Atmospheric Correction Discussion

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WGCV IVOS 27

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Reminder

Ultimate goal of atmospheric correction discussion is understanding the impact of uncertainties in the correction

- Concentrated on impacts to vicarious calibration
- Develop a set of recommended approaches to ensure better comparability between different groups
  - Permit development of new methods
  - Create a common starting point for all groups
- Areas for best practices are
  - Radiative transfer code
  - Input parameterization
  - Measurement approaches
  - Instrumentation
  - Retrieval methods

Step 1 – Radiative transfer code standard data set

Base input data set uses a clean aerosol over a moderately bright surface

- No aerosol absorption highlights impact of aerosol composition selection
- Modest aerosol loading (0.2 at 550 nm)
- Spectral reflectance constant with wavelength
  - Base case input of 0.4 reflectance
  - Second case with 0.05 reflectance
- 45 degree view angle (no ambiguity on elevation versus zenith)
- 60-degree solar zenith angle (large difference in radiance if elevation versus zenith angle confusion)
- Lambertian surface
- TOA reflectance output at 1-nm intervals from 400 to 2500 nm

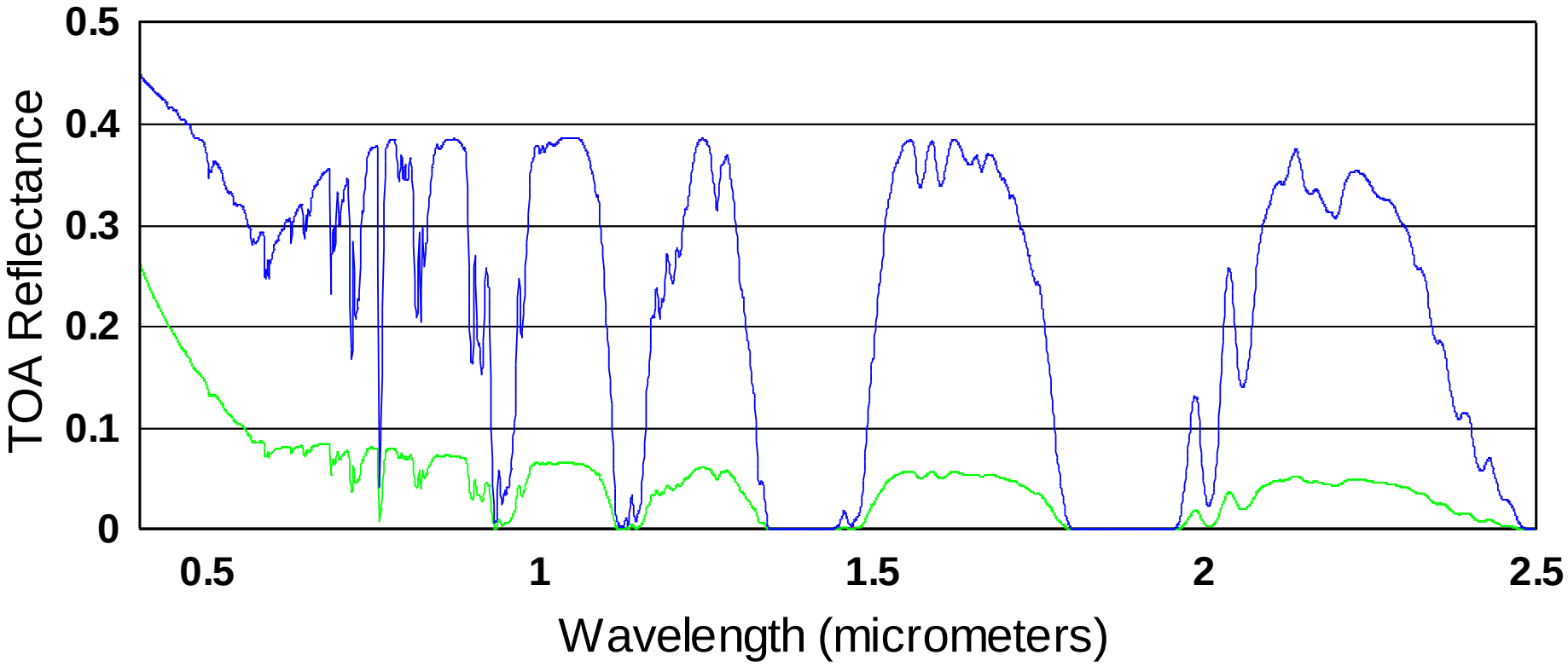
Atmospheric parameterization

List of parameters that will be reported include consistently derived multiple formats

