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Geological and Geophysical Study of the Kombat South area, Otavi Mountain Land, northern Namibia

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The Damara Supergroup in Namibia hosts several important ore deposits. The study area includes the Deblin deposit which is part of the Askevold Trend in Kombat South in northern Namibia. The Askevold Trend is defined by a series of copper occurrences and geochemical anomalies associated with a sheared contact between the Nosib Group Volcanics and the overlying Otavi Group Dolomites [1]. Previous work indicates that most of the basement faults in the region have been important pathways for metal rich fluid from the Nosib Volcanics in Otavi Mountain Land during the hydrothermal activity of the 3rd Damaran deformation event [2]. Recent petrographic studies indicate that the mineralization style is shear-hosted hydrothermal, as opposed to Volcanic Massive Sulphides (VMS), and have suggested a FeO-Cu-Au style mineral assemblage [1]. Little is known though about the structural framework of the study area due to poor exposure and on the existing geological map structures are largely inferred. The available regional aeromagnetic data indicates large scale faults and folds, with large scale NE-SW trending faults across the study area.

This study aims to use aeromagnetic and ground magnetic data, and magnetic susceptibility data to: identify faults below and within the Otavi Group carbonates which may have important inferences for focusing mineralizing hydrothermal fluids; establish and classify magnetic signatures of various rock formations; and assess if the new ground magnetic data can help develop links between local and regional structural architecture. Surface mapping, petrography and geochemistry data are, in turn, used to study the mineralogy and improve the existing local geological map. These data are integrated to establish the mineralization style of the Deblin deposit and decipher its tectonic setting. To date, 62 line km of ground magnetic data have been collected along N-S traverses at 25 m line spacing and 5 m station spacing in the study area. These data were diurnally and IGRF corrected and micro-levelled. Drill cores from 3 boreholes and 140 outcrop samples were measured for magnetic susceptibility. Preliminary results show that some of the lithologies can be clearly mapped under areas of cover due to their magnetic signature. High amplitude magnetic anomalies to the north of the metavolcanics outcrop suggest that metavolcanics may also be present to the north. We have found highly magnetic rocks to the east of the metavolcanics outcrop that have not yet been interpreted. Ground mapping has been used to create a new 1:2500 geological map, while 180 rock samples were collected for future geochemical analyses and isotope studies.

Petrographic interpretation of these samples using ore microscopy indicates that the main sulphides present include chalcopyrite, pyrite and sphalerite. Chalcopyrite is the predominant sulphide and it occurs as anhedral, millimeter-sized patches in the quartz veins at the contact between the upper dolomites and lower metavolcanics. Malachite is the only secondary ore mineral that was observed. Two paragenetic suites of the sulphides were encountered; sphalerite/pyrite/chalcopyrite and pyrite/chalcopyrite/sphalerite. The relatively fresh pyrite and chalcopyrite grains are observed in the silicified dolomites, whereas in the metavolcanics they are affected by sericitic and chloritic alteration. This information is being used to update the geological map.

References:

[1] Golden Deeps Limited (2014) ASX Announcement: 20 January 2014
[2] Pirajno F. and Joubert B.D. (1993) Journal of African Earth Science 16:265–272