Altimetry training resources available under EUMETSAT Copernicus Marine Training Service

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OSTST, Venice, 2022

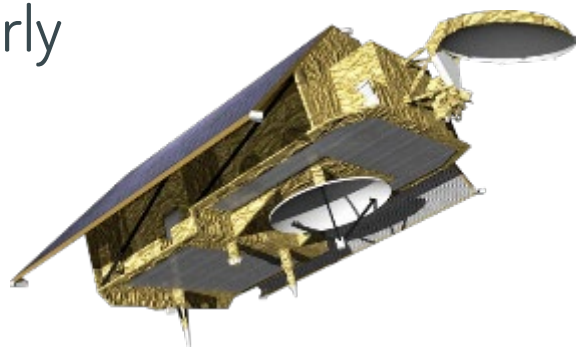
EUMETSAT, Copernicus and marine Earth Observation

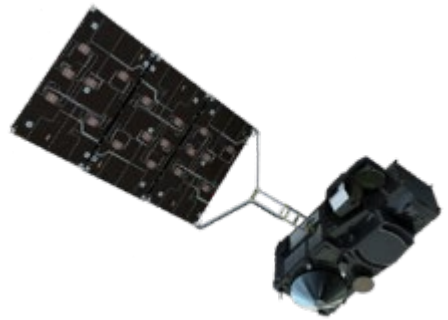
copernicus.eumetsat.int

- In Copernicus frame, operates Sentinel-3A&B, and Sentinel-6 Michael Freilich, and provide their data streams (marine for S3):
  - Ocean Colour, SST/ISST and altimetry products.
  - NRT, STC, NTC operational and reprocessed data, levels 1 and 2 (2P and 3).
- Plus data stream from Copernicus contributing missions & EUMETSAT mandatory missions : Jason-2, -3... (altimetry)

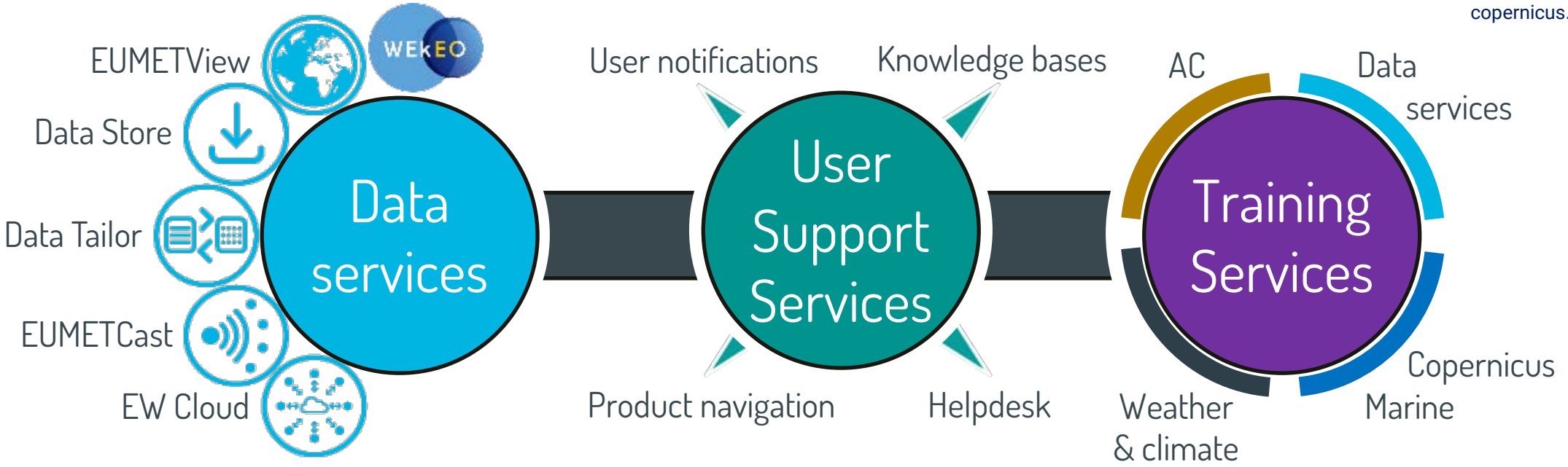
- Working collaboratively with EUMETSAT mandatory missions and services (OSI-SAF).

