Influence of the Foreshock Region on the Propagation of Interplanetary Shocks

L. Prech (1), K. Andreeova (1), J. Safrankova (1), Z. Nemecek (1), J.C. Kasper (2)

(1) Charles University Prague, V Holesovickach 2, CZ-18000 Prague 8, Czech Republic, (2) MIT Kavli Institute for Astrophysics and Space Research, 77 Massachusetts Avenue, Cambridge, MA 02139, USA (email: lubomir.prech@mff.cuni.cz)

Interplanetary shocks are large solar wind structures reported quite often from solar wind monitoring spacecraft. The strongest shocks are usually a part of greater solar wind structures like coronal mass ejections or corotating interaction regions although weaker shocks and discontinuities are not necessarily companions of such global solar wind phenomena. As large pressure changes are maintained across the interplanetary shocks, they are highly geoeffective when they encounter the Earth's magnetosphere and thus they have become a subject of intensive research recently. Observations from multiple spacecraft between L1 and the Earth's magnetosphere allow us to study gradual evolution of the shocks. While many interplanetary shocks retain most of their signatures along their path toward the Earth, recently we have reported particular observations that suggest some shock discontinuities can substantially disperse their fronts locally. These cases were located inside the Earth's foreshock, which is known as a complex region upstream of the Earth's bow shock where the solar wind plasma becomes affected by the presence of the Earth's magnetosphere. Beside a direct interaction between the interplanetary and bow shocks a question arises about the significance of foreshock itself and its influence on the interplanetary shock propagation. In our contribution, we aim to describe conditions that lead to the strongest foreshock alterations and substantial modifications of the interplanetary shock, based on the available spacecraft data and models.