

# MINERALOGY AND CHEMICAL COMPOSITION OF VMS DEPOSITS OF NORTHERN APENNINE OPHIOLITES, ITALY: EVIDENCE FOR THE INFLUENCE OF COUNTRY ROCK TYPE ON ORE COMPOSITION

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## ABSTRACT

In the ophiolites of the Italian northern Apennines, mantle rocks were exposed on the seafloor and eroded prior to the extrusion of pillow basalt and the deposition of pelagic sediments. Various types of VMS deposits occur at different stratigraphic positions in the ophiolite sequence. Stockwork-vein and seafloor-stratiform ore bodies are associated with serpentinitized mantle peridotite and serpentinite breccia. A second group of sulfide deposits consist of crosscutting stockwork or conformable stratabound ore bodies emplaced into the pillow basalt, and seafloor-stratiform deposits located at the top of the volcanic pile, in contact with the sedimentary cover. Geochemical and mineralogical differences are observed in the ore and gangue assemblages of the deposits that were formed before the outflow of pillow basalt, and those precipitated during and after basalt extrusion. Compared with basalt-hosted sulfide deposits, the ores associated with serpentinite have a higher Cu/Zn ratio due to a

low modal proportion of sphalerite and are enriched in the compatible elements Ni, Cr, and Mg. The Co and Ni of the ores reflect those of pyrite. The Co/Ni ratios of pyrite range from 0.29 to 1.79 (av.=0.74) in serpentinite-hosted deposits and from 1.09 to 8.0 (av.=2.59) in basalt-hosted deposits. The composition of chlorite varies from Cr-rich, Mg-clinocllore, in serpentinite-hosted deposits, to Fe-clinocllore with relatively high Mn contents, in basalt-hosted deposits. The sulfides in serpentinite contain accessory chromite that is compositionally similar to chromian spinels from abyssal peridotites. The observed geochemical variations among the various ore types are due to the interaction of the oreforming fluids with different types of country rock (ultramafic vs. mafic), which involves hydrothermal leaching of metals from the substrate, rock-fluid reactions at the site of ore deposition and the mechanical transfer of detrital material from the country rock to the ore forming-system.