

*ISO 19131 SMAPVEX16-MB Volumetric
Soil Moisture Dataset – Data Product
Specifications*

Revision: A

Data product specifications: SMAPVEX16-MB Volumetric Soil Moisture Dataset

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Data product specifications: SMAPVEX16-MB Volumetric Soil Moisture Dataset / Spécifications de contenu informationnel

1. Overview

1.1. Informal description

The Soil Moisture Active/Passive Validation Experiment 2016-Manitoba (SMAPVEX16-MB) was conducted in the Carman/Elm Creek region. The purpose of the experiment was to collect a variety of ground measurements with coincident remotely-sensed data to calibrate and increase the accuracy of the National Aeronautics and Space Administration (NASA)'s Soil Moisture Active/Passive (SMAP) soil moisture products.

This dataset contains bulk density and soil moisture data that was collected for the SMAPVEX16-MB experiment. Soil cores were taken from 50 agricultural fields and 2 radiometer sites within the study area. Sites were sampled on 7 dates during the first phase of the campaign, 6 dates during the second phase of the campaign, 1 time before the campaign and 1 time between Phase 1 and Phase 2 for a total of 15 sampling dates. Samples that were taken during Phase 1 and Phase 2 were taken during SMAP satellite overpasses and Passive Active L- and S-band Sensor (PALS) flight days.

Cores of a known volume were inserted at the soil surface (top 5cm). Cores were extracted, sealed and delivered to the University of Manitoba - Soil Science Department lab where wet weights were recorded, samples were oven-dried and dry weights recorded. Bulk density, gravimetric and volumetric soil moisture values were then calculated.

2 cores were taken at each field during each sampling date. 1 core was always taken at Site 1 (location of temporary soil moisture stations). The other core was rotated between Sites 2 to 16.

1.2. Data product specification - metadata

This section provides metadata about the creation of this data product specification

Data product specification – title:	SMAPVEX16-MB Volumetric Soil Moisture Dataset
Data product specification - reference date:	June, 2016 to July, 2016
Data product specification - responsible party:	AAFC STB
Data product specification – language:	English
Data product specification - topic category:	geoscientificInformation

1.3. Terms and definitions

- Feature attribute characteristic of a feature

- **Class**
description of a set of objects that share the same attributes, operations, methods, relationships, and semantics [UML Semantics]
NOTE: A class does not always have an associated geometry (e.g. the metadata class).
- **Feature**
abstraction of real world phenomena
- **Object**
entity with a well-defined boundary and identity that encapsulates state and behaviour [UML Semantics]
NOTE: An object is an instance of a class.
- **Package**
grouping of a set of classes, relationships, and even other packages with a view to organizing the model into more abstract structures

1.4. Abbreviations

AAFC	Agriculture and Agri-Food Canada
GPS	Global Positioning System
PALS	Passive Active L- and S-band Sensors
SMAP	Soil Moisture Active/Passive
SMAPVEX16-MB	Soil Moisture Active/Passive Validation Experiment 2016-Manitoba
STB	Science and Technology Branch

2. SPECIFICATION SCOPE

This data specification has only one scope, the general scope.

NOTE: The term 'specification scope' originates from the International Standard ISO19131. 'Specification scope' does not express the purpose for the creation of a data specification or the potential use of data, but identifies partitions of the data specification where specific requirements apply.

