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 describes a series of functional tools available for the JERICO-RI community supporting the harmonized management of mature coastal observing platforms as described in JERICO-S3 D5.2, namely Mooring, FerryBox, High Frequency Radar, Underwater Glider.

They include tools entirely designed and realized within JERICO-S3 and tools that have received a substantial contribution from JERICO-S3 discussions, deliverables, workshops, and have been developed in a collaborative framework with other projects.

Tools span from software routines for data management and data Quality Control to web applications for joint management of platform issues to methods and guidelines for structuring practices documentation and assessing their maturity level.

After the introduction, a main section contains the descriptions of each tool according to a uniform scheme.

First, a table is provided summarizing key information like the tool's purpose, scope of applicability, the link to the tool itself and to its documentation.

Then, the tool and its features are described with a minimum level of detail. A second paragraph highlights the added value and contribution deriving from actual and/or previous work in JERICO projects, aimed at supporting the tool development. The contribution could be in terms of best practices, deliverables, workshops, surveys, etc.

The last paragraph is dedicated to the foreseen and potential use of the tool in a wider context and/or as a component or framework for other tools.

2.INTRODUCTION

The value of best practices in JERICO-RI has been highlighted through the introductory section of JERICO-S3 D5.2 "Electronic handbook for mature platforms". The JERICO RI has long recognized that the use of common methods or best practices in operating ocean observing platforms will improve harmonization across similar platforms/sensors, facilitating data comparability, and the quality of data itself.

Four observing platforms were identified during JERICO projects as pilot platforms (Mooring - HF Radar - FerryBox – Glider) and a long process for refining their best practices was supported during recent years, showing however uneven results due to the inherent diversity of the platforms, their different complexity versus dedicated resources and critical mass of community members involved in JERICO-RI.

Despite that, an electronic technical handbook of best practices for implementing and operating those platforms has been realized, and a further step has been achieved within Task 5.2 with the design and (co-)development of functional tools supporting harmonized management of the platforms and best practices implementation.

Most of the tools are intended for harmonization of practices between different operators respect to the same observing platform, as the cross-platform harmonization is a much higher challenging objective. However, some of them are conceptually ready for becoming cross-platform and need just a major upgrade for that purpose.

3.DESCRIPTION OF FUNCTIONAL TOOLS

3.1. HOORT: HFR Online Outage Reporting Tool

3.1.1. Summary of characteristics

Name/title	HOORT: HFR Online Outage Reporting Tool
Type	Free and open web-based application
Purpose	To aid High-Frequency Radar (HFR) operations and maintenance and keep operators more aware of common outages, supporting also the reporting.
Target observing platform	HF radar stations (can be adapted to any platform with major upgrade). Key Platform Performance Indicators (KPPIs) available in the dashboard from HOORT have been defined for all mature platforms (e.g. HFR, gliders, ferry boxes, fixed stations) in JERICO-S3 D5.3.
Developers	SOCIB. Contributions from CNR and AZTI. Other contributors: Mid-Atlantic Regional Association Coastal Ocean Observing System (MARACOOS), for guidance and feedback during the HOORT development, PUERTOS del Estado (providers of historical record of outages from the HFR-DeltaEbro), all European HFR operators (providers of data and metadata of their stations), all beta-testers (from the European HFR network and SOCIB staff).
Funding projects and/or initiatives	EuroSea[1], JERICO-S3
Link to the tool	https://hoort.hfrnode.eu/
Manuals and other related documents	Product User Manual (to be available in the tool)

3.1.2. Description and features

The main characteristics of HOORT are summarised as follows (further detailed in the EuroSea D3.14, not yet published):

- **HOORT** serves as:
  - a forum for troubleshooting.
  - a database of outage records per each HFR station.

[1] EuroSea (https://eurosea.eu/) has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 862626

- an aid to operations and maintenance.
- a tool to report ongoing and past outages and to provide metrics about the HFR stations performance.

- The **main objectives** from HOORT are threefold:
  - 1) automatically detect the outage.
  - 2) automatically alert the HFR operator.
  - 3) provide an interface to manually report the outage following defined best practices for HFRs operation and maintenance.
- HOORT follows this **workflow**:
  - It is connected by means of an REST API (descriptions available in sections 3.4 and 3.5) to the European HFR Node database.
  - It automatically creates a new outage when the radial file from the HFR station has a delay of more than 12 hours in the database.
  - It automatically sends an alarm notification by email to the operator(s) so they are definitely aware of station outages sooner.
  - It guides the HFR operator to report the outage of the HFR station. For closing the outage, the operator should log in to HOORT and provide the outage details.
- HOORT **allow** the HFR operator;
  - To daily monitor their HFR stations performance, by using the Dashboard (see Fig. 3.1.2.1).
  - To know their HFR stations status.
  - To manage and to be aware of their HFR station new or open outages.
  - To add data annotations (for radials and totals) of their HFR stations.

