28*th* IUGG Conference on Mathematical Geophysics, June 7-11, 2010, Pisa, Italy
Session 7: Quantifying the uncertainty in Earth systems

Evaluation the uncertainty of the Earth's magnetospheric magnetic field models

Marta Tyasto[1], Olga Danilova[1], **Natalia Ptitsyna**[1], Valery Sdobnov[2], Giorgio Villoresi[3]

[1] *St. Petersburg Filial of the Institute of Terrestrial Magnetism, Ionosphere, and Radiowave Propagation, Russian Academy of Science, (SPbFIZMIRAN), St. Petersburg, Russia*
[2] *Institute of Solar-Terrestrial Physics Irkutsk, Irkutsk, Russia*
[3] *University "Roma Tre", Rome, Italy*

Keywords: *modelling; magnetospheric dynamics; geomagnetic cutoff rigidity*

As the magnetospheric dynamics depends on both the solar wind conditions and the previous history of the magnetosphere, and the currently available models use only the present values as input, they are not very reliable in predicting the magnetospheric state. Moreover, the magnetic field (MF) at any point of near-Earth space is the sum of fields from various current sources as currents of internal sources, on the magnetospheric boundary, ring currents, currents in high-latitude region and in the magnetospheric tail. However, the contribution of each component cannot be accurately estimated, because this task requires solving an inverse problem, which has multiple solutions. Therefore, all models describing magnetospheric MF by means of these current systems are approximate models. Even the level of the uncertainties cannot be correctly defined, since the real contribution from any of the above sources is not known. We proposed a method for validating magnetospheric MF models by means of cosmic ray data. Cosmic ray intensity distribution on the Earth surface contains information on the space distribution of MF encountered in the magnetosphere through which charged particles propagate. We have analyzed feasibility and limitations of cosmic ray data to be a tool for estimation of magnetospheric MF models. Our approach is based on the fact, that variations of cosmic rays are related to changes in geomagnetic cutoff rigidities. We have compared the cutoff rigidity changes obtained by the trajectory tracing method in the model MF with those obtained on the base of experimental cosmic ray data. The obtained results have shown that cosmic ray data can be successfully used for validation of models in presenting the dynamics of magnetospheric MF for mid latitudes.