Geophysical Research Abstracts
Vol. 20, EGU2018-13074, 2018
EGU General Assembly 2018

Li-bearing pegmatites as residual melts of P-rich Variscan granites from the Central Iberian Zone

Encarnación Roda-Robles (1), Carlos Villaseca (2), Alfonso Pesquera (1), Pedro Pablo Gil-Crespo (1), Romeu Vieira (3), Alexandre Lima (3), and Idoia Garate-Olave (1)

(1) Universidad País Vasco UPV, Bilbao, Spain (encar.roda@ehu.es), (2) Universidad Complutense, Petrología y Geoquímica, Madrid, Spain (granito@ucm.es), (3) Universidade do Porto, Instituto de Ciencias da Terra, Porto, Portugal (allima@fc.up.pt)

The Central Iberian Zone (CIZ) corresponds to the innermost region of the Variscan Iberian Belt. It is mainly composed of metasedimentary rocks, together with a large volume of syn- to post-tectonic granitic intrusions that outcrop from central to NW Iberian Peninsula. Pegmatites, some of them Li-rich, are also locally common lithologies in the CIZ. Their relationship to the different granitic series occurring in this region is often difficult to establish, as granites with different signatures occur frequently in the same area. Granitic rocks from the CIZ can be classified into five geochemically different series: (1) two-mica peraluminous leucogranites (S1); (2) P-rich highly peraluminous granites (S2); (3) P-poor moderately peraluminous granites (S3); (4) moderately to low peraluminous granites (S4); and (5) I-type low peraluminous granites (I). S3, S4 and I series define long, nearly continuous trends of decreasing Al_2O_3, Fe_2O_3, CaO, MgO, TiO_2, and P_2O_5 contents as SiO_2 increases. In contrast, S1 and S2 series show shorter compositional trends with higher P_2O_5 contents defining a perphosphorous character for them. Moreover, the S3, S4 and I-suite granites show markedly higher CaO contents than S1 and S2 types. Contents in the incompatible elements F, Li, Ta, Cs, Rb and Sn are higher in the S1 and S2 than in the other granites, with continuous trends from these granitic series through the simple pegmatites, up to the Li-richest ones. These trace elements increase as the K/Rb, Nb/Ta and Zr/Hf ratios decrease. Moreover, the field relationships clearly suggest that the P $\pm$ F-rich, Ca-poor, strongly peraluminous S1 and the S2 suites, occurring mainly in the N-CIZ and in the S-CIZ respectively, are most probably the parental granites of the Li-rich pegmatites in the CIZ. The low Ca content of the S1 and S2 granitic melts lead to a limited crystallization of apatite, which in turn would lead to a further increase in the P and F contents in the residual melts. A high concentration in these elements, together with other fluxes such as B and H_2O, may be directly related to the occurrence of the Li-rich pegmatites in the CIZ, as these elements favour fractionation in the granitic melts by reducing their viscosity, and also by lowering the liquidus temperature, controlling the ability of melts to segregate from the magma reservoir and to migrate through the crust, thus favouring the mobility of the pegmatite melt. The chemical differences between S1-S2 and S3-S4-I granitic series are originally related to the nature of their protoliths. Lower crustal metaigneous rocks are supposed to be the protholith for the low and moderately peraluminous granitic series (S3-S4-I). In contrast, S1 and S2 granites were derived mainly from pelitic metasediments of the CIZ, which are Al, P, F and Li-richer and Ca-poorer than common shales (e.g., NASC), and than some crustal averages (UCC and the BCC).