

Correlation between activities of Jupiter's infrared aurora and the solar wind

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It is not yet very clear how Jupiter's aurorae respond to ever-changing solar wind activity. Theoretical models of auroral main oval (Cowley and Bunce, 2001; Hill 2001) predict that the auroral brightness anti-correlates with the solar wind ram pressure. On the contrary, observations rather support *positive* correlation between the auroral emission and the solar wind over a range of wavelengths from UV to radio (Prange et al., 1993; Baron et al., 1996; Gurnet et al., 2002). It should be noted, however, the correlation supported by observations is 'weak' and more data are needed for statistical tests.

We analyze a large data set of Jupiter's infrared aurora (line emissions of ionospheric H_3^+ ion) to study its correlation with the solar wind. NASA's Infrared Telescope Facility archives Jupiter images, to support Galileo mission, including 3.53- μm auroral images. Such a data set has been calibrated utilizing 3.42- μm images which were acquired by the author through collaboration with J.E.P.Connerney (NASA/GSFC), enabling the Galileo-support data to be used for a long-term photometric study. The solar wind conditions have been projected to Jupiter's orbit based on MHD tomographic analysis of interplanetary scintillation (IPS) data (Hayashi et al., 2003).

The data set from 1998-2000 observations are used because of a large overlap between the auroral and the IPS observations: the opposition of Jupiter in 1998-2000 was in the fall and the IPS observations are carried out from April to December every year. Through the comparison of these data, we have found the followings:

1. Jupiter's aurora tends to appear brighter when the IMF polarity is northward.
2. It seems that Jupiter's aurora more often show *positive* response to the solar-wind changes when the IMF is northward.
3. The auroral brightness show little changes when the IMF is southward.
4. A few data sets indicate *negative* correlation between the auroral brightness and the solar wind.

We will discuss in detail the comparison as well as the physical interpretation of the phenomena.