Soil water content and water salinity (DP1.00094.001)

Measurement

Volumetric water content (cm^3/cm^3) and salinity (unitless index) of the soil

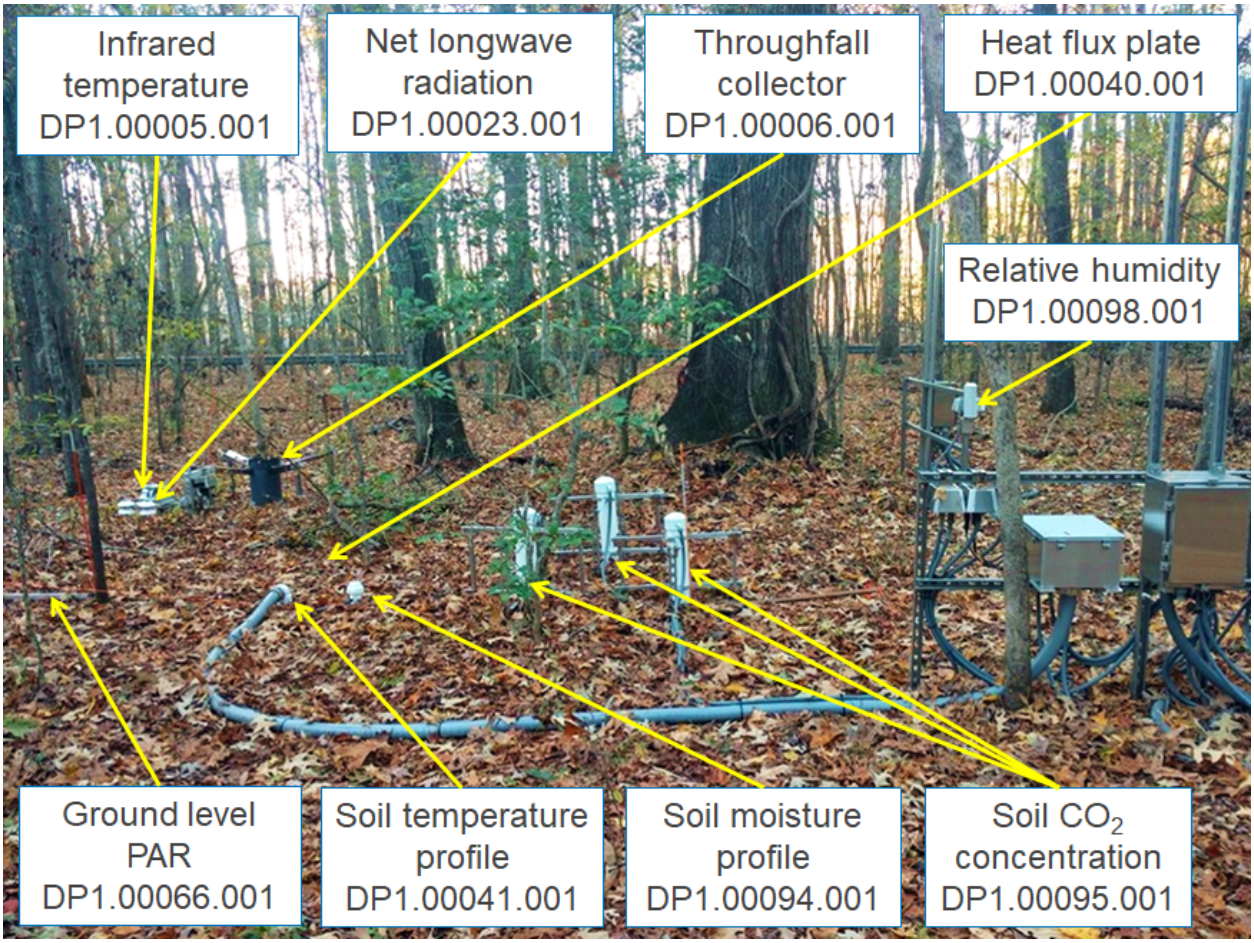
Collection methodology

Soil water content and salinity are measured using up to eight sensors along a vertical profile extending up to two meters into the soil in all five soil plots. The three shallowest nominal installation depths are 6 cm, 16 cm, and 26 cm (±1 cm), with deeper depths determined on a site- and soil plot-specific basis. Both measurements represent an integration across a few centimeters vertically and horizontally around the sensor, are made at 0.1 Hz (10 seconds), and data are published at 1- and 30-minute averaging intervals.

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 is limited to aboveground components and typically performed every 2 weeks. Calibrations were initially performed annually, but have since been discontinued consistent with manufacturer recommendations and to minimize sensor damage during shipping and handling.



Sensor-based soil plot at D08 LENO. Not all measurements are made in every soil plot.

Data package contents

SWS_30_minute: Soil water content and water salinity averaged over 30 minutes
SWS_1_minute: Soil water content and water salinity averaged over 1 minute
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 (VSWCFinalQF and VSICFinalQF). The final quality flag for soil water content data is raised (i.e., VSWCFinalQF = 1) when it is calculated using the sensor manufacturer's default calibration rather than a soil-specific calibration. However, for many use cases the default calibration is sufficient. To identify data that were solely flagged because they were generated using the default calibration, download the "Expanded" data package and identify rows where VSWCFinalQF = 1,

VSWCAlphaQM < 10, VSWCBetaQM < 20, (VSWCFinalQFSciRvw = 0 or NA), and tempFailQM = 0. Each measurement is accompanied by an estimate of measurement uncertainty, expressed at the 95% confidence level (VSWCExpUncert and VSICExpUncert), which comprises known and quantifiable uncertainties.

Standard calculations

For wrapper functions to download data from the API, and functions to merge tabular data files across sites and months, see the neonUtilities R package.

Latitude, longitude (referenceLatitude, referenceLongitude; °), and elevation (m) of the soil plot reference corner are in the sensor positions file (...sensor_positions...csv). Sensor depths are not currently reported correctly in the sensor_positions file, see swc_depths and readme_swc_depths files for installation depths. 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 indices 001-005 correspond to soil plots 1-5, and VER indices 501-508 increase with increasing depth.

Documentation

NEON Algorithm Theoretical Basis Document (ATBD): TIS Soil Water Content and Water Salinity
NEON.DOC.000007vD | 456.4 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

TIS Level 1 Data Products Uncertainty Budget Estimation Plan
NEON.DOC.000785vB | 553.4 KiB | PDF

NEON Algorithm Theoretical Basis Document (ATBD) – Preprocessing for TIS Level 1 Data Products – QA/QC
NEON.DOC.001069vC | 277.8 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: Soil Water Content and Salinity Profile
NEON.DOC.003622vD | 2.5 MiB | PDF

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

Corrected soil sensor installation depth readme file
`readme_swc_depths | 1.2 KiB | Text`

Corrected Soil Sensor Installation Depths
`swc_depthsV2 | 103.6 KiB | CSV`

For more information on data product documentation, see:
https://data.neonscience.org/data-products/DP1.00094.001

Citation

To cite data from Soil water content and water salinity (DP1.00094.001), see citation here:
https://data.neonscience.org/data-products/DP1.00094.001
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https://www.neonscience.org/data-samples/guidelines-policies/citing