Resolving the emplacement history of syntectonic granites from Carrazeda de Ansiães, N Portugal, by U-Pb

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The Iberian Massif is a large segment of the European Variscan Belt formed during the polycyclic collision between Laurentia-Baltica and Gondwana in the Devonian/ Carboniferous. The Central Iberian Zone forms the inner domain of the Iberian Massif and consists mainly of autochthonous Early Paleozoic metasediments, a few pre-Variscan granites and numerous Variscan granitoids, which were emplaced between 340 and 290 Ma, during and after the Variscan continental collision (at ~360 - 350 Ma). Only few granitoids formed during the early stages of the Variscan cycle (D_1 and D_2 deformation phases) with closure of the intervening ocean, crustal thickening and nappe emplacement. By contrast, extensive granitoid activity accompanied the post-thickening and post-collisional extension (D_3 deformation phase). Based on the emplacement ages the granitoid magmatism of Central Iberian Zone has been classified as: 1) pre-D_3; 2) syn- to late-D_3; 3) post-D_3. Most syn-D_3 granitoids are aligned along NW-SE vertical folds and subvertical ductile shear zones.

Peraluminous two-mica granites at Carrazeda de Ansiães, northern Portugal, represent successive intrusive events during the D_3 Variscan deformation phase. Based on tectono-magmatic relationships and petrographic criteria, three groups can be distinguished, from older to younger: I (G1, G2, G3, G4, G5 and G6), II (G7, G8 and G9) and III (G10). The granites from Group I show evidence of high-temperature solid-state deformation, such as microfracturing of feldspar, kinks in biotite, flexural bends in plagioclase and S-C structures. Group II granites show a magmatic syntectonic NW-SE foliation, defined by euhedral phenocrysts of microcline, micas and also surmicaceous enclaves, that is continuous with the regionally developed foliation in the wall rocks. The emplacement of granite G10, belonging to Group III, was controlled by late-Variscan NNE-SSW fractures, which explains its brittle deformation. Representative granites from each group (G5, G7 and G10) were selected for a U-Pb (ID-TIMS) zircon and monazite study. The zircon systematics are generally complex because of Pb loss and inheritance, the latter also affecting some of the monazites. Nevertheless, the data combine to yield consistent ages of 320.5 ± 0.5 Ma for G5, 317.8 ± 0.5 Ma for G7 and 316.2 ± 0.7 Ma for G10, and thus tightly constrain the timing of the main D_3 event.

Time series diffusion experiments with natural alkaline melts

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We performed in this work time series diffusion experiments with contrasting alkaline melts obtained from natural volcanic products. The starting materials are the two end-member compositions and rheologies in the volcanic Province of Tenerife (Canary Islands, Spain). They correspond to an alkali basalt (43% SiO_2; μ= 4,412 Pa·s) and a phonolite (59% SiO_2; $\mu=10^3$ Pa·s).

The samples were loaded in a platinum capsule and arranged in a buoyantly stable geometry, where the denser material is placed at the bottom (alkali basalt, ρ=2,73 gr/cm^3) and the lighter material at the top (phonolite, ρ=2,36 gr/cm^3). We run experiments during 4, 25, 49 and 125 hours and we performed three different sets of experiments (with the same time duration) at 1350^{o}C, 1300^{o}C and 1250^{o}C under atmospheric conditions. For every set the temperature has been kept constant during the whole experimental run and with an irrelevant thermal gradient (< 2^{o}C). These temperatures, well above the *liquidus* for the system, avoid crystallization. No forced convection was applied, so that the diffusion process takes over and the compositional gradient becomes the only parameter enhancing the mixing process.

Microprobe and laser ablation analyses were performed to track major, minor and trace elements. The evolution of the diffusion profiles along a longitudinal section of the resulting products showed that mixing was possible. Diffusivity coefficients of the main elements at every temperature will be calculated in the near future.