



# SMEX03 Soil Climate Analysis Network (SCAN): Alabama, Version 1

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## USER GUIDE

### How to Cite These Data

As a condition of using these data, you must include a citation:

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FOR QUESTIONS ABOUT THESE DATA, CONTACT [NSIDC@NSIDC.ORG](mailto:NSIDC@NSIDC.ORG)

FOR CURRENT INFORMATION, VISIT <https://nsidc.org/data/NSIDC-0293>



National Snow and Ice Data Center

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# 1 DETAILED DATA DESCRIPTION

## 1.1 Format

Data are provided as tab-delimited ASCII text. Two types of files are available for each station: hourly and daily. Table 1 displays the station identification number, the station name, and the station location for the SCAN stations whose data are part of this data set. More information on SCAN stations is posted at <http://www.wcc.nrcs.usda.gov/scan>.

Table 1. SMEX03 Alabama SCAN Stations

SCAN Station No.	Station Name	Location	Coordinates (Latitude and Longitude)
2053	WTARS	Madison County, AL	34.90° N, 86.53° W
2054	Hytrop	Jackson County, AL	34.87° N, 86.10° W
2055	Hodges	Marshall County, AL	34.45° N, 86.15° W
2056	Stanley Farm	Morgan County, AL	34.43° N, 86.68° W
2057	AAMU	Madison County, AL	34.78° N, 86.55° W
2058	Hartselle USDA	Morgan County, AL	34.43° N, 87.00° W
2059	Newby Farm	Limestone County, AL	34.85° N, 86.88° W
2075	McAlister Farm	Lincoln County, TN	35.07° N, 86.58° W
2076	Allen Farms	Giles County, TN	35.07° N, 86.90° W
2077	Eastview Farm	Franklin County, TN	35.13° N, 86.18° W

Table 2 lists the column headings and definitions in the hourly files, and Table 3 lists the column headings and definitions in the daily files. More information on these parameters can be found at <http://www.wcc.nrcs.usda.gov/scan/sensors.html>.

**Note 1:** In both files, missing data values are denoted by either -99.9 or -99.99.

**Note 2:** Not all parameters listed are measured at every station.

Table 2. Column Headings and Definitions for the Hourly Files

Column	Description	Units	SCAN Station No.										
			2053	2054	2055	2056	2057	2058	2059	2075	2076	2077	
#	Number of measurements	no units	x	x	x	x	x	x	x	x	x	x	x
ATEA	Average air temperature, sampled at 10 minute intervals	degrees Celsius									x	x	x
ATEC	Current air temperature, sampled at 10 minute intervals	degrees Celsius									x	x	x
ATEN	Minimum air temperature, sampled at 10 minute intervals	degrees Celsius									x	x	x
ATEX	Maximum air temperature, sampled at 10 minute intervals	degrees Celsius									x	x	x
ATHA6	Average air temperature, hourly	degrees Celsius	x	x	x	x	x	x	x	x			
ATHC6	Current air temperature, hourly	degrees Celsius	x	x	x	x	x	x	x	x			
ATHN6	Minimum air temperature, hourly	degrees Celsius	x	x	x	x	x	x	x	x			
ATHX6	Maximum air temperature, hourly	degrees Celsius	x	x	x	x	x	x	x	x			
BAT1	System battery	volts	x	x	x	x	x	x	x	x			
BATCR	Data logger battery	volts									x	x	x
BPC	Current barometric pressure	inches Hg									x	x	x

