2D wind speed and direction (DP1.00001.001)

Measurement

Two-dimensional wind speed (m/sec) and direction (degree)

Collection methodology

2D wind speed and direction is measured using a solid-state anemometer at the top of the aquatic meteorological station, and on each measurement level of the terrestrial tower, excluding the tower top. Measurement level height is determined on a site-specific basis. Measurements are representative of a spatial point throughout time and are made at 0.1 Hz. Data are published as 2- and 30-minute temporal averages.

For information about disturbances, land management activities, and other incidents that may impact data at NEON sites, see the Site management and event reporting (DP1.10111.001) data product.

Maintenance and calibration

Preventative maintenance includes cleaning and removing debris from the sensor. It is typically performed every two weeks. Sensor validation is performed annually.

Data package contents

2DWSD_30min: 2D wind speed and direction averaged over 30 minutes
2DWSD_2min: 2D wind speed and direction averaged over 2 minutes
variables: Description and units for each column of data in data tables
readme: Data product description, issue log, and other metadata about the data product
sensor_positions: Geospatial locations of individual sensors

Data quality

Each measurement is accompanied by a final quality flag (windSpeedFinalQF and windDirFinalQF). Data with a final quality flag of 1 are potentially inaccurate and should only be used with caution. The final quality flag is based on automated QA/QC tests, including range, step and spike, as well as a manually set science review flag, if applicable. Each measurement is accompanied by an estimate of measurement uncertainty, expressed at the 95% confidence level (windSpeedExpUncert and windDirExpUncert) which comprises known and quantifiable uncertainties.

Please note that quality checks are comprehensive but not exhaustive; therefore, unknown data quality issues may exist. Also note that, conversely, some quality-flagged data are still usable depending on the

scientific use case. Additionally, these Level 1 data are not currently gap-filled or corrected for sensor drift or shifts, such as those introduced by sensor swaps or field calibrations. Users are advised to evaluate quality of the data as relevant to the scientific research question being addressed, perform data review and post-processing prior to analysis, and use the data quality flags, issue logs, and maintenance records included in download packages to aid interpretation. A tutorial with examples of how to do this can be found here.

Standard calculations

For wrapper functions to download data from the API, and functions to merge tabular data files across sites and months, NEON provides the neonUtilities package in R and the neonutilities package in Python. See the Download and Explore NEON Data tutorial for introductory instructions in both programming languages.

Sensor height (zOffset; m) and the latitude, longitude (referenceLatitude, referenceLongitude; °), and elevation (m) of the tower reference corner or aquatic meteorological station base are in the sensor positions file (...sensor_positions...csv). Use the HOR.VER component of the time series file name (horizontalPosition and verticalPosition if stacked using neonUtilities) to link to the corresponding row in the HOR.VER column of the sensor positions file. HOR index 000 corresponds to the tower, and VER indices 010-070 increase with increasing height.

Documentation

NEON Sensor Command, Control and Configuration (C3) Document: 2D Wind
NEON.DOC.000387vD | 299.6 KiB | PDF

NEON Algorithm Theoretical Basis Document (ATBD) – 2D Wind Speed and Direction
NEON.DOC.000780vD | 698.8 KiB | PDF

NEON Algorithm Theoretical Basis Document (ATBD) – Time Series Automatic Despiking for TIS Level 1 Data Products – QA/QC
NEON.DOC.000783vB | 374.8 KiB | PDF

NEON Algorithm Theoretical Basis Document (ATBD) –Quality Flags and Quality Metrics for TIS Data Products
NEON.DOC.001113vC | 1.1 MiB | PDF

NEON Preventive Maintenance Procedure: 2D Sonic Anemometer
NEON.DOC.001458vC | 4.1 MiB | PDF

NEON Algorithm Theoretical Basis Document (ATBD) – QA/QC Plausibility Testing
NEON.DOC.011081vD | 476.8 KiB | PDF

For more information on data product documentation, see:
https://data.neonscience.org/data-products/DP1.00001.001

Citation

To cite data from 2D wind speed and direction (DP1.00001.001), see citation here:
https://data.neonscience.org/data-products/DP1.00001.001
For general guidance in citing NEON data and documentation, see the citation guidelines page:
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NEON welcomes discussion with data users! Reach out with any questions or concerns about NEON data:
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