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SCIENTIFIC STATIONS IN ANTARCTICA 1882-1963

DUBROVIN, L.I. V.N.PETROV

TRANSLATED FROM RUSSIAN

Published for the Polar Information Service of the National Science Foundation, Washington, D. C. by the Indian National Scientific Documentation Centre, New Delhi.

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(NAUCHNYE STANTSII V ANTARKTIKE 1882-1963)

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PREFACE

This book, "Scientific Stations in Antarctica", by L.I. Dubrovin and V.N. Petrov, is a collection of data on the scientific stations beginning from the early stages of winter stations on the Island of South Georgia in 1882-1883 (established by the German Antarctic Expedition under K. Schröder) up to the year 1963.

The description of individual stations includes a short physiographical sketch of the location, available technical and transport equipment, and details of personnel and scientific equipment along with the nature of work and program of observations up to 1963. Besides, the book deals with the work carried out during the expeditions on ships lying almost motionless in the Antarctic as well as on temporary, transportable and automatic stations. The book also provides concise information on shelters, polar camps and base depots.

As the book brings out clearly the history of development of scientific stations in Antarctica and the nature of investigations carried out in them during the entire period, it may be useful to workers studying the nature of Antarctica and to those interested in organizing such scientific observations in the south polar region.

References on general allied problems and on the work done by individual countries are included at the end of the book, and the reader may consult these references to obtain further details on any specific problem of interest.

The stations of Belgium, USSR and USA have been dealt with by L.I. Dubrovin, while V.N. Petrov has described the stations of Australia (except Wilkes Station which has been described by Dubrovin), Argentina, Great Britain, New Zealand

Norway, France, Switzerland, Chile, South African Republic and Japan.

N.I. Barkov, M.S. Dmitrieva, N.A. Korableva and L.I. Sukhonosova participated in the preparation of the manuscript and its publication.

Arctic and Antarctic Scientific
Research Institute

INTRODUCTION

Antarctic research was carried out on a particularly ambitious scale by the Soviet researchers, while preparing for, and during the observance of, the International Geophysical year. Later on, it was also continued throughout the International Quiet Sun Year. As a result, attention of an increasing number of Soviet scientists of different disciplines was drawn to the south polar region. It is of vital interest for anyone engaged in the study of Antarctica to know how, where, and by which instruments the scientific data he wishes to use was obtained.

During the First International Polar Year, the first station-based scientific observations in Antarctica were carried out by the German Antarctic Expedition, which, under the leadership of K. Schröder, wintered on the Island of South Georgia. The workers of this expedition carried out surface meteorological observations and a number of other investigations from September 14, 1882 to September 3, 1883.

The Belgian ship "Belgica" during its forced drift in the Bellingshausen Sea conducted some meteorological and oceanographic observations in approximately stationary conditions, from March 3, 1898 to February, 1900. At about this time, the first scientific station on the Antarctic continent was established by the British expedition on Cape Adare (Victoria Land). The workers of this station under the leadership of the Norwegian geodesist K. Borchgrevink carried out routine surface meteorological, geomagnetic and biological observations.

During the winters of 1900 and 1901, no station-based observations were carried out in the south polar region, and only from 1902 were such observations carried out continuously at different points in Antarctica. In 1902 stationary observations in Antarctica were carried out at four points : on the ice of the Davis Sea by the ship "Gauss" of the German Antarctic Expedition; at the winter base of R. Scott, located on Ross Island; on Snow Hill Island at the northern extremity of the Antarctic Peninsula where the Nordenskjöld expedition spent the winter, and, on Kerguelen Island by participants of the German Antarctic Expedition of E. Drygalski.

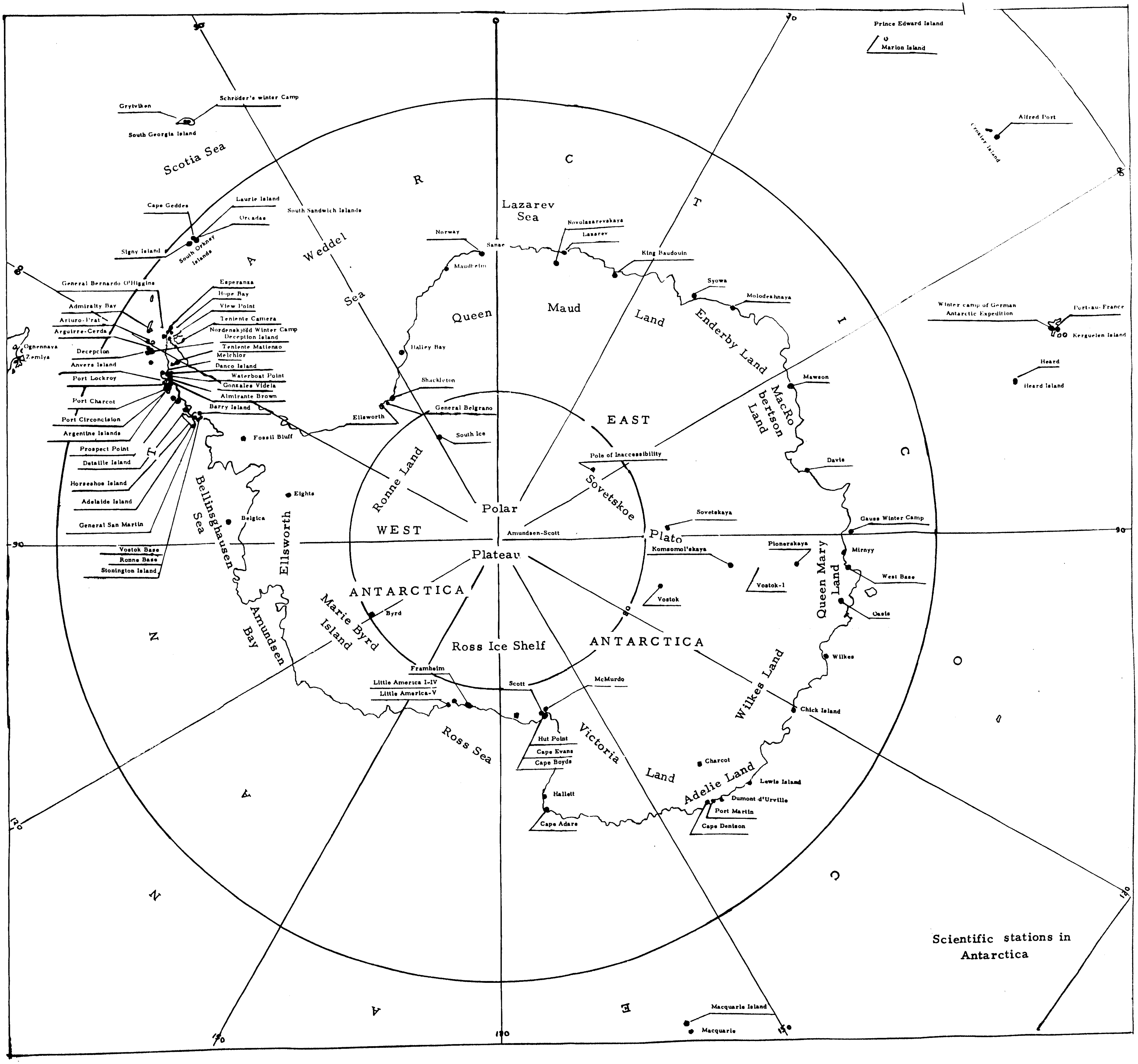
In 1903, a winter base was established by the Scottish Expedition led by W. Bruce at Laurie Island. Later in 1904, this was transferred to the Argentine Metereological Service and it has been continuously operating up to the present time under the name "Orcadas". Argentina started a meteorological station in 1905 to aid the whaling industry at the "Grytviken" settlement on the Island of South Georgia, and it is working even today.

Thus, as a result of the activity of these stations, a vast amount of data on meteorology (and on geomagnetism by the station "Orcadas") has been collected.

Often, these two were the only stations working for a number of years in the Antarctica (in 1905-1907, 1916-1920, 1930-1933, 1935-1939 and 1941-1943).

Station-based investigations on the Antarctic Continent and in the nearby coastal islands were sporadic in nature for a long time. These investigations were usually undertaken by individual expeditions and as a rule, the winter bases attached to these stations did not work for more than a year. Continuously working stations where observations could be carried out for a number of years have been established only since 1944. Such stations were first established on the coastal islands near the Antarctic Peninsula and on the Peninsula itself. In 1944, the Briths stations "Deception Island" and "Port Lockroy" were opened in this region. Within 4 years, at least 6 stations started working, and within 10 years, 11 more stations were added (Great Britain, Argentina and Chile).

Stationary scientific investigations in Antarctica on a large scale were conducted in the preparatory stage as well as during the observance of the International Geophysical Year (IGY).



Scientific stations in Antarctica

Australia, Argentina, Belgium, Great Britain, New Zealand, Norway, USSR, USA, France, Chile, South Africa, and Japan are the twelve countries that participated during this period in the scientific investigation of the Antarctic. Most of the fifty-one stations that participated in the IGY investigations were specifically established to execute the IGY program. Thus, stations with a long term capability were set up in East Antarctica and in the interior of the continent only during the IGY.

The Soviet Union, while carrying out investigations according to the IGY program, occupied a leading position in the study of Antarctica, both in traverse investigations and in establishing station-based observational systems. In 1957, eight Soviet scientific stations were in operation in Antarctica. Six of them were located on the least investigated territories characterized by their inaccessibility and severe climatic conditions.

All the Soviet inland stations, except "Pionerskaya", are located at elevations of more than 3000 m on the icy surface of the Antarctic ice sheet and at considerable distances from the coastal stations. Thus Vostok Station in the vicinity of the South Magnetic Pole is situated at a distance of 1410 km from Mirnyy. Observations showed that the lowest air temperature attained in this region during winter was almost -90°C. By means of sledge and caterpillar-tractor expeditions, Soviet scientists established a station even at the Pole of Relative Inaccessibility. This point is located more than 2000 km from Mirnyy.

All the stations operating in Antarctica have been described. The boundaries of Antarctica correspond to those accepted in the Soviet maps (approximately along the Antarctic Convergence).

Numerous foreign and Russian literary sources furnished material for writing this book. Descriptions of various stations have been made with different degrees of details, and the Chilean stations are described rather perfunctorily, as the information about them in the literature known to the authors was very scanty.

Coordinates and altitudes of the stations have been given from the most reliable and recent sources of the countries to which they belong. In all tables, the opening and closing dates of stations have been noted. Wherever the closing date is not indicated, it is to be understood that the station continued in operation also in 1963.

During the last three years (1964 - 1966), the following changes occurred in the operations of the Antarctic stations.

1. No observations were carried out from the Australian station Davis from October 31, 1964, and since February 24, 1965 it has ceased to function, at least temporarily.

2. On February 17, 1965, the Argentine station Almirante Brown which served earlier as a military and naval base was reopened. Old constructions came in handy as kitchens, electric stations and radio installation sheds. New living accommodation (292 m^2), laboratory (170 m^2) and bath facilities were provided. The winter staff consists of 10 people : the chief of the staff, one doctor, five scientific workers and three mechanics. The program includes meteorological as well as biological observations.

3. There were big changes in the operations of the Soviet station Molodezhnaya. In 1963, the following structures were added to the station : four buildings providing living accommodations, a wardroom, an electric station, a temporary radio station, and a petroleum base with two tanks of 1,000 m^3 capacity, six tanks of 700 m^3 capacity and four tanks of 50 m^3 capacity. Facilities were provided for magnetic, aerological, gravimetric and hydrochemical investigations. Observations were also made with the help of a comparator.

Besides, meteorological, actinometric, hydrological observations as well as those that depended on the use of a comparator were carried out in 1963, and aerological, geomagnetic, glaciological and hydrographical investigations were started in 1964. Riometer investigations of radiowave absorption were started in 1965, while ozonospheric and actinometric exploration of the atmosphere, and observations of noctilucent clouds were started in 1966. In 1965, 44 persons, comprising eleven scientific personnel, five service personnel and twenty-eight construction workers, spent the winter at the station.

4. At the New Zealand-American station Hallett, the geophysical equipment was destroyed in a fire on March 6, 1964. The scientific staff of USA left the station. A small group of scientists from New Zealand remained behind, to continue meteorological observations up to the end of the year. During the summers of 1964/65 and 1965/66, the station functioned as a summer base

5. On February 25, 1965, USA opened a new station "Palmer" on Anvers Island in Arthur Harbor (lat. 60°45'S, and long. 64°04' W.) where the British station "Anvers Island" operated in 1955-58. The old buildings were used as glaciological and biological laboratories. Some new buildings were added. The staff of the station consisted of three glaciologists, two biologists and four sailors from regular service.

6. The US Station "Eights" was closed on November 14, 1965, after 3 years of operation.

7. USA opened a station "Plateau", in January 1966 on the glacial plateau at an altitude of 3624 m above sea level in the central region of East Antarctica (lat. 79°14' and long. 40°30'E). At this point the sledge caravan of the trans-continental expedition stopped temporarily. The station consists of prefabricated buildings and is supplied by aircraft from McMurdo Station.

The staff of the station consists of four scientific workers and four sailors belonging to the US Navy. The program is to carry out meteorological observations and investigations on geomagnetism, aurora and high and low frequency radio emissions.

8. The Chilean station "Gonzalez Videla" was closed on January 16, 1965. However, it functioned as seasonal station in the summer of 1965/66.

9. The Japanese station "Syowa" was again opened on January 20, 1966.

CHAPTER I

SCIENTIFIC STATIONS OF AUSTRALIA

The earliest scientific stations of Australia in Antarctica were opened at the end of 1911 and at the beginning of 1912 by the Australian expedition led by D. Mawson. Two of these stations, Cape Denison and West Base, operated on the continent and another station functioned on Macquarie Island. At the end of 1913, when the work of the expedition was completed, these stations were closed.

In 1947, the Government of Australia established a permanent organization, called the Australian National Antarctic Research Expedition (ANARE) to conduct scientific investigations in Antarctica. This organization opened stations on the islands of Heard and Macquarie in the summer of 1947-48.

In 1949, an Antarctic Department was organized by the Ministry of Foreign Affairs of Australia. The ANARE was placed under its control. F. Law was appointed the Director of this Department. The Australian scientific exploration of Antarctica was to be under the guidance and supervision of the National Committee of Antarctic Research attached to the Australian Academy of Sciences.

Mawson Station was opened in Antarctica in early 1954 by the Australian Antarctic Expedition. It was followed by Davis Station in the summer of 1956-57. In 1959, the US government transferred the Antarctic station "Wilkes" to Australia (Table 1).

The basic scientific material and observational data of the Australian Antarctic Expedition is published in the form of bulletins called "ANARE REPORTS", issued by the Antarctic Department of the Ministry of Foreign Affairs of Australia.

These reports published in English come out in four series. Series A contains material on geography, geology, and

TABLE 1

Australian Stations

Name	Operating Period
Davis	From January 13, 1957 onward
West Base	Feb. 21, 1912-Feb. 23, 1913
Cape Denison	Jan. 19, 1912-Dec. 12, 1913
Macquarie Island	1911-1913 and From 1948 onward
Mawson	From Feb. 13, 1954 onward
Wilkes	From January 29, 1957 onward
Heard	December 26, 1947-March 8, 1955

glaciology; Series B consists of material on zoology, botany, oceanography and hydrology; series C contains material on geophysics and series D, on meteorology.

DAVIS

Geographical Coordinates: Lat. 68°35'S, Long. 77°58'E.
Altitude: 10 m above sea level.
Geomagnetic coordinates: Lat. 76°6'S, Long. 119°0'.
Synoptic Index: 89571.

The scientific research station "Davis" is a permanent base of the Australian Antarctic Expedition.

The station is located in the central part of the south-eastern shore of Prydz Bay, on the Ingrid Christensen Coast (Fig. 1). In this region, the coastline of the continent is broken by tortuous fjords and fringed with numerous rocky islands. The edge of the ice cap is broken in many places by outcrops of bed-rock. The longest of them are Vestfold Hills, forming a part (about 1000 km^2 area) of the sloping ice-free hills. The depressions between the hills are partly occupied by lakes.

The station is built on a smooth coastal terrace in the western extremity of the Breidnes Peninsula in the western

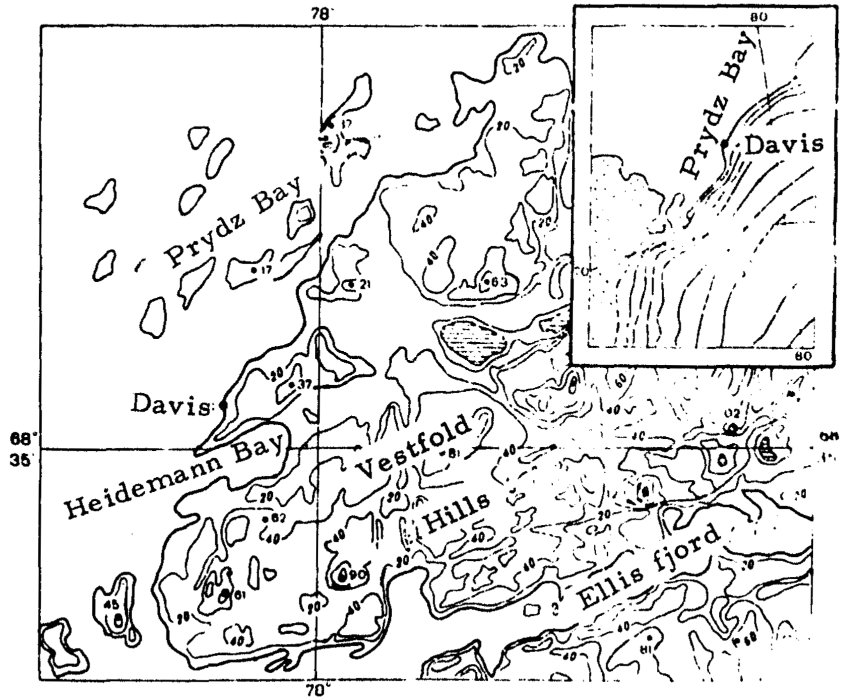


Fig. 1. Region around Davis Station.

part of the Vestfold Hills. The surface, for a few kilometers around the station, is covered with moraine material (boulders and pebbles). The adjacent glacial slope to the southeast has a wavy surface sharply rising to a height of 500 m in a 6 to 8 km range from the end of the open area.

Climatic conditions:- Air temperature: Annual average, -9°C; Maximum, -6°C; Minimum, -32°C. Wind velocity: Annual Average, 5 m/sec; Maximum, 45 m/sec. Average cloudiness, 65%.

Installations :- Davis Station has 13 buildings (1959) serving as electric stations, radio stations, meteorological pavilion, living quarters and auxiliary accommodations (Fig. 2).

Electric Station :- This is provided with a 30 kw generator and another 14 kw generator as a reserve. The station is also equipped with a water distiller, since there is no water suitable for drinking available in summer.

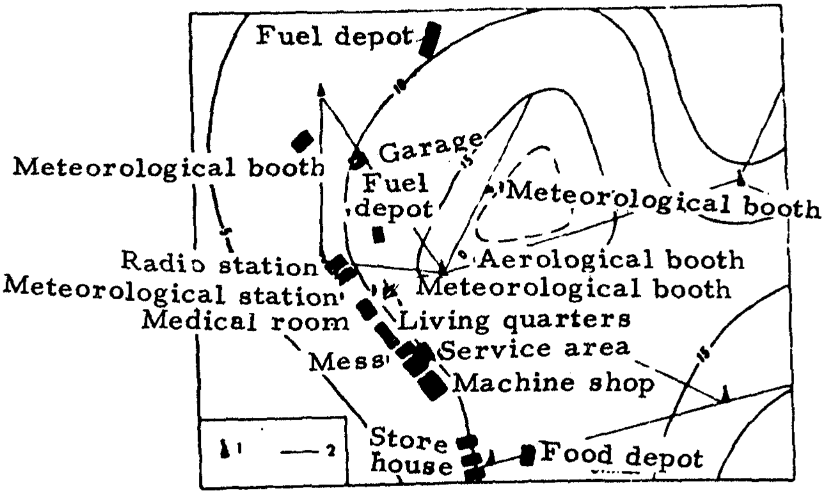


Fig. 2. Plan of Davis Station.
1 - Radio mast; 2 - Antenna.

Means of Transport :- Only "Ferguson" type tractors are used. During the summer season, field work in the region is carried out by airplanes from Mawson Station.

TABLE 2

Station Personnel[1]

Year	Number of workers Total	Scientific	Director
1957	5	2	R. Dingel, Meteorologist
1958	4	2	M. Flatter, Meteorologist
1959	8	4	H. Steiger, Meteorologist
1960	8	4	V. Douglas
1961	9	4	M. Hay, Doctor
1962	9	3	-
1963	9	3	-

[1] The blanks in the Table indicate that relevant information was not available.

Supply :- Supplies are provided by "Tala-Dan" type vessels of the Australian Antarctic Expedition.

The scientific station "Davis" was opened on January 13, 1957 and named in honor of the famous Australian polar Captain, John Davis, former chief officer of E. Shackleton's ship "Nimrod" and at present member of the Planning Committee of ANARE.

Details of staff and the number of workers for this station are given in Table 2.

Principal Scientific Instruments

Meteorology

1. Apparatus for surface meteorological observations.
2. Radiosondes and Rawinsondes (The radiotheodolite started working in April, 1959).

Aurora

1. All-sky camera.

Glaciology

1. Standard glaciological instruments for measuring temperatures and accumulation.

Davis Station also has a set of instruments for carrying out field work in geology, geophysics and biology.

Scientific Observations

The types and periods of scientific observations are shown in Table 3.

TABLE 3
Types of Scientific Observations

Type of observations	Period
Surface meteorological observations	from 1957
Pilot balloon observations	from 1957
Radiosonde sounding	from 1959
Rawinsonde sounding	from 1959
Photography of aurora by all-sky camera (panoramic camera)	1957 - 1958
Visual observations of aurora	from 1957
Observations of accumulation, ablation, temperature of the margin of the ice cap and observation of the thickness of sea ice.	"
Observation of birds and seals in the vicinity of the station	1959 - 1961
Geological observation of the Vestfold Hills and of the coastal belt of the Ingrid Christensen Coast (Geologists also carried out a study of the lakes in the Vestfold Hills)	1957 - 1962

PLATCHA

Coordinates: Lat. 68°31'S, Long. 78°31' E.

This rugged meteorological station of Platcha is located approximately 27 km to the east of Davis Station in the Vestfold Hills. A party of the Australian Antarctic Expedition under the leadership of M. Hay organized the station in April-May, 1961. The name Platcha was given by the workers of Davis Station and is the abbreviation of the name "Plateau Chateau". Usually two meteorologists work at this station. It was set up for carrying out observations on wind flow and operates only periodically.

WEST BASE

Coordinates: Lat. 66°18'S, Long. 95°01' E.
Altitude: About 25 m above sea level.

West Base Station belonged to the Australian Antarctic expedition of D. Mawson in 1911-1914 (Fig. 3).

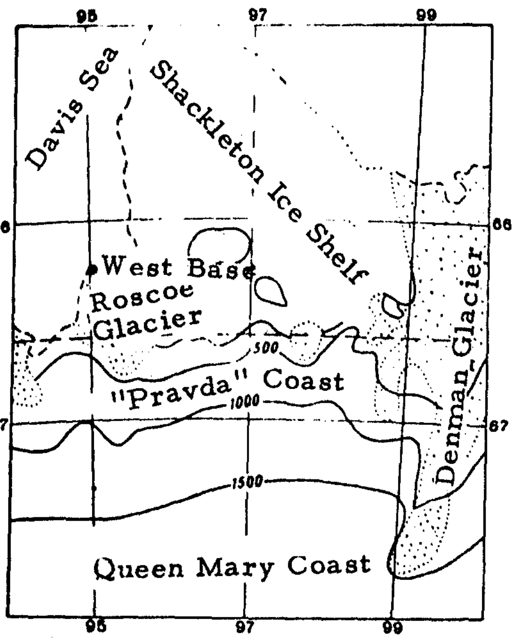


Fig. 3. Region around West Base Station.

It was situated on the southwestern part of the Shackleton Ice Shelf, between the tongues of the outflowing Roscoe Glacier (Pravda Coast, Queen Mary Coast).

The living quarters of the station were placed directly on the surface of the ice shelf approximately 600 m from its northern end and at a distance of 30 km from the ice cap of the mainland. The magnetic observations pavilion, made of ice, was located alongside the living quarters. The non-official name of West Base was "Grotto", so named by the members of the expedition from its external appearance. The personnel of the station consisted of eight people (Director F. Wild), log sleds were used for expeditions along the coast. The station was supplied by the ship 'Aurora'. West Base was opened on February 21, 1912 and closed on February 23, 1913.

Scientific Observations : - West Base was created for carrying out exploratory investigations of the Shackleton Ice Shelf. Besides, the station workers carried out surface meteorological, geomagnetic, biological (on penguins and seals) and glaciological investigations. A borehole of 6.4 m depth was drilled near the living quarters.

CAPE DENISON

Coordinates: Lat. 67°00' S; Long. 142°40' E.
Altitude: 6 m above sea level.

"Cape Denison" Station was the main base of the Australian Antarctic Expedition under D. Mawson in 1911-1914. It was situated on Cape Dension at the eastern part of King George V Coast[1] (Fig. 4).

Cape Denison, jutting out into the Commonwealth Bay of d'Urville Sea is a rocky area, being an outcrop from below the ice cap of the mainland. It is about 2 km long, 900 m wide, and 40 m above sea level. The coastal belt of the sea in this region is strewn with small islands densely populated with penguins, sea gulls and seals.

South of Cape Denison, the surface of the ice cap rises uniformly. It thus serves as a very good access route to the central region of the mainland. The shore on both sides of the station is formed by glacial cliffs of 20 to 40 m height.

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1 *According to some reports pertaining to this period, this part of the coast belonged to Adélie Land. At present, the region between the longitudes 136° and 142° east is known as Adélie Land.*

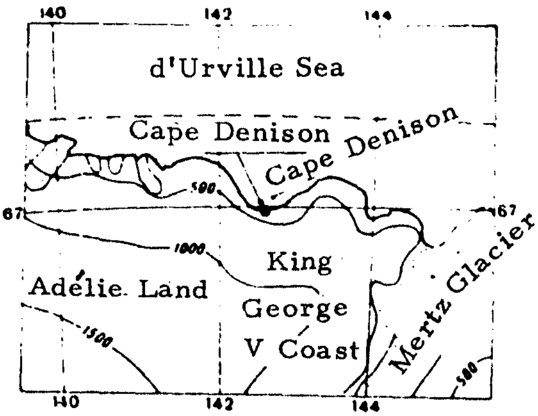

Fig. 4. Region around Cape Denison Station.

Climatic conditions:- Air temperature: Annual average -13°C; maximum temperature, 4.2°C; minimum temperature -33°C. Annual average wind velocity, 19.6 m/sec. Predominant wind direction : southerly and southeasterly.

Installations : The buildings are located on a rocky surface and are protected by a big hillock. The station has a main wooden house providing living accommodation, some working rooms, a provision store, an astronomical laboratory (built by the side of the living quarters), a magnetic laboratory and a hangar for air-sledges.

Electric stations : It has two A.C. and D.C. generators driven by kerosene engines.

Cape Denison was the first in the history of Antarctic expeditions to have a radio facility to communicate (though with extreme difficulty) with Australia through the radio station on Macquarie Island.

Means of Transport : Air-sledges, dog-sleds and sledges The station was supplied by the ship "Aurora". It was opened on February 19, 1912 and closed on December 12, 1913.

The size and composition of the staff is shown in Table 4.

TABLE 4

Personnel of the station

Year	Number of workers		Director
	Total	Scientific	
1912	18	12	D. Mawson, Geologist
1913	7	5	D. Mawson, Geologist

Scientific Observations.

The types of scientific observations are shown in Table 5.

TABLE 5

Types of Scientific Observations

Type of observation	Period
Surface meteorological observations	1912-1913
Recording of geomagnetic-field fluctuations	1912-1913
Absolute geomagnetic observations	1912-1913
Visual observations of aurora	1912-1913
Observations on accumulation and ablation.	1912-1913
Stratigraphic and temperature observations	1912-1913

Contd.

1	2
Observations on sea ice	1912-1913
Observation of sea-level fluctuation	1912
Marine biological investigations	1912
Observations on birds and seals	1912-1913
For the first time in the history of Antarctic expeditions, an accurate determination of the longitude was carried out by using time signals transmitted by the Melbourne Observatory.	

MACQUARIE ISLAND

Coordinates: Lat. 54°29' S, Long. 158°58' E.
Altitude: 6 m above sea level.
Geomagnetic coordinates: Lat. 61°.1 S; Long. 243°.1.
Synoptic Index: 94998.

The scientific research station "Macquarie Island" is a permanent base of the Australian Antarctic Expedition.

The station is located on the northern part of Macquarie Island that stretches nearly 40 km from NNE to SSW in the southern part of the Pacific Ocean between 54°78' and 54°46' south latitudes and at 158°55' east longitude approximately. The island is hilly. In many places the hills slope directly into the sea. On the northwestern part of the island the hills have gentle slopes, whereas on the northern side they rise steeply to form cliffs as high as 366 m. Hamilton Hill is the highest hill (433 m) on the island. Some parts of the island, especially the northwestern part, are marked by narrow tongues of shingled beach. Some other parts of the island are covered by swampy areas and lakes.

The station is situated on the low sandy isthmus joining the island with the almost isolated northern peninsula stretching to the northeast. A large part of this peninsula is occupied by a hill named Radio Hill, about 100 m high and having a flat top. The sandy isthmus where the station is located is 150-200 m wide and divides the two bays: the Northeastern Bay on the east and the Hasselborough Bay on the west.

The coastal region of both the bays in the vicinity of the station is full of obstacles below as well as above water surface and this makes the coast almost inaccessible even to light ships.

Climatic Conditions : - Annual average air temperature, 4.5°C; maximum, 11.5°C; minimum, - 9°C. Average annual wind velocity, 6.5 m/sec, maximum, 48 m/sec. Average annual cloudiness, 82%.

This scientific station which was set up during Australian Antarctic expedition under D. Mawson operated from December 23, 1911 to November 28, 1913 on Macquarie Island. The living quarters were built on the leeward (eastern) side of the massive rock which rises to a sandy bank overgrown with grass on the northern end of the isthmus.

A radio station was built on the top of the Radio Hill. The station staff consisted of five people : one meteorologist, one geologist-cum-cartographer, one biologist, one radio-operator and a mechanic. Meteorologist Ainsworth was the director of the station.

The station was intended for carrying out scientific investigations on Macquarie Island and for maintaining radiocommunications between the main base of the Antarctic expedition under Mawson on the Adélie Land in the Antarctic and Australia. This was achieved with considerable difficulty since the radio equipment was not technically sound.

The staff of the station was vacated from the station in November 1913 by the expedition ship "Aurora". They were replaced by three workers from the Australian State Weather Bureau to carry out meteorological observations and to maintain radiocommunication with Australia.

Scientific Observations : Throughout the whole working period, i.e., from December 1911 to November 1913, surface meteorological observations were carried out. Observations on tides by means of tide gage were also carried out from June 1912.

Precise geodetic data of the island was collected. A reconnaissance (geological) survey of the island was also done. The biologists conducted a study of the flora and fauna.

At present the scientific station "ANARE Macquarie Island" is located on the place where the Mawson expedition base was first established.

Installations : Macquarie Island Station has 40 closely situated small houses. The station consists of an electric station, a radio station, scientific laboratories and sheds, living auxiliary accommodations (Fig. 5).

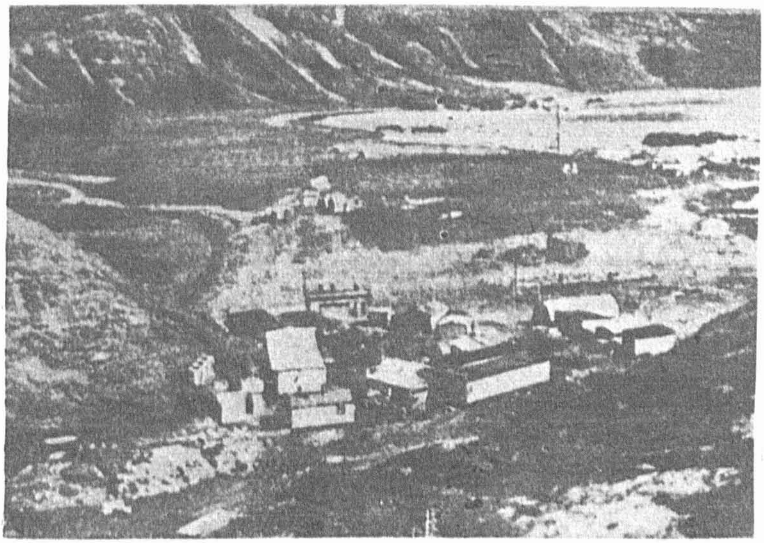

Fig. 5. Macquarie Island Station, 1959.

Electric station: - This consists of a 47 kw generator for regular use and a 15 kw generator as a standby.

At the southern extremity of Macquarie Island, on Cape Hard, a second observatory was built in 1953 to observe aurora.

Transport : "Caterpillar" type tanks are used in the station.

Supply : Supplies are provided by "Tala-Dan" type ships of the Australian Antarctic expedition.

Macquarie Island Station was opened in March 1948.

The composition and number of personnel are shown in Table 6.

TABLE 6

Personnel of the station

Year	Number of workers		Director
	Total	Scientific	
1948	15	6	A. Martin, Meteorologist
1949	12	5	A. Gwynn, Doctor
1950	17	9	D. Cohen, Physicist
1951	17	9	R. Stibbs, Meteorologist
1952	14	5	J. McCarthy, Meteorologist
1953	14	7	R. Dalton
1954	13	7	K. Campbell
1955	14	7	M. Haynes
1956	15	8	I. Adams
1957	15	8	H. Black
1958	15	7	F. Baines
1959	17	8	T. Harwood
1960	15	5	M. Taylor
1961	14	6	F. Stein
1962	15	5	
1963	16	5	

Principal Scientific Instruments

Meteorology

1. Apparatus for surface meteorological observations.
2. Radiosondes.
3. Rawinsondes.
4. Dobson's spectrophotometer.

Ionosphere

1. Instruments for ionospheric investigations (destroyed in the fire of March 1959).

Seismology

1. Wood-Anderson Seismograph (Micro pulsations of the horizontal component).
2. Grenet's Seismograph (For vertical component).
3. Benioff type short-period seismographs.

Geomagnetism

1. Magnetograph La-Kura (Normal sensitivity).
2. Magnetograph La-Kura (Low sensitivity, swift moving)[1].
3. Variometers QHM, BMZ and declinator.

Cosmic rays

1. Ionization chambers and Geiger counter, (removed to Australia in 1949).
2. Two 60 cubic centimeter telescopes (destroyed in the fire of March 1959).

Aurora

1. All-sky camera (exposure 10 sec through 1 minute).
2. Radiolocator.
3. Theodolite for visual observations.

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[1] *Both the seismographs were destroyed in the fire of March 1959.*

Scientific Observations

The types and periods of scientific observations have been presented in Table 7. Geological and geodetic surveys of the entire island were carried out throughout the operational period of the station.

TABLE 7

Types of Scientific Observations

Type of observations	Period
Surface meteorological observations	From 1948 onward
Pilot balloon observations	From 1949 onward
Radiosonde sounding	From 1949 onward
Rawinsonde sounding	From 1959 onward
Total ozone measurement	1957-1959 and from 1963 onward
Vertical sounding of ionosphere	1950-1959
Standard seismological observations	From 1950 onward
Absolute geomagnetic observations (at 7 to 10 day intervals)	From 1948 onward
Recording of geomagnetic field fluctuations	From 1950 onward
Meson count of cosmic rays	1948; 1950-1959
Photographing of aurora by all-sky camera	From 1951 onward
Visual observation of aurora	From 1950 onward
Parallax photography of aurora	1953-1959
Radiolocation observation of aurora	1959-1960
Observation of sea-birds and seals	From 1948 onward

MAWSON

Coordinates: Lat. 67°36' S., Long. 62°52' E.
Altitude: 8 m above sea level.
Geomagnetic coordinates: Lat. 73°2 S., Long. 103°.1.

Mawson Station is a base of the Australian Antarctic Expedition. It is located on the shore of the eastern part of the Holme Bay in the MacRobertson Land which is free from continental glaciers (Fig. 6).

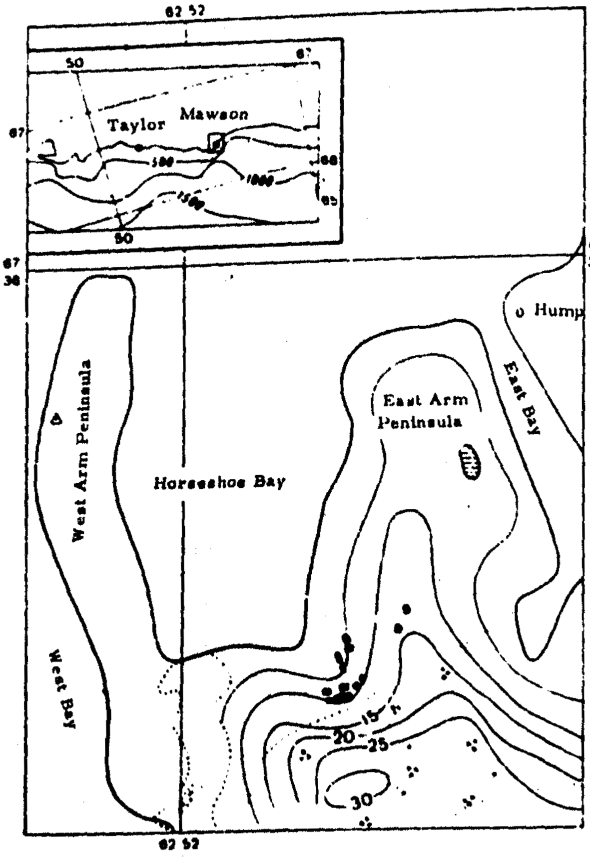

Fig. 6. Region around Mawson Station.

The eastern and southern shores of the Holme Bay are cut by small inlets and in some parts are indented by medium-size glaciers and small projections. To the south of the bay head, there is a large tract of hilly area with jutting peaks free from ice sheet. All this region protruding for about 50 to 90 km into the continent is named Framnes. Individual hills attain a height of 1000 to 1500 m. The Mawson group of islands consisting of numerous cliffs and submarine rocks is situated to the east of Holme Bay.

The station is built on the bulging horseshoe-shaped part of the coast. The interior part of this coast forms the Horseshoe Bay, a very suitable place for landing. The depth in the central part of this bay is 90 m. The sea around Mawson Station is calm even on stormy days since the Horseshoe Bay is protected by the massive capes of East Arm and West Arm in the east and west, by the glacial slope in the south and by the islands in the north (Fig. 7). The mainland coast lying on the eastern and the western part of the station is in the form of a glacial cliff, whose height attains 50 m.

A gentle fissureless glacial slope opens the way to the glacial plateau.

There is a sufficiently large tract of rocky area free from ice around the station where more constructions and buildings can be put up.

Climatic conditions:- Average annual air temperature, -10°C; maximum, -7°C; minimum -30°C; average annual wind velocity, 11.5 m/sec; maximum, 50 m/sec.

Installations: There are 24 buildings (1960) in Mawson Station which include an electric station, a garage, a radio station, a food depot, a hospital, a hangar, a scientific laboratory and living accommodation. The radio station has communication links with Perth, Capetown, and Marion and Kerguelen Islands. It has a radio relay installations and a transmitting station.

Electric station: There is a 70 kw generator as well as a reserve 15 kw generator.

Transport: It is equipped with "Beaver" and "Dakota" type airplanes, tractors, and snow crawlers of the "Snow-Cat" type. There are two landing and take-off strips near the station. One of them is on a floe, the other is on a glacial slope a few miles away to the south of the station.

Supply: Tala-Dan type ships of the Australian Antarctic Expedition bring supplies by the sea route.

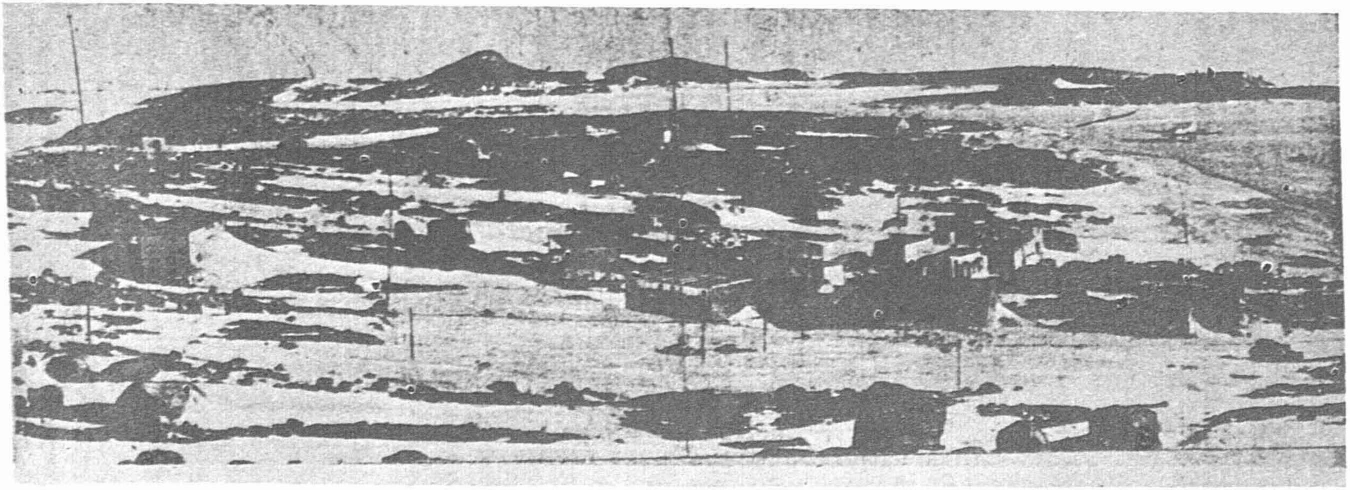

Fig. 7. Mawson Station.

Mawson Station was opened on February 13, 1954. The station got its name from the famous Australian polar researcher Douglas Mawson.

The number and composition of the workers is shown in Table 8.

TABLE 8

Personnel of the Station

Year	Number of workers: Total	Number of workers: Scientific	Director
1954	10	2	R. Dovers, Topologist
1955	15	7	J. Bechervaise
1956	20	7	U. Busher
1957	23	11	K. Mazer, Physicist
1958	28	7	I. Adams
1959	23	9	J. Bechervaise
1960	33	10	H. Jåson
1961	37	10	A. Maslen
1962	25	11	
1963	25	11	

Principal Scientific Instruments

Meteorology

1. Apparatus for surface meteorological observations.
2. Actinometric instruments.
3. Radiosondes and rawinsondes.

Ionosphere

1. Portable ionosonde of IIIA type (Frequency range from 1 to 15 MHz).
2. Riometer (77 and 27 MHz).

3. A 34-MHz radar establishment for measuring movements of meteor trails in the ionosphere.

Seismology

1. A three component short-period seismograph of the type "Lit Blamberg" was used. (These instruments were destroyed in the fire of December 1959 and were replaced by Benioff type seismographs, which are short-period sensitive in the vertical component and long-period sensitive in the horizontal component).

Geomagnetism

1. Low sensitivity magnetograph La-Kura.
2. Normal sensitivity magnetograph La-Kura.
3. Flux meter with normal apertures for registration of quick variations.

Cosmic rays

1. Two cubic meson telescopes.
2. IGY neutron monitor with 12 counters.

Aurora

1. ANARE type all-sky camera.
2. Theodolite for parallax photography of aurora.
3. Four-channel filter photometer with manual adjustment.
4. Petrol spectrograph and modified spectrograph with high dispersion-USA model.

Glaciology

1. Standard glaciological instruments.
2. Apparatus for seismic sounding of the ice cap.
3. Photoelectric meter to measure the forward movement of snow drift.

Scientific Observations

Types and periods of scientific observations are presented in Table 9.

TABLE 9

Types of Scientific Observations

Type of observations	Period
Conventional surface meteorological observations	From 1954 onward
Actinometric observations	" 1955 "
Pilot balloon observations	" 1954 "
Radiosonde sounding of atmosphere	" 1955 "
Rowinsonde sounding	" 1956 "
Vertical sounding of ionosphere	" 1957 "
Measurement of winds (75-110 km) by observing the movement of meteor trails	1957-1961
Measurement of absorption of radio-waves in the ionosphere	From 1961 onward
Standard seismographic observations	" 1956 "
Recording of geomagnetic variations	" 1955 "
Recording of geomagnetic variations by quick-action La-Kura magnetograph	" 1959 "
Absolute magnetic measurements (measurements are carried out once every 7-10 days)	" 1957 "
Observations on meson components of cosmic rays	" 1955 "
Observations on neutron components of cosmic rays	" 1957 "
Photographing of aurora by all-sky camera	" 1957 "
Visual observations	" 1954 "
Parallax photography of aurora	1957-1961
Photometric measurements	From 1960 onward
Observations on accumulation and movement of the continental sheet and sea-ice	" 1954 "
Measurement of forward movement of snow drift	" 1961 "
Seismic sounding of the ice cap	1957-1959

Contd.

1	2
Botanical and zoological observations (birds and seals) around the station	1954-1962
Physiological observation (for human acclimatization)	1958 and 1961
Geological survey of the region including Mac-Robertson, and Enderby Lands	1954-1961

TAYLOR

Coordinates: Lat. $67^{\circ}27'$ S; Long. $60^{\circ}52'$ E.
Altitude: 4 m above sea level
Synoptic Index : 89561

"Taylor" was a temporary subsidiary base of the Australian Antarctic expedition. It was set up in September 1957 and operated continuously up to the spring of 1959.

The station was located on the edge of the Taylor Glacier in Mac-Robertson Land, and was manned by the personnel of Mawson Station. It availed of land transport.

Scientific instruments: Apparatus for surface meteorological observations and all-sky camera for photographing aurora.

Scientific Observations

1. Surface meteorological observations were carried out throughout the duration of the station.

2. Parallax photography of aurora (jointly with Mawson Station) was carried out during 1958-1959.

3. Ornithological observations on the colony of royal penguins on the Taylor Glacier were periodically carried out in summer.

WILKES

Coordinates: Lat. $66^{\circ}15'$ S: Long. $110^{\circ}32'$ E.
Altitude: 10 m above sea level.
Geomagnetic coordinates: Lat. $77^{\circ}.8$ S; Long. $179^{\circ}.0$.
Synoptic index: 89611.

Wilkes Station is located on the Clark Peninsula situated in the northern coastal part of Grierson Oasis. This "oasis" is actually a group of ice-free islands and peninsulas extending 30 miles from the north to the south along the eastern coast of the Vincennes Bay (Budd Coast). The area of ice-free ground in this region is about 75 km^2.

The station buildings are erected on the moraine deposits and rock outcrops approximately 4 km from the edge of the glacial shelf which rises up sharply to the east of the station attaining a height of 1000 m in about 80 km (Fig. 8).

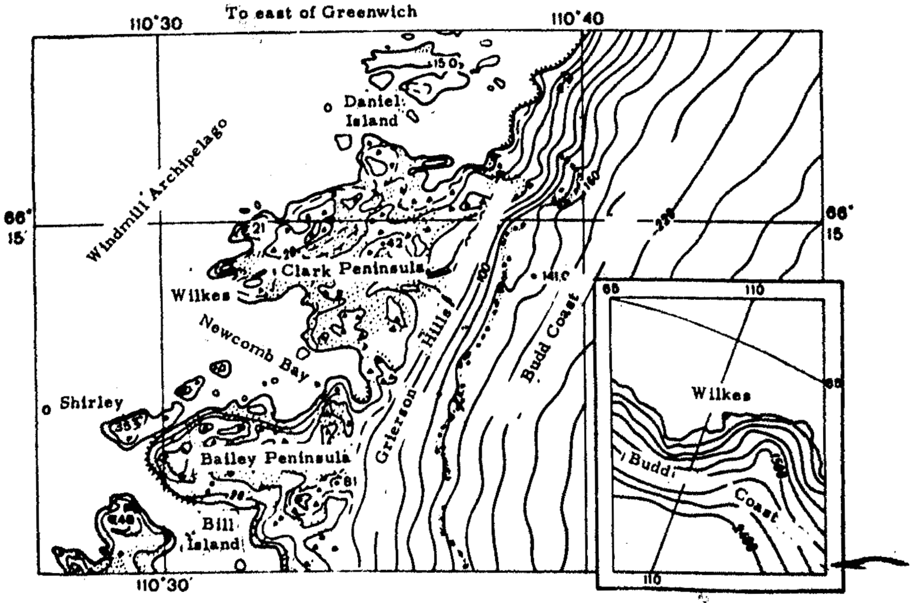

Fig. 8. Region around Wilkes Station.

Climatic conditions: Air temperature: Annual average, - 7°.7; maximum, 8°C; minimum, -37°.8 C. Wind velocity: Annual average, 7.3 m/sec. Maximum above 50 m/sec. Most part of the sea in the vicinity of the station is covered with snow.

Installations: There are about 18 structures used for residential as well as laboratory purposes. About 25 people live in them. It has an electric station with two 60 kw diesel generators, a radio station, a meteorological laboratory and other service establishments. A plot of land near the station has been demarcated for meteorological investigations. It has also an air strip (Figs. 9, 10).

Radiocommunication: Radiocommunication is carried out by a 1 kw transmitter and another 300 watt transmitter. Besides, there are some mobile stations with power ranging from 0.25 to 100 watts.

Transport : "Weasel" caterpillar tanks and tractors are used.

Supply : The station is provisioned by "Tala-dan" type of ships belonging to the Australian Antarctic Expedition and partially by planes from the American base "McMurdo".

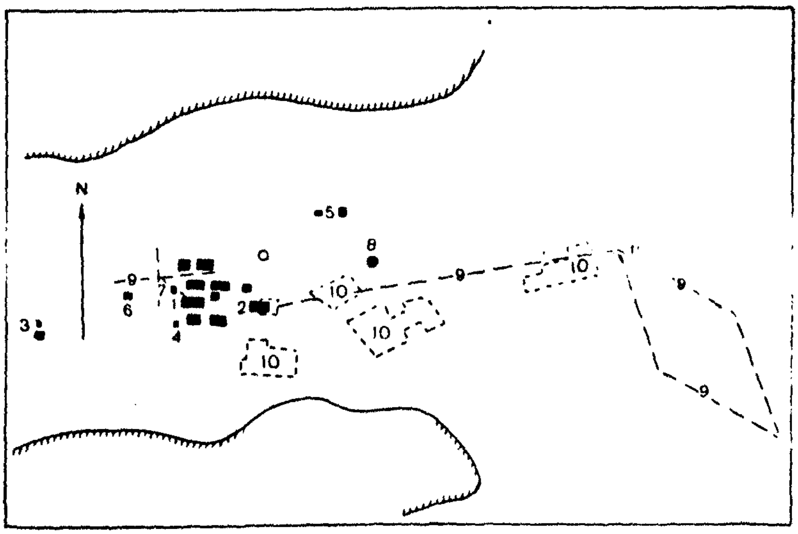

Fig. 9. Plan of Wilkes Station.
1 - Science booth; 2 - Radio and meteorological station; 3 - Aerological booth; 4 - Glaciological booth; 5 - Geomagnetic booth; 6 - Auxiliary seismic laboratory; 7 - Seismic laboratory; 8 - Geodetic pavilion; 9 - Antennas; 10 - Store; 11 - Radio station.

Wilkes Station was opened on January 29, 1957 during the American Expedition "Deep Freeze-II" and was named in honor of Charles Wilkes, Chief of the US Antarctic expedition in 1838-1840 which investigated the coastal waters of Antarctica in this region. Till 1959, Wilkes Station belonged to USA and

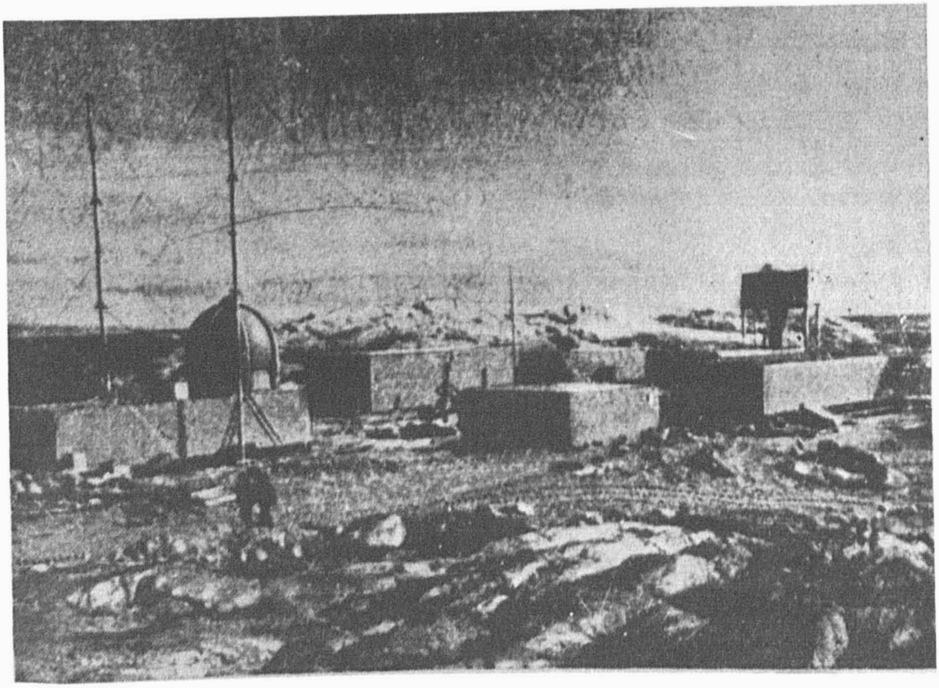

Fig. 10. Wilkes Station.

in January 1959 it was transferred to Australia. However, in recent years, a part of the scientific investigations at the station were carried out by US scientists. The size and composition of the personnel is shown in Table 10.

TABLE 10

Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
1957	27	14	K. Ecklund, Ornithologist
1958	28	11	V. Gresseler

Contd.

1	2	3	4
1959	17	8	Ding
1960	18	8	Black
1961	15	7	I.R. Smethorst
1962	23	11	R.B. Thomson
1963	23	9	R.A. Saxton, Electrician

Note: Three Americans (one biologist and two meteorologists in 1959), four Americans (one meteorologist, one biologist and two synopticians) in 1960, five Americans (three meteorologists and two biologists) in 1961, and four Americans (all meteorologists) in 1962 conducted the investigations at this station.

Principal Scientific Instruments

Meteorology

1. Apparatus for standard surface meteorological observations.
2. Radiosondes and rawinsondes.
3. Actinometric equipment.

Ionosphere

1. Apparatus for vertical sounding of ionosphere: C-3, C-4 recorders, NBS Barker and Williams.

Seismology

1. Seismic apparatus, Lener and Griffith.

Geomagnetism

1. Magnetograph and Magnetometers of different types.

Cosmic Rays

1. Meson telescope.

Aurora

1. Equipment for visual observations.
2. Automatic all-sky camera.
3. Spectral camera.

Glaciology

1. Standard glaciological apparatus and equipment for measurement of temperature, accumulation of snow, etc.
2. Apparatus for crystallographic analysis of snow and ice.
3. Apparatus for seismic sounding of the ice cap.

Oceanography

1. Portable level autorecorder.
2. Equipment for observing snow and investigating sea ice.
3. Apparatus for ground sampling.

Besides, the laboratory possesses instruments for biological observations and geological and geophysical field work.

Scientific Observations

The various types and periods of scientific observations are presented in Table 11.

TABLE 11

Types of Scientific Observations

Types of observations	Period
Surface meteorological observations	From 1957 onward
Radiosonde sounding	" 1957 "
Rawinsonde sounding	" 1957 "
Actinometric sounding	" 1957 "
Vertical sounding of ionosphere	" 1957 "
Stationary seismological observations (Recording of earthquakes)	" 1957 "
Recording of geomagnetic variations by fast-response magnetograph	" 1957 "
Recording of geomagnetic variations by slow-response magnetograph	" 1957 "
Absolute geomagnetic measurements (weekly)	" 1957 "
Continuous monitoring of cosmic rays by means of meson telescope	July 1, 1957 to Dec. 31, 1958 From 1961 onward
Photographing of aurora by all-sky camera	From 1957 onward
Photographing of aurora by spectral camera	" 1957 "
Visual observation of aurora	" 1957 "
Observation of accumulation and ablation	" 1957 "
Observation of glacier drift	" 1957 "
Investigations on physical and mechanical properties of snow and ice	" 1957 "
Observations of temperature and thickness of snow-firn	" 1959 "
Stratigraphic studies of glacier in boreholes and pits	" 1960 "
Petrographic study of snow and ice	" 1960 "
Snow drift	" 1959 "
Observations of sea-level fluctuation	Feb., April, Nov., Dec. 1958
Observations of currents	Feb. 1958-1959

Contd.

1	2
Observation of mobility, thickness and salinity of sea ice	" " "
Ground sampling	" " "
Studies on infections of upper respiratory organs	From 1959 onward
Investigations on acclimatization of human beings in Antarctic conditions	" 1961 "
Study of ecology, collection of seaweeds, moss and lichens	" 1958 "
Collection of fishes	" 1958 "
Investigation on parasitology of fishes	From 1959 onward
Observation of pinnipedia	1956-1957
Ornithological investigations	From 1956 onward

In addition, geological investigations were also carried out in the territory of the station in different years.

Wilkes Station is a starting base for expeditions to the Budd Coast and for sledge-caterpillar caravan expeditions to the inner parts of East Antarctic.

S-2

Coordinates : Lat. 66°31' S., Long. 112°12' E.
Altitude: 116 m above sea level.

The branch station S-2 is located in the territory of Wilkes Station. It is situated on the snow-bound surface of the glacier, 80 km east-southeast of the main station.

Installations: The structures consist of an assembly of four prefabricated houses, and an electric station. There is a meteorological observational area in the station. For glaciological observations, an inclined borepit 35 m deep, a horizontal tunnel and a drill-hole at a depth of 27 m from the bottom of the borepit were drilled (Fig. 11). Amphibian tractors supply the station with provisions.

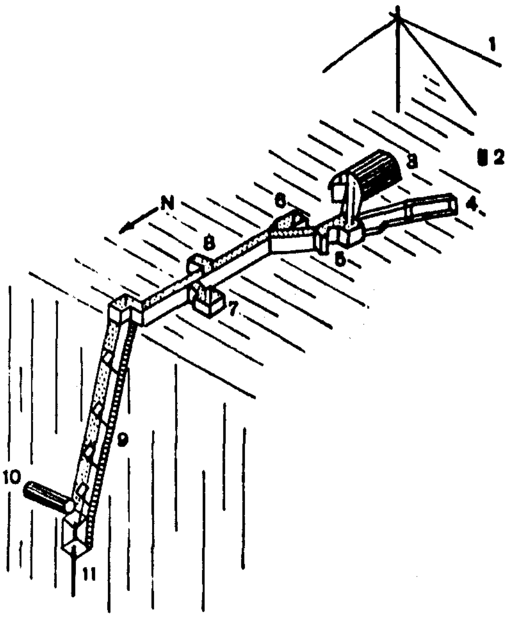

Fig. 11.Plan of S-2 Station.

1 - Anemometer masts; 2 - Storehouse for instruments; 3 - Living quarters; 4 - Entrance; 5 - Depot; 6 - Laboratory; 7 - Generator room; 8 - Entrance; 9 - Inclined 35 m pit; 10 - Horizontal tunnel for investigating deformation in the thickness of the snow-firn; 11 - 27 m pit-hole.

The station S-2 was established in March 1957 and is served by the personnel of Wilkes Station. Meteorological observations are carried out periodically and a number of glaciological investigations are also made.

Besides the station S-2, Wilkes Station has two more branch stations at a distance of 8 and 21 km respectively from the main base. Meteorological investigations are carried out occasionally by workers of the main base itself. In the year 1960/61 automatic weather recorders were established in S-2 Station.

HEARD

Coordinates: Lat. 53°01' S., Long. 73°23' E.
Altitude: 5 m. above sea level.
Synoptic index: 94997.

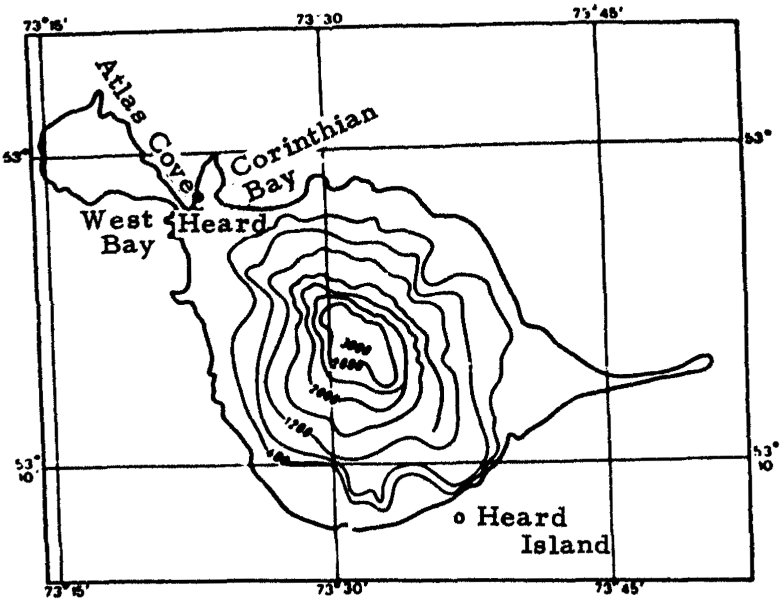

Fig. 12.Region around Heard Station.

The scientific station "Heard" is the base of the Australian Antarctic Expedition on the northern coast of Heard Island on the peak of the Atlas Cove (Fig. 12).

Heard is a volcanic island, the greater part of which is under a continental glacier reaching up to the sea and ending in snowy cliffs 20 - 30 m high.

The only areas free from ice are the lower inclines of Lawrence, Rogers Head and Spit Peninsulas but even they are not entirely free from ice in winter. The central hillock which represents the main mass of the island is made up of the extinct volcano Big Ben (3000 m high).

The vegetation in the island is very scarce. It grows a few varieties of mosses and lichens, and a kind of Kerguelen cabbage whose tufts are found in the coastal parts. The animal world consists of seals and numerous types of sea birds. The station is located on a low, ice-free surface of a narrow isthmus between the main island and Lawrence Peninsula at the foot of the Big Ben volcano (Fig. 13). Though the southeast and southwest edges of Atlas Cove are extremely steep, the top end of the bay

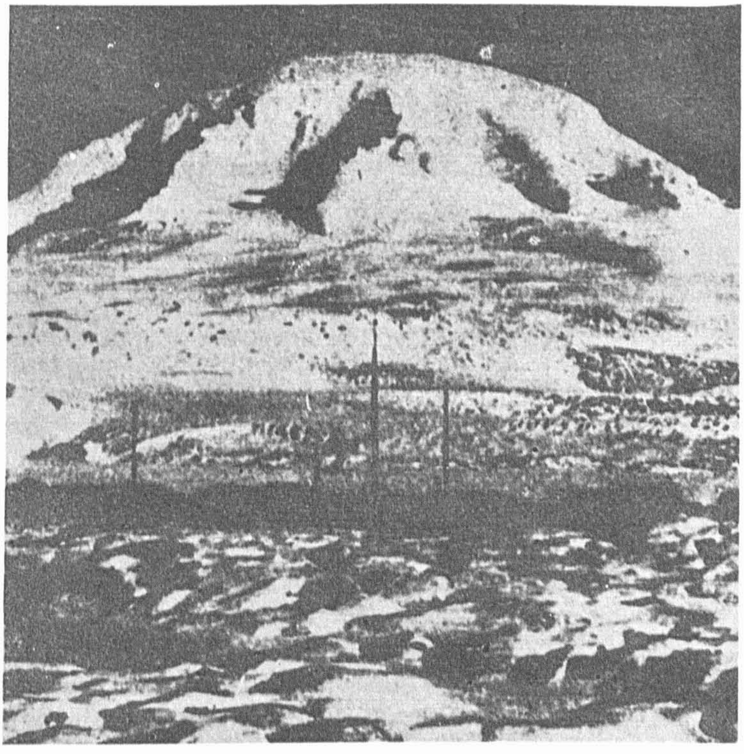

Fig. 13.Heard Station, 1954.

(where the station is located) provides the best landing area on the island.

Climatic conditions: - Air temperature: annual average, $1^{o}.1$ C; maximum 14^{o}C, minimum, $-10^{o}.5$ C. Average annual wind speed, 10 m/sec; maximum: 48 m/sec.

Installations : The station has approximately 30 small sheds consisting of the control building, radio station, diesel electric station (of 15 kw capacity), scientific laboratories and sheds, living accommodations and auxiliary buildings (1954).

Means of Transport :- Dog sleds are used for transport on the island.

Supply :- The station is catered by "Tala-dan" type vessels of the Australian Antarctic Expedition. Heard Station was opened on December 26, 1947 and closed on March 8, 1955. The main scientific equipment was then transferred to the Australian scientific stations in the Antarctic.

The size and composition of the workers are shown in Table 12.

TABLE 12

Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
1948	14	7	A. Hotley, Meteorologist
1949	11	5	R. Allison, Doctor
1950	16	7	J. McCarthy, Meteorologist
1951	14	7	F. Hannan, Meteorologist
1952	14	6	L. Hibbney, Biologist
1953	13	5	J. Bechervaise
1954	13	7	K. Campbell

Principal Scientific Instruments

Meteorology

1. Apparatus for surface meteorological observations ,
2. Radiosondes.
3. Rawinsondes.

Geophysics

1. Geiger counter.
2. Ionization chamber.
3. Magnetograph.
4. Seismograph.

Oceanography

1. Moreograph. (Tide gage).

Besides the above-mentioned equipment, Heard Station had instruments and other facilities for carrying out field work in biology, geology and topography.

Scientific Observations

The types and periods of scientific observations are shown in Table 13.

TABLE 13

Types of Scientific Observations

Type of observation	Period
Surface meteorological observations	1948-1954
Pilot balloon observations	1949-1954
Radiosonde sounding	1949-1954
Rawinsonde sounding	1953-1954
Continuous cosmic ray observations	1948-1954
Standard seismographic observations	1951-1954
Geomagnetic observations (absolute strength and variations)	1952-1954
Observation of sea-level fluctuation	1948-1954
Observation of sea birds and animals	1948-1954

AUTOMATIC METEOROLOGICAL STATIONS

LEWIS ISLAND

Coordinates: Lat. 66°06' S, Long. 134°22' E.
Altitude: 27.5 m above sea level.

The automatic meteorological station "Lewis Island" was established by the Australian Antarctic Expedition on January 23, 1958.

The station is built on the central part of the small and rocky Lewis Island, located near the east shore of the Davis Bay on Clarie Coast. This automatic station, installed on rocky ground, consists of three steel masts, and a small house where the radio transmitting apparatus is located. It has a coding instrument and an accumulator battery which can operate for 3 months without recharging. Two of the masts are for the antennas while the third mast supports a wind-driven generator for charging the accumulators (Fig. 14).

The station can operate for 12 months without requiring any servicing. Measurements are carried out on air temperature, atmospheric pressure, velocity and direction of wind. This information is transmitted every six hours to Macquarie Island, Mawson, and Davis stations.

Meteorological information from the automatic stations is transmitted with the following limits of accuracy.

Atmospheric pressure	to 0.5 Megabars.
Air temperature	0.5°C.
Velocity of wind just 5 minutes before transmission time....	to 3 m/sec.

The meteorological data is transmitted approximately at 0600, 1200, 1800 and 2400 hours Greenwich mean time. Transmission time is about 2 minutes. The servicing of Lewis Island Station is carried out in summer by ships of the Australian Antarctic Expedition.

When one of the masts collapsed on May 20, 1958, the station suddenly ceased functioning. It was repaired and restored to normal operation from January 15, 1959.

CHICK ISLAND

Coordinates: Lat. 66°47' S., Long. 121°00 E.

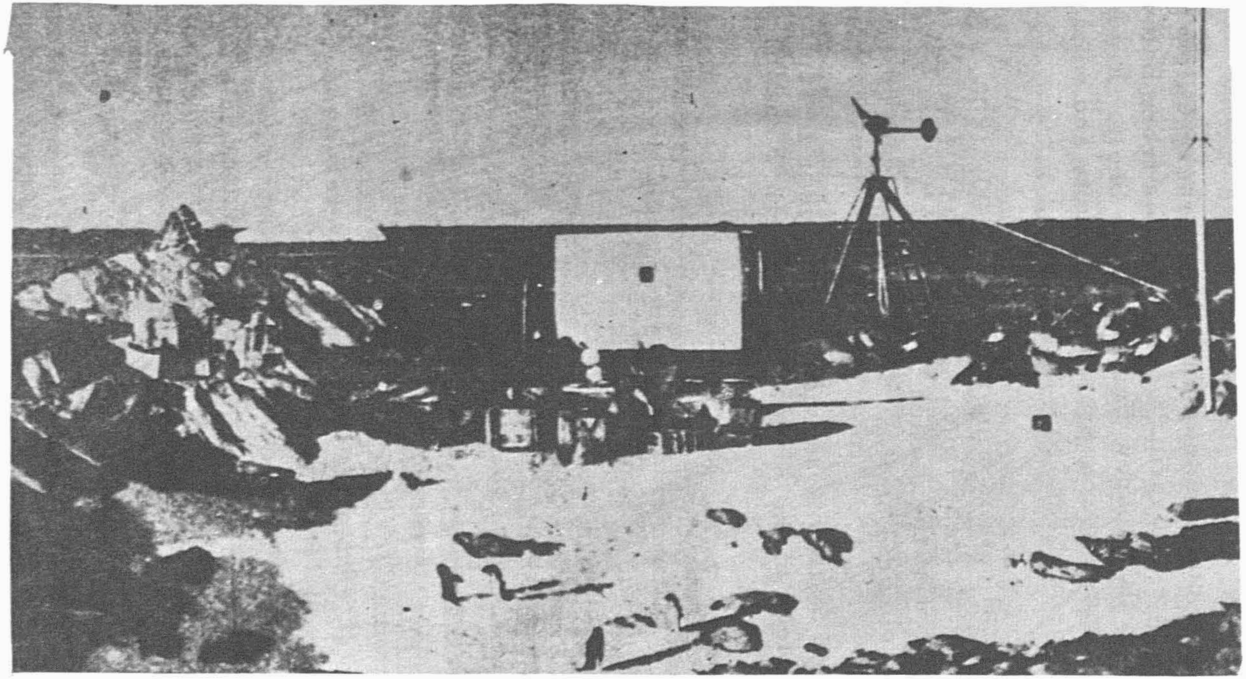

Fig. 14. Lewis Island Station.

The automatic meteorological station Chick Island was opened by the Australian Antarctic Expedition in February 1961.

The station is constructed on the small rocky Chick Island, on the northern shore of Sabrina Coast, 4 miles from Baldwin Cape, at the end of the Moscow University Ice Shelf. It measures air temperature, atmospheric pressure, velocity and wind direction and transmits data to Wilkes Island.

Meteorological data is transmitted at 0600, 1200, 1800 and 2400 hours Greenwich mean time. The general setup and meteorological equipment at the station is the same as that of the automatic meteorological station "Lewis Island".

Chick Island Station is serviced once a year in summer by ships and helicopters of the Australian Antarctic Expedition.

CHAPTER II

SCIENTIFIC STATIONS AND DEPOTS OF ARGENTINA

Station-based scientific investigations in the Antarctic by Argentina were started at the beginning of this century, when a permanent meteorological station called Orcadas was set up in the South Orkney Islands on January 2, 1904 by an order of the Government. This station is still carrying out meteorological observations and is the largest station in the south, possessing a collection of observations spread over half a century.

In 1905 the Argentine Whaling Company established a meteorological station in the Grytviken settlement on the Island of South Georgia for serving its fleet. During January 1950, Grytviken Station was transferred to the Meteorological Department of the Falkland Islands Administration.

A new phase in the Argentine research on the Antarctica began in 1940 when the National Antarctic Committee was set up under the Ministry of Foreign Affairs. The permanent members of this Committee were the representatives of the Navy, Air Force and Army. Representatives of the Argentine Antarctic Institute, Hydrographical Service, Institute of Military Geography, and National Meteorological Service have only the power to give advice and serve as advisers in regard to specific problems referred to them.

Since 1947, the Argentine Army and Navy have been establishing their bases in the Antarctic Peninsula and in the nearby islands where scientific investigations are being conducted. Besides, a number of depots for reserve provisions and other essential necessities have been constructed in this region.

In some of these depots sporadic scientific observations are also carried out in summer.

In 1959, the US Government transferred its Ellsworth Station to Argentina. This station was situated on the Filchner Ice Shelf and up to its closure in 1962 was under the control of Argentine Antarctic Institute.

TABLE 14

Stations of Argentina

Name	Operational period
Almirante Brown	April 6, 1951 to December 1954
Grytviken	1905 to January 1, 1950
Decepcion	From January 25, 1948 onward
Melchior	March 31, 1947 to February 1962
Orcadas	From November 22, 1904 onward
Teniente Camara	April 1, 1953 - March 1960
Teniente Matienzo	From March 15, 1961 onward
General Belgrano	From January 15, 1955 onward
General San Martin	March 21, 1951 - November 28, 1960
Ellsworth	Nov. 11, 1957 - December 30, 1962
Esperanza	From March 31, 1952 onward

The scientific observations and results of the Argentine investigations in the Antarctica are published mainly in the Transactions of the Argentine Antarctic Institute ("Publicaciones") in a series of volumes under one and the same number. Small monographs in the form of brochures ("Contribuciones") are also published with different serial numbers in the series.

Besides, some results of the Argentine investigations on oceanography and hydrography are published by the Hydrographic Service while those on geophysics are published by the Secretariat of the Radio Electronic Service of the Navy as independent publications.

ALMIRANTE BROWN

Coordinates: Lat. 64°53' S., Long. 62°53 W.
Altitude: 7 m above sea level
Synoptic index : 88971.

Almirante Brown Station is under the control of the Antarctic Department of the Hydrographical Service in the Argentine Navy. It is situated on the shore of the Paradise Bay, jutting into the southeast coast of the Antarctic Peninsula opposite Anvers Island. A few hilly islands, the central part of which attains a height more than 500 m, close the entrance to the bay from the Gerlache Strait, separating Anvers and Brabant Islands from the continent.

The coast of the Antarctic Peninsula, which is called the Danco Coast in this region, is hilly and a large part of it is covered by ice. A mountainous massif, whose individual peaks attain heights up to 1500 m, stretches along it from the rocky northeast to the southwest and from its branches, numerous glaciers descend along steep slopes to the sea. The coast of the Paradise Bay, especially in the southern and the eastern parts, is sharply broken and abounds in small inlets. The station is located on the coast of "General Rikkeri" Bay, which is a part of the southeastern part of the Paradise Bay. General Rikkeri Bay is bounded in the south by the Sanaviron Peninsula, which is a rocky massif connected with the lower coast by a low isthmus covered with snow.

There are a few hillocks, about 70 m high, in the Peninsula. Their northern and southern slopes end in Cape Proa in the north and in Cape Pope in the south.

Both the capes are rocky and are partially covered with ice. The station is situated on Cape Proa (Fig. 15).

<u>Climatic conditions</u>: Air temperature: annual average, -2°.6 C; minimum, -29°.2 C; maximum, 10°C. Average annual wind velocity 2.9 m/sec.

<u>Installations</u> : Living quarters, metallic hangar used as a workshop and instruments store (two "S-55" helicopters can also

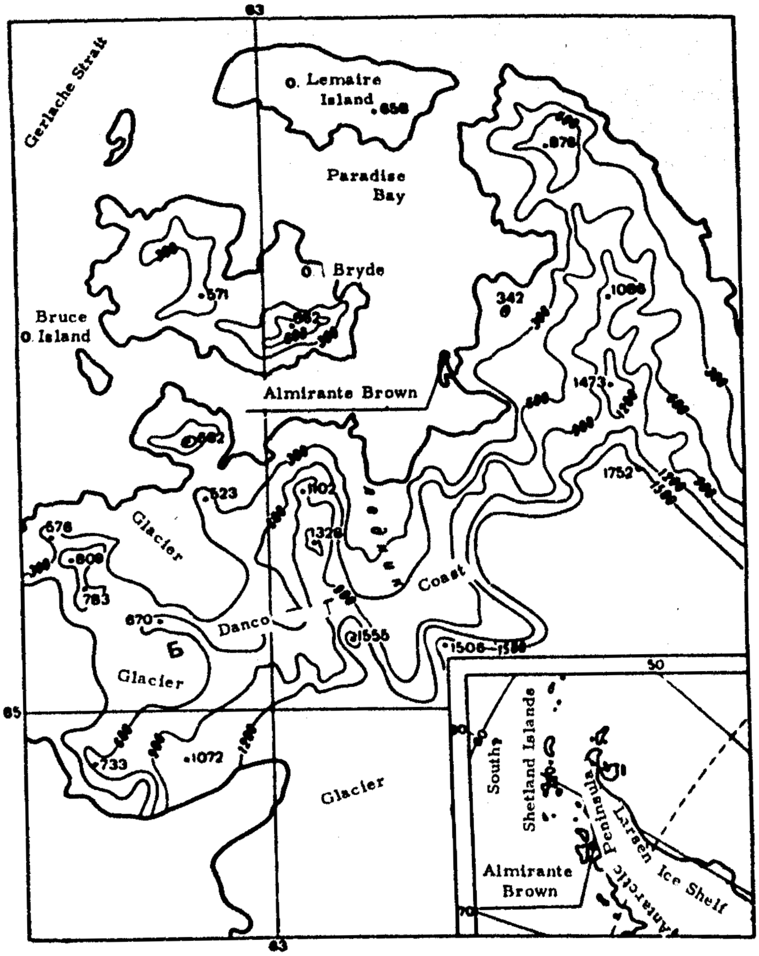

Fig. 15.Region around Almirante Brown Station.

be kept), two storerooms, workshop, and a meteorological laboratory. The branch near the station is equipped with a small quay.

Supply : The station is supplied by means of naval ships and is manned by military personnel. The personnel of the station consisted of 4 to 8 men.

The station Almirante Brown was opened on April 6, 1951 (the main installations were constructed during 1949-1950). The station was damaged by fire in July 1951, but was reconstructed in January 1952.

Throughout 1952-1953, partial reconstructions of the buildings were continued and a new concrete quay was also built. The scientific activities of the station were shut down in December 1959 and it is being used as a depot ever since.

Scientific Observations

The types of scientific observations carried out in the station are shown in Table 15.

TABLE 15

Types of Scientific Observations

Types of observations	Period
Surface meteorological observations	1951-1959
Geomagnetic observations N, Z, D (field work in summer)	1957-1958
Glaciological observations (density of snow, accumulation, sea ice)	1957-1958
Observations on sea-level fluctuations	1957-1958
Visual observations of aurora	1957-1958
Gravimetric observations (Field work in summer)	1957-1958

GRYTVIKEN

Coordinates : Lat. 54°16' S., Long. 36°30' W.
Altitude: 3 m above sea level.

Grytviken Station which was set up in 1905 by the Argentine Whaling Company operated up to 1950, and then was transferred to Great Britain. Meteorological observations were carried out in the station from 1905-1950.

DECEPCION

Coordinates: Lat. 62°59' S., Long. 60°43' W.
Altitude: 7 m above sea level
Synoptic index : 88974.

The scientific station "Decepcion" is under the control of the Antarctic Department of the Hydrographical Service of the Argentine Navy. It is located on the western part of Deception Island which lies in the southwestern part of the archipelago of South Shetland Islands, approximately at a distance of 100 km from the western coast of the Antarctic Peninsula. Deception is a ring-shaped island of volcanic origin and is bounded by the broad Port Foster Bay which is connected to the sea by a narrow strait. The island is mountainous, with heights of individual tops exceeding 500 m. The surface of the island (especially the eastern part) is partially covered with ice. The coast is also predominantly hilly and only occasionally bordered by beaches. The eastern coast and a part of the southern coast are actually glacial barriers.

