Aurora on Ganymede

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Abstract

Jupiter's largest satellite Ganymede is unique because it possesses an internal magnetic field strong enough to create a small magnetosphere around the satellite. The interaction between Ganymede's magentosphere and the Jovian magnetic field and magnetospheric plasma generates classic polar auroral emissions from Ganymede which have been captured in a series of stunning ultraviolet images using the Hubble Space Telescope on six different dates from 1998 to 2012. Analysis of these images (McGrath et al. 2013) has provided a nearly global mapping of the location of Ganymede's auroral ovals, which appear to be remarkably stable in the 14 years spanning the observations. The location of the auroral ovals is compared with several model predictions of the boundary between open and closed magnetic field lines (Koop and Ip 2002; Khurana et al. 2007; Jia et al. 2009), a region where strong field aligned potentials are a likely candidate to accelerate electrons that produce the auroral emissions. The location of the auroral emission is also compared with the polar cap boundary on Ganymede, thought to be produced by charged particle bombardment of the polar region, as delineated by color ratio images acquired by the Galileo mission (Khurana et al. 2007).

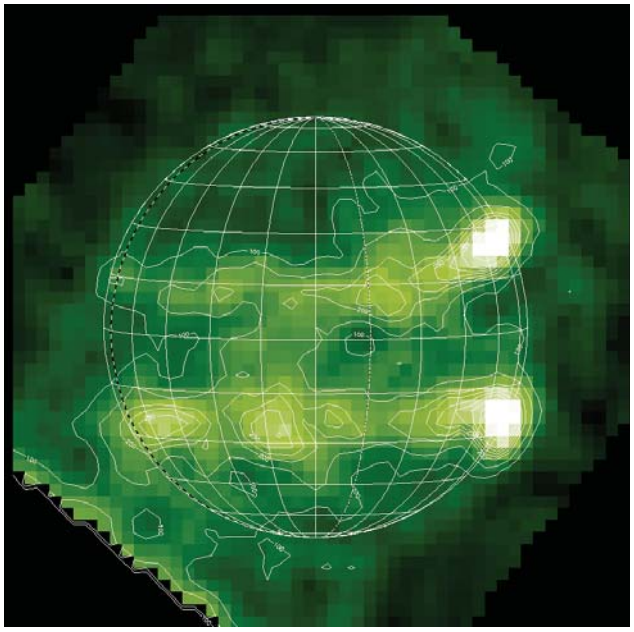

Figure 1: Ganymede's auroral oval emission from the leading hemisphere of the satellite, which is the downstream hemisphere relative to the plasma flow.

References

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