

Magnetic spectral analysis over the Atlantic Ocean off Portugal

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Magnetic spectral analysis, which has often been applied to estimate Curie point depths, was used to delineate thermal and crustal structure of the Atlantic Ocean off Portugal. The Atlantic oceanic plate covers the study area deepening eastward and volcanic islands rise in the eastern margin. We used EMAG2, the resolution and the altitude of which are 2 arc minute and 4 km above geoid, respectively. Linear magnetic anomalies are dominant over the study area. They are attributed to the seafloor spreading of the oceanic plate. The magnetic lineation forms a strong directional feature not only in the space domain but also in the spectral domain. Taking the directional feature, we developed a pseudo-one dimensional spectral analysis using two dimensional data sets. The gradient of the power spectrum across the lineation depends on the centroid depth of magnetic layer. The bottom depth is easily calculated by the centroid and the seafloor depth, assuming that the top of magnetic layer corresponds to the seafloor. The bottom of magnetic layer over young oceanic plate deepens with time, because the Curie point depth deepens with time. Taking the relationship, we assume that the bottom of magnetic layer over the Atlantic oceanic plate corresponds to the Curie point depth and delineates a thermal structure. The results of spectral analysis show that the bottom depths over the oceanic plate are deepening gradually from the ridge to Europe. The results correlate well with magnetic isochrons and thermal history of the oceanic plate. The bottom depths over the volcanic islands are anomalously shallow indicating a rise of high thermal structure.

Keywords: Magnetic data, spectral analysis, Curie point