



## ITINERIS Marine Hub Portal

Supply and configuration of the Web Portal  
Platform for data discovery and data  
download

Report and release of IT-IOOS catalogue of



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## Scope of work

The project concerned the development, customization and delivery of a WebGIS platform designed for the management, visualization and download of environmental data. The platform has been implemented to support the exploration, display and sharing of data and metadata in an interoperable manner, fully aligned with international standards.

### *1. ACTIVITIES PERFORMED*

This section outlines the key phases of the Wen Portal Platform implementation, from development and system setup, through documentation.

- **Development and System Setup**

The Web Portal Platform was developed and customized using a containerized architecture, ensuring scalability, modularity and simplified deployment. Metadata structures were configured and optimized to guarantee efficient search, interoperability and compliance with established metadata standards. Dedicated testing and production environments were set up to support iterative development, validation and final deployment.

- **Documentation**

Comprehensive technical documentation was delivered, covering platform architecture, deployment procedures, data ingestion workflows and user-facing functionalities.

## 2. *PLATFORM DESCRIPTION*

The Web Portal Platform has been deployed using a modular architecture that emphasized flexibility, maintainability and interoperability. This setup ensures that the system could scale efficiently and remain secure under operational conditions.

During the implementation, key services and environments have been integrated:

- **ERDDAP** was configured to handle and distribute multidimensional datasets, providing consistent access through standard protocols such as OPeNDAP, WMS, WCS, CSV and NetCDF.
- **GeoServer** was deployed as the primary map server, enabling the publication and sharing of geospatial layers while maintaining full compliance with OGC standards (WMS, WFS, WCS).
- **GeoNetwork** was established as the metadata management system, supporting dataset documentation, search and dissemination, in accordance with ISO 19115 and INSPIRE requirements, and providing standard interfaces for metadata discovery and harvesting.

The platform also incorporates backend modules for automated data ingestion and normalization, orchestration tools for managing processing pipelines, API services for vocabulary and catalog management and a user-friendly web interface for consulting both data and metadata.

All necessary communication protocols, including HTTP/HTTPS, FTP, SMB and NFS, were implemented. The system is now operational, providing a reliable environment for environmental data management.

### 2.1 *FEDERATED NODE MONITORING AND DATASET AVAILABILITY*

The IT-IOOS ERDDAP system is designed to operate either as a centralized platform or in a federated mode, connecting multiple distributed nodes. This flexibility allows datasets to be maintained locally at the source while remaining accessible through the central platform, ensuring both scalability and redundancy.

A key strength of the system is its ability to monitor federated nodes and automatically detect datasets that are no longer reachable. Unavailable datasets can be flagged or removed from the catalog, maintaining the integrity, reliability, and usability of the metadata repository. To ensure proper operation, each federated node should meet minimum specifications, including at least 32 GB of RAM, sufficient storage capacity and a minimum internet access speed to support timely data retrieval. The

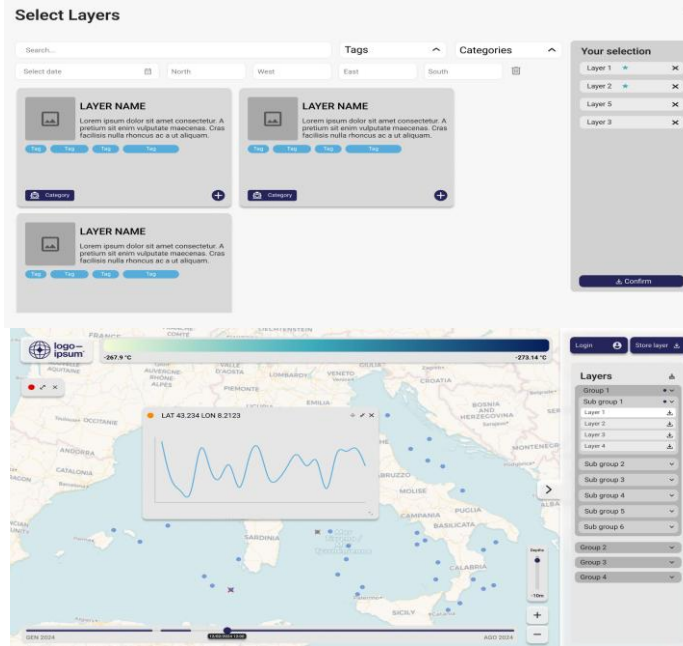
node can run either Windows or Linux, provided it supports Docker or a Java runtime environment. These requirements help guarantee that datasets hosted on federated nodes remain consistently accessible and that metadata validation and retrieval processes can be performed efficiently.

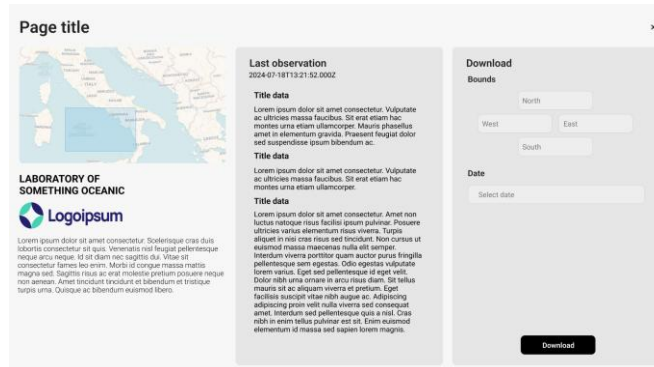
## 2.2 COORDINATION AT THE START OF DEVELOPMENT

During the initial setup, the primary focus of the project was to enhance and streamline the way datasets are accessed and consumed.

Development efforts were therefore directed toward designing the presentation dashboard, conceived as the main user interface. This includes an advanced dataset search screen, an interactive map for visualizing the platforms and accessing their respective platform pages, dataset cards providing detailed information and a dedicated area for downloading data. This approach aims to ensure intuitive exploration, smooth consultation and straightforward access to the available content, thereby improving both the user experience and the overall effectiveness of the platform.

### Mockups – July 2024





## 2.1 FINAL PLATFORM OVERVIEW

The interface displays an interactive geospatial dashboard designed to explore and filter oceanographic and environmental datasets contributed by various research institutions participating in the ITINERIS initiative. The layout consists of a full-screen map, a right-side filtering panel and top-right controls for access-restricted functionalities.



Fig.1 – Platform Overview

## 2.2 MAIN MAP INTERFACE

The central element of the platform is a detailed topographic and bathymetric map covering the Mediterranean basin and surrounding regions. Key characteristics include:

- **Default display of platforms:**  
Measurement platforms are represented as colored circular markers. The default configuration shows all available platforms, with the dataset filtered to observations from the last 7 days.
- **Map navigation tools:**  
Located in the lower-right corner, the map offers standard navigation utilities:
  - A zoom-in and zoom-out control
  - A location or recenter button.
  - A “fit to extent”/full-view button.
  - A sharing/export button for map content.
- **Visible platforms:**  
The platforms appear distributed across the Adriatic Sea, the Tyrrhenian Sea, the Ligurian Sea and the Strait of Sicily. Each marker colors corresponds to a platform type or research infrastructure category.
- **Logos:**  
The platform header (top-left) displays the IT-IOOS and ITINERIS project logos, identifying the system as part of Italy’s ocean observing framework.
- **Default Time Filter Indicator:**  
A green badge labeled “7 Days” confirms that the temporal filter is pre-set to the last seven days of observations.

## 2.3 TOP RIGHT FUNCTIONAL CONTROLS

Two primary action buttons are displayed in the upper-right section:

- **Login Button:**  
Authentication is required for machine-to-machine connections and to download datasets that are not publicly accessible.
- **Dataset Store Button:**  
Redirects to the dedicated data download and metadata visualization page where users can access content associated with the datasets shown on the map.

## 2.4 FILTER PANEL

A vertical, collapsible filtering panel is positioned on the right side of the screen. It allows users to refine the datasets visible on the map through multiple filtering dimensions.

- **Time**  
Enables selection of predefined or custom temporal ranges (e.g., 7 days, 30 days, 1 year, or full dataset availability).
- **Depth**  
Allows users to restrict observations to specific depth intervals in the water column.
- **Derivate Products**  
Groups variables or parameter families to facilitate thematic dataset exploration.
- **Essential Ocean Variables (EOV)**  
Provides selection of variables defined as Essential Ocean Variables for global ocean monitoring.
- **Essential Climate Variables (ECV)**  
Includes parameters relevant to climate monitoring, consistent with the Global Climate Observing System (GCOS).
- **Essential Biodiversity Variables (EBV)**  
Set of parameters that capture key aspects of biodiversity, from genetic diversity to ecosystem structure and function.
- **Research Infrastructure Filter**  
This section displays a set of color-coded buttons corresponding to major European and national research infrastructures.
- **Research Vessels**  
Allows displaying data collected specifically from research vessels.

## 2.5 RESEARCH VESSELS

This section shows the routes of scientific research expeditions.

The map highlights the paths followed during data collection campaigns, covering various marine areas for environmental monitoring and oceanographic research. Users can view the expedition tracks, identify the areas covered and analyse the information collected along the routes.

For example, it includes the expeditions of the research vessel *Gaia Blu*.

