

A composite image showing a satellite with solar panels and a reentry vehicle against a background of plasma flow streamlines. The satellite is at the top left, and the reentry vehicle is below it. The background features blue and green streamlines representing aerodynamic flow.

WOC User Consultation meeting 2022

10–12 October | ESA–ESRIN
Frascati (Rome), Italy

#ESAWOC2022



INTRODUCTION

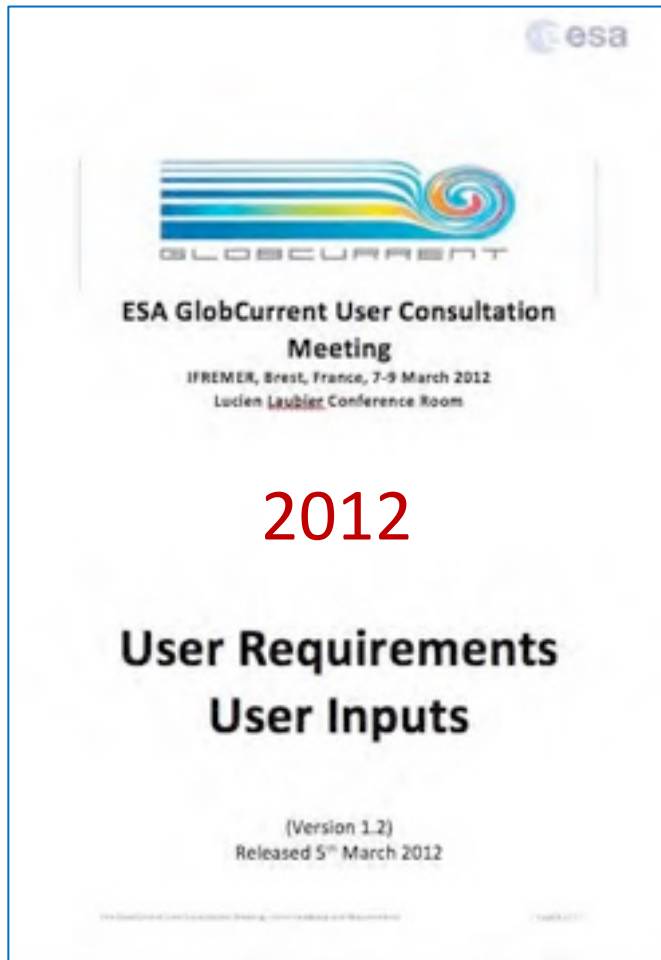
Marie-Helene RIO, ESRIN-ESA

- Context and Objectives
- Meeting organisation

10 years of Ocean Currents User Consultation...



