1. **Dataset Title** - **Soil Texture, vis-NIR Spectra, and Derived Soil Chemistry**

2. **Dataset Author(s) -**

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3. **Time of Interest** - 2019-09-28 00:00:00 to 2019-09-28 23:59:59

4. **Area of Interest -**

- NE1-* 45.9734833 -90.2723000 (pine)
- NE2-* 45.9557333 -90.2406000 (pine)
- NE3-* 45.9749000 -90.2327333 (hardwood)
- NE4-* 45.9618667 -90.2270333 (maple)
- NW1-* 45.9720010 -90.3231720 (pine)
- NW2-* 45.9677333 -90.3087833 (aspen)
- NW3-* 45.9689167 -90.3010333 (wetland)
- NW5-* 45.9458333 -90.2943667 (grass)
- SE2-* 45.9365167 -90.2640833 (hardwood)
- SE3-* 45.9271500 -90.2475000 (aspen)
- SE5-* 45.9380833 -90.2381833 (aspen)
- SE6-* 45.9197333 -90.2288333 (pine)
- SW1-* 45.9149000 -90.3425000 (aspen)
- SW2-* 45.9409000 -90.3177333 (aspen)
- SW3-* 45.9206670 -90.3099000 (hardwood)
- SW4-* 45.9392167 -90.2823167 (hardwood)
- **Bounding Box:** 45.915, -90.343; 45.915, -90.227; 45.980, -90.227; 45.980, -90.343

5. **Data Frequency** - Single

6. **Data Spatial Type** - textTable

7. **General Dataset Description** - Soils sampled at CHEESEHEAD ISFS forest sites.

All soil samples were taken on September 28, 2019. Samples were taken within 5 m of the tower. Tower center coordinates are used. All samples were of the top 0-15 cm of soil mixed. They were then air-dried, ground, and sieved through a 2-mm sieve for analysis.

Particle size analysis: Soil particle size fractions (clay, sand, and silt) were analyzed by the hydrometer method (Gee & Bauder, 1979).

Visible–near infrared (vis–NIR): Visible–near infrared (vis–NIR) spectra of the soils were collected using a portable PSR-3500® Vis–NIR spectroradiometer (Spectral Evolution Inc., Lawrence, MA, USA). The vis–NIR spectrometer is connected to a sample contact probe through a fiber-optic cable and the contact probe has a built-in 5-W halogen light source. The spectrometer is equipped with three detectors and measures the spectral range of 350–2,500 nm: (a) a 512-element silicon photodiode array covering 350–1,000 nm with a resolution of 3 nm; (b) a 256-element InGaAs array covering 1,000–1,900 nm with a resolution of 8 nm; and (c) a 256-element InGaAs array covering 1,900–2,500 nm with a resolution of 6 nm. The reflectance spectra were resampled to 1 nm for output, which resulted in 2,151 spectral points. The vis–NIR was calibrated with a polytetrafluoroethylene (PTFE) white plate and the calibration was run for every 10 samples. Three replicates were collected from each soil sample and averaged for a mean reflectance spectrum.

Portable X-ray fluorescence (PXRF): The soil samples were scanned by a Delta Premium portable X-ray fluorescence (PXRF) spectrometer (Olympus Scientific Solutions Americas Inc., Waltham, MA, USA) using the Geochem Mode. The PXRF spectrometer was calibrated by a 316 stainless steel calibration check reference before scanning. The Geochem Mode operates for a duration of 60s in a two-beam configuration at 40 and 10 keV, respectively. Beam 1 measures at the energy range of 0–40 keV, which is able to detect various heavier elements, including V, Cr, Fe, Co, Ni, Cu, Zn, Ta, W, Hg, As, Se, Pb, Bi, Rb, U, Sr, Y, Zr, Th, Nb, Mo, LE, Ag, Cd, Sn, and Sb. Beam 2 measures at the energy range of 0–10 keV, which is able to detect lighter elements, including Mg, Al, Si, P, S, Cl, Ca, Ti and Mn. The concentrations of the elements were calculated from the PXRF spectra based on an internal factory-installed calibration procedure (Compton normalization method). The spectra of beam 1 contain 2,048 spectral measurements from 0 to 40 keV and the spectrum of beam 2 contains 512 spectral points from 0 to 10 keV. Empty values or zero values indicate the elements or energies were below the detection limits of the PXRF spectrometer.

Detailed about the vis-NIR and PXRF spectra measurements can be found in Zhang and Hartemink (2019).

8. **File Names** -

- Forest Soil Texture and Spectra.xls
- soilspectra_readme.txt (this file)

9. **Data restrictions** - no restrictions. Please see the CHEESEHEAD Data Policy.

10. **Digital Object Identifier (DOI)** - https://doi.org/10.26023/PA3M-V02Z-BZ0E

11. **GCMD Keywords** -
    - WISCONSIN
    - TERRESTRIAL ECOSYSTEMS
    - SOIL TEXTURE
    - SOIL CHEMISTRY

12. **Publications** -

Gee, G. W., & Bauder, J. W. (1979). Particle size analysis by hydrometer: a simplified method for routine textural analysis and a sensitivity test of measurement parameters. Soil Science Society of America Journal, 43(5), 1004-1007.

Zhang, Y., & Hartemink, A. E. (2020). Data fusion of vis–NIR and PXRF spectra to predict soil physical and chemical properties. European Journal of Soil Science, 71(3), 316-333.