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The structure of the Karoo-age Ellisras Basin in Limpopo Province, South Africa, in the light of new airborne geophysical data

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Content :

The Coaltech Research Association funded an airborne magnetic and radiometric survey over the Karoo-age Ellisras Basin in the Northern Province of South Africa in 2008. The Waterberg Coalfield, which is destined to become the major source of energy in South Africa in the future, is situated in this sedimentary basin. Interpretation of the processed geophysical datasets has added significantly to our understanding of the structure of the Ellisras Basin, in addition to providing additional constraints on lithological and structural mapping. The filtered magnetic and ternary radiometric images have yielded abundant information that will be important in future mapping. Two-dimensional modelling of the magnetic data has provided a novel half-graben model for the structure of the Ellisras Basin. The Melinda Fault Zone, which forms the northern boundary of the basin against Archaean Limpopo Belt rocks, is block-faulted and generally steeply dipping. The thickest development of the Karoo Supergroup rocks is against this fault, attaining up to 500 m. The sediment thickness decreases gradually to the south, indicating an asymmetric basin fill. The southern boundary of the basin is formed by the Eenzaamheid Fault Zone, south of which the ~2000 Ma Waterberg Group rocks are developed. Despite its economic importance, the Ellisras Basin has not been well-studied, and there is a need to correct this in the near future as South Africa becomes more reliant on energy from the Waterberg Coalfield.

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