ひさきで観測された木星オーロラの内因性準周期変動

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Quasi-Periodic Variation of Jupiter’s Aurora Observed by Hisaki

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Quasi-periodic variation with a few day to several days is seen in energetic plasma and appearance of auroral spots in the Jupiter magnetosphere. Magnetospheric global re-configuration following periodic magnetotail reconnections is proposed for producing these periodicities. A previous work reported gradual increase and decrease of auroral power integrated over the pole region over 5-10 days with the peaks occurred during magnetotail disturbed periods. Hisaki is a space telescope launched by JAXA in 2013 and provides continuous observations of emissions from Jupiter auroral and Io plasma torus. We analyzed Jupiter aurora taken by a spectrometer EXCEED (Extreme Ultraviolet Spectroscope for Exospheric Dynamics) onboard Hisaki to investigate the statistical feature of the auroral periodic variation.

Auroral power revised by the rotational appearance shows periodic variation with gradual increase and decrease. We analyzed data observed over 2014-2016 which includes periods when Io’s volcanic activity was quiet (in 2014-2015) and high (in 2015). The auroral periodicity spreads from 1.3 to 7 days, which is comparable with the periodicity seen in other observations. The periodicity does not change significantly between the volcanic activity and quiet periods, while the association with the short-burst event increases during the volcanic active time. The periodicity does not show clear correlation with solar wind dynamic pressure, auroral power, central meridional longitude, nor Io phase angle. The periodic variation is continuously seen in the auroral modulation due to solar wind variation. A super-epoch analysis of the spectral information shows the symmetric increase and decrease trends of auroral power and magnetospheric source current, while the color ratio, which is a proxy for auroral electron energies, does not show significant variation associated with this periodic variation. Auroral power also shows asymmetric duration between increase and decrease phases as seen in the ion flux and spectral slope. We will discuss these characteristics and relationships in the presentation.