SMEX02 SMACEX Tower Meteorological/Flux Data: Iowa

Summary:
This data set contains meteorological and flux data collected from 16 June 2002 through 09 July 2002 within the Walnut Creek watershed in central Iowa, USA. The data set includes eddy covariance and ancillary data measured from a variety of sensors mounted on meteorological towers in agricultural fields. The study was part of the Soil Moisture Experiment 2002 (SMEX02) and the Soil Moisture Atmosphere Coupling Experiment (SMACEX), run by Canada's National Research Council (NRC). Parameters for this data set include net radiation, air and soil temperature, a variety of flux parameters, mean wind speed/direction, friction velocity, vapor pressure, and other meteorological parameters. Data are provided in tab-delimited ASCII text files and are available via FTP.

These data were collected as part of a validation study for the Advanced Microwave Scanning Radiometer - Earth Observing System (AMSR-E). AMSR-E is a mission instrument launched aboard NASA's Aqua Satellite on 04 May 2002. AMSR-E validation studies linked to SMEX are designed to evaluate the accuracy of AMSR-E soil moisture data. Specific validation objectives include assessing and refining soil moisture algorithm performance; verifying soil moisture estimation accuracy; investigating the effects of vegetation, surface temperature, topography, and soil texture on soil moisture accuracy; and determining the regions that are useful for AMSR-E soil moisture measurements.

Citing These Data:
To broaden awareness of our services, NSIDC requests that you acknowledge the use of data sets distributed by NSIDC. Please refer to the citation below for the suggested form, or contact NSIDC User Services for further information at: http://nsidc.org/forms/contact.html

Prueger, J., J. Hatfield, J. Albertson, T. Cahill, D. Cooper, B. Eichinger, L. Hipps, B. Kustas, and J. Norman. 2009. *SMEX02 SMACEX Tower Meteorological/Flux Data: Iowa.* Boulder, Colorado USA: NASA DAAC at the National Snow and Ice Data Center.

Overview Table

Category	**Description**
Data format	ASCII tab-delimited files
Spatial coverage	Southernmost Latitude: 41.9328° N Northernmost Latitude: 41.9929° N Westernmost Longitude: 93.7549° W Easternmost Longitude: 93.5285° W
Temporal coverage and resolution	16 June 2002 – 09 July 2002 Measurements were collected every 24 hours.
File naming convention	DTnn(n).txt
File size	~67-408 KB
Parameters	**Eddy covariance parameters:** Net radiation Soil heat flux Latent heat flux Virtual heat flux Sensible heat flux CO2 flux Mean wind speed/direction Friction velocity

	Ancillary parameters: Air temperature Vapor pressure Net radiation Shortwave and long wave radiation (incoming and outgoing) Kipp&Zonen body temperature Soil heat flow Soil temperature IRT target and body temperature
Procedure for obtaining data	Data are available via FTP.

Table of Contents

1. Contacts and Participants:

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Participants:

The tower meteorological/flux (METFLUX) team was comprised of individuals from seven locations. The primary participants included; John Albertson (Duke Univ.), Tony Cahill (Texas A&M Univ.), Dan Cooper (Los Alamos National Lab), Bill Eichinger (Univ. of Iowa), Larry Hipps (Utah State Univ.), Bill Kustas (USDA-ARS-HRSL), and John Prueger/Jerry Hatfield (USDA-ARS-NSTL).

2. Detailed Data Description:

Format:

Data are provided in tab-delimited ASCII text files. The data files contain either eddy covariance data or ancillary data, respectively referred to as EC and AN.

Eddy Covariance (EC) Files:

The data reported consist of the eddy covariance measurements from twelve of the fourteen towers collected in “time series mode” for the period starting on 20 June 2002 [Day of Year (DOY) 171] until 09 July 2002 (DOY 190). Missing data are reported as –999. Table 1 provides a description of column headings for the EC files.

Ancillary (AN) Files:

The data reported consist of the ancillary measurements from twelve of the fourteen towers, which had EC instruments running in “time series mode” for the period starting on 20 June 2002 (DOY 171) until 09 July 2002 (DOY 190). Missing data are reported as –999. Table 2 provides a description of column headings for the AN files.

Table 1. Column headings, description and units for Eddy Covariance (EC) Files.

