



SMAPVEX16 Manitoba Leaf Area Index, 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 Leaf Area Index, Version 1*. [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. <https://doi.org/10.5067/RX8S17GF8ZUH>. [Date Accessed].

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

FOR CURRENT INFORMATION, VISIT https://nsidc.org/data/SV16M_LAI



National Snow and Ice Data Center

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1 DATA DESCRIPTION

1.1 Parameters

The main parameter of this data set is Leaf Area Index (LAI), almost referred to as Plant Area Index (PAI).

1.2 File Information

1.2.1 Format

Data are available in a single Comma Separated Values (.csv) file.

Location information for the relevant field sites are 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

LAI data are presented in one CSV file, SV16M_LAI_CropLAI_Vers3.csv. Table 1 contains more details about this file's contents, and Figure 1 displays the column headers and ten lines of sample data.

Table 1. File Contents

Column Headers	Description
SITE_ID	Unique ID of the field site where sampling occurred; each field had 16 possible sample locations
DATE	Date in MM/DD/YY format
CROP	Crop grown in the sampled field in 2016
TEAM_ID	Team identification number
CAM_ORIENT	Orientation of the camera to the crop, either downward (camera positioned above the canopy) or upward (camera positioned below the canopy)
SAMPLE_ORIENT	Orientation of the camera with regards to the crop row (perpendicular, parallel, or diagonal)
PHOTO_NUM	Number of photos taken at the site
FCOVER_MEAN	The mean fraction of the soil/sky covered by the vegetation (mean fraction cover), calculated from all the processed photos at each site
FCOVER_STD	Standard deviation of the mean fraction cover

Column Headers	Description
PAI_TRUE	Plant Area Index (PAI), estimation of the LAI calculated in CanEye software
EFF_PAI	Modeled PAI, based on modeling in CanEye software
EFF_PAI_MILLER	Modeled PAI derived using the Miller (1967) formula; this model assumes the gap fraction measured in all directions depends only on the view zenith angle
QC	1: great quality 2: use with caution
QC_FLAG	Rationale for assigning a poorer quality control flag: QC_SENESVEG: Senescing vegetation QC_WEEDS: Weeds QC_SHADOW: Shadows WC_TRACTORTRACKS: Tractor tracks
COMMENTS	Comments regarding any issue observed in the field

SITE_ID	DATE	CROP	TEAM_ID	CAM_ORIENT	SAMPLE_ORIENT	PHOTO_NUM	FCOVER_MEAN	FCOVER_STD	PAI_TRUE	EFF_PAI	EFF_PAI_MILLER	QC	QC_FLAG	COMMENTS
14-02	6/13/16	Corn	Team 1	Downward	Parallel	14	5	4.7	0.17	0.14	0.15	1		Some weeds
14-11	6/13/16	Corn	Team 1	Downward	Parallel	14	5.4	3.2	0.17	0.14	0.16	1		Some weeds
14-14	6/13/16	Corn	Team 1	Downward	Parallel	12	5.3	2.8	0.2	0.17	0.19	1		Some weeds
31-02	6/13/16	Wheat	Team 1	Downward	Perpendicular	14	53.9	7.8	2.31	2.05	2.12	1		
31-11	6/13/16	Wheat	Team 1	Downward	Perpendicular	14	52.2	4.8	2.08	1.88	2.04	1		
31-14	6/13/16	Wheat	Team 1	Downward	Perpendicular	14	56.3	4.1	2.16	2.09	2.13	1		
32-02	6/13/16	Wheat	Team 1	Downward	Perpendicular	13	53.8	5.1	1.99	1.84	1.81	1		
32-11	6/13/16	Wheat	Team 1	Downward	Diagonal	13	67.1	4.3	2.82	2.42	2.48	1		
32-14	6/13/16	Wheat	Team 1	Downward	Perpendicular	14	70.2	3.2	2.4	2.24	2.3	1		
228-02	6/13/16	Soybeans	Team 1	Downward	Diagonal	14	4.2	2.2	0.12	0.11	0.11	1		

Figure 1. Sample Data

1.2.3 Naming Convention

File names are:

SV16M_LAI_CropLAI_Vers3.csv

SV16M_LAI_FieldSites.kmz

In the file name, SV16M_LAI stands for SMAPVEX16 (Soil Moisture Active Passive Validation Experiment 2016) Manitoba Leaf Area Index.

1.2.4 File Size

The CSV file is approximately 61 KB.

The KMZ file is approximately 29 KB.

1.3 Spatial Information

1.3.1 Coverage

Northernmost Latitude: 49.761171° N
 Southernmost Latitude: 49.384076° N
 Easternmost Longitude: 97.756264° W
 Westernmost Longitude: 98.098417° W

1.3.2 Resolution

LAI was estimated through photographs, each of which represents a single point measurement. The distance between photographs was approximately 5 meters.

1.3.3 Geolocation

Table 2 provides information on the coordinate reference system for this data set.

Table 2. Coordinate Reference System

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

Data were collected between 13 June 2016 and 21 July 2016.

1.4.2 Resolution

The time between measurements varied.

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 Soil Moisture Active Passive (SMAP) products. For this data set, soil cores were collected to coincide with SMAP satellite overpasses and Passive Active L- and S-band Sensor (PALS) flights.

2.2 Acquisition

LAI was estimated from hemispherical digital photographs. Photos were taken at 50 agricultural fields, each of which has 16 possible sampling locations. A total of three sampling sites were photographed per field. Prior to the campaign, the location of each sample site was assigned in ArcGIS. During the campaign, sites were identified using Garmin GPS units. The accuracy of each GPS unit was approximately 3 m.

On each sampling date, crews took photographs along two transects, seven per transect, for a total of 14 pictures per site. To capture each photograph, a camera with a fish eye lens was positioned at least 50 cm above or below the canopy. If the picture was taken from above the canopy, the camera was mounted on a pole. Pictures were only taken from below the canopy for corn crops in July. In all instances, cameras were positioned relative to the sun to minimize shadowing. Photographs were spaced approximately 5 m apart along each transect.

2.3 Processing

ViewNX-2 (Nikon) software was used to enhance the quality of photographs. Images were then imported into the CanEye software for additional post-processing. CanEye parameters, which include number of lines, number of columns, Julian date, and latitude, were configured to the photos. Any non-soil or other anomalous areas of the pictures were masked and problematic photographs were removed. Lastly, the photos were carefully classified into vegetation and soil. CanEye then computed the average LAI for each sampling site from all usable photographs, up to 14 per site.

2.4 Quality, Errors, and Limitations

The data were manually reviewed for quality control and assigned a quality control flag, either "1" or "2." A "1" indicates that the record is of great quality, while a "2" indicates that the record should be used with caution. The rationale for assigning a poorer quality control class is provided and may offer some aid in interpreting potential errors.

2.5 Instrumentation

2.5.1 Description

Photographs were taken on a Nikon camera with a fish eye lens.

3 SOFTWARE AND TOOLS

Photographs were post-processed in [ViewNX-2](#) and [CanEye](#) Version 5.1 software. More details on ViewNX-2 can be found on [Nikon's](#) website. More details on CanEye can be found on the [CAN-EYE](#) website.

4 RELATED DATA SETS

[SMAP Data| Overview](#)

5 RELATED WEBSITES

[SMAP at NASA](#)
[SMAPVEX16](#)

6 CONTACTS AND ACKNOWLEDGMENTS

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7 REFERENCES

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8 DOCUMENT INFORMATION

8.1 Publication Date

6 August 2018

8.2 Date Last Updated

12 November 20