SMAPVEX16 Manitoba Core-Based In Situ Soil Moisture Data, Version 1

USER GUIDE

How to Cite These Data

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

McNairn, H., K. Gottfried, and J. Powers. 2018. *SMAPVEX16 Manitoba Core-Based In Situ Soil Moisture Data, Version 1*. [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. https://doi.org/10.5067/D4YA3124Y3BR. [Date Accessed].

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

FOR CURRENT INFORMATION, VISIT https://nsidc.org/data/sv16m_csm

National Snow and Ice Data Center

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1 DATA DESCRIPTION

This data set contains bulk density and soil moisture data collected from soil cores gathered during the 2016 Soil Moisture Active Passive Validation Experiment (SMAPVEX16) in Manitoba, Canada.

1.1 Parameters

This data set includes the following parameters:

- Bulk Density
- Gravimetric Soil Moisture
- Volumetric Soil Moisture

1.2 File Information

1.2.1 Format

Data are available in a single Comma Separated Values (.csv) file.

Location information for the relevant field sites is available in a Keyhole Markup language Zipped (.kmz) file.

Extensible Markup Language (.xml) files with associated metadata are also provided.

1.2.2 File Contents

Data are presented in five columns in a single CSV file. Table 1 describes these columns.

Table 1. Data Column Descriptions

Column Header	Description
SITE_ID	Unique ID of the field site where sampling occurred. Each field had 16 possible sample locations.
DATE	Date of collection, in MM/DD/YYYY format
BULK_DENSITY	Bulk density, g/cm^3
GRAV_SOIL_MOISTURE	Gravimetric soil moisture, g/g
VOL_SOIL_MOISTURE	Volumetric soil moisture, cm^3/cm^3

SITE_ID	DATE	BULK_DENSITY	GRAV_SOIL_MOISTURE	VOL_SOIL_MOISTURE
101-1	5/30/16	0.7811	0.356	0.2781
101-1	6/8/16	0.8228	0.4371	0.3597
101-1	6/9/16	0.7665	0.4057	0.311
101-1	6/11/16	0.7815	0.4241	0.3315
101-1	6/14/16	0.7742	0.4547	0.352
101-1	6/14/16	0.8377	0.4623	0.3872
101-1	6/16/16	0.7713	0.3887	0.2998
101-1	6/19/16	0.7582	0.5207	0.3948
101-1	6/20/16	0.7015	0.4031	0.2828
101-1	6/28/16	0.8509	0.3729	0.3173
101-1	7/14/16	0.8606	0.5229	0.45
101-1	7/16/16	0.7191	0.4324	0.311
101-1	7/18/16	0.6258	0.476	0.2979
101-1	7/19/16	0.7643	0.4641	0.3547
101-1	7/21/16	0.7567	0.5413	0.4096
101-1	7/22/16	0.6506	0.4765	0.31

Figure 1. displays sample data from file SV16M_CSM_VolSoilMoisture_Vers3.csv.

1.2.3 Naming Convention

File names are:

SV16M_CSM_FieldSites.kmz
SV16M_CSM_VolSoilMoisture_Vers3.csv
SV16M_CSM is short for Soil Moisture Active Passive Validation Experiment 2016 Manitoba Core-Based In Situ Soil Moisture Data.

1.2.4 File Size

The CSV file is approximately 50 KB.

The KMZ file is approximately 29 KB.

1.3 Spatial Information

1.3.1 Coverage

Northernmost Latitude: 49.761171° N
Southernmost Latitude: 49.384076° N
Easternmost Longitude: 97.756264° W
Westernmost Longitude: 98.098417° W

1.3.2 Resolution

Soil cores are equivalent to point measurements. The distance between samples varied.

1.3.3 Geolocation

Table 2 provides information on the coordinate reference system for this data set.

Table 2. Coordinate Reference System

Geographic coordinate system	NAD83(CSRS)
Projected coordinate system	NAD83(CSRS) / UTM Zone 14N
Longitude of true origin	-99
Latitude of true origin	0
Scale factor at longitude of true origin	0.9996
Datum	NAD83 Canadian Spatial Reference System
Ellipsoid/spheroid	GRS 1980
Units	meter
False easting	500000
False northing	0
EPSG code	3158
PROJ4 string	+proj=utm +zone=14 +ellps=GRS80 +towgs84=0,0,0,0,0,0,0 +units=m +no_defs
Reference	https://epsg.io/3158

1.3.4 Coverage

24 May 2016 through 22 July 2016

1.3.5 Resolution

A total of 15 soil cores were collected from each field. The time interval between samples varied.

2 DATA ACQUISITION AND PROCESSING

2.1 Background

This data set was collected as part of the 2016 Soil Moisture Active Passive Validation Experiment (SMAPVEX16) conducted in the Carman/Elm Creek region of Manitoba, Canada. The experiment was designed to calibrate and increase the accuracy of NASA's Soil Moisture Active Passive

(SMAP) products. For this data set, soil cores were collected to coincide with SMAP satellite overpasses and Passive Active L- and S-band Sensor (PALS) flights.

2.2 Acquisition

Soil cores were taken from 50 agricultural fields and 2 radiometer sites. Each field had a total of 16 sampling locations. Prior to the campaign, the location of each sample site was determined in ArcGIS. During the campaign, sites were identified using Garmin GPS units. The accuracy of each GPS unit was approximately 3 m.

During Phase 1 (8 June to 20 June 2016) and Phase 2 (10 July to 22 July 2016) of the campaign, two cores were collected from each location on every sampling date. One core was always collected from Site 1, which corresponded to the location of temporary soil moisture stations. The second core was rotated between Sites 2 through 16. Soil cores were collected seven times during Phase 1and six times during Phase 2 of the campaign, with each sampling date corresponding to a SMAP satellite overpass and PALS flight. Soil cores were also collected at each field once before the campaign began and once between campaign phases. Pre-campaign and inter-phase samples were always collected from Site 1.

Cores were collected using aluminum rings from areas where the soil had not been trampled or disturbed. Rings were covered with a membrane cap and pushed fully into the soil surface (top 5 cm). A trowel was placed underneath the aluminum ring to loosen the soil enough to make extraction easier. Immediately after extraction, any soil sticking out of the aluminum ring was removed to ensure each sample contained a known volume. Soil cores were then transferred to a container, sealed, and delivered to the University of Manitoba - Soil Science Department Lab. Wet weights were recorded in the lab. Samples were then oven-dried for a minimum of 48 hours at 105°C, and dry weights were recorded.

Data were collected alongside SMAP Validation Experiment Probe-Based Soil Moisture Data.

2.3 Processing

Bulk density (g/cm3) was calculated by subtracting the oven-dry weight of the soil core (g) from the wet weight of the soil core (g) and then dividing by the volume of the soil (cm3).

Gravimetric soil moisture (g/g) was calculated by subtracting the oven-dry weight of the soil core (g) from the wet weight of the soil core (g) and then dividing by the oven-dry weight of the soil (g).

Volumetric soil moisture (cm3/cm3) was calculated by multiplying the gravimetric soil moisture by the bulk density.

2.4 Instrumentation

2.4.1 Description

Data were collected using an aluminum soil core sampler.

3 RELATED DATA SETS

- SMAP Validation Experiment Probe-Based Soil Moisture Data
- SMAP Data | Overview

4 RELATED WEBSITES

- SMAP at NASA
- SMAPVEX16

5 CONTACTS AND ACKNOWLEDGMENTS

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6 DOCUMENT INFORMATION

6.1 Publication Date

1 August 2018

6.2 Date Last Updated

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