

## Fourier analysis of Io's magnetic footprint brightness variation

The interaction between Jupiter's magnetic field and Io creates the bright spot, which is called "Io's magnetic footprint" (IFP). This footprint is a result of plasmas, which are picked up from Io along the magnetic field line and collide with atmospheric particles in Jupiter's ionosphere. The brightness of Io's magnetic footprint varies according to different positions of the Io in plasma torus. In addition, the brightness of Io's magnetic footprint also varies during the strong volcanic eruption on Io. This research study factors that affect variability of interaction between Jupiter's magnetosphere and Io. The brightness variation of Io's magnetic footprint is indicated by Io's system III longitude. Io's magnetic footprint in this research was observed by Hubble Space Telescope (HST) which conducted with Advanced Camera for Surveys (ACS) instrument. The data of Io's magnetic footprint brightness from observed ultraviolet images in 2007 were analyzed with modeled brightness variation by IDL program (Interactive Data Language). In-depth detail of Io's magnetic footprint was studied by Fourier analysis to find variation between Io's magnetic footprint brightness and location of Io's system III longitudes. The result shows that the variation of brightness could be controlled by several factors. Consequently, the magnetic field in Jupiter's ionosphere and its effect on Io's magnetic footprint brightness should play an important role in footprint brightness variation, which requires more investigation. Moreover, the connection between Io's system III longitude that corresponding to Io's location in plasma torus and magnetic field mapping into Jupiter's ionosphere should be studied further in more detail.

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