Local Time Effects in Satellite Induction Studies

N. Richmond (1) S. Constable (1), C. Constable (1)

(1) IGPP, Scripps Institution of Oceanography, University of California at San Diego

nic@ucsd.edu

Vector Orsted data from November 2000 to December 2005 have been used to isolate the fields associated with time-varying magnetospheric currents. The resulting internal and external coefficients have been used to study the effects of local time on (1) satellite estimates of ring current activity, (2) electromagnetic response functions and (3) mantle electrical conductivity estimates. We present response functions for the full range of local time, in 4-hour bins. We find that response function estimates from all nightside data are very similar and use a long timeseries from 2001-2003 with local times ranging from 8pm to 8am to produce an electrical conductivity profile.

Lateral heterogeneities of mantle electrical conductivity and geomagnetic jerks

J. Velimsky (1,2) Z. Martinec (1,3)

(1) Department of Geophysics, Faculty of Mathematics and Physics, Charles University in Prague (2) Center of Earthś Dynamics Research, Research Institute of Geodesy, Topography and Cartography, Zdiby (3) Section 1.3, GeoForschungsZentrum Potsdam

jakub.velimsky@mff.cuni.cz

We study the effect of three-dimensional distribution of electrical conductivity in the Earthś mantle on the upward continuation of geomagnetic field from the core-mantle boundary (CMB) to the Earthś surface. The time-domain, spherical-harmonic finite-element method originally designed to solve the problem of electromagnetic induction driven by external sources has been recently modified to simulate the response of radially and laterally heterogeneous mantle to the boundary conditions imposed on the CMB. We concentrate in particular on modelling mantle response to selected geomagnetic jerks. Increased dB/dt during these events energizes the generation of eddy currents in the mantle. Since the actual lateral conductivity variations in the mantle are poorly known, we employ synthetic 3-D conductivity models based on rescaling of seismic-tomography images.

A global model of mantle conductivity derived from 5 years of CHAMP, ØRSTED, and SAC-C magnetic data

A. Kuvshinov (1,2) N. Olsen (1)

(1) Danish National Space Center, Juliane Maries Vej 30, DK-2100 Copenhagen, Denmark, (2) Institute of Terrestrial Magnetism, Ionosphere and Radiowave Propagation, Russian Academy of Sciences, 142190, Troitsk, Moscow region, Russia

alexei@spacecenter.dk

We present a global 1-D conductivity model which is obtained by analysis of five years (2001-2005) of simultaneous magnetic data from the three satellites Ørsted, CHAMP and SAC-C. After removal of core and crustal fields as predicted by a recent field model we used non-polar scalar and vector observations from the night-side sector, and interpret the field residuals in terms of a large-scale contribution from the magnetospheric ring current and its induced counterpart. We then derive transfer functions between internal (induced) and external expansion coefficients of the magnetic potential and provide globally-averaged C-responses in the period range between 14 hours and 4 months. Since the satellite responses are most probably influenced by induction in the oceans for periods shorter than a few days, we correct the data for this effect. Interpreting the corrected responses yields a 1-D conductivity model which is rather similar to those derived from ground-based data. However, in spite of its proximity, our 1-D model appears to be slightly (but systematically) more conducting at depths greater than 400 km.

Anomalous behavior of horizontal magnetic transfer functions in the Northeastern Asia

Nikolay A. Palshin (1,2) Hisashi Utada (1)

(1)Ocean Hemisphere Research Centre, Earthquake Research Institute, University of Tokyo, Japan (2) Shirshov Institute of Oceanology, Moscow, Russia

palshin@oceam.ru

Lateral inhomogeneities of the upper mantle conductivity associated with active plate boundaries are expected in the Northeastern Asia. Magnetic transfer functions (MTF) are considered to be an efficient tool for studying regional conductivity anomalies. Therefore, vertical and horizontal MTFs for magnetic observatories located at the eastern margin of Asia and in Japan were calculated and analyzed. Both vertical and especially horizontal MTFs are characterized by anomalous behavior caused partly by a 3D coast effect and partly by possible upper mantle conductor associated with the subduction zone. Reliability of the interpretation is being discussed as well.