ISO 19131 SMAPVEX16-MB Soil Roughness Dataset – Data Product Specifications

Revision: A

Data product specifications: SMAPVEX16-MB Soil Roughness Dataset

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Data product specifications: SMAPVEX16-MB Soil Roughness 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 surface soil roughness data that was collected for the SMAPVEX16-MB field campaign. Soil roughness measurements were taken from 50 agricultural fields within the study area. Sites were sampled once June 10, 13 and 15 during the first phase of the campaign: 3 to 4 weeks after all crops had been seeded.

For each field, roughness measurements were collected at site locations 1 and 2 in the look directions of RADARSAT-2 (descending mode) and airborne Passive Active L- and S-band Sensor (PALS). At each location, the surface roughness was measured using a digital camera and a 1m long pin profilometer consisting of 200 needles spaced at an interval of 5mm. To adequately measure the correlation length, the roughness measurements were taken over a 3m profile created by placing the 1m profiler end to end in the look direction of each Synthetic Aperture Radar (SAR) sensor (RADARSAT-2 descending mode and PALS). A digital camera recorded the pin meter profiles.

For each SAR sensor (RADARSAT-2 and PALS) and at each location, the photographs of the 3 separate profiles were joined into a single profile using MATLAB software application to provide the two roughness parameters: the surface root mean square (RMS) average height and the correlation length.

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 Roughness Dataset
Data product specification - reference date:	June, 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
NASA	National Aeronautics and Space Administration
PALS	Passive Active L- and S-band Sensor
RMS	Root Mean Square
SAR	Synthetic Aperture Radar
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 Roughness Dataset
Alternate Title	SMAPVEX16-MB Soil Roughness Data
Abstract	SMAPVEX16-MB was conducted to assess and increase the overall accuracy of the soil moisture retrievals produced using the SMAP satellite. Soil roughness measurements were taken from 50 agricultural fields within the study area. The data was used in MATLAB to produce both the surface RMS average height and correlation length for each sensor.
Purpose	This dataset is used to 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); 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)
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 roughness, pin profilometer
Scope identification	series

3.2. Data product identification

3.2.1. SMAPVEX16-MB Soil Roughness Dataset

Title	SMAPVEX16-MB Soil Roughness Dataset
Alternate Title	SMAPVEX16-MB Soil Roughness Data
Abstract	Roughness measurements were collected at site locations 1 and 2 in the look directions of RADARSAT-2 (descending mode) and airborne PALS. At each location, the surface roughness was measured using a digital camera and a 1m long pin profilometer. To adequately measure the correlation length, the roughness measurements were taken over a 3m profile.
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); 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)

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Keywords	SMAPVEX16-MB, soil roughness, pin profilometer
Scope Identification	dataset
Feature Attribute Names	OBJECTID, SITE_ID, PALS_HEIGHT, PALS_COR_L, R2_HEIGHT, R2_COR_L

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 Roughness Dataset

Title	SMAPVEX16-MB Soil Roughness 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. PALS_HEIGHT

Name	PALS RMS Height (PALS_HEIGHT)		
Definition	The RMS height (cm) measured in the look direction of PALS.		
Aliases	PALS_HEIGHT		
Producer	AAFC STB		
Value Data Type	Double		
Value Domain Type	0 (not enumerated)		
Value Domain			
	Feature Attribute Value		
	Label	Code	Definition

4.2.1.3. PALS_COR_L

Name	PALS Correlation Length (PALS_COR_L)
Definition	The correlation length (cm) measured in the look direction of the PALS.

Aliases	PALS_COR_L		
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. R2_HEIGHT

Name	RADARSAT-2 RMS Height (R2_HEIGHT)		
Definition	The RMS height (cm) measured in the look direction of RADARSAT-2.		
Aliases	R2_HEIGHT		
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. R2_COR_L

Name	RADARSAT-2 Correlation Length (R2_COR_L)		
Definition	The correlation length (cm) measured in the look direction of RADARSAT-2.		
Aliases	R2_COR_L		
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

A handheld Garmin Global Positioning System (GPS) was used to navigate to each sample site. The accuracy of the device is to within 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	Soil roughness measurements were taken from 50 agricultural fields within the study area. Sites were sampled once June 10, 13 and 15 during the first phase of the campaign: 3 to 4 weeks after all crops had been seeded.
Scope	

7. DATA CAPTURE

Soil roughness measurements were collected at site locations 1 and 2 in the look directions of RADARSAT-2 (descending mode) and airborne PALS. At each location, the surface roughness was measured using a digital camera and a 1m long pin profilometer consisting of 200 needles spaced from an interval of 5mm. To adequately measure the correlation length, the roughness measurements were taken over a 3m profile created by placing the 1m profiler end to end in the look direction of each SAR sensor (RADARSAT-2 descending mode and PALS). A digital camera recorded the pin meter profiles. The digital photos were used to calculate the correlation length and RMS height with MATLAB software.

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.