Geophysical Research Abstracts,
Vol. 10, EGU2008-A-03868, 2008
SRef-ID: 1607-7962/gra/EGU2008-A-03868
EGU General Assembly 2008

Case studies for the 1991 3D-secular variation impulse at the CMB

L. Ballani (1), D. Stromeyer (1), H. Greiner-Mai (1), J. Hagedoorn (1)

GeoForschungsZentrum Potsdam, Telegrafenberg, D-14473 Potsdam, Germany, contact: bal@gfz-potsdam.de

Geomagnetic impulses ('jerks') were discovered at first in one field quantity: the dY/dt secular variation component. Because of the integral 3-D character of the field, every episodic process affects two or three of the field components synchronous, however often in a different way. Thus, for a comprehensive description of such processes, generated by the outer core fluid flow and influenced by the electrical mantle conductivity, all field components should be collectively studied.

Here, we focus only on the influence of the mantle conductivity model. Choosing three conductivity models we try to track and to analyse the 1991 3D impulse at the core-mantle boundary (CMB). The needed secular variation components at the CMB are calculated by the non-harmonic downward continuation method.

For our investigations we use two global geomagnetic model data sets containing the time span 1980-2000 : CM4 (Sabaka et al, 2004) and C^3FM (Wardinski and Holme, 2006).

Among the results the differently defined phase shifts are important: between CMB and earth surface, at the CMB between radial and tangential components and due to the different conductivity models. These results are supported by some simulations, e.g. selecting sinusoidally oscillating fields.

However, considering the effect of a conducting mantle marks only an intermediate step. To understand in more detail the physical mechanism behind and to separate the influences, the 3D investigations have to be extended to longer time intervals.