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Mass changes and hydrothermal alteration in the Masara gold district, Compostela Valley, Philippines

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The Masara area in Compostela Valley, eastern Mindanao, Philippines hosts a low to intermediate sulfidation epithermal gold deposit telescoped overporphyry copper-gold mineralization. Detailed alteration mineralogy of the host rocks and mass balance calculations were conducted so as to provide additional insights for the exploration for other similar ore deposits in the region.

Epithermal mineralization in Masara is associated with host rocks exhibiting late chlorite-sericite and sericite alteration, as revealed by alteration mapping and X-ray diffraction (XRD) analysis of representative samples from the area. The late chlorite-sericite alteration is characterized by quartz + chlorite + illite + sericite ± adularia ± magnetite ± epidote. The sericite alteration zone is composed of quartz + illite + sericite. These two alteration zones are observed tooverprint theearlier potassic (quartz + chlorite + illite + sericite ± biotite ± magnetite ± calcite), early chlorite-sericite (quartz + chlorite + illite + sericite ± biotite ± magnetite ± calcite) , and advanced argillic alteration zones (quartz + kaolinite + magnetite + dickite ± illite ± calcite) that are considered to be related to the earlier porphyry copper mineralization in the area.

Mass balance calculations using the isocon analysis technique show that the host rocks for the epithermal mineralization have enrichment in $SiO_2$and K_2O and depletion of CaO and Na_2O. These observations coincide with Cu, Pb, Zn, and Au additions, particularly in the diorite porphyry unit with late chlorite-sericite and sericite alteration assemblages. The host rocks also show varying degrees of sericitization as identified by a Pearce Element Ratio (PER) analysis. In the generated PER alteration index map, three zones with high alteration indices were delineated. Thezones generally coincide with the mineralized regions in the area. These results support the use of mass balance calculations as a complement to traditional techniques in the exploration for hydrothermal deposits.