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Sequential modelling of the Earth magnetic field

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Geomagnetic field models derived from satellite data cover now more than twenty years and are obtained through the processing and analyses of a massive amount of vector magnetic data. As our understanding of the geomagnetic field progresses, these models have to describe contributions of more and more sources with rather complex mathematical representation. In order to handle this increasing complexity and amount of available data, we use a sequential modelling approach (a Kalman filter), combined with a correlation based modelling step (Holschneider et al; 2016). In order to reach high temporal resolution for the core field, a sequence of snapshot models, 3-months apart, has been built. The main characteristics of the derived series of Gauss coefficients are the same as those of recently released field models based on classic modelling techniques. The results we obtained show the importance of a careful calibration of the Kalman prediction steps as well as applying Kalman smoother at the end of the modelling. We identify also the induced fields as the main limitation for an increase resolution of the core field. We will present how these induced fields have been handle in a recent version of the model and future steps to progress further in the representation of the different sources of the geomagnetic field.

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