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Special features of procedure for PC index derivation in near-real time

A. Janzhura and O. Troshichev
Arctic and Antarctic Research, Dept. of Geophysics, St. Petersburg, Russian Federation (olegtro@aari.nw.ru, 7-812-3373241)

To monitor the geoeffective solar wind impact on the magnetosphere a technique for on-line calculation of PC index has been elaborated in the Arctic and Antarctic Research Institute .(AARI, St.Petersburg). The procedure includes automatic determination of the daily quiet curve (QDC) as a level of reference and automatic estimation of δF value in reference to QDC. A new method of running QDC calculation consists in the automatic distinction of the quietest periods using the geomagnetic variations parameterization, calculation of the proper quiet daily variation for certain days, reconstruction of QDC for each day of the elapsed period, and extrapolation of QDC for the subsequent period. The procedure of QDC derivation includes identification of the interplanetary magnetic field (IMF) sector structure (SS) effect on geomagnetic field at the polar cap stations. Separation of the SS effect, whose polarity is invariant within an interval from some days to 2 weeks, proceeds in the same time regime as the QDC derivation, i.e. in quasi-real time. Comparisons of the sector structure reconstructed from the ground magnetic data with the actual variations of the GSM IMF BY component measured onboard the ACE spacecraft demonstrate their good agreement with coefficient of correlation R=0.95-0.97. The proposed simple method makes possible identification of the SS effect in the same near real-time regime as the derivation of the quiet daily curve and as level of reference for the polar cap magnetic disturbances in the calculation of the polar cap magnetic activity PC index.
The method ensures statistically reliable QDCs even for the solar maximum epochs if the time interval used for derivation of QDC is not less than 30 days. The method of the running QDC calculation implies the uninterrupted calculation of the QDC resulting from the continuous 1-day forward shift of the 30-day interval. It is shown that along with the seasonal (from month to month) and the solar cycle (from year to year) changes, the QDC amplitude is modified on a time scale less then a month following solar activity flashes.