



CEOS / WGCV / ACSG Activities

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**Working Group on Calibration and Validation
Atmospheric Composition Sub Group**

- The **CEOS Working Group on Calibration and Validation** (CEOS/WGCV) Mission is to ensure long-term confidence in the accuracy and quality of Earth Observation data and products and provide a forum for the exchange of information about calibration and validation, coordination, and cooperative activities.
- The **CEOS WGCV Atmospheric Composition Sub-Group** (CEOS/WGCV/ACSG) Mission is to ensure the accurate and traceable calibration of remotely-sensed atmospheric composition radiance data and validation of higher level products for application to atmospheric composition and *in conjunction to* climate research.

- Calibration issues impacting atmospheric composition data (outside of IVOS and MSSG areas of competence).
- Satellite validation best practices, such as inter-comparison methodologies and Fiducial Reference Measurements (SOP and requirements), in particular for air quality. Undertaken in cooperation with specialized groups such as NDACC WGs and WMO/GAW for trace gases measurements, ACTRIS-2 for aerosols, GEWEX for water vapour, etc.
- Atmospheric characterisation activities: methodologies, sensitivity analyses, radiative transfer...

Interaction with GSICS

Joint GSICS GRWG-UVSG / CEOS WGCV ACSG Workshop on Calibration in October 2015 at NOAA (College Park)

GSICS-EP17 in June 2016 in Antibes

Possible areas of common interest:

- Solar spectrum: Work together to include the UV-Vis aspects/needs for the new CEOS WGCV solar spectrum recommendation.
- Calibration in the UV-Vis: Avoid duplication in Level-1 work and benefit from independent/standardised Level-2 product validation activities (i.e., develop best practices for the L2→L1 feedback for the calibration).
- Atmospheric characterisation: Work on methodologies (forward calculations), selection of “target areas”, integration of Fiducial Reference Measurements, radiative transfer intercomparisons, etc.

ACSG participation in cross-cutting activities within WGCV (reminder from WGCV-40)

- Organization of the February 2015 Radebeul workshop on the selection of the CEOS/WGCV cross-cutting activities
- Limited 2-year targeted studies – based on a clear defined procedure with defined deliverables
- Selected studies (to follow QA4EO principles) to support EO applications:
 - o Atmospheric Correction for land and ocean parameter retrievals: ACIX
 - o Harmonised cloud screening approach (and nomenclature): Cloud masking task team
 - o Digital Elevation Model (DEM) characterization

Support / develop Fiducial Reference Measurements (FRMs) for atmospheric composition:

- Support the calibration, traceability and characterization of Brewers using the Izaña standard instrument (4 campaigns to date) –
in cooperation with WMO/GAW
- Support the inter-comparison of ground-based instruments (Brewer-Dobson), of ground-based NO₂ measurements, etc.
- The development of ground-based O₃ and NO₂ profiles from spectrometers – *in cooperation with NDACC*
- The standardization of the mini-spectrometer retrievals and processing (Pandonia) and its consistency with other systems
- Cooperate on merging ground-based measurements such as LIDAR, sun-photometers and spectrometers, to enhance aerosol classification databases



CINDI-II Campaign

- Cabauw (NL), September 2016
- S-5p preparation: NO₂, HCHO, SO₂...
- MAX-DOAS, in-situ, sondes, OMI, GOME-2, air- and car-based
- Basis for MAX-DOAS network
- Funding: NSO, ESA FRM4DOAS, EU QA4ECV, others



<http://www.tropomi.eu/science/cindi-2>



As encouraged at SIT-30, WGCV/ACSG activities get on with cross-agencies/cross-domains harmonization of validation practices:

1. Transmission of WGCV experience (incl. QA4EO) to CDRs:
 - Pragmatic implementation in Envisat Phase F data evolution, EUMETSAT O3M-SAF trace gases validation, ESA CCI, Copernicus C3S data procurement (atmospheric ECVs)...
 - EU FP7 QA4ECV (ACSG, IVOS and TMSG joint venture): generic QA framework virtually applicable to all ECVs, guidance on tools and methods like traceability chains and maturity matrix, specific tools and methods, Atmospheric ECV Validation Server (AVS)...
 - Efforts towards common terminology and definitions for data product validation and reporting of uncertainties
 - CLIPC/QA4ECV/EUPORIAS/EUCLEIA/GAIA-CLIM workshop on “Confidence in Climate Services”, Hamburg, Feb. 2016
 - SPARC/IO3C/IGACO-WMO/NDACC (SI2N) initiative on past changes in the vertical distribution of ozone



