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Gravity and Aeromagnetic Studies of the Filabusi Greenstone Belt, Zimbabwe Craton: Regional and Geotectonic Implications

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ABSTRACT

The Filabusi greenstone belt (FGB), Zimbabwe craton, has been geologically remapped relatively recently but its regional tectonic setting and subsurface structure have, until now, remained unresolved. This paper presents gravity and aeromagnetic studies that have been undertaken to provide this important information, and also extend mapping to areas of poor exposure. Several new NNW-trending dykes and structures cutting across the greenstone belt have been revealed, as well as a major extension of one of the metakomatiitic-BIF units, the Shamba Range. ESE-trending dykes identified in the southeast appear on a regional scale to be part of the giant Okavango dyke swarm in northern Botswana. An ~3 km wide NNE-striking magnetic low occurs over the Irisvale-Lancaster shear zone (ILSZ) on the extreme west of the FGB where it roughly marks the boundary with the Bulawayo greenstone belt. Magnetic anomaly trends over ultramafic schists are consistent with strike-slip movement along the ILSZ, and together with the gravity anomalies, support northeasterly directed detachment of the adjacent Fort Rixon belt from the Bulawayo-Filabusi belt. The Bouguer gravity anomaly map shows that the FGB is characterised by a well defined positive anomaly up to 37 mGal, whose symmetry and extent confirm the postulated synclinal structure of the belt. Isolated oval shaped small gravity lows generally correlate with sub-/out-cropping K-rich post-volcanic granite plutons. 2.5D gravity models along three profiles across the greenstone belt show a simple "basin shape" with a possible maximum depth extent of only 4.5 km, compared to an estimated stratigraphic thickness of about 9.0 km. This suggests a truncation at shallow depth of the structurally repeated lithologies. Gravity data and models support the proposed FGB model; deposition of volcanics in an extensional, structurally determined, evolving basin. This autochthonous setting is consistent with other greenstone belts in the Zimbabwe craton and other parts of the world.

KEYWORDS

Granite-Greenstone Terrain; Gravity Anomalies; Depth Extent; Magnetic Structural Interpretation; Greenstone Belt Evolution; Autochthonous Origin

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