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% -- Niwot Ridge Subalpine Forest AmeriFlux Data (site ID:  US-NR1) --
% MST Time Period: 2022  01/01 00:00:00 - 2023  01/01 00:00:00, JD 1.000-366.000 (MST)
% UTC Time Period: 2022  01/01 07:00:00 - 2023  01/01 07:00:00, JD 1.292-366.292 (UTC)
% File Name: niwot_USNR1_radiation_2022.csv
% File Created by: Sean Burns (sean.burns@colorado.edu)
% File Created for: Mark Raleigh (raleigma@oregonstate.edu)
% Date: 12-Apr-2023
% --------
%
%
%   Current Version: ver.2023.04.12
%
%   * The SP-610 outgoing shortwave radiation data was being clipped by the
%     software QA/QC.  This clipping was removed.  An example of the clipped data:
%
%   https://urquell.colorado.edu/data_ameriflux/plots/radiation_usnr1_compare_Rsw_in_2020.pdf
%
%   * Added data for years of 2020 (now full year), 2021, and 2022
%
%
%   ---------------------------------------------------------
%   Previous Version:  ver.2020.05.14 (Preliminary)
%
%   Notes:
%
%   * Plots of the radiation data are in:
%
%    https://urquell.colorado.edu/data_ameriflux/plots/
%
%   * Snow will accumulate on the up-looking sensors in the winter.  See photos on the site
%     calendar:    https://urquell.colorado.edu/calendar/
%
%   * The raw voltages are include in case you need to calculate (or check) anything.
%
%   * the incoming longwave from the SL-510 sensor seems to be a bit
%     strange in 2019 (note this sensor failed in July 2019 and was replaced
%     on 23 Oct 2019)...the issues with the SL-510 are confirmed by
%     comparison to the SN-500 radiation: for both 2019 and 2020 there is an
%     offset between the SL-510 and SN-500 that needs to be better
%     understood...however, in 2019, the differences are large and variable,
%     but in 2020, the differences are fairly consistent.  Based on this, I
%     think the 2019 SL-510 longwave data are questionable...
%
%   * it took some effort to add/remove/add the SN-500 sensor, but Im
%      happy we did...I have not tried to compare Rlw_out calculated from the
%      T_ir data to Rlw_out from the SN-500...
%
%    * the IR surface temperature sensor seemed to have a strange negative
%      shift of around 2 degC on day 96 of 2019.  see
%      "radiation_usnr1_2019_zoom.pdf" for details.  with the snowpack I
%      expect a max surface temp of around 0 degC, but on day 96 of 2019 this
%      seemed to shift...this shift seems to go away in the 2020 data?...
%
%
%
% --------
%
% Columns are:
%
% 1-6. Year, Month, Day, Hour, Minute, Sec -- in MST, Time Stamp Corresponds to start of Averaging Time Period
% 07. Decimal Day of Year (MST)
% 08. Rsw_in_25m_KZ       W/m2         25.5m              Incoming Shortwave Radiation                        Kipp and Zonen CNR1
% 09. Rsw_out_25m_KZ      W/m2         25.5m              Outgoing Shortwave Radiation                        Kipp and Zonen CNR1
% 10. Rlw_in_25m_KZ       W/m2         25.5m              Incoming Longwave Radiation                         Kipp and Zonen CNR1
% 11. Rlw_out_25m_KZ      W/m2         25.5m              Outgoing Longwave Radiation                         Kipp and Zonen CNR1
% 12. Rppfd_in_25m        umol/m2/s    25.5m              Incoming Photosynthetic Active Photon Flux Density (PPFD)       LI-COR 190-SA
% 13. Rppfd_out_25m       umol/m2/s    25.5m              Outgoing PPFD                                       LI-COR 190-SA
% 14. Rnet_25m_REBS       W/m2         25.5m              Net Radiation                                       REBS Q*7.1 (sn ?)
% 15. Rnet_0200cm_REBS    W/m2         2m                 Net Radiation                                       Rebs Q*7.1 (sn Q96333)
% 16. Rsw_in_sp510        W/m2         2.2m               Incoming Shortwave Radiation                        Apogee SP-510
% 17. Rsw_in_sn500        W/m2         2.2m               Incoming Shortwave Radiation                        Apogee SN-500
% 18. Rsw_out_sp610       W/m2         2.2m               Outgoing Shortwave Radiation                        Apogee SP-610
% 19. Rsw_out_sn500       W/m2         2.2m               Outgoing Shortwave Radiation                        Apogee SN-500
% 20. Rlw_in_sl510        W/m2         2.2m               Incoming Longwave Radiation                         Apogee SL-510
% 21. Rlw_in_sn500        W/m2         2.2m               Incoming Longwave Radiation                         Apogee SN-500
% 22. Rlw_out_sn500       W/m2         2.2m               Outgoing Longwave Radiation                         Apogee SN-500
% 23. Tir_si121           degC         ground (sensor at 2m)    Infrared Surface Temperature                 Apogee SI-121
% 24. T_therm_si121       degC         2.2m               Thermistor Temperature                              Apogee SI-121
% 25. T_therm_sl510       degC         2.2m               Thermistor Temperature                              Apogee SL-510
% 26. T_med_uc            degC         2.5m               Air Temperature at Mini-tower                       Medtherm Thermocouple
% 27. snowdepth_judd      cm           2.5m               Snow Depth                                          Judd Ultrasonic Depth Se
nsor
% 28. Rsw_in_sp510_mV     mV           2.2m               Incoming Shortwave Radiation Voltage                Apogee SP-510
% 29. Rsw_out_sp610_mV    mV           2.2m               Outgoing Shortwave Radiation Voltage                Apogee SP-610
% 30. Rpile_in_sl510_mV   mV           2.2m               Thermopile Voltage                                  Apogee SL-510
% 31. T_therm_sl510_mV    mV           2.2m               Thermistor Voltage                                  Apogee SL-510
% 32. Tir_pile_si121_mV   mV           2m                 Thermopile Voltage                                  Apogee SI-121
% 33. Tir_term_si121_mV   mV           2m                 Thermistor Voltage                                  Apogee SI-121
% --------
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%
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