

GEOLOGICAL SETTING AND STRUCTURAL STYLES OF VOLCANIC MASSIVE SULFIDE DEPOSITS IN THE NORTHERN APENNINES (ITALY): EVIDENCE FOR SEAFLOOR AND SUB-SEAFLOOR HYDROTHERMAL ACTIVITY IN UNCONVENTIONAL OPHIOLITES OF THE MESOZOIC TETHYS

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ABSTRACT

This paper is an overview of the geological setting and structural styles of Cu-sulfide deposits of the VMS-type, associated with Tethyan ophiolites (the Ligurides) in the northern Apennines (Italy). The Italian deposits represent a rare example of VMS associated with both the mantle-peridotite basement and the overlying volcanic pile, within a single ophiolite sequence. This peculiar feature is due to the particular geodynamic evolution of the Mesozoic Ligurian ocean that allowed the upper mantle to be exposed on the seafloor for a long period before the outflow of MORB-type lava and the deposition of pelagic sediments (cherts, Palombini shales and Calpionella limestones). Middle to Upper Jurassic uprising of the basaltic magma initially provided the heat source for convective circulation of hy-

drothermal fluids through the overlying mantle section, giving rise to sulfide deposition in crosscutting stockwork veins and seafloor-stratiform ore bodies within the serpentinized mantle peridotite and the serpentinite breccia formed by submarine erosion of the upper mantle. The setting and structure of VMS associated with the volcanic pile indicate that hydrothermal activity continued during and after the eruption of pillow basalts at the ocean floor, forming stockwork veins and conformable stratiform ore bodies within the basalt unit. Furthermore, hydrothermal activity formed seafloor-stratiform deposits, at the top of the volcanic pile,

covered with a thick horizon of cherts containing exhalative deposits of Mn.