

Meteorology and Micrometeorology Data Submission Guidelines for Gap-Filled Records

One of the fundamental requirements of being a participant in the AmeriFlux network is to submit data within one year of data collection to the central AmeriFlux data repository located at the Carbon Dioxide Information Analysis Center (CDIAC). Investigators are expected to provide a core suite of flux and micrometeorological measurements and estimates reported on 30-min (preferred) or 1 hr reporting intervals referenced to the beginning of the interval.

Meteorological and micrometeorological data must be submitted as non gap-filled records. AmeriFlux investigators are strongly encouraged to also submit gap-filled meteorological data. When submitting gap-filled data please provide a flagging column indicating whether the data point is filled or not (0=original measurement, 1=filled). In cooperation with the CarboEurope data activities, Level 4 gap-filled files are produced and available from the CDIAC archive (<ftp://cdiac.ornl.gov//ameriflux/data/Level4>).

Data are submitted in a comma-separated ASCII file. The file type can be CSV, ASC, or TXT. Separate files are submitted for non gap-filled and gap-filled data. The data columns in the gap-filled file must include all required variables, but otherwise may be a subset of the non gap-filled data columns. The same column headings are used for the same variables in each file.

The following provides required AmeriFlux data reporting elements, variable names, and reporting units. Please adhere to these guidelines. The only difference between the requirements for the gap-filled data files and the non gap-filled data files is the inclusion of a flag following each variable indicating whether the data point is based on actual measurements or has been gap-filled. See the example for TA_flag in the table that follows. When submitting gap-filled data records, please provide CDIAC with details on the gap-filling technique(s) used.

Content and Format of Data Submission File Header

Each file contains a header followed by data rows. The header includes information identifying the site, investigator, and submission date as well as rows identifying contents and units of the data rows. A missing data value is indicated by a value of -9999.

Data must be submitted in standard units. The units for each variable are documented in the table below.

<u>Line</u>	<u>Row Text</u>	<u>Contents</u>
1	Site name:	Site name. The site name should be consistent with the one on the AmeriFlux web site. Note that the site name cannot contain any commas.
2	Email:	E-mail contact for questions. The e-mail contact need not be the principal investigator.

3 Created: File creation date
 4 Variable name column headings
 5 Variable units

Content and Format of Data Submission File Data Records

Data row column headings are of the form:

<Variable name><repeat>_<offset>_<offset>_<modifier>

where:

- Variable name is one of the variable names documented on the above web page. The most important variable names are contained in the table below. Note that variable names may include the character “_”.
- Repeat is an integer which indicates data obtained from additional instruments. If there is one and only one instrument, the repeat is not used. The second instrument is associated with repeat = 2.
- _<offset>_<offset> gives the tower elevation in m or soil depth in cm of the measurement. If the site reports only one measurement of each variable, the offset is not used as the offset can be determined by the site ancillary data.
- _<modifier> is one of the additional attributes names documented at the above web page.

Examples include CO2, PAR2_OUT, TA_20_5, and TBole_Pine, and GAP_CO2_10_5.

<u>Variable Name</u>	<u>Units</u>	<u>Description</u>
YEAR		Calendar year, A.D.
DOY		Julian Day; integer.
HRMIN		Local time of day expressed in a three or four-digit HHMM format (e.g., 2:30 AM = 230; 2:30 PM = 1430).
DTIME		Decimal day and local time of day; each half-hour equals 0.02083 (e.g., 12.74988).
UST	m/s	Friction velocity, calculated as the square root of kinematic momentum flux.
TA	deg C	Air temperature.
TA_flag		0=original measurement 1=filled
WD	deg	Wind direction, expressed in degrees clockwise from the North.
WS	m/s	Wind speed measured above the canopy.
NEE	umol/m2/s	Net ecosystem exchange, including subcanopy CO2 storage. Subcanopy storage

		includes the entire column from the ground to the height of the eddy covariance system and for some sites advection losses too.
FC	$\mu\text{mol}/\text{m}^2/\text{s}$	CO ₂ flux or the rate of vertical transfer of CO ₂ , not corrected for storage or advection, as calculated from measurements above the canopy. Positive values denote upward fluxes and negative values downward fluxes.
SFC	$\mu\text{mol}/\text{m}^2/\text{s}$	CO ₂ storage in the canopy air layer. The canopy air layer includes the column from the ground to the height of the eddy covariance system.
H	W/m ²	Sensible heat flux or the rate of vertical transfer of heat, not corrected for storage, measured above the canopy.
SSA	W/m ²	Sensible heat storage in the canopy air space, biomass, and soil above the soil heat plate.
LE	W/m ²	Latent heat flux, not corrected for storage, measured above the canopy.
SLE	W/m ²	Latent heat storage in the canopy air layer.
G1	W/m ²	Soil heat flux.
TS	deg C	Soil temperature.
PRECIP	mm	Rainfall or wintertime precipitation.
RH	%	Relative humidity of air.
PA	kPA	Barometric pressure
CO ₂	$\mu\text{mol}/\text{mol}$	CO ₂ concentration above the canopy
VPD	kPA	Vapor pressure deficit, as the difference between the saturation water vapor pressure and the measured water vapor pressure.
SWC	m ³ /m ³	Soil water content, based on time-domain measurement methods sensitive to dielectric permittivity.
RNET	W/m ²	Net radiation. Positive values denote upwards.
PAR	$\mu\text{mol}/\text{m}^2/\text{s}$	Incoming photosynthetically active radiation (i.e., radiation in the 0.4 to 0.7 micrometer waveband), measured above the canopy.
PAR_DIFF	$\mu\text{mol}/\text{m}^2/\text{s}$	Incoming diffuse photosynthetically active radiation, measured above the canopy.
PAR_out	$\mu\text{mol}/\text{m}^2/\text{s}$	Reflected photosynthetically active radiation.

Rg	W/m ²	Incoming global solar radiation including both direct radiation and diffuse radiation, measured above the canopy
Rg_DIFF	W/m ²	Incoming diffuse global solar radiation including reflected and scattered radiation from all portions of the sky, measured above the canopy.
Rg_out	W/m ²	Outgoing global solar radiation, measured above the canopy.
Rlong_in	W/m ²	Incoming longwave radiation (i.e., radiation in the 4 to 100 micrometer waveband), measured above the canopy
Rlong_out	W/m ²	Outgoing longwave radiation, measured above the canopy.
FH ₂ O	mg/m ² /s	Water vapor flux above the canopy
H ₂ O	mmol/mol	Water vapor concentration above the canopy.
RE	μmol/m ² /s	Total ecosystem respiration.
GPP	μmol/m ² /s	Gross primary production, including total ecosystem respiration (Re) and net ecosystem exchange (NEE).
APAR	μmol/m ² /s	Absorbed photosynthetically active radiation, measured above the canopy.

To submit data simply contact Tom Boden using the information furnished below. Data may be submitted in a variety of ways including sending electronic mail with file attachments, mailing data to CDIAC on transfer media (e.g., CD-ROM, DLT), or transmitting data to the CDIAC server directly using the File Transfer Protocol (FTP).

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