



Committee on Earth Observation Satellites

# 3.1: Working Teams

## Session Scene Setter

Jonathon Ross/GA

CEOS SIT Technical Workshop 2020

Session and Agenda Item # 3.1

Virtual Meeting

10 September 2020





## Objectives:

- Showcase our WGs and VCs - the engine rooms of CEOS
- Provide an opportunity for WGs to identify issues and highlights for exposure at Plenary.
- Provide an opportunity for VCs to showcase their work and identify any highlights or issues for the SIT Chair to flag at Plenary.

## Agenda:

- This session!
- [3.2 \[1 hour 10 minutes: UTC 1040 - 1200\]: Working Groups Showcase](#)
- [3.3 \[2 hour 10 minutes: UTC, UTC 1200 - 1220\]: Virtual Constellations Showcase](#)
- BREAK [20 minutes: UTC 1220 - 1240]
- [3.3 \[2 hour 10 minutes: UTC, UTC 1240 - 1430\]: Virtual Constellations Showcase](#)

# SIT Chair Team Approach to Working Teams

## Promoting Information Flow Outside Major Meetings

- **Following from past SIT Chairs, we have held two rounds of ‘informal chats’ with the VCs (Dec 2019 and June 2020)**
  - These chats have been very fruitful, and have led to progress in a few key areas
  - Highlighted VC activities in the recently released Work Plan
- **In addition to try and promote the flow of information outside CEOS ‘major meetings’, we have introduced**
  - Working Team All Hands calls
  - VC Report to CEOS SEC
- **Working Team All Hands calls (Feb and May 2020)**
  - These are two hour calls during which we cover 3-4 topics (with a cross-cutting interest) nominated by the activities of the WTs (VCs, WGs, AHTs)
  - Feedback is positive and the intention is to continue this, with the next to be planned in Q4-2020

# SIT Chair Team Approach to Working Teams

## Promoting Information Flow Outside Major Meetings

- **VC reporting to CEOS SEC**
  - Completed the first round of reports with SEC-266 in June
  - Started the rotation again with SEC-268 in August
- **This Session is intended to complement these in depth approaches with an opportunity for each VC to highlight to present current issues for CEOS Plenary to a broader set of Agencies at TW**
- **Working Teams All Hands call #3 to take place (TBC)**
  - Tuesday 10th November 0700 US East / 1300 Europe / 2100 Japan / 2300 Canberra
- **Next round of VC Chats to be scheduled from mid-November**

# Additional Contents and Timing

- **We recognise that in this virtual environment we have even less time than normal to dedicate, and so WGs and VCs are welcome and encouraged to provide additional content (e.g. written, video, etc.) to highlight activities.**
  - That can be linked from these slides and we are also happy to highlight these materials on the SIT TW website.
- **We have a large number of time zones represented in this session with some being online well before or after regular business hours.**
- **In light of this, and with a large number of presentations and discussion to get through in Session 3, we will proceed on a 'ready basis' for this Session.**
  - If a presenter is not online for their slot, we will move forward with the agenda to the next presenter who is online.
  - We will make all efforts to return to skipped items when presenters are able to join, and anticipate being able to do so.
  - However, this may require some flexibility in the agenda on the day.



Committee on Earth Observation Satellites

## 3.2: Working Group Showcase

Session Chair: TBA/ISRO

Presented By: WG Chairs

CEOS SIT Technical Workshop 2020

Session and Agenda Item # 3.2

Virtual Meeting

11 September 2020



# Session 3.2 Objectives and Overview



## Objectives:

- Provide an opportunity for WGs to identify issues and highlights for exposure at Plenary.

## Agenda:

- 55 minutes: UTC 1125 - 1220
- WGCapD [N. Searby/NASA] incl. CEOS branded webinar plans [[slides](#)]



Committee on Earth Observation Satellites

# 3.3: Virtual Constellation Showcase

Session Chair: Jonathon Ross/GA

Presented By: VC Co-Leads

CEOS SIT Technical Workshop 2020

Session and Agenda Item # 3.3

Virtual Meeting

11 September 2020





- Session Duration 1 hour 50 minutes

1. [P-VC \[5+5min\]](#)
2. [AC-VC \[5+5min\]](#)
3. [LSI-VC \[5+5min\]](#)
4. [SST-VC \[5+5min\]](#)
5. [OST-VC \[5+5min\]](#)

*20 minute break*

6. [OSVW-VC \[5+5min\]](#)
7. [OCR-VC \[5+5min\]](#)
8. [COVERAGE \[10+5min\]](#)
9. [VC and WG Discussion Time \[30 minutes, all\]](#)

- **Presenters should name their file using the following convention:**
  - AgendaltemNumber\_LastName\_Subject\_Version (e.g., 1.1\_Ross\_Protocols\_v2)
- ***Reporting to support discussion or decision is encouraged*, but historical context and detailed reporting should be provided as pre-meeting reading material or in background slides.**
- **Materials should explicitly highlight the decisions, outcomes, or actions you are seeking. The more explicit you are with the required actions, the better. i.e., do feel free to propose draft action text for consideration – it may be revised, but will help with the efficient preparation of the actions record.**

## Due dates:

- **Documents:** no later than Tuesday Aug 25<sup>th</sup>
- **Presentations:** no later than Tuesday Sept 1<sup>st</sup>



Committee on Earth Observation Satellites

# P-VC

VC Co-Leads: Riko Oki/JAXA, Chris  
Kidd/NASA

CEOS SIT Technical Workshop 2020

Session and Agenda Item # 3.2

Virtual Meeting

11 September 2020





- Add P-VC slides [linked here](https://docs.google.com/presentation/d/1A8pCadpY9OrFwrbCs3u-BWDh-9VjBFiqSXj5eWsxsw/edit?usp=sharing)
  - <https://docs.google.com/presentation/d/1A8pCadpY9OrFwrbCs3u-BWDh-9VjBFiqSXj5eWsxsw/edit?usp=sharing>





