Wind River Field Station MicroFlux Dataset Guide (rev. 1408)

The WRFS MicroFlux format brings together microclimate and eddy covariance data most commonly used in studies of the old-growth forest surrounding the canopy tower. Variable symbols, descriptions, units, and sensors are outlined in this data guide. Data collections span from 1998 to present with current year file updated monthly.

YEAR = calendar year
MONTH = 1, 2, 3 … 12
DOY = day of year 1, 2, 3 … 365 or 366
HRM = hour and minute clock time 30 minute intervals Pacific Standard Time
DTIME = DOY plus decimal time in 30 minute intervals Pacific Standard Time

Forest understory environmental monitoring station: Old-growth forest understory measurement station located 30 meters at 260 degrees from climate tower base. Sensor array spans 2 meters below ground to 2 meters above ground. Station became operational in May 2007.

Ta_02 = mean air temperature 2 meters above ground (C) Vaisala HMP45C
RH_02 = mean relative humidity 2 meters above ground (%) Vaisala HMP45C
u_02 = mean horizontal wind speed 2 meters above ground (m/s) Handar 425AH
dir_02 = mean horizontal wind compass direction 2 meters above ground (degrees) Handar 425AH
Ts_0, 15, and 30 = mean soil temps at surface and 15 cm and 30 cm below ground (C) CSI 107B
G = mean soil heat flux 7.5 cm below ground (W/m^2) CSI HFT-3.1 [positive numbers are surface to atmosphere]
par_02 = mean photosynthetically active radiation understory 2 meters above ground (umole/s/m^2) CSI LI190SB
S1_20 through S1_ 200 = mean soil moisture at probe depths 20, 30, 40, 50, 60, 100, 150, 200 cm below surface (%) EnviroSMART

0<=u<=45, -18<=Ta<=45, 0<=RH<=100, 2<=par<=2100, -18<=Ts_n<=45, -45<=G<=45, 0<=S1_n<=100

From 1998 to 2006, the forest understory environmental monitoring station was located 75 meters east of its current position. Denser forest canopy at this earlier location resulted in lower par_02 measurements with less intense afternoon sun-fleck incidence. In addition, soil water content (SWC) was measured using the TDR method. During fall and winter months, SWC may be greater than 40% due to inundation from a nearby intermittent stream.

Total precipitation environmental monitoring station: Open field precipitation measurement station located near WRFS office building approximately 1000 m at 167 degrees from climate tower base. Station became operational in 2002. Historic monthly precipitation totals compiled from NOAA NCDC cooperative stations located near the WRFS climate tower site are available in the WRFS-NCDC-1931-2010.xlsx file in the WRFS Microflux data download directory.

prcpt1 = total precipitation (mm) MetOne 385 heated 0.254 mm tipping bucket

Radiation environmental monitoring station: Above canopy radiation measurement station located at top of climate tower and operational since 1998.

S_in = mean shortwave radiation incoming (W/m^2) Kipp & Zonen CNR1
S_out = mean shortwave radiation outgoing (W/m^2) Kipp & Zonen CNR1
L_in = mean longwave radiation incoming (W/m^2) Kipp & Zonen CNR1
L_out =mean longwave radiation outgoing (W/m^2) Kipp & Zonen CNR1
par_70 = mean photosynthetically active radiation incoming above canopy (umole/s/m^2) CSI LI190SB – sensor added in 2004.

5<=S_in<=1300, S_out<S_in, if S_in=0 then S_out and par =0, L_in<L_out, par<=2100

Eddy covariance environmental monitoring station 2009 to present: Above canopy eddy covariance and microclimate measurement station (CSI CPEC100) located at 70 meters height on climate tower.

F_CO2_70 = mean carbon dioxide flux ((mg/(m^2 s)) Licor 7000 IRGA [positive numbers are surface to atmosphere]
F_Hs_70 = mean sensible heat flux (W/m^2) CSAT3 [positive numbers are surface to atmosphere]
F_H2O_70 = mean water vapor flux ((g/(m^2 s)) Licor 7000 [positive numbers are surface to atmosphere]
F_LE_70 = mean latent energy of vaporization flux (W/m^2) Licor 7000 IRGA [positive numbers are surface to atmosphere]
u_star = mean friction velocity (m/s) CSAT3
CO2_70 = mean carbon dioxide density (mg/m^3) Licor 7000 IRGA
H2O_70 = mean water vapor density (g/m^3)Licor 7000 IRGA
Ta_70 = mean air temperature (C) Vaisala HMP45C
RH_70 = mean relative humidity (%)Vaisala HMP45C
p_70 = mean atmospheric pressure (kPa) Vaisala CS106
dir_70 = mean horizontal wind compass direction (degrees) CSAT3
u_70 = mean horizontal wind speed (m/s) CSAT3

-4.5<=F_CO2_70<=4.5, -500<=F_Hs_70<=1500, -500<=F_LE_70<=1500, 350<=CO2_70<=1000, 0<=H2O_70<=15
-18<=Ta_70<=45, 0<=RH_70<=100, 0<=u_70<=45

F_CO2_70, F_Hs_70, F_H2O_70, and F_LE_70 are coordinate rotated (zero plane displacement) with WPL corrections applied but are not filtered for nocturnal fluxes, wind direction domains, high precipitation events, energy thresholds, or friction velocity.

Eddy covariance environmental monitoring station 1998 to 2008: Flux variables were collected at the same location on the tower but by a UC Davis research team using different equipment and flux calculations. Data files submitted to Ameriflux during these years were edited for inclusion into the WRFS MicroFlux format.

Variables, units, sensors:

F_CO2_70	umol m-2 s-1	Licor 6262
F_Hs_70	W m-2	GILL Instruments
F_H2O_70	--not provided--	
F_LE_70	W m-2	GILL Instruments
u_star	m s-1	GILL Instruments
CO2_70	umol mol-1	Licor 6262
H2O_70	mmol mol-1	Licor 6262
p_70	kPa	Vaisala CS105