Column	Heading	Description	Units
1	DOY	Julian Day of Year	-----
2	Hour	Ending Time of 30-Min Period Central Standard Time	-----
3	Site	Field Site Identifier	-----
4	Rn_corr	Net Radiation corrected/calibrated	(W m^{-2})
5	G_surf	Surface Soil Heat Flux	(W m^{-2})
6	LE_corr	Latent Heat Flux WPL & CR corrected	(W m^{-2})
7	Hv	Virtual Heat Flux CR corrected	(W m^{-2})
8	H_actual	Sensible Heat Flux WPL & CR corrected	(W m^{-2})
10	CO2	Carbon Flux WPL & CR corrected	(mg m^{2} s^{-1})
11	Wind Spd	Mean Wind Speed CR corrected	(m s^{-1})
12	Cmpass	Wind Direction Compass Coordinates	(deg)
13	u*(cr)	Friction Velocity	(m s^{-1})

Table 2. Column Headings, Descriptions and Units for Ancillary (AN) Files.

Column	Heading	Description	Units
1	DOY	Julian Day of Year	-----
2	Hour	Ending Time of 10-Min Period Central Standard Time	-----
3	Site	Field Site Identifier	-----
4	Temp	Air Temperature	(C)
5	Ea	Vapor Pressure	(Kpa)
6	Rn_raw	Net Radiation Directly from Datalogger	(W m^{-2})
7	Rsw_in	Incoming Short Wave Radiation	(W m^{-2})
8	Rlw_in	Incoming Long Wave Radiation NOT Temperature Corrected	(W m^{-2})
9	Rsw_out	Outgoing Short Wave Radiation	(W m^{-2})
10	Rlw_out	Outgoing Long Wave Radiation NOT Temperature Corrected	(W m^{-2})
11	Kipp & Zonen	Kipp & Zonen Internal Body Temperature	(K)
12	SHF1	Soil Heat Flow Transducer 1	(W m^{-2})
13	SHF2	Soil Heat Flow Transducer 2	(W m^{-2})
14	SHF3	Soil Heat Flow Transducer 3	(W m^{-2})
15	SHF4	Soil Heat Flow Transducer 4	(W m^{-2})
16	TC 1	Soil Temperature Sensor 1	(C)
17	TC 2	Soil Temperature Sensor 2	(C)
18	TC 3	Soil Temperature Sensor 3	(C)
19	TC 4	Soil Temperature Sensor 4	(C)
20	TC 5	Soil Temperature Sensor 5	(C)
21	TC 6	Soil Temperature Sensor 6	(C)
22	TC 7	Soil Temperature Sensor 7	(C)

23	TC 8	Soil Temperature Sensor 8	(C)
24	IRT_Composite Temp	Composite Radiometric Temperature (Soil + Vegetation)	(C)
25	IRT_Composite Body Temp	Composite IRT Body Temperature	(C)
26	IRT_Soil Surf Temp	Radiometric Temperature of Soil Surface	(C)
27	IRT_Soil Surf Body Temp	Soil Surface IRT Body Temperature	(C)

File Naming Convention:
The ASCII text files are named according to the following convention and as described in Table 3:

```
DTnn(n).txt
```

Where:

Table 3. Description of File Name Variables

Variable	Description
`DT`	Data Type (EC: Eddy Covariance, AN: Ancillary)
`nn(n)`	2- or 3-digit flux tower site number (valid values= `03, 06, 13, 14, 23, 24, 25, 33, 151, 152, 161, 162`)
`.txt`	Indicates this is a text file

File Size:
Files range from approximately 67 to 408 KB.

Spatial Coverage:
Southernmost Latitude: 41.9328° N
Northernmost Latitude: 41.9929° N
Westernmost Longitude: 93.7549° W
Easternmost Longitude: 93.5285° W

Table 4 lists additional reference coordinates for SMEX02 SMACEX flux tower field sites for this data set.

Temporal Coverage:
All EC systems were operating by 16 June [Day of Year (DOY) 167] and running in "flux mode" for several days to immediately diagnose any instrument malfunctions. The twelve EC systems were switched over to "time series" mode by 20 June (DOY 171) and left in this mode until the end of the intensive field campaign on 09 July (DOY 190).

Temporal Resolution:
Eddy covariance and ancillary measurements were collected every 24 hours. EC data include 30-min final output data and AN data include 10-min final output data.

