EMODnet Data Ingestion

EASME/EMFF/2018/1.3.1.8/01/SI2.810021 - Ingestion 2

Start date of the project: 11/10/2019 - (24 months)

Final Report

Reporting Period: 11/10/2019 – 10/10/2021

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Disclaimer

0. Executive summary

This report describes the activities and results achieved during the two years of EMODnet Ingestion and safe-keeping of marine data no 2 contract, which ran from 11th October 2019 to 10th October 2021. It is a follow-up of the earlier developments in the EMODnet Ingestion and safe-keeping of marine data project, which run for 3 years from 19th May 2016 till 19th May 2019, and that resulted in the portal: https://www.emodnet-ingestion.eu.

The '**EMODnet Ingestion'** project seeks to identify and reach out to organisations from research, public, and private sectors who are holding marine datasets and who are not yet connected and contributing to the existing marine data management infrastructures which are driving EMODnet. Those potential data providers should be motivated and supported to release their datasets for safekeeping and subsequent freely distribution and publication through EMODnet.

The EMODnet Data Ingestion portal has been launched early February 2017. It encourages data providers to share marine data and provides a number of services as well as guidance information for marine data management. A core service is the Data Submission Service which facilitates data providers to submit their data sets. A low threshold is offered by splitting the completion of the submission form in 2 parts, whereby a data submitter only completes a part of the metadata together with the uploading of a data package. Each data submission is then assigned to a competent data centre for completing the metadata of the submission. Thereafter, those completed submissions are published with their data packages ***'as is'*** at the portal in the View Submissions Service, where users can search, browse and download the data packages.

As a next step assigned data centres might elaborate submissions further to make (subsets of) the data fit for population into national, European and EMODnet thematic portals. This depends on data centres assessing the added-value of the submitted data and the efforts needed for elaborating the data to common formats, if anyway possible.

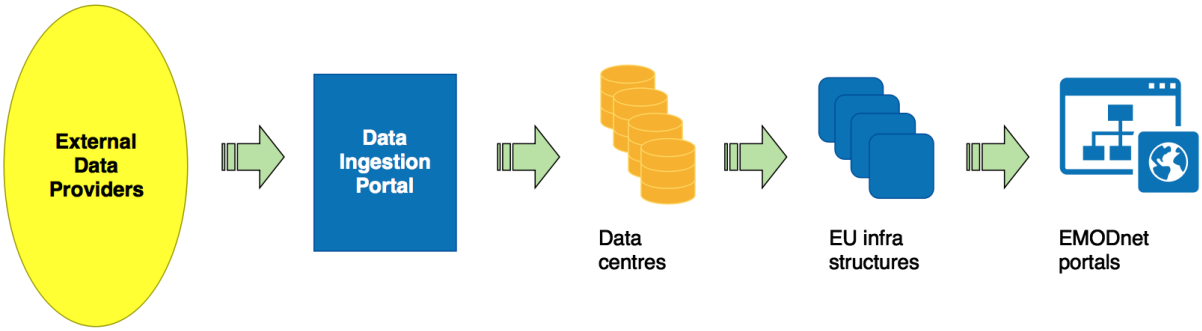

Image: workflow from submission to elaborating and processing for publishing in EMODnet

For this, a network of qualified data centres has been established, divided over many European countries and expert in EMODnet data themes. The network currently comprises 50 data centres, recruited from the EMODnet Ingestion project consortium and the EMODnet thematic networks.

Next to handling delayed mode data sets, EMODnet Ingestion also aims at reaching out to operators of operational oceanography platforms and networks for ingesting their near real-time data streams. This is arranged in a cooperation from EMODnet Ingestion with EMODnet Physics, Copernicus CMEMS-INSTAC and EuroGOOS. Moreover, the uptake by oceanography operators of Sensor Web Enablement (SWE) standards is promoted, for which a SWE demonstrator is maintained.

The new contract aimed at a continuation and improvement, where possible / needed, of the various services of EMODnet Ingestion, and at a further expansion of the number and types of data sets and data

providers that could be mobilised for making their data freely available for publishing through EMODnet Ingestion and following inclusion in EMODnet Thematic portals.

For that purpose, most efforts in the project have been dedicated to further outreach activities promoting the EMODnet Ingestion initiative and to processing incoming data submissions. Although the marketing and promotion have been and still are being seriously hampered by the COVID-19 crisis, considerable results have been achieved which are described in this report. The results concern an increased number of submissions received and processed, but also synergies established with other projects and initiatives, integrating EMODnet Ingestion in the European marine data management landscape. Furthermore, a number of technical improvements have been established for the portal and services, further optimising the performance of EMODnet Ingestion.

At the end of the first 3 year contract, at 19th May 2019, there were **619** submissions with **506** published '*as is*' and of these **205** elaborated to phase 2 and ingested into European portals. Over the two years of the EMODnet Ingestion 2 contract, these numbers have increased considerably. At 10th October 2021, there were **1071** submissions with **936** published '*as is*' and of these **425** elaborated to phase 2 and ingested into European portals. This is an excellent result and demonstrates that EMODnet Ingestion has established its place in the European marine data landscape, performing roles as promotor of data sharing, educator for how to adopt common standards, and facilitator for publishing and elaborating a wide range of data sets for various disciplines and from all sectors.

1. Introduction

Many data collected by public authorities, researchers and private operators of coastal or offshore facilities still do not arrive to national or regional repositories and are thus unavailable to potential users. This creates additional costs for those working on marine issues who will have the choice of accepting lower confidence in their analysis than would otherwise be the case, or being compelled to needlessly repeat observations. There is therefore the need to streamline the data ingestion process so that data holders from public and private sectors can easily release their data for safekeeping and subsequent distribution through EMODnet or other means.

In 2016 EASME concluded a contract for developing a service for ingestion and safe-keeping of marine data. In that context, a Data Ingestion Portal has been developed, which facilitates data managers to ingest their marine datasets for further processing and publishing as open data. In 2019, a new contract has been established with the same consortium for continuing the Ingestion service for another two years. The general objective is to facilitate and streamline the process whereby marine data from whatever source (including national monitoring programmes, research projects and private companies) is delivered on a voluntary basis for safekeeping to data repositories from where it can be freely disseminated.

The service contract comprised the following tasks:

- **Task 1**. Maintain and further develop the existing web portal and its services;
- **Task 2**. Implement pathways for delivering data to final repositories, on condition that they are made freely available and that open access to the data is ensured;
- **Task 3**. Facilitate machine-to-machine transfers;
- **Task 4**. Operate a help-service for users to provide their data in the most appropriate format;
- **Task 5**. Allow providers of data to track the progress of their data from submission through to their storage in a repository;
- **Task 6**. Include a "data wanted" function that allows users seeking certain types of information to specify their needs;
- **Task 7**. Participate in discussions with EMODnet partners in order to improve the efficiency of the whole collection, assembly and dissemination process. Including participating to EMODnet Steering Committee meetings and EMODnet stakeholder conferences;
- **Task 8**. Maintain a summary record of data delivered;
- **Task 9**. Engage in outreach activities towards significant holders of marine data whose data are not already available;
- **Task 10**. Service continuity.

The EMODnet Ingestion no 2 consortium brought together a European consortium of overall 46 organisations (marine research institutes, governmental agencies, and SME's) from 28 coastal countries. Together they have continued the EMODnet Ingestion service by means of technical operation and maintenance of the technical components and by marketing and processing of ingested submissions for publication and wider distribution via national, regional, European and EMODnet portals. Geographically the overall network has nodes in the countries around all European marine basins and it covers also all EMODnet data themes. Most members are data centres and are qualified as National Oceanographic Data Centres (NODC) recognised by the International Oceanographic Data and Information Exchange (IODE) of the Intergovernmental Oceanographic Commission (IOC) of UNESCO or as National Geological Surveys or as National Hydrographic Agencies. Moreover, all EMODnet thematic data portal projects are represented by their coordinators.

This final report will describe the activities and results achieved during the two years of the EMODnet Ingestion and safe-keeping of marine data no 2 contract, which ran from 11th October 2019 to 10th October 2021.

2. Update on the Tasks

The progress in each task detailed in the Tender Specifications under Section 1.4.1 since the start of the project phase (from 11th October 2019 to 10th October 2021) is listed below:

Task 1. Maintain and further develop the existing web portal and its services:
The EMODnet Ingestion portal has been maintained in the reporting period, whereby also care was taken that all services kept functioning as required, while also bugs were fixed. As part of harmonisation of the EMODnet visualization, changes were made to the width of the topbar and the menu of the lower bar of the EMODnet Ingestion website. A dedicated endpoint has been developed and activated to retrieve the downloadable volumes per submission as requested for the quarterly key indicators.

Task 2. Implement pathways for delivering data to final repositories, on condition that they are made freely available and that open access to the data is ensured:
EMODnet Ingestion 2 has a network of 50 data centres which act as 'assigned data centres' for processing received data submissions. The submission process has been refined with additional rules following experiences. HCMR as scientific coordinator has interacted with several data centres to progress with the processing and publishing process. There was also a close cooperation with IFREMER as publisher of the SEANOE entries for further streamlining the ingestion flow and ironing out any issues. At the end of the first 3 year contract, at 19th May 2019, there were **619** submissions with **506** published '*as is*' and of these **205** elaborated to phase 2 and ingested into European portals. Over the two years of the EMODnet Ingestion 2 contract, these numbers have increased considerably. At 10th October 2021, there were **1071** submissions with **936** published '*as is*' and of these **425** elaborated to phase 2 and ingested into European portals.

Task 3. Facilitate machine-to-machine transfers:
Very good progress was made by the cooperation between EMODnet Ingestion and EMODnet Physics towards identifying and convincing more Near Real Time operational oceanography sources (operators, platforms, sensors) to get connected to the European ocean data exchange which is organised together with CMEMS-INSTAC for NRT data and SeaDataNet for archived data. In the contract period multiple sources were convinced and connected. Data sets were added/linked and made available at EMODnet Physics for more than 400 river stations from operators in Spain, Italy, Scandinavia, UK, and other countries, more than 70 sea level stations, including the JRC Tsunami Alert Device network and EMSO, and a monitoring station for underwater noise. In addition, new opportunities were explored, that will be given a follow-up such as possible cooperation with Arctic networks (e.g. EU ARICE project and IADC Italian Arctic Data Centre), Ocean Race Europe, LAMMA network (Italy), EU NAUTILOS project, and SBM Offshore. Furthermore, the Viewing Service, hosted at the EMODnet Physics portal, has been upgraded to provide more visibility to the NRT platforms/sites that have been arranged as part of the joint activities of EMODnet Physics and Ingestion. Next to results for NRT data exchange, also further progress was made towards Real Time (RT) exchange, by promoting uptake of the Sensor Web Enablement (SWE) standards. More connections were made and currently there are 1550 sensors connected to the SWE Demonstrator interface at EMODnet Physics. The SWE Toolkit has also been adopted by the H2020 Eurofleets+ project for managing underway data streams from sailing research vessels. In addition, alternative technologies have been studied and tried for RT exchange, namely the DAB brokerage framework and ERDDAP.

Task 4. Operate a help-service for users to provide their data in the most appropriate format:
The portal has a service-desk, which is operated on working days. Users can either email their questions or ask for a call back. Emails are sent to a generic service desk mailbox. All queries are saved and tracked in the Open-source Ticket Request System (OTRS), allowing providing statistics on the questions received.

Recorded queries are analysed in order to elaborate a Frequently Asked Questions (FAQ) page at the portal. Over the contract period a total of 25 questions were received and answered.

Task 5. **Allow providers of data to track the progress of their data from submission through to their storage in a repository:**
Data providers can follow the processing of their data submissions in the Submission Service, which is done in several steps each indicated by a status field. Data providers are contacted by assigned data centres, in case there are additional questions about the ingested data sets.

Task 6. **Include a "data wanted" function that allows users seeking certain types of information to specify their needs:**
This function is offered by the Data Wanted service which facilitates users to submit post-its, which are then matched with published datasets. Users receive alert messages every time new matches have been established. In practice this service is not really functioning and it is advised not to continue with this service in a possible future successor of EMODnet Ingestion.

Task 7. **Participate in discussions with EMODnet partners in order to improve the efficiency of the whole collection, assembly and dissemination process. Including participating to EMODnet Steering Committee meetings and EMODnet stakeholder conferences:**
Coordination mostly took place by e-mail and short web conferences, and two full project group meetings were joined by all partners of the consortium. The EMODnet Ingestion 2 consortium also comprises the coordinators of each of the thematic lots, which allows for tuning with their project activities. The coordination team participated in several meetings of other themes and in the EMODnet Steering Committee and TWG meetings, as well as the 10 years EMODnet event.

Task 8. **Maintain a summary record of data delivered:**
This function is offered by the View Submissions service. Each completed submission is migrated to that service for publishing as part of a discovery and access service. Distinction is made in phase I and II which has been added as a new search facet. Editing activities took place aimed at replacing so-called orphan data for organisations from free text into controlled EDMO terms and orphan data for projects into controlled EDMERP terms in order to improve the integrity and richness of the metadata.

Task 9. **Engage in outreach activities towards significant holders of marine data whose data are not already available:**
Near the end of the 1st year, an update was compiled of the inventory of potential data sources of interest to EMODnet. The inventory comprises potential data providers and data sets, more than 340 data sets from 26 countries. The inventory is detailed in Deliverable D4.1 which is included as Annex to this report. It has been used as guidance for follow-up activities in the second year. Despite the COVID-19 crisis, still many contacts and web presentations have taken place which have resulted in dialogues with several interesting groups and initiatives, such as U.N. Decade of Ocean Science, RGI – Renewable Grid Initiative, Atlantic REMP project, OceanEye, SBM Offshore, All-Atlantic Workshop, and many others. To support the promotion and marketing, existing promotional materials have been updated and this portfolio has been expanded with additional items, while tuning with the EMODnet Secretariat. This included: 1) updating leaflets; 2) new stickers; 3) updating the EMODnet Ingestion movie, in particular with achieved results in numbers and examples; 4) A0 poster; 5) pins; and 6) Digital background for web conferences. Several of these items were launched at the EMODnet Open Conference – Jamboree held on 14-16 June 2021, which was joined by most partners, whereby several also had an active role in different sessions.

Task 10. **Service continuity:**
Coordination of the consortium has been undertaken by MARIS and HCMR to ensure the continuity of the EMODnet Ingestion portal and its array of services. Two plenary project meetings were held, 30 Sept – 1 Oct 2020 and 21 – 22 September 2021, with all partners. In November 2020 the annual Interim Report was produced, which was accepted by EU in December 2020. In the last period, activities were undertaken for compiling and delivering the Final Report and the Transfer Protocol.

To make the execution of the contract easier and more effective, a Work Plan was implemented that groups specific tasks, comparable in nature, under the same Work Packages (WP):

Work Package No.	Work Package title	Covering tasks	WP leader
WP0	Project Management	Task 7 – EMODnet tuning Task 10 – service continuity	MARIS
WP1	Construct and operate central Data Ingestion portal with services	Task 1 - web-portal Task 5 – tracking service Task 6 – data wanted service Task 8 – summary service	HCMR
WP2	Implement and operate pathways	Task 2 – pathways Task 4 – help service	IFREMER
WP3	Facilitate machine-to-machine transfers	Task 3 – machine-to-machine	ETT
WP4	Marketing and outreach	Task 9 - outreach	RBINS

Details on the WP activities and tasks are presented in following Chapter.

3. Work Package updates

This section provides a list of all Deliverables as from the technical work plan in the table below and the activities that occurred during the full project, using the work package as a header.

Status of the Milestones/Deliverables listed in the workplan			
Milestone/Deliverable	WP	Date due	Status (Pending/Resolved)
D0.1: Quarterly concise progress reports	0	M3, M6, M9, M12, M15, M18, M21, M24	Resolved
D0.2: Interim report	0	M12	Resolved
D0.3: Final report	0	M24	Resolved
D0.4: Transition and hand over protocol	0	M24	Resolved
D1.1: Web portal operational, incl extranet	1	M1 – M24	Resolved
D1.2: Guidelines, manuals, handbooks on portal	1	M1 – M24	Resolved
D1.3: User Management service operational	1	M1 – M24	Resolved
D1.4: Data Submission Service operational	1	M1 – M24	Resolved
D1.5: Data tracking service operational	1	M1 – M24	Resolved
D1.6: Data Wanted service operational	1	M1 – M24	Resolved
D1.7: Summary Records service operational	1	M1 – M24	Resolved
D1.8: Portal and services upgrades responding to user feedback and coupling SEANOE	1	M1 – M12	Resolved
D2.1: Pathways operational	2	M1 – M24	Resolved
D2.2: Many submissions processed and published 'as is' (stage 1) and at EMODnet portals (stage 2)	2	M12, M24	Resolved
D2.3: Help service operational	2	M1 – M24	Resolved
D3.1: Updated documentation, standards and procedure for NRT data published	3	M12, M24	Resolved
D3.2: Connections with new NRT monitoring stations operational	3	M12, M24	Resolved
D3.3: SWE Demonstrator upgraded and updated instructions + guidance published	3	M12	Resolved; see Annex
D3.4: SWE Demonstrator expanded with new stations	3	M12, M24	Resolved; see Annex
D4.1: Inventory of potential data sources and providers in European countries and priorities	4	M4	Resolved; see Annex
D4.2: Updated promotion material	4	M12	Resolved
D4.3: Use cases as examples	4	M12, M20	Resolved
D4.4: Results of marketing and outreach activities	4	M12, M24	Resolved

Note: The technical annex of the contract did not include Milestones.

WP0 – Project Management

Covering Tasks 7 and 10

The project management and the coordination of EMODnet Ingestion have aimed at ensuring timely delivery of outcomes and high quality of documentation, tools, results and products. Project management includes the collaboration with the other EMODnet thematic portals, with the Central portal group and larger EMODnet organisation. The consortium is coordinated by MARIS (project coordinator and HCMR (scientific coordinator).

On 23rd July 2019 message was received from the EU that the bid for EMODnet Ingestion 2 had been successful. Finally, all evidence was supplied on 5th October 2019 and this triggered the countersigning of the new EMODnet Ingestion 2 contract on 11th October 2019. Since then, further contractual activities were undertaken by the coordinator for drafting and getting agreement and signatures for the partner contract with HCMR and bilateral subcontracts with the 44 other members of the EMODnet Ingestion 2 consortium. All subcontractors have signed.

As follow-up and on request on EASME, the content of the portal was reviewed for possible Brexit issues, considering that the UK has officially left the EU. In practice, no changes were required as EMODnet Ingestion already has a larger network of organisations from many countries in Europe, whereby in web presentations no distinction is made in EU members and non-EU members.

Coordination mostly took place by e-mail and short web conferences. The EMODnet Ingestion 2 consortium also comprises the coordinators of each of the thematic lots, which allows for tuning with their project activities. Activities were undertaking for organizing a full project meeting in May 2020, back-to-back with the European Maritime Day 2020 in Cork, Ireland, which would have given also a good opportunity for promotion and marketing. Unfortunately, due to the COVID-19 crisis the planned project meeting could not take place and was postponed as web conference to 30 September – 1 October 2020. At the meeting progress of all project activities, overall and per partner, was discussed and input was gathered for the annual interim report.

A second EMODnet Ingestion 2 plenary project meeting was again held online and at 21 – 22 September 2021, joined by all members of EMODnet Ingestion consortium, which includes the coordinators of all EMODnet Thematic lots. At this meeting, interesting developments were discussed, such as promotion by EMODnet Human Activities and actual adoption by the EU MSP (Marine Spatial Planning) committee of offering Member States the option to submit their completed MSPs through EMODnet Ingestion for uptake in EMODnet Human Activities. In a comparable way, EMODnet Chemistry has successfully promoted such an approach for Marine Litter reporting by Member States, supported by EU JRC and TG ML. In the near future, more such arrangements might be made, promoting EMODnet Ingestion as a structured instrument for Member States reporting on specific marine topics, which then are processed and elaborated by EMODnet Thematic lots for inclusion and publishing as EMODnet data products.

Contributions were given for the EMODnet 2019 and 2020 Annual reports upon request of the EMODnet Secretariat. Moreover, the coordinator of EMODnet Ingestion 2 participated in the preparations and events around 'EMODnet 10 years' and the EMODnet Jamboree.

MARIS and HCMR participated to several other EMODnet meetings, representing EMODnet Ingestion and maintaining relations with other lots.

7 – 8 November 2019	Genua – Italy	Kick-off meeting EMODnet Physics IV	Re-establishing the cooperation between EMODnet Physics, EMODnet Ingestion, and CMEMS INSTAC for identifying, encouraging and connecting more observing platform operators for joining the European NRT oceanographic data exchange.
8 April 2020	Web Conf	EMODnet Physics progress meeting	Discussing progress of EMODnet Physics, including the joint EMODnet Physics – EMODnet Ingestion activities.

20 April 2020	Web Conf	EMODnet – CMEMS coordination meeting	Discussing progress from EMODnet and CMEMS and exploring further options for synergy and future perspectives.
21 - 22 April 2020	Web Conf	EMODnet Steering Committee meeting	Overall project progress monitoring, new perspective for EMODnet, and discussing several strategic development.
23 – 24 April 2020	Web Conf	EMODnet Technical Working Group meeting	Technical progress, and discussing new perspective for EMODnet.
31 July 2020	Web Conf	Preparation 'EMODnet 10 years' – session	Discussing possible panel members and their invitation between MARIS, SMHI and HCMR.
3 August 2020	Web Conf	EMODnet Physics – Ingestion cooperation	Discussing progress of activities for the EMODnet Physics – Ingestion cooperation between MARIS and ETT.
17 September 2020	Web Conf	SWE adoption in Eurofleets+ project	Discussing progress of SWE adoption for transfer of (meta)data from Research Vessels to HUB and further publishing through client between MARIS and Eurofleets+ group
22 September 2020	Web Conf	EMODnet 10 years	Participating in this event with MARIS and HCMR
24 September 2020	Web Conf	EMODnet Biology progress meeting	Discussing progress of joint EMODnet Biology – EMODnet Ingestion activities.
30 September – 1 October 2020	Web Conf	EMODnet Ingestion plenary meeting	Discussing progress of EMODnet Ingestion activities and gathering input for Annual Interim Report
9 -10 November 2020	Web Conf	EMODnet Steering Committee meeting	Overall project progress monitoring, and discussing several strategic development.
12 – 13 November 2020	Web Conf	EMODnet Technical Working Group meeting	Technical progress, and discussing progress migration of EMODnet.
19 November 2020	Web Conf	Eurofleets+ project WP3 meeting	Discussing progress of SWE adoption for transfer of (meta)data from Research Vessels to HUB and further publishing through client.
2 February 2021	Web Conf	EMODnet Chemistry progress meeting	Discussing progress of joint EMODnet Chemistry – EMODnet Ingestion activities.

9 February 2021	Web Conf	EMODnet Physics progress meeting	Discussing progress of EMODnet Physics, including the joint EMODnet Physics – EMODnet Ingestion activities.
9 February 2021	Web Conf	EMODnet – CMEMS coordination meeting	Discussing progress from EMODnet and CMEMS and exploring further options for synergy and future perspectives.
24 February 2021	Web Conf	Eurofleets+ project WP3 meeting	Discussing progress of SWE adoption for transfer of (meta)data from Research Vessels to HUB and further publishing through client.
25 March 2021	Web Conf	EU DG MARE meeting	Discussing potential lead with Renewable Energy Grid initiative.
19 April 2021	Web Conf	EMODnet Steering Committee meeting	Overall project progress monitoring, and discussing several strategic development.
20 - 21 April 2021	Web Conf	EMODnet Technical Working Group meeting	Technical progress, and discussing progress migration of EMODnet.
8 – 9 June 2021	Web Conf	EMODnet Secretariat meeting	Preparation of EMODnet Jamboree
14 – 18 June 2021	Web Conf	EMODnet Jamboree	Participating and contributing to EMODnet Jamboree and back-to-back sessions
8 September 2021	Web Conf	EMODnet Steering Committee meeting	Overall project progress monitoring, and discussing several strategic development.
9 – 10 September 2021	Web Conf	EMODnet Technical Working Group meeting	Technical progress, and discussing progress migration of EMODnet.
21 – 22 September 2021	Web Conf	EMODnet Ingestion plenary meeting	Discussing progress of EMODnet Ingestion activities and gathering input for Final Report

An extranet is maintained to manage all project documents concerning contractual affairs, project activities and minutes and presentations of project meetings. The extranet can be reached through the EMODnet Ingestion portal and all consortium members have received logon details for their account.

Furthermore, a mailing list is used to support internal communication: cg@emodnet-ingestion.eu for all consortium members. In particular the consortium mailing list has been used regularly by the Coordination team to give guidance and suggestions to consortium partners about the ongoing and planned activities and to clear up any questions.

MARIS prepared and submitted quarterly progress reports for the eight quarters in the two years of the EMODnet Ingestion 2 contract. Moreover, a progress report was prepared and submitted for the gap between the 1st EMODnet Ingestion contract and its successor, namely for May till October 2019. A first Annual Progress report was drafted and submitted at 11 November 2020, and accepted by EU in

December 2020. All mentioned progress reports were accepted by EASME (later replaced by CINEA) and made available from the EMODnet Ingestion portal at https://www.emodnet-ingestion.eu.

Finally, this Final Report was drafted for submission to the EU CINEA together with a Transfer Protocol, as part of the service continuity task. The Protocol beings together software and data of the EMODnet Ingestion portal and services for hand over to EU CINEA.

WP1 – Construct and operate central Data Ingestion portal with services

Covering Tasks 1,5,6, and 8

The existing EMODnet Ingestion portal already has several operational services, which were developed and taken into operation in the previous contract phase. The portal and each of the services have been maintained in the reporting period, and further improved, where possible and needed. This could include solving some bugs or making some amendments for improving functionality.

Indicators have been generated about the performance of the Data Ingestion portal, which are reported in Chapter 9. Following the GDPR Directive, activities were undertaken together with the EMODnet Secretariate and EU services to improve the GDPR compliance of the EMODnet Ingestion website and related services. For instance, https:// certificates were acquired and implemented for all domains. Following the feedback and renewed request by EASME, additional activities were undertaken to improve the GDPR compliance. In practice, a number of open items were resolved and reported, which were accepted.

Submission service:

The online Submission service has built in functionality for data providers to follow the processing of their data submissions, which is done in several steps each indicated by a status field. Moreover, it has two phases, with phase I aimed at publishing the ingested data sets 'as-is' with metadata completed by an assigned data centre, and with phase II aimed at elaborating the ingested data sets to standard formats for inclusion and sharing in national and European data infrastructures, feeding into EMODnet thematic lots. Data providers can follow the progress on-line and are contacted by assigned data centres, in case there are additional questions about the ingested data sets. Data providers also have a right to block phase I publication of their data sets within 30 days after completion by the assigned data centres. In practice no use is made of this option and by default all phase I completed data sets are published after 30 days review. For phase II publication no further agreement is asked from the data providers. They can follow this process on-line, and might be contacted for further information to support the elaboration process. Regarding the IT infrastructure of the system, major activities included:

- Information System monitoring of the performance and allocating available computing resources.
- Implementation of a new improved environment (virtual machine) for the testing and development (staging) version of the system.
- Database and Application backups.
- Various supporting actions, i.e. site certificates renewal.

There have been identified several cases where the Data Centres needed support to change the Contact person responsible for reviewing and completing the original submission. The reasons for these changes varied, with the result being the same: need to alter the responsible person handling a submission. This has not been an operation predicted in the first version of the system. Consequently, human intervention was needed to perform the changes requested. As the number of requests has been increasing, it was decided to develop a new dedicated module, allowing both the Data Centre and Administrators (Masters) of the system to complete this kind of operations through the user interface. The new module is called "Re-Assignment" and provides the means to change the Contact person responsible for a submission form. The operation is available only under specific statuses, namely the ones that the Data Centre is

'allowed' to edit a submission form. This rule is applicable for both Phase I and Phase II of the life cycle of a submission. The development of the module required a thorough analysis of the system's business logic and the possible implications. In summary, the assigned Contact person may now be changed, without the need to introduce a status change. Additionally, there have been added new rules in the notification system, to ensure the interested parties get notified upon a 'Re-Assign' operation is triggered.

There have also showed up cases where some forms needed amendments after they have reached out of Data Centres' control. For example, changing some elements in the organization responsible, while the form was ready to be published. Another set of cases appeared concerned the replacement of the data files accompanying the submission form. The replacement was for cases that the data file was not easily recognizable and formattable by end users accessing it. All the aforementioned cases have been addressed by the Ingestion Support team.

Significant resources have been also allocated to improve the performance of sub-modules. Specifically, code rebasing has taken place to improve the KPI calculation time, since as the number of the submissions increased, there has been a speed degradation during the calculation of the KPIs. In the same category the data exchange mechanism with the View service has been improved. The improvement regarded the computation algorithm of the resulting dataset (in json format), which is harvested by the View service.

There have also been actions towards compliance with the legislative framework (GDPR, EU-US Privacy Shield framework). There has been a successful check for unnecessary cookies, use of services involving transfer of personal data to non-EU/EEA countries. Furthermore, a cookie consent module has been developed.

Some bugs have also been addressed during the reporting period. The most important one concerned the de-coupling of a Data Centre from its representatives (Contact persons) when Data Centre's metadata (applicable specialisms) was edited by the system administrators (Masters). This decoupling resulted to a need to manually re-couple Data Centre with the respective contacts. The bug had not been identified as important at earlier stages, due to significant effort put by the system administrators to set-up complete Data Centre profiles and since addressing was easy to be done due limited number of contact persons per Data Centre.

Another bug, identified during the harvesting of the data by the View service, concerned the loss of EDMO codes, when the Organization name changed and the change introduced special characters in the name. The bug was addressed by introducing stricter matching rules.

Finally, a dedicated endpoint has been developed and activated to retrieve the downloadable volumes per submission as requested for the quarterly key indicators.

Data Wanted service:

The Data Wanted service facilitates users to submit post-its, which are then matched with published datasets. Users will receive alert messages every time new matches have been established. In practice, little use is made of this service.

Summary Records service:

Summary records of submissions are published by means of the_View Submissions service. Each completed submission is migrated to that service for publishing as part of a discovery and access service. Distinction is made in phase I and II which has been added as a new search facet. During the reporting period, next to giving regular follow-up to the publishing process, editing activities have taken place aimed at replacing so-called orphan data for organisations from free text into controlled EDMO terms and orphan data for projects into controlled EDMERP terms. This improves the integrity and richness of the metadata of the published data submissions for searches, reports and detailed pages. While the

harvesting mechanism in the Submission service has been improved with further data file integrity checks, smarter cleaning and matching of free text content with Ingestion vocabularies.

Coupling with SEANOE data citing service:

A dynamic exchange between the SeaDataNet SEANOE data citing service (https://www.seadatanet.org/Software/SEANOE) and EMODnet Ingestion has been deployed, after several tests. The SeaDataNet SEANOE service invites European scientists to publish their scientific papers and associated data collections in return for a DOI which promotes their wider citation. The exchange facilitates that (selected) scientific submissions from SEANOE are harvested by EMODnet Ingestion for further metadata completion, publishing 'as-is', and elaboration of data sets for inclusion and publishing in national and European portals. Following experience with the coupling, additional checks have been formulated and are performed on SEANOE end to ensure thematic consistency of the submission fed to Ingestion Service. The dynamic exchange has been taken into production early 2020, and this has resulted in a series of SEANOE data submissions which have been assigned to data centres for processing like any other data submission.

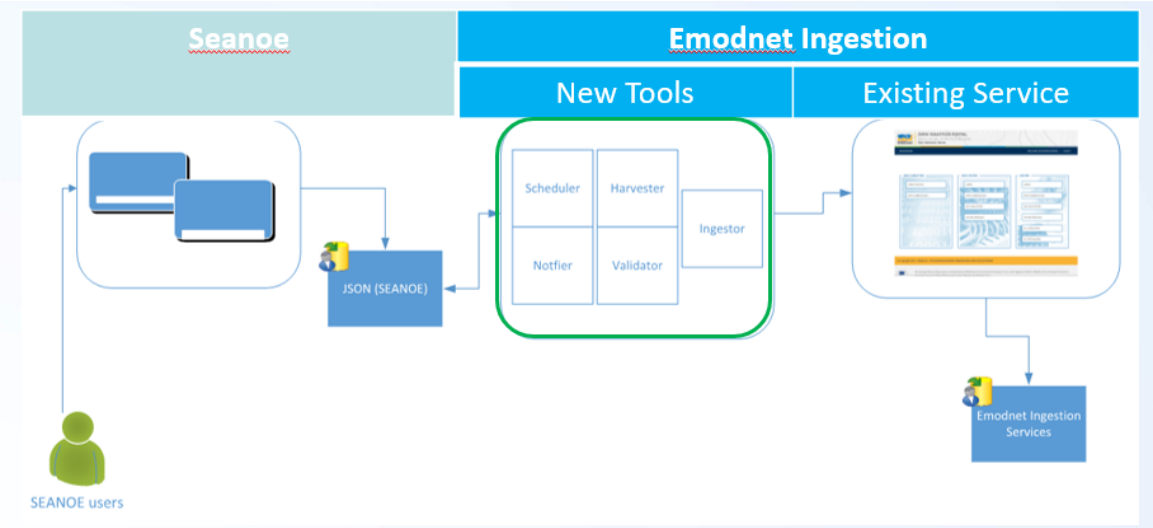

Figure: Logical Structure of the SEANOE – Ingestion exchange mechanism

During the design but also during the development process there has been the need to address semantic interoperability issues (schema/metadata matching, stricter rules in Submission Service and adoption of vocabularies), as well as operational ones (e.g. many data files in SEANOE vs one dataset in Submission service, huge data in SEANOE). With the cooperation of both working group teams all the issues have been solved and the exchange is fully operational since February 2020. By the end of the second phase of EMODnet Ingestion project (10 October 2021), 140 SEANOE data submissions have been ingested into the Submission Service, approximately 14% of the total. The SEANOE submissions were assigned to 11 data centres, which are responsible for their process according to the project workflow. The majority of them (approximately 78%) are assigned to Ifremer, an expected result as the SEAOE service has been developed by Ifremer and is widely used by French scientists compared to the other partners of the EMODnet Ingestion project.

More than half of the SEANOE entries have been already published in the Viewing Submissions service of the project (82 submissions at Phase I) and approximately 9% (12 submissions) are integrated into European infrastructures and EMODnet portals (Phase II).

More than 50% of the submissions concern data for Physics, followed by Biology (22%) and Chemistry (16%), Bathymetry (6%), Geology (2%) and Human Activities (1%). This distribution reflects the fact that in the field of marine data collection activities the acquisition of physical data exceeds the other data types.

In addition, data such as chemical, bathymetric, geological or human activities reach out the EMODnet portals through existing data streams.

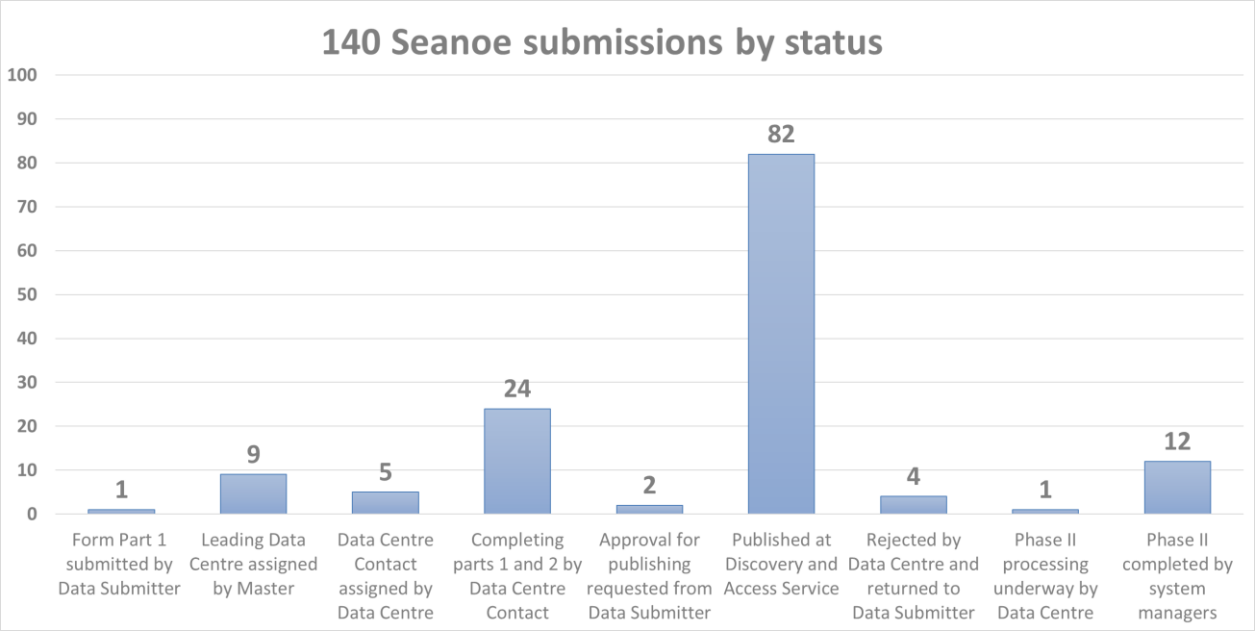

Figure: SEANOE submissions per workflow status

Lessons learned

By the every-day usage of the system, some useful lessons have been learned and necessary changes have been encountered that were not foreseen. Some of these changes were already addressed while others will be managed at a future stage, in case of a new contract:

- Screening of rejected submissions showed that the rejection function was not used in a proper way in some cases. Assigned data centres sometimes rejected several submissions when the respective data types were not managed by the specific data centre. However, this is not a rejection reason but rather this is more applicable for not being able to do phase II elaboration. Still, the data centre can publish the data for Phase I at the project Viewing service as other users may have an interest on these. Therefore, these rejected submissions were pushed again back to the data centres and the data centres were suggested to continue the metadata completion and publish these as is for Phase I. For instance, this insight led to making the selection of SEANOE data sets for ingestion more fit and relevant to the EMODnet scope;
- Several cases were identified where the Data Centre Contact person responsible for reviewing and completing the original submission needed to be changed. Main reasons where the staff movement from one Institute to another or a retirement. This change was not predicted in the initial design of the system. Hence, a re-assignment function has been developed for facilitating Data Centres to switch a responsible person to another from their organization;
- The monitoring of the workflow and the elapsed time between the initial submission and its publishing (Phase I) and/or Phase II elaboration, has shown that in some cases there were delays between the processing steps. For this reason, regular reminders were sent to partners through emails by the administrators in order to speed up the “slow” cases. To improve this follow up activity, new rules will be added to the notifications system and automatic alerts will be sent to re-activate submitters and data centres within the workflow process;
- As new data types are coming into the system such as saildrones, underwater noise data, video, marine litter, spectrometer radioactivity data, etc, more experience should be gained by partners

for the standardisation and harmonisation in terms of existing formats, vocabularies, quality control procedures. This would facilitate a more complete integration of these data into EMODnet;

- More and more data owners, both from the private and research communities, are willing to join and share their data. As in the previous case of the new data types, these data holders need to become more familiar with the data management practices of the marine and oceanographic communities, progammes and projects so that their data could be more easily and quicker ingested into the European Infrastructures and EMODnet.

WP2 – Implement and operate pathways

Covering Task(s) 2 and 4

EMODnet Ingestion has a network of 50 data centres which are 'recruited' from EMODnet Ingestion and Thematic portals consortia to act as 'assigned data centers'. In practice, each ingested data submission will be assigned by MARIS to a qualified data centre from this network, who then will do further processing. Since the end of the previous contract, **452** new submissions have been recorded and for those, data centres have been assigned. Moreover, HCMR as scientific coordinator has interacted with several data centres to progress with the processing and publishing process which has resulted in **430** phase I publications and **220** phase II publications. This brings the scores at 10th October 2021 at **1071** submissions with **936** published '*as is*' and of these **425** elaborated to phase 2 and ingested into European portals. More details about population can be found in Chapter 6.

Throughout the project, a continuous examination of each partners' submissions was taking place by the coordinators (MARIS, HCMR) for the purpose of monitoring the growth of the content and the performance of the system. Partners were regularly alerted to continue their efforts for identifying new data among their data providers or from new ones and to make progress with both the new and the older uncompleted submissions of the system. When unusual delays were noticed, partners were contacted to move on with the finalization of the metadata completion of Phase I as well as with the elaboration of data sets for Phase II implementation. Through the close monitoring of each submission of each partner and data provider, several issues came up which were addressed by the coordinators in close collaboration with the users of the system. For example: how to manage the different types of marine litter data, how to manage data sets out of the scope of the data centres and of EMODnet in general, amendments in the format of the ingested data for more easy integration by the EMODnet portals, changes in data centres contact persons details (such as credentials, organizations, submissions re-assignments), additions of new data centres contacts, guidance for Phase II implementation in case of doubts, management of duplicate submissions, management of big data sets, corrections of metadata at published submissions.

Additionally, the already existing notification system in the Data Submission service has been enriched with new rules. These rules facilitate MARIS and HCMR as Ingestion Administrators to act upon and improve the time required for SEANOE submissions to reach national and European portals. More actions are planned to further fine tune the notification system. The goal is to motivate all actors undertake timely the necessary actions and improve the performance of the system, which will be a combination of automatic triggering of e-mails and human communication.

The service-desk of EMODnet ingestion is available from the portal at the following address: https://www.emodnet-ingestion.eu/help and it is operated on working days by IFREMER and MARIS. Users can either email their questions or ask for a call back. Emails are sent to a generic service desk mailbox managed by IFREMER and MARIS. All queries are saved and tracked in the Open-source Ticket Request System (OTRS) managed by IFREMER, allowing providing statistics on the questions received. Recorded queries are analysed in order to elaborate a Frequently Asked Questions (FAQ) page, available on the EMODnet ingestion website at https://www.emodnet-ingestion.eu/help/faq.

Currently, 5 FAQs are listed:

- What are the data requirements for data providers?
- What kind of license is applicable to a dataset?
- Do I need to register to submit data?
- I don't manage to connect with Marine-ID
- Does EMODnet ingestion provide DOI?

The statistics about the usage of the helpdesk from 11 October 2019 to 10 October 2021 show that 25 questions were received by the EMODnet ingestion helpdesk. A detailed overview of these requests is given in chapter 6. None of them asked for a call-back. This small number has to be put into perspective with the fact that many EMODnet ingestion users make direct contacts with their assigned data centre which directly answers to their questions. They bypass the EMODnet ingestion helpdesk, because they already have direct contacts.

The requests can be divided into 9 different categories which are listed in the following **Error! Reference source not found.**.

	Type of request	**Comments**
1	Can I include my data?	*the user wonder if her/his specific dataset is of interest for EMODnet ingestion*
2	Connection problem	*The user does not manage to be connected because of password forgotten, need of new account…*
3	Data wanted	*The user needs help for the data wanted service*
4	Error or upgrade needed	*Using the submission portal the user encounters errors. This kind of request were at the beginning of the implementation of the EMODnet ingestion submission portal. None error of this type occurs during the 1st year of EMODnet ingestion 2*
5	How to use	*The user needs some help to use the submission portal : how to update data already submitted? Can a DOI be attributed through the submission portal?…*
6	License/Copyright	*The user is uncertain about which license/copyright to use for her/his data*
7	Mailing list	*The user wants to know if he/she can register to a newsletter or a specific EMODnet mailing list*
8	Metadata/Data	*The user is uncertain about the metadata he/she should use for his/her data set*
9	Partner request	*The user is a data centre, partner of the EMODnet ingestion portal, and wants to make a change on an already submitted file, or is not sure about which vocabulary to use or has question about the dataset he/she was appointed…*

Table: different categories of user requests

The statistics per type of requests are presented below.

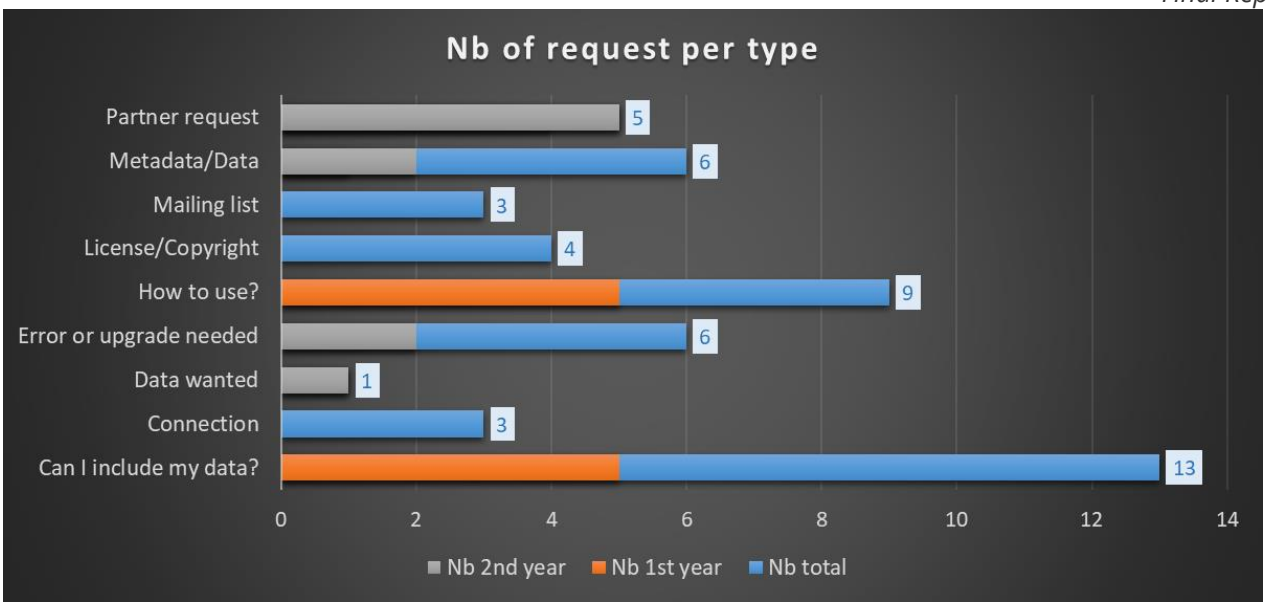

Figure: Number of requests received per type through the EMODnet ingestion service desk during the 1st and 2nd years of EMODnet ingestion 2 versus the total number of requests

Delay to answer the queries is normally short; most of the questions are answered the same day than they are submitted. Exceptions concern non working days or more complicated questions which involve several other partners.

WP3 – Facilitate machine-to-machine transfers

Covering Task 3

Progress was made by the cooperation between EMODnet Ingestion and EMODnet Physics towards identifying and convincing more Near Real Time operational oceanography sources (operators, platforms, sensors) to get connected to the European ocean data exchange which is organised together with CMEMS-INSTAC for NRT data and SeaDataNet for archived data. The cooperation was also reviewed and discussed with CMEMS-INSTAC during the kick-off meeting of EMODnet Physics IV in November 2019. In particular, roles of actors and approach were discussed and re-established between all stakeholders.

Progress towards new and more Near Real Time sources:

This action is done together with CMEMS-INSTAC to have a common and synchronized approach to stakeholders. In analogue to the delayed mode ingestion process as applied in the Data Submission service of EMODnet Ingestion, the (near) real time operational data flow ingestion can be described into 2 distinct phases:

- Phase 1: publishing in EMODnet Physics of the submitted/identified operational data source “as is”
- Phase 2: once this data is fully digested by partner infrastructures (either national, European or International assembly center).

The promotion to phase 2 requires further elaboration (e.g. adoption of common QC/QF at source, adoption of standardized metadata, etc.) and may be not always possible.

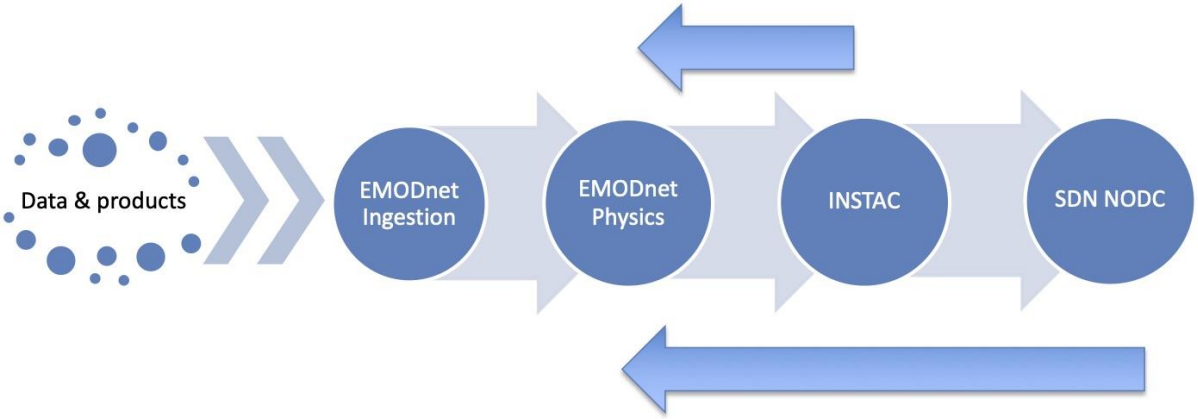

Figure: Simplified schema of the NRT ingestion process. Once the source is available in Physics "as is" (gray lines), phase 1 is achieved. Blue arrows indicate flows once phase 2 process has been completed.

