Deciphering the geodynamic significance of mantle and crustal sources tapped during orogenesis. SHRIMP U-Pb ages and oxygen isotopes in zircon from the Brovales pluton, Ossa-Morena Zone, SW Iberia

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Episodes of crustal growth and recycling are preserved in orogenic magmatism. Investigation of a Variscan 'calc-alkaline' pluton, Brovales, Ossa-Morena Zone, SW Iberia, revealed mixing of mafic- and felsic-derived magmas. Determination of the relative importance of the components in such magma permits assessment of processes involved in mantle and crustal melting. The Ossa-Morena Zone Variscan magmatism is unusual, and particularly useful, in the study of hybrid rocks because it is characterised by numerous intermediate-felsic intrusions with a relatively large component of mafic rocks. New SHRIMP U-Th-Pb zircon dating has constrained the age of the Brovales pluton as Carboniferous (Visean, 340 ± 2 Ma). This magmatic age departs from an earlier, collision-related subduction event. It actually relates to a period of high temperature low pressure metamorphism and sedimentary basin formation in an intra-orogenic context. Extension-related mid-crustal intraplating of mantle magmas apparently caused heat transfer provoking crustal partial melting and interaction of rheologically similar melts. Whole-rock compositions, textural features, mineral chemistry and zircon oxygen isotopes have been combined with pseudosection modelling (NCKFMASHTO) to conclude that the hybrid Brovales pluton formed by mixing of mafic alkaline and felsic peraluminous magmas, in a 60:40 ratio, resulting in an apparent 'calc-alkaline' signature.

Identifying the components of hybrid syn-orogenic magmatism is the first step in order to better understand the processes that control crustal growth and recycling.