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Water vapor measurements in central México using two remote sensing techniques: FTIR spectroscopy and GPS

Alain Zuber[1], Wolfgang Stremme[1], Michel Grutter[1], David Adams[1], Thomas Blumenstock[2], Frank Hase[2], and Matthias Schneider[2]
[1]UNIVERSIDAD NACIONAL AUTÓNOMA DE MÉXICO, CENTRO DE CIENCIAS DE LA ATMÓSFERA, ESPECTROSCOPIA Y PERCEPCIÓN REMOTA, Mexico (azuber91@gmail.com)
[2]Karlsruhe Institute of Technology, Institute of Meteorology and Climate Research, Karlsruhe, Germany.

Atmospheric water vapor plays a key role in weather and climate. Knowledge about its variability, diurnal and seasonal cycles, as well as its long-term trend is necessary to improve our understanding of the hydrological cycle. H2O total columns are measured by the two remote sensing techniques, ground-based solar absorption FTIR spectroscopy and a GPS (Global Positioning System) receiver, over a site in central Mexico. The Altzomoni Atmospheric Observatory (3989 m a.s.l., 19.32ºN, 98.65ºW) is a high altitude station located within the Izta-Popo national park, 60 km SE from Mexico City. The time series of GPS and FTIR show a high correlation between coincident hourly means. Both techniques are complementary since despite that GPS works throughout day and night and also in cloudy and rainy weather conditions, the FTIR data provides in addition altitude-resolved information about the atmospheric water vapor and permits to distinguish different isotopes.

In this study, we show water vapor columns in the 2013 to 2019 period for this region retrieved from FTIR and GPS measurements and preliminary results about their isotopic composition (H216O, H218O and HD16O). We discuss the opportunity to study the hydrological cycle in central Mexico using the relationship between light and heavy isotopes, a relationship that gives valuable information about the sources and transport pathways.