Port Foster Bay is considerably broken into a few small inlets very convenient for landing. The station is located on the shore of one of these inlets (Primero-de-Mayo) jutting into the western coast of Port Foster between Cape Murature in the north and Cape Kasco in the south. The station buildings are situated on a low and uniform sector of the coast covered by volcanic debris. On the eastern side, there is a large lake which is connected to Port Foster Bay by a narrow stream. From the southeast to the northwest, the station is shielded by spurs of a hilly range, 200 to 500 m high, extending from the south to the north along the western part of the island (Fig. 16).

Climatic conditions: Air temperature: Annual average, - 3°C; minimum, -30°C; maximum, 10°C. Average annual wind velocity, 6.2 m/sec. Total annual rainfall: 407 mm.

Installations : Living accommodation, two reserve depots, a hangar rigged up with corrugated iron sheets (it is used in summer as living accommodation for the personnel and as a workshop), another hangar of 30 m x 15 m size, and a small store. There is also a small quay along the shore of Port Foster Bay.

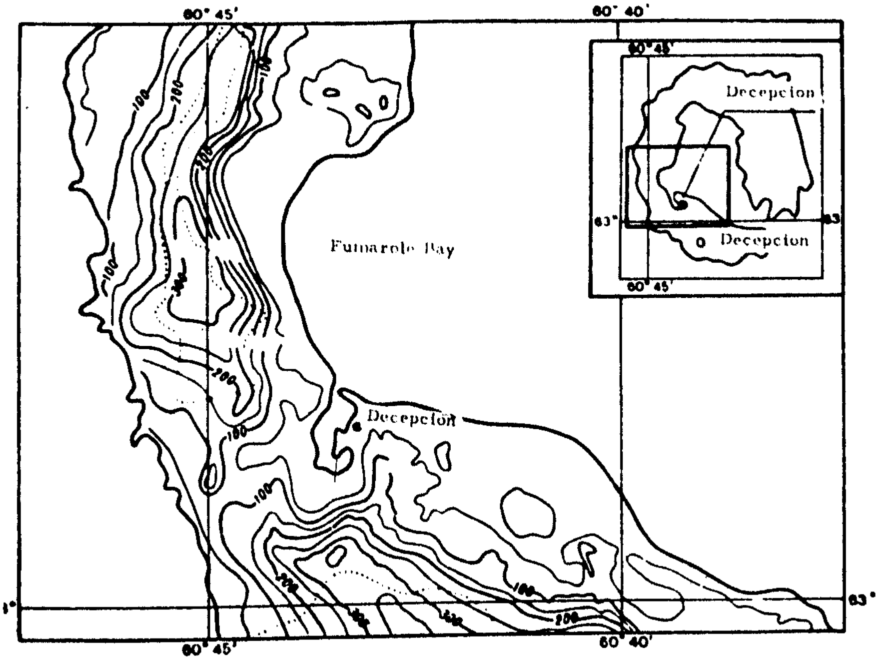

Fig. 16.Region around Decepcion Station.

Electric station : This is equipped with a 30 kw diesel generator.

Transport: A small tractor, a motor cutter and a boat with outboard motor. In the summer season the station is used as a base for light aircraft, hydroplanes and helicopters. Two moving barrels are used for fastening the hydroplanes.

Aeronavigational means : A radiobeacon of power 500 kw. The call sign is L O E .

TABLE 16

Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
1948	10		R. Kabrer
1949	10		
1950	10	2	

Contd.

1	2	3	4
1951	11	1	
1952	11		
1953	11		
1954	11		A. Fort
1955	10		
1956			
1957	18	3	Z. Bolino
1958	18	3	
1959	20		
1960	14	-	L. Messicha
1961	15	-	I. Cecilio
1962			
1963			

Supply : The station is supplied by ships and manned by people of the Argentine Navy. Decepcion Station was opened on January 25, 1948. Total staff and composition of the personnel is presented in Table 16.

Principal Scientific Instruments

Meteorology

1. Equipment for surface meteorological observations.
2. Actinometric instruments.
3. Apparatus for measuring atmospheric electricity.

Ionosphere

Automatic ionosonde of type TRIO-2.

Seismology

1. Two seismographs of type "Mainka S.m.h." (Period 5 secs).

Scientific Observations

The types of scientific observations carried out at the station are shown in Table 17.

TABLE 17

Types of Scientific Observations

Type of observation	Period
Surface meteorological observations	From 1948 onward
Actinometric observations	1957-1958
Atmospheric electricity	1957-1958
Vertical ionospheric sounding	From 1957 onward
Seismic observations	" 1950 "
Geomagnetic observations H, Z, D (Field work during summer)	1957-1958
Gravimetric observations (Field work during summer)	1957-1958
Visual observations of aurora	" 1957 "
Glaciological investigations (measurement of the snow density, snow accumulation and observations on sea ice)	From 1957 onward

Decepcion Station is also a base for concucting geological and topological work in this region. In 1958 it served also as the "weather center" for the Argentine Antarctic stations.

MELCHIOR

Coordinates : Lat. 64°20' S, Long. 62°59' W.
Altitude: 8 m above sea level.
Synoptic Index : 88965

Melchior Station is under the control of the Antarctic Department of the Hydrographical Service attached to the Argentine Navy. It is situated on one of the islands of the Melchior group (Palmer Archipelago), between Brabant and Anvers Islands. Melchior Islands include a number of small islands, encircled by rocks. All of them, as a rule, are not high (maximum height does not exceed 200 m) and are completely covered with ice. Their location between the large hilly islands (Brabant towards the northeast and Anvers towards the southwest) presents rather peculiar hydrometeorological conditions. Hills in the islands of Brabant and Anvers reach a height of 2400 to 2800 m and thus Melchior Islands are well protected from the northeast and southwest winds in the region of Palmer Archipelago. Even when the rest of the ocean is stormy, the region of Melchior Islands is little disturbed.

Melchior Station is located on Gamma Island, which is one of the largest in the southwestern part of the Melchior group of islands (the Argentine name of this island is Observaterio). The buildings are located on a rocky cape lying on the eastern shore of the small narrow inlet jutting out into the northeastern part of the island.

The surface around the station is free from ice sheet and is covered with snow only during the winter months.

Climatic conditions: Air temperature: Annual average, -3°.6 C; minimum, -36°.6 C; maximum, 9°.2 C. Average annual wind velocity: 3.4 m/sec. Total annual rainfall: 1189 mm.

Installations: Main living quarters to house 8 people, two storehouses, and two small moorings for the sloops.

Electric station: Five main diesel generators delivering a total power of 10 kw and two reserve generators with a total capacity of about 5 kw.

Means of transport: The station has a motor cutter and a boat with suspension motor for working near the shore. Mooring barrels are used for fastening hydroplanes. Landing sites for helicopters are located to the east of the station.

Aeronavigation means : Ground direction finders in communication with distant radio stations. Call sign - LOD.

Supply : The station is provisioned by ships and manned by personnel of the Argentine Navy (Table 18).

TABLE 18

Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
1947	9	4	K. Nadaud
1948	8		L. Costillas
1949			
1950	10		
1951	10		
1952			Canova
1953	11		
1954			
1955	10		
1956			
1957	10	2	A. Guintini
1958	11	2	
1959	9	5	K. Beis
1960	9	2	P. Scuimbre
1961	9	3	E. Gomes

Melchior Station was opened on March 31, 1947 and closed after winter camping in 1961

Principal Scientific Instruments

1. Equipment for surface meteorological observations.
2. Actinometric instruments.
3. Automatic magnetograph of type "Ballauff".

Scientific Observations

The nature of scientific work carried out in the station is shown in Table 19. In 1957, Melchior Station was used as the "weather center" for the Argentine Antarctic stations.

TABLE 19

Types of Scientific Observations

Type of observation	Period
Surface meteorological observations	1947-1961
Pilot balloon observations (periodic)	1957-1958
Geomagnetic observations H, Z, D. (Field work only in summer)	1957-1958
Gravimetric observations (Field work carried out in summer)	1957-1958
Visual observations of aurora	1957-1958
Glaciological observations (measurement of the density of ice sheet and accumulation of sea ice)	1957-1961
Observations on sea-level fluctuations	1957-1960

ORCADAS

Coordinates: Lat. 66°45' S., Long. 44°43' W.
Altitude: 4 m above sea level
Geomagnetic coordinates: Lat. 50°.01' S., Long. 18°.00
Synoptic index: 88968

Orcadas Station is also under the control of the Antarctic Department of the Hydrographical Service of the Argentine Navy. It is situated in the middle of Laurie Island, which is the easternmost part of the group of Orkney Islands. The island stretches approximately 20 km from the west to the east and has a very peculiar coastline. Laurie Island is generally hilly.

Some hillock tops in the western part reach a height of 300 to 400 m or more. Almost all the surface is devoid of vegetation and is covered with unbroken ice sheet up to the capes and the cliffs, which descend in steep slopes into the waterline. Individual rocks protruding out of the ice can hardly be seen.

The coast is sharply broken by bays of different shapes. One of them, having the name Uruguay, penetrates deep into the island from the north, and is bounded in the west and east by the peninsulas of Mackenzie and Pirie respectively. This bay props against a narrow and low isthmus, to the southeast, separating it from the Scotia Bay jutting into the south coast of the island between Cape Ray in the east and Cape Birn-Mirdok in the west.

The buildings of the station are scattered throughout the isthmus, the width of which is not more than 400 m. However, most of these buildings are concentrated at the upper end of Uruguay Bay. The isthmus is covered with pebbles and boulders. The neighborhood of the station is free from ice sheet (Fig. 17).

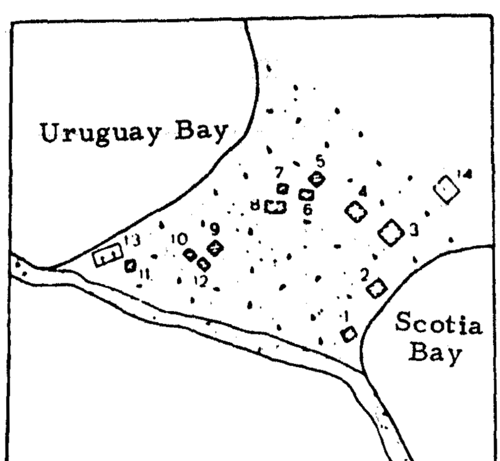

Fig. 17. Plan of Orcadas Station.

1 - Remains of the stone house of B. Bruce's expedition; 2 - Aurora booth; 3, 4 - Storehouses; 5 - Reserve shelter; 6 - Repair shop; 7 - Reserve shelter; 8 - Main living quarters; 9, 10, 11 - Meteorological booth; 12 - Geomagnetic booth; 13 - Cemetery; 14 - Meat Store.

Climatic conditions: Air temperature: Annual average, -4°.5 C; maximum, 12°.2 C; minimum, -40°C. Average annual wind velocity 4.6 m/sec. Total annual rainfall 409 mm. The southerly winds drive a large amount of ice from Weddel Sea towards Laurie Island and therefore the bays jutting into the southern coast as well as the coastal region freeze earlier than the South Orkney Islands.

This station was commissioned on February 22, 1904 following the transfer of the Scottish meteorological station (See description of "Laurie Island") to the Argentine Meteorological Service. The Scottish station was originally set up by W. Bruce under Scottish National Antarctic Expedition. The station has been working continuously ever since. It was transferred to the Hydrographical Service of the Argentine Navy in 1951 and since then is manned by naval personnel (Table 20).

TABLE 20

Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
1904	6		M. Mossman
1948	7		
1950	12	3	I. Estrada
1951	11		
1953	11		
1955	9		
1957	10	3	M. Guruchiga
1958	13	3	
1959	11	8	I. Lakhan
1960	9	2	A. Guintini
1961	9	2	O. Radilla
1962			
1963			

Installations: Main living accommodation, three meteorological laboratories, one geomagnetic laboratory, one laboratory for observing aurora, and two reserve depots and storehouses.

Electric station : Equipped with 17 kw diesel generator. Radio equipment was installed in 1927. Cargo from the quay is sent in small wagons by rails and is stocked in the storehouses.

Transport: One boat with suspension motor and sail for carrying out work near the coast. A mooring was set up near the shore for fastening the hydroplanes.

Aeronavigational means : Ground direction finder in communication with distant radio stations; call sign of the radio-station is LOK.

Supply : The station is provisional by ships of the Argentine navy.

Principal Scientific Instruments

Meteorology

1. Instruments for surface meteorological observations.
2. Actinometric instruments.
3. Pilot balloons.
4. Radiosondes.
5. Instrument for measuring CO_2 content of the air.

Geomagnetism

1. Eshenhagen variometer of normal sensitivity.
2. Magnetometer Q (20").
3. Schulz's induction inclinator.
4. Rusk's variometer.
5. Schmidt's magnetic balance.

Earth currents

1. Campbell's potentiometer.
2. Radioactivity in the atmosphere.
3. Electric suction pump with special filter.

Scientific Observations

The various scientific observations carried out at the station are listed in Table 21. Orcadas Station is also a base for carrying out geological and topographical work in Laurie Island.

TABLE 21

Types of Scientific Observations

Types of observation	Period
Surface meteorological observations	From 1904 onward
Pilot balloon observations and radiosonde sounding (temperature, pressure, and humidity)	" 1950 "
Measurements of CO_2 content in the air	" 1961 "
Measurement of the Sr-90 content in the atmosphere	" 1962 "
Registration of geomagnetic variations	" 1905 "
Absolute measurements of geomagnetic field	" 1905 "
Observations of earth currents	" 1962 "
Visual observations of aurora	" 1957 "
Glaciological investigations (measurements of the density of ice sheet, observations of the accumulation of snow and sea ice)	" 1957 "
Ornithological investigations (ecological observations and grouping of birds)	" 1952 "
Gravimetric observations (field observation)	Periodically in summer

TENIENTE CAMARA

Coordinates : Lat. 62°36' S., Long. 59°54' W.
Altitude: 22 m above sea level.
Synoptic index: 88951

Teniente Camara Station is also under the control of the Antarctic Department of the Hydrographical Service of Argentine Navy.

The station is located on Half Moon Island lying in the McFarlane Strait between the islands of Livingston (Smolensk) and Greenwich (Beresino) in the South Shetland Archipelago. Half Moon Island is located in the southwest part of the McFarlane Strait at the entrance of the Moon Bay which penetrates deep into the northeast coast of Livingston Island. The shore of Moon Bay, mostly covered with glaciers, steeply descends to the waterline and only the southern shore facing Half Moon has some sloping sections which are at places free from ice.

The relief of Livingston Island is hilly. A chain of hills that stretches along the southern shore has the highest peaks of the island (more than 1700 m). The eastern part of the island also has two mountains --Bowles (914 m) and Barnard (1000 m). Greenwich Island to the east of Livingston Island is also hilly. Some of its peaks in the northern part attain heights greater than 600 m.

"Half Moon", which is crescent-shaped (as indicated by its name), ends in tips extending to the east and to the northeast. The most noticeable hillocks on this hilly island are Destacamento (93 m) and Norte (101 m), located in the southwestern and northwestern parts of the island respectively. The northern part is also occupied by a hillock of 46 m height. The station is located towards the southwestern part of the island, on the northern slope of the hillock Destacamento (Fig. 18).

<u>Climatic conditions</u>: Air temperature: Annual average, -2°.9C; maximum, 11°.5C; minimum, -30°C. Annual average wind velocity, 6.2 m/sec. Total annual rainfall, 494 mm.

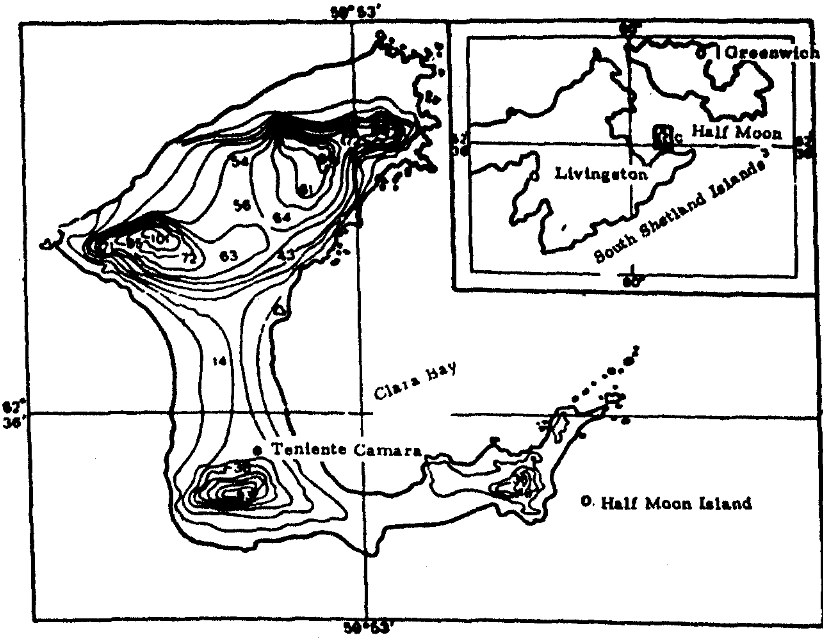

Fig. 18.Region around Teniente Camara Station.

Installations: Living accommodation, hangar, workshop, reserve depot (used as store and living quarters in the summer), and two storehouses.

Transport: Boat with suspension motor, landing and take-off strip for helicopters. Mooring barrels for hydroplanes were also provided.

Aeronavigational means: There is a ground direction finder that can use the broadcasting stations for navigational purposes. The call sign of the radio station is LOO.

Supply: The station is provisioned by ships of the Argentine Navy and is manned by 6-8 navy personnel.

The station was set up on April 1, 1953 though the living accommodation was built only in March 1952. In 1955 the station was renamed in honor of H. Camara who died under tragic circumstances. (Earlier it used to be called Luna). The station was closed in March 1960. Since then it serves as a depot and is used only in summer.

TABLE 22
Scientific observations

Types of observations	Period
Surface meteorological observation	1953-1959
Geomagnetic observation H, Z, D (field work in summer)	1957-1958
Visual observation of aurora	1957-1958
Glaciological observations (measurement of the density of snow, observations on the accumulation of snow and sea ice)	1957-1958
Gravimetric observations	1957-1958

TENIENTE MATIENZO

Coordinates: Lat. 64°58' S. Long. 60°03' W.
Altitude: 30 m above sea level.

Teniente Matienzo Station is under the control of the Antarctic Department of the Argentine Army Headquarters. The station is located on the northern part of Larsen Ice Shelf (eastern coast of the Antarctic Peninsula), adjoining the Nordenskjöld coast. It is situated on the small hilly nunatak "Foca" rising above the surface of the ice shelf, approximately about 15 km northwest of Robertson Island.

The ice shelf in this region is rather wide and slopes gradually to the north towards the sea where it merges with the glacier barrier of height about 10 to 12 m. At some places at the fringe of the ice shelf, islands appear above the surface in the form of snowy domes with small sectors of ice-free rocks. The highest of them is Robertson Island, having a dome-like form and covered with ice, from whose depths rock columns of more than 400 m in height tower up in different places.

Nunatak "Foca" belongs to the group of nunataks scattered in the north, northwest and west of Robertson Island.

Most of them are free from ice and snow and the larger nunataks attain heights of more than 300 m.

The eastern coast of the Antarctic Peninsula in this region is made up of the steep slope of the high Detroit Plateau, almost completely covered by ice sheet. Some peaks attain heights of more than 1000 m.

Installations: Living quarters and a storehouse are built on a part of the Foca nunatak that is free from ice sheet. Total area of the houses: 220 m^2.

Electric station: It is fitted with three diesel generators of about 17 kw total power.

Means of Transport: Five all-purpose snow tractors of the type "Snow-Cat" 443-A, two "Beaver" type planes on skis, and a team of dogs (for sleds).

Aeronavigational means: Radio station with call sign LTA-9.

Supply: The station is supplied by planes of the Argentine Air Force.

Teniente Matienzo Station was opened on March 15, 1961. There were fifteen men working at the station in 1961.

Scientific Observations

Types of scientific observations carried out in the station are shown in Table 23.

TABLE 23

Types of Scientific Observations

Type of observation	Period		
Surface meteorological observations	From	1961	onward
Pilot balloon observations	"	1962	"
Visual observations of aurora	"	1962	"
Glaciological observations (density of ice sheet and snow accumulation)	"	1961	"

GENERAL BELGRANO

Coordinates: Lat. 77°58' S, Long. 37°48' W.
Altitude: 32 m above sea level.
Synoptic Index: 88967.

General Belgrano Station is under the control of the Antarctic Department attached to the Argentine Army Headquarters.

The station is located on the southern coast of Weddel Sea at the top of the Commandante Piedrabuena Bay that juts into the Filchner Ice Shelf to the west of Conscriptocuigli Cape. The banks of the bay, 40 to 50 m high, are formed by glaciers sloping (at an angle 10 to 15°) down to the waterline. The surface of the ice shelf at a distance of a few hundred meters from the shore is full of deep crevices, 30-40 m wide, making an angle of 20° to the coastline. The fissures are spanned by bridges of snow and are extremely dangerous to pass over. The chunk of the ice shelf in the vicinity of the station is bordered by land blocks of thickness up to 1.5 m. The landblocks are adequately used for mooring of ships and carrying out loading and unloading operations (Fig. 19).

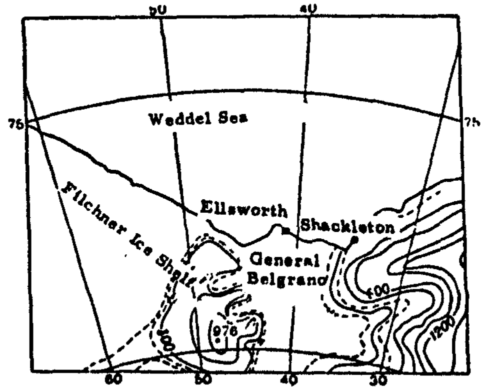

Fig. 19.Region around Ellsworth and General Bèlgrano Stations.

Climatic conditions: Air temperature: Annual average, -21°.9 C; minimum, -56°C; maximum,3°.7C.

Average wind velocity, 6.6 m/sec; maximum, 47.2 m/sec; snow accumulation per year: 308.1 mm.

Installations: The buildings are under thick layers of ice and connected with each other by tunnels. They consist of living barracks, electric station, garage, stores, scientific laboratories, sheds and some auxiliary accommodation. The total area is about 500 m^2.

Electric station: Equipped with generators yielding a total power of 20 kw.

Transport: Two amphibian "Weasel" type tractors, motor skis, and a dog team. Light planes of 'Beaver' and 'Sessna' type can also be used in the station. There is a hangar for helicopters.

Aeronavigational means: Radio station. Call sign-LTA-8.

Supply: Ships of the Argentine navy provide supplies to the station. The station was opened on January 18, 1955.

The size and composition of the workers is shown in Table 24.

TABLE 24

Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
1955	14		S. Puiato
1956	14		J. Puiato
1957	18	6	
1958	22	6	
1959	17	3	
1960	17	3	
1961	13	1	Q. J. Vaka
1962			
1963			

Scientific Observations

Types of scientific observations, carried out in the station, are listed in Table 25.

TABLE 25

Types of Scientific Observations

Types of scientific observations	Period
Surface meteorological observations	From 1955
Pilot balloon observations	1957-1958
Actinometric observations	1957-1958
Measurement of CO_2-content in air	1957-1958
Vertical ionospheric sounding	1957-1958
Photography of aurora by all-sky camera	1957-1958
Visual observations of aurora	From 1957
Temperature observation in deep boreholes	1957-1958

Contd.

1	2
Stratigraphic observations	1957-1958
Observations on snow accumulation	From 1957
Measurement of the movement of ice shelf	1957-1958
Observations on sea ice	From 1955

GENERAL SAN MARTIN

Coordinates: Lat. 68°08'. Long. 67°08' W.
Altitude: 5 m above sea level.
Synoptic index: 88979.

General San Martin Station is under the control of the Antarctic Department of the Argentine Army Headquarters. The station is situated on Barry Island, that belongs to the Debenham group of islands lying in the northeastern part of the Marguerite Bay. The group consists of four islands of moderate altitude located in the straits between Millerand Island and the ice barrier of Fallieres Coast. The biggest, highest and the northernmost of them is Barbara Island, lying at a distance of 50 m from the continental shore and is joined by a bridge of snow and ice. It is separated from the southwestern Barry Island by a very narrow passage.

The coast of the Marguerite Bay in this area is hilly. A high mountainous plateau runs along the Fallieres Coast. Between it and the coastline, there are a number of hills with steep, often precipitous, slope. These hills have amongst them narrow glaciers steeply descending to the shore. To the west of the Debenham Islands is located a large and hilly Millerand Island whose central part rises to an altitude of more than 800 m. From the rocky massifs of the island, glaciers descend to its eastern and southern shores. Barry Island on which the station is located is not very high and is free from ice sheet (Fig. 20).

The basic installations of the station are constructed on the northeastern part of the island. The meteorological laboratory, meteorological observation area and aerological equipment

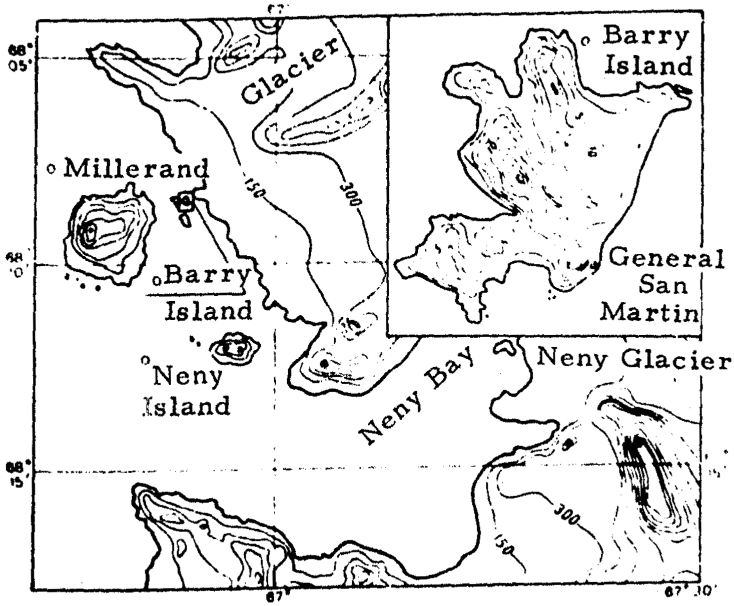

Fig. 20.Region around General San Martin Station.

are located on the southern part of the island at the top of the 11 m high hillock.

Climatic conditions: Air temperature: Annual average, -5°.3C; minimum, -40°.0C; maximum, 7°.0C. Average annual wind velocity, 4.7 m/sec.

Installations: A double-storeyed house for living (destroyed by fire in January 1959), hangar for helicopters, six small shelters used as laboratory, workshop, cold-store and electric station.

Electric station: Equipped with a diesel generator of 5 kw capacity.

Means of transport: One amphibian "Weasel" tractor, two all-purpose tractors, one amphibian jeep, dog team and sleds and a motor boat. S-55 helicopters can also be used in summer.

Aeronavigational means: Radio station with call sign LTA-6.

Supplies: The station is provisioned by ships of the Argentine Navy.

General San Martin Station was opened on March 21, 1951. A base of the British Antarctic Expedition under the directorship of D. Rimmila was originally located in Barry Island from February, 1936 to March, 1937.

The installations of this station were destroyed by the Argentine expedition in March 1951 and in its place "General San Martin" was built. This station was a frequent victim of fires (1952, 1958, 1959). The personnel of the station was evacuated by helicopters on February 28, 1960 and the station was closed.

The size and composition of the personnel are shown in Table 26.

TABLE 26

Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
1951	6	1	D. Motteia
1952	20		D. Bassini
1953	20		D. Bassini
1954	4		D. Leal
1955	10		
1956	7		Elisgarai
1957	23	6	
1958	22	5	
1959	11	4	

Scientific Observations

The various types of scientific observations carried out in the station are shown in Table 27. The station also served as a base for carrying out geological and topographical work in the surrounding regions.

TABLE 27

Types of Scientific Observations

Type of opservations	Period
Surface meteorological observations	1951-1959
Pilot balloon observations	1957-1958
Visual observations of aurora	1957-1958
Gravimetric observations (Field work in summer)	1957-1958
Glaciological observation (Measurement of density, hardness, temperature, stratigraphic investigations in deep bore-pits, observation on snow accumulation, movement of ice, and sea ice)	1957-1958
Ornithological observations (ringing of birds)	1957-1958

ELLSWORTH

Coordinates: Lat. 77°43' S., Long. 41°07' W.
Altitude: 40 m above sea level.
Synoptic index: 89043.

Ellsworth Station is under the control of the Argentine Antarctic Institute.

The station is located on the eastern coast of the Chica Bay jutting into the eastern part of the ice shelf which in this region gradually slopes towards the sea at an angle of about 15° and forms a glacial barrier of height about 40-50 m, (Fig. 19, 21) at the water line.

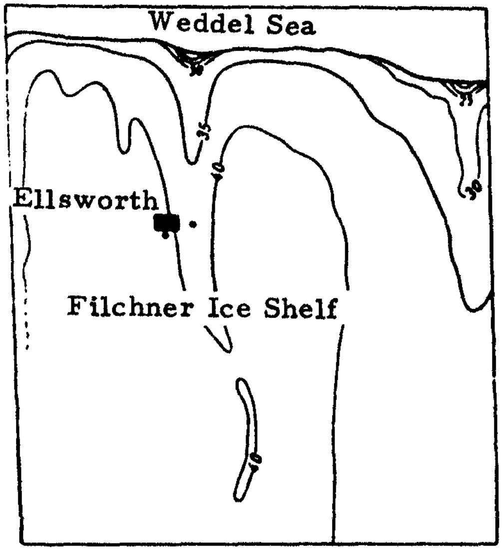

Fig. 21. Region around Ellsworth Station.

Climatic conditions: Air temperature: Annual average -22°.7C; minimum, -55°.6C; maximum, 1°.7C. Average annual wind velocity, 6.0 m/sec; maximum, 37 m/sec. Accumulation of snow (water) 63 mm.

Installations: The installations are located on uniform icy surface, about 2 km away from the ice shelf whose thickness in the territory of the station attains 250-300 m. The station consists of 24 installations (occupying a total area of 1800 m^2) of which five are living quarters (432 m^2), eight are for storehouses, one is a workshop, eight are for science laboratories (about 500 m^2) and one auxiliary building (Fig. 22).

Electric station. Equipped with diesel generators yielding a total power of more than 150 kw.

Transport: "Weasel" and "Snow-Cat" type amphibian tractors and caterpillar type tractors. Planes fitted with skis, and helicopters can also be used.

Aeronavigational means: Radio station and ground direction finder. The call sign of the radiostation is LOE-2.

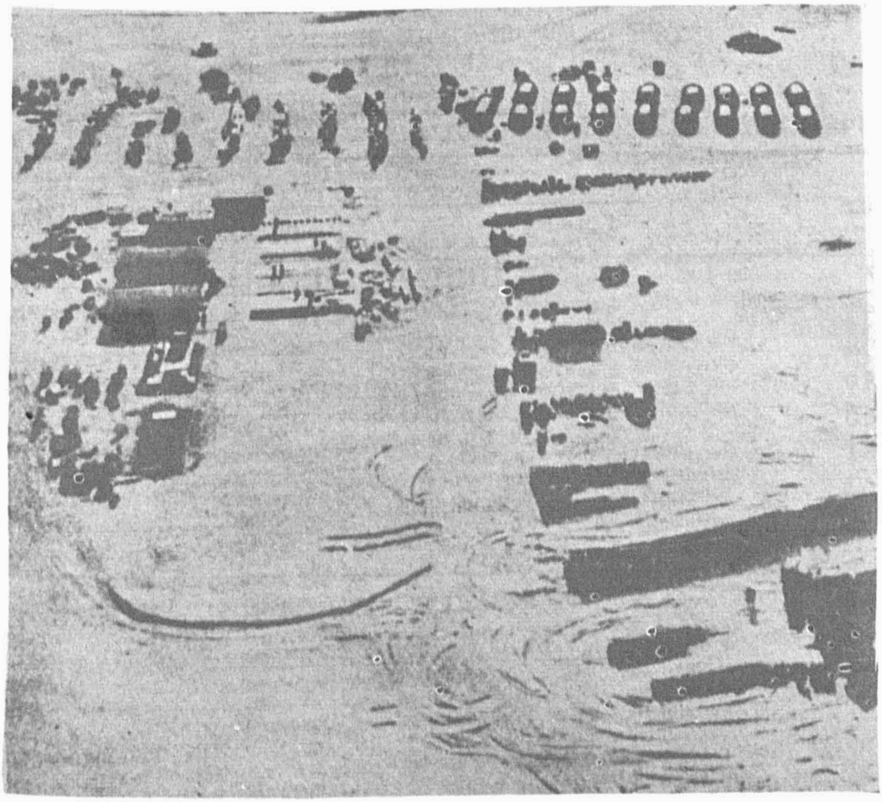

Fig. 22.Ellsworth Station, 1957.

Supplies: The station is provisioned by ships of the Argentine and U.S. Navy.

Ellsworth Station was opened on February 11, 1957 and was under U.S. Control in 1957-58. The station was handed over to Argentina with all installations and equipment on February 2, 1959. It was decided that Argentina would supply and administer the station while USA would continue its support by providing instruments and specialists. The station was closed on December 30, 1962. The size and composition of personnel is shown in Table 28.

TABLE 28

Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
1957	38	10	F. Ronde
1958	40	9	P. Tidd
1959	24	9	J. Soares
1960	24	9	J. Soares
1961	31	6	F. Areta
1962			

Principal Scientific Instruments

Meteorology

1. Instruments for surface meteorological observations.
2. Actinometric instruments.
3. Radiosondes and rawindsondes.

Ionosphere

1. Ionosonde: Type C-4.
2. Equipment for measuring atmospheric static.

Geomagnetism

1. Rusk magnetograph.

Cosmic rays

1. Neutron monitor.
2. Instruments for recording cosmic rays.

Aurora

1. All-sky camera "Alaska".
2. Patrol spectrograph of the type "Meinel-Oliver" (Later on, substituted by the Perkin Elmer 173 spectrograph).
3. Spectrophotometer.

Scientific observations

The types of observations carried out in the station are presented in Table 29.

TABLE 29

Types of Scientific Observations

Types of observations	Period
Surface meteorological observations	1957-1962
Rawinsonde sounding	1957-1962
Actinometric observations	1957-1962
Measurement of CO_2	1957-1962
Vertical ionospheric sounding	1957-1962
Registration of atmospherics	1957-1962
Registration of atmospheric noise	1957-1962
Registration of geomagnetic variations	1962
Registration of neutron components	1957-1962
Photographing of aurora by all-sky camera (on 16 mm film)	1957-1962
Spectrography of aurora	1957-1962
Photometry of aurora	1957-1958
Observations with the help of gravimeter of type "Vorden-1"	1957-1958
Temperature measurements in deep bore-pits (30 m)	1957-1962
Accumulation of snow	1957-1962
Stratigraphic observations (density and grain size of snow)	1957-1962

Contd

1	2
Measurement of the rate of movement of the ice shelf	1957-1962
Measurement of snow drift	1957-1962
Observations on sea ice	1957-1962
Botanical observations (collection of seaweeds and mosses)	1959-1961
Ornithological observations	1959-1961
Parasitological observations	1959-1962

The station is also a base for making investigations of the traverse through the Filchner Ice Shelf.

ESPERANZA

Coordinates: Lat. 63°24' S, Long. 56°59' W.
Altitude: 8 m above sea level.
Synoptic index: 88963.

Esperanza Station is under the Antarctic Division of the Argentine Army Headquarters.

The station is located on the eastern shore of Hope Bay jutting into the northeastern part of the Trinity Peninsula (northern extremity of the Atlantic Peninsula). A mountain range with ridges of more than 400 m stretches along the northwestern shore of the bay. The coast itself is formed by a precipitous glacial barrier of height 15 to 60 m. The glacier "Depot" descends towards the head of the bay, steeply falling into the sea. The southeastern shore of the bay is steep in some parts and is low and rocky in some other parts. To its southeast lies a steep mountainous massif with a 300 m high ridge. The western part of the massif is called Mount Flora and is more than 500 m high. The station is located on Cape Seal projecting from the southeastern shore of the Hope Bay. This low-lying cape is free from the ice sheet, and is partly inhabited by a large colony of Adélie penguins.

To the south, the surface bearing the ice sheet rises smoothly towards a branch of Mount Flora (Fig. 23).

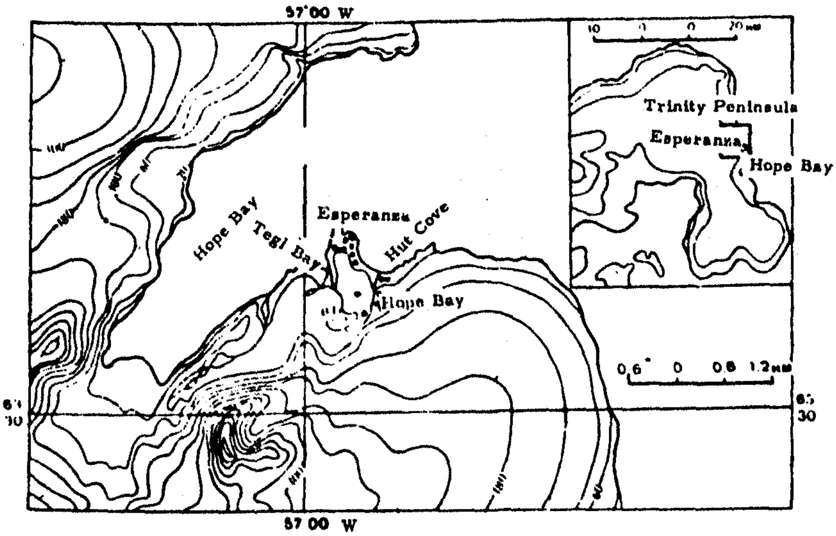

Fig. 23.Region around Esperanza Station.

Climatic conditions: Air temperature: Annual average, -5°.3C; minimum, -32°C; maximum, 14°.6C. Average annual wind velocity, 9.4 m/sec. Total annual rainfall: 446 mm.

Installations: A main three-storeyed building with living rooms to accommodate twenty persons, a radio station, scientific laboratories, power station, a reserve depot that can be used for living in summer, two workshops, a hangar also used as store, garage for amphibian tractors, stores, and dog kennels. A small mooring block has been built on the shore.

Electric station. Equipped with diesel-generators of more than 15 kw power.

Transport: Two all-purpose amphibian tractors of the type "Muskeg", boat with suspension motor, sledges and dog teams. S-55 helicopters also visit the station in summer for which landing and take-off strips have been laid at the station.

Aeronavigational means: A ground direction finder to be used with broadcasting radio stations. Call sign of the Radio station: LTA-7.

Supplies: The station is supplied by the ships of the Argentine Navy and is essentially maintained by Army personnel (Table 30).

TABLE 30

Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
1952	5	1	L. Casanova
1953	15	1	I. Kelly
1954	26	3	K. Rodrigo K. Castro
1955	24		
1956			
1957	21	8	
1958	20	6	
1959	15	3	
1960	12	1	Videla
1961	15	1	
1962			
1963			

Esperanza Station was opened on March 31, 1952 as a meteorological observatory of the Argentine Navy. The headquarters of the Argentine Army started construction of a scientific station in November, 1953. The construction was finished on March 4, 1954 and this is considered as the official date of opening of the station. The observatory belonging to the Navy was maintained by sailors until 1956 when it was dismantled.

Principal Scientific Instruments

Meteorology

1. Instruments and devices for surface meteorological observations.

2. Pilot balloon observations.

Oceanography

1. Conventional Mareograph.

Scientific Observations

Types of observations carried out in the station are presented in Table 31.

TABLE 31

Types of Scientific Observations

Type of observations	Period
Surface meteorological observations	From 1952 onward
Pilot balloon observations	1957-1958
Gravimetric observations (Field work in summer)	1957-1958
Visual observations of aurora	From 1957 onward
Glaciological observations (Measurement of the density of ice sheet, snow accumulation and sea ice)	From 1957 onward
Geomagnetic observations H, Z, D (Field work in summer)	1957-1958
Observations of sea-level fluctuations	From 1957 onward
Ornithological observations (ecological investigations and ringing of birds)	From 1961 onward (in summer)

Esperanza Station is also a base for carrying out geological and topographical work in the northern part of the Antarctic Peninsula.

DEPOTS

ANTONIO MORO

Coordinates: Lat. 63°26' S., Long. 57°03 W.

Antonio Moro Depot is under the control of the Antarctic Department of the Argentine Army Headquarters.

It is located on the northern part of the Tabarin Peninsula jutting out of the Trinity Peninsula towards the south. The depot is at an altitude of 200 m above sea level and is a metallic booth of dimensions 2 x 2 x 2 m built on June 20, 1955. The booth is used periodically by the personnel of the scientific station "Esperanza". It can also store provisions for three men for 1 month.

BALVE

Coordinates: Lat. 62°12' S., Long. 58°58 W.

Balve Depot is under the control of the Antarctic Department of the Hydrographical Service of the Argentine Navy.

It is located on the small Ardley Island lying in the northern part of the Maxwell Bay, that penetrates into the southwestern part of King George Island (Waterloo). The Fildes Peninsula forming the northern coast of Maxwell Bay is hilly, with the glaciers descending in precipitous slopes towards the water line. The depot is located on the northern shore of Ardley Island whose length is less than 2 km. This isle is separated from the Fildes Peninsula by a narrow (not more than 250 m) strait. The depot is a wooden house meant for 4-6 men, with kitchen and bath. It also houses a radio station and a store that can hold 3-month provisions for three men.

The depot was used in the summers of 1953/54, 1954/55, 1955/56, 1956/57, 1957/58, and 1958/59. During the summer of 1957/58, surface meteorological observations on the sea-level fluctuations and gravimetric observations were carried out from this depot.

BAHIA DORIAN

Coordinates: Lat. 64°49' S., Long. 63°30'W.

Bahia Dorian Depot is under the control of the Antarctic Department of the Hydrographical Service of the Argentine Navy.

It is situated on the western part of Wiencke Island, lying near the west coast of the Antarctic Peninsula, in the southeast of Anvers Island. Wiencke Island is mountainous. The tops of certain mountains in its central part rise to a height of 1000 to 1500 m above sea level. The depot has been built on western part of the island. A small part of the coast around this place is free from glacial cover and is fringed with a gently sloping beach covered with silted sand. The depot consists of a small metal barrack and a temporary store, that can stock provisions for three persons for three months. The depot was built on February 23, 1953 and was commissioned in the summer of 1953-54.

BETBEDER

Coordinates: Lat. 64°20' S., Long. 56°56' W.

Betbeder Depot is under the authority of the Antarctic Department of the Hydrographical Service of the Argentine Navy.

It is situated on the northeastern extremity of Snow Hill Island, lying near the east coast of the Trinity Peninsula (northern extremity of Antarctic Peninsula). Almost the entire island is hilly with tops rising to 300 m above sea level and covered with ice and snow. Only the peninsular region projecting from the northeastern coast of the island is free from the glacial cover. Its surface is flat except for a few mounds that rise to 60 m.

The depot is just a small wooden house built on the eastern extremity of this peninsula on January 1, 1954. It has a radio station and a store to stock provisions for three months for three persons. The depot was used in the summer of 1954/55

BRYDE

Coordinates: Lat. 64°53' S., Long 62°56' W.

Bryde Depot is under the authority of the Antarctic Department of the Hydrographic Service of Argentine Navy.

It is situated on a small rocky isle named "Ricardo", lying in the southwestern part of Paradise Bay, near the southern coast of Bryde Island (Danco Coast). The depot consists of a wooden house built on November 12, 1953 and was used in the summer of 1953-54. It can also store enough provisions for three persons for three months.

VIRGEN DE LOS NIEVES

Coordinates: Lat. 79°11' S., Long. 38°53 W.
Altitude: 35 m above sea level.

Virgen de los Nieves Depot is under the authority of the Antarctic Department of the Argentine Army Headquarters.

It is situated on the surface of the Filchner Ice Shelf, about 100 km farther to the south of General Belgrano Station. The depot consists of a living (wooden) house and a provision store, in which a stock of provisions for six persons for three months can be stored. The depot is used periodically by the personnel of General Belgrano Station. It was opened on December 2, 1958.

GRANADEROS

Coordinates: Lat. 68°42' S., Long. 67°40' W.
Altitude: 5 m above sea level.

Granaderos Depot is under the authority of the Antarctic Department of the Argentine Army Headquarters.

It is situated on a small rocky island "Terra Firma", lying in the eastern part of the Marguerite Bay facing the southern part of Fallieres Coast (western sea coast of the Antarctic Peninsula). A small wooden house of dimensions 2.8 x 3 x 2.5 m was built on October 17, 1957. It can also stock food for three persons for two months.

GROUSSAC

Coordinates: Lat. 65°11' S., Long. 64°10' W.

Groussac Depot is under the authority of the Antarctic Department of the Hydrographic Service of Argentine Navy.

It is situated on the southern coast of Circoncision Cove, that penetrates into the southern part of the east coast of Petermann Island (western sea coast of the Antarctic Peninsula, Graham Coast).

The depot, consisting of a small wooden house and a storehouse, was constructed on February 8, 1955. It was used in the summer of 1954-55, 1956-57, and 1957-58. During the period of IGY (in summer), the depot functioned as a base for conducting surface meteorological observations and observations on sea-level fluctuations. It can stock food and other necessities for three persons for three months.

GUARANI

Coordinates: Lat. 64°30' S. Long 59°40' W.
Altitude: 2 m above sea level.

Guarani Depot is under the authority of the Antarctic Department of the Argentine Army Headquarters.

It is situated on Sobral Cape, which is the southeast tip of a small peninsula, jutting out of the east coast of the Antarctic Peninsula and into the northern extremity of the Larsen Ice Shelf. The depot is a wooden shed of dimensions 2 x 2.5 x 1.8 m and was built on July 23, 1959. Stock of food to last one month for two persons can be stored in the depot.

GURRUCHAGA

Coordinates: Lat. 62°18' S., Long. 59°10' W.

Gurruchaga Depot belongs to the Antarctic Department of the Hydrographic Service of the Argentine Navy. It is situated on the western part of Nelson Island, lying on the northern coast of Harmony Bay. Nelson Island belongs to the group of Southern Shetland Islands. It lies close to King George Island (Waterloo) towards the southwest and is separated by only the narrow Fildes Strait. The island is almost entirely covered with ice and is devoid of any perceptible eminences. Harmony Bay, on the northern coast of which the depot stands, juts out into the western part of the island. Its northern coast is low, rocky and is occasionally fringed by a beach. The east coast is rather high and is mostly covered with glaciers. The structures of the depot consist of a wooden house with a kitchen and a bath intended for three to four persons, a secluded storehouse and a radio mast.

The depot was built on December 15, 1953 and was used in the summers of 1953-54, 1954-55 and 1957-58. In the summer of 1957-58, surface meteorological observations and observations of sea-level fluctuations were conducted. A three-month stock of provisions for three persons can be stored in the depot.

CADETE GUILOCHON

Coordinates: Lat. 65°59' S, Long. 65°58' W.

Cadete Guilochon Depot is under the authority of the Antarctic Department of the Hydrographic Service of the Argentine Navy.

It is situated on the northern coast of the Catalina inlet jutting into the northwestern coast of Robot Island. The bank of the inlet is low, rocky and free of ice. Robot Island is one of the larger islands, in the group of Biscoe Islands lying near the western coastline of the Antarctic Peninsula.

The depot is just a small wooden house with two rooms, and was built on February 24, 1957. Provisions for three persons for three months are stored in the depot.

CAPITAN CAILLET BOIS

Coordinates: Lat. 63°50' S., Long. 60°47' W.

Capitan Caillet Bois Depot is under the Antarctic Department of the Hydrographic Service of the Argentine Navy.

It is situated on the small rocky Norte Island, at a height of about 30 m above sea level and lying in the central part of the Mikkelsen Bay. The Mikkelsen Bay juts out into the southern coast of Trinity Island, which belongs to Palmer Archipelago. The depot, consisting of just a wooden house, was built on December 10, 1954. It was used during the summers of 1954-55, 1956-57, and 1958-59.

During the IGY period, observations were conducted on sea-level fluctuations. Food and other essential provisions enough to last three months for three persons are stocked in the depot.

CAPITAN ESTIVARIZ

Coordinates: Lat. 66°26' S., Long. 67°12' W.

Capitan Estivariz Depot is under the authority of the Antarctic Department of the Hydrographic Service of the Argentine Navy.

It is situated on one of the small islands lying at the southwest extremity of Watkins Island. Watkins Island is one of the largest islands in the group of Biscoe Islands stretching from the northeast to the southwest along the central part of the west coastline of the Antarctic Peninsula (Graham Coast, Loubet Coast). The depot consists of a small wooden house, opened on February 29, 1956. It was used in the summers of 1955-56 and 1956-57. The depot has stock of provisions for three months for three persons.

COBBETT

Coordinates: Lat. 61°10' S., Long. 60°57' W.

Cobbett Depot is under the authority of the Antarctic Department of the Hydrographic Service of the Argentine Navy.

It is located on Spring Cape at the southern mouth of the Brialmont Bay, that juts into the west coast line of the Antarctic Peninsula (Danco Coast). The depot consists of a wooden house with a kitchen and a bath room, an office, two small warehouses, and a radio station. Provisions to last for three months for three persons are stocked in the depot. The depot was opened on January 23, 1954. It was used in the summers of 1953-54, 1954-55, 1955-56, 1956-57, 1957-58 and 1960-61.

Surface meteorological observations were made in the summer of 1956-57, 1957-58 and 1860-61. Biological observations (botanical and microbiological) in the summers of 1955-56, 1956-57, 1957-58 and 1960-61 as well as geomagnetic observations (H, Z, D) during the summers of 1953-54 and 1957-58 were carried out from this station.

CONSCRIPTO ORTIZ

Coordinates: Lat. 64°54' S., Long. 62°58' W.

Conscripto Ortiz Depot is under the Antarctic Department of the Hydrographic Service of the Argentine Navy.

The depot is situated on the southern coast of the Paradise Bay, that juts into the west coast of the Antarctic Peninsula in the region of Danco Coast. The depot, which consists of only a small house is also used as an auxiliary base of Almirante Brown Station. It can hold a stock of provisions for three persons for three months.

CORRIENTOS

Coordinates: Lat. 75°34' S., Long. 26°36' W.
Altitude: 30 m above sea level.

Corrientos Depot is under the Antarctic Department of the Argentine Army Headquarters.

It is situated on the surface of the ice shelf bordering the Caird Coast (Queen Maud Land), a little to the south of the British scientific station "Halley Bay". The depot consists of a small house that can stock food for four persons for 15 days. It was built on January 10, 1961.

CRISTO REDENTOR

Coordinates: Lat. 63°32' S., Long. 57°24' W.
Altitude: 6 m above sea level.

Cristo Redentor Depot also belongs to the Antarctic Department of the Argentine Army Headquarters.

It is situated on Cape View, which is the western entrance of the Duce Bay that juts into the southeastern coastline of the Trinity Peninsula (northern extremity of the Antarctic Peninsula). The structures of the depot include a wooden house intended for four persons, a power house and a radio station. The depot was built on May 25, 1955 and is used periodically in summer by the personnel of Esperanza Station.

Rations and other essential provisions sufficient to last six months for three persons are usually stocked in the depot.

MARTIN GUEMES

Coordinates: Lat. 63°30' S., Long. 57°10' W.
Altitude: 10 m above sea level.

Martin Guemes Depot is under the Antarctic Department of the Argentine Army Headquarters.

It is situated on the east coast of the Duce Bay which juts into the southeast coast line of Trinity Island (northern extremity of Antarctic Peninsula). A mountain range of height 500 to 600 m borders on the east coast of Duce Bay which forms the boundary of Tabarin Peninsula. Rocky ridges rising up to 150 m stretch from this range to the coast of the bay. Narrow glaciers descend between these ridges.

The depot comprises a wooden house, 2 x 3 m in size. It was built on October 23, 1953 and is used by fieldwork parties of Esperanza Station, coming here for hunting seals. The depot has stocks of provisions for three persons for one month.

MAIPU

Coordinates: Lat. 68°07' S., Long. 65°58' W.
Altitude: 1310 m above sea level.

Maipu Depot also belongs to the Antarctic Department of the Argentine Army Headquarters.

It is situated in the southeastern part of the Antarctic Peninsula, in the region of Trail Bay. The wooden house of the depot 2 x 2 x 2 m in size was built on a rock on December 14, 1956 and is used as an auxiliary base of General San Martin Station. It can stock provisions to last two months for three persons.

NOGAL DE SALGAN

Coordinates: Lat. 69°35' S., Long. 68°13' W.
Altitude: 600 m above sea level.

Nogal de Salgan Depot is under the control of the Antarctic Department of the Argentine Army Headquarters.

It is situated in the southwestern part of the Antarctic Peninsula, on the east coast of the Shokalski Strait, slightly to the southeast of Jeremy Cape. The wooden house of the depot, 2.8 x 3 x 2.5 m in size, was built on September 26, 1958. It can stock food and other essential provisions to last two months for three persons. It is also used by the personnel of General San Martin Station, situated within 20 km of the depot towards the northwest.

PASO DE LOS ANDES

Coordinates: Lat. 67°49' S., Long. 68°40' W.
Altitude: 6 m above sea level.

The depot Paso de los Andes is attached to the Antarctic Department of the Argentine Army Headquarters.

It is situated on a small island in the Henkes group of rocky islands and individual rocks at the southwestern extremity of Adelaide Island. The wooden house of the depot of dimensions 2.8 x 3 x 2.5 m was built on October 26, 1957. It can stock provisions to last four months for three persons.

PETREL

Coordinates: Lat. 63°28' S., Long. 56°17' W.

Petrel Depot is under the Antarctic Department of the Hydrographic Service of the Argentine Navy.

It is situated on the western part of Dundee Island, which is one of the three big islands that are separated from the Trinity Peninsula (northern extremity of the Antarctic Peninsula) by the Antarctic Sound towards the east. Dundee Island is mostly snow-bound, with rocks projecting out as high as 600 m in its southern region.

The depot is built on the southern coast of a small bay, that juts into the western part of the island in the northeastern direction from Welchness Cape, which is the western tip of the island. The coast in this area is bordered by a sandy and gravelly beach, on which the structures of the depot are located. They consist of a living (wooden) house, approximately 5 x 6 m in size, a small house-cum-store and a fuel store. The depot houses a small electric generator and a radio station. Provisions in the depot suffice for three persons for three months.

The depot was opened in January 1952 as a temporary base for carrying out work during summer months and to serve as a fuel store. It was used in the summers between 1952 and 1962 for conducting surface meteorological observations. Ocean level observations and gravimetric studies were also made from this depot in the summer of 1957-1958.

PLUMERILLO

Coordinates: Lat. 68°20' S., Long. 67°11' W.
Altitude: 6 m above sea level.

Plumerillo Depot is under the Antarctic Department of the Argentine Army Headquarters.

It is situated on one of the small islands "Refuge", lying in the central part of the Marguerite Bay within a few kilometers off the west coast of the Antarctic Peninsula. The coast line of the Marguerite Bay in these parts is formed by steep and precipitous glaciers, sloping down from high mountain ridges, whose tops rise to heights of 1,000 to 15,000 m above sea level. The depot consists of only one wooden house, 2.8 x 3.0 m in area, and was built on April 28, 1953. The depot holds provisions to last four months for three persons.

SALTA

Coordinates: Lat. 78°01 S., Long. 35°48' W.
Altitude: 30 m above sea level.

Salta Depot is under the control of the Antarctic Department of the Argentine Army Headquarters.

It is situated in the eastern part of the Weddell Sea coast about 15 km to the south from the top of the Duke Ernst Bay and 4 km to the west of Moltke nunatak. A little to the west of the depot is the connecting link between the eastern boundary of the Filchner Ice Shelf and the continental shelf.

The depot consists of a wooden house, 3 x 2.5 x 3 m in size, set up on November 12, 1957. It holds a stock of provisions enough to last four months for six persons.

SAN ANTONIO

Coordinates: Lat. 64°58' S., Long. 60°0'W.

San Antonio Depot belongs to the Antarctic Department of the Argentine Army Headquarters.

It is situated on one of the Seal nunataks rising above the surface of the Larsen Ice Shelf adjoining the northeastern coastline of the Antarctic Peninsula. The wooden house of the depot was constructed on March 20, 1959. It has one month stock of provisions for three persons.

SAN CARLOS

Coordinates: Lat. 63°50'S., Long. 57°59' W.
Altitude: 8 m above sea level.

San Carlos Depot belongs to the Antarctic Department of the Argentine Army Headquarters.

It is situated on the northwestern coastline of James Ross Island, the biggest of the islands near the eastern coast of the Trinity Peninsula (northern extremity of the Antarctic Peninsula). The depot consisting of a metal house 2 x 2 x 2 m in size, was built on October 4, 1959. It has a stock of provisions enough for three persons for four months.

SAN ROQUE

Coordinates: Lat. 65°17' S., Long. 59°18' W.
Altitude: 3 m above sea level.

San Roque Depot belongs to the Antarctic Department of the Argentine Army Headquarters.

It is located on one of the rocky nunataks in the southern part of Robertson Island, situated near the northern part of Larsen Ice Shelf. The cupola-shaped island, covered with snow and ice has projections of rocky massifs in some places. Its southeastern coast runs towards the edge of the ice shelf. The depot is just a metal house of 2 x 2 x 2 m in size built on January 25, 1956. It holds stock of provisions enough for four persons for 6 months.

SAN JUAN

Coordinates: Lat. 64°04'S., Long. 58°21' W.
Altitude: 6 m above sea level.

San Juan Depot is under the Antarctic Department of the Argentine Army Headquarters.

It is situated on the western coastline of James Ross Island, the biggest in the group of islands lying near the eastern coast of the Trinity Peninsula (northern extremity of the Antarctic Peninsula). The depot is an aluminum shed, 2 x 2 x 2 m in size. It was set up on October 9, 1959, and can store provisions that will last twenty days for three persons.

17 DE AGOSTO

Coordinates: Lat. 68°09'S., Long. 67°09'W.
Altitude: 2.5 m above sea level.

The Antarctic Department of the Argentine Army Headquarters controls the "17 De Agosto" Depot.

The depot is situated on the east coast of Millerand Island, a small rocky island lying in the northeastern part of Marguerite Bay, within a few kilometers to the west of the Antarctic Peninsular coast. The wooden house of dimensions 2.8 x 3 x 2.5 m was erected on August 17, 1957.

SUESIA

Coordinates: Lat. 64°22' S., Long. 57°00' W.
Altitude: 13 m above sea level.

Suesia Depot is under the Antarctic Department of the Hydrographic Service of Argentine Navy.

It is situated on the northwestern coast of Snow Hill Island which is located near the northeastern coast of the Antarctic Peninsula. The island is mostly an even plain about 300 m above sea level and covered with ice. The depot stands at the head of an inlet jutting into the lower part of the northwestern coast of the island, about 5 km to the southwest of the Costa Lasserre Cape at the northeastern extremity of the island. The depot is a half-ruined wooden house with an annexe. This structure was erected by the Swedish South-Pole Expedition team, led by Nordenskjold, which wintered here in

1902 and 1903. The house was restored by the Argentine Navy on January 1, 1954 and has ever since been called as Suesia Depot. The depot was used for conducting reconnaissance investigations in the summers of 1953-54 and 1954-55. It has a stock of provisions enough to last three months for three persons.

TENIENTE LASALA

Coordinates: Lat. 62°56' S., Long. 60°36' W.
Altitude: 3 m above sea level.

Teniente Lasala Depot is under the Antarctic Department of the Hydrographic Service of Argentine Navy.

It is situated on the eastern part of Deception Island (of South Shetland Islands), on the coast of Pendulum Cove and consists of a small wooden house with a kitchen and bath. The earliest construction here was built on April 4, 1949, but was demolished by the British on February 15, 1950. From the end of 1951 to the beginning of 1952 and again in January 1953, Argentinians built it anew. But the British expedition pulled down the house and carried away the outfit on February 15, 1953. The depot was again renovated on December 30, 1953 and the Hydrographic Service of Argentine Navy used it during summers of 1952-53, 1953-54, 1954-55 and 1955-56.

TENIENTE ESQUIVEL

Coordinates: Lat. 59°27' S., Long. 27°16 W.

Teniente Esquivel Depot is under the Antarctic Department of the Hydrographic Service of Argentine Navy.

It is situated on the coast of Ferguson Bay which juts out into the southern coast of Thule Island (South Sandwich Islands). The coast of the bay in this area is cut up all over by ravines and is fringed with wide beaches. The depot is a small wooden house, with a sloping roof, built on January 29, 1955 and was used during the summers of 1954-55 and 1956-57. During the period of IGY (in summer) it functioned as a base for gravimetric observations.

The depot is equipped with furniture, crockery, clothes, medicines and other provisions for three persons to last for three months.

THORNE

Coordinates: Lat. 62°55' S., Long. 60°42' W.

Thorne Depot is under the Antarctic Department of the Hydrographic Service of Argentine Navy.

It is situated on the northeastern part of Deception Island (of South Shetland Islands), on the southwest coast of Telefon Bay. The depot is essentially a small wooden house (3 x 4 m) with kitchen and bath. Besides, a small (2 x 2.5 m) storeroom lies alongside. The depot was opened on January 2, 1953 and was used in the summers of 1952-53, 1953-54, 1954-55, and 1955-56. The stock of provisions will be enough for three months for three persons.

FLIESS

Coordinates: Lat. 64°51' S., Long. 62°33' W.

Fliess Depot is under the Antarctic Department of the Hydrographic Service of Argentine Navy.

It is situated on the edge of the northeastern coast of Andvord Bay, that juts into the northwestern coast of the Antarctic Peninsula. The depot was constructed on January 13, 1949 on the low, ice-free coast of Neko Harbor. It was pulled down in 1951 and rebuilt in 1952. It was used in the summers of 1949-50, 1952-53, 1953-54 and 1954-55. The depot stocks provisions for three persons for three months.

FLORENTINO AMEGHINO

Coordinates: Lat. 64°25' S., Long. 58°57' W.
Altitude: 29 m above sea level.

Florentino Ameghino Depot is under the Antarctic Department of the Argentine Army Headquarters.

It is situated on Cape Longing, which is the southeastern tip of a rather large peninsula, jutting out on the east coast of Antarctic Peninsula (Nordenskjöld Coast), near the northern extremity of the Larsen Ice Shelf. The wooden house of the depot of 2.2 x 2 x 2 m size was built on October 15, 1960.

GENERAL SAN MARTIN

Coordinates: Lat. 64°11 S., Long. 58°21' W.
Altitude: 7 m above sea level.

General San Martin Depot is under the Antarctic Department of the Argentine Army Headquarters.

It is situated on the small rocky Persson Island lying at the entrance of Röhss Bay, that juts out into the central part of the west coast of James Ross Island. This is the biggest of the group of islands situated near the east coast of the Antarctic Peninsula. Its surface is ice-bound and abounds in mountainous ridges as high as 800 m.

The depot is just a wooden house 2.5 x 2.8 x 1.8 m in size, built on August 17, 1955 and is used periodically in summer months by the personnel of Esperanza Station. It can stock provisions to last one month for three persons.

JUBANY

Coordinates: Lat. 62°14' S., Long. 58°38' W.
Altitude: 5 m above sea level.

Jubany Depot is under the Antarctic Department of the Hydrographic Service of Argentine Navy.

It is situated on the coast of Potter Bay, which juts into the southern coastline of King George Island (Waterloo). King George Island is the biggest of the South Shetland Islands. Its surface is mountainous, and mostly covered with ice. The altitude of the island in the central part reaches 655 m.

Potter Bay, with its mostly ice-bound coast, is situated about 4 km to the northwest of the southern extremity of the island. The depot is built on a declivous, sandy and pebbly beach, stretching in the southern part of the eastern lower bank of the bay. A little to the south of the depot is the snow-free Three Brothers Hill, whose three summits rise up to a height of 180 m. Almost in the middle of the beach a rivulet joins the bay, whose water can be used for drinking. The depot consists of four houses: two for living, one storehouse and one tank-house. A pier has been constructed near the mouth of the rivulet on the shore. A small bridge was built on the rivulet near the station in 1958.

Jubany Depot was set up for supplying fresh water to Argentine ships navigating in this area. The depot was also used for conducting scientific investigations and field work in the summers of 1952-53, 1955-56, 1956-57, 1957-58, 1959-60, 1960-61, and 1961-62. Surface meteorological observations were made in the summers of 1957-58, 1959-60, 1960-61, and 1961-62. Geomagnetic observations (H, Z, D) were carried out in the summer of 1957-58. The depot can stock provisions for three persons for three months.

CHACOBUCO

Coordinates: Lat. 68°07' S., Long. 67°11' W.
Altitude: 1500 m above sea level.

Chacobuco Depot is under the Antarctic Department of the Argentine Army Headquarters.

It is situated on the southwestern part of the Antarctic Peninsula on the glacial plateau of the Fallieres Coast, approximately 100 km to the east of the head of the Neny Bay. The wooden house of the depot, of dimensions 2 x 2 x 2 m, was built on November 21, 1956 as an auxiliary base for General San Martin Station. The depot stocks food for three persons for two months.

JAPEYU

Coordinates: Lat. 68°05' S., Long. 66°42' W.
Altitude: 610 m above sea level.

Japeyu Depot is under the Antarctic Department of the Argentine Army Headquarters.

It is situated on the southwestern part of the Antarctic Peninsula, in the central part of Fallieres Coast, approximately 150 km from the coastline of Marguerite Bay (196 km to the east of General San Martin Station).

The depot consists of a wooden house of dimensions 2 x 2 x 2 m, set up on November 4, 1955. The depot stocks provisions and other essential supplies for three persons for two months.

CHAPTER III

SCIENTIFIC STATIONS OF BELGIUM

Belgium initiated station-based investigations in the Antarctic region in 1899 during the forced drift of the Belgian expeditionary vessel "Belgica" in Bellingshausen Sea.

After this short period of activity there was a long pause until 1957, when Belgian investigators started further work in Antarctica in connection with the International Geophysical Year. They set up the scientific station Roi Baudouin on an ice shelf glacier (Princess Ragnhild Coast), which also served as a base for routine investigations in the eastern part of the Queen Maud Land.

BELGICA

Coordinates: From (Lat. 71°31' S., Long. 85°16' W.)
to (Lat. 70°50' S., Long. 102° 13' W.)

"Belgica", the vessel of the Belgian Antarctic Expedition, got locked in ice on March 3, 1898 in Bellingshausen Sea and continued to drift for more than a year (from March 3, 1898 to March 13, 1899). Gerlache de Gomeri was the leader of this expedition. During this period of drift, meteorological (hourly observations of atmospheric pressure, air temperature, wind, precipitation and other meteorological phenomena), oceanographic, hydrographic, geomagnetic and biological observations were carried out from the ship by five scientific workers (H. Artcowski - geologist, E. Danco - magnetologist, E. Rakovitza - naturalist, F. Cook - physician and photographer and Lieutenant Leconte - cartographer).

The results of these scientific investigations from the ship "Belgica" were published as a handbook of the expedition.

ROI BAUDOUIN

Coordinates: Lat. 70°26' S., Long. 24°19' E.
Altitude: 38 m above sea level.
Geomagnetic coordinates: Lat. 68°00' S., Long. 63°12'.

Roi Baudouin Station was the base of Belgian Antarctic Expedition until 1964 after which it has been serving as the joint base of the Belgian-Netherland Antarctic Expedition. The station is situated on an even snowy surface of the ice shelf on

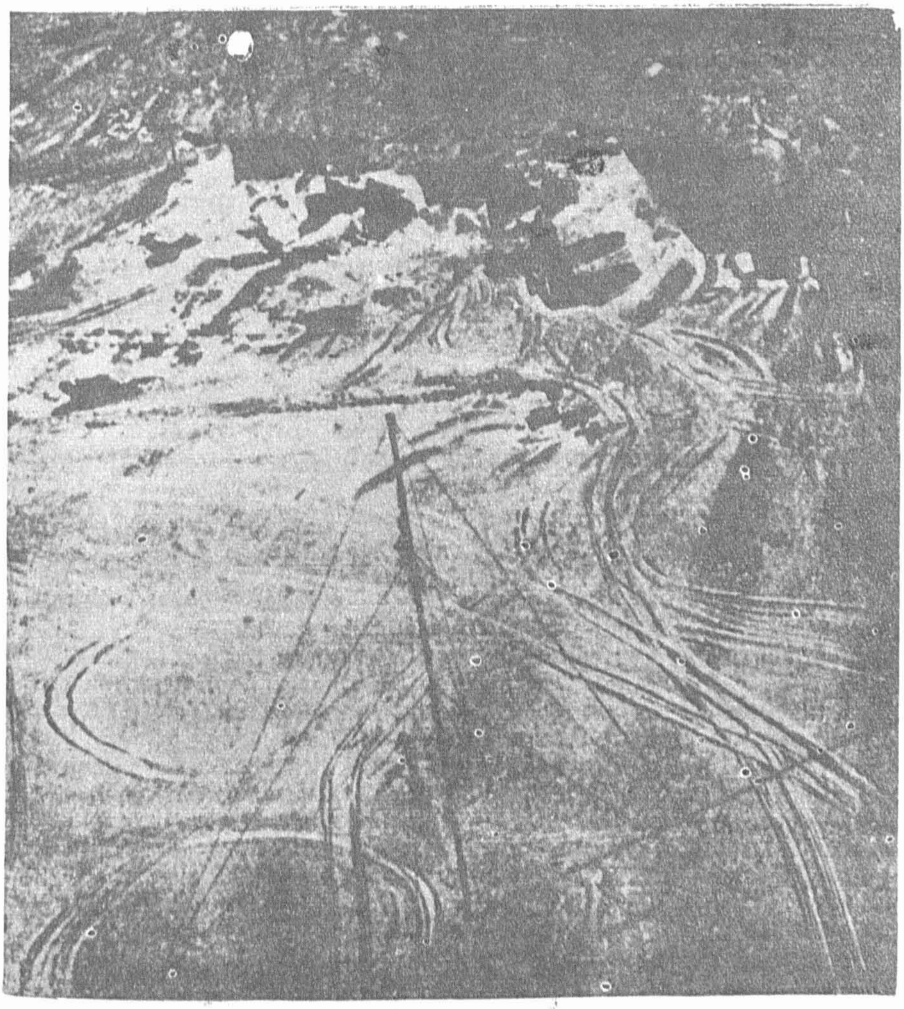

Fig. 24. Roi Baudouin Station, 1958.

the coast of the Breid Bay (Princess Ragnhild Coast, eastern part of Queen Maud Land) at a distance of 17 km from the coastal cliff (Fig. 24). To the south of the station, the surface of the glacial cover rises progressively and at a distance of 100 km attains a height of almost 1 km. The southern region of the station has projections of rocks that rise 150 km above the glacial cover (tops of Sør Rondane).

Climatic conditions: Frequently recurring strong winds from the east, accompanied by snowstorms and temperatures of the air remaining below 0°C during almost the whole year are typical climatic conditions of the region around Roi Baudouin Station. Air temperature: Annual average: about -23°C; minimum, -50°C; maximum: about 1°C. Velocity of wind: Annual average: about 13 m/sec, maximum: more than 50 m/sec.

Installations: Three large prefabricated metal houses joined into one complex in such a way as to communicate with one another, and a few service rooms. The living rooms at the station are equipped for 22 persons. The station also has a meteorological platform as well as a booth for sending up radiosondes (Fig. 25).

Electric Station: Three diesel generators of total 30 kw capacity.

Means of Transport: Three amphibian vehicles of "Snow-Cat" type and one of the "Muskeg" type are used at the station. A landing and take-off strip for airplanes (with skis) was laid on the ice shelf near the station.

During summer, planes of the type "Otter" and "Oster" have their base at the station.

Supply: The station is provisioned by ships of "Tala Dan" type. Intermediate transportation between the place of anchorage of the ship and the station is carried out by means of sledges and caterpillars.

Roi Baudouin Station was opened on January 10, 1958 and was named in honor of the King of Belgium. The station was

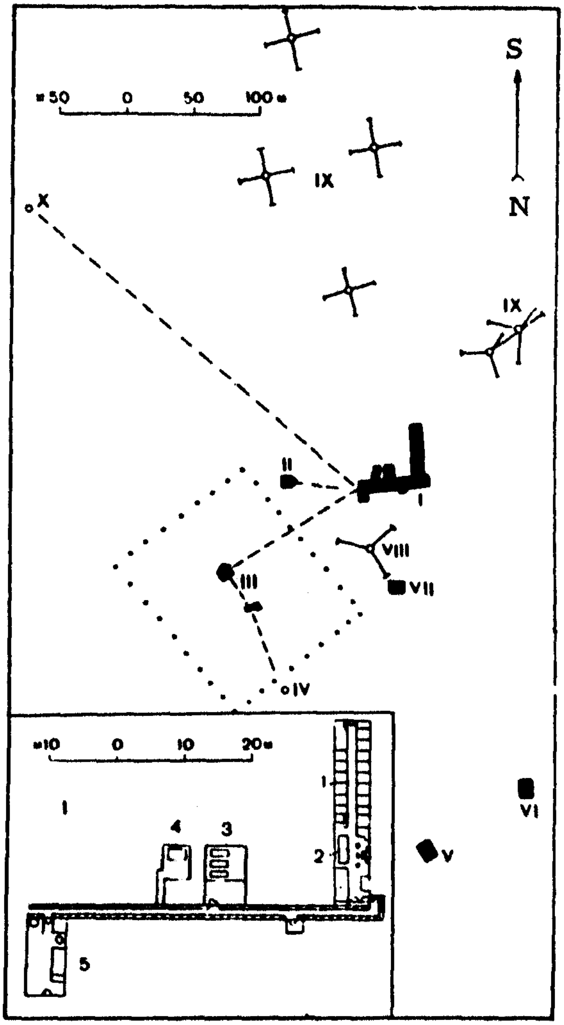

Fig. 25.Plan of Roi Baudouin Station.

I — Complex of principal buildings of the stations: 1 - Residential quarters; 2 - Ward-room; 3 - Electric station; 4 - Generator room and aerological pavilion; 5 - Scientific laboratories; II - Radiotheodolite; III - Geomagnetic booths; IV - Geodetical indicator; V - Helicopter hangar; VI - Airplane hangar; VII - Equipment store; VIII - Antennas of ionospheric station; IX - Radio station antennas.

closed on February 2, 1961. However, station-based investigations were renewed at Roi Baudouin Station on February 6, 1964, when it was renovated and re-equipped by the joint Belgian-Netherland Antarctic Expedition. Fourteen members of the Belgian-Netherland Antarctic Expedition stayed at the station in 1964.

TABLE 32
Personnel at the station

Year	Number of workers Total	Scientific	Director
1958	17	8	G. Gerlache, Pilot
1959	22	12*	F. Bastin, Meteorologist
1960	20	12	G. Derom, Pilot

* Including the British, French and American representatives.

Principal Scientific Instruments

Meteorology

1. Apparatus for surface meteorological observations.
2. Radiosondes and rawinsondes.
3. Apparatus for actinometric observations.
4. Apparatus for aerological observations (automatic radio-theodolite AN/GMDIA).
5. Apparatus for observations of atmospheric electricity.
6. Apparatus for observations of radioactivity of the atmosphere.

Ionosphere

Ionosonde of C_4 type (Barker and Williams) with 10 kw peak power for vertical sounding of the ionosphere.

Geomagnetism

1. Instruments for absolute determination (magnetic theodolite of Asman type, QHM and BMZ – Danish) of magnetic components.

2. Magnetographs, La-Kura type

Aurora

1. Equipment for visual observations of aurora.
2. All-sky camera (Stroffregen) for photographic aurora.

Glaciology

1. Standard glaciological measurements.
2. Unit for drilling holes together with facility to select core samples.
3. Instruments for measuring and recording temperature in snow-firn strata.

In addition, it was equipped with a set of instruments for carrying out geological field work, seismic sounding of the ice cover, gravimetric observations, geodetic and aerophotographic work, as well as for carrying out biological investigations.

The various types of observations undertaken at the station are given in Table 33. In addition, the station carried out observations on atmospheric electricity.

TABLE 33

Scientific Observations

Type of observations	Period
Surface meteorological observations	1958-60
Radiosonde sounding of atmosphere at 0000 and 1200 hours Greenwich Mean Time (occasionally at 0600 and 2100 hours also)	1958-60
Rawinsonde sounding at 0000 and 1200 hours (occasionally, at 0600 and 2100 hours also)	1958-60

Contd.

1	2
Actinometric observations	1958-60
Observations of radioactivity of the atmosphere	1958-60
Vertical sounding of ionosphere	1958-60
Absolute measurement of geomagnetic field (on the 15th of every month)	1958-59
Registration of fluctuations in the geomagnetic field	1958-60
Visual observations of aurora	1958-60
Photography of aurora with all-sky camera (Stroffregen)	1958-60
Standard glaciological observations	1958-60
Crystallographical studies of ice and falling snow	1958-59
Special studies of snow and ice with the help of isotopes of O_2 and H	1958-59
Snowstorm observations	1958-59
Drilling of holes and selection of ice and firn samples up to a depth of 115.7 m	1961
Observations of glaciological profile (8C km long) to the south of the station	1958-59
Study of the influence of Antarctic conditions on human beings	1958-59
Zoological and phytoplankton studies near the border of the ice shelf	1959
Microbiological investigations in mountainous regions	1959

Roi Baudouin Station also served as a base for aerophotographic and geodetic work in the eastern part of Queen Maud Land as well as for routine investigations including biological, geological and gravimetric studies, studies of terrestrial magnetism and seismic sounding of the glacial cover.

The program of work, observational material and other results of investigations by the Belgian Antarctic Expedition at Roi Baudouin Station are being published by the Center for National Polar Research in Brussels.

TELTET

Coordinates: Lat. 72°00' S., Long. 23°32' E.

The field camp "Teltet" was opened in 1959 to conduct traverse investigations in the region of Sør-Rondane mountains. It is situated to the south of Roi Baudouin Station at a distance of about 175 km.

CHAPTER IV

SCIENTIFIC STATIONS OF GREAT BRITAIN

Station-based investigations were started in Antarctica by Great Britain in March 1899, when the British Antarctic expedition set up Cape Adare Station on the Cape of Adare (Victoria Land). This was in fact the first scientific station on the Antarctic Continent. A team of 10 persons, headed by K. Borchgrevink (a Norwegian naturalist) worked at this station for one year. Though Norwegians organized this station, the expedition was financially supported by an English magazine publisher Sir George Newnes, and was officially considered as British. The personnel of Cape Adare Station carried out meteorological, geomagnetic and biological investigations and showed that station-based work in severe icebound conditions in the continent was possible throughout the whole year.

In 1902 the station-based investigations were conducted at the expeditionary base "R. Scott" on Ross Island (Ross Sea). After the name of the cape, on which the base was located, it was named as "Hut Point". Scientific observations were conducted in 1903 from Laurie Island Station set up by the Scottish National Antarctic expedition (under William S. Bruce) on the island lying in the western part of the South Orkney group of islands.

Later on, various British expeditions established scientific stations on Ross Island and other islands near the west coastline of the Antarctic Peninsula.

A new stage in station-based investigations in Antarctica by Great Britain began in 1943, when Falkland Island Dependencies Survey (FIDS) was organized. This organization carried out investigations in the region of the Antarctic Peninsula and nearby islands. In 1944, FIDS set up two stations: Deception Island and Port Lockroy; and by 1950 there were already more than ten stations in the region of the Antarctic Peninsula (Table 34).

TABLE 34

Stations of Great Britain

Name	Operational period
Admiralty Bay	Jan. 25, 1947 - Jan. 19, 1961
Adelaide Island	From Feb. 3, 1961 onwards
Anvers Island	Feb. 28, 1955 - Jan. 10, 1958
Argentine Islands	Feb. 14, 1935 - Feb. 17, 1936 From Jan. 9, 1947 onwards
Barry Island	Feb. 29, 1936 - March 12, 1937
View Point	Temporary
Grytviken	From Jan. 1, 1950 onwards
Danco Island	March 2, 1956 - Feb. 22, 1959
Deception Island	From Feb. 6, 1944 onwards
Detaille Island	Feb. 24, 1956 - April 1, 1959
Cape Adare	March 2, 1899 - Feb. 2, 1900 March 1911 - Jan. 1912.
Cape Geddes	Jan. 29, 1946 - March 17, 1947
Cape Royds	Feb. 22, 1908 - March 3, 1909
Cape Evans	Jan. 17, 1911 - Dec. 19, 1912 May 1915 - Jan. 1917
Laurie Island	April 1 - Nov. 27, 1903
Port Lockroy	Feb. 16, 1944 - April 8, 1947 Jan. 23, 1948 - Feb. 14, 1949 Jan. 24, 1950 - Feb. 11, 1951 Dec. 15, 1951 - Jan. 16, 1962
Prospect Point	Feb. 2, 1957 - Feb. 23, 1959
Sandefjord Bay	Not used
South Ice	April 25, 1957 - Dec. 25, 1957
Signy Island	From March 14, 1947 onwards
Stonington Island	March 13, 1946 - Feb. 12, 1950 March 10, 1958 - March 1, 1959 From August 14, 1960

Contd.

