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Comparative views of geomagnetic jerks

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New geomagnetic field models (Wardinski and Lesur, GFZ Potsdam, 2009) covering the years 1957–2006 - here the model C^3FM2 - enable new comparative secular variation investigations. Combined with the method of non-harmonic downward continuation and e.g. assuming a low, radially dependent mantle conductivity with a conductance of about 10^7 S, we can determine the three secular variation components also for the core-mantle boundary.

For this time span, the jerks (which are sudden trend changes in the geomagnetic secular variation, e.g. around the years 1969, 1978, 1991) have been studied at the earth surface mainly by observatory data. We extend this to a common and uniform view of the jerks, both for the earth surface and the core-mantle boundary finding their different global topologies and their temporal characteristics. The jerk detection of a single secular variation component is done by a simple straight-line approximation algorithm applied to each (ϑ, φ) position of a global 1° by 1° grid. For the individual jerks, we show comparatively the time structure, i.e. the global/regional distribution of the jerk occurrence times in dependency of the time. It is clearly specific for each single component and each jerk and reveals also partly significant spectral differences between radial and tangential components.