ひさき衛星を用いた木星紫外オーロラの太陽風応答に関する研究

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Solar wind response of Jovian EUV aurora from HISAKI observations

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In order to reveal solar wind response of Jovian extreme ultraviolet (EUV) auroral activity, we made statistical analysis of Jovian EUV aurora obtained from long term HISAKI observation.

The EUV emission from hydrogen molecule is excited by collision with high energy electron. Main oval is one of the components of Jovian EUV aurora where the auroral particle precipitations are caused by rotationally driven field-aligned current system. It is theoretically expected that angular velocity of magnetospheric plasma increases when the Jovian magnetosphere is compressed by enhanced solar wind pressure, which decreases the field-aligned current. Regarding to this scenario, increase of the solar wind dynamic pressure is expected to be anti-correlated with the intensity of the EUV aurora. Jovian UV aurora has been observed by such as International Ultraviolet Explorer (IUE) or Hubble Space Telescope (HST). They have investigated the time variability of the EUV aurora, while their data still limited in continuity over solar wind variation with good time resolution. On the other hand, HISAKI satellite is an earth-orbiting EUV spectroscope launched in 2013 which has been continuously monitoring Jovian EUV auroral activity. Therefore, the HISAKI data sets are effective for investigating solar wind response of Jovian aurora.

The purpose of this study is to investigate solar wind response of Jovian EUV aurora which is obtained from long term HISAKI observation. The analyzed data was obtained from Dec. 2013 to Feb. 2014 and from Dec. 2014 to Feb. 2015. We compare the EUV emission intensity over 900-1480 A and solar wind dynamic pressure which is extrapolated at Jupiter using a one-dimensional magnetohydrodynamic (MHD) model.

A preliminary analysis showed the correlation between the EUV intensity variation and the solar wind dynamic pressure. This character is also expected from previous UV and IR observation results. These results contradict the theoretical expectation. In addition to that, we also found that the time duration of rarefaction region of the solar wind have correlation with the intensity variation, which had never been reported. We will discuss possible mechanism to explain these characteristics.