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# Mineral physics and surface observational constraints on the topographic uplift of the Southern African Plateau due to the African Superswell

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The deep mantle African Superswell is thought to cause dynamic topographic uplift of the Southern African Plateau [1], but uplift estimates vary wildly depending on the data and approach used. One reason for these large differences is that the role of lithospheric structure, key in modulating deep dynamic contributions to elevation [2], is commonly ignored or oversimplified. We use multiple high-quality and high-resolution geophysical data coupled with geochemical constraints to compute the static lithospheric contribution to the elevation of the Southern African Plateau, facilitating isolation of the true dynamic component from the total observed elevation.

We employ a stochastic thermo-chemical inversion algorithm to model geoid height, surface-wave dispersion data, surface heat flow data and magnetotelluric (MT) data, in a manner that is fully thermo-chemically and physically consistent [3,4]. We find that a compositionally-layered 240 ± 20 km thick lithosphere, in agreement with abundant independent xenolith evidence, simultaneously fits all datasets. Our results indicate a static lithospheric contribution to elevation of 600 ±300 m, inferring dynamic support arising from the convecting sub-lithospheric mantle of approx. 700 ±300 m, consistent with some prior conclusions. These findings have important implications for the understanding of lithospheric - deep mantle feedback mechanism.

*References:*

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