# Spiral structure of hot electron in the inner magnetosphere of Jupiter

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Io plasma torus is dense plasma region distributed around the orbit of the satellite Io and consists of sulfur and oxygen ions supplied from the satellite Io. The plasma torus persistently emits intense radiation in visible and ultraviolet wavelength ranges through electron impact ionization. This means that there exists persistent electron heating process that balances the intense radiative cooling in the plasma torus. However, the origin of the electron heating is still not resolved and has been one of outstanding problems of the Jovian magnetosphere. Here, we examined you 2-dimensional distributions of thermal electron temperature in the plasma torus based on the HISAKI satellite observation to visualize location of hot electrons injected in the torus and their subsequent transport. In this study, we used continuous data set of the plasma torus observed from Dec. 2014 to May 2015. In Jan. to Mar. 2015, a major volcanic event occurred at Io and input significant amount of mass to the plasma torus. To drive the electron temperature, we used a sulfur line ratio, SIV 65.7nm/SII 76.5nm. This is a useful proxy of not only ion density ratio, $S3^+/S^+$, but thermal electron temperature since the hotter electron temperature causes to increase charge state of ion. The radial distribution of the line ratio was obtained every $0.5R_J$ step from 5.0 $R_J$ to 9.0 $R_J$ from Jupiter. The azimuthal distribution was derived from rotational modulation of the line ration at each radial distance. Combining the radial and azimuthal dimensions, we obtained two-dimensional distribution of the electron temperature in the equatorial plane. Before the peak of the volcanic event (Feb. 2015), we found that high electron temperature region showed a left-handed spiral structure in the equatorial plane. This is explained by electron heating in a limited longitude range in the plasma torus and subsequent transport effect of both slow outward transport and the lagged azimuthal flow. This is consistent with a model proposed by Copper et al. (2016). On the other hand, spiral structure showed right-hand sense after the peak of the volcanic event. Further investigation is required for resolve origin of the opposite spiral.