Towards an improved determination of Earth’s lithospheric field from satellite observations

Perhaps one of the biggest difficulties in modelling the Earth’s lithospheric magnetic field is the separation of contributions from sources of internal and external origin. In particular, the determination of smaller-scale lithospheric magnetic field features is problematic because the lithospheric signal is contaminated by much larger and highly time-dependent contributions from sources in the ionosphere and magnetosphere. Simultaneous, high-quality measurements from different locations as well as gradient estimates provided by the three Swarm satellites open new possibilities in lithospheric field modeling. Field gradients can be approximated by employing along-track and across-track field differences which act as high-pass filters of the data and data kernel. We present improvements of conventional lithospheric field modeling approaches to better determine the small-scale lithospheric field by incorporating gradient information.

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