- Spectral optical depth (total, component)
- Aerosol optical depth at 550 nm = 0.20
- Angstrom coefficient (also known as power law exponent) = 1.00
- Junge parameter = 3.00
- Surface pressure = 1013 mb
- Column water vapor amount = 2.54 cm
- Column ozone amount = 280 Dobsons
- Clean Maritime aerosol type
  - Real index – 1.39
  - Imaginary index – 0.0
- View-sun geometry
  - View zenith – 45 degrees
  - Solar zenith – 60 degrees
  - Delta azimuth – 90 degrees
- Surface height – 0 km
- Sensor height - >100 km

Sample outputs

Two base cases have been run and further cases are being developed



Summary

Data set generation has taken place and we are using RadCalNet work to develop multiple output sets

- Attempting to pre-determine likely questions
- Work is being combined with RadCalNet efforts
  - Document radiative transfer code uncertainties
  - Help develop answers to questions from newer users
- Will generate a sensitivity analysis example
  - Helps with RadCalNet uncertainty development
  - Provide guidance to newer users
- Further outcomes
  - Compiling results leads to a set of best practices
  - Processing schemes
  - Input parameterization
  - Recommended measurement approaches

Coupling with Atmospheric Correction Task Group

WGCV is implementing an Atmospheric Correction Task Group

- More on task groups in later IVOS talk
- Recall the IVOS atmospheric correction activity is primarily interested in impact of atmospheric correction in vicarious calibration
  - Use of radiative transfer codes
  - Measurement approaches to assess atmospheric parameters
- Atmospheric Correction Task is evaluating impacts of atmospheric correction on user products
  - Cross cutting the Land Product Validation, Atmospheric, and IVOS sub groups
  - Interaction with other CEOS non-CEOS entities
- Lessons learned from the Task Group will feed back into the IVOS activity (and vice versa)

CEOS-WGCV Update to IVOS

Kurt Thome / NASA

(with inputs from Albrecht von Bargen / DLR)

IVOS 27

Toulouse, France

November September 17 - 18, 2015

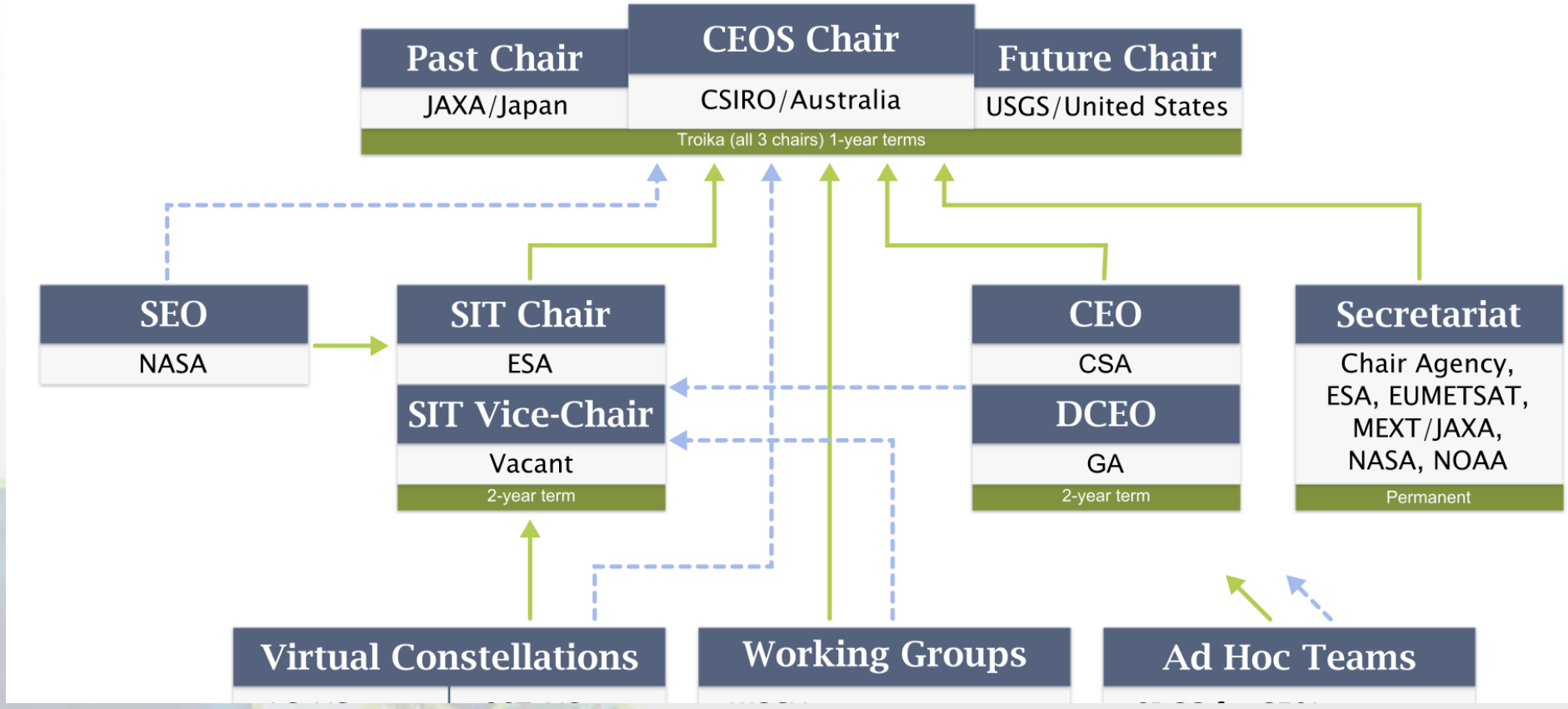
Working Group on Calibration and Validation

