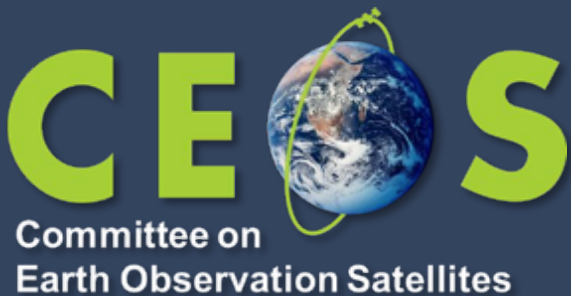


SIT Technical Workshop 2024

*Ocean Colour Radiometry
Virtual Constellation (OCR-VC)
(For Information)*



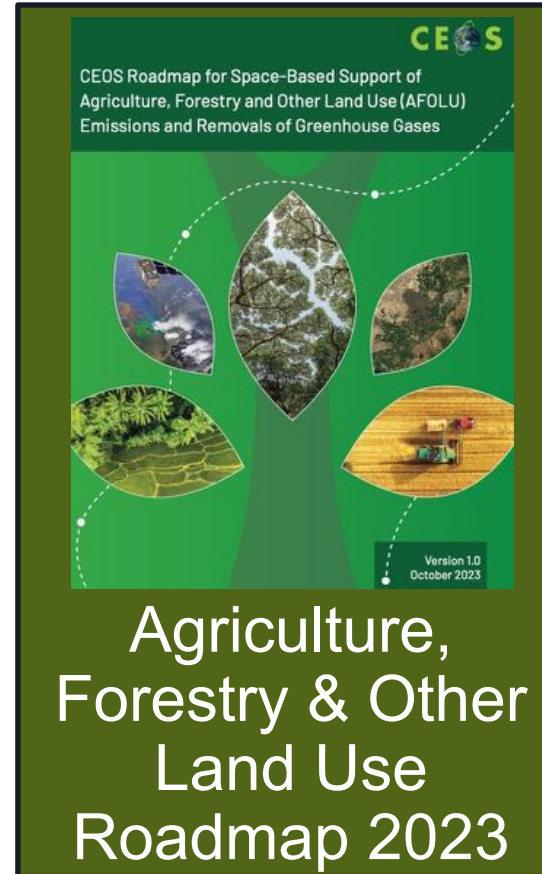
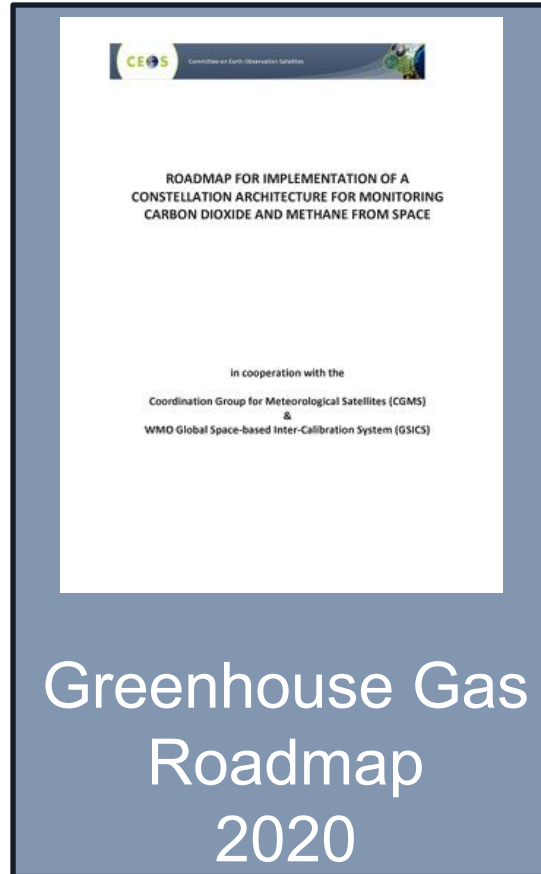
**Ewa Kwiatkowska
EUMETSAT
Agenda Item 5.4
SIT Technical Workshop 2024
Sydney, Australia
18th - 19th September 2024**

