Geophysical Research Abstracts
Vol. 13, EGU2011-6363, 2011
EGU General Assembly 2011

On the rapid core field evolution. Case study: The European network of geomagnetic observatories

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We discuss, on data from the European network of geomagnetic observatories, a few issues regarding the secular variation (SV) and secular acceleration (SA), from the perspective of existing long time series of observatory data and of the existence of high-frequency ingredients in the temporal change of the main field. The importance of eliminating, from observatory and main field model data, prior to any discussion on SV and/or SA, the signal related to external variations is demonstrated and its consequences for SV and SA analysis and/or mapping, including the jerk concept, are shown. Also, the importance of the geographical scale at which the SV is represented is discussed, based on IGRF and CM4 models for the main field from which the residual external signature is eliminated. The results of the paper set additional observational constraints to the main field and geodynamo modeling.