- Working with the different Copernicus services (particularly Copernicus Marine Service).
- Working with GMES&Africa Marine consortia.
- One of the 4 organisations behind the WEkEO DIAS.



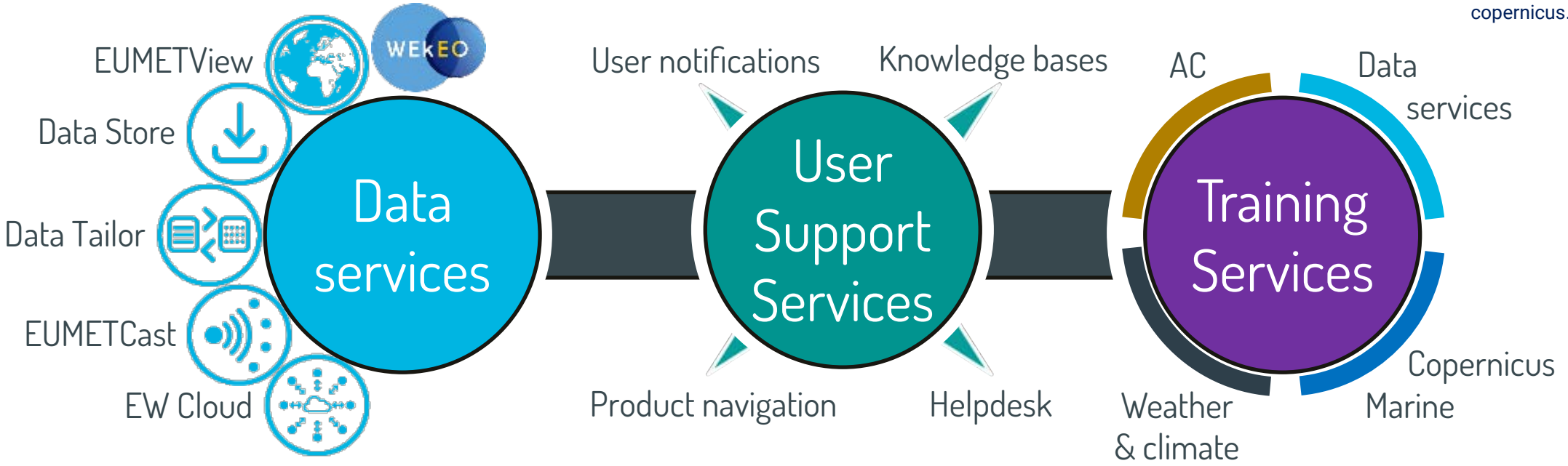


EUMETSAT user support and training services overview



- Offer user support and training through multiple mechanisms
  - Regular notifications of new/product updates, and services (UNS, product notices)
  - Online technical information (knowledge bases, PN), and bespoke query support (helpdesk)
  - Extensive training portfolio

EUMETSAT user support and training services overview



- For Copernicus marine data, focus is on the user community, and those working with Level-1 and 2 data:
  - Agencies providing downstream products within the Copernicus ecosystem and beyond, including operational agencies which will use the NRT / STC data
  - Commercial entities building products and services
  - Academic users in research and educational contexts

Aside: Altimetry products available through the Data Store

Collection	Description	Date start	Date end
EO:EUM:DAT:0413	SRAL Level 1A Unpacked L0 Complex echoes - Sentinel-3	2021-01-08	Operational
EO:EUM:DAT:0406	SRAL Level 1B - Sentinel-3	2021-01-08	Operational
EO:EUM:DAT:0414	SRAL Level 1B stack echoes - Sentinel-3	2021-01-08	Operational
EO:EUM:DAT:0415	SRAL Level 2 Altimetry Global - Sentinel-3	2021-01-08	Operational
EO:EUM:DAT:0236	Poseidon-4 Level 1A High Resolution (baseline version F06) – Sentinel-6 Reprocessed	17/12/2020	28/04/2022
EO:EUM:DAT:0237	Poseidon-4 Level 1B Low Resolution (baseline version F06) – Sentinel-6 Reprocessed	17/12/2020	28/04/2022
EO:EUM:DAT:0238	Poseidon-4 Level 1B High Resolution (baseline version F06) – Sentinel-6 Reprocessed	17/12/2020	28/04/2022
EO:EUM:DAT:0239	Poseidon-4 Level 2 Low Resolution (baseline version F06) – Sentinel-6 Reprocessed	17/12/2020	28/04/2022
EO:EUM:DAT:0240	Poseidon-4 Level 2 High Resolution (baseline version F06) – Sentinel-6 Reprocessed	17/12/2020	28/04/2022
EO:EUM:DAT:0241	Climate-quality Advanced Microwave Radiometer Level-2 Products (baseline version F06) – Sentinel-6 Reprocessed	28/11/2020	28/04/2022

