



EMODnet Thematic Lot n°3 – Physics

EASME/EMFF/2020/3.1.11/Lot4/SI2.838612

Start date of the project: 23/08/2021 (24 months)

Centralisation Phase

Quarterly Progress Report (Q1.2023)

Reporting Period: 01/04/2023 – 30/06/2023

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1. Highlights in this quarter

Task 1: Maintain and improve a common method of access to data held in repositories

Now the new central portal is up and running, Task 1 is primarily focused on improving the data flow towards this new central portal interface. This consists of updating the back end interfaces to serve the central portal, as well as to keep cleaning data, metadata and flow.

As anticipated in the previous report, with the CP up and running, now the flow from data source to products into the CP is the following:

1. Data “as is”. These data are ingested and organized in the EMODnet Physics backend. The EMODnet Physics backend (erddap.emodnet-physics.eu, geoserver.emodnet-physics.eu) offers these data to central portal by means of standard M2M protocols (WMS, WFS). Download is possible via the Central Geoviewer that requests data packages to EMODnet Physics. EMODnet Physics forward these requests the data to original sources. This level also corresponds to Ingestion Phase 1.
2. Fast mode data collections. In situ data is organized per theme (temperature, salinity ...). Metadata is using harmonized and controlled vocabularies (see annex). These data is organized in the EMODnet Physics backend. The EMODnet Physics prod environment backend (prod-erddap.emodnet-physics.eu, prod-geoserver.emodnet-physics.eu) offers these data to central portal by means of standard M2M protocols (WMS, WFS). Download is possible via the Central Geoviewer that requests data packages to EMODnet Physics. This level also corresponds to Ingestion Phase 2 - Level 1.
3. Research quality data. These datasets are fully validated by theme experts (e.g. SeaDataNet network of NODCs, PSMSL, Copernicus Marine Service Reanalysis, ICES, etc.). These data correspond to the Ingestion Phase 2 - Level 2. These data are hosted into specialized DB. Download of these packages are possible via external links.
4. Products. Research quality data are used to make themes products – e.g. temperature, salinity climatology; sea level trend map, etc. These products may be gridded or not. These products are usually developed by EMODnet Physics partner projects/programs (e.g. Copernicus Marine, BlueCloud2026, GLODAP, ICES, etc.). These products are included into EMODnet Physics backend (prod-erddap.emodnet-physics.eu, prod-geoserver.emodnet-physics.eu) and cached into the EMODnet central erddap (erddap.emodnet.eu/erddap/index.html).

Task 2: Construct products from one or more data sources that provide users with information about the distribution and quality of parameters in time and space

During the period the team worked to update some of the products to make them ready for the final release due by the end of August, as well as developed and tested new way to manage multi-resolution products to be offered by the CP with an improved user experience (see Task 1).

More specifically the following products have been updated and are ready to be republished (as link into the Physics Static page): the CORA – Coriolis Ocean datasets for reanalysis (research quality until 2021)¹; the temperature and salinity along the trajectories (extended with views until 12 months)², the MEOP dataset (research quality - until 2018)³.

These are already in line with the development of the platform networks products. As anticipated in the previous report, an example is from the European Ferrybox operators that would like to have a central product to find and discover FB only. This means EMODnet Physics to develop a FB dataset, FB geoservices and geofeatures to be consumed by CP in a

¹ TEMP_001 https://productmaps.s4oceandata.eu/EP_MAP_TEMP_001/;

PSAL_001 https://productmaps.s4oceandata.eu/EP_MAP_PSAL_001/

² TEMP_002 https://productmaps.s4oceandata.eu/EP_MAP_TEMP_002/;

PSAL_002 https://productmaps.s4oceandata.eu/EP_MAP_PSAL_002/

³ TEMP_003 https://productmaps.s4oceandata.eu/EP_MAP_TEMP_003/;

PSAL_003 https://productmaps.s4oceandata.eu/EP_MAP_PSAL_003/

way that the FB products (routes and collected data from routes) are discoverable from the CP. The same applies to other communities. As anticipated these developments will fall into next contracting period.

Task 3. Develop procedures for machine-to-machine connections to data and data products

During the reporting period, the team kept working on machine-to-machine services to support the CP and to connect operational sources. One relevant example is the operational T and S data from the IMOCA boats participating to The Ocean Race. Being the Ocean Race a very good example of a citizen science program, the example turned into a very useful example to motivate and mobilize communities.

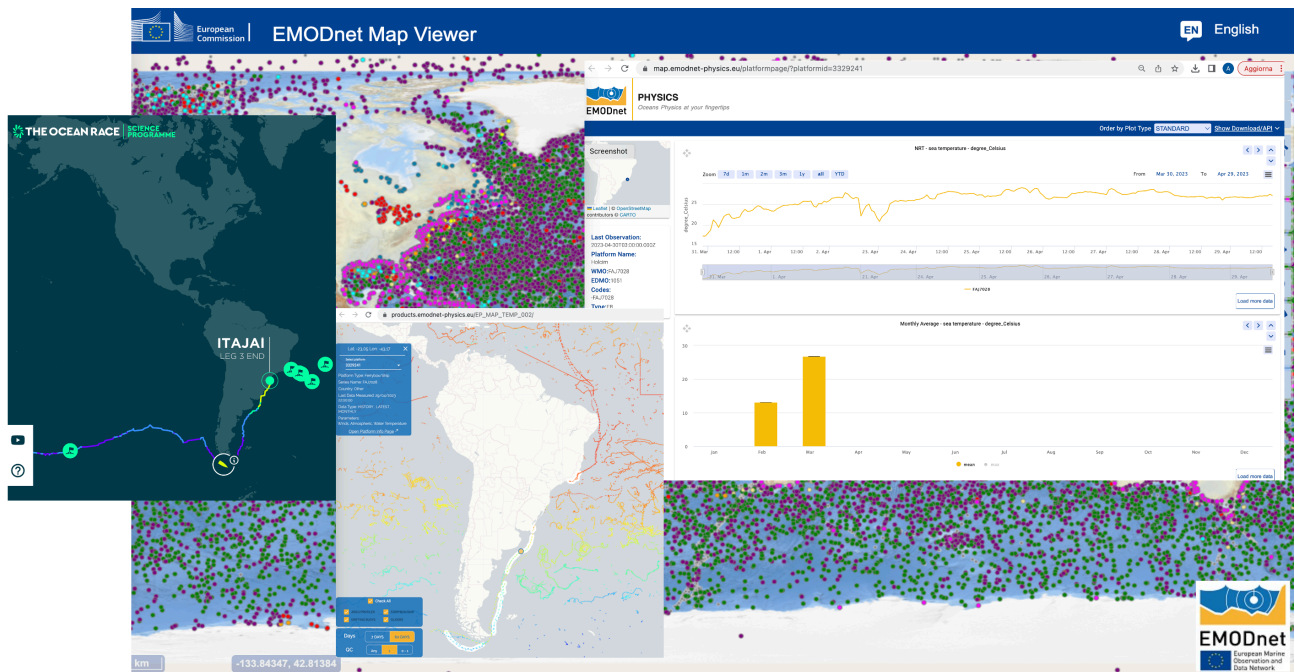


Figure 1. The Ocean Race Data in EMODnet Physics

Other data that have been also included are:

- ifado miniboats
- emolt – Environmental Monitors on Lobster Traps and Large Trawlers
- seaCleaner Project (<https://doi.org/10.4031/MTSJ.49.4.3>)

and there is an open dialogue with the partners of the Prompt project⁴

Task 4. Contribute data, data products and content to a central portal that allows users to find, view and download data and data products

This task was one of the main activities for the period. From now on the focus will be on adding extending and completing the available resources and features.

All exchanges are tracked by Jira tickets, CP team is keeping track but thematic lots have not access to the full planning and schedule of the CP updates/fixes development and release. This is requiring an extra effort from the thematic lot that has design and deploy unplanned fixes to respond to the community needs. As an example, in case of Physics is the presentation of the platform page with data chart and metadata. This product is made available as a combination of

⁴ <https://liguria.bizjournal.it/2023/05/unige-presentato-a-genova-il-progetto-prompt-per-la-salvaguardia-dellambiente-marino/>

services: a GeoServer-WMS is offering the platform geo-location, a GeoServer-WFS is offering the platform page as a html, and a ERDDAP dataset is offering the data values (timeseries or profiles).

