

Harvard Forest Data Archive HF072-01

Data File:

Name = hf072-01-eddy-2002-04.csv
Description = eddy flux (2002 to 2004)
Rows = 45234 Columns = 26
MD5 checksum = f6363b2188ff95a47df616celc5485e3

Variables:

year = year
doy = day of the year with hours and minutes converted to a decimal fraction of a day (nominalDay)
co2 = carbon dioxide concentration of the air drawn into the eddy covariance system at 21 m above ground or 4.5 m above the average tree canopy top (dimensionless)
h2o = water vapor concentration of the air drawn into the eddy covariance system at 21 m above ground or 4.5 m above the average tree canopy top (dimensionless)
u = wind speed measured by the sonic anemometer at 21 m or 4.5 m above the average tree canopy top (metersPerSecond)
ustar = friction velocity measured by the sonic anemometer. Friction velocity is the square of momentum flux from the atmosphere above the sonic to the air layers below the sonic, and is a measure of atmospheric turbulence (metersPerSecond)
wind.dir = compass direction in degrees of the average wind vector, with 0 and 360 degrees indicating geographic north (degree)
h = sensible heat flux from the forest to the atmosphere, calculated by the sonic anemometer from the covariance of air temperature and the vertical component of wind velocity (wattPerMeterSquared)
le = flux of latent heat (heat used in evaporating water) from the forest to the atmosphere, calculated by multiplying FH2O (see definition below) by the heat of evaporation of water (wattPerMeterSquared)
fco2 = measured carbon dioxide flux from forest to atmosphere.
Includes all data collected, some of which are invalid (see below) (micromolePerMeterSquaredPerSecond)
fco2.valid = FCO2 data after removal of data that are invalid due to wind direction or low atmospheric turbulence (see Methods description) (micromolePerMeterSquaredPerSecond)
nee.value = best estimate of FCO2, using either valid measurement from the column to the left, or a model estimate (micromolePerMeterSquaredPerSecond)
r.estimate = estimated ecosystem respiration. This is equal to the measured FCO2 at night, if the wind direction is greater than 215 and ustar is greater than 0.35 m/s. Under all other circumstances it is an estimate of CO2 production by the ecosystem, based on a statistical model that uses soil and air temperatures and valid nighttime FCO2 values to predict FCO2 under other circumstances (micromolePerMeterSquaredPerSecond)
gee.estimate = estimate of gross carbon fixation by the forest, calculated difference between NEE and R (micromolePerMeterSquaredPerSecond)

fh2o = measured water vapor flux from forest to atmosphere. Includes all data collected, some of which are invalid (see below)
(millimolePerMeterSquaredPerSecond)

fh2o.valid = FH2O data after removal of data that are invalid due to wind direction (see Methods description). Low turbulence data are not removed as the H2O flux during the foliated season for the trees is from the canopy, which therefore does not act as a barrier to movement of H2O, as it does for the large amount of CO2 produced by soil and forest-floor litter. When trees do not have foliage, the leafless canopy is not a significant barrier to evaporation of water from the soil, which occurs primarily when the ground and air near the ground are warm, generating upward movement of air.
(millimolePerMeterSquaredPerSecond)

sonic.tair = air temperature estimated from the speed of sound measured by the sonic anemometer. This estimate is based on air density which is directly related to the speed of sound. The sonic air temperature estimate can differ from actual air temperature by a few degrees due to the presence of water vapor, which lowers air density.
(celsius)

tair.above.canopy = air temperature measured at 23 m height, or about 6.5 m above the average tree canopy top (celsius)

rh.above.canopy = relative humidity measured at 23 m height (same location as Tair.above.canopy) (dimensionless)

vpd.above.canopy = water vapor pressure deficit (equals saturation water vapor pressure at Tair.above.canopy minus actual water vapor pressure) (kilopascal)

tsoil.10cm = soil temperature measured at 10 cm depth. The average of 3 to 4 values at randomly located points within 15 m of the flux tower base. (celsius)

par = photosynthetically active radiation measured at 22 m height, or about 5.5 m above the average tree canopy top
(micromolePerMeterSquaredPerSecond)

