

R010-19

C会場 : 11/5 AM1 (9:00-10:30)

10:00~10:15

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Eastward Magnetic Variations in the Equatorial Latitude Associated with the IH-FAC Observed on the Ground and LEO

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The Inter-Hemispheric Field Aligned Currents (IHFAC) are considered to be produced by the north/south asymmetry of the potential in the ionosphere. Maeda (1974) and Fukushima (1979, 1991) theoretically predict the existence of the IHFAC, that is, the IHFAC flows from winter hemisphere to summer hemisphere at the noon and evening sectors and summer to winter hemisphere at the morning sector. On the other hand, several ground-based (Yamazaki et al., 2009, Owolabi et al., 2018) and satellite (Yamashita and Iyemori, 2002, and Park et al., 2002, 2020) observations have been demonstrated by many investigators, which revealed the morphology of the FAC.

Recently, Ranasinghe et al. (2021) pointed out that the eastward magnetic variations at DAV station (Geographical latitude 7 deg., Geographical longitude 124.5, Geomagnetic latitude -2.22 deg, Geomagnetic longitude 197.9 deg, Dip latitude -0.24 deg) shows the positive variations (equivalent to the northward current) at the evening sector during the northern summer. Their results suggested that the seasonal and local-time dependence of the direction of IHFAC shows inconsistency with the prediction by Fukushima (1979).

In this study, the data from the Vector Magnetic Field (VMF) onboard the Swarm satellites were analyzed to compare the magnetic variations associated with the IHFAC with the ground magnetic observations. The magnetic data of the VMF were chosen in the condition that the position of the satellites is within -5 to 5 degrees in latitude and within 115 to 135 degrees in longitude. These criteria are almost equivalent to the location of DAV ground station.

The result indicates that the eastward component of the VMF data shows the clear seasonal and local-time dependences associated with the IHFACs. During the northern summer, the magnetic variations in the eastward variations are strongly negative in the noon sector which indicates the northward current is predominant in the noon. On the other hand, the local time in the range between 12 and 18 LT, the eastward component of the magnetic variations shows obvious seasonal dependence of the IHFAC. The intensification of southward IHFAC appears in the confined local-time around 17 LT in July, then range of LT for southward IHFAC increases with increasing of month, which shows maximum local-time range of 12-17 LT for southward currents in December. These characteristics could not be interpreted by the conventional understanding of IHFAC and suggests that the ionospheric conductivities in the evening terminator might play an important role in the generation of the IHFAC.