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HF001

Fisher Meteorological Station at Harvard Forest since 2001

Related Publications (<http://harvardforest.fas.harvard.edu:8080/exist/apps/pubs/pb-id.html?id=hf001>)

Data

- **hf001-01** (<http://harvardforest.fas.harvard.edu/data/p00/hf001/hf001-01-station-log.csv>) : station log (**preview** (<http://harvardforest.fas.harvard.edu/data/plots/hf001-01.pdf>))
- **hf001-02** (<http://harvardforest.fas.harvard.edu/data/p00/hf001/hf001-02-annual-m.csv>) : annual (metric) since 2002 (**preview** (<http://harvardforest.fas.harvard.edu/data/plots/hf001-02.pdf>))
- **hf001-03** (<http://harvardforest.fas.harvard.edu/data/p00/hf001/hf001-03-annual-e.csv>) : annual (english) since 2002 (**preview** (<http://harvardforest.fas.harvard.edu/data/plots/hf001-03.pdf>))
- **hf001-04** (<http://harvardforest.fas.harvard.edu/data/p00/hf001/hf001-04-monthly-m.csv>) : monthly (metric) since 2001 (**preview** (<http://harvardforest.fas.harvard.edu/data/plots/hf001-04.pdf>))
- **hf001-05** (<http://harvardforest.fas.harvard.edu/data/p00/hf001/hf001-05-monthly-e.csv>) : monthly (english) since 2001 (**preview** (<http://harvardforest.fas.harvard.edu/data/plots/hf001-05.pdf>))
- **hf001-06** (<http://harvardforest.fas.harvard.edu/data/p00/hf001/hf001-06-daily-m.csv>) : daily (metric) since 2001 (**preview** (<http://harvardforest.fas.harvard.edu/data/plots/hf001-06.pdf>))
- **hf001-07** (<http://harvardforest.fas.harvard.edu/data/p00/hf001/hf001-07-daily-e.csv>) : daily (english) since 2001 (**preview** (<http://harvardforest.fas.harvard.edu/data/plots/hf001-07.pdf>))
- **hf001-08** (<http://harvardforest.fas.harvard.edu/data/p00/hf001/hf001-08-hourly-m.csv>) : hourly (metric) 2001-2004 (**preview** (<http://harvardforest.fas.harvard.edu/data/plots/hf001-08.pdf>))
- **hf001-09** (<http://harvardforest.fas.harvard.edu/data/p00/hf001/hf001-09-hourly-e.csv>) : hourly (english) 2001-2004 (**preview** (<http://harvardforest.fas.harvard.edu/data/plots/hf001-09.pdf>))
- **hf001-10** (<http://harvardforest.fas.harvard.edu/data/p00/hf001/hf001-10-15min-m.csv>) : 15-minute (metric) since 2005 (**preview** (<http://harvardforest.fas.harvard.edu/data/plots/hf001-10.pdf>))
- **hf001-11** (<http://harvardforest.fas.harvard.edu/data/p00/hf001/hf001-11-15min-e.csv>) : 15-minute (english) since 2005 (**preview** (<http://harvardforest.fas.harvard.edu/data/plots/hf001-11.pdf>))

Overview

- **Lead:** Emery Boose
- **Investigators:** Mark VanScoy
- **Contact:** **Emery Boose** (<mailto:boose@fas.harvard.edu>)
- **Start date:** 2001
- **End date:** 2017
- **Status:** ongoing
- **Location:** Prospect Hill Tract (Harvard Forest)
- **Latitude:** +42.53311

- **Longitude:** -72.18968
- **Elevation:** 342 meter
- **Taxa:**
- **Release date:** 2018
- **Revisions:** data updated monthly
- **EML file:** **knbn-lter-hfr.1.23** (<http://harvardforest.fas.harvard.edu/data/eml/hf001.xml>)
- **DOI:** **digital object identifier** (<http://pasta.lternet.edu/package/doi/eml/knb-lter-hfr/1/23>)
- **EDI:** **data package** (<https://portal.lternet.edu/nis/mapbrowse?packageid=knbn-lter-hfr.1.23>)
- **DataONE:** **data package** (<https://search.dataone.org/#view/https://pasta.lternet.edu/package/metadata/eml/knb-lter-hfr/1/23>)
- **Related links:**
 - **Real-Time Measurements** (<http://harvardforest.fas.harvard.edu/harvard-forest-weather-station>)
 - **Barn Tower Meteorological Station at Harvard Forest since 2010** (<http://harvardforest.fas.harvard.edu:8080/exist/xquery/data.xq?id=hf165>)
 - **Harvard Forest Snow Pillow since 2009** (<http://harvardforest.fas.harvard.edu:8080/exist/xquery/data.xq?id=hf155>)
 - **Prospect Hill Hydrological Stations at Harvard Forest since 2005** (<http://harvardforest.fas.harvard.edu:8080/exist/xquery/data.xq?id=hf070>)
 - **Shaler Meteorological Station at Harvard Forest 1964-2002** (<http://harvardforest.fas.harvard.edu:8080/exist/xquery/data.xq?id=hf000>)
- **Study type:** long-term measurement
- **Research topic:** climate and carbon exchange; watershed ecology
- **LTER core area:** disturbance
- **Keywords:** air temperature, atmospheric pressure, climate, relative humidity, meteorology, precipitation, net radiation, solar radiation, photosynthetically active radiation, soil temperature, wind direction, wind speed
- **Abstract:**

