

# CNR-ISMAR IN SITU OBSERVATIONS NETWORK: NEW APPROACHES FOR AN INTERACTIVE, HIGH PERFORMANCE, INTEROPERABLE SYSTEM

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CNR - INSTITUTE OF MARINE SCIENCES



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# ISMAR - INSTITUTE OF MARINE SCIENCES

[www.ismar.cnr.it](http://www.ismar.cnr.it)



ISMAR conducts research in polar, oceanic and Mediterranean regions, focusing on the following themes:

- the evolution of oceans and their continental margins, studying submarine volcanoes, faults and landslides and their potential impacts onshore
- the influence of climate change on oceanic circulation, acidification, bio-geochemical cycles and marine productivity
- submarine habitats and ecology, and the increasing pollution of coastal and deep-sea environments
- the evolution of fish stocks with a view to keeping commercial fishing within sustainable limits and improving mariculture and aquaculture practices
- natural and anthropogenic factors producing economic and social impacts on coastal systems from pre-history to the industrial epoch

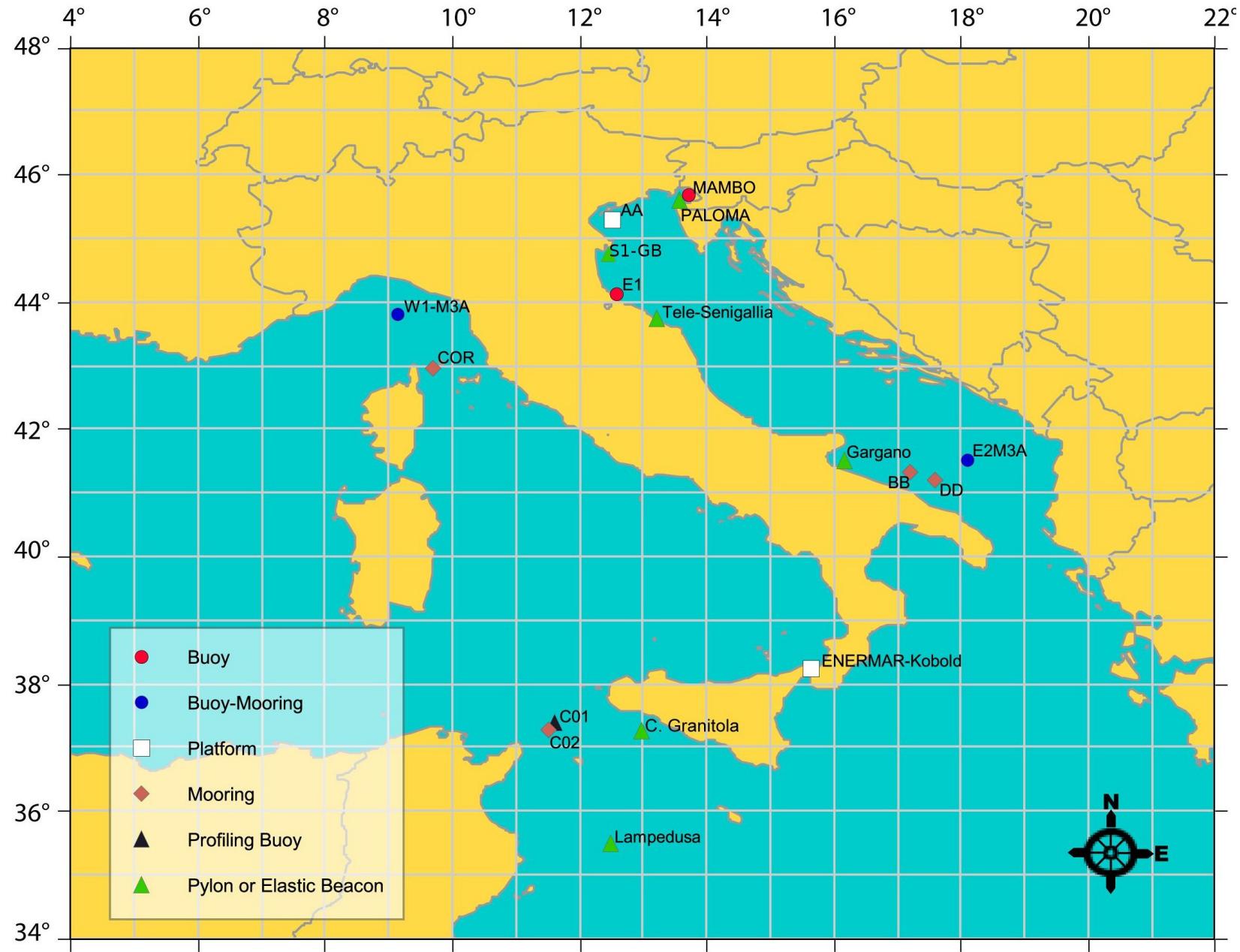
# RITMARE PROJECT



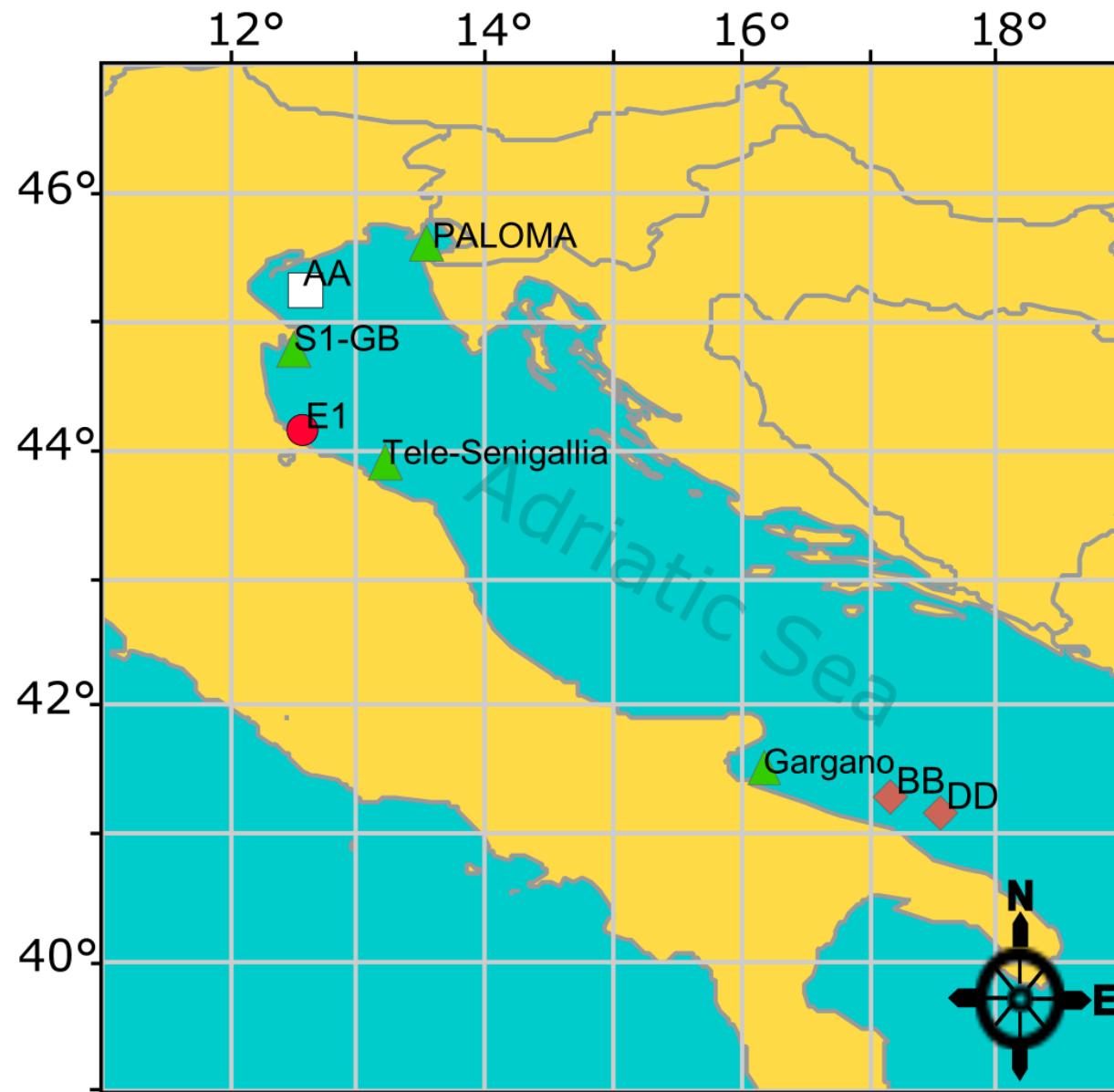
"Italian Research for the Sea" national flagship project

