

Hybrid Magmatic Hydrothermal Deposits at Guayabales, Marmato District, Colombia

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The Midde Cauca belt of Colombia contains a range of hydrothermal Au-Cu deposits, some of which have been mined for hundreds of years. Ranging from the +11.3 Moz Au veins at Buritica on the north to the 28 Moz La Colosa porphyry Au deposit on the south, the belt contains a range of deposit styles, from porphyry to vein districts, reflecting their association with oxidized to reduced magma compositions formed within a narrow time frame in the late Miocene (9 to 5 Ma).

The Guayabales area in the historic Marmato District contains a hybrid system at Apollo that has aspects of reduced as well as oxidized porphyry Au – Cu along with reduced sulfide assemblages in an overprinted breccia. Emplaced into accreted oceanic Arquia Complex, the Apollo system consists of early pyrrhotite dominated, low-grade porphyry Au-Cu intruded by hornblende diorite porphyry suite having magnetite – quartz veins overprinted by a breccia that evolved from reduced assemblages characterized by pyrrhotite replaced chamosite-dominated rock flour, followed by chalcopyrite – pyrite replacement of pyrrhotite, and successively by precious metal-rich sulfosalts characterized by Cu-poor Au-Bi-Te assemblages at depth and Pb-Cu-Ag-Sb-As-Au assemblages in the upper parts of the breccia, and finally cut by precious metal rich carbonate – base metal veins that extend over the entire 1 km vertical depth explored to date, and that extend laterally for kms where they are exploited by artisanal miners. The chalcopyrite – pyrite to late carbonate veins represents a metal zonation typical of a cooling magmatic hydrothermal system. An anomaly is scheelite in the upper part of the breccia. This part of a breccia also contains abundant carbonaceous metasedimentary breccia clasts that presumably affected the redox state of the rock flour, leading to the localized precipitation of scheelite, and likely contributed to pyrrhotite precipitation as well.