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# Density heterogeneity of the cratonic mantle and dynamic topography in southern Africa

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An unusually high topography in southern Africa may be caused by the dynamic support of the mantle below the lithosphere base and/or by a low density (high depletion) of the cratonic lithospheric mantle. We use free-board constraints to examine the relative contributions of the both factors to surface topography and present the model of density structure of the lithospheric mantle in southern Africa.
The results indicate that 0.5-1.0 km of topography requires contribution from the sublithospheric mantle because it cannot be explained by the lithosphere structure within the petrologically permitted range of mantle densities. We propose that this additional topography may be associated with the low-density region below the depth of isostatic compensation (LAB). A likely candidate is the low velocity layer between the lithospheric base and the mantle transition zone, where a temperature anomaly of 100-200 deg may produce the required extra contribution to regional topographic uplift.
The calculated lithospheric mantle density values are in an overall agreement with xenolith-based data for lithospheric terranes of different ages and show an overall trend in mantle density increase from Archean to younger lithospheric terranes. A significant anomaly in mantle depletion beneath the Limpopo belt and the Bushveld Complex may result from regional melt-metasomatism. Density anomalies in the lithospheric mantle show an overall inverse correlation with seismic Vp, Vs velocities at 100-150 km depth; however, density-velocity relationship is strongly non-unique.

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