Io Plasma Torus Observed by EXCEED/Hisaki - Comparison with the Observations by Cassini

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We analyzed the EUV image data of Jovian magnetosphere taken by EXCEED/Hisaki, which was launched in 2013 and is around Earth up to the present, comparing it with that by Cassini, which made a flyby to Jupiter from October, 2000 to March, 2001. The main subjects of the imaging were Io Plasma Torus (IPT) that mainly consists of sulfur and oxygen that was forced to be around the Io orbit by strong Jovian magnetic field and Jovian aurora. Hisaki in Earth orbit was affected by the geocorona like hydrogen, helium, and oxygen, while Cassini took images from $137R_J$ distance from Jupiter in the closest time and not influenced by it. Hisaki used the dammbell-like shaped slit in order to image IPT and aurora effectively, and we used the data gained by it. The points that compare Hisaki and Cassini were the radial brightness profile, the change in the power of the spectrum, and the brightness dependence on SystemⅢ longitude.

Firstly, from the previous research using Cassini's data, the radial brightness profile of the SⅢ680Å spectrum have dawn-dusk asymmetry because the dusk side of the torus is brighter than the dawn side and the slope inside $5.5R_J$ of the dusk side is steeper than that of the dawn side(Steffl, 2003). As for Hisaki, the asymmetry could be seen. The points that were different from Cassini were that the dusk peak($6.4R_J$) was outer than Cassini($5.8R_J$) and that the dawn peak was higher than Cassini. The reason why the brightness near Jupiter drastically fell was supposed to be the dumbbell-like shape slit. The profile outside the peak is almost the same.

Secondly, concerning the change in the energy of the spectrum, in the previous research using Cassini's data, the power of SIV748Å reverses that of SⅡ765Å and the power of SⅢ680Å gradually diminishes at the same time(Steffl, 2003). That is because the big explosion of Io's volcano is said to have occurred(Steffl, 2003); however, as for Hisaki the total counts/sec of SⅢ680Å did not change drastically like the Cassini's observation. This could mean that there was no big explosion of Io's volcano.

Finally, concerning the brightness dependence on SystemⅢ longitude, during Cassini's observation the brightness peak is near λ_{III}=110°, but the physical significance of the variation is uncertain because the scatter is larger than the variation(Steffl, 2003). As with Cassini, we could not clarify the physical significance of the variation because the scatter is large. Using more data was to be required.

In conclusion, in order to compare Hisaki with Cassini more deeply, it was necessary to use the longer term data and improve the accuracy.