

GSICS UV Subgroup Report

Rose Munro



Selected GRWG-UV Subgroup Baseline Projects

Reference Solar Spectrum

Aim: to evaluate the available reference solar spectra and make a recommendation for a reference solar spectrum for community use. **Lead – Larry Flynn (NOAA)**

White Paper on Ground-based Characterisation of UV/Vis/NIR/SWIR spectrometers

Aim: to prepare a white paper documenting best-practise for the on-ground calibration of UV/Vis/NIR/SWIR spectrometers based on in-orbit experience from relevant missions. **Lead – Ruediger Lang (EUMETSAT)**

Match-ups and Target Sites

Aim: to produce over-pass comparisons of UV sensors for specific target sites in use by the community. As a first step summaries of methods and results for target sites currently in use will be collected. **Lead – TBC.**

Cross-calibration below 300nm

Aim: To devise new methods for comparison of wavelength pairs for different viewing geometries taking into account contribution function equivalence to allow radiometric performance comparisons for ozone profile wavelengths from 240 – 200 nm. **Lead Larry Flynn (NOAA).**

UV Instrument and Project Leads

Instrument	Main Contact Web Site	Reflectivity/ Aerosols	Solar Spectra	Ozone Profiles	Calibration
ACE/MAESTRO					
EPIC 2015					K. Yang
GEMS 2018					
GOME	D. Loyola		M. Coldewey- Egbers, S. Slikhuis		
GOME-2	R. Munro		M. Krijger		R. Lang
GOMOS					
OMI	G. Jaross	O. Torres	S. Marchenko, M. DeLand, K. Yang		
OMPS Nadir	L. Flynn	L. Flynn	M. Bali, J. Niu	L. Flynn	C. Pan,
OMPS Limb	G. Jaross				G. Jaross
OMS					
OSIRIS					
SAGE III	D. Flittner			S. Buckner	
SBUS	F-X. Huang			F-X. Huang	
SBUV/2	L. Flynn		L-K Huang	L. Flynn	L-K Huang

UV Instrument and Project Leads

Instrument	Main Contact Web Site	Reflectivity/ Aerosols	Solar Spectra	Ozone Profiles	Calibration
SCIAMACHY	M. Weber		K. Bramstedt, T. Hilbig, M. Krijger		
SOURCE (SOLSTICE/SIM)	M. Snow, T. Woods		J. Harder, E. Richard		
TEMPO	K. Chance				
TOMS					
TOU	W-H. Wang	W-H. Wang	Y. Li		
S5P TropOMI	P. Levelt, P. Veefkind				
S4/MTG UVN	C. Zehner				B. Ahlers, M. Dobber
S5/EPS-SG UVNS	C. Zehner				

Reference Solar Spectrum – Status

Compare solar measurements from BUV (Backscatter Ultraviolet) instruments.

Goals

Agreement at 1% on solar spectra relative to bandpass-convolved high resolution spectra as a transfer after identifying wavelength shifts and accounting for solar activity. Long-term solar spectra drift and instrument degradation can also be analysed.

Collaborative work has started well with participation growing to include more instruments and solar modellers.

See talks in UV Subgroup session at this meeting:

- 4e - Modelling OMPS Nadir Profiler solar measurements and comparisons to reference measurements (L. Flynn, NOAA)
- 4f- UVN hyper-spectral Solar reference spectra: Comparison to GOME-2 BOL and Modelling (R. Lang, EUMETSAT)
- 4g - High resolution reference solar spectrum for GEMS and TEMPO (M. Kang, Ewha Women's University)
- 4h - Deriving the Instrument Transfer Function from OMI Solar Observations and its Implications for Ozone Retrievals (K. Sun, SAO Harvard)

Larry Flynn (Project Lead) will focus on a model to explain the OMPS Nadir Profiler solar measurements and provide an initial comparison to a synthetic spectrum – these will both be used to support inter-comparisons with other solar measurements.

White Paper on Ground-based Characterisation

White Paper still in drafting stage – contributions and/or offers to author sub-sections welcome!
See talk 4d in the UV Subgroup session ...

Proposed table of contents

- Accuracy, sensitivity and repeatability
 - I. Sources / commissioning
 - II. Thermal and pressure environment / stability and characterization

- Instrument components
 - I. Detector level
 - a) Noise
 - b) PRNU/PPG
 - c) SMEAR
 - d) Etaloning
 - II. Stray-light
 - III. Grating and alignment (ISRF)
 - a) Spectral assignment
 - b) Spectral stability
 - IV. Pointing and Spatial stability (ISRF/PSF)
 - a) Spatial and spectral aliasing
 - b) Radiometric and spectral scene in-homogeneity errors.
 - c) Detector co-registration (overlap)
 - V. Polarisation sensitivity
 - VI. Radiometric response
 - a) Sources
 - b) Geometry
 - VII. Diffuser characterisation
 - VIII. Degradation and contamination
 - IX.?

Match-ups and Target Sites

Produce over-pass comparisons of UV/Vis sensors for specific target sites in use by the community.

Goals

- Agreement at 1% on cloud free scene reflectance for 340 nm. Desert, Equatorial Pacific, Polar Ice.
- Agreement at 1% on aerosol index – wavelength dependence of reflectance.
- Long-term stability of 0.5% in reflectance channels

Work being carried out by L. Flynn and colleagues, NOAA, ...

- Focussing on comparisons of Effective Reflectivity and Aerosol Indices in an Equatorial Pacific box as a region for generation of soft calibration adjustments.
- Using minimum land reflectivities and comparisons to other products to check these adjustments especially for sun glint contaminated FOVs.
- Reprocessing all of the OMPS Nadir Mapper Version 8 Total Column Ozone products for the first five years and will use the Pacific region to check the stability of the products.
- See talk 4.b in the UV Subgroup session on these topics.

Cross-Calibration below 300nm

Methods

Double Difference using Climatology:

Perform comparisons (statistical trade off in quantity of matchups vs. quality):

Forward model and measurements:

Ongoing Activities

- Comparisons of Initial Measurement Residuals for Ozone Profile Channels
- This method will be used to generate soft calibration adjustments to remove measurement bias between the NOAA-19 SBUV/2 and S-NPP OMPS NP.
- The first five years of OMPS NP measurements will be reprocessed and compare the two records.
- Talk 4.a in the UV Subgroup side meeting will address some of these results.

Thank you for your Attention

Questions?