1	2
Water Boat Point	March 4, 1921 - Jan. 13, 1922
Fossil Bluff	Feb. 20, 1961 - 1962
Halley Bay	From Jan. 16, 1956 onwards
Hut Point	Feb. 1, 1902 - Jan. 31, 1904
Hope Bay	Feb. 13, 1945 - Feb. 4, 1949
	Feb. 5, 1952 - Feb. 15, 1964
Horseshoe Island	March 11, 1955 - August 21, 1960
Shackleton	Feb. 7, 1956 - November 25, 1957

Great Britain, jointly with Norway and Sweden, took part in 1950 in setting up Maudheim Station, whose description is given in Chapter VII entitled "Scientific Stations of Norway".

Until the end of 1947, the activity of Falkland Island Dependencies Survey was directed by the Ministry of Colonies with the help of a small consultative committee. In 1948 this organization was brought under the Administration of Falkland Island Territories, and on January 11, 1962 Falkland Island Survey was renamed as British Antarctic Survey (BAS).

Scientific data and other results of investigations from the British stations have been mainly published as Scientific Reports of the British Antarctic Survey (Scientific Reports, FIDS Scientific Reports, up to 1962).

ADMIRALTY BAY (BASE G)

Coordinates: Lat. 62°05' S., Long. 58°25' W.
Altitude: 18 m above sea level
Synoptic index: 88934.

Admiralty Bay Station is a base of the British Antarctic Survey.

The station is situated on the west coast of Admiralty Bay, in the eastern part of King George Island which lies in the center of the South Shetland group of islands, within about 60 miles to the west of Trinity Peninsula. The surface of the island is mountainous, mostly covered with ice. In the central part, the height of the island rises up to 650 m. The coastline, particuarly in the southeastern and the eastern parts, is broken by gulfs and bays, whose banks mostly constitute high glacial cliffs (Fig. 26).

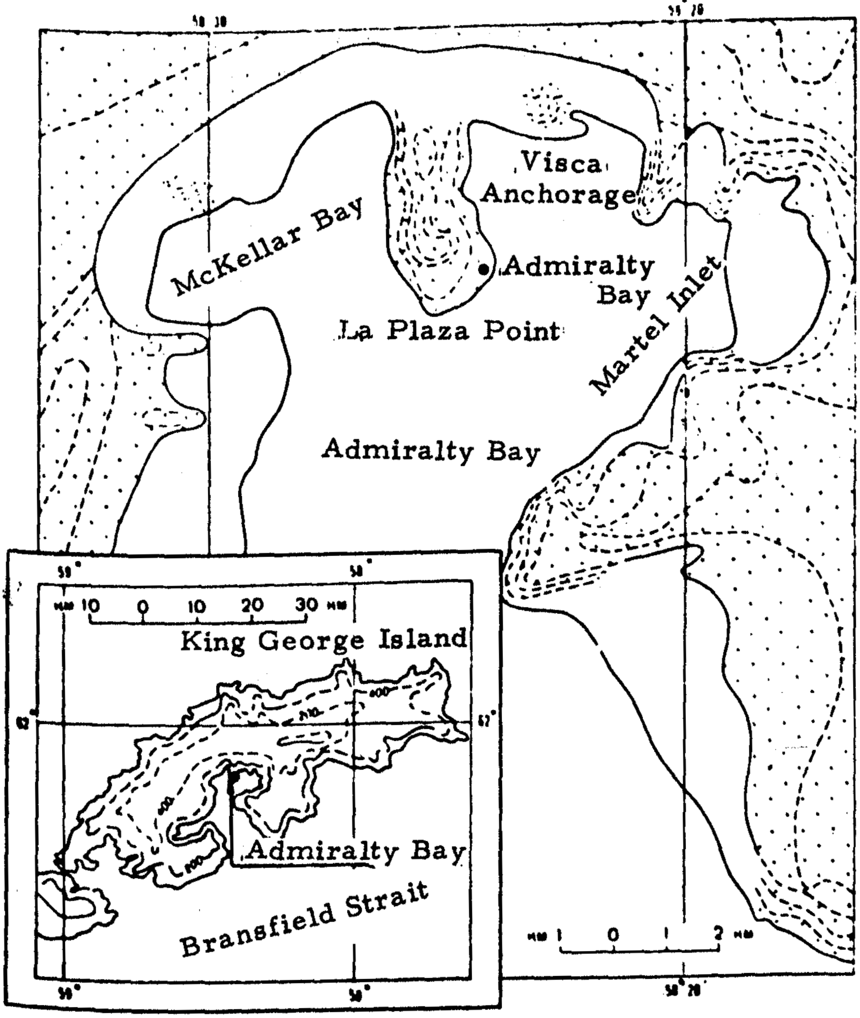

Fig. 26.Region around Admiralty Bay.

Admiralty Bay juts 7 miles into the east coast of the island. Its upper end is divided by a narrow and ice-free peninsula into two small inlets "McKellar" and "Martel". Earlier, the station was located on the eastern part of the peninsula on a narrow coastal strip of Visca Anchorage lying in the western part of the Martel Inlet. But, since this place was closed from all sides (excepting the south) by mountains of 300 to 700 m in height the station was shifted to the southern part of the peninsula in 1960. At present, it is situated on the ice-free coastal part less than 1.5 km away from La Plaza Point, which is the southern extremity of the peninsula.

Climatic Conditions: Air temperature: Annual average, -4°C; maximum, 8°C; minimum, -27°C. Average wind velocity, 5 m/sec.

Installations: Main (residential) building intended for 10 to 12 persons, two storehouses, one spare storehouse and an old house with a storeroom on the bank of Visca Anse.

Electric Station: Provided with two diesel generators of 6.5 kw each.

Means of Transport: Two boats with outboard motors, dog team and sleds.

Supply: The station is provisioned by ships of the British Antarctic Survey.

The first structure of the station was built on January 25, 1947. Two persons stayed at the station until March 23, 1947. On January 18, 1948 a prefabricated house was set up and meteorological observations were started. The station was shifted to the new place in January 1950 and it was closed on January 19, 1961.

The size and composition of staff is given in Table 35.

TABLE 35

Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
1948	5	4	I. Plott, Geologist
1949	6	5	G. Hattersley-Smith, Geologist

Contd.

1	2	3	4
1950	4	3	J. Kindle, Radio Engineer
1951	5	4	J. Guden, Meteorologist
1952	5	3	U. Minan, Radio Engineer
1953	5	3	R. Vorevik, Meteorologist
1954	5	3	D. George, Meteorologist
1955	5	3	J. Noble, Meteorologist
1956	6	4	K. Clement, Mechanic
1957	8	5	A. Prickuse, Meteorologist
1958	7	5	D. Stephens, Meteorologist
1959	9	6	M. Stansborn, Glaciologist
1960	8	5	K. Burton, Geologist

Scientific Observations

The types of scientific observations carried out at the station are mentioned in Table 36.

TABLE 36

Types of Scientific Observations

Type of observation	Period
Surface meteorological observations	1948-60
Visual observations of aurora	1956-60
Glaciological observations: accumulation and ablation, temperature, movement of glacial cover of King George Island	1956-60

The station was also a base for conducting geological and topographical work on King George Island.

ADELAIDE ISLAND (BASE T)

Coordinates: Lat. 67°46' S., Long. 68°54' W.
Altitude: 25 m above sea level.

Adelaide Island Station is a base of the British Antarctic Survey.

The Station is situated on the southern coastline of Adelaide Island, which is the biggest island near the west coast of Antarctic Peninsula (Loubet Coast). Adelaide is a mountainous island, 120 km long and 50 km wide, stretching from the northeast to the southwest and jutting into the northern part of the Marguerite Bay. The mountains on the island are in the form of several interspersed ranges, with narrow ravines. The higher tops of the mountains, situated in the western part of the island, rise up to 2000 to 2500 m.

Installations: A residential house and a storeroom are on the coast of a small bay, that make it convenient to land on the coast (Fig. 27). A landing and takeoff strip has been constructed for light airplanes on the ice sheet near the station.

Means of Transport: One tractor of "Bombardier-Muskeg 6" type and two dog-teams.

Supply: The station is provisioned by the ships and planes of the British Antarctic Survey.

Adelaide Island Station was opened on February 3, 1961. It was set up as a base, in the Marguerite Bay in George VI Strait, for supporting field work from the air and from the sea, as well as for supplying scientific stations working in this region. In addition, Adelaide Island Station served as a base for conducting topographical and geological work on Adelaide Island and its neighborhood.

Beginning from 1962, Adelaide Island Station is scheduled to carry out a definite program of surface meteorological observations for Marguerite Bay. Prior to this time meteorological observations were conducted only sporadically.

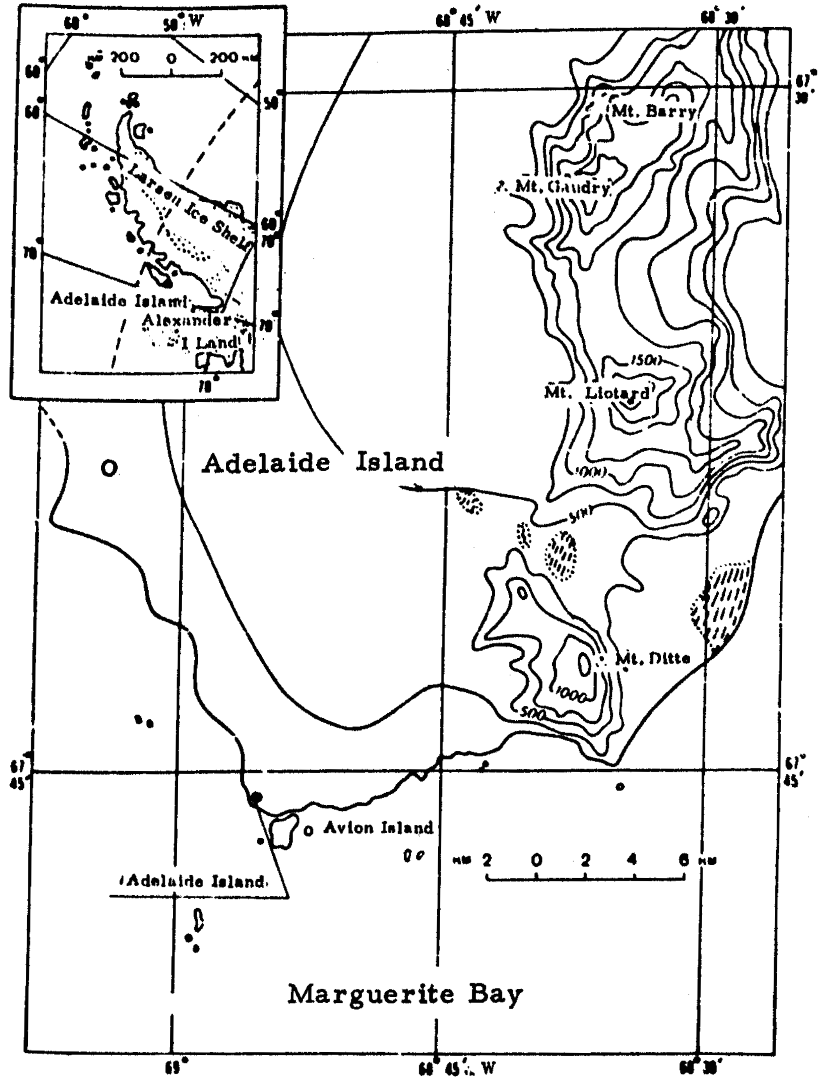

Fig. 27.Region around Adelaide Island.

The number and composition of the workers is indicated in Table 37.

TABLE 37

Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
1961	6	5	F. Preston, Topographer
1962	11	9	R. Likey, Meteorologist
1963	12	6	

Scientific Observations

The type of scientific observations carried out at the station are mentioned in Table 38.

TABLE 38

Types of Scientific Observations

Type of observation	Period
Surface Meteorological observations	from 1961 onwards
Visual observations of aurora	1962 "
Glaciological observations (ablation, accumulation and movement of ice)	1963 "

ANVERS ISLAND (BASE N)

Coordinates: Lat. 64°45' S., Long. 65°05' W.
Synoptic index: 88942

Anvers Island Station is a base of the British Antarctic Survey.

The station lies in the southwestern part of Anvers Island, which is the largest in the Palmer Archipelago. The island is mountainous: its highest point -- Mount France -- rises up to 2870 m. The surface of the island is occupied by a thick broken-up ice shelf and wide glaciers that descend down flat slopes. The station is situated at the head of Arthur Harbor in the southwestern part of the island between Biscoe Bay and Albert-de-Monaco Cape. The bank of the harbor consists of a 40-m high glacial barrier with rare projections of bedrocks.

Installations: A residential house meant for 6 persons and a storeroom for provisions and clothes, situated about 50 m from the main building.

Electric Station: Equipped with diesel-generator of 1 kw capacity.

Means of Transport: Two boats with outboard motors, and a dog team.

Supply: The station is provisioned by British Antarctic Survey ships.

Anvers Island Station was opened on February 28, 1955 and was discontinued on January 10, 1958.

The number and composition of the staff is indicated in Table 39.

TABLE 39
Personnel of the Station

Year	Number of Workers		Director
	Total	Scientific	
1955	6	5	P. Hooper, Geologist
1956	6	5	P. Hooper, Geologist
1957	5	4	D. Thompson, Alpinist

Scientific Observations

This station was set up for conducting geological and topographical work on Anvers Island. Observations of sea ice in Arthur Harbor were also made.

ARGENTINE ISLANDS (BASE F)

Coordinates: Lat. 65°15' S., Long. 64°17' W.
Altitude: 10 m above sea level
Geomagnetic coordinates: Lat. 53°8 S., Long. 3°.3
Synoptic index: 88952.

Argentine Island Station is a permanent base of the British Antarctic Survey.

The station lies on Galindez Island, an island of Argentine Archipelago situated within about 5 miles of the west coastline of the Antarctic Peninsula. The central part of a majority of islands belonging to this group is covered with ice sheets having maximum height near the southern extremity. Occasional projections of bedrocks protrude only in the coastal strip. The southern coasts of almost all islands have high glacial cliffs.

The islands of Galindez, Winter and Skua are the biggest and highest islands in the southern part of the archipelago. The highest point of the archipelago (80 m above sea level) is at the southern part of Galindez Island. This island is separated from Winter Island which lies to the west, by the narrow Stella Creek. In winter, the sea around the islands freezes. This makes sledge trips possible on the mainland and the nearby islands (Fig. 28).

Climatic conditions: Air temperature: Annual average, -5°C; maximum, 8°C; minimum, -39°C. Annual average velocity of wind, 7 m/sec.

Installations: Structures have been built on rocky but fairly even surface not far from the sea coast. They consist of a main (residential) house accommodating 12 persons, a few science laboratories and auxiliary rooms (store, electric station, gas-generating station, etc.). A small mooring block has been set up on the shore near the station (Fig. 29).

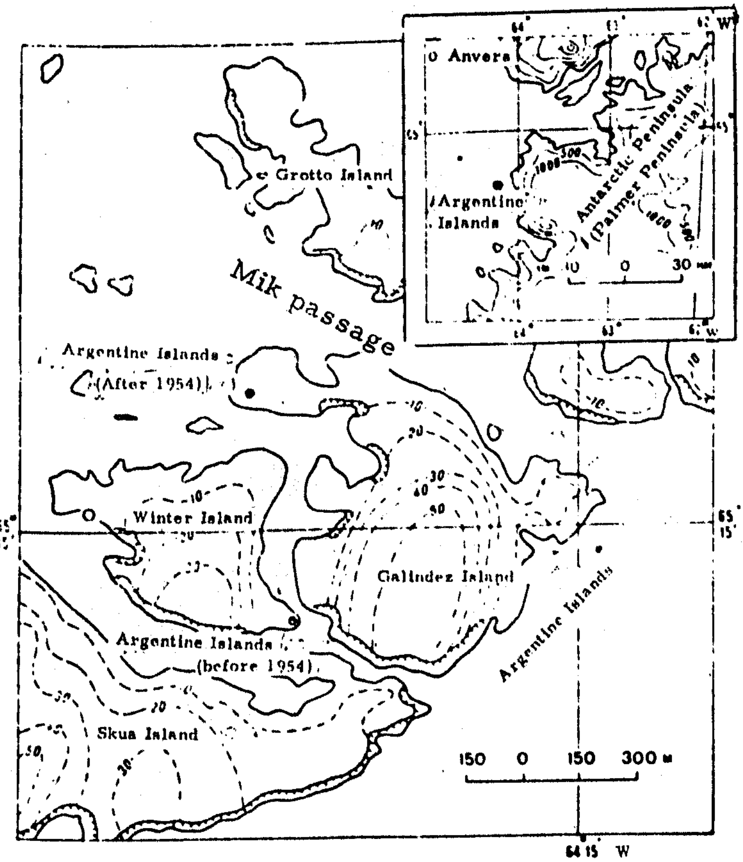

Fig. 28.Region around Argentine Islands Station.

Electric Station: Equipped with two diesel generators, each of 6.5 kw capacity.

Means of Transport: Three motor boats, and dog teams. From February 14, 1935 to February 17, 1936, the staff of the British Expedition of Graham Land, led by John Rymill wintered on the low (about 10 m) ice-free southeast extremity of Winter Island.

On February 18, 1946, materials and equipment were unloaded at that very place for setting up the station of Falkland Island Dependencies Survey. By this time the small house of

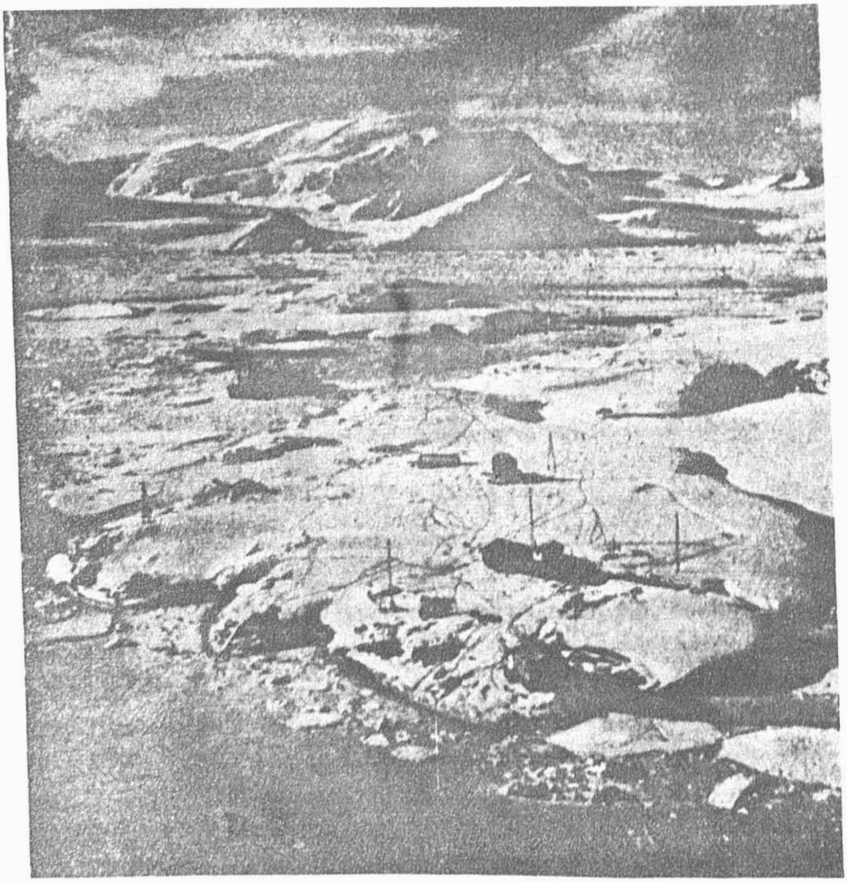

Fig. 29. Argentine Islands Station, 1959.

J. Rymill's expedition had disappeared (probably washed away by waves), and so a new house was constructed on January 9, 1947, when the station was re-opened.

Seven years later on February 5, 1954, the station was shifted to Cape Marina, the northwest extremity of Galindez Island. But the coordinates of the station, in spite of this shifting remain practically unaltered.

Supply: The station was provisioned by the ships of the British Antarctic Survey. The unloading was carried out by means of small boats.

The size and composition of the staff is shown in Table 40.

TABLE 40

Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
1935	9	6	J. Rymill, Topographer
1947	4	4	O. Bard, Meteorologist
1948	4	3	F. Nicholl
1949	4	3	F. Nicholl
1950	4	3	H. Heywood
1951	5	4	D. Green, Meteorologist
1952	4	2	N. Pitts, Mechanic
1953	5	3	D. Barret, Meteorologist
1954	10	6	R. Lenton, Radio Engineer
1955	9	7	R. Hiscot
1956	9	5	Hiddichley, Meteorologist
1957	11	7	D. Emerson, Physician
1958	11	7	I. Farman
1959	10	7	K. Bell, Mechanic
1960	13	9	K. Murrey
1961	13	9	R. Harkness, Mechanic
1962	16	13	

Principal Scientific Instruments

Meteorology

1. Equipment for surface meteorological observations.
2. Pilot balloon equipment.
3. Radiosondes.
4. Actinometric instruments.
5. Dobson photoelectric spectrophotometer.

Ionosphere and whistling atmospherics*.

1. Ionosonde Union-Radio-MK-2 (Frequency range 0.6 - 23 MHz)
2. Ionosonde for studying absorption in ionosphere (2.0 - 2.6 MHz).
3. Equipment for recording (whistler) atmospherics (400 Hz to 30 KHz).

Seismology

1. Two three-component seismographs of Willmore type

Geomagnetism

1. Magnetographs (La-Kura type)
2. Three CHM instruments and two BMZ instruments
3. Proton magnetograph (for measuring F, H, Z)
4. Magnetometer (O).

Oceanography

1. Marcograph and apparatus for registering long-period waves.

Scientific Observations

The types of scientific observations carried out at the station are given in Table 41.

TABLE 41

Types of Scientific Observations

Type of observation	Period
Surface meteorological observations	1935 and from 1947
Pilot balloon observations (sporadically)	from 1947 onwards
Radiosonde sounding of the atmosphere	from 1955 "
Actinometric observations	from 1947 "
Ozone observations	from 1957 "
Vertical ionospheric sounding	from 1962 "
Ionospheric absorption measurements	from 1962 "

Contd.

**The equipment was transferred to Port Lockroy towards the end of summer 1961/1962.*

1	2
Registration of whistling atmospherics	from 1962 "
Registration of earthquakes	from 1956 "
Registration of variations of geomagnetic field	from 1957 "
Absolute observations of geomagnetic field	from 1957 "
Visual observations of aurora	from 1956 "
Glaciological observations (of accumulation and ablation during summer)	1935, and from 1947-52
Observations of sea-level fluctuations	from 1956 onwards
Registration of long period waves	from 1956 "
Observations of sea ice	1935; from 1947 onwards
Ornithological observations (field observations during summer)	1935, from 1947 onwards

BARRY ISLAND

Coordinates: Lat. 68°08'S., Long. 67°07' W.
Altitude: 5 m above sea level.

Barry Island Station was a base of the British Graham Land expedition, and later of Falkland Island Dependencies Survey. The station was situated on a small rocky island called "Barry", belonging to the group of Debenham Islands lying in Marguerite Bay near the west coast of the Antarctic Peninsula. These relatively low rocky islands (the highest point of Barry Island is 18 m), are situated in the passage between the coast and Millerand Islands, from whose steep hills glaciers descend to the eastern and southern coasts.

Installations: A residential house and a plane hangar.

Means of Transport: A single-motor plane, dog team and sleds.

Supply: The station was provisioned by the expedition ship "Penola".

The personnel of the station was composed of 9 persons (including 6 scientific workers). The head of the team was J. Rymill (topographer).

The station was opened on February 29, 1936 and was closed on March 12, 1937. During this period, the station personnel conducted surface meteorological, glaciological and biological work. The station served as a base for geological and topographical work in the southern part of the Antarctic Peninsula.

Falkland Island Dependencies Survey renovated the station in 1946. But the British did not make use of the station. In March 1951, Barry Island Station was demolished by the Argentine Antarctic Expedition, which built General San Martin Station anew.

VIEW POINT (BASE V)

Coordinates: Lat. 63°32' S., Long. 57°23' W.

View Point Station is a base of the British Antarctic Survey.

This station is situated on the west coastline of Duce Bay, that juts into the southeastern part of Trinity Peninsula (northern extremity of the Antarctic Peninsula). The bank of the bay is formed by steep mountain slopes and even at its upper end, the coast is at many places slanting, which facilitates sledge travelling by free movements on the ice of the bay. A snow-covered cupola-shaped 600 m-high mountain rises to the northeast of the bay, in the middle of Tabarin Peninsula, from which rocky ridges separated by narrow glaciers stretch to the coastline. To the northwest of the bay the surface rises gently, merging itself into the central mountain range of Trinity Peninsula, the height of which rises to 1000 m and more. The station is situated on an ice-free region less than 1300 m away from the west of View Point.

Installations: Living house meant for 4 persons and a store for provisions.

Electric Station: Generator of 1 kw capacity.

The station is used from time to time by the personnel of Hope Bay Station for conducting meteorological observations, hunting of seals and as an intermediate base during sledge expeditions over Trinity Peninsula.

View Point Station was opened on February 8, 1953. Beginning from May 11, 1953, surface meteorological and sea ice observations are being conducted periodically (usually for several months in a year) at this station.

GRYTVIKEN

Coordinates: Lat. 54°16'S., Long. 36°30' W.
Altitude: 3 m above sea level.
Synoptic index: 88903.

Grytviken Station is at present under the administration of Grytviken Whale Fishery Base.

The station lies on the eastern coastline of South Georgia Island, on the shore of King Edward Cove, in the western part of Cumberland East Bay (Fig. 30). The station is situated on the small and low lying King Edward Cape jutting out 500 m from the northern shore of King Edward Cove. The Duse Mount (about 500 m high) lies within 1 km, in the northeast of the station and a steep mountain range (up to 400 m high) stretches in the west along the northern coast of the King Edward Cove only 600 m away from the station. Within about 2 km to the west of the station lies the highest summit of this region - Mount Hodges - about 700 m high. Thus the station is fully protected by mountains from the northeast to the northwest.

The southern coast of King Edward Cove is a steep cliff of 20-30 m height facing the station. From the top of the cliff, the surface gently rises, attaining a height of 300 to 400 m at a distance of 1 to 2 km.

Installations: The structures of the station are situated on a low grass-covered part of the coast. The meteorological platform is within a few tens of meters from the beach. The buildings consist of dwelling houses, radio station, electric

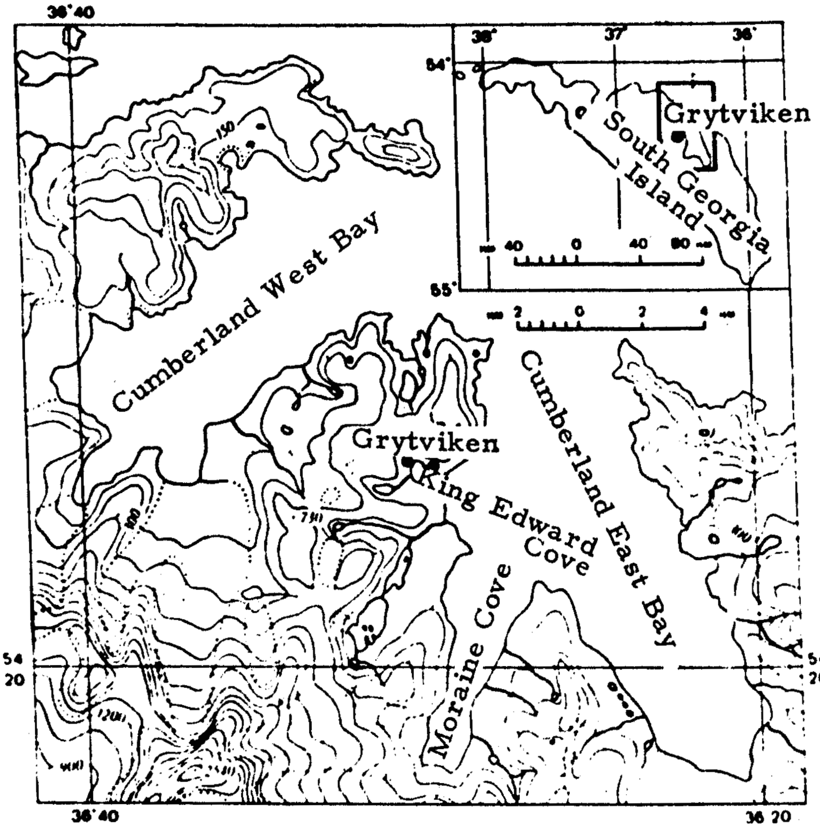

Fig. 30.Region around Grytviken Station.

station, meteorological station, pier etc. There are 20 structures (Fig. 31) in all. On the west coast of King Edward Cove, within 1 km to the west of the station lies the Grytviken Whale Fishery Base.

Grytviken Station was opened on January 1, 1950, after a group of meteorologists of the Falkland Island Dependencies Survey landed on the King Edward Cove and occupied a house built in 1925 by the "Discovery Expedition". At this time, the Argentine meteorological station in Grytviken, which had been in operation since 1905, was closed. The program of meteorological observations was handed over to the British station, which began to function as Base M of Falkland Island Dependencies Survey. On January 1, 1952, it was handed over to the Grytviken Whale Fishery Base.

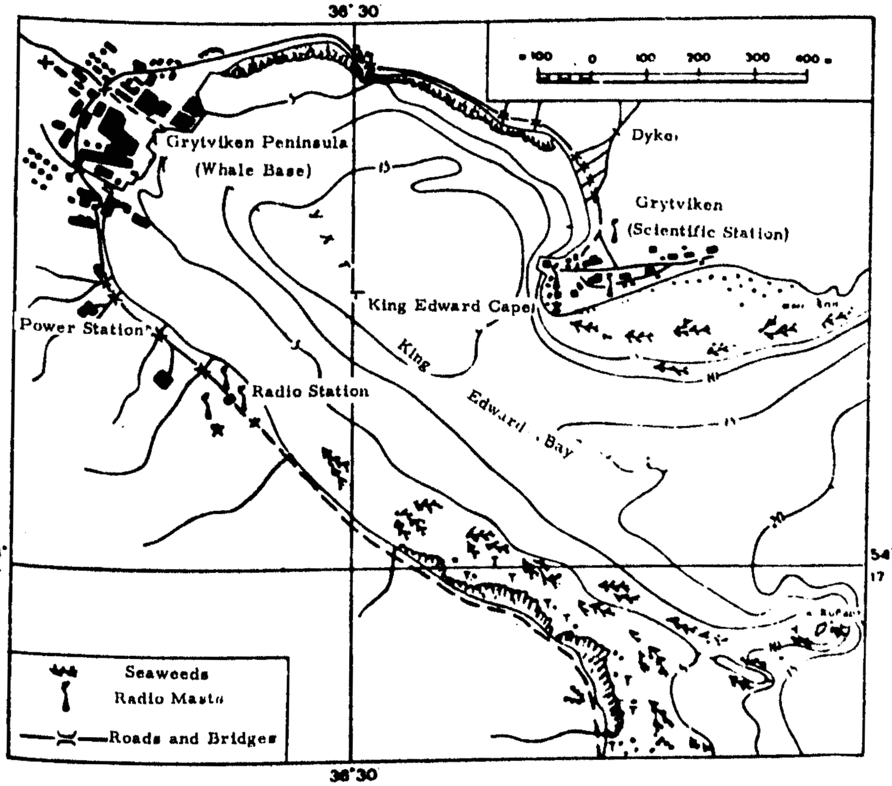

Fig. 31.Plan of Grytviken Station.

The size and composition of the personnel are indicated in Table 42.

TABLE 42

Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
1950	5	5	D. Borland, Meteorologist
1951	5	5	R. Law, Biologist

Contd.

1	2	3	4
1952	3	3	D. Borland, Meteorologist
1953	2	2	J. Couling, Meteorologist
1954	4	4	D. Borland, Meteorologist
1955	-	-	
1956	-	-	
1957	4	4	I. Ford, Meteorologist
1958	4	4	D. Borland, Meteorologist
1959	4	4	D. Borland, Meteorologist
1960	5	5	D. Borland, Meteorologist
1961	-	-	
1962	-	-	
1963	-	-	

Scientific Observations

Grytviken Station was set up for rendering synoptic service to the whaling vessels. Meteorological observations also are a part of the program that is being carried out by the British Antarctic Survey station. Besides, during summer Grytviken Station serves as a base for conducting some field work (e.g., glaciological, topographical and biological work) on South Georgia Island. The types of scientific observations carried out at the station are given in Table 43.

TABLE 43
Types of Scientific Observations

Type of observations	Period
Surface meteorological observations	from 1950 onwards
Glaciological observations	1956 - 59

Contd.

1	2
Oceanographic observations	1959 - 61.
Biological observations	1950 - 51; 1953 - 54; 56.

DANCO ISLAND (BASE O)

Coordinates: Lat. 64°44' S., Long. 62°38' W.
Altitude: 3 m above sea level.

Danco Island Station was a base of the British Antarctic Survey.

The station was situated on Danco Island lying in the southern part of the Errera Channel near the western coastline of the Antarctic Peninsula. Errera Channel is in the south-eastern part of the Gerlache Strait and leads to the Andvord Bay. On the east and the south the Errera Channel is bounded by a part of Danco Coast and on the west by Ronge Island.

Danco Island, stretching 2 km from the south to the north and about 1 km from the west to the east is a low-lying isle almost completely covered with snow and ice. It has some ice-free portions only in the northern part. In the southern part of the island, the coastline constitutes a glacial cliff, about 40 m high. Even the coast of Antarctic Peninsula which is less than 2 km away to the east of the station is almost completely piled up with ice. Further, in the interior of the mainland, the surface of the ice cover gradually rises, to a height of as much as 600 m in a distance of just 2 km.

Installations: The structures consisting of the main living house intended for 6-8 persons, and a small store were built on an ice-free portion of the coastline on the northeastern part of the island.

Electric Station: Equipped with a diesel generator of 1 kw capacity. Besides, there were two wind-driven electric generators.

Means of Transport: Two paddle boats with outboard motors and sledges for expeditions on foot.

Supply: The station was provisioned by the ships of the British Antarctic Survey. The supplies were unloaded on a small rocky beach in the area of the station.

Danco Island Station was opened on March 21, 1956, and closed on February 22, 1959.

The size and composition of the staff is given in Table 44.

TABLE 44

Personnel of the station

Year	Number of workers		Director
	Total	Scientific	
1956	6	3	R. Foster
1957	6	3	F. Foster
1958	5	3	G. Boston, Alpinist

Scientific Observations

Danco Island Station was set up for conducting topographical work in the coastal region of Danco, and was closed after completion of this work. Geological, glaciological and sea ice observations were also carried out at the station and its surroundings during this period.

DECEPTION ISLAND (BASE B)

Coordinates: Lat. 62°59' S., Long. 60°34' W.
Altitude: 8 m above sea level.
Synoptic index: 88938.

Deception Island Station is a base of the British Antarctic Survey.

It is situated on the southeastern part of Deception Island, lying at the southwestern extremity of South Shetland Islands; within about 100 km to the west coast of the Antarctic Peninsula (Fig. 32).

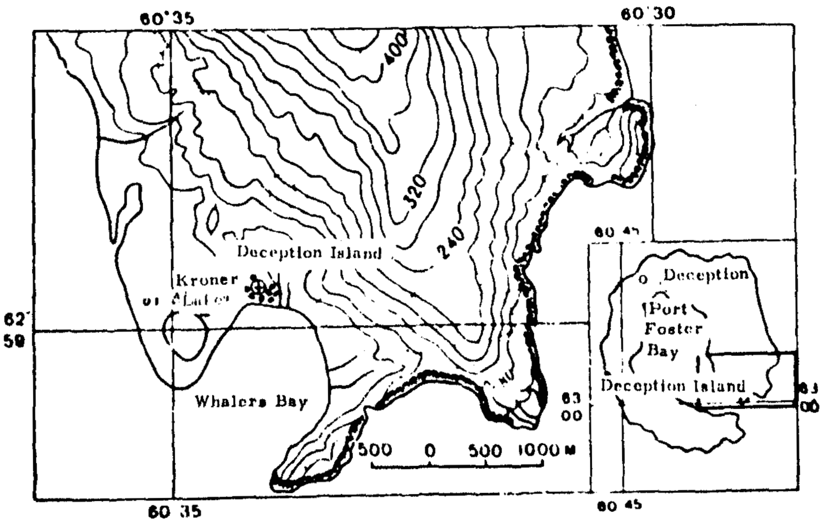

Fig. 32.Region around Deception Island Station.

Deception Island is of volcanic origin. It has the form of a crater, with the wide Port Foster Bay inside it. The Bay is connected with the sea in the southeast by Neptunes Bellows Strait. The surface of the island is absolutely devoid of vegetation and is partially covered with ice. The island is mountainous, the height of individual mountains varying between 200 and 570 m. The coast of the island is mostly craggy, and is at certain places fringed with small beaches. The east coast and part of the southern coast are formed by a glacial barrier.

The coast of Port Foster Bay, which is a submerged crater of a volcano, is broken into small inlets, which facilitate landing on the coast. The station is built on the northern coast of the small and convenient Wellers Bay that juts into the east coast of the Port Foster Bay between the Capes of Fildes and Benfold. In winter, almost the whole of the Whalers Bay is covered with ice and only a narrow strip of water along the coastline remains open. The buildings are located on this beach. The surroundings of the station are free of glacial cover and by midsummer the snow melts off almost completely.

Towards the north and east of the station, the surface of the island rises gently, attaining a height of 300 m at a distance of 1 km. The highest point of the Island – Mount Pond (about 570 m) – lies in its immediate north. The 104 m high Ronald Hill is situated to the northwest of the station; a little to the south, on the west coast of the Whalers Bay is the Kroner salt lake.

Whalers Bay is well protected from the southern and south-western winds by a chain of 100 to 400 m high mounds which stretch along its east coast, and along the northern coastline of the Neptunes Bellows Strait.

Climatic conditions: Annual average air temperature, -3°.5C; maximum, 10°C; minimum, -9°C. Annual average wind velocity, 7 m/sec. Total yearly precipitation: 433 mm.

Installations: The station is partly housed in the structures of the old whale fishery building (built 30-40 years ago) and partly in newly built houses. There are three huge structures in all, providing accommodation for residential purposes, scientific work, radio station, electric station and two storerooms.

Electric Station: Equipped with two diesel generators, each of 6.5 kw capacity.

Means of Transport: "Beaver" and "Oster"-type light planes with wheels are used. A well-equipped strip for landing and taking off is provided. The station also had paddle- and motor boats and dog teams.

Supply: The station is provisioned by ships of the British Antarctic Survey. A pontoon pier is fixed up in the region of the station for unloading.

Deception Island Station was opened on February 6, 1944. The house built by the wintering party was destroyed in a fire on September 8, 1946 and the station was then shifted to the building which was vacated by the whale-fishery factory. In December

1956, the aerial photography expedition of the Falkland Island Dependencies Survey built a new house again.

Deception Island Station is the principal avaiation base of the British Antarctic Survey (formerly, the Falkland Island Dependencies Administration). During 1955-1957 the station served as a base for the expedition of Falkland Island Dependencies Administration, which carried out aerial photographic work on the Antarctic Peninsula. The size and composition of personnel are indicated in Table 45.

TABLE 45
Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
1944	5	2	V. Fleet, Geologist
1945	4	2	A. Rink, Meteorologist
1946	4	3	H. Featherstone, Meteorologist
1947	5	3	J. Hackle, Meteorologist
1948	5	3	A. Scadding, Meteorologist
1949	5	3	G. Stoke, Meteorologist
1950	4	3	J. Green
1951	4	2	R. Lenton, Radio Engineer
1952	6	4	E. Stroud, Meteorologist
1953	5	3	I. Clark, Meteorologist
1954	5	3	G. Hemmen, Meteorologist
1955	6	4	G. Palmer, Radio Engineer
1956	6	4	P. Giaever, Diesel Engineer
1957	6	4	J. Paisley, Meteorologist
1958	7	4	J. Douglas, Meteorologist
1959	5	3	B. Hodkinnon, Meteorologist
1960	11	4	J. Jackson
1961	11	5	J. Killingbeck, Meteorologist
1962	13	5	E. Chin, Meteorologist
1963			

Principal Scientific Instruments

Meteorology

The station is equipped with instruments for making surface meteorological observations and for conducting pilot balloon experiments.

Ionosphere

Equipment for ionospheric investigations was handed over to Port Lockroy Station in 1952.

Scientific Observations

The types of scientific observations carried out at the station are listed in Table 46.

TABLE 46

Types of scientific observations

Type of observations	Period
Surface meteorological observations	from 1944 onwards
Pilot balloon observations	from 1944 " (Not regularly)
Vertical ionospheric sounding	1951-52
Visual observations of aurora	from 1959 onwards
Observations of thickness and spread of sea ice	from 1944
Observations on sea-level fluctuations	1957-58
Observation of sea birds and seals, as well as botanical investigations	1944-47; 1950 to 53; 1958; 1960 to 61
Geological investigations	1944 to 1947; 1949; 58 to 59.

DETAILLE ISLAND (BASE W)

Coordinates: Lat. $66^{o}52'$ S., Long. $66^{o}46'$ W.
Altitude: 9 m above sea level.

Detaille Island Station is a base of the British Antarctic Survey.

The station is situated on bouldery ground on the northern part of a small (about 2000 m long and 900 m wide) rocky Lent Isle, belonging to the group of Detaille Islands near the west coastline of the Antarctic Peninsula (Fig. 33). Detaille Islands constitute a group of small islands, lying near the entrance to the Lallemand Fjord and surrounded by numerous submerged rocks. The east coast of this fjord is formed by sloping mountains, up to 2000 m in height, but the west coast is formed by glacial ridges of wide glaciers coming down to the fjord from

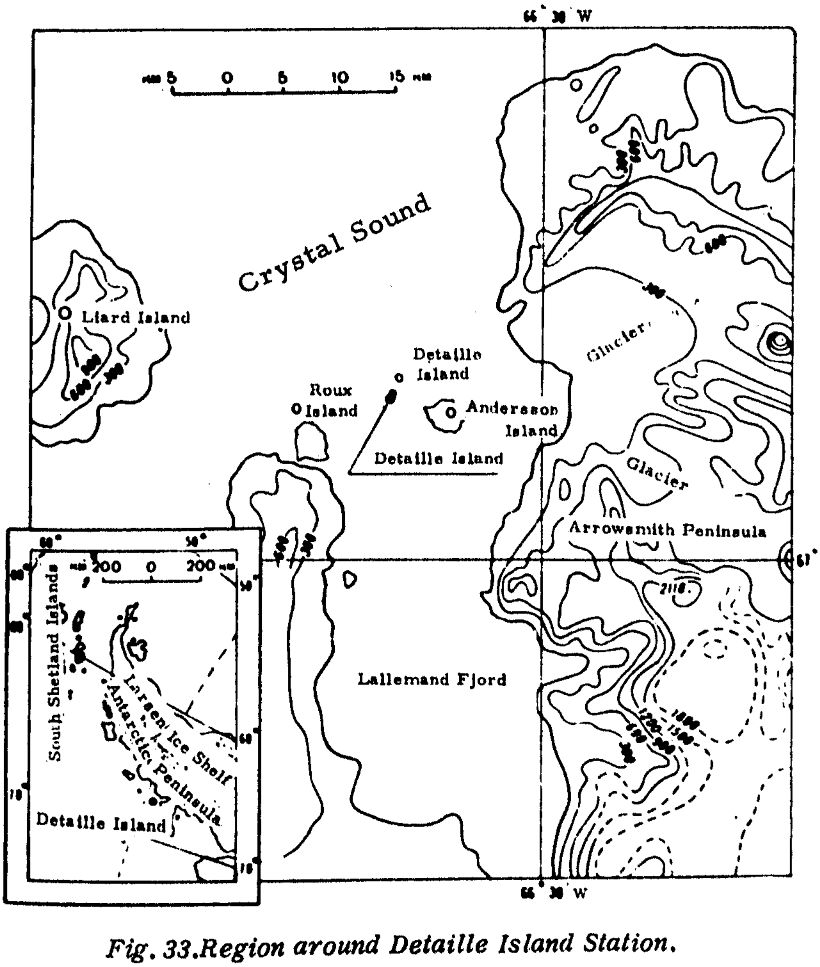

Fig. 33.Region around Detaille Island Station.

the slopes of the mountainous Arrowsmith Peninsula. Mount Gravier, which is about 1600 m high, forms the crown of this Peninsula.

Climatic conditions: Air temperature: Annual average, -5°C; maximum, 4°C; minimum, -25°C. Annual average wind velocity, 7.7 m/sec.

Installations: The station buildings consist of the main (living) house intended for 12 persons, and three auxiliary structures. A small quay was located less than 100 m away from the living house on the northern coast of the isle.

Means of Transport: Two paddle boats with outboard motors, dog teams and sleds.

Supply: The station was provisioned by ships of the British Antarctic Survey.

Detaille Island Station was opened on February 24, 1956 and closed on April 1, 1959.

The size and composition of the staff is indicated in Table 47.

TABLE 47

Personnel of the Station

Year	Number of workers: Total	Number of workers: Scientific	Director
1956	8	5	T. Murphy, Topographer
1957	10	7	A. Erskin, Topographer
1958	9	6	B. Foot, Topographer

Scientific Observations

The station was set up mainly as a base for conducting geological and topographical work in the neighboring regions of the Antarctic Peninsular coastline. Besides, several types of station-based scientific observations were also carried out at the station. These are given in Table 48.

TABLE 48

Types of scientific observations	Period
Surface meteorological observations	1956 to 58
Visual observations of aurora	1956 to 58
Glaciological observations	1956 to 58
Sea-ice observations	1956 to 58
Ornithological observations	1956

CAPE ADARE

Coordinates: Lat. 71°18' S., Long. 170°10' E.
Altitude: 6 m above sea level.

Cape Adare Station was a base of the British Antarctic expedition led by C. Borchgrevink during 1898 to 1900. In the very early phase of the Antarctic investigations, this expedition wintered on the south polar continent. The Norwegians (including the head of the expedition, C. Borchgrevink) constituted a majority of its participants; the equipment also was essentially built in Norway. However, since the expedition was financed by a British magazine (Publisher: Sir George Newnes) it is formally considered as the first British scientific station on the south polar continent.

The station was situated on Cape Adare, which is the northern extremity of the great peninsula, bounding the Robertson Bay from the east. The maximum height of the peninsula reaches 1319 m. Almost perpendicular to each other, the sides of the cape are composed of black basalt. The buildings of the station were situated at the northeastern part of Cape Adare on the Ridley Beach forming a headland of gravel and sand. The height of the beach is not more than 7 m. The cape contains several small lakes of thawed water. Big colonies of penguins and seals live (Fig. 34) on this headland.

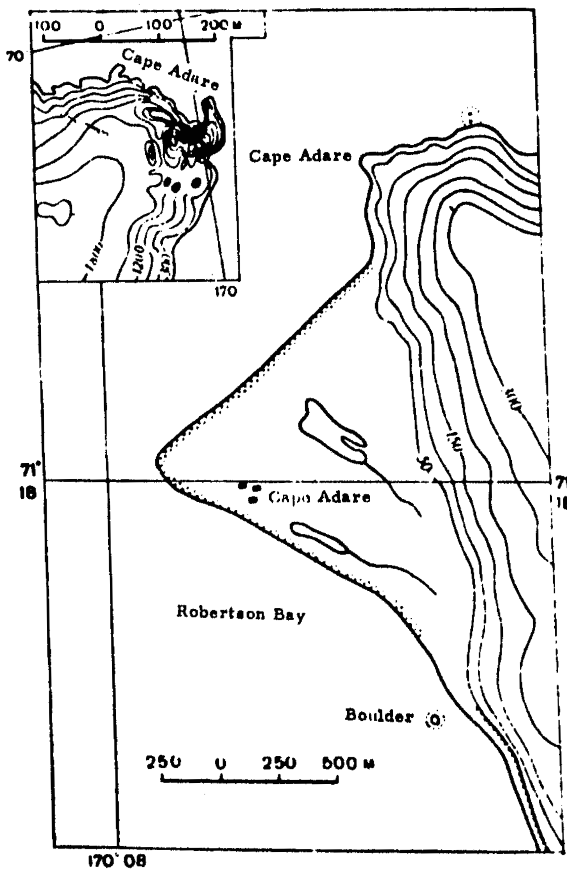

Fig. 34.Region around Cape Adare Station.

Climatic conditions: Air temperature: Annual average, -14°C; maximum, -9°C; minimum -42°C. Annual average wind velocity: -4 m/sec.

Installations: Living house with an attached storeroom. The house was called "Ridley Beach" by members of the wintering party.

Means of Transport: Dog Teams.

Officially, the station was commissioned on March 2, 1899 and closed on February 2, 1900. Meteorological observations were carried out at the station from February 18, 1809 to January 28, 1900.

A party of the British Antarctic Expedition (1910-1913) under the leadership of R. Scott wintered on Cape Adare in 1911. This party built a new house in February 1911 by the side of the base "C. Borchgrevink", and also renovated the old structures. Meteorological observations were continued from March 1, 1911 to December 31, 1911. The party left the station on the ship "Terra Nova" in January 1912.

The size and composition of the personnel are indicated in Table 49.

TABLE 49

Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
1899	10	4	C. Borchgrevink, Geodesist
1911	6	2	V. Campbell, Lieut. Navy.

Scientific Observations

The types of scientific observations, carried out at the station, are given in Table 50. In addition, geological investigations were also conducted in the neighbourhood of the station.

TABLE 50

Types of Scientific Observations

Type of observations	Period
Surface meteorological observations	1899; 1911
Geomagnetic observations	1899
Biological observations	1899; 1911.

CAPE GEDDES (BASE C)

Coordinates: Lat. 60°42' S., Long. 44°34' W.
Altitude: 3 m above sea level.

Cape Geddes Station was a base of the Falkland Island Dependencies Survey.

The station was located on Laurie Island, the easternmost one in the group of South Orkney Islands. The topography of the island is rather broken and mountainous. The individual rocky summits in the western part of the island reach heights of 300-400 m and more. The central and eastern parts of the island are covered with unbroken ice with a very few individual rocks protruding from ice. Cape Geddes is at the northern extremity of the Ferguslie Peninsula which juts out into the Browns Bay. The small structure constituting the station lies on a low and fairly even rocky surface of the cape, free of glacial cover, and 250 m in length and more than 30 m in width. The surface steeply rises up to 400 m towards the southeast and develops into a small plateau of about 150 m in height to the southeast. High rocks surrounding the station render the rest of the island almost inaccessible.

Though Cape Geddes Station was formally opened on January 29, 1946, the installations were made ready only by February 3. The station functioned continuously up to March 17, 1947 when its personnel was transferred to New Signy Island Station, situated on Signy Island. Four people worked at this station during this period, and the leader was a meteorologist, M. Choice. Surface meteorological observations were carried out at this station.

CAPE ROYDS

Coordinates: Lat. 77°33' S., Long. 166°09' E.
Altitude: 8 m above sea level.

Cape Royds Station was the principal base of the British Antarctic Expedition (1907-1909) under the leadership of E. Shackleton.

The station was located on the west coastline of Ross Peninsula (Ross Sea), to the northeast of Cape Royds. Cape Royds is the western extremity of Ross Island, which is just a rocky protrusion of the coastline, partially covered with ice and snow.

The station installations were in a small valley, the even surface of which is covered with a layer of volcanic rocks. The station was within 300 m from Cape Royds. It had a fresh-water lake within a few tens of meters from the station, towards its west. A few more such lakes exist towards the north behind the high (up to 30 m) mounds composed of volcanic rocks. From the east and northeast, the station was protected by a moderately high rocky ridge. Ice and snow-covered gentle slopes of Mount Erebus, whose summit lies about 30 km away from the station, stretch behind this ridge. The coast is badly broken in the vicinity of Cape Royds. The glacial cliffs and bare rocks, projecting into the sea, lie alternately with small patches of sandy coast.

Installations: A big wooden house providing accommodation for residence, laboratory, stores and gas generator. Three storerooms for coal and kerosene are situated a little farther. The residential house has a garage and a stable attached to it.

Means of Transport: For the first time in the history of Antarctic investigations, powerful automobile (15 in number) adapted for snow traction were employed at the station in addition to dog teams and horses.

Supply: The station was provisioned by the expedition ship "Nimrod" (British whaling ship).

Cape Royds Station was opened on February 22, 1908 and closed on March 3, 1909. The personnel of the station consisted of fifteen members including nine scientific workers. The head of the Station was E. Shackleton, a Navy Lieutenant.

Scientific Observations

The details of scientific observations, carried out at the station, are given in Table 51. The staff of the station also conducted geological investigations during the expeditions to Ross Island and Victoria Land. Determination of the values of magnetic inclination were made during the course of the expedition of the Northern Party to the southern magnetic pole.

TABLE 51

Types of scientific observations

Type of observations	Period
Surface meteorological observations	1908
Visual observations of aurora	1908
Absolute measurement of geomagnetic field	1908
Atmospheric electricity observations	1908
Observation of sea and lake ice	1908
Zoological observations	1908
Marine biological work	1908
Botanical observations	1908
Limnological observations	1908

CAPE EVANS

Coordinates: Lat. 77° 38' S., Long. 166° 24' E.
Altitude: 7 m above sea level.

Cape Evans Station was set up as a base of the expedition led by R. Scott in 1910-1913. The station buildings were later used by E. Shackleton's expedition (1914-1917).

The station was located on the northwestern coastline of a small and low-lying peninsula, situated on the western coast of Ross Island and terminating in Cape Evans. To the southeast of Cape Evans, the 20 m high Windvane Hill rises on the peninsula at a distance of 900 m. To the east rises another hill, about 46 m in height. Farther to the east there are a few small peaks covered with pebbles and rock fragments. The western side of Mount Erebus, more than 4000 m high and covered with snow rises further beyond. The southern coast of the peninsula is formed by rocks free of ice and snow, but the northwestern coast (where the station stands) is essentially a sandy beach.

Installations: A wooden living house with an adjacent small storeroom was located on an even sandy patch of coastal strip. The telephone line, laid for the first time in Antarctica, connected the station with the Discovery Expedition camp on Hut Point.

Means of Transport: Three motor sledges, dog teams and horses.

Supply: The station received supplies from the expedition ship "Terra Nova".

The size and composition of the personnel are indicated in Table 52.

TABLE 52

Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
1911	25	9	R. Scott, Naval Officer
1912	13	-	E. Atkinson, Physician-Parasitologist
1915	10	2	A. Mackintosh, Naval Officer
1916	7	2	E. Joyce, Sledger

Cape Evans Stations was opened on January 17, 1911 and closed on December 19, 1912. From May, 1915 to January, 1917 it served as the principal base for the British Trans-antarctic Expedition Party (1914-1917) led by E. Shackleton. This station was meant to serve as a provision store for the party as it trekked to the South Pole. At present, the station house of Cape Evans is a historical monument, preserved as the place from where R. Scott and his companions started their South Pole expedition which came to a tragic end.

Scientific Observations

The various types of scientific observations carried out at the station are given in Table 53.

TABLE 53

Types of scientific observations

Type of observations	Period
Surface meteorological observations	1911-12; 1914-15
Absolute geomagnetic field measurements	1911-1912
Glaciological observations (of forms of glaciation, regime of glaciers, and physics of ice)	1911-1912
Biological observations (Zoological, parasitological, and marine biological)	1911-12; 1914-15

LAURIE ISLAND

Coordinates: Lat. 60°44' S., Long. 44°39' W.
Altitude: 7 m above sea level.

Laurie Island Station is a wintering base of the Scottish National Antarctic Expedition led by W. Bruce (expedition ship "Scotia") in 1902-1904.

Laurie Island Station was located on the coast of Scotia Bay, that juts out into the southern coast of Laurie Island, the easternmost of the group of South Orkney Islands. The island is hilly, individual hills in its western part rising up to 300 to 400 m or more. The central and eastern parts of the island are all covered with ice and individual rock projections from the ice can be seen only occasionally. The coast of Scotia Bay is steep and is partly covered with glaciers. The ship "Scotia" belonging to the expedition led by W. Bruce wintered on the coast of this bay. The party built a stone-house by the side of the ship frozen in the ice. This served as a meteorological observatory. This house was called "Omund House".

Wintering of W. Bruce's expedition began in April (on March 30, Scotia Bay froze completely) and ended on November 27, 1903. The personnel of the expedition consisted of 5 scientists and 7 other persons working on board the ship "Scotia". During the period from November 27, 1903 to February 14, 1904 (when "Scotia" went to Buenos Aires) a group of six persons led by meteorologist M. Mossman remained at the station. They lived at Omund House from November 1, 1963.

On February 22, 1904, Laurie Island Station was handed over to the Argentine Meteorological Survey and subsequently was operated under the name of "Orcadas". The meteorologist M. Mossman and the cook V. Smith remained at the station for wintering in 1904 as instructors.

In 1903 the following observations were carried out at Laurie Island Station: surface meteorological, geomagnetic (absolute), sea ice, zoological and botanical.

PORT LOCKROY (BASE A)

Coordinates: Lat. 64°49' S., Long. 63°31' W.
Altitude: 3 m above sea level.

Port Lockroy Station was a base of the British Antarctic Survey.

The station is situated on the low rocky Goudier Island (Fig. 35) which lies in the middle of the mouth of Port Lockroy Bay at the southwestern extremity of Wiencke Island (Palmer Archipelago). Port Lockroy is a small circular bay of about 1400 m width in the central part. Its coast is made up of glacial precipices, 25 to 30 m high. The isle on which the station stands is closed on all sides (excepting the western one) by rather high mountain ridges. To the northeast of the station, on Wiencke Island, the surface gradually rises to a height of nearly 600 m. The ridge "Wall Range" whose summits are as high as 1000 m, starts from 5.5 km to the east of Goudier Island and stretches towards the northeast. It is separated, by the glacier "Thunder" from the ridge Sierra-du-Fief in the southeast, with some of its summits rising to a height of 1500 m. The mountainous Doumer Island, with its central parts rising to altitudes of about 500 m, lies to the south of the station. The straits separating the islands of Anvers, Wiencke and Doumer are always ice-free in summer and seldom freeze completely in winter.

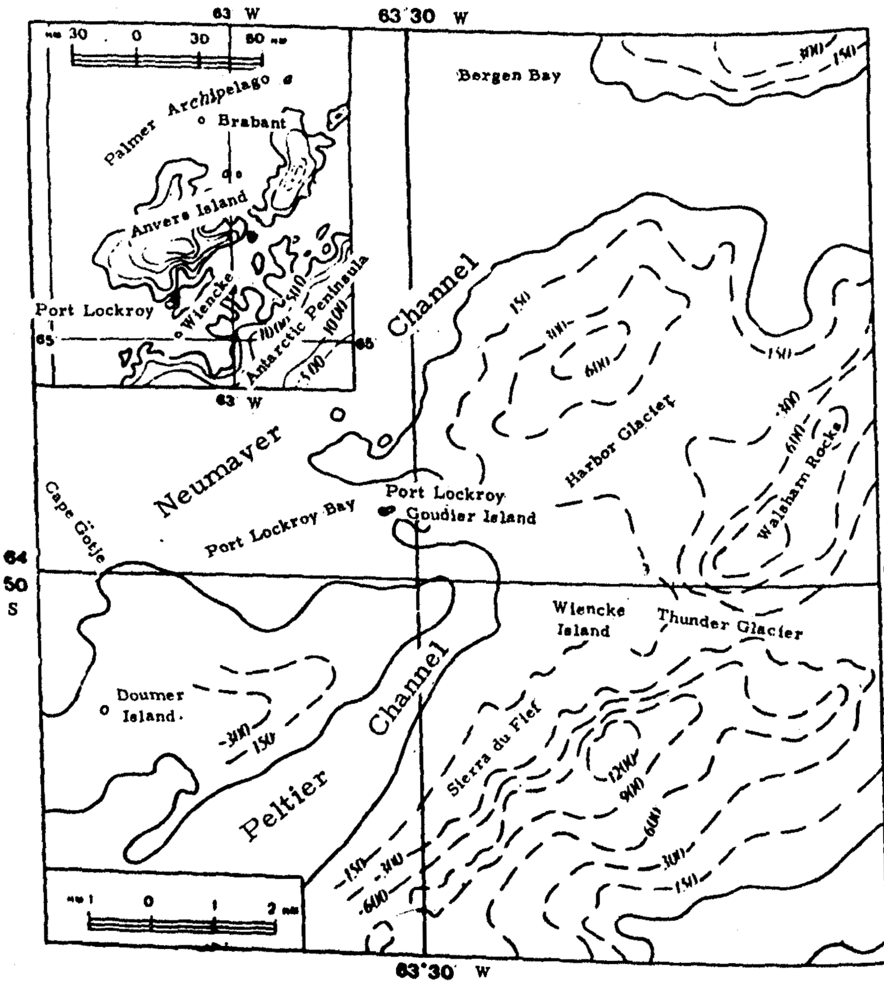

Fig. 35.Region around Port Lockroy Station.

Climatic conditions: Air temperature: Annual average, -3°C; maximum, 8°C; minimum, -25°C. Annual average wind velocity, 5 m/sec. Annual average cloudiness, 7 to 8 points. Average annual precipitation: 93 mm.

Installations: Five small houses include a main building, science laboratories, electric station and auxiliary rooms (Fig. 36).

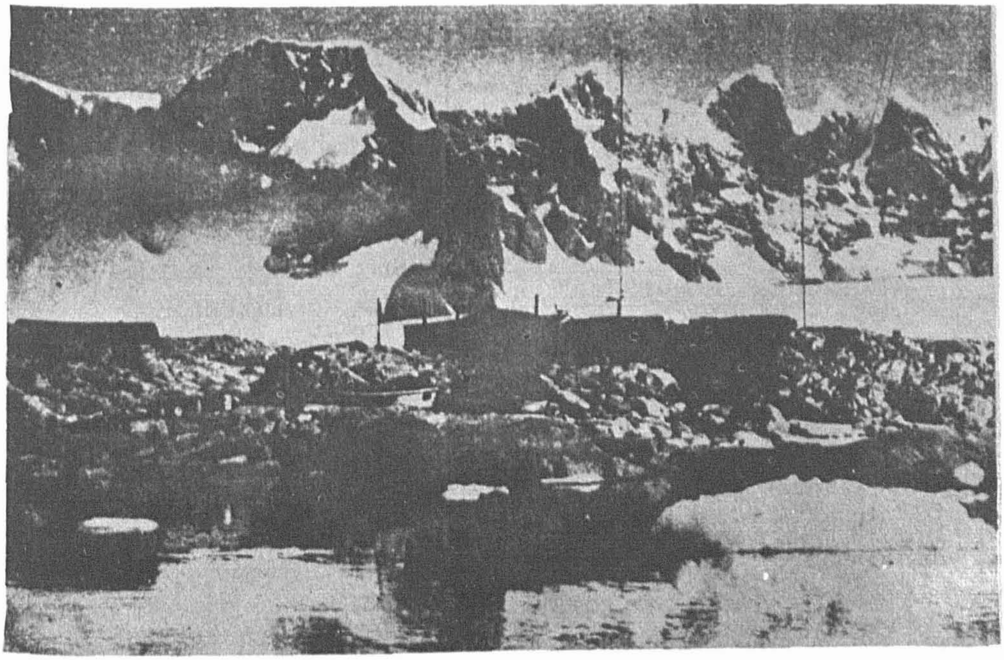

Fig. 36. Port Lockroy Station.

Electric Station: Equipped with two diesel generators of 7.5 kw each.

Means of Transport: Motor boat, sledges for trekking expeditions and motor boats.

Supply: Ships of the British Antarctic Survey "John Biscoe" and "Shackleton" bring provisions to the station.

Port Lockroy Station was opened on February 16, 1944.

Operational periods of the station

February 16, 1944 - April 8, 1947.
January 23, 1948 - February 14, 1949.
January 24, 1950 - February 11, 1951.
December 15, 1951 - summer, 1961-62.

On January 16, 1962 the station was closed, and the equipment was transferred to Argentine Island Station. The station buildings are being used only in summer for conducting field work.

The size and composition of the personnel are indicated in Table 54.

TABLE 54

Personnel of the Station

Year	Number of workers: Total	Number of workers: Scientific	Director
1944	9	5	J. Marr, Zoologist
1945	4	1	G. Lockley
1946	4	1	G. Hardy, Meteorologist
1947	5	4	G. Barry, Radio-operator
1950	4	3	G. Chaplin, Meteorologist
1952	5	2	R. Lenton, Radio-operator
1953	5	3	V. Ward
1954	5	3	F. Byrd, Geophysicist
1955	4	2	A. Carroll, Geophysicist
1956	5	3	A. Carroll, Geophysicist
1957	6	4	K. Clement, Electrical mechanic
1958	5	3	J. Smith
1959	5	3	H. Cameron
1960	5	3	J. Cunningham
1961	5	3	J. Nixon.

Principal Scientific Instruments

Meteorology

1. Instruments for surface meteorological observations.

Ionosphere and "Whistlers"

1. Ionosonde, type "Union-Radio-MK2" (Frequency band 0.6-23 MHz)

2. Vertical sounding of the ionosphere for studying absorption in ionosphere (2.0 to 6.6 MHz).
3. Equipment for recording whistlers (Frequency band from 400 Hz to 30 KHz).

The station also had instruments for conducting geological, glaciological, biological and topographical field work.

Scientific Observations

The various kinds of scientific observations made at the station are given in Table 55.

TABLE 55

Types of Scientific Observations

Type of observations	Period
Surface meteorological observations	During the entire period of working of the station
Vertical sounding of ionosphere	1952 to 1961
Measurement of ionospheric absorption	1952 to 1961
Registration of whistlers	1952 to 1961
Visual observation of aurora	1948; 1959-1961
Observations on the spread and thickness of ice	During the entire period of working of the station
Investigations on marine biology, botany and ornithology	1959

During the period 1944 to 1947 and 1956, Port Lockroy Station also served as a base for conducting geological and topographical field work in the vicinity of the Antarctic Peninsula.

PROSPECT POINT (BASE J)

Coordinates: Lat. 66°00' S., Long. 65°21' W.

Prospect Point Station was a base of the British Antarctic Survey.

The station was located on the east coastline of the Antarctic Peninsula, in the southern part of Graham Coast. Prospect Point, on the southern extremity of which the buildings of the station have been erected, is the southern entrance to a small bay, which juts out into the southeastern part of Ferin Peninsula.

Cape Ferin is the northern boundary of quite a large (about 7 miles long) Bay of Holtedahl, whose coast is principally formed of glacial cliffs. Cape Ferin has the appearance of a mountain range when viewed from the north, stretching almost from the east to the west and gradually turning into a conical mountain covered with snow. The station installations lie at the foot of this mountain on a small rocky part of the coastline. The interior of the Antarctic Peninsula in this region is inaccessible.

Installations: The main building intended for 6 to 8 persons and a small storeroom for provisions. A mooring block was constructed on the shore.

Electric station: A generator of 1 kw capacity.

Means of Transport: Sledges for expeditions on foot, and two boats with outboard motors.

Supply: The station was provisioned by ships of the British Antarctic Survey.

The station began to function from February 2, 1957. It was closed on February 23, 1959.

The size and composition of the personnel are indicated in Table 56.

TABLE 56
Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
1957	6	5	R Miller
1958	5	3	G. Macleod, Mountaineer

Scientific Observations

Prospect Point Station was set up for conducting topographical and geological work in the coastal parts of the Antarctic Peninsula from Cape Tuxen (Lat. 65°17' S.) to South Pole Circle, and was closed after completion of these jobs. In addition, surface meteorological observations and sea ice observations were incidentally conducted at this station.

SANDEFJORD BAY

Coordinates: Lat. 60°37' S., Long. 46°01' W.

Sandefjord Bay Station was a base of the British Antarctic Survey.

The station was set up on the east coast of the Sandefjord Bay on Coronation Island, which is the westernmost and the biggest of South Orkney Islands.

Coronation Island is mountainous and almost entirely covered with ice. A high mountain range stretches throughout the island, attaining its highest point (above 1000 m) in the eastern part. The range descends down to the sea in steep rocky ridges, forming vertically sliced capes. Only at the northern and western coasts, the glacier-covered mountains slope down gently to the coastline. The Sandefjord Bay stretches from north to south between the western extremity of Coronation Island and the small rocky Monroe Island and the station is located on the east coast of this bay.

Installations: One big living house was built on February 12, 1945 on the area free of ice cover, at a distance of about 800 m to the southeast of Cape Morton. The station was never used. In the summer of 1955-56, the personnel of the Falkland Island Dependencies Survey Expedition, who had made a journey along Coronation Island, found that the house was in ruins.

SOUTH ICE

Coordinates: Lat. 81°57' S., Long. 29°52' W.
Altitude: 1350 m above sea level.
Synoptic Index: 89027.

South Ice Station was a base of the British Trans-Antarctic Expedition of 1955-1958 led by V. Fuchs.

The station was situated on the ice sheet at about 550 km from the coast of Weddell Sea (Fig. 37), and served as an intermediate base of the British Trans-Antarctic expeditions during inland trips. The station consisted of a small living house intended for three persons, and an emergency house. A landing and take-off strip was laid for light planes on skis.

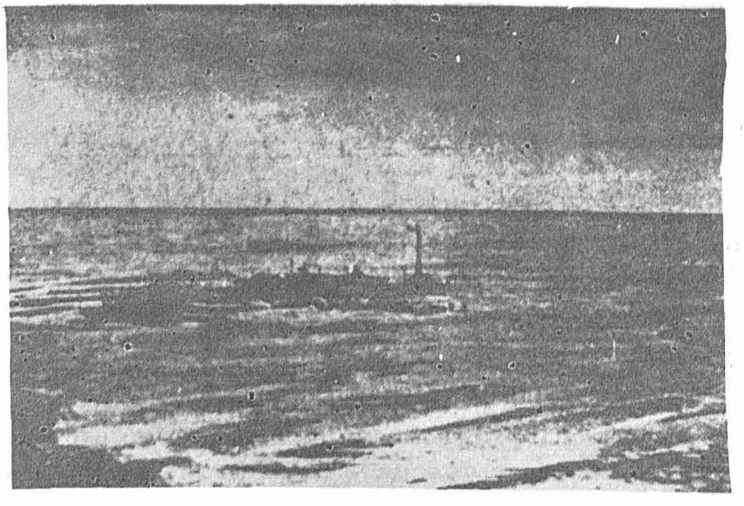

Fig. 37. South Ice Station.

The station was opened on April 25, 1957 under the name "Depot-300". It was discontinued on December 25, 1957. Three persons worked at this station during this period. They made surface meteorological observations and glaciological observations (observations of accumulation and ablation; stratigraphic and deep hole observations).

SIGNY ISLAND (Base H)

Coordinates: Lat. $60^{\circ}43'$ S., Long. $45^{\circ}36'$ W.
Altitude: 7 m above sea level
Synoptic Index: 88925

Signy Island Station is a permanent base of the British Antarctic Survey.

The station is located on the eastern part of Signy Island, belonging to the group of South Orkney Islands. Signy Island is almost triangular in shape. It is about 7 km in length and about 5 km in width. Its surface is mostly even, though towards the northeast, a few stray sharp peaks show up. The southernmost of these hills, called Snow Hill Peak, rises to a height of 215 m. The ice sheet covers a greater part of the southern half of the island.

The station is situated on the northern part of the peninsula that juts into the east from the main mass of Signy Island within a few hundred meters to the south-west of Berntsen Cape (Fig. 38).

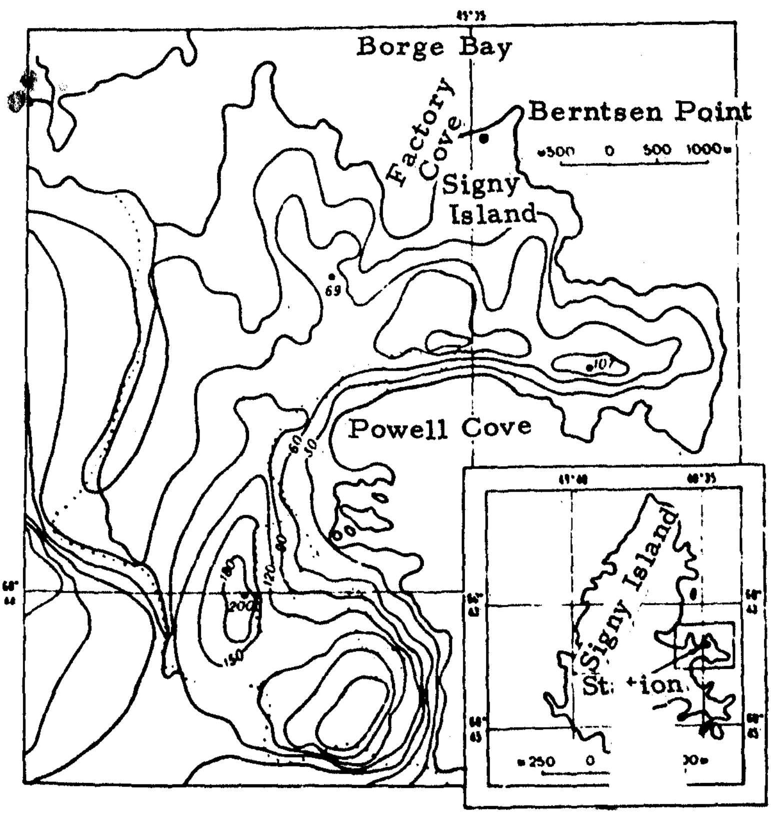

Fig. 38.Region around Signy Island Station.

Climatic conditions: Air temperature: Annual average, -4°C; maximum, 10°C; minimum, -34°C. Annual average wind velocity: 7 m/sec. Annual average precipitation: 331 mm.

Installations: A living house intended for 10 to 12 persons, two small storehouses and a food depot.

Electric station: Two diesel generators of capacity 6.25 kw each.

Means of Transport: Two boats with outboard motor and dog teams.

Supply: The station is provisioned by ships of the British Antarctic Survey.

The station was set up on March 14, 1947 by the personnel of Cape Geddes Station of Laurie Island. It was closed in March, 1947. The station was first built at the upper extremity of the Borge Bay, near the site of the old whale factory, which operated in 1921-22. It was expanded in April 1951 by enlarging the living accommodation and by setting up new meteorological and radio equipment. In April, 1955 the station was shifted to its present site.

Table 57 shows the size and composition of the personnel.

TABLE 57

Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
1947	4	1	K. Robin, Meteorologist
1948	3	2	R. Loos, Biologist
1949	6	5	R. Loos, Biologist
1950	5	3	V. Sladen, Physician
1951	5	4	D. Chill, Meteorologist
1952	5	3	A. Mansfield, Biologist
1953	5	3	A. Tritton, Meteorologist
1954	5	3	H. Smith, Meteorologist
1955	7	5	H. Dollman
1956	8	6	V. Fickill, Meteorologist
1957	8	6	C. Scotland, Meteorologist
1958	6	4	R. Richards, Meteorologist

Contd.

1	2	3	4
1959	9	5	D. Stammers, Meteorologist
1960	8	5	R. Harrison
1961	5	3	R. Thompson, Meteorologist
1962	8	5	P. Tilbrook, Biologist
1963	-	-	-

Principal Scientific Instruments

1. Equipment for conducting surface meteorological observations.
2. Pilot balloon equipment.
3. Biological laboratory.

Scientific Observations

Types of scientific observations, carried out at the station, are given in Table 58.

TABLE 58

Types of Scientific Observations

Type of observations	Period
Surface meteorological observations	from 1947
Visual observations of aurora	from 1957
Observations of sea ice	from 1947
Biological observations (birds and seals)	from 1948

Signy Island Station also serves as a base for conducting geological and topographical work during summer months. Pilot balloon observations are conducted at the station from time to time.

STONINGTON ISLAND (Base E)

Coordinates: Lat. 68° 11' S., Long. 67°00' W.
Altitude: 24 m above sea level.

Stonington Island Station is a base of the British Antarctic Survey.

The station is located on Stonington Island that lies in the southeastern part of the Marguerite Bay near the western coastline of the Antarctic Peninsula (Fig. 39).

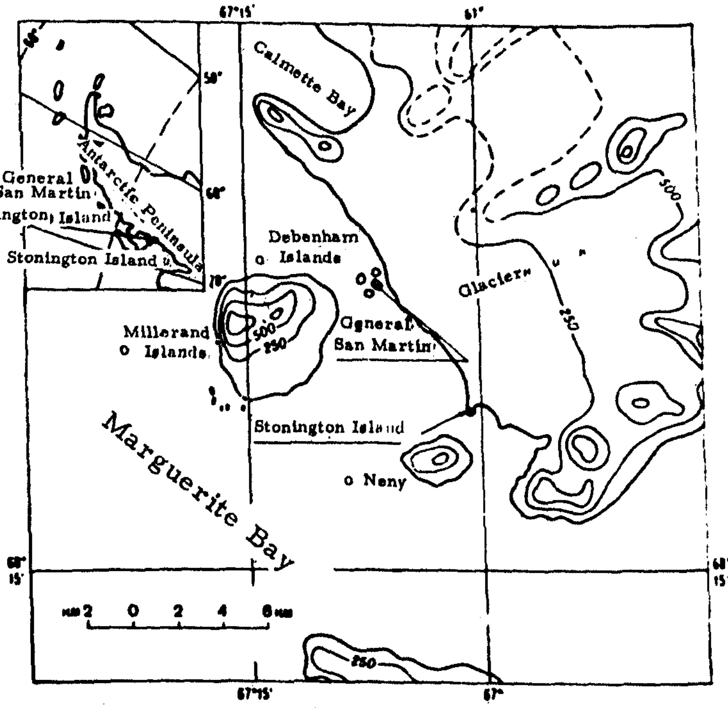

Fig. 39.Region around Stonington Island Station.

Stonington is a small rocky isle (600 m in length and 400 m in width), connected to the mainland by a snow bridge with an ice cover. The highest point of the island is only 26 m high. Towards the northeast of the island lies a small inlet, the north bank of which is formed by glacial cliffs of height 15 to 30 m. Farther to the north and east at a distance of 1 to 2 km, the ice cover rises to a height of 100 to 200 m. Towards the east, at a further distance of 6-7 km, mountains rise up to a height of 800 m.

The shore of the mainland is made up of similar glacial cliffs for about 4 km towards the northeast of the station. To their east the surface rises up steeply, reaching heights of about 600 m in a distance of just 1.5 km. The rocky Isle of Neny, whose height attains 680 m above sea level, lies to the south of Stonington Island. The station installations are located on the western slope of a moderately high ridge stretching through the central part of the island from the northwest to the southeast. The surface of the island is almost always covered with snow, and the sea around it remains frozen for 7-10 months in the year.

Installations: A main (living) house intended for 10 persons, a machine-room and a plane hangar. The portable meteorological station, built by the expedition of R. Byrd in 1940-41 on the surface of ice sheet (coordinates Lat. 68°08' S., Long. 66°22' W., 1800 m above sea level) served as an auxiliary base during sledge expeditions over the Antarctic Peninsula.

Electric Station: Equipped with one generator of capacity 400 watts.

Means of Transport: Paddle boat with outboard motor, dog team and sledges. During 1947-1949 a light plane was also based at this station.

Supply: The station was provisioned by ships and planes of the British Antarctic Survey.

The construction of the station was started on February 23, and was completed by March 13, 1946. The station functioned without break till February 12, 1950 when the station staff was evacuated by airplanes on account of the hard glacial conditions in the Marguerite Bay which rendered supply and movement difficult. On March 10, 1958 the station was re-opened and functioned till March 7, 1959. After another break, the station started functioning again on August 14, 1960 as a base of the British Antarctic Survey.

