

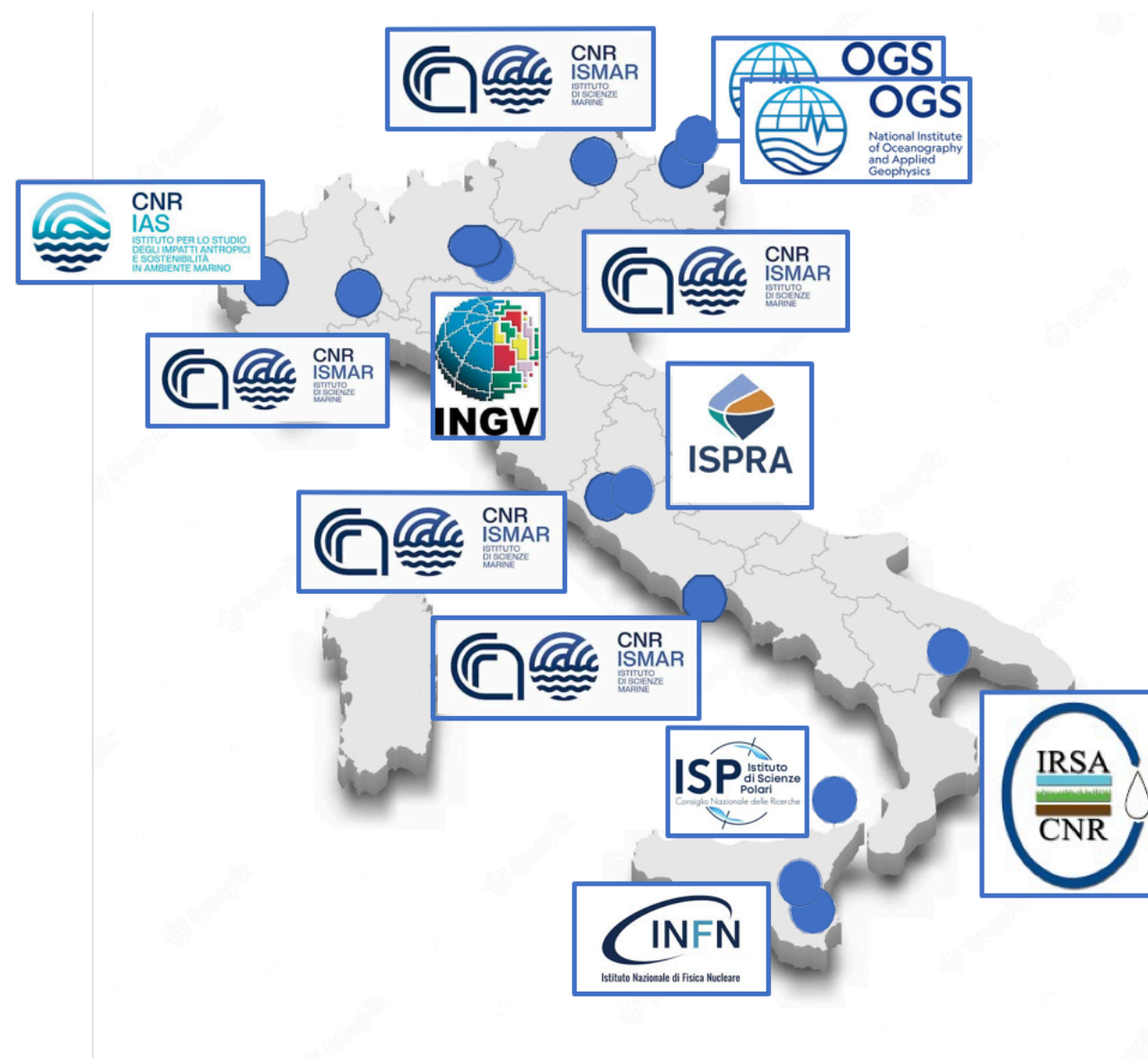
# Update on ITINERIS

## WP5 marine Domain, Activity 5.7

### Simone Sanfilippo

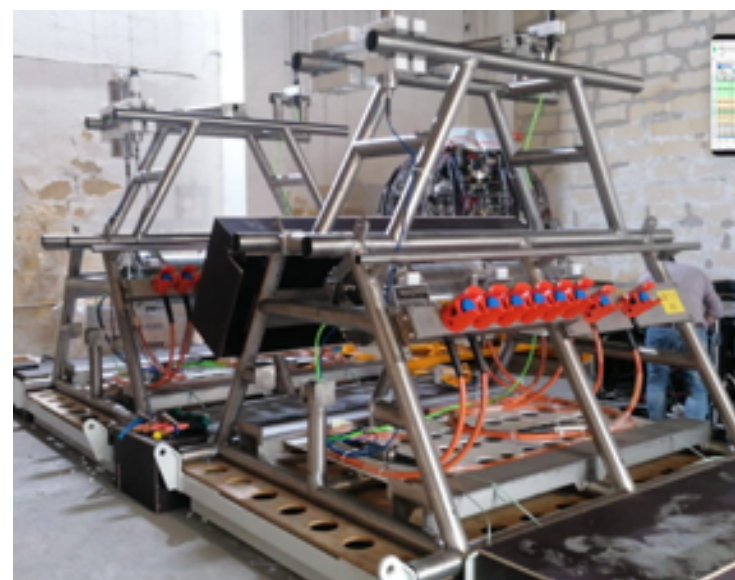
