

Atmospheric origin of small-scale magnetic fluctuations as observed by CHAMP above the ionosphere

AOYAMA, Tadashi^{1*} ; IYEMORI, Toshihiko² ; NAKANISHI, Kunihito¹

¹Graduate School of Science, Kyoto University, ²Graduate School of Science, Kyoto University

We analyzed magnetic field data obtained by a LEO(Low Earth Orbit) satellite, CHAMP(altitude 300~450 km), and found out the global distribution of the short-period(10~40 s) and small-amplitude(0.1~5 nT) magnetic fluctuations in middle and low latitudes. We have reported that these fluctuations are small-scale structure(~100 km) of the field-aligned currents generated by dynamo action in the ionospheric E-layer and the dynamos are caused by the atmospheric gravity waves (horizontal scale is ~100 km) because of the characteristics of geographical and seasonal dependence of their amplitude.

In this paper, we focus on the mesoscale meteorological events to clarify the atmospheric origin such as typhoon which is possible to generate atmospheric gravity waves, and compare with magnetic fluctuations as observed by the CHAMP satellite above the ionosphere. We trace from the location of CHAMP to each footpoint in the E-layer along geomagnetic field line, and then compared with meteorological phenomena beneath the footpoint.

As a result, we detected large amplitudes of geomagnetic fluctuation above typhoons.

Keywords: field-aligned current, ionospheric dynamo, atmospheric gravity wave, acoustic resonance, CHAMP satellite, typhoon