EMODnet Physics is the primary client of this process, and for monitoring the output of these progress, dedicated views and pages have been developed for this EMODnet Ingestion – Physics collaboration. In the two-year project, multiple operators were convinced and connected, while further activities are underway for others. EMODnet Physics has largely redesigned its back end infrastructure. The new data infrastructure is logically organized in three layers (data – services - applications), uses a combination of databases (mySQL, postgreSQL), and data-tools (ERDDAP, GeoServer, GeoNetwork, etc.). Once a new operational data source is ingested into the data layer and a data-collection is added to the ERDDAP data server, phase 1 is completed. This link is the used to continue the process towards the competition of the ingestion phase 2.

Over the two years, the following results were achieved.

Description	Status	Parameters	notes
20 tide gauge from the Sweden Maritime Administration	Phase 2	Sea Level	This data collection was then included into the CMEMS INSITU TAC Baltic product
4 wave buoys in Liguria [2 DISTAV.ARPAL] [2 OSIS.DLTM]	Phase 1	Wave	
Berring Data Collective - Fish vessel data [>500K measurements]	Phase 2	Temperature, Salinity	This data collection was then included into the CMEMS INSITU TAC Global product
Saildrone [> 20K measurements]	Phase 1	Temperature, Atm pressure	

Antarctic Circumnavigation Expedition (ACE)	Phase 1	Temperature, Biogeochemistry	the NRT connection is towards the ACE data dissemination system – i.e. zenodo – as soon as a new dataset is available it is harvested and made available in the EMODnet Physics catalogue.
HFR Lisbon	Phase 2	Surface Currents	This data collection is also included into the EU HFR node and CMEMS INSITU TAC Global product
HFR Cornwall	Phase 2	Surface Currents	(the stream is temporary suspended)
HFR Finnmark – Norway	Phase 2	Surface Currents	This data collection is also included into the EU HFR node and CMEMS INSITU TAC Global product
JRC TAD (tzunamy alert device)	Phase 1	Sea Level	
Sea Level Center University of Hawaii	Phase 2	Sea Level	This data collection is part of GLOSS partnership
NMDIS sea level stations	Phase 1	Sea Level	
EMSO stations (OBSEA, SmartBay,...)	Phase 1	Temperature, Salinity, Noise,	
Centro Tecnologico Naval	Phase 1	Noise	
T-MEDNET	Phase 2	Temperature, Salinity	This data collection was then included into the CMEMS INSITU TAC Global product

Table: New connected operational data stations /operators

Besides these, which already are very important results, the theme that recorded the biggest result is the "River outflow", more specifically the operational river outflow data is now covering Portugal, Spain, France, UK, Ireland, Germany, Belgium, Sweden, Norway, Italy, as well as some international areas (US). Connected providers are:

- ARPA Veneto, ARPA Emilia Romagna
- APA - Agencia Portuguesa do Ambiente – Portugal
- BIZKAIKO FORU ALDUNDIA - DIPUTACION FORAL DE BIZKAIA
- Confederacion Hidrografica del Cantabrico, CH Cantabrico
- Augas de Galicia, Xunta de Galicia
- Confederacion Hidrografica del Guadalquivir
- Direccion General de Infraestructuras del Agua, Junta de Andalucia
- Confederacion Hidrografica del Segura, OA

- Confenderacion Hidrografica del Jucar, Spain
- Confederacion Hidrografica del Ebro
- Agencia Catalana de IAigua - ACA, Generalitat de Catalunya
- Confederacion Hidrografica del Mino-Sil
- Augas de Galicia, Xunta de Galicia
- SCHAPI - Service central d'hydrometeorologie et d'appui a la prevision des inondations - France
- MetNO, Norway
- Department for Environment Food & Rural Affairs - DEFRA UK
- OPW - Office of Public Works of Ireland
- SMHI – Swedish Meterological Hydrografic Institute
- US Geological Survey

EMODnet Physics is the final endpoint for this data hence we can consider alle these data in Phase 2. River outflow represents a very important theme for the land-sea interface modelling hence it is recommended to keep working on new sources as well as to extend the geographical coverage to more inland stations and whenever possible (if recorded at the river gauge) to include atmospheric and chemical parameters. Notably, this will facilitate the connection with other and new communities. These results are discoverable under the EMODnet Physics mapviewer (Integrators – EMODnet Ingestion):

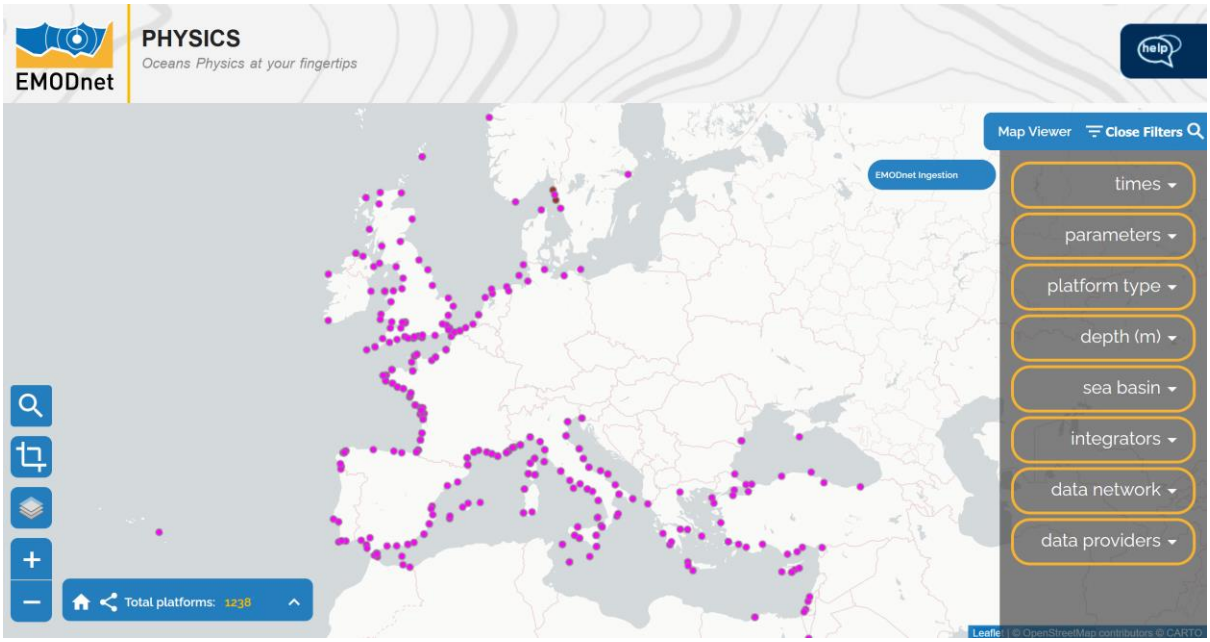

Figure: View of EMODnet Physics Mapviewer of NRT sources added with EMODnet Ingestion as Data Integrator

On-going actions:

- Arctic Data: as a follow-up of the Arctic Data Workshop it was possible to set up links and interactions with some new data providers, one is the ARICE project (https://www.arice.eu/) and in coming months there will be more interaction to identify both operational and delayed mode datasets to be ingested;
- A possible collaboration between the ARICE project (https://www.arice.eu/) and EMODnet Ingestion - Physics projects was officially presented and positively discussed with the ARICE board. As follow-up, there is analysis and mapping ongoing of the available data and defining of the M2M channel to harvest ARICE metadata (first step) and data (second step); importantly the ARICE consortium has been awarded with a new project grant (Arctic PASSION) that represents the basis for an important middle-term collaboration.
- Ocean Race Europe: contacts have been made with the organising committee of the Ocean Race Europe, a major offshore sailing competition. The Volvo Ocean 65 boats will be equipped with sensors

to collect ocean data during competitions and discussion is aimed at how to implement an operational data exchange with EMODnet

- LAMMA (Tuscany Italy) – LAMMA is planning to update its infrastructure and install new M2M services. As follow up of meetings (previous reporting period), exchanges, and further brainstorming, LAMMA decided to go for ERDDAP and they are now configuring their services. As soon as the new infrastructure will be deployed and validated, (new) data will be immediately linked and made available in EMODnet.
- A dialogue has started with SBM Offshore. They provide floating production solutions to the offshore energy industry, over the full product lifecycle. The company leads the market in leased floating production systems, with multiple units currently in operation worldwide, e.g. in Guyana, Brazil, Angola, Equatorial Guinea and Malaysia. In the light of progressing on their long-term Sustainable Development Goals 14 targets, SBM Offshore explores the possibility of using their offshore installations as metocean data collecting points and sharing these data. Therefore, a dialogue has started with EMODnet Ingestion – EMODnet Physics to explore options for equipping and data exchanges. A first meeting took place 5th July 2021. A follow-up meeting is planned 29th October 2021;
- NAUTILOS – "New Approach to Underwater Technologies for Innovative, Low-cost Ocean observation" is an H2020 project funded under the EU Future of Seas and Oceans Flagship Initiative and coordinated by CNR. NAUTILOS will fill-in marine observation and modelling gaps for chemical, biological and deep ocean physics variables through the development of a new generation of cost-effective sensors and samplers, the integration of the aforementioned technologies within observing platforms and their deployment in large-scale demonstrations in European seas;
- IADC – "Italian Arctic Data Center' is being developed by CNR-ISP in the frame of the Italian Arctic Programme (PRA). Observations over the sea collected through monitoring activities carried out by Italian research groups (not only CNR-ISP researchers) in the Svalbard Archipelago as well as data collected via cruises performed by R/V Laura Bassi in the Arctic will be collected and managed by IADC. In this context the actions promoted by EMODnet for an Arctic marine portal are of great relevance. IADC will be developed following FAIR principles, paying great attention to interoperability services to be well connected with other relevant data centers and initiatives related to the Arctic. Therefore, IADC is very interested to exchange its metadata and data with EMODNet Physics – EMODnet Ingestion for contributing to the Arctic Data Portal activities.

Progress towards Real Time data exchange:

RT data exchange through SOS SWE implementation is the second topic of collaboration between EMODnet Ingestion and EMODnet Physics. SOS SWE represents a further community tool to facilitate operational data flow: it is open source, it can be easily adopted, it can be used to model data flow pipeline, it supports metadata exchange together with data exchange. The key elements in SOS SWE implementation process implementation are:

- A SWE SOS server. Sensor Observation Service provides a standardized interface for managing and retrieving metadata and observations from heterogeneous sensor systems.
- A SWE Ingestion Service. The aim of this component is to support sensor operators, researchers and data owners to ingest data and SWE metadata from operational observing platforms and sensors into a local storage system and to publish (selected) data streams from this database by means of SOS services to receiving servers. This facilitates operators to publish streams of near-real time and real-time observation data via SOS servers by first describing the structure of the observation network and data stream and then enabling an automated data ingestion, storage, and publication process;
- A SWE Viewing Services, is an application for exploring and visualizing data streams from operational sensors and platforms.

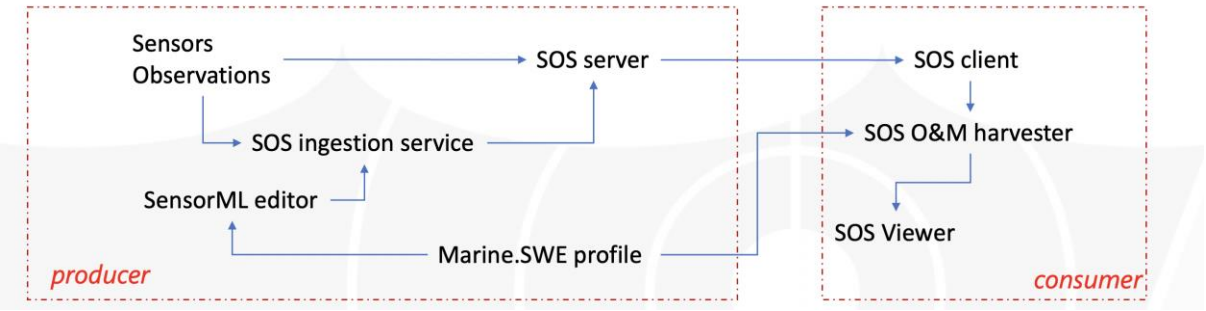

Figure: simplified representation of the SOS SWE elements

EMODnet Ingestion adopted the 52North SOS SWE implementation which is open source and fully documented. The 52N solution offers: OGC Sensor Observation Service, OGC SensorThings API and 52°North Helgoland API (optimised for developing lightweight clients). This pilot SOS service with a number of stations and instruments is available as demonstrator in the Data Ingestion portal and EMODnet Physics portal. The EMODnet Real Time page (http://realtime.emodnet-physics.eu) is a SWE Viewing Service (based on the Helgoland Sensor Web Viewer) that is able to provide RT data and metadata from marine data centers that offer a machine-to-machine interface based on the Sensor Observation Service (SOS) standard of the Open Geospatial Consortium (OGC). Its goal is to offer a simple point of access to verify that their implementation of the SOS SWE standard for RT data distribution is fully working. The page offers features by which users can add and/or remove available sensor systems to/from the portal and thus check and validate the access to their data. Its goal is to offer a simple point of access to verify that their implementation of the SOS SWE standard for RT data distribution is fully working.

Since the demonstrator was launched eleven services have been connected:

- OGS-NODC: http://nodc.ogs.trieste.it/sos/api/v1/
- NeXOS SOS Server: http://nexos.demo.52north.org/52n-sos-nexos-test/api/
- IRCEL – CELINE: https://geo.irceline.be/sos/api/v1/
- OBSEA: http://sos.obsea.es/sos/api/
- PIM: https://www.pim-liguria.it/52n-sos-webapp/api/
- ARPA Emilia-Romagna: http://arpa-er.geodab.eu/emodnet-restful/api/v1//
- HZG: https://codm.hzg.de/52n-sos-webapp/api/v1/
- SMHI: https://shair.smhi.se/52North/api/v1/
- INOGS: https://nodc.inogs.it/sos/api/
- MONALISA DATA SERVICE: http://monalisasos.eurac.edu/sos/api/v1/
- FLUGGS: https://www.fluggs.de/sos2/api/v1/

The demonstrator was launched during EMODnet Ingestion phase 1; it was largely expanded during the first part of this Ingestion phase 2, while in the second year the demonstrator was sustained.

Provider	NEXOS	IRCEL - CELINE	OBSEA	PIM	CNR + ARPA ER	HZG – FerryBox	SMHI	INOGS	MONALISA prj	52N FLUGGS server
Sensors	12	111	2	5	669	569	2825	15	31	83
Types	Mobile Platforms	Time series	Time series	Time series	Time series	Time series	Time series	Time Series	Time Series	Time Series

Datasets	14	598	17	15	4	327585	4591	64	353	212

Table: RT SWE Demonstrator implementation

Thanks to these sources, the demonstrator endpoint is offering more than 1550 sensors. Further to the pilot showcase, the EMODnet RT SWE Demonstrator is consisting of the RT page, which provides access to a full package of tools and services to support the community. It includes: back-end tools for the operators and front-end tools for EMODnet users. Moreover, it includes documentation, which has been updated, following the experiences with the practical installation at various operators, and recently released:

- Deliverable D3.3 - SWE Service Installation User Guide;
- Deliverable D3.4 - SWE Demonstrator expanded with new Services

Both Deliverables are available as Annexes to this report.

Although the reported achievements for the SOS SWE RT exchange are an important result, a number of the connected sources were developing the implementation under research projects (NEXOS, SCHeMA, etc). Now the projects are finished, some of these developments have been halted or by passed by the adoption of wider adopted technologies. As an example, since the GOOS OCG group indicated and promoted ERDDAP as the tool for facilitating FAIRness interoperability (end of 2020), ERDDAP recorded a massive adoption among data providers. The use of the SOS SWE approach for metadata management combined to the use of ERDDAP for RT data exchange may represent an interesting and easily adoptable methodology to facilitate fully documented RT data exchange.

Eurofleets+ adoption of SWE:

A comparable SWE promotion and approach is undertaken for the EU H2020 EUROFLEETS+ project which is an alliance of European marine research infrastructures (research vessels, AUVs, and ROVs) to meet the evolving needs of the research and industrial communities. The project is funding several research cruises, for which all data and metadata acquired will be published. The data management is being implemented in synergy with SeaDataNet and EMODnet Ingestion. The following image gives an overview of the data flow.

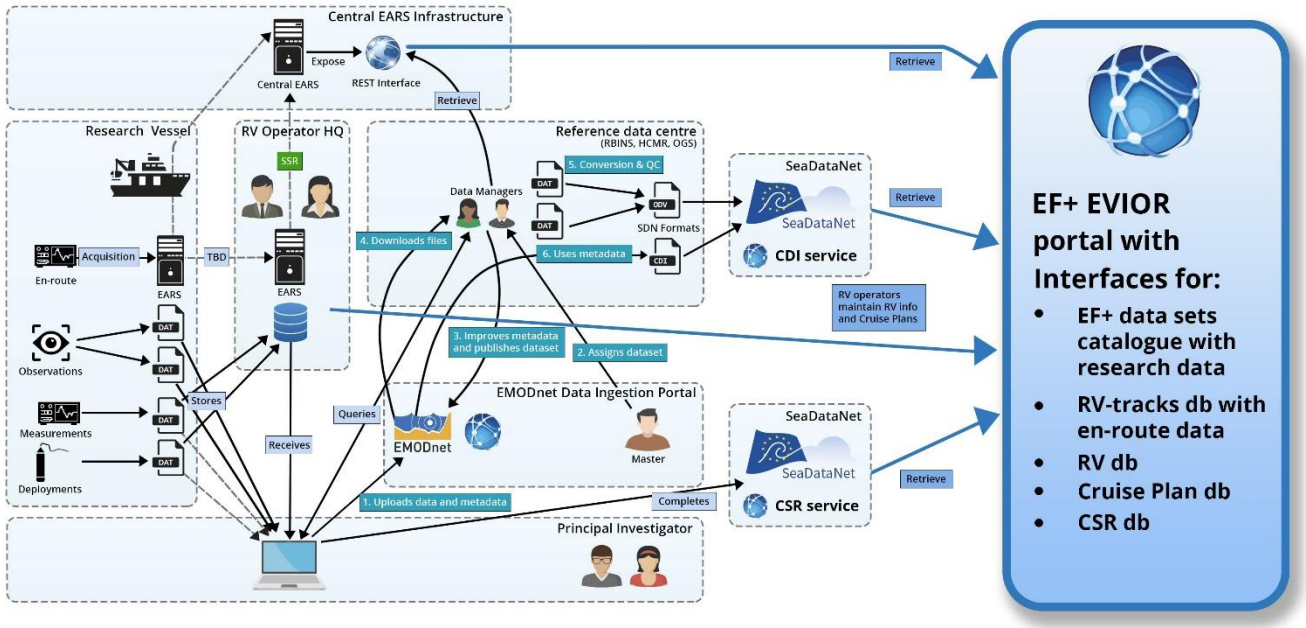

Figure: Data Management plan for data streams from Eurofleets+ research vessel cruises with role for EMODnet Ingestion Submission service

At a Eurofleets+ meeting in Barcelona, Spain, Februari 2020, joined by MARIS and 52North, this approach was discussed further and it was decided to expand the data management plan with adopting the SWE package and SWE standards for supporting a near real time (NRT), distribution, and publishing of underway data from the sailing vessels. A feasible concept was established at the meeting and activities were undertaken for further detailing and implementation.

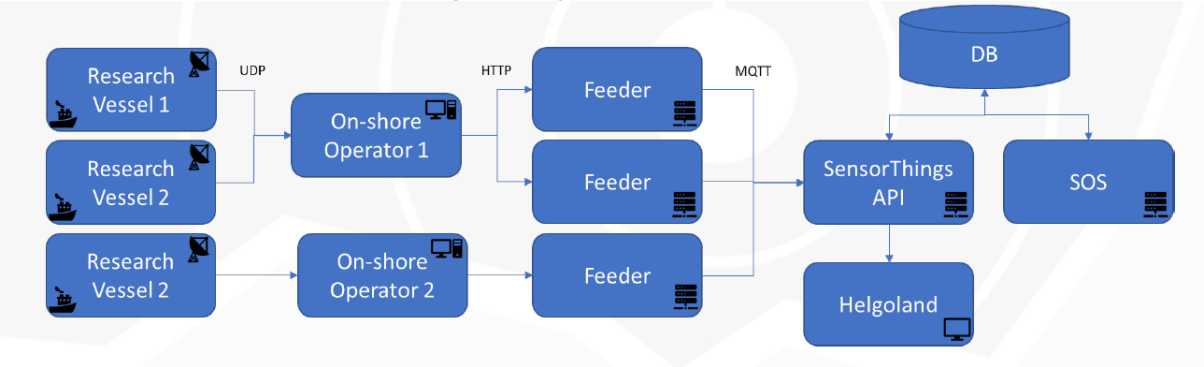

Figure: Underway Data Flow from vessels to shore to clients, applying SWE toolkit in Eurofleets+

The 52North SWE Toolkit has been configured at CSIC (Spain) which now runs a hub for receiving underway data sets (navigation, meteo, and salinometer data) from research vessels, which are then made available by means of SOS services for retrieval and display at the EUROFLEETS+ EVIOR platform, adopting the 52North client program (Helgoland viewer). Several research vessels from different operators have been connected while further deployment is ongoing for other research vessels that also will be involved in the EUROFLEETS+ transnational research cruises.

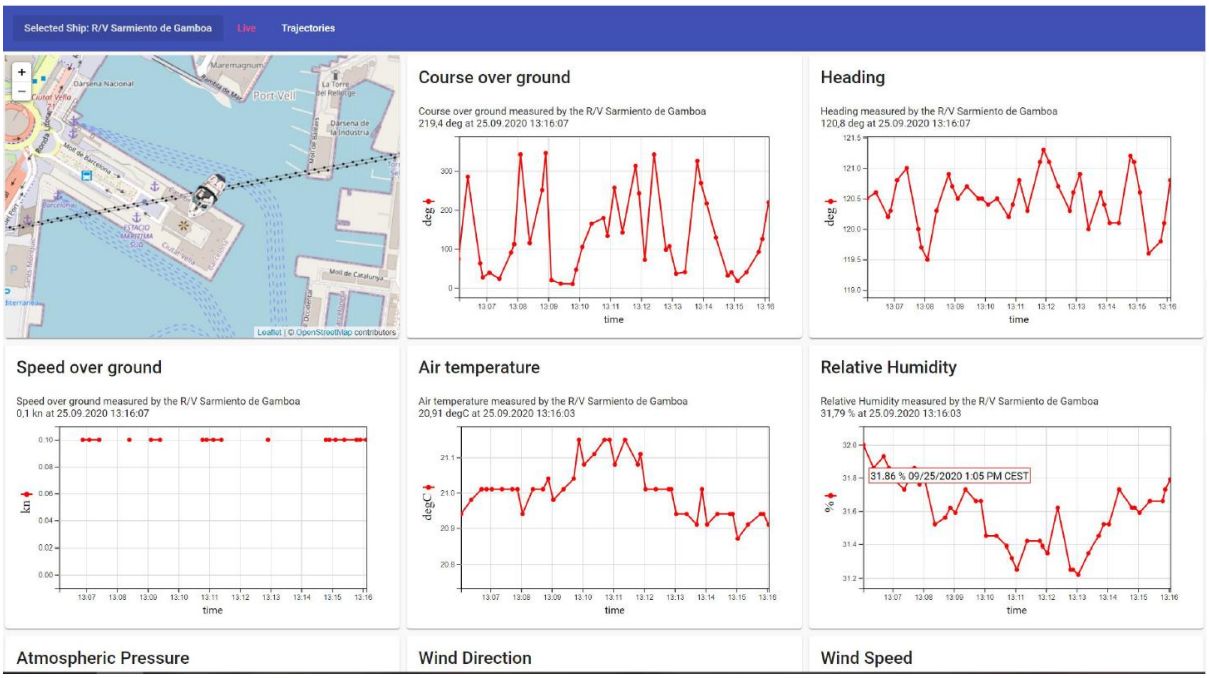

Figure: Dashboard at Eurofleets+ EVIOR platform for presenting Underway Data from research vessels, while sailing and in the port.

During the project, also a start was made with exploring a wider integration of the Broker (DAB) software component as developed and supported by partner CNR. The DAB is already offering e.g. Italian ARPA EM (Emilia Romagna Region Environmental Agency) river water levels in RT to the SOS SWE demonstrator and work is ongoing for designing a dedicated workflow for providers that would like to adopt this technology as it supports various protocols for (meta)data harvesting and access such as OGC, OAI-PMH, OpenSearch,

CKAN, and CUAHSI standard services. The brokerage, this way, can support operators to make their data streams available in a common way, while not having to make no or little changes at their endpoints.

It is also worth mentioning that the activities on smart sensors from fishermen is gaining further momentum: real-time data is flowing from a variety of sources including ILVO and NOAA NEFSC into EMODnet Physics via the Berring Data Collective along with their own data. Furthermore, there has been progress in getting these data streams into Copernicus CMEMS and WMO via dialogues with IFREMER and JCOMMOPS. An ever-increasing number of regions are interested in starting pilot projects: Ghana, Portugal, Canada. and the Southern Ocean. In addition, the first operational assimilation of this data stream has been started with the Doppio model on the East Coast of the USA.

EMODnet Ingestion is encouraging a wider use of machine-to-machine interfaces, such as the SWE package and the brokerage framework (DAB). Also, adopting ERDDAP for RT links is nowadays widely promoted. The DAB enables interoperability amongst distributed heterogeneous data sharing systems, while ERDDAP provides features to virtually link federated ERDDAP catalogues, hence it facilitates the aggregation and integration of several sources towards a single catalogue. Moreover, lately the ERDDAP[1] community is developing interesting real-time data management extensions that could represent a further tool to be offered to facilitate providers to join the network.

WP4 – Marketing and outreach

Covering Task 9

Compiling an inventory of potential data sources:

There has been a steady increase in data submissions as can be derived from the indicators, reported as part of Chapter 9. To focus marketing activities, just after summer 2020, each data centre was invited to analyse its national situation and identify potential data sources of possible interest to EMODnet which could then be used as a list for further follow-up. For that purpose, each consortium member received from RBINS an excel survey form and an updated guidance note with lessons learnt and useful hints. The national submissions were compiled and a draft overview was presented and discussed during the first plenary meeting. The survey resulted in 341 potential data sources from 27 countries and 39 institutes. All members responded to the survey. The results of the survey are reported in:

- **Deliverable D4.1:** Inventory of potential data sources and providers in European countries and priorities

Which Is made available as Annex to this Report. This inventory was used by Ingestion partners for follow-up activities.

Promotion and marketing:

Over the full project, members of the consortium made progress with promotion activities and contacts with potential data providers encouraging and supporting them for ingesting new data sets. The COVID-19 crisis made the participation to physical meetings for promotion more difficult later in the reporting period as several events were cancelled / postponed to later dates. Cancelled / postponed events included for instance Oceanology International 2020, European Maritime Day 2020, Seafood Expo Global, 6.th

[1] ERDDAP is free and open source code (JAVA program and source code is available in GitHub) that uses Apache compatible software licenses

Hydrographic Engineering Conference / 1.st Portuguese-Spanish Hydrographic Engineering Conference, and IMDIS 2020 Conference. Despite these limitations, EMODnet Ingestion was still promoted at many events (partly physical / mostly web organized). A complete and detailed overview is given in Chapter 7. This includes 95 events and meetings organized by EMODnet Ingestion partners and 127 events and meetings attended, which is quite a number over the two years of the contract. This overview not only gives events, but also indicates that there have been many contacts between the EMODnet Ingestion ambassadors and data providers to discuss the possibilities of data exchange and if positive, to support those data providers with their submissions.

This way, despite the limitations for promotion and marketing, very good progress was achieved with **452** new submissions, **430 new** phase I publications, and **220** new phase II publications. This brings the totals at the end of the reporting period on **1071** submissions, **936** phase I publications, and of these, **425** phase II publications, which indicates that EMODnet Ingestion has a great momentum and is mobilising many new data sets.

Among these submissions, one can identify several interesting cases which are documented in:

- **Annex 4** gives an overview of interesting ingestion cases per country and partners.

Which Is made available as Annex to this Report.

Promotional material:

The dissemination uses a variety of media, including promotional items which are designed and produced by partner RBINS. A number were prepared / designed in the first year and produced and disseminated during the second year of the project. The new designs respect the 2017 EMODnet Visual Identity Guidelines and are in line with the own Ingestion visual identity created by the first promotion movie 'Wake up your data'. It should be noted that elements of this film have been regularly reused by the Secretariat in its new video productions since June 2020, and also integrated into the general visual identity of EMODnet. Due to the change of responsible person for promotion activities at the end of May 2020, there was a delay on the preparation of new products in the first year. RBINS has been able to catch up on this delay during the second year. Planned activities were regularly exchanged with Secretariat for agreement on content, timing, who does what and the Secretariat involved in the scenario & script of the success stories movie and publication on the YouTube channel of EMODnet. The persistence of the COVID-19 pandemic from March 2020 until the end of the project prevented the holding of physical meetings, hence there was less demand for printed material. Most communication and promotion were done remotely and the focus was put on new digital material (two new A0 posters, easy to carry poster and digital backgrounds for video conference, pins, promotion of the old and new animation movies, promotion of success cases and achievements of the project, active presence in the social media) and material that can be used meanwhile during visio conferences (PDF, PPT presentations to reach out to the business community).

- **Annex 5** gives an overview of the promotional material

Which Is made available as Annex to this Report.

4. Identified issues: status and actions taken

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**
Compliance with applicable data protection rules	Resolved	The action plan for achieving the compliance has been implemented. Notices for Privacy, Cookies, and BREXIT Content Disclaimer were posted on the Ingestion portal	31/12/2019	
EM-234: Data Ingestion - Update of Data Protection Notices	Resolved	Amendments made	14 June 2021	
EM-254: DIP - Banner UPDATE - deadline extension	Resolved	Survey Banner placed for specific period, extended, and removed	9 July 2021	
EM-356: Ingestion to report on number and volume of downloaded data and data products	Pending	Must cover whole year from 1 October 2020 to 30 September 2021	29 October 2021	

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**
GRAFANA reporting is not functioning as it should as several sections of the portal are not monitored / reported.	Resolved	Required action from Trust-IT		August 2021
The EMODnet Ingestion contract runs till 10 October 2021 and there is no news yet whether the option for another 2 years continuation under the same ToR will be used by CINEA.	Resolved	CINEA has indicated not to make use of article 1.3.5. to continue the current contract with another 24 months. Alternatively, CINEA has published at 9th		Sept 2021

		September 2021 a new Call for Tender with a submission deadline of 14th October 2021 (!).		

5. Allocation of project resources

Information on the allocation of project resources	
Categories	**Resource usage[2] (%)**
Project Management (WP0)	8 %
Construct and operate central Data Ingestion portal with services (WP1)	12 %
Implement pathways to forward submitted data to the appropriate repository (WP2)	35 %
Facilitate machine-to-machine transfers (WP3)	10 %
Marketing and outreach activities (WP4)	35 %

[2] Provide the workings of your calculations, *i.e.* percentage allocation of the total amount awarded.

6. User feedback

Overview of user feedback and/or requests received in this year							
Date	**Organisation**	**Type of user feedback (e.g. technical, case study, etc.) and short description of the feedback received**	**Means of contact**	**Response time (days)**	**Status of user query: resolved/pending**	**Measures taken to resolve the query**	**Status: if not (yet) resolved/pending, explain reason why and expected timeline**
22 October 2019	Marenostrum, Romania	Can I include my data?	Helpdesk email	13	resolved	Contact taken with specialists from the network and answer sent by email	
28 November 2019	Niva, Norway	How to use?	Helpdesk email	4	resolved	Help send by email + link to the online user manual	
17 December 2019	Kartverket, Norway	How to use?	Helpdesk email	< 1	resolved	Help send by email + link to the online user manual	
23 December 2019	?, Greece	Can I include my data?	Helpdesk email	4	resolved	Contact taken with specialists from the network	

						and answer sent by email	
23 December 2019	Institute of Marine Research, Norway	Data center request	Helpdesk email	< 1	resolved	Help send by email or action by the master data centre	
13 January 2020	Cogea, Italy	How to use?	Helpdesk email	< 1	resolved	Help send by email + link to the online user manual	
05 March 2020	ICES, Denmark	Data center request	Helpdesk email	< 1	resolved	Help send by email or action by the master data centre	
06 July 2020	METU-IMS, Turkey	Data center request	Helpdesk email	2	resolved	Help send by email or action by the master data centre	
12 August 2020	?, Russian Federation	Connection	Helpdesk email	< 1	resolved	Marine-id connection problem solved by IFREMER (manager of the Marine-ID service)	
10 September 2020	IO-BAS, Bulgaria	Data center request	Helpdesk email	< 1	resolved	Help send by email or action by the master data centre	
15 September 2020	?, UK	Can I include my data?	Helpdesk email	6	resolved	Contact taken with specialists from the network and answer sent by email	

18 September 2020	?, Iceland	How to use?	Helpdesk email	< 1	resolved	Help send by email + link to the online user manual	
12 October 2020	DFMR, Cyprus	Wanted to edit a submission after publication	Helpdesk email	Next day	resolved	Edit made and feedback by email	
1 December 2020	Biorea, France	Wanted to know how to register its company, a microalgae producer	Helpdesk email	Same day	resolved	The user was together with EMODnet Human Activities referred to EU-JRC who keeps overview of microalgae producers	
8 December 2020	?, Russian Federation	Question if Marine-ID could be used on Central portal	Helpdesk email	Same day	resolved	Answer sent by email with explanation of Marine-ID use.	
10 February 2021	Wikimedia Italia	Request to include attribution to OpenStreetMap in the mapviewer on the Ingestion portal	Helpdesk email	Same day	resolved	Included an OSM copyright to map	
07 May 2021	Danish Maritime Authority	Request to share their data on their maritime spatial plan	Helpdesk email	One week	resolved	Guidance given for data submission	
08 May 2021	Belgian Federal Public Service Economy	Question about missing backscatter data	Helpdesk email	6 days	resolved	Explanation given: backscatter acquisition and processing	

						methodology is not mature enough to be able to provide a "unified product"	
07 June 2021	Expeditions Med	Request to submit one dataset to include a link in a publication	Helpdesk email	Next day	resolved	Recommendation to use SEANOE to have a DOI, then the dataset will be sent to EMODnet ingestion	
15 June 2021	oceaneye	Request to share their data and question about the deadline for submission of metadata regarding the end of the project in October 2021	Helpdesk email	2 weeks	resolved	Guidance given for data submission	
29 July 2021	Cyprus University	Request to change account details	Helpdesk email	Next day	resolved	Change made	
29 July 2021	Cyprus University	Reformulated request to change account details	Helpdesk email	Next day	resolved	See above	
30 July 2021	OceanEye	Request for more info about advised formats for submitting marine litter data	Helpdesk email	Three days later	resolved	Guidance information given and offer to have a short webconf	

20 August 2021	OceanEye	Request to have a webconf for support	Helpdesk email	Same day	resolved	Set up a Doodle for webconf, which took place 18th October 2021	
01 September 2021	GFZ	Question about regular updating of submissions for timeseries and need for DOI	Helpdesk email	Same day	resolved	Advided to make use of SEANOE service for DOI and follow-up by EMODnet Ingestion	

7. Meetings/events held/attended & planned

A. Meetings/events organised and attended					
Date	**Location**	**Type event (internal or external meeting, training/workshop)**	**Indicate if a ppt was given (yes/no + short description)**	**Meeting attended (A) / organised (O)**	**Short description and main results (# participants, agreements made, etc.)**
3-4 October 2019	IJmuiden, Netherlands	National North Sea Days	Yes	O	Rijkswaterstaat promotion activities; Poster sessions and presentations
15 October 2019	Madrid, Spain	Master class at Univ Compl. Madrid	Yes	A	IEO giving lecture to master students and their profesors at univiversity
16-18 October 2019	Brest, France	SeaDataCloud General Assembly	Yes	A	EMODnet Physics, EMODnet Data Ingestion and SeaDataNet are strongly collaborating to improve data management (e.g. gliders, HFR)
22 October 2019	Anavyssos, Greece	EuroGeoSurveys (EGS) Marine Geology Expert Group Meeting	Yes	A	GTK presented EMODnet Ingestion at the meeting to circa 30 participants
24 October 2019	Madrid, Spain	National forum on underwater autonomous instrumentation (CEHIPAR/Barracuda)	No	A	IEO promoting EMODnet Ingestion at this meeting for governmental departments and enterprises forum related to underwater instrumentation and data adquisition
28 October 2019	Karlstad, Sweden	National Montoring days, SWAM organized	Yes	A	SMHI promoted EMODnet Ingestion at meeting & exhibition with national orderers and performers of national monitoring.

29-31 October 2019	Brest, France	6th Workshop IQuOD	Yes	A	INGV presentation mentioned EMODnet and its role in the data and products initiatives in EU. Meeting dedicated to SeaDataNet PRODUCTS AND IQUOD: 25 participants and 9 remote participants
31 October 2019	Poti, Georgia	The Workshop dedicated to the International Black Sea Action Day.	Yes	O	TSU-DNA in collaboration with the MUN of City of Poti, the State Hydrographic Service, following the planned activities of the project "EMBLAS Plus" and within the EU Black Sea Synergy initiative organized the scientific workshop dedicated to the ongoing projects conducting at TSU, that affiliated with EMBLAS Plus (SeaDataCloud, EMODnet Ingestion, RedMar Litter – BSB552 of JOP). A wide range of representatives from governmental and private agencies, scientific and public education (universities and schools) institutions and NGOs took part in the event.
November 2019	Delft, Netherlands	Digitwin North Sea meeting	No	O	Rijkswatertaat and Deltares promotion of EMODnet
01 November 2019	Varna, Bulgaria	Meeting at Scientific and Technical Unions - Varna	Yes	O	Emodet Ingestion project was presented by IO-BAS. A request was made to VSTU to disseminate information about EMODnet Ingestion through their structures. The main activities of VSTU are to keep the society informed about scientific and technological achievements.
2-4 November 2019	Madrid, Spain	IEO coordination data group - internal meeting	Yes	O	IEO Internal meeting. People in charge of data at different areas of IEO activities.
7-8 November 2019	Genova, Italy	EMODnet Physics core team meeting	Yes	O + A	EMODnet Physics core meeting with ETT, SMHI, MARIS, and IFREMER to review the state of action and plan activities for phase 4, including cooperation with EMODnet Ingestion.
8 November 2019	Helsinki, Finland	Meeting about **Nord Stream 2 data**	Yes	A	GTK presented EMODnet Ingestion at the meeting as a way for sharing data from the pipeline project monitoring.
13-14 November 2019	San Sebastian, Spain	Workshop - HF RADAR TASK TEAM WORKSHOP	Yes	O	EMODnet Ingestion was one of the co-organizers of the WS (ETT and SMHI). The meeting was open to all European HF Radar operators and looked for opening new challenges for the European Community around different work lines (Networking, Operations, Data Management, Applications, Governance).
13-15 November 2019	Paris, France	H2020 SO-CHIC project KOM	Yes	A	EMODnet program, EMODnet Physics and Data Ingestion presented by SMHI and will be key endpoints for the project public data

18-22 November 2019	Helsinki, Finland	3rd Polar Forum Workshop	Yes	O	The meeting was aiming at supporting information exchange. A specific Data Ingestion Arctic session was organised by SMHI and ETT together with CMEMS and SDN
19-21 November 2019	Riga, Latvia	Marine Spatial Planning forum	No	A	Rijkswaterstaat promotion activities
21 November 2019	Copenhagen, Denmark	European Environmental agency marine workshop - EIONET	No	A	Rijkswaterstaat and SMHI promoted EMODnet as data host for MSFD
22 November 2019	Remote	EMODnet Physics, Ingestion and T-MEDNET data	Yes	O	ETT discussed how to ingest and present T-MEDNET data
25–26 November 2019	Hyvinkää, Finland	GTK's Unit Days meeting	Yes	A	GTK presented EMODnet Ingestion at the meeting to circa 50 participants
27-29 November 2019	Brussels, Belgium	H2020 EuroSEA project	Yes	A	EMODnet is one of the EuroSEA data integrators and Data Ingestion is represented through ETT and IFREMER. Together with the other key European infrastructures (CMEMS, SDN, etc.) there is an action to promote data findability, accessibility, interoperability and reusability (FAIR)
December 2019	Lelystad, Netherlands	Ferry-box preparations	Yes	O	Rijkswaterstaat promoting agreement of data flow to EMODnet
02 December 2019	Ghent, Belgium	BICEpS – Reinforcing Belgian Ices People colloquium	Yes	O by RBINS & ILVO; A by VLIZ	Presentation by VLIZ entitled **"Towards open science products for ecosystem science"** at the end of the Annual colloquium of BICEpS – Reinforcing Belgian Ices People. 50 participants (researchers, PhD students, public servants in Ministries, RBINS-ILVO-VLIZ marine scientists). Presentations and debate, informal contacts. Report: **http://ices.dk/community/groups/Documents/BICEPS/BICEpS2019report.pdf** PPT compilation: **http://ices.dk/community/groups/Documents/BICEPS/BICEpS19-PPT-presentations.pdf**

4 December 2019	London, United Kingdom	MEDIN DAC meeting	Yes	A	BGS promoted EMODnet Ingestion.
5 December 2019	London, United Kingdom	MEDIN Standards meeting	Yes	A	BGS promoted EMODnet Ingestion.
10 December 2019	Zug, Switzerland	NORD STREAM 2 pipeline project	Yes	O	SMHI and MARIS had a meeting with NordStream 2 AG to discuss possible data delivery from the Nord Stream 2 project into EMODnet Data Ingestion
January 2020	Rotterdam, Netherlands	SEANSE closing conference	Yes	A	Rijkswaterstaat promotion activities; Poster sessions
08-14 January 2020	La Valetta, Malta	Malta International Winter Course	Yes	A	IOI arranged a video production by the Small States Centre of Excellence which includes section about EMODnet Ingestion for the Malta International Winter Course.
17 January 2020	Remote	BOOS SC	Yes	A	SMHI gave general update on EMODnet and Data Ingestion Project
21 January 2020	Remote	Internal project meeting	Yes	O	Discussion MARIS -52North about SWE adoption for EuroFleets+
21-23 January 2020	Venice, Italy	Mediterranean - UN Decade of Ocean Science for Sustainable Development (2021-2030)	Yes	A and O	INGV had EMODnet presentation during the session “transparent and accessible ocean”. Report to UNESCO IOC mentioned EMODnet and the Data Ingestion. See: https://www.cnr.it/it/news/9212/un-decade-of-ocean-science-for-sustainable-development-2021-2030-mediterranean-workshop-the-mediterranean-sea-we-need-for-the-future-we-want Co-organisers: Italian Oceanographic Commission (COI), Intergovernmental Oceanographic Commission (UNESCO/IOC), European Commission (EC), United Nations Environment/Mediterranean Action Plan (UNEP/MAP), Mediterranean Science Commission(CIESM), in collaboration with the BlueMed Initiative.•Sponsors : National Research Council of Italy (CNR), Euro-Mediterranean Center on Climate Change (CMCC), National Institute of Geophysics and Volcanology (INGV), Stazione Zoologica Anton Dohrn (SZN), BlueMed CSA, EC, UNESCO/IOC. 159 participants from 64 countries.

23 January 2020	Ostend, Belgium	RBINS external meeting with EGUERMIN on bathymetry dataset	Yes	O	Several bilateral contacts of RBINS-BMDC with EGUERMIN and Belgian Hydrographic Service
26 Jasnuary 2020	R/V "Bat Galim", Israel	Training cruise	Yes	O	Training meeting of IOLR with Leon H. Charney School of Marine Sciences, University of Haifa. Demonstration of CTD data processing and data retrieval from Cast DB and EMODnet portal. Discussion on collaboration Agreement.
27-28 January 2020	Tromsö, Norway	Arctic ROOS	Yes	A	SMHI gave general update on EMODnet, and DIP together with discussions on an Arctic data portal
February 2020	San Sebastian, Spain	JERICO-S3 kick-off	No	A	Rijkswaterstaat promotion of EMODnet; Link with WP6
13 February 2020	Genova, Italy	Meeting with ARPAL (Regional Agency for Environment Protection)	Yes	O	EMODnet, EMODnet Physics and EMODnet Ingestion were presented by ETT. Discussed EMODnet Physics API to serve and support ARPAL activities and how to include 2 ARPAL wave stations (Capomele and Portofino) into the system.
15-20 February 2020	San Diego, USA	Ocean Sciences	Yes	A	SMHI presented EMODnet, Ingestion and other portals for how to make data sharing to work.
20 February 2020	Liverpool, United Kingdom	Data Processes Workshop for members of the INTERREG VA COMPASS project	Yes	O (co-hosted by NOC-BODC and MEDIN)	Workshop aimed to promote data management best practice, including data dissemination via the European infrastructure. During the workshop NOC-BODC distributed promotional material for Data Ingestion and a pledge was made to Northern Ireland partner AFBI (Agri-Food and Biosciences Institute) to mobilise a mooring dataset via the Ingestion portal. 9 project representatives from Ireland, Northern Ireland and Scotland.
24 February 2020	Gandia, Spain	Master class at Univ Polit. Valencia	Yes	A	IEO giving lecture to master students and their profesors at university
March 2020	Brussels, Belgium	EC WG DIKE and TG-DATA meetings	No	A	Rijkswaterstaat promotion activities

05 March 2020	Meise, Belgium	RBINS external contacts with Meise Botanical Garden	Yes	O	Bilateral contact of RBINS with Meise Botanical Garden to discuss possible ingestions: **https://www.plantentuinmeise.be/en/nieuws/28/_Science_news_Mariene_biodiversiteit**
10 March 2020	Liverpool, United Kingdom	MEDIN Standards meeting	Yes	A	BGS promoted EMODnet Ingestion.
19 March 2020	Remote	External meeting of BGS with Cefas	Yes	O	BGS promoted EMODnet Ingestion to Cefas
08 April 2020	Remote	EMODnet Physics annual general assembly	No	O	Meeting joined by ETT, MARIS, IFREMER and SMHI. Discussed EMODnet Physics progress and joint EMODnet Physics – EMODnet Ingestion activities. Joint activities are planned to link more real-time sources (by exploiting e.g. SOS SWE technologies), improve the links between portals and in particular between the ingested data list and Physics mapviewer, keep working on common events (e.g. Fishing for data webinar and platform networks workshops)
16 April 2020	Remote	In.vi.Tra Jenues KOM	Yes	A	In.vi.Tra Jenues is an Interreg IT-FR project aiming at offering training trans-national opportunities in the blue-economy. ETT presented its activities and the work in both the EMODnet Physics and EMODnet Ingestion as a framework to host and train a student working on the implementation.
20 April 2020	Remote	EMODnet – CMEMS coordination meeting	No	A	A MoU between DG MARE and DG GROW consolidated the interoperability between EMODnet and CMEMS for the physics and chemistry, and EMODnet Ingestion is central in the process to keep adding additional in-situ data to both the initiatives.
21-22 April 2020	Remote	EMODnet Steering Committee	No	A	12th EMODnet Steering Committee Meeting – participation by MARIS and HCMR
23 April 2020	Remote	External meeting of BGS with MCA	Yes	O	BGS promoted EMODnet Ingestion to MCA
23-24 April 2020	Remote	EMODnet TWG meeting	No	A	7th EMODnet TWG Meeting - participation by MARIS
27 April 2020	Remote	HFR TT – CMEMS INSTAC – EMODnet Physics and Ingestion	Yes	A	ETT and SMHI joined technical meeting to discuss about joint action to engage more HFR providers. Part of the discussion was the organization of an HFR Workshop, back to back with FerryBox community for a more integrated coastal monitoring approach.

