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Averaged characteristics of flux distributions and variations in Jovian infrared H3+ aurora: Comparison with UV's

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This study is using imaging data that Satoh et al. observed Jovian infrared H3+ aurora for long term, and it's purpose is to suggest the typical flux distribution,variation and the picture of intensity variation in each auroral region. The aurora emitted UV wavelength ray in Ly-alpha band is observed by Hubble Space Telescope (HST), and it's data is more higher space resolution and more shorter time interval. So, We consulted on analysis approach, which is taken until now, to enable to compare characteristic between IR aurora and UV aurora.

Jovian Auroral flux distribution and the variation is different by mapping magnetospheric region. Auroral high latitude region, mapping open flux, shows variation driven by Solar wind at short times.On the other hand, Main oval, mapping inner magnetospheric region, is considered that more stably exists, because the energy source ,that high Jovian roration ingenetates ,effects brightening.There is a direct temporal-spatial correlation between UV aurora and injected electron,because H and H2 directly emit electric transition emission.

On the other hand, The IR auroral process is that H2 and H2+ ,injected particle produced, collided with each other,and this event producted H3+ and thermal excitation of H3+ emit infrared ray. So, IR aurora reflects thermospheric temperature and may be different from the picture of UV auroral flux distribution and intensity variation.

In Nichols et al.,2009,They first resulted in Jovian UV auroral typical flux distribution ,using data Hubble Space Telescope observed emitted UV wavelength ray for two months. This analysis circularly separated auroral region, and shows the response of solar wind dynamic pressure and correlation between each auroral region.

In this study, we apply UV auroral flux distribution in Nichols et al.,2009 to IR auroral region with the intent to verify difference of the characteristic UV aurora showed.

About analysis data,we use image data observed emitted infrared ray by NSFCAM using 3.4265um narrow bandpass filter attached to NASA/IRTF in 1995-2004, and The typical seeing of this data is 1arcsec(under 0.1 arcsec in HST data).Obsevational days are discrete,however, we can analyze 57days worth of data. Thus far, we compare between dynamic pressure and the intensity variation during dynamic pressure is continually high or low for several days. About the dynamic pressure, we refer to 1DMHD model extrapolates solar wind observed near earth to Jovian orbital.

(A)There is slightly not only the positive correlation between in high latitude region and dynamic pressure,but also it in mainoval region and dynamic pressure(r=0.8).(B) While there is the positive correlation between the variation of intensity in high latitude region and in mainoval region is high similar to UV's, the polar inner region is more brighter than UV's. The latter is seen in Saturn, it is considered that upper high latitude region is more heat reflected the adiabatic compression.

In main oval region, the typical emitted power is 334.1GW , and the range of variation is 180.86GW-613.01GW.

After this,we will progress to analyze data all over.There is potentially four problems, but they are fatally common problems in past Jovian auroral observation.

(1)The spatial resolution is one digit lower than HSTdata,(2)This analysis data isn't simultaneous observation between the IRTF observation and the HST observation,(3)There is the period of low accuracy of solar wind(5days),(4)The number of data isn't enough to bung up compared to response time of Jovian magnetosphere.

In this presentation,based on above-reference,we will report tentative result using all data.