Stonington Island Station served as a base of the British Antarctic Expedition led by F. Ronne in 1947. A transportable biological laboratory worked on one of Dion Islands lying in the northwestern part of the Marguerite Bay from July 4 to August 23, 1949. A party of three persons led by B. Stonehouse conducted ornithological observations at this laboratory. The camp consisted of one living room for three persons, another room for two persons (biological laboratory) and a snow hut for the radio station.

The size and composition of the personnel are given in Table 59.

TABLE 59

Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
1946	10	5	E. Bingham, Physician
1947	11	3	C. Batler
1948	11	6	V. Fuchs, Geologist
1949	11	6	V. Fuchs, Geologist
1958	6	4	P. MacGibe, Topographer
1961	11	7	J. Cunningham, Alpinist
1962	10	5	J. Cunningham, Alpinist
1963	-	-	-

Scientific Observations

Stonington Island Station is a base for conducting topographical and geological work in the southern part of the Antarctic Peninsula. Up to 1962 it was also meteorological station. In 1962, the program of meteorological observations in the region of the Marguerite Bay was shifted to Adelaide Island Station, which is better situated from the point of view of orography.

The types of scientific observations carried out at the Station are listed in Table 60.

TABLE 60

Types of Scientific Observations

Type of observations	Period
Surface meteorological observations	1946-1949; 1958; 1961-1962

Contd.

1	2
Glaciological observations (observations of accumulation and ablation and glacial-geomorphological observations)	1946-1949; 1958
Sea ice observations	1946-1949; 1958; 1961-1962
Biological observations	1948-1949

WATERBOAT POINT

Coordinates: Lat. 64°48' S., Long. 62°43' W.
Altitude: 3 m above sea level.

Waterboat Point Station belonged to the British Antarctic Expedition led by J. Cope in 1921-22.

The station was located on the west coastline of the Antarctic Peninsula, on the Danco Coast, opposite to Anvers Island. Waterboat Point, on which the station was set up, protrudes to the west of the east coast of the Marinero Passage which joins Paradise Bay with Andvord Bay. The cape contains three small isles. The islands lie very close to one another and for a greater part of the year are connected by snow.

Danco Coast in this region is mountainous and almost completely covered with glacial blanket. Within about 1.5 km to the east of the station, mountain tops rise to a height of 1000 m. Farther to the south the height of mountains is still greater.

The station consists of only a small house (rather a shed for two persons), rigged up out of old small boats and provision boxes. Dogs were housed in a small structure behind the house.

The station was opened on March 4, 1921 and was closed on January 13, 1922. Two persons, namely M. Lister (naval mate) and T. Backshawe (geologist) wintered at the station. During winter, they made surface meteorological, sea ice and glaciological observations as well as sea level observations.

Besides, they carried out geological investigations in the vicinity of the station and made some biological observations on penguins.

FOSSIL BLUFF

Coordinates: Lat. 71°20' S., Long. 68°17' W.
Altitude: 40 m above sea level.

Fossil Bluff Station is a base of the British Antarctic Survey.

The station is situated on the southern part of Antarctic Peninsula, on the eastern side of Alexander-I Land. The station stands on a small rocky portion (Fossil Ridge) devoid of any massive ice cover and lies between the glaciers of Uranus in the south and Eros in the north. At this point, George-VI Ice Shelf is joined with steep slopes of the mountains on Alexander-I Land. From the northwest to the southwest, the station is protected by a chain of mountains stretching from the north to the south along the eastern part of Alexander-I Land. Some of these mountain summits reach heights of 800 m or more. To the east of the station lies the George-VI Ice Shelf which separates Alexander-I Land from Antarctic Peninsula. The average altitude of its surface is between 20 and 30 m (Fig. 40).

Installations: A small house, meant for 6 to 8 persons and a small storeroom, situated on the central part of the Fossil ridge on the moraine of a small glacier (Fig. 41).

Means of Transport: Three tractors of type "Bombardier-Muskeg M-6" and four dog teams. A landing and take-off strip, equipped for receiving light planes is also laid at the station.

Supply: Planes of the British Antarctic Survey provision the station.

The station was opened on February 20, 1961. Since 1963 it functions only in summer. The working team at the station consisted of 3 members (chief meteorologist, C. Pears) in 1961 and of 4 members in 1962.

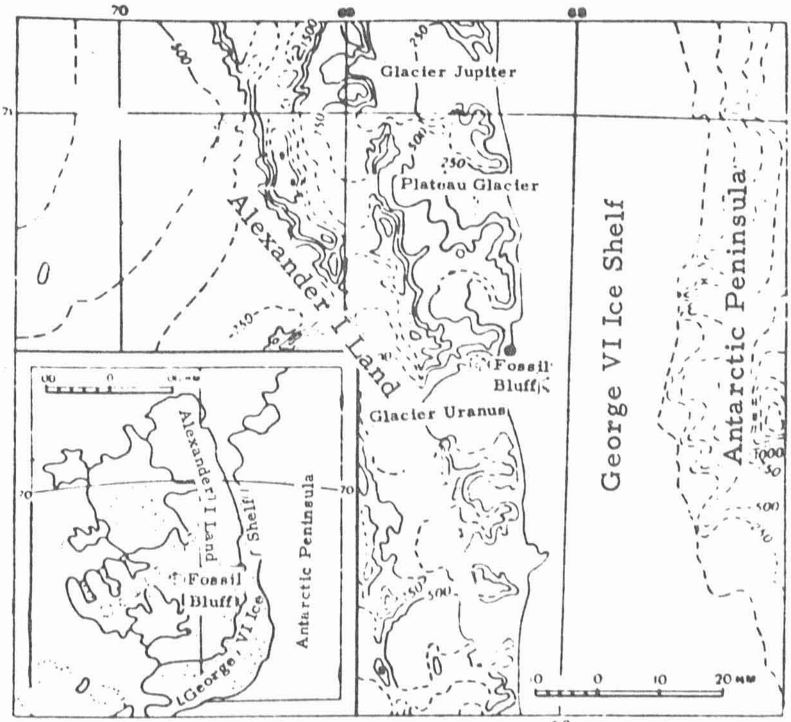

Fig. 40.Region around Fossil Bluff Station.

Fig. 41.Fossil Bluff Station. 1961.

Scientific Observations

The station was set up as a base for conducting topographical and geological investigations on Alexander-I Land and in the adjacent regions of Antarctic Peninsula. Incidentally, surface meteorological observations are also made at the station.

HALLEY BAY (BASE Z)

Coordinates: Lat. 75°31' S., Long.[1] 26°42' W.
Altitude: 35 m above sea level.
Geomagnetic coordinates: Lat. 65°.8 S., Long. 24°.3
Synoptic Index: 89022

Halley Bay Station was a base of the Royal Society of Great Britain during the International Geophysical Year (IGY), and from 1959 is known as "Base Z" of the British Antarctic Survey.

The station is set up on the surface of an ice shelf in Halley Bay on Caird Coast (Coats Land). The coastline towards the northeast of the station is badly broken and bears traces of frequent breaks in the barrier of the ice shelf. The southern side, however, is very smooth and is nowhere split down to the outflowing Dawson-Lambton glacier. The surface of the ice shelf in the area of the station is either absolutely even, or slightly wavy. The waviness is more obvious towards the northeast of the station than towards the south (Fig. 42).

The transition of the surface of the ice shelf into the mainland ice sheet is very gradual at certain places and quite abrupt at other places. It lies at about 80 to 90 km to the southeast of the station.

Climatic conditions: Temperature of air: Annual average, -18°C; maximum 2°C; minimum -51°C.

[1]Since the ice shelf on which the station is situated drifts to the west at a rate of 365 ± 40 m/year, the longitude of the station constantly changes. The longitude given here is that of 1963.

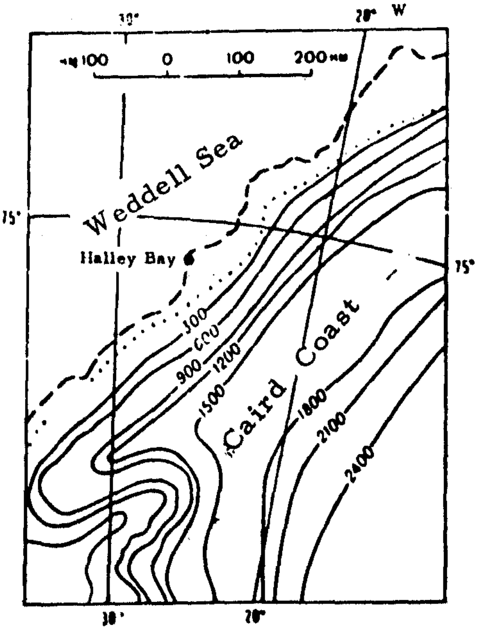

Fig. 42.Region around Halley Bay Station.

Installations: Five buildings consisting of the main living house to accommodate 20 persons, and magnetic and other scientific laboratories are situated at about 4 km from the shore.

Electric Station: Equipped with four diesel generators (two of 27.5 kw capacity each and two of 6.5 kw capacity each).

Means of Transport: Three diesel tractors of 'Ferguson' type.

Supply: Ships of the British Antarctic Survey provision the station.

Halley Bay Station was built during the summer of 1955-56 and was opened on January16, 1956. In the winter of 1956 a group stayed at the station and carried out reconnaissance studies, testing of equipment and other preliminary work for conducting scientific investigations according to the program of the International Geophysical Year. The station was transferred to the British Antarctic Survey in January 1959.

The size and composition of the personnel are given in Table 61.

TABLE 61

Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
1956	10		D. Dalgish
1957			R. Smart
1958	20	12	J. Macdowall
1959	12	7	G. Lash
1960	16		N. Hiddirlay, Meteorologist
1961	25	15	C. Johnson
1962	21	12	G. Jarman, Geophysicist
1963	-	-	

Principal Scientific Instruments

Meteorology

1. Equipment for conducting surface meteorological observations.
2. Actinometric instruments.
3. Rawinsondes.
4. Dobson spectrophotometer.

Ionosphere

1. Ionosonde of the type DSJRmK (Frequency range 0.7 to 25 MH_z).
2. Ionosonde for measuring absorption of radio waves in the ionosphere (Type DSJR).
3. Equipment for measuring drift velocities in the ionosphere.

Seismology

1. Three-component seismograph (Willmore)

Geomagnetism

1. Two magnetographs, type La Kura.
2. Magnetograph of the type PJC III.
3. Three sets of QHM and two sets of BMZ magnetometers.

Aurora

1. Gartlein all-sky camera (16 mm film).
2. Infrared photometer.
3. Radiolocator for observations of aurora and meteors (frequency 71.3 MH_z).

Glaciology

1. Equipment for conducting stratigraphic observations, as well as observations of accumulation and ablation.

Oceanography

1. Apparatus for measuring the velocity of coastal currents.

Scientific Observations

In the course of 1956, the advance party at Halley Bay Station conducted meteorological (surface observations and measurements on ozone content), ionospheric, and glaciological observations as well as observations of aurora. The various types of scientific observations carried out at the station are given in Table 62.

TABLE 62

Types of Scientific Observations

Type of observations	Period
Surface meteorological observations	from 1957 onwards
Rawinsode sounding	from 1957 "
Actinometric observations	from 1957 "
Measurement of ozone content	from 1957 "
Vertical sounding of ionozphere	1957-1958; from 1960 onwards
Measurement of radiowave absorption in ionosphere	1957-1958

Contd

1	2
Registration of variations of geomagnetic field	from 1957 onwards
Absolute geomagnetic measurements	from 1957 "
Registration of earthquakes	1957-1959.
Microseismic observations	1957-1958.
Photography of aurora with all-sky camera	from 1957 onwards
Visual observations of aurora	from 1957 "
Photometric investigations of night sky	1957-1958
Radiolocation studies of aurora	from 1961
Observation of accumulation and ablation of snow cap	from 1957 onwards
Stratigraphic observations	from 1957 "
Temperature measurements	from 1957 "
Observations of ice shelf movement	from 1957 "
Sea ice observations	from 1957 "
Measurements of coastal currents	from 1959 "
Ornithological observations	from 1957 "

HUT POINT

Coordinates: Lat. 77°51' S., Long. 166°45' E.
Altitude: 3 m above sea level.

Hut Point Station was a base of the British Antarctic Expedition led by R. Scott during 1901-1904.

The expeditionary ship "Discovery" wintered in the McMurdo Sound near the southwestern extremity of Ross Island for two years (from February 1902 to January 1904). Hence the station is sometimes called "Winter Quarters Discovery".

The ship remained in a small inlet jutting into the southern extremity of the Hut Peninsula at about one kilometer to the east of Hut Point. A living house and a booth for magnetic observations were constructed on the coast, but the expedition team lived on the ship. The chief meteorological platform was located close to the ship on sea ice. In addition, a special meteorological platform was built on top of the Crater Hill which rises to a height of more than 300 m at about 2 km to the northeast of the place where the ship was anchored.

The scientific personnel of the expedition consisted of seven persons: a meteorologist, a cartographer, a botanist, a geologist, a geophysicist, a zoologist and a biologist.

During the wintering period (from Feb. 1, 1902 to Jan. 31, 1904), surface meteorological and hydrological observations, geomagnetic observations and aurora observations were regularly made at the station. In addition, botanical, zoological (of birds and seals) and marine biological observations were also collected. During summer months, the personnel of the expedition made a few sledge trips into the interior of the mainland. They carried out geological and geodetic work during these trips.

The living house, built by the expedition on Hut Point, was several times utilized by subsequent teams exploring this region. At present, it is preserved as a historical monument.

HOPE BAY (BASE D)

Coordinates: Lat. 63°24' S., Long 56°59' W.
Altitude: 82 m above sea level.
Synoptic Index: 88940.

Hope Bay Station was a base of the British Antarctic Survey.

The station was located on the east coast of Hope Bay (Fig. 43), that juts into the northeastern part of the Trinity Peninsula (norhtern extremity of the Antarctic Peninsula). The northwestern coast of Hope Bay is formed by a glacial barrier 15 to 60 m. high, from which icebergs split off from time to time. Along the east coast of the bay stretches a narrow rocky strip, covered with moraine and sloping down from the southern mountain ranges.

The station installations were set up at about 3 km to the east from the top of Hope Bay on a fairly even surface free of ice sheet. To the south of the station, the surface rises steeply

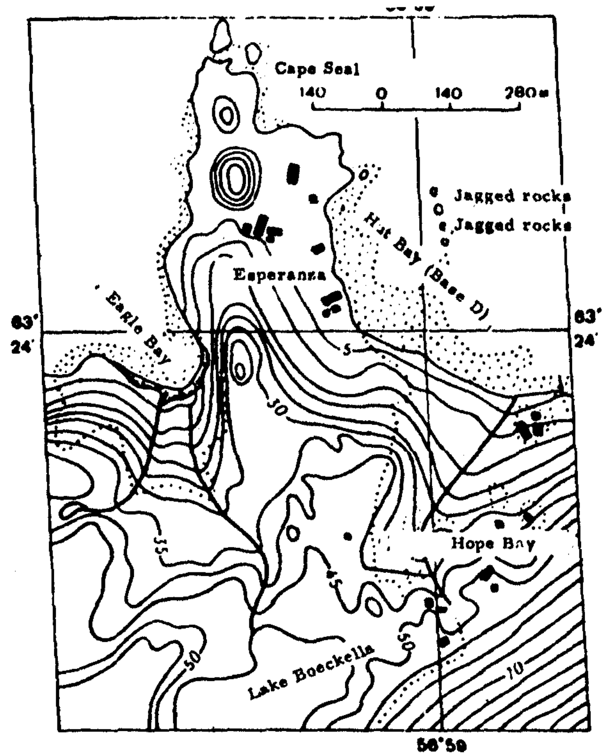

Fig. 43.Region around Esperanza and Hope Bay Stations.

upwards, reaching a height of 200 m at a distance of just 2 km. On the southwest, the station was protected by a precipitous massif covered with ice and snow, and with its summit rising up to 300 m. The highest point -- Mount Flora -- in the western part of the ridge is as high as 550 m. The pyramid-shaped Pyramid Mountain, mostly covered with ice sheet, is situated in the rear of Mount Flora. On the northern slopes of Mount Flora many nunataks stick out above the surface of the ice sheet. There are several fresh water glacial lakes (The biggest of them is Lake Boeckella) near the Station. These lakes are situated to the north of Mount Flora.

Climatic conditions. Air temperature: Annual average, -6.5°C; maximum, 11.5°C; minimum, -30.5°C. Velocity of the wind: Annual average, 6 m/sec.; maximum, 40 m/sec. Predominant directions of the wind: SW and WSW.

Installations: Main (living) house intended for 10 to 12 persons, a small house with spare provisions, another storeroom for provisions, garage, aerological and geomagnetic pavilions (Fig. 44).

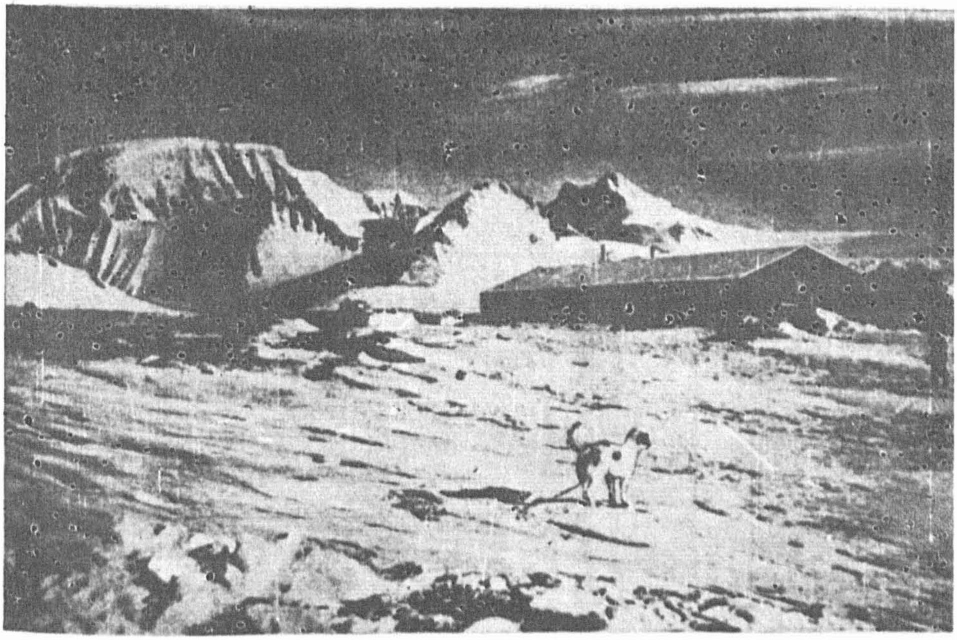

Fig. 44.Hope Bay Station.

Electric station. Equipped with two diesel generators of 6.5 kw. capacity each.

Means of Transport. "Ransom" tractor, paddle boat, boats with outboard motors, dog teams and sledges.

Supply: The station was supplied by ships of the British Antarctic Survey.

The station was opened on February 13, 1945, but on Nov. 8, 1948, the living house was destroyed in fire. The personnel of the station lived in other buildings up to February 4, 1949 when it was closed. The new structures were built to the south of the previous location, at a distance of 350 m from the earlier site and was opened on February 5, 1952. The station was again closed on February 15, 1964.

The size and composition of the personnel are given in Table 63.

TABLE 63

Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
1945	13	4	A. Taylor
1946	8	4	V. Russel, Topographer
1947	9	3	F. Elliott
1948	7	3	F. Elliott
1952	11	8	G. Marsh, Physician
1953	10	7	G. Marsh, Physician
1954	12	8	U. Turner, Physician
1955	12	8	U. Anderson, Meteorologist
1956	12	8	R. Warswick, Meteorologist
1957	12	8	L. Royce, Topographer
1958	14	10	D. Calman, Topographer
1959	19	15	D. Calman, Topographer
1960	15	10	C. Branding, Topographer
1961	14	11	Futurehill, Meteorologist
1962	9	5	Futurehill, Meteorologist
1963			

Principal Scientific Instruments

Meteorology

1. Equipment for conducting surface meteorological observations.
2. Equipment for pilot balloon sounding.

Geomagnetism

1. Magnetograph-Askania GF6

Glaciology

1. Equipment for conducting stratigraphic and temperature observations, as well as observations of accumulation, ablation and movement of glacial sheet.

At Hope Bay Station, there are also sets of instruments for conducting geological and topographical work.

Scientific Observations

The various types of scientific observations, carried out at the station, are given in Table 64.

TABLE 64

Types of Scientific Observations

Type of observations	Period
Surface meteorological observations	1945-48 from 1952 onwards
Pilot balloon observations (occasionally)	from 1952 onwards
Registration of fluctuations in the vertical component of the geomagnetic field (Micropulsations)	1958-1961
Visual observations of aurora	from 1958 onwards
Observations of accumulation and ablation of the ice sheet near the station and on glaciers on the east coast of the Trinity Peninsula	from 1956 onwards
Stratigraphic and temperature observations	from 1956 onwards
Observations of sea ice	1945-1948
Observation of birds and seals	1945; from 1959 onwards

Hope Bay Station was also a base for conducting geological and topographical work on the Trinity Peninsula.

HORSESHOE ISLAND (BASE Y)

Coordinates: Lat. 67°49' S., Long. 67°18' W.
Altitude: 9 m above sea level.
Synoptic Index: 88942.

Horseshoe Island Station was a base of the British Antarctic Survey.

The station was situated on Horseshoe Island, lying in the northern part of the Marguarite Bay, several kilometers away from the west coastline of the Antarctic Peninsula (Fallieres Coast).

Horseshoe Island is a mountainous island, about 12 km in length (from the north to the south) and about 5 km wide in the widest parts. It consists of two uneven elevated parts, joined by a narrow isthmus. Gaul Cove and Lystad Bay lie to the northeast and southwest sides of this isthumus (Fig. 45).

The southern part of the island contains several mountain peaks stretching along the southwest-northeast direction and rises to heights of 800-900 m. Glaciers descending from the mountains fall steeply into the sea. Mt. Searle (587 m high) is the peak at the northern part of the island. The lower parts of these mountain slopes are covered with glaciers and neve.

The station was located in the northwestern part of the island, on surface free from the ice sheet, at the southwestern mouth of Sally Cove.

Climatic conditions: Air temperature: Annual average, -3°C; maximum, 7°C; minimum, -29°C.

Installations: A main (living) house intended for 10 persons, a meteorological laboratory, a storeroom and a small house with spare provisions and clothes.

Electric station: Two diesel generators, each of 7.5 kw capacity.

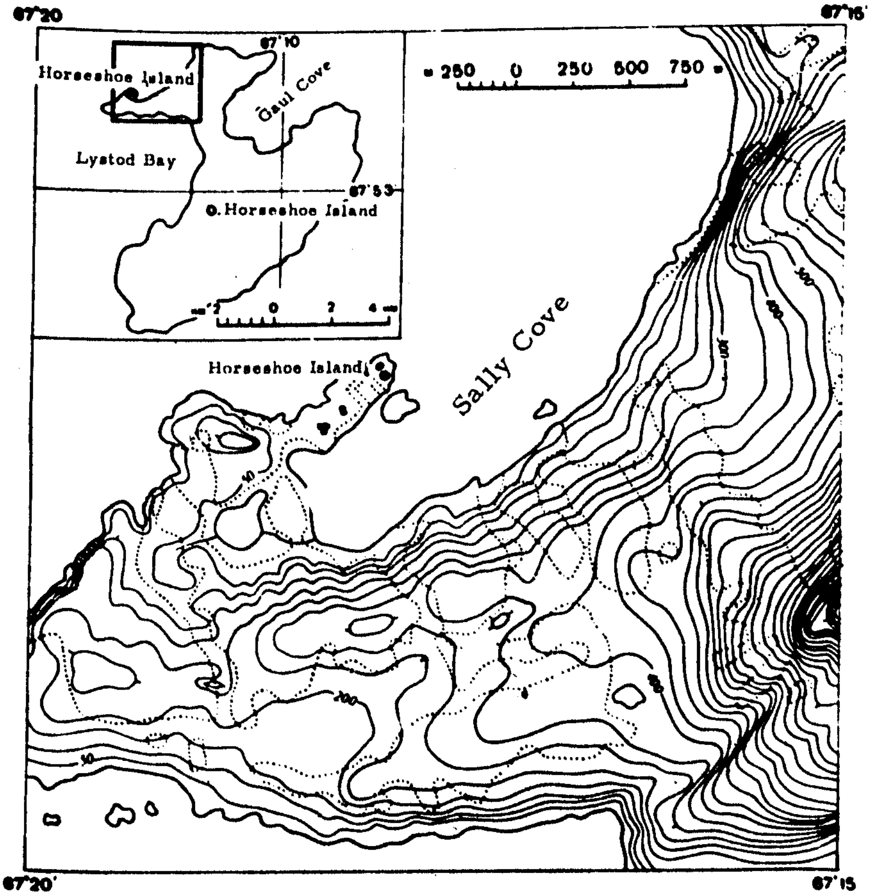

Fig. 45.Region of Horseshoe Island Station.

Means of Transport: Paddle boat with outboard motor, dog teams and sledges.

Supply: The station was provisioned by ships of the British Antarctic Survey.

Horseshoe Island Station was opened on March 11, 1955 and closed on August 21, 1960.

The size and composition of the personnel are indicated in Table 65.

TABLE 65

Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
1955	8	6	C. Hobb
1956	10	7	D. Searle, Topographer
1957	9	6	P. Giaever, Electrician
1958	7	5	D. Peisley, Meteorologist
1959	6	4	R. Pirrey, Meteorologist
1960	4	2	P. Foster, Topographer

Scientific Observations

Various types of scientific observations, carried out at the Station, are given in Table 66.

TABLE 66

Types of Scientific Observations

Types of observations	Period
Surface meteorological observations	1955-1960
Visual observations of aurora	1960
Sea ice observations	1955-1959

SHACKLETON

Coordinates: Lat. 77°59' S., Long. 37°09' W.
Altitude: 58 m. above sea level.
Geomagnetic coordinates: Lat. 67°22' S, Long. 16°34'
Synoptic index: 89034.

Shackleton Station was an advance base and a starting point for the British Transantarctic Expedition of 1955-1958 led by V. Fuchs.

The station was situated on the surface of Filchner Ice Shelf in the eastern part of the Weddell Sea, about 30 km to the west of Duke Ernst Bay. To the west and to the south of the station, over a stretch of 300 to 400 km extends a flat and absolutely even and snowy plain. To the east, the ice shelf is fringed with groups of glacial mounds and sparse nunataks up to 500 to 600 m. in height, projecting to the surface in the south of the Fazel Bay and Duke Ernst Bay. The nearest of these lies about 40 km away towards the east of the station.

Installations: The structures were set up at about 1 km from the border of the ice shelf and consist of a main (living) house, workshop for servicing land caterpillar (tank) transport and planes, meteorological laboratory and subsidiary houses.

Means of Transport: Light Ferguson type tractors, five amphibian Weasel type vehicles, four Snow-Cat type amphibian vehicles, one tractor of Muskeg type and two dog teams. This transport was intended for the Trans-Antarctic traverse. Two Otter type light planes on skis were available at the station between January and October of 1957.

The early structures of the station were built in January, but officially the station was opened on February 7, 1956. In the winter of 1956 the advance party completed the construction of the living house, though the construction of the entire station was completed only in the summer of 1956-57.

The size and composition of the personnel are indicated in Table 67.

TABLE 67

Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
1956	8	4	K. Blacklock, Topographer
1957	9	5	V. Fuchs, Geologist

Shackleton Station was discontinued on November 25, 1957.

Scientific Observations

Scientific observations from Shackleton Station were made in the winter of 1957 by the personnel of the British Transantarctic Expedition led by V. Fuchs. The various types of scientific observations carried out at the station are given in Table 68.

TABLE 68

Types of Scientific Observations

Type of observations	Period
Surface meteorological observations	1956-1957
Pilot balloon observations	1957
Glaciological observations	1956-1957
Observations of sea-level fluctuations with the help of gravimeter (Warden)	1957

CHAPTER V

GERMAN SCIENTIFIC STATIONS

Germany conducted her early station-based investigations during the first International Polar Year in 1882-83, when the German South Polar Expedition led by K. Schröder worked on the island of South Georgia. Later, station-based investigations were renewed in 1901-1904, when the German Antarctic Expedition led by E. Drygalski set up a scientific station on Kerguelen Island, and the ship of the Gauss expedition wintered near the Antarctic shore in the Davis Sea (Table 69). However, after 1904, Germany did not renew any station-based investigations in the Antarctic region.

TABLE 69

German Stations

Name	Period of work
Winter base of the ship Gauss	Feb. 1902 to Feb. 1903
Winter base of German Antarctic expedition on Kerguelen Island	Dec. 1901 to April 1903
Winter base of the German South Polar Expedition led by K. Schröder	Sept. 1882 to Sept. 1883.

WINTER BASE OF THE SHIP GAUSS

Coordinates: Lat. 66°02' S., Long. 89°38' E.

The ship "Gauss" of the German Antarctic Expedition led by E. Drygalski was caught up in ice in Davis Sea on February 14, 1902 and began to drift. On February 22, the ship stopped at a distance of 80 km from the coast of Wilhelm II Land, and stayed there almost for one year, until February 8, 1903 when the drift started again (Fig. 46).

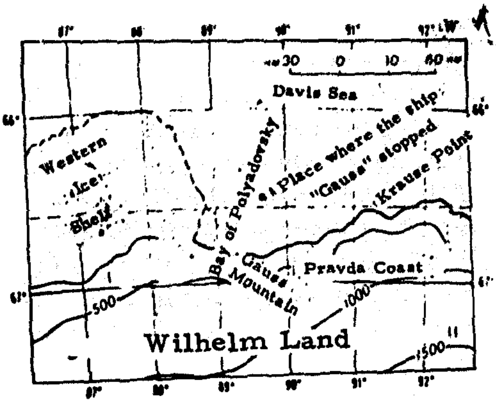

Fig. 46. Wintering region of the ship "Gauss"

The personnel of the expedition utilized the wintering period for conducting intensive scientific observations. A meteorological platform was set up beside the ship; two booths for magnetic observations and an astronomical observatory were also built. The wintering party was also equipped to send up large manned balloons as well as balloons with instruments.

The expedition consisted of 33 persons: Leader: E. Drygalski, five scientists (a zoologist-cum-botanist, a physician-cum-bacteriologist, a geologist-cum-chemist, a photographer, a magnetologist-cum-meteorologist), five officers and 22 sailors.

During the wintering period, they conducted surface meteorological, geomagnetic (absolute and relative), gravitational, astronomical and hydrological observations. Temperature of sea ice was measured with the help of electrical resistance thermometers and atmospheric soundings were made by means of air balloons. Besides, the personnel of the expedition carried out zoological and geological observations during the sledge trips on the mainland.

WINTER BASE OF THE GERMAN ANTARCTIC EXPEDITION ON KERGUELEN ISLAND

Coordinates: Lat. $49^{o}25'$ S., Long, $69^{o}53'$ E.
Altitude: 16 m above sea level.

The German Antarctic Expedition led by E. Drygalski set up a station in 1901 on Kerguelen Island for conducting investigations in the Sub-Antarctic region. The station was located on the southeastern coastline of the island (Morbian Gulf), on the coast of the Observatory Bay, that juts into the southern coastline of Gauss Peninsula.

Installations: A living house and two sheds for magnetic observations were erected on the southeastern and eastern slopes of a moderately high mound which protected the station from the western winds.

The personnel of the station consisted of five members: three scientists and two sailors. The chief of the station was E. Bert, a geologist-cum-naturalist. The first shipments, including building equipment and three persons were brought from Australia to Kerguelen Island in the beginning of November 1901. Later, at the end of December, the expedition ship "Gauss" arrived at the station and added two more persons.

The station started functioning in November-December, 1901 and conducted scientific observations from January 1, 1902 to February 15, 1903. On her way back from Antarctica, "Gauss" did not call at Kerguelen Island, but another ship "Strassburg" arrived on April 1, 1903 to pick up the members of the winter party.

During the operational period of the station, surface meteorological and magnetic (absolute and relative) observations were made continuously. In addition, the personnel of the station collected a large amount of geological and botanical data in the adjoining areas.

WINTER BASE OF THE GERMAN SOUTH POLAR EXPEDITION LED BY K. SCHRÖDER

Coordinates: Lat. 54°31' S., Long. 36°06' W.
Altitude: 65 m above sea level.

The German South Polar Expedition led by K. Schröder made scientific observations on South Georgia Island during the First International Plar Year.

The expedition was directed by the German Polar Committee to set up an observatory on the island. On August 20, 1882 the expedition ship "Moltke" arrived in Royal Bay, that juts into the east coast of the island. The construction of the station was completed by the 3rd of September. It was located on the northern coast of the Moltke Inlet on an even portion of the coastline at the foot of a mountain and consisted of a living house 11 x 8 m in size, two magnetic laboratories and an astronomical observatory. Besides, a stable was also built for animals.

Apart from K. Schroder, the expedition party consisted of six scientists and four other workers. After its successful wintering, the team was brought back from the island by the corvet "Maria" in Sept., 1883.

The expedition party regularly conducted surface meteorological and geomagnetic observations as well as observations of sea level fluctuation by means of a tide-gage at the station from September 14, 1882 to September 3, 1883. In addition, special astronomical observations on the orbit of the planet Venus were carried out in December, 1882.

CHAPTER VI

SCIENTIFIC STATIONS OF NEW ZEALAND

New Zealand began station-based investigations in Antarctica only in the late fifties of this century.

The Special Committee of the IGY approved in October, 1954 the proposal made by New Zealand to open a scientific station on Ross Island (Ross Sea) or at some other suitable place between Ross Island and Cape Adare.

The government set up a Ross Sea Committee in 1955 when it was decided that New Zealand should participate in a Trans-Antarctic expedition. The Committee was responsible for organizing New Zealand's share of the expedition and for setting up of a scientific station on Ross Island.

A station called "Scott Base" was established in the summer of 1956-57. The scientific program of this station was drawn up by the New Zealand Interdepartmental Committee for IGY, and its implementation was entrusted to the Geophysical Section of the Department of Scientific and Technical Research. In May, 1956, the governments of USA and New Zealand signed an agreement on the establishment of joint scientific stations in the Antarctic.

Another station called "Hallett" was built in the summer of 1956-57 by the US Navy and subsequently U.S.A. continued to support the station by providing service personnel, as well as technical and scientific equipment. Besides, 2-3 scientific persons from U.S.A. used to work at the station every year. New Zealand, in her turn, ensured implementation of the principal scientific program and analysis of the results obtained (Table 70).

TABLE 70

New Zealand Stations

Name of the station	Period of work
Scott	from January, 1957
Hallett	from January, 1957

Having decided to continue the investigations in Antarctica, the government of New Zealand set up a committee in March, 1958 to study the territory of Ross Sea. This committee included representatives of various organizations of the country including representatives of the New Zealand Army Headquarters. The implementation of the program and organization of the work was handed over in May, 1959 to the newly organized Antarctic Section of the Department of Scientific and Technical Research.

The results of scientific investigations at the Antarctic stations of New Zealand are published in Bulletins issued by the Department of Scientific and Industrial Research and also come out in the form of individual articles in different journals of New Zealand, England and Australia.

SCOTT BASE

Coordinates: Lat. 77°51' S., Long. 166°48' E.
Altitude: 15 m above sea level.
Geomagnetic coordinates: Lat. 79°0 S., Long. 294°.4.
Synoptic index: 89665.

Scott Base Station is a permanent base of the New Zealand Antarctic Expedition.

It is situated on the southern coast of Ross Island, at Pram Point, which is a low rocky projection of the east coast of the Hut Point Peninsula at about 4 km on the northeast of the Hermitage Cape (Fig. 47). The gentle southeastern slope of

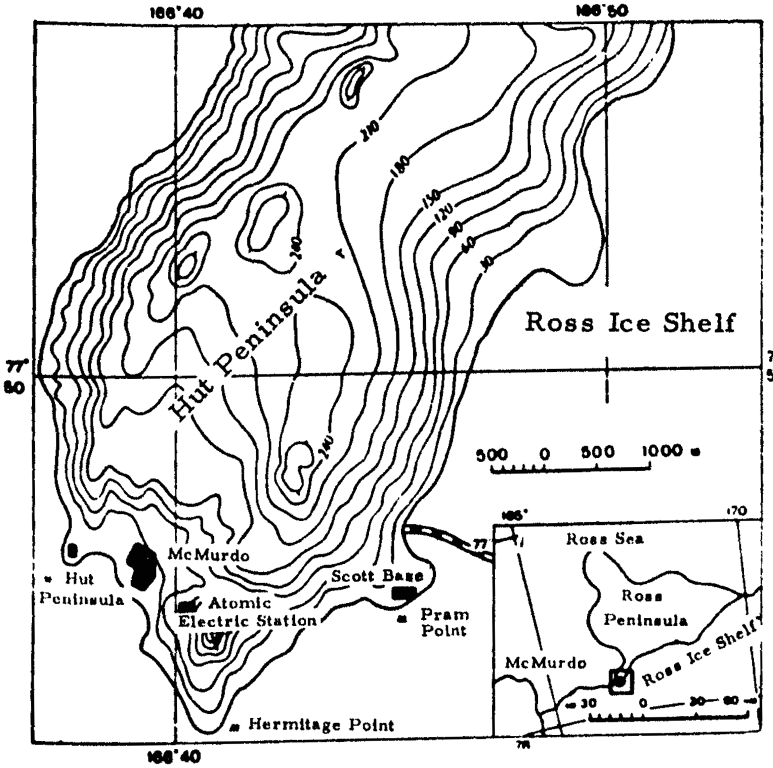

Fig. 47.Region around McMurdo and Scott Base Stations.

Pram Point, on which the station stands, forms a coastal terrace, about 10 m high, covered with basalt fragments.

The surface in the region around the station is covered with snow during winter and spring, and becomes almost completely free of snow by midsummer. Slightly to the north of Pram Point, the edge of the Ross Ice Shelf squeezes against the ice sheet of McMurdo Sound causing a zone of ice crumpled into furrows. This zone stretches 2-4 km to the east and west of the Cape.

Climatic conditions: Air temperature: Annual average, -20.8°C; maximum, 5°C, minimum, -52.5°C. Velocity of wind: Annual average 4.9 m/sec, maximum 39 m/sec.

Installations: The station consists of 14 small houses, connected by covered corridors. They include a main building (with dining room, radio center and service rooms), a science block in which the main laboratory is located, two small living houses, and two other small houses in which the electric station and service rooms are located. A little away from the main building, there are two magnetic laboratories and a seismological laboratory. There are a garage for tractors and amphibian vehicles, a plane hangar and other auxiliary sheds (Figs. 48, 49).

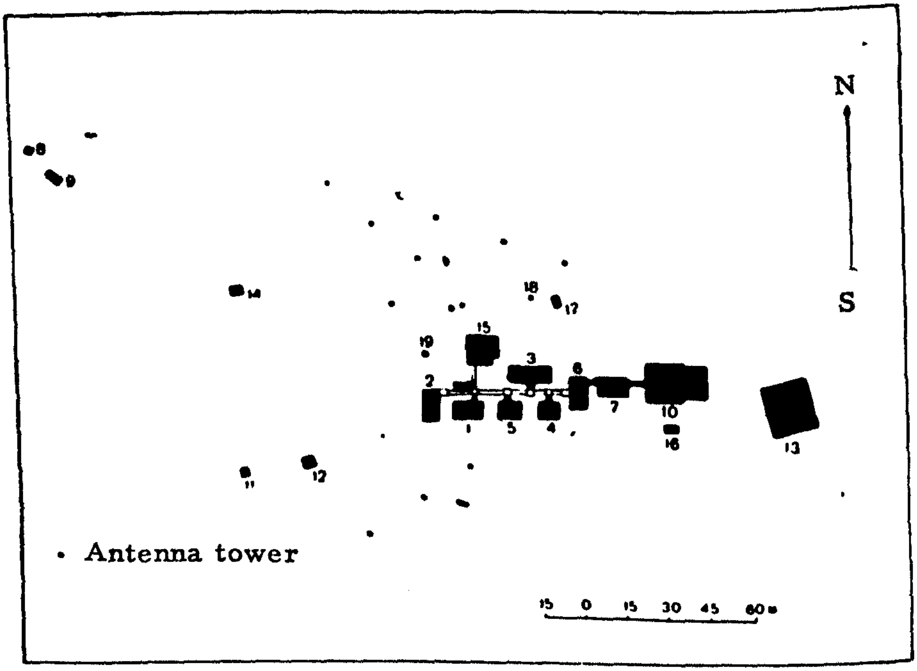

Fig. 48. Plan of Scott Base Station.

1 - Kitchen-cum-dining hall; 2 - Scientific laboratories; 3 - Sleeping quarters; 4 - Hospital; 5 - Administrative premises; (radio, post office, Chief's room); 6 - Auxiliary quarters; 7 - Electric station; 8, 9 - Seismic booths; 10 - Shed for amphibian vehicles; 11, 12 - Magnetic booths; 13 - Main store; 14 - Aurora booth; 15 - Provision store; 16 - Fuel store; 17 - Veterinary hospital; 18 - Meteorological poles; 19 - Meteorological booths.

Electric Station: The total capacity of the generator is 96 kw.

Means of Transport: "Beaver" and "Oster" type planes on skis with a radius of action of 480 km., "Ferguson" type

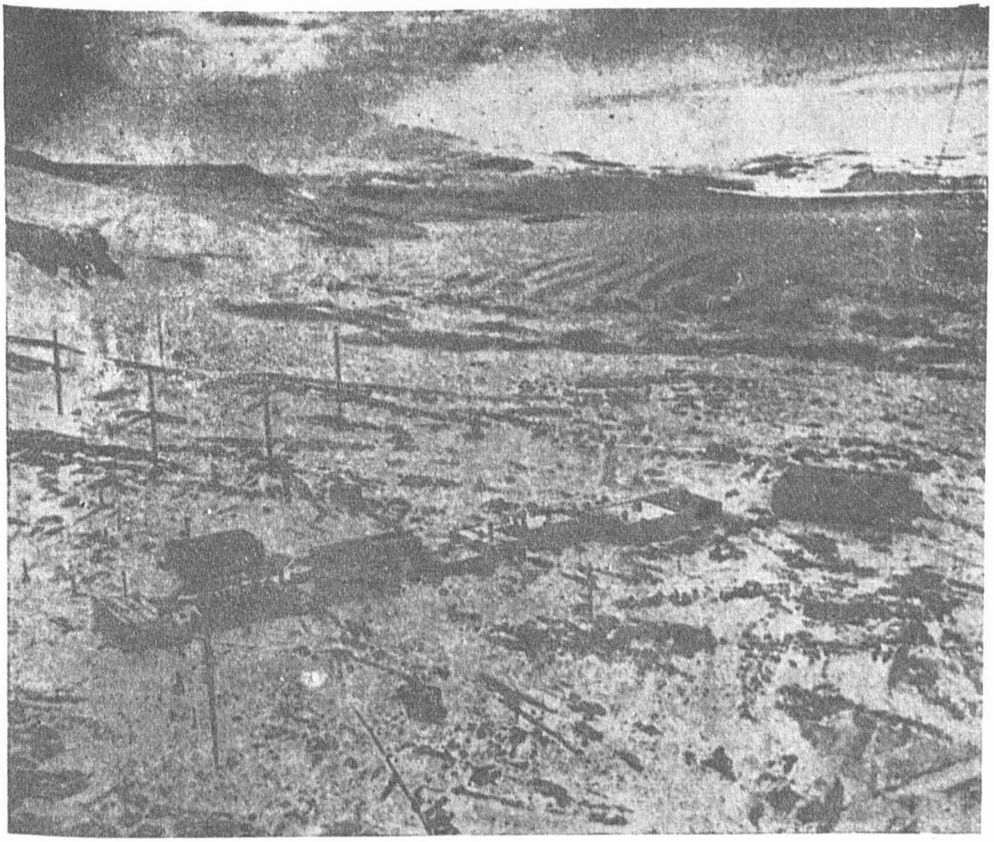

Fig. 49.Scott Base, 1961.

tractors, Weasel type vehicles and amphibian "Snow-cat" vehicles and dog teams.

Supply: The station is provisioned by ships that unload in the region of the American McMurdo Station. The goods are then transferred to Scott Station by tractors and amphibian vehicles. The personnel of the station sometimes fly to Antarctica in American planes.

Scott Station was opened on January 20, 1957 and was named in memory of the famous British polar explorer Robert F. Scott. It served as a base of the New Zealand Trans-Antarctic Expedition led by V. Fuchs in 1957-58 and was engaged in setting up fuel and provision depots between the South Pole and McMurdo Station.

The size and composition of the personnel are given in Table 71.

TABLE 71

Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
1957	23	6	E. Hillary, Alpinist
1958	9	4	L. Martin, Radio Engineer
1959	13	5	L. Hewitt
1960	14	5	K. D. Lenox, Physician
1961			V. Donnely
1962			A. Roberts
1963			R. Tinker

Principal Scientific Instruments

Meteorology

1. Apparatus for surface meteorological observations.
2. Actinometric instruments (Campbell-Stokes heliograph, two pyranometers, balancometers).

Ionosphere

1. Ionosonde: P2 type (made in New Zealand, frequency band 1-22 MHz).
2. Automatic recorders of radio absorption in D layer.

Seismology

1. Three Benioff type seismographs (with natural period of 1 sec).
2. Three short-duration (0.2 sec) galvanometers and three long-duration (25, 25 and 10 sec.) galvanometers recording on 35 mm film.

The seismic booth lies at a height of 33 m above sea level.

Geomagnetism

1. Magnetographs of low sensitivity (La-Kura).
2. Fast response magnetographs (La-Kura).
3. Single component magnetometers (visicorder type).
4. Two QHM instruments and one BMZ instrument.
5. Proton magnetometer.

Aurora

1. Hartley all-sky camera K-100 (photographing on 16 mm black and white film).
2. All-sky camera (photographing on colored film).
3. Patrol spectrograph I, operating within the visible range of the spectrum.
4. Patrol spectrograph II, operating within the infrared range of the light spectrum.
5. Radiolocator (6 kw capacity, 41 MHz frequency).
6. Photometer.

Gravimetry

1. Warden system gravimeters (W-283 and W-454).

Atmospherics

1. Experimental equipment for recording low frequency atmospherics (frequency band: from 700 Hz to 14 KHz).

Radiophysics

1. Automatic radio equipment for exploring the auroral zone (fixed frequencies 11.950; 15.800; 20.035; 23.950 MHz).

Glaciology

1. Standard glaciological instruments for measuring temperature, velocity and direction of the ice movement.

Oceanography

1. Tide-gage of Foxborough type.

Besides, the station is equipped with instruments for conducting biological, geological and topographical field work and laboratory work.

Scientific Observations

The various types of observations carried out at the station are listed in Table 72.

Scott Station serves as a base for conducting geological, topographical, oceanographical and marine biological scientific work in summer by the staff of the Victoria University of Wellington, the New Zealand Geological Survey and the New Zealand Oceanographic Institute.

TABLE 72

Types of Scientific Observations

Type of Observations	Period
Surface meteorological observations	from 1957 onwards
Actinometric observations	from 1957 onwards
Observations of air temperature at heights of 0.06, 0.66, 1.55, 2.72, 4.9, 9.7 and 15.0 m above snow level	1957-1960
Vertical sounding of ionosphere	from 1957 onwards
Radio exploration of the auroral zone	from 1957 onwards
Measurement of radiowave absorption in D-layer	from 1959 onwards
Standard seismological observations	from 1957 onwards
Registration of geomagnetic variations	from 1957 onwards
Absolute geomagnetic observations	from 1957 onwards

Contd.

1	2
Registration of micro pulsations (0. 1 sec) of the geomagnetic field	from 1957 onwards
Visual observations of aurora	from 1957 onwards
Photographic survey of aurora with an all-sky camera	from 1957 onwards
Spectrography of aurora	from 1959 onwards
Radiolocation of aurora by photometry	from 1961 onwards
Gravimetric observations in the region of Ross Island	from 1957 onwards
Hissing atmospherics (whistlers)	from 1957 onwards
Observations on velocity and direction of the movement of Ross Ice Shelf	from 1957 onwards
Observations on ablation and accumulation on Ross Ice Shelf	from 1957 onwards
Observations on sea-level fluctuations	from 1957 onwards
Bird and seal watching	from 1957 onwards

HALLETT STATION

Coordinates: Lat. 72°18' S, Long. 170°18' E.
Altitude: 5 m above sea level.
Geomagnetic coordinates: Lat. 74°.0 S., Long. 278°.1
Synoptic index: 89671.

Hallett Station was jointly set up by New Zealand and USA. Scientific observations and maintenance of the station are the joint responsibility of the members of the Antarctic Expeditions of New Zealand and USA.

Scientific heads take turn every year (one year, representative of USA; and the next year, representative of New Zealand). Scientists of both the countries jointly direct the field work in summer.

The station is situated on Cape Seabea Hook, which is the northeastern extremity of the Hallett Peninsula on the west coastline of Ross Sea (Fig. 50). The structures of the station

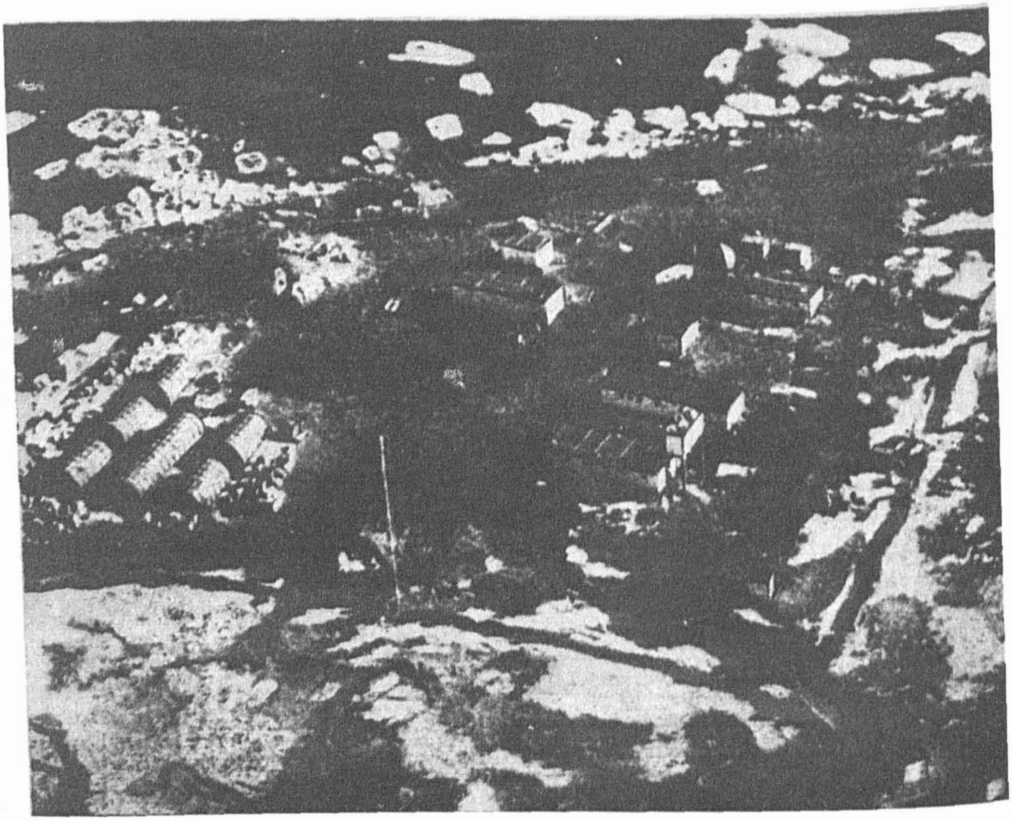

Fig. 50.Hallett Station, 1957.

are located in the eastern part of Cape Seabea Hook on low (up to 3 m), even surface composed of sand, gravel and small cobble-stones. The region of the station is free of ice sheet (the snow cover almost completely disappears in midsummer). The central part of the mainland is not easily accessible from the station. The station is protected on the west by several steep slopes (up to 500 m. high) of mountains occupying the central parts of the Hallett Peninsula, some of the summits being as high as 1500 to 1700 m. On the remaining sides, the station is surrounded by the water of Edisto inlet stretching approximately from the northeast to the southwest between Hallett Peninsula and the coast of the mainland. The width of the inlet in the region of the station is 6-7 km. The east coast of the Edisto inlet is occupied by Admiralty Mountains of height 800-1000 m and covered with snow and ice.

The landing place on the coast in the area of the station lies between Cape Hallett and Cape Seabea Hook, on a small beach covered with pebbles and cobbles of all sizes. The coast near the beach is rather deep and the ground rocky.

A large colony of Adelie penguins inhabits Cape Seabea Hook in the vicinity of the station.

Climatic Conditions: Air temperature: Annual average, -15.5°C; maximum, 8.3°C, minimum, -47.3°C. Velocity of the wind: Annual average, 4.3 m/sec; maximum, 52 m/sec. Cloudiness: Annual average, 6.1 points.

Installations: The station is built on the same lines as the Antarctic stations of USA. It consists of 11 small houses (living house, science laboratories and booths, electric station, garage and auxiliary sheds).

Electric Station: Total capacity of generators: 90 kw. The station is equipped with a plant to distill sea water. This water is used in summer.

Aeronavigational Means: Radio station and direction finder. An emergency landing and take-off strip was laid at the station.

Means of Transport: Weasel type amphibian tractors.

Supply : The station is provisioned by the ships of USA and New Zealand.

Hallett Station was set up in January, 1957.

Scientific observations according to the program of the IGY were started on July 1, 1957.

The size and composition of the personnel are given in Table 73.

TABLE 73

Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
1957	14	7	J. A. Shear, Meteorologist
1958	16	7	C. Salmon, Radio Engineer
1959	16	7	C. Roberts, Meteorologist and Geophysicist
1960	17	6	R. Thompson, Geophysicist
1961	18	-	R. Titus, Meteorologist
1962	19	-	C. Taylor, Geophysicist

Principal Scientific Instruments

Meteorology

1. Apparatus for surface meteorological observations.
2. Actinometric instruments.
3. Rawinsondes.

Ionosphere

1. C-4 type ionosonde (made in USA, frequency range from 1 to 25 MHz, recording on 16 and 35 mm film).

Seismology

1. Short-period (1 sec) seismograph of Willmore type (recording speed 30 mm/min).
2. Three long-period (15 sec) single-component seismographs of Lamont Geological Observatory of Columbia University (recording speed 15 mm/min). Seismic instruments are installed at a height of 2 m above sea level.

Geomagnetism

1. Three-component (D, H, Z) magnetograph ("Askania") of low sensitivity.
2. Portable magnetometer theodolite of CJW-27 type.

Aurora

1. K-100 Hartlaine all-sky camera (made in USA, photographing on 16 mm film).
2. Patrol spectrograph of Meinel-Oliver type.

Scientific Observations

The various types of scientific observations, carried out at the station, are given in Table 74.

TABLE 74

Types of Scientific Observations

Type of observations	Period
Surface meteorological observations	from 1957
Rawindsonde sounding	from 1957
Vertical sounding of ionosphere	from 1957
Standard seismological observations	from 1957
Registration of geomagnetic variations	from 1957
Absolute geomagnetic field measurements	from 1957
Photographing of aurora with all-sky camera	from 1957
Spectrography of aurora	from 1958
Observations on marine birds (conducted by the personnel of the station sporadically)	from 1957

Depots of Trans-Antarctic Expedition

SKELTON DEPOT

Coordinates: Lat. 79°01' S., Long. 162°30' E.
This depot was set up on October 20, 1957 on the surface of Ross Ice Shelf.

PLATEAU DEPOT

Coordinates: Lat. 78°00' S., Long. 158°30' E.
Altitude: 2366 m above sea level.
This depot was set up on the surface of the ice shelf on October 31, 1957.

DEPOT 480

Coordinates: Lat. 79°51' S., Long. 147°40' E.
Altitude: 2298 m above sea level.
This depot was set up on the surface of the ice shelf at 480 miles from Scott Station on November 25, 1947.

MIDWAY DEPOT

Coordinates: Lat. 81°30' S., Long. 146°05'.
Altitude: 2210 m above sea level.
This depot was set up on the surface of the ice shelf.

DEPOT 700

Coordinates: Lat. 83°00' S., Long. 146°00' E.
Altitude: 2469 m above sea level.

It was erected on the surface of the ice shelf at a distance of 700 miles from Scott Station on December 20, 1957.

All these depots were established by the New Zealand party, led by E. Hillary and were essentially fuel stores, intended for sledge-tractor journeys of the Trans-Antarctic Expeditions.

CHAPTER VII

NORWEGIAN SCIENTIFIC STATIONS

The first Norwegian scientific station, "Framheim", was organized by the Norwegian Antarctic Expedition led by R. Amundsen in the beginning of 1911 on Ross Ice Shelf (Table 75).

TABLE 75

Norwegian Stations

Name	Period of operation
Maudheim	February, 1950 - January, 1952
Norway	December, 1956 - February, 1962.
Framheim	February, 1911 - January, 1912

The first station served as a coastal base of the expedition, whose principal task was to reach the South Pole. On October 19, 1911, a team of five persons led by R. Amundsen proceeded towards the pole and reached it on December 16, thus completing a journey unprecedented in heroism over the ice-covered hostile desert of the Antarctic.

In 1950, on the initiative of the Swedish glaciologist Hans Ahlmann, a joint Norwegian-British-Swedish expedition to Antarctica was undertaken. This expedition set up Maudheim

Station on the coastline of Queen Maud Land. It was decided that Norway should look after the meteorological and topographical work as well as the transport of members of the expedition to Antarctica, the supply of fuel, and a part of provisions. Sweden was to take the responsibility of conducting glaciological work and supply of provisions, houses and equipment, while the responsibility of Great Britain was to conduct geological work. John Giaever, a Norwegian, was appointed the Head of the Expedition. Maudheim Station operated for two years carrying out several complex scientific observations.

Towards the beginning of the International Geophysical Year, Norway set up (also on the coastline of Queen Maud Land) Norway Station. The Norwegian Polar Institute was in charge of organization as well as scientific observations. However, in 1960 the government of Norway decided to hand over this station to the South African Republic (SAR). Consequently, the scientists of SAR took charge of the work on this station during the last two years (1960-1961) of its operation.

MAUDHEIM

Coordinates: Lat. 71°02' S., Long. 10°55' W.
Altitude: 37 m above sea level.

Maudheim Station was a base of the joint Norwegian-British-Swedish Antarctic Expedition of 1949 - 1952 led by John Giaever.

The station was set up on an even surface of the Maudheim Ice Shelf, at a distance of 3 km to the south of the tip of Norsel Bay on the coastline of Queen Maud Land (Fig. 51). The thickness of the Ice Shelf in this region is 180 to 200 m and depth of the sea under it is 400 to 450 m. At about 30 to 40 km towards the southeast of the station rises the slope of the mainland glacier, which is rather steep and highly split into crevasses till it reaches a height of 400 m, but beyond that it is gentle and smooth.

<u>Climatic conditions</u>. Air temperature: Annual average, -17.4 °C; minimum, -47°C; maximum, 3.0 °C.

Installations: Two wooden houses, one of which had living rooms. The other one housed the radio station, a meteorological laboratory and a medical unit. Three small individual sheds housed an electric station, a drilling unit and an aerological block. There was also a magnetic laboratory and a workshop. All rooms were interconnected by a corridor made of wooden boxes (Fig. 52).

Means of Transport: Three Weasel type amphibian tractors and 25 dogs. In summer, light planes on skis or on pontoons were based at the station. Two boats with outboard motors were also available at the station.

Electric Station: Equipped with diesel and wind-driven generators.

Supply: The station was provisioned by the ship "Norsel".

Maudheim Station was opened on February 20, 1950 and closed on January 15, 1952. The size and composition of the personnel are indicated in Table 76.

TABLE 76

Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
1950	14	8	J. Giaever
1951	14	9	J. Giaever

The types of observations carried out at the station are given in Table 77. Besides, during the journeys over the ice shelf and to the interior of the mainland, the team conducted geological, geodetic and zoological work, as well as seismic soundings of the ice sheet.

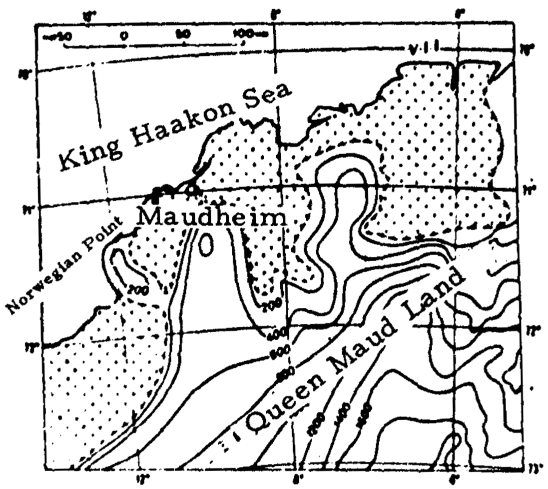

Fig. 51.Region around Maudheim Station.

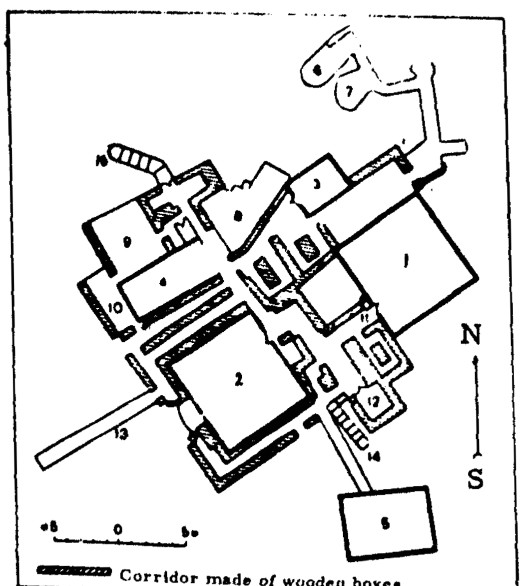

Fig. 52.Plan of Maudheim Station.

1 - Meteorological laboratory, Radio station, Hospital; 2 - Dining room, Kitchen; 3 - Electric station; 4 - Workshop; 5 - Drilling machine; 6, 7 - Gas generator room; 8 - Passage to the workshop; 9, 10 - Garage; 11 - Entrance during snowstorm; 12 - Glaciological laboratory; 13 - Tunnel for dogs; 14 - Entrance, 1951; 15 - Entrance, 1950.

Scientific Observations

TABLE 77

Types of scientific observations

Types of observations	Period
Surface meteorological observations	1950-51
Radiosonde sounding of atmosphere	1950-51
Glaciological investigations (Stratigraphic study of core samples obtained from holes of depth 100 m, measurement of ice temperatures, etc.)	1950-51
Geomagnetic observations	1950-51

NORWAY STATION

Coordinates: Lat. 70°30' S., Long. 2°32' W.
Altitude: 55.7 m above sea level.
Synoptic Index: 89001.

Norway Station was a base of the Norwegian Antarctic Expedition until 1960, when it was handed over to the South African Republic.

The station is located on the coastline of the Queen Maud Land at about 30 km from the coast (Fig. 53). The installations were built on a level surface of the ice shelf, the thickness of which in this region is 200 to 250 m.

Climatic conditions: Air temperature: Annual average, -16.4° C; maximum 2.3° C; minimum, -44.6° C. Average annual wind velocity, 7.4 m/sec.

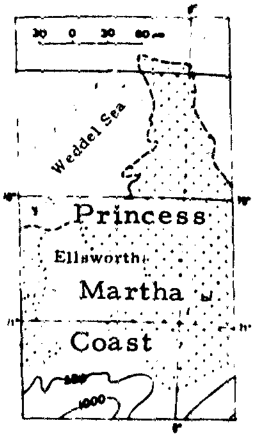

Fig. 53. Region around Norway Station.

Installations: Two residential houses (7 x 7 m and 7 x 10 m in size), and sheds for electric station and garage. A small auxiliary base was also set up near the coast.

Means of Transport: One amphibian tractor, two tractors and dog teams.

Electric Station: Equipped with two diesel generators, each of 12 kw capacity.

The station was opened on December 31, 1956, and closed on February 12, 1962. The program of scientific observations was then transferred to SANAE Station. The personnel of the station consisted of 10 to 14 members. In 1960-61, the station was manned by personnel of SAR (South African Republic).

Principal Scientific Instruments

1. Equipment for surface meteorological observations.
2. Radiosondes (optical theodolite)
3. Equipment for radiosonde sounding of the ionosphere.
4. Actinometric instruments.
5. Magnetographs La-Kura type.
6. Glaciological instruments.

Scientific Observations

The various types of scientific observations made at the station are given in Table 78. The station also functioned as a base for conducting geological, glaciological and geodetic field work.

TABLE 78

Types of scientific observations

Type of observations	Period
Surface meteorological observations	1957-61
Radiosonde sounding of atmosphere	1957-61
Geomagnetic observations (D, H, Z)	1957-61
Photography of aurora with all-sky camera	1957-61
Glaciological observations(observations of accumulation and ablation, temperature and movement of ice shelf)	1957-61

FRAMHEIM

Coordinates: Lat. 78°38' S., Long. 169°37' W.
Altitude: 11.1 m above sea level.

Framheim Station was a coastal base of the Norwegian Antarctic Expedition of 1910-1912 led by R. Amundsen.

The station was built on the plain surface of Ross Ice Shelf, in the area of the Wales Bay at a distance of about 3 km from the ice barrier. The thickness of the glacier in this part was about 250 m. The station consisted of one living house and a few large tents for dogs (Fig. 54).

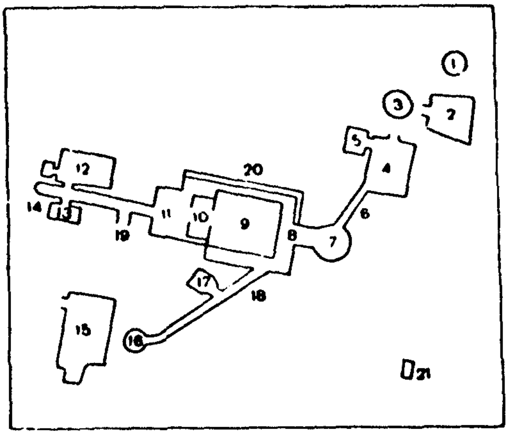

Fig. 54. Plan of Framheim Station.
1 - Astronomical instrument; 2 - Store; 3 - Tent; 4 - Workshop and store; 5 - Sewing workshop; 6 - Corridor; 7 - Place for excavating ice; 8 - Corridor; 9 - Room; 10 - Kitchen; 11 - Annexe; 12 - Carpenter's workshop; 13 - Smithy; 14 - Bath room; 15 - Fire wood and kerosene store; 16 - Tent, Coal store; 17 - Gravimeter; 18 - Corridor; 19 - Entrance; 20 - Fresh meat store; 21 - Booth for thermometers.

The station was opened in the beginning of February, 1911 and was closed on January 29, 1912. The team on the station consisted of nine persons and was directed by R. Amundsen.

Surface meteorological and geomagnetic observations were carried out during the period of wintering from April 1, 1911 to January 29, 1912.

CHAPTER VIII

SCIENTIFIC STATIONS OF USSR

The Soviet Union embarked on station-based scientific investigations in the Antarctica in 1956 in preparation for the International Geophysical Year. All the Soviet Antarctic stations were opened by the Soviet Antarctic Expedition, which was under the USSR Academy of Sciences up to 1958. Thereafter, they were transferred to the Arctic and Antarctic Scientific Research Institute[1]. The scientific programs of the stations are carried out by the teams of the Soviet Antarctic Expedition.

All Soviet stations (except some erected temporarily) are situated on the Antarctic mainland. Moreover five stations were set up inside the continent (Table 79).

TABLE 79

USSR STATIONS

Name	Period
Vostok-1	April to December, 1957
Vostok	December, 1957 to January, 1962 and from January, 1963 onwards
Komsomol'skaya	November 1957 to March, 1959 and from 1960 - seasonally

Contd.

[1] *Until 1964, the Arctic and Antarctic Scientific Research Institute was under the Central Offices of the Northern Seaways (of the Maritime Fleet) of USSR and later it was transferred to the Central Administration of Hydro-meteorological Services of the USSR.*

1	2
Lazarev	March 1959 to February, 1961
Mirnyy	From February, 1956 onwards
Molodezhnaya	February to March, 1962 and from January, 1963 onwards
Novolazarevskaya	From January, 1961 onwards
Oasis	October 1956 to November, 1958
Pionerskaya	May 1956 to January 1959
Pole of Inaccessibility	December 14-26, 1958
Sovetskaya	February 1958 to January 1959

The results of scientific observations carried out at the Soviet stations are published by the AANII (Arctic and Antarctic Scientific Research Institute) in the Trudy Sovetskoi antarkticheskoi ekspeditsii (Reports of the Soviet Antarctic Expedition). This series also contains detailed descriptions of the stations and programs of scientific observations. The current information about Soviet stations is regularly published in the issues of "Information Bulletin of Soviet Antarctic Expedition" published since 1958.

VOSTOK-1

Coordinates: Lat. 72°09'S., Long. 96°34' E
Altitude: 3252 m above sea level.
Synoptic Index: 89594.

The inland scientific station Vostok-1 was situated on a level snowy surface of the ice blanket of Antarctica at a distance of 620 km to the south of Mirnyy. The thickness of the ice sheet in this region is 2900 m; the bed of the sheet rises above sea level to a height of 352 m.

Climatic conditions: Air temperature: Annual average, -47°.4C; maximum, -24°.4C, minimum -73°.3C. Velocity of the wind (monthly average), 5.3-8.1 m/sec; maximum 22 m/sec. In the vicinity of the station the wind is characterized by its steadiness and blows almost exclusively from the southeast. The polar night lasts from May 15 to July 27.

The staff of the station consisted of 8 persons, constituting two aerologists, one radio engineer, a radiotechnician, a physician-cum-cook, a mechanic, and a mechanic-cum-driver. Geographer V.G. Averianov was the head of the group.

Principal Scientific Instruments

Meteorology

1. Apparatus for surface observations.
2. Gradient unit for measuring temperature of air and snow at 10 levels.

Actinometry

1. Thermoelectric actinometer.
2. Pyranometer.
3. Albedometer.
4. Yanishevskii's Balancometer.

Aerology

1. Radiosondes.
2. Radiotheodolite "Malachite".

Glaciology

1. L-shaped snow-measuring platform with a rope with 20 m graduations.
2. Snowstorm meter.
3. Anemometer.
4. Gravimetric density meter.
5. Hardness meter with indicator.
6. Hardness probe.

Medicine

1. Equipment for carrying out medical investigations.

Scientific Observations

The various types of observations carried out at the station are given in Table 80.

TABLE 80

Types of scientific observations

Type of observations	Period of observations
Standard surface meterological observations	April 12 - Nov. 30, 1957
Actinometric observations	April 20 - Nov. 22, 1957
Aerological observations	June 18 - Nov. 19, 1957
Glaciological observations	April to November 1957
Visual observations of aurora	July 30 - October 15, 1957
Observations on acclimatization of man in conditions of Central Antarctica	April - November, 1957

VOSTOK

Coordinates: Lat. 78°28.S., Long. 106°48' E.
Altitude: 3488 m above sea level.
Geomagnetic coordinates: Lat. 89°.2 S, Long. 91°.4.
Synoptic Index: 89606.

The inland scientific station Vostok is situated on an even snowy surface of the glacial plateau at a distance of 1410 km from Mirnyy (nearest distance to the coast 1260 km). The depth of the glacial blanket in this region is 3700 m, the thickness of snow-firn stratum being 130 m. The bed of the glacier under the station is more than 200 m below sea level.

<u>Climatic conditions</u>: The region of the station is characterized by a clear weather with very little cloudiness and very low temperatures during almost the whole year. The average annual

air temperature, - 56°C; maximum - 21°C; minimum - 88.3°C (record minimum, registered on the surface of land). Average temperature between April and September, - 60°C. Average annual velocity of the wind, 5 m/sec; maximum 25 m/sec. Predominant direction of the wind: west-southwest. Strong winds in the region of Vostok Station are rare. During a period of more than 3 years, only 2 days were noted when velocity of the wind was higher than 15 m/sec. The polar night lasts from April 24 to August 1.

Installations: Six houses on sledges with floor space of about 12 m^2 each constituted the main buildings of the station up to 1963. Five of these were connected into one complex by a covered warm vestibule with 55 m^2 of floor space. Electric station, radio station, cabin with a kitchen fitted with electrical appliances and living and service quarters were housed in these five small houses. This complex also contained bath, provision and household stores, etc.

The sixth house was kept separate and was occupied by a nonportable radiolocator. Besides, a residential room was furnished in this house and an outer enclosed lobby with 5 m^2 area was also constructed. A cabin with 16 m^2 floor space was set up for conducting radiosonde experiments. A gas-generator unit occupying 12 m^2 of area was also accommodated.

Two nonmagnetic laboratories of 4.7 m^2 area each, but with different depths of 1.7 m and 3.2 m were set up at a distance of 60 m from the station, for conducting magnetic experiments.

In 1963, a centrally-heated aerological block and three magnetic cabins were added to the station. A diesel electric station, cosmic ray laboratory, geophysical laboratory, aerological and meteorological cabins, radio station and electric kitchen, centrally-heated provision store, photolaboratory, four living rooms and shower were newly added to the main building (Fig. 56).

The main living and working quarters were heated by means of a central water heating system taking advantage of the

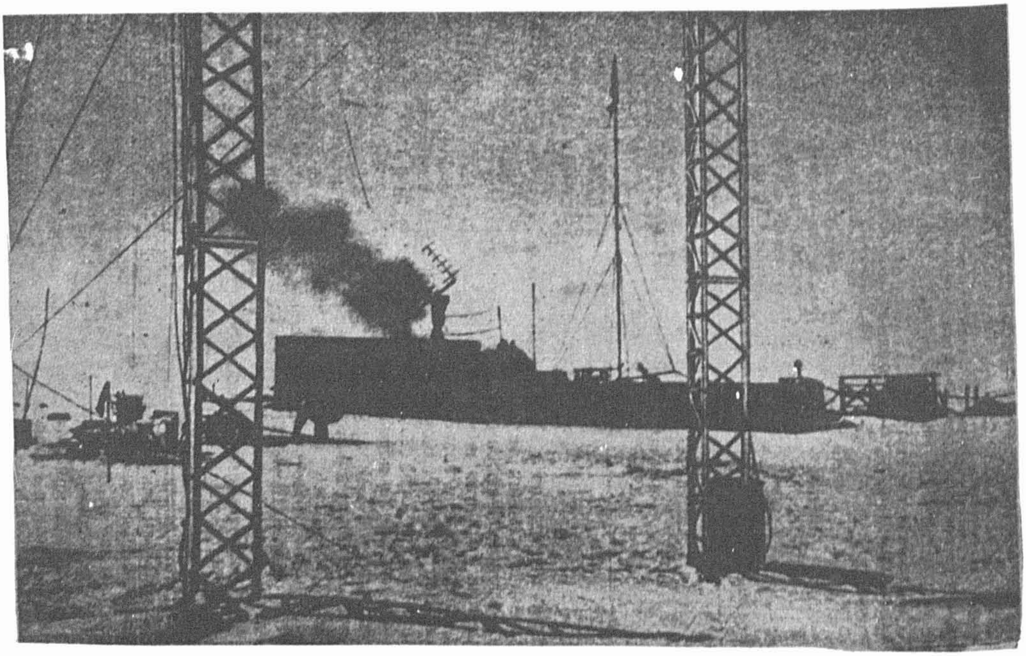

Fig. 56. Vostok Station.

cooling system of the diesel engines in the electric station. After the reconstruction of the station in 1963, all the living and working quarters were fitted with the new centralized water heating system. The water circulating in the diesel-engine cooling system was used as the heat circulator after some additional heating with the exhaust gases. Central water heating was also used in the room of "Malachite" radio-theodolite and in the aerological block.

An electric kitchen of 10 kw capacity was also available.

Electric Station: Equipped with two diesel generators of 12.5 kw and 24.5 kw capacity. The lower capacity generator was operated round the clock and met the major requirements of the station. In 1963, two diesel engines with A.C. generators of 12 kw (in the conditions of Vostok station the actual power delivered was only 10 kw) were installed in the new quarters of the electric station.

Radio Station: The receiving set of the radio station consisted of an all-wave radio receiver working on the rectified output of the 127/220V A.C. and two radio receivers working on the accumulator batteries of 26 volts. A shortwave ship-transmitter of 250 watt capacity (working on 220 V A.C.), a long-wave ship-transmitter of 250 watt capacity (working on 220 V A.C.) and an all-wave airplane transmitter of 70 watt capacity (working on 26V accumulators) were used as receiving sets. Three accumulator batteries, with 84V total voltage, were used as emergency power supply. The charging of the accumulators was done by means of the rectifier and the charging and discharging panel. Besides, a radio-transmitter POB-77OM and two other receiving sets also functioned at the station.

The antenna system of the station consisted of three aerials erected on two steel masts (23 m in height) and a bamboo pole. For experimental work, a transmitting aerial mast, 60 m long was lowered in a borehole under the snow. The aerial system was renovated in 1963; three new masts were set up on which a T-shaped main aerial, a standby transmitting aerial, and a receiving aerial (slanting beam) were suspended.

A landing and take-off strip (2500 x 7 m) was laid at a distance of 100 m from the station from the northeast to the southwest. Later, its length was increased to 3700 m.

The meteorological platform was situated to the south-southwest of the main buildings of the station, at a distance of 60 m. The following were installed on the platform: a psychrometric cabin, a shed for automatic recorders, a spare psychrometric cabin, a mast with pickup units for remote meteorological stations, Tretyakov's precipitation meter, a stand for gradient observations, and stands for actinometric instruments (Fig. 57).

Three platforms were laid at the station for glaciological observations: two for measuring accumulation of snow and one for estimating the density of the snow cover. All of them were located at a distance of 50 m to the southwest of the meteorological platform. The platforms for measuring accumulation of snow

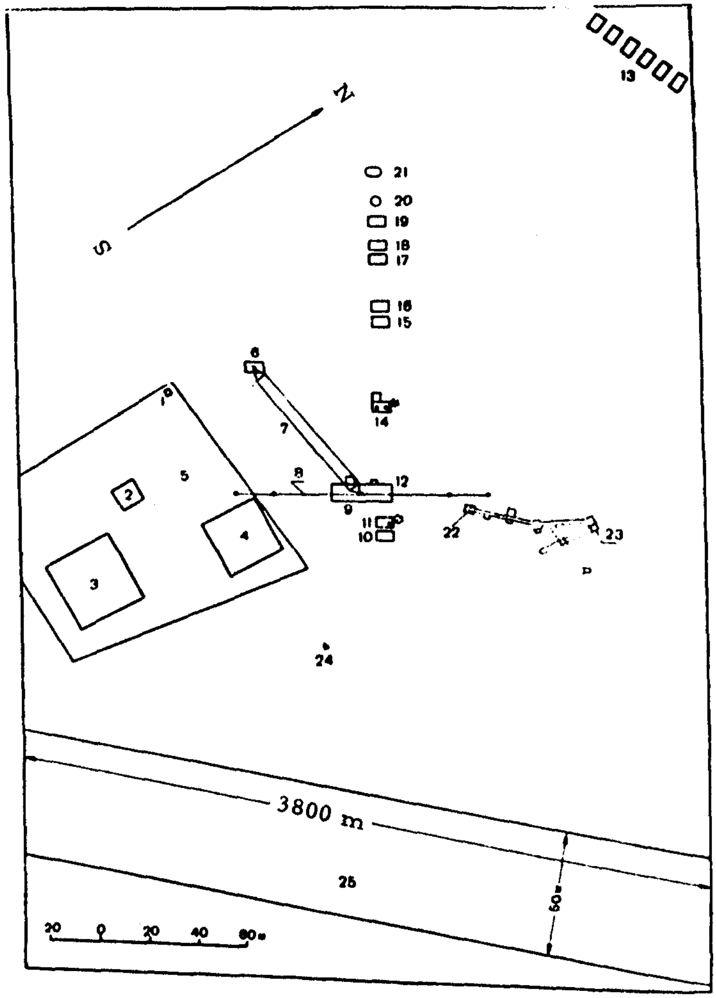

Fig. 57. Plan of Vostok Station.

