

Geochemical Architecture and Exploration Vectors at the Onto Porphyry–High Sulfidation Cu–Au System, Hu'u District, Sumbawa, Indonesia

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The Onto Cu–Au deposit in the Hu'u district, eastern Sumbawa, represents a world class porphyry–high sulfidation (HS) hybrid system with mineral resource of ~3.0 Bt at 0.72% Cu and 0.39 g/t Au (31 December 2024). District to deposit scale lithogeochemistry, drill core assays, and SWIR spectroscopy has been used to characterize metal fertility, alteration architecture, and develop practical exploration vectors.

Whole rock and trace element geochemistry particularly K_2O , Zr, Sr/Y, and V/Sc define a low K, low Zr calc-alkaline andesites close to Onto and highlight progressively more fertile arc magmatism. Fertility plots (Zr– SiO_2 ; V/Sc–Sc; Sr/Y–Y) show that the capping andesite and Late Intermineral Porphyry plot in compressive field trends typical of hydrous, oxidized, fertile magmas, whereas the Early Andesite sequence falls outside this field implying a shift to more favorable geodynamics coincident with porphyry emplacement.

Assays demonstrate that the highest Cu–Au grades are hosted by the Early Porphyry and correlate with elevated quartz vein density; Mo defines an outer halo consistent with classic porphyry zoning, while Zn patterns are muted by the HS overprint. SWIR data indicate K-alunite dominance within mineralized zones whereas Na-alunite occurs peripherally and at shallow levels. White mica crystallinity increases at depth and is only prominent below ~000m below sea level; Fe-rich chlorite predominates in proximal zones. Geochemically, Ag–As–Sb–Se coupled with low Al–V delineate probable upflow feeders.

The data show that porphyry related fertility signatures and HS overprinting interact to redistribute and augment Cu–Au grades, partly obscuring the primary metal zonation. A combined workflow lithogeochemistry, SWIR mineral chemistry, and assay/vein density mapping provides robust vectors to mineralized centers and scalable criteria for district targeting in porphyry–HS of the Hu'u region and analogous settings worldwide.

Keywords: Onto; porphyry–high sulfidation hybrid; lithogeochemistry; fertility indicators; SWIR alteration; alunite (K–Na); white mica crystallinity; exploration vectors; Hu'u, Sumbawa, Indonesia.