
Petrogenesis of an anorthosite-mangerite-charnockite suite in the western margin of the Nain Plutonic Suite: petrological and geochronological evidence

TANYA A. TETELAAR, JOHN S. MYERS,
AND GREG R. DUNNING

*Department of Earth Sciences, Memorial University,
St. John's, NL, A1B 3X5*

The study area is located at the western boundary of the Nain Plutonic Suite and focuses on the Pearly Gates anorthosite pluton (PGA) and the adjacent composite body of mangerite and jotunite called the Tassiarsuyungoakh intrusion (TI). The contact between these intrusions is deformed and original relationships are obscured. The PGA consists of an inner zone of massive anorthosite and an outer zone of foliated, partially recrystallized layers of anorthosite and norite. Undeformed norite bodies intruded the inner and outer zone of the PGA. The contact-parallel fabric in the TI is pervasive through most of the unit, except along the western contact with the older Tasiuyak paragneiss. Where the fabric is weakest, jotunite can be seen to have intruded into the mangerite and the contact is irregular and cusped. Field evidence, petrography and new U-Pb zircon TIMS geochronology ages have been combined to propose a mechanism for mid-crustal emplacement of these intrusions.

Based on zircon crystallization ages obtained from six major rock units with well-constrained field relationships, there appear to be 4 temporally distinct events. 1) The growth of prismatic zircons at 1370 ± 5 Ma in a sample from the PGA. In thin section these zircons were observed as inclusions in plagioclase and are thought to pre-date the intrusion of the PGA and be related to the development of a plagioclase crystal mush at depth. 2) The intrusion and crystallization of the TI composite body at ca. 1360 Ma. 3) The intrusion of anorthosite at 1355 ± 1 Ma into the TI. However, it is unknown whether this anorthosite is part of the PGA. 4) Norite intruded the PGA at ca. 1340 Ma and post-dates the deformation of the PGA and TI. Interstitial, fragmental zircon from a sample of the PGA provides a crystallization age of $1335 +7/-3$ Ma, which places it within error of the crystallization age of the norite.

The model suggested here for the emplacement of this suite of rocks is as follows. Reactivation of Paleoproterozoic structures in the Tasiuyak paragneiss provided conduits for the ascent of mangeritic and jotunitic magmas of the TI. An older plagioclase crystal mush that had formed at depth later followed the same conduit system in intermittent pulses. The margins of the PGA and TI were deformed and recrystallized and then intruded by norite.