Geophysical Research Abstracts, Vol. 8, 04341, 2006
SRef-ID: 1607-7962/gra/EGU06-A-04341

Origin and emplacement of granite magmas during the Variscan Orogeny: the Beiras Batholith (Iberia)

M. Azevedo (1), B. Valle Aguado (1), J.Nolan (2), M. Martins (1) and J. Medina (1)

(1) Departamento de Geociências, Universidade de Aveiro, Aveiro, Portugal, (2) Department of Earth Sciences, Imperial College, London, United Kingdom (Fax: +351-34-370605; e-mail: mrosario@geo.ua.pt)

The Beiras batholith consists of four main Variscan granitoid suites intruded into metasediments of Proterozoic-Cambrian and Palaeozoic age in Central Northern Portugal: a) the early, syn-D_3 granodiorite-monzogranite suite (314-311 Ma); b) the highly peraluminous syn-D_3 two-mica / leucogranite suite (308 Ma); c) the late-post-D_3 granodiorite-monzogranite suite (306 Ma) and (d) the late-post-D_3, peraluminous, biotite-muscovite granite suite (300-295 Ma). Major, trace and isotopic data suggest that the S-type synkinematic two-mica granites result from moderate degrees of partial melting under vapour absent conditions of middle crustal metasedimentary sources comparable to the Proterozoic-Cambrian metapelite-metagraywacke units presently exposed in the studied area. A major contribution from metaigneous lower crust materials and/or interaction with mantle derived magmas appears to be required to produce the early, syn-D_3 granodiorite-monzogranite suite. The emplacement of large volumes of late-post-kinematic granites showing decoupled high-K calc-alkaline and peraluminous signatures documents the importance of combined fractional crystallization and mixing processes (AFC) in granite petrogenesis. In a scenario of post-collisional re-equilibration of a thickened lithosphere, asthenospheric mantle upwelling and underplating of abundant basaltic melts at base of the crust is thought to have lead to widespread dehydration melting of lower- to mid-crustal lithologies and consequent formation of peraluminous granite magmas (syn-D_3 two-mica granites). Mixing to various degrees of anatectic crustal melts with a juvenile asthenospheric mantle component is considered the major controlling process involved in the production of the late-post-D_3, high-K calc-alkaline suite. Concomitant fractional crystallization can explain the geochemical signatures of the more evolved rocks, including those of the

late-post-D_3, peraluminous, biotite-muscovite granites.

Acknowledgements:

This investigation was carried out in the scope of two research projects (MODELIB - POCTI/CTA/35630/99 and CHRONOTECT – POCI/CTE-GIN-60043/04), financially supported by the Portuguese Foundation of Science and Technology (FCT).