This directory contains datafiles, datasets, and numerical processing scripts associated with the January 2019 Mixed Phase (cloud) Isotopes sampling experiment at Storm Peak Laboratory (SPL) in Steamboat Springs, Colorado. Specifically, the directory contains

- All uncorrected, sample rate data
- Calibration data points
- Models for correcting the data for known biases
- Processing scripts for correcting, selecting, and averaging the data
- Corrected data for the pre-deployment, main experiment, and post-experiment periods
- "Quick look" visualization plots

The information is organized as follows:

Subdirectories
CorrectionModels/
    contains regression models of various orders used to correct the water isotopic and water concentration data for the two isotopic analyzers. These models are called by the R scripts described below.

NewProductionData/
    is a subdirectory into which correction models and corrected data are placed when generated using the R scripts described below. In this manner, any newly produced models or data files do not overwrite the models and data files provided with this directory.

QuickPlots/
    is a subdirectory containing time series and scatter plots of measurements made by the two isotopic analyzers for select periods. This is also the subdirectory into which new plots, generated by the scripts described below, are written. In this manner, existing plots are overwritten.

SPL2019_Isotope_Data/
    contains all of the uncorrected, sample rate measurements from both the Desert Research Institute (DRI) HIDS2034 water vapor isotopic analyzer and the National Center for Atmospheric Research (NCAR) HIDS2346 water vapor analyzer associated with the January 2019 Storm Peak Laboratory (SPL) deployment in mixed-phase clouds.

    Subdirectories within SPL2019_Isotope_Data/ with the suffix "PreDeploy" contain measurements of room air made at the NCAR Research Aviation Facility. Data from this pre-deployment period are used for instrument characterization and comparison purposes only.

Those with the suffix "Field" contain data from the January 14-23 period when both analyzers were taking measurements of water vapor (or ice crystals) at SPL. This is considered the main experiment (or intensive observational) period.

The subdirectory with suffix "Extended" contains water vapor measurements from HIDS2034 for the period late January through March. These measurements were obtained after the main experiment had ended. They provide greater seasonal context for the intensive observational period in January.

The two "SyringePump" subdirectories within SPL2019_Isotope_Data/ contain the calibration data obtained with the Picarro Standards Delivery Module (SDM), which are used to correct the isotopic measurements.

Data Files
MixedPhaseIsotopes2019_PreDeploy_VaporComparison_OneMinAvg.nc
This NetCDF contains corrected water concentration and water isotope ratio time series, from both the DRI and NCAR isotopic analyzers, from the pre-deployment period. Measurements are of room air at the NCAR Research Aviation Facility. Data are arithematically averaged to one minute. The data file also contains the root mean square errors obtained when comparing the two analyzers over this period.

MixedPhaseIsotopes2019_PreDeploy_VaporComparison.nc
This NetCDF contains corrected water concentration and water isotope ratio time series, from both the DRI and NCAR isotopic analyzers, from the pre-deployment period. Measurements are of room air at the NCAR Research Aviation Facility. Data are sample rate.

MixedPhaseIsotopes2019_InField_VaporComparison _OneMinAvg.nc
This NetCDF contains corrected water concentration and water isotope ratio time series, from both the DRI and NCAR isotopic analyzers, from the field deployment period. Measurements are of water vapor from the environment around the Storm Peak Laboratory (SPL). Isotopic one-minute averages are mass-weighted. The data file also contains the root mean square errors obtained when comparing the two analyzers over this period.

MixedPhaseIsotopes2019_InField_VaporComparison.nc
This NetCDF contains corrected water concentration and water isotope ratio time series, from both the DRI and NCAR isotopic analyzers, from the field deployment period. Measurements are of water vapor from the environment around the Storm Peak Laboratory (SPL). Data are sample rate.

MixedPhaseIsotopes2019_InField_CloudSampling _OneMinAvg.nc
This NetCDF contains corrected water concentration and water isotope ratio time series from the DRI and NCAR isotopic analyzers, which were simultaneously measuring water

vapor and ice crystals, respectively, in mixed-phase clouds around Storm Peak Laboratory (SPL). Isotopic one-minute averages are mass-weighted.

MixedPhaseIsotopes2019_InField_CloudSampling.nc
This NetCDF contains corrected water concentration and water isotope ratio time series from the DRI and NCAR isotopic analyzers, which were simultaneously measuring water vapor and ice crystals, respectively, in mixed-phase clouds around Storm Peak Laboratory (SPL). Data are sample rate.

Scripts
compareAnalyzersInField.R
This R script reads the field deployment data, corrects and scales it, and produces new data files (NetCDF) of
- sample rate water vapor concentration and isotopic time series during the period over which both analyzers were sampling water vapor
- one-minute-average water vapor concentration and isotopic time series during the period over which both analyzers were sampling water vapor
- sample rate concentration and isotopic time series of water vapor and ice during the mixed-phase cloud sampling period
- one-minute-average concentration and isotopic time series of water vapor and ice during the mixed-phase cloud sampling period

compareAnalyzersPreDeploy.R
This is the second of two R scripts used to produce the correction models and corrected water and isotopic data found in this directory. This script compares the HIDS2034 and HIDS2346 analyzers over the pre-deployment period in order to peg the HIDS2034 water concentration to HIDS2346 and to peg the HIDS2346 isotope ratios to HIDS2034.

produceCalibrations.R
This is the first of two R scripts used to produce the correction models and corrected water and isotopic data found in this directory. This script uses the Syringe Pump data to estimate concentration bias corrections and scaling corrections for the HIDS2034 isotopic data.

quickLookFieldData.R
This script produces basic visualization plots of the field deployment, for periods when both analyzers were sampling water vapor and for periods when the analyzers were simultaneously sampling water vapor and ice in mixed-phase cloud. New plots are placed in the subdirectory /QuickPlots.

Other
ReadMe
is this document, which describes the contents of the directory.