DEPTH TO CRUSTAL MAGNETIC BOTTOM – EXAMPLES USING AEROMAGNETIC DATA ACROSS NORTH QUEENSLAND, AUSTRALIA

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A detailed study to estimate magnetic bottom depths under north Queensland has been made using the continent-wide high-resolution airborne total magnetic intensity (TMI) data of Australia (a source dataset for the World Digital Magnetic Anomaly Map, WDMAM). Magnetisation of the lithosphere is generally assumed not significant below the Moho crust/mantle boundary due to compositional changes. However, in regions of high temperatures in the lower crust, this bottom-depth of magnetisation may be significantly above the Moho depths due to temperatures in excess of the Curie-point isotherm of the dominant magnetic mineralogy. This study uses modelling of the azimuthally averaged log of the power spectrum of TMI data to determine bottom depths. Two methods are considered and compared: slope-fitting and automated fitting of full spectral data. Several issues in successfully using these methods have been addressed, such as magnetisation type, size of data window, location of spectral peak, sensitivities of the spectral parameters and the choice of optimisation algorithm. The TMI data have an initial grid resolution of 80 m, with an appropriate IGRF removed. These data are reduced to the pole, upward continued 1 km, sub-sampled to a 1 km grid spacing and a first order polynominal trend removed prior to the spectral analysis. Calculated magnetic bottom depths are compared both with published data on the depth to Moho and with other model interpretations of the area including heat flow modelling.

Curie depth, magnetic-bottom, aeromagnetic data

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