The Fisher Meteorological Station became operational on 11 Feb 2001. The Station is located in an open field 200 m north of the Shaler Station, in a site chosen to minimize the angle of surrounding trees above the horizon (currently 15-25 degrees from the station at breast height). The Fisher Station records air temperature, relative humidity, dew point, precipitation (water equivalent of snow), global solar radiation, PAR radiation, net radiation, barometric pressure, scalar wind speed, vector wind speed, peak gust speed (1-second), vector wind direction, standard deviation of wind direction (wind measurements at 10 m height), and soil temperature (10 cm depth). Instruments are scanned once per second, and 15-minute (hourly before 2005) and daily values are calculated and stored by a datalogger. Data for the current month are available online, updated every 15 minutes, with out-of-range values replaced by NA but values not otherwise checked. Earlier data are checked and archived with missing, questionable, and estimated values flagged, following methods of the LTER ClimDB project. A log of events affecting station measurements (e.g., instrument repair and recalibration, ice storms, lightning) and selected monthly and annual values are also posted.

For current data, please see: <http://harvardforest.fas.harvard.edu/meteorological-hydrological-stations>. For a complete set of archived data, please see: <http://harvardforest.fas.harvard.edu:8080/exist/xquery/data.xq?id=hf001>.

- **Methods:**

Observation periods

15-minute: 15 minutes, ending with given time. Hourly: 1 hour, ending with given time. Daily: 1 day, midnight to midnight. All times are Eastern Standard Time.

Instruments

Air temperature and relative humidity: Vaisala HMP45C (2.2m above ground). Precipitation: Met One 385 heated rain gage (top of gage 1.6m above ground). Global solar radiation: Licor LI200X pyranometer (2.7m above ground). PAR radiation: Licor LI190SB quantum sensor (2.7m above ground). Net radiation: Kipp and Zonen NR-LITE net radiometer (5.0m above ground). Barometric pressure: Vaisala CS105 barometer. Wind speed and direction: R.M. Young 05103 wind monitor (10m above ground). Soil temperature: Campbell 107 temperature probe (10cm below ground). Data logger: Campbell Scientific CR10X.

Instrument and flag notes

Air temperature. Daily air temperature is estimated from other stations as needed to complete record.

Precipitation. Daily precipitation is estimated from other stations as needed to complete record. Delayed melting of snow and ice (caused by problems with rain gage heater or heavy precipitation) is noted in log - daily values are corrected if necessary but 15-minute values are not. The gage may underestimate actual precipitation under windy or cold conditions.

Radiation. Whenever possible, snow and ice are removed from radiation instruments after precipitation events. Depth of snow or ice on instruments and time of removal are noted in log, but values are not corrected or flagged.

Wind speed and direction. During ice storms, values are flagged as questionable when there is evidence (from direct observation or the 15-

minute record) that ice accumulation may have affected the instrument's operation.

• **Use:**

This dataset is released to the public under Creative Commons license CC BY (Attribution). Please keep the designated contact person informed of any plans to use the dataset. Consultation or collaboration with the original investigators is strongly encouraged. Publications and data products that make use of the dataset must include proper acknowledgement.

• **Citation:**

Boose E. 2018. Fisher Meteorological Station at Harvard Forest since 2001. Harvard Forest Data Archive: HF001.

Detailed Metadata

hf001-01: station log

- 1. date: date
- 2. notes: notes

hf001-02: annual (metric) since 2002

- 1. date: date
- 2. airt: average air temperature. Average of daily averages. (unit: celsius / missing value: NA)
- 3. f.airt: flag for average air temperature
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
- 4. airtmax: average maximum air temperature. Average of daily maximums. (unit: celsius / missing value: NA)
- 5. f.airtmax: flag for average maximum air temperature
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
- 6. airtmin: average minimum air temperature. Average of daily minimums. (unit: celsius / missing value: NA)
- 7. f.airtmin: flag for average minimum air temperature
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
- 8. airtmmx: extreme maximum air temperature. Maximum of daily maximums. (unit: celsius / missing value: NA)
- 9. f.airtmmx: flag for extreme maximum air temperature
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
- 10. airtmmn: extreme minimum air temperature. Minimum of daily minimums. (unit: celsius / missing value: NA)
- 11. f.airtmmn: flag for extreme minimum air temperature
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
- 12. prec: total precipitation. Includes water equivalent of snow. Sum of daily totals. (unit: millimeter / missing value: NA)
- 13. f.prec: flag for precipitation
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
- 14. slrt: average total global solar radiation. Average of daily totals. (unit: megajoulePerMeterSquared / missing value: NA)
- 15. f.slrt: flag for average total global solar radiation
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
- 16. part: average total photosynthetically active radiation. Average of daily totals. (unit: molePerMeterSquared / missing value: NA)
- 17. f.part: flag for average total photosynthetically active radiation
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
- 18. netr: average net radiation. Includes short and long wave. Corrected for wind speeds above 5 m/s using Cambell Scientific equation. Average of daily averages. (unit: wattPerMeterSquared / missing value: NA)
- 19. f.netr: flag for average net radiation
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
- 20. wspd: average horizontal scalar wind speed. Average of daily averages. (unit: metersPerSecond / missing value: NA)
- 21. f.wspd: flag for average horizonal scalar wind speed
 - M: 10 or more daily measurements missing. Summary value not calculated

