Tracking Indian-type mantle at its western limit during the closure of Neo-Tethys and opening of the Indian Ocean

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Since the work of Mahoney *et al.* [1] on old west Indian Ocean and east Tethyan MORBs, we have known that Indian-type (DUPAL) mantle resided beneath at least parts of Neo-Tethys at the time of opening of the Indian Ocean. Furthermore, work on a ~350 Ma ophiolite from China [2] demonstrates that Indian-type mantle must have contributed, in some places, to MORB genesis during the formation of Paleo-Tethys. Together, this evidence suggests that Indian-type mantle has at least to some extent remained within the shallowmost asthenosphere during multiple Wilson cycles, over 100's millions of years.

In the western Pacific the margins of the Indian-type mantle have been recognised and, in places, mapped adjacent to Pacific-type mantle [e.g. 3-5]. Detailed work along this boundary has shown that very little mixing has taken place, but what happened to the Indian-type mantle at its western limit during the diachronous closure of Neo-Tethys?

Using robust Hf-Nd isotopes on an extensive suite of MORB rocks from Neo-Tethyan ophiolites, extending from the Himalayas, through the Mediterranean and Europe, to earliest central Atlantic and proto Caribbean ocean crust, we assess where Indian-type mantle occurred beneath Neo-Tethys. Inferences from these results are then linked to 3D numerical spherical geodynamic models (run using mantle circulation code TERRA) and used to investigate models of how this isotopically distinct Indian-type mantle may have been preserved in the upper mantle during successive events of ocean closure and re-opening, with little apparent tendency to mix laterally.

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Water contents of natural anatectic melts: constraints from NanoSIMS analysis of remelted nanogranites and glassy inclusions

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Formation, extraction and ascent of hydrous anatectic melts to upper crustal levels represent the most important mechanisms for the reworking of the Earth's continental crust [1, 2]. In this scenario, the water content of melts is of prime importance in the formation and evolution of the continental crustal and so far the experimental approach has been largely applied for obtaining constraints on the water content of anatectic melts.

The study of melt inclusions hosted in peritectic phases of partially melted rocks represents a recent, small-scale powerful approach to a better understanding of melting in the continental crust [e.g. 3-5]. Successful experimental rehomogenization of the inclusions to a glass allows the direct analysis of the natural anantectic melts produced in the source region of crustal magmas [5]. This approach provides the precise melt composition for the specific anatectic rock under study.

We report the results of NanoSIMS analyses on melt inclusions hosted in peritectic garnet of partially melted metasedimentary rocks. Data are discussed in order to i) combine information from classical petrology and melt inclusions, ii) compare them with previous estimations from experiments and thermodynamic calculations and iii) deal with new questions, such as the water content heterogeneities of natural anatectic melts in the source region.

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