

## Wp index: A new substorm index derived from high-resolution geomagnetic field data at low latitude

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High-resolution geomagnetic field data (typically 1 s) have recently become more commonly acquired by ground stations. The data permit the identification of Pi2 pulsations, having periods of 40-150 seconds and irregular waveforms. Pulsations of this type appear clearly in time series from mid- and low-latitude ground stations on the nightside at substorm onset. Therefore, with data from multiple stations, substorm genesis and evolution can be monitored. Here we propose a new substorm index, the Wp index (Wave and planetary), which measures Pi2 spectral power at low-latitude. This index is derived from geomagnetic field data obtained from stations arranged in longitude around the Earth's circumference. Presently, data from 11 ground stations (Tucson, Honolulu, Canberra, Kakioka, Learmonth, Urumqi, Iznik, Fürstfeldbruck, Ebro, Tristan da Cunha, and San Juan) are used, but future work may include data from other sites as well. We compare substorm occurrence estimated from the Wp index and those from the AE and ASY indices. The Wp index is found to be a good indicator of substorm onset. The Wp index, other substorm indices, and geosynchronous satellite data are plotted in a stack for quick and easy search of substorm onset. The stack plots and digital data of the Wp index are made available from the web site (<http://s-cubed.info>) for public use.

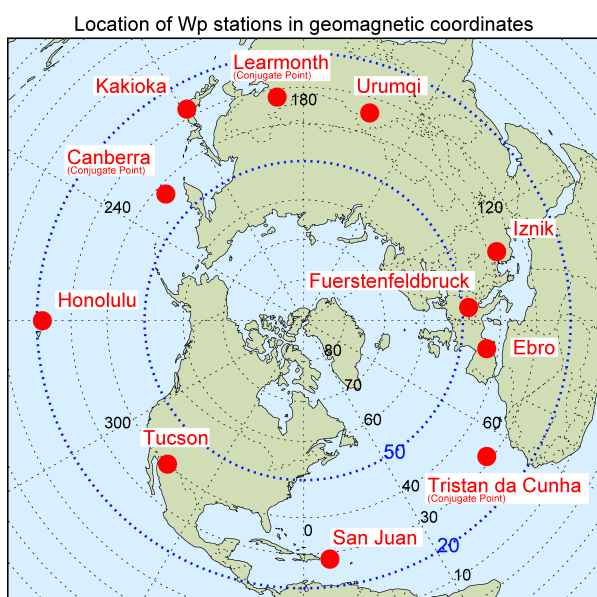


Figure 1: Location of geomagnetic stations in geomagnetic coordinates used to derive the Wp index. Dotted blue circles indicate geomagnetic latitudes of 20° and 50°.

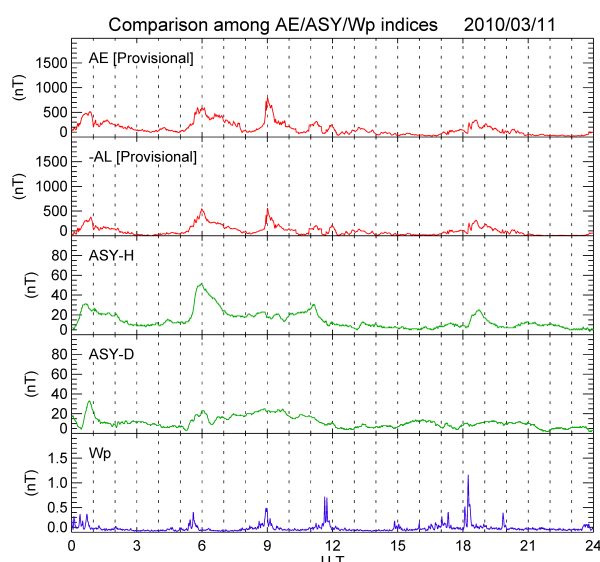


Figure 2: Stack plots of the AE, -AL, ASY-H, ASY-D, and Wp indices for 11 March 2010.