- 1-9: Number of daily measurements missing.
- 22. wres: average horizontal resultant vector wind speed. Vector average of daily averages. (unit: metersPerSecond / missing value: NA)
- 23. f.wres: flag for average horizontal resultant vector wind speed
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
- 24. wdir: average horizontal vector wind direction. Measured in degrees clockwise from true north. Vector average of daily values. (unit: degree / missing value: NA)
- 25. f.wdir: flag for average horizontal vector wind direction
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
- 26. gspd: extreme maximum gust speed. Maximum of daily maximums. (unit: metersPerSecond / missing value: NA)
- 27. f.gspd: flag for extreme maximum gust speed
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
- 28. s10t: average soil temperature at 10cm depth. Average of daily averages. (unit: celsius / missing value: NA)
- 29. f.s10t: flag for average soil temperature
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.

hf001-03: annual (english) since 2002

1. date: date
2. airt: average air temperature. Average of daily averages. (unit: fahrenheit / missing value: NA)
3. f.airt: flag for average air temperature
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
4. airtmax: average maximum air temperature. Average of daily maximums. (unit: fahrenheit / missing value: NA)
5. f.airtmax: flag for average maximum air temperature
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
6. airtmin: average minimum air temperature. Average of daily minimums. (unit: fahrenheit / missing value: NA)
7. f.airtmin: flag for average minimum air temperature
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
8. airtmx: extreme maximum air temperature. Maximum of daily maximums. (unit: fahrenheit / missing value: NA)
9. f.airtmx: flag for extreme maximum air temperature
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
10. airtmn: extreme minimum air temperature. Minimum of daily minimums. (unit: fahrenheit / missing value: NA)
11. f.airtmn: flag for extreme minimum air temperature
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
12. prec: total precipitation. Includes water equivalent of snow. Sum of daily totals. (unit: inch / missing value: NA)
13. f.prec: flag for total precipitation
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
14. slrt: average total global solar radiation. Average of daily totals. (unit: megajoulePerMeterSquared / missing value: NA)
15. f.slrt: flag for average total global solar radiation
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
16. part: average total photosynthetically active radiation. Average of daily totals. (unit: numberPerMeterSquared / missing value: NA)
17. f.part: flag for average total photosynthetically active radiation
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
18. netr: average net radiation. Includes short and long wave. Corrected for wind speeds above 5 m/s using Cambell Scientific equation. Average of daily averages. (unit: wattPerMeterSquared / missing value: NA)
19. f.netr: flag for net radiation
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.

- 20. wpsd: average horizontal scalar wind speed. Average of daily averages. (unit: milesPerHour / missing value: NA)
- 21. f.wspd: flag for average horizontal scalar wind speed
 - M: 10 or more daily measurements missing. Summary value not calculated
 - 1-9: Number of daily measurements missing.
- 22. wres: average horizontal resultant vector wind speed. Vector average of daily averages. (unit: milesPerHour / missing value: NA)
- 23. f.wres: flag for average horizontal resultant vector wind speed
 - M: 10 or more daily measurements missing. Summary value not calculated
 - 1-9: Number of daily measurements missing
- 24. wdir: average horizontal vector wind direction. Measured in degrees clockwise from true north. Vector average of daily values. (unit: degree / missing value: NA)
- 25. f.wdir: flag for average horizontal vector wind direction
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
- 26. gspd: extreme maximum gust speed. Maximum of daily maximums. (unit: milesPerHour / missing value: NA)
- 27. f.gspd: flag for extreme maximum gust speed
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
- 28. s10t: average soil temperature at 10cm depth. Average of daily averages. (unit: fahrenheit / missing value: NA)
- 29. f.s10t: flag for average soil temperature
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.

hf001-04: monthly (metric) since 2001

- 1. date: date
- 2. airt: average air temperature. Average of daily averages. (unit: celsius / missing value: NA)
- 3. f.airt: flag for average air temperature
 - M: 10 or more daily measurements missing. Summary value not calculated
 - 1-9: number of daily measurements missing
- 4. airtmax: average maximum air temperature. Average of daily maximums. (unit: celsius / missing value: NA)
- 5. f.airtmax: flag for average maximum air temperature
 - M: 10 or more daily measurements missing. Summary value not calculated
 - 1-9: number of daily measurements missing
- 6. airtmin: average minimum air temperature. Average of daily minimums. (unit: celsius / missing value: NA)
- 7. f.airtmin: flag for average minimum air temperature
 - M: 10 or more daily measurements missing. Summary value not calculated
 - 1-9: Number of daily measurements missing
- 8. airtmx: extreme maximum air temperature. Maximum of daily maximums. (unit: celsius / missing value: NA)
- 9. f.airtmx: flag for extreme maximum air temperature
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
- 10. airtmn: extreme minimum air temperature. Minimum of daily minimums. (unit: celsius / missing value: NA)
- 11. f.airtmn: flag for extreme minimum air temperature
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
- 12. prec: total precipitation. Includes water equivalent of snow. Sum of daily totals. (unit: millimeter / missing value: NA)
- 13. f.prec: flag for precipitation
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
- 14. slrt: average total global solar radiation. Average of daily totals. (unit: megajoulePerMeterSquared / missing value: NA)
- 15. f.slrt: flag for average total global solar radiation
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
- 16. part: average total photosynthetically active radiation. Average of daily totals. (unit: molePerMeterSquared / missing value: NA)
- 17. f.part: flag for average total photosynthetically active radiation
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
- 18. netr: average net radiation. Includes short and long wave. Corrected for wind speeds above 5 m/s using Cambell Scientific equation. Average of daily averages. (unit: wattPerMeterSquared / missing value: NA)