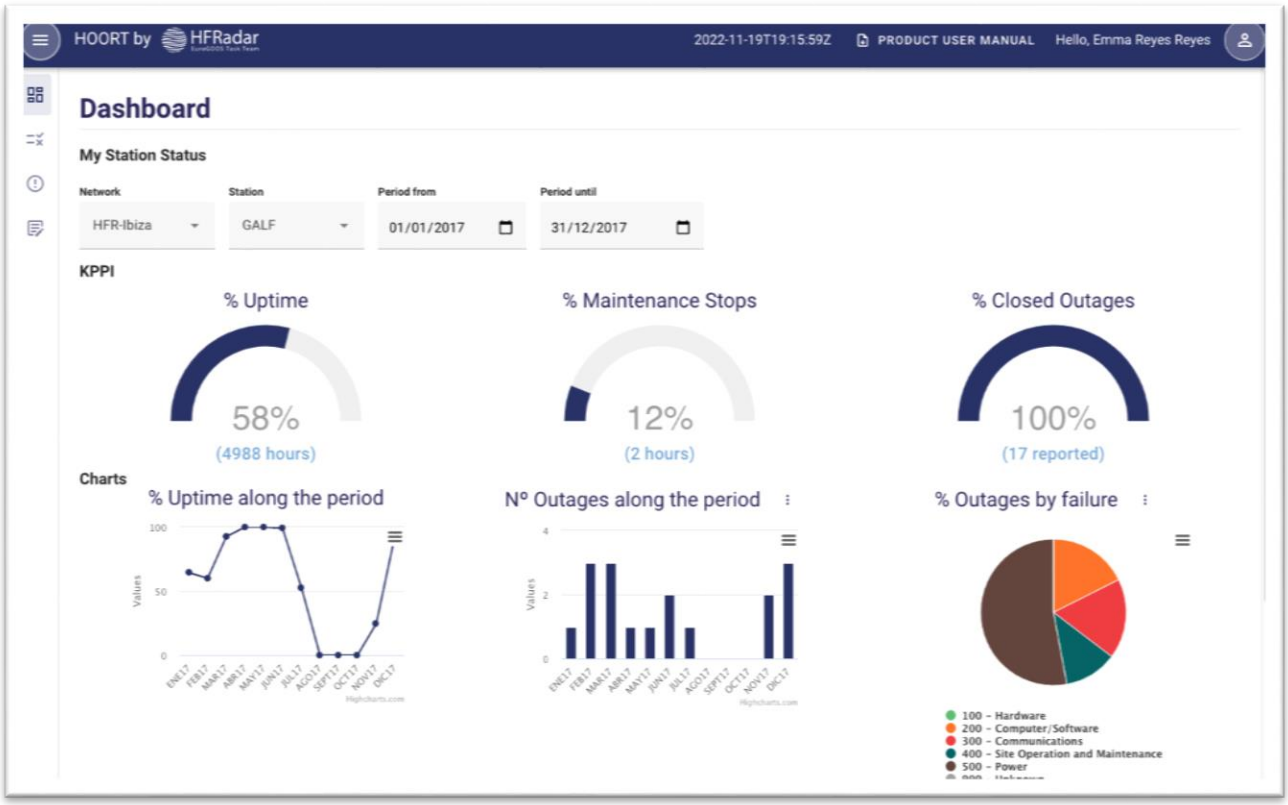


Figure 3.1.2.1.- Screenshot of the Dashboard from HOORT showing the KPPIs and Charts from the HFR station GALF belonging to the HFR-Ibiza network.

3.1.3. JERICO contribution

The implementation of HOORT have been benefited from the **previous contributions** in the context of:

- Jerico NEXT:
  - The European common data and metadata model for real-time HFR data, as defined in the Deliverable 5.14.
  - The outage coding scheme, as defined in the Deliverable 2.14 (Annex IV).
  - The best practices for operations and maintenance, as detailed in the Deliverable 2.14 and published by Mantovani et al., 2020.
- Jerico S3:
  - The Key Platform Performance Indicators defined in the framework of the WP5 for all mature platforms (D5.3, not yet published) that have been refined for specific implementation in HOORT (Dashboard). HOORT includes three KPPIs (see Fig. 3.1.3.1) from the second criteria (i.e. reliability), which is defined as the likelihood that the HFR station will be maintained in working order.

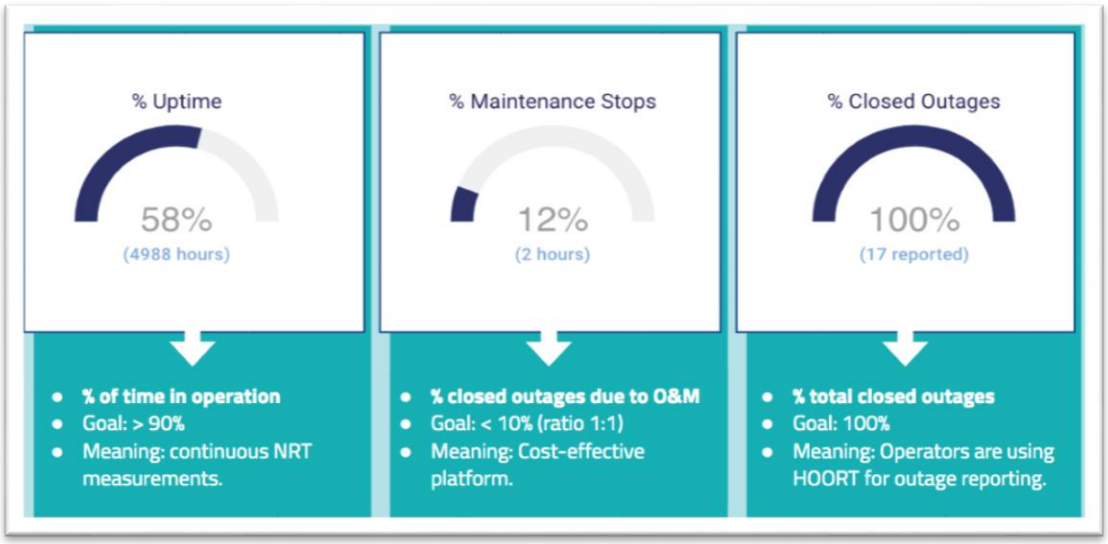


Figure 3.1.3.1.- Key Platform Performance indicators implemented in the Dashboard from HOORT.

During the development of HOORT, some gaps and **needed elements** were identified and developed (see Fig. 3.1.3.2) in the context of Jerico S3 (all of them described in different sections from this deliverable):

- The API for the European HFR Node (see section 3.4) and respective API end-points (i.e. point of entry in a communication channel when two systems are interacting) to report and resolve the outages of the HFR stations.
- The API for HOORT and the database (see section 3.5).
- Detailed documentation describing the Glossary of required terms, the status flow, the filter Types, the product user manual -PUM-, etc (available in the appendices of the HOORT PUM).
- A Simple Mail Transfer Protocol (SMTP) Server must be used to send, receive and relay emails of outage notifications. In a wider perspective, it could support Helpdesk activity. It has to be evaluated the convenience of setting up a dedicated service within the European HFR Node, or just rely on external available services.

