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# Rapid crustal exhumation and mantle-melt extraction: Where has the crust gone?

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The emplacement of the Beni Bousera and Ronda ultramafic massifs of the Betico-Rifean belt (N Morocco–S Spain) has been discussed for several decades. These massifs are among the largest exposures of mantle rocks on Earth's surface, which obviously confers a special interest for mantle research in Earth Sciences. We present an integrated study of mantle and the surrounding crustal material of Beni Bousera in order to understand the interplay between melt percolation and emplacement of the ultramafic rocks and their relationships to the surrounding crust. Here we focus specifically on detailed petrological studies coupled with phase diagram modeling to elucidate the tectono-metamorphic history of the surrounding granulites. We then compare and relate these results to our understanding of the evolution of the Beni Bousera mantle rocks.

The orogenic lherzolite of the ultramafic massif is surrounded by mostly metapelitic high-grade granulites (with local mylonitic layers) that are rimmed in turn by a successive sequence of lower metamorphic grade, from gneisses (with minor migmatites) to schists. The northern part of the massif offers exceptional exposures of a continuous lithospheric section from the ultramafics, via the Moho to the whole granulite packet by showing within the latter the preservation of two pressure events at fairly constant HT of c. 750 ºC. A prograde higher-pressure episode (> 12 kbar) is characterized by equilibrium micro-domains with Grt+Bt+Ky+Rt followed by a lower-pressure (c. 5kbar) symplectic assemblage of Crd+Spl. This reveals a dramatic decompression event registered within less than 2 kms of crustal thickness. These results together with structures, numerical modelling and geochronology will extend the knowledge of the mechanisms of mantle emplacement in particular and global tectonics in general.