Description of Version 0 Data Format NSF UV Monitoring Network: GUV database 2

Filename: SITE_GUV2_YEAR.csv

where SITE is MCM for McMurdo Station, Antarctica
PAL for Palmer Station, Antarctica
SPO for South Pole, Antarctica
USH for Ushuaia, Argentina
SAN for San Diego, California
BAR for Barrow, Alaska
SUM for Summit, Greenland
YEAR is year of measurement

Note that the data are zipped.

This file includes data from a GUV multi-filter radiometer that were averaged over the period of one minute. Data products included in this file are the same as in GUV database 1, but have a 15 times better time resolution.

A description of the GUV radiometer, calibration procedures, and the method of calculating data products can be found in:

> Bernhard, G., C. R. Booth, and J. C. Ehramjian. (2005). Real-time ultraviolet and column ozone from multichannel ultraviolet radiometers deployed in the National Science Foundation's ultraviolet monitoring network. *Optical Engineering*, *44*(4), 041011-1 - 041011-12.

This paper can also be downloaded here:
http://www.biospherical.com/nsf/presentations/OEUV-12.pdf

GUV measurements were calibrated against cosine corrected measurements of the collocated SUV spectroradiometer. GUV product labels have the suffix "C", indicating that the cosine-corrected SUV data set was used.

See next page for column assignment.

Column Assignment

Label	Description	Unit	Remark
GUV S/N	GUV serial number		
Site	1=McMurdo; 2=Palmer; 3=South Pole; 4=Ushuaia; 5=San Diego; 6=Barrow; 7=Summit		
Calibration File	Filename of GUV calibration file		
Time	Time in UT	Days since 1-Jan-1900	1
SZA	Solar zenith angle	degree	2
GUVraw305	Uncalibrated GUV signal of 305 nm channel after subtraction of offset	volts	
GUVraw313	Uncalibrated GUV signal of 313 nm channel after subtraction of offset	volts	
GUVraw320	Uncalibrated GUV signal of 320 nm channel after subtraction of offset	volts	
GUVraw340	Uncalibrated GUV signal of 340 nm channel after subtraction of offset	volts	
GUVraw380	Uncalibrated GUV signal of 380 nm channel after subtraction of offset	volts	
GUVrawPAR	Uncalibrated GUV signal of PAR channel after subtraction of offset	volts	
PAR_X	Phtosynthetically Active Radiation	$\mu E/(cm^2 s)$	3
305nm_C	Spectral irradiance at 305 nm	µW/(cm² nm)	4
313nm_C	Spectral irradiance at 313 nm	µW/(cm² nm)	4
320nm_C	Spectral irradiance at 320 nm	µW/(cm² nm)	4
340nm_C	Spectral irradiance at 340 nm	µW/(cm² nm)	4
380nm_C	Spectral irradiance at 380 nm	µW/(cm² nm)	4
400nm_C	Spectral irradiance at 400 nm	µW/(cm² nm)	4, 5
500nm_C	Spectral irradiance at 500 nm	µW/(cm² nm)	4, 5
600nm_C	Spectral irradiance at 600 nm	µW/(cm² nm)	4, 5
UVB315_C	Integral of spectral irradiance between 290 and 315 nm	µW/cm²	
UVB320_C	Integral of spectral irradiance between 290 and 320 nm	µW/cm²	
UVA315-360_C	Integral of spectral irradiance between 315 and 360 nm	µW/cm²	
UVA320-360_C	Integral of spectral irradiance between 320 and 360 nm	µW/cm²	
UVA360-400_C	Integral of spectral irradiance between 360 and 400 nm	µW/cm²	
UVA315-400_C	Integral of spectral irradiance between 315 and 400 nm	µW/cm²	
UVA320-400_C	Integral of spectral irradiance between 320 and 400 nm	µW/cm²	
VIS_C	Integral of spectral irradiance between 400 and 600 nm	µW/cm²	6
Dose1_C	Spectral irradiance weighted with erythema action spectrum by *Komhyr and Machta*, 1973	µW/cm²	7
Dose2_C	Spectral irradiance weighted with erythema action spectrum by *Diffey*, 1987	µW/cm²	7