- Sentinel-6 operational products currently available via SFTP rolling archive and/or Data Centre.
- Sentinel-6 operational products available through the Data Store planned for Q1 2023

See Ben at poster/demos ODS2022_002, 14:00 – 15:45 Thursday 03.11

Copernicus marine training at EUMETSAT: history and reach

- Started in 2017 with beginning of operational data streams from Sentinel-3. Involves several EUMETSAT staff and a training service contract.
- Thus far; trained 1000+ participants across 40+ events, plus hundreds more in collaborative short courses.

Copernicus marine training at EUMETSAT; history and reach

Training feedback

The level of participants' satisfaction is monitored constantly to gather suggestions and feedback on how to improve training and data uptake. The level of appreciation is very high, with 95% recommending or highly recommending attendance of training events.

"I discovered new commands and the environment of Jupyter that will absolutely enhance my capabilities for data processing. Amazing work!"

"It was great to be given 'recipes' for dealing with the various datasets. This was my expectation of the course and it was met."

"This course has been great, also because it has shown the possibility to have lectures, practical sessions and interactions online, something that was hard to believe just a few months ago!"

Copernicus marine training at EUMETSAT; history and reach

Training participants have reported making the following achievements after their courses:

- Writing a master's thesis using Sentinel-3 data for coastal water quality in the Baltic Sea.
- Integrating Sentinel-3 data into cruise support for regular monitoring at a European hydrographic institute.
- Contributing to assessment of Ocean and Land Colour Instrument (OLCI) reprocessing.
- Integrating data into routine model validation for safety at sea advisories.
- Setting up routine data access to integrate Sentinel-3 into products for aquaculture operations.
- Producing a publication on routine validation of OLCI in complex waters.
- Holding presentations of validation activities at Sentinel-3 Validation Team and Group for High Resolution Sea Surface Temperature meetings.
- Running two independent courses, training about 100 new users in North Africa.
- Writing a master's thesis on detection of island wakes with Sentinel-3.
- Delivering independent training courses for the Global Monitoring for Environment and Security and Africa programme.

Copernicus marine training at EUMETSAT; phase 2 team

Phase 2 began in 2022:

- Scientific experts in ocean colour, SST and altimetry
- Support IOCCG, GHRSST, OSTST communities
  - Collaborating with partners in the community through various projects (H2020, Horizon Europe, COST actions, UN Ocean Decade etc.)
- All "regular" trainings fully online
- Phase 2 includes expanded goals to include:
  - More specialist training on:
    - Different instrument streams (ocean colour, altimetry, SST).
    - Operational oceanography skills
    - Addition of Sentinel-6
    - Integration with cloud computing
  - Broader collaboration in thematic areas (policy, maritime operations etc).

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Dr Hayley Evers-King

EUMETSAT

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Dr Aida Alvera-Azcárate
LIÈGE université GHER

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Consiglio Nazionale delle Ricerche

Dr Ana Ruescas
Brockmann Consult

Vinca Rosmorduc
CLS Collecte Localisation Satellites

Ocean colour support
Sea surface temperature support
Altimetry support

*also phase 1

Copernicus Marine Training at EUMETSAT; pedagogical approach

User engagement main aim:

Support a diverse range of users (global, sectoral) to access Copernicus marine data and apply it to the challenges and opportunities of their work, as they define them.

