

DENUATION OF LITHOSPHERIC SUBCONTINENTAL MANTLE AT THE ADRIA MARGIN OF THE PIEMONTESE OCEAN BELT (MALENCO, ITALY)

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ABSTRACT

Major metaperidotite bodies of the Central and Western Alps and of Liguria are former subcontinental Adriatic lithosphere (Piccardo et al., 1992; Lemoine et al., 1987; Trommsdorff et al., 1993). One of the largest masses of metaperidotite occurs at Val Malenco, Eastern Central Alps, with a surface area of over 130 km². It is composed dominantly of fertile and depleted spinel lherzolites and of subordinate amounts of dunite; corundum bearing garnet clinopyroxenite and phlogopite hornblendite (Müntener, 1997). There is clear geological and petrological evidence for a pre-oceanic subcontinental setting of the Malenco mantle and for Jurassic emplacement and denudation within the Piemontese ocean basin. The evidence may be summarized as follows: The Malenco mantle is in part overlain by a lower crustal granulite complex consisting of kyanite-garnet rocks; migmatites; wollastonite bearing calc-silicate rocks and olivine-spinel marbles. Pelitic granulites and mantle rocks are crosscut and welded together by a gabbro complex, the Braccia Gabbro (Hermann, 1997), which is of Lower Permian age (Hansmann et al., 1996). After the gabbro intrusion the complex underwent granulite facies equilibration. This crust mantle transition was stable at 25-30 km depth for a period of over 50 million years (Hermann et al., 1997), and then was rapidly exhumed during Jurassic rifting. During this process large parts of the Malenco mantle were emplaced in the Piemontese ocean basin and denuded. Proof of this is provided by ophicarbonates that were deposited on top of the Malenco mantle as fracture fillings and as debris flows containing blocks of serpentinized lherzolite and, at some localities, of platform carbonate sediments. The western parts of the Malenco mantle rocks are intruded and overlain by MOR-type basalts which form the basis of a Jurassic to Cretaceous, oceanic sedimentary sequence, the Forno unit. During its oceanic stage the Malenco mantle was partly serpentinized and, concomitantly, metaroddingites formed from the Permian gabbro and Jurassic MORB dykes within the mantle rocks.

It is suggested on the basis of structural geological argu-

ments that the Malenco mantle was exhumed along a lithosphere-scale shear zone that dipped towards the Adriatic continent. This shear zone is preserved in exposures extending several kilometers. The shear zone contains in its brittle part components of crustal and mantle rocks (Ur-breccia, Trommsdorff et al., 1993). The fossil Malenco margin thus resembles in all its properties the modern Galicia margin of the Atlantic ocean described by Boillot et al. (1995).

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