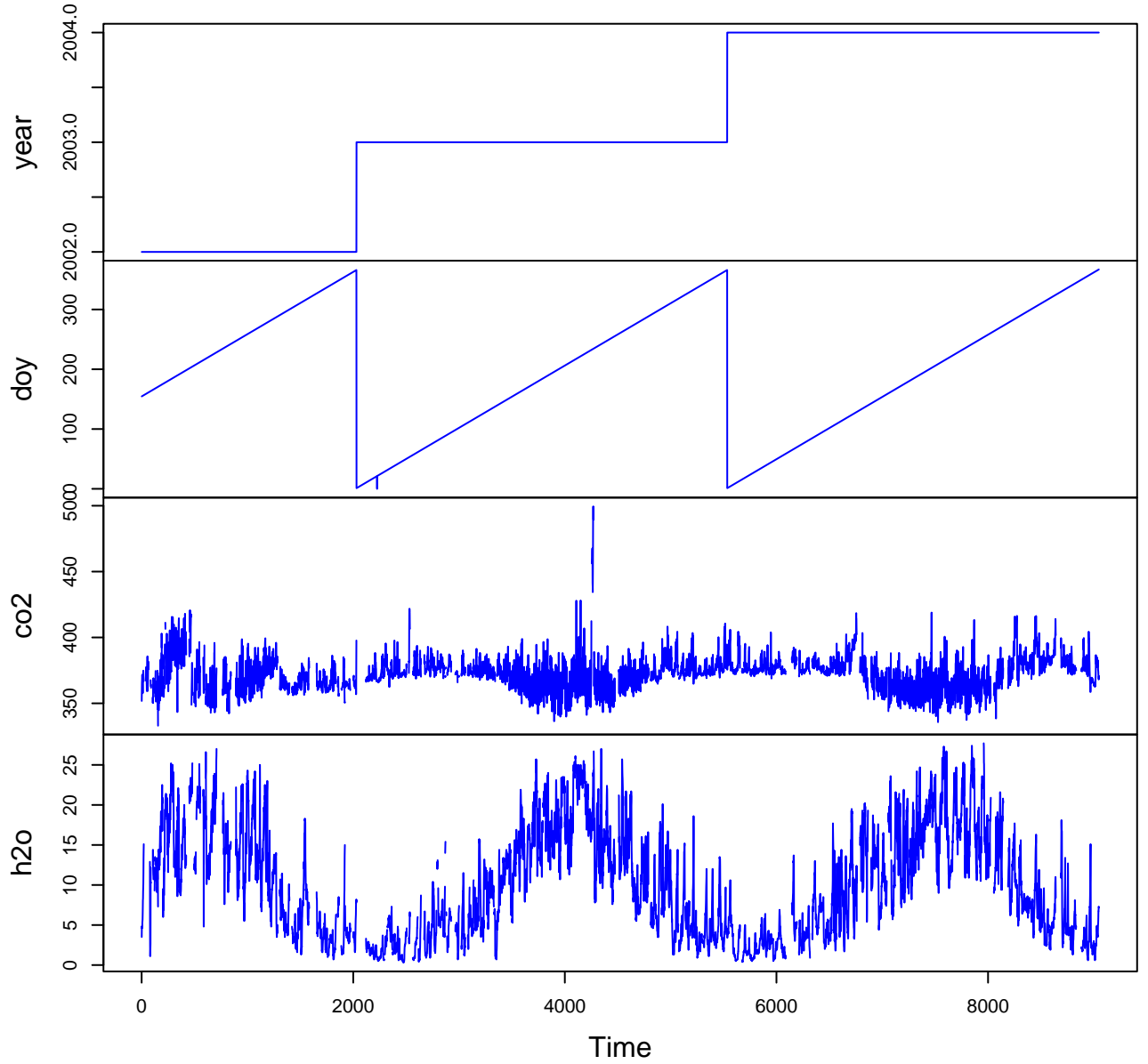
net.radiation = net radiant energy exchange, all wavelengths, measured by a sensor about 27 m above ground, or 10.5 m above the average tree canopy top (wattPerMeterSquared)

understory.tair.20cm = air temperature 20 cm above the soil surface. The average of 2 values at randomly located points within 15 m of the tower. This data is not accurate if the sensors receive direct sunlight. The data is used to identify low-turbulence periods at night or near dawn or dusk when air temperature near the soil is significantly lower than above the canopy, contributing to cold air drainage and invalidating FCO2 and FH2O measurements. (celsius)

