Dynamic pressure and Dst dependence of magnetic field variations at geosynchronous orbit

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Magnetic field variations at geosynchronous orbit can give us information of magnetospheric current systems. The characteristic of the orbit suggests distinguishing each element of magnetospheric current systems from magnetic field variations. We statistically examined dynamic pressure and Dst^* index dependence of magnetic field variations at geosynchronous orbit. The results of our data analysis suggest that the contribution from tail currents is significant in the midnight sector and the tail current region seems to approach geosynchronous orbit during the large storm while the contribution from ring currents and magnetopause currents are significant in the noon sector.

Magnetic field variations at geosynchronous orbit are caused by magnetospheric current systems including magnetopause currents, ring currents, cross tail currents, and field-aligned currents. This means that magnetic field variations at geosynchronous orbit can give us information of magnetospheric current systems. One of the advantageous point of geosynchronous orbit is that the observational point is fixed geomagnetically although the location in the magnetosphere is changing due to dipole tilt angle and local time. This point suggests the possibility of distinguishing each element of magnetospheric current systems from magnetic field variations. For example, in the case of VDH coordinate system, perturbations magnetic field due to tail and magnetopause currents expect to depend on dipole tilt angle, while that due to ring currents does not. In the case of GSM coordinate system, these dependence expect to be opposite.

For this point of view, we statistically examined dynamic pressure and Dst^* index dependence of magnetic field variations at geosynchronous orbit using 1-hour averaged magnetic field data obtained from GOES-8, 9, and 10. The results of our data analysis suggest that the contribution from tail currents is significant in the midnight sector and the tail current region seems to approach geosynchronous orbit during the large storm while the contribution from ring currents and magnetopause currents are significant in the noon sector. Further, field-aligned currents or dusk to dawn currents seem to depend on dynamic pressure and tilt angle in dawn and dusk sector. The detailed signature of mangnetospheric current system will be presented