SPARC/IO3C/IGACO-WMO/NDACC (SI2N)

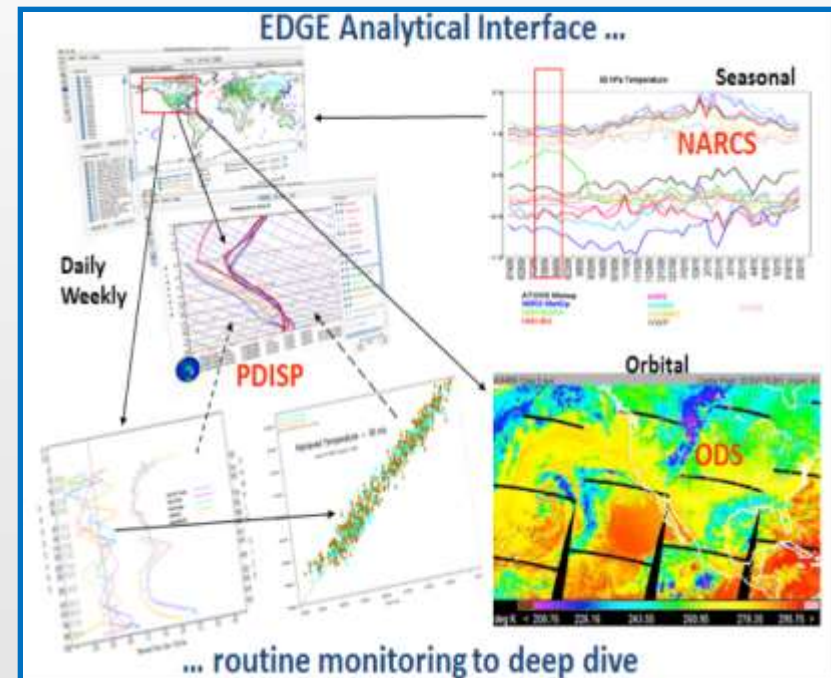
- Topics:
 - o satellite data retrieval, quality and records;
 - o ground-based measurements retrieval, quality and records;
 - o procedures for merging ozone measurements from different sources; and
 - o definition of a new ozone initiative.
- 4 meetings: Geneva 2011/01, Columbia 2012/04, Helsinki 2013/09, Edinburgh 2016/09
- Results: ACP/AMT/ESSD inter-journal special issue (#284): Changes in the vertical distribution of ozone – the SI2N report
- WGCV related:
 - o Harmonization of retrievals, data reporting, calibration issues
 - o Calculation and expression of uncertainties
 - o Issues of data comparisons and merging
 - o Uncertainties on trend assessments (single-/multi-mission, L2/L3...)



2. Contribution to exchanges of practices between (semi-)automated validation servers:

- ICARE (CNES/CNRS/NPDCRC/U. Lille)
- GECA (ESA, heritage), HARP tools (s[&t)
- Multi-TASTE (BIRA-IASB/ESA)
- NORS (BIRA-IASB/s[&t/CAMS-84)
- NPROVS (NOAA)
- QA4ECV AVS (BIRA-IASB)
- S-5p MPC/IDAF (KNMI/ESA)
- S-5p MPC/VDAF (BIRA-IASB/ESA)

➤ Implementation into GAIA-CLIM Virtual Observatory:



3. Interaction with CEOS AC-VC since WGCV-40:

- ACSG contributes validation support to cross-agencies harmonization efforts in 3 of ACC key topics:
 - Topic 1 - Total ozone ECV validation & harmonization
 - Topic 2 - Geostationary Air Quality constellation coordination
 - Topic 4 - Greenhouse gas (GHG) constellation (LEO + GEO)
- Participation of ACSG Chairs and members in VC/ACC-11 at ESRIN in April 2015 (reminder)
- Protocol for harmonization of nadir ozone profile data validation
- Advances in error assessment of ozone trend estimates (SI2N)
- AC-VC/ACSG formulation of Geophysical Validation Needs for the future GEO-AQ Constellation
- AC-VC-12 in October 2016 at Yonsei U. in Seoul: Air Quality Constellation, Ozone Trends, GHG Constellation, ...
- AC-VC members participation in ACVE-5 at ESRIN in October 2016



Thank you!

WGCV ACSG points of contact:

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