When the CP opens a popup box to present data, this box (that is a CP feature) is not responsive neither dynamic, hence it was cutting (hiding) part of the platform page html.

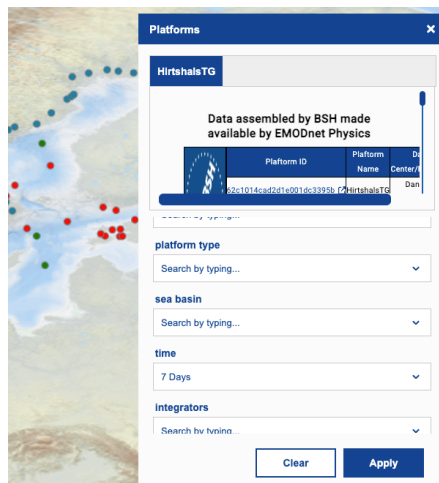


Figure 2. The platform page as displayed in the CP soon after the CP launch (it's in the box top right)

A Jira ticket to ask for a different popup box was issued and well noted but this update has yet to be deployed in production. To mitigate the problem with the user experience when discovering the EMODnet Physics collection, the thematic team had to re-design the page in order to fit into the available box. This mitigated the issue but it was an unplanned activity for the thematic lot.

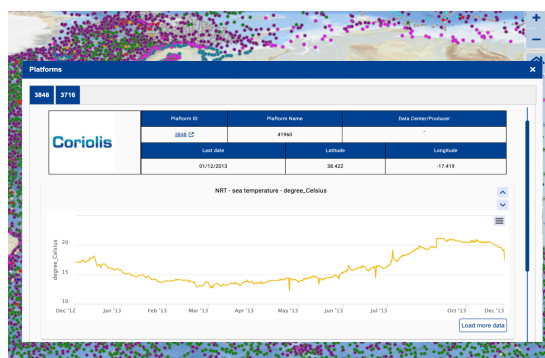


Figure 3. The platform page as displayed in the CP now

Another example is the number of simultaneous requests that the CP is producing when there is a multidimensional product (e.g. a climatology). If the user tries to play the animation, the CP is calling all the available layers at once, without any buffering/slicing policy. We are now testing a combination of low resolution – high resolution views on the same products to fit the data transfer according the zoom level of the request, in other words if the user is exploring a gridded product with a zoom level showing the whole globe, the system offers a layer where the grid resolution is bigger, while if it zooms in, the system moves to a different product (the original) that has a smaller grid resolution.

Task 5. Contributing content to dedicated spaces in Central Portal

Static contents on EMODnet Physics consolidated and published: <https://emodnet.ec.europa.eu/en/physics>

In line with the plans, during coming months, the contents are ready to be updated and to offer (external) links to custom web products page with advanced features (see appendix).

Task 6. Ensure the involvement of regional sea conventions

The main outcome is from the proactively participation to 23rd meeting of the Technical Group on Underwater Noise (TG-Noise) (mainly via ICES and CTN). As already mentioned, the MSFD is reaching the end of its second cycle (deadline for reporting by MS was end 2022). The third cycle will start in 2024, with first assessment of state, definition of GES and targets (Art. 8, 9, 10). During the period, TG NOISE published the guidance documents⁵ for setting the thresholds framework:

- Setting EU Threshold Values for impulsive underwater sound - ISBN 978-92-68-03343-2
- Setting EU Threshold Values for continuous underwater sound - ISBN 978-92-68-03349-4

These docs will help Member States in developing tools to manage and monitor the underwater noise. In this context EMODnet (Physics), by linking regional sea conventions DBs, is the candidate European integrating end point for finding the in-situ data for the assessments (i.e. under water noise background recordings for setting the reference values). In collaboration with Ingestion the team is setting up workflows to be ready and manage these new data.

Task 7. Contribute to the implementation of EU legislation and broader initiatives for open data

The promotional activities for contributing and using EMODnet as a service for EU legislation and broader initiatives, as well as the promotion for open data (CC-BY), reached very high visibility with the participation to the different legs of the Ocean Race touching: Itajai (Brasil), Newport (RI, US), Aarhus (Denmark), The Hague (the Netherlands) and Genova (Italy). The proposed format of a “data ocean hour” moved into hours, in Aarhus, to a day with scientists (from EMODnet network and beyond), in the Hague, to end with the “Ocean Data Week”, in Genova.

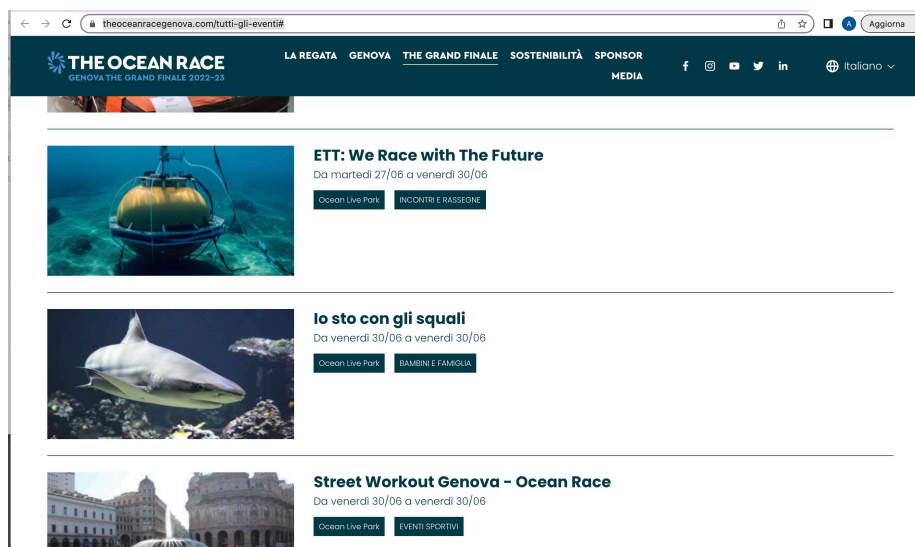


Figure 4. The Ocean Race Genova – events agenda

As anticipated, from 26 June to 30 June, the “Ocean Data Week – The Ocean Race Grand Finale” took place in Genova. The workshop included talks, pitches, round tables on ocean data collection, processing etc. Ocean data value chain was largely discussed by different ocean data stakeholders including research institutes, policy makers, NGOs (from outdoor centers to The Ocean Race scientific program team), private industries (from shipping companies to ICT companies). The

⁵ EMODnet Physics team as co-authors

event included more than 110 speakers, more than 25 hours of live streaming, more than 300 attenders in presence and more than 700 web views (the recordings are available on the web – ettsolutions.com/oceanrace).

EMODnet, FAIRness, interoperability and open data were central to each of the session. Notably Physics was also invited to present on the event - Mission “Restore our Ocean and Waters by 2030” organized by the EC, Comune di Genova with the support of LIFE4MEDECA e BlueMissionMed projects.

Importantly the coordinators of EMODnet Physics were invited to participate to the GOOS – Low Cost Technology and Data Workshop (Cape Town, June 2nd) that defined the basis for the setting of a GOOS group on Low Cost Tech.

Task 8. Monitor quality/performance and deal with user feedback

The subtask “deal with user feedback” goes together with task 7. Since the centralization the monitoring tools and workflows have changed.

Looking at the report, EMODnet Physics section (to the <https://emodnet.ec.europa.eu/en/physics>) is visited less than Bathymetry and Human Activities, more than other lots. The current monitoring system is mainly focused on the static page and EMODnet Physics never collected big number in that section, it would be much more interesting to see the visits and interactions on the CP Geoviewer.

The team also continued to collect feedback during the events and with informal meetings and, among the others, there is a very high interest in the River data (see also the words cloud from the 15/5/2023 event on Ocean Prediction) and data from low cost/cost effective tools and citizen science actions

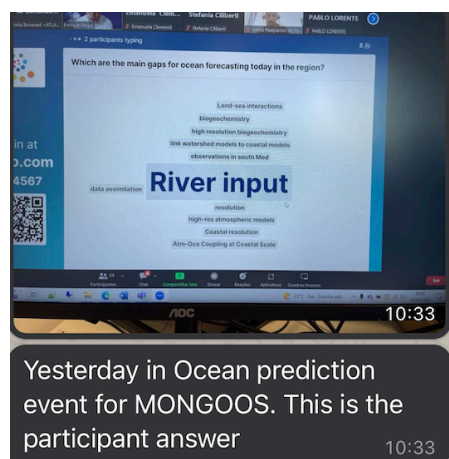


Figure 5. screenshot from the pool

Task 9. Maintain the existing thematic web portal for a maximum of six months from the start of the projects

This task is closed.