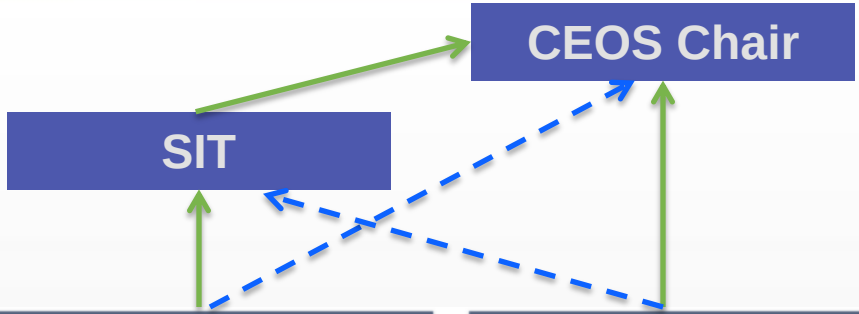
Presentation Outline

- Recent WGCV activities
  - Overview Working Structure CEOS-WGCV
  - Task team description
  - CEOS-WGCV plenary # 39, May 2015
- Upcoming Events
- Future Outlook

CEOS Background

- Committee on Earth Observation Satellites established in1984
- 55 Agencies operating 134 satellites
- Original function of CEOS was to coordinate and harmonise Earth observations
- Make it easier for the user community to access and use data
- Ensures international coordination of civil space-based Earth observation programs
- Promotes exchange of data to optimize societal benefit and inform decision making
- Diverse user community of ever increasing numbers and complexity of sensors means CEOS now also focuses on validating requirements and working with other satellite coordinating bodies


Past Chair
JAXA/Japan
CEOS Chair
CSIRO/Australia
Future Chair
USGS/United States
Troika (all 3 chairs) 1-year terms
SEO
NASA
SIT Chair
ESA
SIT Vice-Chair
Vacant
2-year term
CEO
CSA
DCEO
GA
2-year term
Secretariat
Chair Agency, ESA, EUMETSAT, MEXT/JAXA, NASA, NOAA
Permanent
Virtual Constellations
Working Groups
Ad Hoc Teams
Primary Reporting Path
Secondary Reporting Path



