

Hydrocarbon Chemistry in Jupiter and Saturn

The attached figure shows the detection of ethylene (C_2H_4) on Jupiter at mid-latitudes using TEXES, a 10 micron spectrometer that achieves a resolving power ($\lambda/\Delta\lambda$) of 100,000. The integration time was about 15 min.). Previously, ethylene had been detected primarily in the auroral regions of Jupiter due to the very weak emission from ethylene.

This detection is important for testing photochemical models of Jupiter as ethylene the third most abundant hydrocarbon produced after C_2H_6 and C_2H_2 . The column density inferred from radiative transfer calculations is about 6×10^{14} molecules/cm². The ripples visible on this spectrum are due to problems in the flat fielding. During this run in December 2000, ethylene was also detected on Saturn (integration time: about 30 min.). The inferred column density is about 3×10^{15} molecules/cm².

The observations were made by Bruno Bezard (Observatory of Paris) and the TEXES team.

Observations of this type complements the observations by spacecraft by providing greater sensitivity for detection of minor atmospheric constituents through high spectral resolution observations.

TEXES is available to the planetary and astrophysical communities and it provides unique observing capabilities not found at any other observatory. In addition, the atmospheric conditions at Mauna Kea (low water vapor and good seeing) allow the exploitation of the 10 and 20 micron atmospheric windows.



