

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 (D₁ and D₂ 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 (D₃ deformation phase). Based on the emplacement ages the granitoid magmatism of Central Iberian Zone has been classified as: 1) pre-D₃; 2) syn- to late-D₃; 3) post-D₃. Most syn-D₃ 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 D₃ 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 D₃ event.