Parameter or Variable:

Parameter Description:
Parameters for the EC measurements include: net radiation, soil heat flux, latent heat flux, virtual heat flux, sensible heat flux, CO_2 flux, mean wind speed and direction, and friction velocity. Table 1 provides units and descriptions for these parameters.

Parameters for the AN measurements include: air temperature, vapor pressure, net radiation, incoming and outgoing shortwave and long wave radiation, Kipp&Zonen body temperature, four soil heat flow transducer measurements, eight soil temperature measurements, and IRT target and body temperature measurements. Table 2 provides units and descriptions for these parameters.

3. Data Access and Tools:

Data Access:

Data are available via FTP at:
ftp://sidads.colorado.edu/pub/DATASETS/AVDM/data/soil_moisture/SMEX02/meteorological/SMACEX_tower/

Software and Tools:

Any word-processing program or Web browser is sufficient for viewing the text files.

4. Data Acquisition and Processing:

Sensor or Instrument Description:

Fourteen Campbell Scientific 3-D sonic anemometer (CSAT3) sensors and ten Li-Cor CO_2/H_2O (LI7500) analyzers were used. This gave the ability to mount ten EC systems in the study that provided time series (high frequency) data of wind (u, v, and w components), sonic temperature (TS), water vapor, and CO_2 from the LI7500. The remaining four CSAT3 sensors were used with Campbell Scientific 1-D Krypton Hygrometers/ H_2O (KH20) sensors to provide the same data as above with the exception of CO_2.

Tower Locations and Instrumentation:

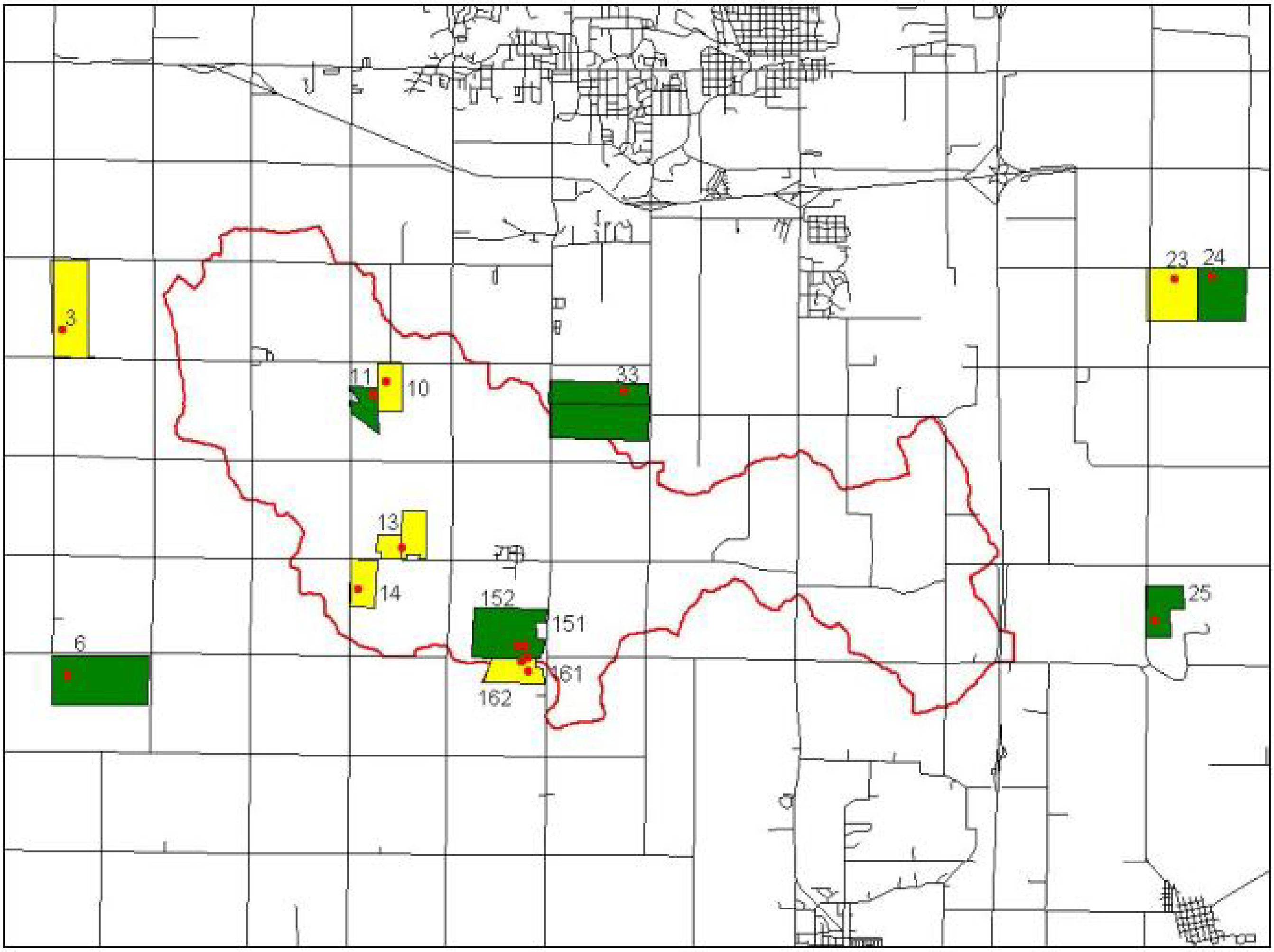
Towers were located in fields used for soil moisture and vegetation sampling during SMEX02 SMACEX. For each tower site, the cover crop, row width and orientation, instrumentation, Latitude/Longitude and mode of collection during the field campaign is listed in Table 4. The tower locations within each field site, including in and around the Walnut Creek Watershed, is illustrated in Figure 1.