Committee on Earth Observation Satellites

# AC-VC

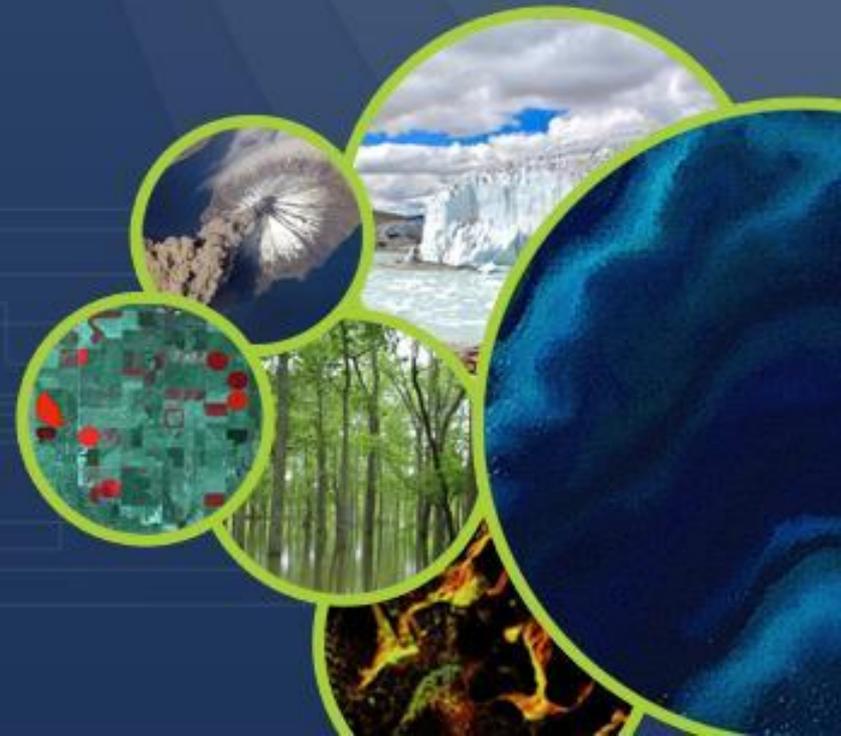
VC Co-Leads: Jay Al-Saadi/NASA, Ben  
Veihelmann/ESA, Hiroshi  
Tanimoto/NIES(JAXA)

CEOS SIT Technical Workshop 2020

Session and Agenda Item # 3.2

Virtual Meeting

11 September 2020





- **AC-VC slides [linked here](https://drive.google.com/file/d/1erN4t4kjU9kTnpzo3mjksho_OKSoEROj/view?usp=sharing)**
  - [https://drive.google.com/file/d/1erN4t4kjU9kTnpzo3mjksho\\_OKSoEROj/view?usp=sharing](https://drive.google.com/file/d/1erN4t4kjU9kTnpzo3mjksho_OKSoEROj/view?usp=sharing)





Committee on Earth Observation Satellites

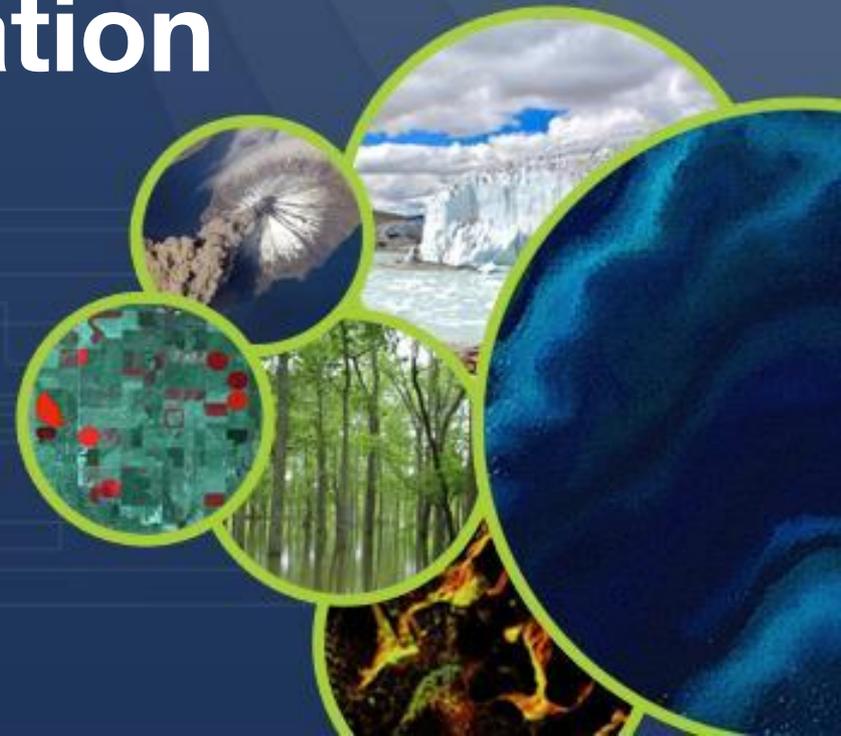
# Land Surface Imaging – Virtual Constellation

Zolti Szantoi/COM-JRC

CEOS SIT Technical Workshop 2020

Session and Agenda Item # 3.3.4

Virtual Meeting, 10/11 September 2020



Updated slides here:

<https://docs.google.com/presentation/d/1Xt3CNn9gqzbadVI8IXaILBUckuZ9Wtklu7qkMp3vb6k/edit?usp=sharing>



## Leadership, membership, changes:

- Adam Lewis (Geoscience Australia) (co-lead)
- Steve Labahn/Tim Stryker (USGS) (co-lead)
- Zolti Szantoi (COM-JRC) (co-lead)

## Successfully integrated, based on CEOS Plenary endorsement

- Ad Hoc Space Data Coordination Group for GFOI
  - to become a thematic subgroup on Forests & Biomass
- Ad Hoc CEOS Working Group on GEOGLAM
  - to become a thematic subgroup on GEOGLAM