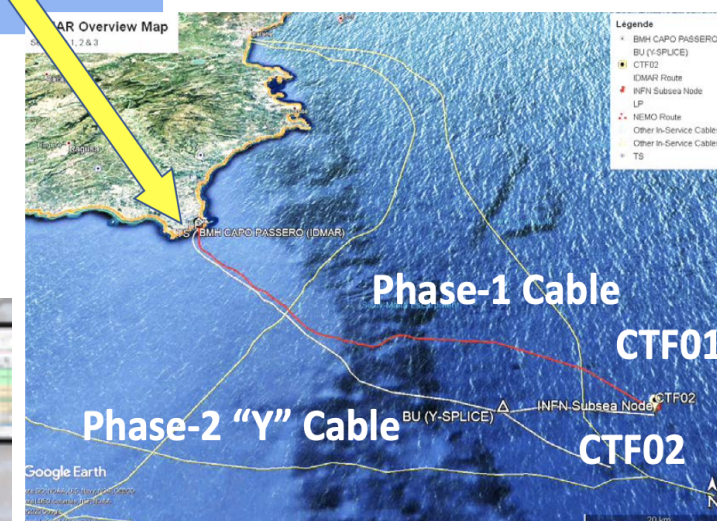
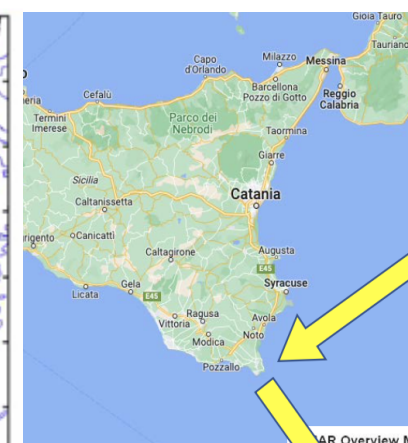
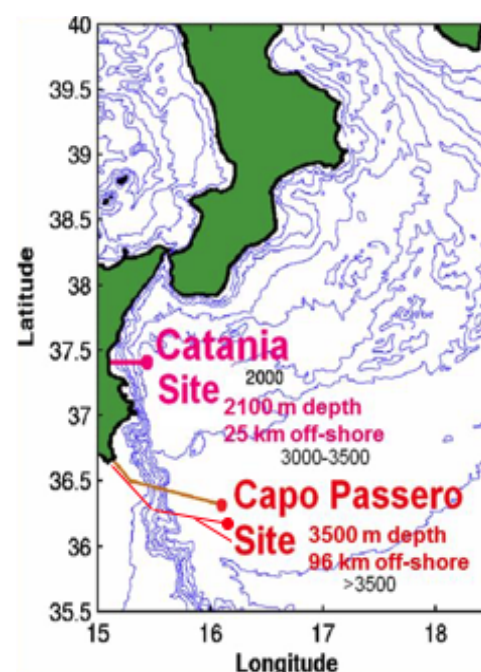
# The ITINERIS Project