Table 4. Flux tower field sites, cover crop, row direction, row spacing, data collection mode, water vapor and/or CO_2 sensor, net radiometer model and reference coordinates.

Field	Crop*	Row Dir.**	Row Spacing	Flux (F) or Time Series (T) Mode	LI7500 or KH20	CNR1 or REBS	Latitude (Deg)	Longitude (Deg)
WC03	S	N	.38 m	T	LI7500	CNR1	41.98380985	-93.75497316
WC06	C	N	.76 m	T	LI7500	CNR1	41.93289579	-93.75331502
WC10***	S	X	.05 m	F	KH20	REBS	41.97659611	-93.69109344
WC11***	C	N	.76 m	F	KH20	REBS	41.9746	-93.69369
WC13	S	N	.76 m	T	KH20	REBS	41.95215301	-93.68766257
WC14	S	X	.05 m	T	LI7500	REBS	41.94598467	-93.69622139
WC23 S		E	--	F	KH20	REBS	41.99245328	-93.53581804
WC24 C		E	--	F	LI7500	CNR1	41.99291298	-93.52857874
WC25 S		N	--	T	LI7500	CNR1	41.94226863	-93.53937428
WC33 C		E	--	T	LI7500	CNR1	41.975341	-93.64431294
WC151	C	E	.76 m	T	LI7500	REBS	41.93781824	-93.6631318
WC152	C	E	.76 m	T	LI7500	CNR1	41.93781542 -	93.66 469965
WC161 S		E	--	T	LI7500	REBS	41.93414103 -	93.66 270304
WC162 S		E	--	T	LI7500	CNR1	41.93548368 -	93.66 405839

* Crop Codes: C=Corn, S=Soybean
** Row Direction: N=North-South, E=East-West, X=Flex Coil
*** WC10 and WC11 data files are not included in this data set

Figure 1. METFLUX tower locations and associated (numbered) field sites for the SMEX02 SMACEX study area. The Walnut Creek Watershed boundary is outlined in red with the town of Ames, Iowa to the north.



TIME SERIES/FLUX MEASUREMENTS:

Logging Measurements:

Each of the fourteen EC systems used a Campbell 23X data logger to execute the time series commands. Twelve EC systems had a Libretto (Toshiba) 30, 50 or 70 mini computer to store all the raw high frequency data in "time series mode". Each mini computer had a PCMCIA card of either 80 or 128 MB storage capacity. Approximately every 24 hours the PCMCIA cards were exchanged at each EC tower with new PCMCIA cards. At this time, input location channels of the EC components were viewed online and inspected for instrument performance and instantaneous data integrity. If the EC systems were performing without error, normal time series acquisition was resumed with no loss of data. If a problem was encountered, it was solved, noted in field logbooks and data acquisition resumed. The two remaining EC systems ran in "flux mode" with 30-minute final output of the fluxes and statistics being stored on a 23X.