Virtual Constellations

AC-VC
- NASA
- ESA

LSI-VC
- ESA
- USGS
- GA

OCR-VC
- ESA
- NASA
- NOAA

OSVW-VC
- NOAA
- EUMETSAT
- ISRO

OST-VC
- CNES
- EUMETSAT

P-VC
- NASA
- JAXA

SST-VC
- EUMETSAT
- NOAA

Working Groups

WGCV
- Chair: DLR
- Vice-Chair: NASA

WGCapD
- Chair: SANSA
- Vice-Chair: ISRO

WGClimate
- Chair: ESA
- Vice-Chair: EUMETSAT

WGDisasters
- Chair: CSA
- Vice-Chair: ASI

WGISS
- Chair: NASA
- Vice-Chair: ESA

Ad Hoc Teams

SDCG for GFOI
- ESA
- USGS

GEOGLAM
- NASA
- CNES

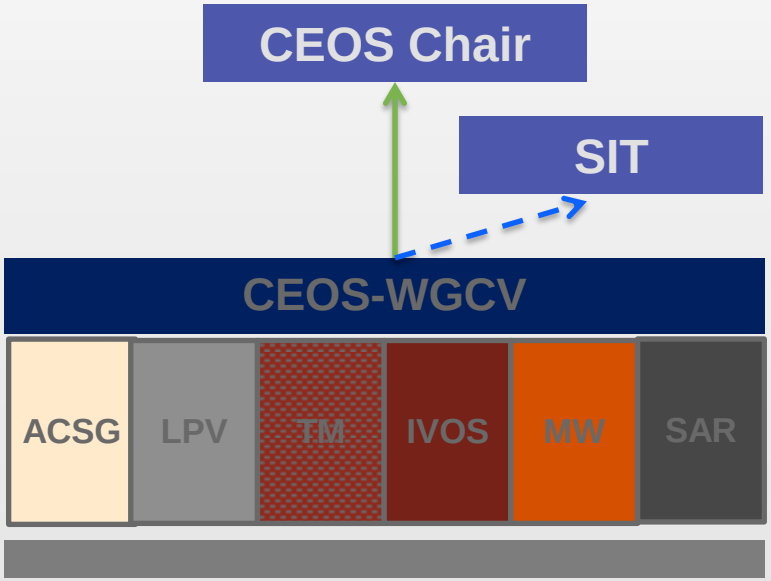
WSIST
- JAXA

Future Data Architectures
- CSIRO
- GA

Applications of Next-Gen Meteorological Satellites
- CSIRO

CEOS Working Group on Calibration/Validation

- Ensure long-term confidence in accuracy and quality of Earth Observation data and products
- Provide forum for exchange of information on cal/val, coordination, and cooperative activities
- Six Subgroups operating as individual entities and focusing on specific technical areas
  - Atmospheric Composition (ACSG)
  - Infrared Visible Optical Sensors (IVOS)
  - Land Product Validation (LPV)
  - Microwave Sensors (MSSG)
  - Synthetic Aperture Radar (SAR)
  - Terrain Mapping (TMSG)
- Sub-groups are unique to WGCV



WGCV Work Structure

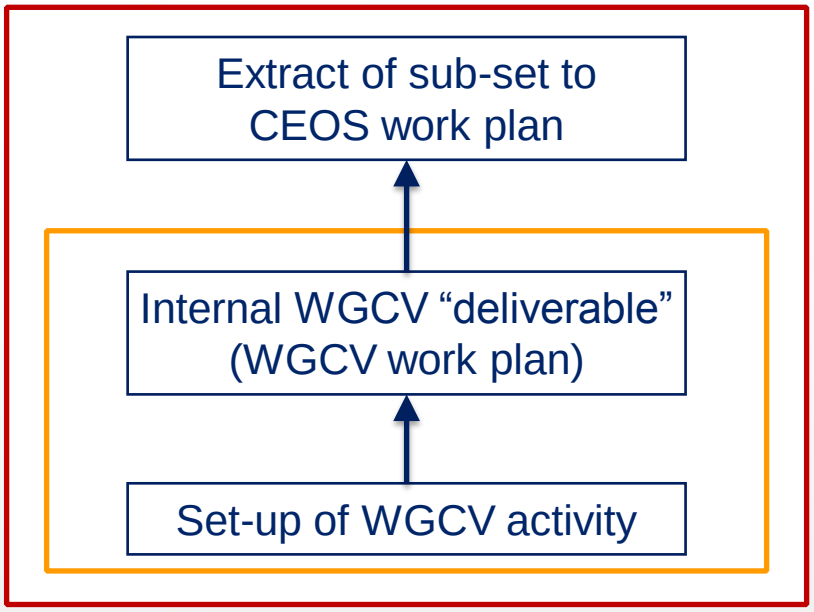
- Changes in CEOS membership and changes in mission portfolios and Earth Observation applications has prompted an effort to update WGCV's work structure
- New CEOS activities
  - Support for other CEOS WGs
  - Cooperation with Virtual Constellations
  - Response to action items developed by task forces such as for Carbon
- New activities at the working group level
  - Planning Meeting took place in February 2015
  - Task team approach
- Cooperation with other institutional organizations (GEO/GEOSS context)

