IMAGING EARTH'S CRUSTAL MAGNETIC FIELD WITH SATELLITE DATA: A REGULARISED SPHERICAL TRIANGLE TESSELLATION APPROACH

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We will present a method for imaging the global crustal magnetic field at Earth's surface using a local basis representation and a minimum norm approach. The local basis consists of a spherical triangle tessellation (STT) parameterisation of the vertical component of the crustal field at Earth's surface. The Green's function for Laplace's equation in spherical geometry with Neumann boundary conditions provides the necessary forward modelling scheme. We solve the inverse problem of estimating the crustal field from magnetic observations by minimising an objective function consisting of a mean absolute deviation (L1 -norm) measure of misfit plus a norm measuring model complexity. Both quadratic and entropy measures of field complexity are investigated. Applying our technique to real observations collected by the CHAMP, Ørsted and SAC-C satellites, we obtain stable images of the crustal magnetic field at Earth's surface that include sharp features with high amplitude. These images provide a perspective on the crustal magnetic field complementary to that given by conventional spherical harmonic models.

Crustal Magnetic Field, Inverse Theory, Spherical Triangle Tesellation, Maximum Entropy Method

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