

**Notice to Data Users:**  
**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 Airborne Visible/Infrared Imaging Spectrometer (AVIRIS) Data: Arizona**

AVIRIS is an imaging spectrometer built and operated by the Jet Propulsion Laboratory in Pasadena, California USA. It has 224 contiguous narrow wave-bands from approximately 0.4 to 2.5  $\mu\text{m}$  wavelength. For the SMEX04 study, AVIRIS was deployed in an ER2 aircraft flying at approximately 20 km above sea level. From this altitude, the pixel size is about 20 m by 20 m and the swath was about 10.5 km wide. For more information about the AVIRIS instrument, please see the AVIRIS Web site (<http://aviris.jpl.nasa.gov/>).

The purpose of the AVIRIS acquisition was to determine canopy water content using biophysical algorithms to validate algorithms developed for NASA's MODIS sensor on the satellite platforms Terra and Aqua (Cheng et al. 2008). The physical basis for the canopy water content retrieval is from Gao and Goetz (1995).

### **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.

Hunt, Jr., E. Raymond, and Michael H. Cosh. 2009. *SMEX04 Airborne Visible/Infrared Imaging Spectrometer (AVIRIS) Data: Arizona*. Boulder, Colorado USA: National Snow and Ice Data Center. Digital media.

### **Overview**

AVIRIS data were acquired over both the Arizona and Sonora study sites. The data over the Arizona site are freely available. There are 7 north-south flightlines with 6 overlapping flightlines covering the study area (see the `smex04_az_er2-flightlines.jpg` file). Each flightline is labeled with letters showing the start and end, respectively.

<b>Table 1: ER2 Flightlines for SMEX04 in AZ</b>		
Run	Title	Start-End
10	SMEX 7	M-N
11	SMEX 6	O-P
12	SMEX 4	Q-R

13	SMEX 2	S-T
14	SMEX 1	U-V
15	SMEX 3	W-X
16	SMEX 5	Y-Z

## File Naming Convention

The file names are `fyymmddt01p00rxx`, where `yy` is the last two digits of year, `mm` indicates the digits for month, and `dd` is the digits for date. `Rxx` is for Run `xx` (see Table 1), which is a single flightline. In contrast to earlier years, the AVIRIS flightlines are not divided up into smaller scenes. Each `.readme` file is an ASCII text file describing the various files for each run.

The image data are calibrated spectral radiances ( $\mu\text{W cm}^{-2} \text{nm}^{-1} \text{sr}^{-1}$ ) encoded into binary 16-bit signed integers in the IEEE format in a band interleaved by pixel (BIP) format. Various atmospheric-correction programs can be used to calculate spectral reflectances.

The following types of files are included:

PER FLIGHT LINE (i.e., occurs once per tar file/tape):

*.info	general information about the flight line
*.gain	multiplication factors, radiance to 16-bit integer
*.geo	geometric calibration data
*.eng	engineering data
*.nav	navigation data
*.rcc	radiometric calibration coefficients
*.readme	user <code>.geo</code> readme file
*.spc	spectral calibration file
*.glt	geometric look up table
*.glt.hdr	geometric look up table header
*.igm	input geometry file
*.igm.hdr	input geometry file header

PER SCENE (i.e., occurs once or several times per tar file/tape):

*.img	calibrated AVIRIS radiance (image) data
*.img.hdr	image format of the scene

OTHER

*.plog	plog file
*.sat	partial saturation file
*.sat.hdr	partial saturation file header

For additional information, refer to the AVIRIS Web site (<http://aviris.jpl.nasa.gov>).

## **References**

Cheng, Y.-B., S. L. Ustin, D. Riaño, and V. C. Vanderbilt. 2008. Water Content Estimation from Hyperspectral Images and MODIS Indexes in Southeastern Arizona. *Remote Sensing of Environment* 112: 363-374.

Gao, B.-C., and A. F. H. Goetz. 1995. Retrieval of Equivalent Water Thickness and Information Related to Biochemical Components of Vegetation Canopies from AVIRIS Data. *Remote Sensing of Environment* 52: 155–162.

## **Technical Contacts**

Dr. E. Raymond Hunt, Jr.  
USDA ARS Hydrology Lab  
U.S. Department of Agriculture  
Email: [erhunt@hydrolab.arsusda.gov](mailto:erhunt@hydrolab.arsusda.gov)

Dr. Michael Cosh  
USDA ARS Hydrology Lab  
U.S. Department of Agriculture  
Email: [mcosh@hydrolab.arsusda.gov](mailto:mcosh@hydrolab.arsusda.gov)

NSIDC User Services  
National Snow and Ice Data Center  
CIRES, 449 UCB  
University of Colorado  
Boulder, CO 80309-0449  
Phone: (303) 492-6199  
Fax: (303) 492-2468  
Email: [nsidc@nsidc.org](mailto:nsidc@nsidc.org)