# Update on ITINERIS
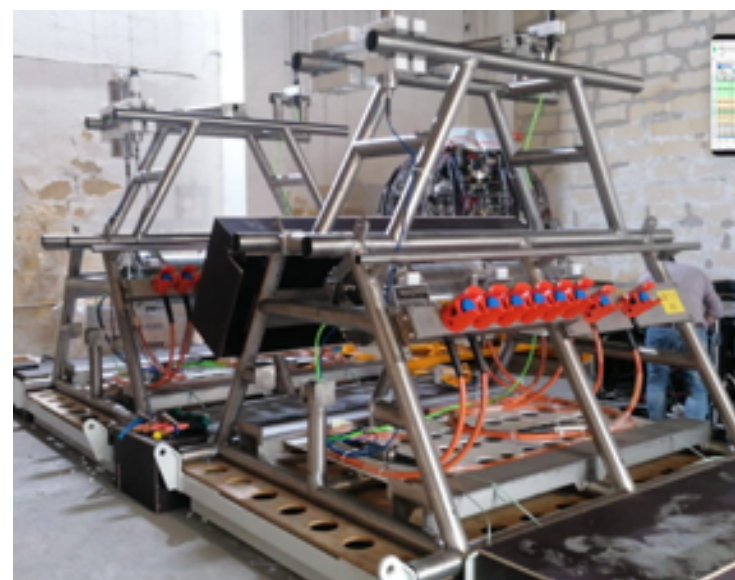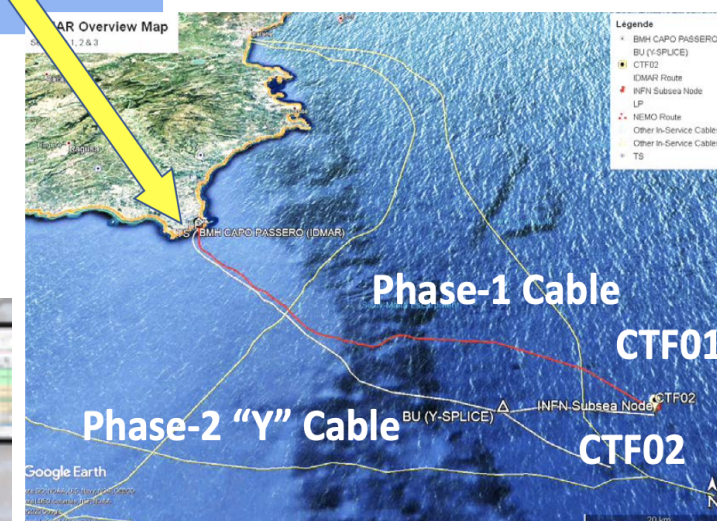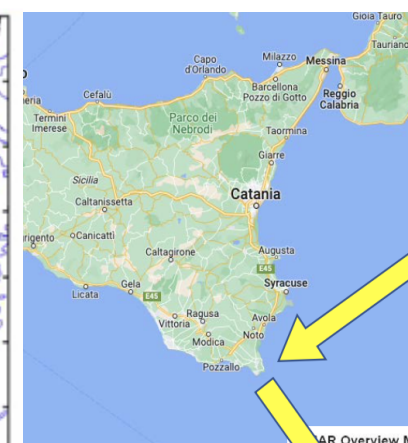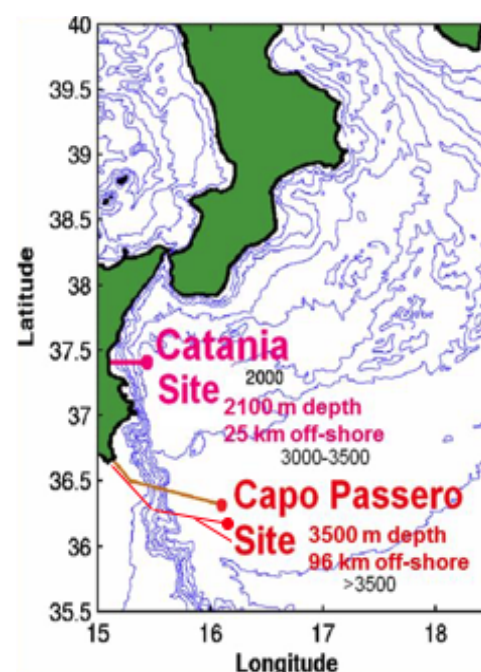# WP5 marine Domain, Activity 5.7
Simone Sanfilippo