19. f.netr: flag for average net radiation
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
20. wspd: average horizontal scalar wind speed. Average of daily averages. (unit: metersPerSecond / missing value: NA)
21. f.wspd: flag for average horizontal scalar wind speed
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
22. wres: Average horizontal resultant vector wind speed. Vector average of daily averages. (unit: metersPerSecond / missing value: NA)
23. f.wres: flag for average horizontal resultant vector wind speed
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
24. wdir: average horizontal vector wind direction. Measured in degrees clockwise from true north. Vector average of daily values. (unit: degree / missing value: NA)
25. f.wdir: flag for average horizontal vector wind direction
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
26. gspd: extreme maximum gust speed. Maximum of daily maximums. (unit: metersPerSecond / missing value: NA)
27. f.gspd: flag for extreme maximum gust speed
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
28. s10t: average soil temperature at 10cm depth. Average of daily averages. (unit: celsius / missing value: NA)
29. f.s10t: flag for average soil temperature
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.

hf001-05: monthly (english) since 2001

1. date: date
2. airt: average air temperature. Average of daily averages. (unit: fahrenheit / missing value: NA)
3. f.airt: flag for average air temperature
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
4. airtmax: average maximum air temperature. Average of daily maximums. (unit: fahrenheit / missing value: NA)
5. f.airtmax: flag for average maximum air temperature
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
6. airtmin: average minimum air temperature. Average of daily minimums. (unit: fahrenheit / missing value: NA)
7. f.airtmin: flag for average minimum air temperature
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
8. airtmx: extreme maximum air temperature. Maximum of daily maximums. (unit: fahrenheit / missing value: NA)
9. f.airtmx: flag for extreme maximum air temperature
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
10. airtmn: extreme minimum air temperature. Minimum of daily minimums. (unit: fahrenheit / missing value: NA)
11. f.airtmn: flag for extreme minimum air temperature
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
12. prec: total precipitation. Includes water equivalent of snow. Sum of daily totals. (unit: inch / missing value: NA)
13. f.prec: flag for total precipitation
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
14. slrt: average total global solar radiation. Average of daily totals. (unit: megajoulePerMeterSquared / missing value: NA)
15. f.slrt: flag for average total global solar radiation
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
16. part: average total photosynthetically active radiation. Average of daily totals. (unit: molePerMeterSquared / missing value: NA)
17. f.part: flag for average total photosynthetically active radiation
 - M: 10 or more daily measurements missing. Summary value not calculated.

- 1-9: Number of daily measurements missing.
- 18. netr: average net radiation. Includes short and long wave. Corrected for wind speeds above 5 m/s using Cambell Scientific equation. Average of daily averages. (unit: wattPerMeterSquared / missing value: NA)
- 19. f.netr: flag for net radiation
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
- 20. wspd: average horizontal scalar wind speed. Average of daily averages. (unit: milesPerHour / missing value: NA)
- 21. f.wspd: flag for average horizontal scalar wind speed
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
- 22. wres: average horizontal resultant vector wind speed. Vector average of daily averages. (unit: milesPerHour / missing value: NA)
- 23. f.wres: flag for average horizontal resultant vector wind speed
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
- 24. wdir: average horizontal vector wind direction. Measured in degrees clockwise from true north. Vector average of daily values. (unit: degree / missing value: NA)
- 25. f.wdir: flag for average horizontal vector wind direction
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
- 26. gspd: extreme maximum gust speed. Maximum of daily maximums. (unit: milesPerHour / missing value: NA)
- 27. f.gspd: flag for extreme maximum gust speed
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.
- 28. s10t: average soil temperature at 10cm depth. Average of daily averages. (unit: fahrenheit / missing value: NA)
- 29. f.s10t: flag for average soil temperature
 - M: 10 or more daily measurements missing. Summary value not calculated.
 - 1-9: Number of daily measurements missing.

hf001-06: daily (metric) since 2001

1. date: date
2. jd: Julian day (unit: nominalDay)
3. airt: average air temperature. Average of 1-second measurements. (unit: celsius / missing value: NA)
4. f.airt: flag for average air temperature
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
5. airtmax: maximum air temperature. Maximum of 1-second measurements. (unit: celsius / missing value: NA)
6. f.airtmax: flag for maximum air temperature
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
7. airtmin: minimum air temperature. Minimum of 1-second measurements. (unit: celsius / missing value: NA)
8. f.airtmin: flag for minimum air temperature
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
9. rh: average relative humidity. Average of 1-second measurements. (percent) (unit: number / missing value: NA)
10. f.rh: flag for average relative humidity
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
11. rhmax: maximum relative humidity. Maximum of 1-second measurements. (percent) (unit: number / missing value: NA)
12. f.rhmax: flag for maximum relative humidity
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
13. rhmin: minimum relative humidity. Minimum of 1-second measurements. (percent) (unit: number / missing value: NA)
14. f.rhmin: flag for minimum relative humidity

- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
15. dewp: average dew point. Average of 1-second values calculated from air temperature and relative humidity. (unit: celsius / missing value: NA)
16. f.dewp: flag for average dew point
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
17. dewpmax: maximum dew point. Maximum of 1-second values calculated from air temperature and relative humidity. (unit: celsius / missing value: NA)
18. f.dewpmax: flag for maximum dew point
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
19. dewpmin: minimum dew point. Minimum of 1-second values calculated from air temperature and relative humidity. (unit: celsius / missing value: NA)
20. f.dewpmin: flag for minimum dew point
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
 - Q: Questionable. Possible problem with instrument.
21. prec: total precipitation. Includes water equivalent of snow. Total value for 1-day period. Measured in increments of 0.01 inch. (unit: millimeter / missing value: NA)
22. f.prec: flag for total precipitation
- E: Estimated. Value estimated from incomplete measurements or from other sources.
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
23. slrt: total global solar radiation. Total value for 1-day period. (unit: megajoulePerMeterSquared / missing value: NA)
24. f.slrt: flag for total global solar radiation
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
25. part: total photosynthetically active radiation. Total value for 1-day period. (unit: molePerMeterSquared / missing value: NA)
26. f.part: flag for total photosynthetically active radiation
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
27. netr: average net radiation. Includes short and long wave. Average of 1-second measurements. Corrected for wind speeds above 5 m/s using Campbell Scientific equation. (unit: wattPerMeterSquared / missing value: NA)
28. f.netr: flag for average net radiation
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
29. bar: average barometric pressure. Corrected for elevation. Average of hourly measurements. (unit: millibar / missing value: NA)
30. f.bar: flag for barometric pressure
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
31. wspd: average horizontal scalar wind speed. Average of 1-second measurements. (unit: metersPerSecond / missing value: NA)
32. f.wspd: flag for average horizontal scalar wind speed
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
33. wres: average horizontal resultant vector wind speed. Vector average of 1-second measurements. (unit: metersPerSecond / missing value: NA)
34. f.wres: flag for average horizontal resultant vector wind speed
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
35. wdir: average horizontal vector wind direction. Vector average of 1-second measurements. Measured in degrees clockwise from true north. (unit:

degree / missing value: NA)

36. f.wdir: flag for average horizontal vector wind direction

- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
- Q: Questionable. Possible problem with instrument.
- E: Estimated. Value estimated from incomplete measurements or from other sources.

37. wdev: standard deviation of wind direction. Calculated from 1-second measurements using Campbell Scientific equation. (unit: degree / missing value: NA)

38. f.wdev: flag for standard deviation of wind direction

- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
- Q: Questionable. Possible problem with instrument.
- E: Estimated. Value estimated from incomplete measurements or from other sources.

39. gspd: gust speed. Maximum of 1-second measurements. (unit: metersPerSecond / missing value: NA)

40. f.gspd: flag for gust speed

- M: # Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
- Q: Questionable. Possible problem with instrument.
- E: Estimated. Value estimated from incomplete measurements or from other sources.

41. s10t: average soil temperature at 10cm depth. Average of 1-second measurements. (unit: celsius / missing value: NA)

42. f.s10t: flag for average soil temperature

- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
- Q: Questionable. Possible problem with instrument.
- E: Estimated. Value estimated from incomplete measurements or from other sources.

43. s10tmax: maximum soil temperature at 10cm depth. Maximum of 1-second measurements. (unit: celsius / missing value: NA)

44. f.s10tmax: flag for maximum soil temperature

- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
- Q: Questionable. Possible problem with instrument.
- E: Estimated. Value estimated from incomplete measurements or from other sources.

45. s10tmin: minimum soil temperature at 10cm depth. Minimum of 1-second measurements. (unit: celsius / missing value: NA)

46. f.s10tmin: flag for minimum soil temperature

- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
- Q: Questionable. Possible problem with instrument.
- E: Estimated. Value estimated from incomplete measurements or from other sources.

hf001-07: daily (english) since 2001

1. date: date

2. jd: Julian day (unit: nominalDay)

3. airt: average air temperature. Average of 1-second measurements. (unit: fahrenheit / missing value: NA)

4. f.airt: flag for average air temperature

- E: Estimated. Value estimated from incomplete measurements or from other sources.
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
- Q: Questionable. Possible problem with instrument.

5. airtmax: maximum air temperature. Maximum of 1-second measurements. (unit: fahrenheit / missing value: NA)

6. f.airtmax: flag for maximum air temperature

- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
- Q: Questionable. Possible problem with instrument.
- E: Estimated. Value estimated from incomplete measurements or from other sources.

7. airtmin: minimum air temperature. Minimum of 1-second measurements. (unit: fahrenheit / missing value: NA)

8. f.airtmin: flag for minimum air temperature

- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
- Q: Questionable. Possible problem with instrument.
- E: Estimated. Value estimated from incomplete measurements or from other sources.

9. rh: average relative humidity. Average of 1-second measurements. (percent) (unit: number / missing value: NA)

10. f.rh: flag for average relative humidity

- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
- Q: Questionable. Possible problem with instrument.
- E: Estimated. Value estimated from incomplete measurements or from other sources.

11. rhmax: maximum relative humidity. Maximum of 1-second measurements. (percent) (unit: number / missing value: NA)

12. f.rhmax: flag for maximum relative humidity

- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.

- Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
13. rhmin: minimum relative humidity. Minimum of 1-second measurements. (percent) (unit: number / missing value: NA)
14. f.rhmin: flag for minimum relative humidity
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
15. dewp: average dew point. Average of 1-second values calculated from air temperature and relative humidity. (unit: fahrenheit / missing value: NA)
16. f.dewp: flag for average dew point
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
17. dewpmax: maximum dew point. Maximum of 1-second values calculated from air temperature and relative humidity. (unit: fahrenheit / missing value: NA)
18. f.dewpmax: flag for maximum dew point
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
19. dewpmin: minimum dew point. Minimum of 1-second values calculated from air temperature and relative humidity. (unit: fahrenheit / missing value: NA)
20. f.dewpmin: flag for minimum dew point
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
 - Q: Questionable. Possible problem with instrument.
21. prec: Total precipitation. Includes water equivalent of snow. Total value for 1-day period. Measured in increments of 0.01 inch. (unit: inch / missing value: NA)
22. f.prec: flag for total precipitation
- E: Estimated. Value estimated from incomplete measurements or from other sources.
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
23. slrt: Total global solar radiation. Total value for 1-day period. (unit: megajoulePerMeterSquared / missing value: NA)
24. f.slrt: flag for total global solar radiation
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
25. part: total photosynthetically active radiation. Total value for 1-day period. (unit: molePerMeterSquared / missing value: NA)
26. f.part: flag for total photosynthetically active radiation
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
27. netr: average net radiation. Includes short and long wave. Average of 1-second measurements. Corrected for wind speeds above 5 m/s using Campbell Scientific equation. (unit: wattPerMeterSquared / missing value: NA)
28. f.netr: flag for average net radiation
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
29. bar: average barometric pressure. Corrected for elevation. Average of hourly measurements. (unit: inchOfMercury / missing value: NA)
30. f.bar: flag for barometric pressure
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
31. wspd: average horizontal scalar wind speed. Average of 1-second measurements. (unit: milesPerHour / missing value: NA)
32. f.wspd: flag for average horizontal scalar wind speed
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
33. wres: average horizontal resultant vector wind speed. Vector average of 1-second measurements. (unit: milesPerHour / missing value: NA)

34. f.wres: flag for average horizontal resultant vector wind speed
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
35. wdir: average horizontal vector wind direction. Vector average of 1-second measurements. Measured in degrees clockwise from true north. (unit: degree / missing value: NA)
36. f.wdir: flag for average horizontal vector wind direction
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
37. wdev: standard deviation of wind direction. Calculated from 1-second measurements using Campbell Scientific equation. (unit: degree / missing value: NA)
38. f.wdev: flag for standard deviation of wind direction
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
39. gspd: Gust speed. Maximum of 1-second measurements. (unit: milesPerHour / missing value: NA)
40. f.gspd: flag for gust speed
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
41. s10t: average soil temperature at 10cm depth. Average of 1-second measurements. (unit: fahrenheit / missing value: NA)
42. f.s10t: flag for average soil temperature
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
43. s10tmax: maximum soil temperature at 10cm depth. Maximum of 1-second measurements. (unit: fahrenheit / missing value: NA)
44. f.s10tmax: flag for maximum soil temperature
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
45. s10tmin: minimum soil temperature at 10cm depth. Minimum of 1-second measurements. (unit: fahrenheit / missing value: NA)
46. f.s10tmin: flag for minimum soil temperature
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.

hf001-08: hourly (metric) 2001-2004

1. datetime: date and time at end of sampling period
2. jd: Julian day (unit: nominalDay)
3. airt: air temperature. Average of 1-second measurements. (unit: celsius / missing value: NA)
4. f.airt: flag for air temperature
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
5. rh: relative humidity. Average of 1-second measurements. (percent) (unit: number / missing value: NA)
6. f.rh: flag for relative humidity
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
7. dewp: dew point. Average of 1-second values calculated from air temperature and relative humidity. (unit: celsius / missing value: NA)
8. f.dewp: flag for dew point
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
9. prec: precipitation. Includes water equivalent of snow. Total value for 1-hour period. Measured in increments of 0.01 inch. (unit: millimeter / missing value: NA)
10. f.prec: flag for precipitation

- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
11. slrr: global solar radiation. Average of 1-second measurements. (unit: wattPerMeterSquared / missing value: NA)
12. f.slrr: flag for global solar radiation
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
13. parr: photosynthetically active radiation. Average of 1-second measurements. (unit: micromolePerMeterSquaredPerSecond / missing value: NA)
14. f.parr: flag for photosynthetically active radiation
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
15. netr: net radiation. Includes short and long wave. Average of 1-second measurements. Corrected for wind speeds above 5 m/s using Campbell Scientific equation. (unit: wattPerMeterSquared / missing value: NA)
16. f.netr: flag for net radiation
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
17. bar: barometric pressure. Corrected for elevation. Sampled once per hour. (unit: millibar / missing value: NA)
18. f.bar: flag for barometric pressure
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
19. wspd: horizontal scalar wind speed. Average of 1-second measurements. (unit: metersPerSecond / missing value: NA)
20. f.wspd: flag for horizontal scalar wind speed
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
21. wres: horizontal resultant vector wind speed. Vector average of 1-second measurements. (unit: metersPerSecond / missing value: NA)
22. f.wres: flag for horizontal resultant vector wind speed
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
23. wdir: horizontal vector wind direction. Vector average of 1-second measurements. Measured in degrees clockwise from true north. (unit: degree / missing value: NA)
24. f.wdir: flag for horizontal vector wind direction
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
25. wdev: standard deviation of wind direction. Calculated from 1-second measurements using Campbell Scientific equation. (unit: degree / missing value: NA)
26. f.wdev: flag for standard deviation of wind direction
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
27. gspd: gust speed. Maximum of 1-second measurements. (metersPerSecond) (unit: metersPerSecond / missing value: NA)
28. f.gspd: flag for gust speed
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
29. s10t: Soil temperature at 10cm depth. Average of 1-second measurements. (unit: celsius / missing value: NA)
30. f.s10t: flag for soil temperature
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.