- The aim of the **Italian Integrated Environmental Research Infrastructures System (ITINERIS)** project, is to establish the Italian Hub of Research Infrastructures within the environmental scientific domain.
  - ITINERIS will create a **flexible system** to collect and store, for the first time in a national integrated system, ocean data and metadata and make them **available, traceable, accessible, interoperable**, and **reusable** for the entire scientific community (**FAIR** principles)
- It includes **8 Work Packages** each organised in macro areas such as *Atmosphere, Marine Domain, Terrestrial Biosphere etc..*
- The project is funded under the **European Union and the Italian Ministry of Research (MUR)** in the context of the “Piano Nazionale di Ripresa e Resilienza (**PNRR**)



# ITINERIS @ INFN - LNS

- **INFN – Laboratori Nazionali del Sud (LNS)** is coordinating the production, integration, and testing of a new subsea **Junction Box** to be installed at the 3450 m deep LNS infrastructure of Capo Passero – Italy, that will ensure power and high-speed data connection from shore to seafloor (WP5.7)
- The JB will also provide **optical link** for communication and **data control/transfer** between the observatories and the data acquisition systems hosted on shore.
- It will be equipped with **high-sensitivity** and large **band-width hydrophones** for real-time and long-term data capture



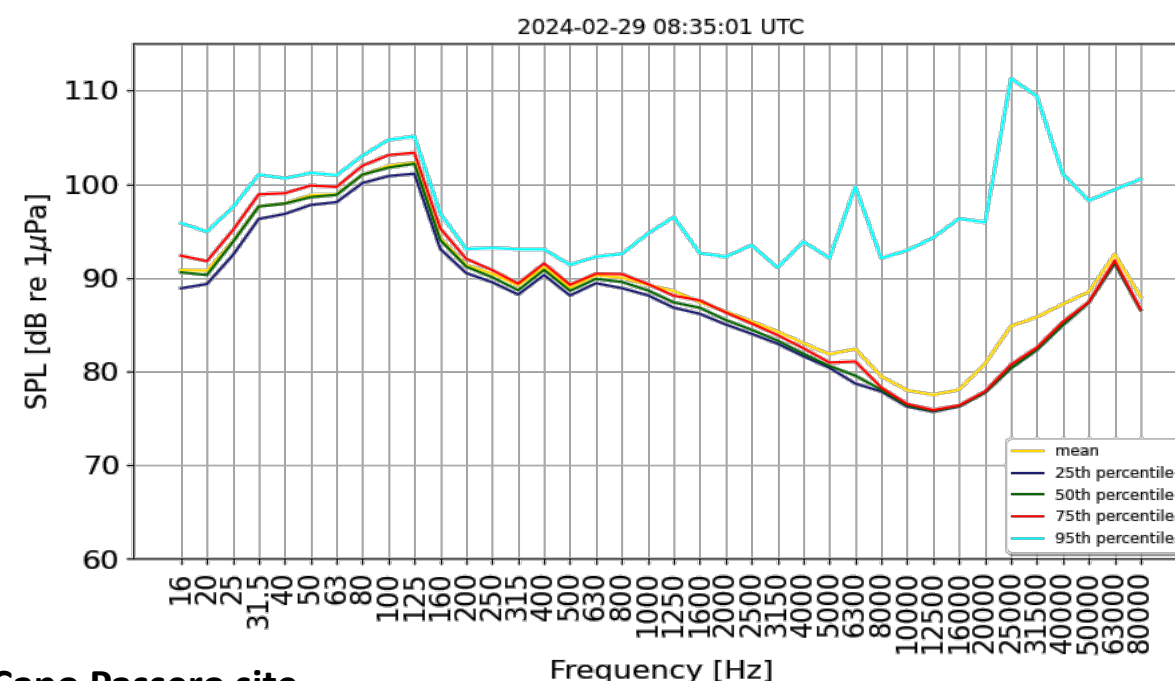
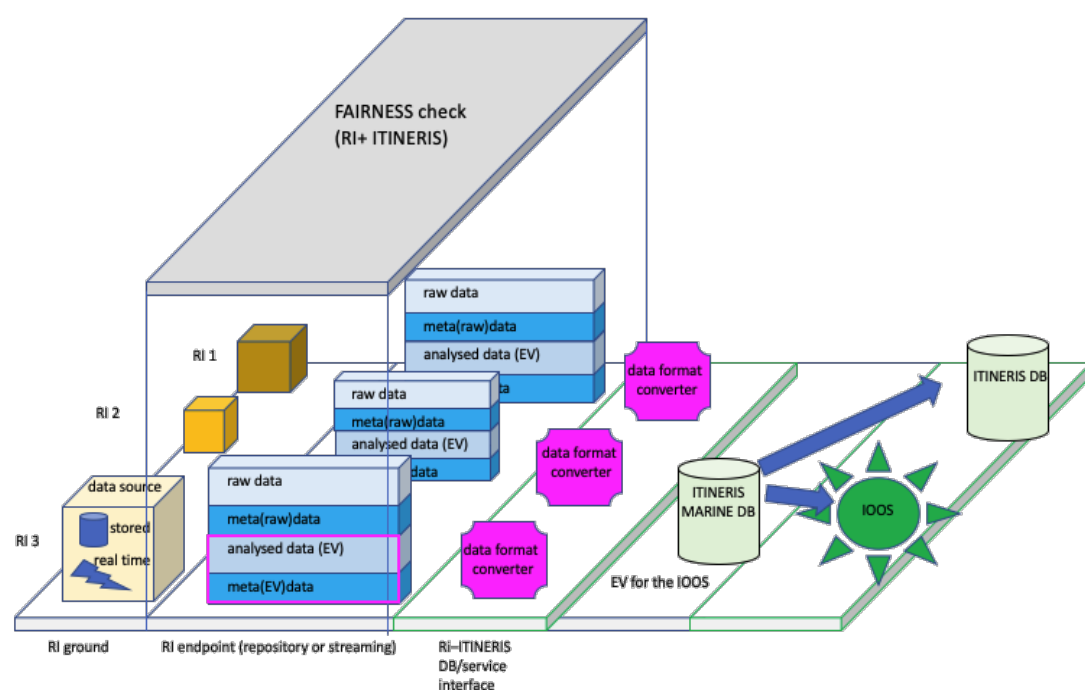


