

The Implication of Metamorphism and Deformation of the Vioolsdrif Domain on the Haib Porphyry Copper-molybdenum Deposit, Namibia

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The Haib Copper deposit, located in the Karas region of southern Namibia, is hosted mainly by the high-K calc-alkaline intrusions of the Vioolsdrif Suite and sub-aerial volcanic rocks of the Orange River Group along the western part of the Paleoproterozoic Richtersveld Magmatic Arc (RMA) of Vioolsdrift Domain, Namaqualand Metamorphic Province. Porphyry-style copper mineralization is developed in and around a quartz-feldspar porphyry (hereafter QFP) intrusion, which is a minor phase of a large composite batholith formed by plutons of the Vioolsdrif Intrusive Suite (VIS). The QFP is a minor constituent of the VIS, the only other occurrence being the Tatasberg prospect in the northeast. Much of the Haib copper deposit area is inaccessible and not well studied thus leading to many outstanding questions regarding whether the deposit was affected highly by subsequent deformation and metamorphism episodes experienced in the domain and the extent of erosion that the deposit was subjected to. In this study, we characterize the mineralization of ore types, grade of metamorphism and structural controls of the Haib deposit to understand the evolution of the deposit. We employed EPMA (electron microprobe analyzer), XRF, petrography and core and field observation. The study shows that the deposit experienced low-grade metamorphism but is highly remobilized into preferred structurally controlled sites. A study of the Paleoproterozoic Richtersveld Subprovince/Magmatic Arc (RMA) in southern Namibia are integrated with previous work in adjacent NW South Africa to produce a new, unified model for the evolution of the RMA. The RMA was variably affected by the ~1 Ga Namaqua which makes it difficult to understand the remobilization, deformation and metamorphism throughout the five deformation episodes studied by other researchers.

Keywords: Richtersveld Magmatic Arc (RMA), quartz-feldspar porphyry (QFP), Vioolsdrif Intrusive Suite (VIS), EPMA (electron microprobe analyzer), XRF (X-ray Fluorescence), Orange River Group (ORG).