

# GEOLOGICAL MAPPING AND RESEARCH IN ANTARCTICA

Norway and six other countries have territorial claims in Antarctica. The Norwegian Polar Institute is responsible for all topographic mapping of the Norwegian claims and dependencies, while geological mapping is carried out by various nations.

## GEOLOGICAL MAPPING

Systematic geological mapping of the mountain chain in Dronning Maud has been carried out during several Norwegian Antarctic Research Expeditions (NARE) over the last 30 years. This has led to a series of geological maps in the scale 1:100,000 and 1:150,000. The geological maps and the supplementary text cover the area between 0°35'W and 6°E, and include information on geomorphology, glaciology, flora and fauna.



truded the high-grade and strongly deformed basement consisting of gneisses and migmatites. The igneous suite includes charnockites, granites and quartz syenites and several generations of dykes. Charnockites and granites occur with local gneissic overprint, while quartz-syenites are mostly post-kinematic.

Metamorphic studies of granulites and migmatites has revealed a tectonothermal evolution characterised by near-isothermal decompression. The exhumation path and

extensional structures indicate rapid tectonic exhumation, which is most likely related to a late-orogenic collapsing phase of the Pan-African orogen.

Spectacular examples of fluid-rock interaction phenomena are widespread in central Dronning Maud Land. The fluid-rock interactions occur as well-developed alteration zones around granitic dikes, pegmatites and aplitic veins, which cross-cut anhydrous, dark colored granulites and quartz syenites. The alteration transforms the originally dark granulite facies rocks into light colored rocks, independent of lithological variability. The excellent exposure of the phenomenon in Dronning Maud Land provides an idea of how short term fracture-controlled fluid infiltration and related retrogression can affect extensive crustal volumes. The high volume percentage of light alteration zones observed throughout the mountain range over hundreds of kilometers, independent of lithological variations and with occasionally entire nunataks being altered, shows that such processes can be effective on a regional scale.



## RESEARCH

Beyond mapping, geological studies of the mountain range in Dronning Maud Land has focused on geochronologic, petrologic and structural studies.

Geochronology has demonstrated that the oldest rocks in Dronning Maud Land have suffered two episodes of deformation, high-temperature metamorphism and partial melting. The first event took place around 1150-1000 million years ago, whereas the younger deformation event is related to the ca. 500 Ma Pan-African orogeny. During the latter episode, large volumes of intrusive rocks in-



The research station Troll was upgraded to a year-round base in 2005 and an airfield constructed on the blue ice nearby the station was opened the same year. The operation of a blue ice runway at Troll brings a number of advantages for terrestrial research, such as less travel time, longer and more flexible research season or the possibility of shorter field periods and exchange of personnel in the course of the season. One of the few stations in Antarctica close to an airfield, Troll now serves as a portal for several nations.



The ca. 500 Ma Pan-African intrusives form spectacular, spiky peaks and jagged mountain ridges, which are so characteristic of central part of Dronning Maud Land. The quartz-syenites belong to a large magmatic complex which extends from 6 to 13° E.

