SMEX02 Sliced Core Soil Moisture Data, Walnut Creek Watershed, Iowa, Version 1

USER GUIDE

How to Cite These Data

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

Laymon, C. 2004. *SMEX02 Sliced Core Soil Moisture Data, Walnut Creek Watershed, Iowa, Version 1*. [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. https://doi.org/10.5067/FE3UHTIWAOHV. [Date Accessed].

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National Snow and Ice Data Center

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1 DETAILED DATA DESCRIPTION

1.1 Format

Data are provided as 13 ASCII text files and as a Microsoft Excel file with 13 worksheets.

1.2 File Naming Convention

The text files use the following naming convention:WCxx_yy.txt

where:

WC = Walnut Creek watershed

xx = the number of the study field

yy = gravimetric soil moisture (GSM), bulk density (BD), or Means

For example, the file "WC23_GSM.txt" contains GSM data from samples taken in field number 23.

The files (and Excel file worksheets), are named as follows:

"Tare" contains tare weights prior to and after oven drying.

"WC15_GSM" contains data for all samples for site WC15.

"WC15_Means" contains mean GSM for each day and field position for site WC15.

"WC15_BD" contains calculations of bulk density for site WC15.

WC16-24 files contain the same types of data as the WC15 files for sites WC16, WC23, and WC24.

1.3 Spatial Coverage

Southernmost Latitude: 41.93

Northernmost Latitude: 41.99

Westernmost Longitude: -93.66

Easternmost Longitude: -93.53

1.4 Temporal Coverage

Sites 15 and 16: 25 June 2002 to 12 July 2002.

Sites 23 and 24: 25 June 2002 to 19 July 2002.

1.4.1 Temporal Resolution

Cores were taken on a near-daily basis at all four sites during the study period.

1.5 Parameter or Variable

1.5.1 Parameter Description

Parameters of the study are gravimetric soil moisture and soil bulk density.

1.5.2 Parameter Range

The following tables detail the column headings for each of the four types of files (or Excel worksheets).

This first table describes the columns in the file "TARE." These data pertain to a set of 50 tares (paper bags) weighed at the beginning of the experiment.

Column heading	Description
Initial weight	Weight (g) of tare prior to oven drying
Dry weight	Weight (g) of tare after oven drying
Change	Change in tare weight (g) due to oven drying

The next table describes the columns found in the files with a "GSM" suffix. These contain data for all samples for the particular site. Following the data for each day in these worksheets are the daily means.

Column heading	Description
Sample ID	ID for soil sample (see note 1 below)
Day of Year	Numerical day of the year
Depth	Depth at midpoint of soil layer (cm)
Site	Site number (15, 16, 23 or 24)
Location	Location within the field site (1-6)
Wet weight	Weight (g) of soil and tare prior to drying
Wet soil weight	Weight (g) of soil alone prior to drying (See note 2 below)
Dry weight	Weight (g) of soil and tare after drying
Net dry weight of soil	Weight (g) of soil alone after drying

Column heading	Description
Dry tare weight	Weight of tare after drying (See note 3 below)
Weight H20	Weight (g) of water lost from soil during drying
GSM	Gravimetric soil moisture (%) for sample
Core Mean GSM	Mean GSM (%) for the six 1 cm slices composing each 0-6 cm core

The following table describes the files that have a "Means" suffix. These contain mean GSM values by location within the site, and by layer, for each day:

Column heading	Description
Day of Year	Numerical day of the year
1, 2, 3, 4, 5, 6	Daily core mean GSM (%) for locations 1-6 at the site
0.5, 1.5, 2.5, 3.5, 4.5, 5.5	Daily mean GSM (%) by soil layer, header gives midpoint of layer (cm)
0-6 cm mean	Daily core mean GSM (%) for all locations at the site

The following table describes the files that have a "BD" suffix contain data used to calculate soil bulk density for the site. These data repeat the data from "WC15_GSM" for cores that were deemed acceptable for bulk density determination.