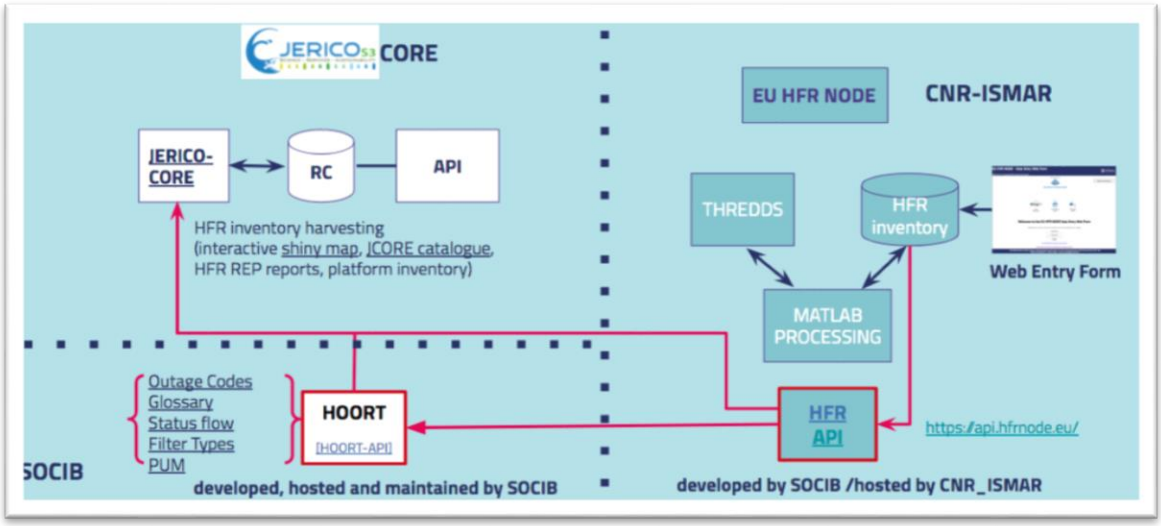


Figure 3.1.3.2.- Scheme of the elements needed (highlighted with red line) and developed, showing also the workflow, in the context of HOORT.

3.1.4. Potential use for third-party applications

As mentioned above, **HOORT is a scalable application** that can be implemented for other mature platforms (gliders, fixed stations, ferry boxes, etc.) for monitoring their operations and maintenance

A **previous structure is required at the network level** (as shown in the schema in Fig. 3.1.4.1), as follows:

- A initial inventory of the network (Mader et al., 2016, Rubio et al., 2017).
- A task team that boost the network collaboration and integration (e.g. EuroGOOS HFR Task Team in the case of HF radars)
- A focal point for data and metadata management (e.g. European HFR Node in the case of HF radars) and for the data distribution to different European marine data portals. This focal point should manage a web entry form for metadata and the database of the network.
    - The development of a RESTful Application Programming Interface (API) is recommended but not particularly required.
    - A centralised login is required, benefiting from the user accounts provided by the European HFR Node that are also being used in the webform.hfrnode.eu
- A European common and standard data and metadata model for real-time and historical HFR data.
- Guidelines and tools (see section 3.3) for implementing the standardisation of the HFR data.

Figure 3.1.4.1.- Timeline of HFR projects and milestones since the launching of the EuroGOOS HFR Task Team that have contributed to the building of the pan-European HFR network (Source: Rubio et al., 2022)

Once the structure is in place, it would be **recommended** to define:

- A set of defined KPPIs and their refinement for implementation and computation.
- A set of documentation defining the outaging code scheme, a detailed glossary, the definition of the HFR stations status flow (from new to open outage, from open to resolve and finally to close), the type of filters to be implemented and a manual of the tool is highly recommended.

The potential and already planned applications of the additional developed elements (i.e. tools) are further detailed in their respective sections.

3.2. Tools for HF Radar advanced QC REP

3.2.1. Summary of characteristics

Name/title	Individual reports for REP HFR datasets
Type	Reports
Purpose	Advanced Quality Control (AQC) procedure is applied to the re-processed (REP) datasets, summarized in individual reports for each radial site and each total system, to assess the effective quality of HFR datasets
Target observing platform	HF radar
Developers	AZTI
Funding projects and/or initiatives	EuroSea, JERICO-S3, Copernicus Marine Service In Situ Ocean TAC
Link to the tool	https://dspace.aztidata.es/handle/24689/6
Manuals and other related documents	Data model reference card: http://www.marineinsitu.eu/wp-content/uploads/2018/02/HFR_Data_Model_Reference_Card_v1.pdf Best Practices on High Frequency Radar Deployment and Operation for Ocean Current Measurement. https://doi.org/10.3389/fmars.2020.00210

3.2.2. Description and features

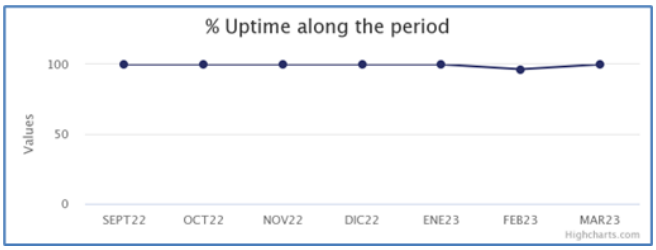
REP HFR surface current data are processed with the NRT QC tests as the first step. Furthermore, Advanced Quality Control (AQC) procedure is applied to the REP datasets, summarized in individual reports for each radial site and each total system. Data series are organized in a standard system/time folder tree and the historical HFR data time series are screened by means of yearly plots in order to allow the inspection of human experts for

assessing the effective quality of HFR datasets. The following plots are produced by year and site/system for each of the individual reports:

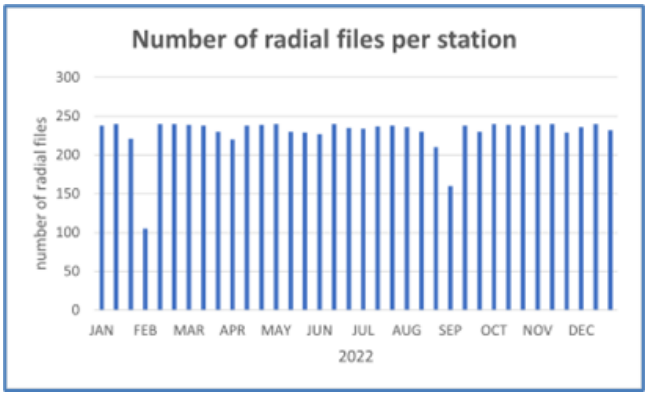
- Time series of the spatial average of the current velocity module, its standard deviation, and the total coverage
- Time series of the QC flags for all the grid nodes with data.
- Maps of the mean value of QC flags for the target year and maps of the mean velocity module and its standard deviation for the target year.
- Spatial (x-axis) vs. temporal (y-axis) coverage 80/80 annual. It allows checking if the system reached the goal of providing surface currents over 80% of the area during 80% of the time
- Map of the mean velocity field in the area of 80% temporal coverage

New plots and tables are being developed for other advanced QC procedures based on process oriented and statistical characterization of historical datasets, including new plots:

- Totals and radials temporal availability - Monthly timelines.

