

Reconsideration of the relation between Jupiter's auroral radio activities and Io's volcanic variations

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It has been discussed for a long time how the logenic heavy plasma affects to Jupiter's magnetic activities. Kronberg et al. (JGR, 2007) proposed a conceptual model for periodic magnetospheric variations by assuming that magnetospheric reconfigurations are caused by ion mass loading from the internal plasma sources. This proposal implies that enhancement of logenic plasma enhances internal magnetic variations. On the other hand, Shay and Swisdak (PRL, 2004) indicated that magnetotail reconnection rate is reduced when heavy ions (O⁺) are contained larger. This idea implies the opposite response of Jupiter's magnetosphere to plasma enhancement.

Tohoku University has conducted campaign-base optical observations for logenic gas around the opposition period of Jupiter since 1999. From the observations, significant variations of logenic gas have been identified several times in 1999, 2003, 2007 and 2015 (Nozawa et al., JGR, 2004; Yoneda et al., GRL, 2010; GRL, 2013; Icarus, 2015). These phenomena give good opportunities to examine how magnetospheric activities respond to the logenic plasma enhancement.

We have analyzed Jupiter's auroral radio emission in hectometer to decameter wave ranges by using the WIND/WAVES data to investigate relation between Jupiter's magnetospheric variations and Io's volcanic events. So far, a negative correlation was reported for the event in 2007 (Yoneda et al., GRL, 2013), while we suggested a positive correlation for the recent event in 2015. To clarify more precise characteristic of the mutual relation, we have extended the analysis for the other volcanic events by evaluating variations of the emission power. In the presentation, we will show the results and reconsider causalities for the variability of magnetospheric response to Io's volcanic variations.

Acknowledgements: We would greatly appreciate M. Kaiser, J.-L. Bougeret and the WIND/WAVES team for providing the radio wave data.

Keywords: Jupiter, radio emission, Io volcanic activity