Late Variscan granite pluton of Vila Pouca de Aguiar (Northern Portugal): an example of low $^{87}Sr/^{86}Sr$ felsic granites

H.C.B. MARTINS AND F. NORONHA

Geology Department/Geology Center, Faculty of Sciences, Porto University, Portugal; (hbrites@fc.up.pt); (fmnoronh@fc.up.pt)

The Vila Pouca de Aguiar pluton (VPA) is an example of late to post-orogenic felsic Variscan granites in northern Portugal (NW of Iberian Peninsula). It is a composite and zoned pluton with three biotite monzogranites: Vila Pouca de Aguiar granite (VPAG), Pedras Salgadas granite (PSG) and Gouvães da Serra granite (GSG).

The emplacement of this pluton, subsequent to the third Variscan deformation phase (D_3), was controlled by a regional tectonic structure, the Régua-Verin fault. The U-Pb zircon data define a normal discordia (MSWD=1.28) with an upper intercept age of 299 ± 3 Ma which is in good agreement to the whole rock Rb-Sr ages of 299 ± 9 Ma and can be interpreted as the emplacement age of the pluton.

The lack of a mechanism that could link the chemistry of these granites suggests an intervention of different processes and/or distinct sources in its genesis. The geochemical and mineralogical data (biotite and zircon) suggest that these granites, although displaying a common potassic sub-alkaline signature are not related to the same initial magma. This is supported by their contrasting isotopic compositions: $^{87}Sr/^{86}Sr_i$= 0.7067-0.7071 and εNd= -2.5 for VPAG, and Sr_i=0.7044-0.7050 and εNd= -1.9 to -2.0 for PSG.

The VPA pluton granites are significantly less radiogenic in Sr but more radiogenic in Nd than most of the Variscan granitoid rocks of Iberian Peninsula as well as most of the European Variscan granites. However, these characteristics are a common feature of late Variscan granites from northern Portugal [1].

Geochemical data further suggest that the chemical zoning resulted from the successive intrusion of at least two main magma batches (VPAG then PSG). This is confirmed by studies of AMS and gravimetry [2]. The primitive isotopic compositions led us to propose a model of partial melting of an heterogeneous meta-igneous lower continental crust but not excluding the involvement of mantle-derived magmas and thus an open system mantle-crust interaction.

References

[1] Mendes A. C. and Dias G. (2004) Terra Nova **16**, 109-115.

[2] Sant'Ovaia H., Bouchez J. L., Noronha F., Leblanc D. and Vigneresse J. L. (2000) Trans. R. Soc. Edinb. Earth Sci. **91**, 123-137.