



SMAPVEX16 Manitoba Radiometer Brightness Temperature Data, Version 1

USER GUIDE

How to Cite These Data

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

McNairn, H., K. Gottfried, and J. Powers. 2018. *SMAPVEX16 Manitoba Radiometer Brightness Temperature Data, Version 1*. [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. <https://doi.org/10.5067/7IJ1A8AGJRSL>. [Date Accessed].

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

FOR CURRENT INFORMATION, VISIT https://nsidc.org/data/SV16M_TB



National Snow and Ice Data Center

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1 DATA DESCRIPTION

1.1 Parameters

The main parameter for this data set is brightness temperature (T_b), measured in Kelvins.

1.2 File Information

1.2.1 Format

Data are available in Comma-Separated Values (.csv) files.

Location information for the radiometer sites is available in a Keyhole Markup Language zipped (.kmz) file.

Extensible Markup Language (.xml) files with associated metadata are also provided.

1.2.2 File Contents

Brightness temperature (T_b) was measured using two L-Band radiometers, one run by the University of Sherbrooke (US) and one run by Environment Canada and Climate Change (ECCC). Both radiometers captured multi-angular and continuous measurements.

US and ECCC L-Band multi-angular measurements are stored in files SV16M_TB_USRadiometerAngular_Vers3.csv and SV16M_TB_ECRadiometerAngular_Vers3.csv, respectively. Table 1 contains the column headers and descriptions which apply to both data files; Figure 1 shows 10 lines of sample data for the US L-Band multi-angular measurements.

Table 1. Multi-Angular Measurement File Descriptions

Column Headers	Description
TIMESTAMP	Time of sampling in Central Daylight Savings Time (MM/DD/YY HH:MM)
INC_ANGLE	Incidence angle ($^{\circ}$), measurements taken at 5° increments between 30° and 70°
TBH	Horizontally polarized T_b (kelvins, K)
TBH_STD	Standard deviation of the horizontally polarized T_b (kelvins, K)
TBV	Vertically polarized T_b (kelvins, K)
TBV_STD	Standard deviation of the vertically polarized T_b (kelvins, K)

TIMESTAMP	INC_ANGLE	TBH	TBH_STD	TBV	TBV_STD
6/8/16 7:52	30	252.81	0.3	263.71	0.36
6/8/16 7:53	35	245.76	0.28	264.57	0.33
6/8/16 7:55	40	243.89	0.39	265.77	0.37
6/8/16 7:57	45	231.96	0.39	266.49	0.36
6/8/16 7:58	50	225.86	0.35	266.19	0.36
6/8/16 8:01	55	215.34	0.42	264.58	0.37
6/8/16 8:03	60	195.35	0.3	255.12	0.27
6/8/16 8:04	65	190.78	0.32	251.45	0.32
6/8/16 8:06	70	169.56	1.13	227.43	1.46
6/9/16 6:55	30	251.48	0.34	265.16	0.32

Figure 1. Sample of US L-Band Radiometer Multi-Angular Measurements.

US and ECCC L-Band continuous measurements are stored in files SV16M_TB_UdeSRadiometerContinuous_Vers3.csv and SV16M_TB_ECRadiometerContinuous_Vers3.csv, respectively. Table 2 contains the column headers and descriptions which apply to both data files; Figure 2 shows 10 lines of sample data for the ECCC L-Band continuous measurements.

Table 2. Continuous Measurement File Descriptions

Column Headers	Description
TIMESTAMP	Time of sampling in Central Daylight Savings Time (MM/DD/YY HH:MM)
TBH	Horizontally polarized Tb (kelvins, K)
TBH_STD	Standard deviation of the horizontally polarized Tb (kelvins, K)
TBV	Vertically polarized Tb (kelvins, K)
TBV_STD	Standard deviation of the vertically polarized Tb (kelvins, K)

TIMESTAMP	TBH	TBH_STD	TBV	TBV_STD
6/6/16 22:15	193.81	0.99	244.56	0.86
6/6/16 22:45	194.14	0.96	244.41	0.91
6/6/16 23:15	194.31	0.93	244.44	0.92
6/6/16 23:45	194.73	1.04	244.49	0.91
6/7/16 0:15	195.65	1.05	244.63	0.84
6/7/16 0:45	195.79	1.06	244.66	0.91
6/7/16 1:15	195.75	1.03	244.68	0.94
6/7/16 1:45	196.12	1.04	244.63	0.89
6/7/16 2:15	197.06	1.11	244.93	0.89
6/7/16 2:45	197.41	1.01	245.02	0.88

Figure 2. Sample of ECCC L-Band Radiometer Continuous Measurements

1.2.3 Naming Convention

Files in this data set are named according to the following convention and as described in Table 3.