Sampling Frequency and Output Averages:

EC systems (CSAT3 with either LI7500 or KH20) were sampled at 20 Hz. For twelve of the fourteen EC systems, no averaging of output was performed with the data recorded in binary. The remaining two EC systems had 30-min averages recorded.

Observation Period:

All EC systems were operating by 16 June (DOY 167) running in "flux mode" for several days to immediately diagnose any instrument malfunctions. The twelve EC systems were switched over to "time series" mode by 20

June (DOY 171) and left in this mode until the end of the intensive field campaign on 09 July (DOY 190).

Data Processing and Quality Control:

The acquired high frequency data from each of the eddy covariance systems run in “time series” mode initially came off the systems stored as binary format as a single block of approximately 24 hour data. The high frequency eddy covariance data (20 Hz) were converted from binary to ASCII and run through a processing program that applied recommended manufacturers scan offset corrections applied to the wind, sonic temperature, water vapor and carbon dioxide signal components to maximize correlation of the turbulent fluxes. The processing program then combined the high frequency data into new, complete scan-offset-corrected 24-hour data blocks (in ASCII) for each of the stations run in time series mode. This process had to be subsequently modified and the entire high frequency data reprocessed following an announcement from Li-Cor of an error with the manufacturer’s original recommended scan offset correction for LI7500 H_2O/CO_2 sensors.

A de-spiking program was then developed to assess data integrity. A preliminary evaluation of the de-spiking results revealed no significant irregularities for most sites. However, there are indications that sites WC14 and WC25 may require some de-spiking to remove spurious observations. A complete assessment of the de-spiking results is still in progress, but in order to meet the data delivery timeline to the DAAC, it is important that the user recognize that the turbulent flux data at the DAAC have been computed from the time series data on the assumption based on preliminary de-spiking results that no significant spikes were in the data. Following a complete assessment of the de-spiking results, any modification to the data set will be updated accordingly.

Data potentially influenced by flow distortion due to the body of the sensors were not removed from this set. Computed wind directions from the CSAT are included. Rejection of flux due to flow obstruction from the tower or winds originating from the back of the CSAT (such as northerly winds) will be left to the user to define their own rejection criteria. The 20 Hz data were processed with temperature and relative humidity measurements used to correct for oxygen and density effects on the evaporative and CO_2 fluxes (Webb-Pearman-Leuning-WPL correction; Webb et al., 1980). Further processing included applying a 2-D coordinate transformation (coordinate rotation-CR) forcing v = w = 0 (Kaimal and Finnigan, 1994) to the turbulence data. In addition to the fluxes, mean wind speed and wind direction were computed from the CSAT3 measurements.

ANCILLARY MEASUREMENTS:

The ancillary measurements included the remaining energy balance components, namely net radiation (RN), and soil surface heat flux (GS) which included soil heat flux across the heat flow transducer (G), and heat transfer of the soil layer above the transducers, the storage term (S), so that GS=G+S. Radiometric temperature observations of the soil-vegetation canopy system or composite surface temperature, (TRAD,C) and one of the bare soil surface (TRAD,S), were made at twelve of the fourteen sites. Mean air temperature (TA) and relative humidity (RH) were made at all sites and soil moisture (W) using a heat capacity probe was collected at twelve of the fourteen sites. The soil moisture data is reported elsewhere.

Logging Measurements:

For the twelve sites in “time series mode”, ancillary measurements were made using a Campbell 21X data logger connected to a Campbell AM 25T multiplexer. The two remaining sites running in “flux mode” had a 23X to collect the ancillary measurements and flux measurements

Sampling Frequency and Output Averages:

The TRAD, RN, TA, RH, G, and TSOIL measurements were sampled at .1 Hz or 10-sec with 10-min average output.

