

Low-latitude Pc 5 Index and its database for space weather study

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Space Environment Research Center (SERC) is developing a new low-latitude Pc 5 index for the space weather study. At low-latitude we can monitor the Pc 5 pulsation activity during 24 hours. The Pc 5 pulsation activity relates to solar wind parameters and the increase of the relativistic electron flux in the radiation belt.

Low-latitude Pc 5 activity is denoted by a hourly mean amplitude of bandpass-filtered magnetic H-component data. The Pc 5 Index is classified as 28 steps like the Kp index (0, 0+, 1-, 1, ..., 9-, 9). Occurrence ratio of every index of the Pc 5 Index is adjusted to equal that of the Kp index. By using twelve years magnetic data observed at Moshiri (MSR, Geomagnetic Latitude = 37.3), Japan, the amplitude range of each index was determined.

Low-latitude Pc 5 activity shows the local time and seasonal dependence. Therefore Pc 5 Index also includes these effects. To minimize these effects, the local time and seasonal dependence of Pc 5 amplitude were statistically analyzed by using twelve years magnetic data at MSR. The correction coefficients for local time and seasons were obtained. By applying these coefficients to observed Pc 5 amplitude, the local time and seasonal dependence of Pc 5 Index was successfully decreased.

We also investigated the relation between the Pc 5 Index and the solar wind velocity observed by the ACE satellite. These data were well correlated from low to middle activity of Pc 5 index (from 0 to 5+ in Pc 5 index). On the other hand, the correlation decreased in the active Pc 5 condition (from 6- to 9 in Pc 5 index). From the statistical analysis, it is found that Pc 5 index from 0 to 5+ corresponds to the solar wind velocity from 360 km/s to 580 km/s. By using this relation, the solar wind velocity can be estimated from the ground Pc 5 observation.

Real time low-latitude Pc 5 index is shown on the web page at the following address.

<http://www.serc.kyushu-u.ac.jp/pc5/>

Recent 24 hours and the past 10 days Pc 5 index and the estimated solar wind velocity are shown in figures. By using the dependence on the 27 days solar rotation, the prediction of Pc 5 activity for oncoming 27 days is also shown.

The database for past Pc 5 Index data was also developed on the same website. Twelve years observation in 1994 to 2005 at MSR and current observation (2005-) at KUJ are archived.