

NATIONAL INSTITUTE OF POLAR RESEARCH
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SHEET 8 KJUKA AND TELEN

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of
Kjuka and Telen, Antarctica

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1. Introduction

Kjuka and Telen are located at 69°34'–69°40'S and 39°37'–39°50'E in Sôya Coast which is the eastern coast of Lützow-Holm Bay, Antarctica. The Telen Glacier about 4.5 km in width separates the Telen area from the Kjuka area.

The topographical map “Kjuka and Telen” on a scale of 1:25000 was published in March 1975 by the Geographical Survey Institute of Japan; the map was compiled from air-photographs taken on January 21, 1962 and January 20, 1969 with ground air-photos control points established by the 14th Japanese Antarctic Research Expedition (JARE-14).

The geological survey in Kjuka was carried out in 1973 by Terumi ISHIKAWA, a member of JARE-13. The geology of Telen was surveyed by Yutaka NAKAI, Takashi KANO and Shin-ichi YOSHIKURA, members of JARE-19, between January 31 and February 1, 1978.

2. Kjuka

The Kjuka area, almost free from permanent ice, has a size of 3.6 km in N–S and 2.7 km in E–W, and the highest point is 316.9 m above sea level. This area is situated in a marginal zone of Enderby Land and about 66 km south of Syowa Station. The lower part of ice-free area is covered with morainic deposits and weathered rock fragments, while higher parts are well exposed and evidence of pre-glaciation was recognized.

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The Kjuka area belongs to one of the Precambrian or Cambrian geological system in East Antarctica. Basement rocks in this area are charnockitic gneiss and garnet-bearing leucocratic gneiss, with subordinate amounts of metabasites and pegmatite. The metabasites, exposed as a small lens at the western end of the Kjuka area are contained large amounts of pyroxene. Pegmatite dikes are found in the charnockitic gneiss in the southern part, where the charnockitic gneiss are clearly cut by the pegmatite. Morainic deposits occupy the southern and eastern margins of the area.

The gneissic rocks west of the Kjuka area strike N-S and dip to the west, whereas the garnet-bearing quartz-feldspathic gneiss strikes N-S and dips to the east. In the garnet-bearing quartz-feldspathic gneiss there are many small-scaled similar folds with N-S axial traces. Charnockitic gneiss east of the Kjuka area strikes NNW-SSE and dips to the west. These structures represent a combination of antiform and synform.

2.1. *Charnockitic gneiss (Gch)*

This rock occupies the most of outcrops in the Kjuka area. It is a medium-grained homogenous rock with dark brown color and has a slightly foliated structure. The foliated structure is partly observed as concentration of mafic minerals. The rock is composed of clinopyroxene, orthopyroxene, hornblende, biotite, plagioclase, potash-feldspar and quartz without garnet.

2.2. *Garnet-bearing quartz-feldspathic gneiss (Gqf)*

This rock is distributed in a rather small area of the western part, occurring as concordant with charnockitic gneiss. It is a medium-grained, massive and white to pink granitic rock, composed of quartz, potash-feldspar, plagioclase and biotite, with a minor amount of garnet.

2.3. *Metabasite (Bm)*

This rock occurs as a thin layer in garnet-bearing quartz-feldspathic gneiss, generally concordant with the foliation of the garnet-bearing quartz-feldspathic gneiss ranging in width from less than 1 m to 2 m. The rock is composed of abundant hornblende, orthopyroxene, biotite and plagioclase.

2.4. *Pegmatite (Pg)*

Pink microcline pegmatite occurs as a dike which contains pink perthite, quartz, biotite and partly abundant magnetite of large crystals.

3. Telen

The Telen area is located at 69°39'S and 39°39'–44'E, about 72 km south of Syowa Station. The area is ice-free, 3 km in E-W, 1 km in N-S, and is separated from the continental ice sheet of Sôya Coast and the Kjuka area by the Telen Glacier and the Skallen Glacier. The highest point is 110.3 m above sea level.

The cliff of the northwest coast and other outcrops consist mainly of metamorphic rocks of granulite facies or upper amphibolite facies. These rocks belong to the Precambrian system or Precambrian to Cambrian system of East Antarctica. The lowland of this area is covered with morainic gravel deposits. Most of gravels are amphibolite, charnockitic gneiss and other metamorphic and plutonic rocks. Marble, magnesian skarn, low-grade meta-sediment and hornfels are found only in the morainic deposits as a few pebbles or cobbles.

The basement rocks of Telen are classified into the following types:

1. Garnet-biotite gneiss (Ggb)
2. Garnet-bearing leucocratic gneiss (Ggl)
3. Garnet-bearing quartz-feldspathic gneiss (Gqf)
4. Clinopyroxene gneiss (Gcp)
5. Charnockitic gneiss (Gch)
6. Two-pyroxene amphibolite (Amp)
7. Quartzite (Qz)

The area has a monoclinical structure and the foliation generally trends N-S and dips 20°–30°E. The basement rocks of Telen are divided into three successions from west to east: lower pelitic gneiss, middle charnockitic gneiss and upper psammitic gneiss intercalated with quartzite and two-pyroxene amphibolite beds.

3.1. Garnet-biotite gneiss (Ggb)

This is a medium- to coarse-grained foliated rock and contains garnet with pinkish to reddish tint. Biotite flakes are orientated parallel to the gneissosity. The garnet-biotite gneiss is the most widespread rock in Telen and occupies the main area. Large garnet-bearing biotite-rich melanocratic rocks occur as thin concordant layers of 10–50 cm thick in the western part. The largest garnet porphyroblasts are 20–25 cm in diameter.

