CHAMP data, noise & lithospheric magnetic field

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We derived a model for the noise appearing in lithospheric magnetic field models obtained from satellite data. The noise model is developed specifically for the case where only the radial component of vector magnetic data, acquired from a nearly polar orbiting satellite, are used. This case is relevant for e.g CHAMP satellite data. We show first that the noise from internal or external origin cannot be distinguished, second that the lithospheric field model is contaminated at all wavelengths and finally that the noise amplitude depends of the ratio of the data noise level over the number of orbits. Even if the noise model is non-linear, it requires only few parameters to describe the noise at relatively high spherical harmonic degrees. We used this noise model in a post-processing step to improve a lithospheric field model derived from four years of CHAMP data. The approach stands as an alternative to the well known "along track filtering" technique. It can be easily extended to models derived from the three components of magnetic data or from data acquired on other terrestrial planets.