Column heading	Description
Sample ID	ID for soil sample (See note 1 below)
Day of Year	Numerical day of the year
Depth	Depth at midpoint of soil layer (cm)
Wet weight	Weight (g) of soil and tare prior to drying
Wet soil weight	Weight (g) of soil alone prior to drying. See note 2 below.
Dry weight	Weight (g) of soil and tare after drying
Net dry weight of	Weight (g) of soil alone after drying
Weight H20	Weight (g) of water lost from soil during drying
GSM	Gravimetric soil moisture (%) for sample
Bulk Density	Bulk density (g/cm3) for each sample - Following the data for each depth is the mean for the 0-6 cm core

To the right of the main data portion in the files (and worksheets) is a summary of bulk densities by layer.

Notes on data and data files:

1. Sample ID is a unique identifier for each soil sample. The format of the ID is MDD-SSLD, where M=month, DD=day of month, SS=site number, L=location (1-6) and D=depth (1=0-1 cm, 2=1-2 cm, etc.). For example, sample 628-2312 was collected on June 28 at site 23, for location 1 and depth 2 (1-2 cm). In a few cases, a slight departure from this convention occurred. These are noted in the files.
2. Wet soil weight is the weight of the wet soil excluding the tare. It the weight of the sample prior to oven drying minus the wet tare weight.

3. Dry tare weight is the weight of the tare after oven drying. On the first day of the experiment, for sites 15 and 16, duct tape was used to keep the bags sealed. In these cases, the actual pre- and post-drying weights were recorded. Otherwise, duct tape was not used, and it was determined that mean wet and dry tare weights were accurate. These weights are calculated in the file "Tare" and used throughout the data in the GSM calculations.

1.5.3 Sample Data Record

The following is a sample from the data file "WC15_GSM.txt":

Sample ID	Day of Year	Depth (cm)	Site	Location	Wet weight (g)	Wet soil weight (g)	Dry weight (g)	Net dry weight of soil (g)	Dry tare weight (g)	Weight H2O (g)	GSM (%)	Core Mean GSM (%)
625-1511	176	0.5	15	1	36.944	27.105	36.006	26.665	9.341	0.440	1.65	
625-1512	176	1.5	15	1	33.258	23.160	32.241	22.641	9.600	0.519	2.29	
625-1513	176	2.5	15	1	33.979	23.977	32.711	23.207	9.504	0.770	3.32	
625-1514	176	3.5	15	1	33.273	23.437	31.272	21.934	9.338	1.503	6.85	
625-1515	176	4.5	15	1	37.498	27.603	34.559	25.162	9.397	2.441	9.70	
625-1516	176	5.5	15	1	32.424	22.516	29.771	20.361	9.410	2.155	10.59	5.73

2 SOFTWARE AND TOOLS

Microsoft Excel is required to view the spreadsheet file. A word-processing program or Web browser is sufficient for viewing the text files.

3 DATA ACQUISITION AND PROCESSING

3.1 Derivation Techniques and Algorithms

3.1.1 Error Sources

Missing and erroneous data were identified based on field notes and post-experiment examination. These data are indicated by (X) and highlighted in grey in the Excel spreadsheet. Errors in soil weights, and consequently GSM and bulk density estimates, are due to weighing (generally on the

order of .01 g) and loss of soil before or after oven drying. The errors found after drying were noted in the data files and corrected to the extent possible in the GSM and bulk density calculations. Cells highlighted in yellow are samples for which dry weight values adjustments were made.

3.2 Sensor or Instrument Description

The 0-6 cm soil moisture profile was measured using a standard soil core sampler, the barrel of which was loaded with one or more metal cylinders and hammered into the soil. Following extraction of the sampler, the cylinder, containing the soil sample, was removed from the barrel. The metal cylinders were 1 cm thick to obtain high-resolution surface moisture profiles. Following extraction, each core was sliced with a wide blade at 1 cm intervals and each was analyzed separately (see the figure below). If soil moisture conditions were favorable and the soil was relatively free from gravel and plant residue, the sample was suitable for determining bulk density.

Six cores were taken each day at each field site. Three of these were taken in the vicinity of the flux tower at each site; these are denoted locations 1-3. The other three were taken at 3 separate sampling points (locations 4-6) in the field.

4 REFERENCES AND RELATED PUBLICATIONS

Please see the SMEX02 site for more information, and 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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