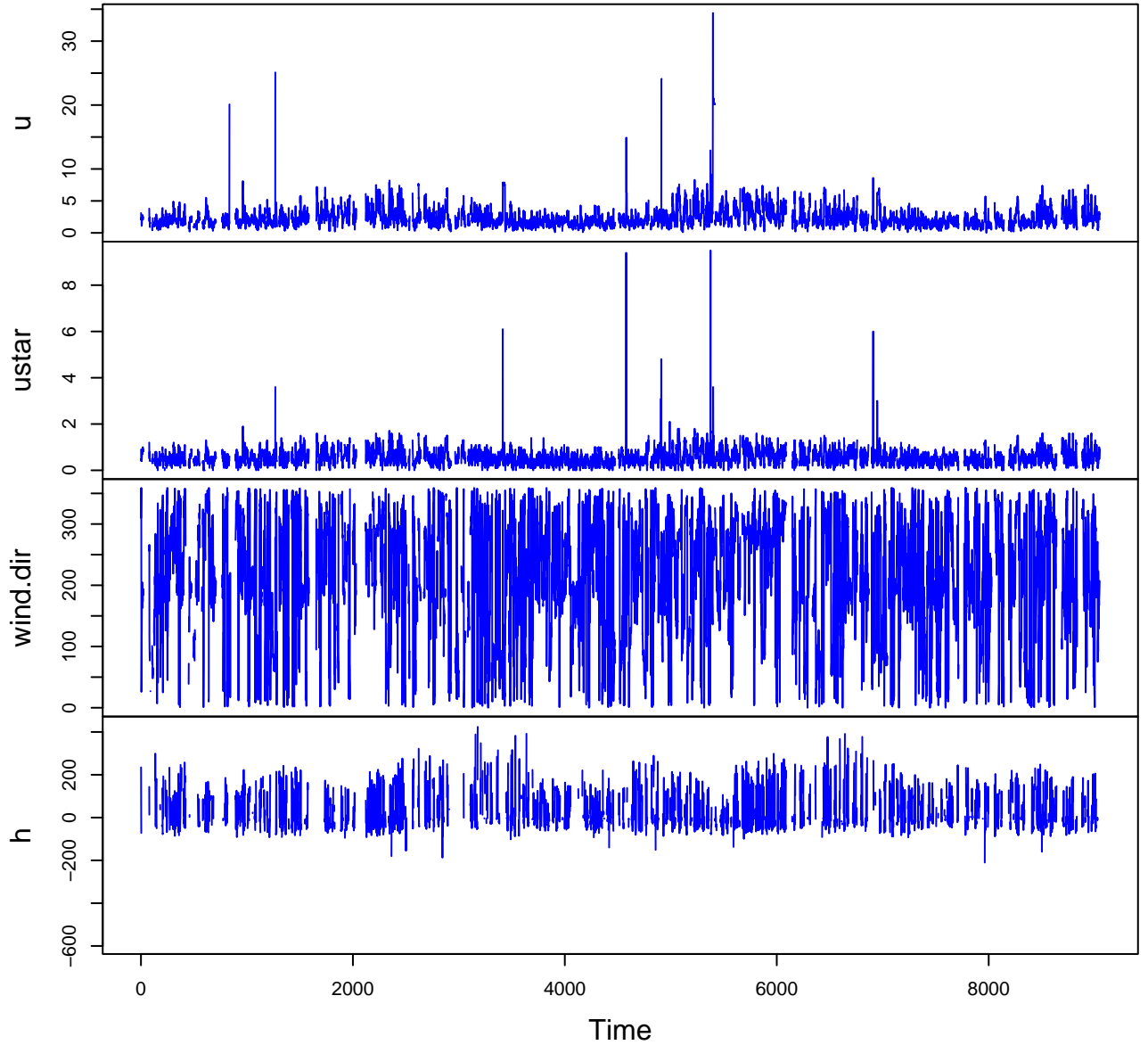
understory.tair.1m. = air temperature 1 m above the soil surface. The average of 2 values at randomly located points within 15 m of the tower. Also not accurate if the sensors receive direct sunlight.
(celsius)

