Magnetic field disturbances associated with the magnetic dipolarization observed by Arase (ERG) in the inner magnetosphere

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The magneto-hydrodynamic waves propagating in the plasma sheet are recognized to transport substantial energies in the magnetosphere. We investigated magnetic field disturbances of the Alfven waves observed by the Arase spacecraft at about 5 earth-radii distance in the midnight. In the inner plasma sheet Alfven waves were often accompanied by the magnetic dipolarization.
We examined the magnetic disturbances in the plane perpendicular to the ambient magnetic field. In the two events examined in our study, the magnetic field disturbances were linearly polarized and the polarization direction gradually rotated 180 degrees in 200 seconds. It is well interpreted that Arase traversed a magnetic flux tube where torsional Alfven waves propagated. The change of the polarization direction reflected the change of observation location in the flux tube. Torsional-mode is significantly common and natural as the parallel-propagating Alfven wave. It is known that large-scale energy transfer and dissipation of the torsional Alfven waves take place on the solar surface.
Meanwhile, in the boundary plasma sheet adjacent to the lobe, the magnetic field disturbances were linearly polarized again and confined to the dawn-dusk direction. They are interpreted as plane Alfven waves having uniformity in the dawn-dusk direction and propagating obliquely. The kinetic effect of the Alfven waves has been often discussed in previous works in association with the auroral emission at the ionospheric altitude.

Keywords: Arase, magnetic field, dipolarization, Alfven wave

