

NATIONAL INSTITUTE OF POLAR RESEARCH

ANTARCTIC GEOLOGICAL MAP SERIES

SHEET 10 PADDA ISLAND

Explanatory Text of Geological Map
of
Padda Island, Antarctica

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NATIONAL INSTITUTE OF POLAR RESEARCH

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Explanatory Text of Geological Map of Padda Island

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1. Padda Island

Padda Island is located near an inner of Lützow-Holm Bay about 100 km southwest of Syowa Station. The island was mapped by HANSEN (1946) for the first time, based on oblique photographs taken by CHRISTENSEN in his expedition in 1936-1937. The shape of the island is irregular, somewhat amoeboid with the wide embayment "Nordbukta" at the northern side and three distinct points, Kuzira Point, Austpynten, and Nagagutu Point at the northwestern, northeastern, and southeastern corners of the island. The area of the island is about 22 km², but the island is almost entirely covered by ice and firn; the total ice-free area is only 1 km². The highest peak, 260 m, situated in the northwestern part of the island, has somewhat precipitous slopes on the north and northeast and wide and gentle ridge and slope on the south and southeast (Fig. 5). Small bared rocks crop out sporadically at the northern margin of the island, occupying the northern slope.

The geological survey of this island was first made by ISHIKAWA, the present writer in 1972 when he visited the island as a member of the geological party of the 13th Japanese Antarctic Research Expedition (JARE) (KAWAGUCHI, 1974). However, the island was visited previously in August, 1957 by NISHIBORI and three members of the first JARE who made some preliminary investigations (TATSUMI, 1958; KIKUCHI and KITAMURA, 1960). M. YOSHIDA, also a member of the Japanese party, explained geologic structure of the island mainly based on aerial photographs and information of field data after ISHIKAWA's 1972-survey (YOSHIDA and ANDO, 1971; YOSHIDA, 1975), in his geological report of the region around Botnneset 20 to 40 km southwest of Padda Island. A gravity survey near the island was made by OURA of the JARE-5 in 1961 along with a systematic measurement of gravity and consideration of the thickness of the earth crust between Syowa Station to Cook Point (OURA, 1965). Cartographic survey was also conducted by the JARE-4 (NIHON GAKUJUTSU KAIGI, 1960).

The maps available at the time of the survey were the 1:1,000,000 reconnaissance toposheet, the 1:250,000 series Lützow-Holm Bay and the 1:25,000 series Padda Island compiled by the Geographical Survey Institute, Japan, in 1956, 1963 and 1966. Also available for field work was the aerial photographs which were prepared on the scale of approximately 1:25,500 by the JARE-6 in January, 1962.

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2. Basement Geology

Basement of Padda Island is composed of garnet-biotite gneiss, hornblende gneiss, pyroxene gneiss, and garnet-bearing granitic gneiss, and subordinate amount of pegmatite. The petrographic characteristics of the gneisses are nearly similar to those occurring around Syowa Station (*cf.* TATSUMI *et al.*, 1964; TATSUMI and KIZAKI, 1969). Somewhat detailed petrography of rocks occurring around Botneset is already presented in YOSHIDA (1975). These rocks trend from E-W to NE-SW, and dip moderately to the south, showing gentle synform with a southern plunge.

2.1. Garnet-biotite gneiss (Ggb)

Garnet-biotite gneiss is widely distributed throughout the island. This rock often alternates with hornblende gneiss. It is reddish brown in color, ferreous in composition, and is characterized by the presence of garnet.

2.2. Hornblende gneiss (Gh)

Hornblende gneiss is distributed mainly at Kuzira Point. This rock is coarse-grained, white, and quartz-feldspathic in composition, with hornblende as a characteristic mafic mineral.

2.3. Pyroxene gneiss (Gp)

Pyroxene gneiss is distributed mainly at Nagagutu Point. This rock is medium-grained and dark brown or gray, showing an indistinct gneissose structure.

2.4. Garnet-bearing granitic gneiss (Ggg)

Garnet-bearing granitic gneiss is leucocratic, whitish, and has a weak foliation. It is quartz-feldspathic in composition always speckled with garnet.

3. Geological Structure

The gneisses occurring in the western part of the island strike N45°E and dip 50° to the south, and in the eastern part they strike approximately E-W and dip 50° to the south. It is considered that the gneisses constitute a part of the large-scale folding, the folding being probably a synform with a southerly plunge. YOSHIDA (1975), in his geological studies of the wide regions extending to the south of the present island, showed the existence of gentle folding, with wavelength of about 4 km and the axis trending around north, which is superposed on the earlier isoclinal and asymmetric linear foldings, the latter trending east. The estimated folding of the present island may well be referred to the later stage folding described by YOSHIDA.

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Fig. 1. Glaciated garnet-biotite gneiss with strong foliation.



Fig. 2. Glacial striations and chatter marks bent concavely toward the down stream direction of ice flow.





Fig. 3. Garnet-biotite gneiss showing minor shear fold.



Fig. 4. Pyroxene gneiss showing minor fold.



Fig. 5. Aerial photograph, northern part of Padda Island. JARE Antarctic air photo, 6AV 1-2, Nos. 746-748.

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