Statistic Study of Coupling Processes between Different Large-Scale Structures of Solar Wind and Magnetic

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Different large-scale solar wind structures (ICME, Sheath, CIR and others) play important role in solar and heliospheric physics and space weather. A comparison of specific interplanetary conditions for 798 magnetic storms with Dst < -50 nT for the period 1976-2000 was made on the basis of the OMNI archive data. We categorized various large-scale types of solar wind as interplanetary drivers of storms: corotating interaction region (CIR), Sheath, interplanetary CME (ICME) including magnetic cloud (MC) and Ejecta, separately MC and Ejecta, and "Indeterminate" type [1]. On one hand, geomagnetic storms are generated by disturbed SW types: CIR, Sheath, Ejecta and MC and we estimate geoeffectiveness (probability to induce magnetic storm) of these SW types. Geoeffectiveness of MC with Sheath is the largest (61 %), geoeffectivenesses for CIR and Ejecta with Sheath are medium (20-21 %) and types of Sheath and Ejecta without Sheath have the lowest geoeffectiveness (15 and 8 %, respectively) [2]. On another hand, to estimate efficiency (comparison output/input of physical process) of these SW types to induce storms, we compare dynamics of interplanetary parameters in different SW types with magnetospheric Dst, Kp and AE indexes using simple and double superposed epoch analysis methods. Obtained results demonstrate high importance of Sheath in generation of magnetic storms as well as a significant differences in properties of MC and Ejecta and in their geoeffectiveness. For all interplanetary drivers the magnetic storms have a "prehistory memory". Paper is supported in part by Physical Department of Russian Academy of Sciences, Program N 16, Presidium of Russian Academy of Sciences, Program N 16, and by RFBR, grant 07-02-00042.

References

[1] Yu. Yermolaev et al., Cosmic Research, **47**, 81 (2009).
[2] Yu. Yermolaev et al., Cosmic Research, **48**, 1 (2010).