OUTLINE OF GEOLOGY OF CAPE RYÛGÛ, OKU-IWA ROCK AND TELEN, EAST ANTARCTICA

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Abstract: Cape Ryûgû, Oku-iwa Rock and Telen are located along the Prince Olav Coast and the Lützow-Holm Bay region, East Antarctica, where crystalline basement rocks are found to occur extensively.

Geological field observations in the three areas by the geologists of the 19th Japanese Antarctic Research Expedition in 1977–1978 are described, and the geological maps of the areas are presented.

The basement rocks exposed in these areas are chiefly biotite gneiss, garnet-biotite gneiss, biotite-hornblende gneiss, and siliceous gneiss with subordinate amounts of metabasites, granite, pegmatite and aplite.

The foliation plane of gneissosity or banded structure of the metamorphic rocks is monoclinal in general, while folding structures are observed in some places.

1. Introduction

This is a report on part of the geological activities of the 19th Japanese Antarctic Research Expedition (JARE–19).

The geological surveys were carried out by the authors for the period from December 1977 to February 1978 in the following three areas: Cape Ryûgû, Oku-iwa Rock and Telen along the Prince Olav Coast and the Lützow-Holm Bay region, East Antarctica (Fig. 1).

The present report deals only with the basement rocks and their geological structure in the surveyed areas. Petrological studies will be published separately in the near future.

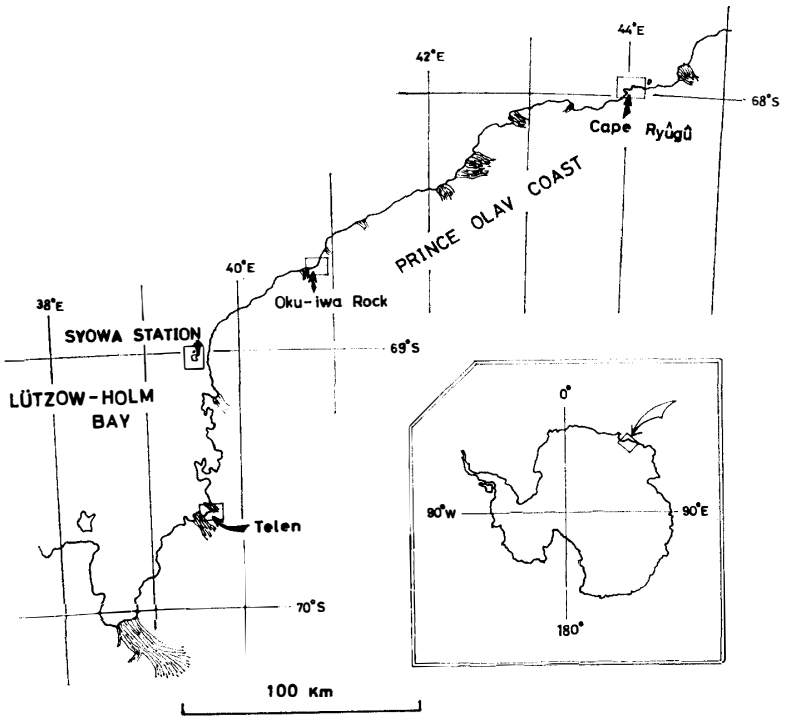

Fig. 1. Location map of the surveyed areas along the Prince Olav Coast and the Lützow-Holm Bay region, East Antarctica.

2. Geology of Cape Ryûgû

Cape Ryûgû located at 67°58′S in latitude and 43°55′E–44°10′E in longitude, has an ice-free area of 10 km in the east-west length with a width of 2 km. This area is bounded by continental ice on the south. Along the U-shaped valleys running in the east-west direction, glacial morainic deposits and numerous ponds are distributed.

Geological survey by JARE in Cape Ryûgû was carried out for the first time by the authors from December 31, 1977 to January 9, 1978 (KAMINUMA *et al.*, 1978).