- 7 sub-programs:
  - SP1 - Maritime Technologies
  - SP2 - Technologies for Sustainable Fishing
  - SP3 - Planning of the Maritime Space in Coastal Waters
  - SP4 - Planning of the Deep Marine Environment and the Open Sea
  - **SP5 - Observation System for the Marine Mediterranean Environment**
  - SP6 - Research, Training and Dissemination Structures
  - **SP7 - Interoperable Infrastructure for the Observation Network and Marine Data**

# RITMARE IN-SITU OBSERVATIONS NETWORK



# ISMAR ADRIATIC IN SITU OBSERVATIONS NETWORK



# CNR-ISMAR IN SITU OBSERVATIONS NETWORK

- Meteo marine stations
  - Acqua Alta oceanographic tower (Gulf of Venice)
  - S1 mast and E1 buoy (Emilia Romagna coast)
  - Telesenigaglia mast (Marche coast)
  - Meda Gargano (Puglia coast, Manfredonia gulf)
- Meteo stations
  - Riva sette martiri (Venice)
  - Ismar (Ancona)
  - Ismar (Lesina (FG)



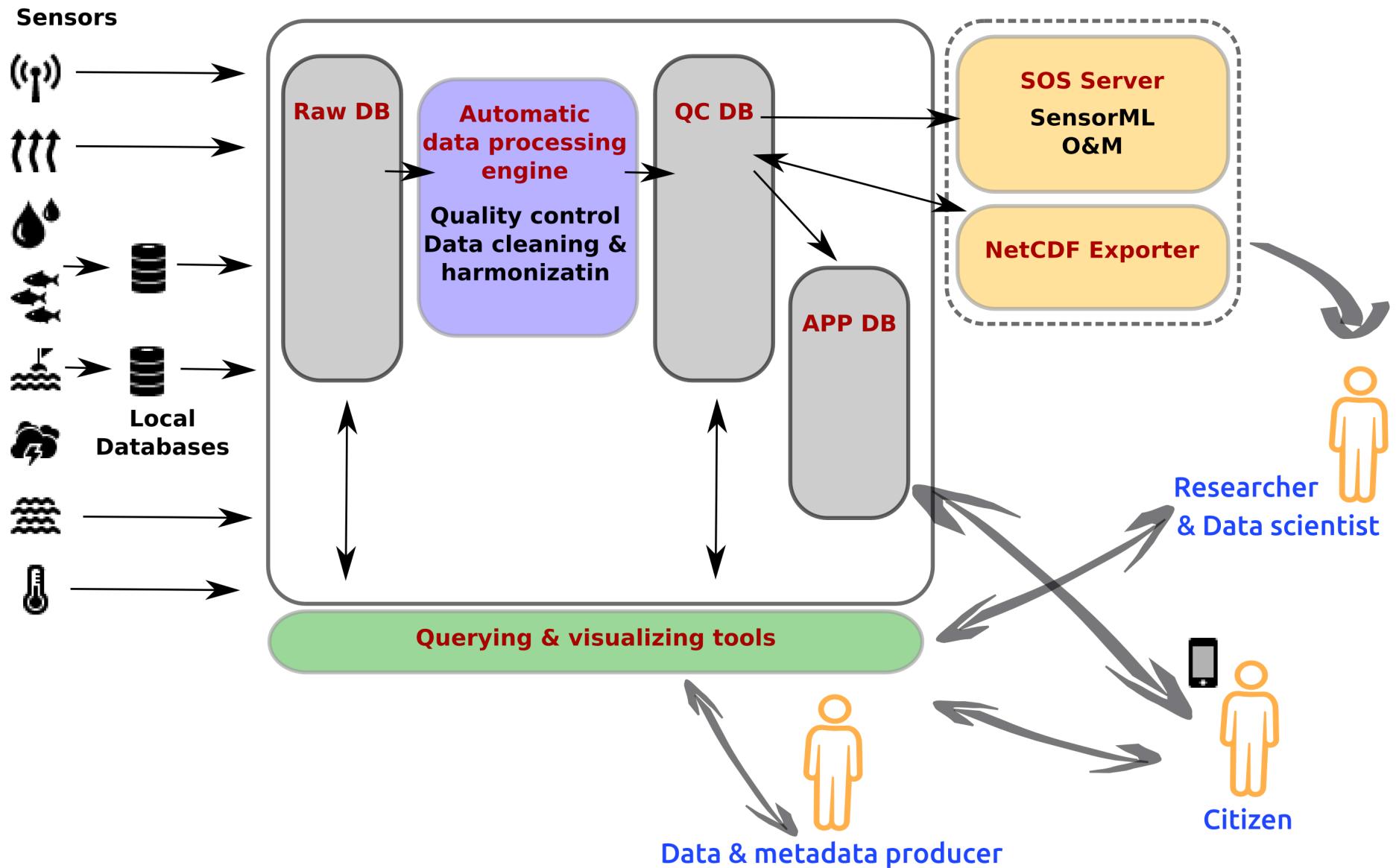
# BACKGROUND: UNHARMONIZED NETWORK

- various levels of (or no) funding
- different managing systems
- separated databases
- different validation procedures
- non-standard publishing of data
- non-common (or non existent) data policies

# GOALS

- Unique visible access point for the ISMAR observational network
- Archiving and storing historical data
- real-time data streams for efficient operational model
- Interactive and efficient system
- Interoperability
- Open data

# ARCHITECTURE



# IMPLEMENTATION

- **InfluxDB:** open source time-series data storage



- **Grafana:** open source dashboards for querying and visualizing time series and metrics



# PARAMETERS AND VARIABLES ACQUIRED

## Use of SeaDataNet vocabularies for the Observed properties

The screenshot shows a web-based interface for managing observed properties. At the top, there's a header bar with a gear icon, the title "ISMAROS - Observed Prop...", and navigation links for "Zoom Out", "Last 6 hours", and a refresh button.

