

Ganymede and Europa and their Jovian polar footprints

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Abstract

In the presented work, the interactions between the Galilean moons Europa and Ganymede and the Jovian magnetosphere are studied. The focus lies on the satellites' auroral footprints observable in the polar regions of Jupiter.

The work encompasses case studies of UV observations, obtained by the Hubble Space Telescope (HST), showing auroral features potentially triggered by either Europa or Ganymede. For those situations the footprint lead angles are determined, using different magnetic field models. The data selection aims to compare observations covering a wide range of satellite CML positions in the attempt to estimate the relationship between satellite longitude and lead angle. These studies are in essence similar to the one done by [2] for the Io footprint.

The existence of a lead angle implies a time delay between the local interaction at the satellite and the arrival of the perturbation in the Jovian auroral region. This delay is due to a finite speed of information transfer, which is the Alfvén velocity. The delay implied by the obtained lead angles is compared to the travel time of an Alfvén wave along a magnetic field line from the satellite to the planet.

An added value of such studies is that their results can aid in understanding other related processes. For example, the mentioned case studies may offer some insight into potential interactions triggering the emission of radio waves. The relevance of the subject under study is further emphasized by the fact that the observation of the location and relative distance of the different satellite auroral emission spots is one of the science objectives of the ongoing JUNO mission [1].

References

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