1 - Astronomical point; 2 - Actinometric platform; 3 - Glaciological platform; 4 - Meteorological platform; 5 - Meteorological booth; 6 - Emergency house and radio station; 7 - Transmitting aerial; 8 - Aerial; 9 - Entrance to the station; 10 - Aerological block; 11 - Radiolocator; 12 - Main complex of station quarters; 13 - Stand for sledge-caterpillar trains; 14 - Locator; 15 - Covered sledge food depot; 16 - Sledge store of household goods and products; 17 - Sledge store of cinepictures; 18 - Sledges for storing equipment in boxes; 19 - Store of electric armature; 20 - Tent KAPSh-1 - store of geophysical equipment; 21 - Tent KAPSh -2 - store of meteorological instruments and medical stock; 22 - Entrance vestibule to magnetic pavilion; 23 - Complex of premises for magnetic observations; 24 - Mira; 25 - Landing and take-off strip.

were equipped with two L-shaped measuring ropes (40- and 60-meter long). At a distance of 10 m from the building of the station, a 15-meter deep hole was bored for measuring temperature gradient of snow and firn layers. In addition, four holes, 52 m deep, were melted at the station in 1959, whic! also were used for temperature observations.

A special unit was set up on a tow-car in 1959 for observations of aurora. In 1960, cameras for photographing th aurora were installed on the roof of the living house, above the geophysical laboratory. For visual observations of aurora a spherical angle gage (made of wires) was mounted on three racl near the building.

The provisions were brought to the station by sledge caterpillar trains and planes. The size and composition of the personnel are indicated in Table 81.

TABLE 81

Personnel of the station

Year	Number of workers		Director
	Total	Scientific	
1957	8	5	V.G.Aver'yanov, Geographer
1958	11	5	V.S.Sidorov, Radio operator
1959	10	7	V.S.Ignatov, Geophysicist.
1960	12	6	V.S.Didorov, Radio operator
1961	12	7	L.N.Zhigalov, Geophysicist
1963	15	8*	V.S.Siaorov, Radio Operator

* including two geophysicists from Czechoslovak Socialist Republic

A sledge-caterpillar train arrived on December 16, 1957 at the place where Vostok Station was set up. This day was considered as the formal opening day of the station. On January 21, 1962, the station was temporarily closed, and again on January 25, 1963 systematic scientific observations were renewed.

The station got its name in honor of the ship "Vostok", one of the vessels of the First Russian Antarctic Expedition led by Baron Fabian Gottlieb van Bellingshausen, in 1820.

Principal Scientific Instruments

Meteorology

1. Apparatus for surface meteorological observations.
2. Actinometric instruments.
3. Radiosondes and equipment for pilot balloon observations (radiotheodolite)

Ionosphere

1. Automatic Ionosonde.
2. Riometer.

Geomagnetism

1. Magnetic field recorder (MVS-AANII).
2. Quartz H-Magnetometers.
3. Vertical field magnetometer.

Aurora

1. C-180 camera for photographing the aurora.
2. Spectral camera C-180-S.
3. Radiolocation equipment.
4. Spherical angle gage for visual observations.

Glaciology

1. Standard glaciological equipment.
2. Thermal gradient apparatus using electrical resistance

thermometers, thermometers(calorimeters), and platinum resistance thermometers.

3. Thermal electric borers (used for drilling holes for investigation of structure of snow-firn stratum).

Medicine

1. Apparatus for medical investigations

Scientific Observations

The types of scientific observations carried out at the station are given in Table 82.

TABLE 82

Types of Scientific Observations

Type of observations	Period of observations
Standard surface meteorological observations	1957 (from Dec. 16th) - 1961; from 1963 onwards
Actinometric observations	1958-1961, and from 1963 onwards
Radiosonde sounding of atmosphere	1958-61, and from 1963 onwards
Pilot balloon observations	1958-61, and from 1963 onwards
Regular vertical sounding of ionosphere	1958-61, and from 1963 onwards
Absorption of radiowaves	from 1963 onwards
Registration of geomagnetic variations	1958-61, and from 1963 onwards
Absolute geomagnetic measurements	1958-61, and from 1963 onwards
Photographing of aurora with C-180 camera	1958-61

Contd.

1	2
Photographing of aurora spectrum with spectral camera C-180-S	1958-61
Radiolocational observations of aurora	1959
Visual observations of aurora	1958-61 and from 1963 onwards
Observations of snow accumulation	1958-61, and from 1963 onwards
Observations of temperature distribution in snow-firn stratum (mass)	1957-61, and from 1963 onwards
Observations of the structure of snow-firn mass	1957-61
Observations on acclimatization of man to the conditions of Central Antarctica	1958-61, and from 1963

KOMSOMOL'SKAYA

Coordinates: Lat. 74°06' S., Long. 97°30' E
Altitude: 3500 m above sea level
Geomagnetic coordinates: Lat. 84°.6' S., Long. 137°.3'
Synoptic index: 89596

The inland scientific station "Komsomol'skaya" is situated on an even snowy surface at a distance of 870 km to the south of Mirnyy. The thickness of the ice sheet in this region is 3370 m, while the thickness of snow-firn mass is about 100 m. The bed of the glacier under the station is about 130 m above the sea level.

Climatic conditions: Air temperatures far below 0°C throughout the year are typical of the region of the station. Even during the warmest period, the maximum temperature is about -20°C. Minimum temperature may be below -80°C. Annual average temperature of the air (according to observations during 1958) is -52.2°C.

The wind is characterized by the constancy of its direction and very low velocities. Southeastern winds predominate. Annual average velocity of the wind (during the year 1958) was 3.8 m/sec, while the maximum recorded velocity was 15 m/sec. But the wind is never at a standstill. Cloudiness in the region of the station is insignificant. Continuous polar night (including twilight) at the Komsomol'skaya Station prevails almost three months (from June to August) and the polar day is also of the same length (from November 4 to February 6).

Installations: Earlier, Komsomol'skaya Station consisted of three small snow-screened sheds joined by a common vestibule. One of the houses was equipped for living. The radio station also was located in this house. Another house contained the ward-room and the kitchen. Electric station was housed in a third room (Fig. 58). The station was expanded by constructing

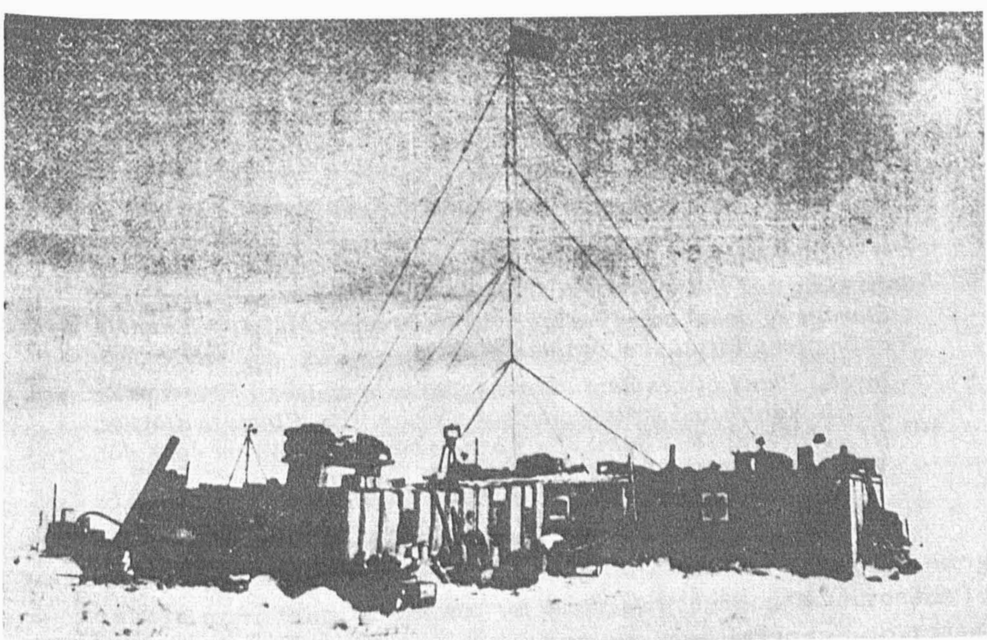

Fig. 58.Komsomol'skaya Station.

more buildings in early 1958. A storeroom and a corridor made of a framework lined with tarpaulin were added to the buildings. The corridor connected the storeroom with the house. The kitchen was shifted to the heated vestibule. A bathroom was also added in the vestibule, and the house where the kitchen was formerly situated was now used as a living quarter (Fig. 59).

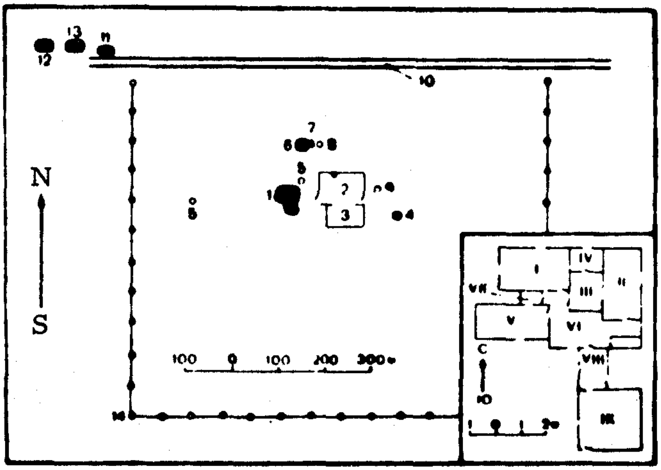

Fig. 59. Plan of Komsomol'skaya Station.

1 - Station premises; 2 - Meteorological platform; 3 - Glaciological platform; 4 - Magnetic booth; 5 - Radio masts; 6 - Stand for tow car; 7 - KAPSh-1; 8 - Deep Hole 40 m; 9 - Mast of anemometers; 10 - Landing and take-off strip; 11 - Storage of aviation petrol; 12 - Storage of solar oil; 13 - Store of empty barrels; 14 - Barrels indicating territorial line of the station.

Inset: Plane of residential and service premises of the station. I - Radio station and meteorological station; II - Electric station; III - Kitchen; IV - Bath; V - Living room; VI - Warm corridor; VII - Toilet; VIII - Cold corridor; IX - Store.

Electric Station: Two diesel-engine-driven electric generators of 15 kw capacity each. In the beginning, the heating of the station rooms was done by means of cast iron stoves. Later on, central heating was introduced by utilizing the diesel cooling system. Antifreeze was used in the heating system as a heat circulator. Only in exceptional cases, when there were severe frosts, it was necessary to use stoves. Some rooms were also heated by means of electric heaters.

TABLE 83

Personnel of the station

Period	Number of workers		Director
	Total	Scientific	
Nov. 6, 1957 to Jan. 3, 1958	7	5	V.S. Pelevin, Mechanic
Jan. 3, 1958 to Jan 15, 1959	5	3	M.A. Fokin, Radio operator-cum-meteorologist.
Jan. 15 to March 9, 1959	2	1	M. M. Lyubaretz, Radio technician-cum-Meteorologist
Jan. 17 - March 3, 1960	2	1	V. G. Kazadayev, Radio-technician-cum-Meteorologist.
Jan. 8- March 2, 1961	2-3	1	N. D. Tyukov, Radio-operator-cum-Meteorologist.

Principal Scientific Instruments

Meteorology

1. Apparatus for surface meteorological observations.
2. Actinometric instruments.
3. Radiosondes and equipment for pilot balloon observations.

Geomagnetism

1. Instruments for registration of variations and measurement of absolute values of components of the geomagnetic field.

Aurora

1. Angle gage for determining the position of aurora by visual observations.

Glaciology

1. Standard glaciological equipment

Scientific Observations

The various types of scientific observations carried out at the station are given in Table 84.

TABLE 84

Scientific Observations

Type of observations	Period
Standard surface meteorological observations	Nov. 6, 1957 to March 8, 1959; Oct. 20-Dec. 31, 1959; Jan. 17-March 3, 1960 & Jan. 8-March 2, 1961.
Actinometric observations	1957 (from Dec. 3) - 1958
Pilot balloon observations	1957 (from Nov. 24) - 1958 (with breaks)
Gradient observations of the velocity of wind and air temperature	1957 (from Nov. 26) - 1958
Registration of geomagnetic variations	Nov. 13-Dec. 7, 1957; Nov. 4-Dec. 7, 1957
Absolute geomagnetic measurements	Nov. 4-Dec. 7, 1957
Visual observations of aurora	1958
Observations of snow accumulation	1958-1959
Density measurements of the snow cover (on the surface)	1958
Measurement of snow temperatures, to a depth of 3.2 m	1958
Temperature measurements of snow-firn mass up to depths of 10 and 50 m	1959

Contd.

1	2
Crystallographic analysis of atmospheric precipitations by microscope	1958
Observations of acclimatization of man to conditions of Central Antarctica	1960

LAZAREV

Coordinates: Lat. 69°58' S., Long 12°55' E
Altitude: 24 m above sea level.
Geomagnetic coordinates: Lat. 65°.6 S., Long. 55°.3.
Synoptic index: 89511.

Lazarev Station is situated on an even snowy surface at the southwestern part of Lazarev Ice Shelf, at a distance of 1300 m from the border (Fig. 60). The thickness of the glacier in the area of the station is about 140 m, the depth of the ocean is about 740 m, and the thickness of the snow-firn mass is 35 m. Towards the north and east of the station the surface of the glacier rises, thus forming a slope of approximately one to twenty. The horizon around the station is open; natural and artificial obstacles distorting the elements of weather under observation are totally absent.

The ocean in the region of the station is covered every year by fast ice, whose width at the time of the maximum development (in October-November) goes up to 20-30 km. The time of setting in of fast ice is different for different years. In 1959, fast ice started setting in August, but in 1960 it set in April. Away from the edge of the fast ice, a space of open water in the midst of ice is found throughout the year. The width of this water area varies from 1 to 2 km in winter, up to tens of kilometers at the end of summer. The width of the belt of drifting ice on the meridian of the station during the period of its maximum development is about 1200 to 1500 km. It decreases to a few tens of kilometers at the end of autumn.

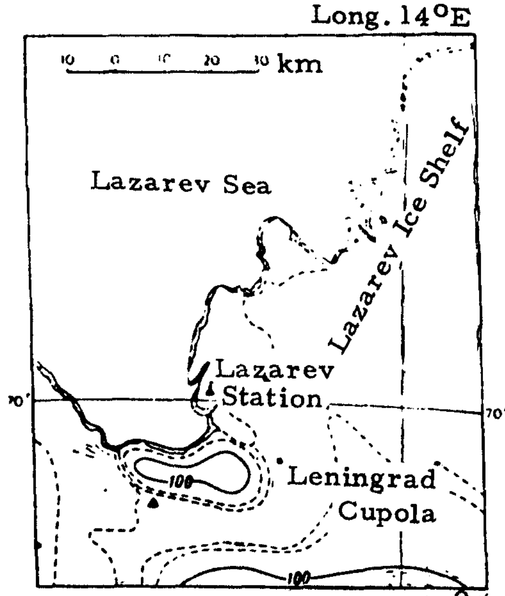

Fig. 60. Region around Lazarev Station.

The ice shelf in the region of the station, apart from drifting in the western direction at a rate of about 80 m a year, undergoes vertical fluctuations of more than 2 m due to tidal effects.

Climatic conditions: Frequencly recurring strong eastern winds accompanied by snowstorms and very low temperatures during almost the whole year are typical of the region of the station. Air temperature : Annual average, -16°C; minimum, -46°C; maximum + 2.5°C. Annual average wind velocity: 9 m/sec, maximum (gusts), more than 50 m/sec. Recurrence of storms and hurricanes exceeds 16%; storms and hurricanes are most frequent in winter. Polar day at the latitude of the station extends from November 20 to January 24, and polar night (including twilight) from May 24 to July 19.

Installations: A set of living and working quarters was built while commissioning the station in 1959. This consisted of a living house, a provision store, an electric station and a bath. These quarters were interconnected by snow screens and plywood walls and roofs. The living house with 85m^2 of floor space contained three living rooms, one physician's room, an equipped medical station, a radio station, a battery room, and a ward-room with kitchen. Glaciological and photographic rooms were situated in the lobbies. A diesel fuel storeroom was constructed adjoining the electric station. The covered courtyard between the provision store and the living house, as well as the corridor formed by interconnecting all the quarters of the main complex, were partly used as storage space(Fig. 61).

At a distance of 120 m to the north of the main complex lay the emergency base, consisting of two twin units. Electric station was housed in one of them while the other accommodated an emergency radio station. In addition, at a distance of 9 km to the east-southeast of the station a second emergency base was set up. A big arctic pavilion of Shaposhnikov's design (KAPSh-2) was set up here. This housed a mobile electric station (with petrol engine), a portable radio station, a coal stove, a reserve stock of fuel, provisions, and necessary household equipment. An aerological block consisting of a gas generator, gas stocking rooms and a tower for sending up radiosondes was constructed near the main complex of the buildings, to its south. An arctic pavilion of Shaposhnikov's design (KAPSh-2) was installed at a distance of 50 m to the east of the living house to accommodate a magnetic station.

Consequent to expansion of Lazarev Station into a major base for undertaking extensive field investigations by increasing the staff and the volume of work, several living and working houses with more equipment were added in early 1960 on Queen Maud Land. A tower was built in the aerological block, and a large cold storage was also constructed. The main building was equipped with a geophysicist's room and three more living rooms were constructed using prefabricated parts.

For accommodating additional magnetic equipment, a magnetic shed was constructed at a distance of 40 m to the south of the living nouse. Radiotheodolite "Malachite" was installed beside the aerological pavilion. A small house and two arctic pavilions of Shaposhnikov's design (KAPSh-2) were installed to the south of the main building complex. They were used for temporary stay by field-work teams working in summer on Queen Maud Land.

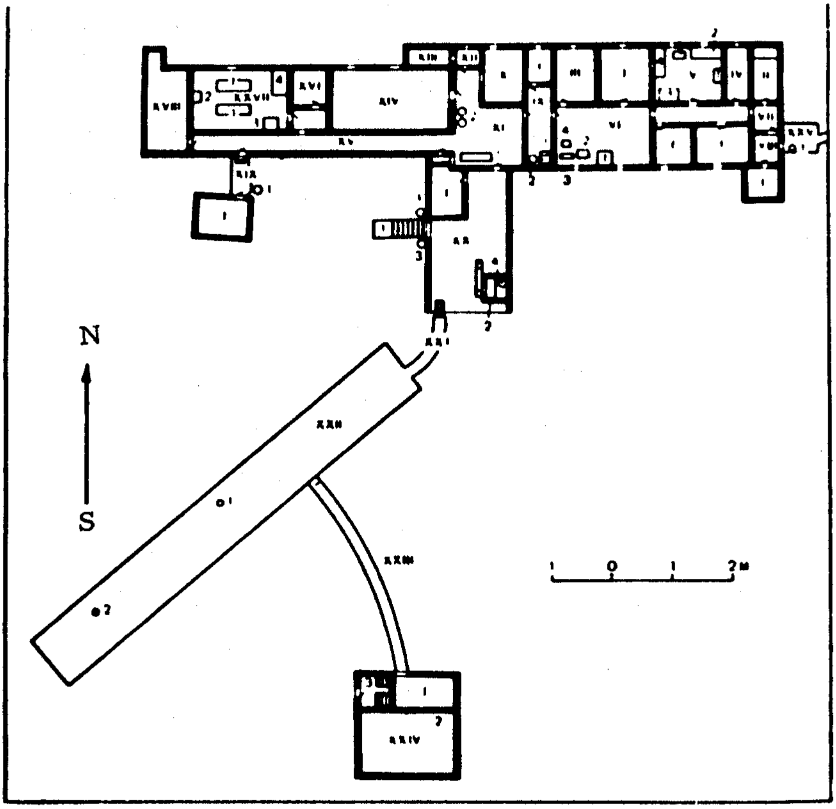

Fig. 61. Plan of Lazarev Station.

I - Residential quarters; II - Geophysicist's room: 1 - Control panel with all-sky camera for photographing the aurora; III - Physician's room; IV - Photolaboratory; V - Service quarters: 1 - Radio transmitters; 2 - Working table of radio operator; 3 - Working table of meteorologists; 4 - Working table of aerologists; VI - Ward-room and kitchen: 1 - Kitchen table; 2 - Electric stove; 3 - Electric boiler for water heating; 4 - Coal boiler for water heating; VII - Warm vestibule; VIII - Cold veranda; IX - Vestibule: 1 - Staircase and exit trap door; 2 - Tank for drinking water and galley; X - Warehouse; XI - Warm courtyard: 1 - Lathe; 2 - Panel with fire fighting equipment and barrels with water; XII - Thermostat room; XIII - Cold storage; XIV - Warm food depot; XV - Corridor; XVI - Bath; XVII - Device for cooling diesel engines; XVIII - Store; XIX - Connecting tunnel; XX - Cold courtyard: 1 - Staircase and exit trap door; 2 - Toilet; 3 - Refuse pit hole; 4 - Melting tank for water heating; XXI, XXIII - Connecting tunnels; XXII - Cold storage: 1 - Hole, 20 m deep; 2 - Hole, 42 m deep; XXIV - Aerological block: 1 - Gas generator room; 2 - Gasholder room; 3 - Tower; XXV - Glaciological laboratory: 1 - Hole, 42 m deep.

The living and working quarters during the first year were heated with water cistern. Water was heated in an electric boiler installed in the cabin. At the beginning of the second year the water heating system was connected with the diesel-engine cooling system of the electric station. The houses situated away from the main building were heated by means of electric stoves and plates.

Electric station: Two diesel generators, each of 24 kw capacity delivered the power. A diesel generator of 12 kw power was installed at the emergency base. The standby base. situated at a distance of 9 km from the station, was equipped with a mobile electric station operated by a petrol engine.

The outfit of the radio station consisted of three radio transmitters (one RSB-70) and two radio receiving sets (one US-R). The ratio equipment was powered by an electric network and storage batteries. In addition, a shortwave radio transmitter was also used during trips on the amphibian tractors and a portable hand-operated radio transmitter was available at the standby base situated at 9 km from the station. The aerials of the radio stations were mounted on three steel poles.

A caterpillar tractor, a caterpillar amphibian vehicle of type GAZ47, two amphibian caterpillars of "Benguin" type and two caterpillar truck tractors were used as means of transport at the station. In addition, a caterpillar with a bulldozer device and a three-ton autocrane operated at the station. During summer, airplanes of type IL-12, LI-2 and AN-6 were based at the station.

A landing and take-off strip, 3 km in length and stretching along the direction of the predominant winds (along the azimuth 105°), was laid at a distance of 100 m to the south of the station. The strip over its entire stretch was flanked by empty fuel barrels.

The meteorological platform is about 50 m to the east of the main complex of the station. Two psychrometric cabins, two sheds for automatic recorders, two 6-meter metal poles with data units of distant meteorological stations, heliograph, Tretyakov precipitation meter, three permanent snow-measuring rods and a stand for actinometric instruments were installed on the platform. An adjustable box for thermometers measuring temperature of the upper snow layer and a pole to facilitate temperature gradient observations were also installed here.

At a distance of 50 km to the south of the living house a camera of type S-180 was placed on four 1.5 m high posts for photographing the aurora.

For observations on accumulation of snow, a snow gaging platform was set up at a distance of 150 m to the southeast of the station. The platform was quadrangular in shape with 100 m-long sides. Fortyone bamboo pegs were fixed on the platform in chess-board fashion. The western border of the platform had an L-shaped snow gaging section with measuring rope. Besides, a five kilometer long segment was marked for snow-gaging observations. This section began at the edge of the ice shelf and passed through the territory of the station from the west to the east. The pegs were fixed on the section at an interval of 250 m on both the sides. In addition to the pegs there were L-shaped measuring cables with 26 m long arms.

At a distance of 100 m towards the southeast of the living house, a pit was dug for stratigraphic studies of the snow-firn blanket. A pavilion of type KAPSh-1 was set up at the pit. During the first year, the depth of the pit was only 9.3 m, but, during the second year, a 70 cm diameter hole was melted down from its bottom up to a depth of 35 m. This hole facilitated collection of firn samples up to a depth of 17 m. Three holes of 10 to 15 cm diameter were melted down to a depth of 42 m at different places within the station area for studying the structure and temperature distribution of the snow-firn mass, as well as the phenomena connected with porosity of snow and firn.

Provisions to the station were supplied by ships. The goods from the place where the ship was enchored to Lazarev Station were transported by sledge-caterpillar tractors, and partly by planes.

The size and composition of the personnel are given in Table 85.

TABLE 85

Personnel of the station

Year	Number of workers		Director
	Total	Scientific	
1959	7	4	Yu. A. Kruchinin, Geographer
1960	11	7	L. I. Dubrovin, Geographer

The ship "Ob" arrived at the place where the station was set up on February 9, 1959. Officially the station was opened on March 10. On February 26, 1961, the work at the station was discontinued. Part of the outfit and almost all instruments were transferred to the new Novolazarevskaya Station. Later, almost all equipment and remaining provisions were transferred to the new station. At the time of closing Lazarev Station, its building complex was under a layer of snow of thickness 1-3 m.

Principal Scientific Instruments

Meteorology

1. Apparatus for surface meteorological observations.
2. Actinometric instruments.
3. Radiosondes and equipment for pilot balloon observations (radiotheodolite "Malachite").

Geomagnetism

1. Equipment for recording fluctuations of the magnetic field on paper on daily basis and on film on weekly basis.
2. Quartz H-magnetometer (Danish).
3. Balance-magnetometer BMZ.
4. Z-magnetometer, M-2 type.

Aurora

1. Camera for photographing aurora (C-180)
2. Angle-gage for determining azimuth and altitude of aurora during visual observations.

Glaciology

1. Standard glaciological equipment.
2. Thermoelectric borers.
3. Polarization microscope.
4. Equipment for photographing samples of snow and firn.
5. Optical theodolite.

Oceanography

1. Winch for measuring depth.
2. Perspectometer.
3. Standard equipment for ice survey (ice-borer, ice, measuring rod, etc.).

Scientific Observations

The various types of scientific observations, carried out at the station, are given in Table 86.

TABLE 86

Types of Scientific Observations

Type of observations	Period
Standard surface meteorological observations	March 10, 1959-Feb. 22, 1961
Actinometric observations	Dec. 21, 1959 to Feb. 4, 1961

Contd.

1	2
Radiosonde sounding of atmosphere (once in twentyfour hours, at 0000 hours GMT)	March 23, 1959 to Feb. 10, 1961
Pilot balloon observations a) with optical theodolite	March 22, 1959 to Dec. 20, 1959
b) with radio theodolite	Dec. 21, 1959 to Feb. 10, 1961
Gradient observations occasionally	1959, 1960
Registration of geomagnetic field variations	Feb. 23, 1959 to Feb. 2, 1961
Absolute geomagnetic field measurements (after 3 days)	Jan. 2, 1960 to Feb. 19, 1961
Photographing of aurora with all-sky camera C-180	Feb. 26 to Oct. 7, 1960
Visual observations of aurora	Feb. 26 to Oct. 7, 1960
Observations of forms of micro-relief of snow surface	1959, 1960, 1961
Study of ice shelf structure	1959, 1960
Observations of dynamics of ice shelf	1959, 1960
Temperature measurements of snow-firn mass up to the depth of 42 m	1959, 1960
Measurements of depth in Leningrad Gulf	1960
Observation of sea ice (formation and growth of fast ice, ice-measuring survey, iceberg movement, ice exploration from air, etc.)	1960
Observations on sea level fluctuations (occasionally)	1960

"Lazarev" station, during summer, served as a base for carrying out extensive geological, geographical, and biological field investigations in the mountains of Queen Maud Land, and for conducting aerophotography, as well as glaciological investigations by applying geophysical methods (seismic sounding, gravimetric, and magnetic observations).

CAMP NEAR ZIMMERMANN MOUNTAIN

Coordinates: Lat. 70°19' S., Long. 13°13' E.
Altitude: about 1500 m above sea level.

The camp was set up at a distance of about 150 km to the south-southeast of Lazarev Station with the help of a plane AN-2 and helicopter MI-4 operating from the "Ob" ship anchored at the place of construction of Lazarev Station. The camp served as a base for geological-cum-geographical reconnaissance investigations of the eastern part of Queen Maud Land. The camp was set up on February 13, and was closed on February 26, 1959. A pavilion (KAPSh-1) was used for living. The team of investigators consisting of 7 persons was headed by the geologist M. G. Ravich.

MOUNTAIN CAMP No. 1

Coordinates: Lat. 71°40' S., Long. 9°32' E.
Altitude: 1820 m above sea level.

The camp was set up at the foot of Lodochnikov mountain at a distance of 200 km to the southwest of Lazarev Station (170 m from the coast) with the help of airplanes based at Lazarev Station (Fig. 62). The camp served as a base for geological and geographical investigations of the mountains of Queen Maud Land. Two big pavilions of the type KAPSh-2 and one of the type KAPSh-1 were set up in the camp. Scientific personnel and crew of the plane were housed in two pavilions and the third was used as a dining room and as a small store. Gas was used for heating the house as well as for cooking food. A meteorological platform was set up near the camp.

The camp was set up on December 31, 1959 and was closed on February 2, 1960. A group of six scientific workers led by geologist D. S. Solov'ev and the crew of the plane AN-2 consisting of three persons stayed at the camp.

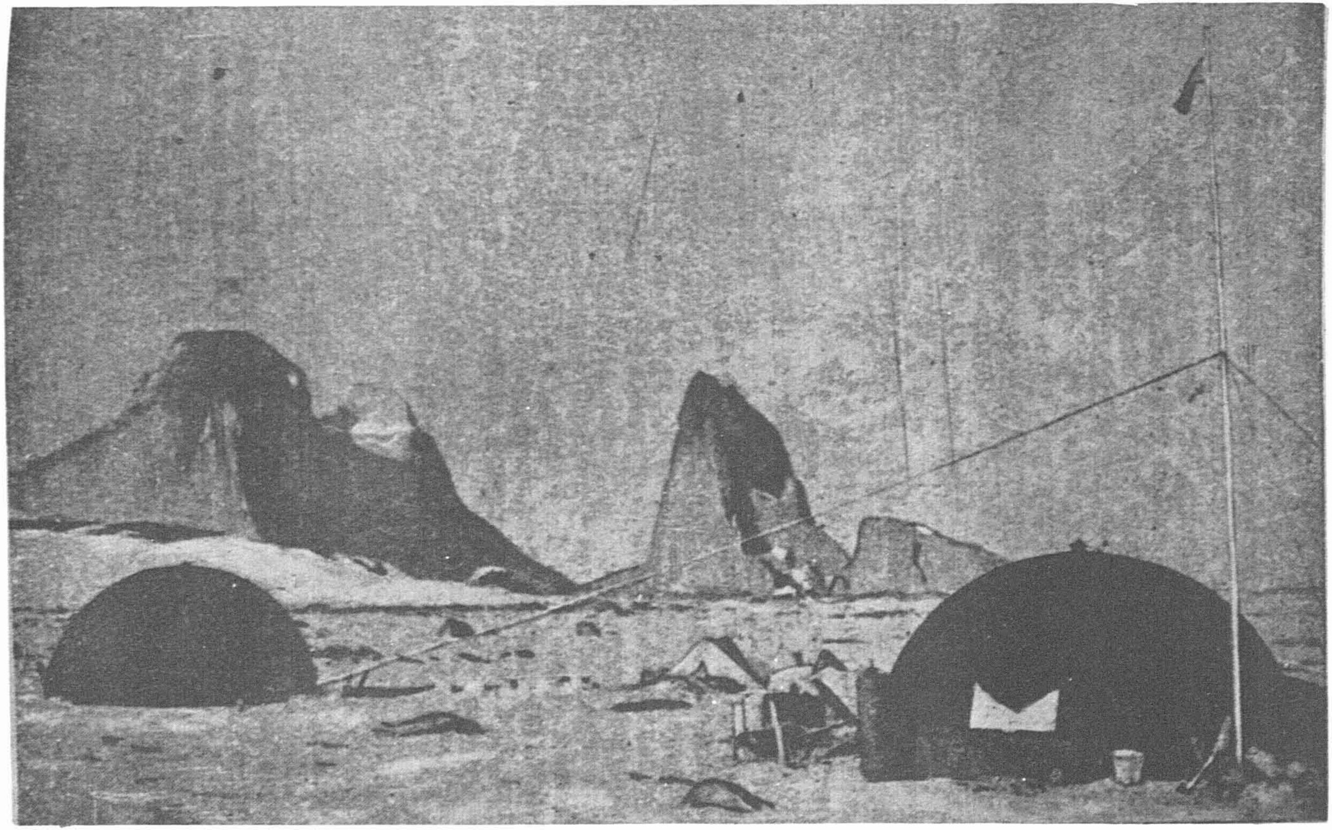

Fig. 62.Mountain Camp, No. 1.

Surface meteorological observations in two shifts (from 0600 and 1800 hours G. M. T.). were conducted at the camp from January 6 to 29. Magnetic field variations were also recorded at the camp.

MOUNTAIN CAMP No. 2

Coordinates: Lat. 71°47' S., Long. 5°49' E.
Altitude: 1640 m above sea level.

This camp was set up at a distance of 310 km to the southwest of Lazarev Station (170 km from the coast) with the help of planes based at Lazarev Station. The camp served as a base for geological and geographical investigations of the mountainous part of Queen Maud Land. Like Camp No. 1, it consisted of three pavilions (two large pavilions of KAPSh-2 type and one pavilion of KAPSh-1 type). Equipment in the camp was similar to that in the first. The same team of workers led by D. S. Solov'ev and the crew of the same plane stayed at the camp.

The camp was set up on January 23, 1960 and on February, 12 of the same year the station was vacated temporarily. On January 3, 1961 work was renewed and was continued up to February 4, 1961, after which the camp was again vacated.

Variations in the geomagnetic field were recorded at the camp by means of the MBC equipment. From January 4, to February 3, 1961, surface meteorological investigations were also conducted.

MOUNTAIN CAMP No. 3

Coordinates: Lat. 72.03' S; Long. 1°16' E.
Altitude: 1510 m above sea level.

The camp was set up on the northern outskirts of the Hedern mountain range at a distance of 480 km to the southwest of Lazarev Station and at 210 km from the coast. The camp received supplies by airplanes based at Lazarev Station and served as a base for geological and geographical investigations in the western part of Queen Maud Land. The equipment in the camp was similar to that in the camps No. 1 and 2. This camp was used by the same group of workers and by the same crew led by geologist D. S. Solov'ev. In addition, the camp was also availed of by a group of geologists of the Sixth Soviet Antarctic Expedition led by M. G. Ravich.

The camp was opened on November 17, 1960 and closed on January 2, 1961. Geomagnetic field variations were recorded at the camp with the help of the instrument MBC. Surface meteorological observations were also conducted at the camp from Nov. 24, 1960 to Jan. 1, 1961.

MOUNTAIN CAMP No. 4 (INSEL)

Coordinates: Lat. 71°26' S., Long. 11°29' E.
Altitude: 1370 m above sea level.

The camp was set up at the foot of the Insel mountain at a distance of 170 km to the south-southwest of Lazarev Station and was supplied by planes based at this station. The camp served as a base for geological and geographical investigations in the central part of Queen Maud Land. The equipment of the camp was the same as that of the rest of the mountain camps described earlier. The camp was used by a group of scientific personnel of the Fifth Soviet Antarctic Expedition led by geologist D. S. Solov'ev and also by the group of geologists of the Sixth Soviet Antarctic Expedition led by geologist M. G. Ravich. Airplanes of type AN-6, intended for field investigations were based at the camp.

The camp was opened on January 28, and was vacated on February 6, 1961.

MIRNYY

Coordinates: Lat. 66°33' S., Long. 93°0.1' E.
Altitude: 35 m above sea level.
Geomagnetic coordinates: Lat. 77°.0 S., Long. 146°.8.
Synoptic Index: 89592.

This scientific station which was also the main base of the Soviet Antarctic Expedition was situated on the coast of Davis

Sea (Indian sector of the Southern Ocean) on a small projection, called Mirnyy Peninsula (Fig. 63). The coast within the area of the station as well as to the west and east of it was given the name of "Pravda".

The station buildings were partly located on four outcrops of rocks and partly on the surface of the glacier which at this place was 80 to 100 m thick. A group of rocky islands called "Haswell" lies in the sea near this Peninsula. The surface of the ice sheet rises towards the south of the station and at a distance of just 100 km, it exceeds 1.5 km in height. The sea in the region of Mirnyy is covered with fast ice, which exceeds 40 km in width by the end of winter. The fast ice breaks and is carried out to the open sea in autumn. There are many icebergs scattered in the vicinity of the station.

Climatic conditions: Strong and frequent winds with very little change in direction and very low temperatures during almost the whole year are characteristic of the coastline on which Mirnyy is situated. During 1956-1960, the air temperature was: average, -11.3°C; maximum, 48°C; minimum, -40°C. Velocity of the wind, average 11.4 m/sec ,maximum 56 m/sec. Mostly, east-southeasterly winds prevail. The velocity of wind in the vicinity of the station exceeds 15 m/sec for about 204 days in a year on the average. Storms and hurricanes are more frequent in winter. Though duration of the polar night never reaches 24 hours at the latitude of Mirnyy, continuous polar day lasts for about a month between December 10 and January 10.

Installations: Twelve standard frame houses, set on foundations of steel girders were built in 1956 when the station was set up. Besides, a few special service quarters were erected for storing goods and scientific apparatus, and for repairing transportation vehicles, etc. Additional houses were built at the station in subsequent years. New quarters were erected in place of those which were in bad condition and the equipment of the station in general was improved.

There were 42 different types of structures at Mirnyy in 1964 (Fig. 64), out of which 18 were used simultaneously as living and working quarters. In these buildings there are 56 living and

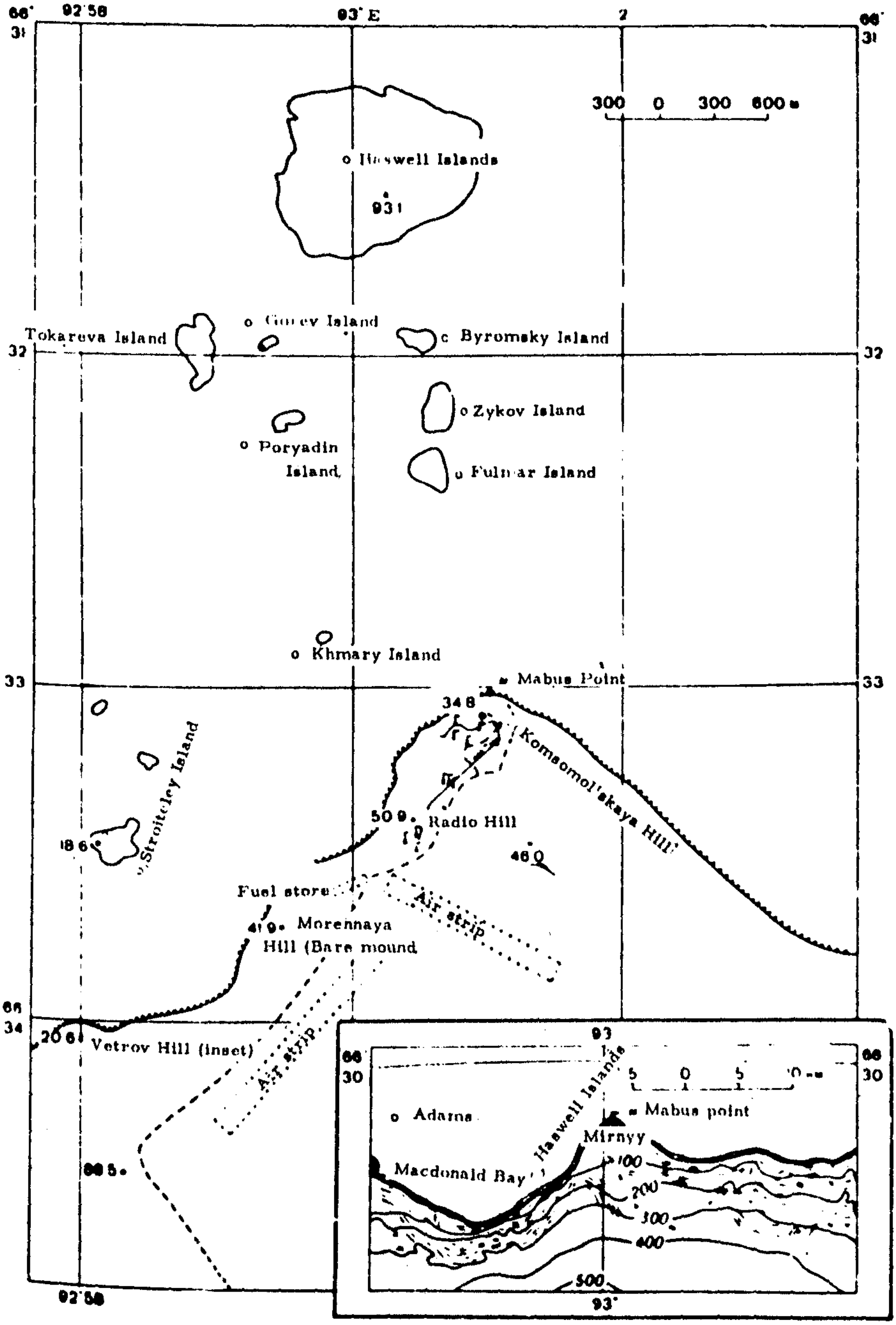

Fig. 63. Region around Mirnyy Station.

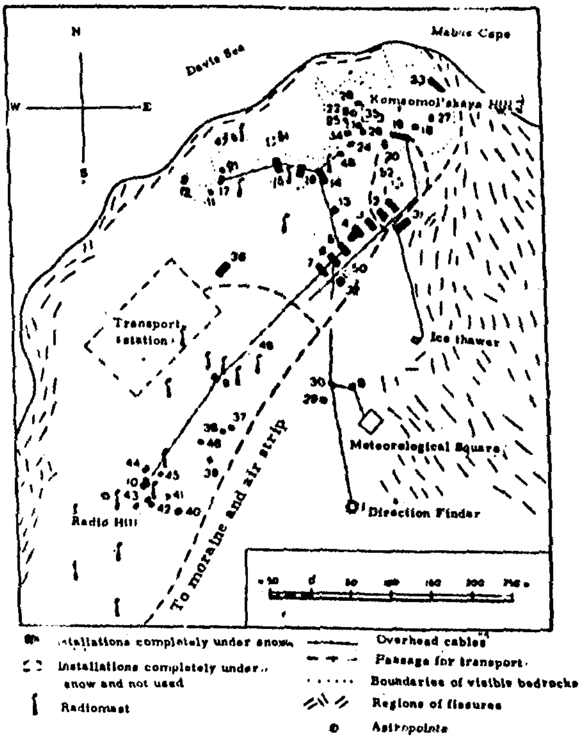

Fig. 64. Plan of Mirnyy Station.

1 - House No. 1 - storehouse for provisions; 2 - House No. 2 - library, boiler room, residential quarters; 3 - House No. 3 - sanitary section, residential quarters; 4 - House No. 4 - ward room; 5 - House No. 5 - residential quarters; 6 - House No. 6 - radio comparator, laboratory, storeroom for cinema films, residential quarters; 7 - House No. 7 - residential quarters; 8 - House No. 8 - meteorological station (Reference base on sledges); 9 - House No. 9 - ionospheric booth, residential quarters; 10 - House No. 10 - radio transmitting station, residential quarters; 11 - House No. 11 - seismological booth, residential quarters; 12 - House No. 12 - terrestrial magnetism booth; 13 - House No. 13 - residential quarters; 14 - House No. 14 - radio receiving station, residential quarters; 15 - House No. 15 - synoptical bureau, residential quarters; 16 - House No. 16 - residential quarters; 17 - House No. 17 - cosmic rays laboratory, residential quarters; 18 - House No. 18 - residential quarters; 19 - House No. 19 - electric station; 20 - Mechanical workshop and store, 21 - Terrestrial currents booth; 22 - Aerology block (for extracting oxygen and releasing radiosondes); 23 - Aerological laboratory; 24 - Radiotheodolite malachite; 25 - Thermostat room (for casing of radiosondes); 26 - Laboratories for stratospheric sounding and cosmic rays; 27 - Radiometer booth; 28 - Storeroom of aerometeorological team; 29 - Shaposhnikov house, residential quarters; 30 - Workshop of aerometeorological team (Shaposhnikov house); 31 - Metallic store (cold room No. 1); 32 - Metallic store No. 3, and wooden annexe; 33 - Metallic store (on Mabus point No. 2); 34 - Pig sty; 35 - Ground with cisterns; 36 - Metal garage, store for aviation materials; 37 - Workshop of aviation team; 38 - Workshop of aviation team; 39 - Store for aviation team; 40 - Store for aviation team; 41 - Battery room of aviation team; 42 - Workshops of aviation team for instrument repairs (Shaposhnikov house); 43 - Radio transmitter 1 kw (in special enclosure); 44 - Store for communications team; 45 - Emergency electric station for the radio transmitting station (in special enclosure); 46 - Store for geophysical team; 47 - Geophysical store (on a special base on sledges); 48 - Carpentry workshop (Shaposhnikov house); 49 - Former aerological block; 50 - Shaposhnikov house; 51 - Shed for dogs; 52 - Store.

working rooms with a total floor space of 580 m^2. A greater part of these structures is under snow. An independent heating system using electricity and water (electrically operated boiler) has been installed in every house where heating is needed. The heating system is regulated by an automatic thermostat, thus insuring maintenance of constant temperature. All living and working quarters have telephone connections (an automatic telephone exchange with 50 connections has been installed). A kitchen and a dining room for 90 people are situated at the center of the settlement. Some storerooms for provisions are also attached to this building. In addition, storage rooms are built at various places in the complex for housing provisions, stand-by scientific equipment, fuel, household goods, spare parts for transport vehicles, electric station and radio station. A storeroom has also been constructed on the glacier at a distance of 12 km to the south of the station for preserving frozen products.

Electric station: A house was built with metal sheets, and then covered with wooden sheets with an outside panel of tin roof. The three diesel engines (300 h.p. each) drive three separate three-phase synchronous generators that can deliver 200 kw at 400/220 volts.

A vertical steam boiler of Shukhov type was also installed in this house to heat water for bathing and for other heating purposes.

As a stand-by to the central electric plant, an emergency diesel electric station of 30 kw capacity was installed in a separate shed. The electric power is transmitted by cable lines laid along special scaffold bridge and pillars. A bath-cum-laundry was built adjacent to the electric station. It was equipped with two washing machines.

To meet the needs of the expedition for a variety of repairs of transportation vehicles, and scientific and other essential equipment, a mechanical workshop was set up at the station in which a lathe, a drilling machine, an electric welding transformer, and forging and electric-gas welding equipment were installed.

Radio station: The radio center consists of two radio stations, one for transmitting and another for receiving. The buildings of these stations were at a distance of 530 m from one another. The transmitting radio station was housed in a standard sectional-sheet building with 59 m^2 of total floor space. It was equipped with the following:

1. Shortwave transmitter, type RAS-KV-5 of 5 kw power, permitting work in telegraph and telephone modes. This transmitter is used for contacting Moscow and other distant regions. Besides, it is used for comparator studies with halved capacity.

2. Shortwave transmitter, type RAS-KV of 1 kw power, permitting work in telegraph and telephone modes. This transmitter was used for contacting Soviet and foreign Antarctic stations, as well as expedition ships lying in Antarctic waters and airplanes.

3. Medium-wave transmitter of 1.2 kw power maintains communications with planes and gives aid in direction finding to the ships. It is also used for contacting ships staying close to the station and for transmitting news and concerts to the planes lying outside Mirnyy. In addition, a spare shortwave transmitter of 1 kw power was meant for contacting planes of the Soviet Antarctic stations. This transmitter was installed in a van at a distance of 65 m from the transmitting radio station.

The antenna system of the transmitting radio station consists of four aerials of the following types: a) a rhombic aerial erected at a height of 20 m on four metal poles, b) a VGD aerial assembled on duralumin rings of 65 cm diameter made of 2 millimeter bimetal wire, with its one end suspended on an 18 meter pole, and the other fixed to one of the poles of longwave aerial, c) a longwave, T-shaped aerial suspended at a height of 28 m, d) an aerial on a slanting, almost vertical beam 30 m high, which was used for local communications and for aviation purposes.

The surface of the ground, where the antennas were erected was metallized by laying 50-100 m long bars made of bimetal wire of 4 mm diameter. In addition, a good ground connection was achieved by sinking a bar of diameter 70 mm into the sea. The transmitting radio station was powered by the electric station. To operate even in the event of damage to the power cable, the radio station was provided with its own emergency electric station installed at a different place. Stand-by equipment of the radio station was kept in a cold storage room in the station itself.

The receiving radio station was also located in a standard house. It was provided with the following apparatus.

1. Main receiving equipment, permitting every kind of telegraphic work and versatile reception by means of telephone connections.

2. Precision receiving set, ensuring handling of A. M. telephone and telegraph services.

3. Two all-wave radio receiving sets.

The aerial and tower establishment of the receiving equipment consists of a separate rhombic aerial, an aerial of type VGD and V-shaped slanting aerial.

A relay station is also located at the receiving station. Fifty telephones are installed with automatic exchange. Two magnetic tape-recorders were also set up for recording news and other broadcasts from the radio.

Means of Transport: At Mirnyy Station, there are various types of amphibian caterpillar vehicles, tractors, and auxiliary as well as lifting contrivances. The following were available at Mirnyy in 1959. Three "Khar'kovchanok" snow tractors, nine heavy caterpillar truck tractors, two "Penguin" cross-country vehicles, three medium amphibian caterpillar vehicles of type GAZ-47, ten caterpillar tractors, a bulldozer-cum-tractor, a three-ton automatic crane, a compressor, a trailer compressor station, 23 pairs of various tractor sledges and 10 scrapers.

A metal sheet garage of 250 m^2 and a wooden garage of 35 m^2 have been set up for repairing transport vehicles. A battery room using rectifiers has been set up beside the metal garage in the metallic body of the field workshop.

Planes are permanently stationed at Mirnyy. In 1959, the station had three IL-12 planes, four LI-2, two AN-6 and two MI-4 helicopters. Two landing and take-off strips "VPP", one small and one large, have been laid on the mainland ice in the area of the station. The small strip (for planes on sledges) is laid along the direction of the prevalent southeastern winds and has a one-sided course for landing at 120°. The larger strip (for planes on wheels), which is used less frequently, is laid perpendicular to the prevalent direction of the wind. Throughout the year, the landing and take-off strips are leveled and rolled-over with a leveling tractor. The strips can also be illuminated.

A shortwave automatic radio-direction finder has been installed facing the direction of the larger air-strip. A short-wave transmitter of 1 kw power is set up here to assist the planes. The operational range of the transmitter is about 1000 km over the sea and about 200-400 km over the mainland.

Buildings and equipment for aero-meteorological investigations: The meteorological station was housed in a building constructed in 1956 at a distance of 110 m to the southwest of the extreme building of the settlement. The building accommodated a meteorological cabin, an aerological laboratory and living rooms for the personnel of the team. Till 1960, there was an aerological booth, assembled out of metal sheets, at a distance of 30 m to the southwest of the building. Gas containers and equipment for the gas-generator were kept in the two rooms of the booth. Filling of casings and preparation for sending up rariosondes were done in a third room. In 1960 the aerological booth became unserviceable. Subsequently, a new aerological block was built on top of the Komsomol'skaya Hill.

Because of the prevailing east-southeast and south-southeast winds in this region, the meteorological platform was built on the side most exposed to the wind, towards the southeast of the settlement. It stands on an even icy surface at a height of 35 m above sea level. It is 40 m x 40 m in size and is fenced with a thin wire.

Meteorological cabins, and sheds for automatic recorders, soil thermometers, sensing elements for actinometric instruments and some other instruments were installed on the platform. A twenty-core cable has been laid on a 150 m long scaffold bridge from the platform to the building of the meteorological station.

An extra meteorological platform has also been erected at a distance of 30 m from the building of the meteorological station on the side exposed to the wind. It is fitted with several instruments and spare equipment (meteorological booth, distant station for ships, distant meteorological station, and equipment for gradient observations, etc.). This platform was used at the time of aviation servicing, as well as at the time of hurricanes, when access to the main meteorological platform became impossible. Besides, observations during special periods for redundancy purposes were carried out from this platform.

A new meteorological platform was laid out and equipped on February 16, 1959 at a distance of 50 m to the south of the meteorological station. A psychrometric cabin, a shed for automatic recorders, a precipitation meter, a universal heliograph, and soil thermometers were installed on this new platform. The actinometric unit and a tower for gradient observations remained on the old platform.

One radiotheodolite was installed in 1956 near the meteorological station for rawinsonde sounding, and in February, 1957 two "Melachite" radiotheodolites were added.

Building and equipment for geophysical investigations: The ionospheric station is housed in a standard-sheet house with very good heat insulation, situated at the western end of the settlement, equidistant (400 m) from the transmitting and receiving radio stations. This building has two working rooms with instruments, a photography room, a boiler-room and two living rooms.

The seismic station building is a sheet house, consisting of a vestibule, workshop and work room. Apparatus is kept in a foundation pit of 2.2 x 2.2 x 2.2 m dimensions, cut in a rock under the building. Concrete foundation has been laid in the pit with 1.5 x 1.5 m upper platform, where seismographs are also installed. Recorders are installed in a separate place on three brick pedestals. The seismic booth is heated by electric heaters with special thermostats (mercury contact thermostat, maintaining a temperature of 8°C).

The instruments for geomagnetic observations were set up in a special magnetic booth, built on rock foundation. This booth is a sort of framework made of wooden cross bars. fastened with antimagnetic materials. Its walls are paneled on the exterior with two layers of igneous-fibrous slabs (argolite) and hard slabs. Three rooms in the magnetic booth have thermostat-controlled heating system. Non-magnetic electrical heaters are used for heating the booth. By means of mercury contact thermostats, a constant temperature of 10° is maintained in the room, where the Eschenhagen's magnetographs are housed.

The instruments for absolute geomagnetic field measurements were installed on two wooden pillars, about 30 cm above the floor level, on stands fixed in rock with concrete. A magnetograph with visicorder (with its recorder placed in a special room by the side of the magnetic booth) was installed in one of the rooms. A special enclosure was being used from 1959 for geomagnetic observations. This enclosure formerly served as a storeroom for magnetometers. In addition, pavilions of type KAPSh-1 and provision storerooms situated at a distance of 12 km from Mirnyy were used while taking geomagnetic observations.

A special laboratory was set up in February 1957 in the region of the station for setting up cosmic ray apparatus and in March, 1957 another pavilion was constructed for observations of terrestrial currents.

At a distance of 50 m from the cosmic ray laboratory, an automatic camera (C-180) was installed in 1957 for photographing night sky to study aurora. Control panel and other auxiliary equipment were housed in one of the rooms of the cosmic ray laboratory. The C-180 camera was transferred to the top of the Komsomol'skaya Hill in 1958 and a spectral camera (C-180-S) was also installed. Later, because of heavy snow drift, both the cameras were shifted to the roof of the pavilion of terrestrial currents.

Installations and outfit for glaciological research: In 1956, a winter laboratory was set up in the small Shaposhnikov house for glaciological research. Station-based glaciological investigations were intensified in the following year (1957). In order to carry out these investigations, the following houses were built and equipped on the station area and in its immediate vicinity. At a distance of 600 m to the south-southeast of Mirnyy, a summer glaciological laboratory was set up in a crevasse. This formed an annex to the Shaposhnikov house. Near the meteorological platform, at its northwest corner, a small hut was constructed for automatic recorders of the temperature gradient (unit No. 1). Unit No. 2 of the temperature gradient recorder was situated towards the north of the settlement.

Two snow-gaging platforms, 50 x 50 m in dimensions were laid out and equipped for observations of accumulation, ablation and dynamics of snow surface. Platform No. 1 lies at a distance of 600 m from the station on the slope of a slanting hollow opening towards the north. Platform No. 2 lies at a distance of 6 km to the south of Mirnyy on a slanting terrace-like ledge. Each of the snow-gaging platforms was fixed with 16 pegs (four rows of four pegs on each). Steel cables, marked with meter graduations, were stretched along the perimeter of the platforms. A two-hundred meter section profile was fixed to the northwest of the platform No. 1 with five pegs. Besides, a snow-gaging section with 23 pegs was set up in the region of Mirnyy from the sea-shore to plateform No. 2. A glaciological section formed of 47 pegs in two rows was laid out from Mirnyy to the astropoint (at 50 km). In the western (main) row, a cross line to indicate direction was displayed near every peg. These indicators were made of two-meter rods (altogether 84 rods).

For stratigraphic studies and temperature observations, several holes were drilled on the territory of the station and in its vicinity. The deepest hole was drilled at a distance of 7 km to the south of Mirnyy to a depth of 371 m. A drilling machine driven by a diesel engine was used. This drilling machine was meant for core-drilling in rocks up to a depth of 500 m. A 14 m high wooden tower was constructed for drilling work.

Buildings and equipment for oceanographical observations: For observations of fluctuations in ocean level, a tide gage was installed in 1956 on fast ice near the northeast end of the Komsomol'skaya Hill at a distance of 40 m to the north of Mabus Cape. Later, an automatic recorder was set up here for registering sea-level fluctuations.

Supply: The station received provisions by ships. Transport of goods from the place where the ships were anchored to the station was carried out partly by sledge-caterpillers and partly by air.

The first expedition ship "Ob" of the Soviet Antarctic Expedition reached the shores of Antarctica in the region where Mirnyy was supposed to be constructed on January 4, 1956. To start with, she entered the Farr Bay, situated towards the east of Helen Glacier. Reconnaissance observations showed that there were no suitable spots for constructing a station at this place. On January 15,. the ship came to Haswell Island situated to the west of Helen Glacier, where unloading of the ship was started. Finally, Mirnyy station was opened on February 13, 1956. The size and composition of the personnel are indicated in Table 87.

TABLE 87

Personnel of the station

Year	Number of workers		Director
	Total	Scientific	
1956	92	30	M. M. Somov, Oceanographer
1957	137	43	E. I. Tolstikov, Meteorologist
1958	145	38	E. I. Tolstikov, Meteorologist
1959	97	31	A. G Dralkin, Oceanographer
1960	106	41	E. S. Korotkevich, Geographer
1961	88	24	V. M. Driatsky, Geophysicist
1962	59	27	V. I. Venediktov, Mechanical Engineer

Contd.

1	2	3	4
1963	67	24	N.I. Tyabin, Oceanographer

Note: The station had only one foreign scientist (belonging to U.S.A.) in 1957; in 1958 there were two foreign scientists (from ChSSR and USA); in 1959 there was one foreign scientist (from ChSSR); in 1960 there were six foreigners (three from GDR, two from ChSSR and one from USA); in 1962 there were four foreigners (one from USA, one from ChSSR, and two from GDR).

Routine meteorological observations at the station were started on February 11, 1956 while radiosondes were regularly released (once in twenty-four hours) from February 12 onwards. Regular temperature and rawinsonde sounding (twice daily) was started on April 17, while actinometric observations were started on March 10. The first synoptic map was prepared on March 4. Regular issue of summaries was commenced on March, 24. From this time onwards, the weather maps were systematically prepared and analyzed.

Station-based observations of the state of snow and ice were started in March. At the end of April, ionospheric observations were conducted on a trial basis and from May onwards they were carried out on a routine basis. Regular registration of earthquakes and variations in earth's magnetic field was started in July.

The station was named "Mirnyy" in honor of one of the ships of the First Russian Antarctic Expedition led by Captain Gottlieb von Bellinghausen.

Principal Scientific Instruments

Meteorology

1. Apparatus for surface meteorological observations
2. Actinometric instruments
3. Radiosondes and rawinsondes (radiotheodolites "Malachite")

4. Range-finding attachment (instrument to find the distance of the moving radiosonde)
5. Equipment for generating gas and filling radiosonde shells
6. Aerological equipment

7. Instruments and accessories for aerological sounding and actinometric observations of free atmosphere.
8. Instruments for finding the quantity of detachable snow at the time of snow storms.

9. Gradient apparatus
10. Apparatus for observations of atmospheric electricity
11. Automatic radiometeorological station
12. Instruments to measure the quantity of ozone in the atmosphere
13. Instruments to measure radioactivity of the atmosphere

Ionosphere

1. Automatic ionospheric station
2. Semi-automatic station for absorption measurements (Riometer)

Seismology

1. Three-component unit of "Kirnos" seismographs
2. Seismograph
3. Recorders

Geomagnetism

1. Magnetographs (two magnetographs of Eschenhagen type, magnetograph of La-Kura type, magnetograph of visible recording type, two units for studying magnetic field variation (MVS and MVS-AANII)
2. Instruments for absolute measurements of geomagnetic field components (Bamberg's quartz-H-magnetometer, Schultz's inclinometer, Balance-magnetometer BMZ, magnetometer M-2).

Terrestrial currents

1. Apparatus to record terrestrial currents

Cosmic rays

1. Ionization camera of type ASK-2
2. Neutron monitor of standard construction with 12 counters
3. High altitude cosmic ray apparatus

Aurora

1. Camera for photography of aurora, type C-180
2. Spectral camera, type C-180-S
3. Spectrograph
4. Zenith Camera
5. Radiolocator, P-3 type
6. Set-up for visual observations

Intensity measurements of ground radio stations

1. Radio-comparator

Satellite observations

1. Magnetic tape recorders
2. Electron content measuring equipment (using satellite beacons)

Glaciology

1. Standard glaciological equipment
2. Instruments and equipment for thermophysical observations
3. Instruments for petrographical studies of ice and snow
4. Equipment for registration of snow settling
5. Topographical and geodetic instruments for studying the dynamics of glacier
6. Tellurometers
7. Drilling equipment (for core drilling up to depths of 500 m)
8. Screw drilling equipment mounted on the chassis of an automobile (ZIS-151)
9. Hand-drilling set
10. Crevice-gage

Oceanography

1. Surveying equipment
2. Standard equipment for oceanographic observations (air vanes and deep water thermometers)
3. Hydrochemical laboratory
4. Automatic sea level recorders
5. Equipment for ice-gaging surveys

Aerial photography

1. Aerial photography apparatus
2. Laboratory for developing and preliminary processing

Medicine

1. Equipment for carrying out medical research

Biology

1. Instruments for biological research, preliminary processing of the collected material and preservation of samples

Geology

1. Machine for preparing sections
2. Polarization microscopes

Mirnyy is the main base of the Soviet Antarctic Expedition on the Antarctic mainland. The principal inland sledge-caterpillar trips and air flights are carried out from here into the depth of the continent and over the sea. Mirnyy is also the principal base for conducting geographical, geological, glaciological, biological and aerial surveys. Provisioning of inland stations as well as staff movements amongst these stations is carried through Mirnyy.

Scientific Observations

The various types of scientific observations carried out at the station are given in Table 88.

TABLE 88

Types of scientific observations

Type of observations	Period
Surface meteorological observations	from 1956
Actinometric observations	from 1956
Radiosone sounding of atmosphere (once in 24 hours)	from 1956
Rawinsonde sounding (twice in twenty-four hours)	from 1956
Synoptic maps and analysis	from 1956
Gradient observations(of temperature, humidity, velocity of wind and temperature of snow)	1956; from 1963
Measurement of total ozone content	1957-60
Studies on condensation nuclei	1961
Study of wind flow	1956
Snowstorm observations	1956-57; 1959-60; from 1963
Estimation of the height range of disturbed layer at the time of snowstorms	1961
Observations on jet currents	1956-57
Vertical sounding of ionosphere	from 1956
Measurement of absorption of radio-waves in ionosphere by the pulse and riometer techniques	from 1961
Registration of earthquakes with seismographs	from 1956
Registration of microseisms	from 1956
Registration of geomagnetic variations	from 1956
Absolute geomagnetic field measurements	from 1956
Registration of terrestrial currents	from 1956
Continuous registration of the meson component of cosmic radiation with the help of ionization chamber "ASK-2"	from 1957

Contd.

1	2
Continuous registration of neutron components of cosmic radiation with the help of neutron monitor	from 1958
Registration of cosmic radiation at higher altitudes by means of radio-sondes	from 1963
Visual observations of aurora	from 1957
Photographing of sky with camera C-180	from 1957
Spectral observations with the help of camera-C-180-S	from 1958
Radiolocation observations of aurora by means of conventional radio-locator	from 1959
Comparing signal strengths from the station Vostok, Lazarev, Molodezhnaya and Novolazarevskaya	from 1960
Signal intensity comparisons of low-power radiotransmitters at seasonal meteorological stations situated within a distance of 500 km from Mirnyy	1960
Recording of radio signals from earth's artificial satellites	from 1960
Station-based study of accumulation, ablation and redeposition of snow	from 1956
Thermophysical research on mass of snow, firn, ice and rocky ground	1956-60
Investigations of physical and mechanical properties of snow, firn and ice	1956-57
Investigation of morphology of the glacier surface	1956-60
Study of the movement of glacier	from 1956
Offshore oceanographical observations (of fluctuations in the level of ocean temperature, salinity and currents)	1956-59
Ice-investigations (observations of thickness of fast ice, and investigation of other physical properties of ice)	from 1956

Contd.

1	2
Air surveys of ice sheets	from 1956
Preliminary processing of aerial photographic results	from 1956
Human acclimatization under *Antarctica* conditions	from 1956
Observations of pinnipedia and birds	from 1956
Collection of data on embryonic development of Emperor penguins	1956, 1960
Collection of data on seasonal changes in planktons and benthos	1956-60
Collection of fishes, pinnipedia and birds	1956-60
Investigation on vegetation and collection of plants	1956; 1960-62
Microbiological investigations	1962-63
Preliminary photographic processsing of the collected geological samples	1956-60

TEMPORARY FIELD STATIONS (No. 1, No. 2, No. 3 and No. 4)

In order to study the hydrometeorology of Mirnyy region in greater detail, especially its wind system, four temporary field stations were set up in 1956. All these stations were roughly located on the 93°E. longitude, to the west of Mirnyy. The stations No. 1 and No. 3 were accommodated in cabins while No. 4 was accommodated in Shaposhnikov type hutment. The personnel of the stations, equipment and outfit were brought by amphibian vehicles GAZ-47.

Field Station No. 1 was situated at a distance of 25 km from the coast, at a height of 600 m on the sloping part of a glacier declivity. Two persons (V. K. Babarykin, Aerologist, being the senior of the two) worked at the station from August 3 to August 18, 1956.

Field Station No. 2 stood at a distance of 10 km from the coast, at a height of 400 m on the steep portion of a glacier declivity. Two persons (senior: V. D. Tulin) worked at the station from August 3-18, 1956.

Field Station No. 3 was set up at a distance of 1.3 km from the coast, at an altitude of 115 m. Two persons (up to August 12, the senior one was geologist P. S. Voronov; later, the senior was helicopter commander I. I. Inozemtsev) worked at the station from July 31 to August 18, 1956.

Field Station No. 4 was situated on fast ice at a distance of 13 km from the coast. From August 2 to September 30, several shifts of two persons (Seniors: – magnetic field specialist M. M. Pogrebnikov, geophysicist P. I. Solonkov, helicopter commander I. I. Inozemtsev and physician A. I. Mikhailov) worked at the station.

At all the field stations in Mirnyy, meteorological observations were carried out once every three hours during the operational period. Temperature on the surface of snow and at heights of 0.5 and 2.0 m was measured regularly. At the same heights, the velocity of the wind was also measured. The direction of the wind at a height of 2.5 m was read from a weather vane. Measurements of atmospheric pressure were made at station No. 1 by the mercury bowl barometer. Apart from the instrumental observations, visual observations of cloudiness, visibility and other atmospheric phenomena, especially of snowstorms, were also conducted at all the stations.

Some complex glaciological observations made at the station consisted of determining accumulation of snow by the method of nine rods, measuring the quantity of snow carried away by wind with snowstorm gages, as well as measuring temperature of snow and ice in holes at various depths.

Besides, seismic sounding of the ice sheet was conducted at stations No. 1 and No. 2, and geomagnetic observations were made at Station No. 4.

DRUZHBA

Coordinates: Lat. 66°43' S., Long. 86°24' E
Altitude: 191 m above sea level.
Synoptic Index: 89111

Three field stations, namely, Druzhba, Mir and Pobeda, were set up in 1960 in the coastal zone with a view to studying meteorological conditions.

The temporary field station 'Druzhba' was located on Zavadovsky Cupola, on the West Ice Shelf, at a distance of 300 km from Mirnyy. The thickness of the ice shelf at the station was 300 m. The horizon around the station is open and free from any natural or artificial obstructions that might distort the basic parameters of weather under observations.

The structures of the station consisted of three pavilions: two large KAPSh-2 type pavilions and one KAPSh-1 type pavilion.

One of the pavilions (KAPSh-2) was used as a working place and dining room. Personnel of the station lived in the second (KAPSh-2) large pavilion and the store was housed in the KAPSh-1 type pavilion. Food was prepared on a gas stove. A gas stove and two kerosene stoves were used for heating while kerosene lamps provided lighting.

Communications were maintained with the help of a radio station of 10-12 watt power, operating on batteries and storage cells. A stand-by radio station of 3.5 watt power was also available.

A meteorological platform with a meteorological booth was set up at the station. Druzhba Station was opened on May 20, 1960 and was closed on August 6, 1960. The personnel of the station consisted of three members (a meteorologist, an aerologist and a radio operator). The station was headed by meteorologist A. L. Dergach.

Meteorological observations were started as early as on May 11, 1960 even before the station was opened officially. From June 11, regular radiosonde sounding was conducted twice a day at

0000 and 1200 hours GMT. The radiosonde sounding data was received by the battery-operated radio receiving set 'R-311'. Aerological sounding was stopped on July 28, while meteorological observations continued up to the closure of the station.

MIR

Coordinates: Lat. 65°45' S; Long. 92°28' E.
Altitude: 327 m above sea level
Synoptic Index: 99222

The temporary field station 'Mir' stood on Drygalski Island on the snowy surface of the glacial cupola at a distance of 90 km from Mirnyy. The depth of the glacier bed in the region of the station was 87 m below sea level.

The structures of the station consisted of three pavilions: KAPSh-1, KAPSh-2 and KAPSh-3. Food was cooked on gas stove. The pavilions were heated by means of gas and kerosene stoves. Radio contact was maintained by means of the radio station "10-RT". A standard meteorological platform with a meteorological cabin was set up at the station.

The station was opened on May 20, and was closed on August 6, 1960. The team of the station consisted of three members. Aerologist-cum-radio operator A Z. Smirnov was the Head of the station. Several meteorological observations were carried out during the operational period of the station. Radiosonde sounding was conducted twice a day coinciding with the soundings at Druzhba Station from June 11 to July 16.

POBEDA

Coordinates: Lat. 64°39' S., Long. 98°54' E.
Altitude: 25 m above sea level
Synoptic Index: 89339

The temporary field station 'Pobeda' was located on the glacial island of Pobeda, at a distance of 350 km from Mirnyy. The island, on which the station was situated, is partly on ground and partly afloat. Its length is 60 km, width 25 to 30 km, and average height about 40m.

The structures of the station consisted of two pavilions of type KAPSh-1, one of which served as living quarters and a working place, while the other was used as a storeroom. Food was prepared on a gas stove. Heating of the quarters was also done with gas stoves.

Two radio stations were used for communication purposes. Besides, there was a stand-by radio station which worked on power from a manually operated generator. A meteorological platform with a meteorological cabin was set up at the station.

The station was opened on May 9, and closed on August 12, 1960. It was set up with the aid of airplanes and provisioning was also done through them. The team consisted of three persons, headed by meteorologist B.A. Deryugin.

Regular meteorological observations at the Pobeda Station were carried out from May 13 to August 11, 1960. Actinometric observations were made from May 13 to July 31. Radiosonde sounding of atmosphere was conducted at the same time as on the stations of Druzhba and Mir from June 11 to July 28, 1960, twice a day. A two-meter glaciological pit was dug at the station. From June 14 to August 9, snow gaging observations were carried out on a 120 m long section with measuring rods fixed at intervals of 20 meters, and on 2.5 km long section with rods fixed for every 100 to 150 m.

AUTOMATIC RADIO-METEOROLOGICAL STATIONS

An automatic radiometeorological station operated on Drygalski Island from November, 1958 to March, 1960. Another automatic radiometeorological station operated on Pobeda Island from the end of July, 1960 to January, 1961.

MOLODEZHNAYA

Coordinates: Lat. 67°40' S., Long. 45°50' E.
Altitude: 42 m above sea level.
Geomagnetic coordinates: Lat. 69°.8 S, Long. 85°.4.

Molodezhnaya Station is situated in the western part of Enderby Land on the southern coast of the Bay of Alasheyev.

The installations of the station were constructed on a small coastal open piece of land at a distance of 600 m from the coast. The surrounding area is a hilly place with broken chains of rocks and individual elongated snow-encrusted depressions, most of which are filled with fresh-water lakes. To the south of the station, the surface of the glacier rises gradually, and hardly reaches a height of 500 m (Figs. 65 and 66) over a distance of 10 km.

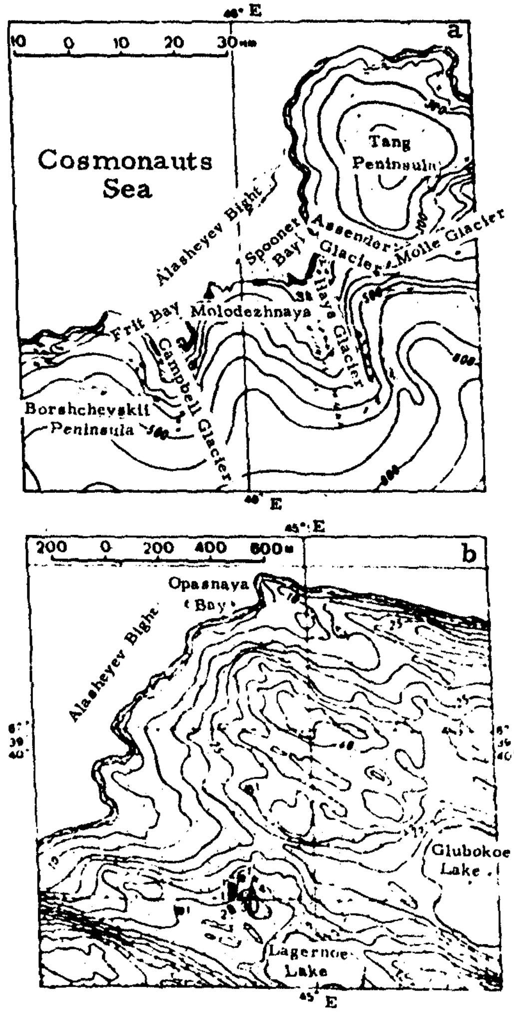

Fig. 65. Region (a), and Plan (b) of Molodezhnaya Station.
1 - Storage; 2 - Electric station; 3 - Radio masts; 4 - Meteorological station.

Climatic conditions: The climate in the region of the station is characterized by low temperatures during almost the whole year, and also by strong and frequent winds. Air temperature: Annual average, -11°.5; maximum, 8°.3; minimum; -38°.6C. Average wind velocity, 11 m/sec; maximum wind velocity, more than 50 m/sec. Predominant directions of the wind are eastern and southeastern. Wind velocity exceeds 15 m/sec on more than 180 days in a year and during certain months the entire month may be windy (May, 1963). The surface melts 30 to 50 cm, and at some places even up to 1 m in summer. The sea in the region of the station is covered with ice during a greater part of the year. The width of fast ice spreads almost up to 100 km. In early autumn (March), fast ice usually breaks up and the sea in the region of the station is clear of ice. Twenty-four hour long polar days continue for 45 days (from December 1 to January 15), and polar nights continue for 15 days (from June 15 to 30).

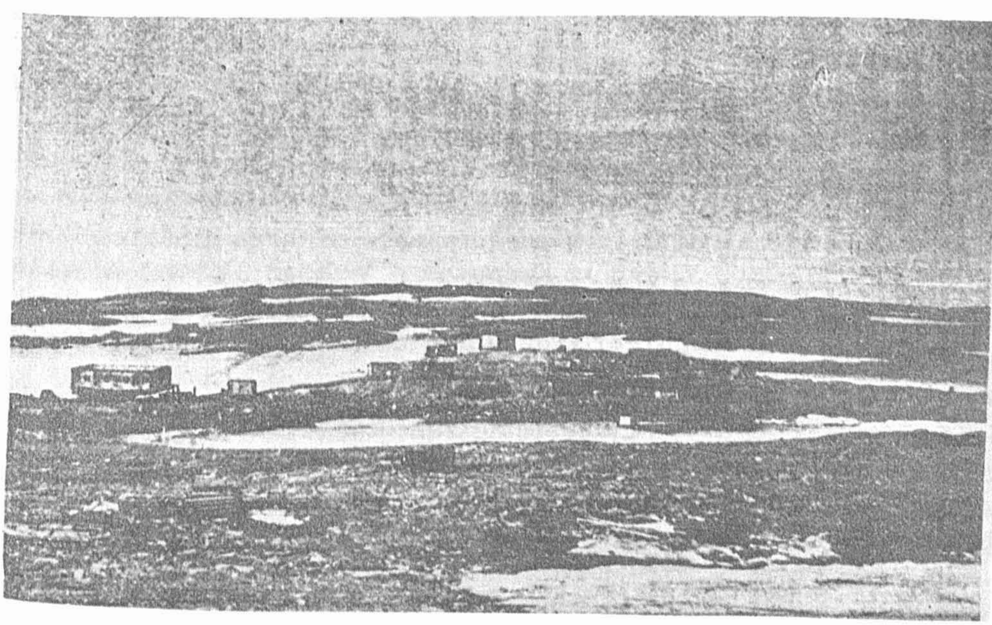

Fig. 66. Molodezhnaya Station.

Installations: The following installations were erected during the first phase of construction in early 1962: an aerological block, a small wooden structure with frames for electric station, three plywood sheds for magnetic stations and several pavilions (type KAPSh-1 and KAPSh-2) in which the building staff and station personnel lived.

Two sheet houses with a living floor space of 68.8 m^2 each were added during the next year. One of them contained a cabin for the radio station and rooms for the meteorologist, the physicist and others. Later, a new building was constructed for the electric station, which also housed a wardroom and a kitchen. The floor space of this house was 72 m^2. A storeroom for provisions was constructed adjoining the electric station building A bath was also set up with a heated unit. The aerological block erected earlier was re-equipped as a warm storeroom. The structure that housed the electric station earlier was renovated and was converted as a cold store. Another store was arranged on the slope of the glacier for perishable goods. Besides, a wooden living room on metal sledges and a storeroom for building and technical materials were built at the station. The heating of the living quarters was effected with oil and electric heater and the wardroom was heated by the diesel plants. The second house was heated with water radiators, water being heated in an electric boiler.

Electric station: It was equipped with three diesel generators of 50, 30 and 12 kw power. Voltage: 220v. A stand-by diesel generator plant of 12 kw power was also available (in the KAPSh-2 pavilion) for emergency purposes.

Radio station: It is provided with the following equipment: Transmitter RSB-70M, receiving sets R-670, R-250, and US-9 (two). The aerials of the radio station were suspended on three 16 m high metal poles.

Means of Transport and Hoists: Two tractors, amphibians GAZ-47, bulldozer on tractor, crane-bulldozer on tractor and a 5-ton autocrane fitted on an automobile of type MAZ.

At a distance of 2.5 km to the west of the station, a landing and take-off strip has been laid for planes fitted with skis. The strip is 1300 m long and 75 m wide.

A meteorological platform, 26 x 36 m in size lies at a distance of 70 m to the northwest of the living quarters, on open ground. Its height above sea level is 39 m. The platform is equipped with a psychrometric cabin, a shed for automatic recorders, two six-meter metal poles with pick-up sensors from the meteorological stations, a pick-up anemorhumbometer M-47 (on a 1.5 m high stand), a heliograph, Tretyakov's precipitation meter, and a stand for actinometric instruments. A plywood shed for housing actinometric apparatus has been erected at the western border of the platform.

Snow-gaging observations were conducted on fast ice, where a 2.5 km long section was laid out with 11 pegs.

A tide-gage was installed at a distance of 650 m to the northwest of the station for observing sea level variations. A vertical shaft and a horizontal 2.5 m-long canal to connect the former with the sea were sunk in the 4.5 m thick glacier for installing the tide-gage. A plywood shed was set up on the installation.

The first group of builders arrived at the place of construction by airplane from the ship "Ob" on February 23, 1962. The same year the station was temporarily closed and the entire personnel was transported on March 31. Again in 1963, a team of workers was flown by air from Mirnyy to the station on January 14. This team re-activated the station and continued scientific observations.

