Observation of the Ionospheric Currents by the CubeSat at the Low and Middle Latitude

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The ionospheric currents flowing in the dayside ionosphere have been considered as a significant subsequence of Mesosphere-Ionosphere-Magnetosphere coupling. These currents were well detected in the Solar quiet conditions and named Sq currents. In particular, it is well known that the flow pattern of Sq currents shows the north-south hemispheric asymmetry due to the different ionospheric conductivities in the winter and summer hemispheres. This indicates that the asymmetry of the potential must be kept by the energy balance between each hemisphere through the field line.
An InterHemispheric Field Aligned Current (IHFAC) was theoretically predicted by Maeda [1974] and Fukushima [1979, 1991] to interpret the north-south asymmetry in the potential pattern. Several ground magnetic observations and satellite observations suggested an existence of the IHFAC in the noon sector and both the morning and evening terminators. However, the detailed morphology of the IHFAC have not been well understood yet, despite that the direct detection of the IHFAC at Low Earth Orbit (LEO) was reported in the observation by several satellites.
In order to investigate the Sq current system including the IHFAC, the in-situ observation by a CubeSat (2U size satellite emitted from ISS) is proposed in collaboration with 10 national colleges which belong to National Institute of Technology (KOSEN). The fluxgate magnetometer is onboard the CubeSat to observe small perturbations of the magnetic field. After the ejection from the ISS, the CubeSat will gradually glide down to the upper atmosphere due to the strong atmospheric drag and finally burn up in it. The duration of possible observation is estimated for more than 50 days.
The CubeSat can be characterized by the short duration of development (less than 3 years) and low cost (less than 100,000USD). We are considering an actual utilization of this extremely low-cost CubeSat to more realistic science mission. This concept enables us to conduct the multi-satellite in-situ observation in fairly low budget compared to conventional satellite missions.

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