## Meetings

- Monthly telecons with active participation
- LSI-VC 9 - virtual meeting 2020 April 14, 28, May 12, 13
  - CEOS ARD & Standardization
  - Industry & CEOS ARD
  - CARD4L and the Product Family Specifications (PFS)
  - LSI-GEOGLAM, LSI-Forests & Biomass, ARD Strategy
- LSI-VC 10 - virtual meeting
  - series of thematic sessions (as done for LSI-VC-9) across the weeks of October 5 and 12.
- Additional calls on an ad hoc basis (particular PFS discussion for example)

### Active involvement

Canadian Space Agency  
 European Commission  
 European Space Agency  
 Geoscience Australia  
 JAXA  
 NOAA  
 United States Geological Survey

### Periodic Involvement

Korea Aerospace Research Institute  
 National Institute of Aeronautics and Space, Indonesia  
 National Space Activities Commission, Argentina  
 Institute of Remote Sensing and Digital Earth (RADI), China  
 Indian Space Research Organization

## • Industry

- Direct contacts with key players (PCI, PLANET, SINERGISE, etc.)
- CEOS ARD Webinar #1 – July 1, 2020: [Watch Here](#)
  - 500 registrations, 725 views; further webinars planned
  - Analysis Ready Data Strategy and Early Progress: 16th, #5.2, UTC 1240-1430

## • Scientific

- IGARSS ARD sessions (2018/19/20)
- PECORA
- Geo Week (key side event)
- Living Planet 2019

## • General

- CEOS Newsletter
- WG on Capacity Development and Data Democracy collaboration
- Undertake two actions from the WG Climate Coordinated Action Plan
  - LST Climate Data Records and continuity
- Participation in OGC's TESTBED16 ARD activity

CEOS Newsletter No.55 / August 2020

### Reports of LSI-VC

The ninth meeting of the CEOS Land Surface Imaging Virtual Constellation (LSI-VC) was held as a series of thematic teleconferences from mid-April to mid-May, covering: CEOS ARD & Standardisation; Industry and CEOS ARD; CARDAL and the Product Family Specifications (PFS); and LSI-GEGLAM, LSI-Forests & Biomass, and the CEOS ARD Strategy. The focused scope for each call, as well as strong participation, resulted in good discussions and decision making.

We continue with our efforts to engage groups outside CEOS in the CEOS ARD discourse, in particular the commercial sector. We have seen great interest from industry, and there are currently numerous dialogues taking place across several CEOS entities. LSI-VC is working with the SIT Chair Team to ensure CEOS has a coordinated and unified interface to industry on this topic – in line with the CEOS ARD Strategy.

LSI-VC decided to reform the planned CEOS Industry ARD Workshop into a series of online webinars, with the first held on July 1. There were 490 registrations, 227 people connected to the live discussion, and more than 500 views of the webinar (live and recorded). The initial webinar was organised as a means to strengthen the dialogue between CEOS and the broader community on the topic of ARD, and to explore what interfaces and cooperative activities are needed to increase data use, choice and flexibility for users. Subsequent webinars will take deeper dives into other aspects of ARD and Future Data Architectures (FDA).

In addition to updating the original three CARDAL PFS (Surface Reflectance, Surface Temperature, Normalised Radar Backscatter) LSI-VC has expanded its portfolio of PFS with the endorsement of the Polarimetric Radar (POL) PFS at LSI-VC-9. CARDAL for SAR is particularly helpful at lowering the barrier of entry for users with SAR data, which is inherently more complex. The LSI-VC Leads thank Tadeu TADINI (JAXA), Ake ROSEQUIST (JAXA) and the entire CARDAL SAR sub-team for their work on the specification. Good progress is also being made on an Aquatic Reflectance PFS, which is expected to be a timely contribution to the CEOS-GOALS initiative. Finally, in response to CEOS feedback, LSI-VC will also seek to add 'Advisory Notes' as a fourth component of the CARDAL Framework to address issues like data policy, data formats, and interoperability.

Landset Collection 2 (Surface Reflectance and Surface Temperature) has just recently been approved as CARDAL at the 'Threshold' level and Sentinel-2 Level-2A (Surface Reflectance) is expected to follow soon. A number of other assessments are anticipated, including for Synthetic Aperture Radar (JAXA ALOS-2 and Sentinel-1). The LSI-VC Leads would like to thank our IWGIS colleagues, in particular Mochay Thankappan who has served a dual role across both teams, for their assistance with the peer reviews of the CARDAL self-assessments – a critical step in ensuring consistency, accuracy and objectivity in the process.

The LSI-VC Leads would like to extend an open invitation

Adam Lewis,  
Geoscience Australia



Steve Labahn,  
USGS



Zoltan Szantoi,  
ECJRC



for CEOS Agencies to join the LSI-VC. Should you require information on any of our work, please feel free to get in touch with the LSI-VC Leads or the LSI-VC Secretariat: labahn@usgs.gov, Adam.lewis@ga.gov.au, Zoltan.SZANTOI@ec.europa.eu, matthew@ymbioscomms.com

<http://ceos.org/launcher/virtual-constellations/sit/>  
<http://ceos.org/ard>

# CARD4L, Product Family Specifications



- **Current endorsed CARD4L Specifications:** Surface Reflectance (SR), Surface Temp (ST), Normalized Radar Backscatter, Polarimetric Radar
- **In progress CARD4L Specifications:** Aquatic Reflectance (Coastal), Interferometric SAR, Geocoded Single-Look-Complex (SLC)
- **First CARD4L Datasets:** USGS Landsat Collection 2 SR & ST. COM/ESA Sentinel-2 SR currently being assessed.
- **Interoperability discussions**
  - LSI-VC and Working Group on Information Systems and Services have been developing the terms
  - The current version will be discussed at SIT-TW and is down for endorsement at CEOS Plenary
- **Supporting discussion around adaptation of the CARD4L Framework to support other domains (SIT TW Session 2.2)**
- **Contributing to realization of the CEOS ARD Strategy:**
  - Contributed to CEOS Interoperability Terminology (WGISS, SIT TW Session 5.2)
  - Involved in ARD and commercial sector paper (SIT TW Session 5.2)
  - Exploring opportunities for CARD4L pilots – for feedback and improvement of specs



