

Three-dimensional conductivity structure of the Australian Victorian lithosphere

Jingming Duan, Karol Czarnota, Tristan Kemp, and Richard Chopping
Geoscience Australia

SUMMARY

The Australian Lithospheric Architecture Magnetotelluric Program (AusLAMP) is a multi-year collaboration between Geoscience Australia, State/Territory geological surveys, and universities to acquire long-period magnetotelluric data at half degree grid spacing. The results of the first state-wide AusLAMP data over Victoria present in here.

The data were inverted using ModEM code running on a supercomputer at the National Computational Infrastructure facility. A number of inversion approaches and different parameters were tested. The topography, bathymetry and static shift were taken into account during the inversion. The inversion results were examined and a best model was selected based on a range of testing and known information.

The three-dimensional electrical conductivity model of Victoria provides interesting results with evident correlations with the mapped geology, seismic tomography and other available datasets. In the crust, the models delineate the boundary between a more resistive Delamerian Orogen to the west and the more conductive Lachlan Orogen to the east. Within the Lachlan Orogen there is a series of northeast trending conductive anomalies within the mid to lower crust. These conductive anomalies correspond with the surficial distribution of Devonian granite intrusions suggesting they may represent fossil metasomatised ascent pathways of the granitic melts. In the mantle, major contrasts of resistivity in the central and eastern part of the Victoria show good agreement with the lithosphere-asthenosphere boundary defined on the basis of seismic tomography. The combination of the conductivity models, seismic velocity models and rock samples indicate the conductive lithospheric mantle of central Victoria maybe attribute to metasomatised during Palaeozoic accretion of oceanic terranes.

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