Table 1. Milestones and Deliverables - EASME/EMFF/2020/3.1.11/Lot4/SI2.83861

Status of the Milestones and Deliverables listed in the workplan				
Milestone/Deliverable	WP	Date due	Status (Delivered/Delayed)	If Delayed: reason for delay and expected delivery date
D1.1 Kick off Meeting	1	30/11/2021	8 November 2021	
D1.2 Annual assembly	1	30/11/2022	28-29 June 2023	(split session with core team during the Ocean Data Week at the Ocean Race Grand Finale)
D1.3 EMODnet SC	1	30/11/2021	8-10 September 2021	
D1.4 EMODnet TWG	1	30/11/2021	8-10 September 2021	
D1.5 EMODnet SC	1	31/05/2022	27-28 April 2022	
D1.6 EMODnet TWG	1	31/05/2022	26 April 2022	
D1.7 EMODnet SC	1	31/08/2022	18 July 2022	
D1.8 EMODnet TWG	1	31/08/2022	18 July 2022	
D1.9 EMODnet SC	1	30/11/2022	7-8 November 2022	
D1.10 EMODnet TWG	1	30/11/2022	21-22 September	
D1.11 EMODnet plenary event	1	31/12/2021	8-9 November 2021	The EMODnet Physics KOM was organized in two session, the first one was closed to core partner (D1.1) the second was a plenary with invited speech about previous and recent developments of the EMODnet Physics networks and collaborators
D1.12 EMODnet plenary event	1	30/06/2022	12-13 April 2022	INS data ingestion WS. The event is involving EMODnet (Physics, Chemistry and Ingestion), CMEMS INSTAC and EurGOOS to discuss about joint actions for facilitating nrt operational data ingestion
D1.13 EMODnet plenary event	1	31/12/2022	4 October 2022. EMODnet Physics organized a special session during the MetroSEA2022 IEEE conference 21-24 November 2022. EMODnet Physics supported the organization of both the European HFR task team assembly and the MONGOOS annual workshop and assembly.	

D1.14 EMODnet plenary event	1	30/06/2023	the Ocean Data Week – The Ocean Race Grand Finale Genova 2023 ⁶	
D1.15 Quarterly report Q3.2021	1	15/10/2021	Delivered 15/10/2021	
D1.16 Quarterly report Q4.2021	1	15/01/2022	Delivered 15/01/2022	
D1.17 Quarterly report Q1.2022	1	15/04/2022	Delivered 15/04/2022	
D1.18 Quarterly report Q2.2022	1	15/07/2022	Delivered 15/07/2022	
D1.19 Quarterly report Q3.2022	1	15/10/2022	Delivered 15/09/2022	
D1.20 Quarterly report Q4.2022	1	15/01/2023	Delivered 15/1/2023	
D1.21 Quarterly report Q1.2023	1	15/04/2023	Delivered 15/4/2023	
D1.22 Quarterly report Q2.2023	1	15/07/2023	Delivered 15/7/2023	This report
D1.23 Annual progress report	1	23/08/2022	Delivered 23/8/2022	
D1.24 Final progress report	1	23/08/2023		
D1.25 Handover note	1	23/08/2023		
D1.26 EMODnet Physics note for Annual Report 2021	1	31/01/2022	Delivered (January 2022)	
D1.27 EMODnet Physics note for Annual Report 2022	1	31/01/2023	Delivered (March 2023)	
D1.28 EMODnet Ingestion general assembly 2021	1	30/11/2021	21-22 September 2021	
D1.29 EMODnet Ingestion general assembly 2022	1	30/11/2022	16-17 April 2022	
D1.30 Guideline on data ingestion procedures for new real time and near real time streams v.2022	1	31/08/2022	Delivered (August 2022)	
D1.31 Guideline on data ingestion procedures for new real time and near real time streams v.2023	1	23/08/2023		
D1.32 Use cases 2021	1	31/12/2021	CMCC delivered (Dec 2021) OGS delivered (Feb 2022)	
D1.33 Use cases 2022	1	31/12/2022	CSCS delivered (Feb 2022) OceanGlider delivered (Feb2022)	
D1.34 Use cases 2023	1	23/08/2023		
D1.35 Contribution to central space with background	1	28/02/2022	In progress – tracked with JIRA	

⁶ <https://ettsolutions.com/oceanrace/>

information and EMODnet Physics content				
D1.36 TGs - RSCs event attendance	1	31/12/2021	TG NOISE WS “towards EU thresholds for underwater noise”, 13-14 Sept 2021	
D1.37 TGs - RSCs events attendance	1	30/06/2022	TG NOISE WS: Towards EU threshold values for underwater noise (17/02/2022) 20th TG-NOISE – 22/03/2022	TG NOISE doc library ⁷
D1.38 TGs - RSCs events attendance	1	31/12/2022	21st TG-NOISE – 24/05/2022	This event was attended by partners ICES and CTN.
D1.39 TGs - RSCs events attendance	1	30/06/2023	22 nd TG-NOISE – 11/10/2022 23 rd TG-NOISE – 21/02/2023	This event was attended by partners ICES and CTN.
D2.1. Data Inventory with gap analysis v.2021	2	31/12/2021	V.2021 attached to Q1.2022	EMODnet Physics_Inventory_v.2021.03
D2.2 Data Inventory with gap analysis v.2022	2	31/08/2022	V.2022 attached to Interim Report	
D2.3 Data Inventory with gap analysis v.2023	2	23/08/2023		
D2.4 EMODnet Physics Event/Workshop	2	31/12/2021	Delivered – (15/1/2022) - updates are described in the quarterly report Q4.2021 – Section 4	
D2.5 EMODnet Physics Event/Workshop	2	30/06/2022	Delivered – (15/4/2022) - updates are described in the quarterly report Q1.2022 – Section 4	
D2.6 EMODnet Physics Event/Workshop	2	31/12/2022	EMODnet team organized the special session on Data System Networking and Interoperability Technology and Methodology at the IEEE MetroSea 2022 (3-5 October 2022)	
D2.7 EMODnet Physics Event/Workshop	2	30/04/2023	Ocean Data Hours @ Ocean Race: 23/02/2023 - CapeTown 18/05/2023 – Newport (RI) 05/06/2023 – Aarhus 12/06/2023 – The Hague 26-30/06/2023 - Genova	
D2.8 Report on the maintenance and update of the EMODnet Physics smart connectors v.2022	2	31/08/2022	Delivered 23/08/2022	Annex to Interim Report I.2022
D2.9 Report on the maintenance and update of the EMODnet Physics smart connectors v.2023	2	23/08/2023		

⁷ <https://circabc.europa.eu/ui/group/326ae5ac-0419-4167-83ca-e3c210534a69/library/89b98517-6283-4d3a-abd0-3a716661b370?p=1>

D2.10 EMODnet Physics Handbook on data management	2	31/08/2022	Delivered 23/08/2022	Annex to Interim Report I.2022
D2.11 Support to develop common strategy and guideline for adoption cloud technologies	2	23/08/2023		
D2.12 EMODnet Physics Metadata handbook and examples	2	31/08/2022	Delivered 23/08/2022	Annex to Interim Report I.2022
D2.13 Report on dissemination system interfaces update v.2022	2	31/08/2022	Delivered 23/08/2022	Annex to Interim Report I.2022
D2.14 Report on dissemination system interfaces update v.2023	2	23/08/2023		
D2.15 Updated list of EMODnet Physics products v.2021	2	31/12/2021	Delivered 15/1/2022	
D2.16 Updated list of EMODnet Physics products v.2022	2	31/08/2022	Delivered 23/08/2022	Annex to Interim Report I.2022
D2.17 Updated list of EMODnet Physics products v.2023	2	23/08/2023		
D2.18 SSS v.2020	2	28/02/2022	Released ⁸	
D2.19 SSS v.2021	2	28/02/2023	Released ⁹	
D2.20 River Proxy V1.0	2	31/12/2021	Released ¹⁰	
D2.21 River Proxy V2.0	2	31/08/2022	31/12/2022	Physics and Chemistry are working on a new river product (limited number of rivers) that includes both outflow, temperature and salinity. Release postponed to end of the year
D2.22 River Proxy V3.0	2	23/08/2023		
D2.23 INS RVFL DB v.1.0	2	31/08/2022	Released ¹¹	
D2.24 TSM v.2021	2	28/02/2023		Not ready yet. Will be published as soon as ready
D2.25 SLEV INS DB	2	31/12/2021	Released ¹²	
D2.26 SLEV REL TRENDS	2	31/08/2022	Released ¹³	
D2.27 SLEV ABS TRENDS	2	31/08/2022	Released ¹⁴	