27 April 2020	Remote	In.vi.Tra Jenues selection day	No	A	ETT joined as follow up of the previous meeting.
May 2020	Remote	Earth Observation Data for Science and Innovation in the Black Sea (EO4SIBS) Project partners meetings	Yes	A	NIMRD promoted data sharing with EMODnet Ingestion with EO4SIBS project partners
06 May 2020	Remote	Meeting with LAMMA	Yes	O	ETT organized meeting to discuss how LAMMA (http://www.lamma.rete.toscana.it/) can contribute to EMODnet Ingestion and be linked in EMODnet Physics. Follow up actions are planned in coming months.
20 May 2020	Remote	Fishing for Data webinar	Yes	O	More than 300 people participated to the webinar organised by SMHI and ETT showing high interest for the topic. EMODnet Ingestion and Physics will take lead on the development of this new type of data stream.
27 May 2020	Remote	EMODnet Seabed Habitats 2nd partner meeting	Yes	O	JNCC reminding EMODnet Seabed Habitats partners of EMODnet ingestion activities and aims
27 May 2020	Split, Croatia	Workshop Department of Marine Studies, University of Split	Yes	A	IOF introduced 26 students of 5th year of Ecology and marine protection to the EMODnet project in general as EU gateway for marine data and information. EMODnet Data Ingestion was presented as an appropriate way for data submission.
27 May 2020	Remote	Hazrunoff final meeting	Yes	A	ETT participated. The project (www.hazrunoff.eu) studied the integration of sensing and modelling technologies for early detection and follow-up of hazmat and flood hazards in transitional and coastal waters. It used EMODnet Physics M2M services and contributed to EMODnet Ingestion activities to link more river data in the Iberian area.
27 May 2020	Remote	Glider data flow	Yes	O	ETT organized this meeting with the core glider community to inform them about how to join EMODnet
28 May 2020	Remote	Polar Forum webinar	Yes	A	RIHMI-WDC presented information on international EU projects (SeaDataCloud, EMODNet Ingestion, Chemistry) and data access possibilities. Discussion about access to data obtained during the International Polar Year (2007-2008) by AARI. 11 participants.
29 May 2020	Remote	Nord Stream II	No	O	Further data exchange discussions of SMHI and MARIS with Nord Stream 2 AG

June 2020	The Hague, Netherlands	North Sea convenant between government and stakeholders	No	A	Rijkswaterstaat Convenant on e.g. open data
June 2020	Constanta, Romania	NIMRD Internal	Yes	O	NIMRD inter-departmental meetings about sharing more data sets with EMODnet Ingestion
02 June 2020	Remote	15th Meeting of the MSFD Common Implementation Strategy - Technical Group on Underwater Noise (TG-Noise)	No	A	ETT participated to represent EMODnet Ingestion. It is the periodic TG NOISE meeting to present and discuss on progress on D11 MSFD. The meeting introduced the new chairs and present outcomes from European projects working on the topic
04 June 2020	Remote	Sustunable KOM	No	A	ETT is serving the project AOB to facilitate the connection and ingestion of project produced data into the EMODnet infrastructure. https://www.sustunableproject.eu/
10 June 2020	Remote	EU HFR node coordination meeting	Yes	A	The meeting was organized to discuss about action to streamline more data from the same sources, in particular it is under discussion the ingestion and inclusion of radial data from HFR stations (at the moment only totals are delivered). ETT represented EMODnet Ingestion.
11 June 2020	Remote	MEDIN DAC meeting	No	A	BGS promoted EMODnet Ingestion.
12 June 2020	Haifa, Israel	External Meeting	Yes	O	Presentation of EMODnet Ingestion project by IOLR to Nobel Energy, Ministry of environment Protection. Discussion on data sharing.
16 June 2020	Remote	Coastal workshop: EMODnet and CMEMS	No	A	The workshop was aimed at exchanging on EMODnet and Copernicus (CMEMS and land) services and developments in this thematic area. Several EMODnet Ingestion partners joined such as MARIS, HCMR, OGS, ETT, and others.
21 June 2020	R/V "Bat Galim", Israel	Training cruise	Yes	A	Training meeting of IOLR with Faculty of Marine Sciences. Ruppin Academic Center. Presentation of EMODnet Ingestion.
24 June 2020	Remote	National Coastal Monitoring Program 2020-2022 Kick-off Meeting	No	A	METU-IMS promoted EMODnet Ingestion at this Mediterranean Sea meeting.
29 June 2020	Remote	EMODnet, JCOMMOPS, CORIOLIS – Glider	Yes	O	As part of the EMODnet Physics and Ingestion activities there is a continuous interaction with network platform operators. This meeting was organised by ETT to recap on some pending actions on glider data management with a focus on

		Data flow – tech meeting			streamlining data from the platform to GDAC (Coriolis) and NRT data integrators (EMODnet Physics, CMEMS), design the management of both recovery and delay mode data management to facilitate long-term stewardship of the data while exploiting the use of recent technologies such as SensorML to link more platform setting information. On discussed action is to organize a new international event in 2021 as follow up of the international glider workshop held in Genova in 2018.
30 June 2020.	Ventspils, Latvia	Gulf of Riga Regatta event	Yes	A	Meeting organised by The Latvian Yachting Union with 200 participants from 7 countries. Presentation of LHEI included information about possibilities to submit data about any regular (or simple) observations in the sea done by participants/ sailors, for example Secchi depts observations.
30 June 2020 – 02 July 2020	Remote	IHO Crowdsourced Bathymetry Working Group	Yes	A	SHOM promoted EMOdnet Ingestion at this IHO meeting with 43 participants
07 July 2020	Remote	EU HFR Task Team	No	A	Discussion by ETT on developments regarding HFR data and new HFR based products
21 July 2020	Mersin, Turkey	Clean Sea Mersin Project Meeting	Yes	O	Meeting about new monitoring stations in Mersin bay. METU-IMS promoted EMODnet Ingestion.
22 July 2020	Haifa, Israel	External meeting	Yes	O	Presentation of EMODnet Ingestion project by IOLR to Meteorological Service of Israel. Discussion on data sharing.
23 July 2020 + 28 July 2020	Brussels, Belgium	RBINS external Web "Training on EUROfleets Principal Investigators on the use of the EMODnet DIP portal"	Yes	O	RBINS getting young and non-European scientists to know EMODnet-DIP, Marine ID, SeaDataNet, circa 20 participants
August 2020	Remote	Earth Observation Data for Science and Innovation in the Black Sea (EO4SIBS) Project partners meetings	Yes	A	NIMRD promoted data sharing with EMODnet Ingestion with EO4SIBS project partners
11 August 2020	Remote	JNCC Marine Management Team meeting	Yes	A	EMODnet Seabed Habitats coordinator at JNCC introduced EMODnet Ingestion to JNCC Marine Management Team, which provides advice on EIA and licencing requests and which works closely with Industry partners.

26 August 2020	Obninsk, Russian Federatio	Internal workshop at RIHMI-WDC	No	O	RIHMI-WDC discussed and agreed internally to make data obtained during the International Polar Year (2007-2008) available via EMODNet Ingestion.
September 2020	Remote	ENEA external exchange with ARPAL	No	O	ENEA had some phone calls with ARPAL (Regional Environmental Ligurian Protection Agency) about EMODnet Ingestion for data sharing
September 2020	Constanta, Romania	NIMRD Internal	No	O	NIMRD inter-departmental meetings about sharing more data sets with EMODnet Ingestion
03 September 2020	Moscow, Russian Federation	External workshop with RIFO	Yes	O	RIHMI-WDC discussed with RIFO held on the possibilities of presenting data obtained during the international polar year (2007-2008) through EMODNet Ingestion project. 6 participants.
10 September 2020	Brussels, Belgium	RBINS external exchange with SUMO	Yes	O	RBINS meeting with SUMO to discuss possible ingestions
11 September 2020	Remote	RBINS web external meeting with ILVO	Yes	O	RBINS meeting with ILVO to discuss possible ingestions
11 September 2020	Remote	Discussion about a citizen science ingestion test case	Yes	A	Discussion by ETT about new approaches for easy ingestion of ocean physics data from citizen science with BRIZO CEO - https://www.brizo-tracker.com/about-us/
17 September 2020	Brussels, Belgium	RBINS internal meeting with MARECO	Yes	O	RBINS meeting with MARECO to discuss possible ingestions
17/09/2020	Remote	SeaDataCloud User Workshop	Yes	O	OGS promoted EMODnet Ingestion at SeaDataCloud User Workshop: 155 attendees followed the Webinar, from 32 countries
17 September 2020	Reykjavik, Iceland	Internal meeting regarding zooplankton data	Yes	A/O	MFRI introduced EMODnet Ingestion to 3 MFRI collagues.
21 September 2020	Remote	Lecture to Helsinki University, the Faculty of Biological and Environmental Sciences	Yes	A	GTK presented EMODnet Ingestion as part of the lecture to 31 students at the Helsinki University, the Faculty of Biological and Environmental Sciences

22 September 2020	Remote	Webinar EMODnet 10 Years	Input for overview and movie	A	EMODnet 10 Years - Open Conference - participation by full EMODnet Ingestion network
23 September 2020	Online	Meeting between BGS, JNCC, and BODC	No	O	Coordinating UK activities for EMODnet Ingestion
23-25 September 2020	Remote	EMODnet Geology	No	A	BGS and GTK reported on progress with EMODnet Ingestion
30 September 2020	Remote	NORD STREAM 2 meeting	No	O	SMHI discussed 1st data package as received
30 September 2020 – 1 October 2020	Remote	Internal – Full Project Group meeting	Yes	O	EMODnet Ingestion full Project Group meeting with all consortium members participating for monitoring progress and contributions to reporting
30 September 2020 – 1 October 2020	Remote	Internal – Full Project Group meeting	Yes	O	EMODnet Ingestion full Project Group meeting with all consortium members participating for monitoring progress and contributions to reporting
1 October 2020	Remote	Meeting with the ENI Chief Financial Officer	Yes	O	Present activities under EMODnet Physics and Data Ingestion and try and involve ENI to share data by ETT
2 October 2020	Remote	VOTO, Voice of the Ocean	Yes	O	VOTO are launching a number of smart autonomous platforms into the Baltic Sea. This was the first meeting by SMHI with this new Baltic initiative to initiate discussion on data sharing with EMODnet Physics and Ingestion.
12 October 2020	Remote	IODE International data sharing workshop	No	A	Workshop for non-UN IGOs, Global and Regional organisations and projects, NGOs and private sector. SMHI promoting EMODnet Ingestion to a new initiative in the Baltic seeking guidance on how to share data to EMODnet and other EU data aggregators. Three participants.

15 October 2020	Web	EU Polar Board Plenary	Yes	A	SMHI promoting EMODnet Ingestion to the Board of the EU Polar Board. Approx. 18 participants
12-16 October 2020	Remote	SeaTech Week	Yes	A	UM described their role in the collection of data locally within the context of international collaborations, including EMODnet Ingestion.
20-21 October 2020	Remote	Marine data to support aquaculture in the North Atlantic Workshop	No	A	The event was jointly organized by EATiP, DG MARE, DG DEFIS, Copernicus Marine and EMODnet with the goal to discuss and link new marine data in support to aquaculture activities
27 October 2020	Remote	Follow up meeting with VOTO	No	O	Further discussions of SMHI with VOTO
28 October 2020	Remote	The workshop dedicated to the International Black Sea Day.	Yes	O	TSU TSU organized the "Information day" as part of the International Black Sea Day to ensure close collaboration between the ongoing EU projects within the EU Black Sea Synergy Initiative. TSU promoted aims and objectives of EMODnet Ingestion. Participation by circa 60 persons from governmental agencies, scientific and public education (universities and schools)
28-29 October 2020	Remote	Conference Black Sea 2020	No	A	The conference was organized by Varna Scientific and Technical Unions in cooperation with Technical University – Varna, Bulgarian National Association of Shipbuilding, Naval Academy, Institute of Oceanology, Bulgarian Ship Hydrodynamics Centre. The Emodnet ingestion poster was presented by IO-BAS during discussion time. Promotional materials were sent by e-mail to interested participants. As a result, some human activities data can be provided. About 50 people related to the maritime industry and science attended the conference.
29-30 October 2020	Remote	50th Anniversary of NIMRD's establishment and International Black Sea Day	Yes	O	Romanian National Oceanographic and Environmental Data Center (RoNODC); EMODnet Ingestion portal was presented by NIMRD, along with EMODnet Chemistry and SeaDataCloud, as one of the main European Initiatives where RoNODC is participating. Representatives of international organisations (CIESM, GFCM, BSC), ntional and local authorities, R&D Institutions and Universities, NOGOs, main Blacks Sea projects (BS CONNECT, EO4SIBS, EO4BSP, ANEMONE, LitOUTer, etc) were participating along with more than 50 other participants from Black Sea and Europe countries.

3-5 November 2020	Remote	SO-CHIC Annual meeting	Yes	A	Discuss about interoperability between the project and EMODnet Physics and Data Ingestion by ETT
4-6 November 2020	Remote	BOOS AM	No	A	Annual meeting. Presenting on EMODnet, EMODnet Physics progress, Data Ingestion, initiate a BOOS river task, new possible data sources by ETT and SMHI. Approx. 35 participants
9-10 November 2020	Remote	EMODnet SC	Yes	A	Periodic meeting. Brainstorming, common standards, joint activities, etc. involving MARIS and HCMR for Ingestion
11-12 November 2020	Remote	EMODnet TWG	Yes	A	Periodic meeting. Brainstorming, common standards, joint activities, etc. involving MARIS and HCMR for Ingestion
17 November 2020	Remote	Introducing the EMODnet Arctic Data Portal	Yes	O	Full webinar. SMHI and ETT promoting EMODnet Ingestion and Physics Arctic Data Portal for more than 100 attendees (~150 registered)
20 November 2020	Remote	Lecture of "Sampling. Sample treatment and preparation before chemical analyses" for master students at University of Latvia, Faculty of Chemistry.	Yes	A	Appr. 20 students participated in the lecture. LHEI promoted EMODnet Ingestion - possibilities to submit data about any regular (or simple) observations in the sea, for example Secchi depts or floating microplastic observations. Presentation and EMODnet DI video were shown.
20 November 2020	Remote	Arctic Data Portal KO	Yes	A/O	Following the SOOS experience, EMODnet Physics will host a dedicated data portal for the Arctic community. The goal of the workshop was to define actions (EMODnet Physics, Ingestion, CMEMS INSTAC, SeaDataNet, etc) to unlock and link new and more arctic data. By ETT and SMHI. Circa 8 participants
19-20 November 2020	Remote	FINAL INTERNATIONAL OCEANGOV Conference	Yes	A	INGV was guest speaker: Marine Open Data, a way forward to increase multi-disciplinary ocean knowledge and support the Blue Growth.
24 November 2020	Remote	MEDIN Data Archive Centres Meeting	No	A	MEDIN DAC meeting including BGS, BODC and other DACs

24 November 2020	Remote	Newly developed consortia for future project	No	A	SMHI promoted EMODnet Ingestion for new project consortia.
26 November 2020	Remote	MEDIN Joint Meeting	No	A	MEDIN cross working group meeting including BGS, BODC and other DACs
23-25 November 2020	Remote	Conference (external)	Yes	A	EVOLMAR: 1st Italian conference on Marine Evolution: - Oral session where a presentation on "How can EMODnet Biology be used for marine biodiversity studies?" was given - Book of abstracts can be accessed via the **link** - Social media presence in both Twitter and Facebook - 200+ participants
26 November 2020	Remote	Meeting	No	O	Meeting of the UK inter-agency working group on habitat mapping – Brought together government conservation agencies collating benthic habitat data in UK waters (with representatives from Nature Scot, Natural England, Natural Resources Wales, and Northern Ireland Department of Agriculture, Environment and Rural Affairs)- Promotion of EMODnet Ingestion portal and ingestion activities by JNCC.
8 December 2020	Remote	World Ocean Council Sustainable Ocean Summit,	Y	A	EMODnet-Ingestion was promoted and presented by RBINS in session on the U.N. Decade of Ocean Science - Data Collection and sharing by industry. PPT aiming at the business sector was jointly prepared with the EMODnet Secretariat and is available to partners on the EMODnet forum.
10 December 2020	Remote	External	Yes	O	SMHI and MARIS promoting EMODnet Ingestion to US colleagues
14-15 December 2020	Remote	SHAREMED First Capitalisation Workshop	No	O	The workshop brought together leading experts and representatives of major international projects and initiatives relevant to the Mediterranean Sea in the framework of ocean observing systems intended to address major marine environmental threats. UM promoted EMODnet Ingestion.
17 December 2020	Remote	Sea and Society Day	No	A	SMHI promoting EMODnet Ingestion at Sea and Society Day organised by Gothenburg University with International participants
December /2020	Remote	Clean Sea Adana Project Meeting	No	O	METU-IMS has promoted EMODnet Ingestion. Meeting is about new monitoring stations in Mersin bay
6 January 2021	online	Tech meeting - ODP/C4IR with ETT	Yes – presentation	A	Discuss bidirectional interoperability between EMODnet and ODP/C4IR (5 people)

			of EMODnet, Ingestion and Physics		
11 January 2021	online	NAUTILOS project – progress meeting with ETT	No	A	NAUTILOS is developing ocean new sensors and new products. NAUTILOS DMP considers to share/links its products with EMODnet (more than 40 people)
12 January 2021	online	EMOD-PACE WP3-4-5 meeting with several EMODnet Ingestion partners	No	A	To progress on EU-China interoperability on ocean observing systems – further discussion on data flow
12-14 January 2021	online	EuroGOOS Tide Gauge Task Team Workshop with ETT and SMHI	Yes – update on how EMODnet Physics is managing TG data and how Ingestion contribute to link new platforms	A	The WS discussed the status of TG data management and how to improve it (about 40 people worldwide)
18-22 January 2021	online	EuroSEA annual meeting with ETT	No	A	Annual general assembly. EMODnet represents one of the EuroSEA community stakeholders
21 January 2021	online	Environmental Science Department. Univ. Bologna meeting with INGV	Yes, see description	A	Lecture by INGV on Marine Open Data - a way forward to increase multi-disciplinary ocean knowledge and support the Blue Growth
25-29 January 2021	online	EMOD-PACE annual assembly with several EMODnet Ingestion partners	No	A	Annual general assembly
26 January 2021	online	Blue Data Conference 2021 with BGS	No	A	UKHO and experts across marine industries addressing the big marine questions **https://discover.admiralty.co.uk/blue-data-conference**

26-28 January 2021	online	CMEMS General Assembly with ETT and SMHI	No	A	General assembly reviewing the achievements of the 2015-2021 Copernicus Marine Service and make future plans. over 635 unique participants, from more than 77 countries, and for a total of 16 hours of broadcast.
8 February 2021	online	Tech meeting about coupling Marine Data Exchange of Crown Estate to EMODnet Ingestion with BODC, MARIS, and HCMR	No	O	Explore options between BODC, HCMR, and MARIS
4 February 2021	online	SO-CHIC progress meeting with ETT and SMHI	No	A	EMODnet Physics contributes to the project looking after data interoperability and data ingestion
9 February 2021	online	EMODnet Physics meeting with ETT, SMHI, IFREMER, and MARIS	Yes, internal docs	O	Internal annual core team meeting
9 February 2021	online	5th EMODnet-CMEMS coordination meeting with ETT and SMHI	Yes. Update on the collaboration between INSTAC, EMODnet Physics and Ingestion	A	Updates on the status of the collaboration between CMEMS and EMODnet, including progress made so far and planning of future activities
9–10 February 2021	online	EOOS Operation Committee meeting	No	A	RWS joined the start and follow-up meetings of the Operation Committee meetings of EOOS as national representative and GOOS focal point. The collaboration with EMODNET activities was promoted and stimulated.
16 February 2021	online	Arctic ROOS General Assembly with ETT and SMHI	Yes. Presentation about data ingestion and the EMODnet Arctic ocean data portal	A	Presentation about data ingestion and the EMODnet Arctic ocean data portal; planning of joint Arctic ROOS activities

18 February 2021	online	SO-CHIC progress meeting with ETT and SMHI	No	A	EMODnet Physics contributes to the project looking after data interoperability and data ingestion
24 February 2021	online	EuroFleets+ WP3 meeting with MARIS, CSIC, RBINS, and 52North	No	O	Discussing progress with implementing SWE for transfer of underway data from research vessels
25 February 2021	online	4° Convegno dei Geologi Marini Italiani, Italian Marine Geologist Conference with INGV	Yes, see description	A	INGV presented EMODnet in "Dati marini rapidamente accessibili per una maggiore competitività scientifica a servizio della società" doi.org/10.3301/ABSGI.2021.01
3 March 2021	online	VLIZ Marine Science Day Conference with VLIZ and RBINS	Yes, see description	A	Conference: EMODnet-DIP poster & Video presentation during the day. Gathering of Belgian marine scientists, students, Business sector). Participants: 500
9 March 2021	online	AtlantOS Ocean Hour with ETT and SMHI	No	A	Review of some of the new approaches - in Storms and Boundary Currents - that take advantage of gliders to offer new ocean observations for better serving user needs and robust information products.
10 March 2021	online	Civil Hydrography Annual Seminar (CHAS)	No	A	CHAS represents the main opportunity for the MCA to present its proposed survey plans for the forthcoming year
10-12 March 2021	online	EMODnet Geology meeting with BGS, GEUS, and GTK	Yes, internal docs	A	EMODnet Geology plenary meeting
12-14 March 2021	online	Hack the Arctic with ETT and SMHI	No	A	The event brought together science and society representatives to identify innovative solutions for key environmental challenges in the Arctic. The hackathon focused on topics such as mapping Arctic data, making scientific data available for policy-making, developing services for Arctic communities, addressing environmental changes, and fighting air pollution.
16 March 2021	online	EMODnet – HFR Network with ETT, SMHI, and RWS	No	O	Internal meeting to check activities on HFR data flow in EMODnet Physics and Ingestion
17-18 March 2021	online	EuroGOOS - FerryBox and High Frequency Radar	Yes – brief intro on EMODnet	A/O	The workshop brought together the two European (EuroGOOS) communities that are working on HFR and FB to discuss about systems, data flow and data

		virtual workshops with ETT, SMHI, and RWS	with a focus on Physics and Ingestion		processing. A lot of other Emodnet-Ingestion partners joined and promoted EMODNET during Wonder-me breaks.
23 March 2021	online	Blue-Cloud Workshop with MARIS	Yes, see description	A	Presenting EU landscape for marine data management including role of EMODnet
24 March 2021	online	EMODnet Biology workshop - Data Solutions for a Changing Ocean with VLIZ, RWS, Deltares and others	Yes, see description	A	Deltares presented the past and future challenges of using EMODNET data and products and promoted the use of EMODNET ingestion for getting more data.
24-25 March 2021	online	Marine data to support aquaculture in the Mediterranean Sea Workshop with MARIS, ETT, SMHI, HCMR, COGEA	No	A	The event is jointly organized by EATiP, DG MARE, DG DEFIS, Copernicus Marine and EMODnet with the goal to discuss and link new marine data in support to aquaculture activities
25 March 2021	online	Meeting with RGI – Renewable Grid Initiative with MARIS and HCMR	Yes, see description	O	To discuss with RGI and DG-MARE possible data sharing
25 March 2021	online	Meeting with LAMMA with ETT and SMHI	No	O	Support to develop new M2M and facilitate the federation of new data from Tyrrenian Sea
26 March 2021	online	Meeting with Northern regional office Roshydromet with RIHMI-WDC	Yes, see description	O	Meeting to discuss EU data management projects (SeaDataCloud, EMODNet Ingestion, and Chemistry) and data access opportunities. RIHMI-WDC received permission on access to data obtained during the International Polar Year (2007-2008).
30 March 2021	online	NL Copernicus Marine conference with MARIS	Yes, see description	A	Presented the European data management landscape with roles of SeaDataNet and EMODnet
1 April 2021	online	Blue-Cloud – EuroSea synergy meeting with MARIS	no	A	To discuss potential synergy between the 2 projects. Including role of EMODnet Ingestion in the European data exchange.

7 April 2021	online	Meeting of CNR with data producers	yes	O	Meeting with researchers from CNR, Stazione Zoologica Anton Dohrn and ISPRA
8 April 2021	online	Internal meeting with MSI	yes	A	Meeting with Ministry of the Environment – Marine Environment Department. Introducing and promoting ongoing projects ie. JERICO, EMODnet Physics and Ingestion.
12- 14 April 2021	On line	IMDIS – International Conference on Marine Data and Information Systems	yes	A	This year IMDIS recorded its highest number of attenders (more than 500 participants - **https://imdis.seadatanet.org/Conference-Information/Participants**) and EMODnet Ingestion and lots were presented and discussed. Active participation by many Ingestion partners in sessions. EMODnet Ingestion has been presented by HCMR
13 – 14 April 2021	online	NAUTILOS 2nd Consortium Meeting with ETT	No	A	The NAUTILOS project is developing new sensors (https://nautilos-h2020.eu/) and EMODnet (Ingestion) will receive/be linked to the new data (once validated).
19 – 21 April 2021	online	EMODnet Technical Working Group and Steering Committee	No	A	periodic EMODnet SC and TWG progress meeting
19 April 2021	online	Thematic Webinar WOZEP on Ecosystems effects by extend of future large windfarms in the North sea with RWS and Deltares		O	RWS and Deltares organized this WOZEP thematic webinar on Ecosystems effects that is part of the WOZEP program, where a lot of data are delivered. Promotion of EMODnet Ingestion.
19- 21 April 2021	online	H2020 JERICO S3 GA with MARIS	no	A	Annual General Assembly – JERICO S3 is developing and organizing the data flow from coastal platforms and EMODnet is one key project stakeholder.
20 April 2021	online	EuroSea Workshop during BlueWeek with MARIS	yes	A	MARIS presented European landscape of marine data management with role of EMODnet Ingestion and participated in panel discussions
24 April 2021	Brest, France / Remote	Internal meeting by Shom on European-funded projects.	yes	O	Presenting European-funded projects in which Shom is currently involved. Sharing experience and best practices.
28 April 2021	online	Ingestion Workshop with RGI with MARIS,	yes	O	To explore further possible data sharing and adoption of best practices with RGI stakeholders

		HCMR, IFREMER, ETT, and SMHI			
3 -5 May 2021	online	EuroGOOS International conference with ETT, MARIS, and SMHI		A	The conference provided a forum for a broad range of implementers and users of operational oceanography services, including marine scientists and technologists, private companies, and policymakers, with both European and international partners and stakeholders.
4 May 2021	online	Meeting with consultant of RGI about approach to data acquisition and documentation by MARIS	yes	O	RGI has hired a consultant as part of the process for improved data management. MARIS explained the European data exchange and what standards to adopt
5 May 2021	Online	GEOHAB (Marine Geological and Biological Habitat Mapping) conference, with JNCC	Yes	A	Raised awareness of the project amongst a global community of marine geological and habitat mappers.
6 May 2021	online	MEDIN Data Archive Centres Meeting with BGS and BODC		A	MEDIN DAC meeting including BGS, BODC and other DACs
20 - 21 May 2021	online	European Maritime Day 2021 with COGEA, MARIS, and others	no	A	Included a session by SSBE on European marine data exchange with attention for EMODnet Ingestion
21 May 2021	online	EMODnet Biology Phase IV kick off meeting (2nd day) with VLIZ	yes	O	Internal meeting for EMODnet Biology IV partners, EMODnet Ingestion was highlighted in the plenary discussions. Report due in August 2021
24-28 May 2021	Online	ICES Working Group on Marine Habitat Mapping, with JNCC	Yes	A	Raised awareness of the project amongst a small specialist group of marine habitat mappers, and those who read the working group report.
27 May 2021	online	TG-ML meeting about gathering of micro litter with OGS and MARIS	no	A	Discussing with Member States the process for gathering micro litter data and role of EMODnet Ingestion

31 May 2021	Online	Tech meeting with CNR ISP (Institute for Polar Science) with ETT	No	O	CNR ISP is the contact point for the ARICE project and the meeting was organized to discuss about data flow and related tech issues.
3 June 2021	online	All-Atlantic Forum with MARIS	yes	A	Major international conference organised by EU about ocean governance, including focus on data exchange and digital twin of the ocean. MARIS present European marine data landscape and role of EMODnet Ingestion
8 June 2021	online	SeaRICA Underwater Noise with ETT and SMHI	No	A	Webinar on sea noise organised by SeaRICA and Seas at Risk. Underwater noise was one of the agenda items and the workshop was attended in order to check shared insights and outcomes.
14 -18 June 2021	online	EMODnet Open Conference and Jamboree	Yes	O	EMODnet partners, data providers and users. EMODnet Physics and Ingestion organized the session - EMODnet dialogue: Citizen Science. Many partners of Ingestion were also active in other sessions and in presenting EMODnet Ingestion by presentation and posters. MARIS chaired a session on the European marine data exchange landscape with attention for EMODnet Ingestion Poster & abstract highlighting nine success stories of EMODnet Ingestion + new animation produced by RBINS "**YOUR DATA, WORK IT**" (2 min) Presentation of the updated poster and a 1 min teaser of the animation produced by RBINS "WAKE UP YOUR MARINE DATA". Abstract entitled "Wake up, safeguard and share your marine data with EMODnet-Ingestion.EU"
17 June 2021	Online	MEDIN Standards group meeting with BGS and BODC	no	A	MEDIN Standards group meeing
25 June 2021	Online	H2020 DOORS project meeting, with NIMRD and METU	no	A	EMODNet Data Ingestion principles were presented along with SeaDataCloud and EMODnet
28 June 2021	Online	OECD Access to research data from public funding: The case of marine data? With BGS	no	A/O	Access to research data from public funding: The case of marine data', organised by the OECD and co-hosted by GOOS and MEDIN)
29 June 2021	Online	3rd General Meeting of SeaDataNet AISBL	no	O	31 member organisations of SeaDataNet AISBL are committed to sustain ingestion of European marine data from different sources in the long term.

		with many EMODnet Ingestion partners			
30 June 2021	On line	EuroGOOS Tide Gauge Task Team meeting with ETT and SMHI	No	A	Periodic meeting of the Task Team to discuss on actions and progresses on sea level data management.
July - September 2021	Online	Earth Observation Data for Science and Innovation in the Black Sea **(**EO4SIBS**)** Project partners meetings, with NIMRD	No	A	Partners discussions resulting in submission of data obtained with the support of EO4SIBS project (ADCP data) (about 7 participants)
5 July 2021	Online	Meeting - SBM Offshore with MARIS, ETT, SMHI, HCMR	Yes	O	To discuss equipping SBM Offshore installations as oceanographic stations and setting up operational data exchange
5-7 July 2021	Vitoria (Spain)	10th Spanish Geological Congress. Conference in the Marine Geology session, with CSIC	Yes	A	Presentation: The European Marine Observation and Data Network
6 July 2021	On line	Meeting – CNR ISP with ETT and SMHI	No	O	Follow up on linking ARICE project data
6 July 2021	Online	Meeting with possible data submitter, Oceana, by JNCC	Yes	O	Oceana have data on multiple themes from multiple countries.
6 July 2021	R/V "Bat Galim"	Training/workshop – IOLR- Haifa University	Yes	O	To discuss CTD data processing and submission to IOLR
6 July 2021	online	Meeting of CSIC with IGEOTEST (SME)	Yes	O	EMODnet and ingestion portal. were introduced and data sharing was discussed.

		working on offshore and onshore engineering works			
10 July 2021	online	Internal meeting with Marine Ecology Group of CEAB-CSIC.	Yes	O	To discuss data sharing about sponges
20 July 2021	online	Meeting of CSIC with MEDGAZ	Yes	O	To discuss data sharing.
21 July 2021	Online	Geospatial Commission Coastal Zone Mapping, with UKRI-BGS	Yes	A	This project focused on understanding the data landscape of agencies involved in the collection and use of geospatial data in the coastal zone
28 July 2021	online	Meeting of CSIC with of the BASAN-Group: BASIN ANALYSES (XM-3, University of Vigo).	Yes	O	To discuss sharing of bathymetric and geological information about the Rias of Vigo.
29 July 2021	online	The Open Sea Monitoring Activities - A National meeting organized by Ministry of Environment and Urbanisation, with METU	Yes	A	A national open sea monitoring program will be started.
30 July 2021	Onboard the RV Sarmiento de Gamboa	Meeting of CSIC with PI of the BOCATS project, geology part.	Yes	O	To discuss sharing of bathymetric information about the Mid-Atlantic Ocean Ridge.
30 July 2021	online	Meeting of ENEA with scientific team from CNR and Stazione Zoologica Anton Dohrn	Yes	O	To discuss data sharing

3August 2021	Barcelona, Spain	Meeting of CSIC with scientists from University of Granada in the framework of AGORA and PAPEL projects.	Yes	O	Commitment to ingest data coming from future projects to EMODnet; Master class about EMODnet in the GeoRec Master of the U. Granada, and Geodesy and Geophysics master of the U. Jaen.
5 August 2021	Liepaja, Latvia	World Environmental day, public event on the beach, wide range of attendants, with LHEI	Yes, poster	O	Promotion
16 August 2021	Online	Training/workshop – IOLR-Nobel Energy	Yes	O	To discuss CTD data processing and submission to IOLR
17 August 2021	Ulkokrunnit island, Finland	An international marine field course for students from University of Oulu (Finland) and Umeå University (Sweden), with GTK	Yes	A	GTK lecture about marine geology of the Baltic Sea to master students
21 August 2021	Saulkrasti (Zvejniekciems), Latvia	Port Festival, public event in town, with LHEI	Yes, poster	O	Promotion
24 August 2021	online	Training/workshop – IOLR-FUGRO	Yes	O	To discuss CTD data processing and submission to IOLR
25-26 August 2021	Rostock (Germany) and online	External meeting, with 52North	Yes	A	Conference dealing with different topics about the collection and management of ocean data. Core topic was the creation of a digital twin of the ocean.
2 September 2021	online	Meeting of CSIC with Project Magnetic data analysis in the Alborán Sea)	Yes	A	Magnetic and gravimeter data were provided for ingestion. More promised.

7 September 2021	Online	GOOS-OECD-MEDIN Webinar, with UKRI-BGS	Yes	A/O	Presentation of the paper - Value Chains in Public Marine Data: A UK case study. Webinar: **https://www.youtube.com/watch?v=36dRXGO7Nqs**
8-10 September 2021	On line/hybrid	EMODnet Steering Committee and Technical Working Group meetings with MARIS and HCMR	Yes	A	To discuss results of project and finalising present contract phase
14-16 September 2021	Online	11th Crowdsourced Bathymetry Working Group (CSBWG – IHO), with Shom	No	A	75 participants from 20 countries (8 in Europe), GEBCO Seabed2030 and industry representatives.
16-20 September 2022	Porto Heli, Argolida, Greece	Panhellenic Conference, with HCMR	Yes	O	The Marine and Inland Waters Research Symposium (former Panhellenic Symposium on Oceanography & Fisheries) is the biggest event in Greece related to marine environment.
21-22 September 2021	Online	EMODnet Ingestion Final meeting with all partners	Yes	O	To discuss results of project and finalising present contract phase
20-24 September 2021	Online	Workshop – Polar Data Forum with ETT and SMHI	Yes	A	Co-organising a conference session on 'Documenting data flows into aggregators'
28 September 2021	Helsinki, Finland	Lecture at the Faculty of Biological and Environmental Sciences, University of Helsinki	Yes	O	GTK lecture about marine geology
1 October 2021	La Spezia (Italy)	Sea Future - exhibition with ENEA	No	A	Promotion
1 October 2021	online	Meeting of CSIC with MEDGAZ	No	O	To continue discussion about data sharing.

7 October 2021	Online	Workshop, with NIB	Yes	A	The second workshop will gather all marine data providers. Discussions on establishing a national data platform. OGS will join as lead of SHAREMED project.
7 October 2021	Online	Webinar, with VLIZ	Yes	A	Best Practice Webinar & Study Launch: Offshore Biodiversity Data and Monitoring - What have we yet to learn?
SUM				O	Total # of meetings organised = 95
SUM				A	Total # of meetings attended = 127

A. Meetings/events planned in the future				
Date	**Location**	**Type event (meeting, training (workshop), etc.)**	**Meeting to be attended (A) / organised (O)**	**Short description and main expected outcomes**
11-12 October 2021	Online	EMODnet Geology 5 kick-off meeting, with GTK and BGS	O	To discuss project plans and products
28 October 2021	Constanta/Romania (online)	International Black Sea Action Day - Workshop, with NIMRD	O/A	Promotion of EMODnet Lots and EMODnet Data Ingestion
18 – 22 October 2021	Aarhus University,Aarhus, Denmark	BSSC2021: 13th Baltic Sea Science Congress hosted by Aarhus University, with AU-DCE and GTK	A	AU-DCE and GTK are going to promote the EMODnet Ingestion project at the Baltic Sea Science Congress through a poster and sharing of informative material
29 October 2021	Online	Meeting - SBM Offshore with MARIS, ETT, SMHI, HCMR	O	To continue discussion on equipping SBM Offshore installations as oceanographic stations and setting up operational data exchange
October 2021	Online	EMODnet Seabed Habitats kick-off meeting with JNCC network	O	Kick-off for next phase of EMODnet Seabed Habitats, organised by JNCC. Will

				promote Ingestion and make sure that all partners are signed up as data centres for habitat data in their countries.
October 2021	online	B-Blue meeting with ENEA	O	ENEA is going to promote the EMODnet Data Ingestion portal in the B-Blue project towards Blue Biotechnology community of the Mediterranean area, including sharing of informative material
30 November 2021	Varna, Bulgaria	BSHC-annual seminar, with IO-BAS	A	IO-BAS plans to present EMODnet Data Ingestion and distribute promotion material.
October / November 2021	Batumi, Georgia	Science picnic, with TSU	O	Science picnic – science popularisation country-wide event (TSU will have its own facility, where results of all ongoing marine projects (including EMODnet Ingestion) will be introduced.
October-December 2021	Online	Sea EU Marine Data Literacy Course, with University of Malta	O	This is a formative, intensive course intended to inform, train and empower students on marine data sourcing, exploration, elaboration, valorisation and added-value creation.
Last quarter 2021	Online	MOOC course, with VLIZ	A	To share various videos relating to EMODnet Biology and Ingestion as additional resources for course participants (free and open course)
19-21 January 2022	Aalborg University, Aalborg, Denmark	The Danish Marine Research Meeting, with AU-DCE	A	AU-DCE is planning to participate with a poster and/or dissemination of EMODnet brochures and promotion of EMODnet Ingestion to the The Danish Marine Research Meeting
TBC	Gandia (Spain)	Master class at Univ Polit. Valencia, with IEO	A	IEO giving lecture to master students and their profesors at university

TBC	Madrid (Spain)	Master class at Univ Compl. Madrid, with IEO	A	IEO giving lecture to master students and their profesors at university
TBC	Hatay, Turkey	Clean Sea Hatay Project Meeting, with METU	O	METU-IMS will promote EMODnet Ingestion. Meeting is about new monitoring stations in Iskenderun bay
TBC	Antalya, Turkey	Clean Sea Antalya Project Meeting, with METU	O	METU-IMS will promote EMODnet Ingestion. Meeting is about new monitoring stations in Antalya bay
TBC	Strandbúnaður, Iceland	Aquaculture Conference, with MFRI	A	Annual conference with discussion between all those who are involved in the aquaculture industry in Iceland. MFRI will give presentation including EMODnet Ingestion and data sharing.
TBC	Iceland	The Icelandic Biology conference, with MFRI	A/O	MFRI will distribute flyers and poster introducing EMODnet Ingestion. Targeted against the science community.
TBC	Reykjavik, Iceland	MFRI annual public meeting	A/O	MFRI will promote EMODnet Ingestion
TBC	La Spezia, Italy	33rd Mariperman, with ETT	A	It is the annual event of the Italian Navy to PA services presentation and demonstration. The event hosts a scientific/dissemination session to present relevant projects and programs. ETT plans to present EMODnet Physics and Data Ingestion

8. Communication assets

A. Communication assets				
Date	**Communication material**	**Short description (of the material, title, ...) and/or link to the asset**	**Main results**	**Name of event at which material was disseminated (if applicable)**
28 September 2020	Inventory of new data sources	D4.1 Inventory of potential data sources and providers in European countries and priorities	See WP4.	
28 September 2020	Communication Plan	Planned programme for Communication activities	See WP4	
21 October 2020	Poster A0 – Portrait & Landscape	New poster A0 available on digital format and for print (based on the pull up Wake up your data)	Can be used in printed version at physical meetings or shown in background during videoconferences	World Ocean Council Sustainable Ocean Summit,
01 November 2020	EMODnet digital background	Digital background of EMODnet-DIP project	For use by partners articipants during Zoom/Teams online conferences	
April 2021	Enamel Pins	EMODnet Ingestion logo on pin to wear at any occasion, and for online meetings / webinars	Branding	By classic mail to home or office addresses of EMODnet partners for use during the Open Conference and future online or physical meetings
May 2021	New video	Final version of "Your Data, Work It". New promotion animation complementing the first movie with the achieved results of the project in numbers and showcases a selection of three success stories	Promotion	Publication on Youtube and advertisement on website, by mails, shown at conferences (Open Conference in June 2021)
June 2021	Poster / Leaflet	Poster highlighting nine success stories of the project	Promotion	EMODnet Open Conference in June 2021 and at website
June 2021	Two short video teasers	A 1 min teaser was produced for the two animation movies for use in	Branding and promotion	The two teasers were shown during the plenary of the Open Conference and

		oral presentation and for online poster sessions.		remain accessible in the Virtual Exhibition room until Oct. 2021. They are also published on the Ingestion portal
Sept 2021	Poster / Leaflet	Updating e-poster highlighting nine success stories of the project	Promotion	Website

B. Planned communication assets			
Date	**Communication material**	**Short description (of the material, title, ...) and/or link to the asset**	**Main results expected**

List of known publications using EMODnet data or data products				
Date	**Type and name of journal, conference, ...**	**Publication title**	**Author(s)**	**Organisation(s)**
01 November 2019	Ocean & Coastal Management, 181.	EMODnet marine litter data management at pan-European scale	Maria Eugenia Molina Jacka, Maria del Mar Chaves Montero, François Galgani, Alessandra Giorgetti, Matteo Vinci, Morgan Le Moigne, Alberto Brosich	Istituto Nazionale di Oceanografia e di Geofisica Sperimentale, Division of Oceanography, Borgo Grotta Gigante, 42/C, 34010, Sgonico, TS, Italy. IFREMER, Laboratoire LER/PAC, Immeuble Agostini, ZI Furiani, 20600, Bastia, France. IFREMER, Service Valorisation de l'Information pour la Gestion Intégrée et la Surveillance, Centre Atlantique, Rue de l'Ile d'Yeu, BP 21105, 44311, Nantes Cedex 03, France.
In press (2020)	Biodiversity Data journal	A dataset on trophic modes of aquatic protists	Lisa Schneider, Konstantinos Anestis, Joost Mansour,Anna Anschütz, Nathalie Gypens, Per Hansen,	Deltares and others

			Uwe John , Kerstin Klemm, Jon Martin, Nikola Medic, Fabrice Not, Willem Stolte.	
In press (2020)	Frontiers in Marine Science	Fishing gear as a data collection platform: Opportunities to fill gaps in ocean observation network doi: 10.3389/fmars.2020.485512	Cooper H. Van Vranken, Berthe M. Vastenhoud, James P. Manning, Kristian S. Plet-Hansen, Julie Jakoboski, Patrick Gorringe and Michela Martinelli	Other, Denmark, National Marine Fisheries Service (NOAA), United States, Technical University of Denmark, Denmark, MetOcean Solutions Ltd, New Zealand, Swedish Meteorological and Hydrological Institute, Sweden, National Research Council (CNR), Italy
2020	JRC Technical Report	EU Marine Beach Litter Baselines (10.2760/16903)	HANKE Georg WALVOORT Dennis VAN LOON Willem ADDAMO Anna BROSICH Alberto DEL MAR CHAVES MONTERO Maria MOLINA JACK Maria Eugenia VINCI Matteo GIORGETTI Alessandra	JRC, OGS
September 2020	ENVIROMIS 2020. IOP Conf. Series: Earth and Environmental Science 611 (2020) 012054 IOP Publishing. doi:10.1088/1755-1315/611/1/012054.	Standardization of Forms and Tools for Inter-machine Interaction in the Exchange of Hydrometeorological Data	Evgenii Viazilov, Alexander Vikheev	RIHMI-WDC

	(https://iopscience.iop.org/article/10.1088/1755-1315/611/1/012054/pdf**)**			
20 May 2021	XVII International scientific conference "The modern methods and tools for oceanographic research". Moscow SIO RAS.	Modern means for oceanographic data Exchange	Evgenii Viazilov, Alexander Mikheev	RIHMI-WDC, SIO-RAS
July 2021	10th Spanish Geological Congress	Valencia and Ercilla, 2021. The European Marine Observation and Data Network (EMODnet). GEOTEMAS, 18, 773. ISSN: 1576-5172 (printed version);2792-2308 (digital version)	Javier Valencia (IGME) ; Gemma Ercilla (CSIC)	Spanish Geological Society
30 July 2021	OECD Science, Technology and Industry Working Papers, No. 2021/11	Value chains in public marine data: A UK case study, https://doi.org/10.1787/d8bbdcfa-en	Claire Jolly, James Jolliffe, Clare Postlethwaite and Emma Heslop	OECD, NOC, IODE
9 September 2021	Marine Pollution Bulletin	Chernobyl still with us: 137Caesium activity contents in seabed sediments from the Gulf of Bothnia, northern Baltic Sea. Marine Pollution Bulletin. 172. https://doi.org/10.1016/j.marpolbul.2021.112924	Kotilainen, A.T., Kotilainen, M.M., Vartti, V.-P., Hutri, K.-L., Virtasalo, J.J.	Geological Survey of Finland (GTK), Helsinki University, Radiation and Nuclear Safety Authority in Finland (STUK)
17 September 2021	EU Publication	Proposal for making harmonized MSP plan data available across Europe	CINEA	CINEA, contribution COGEA
Sept 2021	Proceedings of the 9th EuroGOOS International Conference 'Advances in Operational Oceanography: Expanding Europe's Observing and Forecasting Capacity'; 3 – 5 May 2021; V. Fernández, A. Lara-López, D. Eparkhina, L. Cocquempot, C. Lochet, I. Lips (Eds); EuroGOOS. Brussels, Belgium. 2021.	EMODnet preliminary high-resolution temperature and salinity climatologies for the northern Adriatic Sea. DOI: 10.13155/83160	Damiano Delrosso, Simona Simoncelli, Paolo Oliveri, Antonio Guarnieri, Antonio Novellino.	INGV, ETT, and others
Sept 2021	Proceedings of the 9th EuroGOOS International Conference 'Advances in Operational Oceanography: Expanding Europe's Observing	SeaDataCloud Data Products for the European marginal seas and the Global Ocean DOI: 10.13155/83160	Simoncelli, S., Coatanoan, C., Myroshnychenko, V., Back, O., Sagen, H., Scory,	INGV, METU, SMHI, IMR, RBINS, UB, ULg, AWI,

	and Forecasting Capacity'. 3 – 5 May 2021; V. Fernández, A. Lara-López, D. Eparkhina, L. Cocquempot, C. Lochet, I. Lips (Eds); EuroGOOS. Brussels, Belgium. 2021. DOI: 10.13155/83160		S, Oliveri, P., Shahzadi, K., Pinardi, N., Barth, A., Troupin, C., Schlitzer, R., Fichaut, M, Schaap, D. EuroGOOS	IFREMER, MARIS
In press	Book	Ocean Science Data: Collection, Management, Networking and Services, Elsevier, 2022, ISBN: 978-0-12-823427-3; **eBook ISBN:** 9780128225950, 386 pages: https://doi.org/10.1016/C2019-0-05509-4	edited by G. Manzella and A. Novellino:	HOS, ETT, with many contributors
In press	Book Chapter in "Ocean Science Data". Ed. Manzella, G.M.R. and Novellino A., Elsevier.	"A collaborative framework among data producers, managers, and users" https://doi.org/10.1016/C2019-0-05509-4	S. Simoncelli, G.M.R. Manzella, A. Storto, A. Pisano, M. Lipizer, A. Barth, V. Myroshnychenko, T. Boyer, C. Troupin, C. Coatanoan, A. Pititto, R. Schlitzer, D.M.A. Schaap, S. Diggs (2021)	INGV, HOS, OGS, ULg,METU, IFREMER, COGEA, AWI, MARIS
In press	Book Chapter in "Ocean Science Data". Ed. Manzella, G.M.R. and Novellino A., Elsevier.	"Data management infrastructures and their practices in Europe" https://doi.org/10.1016/C2019-0-05509-4	D.M.A. Schaap, A. Novellino, M. Fichaut and G.M.R. Manzella	MARIS, ETT, IFREMER, HOS
In press	Ocean and Coastal Research	The Mediterranean Sea we want http://doi.org/10.1590/2675-2824069.21019mc	M. Cappelletto, R. Santoleri, L. Evangelista, F. Galgani3, E. Garcés, A. Giorgetti, ..., S. Simoncelli, ..., M.Fichaut, et al.	
In press	Monograph, Russia, RIHMI-WDC, 2021.	The digital transformation of hydrometeorological support for consumes	E.Viazilov	Russia, RIHMI-WDC
In review	Book Chapter in: Ocean Governance. Pasts, Presents, Futures. Anna-Katharina	"Ocean acidification impact on the aquaculture and fisheries as	*N. Bednaršek, .., S. Simoncelli, ...* (202X)	

	Hornidge and Maria Hadjimichael Eds. MARE Publication Series, Springer.	governance challenge in the Mediterranean Sea".		
TBC	Marine Pollution Bulletin	Marine macrolitter on the Greek coasts (in preparation)	Kaberi H., Zeri C., Tsangaris C., Papathanassiou V., Vlachogianni T	Hellenic Centre for Marine Research (HCMR)

9. Monitoring indicators

Comments on the progress indicators in the excel template		
Progress indicator	**Means of collecting figures**	**Comment**
1. Volume of submitted data A) Number and volume of submissions	View Submissions database	The total number of new phase 1 + phase 2 submissions in the 2nd contract of 2 years is relatively higher as those in the 1st contract of 3 years. The overall number of published submissions went from 506 to 936 for which the number of phase 2 submissions more than doubled from 205 to 425. Overall, this implicates an excellent throughput.
B) Usage of data in this quarter	View Submissions database	The total number of download transactions (2566) and downloaded volume (168 GB) is considerable and demonstrates that users find their way to the View Submissions service. No comparison can be made with the previous contract as no records are available for that period, since it was not yet an indicator.
3. Organisations supplying/approached to supply data	View Submissions database	There is a good mix in organisation types and countries. The total number of data providers has increased with 46 to 154 compared to the previous contract.
9. Visibility & Analytics for web pages	Matomo	The Grafana application has just been configured for Data Ingestion in 2021, so there is not much to report about trends.
10. Visibility & Analytics for web sections	Matomo	The Grafana application shows the visit stats of several sections, such as the Data Viewer, Guidelines, and Operational data; however only since 2021. The total quarterly data views are moderate, but this is also expected as EMODnet Ingestion is more a dedicated site to get new data providers in. The Data Viewer shows quite good activity of users as expected considering the download stats. Missing are Grafana graphs for the Submission service. There is an action in JIRA for Trust-IT to look into this.
11. Average visit duration for web pages	Matomo	The Grafana application only shows the visit durations for the homepage while this functions more as a menu for starting, while real action takes place at other pages. This also needs further action by Trust-IT as it now misses data.

