

Io Magnetic Footprint Morphology: Brightness in Corresponding to Angular Size

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Satellites in planetary magnetosphere are often affected by the interaction between magnetospheric plasma and satellites' atmospheres. Due to the interaction, picked up currents travel along the magnetic field lines from interaction region toward the planet's ionosphere. These currents clearly connect the vicinity of Io to Jupiter's ionosphere via magnetic field lines. In ionosphere, spot emissions can be detected at the end of magnetic field lines, which is known as "Auroral Magnetic Footprint". Io's magnetic footprint is a prominent auroral feature, which locates few degrees latitude lower from Jupiter's main auroral emission. Corresponding to the interaction region at Io, ~ 1.5 Io radii, the size of Io's magnetic footprint is expected to be approximately ~ 100 km. In this study, the correlation between brightness and sizes of the footprints was analyzed based on FUV imaging by Advanced Camera for Surveys (ACS) instrument on Hubble Space Telescope (HST). The images of Jupiter's auroral region were taken in 2007 during HST's campaigns. For several months of observations, the angular sizes of Io's magnetic footprint varied with general trend, in which several emission peaks were detected. This result suggests some correlation between the footprint brightness and its size. According to in situ observations of plasma environment near Io, temporal and spacial variations of Jupiter magnetospheric plasma could be one of the factors that affect the brightness and angular size of Io's magnetic footprint.