Variable	Min	Median	Mean	Max	NAs
year	2002.000	2003.000	2003.164	2004.000	0
doy	0.000	209.270	200.925	367.000	0
co2	331.800	373.100	372.628	504.100	6383
h2o	0.300	9.100	10.022	28.200	6382
u	0.000	2.000	2.411	34.500	7150
ustar	0.000	0.500	0.561	13.700	7099
wind.dir	0.000	217.000	212.778	359.000	6548
h	-596.400	-5.400	25.139	572.400	26808
le	-100.600	4.100	50.046	1624.300	27420
fco2	-525.800	0.700	-0.102	145.300	10143
fco2.valid	-37.200	0.500	-2.915	29.800	32649
nee.value	-38.500	0.800	-0.869	33.800	10255
r.estimate	-8.700	1.700	2.331	33.800	10302
gee.estimate	-42.900	0.000	-3.300	0.000	10302
fh2o	-295.400	0.100	0.797	40.700	9375
fh2o.valid	-2.400	0.100	1.035	21.400	27364
sonic.tair	-25.900	10.600	9.292	33.900	6807
tair.above.c	-25.800	9.400	8.411	33.000	157
rh.above.can	83.300	83.300	83.300	83.300	45233
vpd.above.ca	0.130	0.130	0.130	0.130	45233
tsoil.10cm	-2.200	10.200	9.735	1508.000	1631
par	0.000	10.000	296.967	2116.000	364
net.radiatio					45234
understory.t	-26.000	5.600	6.105	32.400	24947
understory.t	-25.800	6.200	6.413	31.100	25191