⁸ <https://prod-erddap.emodnet-physics.eu/erddap/griddap/CISC-BEC-SSS.html>

⁹ https://prod-erddap.emodnet-physics.eu/erddap/info/MULTIOBS_GLO_PHY_SSS_L4_MY_015_015/index.html

¹⁰ https://products.emodnet-physics.eu/EP_MAP_RVFL_001/
https://prod-erddap.emodnet-physics.eu/erddap/tabledap/ERD_EP_RVFL_NRT.html

¹¹ https://prod-erddap.emodnet-physics.eu/erddap/tabledap/ERD_EP_RVFL_NRT.html

¹² https://prod-erddap.emodnet-physics.eu/erddap/tabledap/ERD_EP_SLEV_NRT_60m.html

¹³ http://prod-geoserver.emodnet-physics.eu/geoserver/EMODnet/wms?service=WMS&version=1.1.0&request=GetMap&layers=EMODnet%3AEP_PSMSL_SLEV_REL&bbox=-157.86700315733998%2C-36.843100736862%2C174.76900349538002%2C65.673401313468&width=768&height=330&srs=EPSG%3A4326&styles=&format=application/opmlayers

¹⁴ https://prod-erddap.emodnet-physics.eu/erddap/griddap/EMODNET_SEA_LEVEL_TREND.graph

D2.28 SLEV REL ANOM	2	31/08/2022	31/12/2022	SONEL, which is the provider for this product is developing a new workflow to facilitate harvesting from Physics. Only lately it was possible to start this action and should be possible to close and include the new product by end of the year
D2.29 SLEV ATL ABS TREND	2	31/08/2022	Released ¹⁵	
D2.30 RFVL v.1	2	28/02/2023	Released	Fully operational, with continuous updates, directly towards the CP
D2.31 UWN ROI v.1.0	2	31/08/2022	Released ¹⁶	
D2.32 WAVE INS DB+ NOWCAST v.2.0	2	28/02/2022	Delayed	The product is not covering whole Europe (hence it is not ready yet) – At the moment we are receiving data for Med Sea (UniGE – DICCA), Iberian Atlantic (CoLAB Atlantic), Irish Atlantic (Marine Institute), BlackSea (CMCC) and Baltic (DMI). The product is under final development.
D2.33 WIND INS DB+ NOWCAST v.2.0	2	28/02/2022	Released ¹⁷	
D2.34 ICE SIC v.2.0	2	31/08/2022	Released ¹⁸	
D2.35 TGs - RSCs event attendance	2	31/12/2021	19 th TG NOISE: 26 October 2021	
D2.36 TGs - RSCs events attendance	2	30/06/2022	20 th TG NOISE: 22 March 2022	
D2.37 TGs - RSCs events attendance	2	31/12/2022	21 st TG NOISE: 24 May 2022	
D2.38 TGs - RSCs events attendance	2	30/06/2023	22 st TG NOISE: 10 October 2022 23 rd TG-NOISE: 21 February 2023	The frequency of TG NOISE was increased to complete the deliverables for continuous noise threshold assessment.

¹⁵https://prod-erddap.emodnet-physics.eu/erddap/griddap/EMODNET_SEA_LEVEL_MONTHLY_MEAN_DESEASONALIZED.graph

¹⁶http://prod-geoserver.emodnet-physics.eu/geoserver/EMODnet/wms?service=WMS&version=1.1.0&request=GetMap&layers=EMODnet%3AEMODnet_Physics_-_Registry_of_continuous_noise_monitoring_sites&bbox=-3.536%2C36.93%2C30.6%2C68.91&width=768&height=719&srs=EPSG%3A4326&styles=&format=application/openlayers

¹⁷http://prod-geoserver.emodnet-physics.eu/geoserver/EMODnet/wms?service=WMS&version=1.1.0&request=GetMap&layers=EMODnet%3ADAT_LatestDataParametersProduct&bbox=-180.0%2C-90.0%2C180.0%2C90.0&width=768&height=384&srs=EPSG%3A4326&styles=&format=application/openlayers

¹⁸Arctic Seas:

http://prod-geoserver.emodnet-physics.eu/geoserver/EMODnet/wms?service=WMS&version=1.1.0&request=GetMap&layers=EMODnet%3Aice_edge_nh_annual&bbox=-4632266.5%2C-2364732.5%2C4185461.75%2C3981740.25&width=768&height=552&srs=EPSG%3A3995&styles=&format=application/openlayers

Antarctic Seas:

http://prod-geoserver.emodnet-physics.eu/geoserver/EMODnet/wms?service=WMS&version=1.1.0&request=GetMap&layers=EMODnet%3Aice_edge_sh_annual&bbox=-2624331.25%2C-2947571.75%2C3415682.5%2C3649295.25&width=703&height=768&srs=EPSG%3A3031&styles=&format=application/openlayers

D3.1 Report on the SOS.SWE connected stations v.2021	3	30/11/2021	Delivered 15/01/2022	Annex to Q4.2021
D3.2 Report on the SOS.SWE connected stations v.2022	3	31/08/2022	Delivered 23/08/2022	Annex to Interim Report I.2022
D3.3 Report on the SOS.SWE connected stations v.2023	3	23/08/2023		
D3.4 Handbook on procedure to set up SOS.SWE interoperability	3	23/08/2023		
D3.5 Report on new API v.2021	3	30/11/2021	Delivered 15/01/2022	Annex to Q4.2021
D3.6 new APIs v.2022	3	31/08/2022	Delivered 23/08/2022	Annex to Interim Report I.2022
D3.7 new APIs v.2023	3	23/08/2023		
D3.8 handbook to use EMODnet Physics APIs v.2021	3	30/11/2021	Delivered 15/1/2022	Annex to Q4.2021
D3.9 handbook to use EMODnet Physics APIs v.2022	3	31/08/2022	Delivered 23/08/2022	Annex to Interim Report I.2022
D3.10 handbook to use EMODnet Physics APIs v.2023	3	23/08/2023		
D3.11 Phasing out of EMODnet Physics Landing page	3	28/02/2022	Completed the 23 rd Jan 2023	
D3.12 Phasing out of EMODnet Physics mapviewer	3	30/11/2021	Completed 23 rd Jan 2023	
D3.13 EMODnet Physics catalogue v.2021	3	30/11/2021	Delivered 15/1/2022	Annex to Q4.2021
D3.14 Maintenance and update of EMODnet Physics catalogue v.2022	3	31/08/2022	Delivered 23/08/2022	Annex to Interim Report I.2022
D3.15 Maintenance and update of EMODnet Physics catalogue v.2023	3	23/08/2023		
D3.16 Monitoring tools	3	28/02/2022	Given the centralization process the monitoring tools are going to be a combination of tools, some designed to let Physics and CP to interact and fix issues (e.g. JIRA), some to report on indicators (matomo) some to monitor M2M (the central team is updating the tools to monitor the new EMODnet Physics Environment). Whenever needed new tools will be discussed and deployed.	

