

3-D inversion of tippers estimated at a continental grid of Chinese geomagnetic observatories: Preliminary results

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SUMMARY

Deep 3-D electrical conductivity structures on a continental scale can be retrieved by the joint inversion of multi-source magnetic transfer functions (TFs) - tippers, and longer period global-to-local (G2L) TFs originated from the signals due to ionospheric and magnetospheric sources - which in their turn can be estimated from a regional network of continuous measurements of the geomagnetic field. In this study, we discuss a data set comprising measurements from a grid of continental Chinese geomagnetic observatories, present results of estimating tippers from these data and perform their forward and inverse modelling. Specifically, we sorted out and carefully calibrated twelve years (2008-2019) of data from 67 Chinese observatories. We estimated tippers at these observatories in a period range between 5 minutes and 3 hours; notably, tippers appeared to be extremely large at four stations in southwest China. We also present the first results of inverting tippers in terms of 3-D conductivity distribution in the crust and part of the upper mantle beneath China. Inversion is performed using a novel, accurate, and computationally efficient 3-D forward and inverse solver, GEMMIE, based on the integral equation approach. This work is considered as the first step toward joint inversion of tippers and longer period G2L TFs to obtain a 3-D conductivity model beneath China down to the lower mantle.

Keywords: Geomagnetic induction; Time-series analysis; Tippers; Three-dimensional conductivity structure.