10. Recommendations for follow-up actions by the EU

From the experiences with EMODnet Ingestion it can be concluded that there are still many data providers that are not aware of the European and international standards and infrastructures for making their data interoperable and reuseable for other applications. This strengthens the need for continuing the EMODnet Ingestion mission and operation. The mission should be aimed at making more stakeholders in the marine data community, both users and providers, aware and informed about European marine data management and the larger benefits of sharing data. This can partly be implemented by EMODnet Ingestion by continuing its marketing and outreach campaign activities. However, there should also be sufficient resources kept available for elaborating submitted data sets as these can have many formats, lacking quality indications or quality control, and having limited metadata. For that reason, the promotion of open data principles should be complemented by the EU, wherever it can.

Exploring, finding and implementing ways for connecting more providers by means of direct exchanges with their portals and systems becomes increasingly important and relevant. This includes an evolution of the Ingestion portal with more machine-to-machine exchanges. Although it should be realised that setting up such exchanges largely will depend on the question in how far data providers already are using standards, both for IT services and for the formatting and documenting of their data sets. The technical coupling can be quite challenging in practice and represent considerable efforts. For that reason, EU should stimulate more adoption of standards for data management as well as promote development of machine-to-machine exchanges.

11. Handover instructions for providers of follow-up service

Description of EMODnet Ingestion portal and services and solutions for hand-over of results as part of the EMODnet Ingestion contract with reference **EASME/EMFF/2018/1.3.1.8/01/SI2.810021:**

1. The **EMODnet Ingestion portal** (https://www.emodnet-ingestion.eu) is a website which gives information pages. The website is driven by a Content Management System (licensed by MARIS), while content is stored in a relational database management system.

   Transfer solution: For digital hand-over to CINEA, HTML pages of each page of the website have been generated, except for the services. This concerns the status per 10th October 2021. The HTML website can be started by clicking on the Index.html page. These web pages give information on the various menu options, and give access to several presentations and documents which can be downloaded from the website and are now included in the website zip file. In addition, there are links included to relevant open knowledge resources at the world wide web. The information related to Operational Oceanography submissions is part of the web portal and included. This includes a link to the SWE Demonstrator which has been developed together with EMODnet Physics and is hosted at the EMODnet Physics portal.

   The portal includes 3 operational services which are specified below.

2. The **Data Submission service** facilitates users to submit data sets and enter associated metadata, and it enables assigned data centres to review and complete the metadata for publishing 'as-is' and including URLs for DOI landing pages and for European portals where the data in elaborated form can be retrieved, if applicable. The service has been developed by HCMR as part of the contract.

   Transfer solution: The Data Submission service is considered as a foreground result and an export of the software sources of the online service per 10th October 2021 has been made which is handed over to CINEA as a digital resource. In addition, a copy is given of the submission metadata records (which include URLs to the related original data sets and elaborated data sets, where applicable) per 10th October 2021 which are also considered as foreground results and license-free. The transfer of those is done by means of MS-ACCESS tables which correspond to the relational database model as used by the Data Submission service software.

3. The **Viewing Submissions service** facilitates users to discover and browse through completed and published data submissions, including following possible URLs to DOI landing pages and elaborated data as included in European portals. The service has been developed by MARIS as part of the contract.

   Transfer solution: The Viewing Submissions service is considered as a foreground result and an export of the software sources of the online service per 10th October 2021 has been made which is handed over to CINEA as a digital resource. In addition, a copy is given of the submission metadata records as published per 10th October 2021 which are also considered as foreground results and license-free. The transfer of those is done by means of MS-ACCESS tables which correspond to the relational database model as used by the Viewing Submissions service software.

4. The **Data Wanted service** facilitates any user to formulate and post requests for data sets they are looking for. These requests are published at the portal as post-it's. It also includes a matching function which compares data wanted posts with published data submissions and alerts posting users about this. The service has been developed by MARIS as part of the contract.

   Transfer solution: The Data Wanted service including matching function is considered as a foreground result and an export of the software sources of the online service per 10th October 2021 has been made which is handed over to CINEA as a digital resource. In addition, a copy is given of the post-it metadata records as published per 10th October 2021 which are also considered as foreground results and license-free. The transfer of those is done by means of MS-ACCESS tables which correspond to the relational database model as used by the Data Wanted service software.

All these results are handed-over to CINEA by electronic transfer of digital software and data resources. There are no pre-existing rights applicable.

12. List of abbreviations and acronyms

CKAN	Comprehensive Knowledge Archive Network
CMEMS-INSTAC	Copernicus Marine Environment Monitoring Service - In Situ Thematic Centre
CUAHSI	Consortium of Universities for the Advancement of Hydrologic Science, Inc
DAB	Data Access Brokerage
EASME	Executive Agency for Small and Medium-sized Enterprises
EDMERP	European Directory of Marine Research Projects
EDMO	European Directory of Marine Organisations
EMODnet	European Marine Observation and Data Network
EU	European Union
FAQ	Frequently Asked Questions
GDPR	General Data Protection Regulation
IOC	Intergovernmental Oceanographic Commission
IODE	International Oceanographic Data and Information Exchange"
NODC	National Oceanographic Data Centre
NRT	Near Real Time
O&M	Observations & Measurements
OAI-PMH	Open Archives Initiative Protocol for Metadata Harvesting
OGC	Open Geospatial Consortium
OTRS	Open-source Ticket Request System
RT	Real Time
SEANOE	SEA scieNtific Open data Edition

SME	Small Medium Enterprise
SOS	Sensor Observation Service
SWE	Sensor Web Enablement
WMO	World Meteorological Organisation

13. Annex: Other documentation attached

Annexes:

1) Deliverable 3.3 - SWE Service Installation User Guide;

2) Deliverable 3.4 - SWE Demonstrator expanded with new stations;

3) Deliverable D4.1 - Inventory of potential data sources and providers in European countries and priorities

4) Annex 4: Overview of interesting ingestion cases per country

5) Annex 5: Overview of promotional material

EMODnet Ingestion and safe-keeping of marine data n.2

EASME/EMFF/2018/1.3.1.8/01/SI2.810021

EMODnet Data Ingestion

D3.3 - SWE Service Installation User Guide

September 2020

Contents

Disclaimer

Document info

Title	EMODnet Data Ingestion – D3.3 - SWE Service Installation User Guide
Authors [affiliation]	Antonio Novellino, Luca Bonofiglio, Andrea Bocchimpani [ETT], Christian Autermann – 52North
Dissemination level	Public
Revision	1
Date	16/09/2020

1. Introduction

The European Marine Observation and Data Network, EMODnet, is a long-term marine initiative implementing mechanism of the European Commission's Marine Knowledge 2020 strategy1,2 to unlock the potential of Europe's wealth of marine data. Based on the principle of collecting data once and using it many times for many purposes, EMODnet is a network of organizations supported by the EU's Integrated Maritime Policy linked by a data management structure. These organizations work together to facilitate the discovery and access to marine data and data products representing the following seven main themes: bathymetry, biology, chemistry, geology, human activities, physics, and seabed habitats; six regional check points and a Data Ingestion facility. EMODnet provides a gateway to those marine data accompanied by their metadata and data products through a number of thematic portals and a central portal (www.emodnet.eu).

The EMODnet Data Ingestion portal seeks to identify and to reach out to other potential providers in order to make their data sets also part of the total offer. It aims at streamlining the data ingestion process so that data holders from public and private sectors that are not yet connected to the existing marine data management infrastructures can easily release their data for safekeeping and subsequent distribution through EMODnet. This will enrich the total offer for all types of users and conform to the EMODnet motto 'collect data once and use it many times'.

The EMODnet Real time Portal (http://www.emodnet-physics.eu/realtime) is a web application that is able to provide NRT data and metadata from marine data centres that offer a machine to machine interface based on the Sensor Observation Service (SOS) standard of the Open Geospatial Consortium (OGC). Its goal is to offer a simple point of access to distributed NRT data in a transparent way: users can add and/or remove available sensor systems to/from the portal and thus access their data.

This document is an introductory guide to users on how to exchange EMODnet Real Time Data using the Sensor Web Enablement Sensor Observation Service. In particular, this document presents how to set up a SWE SOS 52N server and how to connect it to the EMODnet RT data flow.

[1] European Commission (2010). Marine Knowledge 2020 Marine Data and Observation for Smart and Sustainable Growth. Commission Communication COM (2010) 461, Publications Office of the European Union.

[2] European Commission (2012). Marine Knowledge 2020 from Seabed Mapping to Ocean Forecasting. Green Paper, Publications Office of the European Union, Luxembourg.

2. Sensor Web Enablement / Sensor Observation Service

a. A brief intro of the Sensor Web Enablement (SWE)

The Sensor Web Enablement framework developed by the Open Geospatial Consortium (OGC) aims to develop and maintain standards for the interoperable integration of sensors and their observation data into Web-based (spatial) data infrastructures (Bröring et al., 2011). There exist several document types within the OGC, representing the maturity of a specification (e.g. discussion paper, best practice paper or standard).

A specification can be understood as a technical definition for a web service or data model (independent of the grade of maturity) while a standard is the document that has been officially adopted by the OGC.

The OGC Sensor Observation Service (SOS) interface allows pull-based access to observation data as well as sensor metadata. This means that the SOS acts as a mediator between clients and a measurement archive (e.g. database) or sensor system.

Through the SOS, it is possible for clients to query observation data of heterogeneous sources via a standardized interface.

On the one hand the SOS standard defines a set of operations and their parameters and on the other hand it relies of the data model/encoding standards of the SWE framework to provide standardised outputs.

The core operations of the SOS interface are:

- GetCapabilities: Retrieve metadata about a SOS server (e.g. supported operations and available data sets)
- DescribeSensor: Access metadata about the sensors or processes which have generated the observation data offered by the SOS server
- GetObservation: Retrieval of observation data/measurements

An important extension of the SOS interface is a group of transactional operations (InsertSensor and InsertObservation) for publishing new sensors and observations data on a SOS server.

Another important operation is the GetFeatureOfInterest operation which allows the retrieval of the geometric features to which observations are associated. It provides the required spatial context, by serving e.g. point or polygon features of the feature that is being observed.

Figure 1 illustrates the four interface methods and their corresponding response formats.

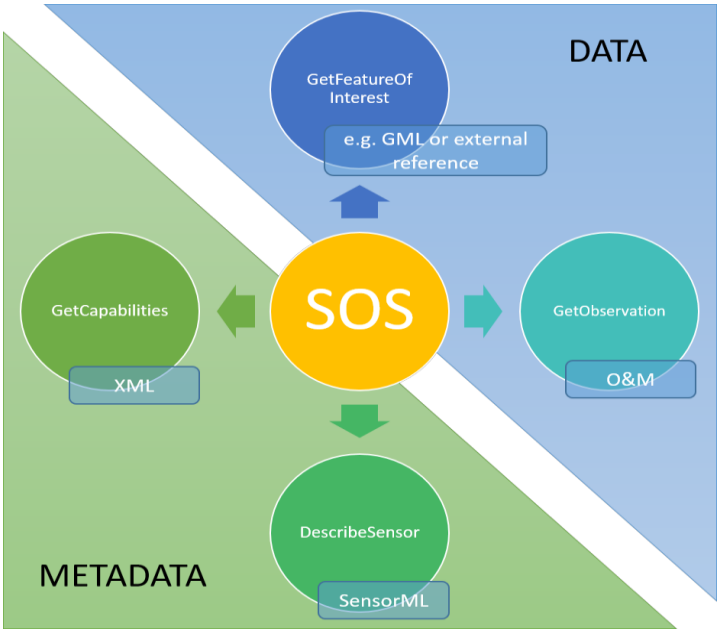

Figure 1. SOS Interfece Method Overview

Increasingly, marine data will be collected by smart sensors and platforms. Several developments are ongoing in this field of developing new sensors for an expanding range of parameters, and new platforms that can carry a payload of multiple sensors and operate efficiently for long durations. These developments need to be anticipated, also with respect to data management and data flow.

For that purpose, adoption of Sensor Web Enablement (SWE) standards holds great promise as it facilitates to streamline data from platforms in real-time to receivers, and to document many relevant aspects of the sensors, platforms, and observations using marine SWE profiles and vocabularies, thus enriching the available metadata from observations at their origin, which will contribute to improving the FAIRness of data sets and documenting the provenance of observed data.

The SeaDataNet consortium, has also made great progress in building upon the SWE standards to support the interoperable sharing of near-real time and real-time observation data streams. This methodology has already tested to streameline data flow into EMODnet Physics and EMODnet Data Intestion is going to uptake and exted futher the system.

This comprises especially a component, which have been developed led by 52North, the 52N SOS Service. The 52°North Sensor Observation Service 4.x3 implements the OGC SOS standard versions 1.0.0 and 2.0. The implementation comprises all extensions defined in the specification.

[3] www.52north.org/sos

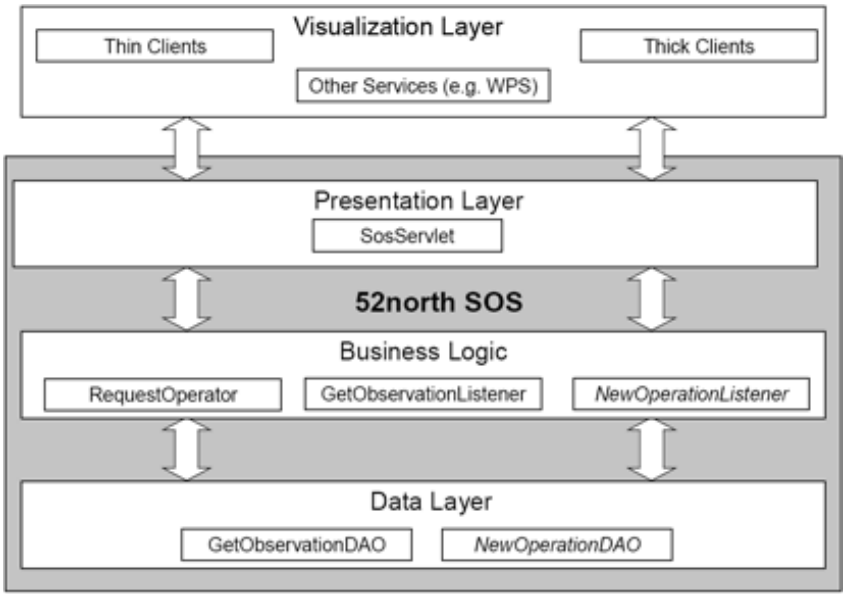

Figure 2. Layered architecture of the 52°North Sensor Observation Service

With its layered architecture, shown in Figure 2 the SOS server can be flexibly connected to different data sources ranging from file-based approaches to different database systems. By default, PostGIS is used as the Database Management System (DBMS). By customizing the Business Logic layer, new functionality may be added. Thereby, new encoders and decoders can be added in a plug and play fashion. For example, prototypical support for an EXI encoding for SOS messages, O&M as well as SensorML has already been implemented in the European research project NeXOS[4].

A new extension of the 52°North SOS implementation is the support of the OGC SensorThings API Sensing profile. Currently a first beta version of the implementation of the core profile of this specification is available. Further extensions of this module are currently work in progress. The aim of this component is to support sensor operators, researchers and data owners to ingest data and SWE metadata from operational observing platforms and sensors into a local storage system and to publish (selected) data streams from this database by means of SOS services to receiving servers. This facilitates operators to publish streams of near-real time and real-time observation data via SOS servers by first describing the structure of the observation network and data stream and then enabling an automated data ingestion, storage, and publication process. The 52N suite also comprises a SWE Viewing Services, based on the Helgoland Sensor Web Viewer, that is an application for exploring and visualising data streams from operational sensors and platforms. This tool is also available to partner that are joining the data sharing methodology as a complementary tool to self-check the correctness of system configuration and provide the users with a further data exploring and access tool.

These components are available as open source software via GitHub[5].

[4] http://www.nexosproject.eu/

[5] More information about these solutions, background, SWE profiles, how to apply, and GitHub locations, can be found at https://www.seadatanet.org/Software/Sensor-Web-Viewer/Documentation

3. SOS Server Service installation

a. General Requirements

This section summarizes the general necessary requirements to connect to 52N SOS server.

Follow these steps:

1) In order to access your services, it is necessary to connect with the Windows VPN to DLTM, using the following credentials:

   - User: xxxx

   - Password: yyyy

   - Shared key: dltmdell

2) Once you are connected to the VPN, create an SSH connection to your server.

To implement this operation, it is recommended to download a dedicated software, such as Putty.

You can install Putty following this link https://www.chiark.greenend.org.uk/~sgtatham/putty/latest.html

3) Once Putty is installed, connect to your server:

- IP: 192.168.20.xxx

- User: xxxx

- Password: yyyy

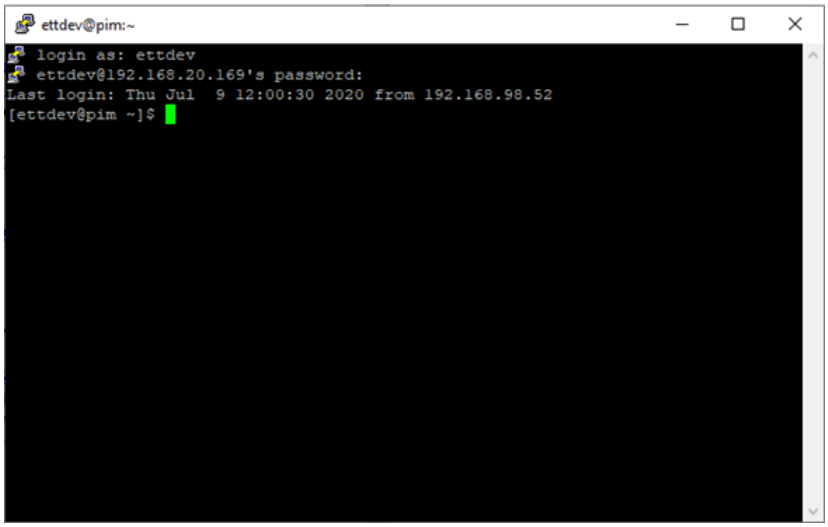

Figure 3. Server's connection

4) Check if the following software are present in your PC. Otherwise, install:
   - Java Runtime Enviroment 7.0: https://www.oracle.com/java/technologies/javase-downloads.html

   - Java Servlet-API, for example Tomcat: http://tomcat.apache.org/download-60.cgi

   - Database Management System, below are the steps to check the presence of PostgreSql and if it is not present how to install it from an open terminal on Putty:

      1) Install PgAdmin on your computer: https://www.pgadmin.org/download/

      2) 'which psql' (Check if PostgreSql is already installed)

      3) 'sudo yum - y install epel-release'

      4) 'sudo yum –y install https://download.postgresql.org/pub/repos/yum/reporpms/EL-7-x86_64/pgdg-redhat-repo-latest.noarch.rpm'

      5) 'sudo yum install postgis25_12'

5) After verifying the conditions described above (point 4), download the war file package directly from the open terminal on Putty through this command: 'wget https://github.com/52North/SOS/releases/download/v4.4.15/52n-sensorweb-sos-4.4.15.zip'

   It is raccomended to create a special folder with 'mkdir sos' and move the zipped file inside it with 'mv 52n-sensorweb-sos-4.4.15.zip./sos/'. Then, unzip the folder with 'unzip 52n-sensorweb-sos-4.4.15.zip'.

6) Copy the war file in the Tomcat folder with 'cp 52n-sensorweb-sos-4.4.15.war/usr/share/tomcat/webapps', so that it is visible and manageable by the Tomcat manager.

The download and deployment of the war file can also be done from the link: https://github.com/52North/SOS/releases.

After unziping, the war file will be found in UNZIPPED_PACKAGE / bin / target.

Connect to the Tomcat Manager: http: // localhost: 8080 / manager / html and scroll to the "WAR file to deploy" section, select the file and click on "deploy"

7) Create the database and the user with the relative password.

b. Pre-configuration

1. Download and configure SOS following this link: http://192.168.20.xxxxxxx/52n-sos-webapp/
2. Log in with your credentials (Username and password)
3. At the first access, setup the SOS server: insert User, Password, Database and all other required data

At every time, through the administration panel, it is possible to make changes of the data entered during the initial configuration and to set up new optional configurations.

c. Installing the package

Now you are ready to configure the 52N SOS server:

1) Open PgAdmin and connect to the newly created server.
2) Click on “Add New Server” and complete the requested data such as Name, Hostname/Address, Port, Database, User and Password.
3) If the data entered are correct, then you will find the new server in the menu on the left.
4) You can navigate it and find, in the “Database” submenu, the database created previously.

After the above procedure is completed, you should visualize a dashboard of the database, as shown in the image below:

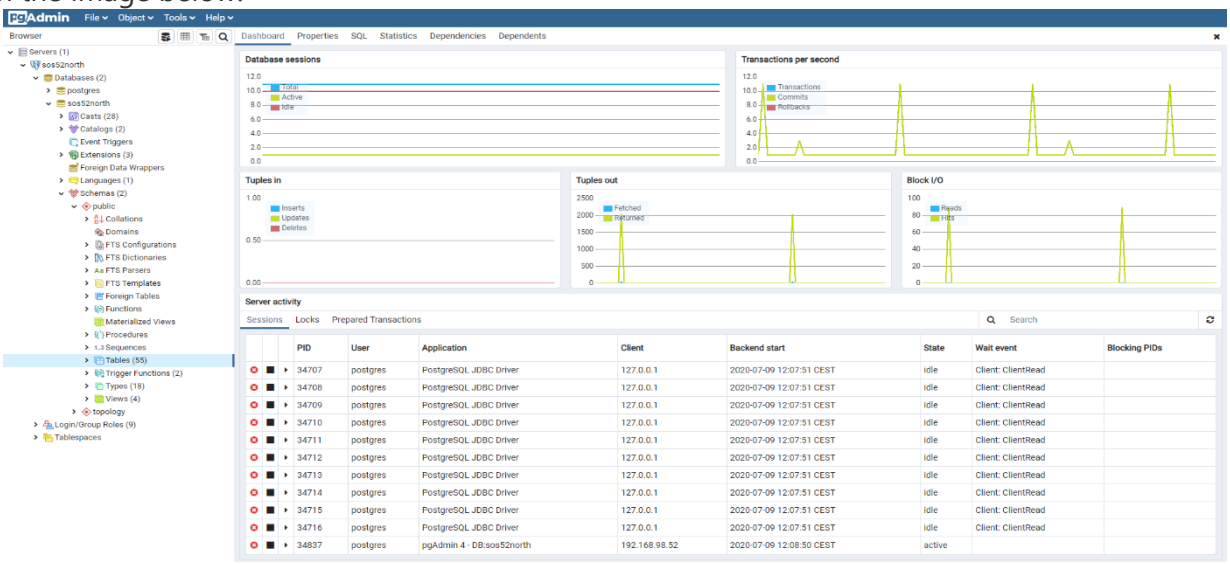

Figure 4. PgAdmin screen

For more information on installation requirements and configurations, you can directly consult the official website of the 52N SOS server at the following link: https://wiki.52north.org/SensorWeb/SensorObservationServiceIVDocumentation

4. SOS Services Configuration

This section describes how to configure Sensor and Observation services, using 52N SOS server.

a. Insert Sensor procedures

In order to insert the sensor in the server, please follow these steps:

1) Enter the measurements via the previously installed webapp and log in with the same username and password used before.
   Click on "Client" and choose the request "InsertSensor"

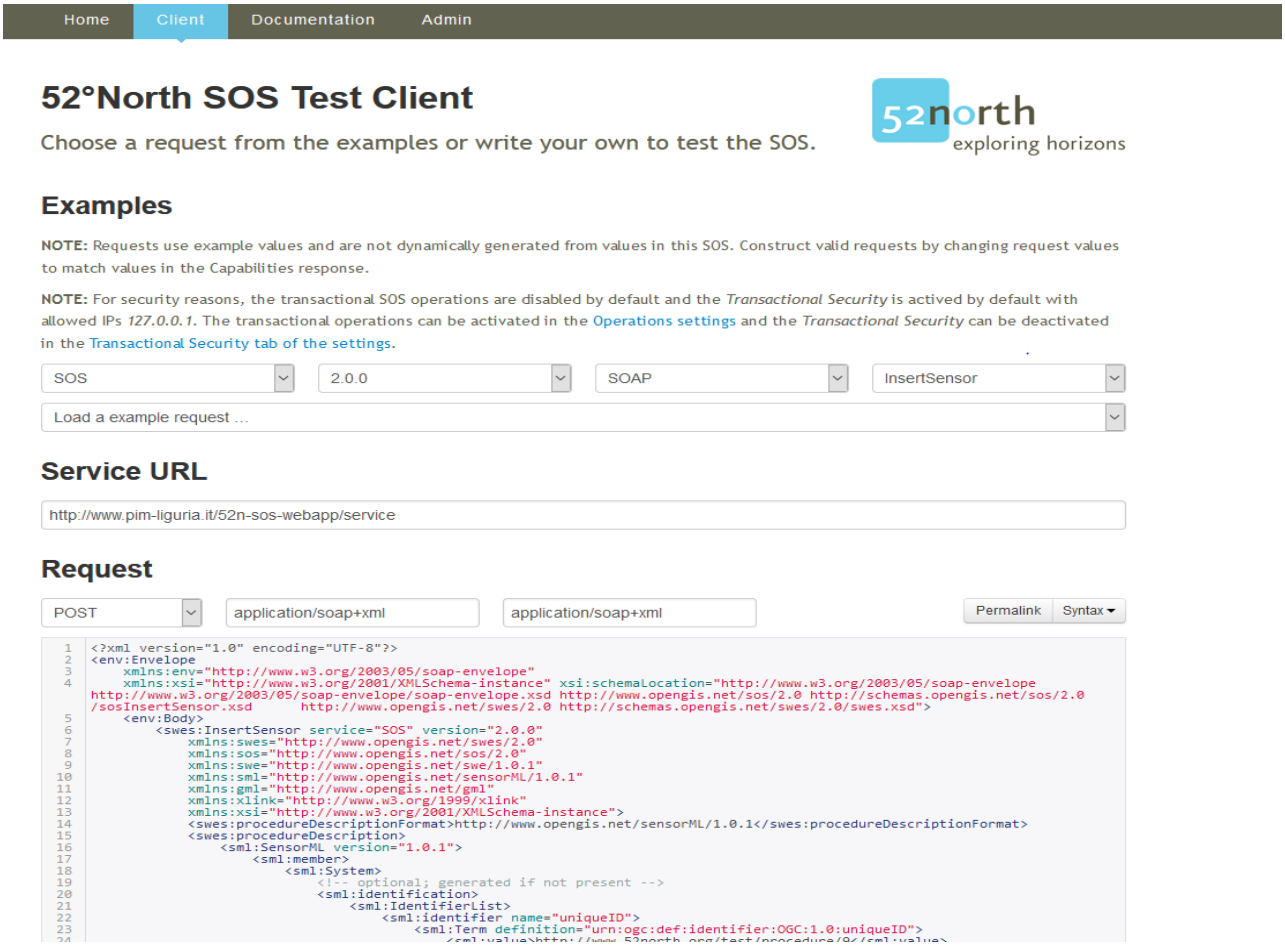

Figure 5. 52N SOS Test Client

2) Create the specific "Sensor" and insert the Service URL, as shown below:

   The data proposed in the figure above are just an example in order to show how to insert the sensor. Data should be modified accordingly when inserting new sensors.

3) Enter your XML code
   (i.e. http://www.pim-liguria.it/erddap/info/AMP_Portofino_MEDA2/index.html):

```
<?xml version="1.0" encoding="UTF-8"?>
<env:Envelope
   xmlns:env="http://www.w3.org/2003/05/soap-envelope"
                                                xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance"
xsi:schemaLocation="http://www.w3.org/2003/05/soap-envelope http://www.w3.org/2003/05/soap-
envelope/soap-envelope.xsd                                  http://www.opengis.net/sos/2.0
http://schemas.opengis.net/sos/2.0/sosInsertSensor.xsd                 http://www.opengis.net/swes/2.0
http://schemas.opengis.net/swes/2.0/swes.xsd">
   <env:Body>
      <swes:InsertSensor
         xmlns:swes="http://www.opengis.net/swes/2.0"
         xmlns:sos="http://www.opengis.net/sos/2.0"
         xmlns:swe="http://www.opengis.net/swe/1.0.1"
         xmlns:sml="http://www.opengis.net/sensorML/1.0.1"
         xmlns:gml="http://www.opengis.net/gml"
         xmlns:xlink="http://www.w3.org/1999/xlink"
         xmlns:xsi="http://www.w3.org/2001/XMLSchema-instance" service="SOS" version="2.0.0">
          <swes:procedureDescriptionFormat>http://www.opengis.net/sensorML/1.0.1</swes:procedu
reDescriptionFormat>
         <swes:procedureDescription>
            <sml:SensorML version="1.0.1">
               <sml:member>
                  <sml:System>
                     <!-- optional; generated if not present -->
                     <sml:identification>
                        <sml:IdentifierList>
                           <sml:identifier name="uniqueID">
                              <sml:Term definition="urn:ogc:def:identifier:OGC:1.0:uniqueID">
                                 <sml:value>Meda2</sml:value>
                              </sml:Term>
                           </sml:identifier>
```

```
                    <sml:identifier name="longName">
                        <sml:Term definition="urn:ogc:def:identifier:OGC:1.0:longName">
                            <sml:value>AMP Portofino MEDA2</sml:value>
                        </sml:Term>
                    </sml:identifier>
                    <sml:identifier name="shortName">
                        <sml:Term definition="urn:ogc:def:identifier:OGC:1.0:shortName">
                            <sml:value>AMP Portofino MEDA2</sml:value>
                        </sml:Term>
                    </sml:identifier>
                </sml:IdentifierList>
            </sml:identification>
            <sml:capabilities name="offerings">
                <!-- Special capabilities used to specify offerings. -->
                <!-- Parsed and removed during InsertSensor/UpdateSensorDescription,
added during DescribeSensor. -->
                <!-- Offering is generated if not specified. -->
                <swe:SimpleDataRecord>
                    <!-- Field name or gml:name is used for the offering's name -->
                    <swe:field name="Offering for Meda2">
                        <swe:Text definition="urn:ogc:def:identifier:OGC:offeringID">
                            <gml:name>Offering for Meda2</gml:name>
                            <swe:value>Meda2</swe:value>
                        </swe:Text>
                    </swe:field>
                </swe:SimpleDataRecord>
            </sml:capabilities>
            <sml:capabilities name="featuresOfInterest">
                <!-- Special capabilities used to specify features of interest. -->
                <!-- Parsed and removed during InsertSensor/UpdateSensorDescription,
added during DescribeSensor. -->
```

```
                    <swe:SimpleDataRecord>
                        <swe:field name="featureOfInterestID">
                            <swe:Text>
                                <swe:value>Meda2
</swe:value>
                            </swe:Text>
                        </swe:field>
                    </swe:SimpleDataRecord>
                </sml:capabilities>
                <sml:capabilities name="metadata">
                    <swe:SimpleDataRecord>
                        <!-- status indicates, whether sensor is insitu (true) or remote (false) -->
                        <swe:field name="insitu">
                            <swe:Boolean definition="insitu">
                                <swe:value>true</swe:value>
                            </swe:Boolean>
                        </swe:field>
                        <!-- status indicates, whether sensor is mobile (true) or fixed/stationary (false)
-->
                        <swe:field name="mobile">
                            <swe:Boolean definition="mobile">
                                <swe:value>false</swe:value>
                            </swe:Boolean>
                        </swe:field>
                    </swe:SimpleDataRecord>
                </sml:capabilities>
                <sml:position name="sensorPosition">
                    <swe:Position referenceFrame="urn:ogc:def:crs:EPSG::4326">
                        <swe:location>
                            <swe:Vector gml:id="STATION_LOCATION">
                                <swe:coordinate name="easting">
```

```
                <swe:Quantity axisID="x">
                    <swe:uom code="degree"/>
                    <swe:value>9.165838</swe:value>
                </swe:Quantity>
            </swe:coordinate>
            <swe:coordinate name="northing">
                <swe:Quantity axisID="y">
                    <swe:uom code="degree"/>
                    <swe:value>44.31372</swe:value>
                </swe:Quantity>
            </swe:coordinate>
            <swe:coordinate name="altitude">
                <swe:Quantity axisID="z">
                    <swe:uom code="m"/>
                    <swe:value>0</swe:value>
                </swe:Quantity>
            </swe:coordinate>
        </swe:Vector>
    </swe:location>
</swe:Position>
</sml:position>
<sml:inputs>
<sml:InputList>
    <sml:input name="observable_property_Meda2">
        <swe:ObservableProperty definition="observable_property_Meda2"/>
    </sml:input>
</sml:InputList>
</sml:inputs>
<sml:outputs>

    <sml:OutputList>
```

```
                <sml:output name="TEMP">
                  <swe:Quantity definition="TEMP">
                    <swe:uom code="degree_Celsius"/>
                  </swe:Quantity>
                </sml:output>
                <sml:output name="PSAL">
                  <swe:Quantity definition="PSAL">
                    <swe:uom code="psu"/>
                  </swe:Quantity>
                </sml:output>
                <sml:output name="CNDC">
                  <swe:Quantity definition="CNDC">
                    <swe:uom code="S/m"/>
                  </swe:Quantity>
                </sml:output>
                        </sml:OutputList>
                    </sml:outputs>
                  </sml:System>
                </sml:member>
              </sml:SensorML>
            </swes:procedureDescription>
<swes:observableProperty>TEMP</swes:observableProperty>
<swes:observableProperty>PSAL</swes:observableProperty>
<swes:observableProperty>CNDC</swes:observableProperty>

            <swes:metadata>
              <sos:SosInsertionMetadata>
                                <sos:observationType>http://www.opengis.net/def/observationType/OGC-OM/2.0/OM_Measurement</sos:observationType>
                                <sos:observationType>http://www.opengis.net/def/observationType/OGC-OM/2.0/OM_CategoryObservation</sos:observationType>
```

<sos:observationType>http://www.opengis.net/def/observationType/OGC-OM/2.0/OM_CountObservation</sos:observationType>

<sos:observationType>http://www.opengis.net/def/observationType/OGC-OM/2.0/OM_TextObservation</sos:observationType>

<sos:observationType>http://www.opengis.net/def/observationType/OGC-OM/2.0/OM_TruthObservation</sos:observationType>

<sos:observationType>http://www.opengis.net/def/observationType/OGC-OM/2.0/OM_GeometryObservation</sos:observationType>

<sos:observationType>http://www.opengis.net/def/observationType/OGC-OM/2.0/OM_ComplexObservation</sos:observationType>

<sos:observationType>http://www.opengis.net/def/observationType/OGC-OM/2.0/OM_SWEArrayObservation</sos:observationType>

<sos:observationType>http://www.opengis.net/def/observationType/OGC-OM/2.0/OM_ReferenceObservation</sos:observationType>

<!-- multiple values possible -->

<sos:featureOfInterestType>http://www.opengis.net/def/samplingFeatureType/OGC-OM/2.0/SF_SamplingPoint</sos:featureOfInterestType>

</sos:SosInsertionMetadata>

</swes:metadata>

</swes:InsertSensor>

</env:Body>

</env:Envelop

NOTE: remember to provide, each time, specific data in the sections highlited in yellow

4) After requesting the server, you will find the response code. If this is equal to 200, the call is successful. Otherwise, it is failed.
5) If the procedure has been executed correctly, move to "Client" → "Sensor Web Thin Client (Helgoland)" and check that the sensor is available.
6) Choose the Timeseries. If you can select the sensor just inserted, then it means that the InsertSensor operation is correct and you can proceed to insert the relevant measurements.

b. Insert Observation procedures

To insert Observation's measurements, repeat the initial procedures described in paragraph 3.1 and follow specific cases:

CASE 1

1) Enter the measurements via the previously installed webapp and log in with the same username and password used before.
2) Click on "Client" and choose the request "InsertObservation"
3) Create the specific "Observation" and insert the observed properties from the server
4) Access the server, select the typology of measurements, choose the file type and click on Submit, accordingly to your Data Storage System. A page will be opened with a data table showing all the measurements made by the sensor.
5) Insert the measurements as showed below (i.e we used an example entering a measurement value for the TEMP field of the AMP Portofino MEDA sensor as described previously):


```
(
  "request": "InsertObservation",
  "service": "SOS",
  "version": "2.0.0",
  "offering": "Meda2",
  "observation": {
                          "type":          "http://www.opengis.net/def/observationType/OGC-
OM/2.0/OM_Measurement",
    "procedure": "Meda2",
    "observedProperty": "TEMP",
    "featureOfInterest": {
      "identifier": {
        "value": "Meda2",
        "codespace": "http://www.opengis.net/def/nil/OGC/0/unknown"
      },
      "name": [
        {
          "value": "Meda2",
          "codespace": "http://www.opengis.net/def/nil/OGC/0/unknown"
        }
      ],
      "geometry": {
        "type": "Point",
        "coordinates": [
          44.313725,
          9.165838
        ],
        "crs": {
          "type": "name",
```

```
        "properties": {
          "name": "EPSG:4326"
        }
      }
    }
  },
  "phenomenonTime": "2018-07-20T19:16:16.000+00:00",
  "resultTime": "2018-07-20T19:16:16.000+00:00",
  "result": {
    "uom": "celsius",
    "value": 26.037
  }
 }
}
```

NOTE: remember to provide, each time, specific data in the sections highlited in yellow

CASE 2

Entering all the measurements, one at a time, may be not efficient. Therefore, a Python script has been created to be able to insert the data sequentially.

Apply the following procedures to use the Python script:

1) Create the file
2) Insert and modify the typology of fields and data necessary for the sensor, as shown below:

```
import urllib.request
import requests
import json

urlSOS = "http://www.pim-liguria.it/52n-sos-webapp/service"
headers = {
  'Authorization': 'Basic YWRtaW46M1RUMTIzIUA=',
  'Content-Type': 'application/json'
}
payload_template = "{\r\n  \"request\": \"InsertObservation\",\r\n  \"service\": \"SOS\",\r\n  \"version\": \"2.0.0\",\r\n  \"offering\": \"Meda2\",\r\n  \"observation\": {\r\n\"type\":
\"http://www.opengis.net/def/observationType/OGC-OM/2.0/OM_Measurement\",\r\n \"procedure\": \"Meda2\",\r\n \"observedProperty\": \"[PARAM]\",\r\n \"featureOfInterest\": {\r\n \"identifier\": {\r\n \"value\":
\"Meda2\",\r\n \"codespace\": \"http://www.opengis.net/def/nil/OGC/0/unknown\"\r\n},\r\n\"name\": [\r\n{\r\n\"value\": \"Meda2\",\r\n\"codespace\":
\"http://www.opengis.net/def/nil/OGC/0/unknown\"\r\n}\r\n],\r\n\"geometry\": {\r\n\"type\": \"Point\",\r\n\"coordinates\": [\r\n44.313725,\r\n9.165838\r\n],\r\n\"crs\": {\r\n\"type\": \"name\",\r\n\"properties\":
{\r\n\"name\": \"EPSG:4326\"\r\n}\r\n}\r\n},\r\n\"phenomenonTime\": \"[TIME].000+00:00\",\r\n    \"resultTime\": \"[TIME].000+00:00\",\r\n    \"result\": {\r\n\"uom\": \"[UOM]\",\r\n      \"value\":
[VALUE]\r\n    }\r\n  }\r\n}"

url="http://www.pim-liguria.it/erddap/tabledap/AMP_Portofino_MEDA2.json?
FileTime%2Ctime%2CTIME_QC%2Cdepth%2CDEPTH_QC%2CPRES%2CPRES_QC%2Clatitude%2Clongitude%2CPOSITION_QC%2CTEMP%2CTEMP_QC%2CPSAL%2CCNDC&orderBy(%22time%22)"
savepath_file="meda2.json"
urllib.request.urlretrieve(url, savepath_file)
read_file= open(savepath_file, "r")
data = json.load(read_file)
read_file.close()
for row in data["table"]["rows"]:
  time=row[1].replace("Z","")
  temp=row[10]
  psal=row[12]
  cndc=row[13]
  payload=payload_template.replace("[PARAM]","TEMP").replace("[TIME]",time).replace("[VALUE]",str(temp)).replace("[UOM]","degree_Celsius")
  response = requests.request("POST", urlSOS, headers=headers, data = payload)
  payload=payload_template.replace("[PARAM]","PSAL").replace("[TIME]",time).replace("[VALUE]",str(psal)).replace("[UOM]","psu")
  response = requests.request("POST", urlSOS, headers=headers, data = payload)
  payload=payload_template.replace("[PARAM]","CNDC").replace("[TIME]",time).replace("[VALUE]",str(cndc)).replace("[UOM]","S/m")
  response = requests.request("POST", urlSOS, headers=headers, data = payload)
  print("DONE " + time)
```

Figure 6. Script Python to insert Observation

The procedure to request the server through the payload_template is defined in Figure 6.

The measurements entered in the script are those used in the example (TEMP, PSAL and CNDC fields of the sensor AMP Portofino MEDA).

NOTE: remember to provide, each time, specific data

3) Finally launch the script from the terminal with the command python filename.py

5. Services Validation

In this section, we describe the procedures to validate the services.

a. Timeseries

In order to verify if the Observation's measurement expalined in Case 1 is inserted correctly, go back to Sensor Web Thin Client (Helgoland).

Select the Timeseries, as shown in Figure 7:

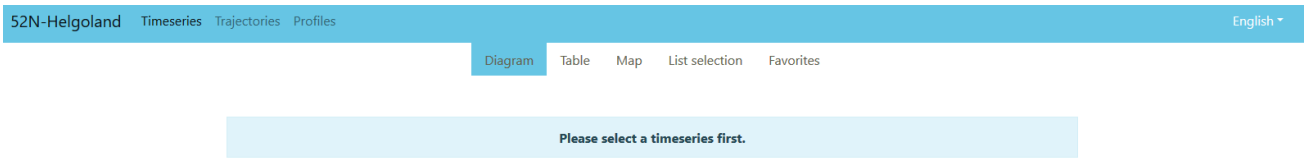

Figura 7. Timeseries selection

In the timeseries, you will find a map with the measurement inserted, as showed in Figure 8:

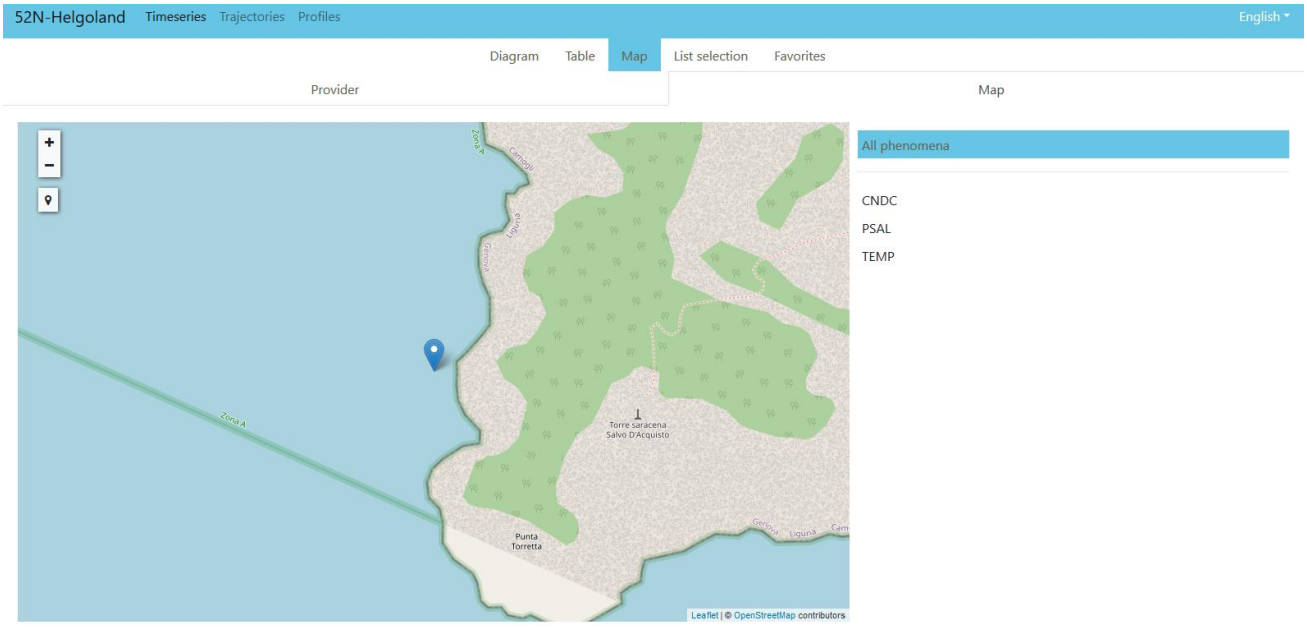

Figura 8. Timeseries Map

If the map is available and the measurements visible, then the procedures have been executed correctly.

Otherwise, start again.

b. Script validation procedures

In order to verify if the Observation's measurement, as explained in Case 2, is inserted correctly, go back to Sensor Web Thin Client (Helgoland).

You can see the insertion of the measurements both while the script is working (through the graph) and at the end of the process on a weekly base.

6. References

European Commission (2010), Marine Knowledge 2020 Marine Data and Observation for Smart and Sustainable Growth. Commission Communication COM (2010) 461, Publications Office of the European Union.

European Commission (2012), Marine Knowledge 2020 from Seabed Mapping to Ocean Forecasting. Green Paper, Publications Office of the European Union, Luxembourg.

Bröring, A., Echterhoff, J., Jirka, S., Simonis, I., Everding, T., Stasch, C., ... & Lemmens, R. (2011). New generation sensor web enablement. Sensors, 11(3), 2652-2699.