2. Identified issues: status and actions taken

Table 2. Priority issues identified by CINEA/ DG MARE/ Secretariat

A. Priority issue(s) identified and communicated by CINEA/ DG MARE/ SECRETARIAT				
Priority issue	Status (Pending/ Resolved)	Action(s) taken/ remaining actions planned	Date due	Date resolved
Physics ncWMS to GeoHealthCheck and Web Service Documentation	In Progress	Waiting for CP to close the ticket	02/06/23 11:35	04/07/23 12:41
Missing Wind Layer	Done		12/05/23 14:58	15/05/23 14:35
in situ near real time sea level data legend shows only platform initials	Done		12/05/23 14:35	15/05/23 14:39
Downloads via layer description button dumps raw data in browse	Done		12/05/23 14:20	23/05/23 17:43
EMODnet Physics Catalogue Service to Harvest	In Review	Waiting for CP to close the ticket	05/07/22 14:12	04/07/23 12:41
Details on Platform Layer from EMODnet Physics	Done		30/05/22 16:39	17/06/22 11:36
Adding Physics geoserver layers to metaGIS	Done		02/05/22 10:03	17/06/22 17:53
Layer EP_HFR_CFM_EUROPE not working in Physics WMS	In Progress	HFR are already integrated into the “in situ” layer and the surface currents will be available as external link from the static page	16/03/22 15:28	21/04/23 14:32
Physics - EMODnet Catalogue Tags	In Progress	Waiting for CP to close the ticket	11/03/22 15:16	21/04/23 14:32
Content Inventory Physics	Done		10/09/21 10:30	03/04/23 16:42
GetLegendGraphic not supported for High Frequency Radar WMS	In Progress	old ticket to be closed (no more valid)	11/05/21 15:59	16/06/23 15:14
Correct Legend for EMODPace sealevel Map	Done		09/12/20 16:14	26/05/23 16:08
TWG3-Action 2: Physics to provide combined climatology products for European scale (not per sea basin) for integration in the viewer.	Done		11/09/20 18:02	17/06/22 11:43

Table 3. Priority issues group

B. Issues / challenges identified by the thematic assembly group itself				
Priority issue / challenge	Status (Pending/ Resolved)	Action(s) taken / remaining actions planned	Date due	Date resolved

3. Communication assets

Table 4. Communication assets

A. (Co-)Authored peer-reviewed publications in the quarter					
Date of publication	Type of publication	Full reference	ISBN	DOI	Is it open access? Yes/No
		Setting EU Threshold Values for impulsive underwater sound	978-92-68-03343-2		Y
		Setting EU Threshold Values for continuous underwater sound	978-92-68-03349-4		Y

Table 5. Other publications

B. Other/non-peer reviewed types of publications (co-)authored in the quarter					
Date of publication	Type of publication	Full reference	ISBN	DOI	Is it open access? Yes/No
11/3/2023	Web article + interview	https://www.primocanale.it/sport/22865-the-ocean-race-genova-the-grand-finale-sostenibilita-storia-puntata-10.html			
31/3/2023	Web article + interview	https://www.primocanale.it/sport/23927-the-ocean-race-genova-the-grand-finale-arrivo-itajai-sostenibilita-puntata-13.html			
	Web article + interview	https://smart.comune.genova.it/comunicati-stampa-articoli/sostenibilit%C3%A0-cultura-promozione-turistica-il-pavilion-di-genova			
	Web article + interview	https://www.primocanale.it/sport/26816-sostenibilita-cultura-promozione-turistica-il-pavilion-di-genova-protagonista-anche-ad-aarhus-2.html			
	Web article + interview	https://www.primocanale.it/sport/25209-the-ocean-race-genova-the-grand-finale-genova-rota-newport-puntata-17.html			
	Web article + interview	https://www.primocanale.it/sport/22865-the-ocean-race-genova-the-grand-finale-sostenibilita-storia-puntata-10.html			
26/06/2023	Newspaper	La verità viene dal mare – SecoloXIX			
22/06/2023	Newspaper	All’Ocean Race le barche navigano contro il climate change – ilSole24ore			
29/06/2023	Newspaper	https://www.corriere.it/tecnologia/23_giugno_29/ocean-race-progetto-scientifico-regata-dura-718381e4-561b-4a27-a814-c1785495dxlk.shtml			

To facilitate the management of Physics related publication we set up a Zenodo Community – this is intended to provide EMODnet Physics stakeholder an easy tool to find out the EMODnet Physics related material. This tool will be developed during coming months.

<https://zenodo.org/communities/emodnetphysics/>

During the period there was an intense activity on socials to promote the Ocean Data Hours and Ocean Data Week

For a compressive overview of publications referring to/making use of EMODnet data and/or data products, please consult Google Scholar.

4. Monitoring indicators

Comments on the progress indicators in the indicators spreadsheet		
Progress indicator	Means of collecting figures	Comment
<p>1. Current status and coverage of total available thematic data</p> <p>A) Volume and coverage of available data</p>	<i>Number of platforms</i>	<p>EMODnet Physics input data is sparse and for this indicator we consider the "platform" as the "unit" of monitoring assessment. A platform is a logical entity that hosts data, where data maybe a single dataset (e.g. a profile in case of CTD), a timeseries (e.g. sea level station), a series of profiles (e.g. ARGO). For indicator 1.A we report on the % variation of the number of platforms for the given basin. To note that some platforms are moving from one basin to another, considering that we are reporting figures based on the latest position, the % are deeply influenced by this. For this indicator we are using bounding box shapes. Most of them are already compliant to new indications - EEA shapefiles - (to note that Atlantic is covering EEA Atlantic and the South Atlantic is now included in Other Seas) - Caspian and Caribbean Seas have been not used yet and platforms in these regions are counted under Other Seas. The total volume is less than the previous quarter because most of the data are now stored in netcdf v.4.0 that provides a higher compression factor. For indicator 1.B, since the Central Portal is now up and running, EMODnet Physics cannot capture the specific traffic on the mapviewer, hence we can only provide the overall volume of downloaded data.</p>
<p>What is your opinion on the data coverage within EMODnet for your thematic?</p>		<p>The available coastal data is still very limited and new data sources (e.g. Citizen Science projects) have to be approached. Metadata on Wind data should be improved. In situ underwater noise is still very limited. Data on Ice should include new data type (e.g. cameras). We need some focus actions to link in some other integrators (e.g. SIOS). During this period, the service that connects EMODnet Physics to PANGAEA and ARICE was updated and it linked in a large amount of new CTDs.</p>
<p>B) Usage of data in this quarter</p>	<i>Server logs</i>	<p>Since the CP is now up and running, the Physics team can only report on the overall volume of downloaded data when this is mediated by the EMODnet Physics backend (some products are cached centrally hence EMODnet Physics cannot track this volume). Given that the volume of data download for each theme was based on an</p>

		algorithm considering the number of viewed map pages, considering that EMODnet Physics is not hosting the mapviewer any longer, this calculation cannot be applied any longer. From now on EMODnet Physics will report on the number of available platforms (units - col C) and overall volume of downloaded Gigabites (col D) from ERDDAP (that is hosting the in situ data).
2. Current status and coverage of total number of data products A) Volume and coverage of available data products	<i>Matomo and server logs</i>	EMODnet Physics data products may be both datacollections (e.g. PSMSL RLR) and products (e.g. gridded climatology) and the full list is reported in the Products20230630 sheet. The Prod-Prod (products on the production env) this is the selected list products that are discoverable from the Central Portal mapviewer. Apart from the European Under Water Noise Register and the TSM that only covering Europe (100% of the available information) the other products offer global coverage. This makes the "Volume unit" not homogeneous therefore here we report on a limited number of products.
B) Usage of data products in this quarter	<i>Matomo and server logs</i>	The mapviewer and the products pages accessible under the "Products" section are monitored in terms of visits (by matomo). ERDDAP is monitored both in terms of visit to the erddap landing page (matomo) and in terms of transactions (downloads - by logs). THREDDS and GeoSERVER are both monitored in terms of logs. We record a quite good use of the services, ERDDAP and THREDDS are the most used interfaces
3. Internal and external organisations supplying/approached to supply data and data products within this quarter	<i>Please specify</i>	During the period we organized a series of events to unlock new data sources (with a focus on temperature and salinity from CS actions). Most of these data are not yet in the system but teams are working to ingest it. During the period the team was able to ingest different River outflow data sources.
5.1 Daily number of page views of EMODnet Thematic entry page	<i>Europa Analytics</i>	We record a typical working hours use of the portal, with peaks back to back to events. Notably the system is monitoring the EMODnet Physics static page that is presenting general overview of the activity. The most used Physics page was the mapviewer, hence we suggest to monitor the CP geoviewer with a view on the thematic sessions

5.2 Quarterly total number of visitors, page views, unique page views and percentage of returning visitors	<i>Europa Analytics</i>	Physics collects good interest, being among the top viewed themes. We recorded peaks around "ocean data hours" events (may is particularly evident). It would be much more interesting to see the user's interaction with the geoviewer where data are not as static as in the static physics presentation page.
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The monitoring numbers reported as part of the progress monitoring of EMODnet performance are collected through Europa Analytics, unless reported otherwise.

