R006-27
A 会場 ：11/7　 AM1 （9:00-10:30）
10:15〜10:30

ひさき衛星極端紫外線観測データを用いた木星イオプラズマトーラス突発増光時における Dusk 側からの Hot electron 流入

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Localized hot electron inflow on the dusk side during transient brightening in Io plasma torus observed by Hisaki/EXCEED.

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The Hisaki satellite has observed 10% transient increases in the intensity of the Io plasma torus (IPT) emission in the inner magnetosphere (r<8Rj) over a time scale of several to ten hours after a transient brightening of Jupiter's UV auroral emission. Since the plasma convection in the Jovian magnetosphere is dominated by the planetary rotation, it has been considered that the fast transport of energy in the radial direction is not significant. However, this transient phenomenon suggests that the effects of transient energy release in the middle or outer magnetospheres, which cause auroral brightening, extend to the IPT on a time scale of a few tens of hours. Considering that the relaxation time of hot electrons with energy of several hundred eV in the IPT due to Coulomb collisions is comparable to the time scale of the brightening, previous studies interpreted the cause of brightening as the influx of hot electrons into the IPT from outer part of the magnetosphere. In this study, we investigated the start local time (LT) of the IPT brightening from the extreme ultraviolet (EUV) spectra observed by the HISAKI satellite and clarified the inflow position of hot electrons in the IPT.

The field-of-view of the EUV spectrograph onboard the HISAKI satellite is 360 arcsec, which enables to observe the radial spatial structure of the IPT emission in both dawn and dusk sides. We obtained the intensity of sulfur ion emission by integrating the EUV spectrum from 65 to 77 nm in wavelength, and then determined the start LT of the IPT brightening by dividing the spatial distribution of the IPT into 10 parts in each dawn and dusk region (20 regions in total). The integration time was set to 10 minutes. In order to detect the IPT brightening with an amplitude of 10%, the trend of the intrinsic periodic variations in the torus (System III period: 9.93 h, System IV period: 10.14 h, and Io's orbital period: 42.46 h) were fitted by the least-squares method and eliminated from the data.

23 brightening events were identified in 2014-2016. 18 events started in the dusk side, and 13 of them were localized at LT14-16. Assuming that the cause of the brightening is the inflow of hot electrons, this result indicates that inflow of hot electrons in the IPT tend to localize on the dusk side. In the rotation-dominant magnetosphere, the transport of plasma in the radial direction is thought to be caused by interchange instability driven by centrifugal forces. Since the centrifugal force which acts on plasmas is independent of LT, it is expected that inflow of hot electron would occur in all LT region. The result presented here shows different picture of Jovian magnetosphere from that previously thought.