# ITINERIS @ INFN - LNS

## WP5 marine Domain, Activity 5.7

The goal is to harmonise data and products from the various Research Infrastructures (RIs) and to **integrate them** to guarantee **access to Italian facilities, services and marine data** and to **ensure long term monitoring of EOVs, EBVs and ECVs**. This will allow:

- to establish the **Italian Integrated Ocean Observing System (IOOS)** able to contribute to **European and International** effort on ocean observations: European Ocean Observing System (EOOS) and Global Ocean Observing System (GOOS)
- to develop a subsystem for measuring **Sound Pressure Level** in open sea



**Example of data production with hydrophones located at 3500m depth in the Capo Passero site**

**Sound Pressure Level (SPL)** is calculated in **third-octave** frequency bands comprising 63 and 125 Hz bands (central values, EU MSFD indicators 11.1 and 11.2)

- for bio-acoustic underwater communication and high energy physics studies, *further bands should be included* (sampling frequency is about 195 kHz)
- **The mean value of SPL** is calculated together with the 25th, 50th, 75th, and 95th percentiles

# WP5 marine Domain, Activity 5.7:

## Data production

### Main Strategy:

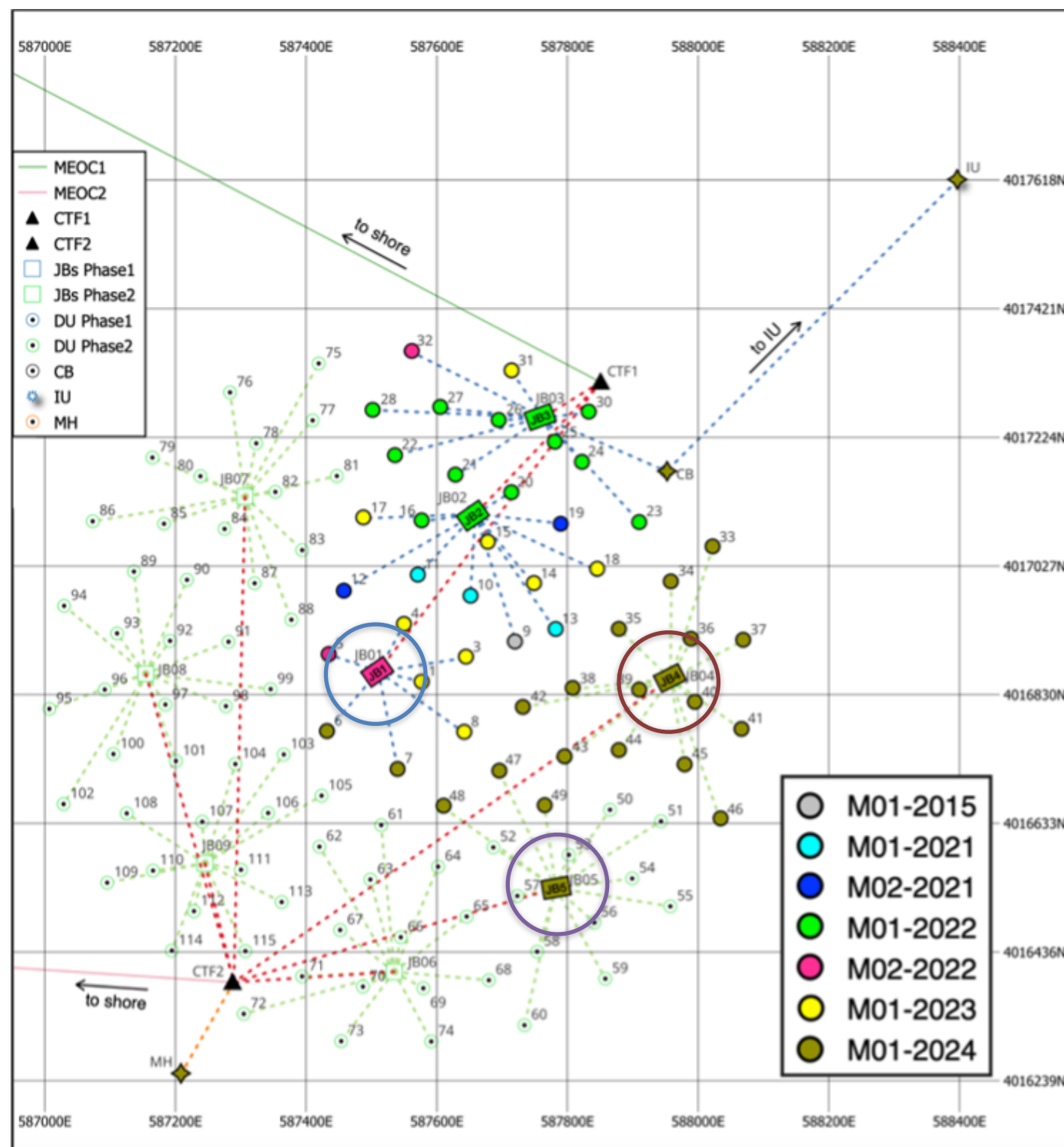
- Save 5 minutes acoustic data from JBs every 5 min (~60 GB/day)
- **Real time analysis**
  - Produce Spectrograms
  - Calculates Sound Pressure Level (dB re 1 $\mu$ Pa) in 1/3-octave frequencies bands
    - Mean, 25, 50, 75 and 95 percentiles
  - Save outputs in PNG and HDF5 formats
  - Produce WAV and MP3 files for outreach purposes

### Analysis input parameters:

- 2048 FFT points
- Sampling frequency (fs) = 195.3 kHz (2.034 kHz for the low frequency analysis after decimation)
- Overlap 50%
- Hamming window: 2048 samples
- Window length 1.5 s (15 ms) with 2 kHz (195.3 kHz) fs

