Investigation into lithospheric mantle of Northern Tanzania utilising 3D magnetotellurics.

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SUMMARY

The relationship between mantle melting and its residual effects on the composition of the lithosphere has not been well documented. Neogene rifting system in Northern Tanzanian Divergence provides an excellent laboratory to investigate such a relationship since a variety of volcanic rocks in the vicinity are associated with different categories of recent incipient mantle melting (Foley et al, 2012). Electrical conductivity is sensitive to the products of metasomatism exerted on the mantle (e.g., water, hydrous minerals); therefore, the magnetotelluric (MT) method can be utilised to explore such relationships.

The electrical structure of North Tanzanian Divergence was investigated using 3D magnetotelluric modelling (Kelbert et al, 2014) of a dataset combining long-period and broadband MT stations (Selway, 2015; Plasman et al, 2019). Then the magnetotelluric model was interpreted using the MATE software (Özaydın and Selway, 2020) to understand the relationship between mantle composition and electrical conductivity. The preliminary results indicate that the Tanzanian craton and the rift region consist of a more heterogeneous mantle with patches of hydrated/conductive regions. On the other hand, a more dry/resistive mantle is present beneath the Mozambique Belt, possibly reflecting the destruction of metasomes via larger volumes of mantle melting.

Keywords: magnetotellurics, electrical conductivity, cratons, rifting, incipient melts

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