CEOS Analysis Ready Data

Overview Framework Specifications FAQ Resources **CEOS ARD Strategy** Information for: Data Producers Data Distributors Data Users

CEOS ARD Webinar – July 1, 2020: Watch Here >>

## CEOS ANALYSIS READY DATA

CEOS Analysis Ready Data for Land (CARD4L) are satellite data that have been processed to a minimum set of requirements and organized into a form that allows immediate analysis with a minimum of additional user effort and interoperability both through time and with other datasets.

Information for:

- Data Producers
- Data Distributors
- Data Users

<http://ceos.org/ard/>



*GEOGLAM work is now principally executed by GEOGLAM Coordination Team on EO Data Coordination.*

Essential Agricultural Variables remain primary focus.

- USER/policy-facing
- Some COVID-related delay.
- Variable characterizations are 90% complete.
- Up next:
  - Gap Analysis
    - Methods?
    - Satellite Data?
    - Ground Data?
    - Compute?
  - Outcomes will drive:
    - Research Agenda
    - EO Data Requirements - observations, ARD, access
    - Core priority products for CEOS Land Product Validation collab?

ESSENTIAL AGRICULTURE VARIABLES FOR  **GEOGLAM**  
Global Agricultural Monitoring

**What are EAV for GEOGLAM?**

**Essential:** key 'building blocks' to produce relevant and timely information products  
**Agriculture:** related to agricultural production and land use  
**Variables:** that can be measured and reflect state, change, and forecast in agricultural land use and productivity  
**For GEOGLAM:** to support our policy mandates, G20-GEOGLAM, SDGs, Climate, Sendai



EAV Working Group co-led by Alyssa Whitcraft & Sven Gilliams (VITO)



## Copernicus Global Land Service

Providing bio-geophysical products of global land surface

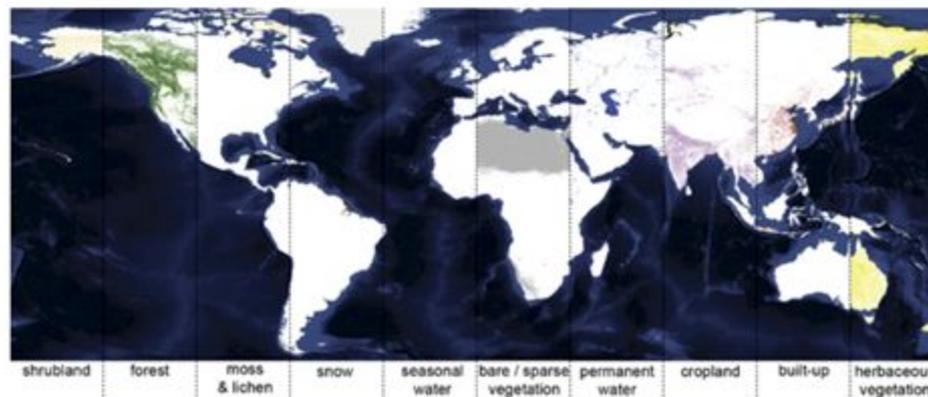

[Home](#)
[Products](#)
[Use cases](#)
[Product Access](#)
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[Library](#)
[Get Support](#)

### Annual 100m global land cover maps available!

**Published on:** 2020-09-09

Global Land's first global 100 m land cover map for 2015 – released just over one year ago – continued to inspire thousands of users with applications in [agriculture](#), [biodiversity](#) & [nature conservation](#) and [natural capital accounting](#).Ov

Today, Global Land's land cover team is happy to release **annual updates to the 100m global land cover maps**, covering the **2015-2019** period, including the same 23-class classification, versatile cover fractions for 10 classes, forest type layer and quality indicators on input data density and the confidence in the detected changes.



Cover fractions for the 9 base land cover classes and seasonal inland water

The NASA contributed activities were carried out at the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration. Dedicated funding for PO.DAAC activities is through a grant from NASA's ESDIS Project.  
©2020 California Institute of Technology. Government Sponsorship Acknowledged.



Committee on Earth Observation Satellites

# SST-VC

Edward M. Armstrong, NASA JPL, California  
Institute of Technology, CEOS SST-VC co-lead

Anne O'Carroll, EUMETSAT, CEOS SST-VC  
co-lead (outgoing)

Christo Whittle, SANSA / CSIR, CEOS SST-VC  
co-lead (incoming)

CEOS SIT Technical Workshop 2020

Session and Agenda Item 3.4: VC Showcase

Virtual Meeting 7-11 and 14-18 September 2020





- **Membership:**

- Ed Armstrong, NASA (co-lead since 2019, replacing Ken Casey).
- Anne O'Carroll, EUMETSAT (co-lead since 2015, outgoing 2020).
- Christo Whittle, representing SANSA (2020, incoming co-lead, replacing Anne).
- Active participation from CMA, KMA, ISRO, NASA, NOAA, EUMETSAT, BoM, ESA, JAXA, SANSA.

