

Mantle and crustal sources in the genesis of late-hercynian hybrid granitoids (NW Portugal): Sr-Nd isotopic constraints

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In the Hercynian Central Iberian Zone large volumes of granitoids were emplaced during the last ductile deformation phase (D3, 300-320Ma). The biotite-dominant granitoids are the most abundant: (1) syn-D3 granodiorites/monzogranites (313-319Ma) with calc-alkaline and aluminopotassic affinities; (2) late-D3 monzogranites (306-311Ma), related to subalkaline and aluminopotassic series.

Seven plutons were studied which have a composite character. The granitoids are associated with coeval gabbro-norite to granodiorite bodies and/or mafic microgranular enclaves. Both granitoids and basic-intermediate rocks show petrological, geochemical and isotopic evidences of interaction between felsic and mafic magmas. Petrogenetic processes involving mingling and/or mixing and fractional crystallisation (at variable degrees) in multiple reservoirs are suggested.

The mantle-derived melts, represented by the gabbro-norites, have a shoshonitic affinity, possibly derived from an enriched source and are rather homogeneous in composition ($Sr_{87}/Sr_{86}=0.7050$ to 0.7053 , $\epsilon Nd=-2.3$ to -2.5). In some plutons there are evidences of crustal sources, represented by peraluminous granites. They have similar Nd model ages (1.2 to 1.4Ga) but different isotopic compositions ($Sr_{87}/Sr_{86}=0.7089$ to 0.7106 , $\epsilon Nd=-5.6$ to -6.8), revealing a heterogeneous melting crust.

A major crustal accretion event occurred in late-hercynian times (~305-320Ma) leading to the genesis of composite calc-alkaline and subalkaline plutons, largely represented in the Central Iberian Zone.