5. Annex: Other documentation attached

5.1 Standards and Vocs

Metadata field	Vocabulary exists	Link to vocabulary	Vocabulary governance
Platform id		https://www.ocean-ops.org/ https://vocab.ices.dk/?ref=1399 https://eurogoos.eu/download/eu-hfradar-inventory-2016/?wpdmdl=9972&refresh=642bf4a58042f168060227Z https://www.ego-network.org/dokuwiki/doku.php?id=public:glidersdeployments https://www.ferrybox.org/routes_data/routes/table_of_routes/index.php.en http://eutgn.marine.ie/geonetwork/srv/ita/catalog.search#/home	OCEANOPS/WMO ICES, EU HFR node EGO (glider) FB Tide Gauge
naming_authority	Yes	https://edmo.seadatanet.org/	SeaDataNet
Institution	Yes	https://edmo.seadatanet.org/	SeaDataNet
qc_method	*	doi	
data_mode	Yes	NRT/DM/REP	EuroGOOS DATAMEQ
variable names	Yes	http://vocab.nerc.ac.uk/collection/P02/current/ http://vocab.nerc.ac.uk/collection/P01/current/ http://vocab.nerc.ac.uk/collection/P07/current/ https://cfconventions.org/Data/cf-standard-names/79/build/cf-standard-name-table.html	BODC:NVS CF Standard Name Table v29
unit	yes	https://vocab.nerc.ac.uk/collection/P06/current/	SeaDataNet
Quality Flag Scheme	yes	http://www.oceansites.org/docs/oceansites_data_format_reference_manual.pdf https://vocab.seadatanet.org/v_bodc_vocab_v2/search.asp?lib=L20	OceanSites SeaDataNet
Time	yes	ISO8601	ISO
Datum	Yes	WGS84	ISO
Country	yes	ISO3166	ISO
Licence	Yes	https://creativecommons.org/	CC
INSPIRE	Yes	ISO 19115	ISO/INSPIRE
PI	yes	https://orcid.org/	ORCID

5.2 Low-cost technology outcomes, momentum and network



The Global Ocean Observing System



Low Cost Technology Workshop

Patrick Gorringer, Lucie Cocquempot, Callum Rollo, Antonio Novellino, Kevin O'Brien, Juliet Hermes, Tamaryn Morris, Ann Zinkann

OCG-14 Meeting, June 5-8, 2023

Pieter Stoker Centre, Department of Forestry, Fisheries and the Environment (DFFE), Cape Town, South Africa

THE MOMENTUM

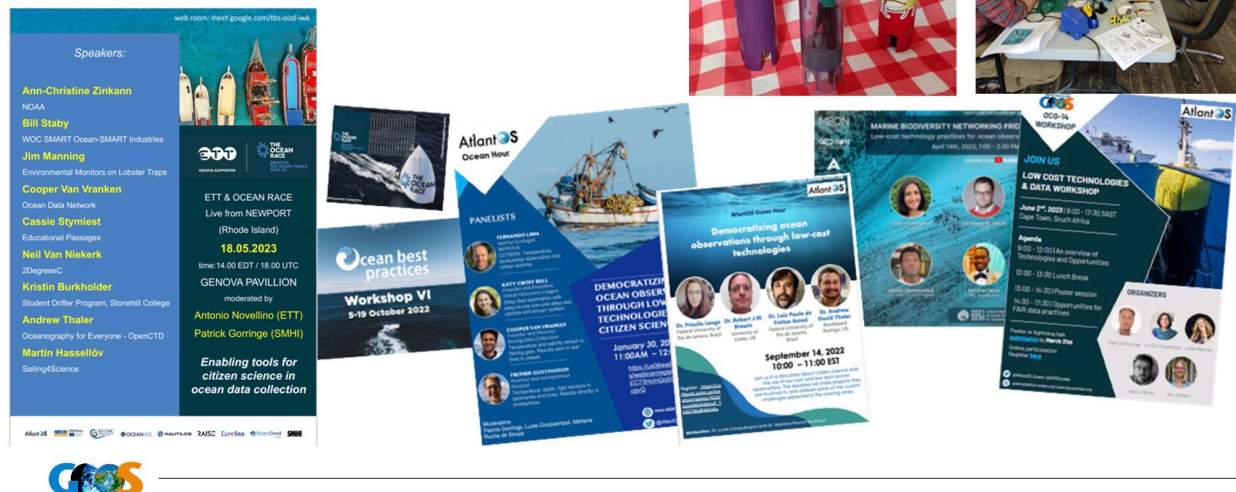


Figure 6. screenshot from the workshop presentations

5.3 Events

A. Meetings/events Organized and attended				
Date	Location	Type event (internal or external meeting, training/workshop)	ppt	Short description and main results (# participants, agreements made, etc.)
13/4/2023	Las Palmas, Spain + web	workshop	yes	EUROSEA - Autonomous Surface Vehicles - EMODnet is a key stakeholder and was invited to present and discuss on metadata, ingestion and data flow
03-04/04/2023	web	technical working group	yes	EMODnet Technical working group
11-12/04/2023	Lanarca, Cyprus	meeting	yes	EMODnet Ingestion General Assembly
13/4/2023	web	workshop	yes	EuroSea - WP3 Platform Networks workshop - EMODnet is a key stakeholder and was invited to present and discuss on metadata, ingestion and data flow
20/04/2023	Itajai, Brasil	workshop	yes	Ocean Data Hours - ocean data management - The Ocean Race Village, Genova Pavillion
27/4/2023	web	workshop	yes	EMODnet River activities & BOOS
3/5/2023	web	meeting	yes	ArcticROOS - EMODnet is a key stakeholder and was invited to present and discuss on metadata, ingestion and data flow
04-05/05/2023	Madrid, Spain + web	workshop	no	Tide Gauge Workshop
09-11/05/2023	Oslo, Norway	meeting	yes	NAUTILOS General Assembly - EMODnet is a key stakeholder and was invited to present and discuss on metadata, ingestion and data flow
18/05/2023	Newport, Rhode Island, US	workshop	yes	Ocean Data Hours - low cost technology for ocean data monitoring - The Ocean Race Village, Genova Pavillion
23/05/2023	Brest, France	meeting	yes	EMODnet SC
24-25/05/2023	Brest, France	workshop	no	European Marine Days
26/05/2023	web	meeting	yes	MIC TWG - periodic meeting to discuss on metadata, QC/QF, ingestion and data flow, Ocean Best Practices, etc
2/6/2023	Cape Town, South Africa	workshop	yes	GOOS - Low cost technology Workshop
5/6/2023	Aarhus, Denmark	workshop	yes	Ocean Data Hours - talk to a scientist - The Ocean Race Village, Genova Pavillion
12/06/2023	The Hague, The Netherlands	workshop	yes	Ocean Data Day - talk to a scientist - The Ocean Race Village, Genova Pavillion
13-14/06/2023	Brussels, Belgium	meeting	yes	EFFECTIVE KOM - EMODnet is a key stakeholder and was invited to present and discuss on metadata, ingestion and data flow
15/06/2023	web	meeting	no	AIVP GA
19/06/2023	web	meeting	no	TG NOISE
26/06/2023	Genova, Italy	workshop	no	EyesOnPlastic
26/06/2023	Genova, Italy	workshop	yes	Mission Restore - EMODnet as source and destination for FAIRness in situ data

27-30/06/2023	Genova, Italy	workshop	yes	<input type="radio"/>	Ocean Data Week - The Ocean Race Village
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Figure 7. the events flyers

5.4 Static Page Contents review:

Physics

Data on temperature, salinity and currents in the water column, sea level trends, wave height and period, wind speed and direction, water turbidity (light attenuation), underwater noise, river flow, and sea-ice coverage. EMODnet-Physics is an upstream ocean data integrating service. It builds on the discovery of data sources or providers and their connection to the EMODnet Physics infrastructure. It provides a single point of access to in situ ocean physics time-series data and vertical profiles, data products and metadata built with common standards, free of charge and no restrictions. The available parameters cover temperature, salinity and currents profiles, sea level trends, wave height and period, wind speed and direction, water turbidity (light attenuation), underwater noise, river flow, and sea-ice coverage.