- ❖ CEOS Aquatic Carbon Roadmap progress
- ❖ Aquatic Reflectance ARD Product Family Specification
- ❖ Ocean Colour System Vicarious Calibration white paper

Towards the Aquatic Carbon Roadmap



CEOS Global Stocktake strategy paper
□ to demonstrate the value of Earth Observation satellite datasets to support the Global Stocktake process





2023-2025

CEOS Deliverable Tracking Tool 2.0

Home Dashboard Help Login

Deliverables

Status: open | Creation year: 2023 | Category: Virtual Constellations (VC) | Number contains: | Title contains: carbon

Description contains: **Apply Filter**

Number	Title	Status	Creation year	Completion date	Description
<input type="checkbox"/> VC-23-01	Aquatic Carbon roadmap	open	2023	2025 Q4	Aquatic contribution to the CEOS Carbon Roadmap
<input type="checkbox"/> VC-23-02	Blue Carbon Workshop	open	2023	2024 Q2	Workshop on Blue Carbon from space

Aquatic Carbon Roadmap Objectives

Deliverable VC-23-01



- ❑ To provide a **framework** and serve as a **guiding vision** for **long term (~ 15+ years) coordination of CEOS agency observing programmes** in support of the science and policy needs for Aquatic Carbon related information in the context of the CEOS carbon strategy.
- ❑ To contribute to support the needs and ambition cycle of the Global Stocktake of the Paris Climate Agreement, by
 - **driving the inclusion of inorganic and organic Aquatic Carbon within global and regional carbon assessments constraining the global carbon budget;**
 - **supporting countries reporting on their NDC** by improving the estimation and monitoring the changes in CO₂ fluxes from/to the inland and coastal waters at country level (within each country's exclusive economic zone (EEZ));
 - **improving the monitoring of major Blue Carbon coastal ecosystems' extent and carbon stock around the world.**
- ❑ To characterize the **needs, gaps and challenges**, regarding the **required data and products** to support science, services and applications and the **observing systems** that can support their developments, including the needs to plan for ground and space segments. This includes addressing basic observation continuity and the necessary agency coordination to achieve it.
- ❑ To clarify the importance and **elevate the profile** of remote sensing and satellite Earth Observation that are already routinely used within carbon assessments, highlighting how Earth Observation has much more to offer beyond its current use and serve as **an effective means for communicating** our intentions to society, UNFCCC, national inventory community.

Toward an Aquatic Carbon Roadmap – Status



Coordinators

Marie-Helene Rio (ESA)
Laura Lorenzoni (NASA)
Hiroshi Murakami (JAXA)

Scientific leaders

Jamie Shutler (University of Exeter)
Bob Brewin (University of Exeter)
Cecile Rousseaux (GSFC-NASA)
Kelsey Bisson (NASA)

And many contributors from the CEOS OCR-VC / IOCCG space agencies and the scientific community

- Roadmap Outline drafted
- Book Captains by chapters assigned
- Contacting contributors on-going
- Monthly progress meetings scheduled until Roadmap completion, last meeting on September 12th, next one on October 18th



Outline has been shared with the AFOLU and GHG roadmap teams in the frame of the Carbon Roadmap Coordination activities – awaiting feedback



 **Blue Carbon from Space Forum** 

14-17 May 2014 | ESA, Bonn, Germany

ESA Forums are informal and free debates among up to 25 high-level participants on open questions of scientific nature or science policy matters.