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**)
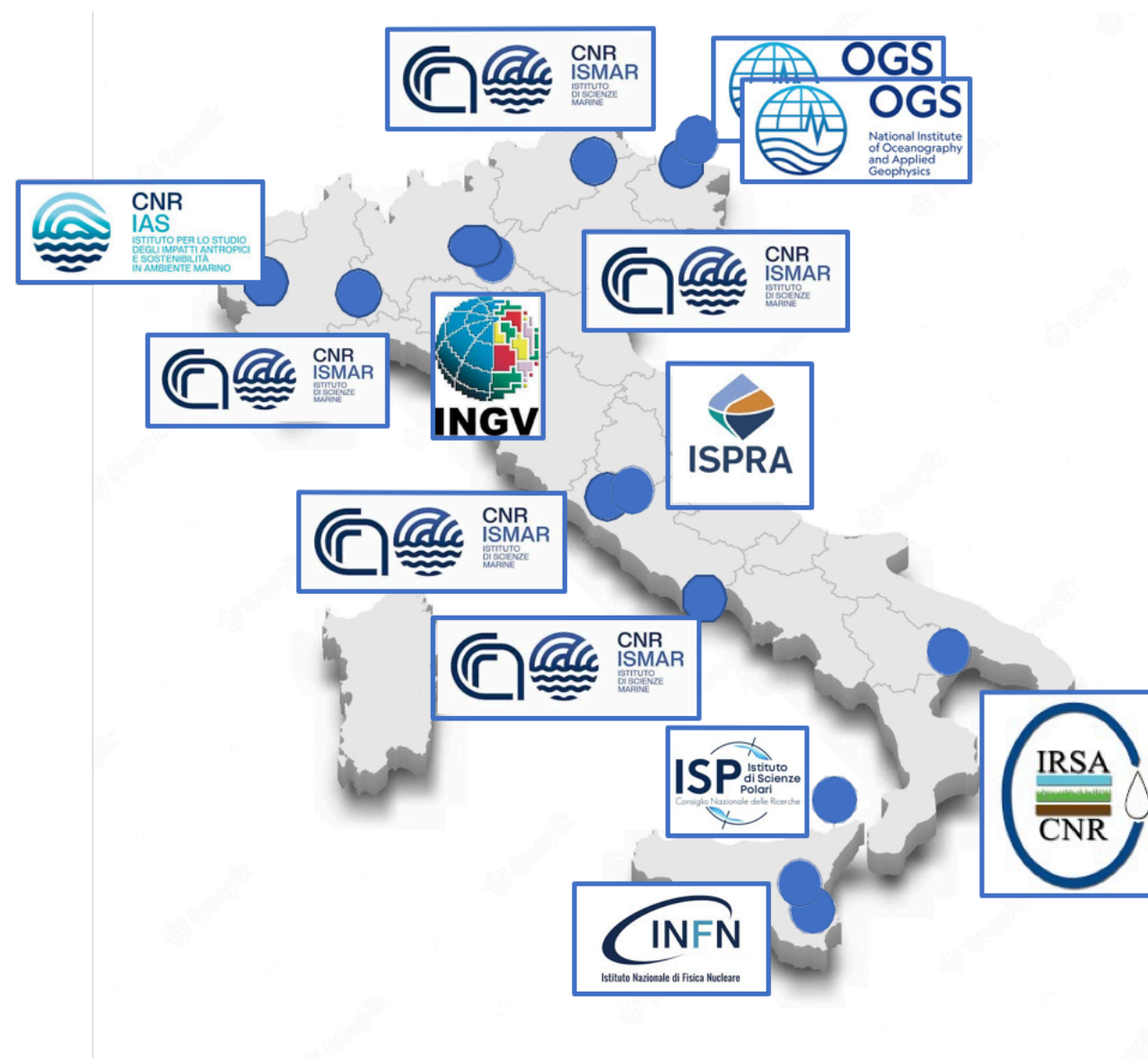
ITINERIS @ INFN - LNS

