

DELINEATING DYKES AND SILLS IN THE KAROO WITH AEROMAGNETIC DATA: IMPORTANT REVELATIONS OF HIGH RESOLUTION DATA

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ABSTRACT

Dolerite dykes and sills in the Karoo Basin are a challenge to future shale gas exploration. Fractures associated with these bodies provide pathways for gas and water to move along. In addition, if these dolerites are in close contact with the shale layer, they will have heated up the layer. This can result in over-maturation and the violent escape of the gas through vents to the surface. Aeromagnetic data are effective at mapping these dolerite dykes and sills in the Karoo, due to the significant susceptibility contrast between the dolerite and the Karoo sediments. However, most of the aeromagnetic data in the Karoo was collected in the 1970s with the goal of mapping the whole country, thus the spacing between lines is 1 km (flight height of 150 m). This line spacing is much too coarse to fully delineate the location and extent of dykes in the Karoo that, in general, are < 10 m wide. Here we present an example of the dramatic improvement that higher resolution aeromagnetic will provide in mapping these dykes. In 2003, the Council for Geoscience collected data in the northwestern Karoo at a flight height of 80 m and 200 m line spacing. These data reveal a distinct set of linear features that were previously unresolved on the regional magnetic data. These east-northeast striking features have been mapped as melilitite basalt dykes, that are likely to have significant depth extents with associated fractures. As companies embarks on a new phase of shale gas exploration, the importance of understanding these dolerite networks needs to be a priority. High resolution aeromagnetic data provide the most cost effective and fastest method of mapping these features.