2012



2014



2017

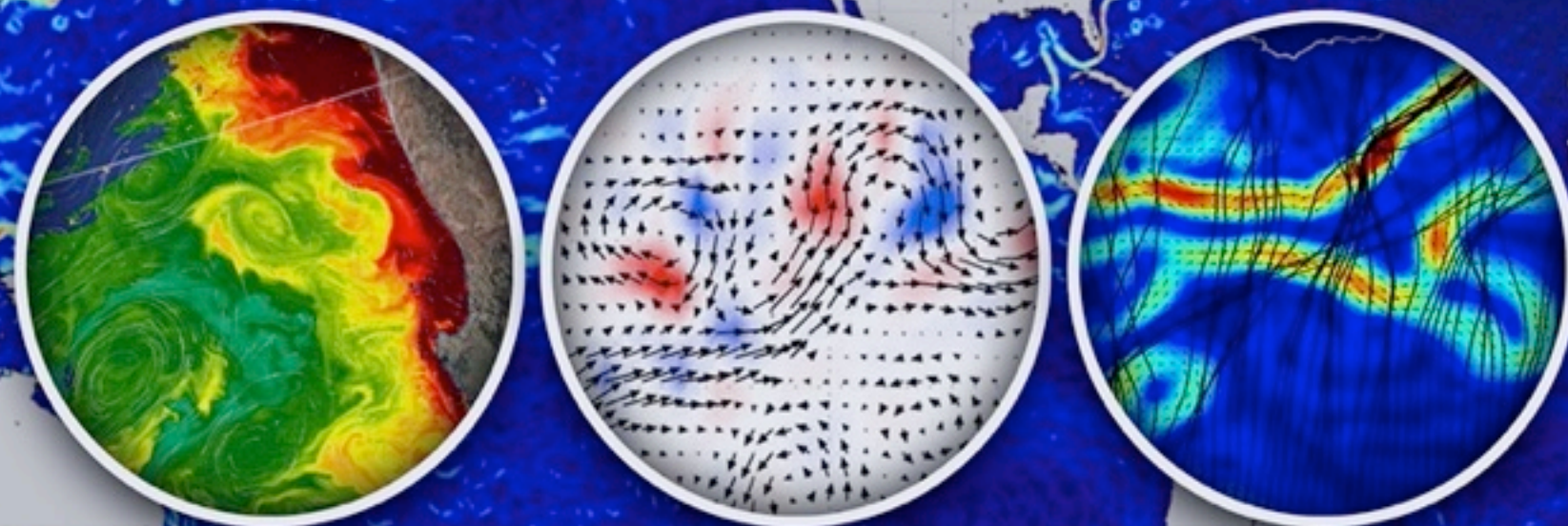


2019



2022



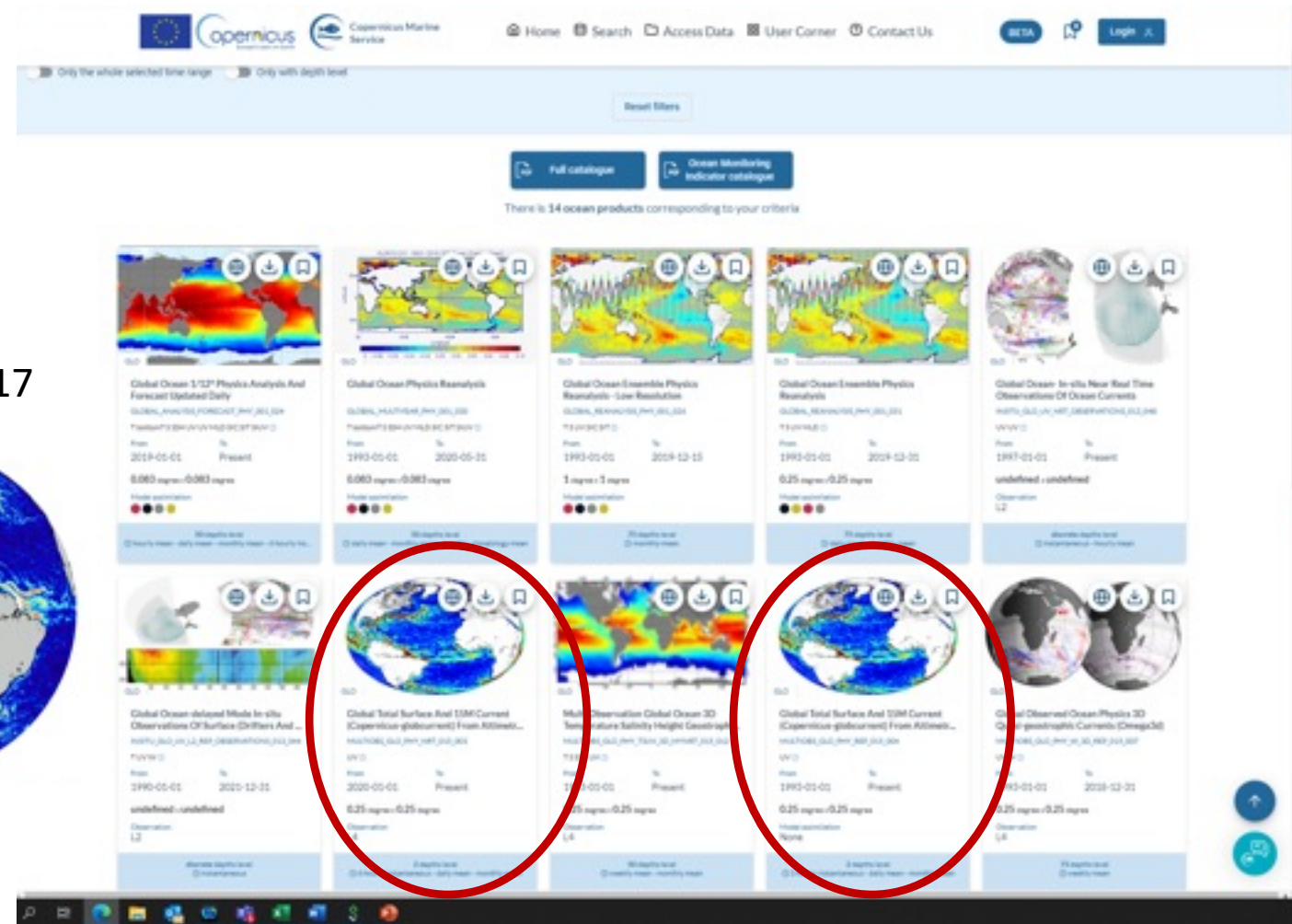


→ WORLD OCEAN CIRCULATION USER CONSULTATION MEETING

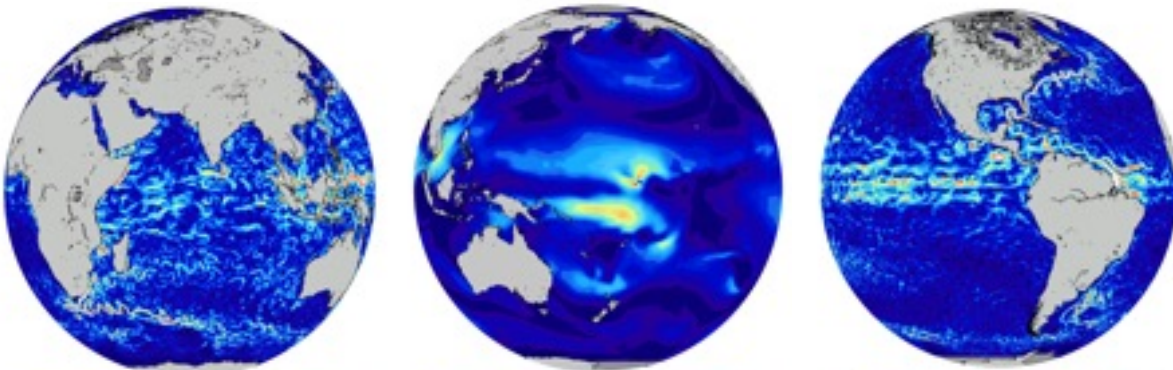
21–22 February 2019 | ESA–ESRIN | Frascati (Rome), Italy

ESA UNCLASSIFIED - For Official Use

From Globcurrent ... to Copernicus Marine Service



Global datasets of daily, $\frac{1}{4}$ Geostrophic, Ekman, and total currents at 0m and 15m over the period 1993-2017



Rio et al, GRL, 2014

ESA UNCLASSIFIED - For ESA Official Use Only



THE EUROPEAN SPACE AGENCY

The WOC UCM 2019 – Recommendations



https://woc2019.esa.int/files/WOC2019_summary.pdf

- The **limits** of the current approximations used for global ocean currents products **need to be better assessed**.
- Progress toward **higher spatio-temporal resolution upper-layer ocean circulation products**. Results from the WOC2019 online survey suggest that most users require **better than 10 km/daily effective spatio-temporal resolution** ocean circulation products. Also most users require **subsurface information**, among which a majority in the **upper-layer**.
- This requires the development of **new retrieval methods**. To help fill spatio-temporal gaps in mesoscale to submesoscale dynamics
- Develop both grids of **current vectors** and **new added-value circulation products** targeted to the specific user needs as surface current gradients (divergent and rotational component), frontal boundaries, water mass pathways, upwelling and convection indexes, lagrangian coherent structures, crossing sea index, internal wave crest feature...
- Define **new validation methods** and **assessment approaches**.
- Include the end-users at very early stage in any project as **user requirements strongly depend both on the user application and on the dominant oceanographic processes** of the area of interest.
- Use **specific high-interest locations** as testbeds to test new algorithms and compare different approaches. Specific regions of interest include the **equatorial band, the western boundary currents, coastal zones, upwelling areas, the polar Seas...**
- Further develop **visualization tools** to strengthen the exploration of the products, notably the spatial and temporal evolution of surface expressions associated with upper-layer ocean dynamics and interactive processes.
- Develop a **common delivery portal of Ocean Circulation products** in order to increase the involvement of users, and attract new users. Access to the **different current components** (geostrophic, ekman, tidal, stokes...) of the currents should be provided. The portal should also allow access to a **Use Case library** and to **Industry Best Practices**.

