[EJ] Evening Poster | S (Solid Earth Sciences) | S-RD Resources, Mineral Deposit & Resource Exploration

[S-RD33]Resource Geology

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Ore deposits consisting of supracrustal concentrated valuable elements and minerals result from the Earth's dynamics including magmatism, hydrothermal activity, metamorphism, and weathering. The formation of ore deposits is also closely associated with global environmental changes and biological evolution in the Earth's history. Involvement of different academic fields in Earth Science including Geology, Petrology, Mineralogy, and Microbiology is required to understand the genesis of ore deposits. The filed of Resource Geology is essential not only for efficient exploration and development of ore deposits but also for better understanding and assessment of hazardous elements that may be caused by resources development. This session widely covers various topics of field investigation and observation, laboratory experiments, theoretical calculation, development of analytical methods and others related to the supracrustal migration and concentration of elements.

[SRD33-P03]Temporal Relationships between Hydrothermal Activities, Intrusions and Phreatomagmatic Brecciation in the Southwest Prospect, in the Vicinity of Sto. Tomas II (Philex) Porphyry Cu-Au Deposit, Baguio District, Philippines

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The Southwest prospect is one of the indications of multiple phases of porphyry Cu mineralization in the Baguio District. It is located at the southwestern periphery of the Sto. Tomas II Orebody, a 60-year old porphyry Cu-Au mine being operated by Philex Mining Corporation (PMC). Intriguingly, its footprint of Cu and Au mineralization is positioned in between approximately 1400Masl and 850Masl, roughly the same elevation as the Sto. Tomas II Orebody that may possibly be the key to the unravelling the evolution of the porphyry Cu clusters in the Southern Baguio District.

In this study, we summarize the evidence gathered from diamond drillholes sunk in the prospect that would establish the relationships among the multiple phases of intrusive and breccia units and elucidate the accompanying ore-forming processes.

Based on the drillcore logging, at least 6 phases of intrusive rocks and at least 3 breccia units are recognized that intruded through the basement Pugo and Zigzag Formations. The pre-mineralization intrusive rocks include the Pre-mineralization Diorite (PMD), Old Diorite Porphyry (ODP) and the Keratophyre (KTP). The syn- to intra-mineral phases are composed of the Early Mineralization Diorite (EMD) and its brecciated

equivalent, termed as the (EMDBx) and the phreatomagmatic breccia 1 (PMBx1). EMD is strongly altered by secondary biotite and magnetite, with disseminations of Cu-Fe sulfides, such as chalcopyrite and bornite, along with cross-cutting veinlets and stringers of magnetite, biotite and quartz. The syn- to intra-mineral timing is indicated by wavy quartz veinlets being terminated within the EMD body. EMD transitions to its brecciated equivalent, the EMDBx, which is thought to be its intrusive breccia counterpart. In turn, EMDBx is at times seen transitioning to PMBx-1, though in most cases, clear cutting of the latter to EMDBx is observed. PMBx-1 is characterized as a clast-rich breccia with chaotic sorting. The clasts are composed of mostly EMD and the earlier rocks, various types of quartz vein fragments and are set in a rock-flour matrix, usually filled with secondary biotite, magnetite and Cu-Fe sulfides when near the contact with EMD, but no significant alteration is observed at the distal portions. Late-mineralization rocks are composed of the Late Diorite (LD), Diorite Porphyry (DP), a matrix-rich phreatomagmatic breccia-2 a (PMBx-2a), and a clasts-rich a matrix-rich phreatomagmatic breccia-2 b (PMBx-2b). Clear cross-cutting relations, overprinting chlorite±epidote-calcite alteration, and sharp decrease in Cu and Au grades establish the late timing of these late-mineralization rocks. Among the intrusive rocks, only LD is significantly vesiculated indicating a significant amount of volatiles was present during crystallization. LD is also characterized by sporadic Au-rich mineralization. Meanwhile, among the breccias only PMBx-2a shows clear crosscutting with PMBx-1 at the deeper portions, and extends upwards to the shallower portions, cutting the PMBx-2b, which is usually infilled with chlorite-pyrite in the open spaces, indicating hydrothermal activity persisted until the late stages. Post Late Andesitic Dikes (LAD) cross-cut all rocks types.

The most peculiar and significant observation in the Southwest prospect is the occurrence of porphyry type veinlets (sheeted quartz-magnetite veinlets) overprinting the PMBx-1, specifically at the central deeper portions (~900Masl to 850Masl). They are accompanied with chalcopyrite-chlorite stringers and chlorite-quartz-sericite±epidote alteration halo. This occurrence corresponds to the highest Cu and Au grades. Furthermore, this occurrence along with the observation of porphyry type veinlets as clasts in the breccia units, as veinlets hosted in intrusive rocks, as well as the occurrence chlorite-pyrite infills in PMBx-2b indicates hydrothermal activities overlapping with multiple phases of intrusion and brecciation.