NEON SOIL MOISTURE MEASUREMENTS

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NEON overview

• NEON is a major NSF research facility comprised of scientists and engineers
• Understand how drivers – climate change, land use/land cover change, and invasive species affect ecological patterns and processes
• Enable study and forecasting of long-term ecological trends at multiple scales

• Provide data and physical infrastructure to the public
• Construction complete: 2017
• Data: 2014
NEON sites

60 sites – wildlands & managed/disturbed ecosystems
Site layout

5 soil plots per site

Soil moisture profile:
- Sentek TriSCAN sensors
- 8 sensor per profile
  - Uppermost sensor measures 1-11 cm depth
- Up to 2 m deep
- 1-min & 30-min averages with uncertainty

25 - 40 m
Schedule for soil moisture measurements

2014: 17 sites
2015: 22 sites
2016: 21 sites
Schedule for soil moisture measurements

2014: 17 sites
2015: 22 sites
2016: 21 sites

Jul 2014: 7
Oct 2014: 4
Nov 2014: 2
Dec 2014: 4
Calibration

1 soil pit per site

1 intact soil block collected from each horizon

Water added and allowed to dry down. Soil moisture measured gravimetrically and using sensor.
Data flow and QA/QC

Raw data
↓
Calibration
↓
Automated QA/QC tests and flags
↓
Data verification by NEON staff

Automated QA/QC

Temperature test

Plausibility tests
• Range
• Step
• Null
• …

Consistency test
• Compares a measurement with measurements above and/or below it

Provisional data release (hours/days)

Published data (45 days)

data.neoninc.org/
Representing 0-5 cm soil moisture

Level 1 data product:

- Assume sensor at 6 cm depth represents 0-5 cm moisture
  - Integrates over 1-11 cm

Level 2 data product (~1 year):

- Modeled/interpolated soil moisture profiles from 0-200 cm
Up-scaling to SMAP scale

Short-term:

- Data from the 5 soil moisture profiles at each site can be averaged
  - 8 pairs of sites <36 km apart

Longer term (~2-3 years)

- Modeled soil moisture across ~10,000 km$^2$ at each site (Andy Fox, NEON)
  - 100 m spatial resolution
  - 30 minute temporal resolution
Other relevant measurements

- Precipitation
- Throughfall
- Snow depth
- Soil temperature profiles
- Net ecosystem C exchange (eddy covariance)
- >500 data products
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