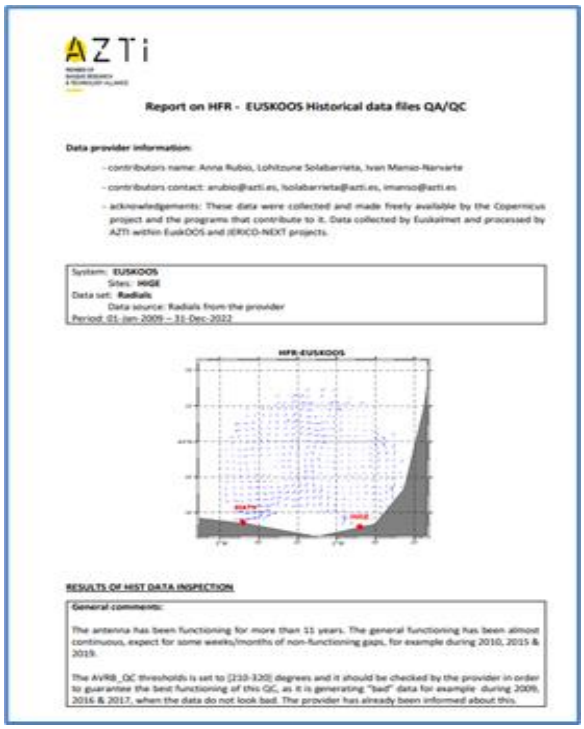


- Histogram of the number of radial files per 10 days at each HFR site of the network.



- Tables showing QC percentages (for each QC Flag of each variable with basic statistics at a particular point or averaged metrics).

When they are ready, they will be implemented in the REP HFR reports in https://dspace.aztidata.es/handle/24689/6



AZTI

Report on HFR - EUSKOOS Historical data files QA/QC

Data provider information:

- contributors name: Anna Rubio, Lohitzune Solabarrieta, Ivan Manso-Narvarte
- contributors contact: arubio@azti.es, lsolabarrieta@azti.es, imanso@azti.es
- acknowledgements: These data were collected and made freely available by the Copernicus project and the programs that contribute to it. Data collected by Euskalmet and processed by AZTI within EuskOOS and JERICO-NEXT projects.

System: EUSKOOS
Sites: HIGE
Data set: Radials
Data source: Radials from the provider
Period: 01-Jan-2009 – 31-Dec-2022

HFR-EUSKOOS

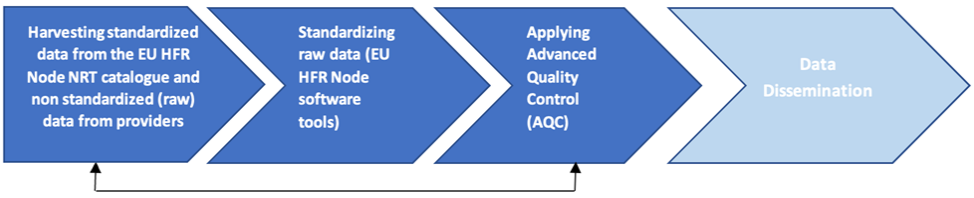
RESULTS OF HIST DATA INSPECTION

General comments:

The antenna has been functioning for more than 11 years. The general functioning has been almost continuous, expect for some weeks/months of non-functioning gaps, for example during 2010, 2015 & 2019.

The AVRB_QC thresholds is set to [210-320] degrees and it should be checked by the provider in order to guarantee the best functioning of this QC, as it is generating "bad" data for example during 2009, 2016 & 2017, when the data do not look bad. The provider has already been informed about this.

Based on the screening of the AQC reports, the performance is analysed year by year, and periods for reflagging (expert but subjective analysis) are proposed. In addition, possible changes in the processing of the data (namely in the thresholding strategy) are proposed too, if any anomaly is detected in the data or in the QC, for ensuring the effective quality of HFR data. Once the report is generated, it is sent to the HFR data provider for its validation and agreement or feedback on the comments and the reflagging/reprocessing proposed. After the provider's feedback, changes in the original data series (reflagging or reprocessing) are indicated. A final version of the report is produced and shared in a public repository. The process is summarized in the next figure.



3.2.3. JERICO contribution

The development and implementation of the REP HFR reports is based on the homogenization and standardization activities started in WP 5 of the Jerico-Next project. In fact, Quality Control applied in the REP reports follow the recommendations published in D5.14 "Recommendation Report 2 on improved common procedures for HFR QC analysis".

3.2.4. Potential use for third-party applications

We envisage to enhance the use of the REP reports that give QA/QC analysis of REP data through the interactive community tool (https://www.hfrnode.eu/map/) that would ease the access to the information and outcomes of the reports directly from the interactive map.

European HFR node is nowadays creating individual websites for the different HFR systems to assign a Digital Object Identifier (DOI) and give more visibility to the data providers. The users will be redirected to the individual HFR REP reports, for the assurance of quality and performance of the specific HFR sites/system.