The basement rocks exposed in this area are classified into the following units on the basis of their modes of occurrence and petrographic features: 1) Biotite gneiss, 2) Fine-grained melanocratic biotite-hornblende gneiss, 3) Garnet-biotite gneiss, 4) Siliceous gneiss, 5) Leucocratic biotite gneiss, 6) Crystalline limestone, 7) Augen gneiss, 8) Amphibolite, 9) Hornblende gneiss, and 10) Granite, pegmatite, aplite. The distribution of these rocks is shown as a geological map in Fig. 2.

Biotite gneiss characteristically containing magnetite and ilmenite is the most predominant rock species in the northern part of this area. The rock occurs as the lowermost member in this area, and is associated with thin layers of melanocratic biotite-hornblende gneiss, amphibolite and pyroxene gneiss. Pegmatite and aplite

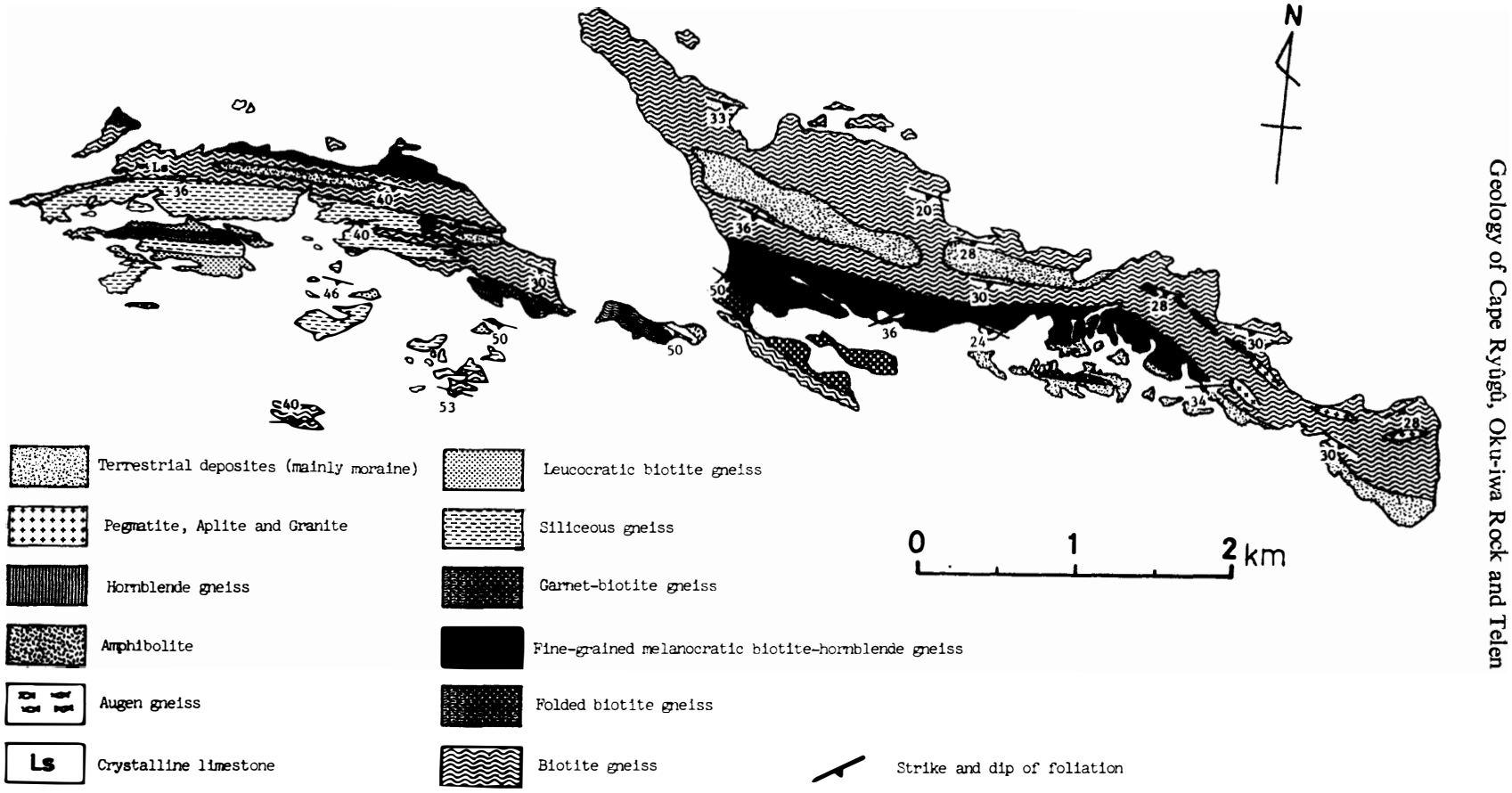

Fig. 2. Geological map of Cape Ryûgû.

dykes and/or sheets are found to cut the biotite gneiss. Above the biotite gneiss horizon in the northern part, alternation of fine-grained melanocratic biotite-hornblende gneiss, garnet-biotite gneiss, biotite gneiss, siliceous gneiss, hornblende gneiss and leucocratic biotite gneiss is found to occur in the southern part of this area. Crystalline limestone and augen gneiss occur as lenses or thin layers within the biotite gneiss in the western part.

The foliation plane of gneissosity or banded structure in these metamorphic rocks generally runs in the east-west direction and dips to the south monoclinally from 30° to 50° as a whole. In some places syncline and anticline are observed. Remarkable folding structure is observed within the biotite gneiss in the central part.

3. Geology of Oku-iwa Rock

The Oku-Iwa Rock area is situated at 68°42′S in latitude and between 40°48′E and 40°52′E in longitude approximately. This area has an ice-free area of about 3 km in the east-west length and 1.5 km in width.

The geology of Oku-iwa Rock was preliminarily surveyed and reported by YOSHIDA and ANDO (1971), members of the wintering team of JARE-10, 1969–1970.