***All the output files contain also metadata informations to ensure FAIR(ness)***

# WP5 marine Domain, Activity 5.7: JBs location

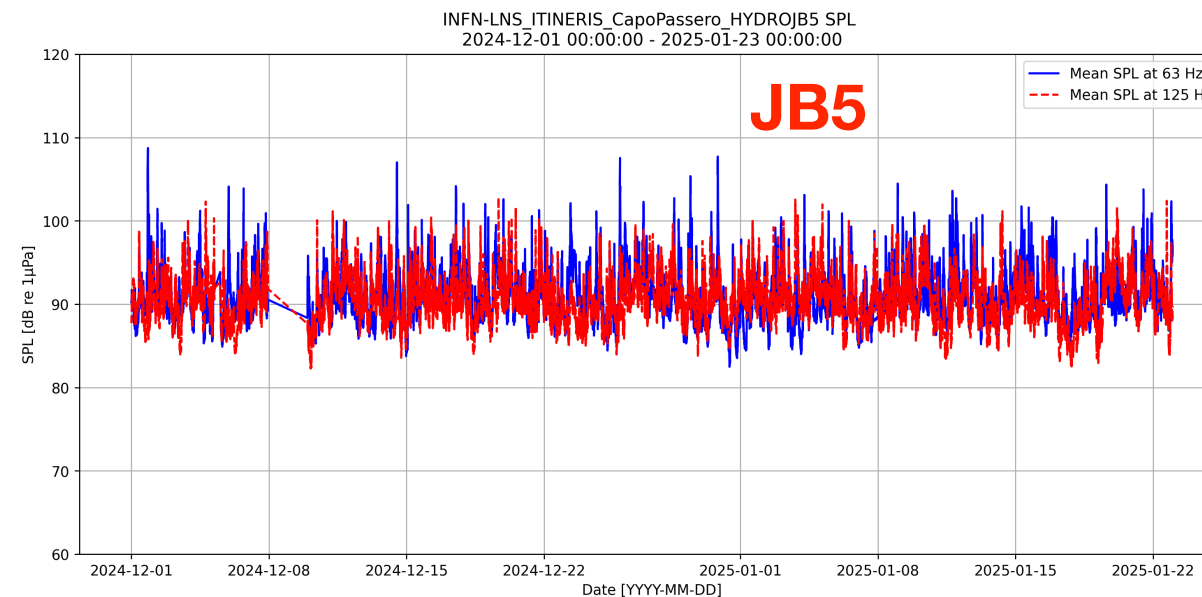
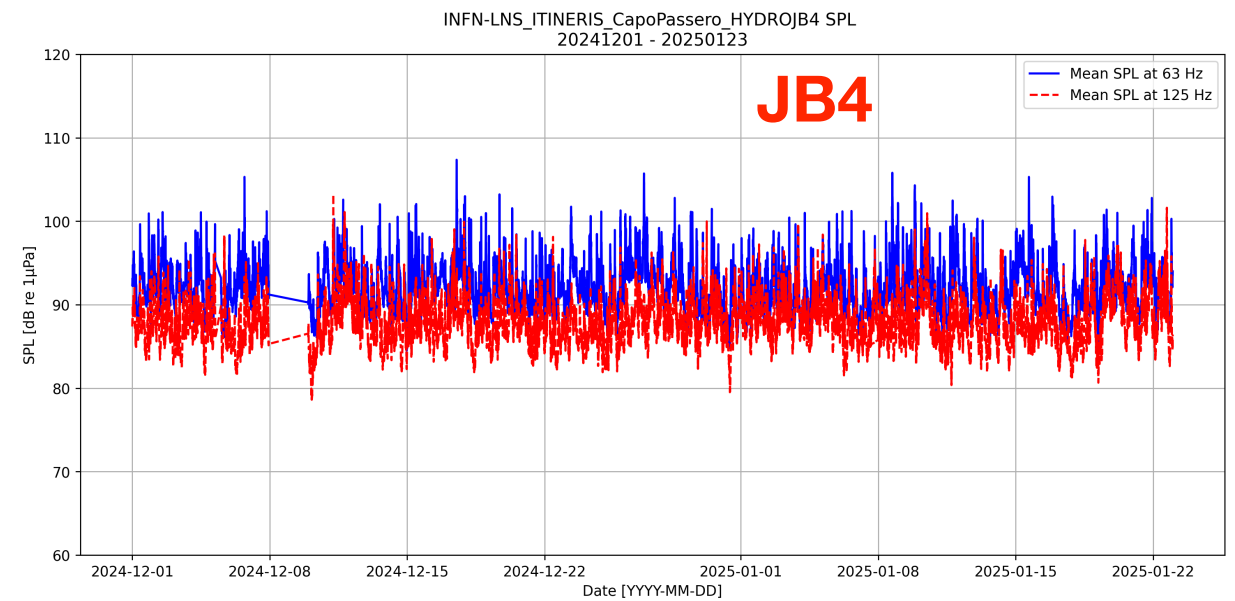
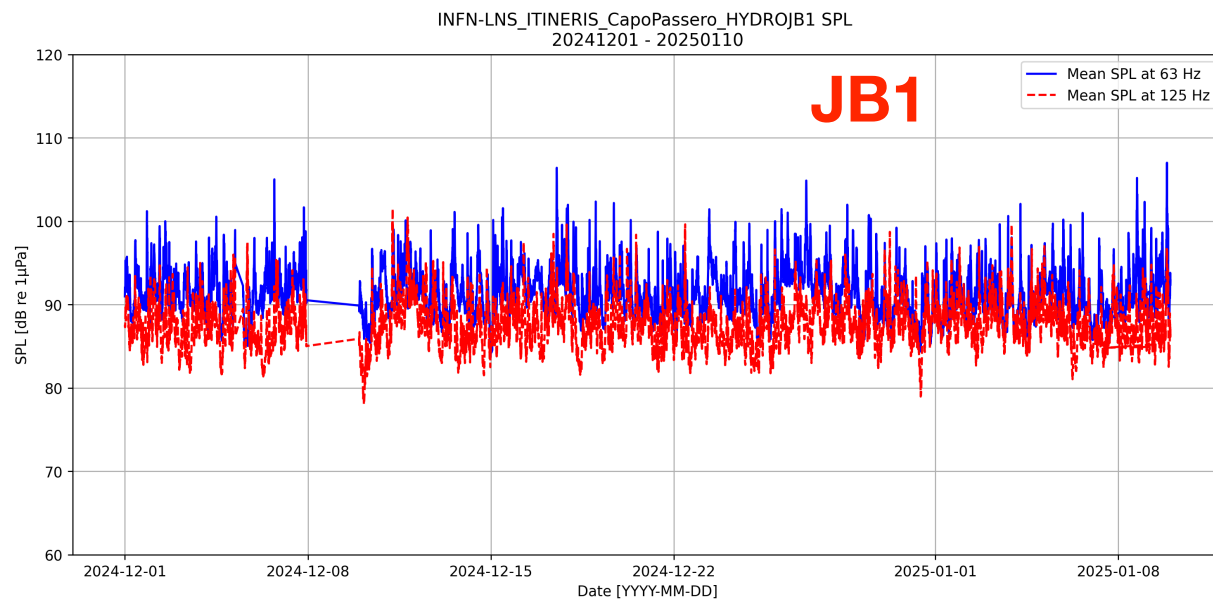