3.3. Tools for HF Radar operational NRT workflow

3.3.1. Summary of characteristics

Name/title	EU_HFR_NODE_pyHFR
Type	Python toolbox and application
Purpose	Python3 toolbox for the operational workflow of the European HFR Node (EU HFR Node). Tools for the centralised processing at the EU HFR Node and for local processing on the provider side.
Target observing platform	HF radar
Developers	CNR
Funding projects and/or initiatives	EuroSea, JERICO-S3, Copernicus Marine Service In Situ Ocean TAC
Link to the tool	https://github.com/LorenzoCorgnati/EU_HFR_NODE_pyHFR
Manuals and other related documents	https://github.com/LorenzoCorgnati/EU_HFR_NODE_pyHFR

3.3.2. Description and features

The processing tools for the operational NRT workflow performs the following tasks:

- data acquisition and harvesting;
- Combination of radial current data into total current data
- Quality Control (QC) of radial and total data;
- conversion of radial and total data into the European standard data format for HFR current data;
- delivery of standardized NRT HFR current data with different reprocessing levels.

These tools are in the process of being ported in Python3 language (the current ones are written in Matlab), in order to avoid the use of licensed products (thus enhancing the usage of the tools by the HFR operators) and to take advantage of the open source benefits related to the continuous expansion and improvement of the language capabilities.

The routines for the operational processing have been reimplemented for refining the underlying science and for managing both files written in CODAR Tabular Format (CTF) and files written in the WERA and LERA crad_ascii and cur_asc native formats.

Furthermore, the new routines are able to perform for both data types the weighted least square combination of radial currents into total currents as defined in (Gurgel, 1994). The use of classes made this homogenization possible even at the processing low level.

When completed, the ensemble of the new routines will be published as a general purpose Python3 toolbox for treating all HFR data.

3.3.3. JERICO contribution

The development and implementation of the EU_HFR_NODE_pyHFR tool is based on the homogenization and standardization activities started in WP 2, WP3 and WP 5 of the Jerico-Next project. In particular, the operational tools for NRT data processing generate datasets compliant to the European common QC, data and metadata model for NRT current velocity data measured by HFR radar, documented in the D5.14 deliverable of the Jerico-Next project (http://dx.doi.org/10.25607/OBP-944).

The development of the new tools is carried on in strict collaboration with WP6 and WP7 of the JERICO-S3 project, in order to improve the interoperability and the FAIRness of HFR data.

3.3.4. Potential use for third-party applications

The EU_HFR_NODE_pyHFR ensemble will be published as a general purpose Python3 toolbox for treating all HFR data. Thus, it could be used as the core toolbox of Dockers to be distributed for HFR data processing (this action is under discussion with EMODnet).

The toolbox could also be integrated as a computational resource in Virtual Resource Environments (VRE). The JERICO-CORE VRE and the VRE developed in the framework of the Italian PNRR (Piano Nazionale di Ripresa e Resilienza) ITINERIS project will be the first test applications.

3.4. API HFR and JERICO CORE Jupyter Notebook

3.4.1. Summary of characteristics

Name/title	Eur_HFR_Node_API: European High-Frequency Radar Node API
Type	RESTful Application Programming Interface (API)
Purpose	For facilitating Machine-to-Machine (M2M) discovery of metadata from the European HFR stations, networks and users
Target observing platform	HF radar
Developers	SOCIB. Contributions from CNR-ISMAR and AZTI
Funding projects and/or initiatives	EuroSea, JERICO-S3
Link to the tool	https://api.hfrnode.eu/
Manuals and other related documents	Description, metadata access conditions (specified in the Terms of service), acknowledgements, other European HFR node OGC web services, contact and licence (CC BY 4.0) are included in the Swagger documentation. It also includes paths or API endpoints (resources), parameters, operations (i.e. HTTP methods used to manipulate the paths, such as GET, POST or DELETE) and responses.

3.4.2. Description and features

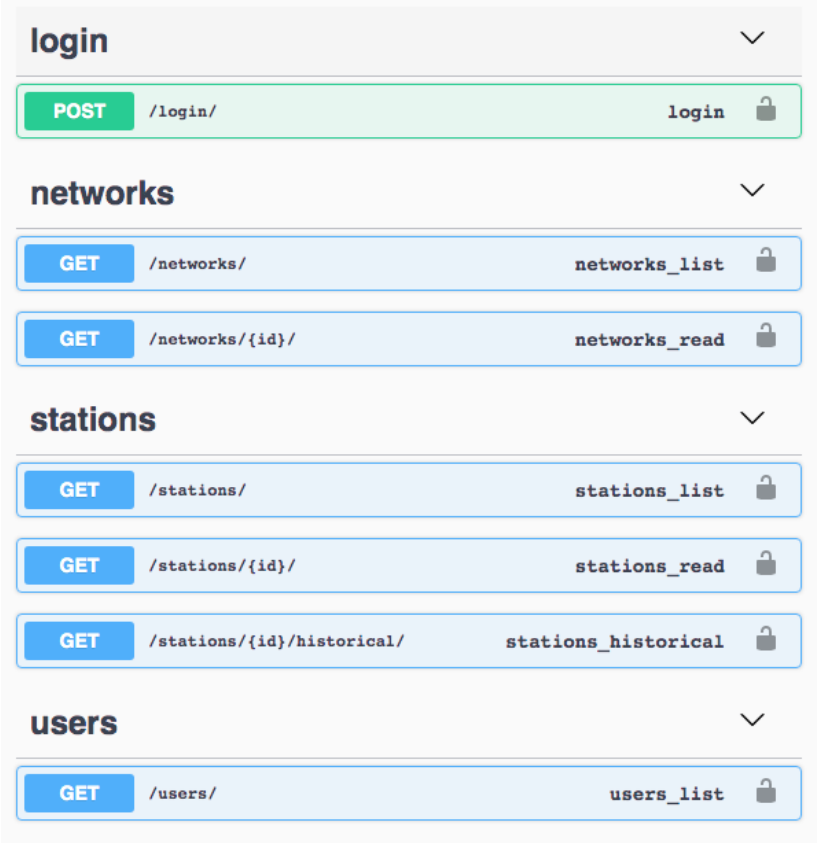
The RESTful API for accessing the European HFR Node database provides:

- Information from HFR networks, stations and users associated with HFR operators registered in the European HFR Node.
- Access to updated metadata from networks and stations of the European HFR network, to be aware of their statuses of performance.

