

Proposed research topic: Geomagnetic activity forecasting.

The research project concentrates on space weather. Space weather is a branch of space physics concerned with condition on the Sun and in the solar wind, magnetosphere, ionosphere and thermosphere. Space weather is controlled by activity of the Sun. Extreme space weather could cause geomagnetic storms in the Earth' environment. **The main task of this study is to predict occurrence and intensity of geomagnetic storms.**

Geomagnetic storms are caused by disturbances in the interplanetary (IP) medium generated by activity of the Sun. The geomagnetic storms are defined by change of the horizontal component of the Earth's magnetic field at the magnetic equator. The severest magnetic storms are caused by coronal mass ejections from the Sun (CME). During the geomagnetic storm, in IP and in the terrestrial environment, severe phenomena such as the acceleration of charged particles, the enhancement of electric currents, auroras, and magnetic field variations on the Earth are recorded. These disturbances can damage satellites and endanger human life or health. Therefore, the forecast of the geomagnetic disturbances is one of the most important subject in solar-terrestrial physics and it needs immediate concern.

Since few decades space weather has been intensively studied using space instruments. However, there are of course some issues that still need to be addressed. In the proposed research project we would like to study some key aspects of solar-terrestrial physics such as the arrival time of CMEs (the occurrence of storms), strength of geomagnetic disturbances (magnitude of geomagnetic storms), impact of interplanetary plasma on properties of CMEs, change of geoeffectiveness of CMEs in different cycles of solar activity (23 and 24 cycles), and influence of solar activity on propagation and generation of low frequency (ULF and ELF) waves in the Earth-ionosphere waveguide.

All problems included in the proposed research are crucial from the point of view of the development of civilization on the Earth. We live in the world of advanced technology that is highly vulnerable to the effects of the Sun. Currently, active phenomena from the Sun may significantly disrupt our life on the Earth. Predicting occurrence and strength of geomagnetic disturbances is very important and regularly recurring issue raised before modern geophysics science. Results of the study will have significant impact on the development of solar-terrestrial physics.