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JERICO-S3 DELIVERABLE

Joint European Research Infrastructure for Coastal Observatories
Science, Services, Sustainability

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TABLE OF CONTENT

1. EXECUTIVE SUMMARY

This document D11.4 presents the evaluation, carried out by the members of the VA Expert Panel, of the VA services under WP11 of JERICO-S3. It follows the previous deliverables of JERICO-S3 WP11 (D11.1, D11.2 and D11.3) summarized below. In D11.1, the Virtual Access Metrics System (VAMS), a central system developed to monitor the access to each VA service, was presented. However, the core content of D11.1 are the access metrics and outreach activities of each VA service corresponding to the period between September 2021 and December 2023. D11.1 also introduced the JERICO-CORE conceptual framework (VA concept). Importantly, D11.1 presented the Virtual Access Expert Panel whose members, in no particular order, are: Anca Hienola (FMI), Antonio Novellino (EMODnet Physics, ETT), Thierry Carval (IFREMER), Simon Keeble (Blue Lobster), Shaun Deyzel (SAEON) and Sebastien Mancini (AODN-IMOS). D11.2, contains, for each VA service, a succinct description, the assessments of the assigned members of the panel and, when considered needed, a response from the responsibles for the VA infrastructure.

D11.3 and D11.4 repeat the same approach of D11.1 and D11.2. In the second phase of this evaluation period, D11.3 included the access metrics and the outreach activities of each VA service and notably, a brief description of the new JERICO-CORE pilot platform that was available through Virtual Access from November 2022. Finally, and as reported in this deliverable, the final assessment of the VA services of JERICO-S3 WP11 was carried out. Similarly to the method of work of D11.2, each VA service was assessed by two different members of the panel based both on the access metrics and the outreach activities reported in D11.3, and examination of the VA service itself. Optionally, and if so decided by each VA service responsible, clarifications to the expert panel review are included.

2. INTRODUCTION

Virtual access (VA), a key concept in EU research, enables remote access to computational resources, data, and specialized software tools. It eliminates the need for researchers to be physically present at specific locations or set up their own computing infrastructure. JERICO-NEXT and JERICO-S3, initiatives under the Joint European Research Infrastructure for Coastal Observatories (JERICO), have made significant strides in advancing VA capabilities in coastal ocean research.

In their goal to standardize methods, align efforts, and collaborate, these projects have developed platforms and tools to facilitate remote access to coastal observatories, data, and specialized research infrastructure.

JERICO-S3 WP11 serves as the instrument for coordinating and reimbursing access provisioning costs to access providers. A VA work package is provided by the European Commission as a tool to promote the sharing of research infrastructures and services that

would otherwise be unavailable to international user groups. In JERICO-S3, a list of already existing VA infrastructures capable of hosting a variety of VA services has been selected to receive financial support.

These VA infrastructures must provide free and open access to researchers through communication networks, without any selection criteria imposed on the researchers granted access. In this context, access metrics play a crucial role in assessing user access to research resources, providing quantitative assessments of their dissemination and usefulness. These metrics enable providers to evaluate the fitness for use of their VA and make informed decisions to improve their dissemination strategies based on user needs.

Additionally, JERICO-S3 has focused on expanding the benefits of VA for the coastal community by enhancing the following aspects that will be further studied under the JERICO-DS project:

- **Remote Data Access**: Researchers can remotely access coastal ocean data collected from various observatories and sensors, eliminating the need for physical visits and enabling access to a wider range of data sources. Data access was enhanced by the elaboration of a Data Management Plan (DMP) for coastal ocean data that profits from the existing international Blue Data Infrastructures (BDI).
- **Computational Resources**: VA provides researchers with the computational power and storage capacity required for analysing large datasets and running complex models, which is essential in coastal ocean research due to substantial data volumes and demanding simulations. Tools of JERICO partners are enhanced and made available to the community. A Virtual Research Environment (VRE) is made available for collaborative research and software development.
- **Knowledge Exchange and Assessment**: VA platforms foster collaboration among researchers, facilitating the sharing of data, information, tools, models, and analysis techniques among other resources. It encourages interdisciplinary research and knowledge exchange within the coastal ocean domain. A catalogue of JERICO assets is proposed as the foundation for the creation of thematic services and the assessment of JERICO activities. Additionally, key performance indicators were defined for platforms and their integration to support the JERICO label.
- **Experimental Design and Testing**: VA enables researchers to design and test experiments in coastal environments, providing a collaborative environment to exchange expertise and share equipment. New sensing technologies and advanced algorithms, such as eGIM and AI image recognition, are explored and will be made available to the JERICO community. Additionally, JERICO observatories are made available through a thoughtful Transnational Access (TA) program that will be supported by the JERICO e-infrastructure.

- **Training and Education**: VA platforms can be used for training and education purposes, enabling students, researchers, and technical experts to gain hands-on experience with coastal ocean research tools and techniques. It promotes capacity building and enhances the skills of the research community. Workshops and training are organized and will be made available through the JERICO e-infrastructure.

The assessment of these VA infrastructures was conducted in two phases. The first phase happened during the first 19 months and resulted in two deliverables D11.1 and D11.2. In this first phase, the Virtual Access Metrics System (**VAMS**) was designed and implemented to facilitate the gathering and evaluation of VA metrics. D11.1 explains the VAMS as well as the JERICO-CORE conceptual framework. D11.2, contains, for each VA service, a succinct description, the assessments of the assigned members of the panel and optionally, and if so decided by each VA service responsible, clarifications to the expert panel review.

The second phase is reported in D11.3 and D11.4 and spans between months 20 and 43 of the project. The first Deliverable of this phase (D11.3) provided a comprehensive evaluation of the status of the VA within WP11. It summarized the outcomes of the first phase (D11.1 & D11.2), offering valuable insights derived from the initial evaluation process, and delving into the detailed analysis of the findings, encompassing crucial aspects such as metrics, panel assessments, and outreach activities. Importantly, D11.3 also briefly describes the new JERICO-CORE platform pilot (as a new VA service) that was developed in WP7, and some use cases happened since the JERICO-CORE was released.

In D11.4 we repeat the same process carried out in D11.2 in respect to the Expert Panel assessment and optional replicas by the VA service responsibles.

3. MAIN REPORT

Similarly to D11.2, this report starts by describing the Virtual Access Expert Panel and its composition. Secondly, for each VA service, the assessments by the members of the panel and the potential responses from the VA service managers are included.

3.1. VA Expert Panel Composition

Article 16.2b of the JERICO-S3 Grant Agreement states that Virtual Access providers "*must have the virtual access services assessed periodically by a board composed of international experts in the field, at least half of whom must be independent of the beneficiaries*".

It has been the responsibility of the WP11 team to select and invite the members of the Virtual Access Expert Panel. It was decided to create a Panel of six members: three of them, independent of JERICO-S3 and three of them, members of JERICO-S3. The following is a short profile of each of the current members of the Virtual Access Expert Panel.

- **Anca Hienola (FMI)**. Anca Hienola was awarded a PhD (Physics) in 2008 from the University of Helsinki, Finland. She works at the Finnish Meteorological Institute as a leading specialist and Open Science Taskforce leader. She has extensive experience in data flows and virtual data access metrics, including evaluation and metrics-based decision-making and policies. Furthermore, she is involved in three major EOSC-related projects: ENVRI-FAIR, EOSC Nordic, and EOSC-Future.
- **Antonio Novellino (EMODnet Physics)**. Antonio Novellino has a PhD in Biotechnology and Bioengineering. He is the Research Manager at ETT Spa (Gruppo SCAI). He is a member of the EuroGOOS DATAMEQ group and contributes to several EuroGOOS Task Teams for advising on operational oceanography data management procedures and standards. Likewise, he serves on the EMODnet Steering Committee and the EMODnet Technical Working Group. He is the EMODnet Physics coordinator and CMEMS DU deputy coordinator.
- **Thierry Carval (IFREMER)**. Thierry Carval is the head of Ifremer "Scientific Information Systems development". He is particularly involved in the management of in situ Marine data. He is the technical coordinator of the European service "Copernicus Marine in situ TAC" and data manager for the French JERICO sites. Furthermore, he is involved in the development of EOSC through projects such as ENVRI-FAIR, EOSC-HUB, EOSC-FUTURE, and Blue-Cloud. Not only that, but he ensures that the JERICO VA services are well aligned with the EOSC e-infrastructure.
- **Simon Keeble (Blue Lobster)**. Simon Keeble is the Managing Director at SME Blue Lobster IT Limited, based in Wales, UK. He has extensive experience in big-data systems and web / mobile interfaces and user interaction within the marine and environmental sciences sectors. The Blue Lobster team operated one of the first services to be part of Virtual Access, in the Framework 7 project FixO3, and they

continue to develop and operate a variety of web-based platforms presenting a variety of observational, model, and complex derived product data.

- **Shaun Deyzel (SAEON)**. Shaun Deyzel is the Science and Data Coordinator of the South African Environmental Observation Network (SAEON) Elwandle Coastal Node and the Shallow Marine and Coastal Research Infrastructure (SMCRI) initiative of South Africa. He has a PhD in Zooplankton Ecology and has been leading the Pelagic Ecosystem Long-term Ecological Research Programme of SAEON since 2010. His data team develops, implements, and maintains data management workflows, standard operating procedures, and web-based platforms for public serving of a range of oceans, biodiversity, and remote sensing data and data products.
- **Sebastien Mancini (AODN-IMOS)**. Since August 2008, Sebastien Mancini has worked as a project officer, data services team leader, and, more recently, as the Director of the Australian Ocean Data Network (AODN). The AODN is in charge of the ingestion, curation, and preservation of all data and relevant metadata collected by IMOS. During this period, he has contributed to the creation and improvement of the single integrative framework for data and information management that allows the discovery and access of data by scientists, managers, and the public.

3.2. VA Expert Panel Task

The VA services were divided into three distinct groups, ensuring that each group had a similar level of assessment effort. Subsequently, one internal expert and one external expert were randomly designated for each group. Consequently, every VA service was evaluated by two distinct members of the VA Expert Panel, comprising one internal and one external expert.

Each panel member received a list of the VA services allocated to them, along with detailed instructions on how to conduct the assessments. These instructions encompassed the task's context and suggested topics for consideration in the assessment. It was made explicit that these suggested topics were not obligatory, and panel members had the discretion to include additional subjects if deemed appropriate. The recommended topics were:

- Scientific Relevance
- Technical Implementation
- Scientific Usability/FAIRness
- Access Metrics
- Outreach Activities

3.3. Assessment of Mawenzi (ID 1.2)

Next, the description of Mawenzi, its assessment by Sebastien Mancini and its assessment by Simon Keeble are included.

3.3.1. Description of the VA Service

ID	1.2
Name	Mawenzi
Institution	IFREMER, ULCO-LISIC
Short Description	Software packages written in R to help scientists, as well as stakeholders, in the modeling and interpretation of data (time series data from gliders/ferrybox or cytometry data), with some tutorials and user guidelines.
VA Services	The VA Infrastructure consists of the following R packages: DTWBI, DTWUMI, sClust, and uHMMweb.

3.3.2. Assessment by Sebastien Mancini

Description

The Virtual Access Infrastructure consists of software packages written in R to help scientists, as well as stakeholders, in the modelling and interpretation of data (time series data from gliders/ferrybox or cytometry data), with some tutorials and user guidelines.

VA

The following R packages are made available:

— DTWBI (http://mawenzi.univ-littoral.fr/DTWBI/),

— DTWUMI (http://mawenzi.univ-littoral.fr/DTWUMI/),

— uHMMweb (http://mawenzi.univ-littoral.fr/uHMMweb/).

Scientific relevance

Each of the websites would benefit by including more information to describe each tool and its functionalities. The navigation between the websites could be improved.

An overarching webpage already exists at https://mawenzi.univ-littoral.fr/. This page could be included into the report to increase the discoverability and accessibility of the websites. Moreover, the overarching webpage could benefit with additional information on each tool.

For example, a number of webpages with additional content such as documentation, content formatting are made available for the uHMM R package which is not part of the VA infrastructure.

Technical Implementation

The overarching webpage does not contain any link to the web-interface developed from the uHMMweb R package.

Each of the tools would also benefit with examples of time-series data and R code to help first-time users to familiarise themselves with the package. Step-by-step examples would be very useful. In the general description of the VA infrastructure, it mentions that the tool can be used to process glider time series data.

Scientific Usability

A search on glider data through the website returns no result.

Licence information is made available for each package, but citation examples could also be provided.

The packages are also available from the Comprehensive R Archive network, but no links are provided in each website.

Access Metrics

The monitoring of access to Mawenzi software packages employs two distinct methods: the CRAN downloads API and analysis of log files from the documentation website.

The metric of the number of visits by Country could be improved as there is no legend and so the user do not have any ideas of the number of users per country. The pie chart presented later on in the report displaying the same information is more appropriate.

It is claimed that "valuable insights into the evolving trends of both page views and user interactions with the software packages".

Outreach

As mentioned by the initial reviewers, the website and its documentation should not be considered as outreach activities. Poster presentations and workshops are a good way to promote the package.

It would be interesting to know if the tool has been used as training materials in any online course or university degree material for students.

Social media platforms and existing JERICO project website could be leveraged to promote the different tools. For example, other VA infrastructures have successfully used news items on the JERICO website to promote their tool, its usage and future improvements.

3.3.3. Assessment by Simon Keeble

Description

The Virtual Access Infrastructure consists of software packages written in R to help scientists, as well as stakeholders, in the modelling and interpretation of data (time series data from gliders/ferrybox or cytometry data), with some tutorials and user guidelines.

VA

The following R packages are made available:

— DTWBI (http://mawenzi.univ-littoral.fr/DTWBI/),

— DTWUMI (http://mawenzi.univ-littoral.fr/DTWUMI/),

— uHMMweb (http://mawenzi.univ-littoral.fr/uHMMweb/).

Scientific relevance

The service was reached by accessing URL: https://mawenzi.univ-littoral.fr/apps/uHMMweb/ It is noted that it is highlighted that this is a demo.

I was asked immediately for my email address, without any notification of what it will be used for. I recommend considering GDPR when requesting identifying information. It did say that I wouldn't need to put my information in again, but when I went back to the site, it asked me again to fill out the whole form.

After entering an email, more information is then requested. There is no help text here, so I'm unsure what the 'Quality' field wants.

After reaching the application, I can find appropriate credits in the About page.

The documentation can be accessed via: http://mawenzi.univ-littoral.fr/sClust/

Technical Implementation

The technical implementation is beyond the scope of my knowledge, so I am unable to comment on the technical abilities or functionality.

Scientific Usability

It can be seen from the access statistics for both services that they are well-used.

Access Metrics

Same as above.

Outreach

There is no reference to JERICO, credit to the EC funding or otherwise on the homepage.

3.4. Assessment of EU HFR Node/AZTI (ID 4.1)

Next, the description of EU HFR Node/AZTI, its assessment by Thierry Carval and its assessment by Shaun Deyzel are included.

3.4.1. Description of the VA Service

ID	4.1
Name	EU HFR Node/AZTI
Institution	AZTI
Short Description	Open access to different software for processing and analysing coastal data. The tools aim to support sustainable management of the ocean and its resources.
VA Services	The VA Infrastructure consists of a GitHub repository[1].

3.4.2. Assessment by Thierry Carval

EU HFR Node processing tool

Description

[1] https://github.com/Fundacion-AZTI/JRadar

Open access to different software packages for processing and analysing coastal data. The tools aim to support sustainable management of the ocean and its resources.

VA

https://www.jerico-ri.eu/va-service/jradar/

The VA Infrastructure consists of a GitHub repository.

Scientific relevance

The Radar Toolbox performs conversion of CODAR TUV and RUV native files to the NetCDF European HFR Standard. This NetCDF format for HF Radar is endorsed and adopted by Copernicus Marine Service and SeaDataNet.

Technical Implementation

The JRadar Toolbox is managed on GitHub with a CC-BY licence, which is an excellent choice for open science.

Instructions on how to use JRadar are documented in the classical Readme.md file.

Scientific Usability

The toolbox is dedicated to HF radar operators, it produces NetCDF files used by the scientific community. The toolbox itself is not directly used by scientists.

A vast amount of data is processed by the toolbox and made available to the scientific community (JERICO, Copernicus, SeaDataNet, EMODnet).

Access Metrics

There are about 10 page views per month, a fair score for a very specialized software for HFRadar operators.

The metrics are unable to offer insights into the toolbox effective use; once the tool has been installed and utilized, there is no consistent return to the repository, regardless of how frequently the toolbox is employed.

Outreach

The main users of the tool are data providers from the European HF radar network.

Outreach activities of end-user workshops and news items in relevant newsletters are highly relevant to increase the exposure of the tool, in particular towards non-European radar operators.

3.4.3. Assessment by Shaun Deyzel

EU HFR Node processing tool

Description

The JRadar is a GitHub repository of tools for CODAR file transformation into European HF Radar Standard, associated code and documentation. The toolbox is run at operator level to facilitate the conversion of CODAR TUV and RUV native files to the NetCDF European HF Radar Standard.

VA

https://www.jerico-ri.eu/va-service/jradar/

Scientific relevance

The purpose of the repository is briefly indicated in the Readme.md file, which lists, inter alia, the description and purpose statement, funder and project coordination information. More extensive details are contained in the Readme.pdf version (29pp), which gives a description of applicable licences, JRadar dependencies and application instructions.

Technical Implementation

The JRadar Toolbox is licensed under CC BY-NC-SA 4.0 with an extended explanation given of specific terms under the licence on page 3 of 29 of the Readme.pdf document.

