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Lithospheric structure of the Indian subcontinent revealed by CHAMP data – implications for geological studies

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Increasingly accurate and reliable lithospheric field models derived using CHAMP satellite magnetometer data show prominent tectonic and geological structures of the Earths crust. The intermediate to short wavelength anomaly features seen in these global magnetic anomaly maps can now be used to study the composition of the lower crust in particular. Utilising geologic and tectonic maps of the world and laboratory susceptibility values, Hemant and Maus (JGR, 110, B12103, 2005) have derived a vertically integrated susceptibility (VIS) grid of the world and the vertical component of the magnetic field is predicted at satellite altitude of 400 km and compared with the corresponding observed magnetic anomaly map. On comparison over India, preliminary results show a marginal to moderate agreement in anomaly shapes in the northern region of the subcontinent, while a poor correlation is obtained in the south. To improve on this, the crustal magnetisation model of the Indian subcontinent is derived based on the available geological and tectonic information of the region, exposed rock types in these regions and the available volume susceptibility values. Average susceptibility values are computed for each geological region and multiplied with Curie isotherm derived from the aeromagnetic data or the seismic crustal structure of the Indian lithosphere. More accurate crustal structure obtained in recent years using seismic tomography and receiver function analysis is used here. The discrepancy between the prediction and observations is utilised to investigate and modify existing geological boundaries of the Indian region. It is expected that new geological information of the Indian crust can thus be obtained.