Training approaches should...	In practice this looks like...
...be participant led.	...courses with mini-projects/artefacts defined by, and developed with, participants.
...facilitate long-term data use after the event(s)	...centering data access in our activities.
...be end user application and situation focussed	...offering flexible options for getting and working with data in different environments (technical, low bandwith), structural (funding, existing facilities etc).
...support selecting the right data for the right task.	...sharing examples of data in use. ...courses at different levels, allowing users to build knowledge over time.
...be based on skills needed in the modern EO sector	...designing tutorials around common workflows ...teaching aspects of programming to support EO data workflows.
...integrate training and networking opportunities	...expert exchanges to bring communities together
...align with open science principles	...use and creation of open source data and tools.

Training resources: overview

Knowledge Bases

Sentinel-3
Sentinel-6
Data access

Courses

moodle

Code distribution

CONDA

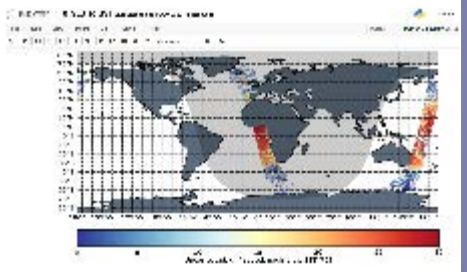
GitLab

Video tutorials

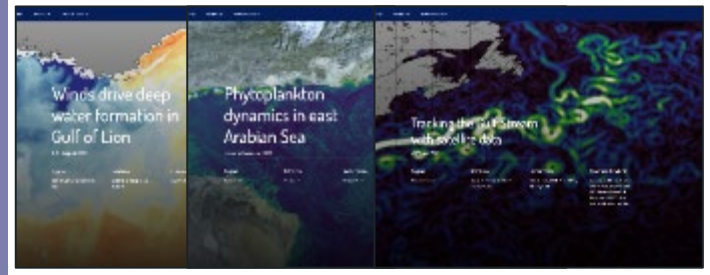
YouTube

Jupyter Notebooks

jupyter



Case studies



Training resources

User focussed approach

- Help navigate data access, data selection, and computing options to design their workflows.
- Reusable resources
- Deployable in self-paced, asynchronous and synchronous learning modes

EUMETSAT user support and training services overview

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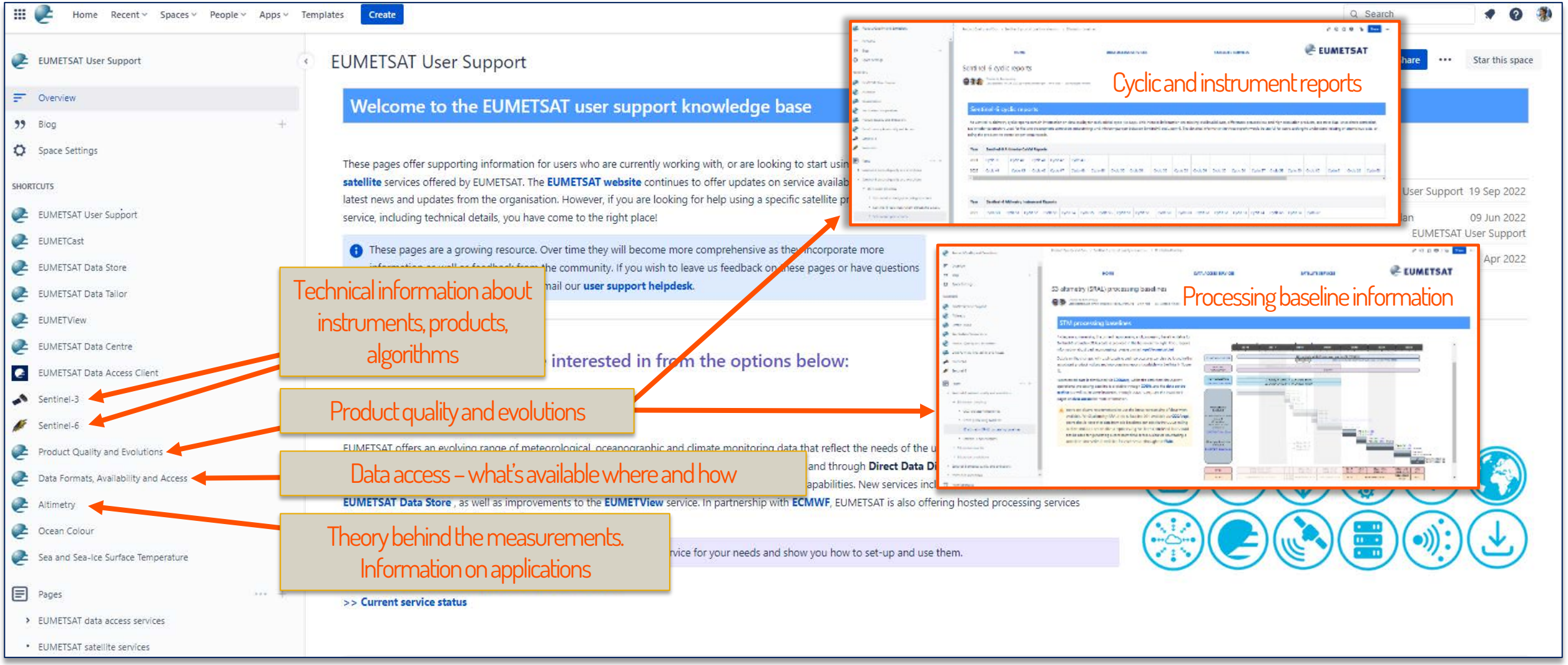
- Collection of confluence spaces providing technical information about EUMETSAT products and services: https://bit.ly/EUM_KB