Scientific Usability

This VA, serves to connect users with the Toolbox for downloading purposes. Once downloaded, the need to engage with the VA seems limited to issue reporting and, if the need arises, to consult licence terms and the readme resources. Access metrics obtained from the GitHub API, are, therefore, not surprisingly, limited to page views and unique page views data.

Data displayed in Annexe 2.3 cover viewer figures from 18 June 2021 to November 2023. Both plots show similar view trends with three notable spikes (views > 160; unique views > 20), pre-April 2022. Views systematically decline until September 2023. Page view data does not give insight on use cases, nor insight into viewer demographics. Any data on who is actually visiting to download the software?

Access Metrics

A simple search with relevant keywords does not immediately yield links to the JRadar resource. Specifically searching for "JRadar", however, returns at high rank, both the GitHub and ZENODO 1 record. At the time of reporting, the ZENODO record received 235 views and 8 downloads. TheZENODO record is minted with a DOI 2, which gives opportunity for wider reach as it becomes linked with various metadata repositories.

Outreach

The outreach activities listed dates prior to data coverage displayed in the access metrics. It would be interesting to note responses in views after such activities.

3.5. Assessment of CefMAT (ID 6.1)

Next, the description of CefMAT, its assessment by Thierry Carval and its assessment by Shaun Deyzel are included.

3.5.1. Description of the VA Service

ID	6.1
Name	CefMAT
Institution	Cefas
Short Description	Access to marine environmental assessments to address policy questions. Users can efficiently produce high-quality visualisations and summary statistics tailored to their queries. It also gives access to specific products created under CMEMS and visualisation of aggregated DOI biological datasets from Cefas Data Hub.
VA Services	The VA Infrastructure consists of a website[2].

3.5.2. Assessment by Thierry Carval

CefMAT

Description

Access to marine environmental assessments to address policy questions. Users can efficiently produce high-quality visualisations and summary statistics tailored to their queries.

[2] https://www.cefmat.org

It also gives access to specific products created under CMEMS and visualisation of aggregated DOI biological datasets from Cefas Data Hub.

VA

The VA Infrastructure consists of a website.

Scientific relevance

CefMAT the Cefas marine Assessment Tool is for citizens and scientists requesting marine environmental assessments to address policy questions. Registered users can produce high-quality visualisations and summary statistics tailored to their queries. The website provides a good description of the tools on offer. The 3 major topics are "water quality", "food webs and biodiversity" and "fisheries".

Technical Implementation

The registration process is straightforward with minimal information requested. The user interface to perform the queries is well conceived and efficient. The website interactivity was good, with results made available within a few minutes. CefMAT does not provide information on data products creation, ideally FAIR data products should be generated from open source software managed in public repositories (such as GitHub).

Scientific Usability

Associated to the data request, the provenance information provided under "Metadata" is important to identify the source data and the processing that was applied to the data. The output file is a PDF document that contains plots and tables with data values. It would be useful to provide users with direct access to data in FAIR format (such as CSV plus metadata). The "Terms and Conditions" could also be included in the result files.

Access Metrics

There are about 700 monthly users who perform 2000 sessions. The number of domestic (UK) users is about 60%, meaning that a fair amount of users (40%) comes from Europe or other countries.

These numbers illustrate a sustained use of CefMAT data services.

Outreach

CefMAT should probably provide tutorials on how to query and get marine environmental data and reports.

Targeted workshops would increase the visibility of this type of tool and gather feedback from end-users on future developments.

3.5.3. Assessment by Shaun Deyzel

CefMAT

Description

Access to marine environmental assessments to address policy questions. Users can efficiently produce high-quality visualisations and summary statistics tailored to their queries. It also gives access to specific products created under CMEMS and visualisation of aggregated DOI biological datasets from Cefas Data Hub.

VA

The VA Infrastructure consists of a website.

Scientific relevance

CefMAT facilitates national and international marine environmental assessments to assist scientists in addressing policy questions. This Cefas assessment tool is accessible to registered users for the production of high quality visualisations and summary statistics, based on queries. Users also have access to CMEMS products and visualisation of aggregated biological datasets sourced via the Cefas Data Hub.

Technical Implementation

The landing page offers a brief description of the resource with links to selected tools (MOAT and Atlantic Assessments) and related Cefas resources. Links to more specific tools can be accessed once the Marine Assessment Tools link is executed. Three main tools are showcased, namely: Water Quality, Food Webs and Biodiversity and Fisheries. A further functional explanation is given regarding access criteria and the registration process. Specifically, the user is notified of the distinction between public and formal assessor's roles related to selected tools.

Scientific Usability

An attempt to register an account in order to assess the access tools returned a server error log. An excerpt of the error log is shown below:


Server Error in '/' Application.

Mailbox unavailable. The server response was: 5.4.1 Recipient address rejected: Access denied. [AMS0EPF000001B2.eurprd05.prod.outlook.com 2024-05-01T16:44:44.090Z 08DC67BF89D07D5D]

Description: An unhandled exception occurred during the execution of the current web request. Please review the stack trace for more information about the error and where it originated in the code.

Exception Details: System.Net.Mail.SmtpFailedRecipientException: Mailbox unavailable. The server response was: 5.4.1 Recipient address rejected: Access denied. [AMS0EPF000001B2.eurprd05.prod.outlook.com 2024-05-01T16:44:44.090Z 08DC67BF89D07D5D]

Source Error:

An unhandled exception was generated during the execution of the current web request. Information regarding the origin and location of the exception can be identified using the exception stack trace below.

As an alternative, the "Request access here" option was selected, which prompted a Contact Us ticket form. I did not log a ticket, so could not subsequently perform a test on specific tools.

Access Metrics

The monitoring process involves Google Analytics data submitted to VAMS on a monthly basis by means of Google Forms. Google Analytics data involve three categories, namely traffic volume, session quality and origin of traffic. In its current configuration, metrics displayed are useful to assess user numbers and origin, the latter being by device and country.

The country of origin data only displays the percentage of domestic users. It would be useful to have access to information about countries of origin. Performance is assessed on a timescale, which is useful when aiming to understand seasonality and associated temporal trends.

Outreach

Outreach activities mentioned were limited to 2020 activities and involved workshops and mentions on key websites. At this point, it is not clear whether any outreach activities have been achieved post 2020.

3.6. Assessment of CNR TirLig e-infrastructure (ID 7.1)

Next, the description of CNR TirLig e-infrastructure, its assessment by Anca Hienola and its assessment by Antonio Novellino are included.

3.6.1. Description of the VA Service

ID	7.1
Name	CNR TirLig

Institution	CNR
Short Description	Provide access and distribution of sea surface current data derived from High Frequency Radar acquisitions.
VA Services	The VA Infrastructure consists of a THREDDS data server[3] containing HF Radar data of the Ligurian coast near La Spezia and Cinque Terre and a website[4] with visualizations of that data and links to the mentioned THREDDS data server.

3.6.2. Assessment by Anca Hienola

CNR TirLig Thredds Data server

Description

The CNR TirLig Thredds Data Server, operated by the Italian National Research Council (CNR), is a tool for accessing diverse environmental datasets that focus on the Ligurian Sea area. Leveraging THREDDS (Thematic Real-time Environmental Distributed Data Services) technology, this server offers great capabilities for data access and visualization. It supports a variety of data access protocols, including OPeNDAP, NetCDF Subset Service, WCS, and WMS, thereby enabling a broad spectrum of scientific research and educational endeavours.

Researchers and environmental analysts utilize this server to access, visualize, and analyse oceanographic and atmospheric data, contributing significantly to climate research, environmental monitoring, and the formulation of policies concerning the Mediterranean region.

VA

https://thredds.hfrnode.eu:8443/thredds/NRTcurrent/HFR-TirLig/HFR-TirLig_catalog.html

Scientific relevance

The CNR TirLig Thredds Data Server is important for supporting scientific research on the Mediterranean environment, providing data for studies on climate change, marine biology, and ecological sustainability in the Ligurian Sea region.

[3] https://thredds.hfrnode.eu:8443/thredds/NRTcurrent/HFR-TirLig/HFR-TirLig_catalog.html

[4] http://radarhf.ismar.cnr.it/

Technical Implementation

The CNR TirLig Thredds Data Server employs THREDDS technology, which is robust for managing and disseminating large datasets but does present some technical challenges. While the server effectively supports a range of data access protocols such as OPeNDAP, WCS, and WMS, enhancing user experience and data retrieval efficiency, there could be improvements. For instance, the interface and user interaction could be modernized to improve accessibility and ease of use, particularly for less technically savvy users.

As I cannot judge for myself, this is just a question to be considered:are the backend technologies updated to handle high volumes of concurrent data requests more efficiently? The server's performance might benefit from such an upgrade, ensuring data is delivered swiftly and reliably to users.

The licence should be more visible (it is hard to find!).

DOIs (or other PIDs) not provided.

Scientific Usability

While the CNR TirLig Thredds Data Server is a valuable scientific resource, improvements in data documentation and user interface could significantly enhance its usability. Implementing a system to assign DOIs to datasets and making licensing information readily accessible and easy to understand would align the server more closely with best practices in data management, thereby increasing its utility and credibility in the scientific community.

Access Metrics

The access metrics detailed for the CNR TirLig infrastructure in the D11.3 represent a great effort to monitor and evaluate the utilization of the THREDDS data server. While the current metrics provide a good baseline understanding (+52 mil visits and +3TB of downloaded data – impressive!), they could be expanded to include more detailed user interaction data, such as specific datasets accessed, duration of data access sessions, and user feedback mechanisms.

This additional layer of detail would offer a deeper insight into the effectiveness of the data server, identifying potential areas for improvement in user experience and data delivery.

Please redo all the plots in a y-log format. As they are, they cannot be read.

Outreach

I could not find the outreach reports for this.

CNR TirLig website

Description

The website is associated with the Institute of Marine Sciences (ISMAR) under the CNR. It serves as a portal for accessing high-frequency radar data related to marine and coastal environments. This site provides researchers and other stakeholders with real-time and historical data on ocean surface currents, waves, and wind, supporting marine research, navigation safety, and environmental monitoring.

VA

http://radarhf.ismar.cnr.it

Scientific relevance

The website provides critical high-frequency radar data for scientific research on ocean currents, waves, and wind conditions, essential for maritime safety and environmental monitoring.

Technical Implementation

Based on its intended function, the website is a simple platform providing links to various data catalogues, data visualization tools, and information about the network and radar technology. This setup is practical for researchers who need quick access to specific types of maritime data and technical details regarding the tools used for data collection. Critical issues are described in the Scientific usability below.

Scientific Usability

It would be beneficial to centralize critical information such as terms of use, licensing details, and DOI (if they exist, as it is not clear at all) references for all catalogues. This would enhance transparency and accessibility, making it easier for researchers to understand usage rights and data citation methods at first glance. Enhancing the initial visibility of legal and technical documentation related to data use could significantly improve the UX for academic and professional users. Implementing a dedicated section on the homepage for this information could address this need.

Access Metrics

The metrics include a variety of indicators such as page views, session duration, user types (new vs returning), and geographic distribution. This broad range of data points offers a nuanced understanding of how the website is used. I think deeper insights into user behaviour, such as the paths users take through the site, the most interacted-with pages, and user actions per session, could provide more actionable data.

Outreach

I could not find the outreach reports for this.

3.6.3. Assessment by Antonio Novellino

CNR TirLig Thredds Data server

Description

The CNR TirLig Thredds Data Server, operated by the Italian National Research Council (CNR), is a tool for accessing diverse environmental datasets that focus on the Ligurian Sea area. Leveraging THREDDS (Thematic Real-time Environmental Distributed Data Services) technology, this server offers great capabilities for data access and visualization. It supports a variety of data access protocols, including OPeNDAP, NetCDF Subset Service, WCS, and WMS, thereby enabling a broad spectrum of scientific research and educational endeavours.

Researchers and environmental analysts utilize this server to access, visualize, and analyse oceanographic and atmospheric data, contributing significantly to climate research, environmental monitoring, and the formulation of policies concerning the Mediterranean region.

VA

https://thredds.hfrnode.eu:8443/thredds/NRTcurrent/HFR-TirLig/HFR-TirLig_catalog.html

Scientific relevance

It fills a scientific gap.

It provides access to TirLig HFR data. Furthermore, it's an important component of EU HFR and global HFR nodes. It's integrated in the main european data integrators.

Technical Implementation

The system is based on Thredds Data Server employs THREDDS technology, which is robust for managing and disseminating large datasets.

Data access may be improved by coupling TDS with ERDDAP.

Scientific Usability

The usage licence is clear, it contains instructions on how to cite it.

There is no User Manual needed, and the service is interoperable.

The FAIRness is not applicable.

Access Metrics

Metrics present the interaction with the system, these are OK for the purpose.

Outreach

Links are made available.

3.6.4. Response from CNR to Antonio Novellino

The EU HFR NODE ERDDAP Data Server was set up at https://erddap.hfrnode.eu

CNR TirLig website

Description

The website is associated with the Institute of Marine Sciences (ISMAR) under the CNR. It serves as a portal for accessing high-frequency radar data related to marine and coastal environments. This site provides researchers and other stakeholders with real-time and historical data on ocean surface currents, waves, and wind, supporting marine research, navigation safety, and environmental monitoring.

VA

http://radarhf.ismar.cnr.it

Scientific relevance

The website provides critical high-frequency radar data for scientific research on ocean currents, waves, and wind conditions, essential for maritime safety and environmental monitoring.

It's an easy-to-use entry point for local users.

Technical Implementation

It is working as a catalogue to access tools and data.

Scientific Usability

The website provides links to tools that can be used for scientific purposes.

Data licence is attached to data.

Access Metrics

It is assessing the visits and interaction with the page.

Outreach

The website is for local and internal use, it is already targeting its audience.

3.7. Assessment of EU HFR Node/CNR (ID 7.2)

Next, the description of EU HFR Node/CNR, its assessment by Sebastien Mancini and its assessment by Simon Keeble are included.

3.7.1. Description of the VA Service

ID	7.2
Name	EU HFR Node/CNR
Institution	CNR
Short Description	The EU (European) HFR (High Frequency Radar) Node/CNR is the contribution of CNR to the EU HFR Node Competence Center for HFradar data management.
VA Services	The VA Infrastructure consists of a software package written in MATLAB[5] and Python[6] and a remote processing service[7] that uses the software to process HF Radar files.

[5]https://github.com/LorenzoCorgnati/HFR_Node__Historical_Data_Processing
https://github.com/LorenzoCorgnati/HFR_Node__Centralized_Processing
https://github.com/LorenzoCorgnati/HFR_Node_tools
https://github.com/LorenzoCorgnati/HFR_Node__REP_Temporal_Aggregation
[6] https://github.com/LorenzoCorgnati/EU_HFR_NODE_pyHFR
[7] https://webform.hfrnode.eu

3.7.2. Assessment by Sebastien Mancini

Assessment of EU HFR Node/CNR (ID 7.2)

Description

The VA Infrastructure consists of a software package written in MATLAB, Python, and a remote processing service that uses the software to process HF Radar files.

VA

The GitHub repository (https://github.com/LorenzoCorgnati/HFR_Node__Historical_Data_Processing) provides access to a set of Matlab scripts for processing historical data from High Frequency Radar platform.

Scientific relevance

Developing, maintaining and making available this type of toolbox is very important for the scientific community for several reasons such as reproducibility, helping data providers to simplify their workflow, consistency in data formats and quality control.

Technical Implementation

The Readme file provides an overall description of the tool, as well as licensing information and citation information. The tool is also available on the Zenodo platform with a DOI associated to it.

A limitation of the repository is that it is currently disseminated under a personal page. As the HFR European observing system gets more mature, the tool would need to be migrated and maintained by an appropriate institution.

I notice that a new release of the tool has been released roughly once a year for the past three years, and also that no issues have been opened nor closed in the repository. I am wondering how the HFR community is contributing to the tool, by for example reporting any bugs or new features that would need to be prioritised for a future release. See an example from the Australian Integrated Marine Observing System (IMOS) and the IMOS Matlab Toolbox to process moorings data (https://github.com/aodn/imos-toolbox).

Another great GitHub feature that could be used to improve the Accessibility of the tool is the Wiki, where more documentation could be provided for each step of the workflow and common problems encountered by users. See an example from the IMOS Matlab Toolbox

(https://github.com/aodn/imos-toolbox/wiki). Jupyter Notebooks would also provide step-by-step examples on how to process the data by combining the code and guidance.

Scientific Usability

I have not created an account to test the features of the EU HFR Node Data Entry Web Form.

It would be great to provide an appropriate Web-URL rather than the existing one (https://webform.hfrnode.eu). Again, this would demonstrate the level of maturity of the European HFR observing System.

Access Metrics

A number of different metrics are provided. The first plot showing the number of files uploaded over time for each network could be improved for readability. The list of networks could be more readable. I noticed that it include HFR nodes from the US as well as from Europe. But on this plot, only 2 networks are sending a lot of data, for all the others, it is impossible to distinguish if any data has been uploaded.

For some other metrics, it would be great to explain the reason for capturing the metric. For example, regarding the process lengths, does the metric provide some insights on the processing time per type of file and as a consequence does the process need to be further developed to process data faster?

Outreach

Reported outreach is very limited. Only one activity in 2021 is listed.

I would have thought that members of the European HF Radar community would meet on a regular basis to share their experience in setting-up and maintaining the systems, and also discuss the use of the Matlab toolbox and future improvements.

3.7.3. Assessment by Simon Keeble

Description

The VA Infrastructure consists of a software package written in MATLAB, Python, and a remote processing service that uses the software to process HF Radar files.

VA

The platform can be accessed at this address: https://webform.hfrnode.eu. It is recommended that a suitable domain name is chosen and also that the platform is operated through an SSL certificate.