API paths and operations are defined in the global paths section of the API specification:

```
Paths:
        /login/
        /networks/
        /networks/{id}/
        /stations/
        /stations/{id}/
        /stations/{id}//historical/
        /users/
```

As displayed by the Swagger UI:



All paths are relative to the API server URL. The full request URL is constructed as `<server-url>/endpoint-path` as follows:

- **Request URL:** `https://api.hfrnode.eu/api/networks/`

The API client needs to provide appropriate parameter values when making an API call, such as e.g. /network/HFR-Ibiza, as follows:

- **Request URL:** `https://api.hfrnode.eu/api/networks/HFR-Ibiza/`
- **Server response:**

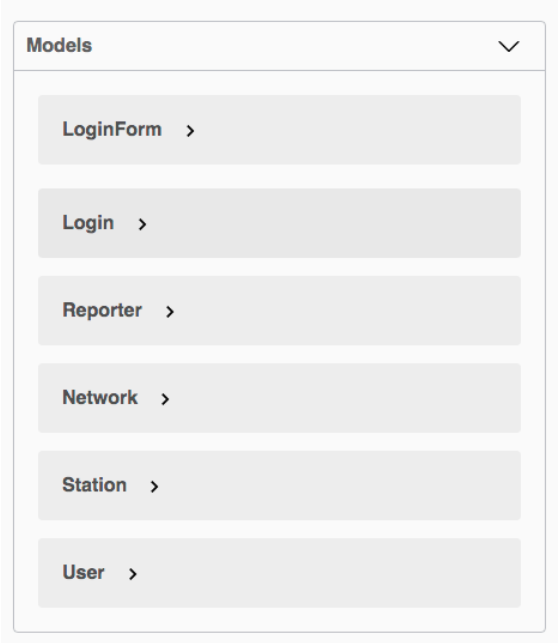

```
{
  "id": "HFR-Ibiza",
  "region_bigram": "MO",
  "area": "Ibiza Channel",
  "stations": [
    "FORM",
    "GALF"
  ],
  "reporters": [
    {
      "username": "hfr_ibiz",
      "name": "Emma",
      "surname": "Reyes Reyes"
    },
  ]
}
```

For each path, diverse operations (HTTPS methods) can be used to access that path. The Eur_HFR_Node_API supports get (for users, stations and networks) and post (only for login).

- **Curl:** `curl -X GET "https://api.hfrnode.eu/api/networks/HFR-Ibiza/" -H "accept: application/json" -H  "Authorization: XXXXXXX"`

Swagger UI displays the operations with a different style:

Finally, models are data schemas that are required as inputs (e.g. LoginForm) or provided as outputs or responses (e.g. reporter, network, station, user, etc.)



3.4.3. JERICO contributions

The Eur_HFR_Node_API has been developed in the framework of Jerico-S3 aiming to facilitate Machine-to-Machine discovery of metadata from the European HFR stations, networks and users.
In order to report and to resolve the outages for HOORT, a script has been developed calling the endpoints for both APIs (Eur_HFR_Node_API and HOORT_API). The scripts check the information provided by the radial delay of all stations and if a delay over 12 hours is identified, it creates a new outage for HOORT. Therefore, the European HFR Node plays an active role for registering and resolving the outage in HOORT, since it represents the focal point of the European HFR data management.

3.4.4. Potential use for third-party applications

The Eur_HFR_Node_API can be used to make queries and filter the information according to the interest of the users. It can be used from third party clients (e.g. a web browser, a Jupyter notebook or any other data science framework) to be able to connect to the API for requesting information. There are already planned applications and existing demos that use this API:

- Jupiter Notebook for HFR (demo available under registration in JERICO-RI VLAB of Blue Cloud): JERICO-CORE provides a general picture of the HFR stations. This overview allows us to analyse gaps and status of these stations. In fact, we already identified some gaps in the information provided by the aggregators with this simple demo that is currently being checked.
    - The demo (HFR_Quantitative_Framework.ipynb) was done in combination with the Eur_HFR_Node_API. The HFR information is integrated in JERICO-CORE and collected via API (please, see Fig.3.4.4.1). In that way, the information from the European HFR Node is combined with the information of other resources such as documents, datasets, best practices, etc. This provides a more comprenhensive picture of the HFR assets.
    - A valuable service can be done for creating reports of the quantitative framework of the HFR network governance (as detailed by Rubio et al., 2022) in real time, once JERICO-CORE is capable of updating the catalog in real-time.

