

Exploring the atmosphere of Jupiter with ultraviolet spectroscopy

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Abstract

By analysing spectral emission and absorption features over a range of wavelengths emanating from Jupiter's troposphere and stratosphere, we can retrieve the density and temperature of the constituents within it. Here, we present an analysis of Cassini UVIS far-ultraviolet observations of Jupiter, obtained in late 2000. These show the belt and zone structure present in the reflectance spectra long-ward of 160 nm, a region that shows absorption by acetylene and ammonia. We have compiled the relevant cross sections and have integrated these into the NEMESIS radiative transfer and atmospheric retrieval algorithm code. Using this tool, we have performed a search and sensitivity test, identifying the absorption features present in the observed spectrum, retrieving zonally averaged meridional profiles of acetylene and ammonia for comparison with similar results from the Cassini/CIRS investigations (Nixon et al., 2010; Achterberg et al. 2006, Fletcher et al., 2009) at mid-infrared wavelengths. Having developed the tool required to retrieve atmospheric abundances from ultraviolet spectra, we outline its applicability to future ultraviolet observations at Jupiter by ESA JUICE.