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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 Surface Temperature Data: Arizona

Summary

This data set contains infrared thermometer data collected as part of the Walnut Gulch Micronet during the SMEX04 Experiment in Arizona.

Citing These Data:

Keefer, T., D. Goodrich, and S. Moran. 2009. *SMEX04 Surface Temperature Data: Arizona*. Boulder, Colorado USA: National Snow and Ice Data Center. Digital media.

Overview Table

Category	Description
Data format	ASCII tab-delimited text
Spatial coverage	31.422° N to 31.112° N, 109.718° W to 110.239° W
Temporal coverage	23 June 2004 to 30 September 2004
File naming convention	SMEX04_IRT_XXX.txt
File size	3.239 MB
Parameter(s)	Land Surface Temperature in Celsius
Procedures for obtaining data	Data are available via FTP.

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1. Contacts and Acknowledgments:

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Acknowledgements:

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2. Detailed Data Description:

Format:

Data set consists of seven ASCII tab-delimited text files, with data column headings listed with descriptions for station data.

File Naming Convention:

These files are named according to the following convention and are further described in Table 1:

SMEX04_IRT_xxx.txt

Table 1. Description of File Name Variables

Variable	Description
SMEX04	Soil Moisture Experiment 2004
IRT	infrared thermometer
xxx	Indicates IRT site name (such as Kendallmet or rg100), or metadata file
.txt	Indicates that this is an ASCII text file

File Size:

File sizes range from 1 KB to 572 KB.

Spatial Coverage:

Southernmost Latitude: 31.112° N
Northernmost Latitude: 31.422° N
Westernmost Longitude: 110.239° W
Easternmost Longitude: 109.718° W

Temporal Coverage:

23 June 2004 to 30 September 2004

Temporal Resolution:

Apogee data were recorded every 5 minutes. Data are 5 minute averages of 1 minute samples.

Parameter or Variable:

Surface Temperature. These data have been quality controlled and suspect or missing data have been removed. Consequently, these data are not continuous.

3. Data Access and Tools:**Data Access:****Software and Tools:**

No special tools are required to view these data. Any text reader or web browser is suitable.

Related Data Collections:

See related information on the Soil Moisture Experiment (SMEX) Web site:
http://nsidc.org/data/amr_validation/soil_moisture/index.html

4. Data Acquisition and Processing:



Apogee infrared thermometer

The Apogee infrared thermometer IRTS-P was installed at 1.5 m AGL, pointing vertically downward, oriented South.

Accuracy of the instrument: ± 0.4 °C from 5 to 45 °C
 ± 0.1 °C when sensor body and target are at the same temperature)

Wavelength range: 6.5 to 14 micrometers

The principle of the use of infrared thermometers (IRT) is that they are filtered to allow only a specific waveband, about 8 to 14 microns, to be transmitted to the IRT detector. This transmitted energy (E) is converted to temperature (T) via the Stefan-Boltzman Law which states $E = \epsilon \sigma T^4$, where ϵ is the emissivity of the object and σ is the Stefan-Boltzmann constant (5.68×10^{-8} Joules $m^{-2} s^{-1} K^{-4}$) (Bugbee et al., 1999).

The apparent target temperature also includes an effect due to the casing temperature of the instrument or the Sensor Body (SB) temperature. A formula is provided by the instrument makers to make this correction (Bugbee et al., 1999).

The basic equation to estimate target temperature for a given SB is:

Corrected Target Temperature = Apparent Target temperature - SEC

And

$$SEC = (0.25/P) * [(Apparent Target Temperature - H)^2 - K]$$

where P, H and K are related to the sensor body temperature T_{sb} as:

$P = 26.168 + 2.8291 * T_{sb} - 0.03329 * T_{sb}^2$	$r^2 = 0.708$
$H = 5.8075 - 0.08016 * T_{sb} + 0.00849 * T_{sb}^2$	$r^2 = 0.674$
$K = -85.943 + 11.740 * T_{sb} + 0.08477 * T_{sb}^2$	$r^2 = 0.893$

For further details about the apogee infrared thermometers see:

http://www.apogee-inst.com/irt_manu.htm and Bugbee et al. (1999).

5. References and Related Publications:

Please see the SMEX04 site to access data:

http://nsidc.org/data/amsr_validation/soil_moisture/smex04/index.html