Water vapor isotopologue variability in an urban environment near Lake Michigan from January to March

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The isotopic composition of water vapor in urban air is highly variable, affected not only by evaporative sources and convective events but by contributions from fossil fuel combustion. Prior work on time-variation in urban water isotopologues has included meteorological contexts dominated by intermittent strong inversions or seasonal monsoons. We describe here high frequency measurements from a ground campaign in a meteorological environment characterized by strong but shortlived variations in temperature, humidity, pollutant level, and degree of lake influence. Air from urban Chicago was sampled near-continuously from January to March 2023 by the Chicago Water Isotope Spectrometer (ChiWIS), an integrated output spectrometer that uses a 2.647um tunable diode laser and has an effective path length of ~7km. ChiWIS was designed for use on airborne platforms in the dry conditions of the upper troposphere/lower stratosphere, but can be used as a ground instrument in conditions up to several thousand parts per million water vapor mixing ratio. We show a preliminary analysis of time-variability in water isotopic composition in the context of temperature, humidity, CO2, wind direction, and precipitation history.