Geophysical Research Abstracts
Vol. 17, EGU2015-11228, 2015
EGU General Assembly 2015

Multiple refertilisation of oceanic mantle: new insights into the evolution of the southern sector of the Ligurian Tethys from Mt. Pollino ophiolites (Basilicata, Southern Italy)

Fabio Carmine Mazzeo (1,2), Massimo D'Antonio (2), Alberto Zanetti (3), Paola Petrosino (2), and Meritxell Aulinas (4)

(1) Department of Physics "E. R. Caianiello", University of Salerno, Via Giovanni Paolo II 132, 84084 Fisciano (SA), Italy, (2) Department of Earth, Environmental and Resources Science, University Federico II of Naples, Italy, Largo S. Marcellino 10, 80134 Naples, Italy, (3) Istituto di Geoscienze e Georisorse, CNR – Sezione di Pavia, Via Ferrata 1, 27100 Pavia, Italy, (4) Departamento de Geoquímica, Petrologia i Prospecció Geològica, Facultat de Geologia, Universitat de Barcelona (UB), Martí i Franquès s/n, 08028 Barcelona, Spain

Southern Apennine ophiolites consist of a serpentinized peridotite basement and a reduced crustal sequence characterized by lack of sheeted-dyke complexes, relatively small volumes of intruded gabbros, and a discontinuous basaltic and pelagic sediments cover. These ophiolites are believed to represent fragments of the Ligurian branch of Tethys oceanic crust that were obducted on continental crust during its closure. A thorough petrological investigation has been carried out on ophiolites that crop out widely along the boundary between Basilicata and Calabria, close to Mt. Pollino (Southern Italy). All peridotite samples contain large amount of serpentine, and are characterized by millimeter-sized porphyroclasts of olivine and orthopyroxene, varying from anhedral to subhedral and showing internal deformation. Clinopyroxene is present as large crystals or as exsolution lamellae in orthopyroxene. Spinels are typically anhedral. The protoliths of all samples were likely depleted harzburgites and/or cpx-poor lherzolites. Three samples (named Type-1) have MgO = 40.9-41.3 wt.%, while the other samples (named Type-2) have higher concentrations of MgO = 43.3-44.6 wt.%. The Type-1 peridotites have the highest values of $Al2O_3$, CaO, SiO_2, Sc and V, but lower Ni and Co contents. Peridotites show chondrite-normalized REE patterns with strong, but variable depletions in LREE. Type-1 peridotites are less depleted, whereas Type-2 peridotites are strongly depleted HREE pattern regions are poorly variable, showing chondritic values. The geochemical variations displayed by major oxides and trace elements, and the positive relationship between Fo content of olivine and Cr# of spinel suggest high degrees of partial melting ($\sim$20%). However, the degree of partial melting inferred on the basis of LREE concentrations of clinopyroxenes is much lower than that recorded by the spinel-olivine equilibrium (maximum $\sim$6% near-fractional melting of a spinel-facies depleted mantle for both peridotites). However, the geochemical data indicate a different petrological stories for two type of peridotites, because, unlike the Type-2, the Type-1 peridotites have been affected by a multistage refertilization, at least two events. We interpret the apparent discrepancy of the depleted spinel peridotites of Mt. Pollino as the result of a reactive melt/rock interaction with depleted melts of MORB affinity, occurred at spinel-facies conditions after an earlier melt extraction. The geochemical characteristics of these serpentinized peridotites suggest that both types represent a very depleted mantle similar to that typical of intra-basinal settings. For this reason we propose that Mt. Pollino ophiolites may have formed an accretionary wedge (as part of the so-called Ligurian Accretionary Complex) during the early stages of the subduction of oceanic lithosphere below the European margin. This accretionary wedge, however, was dismantled and its remains were deposited in the adjacent Liguride sedimentation basin. Later these terrains were buried during upper Oligocene, reaching HP/LT conditions.