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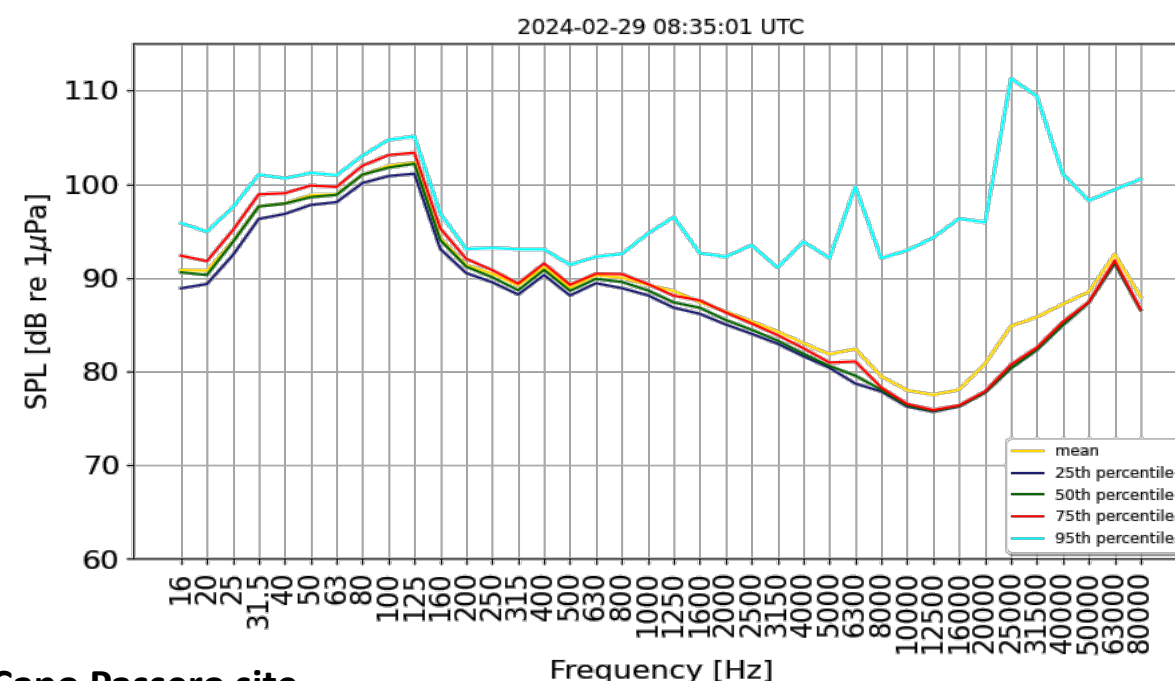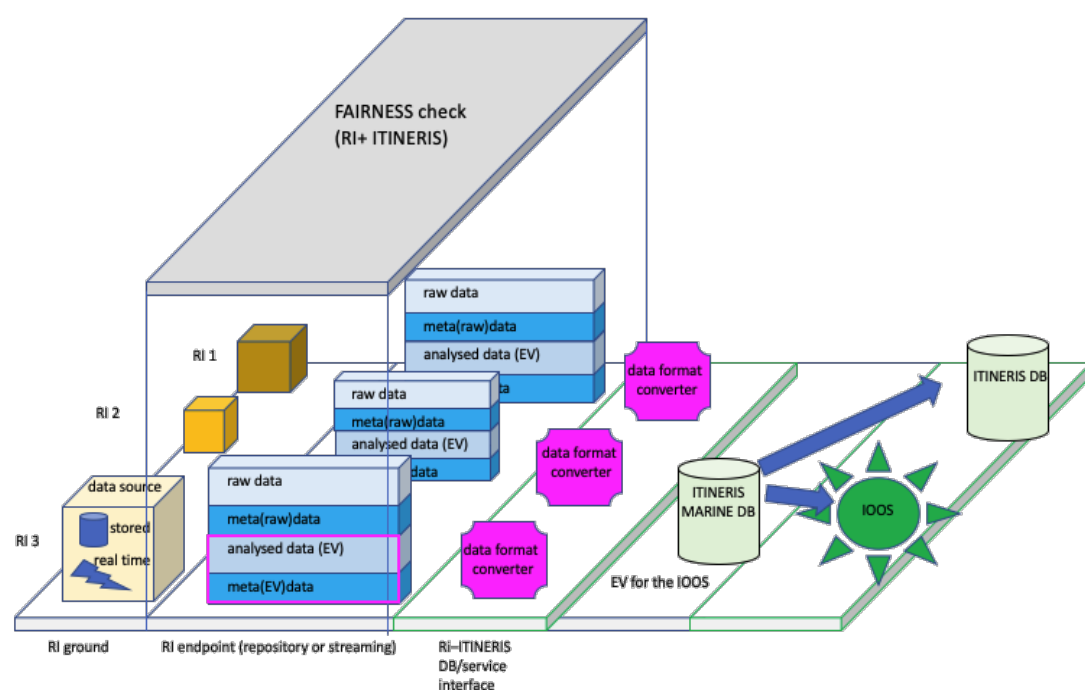
Example of data production with hydrophones located at 3500m depth in the Capo Passero site