WGCV Task Approach

- Define a clear task and determine if it is a cross-cutting topic
  - Well confined and described task
  - Clearly defined time frame (< 24 months)
- Identify a task lead
  - Need not be a WGCV member but must be backed by a CEOS agency
  - Co-lead from a non-WGCV organization is allowed (and in some topics encouraged)
- Definition phase can occur during a workshop but length of definition phase cannot extend beyond two WGCV plenaries
  - Road map including schedule, deliverables, and milestones
  - Definition phase undertaken by core team lead by task lead
  - Road map receives approval from WGCV plenary
  - Definition phase also used to identify funding issues

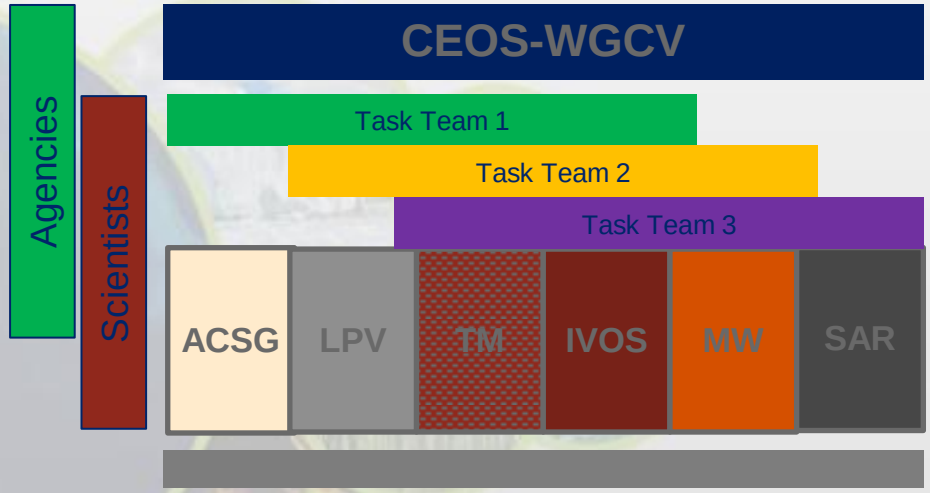
WGCV Task Approach

- Three tasks as “pre-cursor” identified
- All three tasks are thought in support of Earth Observation applications
- Cloud Masking Task / PoC: B.Bojkov (ESA)
- Atmospheric Correction / PoCs: B. Bojkov (ESA), E. Vermote (NASA)
- Digital Elevation Model / PoC: contact chairs for cooperation



CEOS plenary approval & feedback

WGCV **external** initiative for ideas suitable to CEOS-WGCV



WGCV **internal** initiative for ideas suitable to CEOS-WGCV

CEOS WGCV Plenary 39,

- Berlin, May 6-8, 2015 hosted by DLR
- Special session: Ocean Color / Calibration and Validation
  - OCR-VC (Introduction), IOCCG (Calibration), and JRC (Validation)
  - Follow-on discussion about calibration in collaboration with WGCV/IVOS
- Interaction with GSICS / GRWG
  - Combined meetings on sub-group level
  - Document.describing topic overlaps and areas of collaboration
- Interaction with SST and LSI
- Discussion of Carbon Action Items