EMODnet Ingestion and safe-keeping of marine data n.2

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EMODnet Data Ingestion –

D3.4 - SWE Demonstrator expanded with new Services

September 2020

Contents

Disclaimer

Document info

Title	D3.4: EMODnet Data Ingestion – SWE Demonstrator expanded with new Services
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1. Introduction

The European The European Marine Observation and Data Network, EMODnet, is a long-term marine initiative implementing mechanism of the European Commission's Marine Knowledge 2020 strategy1,2 to unlock the potential of Europe's wealth of marine data. Based on the principle of collecting data once and using it many times for many purposes, EMODnet is a network of organizations supported by the EU's Integrated Maritime Policy linked by a data management structure. These organizations work together to facilitate the discovery and access to marine data and data products representing the following seven main themes: bathymetry, biology, chemistry, geology, human activities, physics, and seabed habitats; six regional check points and a Data Ingestion facility. EMODnet provides a gateway to those marine data accompanied by their metadata and data products through a number of thematic portals and a central portal (www.emodnet.eu).

The EMODnet Data Ingestion portal seeks to identify and to reach out to other potential providers in order to make their data sets also part of the total offer. It aims at streamlining the data ingestion process so that data holders from public and private sectors that are not yet connected to the existing marine data management infrastructures can easily release their data for safekeeping and subsequent distribution through EMODnet. This will enrich the total offer for all types of users and conform to the EMODnet motto 'collect data once and use it many times'.

The EMODnet Real time Portal (http://www.emodnet-physics.eu/realtime) is a web application that is able to provide NRT data and metadata from marine data centers that offer a machine to machine interface based on the Sensor Observation Service (SOS) standard of the Open Geospatial Consortium (OGC). Its goal is to offer a simple point of access to distributed NRT data in a transparent way: users can add and/or remove available sensor systems to/from the portal and thus access their data.

This document is an introductory guide to users on how to exchange EMODnet Real Time (RT) Data using the Sensor Web Enablement (SWE) Sensor Observation Service (SOS). In particular, this document presents an overview on the functioning of the SWE Demonstrator expanded with new stations related to SOS Server in the reporting period.

[1] European Commission (2010). Marine Knowledge 2020 Marine Data and Observation for Smart and Sustainable Growth. Commission Communication COM (2010) 461, Publications Office of the European Union.

[2] European Commission (2012). Marine Knowledge 2020 from Seabed Mapping to Ocean Forecasting. Green Paper, Publications Office of the European Union, Luxembourg.

2. Sensor Web Enablement

A brief intro of the Sensor Web Enablement (SWE)

The Sensor Web Enablement framework developed by the Open Geospatial Consortium (OGC) aims to develop and maintain standards for the interoperable integration of sensors and their observation data into Web-based (spatial) data infrastructures (Bröring et al., 2011). There exist several document types within the OGC, representing the maturity of a specification (e.g. discussion paper, best practice paper or standard).

A specification can be understood as a technical definition for a web service or data model (independent of the grade of maturity) while a standard is the document that has been officially adopted by the OGC.

The OGC Sensor Observation Service (SOS) interface allows pull-based access to observation data as well as sensor metadata. This means that the SOS acts as a mediator between clients and a measurement archive (e.g. database) or sensor system.

Through the SOS, it is possible for clients to query observation data of heterogeneous sources via a standardized interface.

On the one hand the SOS standard defines a set of operations and their parameters and on the other hand it relies of the data model/encoding standards of the SWE framework to provide standardised outputs.

The core operations of the SOS interface are:

- GetCapabilities: Retrieve metadata about a SOS server (e.g. supported operations and available data sets)
- DescribeSensor: Access metadata about the sensors or processes which have generated the observation data offered by the SOS server
- GetObservation: Retrieval of observation data/measurements

An important extension of the SOS interface is a group of transactional operations (InsertSensor and InsertObservation) for publishing new sensors and observations data on a SOS server.

Another important operation is the GetFeatureOfInterest operation which allows the retrieval of the geometric features to which observations are associated. It provides the required spatial context, by serving e.g. point or polygon features of the feature that is being observed.

Figure 1 illustrates the four interface methods and their corresponding response formats.

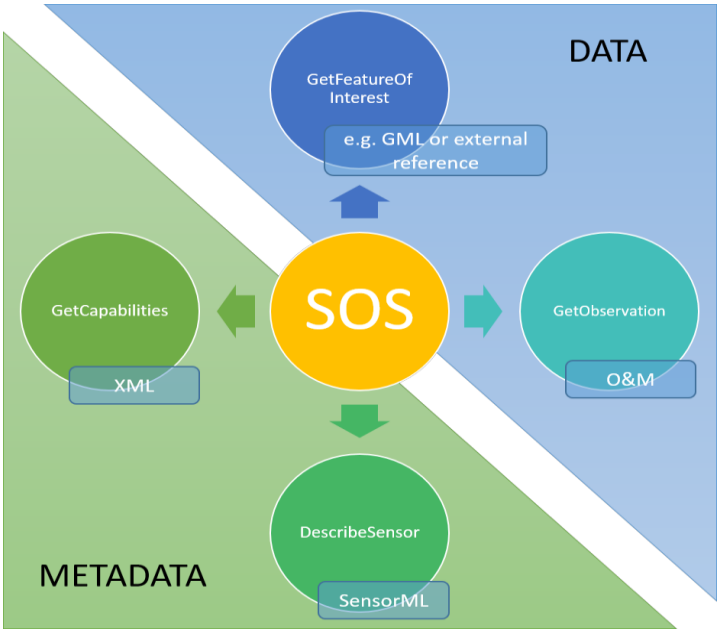


Figure 1. SOS Interfece Method Overview

Increasingly, marine data will be collected by smart sensors and platforms. Several developments are ongoing in this field of developing new sensors for an expanding range of parameters, and new platforms that can carry a payload of multiple sensors and operate efficiently for long durations. These developments need to be anticipated, also with respect to data management and data flow.

For that purpose, adoption of Sensor Web Enablement (SWE) standards holds great promise as it facilitates to streamline data from platforms in real-time to receivers, and to document many relevant aspects of the sensors, platforms, and observations using marine SWE profiles and vocabularies, thus enriching the available metadata from observations at their origin, which will contribute to improving the FAIRness of data sets and documenting the provenance of observed data.

The SeaDataNet consortium, has also made great progress in building upon the SWE standards to support the interoperable sharing of near-real time and real-time observation data streams. This methodology has already tested to streameline data flow into EMODnet Physics and EMODnet Data Intestion is going to uptake and exted futher the system.

This comprises especially a component, which have been developed led by 52North, the 52N SOS Service. The 52°North Sensor Observation Service 4.x3 implements the OGC SOS standard versions 1.0.0 and 2.0. The implementation comprises all extensions defined in the specification.

[3] www.52north.org/sos

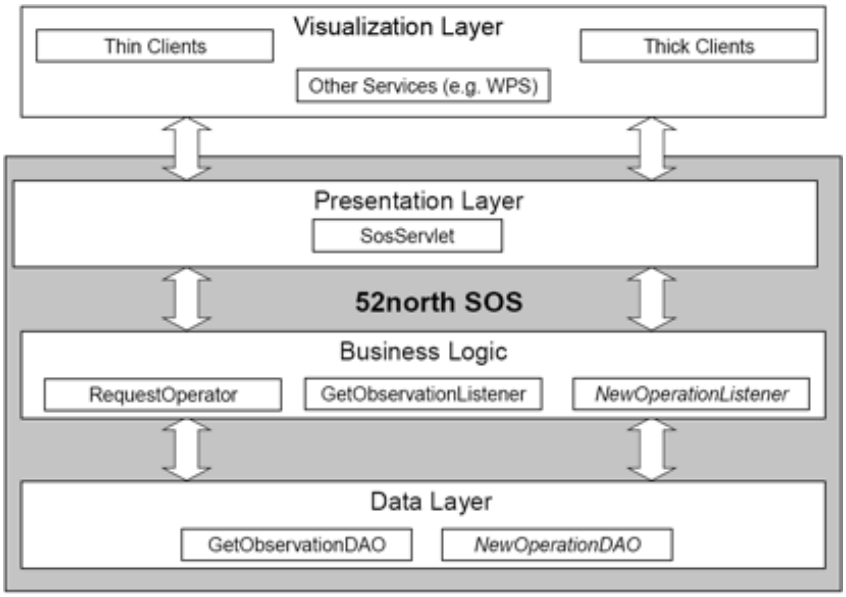


Figure 2. Layered architecture of the 52°North Sensor Observation Service

With its layered architecture, shown in Figure 2 the SOS server can be flexibly connected to different data sources ranging from file-based approaches to different database systems. By default, PostGIS is used as the Database Management System (DBMS). By customizing the Business Logic layer, new functionality may be added. Thereby, new encoders and decoders can be added in a plug and play fashion. For example, prototypical support for an EXI encoding for SOS messages, O&M as well as SensorML has already been implemented in the European research project NeXOS[4].

A new extension of the 52°North SOS implementation is the support of the OGC SensorThings API Sensing profile. Currently a first beta version of the implementation of the core profile of this specification is available. Further extensions of this module are currently work in progress. The aim of this component is to support sensor operators, researchers and data owners to ingest data and SWE metadata from operational observing platforms and sensors into a local storage system and to publish (selected) data streams from this database by means of SOS services to receiving servers. This facilitates operators to publish streams of near-real time and real-time observation data via SOS servers by first describing the structure of the observation network and data stream and then enabling an automated data ingestion, storage, and publication process. The 52N suite also comprises a SWE Viewing Services, based on the Helgoland Sensor Web Viewer, that is an application for exploring and visualising data streams from operational sensors and platforms. This tool is also available to partner that are joining the data sharing methodology as a complementary tool to self-check the correctness of system configuration and provide the users with a further data exploring and access tool. These components are available as open source software via GitHub[5].

[4] http://www.nexosproject.eu/

[5] More information about these solutions, background, SWE profiles, how to apply, and GitHub locations, can be found at https://www.seadatanet.org/Software/Sensor-Web-Viewer/Documentation

3. Demonstrator Concept

Background of the SWE demonstrator

Increasingly, marine data will be collected by smart sensors and platforms. Several developments are ongoing in this field of developing new sensors for an expanding range of parameters, and new platforms that can carry a payload of multiple sensors and operate efficiently for long durations. These developments need to be anticipated, also with respect to data management and data flow. For that purpose, adoption of **Sensor Web Enablement (SWE)** standards holds great promise as it facilitates to streamline data from platforms in real-time to receivers, and to document many relevant aspects of the sensors, platforms, and observations using marine SWE profiles and vocabularies, thus enriching the available metadata from observations at their origin, which will contribute to improving the FAIRness of data sets and documenting the provenance of observed data.

Integrating the **online Sensor Web Enablement (SWE)** for ingesting near real time data sets from operational oceanography sensor networks has several benefit/reasons:

- The SWE software is open source and widely adopted
- It can be easily adopted and configured by the operators (e.g. NODCs)
- The model can be used to set up dedicated pipelines by operators
- Close the gap between RT, NRT and DM data
- Facilitate streamlining the data and metadata transfer from operational networks to a database buffer from which assigned (SDN) data centres can pick up the data timeseries for further elaboration and later population into the CDI service

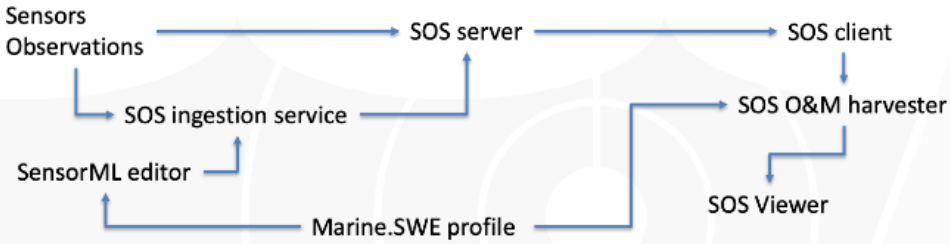


Figure 3. SWE demonstrator concept

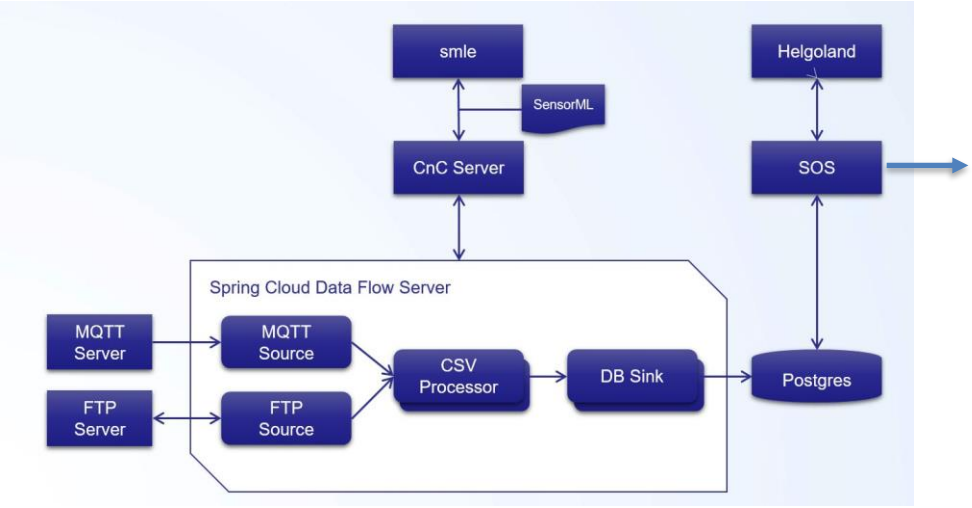
Starting from the progresses made by the SeaDataNet community, in building upon the SWE standards to support the interoperable sharing of near-real time and real-time observation data streams, EMODnet Data Ingestion and EMODnet Physics designed and implemented a EMODnet SWE demonstrator consisting in:

- Back End tools for the operators
- Guidelines on tools and standards (e.g. this document)
- Front End tools for EMODnet users

Back end Tools for operators

Backend tools support the collection of data from different sources, the interpretation and conversion into an internal data model (based on the ISO/OGC Observation and Measurements (O&M) standard, as well as the publication of the collected data into the database of an interoperable OGC Sensor Observation Service (SOS) instance. They consists of the following components:

- SWE SOS server. SOS – Sensor Observation Service provides a standardized interface for managing and retrieving metadata and observations from heterogeneous sensor systems.
- SWE Ingestion Service: The aim of this component is to support sensor operators, researchers and data owners to ingest data and SWE metadata from operational observing platforms and sensors into a local storage system and to publish (selected) data streams from this database by means of SOS services to receiving servers. This facilitates operators to publish streams of near-real time and real-time observation data via SOS servers by first describing the structure of the observation network and data stream and then enabling an automated data ingestion, storage, and publication process;
- SWE Viewing Services, based on the Helgoland Sensor Web Viewer, is an application for exploring and visualising data streams from operational sensors and platforms.



- EMODnet Physics
- SeaDataCloud CDI ingestion service
- ...

Figure 4. SWE Ingestion service

Sensor Observation Service

The OGC SOS standard defines a Web service interface that allows querying observations, sensor metadata, as well as representations of observed features.

For connecting the Helgoland client to SOS servers, usually these servers need to provide at least the following basic "core" operations:

- GetCapabilities: returns a service description with information about the interface (offered operations and endpoints) as well as the available sensor data, such as the period for which sensor data is available, sensors that produce the measured values, or phenomena that are observed.
- DescribeSensor: metadata on the registered probes and sensors. The sensor description can contain information about the sensor in general, the identifier and classification, position and observed phenomena.
- GetObservations: allows pull-based querying of observed values, including their metadata stored in the SOS database.

In addition, the GetDataAvailability operation, as defined by the INSPIRE Technical Guidance on Download Services, may be used for determining in more detail the available data sets offered by an SOS server. To encode observations, the ISO/OGC Observations & Measurements (O&M) standard is used. To encode sensor descriptions, the OGC Sensor Model Language (SensorML) is used.

Deliverable 3.3 provides instruction on how to install and implement a SOS Server.

Viewing Service - Helgoland

Helgoland is a software client for visual exploration and analysis of sensor web data developed by 52° North (https://52north.org). It is a lightweight web application that enables the exploration, analysis and visualization of sensor web data in various fields of use, e.g. hydrology, meteorology, environmental monitoring, traffic management.

Using this application, users can easily explore stations or mobile sensor platforms in a map, select time series data by a list selection, visualize time series, trajectory or profile data and explore their metadata.

The application is based on HTML, JavaScript and CSS and can connect to different Sensor Web endpoints (REST-APIs). These Sensor Web REST-APIs provide a thin access layer to sensor data via RESTful Web binding with different output formats (e.g. proxy solution is available that allows to encapsulate existing XML-based SOS severs for integration into the Helgoland client).

The main features provide by Helgoland are:

- Access to SOS instances (through the proxy solution SOS 1.0.0 and 2.0 as well as specific extensions such as those required by the INSPIRE technical guidance on Download Services are supported)
- Diagram view of multiple time series, profiles, temporal zooming and panning, etc.
- Data export (PDF, Excel, CSV).

Guidelines and documentation

Information about these solutions, background, SWE profiles, how to apply, and GitHub locations, can be found at: https://www.seadatanet.org/Software/Sensor-Web-Viewer/Documentation

Software components can be found at GitHub resources:

- Spring Cloud software and SWE Ingestion service at: https://github.com/52North/SWE-Ingestion-Service
- Helgoland sensor web viewer at: https://github.com/52North/helgoland/tree/feature/sea-data-cloud
- SWE SOS importer: https://github.com/52North/sos-importer
- SMLE editor: https://github.com/52North/smle
- SWE Profiles: https://odip.github.io/MarineProfilesForSWE/

Once installed, the deployed platforms and sensors should be described using the SMLE editor, which allows to configure SWE profiles and to make use of SeaDataNet vocabularies for most metadata elements.

Technologies adopted for implementing the tools

Different technologies have been used to develop Helgoland:

- *Angular.js*: it is a client side JavaScript MVC framework to develop a dynamic web application. AngularJS was originally started as a project in Google but it is now an open source framework. AngularJS is entirely based on HTML and JavaScript and it changes static HTML to dynamic HTML. It extends the ability of HTML by adding built-in attributes and components and also provides an ability to create custom attributes using simple JavaScript. The AngularJS framework works by first reading the HTML page, which has additional custom tag attributes embedded into it. Angular interprets those attributes as directives to bind input or output parts of the page to a model that is represented by standard JavaScript variables. The values of those JavaScript variables can be manually set within the code, or retrieved from static or dynamic JSON resources. AngularJS is the frontend part of the MEAN stack, consisting of MongoDB database, Express.js web application server framework, Angular.js itself, and the Node.js server runtime environment.
- *Leaflet*: Leaflet is a widely used open source JavaScript library used to build web mapping applications. It supports most mobile and desktop platforms, supporting HTML5 and CSS3. Along with OpenLayers, and the Google Maps API, it is one of the most popular JavaScript mapping libraries and is used by major web sites such as FourSquare, Pinterest and Flickr. Leaflet allows developers without a GIS background to very easily display tiled web maps hosted on a public server, with optional tiled overlays. It can load feature data from GeoJSON files, style it and create interactive layers, such as markers with popups when clicked.
- *Bootstrap*: Bootstrap is a free front-end framework for faster and easier web development. It includes HTML and CSS based design templates for typography, forms, buttons, tables, navigation, modals, image carousels and many other, as well as optional JavaScript plugins. Is also used to provide features to easily create responsive design applications.
- *MomentJS*: it is a JavaScript code for manipulating dates and time, without other dependencies provided; it is a powerful tool for parsing, validating and displaying dates. Supporting internationalization and time zone it is very useful when dates should be displayed in a localized format provided by user location.
- *Flot*: Flot is a pure JavaScript plotting library for jQuery, with a focus on simple usage, attractive looks and interactive features.

4. SWE Demonstrator

EMODnet Physics viewer for the SWE Demonstrator

The EMODnet Real time Portal (http://www.emodnet-physics.eu/realtime) is a web application that is able to provide NRT data and metadata from marine data centres that offer a machine to machine interface based on the Sensor Observation Service (SOS) standard of the Open Geospatial Consortium (OGC). Its goal is to offer a simple point of access to distributed NRT data in a transparent way: users can add and/or remove available sensor systems to/from the portal and thus access their data.

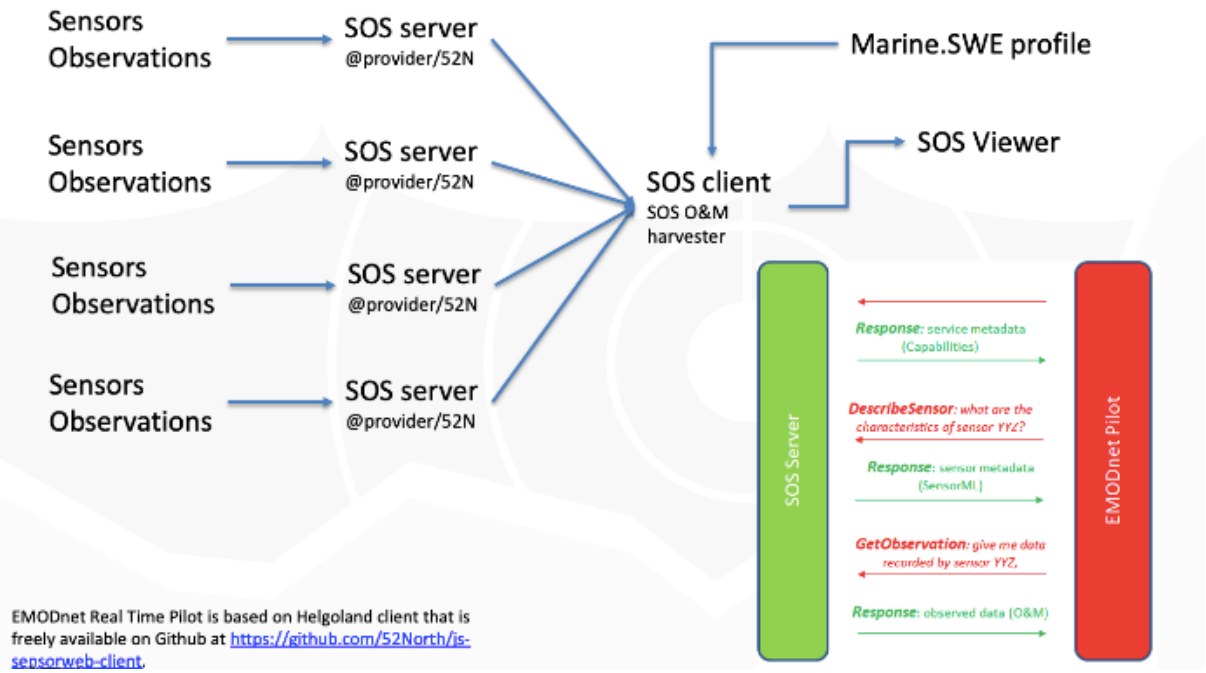


Figure 5. RT data flow with SWE implementation

The following figure shows the logical architecture behind the portal:

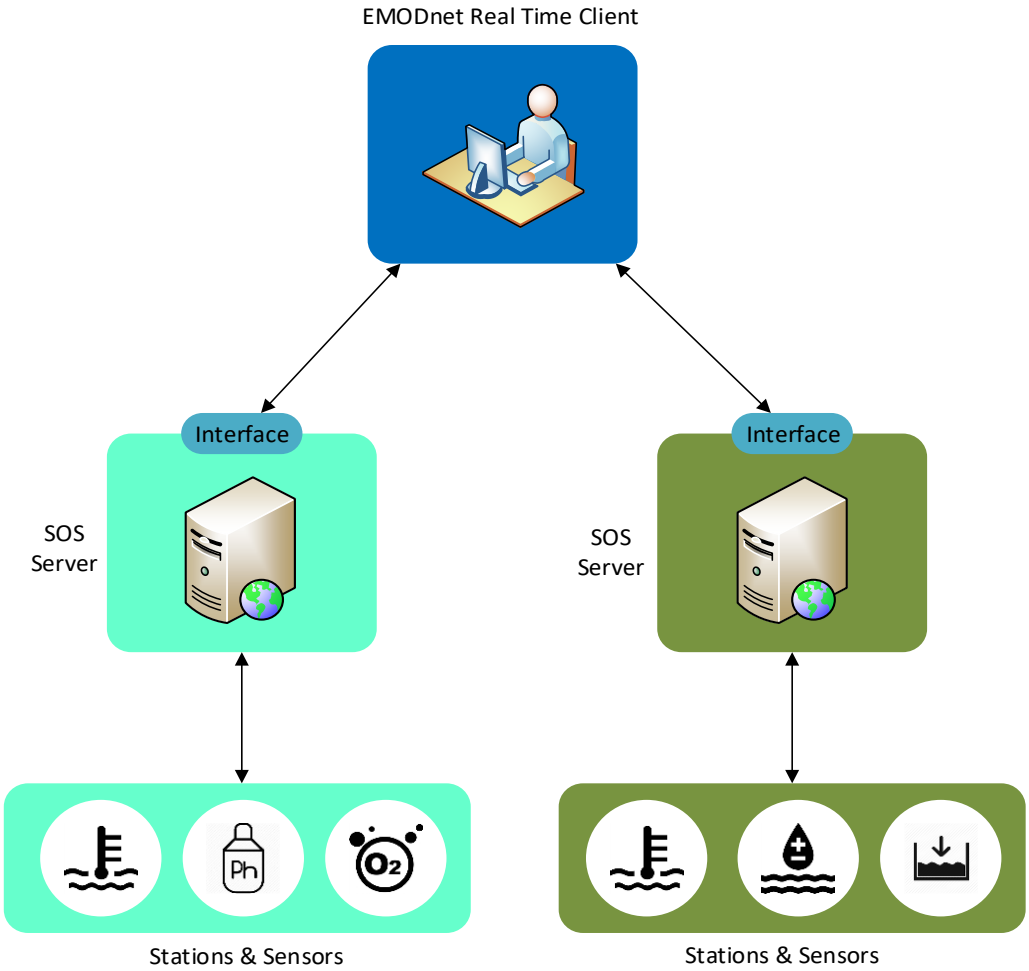


Figure 6. EMODnet Real Time Pilot System Architecture

EMODnet Real Time pilot is based on Helgoland client that is freely available on Github at https://github.com/52North/js-sensorweb-client.

5. Services related to the SOS Server

The EMODnet Real Time client (http://www.emodnet-physics.eu/realtime) is a software client based on the Helgoland application that, in its current beta version, gives the user the opportunity to explore, analyse and download real time data and metadata from existing data servers that provides OGC SOS interoperability.

In particular, eleven services are connected to SOS server in the present release.

- OGS-NODC: http://nodc.ogs.trieste.it/sos/api/v1/
- NeXOS SOS Server: http://nexos.demo.52north.org/52n-sos-nexos-test/api/
- IRCEL – CELINE: https://geo.irceline.be/sos/api/v1/
- OBSEA: http://sos.obsea.es/sos/api/
- PIM: https://www.pim-liguria.it/52n-sos-webapp/api/
- ARPA Emilia-Romagna: http://arpa-er.geodab.eu/emodnet-restful/api/v1//
- HZG: https://codm.hzg.de/52n-sos-webapp/api/v1/
- SMHI: https://shair.smhi.se/52North/api/v1/
- INOGS: https://nodc.inogs.it/sos/api/
- MONALISA DATA SERVICE: http://monalisasos.eurac.edu/sos/api/v1/
- FLUGGS: https://www.fluggs.de/sos2/api/v1/

OGS-NODC provides data and metadata from six fixed monitoring stations located in the Adriatic Sea that provides information on sea physical parameters. The NeXOS SOS Server offers data acquired by different mobile platforms. IRCEL-CELINE offers access to air quality data collected by different stations based in Belgium.

Among the new added observations, OBSEA provides data from underwater noise in the area of Barcelona (Spain). PIM provides physical data from fixed sensors in the area of the Ligurian Sea (Italy). ARPA E-R provides physical marine and river data (Discharge, Precipitation, Temperature, Water Level) from Emilia Romagna Region (Italy). HZG provides physical marine data collected through Ferrybox stations from Europe and beyond. SMHI provides physical data (weather and climate) from Sweden; INOGS offers physical marine data from the Adriatic Sea; MONALISA DATA SERVICE collects environmental physical data that offers information on the conditions of the Alpes (Bolzano, Italy). Ultimately, FluGGS provides physical data from the in situ stations based in the Wupper River (Germany).

The following tables show a summary of the information provided:

	OGS-NODC	NEXOS	IRCEL - CELINE
Name	My timeseries service	NeXos Test SOS Server	IRCEL - CELINE: timeseries-api (SOS 2.0)
Stations	12	12	111
Types	Time series	Mobile Platforms	Time series
Datasets	73	14	598

Table 1: EMODnet RT observations present before the reporting period

	OBSEA	PIM	CNR + ARPA ER	HZG	SMHI	INOGS	MONALISA DATA SERVICE	FLUGGS
Name	Restful SOS Service	RESTful Dataset Service	EMODnet broker	HZG FerryBox data	SwedischEPA, SHMI	My RESTful Dataset Service	My Timeseries Service	Wupperverband Zeitreihen Dienst
Stations	2	5	669	569	2825	15	31	83
Types	Time series	Time series	Time series	Time series	Time series	Time Series	Time Series	Time Series
Datasets	17	15	4	327585	4591	64	353	212

Table 2: EMODnet RT observations (added) in the reporting period

6. Real Time Data Exchange User Guide

This paragraph describes the Guidelines for Real Time Data Exchange using the EMODnet Real Time Portal. Therefore, it will introduce the different features of the application and an example of a procedure to access data.

Main Window menu

The main window menu allows the user to select the features of interest, in particular different kind of data (time series, profiles, and trajectories), favourites and settings. Selecting a "data type" item, opens a second menu that provides tools for loading, harvesting and browsing data from different data providers (i.e. SOS servers) (see next paragraphs for full details).

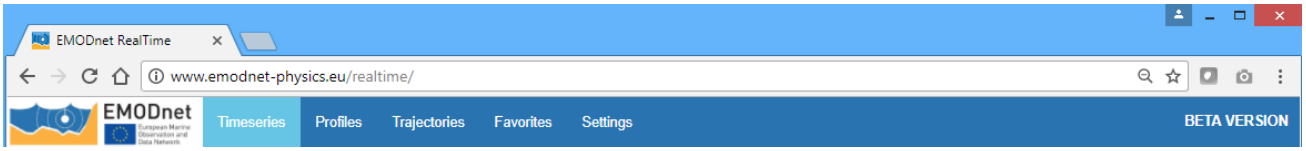


Figure 7. EMODnet Real Time Menu

Timeseries

The timeseries item opens the custom menu for browsing timeseries data types with different features:

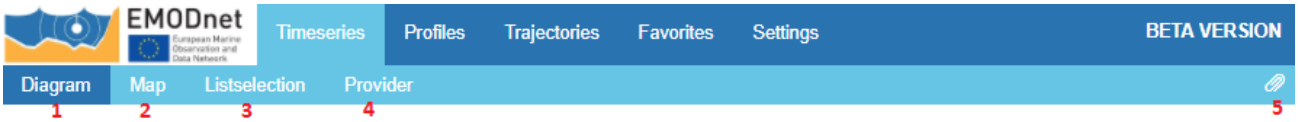


Figure 8. Time Series Menu

1. Diagram: this page shows the time series selected by the user in the List Selection page.

Figure 9. Time Series - Diagram page

The Diagram page is basically divided in 3 parts:

- Chart section: the data selected are shown in the chart. When moving the mouse on the plot, a tooltip appears with details on the values. Multiple plots can be loaded simultaneously and by clicking on the y-axis legend the related chart is highlighted.
- Time Bar: the time bar is used to change the time scale of the chart and change the visualization from chart to data table.
- Legend section: this section provides metadata on the plots (station, phenomenon, sensor) and features for interaction with the data, as shown below:

Icon	Description
	Enable/disable the visualization of the plot
	Shows a mini map with the station location
	Change the style and colour of the plot
	Shows first data, latest data and link to download the time series in CSV format
	Remove the current time series from the view

Table 3: Time Series – Diagram Legend

2. Map: the map shows the stations provided by the selected providers. Clicking on a station brings up a popup with all the phenomena available for that station that can be selected for visualization

and data download. In the right part of the page there is a list of all the phenomena provided by the platforms. This list can be used to filter the stations visualized in the map

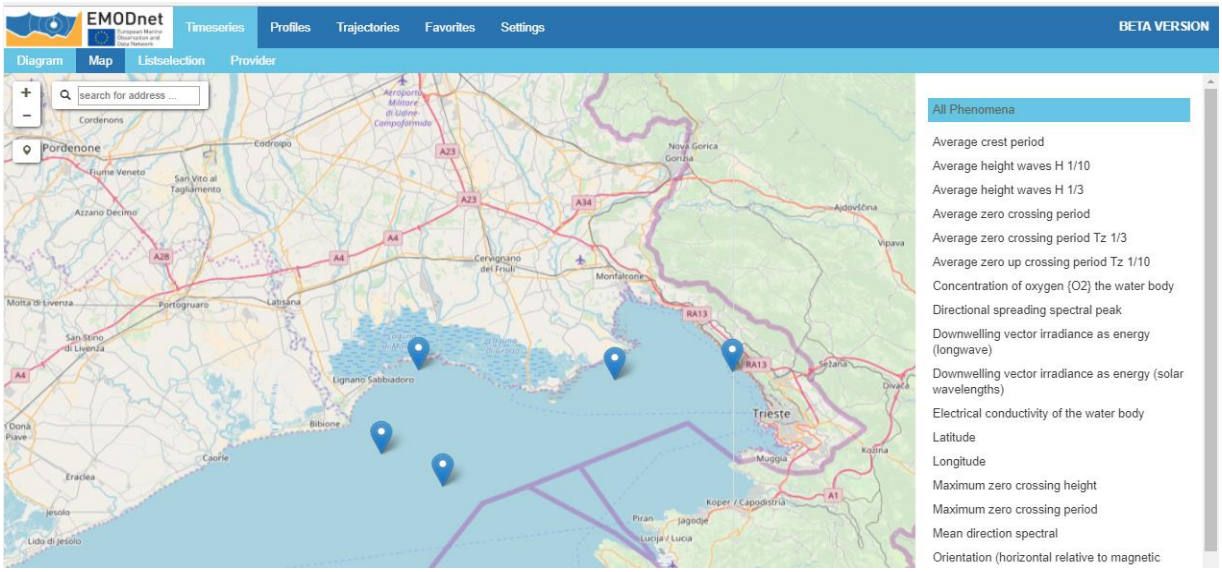


Figure 10. Time Series - Map page

3. ListSelection: this page allows the user to select the timeseries to view in the diagram page. Using a menu list that shows all the information provided by the selected SOS in terms of category, station name, phenomenon and sensor.

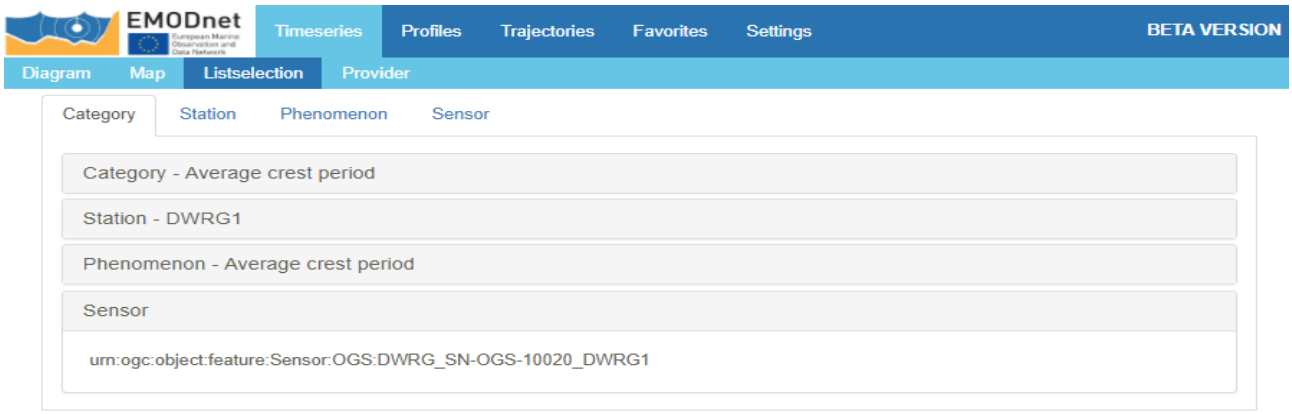


Figure 11. List Selection page

Once the selection process is completed, the selected time series is opened in the diagram page

4. Provider: offers a list of SOS Data Centers that provide timeseries. By clicking on an item, the system queries the SOS interface and retrieve its capabilities, thus allowing the users to navigate its data.

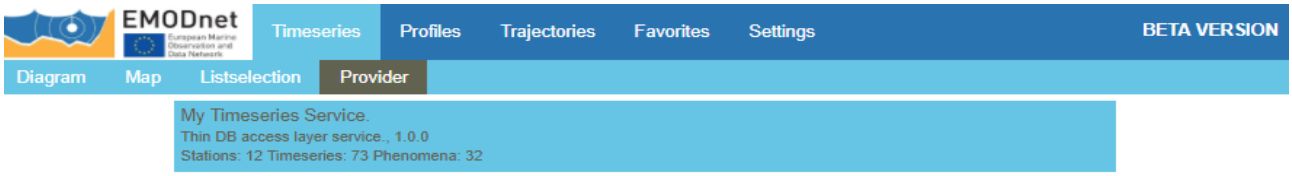


Figure 12. Timeseries – Provider page

5. Permalink: creation of a permanent link for the current view. This link can be sent to other users so that they can open the same view.

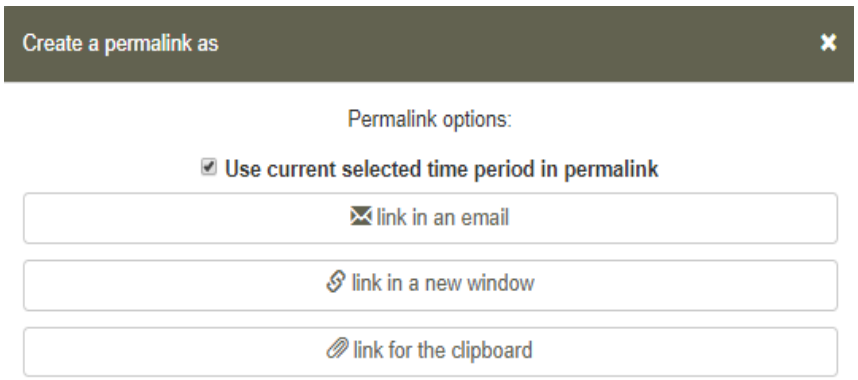


Figure 13. Permalink creation

Profiles

The profile section provides features to harvest and view profile data. In the current version of EMODnet Real Time data from the Argo network are available through the OCEANOTRON SOS provided by IFREMER.

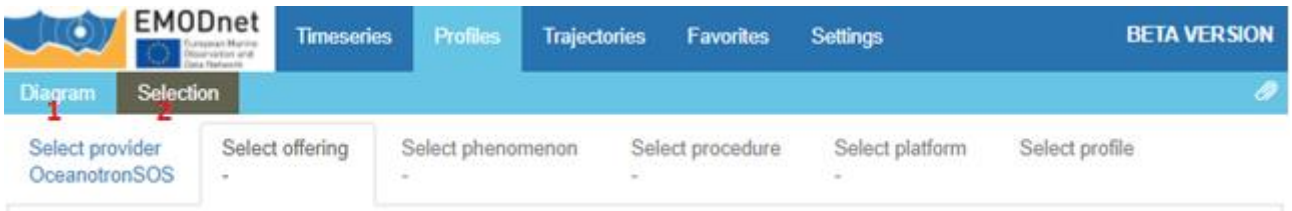


Figure 14. Profiles menu

The Profiles section menu provides two item:

1. Diagram: this page shows the profiles selected by the user in the Selection page:

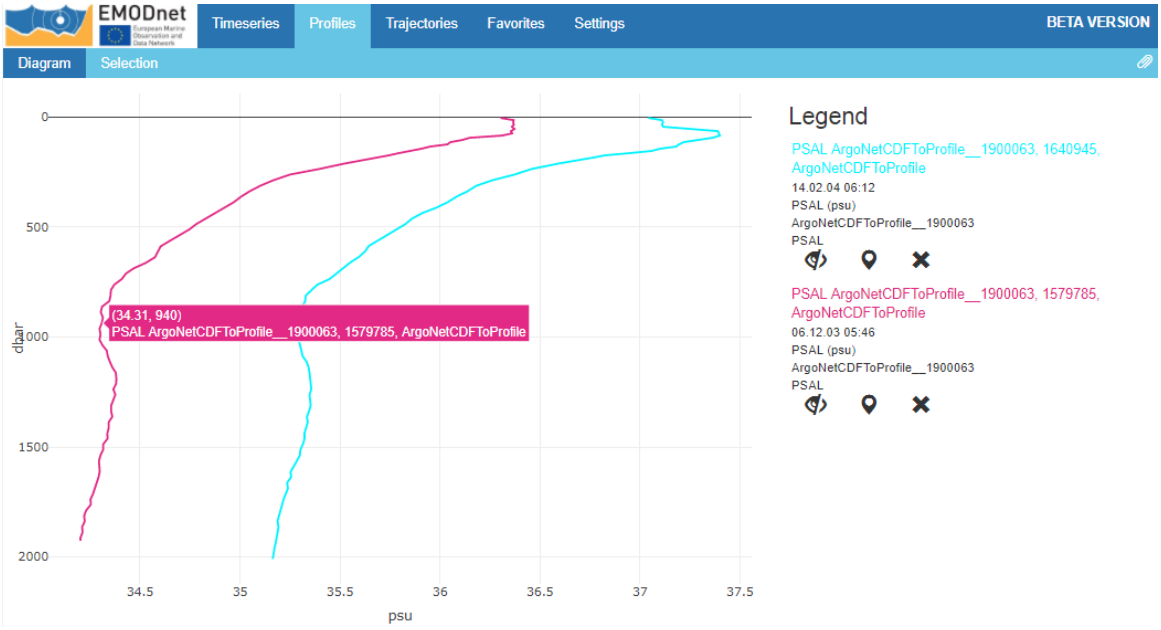


Figure 15. Profiles - Diagram page

The Diagram page is divided in 2 parts:

- Chart section: the data selected are shown in the chart. When moving the mouse on the plot, a tooltip appears with details on the values. Multiple profiles can be loaded simultaneously.
- Legend section: this section provides metadata on the plots (station, phenomenon, sensor) and features for interaction with the data:

Icon	Description
	Enable/disable the visualization of the plot
	Shows a mini map with the location of the profile
	Delete the current profile

Table 4: Profiles – Diagram Legend

2. Selection: this section allows the user to select profiles to be shown in the diagram page. The user is guided by the interface in a selection process that includes:
    - Selection of an offering (a particular test)
    - Selection of a phenomenon (the physical parameter to observe – temperature, salinity, conductivity)
    - Selection of the procedure (the dataset)
    - Platform selection: could be a stationary or a mobile platform. The system allows the user to select the station directly from a map:
    - Selection of the time stamp of the profile.

Figure 16. Profiles – Platform selection

Once the selection process is completed the data is automatically opened in the Diagram page.

Trajectories

The trajectories item opens the custom menu for browsing trajectories data types with different features:

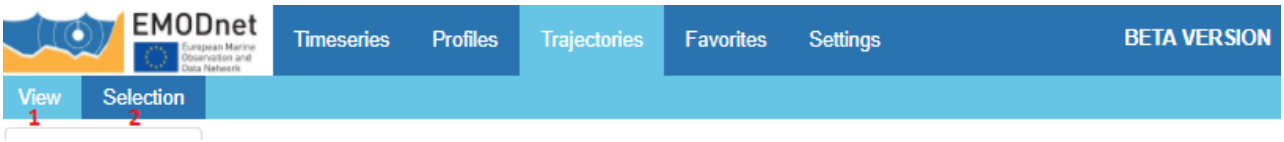


Figure 17. Trajectories Menu

The Profiles section menu provides two item:

1. View: this page shows a map with the trajectories selected in the Selection page and a diagram with the data associated with that trajectory. By moving the mouse on the trajectories in the map, the correspondent data on the chart is highlighted.

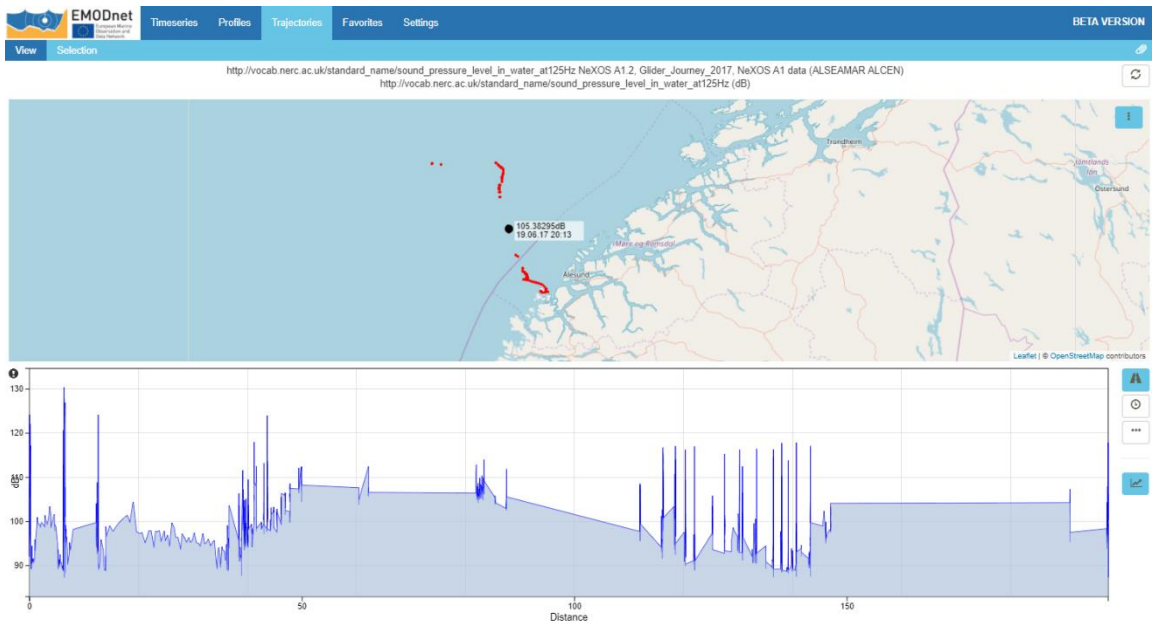


Figure 18. Trajectories – View Page

2. Selection: this section allows the user to select the trajectories to be shown in the map page. The user is guided by the interface in a selection process that includes:
    - Selection of the provider
    - Selection of the platform
    - Selection of the phenomenon

Once the selection process is completed the data is automatically open in the View page.

Favorites

The star icon within the *Legend* area of the timeseries view, users can mark their favorite timeseries so that the client remembers these timeseries for faster access. When opening the *Favorites* menu, users can view an overview of the marked timeseries with their current values.

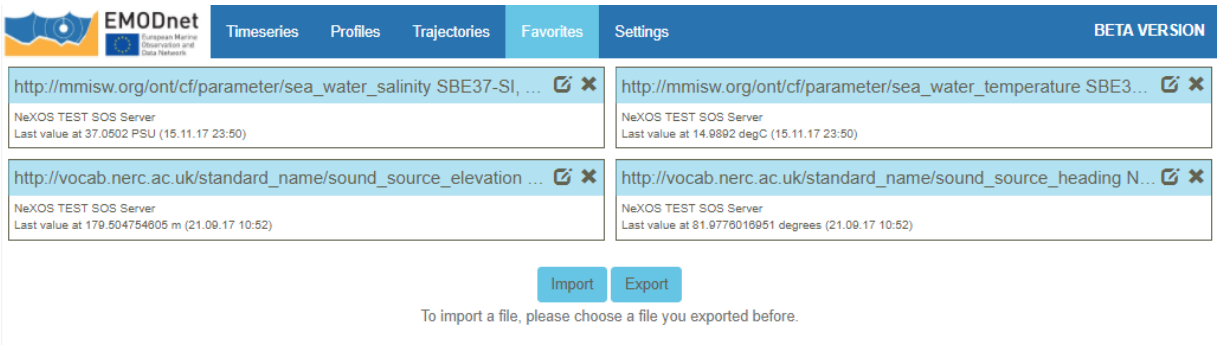


Figure 19. Favorites Page

As the list of favorites is stored in the local storage of the browser, these favorites will get lost if the local storage/cache of the browser is emptied. For this purpose, the Helgoland viewer offers in this menu functionality for exporting and importing previously created lists a favorites. Furthermore, this functionality can be used for transferring lists of favorites to other computers.

