Aircraft in-situ measurements of water concentration and heavy water isotope ratios D/H and 18O/16O were collected during the NASA ObseRvations of Aerosols above CLouds and their intEractionS (ORACLES) project. Aircraft sampling took place in the southeast Atlantic marine boundary layer and lower troposphere (equator to 22 degrees south) over the months of Sept. 2016, Aug. 2017, and Oct. 2018. Isotope measurements were made using cavity ring-down spectroscopic analyzers integrated into the Water Isotope System for Precipitation and Entrainment Research (WISPER). The WISPER data are processed into mean latitude-altitude curtains and individual vertical profiles for each sampling period.

The WISPER data accompanied a suite of other variables including standard meteorological quantities (wind, temperature, moisture), trace gas and aerosol concentrations, radar, and lidar remote sensing, which can be accessed through the DOIs listed further down. The ORACLES campaigns are described by Redemann et al., (2021). The water isotope measurements are further described in Henze et al., (2021). The absolute error with respect to the SMOW-SLAP scale is explained in detail by Henze et al., (2021).

Total water concentration and isotope ratios were binned and averaged onto latitude-altitude grids using a kernel estimation approach, with weighting designed to estimate the mean during the approximate month-long duration of each sampling period. Standard deviations for each bin are also computed using kernel density estimation.

Time intervals during aircraft vertical profiling are isolated and averaged onto 50-meter vertical levels. The files include water concentration and isotope ratios for both total water and cloud water in addition to temperature, pressure, latitude, and longitude.

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The complete archive of ORACLES data are accessible via the digital object identifiers (DOIs) provided under ORACLES Science Team references as follows:

ORACLES Science Team: Suite of Aerosol, Cloud, and Related Data Acquired Aboard P3 During ORACLES 2018, Version 3, NASA Ames Earth Science Project Office, https://doi.org/10.5067/Suborbital/ORACLES/P3/2018\_V3, 2020a.

ORACLES Science Team: Suite of Aerosol, Cloud, and Related Data Acquired Aboard P3 During ORACLES 2017, Version 3, NASA Ames Earth Science Project Office, https://doi.org/10.5067/Suborbital/ORACLES/P3/2017\_V3, 2020b.

ORACLES Science Team: Suite of Aerosol, Cloud, and Related Data Acquired Aboard P3 During ORACLES 2016, Version 3, NASA Ames Earth Science Project Office, https://doi.org/10.5067/Suborbital/ORACLES/P3/2016\_V3, 2020c.

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