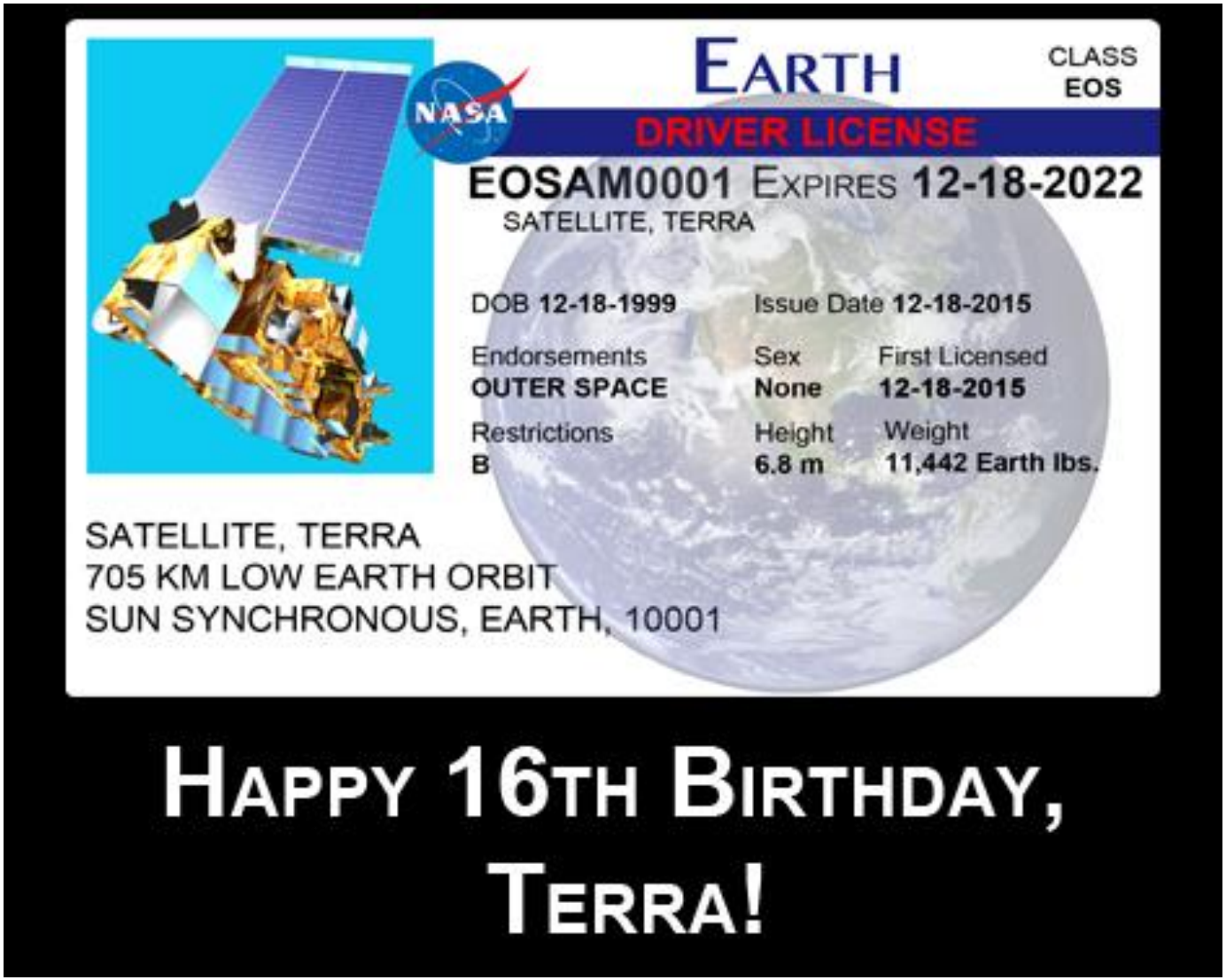
- TMSG sub-group is in hibernation mode

Carbon Action Items

- Original Actions cannot be assigned one-by-one to WGCV and its sub-groups
  - Some are sub-group specific and some cross-cutting specific items
  - Sub-groups invited to comment in terms what they can do (Thome was IVOS representative for this)
- Follow-on is identifying common items for combination
  - Collaborations within and outside CEOS
  - Define a step-wise approach with defined milestones
- Consolidation will be done in a fashion that allows WGCV and SIT to track progress

Terra will turn 16 years old in December

Terra has ben instrumental in helping us understand calibration methods



Upcoming Events

- ***CEOS-WGCV plenaries***
  - WGCV # 40, March 14-18, 2016 in Canberra (AUS) hosted by GEOSCIENCE Australia and CSIRO
  - WGCV # 41, September 2016, hosted by JAXA

- ***Other workshops or meetings***
  - CEOS SAR Cal/Val workshop, October 2015, hosted by ESA/ESTEC
  - GSICS / WGCV ACSG workshop, October 2015, hosted by NOAA
  - **WGCV IVOS workshop, November 2015, hosted by ONERA**