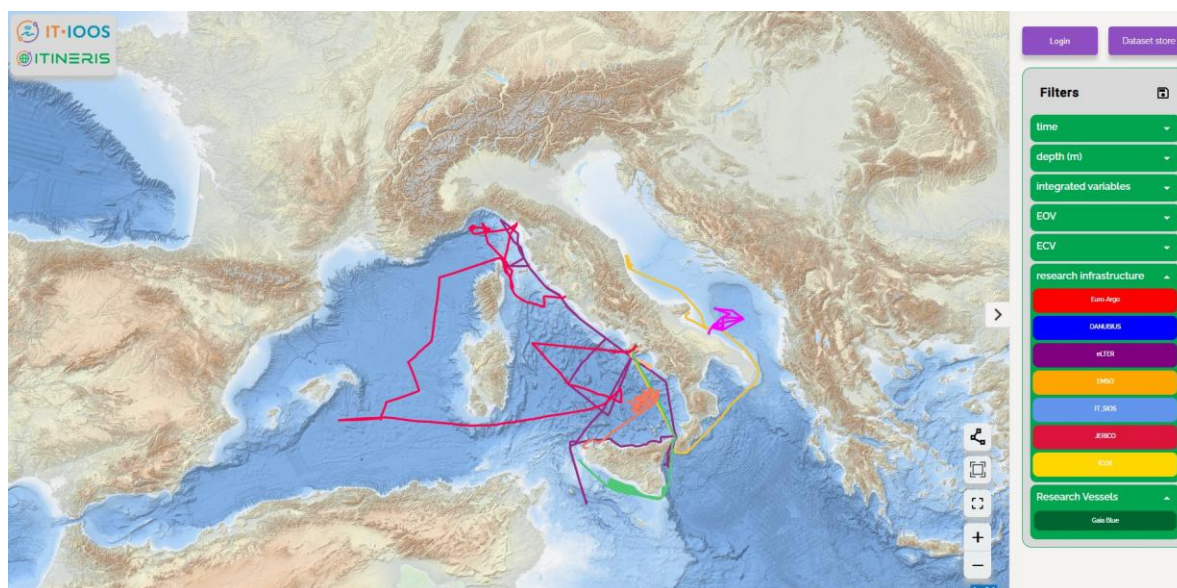


Fig.2 – Detail of Research Vessels page

## 2.6 USER INTERACTION

Users can interact with the platform as follows:

- **View all available platforms** on the map with default filters applied.
- **Select or refine filters** from the right panel to adjust the dataset shown.
- **Click a platform marker** to open a popup containing metadata, institutional information, platform description and sensor-derived data visualizations.
- **Access the dataset store** for downloading data and metadata.
- **Authenticate** when a machine-to-machine connection is required or to access to restricted datasets require user login.

## 2.7 DATA VISUALIZATION

The map provides users with the ability to explore the data associated with the datasets collected by the various institutions participating in the ITINERIS project. These datasets originate from different Research Institutes, each of which is identified on the portal page through a distinct coloured label.

All platforms are displayed on the map by default. The default filter applied corresponds to observations from the last 7 days.

By clicking on any platform shown on the map, the user can access a popup window containing detailed information related to that specific platform, including:

- **Start and end dates** of the time series or profile associated with the selected dataset.
- **Institution responsible** for data collection, accompanied by its logo.

- **Description of the platform**, including platform name, WMO ID, code and platform type, as well as details of the sensors used to collect the dataset.
- **Project funding information**, indicating the project that financed the acquisition of the dataset.
- **Charts of measured variables** from the sensors installed on the platform:
  - For time series, the charts display the temporal evolution of the variables at a constant depth.
  - For profiles, the charts show how variable values change with pressure (and therefore with water depth).

From within the Platform Page (popup window), users can access the dedicated download page, available via the “download” logo positioned at the bottom-right of the Platform Page, where both data and metadata can be downloaded.

## 2.8 FINAL METADATA VISUALIZATION AND DOWNLOAD

From the main page of IT-IOOS, by clicking the **Store Layer** button, users can access the metadata catalog for the layers displayed on the map on the main page. The catalog allows users to discover and access datasets from ITINERIS research infrastructures as well as any additional systems. It was designed in accordance with existing community standards, ensuring data integration within infrastructure workflows and visibility across EU data infrastructures (e.g. EMODnet, SeaDataNet, Copernicus).

The ITINERIS project metadata catalog contains metadata associated with the data displayed in the map section (WebGIS). Metadata of interest can be explored using keywords or filters, which include:

- **Variables:** listed according to the code assigned by the reference vocabulary (SeaDataNet P01) (dropdown menu activated by selecting the **Tags** filter).
- **Time Range:** selectable using the **Time** filter.
- **Publisher:** selectable using the **Publisher** filter.

Metadata can also be filtered based on geographic location (dropdown menu activated by selecting **Go to Map**).

Select Dataset

Fig.3 – Dataset Store

For each dataset displayed on the main page map, users can access the complete metadata and download both the metadata and the data associated with that dataset. To do this, click the “+” symbol next to each dataset card. This action adds the selected datasets to the **Your Selection** section on the right side of the screen. By clicking the “Go to the download page” button at the bottom of the **Your Selection** section, users are redirected to a new page, called the **Download Page**.

Fig.4 – Download Page

The Download Page is divided into three vertical sections:

- **Map:** displays the locations of the platforms associated with each selected dataset.

- **Data:** shows the metadata selected on the Metadata Catalog page.
- **Download:** allows users to set the time range and select the variables of interest, which serve as filters to prepare the dataset and metadata for download.

Each dataset downloaded will always include a metadata file in text format. Data can be downloaded in NetCDF and CSV formats. The selected download format will apply to all datasets included in the request.

When the “Download” button (bottom-right) is clicked, a popup window appears with a mandatory questionnaire to understand the user’s origin and the intended use of the data.

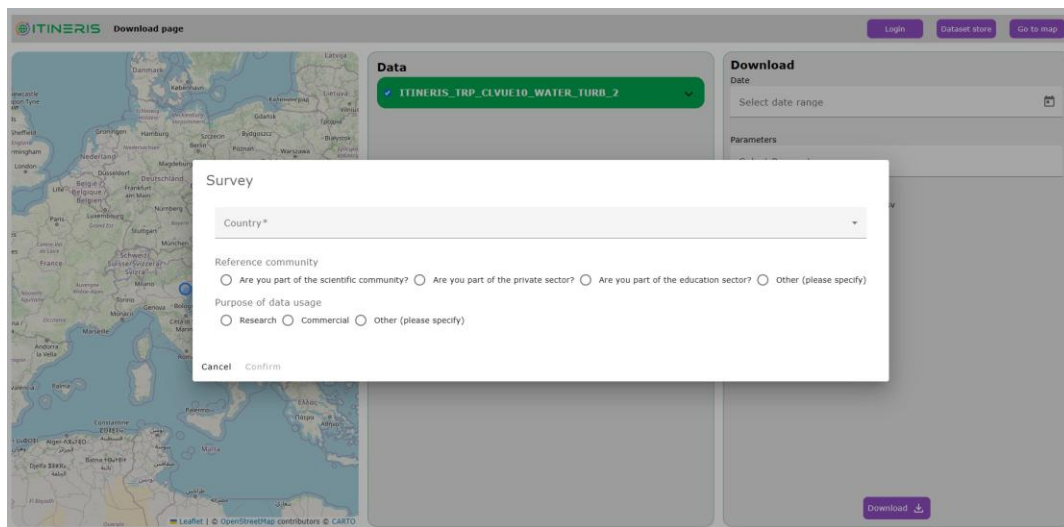


Fig.5 – Detail of the Survey pop-up

## 2.9 LOGIN

Authentication is required for machine-to-machine connections and to download datasets that are not publicly accessible.

User authentication is handled through a centralized authentication service and is used to enable access to the APIs and to support personalized features, such as saving user-defined searches.

If at least one of the requested datasets is classified as “restricted”, the procedure triggers a suspension of the download. In this case, an email is sent to the ITINERIS manager and the download request is listed in the Download Manager Form.

In this form, the operator can:

- review the requested data and notify the contact person responsible for the restricted dataset;
- approve or reject one or more of the requested datasets;
- enable the download.

Once the download is enabled, an email is sent to the requester with a download link (valid for a configurable number of days), allowing them to proceed with downloading the approved public and restricted datasets.

The authentication process is managed by **D4Science**.

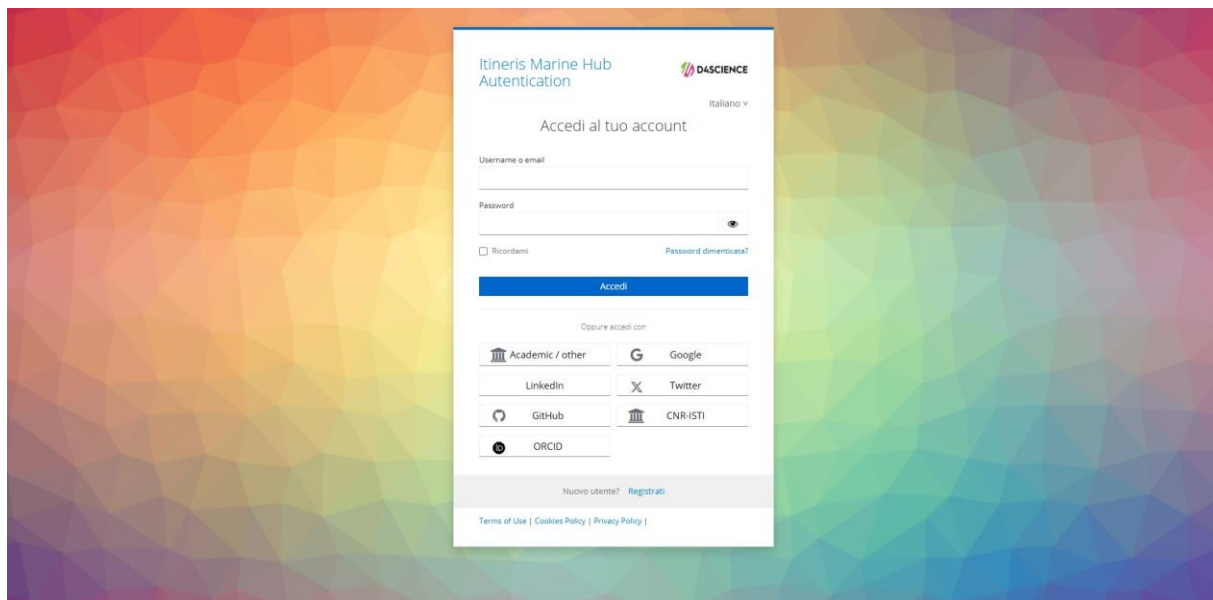


Fig.6 – Authentication page

### 3. METADATA MODEL

Below is the metadata schema adopted (version 1.0) to structure the information related to the datasets managed through the IT-IOOS platform. The example is based on the EMSO BB 567 SBE56 dataset.

