

The Pan-African massif-type Gruber anorthosite (East Antarctica) - its deformation and metamorphism

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The Gruber anorthosite in central Dronning Maud Land (13°30'E 71°20'S) is the largest known massif-type anorthosite in Antarctica. It intruded at 600 Ma in an already deformed and metamorphosed basement of Grenvillian age. The anorthosite shows orthopyroxene-clinopyroxene-magnetite-ilmenite-plagioclase (An₄₂-An₆₂) assemblages. A magmatic layering is defined by varying amounts of mafic minerals and differing coarseness. The anorthosite is intruded by ferrodiorite dykes.

The magmatic rocks and their host rocks were affected by high-grade metamorphism and polyphase tectonism during Pan-African (570-510 Ma) times. Metamorphic conditions of 700 ± 30°C and 0.8-0.9 GPa have been deduced from ferrodiorite samples, using garnet-orthopyroxene-clinopyroxene-quartz-plagioclase geothermobarometry. In peripheric parts the anorthosite displays a continuous foliation and discrete shear zones as a result of the ductile Pan-African deformation whereas the central part of the intrusion is not deformed.

Texture analyses on selected anorthosite specimens have been performed by neutron diffraction pole figure scanning. Four anorthosite specimens from different locations, representing increasing deformation strengths, have been measured using the four-circle texture diffractometer SV7b at the research reactor in Jülich/Germany. The strength of crystallographic preferred orientation of the triclinic plagioclase corresponds to the macroscopically observed mylonitic overprint.