The United Nations Decade of Ocean Science for Sustainable Development



The Science We Need for the Ocean We Want



ESA UN

DECADE OUTCOMES

"THE OCEAN WE WANT"



A clean ocean



A healthy & resilient ocean



A productive ocean



A predicted ocean



A safe ocean



An accessible ocean



An inspiring & engaging ocean



© THE EUROPEAN SPACE AGENCY

The WOC project



*The **overarching objective** of the World Ocean Circulation project was to:*

develop and validate innovative methods allowing to optimize the synergetic capacity offered by satellite data, in situ measurements and numerical models for retrieving improved REGIONAL upper-layer ocean circulation products responding to the specific needs of different key players engaged in the transition toward a clean, safe, sustainable and productive ocean

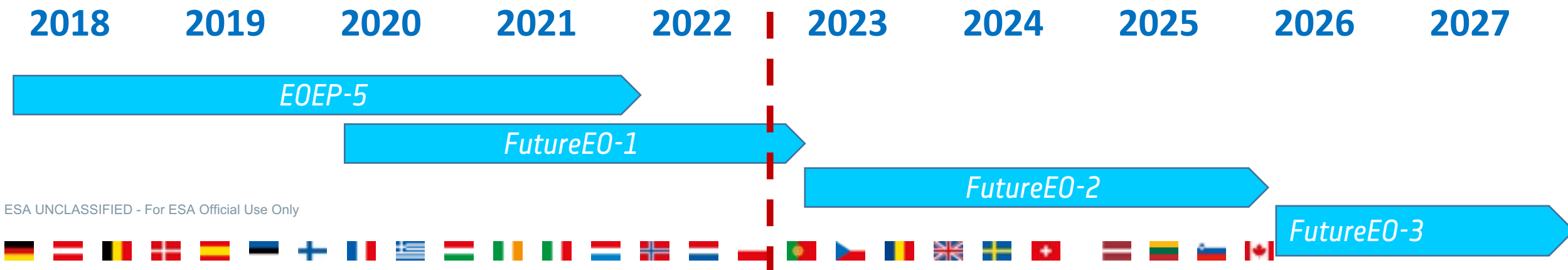


Project kicked-off in June 2020

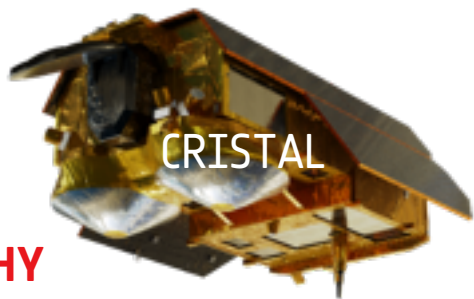
The WOC UCM 2022 - Objectives



- Bring together expert scientists, service providers and direct users of Ocean Currents products
- Present the main outcomes of the ESA World Ocean Circulation (WOC) project <https://www.worldoceancirculation.org/>
- Review the state-of-the-art in ocean circulation products and applications.
- **Discuss key requirements for research and development activities that will address the needs of a wide range of users, define priorities and issue recommendations for shaping new ESA science and applications projects to be implemented in the ESA FutureEO-2 Science for society programme element with an emphasis on evaluating where Earth Observations (EO) may contribute.**

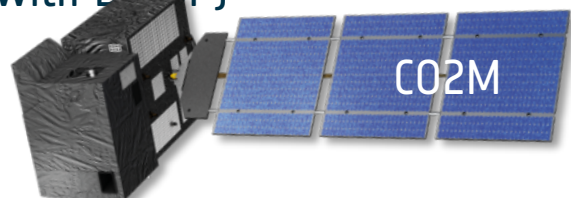


Will be proposed at upcoming ESA Council Meeting at Ministerial Level CM22, as part of the FutureEO-1 Segment-2 [2023-2025]. **WHAT**