## WP5 marine Domain, Activity 5.7: Update 03-02-25

- **Hydrophone** (JB1, JB4 and JB5) **ON** since 14-11-2024 after sea camping and ARCA commissioning
  - Smooth data taking **from 27-11-24**
  - **Earthquake** event of Jan 4th (5:57 UTC off-shore Syracuse) *probably detected* but hard to claim it from the spectrogram due to the presence of several ships in the area
  - On Jan 10th we **lost JB1** due to an ARCA PFE problem (still to be fixed)
    - *Last useful run is at 20:45 UTC*
    - *Last connection with hydro on JB1 at 20:53 UTC (~3 mins recording)*
  - Long-term SPL (> 24h) analysis script implemented (**thanks Didac for the template**)
  - IT-IOOS **paper** successfully **submitted** at Journal of Marine Science and Engineering Special Issue (id: *jmse-3480161*) (**thanks to all for the crucial contribution and help!**)
    - Pre-print DOI: 10.20944/preprints202502.0018.v1 (<https://www.preprints.org/manuscript/202502.0018/v1>)
- **ERDDAP** server is **up and running** since Dec 20th (<http://192.84.151.12:8080/erddap>) (some checks still pending)
- **IPANEMA-CATANIA** server is online, analysis scripts was fully and successfully tested on the first data
  - python env and analysis scripts deployed
  - metadata JSON file to be checked with Salvo.

# WP5 marine Domain, Activity 5.7

## SPL Long-term data analysis



*Very memory demanding analysis: about two month of data in about 30 mins with a 32 GB RAM VM*



# WP5 marine Domain, Activity 5.7

## ERDDAP Server at LNS

(<http://192.84.151.12:8080/erddap>)

ERDDAP - Home Page

192.84.151.12:8080/erddap/index.html

**ERDDAP**  
Easier access to scientific data

### ERDDAP

ERDDAP is a data server that gives you a simple, consistent way to download subsets of scientific datasets in common file formats and make graphs and maps. This particular ERDDAP installation has oceanographic data (for example, data from satellites and buoys).

### Easier Access to Scientific Data

Our focus is on making it easier for you to get scientific data.

Different scientific communities have developed different types of data servers.

For example, OPeNDAP, WCS, SOS, OBIS, and countless custom web pages with forms. Each is great on its own. But without ERDDAP, it is difficult to get data from different types of servers:

- Different data servers make you format your data request in different ways.
- Different data servers return data in different formats, usually not the common file format that you want.
- Different datasets use different formats for time data, so the results are hard to compare.