Variable name: NC_GLOBAL					
Attribute name	Data type	Description	Mandatory	Vocabulary	Example
acknowledgment	string	A place to acknowledge various types of support for the project that produced this data			-
cdm_data_type	string	Data type according to Common Data Model (possible values: Grid, MovingGrid, Other, Point, Profile, RadialSweep, TimeSeries, TimeSeriesProfile, Swath, Trajectory, TrajectoryProfile)	yes	<u>NCEI NetCDF Templates v2.0</u>	TimeSeries
contributors_name	string	The name of any individuals, projects, or institutions that contributed to the creation of this data. May be presented as free text, or in a structured format compatible with conversion to ncML (e.g.,			Stefano Miserocchi

		insensitive to changes in whitespace, including end-of-line characters)			
contributors_orcid	string	ORCID of any individuals or institutions that contributed to the collection of this data (separated by comma)		<u>ORCID</u>	<u>0000-0002-6315-8919</u>
contributors_role	string	The role of any individuals, projects, or institutions that contributed to the creation of this data. May be presented as free text, or in a structured format compatible with conversion to ncML (e.g., insensitive to changes in whitespace, including end-of-line characters). Multiple roles should be presented in the same order and number as the names in contributor_names			
Conventions	string	Conventions used to define dataset metadata	yes		OceanSITES v1.4, SeaDataNet_1.0, COARDS, CF-1.10, ACDD-1.3
Coordinates_reference_system	string				
creator_name	string	The name of the person (or other creator type specified by the creator_type attribute) principally responsible for creating this data	yes		Italian National Research Council - Institute of Polar Sciences
creator_type	string	Specifies type of creator with one of the following: 'person', 'group', 'institution', or 'position'. If this attribute is not specified, the creator is assumed to be a person	yes		institution
creator_url	string	The URL of the person (or other creator type specified by the creator_type attribute) principally responsible for creating this data	yes		<a href="https://www.isp.cnr.it/index.php/en/science/other-activities/adriatic-sea#mooring-southern-adriatic-msa">https://www.isp.cnr.it/index.php/en/science/other-activities/adriatic-sea#mooring-southern-adriatic-msa</a>

data_best_practices_doi	string	Data best practices DOI	yes, if existing	DOI	
data_creation	string	Date of dataset creation	yes	ISO 8601	2023-12-22
data_dataset	string	URL to ERDDAP data dataset (in case of collection for which there are 2 different dataset for data and metadata) - connected to metadata: metadata_dataset			
data_doi	string	Data DOI	yes, if existing	DOI	-
data_format_original	string	Original format of the dataset	yes		-
data_type	string	NRT/DMT	yes		
data_update	string	Date of dataset update	yes	ISO 8601	
data_update_frequency	string	Frequene of dataset update	yes		PT10M
data_version	string	Dataset update version	yes		-
distributor_name	string	Name of the entity from which we are federating information			
distributor_url	string	URL of the entity from which we are federating information			
geospatial_lat_max	double	Max latitude expressed in WGS84 (the highest possible precision)	yes, if spatial data	WGS84	41.341967
geospatial_lat_min	double	Min latitude expressed in WGS84 (the highest possible precision)	yes, if spatial data	WGS84	41.340767
geospatial_lat_resolution	double	Latitude resolution expressed in WGS84 (for grid data)	yes, if spatial grid data	WGS84	
geospatial_lat_units	string	Degrees north	yes, if spatial data		degrees_north
geospatial_lon_max	double	Max longitude expressed in WGS84 (the highest possible precision)	yes, if spatial data	WGS84	17.194083
geospatial_lon_min	double	Min longitude expressed in WGS84 (the highest possible precision)	yes, if spatial data	WGS84	17.193368
geospatial_lon_resolution	double	Longitude resolution expressed in WGS84 (for grid data)	yes, if spatial grid data	WGS84	
geospatial_lon_units	string	Degrees east	yes, if spatial data		degrees_east
geospatial_vertical_max	double	Max vertical extension (in case of vertical profile) (the highest possible precision)	yes, if spatial data		567

geospatial_vertical_min	double	Min vertical extension (in case of vertical profile) (the highest possible precision)	yes, if spatial data		567
geospatial_vertical_positive	string	Positive direction of vertical extension ("up" means that z increases up - height, "down" means that z increases downward - pressure or depth)	yes, if spatial data		down
geospatial_vertical_units	string	Units used for the vertical extension	yes, if spatial data		m
infoUrl	string	URL of data information background (es. GeoNetwork, project web page, dataset page, ...)	yes		<a href="https://www.isp.cnr.it/index.php/en/science/other-activities/adriatic-sea#mooring-southern-adriatic-msa">https://www.isp.cnr.it/index.php/en/science/other-activities/adriatic-sea#mooring-southern-adriatic-msa</a>
inspire	string	INSPIRE spatial data or SeaDataNet vocabulary	yes, if spatial data	<a href="#">INSPIRE Spatial Data Themes (GEMET)</a>	
institution	string	The name of the institution principally responsible for originating this data. This attribute is recommended by the CF convention	yes		CNR-ISP
institution_edmo_code	string	EDMO code of the institution principally responsible for this data (owner or provider)	yes	<a href="#">EDMO SeaDataNet</a>	<a href="#">6075</a>
institution_edmo_uri	string	EDMO URI of the institution principally responsible for this data (owner or provider)	yes	<a href="#">EDMO SeaDataNet</a>	<a href="https://edmo.seadatanet.org/report/6075">https://edmo.seadatanet.org/report/6075</a>
institution_ror_code	string	ROR code of the institution principally responsible for this data (owner or provider)	yes	<a href="#">ROR</a>	-
institution_ror_uri	string	ROR URI of the institution principally responsible for this data (owner or provider)	yes	<a href="#">ROR</a>	-

keywords	string	List of keywords and phrases (separated by comma - in case of multiple vocabularies, insert keywords following the same order listed in "keywords_vocabulary")	yes	<a href="#">Global Change Master Directory (GCMD)</a>	cnr, cnr-isp, control, council, data, deployment, depth, discovery, earth, Earth Science > Oceans > Ocean Temperature > Water Temperature, emso, flag, identifier, isp, latitude, longitude, measurement, national, ocean, oceans, parameter, quality, research, sbe56, science, sea, sea-water, sea_water_temperature, seadatanet, seawater, station, station_id, TEMP, TEMP_QC, temperature, time, timeseries, vocabulary, water
keywords_vocabulary	string	Identifies the controlled list of keywords from which the values in the "keywords" attribute are taken (in case of multiple vocabularies, separated by comma)	yes	<a href="#">Global Change Master Directory (GCMD)</a>	GCMD Science Keywords
license	string	License that describes the restrictions to data access and distribution (CC-BY)	yes	<a href="#">Creative commons</a>	CC-BY-4.0
license_url	string	Link to license url	yes		<a href="https://spdx.org/licenses/CC-BY-4.0">https://spdx.org/licenses/CC-BY-4.0</a>

metadata_dataaset	string	URL to ERDDAP metadata dataset (in case of collection for which there are 2 different dataset for data and metadata) - connected to metadata: data_dataset			
metadata_source	string	URL to data source metadata			
naming_authority	string	Name of who defines the data set and the standards to be applied	yes		-
oceanographic_campaign	string	Name of the oceanographic campaign during which the data were collected			
platform_id_orig	string	Pre-existing platform id, if applicable			
platform_name	string		yes		
platform_organization_managing	string	Organization or institute managing the facility or observation platform	yes		
platform_organization_owning	string	Organization owning the facility or observation platform	yes		
platform_reference_person	string	Facility or observation platform reference person	yes		
platform_type_sdn_name	string	Name of the platform type according to SeaDataNet vocabulary		<a href="#">NERC Vocabulary L06</a>	Mooring
platform_type_sdn_uri	string	URI of the platform type according to SeaDataNet vocabulary		<a href="#">NERC Vocabulary L06</a>	<a href="https://vocab.nerc.ac.uk/collection/L06/current/48">https://vocab.nerc.ac.uk/collection/L06/current/48</a>
platform_type_sdn_urn	string	URN of the platform type according to SeaDataNet vocabulary		<a href="#">NERC Vocabulary L06</a>	<a href="#">SDN:L06::48</a>
platform_wmo	double	Platform identification numbers according to World Meteorological Organization		<a href="#">Buoy WMO Identification numbers</a>	-
project_code	string	Project code/acronym	yes	<a href="#">CORDIS for European Project</a>	
Project_DOI	string	Project DOI	yes	<a href="#">CORDIS for European Project</a>	

project_ed_merp	string	Project EDMERP code	yes	<a href="#">EDMERP SeaDataNet</a>	
project_ed_merp_uri	string	Project EDMERP uri	yes	<a href="#">EDMERP SeaDataNet</a>	
project_id	double	Project Grant agreement number	yes	<a href="#">CORDIS for European Project</a>	
project_name	string	Project name	yes	<a href="#">CORDIS for European Project</a>	
project_statement	string	Project Grant agreement statement	yes	<a href="#">CORDIS for European Project</a>	
publisher_name	string	The name of the person (or other entity <i>specified by the publisher_type attribute</i> ) responsible for publishing the data file or product to users, with its current metadata and format.			
publisher_type	string	Specifies type of publisher with one of the following: 'person', 'group', 'institution', or 'position'. If this attribute is not specified, the publisher is assumed to be a person.			
publisher_url	string	The URL of the person (or other entity specified by the <i>publisher_type attribute</i> ) responsible for publishing the data file or product to users, with its current metadata and format.			
references	string	Description of how the dataset was created: published or web-based references that describe the data or methods used to produce it. Recommend URIs (such as a URL or DOI) for papers or other references. This attribute is defined in the CF conventions.	yes		-
RI_name	string	Name of the Subsystem or Research Infrastructure	yes		
RI_short_name	string	RI's Acronym	yes		
RI_coordin_organization	string	Coordinating institute	yes		
RI_coordin_organization	string	Coordinating institute EDMO code	yes	<a href="#">EDMO SeaDataNet</a>	