Sensor or Instrument Description:

Net radiation was measured using primarily one of two RN sensors, the Kipp & Zonen CNR1 and the Radiation and Energy Balance (REBS) Q*7 series. There are seven CNR1 and seven REBS. We assigned priority levels to the flux sites so as to insure that the highest priority sites receive the "A" suite of instruments, i.e. the CSAT3 with LI7500 and a CNR1 net radiometer. For the sites having the CNR1 net radiometer, all four-radiation components were recorded, namely incoming and outgoing short and long wave radiation. Soil flux G was measured using REBS HFT3 soil heat flow transducers (plates) and the soil temperature measurements of the soil layer above the HFT3 sensors for estimating S were made using type-T soil thermocouples manufactured by NSTL. The TRAD,C and TRAD,S observations were made using Apogee precision radiometers (model IRTS-P). Mean TA and RH observations were made using Vaisala temperature/RH probe (model HMP35C) enclosed in a radiation shield.

Data Processing and Quality Control:

An inter-comparison of the RN sensors was conducted at the end of the field study and measurements were calibrated to an average output from all systems. Estimates of the surface soil heat flux, GS, were computed by estimating the magnitude of the storage term S of the soil layer above the heat flow transducers. The magnitude of S is dependent on soil heat capacity, which is a function of soil texture and soil moisture, and the temporal trace of soil temperature (TSOIL). The most accurate estimate of S was obtained when the data was post-processed using the bulk density and soil moisture measurements collected for the field sites during the field campaign. The quality of the heat flow transducer and soil temperature measurements was evaluated in the computation of a mean soil heat flux from the four measurement locations around each tower. Some of the observations were deemed unreliable and not used in the final computations of the mean soil heat flux reported in the EC files. The TRAD observations need to be corrected for differences between target and body temperature. The IRT body temperature of the sensor housing is measured and used in a set of equations provided by Apogee. Refer to the Apogee Web site (http://www.apogee-inst.com/irt_spec.htm) for more information. To obtain the physical temperature of the surface a correction for surface emissivity is also needed.

INSTRUMENT HEIGHT/DEPTH AND POSITION:

All sensor height/depth information is listed in Table 5.

Table 5. A summary of sensor height (above ground level: AGL)/depth (below ground level: BGL) for the flux towers in the corn and soybean field sites. DOY in parentheses indicates day of year when EC instrumentation height changed.

Field	RN AGL(m)	EC Flux AGL(m)	TRAD,C AGL(m)	TRAD,S AGL(m)	TA, RH AGL(m)	G BGL(m)	TSOIL BGL(m)
WC03	2.90	2.12	2.90	0.10	2.10	- 0.06	- 0.02 & -0.04
WC06	5.65	2.90 (<181) 5.03 (>181)	5.65	0.35	2.63	- 0.06	- 0.02 & -0.04
WC10	1.50	2.20	-----	-----	2.00	- 0.06	- 0.02 & -0.04
WC11	4.00	2.20 (<179) 3.70 (>179)	-----	-----	2.75	- 0.06	- 0.02 & -0.04
WC13	1.80	1.83	1.80	0.35	1.55	- 0.06	- 0.02 & -0.04
WC14	1.92	1.97	1.92	0.17	2.05	- 0.06	- 0.02 & -0.04
WC151	5.14	3.00 (<179) 4.02 (>179)	5.14	0.35	1.80	- 0.06	- 0.02 & -0.04
WC152	5.27	3.00 (<179) 3.90 (>179)	5.27	0.35	2.66	- 0.06	- 0.02 & -0.04
WC161	2.90	2.00	2.90	0.30	1.16	- 0.06	- 0.02 & -0.04
WC162	2.88	2.28	2.88	0.30	1.20	- 0.06	- 0.02 & -0.04
WC23	2.31	2.00	2.31	0.10	2.06	- 0.06	- 0.02 & -0.04
WC24	4.70	2.98 (<179) 3.90 (>179)	4.70	0.30	2.62	- 0.06	- 0.02 & -0.04
WC25	4.80	4.10	4.80	0.30	2.50	- 0.06	- 0.02 & -0.04
WC33	5.22	2.90 (<179) 3.91 (>179)	5.22	0.35	2.55	- 0.06	- 0.02 & -0.04

Eddy Covariance Sensors:

A 6-m tower (combining two 3-m triangular tower sections) anchored by three guy wires was placed in the corn field sites while a single 3-m triangular tower section was placed in the soybean field sites. For the soybean crop, the vegetation height did not exceed ~0.5 m by the end of the experimental period in mid-July.