ERDDAP unifies the different types of data servers so you have a consistent way to get the data you want, in the format you want.

- ERDDAP acts as a middleman between you and various remote data servers. When you request data from ERDDAP, ERDDAP reformats the request into the format required by the remote server, sends the request to the remote server, gets the data, reformats the data into the format that you requested, and sends the data to you. You no longer have to go to different data servers to get data from different datasets.

### Start Using ERDDAP:

#### Search for Interesting Datasets

- Do a Full Text Search for Datasets
- View a List of All 2 Datasets**
- Search for Datasets by Category
- Search for Datasets with Advanced Search
- Search for Datasets by Protocol

Datasets can be categorized in different ways by the values of various metadata attributes. Click on an attribute (cdm\_data\_type, institution, loc\_category, keywords, long\_name, standard\_name, variableName) to see a list of categories (values) for that attribute. Then, you can click on a category to see a list of relevant datasets.

Protocols are the standards which specify how to request data. Different protocols are appropriate for different types of data and for different client applications.

ERDDAP - List of All Datasets

192.84.151.12:8080/erddap/info/index.html?page=1&itemsPerPage=1000

**ERDDAP**  
Easier access to scientific data

### ERDDAP > List of All Datasets

2 matching datasets, listed in alphabetical order.

Grid DAP Data	Sub-set	Table DAP Data	Make A Graph	W M S	Source Data Files	Title	Summary	FGDC, ISO, Metadata	Back-ground Info	RSS	E mail	Institution	Dataset ID
	set	data	graph			* The List of All Active Datasets in this ERDDAP *		M	background			Axiom Docker Install	allDatasets
	set	data	graph		files	Sound Pressure Level (SPL) from hydrophones at Portopalo di Capo Passero site		M	background	RSS		INFN-LNS	Data_a1ef_7fbc_ee71

The information in the table above is also available in other file formats (.csv, .htmlTable, .itx, .json, .jsonlCSV1, .jsonlCSV, .jsonlKVP, .mat, .nc, .nccsv, .tsv, .xhtml) via a RESTful web service.

# WP5 marine Domain, Activity 5.7

## ERDDAP Server at LNS

(<http://192.84.151.12:8080/erddap>)



### ERDDAP > Files > Data\_a1ef\_7fbc\_ee71 > Hydro1/highf/

ERDDAP's "files" system lets you browse a virtual file system and download source data files.  
("files" [documentation](#), including "How can I work with these files?")

Dataset Title: **Sound Pressure Level (SPL) from hydrophones at Portopalo di Capo Passero site**   
Institution: INFN-LNS (Dataset ID: Data\_a1ef\_7fbc\_ee71)  
Information: [Summary](#) | [License](#) | [Metadata](#) | [Background](#) | [Subset](#) | [Data Access Form](#) | [Make a graph](#)

Name	Last modified	Size	Description
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### ERDDAP > Files > Data\_a1ef\_7fbc\_ee71 > Hydro1/lowf/

ERDDAP's "files" system lets you browse a virtual file system and download source data files.  
("files" [documentation](#), including "How can I work with these files?")

Dataset Title: **Sound Pressure Level (SPL) from hydrophones at Portopalo di Capo Passero site**   
Institution: INFN-LNS (Dataset ID: Data\_a1ef\_7fbc\_ee71)  
Information: [Summary](#) | [License](#) | [Metadata](#) | [Background](#) | [Subset](#) | [Data Access Form](#) | [Make a graph](#)

Name	Last modified	Size	Description
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INFN-LNS_ITINERIS_CapoPassero_HYDROJB1_20241115_050001_SPL.h5	22-Jan-2025 14:46	57296	

# WP5 marine Domain, Activity 5.7

## ERDDAP Server at LNS

(<http://192.84.151.12:8080/erddap>)

- **ERDDAP** server is **up and running** since Dec 20th
  - Currently the server uses a 100 GB remote disk space from CDC (about 7 month of data from 3 hydros)
    - 5 mins/hour SPL data from JB's are online (about 10 GB up-to-now)
    - Plan to buy a physical server with high-storage and high-memory capacity
- **TO DO:**
  - Customise the web page with LNS logo and other CSS stuff
  - Check the access from the other federated servers of ITINERIS (M. Caccavale et al.)
  - Are we ready to inform ITINERIS management about it?



# WP5 marine Domain, Activity 5.7

## IPANEMA - CATANIA test on data analysis

