SMAPVEX19-22 Millbrook Lidar Derived Digital Elevation Model, Version 1

USER GUIDE

How to Cite These Data

As a condition of using these data, you must include a citation:

Colliander, A., Xu, X., & Yueh, S. 2023. SMAPVEX19-22 Millbrook Lidar Derived Digital Elevation Model, Version 1. [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. https://doi.org/10.5067/9UYFIEJSO7MN. [Date Accessed].

FOR QUESTIONS ABOUT THESE DATA, CONTACT NSIDC@NSIDC.ORG

FOR CURRENT INFORMATION, VISIT https://nsidc.org/data/SV19MB_DEM

National Snow and Ice Data Center

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1 DATA DESCRIPTION

These digital elevation model (DEM) data consist of ground surface elevations derived from source lidar measurements collected in April and August 2022 in the vicinity of Millbrook, NY during the SMAPVEX19-22 campaign. This location was chosen due to its forested land cover, as SMAPVEX19-22 aims to validate satellite derived soil moisture estimates in forested areas. The two acquisition periods were selected to characterize differences during "leaf-off" and "leaf-on" conditions.

1.1 Parameters

This data set represents ground surface elevations. The vertical units of the data set are meters relative to the North American Vertical Datum of 1988 (NAVD88).

1.2 File Information

1.2.1 Format

Data files are provided in Geographic Tagged Image File Format (GeoTIFF).

1.2.2 File Contents

Each GeoTIFF files contains embedded georeferenced data representing bare earth surface elevation commonly referred to as a digital elevation model (DEM).

1.2.3 Naming Convention

Files are named according to the following convention:

sv19mb_dem_[tile ID]_[yyyymm].tif

Table 1 describes the variables within each file name:

Table 1. File Naming Convention

Variable	Description
sv19mb	SMAPVEX19-22 campaign, Millbrook, NY study domain
dem	Digital elevation model
tile ID	Six-digit ID of the approximately 1000 m x 1000 m tile
yyyymm	Four-digit year and two-digit month of data acquisition
.tif	File extension

1.3 Spatial Information

1.3.1 Coverage

The Millbrook, NY site is defined by the following geographic coordinates:

Northernmost Latitude: 41.68° N
Southernmost Latitude: 42.03° N
Easternmost Longitude: 73.44° W
Westernmost Longitude: 73.79° W

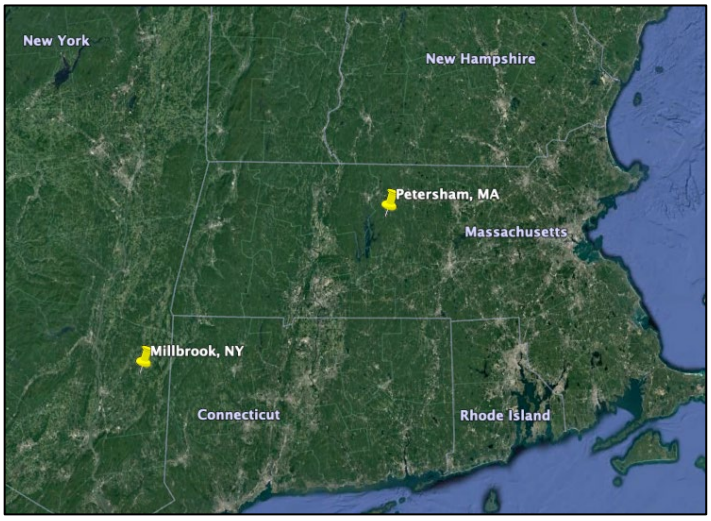

Figure 1. SMAPVEX19-22 Campaign Sites

1.3.2 Resolution

The spatial resolution is approximately 0.5 m. This number is approximate because data are provided in geographic coordinates.

1.3.3 Geolocation

These data are referenced to WGS84 horizontally and the NAVD88 (Geoid 18b) vertical datum. The following table provides additional details on geolocating this data set.

Table 2. Geolocation Details

Geographic coordinate system	World Geodetic System 1984
Projected coordinate system	WGS84
Longitude of true origin	Prime Meridian, Greenwich
Latitude of true origin	N/A
Scale factor at longitude of true origin	N/A

Datum	WGS84
Ellipsoid/spheroid	WGS84
Units	degree
EPSG code	4326
PROJ4 string	+proj=longlat +datum=WGS84 +no_defs
Reference	http://epsg.io/4326

1.4 Temporal Information

1.4.1 Coverage and Resolution

The data set includes two set of data, each containing ~2,500 GeoTIFF files, representing elevation from 4-5, 4-11, and 29 April 2022 (leaf-off conditions) and 2-3, 5-6, and 8-9 August 2022 (leaf-on conditions) respectively.

2 DATA ACQUISITION AND PROCESSING

2.1 Acquisition

Lidar scanning was conducted by Woolpert, under contract from NASA, using the Leica CityMapper-2 lidar mapping sensor. Approximately 80 scans were conducted in April and 50 in August. The data were acquired with a point density of 8 points per square meter.

2.2 Processing

Woolpert performed the lidar point cloud data processing including calibration, cleaning, classification, and final formatting of the LAS file, then rasterizing the data to DEM. There were five classes in the LAS lidar point cloud classification scheme: low vegetation, medium vegetation, high vegetation, ground, and buildings. These ground classified points from the LAS file were used to derive the DEM data.

2.3 Quality, Errors, and Limitations

The vertical accuracy of the derived DEM is assumed to meet the below conditions. However, no quantitative assessment was performed.

- The RMSEz for non-vegetated ground is ≤20 cm.

- Approximately 67% of all measurements are within 20 cm and 95% within 39.2 cm on hard unobstructed surfaces.
- Approximately 95% (with 5% unrestricted outliers) of all measurements are within 58.8 cm in vegetated land cover categories combined (includes tall grass, brush, and forested areas; does not include swamps or wetlands).

2.4 Instrumentation

Surveys were conducted using a Leica CityMapper-2 mapping sensor. For more information about this instrument, please see the Leica Geosystems website.

3 RELATED DATA SETS

SMAPVEX19-22 Massachusetts Lidar Derived Digital Elevation Model

SMAPVEX19-22 Millbrook Lidar Derived Digital Surface Model

SMAPVEX19-22 Massachusetts Lidar Derived Digital Surface Model

SMAPVEX19-22 Millbrook Temporary Soil Moisture Network

SMAPVEX19-22 Massachusetts Temporary Soil Moisture Network

SMAPVEX19-21 Massachusetts Vegetation Optical Depth

4 RELATED WEBSITES

SMAP Validation Data

SMAP Overview

5 DOCUMENT INFORMATION

5.1 Publication Date

May 2023

5.2 Date Last Updated

May 2023