Description of Version 0 Data Format NSF UV Monitoring Network: GUV database 1

Filename: SITE_GUV1_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 recorded concurrently with measurements of the collocated SUV spectroradiometer. For example, data of the GUV's 305 nm channel were selected for times when the SUV was scanning at 305 nm. Due the finite scan time of the SUV, GUV data from different channels have a different time stamp.

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 SUV data. GUV product labels have either the suffix "U" or "C":

- The suffix "C" implies that SUV measurements were corrected for the SUV's cosine error before they were correlated against GUV data for establishing the GUV's calibration.
- The suffix "U" implies that SUV measurements were not corrected for the cosine error.

The "C"-dataset is more accurate, and the "U"-dataset is more consistent with "Version 0" SUV data.

See next page for column assignment.

Column Assignment

Label	Description	Unit	Remark
Datascan	Filename of SUV scan		1
GUV S/N	GUV serial number		
Time matching SZA	Time in UT at time of solar zenith angle	Days since 1-Jan-1900	2
Site	1=McMurdo; 2=Palmer; 3=South Pole; 4=Ushuaia; 5=San Diego; 6=Barrow; 7=Summit		
SZA	Solar zenith angle	degree	
Calibration File	Filename of GUV calibration file		
Time305	Time in UT when SUV scanned at 305 nm	Days since 1-Jan-1900	2
GUVraw305	Uncalibrated GUV signal of 305 nm channel after subtraction of offset	volts	
Time313	Time in UT when SUV scanned at 313 nm	Days since 1-Jan-1900	2
GUVraw313	Uncalibrated GUV signal of 313 nm channel after subtraction of offset	volts	
Time320	Time in UT when SUV scanned at 320 nm	Days since 1-Jan-1900	2
GUVraw320	Uncalibrated GUV signal of 320 nm channel after subtraction of offset	volts	
Time340	Time in UT when SUV scanned at 340 nm	Days since 1-Jan-1900	2
GUVraw340	Uncalibrated GUV signal of 340 nm channel after subtraction of offset	volts	
Time380	Time in UT when SUV scanned at 380 nm	Days since 1-Jan-1900	2
GUVraw380	Uncalibrated GUV signal of 380 nm channel after subtraction of offset	volts	
TimePAR	Time in UT when SUV scanned at 500 nm	Days since 1-Jan-1900	2
GUVrawPAR	Uncalibrated GUV signal of PAR channel after subtraction of offset	volts	
PAR_X	Photosynthetically Active Radiation (PAR)	$\mu E/(cm^2 s)$	3
305nm_X	Spectral irradiance at 305 nm	µW/(cm² nm)	3
313nm_X	Spectral irradiance at 313 nm	µW/(cm² nm)	3
320nm_X	Spectral irradiance at 320 nm	µW/(cm² nm)	3
340nm_X	Spectral irradiance at 340 nm	µW/(cm² nm)	3
380nm_X	Spectral irradiance at 380 nm	µW/(cm² nm)	3
400nm_X	Spectral irradiance at 400 nm	µW/(cm² nm)	4, 5
500nm_X	Spectral irradiance at 500 nm	µW/(cm² nm)	4, 5
600nm_X	Spectral irradiance at 600 nm	µW/(cm² nm)	4, 5
UVB315_X	Integral of spectral irradiance between 290 and 315 nm	µW/cm²	
UVB320_X	Integral of spectral irradiance between 290 and 320 nm	µW/cm²	
UVA315-360_X	Integral of spectral irradiance between 315 and 360 nm	µW/cm²	
UVA320-360_X	Integral of spectral irradiance between 320 and 360 nm	µW/cm²	
UVA360-400_X	Integral of spectral irradiance between 360 and 400 nm	µW/cm²	
UVA315-400_X	Integral of spectral irradiance between 315 and 400 nm	µW/cm²	
UVA320-400_X	Integral of spectral irradiance between 320 and 400 nm	µW/cm²	

VIS_X	Integral of spectral irradiance between 400 and 600 nm	µW/cm²	6
Dose1_X	Spectral irradiance weighted with erythema action spectrum by *Komhyr and Machta*, 1973	µW/cm²	7
Dose2_X	Spectral irradiance weighted with erythema action spectrum by *Diffey*, 1987	µW/cm²	7
CIE_X	Spectral irradiance weighted with CIE erythema action spectrum (This is the most widely used erythema action spectrum)	µW/cm²	7
UVIndex_X	UV Index		7, 8
Erythema_Anders_X	Spectral irradiance weighted with erythema action spectrum by *Anders*, 1995	1/s	7
RBM501_X	Spectral irradiance weighted with RBM response function	µW/cm²	7
SetlowBSI_X	Spectral irradiance weighted with action spectrum for DNA damage by *Setlow*, 1974; BSI parameterization	µW/cm²	7
SetlowBSI_300_X	Spectral irradiance weighted with action spectrum for DNA damage by *Setlow*, 1974; BSI parameterization normalized at 300 nm	µW/cm²	7
SetlowTUV_X	Spectral irradiance weighted with action spectrum for DNA damage by *Setlow*, 1974; TUV parameterization	µW/cm²	7
SetlowNDSC_X	Spectral irradiance weighted with action spectrum for DNA damage by *Setlow*, 1974; NDSC parameterization	µW/cm²	7
SCUP-h_X	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_X	Spectral irradiance weighted with action spectrum for skin cancer in mice by *Gruijl et al.*, 1993	µW/cm²	7
Caldwell_X	Spectral irradiance weighted with action spectrum for generalized plant response by *Caldwell*, 1971	µW/cm²	7
Flint_X	Spectral irradiance weighted with action spectrum for plant growth by *Flint and Caldwell*, 2003	µW/cm²	7
Hunter_X	Spectral irradiance weighted with action spectrum for northern anchovy by *Hunter*, 1979	µW/cm²	7
Boucher_X	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_X	Spectral irradiance weighted with action spectrum for inhibition of phytoplankton photosynthesis of phaeodactylum by *Cullen et al.*, 1994		7
Cullen_prorocentrum.txt_X	Spectral irradiance weighted with action spectrum for inhibition of phytoplankton photosynthesis of prorocentrum by *Cullen et al.*, 1994		7
Neale_Antarctic_X	Spectral irradiance weighted with action spectrum for inhibition of photosynthesis by *Cullen and Neale.*, 1997		7
TSI_X	Spectral irradiance weighted with TSI response function	µW/cm²	9
GUVSP_305_9_X	Spectral irradiance weighted with response function of GUV 305 channel		10
Ozone_short_X	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 - Filename convention of spectral scans:
sDyyhhmm.jjj

where
s = Site identifier (A=McMurdo; B=Palmer; C=South Pole; D=Ushuaia; E=San Diego; F=Barrow; J=Summit)
D = Always D
yy = Year
hh = Hour (UT)
mm = Minute
jjj = Julian Day

2 - 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.

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/m^2, 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.