

Long-term monitoring of Jupiter's aurora and Io torus by Hisaki EXCEED

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Hisaki is an Earth-orbiting spacecraft equipped with a UV spectroscopy that primarily observes planetary atmospheres and magnetospheres. The spectrometer EXCEED (Extreme Ultraviolet Spectroscopy for Exospheric Dynamics) has a unique dumbbell-shaped slit for observing 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. Hisaki EXCEED began its monitoring of the Jovian system in December 2013 with the dumbbell slit. Because of the degradation of the Hisaki EXCEED field of view camera, it is more difficult to track the target with the guide camera after mid-2016. 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 have been developing a pipeline to correct the center position of the Jovian disk and derive the time series of the aurora and torus power. Several transient and solar wind induced brightenings were observed after 2016. We also found minor volcanic enhancement around the beginning of 2018 and 2019. The optical observation showed that sulfur ribbon brightness increased in mid-2019 and mid-2020, however, UV torus brightness did not show a notable change. In this study, we will show the time series of the total auroral power over 900-1480 Å as well as the torus emission over 650-780 Å.

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