Scientific relevance

The site is not secure and should not be collecting usernames / passwords in this way. This is a major issue.

Technical Implementation

Due to the insecure nature of the website, it has not been possible to set up a username and password, as our internal security standards prevent passing information over insecure connections.

Scientific Usability

Evaluating the GitHub repository shows a well-structured set of scripts. The codebase hasn't changed, according to the repository, for the last couple of years. This could be entirely valid for a working, production application. The GitHub codebase well acknowledges JERICO/EC funding appropriately. Perhaps the key components of this VA are the Git repository rather than the website?

Access Metrics

The usage statistics show that the application is in use regularly. The GitHub views show a relatively low level, but this would be expected from such a tool.

Outreach

Simon Keeble has not made remarks on this matter.

3.8. Assessment of CytoFluoTool (ID 8.1)

Next, the description of CytoFluoTool, its assessment by Thierry Carval and its assessment by Shaun Deyzel are included.

3.8.1. Description of the VA Service

ID	8.1
Name	CytoFluoTool
Institution	CNRS-LOG, ULCO

Short Description	Automated techniques, and complementary to automated image analysis, automated flow cytometry (FCM) and multispectral fluorometry (MSF).
VA Services	The VA Infrastructure consists of a software package written in R (RclusTool).

3.8.2. Assessment by Thierry Carval

CytoFluoTool - CRAN

CytoFluoTool: Documentation Dashboard

Description

Automated techniques, and complementary to automated image analysis, automated flow cytometry (FCM) and multispectral fluorometry (MSF).

VA

The VA Infrastructure consists of a software package written in R (RclusTool):

https://mawenzi.univ-littoral.fr/RclusTool/

Scientific relevance

RclusTool is a clustering and visualisation R toolbox to visualize and process cytometry data in various forms: profile/time series, features, and images. It provides services for unsupervised clustering, semi-supervised clustering, supervised classification, labelling expert interface, constraint expert labelling.

Technical Implementation

The R package is available from the CRAN repository. The Comprehensive R Archive Network (CRAN) is R's central software repository, supported by the R Foundation. The installation instructions are documented, the latest release is recent, from 2024-02-27.

Scientific Usability

RclusTool is contributed to by a specialist community of developers and also funded by a respected network, including JERICO.

Access Metrics

The access to the CytoFluoTool software package is monitored in two different ways: the CRAN downloads API and the log files of the documentation website.

There are about 300 downloads of documentation a month. It probably illustrates a good and sustained usage of the CytoFluoTool. Some spikes on documentation page views should probably be ignored (as unexplainable).

Outreach

The licensing is clear and open source, for any purpose.

A richer documentation of the tool may improve its adoption by the community.

Small workshops are appropriate to promote the tool and increase awareness. Inclusion in teaching materials is also a good way of promoting this type of tool. It could be interesting to include a metadata record in an existing repository to describe the package. This metadata record could be harvested by other data repositories and will increase its discoverability.

3.8.3. Assessment by Shaun Deyzel

CytoFluoTool - CRAN

CytoFluoTool: Documentation Dashboard

Description

Automated techniques, and complementary to automated image analysis, automated flow cytometry (FCM) and multispectral fluorometry (MSF).

VA

The RclusTool is an R package available from CRAN for clustering and classification of data frames. The tool offers a graphical interface allowing the processing of clustering and classification methods.

Scientific relevance

Clustering methods include unsupervised and supervised clustering, as well as supervised classification. Proposed clusters or classes can further be assessed against supplementary data formats such as profile or time series and images. This supplementary functional enhances expert labelling of clusters or to assist with decision-making around constraining data frame rows with a constrained spectral embedding algorithm.

Technical Implementation

Beyond the resources accessible via the CRAN repository, information, and resources related to RclusTool package online could not be readily sourced. I had no issues accessing documentation and information via the CRAN repository. A list of contributing and funding organisations are listed on the tool documentation webpage 3 and the VA seems to be well-supported in this regard.

Scientific Usability

Additionally, applicable information on the Software, including installation and user instructions are listed, as well as contact details for persons related to software instructions, development, and interpretation of data. The website also includes publications (2011-2018; any updates or no publications beyond 2018?) and licence conditions.

Access Metrics

Access to the VA service is monitored with metrics measuring downloads from CRAN and visits to the documentation webpage (log files). Download data are sourced from the CRAN downloads API and is displayed as a numeric and a time series plot. The limitations of this metric are acknowledged and accordingly supplemented with user data from the documents' webpage.

Log files from the server starts from 13 April 2021 since earlier files were lost to the analysis. Their analysis involves geographic statistics based on visits, a temporal analysis of traffic, the content type visited and the origin of traffic.

Data indicate a large user base, listing 65 countries of origin with notable periods of significant engagement around August 2022 (page views and users), May 2023 and December 2023. Traffic is analysed in pie segment fashion for page views by page type and users by referrer domain.

Outreach

Seven outreach activities were listed for the period 23 November 2020 to 6 July 2021. Activities ranged from poster presentations, workshops (virtual), training in support of an M.Sc. project and a special session and an ASLO ASM meeting. I must assume no data is available post July 2021, or were there no further outreach activities to log?

3.9. Assessment of JERICO-ECOTAXA (ID 8.2)

Next, the description of JERICO-ECOTAXA, its assessment by Anca Hienola and its assessment by Antonio Novellino are included.

3.9.1. Description of the VA Service

ID	8.2
Name	EcoTaxa
Institution	CNRS-LOV
Short Description	Web application that provides services for users to handle large image datasets and their associated metadata. System suited for imaging sensors such as UVP5, ZOOSCAN, ZOOCAM, FLOWCAM, IFCB, microscopic imaging, and confocal microscopy, that are used in marine sciences.
VA Services	The VA Infrastructure consists of a website[8].
Monitoring Method	EcoTaxa has its own metrics system that synchronises to VAMS via a custom CSV file.
Metrics	EcoTaxa metrics can be found in Annexe 1.7.
Funders	OCEANOMICS[9] Partner University Fund[10] CNRS LEFE program[11] Belmont Forum WWW.PIC project[12] H2020 Blue-Cloud project[13] JERICO-S3[14]

[8] https://ecotaxa.obs-vlfr.fr/

[9] http://www.oceanomics.eu/

[10] https://face-foundation.org/higher-education/partner-university-fund/

[11] https://programmes.insu.cnrs.fr/lefe/

[12] https://www.belmontforum.org/projects/world-wide-web-of-plankton-image-curation/

[13] https://www.blue-cloud.org

[14] https://www.jerico-ri.eu/

3.9.2. Assessment by Anca Hienola

CNRS-LOV Ecotaxa

Description

EcoTaxa is a web application designed to assist users in managing large datasets of zooplankton images and associated metadata. It is tailored for use with imaging sensors like Underwater Vision Profiler (UVP), ZOOSCAN, FLOWCAM, IFCB, and other microscopic and confocal imaging tools frequently used in marine sciences.

VA

https://ecotaxa.obs-vlfr.fr

Scientific relevance

EcoTaxa facilitates studies on biodiversity, distribution, and ecological roles of plankton in marine ecosystems, crucial for understanding ocean health and responses to environmental changes.

Technical Implementation

EcoTaxa's database manages large volumes of image data and metadata, which is crucial for high-throughput image analysis tasks common in marine biodiversity research. The platform is designed with a focus on user experience, providing an intuitive interface that facilitates easy navigation and manipulation of complex datasets. The increasing volume and complexity of marine imaging data may challenge its capacity to scale efficiently without performance degradation.

Any plans on how to handle that? The link to Zooprocess is not obvious, as it requires going to Exploration, then select an image and only then one can find a link to Zooprocess where documentation exists. It would be preferable to have links to documentation or at least a how-to document in the EcoTaxa webpage. One would think that the integration of both automated tools for initial sorting and manual annotation capabilities allows for accurate classification and detailed study of zooplankton images.

It is known that, due to time constraints, the researchers often accept automatic predictions for less critical categories by default, group distinct objects based on taxonomic knowledge, and concentrate solely on categories deemed relevant for the specific study. How do you ensure the accuracy of the automatic annotation?

Scientific Usability

The website does not specify whether there is a licence for using the images or if Persistent Identifiers (PIDs) are available, both of which are crucial for ensuring the fairness of the data. However, if this information exists, it should be surfaced and made visible on the front page.

Access Metrics

EcoTaxa has a solid framework for monitoring access metrics, but the technical challenges with data collection tools and potential data gaps highlight areas that could impact the accuracy and utility of these metrics. These issues need addressing to ensure consistent and reliable metric tracking for better decision-making and resource management.

Outreach

The deliverable D11.3 indicates that EcoTaxa participated in six workshops/ conferences/ webinars. While these events are valuable for academic and professional engagement, they represent a relatively narrow approach to outreach.

Relying predominantly on workshops and conferences restricts the reach primarily to academic audiences who attend such events. This approach may not effectively engage broader or more diverse groups, including citizen scientists, educators, or policy-makers.

There's no mention of engagement through more accessible and widespread channels such as social media, blogs, newsletters, or interactive online platforms which can engage a global audience.

The minimal diversity in outreach methods could lead to poor visibility of EcoTaxa's capabilities and contributions outside specialized academic circles. It's a great tool! You should promote it properly.

There are a lot of Opportunities for Improvement.

Leveraging social media platforms like Twitter, Facebook, or Instagram could increase visibility and engage a younger, broader audience. Regular posts, interactive content, and highlights of key research findings or datasets could drive more engagement. A regular newsletter or a blog could keep users updated about new features, datasets, case studies, and research projects associated with EcoTaxa. Also, the idea of a booth during very large conferences should be considered.

3.9.3. Assessment by Antonio Novellino

CNRS-LOV EcoTaxa

Description

EcoTaxa is a web application designed to assist users in managing large datasets of zooplankton images and associated metadata. It is tailored for use with imaging sensors like Underwater Vision Profiler (UVP), ZOOSCAN, FLOWCAM, IFCB, and other microscopic and confocal imaging tools frequently used in marine sciences.

VA

https://ecotaxa.obs-vlfr.fr

Scientific relevance

Eco Taxa provides distribution on biodiversity.

Technical Implementation

EcoTaxa's database handles extensive image data alongside metadata, essential for conducting high-throughput image analyses frequently employed in marine biodiversity research. With user experience at the forefront, the platform offers an intuitive interface for seamless navigation and manipulation of intricate datasets. However, the growing size and complexity of marine imaging data pose potential scalability issues, potentially impacting performance.

Scientific Usability

The application can be freely downloaded and installed for scientific usage.

Would be better to indicate a proper licence e.g. CC-BY.

Documentation can be improved.

Interoperability also.

Access Metrics

EcoTaxa has a solid framework for monitoring access metrics.

Outreach

Relatively narrow approach to outreach and mainly for experts.

Given the idea and tool, it could be much improved.

3.10. Assessment of Utö Atmospheric and Marine Research Station (ID 15.1)

Next, the description of Utö Atmospheric and Marine Research Station, its assessment by Thierry Carval and its assessment by Shaun Deyzel are included.

3.10.1. Description of the VA Service

ID	15.1
Name	Utö Atmospheric and Marine Research Station
Institution	FMI
Short Description	Software for instrument-computer interfaces, automated warning message system, data transmission systems, basic QC processes, data visualisation tools and a www-page open for public use.
VA Services	The VA Infrastructure consists of a website[15].
	The website is monitored using Google Analytics API.
	Utö metrics can be found in Annexe 1.8.

3.10.2. Assessment by Thierry Carval

Utö Atmospheric and Marine Research Station

Description

Software for instrument-computer interfaces, automated warning message system, data transmission systems, basic QC processes, data visualisation tools and a www-page open for public use.

[15] http://swell.fmi.fi/Uto/

VA

The VA Infrastructure consists of a website.

Scientific relevance

The Utö Atmospheric and Marine Research Station provides real-time data measured on 3 sites (marine, atmosphere, carbon) on Utö island in the middle of the Baltic Sea in the Finnish archipelago.

Technical Implementation

Access to the data is intuitive with reactive plots and numbers. Only the last two weeks of data are available for download as CSV files. No historical data are provided. It would be good to see on the site where users can obtain long time series data.

Scientific Usability

The website provides graphs for different variables at different timescales.

The data availability is limited to 2 weeks. Long time series of Utö observations are certainly available, but this is not mentioned on the website. It would be useful if a metadata record was created in a relevant repository to describe the entire dataset collection and act as a reference point for other metadata catalogues.

The FAIRness of Utö real-time data would be improved by addition of metadata in the CSV files: the site position, link to existing vocabularies for parameter names, such as SeaDataNet P01. A documentation on instruments, quality control procedures would also improve the FAIRness of the observatory.

Beyond the website, Utö data are available from FMI "Weather in Finland" website. However, these valuable observations do not (yet) circulate on WMO GTS, Copernicus marine service or EMODnet.

Access Metrics

The metrics are available for January to September 2022 period only (Google Analytics no more allowed on FMI websites). The site had an average of 75 users per month. This stable number of visits probably indicates a regular number of satisfied users.

Outreach

The cross-domain in situ observations performed in Utö (atmosphere, marine, carbon) are highly relevant for the Baltic ROOS, ICOS and beyond the Global Ocean Observing system

(GOOS). A data circulation towards WMO GTS, Copernicus Marine and EMODnet would be welcome.

3.10.3. Assessment by Shaun Deyzel

Utö Atmospheric and Marine Research Station

Description

Software for instrument-computer interfaces, automated warning message system, data transmission systems, basic QC processes, data visualisation tools and a www-page open for public use.

VA

The VA Infrastructure consists of a website.

Scientific relevance

The website serves real-time data, data products and graphs from the Utö Atmospheric and Marine Research Station, Utö Island, Archipelago Sea, Baltic Sea. Real-time data are sourced from automatic weather stations from Utö and tide gauge stations located at the nearby Hanko and Föglö. The stations are jointly managed by the Finnish Meteorological Institute (FMI) and the Finnish Environmental Institute (SYKE).

Technical Implementation

The website consists of four main pages, with the landing page serving snapshots of the latest data derivatives of key variables that include wind, sea level, waves, currents, chlorophyll-a, water temperature, -salinity and partial CO2. A date and time stamp accompany each variable tile. I find this a simple yet useful overview of the latest observations.

The second page gives an opportunity to view data graphically by variable, with the option to toggle temporal filters by day, one week, two weeks and so on. Each plot instance is accompanied by a short description of where the data were sourced and derived. The third page lists data (limited to the most recent two weeks) available for downloading in CSV format.

The final page is an "About" page, with information on the observation stations, a site map, a data offering statement, funding details and links to webpages, including the JERICO-RI Virtual Access Services page.

Scientific Usability

The simplicity of the website is its strength. All components are easy to navigate and to the point and purpose. I find it interesting that data are served for the most recent two weeks only. How does one access historical data? If there is an instruction to this effect, I've clearly missed it on the website. Sure, additional functionality can be considered for the graphical representation of the data (interactive options, sliding x- and y-axis scales for filtered views etc.), but it is not a necessity given the purpose of this element.

Access Metrics

The website used Google Analytics derived metrics from January 2022 to September 2022, with no such data available October 2022 onwards, due to discontinued use of Google Analytics. There seems to be an objective to implement Matomo Analytics instead, but this process is still underway.

Overall access statistics are presented as numeric expressions of page views and sessions, followed by more detailed graphical analyses of geographic spread, user type (new vs returning), bounce rate, device, and traffic source analysis. The selection of graph and variable type is appropriate given their user monitoring objectives.

Outreach

Six outreach activities are listed for the period 2 April 2020 to 11 December 2023, which ranged from press releases to social media posts. Audiences included civil society, policy-makers, industry, media and the scientific community.

3.11. Assessment of POSEIDON Multi Platform Observatory Data Center (ID 16.1)

Next, the description of POSEIDON Multi Platform Observatory Data Center, its assessment by Anca de Hienola and its assessment by Antonio Novellino are included.

3.11.1. Description of the VA Service

ID	16.1
Name	POSEIDON Multi platform observatory Data Center
Institution	HCMR
Short Description	Integrated observatory located in the Eastern Mediterranean, which has adopted a multiplatform-multi parameter approach with the current system's status including open and coastal sea fixed platforms,

	deep-ocean observatories, a Ferrybox system, glider missions and Argo profiling floats.
VA Services	The VA Infrastructure consists of a website[16] and an API[17].

3.11.2. Assessment by Anca Hienola

POSEIDON API

Description

The POSEIDON API provides a structured framework for interacting with the POSEIDON system's data services. It details the available endpoints, methods, and parameters for accessing real-time and historical oceanographic and meteorological data collected by the POSEIDON observatory network.

VA

http://api.poseidonsystem.gr/swagger/

Scientific relevance

The API has the capability to facilitate extensive research and operational applications by providing structured, programmable access to a vast repository of oceanographic and meteorological data. The API allows researchers and developers to access real-time data from the Eastern Mediterranean.

This is crucial for timely studies related to weather forecasting, climate modelling, and marine ecosystem monitoring. It also provides access to archived data, which is essential for long-term environmental studies, trend analysis, and historical research.

Technical Implementation

The API employs a RESTful architecture, which is widely used for its simplicity and compatibility across various platforms and languages. This architecture makes the API accessible and easy to integrate with existing systems and applications.

[16] https://poseidon.hcmr.gr/

[17] https://api.poseidon.hcmr.gr/swagger/

Utilizing Swagger UI for its documentation, the API provides a dynamic environment where developers can easily understand and interact with the API endpoints directly from the browser.

Also, very important, the implementation likely ensures scalability to handle large volumes of requests and data efficiently.