Settings

The setting page allows users set some configuration parameters of the application:

- Save/Reset Environment: selections made in the sessions are saved/reset for the next session.
- Switch language: change the language of the application
- Generalize data: In case of high-resolution time series data, the amount of data points in a timeseries may be magnitudes higher than the number of pixels available for visualizing the time series. Thus, if the Generalization option is activated, the client is able to request from its underlying REST API timeseries data in a lower resolution that matches the resolution of the display. This reduces the data volume which is transmitted to the browser (especially useful for mobile connections)
- Imprint: general information on Helgoland

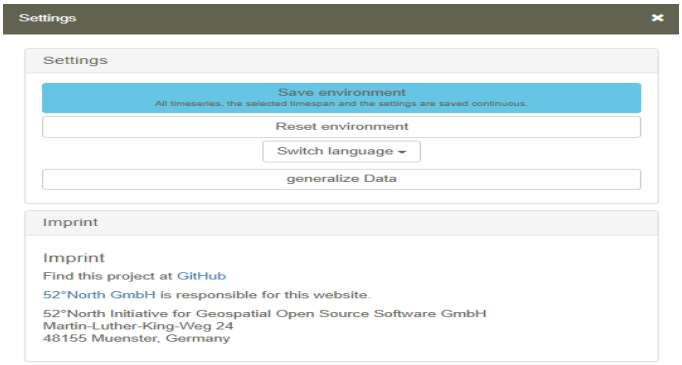


Figure 20. Settings page

7. References

Deliverable 3.3, EMODnet Data Ingestion - SWE Service Installation User Guide

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EMODnet Ingestion and safe-keeping of marine data n.2

EASME/EMFF/2018/1.3.1.8/01/SI2.810021

EMODnet Data Ingestion

D4.1 - Inventory of potential data sources and providers in European countries and priorities

October 2020

Contents

Disclaimer

Document info

Title	D4.1: EMODnet Data Ingestion – Inventory of potential data sources and providers in European countries and priorities
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1. Introduction

To stimulate all partners and countries to stay on the same line, the WP4.1 coordinated action that was done at the start of the EMODnet Ingestion 1 project was repeated during the summer 2020.

Each data centre was invited to analyse its national situation and identify potential data sources of possible interest to EMODnet which could then be used as a list for follow-up under WP4.2. For that purpose each consortium member was sent by RBINS on August, 24th an excel survey form and an updated guidance note with lessons learnt and useful hints. The deadline to compile this national overview was September, 23th. A summary of the survey results was presented by RBINS during the first Plenary Meeting on October 1st. It should be noted that this time, the activity could build upon the earlier achievements, insights and lessons learned during the preceding four years.

In completing the survey, partners were invited to pay attention to two main lessons learned from last phase:

1) As contacting and convincing external potential data providers turned out to be time consuming with often limited benefits, partners were encouraged to look for data sources within their own Institute which has proved to give more satisfying results. The consortium members were therefore invited to firstly exploit their own organization network and concentrate efforts on building upon already existing relationships to seek for potential data sources inside and outside their organisation.

2) To lower the threshold of effort for data providers, it was recommended that consortium members act as 'EMODnet ambassadors' to help data providers undertaking the submission. It even can be that the consortium members make the submissions themselves on behalf of the data providers as originator and/or data holding organisation.

The national submissions were compiled and an overview was presented during the plenary meeting. The members have made a self-assessment by providing the opportunity level from low to high. During the plenary, no specific prioritization was done in order to reach best candidates/priority data sets for a successful and useful ingestion. This is left to the members who have the clearest view on the situation. However, analysis of the submissions shows a slight discrepancy between themes and opportunity. It is advised that data centres try to focus their efforts on datasets that are underrepresented on the whole but that have a lower opportunity level. On the other hand, 'low hanging fruit' datasets should not be put aside, especially if they are large or come from an underrepresented marine area.

2. Summary of survey results and inventory of potential data sets

This survey resulted in 341 data sources from 27 countries and 39 institutes. All members responded to the survey. A similar survey was launched in March 2017, which resulted in 117 data sources. After this stage the number of actual submissions grew quickly and EMODnet DIP 2 started out with 549 submissions. Assuming members reported every data nset they had in 2017 and that the same dataset

doesn't appear in both surveys, we can therefore deduce that the recent survey has a closer-to-reality coverage of nationally available datasets. We can then expect the number of future Phase I submissions to be more in step with the numbers reported in this survey. The results of the survey show that the strategy to let members look at more local and internal (and less commercial/external) datasets did work out positively and that their networks might have matured in the meantime.

Country	Nb Submissions	Country	Nb Submissions
GB	52	**IS**	7
IT	41	**EST**	6
MT	35	**PT**	6
RU	28	**SI**	6
BE	26	**GE**	5
SP	18	**IL**	5
FI	14	**TR**	5
SE	13	**LV**	4
DK	12	**NL**	4
FR	11	**CY**	3
GR	10	**RO**	3
BG	8	**DE**	2
IE	8	**NO**	2
HR	7		

Table 1.: Number of expected submissions per country

The number of submissions per country shows that having multiple members per country helps in reaching higher numbers. The top ten does not change when normalizing for number of institutions per country. Malta has most submissions in absolute terms (35 from the University of Malta).

Theme	Nb Submissions	Pct	Low	Medium	High	Low % TOTAL	Medium % TOTAL	High % TOTAL	Low % within	Medium % within	High % within	Diff theme Medium	Diff theme Low-

									the me	**the me**	**the me**	**- High**	**Medium**
Bathymetry	**22**	**6.5**	4	13	12	1.2	3.8	3.5	5.3	17.3	16.0	-1.3	12.0
Chemistry	**103**	**30.2**	16	47	73	4.7	13.8	21.4	4.6	13.4	20.8	7.4	8.8
Physics	**141**	**41.3**	14	61	92	4.1	17.9	27.0	2.9	12.7	19.1	6.4	9.8
Biology	**90**	**26.4**	20	15	53	5.9	4.4	15.5	6.5	4.9	17.3	12.4	-1.6
Geology	**38**	**11.1**	6	19	14	1.8	5.6	4.1	4.6	14.7	10.8	-3.9	10.0
Human activities	**22**	**6.5**	2	7	12	0.6	2.1	3.5	2.7	9.3	16.0	6.7	6.7
Seabed habitats	**25**	**7.3**	2	13	15	0.6	3.8	4.4	2.3	15.2	17.6	2.3	12.9
Marine litter	**3**	**0.9**	0	1	2	0.0	0.3	0.6	0.0	9.8	19.6	9.8	9.8
	444												

Table 2.: Repartition of themes over the expected submissions

Table 2 shows the repartition of themes over the submissions. A fair amount of submissions (60/341) belongs to more than one theme. Physics, Chemistry and Biology are the most common (>25%), followed by Geology (11%). There are three datasets dealing with Marine Litter but formally they would be considered Chemistry datasets.

An assessment of themes versus opportunity (49 Low, 127 Medium and 215 High) shows that the easiest opportunities lie in Biology datasets. 'Opportunity' expresses the availability of the data (how easy it is to get, through willingness, leverage, good contacts,...) and the effort willing to be given related to the data size, quality and resolution itself. Inherent data qualities cannot be improved, but

it might be possible to increase the likelyhood of receiving the data, via more extensive contacts, if the data is really interesting or rare over the whole project. Based on all submissions, in Bathymetry and Geology there is the least amount of high opportunity datasets. While the numbers are low, most of these datasets have a medium opportunity. Members should be on the lookout for opportunities that could present themselves later in 2020-2021 or in follow-up projects for Geology and Bathymetry.

The current inventory is shared as a collaborative Google document to provide a dynamic survey follow-up:

(https://docs.google.com/spreadsheets/d/1lzzOOKVZE3gzbwmh6Dv6VXpm2iW2UGMjhpktSXZUCZI/edit?usp=sharing

Partners will use the inventory to give a follow-up in their countries. The latest inventory begin October 2020 is included in this Deliverable.

The following pages give the inventory as collated begin October 2020.

Country	Reporting consortium member (EDMO code)	EMODnet Theme	Potential data provider	Potential data sets	Context info	Opportunity	Comment	Obstacles
BE	1578, BMDC, Thomas Vandenberghe	Chemistry	Flemish Institute for Agriculture, Fisheries and Food (ILVO) – 1478	PAHs, PCBs, heavy metals, TOC, grain size in harbours and dredging disposal sites	Research; Sediment; Pollution at Belgian harbours (Nieuwpoort, Oostende)	high		
BE	1578, BMDC, Thomas Vandenberghe	Chemistry	Flemish Institute for Agriculture, Fisheries and Food (ILVO) – 1478	Oxygenated PAHs in mussels	Research; Biota (mussels) Pollution at Belgian harbours (Nieuwpoort, Oostende)	high		
BE	1578, BMDC, Thomas Vandenberghe	Marine Litter	Flemish Institute for Agriculture, Fisheries and Food (ILVO) – 1478	Microplastics in Crangon crangon	Research, biota (brown shrimp)	high	Reporting planned via ICES DOMES	To be considered only if ICES would not submit this already to EMODnet Chemistry

BE	1578, BMDC, Thomas Vandenberghe	Biology	RBINS – MARECO – 3327	Bird radar data	BRAIN.be RAVen project	low to n/a	embargo recently expired,readily available	It appears the ground truthing didn't go so well during the project. No data is actually usable as in-situ data, just information on "flock of birds seen y/n".
BE	1578, BMDC, Thomas Vandenberghe	Biology, Chemistry	RBINS – MARECO – 3327	Biomass and abundance (Belgian Part of the North Sea - Epi-, hyper- and macrobenthos, fish, ...), Experiments data (nutrients concentrations, DIC, oxygen, alkalinity, ...), stable isotopes data	Research - FaCE-It	high (partly, only in situ part)	readily available, but still embargo on the stable isotopes data	

BE	1578, BMDC, Thomas Vandenberghe	Physics	RBINS – SUMO – 3327	nav	Monitoring and research	high	For adequate data interpretation, sensors information should be included alongside the data itself. readily available	
BE	1578, BMDC, Thomas Vandenberghe	Human activities	RBINS – BMDC – 3327	Marine Spatial Plan 2019	Marine Spatial Planning	high	readily available	
BE	1578, BMDC, Thomas Vandenberghe	Bathymetry	Belgian Navy	multibeam taken demining campaigns	Military data	medium	There is a data pathway together with Vlaamse Hydrografie to submit to EMODnet Bathymetry	Military personnel is hard to reach
BE	1578, BMDC, Thomas Vandenberghe	Physics, Chemistry	Belgian Navy	physicochemical parameters on any campaign	Military data	medium		Military personnel is hard to reach
BE	422, VLIZ, Joana Beja	Biology, Seabed habitats	EEA	EU species and habitats data (Article 17 of the Habitats Directive)		High		Data not readily available

BE	422, VLIZ, Joana Beja	Biology, Geology	EEA	Time series for invertebrates and sediments	Oil and Gas producers monitoring	High		Data not readily available
BE	422, VLIZ, Joana Beja	Biology	INBO	Seabirds and seamammals of the Belgian Continental Shelf	Research	Low	http://www.vliz.be/en/imis?module=dataset&dasid=419	Availability not known
BE	422, VLIZ, Joana Beja	Biology	ILVO	Evaluation of by-catch in the Belgian brown shrimp (Crangon crangon L.) fishery since 1996	Monitoring		http://www.vliz.be/en/imis?module=dataset&dasid=5178	
BE	422, VLIZ, Joana Beja	Biology	Universiteit Gent; Faculteit Wetenschappen; Vakgroep Biologie; Onderzoeksgroep Mariene Biologie (MARBIOL)	Data collected during the educational expeditions of Ghent University, Marine Biology Section	Research		http://www.vliz.be/en/imis?module=dataset&dasid=4374	
BE	422, VLIZ, Joana Beja	Biology	VUB (ESA)	Phytoplankton of the Belgian Continental shelf gathered by the ULB	Research	Low		Availability not known

BE	422, VLIZ, Joana Beja	Biology	Green Balkans NGO, Bulgaria and TUDAV Foundation, Turkey	Flora and fauna inhabiting the Black Sea	Field survey	Low	Contact from CommOCEAN, contacted through email, http://blackseawatch.org/	
BE	422, VLIZ, Joana Beja	Biology	INBO	Bird countings on the Belgian Continental Shelf	Research	Low	http://www.vliz.be/en/imis?module=dataset&dasid=996	Restricted
BE	422, VLIZ, Joana Beja	Biology	INBO	Distribution of seabirds on the Belgian Continental Shelf	Research	Low	http://www.vliz.be/en/imis?module=dataset&dasid=653	Restricted
BE	422, VLIZ, Joana Beja	Biology	INBO	Flemish waterbird counts	Monitoring	Low	http://www.vliz.be/en/imis?module=dataset&dasid=1620	Restricted
BE	422, VLIZ, Joana Beja	Biology	IRScNB/KBIN, INBO	Crgulls: Observations of Belgian color ring-marked gulls from 1999 until 2010	Monitoing	Low	http://www.vliz.be/en/imis?module=dataset&dasid=2692	Restricted

BE	422, VLIZ, Joana Beja	Biology	MARBIOL	Meiobenthos of the Southern Bight of the North Sea, Western Scheldt and also Greenland, Antarctica and the Kenyan mangroves	Research	Low	http://www.vliz.be/en/imis?module=dataset&dasid=927	Restricted
BE	422, VLIZ, Joana Beja	Biology, Chemistry, Physics	FAO	EAF-Nansen Programme datasets (several surveys)	Supporting the Application of the Ecosystem Approach to Fisheries Management considering Climate and Pollution Impacts. Executed by Fao in collaboration with IMR	Medium	http://www.fao.org/in-action/eaf-nansen/en/	
BE	422, VLIZ, Joana Beja	Biology	HELCOM	Ballast water Invasive species	Monitoring	High	http://jointbwmexemptions.org/ballast_water_RA/apex/f?p=104:12	

BE	422, VLIZ, Joana Beja	Biology	VLIZ	LifeWatch observatory data: passive acoustic network (CPOD) for Cetacean detection	Monitoring	Low	https://www.vliz.be/en/imis?module=dataset&dasid=5531	CC-BY
BE	422, VLIZ, Joana Beja	Biology	VLIZ	LifeWatch observatory data: long term collections of macrobenthos in the Belgian Part of the North Sea	Monitoring	Low	https://www.vliz.be/en/imis?module=dataset&dasid=5512	CC-BY
BE	422, VLIZ, Joana Beja	Biology	VLIZ	LifeWatch observatory data: fish acoustic receiver network	Monitoring	Low	https://www.vliz.be/en/imis?module=dataset&dasid=5250	CC-BY
BG	692, IO-BAS, Asen Stefanov	Human activities, Chemistry	Black Sea Basin Directorate, bdvarna@bsbd.org ,https://www.bsbd.org	T,S, Silicate, Phosphate, Nitrite, Nitrate, Ammonium, DO	Research & monitoring activity	High	There is existing cooperation which will facilitate further data provision	

BG	692, IO-BAS, Asen Stefanov	Chemistry, Physics	IO-BAS, http://io-bas.bg	Buoy data (Varna , Burgas) , one year series (IMAMO project, 2016,2017))	Research activity	High	The data are iavailble in IO-BAS	
BG	692, IO-BAS, Asen Stefanov	Physics, Biology	NGO "Morski zvuci"; http://www.morskizvuci.org	Ferry box data from Bulgarian coast (2018,2019,2020)	Monitoring activity	High	There is already existing cooperation which will facilitate further data provision	
BG	692, IO-BAS, Asen Stefanov	Human activities	NAFA Bulgaria ; http://iara.government.bg/	Aquaculture	Monitoring activity	Low	Previous experience indicated that they are not willing to share data	
BG	692, IO-BAS, Asen Stefanov	Physics	Union of Bulgarian Black Sea Local Authorities, office@ubbsla.org, http://www.ubbsla.org	Sea-level (2018,2019)	Research & monitoring activity	Medium	There is no contact yet	
BG	692, IO-BAS, Asen Stefanov	Physics	Executive Agency "Maritime administration"	Meteo stations, T/S	Monitoring activity	High		

BG	692, IO-BAS, Asen Stefanov	Physics	National Institute of Geophysics, Geodesy and Geograph	Sea-Level	Monitoring activity	High		
BG	692, IO-BAS, Asen Stefanov	Chemistry, Human activities	MARINE ANTIPOLLUTION ENTERPRISE JSCO, http://www.pchmv-bg.com/	Oil spils - since 1972; New history after 1992	Oil/monitoring/prevention	Low	Previous experience indicated that they are not willing to share data	Data can be confidential
CY	4537, ORION, George Zodiatis	Chemistry, Physics	DFMR	Nutrients, Chl-a, T,S	hot spot coastal areas	high		
CY	4537, ORION, George Zodiatis	Physics	ORION	ADCP	mooring time series station	high		
CY	4537, ORION, George Zodiatis	physics	ORION	CTD	mooring time series stations	high		
DE	96, BSH, Susanne Tamm	Physics	Federal Maritime and Hydrographic Agency, Germany	Deep sea moorings: Temperature, Salinity, Currents	Research activity	Medium to High	There is existing cooperation	
DE	96, BSH, Susanne Tamm	Chemistry	Dr. Uwe Brockmann, retired, University of Hamburg, Germany	Nutrients in the North Sea, two decades	Research activity	Medium to High	contact to one of his former colleagues already established	

DK	729, AU-DCE, Mihail-Constantin Carausu	Bathymetry, Chemistry, Physics, Biology, Geology, Seabed habitats	Femern A/S	CTDs, water bottle, moorings, sidescan, turbity, plankton, seabed mappings. Southern inner Danish waters 2009-2011	Data from the baseline studies for the environmental impact assessment for the Femern belt bridge/tunnel connection between Fermern (Germany) and Lolland	Medium	Femern A/S is involed in an ongoing legal process in Germany. Some data may not be released until the process is finished	The legal process may be long
DK	729, AU-DCE, Mihail-Constantin Carausu	Bathymetry, Physics, Biology, Geology	Nord Stream 2	Profile, sidescan	Nord Stream 2 will be a twin pipeline trhough the Baltic Sea transporting gas from Russia to Europe	Low	The data is currently held at the Danish consultancy company Rambøll. We have contancted them, but are still pending an answer.	It s politically sensitive

DK	729, AU-DCE, Mihail-Constantin Carausu	Physics, Chemistry, Biology	Environment Agency for the Mineral Resources Activities (EAMRA), Government of Greenland	CTDs, water bottle, plankton. West Greenland 2010-2015	In connection with licenses to oil explorations in Greenlandic waters, baseline studies have mapped the current status of the marine environment and data to assess the risk to the evoriment on case of leakages has been collected	High	The data is held at the Arctic department at Aarhus University	Some data may be restricted and not available for public release
DK	729, AU-DCE, Mihail-Constantin Carausu	Biology, Geology	MST	Stone reefs data (substrat + species) from inner Danish waters 1890-2015		High	The data is currently held by DCE at Aarhus University	
DK	729, AU-DCE, Mihail-Constantin Carausu	Biology	MST	Coastline vegetation data (species + substrat) from inner Danish waters 198x-2015		High	The data is currently held by DCE at Aarhus University	The data is right now in a deep quality control process.

DK	729, AU-DCE, Mihail-Constantin Carausu	Biology	University of Copenhagen	Galathea II, Danish Deep Sea Expedition 1950-52	Data from the Expedition, needs approval to register withim EMODnet	High	Data held by University of Copenhagen	Approval, publication
DK	729, AU-DCE, Mihail-Constantin Carausu	Biology	University of Copenhagen	Marine Benthic Fauna List, Island of Læsø, Denmark	Needs approval	High	Data held by University of Copenhagen	Approval
DK	729, AU-DCE, Mihail-Constantin Carausu	Biology	University of Copenhagen	Nivå Bay species list, Zealand, Denmark	Needs approval	High	Data held by University of Copenhagen	Approval
DK	729, AU-DCE, Mihail-Constantin Carausu	Chemistry	MST	Micro plastic in sediment in Danish waters 2015-2020	Approved	High	The data is currently held by DCE at Aarhus University	Needs parameters and to be proper databased
DK	729, AU-DCE, Mihail-Constantin Carausu	Marine Litter	MST	Microplastic and Macroplastic/litter collected on Danish beaches	Approved	High	The data is currently held by DCE at Aarhus University	Needs parameters and to be proper databased
DK	729, AU-DCE, Mihail-Constantin Carausu	Physics, Chemistry	MST	CTD, NOW-2015, Greenland	Approved	High	The data is held at the Arctic department at Aarhus University	Needs conversion and/or to be databased

DK	729, AU-DCE, Mihail-Constantin Carausu	Physics, Chemistry	MST	CTD, SANA-2015, Greenland	Approved	High	The data is held at the Arctic department at Aarhus University	Needs conversion and/or to be databased
EST	713, TalTech, Villu Kikas	Chemistry, Physics	OÜ Järve Biopuhastus	Dangerous substances - As, Ba, Hg, F, Cd, Co, Cr, Mo, Ni, Pb, Zn, Cu, Se etc.	Monitoring of wastewater output in Kohtla-Järve (2016).	High	Report is in pdf format	Data digitizing and needs some translation for short description of the data.
EST	713, TalTech, Villu Kikas	Chemistry, Physics	AS Estonian Cell	Dangerous substances - As, Ba, Hg, F, Cd, Co, Cr, Mo, Ni, Pb, Zn, Cu, Se etc.	Monitoring of wastewater output in Kunda.	High	Report is in pdf format	Data digitizing and needs some translation for short description of the data.
EST	713, TalTech, Villu Kikas	Chemistry, Physics	OÜ Järve Biopuhastus	Dangerous substances - As, Ba, Hg, F, Cd, Co, Cr, Mo, Ni, Pb, Zn, Cu, Se etc.	Monitoring of wastewater output in Kohtla-Järve (2017).	High	Report is in pdf format	Data digitizing and needs some translation for short description of the data.
EST	713, TalTech, Villu Kikas	Chemistry, Physics	OÜ Järve Biopuhastus	Dangerous substances - As, Ba, Hg, F, Cd, Co, Cr, Mo, Ni, Pb, Zn, Cu, Se etc.	Monitoring of wastewater output in Kohtla-Järve (2018).	High	Report is in pdf format	Data digitizing and needs some translation for short description of the data.

EST	713, TalTech, Villu Kikas	Biology, Human activities	Baltic Environmental Forum (bef.ee)	Different potential data sets.	Baltic Environmental Forum (BEF) Estonia is a non-governmental organization working in the areas of environmental protection and nature conservation. Our main aim is to preserve sustainable environment through	Medium	Contact is made and was quite positive.	Data set format in other format than report might be difficult to obtain (raw .txt, xls, sql etc.)

EST	713, TalTech, Villu Kikas	Physics, Chemistry, Biology, Human activities	TalTech MSI	Different potential data sets from various colleagues who is working in MSI.	Test measurements, side projects, historical data sets etc.	Very high	Personally I see this the most valuable source of data (meaning also quality data) and potential user who could use the Ingestion portal themselves.	A lot of data goes already into major data portals (SeaDataNet, EMODnet Chemistry etc.). Major hold back for this year has been global pandemic (+summer holidays) with suggestions to avoid gatherings and meetings, therefore reducing
FI	1544, GTK, Aarno Kotilainen	Geology	Radiation and Nuclear Safety Authority in Finland (STUK), Helsinki	Sedimentation rate data	Research & monitoring activity	High	Part of the sedimentation rate data has been already received	
FI	1544, GTK, Aarno Kotilainen	Geology	City of Kalajoki, Finland	Coastal migration data	Monitoring activity	Medium	Digital data	

FI	1544, GTK, Aarno Kotilainen	Geology	Centre for Economic Development, Transport and Environment, Oulu, Finland	Coastal migration data	Environmental surveys	Low	no monitoring data	
FI	1544, GTK, Aarno Kotilainen	Geology	Helsinki University, the Faculty of Biological and Environmental Sciences	FeMn concretion/polymetallic nodule data	Research	High	Data is part of the M.Sc. Thesis	
FI	1725, FMI, Kimmo Tikka	Physics	Traficom	Temperature profiles	Temperature profiles from	modest		
FI	1725, FMI, Kimmo Tikka	Physics	Navy	Temperature profiles		low		
FI	1725, FMI, Kimmo Tikka	Physics/Chemistry/Biology	University of Helsinki	Variety of reseach data		low/modest		Embarco, datamanagement
FI	1725, FMI, Kimmo Tikka	Physics/Chemistry/Biology	University of Turku, Archipelago Sea Research Institute	Variety of reseach data		low/modest		Embarco, datamanagement
FI	1725, FMI, Kimmo Tikka	Biology	LUKE	Fish stock	Fish stock monitoring			
FI	1725, FMI, Kimmo Tikka	Chemistry/Biology/Human activities	Fisheries	Fishery data	Nutrients			

FI	1725, FMI, Kimmo Tikka	Human activities	Port autohorities	Freight traffic				
FI	1725, FMI, Kimmo Tikka	Human activities	Windfarms	Noise levels				
FI	1725, FMI, Kimmo Tikka	Physics/Chemistry/ Biology	Local communities	Monitoring	Variety of parameters	modest	quality procedures applied	datamanagemengt
FI	1725, FMI, Kimmo Tikka	Biology	University of Turku, Archipelago Sea Research Institute	Mamals monitoring		modest		
FR	540, SHOM, Ronan Pronost	Bathymetry, Physics	National Institute for Universe Sciences (INSU, CNRS) https://www.insu.cnrs.fr/ http://charon.dt.insu.cnrs.fr/daufin/ Céline Laus Heyndickx: celine.heyndrickx@cnrs.fr	Raw data ASCII files: Singlebeam data (coastal bathymetry) Pressure, air temperature and humidity, wind direction and speed, water conductivity, salinity and temperature, fluorescence	Research activity	High	Bathymetric data is available (free access) on an ftp server (ftp://daufin.dt.insu.cnrs.fr/)	Self delivery on Data Ingestion portal Raw data

FR	540, SHOM, Ronan Pronost	Bathymetry, Human activities, Geology	"Grands Ports Maritimes", French autonomous harbours, (Le Havre, Marseille, Bordeaux, …)	Multibeam, singlebeam, sidescan, wrecks, obstructions, sediments	Monitoring and maintenance activity	Medium to High	Potential sharing restrictions but we can try to convice them case by case	
FR	540, SHOM, Ronan Pronost	Bathymetry, Human activities, Geology	Regional councils Departmental Directorate of Territories (DDT)	Multibeam, singlebeam, sidescan, wrecks, obstructions, sediments	Monitoring and maintenance activity	Medium to High	Potential sharing restrictions but we can try to convice them case by case (surveys usually subcontracted)	
FR	540, SHOM, Ronan Pronost	Bathymetry	ENSTA Bretagne http://www.ensta-bretagne.fr/ Roderick Moitié: roderick.moitie@ensta-bretagne.fr	Multibeam, Singlebeam, sidescan	Research avtivity	High	Current partner (own ressources but few surveys and not widespread)	

FR	540, SHOM, Ronan Pronost	Bathymetry, Geology	INTECHMER http://www.intechmer.cnam.fr/l-institut/presentation/ Emmanuel Poizot: emmanuel.poizot@lecnam.net	Multibeam, grain size	Research avtivity	Medium	Possible collaborative relationship (not own ressources and few surveys)	
FR	540, SHOM, Ronan Pronost	Bathymetry	Institut Paul-Emile Victor https://www.institut-polaire.fr/language/en/ Héléne Leau: helene.leau@ipev.fr	Multibeam	Research avtivity	High	Current partner	Sensitive data (cables, …)

FR	540, SHOM, Ronan Pronost	Bathymetry	Local industries and every kind of private organizations	Multibeam, singlebeam, etc.	Monitoring and commercial activity in french waters	Low to medium	Potential protected commercial data (mainly not for sharing) but we can try to convince them case by case as they send us data for safety of navigation (Mining Code). Potential difficulties to identify the real data owner when subcontracting (Total,	Previous experience indicate that they are not willing to share data that might disadvantage their products. By default, data is not releasable until 15 years have passed.
FR	540, SHOM, Ronan Pronost	Bathymetry	DRASSM (French Marine and Sub-marine Archeological Department)	Mainly high resolution Multibeam (R2Sonic) data on wrecks	Research avtivity	Medium to High	R2Sonic mounted on their vessel André Malraux. Potential partnership to be established	

FR	540, SHOM, Ronan Pronost	All	ETR-Every Foreign data collector in French waters	Various	Various	High	When a Foreign country asks authorisation for collecting data in French waters, they have to send the data to Shom.	By default, data is not releasable until 15 years have passed.
FR	540, SHOM, Ronan Pronost	Bathymetry, Geology, Seabed habitats, Chemistry, Biology, Physics, Human activities	US-National Centers for Environmental Information (NCEI, NOAA) https://www.ncei.noaa.gov/ Jennifer Jenks: jennifer.jencks@noaa.gov	Wide range of raw data in climate, coastal, oceanographic and geophysical (variety of formats)	Data Collecting activity	Medium	Data free access: numerous possibilities detailed on https://www.nodc.noaa.gov/access/services.html. For bathymetry: https://maps.ngdc.noaa.gov/viewers/bathymetry/	Self delivery on Data Ingestion portal Raw data

FR	540, SHOM, Ronan Pronost	Bathymetry	NO-OLEX (Marine charting and navigation) www.olex.no Ole Benjamin Hestvik: oleb@olex.no	Bathymetry (singlebeam and multibeam) with tide merging (predicted or measured) and constant sound velocity	Commercial fishing activity	Medium to High	Seafloor maps (data sharing between Olex users): http://www.olex.no/dybdekart_e.html#deling May be profitable (Magic Instinct, reseller for France)?	
GB	2746, JNCC, Eleonora Manca	Seabed habitats	Envision Mapping via The Crown Estate, EDMO Id. 3194	2013, Envision Mapping, Dogger Bank, Creyke Beck Project Habitat Mapping	2 polygon datasets derived from cluster analysis of infaunal grab samples, taken from 36 stations. Point data also available.	High	Data is open access	Habitats are classified to MHC, but full details not given (e.g. CMx). Creating metadata to accompany the data may be difficult if unable to get through to the Data Owner directly.

GB	2746, JNCC, Eleonora Manca	Seabed habitats	IECS via The Crown Estate, EDMO Id. 3202	Teesside Landfall Intertidal and Phase 1 Benthic Survey Report 2012_GIS	The intertidal survey was completed as part of the development of the Environmental Impact Assessment (EIA). 1 polygon dataset and 52 points available.	High	Data is open access	Habitats are classified to MHC, but full details not given (e.g. CMx). Creating metadata to accompany the data may be difficult if unable to get through to the Data Owner directly.
GB	2746, JNCC, Eleonora Manca	Seabed habitats	The Crown Estate, EDMO id.	2011, Envision Mappng, North West Lewis Wave Farm, Benthic Ecology Drop-down Video Survey - GIS Data	First stage of the Environmental Impact Assessment (EIA) to determine the abundance of marine habitats and communities within the study area	High	Data is open access,	

GB	2746, JNCC, Eleonora Manca	Seabed habitats	Channel Coast Observatory, EDMO Id. 1110	EUNIS level 3 habitat map, England (potentially 52 habitat polygon datasets)	Coastal monitoring data	Medium	Data is open access see https://www.channelcoast.org/cco/	A more detailed inventory of data access will be required. Formatting required
GB	2746, JNCC, Eleonora Manca	Seabed habitats, biology	Environment Agency, EDMO Id. 90	Seagrass Taxa, cover and Abundance in English waters	Point data on the presence, and percentage cover, of seagrass species at specific marine monitoring points held within the Environment Agency's BIOSYS database	High	Data is open access,	Conversion of XLSX data into EMODnet Data Exchange Format

GB	2746, JNCC, Eleonora Manca	Seabed habitats	Marine Scotland Science (Marion Harrald), EDMO Id. 2135	Habitat maps classified in National habitat classification or Annex I from 2000-present Scottish waters inshore and offshore, from research activities	Research	Medium	MSS has shared habitat data with JNCC previously	
GB	2746, JNCC, Eleonora Manca	Seabed habitats	Univeristy of Plymouth, Marine Conservation research group, EDMO Id. 47	Habitat maps from recent research projects in UK waters (e. g. Deeplinks)	Research	Medium	Univeristy of Plymouth has shared habitat data with JNCC previously	
GB	2746, JNCC, Eleonora Manca	Seabed habitats	Oceana EDMO Id. 2110	EUNIS habitat maps in UK waters and wider Atlantic	NGO, Conservation	High to Medium	JNCC has previously worked with Oceana.	Limited Resource at Oceana to format the data into EMODnet Data Echnage format

GB	2746, JNCC, Eleonora Manca	Seabed habitats	NAFC Marine centre, Univeristy of the Highlands and Islands, EDMO Id. 2485	Habitat mapping for the Shetland Islands' Marine Spatial Plan (SIMSP)	Marine spatial planning	Medium		
GB	2746, JNCC, Eleonora Manca	Seabed habitats	National Oceanography Centre So, Marine Geoscience group, EDMO Id. 17	Marine habitat maps from recent NOCs cruises (e.g. CODEMAP project)	Research	Medium	JNCC has previously worked with NOC	Conversion into EMODnet Data Exchange Format required
GB	2746, JNCC, Eleonora Manca	Seabed habitats	Scottish Association for Marine Science (SAMS), EDMO id. 44	Habitat mapping outputs of the MARPAMM project	Research, Marine management	High to Medium	We are in touch with prject partners of the MARPAMM project	

GB	2746, JNCC, Eleonora Manca	Seabed habitats	Scottish Association for Marine Science (SAMS), EDMO id. 44	Deep sea monitoring series from multiple projects (Arctic, Off Barra and Rockall Through) (EDIOS series id 20291)- Habitat extent- Several datasets since 1973	Research	Medium to low	A potentially very large dataset - Mostly stored in a searchable Access database along with associated files & folders (e.g. scanned documents & seabed photos). This was paid for by NERC through a Data Management grant. It is planned	Data is potentially in various formats and very old formats - Unsure if data is open

GB	2746, JNCC, Eleonora Manca	Seabed habitats, Physics, Geology, Chemistry, Human activities	Atlas (also iAtlantic) project manager (WP8)	Outputs from nine work packages https://www.eu-atlas.org/about-atlas/atlas-work-package-descriptions - For example habitat map of cold water corals in Mingulay reef (published as https://link.springer.com/article/10.1007/s00338-016-1519-8)	Research	Medium	Species data is already provided to EMODnet, but many other data sources available - Th eproject had a WP dedicated to open science resources for stakeholder and a dedicated data manager -	identifying data providers and most relevant datasets
GB	42, BGS, Mary Mowat	Geology	University of Plymouth; EDMO Id. 47	Particle Size Analysis data and carbonate data from NERC BLUECoast project	Research	High	Data to be deposited once analysed. Other data from BLUECoast project to be archived at BODC	
GB	42, BGS, Mary Mowat	Geology	Wessex Archaeology; EDMO Id. 5120	Sidescan sonar, magnetometer	Monitoring	Medium	Some discussion about potentially archiving data	Potential cost of archiving data

GB	42, BGS, Mary Mowat	Geology	Marine Scotland Science (MSS); EDMO Id. 2135	Geology, geophysics	Monitoring/Research	Medium	To contact. Some data previously archived (but only where BGS was involved in collection).	
GB	42, BGS, Mary Mowat	Geology	Scottish Association for Marine Science (SAMS); EDMO Id. 44	Geology, geophysics	Research	Medium	Some data previously archived (but only where BGS was involved in collection).	BODC to check on current status of data archiving first.
GB	42, BGS, Mary Mowat	Geology	Agri-Food and Biosciences Institute (AFBI), EDMO Id. 1385	Geology, geophysics	Monitoring/Research	Medium	Contacted	
GB	42, BGS, Mary Mowat	Geology	The Crown Estate (Marine Data Exchange); EDMO Id. 1604	Celtic Arrray Geotechnical data	Renewables	Medium	Data downloaded but not much progress on extracting geotechnical data	

GB	42, BGS, Mary Mowat	Geology	The Crown Estate (Marine Data Exchange); EDMO Id. 1604	Geological/geophysical data off Yorkshire coast (Ground-truthing samples from Westernmost Rough, Hornsea, and Humber Gateway and bathymetry data from Westernmost Rough)	Renewables	High	Data being used for a geological mapping project	
GB	42, BGS, Mary Mowat	Geology, Biology	Hartley Anderson (on behalf of BEIS); EDMO Id. 2280	Strategic Environment Assessment data	Monitoring	Low	New SEA portal, https://www.bgs.ac.uk/data/sea/app/, There may also be data for DASSH	Additional newer data has not been received yet.

GB	42, BGS, Mary Mowat	Geology	University of St Andrews; EDMO Id. 2770	Geology, geophysics, backscatter, sample anaylsis	Research	High	Some collected by BGS and contacted to ask if they also have other data. Data from sample anaylsis to be submitted	St Andews to checking with IP about licence
GB	42, BGS, Mary Mowat	Geology	Cefas; EDMO Id. 28	Backscatter data	Monitoring	Medium	Some discussion about further data earlier in the year.	Await discussion with UKHO/MCA first
GB	42, BGS, Mary Mowat	Geology	Maritime and Coastguard Agency (MCA); EDMO Id. 1525 / UK Hydrographic Office (UKHO); EDMO Id. 26	Civil Hydrography Programme geological sample data, backscatter	Monitoring	Medium	Improved receipt of sample data from contractors.	Needs wider discussions with UKHO/MCA

GB	42, BGS, Mary Mowat	Geology?	Heriot Watt University	No Geological /geophysical data	Research	None	Contacted following an internal lead, but other data are already being archived elsewhere (BODC, PANGAEA) and no geology data to be archived	No relevant data
GB	42, BGS, Mary Mowat	Geology?	University of Edinburgh; EDMO Id. 4945	No Geological /geophysical data	Research	None	Contacted following an internal lead, but data are already archived in ATLAS GEONODE so go to EMODnet via that route	No relevant data
GB	42, BGS, Mary Mowat	Geology?	UHI Environmental Research Institute, Thurso	Geological /geophysical data?	Research	Unlikely	Contacted to check if they have any relevant data following an internal lead	

GB	43, BODC, Mark Hebden / Lesley Rickards	Physics	Plymouth Marine Laboratory; EDMO Id. 47	Western Channel Observatory, Stations E1 and L4 (near real time data as delayed mode already at BODC)	T, S, meteorological variables, fluorescence, turbidity, O2 and nitrate	Medium	Near real-time data for EMODnet Physics (Delayed mode data already in SeaDataNet)	Need agreement with PML
GB	43, BODC, Mark Hebden / Lesley Rickards	Physics, Chemistry	AFBI, Northern Ireland; EDMO Id. 1385	North of Ireland Joint Agency Coastal Monitoring Programme (NIJACMP) - 11 coastal stations (temperature, salinity, flouresence. Some moorings also measure turbidity and DO)	Monitoring data	High/Medium		Potentially not enough resource at AFBI to sort out and provide data - Afbi have resource to provide 1 or 2 data series
GB	43, BODC, Mark Hebden / Lesley Rickards	Physics, Chemistry	AFBI, Northern Ireland; EDMO Id. 1385	Irish Sea Transects (surveys since 1990s)	Monitoring data	Medium		Potentially not enough resource at AFBI to sort out and provide data

GB	43, BODC, Mark Hebden / Lesley Rickards	Physics, Chemistry	Marine Scotland Science; EDMO Id. 2135	Offshore Standard Oceanographic Sections (3 sections); profiles of temperature, salinity and	Offshore Standard Oceanographic Sections - monitoring	High		Data supplied in the past. Lack of resource at Marine Scotland
GB	43, BODC, Mark Hebden / Lesley Rickards	Physics, Chemistry	Isle of Man Government Laboratory; EDMO Id. 1371	Isle of Man Marine Water Monitoring Programme	Monitoring data	High/Medium		Current status of data set unknown
GB	43, BODC, Mark Hebden / Lesley Rickards	Physics, Chemistry	Univeristy of Bangor, School of Ocean Science; EDMO Id. 1468	St. George's Pier, Menai Strait (Irish Sea) data set	Long term time series	Medium/Low		Current status of data set unknown
GB	43, BODC, Mark Hebden / Lesley Rickards	Physics	Channel Coastal Observatory (CCO); EDMO Id. 1110	CCO tide gauge and wave buoy data (33 series)	Time series along the south coast of UK	Medium		CCO may consider data are safely archived with them; our contact point has retired
GB	43, BODC, Mark Hebden / Lesley Rickards	Physics	Peel Ports Group Ltd.; EDMO Id. 4654	tide gauge data	Extension of long time series	Medium/Low		Unknown at present if they wish to share data

GB	43, BODC, Mark Hebden / Lesley Rickards	Physics	Shell UK Exploration and Production Ltd; EDMO Id. 78	Metocean data from approx 20 sites	Shell were a partner in the SIMORC project, but no longer participate, so this could re-establish data flow from the UK part of Shell; some real time data may already be available.	Medium		Potentially no resource available at Shell UK to provide data; data may be restricted
GB	43, BODC, Mark Hebden / Lesley Rickards	Geology	The Crown Estate (Marine Data Exchange); EDMO Id. 1604	2011, Fugro, Zone 9 Celtic Array, Geotechnical Survey	Irish Sea Round 3 Wind Farm (Zone 9) site. Geotechnical data from boreholes.	High	Held in The Crown Estate Marine Data Exchange with MEDIN metadata; no restriction on data access	BODC do not normally handle this type of data

GB	43, BODC, Mark Hebden / Lesley Rickards	Geology	The Crown Estate (Marine Data Exchange); EDMO Id. 1604	2012, Fugro, Zone 9 Celtic Array, SE Geotechnical Survey	Irish Sea Round 3 Wind Farm (Zone 9) site. Geotechnical data from boreholes.	High	Held in The Crown Estate Marine Data Exchange with MEDIN metadata; no restriction on data access	BODC do not normally handle this type of data
GB	43, BODC, Mark Hebden / Lesley Rickards	Biology	The Crown Estate (Marine Data Exchange); EDMO Id. 1604	2009-2011 RPS, Argyll Array Bird Survey	Bird dataset, (Renewables Round 3 data set)	High	Held in The Crown Estate Marine Data Exchange with MEDIN metadata; no restriction on data access	Bird data not normally handled by BODC
GB	43, BODC, Mark Hebden / Lesley Rickards	Biology	The Crown Estate (Marine Data Exchange); EDMO Id. 1604	2010, Food and Environment Research Agency (FERA), Argyll Array Bird Detection Radar Migration Monitoring	Bird dataset, (Renewables Round 3 data set)	High	Held in The Crown Estate Marine Data Exchange with MEDIN metadata; no restriction on data access	Bird data not normally handled by BODC

GB	43, BODC, Mark Hebden / Lesley Rickards	Biology	The Crown Estate (Marine Data Exchange) ; EDMO Id. 1604	2012 RPS Argyll Array Offshore Wind Farm Basking Shark Survey	basking shark survey, harbour porpoise records, (Renewables Round 3 data set)	High	Held in The Crown Estate Marine Data Exchange with MEDIN metadata; no restriction on data access	BODC do not normally handle this type of data
GB	43, BODC, Mark Hebden / Lesley Rickards	Biology	The Crown Estate (Marine Data Exchange) ; EDMO Id. 1604	2012 Scottish Power Renewables, Argyll Array Offshore Windfarm Basking Shark Workshop	discussion about a data set, (Renewables Round 3 data set)	High	Held in The Crown Estate Marine Data Exchange with MEDIN metadata; no restriction on data access	BODC do not normally handle this type of data
GB	43, BODC, Mark Hebden / Lesley Rickards	Biology	The Crown Estate (Marine Data Exchange) ; EDMO Id. 1604	2012 Xero Energy, Argyll Array Connection Solution and Route Design - Onshore and offshore cables	possible species/habitat data, (Renewables Round 3 data set)	High	Held in The Crown Estate Marine Data Exchange with MEDIN metadata; no restriction on data access	Species/habitats not normally handled by BODC

GB	43, BODC, Mark Hebden / Lesley Rickards	Biology	The Crown Estate (Marine Data Exchange) ; EDMO Id. 1604	Argyll Array Bird Flight Height Data	Bird dataset, (Renewables Round 3 data set)	High	Held in The Crown Estate Marine Data Exchange with MEDIN metadata; no restriction on data access	Bird data not normally handled by BODC
GB	43, BODC, Mark Hebden / Lesley Rickards	Biology	The Crown Estate (Marine Data Exchange) ; EDMO Id. 1604	2013 SMRU Ltd, Argyll Array Windfarm Basking Shark Draft (FINAL) Chapter for Environmental Statement	basking shark data set, (Renewables Round 3 data set)	High	Held in The Crown Estate Marine Data Exchange with MEDIN metadata; no restriction on data access	BODC do not normally handle this type of data
GB	43, BODC, Mark Hebden / Lesley Rickards	Biology	The Crown Estate (Marine Data Exchange) ; EDMO Id. 1604	2009-2010, Econ, Zone 8 - Bristol Channel Atlantic Array, Ornithological Survey (http://www.marinedataexchange.co.uk/ItemDetails.aspx?id=2745)	Bird dataset, (Renewables Round 3 data set)	High	Held in The Crown Estate Marine Data Exchange with MEDIN metadata; no restriction on data access	Bird data not normally handled by BODC

GB	43, BODC, Mark Hebden / Lesley Rickards	Biology	The Crown Estate (Marine Data Exchange); EDMO Id. 1604	2009-2010, HiDef/WWT, Zone 8 - Bristol Channel Atlantic Array, Aerial Bird Surveys (http://www.marinedataexchange.co.uk/ItemDetails.aspx?id=2707)	Bird dataset, (Renewables Round 3 data set)	High	Held in The Crown Estate Marine Data Exchange with MEDIN metadata; no restriction on data access	Bird data not normally handled by BODC
GB	43, BODC, Mark Hebden / Lesley Rickards	Biology	The Crown Estate (Marine Data Exchange); EDMO Id. 1604	2010 RPS, Bristol Channel, Atlantic Array Marine Mammal Survey (http://www.marinedataexchange.co.uk/ItemDetails.aspx?id=2735)	marine mammal dataset, (Renewables Round 3 data set)	High	Held in The Crown Estate Marine Data Exchange with MEDIN metadata; no restriction on data access	Marine mammal abundance not normally handled by BODC
GB	43, BODC, Mark Hebden / Lesley Rickards	Biology	The Crown Estate (Marine Data Exchange); EDMO Id. 1604	2010, RPS, Zone 8 - Bristol Channel Atlantic Array, Fish Larvae Survey (http://www.marinedataexchange.co.uk/ItemDetails.aspx?id=2757)	fish larvae dataset, (Renewables Round 3 data set)	High	Held in The Crown Estate Marine Data Exchange with MEDIN metadata; no restriction on data access	Fish larvae not normally handled by BODC

GB	43, BODC, Mark Hebden / Lesley Rickards	Biology	The Crown Estate (Marine Data Exchange); EDMO Id. 1604	2007, WWT, Bristol Channel Atlantic Array, Aerial Surveys for Waterbirds and Seabirds in the South West of England and Wales: 2007 Final Report (http://www.marinedataexchange.co.uk/ItemDetails.aspx?id=2728)	Bird dataset, (Renewables Round 3 data set)	High	Held in The Crown Estate Marine Data Exchange with MEDIN metadata; no restriction on data access	Bird data not normally handled by BODC
GB	43, BODC, Mark Hebden / Lesley Rickards	Biology	The Crown Estate (Marine Data Exchange); EDMO Id. 1604	2010-2011 Zone 8 Bristol Channel Atlantic Array, RPS Nocturnal Bird Surveys (http://www.marinedataexchange.co.uk/ItemDetails.aspx?id=2712)	Bird dataset and 'other species groups', (Renewables Round 3 data set)	High	Held in The Crown Estate Marine Data Exchange with MEDIN metadata; no restriction on data access	Bird data not normally handled by BODC

GB	43, BODC, Mark Hebden / Lesley Rickards	Biology	The Crown Estate (Marine Data Exchange); EDMO Id. 1604	2011, RPS, Zone 8 - Bristol Channel Atlantic Array, Benthic Ecology Surveys (http://www.marinedataexchange.co.uk/ItemDetails.aspx?id=2730)	benthos and fish data; grab photos, logs, PSA, (Renewables Round 3 data set)	High	Held in The Crown Estate Marine Data Exchange with MEDIN metadata; no restriction on data access	Benthic ecology not normally handled by BODC
GE	693, TSU-DNA, Kakhaber Bilashvili	Chemistry	Laboratory Research Centre Ltd., Poti	Nitrite, Nitrate, other chemical parameters - Black Sea, City of Poti area - (2000 - 2020, further monitoring is planned)	Monitoring activity	High	There is existing cooperation which will facilitate further data provision	
GE	693, TSU-DNA, Kakhaber Bilashvili	Chemistry	Gamma Ltd.	Marine litter	Research activity	High	There is existing cooperation which will facilitate further data provision	
GE	693, TSU-DNA, Kakhaber Bilashvili	Geology, Bathymetry	State Hydrographic Service	Bathymetry, chemical and phisical parameters	Monitoring activity	High	There is existing cooperation which will facilitate further data provision	

GE	693, TSU-DNA, Kakhaber Bilashvili	Human activities	Batumi State Maritime Academy	Shipping traffic	Research activity	Medium to High	There is existing cooperation which will facilitate further data provision	
GE	693, TSU-DNA, Kakhaber Bilashvili	Chemistry, Physics	Georgian Technical University	Chemical and phisical parameters	Research activity	Medium to High	There is existing cooperation which will facilitate further data provision	
GR	269, HCMR, Sissy Iona	Chemistry	Mediterranean Information Office - Thomie Vlachogianni https://mio-ecsde.org/	Beach litter data	research & monitoring activity	medium to high	Existing Cooperation with HCMR Researchers	
GR	269, HCMR, Sissy Iona	Chemistry	Aegean Rebreath - George Sarelakos https://www.aegeanrebreath.org/	seafloor litter data form divers	data from cleanups	medium	Memorandum of understanding with HCMR	questionnable data quality - protocol used
GR	269, HCMR, Sissy Iona	Chemistry	WWF-Greece https://www.wwf.gr/	Beach litter citizen data	citizen - scientists project	medium to high	HCMR participates in the project as an external scientific advisor	

GR	269, HCMR, Sissy Iona	Physics, Chemistry, Biology	HCMR/Institute of Oceanography	CTD data, zooplankton, Chl, nutrients, Dissolved ocygen, Cs137, microfloating ML, optic data	Research activity (Project MARRE)	high	HCMR Project	
GR	269, HCMR, Sissy Iona	Physics	HCMR/Institute of Oceanography	CTD data, current meters	Monitoring activity (WFD)	high	HCMR Project	
GR	269, HCMR, Sissy Iona	Physics, Chemistry, Biology	HCMR/Institute of Oceanography	CTD data, zooplankton, Chl, nutrients, Dissolved ocygen, Beach Litter, Hydrocarbons	Monitoring activity (MSFD)	high	HCMR Project	
GR	269, HCMR, Sissy Iona	Physics, Chemistry, Biology, Geology	HCMR/Institute of Oceanography	CTD data, nutrients, Dissolved ocygen, Hydrocarbons, metals	Research activity (Project Coastal)	medium to high	HCMR Project	
GR	269, HCMR, Sissy Iona	Physics	HCMR/Institute of Oceanography	Optic data	Research activity	medium to high	Various HCMR Projects	
GR	269, HCMR, Sissy Iona	Physics	Univ. of Aegean	CTD data, drifters, moorings	Research activity	medium to high	Research projects	
GR	269, HCMR, Sissy Iona	Biology	Univ. of Aegean	Chl from sentinel 3 data	Research activity	high		

HR	700, IOF, Vlado Dadic	Biology and Chemistry	Institute For Marine And Coastal Research - University Of Dubrovnik	Biological and chemical data (1998-2008)	Research activity		Data digitizatio n needed	
HR	700, IOF, Vlado Dadic	Physics	Institute Ruđer Boskovic	Currents profile (more time series) (2008-2012)	Research activity			
HR	700, IOF, Vlado Dadic	Physics	Institute Ruđer Boskovic	CTD measure ments (1998-2008)	Research activity			
HR	700, IOF, Vlado Dadic	Physics	Croatian Hydrograp hic Institute	Currents profile (more time series) (2008-2012)	Research activity			
HR	700, IOF, Vlado Dadic	Physics	Institute of oceanogra phy and fisheries	Sea surface currents by HF radars-middle Adriatic (2014-2019)	Research activity			
HR	700, IOF, Vlado Dadic	Physics	Institute of oceanogra phy and fisheries	Sea surface currents by HF radars-north Adriatic (2008-2010)	Research activity			

HR	700, IOF, Vlado Dadic	Physics	Institute of oceanography and fisheries	Current profiles - middle Adriatic Sea-more seies (2004-2012)	Research activity			
IE	396, MI, Rob Thomas	Physics	BIM - Ireland's Seafood Development Agency	ADCP and drifter deployments	Contact made through another EU project in which BIM and MI are partners about archiving ADCP and drifter deployment data at the MI.			Data provider unfamiliar with ADCP data processing. So far data have been manipulated in Excel to provide qualitative/indicative plots for the sites where the ADCPs have been periodically deployed (usually a couple of tidal cycles). No standardised

IE	396, MI, Rob Thomas	Physics	Marine Institute	Surface drifters	MI have periodically released surface drifters for model validation on oceanographic cruises. Data currently being compiled internally.			
IE	396, MI, Rob Thomas	Physics	Marine Institute	South Rockall Trough pilot sub-surface mooring	Sub-surface mooring has been piloted in the South Rockall Trough. Data are available from MI erddap. On the workplan to make available through SDN.			

