

# **Understanding the Evolution of the Baguio Minerals District (Northern Luzon, Philippines) and Its Associated Arc- Related Mineralization**

G. P. Yumul, Jr.<sup>1,2</sup> and C. B. Dimalanta<sup>2</sup>

1. Department of Science and Technology  
Bicutan, Taguig, Metro Manila, Philippines

2. National Institute of Geological Sciences, College of Science  
University of the Philippines, Diliman, Quezon City, Philippines

## **Abstract**

The Baguio Minerals District hosts several major world class gold and copper deposits in the Philippine island arc system. Recent works have shown that this part of the Philippine island arc system evolved from an oceanic marginal basin to a mature island arc system. Calc-alkaline igneous rocks range from andesitic to dioritic compositions. Adakitic rocks, attributed to the partial melting of the subducted slab, have also been recognized. A genetic link between the occurrence of adakitic rocks and the porphyry copper and meso-epithermal gold mineralization in the district has been forwarded by previous workers. Petrographic and whole rock chemical analyses of rocks from two major sedimentary sequences, the Middle to Late Miocene Klondyke Formation and Oligocene Zigzag Formation, reveal a lot in terms of the evolution of this arc system. The Zigzag Formation is characterized by a higher amount of quartz than the Klondyke Formation. This suggests the presence of a nearby acidic source which was being eroded and supplying quartz during the deposition of the Zigzag Formation. The progenitors of the Zigzag Formation range from oceanic crust to volcanic arc systems. Crustal thickness estimates for this region obtained from available seismic and gravity data reveal a 26 to 29 kilometer thick crust. A similar crustal thickness is revealed by the plagioclase-hornblende geobarometry of minerals extracted from mantle xenoliths, i.e. 0.73 GPa which is ~26 kilometers. These results point to arc accretion as the dominant factor in the crustal growth of northern Luzon. Subduction-related igneous processes, stratigraphy, structural controls and tectonic setting have all exerted influences in the generation of the observed mineralization in the area.

Key words: Evolution, tectonics, mineralization, Baguio, Philippines