Geophysical Research Abstracts
Vol. 15, EGU2013-1301, 2013
EGU General Assembly 2013

A Multiscale Power Spectrum for Geomagnetic Modeling

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Degree Variances are a frequently used tool to analyze the internal geomagnetic field. They describe the contribution of a spherical harmonic degree n to the mean square value of the magnetic field b. In this talk we want to introduce multiscale variances that can be interpreted as the influence of a scale-dependent region on the mean square value of b. The foundation for their definition is an expansion of the magnetic field in terms of spatially localizing wavelets. In this sense the multiscale variances form a spatially-oriented counterpart to the frequency-oriented degree variances.

We investigate the corresponding multiscale power spectrum for the MF7 model and the CHAOS-4 model as well as for different continental and oceanic regions. The multiscale variances reflect the expected weaker power of the crustal field over oceanic regions and show differences between the MF7 model and the CHAOS-4 model at higher scales.