SMEX04 Aircraft Polarimetric Scanning Radiometer (PSR) Data

Summary

The Polarimetric Scanning Radiometer (PSR) is an airborne microwave imaging radiometer developed and operated by the National Oceanic and Atmospheric Administration (NOAA) Environmental Technology Laboratory. This data set includes brightness temperature (Tb) and soil moisture data. Measurements were taken 5 August through 26 August 2004 in the regional domains in Arizona and Walnut Gulch Watershed areas in USA and Sonora, Mexico during the Soil Moisture Experiment 2004 (SMEX04). The PSR/CX band radiometer is similar to the low-frequency channel of the Advanced Microwave Scanning Radiometer (AMSR-E) on the NASA Aqua satellite. The radiometer operates at V (vertical) and H (horizontal) polarizations. Data are available from NSIDC via FTP.

AMSR-E is an 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

The following example shows how to cite the use of this data set in a publication. List the principal investigators, year of data set release, data set title, publisher: NSIDC, and digital media.

Jackson, Thomas J., Rajat Bindlish, Albin J. Gasiewski, Marian Klein, and Boba Stankov. 2009. *SMEX04 Aircraft Polarimetric Scanning Radiometer (PSR) Data*. Boulder, Colorado USA: NASA DAAC at the National Snow and Ice Data Center.

Overview Table

Category	Description
Data format	ASCII text files
Spatial coverage and resolution	All locations are in NAD83/WGS84 datum Northing Easting Latitude Longitude Arizona (UTM Zone 12) 3555000,627000,32.124236222,-109.653684955 3555000,567000,32.129402360,-110.289678626 3475800,567000,31.414903779,-110.295117690 3475800,627000,31.409878818,-109.663991234 Sonora, Mexico (UTM Zone 12) 3381000,574800,30.559103051,-110.220052577 3285000,574800,29.692836969,-110.226832041 3285000,522000,29.694898092,-110.772589783 3381000,522000,30.561236855,-110.770595530
Temporal coverage and resolution	5 August - 26 August 2004
File naming convention	Gridded files have names such as "AZ0805a.txt" and "SO0805.txt." The two-letter prefix indicates the area (AZ=Arizona regional, SO=Sonora regional, followed by the month and day. On August 26 the AZ domain was flown twice. A suffix a or b is added to indicate the first or second set of flights. The ungridded raw data files start with TB followed by the month and day and a 1 digit number (1-4 indicating the flight line; 1-west to 4-east). The last character (A or B) indicates the first or second observation over the same flight line (TB0805_1A.txt).
File size	File sizes range 267 KB to 4.31 MB
Parameter(s)	Brightness temperatures, Soil Moisture
Procedures for obtaining data	Data are available via FTP.

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1. Contacts and Acknowledgments

Investigator(s) Name and Title

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2. Detailed Data Description

Format

Data are provided in ASCII text format.

File and Directory Structure

The main directories are regional and watershed, for the two different regions studied. Subdirectories under each of these are gridded and ungridded. The gridded directory contains brightness temperatures and estimated soil moisture. The ungridded directory contains the raw brightness temperature observations.

File Naming Convention

Gridded files have names such as " AZ0805a.txt" and "SO0805.txt" The two-letter prefix indicates the area (AZ=Arizona regional, SO=Sonora regional), followed by the month and day.
The ungridded raw data files start with TB followed by the month and day and a 2 digit number (TB0805_1A.txt).

File Size

File sizes range 64 KB to 3.5 MB.

Spatial Coverage

All locations are in NAD83/WGS84 datum

Northing Easting Latitude Longitude

Arizona (UTM Zone 12)

3555000,627000,32.124236222,-109.653684955
3555000,567000,32.129402360,-110.289678626
3475800,567000,31.414903779,-110.295117690
3475800,627000,31.409878818,-109.663991234

Sonora, Mexico (UTM Zone 12)

3381000,574800,30.559103051,-110.220052577
3285000,574800,29.692836969,-110.226832041
3285000,522000,29.694898092,-110.772589783
3381000,522000,30.561236855,-110.770595530

Temporal Coverage

This study was conducted 5 August through 26 August 2004.

Parameter or Variable

Parameter Description

For the ungridded brightness temperature, the first two columns in the data columns are the UTM (easting and northing), the third and fourth column are the geographic latitude and longitude, the next four columns are the brightness temperatures: C-band (7.32 GHz) (V and H) and X-Band (10.7

GHz) (V and H) observations and the last column is the azimuth angle, respectively.

For the gridded brightness temperature, the first two columns in the data columns are the UTM (easting and northing) and the next four columns are the brightness temperatures: C-band (7.32 GHz) (V and H) and X-Band (10.7 GHz) (V and H) observations, respectively.

For the gridded soil moisture, the first two columns in the data columns are the UTM (easting and northing) and the last column is the estimated soil moisture.

3. Data Access and Tools

Data Access

Data are available via FTP.

Volume

Total volume of data files is approximately 100 MB.

Related Data Collections

- AMSR-E Validation Data
- AMSR-E Data at NSIDC

4. Data Acquisition and Processing

Sensor or Instrument Description

The PSR/CX instrument was integrated onto the NRL WFF P3B aircraft in the aft portion of the bomb bay. The PSR scans at a constant incidence angle of 55°. In SMEX04, PSR was flown over the regional areas. There were four regional flight lines at an altitude of ~8000 m were flown over AZ and SO. The P3 was deployed out of Tucson, AZ from August 5 to August 26, 2004.

5. References and Related Publications

Refer to the USDA SMEX04 Web site for in-depth information on the science mission and goal of the SMEX project: http://hydrolab.arsusda.gov/smex04/.

R. Bindlish, T. J. Jackson, A. Gasiewski, B. Stankov, M. Klein, M. H. Cosh, I. Mladenova, C. Watts, E. Vivoni, V. Lakshmi, J. Bolten, T. Keefer. 2008: Aircraft-based soil moisture retrievals under mixed vegetation and topographic conditions. Remote Sensing of Environment 112 (2008) 375–390.

6. Document Information

List of Acronyms

The following acronyms are used in this document:

AMSR-E - Advanced Microwave Scanning Radiometer - Earth Observing System
FTP - File Transfer Protocol
PSR - Polarimetric Scanning Radiometer
SMEX - Soil Moisture Experiment
Tb - brightness temperature