

Feasibility of Geomagnetic Observation by 2U-size CubeSat

Kentarou Kitamura[1]; Kazumasa Imai[2]; Taku Takada[3]; Manabu Shinohara[4]; Makoto Wakabayashi[5]; Masahiro Tokumitsu[6]; Kazumasa Imai KOSEN Space Renkei[7]
[1] NIT, Tokuyama College; [2] NIT, Kochi; [3] Kochi-CT; [4] Kagoshima National College of Technology; [5] Electrical Engineering, Niihama N.C.T.; [6] NIT, Yonago College; [7] -

Geomagnetic observation by the satellite has been conducted by many institutes to understand the global structures of the ionospheric currents. Recently, nano-satellite named CubeSat whose dimension is less than 10*20*30 (cm) are developed in many universities. The features of CubeSat can be characterized as a short duration of development and in the extreme low-cost.

We started a development of CubeSat under collaboration with 10 colleges to observe the small perturbation of the geomagnetic field at the LEO. Focus of the observation is to understand the global distribution of the Sq (Solar quiet) currents flowing in the dayside ionosphere, and to try an in-situ observation of the InterHemispheric Field Aligned Current (IHFAC). In particular, the IHFAC was theoretically predicted by Maeda [1974] and Fukushima [1979, 1991] to interpret the north-south asymmetry in the potential pattern. However, the fine structures and natures of IHFAC have not been well understood, although there are several observations of IHFAC from the ground magnetic observation and satellite observations (e.g. Yamashita and Iyemori, 2002, and Park et al., 2002).

In this study, we propose the 2U-size CubeSat in which the fluxgate magnetometer is installed to observe the 3D fine structures of Sq current system. The fundamental feasibility studies depending on the electric power budget, orbital life time, the communication capacity, and specification of the magnetometer show that the observation of the Sq current by CubeSat is well feasible with a short duration of the development and quite low-cost.