The size and composition of the personnel are given in Table 89.

TABLE 89

Personnel of the Station

Year	Number of workers: Total	Number of workers: Scientific	Director
1962	12	5	V.S. Sidorov, Radio Operator
1963	11	7	P.G. Morozov, Oceanographer

Principal Scientific Instruments

Meteorology

1. Apparatus for surface meteorological **observations**
2. Actinometric instruments

Observations on radiowave communications

1. Radiocomparator equipment

Oceanography

1. Tide-gage (diurnal)
2. Alekseev's recording air vane
3. Bathometer with deepwater thermometers
4. Hydrochemical laboratory
5. Ice-borers and plumb lines

Scientific Observations

The types of observations carried out at the station are listed in Table 90.

TABLE 90

Types of Scientific Observation

Observations	Period
Standard surface meteorological observations	Feb. 24 to March 30, 1962
Actinometric observations	Jan. 18, 1962 to April 1, 1963
Observations on propagation of radio waves	from 1963
Observations on sea-level fluctuations	Feb.-March 1962 to April 20, 1963
Temperature measurements	March 1962 & from 1963
Observations of currents	Feb.-March, 1962 & from 1963
Observations of sea ice	from 1963

In summer, Molodezhnaya Station served as a base for carrying out geological, glaciological and physiographical investigations on Enderby Land, as well as for hydrographical work in the Alsheyev Bay. The construction work at Molodezhnaya Station is still continuing to make it ultimately the main base of the Soviet Antarctic Expedition.

GEOLOGICAL CAMP ON RICHARDSON LAKE

Altitude: 20 m above sea level

This field camp, set up for carrying out work on Enderby Land, was located on Richardson Lake, at a distance of 6 km from the east coastline of Amundsen Bay, near the northern slope of the mount "Riiser Larsen". The camp was set up on February 6, 1962 and was vacated on March 18 of the same year. The camp consisted of seven structures of type KAPSh-1, erected on the ice slab of the lake. Gas (propane-butane) was used for preparing food and heating. A radio station, kitchen and food depot were housed in two tents, while the rest of the tents were used as living quarters for 16 persons (four geologists, one radio-operator, one geophysicist, two astronomers and eight members of the airplane crew). Provisions sufficient for three months were brought to the camp. Hangars for planes were erected on the ice slab of the lake, which was used as an airport.

NOVOLAZAREVSKAYA

Coordinates: Lat. 70°46' S., Long. 11°50' E.
Altitude: 99 m above sea level.
Geomagnetic coordinates: Lat. 66°.2 S, Long. 53°.6
Synoptic Index: 89512

Novolazarevskaya Station is located on the outcrop of bedrocks at the eastern extremity of Schirmacher Oasis (Fig. 67). To the north of the station over an expanse of 80 km an ice shelf stretches with a slight wavy surface, ending with the Leningrad glacial cupola. The sloping mainland ice sheet, which rises to a height of 1000 m in just 50 km extends from the south. Several nunataks rise above the ice on this slope. Ponds, lying

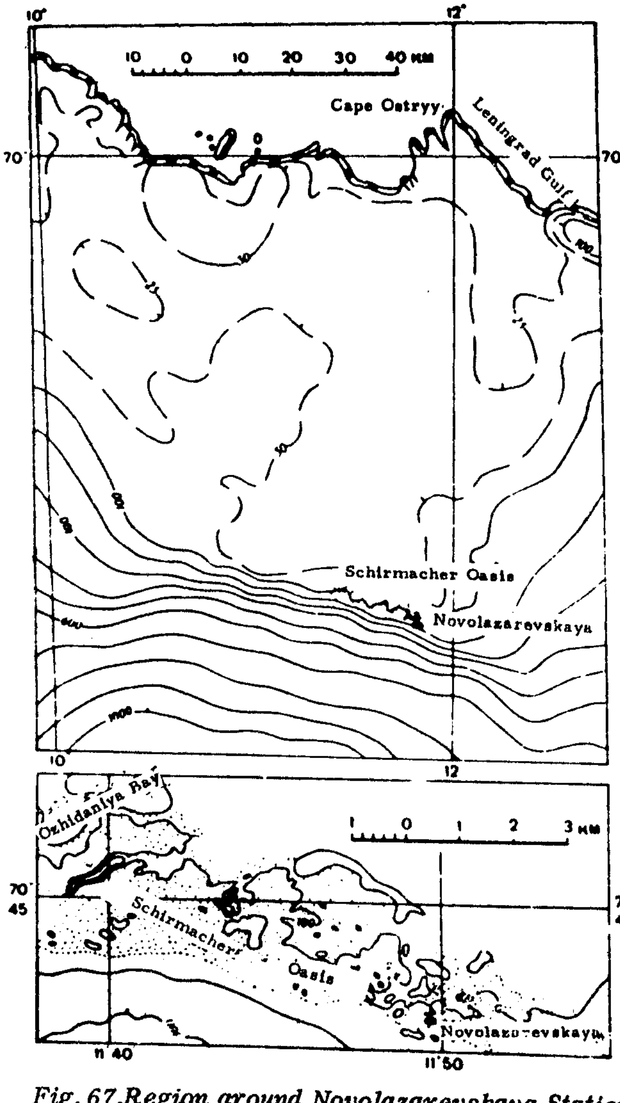

Fig. 67.Region around Novolazarevskaya Station.

at the northern border of the oasis (beneath the ice shelf which separates Schirmacher Oasis from the ocean) are connected with the sea by canals. This is obvious from the clearly perceptible ebb and flow variations of the level in these ponds.

Climatic conditions: Strong and frequent winds with low air temperatures almost throughout the year are characteristic of the region of the station. Temperature of the air: Annual average, about -10°C, minimum, below -33°C, maximum 5°C. Southeastern winds prevail. Velocity of the wind: Annual average, 11 m/sec; maximum about 53 m/sec. For about 220 days during a year the velocity of the wind exceeds 15 m/sec. During certain months, it is as much as 23-25 m/sec. The velocity of the wind is less in summer. The polar night continues from May 20 to July 19.

Installations: *Four assembled* sheet houses were erected in 1961 *when this station* was set up. These houses accommodated a radio station, a photolaboratory, living cabins (for meteorologists, aerologists, geophysicists, and the physician), the wardroom, kitchen, bakery, electric station, mechanical workshop, laundry, bath and some other living quarters. In addition, one aerological block, three magnetic sheds, one glaciological cabin, a storeroom for stocking technical materials and three Shaposhnikov pavilions were constructed on the station territory. Cisterns of 25 m^3 capacity were used for storing diesel-fuel. A cold storage for products was fitted in the neve to the north of the station (Figs. 68 and 69).

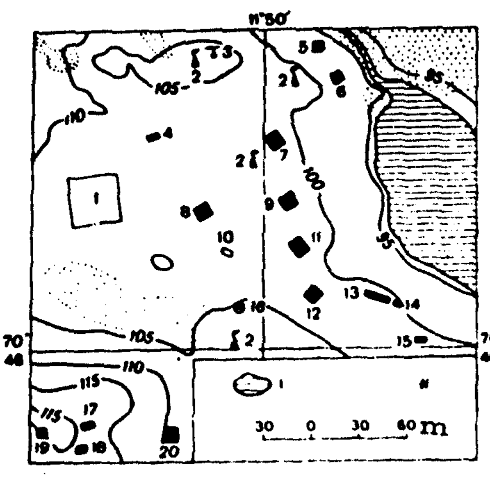

Fig. 68.Plan of Novolazarevskaya Station.

I - Lake; II - Blown up glaciers and snow: 1 - Meteorological area; 2 - Radio mast; 3 - Meteorological mast; 4 - Store of building materials; 5 - Pigsty; 6 - Food depot; 7 - Radio station; 8 - Aerological block; 9 - Living quarters; 10 - Radiolocator; 11 - Ward-room; 12 - Diesel room; 13 - Cold storage of goods; 14 - Hot storage of goods; 15 - Glaciological booth; 16 - Cisterns; 17, 18, 19 - Magnetic booths; 20 - Geophysical booth.

The construction activity continued at the station in 1962 also. One more assembled sheet house was set up at a distance of 100 m to the south-southwest of the main buildings, wherein geophysical equipment was kept. A fourth magnetic pavilion was erected at a distance of 50 m to the northwest of this house. An automatic telephone exchange with 18 lines was also installed.

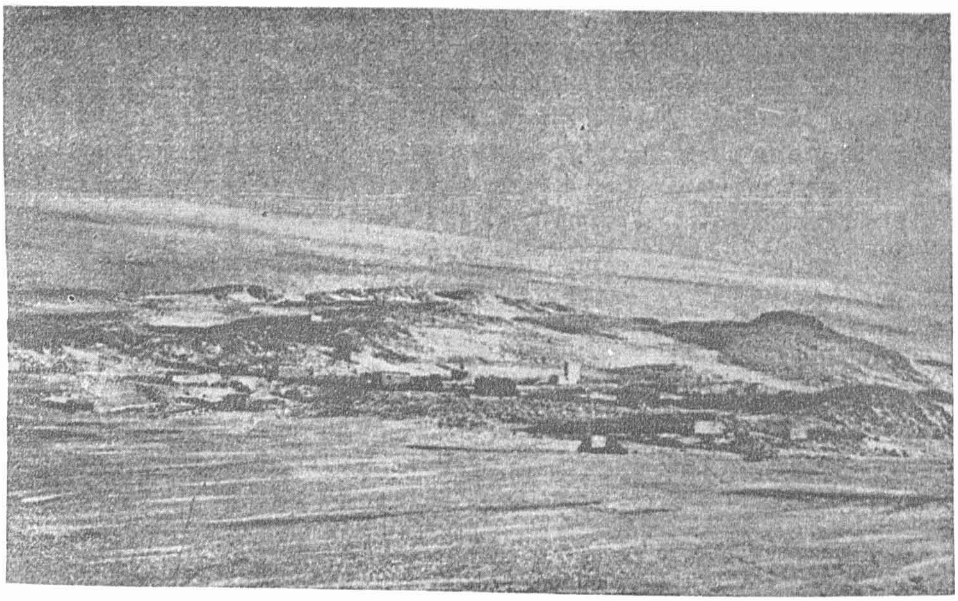

Fig. 69 Novolazarevskaya Station, 1961.

All the assembled sheet houses are heated by hot water. The working and living quarters are also heated by water from electric boilers. The electric station and wardroom are heated by using the radiator water of the diesel generators. Electric oven is used for preparing food. Water is supplied by means of water pipes from the lake situated near the station. The electric station is equipped with two diesel generators, each of 24 kw power and a diesel generator of 12 kw power.

All the three generators are of three-phase type, supplying a voltage of 380 v.

Means of Transport: In 1962 the station had four truck-tractors, two amphibian vehicles GAZ-47 and a tractor. In addition, a bulldozer, an autocrane on an automobile ZIL-150, and 17 tractor sledges operate at the station.

Radio station: Various radio transmitters including type RSB-70M, radio receiving sets of models R-250M, US-9 and others were used to contact ships, airplanes and sledge-caterpillar trains. Besides, the personnel of the station have a manually-operated radio station and two sets of shortwave radio stations (10 RT). The aerials of the radio stations were installed on two 22-meter and two 16-meter metal poles.

Landing and take-off strips have been laid in the station region for planes on skis and on wheels. One of them is at a distance of 10 km and the other at a distance of 20 km to the south of the station on the surface of the glacier. For the LI-2 type planes on skis, the landing and take-off strip is near the station itself.

The meteorological platform, 26 x 20 m in dimensions lies on a stony surface at a distance of 90 m to the west of the main buildings of the station. The platform is equipped with the following: psychrometric cabin, two sheds for automatic recorders, Tretyakov's precipitation meter, heliograph, snow-gaging rod, and deep soil thermometers. The platform is 99 m high above sea level. The installations for gradient observations are located on the neve basin, lying at a distance of 200 m to the north of the living quarters, and on the main meteorological platform. A pole is erected with units of anemorhumbometer M-47 and anemorhumbograph at a distance of 700 m to the north of the living quarters.

Actinometric instruments have been set up on the special actinometric platform of 26 x 15 m in size, which lies adjacently to the north of the meteorological platform. Besides, an additional actinometric platform was installed on the neve (to the east of the principal one). The camera for photography of aurora (C-180) was installed at a distance of 50 m to the south of the new Geophysical Laboratory.

Three snow-gaging sections were set up in the region of the station. One of them, 1100 m in length, cuts across the oasis from the south to the north. It is fixed with 44 pegs. The second section (with 35 pegs), 900 m long, is oriented from the east to the west along the neve basin situated at a distance of 100 m to the north of the station. The distance between consecutive pegs on both sections is 25 m. An L-shaped section with a 50 m long measuring rope has been arranged on the neve. Besides, snow-gaging pegs have been fixed on the route between the station and the coastal base Rubezh, and on the way to Lazarev station.

Supply: The station is provisioned by ships. The transport of goods to the station from the place of unloading of the ships is done partly by sledge-caterpillar trains, and partly by planes.

The first sledge-caterpillar train arrived at the place where it was planned to set up the station on Dec. 17, 1960. Three Shaposhnikov type houses, a unit with radio station and four tents were erected on the site selected for construction. Construction of main buildings was started on December 24 and was completed on January 18, 1961. The national flag of the Soviet Union was hoisted and the scientific observations were started on the same day.

The size and composition of the personnel are indicated in Table 91.

TABLE 91

Personnel of the Station

Year	Number of workers Total	Scientific	Director
1961	12	6	V.I. Gerbovich, Oceanographer
1962	21	12	V.M. Rogachev, Meteorologist
1963	12	6	V.G. Averianov, Geographer

Note: Apart from the principal staff (17 persons) of the station, the Head of the Eighth Soviet Antarctic Expedition A.G. Dralkin and three other Czechslavak geophysicists also worked at the station in the year 1962.

Principal Scientific Instruments

Meteorology

1. Apparatus for surface meteorological observations
2. Actinometric instruments (recording total radiation, including direct, diffused, and reflected radiations by radiation bridge with six-channel electronic potentiometer. EPP 09)
3. Rawinsondes and aerosondes (Radio-theodolite "Malachite")

Seismology

1. "Kirnos" seismographs
2. Seismograph

Geomagnetism

1. Two magnetic field variation meters
2. Quartz N-magnetometer (Danish)
3. Balance-magnetometer (Danish)
4. Three magnetometers M-2
5. Magnetometer of visual recording
6. Proton magnetometer (brought in 1964)
7. Equipment for recording micropulsations (brought in 1962)

Terrestrial currents

1. Apparatus for registration of terrestrial currents (installed at the beginning of 1962)

Aurora

1. Camera for photographing aurora (C-180)
2. Angle-gage for visual observations

Glaciology

1. Standard glaciological equipment

Hydrology

1. Equipment for rope-measuring of depth
2. Apparatus for registration of sea level fluctuations (automatic recorder).

Scientific Observations

The various types of scientific observations carried out at the station are given in Table 92.

TABLE 92

Types of Scientific Observations

Type of observations	Period
Standard surface meteorological observations	from 1961 onwards
Actinometric observations	from 1961 onwards
Radiosonde sounding of atmosphere (once in twenty-four hours, at 0000 hours GMT)	from 1961 onwards

Contd.

1	2
Rawinsonde sounding (Once in twenty-four hours at 0000 hours GMT)	from 1961 onwards
Gradient observations in the velocity of wind and air temperature	from 1961 onwards
Registration of variations in geomagnetic field	from 1961 onwards
Registration of short-period fluctuations of geomagnetic field	from 1962 onwards
Absolute magnetic field measurements	from 1962 onwards
Magnetic survey of the area of Schirmacher's Oasis	from 1962 onwards
Detection of earthquakes	from 1962 onwards
Registration of terrestrial currents	from 1962 onwards
Photography of aurora with camera C-180	from 1961 onwards
Visual observations of aurora	from 1961 onwards
Observation of accumulation and density of snow	from 1961 onwards
Observations of temperature of the upper layer of snow and firn on open ground	from 1961 onwards
Investigation of the structure and texture of ice	from 1961 onwards
Hydrological observations of the lakes of Schirmacher's Oasis	from 1961 onwards
Hydrological observations (including registration of fluctuation in the level over 24 days) in reservoirs connected with the ocean	from 1962 onwards
Studies on acclimatization of man in Antarctica	from 1961 onwards

Novolazarevskaya Station served as a base in summer for carrying out geological, biological and geophysical field investigations in the mountains of Queen Maud Land, as well as for glaciological observations in this region.

RUBEZH

Coordinates: Lat. 70°08' S., Long. 12°32' E.
Altitude: 8 m above sea level.

"Rubezh" coastal base in the region of Novolazarevskaya Station lies on the southern coast of the Leningrad Gulf (the slope of Leningrad glacial cupola) at a distance of 50 m from the ice barrier. The base was opened on December 13, 1960. It consists of one small house (made of hardboards) equipped with a radio station (RSB-70M) and a coal oven for heating. The base also serves as a temporary store of goods brought by ships for Novolazarevskaya Station.

OASIS

Coordinates: Lat. 66°16' S, Long. 100°45' E.
Altitude: 29 m above sea level
Geomagnetic coordinates: Lat. 77°.5 S, Long. 160°.7.
Synoptic Index: 89601

Oasis Station was situated in the Bangera Gasia (eastern part of Queen Mary Land) at a distance of 370 km to the east of Mirnyy (Fig. 70). Bangera Gasia is surrounded by ice on all sides. To its south and southeast, it is bounded by the border of the mainland ice sheet of Antarctica. Several outflowing glaciers merging with one another are situated on its western boundary. Shackleton Ice Shelf is situated towards its north and northwest.

The total extent of the oasis from the southwest to the northeast is nearly 50 km and the width is 20 km. Its southwestern part is completely free from ice sheet, while the northeastern part is divided by fjords and projecting glaciers into a number of separate islands.

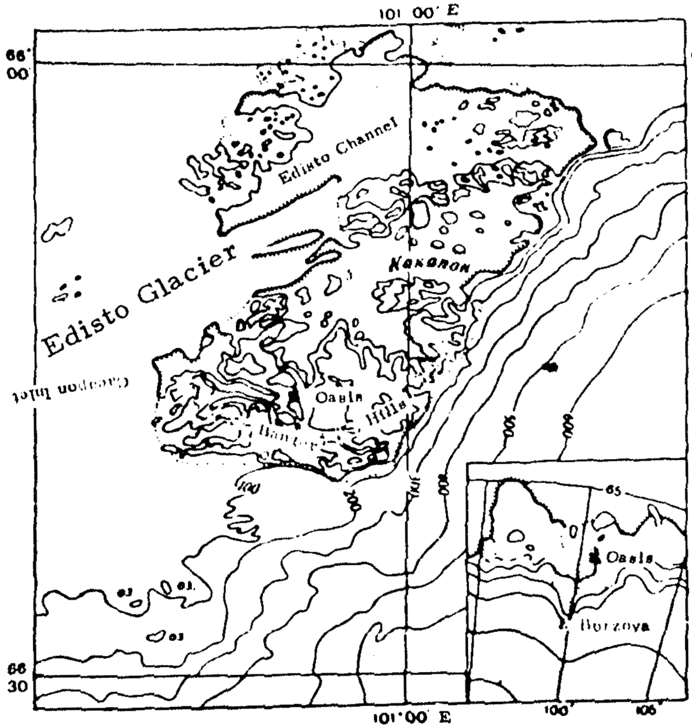

Fig. 70.Region of Oasis Station.

The surface of the oasis is alternated by big mounds, composed of bedrocks (up to 200 m high), and valleys partly filled with lakes. There are three large and deep fresh water lakes and more than 20 small ones in its vicinity. The station stands on the coast of the largest of these lakes, namely, Figurnyy. Its length is about 18 km, width varies between 100 and 1000 m and depth is more than 130 m. Snow melts in summer in the vicinity of the oasis, and small neve areas exist only in specially favorable conditions. The station structures are located on the southwestern slope of a moderately high mound descending with small projections to the lake, and at a distance of 100 m from the shore (Fig. 71).

Climatic conditions: Air temperature: Annual average, -8°. 2C; maximum, 10°C; minimum, -43°C. Velocity of the wind: Annual average, 6 m/sec; maximum, 56 m/sec. Predominant direction of the wind: easterly. The velocity of wind exceeds 14 m/sec for more than 100 days in a year. In

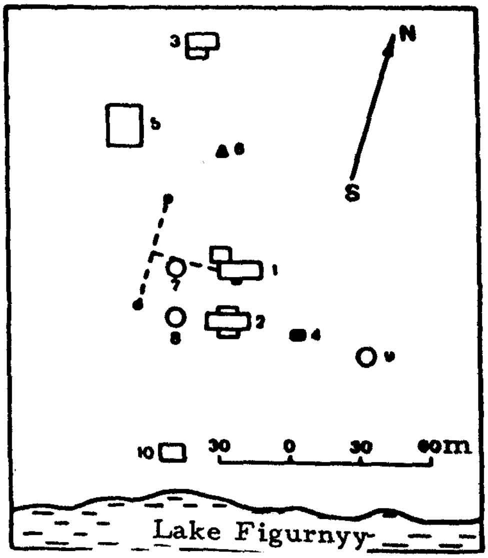

Fig. 71. Plan of Oasis Station.

1 - House No. 1; 2 - House No. 2; 3 - Seismic booth; 4 - Magnetic booth; 5 - Meteorological area; 6 - Aurora observation room; 7 - KAPSh tents for preserving different materials; 8 - KAPSh tents for preservation of goods; 9 - KAPSh tents with MBS arrangements; 10 - Aerological block.

summer, the ice slab melts about 30 to 50 cm in thickness and even up to 1 m at a few places.

Installations: Three Shaposhnikov-type small houses and two KAPSh-1 tents were erected when the station was set up. The aerial of the radio station was installed over three 18-meter bamboo poles. Subsequently, as the station gradually expanded, it was modified and more equipment was added (Fig. 72).

In 1958, the main working and living quarters of the station were accommodated in two small interconnected assembled sheet houses. They accommodated the following: Aerological and meteorological cabins; observatory for terrestrial currents and aurora, radio station, electric station, wardroom and kitchen, living rooms, and warm storeroom. Aerological, seismic and magnetic cabins were located separately. Two 24-meter metal poles were installed for radio aerials.

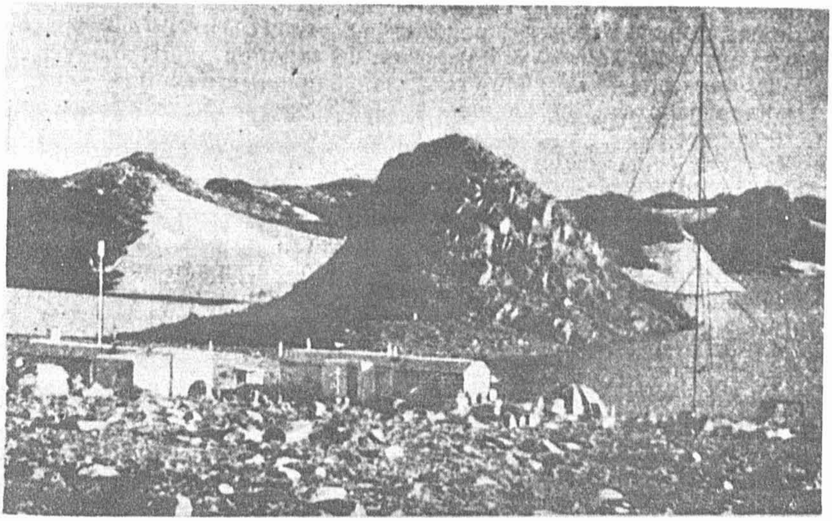

Fig. 72.Oasis Station, 1958.

The quarters were heated by means of calorifier heating system in which wood and coal were burnt. Food was prepared on gas stoves.

Electric station: It was equipped with a generator and three gasoline engines. In addition, 20 alkaline and 4 acid storage batteries were installed at the station.

Radio station: It had two radio transmitters and two receiving sets, one of which was used as a stand-by.

In summer, airplanes could land on the air-strip laid on the glacier at a distance of 15 km from the station. Provisions were brought to the station by helicopters. In winter, the planes landed on ice on Lake Figurnyy in the immediate vicinity of the station.

The meteorological platform was at a distance of 100 m to the northwest of the main buildings of the station. The following were installed on this platform: psychrometric cabin, shed for automatic recorders, weather vane with a heavy board, pole of the distant meteorological station (DMS)[1], helio-

[1] *On may 27, 1958, the DMS pole was removed beyond the limits of the meteorological platform.*

graph, Tretyakov's precipitation meter, gradient and actinometric stands, bracket for actionometer and one auxiliary shed. A special site for soil temperature measurements was prepared by clearing all stones, and covering the area with a layer of 20-cm thick silt. For observations on the snow blanket, two sections --one open and another closed-- were set up outside the meteorological platform. There was also a section (1 km long) laid for snow-gaging observations. A total precipitation meter was installed at a distance of 8 km from the station.

At a distance of 90 m from the living quarters, a C-180 camera was installed on a triangle made of wooden beams for photographing the aurora.

Supply: The station received its supplies from Mirnyy station by airplanes and helicopters.

After several survey flights to Bangera Gasia, the place was finally selected on August 27, 1956 for the construction of the station on the coast of Lake Figurnyy. A group forming a part of the expedition arrived by planes on September 17 for constructing the station and meteorological observations were started on September 22. Installation of the station was completed on October 13 and it was officially opened on October 15, 1956.

The station was closed on November 17, 1953. Only stand-by radio equipment was removed from it. All the remaining equipment, stock of provisions, fuel and articles of household use were securely left behind at the station.

On January 23, 1959, Oasis Station was handed over to the Academy of Sciences of the Polish People's Republic and was renamed as "Dobrovol'skii". After this, station-based work was not carried out at the station.

The size and composition of the personnel are indicated in Table 93.

TABLE 93

Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
1956	2	1	P. D. Tselishchev, Radio-operator and Meteorologist
1957	7	6	G. I. Pashchenko, Aerologist
1958	3	6	B. I. Imerekov, Aerologist

Principal Scientific Instruments

1. Apparatus for surface meteorological observations
2. Actinometric instruments
3. Radiosondes and apparatus for pilot balloon observations (aerological theodolite T)

Seismology

1. Set of seismographs with galvanometers (GK-6)
2. Vertical seismograph

Geomagnetism[1]

1. Quartz N-magnetometers (two)
2. Quartz N-magnetometer (Danish) to find the dip and horizontal component
3. Magnetic null balance BMZ (Danish) to measure vertical component
4. Vertical magnetic balance
5. Magnetic field variation meter (MVS)
6. Chronometer
7. Geodetic theodolite

Terrestrial currents

1. Apparatus for registration of terrestrial currents

[1] *All geomagnetic equipment was removed to Mirnyy.*

Aurora[2]

1. Camera for photography of aurora (C-180)

Glaciology

1. Standard glaciological equipment
2. Danilin's frozen state meter (to find depth of melting in loose rocks)

Scientific Observations

The various types of scientific observations carried out at the station are given in Table 94.

TABLE 94

Types of Scientific Observations

Type of observations	Period
Standard surface meteorological observations (at 0300, 0900, 1500 and 2100 hours Moscow Time)	September 22, 1956 to November 17, 1958
Gradient observations (4 times in twenty-four hours) of velocity of wind, temperature and humidity of air	1956 - 1958
Total content measurements of ozone	Only in 1958
Actinometric observations (4 times in twenty-four hours)	1956 - 1958
Simultaneous temperature and wind measurements of atmosphere (at 0300 hours Moscow Time)	March 28, 1957 -- September 17, 1958
Continuous round-the-clock registration of earthquakes with standard apparatus	1957 - 1958
Continuous registration of geomagnetic field variations	August 1, 1957 - September 17, 1958, October 1956

Contd.

[2]*All apparatus for studying the aurora were removed to Mirnyy.*

1	2
Absolute measurements of the components of terrestrial magnetic field (once in five days)	1957 - 1958
Magnetic field observations with two sets of equipment having different sensitivity and different recording speed, (90 mm/hour and 30 mm/min)	1957 - 1958
Photographing of aurora by camera C-180	June-October, and December, 1957, March 1958
Visual observations (every 30 min)	June 28 to October 4, 1957, February 21 to October 30, 1958
Systematic observations of change in the depth of snow blanket by snow-gaging rods (on an average, one series in three days)	February 1957 to November 1958
Finding the melting depth in loose rocks	Summer 1957-1958
Finding the humidity of frozen surfaces	1957 to 1958
Change in temperature of the ground at different levels (daily)	January to November, 1958

Oasis Station was also used as a base for carrying out geological, glaciological, biological, hydrological and geophysical investigations.

PIONERSKAYA

Coordinates: Lat. 69°44' 30" S., Long. 95°31' 24" E.
Altitude: 2741 m above sea level
Geomagnetic coordinates: Lat. 80.°3 S., Long. 146.°5.
Synoptic Index: 89593

The inland scientific station "Pionerskaya" stands on an even snowy surface of the glacial slope at a distance of 375 km to the south of Mirnyy. The shortest distance of the station from coast is also 375 km (Fig. 73). The thickness of

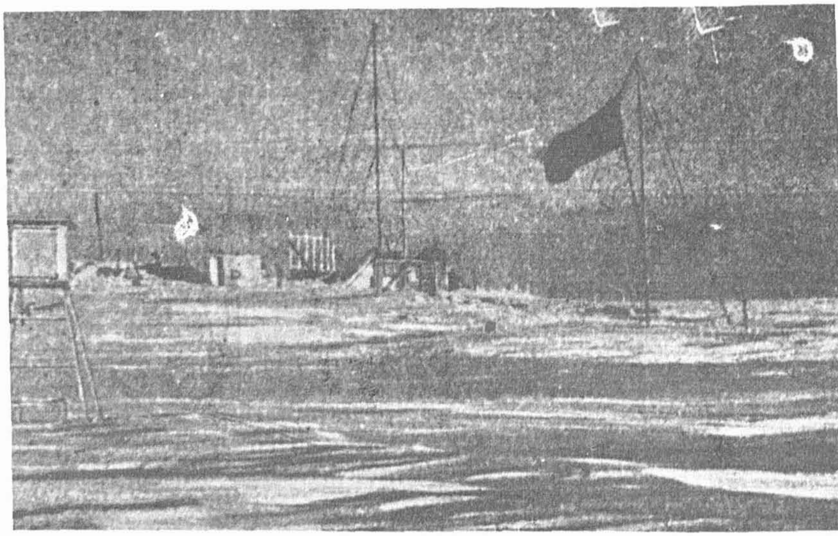

Fig. 73. Pionerskaya Station, 1958.

the ice sheet in this region is 2050 m. The bed of the glacier under the station is 691 m above sea level.

Climatic conditions: Continuous and strong southeastern winds accompanied by snowstorms and low temperature throughout the year are characteristic of the region of the station. Air temperature: Annual average, -38°C; minimum, -68°.8C; maximum, -13°C. Average monthly velocity of the wind during the existence of the station varied from 8.3 to 13.5 m/sec with the maximum reaching 32 m/sec. During the entire period of operation of the station only one calm period (in October, 1958) was registered. Polar night continues from May 26 to July 15.

Installations: Two small sheet houses on sledges were erected in 1956 when the station was set up. The space between them was converted into a sort of corridor from which one could enter any particular part of the station along the paths under snow. Empty sledges served as the floor of the corridor, and the roof was wooden. One of the houses (14 m^2) served as the living quarters and another one was used as kitchen and wardroom.

One unit on a tow car, left at the station by the Second Soviet Antarctic Expedition was converted into a sort of living room in 1958. This unit was connected with the main building by a snow tunnel. In addition, a food depot, a storage battery room, three magnetic cabins, toilets and snow niches which were used as a storage places (Fig. 74) were built in the snow around the main complex of structures. A KAPSh-1 type pavilion was erected on one side of the main quarters. It served as an emergency base up to 1958. During the last year of operation of the station, the pavilion was shifted nearer to the main buildings of the station and a bath was fitted. A snow garage, aerological block, gas generator room and a new room for electric station were also built at the same period.

Up to 1957, the living quarters were heated with solar furnaces while the kitchen was heated with wood or coal. Food was prepared on gas stove. Later, electric stoves were also used for heating the quarters.

Electric station : In 1956 the electric generator of the station used to be driven by a petrol engine. Two more powerful engines were added to the station in 1957. Besides, storage batteries (16 storage cells) were also installed.

Radio station: Radio transmitter (RSB-70 M), two receiving sets (US-9), radio compass (ARK-5), and a small emergency automatic transmitter of 500 KHz band were installed at the station when it was opened. A little later, an emergency transmitter of type RSB-5 was brought to the station. A stand-by receiving set US-9 was used. In the winter of 1956, the radio station operated mainly on a "subsnow" 60-meter aerial. In order to improve radio reception, two new 20 and 22 m high radio-poles were fixed in place of the one 6-meter high pole in 1957. At the same time the emergency radio-transmitter RSB-5 was replaced by a new radio station RSB-70 M.

Two landing and take-off strips were laid near the station. One of them was laid out in 1956 and the other in 1957. Seven illuminators with electric lamps of 100 kw power each were installed on the second strip.

The meteorological platform was laid out approximately at a distance of 150 m from the station building on the side exposed

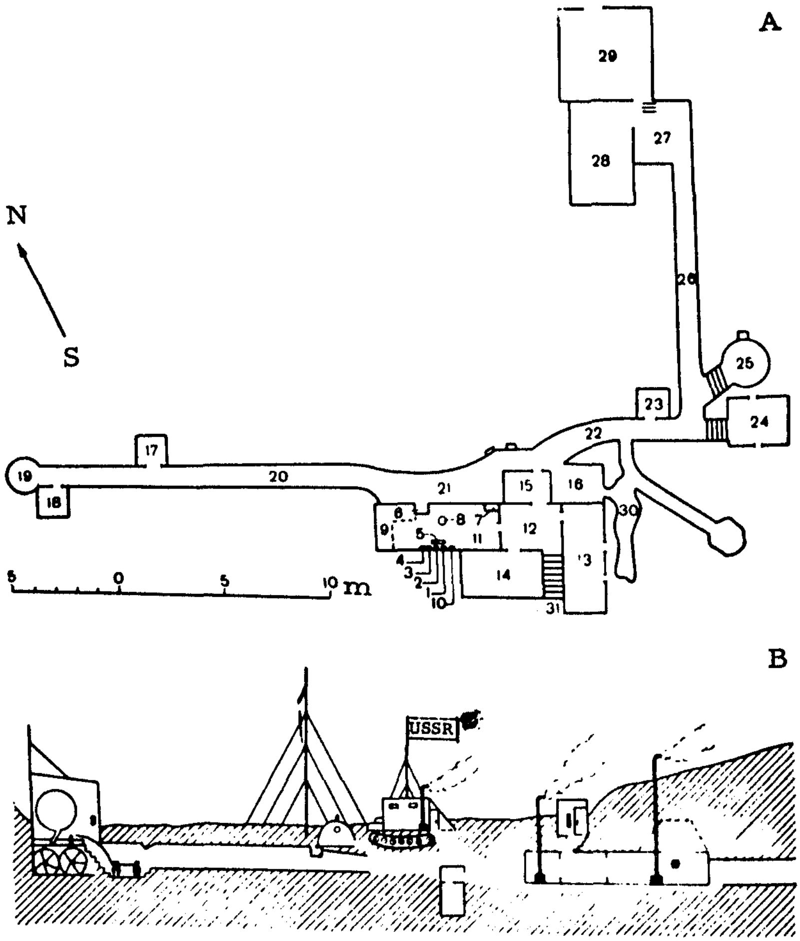

Fig. 74. Plan and section of Pionerskaya Station.

1 - Weekly barograph; 2 - Barometer-altimeter; 3 - Apparatus for remote meteorological station; 4 - Dial barograph; 5 - Meteorologist's table; 6 - Magnetologist's table; 7 - Radio station; 8 - Furnace; 9 - Beds; 10 - Mercury-cup-barometer; 11 - Living house; 12 - Lower vestibule; 13 - Wardroom; 14 - Food depot; 15, 16 - Electric station; 17 - Magnetic variation station; 18 - Quartz and H-magnetometer; 19 - Balance magnetometer BMZ; 20 - Magnetic tunnel; 21 - Store of materials; 22 - New tunnel; 23 - Toilet; 24 - Aerological unit; 25 - Bath (first floor); 26 - Gas generating tunnel; 27 - Gas generator room; 28 - Gasholder room; 29 - Aerological room (sarai) (first floor); 30 - Drinking water tunnel.

to wind. But, during the very first year it was found to have been filled with snow. Therefore, in February 1957, the platform was shifted to another place at a distance of 70-80 m to the south of the main station installations.

The following were installed on the meteorological platform: psychrometric cabin with psychrometric and external thermometers and capillary hygrometers; shed for automatic recorders with weekly hygrographs and thermographs and daily thermographs; Tretyakov's precipitation meter; soil (minimum and periodic) thermometers; five snow-gaging rods (in the corners and center of the rectangle).

An electrical anemometer was installed in 1956 for recording the velocity of the wind, and in 1957 a remote meteorological station was installed. The former was set up on the old meteorological platform, while the latter was set up between the new platform and the station. Sometimes the velocity of wind was also measured with manual induction anemometer.

In 1956, actinometric instruments were placed on two stands on the old meteorological platform. In 1957, an actinometer, albedometer, pyranometer, and balancometer (with filter and without filter) were installed on a stand which stood between the new meteorological platform and the station quarters. A galvanometer kept in the station premises gave the final readings of the instruments set up in the field.

A pole was fixed on the old meteorological platform for wind gradient observations. Electrical anemometers, whose readings were registered in the premises, were at a height of 0.5, 1.9, and 2.0 m. Thermometers were placed on the old meteorological platform, at heights of 0.5, 2.0 and 5.5 m (as well as in the snow at depths 0.05, 0.1, 0.2, 0.5 m) for temperature gradient observations. As a result of intensive drift, the height position of these instruments changed and at the end of 1957, only two instruments remained above the surface of the snow. A total precipitation meter was fixed at a distance of 130 m to the southwest of the premises in 1957.

A glaciological platform was set up at a distance of 100 m to the south of the station. Snow-gaging observations were conducted on the platform of 100 x 1000 m in dimensions, where 41 pegs were fixed like chess-men on a chess board. In this same area, two snow-gaging sections using a measuring rope with one-meter graduations were set up. The length of the section, coincident with the direction of the prevalent winds, was 76 m while the perpendicular side was 69 m. On April 13, 1957, the first section was shifted to the west by a distance of 60 m. This was considered necessary because the natural regime of snow precipitations was getting highly distorted under the effect of the station installations.

During the first year, a pit was bored in the immediate vicinity of the living quarters and a 16-meter hole was drilled in the region of the old meteorological platform. Since these places were subjected to heavy drift, a 6-meter pit was bored near the northwestern border and a new hole, 25 m deep and 20 cm in diameter, was drilled near the southwest border of the meteorological platform in April 1957. In the bore-pit meant to measure vertical shifting of snow, the recording plates were placed at levels of 2, 4 and 6 m. Thermometers were installed in the hole at levels of 1, 2, 4, 6, 8, 12 and 15 m for measuring temperature of snow and firn.

Equipment for recording magnetic field variations and for absolute magnetic field measurements were housed in non-magnetic plywood hamlets dug in snow near the living quarters.

<u>Supply</u>: The station was provisioned by means of sledge-caterpillar trains and planes.

The first sledge-caterpillar train arrived at the place where the Pionerskaya Station was proposed to be set up, on May 4, 1956. Officially the station was opened on May 27. Certain observations were conducted right from the time of arrival of the train. This was the first inland station in Antarctica and therefore it was called "Pionerskaya". The size and composition of the personnel are indicated in Table 95.

TABLE 95

Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
May 26 to Nov. 17, 1956	4	2	A. M. Gusev, Meteorologist
Nov. 17, 1956 to Jan. 30, 1957	4	2	N. P. Pusin, Meteorologist
1957	4	3	S. A. Pavlov, Hydrologist
1959	5	3	G. M. Silin, Meteorologist

The station was closed after completion of the IGY. Magnetic and glaciological investigations were discontinued from Jan. 1, 1959, aerological investigations from January 10, actinometric observations from January 11, and meteorological observations from January 15, 1959. The entire personnel of the station flew to Mirnyy. The radio station, engines with generators of 220V A. C. and 127V D. C., and a considerable reserve of provisions were left behind at the station. All these things were conserved for later use.

When work was discontinued at the station, its houses were under 6-8 meters of snow.

Principal Scientific Instruments

Meteorology

1. Apparatus for surface meteorological observations
2. Actinometric instruments
3. Radiosondes and equipment for pilot balloon observations

Geomagnetism

1. Magnetic field variations recording station MVS-AANII
2. Quartz H-magnetometer
3. Balance-magnetometer (Danish)

Glaciology

1. Standard glaciological equipment
2. Three automatic recorders for registering precipitation of snow.

Scientific Observations

The several types of scientific observations, carried out at the station, are given in Table 96. Ground magnetic observations were also conducted when the station was organized.

TABLE 96

Types of Scientific Observations

Type of observations	Period
Standard surface meteorological observations	May 1956-1958
Actinometric observations	May 1956-1958
Radiosonde sounding of atmosphere	1956 to Jan. 1957; 1958
Pilot balloon observations	1956 to Jan. 1957; 1958
Gradient observations of velocity of wind and soil temperature	1956 to 1958
Registration of geomagnetic field variations	1957 to 1958
Absolute geomagnetic field measurements	1957 to 1958
Visual observations of aurora	1957
Observations on accumulation of snow	1956-1958
Observations of the varying snow surface	1956
Observations of temperature of snow-firn to a depth of 16 m	1956-1958
Observations of the structure of snow in 6-meter bore pit	1956
Snow drift observations	1956

Contd.

1	2
Visual observations of the state of the surface of snow	1956; 1958
Observations of precipitation of snow	1957-1958
Crystallographical analysis of atmospheric precipitations	1957

Note: In 1956, the sounding of the atmosphere was carried out mainly by means of the meteorological kite balloons with thermistors aboard. In the summer of 1956/1957 thirty radiosondes and fifteen pilot balloons were released.

POLE OF INACCESSIBILITY

Coordinates: Lat. 82°06' S., Long. 54°58' E.
Altitude: 3800 m above sea level
Synoptic Index: 89550

The inland scientific station "Pole of Inaccessibility" stood on a level snowy surface of the glacial plateau in the region farthest from the coastline (Fig. 75). It is about 1450 km away from the nearest point on the coast of Lutzow-Holm Bay. The thickness of the ice sheet in this region is 2950 m. The bed of the glacier under the station is 770 m high above sea level. Pole of Inaccessibility Station was set up in the final phase of the sledge-caterpillar expedition, whose participants carried out complex scientific observations over a stretch of 2110 km. These investigations for the first time gave an idea about the thickness and structure of the ice, meteorological and geomagnetic conditions of the erstwhile unexplored region between the coastline of Davis Sea and the Pole of Relative Inaccessibility of the southern hemisphere.

Climatic conditions: The climatic conditions in the region of the station are somewhat similar to those regions, where Vostok and Sovetskaya stations are located. The average annual air temperature, found by measuring the temperature of the snow firn at a depth where seasonal variations of temperature are absent is 57°. Polar night lasts from April 15 to August 29.

Installations: The station consists of a small house with 24 m^2 floor space set up on steel sledges containing an electric

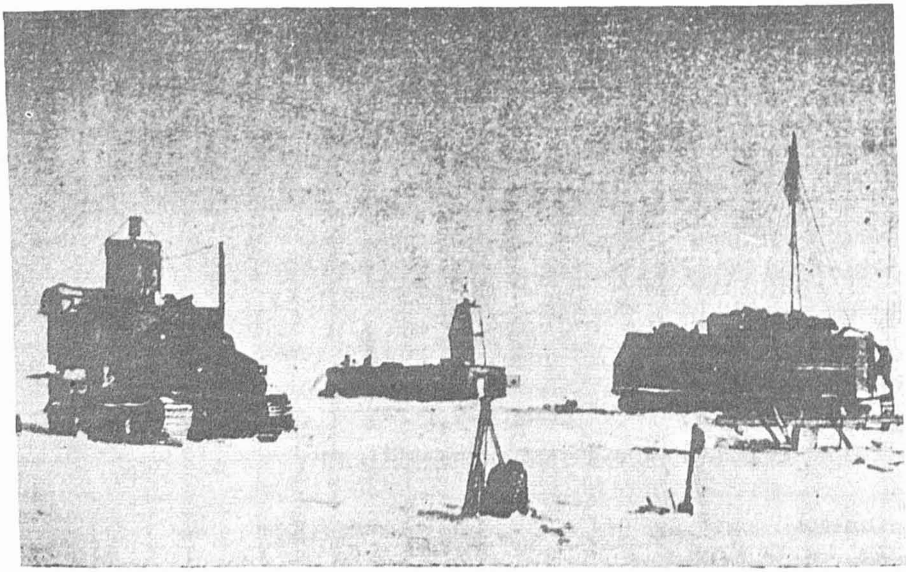

Fig. 75.Pole of Inaccessibility Station.

station of 13 kw power, electric kitchen, radio station and living quarters for four persons. The quarters are heated by electric stove, and it has a stand-by stove working on solar oil. A stock of fuel to last for 6 months is kept at the station. A storeroom has been improvised for stocking provisions. It holds enough stock of provisions for six months for four persons.

A meteorological platform has been laid out and two radio poles, each 20 m high, have been installed at a distance of 30 km from the station house. A landing and take-off strip, 30 x 1200 m in dimensions was laid near the station (Fig. 76).

The station has an all-wave aviation radio transmitter of 70 watt power and a radio receiving set.

The scientific observations were started at the station immediately after the arrival of the sledge-caterpillar train on December 14, and were continued up to December 26, 1958.

Meteorologist V. K. Babarykin was the leader of the station. He participated in the expedition to the Pole of Inaccessibility and

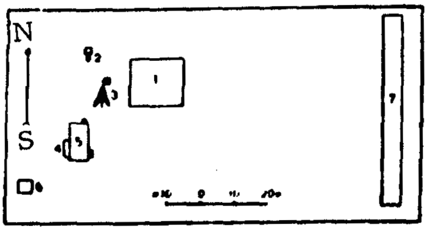

Fig. 76.Plan of Pole of Inaccessibility Station.
1 - Meteorological area; 2 - Borehole; 3 - Radio masts; 4 - Food depot; 5 - Living quarters; 6 - Fuel store; 7 - Landing and take-off strip.

took a leading part in opening the station. Up to December 18, there were 18 persons at the station including scientific workers. After that 14 persons including 4 scientific workers (an aerologist, a meteorologist, two seismic explorers-cum-pilot gravimetrists) remained behind at the station.

The meteorological platform was equipped with the following: Psychrometric cabin with a set of thermometers and capillary hygrometer, actinometric stand, thermometers on the surface of snow, data units of distance meteorological stations on standard 6 meter pole and three snow-gaging rods. Meteorological and actinometric observations were conducted 4 times a day at 0000, 0600, 1200 and 1800 hours GMT.

Seismic observations were carried out for ascertaining the thickness and structure of the ice sheet and ultrasonic multichannel logging of snow and firn.

According to the program of the glaciological observations, the following investigations were conducted: determination of the density and hardness of the snow blanket, reporting on its relief and structure, taking samples of snow from the surface down to a depth of 10-15 m, measurement of the temperature of snow and firn at different levels in a hole to a depth of 50 m.

Frequent series of observations for determination of horizontal and vertical components of the Earth's magnetic field and several series of gravimetric observations were carried out.

L. I. DUBROVIN & V. N. PETROV

SOVETSKAYA

Coordinates: Lat. 78°24' S., Long. 87°32' E.
Altitude: 3662 m above sea level
Synoptic Index: 89557

The inland scientific station "Sovetskaya" stands on an even snowy surface in the eastern part of the Sovetskii Plateau. It is 1040 km away from the coast, and 1420 km from Mirnyy. The thickness of the ice sheet in this region is 1830 m. The bed of the glacier at the station is 1710 m high above sea level.

Climatic conditions: Almost clear or slightly cloudy weather with feeble winds, negligible precipitation, little humidity of air and stable low temperatures are characteristic of the station region. Air temperature: Annual average, -57°.4C; minimum, -76°.8C; maximum, about -20°C. Average humidity of air (during 10 months) 55 per cent, average atmospheric pressure, 608.7 mb. Predominant wind direction: east-southeastern. Velocity of wind: monthly average from 2.5 to 4.6 m/sec, maximum 20 m/sec (in June). Polar night lasts from April 25 to August 19.

Installations: The station buildings consist of three units, each 12 m^2 in area and two units of each 25.5 m^2. These units, brought on sledges from Mirnyy were set in the form of a rectangle and covered with common roof. The space between the units was covered by insulated sheets and planks were laid on the snowy surface to make the floor. Thus, it was essentially one common building with 99.25 m^2 floor space, where living quarters for four persons, scientific laboratories, radio house, electric station, kitchen, bath, drying room, bolier room, cine-booth and storeroom for provisions and goods were arranged (Fig. 77).

All working and living quarters were provided with central hot water heating system. Water bolier installed in the inner yard was heated with anthracite coal. Snow was melted by means of heat from the engine's cooling system of the electric station for bathing purposes. The bath was heated by a composite cast iron furnace. The kitchen was equipped with an electric cooking-range and a gas stove.

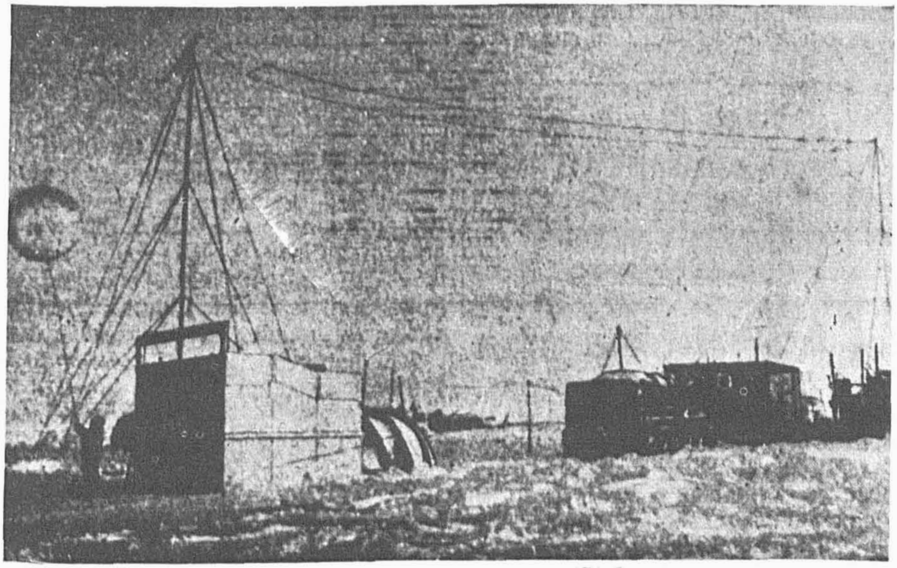

Fig. 77. Sovetskaya Station.

Electric station: There were two diesel generators with 36 kw total power, delivering three-phase current at 400/230 volts.

Radio station: It was equipped with three transmitters. A shortwave transmitter of 250 watt power working on A. C., a longwave transmitter of 250 watt power for local use and an aviation set working on storage batteries. Two shortwave receivers and an allwave receiver were also used.

The aerial establishment of the station consisted of a longwave aerial on two 15-meter duralumin poles. Various shortwave and other general aerials were also suspended from the same poles. After the station was closed, the main radio equipment was dismantled and taken to Mirnyy. Only the aerial and pole establishments, the all-wave radio station and a stock of storage batteries were left behind at Sovetskaya.

For pilot balloon and radiosonde sounding observations, an aerological block, consisting of a framework and plywood board, was constructed on the territory of the station.

The meteorological platform was located at a distance of 36 m from the station on an even surface with the following installations: psychrometric cabin, shed for automatic recorders, and a 6 m high pole for the data unit of the distance meteorological station, Tretyakov's precipitation meter, stands for heliograph and actinometric instruments and four poles for data units of distance anemometers fixed at heights of 0.5, 1.0, 2.0, and 4.0 m. A snow-gaging platform with 50 pegs was laid at a distance of 100 m to the east-southeast of the meteorological station (Fig. 78).

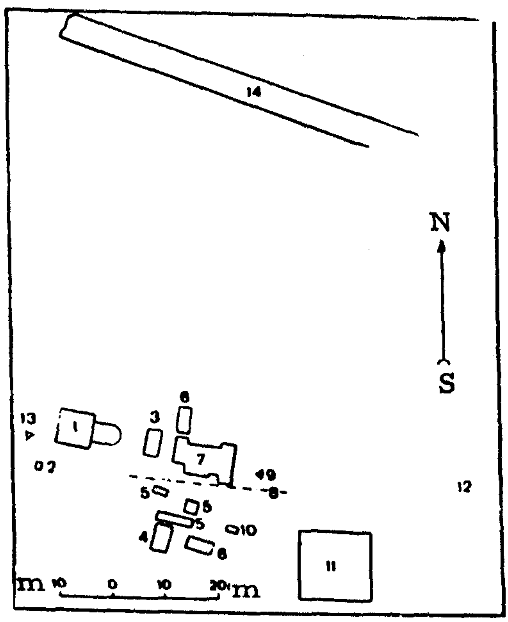

Fig. 78. Plan of Sovetskaya Station.

1 - Aerological block; 2 - Meteorological booth for Aerologist; 3 - Tractor No. 15; 4 - Tractor No. 20; 5 - Racks for foodstuffs; 6 - Sledges with fuel; 7 - Living quarters; 8 - Antenna; 9 - Borehole; 10 - Packing store; 11 - Meteorological area; 12 - Area for snow gage; 13 - Theodolite point; 14 - Landing and take-off strip.

Supply: Sledge caterpillar trains and planes brought supplies to the station. A landing and take-off strip was laid on the territory of the station for planes on skis. It was 40 x 2300 m in dimensions.

The sledge caterpillar train of the Third Soviet Antarctic Expedition arrived at the place where it was decided to set up Sovetskaya Station on February 10, 1958. The first meteorological report was dispatched from the station on February 12. With the hoisting of the national flag of the USSR on February 16, 1958 the station was formally declared open. Scientific observations were discontinued and the station was closed on January 3, 1959.

The personnel of the station consisted of six members. An engineer-aerologist, a radio-operator, a mechanic-cum-electrician, an airplane-mechanic, and a physician-cum-cook. Aerologist V. K. Babarykin was the Director of the station.

Principal Scientific Instruments

Meteorology

1. Apparatus for surface meteorological observations

Actinometry

1. Thermoelectric Actinometer
2. Pyranometer
3. Balancometer without filters
4. Albedometer

Aerology

1. Radiosondes
2. Optical aerological theodolite

Glaciology

1. Snow-gaging pegs
2. Standard gravimetric density-meter
3. Polarization microscope for crystallographic analysis of atmospheric precipitations
4. Tretyakov's plate precipitation meter

Medicine

1. Equipment for carrying out medical investigations

Scientific Observations

The various types of observations carried out at the station are given in Table 97.

Geomagnetic observations were also conducted during the functioning of the station.

TABLE 97

Types of Scientific Observations

Type of observations	Period of observations
Standard surface meteorological observations	February 16 to December 31, 1958
Actinometric observations	March 1 to December 31, 1958
Aerological observations	March 16 to December 31, 1958
Glaciological observations	March to December, 1958
Observations of acclimatization of man to the conditions of Central Antarctica	March to December, 1958

CHAPTER IX

SCIENTIFIC STATIONS OF USA

USA started station-based investigations in Antarctica in 1929, during the First Antarctic Expedition led by R. Byrd. This expedition made observations in meteorology, geophysics, and other branches of sciences at the first American Antarctic station, "Little America I". The work at this station was conducted from January 1929 to February 1930. Little America I Station which was the base of this expedition on the Antarctic continent was set up on the shore of the Bay of Whales in the eastern part of the Ross Ice Shelf.

In 1934, after a break of four years, the station-based investigations were renewed during the Second Antarctic Expedition led by R. Byrd. The base of the second expedition was also at the same place and was called "Little America II". This time, the leader, R. Byrd, did not restrict the activities to conducting station-based observations at one point only, but set up a temporary field station at a distance of 175 km to the south of "Little America II" on the snowy surface of the Ross Ice Shelf, near the southern extremity of Roosevelt Island. At this station, which was called Advance Base, R. Byrd carried out single-handed meteorological observations and observations of aurora for several months.

R. Byrd's Third Antarctic Expedition carried out scientific observations during almost the entire year 1940 and the beginning of 1941 at two points, namely, at Little America III Station, situated at about the same place as Little America II, and at the eastern base of the expedition set up on Stonington Island in the Marguerite Bay (western coast of the Antarctic Peninsula).

After the Third Antarctic Expedition of R. Byrd, there was another lull in the station-based investigations in Antarctica by the USA. They were resumed only in 1947, when F. Ronne's expedition commenced station-based investigations on Stonington Island. Apart from the observations at the main base, the members of this expedition carried out station-based investigations at the two temporary field stations: "Plateau" (on the surface of the ice sheet in the central part of the Antarctic Peninsula) and "Cape Keeler" (east coast of the Antarctic Peninsula).

In the beginning of 1947, the United States Naval Expedition known as "Operation High Jump" conducted station-based observations for one month on the coast of Ross Sea at the expedition base, "Little America IV", situated near the previous Little America III Station.

After working more than a year, there was again a break in the American investigations in Antarctica. They were resumed, however, at the end of 1955 while preparing for the International Geophysical Year. The first such station was set up on the shore of Kainan Bay about 30 miles to the east of the place where the stations Little America I, II, III and IV were earlier situated. This station was given the name "Little America V". At the same time, station-based observations were conducted from McMurdo, the main base of the American Antarctic Expedition on Ross Island located in the western part of the Ross Sea. Later, "Wilkes" Station (Wilkes Land), Ellsworth (Filchner Ice Shelf), and the inland stations Amundsen-Scott (South Pole) and Byrd (Marie Byrd Land) were opened, and temporary stations and bases like Rockford, Little Rockford, Beardmore, etc. were set up to aid flights and intracontinental expeditions. Besides, American research workers took part in the station-based observations at Hallett Station, which is considered to be a joint New Zealand-American venture (Table 98).

TABLE 98

US Stations

Name	Period of operation
Amundsen-Scott	from January 1957
Ronne Base	March 1947 to February 1948
Byrd	from February 1957

Contd.

1	2
East Base	March 1940 to March 1941
Little America I	February 1929 to February 1930
Little America II	February 1934 to February 1935
Little America III	February 1940 to February 1941
Little America IV	January to February 1947
Little America V	December 1955 to January 1959
McMurdo	from January 1956
Wilkes[1]	from January 1957
Hallett[2]	January 1957
Ellsworth[3]	February 1957 to December 1962
Eights	January 1963

1. From February 1959 Wilkes Station has been under Australian authority. It is therefore described in Chapter I.

2. Hellett Station is a joint station of USA and New Zealand.

3. From February 1959 Ellsworth Station is under the authority of Argentina. It has accordingly been described in Chapter II.

After the conclusion of the International Geophysical Year the number of American Antarctic stations decreased. On January 1, 1959 scientific observations were discontinued at Little America V Station and in the same year Ellsworth Station was handed over to Argentina while Wilkes Station was transferred to Australia.

All the Antarctic stations of USA, set up at the time of preparation and during the observance of the International Geophysical Year, were constructed and operated by the US Navy and Air Force. The station-based investigations are, however, essentially carried out by civil specialists, whose number is rather small compared to the personnel of the armed services.

The description of Antarctic stations of the USA are available in the books by R. Byrd (some of them have been translated into Russian), F. Ronne and other members of the expeditions. The descriptions of the stations set up during the preparation and observance period of International Geophysical Year as well as in the following years are given in the publications on "Operation Deep Freeze" as well as in the "Bulletins of US Antarctic Projects Office", in the publications of the National Science Foundation, and in the annual reports of the Committee on Polar Research under the National Academy of Sciences (Report on United States Antarctic Research Activities), prepared for the Special Committee on Antarctic Research (SCAR). Besides, observational data and reports on progress of work at the stations are published in various periodicals and other US publications.

AMUNDSEN-SCOTT

Coordinates: Southern Geographical Pole. Lat: 90° S.
Altitude: 2800 m above sea level
Synoptic Index: 89009

The station is located on an even snowy surface of a glacial plateau, at a distance of 1276 km from the coast and 1350 km from McMurdo Station which is the main base of American Antarctic expedition. The thickness of the ice sheet in this region is 2810 m. Thus the bed of the ice sheet at the station is almost at sea level (Fig. 79).

Climatic conditions: The region of the station is characterized by freezing weather throughout the year with moderate winds and moderate cloudiness. Air temperature: Annual average, -49°3C; minimum, -78°9C; maximum, -14°7C. Velocity of wind: Annual average, 6.5 m/sec; maximum 24 m/sec. Predominant direction of the wind: along longitude 20°E. Continuous polar day lasts at the South Pole for six months (from September 22 to March 23). Civil twilight exists for more than a month after sunset and for as long a period before sunrise. The rest of the year is continuous polar night at Amundsen-Scott Station.

Installations: The station consists of 15 prefabricated houses and scientific laboratories. Three of them are used as living quarters, three for administrative purposes, seven as science laboratories and three as storage places. As the station buildings used to be blocked up with snow, the main buildings and laboratories were connected by snow tunnels. A meteorological platform and a landing and take-off strip for planes on skis are laid near the station.

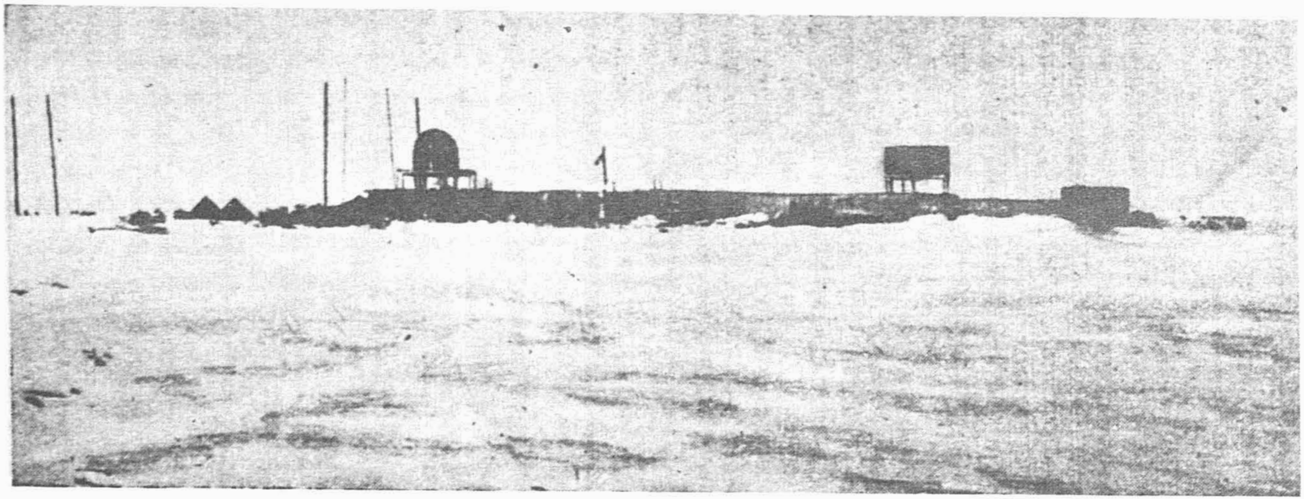

Fig. 79.Amundsen-Scott Station.

Electric Station: Equipment with diesel generators of 90 kw power.

Radio Station: It is equipped with three transmitting sets of 1 kw, 200 watt and 250 watt capacity. In addition there are five mobile radio stations of 100 to 0.25 watt capacity.

Means of Transport: The station has two caterpillar (D2) tractors and two caterpillar amphibian vehicles.

Supply: The station received supplies by air from McMurdo, the main base of the US Antarctic Expedition.

For the first time after R. Amundsen and R. Scott visited the South Pole (end of 1911-beginning of 1912), a team of Americans led by Admiral Dufek landed at the South Pole by airplane on October 31, 1956. Again in November two planes landed at the South Pole, bringing workers, materials and equipment for building construction. The station was formally opened on January 23, 1957. It was named in honor of those who were the first to reach the South Pole -- the Norwegian, R. Amundsen and the Englishman, R. Scott.

The size and composition of the personnel are indicated in Table 99.

TABLE 99

Personnel of the Station

Year	Number of workers.		Director
	Total	Scientific	
1957	18	9	P. A. Siple, Geographer
1958	18	10	R. Morgensen
1959	17	8	I. Posey, Meteorologist
1960	18	9	E. Flowers, Meteorologist
1961	20	10	F. Schwartz, Lieut. Physician B. Harlin, Meteorologist

Contd.

1	2	3	4
1962	22	12	M. Lentz, Lieut. Physician L. Aldaz, Meteorologist

Note: At American Antarctic stations, apart from the scientific director, there is a Head of the station usually from US Navy or Air Force. Therefore, during certain years, two names are mentioned in the Table under the column "Director". The first name will indicate the Head of the station followed by the name of the scientific coordinator.

Principal Scientific Instruments

1. Apparatus for surface meteorological observations
2. Actinometric instruments
3. Radiosondes and equipment for pilot balloon observations (radio-theodolite)
4. Instruments to measure ozone content in the atmosphere (total as well as in the layer close to the ground)
5. Instruments for measuring carbon dioxide content in the atmosphere
6. Instruments to investigate radioactivity in the atmosphere

Ionosphere

1. Equipment for vertical sounding of ionosphere (Ionosonde BS C-3, and C-4 with 10 kw peak power).

Seismology

1. Seismic stations

Geomagnetism

1. Askania Magnetograph
2. Standard low sensitivity magnetograph
3. Portable proton magnetometer
4. Quartz horizontal magnetometers of Danish Meteorological Institute (two)
5. Induction magnetometer of Rusk-field type
6. Visible recording magnetograph

Aurora

1. Automatic camera for photographing the entire sky
2. Patrol spectrograph
3. Equipment for visual observations

Glaciology

1. Standard glaciological equipment
2. Instruments for microscopic research (Chemical analysis of snow and ice, mass spectrometer, etc.)
3. Instruments for studying the deformation of snow blanket and engineering tests

The station also has equipment for microbiology and physiological research.

Scientific Observations

The types of scientific observations carried out at the station are given in Table 100.

TABLE 100
Types of Scientific Observations

Types of observations	Period
Standard surface meteorological observations	from 1957
Actinometric observations	from 1957
Radiosonde sounding of atmosphere (twice in twenty-four hours at 0000 and 1200 hours GMT)	from March 1957
Rawinsonde sounding (twice in twenty-four hours at 0000 and 1200 hours GMT)	from March 1957
Observations of luminescent clouds	from 1957
Gradient observations up to a height of 15 m above snow surface and up to a depth of 2.5 m (continuous recording)	from 1957

Contd.

1	2
Taking samples of air (once in three months) and of precipitations (every month)	from 1957
Measuring total ozone content	from 1959
Measuring ozone near the surface	from 1960
Ozone measurement in a vertical profile (approximately twice a month)	from 1963
Carbon dioxide content estimation	from 1959
Atomospheric radio activity investigations (continuous recording)	from 1959
Vertical sounding of ionosphere at 00, 02, 05, 15, 30, 45, 55 and the 59th minute of every hour with recording on 35 mm film	from July 1957
Observations of hissing atmospherics	from 1957
Continuous monitoring of earthquakes	from July 1957
Registration of geomagnetic field variations	from Jan. 1957
Absolute geomagnetic field measurements	from 1960
Photographing of aurora with automatic all-sky camera	from 1957
Photographing of the auroral spectrum with spectral camera	from 1957
Visual observations of aurora	from 1957
Observations of snow accumulation	from 1957
Observations of temperature of snow-firn	from 1957
Research into the structure of snow-firn	1957, 1958
Observations on movements and deformations of ice	1960-1962
Snowstorm-gaging observations	from 1957

In addition, seismic sounding of the ice sheet, gravimetric observations, as well as a number of biological investigations (influence of Antarctic conditions on microorganisms, life cycle of plants at the South Pole, influence of rotation of the

Earth on certain plant and animal organisms, etc.) were carried out at Amundsen-Scott Station.

In recent years, Amundsen-Scott Station has been used as a base for inland traverse investigations in the Antarctic.

RONNE BASE

Coordinates: Lat. 68°11' S., Long. 67°00' W.

This is a base of the expedition led by Finn Ronne and is situated on Stonington Island in Marguerite Bay, near the west coast of the Antarctic Peninsula. The base was set up in 1940 by R. Byrd's Third Antarctic Expedition (East Base). However, by the time F. Ronne undertook his expedition (1947), its condition had deteriorated and required considerable renovation. F. Ronne's expedition occupied this base from March 12, 1947 to February 20, 1948. In a small bay, at a distance of three miles from the base, also lay the expedition vessel "Port of Beumont".

A meteorological platform was set up on the territory of the base and not far from it a landing and take-off strip for light planes on skis was laid. Ronne's expedition had three planes at its disposal and dog teams were used for surface transport.

Twenty-three persons passed the winter on the base. For the first time in the history of Antarctic research, the winter party included women members. One of them was Mrs. Ronne, wife of the expedition leader while the other one was Mrs. Darlington, wife of the deputy leader and pilot, Darlington.

Surface meteorological, aerological, actinometric, geomagnetic, seismic, glaciological and geological observations, as well as cosmic ray investigations were carried out at the base.

The base was used for extensive ground and air traverse investigations in the southern part of the Antarctic Peninsula and the adjoining territories. These included visual observations, geological and geodetic work as well as aerial photography.

CAPE KEELER

Coordinates: Lat. 68°51' S., Long. 63°13' W.
Altitude: 18 m above sea level

The meteorological field station "Cape Keeler", set up by F. Ronne's expedition, was intended to provide meteorological services to the airplanes. It stood on the eastern coast of the Antarctica Peninsula. Cape Keeler, on which the station was situated, is covered with ice, its surface smoothly rising to the northwest up to a height of about 600 m. Meteorological observations were conducted here from September 30 to December 1, 1947.

PLATEAU

Coordinates: Lat. 68°06' S., Long. 66°24' W.
Altitude: 1765 m above sea level.

"Plateau" was also a meteorological field station set up by F. Ronne's expedition, to aid air flights by providing meteorological services. It stood on the glacial plateau in the central part of the Antarctic Peninsula, between Marguerite Bay and Larsen Ice Shelf. Meteorological observations were conducted from August 28 to December 1, 1947.

BYRD

Coordinates: Lat. 80°01' S., Long. 119°32' W.
Altitude: 1530 m above sea level
Geomagnetic coordinates: Lat. 70°.6 S., Long. 336°.0.
Synoptic Index: 89125.

The inland scientific station "Byrd" is situated in Marie Byrd Land (West Antarctica) and is situated on the level snowy surface of the glacial plateau at a distance of 660 km from the coastline (about 1400 km from the main base of McMurdo). The thickness of the ice sheet in this region is more than 3000 m. The bed of the ice sheet under the station lies at a depth of about 1500 m below sea level.

Climatic conditions: The area of the station is characterized by low air temperatures throughout the year and intense wind velocities. Air temperatures: Annual average, -28.2°C; minimum, -63.2°C; maximum, -0.08°C. Velocity of wind: annual average, 8.5 m/sec; maximum, more than 40 m/sec. Predominant directions of the wind are northern and north-eastern. The continuous polar day at the station extends for about 5 months (from the middle of October to the end of February). The polar night lasts about 4 months (from second half of April to second half of August) interspersed by civil twilight.

Installations: Up to 1962, the station consisted of 12 structures, including prefabricated living houses, scientific laboratories and working rooms. These buildings were covered with accumulated snow and gradually were reduced to such a state that their further use became difficult and dangerous. Therefore at a distance of about 10 km to the south-southeast of the old station a new Byrd Station was built. As distinct from the old station, whose buildings stood on snowy surface, all the main buildings of the new station were at the very beginning built under snow on similar lines as the American military base "Camp Century" in Greenland.

The buildings were located in trenches dug in snow by snowmobiles and were covered on the top with arched metal roofings and thus were transformed into tunnels. The main tunnel, extending from the north to the south, is 200 m long. On both sides, it ends with sloping exits. Perpendicular to the main tunnel, several more tunnels from 100 to 400 m in length were made on both sides. These tunnels contained living quarters, a diesel electric station provided with four diesel generators each of 150 kw power[1], scientific laboratories, radio station, storerooms, workshops, garage, and other service quarters. The ionospheric station is located towards the north of the main building, while the seismic booth is to its east. A meteorological platform was erected on the territory of the station. Above the snow surface rise towers, in which equipment for observations of aurora, aerological sounding as well as a shed for releasing radiosondes are installed (Fig. 80).

[1]The capacity of the electric station was 90 kw at the old station.

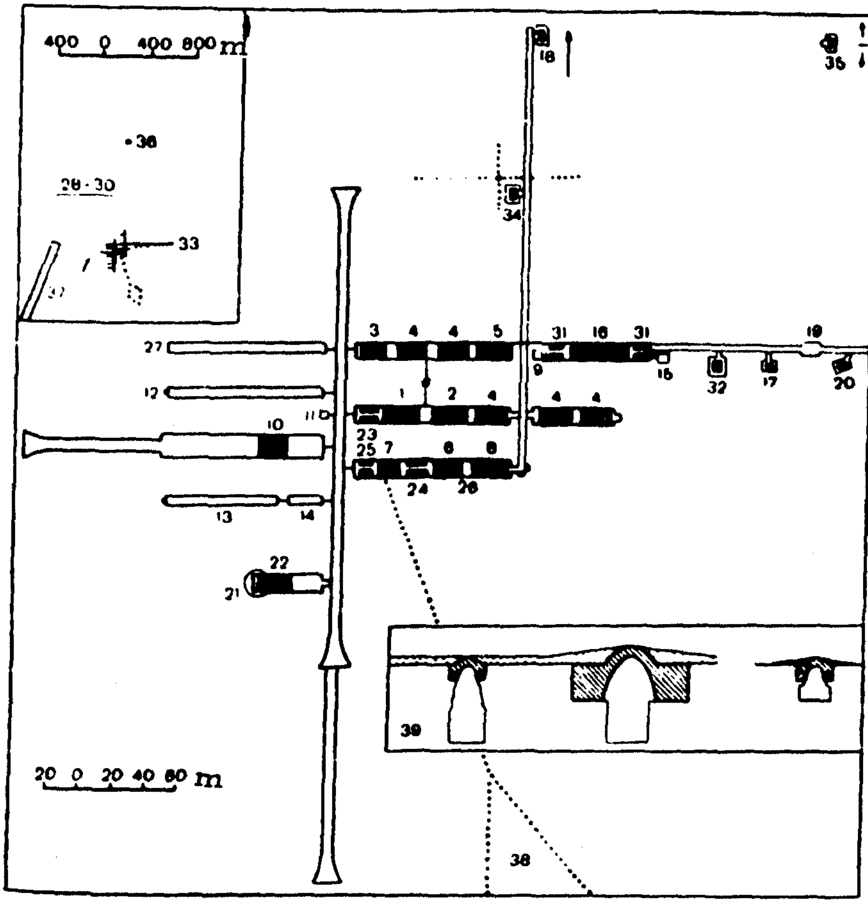

Fig. 80.Plan of Byrd Station.

1 - Dining room and kitchen; 2 - Retiring rooms; 3 - Hospital; 4 - Living quarters; 5 - Laboratory with dark room; 6 - Workshop; 7 - Radio station; 8 - Electric station; 9 - Booth for observing aurora; 10 - Workshop for repairing jeeps; 11 - Cold storage for provision; 12 - Main store; 13 - Tunnel for diesel fuel; 14 - Store; 15 - Place for filling pilot balloons; 16 - Meteorological room; 17 - Aerological booth; 18 - Glaciological laboratory; 19 - Geomagnetic laboratory; 20 - Geomagnetic booth; 21 - Water pipe; 22 - Suction; 23 - Food depot; 24 - Workshop and store; 25 - Store for radio materials; 26 - Tank for diesel fuel; 27 - Garbage tunnel; 28 - Transformer tunnel; 29 - Liquid fuel store; 30 - Fuel suction gallery; 31 - Store for scientific materials; 32 - Seismic laboratory; 33 - Place for seismographs; 34 - Ionosphere laboratory; 35 - Laboratory for observing atmospherics; 36 - Laboratory for observing radio sounds; 37 - Landing and take-off strip; 38 - Antenna; 39 - Vertical section of tunnels containing houses and scientific laboratories and stations.

The old station had two stationary transmitters of 1 kw and 250 to 300 watt power, as well as several portable ones of power ranging from 0.25 watt to 105 watts. At a distance of 300 m to the west of the station, a landing and take-off strip was laid from the south-southwest to the northeast.

In 1959/60 the following means of ground transport existed at the station: two tractors of "Caterpillar D-8" type, one "Caterpillar D-4" type, two amphibian vehicles of "Weasel" type and nine amphibian vehicles of "Snow Cat" type.

Supply: During the International Geophysical Year, airplanes and tractor trains brought supplies from Little America V. It was provisioned in later years by air from the main base of the American Expedition, "McMurdo". The first tractor train arrived at the place of construction of the station on December 16, 1956. Officially the station was opened on January 1, 1957. In December 1960, the construction of the new station was started. On February 13, 1962 when construction was mostly finished, the new station was formally opened and the scientific observations were discontinued at the old station.

The station was named in honor of the famous American Polar explorer and leader of several American Antarctic expeditions, Admiral R. E. Byrd.

The size and composition of the personnel are indicated in Table 101.

TABLE 101

Personnel of the Station

Year	Number of workers		Director
	Scientific	Total	
1957	12	23	G. Toney
1958	10	24	Barnes
1959	10	23	Dr. Wolk, Lieut. Physician
1960	11	21	N. Benes, Meteorologist
1961	10	20	
1962	10	36	L. Martin, Geophysicist
1963	12	36	

Principal Scientific Instruments

Meteorology

1. Apparatus for surface meteorological observations
2. Actinometric instruments
3. Radiosondes and rawinsondes (radio-theodolite)
4. Equipment to measure the content of carbon dioxide in air
5. Equipment to study radiation cooling (radio-meteosondes GMDIA)
6. Equipment to measure vertical distribution of ozone (Dobson's spectrophotometer, and ozone sonde).

Ionosphere

1. Ionosonde (10 kw peak power)
2. Special automatic apparatus for recording "hissing atmospherics"
3. Special automatic apparatus for recording atmospherics

Seismology

1. Seismic apparatus for registration of vertical components (Benioff, Wilson-Lamison, Spregnether)

Geomagnetism

1. Instruments for registration of variations of geomagnetic field (Rusk's magnetograph)
2. Apparatus for absolute geomagnetic field measurements

Aurora

1. Automatic all-sky camera
2. Spectral camera
3. Equipment for visual observations

Glaciology

1. Equipment for standard glaciological observations
2. Equipment for drilling holes in ice
3. Instruments for physical investigation of snow and ice

Besides, the station is equipped for gravimetric, biological and field geological investigations.

Scientific Observations

The types of scientific observations carried out at the station are given in Table 102.

TABLE 102

Types of Scientific Observations

Type of observations	Period
Standard surface meteorological observations	from 1957
Actinometric observations	from 1957
Radiosonde sounding of atmosphere	from 1957
Rawinsonde sounding	from 1957
Observations of luminescent clouds	from 1957
Determination of carbon dioxide content in atmosphere	from 1957
Study of radiational cooling and heating in a vertical profile	from 1960
Determination of ozone (total content and densities in the vertical profile)	from 1962
Vertical sounding of ionosphere	from 1957
Registration of atmospherics with a special automatic apparatus	from 1957
Registration of "hissing atmospherics"	from 1957
Stationary seismic observations of vertical components (N-S and E-W)	from 1957
Continuous recording of geomagnetic field variations (with high-speed magnetograph as well as magnetograph of low sensitivity)	from 1957
Absolute geomagnetic field measurements (weekly)	from 1957
Photographing of aurora with automatic all-sky camera	from 1957
Photographing of auroral spectrum	from 1957
Visual observations of aurora	from 1957

Contd.

