31 - Physical properties and seasonal behavior of H$_2$O, HDO, CO$_2$ and trace gases on Mars: Quantitative mapping from Earth-based observatories

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Since 1997, we have used high-resolution (R > 40000) spectrometers on ground based-telescopes to study molecules that have astrobiological significance in Mars' atmosphere. We have used the NASA-IRTF, Keck II, and VLT telescopes in the 1.0-5.0 micron range. The spectrometer is set at a wavelength to detect specific molecules. Spectral/spatial images are produced. Extracts from these images provide column densities centered at latitude/longitude locations (resolution ~400km at sub-Earth point). We have mapped the O$_2$ singlet-Delta emission (a proxy for ozone), HDO, and H$_2$O for seasonal dates throughout the Martian year. Previously undiscovered isotopic bands of CO$_2$ have been identified along with isotopic forms of CO. We are searching for other molecules that have astrobiological importance and have successfully measured methane in Mars' atmosphere.

We acknowledge support from NSF (AST-0805540) and NASA (Planetary Astronomy (344-32-51-96) and Astrobiology (344-53-51)) and thank the Director and Staff of the telescopes mentioned for observing time.

Tuesday, August 30, 2011 10:50 AM
Chemistry as a Tool for Space Exploration and Discovery at Mars (08:30 AM - 11:50 AM)
Location: Colorado Convention Center
Room: 102