Column	Description	Units	SCAN Station No.										
			2053	2054	2055	2056	2057	2058	2059	2075	2076	2077	
BPHGC	Current barometric pressure Hg (Mercury)	inches Hg	x	x									
c1rdc	Real dielectric constant, 2-inch depth	no units	x	x	x	x	x	x	x	x	x	x	x
c1sal	Soil salinity, 2-inch depth	grams per liter	x	x	x	x	x	x	x	x	x	x	x
c1smv	Percent water by volume, 2-inch depth	percent	x	x	x	x	x	x	x	x	x	x	x
c1tmp	Soil temperature, 2-inch depth	degrees Celsius	x	x	x	x	x	x	x	x	x	x	x
c2rdc	Real dielectric constant, 4-inch depth	no units	x	x	x	x	x	x	x	x	x	x	x
c2sal	Soil salinity, 4-inch depth	grams per liter	x	x	x	x	x	x	x	x	x	x	x
c2smv	Percent water by volume, four-inch depth	percent	x	x	x	x	x	x	x	x	x	x	x
c2tmp	Soil temperature, 4-inch depth	degrees Celsius	x	x	x	x	x	x	x	x	x	x	x
c3rdc	Real dielectric constant, 8-inch depth	no units	x	x	x	x	x	x	x	x	x	x	x
c3sal	Soil salinity, 8-inch depth	grams per liter	x	x	x	x	x	x	x	x	x	x	x
c3smv	Percent water by volume, 8-inch depth	percent	x	x	x	x	x	x	x	x	x	x	x
c3tmp	Soil temperature, 8-inch depth	degrees Celsius	x	x	x	x	x	x	x	x	x	x	x
c4rdc	Real dielectric constant, 20-inch depth	no units	x	x	x	x	x	x	x	x	x	x	x

Column	Description	Units	SCAN Station No.										
			2053	2054	2055	2056	2057	2058	2059	2075	2076	2077	
c4sal	Soil salinity, 20-inch depth	grams per liter	x	x	x	x	x	x	x	x	x	x	x
c4smv	Percent water by volume, 20-inch depth	percent	x	x	x	x	x	x	x	x	x	x	x
c4tmp	Soil temperature, 20-inch depth	degrees Celsius	x	x	x	x	x	x	x	x	x	x	x
c5rdc	Real dielectric constant, 40-inch depth	No units	x	x	x	x	x	x	x	x	x	x	x
c5sal	Soil salinity, 40-inch depth	grams per liter	x	x	x	x	x	x	x	x	x	x	x
c5smv	Percent water by volume, 40-inch depth	percent	x	x	x	x	x	x	x	x	x	x	x
c5tmp	Soil temperature, 40-inch depth	degrees Celsius	x	x	x	x	x	x	x	x	x	x	x
Date	Date of measurement		x	x	x	x	x	x	x	x	x	x	x
HFT1A	Average heat flux	watts per square meter			x	x	x	x	x				
HFT2A	Average heat flux	watts per square meter			x	x	x	x	x				
HFT3A	Average heat flux	watts per square meter			x	x	x	x	x				
Hour	Hour of measurement	Central Standard Time (CST)	x	x	x	x	x	x	x	x	x	x	x
ML2A1	Average ML2 soil moisture theta probe #1	percent			x	x	x	x	x				

Column	Description	Units	SCAN Station No.									
			2053	2054	2055	2056	2057	2058	2059	2075	2076	2077
ML2A2	Average ML2 soil moisture theta probe #2	percent			x	x	x	x	x			
ML2V1	Average ML2 soil moisture theta probe #1	volt			x	x	x	x	x			
ML2V2	Average ML2 soil moisture theta probe #2	volt			x	x	x	x	x			
Month	Month of measurement		x	x	x	x	x	x	x	x	x	x
PCCTB	Current precipitation-tipping bucket,USVI	inches										x
PCPIN	Current global precipitation sensor	inches	x	x	x	x	x	x	x			
PPCT1	No description available	no units given									x	
PPCTB	No description available	no units given								x		
RH1C1	Current relative humidity-SM/ST, previous hour	percent	x	x	x	x	x	x	x			
RH1N1	Minimum relative humidity-SM/ST, previous hour	percent	x	x	x	x	x	x	x			
RH1X1	Maximum relative humidity-SM/ST, previous hour	percent	x	x	x	x	x	x	x			
RHC	Current relative humidity	percent								x	x	x
RHN	Minimum relative humidity	percent								x	x	x

Column	Description	Units	SCAN Station No.										
			2053	2054	2055	2056	2057	2058	2059	2075	2076	2077	
RHX	Maximum relative humidity	percent									x	x	x
SLRHA	Average hourly solar radiation	watts per square meter			x	x	x	x	x				
SOLAR	Current solar radiation	watts per square meter									x	x	x
SRHA	Average hourly solar radiation	watts per square meter	x	x									
STM1A	Average TM10 soil temperature, probe #1	degrees Celsius			x	x	x	x	x				
STM2A	Average TM10 soil temperature, probe #2	degrees Celsius			x	x	x	x	x				
STM3A	Average TM10 soil temperature, probe #3	degrees Celsius			x	x	x	x	x				
WDHA	Average wind direction, hourly	degrees from true north	x	x									
WDUVM	Unit vector mean wind direction	degrees			x	x	x	x	x				
WNDDA	Average vector wind direction	meters per hour									x	x	x
WNDSA	Average wind speed, previous hour	meters per hour									x	x	x
WSHX	Maximum wind speed	miles per hour									x	x	x