Under the microscope, it shows lepidoblastic to granoblastic texture. The rock is composed mainly of quartz, plagioclase, biotite, garnet, potash-feldspar and small amounts of orthopyroxene, magnetite, hematite, apatite and zircon. Biotite is tabular crystal of brown to reddish brown in color and is closely associated with magnetite and hematite. Garnet is anhedral porphyroblast including small quartz and isotropic minerals (spinel). Potash-feldspar is perthitic and is less than quartz and plagioclase in amount. Orthopyroxene sometimes occurs in this rock and is pleochroic with X' = pink to pale red, Z' = colorless.

3.2. Garnet-bearing leucocratic gneiss (Ggl)

This is a fine- to medium-grained leucocratic rock which contains a small amount of granular garnet with reddish to pinkish tint. The foliation is weak and the rock is massive in appearance. The garnet-bearing leucocratic gneiss occurs as light-colored concordant layers of 0.5–3 m thick in the garnet biotite gneiss.

Under the microscope, the rock exhibits an equigranular granoblastic texture

and is composed mainly of quartz, potash-feldspar, plagioclase and small amounts of garnet, biotite and opaque minerals.

3.3. *Garnet-bearing quartz-feldspathic gneiss (Gqf)*

This is a fine-grained leucocratic and foliated rock. It is pink or red in color and has compositional banding consisting of 2–3 cm to 20–30 cm thick quartz-feldspathic leucocratic bands and fine-grained biotite-bearing melanocratic bands. The foliation is due to the preferred orientation of biotite flakes. The rock occurs mainly in the eastern part, and is intercalated with quartzite.

Under the microscope, it shows an equigranular granoblastic texture and is composed of potash-feldspar, quartz, plagioclase and small amounts of biotite, garnet and opaque minerals. The rock is rich in perthitic potash-feldspar with cross-hatched microcline twinnings, and most of plagioclase crystals are sericitized.

3.4. *Clinopyroxene gneiss (Gcp)*

This is a fine-grained melanocratic rock and is deep green in color. The foliation is weak and the rock has a massive appearance. The clinopyroxene gneiss occurs in the central and western parts of Telen, alternates with fine-grained biotite gneiss. The alternations are well folded and a half wave length of foldings is about 0.5–1 m. At about 500 m WSW from the highest point, the clinopyroxene gneiss is intruded by irregular veinlets or pools of diopsidic clinopyroxene-bearing pegmatoids.

Under the microscope, it exhibits an equigranular granoblastic texture and is composed of clinopyroxene, quartz, plagioclase and with or without hornblende, biotite, potash-feldspar, sphene and scapolite. Clinopyroxene is weakly pleochroic, being pale green to colorless, and is partly replaced by green hornblende. Plagioclase is small in amount and most of crystals are strongly sericitized. A considerable amount of scapolite is found in this rock at about 500 m WSW from the highest-point.

3.5. *Charnockitic gneiss (Gch)*

This is a fine- to coarse-grained foliated rock and has compositional banding of medium- to coarse-grained quartz-feldspathic bands and fine- to medium-grained melanocratic bands. Flakey minerals are orientated parallel to the foliation. The rock is dark gray to dark greenish gray in color due to the presence of dark-colored quartz and feldspars. The charnockitic gneiss occurs in the central part.

Under the microscope, it exhibits an equigranular granoblastic texture and is composed of plagioclase, quartz, clinopyroxene, orthopyroxene, biotite, potash-feldspar, garnet and opaque minerals. Plagioclase is antiperthitic; potash-feldspar is stringlets or strings perthite. Orthopyroxene is pleochroic with pale pink to pale red, and biotite is also pleochroic with Y=Z=reddish brown, X=yellow. Garnet occurs as porphyroblastic crystals.

3.6. *Two-pyroxene amphibolite (Amp)*

This is a fine- to coarse-grained melanocratic rock having clinopyroxene and orthopyroxene. Fine-grained foliated amphibolite occurs as concordant layers intercalated in the garnet-biotite gneiss at the eastern end. Coarse-grained or fine-grained massive amphibolite is found in the western part as agmatitic breccias in the leucocratic biotite gneiss.

Under the microscope, the massive one has a nonorientated equigranular granoblastic texture and the foliated one shows lepidoblastic to granoblastic texture. Both types are composed mainly of hornblende, plagioclase, clinopyroxene, orthopyroxene and small amounts of biotite and opaque minerals, with or without quartz. Hornblende is pleochroic with Z' =deep green, X' =yellow green and orthopyroxene is also pleochroic, being pale pink to colorless.

3.7. *Quartzite (Qz)*

This is a light-colored and weakly foliated rock. The foliation is shown by the preferred orientation of small biotite flakes. The rock occurs as concordant layers, about 2–3 m to 10 m in thickness, intercalated in the garnet-biotite gneiss and garnet-bearing quartz-feldspathic gneiss in the eastern part.

Under the microscope, it exhibits a weakly orientated granoblastic texture and is composed mainly of quartz and small amounts of potash-feldspar, dusty plagioclase, biotite, chlorite, calcite and tourmaline. Quartz is completely recrystallized and dusty core is enveloped by clear mantle. Smaller grains of potash-feldspar, plagioclase and biotite are included in large quartz grains. Potash-feldspar is perthitic and has cross-hatched microcline twinnings. The trains of small biotite flakes making the foliation, cross through the large quartz grains.

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