Geophysical Research Abstracts
Vol. 15, EGU2013-12089, 2013
EGU General Assembly 2013

Metamorphic evolution of the Frido Unit from the southern Apennines (Italy): consequences for the subduction processes in the western Mediterranean area

Salvatore Laurita (1), Giacomo Prosser (1), Uwe Altenberger (2), Romain Bousquet (3), Roland Oberhänsli (2), and Francesco Cavalcante (4)

(1) Università della Basilicata, Dipartimento di Scienze, Potenza, Italy (giacomo.prosser@unibas.it), (2) Institut für Erd-und Umweltwissenschaften, Universität Potsdam, Germany (altenber@uni-potsdam.de), (3) Institut für Geowissenschaften, Christian-Albrechts-Universität zu Kiel, Germany (bousquet@min.uni-kiel.de), (4) IMAA-CNR, Tito Scalo, Italy (francesco.cavalcante@imaa.cnr.it)

The southern Apennine chain is a typical segment of the western Mediterranean orogenic belt. It consists of oceanic- and continent-derived complexes, representing the remnants of the Tethyan oceanic crust and as its eastern (Adriatic) margin. Oceanic subduction was active during the Eocene, followed by involvement of the Adriatic margin during the Oligocene-early Miocene. The Frido Unit represents the uppermost tectonic unit in the nappe pile of the southern Apennine chain. It is a typical ocean-derived unit, made up of metasediments, metabasites, serpentinites and fragments of continental crust rocks. Although HP/LT conditions for metabasites (0.6-0.8 GPa; 350±50°C or 0.8-1.0 GPa; 400-450°C) were already recognized, the extent of the HP-LT overprint and its widespread regional distribution in the sedimentary matrix has never been described in detail.
In the present study we define the HP/LT metamorphism of the Frido Unit exposed in the Pollino area (Basilicata) by: i) mapping the occurrence of new and significant index minerals in all rock types (metasediments, gneisses and mafic rocks), to document the areal extent of HP-LT metamorphism in the Frido Unit; ii) constraining P-T evolution and the deformation of both mafic rocks and metasediments during the subduction process.
Mapping of index minerals in metasediments (carpholite and aragonite), metabasites and fragments of continental crust rocks (glaucophane, riebeckite, lawsonite, and omphacite/jadeite) reveals widespread HP metamorphism, indicating that the whole Frido Unit underwent HP-LT conditions during subduction. Interestingly, carpholite occurs within a NW-oriented belt, where strongly deformed metabasalts and massive metadolerites show the most widespread HP overprint. By using thermodynamic modelling on a HP metadolerite and by considering the stability field of carpholite and aragonite in metasediments peak PT conditions of 0.9-1.2 GPa at less than 350 °C can be deduced. A very cold retrograde path in the stability field of aragonite, implying extremely cool exhumation conditions, followed the PT peak. Significant cooling during decompression implies that exhumation took place during active subduction of the cold oceanic lithosphere of the Tethyan domain. In addition, exhumation was slow enough to equilibrate the temperature of the exhuming body with the ambient conditions. Summarizing, the evolution of the Frido Unit fits the HP-LT evolution of metasediments of the Alpine-Apennine System during subduction and closure of the Piedmont-Ligurian Ocean.