Column	Description	Units	SCAN Station No.									
			2053	2054	2055	2056	2057	2058	2059	2075	2076	2077
WSPHA	Average wind speed hourly	meters per hour	x	x	x	x	x	x	x			
WSPHX	Maximum wind speed, hourly	meters per hour	x	x	x	x	x	x	x			

Table 3. Column Headings and Definitions for the Daily Files

Column	Description	Units	SCAN Station No.										
			2053	2054	2055	2056	2057	2058	2059	2075	2076	2077	
#	Number of measurements	no units	x	x	x	x	x	x	x			x	
AT24A	Average air temperature, 24 hours	degrees Celsius									x	x	x
AT24N	Minimum air temperature, 24 hours	degrees Celsius									x	x	x
AT24X	Maximum air temperature, 24 hours	degrees Celsius									x	x	x
ATA6	Average air temperature daily	degrees Celsius	x	x	x	x	x	x	x				
ATN6	Minimum air temperature daily	degrees Celsius	x	x	x	x	x	x	x				
ATX6	Maximum air temperature daily	degrees Celsius	x	x	x	x	x	x	x				
Date	Date of measurement		x	x	x	x	x	x	x	x	x	x	
ENHUM	Current relative humidity in enclosure	percent	x	x									
EPCRN	Minimum hourly CR10X Internal Temperature	degrees Celsius			x	x	x	x	x				
EPCRX	Maximum hourly CR10X Internal Temperature	degrees Celsius			x	x	x	x	x				
Hour	Hour of measurement	CST	x	x	x	x	x	x	x			x	

Column	Description	Units	SCAN Station No.										
			2053	2054	2055	2056	2057	2058	2059	2075	2076	2077	
LBAT	Current lithium battery for data logger backup	volts	x	x	x	x	x	x	x	x	x	x	x
Month	Month of measurement		x	x	x	x	x	x	x	x	x	x	x
PCPDY	Total precipitation, previous day	inches									x	x	x
PCPYR	Total precipitation, year-to-date	inches									x	x	x
RHENC	Current internal relative humidity	percent									x	x	x
RHN24	Relative humidity, 24 hour minimum	percent			x	x	x	x	x				
RHX24	Relative humidity, 24 hour maximum	percent			x	x	x	x	x				
SLRDA	Average solar radiation	watts per square meter			x	x	x	x	x				
WD24A	Average wind direction, previous 24 hours	degree									x	x	x
WDDA	Average wind direction daily	degree	x	x	x	x	x	x	x				
WS24A	Average wind speed, 24 hours	meters per hour									x	x	x
WSPDA	Average wind speed daily	meters per hour	x	x	x	x	x	x	x				

## 1.2 File and Directory Structure

Table 4 lists the files contained in this data set.

Table 4. Files Contained in this Data Set

File Name	Description	File Size
SCANxxxx_Hourly.txt	These are tab-delimited ASCII text files of the data in hourly measurements, where xxxx is the SCAN station identification number.	273 KB to 389 KB
SCANxxxx_Daily.txt	These are tab-delimited ASCII text files of the data in daily averages, where xxxx is the SCAN station identification number.	3.1 KB to 5.0 KB

## 1.3 Volume

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The total data set volume is 3.4 MB.

## 1.4 Spatial Coverage

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Southernmost Latitude: 34.43° N  
 Northernmost Latitude: 35.13° N  
 Westernmost Longitude: 87.00° W  
 Easternmost Longitude: 86.10° W

## 1.5 Temporal Coverage

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Data were collected between 1 June 2003 and 31 July 2003.

### 1.5.1 Temporal Resolution

Hourly measurements are averages computed as the sum of all measurements taken during an hour divided by the number of measurements taken during that hour. Daily values are averages computed as the sum of all hourly measurements taken during a day divided by the number of hourly measurements taken during that day.

