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SMEX03 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 Alabama, Georgia, and Oklahoma USA on various dates from 25 June to 15 July 2003 as part of the Soil Moisture Experiment 2003 (SMEX03). 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. *SMEX03 Two-Dimensional Synthetic Aperture Radiometer (2D-STAR) Brightness Temperatures*. Boulder, Colorado USA: National Snow and Ice Data Center. Digital media.

Overview Table

Category	Description
Data format	ASCII tab-delimited files
Spatial coverage and resolution	Alabama: Southernmost Latitude: 34.66° N Northernmost Latitude: 35.19° N Westernmost Longitude: 87.77° W Easternmost Longitude: 87.08° W Georgia: Southernmost Latitude: 30.96° N

	<p>Northernmost Latitude: 31.90° N Westernmost Longitude: 83.97° W Easternmost Longitude: 83.36° W</p> <p>Oklahoma North: Southernmost Latitude: 36.10 ° N Northernmost Latitude: 36.87 ° N Westernmost Longitude: 98.04 ° W Easternmost Longitude: 97.41 ° W</p> <p>Oklahoma South: Southernmost Latitude: 34.44 ° N Northernmost Latitude: 35.42 ° N Westernmost Longitude: 98.34° W Easternmost Longitude: 97.70 ° W</p> <p>Resolution of each grid cell is 800 m.</p>
Temporal coverage	<p>Alabama: 25, 27, 29, and 30 June 2003, and 02 July 2003</p> <p>Georgia: 25 and 29-30 June 2003</p> <p>Oklahoma North: 10 and 12-15 July 2003</p> <p>Oklahoma South: 02, 10, and 12-15 July 2003</p>
File naming convention	2DSTAR_SMEX03_XX(X)_YYYYMMDD.txt
File size	~198-301 KB
Parameter(s)	H-/V-polarized brightness temperatures (K)
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)

File Naming Convention:

The ASCII text files are named according to the following convention and as described in Table 2:
2DSTAR_SMEX03_XX(X)_YYYYMMDD.txt

Where:

Table 2. Description of File Name Variables

Variable	Description
2DSTAR	Two-Dimensional Synthetic Aperture Radiometer
SMEX03	Soil Moisture Experiment 2003
XX (X)	Study Region: AL = Alabama GA = Georgia OKN = Oklahoma North OKS = Oklahoma South
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 198 to 301 KB.

Spatial Coverage:

Table 3 contains the precise locations of the 2D-STAR study regions for this data set. Coordinates are listed in Easting, Northing, Latitude, and Longitude for each region. All locations are in the NAD83/WGS84 datum, located in UTM Zone 14. The resolution of each grid cell is 800 m.

Table 3. Locations of 2D-STAR Study Regions

Region	Region Bounding Box Corner	Easting	Northing	Latitude	Longitude
Alabama	Upper Left	492000	3894600	35.194353404	-87.08787792
	Upper Right	612000	3894600	35.188137035	-85.769834626
	Lower Right	492000	3837000	34.674943785	-85.777562595
	Lower Left	612000	3837000	34.668845602	-87.087325703
Georgia	Upper Left	219000	3532200	31.903257457	-83.970846870
	Upper Right	219000	3429000	30.972927502	-83.941646829
	Lower Right	274200	3429000	30.961064855	-83.364252777
	Lower Left	274200	3532200	31.890956391	-83.387736190
Oklahoma North	Upper Left	585800	4081000	36.871048244	-98.037331796
	Upper Right	641000	4081000	36.864419443	-97.418165280
	Lower Right	641000	3997000	36.107428397	-97.433484464
	Lower Left	585800	3997000	36.113877589	-98.046657639
Oklahoma South	Upper Left	560400	3920100	35.422485463	-98.334661234
	Upper Right	618000	3920100	35.417323871	-97.700276141
	Lower Right	618000	3812100	34.443677450	-97.715544713
	Lower Left	560400	3812100	34.448656578	-98.342479279

Temporal Coverage:

Alabama: 25, 27, 29, and 30 June 2003, and 02 July 2003

Georgia: 25 and 29-30 June 2003

Oklahoma North: 10 and 12-15 July 2003

Oklahoma South: 02, 10, and 12-15 July 2003

Temporal Resolution:

Brightness temperatures were collected once per day.

Parameter or Variable:

Parameter Description:

Horizontally- and vertically-polarized brightness temperatures measured in degrees Kelvin.

3. Data Access and Tools:

Data Access:

Data are available via FTP at:

ftp://sidacs.colorado.edu/pub/DATASETS/AVDM/data/soil_moisture/SMEX03/Alabama/aircraft_remote_sensing/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 over land and water.

5. References and Related Publications:

Please see the USDA SMEX03 Web site (www.hydrolab.arsusda.gov/smex03/) 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
AL	Alabama
AMSR-E	Advanced Microwave Scanning Radiometer - Earth Observing System
ASCII	American Standard Code for Information Interchange
FTP	File Transfer Protocol
GA	Georgia
H	Horizontal
K	Kelvin
NAD83	North American Datum of 1983
NASA	National Aeronautics and Space Administration
NSIDC	National Snow and Ice Data Center
OKN	Oklahoma North
OKS	Oklahoma South
SMEX03	Soil Moisture Experiment 2003
UTM	Universal Transverse Mercator
V	Vertical
WGS84	World Geodetic System 1984

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