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# Oceanization of the lithospheric mantle: the study case of the spinel peridotites from Monte Maggiore (Corsica, France).

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The Monte Maggiore peridotite body, cropping out within the Alpine Corsica metamorphic belt, is an ophiolite massif derived from the more internal setting of the Jurassic Ligurian Tethys basin. It is mostly composed by spinel and plagioclase peridotites that are cut by MORB gabbroic dykes.
The spinel peridotites, similarly to other ophiolitic peridotites from the Internal Ligurides, have been considered, on the basis of their low abundance of fusible components, low Si and high Mg contents, as refractory residua after MORB-type partial melting related to the formation of the Jurassic basin (e.g. Rampone et al., 1997). Recent studies (e.g. Müntener & Piccardo 2003; Rampone et al. 2008) have evidenced that these depleted spinel peridotites show diffuse melt-rock interaction micro-textures and contrasting bulk vs. mineral chemistry features which cannot be simply reconciled with partial melting. Accordingly, these peridotites have been recognized as reactive peridotites, formed by interaction of pristine peridotites with melts percolating by porous flow. Geochemical data have evidenced the depleted MORB signature of the percolating melts.
Recent field studies at Monte Maggiore (Piccardo, 2007; Piccardo & Guarnieri, 2009), have revealed: 1) the presence and local abundance of pyroxenite-bearing, cpx-rich spinel lherzolites and 2) the replacement relationships of the reactive peridotites on the pyroxenite-bearing lherzolite rock-types. The pyroxenite-veined spinel lherzolites record a composite history of subsolidus evolution under lithospheric P-T conditions, thus indicating their provenance from the sub-continental lithospheric mantle. Accordingly, the pristine sub-continental mantle protoliths were infiltrated by MORB melts and transformed by melt-rock interaction to reactive spinel peridotites and refertilized by melt impregnation to plagioclase-enriched peridotites.
Available isotopic data on the Mt. Maggiore spinel and plagioclase peridotites and gabbroic rocks (Rampone, 2004; Rampone et al., 2008; 2009) provide reliable geochronological informations (i.e. Sm-Nd cpx-plg-wr isochron ages and Sm-Nd model ages) and evidence that the whole mafic and ultramafic rocks show an overall Sm/Nd isotopic homogeneity. Cpx-plg-wr data from gabbroic dykes define internal isochrones yielding Jurassic ages (162+/-10 Ma and 159+/-15 Ma, respectively). The plg-cpx(-wr) isochrons for impregnated plagioclase peridotites yields age of 155+/-6 Ma. The initial Nd values (8.9-9.7) are indicative of a MORB affinity. Calculated DM model ages for both spinel and plagioclase peridotites point to a Late Jurassic age (150 Ma). Isotope ratios of cpx from spinel and plagioclase peridotites conform to the linear array defined by overall gabbroic rocks.
The isotopic evidence from the melt-percolated, reactive and impregnated peridotites indicates that the pristine lithospheric mantle protoliths were isotopically homogenized by the melt-rock interaction during percolation/impregnation processes which erased any pre-existing isotopic signature. Moreover, the overall Sm/Nd isotopic homogeneity indicates that the asthenospheric mantle sources of the infiltrating melts were isotopically homogeneous. Accordingly, it is plausible that percolation and intrusion were operated by similar and coeval Late Jurassic MORB-type melts.
In conclusion, petrologic and isotopic data allow to recognize that the extending sub-continental lithospheric mantle was infiltrated by Late Jurassic MORB melts, formed by asthenospheric decompression-induced partial melting during continental extension and rifting. Melt-peridotite interaction modified the compositional features of the lithospheric mantle and caused its isotopic resetting. Accordingly, the sub-continental lithospheric mantle underwent an “oceanization” process (i.e. isotope resetting to “oceanic” MORB signatures) during Late Jurassic times operated by asthenospheric MORB melts. Depending on the melt composition, the lithospheric level and the mode of melt-rock interaction, fertile peridotites from the sub-continental lithospheric mantle were transformed, concomitantly, to depleted spinel peridotites and refertilized plagioclase peridotites.