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Objectives

EMODnet Physics has successfully designed, organized, and is running operational services that provide ocean physics data and data products built with common standards, free of charge, and without restrictions. The available parameters cover temperature, salinity, and current profiles, sea level trends, wave height and period, wind speed and direction, water turbidity (light attenuation), underwater noise, river flow, and sea-ice coverage.

The data sources can include research institutes that hold data from scientific expeditions, such as ICES; environmental protection agencies that perform routine monitoring surveys; research programs and infrastructures that manage marine monitoring systems (e.g., Argo, OceanSITES, GO-SHIP, etc.) and repeated observations (CTDs) or observatories and networks (e.g., EMSO, SeaDataNet); and private companies that work in the blue economy sector.

The data products consist of collections of in-situ data, reanalysis and trends of parameters, and space and time aggregated in situ data and model outputs.

Background

EMODnet Physics marine data infrastructure originated from the advancements made by the Global Ocean Observing System (GOOS) community, particularly the European component (EuroGOOS), in the development of operational physical oceanography capabilities.

The consortium represents a strong cooperation between the Copernicus Marine Service (CMS) In Situ Thematic Assembly Centre (INS TAC), the SeaDataNet network of National Oceanographic Data Centers (NODCs), the International Council for the Exploration of the Sea (ICES), and the Joint Technical Commission for Oceanography and Marine Meteorology in situ Observations Programme Support Centre (OceanOPS).

EMODnet Physics combines European marine data collection projects with international programs such as Argo, the Data Buoy Cooperation Group (DBCP), OceanSITES, the Global Ocean Ship-based Hydrographic Investigation Program (GO-SHIP), the Global Sea Level Observing System (GLOSS), and the Ship Observation Team (SOT), which comprises the Volunteer Observing Ship (VOS) and Ship of Opportunity Program (SOOP). Additionally, OceanGliders and tagged animals.

However, it is important to acknowledge that the primary investigators, marine technicians, ship's crew, and volunteers who have made and continue to make numerous oceanographic measurements, often under challenging conditions, are responsible for the quality and quantity of the oceanographic data. The institutions that maintain the platforms and the projects that plan, fund, and execute field campaigns and operational ocean monitoring are responsible for the spatial and temporal coverage of the oceanographic profile data. The data managers are responsible for preserving and ensuring the reusability of the data. This vast network, maintained and updated over time, deserves credit for the aggregated data collections available in EMODnet Physics.

Approach

EMODnet Physics does not operate any platforms; instead, it serves as the final step in gathering oceanographic data for public dissemination. Data from key European oceanographic repositories and marine infrastructures (such as EuroGOOS, Copernicus Marine Service INSTAC, and SeaDataNet NODCs) are integrated with other available data sources, including the ICES database, PANGAEA repository, the Permanent Service for Mean Sea Level, the SONEL - GNSS data assembly center for Global Sea Level, the Global Sea Level Observing Service, and the European Multidisciplinary Seafloor and Water Column Observatory (EMSO). This integration aims to provide the most comprehensive catalog of in-situ ocean physics data. In this context, EMODnet Physics encourages the adoption of the CC-BY license for data products.

In addition to this federated data management system, EMODnet Physics develops aggregated data products and interoperability services to facilitate machine-to-machine interaction. Datasets are provided with metadata and are downloadable in multiple data formats (netcdf, csv, txt, etc.).

EMODnet Physics catalogs go beyond European borders to offer a comprehensive entry point to global ocean physical observations, covering regions from the Arctic Ocean (International Arctic Buoy Program - IABP) to the Southern Ocean Observing System (SOOS), the Deep Ocean Observing System (DOOS), and the Global Oceans (ARGO, GO-SHIP, etc.).

The available data collections are discoverable based on themes (such as temperature, salinity, and current profiles), platforms (mooring, drifting buoys, tide gauges, etc.), recording age (near-real-time, delayed mode), depth, provider, and area. Each dataset/platform has a dedicated platform page that provides users with metadata, plots, download features, platform products (such as monthly averages and transects), as well as additional information and links to the data provider or program. Data quality information is available in connection with datasets, along with the ability to explore available machine-to-machine services.

Products

Temperature and Salinity in the water column

Temperature is a crucial component of the climate system and its variability in the water column. Sea-surface temperature (SST) has a significant impact on energy, momentum, and gas exchanges between the ocean and atmosphere. Daily variations in SST can exceed 3°C and can lead to changes of over 10 Wm⁻² in the surface energy budget in the tropics and subtropics.

Subsurface ocean temperature is a fundamental observation for understanding various ocean phenomena that influence climate, including ocean stratification, circulation, mixed layer dynamics, water mass properties, and coastal shelf-open ocean exchange. Profiling subsurface temperature observation systems also contribute to in-situ validation of satellite observations of surface temperature. Changes in ocean temperature, for instance, can impact the growth rate of farmed fish, as well as the distribution and abundance of wild fish stocks and other economically and socially valuable marine species.

Salinity observations play a role in monitoring the global water cycle, ocean density, mass, and more. These in-situ data are essential inputs for many ocean models, for validating and calibrating remote sensing observations, and for understanding the ocean's role in the global climate system.

EMODnet Physics provides in-situ observations from various catalogues, both European (such as SeaDataNet, CMS, ICES DB, etc.) and international (including MEOP, SOOS, DOOS, IOOS, etc.), linking different platforms with a wide range of spatial and temporal scales.

The EMODnet Physics data collection includes moorings, which offer high temporal resolution at specific locations but have limited spatial resolution due to array density; gliders and tagged animals that provide higher spatial resolution depending on endurance and instrument characteristics; profiling floats (ARGO) that deliver temperature profiles typically from 0-2,000 meters; casts from ship-based Conductivity-Temperature-Depth (CTD) observations along research voyage tracks, providing temperature observations throughout the water column; Expendable probes (xBT) dropped from a network of volunteer commercial vessels along major shipping routes, observing temperature to several hundred meters depth on a roughly seasonal repeat schedule; and surface loads and ferrybox repeated transects, which offer high-resolution sea surface temperature datasets.

Using these in-situ data, it is possible to analyze trends, create maps, and generate gridded data products. Examples include the CORA (Coriolis Ocean Dataset for Reanalysis), developed by IFREMER for the Copernicus Marine Service and regularly updated (annually), and the SeaDataNet Regional Climatology products, developed by SeaDataNet partners using DIVA software and periodically updated

<<href: https://productmaps.s4oceandata.eu/EP_MAP_TEMP_001/>>

A near real time picture of the sea surface temperature and salinity is made available by a dedicated web interactive page.

<< href: https://productmaps.s4oceandata.eu/EP_MAP_TEMP_002 >>

EMODnet Physics is also offering a SMOS Sea Surface Salinity product developed by the Barcelona Expert Center – CISC for EMODnet.

<< href: https://productmaps.s4oceandata.eu/EP_MAP_PSA_004/>>

Sea Surface Currents

The general circulation of the ocean surface plays a significant role in the transport of heat, salt, passive tracers, and ocean pollutants. Ocean currents, in conjunction with atmospheric currents, contribute to the redistribution of equatorial heat content towards the poles. There are two main types of sea currents: surface wind-driven currents and the thermohaline circulation.

The existing surface current observing systems, such as moorings and Lagrangian drifters, capture a substantial portion of this range. EMODnet Physics combines these observations with land-based High-Frequency (HF) radar observations, which provide a high-resolution tool (albeit with limited spatial coverage) for improved understanding of surface currents, eddies, air-sea fluxes, and exchanges between coastal waters and the open ocean. The EMODnet Physics HFR catalogue, which includes approximately 150 antennas, combines the European HFR node observation capacity

<< href: <https://eurogoos.eu/high-frequency-radar-task-team/> >>

with global sources, making it one of the most comprehensive sources of HF Radar observations worldwide.