The Poseidon API lacks clear information regarding a usage licence, and there is no mention of whether datasets are assigned PIDs. The API does provide thorough instructions for access but requires AAI, necessitating a brief description of the intended use of the data for access approval.

Scientific Usability

The POSEIDON API tracks a wide range of metrics, including number of requests, data download volumes, and user engagement over time. The metrics are presented as time-series data, allowing for an easy understanding of trends and patterns over specified periods.

Some figures presenting data such as request counts or data volumes could benefit from a logarithmic (y-log) scale for clarity. This scale would better illustrate the range and variance of data points, especially when there are large disparities in values that can obscure subtler trends in linear scales.

Access Metrics

To enhance the analysis and utility of the POSEIDON API, additional metrics such as error rates, response times, user retention and churn rates, geographic distribution, endpoint-specific usage, and integration success metrics could be considered.

Outreach

No specific remarks were made.

HCMR POSEIDON webpage

Description

POSEIDON is a multi-platform observatory data centre, integrating various marine observation systems across the Eastern Mediterranean to monitor real-time oceanographic and meteorological conditions.

VA

https://poseidon.hcmr.gr/

Scientific relevance

The POSEIDON website, hosted by the Hellenic Centre for Marine Research, is scientifically relevant for providing real-time and historical oceanographic and meteorological data for the Eastern Mediterranean. It supports diverse research from climate studies to marine biodiversity, enhancing our understanding of environmental changes.

The website is exceptionally well-designed, offering user-friendly navigation and robust data visualization, making it an excellent resource for the scientific community.

Technical Implementation

The POSEIDON website employs advanced web technologies for robust data management and high performance. It features real-time data streaming, interactive maps, and visualization tools, supported by a backend optimized for efficient data retrieval and scalability. This setup ensures seamless access to extensive marine research datasets for both researchers and the public.

Scientific Usability

The Poseidon webpage does not provide clear information on usage licensing or indicate if datasets have PIDs. Additionally, the site lacks explicit access instructions, and attempts to retrieve data reveal that AAI is necessary. Unfortunately, these issues persist as they were previously highlighted in an earlier review by another reviewer, and the suggestions for improvement have not been considered.

Access Metrics

The access metrics for the POSEIDON webpage provide basic insights but lack depth in user engagement details. The presentation of data, particularly in graphs, would benefit from logarithmic scaling to better visualize disparities in metrics like page views or unique visitors.

More advanced metrics such as conversion rates, heat maps for page activity, and real-time monitoring tools could enhance the understanding of user interactions and webpage performance. Implementing these changes will help in identifying trends more accurately and optimizing the webpage based on detailed user behaviour analysis.

Outreach

D11.3 reveals that the POSEIDON website's outreach activities were minimal, for example in 2023 having only one release. This narrow approach limits the potential to engage a wider scientific audience that could benefit from the site's resources. Moreover, the lack of social media involvement is a missed opportunity for continuous engagement and real-time

updates, which could significantly enhance the visibility and usability of the website for marine researchers and related professionals.

Expanding outreach to include regular academic webinars, collaboration with scientific networks, and active participation in online forums could greatly improve engagement and utilization of the POSEIDON resources.

3.11.3. Assessment by Antonio Novellino

HCMR POSEIDON API

Description

The POSEIDON API provides a structured framework for interacting with the POSEIDON system's data services. It details the available endpoints, methods, and parameters for accessing real-time and historical oceanographic and meteorological data collected by the POSEIDON observatory network.

VA

https://api.poseidon.hcmr.gr/swagger/

Scientific relevance

Swagger API is very useful to implement FAIR principles.

Technical Implementation

Performance: time by time I get some service unavailability – would be good to add and monitor this.

Scientific Usability

The service is not showing licence or how to cite, but it's not the scope, a swagger API implements FAIR principles. More examples and documentation would facilitate a newcomer.

Access Metrics

No special remarks were made.

Outreach

No special remarks were made.

HCMR POSEIDON webpage

Description

POSEIDON is a multi-platform observatory data centre, integrating various marine observation systems across the Eastern Mediterranean to monitor real-time oceanographic and meteorological conditions.

VA

https://poseidon.hcmr.gr/

Scientific relevance

The POSEIDON website, hosted by the Hellenic Centre for Marine Research, is scientifically relevant for providing real-time and historical oceanographic and meteorological data for the Eastern Mediterranean. It supports diverse research from climate studies to marine biodiversity, enhancing our understanding of environmental changes. The website is exceptionally well-designed, offering user-friendly navigation and robust data visualization, making it an excellent resource for the scientific community.

Technical Implementation

The POSEIDON website employs advanced web technologies for robust data management and high performance. It features real-time data streaming, interactive maps, and visualization tools, supported by a backend optimized for efficient data retrieval and scalability. This setup ensures seamless access to extensive marine research datasets for both researchers and the public.

The system is working well, and user experience is up-to-date.

Scientific Usability

No licence indicated, but data are flowing towards CMEMS and EMODnet, so POSEIDON is implementing full FAIRness principles.

The portal is missing an easier button/function to download data in other formats than CSV.

Access Metrics

Metrics tells the number of users and time on the portal. In line with the offered service.

Outreach

Very limited outreach, but POSEIDON is a well known system and service in the network.

3.12. Assessment of the Coastal Observing System for Northern and Arctic Seas (COSYNA) (ID 17.1)

Next, the description of COSYNA, its assessment by Anca Hienola and its assessment by Antonio Novellino are included.

3.12.1. Description of the VA Service

ID	17.1
Name	COSYNA
Institution	Hereon
Short Description	Monitor real-time conditions and provide short-term forecasts, data, and data products to help assess the impact of anthropogenically induced change. It includes data from Hereon HF Radar, FerryBoxes, Underwater Nodes and operational models (Circulation, Waves) as well as models with assimilated data.
VA Services	The VA Infrastructure consists of a website[18]

3.12.2. Assessment by Anca Hienola

HZG COSYNA

Description

COSYNA (CODM) is an advanced data portal designed to provide access to a comprehensive range of observational data from coastal and marine environments. It integrates data from various monitoring systems like HF Radar, FerryBoxes, and underwater nodes, and offers tools for real-time data visualization and analysis, aimed at supporting research in coastal ocean dynamics and environmental science.

VA

https://codm.hzg.de/codm/

[18] https://www.hereon.de/institutes/coastal_ocean_dynamics/cosyna/index.php.en

Scientific relevance

CODM provides essential real-time and historical coastal and marine environmental data. This resource supports a wide array of scientific research in coastal dynamics, climate change, and marine ecology, enabling scientists to track environmental trends, assess ecosystem health, and model future changes in marine environments.

Technical Implementation

Accessing the portal requires a registration, which is a straightforward process. Selecting and downloading data is also user-friendly. However, there was an issue with the metadata page, as attempts to access it resulted in a "forbidden" page error.

Scientific Usability

The portal lacks specific information on licensing, Persistent Identifiers (PIDs), and citation guidelines. While the interface is user-friendly, the absence of these elements means the data does not fully comply with FAIR principles. Additionally, clear metadata for each dataset should be provided to enhance data usability. That's pity!

Access Metrics

The analysis of access metrics for COSYNA shows a minimal set of metrics currently being tracked. This limited range can hinder a comprehensive understanding of user interactions and system performance. It looks like both number of users and data downloaded has decrease over time. Consider including other metrics (e.g. download speed) to monitor and understand the reason behind this drop.

Outreach

The outreach activities for COSYNA are notably limited, with only one event conducted annually. This modest level of engagement could benefit from expansion to better disseminate its contributions and findings. The minimal outreach efforts might be contributing to the observed decline in the numbers within the access metrics.

3.12.3. Assessment by Antonio Novellino

HZG COSYNA

Description

COSYNA (CODM) is an advanced data portal designed to provide access to a comprehensive range of observational data from coastal and marine environments. It integrates data from various monitoring systems like HF Radar, FerryBoxes, and underwater

nodes, and offers tools for real-time data visualization and analysis, aimed at supporting research in coastal ocean dynamics and environmental science.

VA

https://codm.hzg.de/codm/

Scientific relevance

CODM provides essential real-time and historical coastal and marine environmental data. This resource supports a wide array of scientific research in coastal dynamics, climate change, and marine ecology, enabling scientists to track environmental trends, assess ecosystem health, and model future changes in marine environments.

Technical Implementation

Accessing the portal requires a registration, which is a straightforward process. Selecting and downloading data is also user-friendly. However, there was an issue with the metadata page, as attempts to access it resulted in a "forbidden" page error.

Scientific Usability

Licence is not clear, but COSYNA is fully integrated into CMEMS and EMODnet proofing FAIRness of the system. Furthermore, it offers different APIs and services to connect and consume data. Some services are a bit complex and more documentation would help.

Access Metrics

The analysis of access metrics for COSYNA shows a minimal set of metrics currently being tracked.

Outreach

Very minimal outreach activity. The system is a consolidated tool towards its stakeholders.

3.13. Assessment of HIDROGRAFICO (ID 19.1)

Next, the description of HIDROGRAFICO+, its assessment by Thierry Carval and its assessment by Shaun Deyzel are included.

3.13.1. Description of the VA Service

ID	19.1

Name	HIDROGRAFICO+
Institution	IH
Short Description	Access to data collected by the real-time monitoring infrastructure for the Portuguese waters (MONIZEE system) that is operated by Instituto Hidrografico.
VA Services	The VA Infrastructure consists of a website[19] which presents data provided by a web service.

3.13.2. Assessment by Thierry Carval

Hidrografico+: Web service

Hidrografico+: Web

Description

Access to data collected by the real-time monitoring infrastructure for the Portuguese waters (MONIZEE system) that is operated by Instituto Hidrografico.

VA

The VA Infrastructure consists of a website which presents data provided by a web service.

Scientific relevance

The VA infrastructure provides very interactive access to the data collected by the MONIZEE system in the Portuguese coastal ocean water. The variety of observations is important for operational applications and science: tide gauges, scientific cruises, moorings, buoys. MONIZEE also provides numerical products such as bathymetry or ocean models.

Technical Implementation

The web interface has an efficient and very interactive map. Users are able to search for a wide range of dataset collections and load the layer on the map interface. The interactions are fluid and intuitive. A user can add its own specific mapping data (Shapefile, external WMS service), an interesting feature to compare MONIZEE data with external data sources.

Scientific Usability

[19] https://geomar.hidrografico.pt/

Data is up-to-date and easily retrieved by clicking on features in the map. Additional useful calculation tools are provided, including voyage planning. The time-series are particularly well managed, it is quick and easy to plot a graphic of observations at a given location, these data can be downloaded in CSV format in one click.

Additional documentation on data processing and quality controls would be welcome for safe scientific usage.

Access Metrics

The access metrics are provided for the web services and for the web interface.

The web services show an impressive average number of 15000 sessions per month, regularly increasing. The number of users is not readable, it should be displayed on a distinct graphic, as it is flattened by the number of sessions.

The web interface statistics shows a vast majority of pages viewed from Portugal (as can be expected). Excluding occasional spikes, the average number of page views per months is between 1000 and 2000, regularly increasing. The number of users per month globally increased from 150 to 450 between January 2022 and 2024.

This can be interpreted as a successful service having a sustained user base growing.

Outreach

The MONIZEE web interface does not provide access to an editorial website where outreach activities could be performed or advertised.

3.13.3. Assessment by Shaun Deyzel

Hidrografico+ Web service and Web (IH)

Description

Access to data collected by the real-time monitoring infrastructure for the Portuguese waters (MONIZEE system) that is operated by Instituto Hidrografico.

VA

The VA Infrastructure consists of a website which presents data provided by a web service.

Scientific relevance

The website provides users access to marine spatial data served from real-time monitoring infrastructure (MONIZEE infrastructure), operated by the Instituto Hidrografico in Portuguese waters. Users have access to data from 5 multiparametric buoys, surface currents from 6 HF radar stations (southern and northwestern Portuguese margin and Lisbon Bay Area), sea surface height from 17 tide gauge stations (mainland coast) and wave measurements from 3 wave buoys (southern and western Portuguese margin).

Technical Implementation

The website offers a marine spatial data portal that is impressively responsive in use. Main selection icons are listed vertically, each giving the user well-defined options for a smooth and intuitive interaction. The user is free to select layers, operations options (measuring tools and nautical calculations), a campaign menu and other ocean user criteria, and a very useful ocean data viewer called Oceanogram Menu.

The latter gives an option to enter custom coordinates or simply drop a cursor on the map, which renders a selection of variables to choose from. Once the desired time interval is entered, a metocean forecast is generated in a new page for instant viewing, or downloading in PDF format.

Scientific Usability

The webpage otherwise contains no documentation that I could find, nor any explanatory information regarding the resource, programmes or associated research infrastructure platform. The majority of this information I found on the JERICO-RI website, on the Virtual Access/MONIZEE and infrastructure/monizeeih pages. A banner at the bottom of the landing page, however, lists several logos of funders, and links to their Privacy Policy, Legal Warning and Accessibility statements.

Access Metrics

Access metrics are measured for two components of the VA, namely the web service providing oceanographic data (internal monitoring mechanisms) and the website that offers users visualisation tools (Google Analytics).

The Web Service monitoring framework entails synchronising VAMS' and IH's ElasticSearch database, fed by an internal monitoring system. Data for the number of users, new users, page views and sessions are analysed for the period August 2022 to December 2023. Specifically, the number of visits is analysed by request, user role, station ID and group. In general, their approach offers a comprehensive set of data, suitable for the analysis of trends.

The website analytics involves a synthesis of access metrics (overall numeric of page views and sessions) and various graphical presentations of geographic spread, user type, bounce rate, user device and traffic source analyses. Once more, their analytical approach yields good oversight of performance and engagement with insight into the user base and how, and when, these users are making use of the website and web service.

Outreach

A total of 18 outreach activities were registered between 7 October 2020 and 24 November 2023. Activities ranged from website and social media posts (majority of cases), to participation at conferences. Audiences included the scientific community, industry, policymakers, civil society and the public.

3.14. Assessment of VOS Finnmaid GHG: BGC (ID 21.1)

Next, the description of VOS Finnmaid GHG: BGC, its assessment by Thierry Carval and its assessment by Shaun Deyzel are included.

3.14.1. Description of the VA Service

ID	21.1
Name	VOS Finnmaid GHG: BGC
Institution	IOW
Short Description	Measurement of trace gases on the ferry Travemünde/Germany to Helsinki/Finland.
VA Services	The data is distributed via ICOS (SOCAT[20] database)

3.14.2. Assessment by Thierry Carval

VOS Finnmaid GHG: BGC

Description

Measurement of trace gases on the ferry Travemünde/Germany to Helsinki/Finland.

VA

[20] https://www.socat.info/

The data is distributed via ICOS (SOCAT database).

Scientific relevance

Since 2003 the Leibniz Institute for Baltic Sea Research Warnemünde (IOW) operates the measurement of trace gases on the ferry Germany to Finland.

Technical Implementation

There is no specific technical implementation for VOS Finmaid. The Finmaid web page is editorial and presents the continuous measurements of trace and greenhouse gases on the ferry Finnmaid. For data circulation, VOS Finmaid GHG relies on the global SOCAT infrastructure. This data distribution is totally appropriate as SOCAT is the major infrastructure for the GHG marine community.

Scientific Usability

SOCAT is the well-established data portal for marine Carbon and GHG. It provides a major visibility to VOS Finmaid data. The single webpage on the IOW-Leibnitz website provides information about Finnmaid GHG-BGC observations. There is no information about data processing and quality control. As this ferry box line is part of SOCAT, it can be assumed that the SOCAT QC procedures are applied.

Access Metrics

There is an average of 30 downloads per month of Finnmaid data files from SOCAT, with a majority of German users. The number of downloads versus downloaded items is difficult to interpret.

As Finnmaid data are included in the global SOCAT dataset, the individual downloads numbers understate the Finnmaid data circulation; the majority of users probably download and use the full SOCAT dataset.

Outreach

The IOW Finnmaid web page does not mention or link to outreach activities.

A section with Finmaid data publications, bibliography, news would be welcome.

3.14.3. Assessment by Shaun Deyzel

VOS Finnmaid GHG: BGC

VOS Finnmaid GHG-BGC (IOW)

Description

Measurement of trace gases on the ferry Travemünde/Germany to Helsinki/Finland.

VA

The data is distributed via ICOS (SOCAT database).

Scientific relevance

The link provided guides to the SOCAT platform, which serves data from more than 10 countries, with measurements dating back to 1957. Among these are data gathered by the M/S Finnmaid, a ship of the Finnlines shipping company, which crosses the central Baltic Sea, approximately every 2 days, along the Travermunde – Helsinki route. It is the only observing line operating in the ICOS-D region with a focus on marginal seas. Its importance in this respect is highly regarded.

Technical Implementation

The SOCAT landing page makes no reference to VOS Finnmaid and I had to conduct a wide search for context information, which was eventually found on a Leibniz Institute for Baltic Sea Research Warnemunde website. It is on this website that the connection with JERICO-S3 is first noted (although incorrectly spelled as JERICO-S3).

Scientific Usability

In general, the SOCAT webpage is easy to navigate, with insight given to data access terms and conditions, data download links, credits, publications, and records of meetings and presentations. The SOCAT impact page gives a good overview of publications and other outputs naming or using SOCAT data products. I note from the Leibniz Institute page that the Finnmaid data are also served through additional data portals: PANGEA and ICOS Data Portal.

Access Metrics

Access metrics are supplied by the SOCAT team via their Access Metrics API. The data show the number of downloads by country, file name and date. The number of downloads by item is interesting and could lend insight into favoured sets.

Outreach

Seven outreach activities were reported between 2 January 2021 and 14 November 2021. No activities were listed after this date. Activities included press releases, social media engagements and sharing information via websites. The wide variety of audiences were reached including civil society, public and the scientific community.