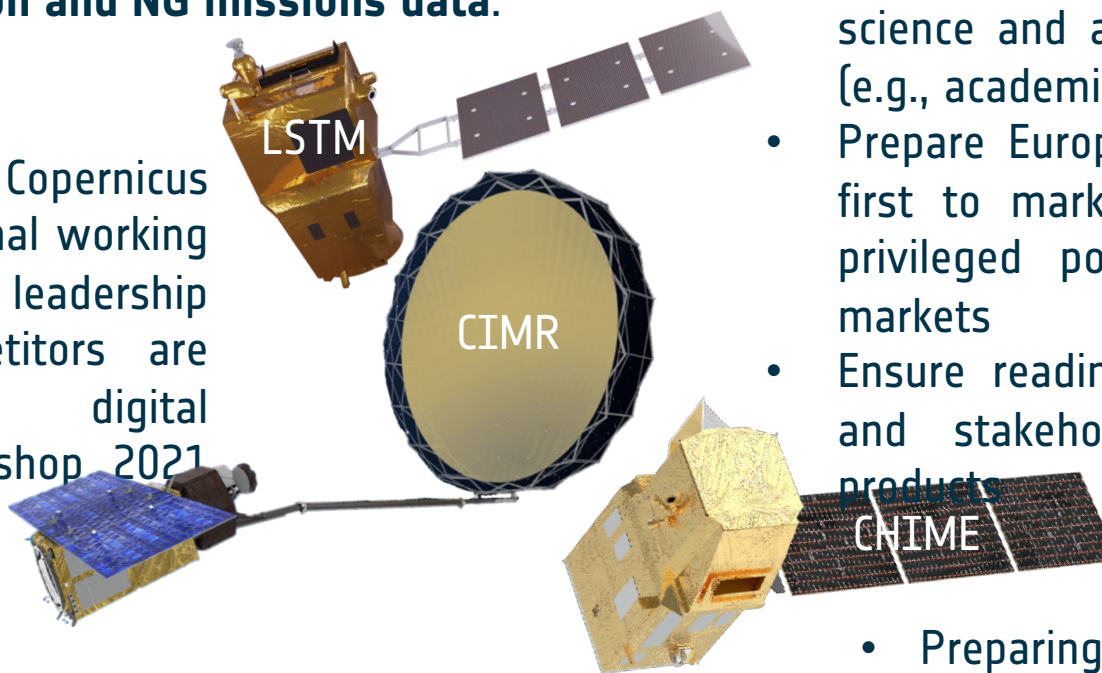
WHY

Supporting the integration of new Copernicus Expansion/NG datasets into operational working practices and so promote European leadership for space systems where competitors are already active and boost digital commercialisation (ref. EARSC workshop 2021 with D-FOP)



WHAT

SUP is an activity focusing on **preparing the use of Copernicus Expansion and NG missions data.**



HOW

- Build the necessary expertise in the various science and application domains and sectors (e.g., academia and Value adding companies).
- Prepare European industry readiness and be first to market by putting companies in a privileged position to exploit new export markets
- Ensure readiness for rapid uptake by users and stakeholders of derived information products

KEY OPPORTUNITY

- Prepare new science and downstream analytics to address environmental challenges
- Preparing the Future Downstream Services

Use Only

- Act as a 'de-risking' factor and as an incentive for growth to maximise the rapid and effective return-on-investment

- Have we made progress since the last UCM in 2019?
(Where do we stand versus UCM 2019 recommendations?)
- What are the remaining gaps?
- Have new user requirements emerged? How to best address them?
- What are the next priorities, also in the context of upcoming new missions?

woc Programme at a glance

Time	10 October 2022	Time	11 October 2022	Time	12 October 2022
0830	Registration		Downstream applications		Perspectives and Outlook
09:00-10:45	Introductory session	08:30-10h00	Safe Navigation	08:30-09:00	DAY1 and DAY2 Discussion summary by discussion chairs
10:45-11:15	Coffee Break	10:00-10h30	Discussion 1	09:00-10h10	Perspectives keynotes I
11:15-12:45	Key WOC achievements I	10:30-11:00	Coffee Break	10:10-10:30	Coffee Break
12:45-14:00	Lunch	11:00-11:50	Sustainable Fisheries	10:30-11:50	Perspectives keynotes II
14:00-14:30	Key WOC achievements II	11:50-12:15	Discussion 2	11:50-12:50	Discussion
1430-1530	Poster Pitch session	12:15-13:15	Lunch	12:50-13:00	Wrap-up and final remarks
15:30-16:00	Coffee Break	13:15-14:15	Clean Ocean	13:00-14:00	Lunch
16:00-17:00	Discussion	14:15-14:45	Discussion 3		
17:00-19:00	Poster session 1 and Icebreaker	14:45-15:00	Coffee Break		
1900	Adjourn	15:00-16:15	Renewable Energy		
		16:15-16:45	Discussion 4		
		16:45-17:00	Syntool presentation		
		17:00-19:00	Poster session 2 + Demo+ Cocktail Dinner		

Remote connection



Webex link from 10-12 October:

<https://jbgproductionsdijacopobasilegiannini.my.webex.com/meet/jbgproductions83>

**Webex meeting number:
2743 963 5838**

**Access via mobile
+1-650-479-3208 United States Toll
Access Code: 27439635838**

Participants in the room are also welcome to connect to participate to the chat discussions!


