Light Curve of Jupiter's UV Aurora and Io Plasma Torus after 2016 Obtained from Hisaki EXCEED

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Hisaki is an Earth-orbiting satellite launched in 2013. The purpose of this mission is to observe UV emission from planetary atmospheres and magnetospheres by the spectrometer EXCEED (Extreme Ultraviolet Spectroscope for Exospheric Dynamics). Hisaki EXCEED began its monitoring of the Jovian system in December 2013 with a 140 arcsec −20 arcsec dumbbell slit which is designed to observe the Io plasma torus and Jovian aurora simultaneously. Hisaki EXCEED can continuously observe the Jovian system along the 106 min orbit for several months, which is a feature never available for large facilities such as Hubble Space Telescope.

The guide camera of Hisaki broke down around mid-2016. From 2016 to 2017, we tried to observe the aurora and torus simultaneously without the guide camera. The location of Jupiter was set to in the narrow slit region, however, sometimes aurora moved away from the narrow slit region. Therefore, we use two observing modes, “torus mode” and “aurora mode” since 2017. The Jovian disk is located in the wide-slit region for the aurora mode. Both north and south auroras are observed, and only one side of the torus can be seen. For the torus mode, we set the location of Jupiter to the narrow slit region, and the torus fit within the wide-slit region. We made a light curve of the aurora and torus over 900-1480A and 650-780A, respectively.
Although the light curves obtained after 2016 are missing some parts, we compare the light curves with HST and ground-based observation. A large HST campaign has been made since the arrival of Juno, and aurora brightenings were observed by both Hisaki and HST. The torus light curve shows minor enhancement of volcanic activity around the end of 2017, which is roughly consistent with the sodium observation. Therefore, we successfully corrected Jupiter’s position and the obtained aurora and torus light curve are consistent with other observations.

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