3.14.4. Response from IOW to Shaun Deyzel

Since labelling process ended, the data are retrievable via the ICOS carbon portal (https://meta.icos-cp.eu/resources/stations/OS_BALTIC-VOS) which also contains metrics information.

IOW seeks to provide the information including mentioning of JERICO-S3 on a new web page which is almost ready to be launched. This has been delayed due to the planning of an overhaul of the complete institute's web page, but content is clear. The page will address some important suggestions by the reviewers:

— a documentation to different sources of data and description (ICOS, Carbon Portal)

— a list of publications related to the page

— a direct graphical data visualization tool (currently in beta testing), where the data can be visualized near real time, but not downloaded. We decided not to be data downloadable directly, as we feel it currently more important that the data are available ONLY in final form after ICOS/SOCAT QC procedures run over it.

— However, the site will have a contact information for the case preliminary data need to be assessed prior to final data submission.

3.15. Assessment of NorFerry/NorSOOP (ID 25.1)

Next, the description of NorFerry/NorSOOP, its assessment by Sebastien Mancini and its assessment by Simon Keeble are included.

3.15.1. Description of the VA Service

ID	25.1
Name	NorFerry/NorSOOP
Institution	NIVA
Short Description	Coastal observing data from Ferry Boxes, descriptions of data types, and ocean literacy educational stories are provided for public interaction in the form of 24-inch touchscreen display consoles on passenger vessels that are updated pseudo-real-time.
VA Services	The VA Infrastructure consists of the application available on the touchscreens.

3.15.2. Assessment by Sebastien Mancini

Assessment of NorFerry/NorSOOP (ID 25.1)

Description

The NorFerry infrastructure began in 2001 and covers a network of five FerryBox systems in the Baltic, North Sea, Atlantic Ocean, Norwegian Sea, and Arctic areas.

VA

The Virtual Access Infrastructure consists of 24-inch touchscreen display consoles installed on passenger vessels. The data is collected and presented to the passengers in near real-time.

Scientific relevance & Technical Implementation

As mentioned by the reviewers in the previous report, it is not possible to perform any assessment of the system as it is installed on the ship. You will need to be a passenger to test the 24-inch touchscreen display console.

Scientific Usability

I assume that the data and the associated metadata are made available in relevant infrastructure, such as for example EMODNET Physics.

Access Metrics

The metrics presented in the report are relatively rudimentary. It is nice to see the increase in the number of visitors over time during a significant period of time, but many other statistics could have been captured and analysed to help improve the system.

Outreach

For example, in the news item listed in the outreach activities, it is mentioned that the passengers can access a range of services, including:

Variable vs. Time Plots,

Location on a Map,

Ocean Literacy Modules,

Global Ocean Data Viewer.

Capturing statistics on the services most used by passengers would be very beneficial in order to identify future features and improve the user experience.

It is nice to see that a number of different outreach activities (e.g. social media, workshops, news item…) have been used to promote the tool.

The news item on the JERICO website is a great way to communicate the tool and its benefits.

https://www.jerico-ri.eu/2023/09/21/niva-provides-passengers-access-to-ocean-data-via-touchscreen-consoles-as-part-of-the-jerico-ri-virtual-access-services/

I am surprised that not many of the other Virtual Access Infrastructure have not used this type of outreach.

3.15.3. Assessment by Simon Keeble

Description

Coastal observing data from Ferry Boxes.

VA

Application available on touchscreen.

Scientific relevance

Public interaction with ferry box data is clearly popular on the vessels.

It is noted that during COVID-19 times, only one service was in operation. However, given the analysis period, the access levels of the service have been quite high. This shows the interest in the platform.

Technical Implementation, Scientific Usability & Access Metrics

It has not been possible to ascertain if there is suitable credit given to JERICO/EC funding on the terminals. Credit has not been found on the institutional pages either at: https://www.niva.no/en/ferrybox

Outreach

Outreach activities for the VA service have been effective. This tool in itself is an outreach activity.

3.16. Assessment of PORTUS Observing and Forecasting System (ID 28.1)

Next, the description of PORTUS Observing and Forecasting System, its assessment by Anca Hienola and its assessment by Antonio Novellino are included.

3.16.1. Description of the VA Service

ID	28.1
Name	PORTUS observing and forecasting system
Institution	PdE
Short Description	Oceano-meteorological network and forecasting system that integrates different observing platforms (buoys, tide gauges and HF-radars) with numerical models along the Spanish coast. All data and derived products are distributed through PORTUS early warning system and visualisation tool. Additionally, data from the numerical models, the HF radars and the tide gauges are presently available in the PORTUS OPeNDAPsystem.
VA Services	The VA Infrastructure consists of a website[21] and a THREDDS data server[22].

3.16.2. Assessment by Anca Hienola

PdE PORTUS Opendap System and website

Description

Puertos del Estado Thredds/OpenDAP service provides access to the oceanographical and meteorological data catalogue produced by Puertos del Estado. This tool is oriented to the access to large volumes of data, including: forecast data and observation data.

The website, on the other hand, is available only in Spanish, which significantly limits accessibility for non-Spanish speaking users, potentially hindering its utility for international stakeholders and researchers in the maritime industry.

VA

http://opendap.puertos.es/thredds/catalog.html and https://portus.puertos.es/#/

Scientific relevance

[21] http://portus.puertos.es

[22] http://opendap.puertos.es

The website http://opendap.puertos.es/thredds/catalog.html hosts a THREDDS data server that provides essential meteorological and oceanographic data crucial for research in climate patterns, ocean health, and maritime safety. It supports OPeNDAP for seamless integration with scientific tools, enhancing environmental research and modelling.

Technical Implementation

The server uses the THREDDS Data Server (TDS) and supports OPeNDAP, a protocol that allows for efficient access and manipulation of scientific data over the web. This enables users to query and retrieve only the subset of data they need, which is highly beneficial for handling large datasets.

By supporting protocols like OPeNDAP, the server facilitates easy integration with a range of scientific computing tools and environments, which is crucial for advanced data analysis and visualization.

However, the interface of the THREDDS catalogue can be challenging for non-technical users. It often requires a steep learning curve to navigate and utilize effectively, which might limit its accessibility to a broader audience. Therefore, the server could benefit from more comprehensive documentation and user support.

Enhanced guidance on how to use the server and troubleshoot common issues would improve user experience.

Comment: During periods of high demand, performance issues such as slow response times or server timeouts may occur, especially when accessing large datasets. This has not been presented in the access metrics.

Scientific Usability

The absence of mention whether PIDs are provided for datasets limits their findability. The lack of explicit documentation and licensing information severely hampers accessibility. Without comprehensive documentation, it's challenging to assess whether the data formats and standards used are conducive to interoperability.

However, the use of OPeNDAP suggests some level of interoperability since it is a widely supported protocol allowing for effective data exchange and manipulation across various platforms.

Access Metrics

Traffic by THREDDS protocol, geographic origin, used client, referrer domain, and operating system is presented, including an impressive number of visits and TBs of data downloaded. The plots are frustrating because the lines are indistinguishable from one another.

Outreach

The outreach efforts are commendable, featuring a dynamic mix of conferences, workshops, and social media engagement. Keep up the great work!

3.16.3. Assessment by Antonio Novellino

PdE PORTUS Opendap System and website

Description

Puertos del Estado Thredds/OpenDAP service provides access to the oceanographical and meteorological data catalogue produced by Puertos del Estado. This tool is oriented to the access to large volumes of data, including: forecast data and observation data.

The website, on the other hand, is available only in Spanish, which significantly limits accessibility for non-Spanish speaking users, potentially hindering its utility for international stakeholders and researchers in the maritime industry.

VA

http://opendap.puertos.es/thredds/catalog.html and https://portus.puertos.es/#/

Scientific relevance

The website http://opendap.puertos.es/thredds/catalog.html hosts a THREDDS data server that provides essential meteorological and oceanographic data.

THREDDS is one of the most important and well-known tech for implementing FAIR principles (OPeNDAP). Together with THREDDS the other best tech is ERDDAP that is also suggested by GOOS OCG.

Technical Implementation

The interface of the THREDDS catalog can be challenging for non-technical users, but the Puertos del Estado landing page is one of the most intuitive and well-designed. Hence, considering the full asset, the system is matching both UX and FAIR needs.

Scientific Usability

The absence of mention whether PIDs are provided for datasets limits their findability. The lack of explicit documentation and licensing information severely hampers accessibility. Without comprehensive documentation, it's challenging to assess whether the data formats and standards used are conducive to interoperability.

However, the use of OPeNDAP proposes some level of interoperability since it is a widely supported protocol allowing for effective data exchange and manipulation across various platforms.

Moreover, the PdE data are fully accessible in both EMODnet and Copernicus Marine, proofing the correct implementation of FAIRness and support to Marine Integrator initiatives.

Access Metrics

Metrics is tracking the access and downloads from THREDDS.

Outreach

The outreach is impressive and continuous.

3.17. Assessment of Swedish Oceanographic Data Centre (ID 32.1)

Next, the description of the Swedish Oceanographic Data Centre, its assessment by Sebastien Mancini and its assessment by Simon Keeble are included.

3.17.1. Description of the VA Service

ID	32.1
Name	Swedish Oceanographic Data Centre: Toolboxes in marine data management
Institution	SMHI
Short Description	Access to Swedish oceanographic data and with the use of toolboxes; handling, quality control and analyses of such data.
VA Services	The VA Infrastructure consists of 3 websites (SMHI general website[23], OpenData View[24] and Shark Web[25]) and 2 APIs (OpenData[26] and SharkData[27]).

[23] https://www.smhi.se

[24] https://opendata-view.smhi.se

[25] https://sharkweb.smhi.se

[26] https://opendata.smhi.se

[27] https://sharkdata.smhi.se

3.17.2. Assessment by Sebastien Mancini

Assessment of Swedish Meteorological and Hydrological Institute (32.1)

Description

Access to Swedish oceanographic data

VA

The Virtual Access Infrastructure consists of the following components:

— SMHI general website (https://www.smhi.se),

— OpenData View website (https://opendata-view.smhi.se),

— Shark Web website (https://sharkweb.smhi.se),

— OpenData API (https://opendata.smhi.se),

— SharkData API (https://sharkdata.smhi.se).

Scientific relevance

The Swedish Meteorological and Hydrological Institute, is an expert agency under the Ministry of the Environment. Through unique expertise in meteorology, hydrology, oceanography and climatology, SMHI contributes towards greater public welfare, increased safety and a sustainable society.

The general website provides access to a range of different content such as real-time data feeds, news item. The website is available in both Swedish and English. I was interested in the section "Open access to data for research and development" and the links included within that page.

Technical Implementation

On the "Search SMHI's open data" webpage (last updated in 2018), I selected the link "Explorer SMHI data" but unfortunately the webpage is not accessible (404 error).

On the "Oceanographic observations" webpage (last updated in 2014), I selected the link "Interface for downloading oceanographic observations" but unfortunately the webpage is not accessible (404 error).

The OpenData View website is only available in Swedish, and it contains links to three different resources. Each link is redirecting the user to an OGC WMS GetCapabilities document (XML format). The OpenData View web page could include additional description

of each of the services. A software developer would be able to understand the information provided, but many other users would not have a clue of what to do next.

The SharkWeb website is also only available in Swedish. Using Google Translate, the following description is provided, "SHARK web is Svenskt HavsARKiv's website for downloading data. For download via API, we refer to SHARKdata. In SHARK, biological, physical and chemical marine environmental monitoring data are stored. SMHI is the national data host for oceanography and marine biology on behalf of the Norwegian Sea and Water Authority and is designated by UNESCO as the National Oceanographic Data Center (NODC)."

The website allow the user to filter data using a number of different categories (e.g. parameter, time period, station name…). A link to the Data Policy is available at the bottom of the page, but the policy is dated from 2019, and unfortunately it is all in Swedish.

It is laborious and frustrating to follow any of the links on the OpenData API webpage (https://opendata.smhi.se). Through one of the link, the user is redirected to the following webpage (https://data-download.smhi.se/data/) where a user can browse through directories. But a user would need to understand how the data is organised before getting the data they are interested in.

Scientific Usability

The most useful webpage is about the API documentation (https://opendata.smhi.se/apidocs/).

The documentation is in English and will be very useful for software developers to access datasets.

For the SharkData API , the most appropriate webpage for a first time user should be https://sharkdata.smhi.se/about/. I assumed that it is a recently developed web-application making use of the different web services presented in the previous websites.

The website contains documentation in English about how to use the web service. One Python Code and one R script are available to demonstrate how to access the data. The content could be easily enhanced with additional scripts using for example Jupyter Notebooks where the code and some description can be made available to the end-user.

The data policy is also available but this time in both English and Swedish.

Access Metrics

Some improvements could be made to the type of metrics presented for each website. The metric about "the number of users over time" is useful. Is there a reason why, on most graphs, the number of users is dropping to 0 roughly at the start of January 2023? As mentioned by the previous reviewers, it would be great to include a metric on the number of international users to compare with the numbers of Swedish users.

I would suggest including additional metrics about the two web-interfaces Shark Web and SharkData in order to understand which filtering option (e.g. parameter, time period, station name…) is used the most. This information could be used later on to improve the user interface.

Outreach

5 workshops are listed in the outreach activities. I assume that they are more institute outreaching activities rather than VA outreaching activities. No outreach activities are listed for any of the web services listed above. As a minimum, a news item on the JERICO website would be appropriate.

3.17.3. Assessment by Simon Keeble

Description

Access to Swedish oceanographic data.

VA

It is noted that this VA service originally covered the SMHI website and OpenData View. It now also covers SharkWeb and two APIs, OpenData and SharkData. Three new dashboards were incorporated into VAMS for the visualisation of these three new services.

The Virtual Access Infrastructure consists of the following components:

— SMHI general website (https://www.smhi.se),

— OpenData View website (https://opendata-view.smhi.se),

— Shark Web website (https://sharkweb.smhi.se),

— OpenData API (https://opendata.smhi.se),

— SharkData API (https://sharkdata.smhi.se).

Scientific relevance, Technical Implementation, Scientific Usability & Access Metrics

SMHI's website:

The general website for SMHI is an effective platform for providing meteorological and environmental information in Sweden. It is an effective and popular website.

It was not possible to find JERICO/EC funding credit.

The statistics show that the website is viewed regularly. Bounce rates may appear higher due to ease of reaching the needed information quickly on the home page.

SharkWeb:

It was possible to easily extract data from the service and download it in appropriate formats. The help provided good guidance as to how to use the tool.

The web application is currently only available in Swedish.

It was not possible to find JERICO/EC funding credit.

The statistics show a platform that is in regular use. The usage appears to be quite high.

SharkData:

Downloading data 'manually' was straightforward. It was also possible to set up a quick programmatic download of data given the examples.

When looking at metadata, although it's possible to download, it would be nice to be able to see in the browser to check the metadata before downloading the data.

It was not possible to find JERICO/EC funding credit.

The statistics show a platform that is in regular use. It would be interesting to understand the ultimate use of the data collected automatically.

OpenData:

It was not possible to check this fully as the link did not work: https://opendata-catalog.smhi.se/explore/ However, it was possible to explore the CSW service (it was assumed to be the same service but machine to machine instead of via an interface?): opendata-catalog.smhi.se/catalog/srv/eng/csw

The statistics from the OpenData View Website show that the service is used a lot. The API is also used heavily.

It is suggested that using SHARK in the branding of the services is confusing, as there is nothing ''shark'' related. It is appreciated this comes from "Svenskt HavsARKiv". Perhaps this is only an issue for native English speakers.

Outreach

Outreach activities of these services appear to be most related to workshops. Are there other communications opportunities available via other channels that could increase usage, or does this reach the majority of potential end users?

3.18. Assessment of SOCIB Data Centre Multi-Platform Observatory (ID 33.1)

Next, the description of SOCIB Data Centre Multi-Platform Observatory, its assessment by Sebastien Mancini and its assessment by Simon Keeble are included.

3.18.1. Description of the VA Service

ID	33.1
Name	SOCIB Data Centre Multi-Platform Observatory
Institution	SOCIB
Short Description	Access to the multi-platform observing system of the Balearic Islands in the western Mediterranean.
VA Services	The VA Infrastructure consists of a THREDDS data server[28], a data API[29] and a data catalogue[30].

3.18.2. Assessment by Sebastien Mancini

Assessment of SOCIB Data Centre Multi-Platform Observatory (ID 33.1)

[28] https://thredds.socib.es

[29] http://api.socib.es

[30] http://apps.socib.es

Description

Access to the multi-platform observing system of the Balearic Islands in western Mediterranean.

VA

The Virtual Access Infrastructure consists of 3 web applications to access and download a range of different data streams collected by SOCIB.

The 3 web-application are:

— THREDDS Data Server (https://thredds.socib.es)

— Data API (https://api.socib.es)

— Data Catalog (https://apps.socib.es)

Scientific relevance

SOCIB has developed over the years a mature infrastructure, recognised internationally as a trusted data repository.

Technical Implementation

Throughout the different web applications, relevant information is provided to the end user on what each tool can provide and links to other elements of the infrastructure that might be more useful.

For example, the banner at the top of the home page of the THREDDS Catalog is a great addition. Many users in the scientific community will understand how to use the THREDDS to access and download data. For less technical users, it might be more beneficial to access the data via the catalogue.

Scientific Usability

The main page of the Data API is also very user-friendly. Access to the documentation and Python notebooks is clearly visible to the user. Each of these provide clear guidance on how to access and use the available web service. The Swagger UI also contains the Terms of Service and clear Licence information for the API.

