

Groundbased Infrared Detection of Io's SO₂ Atmosphere

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We report the first ground-based IR observations of Io's atmosphere. We observed 15 lines of the gaseous SO₂ at 18.9 microns at a resolution of 50,000 with the TEXES mid-infrared spectrograph on the IRTF in November 2001. The lines appeared in absorption, probably due to non-LTE effects that produce absorption even for atmospheric kinetic temperatures comparable to surface temperatures. Line strength varied strongly with orbital longitude, being greatest on the anti-Jupiter hemisphere. We also attempted a detection of the SO₂ band at 7.4 microns, seen by Voyager over Loki in 1979. A 15-minute integration showed no absorption at sensitivity levels that should easily have detected the absorption strength seen by Voyager at Loki, indicating that this spectral region also holds promise for ground-based studies.

These high-spectral resolution observations of Io in the 20 micron window show how ground-based observations can complement spacecraft observations and produce unique data for planetary studies.