Training resources: Jupyter Notebooks

EUMETLAB

https://gitlab.eumetsat.int/eumetlab

Oceans

Ocean Training

Sensors

Tools

Applications

GitLab

LEARN SLSTR Marine Training Service

LEARN OLCI Marine Training Service

LEARN SRAL Marine Training Service

LEARN S6 Marine Training Service

CASE STUDIES Marine Training Service

Applications S&IST Marine Training Service

Applications ALT Marine Training Service

Applications OC Marine Training Service

Pending

Local deployments

Temporary hosted deployment

binder

Scalable hosted deployment

WEkEO

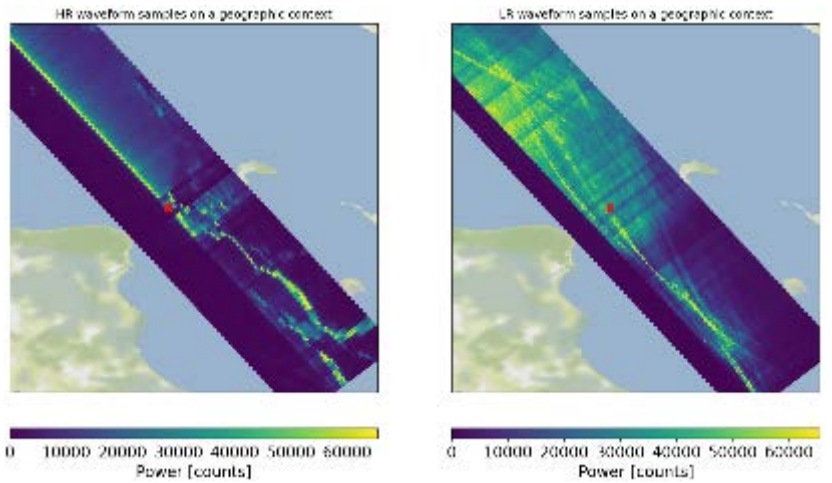
