SMAPVEX12 Core-Based In Situ Soil Moisture Data for Agricultural Area, Version 1

USER GUIDE

How to Cite These Data

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

Wiseman, G., A. Berg, and P. Bullock. 2014. *SMAPVEX12 Core-Based In Situ Soil Moisture Data for Agricultural Area, Version 1*. [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. https://doi.org/10.5067/9FOFYHLEZA7T. [Date Accessed].

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

FOR CURRENT INFORMATION, VISIT https://nsidc.org/data/SV12CSMA

National Snow and Ice Data Center

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1 DATA DESCRIPTION

This data set contains in situ soil moisture data collected with coring devices at several agricultural sites as part of the Soil Moisture Active Passive Validation Experiment 2012 (SMAPVEX12).

1.1 Parameters

Parameters in this data set include volumetric soil moisture and gravimetric soil moisture. The following table describes the units of measurement, sources, and valid ranges of each parameter.

Table 1. Parameter Units and Sensors

Parameter	Unit of Measurement	Sensor	Valid Range
Volumetric soil moisture	Water Fraction Volume (m3/m3)	Coring device	0 - 0.6
Gravimetric soil moisture	g/g	Coring device	0 - 0.6

1.2 File Information

1.2.1 Format and File Contents

Data are provided in ASCII text files.

`SV12CSMA_Soil_Vol_Moisture_ver4.txt` contains the soil moisture data from ground sampling. `Field_Sites_ver4_coords.txt` contains the UTM coordinates for the sampling points.

Table 2 describes the data columns of the sampling data file, while Table 3 describes the columns of the geolocation file.

Table 2. Data fields and descriptions for SV12CSMA_Soil_Vol_Moisture_ver4.txt

Column Heading	Description
OBJECT_ID	ID of the sample
Sample_Date	4-digit year/2-digit month/2-digit day
Site_ID	ID of the field and the sample point within the field
Vol_Moist_m3	Volumetric soil moisture content (m3 water/m3 oven-dry soil) calculated from the mass of water in each soil core (converted to volume) divided by the volume of the individual core.
Vol_Moist_2	Volumetric soil moisture content (m3 water/m3 oven-dry soil) derived from the gravimetric soil moisture content multiplied by the field average bulk density of the soil.

Column Heading	Description
Gravimet_soil_moist_g_g	Gravimetric soil moisture content (g water/g oven-dry soil) calculated by subtracting the oven-dry soil mass from the moist soil mass, then dividing the derived soil moisture mass by the oven-dry soil mass.

Table 3. Data column descriptions for Field_Sites_ver4_coords.txt

Column Heading	Description
OBJECTID	ID of the data record
Site_ID	ID of the field and the sample point within the field
X	UTM easting coordinate (meters)
Y	UTM northing coordinate (meters)

1.3 Spatial Information

1.3.1 Coverage

Southernmost Latitude: 49.44°N

Northernmost Latitude: 49.96°N

Westernmost Longitude: 98.51°W

Easternmost Longitude: 97.85°W

1.3.2 Resolution

The spatial resolution was approximately 3.2 km. Sampling was performed on sites approximately one quarter section (0.8 km by 0.8 km) in size.

1.3.3 Geolocation

Data are provided in Universal Transverse Mercator (UTM), Zone 14 N, World Geodetic System 1984 (WGS84) coordinates.

1.4 Temporal Information

1.4.1 Coverage and Resolution

Measurements were taken every one to five days from 07 June 2012 through 19 July 2012.

2 SOFTWARE AND TOOLS

No special tools are required to read these data. Any text editor or Web browser will display the ASCII text files.

3 DATA ACQUISITION AND PROCESSING

3.1 Background

Determination of the water content in the collected core samples was based on weighing the original sample, drying it, and weighing it again. The difference in the weight corresponds to the water content in the original sample.

3.2 Processing Steps

During flight days, crews were instructed to collect one bulk density core per field (the primary reason for this was the calibration of the handheld sensors). The location of the one bulk density site was moved each flight day such that by the end of the campaign, one sample had been collected at each sampling location within each field. This strategy yielded more than 850 cores during the course of SMAPVEX12. The dimensions of the soil core were approximately 4.6 cm in height and 4.7 cm in diameter with a core volume of 80 cm3. When the crew arrived at the designated bulk density site for that particular sampling day, they took their three standard probe readings. As well, the crew collected a soil core and three additional probe readings. These three additional readings were located in close proximity to the location of the soil core extraction, and were recorded separately on the field sheets. Crews were careful to collect an undisturbed soil sample. These samples (soil and core) were placed in a soil tin with a lid, with the tin then being placed in a re-sealable plastic bag to minimize moisture loss. Soil cores were transported back to Winnipeg for weighing and drying. The entire sample (soil, core, tin, and bag) was weighed. The tin was then removed from the plastic bag and placed in a soil drying oven. The samples were oven dried for 24 hours at 105°C. Following drying, the entire sample (soil, core, tin) was then re-weighed.

See more details in Section 2.1.1 of the SMAPVEX12 Database Report, released 18 December 2012.

3.3 Quality, Errors, and Limitations

3.3.1 Error Sources

No unusual error sources were introduced to the measurement procedure during the campaign.

3.3.2 Quality Assessment

The quality of the data corresponds to the quality of the soil moisture measurements carried out in similar soil moisture field experiments.

4 VERSION HISTORY

Version 1 (August 2014)

5 CONTACTS AND ACKNOWLEDGMENTS

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5.2 Acknowledgments

Agriculture and Agri-Food Canada, National Aeronautics and Space Administration, U.S. Department of Agriculture, Environment Canada, U. Manitoba, U. Guelph, Massachusetts Institute of Technology, U. South Carolina, U. Colorado, U. Sherbrooke, Ohio State, U. Montana, Florida

International U., U. Southern California, Texas A&M, Georgia Institute of Technology, U. Washington are acknowledged for their support for the campaign.

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6 REFERENCES

McNairn, H., T. Jackson, G. Wiseman, S. Belair, A. Berg, P. Bullock, A. Colliander, M. Cosh, S. Kim, R. Magagi, M. Moghaddam, J. Adams, S. Homayouni, E. Ojo, T. Rowlandson, J. Shang, K. Goita, and M. Hosseini. 2013, In Review. The Soil Moisture Active Passive Validation Experiment

2012 (SMAPVEX12): Pre-Launch Calibration and Validation of the SMAP Satellite. IEEE Trans. Geosci. Rem. Sens.

7 DOCUMENT INFORMATION

7.1 Publication Date

August 2014

7.2 Date Last Updated

October 2020