IE	396, MI, Rob Thomas	Physics	Marine Institute	Mace Head COMPASS buoy	COMPASS project deployed a metocean buoy near Mace Head at the west of Galway Bay. Chemical sensor data still being validated by project scientists.			
IE	396, MI, Rob Thomas	Physics	University College Cork	Seal tag data from the SeaMonitor project	MI working with UCC to provide seal tag positions through Erddap to allow project outreach through track visualisations. At present only location data have been made available but temperature from dive profiles will be available	Organisation may have more historic seal tag data they would be willing to release once trust in data pipeline and capacity to embargo data has been established.	Data already submitted to a global database of animal tags, so will need to review if this would be wasted effort to bring in through EMDONet Ingestion.	Project is ongoing and data are embargoed.

IE	396, MI, Rob Thomas	Physics	Commissioner for Irish Lights	met-ocean buoys	CIL have upgraded the network of navigation marks and buoys around Ireland to host met-ocean sensors. Data are published to Twitter and a restricted API.		We have provided technical assistance to enable CIL to set up an Erddap server for their data. Understand this is currently being used as an internal service rather than a public API. We have an API key to their external API service to visualise data on the	Reluctance to release data in phase 1 of EMODNet Ingestion. At the time as the organisation wanted to retain control over the data usage and exploitation. Senior management were still developing a data policy/strategy to determine future

IE	396, MI, Rob Thomas	Physics	Sustainable Energy Authorty Ireland (SEAI)/Electicity Supply Board Ireland (ESBI)	All datasets collected as part of the WestWave project.	ESBI (who were promoting the Westwave renewable energy demonstration zone off Killard, Co. Clare) have offered ALL the data they have acquired during the course of the project development. It appears the project is being postponed until		This is likely to be in the SEAI/ESBI 2021 workplan.	

IE	396, MI, Rob Thomas	Chemistry	National University of Ireland Galway	VOCAB project	Ongoing project looking at ocean acidification in the waters around Ireland.		Data currently being collected and worked up. Likely to be underway pCO2 and carbonate chemistry parameters. Submission to SOCAT liekly to be first priority for the research team. Once this is done we can look to include in EMODNet	
IL	963, IOLR, Isaac Gertman	Physics, Chemistry	Leon H. Charney Scool of Marine Scienes . Haifa Univercity (https://marsci.haifa.ac.il/index.php/en/). Dr Gideon Tiborg (tiborg@ocean.org.il)	Episodic CTD educational surveys	Educational activity	High	There is existing cooperation which will facilitate further data provision	

IL	963, IOLR, Isaac Gertman	Physics, Chemistry	Ruppin academical Center.Faculty of Marine Science. Michmoret Campus. (https://www.ruppin.ac.il/en/Marine-Sciences/Pages/default.aspx. Prof. Gitai Yahel, yahel@ruppin.ac.il)	Episodic CTD educational surveys	Research activity, Educational activity	High	There is existing cooperation which will facilitate further data provision	
IL	963, IOLR, Isaac Gertman	Physics	CAMERI – Coastal and Marine Engineering Research Institute (Technion - Faculcy of Civil and Environmental Enginering) http://cee.technion.ac.il/eng/Templates/showpage.asp?TMID=84&FID=194; Dr. Michail Sladkevich	Collection of oceanographic data along the eastern Mediterranean shoreline. This data is available for designers and decision makers in near real time in table form. Waves.	Ingenering design. Research activity	Low to Medium	There is existing cooperation with IOLR reseachers	

IL	963, IOLR, Isaac Gertman	Physics	Noble Energy Mediterranean LTD. http://www.nobleenergyinc.com/operations/eastern-mediterranean-128.html; Orna Primor - Environmental Manager (http://www.zoominfo.com/p/Orna-Primor/-20518813 86)	Observation of waves and currents on an open sea mooring near to "Tamar" gas field.	Ingenering service	Low to Medium	There is existing cooperation with ISRAMAR	
IL	963, IOLR, Isaac Gertman	Physics	Israel Ports Development & Assets Company Ltd. (IPC) Ltd. (http://eng.israports.co.il/Pages/HomePage.aspx)	Observation of waves and currents in coastal area	Ingenering design.	Low to Medium	There is existing cooperation with IOLR reseachers	

IS	583, MFRI, Sólveig Rósa Ólafsdóttir and Eygló Ólafsdóttir	Chemistry, Physics	MFRI - Marine and Freshwater Research Institute	T,S, Silicate, Phosphate, Nitrite, Nitrate, Ammonium, DO, Phytoplakton (biomass, abundance) - Icelandic Waters, 1950-present	Research and monitoring	High	Some of the data is already available at public data repositories	
IS	583, MFRI, Sólveig Rósa Ólafsdóttir and Eygló Ólafsdóttir	Chemistry	Umhverfisstofnun - The Environment Agency of Iceland. https://www.ust.is/english/	OSPAR and WFD monitoring data, including heavy metals and priority substances	Monitoring activity	High	Data might be alredy available at ICES-DOME database and in WISE	
IS	583, MFRI, Sólveig Rósa Ólafsdóttir and Eygló Ólafsdóttir	Marine Litter	BioPol, Marine Biotechnology Science Hotel in Skagaströnd. https://biopol.is/efni/english	Marine litter, marine biotechnology and microplastic	Research	Medium	No contact has been made	

IS	583, MFRI, Sólveig Rósa Ólafsdóttir and Eygló Ólafsdóttir	Chemistry	Háskólasetur Suðurnesja - The University of Iceland's Research Center in Sudurnes	Contaminants	Research	High	No contact has been made	
IS	583, MFRI, Sólveig Rósa Ólafsdóttir and Eygló Ólafsdóttir	Physics	MFRI - Marine and Freshwater Research Institute. https://sjora.hafro.is/	2 new sites for continous real time surface T data and one site for T, S, DO	Monitoring activity	High	Equipment is being installed	
IS	583, MFRI, Sólveig Rósa Ólafsdóttir and Eygló Ólafsdóttir	Biology	MFRI - Marine and Freshwater Research Institute. Contact Person: Hildur Pétursdóttir - hildur.petursdottir@hafogvatn.is	Data sets of zooplankton biomass and species composition.	Research activity	Medium	There is exixting cooperation on which will facilitate further data provision.	

IS	583, MFRI, Sólveig Rósa Ólafsdóttir and Eygló Ólafsdóttir	Human activities	MAST - Icelandic Food and Veterinary Authority. https://www.mast.is/en	Locations and metadata for aquaculture sites and production in sea water and freshwater aquaculture farms	Public Authority	Medium	No contact has been made	
IT	120, OGS, Alessandra Giorgetti	Chemistry	OSPAR Commission	Beach Litter Dataset	Monitoring activity	Medium to High	There is existing cooperation which will facilitate further data provision	
IT	120, OGS, Alessandra Giorgetti	Chemistry	ICES	Marine litter data from DATRAS trawl surveys	Research activity	Medium to High	There is existing cooperation which will facilitate further data provision	
IT	120, OGS, Alessandra Giorgetti	Chemistry	COISPA – Tecnologia & Ricerca (M.T. SPEDICATO)	MEDITS - International bottom litter trawl survey	Research activity	Medium to High		

IT	120, OGS, Alessandra Giorgetti	Chemistry	Department of Chemical Sciences, University of Trieste, Via Giorgieri 1, Trieste, Italy;Gianpiero Adami;gadami@units.it	Contaminants	Research activity	Medium to low	Personal contacts are underway	
IT	120, OGS, Alessandra Giorgetti	Chemistry	Department of Geological, Environmental and Marine Sciences, University of Trieste, Trieste, Italy;Stefano Covelli;covelli@units.it	Contaminants	Research activity	Medium to low	There is existing cooperation which may facilitate data provision	
IT	120, OGS, Alessandra Giorgetti	Chemistry	PANGAEA® Data Publisher	Italian Chemical Dataset	Research activity	Medium to low		
IT	120, OGS, Alessandra Giorgetti	Chemistry /Physics	SEANOE Sea scientific open data publication	Italian Chemical and Physical Dataset	Research activity	Medium to low		

IT	136, ENEA, Leda Pecci	Biology	ARPAL (regional agency for the protection of the Ligurian environment)	Monitoring of Posidonia	Monitoring activity	Medium	Direct contacts with a biologist	
IT	136, ENEA, Leda Pecci	Biology	ARPAL (regional agency for the protection of the Ligurian environment)	Monitoring of phanerogams, Monitoring of macrozoobenthos in the sediment, Monitoring of algae on rocks, phytoplankton, bacteria	Monitoring activity	Medium	Direct contacts with a biologist	
IT	136, ENEA, Leda Pecci	Physics, Chemistry	LAMMA	Temperature, salinity, oxygen, turbidity and chlorophyll	Research activity	Medium	One of my colleagues has worked with a team in LAMMA	

IT	136, ENEA, Leda Pecci	Biology	CNR Ancona	Marine fish species	Research activity	High	ENEA has collaborated with a researcher interested in data sharing but that data was taken with a project that had restrictions on data distribution	
IT	2276, OGS, Paolo Diviacco / Mihai Burca	Physics	**OGS** (Istituto Nazionale di Oceanografia e di Geofisica Sperimentale), **Infrastructures Division**	**D90** (Other physical oceanographic measurements): **SVP**	Research activity	Medium to High	Please see attach: csr_export_20200920200432.xlsx	Some of this cruises was made with **partners**, we must obtain their **consensus**
IT	251, INGV, Simona Simoncelli	Chemistry	INGV/CNR-ISMAR/CNR-ICCOM	beach litter density per meter square 2014-2015	monitoring activity	Medium to High		
IT	251, INGV, Simona Simoncelli	Chemistry	INGV/CNR-ISMAR/CNR-ICCOM	beach microplastic litter density per meter square 2016-2017	monitoring activity	Medium to High		

IT	251, INGV, Simona Simoncelli	Chemistry	INGV/CNR-ISMAR/CNR-ICCOM	Polymeric characterization (FTIR or Raman) 2016-2017	monitoring activity	Medium to High		
IT	251, INGV, Simona Simoncelli	Chemistry	INGV/CNR-ISMAR/ENEA	qualitative parameters: colorimetric characterization (microscope) and porosity, fragmentation (microscope) 2016-2017	monitoring activity	Medium to High		
IT	251, INGV, Simona Simoncelli	Chemistry	INGV/CNR-ISMAR/Marevivo	Marine litter density per meter square 2018	monitoring activity	Medium to High		

IT	251, INGV, Simona Simoncelli	Chemistry /Physics	INGV Palermo	Hidrotermal system monitoring ocean acidification) Multiparametric observatory deployed at 22m depth acquired (Aeolian Islands, offshore Panarea island): Temperature, pH, conductivity, pressure, turbidity,dissolved CO2, dissolved O2, Acoustic records (2015-now)	monitoring activity	Medium to High		

IT	251, INGV, Simona Simoncelli	Chemistry /Physics	INGV Palermo	Multiparametric observatory deployed at 120m depth in the Black Sea- Data acquired: Temperature, pH, conductivity, pressure, turbidity, CH4, Acoustic records (04-2019 to 10-2019)	monitoring activity	Medium to High		

IT	251, INGV, Simona Simoncelli	Physics	INGV OV Napoli	marine monitoring infrastructure local seismicity and the seafloor ground movements. MEDUSA consists of four buoys (CFB1, CFB2, CFB3, CUMAS) equipped with geophysical and oceanographic instrumentation and continuous and real	monitoring activity	under discussion		
IT	251, INGV, Simona Simoncelli	Physics	ARPAE (https://simc.arpae.it/dext3r/)	daily average outflow at Pontelagoscuro 1971 2015	monitoring activity	ongoing in collaboration with ETT		
IT	2764, ETT, Antonio Novellino	Physics	NL-RWS	River Flow (https://waterinfo.rws.nl/#!/kaart/waterafvoer/)	Monitoring activity	Medium to High		

IT	2764, ETT, Antonio Novellino	Physics	CN-Ocean Network Canada	Ice profiler (https://data.oceannetworks.ca/home?TREETYPE=1&LOCATION=88&DEVICECATEGORY=87&TIMECONFIG=0)	monitoring activity	Medium to High		
IT	2764, ETT, Antonio Novellino	Physics	US-Arctic Observing Network	http://aon.whoi.edu/	research activity	Medium		
IT	2764, ETT, Antonio Novellino	Physics	GR-North Eastern Aegean Sea: Remote Sensed surface flow field	HFR - http://www.poseidon.hcmr.gr/NE_Aegean_surface_flow/	research activity	Medium to High		
IT	2764, ETT, Antonio Novellino	Physics	US-Northwest Association of Networked Ocean Observing System	http://nvs.nanoos.org/Explorer	monitoring activity	Medium to High		
IT	2764, ETT, Antonio Novellino	Physics	US-Coastal Data Information program	http://cdip.ucsd.edu/m/stn_table/	monitoring activity	Medium to High		
IT	2764, ETT, Antonio Novellino	Physics	FR-EMSO - CNRS - West Ligurian area	http://emso.eu/observatories-node/ligurian-sea/	research activity	Medium to High		
IT	2764, ETT, Antonio Novellino	Physics	SP-EMSO - PLOCAN - ESTOC	http://data.emso.eu/sites/estoc.html	research activity	Medium to High		

IT	2764, ETT, Antonio Novellino	Physics	UK-Uni Playmouth	HFR - http://hfradar.plymouth.ac.uk/	monitoring activity	Medium		
IT	2764, ETT, Antonio Novellino	Physics	SP-CSIC	http://data.utm.csic.es/rtp/	monitoring activity	Medium to High		
IT	2764, ETT, Antonio Novellino	Physics	JRC - Tzunami Alert Device	Sea Level	Monitoring activity	Medium to High		
IT	2764, ETT, Antonio Novellino	Physics	INGV, INFN, CNR	http://data.emso.eu/sites/western-ionian.html	monitoring activity	High		
IT	2764, ETT, Antonio Novellino	Physics	CNR IRBIM	MEDA SENIGALLIA - http://rmm.an.ismar.cnr.it/index.php/meda-senigallia/medasenigallia-realtime	monitoring activity	Medium to High		
IT	2764, ETT, Antonio Novellino	Physics	CNR IRBIM	MEDA GARGANO - http://rmm.fg.ismar.cnr.it/index.php/laguna-ismar-lesina/realtimelesinalaguna	monitoring activity	Medium to High		
IT	2764/ETT	Physics	JRC - Tzunami Alert Device	Sea Level	Monitoring activity	Medium to High		

IT	2764/ETT	Physics	INGV, INFN, CNR	http://data.emso.eu/sites/western-ionian.html	monitoring activity	High		
IT	2764/ETT	Physics	CNR IRBIM	MEDA SENIGALLIA - http://rmm.an.ismar.cnr.it/index.php/meda-senigallia/medasenigallia-realtime	monitoring activity	Medium to High		
IT	2764/ETT	Physics	CNR IRBIM	MEDA GARGANO - http://rmm.fg.ismar.cnr.it/index.php/laguna-ismar-lesina/realtimelesinalaguna	monitoring activity	Medium to High		
IT	Cogea	Human activities	Ministry of Economic Development	Offshore pipelines		High		MIght be difficult as the information is often considered sensitive
IT	Cogea	Human activities	Italian Hydrographic Institute	Wrecks, pipelines, cables	monitoring activity	High	Data publicly available but not in an electronic format	Maps are available for purchase

LV	698, LHEI, Rita Poikane	Chemistry, Seabed habitats	Baltic Environmental Forum-Latvia (NGO), bef@bef.lv, Kristina Veidemane kristina.veidemane@bef.lv, https://www.bef.lv/en/	Hazardous substances, Phosphate, Nitrate - Gulf of Riga, Baltic Sea	Research activity	Medium to High	There is existing cooperation, public projects (for example, LIFE) request for public available data	
LV	698, LHEI, Rita Poikane	Geology, Seabed habitats	METRUM - Worldwide Survey, Planning, Consulting & GIS data and Geospatial systems company - http://www.metrum.lv/en/ - metrum@metrum.lv - Uldis Karulis	Coastal erosion monitoring data	Monitoring activity	Low to medium		

LV	698, LHEI, Rita Poikane	Biology, Physics	Institute of Food Safety, Animal Health and Environment BIOR - https://bior.lv - Contact point: Ivars Putnis - Ivars.Putnis@bior.lv	Database on long-term changes in Baltic Sea T,S, phytoplankton, zooplankton, zoobenthos abundance, feeding ecology and functional traits	Research activity	Low	BONUS Bluewebs	Data used in projects is agregated from other project with licence of limited use
LV	698, LHEI, Rita Poikane	Chemistry, Geology, Biology	Balin Energy, Ltd., Inga Gavena, inga.gavena@gmail.com	Database on nutrients in water, SPM, contaminants in sediments, geological composition of the Baltis sea bottom, grainsize, bentic data	Research activity	Medium to High	This information was/is restricted	Balin Energy Ltd is liquidated
MT	708, UoM, Audrey Zammit	Biology	Enemalta	Posidonia morphological attributes	Interconnector coastal site monitoring	High	Excel sheet	
MT	708, UoM, Audrey Zammit	Biology	Environment and Resources Authority, Malta	Macroalgae	National WFD Baseline Environmental Surveys	High	raw data as tables in pdf, May - June 2012	

MT	708, UoM, Audrey Zammit	Biology	Environment and Resources Authority, Malta	Benthic invertebrates	National WFD Baseline Environmental Surveys	High	raw data as tables in pdf, June 2012	
MT	708, UoM, Audrey Zammit	Biology	Environment and Resources Authority, Malta	Posidonia morphological attributes	National WFD Baseline Environmental Surveys	High	raw data as tables in pdf, May-June 2012	Data needs to be digitised
MT	708, UoM, Audrey Zammit	Biology	Environment and Resources Authority, Malta	Posidonia PREI Index, Macroalgae - CARLIT index, Phytoplankton - Chlorophyll a & cell density, Infauna - AMBI index	National WFD Baseline Environmental Surveys	High	raw data as tables in pdf, March 2012, June 2012, Sept 2012, Dec 2012	Data needs to be digitised
MT	708, UoM, Audrey Zammit	Biology	Environment Health Directorate	Bathing water programme data archive (E. coli and enterococci)	Bathing water monitoring	High	raw data as tables in pdf, yearly from 2009 (May to October)	Data needs to be digitised
MT	708, UoM, Audrey Zammit	Biology	Environment and Resources Authority, Malta	Phytoplankton assemblage	Coastal Water Monitoring	High	raw data as tables in pdf Aug, Nov, Dec 2012, Feb 2013 selected coastal locations (see map)	Need to get data from provider

MT	708, UoM, Audrey Zammit	Biology	Environment and Resources Authority, Malta	Total marine Bacteria, fecal streptococci	Maghtab landfill monitoring	High	raw data as tables in pdf, 15 surveys between 5 Feb & a5 Mar 2003 NE coast (see map)	Need to get data from provider
MT	708, UoM, Audrey Zammit	Biology	Ministry of Health	E. coli & Enterobacteria	Bathing Water Directive monitoring	High	raw data as Excel sheets	Need to get data from provider
MT	708, UoM, Audrey Zammit	Biology	Enemalta	Posidonia morphological attributes	Thermal effluent monitoring survey	High	Tables in pdf files 2012-2016 (September only) at Hofra z-Zghira	Need to get data from provider
MT	708, UoM, Audrey Zammit	Biology	Fisheries	Posidonia morphological attributes & PREI Index	Environment Impact Assessment	High	Tables in pdf files Jan 2016, Marsaxlokk Bay	Need to get data from provider
MT	708, UoM, Audrey Zammit	Biology	MSDEC	Posidonia morphological attributes	Environment Impact Assessment	High	Tables in pdf files Summer 2011, Sikka l-Bajda	Need to get data from provider
MT	708, UoM, Audrey Zammit	Biology	Fisheries	Infauna - AMBI Index	Aquaculture monitoring	High	Excel sheets, May 2014	Need to get data from provider
MT	708, UoM, Audrey Zammit	Biology	Fisheries	Infauna - AMBI Index & BENTIX index	Environment Impact Assessment	High	Benthic Maps, Jan 2016	Need to get data from provider

MT	708, UoM, Audrey Zammit	Biology	Biodivalue Consortium	Infauna - S, H', J Index values	Research activity	High	Excel sheets, Grand Harbour creeks, 2014	Need to get data from provider
MT	708, UoM, Audrey Zammit	Chemistry	Environment and Resources Authority, Malta	Various Pollutants including Metals, Hydrocarbons, PAHs, Chlorinated Hydrocarbons in sediments	National WFD Baseline Environmental Surveys	High	Data digitised	
MT	708, UoM, Audrey Zammit	Chemistry	AMAre project	Beached marine litter	Research activity	High	Data digitised	
MT	708, UoM, Audrey Zammit	Chemistry	Environment and Resources Authority, Malta	Eutrophication Status of Selected Coastal Areas (Salini, Marsaxlokk, Xlendi)	National WFD Baseline Environmental Surveys	High	raw data as tables in pdf, Feb 2012 - Jan 2013 (Monthly), inland water (see map)	
MT	708, UoM, Audrey Zammit	Chemistry	Environment and Resources Authority, Malta	Various Pollutants including TOC, Total P, Total N, Metals, Hydrocarbons, PAHs, Chlorinated Hydrocarbons in inland waters	National WFD Baseline Environmental Surveys	High	raw data as tables in pdf Dec 11, Jan 12, Feb 12 surface of inland waters (see map)	Data needs to be digitised

MT	708, UoM, Audrey Zammit	Chemistry	Environment and Resources Authority, Malta	Total N, Nitrates, Dissolved O, Oil and Grease	Bathing Water Directive Study	High	raw data as tables in pdf forthnightly sampling throughout summer 2003, 2004, 2005	Data for 2003 and 2005 needs to be digitised
MT	708, UoM, Audrey Zammit	Chemistry	Environment and Resources Authority, Malta	Heavy metals	Maghtab landfill monitoring	High	raw data as tables in pdf, 1998-1999, Jul 2003, Dec 2003 NE coast (see map), sediments	Need to get data from provider
MT	708, UoM, Audrey Zammit	Chemistry	Biodivalue Consortium	Pollutants	Research activity	High	raw data as Excel sheets	Need to get data from provider
MT	708, UoM, Audrey Zammit	Chemistry, Physics	Environment and Resources Authority, Malta	Nutrients (Chlorophyll a, Nitrates, Phosphates), Dissolved Oxygen, Salinity, Temperature	Monitoring programme in connection with aquaculture activities	High	raw data as tables in pdf, NE coast of Malta (off St. Paul's islands). 26th June 2001, 31st July 2001, 19th Sep 2001, 17th Oct 2001, 22 Jan 2002. surface, 5m, bottom	Need to get data from provider

MT	708, UoM, Audrey Zammit	Chemistry, Physics	Environment and Resources Authority, Malta	Temperature, Salinity, Chlorophyll a, Transparency, Dissolved Oxygen, Chlorophyll a, Nitrates, Phosphates,	Maghtab landfill monitoring	High	raw data as tables in pdf, Jun 2003, Jan, March, May 2004 NE coast (see map)	Need to get data from provider
MT	708, UoM, Audrey Zammit	Human activities	University of Malta	Shipping traffic	Research activity	High	Excel data, 2012-current	
MT	708, UoM, Audrey Zammit	Human activities	University of Malta	Bunkering density	Research activity	High	Excel data, 2012-current	
MT	708, UoM, Audrey Zammit	Human activities	Cleansing Department	Marine litter	Day-to-day operations	??	Unknown	Need to get data from provider
MT	708, UoM, Audrey Zammit	Physics	Environment and Resources Authority, Malta	pH, Dissolved Oxygen & Oxygen saturation, Temperature, Salinity, Turbidity	National WFD Baseline Environmental Surveys	High	raw data as tables in pdf,	Need to get data from provider
MT	708, UoM, Audrey Zammit	Seabed habitats	Environment and Resources Authority, Malta	Benthic maps	Spoil ground survey	High	Benthic maps NE coast of Malta	Need to get data from provider

MT	708, UoM, Audrey Zammit	Seabed habitats	AIS	Benthic maps	RICS Education Trust Survey	High	Benthic Maps, NE coast of Malta, October 2009-August 2011	Need to get data from provider
MT	708, UoM, Audrey Zammit	Seabed habitats	AIS	Benthic maps	MPA Management Study	High	Benthic Maps, 2005-2006, Filfla MPA	Need to get data from provider
MT	708, UoM, Audrey Zammit	Seabed habitats	ADI Associates	Benthic maps	Scott-Wilson report on Land Reclamation	High	Benthic Maps, 2007, SE coast	Need to get data from provider
MT	708, UoM, Audrey Zammit	Seabed habitats	AIS, ADI Associates	Benthic maps	Surveys	High	Benthic Maps, 2009-2016, Various locations	Need to get data from provider
MT	708, UoM, Audrey Zammit	Seabed habitats	University of Malta	ROV footage	Research activity	High	ROV footage, Oct 2016, Hurd's Bank	Need to get data from provider
MT	708, UoM, Audrey Zammit	Seabed habitats	Biodivalue Consortium	ROV footage	Research activity	High	ROV footage, Nov 2012, Deep waters off Filfla	Need to get data from provider
NL	1528, Deltares, Willem Stolte	Biology	Deltares	Phytoplankton traits (trophy)	Within a EU project, a summary of phytoplankton traits is produced	submit to WoRMS		none

NL	1528, Deltares, Willem Stolte	Biology	Deltares	Offshore wind monitoring	Project monitoring of biodiversity (fish, benthos, shellfish)	high	several datasets upcoming	none
NL	1528, Deltares, Willem Stolte; 630, NIOZ, Taco de Bruijn	Physics	Rijkswaterstaat/Deltares/NIOZ	CTD	CTD sampling before each water sample, 30+years, North Sea	Files are stored at RWS, transferred to Deltares. NIOZ will stream the data to SeaDataNet	2.5M lines	Unclear quality and vaying formats
NL	630, NIOZ, Taco de Bruijn	Physics, Chemistry	NIOZ	CTD	CTD + bottle (nutrients, O2, fluorescence) data from research cruises in Wadden Sea, North Sea, N. Atl. Ocean, Mediterranean Sea and Black Sea.	High, files already processed.		None
NO	612, IMR, Øyvind Angelskår	Physics	PGS (https://www.pgs.com/)	CTD	Oil/gas activities	Medium to High	CTD used to calibrate instruments before seismic surveys	Not willing to share without Non Commercial clause (CC BY-NC)

NO	612, IMR, Øyvind Angelskår	Physics	Statens vegvesen (Norwegian Public Roads Administration - www.vegvesen.no)	CTD	Road networks	Low to Medium	BOUY observations of wind, wave and stratisfaction related to fjord crossing projects	Not yet available
PT	590, Portuguese Hydrographic Institute, Paulo Nunes	Chemistry, Physics	Project - COASTNET Faculdade de Ciências da Universidade de Lisboa, Campo Grande, 1749-016 Lisboa	temperature, salinity, oxygen, chlorophyll and ph	Project team developed contacts with the research community from University of Lisboa with the objective of making available in-situ data from several buoys from COASTNET Project.	Medium to High	The release their data through a portal and demonstrate will to cooperate	

PT	590, Portuguese Hydrographic Institute, Paulo Nunes	Physics	Portuguese Navy	BT registries collects by Portuguese Military vessel (1957-2018) .	Organizational arrangement	High	the Portuguese Hydrographic Institute requested to the Naval Operational Command to unclassified historic BT profiles collected during military exercises. They agree and the process is running.	
PT	590, Portuguese Hydrographic Institute, Paulo Nunes	Physics	IPTMA (Instituto Português do Mar e Atmosfera)	sea surface temperature and salinity records obtained from a termosalinograph installed at Noruega research vessel in 2019	Research Arrangement	High	Data have been submitted to EMODnet Portal.	

PT	590, Portuguese Hydrographic Institute, Paulo Nunes	Physics	Project CERES	Bathy profiles - Temperature profiles obtained along the Portuguese coast, between 1981 and 1985	Research	High	Data submitted to EMODnet Ingestion Portal	
PT	590, Portuguese Hydrographic Institute, Paulo Nunes	Physics	MARTEC (data from the portuguese HF Radar Network)	surface Currente NRT HF Radar data	Research Arrangement	High	The Portuguese HFRadar data publishing through EMODnet Ingestion --> EMODnet Physics. MARTEC submitted the data to Ingestion Portal and the next phases is underway.	

PT	590, Portuguese Hydrographic Institute, Paulo Nunes	Human activities	CCMAR - Centro de Ciências do Mar (www.ccmar.ualg.pt) PhD Jorge Gonçalves (jgoncal@ualg.pt) - CCMAR Researcher	geonames (local fisheries bank names in the Algarve Coast)	The R&D project PESCAMAP collects the fisheries community names for marine fisheries sptos in the Algarve Coast. One of the outcomes is the first "Mapa da toponímia dos mares algarvios" (Map of Algarve sea names)	High	waiting for dataset.	
RO	697, NIMRD, Luminita Buga	Physics	National Institute for Marine Research and Development "Grigore Antipa"	Remote sensing reflectance at given wavelengths (2019); AOP measurements, Romanian Black Sea Shelf	Research activity	High		

RO	697, NIMRD, Luminita Buga	Chemistry	National Institute for Marine Research and Development "Grigore Antipa"	Nutrients (NO2,NO3, PO4, NH4), Silicates, Dissolved O2- Romanian Coastal Stations (Constanta, Mangalia), daily values, 1985-2000	Research/ Monitoring activity	High		
RO	697, NIMRD, Luminita Buga	High Resolution Seabed Mapping/ Bathymetry	National Institute for Marine Research and Development "Grigore Antipa"	Coastal line dynamic (2008-2015), north part of Romanian littoral (Danube Delta shore,)	Research/ Monitoring activity	High		
RU	681, RIHMI-WDC, Evgenii Viazilov	Physics	Arctic and Antarctic Research Institute	CTD-measurements data in drifting Ice Base expedition	Research activity	High	Region: Arctic ocean; Period6 2007; Parameters: T, S.	Need to convert data to format ODV
RU	681, RIHMI-WDC, Evgenii Viazilov	Physics	Arctic and Antarctic Research Institute	CTD-measurements data of North Pole-35 drifting	Research activity	High	Region: Arctic ocean; Period6 2007; Parameters: T, S.	Need to convert data to format ODV

RU	681, RIHMI-WDC, Evgenii Viazilov	Physics	Arctic and Antarctic Research Institute	CTD-measurements data of North Pole-36 drifting	Research activity	High	Region: Arctic ocean; Period6 2007; Parameters: T, S.	Need to convert data to format ODV
RU	681, RIHMI-WDC, Evgenii Viazilov	Physics	Northern-HMS	CTD-measurements data of "Somov" RV, IPY-2008 expedition	Research activity	High	Region: Arctic ocean; Period6 2007; Parameters: T, S.	Need to convert data to format ODV
RU	681, RIHMI-WDC, Evgenii Viazilov	Physics,Chemistry	Arctic and Antarctic Research Institute	CTD-measurements data in the RAE 53, "AKADEMIK FYODORO	Research activity	High	Region: Arctic ocean; Period6 2007; Parameters: T, S.	Need to convert data to format ODV
RU	681, RIHMI-WDC, Evgenii Viazilov	Physics	Arctic and Antarctic Research Institute	CTD-measurements data of Arctic-2007 expedition on "Rossiya"	Research activity	High	Region: Arctic ocean; Period6 2007; Parameters: T, S.	Need to convert data to format ODV
RU	681, RIHMI-WDC, Evgenii Viazilov	Physics	Arctic and Antarctic Research Institute	Data of ocean XBT-measurements in Arctic-2007 expedition on "Akademik Fedorov" RV	Research activity	High	Region: Arctic ocean; Period6 2007; Parameters: T.	Need to convert data to format ODV

RU	681, RIHMI-WDC, Evgenii Viazilov	Physics	POLAR BRANCH OF THE FSBSI “VNIRO”	Meteorological data R/V "Fridtjof Nansen" - Arctica-2007	Research activity	High	Region: Arctic ocean; Period6 2007; Parameters: Meteo - Tw, Ta, P, others	Need to convert data to format ODV
RU	681, RIHMI-WDC, Evgenii Viazilov	Physics	State oceanographic institute of roshydromet	Meteorological data R/V "Victor Buinicky" for Arctica-2007	Research activity	High	Region: Arctic ocean; Period6 2007; Parameters: Meteo - Tw, Ta, P, others	Need to convert data to format ODV
RU	681, RIHMI-WDC, Evgenii Viazilov	Physics	Arctic and Antarctic Research Institute	Meteorological data R/V "Akademik Fedorov" - 26	Research activity	High	Region: Arctic ocean; Period6 2007; Parameters: Meteo - Tw, Ta, P, others	Need to convert data to format ODV
RU	681, RIHMI-WDC, Evgenii Viazilov	Physics	Northern-HMS	Meteorologicalaa dta /RV "Michail Somov" for Arctica-2007	Research activity	High	Region: Arctic ocean; Period6 2007; Parameters: Meteo - Tw, Ta, P, others	Need to convert data to format ODV
RU	681, RIHMI-WDC, Evgenii Viazilov	Chemistry	Arctic and Antarctic Research Institute	Results of measurements of CO2 flow from water, RV "Academic Fedorov"	Research activity	High	Region: Arctic ocean; Period6 2007; Parameters: CO2	Need to convert data to format ODV

RU	685, SIO-RAS, Tamara Shiganova	Chemistry: Water column, Sediment	Southern branch SIO RAS (SB SIO RAS) http://www.ocean.ru/content/view/170/105/	PO4-P, TP, NO3-N, NO2-N, NH4-N, TN, Si, BOD5, O2, H2S, pH, Total alkalinity, Detergents, Fenols, Suspended solids, TPHs, Heavy metals: 12 parameters, Pesticides (DDT, DDE, DDD, a-HCH, b-HCH, c-HCH, aldrin, HCB), PAHs-Benzo(a)pyrene.	Research activity	High	Contacts with the responsible experts have been established and the will to data exchange has been confirmed.	
RU	685, SIO-RAS, Tamara Shiganova	Chemistry	State Oceanographic Institute (SOI) http://oceanography.ru	Nutrients, Heavy metals	Research activity	High	Contacts with the responsible experts have been established and the will to data exchange has been confirmed.	

RU	685, SIO-RAS, Tamara Shiganova	Chemistry	NPO "Typhoon" http://www.rpatyphoon.ru	Trace metals, organic pollutants	Research activity	High	Contacts with the responsible experts have been established and the will to data exchange has been confirmed.	
RU	685, SIO-RAS, Tamara Shiganova	Chemistry	AO "Ugmorgeologia" http://www.ymg.ru/ru	Nutrients, Trace metals, organic pollutants	Research activity	Medium to High	The data atre split between various public bodies but can be accessed	
RU	685, SIO-RAS, Tamara Shiganova	Chemistry	Hydrochemical Institute http://gidrohim.com	Nutrients, Trace metals, organic pollutants	Research, Monitoring activity	High	The data atre split between various public bodies but can be accessed	
RU	685, SIO-RAS, Tamara Shiganova	Chemistry	Azov Scientific Research Institute of Fisheries http://azniirkh.ru	Nutrients, Trace metals, organic pollutants,others	Research, Monitoring activity	High	The data atre split between various public bodies but can be accessed	
RU	685, SIO-RAS, Tamara Shiganova	Chemistry	Southern Scientific Center of the RAS (ЮНЦ РАН) http://www.ssc-ras.ru	Nutrients, Trace metals, organic pollutants,others	Research, Monitoring activity	Medium to High	The data atre split between various public bodies but can be accessed	

RU	685, SIO-RAS, Tamara Shiganova	Chemistry	Kuban State University https://kubsu.ru	Nutrients, Trace metals, organic pollutants ,others	Research	Medium to low		
RU	685, SIO-RAS, Tamara Shiganova	Chemistry	FGBU Chernomor-Azov Directorate for Technical Supervision of the Sea http://bsatmd.ru	Nutrients, Trace metals, organic pollutants ,others	Research activity	Medium to low	The data atre split between various public bodies but can be accessed	
RU	685, SIO-RAS, Tamara Shiganova	Chemistry	"Special Centre Gydrometeorology and enviromen t monitoring of the Black and Azov	Nutrients, Trace metals, others	Research	Medium to low	The data atre split between various public bodies but can be accessed	
RU	685, SIO-RAS, Tamara Shiganova	Chemistry	Hydrometeorological bureau Tuapse	Nutrients, others	Monitoring activity	Medium to low	The data atre split between various public bodies but can be accessed	

RU	685, SIO-RAS, Tamara Shiganova	Chemistry	Chemistry, Centre Of lab analyses and tekhnical measure mennts on YUFO, Krasnodar http://clati.ru	Nutrients, Trace metals, organic pollutants,others	Research activity	Medium to low	The data atre split between various public bodies but can be accessed	
RU	685, SIO-RAS, Tamara Shiganova	Chemistry	Novorossiisky aducation and research marine biological centre https://kubsu.ru/ru/node/2887	Nutrients, Trace metals, organic pollutants,others	Research	Medium to low	The data atre split between various public bodies but can be accessed	
RU	685, SIO-RAS, Tamara Shiganova	Chemistry	Kuban Basin Water Administration.	Nutrients, Trace metals, organic pollutants,others	Monitoring activity	Medium to low	The data atre split between various public bodies but can be accessed	
RU	685, SIO-RAS, Tamara Shiganova	T,S, Chemistry,	Aqualog Ltd	temperature, salinity,density,oxygen,water current	Research activity	High	Data exchange	

RU	685, SIO-RAS, Tamara Shiganova	Chemistry	Southern branch SIO RAS	Nutrients, Trace metals, organic pollutants, Mn, Fe, Cu, Zn, Cd, Pb, Hg, Co, Ni, Cr	Research activity	High	Data exchange	
SI	1229, NIB, Branko Cermelj	Physics	Port of Koper, slovenia	Currents, Turbidity	Monitoring activity	Medium to High		
SI	1229, NIB, Branko Cermelj	Physics	Institute for water of the republic of Slovenia	Marine noise	Monitoring activity	Medium to High		
SI	1229, NIB, Branko Cermelj	Physics, chemistry	National Institute of Biology	CTD casts	Research, Monitoring activity	Medium to High		
SI	1229, NIB, Branko Cermelj	Physics	National Institute of Biology	drifters	Research activity	High		
SI	1229, NIB, Branko Cermelj	Biology, Chemistry, Physics	National Institute of Biology (results of BALMAS project - balast water)	Phytoplankton: Abundance, species presence or absence Nutrients, CTD casts Time period: March 2014 - Feb. 2015	Project activities	Medium to High		
SI	1229, NIB, Branko Cermelj	Chemistry	Slovenian Water Agency and the Environmental Agency	Contaminants (sediment, water)	Research & monitoring activity.	low		

SP	26, CSIC, Gemma Ercilla	Biology	Instituto de Ciencias del Mar, CSIC-ICM, Plankton ecology and ocean health. Dra. Elisa Bardalet; berdalet@icm.csic.es	Harmful algal blooms .Information on harmful algal events and harmful algae monitoring .	Research and monitoring activities	Medium to High	ICM-CSIC Researchers	
SP	26, CSIC, Gemma Ercilla	Geology	University of Oviedo. Dept. of Geology. pulgar@geol.uniovi.es	Geology: multi-channel seismic profiles	Research	medium	Previous Cooperation with ICM-CSIC Researchers	
SP	26, CSIC, Gemma Ercilla	Physics Oceanography	CASEM. Faculty of Marine Sciences, University of Cadiz. Physics Applied Department; DR. Miguel Bruno. Email:miguel.bruno@uca.es	ADCP and CTD measurements	Research and monitoring activities in physcis oceanography	Low-medium	They have many data but lack of economical and human resources for gathering and information	
SP	26, CSIC, Gemma Ercilla	Geology	Royal Institute and Observatory of the Navy-ROA; Dr. Manolo Catalán. Email:mcatalan@roa.es	Geology: Magnetometer data	Research		Previous Cooperation with ICM-CSIC Researchers	

SP	26, CSIC, Gemma Ercilla	Meteorological data (real time data); Biology (species distribution); Bathymetry	Granadilla Environmental Observatory Foundation; https://www.oag-fundacion.org/;	REDMIC. Canary Islands integrated marine data repository	Foundation	Medium	Aim: to collaborate with the departments and institutions of the Autonomous Community of the Canary Islands and other Macaronesian archipelagos as well as with the institutions of the State Administration, with competence in the conservati	
SP	26, CSIC, Gemma Ercilla	Biology	The Centre for Advances Studies of Blanes (CEAD)-CSIC; Prof. Dr. Manuel Maldonado	Sponge Grounds as Key Marine Habitats. Submarine photos	Research	Medium to High	Previous Cooperation with ICM-CSIC Researchers	

SP	26, CSIC, Gemma Ercilla	Geology	University of Vigo, Marine Geoscience, Xeocienci as mariñas e ordenació n do territorio, Prof. Dra. Soledad García Gil. sgil@uvig o.es	bathymetr y, seismic profiles, Human activities (impact of aquacultu re)	Research activities	Medium	Previous Cooperati on with ICM-CSIC Researche rs	
SP	26, CSIC, Gemma Ercilla	Physics Oceanogr aphy,Bath ymetry	University of Alicante. Faculty of Marine Sciences. Dr. Alfonso Ramos. alfonso.ra mos@ua. es	Physics Oceanogr aphy (temperat ure, salinity); Bathymetr y	Research activities	Medium to High		
SP	26, CSIC, Gemma Ercilla	Bathymetr y; Geology	MEDGAZ Consortiu m. Oran-Almeria gaspipelin e	Bathymetr y; geology	Industry	Low	Previous Cooperati on with ICM-CSIC Researche rs	
SP	26, CSIC, Gemma Ercilla	Bathymetr y	Red Eléctrica Española. REE.	Bathymetr y	Industry	Low		
SP	353, IEO, Elena Tel	Physics	IEO	temperat ure, salinity at Santander Bay	Historical data set recovery	Medium to High		

SP	353, IEO, Elena Tel	Physics	IEO	Tide gauges network historical data	Historical data sets recovery	Medium to High		
SP	353, IEO, Elena Tel	Physics	IEO	sea surface temperature and salinity records obtained from a termosalinograph	Continuous underway recording data at IEO RVs	Medium to High		
SP	353, IEO, Elena Tel	Physics	IEO	marine meteo records obtained from automatic station	Continuous underway recording data at IEO RVs	Medium to High		
SP	353, IEO, Elena Tel	Bathymetry	IEO	Sounding obtained from navigation echosounder	Continuous underway recording data at IEO RV	Medium to High		
SP	353, IEO, Elena Tel	Physics	SGP	sea surface temperature and salinity records obtained from a termosalinograph	Continuous underway recording data at SGP RVs	Medium		
SP	353, IEO, Elena Tel	Physics	SGP	marine meteo records obtained from automatic station	Continuous underway recording data at SGP RVs	Medium		

SP	353, IEO, Elena Tel	Bathymetry	SGP	Sounding obtained from navigation echosounder	Continuous underway recording data at SGP RVs	Medium		
TR	696, METU, Devrim Tezcan	Biology, Physics	Republic of Turkey Ministry of Agriculture and Forestry, Mediterranean Fisheries Research, Production And Training Institute https://arastirma.tarimorman.gov.tr/akdenizsuurunleri/Sayfalar/EN/AnaSayfa.aspx	T,S, Fish - Mediterranean	Research activity	Low to Medium		
TR	696, METU, Devrim Tezcan	Geology	General Directorate of Mineral, Research and Exploration https://www.mta.gov.tr/v3.0/	Marine gravimeter/ gravity data, Magnetometer, - Single Channel Seismic Data , - Multi Channel Seismic Data, - Geological maps	Research activity	Low		

TR	696, METU, Devrim Tezcan	Chemistry	Mersin Metropolitan Municipality https://www.meski.gov.tr	Coliforms, Nutrients	Monitoring activity	Medium to High		
TR	696, METU, Devrim Tezcan	Biology, Physics	Ministry of Agriculture and Forestry https://www.ifishproject.com/	T,S, Fish - Mediterranean	Research activity	Medium		
TR	696, METU, Devrim Tezcan	Physics	Kyrenia University	T,S, Mediterranean	Research activity	High		

Annex 4: Overview of interesting ingestion cases per country and partners

In the contract period, very good progress was achieved with **452** new submissions, **430 new** phase I publications, and **220** new phase II publications. The following overview highlights interesting cases per country and partners. As part of promotion, a selection of these have been included in a poster on success stories.