Introductory

- Data access
- File structure
- Coverage
- Tracks
- Waveforms
- SSHA
- SWH
- WS

jupyter

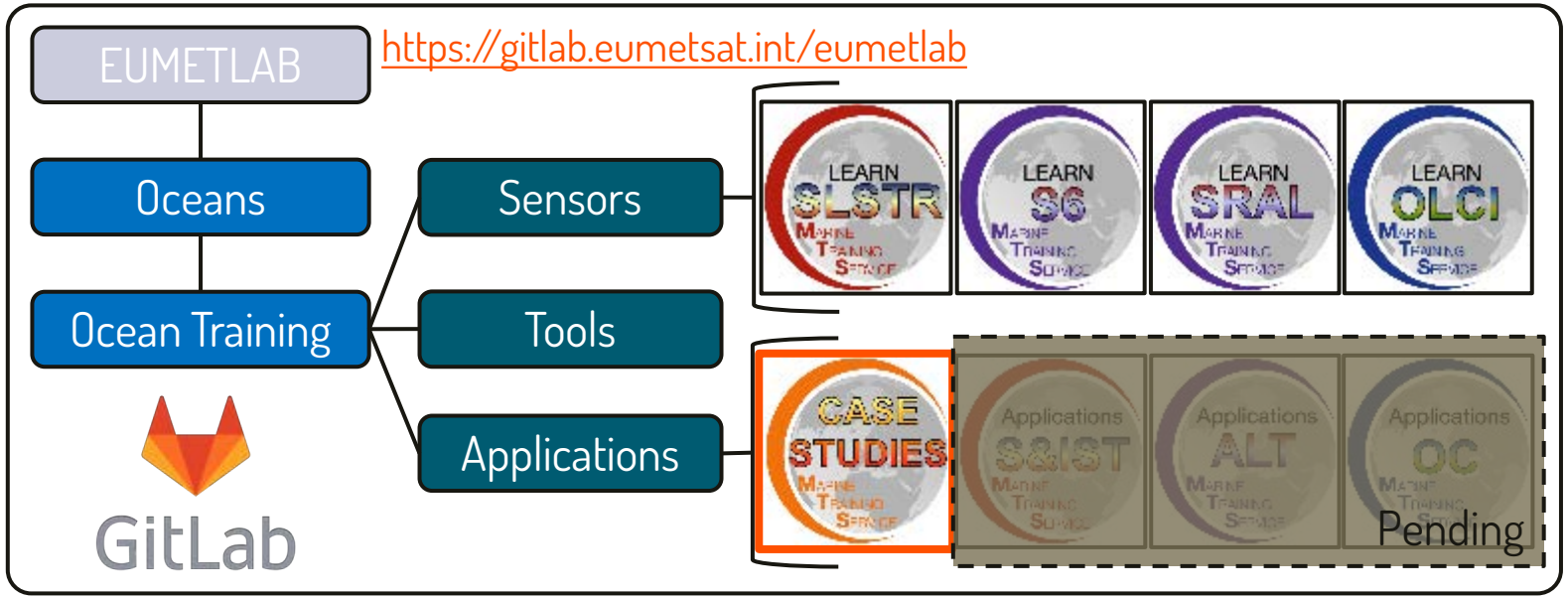
Advanced

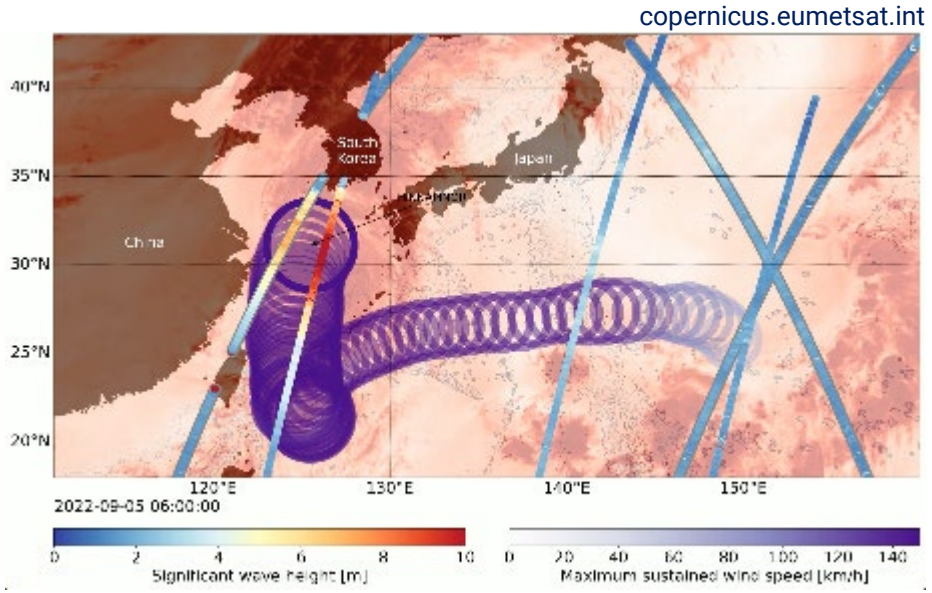
- Advanced data access
- Acquire full cycle
- Coastal waveforms
- More soon



- Repositories and code designed for flexible and modular deployment to match users needs i.e. local or hosted, with end to end workflows.
- Content based on fundamental learning objectives, and/or common user workflows
- Shared under open license for reuse (feedback/credit much appreciated!)

