Recurrent High Speed Streams in the Solar Wind during Solar Cycle 23 and their Geomagnetic Imprints

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The High Speed Streams in the solar wind, by their content of energetic solar particles, provide an enhanced energy transfer from the solar wind/heliospheric magnetic field system into the Earth magnetosphere and initiate geomagnetic disturbances. Connecting solar coronal dynamics with planetary magnetospheres dynamics, these streams are one of the main drivers of the Space Weather in the heliosphere during the entire 11-year solar cycles.

This paper analyses the specific features of the recurrent high speed streams in the solar wind during solar cycle no. 23 (1996-2008). We used the catalogue of the high speed streams for solar cycle 23 that gives the fast stream parameters as well as the main polarities of the interplanetary magnetic field and Bz component, during the streams. This catalogue for the 23rd solar cycle was set up by the authors as a Romanian contribution in the frame of the IHY CIP #69. The statistics of the recurrent fast streams (by duration, maximum velocity and maximum gradient of the plasma velocity) are presented here. The dynamics of the parameters given in the catalogue and the intensity of the streams are discussed in comparison with the "standard" cycle of the sunspot relative numbers (Wolf numbers) and with the coronal hole dynamics during solar cycle 23. An analysis of the recurrent streams during the ascendant and descendant phases of the cycle is also performed. The increased activity of the recurrent fast streams on the descendant phase is remarked: it overtopped the corresponding ones during the previous three solar cycles.

The paper also analyses the geomagnetic variability during the 23rd solar cycle using the indices Ap, IHV, IDV, Dst in comparison with the stream parameters.