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Variations of the UV emission from the atmosphere of the Jovian moon Io

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We analyze a set of Hubble Space Telescope (HST) observations of the auroral UV emission from Jupiter's satellite Io and find a remarkably stable emission pattern over a period of 5 years.
Io's auroral radiation is generated by collisions of impinging magnetospheric electrons and the atmospheric gas particles. The radiation is often used as a tool to infer properties of both the satellite's plasma environment and the atmosphere. In our study, we investigate 40 images of the spatially resolved OI1356 Å emission on Io's dayside atmosphere taken by the HST Space Telescope Imaging Spectrograph (STIS) between 1997 and 2001. We construct a phenomenological model for the three dimensional distribution of the local UV emission in Io's vicinity, which only depends on the properties of the ambient plasma. Model images generated by integrating the local emission along the respective line-of-sight show very good agreement with the 40 STIS observations for all major auroral features.
We find that the sunlit hemisphere appears to be brighter than the nightside hemisphere. Furthermore, a comparison with a STIS observation taken in eclipse indicates a collapse of the lower atmosphere, when Io moves through Jupiter's shadow. These findings imply a primarily sublimation driven atmosphere.