



IGCP 290: Magma Chambers and Processes in Anorthosite Formation

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The third annual meeting of IGCP 290 "Anorthosites and related rocks" was held 1-6 June 1992 at Moi in southern Norway with the theme "Magma Chambers and Processes in Anorthosite Formation". The meeting was attended by more than 30 people from 11 countries, representing universities, governments and the mining industry. Participants stayed at a very comfortable private school that was actually on the Rogaland Anorthositic suite rocks. The meeting was very well organised by Jean-Claire Duchesne and Jacqueline Vander Auwera (U. Liege), together with Richard Wilson (U. Aarhus), and Brian Robbins (U. Bergen).

The meeting began with a full day of scientific presentations, followed by three days in the field looking at the various components of the Rogaland Anorthosite suite. Half of the last day was devoted to scientific sessions and a final business meeting. In all, we had three-and-a-half days in the field, sunny skies, and no rain; not bad for a five-day meeting in Norway.

Three papers considered the role of percolating intercumulus magmatic fluids. Peter Salpas presented his very detailed analysis of three small outcrops in the Stillwater complex, an extension of his earlier work. His work showed evidence for compaction and interaction of percolating magmatic fluids with cumulus minerals. Bernard Platevoet presented data from a layered complex on Corsica that show the influence of intercumulus compositional convection in the formation of anorthosite layers. Michael Higgins showed that percolating fluids can remove olivine, converting troctolite to anorthosite, and can completely rebuild an originally laminated anorthosite to produce a massive anorthosite. In these rocks, as elsewhere, pyroxene oikocrysts have preserved the earlier structures.

Karl Siefert analysed the trace elements in separated minerals. He showed that some metamorphic minerals can inherit the composition of their igneous precursors, and that individual minerals (metamorphic and igneous) are not necessarily in equilibrium. Jonathan Berg described picritic magmas that have intermingled with leucotroctolites in the Nain Plutonic suite. He suggested that there might be a parent-daughter relationship. Tony Morse continued with a double-speed overview of the Nain rocks: the earlier division into Dark and Pale facies appears to be corroborated by other parameters, and has important bearing on the emplacement history of the intrusions.

Dominique Weis presented data suggesting lead isotopic disequilibrium between adjacent mineral phases in the Kiglapait Intrusion. Lew Ashwal presented other isotopic data from the Nain plutonic suite, illustrating the same effects. If confirmed, these data would upset most petrological models. Jane Barling concluded that the transition between two macro-cyclic units in the Bjerkreim-Sokndal intrusion did not involve simple mixing, but must include fractional crystallization or contamination. Jean-Claire Duchesne presented preliminary U-Pb ages for the Rogaland complex, indicating that emplacement of the suite took place over a short period of time (930-920 Ma).

Allan Kolker and James Scoates presented data on the Laramie Anorthosite, suggesting that the emplacement and crystallization history was very complex: mixing of magmas and mushes, filter-pressing, solid-state deformation and accumulation of crystals were all important. Fe-Ti gabbros and monzonites may be residual liquids of this process. Jim Olmsted presented data from the Meilen complex in the Midcontinent Rift System, suggesting that this tectonic environment may be similar to that which produced the massif anorthosites.

Data from less well-known anorthosites were presented by L. Bjorklund (Routevare complex, Sweden), Mikael Sukhanov (Anabar shield), Georg Geringer (Namaqua mobile belt), Zenaide Silva (Kuene complex), Akira Fujiyoshi (Hida belt), Bill Brown (Meugueur-Meugueur complex), and Christian Moreau (Ofoud intrusion).

The connection between massif anorthosites and rapakivi granites was considered by Olav Eklund. He showed that mixtures of anorthosite-related basic magmas and paligenetic granitic magmas could be a major component of the wiborgite batholiths. Bernard Bonin suggested that major Proterozoic syenites and Phanerozoic sanidine-bearing volcanic rocks may be components of the non-orogenic suite that includes massif anorthosite and rapakivi granite.

The experimental petrology of anorthosite-suite rocks has been investigated by Vander Auwera and John Longi. They showed that a fine-grained monzonitic facies of the

Bjerkreim-Sokndal intrusion could be a parental magma. They also showed that massif-type anorthosites can be produced from a wide range of parent magmas, from high-Al gabbro to monzonorite.

Duchesne, Wilson, Robbins and Edith Wilmart gave presentations on the Rogaland anorthositic suite, both in the sessions and in the field. The most striking aspect of these anorthosites, for the author, is the resemblance of their deformation to that of the Grenville anorthositic complexes. The lack of a regional deformation event here suggests that the importance of a regional Grenville deformation may have been over-emphasized, and that much deformation might be due to the emplacement.

The meeting was very productive. All the research that was presented does not fit into a single theme, but it may be significant that several papers were concerned with mineralogical changes caused by the migration of high-temperature magmatic liquids. Such processes could resolve the problem of isotopic disequilibrium between adjacent phases. Certainly, if such effects occur, then they would be expected to be most pronounced in large, mid-crustal level intrusions, such as many massif anorthosites.

The 1993 meeting will be in the Kola Peninsula, but will be restricted, for logistical reasons, to 15 participants. The final meeting of IGCP 290 will be in Montreal in 1994, with excursions to the Nain and central Grenville anorthosites.

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