Paper Number: 4979

Geophysical mapping of the Ramokokastad Carbonatite Complex, Northwest, South Africa

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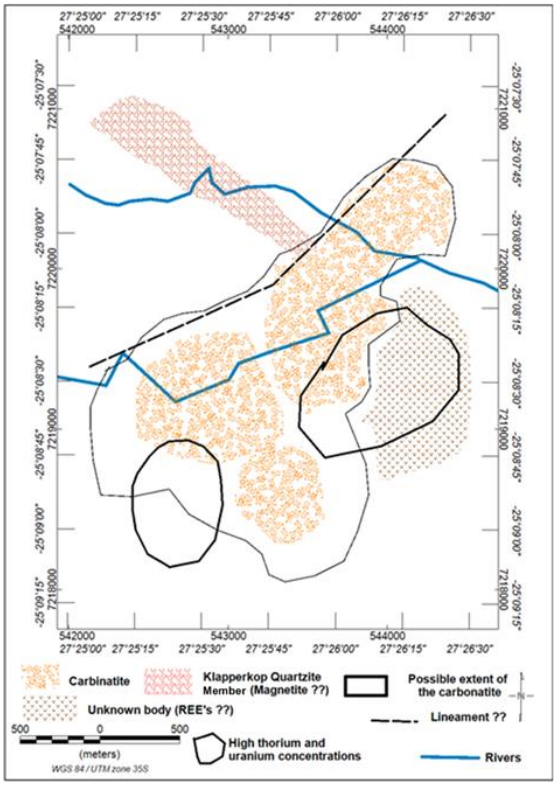
This report describes the results of the ground geophysical survey carried out over the Ramokokastad carbonatite area in the Northwest Province. The carbonatite was discovered by the Council for Geoscience (CGS) during previous geochemical sampling campaigns. The Ramokokastad Carbonatite Complex is situated at the contact of the Transvaal Supergroup sediments to the northeast and the Nebo Granites belonging to the Bushveld Complex in the southwest. The shape and size of this is 2-3 km complex was inferred from the high density airborne geophysical data as well as the ground geochemical data. The magnetic anomaly suggests a north-east dipping body, probably covered by Transvaal Supergroup sediments (Strauss et. al., 2007).



The overall objective was to assist with the planning of a proposed exploration and drilling program through mapping the lateral extent of the carbonatite. Three geophysical methods were used. The methods were chosen based on the following criteria; Magnetic method because carbonatites often have high concentrations of magnetite. The method was also chosen for the delineation of structures that may have facilitated magmatic fluid flow and segregation. Radiometric method because concentrations of radioactive U and Th bearing minerals cause noticeable anomalies associated with many carbonatite complexes. Gravity method because the carbonatite is denser than the country rocks which will result in a gravity high. Magnetite is very dense and strongly magnetized; producing a vertical gravity gradient high. The depth extent to the top was to be inferred through 2D and 3D modelling. High resolution ground geophysical data collected over the project area confirmed the presence of a carbonatite.

Figure 1: Map showing the interpretation of both the magnetic data and the gravity data.

The carbonatite is responsible for negative magnetization with a sub-circular shape. The gravity data clearly defines the carbonatite in terms of shape and size. The radiometric data shows a high thorium and uranium anomaly coinciding with a high phosphorous geochemical anomaly. The radiometric anomalies are situated on top of an interpreted positive magnetic body. A linear magnetic anomaly coinciding with the Klapperkop quartzite suggests that the quartzite is highly ferruginous with potential

for magnetite. Geophysical modelling of the magnetic and gravity data indicates about 25 m thick overburden lying on top of the carbonatite. Gravity and magnetic 2D and 3D models show the presence of a very dense magnetic body of varying depth up to about 25 m depending on profile orientation.

References:

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