Constraining the crustal and mantle conductivity structures beneath islands by a joint inversion of multi-source magnetic transfer functions

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SUMMARY

In this study, we present a tool to simultaneously invert multi-source magnetic transfer functions (TFs), including tippers, solar global-to-local transfer functions (TFs) originating from the signals due to ionospheric source, and global Q-responses originating from the signals due to magnetospheric source. We jointly invert the aforementioned TFs to constrain the local conductivity structures beneath three islands in the Atlantic (Tristan da Cunha), Indian (Cocos), and Pacific (Oahu) Oceans. The recovered conductivity profiles appeared to be consistent with the presence of upper mantle plumes beneath the Tristan da Cunha and Oahu Islands. Our results indicate resistive lithosphere of different thicknesses beneath considered three islands. Besides, new conductivity profiles suggest warmer-than-average mantle temperatures and the presence of a small fraction of melt beneath Tristan da Cunha Island. At the same time, the conductivities beneath Cocos Island are in good agreement with estimates expected for ambient mantle conditions.
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