THE SOLAR WIND ENERGY INPUT RATE AND RECOVERY OF THE MAGNETOSPHERIC RING CURRENT DURING THE TWO LAST SOLAR CYCLES
IN COMPARIZON WITH THE 20 AND 21 SOLAR CYCLES

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Simulation of Dst index on the basis of the solar wind energy input to the ring current and the adjustment for the solar wind dynamic pressure with the exponential decay rate of the ring current has more than thirty year-old history. This study presents the recent results of our calculations of the solar wind energy input rate to the magnetospheric ring current in the main phase of magnetic storms used for simulation of Dst index on the basis of the solar wind data. For this purpose we continued studying the solar wind parameters during the two last solar cycles. We looked for the acceptable geomagnetic storms and intervals in the 22 and 23 solar cycles for calculation of the solar wind energy input rate function to the ring current. Intense solar and geomagnetic activity that had occurred in October - November 2003 and in July and November 2004 allowed us to find the acceptable intervals for the wide range of the solar wind electric field more than 30 mV/m. It should be noted that previous calculations of the solar wind energy input rate to the magnetospheric ring current were carried out from 0.2 mV/m to 16 mV/m of the solar wind electric field values. Furthermore, there were a lot of small and moderate geomagnetic storms during the 22 and 23 solar cycles to correct the injection functions for the geomagnetic ring current. These calculations show us that the relationship between rate change of the ring current and Ey-component of the solar wind remains linearly proportional to great Ey values as in the case of small and medium storms. We present the simplest algorithm for calculation the Dst-variations in order to facilitate the quick estimation of Dst-index from the solar wind data directly. The algorithm arises from the fact that energy input to the ring-current is proportional to the Y-component of the solar wind electric field and from the regularities for the ring current decay. The results have been compared with the previous model parameters calculated in the 20 and 21 solar cycles.

Dst index, simulation, solar cycles

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