_edmo_code					
RI_coordinating_organization_edmo_uri	string	Coordinating institute EDMO uri	yes	EDMO SeaDataNet	
RI_coordinating_person	string	Principal Investigator (Name/Names, free text)	yes		
RI_start_date	string	Program Start date	yes		
RI_geographical_coverage	string	Sea-areas and fresh water bodies	yes	SEA AREAS and FRESH WATRE BODIES SeaDataNet	
RI_abstract	string	Abstract			
ship_call_sign	string	Maritime call sign assigned as unique alphanumeric identifier to the ship			
ship_imo	double	IMO ship identification number (unique ship identifier) - report only the seven-digit number		<u>Marine Traffic Research</u>	
ship_name	string	Name of the ship			
source	string	The method of collection and production of the dataset (e.g., types of instrument, model, collection). If it was model-generated, source should name the model and its version. If it is observational, source should characterize it. This attribute is defined in the CF Conventions	yes		-
standard_name_vocabulary	string	Name and version of standard vocabulary (e.g., CF Standard Name Table v70)	yes		CF Standard Name Table v70
summary	string	A paragraph describing the dataset, analogous to an abstract for a paper	yes		Oceanographic mooring data from deployment of BB mooring at the Southern Adriatic Sea (Mediterranean Sea). Measured properties: sea-water temperature
time_coverage_duration	string	Time coverage duration using ISO 8601 (in alternative to time_coverage_start/time_coverage_end)	yes	ISO 8601	-

time_coverage_end	string	Time coverage end using ISO 8601	yes	ISO 8601	2023-04-10T04:20:08Z
time_coverage_resolution	string	Time coverage resolution using ISO 8601 (if applicable)	yes, if applicable	ISO 8601	
time_coverage_start	string	Time coverage start using ISO 8601	yes	ISO 8601	2012-12-13T10:30:03Z
title	string	A short phrase or sentence describing the dataset. In many discovery systems, the title will be displayed in the results list from a search, and therefore should be human readable and reasonable to display in a list of such names	yes		EMSO BB 567 SBE56
<b>Variable name: VARIABLE</b>					
ebv	string		yes, if applicable	GEOBON Essential Biodiversity Variables	
ebv_uri			yes, if applicable	GEOBON Essential Biodiversity Variables	
ecv	string	Essential Climate Variable (ECV): physical, chemical or biological variable or a group of linked variables that critically contributes to the characterization of Earth's climate			Subsurface Temperature
ecv_uri	string	URI to the Essential Climate Variable (ECV)		NERC Vocabulary P01	<a href="https://gcos.wmo.int/site/global-climate-observing-system-gcos/essential-climate-variables/surface-temperature">https://gcos.wmo.int/site/global-climate-observing-system-gcos/essential-climate-variables/surface-temperature</a>
discipline	string		yes	NERC Vocabulary P08	
device_sdn_name	string	Name of the device according to SeaDataNet vocabulary	yes	NERC Vocabulary L05	
device_sdn_uri	string	URI of the device according to SeaDataNet vocabulary	yes	NERC Vocabulary L05	
device_sdn_urn	string	URN of the device according to SeaDataNet vocabulary	yes	NERC Vocabulary L05	

long_name	string	Long name of the variable	yes	NERC Vocabulary P01	Temperature of the seawater
parameter_group	string			NERC Vocabulary P03	
parameter_sdn_name	string	Name of the parameter according to SeaDataNet vocabulary	yes	NERC Vocabulary P01	Temperature of the water body by CTD or STD
parameter_sdn_uri	string	URI of the parameter according to SeaDataNet vocabulary	yes		<a href="https://vocab.nerc.ac.uk/collection/P01/current/TEMPST01/">https://vocab.nerc.ac.uk/collection/P01/current/TEMPST01/</a>
parameter_sdn_urn	string	URN of the parameter according to SeaDataNet vocabulary	yes	ISO 8601	SDN:P01::TEMPST01
sensor_accuracy	string	Accuracy of the sensor	yes, if applicable	NERC Vocabulary L35	
sensor_last_calibration	string	Date of the last calibration of the sensor	yes, if applicable	NERC Vocabulary L35	
sensor_manufacturer_sdn_name	string	Name of the sensor manufacturer or developer according to SeaDataNet vocabulary	yes, if applicable	NERC Vocabulary L35	Sea-Bird Scientific
sensor_manufacturer_sdn_uri	string	URI of the sensor manufacturer or developer according to SeaDataNet vocabulary	yes, if applicable	NERC Vocabulary L22 (in case of ARGO: NERC Vocabulary R25)	<a href="https://vocab.nerc.ac.uk/collection/L35/current/MAN0013/">https://vocab.nerc.ac.uk/collection/L35/current/MAN0013/</a>
sensor_manufacturer_sdn_urn	string	URN of the sensor manufacturer or developer according to SeaDataNet vocabulary	yes, if applicable	NERC Vocabulary L22 (in case of ARGO: NERC Vocabulary R25)	SDN:L35::MAN0013
sensor_sdn_name	string	Name of the sensor according to SeaDataNet vocabulary	yes, if applicable	NERC Vocabulary L22 (in case of ARGO: NERC Vocabulary R25)	Teledyne RDI Workhorse Sentinel 300 kHz ADCP
sensor_sdn_uri	string	URI of the sensor according to SeaDataNet vocabulary	yes, if applicable	CF Standard Name Table v70	<a href="https://vocab.nerc.ac.uk/collection/L22/current/TOOL0295">https://vocab.nerc.ac.uk/collection/L22/current/TOOL0295</a>
sensor_sdn_urn	string	URN of the sensor according to SeaDataNet vocabulary	yes, if applicable	NERC Vocabulary P06	SDN:L22::TOOL0295

standard_name	string	A long descriptive name for the variable taken from a controlled vocabulary of variable names. We recommend using the CF convention and the variable names from the CF standard name table. This attribute is recommended by the CF convention.	yes	NERC Vocabulary P06	sea_water_temperature
unit_sdn_name	string	Name of the unit of measurement according to SeaDataNet vocabulary	yes	NERC Vocabulary P06	Degrees Celsius
unit_sdn_uri	string	URI of the unit of measurement according to SeaDataNet vocabulary	yes	UDUNITS library of UniData (use one of the database in the chapter "6 The Units Database")	<a href="https://vocab.nerc.ac.uk/collection/P06/current/UPAA/">https://vocab.nerc.ac.uk/collection/P06/current/UPAA/</a>
unit_sdn_urn	string	URN of the unit of measurement according to SeaDataNet vocabulary	yes	UDUNITS library of UniData (use one of the database in the chapter "6 The Units Database")	SDN:P06::UPAA
units	string	Unit of measurement of the variable needed by ERDDAP	yes	DOI	degree_Celsius
units_url	string	URL to the vocabulary used to define the unit of measurement of the variable in "units"	yes		<a href="https://docs.unidata.ucar.edu/udunits/current/udunits2-derived.xml">https://docs.unidata.ucar.edu/udunits/current/udunits2-derived.xml</a>
variable_best_practices_doi	string	Variable best practices DOI (if the same of the data insert the same value of "data_best_practice_doi")	yes, if existing	NERC Vocabulary P01	
<b>Variable name: VARIABLE_QC</b>					
standard_name	string	Fixed standard name for quality check "quality_flag"	yes	<a href="https://repository.oceanbestpractices.org/bitstream/handle/11329/874.2/oceansites_data_format_reference_manual.pdf">https://repository.oceanbestpractices.org/bitstream/handle/11329/874.2/oceansites_data_format_reference_manual.pdf</a>	quality_flag
long_name	string	Long name of the variable	yes		quality control flag of sea-water temperature
flag_meanings	string	One or more values separated by comma that indicate the meaning of the QC flags of the variable, there must be a match with the one entered in "flag_values" (fixed value: no_qc_performed, good_data, probably_good_data, bad_data_that_are_potentially_correctable, bad_data, value_changed, not_used,	yes		no_qc_performed good_data probably_good_data bad_data_that_are_potentially_correctable bad_data value_changed

		nominal_value, interpolated_value, missing_value)			ed nominal_val ue interpolated _value missing_valu e
flag_values	string	One or more values separated by comma that indicate the QC flags of the variable, there must be a match with the one entered in "flag_meanings" (possible values: 0,1,2,3,4,5,7,8,9)	yes		0,1,2,3,4,5,7,8,9
qc_manual	string	Quality Flag Scheme	yes, if applicable		OceanSITES Data Format Reference Manual
qc_method	string	Quality Flag Method (DOI or other reference)	yes, if applicable		<a href="https://repository.oceanbestpractices.org/bitstream/handle/11329/874.2/oceansites_data_format_reference_manual.pdf">https://repository.oceanbestpractices.org/bitstream/handle/11329/874.2/oceansites_data_format_reference_manual.pdf</a>

#### 4. METADATA VERIFICATION TOOL (COLAB)

The metadata verification component is implemented as a Colab-based tool and is intended to support metadata quality assessment within the IT-IOOS ecosystem. Its primary purpose is to facilitate the verification of dataset metadata against the ITINERIS metadata model, contributing to improved consistency and interoperability across the platform. A Colab (Google Colaboratory) is a cloud-based interactive environment that allows the execution of Python code through notebooks, without requiring local software installation. In this context, the Colab notebook is used as a support tool to perform metadata checks in a controlled and reproducible environment.