hf001-09: hourly (english) 2001-2004

1. datetime: date and time at end of sampling period
2. jd: Julian day (unit: nominalDay)
3. airt: Air temperature. Average of 1-second measurements. (unit: fahrenheit / missing value: NA)
4. f.airt: flag for air temperature
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
5. rh: relative humidity. Average of 1-second measurements. (percent) (unit: number / missing value: NA)
6. f.rh: flag for relative humidity
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
7. dewp: dew point. Average of 1-second values calculated from air temperature and relative humidity. (unit: fahrenheit / missing value: NA)
8. f.dewp: flag for dew point
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
9. prec: precipitation. Includes water equivalent of snow. Total value for 1-hour period. Measured in increments of 0.01 inch. (unit: inch / missing value: NA)
10. f.prec: flag for precipitation
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
11. slrr: global solar radiation. Average of 1-second measurements. (unit: wattPerMeterSquared / missing value: NA)
12. f.slrr: flag for global solar radiation
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
13. parr: photosynthetically active radiation. Average of 1-second measurements. (unit: micromolePerMeterSquaredPerSecond / missing value: NA)
14. f.parr: flag for photosynthetically active radiation
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
15. netr: net radiation. Includes short and long wave. Average of 1-second measurements. Corrected for wind speeds above 5 m/s using Campbell Scientific equation. (unit: wattPerMeterSquared / missing value: NA)
16. f.netr: flag for net radiation
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
17. bar: barometric pressure. Corrected for elevation. Sampled once per hour. (unit: inchOfMercury / missing value: NA)
18. f.bar: flag for barometric pressure
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
19. wspd: horizontal scalar wind speed. Average of 1-second measurements. (unit: milesPerHour / missing value: NA)
20. f.wspd: flag for horizontal scalar wind speed
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
21. wres: horizontal resultant vector wind speed. Vector average of 1-second measurements. (unit: milesPerHour / missing value: NA)
22. f.wres: flag for horizontal resultant vector wind speed
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
23. wdir: horizontal vector wind direction. Vector average of 1-second measurements. Measured in degrees clockwise from true north. (unit: degree / missing value: NA)
24. f.wdir: flag for horizontal vector wind direction
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.

- Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
25. wdev: standard deviation of wind direction. Calculated from 1-second measurements using Campbell Scientific equation. (unit: degree / missing value: NA)
26. f.wdev: flag for standard deviation of wind direction
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
27. gspd: gust speed. Maximum of 1-second measurements. (unit: milesPerHour / missing value: NA)
28. f.gspd: flag for gust speed
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
29. s10t: soil temperature at 10cm depth. Average of 1-second measurements. (unit: fahrenheit / missing value: NA)
30. f.s10t: flag for soil temperature
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.

hf001-10: 15-minute (metric) since 2005

1. datetime: date and time at end of sampling period
2. jd: Julian day (unit: nominalDay)
3. airt: air temperature. Average of 1-second measurements. (unit: celsius / missing value: NA)
4. f.airt: flag for air temperature
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
5. rh: relative humidity. Average of 1-second measurements. (percent) (unit: number / missing value: NA)
6. f.rh: flag for relative humidity
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
7. dewp: dew point. Average of 1-second values calculated from air temperature and relative humidity. (unit: celsius / missing value: NA)
8. f.dewp: flag for dew point
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
9. prec: precipitation. Includes water equivalent of snow. Total value for 15-minute period. Measured in increments of 0.01 inch. (unit: millimeter / missing value: NA)
10. f.prec: flag for precipitation
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
11. slrr: global solar radiation. Average of 1-second measurements. (unit: wattPerMeterSquared / missing value: NA)
12. f.slrr: flag for global solar radiation
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
13. parr: photosynthetically active radiation. Average of 1-second measurements. (unit: micromolePerMeterSquaredPerSecond / missing value: NA)
14. f.parr: flag for photosynthetically active radiation
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
15. netr: net radiation. Includes short and long wave. Average of 1-second measurements. Corrected for wind speeds above 5 m/s using Cambell Scientific equation. (unit: wattPerMeterSquared / missing value: NA)
16. f.netr: flag for net radiation
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.