## 1.6 Parameter or Variable

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### 1.6.1 Parameter Description

Table 5 describes the parameters in the hourly files.

Table 5. Parameters in Hourly Files

Parameter	Description
Precipitation	Current value
Air temperature	Maximum, minimum, average, and current values

Parameter	Description
Relative humidity	Maximum, minimum, average, and current values
Wind speed	Maximum and average values
Wind direction	Averages
Solar radiation	Averages
Soil temperature	Current values at 2, 4, 8, 20, and 40 inch ground depths
Percent water by volume	Current values at 2, 4, 8, 20, and 40 inch ground depths
Real dielectric constant	Current values at 2, 4, 8, 20, and 40 inch ground depths

Table 6 describes the parameters in the daily files.

Table 6. Parameters in Daily Files

Parameter	Description
Temperature	Daily maximum, minimum, and average values
Wind speed	Daily average
Wind direction	Daily average
Battery voltage	Current value
Enclosure relative humidity	Current value

## 1.6.2 Sample Data Record

The following sample shows the first four records from the hourly file Scan2057\_Hourly.txt. The first six and last six columns are shown.

Table 7. Sample from Hourly File Scan2057\_Hourly.txt

Year	Month	Date	Hour	#	BAT1	...	STM1A	STM2A	STM3A	HFT1A	HFT2A	HFT3A
3	6	1	0	1	13	...	60.24	60.56	59.32	-10.45	-4.98	-3.42
3	6	1	1	2	12.97	...	60.05	60.44	59.34	-11.62	-6.15	-4.2
3	6	1	2	3	12.95	...	59.8	60.32	59.34	-14.16	-7.91	-5.57
3	6	1	3	4	12.92	...	59.56	60.2	59.39	-17.88	-10.26	-7.33

The following sample shows the first four records from the daily file Scan2057\_Daily.txt. The first six and last six columns are shown.

Table 8. Sample from Daily File Scan2057\_Daily.txt

Year	Month	Date	Hour	#	ATX6	...	WDDA	RHX24	RHN24	EPCRXX	EPCRN	LBAT
3	6	1	0	1	28.38	...	308.22	77.09	46.3	31.4	18.75	3.18
3	6	2	0	1	24.25	...	37.01	97.07	42.91	28.38	12.6	3.18
3	6	3	0	1	23.96	...	89.14	98.44	50.38	28.18	11.01	3.18
3	6	4	0	1	27.79	...	244.13	96.75	53.92	31.31	18.56	3.17

## 2 SOFTWARE AND TOOLS

Data files are viewable using a browser or text editor.

## 3 DATA ACQUISITION AND PROCESSING

### 3.1 Sensor or Instrument Description

Each SCAN station houses multiple sensors that automatically record data. These data are uploaded at regular intervals to the NRCS Data Processing Center, Portland, Oregon, USA. Table 9 describes the sensors housed in each SCAN station and the parameters they measure.

Table 9. SCAN Station Sensors and Measured Parameters

Sensor Name	Parameters Measured	Method of Measurement
Global Precipitation Sensor	Precipitation	Daily cumulative inches of precipitation are recorded.
Shielded Thermistor	Air temperature	The instrument is raised six feet from the surface. Current temperature and the previous hour's maximum, minimum, and average temperatures are recorded.
Soil Sensors	Soil moisture, soil temperature	Sensors are located at depths of 2, 4, 8, 20, and 40 inches below the surface. Current soil moisture and temperature are recorded.
Thin Film Capacitance-type Sensor	Relative humidity	The sensor is raised six feet from the surface. Current relative humidity and the previous hour's maximum and minimum relative humidities are recorded.
Anemometer	Wind speed, wind direction	The instrument is raised 10 feet from the surface. Hourly averages are computed from continuous measurements.
Pyranometer	Solar radiation	The sensor is raised 10 feet from the surface. Hourly average readings of total incoming solar energy are computed.
Silicon Capacitive Pressure Sensor	Barometric pressure	Hourly barometric pressure is recorded.

## 4 REFERENCES AND RELATED PUBLICATIONS

Please see the [AMSR-E site](#) to access data.

## 5 CONTACTS AND ACKNOWLEDGMENTS

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## 6 DOCUMENT INFORMATION

### 6.1 Publication Date

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## 6.2 Date Last Updated

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1 April 2021