READ ME document for JSU mobile datasets

Dataset Title: Mobile Surface Meteorology: Pedestrian

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Dataset Overview:
Surface meteorology parameters were measured by sensors mounted to a backpack which was carried on roads and trails within CHEESEHEAD core domain during Intensive Observing Periods (IOPs).

Time Period: 2019/07/08 15:00:00 to 2019/09/27 04:00:00

Area Bounding Box: 45.00 to 47.00 latitude; -91.00 to -89.00 longitude

Data Frequency: All data are logged at 2-s intervals. Primary time reference is UTC from GPS (not from datalogger).

Data Spatial Type: Consecutive point data

Dataset Description:
Data are primarily collected while mobile, but stationary data may also be collected for short periods.

Times in descriptive data log file are rounded to nearest minute. Min/max of temperature, relative humidity, and dewpoint are summarized for each leg.

Procedures:
The .dat files from CR23X logger are manipulated in Excel to separate logs and calculate derived parameters. Each leg is saved as separate .csv file compatible with QGIS, as well as a full day csv file.

File Naming Convention:
IOPx_ped_MMDDYYYY
where the x denotes the IOP (1-3).

Instrument Description:

- Campbell Scientific HygroClip HC2S (2)
- LiCor LI-200 pyranometer
- Campbell Scientific PTB101-B barometer
- Campbell Scientific IRTS-P Infrared Temperature Sensor
- Garmin GPS16X-HVS
- CR23-X datalogger
- 10-plate Gill radiation shield
- Apogee TS-100 aspirated shield

Description of parameters directly measured on mobile system

- Datalogger time: HHMM SS.S
- GPS time in UTC: HH MM SS
- GPS latitude: DDMM .MMMM
- GPS longitude: DDMM .MMMM
- GPS elevation (m)
- Number of GPS satellites
- GPS reception quality
- Datalogger panel temperature (C)
- Incoming solar radiation (kW/m^2)
- Temperature in Apogee shield (preferred)
- Relative humidity in Apogee shield (preferred)
- Temperature in Gill shield (C)
- Relative humidity in Gill shield (C)
- Station pressure (hPa - 1000)
- Battery voltage
- Downward looking infrared temperature (IRTS) (C) at ~45° from vertical: Ground cover to side of path

Description of derived/calculated quantities

- Decimal GPS latitude
- Decimal GPS longitude
- Dewpoint calculated from Apogee shield temperature and humidity (C)
- Potential temperature calculated from Apogee shield temperature and station pressure (K)
- Dewpoint calculated from Gill shield temperature and humidity (C)
- Potential temperature calculated from Gill shield temperature and station pressure (K)
- Vapor pressure calculated from Apogee shield dewpoint (hPa)
- Mixing ratio calculated from Apogee shield vapor pressure and station pressure (g/kg)
- Vapor pressure calculated from Gill shield dewpoint (hPa)
- Mixing ratio calculated from Gill shield vapor pressure and station pressure (g/kg)
- IRTS minus Apogee shield temperature (C)
- Apogee shield temperature minus Gill temperature (C)

- “Pseudospeed”: Approximate measure of motion from difference of latitude/longitude over time interval (degrees of lat/lon)
- “Pseudodistance”: Accumulation of pseudospeed since beginning of transect leg (degrees of lat/lon)
- Road ID: FR = forest road (text)

Formulas used for calculations:

Dewpoint: $T_d = (RH * 0.01)^{0.125} * (112 + 0.9 * T) + (0.1 * T) - 112$

Potential temperature: $\theta = (T + 273.15) * \left(\frac{1000}{p}\right)^{(287/1004)}$

Vapor pressure: $q_p = 6.112 * e^{\left(\frac{17.67 * T_d}{T_d + 243.5}\right)}$

Mixing ratio: $q_r = \frac{q_p * 621.97}{p - q_p}$

Pseudospeed: $d = \sqrt[2]{(\varphi_i - \varphi_{i-1})^2 + (\lambda_i - \lambda_{i-2})^2}$