

GEOMAGNETIC JERKS AND RAPID CORE FIELD VARIATIONS

RICHARD HOLME

Department of Earth and Ocean Sciences, University of Liverpool, UK

E-mail holme@liv.ac.uk

Geomagnetic jerks are defined as sharp changes in the geomagnetic secular variation – specifically discontinuities in the second time derivative of the geomagnetic field, the secular acceleration. These features were first identified 30 years ago, and have been the subject of considerable interest since then. Jerks have been identified all through the 20th and into the 21st centuries, and have been correlated with a number of other physical observables, particularly relating to Earth rotation. Identification of what is really a jerk is unclear; while some events (particularly the 1969/1971 event) are universally accepted, others are less clear. In the last decade, a number of events have been identified, with ever increasing frequency but decreasing magnitude. Are these true jerks, or other, perhaps related features in the secular variation? Furthermore, the detailed models derived from satellite data available from 1999 from the Ørsted and CHAMP satellites have suggested other, rapid variations in the observed field, many of which have been suggested to be of core origin. Are these related to jerks, or are they separate phenomena? Are there smaller jerk like features which would suggest a continuum in behaviour of rapid variations? To what extent can torsional oscillations or related phenomena explain these rapid secular variation changes? I will review the current evidence and understanding of jerks and rapid secular variation, and suggest areas in which further work is needed.

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Richard Holme, Department of Earth and Ocean Sciences, University of Liverpool, 4 Brownlow St., Liverpool L69 3GP, UK. +44 151 794 5254, e-mail: holme@liv.ac.uk