3. DATA PRODUCT IDENTIFICATION

3.1. Data series identification

Title	SMAPVEX16-MB Volumetric Soil Moisture Dataset
Alternate Title	SMAPVEX16-MB Volumetric Soil Moisture Data
Abstract	SMAPVEX16-MB was conducted to assess and increase the overall accuracy of the soil moisture retrievals produced using the SMAP satellite. Using the calculated volumetric soil moisture from soil cores and comparing the results to those of the SMAP satellite's soil moisture products provides the ability to calculate the error between the observed and expected values.
Purpose	This dataset is used to assess and increase the overall accuracy of the SMAP soil moisture product.
Topic Category	geoscientificInformation
Spatial Representation Type	textTable
Spatial Resolution	
Geographic Description	Carman/Elm Creek, Manitoba, Canada
Supplemental Information	<p>Principle Investigators: Heather McNairn - Agriculture and Agri-Food Canada; Tom Jackson - United States Department of Agriculture; Co-Investigators(Canada): Amine Merzouki, Anna Pacheco, Jarrett Powers - Agriculture and Agri-Food Canada; Stephane Belair, Peter Toose - Environment and Climate Change Canada; Monique Bernier - Institut National de la Recherche Scientifique(INRS); Aaron Berg, Tracy Rowlandson - University of Guelph; Paul Bullock - University of Manitoba; RoTimi Ojo - Manitoba Agriculture; Alexandre Roy - University of Montreal; Ramata Magagi - University of Sherbrooke; Co-Investigators(United States): Alicia Joseph, Peggy O'Neill - NASA Goddard Space Flight Centre; Andreas Colliander, Sab Kim - NASA Jet Propulsion Lab; Mike Cosh - United States Department of Agriculture; Co-Investigators(International): Giuseppe Satalino - National Research Council of Italy (ISSIA-CNR)</p>
Constraints	SMAPVEX16-MB field data will be placed on the University of Sherbrooke website. Access will be limited by password that will be provided to principle and co-investigators listed below. Principle and Co-Investigators are to ensure that staff, graduate students and post docs respect the terms of the agreement on usage and distribution. Access to the website will be restricted until August 1, 2017 for preliminary research and quality control. After

	August 1, 2017 all field data will be transferred to the National Snow and Ice Data Centre to be made publically available.
Keywords	SMAPVEX16-MB, core sample, soil moisture
Scope identification	series

3.2. Data product identification

3.2.1. SMAPVEX16-MB Volumetric Soil Moisture Dataset

Title	SMAPVEX16-MB Volumetric Soil Moisture Dataset
Alternate Title	SMAPVEX16-MB Volumetric Soil Moisture Data
Abstract	Bulk density and soil moisture data were collected for the SMAPVEX16-MB. Soil cores were taken from 50 agricultural fields and 2 radiometer sites within the study area. Cores of a known volume were inserted at the soil surface. Cores were extracted, sealed and delivered to the University of Manitoba – Soil Science Department lab where wet weights were recorded, samples were oven-dried and dry weights recorded.
Purpose	SMAP produces global soil moisture products. This dataset is used to assess and increase the overall accuracy of the SMAP soil moisture product.
Topic Category	geoscientificInformation
Spatial Representation Type	textTable
Spatial Resolution	
Geographic Description	Carman/Elm Creek, Manitoba, Canada
Supplemental Information	<p>Principle Investigators: Heather McNairn - Agriculture and Agri-Food Canada; Tom Jackson - United States Department of Agriculture;</p> <p>Co-Investigators(Canada): Amine Merzouki, Anna Pacheco, Jarrett Powers - Agriculture and Agri-Food Canada; Stephane Belair, Peter Toose - Environment and Climate Change Canada; Monique Bernier - Institut National de la Recherche Scientifique(INRS); Aaron Berg, Tracy Rowlandson - University of Guelph; Paul Bullock - University of Manitoba; RoTimi Ojo - Manitoba Agriculture; Alexandre Roy - University of Montreal; Ramata Magagi - University of Sherbrooke;</p> <p>Co-Investigators(United States): Alicia Joseph, Peggy O'Neill - NASA Goddard Space Flight Centre; Andreas Colliander, Sab Kim - NASA Jet Propulsion Lab; Mike Cosh - United States Department of Agriculture;</p> <p>Co-Investigators(International):</p>

	Giuseppe Satalino - National Research Council of Italy (ISSIA-CNR)
Constraints	SMAPVEX16-MB field data will be placed on the University of Sherbrooke website. Access will be limited by password that will be provided to principle and co-investigators listed below. Principle and Co-Investigators are to ensure that staff, graduate students and post docs respect the terms of the agreement on usage and distribution. Access to the website will be restricted until August 1, 2017 for preliminary research and quality control. After August 1, 2017 all field data will be transferred to the National Snow and Ice Data Centre to be made publically available.
Keywords	SMAPVEX16-MB, core sample, soil moisture
Scope Identification	dataset
Feature Attribute Names	OBJECTID, SITE_ID, BULK_DENSITY, GRAV_SOIL_MOISTURE, VOL_SOIL_MOISTURE

