Special Section

Working Group On Mediterranean Ophiolites

MODERN AND FOSSIL OCEANIC LITHOSPHERE

Edited by

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FOREWORD

The ocean floor exploration carried out by the Ocean Drilling Program (1985-2003), and previously by other ocean drilling programs, has provided a wealth of new data about composition, origin and evolution of the accreting and subducting oceanic lithosphere in modern oceanic basins. Conversely, research on ophiolites worldwide has been playing for long time a relevant role in the identification of past oceans through the whole geologic column, and has improved significantly our knowledge of the tectonic, magmatic and metamorphic processes through which the oceanic lithosphere is generated and transformed. Italian geologists have pioneered the study of ophiolites and, since 1986, many Italian researchers have been involved in ODP.

This special isue of OFIOLITI contains a selection of research papers presented at the G.L.O.M. session of the GEOITALIA meeting held in Spoleto (Italy) in September 2005. This thematic session, entitled "Composition, structure and evolution of the modern and fossile oceanic lithosphere: contributions from the ophiolites and recent ODP-IODP cruises" was open to multi-disciplinary contributions on ophiolitic complexes and modern oceanic lithosphere, and was aimed to stimulate discussion on mantle and crust of modern oceans and on different ophiolite types. The meeting represented a fruitful opportunity to stimulate discussion between researchers working on present-day oceanic lithosphere and ophiolitic analogues.

In this special issue nine papers report the results of structural, geophysical, petrological, geochemical and paleontological studies on different oceanic sectors (East Pacific Rise, Southern Shetland margin, Izu-Bonin-Mariana arc), Tethyan ophiolitic sequences from the Alps and from Caribbean ophiolites (Guatemala).

Tartarotti et al. and *Crispini et al.* illustrate the stratigraphy of oceanic crust generated at a superfast spreading rate (East Pacific Rise, IODP Site 1256), focussing on the structural features of the massive basaltic flows. The continuous section of *in situ* oceanic crust drilled at Site 1256 provides the first sampling of a complete section of upper ocean crust including extrusive rock, sheeted dike complex and gabbros. On the basis of a detailed structural analysis of a massive thick lava flow interpreted as a lava pond, *Tartarotti et al.* provide constraints on the relationships between tectonics and crustal accretion. In a companion paper, *Crispini et al.* describe petrographic and microstructural features of the Site 1256 lava pond. The reported ductile to brittle structures are employed to reconstruct emplacement mechanisms and dynamic evolution of the lava flow.

Boschi et al. provide an overview of the occurrence and significance of talc- and amphibole-rich fault rocks developed in ultramafic protoliths from oceanic fracture zones and detachment faults of slow- and ultra-slow spreading ridges. Origin, deformation mechanisms, role of talc-amphibole metasomatism in the seafloor exhumation of mantle peridotites and implications for the genesis and evolution of oceanic core complexes are discussed.

Chiari et al. provide the first geochronological evidence for a Jurassic age of the Guatemala ophiolites based on the study of metaradiolarites. Geodynamic implications of this new finding indicate that the Caribbean ophiolites may correspond to the western termination of the Pangea breakup.

Loreto et al. describe the results of a geophysical survey carried out by R/V OGS Explora in the Southern Shetland Trench (Antarctic Peninsula), in order to provide a better knowledge of the passive subduction processes. The acquired geophysical data have highlighted the shallow structures characterizing the subduction of the last Phoenix Plate Segments beneath the South Shetland margin; the new multibeam image, in particular, shows in detail the character and extension of the main investigated domains, i.e. the incoming oceanic crust, the trench, and the frontal accretionary prism.

Scribano et al. present a mineralogic and geochemical study of strongly metasomatized mafic and ultramafic xenoliths (gabbroic rocks, pyroxenites, spinel peridotites) hosted in the Hyblean alkaline volcanics from southern Sicily. The widespread development of seawater-related hydrothermal alteration in the Hyblean crustal basement as shown by the xenoliths supports the hypothesis of its fossil oceanic nature and of a continuity with the oceanic crust of the adjacent Ionian Domain.

D'Antonio et al. report geochemical and isotopic features of the ODP Leg 195 Site 1201 basement rocks from West Philippine Basin - Palau-Kyushu Ridge. These rocks offer some insights into the early history of the Izu-Bonin-Mariana subduction factory, representing a unique opportunity to investigate the geochemical and isotopic features of volcanic rocks from a now-extinct intra-oceanic volcanic arc.

Zanetti et al. investigate mantle peridotites from the Izu-Bonin-Mariana forearc recovered by ODP Leg 195 cruise. The marked heterogeneity in terms of petrographic, mineralogical and geochemical features indicate they represent an example of multistage evolution of a supra-subduction mantle section involving, at variable extent, partial melting, reactive porous flow melt migration, and subsolidus metamorphic re-equilibration under decreasing temperature conditions.

Tartarotti & Turco depict the subduction-related metamorphic evolution of a poorly known ophiolitic sequence from the

Western Alps (Antrona nappe ophiolites) and discuss the regional implications of this evolution. According to the new reconstruction, blueschist prograde path was followed by high pressure (eclogitic) metamorphic peak followed by a retrograde exhumation path dominated by epidote-amphibolite/amphibolite facies conditions.

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