

Visitor Research Report

Visitor Name: Dr. Elena Belenkaya
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Area of Research: Space Weather, in particular, Geomagnetic Storm Time Phenomena

Period of Visit: May 5, 2008 – June 6, 2008

Goal:

One of the main goals of the visits is to take part in the CPCP (Cross Polar Cap Potential) saturation Meeting which took place in Ann Arbor, Michigan on 22-23 May 2008.

Other goal is an analysis of the UT-MLT maps of the magnetic field disturbances (dependent on the interplanetary magnetic field (IMF)) measured at the low-latitude on-ground observatories after the interplanetary shock encounter.

The third goal is a study of conditions in the solar wind under which a transition current system forms in one or two polar caps. The transition current system may arise after the solar wind dynamic pressure jump simultaneous with the interplanetary magnetic field rotation from the near horizontal to northward orientation.

The forth goal is a discussion of the reconnection features for southward and northward IMF, and of the consequent properties of the magnetospheric field-aligned current systems and convection flows.

Strategy:

To realize these goals the participation of the Moscow State University (MSU) scientists together with the Virginia Tech scientists in the CPCP (Cross Polar Cap Potential) saturation Meeting in Ann Arbor, Michigan on 22-23 May 2008 was planned.

For comparison of the paraboloid model of the magnetospheric magnetic field results with the MHD simulation the test run was planned.

The tutorial presented by E.S. Belenkaya (MSU) for the VTU team summarized the MSU approach to the reconnection problem for northward IMF was planned.

Accomplishments:

The report by R. Clauer, I.I. Alexeev and E.S. Belenkaya “Nonlinear polar cap potential drop dependence on the solar wind velocity” was presented at the CPCP saturation Meeting in Ann Arbor, Michigan on 22-23 May 2008.

In this report it was mentioned that decrease of the bulk velocity inside the magnetosphere for northward IMF can be a reason for the corresponding decrease of the magnetospheric electric field and potential drop across the polar cap comparable with the case of southward IMF. Moreover, in the dependence of the polar cap potential drop on the electric field in the solar wind, the attention is paid to the solar wind velocity which determines the magnetospheric, and consequently, the polar cap size.

The tutorial report by E.S. Belenkaya “Reconnection of IMF with the magnetospheric magnetic field” was given in NIA on May 30, 2008.

In this report the summary of the MSU team activity on the subject of reconnection for southward and northward IMF was presented. The main attention was paid to the distribution of the NBZ currents for northward IMF, to the mechanism of these currents generation, the cause of the Region I field-aligned current creation and the total current circle in the magnetosphere for northward IMF. The self-consistent convection structure for northward IMF was also presented.

Future Work:

Our future work will be directed to continuation of a work on the papers which are planned to be published after this visit. We plan to develop the observed data for comparison with the model calculation results.

Pending Publications:

1. Contribution of the magnetopause and tail current to the SI after the solar wind pressure jump encounter the magnetosphere
by C.R. Clauer, F. Wilder, I. Alexeev, E. Belenkaya, A. Kozlovsky.
2. Transition current system in one or two polar caps
by E.S. Belenkaya, C.R. Clauer, I.I. Alexeev

Seminar Presented:

Seminar NIA on 04 May 2008 at 11:00 “MHD Simulation and Saturation of the Polar Cap Potential Drop. SSC at low-latitude magnetic observatories,” by I. I. Alekseev and E.S. Belenkaya.