1	2
Observations on accumulation of snow	from 1957
Observations of temperature of snow-firn	from 1957
Snowstorm gaging observations	from 1957
Observations of the movement of ice	from 1957
Drilling of a hole to a depth of 330 m and stratigraphic investigation of snow-neve and ice mass	1957-58

Besides, geodetical and gravimetric observations were also conducted at the station. Byrd Station is a base for carrying out extensive investigations on traverses in West Antarctica. Expeditions of tractor trains, which carry out complex scientific observations, including seismic sounding of ice sheet, as well as field magnetic and gravimetric observations are sent out from this base. It is a base for carrying out geological survey for traverse charts and aerial photography.

DELTA SUB-ONE

The field station "Delta Sub-One" was set up for simultaneous observations of aurora from two points. It was situated at a distance of 70 km to the northeast of Byrd Station. Three persons specializing in aurora investigations (the senior one A.E. Gedin) worked at this station in the winter of 1962.

CAMP WASHINGTON

Coordinates: Lat. 85° S., Long. 90° W.
Altitude: about 200 m above sea level

Camp Washington is essentially a geological camp set up in 1958 in the Thiel mountains. It was also used in the summer of 1961/62 in connection with the extension of geological investigations in the Horlick mountains.

CAMP MARUND PARTY

Coordinates: Lat. 75° S., Long. 90° W.

The geological camp "Marund Party" was set up on the Eights Coast while determining traverses in West Antarctica in 1960.

CAMP MINNESOTA

Coordinates: Lat. 73°30' S., Long. 94°35' W.

The geological camp Minnesota was also set up while exploring the new traverses (at the end of the traverse from Byrd Station) in the summer of 1960-61.

EAST BASE

Coordinates: Lat. 68°12' S., Long. 67°03' W.
Altitude: 9 m above sea level

"East Base" was set up by the Third Antarctic Expedition led by R. Byrd on the small rocky Stonington Island situated in Marguerite Bay on the west coast of the Antarctic Peninsula. From the north to the south, Stonington Island extends approximately over 800 m, its breadth being 330 m. The highest point of the island, lying in its south-eastern part, rises 27 m above sea level. The greater part of the island constitutes essentially a rocky surface though there are some parts covered with morainic pebbles and boulders. The island is connected with the mainland by neve which rises up and fuses with the mainland ice sheet. This neve and the steep slope of the glacier serve as a passage to the high mountainous glacial plateau of the central part of the Antarctic Peninsula.

Installations: The main residential building of the base resembles a Pullman car in shape. Besides, several service quarters were constructed on the territory of the base. A meteorological platform was set up near the buildings. At the location Lat. 69°32'S. and long. 66°56' W. and at an altitude of almost 700 m above sea level on the glacial incline, a depot was set up with stores of provisions, fuel and food for dogs.

Means of Transport: One plane, one light tank, one light artillery tractor, and 75 dogs.

The construction of all main structures was completed by the end of April 1940. The main residential building was occupied on March 27. Station-based scientific observations were carried out from March 31, 1940 to March 22, 1941. At the end of March, 1941 the base was closed.

The station was called "East Base" to distinguish it from West Base which was set up by the same expedition on Ross Ice Shelf and was better known by the name of Little America III. Later, in 1947-1948, East Base was used by F. Ronne's expedition. It is also known as "Ronne Base".

Twenty-six persons including six scientific workers stayed here during winter. R. Black was the Director of the station and F. Ronne was his Deputy. Afterwards the latter himself headed another expedition using this as the base.

Observations in meteorology, including measurements of pressure, direction and velocity of wind, temperature and humidity of air, precipitation and various other visual observations were carried out at the station. High-altitude meteorological observations were also conducted during air flights. Besides, samples of air were taken and actinometric observations were carried out. Observations on sea level fluctuations, geomagnetic field variations and glaciological parameters were conducted at the station.

The station served as a base to carry out topographic and geological studies in the southern part of Antarctic Peninsula, as well as to do aerial photography and other reconnaissance observations. Besides, botanical observations (collection of samples of mosses and lichens), observations of seals and other marine fauna, as well as ornithological observations were conducted in the region of the station.

PLATEAU

Coordinates: Lat. 68°07' S., Long. 66°30' W.
Altitude: 1637 m above sea level.

The meteorological field station "Plateau" was located on an ice tableland in the central part of the Antarctic Peninsula at a distance of 22 km to the east-northeast of East Base.

The station was serviced and manned by the personnel from "East Base". From October 26, to December 31, 1940, two persons were working at this station and carried out surface meteorological observations and released 25 pilot balloons. They regularly transmitted meteorological data to East Base twice in every twenty-four hours.

LITTLE AMERICA

Five US Antarctic stations are known by the common name "Little America" and are located on the Ross Ice Shelf in the region of the Bay of Whales and of Kainan Bay. These stations were operated at different times during the period from 1929 to 1958 (Little America I, Little America II, Little America III, Little America IV and Little America V).

The thickness of the ice shelf in the region of the stations was 248 m. The glacier in this region is drifting and moves in the northern direction at a rate of 1.5 m per day. The depth of the sea around here is 630 to 660 m.

Climatic conditions: The climate of the region at the station is characterized by low air temperatures during almost the entire year and by high wind velocities. Air temperature: annual average, -23°.6C; minimum, -61°.1C (August), maximum, 5°.8C (January). Velocity of wind: Annual average, 5.6 m/sec; monthly average 3.9 m/sec (Nov.) to 6 m/sec (July); maximum, more than 40 m/sec. Predominant directions of the wind: easterly, southerly and southwesterly. Days or nights of duration of less than 24 hours are found only during four months in a year at this station. A greater part of the year consists of periods of continuous polar day and continuous polar night. Polar day lasts from October 23 to February 18 and polar night from April 26 to August, 18.

LITTLE AMERICA I

Coordinates: Lat. 74°40′S., Long. 164°03′ W.
Altitude: 9 m above sea level.

Little America I Station was the base of R. Byrd's first Antarctic Expedition. It was built on the Ross Ice Shelf, on the eastern side of the Bay of Whales at a distance of 15 km from the sea.

Installations: Living quarters, a dining room for 40 persons, a "Norwegian house" which in the beginning was intended for machine section, but was later adapted for radio laboratory and a library were built when the station was set up. Several service quarters and scientific hutments were also built at the station. A greater part of these quarters was connected by snow tunnels. It also had an electric station, an establishment for storage batteries and a radio station. The antennas were suspended from three poles of more than 20 m in height (Fig. 81).

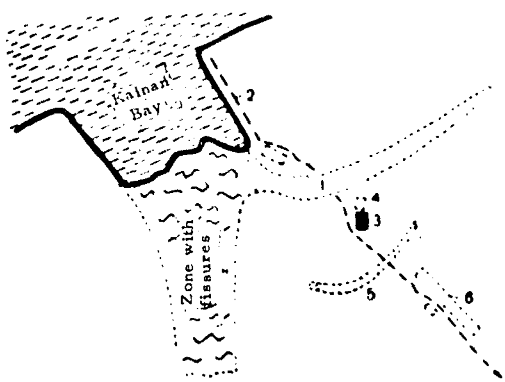

Fig. 81.Plan of Little America I Station.
1 - Flat region with fissures; 2 - Road; 3 - Little America Station;
4 - Place for meteorological observations; 5 - Small flat area;
6 - Airport.

Means of Transport: The station was equipped with three airplanes, one Ford snowmobile (experimental model) and dog teams. The airplanes were also equipped for aerial photography.

The place for setting up the station was selected on January 1, 1929. Immediately after this, unloading of ships and construction of the station buildings started. The station-based observations were commenced on February 16, 1929 and continued up to February 17, 1930. Next day, that is on February 18, 1930, the station was closed.

The team of the station consisted of 42 persons including about ten scientific workers. The rest of them were technical and service staff. The American polar explorer, R. Byrd. was the Head of the station.

Scientific Observations

During the functioning of Little America I Station, a large variety of scientific observations were conducted from it. These included surface meteorological and pilot balloon observations, glaciological, oceanological, biological and geophysical observations.

Little America I Station was a base for doing extensive ground and air traverse investigations. In fact, R. Byrd took off from this station on November 28, 1929 in an airplane and reached the South Pole for the first time. During the traverse investigations, geological, biological, and aerial observations were also carried out.

LITTLE AMERICA II

Coordinates: Lat. $78^{o}40'$ S., Long. $164^{o}03'$ W.
Altitude: 9 m above sea level

Little America II Station was a base of R. Byrd's Second Antarctic Expedition. It was located on the same place where "Little America I" was located. The old base was substantially re-equipped and expanded.

Installations: Several buildings were additionally constructed. These included a new dining room, a house for scientific laboratories, a hutment for observations of meteors, a radio station with living quarters for radio operators, an electric station provided with three generators (each of 2 kw power), two hutments for magnetic observations and a cowshed. The station also had a wind-driven electric generator and a telephone system. A meteorological platform and an air strip were laid in the vicinity of the station.

Means of Transport: One twin-engined plane, two mono-engine planes, and one autogyro were brought to the station.

Besides, two more planes that were left here after R. Byrd's First Antarctic Expedition were also lying at the station. One of them was a three-engined plane while the other was single-engined. Thus there were five planes and one gyroplane at the disposal of the winter party. For ground transport, the station had two light Ford snowmobiles, three citroens and one "snow cruiser"[1] (cletrack) specially manufactured for the expedition with 10-ton load capacity. In addition, dog teams (150 dogs) were also used.

Scientific Observations

The station-based scientific observations at Little America II Station were carried out from February 9, 1934 to February 3, 1935.

The staff of the station consisted of 56 persons. The Head of the station was R. Byrd. When R. Byrd was at the field station "Advance Base", geophysicist Poulter directed the work of the station.

Surface meteorological observations were carried out at the station. Besides, continuous recording of humidity and atmospheric pressure as well as direction and velocity of the wind was made. Twelve hundred pilot balloons were released (3 times in twenty-four hours) and fifty high altitude observations from planes or by means of kite balloons were carried out.

Seismic investigations were mainly conducted during the expeditions undertaken for finding traverses, though some of this work was also carried out at the station.

Magnetic observations included registration of variations in geomagnetic field and absolute determination.

Observations of cosmic rays (for the first time carried out in Antarctica) continued for a total period of about 700 hours by means of an instrument with an ionization chamber.

Visual observations of meteors were conducted with the help of a special device which permitted finding the path of me-

[1] *The "snow cruiser" however belied the expected performance and soon went out of order. (It was put back into operation the following year - Ed.).*

teors by the provisional system of coordinates. These observations were carried out simultaneously at 70 observatories and stations situated at different places on the globe.

Continuous observations of aurora as well as glaciological investigations with special emphasis on the temperature variation of snow with depth were carried out.

Biological investigations included observations of seals, bacteriological analysis of snow, collection of plankton and benthos.

Similar to the First Antarctic Expedition led by Byrd, Little America II Station also served as a base for extensive investigations for locating traverses in the territory of Antarctica, adjacent to Ross Sea. In the course of these investigations, geological investigations in the region of the mountains of Queen Maud Land and Marie Byrd Land, and seismic and magnetic work on the polar plateau were conducted. Determination of the thickness of the ice by means of seismic sounding was also included in the program of work. The station also served as a base for conducting photographic and visual observations from airplanes.

ADVANCE BASE

Coordinates: Lat. 80°08' S., Long. 163°57' W.
Altitude: 85 m above sea level.

The meteorological field station "Advance Base" was set up by R. Byrd on the Ross Ice Shelf at a distance of 175 km to the south of Little America II Station at the southern extremity of Roosevelt Island.

Installations: The structures consisted of one prefabricated fire-proof house of 3 x 4 x 2.5 m in dimensions. It was erected in a deep trench, so that its roof was coincident with the level of snow surface. Two parallel snow tunnels, each 15 m long were constructed adjoining the house. These were used as storerooms. A small generator with petrol engine was installed to supply power to the radio station in one of these tunnels. The house was heated with kerosene stove.

From March 27 to October 11 (August 10? - Ed.), R. Byrd lived alone and carried out meteorological observations (twice in twenty-four hours) as well as visual observations of aurora (4 to 5 times in twenty-four hours) at the station. Byrd's stay at this station narrowly escaped a tragic end. He was poisoned by gases that infiltrated into the house from the fuel and was found in a very serious condition by the party which arrived just in time from the main base.

LITTLE AMERICA III

Coordinates: Lat. 78°35' S., Long. 163°52' W.
Altitude: 9 m above sea level.

The scientific station, Little America III, was one of the bases of R. Byrd's Third Antarctic Expedition (known also by the name "West Base").

"Little America III" was built anew, because the buildings of the earlier expeditions were found to be entirely covered with a very thick layer of snow and all the other installations like antenna poles were severely damaged due to a very uneven drifting of snow. The place for building the new station was chosen nearer the edge of the ice sheet, at a distance of about 5 km to the north of Little America II.

The expedition ships reached the Bay of Whales and began to unload on January 11, 1940 and by January 24, the winter party had already occupied the station quarters. On the same day the ships left towards the north. The observations at the station started on February 1, 1940 and continued up to February 1, 1941 when the station was closed and the entire personnel was transferred to the ship.

The staff of the station consisted of 33 persons, of whom 9 were scientific workers. P. Siple, a biologist (geographer? - Ed.) was the head of the station.

Scientific Observations

Systematic meteorological observations (4 times in twenty-four hours), radiosonde sounding of atmosphere (from April 26, 1940 to January 15, 1941) and pilot balloon observations (from February 1, 1940 to January 29, 1941) were carried out daily. A total of 190 radiosondes were released, their altitudes ranging between 3 and 6 km. Attempts were also made to conduct actinometric observations.

Geomagnetic observations (registration of magnetic field variations and absolute measurements), observations of cosmic rays, aurora and some ionospheric investigations were conducted from the geophysical complex of the station. The observations of cosmic rays were conducted with two automatic instruments (Millikan Neher) from April 27 to September 15, 1940, and with one instrument up to November 16.

Observations of aurora were also made at the station for some time simultaneously from two points, separated from one another by a considerable distance. Photographing of aurora was done with a camera that was attached to a theodolite.

The glaciological work included observations of accumulation of snow and density of its upper layers, crystallographic investigations, and study of stratigraphy of snow-firn (for which a 7 m deep hole was dug), etc.

Oceanographic observations including measurement of temperature of water at different depths were carried out at the station. As in the preceding expeditions, biological research was also carried out in the area of the station. Besides, a study on protective clothes and acclimatization of man to the conditions of Antarctica was conducted.

Little America III served as a base for extensive investigations on traverses in the regions of the Ross Ice Shelf and Marie Byrd Land.

Later, a part of the ice shelf on which Little America III Station was situated split off and moved into the sea. In February, 1963 in the course of a voyage of the American ice breaker "Edisto", the iceberg with the remnants of the buildings of the station was discovered at Lat. 77°32.5 S. and Long. 174°22.5 E which is almost at a distance of 300 miles to the west of its original location on Ross Ice Shelf.

SEISMIC STATION

Coordinates: Lat. 78°06' S., Long. 155°30' W.
Altitude: 390 m above sea level.

During the functioning of the station "Little America III" a temporary seismic station was operated at a distance of 180 km to its east-northeast. The camp "Seismic Station" lay in the central part of Rockefeller Mountains on a small nunatak, later called Mount Franklin. The station-based meteorological observations were conducted from November 1 to December 28, 1940. The seismograph operated for 41 days, from November 17 to December 27. A team of three persons led by R. Fitzsimmons worked at the station.

LITTLE AMERICA IV

Coordinates: Lat. 78°33' S., Long. 163°56' W
Altitude: 9 m above sea level.

The summer tent camp, called "Little America IV", was located on Ross Ice Shelf at a distance of 3 km to the north of Little America III Station. The camp was set up in the course of the American Antarctic Expedition known by the name of "Operation High Jump". The camp served as a base for the central group of the expedition, whose main task was to survey the Ross Sea sector. About 300 persons stayed in the camp. A landing and take-off strip was laid for airplanes.

The station-based meteorological and aerological observations were carried out at the station from January 24 to February 22, 1947. In addition, observations in glaciology and certain sections of geophysics were conducted.

LITTLE AMERICA V

Coordinates: Lat. 78°19' S., Long. 162°22' W.
Altitude: 42 m above sea level.
Geomagnetic coordinates: Lat. 74°.0 S., Long. 312°.0
Synoptic Index: 89162

The coastal station "Little America V" was the main scientific station of USA in Antarctica during the International Geophysical Year.

The station was located on Ross Ice Shelf at a distance of 5 km to the southeast of the Kainan Bay. The buildings of the station stood on an even snowy surface of the ice sheet. The height of the precipitous ice sheet in the Kainan Bay is about 25 to 30 m. Approximately at a distance of 2 km to the north of the station a crevasse-like hollow of 35 m depth passes from the northeast to the southwest.

Installations: There were more than 40 different structures: seven living houses, five service houses, ten structures for scientific and technical requirements, six for housing technical subdivisions, nine for residential and domestic requirements and six for storage (Fig. 82).

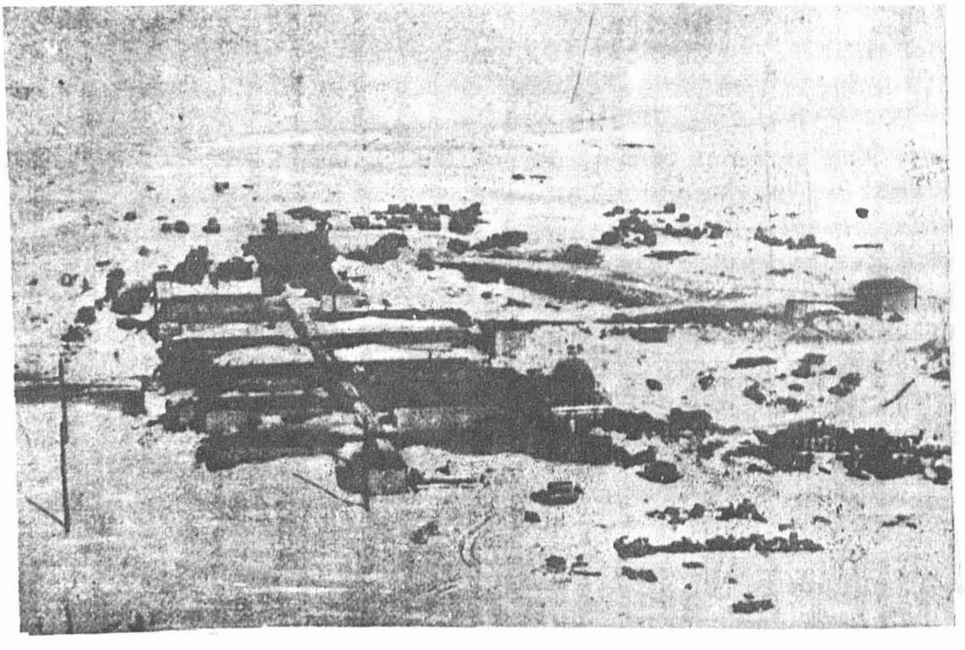

Fig. 82. Little America V Station.

The premises for scientific investigations housed the following: a meteorological station and an IGY weather center, a magnetic observatory, geomagnetic hutment, one physiological and two glaciological laboratories and a laboratory for ionospheric research. In two specially constructed towers, rising above the snow surface, an aerological radiotheodilite and instruments for observations of aurora and atmospheric ozone were installed.

The buildings for technical installations are occupied by transmitting and receiving radio equipment, an electric station, a garage, a service workshop, an electrical workshop and a gas generating plant.

The household and living quarters accommodate a dining room, a kitchen, a hospital, a rest hall, a cinema hall, a store and a church. Three separate sheds are reserved for toilets and showers. Laundry machines and drying cabinets are also installed here. Anticipating heavy snow, the buildings were connected in advance by covered corridors, which were soon transformed into snow tunnels. The main buildings of the station were spread along the principal tunnel. The wooden framework of this tunnel was covered with a thin mesh screen overlain by canvas. The tunnel had two main exits at the end. One more tunnel, 120 m long, led to the buildings of the magnetic observatory. The meteorological platform lay to the north of the station. The electric station was operated with diesel generators.

An air-strip for planes on skis was laid at a distance of 3 km to the northeast of the station. Buildings for the command post, aviation workshops, radio station, radio location equipment and living quarters for aviation crew were located near the air-strip. All the buildings were connected by tunnels, in which two diesel generators (each of 30 kw power) were installed along with an air compressor, storage batteries and a heater. A landing and take-off strip, about 2 km long, was oriented in the direction of 140^{o}-320^{o}. A gasoline tank with a total capacity of 400 thousand liters was located between the station and the aerodrome.

<u>Means of Transport:</u> Four medium planes on skis, two light planes and one helicopter served the station in winter. The means of ground transport consisted of amphibian vehicles of Weasel type, Snowcats and Caterpillar tractors.

Radio Station: Equipped with nine stationary radio transmitters of 1 to 15 watt power, and two stationary direction-finding instruments. In addition, there were several mobile radio stations of power 0.25 watt to 125 watts and a mobile direction-finding unit.

Little America V Station was opened on December 29, 1955 and continued to operate up to the end of the International Geophysical Year. Systematic scientific observations at the station were conducted up to December 31, 1958. The station was closed in early January 1959.

During the IGY period, representatives of other countries were also included among the scientific workers at the station. Representatives of Argentina and USSR participated in 1957 while representatives of Australia, Argentina, USSR and France participated in the year 1958. Capt. Mayer, Chief of the forces in charge of provisioning the Antarctic stations of USA, stayed at the station in the winter of 1958.

The size and composition of the personnel are indicated in Table 103.

TABLE 103

Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
1956	72		
1957	109	24	A. Crary, Glaciologist
1958	109	24	Thompson, Lieut. Commander A. Crary, Glaciologist

Principal Scientific Instruments

Meteorology

1. Apparatus for surface meteorological observations
2. Actinometric instruments

3. Radiosondes and rawinsondes (Army radiolocation unit for radio-pilot observations)
4. Projector
5. Apparatus for continuous measurement of carbon dioxide content in the air
6. Apparatus for measuring radioactivity of impurities in the air
7. Dobson's spectrophotometer for measuring the total content of ozone in the atmosphere
8. Automatic ozone gage for local measurements close to the ground.

Ionosphere

1. Barker and Williams Ionosonde

Geomagnetism

1. Rusk's fast and slow response magnetographs
2. Standard variometer and magnetometer (Visicorder).
3. Magnetometer for absolute measurements.

Aurora

1. Camera for photography of aurora
2. Petrol spectrograph
3. Spectrometer
4. Radar equipment
5. Equipment for visual observations of aurora

Glaciology

1. Standard glaciological equipment
2. Device for observations of accumulation of snow
3. Equipment for observation on glacier deformations and movement
4. Drilling equipment

Oceanography

1. Gravimeter for observations of fluctuations in sea level

2. Nansen's bathometer and tilting thermometers
3. Ecknaan's current gages

In addition, the station was equipped with instruments for medical research as well as for glacial and geophysical investigations, which were carried out during investigations on traverses.

Scientific observations

The types of scientific observations carried out at the station are given in Table 104. Little America V Station served as the weather center in Antarctica during the International Geophysical Year. It also served as the base for extensive investigations on traverses on Ross Ice Shelf and Marie Byrd Land.

Sledge caterpillar trains proceedings from this station enabled the construction of Byrd Station. Supply of provisions to Byrd Station in 1957-1958 was also carried out from Little America V Station.

MICHIGAN

"Michigan" is the glaciological station of the University of Michigan and is situated approximately at a distance of 40 km to the north of Little America V Station and was built on the ice shelf in the vicinity of the crevasse. During the summer of 1958/59 petrographic investigations of ice and some other studies connected with the deformation of glaciers were made at the station.

TABLE 104

Types of scientific observations

Type of observations	Period
Standard surface meteorological observations	1956-1958
Actinometric observations	1957-1958

Contd.

1	2
Radiosonde sounding of atmosphere (twice in twenty-four hours)	1956-1958
Rawinsonde sounding (twice in twenty-four hours)	1956-1958
Gradient observations	
Observation of luminescent clouds	1957-1958
Measurement of ozone content in the layer close to the ground	1957-1958
Total ozone content measurement of the atmosphere with Dobson's instrument (intermittently)	1957-1958
Measurement of carbon dioxide content in air	1957-1958
Observations of particle radioactivity in the atmosphere	1957-1958
Sampling of atmospheric dust	1957-1958
Sampling of snow for chemical analysis	1957-1958
Vertical sounding of ionosphere	July 1957 to December 1958
Continuous registration of variations in geomagnetic field with fast-response magnetograph as well as with slow-response magnetograph	July 1957
Absolute geomagnetic field measurements (weekly or more often)	December, 1958
Registration of variations in the geomagnetic field with visual recording magnetograph	May, 1957 to December 1958
Photographing of aurora with an all-sky camera	1957-1958
Spectral observation of aurora with spectrograph and spectrometer	1957-1958
Visual observations of aurora	1957-1958
Observations of accumulation of snow	1957-1958
Temperature observations	1957-1958
Observations of formation of snow surface	1957-1958
Physical investigations of snow and ice	1957-1958
Snow-gaging observations during snow storms	1957-1958

Contd.

1	2
Observation of deformation and movement of the ice shelf	1957-1958
Drilling of holes in the ice shelf to a depth of 244 m for stratigraphic investigations, study of thermal properties of the ice shelf, etc.	1958
Observation of sea level fluctuations	June-July 1957
Hydrological studies	April-Sept. 1957
Sampling of water and temperature measurement at various levels	April-Sept. 1957; July, 1958
Measurement of currents with the help of wind vane	April 1957-April 1958
Investigations on acclimatization of man to the conditions of Antarctica	1957-1958
Psychological investigations	1957-1958
Stomatological investigations	1957-1958

ROCKFORD

Coordinates: Lat. 79° 35' S., Long. 152°56' W.
Altitude: 70 m above sea level.

The seasonal meteorological station "Rockford" was set up by the US expedition on a gentle slope of the plateau of Marie Byrd Land, in the vicinity of the eastern border of Ross Ice Shelf. The station was opened on November 20, 1958 and functioned during every summer, until another seasonal station "Little Rockford" was set up. Regular surface meteorological observations necessary to aid air flights from Little America V Station to Byrd Station were carried out at the station. Besides, it served as an intermediate base for sledge-tractor trains that had to run on this traverse.

MCMURDO

Coordinates: Lat. 77°51' S., Long. 166°37' W.
Altitude : 26 m above sea level
Synoptic Index: 89664

McMurdo Station has been the main base for all the US Antarctic Expeditions undertaken after the International Geophysical Year.

The station is built on the Hut Point Peninsula on the shore of Ross Island, in the southwestern part of Ross Sea. The station is situated on an outcrop of bedrock and is protected from the south, west and east by massive mountains. The nearest hillocks are 300 to 700 m high. Further to the east lies the active volcano Erebus, which is 3742 m high (Fig. 83).

Climatic conditions: The climate in the region of McMurdo Station exhibits essentially the same features as the climate of the Antarctic coastal zone. Almost throughout the year, temperatures below $0^{o}C$ and strong winds prevail. Air temperature: annual average, $-17^{o}.7C$, minimum, $-50^{o}.6C$; maximum, $5^{o}.5C$; Velocity of the wind: annual average, 6.3 m/sec; maximum, more than 40 m/sec. The continuous polar day in the region of the station lasts from October 27 to February 15, while polar night lasts from April 20 to August 19.

Fig. 83. McMurdo Station.

Installations: The settlement of McMurdo Station consists of approximately 125 houses of various types. Living summer houses (mainly of hemispherical shape) are assembled with hard wooden frames covered with many layers of tarpaulin. These houses are heated with oil heaters. The winter houses have been assembled with insulating sheets paneled with fire-proof materials.

There are 11 storerooms in the settlement. These are assembled from semicylindrical corrugated iron sheets. The useful area of each store is about 350 to 400 m^2. In addition, there are two refrigerators for stocking provisions. Twelve tanks, each of 1250 m^3 capacity were constructed on and around the settlement for storing liquid fuel. There are workshops in the settlement for servicing ground transport equipment. The residential space at McMurdo Station is sufficient to accommodate 1400 persons. Most of the buildings are linked up by telephone lines.

Electric station: The diesel electric station of the settlement is of 400 kw capacity. An atomic power plant of 1500 kw was erected in 1962. The reactor of the station lies in rocky ground at a depth of 11-12 m. The plant is situated at a height of 100 m and at a distance of 0.5 km from the settlement. The power plant is operated by remote control.

The special feature of the atomic power plant is that it is assembled from individual blocks weighing 10-12 tons which can be air-lifted whenever replacement is necessary. Radioactive shielding consists of steel, lead slabs, water and soil. The station requires the services of only two or three experts. The period of exploitation of one core charge is two years. Radioactive waste after electric vaporization is to be carried away to USA in special containers.

Means of Transport: There are a large number of four-seater "Weasel" amphibian vehicles, dump trucks, lorries, motor-loaders, as well as caterpillar tractors of various types and "Snow Cats". Bulldozers are used for construction work and for clearing the snow. An aerodrome has been set up at a distance of 6 km from the station on the ice sheet of a small inlet of McMurdo Sound. A landing spot has been prepared for helicoptors on the territory of the station. Four planes, namely "Hercules", "Neptune", "Dakota" and "Beaver" (Otter ? -Ed.) and some helicoptors are stationed at this aerodrome from 1962.

A special building was set apart for aerological instruments and a radiolocator. A special laboratory with 120 m^2 of floor space is equipped for conducting biological research.

Observations of cosmic rays are made from a small building situated at a distance of about 100 m from the settlement.

The size and composition of the personnel are given in Table 105.

TABLE 105

Personnel of the Station

Year	Number of workers		Director
	Total	Scientific	
1956	93	-	
1957	87	-	
1958	112	-	
1959	135	1	
1960	130	3	
1961	145	10	L. Helms, Lieut. Commander G. Mayer, Biologist.
1962	200	8	D. Breshnahan, Commander Bettle, Meteorologist
1963	227	20	R. Marvell, Commander R. Briggs

Principal Scientific Instruments

Meteorology

1. Apparatus for surface meteorological observations
2. Radiosondes and rawinsondes

Ionosphere

1. Riometers

Cosmic Rays

1. Neutron monitor
2. Meson telescope
3. Equipment for studying the dynamics of glacier

Glaciology

1. Standard glaciological equipment
2. Equipment and instruments for investigations of the thermal properties of glacier.

Oceanography

1. Equipment for carrying out a variety of observations and measurements of oceanographic parameters

In addition, the station was equipped with instruments for biological investigations, as well as for carrying out investigations on traverses.

Scientific Observations

The various types of scientific observations carried out at the station are given in Table 106. In addition, several biological and geological investigations were carried out at McMurdo Station. The station is also a base for conducting extensive investigations on traverses in Ross Ice Shelf, Victoria Land and other neighbcring regions.

TABLE 106

Types of Scientific Observations

Type of observations	Period
Surface meteorological observations	from 1956
Radiosonde sounding of atmosphere	from 1956

Contd.

1	2
Rawinsonde sounding	from 1956
Observation of absorption of radio waves in ionosphere	from 1962
Continuous monitoring of cosmic rays by means of multisectional neutron monitor and meson telescope	from 1960
Standard glaciological observations	from 1957
Observation of the movement of the glacier	-
Stratigraphic investigations of ice shelf	-
Glacio-geomorphological observations in the region of the station	1960
Standard oceanographical observations at hydrological stations	1960

BEARDMORE

Coordinates: Lat. 83°17' S., Long. 175°45' E.
Synoptic Index: 89677

The seasonal meteorological station "Beardmore" was set up on the Ross Ice Shelf at the foot of Beardmore Glacier, and was meant to attend to the airplanes flying from McMurdo Station to Amundsen-Scott Station.

Installations: The buildings of the station consist of three small prefabricated houses of 'Jamesway' type which are used for living purposes as well as for housing the electric station and the radio station.

The station was opened on October 28, 1956 and functions every year between October and March. During its operation, regular surface meteorological observations (once in 3 hours) and release of radiosondes from time to time, are carried out at the station. The staff of the station consists of 3 to 6 persons.

LITTLE ROCKFORD

Coordinates: Lat. 79°16' S., Long. 147°30' W.
Altitude: 603 m above sea level.
Synoptic Index: 89153

Little Rockford is a seasonal meteorological station situated on Marie Byrd Land on the slope of the glacial plateau, that descends down gently to the western border of the Ross Ice Shelf. It is intended for attending to airplanes flying from McMurdo Station to Byrd Station.

Installations: The buildings of the station consist of three small prefabricated houses of 'Jamesway' type which include living quarters, an electric station, and a radio station.

The station functions from October to March every year. During this period, regular surface meteorological observations (once in 3 hours) and release of radiosondes from time to time, are carried out at the station.

The staff of the station consists of 4 to 6 persons.

MARBLE POINT

Coordinates: Lat. 77°25' S., Long. 163°45' E.

Marble Point Camp was set up on the shore of McMurdo Sound at a distance of approximately 80 km to the northwest of McMurdo Station. The camp is located at the northern end of the long narrow strip of the ice-free ground, about 15 km long and 2 km wide, stretching to the north of Gneiss Point. Several streams of thawed water, starting at the end of the glacier, cross the strip. Besides, there are a few small lakes on it. Bordering to the west of this strip is the steep Wilson Piedmont Glacier, which is about 30 m high. Still further, the surface of the glacier rises up steeply to a height of more than 300 m.

A team of 27 workers laid a 366 m long air strip for landing and take-off at the station in 1957. The first plane landed on the strip on January 31, 1958. Marble Point Camp is used to carry out geological, biological, and other investigations in this region.

WILKES

Coordinates: Lat. 66°15' S., Long. 110°32' E.
Altitude: 10 m above sea level.
Geomagnetic coordinates: Lat. 77 .8 S., Long. 179°.0.
Synoptic Index: 89611

Wilkes Station was set up by USA in 1957. In 1959, it was handed over to Australia.[1]

HALLETT

Coordinates: Lat. 72°18' S. Long. 170°18' E.
Altitude: 5 m above sea level.
Geomagnetic coordinates: Lat. 74°.6 S., Long. 278°.1E
Synoptic Index: 89671.

Hallett Station is a joint station of USA and New Zealand[2].

EIGHTS

Coordinates: Lat. 75°14' S., Long. 77°10' W.
Altitude: 458 m above sea level.

Eights is an inland scientific station situated on Ellsworth Land at the base of the Antarctic Peninsula. The station lies on an even snowy surface of the ice sheet. The thickness of ice in the region of the station is about 2000 m and bedrock lies about 1500 m below the sea level. The station was set up at a distance of more than 1100 km from Byrd Station and more than 2500 km from McMurdo Station. The shortest distance from the station to the coast is about 180 km (Fig. 84).

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[1] *The description of the station is given in Chapter I entitled 'Scientific Stations of Australia'.*

[2] *The description of the station is given in Chapter VI entitled 'Scientific Stations of New Zealand'.*

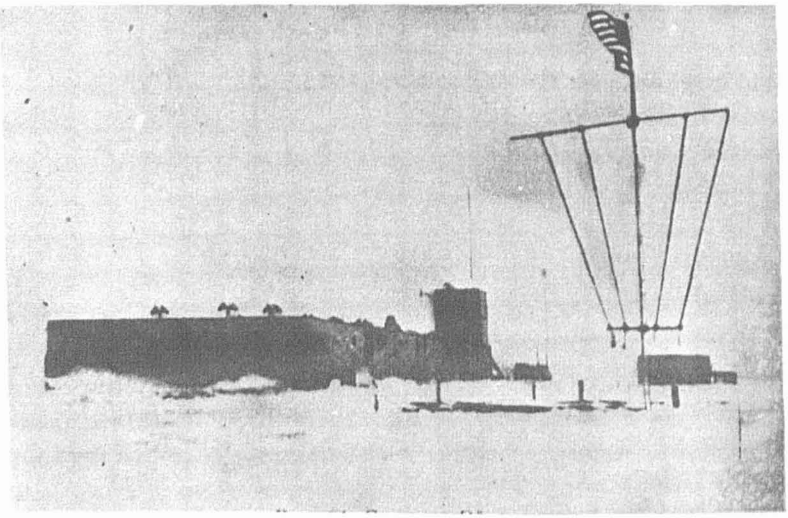

Fig. 84. Eights Station.

Climatic conditions: Freezing weather throughout the year is characteristic of the region of the station. Air temperature: Annual average -27°C, minimum -61°.1C, maximum 2°.2 C. Average velocity of the wind about 5 m/sec.

Installations: The buildings of the station consist of 11 different structures of prefabricated type, brought to the station by planes. They comprise living quarters, electric station, radio station, scientific laboratories and other domestic and service quarters. The station was named to honor the memory of James Eights, the first American naturalist who visited Antarctica at the beginning of the 19th Century.

At the end of November, 1961, a seasonal summer station, which was known by the name of Sky-Hi, was set up in this region using airplanes. The landing area was prepared by the crew of the Dakota plane which had come from Byrd Station. Later, materials, fuel, and personnel for this seasonal station were flown by heavy planes from McMurdo Station.

Up to February 8, 1962, the personnel belonging to the National Bureau of Standards, United States Coast and Geodetic

Survey and US Weather Bureau (Two ionospheric physicists, a meteorologist, a geomagnetician and an engineer) worked at the station and the team was directed by W.F. Johnson, the meteorologist. In addition, the station had six attendants from the Navy.

The scientific station Eights was officially opened on January 27, 1963. The winter party consisted of 6 scientists and 5 attendants (from Armed Forces).

Observations on meteorology, physics of ionosphere, geomagnetism, aurora and radio propagation phenomena are conducted at the station.

ELLSWORTH

Coordinates: Lat. 77°43' S., Long. 41°07' W.
Altitude: 40 m above sea level.
Synoptic Index: 89043

Ellsworth Station was set up by USA in 1957. In 1959 it was transferred to Argentina[1].

BASE A

Coordinates: Lat. 80°03' S., Long. 54°32' W.
Altitude: 73 m above sea level.

The field camp "Base A" lies at the extreme point of the sledge caterpillar train route of the US Antarctic Expedition over the Filchner Ice Shelf. The train left Ellsworth Station on October 28, 1957, but on January 17, 1959, the members of the expedition were taken to Base A by airplanes. Base A was the point from where seismic and gravimetric observations were conducted.

LASSITER

Coordinates: Lat. 82°28' S., Long. 52°17' W.
Altitude: 520 m above sea level.

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[1] *The description of this station will be found in Chapter II entitled "Scientific Stations of Argentina".*

The field camp "Lassiter" was also set up during the tractor train trek of the US Antarctic Expedition over the Filchner Ice Shelf, in the summer of 1957/58. The train had to stop here until December 10, when it received replenishments of fuel and provisions by air. During the sojourn of the train, gravimeteric observations were conducted.

AUTOMATIC RADIO-METEOROLOGICAL STATIONS

In recent years the US Antarctic Expedition has started using automatic radio-meteorological stations of the "Grasshopper" and "Pinball" type. Such stations were installed at five points on an experimental basis (Table 107) in the summer of 1961-62.

TABLE 107

Automatic radio-meteorological stations of USA set up in 1961-62.

Coordinates		
South latitude	Longitude	period of work
79°45'	175°00' W	October 11 to December 2
83°18'	176°00' E	October 25 to November 3
78°14'	161°55' W	December 4 to February 12
78°03'	158°15' E	December 19 to January 23
81°30'	167°35' E	January 25 to November 17.

An atomic-powered automatic radio-meteorological station was installed on February 8, 1962 on Ross Ice Shelf at a distance of 100 km to the south of McMurdo Station. A cylindrical container weighing 1 ton with the atomic generator working on strontium-90 was sunk in snow to a depth of 2.5 m. This is supposed to work for ten years without refueling and requires servicing attention once in two years only. It transmits information about temperature, atmospheric pressure, direction and velocity of the wind to McMurdo Station once in every 3 hours.

CHAPTER X

SCIENTIFIC STATIONS OF FRANCE

The first French Antarctic scientific station was set up by the French Antarctic Expedition led by J. Charcot on the western coastline of the Antarctic Peninsula in 1904 (Table 108).

TABLE 108

Scientific Stations of France

Name	Period of work
Dumont d'Urville	from April 1, 1956
Port Alfred	from May 1, 1962
Port Martin	February 3, 1950 to January 2, 1963.
Port-au-France	from January 1, 1950
Port Charcot	March 4, 1904 to December 25, 1904
Port Circoncision	February 3, 1909 to November 26, 1909
Charcot	April 1, 1957 to December 31, 1958

During the wintering period which continued up to the end of 1904, the personnel of the expedition made a variety of scientific observations. In 1909, the Second French Antarctic Expedition led by J. Charcot spent the winter on Petermann Island near the northwestern extremity of the Antarctic Peninsula and conducted a series of observations.

The second stage in the French Antarctic investigations was begun in 1947, when a committee "Expéditions Polaires Françaises" or as it is otherwise called "Paul Emile Victor Mission" was set up in Paris on the initiative of Paul Emile Victor. This committee is under the authority of a special organization called "French Antarctic and Southern Lands" which is a joint organ of the "Ministry of Colonies and Overseas Territories" and the "French Academy of Sciences".

The committee "Expeditions Polaires Françaises" organizes scientific research in the Arctic (Greenland) and the Antarctic. The first Antarctic station, opened by this committee was Port Martin, set up on Adélie Land in the beginning of 1950. Within a year the station was destroyed by fire and was consequently shifted a little to the west, to one of the islands of "Géologie Archipelago" where observations were carried out according to the reduced program for one more year.

At this time, the Ministry of Colonies and Overseas Territories, jointly with the Government of Madagascar, organized an expedition led by P. Sicot to set up permanent scientific stations on the islands of Kerguelen and Crozier. The station on Kerguelen Island (Port-au-France) was opened on January 1, 1950 and it is functioning without a break ever since. At the beginning of the International Geophysical Year, the French National Committee was set up in France for Antarctic investigations, with research activity in Antarctica being one of its main responsibilities.

On April 1, 1956, the scientific station "Dumont d'Urville" was opened on Adelie Land in the usual region of French Antarctic investigations. This is the main base for the team of "Expéditions Polaires Françaises". At a distance of 300 km from the coast, the inland station of Charcot was set up for the IGY period (1957-58).

In the summer of 1961/62 the scientific station, "Port Alfred", was set up on Possession Island, which is one of the Crozier group of islands. It is under the authority of the organization called "French Antarctic and Southern Lands".

The results of the scientific investigations of France in Antarctica are published in the publications of the French Academy of Sciences (Comptes Rendues des Sciences de l'Académie des Sciences), Bulletin of French Antarctic and Southern Lands (Bulletin T. A. A. F.), periodicals of the National Center of Scientific Research (Centre National de la Recherche) and in various other publications.

DUMONT D'URVILLE

Coordinates: Lat. 66° 40' S, Long. 140° 01' E
Altitude: 40 m above sea level
Geomagnetic Coordinates: Lat. 75°.5 S, Long. 230°.8
Synoptic Index: 95502.

Dumont d'Urville Station is a permanent Antarctic base of the mission "Expéditions Polaires Françaises" (Paul-Emile Victor Mission).

The station lies on Petrel Island, one of the fairly large islands of Géologie Archipelago, in the western part of d'Urville sea, on the coast of Adelie Land. The coast of the mainland in this region consists of a precipice of ice shelf, marked by small outlet glaciers and occasional bedrocks. The largest glacier, namely Astrolabe, glides into the sea in the region of long. 140°E. Petrel Island is about 800 m long stretching from the northwest to the southeast, and lies at a distance of about 1 km to the west of the northwestern border of the glacier Astrolabe. The central part of the island is free of ice blanket, and its surface is an alternation of moderately high rocky hillocks (from 40 to 45 m above sea level) and depressions covered with pebbles and stones (Fig. 85).

The structures of the station are erected in the northern part of the island at a distance of 300 m from the coast, on a relatively level surface, composed of granites and granite-cum-gneisses.

Climatic conditions: Air temperature: annual average - 10°.1 C; maximum, - 7°.4C; minimum, - 36°C. Velocity of wind: annual average, 7.1 m/sec, maximum, 32.9 m/sec.

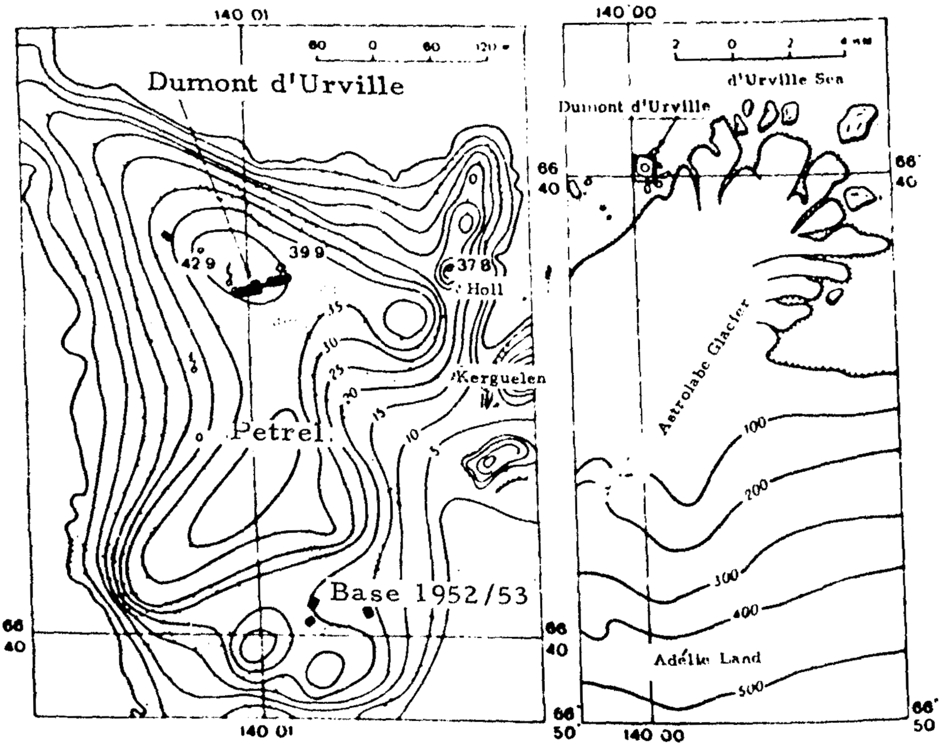

Fig. 85.Region around Dumont d'Urville Station.

Installations: The station consists of 14 buildings including a main building, science laboratories, and other subsidiary quarters.

Electric Station: Capacity 60 kw.

Means of transport: There are Weasel type amphibian vehicles and Snow-Cats. Helicopters are also used at the station in the summer.

Supply: The station is provisioned by the ships "Norsel" and "Magga-Dan".

Dumont d'Urville Station was opened on April 1, 1956 and was named in memory of the famous French navigator and leader of the French Antarctic Expedition of 1837-1840. The size and composition of the personnel are indicated in Table 109.

TABLE 109

Personnel of the Station

Period	Number of workers		Director
	Total	Scientific	
1956	14	5	R. Gilland
1957	20	11	B. Imber, Seismologist
1958	20	12	Rouilland, Gravimetric expert
1959	12	7	R. Merle, Radio operator
1960	14	7	A. Faurie, Meteorologist
1962	19	19	R. Merle, Radio operator
1963			

Principal Scientific Instruments

Meteorology

1. Apparatus for conducting surface meteorological observations.
2. Equipment for conducting pilot ballon observations.
3. Rawinsondes (Radio-theodolite Metox 400 MH with telecontrol).
4. Actinometric instruments.
5. Volumetric pump "Dolley" and filter (10 cm^2).
6. Apparatus for CO_2 measurements in the air.

Ionosphere

1. Apparatus for measuring radioactivity in precipitations.
2. Automatic Ionosonde, type CNET-SP35/16 (recording on 35 and 16 mm film).

Seismology

1. Two long-period (10 to 12 sec.) seismographs of Galitzene Wilp m. Askania system (horizontal components)
2. Short-period (1.5 sec.) seismograph of APY system (vertical component).

Geomagnetism

1. Magnetograph type La-Kura, of low sensitivity.
2. Instruments QHM and BMZ.
3. Fluxmeter of Selzer system.
4. Photoelectric magnetograph.

Aurora and Night Sky

1. All-sky camera of Paillard H16 type
2. Zenith polar photometer on 8 colors
3. Two spectographs (on violet and red wavelengths of the spectrum).
4. Radiolocator for locating aurora

Terrestrial currents

1. Equipment for measuring terrestrial currents.

Glaciology

1. Instruments for conducting observations on accumulation of snow, density and temperature of snow and firn.
2. Snowstorm-gaging equipment.

Oceanography

1. Tide gage "Cant-Chamond Granat".

Apart from the equipment listed above, the station was equipped with instruments for conducting biological, geological and geodetic investigations.

Scientific Observation

The various types of scientific observations carried out at the station are given in Table 110.

TABLE 110

Types of Scientific Observations

Type of observations	Period
Surface meteorological observations	from 1956
Actinometric observations (total and direct radiation)	from 1956
Pilot balloon observations	from 1956
Rawinsonde sounding of atmosphere	from 1956
Ozone measurements	1958-1962
Study of aerosols	from 1961
Study of the radioactivity of precipitations	from 1961
CO_2 measurements in the air	from 1961
Oblique sounding of ionosphere	1957 to 1958
Vertical sounding of ionosphere	from 1956
Continuous registration of earthquakes	from 1957
Registration of variations in the geomagnetic field	from 1957
Absolute geomagnetic field measurements	from 1957
Photographing of aurora	from 1957
Spectrography of aurora	1957 to 1959
Visual observation of aurora	from 1957
Radiolocational observation of aurora and meteors	1957 to 1958
Registration of terrestrial currents	from 1958
Observations on accumulation of snow	1956
Stratigraphy of snow and firn and temperature observations	from 1956
Snowstorm-gaging observations	1956 to 1957
Observation of sea-level fluctuations	from 1957
Observation of birds and seals	from 1956

Dumont d'Urville Station is also used for conducting extensive geological and geodetic investigations on Adelie Land.

PORT ALFRED

Coordinates: Lat. 46°26'S., Long. 51°52' E.
Altitude: 3m above sea level.

Port Alfred Station is under the control of the organization "French Antarctic and Southern Lands".

The station is located in the eastern part of Possession Island, which is the largest of the Crozier Islands, lying in the central part of the Indian sector of the Southern Ocean. Possession Island is hilly, the Mount Mascarene being the highest (954 m). It is situated in the southern part. The tops of the mountains are covered with snow. The shore of the island, throughout its length, is high and steep. The lower parts of the island are swampy.

The station is situated at the top end of Marin Bay, that juts into the east coastline of the island. The station buildings are situated on the gravel section of the shore of a small inlet Navire, at the place where the River Kemp falls into it (Fig. 86).

Installations: The station consists of six to seven small houses, a mooring place, and a meteorological booth, laid at a height of 31.3 m and at a distance of 100 m to the south of the main station structures.

The station was opened on January 5, 1962.

Scientific Observations

The various types of scientific observations carried out at the station are listed in Table 111. In summer, Port Alfred Station serves also as a base for conducting geological and geodetic investigations on the island.

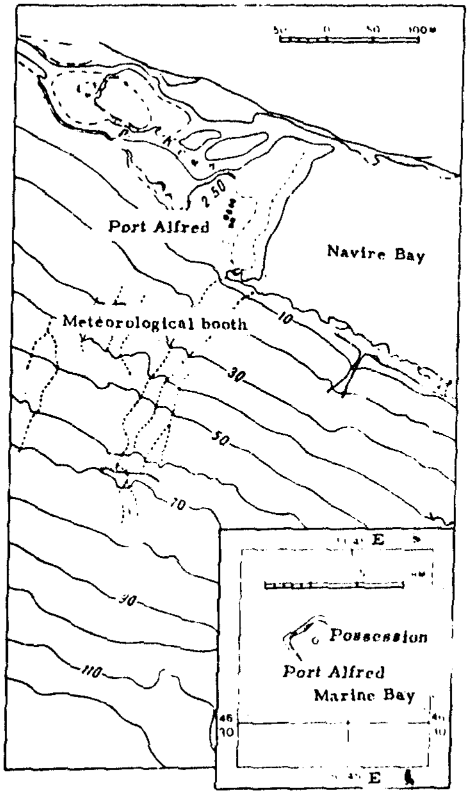

Fig. 86.Region around Port Alfred Station.

TABLE 111

Types of scientific observations

Type of observations	Period
Surface meteorological observations	from 1962 onwards
Gravimetric observations	1962
Zoological and botanical observations	from 1963 onwards

PORT MARTIN

Coordinates: Lat. 66°49' S, Long. 141°24' E.
Altitude: 14 m above sea level.

Port Martin Station is a base of the commission "Expeditions Polaires Francaises".

The station lies on Adelie Land, in the southeastern part of Martin Bay, situated between Découverte Cape and Jules Cape. The eastern part of the Martin Bay is full of numerous rocky Curzon islets, spread up to 2.5 miles from the coast, and the height of whose cliffs ranges from 30 to 50 m (Fig. 87).

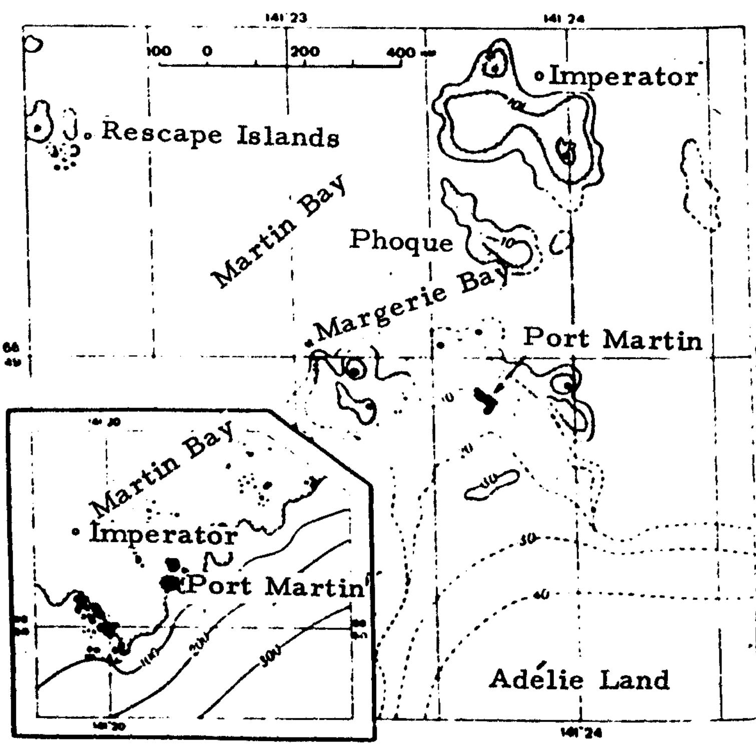

Fig. 87.Region around Port Martin Station.

The high glacial plateau in this region smoothly descends to the north and very often terminates in 30 to 40 m high glacial cliffs. At many places along the coast low rocky capes jut out from under the ice sheet. The station is built on one of these capes called Margerie Cape.

Margerie Cape, whose maximum width is about 800 to 900 m, lies at a distance of about 10 km to the southwest of the Cape of Découverte. It is flanged by rocky isles on the north and by the 90 m high Mount Lacroix (that skirts the Zelee glacier in the east) from the southwest.

The structures of the station are located on the northeastern part of the Margerie Cape. They are protected from the strong and frequent winds by the moderately high rocky peaks and the glacial incline.

Climatic conditions: Air temperature: annual average, -11°.4C; minimum, -34°C; maximum,+4°C. Velocity of wind: annual average, 18.5 m/sec, maximum, 45 m/sec. Predominent directions of the wind: southeast and south-southeast.

Installations: The houses included a main wooden barrack in which living rooms, radio station, kitchen, laundry, photo-laboratory and scientific laboratories are housed (Fig. 88). This main building was connected by a covered corridor with another house in which an electric station, a gas generating plant, some equipment and some smaller storerooms were housed. To the south of the main barrack, a small standby house was built to accommodate the radio equipment, medical and scientific instruments and spare provisions. An astronomical observatory, magnetic and seismic sheds, 8-meter tower for the weather vanes, anemometers and radio aerials (11 and 20 m) were installed a little farther.

Electric Station: It was provided with three diesel generators and two wind-driven generators (which however were damaged by strong winds and were disabled soon after installation).

Means of Transport: These consisted of "Weasel" type amphibian vehicles, a motor boat, and dog teams.

The station was opened on February 3, 1950 but all the structures of the station were almost completely destroyed by

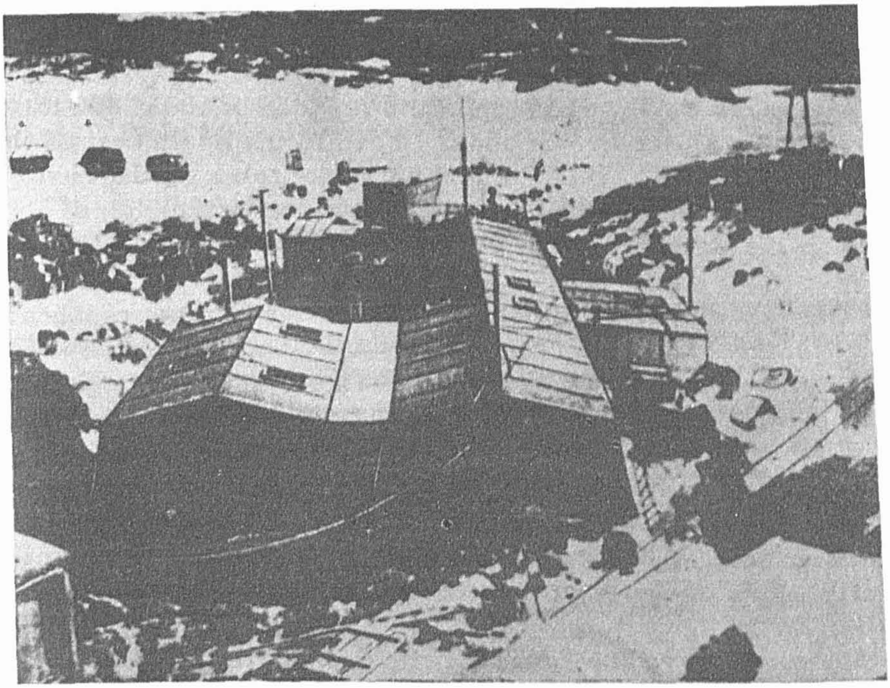

Fig. 88. Port Martin Station.

fire on January 23, 1952. Hence, in the winter of 1952 a party consisting of seven persons conducted observations according to the reduced program on Marret Base situated on Petrel Island (Archipelago Géologie). Marret Base Station consisted of two small wooden houses, situated in the southern part of Petrel Island (Lat. 66°40'S, Long. 140°00'E). The living quarters were in one of these houses while the service quarters, the garage and the store were in the other.

Marret Base was built in the middle of January, 1952, and was discontinued on January 2, 1953.

The ships "Commandant Charcot" and "Tottan" brought provisions etc. to the stations of Port Martin and Marret Base.

The size and composition of the personnel are given in Table 112.

TABLE 112

Personnel of the Station

Period	Number of workers Total	Scientific	Director
1950	11	6	A. F. Lutar
1951	17	10	M. Barret, Geophysicist
1952*	7	3	M. Marret, Radio operator

* On the Marret Base.

Principal Scientific Instruments

Meteorology

1. Equipment for conducting surface meteorological observations.
2. Pilot balloon equipment.
3. Radiosondes.

Ionosphere

1. Automatic ionosonde of EI-80 type (frequency band 2-16MH_z).

Seismology

1. Electromagnetic seismograph of the vertical component (period 10 cm).
2. Short-period and long-period seismographs for the horizontal component.
3. Short-period seismograph of horizontal component (fast speed recording).

Geomagnetism

1. Magnetograph of low sensitivity, "La-Kura" type.
2. Instruments QHM and BMZ

Atmospheric Physics

1. Spectrograph "Lebrun"
2. Polariscope "Savart-Lyot"
3. Apparatus for registration of atmospheric noises (amplifiers, cathode goniometer, etc.).
4. Apparatus for registration of disturbances caused by violent snowstorms (blizzards)
5. Apparatus for registration and measurement of electromagnetic field.

Glaciology

1. Snowstorm gage of "Mawson" type.
2. Equipment for stratigraphic and temperature observations.

Oceanography

1. Tide gage of "Armes Navales" type.
2. British hydrostatic tide gage "ARL"
3. Sounding device of "MS 21 HUGUES" type.
4. Instruments for physico-chemical investigations of sea ice.

Biology

1. Biological laboratory equipment.
2. Meteorological instruments for microclimatic observations.
3. Dredger.

In addition, the station had instruments and other accessories for conducting geodetic and geological work.

Scientific Observations

The various types of scientific observations, carried out at the station, are stated in Table 113. Besides, the station was used as a base for conducting extensive geodetic and geological survey.

TABLE 113

Types of Scientific Observations

Type of observations	Period
Surface meteorological observations (8 times in twenty-four hours)	1950 to 1952
Pilot balloon observations	1950 to 1952
Radiosonde sounding of atmosphere	1951
Vertical sounding of ionosphere	1950 to 1951
Continuous registration of earthquakes	1950 to 1951
Microseismic observations	1951
Registration of geomagnetic field fluctuations	1951
Absolute geomagnetic field measurements at the station, as well as on the Cape of Denison and in other regions	1951
Spectrography of sky during night and twilight	1950 to 1951
Registration of atmospheric noises	1951
Registration of noises due to strong snow-storms (blizzards)	1951
Registration and measurement of electro-magnetic field	1951
Observation of ablation and accumulation; stratigraphic and temperature observations	1951
Actinometric observations	1951
Snowstorm-gaging observations	1950 to 1951
Observation of relief of frozen forms	1951
Observation of sea level fluctuations	1950 to 1952
Depth measurements in Martin Bay by the "Echo Sounder"	1951
Observation of sea ice (measuring of thickness, investigation of the movement and other physico-chemical properties of ice)	1951 to 1952
Observation of birds and seals	1950 to 1952

Contd.

1	2
Microclimatic observations in the colonies of emperor penguins	1950 to 1952
Botanical observations	1950 to 1951
Marine biological work	1950 to 1951

PORT-AU-FRANCE

Coordinates: Lat. 49°21'S., Long. 70°13' E.
Altitude: 10 m above sea level.
Geomagnetic Coordinates: Lat. 57°.2 S, Long. 128°.0
Synoptic Index: 61998.

Port-au-France Station is under the "French Antaractic and Southern Lands" organization.

The station is situated on the northeastern part of Kerguelen Island, which lies in the central part of the Indian sector of the Southern Ocean. The northeastern part of Kerguelen Island formed by the Courbe Peninsula has a very uneven topography. The area of the peninsula is about 1000 km^2. It stretches over 60 km from the east to the west and about 40 km from the north to the south. According to the nature of the surface, the peninsula may be classified into two regions. In the west, the topography is very uneven with hilltops that soar up to 1000 m, while the eastern region contains slightly wavy or uniformly flat landscapes, interpersed with small lakes. In the latter region, stray elevated places not exceeding 200 m are visible only occasionally. The southeast coastline of the peninsula bordering the vast Morbian Bay from the north is broken by inlets. Port-au-France Station (Fig. 89) stands at the upper extremity of one of these inlets, named "Aurore australe" and jutting into the northeastern part of the gulf coast between the Cape of Gig and Molloi.

Climatic conditions: Air temperature: annual average, 4°C, maximum 7.8°, minimum 1.4°C. annual average velocity of wind: 10 m/sec.

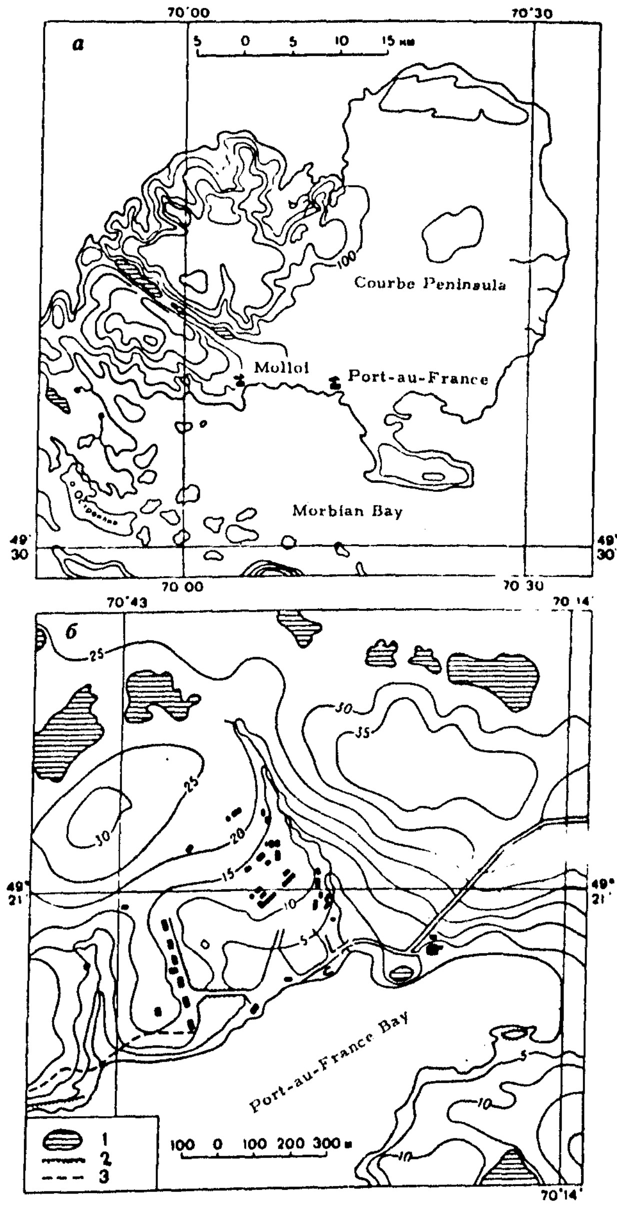

Fig. 89.Region around Port-au-France Station.

Installation: The station comprises of a complex of different structures (about 40), which are situated on a level stony part of the coastline. Cabins for seismic observations have been set up at a distance of about 12 km to the west of the station, on the Cape of Molloi.

Means of Transport: Tractors, amphibians and bulldozers are available at the station.

Supply: The station is provisioned by ships.

The station was opened on January 1, 1950. The team consisted of 40 to 110 members.

Principal Scientific Instruments

Meteorology

1. Equipment for surface meteorological observations.
2. Radiolocator of "Cotal" type.
3. Ozonometric apparatus of VASSY type.

Ionosphere

1. Ionosonde SP35/16 (recording on 35 mm film).
2. Ionosonde CNET.
3. Noise integrator, type TBF.

Seismology

1. Seismographs, Grenet Coulomb and Y. P. G. Paris type.

Geomagnetism

1. Magnetograph "La-Kura" of low sensitivity.
2. BMZ and QHM apparatus.

Cosmic Rays

1. Neutron monitor, AGI Type
2. Cubic telescope, AGI type

Aurora

1. All-sky camera (16 mm)
2. Zenith photometer (for 8 wavelengths)
3. Photometers with large field of view.

Radioactivity

1. Equipment for radioactivity investigations.

Scientific Observations

The various types of scientific observations, carried out at the station, are given in Table 114.

TABLE 114

Types of Scientific Observations

Type of observations	Period
Surface meteorological observations	from 1950
Actinometric observations	from 1961
Rawinsonde sounding	from 1961
Ozonometric observations (concentration of ozone in the ground layer and total content)	from 1961
Vertical sounding of the ionosphere	from 1961
Measurement of rawinsonde sounding	from 1961
Absorption of radiowaves in the ionosphere	from 1961
Observation of "hissing atmospherics"	from 1961
Investigations on aeronomy	from 1961
Seismic observations of earthquakes	from 1961
Registration of geomagnetic field variations	from 1961
Registration of micropulsations (pearl type)	from 1961
Registration of fast telluric variations	from 1961
Continuous monitoring of nuclear and neutron components of cosmic rays	from 1961
Continuous recording of total cosmic ray emissions	from 1961
Photographing of aurora with all-sky camera (on 16 mm film)	from 1961
Photometry of aurora	from 1961
Registration of frequency and average field of atmospherics	from 1961

Contd.

1	2
Investigations of aerosols, radioactivity of atmospheric precipitations and products of decomposition	from 1961
Temperature and stratigraphic observations of glaciers	from 1961
Measuring the movement of glaciers	from 1961
Measuring the thickness of glacier by electric sounding	from 1961
Observation of lake level fluctuations	from 1961
Observation of psychology of the personnel of the station	from 1961
Observation of birds and seals	from 1950
Microbiological observations	from 1961
Botanical investigations	from 1961
Geological work on the Courbe Peninsula	from 1950 in summer

Note: Program of observations of the station Port-au-France up to 1961 was not available to us. Seismic observations were conducted on Molloi Cape.

The station "Port-au-France" is also a base for conducting geodesical and gravimetric work on Kerguelen Island.

PORT CHARCOT

Coordinates: Lat. 65°03' S., Long. 64°01' W.

The team of the French Antarctic Expedition 1903 - 1905 led by J. Charcot (on the expeditionary ship "Français") spent the winter in 1904 in the Bay of Charcot (Booth Island) near the west coastline of the Antarctic Peninsula (Graham Coast).

Booth Island, lying at a distance of about 7 miles to the west of the Renard Cape on the west coast of Antarctic Peninsula, consists of two elevations, joined by a low and narrow glacial isthmus. The Charcot Bay juts into the northwestern coast of the islands. Charcot's expeditionary ship wintered on the southwestern part of the Bay, in Francais Cove. The wintering place was protected on all sides except on the northeast.

The lowest temperature, recorded in 1904, was - 34° and the highest - 6°. The predominant directions of the wind were south and northeast. A small prefabricated living house, a magnetic booth and a meteorological platform were set up on the bank of the Francais Cove.

The winter stay of the expedition began on March 4, and ended on December 25, 1904. The scientific personnel of the expedition consisted of 6 members while the crew of the ship "Français" comprised of 14 persons. The leader of the expedition was the bacteriologist J. Charcot.

During the wintering period of the expedition, the following scientific observations were conducted:

1. surface meteorological;
2. gravimetric;
3. observation of atmospheric electricity;
4. geomagnetic (absolute) field measurements;
5. sea ice;
6. observation of birds and seals;
7. botanical;
8. glacio-geomorphological;
9. geological;
10. geodetic.

PORT CIRCONCISION

Coordinates: Lat. 65° 10' S, Long. 64°10' W.

The Second French Antarctic Expedition of 1908-1910 led by J. Charcot (expedition ship "Pourquoi Pas") wintered in 1909 in the Bay of Circoncision (Petermann Island), near the west coastline of the Antarctic Peninsula (Graham Coast).

Petermann Island (about 2 km long and up to 200 m wide) belongs to the Dannebrog group of islands, situated at a distance of one mile from the Cape of Duseberg on the Antarctic Peninsula. The central part of the island is covered with ice and snow and the coastal part consists of rocky sections. The highest point of the island is the mountain "Clayton Hill" (218 m), situated in the northern part of the island.

The Bay of Circoncision, at the southern coast of which the expedition of J. Charcot wintered, juts into the southern part of the east coast of Petermann Island. The wintering place was not protected from the northeastern and southwestern winds prevalent here. The northeastern winds in this region are especially known for their violent force.

A magnetic laboratory, a seismic laboratory, a radio station and another cabin for housing instruments to measure atmospheric electricity were erected at the station on the coast of the bay. Meteorological instruments were installed in the immediate vicinity of the ship. The meteorological house was located on top of the Megalestris Hill, 35 m high, in the southwestern part of the island. Two tide gages were installed near the ship. A biological laboratory was equipped in one of the lounges of the ship.

The Expedition consisted of eight scientists and 22 members of the crew with J. Charcot as the leader. The winter stay of J. Charcot's expedition in the Circoncision Bay began on February 3, and ended on November 26, 1909.

During the wintering period of the expedition, the following scientific observations were conducted:

1. surface meteorological;
2. actinometric;
3. pilot balloon (from time to time);
4. seismic (recording of earthquakes);
5. geomagnetic (variational and absolute);
6. gravimetric;
7. atmospheric electricity;
8. hydrological (of fluctuation of level and sea ice);
9. biological;
10. botanical;
11. bacteriological;

12. glacio-geomorphological;
13. geological;
14. astronomical-geodetic.

CHARCOT

Coordinates: Lat. 69°22' S, Long. 139°01' E.
Altitude: 2401 m above sea level.
Geomagnetic coordinates: Lat. 78°. 3, Long 234°.5.
Synoptic index: 89643.

Charcot Station was a base of the "Expéditions Polaires Francaises" (Paul-Emile Victor Mission).

The station is situated on the slope of the mainland ice sheet of Adélie Land, at a distance of 318 km from the coast, and at a height of 2401 m above sea level. The thickness of the ice sheet in this region is approximately 1800 m.

Climatic conditions: Air temperature: annual average, -37°.1C; minimum, -62°C, maximum, -9°C. Velocity of wind annual average, 8 m/sec., maximum 32 m/sec. The predominant direction of the wind: south-southeast.

Installations: The station was built under snow. The main (living) quarters consisted of a metal barrack of semi-cylindrical form, 6 m in length and of 2.2 m radius, standing on sledges. Tunnels in the snow and firn mass connect the main house with the aerological block, the glaciological laboratory, the quarters where seismic instruments are installed, and with other premises (Fig. 90).

Electric Station: It was provided with an aircraft engine "Ciamo" and two electric generators each of 300 watt capacity.

Means of Transport: Weasel type amphibian vehicles, with a stock of fuel and radio station.

Charcot Station was opened on April 1, 1957 and closed on December 31, 1958. The strength and composition of the personnel are indicated in Table 115.

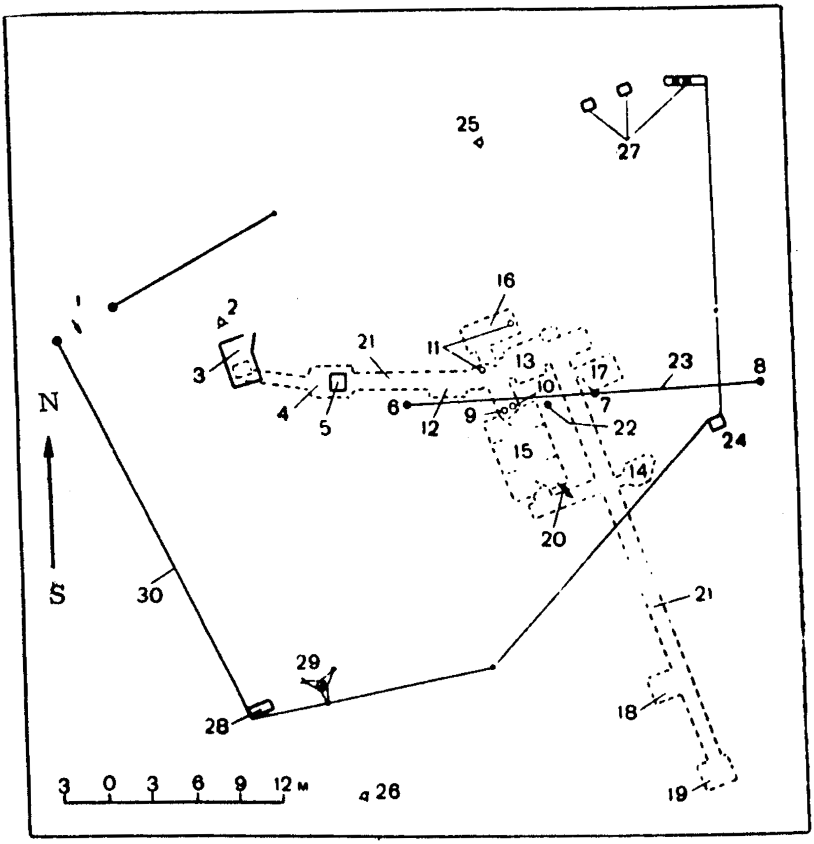

Fig. 90. Plan of Charcot Station.

1 - Entrance to camp; 2 - Theodolite; 3 - Exit to surface; 4 - Gas generator; 5 - Exit to surface; 6, 7, 8 - Radio masts; 9, 10, 11 - Ventilators; 12, 13, 14 - Stores; 15 - Living house; 16 - Electric station; 17 - Glaciological laboratory; 18, 19 - Magnetic laboratory; 20 - Pole with wind vane; 21 - Corridor below ice; 22 - Anemometer; 23 - Antenna; 24 - Aerological tower; 25, 26 - Heliograph; 27 - Actinometric instruments; 28 - Meteorological booth; 29 - Wind mill; 30 - Rope along the camp boundary.

TABLE 115

Personnel of the station

Period	Number of workers Total	Scientific	Director
1957	3	3	J. Dubois, Meteorologist
1958	3	3	R. Garcia, Meteorologist.

Principal Scientific Instruments

Meteorology

1. Equipment for conducting surface meteorological observations.
2. Actinometric instruments.
3. Pilot balloon equipment.

Geomagnetism

1. Vertical component magnetograph of type "GF6-Askania".
2. Apparatus BMZ (for absolute determination of vertical component).
3. Three-component fluxmeter.

Glaciology

1. Glaciological pegs
2. Equipment for crystallographical investigations
3. Snowstorm gage.

Scientific Observations

The various types of scientific observations carried out at the station are presented in Table 116.

TABLE 116

Types of Scientific Observations

Type of observations	Period
Surface meteorological observations	1957 to 1958
Actinometric observations	1957 to 1958
Pilot balloon observations	1957 to 1958
Recording of geomagnetic field variations (only of vertical component)	1957 to 1958
Absolute geomagnetic field measurements	1957 to 1958
Recording of short-period geomagnetic fluctuations	1957 to 1958
Observations on accumulation of snow	1957 to 1958
Stratigraphy of snow cover	1957 to 1958
Snowstorm-gaging observations	1958
Crystallographic investigation of precipitations	1957 to 1958

BIFURCATION

Coordinates: Lat. 67°03' S, Long. 141°31' E.
Altitude: 830 m above sea level.

The field camp "Bifurcation" was set up on the glacial plateau of Adelie Land, at a distance of 33.4 kms from Port Martin Station. This served as a camp for conducting scientific observations (including seismic sounding) by the personnel of French Antarctic Expedition at the time of their inland trip up to a latitude of 69°S in 1951/52. In January 1953, the French scientists conducted gravimetric observations at this point.

CAMP A

Coordinates: Lat. 66°56' S, Long. 141°31'E.
Altitude: 585 m above sea level.

"Camp A" was set up on the glacial plateau of Adélie Land, at a distance of 18.6 km from Port Martin Station. This served as a camping place for conducting scientific observations for the personnel of the French Antarctic Expedition during their sledge trip along the traverses of "Port Martin" and "Archipelago Geologie" stations in 1951/52. In January, 1953 the French scientists conducted gravementric observations from this camp.

CAMP B

Coordinates: Lat. 66°59' S, Long. 140°25' E.
Altitude: 830 m above sea level.

The personnel of the French Antarctic Expedition at the time of the sledge trek along "Port Martin" and "Archipelago Géologie" traverse in 1950/51, stopped at "Camp B" and made some scientific observations from this camp.

CHAPTER XI

SCIENTIFIC STATIONS OF SWEDEN

The station-based investigations of Sweden in Antarctica were conducted from 1901 to 1903 by the Swedish Antarctic Expedition (led by O. Nordenskjöld), which spent the winter near the western coastline of the Antarctic Peninsula. Later, during 1950-1952 the Swedish scientists participated in the Joint Norwegian-Swedish-British Expedition on Queen Maud Land, where they carried out glaciological investigations. It was also the responsibility of Sweden to provide the expedition with provisions, houses, bedding and other allied equipment.

NORDENSKJÖLD WINTER STATION

Coordinates: Lat. 64°22' S, Long. 57°00' W.
Altitude: 13 m above sea level.

The wintering base of the Swedish Antarctic Expedition of 1901 - 1903 led by O. Nordenskjöld was on the northern coastline of Snow Hill Island, at the northeastern extremity of the Antarctic Peninsula.

Almost the entire surface of the island is plain. It is about 300 m above sea level, and is covered with snow and ice. Only the peninsula on the northeastern coast of the island is free of ice and snow, and has several isolated hillocks.

The station consisted of only a prefabricated house of 6.3 x 4.0 m, set up on a level stony ground not far from the shore (Fig. 91). A magnetic laboratory and a meteorological platform were erected by the side of the house.

The station was opened on February 21, 1902, and was closed on November 8, 1963. The personnel and the equipment were brought up to Snow Hill Island by the ship "Antarctic" belonging to the Swedish Expedition, and were brought back by the rescue ship 'Uruguay' belonging to Argentina (Table 117).