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

![ITINERIS logo]

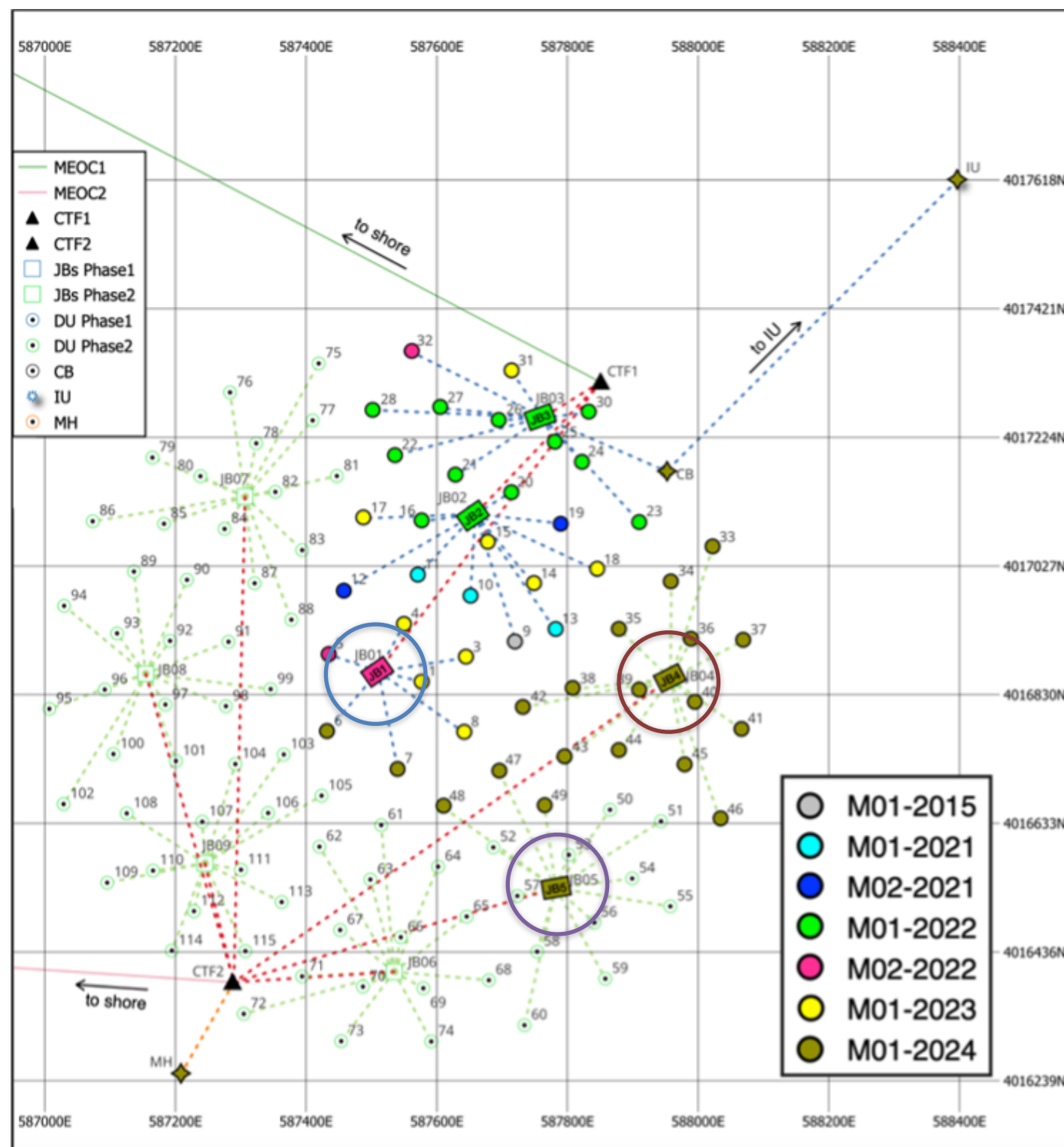# WP5 marine Domain, Activity 5.7: Data production

