

Local electron heating around Io observed by the HISAKI satellite

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Io-correlated brightness change in Io plasma torus (IPT) has been discovered by the Voyager spacecraft and show an evidence of local electron heating around Io. However, the observation data is still limited to investigate its detail properties and cause of the electron heating around Io is still open issue. EUV spectrograph onboard the HISAKI satellite carried out continuous observation of IPT and Jovian aurora for 2.5 months since the end of Dec. 2013. It covers wavelength range from 55 to 145 nm, a wide slit which had a field of view of 400 x 140 arc-second was chosen to measure radial distribution and time variation of IPT. Observation of IPT with HISAKI found clear periodic variation in the IPT brightness associated with Io's orbital period. The Io phase dependence shows that bright region is located just downstream of Io. The amplitude was larger in the short wavelength than in long wavelength. These are evidence of local electron heating around/downstream of Io and consistent with the Voyager result. In addition, it is found that the brightness also depends on the system-III longitude of Jupiter and has local maximum around 120 and 300 degrees. Based on an empirical model of IPT, electron density at Io also shows maxima around the same longitudes. This suggests that the electron heating process is related with IPT density at Io. Total radiated power from IPT on Jan. 2014 was 1.1 TW, which was about a half of the power measured by the Cassini UVIS instrument on Oct. 2000. Io-correlated component has about 10 % of the total radiated power, showing that about 100 GW of power was converted to heat thermal electron in IPT immediately after the generation of source energy around Io.

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