New evidence of magmatic-hydrothermal activity of porphyry-epithermal system in the rearc of Izu-Bonin-Mariana

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ABSTRACT

The Izu Bonin Mariana arc developed in response to subduction of the Pacific Plate under the Philippines plate over the past 52 Ma. The International Ocean Discovery Program (IODP) Site U1437 is located in a basin between Enpo and Manji seamount chains at Izu Bonin rearc. The Manji seamount (ca. 7 Ma) reports the first evidence of a submarine Cu-porphyry hydrothermal activity. The main objective of this contribution were: to characterize the oxide and sulphide minerals in volcaniclastic succession, to establish relations between those minerals and the surrounding mineralisation systems and to determine the oxidation state of the rearc magmatism through oxide and sulphide chemical analysis. Analysis were carried out using SEM-EDS on polished thin sections from units V to II (ca. 9-4,4 Ma). Results show four mineral associations: (i) detrital oxides of volcanic origin (Ti-mag + ilm), (ii) detrital sulphides of hydrothermal origin (py + ccp ± sp ± gn), (iii) hydrothermal association (mag + py + ccp + kfs + anh + chl) and (iv) hydrothermal association (mag + py + sp + gn + brt + sme ± Au ± Ag). “ii” occurs in lithoclasts and in the matrix of volcaniclastics rocks older than 7 Ma. It relates to an hydrothermal activity previous to the porphyry system and was interpreted as associated with rearc seamounts building volcanism. “iii” occurs in units IV and III (6,8-5 Ma) and relates to a potassic alteration of a Cu-porphyry. “iv” occurs in all units and was interpreted as a high sulphidation Au-Ag Epithermal alteration. Detrital oxides “i” characterize an I-type magnetite magma series with oxygen fugacity ranging between the FMQ and the MH buffers. The development of porphyry-epithermal hydrothermal activity may relate to changes of the Pacific plate motion and to a compressive stress regime (ca. 8-5 Ma).

Keywords: Cu-porphyry, Au-Ag epithermal, Volcaniclastics, Rearc, Izu-Bonin-Mariana