- **Key-points:**

- Ninth CEOS SST-VC meeting held online, alongside the annual GHRSSST-online Science Team meeting in June 2020.
- CEOS SST-VC white paper completed for publication.
- 100+ standardized GHRSSST products, spanning ~8 million CF/ACDD netCDF data files, ~200 TB, from Sep 1981 – Aug 2020

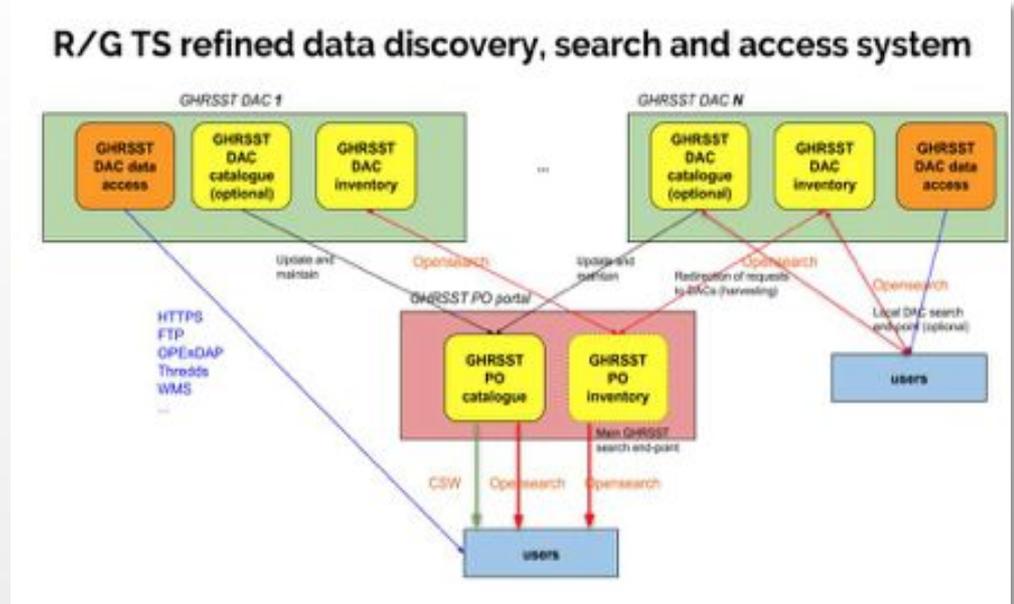
GHRSSST Regional / Global task sharing (R/GTS) framework evolution continues, toward implementation of a federated distribution architecture.

Report on R/GTS evolution prepared and released. The final consolidation was completed with the GHRSSST science team over the last year.

[https://www.ghrsst.org/wp-content/uploads/2020/02/GHRSSST-Regional\\_Global-Task-Sharing-R\\_G-TS-v1.0rev1.pdf](https://www.ghrsst.org/wp-content/uploads/2020/02/GHRSSST-Regional_Global-Task-Sharing-R_G-TS-v1.0rev1.pdf)

Pilot phase completed, demonstrating federated catalogue at IFREMER capable of consolidating discovery from NASA and NOAA.

Implementation phase starting soon.



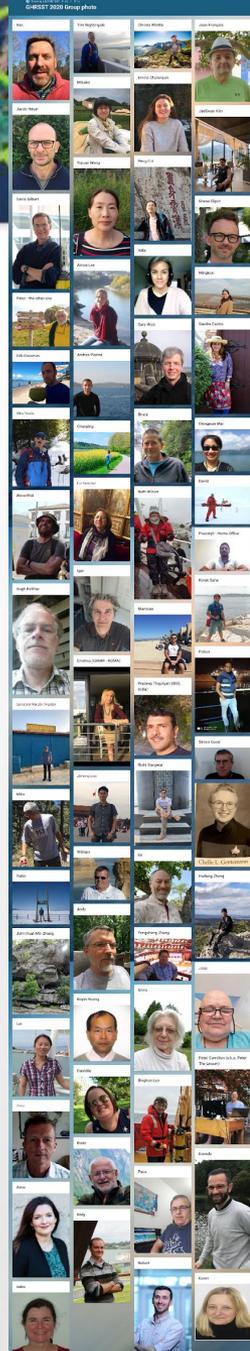
# GHRSSST-XXI-online Science Team meeting, 1-4 June 2020

- 145 participants, a combination of pre-recorded presentations covering 5 science sessions, padlet posters, forum discussions, and Task Team activities. All resources available from:

<https://www.ghrsst.org/meetings/21st-ghrsst-international-science-team-meeting-g-xxi/>