The field work was carried out by the authors from January 24 to 27, 1978. In

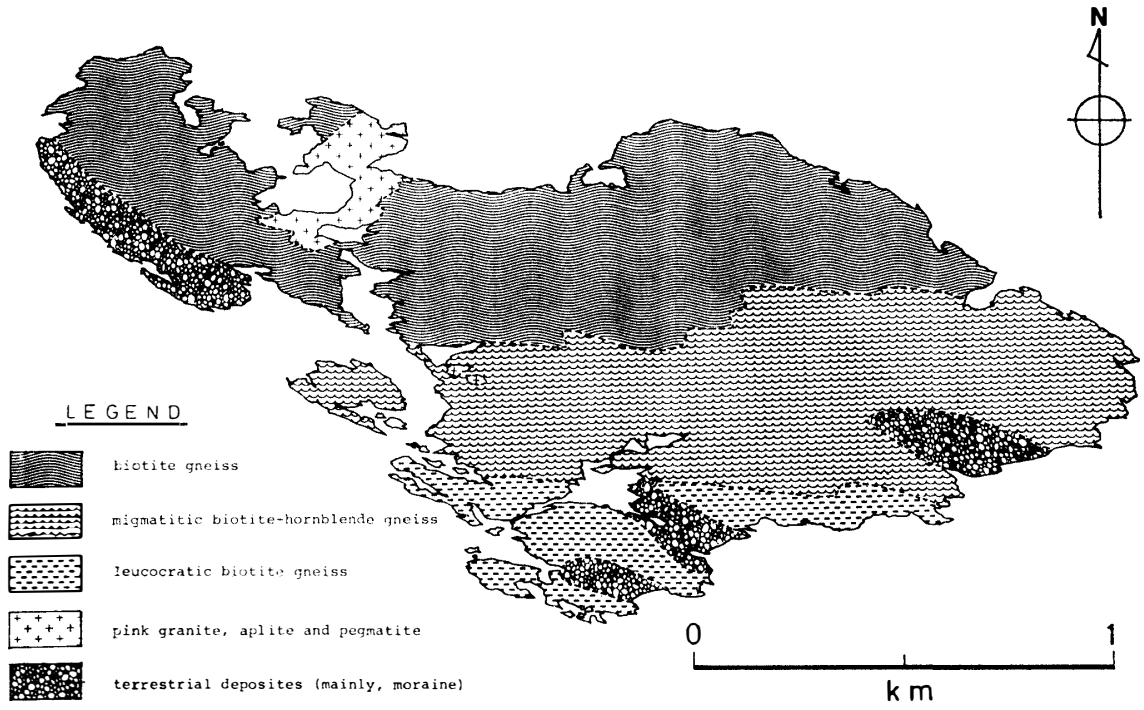

Fig. 3. Geological map of Oku-iwa Rock.

the southern part of this area, near the continental ice sheet, morainic glacial deposits and patterned ground are found.

The exposed basement rocks in the area are classified as follows: 1) Biotite gneiss with strong microfolding, 2) Migmatitic biotite-hornblende gneiss, 3) Leucocratic biotite gneiss, and 4) Pink granite, aplite and pegmatite.

The distribution of these rocks is shown in a geological map (Fig. 3). The exposed area is divided into three zones, biotite gneiss zone, migmatitic biotite-hornblende gneiss zone and leucocratic biotite gneiss zone, on the basis of the petrographical character, folding structure and degrees of migmatization. The three zones are arranged in parallel with each other in the east-west direction. The biotite gneiss exhibiting strong folding in the biotite gneiss zone lies in the northern part of this area, where the biotite gneiss is the lowermost member. Toward the south, the other two zones are successively distributed above the biotite gneiss zone. In the migmatitic biotite-hornblende gneiss zone, the melanocratic rocks are often affected with migmatization and grade into the leucocratic dioritic rock. Granite, aplite and pegmatite having pinkish potassium feldspar show remarkable folding structures, and the occurrence of these rocks is limited to the folded biotite gneiss zone in the northwestern part of this area. The foliation of this area shows a general strike in the east-west direction and dips 40°–60° to the south.

4. Geology of Telen

The Telen area located at 69°39′S and between 39°39′E and 39°44′E, has an exposed area of about 3 km east-west and 1 km north-south.

Geological survey of the Telen area was carried out from January 31 to February 1, 1978. It was the first geological survey of this area. Geomorphologically the area shows an undulating surface. The basement rocks exposed in the Telen area are classified into the following eight types: 1) Garnet-biotite gneiss, 2) Melanocratic hornblende-biotite gneiss, 3) Garnet-bearing gneiss, 4) Clinopyroxene gneiss, 5) Charnockitic gneiss, 6) Garnet-bearing quartzose gneiss, 7) Quartzite, and 8) Biotite amphibolite (NAKAI *et al.*, 1979).

Among these rocks, garnet-biotite gneiss is most predominant and the other rock types occur as thin layers intercalated in the garnet biotite gneiss.

The geological map of the Telen area is shown in Fig. 4.

Megascopically the foliation shows a uniform strike in the north-south direction and a monoclinal dip to the east, so that the lower formation occurs in the western side of the area. The gneiss of the lower formation is pelitic in composition, and the upper formation is occupied by the psammitic gneiss. Charnockitic gneiss occurs in the middle formation and clinopyroxene gneiss and biotite amphibolite are exposed in the uppermost formation. Large crystals of garnet reaching 20 cm in maximum diameter are often found in a biotite-rich thin layer of the melanocratic hornblende-

