The spatial structure of magnetospheric plasma disturbance estimated by using magnetic data obtained by LEO satellites.

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Field-aligned currents with various spatial scales flow into and out from high-latitude ionosphere. The magnetic fluctuations observed by LEO satellites along their orbits having period longer than a few seconds can be regarded as the manifestations of spatial structure of field aligned currents.This has been confirmed by using the initial orbital characteristics of 3 SWARM-satellites.
From spectral analysis, we evaluated the spectral indices of these magnetic fluctuations and investigated their dependence on regions, such as magnetic latitude and MLT and so on. We found that the spectral indices take quite different values between the regions lower than the equatorward boundary of the auroral oval (around 63 degrees' in magnetic latitude) and the regions higher than that.
By the way, the FACs are believed to be generated in the magnetiospheric plasma sheet and boundary layer, and they flow along the field lines conserving their currents. Inaddition, the theory of FAC generation [e.g., Hasegawa and Sato ,1978] indicates that the FACs are strongly connected with magnetospheric plasma disturbances.
The spectral indices above are these of spatial structures of the FACs over the ionosphere, by using the theoretical equation of FAC generation, we can evaluate the spectral indices of magnetospheric plasma disturbance in FAC' s generation regions.
Furthermore, by projecting the area of fluctuations on the equatorial plane of magnetosphere (i.e. plasma sheet), we can estimate the spatial structure of magnetospheric plasma disturbance.
In this presentation, we will focus especially on magnetic flucutations of region1-FACs and show thire dependences on thire surrounding condition, such as the AE index and solar wind's parameters. We also discuss how to estimate the spectral indices of magnetospheric plasma.

Keywords: Field-aligned current, Magnetosphere-ionosphere coupling, Swarm satellite

