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Observations of neutral oxygen torus in the inner magnetosphere of Saturn by Hisaki

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Water group neutrals in Saturn's inner magnetosphere play the dominant role in loss of energetic electrons and ions because of abundance of the neutral particles Enceladus [e.g., Paranicas et al., 2007; Sittler et al., 2008]. Understanding of the temporal and spatial distribution of the neutrals is required to understand the plasma-neutral dynamics in the inner magnetosphere of Saturn. Water molecules mainly originating from Enceladus lead to the productions of hydroxyl radicals and oxygen atoms through dissociation reactions. In this study, we focus on oxygen dynamics in the inner magnetosphere of Saturn. The atomic oxygen in the magnetosphere of Saturn was discovered by UVIS/Cassini [Esposito et al., 2005]. Melin et al., [2009] reported the spatial distribution of oxygen and the variation of the total number of oxygen with time scale of several days — several tens of days. In this study, we examine the time and spatial distributions of neutral oxygen in the inner magnetosphere of Saturn observed by Hisaki. The daily variation of oxygen is first detected by the EXCEED onboard Japanese Earth orbiting satellite Hisaki. We also show the daily variation of spatial distribution such as dawn-dusk distribution and Enceladus phase angle observed by Hisaki.

Keywords: Hisaki, Saturn, neutral oxygen, Enceladus neutral torus