ND-SR ISOTOPE AND TRACE ELEMENT EVIDENCE FOR CONTRASTING MANTLE SOURCES IN THE BIMODAL GABBROIC AND SYENITIC COMPLEXES OF NE ALENTEJO, PORTUGAL (OSSA-MORENA ZONE)

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The NE Alentejo features several pre-Variscan plutonic complexes of diverse geochemical affinity: Alter do Chão/Alter Pedroso (AC/AP) (per)alkaline bimodal associations of Early Ordovician age, and Elvas-Campo Maior (ECM) gabbros and gabbro-diorites, of calc-alkaline affinity, and still uncertain emplacement age. The data obtained for 22 mafic and salic samples highlight a great geochemical diversity. Salic rocks, ranging from under-saturated syenite to granite, originated from mantle-derived parental magmas. Minor amounts of crustal contamination are reflected by decreasing εNd_i values from +4.0 to +2.5 with increasing degree of silica saturation in AC/AP, but a highly alkaline sample from Arronches with εNd_i +5.0, suggests that some salic melts may have been directly produced by very low degree of partial melting of a mantle source. No typical crustal signatures were found among the felsic rocks, suggesting that pervasive lower crustal melting did not occur. Gabbroic cumulates from AC and two gabbroic samples from CM fractionated from basaltic or basanitic magmas. Their very low Th/Nb ratio and radiogenic isotope signatures (εNd_i *ca.* +5; $^{87}Sr/^{86}Sr_i$ *ca.* 0.704) exclude any significant contamination during ascent through the continental crust. Their parent magmas were extracted from a mantle reservoir that was characterized by secular depletion of LREE, and was enriched in Nb and LREE, but not Th, at some time predating the ~500 Ma magmatism. This perhaps occurred in the Late Proterozoic, as might be inferred from T_{DM} Nd model ages in the 0.7-0.8 Ga range.

Gabbroic to dioritic rocks from ECM have variable degrees of enrichment in Th and LREE, marked depletion in Nb, and εNd_i = -1 to -5, pointing to a strong imprint of materials from the upper continental crust. However, given the basic major element composition of these rocks, and the lack of evidence for abundant crustal melting, it is inferred that their parent magmas owe their signature to a mantle source that underwent a style of enrichment style very different from that observed in the AC gabbros. Indeed, while the AC source was enriched in Nb and LREE without major change of its depleted mantle isotope signature, the ECM mantle source was penetrated, at some earlier epoch, by silicic melts rich in Th and LREE, but relatively poor in Nb, that had a drastic effect on the incompatible trace element budget of the peridotite country-rock. This might have occurred in supra-subduction zone (SSZ) settings of Late Proterozoic age, through hydrous partial melting of the uppermost oceanic crust and clastic sediments from tha *ca.* 2 Ga West African craton. Such inherited SSZ signatures are well known in other within-plate basaltic provinces generated during continental break-up episodes such as, for example, the Jurassic Karoo-Ferrar igneous province.

All plutons may have emplaced during a single, broad igneous event associated with the Cambro-Ordovician rifting episode well documented in the Ossa-Morena Zone, but precise U-Pb dating is needed to establish the igneous sequence on a firm basis, and verify whether the ECM plutons do not reflect a much younger, entirely separate event.