Training resources: Jupyter Notebooks

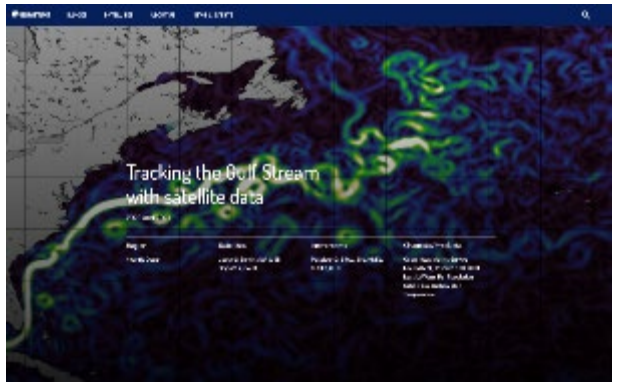


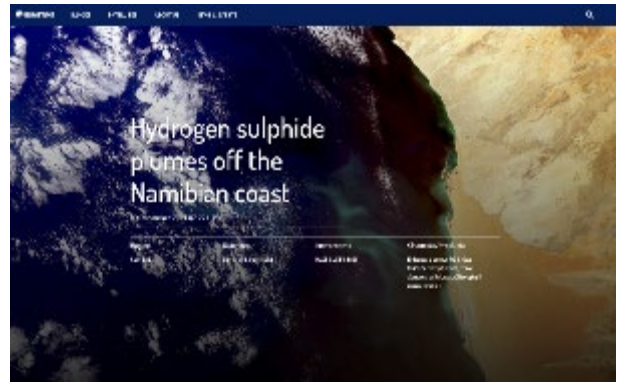


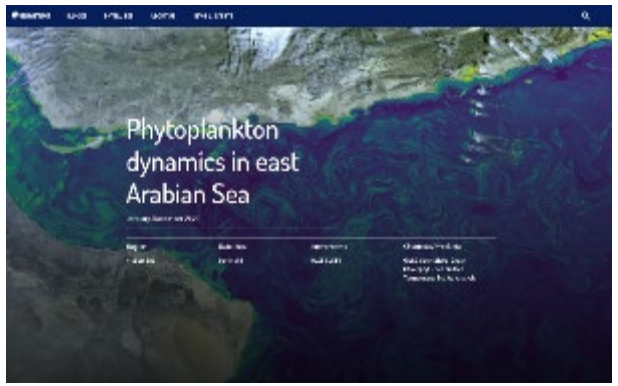
- Provide essential technical information about the different data streams available from Copernicus missions operated by EUMETSAT relevant for marine applications. E.g. from Sentinel-3 and 6 instruments.
- Provide end-to-end work flows covering data access and download, loading data, basic interpretation and quality assessments, and advanced processing and analysis.
- Provide case studies showcasing example usage of data, relating to specific phenomena and in support of wider ocean programmes.