The main content area is titled "ISMAROS Observed Properties" and describes it as a "SeaDataNet APG Agreed parameter group" located at <http://vocab.nerc.ac.uk/collection/P03/current/>.

The interface lists several parameter groups:

- currents\_sea\_level\_and\_waves**:  
This APG contains all parameters pertaining to the measurement of: Eulerian currents Lagrangian currents (except drifter position) Vertical currents River flow velocity Wave height Wave period Wave direction Wave energy spectra Sea level relative to a terrestrial datum Water column height at a fixed location
- BinDep\_ADCPWaves**:  
label: Depth below sea surface (acoustic doppler wave array bin) in the water body  
definition: Unavailable  
InfluxDB syntax:

```
# InfluxDB: syntax to insert or update a BinDep_ADCPWaves observation (line protocol)
currents_sea_level_and_waves,observed_property=BinDep_ADCPWaves,location=XXXX,sensor=YYYY value=VV.DD TTTTTTTTTTTTTTTTTTT
```
- End\_depth**:  
label: Depth below surface (sampling event end) of the water body by profiling pressure sensor and conversion to depth using unspecified algorithm  
definition: Measurement determined from an in-situ pressure sensor at the end of a sampling event  
InfluxDB syntax:

```
# InfluxDB: syntax to insert or update a End_depth observation (line protocol)
currents_sea_level_and_waves,observed_property=End_depth,location=XXXX,sensor=YYYY value=VV.DD TTTTTTTTTTTTTTTTTTT
```
- waves**:  
This APG contains all parameters pertaining to the measurement of: Wave height Wave period Wave direction Wave energy spectra
- MeanDir\_ADCPWaves**:  
label: Mean direction of waves on the water body by acoustic doppler wave array  
definition: Unavailable  
InfluxDB syntax:

```
# InfluxDB: syntax to insert or update a MeanDir_ADCPWaves observation (line protocol)
waves,observed_property=MeanDir_ADCPWaves,location=XXXX,sensor=YYYY value=VV.DD TTTTTTTTTTTTTTTTT
```

