

Documentation of Data from NOAA Site 10, CASES-97

From mcmillen@atdd.noaa.gov Mon May 3 18:49:43 1999; Address at that time:
 ATDD/NOAA/p. o. box 2456//456 s. illinois ave.//oak ridge, tn 37830
 Notes (at bottom) added by Margaret LeMone, 16 November 2009

Location. On pasture, with little and big bluestem grass, gramma, brome, and Indian Grass.
 37.464 N 96.812 W.

Duration of Measurements. 3 – 21 May 2009

Instrumentation

Fast response water vapor measurements are made with an open-path, fast response infrared gas analyzer developed at ATDD. This sensor was used extensively for flux measurements during recent ARM and BOREAS experiments.

Standard meteorological data collected at each site includes wind speed and direction, air temperature and relative humidity, precipitation, net radiation, incoming global radiation, incoming and outgoing visible radiation, ground heat flux, and soil temperatures (at 6 depths: 2 cm, 4 cm, 8 cm, 16 cm, 32 cm, and 64 cm). The surface or "skin" temperature is also measured with an infrared temperature sensor.

Standard meteorological sensors (Table 1) are sampled every 2 s with a datalogger (21x, Campbell Scientific, Inc.); averages are computed every 30 minutes, coincident with the eddy correlation data.

Digital wind speed data from the sonic anemometer (which includes the digitized H₂O and CO₂ signals from the IRGA) are continuously transmitted to a laptop computer which does all the necessary calculations to determine the fluxes. Every half hour, the computer also retrieves data from the 21X datalogger. After midnight, the flux and standard meteorological data are placed in separate files with a year and calendar day stamp. The computer is equipped with a modem and cellular phone in order to retrieve the data and conduct occasional system checks. Data are retrieved from the laptop computers about every other day, on average.

Table 1. Variable Name, Units, and Height of Measurement (if applicable)

Variable	Description
jday	Julian Day
time	LST, half hour ending
w_speed	propeller anemometer (2 m)
w_dir	wind direction (2 m)
Ta	air temperature (C), at 2 m
RH	relative humidity at 2 m
Pres	surface pressure in mb (inoperative)
Rg	incoming global radiation (W/m ²)
Rnet	net radiation (W/m ²)
GHF	soil or ground heat flux (W/m ²)
rain	total rain for half hour (inches)
wet	wetness sensor (in voltage with higher values indicating wetness)

IRT	surface or skin temp (C)
2_cm	soil temp at 2 cm (C)
4_cm	soil temp at 4 cm
8_cm	soil temp at 8 cm
16_cm	soil temp at 16 cm
32_cm	soil temp at 32 cm
64_cm	soil temp at 64 cm
u_bar	average wind vector speed (m/s)
u'w'	kinematic shear stress (m ² /s ²), 2 m
u'2	streamwise velocity variance (m ² /s ²), 2 m*
v'2	crosswind velocity variance (m ² /s ²), 2 m*
w'2	vertical velocity variance (m ² /s ²), 2 m*
H	sensible heat flux (W/m ²), 2 m
LE	latent energy flux (W/m ²), 2 m
CO2 flux	CO2 flux (mg CO ₂ /m ² /s), 2 m

*Not included in dataset

Table 2. Meteorological variables measured at NOAA Energy Flux Monitoring Site along with model number and manufacturer of instrumentation used.

Variable	Manufacturer/Model	Units	Accuracy	Response Rate
Wind Speed/Direction	R.M. Young Bivane	m/s, deg	0.2,1	0.25 Hz
Air Temperature, RH	Vaisala 50Y	Deg C/%	0.25, 1%	0.25 Hz
Net Radiation	Radiation and Energy Balance Systems (REBS) Q*7	W/m ²	10	0.2 Hz
Global Radiation	LI-COR LI-200 SB	W/m ²	10	100 Hz
Precipitation	Texas Instruments	mm?	0.5	0.01 Hz
Wetness	ATDD	%	10	1 Hz
Soil Heat Flux	REBS	W/m ²	5	0.1 Hz
Air Pressure	Vaisala PTB101B	missing	missing	missing
Surface Temperature	Everest 4000A			
Soil Temperature	ATDD	Deg C	0.1	0.25
Soil Moisture	Vitel hydra	?	?	?

Table 3: Flux Data

Variable	Manufacturer/model	Units	Accuracy	Response Rate
Wind Speed	Gill "Solent" Sonic	m/s	0.1	10 Hz
Virtual Air Temp	Gill "Solent" Sonic I	Degrees C	0.1	10 Hz
IRGA CO ₂	In-house	mg/m ³	0.3	40 Hz
IRGA H ₂ O	In-house	g/m ³	0.01 (?)	40 Hz

NOTES: (ml 16 November 2009)

1. The time clock stops when the data are bad or missing.
2. Used Rsolar to determine time was in CST; assume other fluxes correspond.
3. Soil moisture is not well-documented. However, plotting the values of both suggests that the units are not standard for volumetric soil moisture. I selected “percent of saturation” based on a visit to the Vitel web site).
4. Rainfall – Note units not consistent between two tables. Inches seem more likely than mm, though, given surrounding rainfall values.