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Unveiling parental compositions in Andean-type intrusions through magma mingling zones

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An important task in petrology is the successful identification of the parental that birthed the magmas constituting the continental crust. Among these, an intermediate parental to subduction related magmas, often referred to as Andean-type, has been determined experimentally in various works. However, identification of a natural rock matching the model compositions has not been accomplished. This difficulty arises primarily from prolonged cooling times, leading to large-scale fractionation and impeding the preservation of the parental magmas. In this regard, quenching becomes a valuable phenomenon, precluding differentiation and thereby preserving the initial compositions. This highlights the relevance of magma mingling zones, a common feature of Andean-type batholiths, as optimal places to probe for parental compositions. Following these considerations, a new set of geochemical analyses from the Gerena magma mingling zone, an Andean-type intrusion in southwest Iberia, is presented to address this problematic. Sampling focused on dark bodies, presumed to be mafic to intermediate in composition. Interestingly, combined evidence from major, trace element and Sr and Sm isotopes suggest that the smaller dark bodies have undergone precluded differentiation. Moreover, according to geochemical modelling their composition can reproduce the neighbouring granites and cumulates through differentiation. These findings emphasize the importance of magma mingling zones as valuable sources of information and shed new light in the identification of the parental composition to Andean-type magmatism.