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Geomagnetic storms and PC index

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Relationships between the geoeffective interplanetary electric field Em, the polar cap magnetic activity index PC, and the magnetic storm index Dst have been studied for the time intervals (N=54) with the electric field Em > 2 mV/m lasting over 12 hours. It has been found for 1998-2004 that all intervals with Em > 2mV/m (and, correspondingly, with PC > 2 mV/m) are characterized by magnetic storms with magnitude in the range from -30 to -370 nT, dependent on level of Em. It is shown that the storm magnitude (minimal value of Dst index) is linearly connected with the Em and PC quantities, averaged for the time interval from the storm beginning to the storm maximum, The moment of the firm descent of the Em and PC quantities below the threshold level $\sim$ 2 mV/m is consistent with time of transition from the storm main phase to the recovery phase. At the same time, the storm dynamics correlate better with value and changes of the PC index than with those of Em field. The similar peculiarity has been revealed for substorms [Troshichev and Janzhura, 2009]: behavior of AL index is better controlled by the PC changes than by Em variations. Based on these results, the conclusion is made that the PC index is a reliable proxy, characterizing the solar wind energy input in the magnetosphere. In this quality the PC index can be used to monitor the magnetospheric ring current dynamics.