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The documentation for this data set was provided solely by the Principal Investigator(s) and was not further developed, thoroughly reviewed, or edited by NSIDC. Thus, support for this data set may be limited.

SMEX04 Two-Dimensional Synthetic Aperture Radiometer (2D-STAR) Brightness Temperatures

Summary

This data set includes dual-polarized L-band brightness temperatures measured by the Two-Dimensional Synthetic Aperture Radiometer (2D-STAR) instrument. An aircraft carrying the instrument was flown over Arizona, USA and Sonora, Mexico on various dates from 07 August to 26 August 2004 as part of the Soil Moisture Experiment 2004 (SMEX04). The 2D-STAR is a research instrument developed under the NASA Instrument Incubator Program with an aim to demonstrate the capability of the two-dimensional aperture synthesis radiometer at low frequency (approximately 1.4 GHz) to observe surface variables such as soil moisture and ocean salinity. Data are provided in tab-delimited ASCII text files and are available via FTP.

These data were collected as part of a validation study for the Advanced Microwave Scanning Radiometer - Earth Observing System (AMSR-E). AMSR-E is a mission instrument launched aboard NASA's Aqua Satellite on 04 May 2002. AMSR-E validation studies linked to SMEX are designed to evaluate the accuracy of AMSR-E soil moisture data. Specific validation objectives include assessing and refining soil moisture algorithm performance; verifying soil moisture estimation accuracy; investigating the effects of vegetation, surface temperature, topography, and soil texture on soil moisture accuracy; and determining the regions that are useful for AMSR-E soil moisture measurements.

Citing These Data

To broaden awareness of our services, NSIDC requests that you acknowledge the use of data sets distributed by NSIDC. Please refer to the citation below for the suggested form, or [contact NSIDC User Services](http://nsidc.org/forms/contact.html) for further information at: <http://nsidc.org/forms/contact.html>

Jackson, Thomas J., Dongryeol Ryu, and David M. Le Vine. 2009. *SMEX04 Two-Dimensional Synthetic Aperture Radiometer (2D-STAR) Brightness Temperatures*. Boulder, Colorado USA: NASA DAAC at the National Snow and Ice Data Center.

Overview Table

Category	Description
Data format	ASCII tab-delimited files
Spatial coverage and resolution	Arizona, USA and Sonora, Mexico: Southernmost Latitude: 29.6° N Northernmost Latitude: 32.1° N Westernmost Longitude: 110.2° W Easternmost Longitude: 109.6° W
Temporal coverage	Arizona, USA: 08 and 24-26 August 2004 Sonora, Mexico: 07-08 and 24-26 August 2004 Resolution of each grid cell is 800 m.

File naming convention	2DSTAR_SMEX04_XX_YYYYMMDD.txt
File size	~242-260 KB
Parameter(s)	H-/V-polarized brightness temperatures (K) Soil moisture (m ³ / m ³)
Procedure for obtaining data	Data are available via FTP.

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1. Contacts and Acknowledgments:

Technical Contact:

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2. Detailed Data Description:

Format:

Data are provided in tab-delimited ASCII text files. Table 1 describes the data listed in each column. Data that were not collected are shown as -9999.

Table 1. Data File Description

Data File Column	Description
Column 1	UTM Easting (m)
Column 2	UTM Northing (m)
Column 3	H-polarized brightness temperatures (K)
Column 4	V-polarized brightness temperatures (K)
Column 5	Soil moisture (m ³ / m ³)

File Naming Convention:

The ASCII text files are named according to the following convention and as described in Table 2:

2DSTAR_SMEX04_XX_YYYYMMDD.txt

Where:

Table 2. Description of File Name Variables

Variable	Description
2DSTAR	Two-Dimensional Synthetic Aperture Radiometer
SMEX04	Soil Moisture Experiment 2004

XX	Study Region: AZ = Arizona SO = Sonora
YYYY	4-digit year
MM	2-digit month
DD	2-digit day
.txt	Indicates this is a text file

File Size:

Files range from approximately 242 to 260 KB.

Spatial Coverage:

Table 3 contains the exact locations of the 2D-STAR study regions for this data set. Coordinates are listed in Easting, Northing, Latitude, and Longitude for each region. All regions were located in UTM Zone 12. The datum is NAD83/WGS84 and the resolution of each grid cell is 800 m.

Table 3. Locations of SMEX04 2D-STAR Study Regions

Region	Region Bounding Box Corner	Easting	Northing	Latitude	Longitude
Arizona	Upper Left	3555000 6270	00	32.124236222	-110.289678626
	Upper Right	3555000	567000 32.1	29402360	-109.653684955
	Lower Right	3475800	567000 31.4	14903779	-109.663991234
	Lower Left	3475800	627000 31.4	09878818	-110.295117690
Sonora	Upper Left	3381000	574800 30.5	61236855	-110.220052577
	Upper Right	3285000	574800	29.694898092	-110.226832041
	Lower Right	3285000	522000	29.692836969	-110.772589783
	Lower Left	3381000	522000	30.559103051	-110.770595530

Temporal Coverage:

Arizona, USA: 08 and 24-26 August 2004

Sonora, Mexico: 07-08 and 24-26 August 2004

Temporal Resolution:

Brightness temperatures and soil moisture data were collected once per day.

Parameter or Variable:

Parameter Description:

Parameters include horizontally- and vertically-polarized brightness temperatures measured in degrees Kelvin, and soil moisture (m³/ m³).

3. Data Access and Tools:

Data Access:

Data are available via FTP at:

ftp://sidads.colorado.edu/pub/DATASETS/AVDM/data/soil_moisture/SMEX04/Arizona/aircraft/2DSTAR/

Software and Tools:

Any word-processing program or Web browser is sufficient for viewing the text files.

4. Data Acquisition and Processing:**Sensor or Instrument Description:**

The 2D-STAR instrument is an airborne synthetic aperture radiometer capable of measuring multi-angular dual-polarized brightness temperatures and soil moisture over land and water.

5. References and Related Publications:

Please see the USDA SMEX04 Web site (www.hydrolab.arsusda.gov/smex04/) for in-depth information on the science mission and goal of the SMEX project.

6. Document Information:**Glossary and Acronyms:**

Please see the EOSDIS Acronyms <<http://harp.gsfc.nasa.gov/v0ims/acronyms.html>> list for a general list of acronyms. The following acronyms are used in this document:

2D-STAR	Two-Dimensional Synthetic Aperture Radiometer
AZ	Arizona
AMSR-E	Advanced Microwave Scanning Radiometer - Earth Observing System
ASCII	American Standard Code for Information Interchange
FTP	File Transfer Protocol
H	Horizontal
K	Kelvin
NAD83	North American Datum of 1983
NASA	National Aeronautics and Space Administration
NSIDC	National Snow and Ice Data Center
SMEX04	Soil Moisture Experiment 2004
UTM	Universal Transverse Mercator
V	Vertical
WGS84	World Geodetic System 1984

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