NEON Initial Characterization Soils: Archival and Access

A joint project of Battelle/NEON and the University of Michigan

Coordinated by the Initial Characterization Soil Archive Team (ICSArchive@battelleEcology.org)

URL: https://mfield.umich.edu/soil_archive_request

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Background

During initial construction activities or early operations, NEON / Battelle contracted with the U.S. Department of Agriculture- Natural Resources Conservation Service (USDA-NRCS) to perform an initial characterization of soils and their variability within and across NEON sites, complementing other NEON soils efforts including the Megapit and distributed periodic soil collections. The initial characterization effort was conducted from 2015-2019, and resulted in two data products now available from NEON. In addition, of the 3,246 soil horizons characterized from 46 NEON sites during the USDA-NRCS initial soil characterization campaign, 1,991 from 33 sites possessed sufficient material for archive in the University of Michigan Biological Station- Sample Archive Facility in Ehlers (UMBS-SAFE), a community-accessible soil archive established with NSF support in 2016-18. Subsamples of these well-characterized, air-dried samples are now available to researchers who complete a request and review process, described below. This process follows that used for the Megapit Soil Archive, with some key differences due to the smaller quantities of the archived samples (generally 50-200 g per sample) and the joint management of the archive by NEON and UMBS-SAFE staff.

Permit Requirements

All requesters must have an active Permit to Receive Soil (PPQ 525) or similar from the USDA Animal and Plant Health Inspection Service (USDA-APHIS), or equivalent permit from their country's cognizant regulatory agency. Find information about the permit at the APHIS website. Samples will not be shipped to facilities that do not have an active permit, and UMBS-SAFE managers must receive copies of any permits (and include them in their request for permission to ship from USDA-APHIS) prior to shipping samples.

Considerations for Approval

In order to balance preservation and sample use, request only the minimum amount of soil needed for your analysis or study. Many analyses have already been completed; see NEON Data Product DP1.10047.001 before initiating your request. Any amount of material may be requested; however, requests for smaller quantities of soil per sample (e.g., <10 g/sample) are more likely to be approved. Requests for larger quantities may be approved if clearly justified, the aim of the study passes a merit review, and sufficient material is available in the archive to support future requests. Do not request spare or extra soil. A minimum quantity of "forever sample" (10 g) will be reserved in the archive for each sample for long-term keeping and potential re-analysis.

All requests undergo a review process to evaluate the intellectual merit, quantity justification, and data management plan by members NEON and UMBS-SAFE staff. Requests are evaluated to ensure that:

1. A legitimate research project is the basis for the request, including agency and award information if applicable

2. The use of NEON Initial Characterization samples (as opposed to Megapit or periodic soil samples) is critical to achieve the study goals.

3. The quantity is justified. Staff also review whether a sample was previously used for the same purpose, including initial characterization by NRCS (data available from NEON)

4. A specific data management plan describing how the data generated from the request will be made publicly available in a format suitable for reuse by others (e.g., see FAIR data principles). If possible, include links to publicly available data that you have previously generated to demonstrate a commitment to open science.

5. The sample requester agrees to provide proactive, timely updates to the NEON and UMBS-SAFE staff when results derived from the samples are presented at meetings or submitted for publication, and to acknowledge NEON and UMBS-SAFE award information in their products and outputs.

In addition, the evaluation will consider the impact of fulfilling the request on the samples' projected exhaustion date, specifically whether they will be exhausted prior to the planned end date of this project (2035), in order to maintain the ability to support future requests. This is achieved by extrapolating the sample consumption rate after fulfilling the proposed request into the future to determine the projected sample mass at the end date, as described in Ayres (2019). Given that some samples have a faster consumption rate than others and some samples had a lower original mass than others, staff may approve a request for some samples but not others included in the request. Staff will typically reject requests for a specific sample in cases where fulfilling the request would result in that sample being exhausted prior to the project end date. In this case, a requester may provide a justification explaining why that sample is essential to the project and the decision will be reevaluated.

In the event that a request is rejected or partially rejected, a requester may ask for a second evaluation by an external panel if they deem it necessary.