Instructions for a smooth meeting

Each session is made of:

- ☐  A set of project presentations

Speaker's instructions: Please stick to your allocated 15 minutes slot!

Try to give you talk in max 12 minutes so we have time for questions.

Virtual Audience: please write your questions in the chat as needed.  We will address them during the after the talks or during the discussion session.

Chairs: please try to keep a tight schedule!

- ☐  A discussion slot

All: Time for **Q/A** to the different speakers (in the chat for the virtual audience!)

All: Time for discussing **Gaps and challenges** and identify **Opportunities to improve the state-of the art in ocean currents retrieval and uptake**, provide recommendations for **shaping future projects**.

Chairs: After the session, please prepare a **5' synthesis of the discussions** for the last day's Summary and Recommendations session

Instructions for a smooth meeting

The Poster Pitch session

Today from 2:30pm to 3:30pm

Opportunity to orally present a 2' synthesis of your work to the audience

An unique ppt presentation has been prepared merging your inputs.

On each slide you will see the name of the following two speakers...when you see your name, be ready to go next!

Presentation order follows the poster's numbering (see poster list on the dedicated board behind you)

Posters will then be displayed during the whole duration of the meeting, and two dedicated poster sessions will take place, Monday 5pm-7pm and Tuesday 5pm-6pm



Instructions for a smooth meeting

We plan to upload all the presentations and posters on the meeting website after the Workshop. For oral presenters, if you wish to remove some content before publication, please let us know.



quality of
ts

Synergy with in-situ observations
to investigate 3-dimensional
dynamics

Characterize the connection between the surface motion and the vertical velocities

Provide information on the effective resolution of the products

My recommendation

*Provide systematic maps
of frontal boundaries*

combine multi-sensor
remote sensing to retrieve
internal wave currents

Investigate the ocean circulation shift in a changing climate and impact on ocean productivity and ocean ecosystems

The background of the slide features a deep blue space scene with a satellite in the upper left and a probe in the lower left. Both are set against a backdrop of colorful, swirling patterns in shades of blue, green, and yellow, resembling plasma or magnetic field lines. A horizontal cyan band runs across the middle of the image.

WOC User Consultation meeting 2022

10–12 October | ESA–ESRIN
Frascati (Rome), Italy

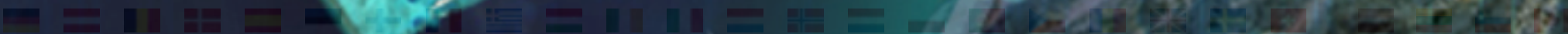
I wish you a very fruitful workshop!

Ocean Science Cluster Projects (>35 on-going)

<https://eo4society.esa.int/communities/scientists/esa-ocean-science-cluster/>



ESA UNCLASSIFIED - For ESA Official Use Only



Ocean Science Cluster Projects (>35 on-going)

Ocean Health



Coastal Ocean incl.
Land-Sea interactions



Upper-ocean
dynamics
including air-sea
interactions



World Ocean Circulation

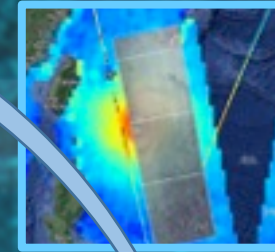
Space4SafeSea

S-6 JTEX

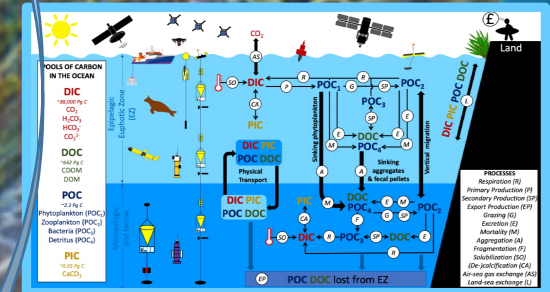
S-1 Doppler

CIRCOL

Ocean Extremes



Ocean Carbon



Ocean's role in
Earth and
Climate System

