Mapping of the small scale magnetic fluctuations observed by LEO satellites to the equatorial plane of magnetosphere

*Yoshihiro Yokoyama[1], Toshihiko Iyemori[2], Kunihito Nakanishi[1], Tadashi Aoyama[1]

1.Department of Earth and Planetary Sciences, Graduate School of Science, Kyoto University, 2.Data Analysis Center for Geomagnetism and Space Magnetism, Graduate School of Science, Kyoto University

In regions of high-beta (i.e., the plasma sheet and the boundary layer) in the magnetosphere,it can be expected that the plasma behaves as turbulence due to the effects of various plasma instabilities, non-linear development of Alfven waves and so on. Satellites in plasmasheet also have observed the fluctuations in velocity and magnetic field that have the characteristics of fluid turbulence. If the plasma always behaves as turbulence, the distribution and the spectrum become important for understanding phenomena in the magnetosphere. However, it is almost impossible to have sufficient simultaneous satellite observations that could physically cover the huge magnetospheric domain. On the other hand, we confirmed that the magnetic fluctuations over the high-latitude ionosphere observed by low-altitude satellites almost can be regarded as the manifestation of the spatial structure of field aligned currents by using the magnetic data obtained by SWARM satellites during December,2013 when the SWARM satellites flew on nearly the same orbits with slight time separations. In addition, the low-altitude satellites scan wide range on the equatorial plane of the magnetosphere in short time.therefore, by projecting these fluctuations into the equatorial plane of the magnetosphere,i.e., the source regions of Field aligned currents, we try to estimate the distribution and the characteristics of plasma there.
We made statical maps of the amplitude of magnetic fluctuations having period shorter than 8s for both quiet(AE<50nT) and disturbed(AE>50nT)condition. We found that the large amplitude regions exist to the same extent in both conditions. This result suggest that the plasma might behave as turbulence even in quiet condition. In order to examine in more detail, we also calculated the spectral index of these fluctuations.

Keywords: field aligned currents, low altitude satellites, small scale magnetic fluctuations