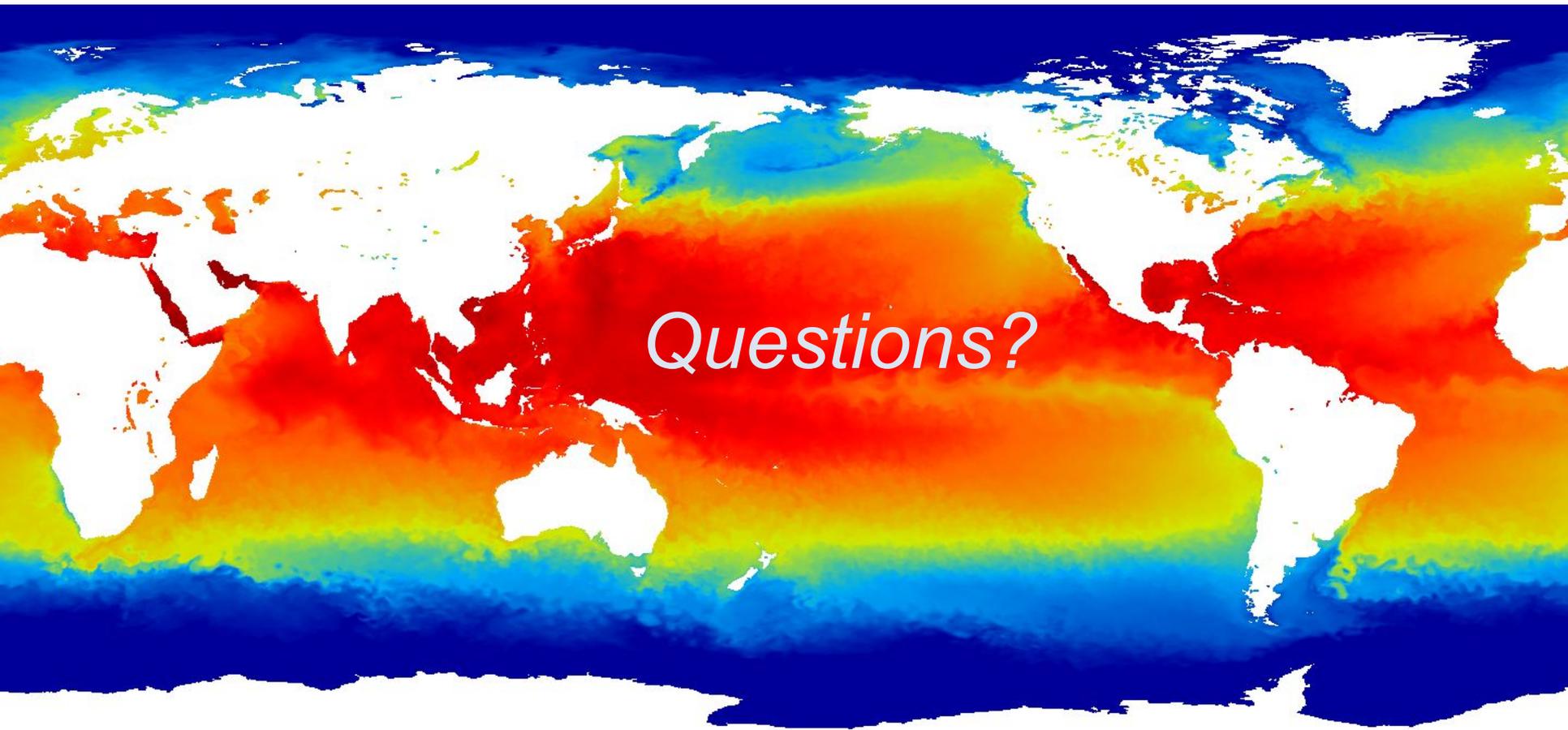
- Use of the EUMETSAT 'moodle' platform to facilitate working teams and promote more inter-sessional work. Current Task Teams include: GHRSSST climatology and L4 inter-comparison; R/GTS; Coral Heat-Stress; Pixel to Pixel Variation; Ship-born radiometry; High-latitude; SSES and L4; Matchup-dataset
- The Coral Heat Stress User Requirements Task Team was set up to produce recommendations to agencies wishing to produce SST products for Coral Heat Stress Users. The Task Teams first report can be found here:

[https://www.ghrsst.org/wp-content/uploads/2020/08/GHRSSST\\_Coral\\_Heat\\_Stress\\_User\\_Requirements\\_v1.0.pdf](https://www.ghrsst.org/wp-content/uploads/2020/08/GHRSSST_Coral_Heat_Stress_User_Requirements_v1.0.pdf)



- Build on the results of Ocean SST ARD presentation in section 2.2 (Weds)
  - Continue to survey more GHRSSST datasets focusing on data formats and metadata structures, variables, services, storage, cloud optimization, and data recipes
  - Engage other VCs and ARD collaborators (e.g., CEOS COAST)
  - Report or review presentation by April 2021
- Provide recommendations for improving search relevancy and data access across CEOS VC partners (Ongoing work within GHRSSST)

- Engaging early career scientists.
- More collaboration with other VCs on common themes e.g. coasts
- GHRSSST data management evolution
- Search relevancy / decision trees based on GHRSSST product search. This is likely to be built on through the GHRSSST activities.
- SST-VC will maintain SST needs on Passive Microwave Radiometers



*Questions?*



Committee on Earth Observation Satellites

# OST-VC

VC Co-Leads: Annick Sylvestre-Baron/CNES,

Remko Scharroo/EUMETSAT

CEOS SIT Technical Workshop 2020

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# OST-VC Guidance

The logo for CEOS (Committee on Earth and Environmental Sciences) features the letters 'CEOS' in a bold, green, sans-serif font. The letter 'O' is replaced by a stylized blue and white globe of the Earth. The logo is set against a white circular background with a green border.

- **Please provide a brief update on OST-VC activities, focused on current issues and in particular issues to be addressed at the Technical Workshop in preparation for CEOS Plenary**
- **Feel free to refer to external files, but please note that the SIT Chair Team would like to use this shared Google slide deck during the Workshop presentation to help streamline the flow of discussion and also to allow Workshop participants to read ahead**
- **Prepare for five minutes of presentation and five minutes of discussion for your VC**
- **Please try and address OST-VC related deliverables from the CEOS Work Plan: [http://deliverables.ceos.org/task\\_manager/deliverables/?status=2&creation\\_year=&category=12&number=&title=&description=](http://deliverables.ceos.org/task_manager/deliverables/?status=2&creation_year=&category=12&number=&title=&description=)**
- ***Reporting to support discussion or decision is encouraged*, but historical context and detailed reporting should be provided as pre-meeting reading material or in background slides.**
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- **Add OST-VC updates here**
- **Please feel free to insert additional slides being mindful of the five minute time allocation**





Committee on Earth Observation Satellites

# OSVW-VC

VC Co-Leads: Paul Chang/NOAA, Raj  
Kumar/ISRO, Stefanie Linow/EUMETSAT

CEOS SIT Technical Workshop 2020

Session and Agenda Item # 3.2

Virtual Meeting

11 September 2020





- Please provide a brief update on OSVW-VC activities, focused on current issues and in particular issues to be addressed at the Technical Workshop in preparation for CEOS Plenary
- Feel free to refer to external files, but please note that the SIT Chair Team would like to use this shared Google slide deck during the Workshop presentation to help streamline the flow of discussion and also to allow Workshop participants to read ahead
- Prepare for five minutes of presentation and five minutes of discussion for your VC
- Please try and address OSVW-VC related deliverables from the CEOS Work Plan: [http://deliverables.ceos.org/task\\_manager/deliverables/?status=2&creation\\_year=&category=12&number=&title=&description=](http://deliverables.ceos.org/task_manager/deliverables/?status=2&creation_year=&category=12&number=&title=&description=)
- *Reporting to support discussion or decision is encouraged*, but historical context and detailed reporting should be provided as pre-meeting reading material or in background slides.
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- **Add OSVW-VC updates here**
- **Please feel free to insert additional slides being mindful of the five minute time allocation**





