Characteristics of the IHFAC derived from the Complementary Geomagnetic Field Observations by the Satellite and Ground Stations

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The IHFAC (Inter-Hemispheric Field Aligned Current) can be considered as consequence of the quasi-static equilibrium in the dayside ionosphere. The divergent components of the dynamo currents in both hemispheres may make an unbalance of the current intensities of FAC flowing into and out to the magnetosphere. This north/south asymmetry should be maintained in the equilibrium state between the IHFAC and potential patterns in both hemispheres. These potential patterns are formed mainly by ionospheric convection due to the drag of tidal motion in the lower neutral atmosphere. In this sense, it is quite important to clarify the relationship between the center of the potential and the actual spatial distribution of the IHFAC. However, in general, these potential patterns are derived as the equivalent current system by the geomagnetic variations, so that it is difficult to precisely determine the actual center of the potential. In order to determine the spatial variations of the IHFAC, we use the magnetic variation data of Magnetic Field (VMF) onboard the Swarm satellites and from the ground stations of MAGDAS organized by Kyushu University.
In this study, 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, where is the just above the DAV station. The seasonal and local time dependence of the eastward variation of magnetic shows quite similar characteristics between the Swarm and DAV. In particular, the polarization of the magnetic variations of Swarm coincides with that at DAV, though those amplitudes are different depending on the conditions of the season and local time. This means that the primary part of the IHFAC may flow in the higher altitude than 450km which is altitude of orbit Swarm. In this paper we will discuss the spatial distribution of IHFAC tomographically determined from the complementary magnetic observation by Swarm and MAGDAS.

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