4. DATA CONTENT AND STRUCTURE

4.1. Feature-based application schema

Figure <#> - <Insert dataset title> UML Class Diagram

4.2. Feature catalogue – SMAPVEX16-MB Volumetric Soil Moisture Dataset

Title	SMAPVEX16-MB Volumetric Soil Moisture Feature Catalogue
Scope	series
Version Number	1
Version Date	November 30, 2016
Producer	AAFC STB

System-generated attributes (for example, OBJECTID, Shape, Shape Length and Area) are not defined in the feature catalog.

4.2.1. Feature attributes

4.2.1.1. SITE_ID

Name	Site Identification (SITE_ID)		
Definition	Unique ID to identify the site where sampling occurs. Each field has 16 sampling locations.		
Aliases	SITE_ID		
Producer	AAFC STB		
Value Data Type	String		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.2. DATE

Name	Date (DATE)		
Definition	Date of sampling (YY-MM-DD).		
Aliases	DATE		
Producer	AAFC STB		
Value Data Type	Date and time		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.3. BULK_DENSITY

Name	Bulk Density (BULK_DENSITY)
Definition	Bulk density of the core determined in the lab by subtracting the oven-dry weight of soil (g) from the wet weight of soil (g) divided by the volume of soil (cm ³).

Aliases	BULK_DENSITY		
Producer	AAFC STB		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.4. GRAV_SOIL_MOISTURE

Name	Gravimetric Soil Moisture (GRAV_SOIL_MOISTURE)		
Definition	Gravimetric soil moisture content determined in lab by subtracting the oven-dry weight of soil (g) from the wet weight of soil (g) divided by the dry weight of soil (g).		
Aliases	GRAV_SOIL_MOISTURE		
Producer	AAFC STB		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.5. VOL_SOIL_MOISTURE

Name	Volumetric Soil Moisture (VOL_SOIL_MOISTURE)		
Definition	Volumetric soil moisture value (cm ³ /cm ³) calculated by multiplying the gravimetric soil moisture by the bulk density determined in the lab.		
Aliases	VOL_SOIL_MOISTURE		
Producer	AAFC STB		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

5. REFERENCE SYSTEMS

5.1. Spatial reference system

Not applicable

5.2. Temporal reference system

Gregorian calendar

6. DATA QUALITY

6.1. Completeness

Measure not used at this time.

6.2. Logical consistency

Measure not used at this time.

6.3. Positional accuracy

The location of each sample site was created using ArcGIS. These points were loaded onto handheld Garmin Global Positioning Systems (GPS) and were used to navigate to the site by field team members. The accuracy of the GPS device is within approximately 3m.

6.4. Temporal accuracy

Measure not used at this time.

6.5. Thematic accuracy

Measure not used at this time.

6.6. Lineage statement

Lineage Statement	Bulk density and soil moisture data was collected for the SMAPVEX16-MB campaign. Sites were sampled on 7 dates during the first phase of the campaign, 6 dates during the second phase of the campaign, 1 time before the campaign and 1 time between Phase 1 and Phase 2 for a total of 15 sampling dates. Samples that were taken during Phase 1 and Phase 2 were taken during SMAP satellite overpasses and Passive Active L- and S-band Sensor (PALS) flight days.
Scope	

7. DATA CAPTURE

Bulk density and soil moisture data was collected for the SMAPVEX16-MB campaign. Soil cores were taken from 50 agricultural fields and 2 radiometer sites within the study area. Cores of a known volume were inserted at the soil surface. Soil cores were extracted, sealed and delivered to the University of Manitoba – Soil Science Department lab where wet weights were recorded, samples were oven-dried and dry weights recorded.

8. DATA MAINTENANCE

Unknown.

9. PORTRAYAL

Not applicable.

10. DATA PRODUCT DELIVERY

Csv
 Format name : Comma Delimited
 Format version: 1.0

Specification: A delimited data format that has fields/columns separated by the comma character.
Languages: eng
Character set: utf8

11. METADATA

Not applicable.