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 1µPa) 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)
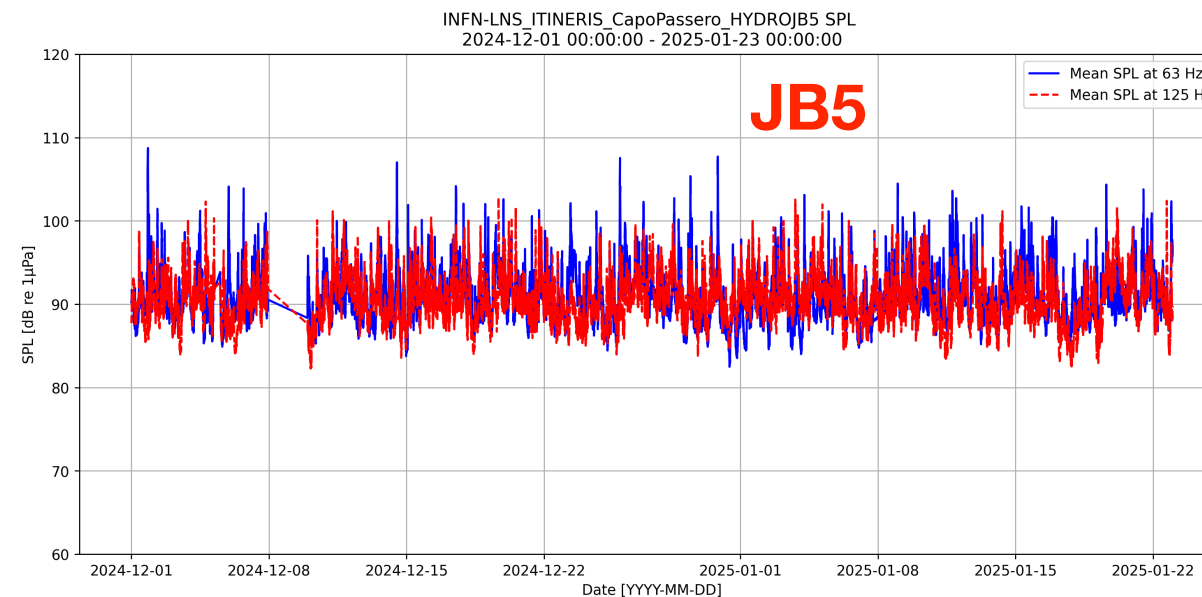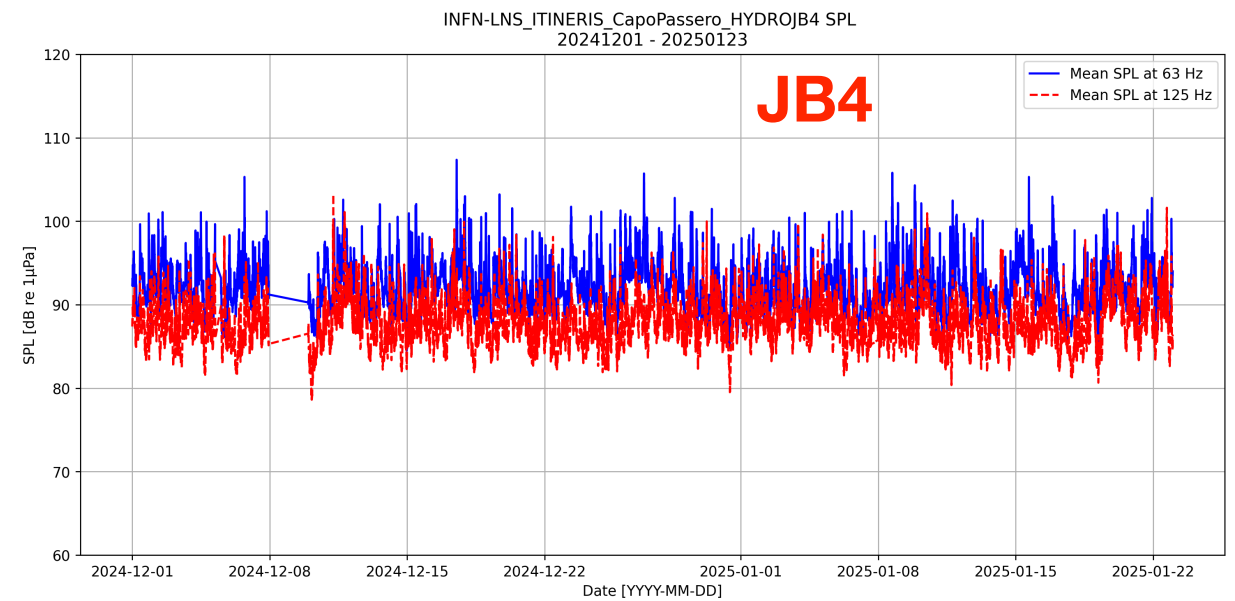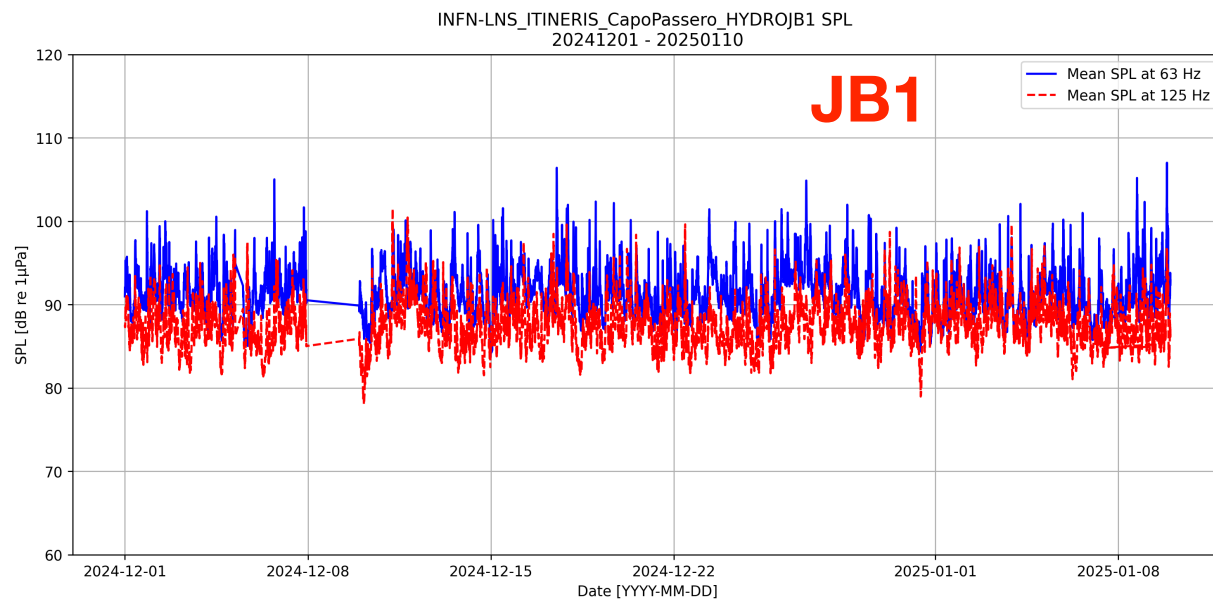
WP5 marine Domain, Activity 5.7: JBs location

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)

WP5 marine Domain, Activity 5.7
ERDDAP Server at LNS
(http://192.84.151.12:8080/erddap)

Left panel

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 ✉ RSS
Institution: INFN-LNS (Dataset ID: Data_a1ef_7fbc_ee71)
Information: Summary | License | Metadata | Background | Subset | Data Access Form | Make a graph

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Right panel

ERDDAP > Files > Data_a1ef_7fbc_ee71 >

Hydro1/lowf/

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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 JBs 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