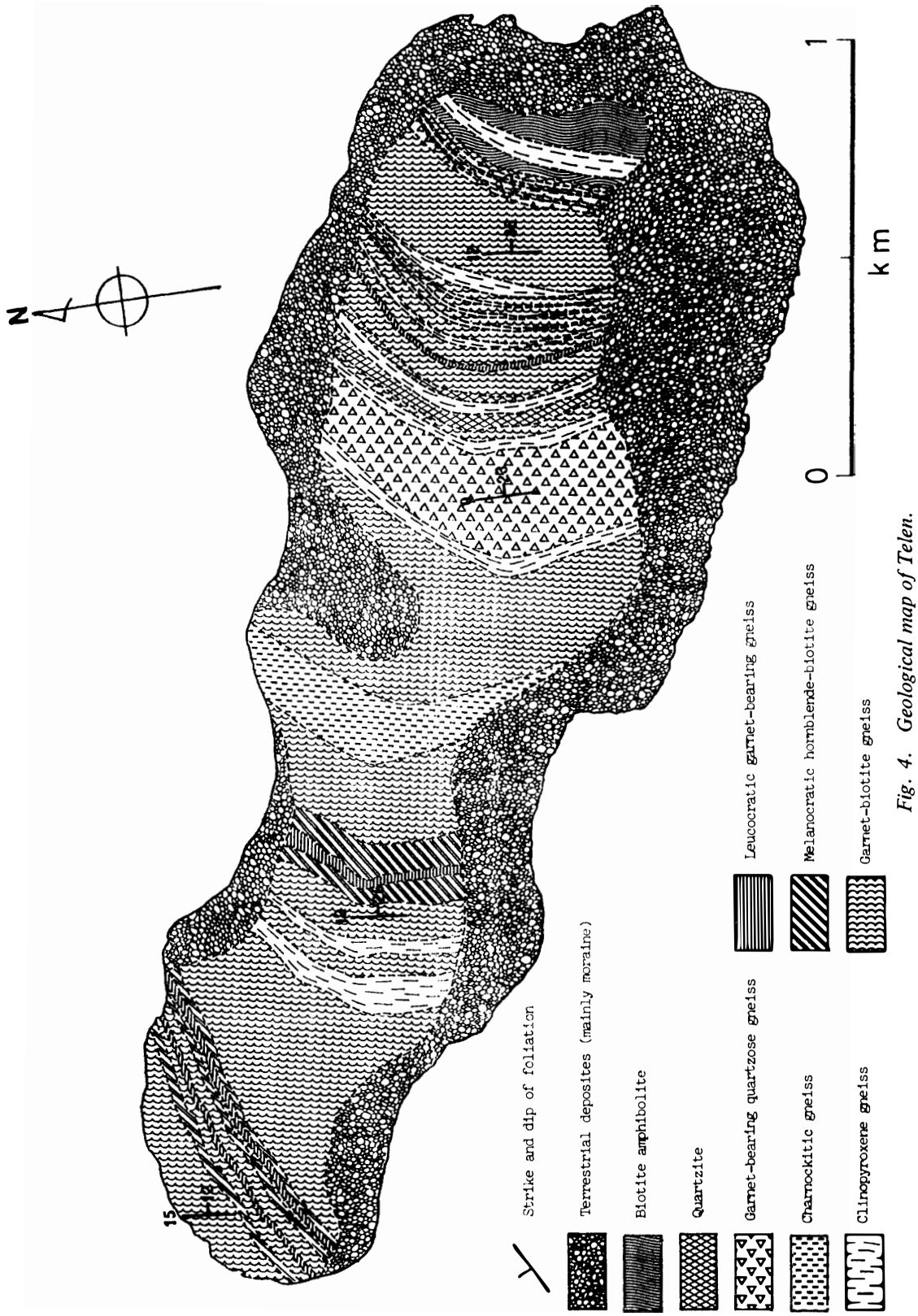

Fig. 4. Geological map of Telen.

biotite gneiss.

Folding structure of this area is not so remarkable. Microfolding of clinopyroxene gneiss, however, is observed in the western area.

Acknowledgments

The authors are greatly indebted to Dr. Takeo HIRASAWA, leader of JARE-19, and to all the expedition members. Thanks are due to Dr. Kanenori SUWA of Nagoya University for critically reading the manuscript of this paper.

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(*Received January 16, 1979; Revised manuscript received May 1, 1979*)