# OPEN SCIENCE APPROACH

- Open access to data
- Standard open licences for access and reuse:

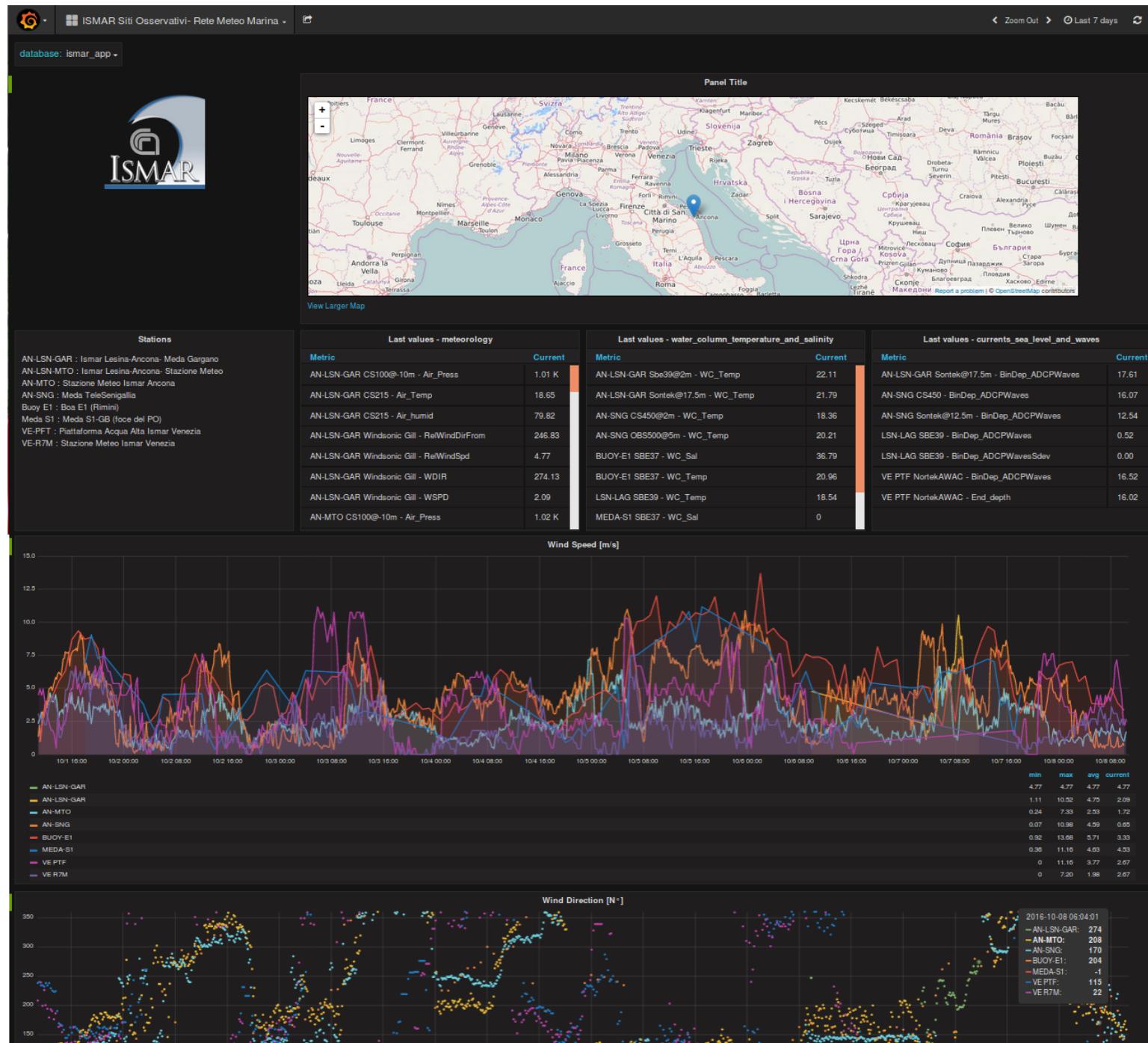
Creative Commons Attribution 4.0 (CC-BY)



- Publication of yearly datasets on [Zenodo](#) with DOI
- Publication of a Data Paper with relevant aggregation of data

