Geophysical Research Abstracts
Vol. 20, EGU2018-2289-1, 2018
EGU General Assembly 2018

The mineralogy of S-type granites in the Iberian Variscan belt: influence of geochemistry and emplacement P-T-XH_2O conditions.

Luis González-Menéndez (1), Gloria Gallastegui (2), Francisco J. Rubio Pascual (3), Andrés Cuesta (4), Álvaro Rubio-Ordóñez (5), and Luis Roberto Rodríguez-Fernández (6)

(1) IGME, Unidad de León, Avda Real 1, 24006 León, Spain (l.gonzalez@igme.es), (2) IGME, Unidad de Oviedo, Matemático Pedrayes 25, 33005 Oviedo, Spain (g.gallastegui@igme.es), (3) IGME, Área de Cartografía Geocientífica, Ríos Rosas 23, 28003, Madrid, Spain (f.rubio@igme.es), (4) Departamento de Geología, Universidad de Oviedo, C/Jesús Arias de Velasco, 33005, Oviedo, Spain (acuesta@geol.uniovi.es), (5) Departamento de Geología, Universidad de Oviedo, C/Jesús Arias de Velasco, 33005, Oviedo, Spain (arubio@geol.uniovi.es), (6) IGME, Ríos Rosas 23, 28003, Madrid, Spain (lr.rodriguez@igme.es)

Peraluminous S-type granites of the Iberian Variscan belt constitute an important volume of upper crustal rocks generated in a 25-30 Ma time span. Most of these granites can be classified in two groups: i) Two mica granites (biotite + muscovite ± sillimanite/andalusite ± turmaline ± garnet), abundant in the northern part of the belt and many of them syn-tectonic and ii) Cordierite bearing granites (biotite ± muscovite ± cordierite ± andalusite ± turmaline), located in the south-central part of the belt and mostly post-tectonic. One of the main differences between both groups is the presence/absence of cordierite. We studied some slight but relevant differences in bulk-rock geochemistry and also investigate P-T-XH_2O factors responsible for the observed mineralogical differences.

Bulk rock geochemistry shows that two mica granites (group i) have lower Fe/(Fe+Mg) and slightly higher alumina saturation index (ASI or A/CNK) compared with the Crd-bearing granites (group ii). Nevertheless there is an overlap between both groups. This is surprising considering that Crd has a relatively low Fe/(Fe+Mg) and very high ASI. In order to explain this, we propose that both magma types could had initially cordierite but with different peritectic assemblages. Cordierite was dissolved into the melt in the case of group i) and incorporated its chemistry into these magmas, rising its ASI and lowering its Fe/Fe+Mg values. In the case of group ii) the amount of peritectic cordierite was probably lower but remained stable and was not dissolved into the melt. Even a small part of it could have fractionated, slightly reducing the ASI and increasing the Fe/Fe+Mg value of these magmas.

Using thermodynamic modeling to investigate the P-T conditions of crystallization and subsolidus evolution of these granites we observe that two mica granites with magmatic muscovite should have crystallize at pressures above $\approx$ 4 kbar. On the other hand, granites having cordierite should have crystallized below $\approx$ 2.75 kbar and its muscovite being secondary. No co-existence of magmatic muscovite and cordierite is possible at the end of magmatic crystallization. Water extraction from these systems, in the last stages of solidification, would determine the degree of preservation of the final crystallization assemblages (especially regarding cordierite). When water was easily extracted (near the fractured country wall rocks of intrusions) preservation was favored and minor retrogression is expected. In the inner parts of the granites, water was probably retained and retrogression was then more severe. Some inner stocks of two mica granites, within cordierite granites, can have this origin, being previously biotite ± cordierite granites and leucogranites.