Request review procedure and timeline

The approval of requests for ≤4 g (organic horizons) or ≤15 g (mineral soils) subsamples is determined internally by NEON and UMBS-SAFE staff. For requests of >4 g or >15 g subsamples, a recommendation is sought from an external group of experts prior to NEON and UMBS-SAFE staff determining an approval decision. A first decision, which may be a request for additional information, is typically achieved within 1 week for requests of ≤4 or ≤15 g subsamples and within 2 weeks for requests of >4 g or >15 g subsamples.

Tips to avoid delays in the review of your request include:

1. Provide all requested information

2. Justify the quantity of soil requested for each analysis (include relevant citations where appropriate)

3. Avoid requests for soil analyses to be run in duplicate or triplicate, or if absolutely necessary, providing a suitable justification (include relevant citations where appropriate)

Request fulfillment

To maximize homogeneity of the subsample and ensure that it is representative of its corresponding characterization data, each child subsample requested is split from the master archived sample according to methods described in Ayres (2019), including the thorough cleaning of tools and utensils between each subsample according to the USDA-approved Standard Operating Procedure utilized in UMBS-SAFE.

Soil samples are typically shipped within 1-4 months of approving a request, depending on the number of samples requested, and provided permitting delays are not encountered.

In order to maintain the quality of the archived soils, returning subsamples to the archive after nondestructive analyses is not permitted due to the reduction in quality assurance that can be provided for material that has changed hands, as well as to protect the UMBS-SAFE from external contaminants (e.g., isotopic tracers or biological contaminants). As a result, every subsampling event results in the permanent loss of soil from the archive.

To complete this request form you must include:

1. Your full name and affiliation

2. A copy of all relevant USDA-APHIS permits to receive soil or equivalent permit

3. A project description, including:

    a. Project objectives and background information;

    b. A list of each analysis you will perform, description of how the analysis relates to the project objective, the quantity of soil required for each analysis, and a justification for the quantity used in each analysis;

    c. A list of samples and the mass requested;

    d. A detailed data management plan describing how data generated from the request will be made publicly available in a format suitable for reuse by others (e.g., see FAIR data principles). If possible, include links to publicly available

data that you have previously generated to demonstrate a commitment to open science.

4. Agreement to the consent agreement (see below)

If you have questions, please email the NEON and UMBS-SAFE staff.

Consent Agreement

By submitting a request, requestors agree to: 1) report all publications, presentations or other derived products resulting from the use of the samples to NEON and UMBS-SAFE staff; 2) acknowledge NEON and UMBS-SAFE as provider of samples in any publication or presentation resulting from the request, regardless of authorship; and 3) publish data generated from the request in a publicly available location in a format suitable for reuse by others (e.g., see FAIR data principles) within two years of receipt of the samples or upon publication of results (whichever is shorter, with variances from this agreement approved based on a request in writing). Please review NEON Data Usage and Citation Policies.

Acknowledgement and Citation Policy

See NEON Data Usage and Citation Policies for details. Suggested acknowledgement:

> 'The National Ecological Observatory Network is a program sponsored by the National Science Foundation and operated under cooperative agreement by Battelle Memorial Institute. This material is based in part upon work supported by the National Science Foundation through the NEON Program, including samples from the NEON Initial Characterization Soil Archive, a joint project of NEON and the University of Michigan Biological Station, as supported by the National Science Foundation (DBI-1624205) and Battelle Memorial Institute (US001-0000757206).'

The following documents, available through the NEON document library in the External Lab Protocols > NRCS Initial Soil Characterization folder, describe procedures related to the Initial Soil Characterization sampling effort and can be cited as necessary:

Browning, D. and L. Stanish. 2017. Guidelines for the NEON Soil Characterization Effort.

Schoeneberger, P.J., D.A. Wysocki, E.C. Benham, and Soil Survey Staff. 2012. Field book for describing and sampling soils, Version 3.0. Natural Resources Conservation Service, National Soil Survey Center, Lincoln, NE.

Additionally, the following paper outlines key guidelines and procedures that will be used in administering the Initial Characterization soil archive:

Ayres, E. 2019. Quantitative guidelines for establishing and operating soil archives. Soil Science Society of America Journal 83:973-981. doi: 10.2136/sssaj2019.02.0050