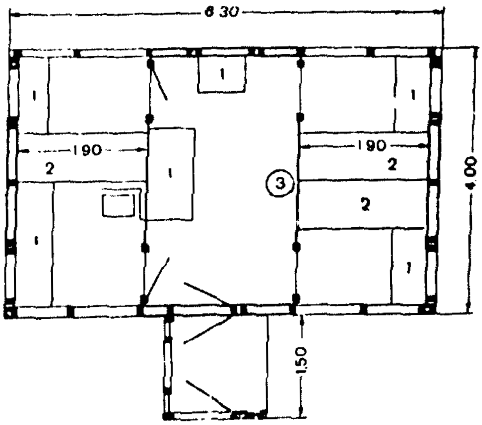

Fig. 91. Plan of the Nordenskjöld Station House.
1 - Tables; 2 - Beds; 3 - Furnace.

TABLE 117

Personnel of the Station

Period	Number of workers		Director
	Total	Scientific	
1902	6	2	O. Nordenskjöld Geologist.
1903	6	2	O. Nordenskjöld, Geologist.

Scientific Observations

Various observations carried out at the station are mentioned in Table 118.

TABLE 118

Type of Scientific Observations

Type of observations	Period
Surface meteorological observations	1902 to 1903
Geomagnetic observations	1902 to 1903
Astronomical observations	1902 to 1903
Geological investigations in the neighborhood of the station	1902 to 1903

The expedition ship "Antarctic" under the command of Captain Larsen could not force her way to Snow Hill Island in December 1902. A team of three persons led by Lieutenant D. Andersson landed on the shore in the region of the Bay of Hope (northern extremity of Antarctic Peninsula). They were to reach the wintering place "O. Nordenskjöld" on foot and to return. However D. Andersson's team could not manage to do this. Returning back to the Bay of Hope the team built a stone hut on Seal Point (Lat. 63°.24' S, Long. 56°59' W) and spent the winter in it. They were able to go up to Snow Hill Island only in October, 1903.

The ship "Antarctic" developed a lead and sank on February 12, 1903, near Paulet Island, on which her crew had to spend the winter (Lat. 63°35' S, Long. 55°40'W). Paulet Island lies at the northern extremity of the Antarctic Peninsula, within a few miles to the east of the Dundee Island. It is completely free of snow and ice. A coneshaped mountain about 300 m high rises in the middle of the island. The winter party built a stone hut here and constructed a meteorological platform. Surface meteorological observations were conducted from March 2 to November 10, 1903. In November 1903, the ship "Uruguay" came to the island and the crew of the ship "Antarctic" was evacuated.

CHAPTER XII

SCIENTIFIC STATIONS OF CHILE

The first Chilean scientific station was founded in Antarctica in February, 1917. It was situated on one of the South Shetland Islands, namely Greenwich Island (Beresino), and was called "Arturo Prat". During subsequent years, Chile set up several more permanent and temporary bases in the region of the Antarctic Peninsula, from where scientific (mainly meteorological) observations are being conducted (Table 119).

TABLE 119

Chilean Stations

Name of Station	Period of operation
Aguirre Cerda	from January 1955
Arturo Prat	from February 22, 1947
Gonzales Videla	from January, 1951
General Bernardo O'Higgins	from February 18, 1948.

The responsibility to organize and meet the material and technical requirements of Antarctic investigations rests with the Chilean Navy. The program of scientific work is carried out by the representatives of the Armed Forces of Chile as well as by various other civil institutes of the country.

AGUIRRE CERDA

Coordinates: Lat. 62°56' S, Long. 60°36' W.
Altitude: 15 m above sea level.
Synoptic index: 85987.

Aguirre Cerda Station is under Chilean Navy. It is situated in the northern part of Deception Island (Fig. 92). The staff of the station consists of 8 to 9 persons. The station was opened in January, 1955. Surface meteorological observations were conducted (1955 to 1963) at the station. There is no information about any other observations.

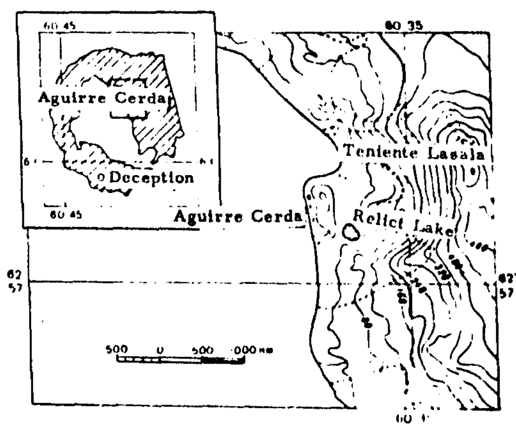

Fig. 92. Region around Aguirre Cerda Station.

ARTURO PRAT

Coordinates: Lat. 62°29' S, Long. 59°40' W.
Altitude: 5 m above sea level.
Synoptic index: 85986.

Arturo Prat Station is also under Chilean Navy.

The station is situated on the northwest coastline of Greenwich Island (Beresino). The island is mountainous and almost completely covered with ice. The buildings are located on the coast of the Discovery Bay jutting into the northwestern part of the island.

Installation: The station consists of several small houses and a small jetty on the shore.

Means of Transport: Light sea helicopters, small boat with outboard motor and dog teams.

Supply: Naval ships of Chile supply the provisions. The staff consists of 8 to 10 persons. The station was opened on February 22, 1947.

Scientific Observations

The types of scientific observations, conducted at the station, are stated in Table 120.

TABLE 120

Types of Scientific Observations

Type of observations	Period
Surface meteorological observations	from 1947 onwards
Glaciological observations(of accumulation and ablation, and observation of sea ice).	from 1947 onwards

GONZALES VIDELA

Coordinates: Lat. 64°49' S, Long. 62°51' W.
Altitude: 10 m above sea level.
Geomagnetic coordinates: Lat. 53°.3 S, Long 4°.4
Synoptic index: 85995.

Gonzales Videla Station is also under Chilean Navy.

The station is situated on the coastline of the Paradise Bay at the western coastline of the Antarctic Peninsula (Danco Coast). The staff consists of about 7 or 8 persons. The station was opened in January, 1951.

Principal Scientific Instruments

Meteorology

1. Equipment for conducting surface meteorological observations.
2. Radiosondes.

Seismology

1. Magnetograph, Askania GV-3 type.
2. Magnetic theodolite (Askania).

Scientific Observations

The various types of scientific observations carried out at the station are given in Table 121.

TABLE 121

Types of Scientific Observations

Type of observations	Period
Surface meteorological observations	from 1951
Radiosonde sounding of atmosphere	from 1951
Recording of earthquakes	from 1951
Recording of geomagnetic field variations	from 1951
Absolute geomagnetic field measurements	from 1951
Observations of ablation and accumulation	from 1951
Measurement of the movement of glaciers	from 1951
Observation of sea ice	from 1951

Contd.

1	2
Stratigraphic and glaciological studies	from 1951
Observation of birds	from 1951
Marine biological research	from 1951

GENERAL BERNARDO O'HIGGINS

Coordinates: Lat. 63°19' S, Long. 57°54' W.
Altitude: 10 m above sea level.
Synoptic index: 85988.

The scientific station "General Bernardo O'Higgins" is under Chilean Navy.

The station is situated on the western coastline of the Trinity Peninsula, which is the northern extremity of the Antarctic Peninsula. In this region, the coast is rather low and covered most of the time with ice. Outcrops of bedrocks are seen only occasionally.

As one goes deeper into the coast, mountains rise high, stretching in the form of a chain from the northeast to the southwest and reaching a height of 1000 m in their southern part.

Installations: The station structures are located on the Cape of Legouin.

Means of Transport: Amphibian vehicles and dog teams.

Supply: The station is provisioned by ships of the Chilean Navy.

The staff of the station consist of 8 to 10 persons. The station was opened on February 18, 1948, but was destroyed by fire on November 27, 1957. It was later rebuilt in March 1958

Scientific Observations

The types of scientific observations carried out at the station are given in Table 122. The station also serves as a base for conducting geological and geodetic work on the Trinity Peninsula.

TABLE 122

Types of Scientific Observations

Type of observation	Period
Surface meteorological observations	from 1948
Seismic observations	from 1948
Glaciological observations (accumulation, sea ice).	from 1948

Temporary Stations and Depots

GUEZELAGA

Coordinates: Lat. 67°32'S, Long. 68°55' E.

Guezalaga Depot belongs to Chilean Navy.

It is situated on the eastern part of Avian Island, lying in Marguerite Bay, at the southern extremeity of Adelaide Island.

YELCHO

Coordinates: Lat. 64°50' S, Long. 63°35' W.

Yelcho Depot belongs to Chilean Navy.

It lies on the shore of South Bay that juts into the southwest coast of Doumer Island, lying near the west coastline of the Antarctic Peninsula.

COPPERMINE COVE

Coordinates: Lat. 62°23' S, Long. 59°41 W.

Coppermine Cove Depot belongs to Chilean Navy.

It lies on the coast of Coppermine Cove that juts into the southern part of Polotzk (Roberts) Island, lying in the central part of the group of South Shetland Islands.

THEODOLITE HILL

Coordinates: Lat. 63°25' S, Long. 57°26' W.

Theodolite Hill Depot belongs to Chilean Navy.
The depot lies on Trinity Peninsula, which is the northern extremity of the Antarctic Peninsula.

YANKEE HARBOR

Coordinate: Lat. 62°33' S, Long. 59°47' W.

Yankee Harbor Depot belongs to Chilean Navy. It lies on the cost of Yankee Bay, which juts into the southwest coast of Beresino Island, near the west coastline of the Antarctic Peninsula.

CHAPTER XIII

SCIENTIFIC STATIONS OF SOUTH AFRICAN REPUBLIC

The first scientific Antarctic station of SAR was opened in the beginning of 1948 on Marion Island. The station was set up on the initiative of the Weather Bureau of South Africa for conducting meteorological observations in the region of Antarctica (Table 123).

TABLE 123

Stations of South African Republic

Name of the station	Period of operation
Marion Island	from March 3, 1948
SANAE	from December 2, 1962

In early 1960, the Norwegian scientific station "Norway" on the coastline of Queen Maud Land was transferred to the South African Republic by the Norwegian government. The scientists of this country conducted an extensive program of scientific observations at the station for two years (1960 and 1961). In the beginning of 1962, a new station called SANAE (after South African National Antarctic Expedition) was opened at a distance of 20 km to the northeast of this station.

At present the organization of scientific investigations in Antarctica and the administrative supervision and furnishing of material and technical requirements to Antarctic stations are executed by the Interdepartmental Antarctic Committee which is under the Antarctic Department of the SAR, Ministry of Transport.

The scientific guidance of Antarctic research is directed by the Scientific Committee on Antarctic Research under SAR's Council of Scientific and Technical Research.

The main scientific results of investigations of SAR in Antarctica are published in SAR Weather Bureau publications like the Newsletter of Weather Bureau and others.

MARION ISLAND

Coordinates: Lat. 46°53' S, Long. 37°52' E.
Altitude: 26 m above sea level
Synoptic Index: 68994.

Marion Island Station is under the Antarctic Department of SAR, Ministry of Transport.

The station lies on the Marion Island, the southermost of the group of Prince Edward Islands, lying in the eastern part of the Indian sector of the Southern Ocean. Marion Island is mountainous, the Ian Smiths Peak being the highest (1186 m). Its top is flat and is situated almost in the center of the island. Most of these mountain tops remain covered with snow. The shores of the island are mostly craggy except that on the eastern side the cliffs are a little lower than those on the western side.

The station is located on the top of the Transvaal Inlet on the northeast coastline of the island. The shore of the inlet is flanged by a beach stream with splinters of rocks. The station is well protected from the westerly winds by the steep and precipitious mountains (Fig. 93).

Installations: The station consists of several small houses, which have been built on high piles because the place is swampy. These houses are connected with one another by small bridges of planks. Near the shore, in the northwestern part of the inlet, a

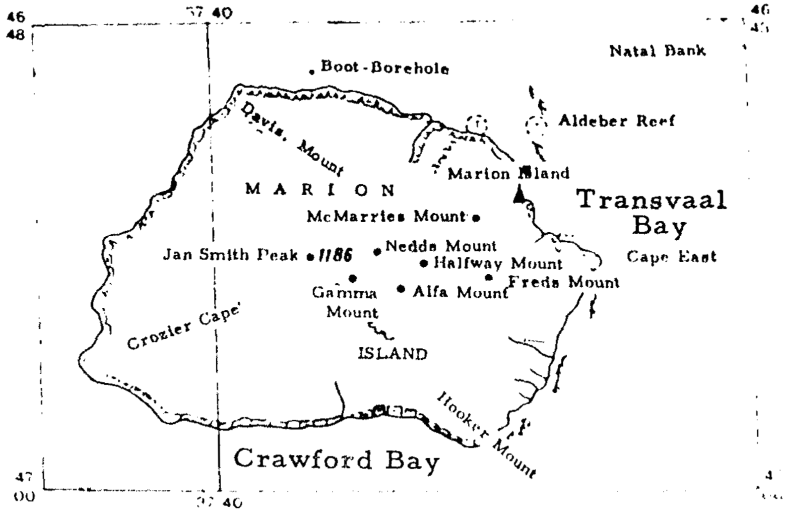

Fig. 93. Region around Marion Island Station.

structure has been set up for sloops and launches. Because of the inconvenient location of the scientific station, the automatic meteorological station was set up at a distance of about 3.5 km from the premises of the station on a coastal plateau.

Supply: The ships of SAR Navy supply provisions to the station. The personnel of the station consisted of 7 to 11 members.

Marion Island Station was opened on March 20, 1948.

Principal Scientific Instruments

Meteorology

1. Equipment for surface meteorological observations.
2. Actinometric instruments.
3. Rawinsondes Radio-theodolite of Vaisala type.

Ionosphere

1. Equipment for registration of hissing atmospherics.

Scientific Observations

The various types of scientific observations, carried out at the station are stated in Table 124.

TABLE 124

Types of Scientific Observations

Type of observation	Period
Surface meteorological observations	from 1948
Actinometric observations	from 1948
Rawinsonde sounding	from 1959
Registration of hissing atmospherics	1959 to 1961

SANAE

Coordinates: Lat. $70^{o}19'$ S, Long. $2^{o}24'$ W.
Altitude: 52 m above sea level

SANAE Station is under the Antarctic Department of SAR Ministry of Transport.

The station is situated on the coastline of Queen Maud Land at a distance of about 20 km from the coast.

Installations: The station is located on an even surface of the ice shelf which is 200 to 250 m thick in this region. The team of the station consisted of 13 to 14 members.

The station was opened on February 12, 1962.

Principal Scientific Instruments

Meteorology

1. Equipment for surface meteorological observations.
2. Actinometric instruments.
3. Radiosondes. Radio-theodolite "Vaisala".

Ionosphere

1. Equipment for vertical sounding of ionosphere.

Geomagnetism

1. Magnetographs (La-Kura).
2. Magnetic balances
3. Quartz magnetometer

Scientific Observations

The various types of scientific observations, carried out at the station, are stated in Table 125.

TABLE 125

Types of Scientific Observations

Type of observations	Period
Surface meteorological observations	from 1962 onwards
Actinometric observations	from 1962 "
Rawinsonde sounding	from 1962 "
Vertical sounding of ionosphere	from 1962 "
Recording of geomagnetic field fluctuations	from 1962 "
Absolute geomagnetic field measurements	from 1962 "
Observation of accumulation, ablation and snow-drift	from 1962 "
Stratigraphic and glaciological investigations	from 1962 "

CHAPTER XIV

SCIENTIFIC STATIONS OF JAPAN

Japan had been sending scientific expeditions to Antarctica every year between 1956 and 1962. They carried out an extensive program of research work at Syowa Station, situated on Prince Olav Coast. The station did not function only in the winter of 1958 during this span. At present the station is not in use.

The organization and scientific management of Japanese research in Antarctica is entrusted to the National Antarctic Committee under the Japanese Scientific Council.

The observational data and other main scientific results of the work of Japanese Antarctic Expedition of Syowa Station are published in the journal "Antarctic Record" which is being published since December 1957 by the Japanese Ministry of Education. The articles are usually printed in English with a Japanese abstract (rarely, vice versa).

SYOWA BASE

Coordinates: Lat. $69^{\circ}00'$ S, Long. $39^{\circ}35'$ E.
Altitude: 15.5 m above sea level
Synoptic Index: 89532.
Geomagnetic coordinates: Lat. $69^{\circ}.7$ S, Long. $77^{\circ}.6$.

Syowa Station is the base of the Japanese Antarctic Expedition.

The station is situated on the islands of Ongul, lying in the northeastern part of Lützow-Holm Bay (Queen Maud Land), at a distance of 5 km from the coast of the mainland (Figs. 94, 95) The east coast of Lützow-Holm Bay is a glacial precipice, 20 m high, stretching approximately from the north to the south and

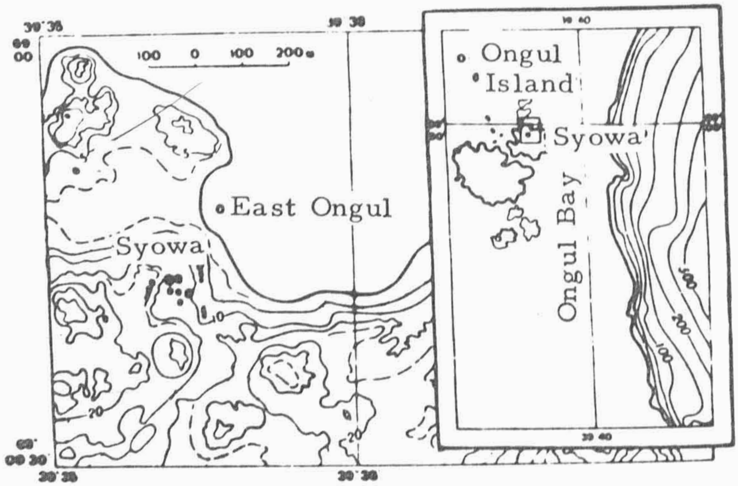

Fig. 94. Region around Syowa Station.

Fig. 95. Syowa Station.

broken at certain places by ice-free rocks. Ongul Islands consist of two small isles, namely West Ongul and East Ongul separated by a narrow (about 30 m) strait, spanned by a snow bridge.

The station is situated in the northern part of East Ongul Isle that extends over 2.2 km from the east to the west and over 2 km from the south to the north. The highest point of the island is 43 m high. The undulating surface of the island, composed of highly windworn gneisses and granite-gneisses, is generally inclined from the south to the north and is only partly covered with snow. The depressions between the hillocks are covered with sand and pebbles, and with occasional basaltine boulders. Certain depressions are formed into small lakes that are free of ice sheet in summer.

Climatic conditions: Air temperature: annual average, $-10^{\circ}.1C$; maximum, $7^{\circ}.4C$; minimum, $-36^{\circ}C$. Velocity of wind annual average, 7.1 m/sec; maximum, 32.9 m/sec., annual average cloudiness 6.6.

Installations: The total area occupied by the station premises is about 413 m^2 (1960). They lie on the rocky surface of the coastal terrace. On the west and on the south they are protected by low (30 to 40 m) hillocks. The landing and take-off strip, laid at a distance of 75 m to the east of the main structures, serves for receiving light planes, and helicopters. The main buildings (living house, radio station, dining room, workshop, and electric station) are connected with one another by a covered corridor. The seismic booth is erected on a gneiss base, within 20 m to the southeast of the station, at a height of 23 m above sea level.

Electric station: It is provided with a generator of 25 kw power.

Means of Transport (1959): Six "Snow-Cats " and one tractor.

Supply: The station is provisioned by the ice breaker "Soiya", two helicopters and a plane on skis.

The station was built in January-February, 1957 and officially opened on February 15, 1957. The first winter party was evacuated by a helicopter on February 11, 1958. Since it was impossible to bring scientific equipment and provisions to the base for the second winter group, the station was discontinued. It was re-opened in February, 1959 and again closed on February 8, 1962. The size and composition of the personnel are given in Table 126.

TABLE 126

Personnel of the station

Period	Number of workers		Director
	Total	Scientific	
1957	11	5	E. Nishibori
1959	14	8	M. Murayama
1960	15	9	T. Tori
1961	16	10	M. Murayama

Principal Scientific Instruments

Meteorology

1. Equipment for conducting surface meteorological observations.
2. Rawinsondes.

Aurora

1. All-sky camera (photographing on 16 mm film).
2. Patrol spectrograph (photographing on 16 mm film).
3. Phototheodolite for parallactic photographing of aurora.
4. Photoelectric photometer.

Ionosphere

1. Ionosonde of RIR-6B type.
2. Apparatus for measuring the intensity of HF field (from HF transmitters).

Geomagnetism

1. Magnetograph with visual recording.
2. Magnetograph of low sensitivity.
3. Induction magnetograph.
4. Proton magnetometer.

Terrestrial Currents

1. Setup for measuring terrestrial currents.

Atmospheric Physics

1. Apparatus for measuring atmospheric electricity.

Cosmic Rays

1. Ionization chamber of Neher Type (operated in 1957).
2. Neutron monitor.
3. Cubic meson telescope with two plastic chambers (field of view of telescope 2500 km^2, maximum aperture $\pm 45^{\circ} \times \pm 45^{\circ}$).

Seismology

1. Electromagnetic seismograph (N-S, E-W components).

Ozone

1. Apparatus for measuring density of ozone.
2. Spectrophotometer of Dobson type.

Gravitational Observations

1. Portable gravimeter of Worden type.
2. Pendulum gravitational station.

Oceanography

1. Tide Gage.

Biology

1. Thermograph.

In addition to the aforementioned scientific equipment, the station had various types of instruments for field research, and a small laboratory for geochemical, geological and biological investigations.

Scientific Observation

The various types of scientific observations carried out at the station are stated in Table 127.

TABLE 127

Type of Scientific Observations

Type of observations	Period
Surface meteorological observations	Feb. 1957 to Feb. 1958; Feb. 1959, Jan. 1962
Synoptic work	Feb. 1959 to Jan. 1962
Aerological sounding of atmosphere	Feb. 1959 to Jan. 1962
Actinometry	Jan. 1960 to Jan. 1962
Ozone measurements	Jan. 1961 to Jan. 1962
Vertical sounding of ionosphere (once every 15 minutes)	Feb. 1959 to Jan. 1962
Measuring of intensity of the HF field	Feb. 1959 to Jan. 1962
Standard seismic observations	Feb. 1959 to Jan. 1962
Recording of variations of H, D, Z with magnetography of low sensitivity	Feb. 1959 to Jan. 1960

Contd.

1	2
Registration of X, Y, Z by visual recording magnetograph	Feb. 1959 to Jan. 1962
Registration of variations in D, H, Z with induction magnetograph	Feb. 1959 to Jan. 1961
Absolute magnetic field measurements	Feb. 1959 to Jan. 1962
Magnetic survey	Jan. 1961 to Jan. 1962
Measuring of meson components of cosmic rays	Feb. 1957 to Feb. 1958; Feb. 1959 to Jan. 1962
Measuring of neutron components of cosmic rays	Jan. 1960 to Jan. 1962
Visual observations of aurora	Feb. 1957 to Feb. 1958 Feb. 1959 to Jan. 1962
Photographing of aurora with all-sky camera	Feb. 1957 to Feb. 1958 Feb. 1959 to Jan. 1962
Photometry of aurora	Feb. 1959 to Jan. 1962
Spectrography of aurora	Feb. 1959 to Jan. 1960
Registration of terrestrial currents	Feb. 1959 to Jan. 1961
Seismic sounding of ice sheet	Feb. 1959 to Jan. 1962
Physics of snow and ice	Feb. 1959 to Jan. 1962
Standard glaciological observations (accumulation, temperature and movement)	Feb. 1959 to Jan. 1962
Observations of sea-level fluctuations	Feb. 1959 to Jan. 1962
Human physiology	Feb. 1959 to Jan. 1962
Zoological studies	Jan. 1961 to Jan. 1962
Geological survey of Prince Olav Coast, east coast of Lutzow-Holm Bay and mainland regions	Feb. 1957 to Feb. 1958 Feb. 1959 to Jan. 1960 Jan. 1960 to Jan. 1962
Gravimetric observations at the station	Jan. 1961 to Jan. 1962
Gravimetric observations during investigations on traverse	Jan. 1961 to Jan. 1962
Chemistry of sea water, moraine and mainland ice and rocks	Jan. 1960 to Jan. 1962
Content of CO_2 in the atmosphere	Jan. 1960 to Jan. 1962

CONCLUSIONS

The history of the station-based investigations in Antarctica can be very clearly subdivided into four periods, based on the duration of observations at the stations as well as on the distribution of the stations.

The first phase of these investigations began in the year 1883 when the German Expedition led by K. Schröder carried out, for the first time, station-based scientific observations on the Island of South Georgia during the first International Polar Year. These observations were continued for about one year only. A characteristic of this period was that the investigations were intermittent and spasmodic and did not continue for more than 1 to 2 years. In fact during certain years of this period, there were no scientific stations in Antarctica.

The station-based observations were as a rule conducted at the coastal bases of the Antarctic expeditions, whose main object was traverse reconnaissance exploration of little known or totally unknown expanses of Antarctica and South Ocean. Quite often, observations were conducted during forced winterings and from ships that were forced to drift after being caught in the ice masses of the South Ocean.

The second period of investigations started in 1903, when W.S. Bruce's Scottish National Antarctic Expedition to Laurie Island (South Orkney Islands) set up a scientific station, which was later called 'Orcadas', and is still operating at the time of compilation of this book. During this second period of investigations, scientific stations continued to operate for relatively longer periods. Consequently, continuous observations over several years are available for certain regions of the Antarctica. However, even the second period was still characterized by a predominance of station-based investigations carried out essentially at coastal bases of Antarctic expeditions, whose main object was confined to reconnaissance explorations. A majority of the stations during this period did not operate for a prolonged period, and in general did not exceed 1 or 2 years.

The third period of investigations began in 1944-1945, when permanent stations began to be set up in the region of Antarctic Peninsula. This period is characterized by a considerable expansion in the network of stations, primarily intended to carry out station-based investigations. The number of stations gradually increased, especially during the preparatory period of the International Geophysical Year.

These three periods of investigations in Antarctica have one special feature in common: the scientific stations were set up exclusively on the coastline of Antarctica or on the oceanic islands near the coastline. In the interior regions of Antarctica, practically no station-based observations were made except at the temporary field stations (Advance Base of Ross Ice Shelf and Plateau on Antarctic Peninsula).

The fourth phase of investigations began in 1956 during the preparatory period of the International Geophysical Year, when the first inland station ''Pionerskaya '' was set up in the interior of the mainland at a distance of 375 km from the shore. The characteristic feature of this period is the setting up of a network of scientific stations in the deep interior of the Antarctic Continent. The network of the inland stations underwent a big expansion during the period of International Geophysical Year, when ten scientific stations operated in the interior regions of the mainland. More than half of these stations belonged to the USSR. In the following years the number of inland stations started decreasing and in 1963, their number was only four.

The station-based investigations in Antarctica have already a history of 80 years (with small breaks during the first period). A large amount of scientific material was collected at these Antarctic stations during this period. When these data are combined with the knowledge of investigations of traverses, many aspects of the nature of the south polar region become clear and evident. In due course, the program of observations of the station was expanded, and the methods of investigations were improved. Though the principal observations during the earlier periods were only meteorological in nature, the later periods embraced a wider complex of geophysical investigations that are acquiring an ever-increasing importance.

In the present setup of the scientific stations in Antarctica, we can notice the following special features. The stations principally lie on the coastline. The densest network of the stations is observed in the Antarctic Peninsula. In the rest of the Antarctica, the stations are distributed more or less evenly all along the coastline, with the exception of the section between Queen Victoria Land and Alexander I Land, where over a stretch of 4000 km there is not a single station at present. As regards inland stations, two of them (Byrd and Eights) lie in West Antarctica and two (Amundsen-Scott and Vostok) in East Antarctica. However, a vast area in the polar region is relatively inaccessible and we are practically ignorant of the western part of the polar region in regand to station-based observations.

The observations at coastal stations principally reveal the phenomena that are typical only of a relatively narrow strip of the coastline, and are absolutely unrepresentative of the neighboring interior regions of the mainland. Thus, for the sake of more detailed investigations of the south polar region, it is necessary in future to expand the network of inland scientific stations, particularly in East Antarctica.

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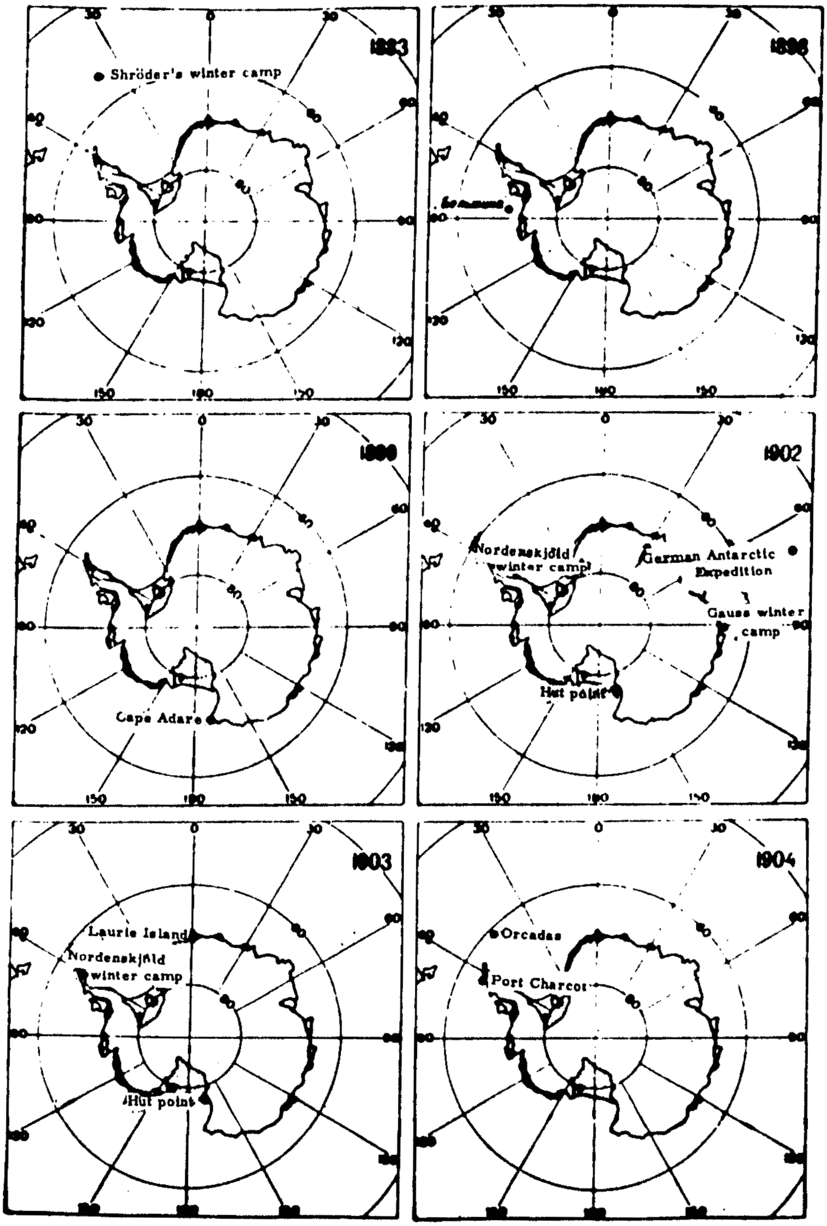
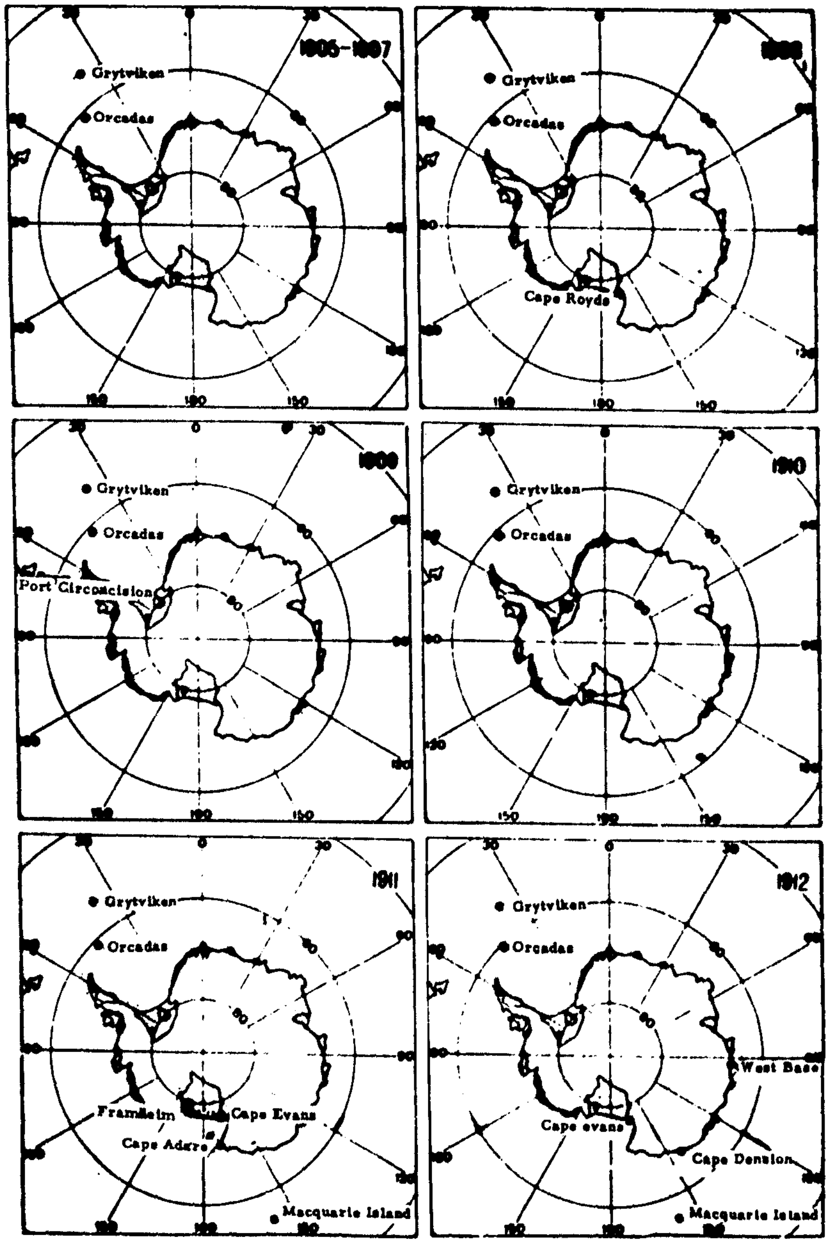
APPENDIX

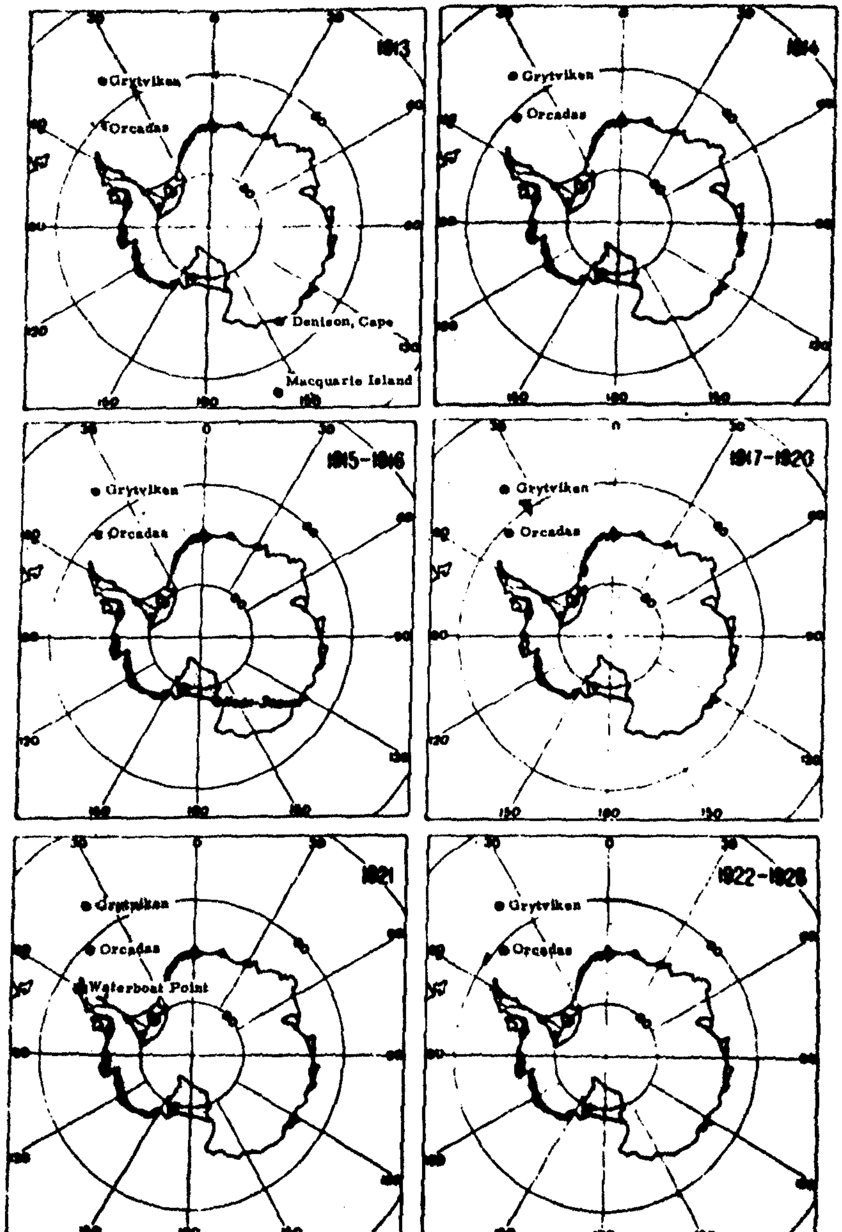
APPENDIX I


Shröder's winter camp
Cape Adare
1902
Nordenskjöld winter camp
German Antarctic Expedition
Gauss winter camp
Hut point
1903
Laurie Island
Nordenskjöld winter camp
Hut point
1904
Orcadas
Port Charcot

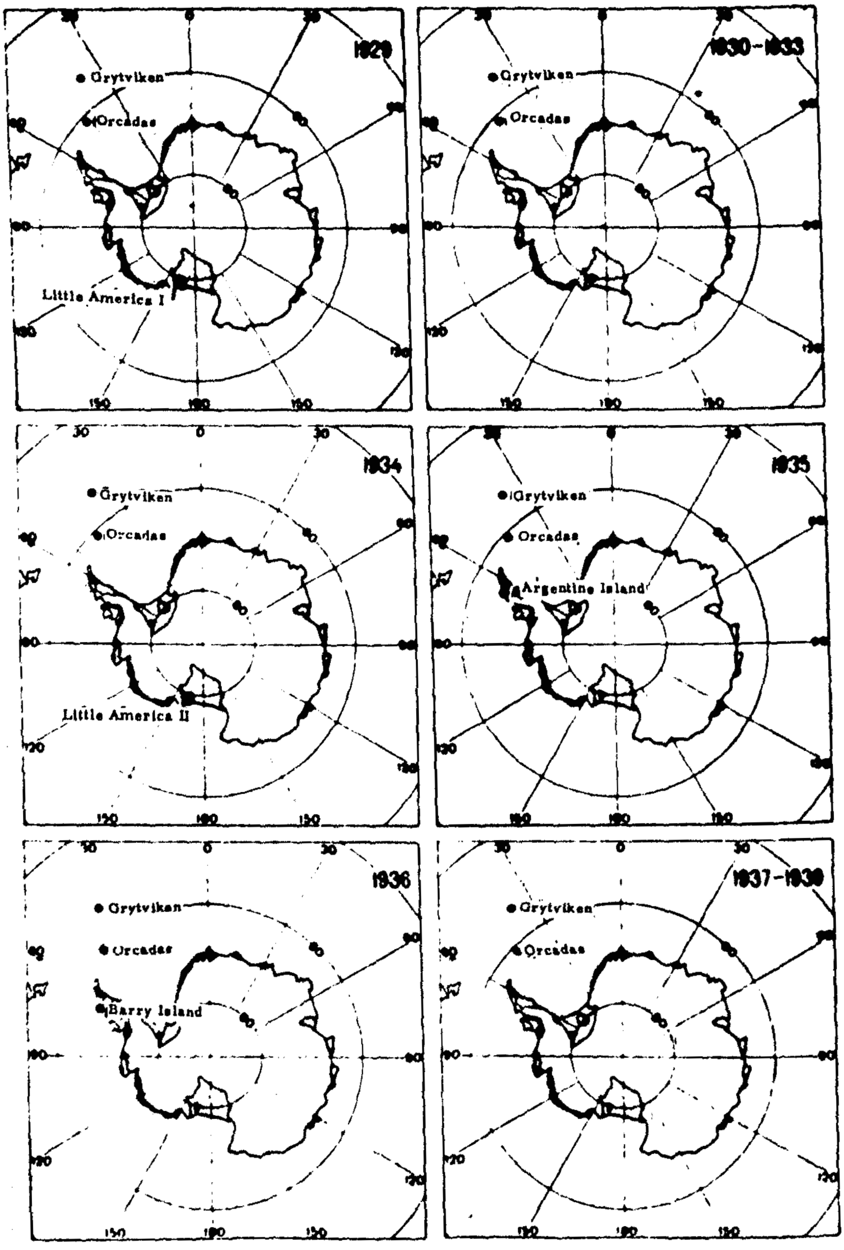
APPENDIX 2


Grytviken
Orcadas
Cape Royds
Port Circoncision
1910
1911
Framheim
Cape Evans
Cape Adare
Macquarie Island
1912
West Base
Cape evans
Cape Denison
Macquarie Island

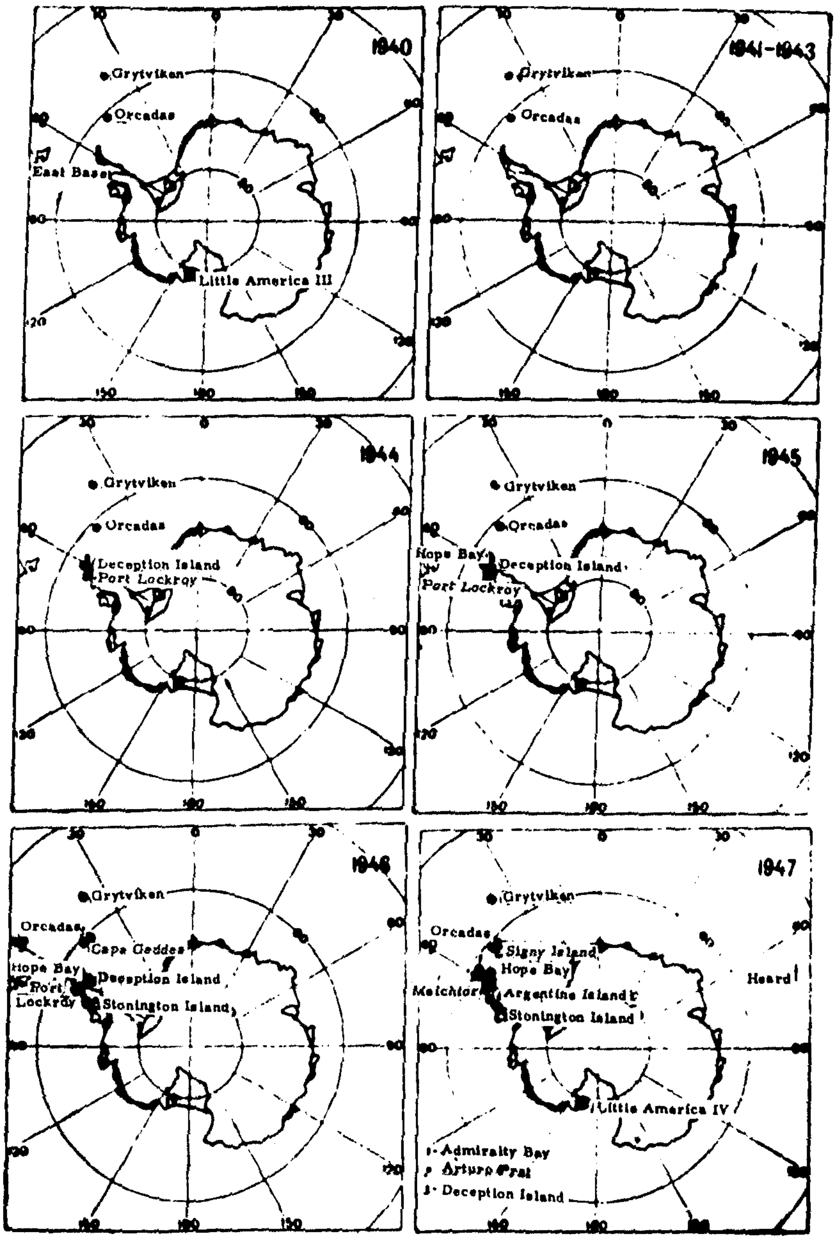
APPENDIX 3


1913
Grytviken
Orcadas
Denison, Cape
Macquarie Island
1914
Grytviken
Orcadas
1915-1916
Grytviken
Orcadas
1917-1920
Grytviken
Orcadas
1921
Grytviken
Orcadas
Waterboat Point
1922-1928
Grytviken
Orcadas

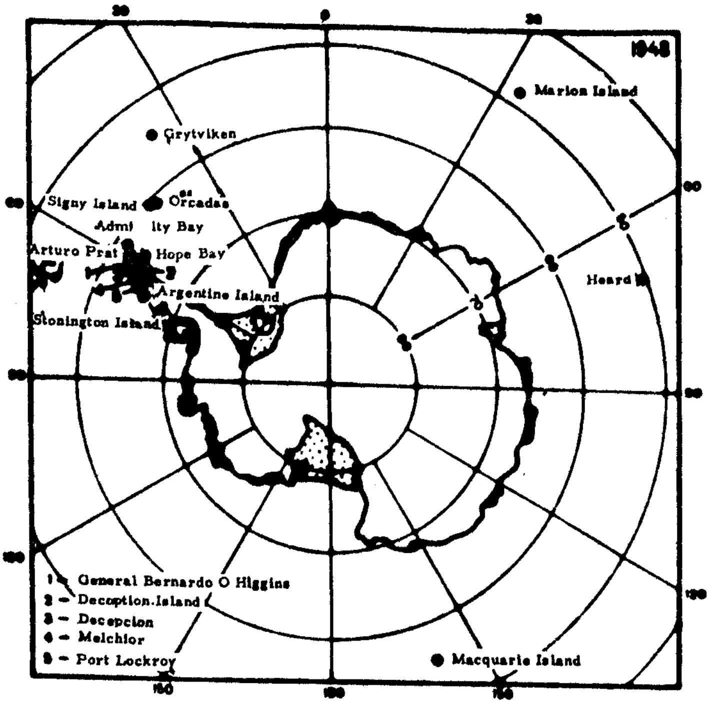
APPENDIX 4

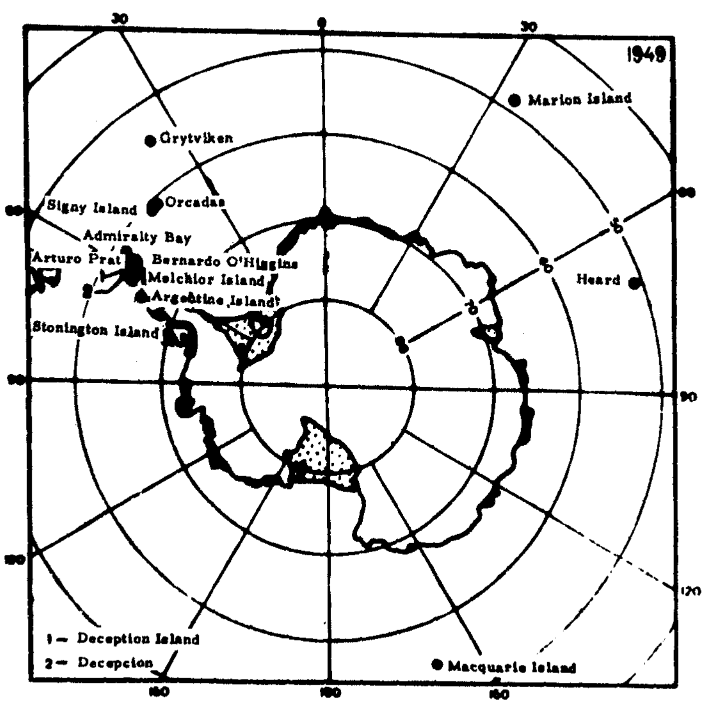

1929
Grytviken
Orcadas
Little America I
1930-1933
Grytviken
Orcadas
1934
Grytviken
Orcadas
Little America II
1935
Grytviken
Orcadas
Argentine Island
1936
Grytviken
Orcadas
Barry Island
1937-1939
Grytviken
Orcadas

APPENDIX 5

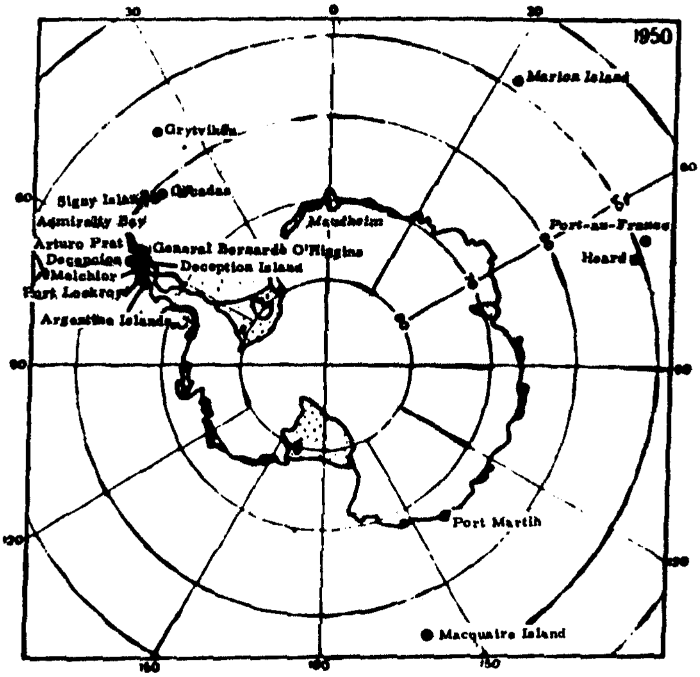

1940
Grytviken
Orcadas
East Base
Little America III
1941-1943
Grytviken
Orcadas
1944
Grytviken
Orcadas
Deception Island
Port Lockroy
1945
Grytviken
Orcadas
Hope Bay
Deception Island
Port Lockroy
1946
Grytviken
Orcadas
Cape Geddes
Hope Bay
Deception Island
Port Lockroy
Stonington Island
1947
Grytviken
Orcadas
Signy Island
Hope Bay
Melchior
Argentine Island
Stonington Island
Heard
Little America IV
1- Admiralty Bay
2- Arturo Prat
3- Deception Island

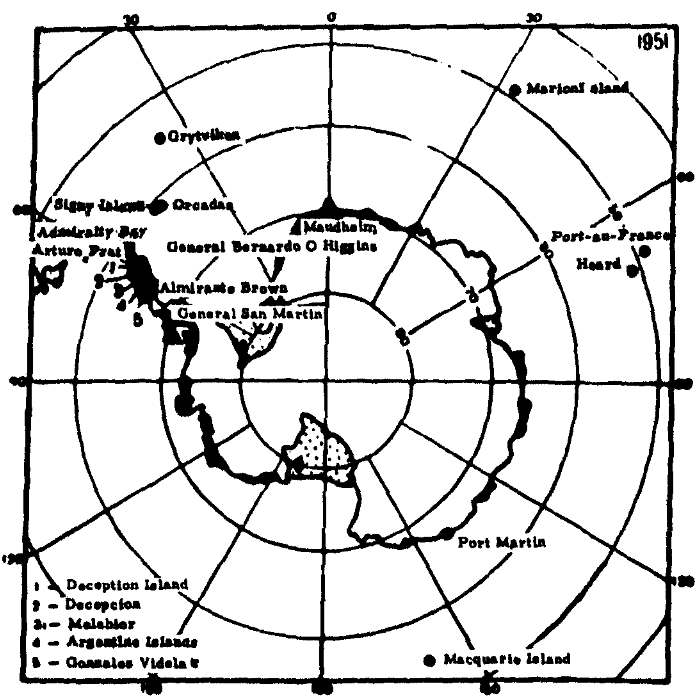
APPENDIX 6


1948
Marion Island
Grytviken
Signy Island
Orcadas
Admi lty Bay
Arturo Prat
Hope Bay
Heard
Argentine Island
Stonington Island
1 – General Bernardo O Higgins
2 – Deception Island
3 – Decepcion
4 – Melchior
5 – Port Lockroy
Macquarie Island

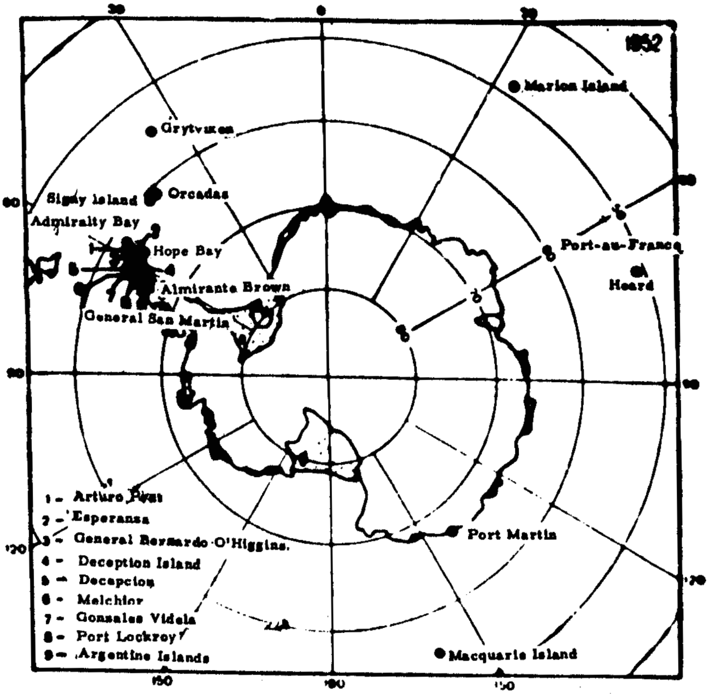

1949
Marion Island
Grytviken
Signy Island
Orcadas
Admiralty Bay
Arturo Prat
Bernardo O'Higgins
Melchior Island
Heard
Argentine Island
Stonington Island
1 – Deception Island
2 – Decepcion
Macquarie Island

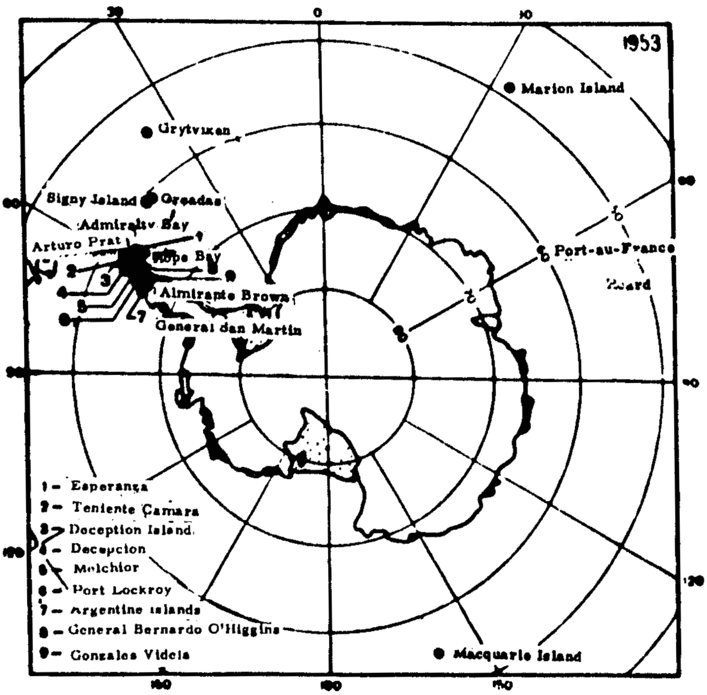
APPENDIX 7


1950
Marion Island
Grytviken
Signy Island
Orcadas
Admiralty Bay
Arturo Prat
General Bernardo O'Higgins
Decepcion
Deception Island
Melchior
Port Lockroy
Argentine Islands
Maudheim
Port-au-France
Heard
Port Martin
Macquaire Island

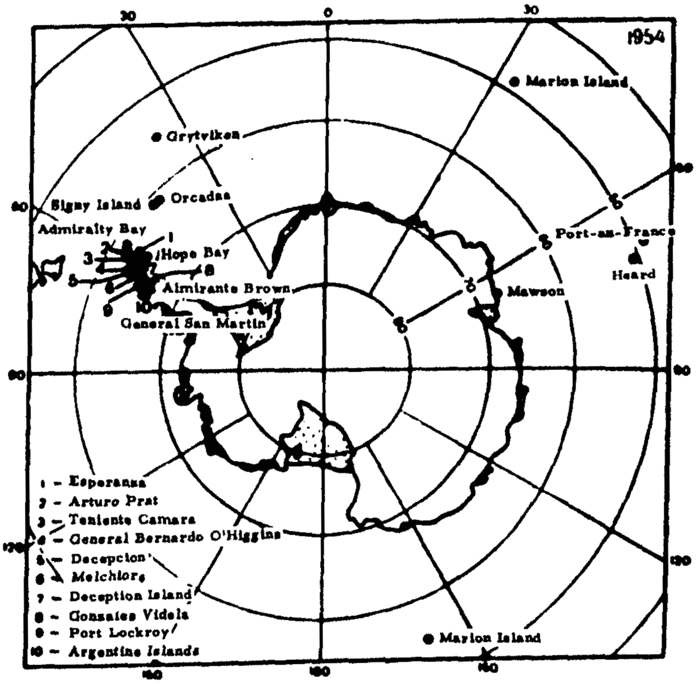

1951
Marion Island
Grytviken
Signy Island
Orcadas
Admiralty Bay
Arturo Prat
General Bernardo O Higgins
Maudheim
Almirante Brown
General San Martin
Port-au-France
Heard
Port Martin
1 – Deception Island
2 – Decepcion
3 – Melchior
4 – Argentine Islands
5 – Gonzales Videla
Macquarie Island

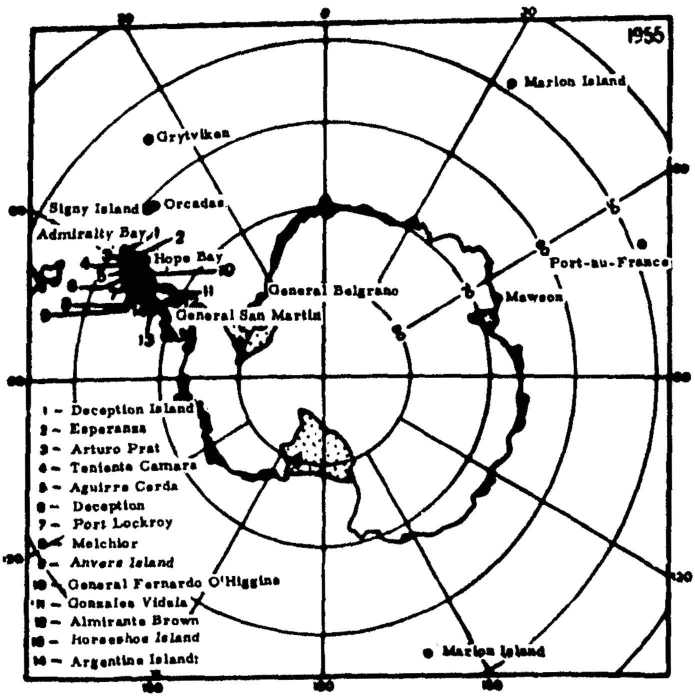
APPENDIX 8


1952
Marion Island
Grytviken
Orcadas
Signy Island
Admiralty Bay
Hope Bay
Almirante Brown
General San Martin
Port-au-France
Heard
Port Martin
Macquarie Island
1 - Arturo Prat
2 - Esperansa
3 - General Bernardo O'Higgins.
4 - Deception Island
5 - Decepcion
6 - Melchior
7 - Gonzales Videla
8 - Port Lockroy
9 - Argentine Islands

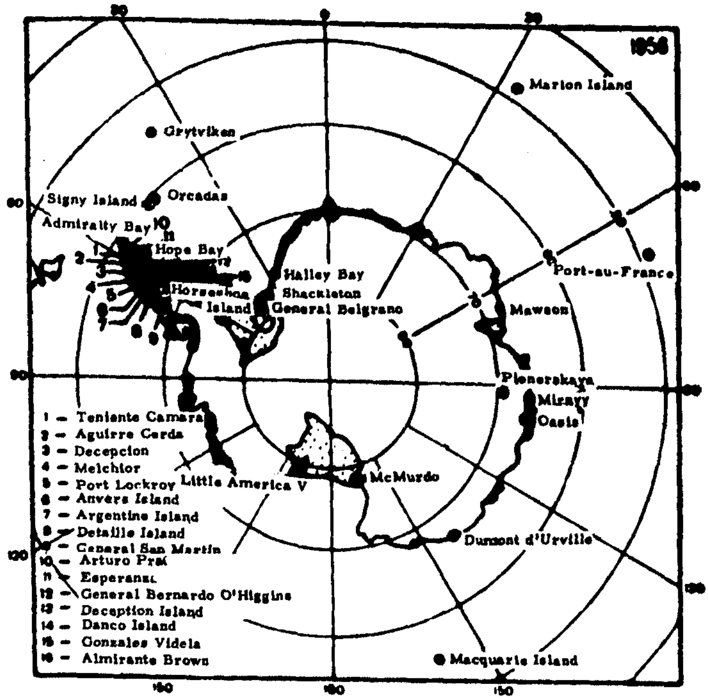

1953
Marion Island
Grytviken
Signy Island
Orcadas
Admiralty Bay
Arturo Prat
Hope Bay
Almirante Brown
General San Martin
Port-au-France
Macquarie Island
1 - Esperanza
2 - Teniente Camara
3 - Deception Island
4 - Decepcion
5 - Melchior
6 - Port Lockroy
7 - Argentine islands
8 - General Bernardo O'Higgins
9 - Gonzales Videla

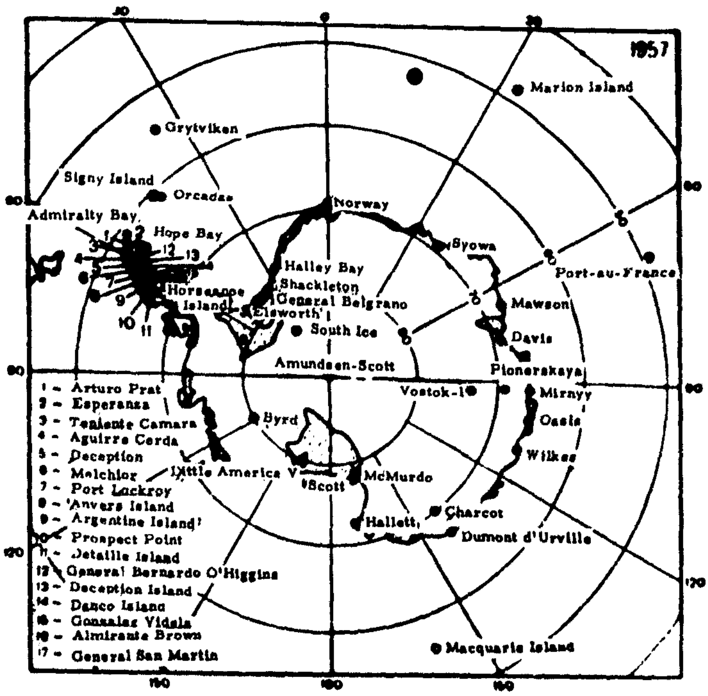
APPENDIX 9


1954
Marion Island
Grytviken
Signy Island
Orcadas
Admiralty Bay
Hope Bay
Almirante Brown
General San Martin
Port-au-France
Heard
Mawson
Marion Island
1 - Esperanza
2 - Arturo Prat
3 - Teniente Camara
4 - General Bernardo O'Higgins
5 - Decepcion
6 - Melchior
7 - Deception Island
8 - Gonzales Videla
9 - Port Lockroy
10 - Argentine Islands

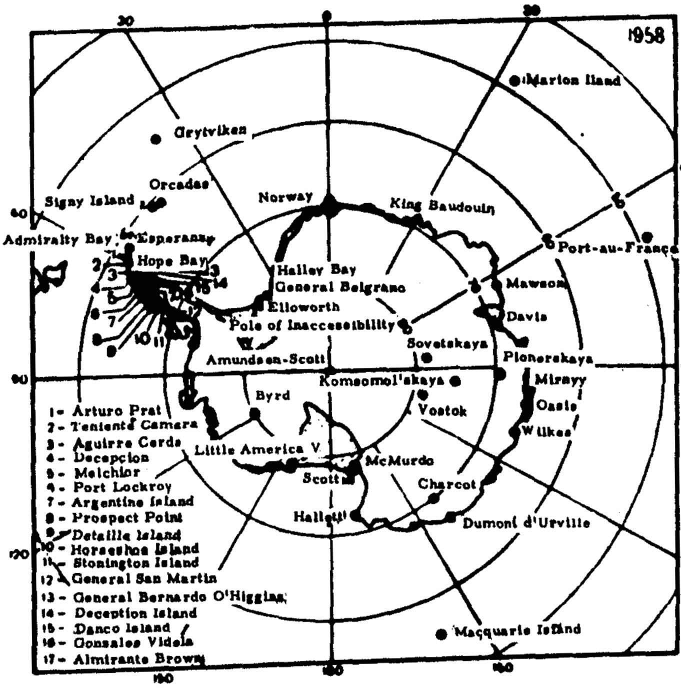

1955
Marion Island
Grytviken
Signy Island
Orcadas
Admiralty Bay
Hope Bay
General Belgrano
General San Martin
Port-au-France
Mawson
Marion Island
1 - Deception Island
2 - Esperanza
3 - Arturo Prat
4 - Teniente Camara
5 - Aguirre Cerda
6 - Deception
7 - Port Lockroy
8 - Melchior
9 - Anvers Island
10 - General Fernardo O'Higgins
11 - Gonzales Videla
12 - Almirante Brown
13 - Horseshoe Island
14 - Argentine Islands

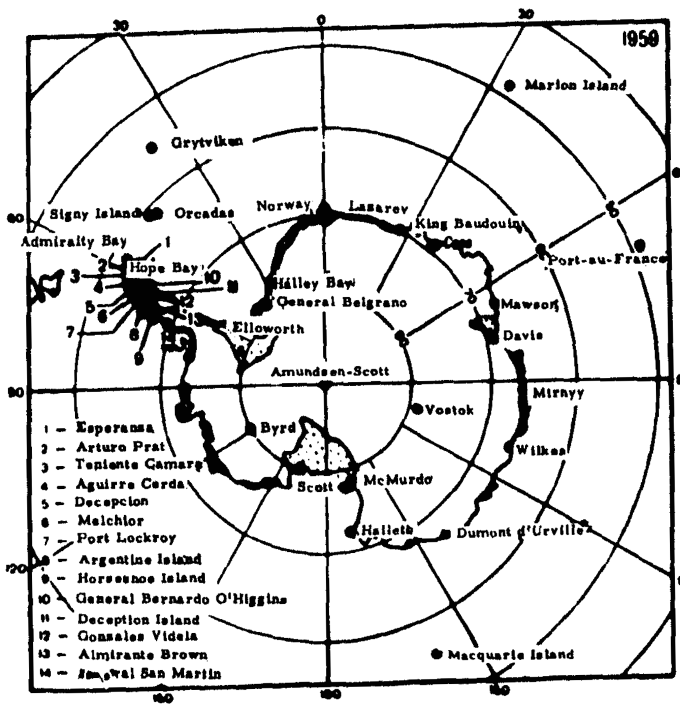
APPENDIX 10


1956
Marion Island
Grytviken
Signy Island
Orcadas
Admiralty Bay
Hope Bay
Halley Bay
Shackleton
General Belgrano
Horseshoe Island
Port-au-France
Mawson
Pionerskaya
Mirnyy
Oasis
Little America V
McMurdo
Dumont d'Urville
Macquarie Island
1 – Teniente Camara
2 – Aguirre Cerda
3 – Decepcion
4 – Melchior
5 – Port Lockroy
6 – Anvers Island
7 – Argentine Island
8 – Detaille Island
9 – General San Martin
10 – Arturo Prat
11 – Esperanza
12 – General Bernardo O'Higgins
13 – Deception Island
14 – Danco Island
15 – Gonzales Videla
16 – Almirante Brown

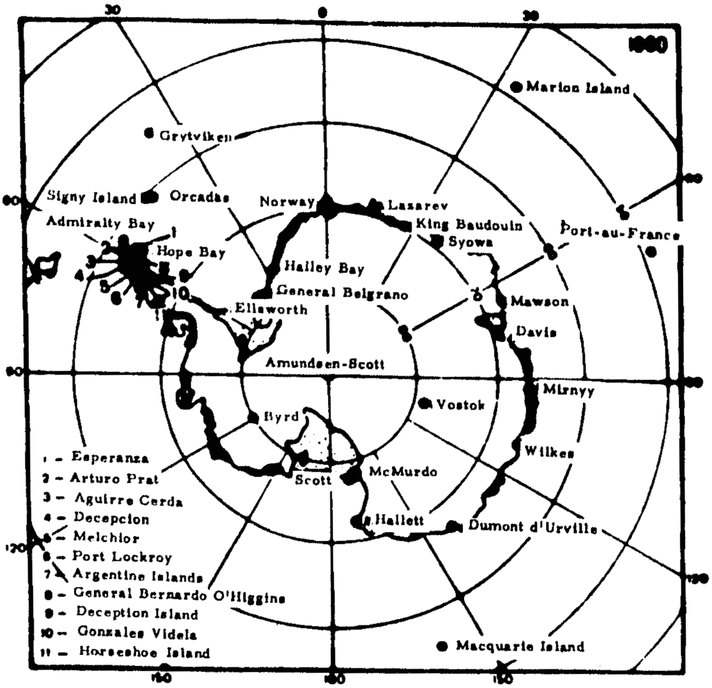

1957
Marion Island
Grytviken
Signy Island
Orcadas
Admiralty Bay
Hope Bay
Norway
Syowa
Port-au-France
Halley Bay
Shackleton
General Belgrano
Horseshoe Island
Elsworth
South Ice
Amundsen-Scott
Mawson
Davis
Pionerskaya
Vostok-I
Mirnyy
Oasis
Wilkes
Byrd
Little America V
Scott
McMurdo
Hallett
Charcot
Dumont d'Urville
Macquarie Island
1 – Arturo Prat
2 – Esperanza
3 – Teniente Camara
4 – Aguirre Cerda
5 – Deception
6 – Melchior
7 – Port Lockroy
8 – Anvers Island
9 – Argentine Island
10 – Prospect Point
11 – Detaille Island
12 – General Bernardo O'Higgins
13 – Deception Island
14 – Danco Island
15 – Gonzales Videla
16 – Almirante Brown
17 – General San Martin

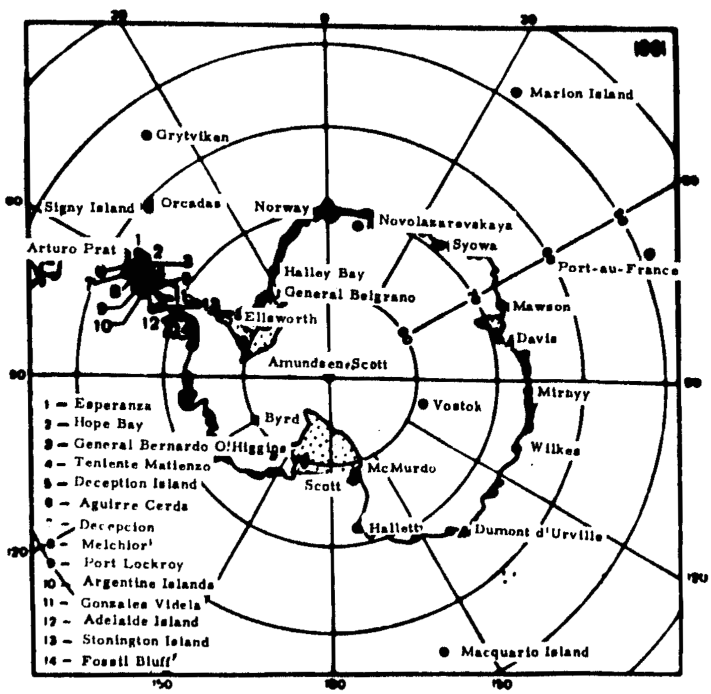
APPENDIX 11


1958
Marion Island
Grytviken
Orcadas
Signy Island
Admiralty Bay
Esperanza
Hope Bay
Norway
King Baudouin
Port-au-France
Halley Bay
General Belgrano
Elloworth
Pole of Inaccessibility
Mawson
Davis
Amundsen-Scott
Sovetskaya
Pionerskaya
Komsomol'skaya
Mirnyy
Byrd
Vostok
Oasis
Wilkes
Little America V
McMurdo
Scott
Charcot
Hallett
Dumont d'Urville
Macquarie Island
1 - Arturo Prat
2 - Teniente Camara
3 - Aguirre Cerda
4 - Decepcion
5 - Melchior
6 - Port Lockroy
7 - Argentine Island
8 - Prospect Point
9 - Detaille Island
10 - Horseshoe Island
11 - Stonington Island
12 - General San Martin
13 - General Bernardo O'Higgins
14 - Deception Island
15 - Danco Island
16 - Gonsales Videla
17 - Almirante Brown

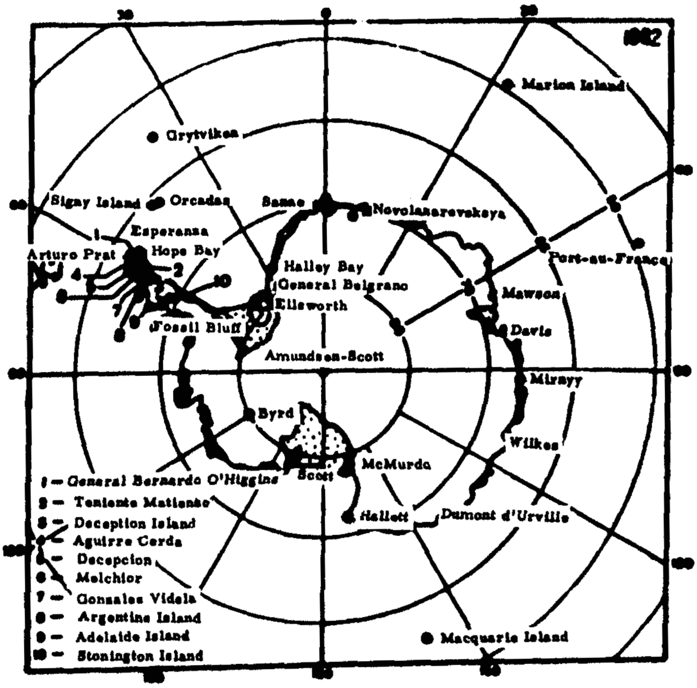

1959
Marion Island
Grytviken
Signy Island
Orcadas
Norway
Lasarev
King Baudouin
Admiralty Bay
Port-au-France
Hope Bay
Halley Bay
General Belgrano
Mawson
Davis
Elloworth
Amundsen-Scott
Mirnyy
Vostok
Byrd
Wilkes
Scott
McMurdo
Hallett
Dumont d'Urville
Macquarie Island
1 - Esperansa
2 - Arturo Prat
3 - Teniente Camara
4 - Aguirre Cerda
5 - Decepcion
6 - Melchior
7 - Port Lockroy
8 - Argentine Island
9 - Horseshoe Island
10 - General Bernardo O'Higgins
11 - Deception Island
12 - Gonsales Videla
13 - Almirante Brown
14 - San Martin

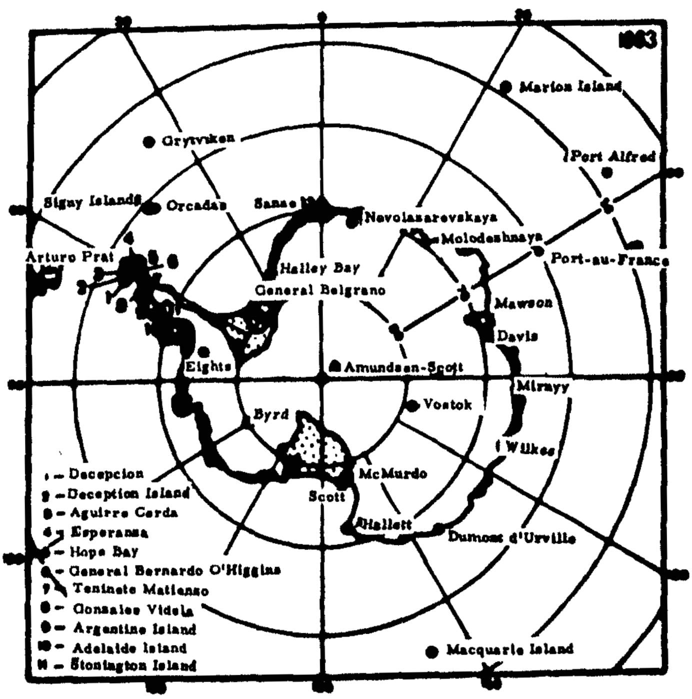
APPENDIX 12


1960
Marion Island
Grytviken
Signy Island
Orcadas
Norway
Lazarev
King Baudouin
Syowa
Admiralty Bay
Hope Bay
Halley Bay
General Belgrano
Port-au-France
Ellsworth
Mawson
Davis
Amundsen-Scott
Mirnyy
Vostok
Byrd
Wilkes
Scott
McMurdo
Hallett
Dumont d'Urville
Macquarie Island
1 - Esperanza
2 - Arturo Prat
3 - Aguirre Cerda
4 - Decepcion
5 - Melchior
6 - Port Lockroy
7 - Argentine Islands
8 - General Bernardo O'Higgins
9 - Deception Island
10 - Gonzales Videla
11 - Horseshoe Island


1961
Marion Island
Grytviken
Signy Island
Orcadas
Norway
Novolazarevskaya
Syowa
Arturo Prat
Halley Bay
General Belgrano
Port-au-France
Mawson
Ellsworth
Davis
Amundsen-Scott
Mirnyy
Vostok
Byrd
Wilkes
McMurdo
Scott
Hallett
Dumont d'Urville
Macquarie Island
1 - Esperanza
2 - Hope Bay
3 - General Bernardo O'Higgins
4 - Tenlente Matienzo
5 - Deception Island
6 - Aguirre Cerda
7 - Decepcion
8 - Melchior
9 - Port Lockroy
10 - Argentine Islands
11 - Gonzales Videla
12 - Adelaide Island
13 - Stonington Island
14 - Fossil Bluff

APPENDIX 13


1962
Marion Island
Grytviken
Signy Island
Orcadas
Sanae
Novolasarevskaya
Esperanza
Arturo Prat
Hope Bay
Halley Bay
Port-au-France
General Belgrano
Mawson
Ellsworth
Fossil Bluff
Davis
Amundsen-Scott
Mirnyy
Byrd
Wilkes
McMurdo
Scott
Hallett
Dumont d'Urville
Macquarie Island
1 — General Bernardo O'Higgins
2 — Teniente Matienzo
3 — Deception Island
Aguirre Cerda
Decepcion
Melchior
7 — Gonzales Videla
8 — Argentine Island
9 — Adelaide Island
10 — Stonington Island


1963
Marion Island
Grytviken
Port Alfred
Signy Island
Orcadas
Sanae
Novolasarevskaya
Molodezhnaya
Arturo Prat
Port-au-France
Halley Bay
General Belgrano
Mawson
Davis
Eights
Amundsen-Scott
Mirnyy
Vostok
Byrd
Wilkes
McMurdo
Scott
Hallett
Dumont d'Urville
Macquarie Island
1 — Decepcion
2 — Deception Island
3 — Aguirre Cerda
4 — Esperanza
— Hope Bay
— General Bernardo O'Higgins
7 — Teninete Matienzo
8 — Gonzales Videla
9 — Argentine Island
10 — Adelaide Island
11 — Stonington Island