SV16M_TB_[INST]Radiometer[BAND]_Vers3.csv

Example:

SV16M_TB_ECRadiometerContinuous_Vers3.csv

Table 3. File Naming Conventions

Variable	Description
SV16M_TB	Short name for SMAPVEX16 (Soil Moisture Active Passive Validation Experiment 2016) Manitoba Radiometer Brightness Temperature Data
INST	EC = Environment Canada and Climate Change UdeS or US = University of Sherbrooke
Band	Angular = multi-angular measurements Continuous = continuous measurements
Vers3	Version 3

Site locations are stored in the file named SV16M_TB_RadiometerSites.kmz.

1.2.4 File Size

CSV files range between approximately 10 KB and 77 KB.

The KMZ file is approximately 1.7 KB.

1.3 Spatial Information

1.3.1 Coverage

The ECCO L-Band radiometer was positioned at 49.385358° N, 97.896719° W

The US L-Band radiometer was positioned at 49.648789° N, 97.888578° W

1.3.2 Resolution

Data are point measurements (radiometers were placed at fixed locations).

1.3.3 Geolocation

Table 4 provides information about this data set's coordinate system.

Table 4. Geolocation Details

Geographic coordinate system	NAD83(CSRS)
Projected coordinate system	NAD83(CSRS) / UTM Zone 14N
Longitude of true origin	-99
Latitude of true origin	0
Scale factor at longitude of true origin	0.9996
Datum	NAD83 Canadian Spatial Reference System
Ellipsoid/spheroid	GRS 1980
Units	meter
False easting	500000
False northing	0
EPSG code	3158
PROJ4 string	+proj=utm +zone=14 +ellps=GRS80 +towgs84=0,0,0,0,0,0,0 +units=m +no_defs
Reference	https://epsg.io/3158

1.4 Temporal Information

1.4.1 Coverage

06 June through 21 July 2016

1.4.2 Resolution

On a given sample date, the time between multi-angular measurements varied, but was generally between 1 and 3 minutes. The time between continuous measurements was 30 minutes.

2 DATA ACQUISITION AND PROCESSING

2.1 Background

This data set was collected as part of the [2016 Soil Moisture Active Passive Validation Experiment](#) conducted in the Carman/Elm Creek region of Manitoba, Canada. The experiment was designed to calibrate and increase the accuracy of NASA's Soil Moisture Active Passive (SMAP) products. For this data set, brightness temperature measurements were collected to coincide with SMAP satellite overpasses and Passive Active L- and S-band Sensor (PALS) flights.

2.2 Acquisition

For the duration of the SMAPVEX16 Manitoba campaign, the US L-band radiometer was installed in a wheat field (Field 105), while the ECCC L-band radiometer was installed in a canola field (Field 202). Both radiometers were installed at the edge of the field with an incident angle of 5 degrees.

Continuous data were collected from 06 June 2016 to 21 July 2016. Continuous measurements were halted for less than 2 hours at a time, usually 20-30 minutes, to calibrate the instruments and take multi-angular measurements. Multi-angular measurements were taken between 30 and 70 degrees at 5 degree intervals; readings were taken to coincide with morning in situ soil moisture sampling, PALS flight days, and, when available, evening Soil Moisture and Ocean Salinity (SMOS) acquisitions.

2.3 Processing

Continuous T_b measurements were collected with a 5-second integration time. Measurements were then averaged over 30-minute intervals to synchronize with in situ observations.

2.4 Quality, Errors, and Limitations

Erroneous data were removed. In addition, software issues resulted in some missing data, mostly at the beginning of the campaign.

3 RELATED DATA SETS

[SMAP Data | Overview](#)

4 RELATED WEBSITES

[SMAP at NASA](#)

[SMAPVEX16](#)

5 CONTACTS AND ACKNOWLEDGMENTS

Heather McNairn

Science and Technology Branch
Agriculture and Agri-Food Canada
200-303 Main Street
Winnipeg, Manitoba R3C 3G7 Canada

Kurt Gottfried

Science and Technology Branch
Agriculture and Agri-Food Canada
200-303 Main Street
Winnipeg, Manitoba R3C 3G7 Canada

Jared Powers

Science and Technology Branch | Direction générale des sciences et de la technologie
Agriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada
200-303 Main Street
Winnipeg, Manitoba R3C 3G7 Canada

6 DOCUMENT INFORMATION

6.1 Publication Date

21 August 2018

6.2 Date Last Updated

28 September 2018