The following link, https://apps.socib.es, provides a list of the different tools and web applications developed and maintained by SOCIB. The Data Catalogue is accessible via the following link (https://apps.socib.es/data-catalog/). It enables the user to search, access and download the data available at SOCIB data repository.

The search is very intuitive with a variety of filters available. Improvements could be made to the "Data Access" section of the interface. The feature to select multiple entries is a bit clunky, and more user-friendly alternatives would be very useful. For some datasets, a feature to download an aggregated product is available. This feature would make it easier for users to download the required dataset.

The download gives you access to the THREDDS and individual files. By experience, people are annoyed by downloading many files for the same dataset. If data can be aggregated logically, then it makes their life easier.

Acknowledgement and licensing information are clearly available for end-users.

Access Metrics

Numerous metrics are presented for each of the three web applications. It would be beneficial to select a subset of these metrics so that specific information would be highlighted. Many of the plots do not provide useful information to help decision-making on future improvements to the infrastructure.

On several plots, a large peak of users is displayed around the 1st January 2023. Is this peak related to internet bots or to "real" users like for example attending a conference or workshop?

Finally, the statistics for the API show a few users compared to the THREDDS server. It would be interesting to dive into the details of the low uptake of the API at this stage.

Outreach

The outreach activities for SOCIB, according to deliverable D11.3, comprise three Twitter messages and three news items. Other actions could be considered such as for example presentations, workshops, and tutorials for both experts and non-technical users to showcase the different elements of the infrastructure and in particular the newly developed API.

3.18.3. Response from SOCIB to Sebastien Mancini

Thanks for your valuable comments. Regarding facilitating data download, we offer the possibility of downloading one single zip file as long as the dataset is versioned. So far, the latter only occurs when the dataset has a DOI assigned. Please check the PUM[31] of the Data Catalog for further details in this regard. Nevertheless, we will facilitate data download in general in future versions of the Data Catalog. As per the 2 issues indicated related to access metrics, the first one (January 2023) is currently under investigation. We suspect

[31] https://apps.socib.es/data-catalog

that, given the fact that the API is used for regular harvesting of our datasets, this may be due to the operations of a third party data system. The second signalled issue is related to the low metrics of the API, in comparison to the ones of our THREDDS server. The main reason why is that there are many users that are using an old API which is still available. The latter will be decommissioned soon, and as a consequence, we expect to increase the number of users of the "official" API.

3.18.4. Assessment by Simon Keeble

Description

Access to the multi-platform observing system of the Balearic Islands in western Mediterranean.

VA

The Virtual Access Infrastructure consists of 3 web applications to access and download a range of different data streams collected by SOCIB.

The 3 web-application are:

— THREDDS Data Server (https://thredds.socib.es)

— Data API (https://api.socib.es)

— Data Catalog (https://apps.socib.es)

Scientific relevance, Technical Implementation, Scientific Usability & Access Metrics

Data Catalog:

The SOCIB data catalogue is easy to navigate, with a minimal understanding of data, allowing a user to explore and download data. It operates efficiently.

The UI is very 'scroll' based, and it is suggested to consider a more 'app' based approach to user interaction in the future, as the service would be straightforward to present in this way.

It was not possible to find JERICO/EC funding credit on the website.

API:

Requesting an API key was an easy process.

Connecting to data was straightforward. The help and examples in the GitHub repository are good and easy to use.

THREDDS Service:

The THREDDS service operates well, and it was easy to navigate and download NetCDF files.

Overall, the usage statistics of the services are high. There is an anomaly in the statistics in January 2023, it would be interesting to understand this, but it is an outlier in terms of the general statistics.

Outreach

Communication and outreach of the services have been conducted well.

3.18.5. Response from SOCIB to Simon Keeblee

Thanks for your valuable comments. We are about to release a new corporate site and Data Catalog version that will include all the required funding credit information. As per your comment regarding the scroll issue in the Data Catalog web application, we will explore a more suitable approach for improving responsiveness for mobile devices.

3.19. Assessment of JERICO-CORE (ID 1.1 + 33.2)

The JERICO-S3 project has undertaken a significant effort in the context of VA through Task 7.5 (T7.5) to create a **pilot virtual e-infrastructure, e-JERICO**. This e-infrastructure, later named JERICO Coastal Ocean Resource Environment (JERICO-CORE), enables the identification, discovery, and access of JERICO resources.

Next, the description of JERICO-CORE, its assessment by Anca Hienola and its assessment by Antonio Novellino are included. In response to their assessment, the comments and responses are integrated within this section for clarity and coherence, rather than being separated into distinct sections.

3.19.1. Description of the VA Service

ID	1.1 + 33.2
Name	JERICO-CORE
Institution	IFREMER + SOCIB

Short Description	JERICO-CORE is the **pilot e-infrastructure** of e-JERICO implemented in WP7. It is a **pilot for the unified central hub of JERICO-RI** to discover, access, manage and interact with JERICO-RI resources including services, datasets, software, best practices, manuals, publications, organizations, projects, observatories, equipment, data servers, e-libraries, support, training and similar assets.
VA Services	JERICO-CORE UI at DATARMOR JERICO-CORE Catalog Resource API JERICO-CORE VRE

3.19.2. Assessment by Anca Hienola and Responses from SOCIB

The development team of JERICO-CORE truly appreciates the invaluable feedback provided by the reviewer. After the assessment, and for the sake of the readability, we have included intercalated and in italic the responses from the JERICO- CORE development team.

JERICO-CORE UI at DATARMOR

VA

Website: https://ui.core.jerico-ri.eu

Scientific relevance

The JERICO-CORE UI is intended to be a tool in marine science, providing a centralized interface for accessing, managing, and utilizing vast arrays of oceanographic data. This user interface should enhance scientific research by facilitating easy access to a comprehensive network of datasets, observational tools, and analytical resources. By integrating data from various coastal observatories across Europe, JERICO-CORE supports the scientific community in conducting detailed environmental monitoring and climate research.

In its design phase, the JERICO design team recognised that information access beyond data provided by the data aggregators was necessary to support research and monitoring for the European coastal region. This included observation system status, best practices in creating and processing data, key definitions, tools for processing information, etc. Thus, we would like to clarify that while JERICO-CORE indeed indexes datasets, it is not designed as a data portal and in any way replaces the important role that the existing data aggregators have in the oceanography landscape. Instead, it serves as a resource linking data to other resources, enabling the assessment of assets available to JERICO. For instance, this approach has been implemented for data management tools as outlined in Deliverable 6.9. Additionally, the descriptions of VA 1.1 and 33.2 suggest support for large datasets.

Response:

The JERICO-CORE user interface focused on making accessible the JERICO's resource catalog that emphasizes the discoverability and access to JERICO assets, rather than handling large volumes of data directly. On the other hand, support for the extraction of large data volumes of selected in situ data from PSSs and IRSs is not provided through the user interface. Instead, this functionality is offered by the Virtual Research Environment (VRE), which utilizes the Workspace and other Blue Cloud's functionalities to facilitate data sharing.

Technical Implementation

The technical implementation of the JERICO-CORE UI faces, unfortunately, several significant issues that impact its usability and effectiveness for scientific research. I assume it is still under construction.

We acknowledge the current limitations and appreciate your understanding that this is a prototype developed within the context and scope of a scientific project such as JERICO-S3. As indicated in JERICO-S3 description of work, "An e-infrastructure, ***prototype of e-JERICO****, offering a Virtual Research Environment (VRE), will be developed as a Virtual Access (VA) scalable framework that allows visibility and easier access to JERICO-S3 RI* ***capabilities****.". In WP11, Virtual Access is offered to the e-JERICO prototype (aka JERICO-CORE) that was developed under WP7 of JERICO-S3. A prototype has been developed, and we are committed to addressing these issues and enhancing the usability and effectiveness of the JERICO-CORE UI as we move forward with the development in future phases under the umbrella of other projects (scoped in the ESFRI Roadmap). In fact, we identified the need to create a set of custom interfaces made for specific purposes.*

At the moment, I can report a non-functional login system, which is a critical barrier to accessing personalized data.

Response:

We acknowledge that this is a critical barrier to accessing personalized data. However, as mentioned earlier, access to data, particularly personalized data, is provided through the Virtual Research Environment (VRE) and the information providers (eg. data aggregators and the Ocean Best Practices Repository), not the user interface. Since managing custom information through the user interface is not required during this prototype phase of JERICO-S3, we did not implement authentication in the UI. As discussed in Deliverable 7.6, this protype aims to explore limitations and available technologies for a future sustained infrastructure.

To make development feasible within the project's scope, we adopted the EPOS software as the JERICO-CORE user interface. Consequently, we deprioritized certain functionalities that required major updates to the EPOS version provided. For instance, the login feature was omitted, as future designs will integrate the VRE, catalog, API, and UI.

It is true that we could have avoided showing the login link in the user interface to prevent confusion, and we will consider this feedback for future iterations. We again thank you very much for your suggestion.

The absence of user documentation further complicates the experience, leaving new users without guidance on navigating or utilizing the interface effectively.

Response:

We acknowledge the importance of a comprehensive user manual for the internal users and the public. Nevertheless, platform demonstrations have been carried out to the partners of the project. Moreover, deliverable D7.6 contains a brief summary of the different features of the user interface, including the top bar and left/right panels and an overview of the UI components and their functionalities.

Additionally, the interface suffers from slow loading times for map areas,

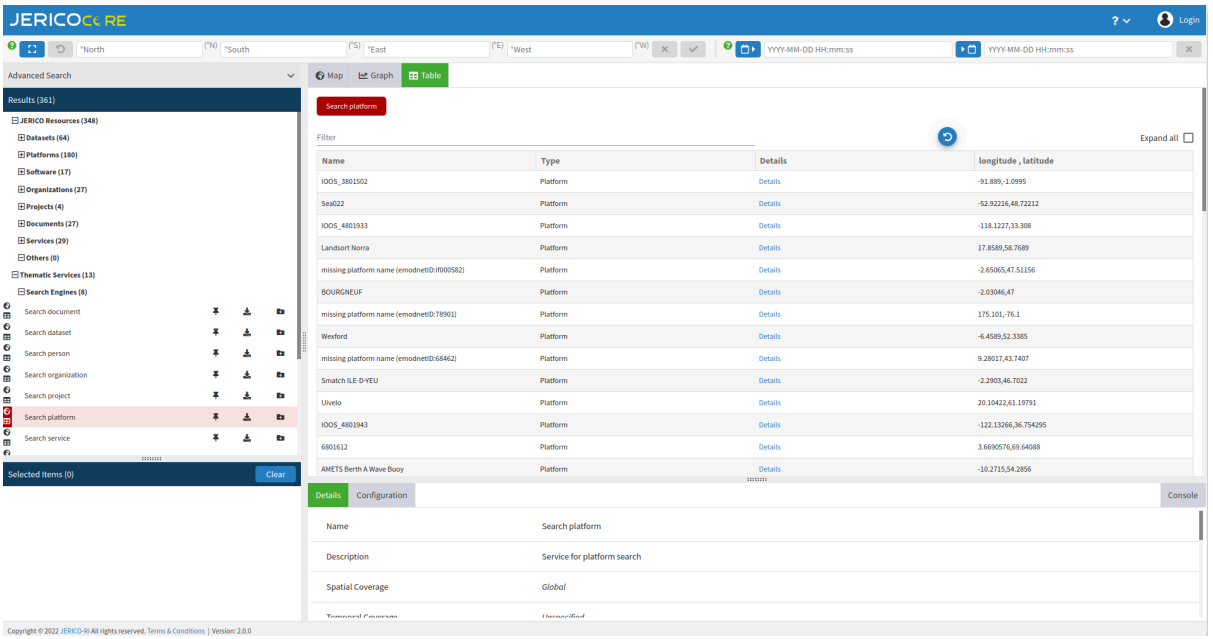
Response:

We understand its impact on the user experience, and we are committed to consider this issue for future developments and designs. It will require optimizing the processes within the infrastructure and improving the communication between components of JERICO-CORE. Again, our goal was to design a prototype, a scalable framework (as in the DoW).

the tabular view is unclear,

Response:

This is also a valuable input regarding the clarity of the tabular view. We understand that this is a significant concern from a user perspective. Deliverable D7.6 shortly explains that the Table tab shows a list of resources in the form of a table (see figure below).



The idea is to list the basic information of the asset or the associated resources and provide a link to obtain further details in case users would like to check more information about the resource (see figure below).

We will explore this issue further and work towards clarifying the tabular view in the user manual of the future integrated infrastructure. Additionally, we should plan to gather feedback from various users via the user committee to determine the best way to visualize summaries of the assets.

and some datasets do not have corresponding pins on the map (e.g. HFR Near Real Time In Situ Surface Ocean Radial Velocity: Gibraltar TARI). The visualization features are also completely lacking, which is a major drawback for a tool designed to handle complex oceanographic datasets.

Response:

We agree that having a complete picture of the geolocations of the datasets is crucial.

In this sense, the catalogue information is provided by data providers that we then integrated into the JERICO-CORE database. It is possible that we made assumptions on how data is represented by the data aggregator, that prevented us from identifying the complete

casuistry for processing the metadata and incorporating it into our database. This harvesting mechanism will be improved in future projects on close collaboration with the data aggregators.

Although we can complement asset metadata by linking information from various providers we do not aim to replace data providers. Future efforts will focus on assessing metadata quality and informing providers of necessary corrections.

Overall, while the concept of JERICO-CORE UI is highly relevant for marine and environmental sciences, its current technical execution does not meet user-friendly standards, significantly hampering its potential as a powerful research tool.

We agree that the UI is clearly improvable, and does not give the Catalog of Resources nor the capability of the infrastructure the value we think it deserves. The future design will integrate the UI, API, and VRE to ensure a more user-friendly and powerful research tool. This insight will guide our future efforts to develop more tailored solutions that better meet the specific needs of different user groups.

No return button to jerico-ri.eu

No link to Blue Cloud VLAB.

No evident connection to Blue Cloud VLAB for those who land directly on the Jerico Core pilot page.

We understand the importance of these links for seamless navigation and user experience. These issues will be resolved once all the components are fully integrated in the future.

Scientific Usability

Although in the D11.2 it is noted that the system provides DOI, how to cite and license, I could not find them. I suggest a more obvious approach to this matter.

Response:

Not sure where this was stated in D11.2, nevertheless and as part of the future operational JERICO-CORE, those 3 elements, being core metadata, will be propagated from the original source to the JERICO-CORE database.

Access Metrics

The D11.3 deliverable discusses the access metrics related to the JERICO-CORE pilot, emphasizing its performance in terms of user interaction and engagement. The access metrics presented include user sessions, page views, and the geographic distribution of users. These metrics are crucial for assessing the reach and effectiveness of the JERICO-CORE UI and its related services. However, the document does not provide a deep

analysis or comparison over time or against targets, which could be more informative for understanding trends and identifying areas for improvement.

While the document does outline basic access metrics, it lacks a detailed analytical approach that could provide deeper insights into user behavior, such as session duration or specific user actions within the UI. This kind of detailed analysis is essential for optimizing the interface and improving user experience.

Further, the metrics are presented without much context regarding the expected performance or benchmarks, which makes it difficult to gauge the actual success of the JERICO-CORE UI in engaging its target audience. For a more comprehensive understanding and to truly enhance the platform, future reports should include more granular data analyses, set against clear objectives and benchmarks.

Response:

This detailed analysis could align well with the co-design of the interface that was mentioned in response to your comment regarding the tabular view. Collecting and analyzing data on session duration and specific user actions will be essential for optimizing the interface and improving the overall user experience. In addition, access to the JERICO-CORE pilot was made available in November 2022, lacking historical data for trend analysis for the moment. Future reports will aim to include more granular data analyses, set against clear objectives and benchmarks. This will become even more relevant as we integrate all aspects of JERICO-CORE into a sustained infrastructure.

Outreach

The outreach activities for JERICO-CORE UI have been comprehensive and varied, aiming to engage a broad spectrum of audiences including the scientific community, industry, civil society, and the public. The strategies employed include workshops, social media engagement, and press releases.

The use of multiple platforms such as workshops for direct engagement and social media for broader outreach ensures that various user groups are reached effectively.

In addition, the outreach activities have successfully engaged a large portion of the scientific community and garnered significant interest from the public, which is indicative of their effectiveness.

However, the report does not detail any follow-up strategies to capitalize on the initial engagement, which is essential for sustaining interest and active participation over time.

Response:

You have highlighted a critical point regarding the need for follow-up strategies to sustain interest and active participation over time. It is our oversight not to include this in the previous deliverable D11.4. After the implementation and demonstration of the JERICO-CORE prototype, we established a user committee in coordination with WP9 comprising internal and external members. This committee evaluates various aspects of JERICO's interaction with the external world with a long-term perspective. Insights from this

group will help us define strategies to co-design and engage stakeholders with JERICO-CORE effectively. It will be explained in the deliverable D9.2"User engagement strategy plan with metrics to assess user satisfaction and expectations".

JERICO-CORE Catalog Resource API at DATARMOR

VA

API at https://api.core.jerico-ri.eu/api

Scientific relevance

This API is a great component for accessing the JERICO project's data efficiently and programmatically.

Technical Implementation

No documentation provided for newcomers.

Response:

It is true that we did not provide a user manual in the classical way. However, we understand that the Swagger documentation describing the endpoints is the common approach to document RESTful APIs. Nonetheless, it is important to consider your comment. We will include comprehensive documentation in the user manual of JERICO-CORE, covering all aspects including the user interface and the API, to address your concerns.

Scientific Usability

As above.

Access Metrics

The JERICO-CORE Catalog Resource API's access metrics provide important insights into user interactions and system performance. These metrics include data on the number of API calls, unique users, session durations, and geographic distribution of users. This information is important for understanding the reach and efficiency of the API.

