

ISO 19131 Soil Properties – Data Product Specifications

Revision: A

Data product specifications: Soil Properties

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Data product specifications: Soil Properties / 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 table contains soil textural data generated from field studies that were conducted under the SMAPVEX16-MB field campaign.

1.2. Data product specification - metadata

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

Data product specification – title:	Soil Properties
Data product specification - reference date:	January 19, 2017
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
NASA	National Aeronautics and Space Administration
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	Soil Properties
Alternate Title	SMAPVEX16-MB Soil Properties Dataset
Abstract	<p>SMAPVEX16-MB was conducted to assess and increase the overall accuracy of the soil moisture retrievals produced using the SMAP satellite. This dataset contains soil textural and organic matter data that was collected for the SMAPVEX16-MB experiment.</p> <p>A series of soil samples were taken at Site 1 from 35 of the 50 agricultural fields within the study area during the course of the campaign. The individual samples from each field were combined and a particle size analysis was conducted by the University of Manitoba Soil Science Department. Percent sand, silt and clay as well as sand fraction was determined from the samples.</p> <p>Particle size analysis was only conducted for new sampling fields that were not used in the 2012 campaign or on fields that were used but had the sampling site configuration changed. Results from the 2012 particle size analysis are included in this table for the 15 fields that were used in both 2012 and 2016 and had no change to the sampling sites. Samples for these fields were collected from Site 12 and in one instance, Site 3.</p> <p>A loss on ignition method was used to determine soil organic matter (SOM). Samples were selected from sites 1, 2, 3, 11, 13 and 14. 3 replicates from each sample were used for the lab tests.</p>
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;</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;</p>

	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)
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, soil texture, particle size analysis
Scope identification	series

3.2. Data product identification

3.2.1. Soil Properties

Title	Soil Properties
Alternate Title	SMAPVEX16-MB Soil Properties Dataset
Abstract	This dataset contains soil textural and soil organic matter data generated from field studies that were conducted under the SMAPVEX16-MB field 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	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);

	<p>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	<p>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.</p>
Keywords	SMAPVEX16-MB, soil texture, particle size analysis
Scope Identification	dataset
Feature Attribute Names	SITE_ID, SAND, SILT, CLAY, SF_VERY_FINE, SF_FINE, SF_MEDIUM, SF_COARSE, SF_VERY_COARSE, TEXTURE, SOM

4. DATA CONTENT AND STRUCTURE

4.1. Feature-based application schema

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

4.2. Feature catalogue – Soil Properties

Title	Soil Properties Feature Catalogue
Scope	series
Version Number	1
Version Date	September 18, 2017
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. SAND

Name	Sand (SAND)		
Definition	Percent of the total amount of soil contained in the sand fraction.		
Aliases	SAND		
Producer	AAFC		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.3. SILT

Name	Silt (SILT)
Definition	Percent of the total amount of soil contained in the silt fraction.

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

4.2.1.4. CLAY

Name	Clay (CLAY)		
Definition	Percent of the total amount of soil contained in the clay fraction.		
Aliases	CLAY		
Producer	AAFC		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.5. SF_VERY_FINE

Name	Very Fine Sand Fraction (SF_VERY_FINE)		
Definition	Percentage of the total soil contained in the very fine sand fraction (<106 um).		
Aliases	SF_VERY_FINE		
Producer	AAFC		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.6. SF_FINE

Name	Fine Sand Fraction (SF_FINE)		
Definition	Percentage of the total soil contained in the fine sand fraction (106-250 um).		
Aliases	SF_FINE		
Producer	AAFC		

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

4.2.1.7. SF_MEDIUM

Name	Medium Sand Fraction (SF_MEDIUM)		
Definition	Percentage of the total soil contained in the medium sand fraction (250-500 um).		
Aliases	SF_MEDIUM		
Producer	AAFC		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.8. SF_COARSE

Name	Coarse Sand Fraction (SF_COARSE)		
Definition	Percentage of the total soil contained in the coarse sand fraction (500 um – 1 mm).		
Aliases	SF_COARSE		
Producer	AAFC		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.9. SF_VERY_COARSE

Name	Very Coarse Sand Fraction (SF_VERY_COARSE)		
Definition	Percentage of the total soil contained in the very coarse sand fraction (≥1 mm).		
Aliases	SF_VERY_COARSE		
Producer	AAFC		
Value Data Type	Double		

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

4.2.1.10. TEXTURE

Name	Texture (TEXTURE)		
Definition	Abbreviated soil texture name.		
Aliases	TEXTURE		
Producer	AAFC		
Value Data Type	String		
Value Domain Type	1 (enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition
	HC	HC	Heavy Clay
	C	C	Clay
	CL	CL	Clay Loam
	SiCL	SiCL	Silty Clay Loam
	SCL	SCL	Sandy Clay Loam
	SL	SL	Sandy Loam
	LS	LS	Loamy Sand
	S	S	Sand

4.2.1.11. SOM

Name	Soil Organic Matter (SOM)		
Definition	Percentage of organic matter.		
Aliases	SOM		
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

Measure not used at this time.

6.2. Logical consistency

Measure not used at this time.

6.3. Positional accuracy

A handheld Garmin Global Positioning System (GPS) device was used to navigate to each sampling point. 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	Particle size analysis was only conducted for new sampling fields that were not used in the 2012 campaign or on fields that were used but had the sampling site configuration changed. Results from the 2012 particle size analysis are included in this table for the 15 fields that were used in both 2012 and 2016 and had no change to the sampling sites. Samples for these fields were collected from Site 12 and in one instance, Site 3. Soil organic matter was determined from all 50 study fields from the 2016 campaign.
Scope	

7. DATA CAPTURE

A series of soil samples were taken at Site 1 from 35 of the 50 agricultural fields within the study area during the course of the campaign. The individual samples from each field were combined and a particle size analysis was conducted by the University of Manitoba Soil Science Department. Percent sand, silt and clay as well as sand fraction was determined from the samples.

The University of Manitoba Soil Science Department conducted lab tests to measure soil organic matter (SOM). A loss on ignition method test was used determine SOM. Samples were selected from sites 1, 2, 3, 11, 13 and 14. 3 replicates from each sample were used for the lab tests.

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.