

QCRad\_V3 quality control files for SURFRAD Network data:

Contact:

John Augustine  
NOAA GML  
325 Broadway Street  
Boulder, CO 80305  
email: john.a.augustine@noaa.gov  
Phone: 720-238-6480

Use the following references in any publications that use SURFRAD QCRadV3 data:

Long, C. N., and Y. Shi, 2008: An Automated Quality Assessment and Control Algorithm for Surface Radiation Measurements, *TOASJ*, 2, 23-37, doi: 10.2174/1874282300802010023.

Long, C. N. and Y. Shi, 2006: The QCRad Value Added Product: Surface Radiation Measurement Quality Control Testing, Including Climatologically Configurable Limits, Atmospheric Radiation Measurement Program Technical Report, ARM TR-074, 69 pp., Available via <http://www.arm.gov>.

Augustine, J. A., J. J. DeLuisi, and C. N. Long, 2000: SURFRAD—A national surface radiation budget network for atmospheric research. *Bull. Amer. Meteor. Soc.* **81**, 2341-2357.

Augustine, J. A., G. B. Hodges, C. R. Cornwall, J. J. Michalsky, and C. I. Medina, 2005: An update on SURFRAD—The GCOS surface radiation budget network for the continental United States, *J. Atmos. And Oceanic Tech.*, **22**, 1460-1472.

See the end of this document for "Fair use" data practices and licensing policies that pertain to SURFRAD data.

DATA DISTRIBUTION:

QCRadV3 filenames are of the form: sta\_yyyymmdd.qdat  
e.g., bon\_20240106.qdat for Bondville QCRadV3 data for 6-jan-2024

These daily SURFRAD QCRadV3 text data files for each station may be downloaded from the GML FTP site at:

[https://gml.noaa.gov/aftp/data/radiation/surfrad/qcrad\\_v3/](https://gml.noaa.gov/aftp/data/radiation/surfrad/qcrad_v3/)

To get to a specific file, advance to the appropriate station directory, and then to the specific year directory, e.g., for Bondville 2024 data:

[https://gml.noaa.gov/aftp/data/radiation/surfrad/qcrad\\_v3/bon/2024/](https://gml.noaa.gov/aftp/data/radiation/surfrad/qcrad_v3/bon/2024/)

FILE DESCRIPTION:

The QCRadV3 files contain a header line, then the output data in rows starting with a date/time stamp, and followed by the variables in columns. The column headers and their meanings are as follows:

Date	date in YYYYMMDD format (UTC)
Time	time of day in hhmm format (UTC)
BESW	Best Estimate SW, sum of direct plus diffuse if both pass QC tests, else global SW if available (W/m <sup>2</sup> )
GSW	total (global) SW from unshaded pyranometer (W/m <sup>2</sup> )
DIF	measured downwelling diffuse SW (W/m <sup>2</sup> )
DIR	measured downwelling direct SW (W/m <sup>2</sup> )
SWup	upwelling SW from pyranometer (W/m <sup>2</sup> )
LWdn	downwelling LW from pyrgeometer (W/m <sup>2</sup> )
LWup	upwelling LW from pyrgeometer (W/m <sup>2</sup> )
Ta	air temperature (K)
RH	Relative Humidity (%)
Prs	station pressure (mb)
LWdTc	Downwelling LW pyrgeometer case temperature (K)
LWdTd	Downwelling LW pyrgeometer dome temperature (K)
LWuTc	Upwelling LW pyrgeometer case temperature (K)
LWuTd	Upwelling LW pyrgeometer dome temperature (K)

qc1 through qc19 are quality testing flags, one for each test performed. See "QC\_Rad3\_flg\_key.pdf" for details.

NOTE: If QC1, QC2, or QC3 flag value is set to "10" or greater, then that SW value was either "missing" or tested "bad" and the value was replaced by adding or subtracting the other two SW components to calculate the value. This calculated value is then tested just as the original value would have been, and might then be set to "bad" if the testing is not passed. The second digit (<10 value) represents the "normal" test flagging as described in "QC\_Rad3\_flg\_key.pdf."

gflg	type of IR loss correction applied to global SW, none/full dry/full moist/detector dry/det moist (0/1/2/3/4)
dflg	type of IR loss correction applied to diffuse SW, none/full dry/full moist/detector dry/det moist (0/1/2/3/4)
Z	Solar zenith angle (degrees)

AU Earth-Sun distance in astronomical units  
 ClrSW Estimated clear-sky total downwelling SW, from user-set power law coefficient settings in configuration file  
 DifCorr IR loss correction applied to diffuse (shaded) SW measurements  
 GSWCorr IR loss correction applied to global (unshaded) SW measurements  
 UVB\_down Erythemal UVB irradiance (milli-W/m<sup>2</sup>)  
 PAR\_dn Photosynthetically Active Radiation (W/m<sup>2</sup>)  
 WindSp Wind Speed (m/s)  
 WindDir Wind direction (deg. clockwise from north, north is 0 deg.)

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NOTE: The term "pyrgeometer detector flux" refers to the pyrgeometer signal (typically mV) times the sensitivity factor (or divided by the calibration factor). This value is what Dutton et al. 2001 call the instrument "netIR" in their diffuse correction paper.

Dutton, E. G., J. J. Michalsky, T. Stoffel, B. W. Forgan, J. Hickey, D. W. Nelson, T. L. Alberta, and I. Reda, 2001: Measurement of broadband diffuse solar irradiance using current commercial instrumentation with a correction for thermal offset errors. J. Atmos. and Ocean. Tech., 18(3), 297-314.

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SURFRAD data are archived in many places including international archives and within NOAA at the NOAA Centers for Environmental Information ([NCEI](#)). Our data are freely available to users both from NCEI and on our GML web-site (e.g. [GML web-site](#), GRAD ftp data access). The NCEI archive assigns a DOI to the data-sets including the radiation data from our networks.

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insight. In cases where the data are central to a publication, co-authorship for data providers may be appropriate.

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