Blue Carbon from Space Forum objective

Deliverable VC-23-02



Bring together **Coastal Blue Carbon experts** from different fields (remote sensing, in-situ, modelling), **relevant stakeholders** and **international initiatives** to discuss **the state of the art, challenges and opportunities** regarding the use of satellite observation to advance **Blue Carbon key priority areas** including:

- ❑ **Observing systems** – discussing the capabilities of Earth Observation to map blue carbon ecosystem extent/ carbon stock/ change and answer user and policy needs
- ❑ **User and Policy Needs** – with a specific focus on the ambition cycle of the Global Stocktake of the Paris Climate Agreement
- ❑ **Economic Value** - covering current carbon crediting methodologies and how remote sensing can support
- ❑ **External threats impact and recovery** - how Earth Observation can support the monitoring/prediction of how external drivers affect blue carbon ecosystems and their carbon stocks/sequestration potentials
- ❑ **Climate Change Mitigation and Adaptation** - impact of ecosystem conservation, restoration, and creation on mitigation capabilities and how Earth Observation can contribute to quantifying the added value of those strategies



Aquatic Carbon
key priority areas

Participants

Forum co-conveners: Marie-Helene Rio (ESA), Laura Lorenzoni (NASA), Benjamin Poulter (NASA), Stephen Plummer (ESA), Clement Mathieu Jacques Albergel (ESA), Sophie Hebden (ESA), Sarah Connors (ESA), Alina Blume (ESA)



Organized jointly by **ESA** and **NASA** with the support of the **International Space Science Institute (ISSI)**, it gathered 24 participants from 14 different countries across six continents (North America, Central America, Africa, Australia, Europe, Asia), with diverse and complementary expertise in the realm of blue carbon including remote sensing and in-situ observations experts, blue carbon ecosystems and climate change ecologists, marine biologists, and representatives of international organizations and NGOs (IPCC, UNESCO, Wetland International, Conservation International, the Nature Conservancy, GRID-ARENDALE). Participants also included the partners of the **newly launched ESA Application project on Coastal Blue Carbon** (consortium led by I-Sea, France).

Blue Carbon from Space Forum program



Time	Tuesday 18.09 Setting the Tone	Time	Wednesday 19.09 Needs to Science	Time	Thursday 20.09 Science to Action	Time	Friday 21.09 Action
		09:00	Scene Setting By Forum Conveners	09:00	Impacts of External Threats & Recovery - • Session Introduction by Chairs (5') 12:15 • Introduction of each ecosystem (3*10') • Breakout Sessions by Ecosystem • Discussion (45') • Wrap up (15') • Plenary • Presentation of Wrap-ups (15') • Discussion (45') • Wrap up (10')	09:00	Closing Plenary - • Session Introduction (5') 12:30 • For each session: Session outcome presentation (10') and questions (5') • Drafting (Session chairs as book captains) (1.5hrs) • Session 1-2: Same room • Session 3-5: Split by ecosystems • Closing Speech (10')
		09:15	User/Policy Needs - • Session Introduction by Chairs (5') 11:00 • Keynote (30') • Plenary Discussion (1hr) • Wrap up (30')				
		11:00		11:00			
		11:00 - 11:30	BREAK	11:00 - 11:30	break		
		11:30	Economic Value - • Session Introduction by Chairs (5') 13:15 • Keynote (30') • Plenary Discussion (1hr) • Wrap up (30')	11:30			
		13:15		13:15 - 14:45	LUNCH		
13:30 - 14:00	REGISTRATION	13:25 - 14:45	LUNCH	13:25 - 14:45			
14:00 - 18:30	Opening Plenary • ISSI Welcome (15') • Opening Speech: ESA and NASA (1.15hrs) • Agenda and Seed Question Introduction (15') • Forum Logistics (15') • Break • Lightening talks of all participants (5' per person)	14:45	Observing Systems - • Session Introduction by Chairs (5') 18:00 • Introduction of each ecosystem (3*10') • Breakout Sessions by Ecosystem • Discussion (45') • Wrap up (15') • Plenary • Presentation of Wrap-ups (15') • Discussion (45') • Wrap up (10')	14:45			
incl. 30' break		18:00		18:00			
Start 19:00	Ice Breaker	incl. 30' break		incl. 30' break			
		Start 19:00	Included Dinner at DIGITALANT DUTENHAGEN				
				17:00 - 17:15	BREAK		
				17:15	Closing Plenary Preparation - • Forum White Paper Discussion 18:00 • Session Wrap-up Finalisation		



Workshop Summary – Drafted, under review by session chairs



Perspective Paper – In preparation – To be submitted to Nature Communications collection on Coastal Blue Carbon (deadline for submission: October 11th, 2024)

- Identifying the main **gaps, challenges** and **opportunities** related to the use of space-borne data to support Coastal Blue Carbon science and policy needs.
- Including a **roadmap** towards filling the identified research gaps.