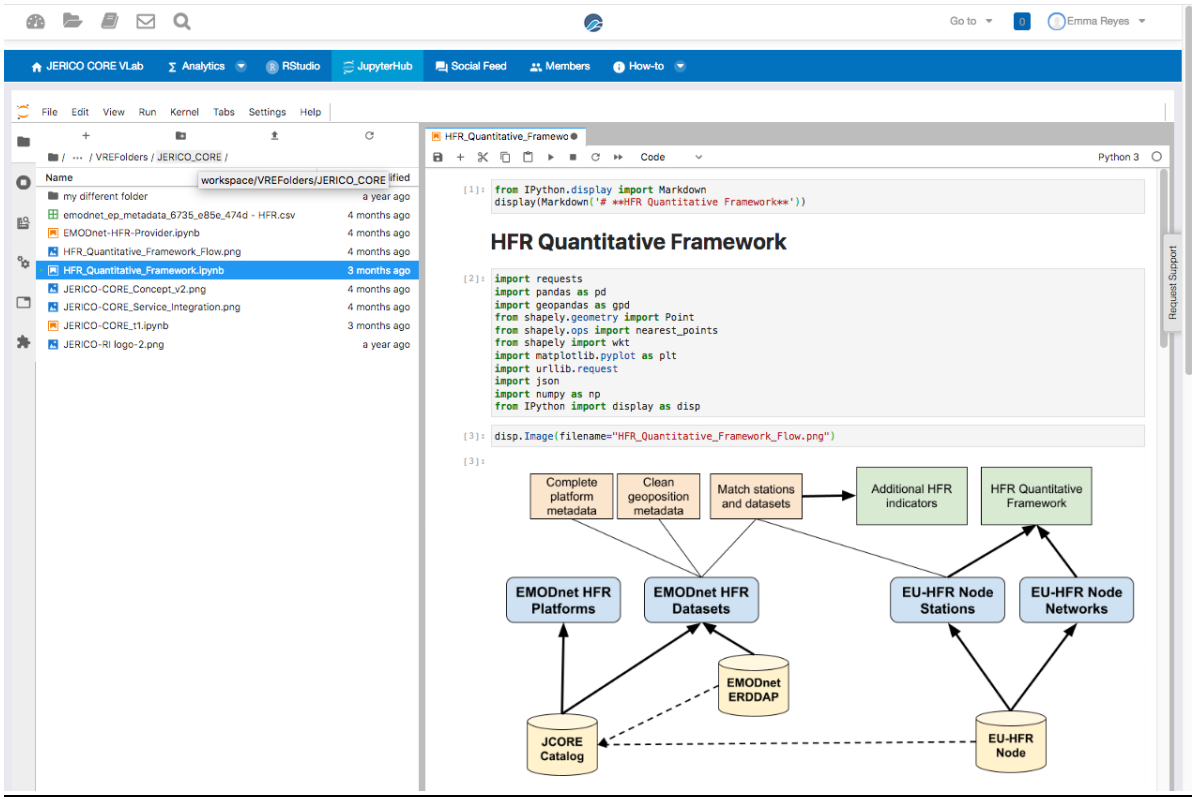


Figure 3.4.4.1.- Screenshot of the Blue Cloud UI showing the display of the HFR-Quantitative_Framework.ipynb notebook.

- Generation of the HFR reprocessed data reports: The API would facilitate the computation of the Real-Time Data Delivery Delay, which is the ratio of data arriving within 24 hours and the display of a time series of hourly (daily average might be

considered for longer periods) radial delay per station in a selected period. This information is directly related to the HFR station statuses, as considered by HOORT.

3.5. API HOORT

3.5.1. Summary of characteristics

Name/title	API-HOORT: HFR Outage Online Reporting Tool API
Type	RESTful Application Programming Interface (API)
Purpose	For facilitating Machine-to-Machine (M2M) discovery of XX
Target observing platform	HF radar (can be adapted to any platform with major upgrade).
Developers	SOCIB. Contributions from CNR and AZTI
Funding projects and/or initiatives	EuroSea, JERICO-S3
Link to the tool	https://gitlab.priv.socib.es/data-center/hoort/hoort-api
Manuals and other related documents	Internal documents (not available to the public). Introduction: https://gitlab.priv.socib.es/data-center/hoort/hoort-api/-/blob/develop/docs/introduction.md Object versioning: https://gitlab.priv.socib.es/data-center/hoort/hoort-api/-/blob/develop/docs/historical_records.md Developing with docker: https://gitlab.priv.socib.es/data-center/hoort/hoort-api/-/blob/develop/docs/docker.md Integration with the European HFR Node: https://gitlab.priv.socib.es/data-center/hoort/hoort-api/-/blob/develop/src/main/services/eunode.py

3.5.2. Description and features

The API-HOORT implements application logic for outage management and integration with the European HFR Node (via API: https://api.hfrnode.eu/), also accessing the HOORT frontend.

3.5.3. JERICO contribution

The API-HOORT has been developed in the framework of JERICO-S3 aiming to facilitate Machine-to-Machine discovery between the HOORT frontend and the API of the European HFR Node.

3.5.4. Potential use for third-party applications

The API-HOORT will be used by:

- The dynamic map of locations of the HFR stations connected to the European HFR Node, developed by AZTI: to collect and then display the near real-time operation status of the European HFR stations. The traffic light colour coding will be used to identify the Station Status based on the delay of the arrival of the radial data to the European HFR Node, being shown at the station locations:
    - Green : Operational stations working properly. Radials are updated (≤12 hours delayed).
    - Yellow : Operational stations with an outage. Radials are delayed (12 < radial delay ≦24 h).
    - Red : Operational stations with an extraordinary outage. Radials are delayed > 24 hours

  The map is intended to be embedded in the EuroGOOS HFR Task Team (https://eurogoos.eu/high-frequency-radar-task-team/) and in the European HFR network website (https://www.hfrnode.eu/) that is currently being in construction.
- The generation of the HFR reprocessed data reports: to collect and then display the historical operational status of the European HFR stations. This would help to explain the decrease in the data quality or the existence of gaps based on the station status.

3.6. Best Practices Maturity Model

3.6.1. Summary of characteristics

Name/title	Best Practices Maturity Model
Type	Conceptual scheme and evaluation criteria
Purpose	Assessment of maturity level covering the status of methods documentation and the degree to which the methods are widely and effectively implemented for research and operations
Target observing platform	All mature platforms
Developers	CNR, IEEE, IOC-UNESCO
Funding projects and/or initiatives	JERICO-S3
Link to the tool	JERICO-S3 D5.2 (not yet published)
Manuals and other related documents	

3.6.2. Description and features

The tool provides a conceptual scheme and criteria for helping the maturity level assessment of ocean observing practices from the point of view of their documentation, application and evolution. With this tool, existing practices can be reviewed against a series of capability attributes, and gaps can be identified and addressed towards a uniform level of maturity. The final objective is to push practices and make them become best practices, formally endorsed by experts, widely applied, and sustained by training programs and tools for their improvement.

Five maturity levels are identified, where level 5 is the most mature. Only levels 3 to 5 are considered as they refer to mature observing platforms where practices are well documented.

Table 3-6-1 The five levels of maturity for ocean best practices (Mantovani C, Pearlman J, Simpson P., JERICO-S3 D5.2 "Electronic handbook for mature platforms")

Level			Description
5		Mature	Practices are endorsed by multi-institutional expert panels. Practices have formal diagnostic tools and user feedback loops supporting continuous improvement and optimization over the practice lifecycle. Practices have associated methods for training and sustainability. Practices are embedded into advanced information infrastructures.
4		Broadly adopted	Practices are widely adopted by multiple institutions. Practices with standardized formats and comprehensive metadata are in a sustained repository with DOIs assigned. Documents and metadata are machine-actionable. Practices have associated guidelines and metrics for their implementation, monitoring and evolution. Practices can be replicated with no prior experience in the process.
3		Defined and documented	Practices are formally defined and documented with metadata, are openly available, and can be replicated by independent practitioners with prior knowledge in similar processes.
2		Repeatable	Practices are defined and may be documented. It is repeatable by the process creator.
1		Formation	Practices are ad hoc with little documentation.

