



NEON Soil Sensor Technical Working Group

2020 Annual Report



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National Ecological Observatory Network (NEON) is a project sponsored by the National Science Foundation and proudly operated by Battelle.

Introduction

Since its inception, NEON has relied on expertise within the science, education, and engineering communities to advise on key areas impacting the design, construction, and maintenance of the observatory with the goal to optimize its operation. Currently, two types of external advisory bodies support staff and leadership in making key decisions that guide all of NEON's activities: the Science, Technology & Education Advisory Committee (STEAC) and Technical Working Groups (TWGs). Both bodies are comprised of experts nominated to serve in these roles who are selected by NEON staff following a rigorous selection process.

NEON currently relies upon input from 22 TWGs. These groups play an important role by providing input to NEON's data collection and processing methods and ensuring that NEON infrastructure, data, and programs are a valuable community resource. Working groups are participatory and advisory; they are often tasked with providing input on issues that have scientific, educational, engineering, or operational implications.

This document includes a summary of activities, recommendations, and NEON's response to those recommendations for the Soil Sensor TWG during the 2020 funding year (November 2019-October 2020).

The Soil Sensor Technical Working Group (TWG), provides feedback on all aspects of sensor measurements made in the TIS soil plots, including soil temperature, soil moisture and salinity, soil CO₂ concentration, soil heat flux, throughfall, soil surface photosynthetically active radiation (PAR), net longwave radiation, and soil surface/litter/vegetation infrared temperature measurements. In addition, the Soil Sensor TWG provides recommendations on approving or disapproving requests for large amounts of soil from the NEON Megapit Soil Archive.

Q1 – November 2019-January 2020

Summary of Activities

Held FY20 kick-off meeting and elected chair for FY20 (Michael Loik). Summarized progress over the last year:

1. Megapit Soil Archive has continued to receive requests with 12 requests approved to date resulting in 3 peer-reviewed publications and 4 conference presentations.
2. The proportion of available valid data has improved for every single soil sensor data product over the last year, although additional improvements are still needed for some products (especially soil moisture, heat flux and soil CO₂ concentration).
3. Developed and tested R code to calculate soil CO₂ fluxes at all NEON sites with work ongoing to improve reliability and make the data publicly available. Proposed soil sensor priorities for FY20.

TWG Recommendations

TWG approved soil sensor priorities for FY20:

1. Finish deployment of more reliable throughfall sensor
2. Move heat flux plates from 8 cm deep to 5 cm deep
3. Test and select a new soil moisture sensor (current sensor has been discontinued)
4. Develop R code to process all soil sensor data products through the new data processing pipeline
5. Release the soil CO2 flux data product
6. Continue manually flagging suspect data as needed
7. Provide support to the user community as needed

NEON Response

FY20 priorities adopted.

Q2 – February 2020-April 2020

Summary of Activities

Communication was conducted via emails:

Requested feedback on a draft NEON Quick Start (QS) Guide for the soil temperature data product, which will serve as a template for all QS guides for sensor-based data products. The draft QS also acted as a catalyst for the TWG to develop a user/applications note for the soil temperature data product to demonstrate its utility to the potential user community, which is being led by a non-NEON member of the TWG.

Requested TWG recommendations for NEON's Community Engagement strategy including which conferences (besides AGU and ESA) NEON should have a presence at, which community groups NEON should engage with, and which online platforms NEON should consider for outreach.

Provided a notification of the suspension of all NEON in-person and on-site activities, including sensor maintenance and recalibration, due to the COVID-19 pandemic. Described the types of activities the field scientists would perform remotely and asked if there were additional suggestions that could be implemented while working remotely.

TWG Recommendations

Numerous QS suggestions were received, including adding hyperlinks to all documents, an explanation of file naming conventions, and different subsection headings.

Community Engagement feedback went directly to the NEON community engagement team.

No recommendations for remote work activities were received.

NEON Response

Most QS recommendations were incorporated into the template, but some could not be incorporated due to space constraints, maintaining consistency among the NEON Subsystems, and/or technical limitations given the short timeframe. The short timeframe was due to this activity being performed by field scientists that cannot perform their regular duties due to the COVID-19 pandemic and require alternative work immediately to remain productive.

Other TWG activities did not require a response.

Q3 – May 2020-July 2020

Summary of Activities

TWG reviewed a request for soil samples from the Megapit Soil Archive that exceeded 20 g/sample (the threshold requiring TWG review). TWG members requested additional justification for various aspects of the request, in particular in relation to the quantity of soil. Comments were sent to the requester and an updated request was received. TWG recommended approving updated request.

A question raised in the 2020 TWG kick-off meeting was "Which soil sensor data products are most popular?", with the hope that this could be used to guide which data products the TWG should focus on. These data were not available at the time; however partial data based on API downloads became available this quarter and were sent to the TWG.

TWG Recommendations

Recommended approval of updated Megapit Soil Archive request.

NEON Response

Megapit Soil Archive request was approved, and sample preparation is ongoing.

Q4 – August 2020-October 2020

Summary of Activities

No activity for Q4.

TWG Recommendations

N/A

NEON Response

N/A