

Angular Extension of Io Magnetic Footprint in Corresponding to Io's Longitudinal Variation

The interaction between Io's extended atmosphere and Jupiter magnetosphere is a strong evidence of electrodynamic interaction between intense plasma source and planetary magnetosphere. The result of this interaction is picked up current, which travels along the magnetic field line, from the vicinity of Io toward Jupiter's magnetosphere. At the end of magnetic flux tube, spot emissions were previously proved to be detectable, which are well known as Io's auroral magnetic footprint emissions. Io's magnetic footprint locates a few lower degree latitude from Jupiter main auroral emission. With the conservation of magnetic flux, the size of interaction region at Io, 1.5 Io radii, should be corresponding to the emission size of ~100 km. In this study FUV images of Jupiter's auroral region, which were taken in 2007 by Advanced Camera for Surveys (ACS) instrument on Hubble Space Telescope (HST), were used to analyze the variation of Io's magnetic footprint emission. Regardless of different observing time in one year, the angular size of Io's magnetic footprint shows strong trend of variability, whose peaks appears to be noticeable when Io was near 80 and 295 degrees longitude. This result shows similar two-peak feature as the footprint brightness with some shift in longitude. Based on direct observation of plasma environment near Io by Cassini spacecraft, the azimuthal variation of plasma in Jupiter magnetosphere could be responsible for this shift between maximum brightness and angular size of Io's magnetic footprint.

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