CLASIC07 In Situ Soil Moisture Data, Version 1

USER GUIDE

How to Cite These Data

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

Cosh, M. 2013. *CLASIC07 In Situ Soil Moisture Data, Version 1.* [Indicate subset used]. Boulder, Colorado USA. NASA National Snow and Ice Data Center Distributed Active Archive Center. https://doi.org/10.5067/W2WMLRUQOCA8. [Date Accessed].

FOR QUESTIONS ABOUT THESE DATA, CONTACT NSIDC@NSIDC.ORG

FOR CURRENT INFORMATION, VISIT https://nsidc.org/data/CL07SM

National Snow and Ice Data Center

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1 DETAILED DATA DESCRIPTION

This data set is comprised of several parameters from in situ measurements collected for the Cloud and Land Surface Interaction Campaign 2007 (CLASIC07). The study site was divided into regional squares, approximately .08 km by .08 km in size, with several sample point locations.

1.1 Format

Data are provided in tab-delimited ASCII text files. An associated Extensible Markup Language (XML) metadata file is also provided for each data file.

The following table describes the soil sampling data columns of the data file, `GVSM_LW_FC.txt`.

Table 1. Data Fields and Descriptions

Column Heading	Description
Date	Month/Day/Year
DOY	Day of the year
Site_ID	Designation of the field site
Sample	Sample number
Start Time	Hour:Minute
Lat	Latitude
Lon	Longitude
UTM	Universal Transverse Mercator
EG	Temperature of exposed ground surface [°C]
SG	Temperature of ground surface in shadow [°C]
EV	Temperature of exposed vegetation surface [°C]
SV	Temperature of vegetation surface in shadow [°C]
Temp_1cm	Soil temperature at depth 1cm [°C]
Temp_5cm	Soil temperature at depth 5cm [°C]
Temp_10cm	Soil temperature at depth 10cm [°C]
mV-A	Theta probe reading A [mV]
mV-B	Theta probe reading B [mV]
mV-C	Theta probe reading C [mV]
TP_gc_A	Theta probe soil moisture value A with general calibration [%]
TP_gc_B	Theta probe soil moisture value B with general calibration [%]
TP_gc_C	Theta probe soil moisture value C with general calibration [%]
TP_fsc_A	Theta probe soil moisture value A with field specific calibration [m^3/m^3]
TP_fsc_B	Theta probe soil moisture value B with field specific calibration [m^3/m^3]

Column Heading	Description
TP_fsc_C	Theta probe soil moisture value C with field specific calibration [m^3/m^3]
Can_ID_0-6	Identification number of the soil core sampling can
Can_Wgt_0-6	Weight of the soil core sampling can
Wet_Wgt_0-6	Wet weight of the soil core sample [g]
Dry_Wgt_0-6	Dry weight of the soil core sample [g]
Soil_BD_0-6	Bulk density of soil core sample [g/cm^3]
VSM_0-6	Volumetric soil moisture obtained from the soil core sample [m^3/m^3]

1.2 File Naming Convention

`CL07SM_GVSM_LW_FC.txt` contains the soil moisture data for the study areas, Little Washita (LW) and Fort Cobb (FC).

1.3 File Size

The data file is approximately 502 KB.

1.4 Spatial Coverage

Southernmost Latitude: 34.91°N
Northernmost Latitude: 35.21°N
Westernmost Longitude: 98.59°W
Easternmost Longitude: 97.95°W

1.4.1 Spatial Resolution

Sampling was performed on sites approximately one quarter section (0.8 km by 0.8 km) in size.

1.4.2 Projection

Universal Transverse Mercator (UTM) Zone 14N easting and northing, and World Geodetic System 1984 (WGS84) coordinates.

1.5 Temporal Coverage and Resolution

Depending on the site and period, measurements were taken every 1 to 2 days from 7 June 2007 through 7 July 2007.

1.6 Parameter or Variable

Parameters include volumetric soil moisture (m^3/m^3 or %), surface and soil temperature (°C), bulk density (g/cm^3), and electrical conductivity [mV].

1.6.1 Parameter Range

Valid parameter values are as follows:

Volumetric Soil Moisture: 0 - 0.6 m^3/m^3
Surface and Soil Temperature: 0 - 50°C
Bulk Density: 1.57 g/cm^3 (maximum)
Electrical Conductivity: 1.135 mV (maximum)
Missing Data: NaN

2 SOFTWARE AND TOOLS

No special tools are required to view these data. A spreadsheet program which recognizes tab-delimited text files, such as MS Excel is recommended. Any word-processing program or Web browser will also display the data.

3 DATA ACQUISITION AND PROCESSING

3.1 Theory of Measurements

3.1.1 Section Sampling

Sampling was performed on sites approximately one quarter section (0.8 km by 0.8 km) in size. Eight points were sampled in a field for Theta Probe volumetric soil moisture and voltage measurements. Two points were sampled in a field for surface and soil temperature, and for soil moisture samples.

3.2 Sensor or Instrument Description

3.2.1 Theta Probes

Investigators used theta probes to measure surface volumetric soil moisture. The probes were Type ML2 manually-operated impedance instruments manufactured by Delta-T Devices, Ltd. The theta probes have 4 separate 6-cm stainless steel rods inserted vertically into the soil. Each instrument was connected to a handheld reader, which delivers the electrical pulse, detects the

return signal, and converts the period to a voltage between 0 V and about 1 V. Watershed surface soil moisture was sampled each morning (9:00AM-12:00AM) during the experiment.

3.3 Processing Steps

3.3.1 Soil Moisture Sample Processing

Researchers weighed the wet soil obtained in the field, heated the soil in an oven to dry it, and then weighed the dry soil.

3.3.2 Calibration of Probe Measurements

The software provided by the probe manufacturer calibrates the theta probes by calculating an estimate of volumetric soil moisture according to the following equation:

*Theta=(1.07+6.4*V-6.4*V2+4.7*V3-a0)/a1*

where a0 and a1 are 1.6 and 8.4, respectively. These estimates are provided in the data files.

Researchers also performed field-specific calibration for each sampled field. Soil moisture values obtained using the gravimetric sampling technique were compared with the theta probe readings of the corresponding locations. A regression relationship was developed, and revised volumetric soil moisture values were estimated for the theta probe measurements.

3.4 Error Sources

Error sources for theta probe soil moisture include instabilities in electronics and calibration coefficients. Errors regarding temperature sensors occur due to instabilities in electronics.

3.5 Quality Assessment

The field-specific calibration of the soil moisture values using the soil core samples ensures high accuracy and minimized the potential errors.

4 REFERENCES AND RELATED PUBLICATIONS

Cosh, M. H., T. J. Jackson, R. Bindlish, J. S. Famiglietti, and D. Ryu. 2005. A Comparison of Soil Moisture Impedance Probe Calibration Techniques, *Journal of Hydrology*. 31(1-4): 49-58.

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6 DOCUMENT INFORMATION

6.1 Publication Date

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6.2 Date Last Updated

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