The Colab ingests an XML file containing the configuration of an ERDDAP dataset and verifies that both global metadata and variable-level metadata conform to the ITINERIS metadata model. The checks focus on aspects such as the presence of required fields, the use of controlled vocabularies, and the structural coherence between global and variable metadata (see the ERDDAP documentation for



## 7. ANNEX

### 7.1 ITINERIS DATA & METADATA CONVERTER USER MANUAL

#### Introduction

The **ITINERIS Data & Metadata Converter (Flask Web App)** is an intuitive, browser-based platform developed to simplify the preparation of scientific datasets for **ERDDAP** publication and internal data sharing. It allows users to upload raw data files (e.g., CSV, Excel, NetCDF) and corresponding metadata files (XML, Excel, JSON), review or modify the metadata interactively, and export standardized outputs in **NetCDF (.nc)** formats together with metadata in the desired format.

Designed under the **EU ITINERIS project** at **CNR-ISMAR**, the application provides a unified environment that bridges data processing, metadata validation, and ERDDAP-ready packaging ensuring compliance, reproducibility, and ease of use for both researchers and data managers.

#### Purpose & Scope

The **ITINERIS Data & Metadata Converter** is designed to provide a unified, web-based environment for transforming heterogeneous scientific data and metadata files into standardized, ERDDAP-compatible formats. Developed using the **Flask** framework in Python, the tool bridges the gap between raw data preparation, metadata validation, and NetCDF/CSV generation ensuring that datasets are consistent, well-structured, and ready for integration into data repositories or publication services.

#### What the App Does

- Converts uploaded **data files** (e.g., CSV, Excel, NetCDF) and **metadata files** (XML, Excel, JSON) into standardized **NetCDF (.nc)** and **CSV** outputs.
- Embeds metadata fields directly into the generated data files as **global and variable-level and QC attributes**.
- Packages all generated files (data + metadata) into a **single ZIP archive** for easy download and archiving.
- Provides an **interactive metadata editor** allowing users to view, modify, and validate metadata fields before file generation.
- Offers **real-time validation and warnings** (e.g., red borders for custom or missing attributes) to ensure compliance with ITINERIS and ERDDAP metadata standards.

#### Who Should Use It

- **Research scientists and data technologists** preparing environmental, oceanographic, or remote-sensing datasets for publication.
- **Data managers and curators** responsible for ensuring dataset consistency and metadata completeness within the ITINERIS framework.

- **Collaborators and external users** who need a lightweight, browser-based solution to convert raw or tabular data into structured NetCDF formats without manual coding.
- **Operators or project partners** contributing metadata or quality-controlled data to shared repositories (e.g., CNR-ISMAR servers or ERDDAP instances).

### Typical Use Cases

- Rapidly converting observation or model output data (e.g., FerryBox, HF radar, AWS data) into ERDDAP-ready formats.
- Editing and validating metadata from Excel or XML templates directly in the browser before generating output files.
- Embedding rich metadata fields (Global, Variable, and QC attributes) within NetCDF files to maintain full provenance.
- Generating and distributing self-contained ZIP packages for **data sharing, archiving, or automated ERDDAP ingestion**.

### System Requirements

To ensure smooth operation and compatibility, the **ITINERIS Data & Metadata Converter** requires a minimal yet stable environment on both the **user** and **server** sides. The following specifications outline the recommended setup for deploying and using the application effectively.

#### Client-Side (User Environment)

- A **modern web browser** such as **Google Chrome, Microsoft Edge, Mozilla Firefox, or Safari** (latest versions recommended).
- JavaScript and cookies must be **enabled** to support dynamic form validation, dropdowns, and live field updates.
- A **stable internet connection** is required when accessing the app from a remote server (for local installations, localhost access is sufficient).
- Minimum screen resolution of **1280 × 720 pixels** is recommended for optimal viewing of tables and forms.

#### Server-Side (Application Host)

- **Python 3.8 or higher**, with the following primary libraries installed:
  - ✓ Flask – web framework for routing and UI handling.
  - ✓ pandas – data and metadata parsing.
  - ✓ xml.etree.ElementTree – XML generation and parsing.
  - ✓ netCDF4 – for creating NetCDF outputs.
  - ✓ openpyxl – Excel file reading/writing.
  - ✓ zipfile, uuid, json, and datetime – for packaging and metadata management.

- Operating System: any system supporting Python (Windows, Linux, or macOS).
- Flask can run either in **development mode** (for local testing) or through a production setup using **Gunicorn + Nginx** or **uWSGI** (will be updated later)

### Storage & Performance

- At least **500 MB of free disk space** for temporary storage of uploaded files and generated ZIP archives.  
(Each processed dataset is temporarily saved in an /uploads directory until cleaned automatically or manually.)
- Additional space may be required for large NetCDF datasets, especially those containing gridded or time-series data.
- A minimum of **4 GB RAM** is recommended for smooth handling of large files or multiple concurrent users.

### Optional Dependencies (for Extended Features)

- `pdfminer.six` – to handle PDF parsing if future metadata extraction from PDF files is enabled.
- `Werkzeug` – for enhanced file upload management and error handling.
- `Gunicorn` or `Waitress` – for deploying in production environments.
- `dotenv` – for environment variable management (paths, secret keys, etc.).

### Accessing the Application

The **ITINERIS Data & Metadata Converter (Flask Web App)** can be accessed either locally on a researcher's workstation or remotely through a web browser when deployed on a dedicated server.

This section describes how users can start, connect to, and interact with the web interface safely and efficiently.

#### 1. Local Access (Development Mode)

If the Flask app is hosted locally (on the user's machine):

1. Open a command prompt or terminal window.
2. Navigate to the project directory where the Flask files (`app.py`, `convert_nc.py`, etc ) are stored.
3. Create the virtual environment and run the configuration file **`env.yml`**.
4. Run the following command to start the Flask development server:

```
python app.py
```

5. Once started, Flask will display a message such as:

```
Running on http://127.0.0.1:5000/
```

6. Open a web browser and enter the following address:

`http://127.0.0.1:5000/`

or simply

`http://localhost:5000/`

7. The home page of the ITINERIS converter will appear, allowing file uploads and metadata editing.

## 2. Remote Access (Server Deployment)

When deployed on a web server (e.g., hosted by **CNR-ISMAR** or a central ITINERIS server), the app is accessible via a public or intranet URL.

- Example URL: `https://it-ioos.eu/converter`
- Users can access the app from any device connected to the same network.
- HTTPS is recommended for data protection, especially when transferring sensitive datasets.
- For multi-user environments, session handling ensures each user's upload directory is isolated.
- User uploads are temporary and not publicly accessible. Each session uses a unique folder identifier (UUID) to prevent file mix-ups between users.

## 3. Login & Permissions (Optional)

- The default version of the app is **open access** (no login required).
- If configured for multi-user deployment, authentication can be integrated using:
  - Basic username/password (via Flask-Login).
  - Institutional Single Sign-On (SSO).
  - Token-based access for automated data uploads (future extension).
- Admin accounts may have access to logs, configuration settings, or upload-cleaning functions.

## 4. Session Behavior

- Each user session is temporary and lasts until the browser window is closed.
- Uploaded files are stored in an **“uploads”** directory with a unique session ID.
- After ZIP generation and download, files can be automatically deleted to free up disk space (configurable in settings).
- The application supports multiple users uploading and generating files simultaneously without interference.

## 5. Data Privacy & Retention Policy

- All uploaded files remain private to the user session and are not indexed or shared.
- The app implements an **automatic clean-up** mechanism to remove temporary files older than a defined time period (e.g., 24 hours).
- Logs contain only minimal, non-sensitive information such as timestamps and file types (no data content is stored).

## Supported Input and Output Formats

The **ITINERIS Data & Metadata Converter** has been designed to handle a wide range of scientific data and metadata formats commonly used in oceanographic, environmental, and remote-sensing applications.

This flexibility ensures that users can integrate diverse data sources and metadata structures into a single, ERDDAP-ready output package.

### 1. Supported Input Formats

The application accepts two primary categories of input files — **data files** and **metadata files** — each supporting multiple formats.

#### a. Data Files

Users can upload data in any of the following formats:

<i>Format</i>	<i>Description</i>	<i>Typical Usage</i>
<b>CSV (.csv)</b>	Comma-separated values; standard tabular format.	Sensor data, time-series observations, station measurements.
<b>Excel (.xlsx / .xls)</b>	Spreadsheet format with one or more sheets.	Multi-variable datasets, formatted tables, metadata-linked variables.
<b>NetCDF (.nc)</b>	Self-describing scientific data format.	Re-processing or merging existing NetCDF data with updated metadata.
<b>H5/HDF (.h5)</b>		

#### Key Features:

- Automatic detection of file type based on extension and MIME type.
- Smart parsing through pandas, openpyxl, or netCDF4 libraries depending on input.
- Data columns automatically mapped to variable names during NetCDF/HDF5 generation.
- PDF inputs are stored as byte arrays (not read for content).

#### b. Metadata Files

Metadata can be uploaded in several formats to maximize compatibility with different workflows:

<i>Format</i>	<i>Description</i>	<i>Parsing Method</i>
<b>XML (.xml)</b>	Hierarchical metadata based on ITINERIS or ERDDAP schema.	Parsed with <code>xml.etree.ElementTree</code> to extract Global, Variable, and QC attributes.
<b>Excel (.xlsx / .xls)</b>	Metadata stored in structured sheets (Global, Variable, QC).	Read using <code>openpyxl</code> or <code>pandas</code> . Recommended format for editing.
<b>JSON (.json)</b>	Lightweight data structure for metadata exchange.	Parsed and mapped to internal DataFrame structure.