Committee on Earth Observation Satellites

# OCR-VC

VC Co-Leads: Ewa Kwiatkowska/EUMETSAT,  
Marie-Helene Rio/ESA, Annick  
Sylvestre-Baron/CNES

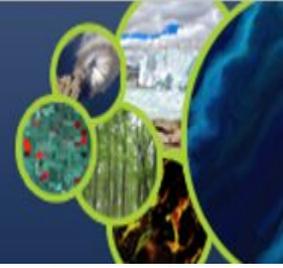
CEOS SIT Technical Workshop 2020

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## Climate

*OCR is Essential Climate Variable defined by GCOS*

- *OCR Climate Data Records contribution to the WGClimate ECV inventory*
- *System Vicarious Calibration infrastructures in support of Climate-quality OCR data records*
- *Bio-optical / radiometric in situ measurement protocols in support of Climate-quality OCR*

## Carbon

*Aquatic Carbon is a major component of the Earth system with respect to carbon cycling and carbon sequestration*

- *“Aquatic Carbon From Space” – IOCCG journal special issue and workshop*
- *“Aquatic Carbon Strategy” – CEOS contribution*

## Water Quality

*OCR provides major EO variables for Water Quality applications*

- *IOCCG report ‘Earth Observations in Support of Global Water Quality Monitoring’*
- *Coordination with “CEOS Feasibility Study on Satellite Missions/Instruments Focused on Water Quality Measurements” in the frame of “CEOS Strategy for Water Observations from Space”*
- *Review proposal of a new interagency task force on Remote Sensing of Marine Debris*
- *Pursue the establishment of a new interagency task force on hyperspectral measurements*

OCR-VC Deliverables

New Technologies

- Hyperspectral OCR
- Geostationary OCR
- Polarimetry, Lidar



# OCR-VC main ongoing contributions to CEOS Work Plan 2020-2022



## EXISTING

VC-14-19	Implementation of the International Network for Sensor InTercomparison and Uncertainty Assessment for Ocean Colour Radiometry (INSITU-OCR)	2021 Q4
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## NEW

VC-20-24	Aquatic Carbon From Space Special Issue	2021 Q4
VC-20-25	Aquatic Carbon From Space Workshop	2021 Q4
VC-20-26	System Vicarious Calibration (SVC) infrastructures in support of Climate-quality OCR data records	2024 Q4
VC-20-27	Development of protocols for bio-optical in situ measurements	2021 Q4
VC-20-28	Capacity building summer schools and online resources	2022 Q4
VC-20-29	Synergistic activities with CEOS COVERAGE	2020 Q4

## OCR-VC specific linkages to CEOS Work Plan

- 3.1 Climate Monitoring, Research, and Services
- 3.2 Carbon Observations, Including Forested Regions
- 3.5 Observations for Water
- 3.6 Data Quality
- 3.7 Capacity Building and Data Democracy





Implementation is advancing and following a modular approach coordinated across the space agencies

Examples:

- R1.3 Permanent working group on satellite sensor calibration
  - IOCCG/OCR-VC instrument calibration task force: exchanges ongoing
- R1.4 Ocean Colour System Vicarious Calibration ➡ OCR-VC Deliverable VC-20-26
- R2.2 Working groups on algorithm topics
  - current IOCCG Working Group: Harmful Algal Blooms
  - current IOCCG Working Group: Intercomparison of Atmospheric Correction Algorithms over Optically-Complex Waters
  - current IOCCG Working Group: Role of Ocean Colour in Biogeochemical, Ecosystem and Climate Modelling (report published in 2020)
- R2.3 Product uncertainties
  - current IOCCG Working Group: Uncertainties in Ocean Colour Remote Sensing (report published in 2019)
- R3.2 Continuous consolidation and update of measurement protocols ➡
  - IOCCG working group on “Conducting Benthic Reflectance Measurements” (<https://ioccg.org/group/benthic/>) OCR-VC Deliverable VC-20-27



- **Why:** aquatic carbon is a *major component* of the Earth system with respect to carbon cycling and carbon sequestration
- **Why now:** substantial advancements have been made in the past decade, especially after numerous carbon projects funded by NASA, ESA and other agencies, and in response to
  - CEOS Strategy for Carbon Observations from Space
  - Group on Earth Observations (GEO) Integrated Global Carbon Observing system (IGCO)
- **What:** how can remote sensing help assess aquatic carbon sources, stocks and fluxes
  - Introduction on the current state of knowledge of the carbon cycle and the role of aquatic environments, with recent numbers / impact factors
  - Retrospective on aquatic carbon from space, from observations to modeling and applications
- **Themes:** carbon stocks, sources/sinks, fluxes; methodology and uncertainty estimates
- **Status:**
  - Editorial board is being finalized
  - Preparation of the release of the call for papers

Contacts for the journal special issue: **Laura Lorenzoni** (laura.lorenzoni@nasa.gov); **Chuanmin Hu** (huc@usf.edu)



- **Why:** aquatic carbon is a major component of the Earth system in carbon cycling and carbon sequestration.
- **Why now:** an international workshop on the Ocean Carbon Cycle is planned in the frame of the ESA BICEP project ( Ocean Biological Carbon Pump ); NASA is also interested in supporting this as it falls within the framework of EXPORTS. Better synchronization with Aquatic Carbon from Space Special Edition.
- **What:** current state of knowledge of the carbon cycle and the role of aquatic environments, with recent numbers / impact factors, from observations to modelling and applications
- **Themes:** carbon stocks, sources/sinks, fluxes; methodology and uncertainty estimates

