



Dynamics of the High Speed Streams in the Solar Wind during Solar Cycle 23

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The High Speed Streams (HSSs) 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. A series of catalogues (Lindblad and Lundstedt 1981, 1983, 1989; and Mavromichalaki et al. 1988, 1998), covering three solar cycles (solar cycles 20 - 22), list the basic parameters of such streams (duration, maximum speed, speed gradient). This paper sets a catalogue of HSSs in the solar wind for the 23rd solar cycle, namely during the 1996 - 2007 interval, assuring the coverage of four last solar cycles with HSS data. We have used the same identification and calculation criteria of the streams as the authors of the similar catalogues for solar cycles 20 - 21 (Lindblad and Lundstedt: 1981, 1983, 1989). The data source consists of OMNI Data - an hourly resolution multi-source data set - and SOHO data. Our catalogue lists the basic parameters of the rapid streams: the time of start (calendar date by year, month, and day as well as the corresponding day of Bartels Rotation), the initial and maximum speeds (in km/sec), the maximum gradient of the bulk speed, the duration (in days) and, the solar source (coronal holes or solar eruptive phenomena). The main interplanetary magnetic field polarity during the stream is also mentioned. The statistics of the high speed streams (by duration, by maximum velocity and, by maximum gradient of the plasma velocity) are presented. The dynamics of the HSSs in the solar wind during the 23rd solar cycle is investigated, separately on the two types of the streams according to their solar origin: the streams produced by coronal holes (co-rotating streams) and the streams produced by solar eruptive phenomena (such as solar flares, coronal mass ejections). The analysis

is based on the cyclic variation of the stream parameters given in catalogue and, on the HSS importance in comparison with the standard cycle of the sunspot relative numbers (Wolf numbers). The increased activity of the high speed streams on the descendant phase of the 23rd solar cycle is remarked regardless their solar sources. The results are discussed in comparison with the specific features of the 23rd solar cycle. This paper presents the first results obtained in the frame of the IHY Coordinated Investigation Program 69.