Policy Brief – To be developed from the Workshop Policy Needs summary chapter and submitted before end of 2025

Workshop Summary and Papers will directly contribute to the CEOS Aquatic Carbon Roadmap

Aquatic Reflectance CEOS-ARD Product Family Specification



CEOS Deliverable Tracking Tool 2.0

Deliverables

Status: open | Creation year: | Category: Virtual Constellations (VC) | Number contains: 10 | Title contains: ARD

Description contains:

Number	Title	Status	Creation year	Completion date	Description
VC-23-10	Expansion of the Aquatic Reflectance CEOS-ARD PFS to Cover Oceans	open	2023	2023 Q4	The CEOS Land Surface Imaging Virtual Constellation (LSI)

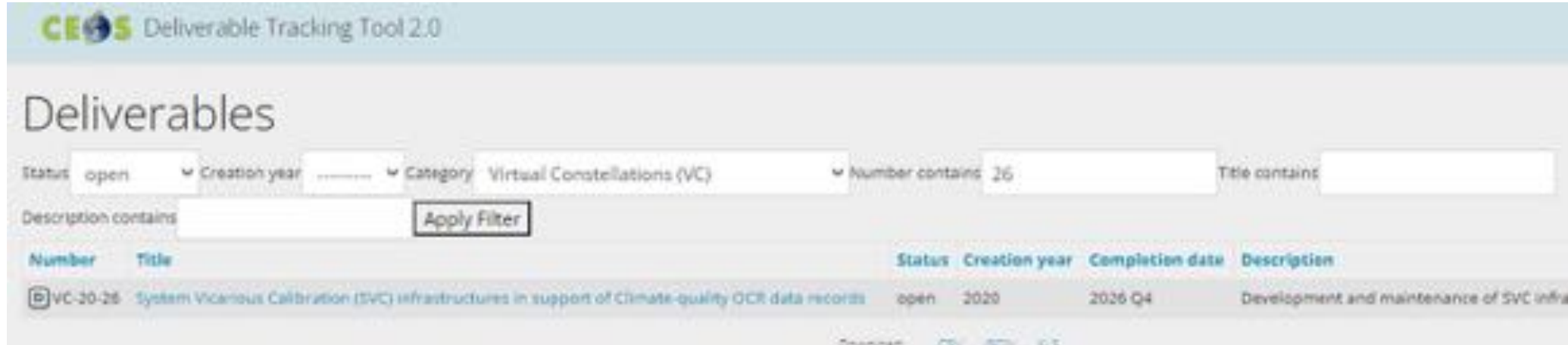
- ❖ Aquatic Reflectance CEOS-ARD PFS delivered, focused on inland water bodies and nearshore coastal regions, including optically shallow water
- ❖ Extended approach in development, to define a single consolidated Aquatic-Ocean Reflectance ARD PFS covering inland, coastal, **sea and oceanic waters**

- ❖ PFS originally written with an emphasis towards higher resolution inland and coastal water products
- ❖ Now in review to expand applicability to ensure coverage of all aquatic domain
- ❖ Group is currently meeting every two weeks and includes representatives from CEOS agencies (ESA, EUMETSAT, EC, DLR, CSIRO (lead), GA, USGS,), IOCCG, service providers, research and commercial spheres
- ❖ Careful consideration of specification thresholds and goals
- ❖ Feedback that will be crucial in optical PFS consolidation