To maintain an acceptable measurement height above the canopy for the EC sensors and at the same time remain within the upwind source-area or fetch of the individual field sites, we maintained at least a ~1.5 m height above the corn and soybean canopies during the experimental period. Given the measurement configuration for the two tower heights, and typical size of the fields (~400 x 400 m), this is a reasonable compromise for both corn and soybean canopies. The EC sensors were orientated in a southerly direction.

Ancillary Instrumentation:

Net Radiation:

Net radiation instruments were mounted at the top of the radio towers and oriented to the south at a fixed height, nominally at 5.5 m and 2.5 m above ground level (AGL). They were positioned further away (south) from the tower than the EC system positioned below, to avoid instrument shadowing and influences of EC sensors on reflected/upwelling radiance measurements.

Radiometric Surface Temperature:

The Apogee IRT sensors were positioned at two heights and viewing angles. The sensor for measuring composite temperature, TRAD,C was positioned at the top of the tower with a nadir viewing angle. The IRTS-P model has nominally a 60^{o} field of view (FOV) so that at 3 m AGL the FOV is a 3.5 m diameter circle. To minimize any contamination from the tower and instrumentation, the nadir-viewing IRT was positioned on the east side of the tower and located ~2 m away from the tower. The other IRTS-P for estimating TRAD,S was placed in the center of the row crop on a short pole with a measurement height of ~ 0.1 to 0.4 m AGL and nominally a 45 degree view angle from nadir. The sensor viewed the soil surface parallel to the row direction (either north-south or east-west) to obtain a spatial representation of the average bare surface soil temperature. The actual TRAD,S measurement height depended primarily on crop row spacing with ~ 0.4 m height for the 30-in row crops, and ~0.1 m height for the 8-in row crops.

Air Temperature/Relative Humidity:

The air temperature/relative humidity sensor (Vaisala HMP35C) was positioned on the north facing side of the tower. Measurement height above local terrain was variable, being ~1-2 m for soybean fields and ~2-3 m for the corn.

Soil Heat Flux Plates and Soil Thermocouples:

Soil heat flux plates were buried at a depth of 0.06 m below the soil surface with Type-T thermocouples at 0.02 and 0.04 m below the soil surface but above the associated soil heat flux plate. Four soil heat flux plates and eight soil temperature sensors were used for obtaining a spatially-representative value of GS. Each sensor cluster (1 soil heat flux plate and 2 soil temperature sensors) occupied ¼ of the row, with the cluster placed in the center of each ¼-section. For corn planted in 30-in or ~ 0.76 m row, the ¼-sections were ~ 0.2 m wide. The row width for soybeans varied anywhere from 30-in to 8-in or ~ 0.20 m (drilled soybean) to no real row-structure (flex-coil soybean). For the 0.20 m rows, the ¼-sections were 0.05 m wide, while for flex-coil soybeans, sensors were placed in a more random fashion. Within the row, the sensor clusters were placed at different distances from the tower in order to obtain a better spatial sampling of soil and vegetation conditions.

5. References and Related Publications:

Please see the USDA SMEX02 Web site (http://www.ars.usda.gov/Research/docs.htm?docid=8993) for in-depth information on the science mission and goal of the SMEX project.

Kaimal, J. C., and J.J. Finnigan. 1994. Atmospheric Boundary Layer Flows, Their Structure and Measurement. *Oxford University Press*, New York, 289 pp.

Webb, E. K., G. I. Pearman, and R. Leuning.1980. Correction of Flux Measurements for Density Effects Due to Heat and Water Vapor Transfer. *Quarterly Journal of the Royal Meteorological Society*, 106, 85-100.

6. Document Information:

Glossary and Acronyms:

Please see the EOSDIS Acronyms <http://harp.gsfc.nasa.gov/v0ims/acronyms.html> list for a general list of acronyms. The following acronyms are used in this document:

AMSR-E	Advanced Microwave Scanning Radiometer - Earth Observing System
AN	Ancillary data
ASCII	American Standard Code for Information Interchange
DAAC	Distributed Active Archive Center
EC	Eddy Covariance data
FTP	File Transfer Protocol
NASA	National Aeronautics and Space Administration
NRC	National Research Council
NSIDC	National Snow and Ice Data Center
PCMCIA	Personal Computer Memory Card International Association
SMACEX	Soil Moisture-Atmosphere Coupling Experiment (SMACEX)
SMEX02	Soil Moisture Experiment 2002
USDA	United States Department of Agriculture

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