# A QUICK HANDS-ON

[HTTP://RMM.DATI.ISMAR.CNR.IT](http://RMM.DATI.ISMAR.CNR.IT)



# Home Dashboard

Meteo Marina

Gano



## Installed Apps

None installed. [Browse Grafana.net](#)

## Installed Panels

None installed. [Browse Grafana.net](#)

## Installed Datasources

None installed. [Browse Grafana.net](#)

 starred | tags

- |                              |   |
|------------------------------|---|
| control                      | ☆ |
| meteo                        | ☆ |
| eleSenigallia                | ☆ |
| buoy E1                      | ☆ |
| Meda S1-GB                   | ☆ |
| N - Meda Gargano             | ☆ |
| N - Meteo                    | ☆ |
| servativi- Rete Meteo Marina | ☆ |
| ia                           | ☆ |
| bserved Properties           | ☆ |
| bserved Properties Todo      | ☆ |

## Installed Apps

None installed. [Browse Grafana.net](#)

#### Installed Panels

None installed. [Browse Grafana.net](#)

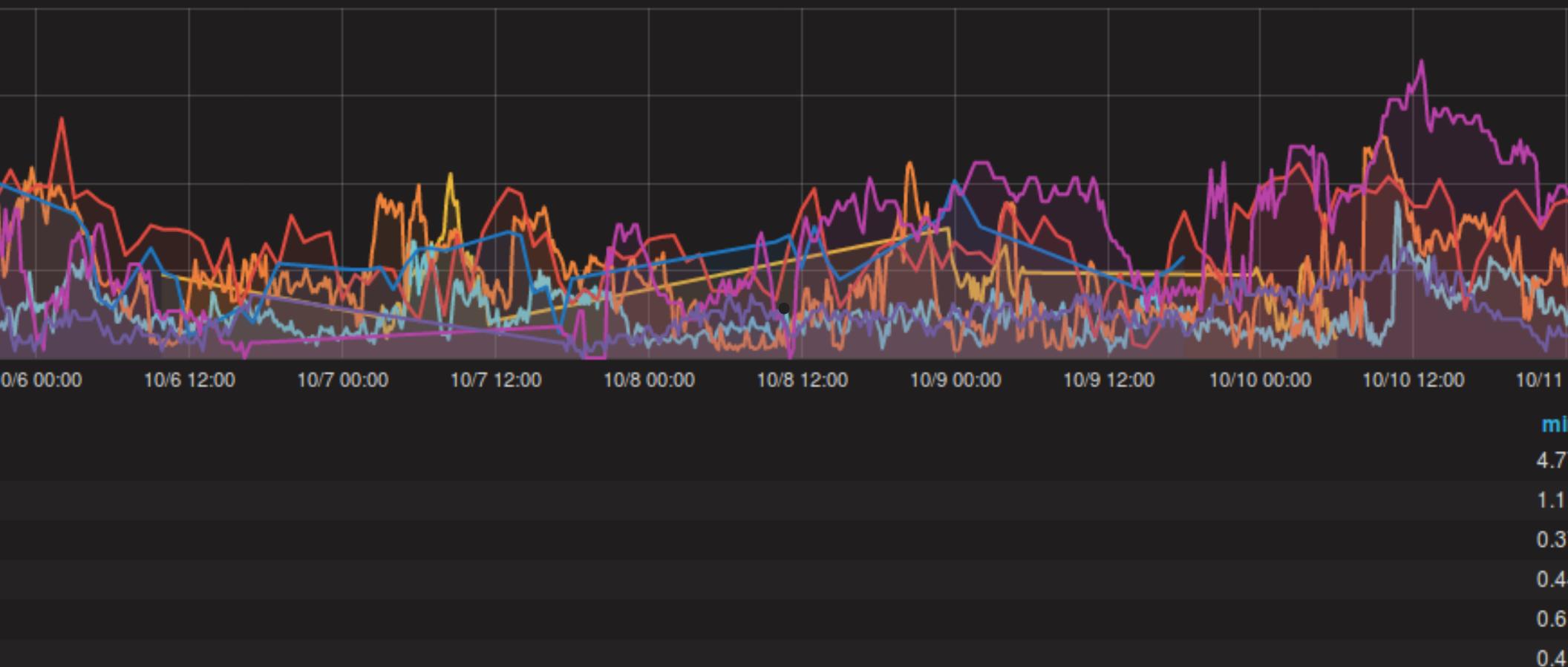
## Installed Datasources

None installed. [Browse Grafana.net](#)