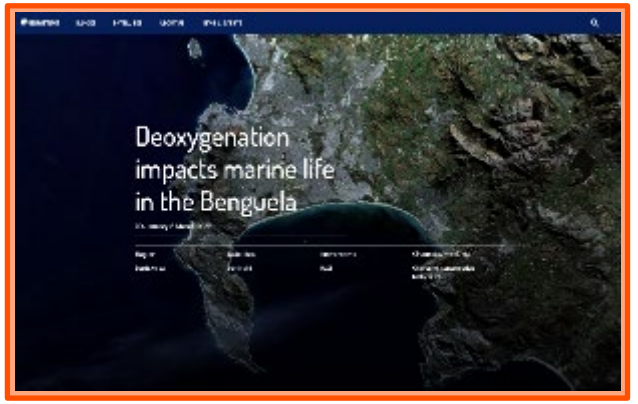
Training resources: Case studies

- **EUMETSAT produces case studies to**:
  - Develop a library of interesting examples of phenomena.
  - Showcase human interest stories where data supports understanding, preservation of lives and livelihoods etc.
  - Support new and inexperienced users to see relevance of data to their sectors.
  - Promote the work done by our users.
- **Special series for UN Ocean Decade:** 2021 2030 United Nations Decade of Ocean Science for Sustainable Development
  - Case studies showing how data can help meet the 10 UNOD challenges.
  - Each case includes a web story and Jupyter notebook showing how to access data and analyse as in the case study.
  - https://tinyurl.com/eumetsat-unod-case-studies
  - https://tinyurl.com/eumetsat-ocean-case-studies

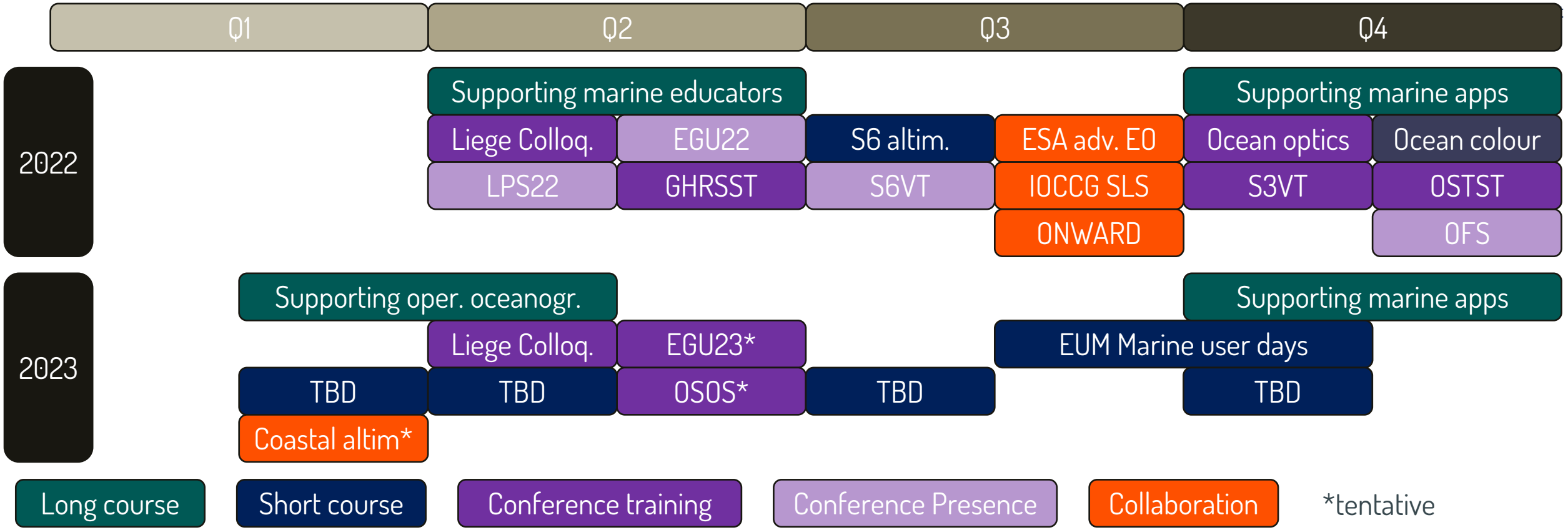








2022/2023 training calendar & collaborations



Events and collaborations:

Collaborate with us!

Are you running a project with a training/outreach component relating to satellite data? Are you hosting a meeting where participants might want to learn about the data we provide? Would you like to teach about satellite data in your university courses?

Contact us to discuss your needs and how we can support! We can offer:

- Trainers to support events
- Financial support for attendees
- Reuse of our training material
- Collaboration on new training material

Final points...

Thank you!

Questions are welcome.

How to...

...find out more information on our training programmes and collaborating on events:

email: copernicus.training@eumetsat.int

...ask questions about EUMETSAT data and services:

email: ops@eumetsat.int

...see what events we have in our training calendar and register to any of them:

visit: https://trainingevents.eumetsat.int/trui/