Levels 3 to 5 are then expanded in a series of criteria that can be evaluated, some of them with factual evidence and some others with judgement because they have a subjective component.
The evaluation is obtained answering to questions as in the following examples:

Example 1: Document is openly available in a sustained digital repository
Capability 1 - no
Capability 2 - yes, in a generic repository
Capability 3 - yes, in the sustained OBPS or similar repository with a DOI

Example 2: Degree of adoption of a documented practice
Capability 1: only one organization uses this documented practice.
Capability 2: multiple organizations (e.g. in a network) use this documented practice
Capability 3: this documented best practice is widely adopted globally

For a complete list, please see JERICO-S3 D5.2 "Electronic handbook for mature platforms" (under review while writing the present document).

3.6.3. JERICO contribution

The tool has been entirely developed under JERICO-S3 project, and was possible also thanks to the analysis of a relevant number of ocean (best) practices documentation released and published under JERICO-FP7 and JERICO-Next project as well as the experience on best practices available from the Ocean Best Practices System.

3.6.4. Potential use for third-party applications

This tool is general and a collaboration with Ocean Best Practices[2] project is foreseen, for refining the conceptual scheme and reviewing the applicability of the maturity model.

[2] (https://www.oceanbestpractices.org/) International project co-sponsored by the Global Ocean Observing System (GOOS) and the International Oceanographic Data and Information Exchange (IODE)

3.7. Data Management Plan Template

3.7.1. Summary of characteristics

Name/title	Data management Plan Template
Type	Spreadsheet template
Purpose	The Data Management Plan Template aims to outline the data management life cycle for collected, processed, and/or produced ocean glider data. It covers the curation, preservation, and description of data flows from institutional databases to significant European maritime data portals such as CMEMS-INSTAC, SeaDataNet, and EMODnet.
Target observing platform	Ocean gliders
Developers	SOCIB
Funding projects and/or initiatives	JERICO-S3, Ministerio de Ciencia e Innovación (http://www.ciencia.gob.es/). Govern de les Illes Balears (http://www.caib.es/). Consejo Superior de Investigaciones Científicas (https://www.csic.es/en)
Link to the tool	https://repository.socib.es/repository/entry/show?entryid=49c5aa00-6f3a-4978-ab31-6342ba950cec
Manuals and other related documents	

3.7.2. Description and features

The goal of the Data Management Plan Template is to enhance the day-to-day management of Ocean glider data by establishing a more open, collaborative, and long-term communication system both internally and with end users. Furthermore, by outlining the roles and responsibilities of the teams participating in the various components of the data life cycle.

3.7.3. JERICO contribution

The SOCIB Data Management Plan (DMP) template was established after reviewing the approaches followed by key players and initiatives of interest for SOCIB (e.g., IODE, ORD, ANDS, IMOS, NANOOS). This template outlines the various steps of the data flow for different platforms. It also identifies the roles in the data flow and the definitions of the formats, naming conventions, and products. After our experience with the existing DMPs, we decided to evaluate how they align with international standards and how they respond to the internal needs of SOCIB. The SOCIB DMP template describes the data management life

cycle for ocean observations, data gathering, processed and/or generated by SOCIB, making data FAIR. It also includes the data curation, preservation, and description of the data flows from SOCIB to the main European marine data portals such as CMEMS-INSTAC, SeaDataNet, and EMODnet. This DMP aims to improve the day-to-day handling of the SOCIB data, creating a more transparent, collaborative, and sustainable communication system internally and with the end users. This approach seeks convergence and alignment with the global actors in the global scene, fostering the implementation of Ocean Best Practices (OBPs) procedures across the value chain.

This document also benefits from the participation and achievements of EU and international initiatives and projects (e.g., CMEMS-In Situ TAC, JERICO-S3, JERICO-DS, EuroSea, and Calypso) concerning data management and the building of an integrated data system. It is, in particular, aligned with the ongoing efforts in JERICO-S3 and the related DMP for coastal platforms. The aim is, therefore, to promote data management and its application in Europe, seeking convergence among the recommendations from the EuroGOOS Data Management, Exchange, and Quality Working Group (DATAMEQ). The template aims to meet the requirements of different observing programs and platforms with the necessary flexibility and adaptability, allowing the stakeholders to design a customized workflow, responding to their needs.

3.7.4. Potential use for third-party applications

The template aims to meet the requirements of various observing programs and platforms while providing the necessary flexibility and adaptability to allow stakeholders to develop a customized workflow that meets their needs.

4.OUTREACH, DISSEMINATION AND COMMUNICATION ACTIVITIES

Training workshop for HF radar community during the EuroGOOS HFR TT Meeting in Florence, Italy, 21-22 Nov 2022.

Presentations:

- JERICO Coastal Ocean Resource Environment (CORE) as a platform to support HFR activities;
- HOORT [HFR Online Outage Reporting Tool]: What is it and how does it work?
- The European HFR Node: Quality Control on surface current data

Link to the video recording

Target: Operators of the European HF Radar network

11th FerryBox workshop, in Geesthacht, Germany, September 28-29, 2022, agenda, presentations and further information are available here : https://ferrybox.org/dissemination/workshops/index.php.en. The workshop took place in a conjunction with a JERICO-S3 NS & English Channel PSS / KASKEN & Norwegian Sea IRS (September 26-27, 2022).

(Most) Relevant presentations:

- Gonzalez-Nuevo, G.: Development of web apps to facilitate QC and dissemination of TSG data from IEO research vessels (PDF)
- Protsenko, E.: NIVA Ferrybox data management (PDF)
- Böcke, M.: Data Management HELMI – HEreon Layer for Managing Incoming data (PDF)
- Gorringe. P.: EMODNet – update and outlook

Target: Operators from the FerryBox community, other users who may be interested in FerryBoxes