

A new index to monitor temporal and long-term variations of the Equatorial Electrojet by MAGDAS/CPMN real-time data: EE-Index

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The magnetic equatorial region is considered as the terminator of the energy flow on the sun-earth connecting system. It is vital to monitor equatorial geomagnetic phenomena for not only clarifying their fundamental occurrence mechanisms but also for studying the space weather. Aside from MAGDAS/CPMN, there is no monitoring system of the equatorial electrojet (that is, there is no other system that has stations located along the dip equator with sufficient numbers). It is important to construct a real-time monitoring system of temporal and long-term variations of equatorial magnetic disturbances associated with the equatorial electrojet (EEJ) and counter electrojet (CEJ).

A new index; EE-index (EDst, EU, and EL) is proposed to monitor temporal and long-term variations of the EEJ by using the MAGDAS/CPMN real-time data. The mean value of the H component magnetic variations observed at the nighttime (LT = 18-06) MAGDAS/CPMN stations along the magnetic equatorial region is found to show variations similar to those of Dst; we defined this quantity as EDst. The EDst can be used as a proxy of Dst for the real-time and long-term geospace monitoring. By subtracting EDst from the H component data of each equatorial station, it is possible to extract the EEJ and CEJ components, which are defined as EU and EL, respectively.

We investigated the occurrence characteristics of the EEJ (EU) component derived from Davao (DAV) station (GMLAT=-1.37deg, GMLON=196.53deg). We analyzed EU data for the period from July 1, 2005 to March 4, 2006. During the period, several magnetic storm activities occurred and sometime EEJs were strongly disturbed. In those cases, it is not clear to identify the occurrence of EEJ from the raw magnetogram. Nevertheless, EU made possible to identify the disturbed-time EEJ component similar to those of the quiet period. It is found that the amplitude of the extracted component fluctuated with dominant peak periods of 7.5, 14.5 and 35.3 day. The result suggests that the activity of the EEJ correlates with the Rossby wave. This issue should be clarified in the future work.