Sea Level

Sea level is considered an Essential Ocean Variable by the Global Ocean Observing System (GOOS). Measurements of sea level along coasts have been conducted since the 19th century using tide gauges.

Tide gauges remain a key method for observing trends in mean sea level, assessing extreme events, making tidal predictions, supporting geodetic applications, and facilitating harbor operations and navigation. Tide gauge measurements are increasingly important for new warning systems for tsunamis and storm surges, as coastal inundation and storm surges can lead to significant flood events and the destruction of property and infrastructure.

Sea level is regarded as one of the most crucial Essential Climate Variables (ECVs), given that its projected evolution over the next few decades is predicted to pose challenges for millions of people, particularly those in vulnerable areas. Continuous monitoring of sea level trends is essential, and EMODnet Physics incorporates different data collections:

European Tide Gauge Stations (EuroGOOS - Tide Gauge task team), which constitute a network of approximately 500 operational stations providing hourly data. These data undergo near-real-time quality control (NRTQC) to identify spikes.

The UNESCO IOC Sea Level Monitoring Service, which comprises a network of over 1,250 operational tide gauges providing near-real-time data that contributes to international tsunami networks. These data are available "as is" and are not quality controlled or intended for research purposes.

The Global Sea Level Observing Systems (GLOSS) core network, consisting of around 300 stations that form the foundation of the global in-situ sea level network. This network ensures even sampling of coastal sea level variation at various time scales.

JRC-TAD tsunami array devices, a network of over 1,000 smart sensors that monitor real-time sea level status at a frequency of one minute, supporting tsunami warning services.

The GLOSS Fast Delivery (FD) and Research Quality (RQD) tide gauge data, operated by the University of Hawaii Sea Level Centre (UHSLC). The database includes 574 stations. FD data are released within 1-2 months of data collection and undergo basic quality control focusing on large level shifts and obvious outliers. FD data is replaced by RQD data as it becomes available, usually 1-2 years after FD.

The Permanent Service for Mean Sea Level (PSMSL) global sea level database, which provides long-term sea level change information from tide gauges and bottom pressure recorders. The database comprises over 2,350 stations and contains monthly and annual mean sea level values.

These in-situ data are processed by the PSMSL expert center, which provides relative sea level trend and sea level anomalies products. The relative sea level trends measured by tide gauges reflect local changes in water level plus local vertical land motion. However, these trends are not corrected for land movement. Tide gauge trends are relative to a fixed point on land and can be influenced by land movements caused by earthquakes or ground-water withdrawal. These in-situ trends are part of the EMODnet Physics products collection in the EMODnet GeoViewer.

The absolute sea level is processed using geodetic data from GNSS stations (SONEL). SONEL serves as the GNSS data assembly center for the Global Sea Level Observing System (GLOSS), developed under the auspices of the IOC/UNESCO. Based on the SONEL product, EMODnet Physics offers an absolute sea level trend product.

EMODnet Physics also includes gridded and reanalysis products developed by CMCC for EMODnet Physics. The map is based on SSALTO/DUACS altimeter products produced and distributed by the Copernicus Marine Service. The satellite trends reflect changes in sea surface height, with most of the spatial variation resulting from the influence of winds blowing over the ocean.

<< href: [>>](https://productmaps.s4oceansdata.eu/EP_MAP_SLEV_006)

Wave (height and period) - Sea State and Wind (speed and direction)

Sea state refers to the characterization of waves and swells, including their height, wavelength, period, and directional wave energy flux. It is widely recognized that sea state significantly impacts marine safety, marine transport, and the potential for damage to structures. However, the availability of in-situ wave and wind observations remains limited.

EMODnet Physics provides access to these data by integrating multiple data sources, such as the Data Buoy Cooperation Panel, OceanSITES, EuroGOOS regional observations in Europe, and more, into a single catalogue. Operational data are aggregated to provide a synoptic dynamic view of sea state conditions.

River Runoff Data

River runoffs exert a strong influence on their neighboring coastal areas in various ways, such as modifying water stratification, introducing significant fluctuations in circulation patterns, and modulating the impact of upwelling events. However, uncertainties arise due to the global decline of hydrometric networks, which affects the availability of river runoff data and information on water properties like temperature and salinity.

Typically, climatology products of rivers are imposed at the land boundaries of coastal or regional ocean models, overlooking the inter-annual variability in flow and associated properties of rivers. This omission limits our understanding of river dynamics and their impact on coastal areas. River flow fluctuations, from low to high levels, occur frequently and rapidly due to heavy rainfall, disrupting plant life and animal reproduction. These factors are crucial for coastal area management and improved forecasting systems.

EMODnet Physics serves as an in-situ hub for accessing operational river runoff data, offering over 600 stations. River runoff data can be accessed through the EMODnet geoviewer and an advanced product that also includes river catchment information.

The EMODnet Physics River runoff operational product is developed in collaboration with CoLabAtlantic+. The research-quality river data database is operated by the Global Runoff Data Center (GRDC). EMODnet Physics includes a subset of the GRDC, focusing on coastal areas and including only stations located near the river mouths

<<href: https://productmaps.s4oceandata.eu/EP_MAP_RVFL_001/>>

Water Clarity (Light Attenuation)

Light attenuation is a significant parameter for determining the photic zone, which refers to the zone with sufficient light for photosynthesis. It is essential for understanding total primary production and the distribution between pelagic and benthic primary production. In addition to working on in-situ data collection of water clarity data, including the availability of a database for parameters such as turbidity, EMODnet Physics offers a Total Suspended Matter (TSM) product.

The TSM product represents the percentage of suspended particles (not dissolved) and is presented as a gridded product. It is based on the CoastColour L2W Concentrations Data, which is obtained from the OC4 algorithm for clear and moderately turbid waters, as well as the CoastColour v1 neural network. The L2W product is then remapped onto a regular grid while maintaining a full resolution of 300 meters. This allows for the generation of products covering European sea basins on a monthly average basis.

The TSM product, developed by CNR – ISMAR for EMODnet Physics, covers the period from 2003 to 2012.

Underwater Noise

Underwater noise, which has adverse effects on the health of marine species and biological productivity, is gaining attention as a form of pollution. Maritime traffic serves as the main source of continuous noise, while impulsive noise sources include pile driving during construction, seismic exploration using airguns, explosions, and sonar systems.

EMODnet Physics provides two products related to underwater noise: the collection of impulsive noise events and the atlas of sites for continuous noise monitoring.

The impulsive noise events are compiled nationally from registers of licensed events, such as pile driving, controlled explosions from naval operations, and other activities that release energy. Most Member States provide these data to the Regional Sea Conventions, contributing to regional assessments of MSFD descriptor 11.1.1 (Low and mid-frequency impulsive noise). Regional registries, operated by ICES (HELCOM, OSPAR) and Centro Tecnológico Naval (Mediterranean Sea), are unified and made available through EMODnet Physics.

These efforts aim to enhance understanding and assessment of underwater noise impacts in different regions.

Guidelines from TG NOISE:

[JRC Publications Repository - Setting EU Threshold Values for impulsive underwater sound \(europa.eu\)](#)

[JRC Publications Repository - Setting EU Threshold Values for continuous underwater sound \(europa.eu\)](#)

Sea Ice data

Sea ice extent and thickness are rapidly decreasing, particularly in the Arctic. This loss of sea ice can have long-lasting effects on the cold branch of the global thermohaline circulation. EMODnet Physics incorporates in-situ data collections from various sources, including the International Arctic Buoy Cooperation Program, the Woods Hole Ice-Tethered Profiler Program, and icebreakers and research vessels operating in the Arctic area (ARICE). Additionally, EMODnet Physics supports the Southern Ocean Observation System (SOOS) by providing the data backend infrastructure to host and make Southern Ocean data accessible.

<< href: www.soosmap.aq >>

The positions of the platforms are superimposed on the sea ice extent in both the Arctic and Antarctic Oceans.

Sea ice extent is derived from the SEAICE_GLO_SEAICE_L4_NRT_OBSERVATIONS_011_001 product, which was developed by SIW-METNO-OSLO-NO for the Copernicus Marine Service.

<<href: https://productmaps.s4oceanandata.eu/EP_MAP_SICE_001/>>

<<href: https://productmaps.s4oceanandata.eu/EP_MAP_SICE_002/>>