#### Notes:

- The app can use **multiple metadata sources** simultaneously (e.g., merge Excel and XML).
- If no metadata file is provided, a **default ITINERIS template** is automatically loaded.
- Validation ensures all mandatory fields (e.g., title, institution, variable\_name, units) are present before file generation.

## 2. Manual Metadata Upload and Conflict-Resolution Workflow

The application supports both single and multiple manual metadata file uploads. The processing logic adapts automatically based on the number of uploaded metadata files and their content.

### 1. Single Metadata File Upload

When the user uploads a single metadata file (supported formats include XML and JSON):

- The Flask backend automatically parses all metadata attributes and their corresponding values.
- All extracted attributes are copied directly to the metadata editing page.
- The user can:
  - Review the metadata,
  - Modify any attribute values if needed,
  - Save the metadata without additional intervention.
- Upon saving, the metadata is:
  - Stored as the final standalone metadata file (in the selected output format),
  - Embedded as global and variable attributes inside the generated NetCDF (.nc) file.

This workflow ensures a fast and transparent metadata handling process when no conflicts are present.

### 2. Multiple Metadata File Upload

When the user uploads multiple metadata files (e.g. several JSON and/or XML files):

- The system performs a field-by-field comparison across all uploaded files.

- For each metadata attribute, two scenarios are possible:

#### 2.1 Identical Attribute Values (No Conflict)

- If an attribute appears in multiple files with the same value:
  - The system automatically selects one representative value.
  - No user interaction is required for that attribute.
  - The value is copied to the metadata editing page.

#### 2.2 Different Attribute Values (Conflict Detected)

- If an attribute appears in multiple files with different values:
  - The system flags this situation as a metadata conflict.
  - All distinct values for that attribute are presented to the user in the metadata editing interface.
  - The user is explicitly given the option to:
    - Select the most appropriate value,
    - Confirm their selection before saving.

This conflict-resolution step ensures that user intent and data provenance are preserved, avoiding silent overwriting of important metadata.

### 3. Final Metadata Saving and NetCDF Embedding

After conflict resolution (if applicable):

- The user saves the finalized metadata.
- The selected attribute values are:
  - Written to the output metadata file (XML, JSON, or other selected format),
  - Embedded into the generated NetCDF (.nc) file as metadata attributes.
- The resulting .nc file is therefore:
  - ERDDAP-ready,
  - Self-describing,
  - Fully consistent with the user-approved metadata.

### 4. Key Advantages of This Approach

- ✓ Supports single and multi-source metadata ingestion
- ✓ Prevents automatic overwriting of conflicting metadata
- ✓ Provides explicit user control over metadata decisions
- ✓ Ensures consistency between standalone metadata files and NetCDF contents
- ✓ Suitable for ERDDAP ingestion and long-term archiving#

## 2. Supported Output Formats

The application produces structured, ERDDAP-compatible outputs ready for publication, archiving, or sharing.

#### a. Data File

- **NetCDF (.nc)** — Default scientific data output, fully compliant with CF-conventions and ERDDAP standards.
- **CSV (.csv)** – Compact tabular export of metadata attributes.

- All metadata from the Global, Variable, and QC sections are embedded inside the data file as attributes.

#### b. Standalone Metadata File

- Users can choose the export format for metadata among:
  - **XML (.xml)** – Default format following the ITINERIS schema.
  - **JSON (.json)** – Useful for web APIs or interoperability.
  - **Excel (.xlsx)** – Preserves sheet structure (Global, Variable, QC).
- The standalone metadata file mirrors the structure embedded within the NetCDF/HDF5 file, ensuring perfect consistency.

#### c. Combined ZIP Package

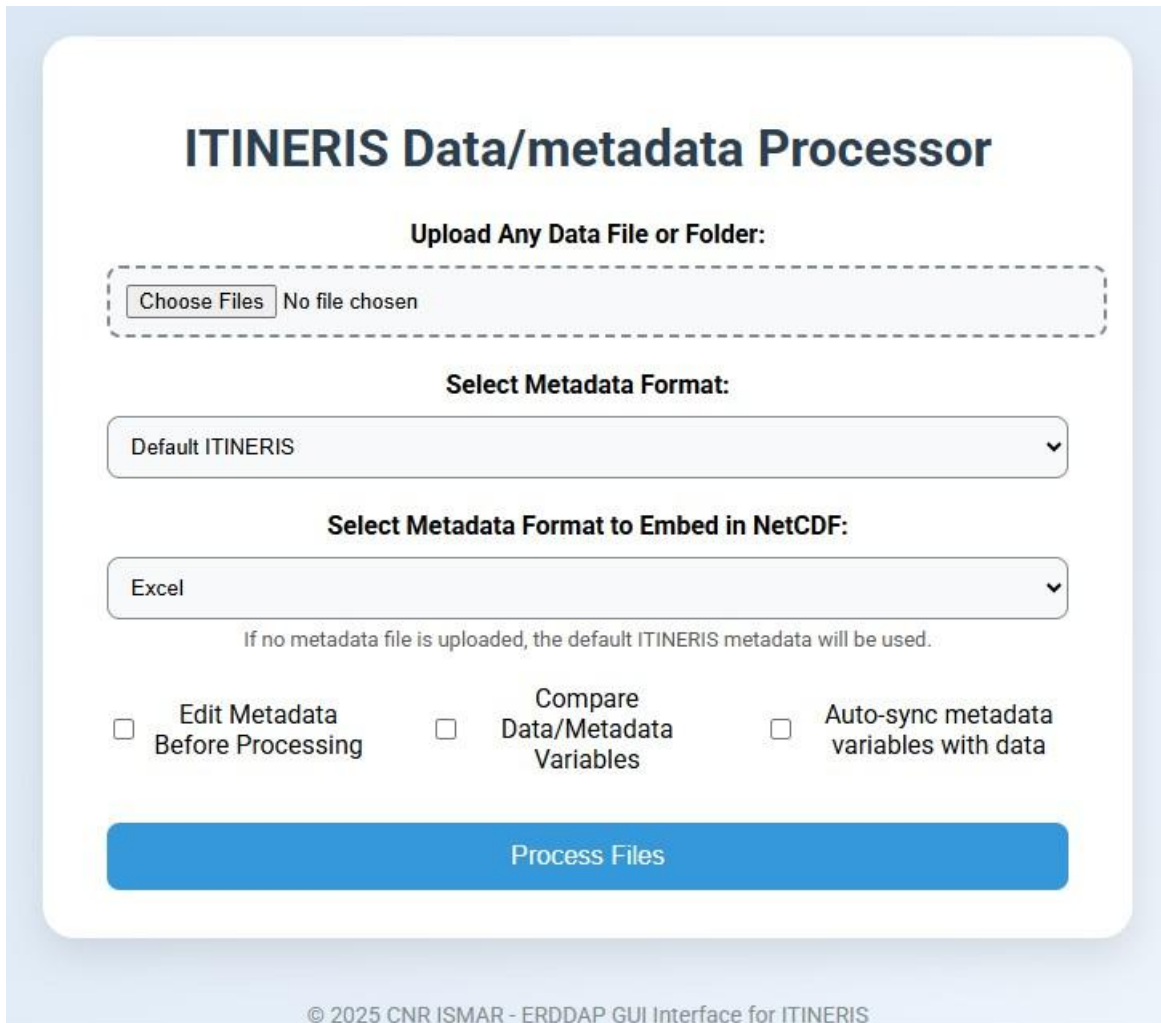
- The final output is a **ZIP archive** containing:
  - The generated **data file** (.nc or .h5).
  - The **standalone metadata file** (in user-selected format).
  - Optionally, the **original uploaded files** (if “include originals” is enabled).
- Each ZIP file is named with a unique ID or timestamp to maintain reproducibility and prevent overwriting.
- The ZIP can be downloaded directly via browser or accessed from the output archive directory.

### Highlights

- Full bidirectional compatibility between Excel/JSON/XML metadata and NetCDF/CSV data structures.
- Support for mixed inputs (e.g., data in CSV + metadata in XML).
- Simple one-click export ensuring ERDDAP-readiness and ITINERIS compliance.

### Quick Start — Step by Step

- Open the app → Upload your **\*\*data file\*\***.



## ITINERIS Data/metadata Processor

Upload Any Data File or Folder:

Choose Files No file chosen

Select Metadata Format:

Default ITINERIS

Select Metadata Format to Embed in NetCDF:

Excel

If no metadata file is uploaded, the default ITINERIS metadata will be used.

Edit Metadata Before Processing

Compare Data/Metadata Variables

Auto-sync metadata variables with data

Process Files

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- Upload or choose a **\*\*metadata source\*\*** (Default ITINERIS/XML/Excel/JSON).

## ITINERIS Data/metadata Processor

Upload Any Data File or Folder:

Choose Files All\_sensors\_732405\_2025-04-18 (1).nc

Select Metadata Format:

Default ITINERIS

Default ITINERIS

Excel (.xlsx, .xls)

XML (.xml)

JSON (.json)

If no metadata file is uploaded, the default ITINERIS metadata will be used.

