Temporal variability of the Io-induced aurorae on Jupiter: a proxy for plasma variations in the magnetosphere

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The orbital motion of the three innermost galilean moons - Io, Europa and Ganymede - within Jupiter's magnetosphere is known to be associated with auroral signatures, which can be detected in the UV, visible and IR wavelengths near the polar regions of the planet. Indeed, the moons interact with the magnetic field and plasma surrounding Jupiter, setting up a system of currents that ultimately transmit the perturbation to Jupiter's ionosphere. Such currents are carried by Alfven waves, whose direction of propagation and speed are determined by the magnetic field geometry and plasma distribution in the magnetosphere.

The auroral signatures due to the moon-magnetosphere interaction exhibit several features, most notably a very bright main spot - usually referred as *footprint* or *Main Alfven Wing spot* (MAW) - a possible precursor - the *trans-hemispheric electron beam* (TEB) - and a fading tail.

The JIRAM instrument onboard Juno is equipped with an IR imager designed to inspect auroral emission in the 3.2-3.7 micron band with unprecedented spatial resolution, which it has been doing for more than 40 spacecraft orbits up to now. Restricting the present discussion solely to the aurorae due to Io, it was observed by JIRAM that the relative position between the MAW and the TEB varies not only with Io's longitude - as already observed by HST - but also with time. Indeed, images taken by JIRAM during perijove 11 and 32 when Io was at the same longitude (within 1.5 degrees) showed that the relative distance between the two features was remarkably different. Bearing in mind that the plasma distribution, together with the magnetic field configuration, determines the position of the footprint, it is proposed here that such discrepancy is a reflection of potential variability of the dense plasma environment where Io orbits.