[View Larger Map](#)

	Last values - meteorology			Last values - water_column_temperature_and_salinity		
	Metric	Current		Metric	Current	Metric
Meda Gargano Stazione Meteo a	AN-LSN-GAR CS100@-10m - Air_Press	1.01 K	Venezia a	AN-LSN-GAR Sbe39@2m - WC_Temp	21.69	AN-LSN-GAR Sonte BinDep_ADCPWave
	AN-LSN-GAR CS215 - Air_Temp	17.85		AN-LSN-GAR Sontek@17.5m - WC_Temp	21.44	AN-SNG CS450 - Bi
	AN-LSN-GAR CS215 - Air_humid	91.00		AN-SNG CS450@2m - WC_Temp	17.74	AN-SNG Sontek@1
	AN-LSN-GAR Windsonic Gill - RelWindDirFrom	246.83		AN-SNG OBS500@5m - WC_Temp	19.46	LSN-LAG SBE39 - B
	AN-LSN-GAR Windsonic Gill - RelWindSpd	4.77		BUOY-E1 SBE37 - WC_Sal	35.50	LSN-LAG SBE39 - B
	AN-LSN-GAR Windsonic Gill - WDIR	250.74		BUOY-E1 SBE37 - WC_Temp	19.53	VE PTF NortekAWA
	AN-LSN-GAR Windsonic Gill - WSPD	1.23		LSN-LAG SBE39 - WC_Temp	18.54	VE PTF NortekAWA
	AN-MTO CS100@-10m - Air_Press	1.01 K		MEDA-S1 SBE37 - WC_Sal	0	

## Wind Speed [m/s]



## Time range

From:

now-7d



To:

now



Refreshing every:

Apply

## Quick ranges

**Last 7 days**

Last 30 days  
Last 60 days  
Last 90 days  
Last 6 months  
Last 1 year  
Last 2 years  
Last 5 years

Yesterday

Day before yesterday

This day last week

Previous week

Previous month

Previous year

Today

Today so far

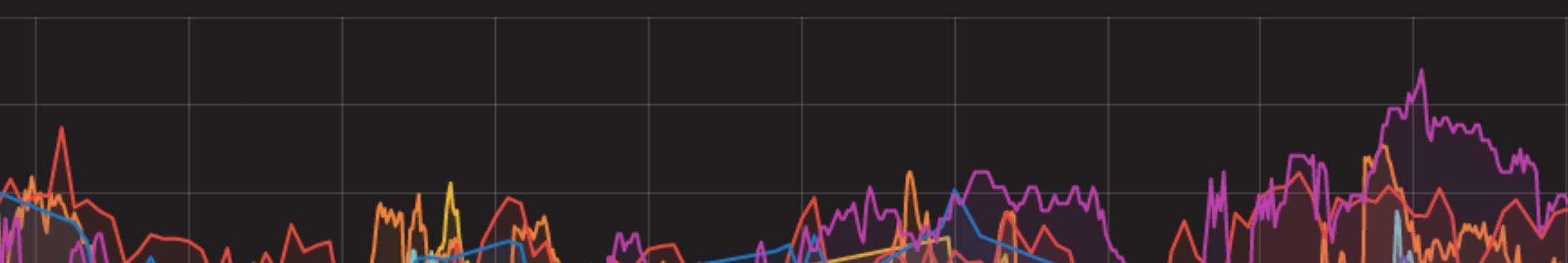
This week

This week so far

This month

This year

Wind Speed [m/s]



# ADDITIONAL BONUS: ISMAR DATA APP

Still in Beta!



ISMAR Data

CNR-ISMAR Istituto di Scienze Marine Education

★ ★ ★ ★ 0

3 PEGI 3

This app is compatible with some of your devices.

Installed



# CONCLUSIONS

- From a series of unconnected systems to a real network
- Optimization of quality controlled data flows
- Use of open source technologies and international standards
- Vision towards open data access and sharing

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