- Edit Metadata Before Processing
- Compare Data/Metadata Variables
- Auto-sync metadata variables with data

Process Files

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## ITINERIS Data/metadata Processor

Upload Any Data File or Folder:

Choose Files INFN-LNS\_ITINERIS\_CapoPassero\_HY...0250101\_010000\_SPL\_converted (11).nc

Select Metadata Format:

Excel (.xlsx, .xls)

Upload Metadata File:

Choose File No file chosen

Select Metadata Format to Embed in NetCDF:

Excel

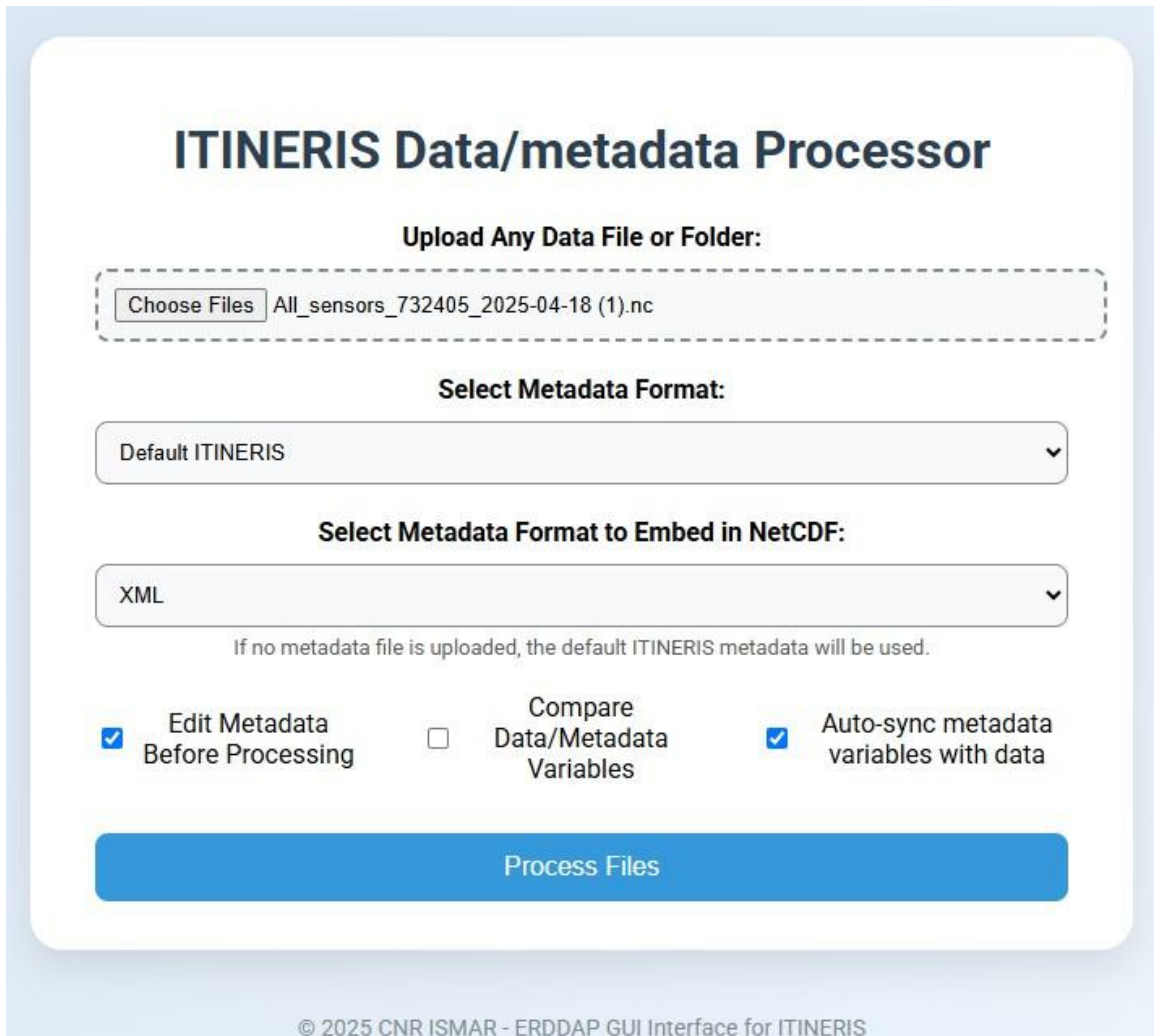
If no metadata file is uploaded, the default ITINERIS metadata will be used.

- Edit Metadata Before Processing
- Compare Data/Metadata Variables
- Auto-sync metadata variables with data

Process Files

If user selects any of option in metadata format it will ask for the metadata file.

- Optionally \*\*edit metadata\*\* (Global, Variable, QC tabs).



**ITINERIS Data/metadata Processor**

**Upload Any Data File or Folder:**

Choose Files All\_sensors\_732405\_2025-04-18 (1).nc

**Select Metadata Format:**

Default ITINERIS

**Select Metadata Format to Embed in NetCDF:**

XML

If no metadata file is uploaded, the default ITINERIS metadata will be used.

Edit Metadata Before Processing     Compare Data/Metadata Variables     Auto-sync metadata variables with data

**Process Files**

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If the only **Edit Metadata Before processing** is selected, the default ITINERIS metadata form will be open for processing, and all field will be empty. If the **Auto-sync metadata variable** with data is also selected, all the variables contained by the NetCDF file will be automatically copied to the metadata variable form or if the if the **compare data/metadata variables** are also select the variables present in the metadata and data will be compare, will inform about the missing variables.

The mandatory field is highlighted with **Asterisk**, if not filled will be ask for it with the red text.

**Process Files** click will go to metadata edit page as below.....

## Edit Metadata

**Global** Only Value editable Hide Section

Add extra attribute:  Type or enter custom nam  Collapse All

Attribute name	Value (icons at right)
<b>▼ acknowledgement</b>	
acknowledgement	Enter value... <span>ⓘ</span> <span>🗑️</span> <span>&lt;-&gt;</span>
<b>▼ cdm</b>	
cdm_data_type	Enter value... <span>ⓘ</span> <span>🗑️</span> <span>&lt;-&gt;</span>
<b>▼ contributors</b>	
contributors_name	XYZ <span>ⓘ</span> <span>🗑️</span> <span>&lt;-&gt;</span>
contributors_orcid	AAAA-0000-0000-XXXX <span>ⓘ</span> <span>🗑️</span> <span>&lt;-&gt;</span>
contributors_role	Principal Investigator, Principal Investigator, Dataset Processing <span>ⓘ</span> <span>🗑️</span> <span>&lt;-&gt;</span>

- 
- 
- 
- 

## Edit Metadata

**Global** Only Value editable Show Section

**Variable** Per-variable ERDDAP attributes (source/destination/dataType + addAttributes) Hide Section

New variable name...  + At varia

- ×
- ×
- ×
- ×
- ×
- ×
- ×
- ×
- ×
- ×
- ×
- ×

sourceName	Date_Time <span>ⓘ</span>
destinationName	Date_Time <span>ⓘ</span>
dataType	string <span>ⓘ</span>
dataCode	Type or pick a datacode... <span>ⓘ</span>
ecv	Type or pick a ecv... <span>ⓘ</span>
ecv_uri	Type or pick a ecv_uri... <span>ⓘ</span>
source_ecv_list	Type or pick a source_ecv_list... <span>ⓘ</span>
ebv	nan <span>ⓘ</span>
ebv_uri	nan <span>ⓘ</span>
source_ebv_list	Type or pick a source_ebv_list... <span>ⓘ</span>
eov	Sea Surface Temperature <span>ⓘ</span>
eov_uri	Type or pick a eov_uri... <span>ⓘ</span>
source_eov_list	Type or pick a source_eov_list... <span>ⓘ</span>
discipline	SDN-P08:DS03 <span>ⓘ</span>
parameter_sdn_name	Temperature of the water body <span>ⓘ</span>
ebv_urn	Type or pick a ebv_urn... <span>ⓘ</span>
device_sdn_name	non-separating flow-through data acquisition system <span>ⓘ</span>

- 
- 
-

### Edit Metadata

**Global** Only Value editable

Show Section

**Variable** Per-variable ERDDAP attributes (source/destination/dataType + addAttributes)

Show Section

**Variable QC** Auto-created per variable; editable QC attributes

Hide Section

QC Variables	variable (linked)	Date_Time
DATE_TIME_QC	sourceName (QC var)	DATE_TIME_QC
LATITUDE_QC	quality_flag	
LONGITUDE_QC	qc_source	
SPEED_QC	qc_method	
COURSE_QC	qc_comment	
HEIGHT_QC	valid_min	
DILUTION_QC	valid_max	
SATELLITES_QC	_FillValue	
GPS_ERROR_QC		
PRESSURE_QC		
FLOW_IN_QC		
FLOW_MAIN_QC		
FLOW_BYPASS_1_QC		
FLOW_BYPASS_2_QC		

Save Metadata Clear Global Clear Variables Clear Variable QC

### Customized Global, Variables, QC

#### Edit Metadata

**Global** Only Value editable

Hide Section

Add extra attribute: Customized Name Add

Expand All Groups

Attribute name	Value (icons at right)
► acknowledgement	
► cdm	
► contributors	
► Conventions	

► summary	
► time	
► title	
▼ <b>_custom</b>	
AAAAAA	11111
Customized Name	Enter value...

**Variable** Per variable ERDDAP attributes (source/destination/dataType + addAttributes) Hide Section

<input type="text" value="New Variable XYZ"/>	<input type="text" value="New Variable XYZ"/>
<input type="text" value="nc4_non_coord_frequency"/>	<input type="text" value="New Variable XYZ"/>
<input type="text" value="nc4_non_coord_time"/>	<input type="text" value="New Variable XYZ"/>
<input type="text" value="depth"/>	<input type="text" value="e.g. double, float, String"/>
<input type="text" value="frequency"/>	<input type="text" value=""/>
<input type="text" value="latitude"/>	<input type="text" value="Type or pick a datacode..."/>
<input type="text" value="longitude"/>	<input type="text" value="Type or pick a ecv..."/>
<input type="text" value="name_strlen"/>	<input type="text" value="Type or pick a ecv_uri..."/>
<input type="text" value="spl"/>	<input type="text" value="Type or pick a source_ecv_list..."/>
<input type="text" value="station"/>	<input type="text" value="Type or pick a ebv..."/>
<input type="text" value="station_id"/>	<input type="text" value="Type or pick a ebv_uri..."/>
<input type="text" value="time"/>	<input type="text" value="Type or pick a source_ebv_list..."/>
<input type="text" value="New Variable XYZ"/>	<input type="text" value="Type or pick a eov..."/>
	<input type="text" value="Type or pick a eov_uri..."/>
	<input type="text" value="Type or pick a source_eov_list..."/>
	<input type="text" value="Type or pick a discipline..."/>

QC will get it automatically on basis of Variable..

