The study of Jovian magnetospheric plasma using the investigation of satellite footprints brightness

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The magnetosphere of Jupiter could be partly controlled by energetic particles originated from volcanic eruption on Io. These energetic particles could affect the variation of plasma sheet's density, and accordingly the azimuthal current inside magnetosphere. The variation of azimuthal current results in the stretching of magnetic field line of Jupiter. Accordingly, the mapping of Jupiter's aurora and satellites footprint would vary as well. The investigation of brightness of satellite footprints will refer to the structure of Jupiter's magnetic field which varies due to the influence of plasma in magnetodisc region. This work presents a study of Io and Ganymede's footprint brightness in Jupiter's ionosphere. Jupiter's aurora images were obtained by Hubble space Telescope (HST) with Advanced Camera for Surveys (ACS) instrument in 2007. The data were studied using Fourier fitted technique. From the region around Io, plasmas diffuse outward and take some time to propagate to Ganymede. Thus, the position of satellites are considered with observed footprint brightness time as well. This work found inverse relation between Io's and Ganymede's footprint brightness. Orbits of satellites are found to be significant factors for the variations of satellites' footprints. For example, Ganymede orbit in middle magnetosphere which is affected by the stretching of magnetic field. Therefore, Ganymede' s magnetic footprint should be more fluctuated than Io's magnetic footprint. The reason is because Io orbits in inner magnetosphere. In addition, the dense plasma torus and the magnetic anomaly of Jupiter could play important roles in shifted locations of Jupiter's main auroral emission and satellites footprints.

Keyword: satellite footprints, Jupiter's magnetosphere, magnetospheric plasma

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