The metrics indicate a steady number of API calls and user sessions, suggesting that the API is being actively used, which is positive for ongoing user engagement and system validation.

Also, the distribution of users across different regions demonstrates the API's global reach and accessibility, which is essential for fostering international collaboration and data sharing.

I think that access metrics should also include response times and error rates to assess the technical performance of the API. Monitoring these metrics could help identify and mitigate issues that affect user experience.

Response:

The latter will be certainly addressed as part of the development of the future operational system. We agree, this aspect is crucial to meet future Service Level Agreements.

Outreach

The diverse range of outreach activities ensures that information about JERICO-CORE reaches a broad audience, including potential users who can benefit from its data and services. The delivery of high-quality and informative content through these channels helps establish JERICO-CORE as a credible resource within the scientific community.

Although various outreach activities are implemented, there might be a gap in systematically measuring their impact in terms of audience engagement and the subsequent increase in API usage or collaboration. Setting up clearer KPIs (Key Performance Indicators) for each type of outreach activity could help in evaluating their effectiveness and in refining strategies to maximize impact.

Response:

As outlined in Deliverable 9.2, it is planned to include a "KPI-fed dashboard to support the improvement of products and services (in particular JERICO-CORE) based on clear feedback mechanisms. Setting up clearer KPIs for each type of outreach activity will indeed help in evaluating their effectiveness and refining strategies to maximize impact. Lastly, this topic has been addressed in the recently finished JERICO Design Study project, where it is described as a first version of a robust and sustainable set of KPIs for the future e-JERICO.

JERICO CORE VRE

VA

https://blue-cloud.d4science.org/group/jerico_core

Scientific relevance

The Blue-Cloud JERICO-CORE service plays an important role in enhancing scientific research and understanding of marine environments. By providing a comprehensive platform for accessing and integrating diverse marine and environmental datasets, it supports advanced research initiatives, facilitates data-driven discoveries, and promotes collaboration across scientific disciplines.

This service is particularly relevant for studies focused on marine biodiversity, ecosystem management, and environmental monitoring, making it a critical resource for researchers aiming to address global environmental challenges.

Technical Implementation

The Blue-Cloud JERICO-CORE platform's technical implementation showcases both strengths and areas for improvement. Positively, its integration within the broader D4Science infrastructure provides robust data access and collaborative tools, enhancing its utility for scientific research in marine environments.

However, the requirement for a double login — one for the general platform and another for specific sections within it — can be cumbersome for users, potentially hindering seamless access and user experience. Simplifying this authentication process could significantly enhance the platform's usability and accessibility.

Response:

Regarding the requirement for a double login, there was an option to avoid multilogin in the VRE by creating a JERICO D4Science Gateway instead of using a Virtual Lab in Blue Cloud. However, it was deemed unrealistic to implement within the JERICO-S3 project. Utilizing the Blue Cloud Virtual Lab allowed us to explore the potential of this infrastructure for future designs, despite the login complexity. The future integration of the VRE, API, and UI within a JERICO Gateway would address the complexity of multi-login within the VRE, significantly enhancing the platform's usability and accessibility.

Scientific Usability

I could not find: how-to-cite, info about PIDs and licences.

Response:

We will communicate this issue to the Blue-Cloud team to ensure that, if available, these important metadata are easily shown in its VRE user interface.

Access Metrics

The JERICO-CORE VRE has implemented a robust tracking system that measures various access metrics, including user sessions, page views, and user engagement within specific environments like R Studio and Jupyter. This comprehensive tracking provides insights into how users interact with the VRE, allowing for informed decisions about enhancements.

The access metrics include visual representations that illustrate the growth in user adoption over time. This not only highlights the increasing popularity of the VRE but also aids in understanding seasonal or periodic fluctuations in usage, which can be crucial for capacity planning and resource allocation.

While the metrics provide good quantitative data, there is room for deeper analysis regarding the quality of engagement. Metrics like session duration and specific interactions within sessions could offer more nuanced insights into user satisfaction and VRE efficacy.

Response:

As previously mentioned in the context of the user interface and API metrics, we recognize the importance of deeper analysis regarding the quality of engagement. Metrics like session duration and specific interactions within sessions could provide more nuanced insights into user satisfaction and VRE efficacy. We will consider this for future assessments to enhance the overall user experience.

Outreach

The JERICO-CORE VRE has utilized a variety of outreach activities, including workshops, social media engagement, and press releases, to promote its virtual access services. This multi-channel approach has effectively increased visibility and engaged a broad audience, which is essential for fostering community involvement and promoting the use of the VRE.

The outreach efforts have successfully targeted multiple audience segments, including the scientific community, general public, industry, and civil society. This inclusive approach has not only expanded the user base but also enhanced the societal impact of the JERICO-CORE services, demonstrating a strong commitment to broadening the scope of environmental research and its applications.

However, even if the outreach activities are well-documented in terms of execution, there appears to be a gap in systematic impact analysis and measurement. Establishing more concrete metrics to assess the direct impact of each outreach activity on user engagement and VRE utilization would provide clearer insights into their effectiveness and guide future strategies.

Response:

As previously mentioned in the context of the user interface and API metrics, we recognize the importance of implementing concrete metrics to assess the direct impact of each outreach activity on user engagement and VRE utilization. Establishing such metrics will provide clearer insights into the effectiveness of our outreach efforts and guide future strategies.

3.19.3. Assessment by Antonio Novellino and responses by SOCIB

The development team of JERICO-CORE truly appreciates the invaluable feedback provided by the reviewer. After the assessment, and for the sake of the readability, we have included intercalated and in italic the responses from the JERICO- CORE development team.

IFREMER JERICO-CORE UI at DATARMOR

VA

Website: https://ui.core.jerico-ri.eu

Scientific relevance

The idea to develop a workspace where to find data and pre-fab processing tools is very interesting, anyhow the current development status does not permit to express more comments. Notably some other (younger) initiatives (e.g. bluecloud to mention one of the many) are implementing similar concepts and services (workbenches, Vlabs…).

Response:

Indeed, there are other initiatives, such as Blue Cloud, that provide robust workspaces with comprehensive functionalities. We collaborate with Blue Cloud to explore the features that D4Science offers for a future and more sustainable design of the JERICO VRE. JERICO-CORE VA access is a prototype developed to explore technologies for a future sustainable design within the JERICO-DS project. In this design, we studied various options in addition to Blue Cloud such as EGI.

However, as mentioned in the VA description, the purpose of our user interface is not to implement these workspaces but to provide a visual interface for users to search and access the available assets of JERICO.

Technical Implementation

The system looks incomplete. Errors in links, blank pages, no documentations do not help.

Other systems (e.g. SeaDataNet, EMODnet, CMEMS) offer better UX and UI for data search and interaction.

Response:

We acknowledge the current limitations and appreciate your understanding that this is a prototype developed within the context and scope of a scientific project such as JERICO-S3. As indicated in the JERICO-S3 description of work, "An e-infrastructure, prototype of e-JERICO, offering a Virtual Research Environment (VRE), will be developed as a Virtual Access (VA) scalable framework that allows visibility and easier access to JERICO-S3 RI

capabilities." In sum, WP11 provided Virtual Access to the e-infrastructure prototype (e-JERICO) developed under WP7.

We are committed to addressing these issues and enhancing the usability and effectiveness of the JERICO-CORE UI as we move forward with development in future phases under the umbrella of other projects (scoped in the ESFRI Roadmap).

More specifically, while JERICO-CORE indeed indexes datasets, it is not designed as a data portal and does not intend to replace the important role that existing data aggregators have in the oceanography landscape. As you well mentioned, these aggregators have better portals because they have been in the landscape for many years while we are at the proof of concept stage. Instead, JERICO-CORE serves at this stage as a resource linking data to other resources, enabling the assessment of assets available to JERICO. For instance, this approach has been implemented for data management tools as outlined in Deliverable 6.9.

Concerning the broken links, there is a combination of factors contributing to this. As you well know, the UI front end development had very limited funding to support the fix of some of the issues that were identified during the implementation phase under T7.5.

Additionally, the catalogue information is provided by data providers that we then integrated into the JERICO-CORE database. It is possible that we made assumptions on how data is represented by the data aggregator, that prevented us from identifying the complete casuistry for processing the metadata and incorporating it into our database. This harvesting mechanism will be improved in future projects on close collaboration with the data aggregators.

Scientific Usability

Very difficult to assess, most elements are missing.

Access Metrics

Metrics are tracked by Datamor, which gives the number of visits/users. It would have been better to monitor authenticated users and type/duration of actions on the system.

Response:

The comments regarding the metrics and user assessments are particularly pertinent for enhancing the Virtual Access (VA). We recognize the importance of implementing an analytical approach to better understand user interests and enhance the user experience. This will become even more relevant as we integrate all aspects of JERICO-CORE into a sustained infrastructure. Specifically, when user authentication is implemented, we will be able to monitor actions for authenticated users.

To make development feasible within the project's scope, we adopted the EPOS software as the JERICO-CORE user interface. We deprioritized certain functionalities that required major updates to the EPOS version provided. For instance, the login feature was omitted, as future designs will integrate the VRE, catalog, API, and UI.

It is true that we could have avoided showing the login link in the user interface to prevent confusion. This was also due to limitations in the front-end development team funding.

Outreach

The outreach activities were intense.

JERICO-CORE Catalog Resource API at DATARMOR

VA

API at https://api.core.jerico-ri.eu/api

Scientific relevance

This API is a great component for accessing the JERICO data.

The limit is in the available data.

Response:

Because JERICO-CORE was implemented as a pilot in the scope of JERICO-S3, the metadata harvesting mechanism we implemented considered only the best case scenario regarding the processing of the metadata. In addition, tagging JERICO resources is an ongoing process that has to be fully implemented in order to implement a sustainable gathering metadata mechanism. The latter will be improved in the context of the ESFRI roadmap as JERICO is implemented as a sustainable RI.

Technical Implementation

No documentation provided for newcomers. Hard to use for people outside the loops.

Response:

It is true that we did not provide a user manual in the classical way. However, we understand that the Swagger documentation describing the endpoints is the common approach to document RESTful APIs. Nonetheless, it is important to consider your comment. We will include comprehensive documentation in the user manual of the sustained JERICO-CORE, covering all aspects including the user interface and the API, to address your concerns.

Scientific Usability

As above.

Access Metrics

Metrics give an overview on how users interacted with the VA. Given the no-documentation, it looks like that the interactions were only from internal users (and peaks may be related to tests).

Response:

Despite its newness, the API has shown a clear upward trend in usage, with peaks corresponding to workshops and internal assessments rather than just tests. The use of the API has primarily been limited to internal users who were trained to its use. Additionally, the demo conducted in Lisbon was another way for users to learn how to use the API and user interface.

Outreach

Outreach was intense.

JERICO CORE VRE

VA

https://blue-cloud.d4science.org/group/jerico_core

Scientific relevance

The Blue-Cloud JERICO-CORE is very interesting and useful VA, the "limit" is that it is VA in a VA, or better a service in a VA.

Response:

Utilizing the Blue-Cloud Virtual Lab allowed us to explore the potential of this infrastructure for future designs. There is a potential strength provided by JERICO's integration as a D4Science Gateway, which would avoid the limitations of being a service in a VA. While a JERICO D4Science Gateway instead of using a Virtual Lab in Blue Cloud might make more sense as an independent research infrastructure, it was deemed unrealistic to implement within the JERICO-S3 project.

Technical Implementation

Having the JERICO-CORE in bluecloud facilitates the use of JERICO data coupled to other tools and services (from the BlueCloud network).

Double login — one for the general platform and another for specific sections within it — is not ideal.

Response:

We acknowledge your comment about the double login. Utilizing the Blue Cloud Virtual Lab enabled us to explore the potential of this infrastructure for future designs, despite the login complexity. The future integration of the VRE, API, and UI within a JERICO Gateway would address the complexity of multi-login within the VRE, significantly enhancing the platform's usability and accessibility.

Scientific Usability

Missing many of the information.

Response:

Please refer to the use cases described in D11.3 (sections 3.3.3 and 3.3.4).

Access Metrics

Metrics give an overview on how users interacted with the VA.

Response:

This data is crucial for understanding user behavior and improving the platform. As we continue to develop and refine JERICO-CORE, we plan to incorporate more detailed metrics to gain deeper insights into user interactions and enhance the overall user experience.

Outreach

The outreach activities was intense. Establishing more concrete metrics to assess the direct impact of each outreach activity on user engagement and VRE utilization would provide clearer insights into their effectiveness and guide future strategies.

Response:

After the implementation and demonstration of the JERICO-CORE prototype, we established a user committee in coordination with WP9, comprising internal and external members. This committee evaluates various aspects of JERICO's interaction with the external world with a long-term perspective. Insights from this group will help us define strategies to co-design and engage stakeholders with JERICO-CORE effectively. It will be explained in the deliverable D9.2 "User engagement strategy plan with metrics to assess user satisfaction and expectations".

Additionally, it is planned to include in D9.2 clear KPIs for each type of outreach activity will indeed help in evaluating their effectiveness and refining strategies to maximize impact. Lastly, this topic has been addressed in the recently finished JERICO Design Study project,

where it is described as a first version of a robust and sustainable set of KPIs for the future e-JERICO.

3.20. Assessment of SYKE-ALG@LINE (ID 34.1)

Next, the description of SYKE-ALG@LINE, its assessment by Thierry Carval and its assessment by Shaun Deyzel are included.

3.20.1. Description of the VA Service

ID	34.1
Name	SYKE-ALG@LINE
Institution	SYKE
Short Description	Monitors the state of the Baltic Sea using ferry box systems. Collected data includes simultaneous measurements of physics, biogeochemistry, and biology carried out in two ferry lines.
VA Services	The VA Infrastructure consists of a set of web pages [32] with information about Alg@line and its data.

3.20.2. Assessment by Thierry Carval

SYKE-ALG@LINE e-infrastructure / portal/ Web

Description

Monitors the state of the Baltic Sea using ferry box systems. Collected data includes simultaneous measurements of physics, biogeochemistry, and biology carried out in two ferry lines.

VA

[32] https://www.marinefinland.fi/en-US/The_Baltic_Sea_now/Automatic_observations_from_ships, https://www.marinefinland.fi/en-US/The_Baltic_Sea_now/Algal_bloom_observations, http://swell.fmi.fi/Algaline/ and https://www.finmari-infrastructure.fi/ferrybox/

The VA Infrastructure consists of a set of web pages 96 with information about Alg@line and its data:

https://www.marinefinland.fi/en-US/The_Baltic_Sea_now/Automatic_observations_from_ships/Current_observations

Scientific relevance

The ferry box observations consist of long time series of Algal observations (ferry box and water samples).

This sustained observation of the Baltic Sea started in 1993 and is ongoing, this is a major long term commitment.

The web page does not contain information on data processing and quality controls.

Technical Implementation

A web page showing in real-time the map observations of ferry lines. The maps and charts are static images with a good presentation and description of the observations. However, there is no link to access the real-time data. The time-series page show graphics of algae observations (water samples) performed in the last year compared with average values of the 21st century. There is no link to access these data.

Scientific Usability

The web page Alg@line long term measurement on environment.fi is broken.

It was not possible to assess the scientific usability due to the broken link.

However, data from SYKE's ferry boxes circulate in real time and delayed mode towards Copernicus marine service and EMODnet where the scientific community works with these long time series.

Access Metrics

There is a spiky number of monthly users (from 0 to 11000).

It is difficult to evaluate the median monthly number of visitors, probably around 50.

Outreach

The list of outreach activities is relevant, with links to the corresponding online resource.

The video "How Alg@line" works provides a technical description of a ferry box system.

3.20.3. Assessment by Shaun Deyzel

SYKE-ALG@LINE e-infrastructure / portal/ Web

Description

Monitors the state of the Baltic Sea using ferry box systems. Collected data includes simultaneous measurements of physics, biogeochemistry, and biology carried out in two ferry lines.

VA

The VA Infrastructure consists of a set of web pages 96 with information about Alg@line and its data:

https://www.marinefinland.fi/en-US/The_Baltic_Sea_now/Automatic_observations_from_ships/Current_observations

Scientific relevance

This VA infrastructure includes a compilation of websites serving the Alg@line project and its data. The Alg@line project is managed by the Finnish Environment Institute (SYKE) as a network of maritime transport vessels installed with flow-through measuring systems called Ferry boxes. Merchant vessels sail from Helsinki to Stockholm, Kemi and Lübeck while producing a suite of environmental data for the monitoring of the Baltic Sea state.

Variables measured include salinity, temperature, chlorophyll-a, turbidity and the concentration of dissolved organic material. Water samples are additionally collected for the analysis of phytoplankton species composition and nutrients content. Vessels currently contributing to the project are M/S Finnmaid and M/S Silja Serenade.

Technical Implementation

The first web page explains the rationale behind the use of Ferry boxes and the partnership with merchant ships and shipping lanes in the gathering of data. Links are provided to an explanation of observations being made and to time series (concepts and plots). The time series plots are climatologies of selected variables (mainly phytoplankton biomass and nutrients) for specific regions.

The second web page focuses on algal blooms specifically, with context, general and up-to-date information posted on the algal bloom state of the Baltic Sea during the summer months. It is a useful page that puts ocean users in contact with up-to-date information, including how to identify algal blooms, their potential toxicity and contact numbers to a Poison Information Center, for emergency events.

The third webpage contains real-time data served from the Alg@line ship network operating in the Baltic Sea. Data are updated automatically and is served as is (no QC).

Scientific Usability

A disclaimer to this effect is duly noted on the "About" tab. Profiles are served for various variables as a function of location (route followed by the vessel, presumably). The current profiles tab shows the most recent plot versus those from previous cruises. Plots are clearly labelled and easy to interpret.