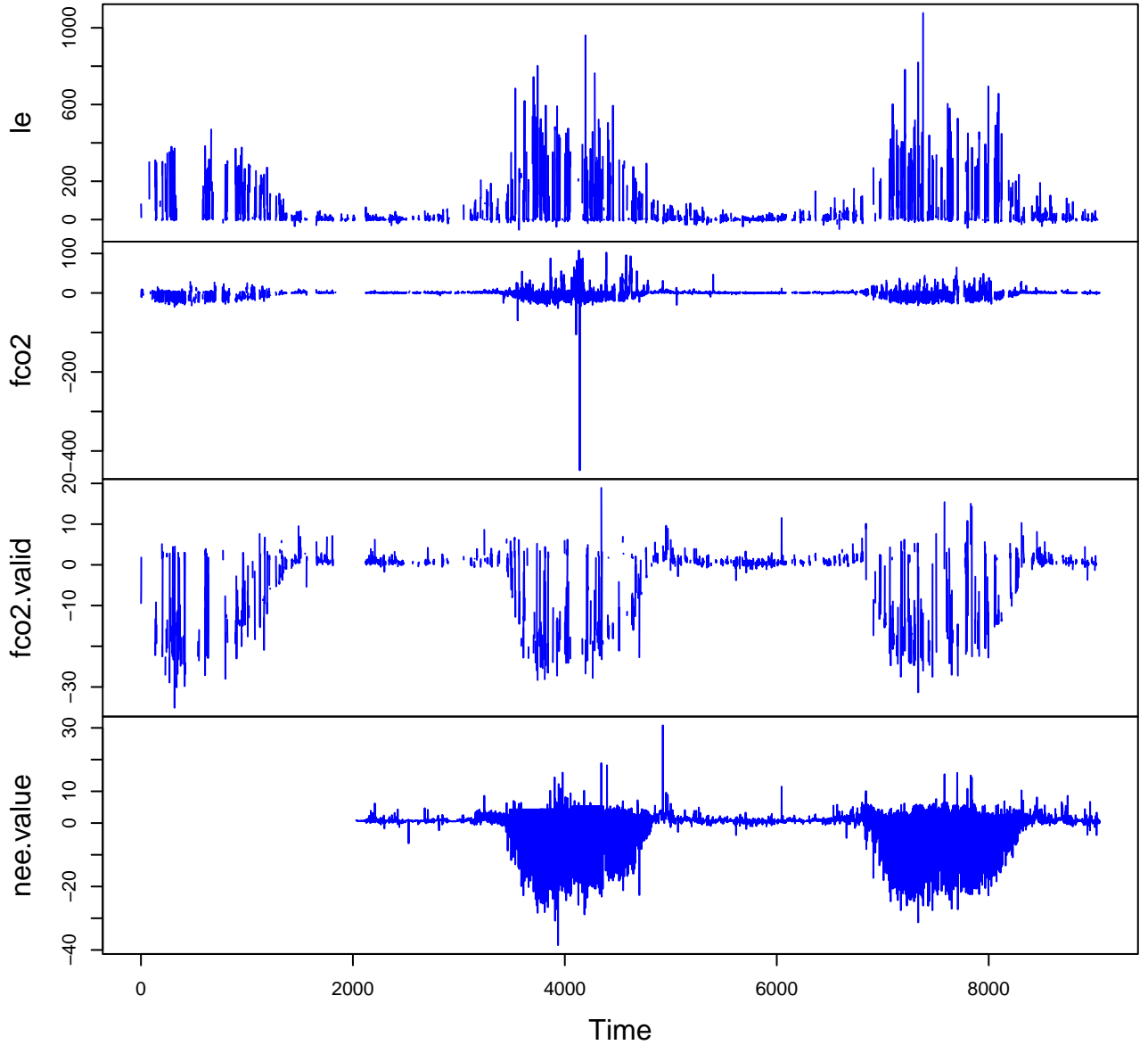
HF072-01 Plot 1



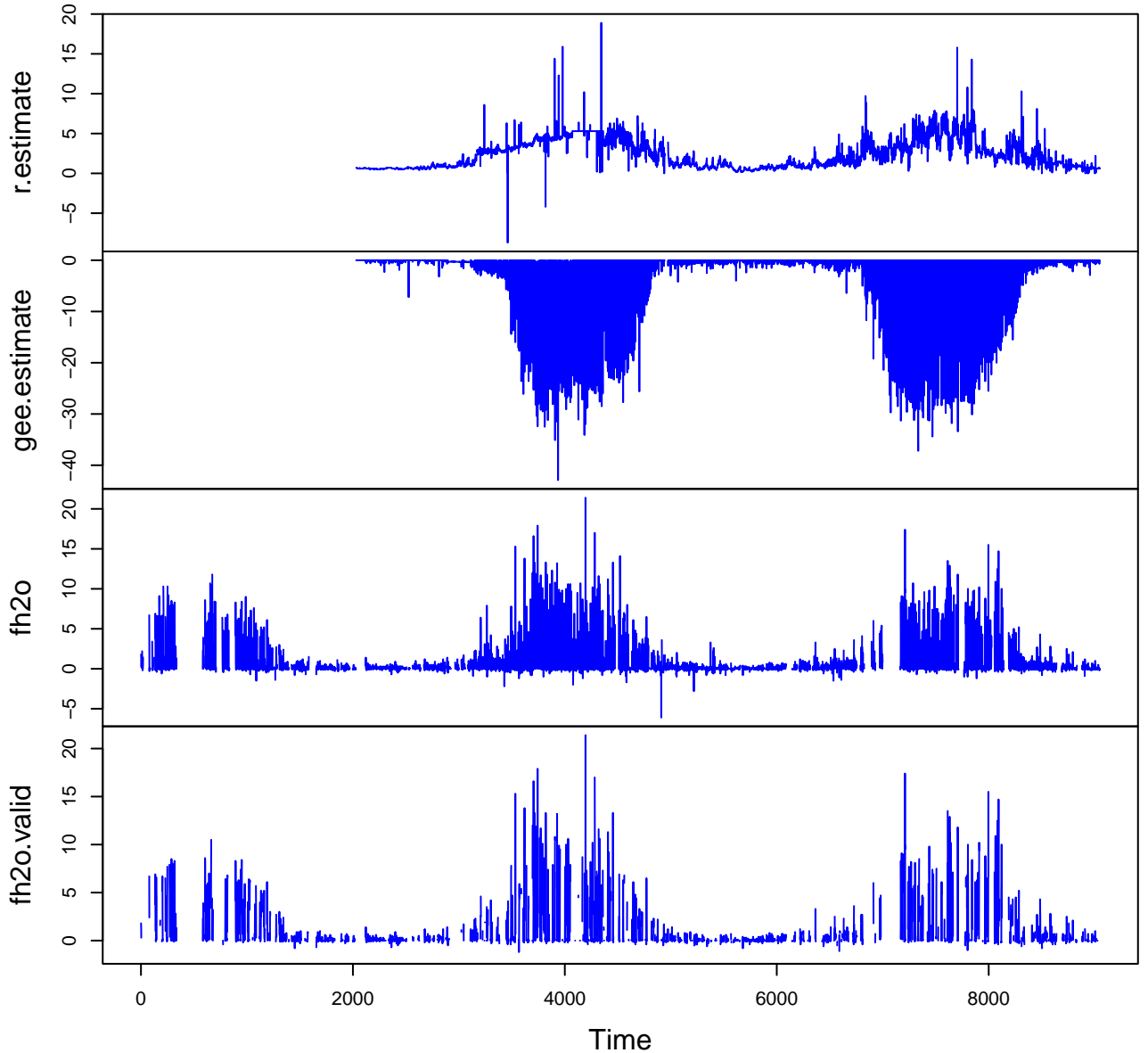
HF072-01 Plot 2