CIE_C	Spectral irradiance weighted with CIE erythema action spectrum (This is the most widely used erythema action spectrum)	µW/cm²	7
UVIndex_C	UV Index		7, 8
Erythema_Anders_C	Spectral irradiance weighted with erythema action spectrum by *Anders*, 1995	1/s	7
RBM501_C	Spectral irradiance weighted with RBM response function	µW/cm²	7
SetlowBSI_C	Spectral irradiance weighted with action spectrum for DNA damage by *Setlow*, 1974; BSI parameterization	µW/cm²	7
SetlowBSI_300_C	Spectral irradiance weighted with action spectrum for DNA damage by *Setlow*, 1974; BSI parameterization normalized at 300 nm	µW/cm²	7
SetlowTUV_C	Spectral irradiance weighted with action spectrum for DNA damage by *Setlow*, 1974; TUV parameterization	µW/cm²	7
SetlowNDSC.txt_C	Spectral irradiance weighted with action spectrum for DNA damage by *Setlow*, 1974; NDSC parameterization	µW/cm²	7
SCUP-h_C	Spectral irradiance weighted with action spectrum for skin cancer in mice corrected for human skin by *Gruijl et al*., 1993	µW/cm²	7
SCUP-m_C	Spectral irradiance weighted with action spectrum for skin cancer in mice by *Gruijl et al*., 1993	µW/cm²	7
Caldwell_C	Spectral irradiance weighted with action spectrum for generalized plant response by *Caldwell*, 1971	µW/cm²	7
Flint_C	Spectral irradiance weighted with action spectrum for plant growth by *Flint and Caldwell*, 2003	µW/cm²	7
Hunter_C	Spectral irradiance weighted with action spectrum for northern anchovy by *Hunter*, 1979	µW/cm²	7
Boucher_C	Spectral irradiance weighted with action spectrum for inhibition of phytoplankton carbon fixation by *Boucher et al*., 1994	(mg C) / (mg chl s)	7
Cullen_phaerodactylum.txt_C	Spectral irradiance weighted with action spectrum for inhibition of phytoplankton photosynthesis of phaeodactylum by *Cullen et al*., 1994		7
Cullen_prorocentrum.txt_C	Spectral irradiance weighted with action spectrum for inhibition of phytoplankton photosynthesis of prorocentrum by *Cullen et al*., 1994		7
Neale_Antarctic.txt_C	Spectral irradiance weighted with action spectrum for inhibition of photosynthesis by *Cullen and Neale*., 1997		7
TSI_C	Spectral irradiance weighted with TSI response function	µW/cm²	9
GUVSP_305_9_C	Spectral irradiance weighted with response function of GUV 305 channel		10
Ozone_short_C	Spectral irradiance weighted with an exponential function (do not use)		
Lookuptable	Filename of lookup table used for ozone calculation		
w_short	Short-wavelength data product used for ozone calculation		
w_long	Long-wavelength data product used for ozone calculation		
TotalOzone	Total column ozone	Dobson Unit (DU)	

X is either "U" or "C", depending on the SUV data set that was used to establish the calibration of the GUV (see comment on Page 1)

Remarks

1 - Date and time at the start of a scan are encoded into a single number where the integer part is the day number relative to January 1, 1900 (day 1 corresponds to 1/1/1900). The fractional part is the time of day. (For example, the fractional part multiplied with 24 gives the hour of the measurement). When the file is decoded by Microsoft Excel, the date value will automatically be translated into a correct date/time string, if the box "1904 date system" of the "Tools -> Options -> Calculation"-menu is unchecked.

2 - Before February 25, 2006, solar zenith angles in "GUV database 2" were calculated with a approximating algorithm and may deviate from the true solar zenith angle by up to 0.5°. (Solar zenith angles in the "GUV database 1" are not affected by the approximation as they are based on the solar zenith angle of SUV data). From February 25, 2006 onward, solar zenith angles in "GUV database 2" were calculated with the following algorithm, which is very accurate: Blanco-Muriel, M., Alarcón-Padilla, D. C., López-Moratalla, T. and Lara-Coira, M. (2001) Computing the solar vector, *Solar Energy*, *70*(5), pp. 431-441.

3 - Units of PAR are μE/(cm^2s) = microEinstein /(cm^2s) = 10^{-6} molphotons/(cm^2s)

4 - The "action spectra" for the calculation of spectral irradiances are triangular functions with a bandwidth of 1 nm FWHM centered at the specified wavelengths.

5 - Spectral irradiances at 400, 500, and 600 nm were extrapolated from spectral irradiances measured at 340 and 380 nm. Values should be treated with caution due to uncertainties of this extrapolation.

6 - The integral calculated from the 400 - 600 nm range was extrapolated from spectral irradiances measured at 340 and 380 nm. Values should be treated with caution due to uncertainties of this extrapolation.

7 - For parameterization of action spectra see links in document http://www.biospherical.com/nsf/login/GUV/description-GUV-data-products.html

8 - UV Index is a unit of measure of UV levels relevant to the effects on human skin. It serves as a vehicle to raise public awareness about the potential detrimental effects on health from solar UV exposure and to alert people of the need to adopt protective measures. The UV index is defined as erythemally (CIE) weighted irradiance, expressed in the units W/m², and multiplied by 40. Note that the UV Index is a dimensionless number. More information can be found here: http://www.biospherical.com/nsf/Solar_Index_Guide.pdf

9 - TSI stands for "Total scene irradiance" and refers to a filtered photodiode that is integral to the SUV-100 spectroradiometer. The sensor is sensitive between 330 and 380 nm. Measurements of the sensor can be used to estimate the variation of radiation levels (for example due to changing cloud cover) during the period of a spectral scan.

10 - The definition of this data product is different for every GUV.