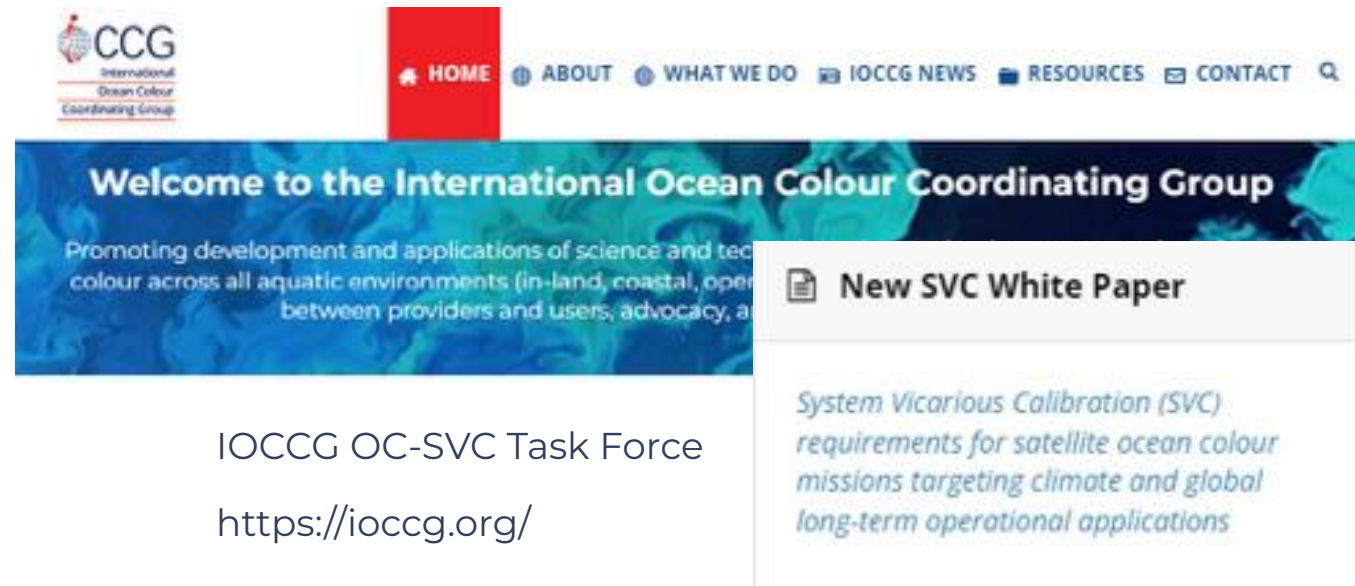
- ❖ Metadata on processing, DOIs
 - Single landing pages to trace data provenance, processor changes
 - Product Guides vs ATBDs vs peer reviewed papers (latter two less frequently updated/updatable)
- ❖ Flags
 - Optically shallow water. Can this be readily defined? Threshold = information on assumptions made in processing, Goal = flag with a defined method (currently many)
 - Turbid water – common definition? Some significant differences across missions.
 - Floating vegetation/scum
 - Ice cover, including snow cover
- ❖ Corrections
 - BRDF – as goal
 - Adjacency effect – sub-group discussions ongoing
 - Separation of atmospheric correction components

- ❖ Uncertainty – using Guide to the expression of Uncertainty in Measurement
- ❖ Terminology updates
 - e.g. replacing all mentions of accuracy with uncertainty
- ❖ Geolocation over large water bodies vs. terrestrial geolocation methods
 - Gridding and sampling frames (impacts several parts of the specification)
- ❖ General metadata fields may no longer be consistent with the other ARD PFS definitions □ potential impact and coordination with the other PFSs
- ❖ Aiming for **December 2024** to complete the draft specification

Ocean Colour System Vicarious Calibration (OC-SVC) white paper



- ❖ CEOS action for a White Paper on requirements for global OC-SVC infrastructures ✓
- ❖ Publication submitted to the Bulletin of the American Meteorological Society



- ❖ CEOS Aquatic Carbon Roadmap
 - Several activities ongoing, Blue Carbon workshop delivered
- ❖ Aquatic Reflectance ARD Product Family Specification
 - Activities ongoing, planning for delivery December 2024
- ❖ Ocean Colour System Vicarious Calibration white paper
 - White Paper action completed