- E: Estimated. Value estimated from incomplete measurements or from other sources.
- 17. bar: barometric pressure. Corrected for elevation. Average of 1-second measurements. (unit: millibar / missing value: NA)
- 18. f.bar: flag for barometric pressure
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
- 19. wspd: horizontal scalar wind speed. Average of 1-second measurements. (unit: metersPerSecond / missing value: NA)
- 20. f.wspd: flag for horizontal scalar wind speed
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
- 21. wres: horizontal resultant vector wind speed. Vector average of 1-second measurements. (unit: metersPerSecond / missing value: NA)
- 22. f.wres: flag for horizontal resultant vector wind speed
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
- 23. wdir: horizontal vector wind direction. Vector average of 1-second measurements. Measured in degrees clockwise from true north. (unit: degree / missing value: NA)
- 24. f.wdir: flag for horizontal vector wind direction
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
- 25. wdev: standard deviation of wind direction. Calculated from 1-second measurements using Campbell Scientific equation. (unit: degree / missing value: NA)
- 26. f.wdev: flag for standard deviation of wind direction
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
- 27. gspd: gust speed. Maximum of 1-second measurements. (unit: metersPerSecond / missing value: NA)
- 28. f.gspd: flag for gust speed
 - Q: Questionable. Possible problem with instrument.
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
- 29. s10t: soil temperature at 10cm depth. Average of 1-second measurements. (unit: celsius / missing value: NA)
- 30. f.s10t: flag for soil temperature
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.

hf001-11: 15-minute (english) since 2005

1. datetime: date and time at end of sampling period
2. jd: Julian day (unit: nominalDay)
3. airt: air temperature. Average of 1-second measurements. (unit: fahrenheit / missing value: NA)
4. f.airt: flag for air temperature
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
5. rh: relative humidity. Average of 1-second measurements. (percent) (unit: number / missing value: NA)
6. f.rh: flag for relative humidity
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
7. dewp: dew point. Average of 1-second values calculated from air temperature and relative humidity (unit: fahrenheit / missing value: NA)
8. f.dewp: flag for dew point
 - M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
 - Q: Questionable. Possible problem with instrument.
 - E: Estimated. Value estimated from incomplete measurements or from other sources.
9. prec: precipitation. Includes water equivalent of snow. Total value for 15-minute period. Measured in increments of 0.01 inch. (unit: inch /

missing value: NA)

10. f.prec: flag for precipitation

- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
- Q: Questionable. Possible problem with instrument.
- E: Estimated. Value estimated from incomplete measurements or from other sources.

11. slrr: global solar radiation. Average of 1-second measurements. (unit: wattPerMeterSquared / missing value: NA)

12. f.slrr: flag for global solar radiation

- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
- Q: Questionable. Possible problem with instrument.
- E: Estimated. Value estimated from incomplete measurements or from other sources.

13. parr: photosynthetically active radiation. Average of 1-second measurements. (unit: micromolePerMeterSquaredPerSecond / missing value: NA)

14. f.parr: flag for photosynthetically active radiation

- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
- Q: Questionable. Possible problem with instrument.
- E: Estimated. Value estimated from incomplete measurements or from other sources.

15. netr: net radiation. Includes short and long wave. Average of 1-second measurements. Corrected for wind speeds above 5 m/s using Campbell Scientific equation. (unit: wattPerMeterSquared / missing value: NA)

16. f.netr: flag for net radiation

- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
- Q: Questionable. Possible problem with instrument.
- E: Estimated. Value estimated from incomplete measurements or from other sources.

17. bar: barometric pressure. Corrected for elevation. Average of 1-second measurements. (unit: inchOfMercury / missing value: NA)

18. f.bar: flag for barometric pressure

- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
- Q: Questionable. Possible problem with instrument.
- E: Estimated. Value estimated from incomplete measurements or from other sources.

19. wspd: horizontal scalar wind speed. Average of 1-second measurements. (unit: milesPerHour / missing value: NA)

20. f.wspd: flag for horizontal scalar wind speed

- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
- Q: Questionable. Possible problem with instrument.
- E: Estimated. Value estimated from incomplete measurements or from other sources.

21. wres: horizontal resultant vector wind speed. Vector average of 1-second measurements. (unit: milesPerHour / missing value: NA)

22. f.wres: flag for horizontal resultant vector wind speed

- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
- Q: Questionable. Possible problem with instrument.
- E: Estimated. Value estimated from incomplete measurements or from other sources.

23. wdir: horizontal vector wind direction. Vector average of 1-second measurements. Measured in degrees clockwise from true north. (unit: degree / missing value: NA)

24. f.wdir: flag for horizontal vector wind direction

- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
- Q: Questionable. Possible problem with instrument.
- E: Estimated. Value estimated from incomplete measurements or from other sources.

25. wdev: standard deviation of wind direction. Calculated from 1-second measurements using Campbell Scientific equation. (unit: degree / missing value: NA)

26. f.wdev: flag for standard deviation of wind direction

- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
- Q: Questionable. Possible problem with instrument.
- E: Estimated. Value estimated from incomplete measurements or from other sources.

27. gspd: gust speed. Maximum of 1-second measurements. (unit: milesPerHour / missing value: NA)

28. f.gspd: flag for gust speed

- Q: Questionable. Possible problem with instrument.
- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
- E: Estimated. Value estimated from incomplete measurements or from other sources.

29. s10t: soil temperature at 10cm depth. Average of 1-second measurements. (unit: fahrenheit / missing value: NA)

30. f.s10t: flag for soil temperature

- M: Missing. Instrument not installed, instrument not working correctly, or measured value out of range.
- Q: Questionable. Possible problem with instrument.
- E: Estimated. Value estimated from incomplete measurements or from other sources.