A new automated method to determine depth to magnetic basement – the Gawler Craton depth to basement map.

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A new method has been developed to determine the depth to magnetic basement. This method uses an efficient automated approach that produces depth estimates via inverse modelling the azimuthally averaged log of the power spectra of gridded airborne magnetic data. The model consists of a horizontal slab possessing band limited fractal magnetisation. The sensitivity and uncertainty of the depth estimates were analysed based on the magnetic slab's fractal property using Bayesian analysis via Markov chain Monte Carlo and Jeffery's prior. A sliding window technique with an appropriate amount of overlap to the adjacent data window has been applied to a magnetic grid of the Gawler Craton region. The window size selected was optimised to produce depth estimates for relatively shallow magnetic sources due to the relatively thin cover material in the region The resulting depth estimates were combined with drill-hole data and seismic data and then gridded using the minimum curvature technique to produce a depth to basement map of the region. The new automated depth method was developed within Geoscience Australia's Geodynamic Framework Project, part of the Onshore Energy Security Program.