EPSC Abstracts,
Vol. 2, EPSC2007-A-00344, 2007
European Planetary Science Congress 2007

MHD simulation of the CME propagation in the stellar winds of active stars

M. Panchenko (1), M. L. Khodachenko (1), N. Terada (2), H. Lammer (1), Yu. Kulikov (3), P. Odert (4), M. Leitzinger (4), H. O. Rucker (1)

(1) Space Research Institute, Austrian Academy of Sciences, Graz, Austria, (2) National Institute of Information and Communications Technology, Tokyo, Japan, (3) Polar Geophysical Institute, Russian Academy of Sciences, Murmansk, Russia, (4) Institute of Physics, Karl-Franzens-University Graz, Austria (Mykhaylo.Panchenko@oeaw.ac.at / Fax: +43 316 4120 690 / Phone: +43 316 4120 622)

We present the results of MHD simulations of propagation of the coronal mass ejections (CME) in the winds of M-stars. The interval of orbital distances under consideration is between 0.1 - 1 AU. The outcome of this study is used for super-computer simulations of the planetary atmospheric erosion, which are important for investigation of the evolution of atmospheres of exoplanets and their potential habitability. The first step of the MHD simulation is to define the ambient state of the stellar wind plasma in a 3D computation domain with the frozen spiral interplanetary magnetic field (Parker's corotating magnetic field model). For that, several typical theoretical values of the M-star stellar wind parameters such as velocity, density, temperature and intermedium magnetic field are used. The second step concerns with MHD simulation of the CMEs propagation. By this, CMEs are modelled as hot and dense plasma clouds into the ambient stellar wind. The initial parameters of the CME are chosen with taking account of the typical relations between densities, velocities and temperatures of the ambient solar wind and solar CME events. Variation of the main CME parameters on the distances from a star has been obtained for different stellar wind conditions.