

*ISO 19131 SMAPVEX16-MB Soil and
Crop Temperature Dataset – Data
Product Specifications*

Revision: A

Data product specifications: SMAPVEX16-MB Soil and Crop Temperature Dataset

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Data product specifications: SMAPVEX16-MB Soil and Crop Temperature 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 information on soil and vegetation temperature that was collected for SMAPVEX16-MB. Temperatures were taken from 50 agricultural fields within the study area. Sites were sampled on 7 dates during phase 1 of the campaign and 6 dates during phase 2 of the campaign for a total of 13 sampling dates. Samples that were taken during SMAP satellite overpasses and Passive Active L- and S-band Sensor (PALS) flight days.

A probe thermometer was used to record a 5cm and 10cm soil temperature at each sampling location. An Infrared Radiometer (IR) was used to record soil and vegetation surface temperatures. Both shaded and unshaded measurements were taken.

A total of 4 locations (Sites 1, 8, 9, and 16) were used on each field for the measurements.

1.2. Data product specification - metadata

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

Data product specification – title:	SMAPVEX16-MB Soil and Crop Temperature Dataset
Data product specification - reference date:	Jun 8, 2016 to July 22, 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
IR	Infrared Radiometer
NASA	National Aeronautics and Space Administration
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 Soil and Crop Temperature Dataset
Alternate Title	SMAPVEX16-MB Soil and Crop Temperature Data
Abstract	SMAPVEX16-MB was conducted to assess and increase the overall accuracy of the soil moisture retrievals produced using the SMAP satellite. Soil and crop temperatures were recorded by field crews during both phases of SMAPVEX16-MB. The probe thermometer was used to record soil temperature at the 5cm and 10cm depths. An IR was used to record soil surface temperature, as well as the shaded and sunlit sides of the vegetation.
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, temperature, IR sensor
Scope identification	series

3.2. Data product identification

3.2.1. SMAPVEX16-MB Soil and Crop Temperature Dataset

Title	SMAPVEX16-MB Soil and Crop Temperature Dataset
Alternate Title	SMAPVEX16-MB Soil and Crop Temperature Data
Abstract	This dataset contains soil and crop temperature data collected during the SMAPVEX16-MB campaign.
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; 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>
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Keywords	SMAPVEX16-MB, temperature, IR sensor
Scope Identification	dataset
Feature Attribute Names	SITE_ID, START_TIME, END_TIME, SOIL_TEMP_5, SOIL_TEMP_10, SUN_VEG_TEMP, SHADE_VEG_TEMP, SUN_SOIL_TEMP, SHADE_SOIL_TEMP

4. DATA CONTENT AND STRUCTURE

4.1. Feature-based application schema

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

4.2. Feature catalogue – SMAPVEX16-MB Soil and Crop Temperature Dataset

Title	SMAPVEX16-MB Soil and Crop Temperature Feature Catalogue
Scope	series
Version Number	1
Version Date	December 12, 2016
Producer	AAFC

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		
Value Data Type	String		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.2. START_TIME

Name	Start Time (START_TIME)		
Definition	Time in the field CDT (YYYY-MM_DD HH:MM).		
Aliases	START_TIME		
Producer	AAFC		
Value Data Type	Date and time		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.3. END_TIME

Name	End Time (END_TIME)
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Definition	Time out of the field CDT (YYYY-MM-DD HH:MM).		
Aliases	END_TIME		
Producer	AAFC		
Value Data Type	Date and time		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.4. SOIL_TEMP_5

Name	Soil Temperature 5cm (SOIL_TEMP_5)		
Definition	Soil temperature (°C) at 5cm.		
Aliases	SOIL_TEMP_51		
Producer	AAFC		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.5. SOIL_TEMP_10

Name	Soil Temperature 10cm (SOIL_TEMP_10)		
Definition	Soil temperature (°C) at 10cm.		
Aliases	SOIL_TEMP_101		
Producer	AAFC		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.6. SUN_VEG_TEMP

Name	Sunlit Vegetation Temperature (SUN_VEG_TEMP)		
Definition	Sunlit surface vegetation temperature (°C).		
Aliases	SUN_VEG_TEMP1		
Producer	AAFC		

Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.7. SHADE_VEG_TEMP

Name	Shaded Vegetation Temperature (SHADE_VEG_TEMP)		
Definition	Shaded surface vegetation temperature (°C).		
Aliases	SHADE_VEG_TEMP1		
Producer	AAFC		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.8. SUN_SOIL_TEMP

Name	Sunlit Soil Temperature (SUN_SOIL_TEMP)		
Definition	Sunlight surface soil temperature (°C).		
Aliases	SUN_SOIL_TEMP1		
Producer	AAFC		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.9. SHADE_SOIL_TEMP

Name	Shaded Soil Temperature		
Definition	Shaded surface soil temperature (°C).		
Aliases	SHADE_SOIL_TEMP1		
Producer	AAFC		
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

A null value appears where measurements were missed due to error or instrument failure. Records have been removed in instances where no measurements were made at the site.

6.2. Logical consistency

Measure not used at this time.

6.3. Positional accuracy

The location of each sample site has been recorded with a handheld Garmin Global Positioning System (GPS) device. The device is accurate to 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	Temperature were taken from 50 agricultural fields within the study area. Sites were sampled on 7 dates during the first phase of the campaign and 6 dates during the second phase of the campaign for a total of 13 sampling dates. Samples were taken during SMAP satellite overpasses and PALS flight days.
Scope	

7. DATA CAPTURE

A probe thermometer was used to record a 5cm and 10cm soil temperature at each sampling location. An IR was used to record soil and vegetation surface temperatures. Both shaded and unshaded measurements were taken.

A total of 4 locations (Sites 1, 8, 9 and 16) were used on each field for the measurements.

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.