## System Vicarious Calibration (SVC) infrastructures in support of Climate-quality OCR data records



- NOAA – MOBY ongoing operations and technology refreshment

<https://coastwatch.noaa.gov/cw/field-observations/MOBY.1.html>

- NASA – completed the first phase of PACE SVC development, 3 projects funded (3-year/US\$8M investment)
- NASA – initiated the second phase of PACE SVC development with the goal for infrastructure to be in water ~2021

[https://pace.oceansciences.org/docs/PACE-SCI-PLAN-0140-VC\\_20190226.pdf](https://pace.oceansciences.org/docs/PACE-SCI-PLAN-0140-VC_20190226.pdf)

- ESA – produced community Copernicus OC-SVC recommendations via FRM4SOC workshops, Feb 2017/Oct 2018

<https://frm4soc.org/index.php/activities/workshop-on-vicarious-infrastructure/>

- ESA / CNES / Copernicus – BOUSSOLE ongoing operations
- JRC – peer-review publications, OC-SVC requirements

<https://publications.jrc.ec.europa.eu/repository/handle/JRC105497>

- EUMETSAT – provided “Requirements for Copernicus OC-SVC Infrastructure”
- EUMETSAT – ongoing “Preliminary design of Copernicus OC-SVC Infrastructure”

<https://www.eumetsat.int/website/home/Data/ScienceActivities/ScienceStudies/CopernicusOceanColourVicariousCalibrationInfrastructure/index.html>

## Development of protocols for bio-optical in situ measurements



- Volume 1.0 - Inherent Optical Property Measurements and Protocols: Absorption Coefficient (Nov 2018)
- Volume 2.0 - Beam Transmission and Attenuation Coefficients: Instruments, Characterization, Field Measurements and Data Analysis Protocols (Apr 2019)
- Volume 3.0 - Protocols for Satellite Ocean Color Data Validation: In situ Optical Radiometry (Dec 2019)
- Volume 4.0 - Inherent Optical Property Measurements and Protocols: Best Practices for the Collection and Processing of Ship-Based Underway Flow-Through Optical Data (Nov 2019)
- Volume 5.0: Measurement Protocol of Absorption by Chromophoric Dissolved Organic Matter (CDOM) and Other Dissolved Materials (**under revision**)
- Volume 6.0: Particulate Organic Carbon Sampling and Measurement Protocols: Consensus Towards Future Ocean Color Missions (**under revision**)
- Noteworthy and Supplemental Topics on Ocean Colour Radiometry Protocols (**DRAFT**)
- Best Practices for the Collection and Processing of Ship-Based Underway Flow-Through Optical Data (**In Press**)
- + a new IOCCG working group has been established on “Conducting Benthic Reflectance Measurements” (<https://ioccg.org/group/benthic/>) – which **should produce an IOCCG report on the topic**

# OCR-VC Deliverable VC-20-28

## Capacity building summer schools and online resources



- 5th IOCCG Summer Lecture Series, 22 June – 3 July 2020 at LOV (France)  
cancelled due to COVID-19
- 6th IOCCG Summer Lecture Series, July 2022 at LOV (France)
- Other training activities, e.g. ISRO in collaboration with OCR-VC agencies in Dehradun, India.
- On line tutorials:  
<https://ioccg.org/what-we-do/training-and-education/educational-links-and-resources/>
- Consider capacity building activity around water quality (feeding from the 2018 IOCCG Report)
- Trevor Platt Memorial scholarship
  - Established to honour the memory of Professor Trevor Platt (1942-2020), who was a brilliant scientist and a leader in interdisciplinary oceanographic research, with outstanding contributions in the fields of biological oceanography, theoretical ecology and the use of satellite ocean colour data for measuring ocean processes. awarded annually
  - open to graduate students and young scientists (i.e., having received a Ph.D. within the past 5 years)
  - involved in any aspect of ocean optics and ocean colour research and applications relevant to the [IOCCG Objectives](#).



- Expand synergistic activities with COVERAGE with the aim of having better integration across IOCCG/COVERAGE

In the frame of the current COVERAGE development: recommendations were provided regarding the application of the proposed multi-resolution analysis to OCR

IOCCG will contribute with verifications and validations of example chlorophyll Level-4 products before any release to users is planned (pre-release is planned in October)

For the longer-term COVERAGE development: recommendation was provided to include variables beyond chlorophyll and to increase spatial resolution  $<0.250$



*Questions?*



Committee on Earth Observation Satellites

# COVERAGE

Co-Leads: Vardis Tsontos/NASA, Jorge  
Vazquez/NASA

CEOS SIT Technical Workshop 2020

Session and Agenda Item # 3.2

Virtual Meeting

11 September 2020



# COVERAGE

The logo for the Committee on Earth Observing Satellites (CEOS). It features the letters 'CEOS' in a bold, green, sans-serif font. The letter 'O' is replaced by a small, realistic image of the Earth from space, showing the blue oceans and white clouds. The entire logo is enclosed within a circular border that is light green and has a slight glow.

- **COVERAGE slides [linked here](#)**
  - <https://drive.google.com/file/d/1BGkf3TiG6wDHrNgQ-MlanKczmonJ6FFk/view?usp=sharing>



Committee on Earth Observation Satellites

# VC and WG Discussion Time

CEOS SIT Technical Workshop 2020

Session and Agenda Item # 3.2

Virtual Meeting

11 September 2020



# Discussion Topics

The logo for the Committee on Earth Observing Satellites (CEOS). It features the letters 'CEOS' in a bold, green, sans-serif font. The letter 'O' is replaced by a small, realistic image of the Earth from space, showing blue oceans and white clouds. The entire logo is set against a white circular background with a green border.

- **WG and VC Discussion Topics TBA**
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