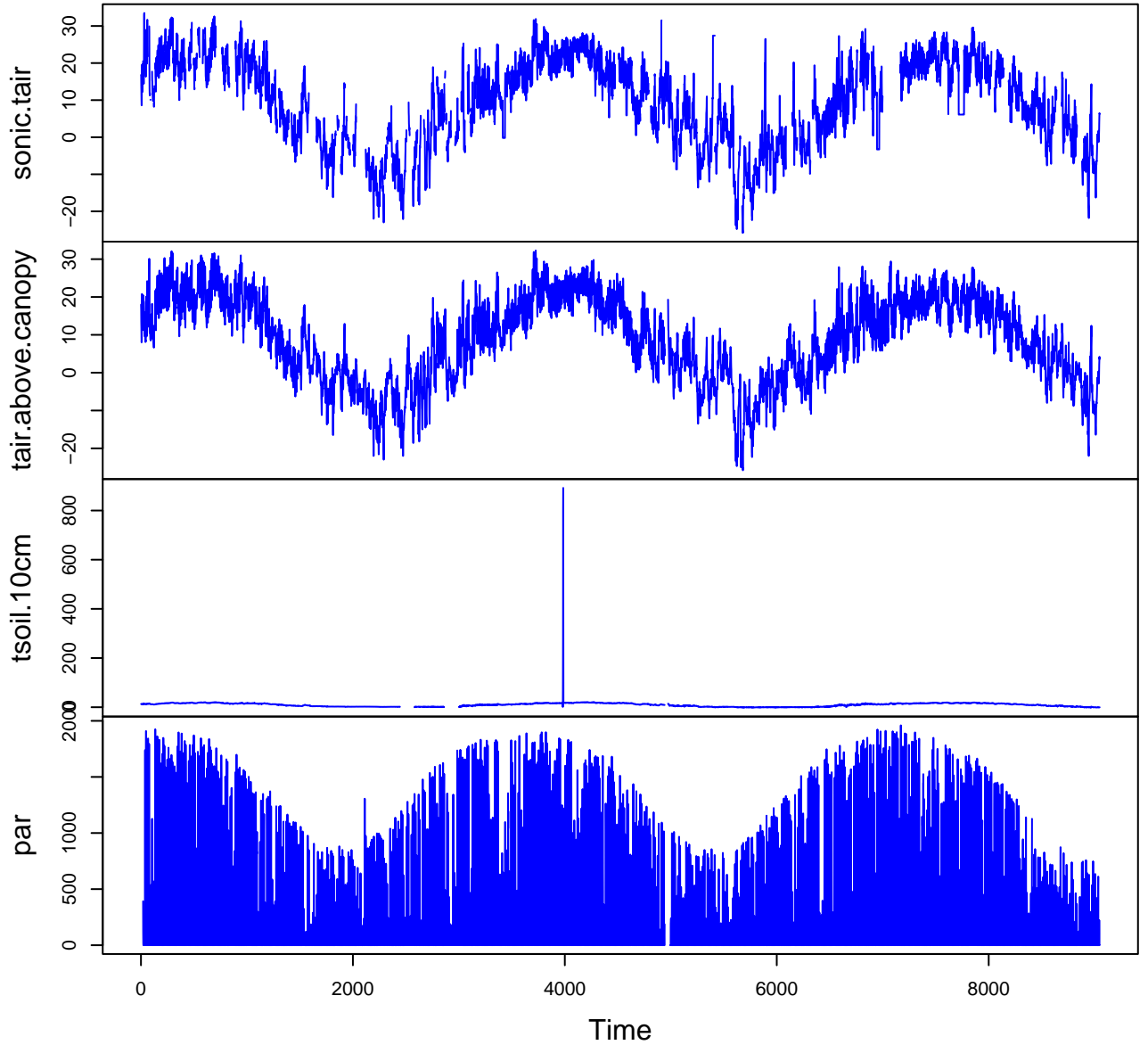
HF072-01 Plot 3



HF072-01 Plot 4



HF072-01 Plot 5



HF072-01 Plot 6