Belgium – RBINS and VLIZ

RBINS has had contacts with the Belgian Navy Mine Warfare Datacentre since 2018 and these contacts resulted in October 2020 in the delivery of a dataset of worldwide AUV missions for port protection and mine hunting operations (2006-2019). In the meantime, two out of the eight parameters have been elaborated to phase II and made available in SeaDataNet for feeding EMODnet. This case has been recognized as case 4 of the 15 success stories. Another dataset, elaborated to Phase II is a long and nearly continuous (2005-2019) benthic mooring timeseries on cohesive sediment transport with turbidity, CTD and ADCP information. The data will be made available in NRT to CMEMS in 2022.

RBINS has promoted and presented EMODnet-Ingestion at the World Ocean Council Sustainable Ocean Summit, session on the U.N. Decade of Ocean Science - Data Collection and sharing by industry

VLIZ has worked up several biology submissions to Phase II by including these in EurOBIS – EMODnet Biology.

Bulgaria – IO-BAS

IO-BAS (Bulgaria) contacted with success several organisations in Bulgaria, such as port authorities, and Black Sea water management departments. This resulted for instance in the CORES Ltd. Company to provide an echosounding dataset (taken from a small boat) for a project to build a new fishing port near Varna. The dataset has been elaborated to phase II by inclusion in the SeaDataNet CDI system. This has been recognized as case 5 of the 15 success stories.

Denmark – AU-DCE and Berring Data Collective

A win-win collaboration with the Danish Centre for Environment and Energy allowed the publication of the 2015 survey on microplastic-like particles in sediments from Danish waters to EMODnet Chemistry. The data are now fit for reporting to MSDF descriptor 10. This has been recognized as case 6 of the 15 success stories.

Another interesting dataset in Phase II has been provided by the Berring Data Collective. This group works together with fishermen to equip fishing gears (nets, beams) with smart sensors, and has been collecting salinity and temperature profiles and other EOVs. Vessels are selected primarily to fill in large-scale data gaps in the North Atlantic, and so far, 81 vessels are equipped. The dataset submitted to EMODnet DIP, after mediation by SMHI, contains data from 2000-2019 and is available in EMODnet Physics. The Berring dataset submission has been recognized as case 3 of the 15 success stories.

Cyprus – ORION

ORION (Cyprus) worked together with the Department of Fisheries and Marine Research to process their submission of beach litter monitoring data (2018-2019). Further guidance was given by ORION to support the Department to adopt the Marine Litter standards as promoted by EMODnet Chemistry with TSG-ML for easier integration into the EMODnet Marine Litter databases and products.

ORION (Cyprus) has deployed a monitoring platform in the frame of the HERMES project, in Larnaca Bay. It is part of the HERMES buoys observation network of four platforms. Following a meeting with MARIS, ORION has submitted already data sets for the Larnaca buoy and is interacting with HERMES partners in Greece, Albania, and Bulgaria to get their data submitted too and to make the platforms also part of the NRT data exchange.

Finland – FMI and GTK

GTK staff acted as lecturer for university courses, providing a unique opportunity to promote the long-term usefulness of the EMODnet Ingestion project to students. GTK both also participated to the Baltic Sea Science Congress with a scientific talk concerning one of the potential datasets on marine Caesium-137 sediment pollution due to the Chernobyl disaster. This dataset was provided by a government agency and is now included in EMODnet Geology. This has been recognized as case 10 of the 15 success stories. Data collected by a private company and from a citizen science initiative (surface temperature from pleasure boats) are currently being piloted/evaluated to a data pipeline.

France – IFREMER and SHOM

IFREMER operates the SeaDataNet SEANOE data publishing service, from which a selection is forwarded to EMODnet DIP for further processing as part of EMODnet. So far, 145 have been submitted in EMODnet DIP, and 115 are worked up to phase I-II by IFREMER. With such high submission numbers assigned to one data centre, interesting patterns emerge with regards to dataset rejection. The following reasons have been encountered for rejection: non-in situ data (models, large-scale aggregations, system characterisations,...), data already included in the Coriolis data system, and wrongly assigned to IFREMER. From this experience, lessons are learnt for refining the filter for selecting interesting SEANOE records.

SHOM encountered some confidentiality and legal issues when publishing datasets not gathered by their own organisation. SHOM personnel gave lectures on Hydrography toengineering students that are likely to be engaged in survey companies one day; thus, proving the case for open data sharing at a young age.

United Kingdom – BGS, BODC and JNCC.

MEDIN, the national framework for marine data management in the UK, joins 7 data archive centres. In 2020, it launched the 'Value chains in public marine data' survey (https://doi.org/10.1787/d8bbdcfa-en) to their users, yielding 191 responses, from respondents with a scientific or industry background. From industry, offshore wind was the most represented. Physical oceanography data was the most often used, with T and S on top. Animportant observation is that a data centre's website is visited for mainly one reason: to get the data as easy as possible, preferrably supported by machine-to-machine methods..

BGS had ongoing discussion with Cefas on processed backscatter data from the Civil

Hydrography Programme surveys and with Maritime and Coastguard Agency (MCA) on potential sample analysis data.

BODC has elaborated 640 CTD casts from cruises in 2016 – 2017 from Marine Scotland Science (MSS) to Phase II populating these into BODC, SeaDataNet CDI service, which feeds into EMODnet. This has been recognized as case 1 of the 15 success stories.

Furthermore, BODC worked up data sets for time-series of physical and chemical transports through the Rockall Trough from SAMS (Scottish Association for Marine Science) to Phase I. These were collected in the EU HORIZON 2020 ATLAS project, which has more interesting data sets collected which are not yet made available in the European marine data exchange. For that purpose, MARIS and HCMR together with SSBE, partner in the ATLAS project, discussed a feasible approach using EMODnet Ingestion for getting more of the ATLAS data sets made available for wider use. SSBE proposed the approach at the final ATLAS GA meeting, 9-10 March 2020, as a way forward for delivering the ATLAS data sets as tangible project results. A further follow-up is expected and will be safeguarded by SSBE.

BODC has discussed with The Crown Estate's Marine Data Exchange a more structural exchange (passing via MEDIN) of datasets towards EMODnet DIP. Coordination is taking place between BODC, HCMR and MARIS in achieving interoperability and harvesting.

JNCC (the Joint Nature Conservation Committee) has provided an exhaustive list of potential datasets in the Biology and Seabed habitats lot. There is very little untapped data left in Seabed habitats in the UK and a lot of it has already been published to EMODnet Seabed Habitats (bypassing EMODnet Ingestion). This frees JNCC to focus more on processes: currently they are streamlining a pipeline so that data submission to EurOBIS becomes more straighforward.

Georgia – TSU-DNA

TSU has separated the work required to uplift datasets to Phase II among three staff members in order to 1) foster the in-situ contacts with data providers, 2) remain in stand-by modus at the data centre and 3) do the tech work to make the datasets available in SeaDataNet/EMODnet lots. It remains in close contact with HCMR and MARIS to populate the catalogs.

TSU organized an event dedicated to the International Black Sea Day on 28/10/2020 that joined over 60 participants from different backgrounds, with a specific focus to underline the importance of EMODnet Ingestion. TSU has translated the templates and the promotional material of EMODnet into Georgian. This has been recognized as case 7 of the 15 success stories.

Greece – HCMR

Greece has made 14 submissions in the DIP (Phase 0, I, II) over a wide variety of topics (CTD, Nutrients, DO, Chl-a, Zooplankton, Beach Litter, Metals in sediment) and in many cases covering a large time period (globally, 1991-2020). HCMR is committed to bring all datasets at least to Phase I. In addition, it has been assigned to do the data management of 4 large, worldwide datasets.

HCMR is regularly reminding its HCMR scientists to make use of EMODnet Ingestion as a first step for publishing data from their completed projects as part of the European marine data exchange. This resulted already in submissions for Greek data of the Interreg Adriatic-

Ionian HARMONIA and EU DG ENV MEDREGION Projects. In principle, the Ingestion pathway will be used for the data output of the ongoing Greek national MARRE Project. On top of that, HCMR has agreed with Greek authorities to use EMODnet Ingestion as the prevailing mechanism for gathering the data collected within the Greek MSFD monitoring programme, for those data sets which are to made publicly available.

HCMR processed and published (Phase I) the bathymetric and geophysical of the Eastern Mediterranean collection of Dr. John K. Hall, the former Vice Chairman of the IBCM (International Bathymetric Chart of the Mediterranean), on behalf of the Geological Survey of Israel. This dataset was submitted into the system by ENEA and consists of scanned charts and notes, and is so large it had to be split up in 4 parts. This data collection cannot be upgraded to Phase II due to its nature.

Two ingestions were made for data collected by Saildrone during the cruise legs ANTA-SD-019 (Tasman Sea) and ATL2MED-SD-1030 (Atlantic Ocean off West Africa). The ingested datasets included 45 parameters plus 3 reference parameters time, lat, lon. HCMR as assigned data centre managed to map 24 out of the 45 submitted parameters, because it was the first time they handled such data. Additional P01 codes have been requested from BODC and will be added later.

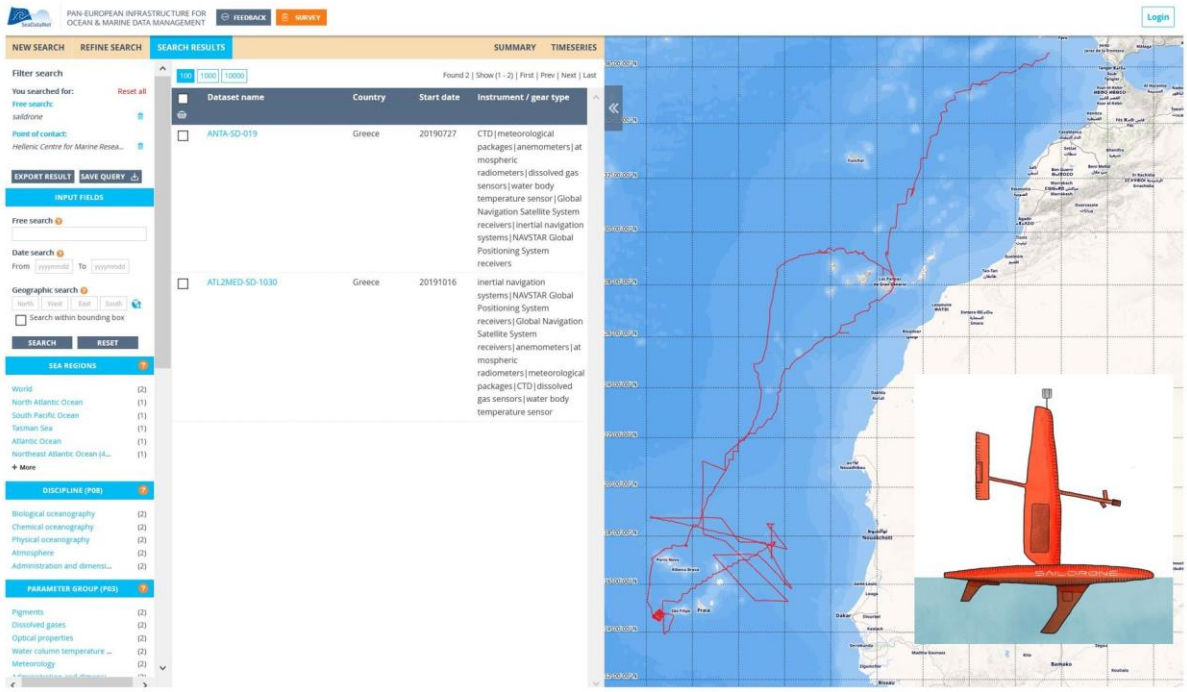

Figure: Saildrone cruise leg data sets included in CDI service for feeding EMODnet

Croatia – IOF

The Institute of Oceanography and Fisherles (IOF) mainly submitted marine litter and noise dataset series in the project period. They have contacted 16 potential data submitters all over the country. This active promotion interestingly will result in a post-project (in 2022) submission to the Ingestion Portal, containing ten years of CTD data gathered in the open sea of the Adriatic at about ninety stations. This is data gathered for the European Data Collection Framework. Other datasets will be published as well, some are planned to go directly to other EMODnet lots.

Ireland – MI

The Marine Institute went from 6 datasets at the start of the contract to 28 submissions currently in the system, mainly shapefiles on seabed and coastal habitats and Marine Spatial Planning (human activities). These submissions follow the approval formulated in Ireland's National Marine Planning Framework (NMPF) to release underlying data on a suitable platform. A long timeseries on seawater temperature at Carna, Galway Bay (1974-2003, NUI Galway) has been uplifted to Phase II.

Israel – IOLR

The Israel Oceanographic and Limnological Research institute has managed to receive CTD and bottle data from Noble Energy Mediterranean Ltd. (Chevron) and FUGRO, gathered resp. near the sea gas platforms "Tamar" (Tamar Gas field) and "Karish" (Karish Gas field).

Iceland – MFRI

Iceland has made available (Phase I) a relatively large number (16) of temperature daily mean time series in Icelandic waters, each from a different intertidal/surface sensor station. A long-term (1970-1990) dataset in sample-based observations of water column temperature, salinity, nutrients (N,P,Si) and oxygen is currently in Phase I.

Italy – COGEA, ENEA, CNR and OGS

COGEA supported EU JRC for an updated data submission of their data set on macroalgae and microalgae production facilities. This does not only include new facilities, but also new fields of information, such as information on species harvested/cultivated. Another data submission by EU-JRC on spirulina producers is on its way. This submission has been recognized as case 2 of the 15 success stories.

COGEA agreed with EU MSP (Marine Spatial Planning) committee on adopting an approach by which Member States are promoted to submit their completed MSPs through EMODnet Ingestion for uptake in EMODnet Human Activities. This initiative already has resulted in submissions by a few countries which was followed up by elaboration and publication in EMODnet Human Activities.

ENEA mediated the publication of a biology dataset (5000 occurrences) by a CNR research team and the Anthon Dohrn Zoological Station on EMODnet Biology. This dataset did not pass via EMODnet Ingestion as all data on EMODnet DIP is fully open and the scientists wanted an embargo.

OGS arranged with the TSG-ML to promote to Member States the use of the EMODnet DIP to submit marine litter data for the requirements of MSFD Descriptor 10. The data is then elaborated and shared in the European Marine Litter Database operated by EMODnet Chemistry. This has been recognized as case 11 of the 15 success stories.

> There has been a submission for the SIMBIOS project (2000-2002), supported by the Italian Ministry of Research, which aimed at the investigation of the Sardinia Sea and Sardinia Channel. Five oceanographic cruises were organised between 2000 and 2002 involving hydrodynamics and biochemical measurements. A diagnostic ocean circulation model was used to study the surface dynamics. The single submission by CNR, Istituto per l'Ambiente Marino Costiero (Sezione di Oristano) has resulted into a collection of circa 400 CTD stations which have been populated into the CDI service for feeding into EMODnet.

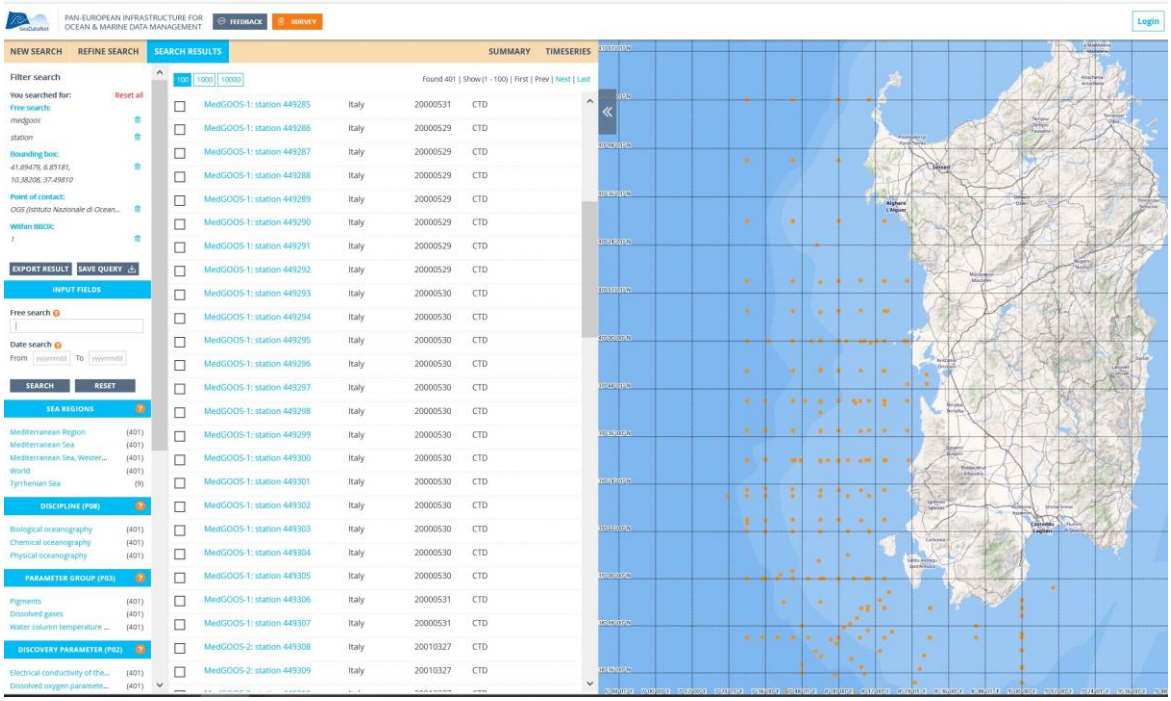

Figure: SIMBIOS (2000 – 2002) data from Italy included in CDI service for feeding EMODnet

Malta – UoM

The University of Malta (together with OGS) organised the SHAREMED Capitalisation Workshop (14-15 december 2020s) where EMODnet was represented during roundtable discussions. The UoM is leading the 2021 edition of the 'Short Course on Marine Data Literacy', organised by the European University of the Seas. Lecturers are from around Europe. Dedicated sessions in the programme link to the CMEMS and EMODnet portals, including EMODnet Ingestion, how to use them and how they are positioned in the open data derivation chain.

Netherlands – Deltares, NIOZ and Rijkswaterstaat

Deltares has submitted (Phase II) a large dataset (3000 profiles, 1995-2019) with CTD profiles that were routinely taken during long term monitoring programmes of Rijkswaterstaat. NIOZ is undertaking a similar task with worldwide CTD profiles taken by the Dutch scientific community; this dataset is currently in QC phase. RWS/Deltares actively promoted the use of EMODnet (Ingestion) during WG DIKE and TG-Data meetings of MSFD.

Long-term macrobenthos monitoring data from 1991 to 2015 have been shared by the Dutch Ministry of Infrastructure and Water Management. The data were published to EMODnet Biology after harmonization and matching of taxonomical names to WoRMS. This has been recognized as case 8 of the 15 success stories.

Norway – IMR

There has been made a fruitful data contact with Petroleum Geo Services, a hydrocarbon exploration company specialised in geophysics. The company is willing to deliver seismic survey data and the CTD used to calibrate the instruments before these surveys under a non-commercial clause. IMR also caught the attention of the Norwegian Public Roads Administration who wanted

to publish their data externally anyway. They could make available CTD data near Fjord road crossings.

Portugal – IHPT

IHPT (Portugal) has sent a formal request to naval staff to start the declassifying process of historical military BT and XBT profiles, which includes more than twenty five thousand bathy messages (temperature versus depth) since 1957. Most probably, the Naval Staff will agree to free a portion of these datasets, which will be undertaken using the EMODnet Ingestion workflow.

Romania – NIMRD

The National Institute for Marine Research and Development (NIMRD) has uplifted all its datasets (19) to Phase II. A long timeseries (1981-2000) groups daily temperature and salinity measurements at the Constanta Coastal station. Online meetings with the ANEMONE consortium and the Mare Nostrum NGO resulted in direct submissions of litter data to EMODNet Chemistry. The establishment of these contacts have been included in the 15 success stories.

The Romanian MONITORING project (2018 – 2020) aims at studying the Black Sea marine ecosystem's ecological state evolution through the MSFD descriptors based on the physical-chemical and biological parameters monitored in the Romanian marine waters. Part of the submission by NIMRD has resulted in circa 30 ADCP stations which have been populated into the CDI service.

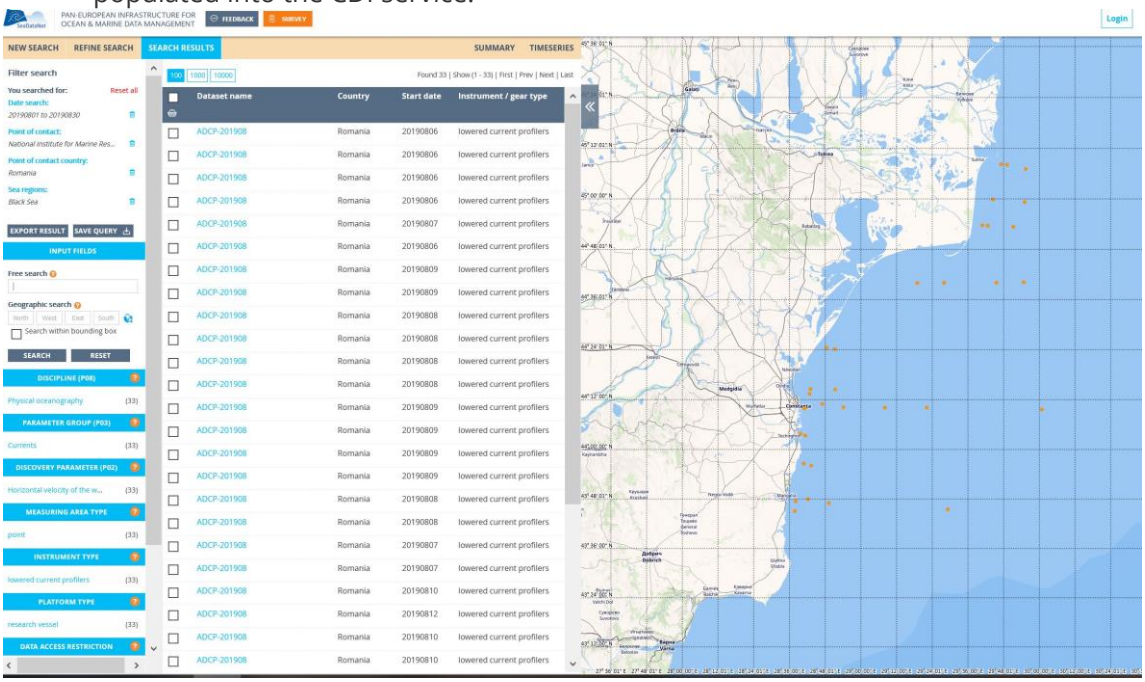

Figure: MONITORING (2018 – 2020) data from Romania included in CDI service for feeding EMODnet

Russian Federation – RIHMI-WDC and SIO-RAS

Almost all Russian contributions in the project period have been uplifted to Phase II.

Sweden – SMHI

An agreement was reached with the Nord Stream 2 AG pipeline consortium concerning exchange of monitoring data as collected in the more than 1200 km long pipeline

trajectory. Following discussions of SMHI and MARIS with the consortium in December 2019, a request was made for MARIS to provide a document explaining in more detail how the ingestions will be handled, acknowledged, and published. This was delivered and followed by a next request to derive an agreement from that document specifying further details about the practicalities and liabilities of sharing data by the Nord Stream 2 pipeline consortium through EMODnet Ingestion. This draft agreement was delivered by MARIS and has been accepted by the management of the pipeline consortium. Following this, the actual submission has started. For this, the pipeline consortium has prepared a metadata inventory of data sets with sufficient detail. As a first step the Nord Stream 2 pipeline consortium has prepared a package with data and documentation for environmental observation data (physics, chemistry, geology, habitats, bathymetry) as collected in the pipeline trajectory in Swedish waters. The package has been assigned to SMHI as data centre and they have been undertaking processing which has resulted in publishing CTD data sets. More data packages will follow for other trajectories of the pipeline. Based upon this experience, further data deliveries are planned. The data inventory will be used to select subsets, based upon suitability for EMODnet lots, that will be ingested and further elaborated. The overall volume and diversity of data is very large and exceeds the processing capacity and budget of the EMODnet Ingestion data centres.

Slovenia – NIB

An interesting contribution (Phase I) is a dataset consisting of 421 CTD casts done in Slovenian coastal waters in 2012-2013 by the National Institute of Biology.

Spain – IEO and CSIC

CSIC contacted geophysics and energy companies (resp. ESGEMAR, IGEOTEST, MEDGAZ) running submarine pipelines and cables. The contact with ESGEMAR has been showcased as case 9 of the 15 success stories. Moreover, CSIC continues to encourage successfully its relations in the Spanish bathymetry scientific community for releasing bathymetry survey data sets from old and recent cruises as these can be used as input for EMODnet Bathymetry to enrich the EMODnet Digital Bathymetry. It also has active ties with academic institutions and has in most cases engaged the contact persons with a presentation on EMODnet (Ingestion).

IEO released a large (globally 2013-2020) collection of thermosalinometry, meteorology and singlebeam depth acquisition data from its Research Vessels (A. Alvariño, Cornide, R. Margalef, M. Oliver). The data is currently in Phase I.

CSIC and IEO jointly presented a poster on the EMODnet Open Conference (14-16 June 2021) on the challenges and solutions to keep engaging potential and promised data providers, in all steps of data elaboration (first contact to metadata and data enrichment). Lack of knowledge of the EMODnet Lots and Ingestion websites is seen as a fundamental problem and relatively easy to remediate in a small presentation/webinar.

Other interesting developments:

In addition, the following interesting contacts were followed up by MARIS and HCMR as coordinating team, together with relevant partners:

- Following a lead by DG-MARE, a meeting took place with the RGI – Renewable Grid Initiative to explore options for data sharing from e.g. marine windfarms and how to adopt best practices for data management for streamlining the data sharing to EMODnet Ingestion. A

Workshop was arranged with RGI and several of its members to discuss this further. As result it has been agreed that RGI will make a data inventory together with its members of those data sets that might be shared. Once this is available, a next Workshop will be organized to discuss how EMODnet Ingestion data centres can assist to make the data fit for sharing and also to educate data providers for a more efficient data management in the near future. For that purpose, MARIS also had a meeting with a consultant of RGI, discussing how to improve data acquisition for specific data types and its documentation.

- An interesting exchange took place with the Atlantic REMP project. This project, funded by the European Union, coordinated by SeaScape Consultants, worked together with stakeholders to produce a draft Regional Environmental Management Plan (REMP) for the Area in the North Atlantic, with a focus on the polymetallic sulphide deposits of the Mid-Atlantic Ridge which are of interest for deep-sea mining. There was close collaboration with the International Seabed Authority (ISA) and a consortium of scientific organisations. Marine data from multiple data services underpinned the environmental management plan development. A selection of the data sets is included in EMODnet Ingestion for wider distribution. No new data was collected, but all data sets are existing and are considered to be open. In dialogue with the REMP coordinator and REMP data management partner (Duke University), it was decided to submit these data sets into EMODnet Ingestion by which potentially more users can be served. This has been effectuated by Duke University by preparing and submitting 17 data packages, which all have been processed and published 'as-is' by EMODnet Ingestion. Note that these submissions will not be elaborated to Phase 2 as the data sets are already published by other established data centres in the world.

- EMODnet Ingestion was approached by SBM Offshore. They provide floating production solutions to the offshore energy industry, over the full product lifecycle. The company leads the market in leased floating production systems, with multiple units currently in operation worldwide, e.g. in Guyana, Brazil, Angola, Equatorial Guinea and Malaysia. In the light of progressing on their long-term Sustainable Development Goals 14 targets, SBM Offshore explores the possibility of using their offshore installations as metocean data collecting points and sharing these data. Therefore, a dialogue has started with EMODnet Ingestion – EMODnet Physics to explore options for equiping and data exchanges. A first meeting took place in July 2021 to explore SBM Offshore ideas and to explain the European approach and infrastructures for marine data management. A follow-up is planned end October 2021 for further exploring data type priorities and modalities for SBM Offshore to configure NRT data collection and make data sets available for exchange with EMODnet.

- EMODnet Ingestion was approached by OceanEye, an NGO based in Switzerland, who are collecting data about marine litter in various places worldwide using volonteers. They are interested in sharing these data with EMODnet. For that reason, a meeting took place with OceanEye, joined by MARIS, HCMR, IFREMER, and OGS to discuss options, standards, and tools for elaborating local data sets to the EMODnet standards. This has been followed up by a short course, given by IFREMER, on using the SeaDataNet tools. Currently, OceanEye is progressing with converting a selection of its data sets to SeaDataNet standards, coached by IFREMER for validation and later ingestion.

Annex 5: Overview of promotional material as produced for EMODnet Ingestion

The dissemination uses a variety of media, including promotional items which are designed and produced as part of EMODnet Ingestion:

- **New A0 poster for partners and roll-up banner**

  This attractive poster explains with little text and direct illustrations how EMODnet Ingestion works and why it is useful for marine data owners to make use of the EMODnet Ingestion service to share their data and to benefit themselves from better EMODnet data products and services. It is inspired by the design of the existing roll-up infographic with an updated content and addition of a QR code to easily link to the EMODnet-Ingestion promotion video “Wake up your data”. The PDF of the poster is available in the promotion section of the portal and on the Forum.

  Copies of this A0 poster (119 centimeters high by 83 centimeters wide) were printed on polyester for easier use by partners as it is light, does not take a lot of space and can be folded in luggage when attending physical meetings. It can also be advertised on a wall at the office or as background to visio-conferences. The printed versions were routed to partners together with the enamel pins, stickers, bookmarks and a letter with instructions for use early June 2021 in view of the EMODnet Open Conference.

  One of the previously printed roll-up banners (2 meters high by 70 centimeters wide) is currently hosted at the EMODnet Secretariat and remains available for upcoming conferences, workshops and other similar events. The second banner was sent with EMODnet leaflets and gadgets to INGV headquarter in Rome in September 2019. It was damaged during transport (cannot be rolled anymore) and stays advertised in Rome.

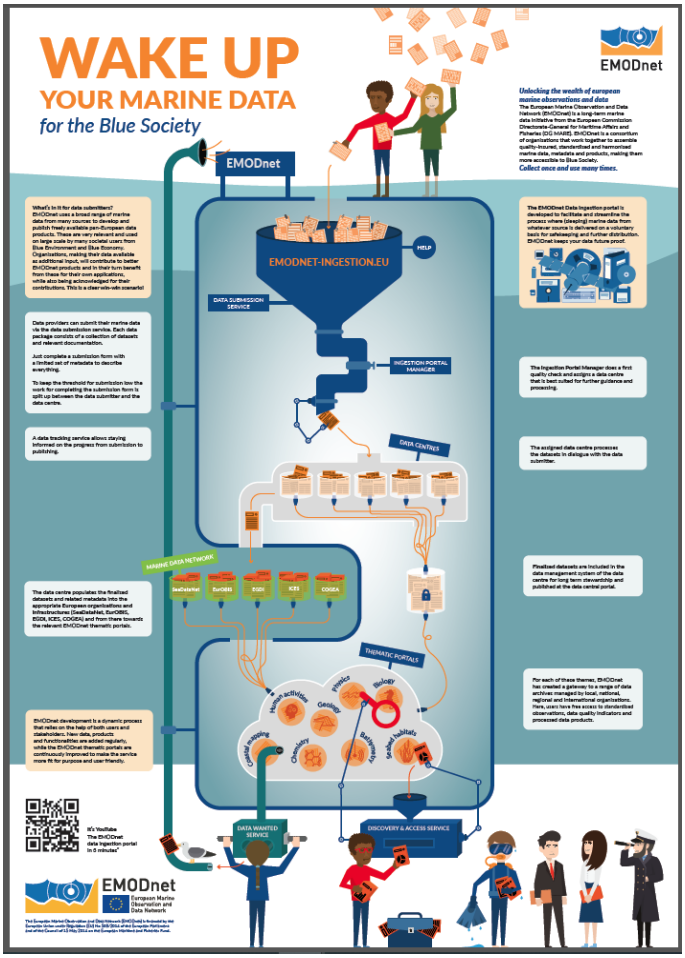

Image: Updated design of the updated general presentation poster (A0 format) of EMODnet Data Ingestion.

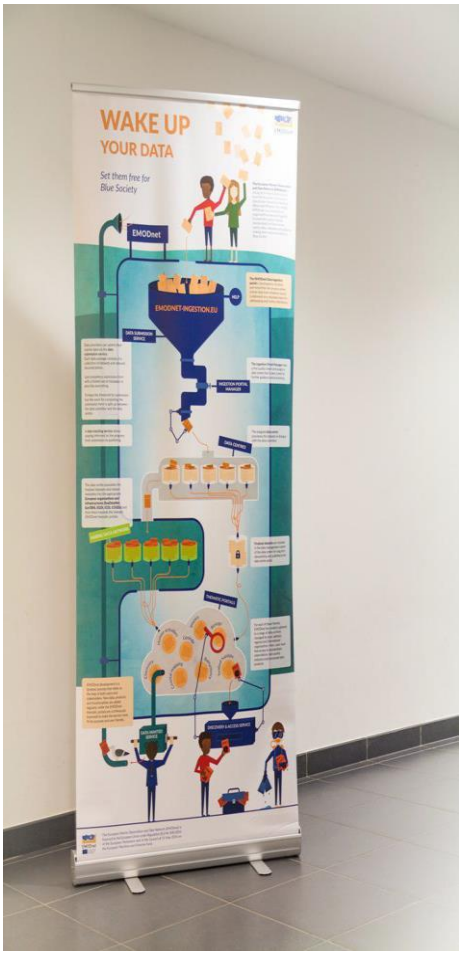

Image: design of the EMODnet Data Ingestion roll-up banner

- **Presentations at external events & conferences**

Conferences are a means of developing national and international connections with governmental, non-governmental, industry or academic leaders, and engaging in a direct, face-to-face communications and discourse. In this second phase of EMODnet Ingestion, partners have presented the EMODnet Data Ingestion service at a large number of relevant events and conferences targeting the marine scientific community at large and specific scientific and industrial sectors. This also includes relevant EU meetings, such as e.g. WG-DIKE (Marine Strategy Framework Directive WG on Data and Information Knowledge Exchange) and the MSP Member States Expert Group. The events and conferences are listed in Chapter 6 together with Workshops and other types of meetings, organised or joined by EMODnet Ingestion partners and giving opportunities for promoting and marketing EMODnet Ingestion and identifying potential leads.

All relevant presentations and posters were posted on the website and/or forum for consultation and reuse by partners (Presentation for businesses used at the WOC SOS conference in December 2020, CSIC poster on lessons learned and RBINS poster on 9 case studies presented at the Open Conference in June 2021, presentations given by MARIS and HCMR at major events).

To support EMODnet Data Ingestion promotion and branding when attending video conferences, limit distraction and maintain privacy in the surrounding, customized virtual backgrounds have been designed and published in the promotion section of the website together with a How to guide.

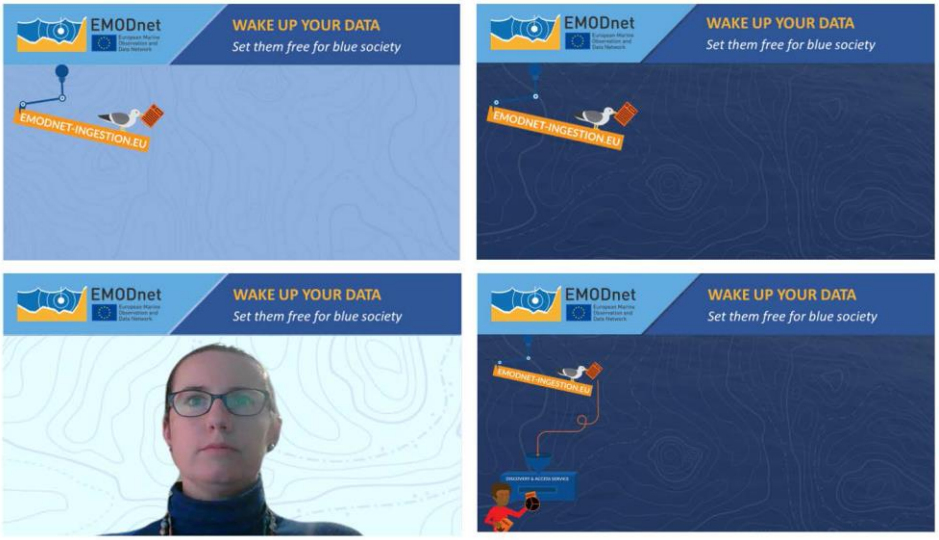

Image: Design of the EMODnet-Ingestion virtual backgrounds.

- **Enamel pins**
  To comfort the commitment of partners as ambassadors of EMODnet Data Ingestion and arose interest of key data providers, 200 enamel pins were produced and sent to the partners ahead of the Open Conference in June 2021. Despite the absence of physical meetings, those pins can be worn during visio-conference events and webinars, and physical meeting events later. Their surface is matt to avoid reflections.

Image: New EMODnet-Ingestion enamel pins.

- **Movies**

The first animation movie WAKE UP YOUR DATA (3'28") was launched on the EMODnet Secretariat YouTube channel on November 7, 2017 and is still the second top success among all EMODnet videos. It is integrated in the homepages of the EMODnet Ingestion portal with an updated visual

and in the central EMODnet portal. To date, it has reached 2850 views, of which 87% were seen on computer, 11 % on mobile phones and the rest on tablets and TV. Due to COVID crisis, there was a huge drop in the number of views, starting 2020.

Along the lines of the first animation movie, the second animation movie YOUR DATA, WORK IT! focuses on the achievements of EMODnet-Ingestion and three key successful cases (Marine Scotland Science, the JRC dataset on algae production, and data collected by fishermen as part of the Berring Data Collective). The movie was launched on the EMODnet Secretariat YouTube channel on June11, 2021. To date, it has reached 285 views and a strategy for further promotion needs to be elaborated in partnership with the Secretariat.

Prominent links to the two movies are posted on the home page of the Ingestion portal:

- WAKE UP YOUR DATA: https://www.youtube.com/watch?v=p3vwngxyXuo
- YOUR DATA, WORK IT!: https://www.youtube.com/watch?v=EEjoSgFBOOA

For a bigger impact, EMODnet-Ingestion partners were encouraged during the annual meeting to advertise the movie on the home page of their institutes, during conferences (or breaks during visio conferences), and systematically point to the movie when contacting new data providers.

In June 2020, the first animation movie has been partially reused by the EMODnet Secretariat for the production of two other movies: EMODnet for Science (long version 3'35"and short versions 1'16")

Image: The two animation movies as seen on a mobile

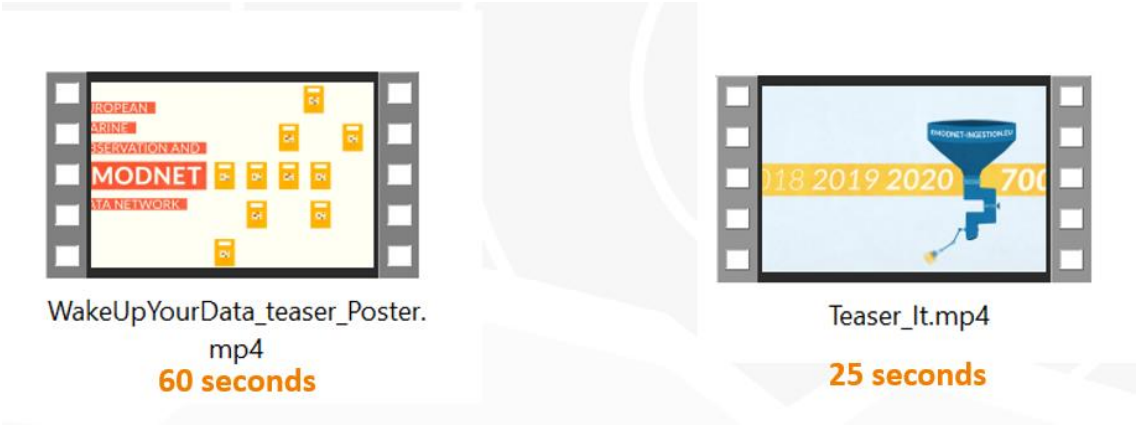

Image: Thumbs of the two teasers of the animation movies

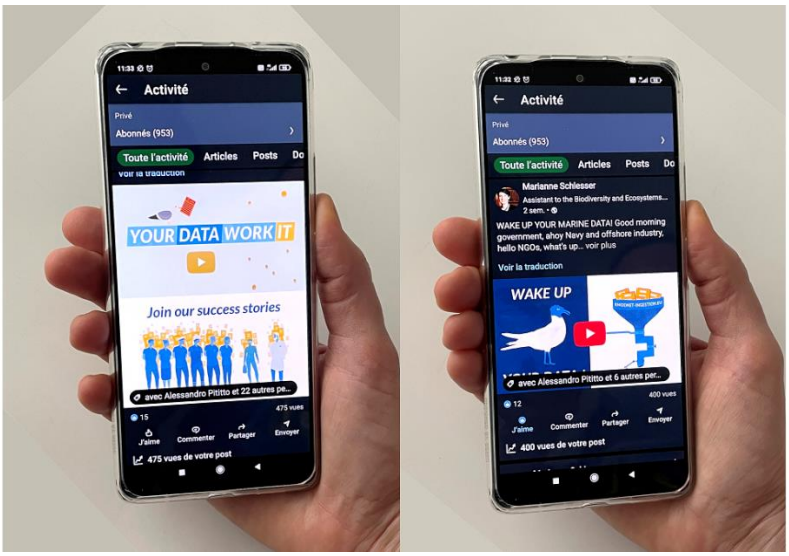

Image: Promotion of the two Ingestion animation movie in the social media (LinkedIn)

- **Stickers**

Depending on the occasion to distribute the remaining stickers (about 500), RBINS will consider reprinting them later.

Image: Stickers for the promotion of the first movie and the data ingestion portal

- **Success stories**

More than 15 Ingestion success stories have been collected via a survey to partners in April 2021. A digital poster with 9 cases was presented at the Open Conference in June 2021. These cases have been fully elaborated over the summer 2021 and promoted on the website and in the social media. The use cases have a data description, an analysis of the problems/obstacles and a solution / perspective. Two additional cases are fully elaborated in October 2021 and four more are underway. Three cases were shown in the updated promotion animation movie. The collection of use cases in a Powerpoint allows printing in a booklet format to handed over to potential partners and data providers. A special use case (case 11) will also be published separately on the website on Marine Litter datasets coming from 8 countries bordering the Baltic Sea, the Black Sea and the Mediterranean. Further promotion of the success stories is to be planned with the Secretariat (EMODnet Newsletter).

Overview of success stories:

Case no	Country / Partner (Provider)	Title
1	UK - BODC (MSS data)	A champion in the provision of numerous datasets
2	IT - COGEA (JRC algae dataset)	The algae production business now on the map
3	SE - SMHI (BDC data)	Fishing for data: Collaborative ocean data where it is needed most
4	BE - RBINS (Belgian Navy)	Fourteen years of archived data shared and saved forever
5	BU - IOBAS (BDCA data)	An example of a mutually beneficial cycle of scientific data
6	DK - AUBIOS (DCEE data)	Microplastic-like particles in sediments fit for reporting
7	GE - TSU (Poti laboratory)	Stages of a long-term collaboration with a data provider in Georgia
8	NL - Deltares (Ministry)	Dutch long term macrobenthos monitoring data 1991-2015
9	SP - CSIC (ESGEMAR company)	The SME sourcing to the Data Ingestion Portal and partnership
10	FI - GTK (STUK)	^{137}Caesium activity contents in seabed sediments in the Baltic Sea
11	IT - OGS (8 Res. Centers & NGO's)	Marine litter data fit for reporting to EU marine strategies

Table: Overview of the success stories identified and fully elaborated so far.

Image: Overview of the design of the first 9 success stories fully elaborated

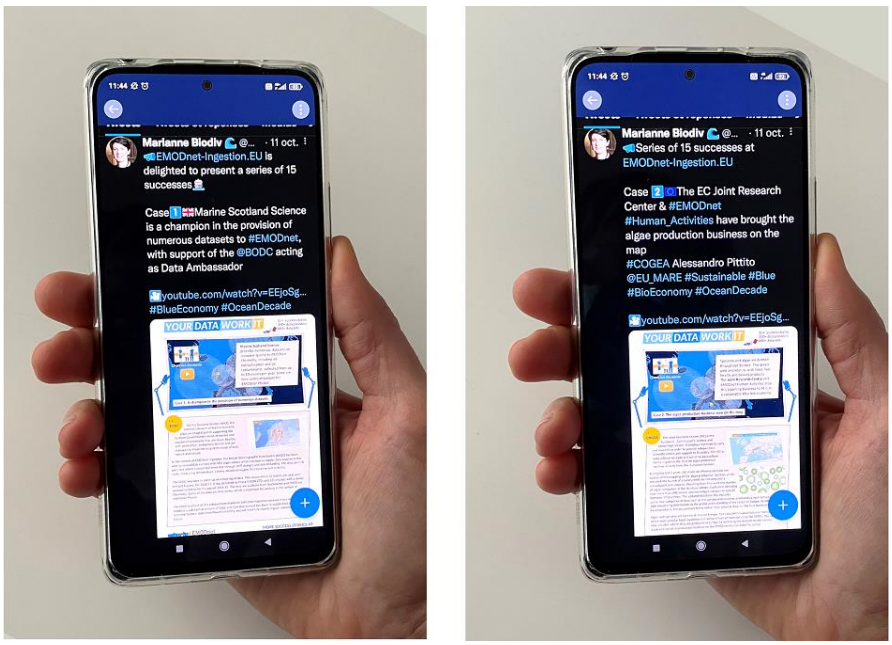

Image: Individual promotion of the success stories in the social media (Twitter)

- **Gift pack sent to partners**

Before the EMODnet Open Conference, all partners received a briefing letter and a "gift pack" sent at their home / office address by RBINS with the new promotional material for use during online and physical meetings. The shipment contained an assortment of the new EMODnet Ingestion pins, the updated poster printed on polyester (easy to fold and carry in a handbag) and project stickers & bookmarks produced in 2019.

Image: Content of the gift pack sent to EMODnet-Ingestion partners early June 2021

- **Social media communication**

A number of Ingestion partners are daily active on social media and promoting the project, tweeting when ingestion data sets, attending conferences, etc. An exhaustive list of this activity was not kept in this phase of the project. Since the summer 2020, the WP4 leader started active promotion of the Ingestion activities and products in the social networks with her own Twitter and LinkedIn accounts. At project meetings, partners were encouraged to be present on those social network as it could benefit the development of their own professional networks and the full deployment of the project in each country with the partners also acting as ambassadors in the social media. An incomplete summary of the social media presence of the project is included in chapter 8 on communication assets.

In a publication dated of November 2018 in Nature (title:" Social media for scientists"), it was concluded that Scientists are increasingly embracing social media in their professional lives. The article looks at the different platforms available to researchers and how social media engagement can positively influence their day-to-day work and scientific communication. ResearchGate, LinkedIn, Facebook, Twitter and Academia.edu were the top five sites visited by scientists and engineers participating in the survey. Once scientists decide to participate it is also important to have a clear idea of what they would like to achieve from their online interactions, and to decide which platforms would best serve this purpose.