Also, the interface between the plots run smoothly, and refreshes quickly enough. An additional expression of these data is given in time by location contour plots, separated by month and year scale. This resource is good for gaining a quick snapshot, but it would be good to also embed a link to portals where the data can be downloaded. This can be ascertained by following the links listed in the About tab (not immediately clear in my brief search thereof)).

Access Metrics

Access metrics data are sourced from Google Forms submitted by SYKE staff on a monthly basis, based on their Google Analytics reports. Traffic volumes are analysed along with metrics related to session quality and traffic origin. The large volumes of sessions and page views reported does not indicate whether this is for a month, or total volume of traffic; I'm assuming the latter.

The number of new versus returning users are analysed over time, with interesting peaks around the summer months (possibly linked to the annual peak in blooms). The user statistics does not indicate whether the data distinguishes between pages or if it accumulates for the entire website.

Outreach

Outreach activities were limited to four outputs and involved press releases and release notifications of data portals.

3.21. Assessment of Keri Island Research Station (ID 35.1)

Next, the description of Keri Island Research Station, its assessment by Anca Hienola and its assessment by Antonio Novellino are included.

3.21.1. Description of the VA Service

ID	35.1
Name	Keri Island research station
Institution	TALTECH
Short Description	Part of the Network of experimental research stations of the Estonian Observatory that measures high-frequency full-depth profiles of temperature, salinity, turbidity, oxygen content, chlorophyll-a and pyocyanic fluorescence in the Central Gulf of Finland.
VA Services	The VA Infrastructure consists of a webpage[33].

3.21.2. Assessment by Anca Hienola

TalTech Keri Island research station e-infrastructure

Description

Part of the Network of experimental research stations of the Estonian Observatory that measures high-frequency full-depth profiles of temperature, salinity, turbidity, oxygen content, chlorophyll-a and pyocyanic fluorescence in the Central Gulf of Finland.

VA

https://taltech.ee/en/department-marine-systems/marine-information

Scientific relevance

The Marine Information section on TalTech's website provides data and resources for marine science and engineering, supporting research in oceanography, maritime technologies, and marine ecology.

Technical Implementation

At the time of this review, the webpage was not operational, and no data were accessible, preventing a thorough assessment. In general, it is not easy to navigate the page. Maybe

[33] https://taltech.ee/meresusteemide-instituut/mereinfo

one single page with all the data, logical download capabilities would increase the usage of the data.

Scientific Usability

As far as I can tell, no licence or citation information is mentioned on the site. An enhancement would be to include a data licence, like CC-BY, that is readable by both humans and machines and PIDs (in case they are not available). User documentation would also be an improvement.

Access Metrics

The volume of traffic, session quality (session duration and bounce rate) and the origin of traffic are analysed. The number of sessions and number of views are average. I would like to know what happened in October 2023 when the number of sessions and number of users drastically increased.

Outreach

Since the last review, there has been no change; the D11.3 deliverable still lists only two outreach activities, which could explain the limited number of users. It is surprising that there is no record of participation in conferences or workshops.

3.21.3. Assessment by Antonio Novellino

TalTech Keri Island research station e-infrastructure

Description

Part of the Network of experimental research stations of the Estonian Observatory that measures high-frequency full-depth profiles of temperature, salinity, turbidity, oxygen content, chlorophyll-a and pyocyanic fluorescence in the Central Gulf of Finland.

VA

https://taltech.ee/en/department-marine-systems/marine-information

Scientific relevance

The Marine Information section on TalTech's website provides data and resources for marine science and engineering, supporting research in oceanography, maritime technologies, and marine ecology.

Unfortunately, the portal is providing pictures of data, far away from being FAIR or a VA. Navigating the website you may reach more interactive pages e.g. http://on-line.msi.ttu.ee/metoc/ but while this web portal offers an easy UX, data are not really accessible.

Technical Implementation

See previous comments.

The VA is supposed to offer VA access to Keri Station, but the only data you can find are pictures, and pictures cannot be used for further processing.

Scientific Usability

No licence or citation information is mentioned on the site.

Notably, most of the data under the observation data are not included yet in either CMEMS or EMODnet.

System FAIRness can be largely improved, interoperability is very limited.

Access Metrics

Views on page, in this specific case this is not a good matrix as the page is not interactive and data cannot be downloaded or connected (only pictures).

Outreach

Outreach is very limited.

3.22. Assessment of OBPS-OTGA (ID 36.1)

Next, the description of OBPS-OTGA, its assessment by Thierry Carval and its assessment by Shaun Deyzel are included.

3.22.1. Description of the VA Service

ID	36.1
Name	OBPS-OTGA
Institution	IODE of UNESCO-IOC
Short Description	**Ocean Best Practices System** (OBPS): Open access, permanent, digital repository of community best practices in ocean-related sciences maintained by the IODE of the UNESCO-IOC as an IOC coordinated activity.

	The OceanTeacher Global Academy (OTGA) Project aims at building equitable capacity related to ocean research, observations, and services in all IOC Member States. **AquaDocs:** Open access thematic document repository covering the natural marine, coastal, estuarine/brackish, and freshwater environments maintained by the UNESCO/IOC International Oceanographic Data and Information Exchange (IODE) and the International Association of Aquatic and Marine Science Libraries and Information Centers (IAMSLIC). With support from the FAO Aquatic Sciences and Fisheries Abstracts.
VA Services	The VA Infrastructure consists of three different websites: AquaDocs[34] (an oceanographic documentation open-access repository), OceanTeacher[35] (an oceanographic web-based training platform) and OceanBestPractices[36] (a best practices repository).

3.22.2. Assessment by Thierry Carval

OceanTeacher

OBPS document repository

Aqua Docs

Description

Ocean Best Practices System (OBPS): open access, permanent, digital repository of community best practices in ocean-related sciences maintained by the IODE of the UNESCO-IOC as an IOC coordinated activity.

VA

https://search.oceanbestpractices.org/

The OceanTeacher Global Academy (OTGA) Project aims at building equitable capacity related to ocean research, observations, and services in all IOC Member States.

https://classroom.oceanteacher.org/

[34] https://aquadocs.org

[35] https://classroom.oceanteacher.org

[36] https://repository.oceanbestpractices.org

AquaDocs: Open access thematic document repository covering the natural marine, coastal, estuarine/brackish, and freshwater environments maintained by the UNESCO/IOC International Oceanographic Data and Information Exchange (IODE) and the International Association of Aquatic and Marine Science Libraries and Information Centers (IAMSLIC). With support from the FAO Aquatic Sciences and Fisheries Abstracts.

https://aquadocs.org/

Scientific relevance

This Virtual Access is composed of 3 distinct services and websites: AquaDocs (ocean documentation open-access repository), OceanTeacher (training platform) and Ocean Best Practices (repository for best practices).

AquaDocs is the joint open access repository of UNESCO-IOC-IODE (International Oceanographic Data and Information Exchange), the International Association of Aquatic and Marine Science Libraries and Information Centers (IAMSLIC) and the FAO Aquatic Sciences and Fisheries Abstracts (ASFA). It encompasses the natural marine, coastal, estuarine/brackish and freshwater environments. It covers all aspects of the science, technology, management, and conservation of these environments, their organisms and resources, and the economic, sociological and legal aspects.

OceanTeacher Global Academy provides a comprehensive web-based training platform that supports classroom training (face-to-face), blended training (combining classroom and distance learning), and online learning.

The Ocean Best Practices is a long term secured repository organised by communities and collections. It provides well accepted ocean best practices. This service gathers, shares and promotes best practices for ocean research, observation, and data management communities.

Technical Implementation

Aquadocs is a website to search and download documents on a wide repository. The search facility is very interactive, and the results provide a good overall view of the metadata associated with documents; the use of facets is efficient to analyse the results of a search query. The results are downloadable.

OceanTeachers (and OceanExperts) website is well-organised and intuitive to discover the course of its vast catalogue. The events calendar advertises dozens of courses for the coming months. The search facility organised with maps and facets is efficient and provides

a good overview of many experts, institutions, and themes covered by OceanTeachers. After identification and registration, it is straightforward to access the Table of contents of the courses and start the different modules.

Ocean Best Practices has a clear user interface that provides well-organised, faceted search of documents. Multiple versions of the same document are available for download by the users. The registration facility is available for providers to contribute to best practices.

Scientific Usability

Aquadocs website clearly highlights its objective, what it is trying to support and also define what is actually not in scope. There are a number of user guides available for people to access for a number of activities.

Aquadocs provides user e-mail subscription to track collections updates. The deposit service for providers feeds new items to the repository. The metadata associated with a particular dataset is clear and well curated. It contains, where applicable, a link to a Digital Object Identifier (DOI) and appropriate licensing information. The use of the Creative Commons licence is clearly displayed.

OceanTeachers courses are dedicated to ocean knowledge, its face-to-face, hybrid or web courses reach a vast number of scientists or ocean aware citizens.

With Ocean Best Practices, each document has a series of metadata displayed consistently, providing clear licensing information such as Creative Commons and Digital Object Identifier that can be reused by the scientific community.

Access Metrics

Aquadocs metrics shows high attendance figures with an average of 20 000 users per month in 2022 and a good increase to 30 000 users per month in 2023. The geographical distribution of users is well-balanced between America, Europe, China and a lesser number from Africa.

Surprisingly, the number of new user's is very high and the returning very low to less than 5%. There may be a bias in this statistics which may be due to the fact that most regular users do not perform daily searches, but episodic bibliographic searches count as new users.

The statistics of OceanTeachers are difficult to analyse, the numbers before 2021 show more than 1000 monthly users whereas 2021–2023 numbers are dwarfed by 2021 numbers.

OceanBestPractices numbers are impressive, with about 5000 users per month in the last 3 years with a very well-balanced geographical distribution. The number of returning users is below 10%.

Outreach

The IODE meetings regularly present the Aquadoc, OceanTeachers and OceanBestPractices tools and their developments.

Ocean Teachers is by nature an outreach service. Its "Event calendar" is impressively full of training sessions scheduled for the next 3 months.

Ocean Best Practices has a "Community and development" section, which provides excellent outreach services with courses, tutorials, webinars, and workshops.

3.22.3. Assessment by Shaun Deyzel

OBPS-OTGA (IODE of UNESCO-IOC)

Description

Ocean Best Practices System (OBPS): open access, permanent, digital repository of community best practices in ocean-related sciences maintained by the IODE of the UNESCO-IOC as an IOC coordinated activity.

VA

This VA infrastructure consists of three websites, namely: AquaDocs, OceanTeacher and OceanBestPractices.

Scientific relevance, Technical Implementation & Scientific Usability

AquaDocs is a joint open access repository (IODE and IAMSLIC), with a scope that covers marine, coastal, estuarine and freshwater environments. Collections cover all aspects of science, technology, management, conservation issues and associated socio-ecological/economical aspects. AquaDocs provide FAIR access to marine and aquatic information. It also provides a repository service to organisations and individuals without the means to manage such information themselves.

The website is easy to navigate and displays pertinent information on context, partnerships, and funders in appropriate spaces. User information is displayed, which gives the user a

quick overview of page visits by theme (community, collection, item, file downloads), usage per month, top item visits and top file downloads. This is an interesting addition to the user experience.

The OceanTeacher Global Academy website delivers IOC capacity development through comprehensive internet-based training suited for classrooms, blended training and online/distance training configurations. The website delivers a lot of information in a single scroll down page, including the courses on offer and a list of partner institutions functioning as regional specialised training centres. Users must register to be reviewed for eligibility to enrol for a specific course. Site news is displayed at the bottom of the page with links to source pages.

The OceanBestPractices (OBP) website is a repository of documents and objects with a search and discovery function for users. Users are given an immediate overview of guidelines, a list of communities and the latest submissions. Custom searches can be conducted directly from the landing page. The "About" and "FAQs" tabs otherwise provide comprehensive supplementary information and explanations. The website is easy to navigate and serves its purpose well.

Access Metrics

Access statistics for all three websites are monitored with Google Analytics. Data are specifically sourced from the Google Analytics API. Access metrics included overall page views and sessions, geographic and user analyses, bounce rate, device, and traffic analyses.

The lapse in data from July-December 2023 in lieu of the deprecation of the old version of the Analytics API was supplemented with additional plots constructed for the OceanTeacher and OBP websites for that period. These compared the users versus new users and sessions over time, as well as bounce rate and type of device.

I found the access metrics analyses framework comprehensive and adequate, given the purpose.

Outreach

Ten outreach activities are reported for the period 20 February 2019 to 23 August 2023. Activities included conference attendance, magazine articles, website posts/blogs, distribution of flyers, webinars and similar presentations. The scientific community is the main audience reached, although popular articles and website posts seem to have reached numerous civil society and industry members, as well as policymakers.

3.23. Assessment of VLIZ Marine Data Archive (ID 38.1)

Next, the description of VLIZ Marine Data Archive, its assessment by Sebastien Mancini and its assessment by Simon Keeble are included.

3.23.1. Description of the VA Service

ID	38.1
Name	VLIZ Marine Data Archive
Institution	VLIZ
Short Description	The infrastructure is an archival platform that provides a Java based interface with a connected MS SQL Server database for upload and documentation of data files.
VA Services	The VA Infrastructure consists of a website[37].

3.23.2. Assessment by Sebastien Mancini

Assessment of VLIZ Marine Data Archive (ID 38.1)

Description

The infrastructure is an archival platform that provides a Java-based interface with a connected MS SQL Server database for upload and documentation of data files.

VA

The Virtual Access Infrastructure consists of a website (https://marinedataarchive.org/).

Scientific relevance

The landing page of the website is very clear and provides a link to a number of tabs with additional information.

Technical Implementation

In the introduction, it is mentioned that the Marine Data Archive can serve individuals, consortia, working groups and institutes. I am just wondering if the targeted audience could

[37] https://marinedataarchive.org

be more specific. For example, would any researchers in the World be able to access the repository and store data?

Good documentation is provided from the landing page. A user manual, updated in 2018, is made available and provide step-by-step instructions.

Scientific Usability

The MDA Policy document, updated in 2023, contains more information on the features available or not available in the tool. It is made clear that the repository is about storing and archiving data. This is the initial step to its data management, and more work would be required to quality control the data or make it available through a discovery website.

I am wondering how this initiative is related to the EMODnet Data Ingestion Portal.

Access Metrics

The metrics provided are appropriate for the monitoring of this repository.

The number of users is growing over time. If possible, it would be useful to provide more metrics on the type of users using the repository. For example, the type of institutions they are coming from, which countries do they come from…

Another suggestion would be to provide any information about how often users are accessing the tool. Do users access the tool on a regular basis or only at specific times when finalising a project, for example?

Outreach

The list of outreach activities for this VA is extensive and diverse, comprising workshops, conference presentations, training sessions, Twitter messages…

3.23.3. Assessment by Simon Keeble

Description

The infrastructure is an archival platform that provides a Java-based interface with a connected MS SQL Server database for upload and documentation of data files.

VA

The Virtual Access Infrastructure consists of a website (https://marinedataarchive.org/).

Scientific relevance, Technical Implementation & Scientific Usability

It was necessary to register for the service initially. The process was straightforward.

Locating and downloading data is easy.

After looking at other navigation, it wasn't obvious how to get back to the Archive, as it is the 3rd menu item. Minor UX point.

The web user interface is a little dated and would benefit from modernisation in the future.

It was not possible to find JERICO/EC funding credit on the website.

Access Metrics

The usage statistics show that the service is under constant use, but not in high numbers. That is to be expected of a service of this nature.

Outreach

The communications and outreach activities are plentiful.

4. OUTREACH, DISSEMINATION, AND COMMUNICATION ACTIVITIES

The results of these documents have been communicated, mainly, to the members of JERICO-S3, especially to the partners of WP11. These communication activities consist of:

- Online presentation in the June 2023 JERICO-S3 Final General Assembly;
- Communication of the assessments by the VA Expert Panel of each VA service to the concerned organization.

These communication activities are helping the partners of WP11 improve their VA services. They are also fostering collaboration between WPs.

Annexe 4 of D11.3 includes a report of the outreach activities carried out by the JERICO-S3 WP11 partners to promote their VA services. The report corresponds to the period from September 2022 to December 2023 (the last 28 months of the project).

5. CONCLUSIONS

Each VA service has been assigned to two of the six members of the VA Expert Panel of JERICO-S3. This document contains these assessments together with a succinct description of each service and, optionally, the response of the VA infrastructure. The assessments are based on the access metrics reported in D11.3, the outreach activities reported in D11.3, and the direct interaction of the panel members with the VA service.

Although each VA service has had specific feedback provided by the assigned VA Expert Panel members, the following are the general conclusions we could draw from the collection of assessments.

Recommendations from these assessments stressed the need for enhanced outreach strategies and more detailed user engagement metrics. Strengthening outreach efforts could broaden visibility and adoption within the scientific community, while improved metrics would offer deeper insights into service utilization and impact. These enhancements are critical not only for increasing adoption rates, but also for maximizing the effectiveness of VA services in supporting research and data accessibility.

Beyond specific services, assessments of the Keri Island Research Station, OBPS-OTGA, and VLIZ Marine Data Archive provided further insights into their roles in environmental monitoring, oceanographic research, and global best practices. Each assessment highlighted strengths and areas for improvement, underscoring the diverse contributions of VA services.

Overall, the evaluations underscored the transformative potential of VA services in facilitating scientific collaboration and generating data-driven insights. Addressing identified challenges and implementing recommended enhancements will enable these services to better meet the evolving needs of the scientific community, thereby enhancing data accessibility and contributing significantly to global scientific knowledge and innovation.