**Variable QC** Auto-created per variable; editable QC attributes Hide Section

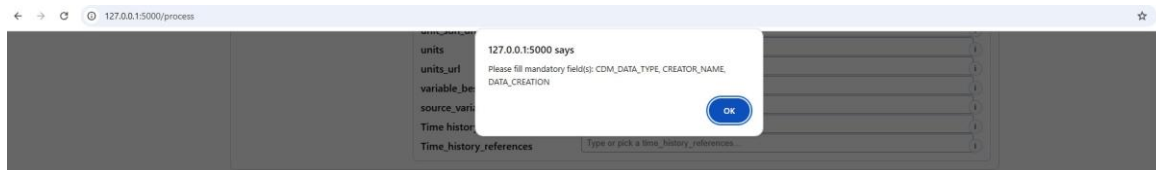
<input type="text" value="NC4_NON_COORD_FREQUENCY_QC"/>	<input type="text" value="New Variable XYZ"/>
<input type="text" value="NC4_NON_COORD_TIME_QC"/>	<input type="text" value="New Variable XYZ_QC"/>
<input type="text" value="DEPTH_QC"/>	<input type="text" value=""/>
<input type="text" value="FREQUENCY_QC"/>	<input type="text" value=""/>
<input type="text" value="LATITUDE_QC"/>	<input type="text" value=""/>
<input type="text" value="LONGITUDE_QC"/>	<input type="text" value=""/>
<input type="text" value="NAME_STRLen_QC"/>	<input type="text" value=""/>
<input type="text" value="SPL_QC"/>	<input type="text" value=""/>
<input type="text" value="STATION_QC"/>	<input type="text" value=""/>
<input type="text" value="STATION_ID_QC"/>	<input type="text" value=""/>
<input type="text" value="TIME_QC"/>	<input type="text" value=""/>
<input type="text" value="NEW VARIABLE XYZ_QC"/>	<input type="text" value=""/>
<input type="text" value="New Variable XYZ_QC"/>	<input type="text" value=""/>

Assigning the attribute value for variables that are not in ITINERIS data file will appear as red

**Variable** Per-variable ERDDAP attributes (source/destination/dataType + addAttributes) Hide Section

sourceName	depth
destinationName	depth
dataType	double
dataCode	22
ecv	AAA
ecv_uri	<a href="https://gcos.wmo.int/site/climate-observing-system-gcos/essential-climate-variables/ocean-colour">https://gcos.wmo.int/site/climate-observing-system-gcos/essential-climate-variables/ocean-colour</a>
source_ecv_list	Type or pick a source_ecv_list...
ebv	Type or pick a ebv...
ebv_uri	Type or pick a ebv_uri...
source_ebv_list	Type or pick a source_ebv_list...
eov	Type or pick a eov...
eov_uri	Type or pick a eov_uri...

Warning about the missing mandatory fields :



Automatically drag on to the missing mandatory fields: ask for value

### Edit Metadata

**Global** Only Value editable Hide Section

Add extra attribute:  Type or enter custom nan Add Collapse All

Attribute name	Value (icons at right)
<b>▼ acknowledgement</b>	
acknowledgement	Enter value... <span>i</span> <span>🗑</span> <span>&lt;/&gt;</span>
<b>cdm</b>	
cdm_data_type	Enter value... <span>i</span> <span>🗑</span> <span>&lt;/&gt;</span>

### Multiple Manual metadata file Uploads

If the user upload manual metadata file a single one or multiple if single one the flask automatically copies all attributes to the metadata page and user can save it. Else if the user upload multiple metadata files (JSON, XML), if the more then one JSON file is uploaded and if the attributes and its values same it select one values for each attributes, if the attributes values are different it give option to the user to select one that could be saved in the metadata file and embed in the .nc file when created.

### ITINERIS Data/metadata Processor

Upload Any Data File or Folder:

Choose Files LUCA\_20250807\_000003.nc

Select Metadata Format:

JSON (.json)

Upload Metadata File(s) (JSON):

Choose Files 3 files

Select Metadata Format to Embed in NetCDF:

Excel

If no metadata file is uploaded, the default ITINERIS metadata will be used.

Edit Metadata Before Processing     Compare Data/Metadata Variables     Auto-sync metadata variables with data

Process Files

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### Edit Metadata

Global Only Value editable Hide Section

Add extra attribute:  Type or enter custom nam  Collapse All

Attribute name	Value (icons at right)
<b>acknowledgement</b>	
acknowledgement	<span>⚠ Select value from metadata files</span> SHIP
<b>cdm</b>	
cdm_data_type	<span>⚠ Select value from metadata files</span> SHIP R/V Gaia Blu crew and commandants Nothing trajectory
<b>contributors</b>	
contributors_name	<span>⚠ Select value from metadata files</span> Carolina Cantoni, Katrin Schoeder, Florian Kolkoszka, Giovanna Inerra, Marcello Felsani, Davide Vernazzani
contributors_orcid	<span>⚠ Select value from metadata files</span> 0000-0002-3263-5583
contributors_role	<span>⚠ Select value from metadata files</span> principal investigator
<b>Conventions</b>	
Conventions	<span>⚠ Select value from metadata files</span> COARDS, CF-1.6, ACDD-1.3

The conflicted fields are shown red by the FLASK, user can select one. By click the dropdown option are visible

## Edit Metadata

**Global** Only Value editable Hide Section

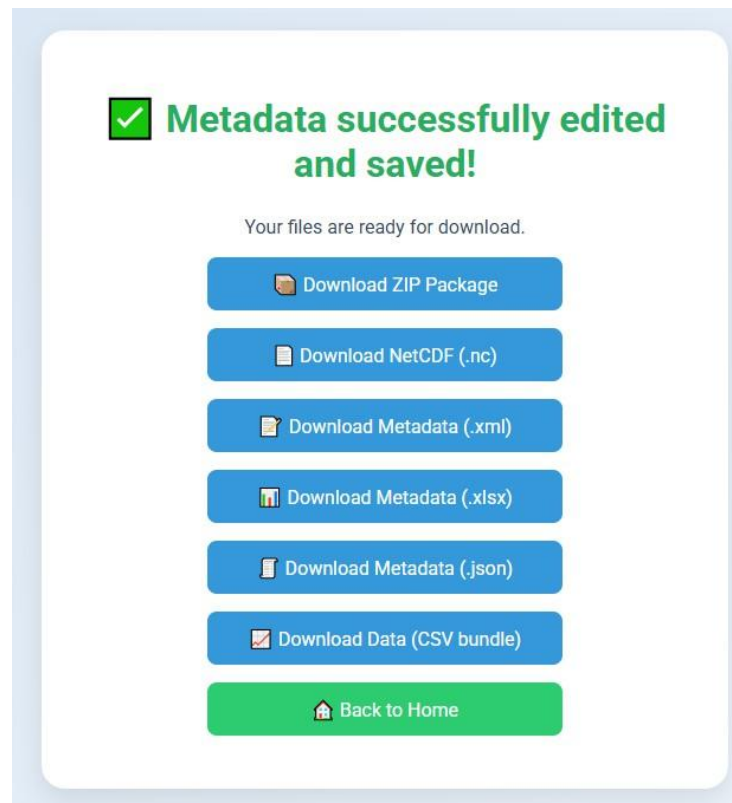
Add extra attribute:   Collapse All

Attribute name	Value (icons at right)
<b>▼ acknowledgement</b>	
acknowledgement	SHIP SHIP <span>?</span> <span>↔</span>
<b>▼ cdm</b>	
cdm_data_type	trajectory <span>?</span> <span>↔</span>
<b>▼ contributors</b>	
contributors_name	Carolina Cantoni, Katrin Schoeder, Florian Kokoszka, Carolina Cantoni, Katrin Schoeder, Florian Kokoszka, Giovanna Inserra, Marcello Felsani, Davide Vernazzani <span>?</span> <span>↔</span>
contributors_orcid	Select value from metadata files 0000-0002-3263-5583 <span>?</span> <span>↔</span>
contributors_role	Select value from metadata files principal investigator <span>?</span> <span>↔</span>
<b>▼ Conventions</b>	

**Field which is common is not RED**

**Save metadata click will take you to the output download page.**

- Choose **\*\*output format\*\*** (NetCDF) and **\*\*metadata output\*\*** format.



Click **Generate** → Download **ZIP** (contains data + metadata).

### Metadata Editor — Rules & Tips

- Mandatory fields are marked and validated.
- Dropdowns (e.g., RI\_Short\_name) support custom entries; non-listed entries show **red border + tooltip warning**.
- Runtime validation: border turns red while typing if not matched to allowed list.
- QC fields can be added/removed; empty optional fields are skipped in output.

### Common Tasks

- Using built-in default metadata when none is provided.
- Switching between **auto-sync** and **manual editing**.
- Adding/removing variables; mapping to data columns.

### Troubleshooting

- Upload fails → check file size/extension and try again.
- NetCDF generation error → verify required metadata fields.
- Auto-sync jumps to download → disable auto-sync to review editor.

- PDF-as-data: PDF content is embedded; not parsed for tables.

### **FAQ**

- Where are files stored? → temporary upload directory with periodic clean-up.
- Can I re-download past outputs? → if archive history is enabled.
- How to cite or reference the tool in reports.

### **Contact / Support (should be updated)**

- **Maintainer: Muhammad Adil (CNR-ISMAR).**
- **Responsible Person: Mauro Caccavale (CNR-ISMAR)**
- **Project: EU ITINERIS.**
- **Issue reporting: email / Git repository (if applicable).**