低緯度―赤道域における磁気急始時の主インパルス振幅の季節変化

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Seasonal variation of the amplitude of the main impulse (MI) of sudden commencements in the low-latitude and equatorial regions

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Seasonal variation of the amplitude of the main impulse (MI) of geomagnetic sudden commencements (SCs) in the equatorial and low-latitude regions (geomagnetic latitude (GMLAT) range: <18 degrees) has been investigated using high time resolution (1-3 sec) geomagnetic field data for the period 1996-2010. These geomagnetic field data are provided by the Circum-Pan-Pacific-Magnetometer-Network (CPMN) [Yumoto and the CPMN Group, 2001] and National Institute of Information and Communications Technology (NICT) Space Weather Monitoring (NSWM) [Kikuchi et al., 2008]. In order to identify SC events from January 1996 to 2010, we used the SYM-H index with 1-minute time resolution archived on the web site of World Data Center for Geomagnetism, Kyoto University. In this study, total 7686 SC events were found as a sudden increase of the SYM-H index by more than 5 nT during this period, corresponding to the solar wind dynamic pressure enhancement. The solar wind data are archived on the CDAWeb site. As a result, the local time distribution of the SC-MI amplitude in the equatorial region (GMLAT range: < 10 degrees) showed that the SC-MI amplitude was enhanced significantly with the maximum around 10-11 h (magnetic local time: MLT). This suggests that a dawn-to-dusk electric field originating from the polar ionosphere enhances an eastward equatorial electrojet (EEJ) during the SC-MI phase. The peak of the SC-MI amplitude around 10-11 h (MLT) showed a little decrease by 3-10 % in the summer (May - July), compared with that in the equinox or winter. A magnitude of the SC-MI amplitude reduction was larger at Muntinlupa and Guam off the dip equator than at Ponpei and Yap around the dip equator. This implies that the intensity of the eastward EEJ becomes slightly weak during the summer due to a decrease of ionospheric conductivity or SC-MI electric field intensity. On the other hand, the diurnal variation of the SC-MI amplitude at Okinawa showed two peaks around the noon and midnight. The first peak value around the noon tended to decrease slightly by 5-7 % in the summer, compared with that in the winter, but the second peak tended to be enhanced in the summer. The summer depression of the low-latitude SC-MI amplitude can be thought as a weakness of the SC-MI electric field intensity due to the enhancement of ionospheric conductivity.