Barroso-Alvão and Fregeneda-Almendra Pegmatitic Fields (Portugal and Spain): Mineralogical and geochemical comparison

R. VIEIRA[1], T. MARTINS[1], R.E. RODA[2] AND A. LIMA[1]

[1]Porto University, Portugal (allima@fc.up.pt)
[2]Basque Country University, Spain

The Barroso-Alvão (BA) and Fregeneda-Almendra (FA) regions are known by their LCT (Li, Cs, Ta) pegmatites. Both pegmatite fields are located in the Iberian Massif (NW Iberian Peninsula). They are hosted in low- to medium-grade metamorphic rocks and surrounded by highly evolved syn-orogenic two-mica granitoids of the same age and geochemical signature.

Barroso-Alvão Pegmatitic Field

At the BA field it is possible to find different types of granitic pegmatite bodies, from barren to spodumene-, petalite-, and lepidolite-bearing pegmatites. These Li-rich bodies are located in the andalusite and biotite metamorphic zones, although a regional distribution of the various bodies is not clearly defined. The K/Rb medium values from bulk analysis are 9.80 for the lepidolite-rich pegmatites, 27.44 for the petalite-rich and 40.05 for the spodumene-rich bodies. Micas K/Rb medium values from petalite-rich are 51.50 and 15.76 for lepidolite-rich pegmatites.

Fregeneda-Almendra Pegmatitic Field

In contrast, at the FA field the pegmatite bodies show a zoned spatial distribution: barren pegmatites located near to the granitic complex and the Li-enriched bodies further away from the granite. The petalite-rich pegmatites occur at the andalusite-sillimanite metamorphic zone, whereas the spodumene-rich pegmatites appear in the biotite and/or chlorite isograd. The K/Rb medium values from bulk analysis are 10.49 for the lepidolite-rich pegmatites and 30.38 for the petalite-rich bodies. Micas K/Rb medium values from the petalite-rich are 69.74; 76.02 for the spodumene-rich and 15.86 for the lepidolite-rich pegmatites.

Final Remarks

Similarities in the petrography, mineralogy and geochemistry of the different types of pegmatites of both pegmatitic fields, as well as their spatial association with synorogenic peraluminous leucogranitic complexes of the same age and similar geochemical signature, and the alike metamorphic conditions, suggest that they could be related to similar petrogenetic processes.

Felsic magmas indicate crustal recycling during NAIP and FLIP formation

L. VIERECK-GOETTE[1], M. ABRATIS[1]*, J. HERTOGEN[2], R. MEYER[2], R.B. PEDERSEN[3], M. ELSNER[1] AND R. SCHOENER[1]

[1]IGW, Universitaet Jena, D-07749 Jena, Germany (*correspondence: michael.abratis@uni-jena.de)
[2]Geo-Instituut, K.U.Leuven, B-3001 Leuven, Belgium
[3]Geological Institute, Univ. Bergen, N-5007 Bergen, Norway

Felsic magmas are typically subordinate compared to mafic magmas within large igneous provinces (LIPs). However, silicic melts do occur within most, if not all, the LIPs and they are locally voluminous or even dominant.

We investigated silicic volcanics of the Palaeogene North Atlantic Igneous Province (NAIP) and of the Mid-Jurassic Ferrar Large Igneous Province (FLIP), Antarctica.

In the NAIP, silicic magmas erupted at several stages of the volcanic evolution, most often preceding the mafic volcanics, but in other places contemporaneously with them. Available evidence indicates that felsic volcanic rocks in the NAIP are related to multiple eruptive centers or caldera complexes that are mainly concentrated along the rifted continental margins. Such an eruptive center was drilled during ODP Leg 104 Site 642E on the Vøring Plateau off Norway. The lower 130 m of that core are made up of glassy dacitic lavas and some minor basaltic andesitic lava flows with an interlayered rhyolitic ignimbrite. Their mineralogy and geochemistry characterize these felsic rocks as being derived from partial melting of metasedimentary rocks: they are calc-alkaline, strongly peraluminous (Al/(Ca+Na+K) >1.1) and corundum normative, have high Th/Ta, La/Sm ratios, pronounced negative P and Ti anomalies, radiogenic isotope compositions ($^{87}Sr/^{86}Sr_i$ > 0.711, εNd_i ~ -8), high stable isotope values ($\delta^{18}O$ > +10‰) and characteristic aluminium-rich minerals such as cordierite and mullite. The felsic magmas formed within an intra-continental rift setting at the location of an ancient suture zone and eventually lead to continental breakup

In the FLIP, which extends along the cratonic margin of East Antarctica, the effusive section is underlain by 50 m of reworked rhyodacitic to rhyolitic fall-out tuffs (Shafer Peak Formation, SHF) originating from very distal large volume (ultraplinian), caldera-type eruptions, as they occurred synchronously in the Patagonian-Antarctic Peninsula Silicic Large Igneous Province. Whole rock geochemical analyses indicate that the SHF tuffs are strongly peraluminous and corundum normative, S-type crustal melts, most likely generated in a back-arc environment by underplating of large volumes of Ferrar LIP magmas.