



**MDMC**

Master in Data Management  
and Curation



# Implementation of FAIR Principles for Marine Data at OGS

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National Institute of Oceanography and Applied Geophysics - OGS

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- The Trieste Marine Observatories system and E2M3A buoy
- The “Buoy Controller” Hardware & Software
- Instrument maintenance
- Data flow
- Data publication ERDDAP and NODC portal
- ERDDAP and FAIR principles
- Metadata and Standard Vocabularies

# The Gulf of Trieste and the Northern Adriatic Sea



- Morphology
- Physical forcing
- Marked seasonal and interannual variability
- Biogeochemical characteristics
- Anthropogenic impacts
- Extreme events
- Extensive observational sites

**Red tides**



**Mucilage**



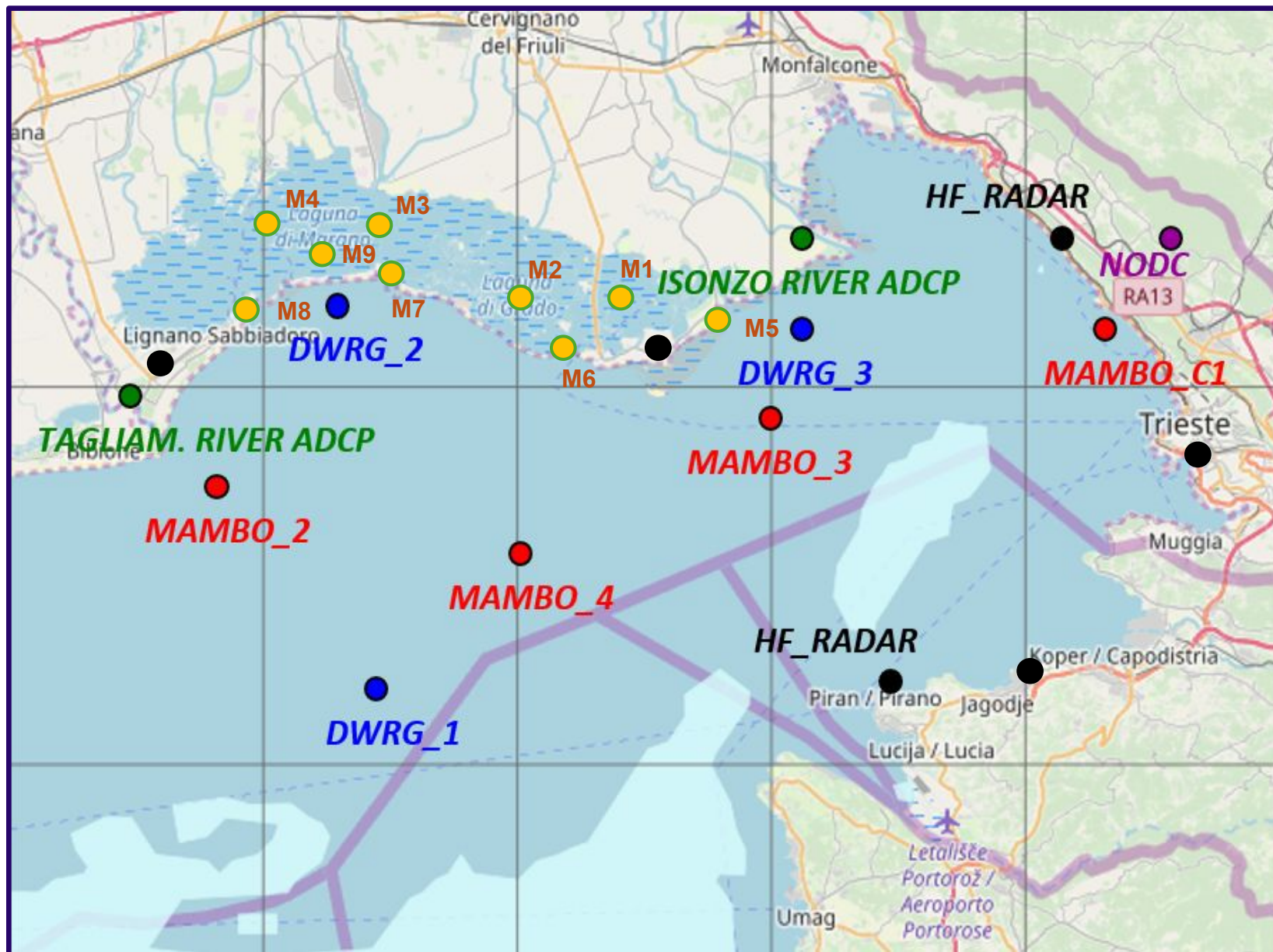
**Jellyfish**









**Toxic algae**

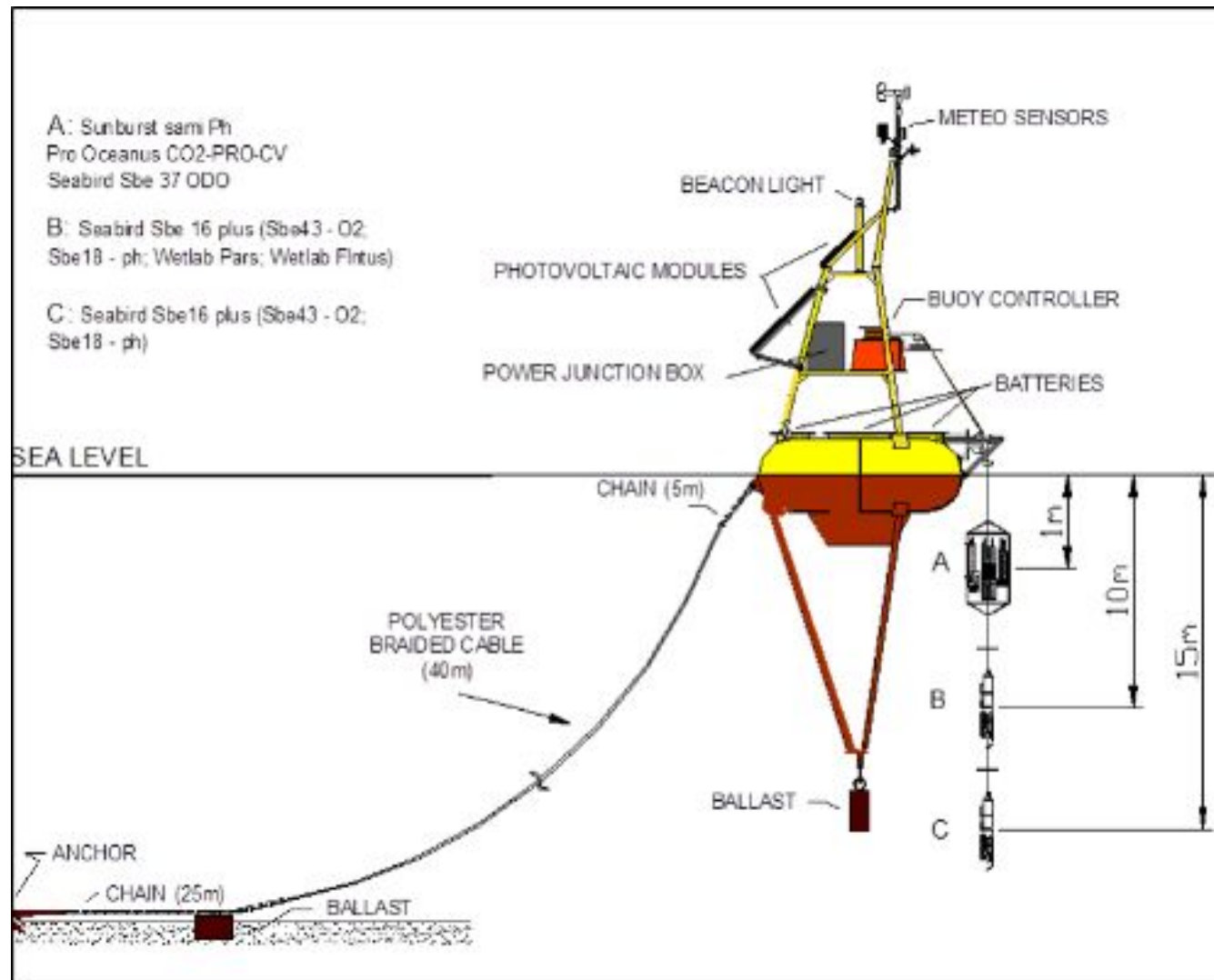
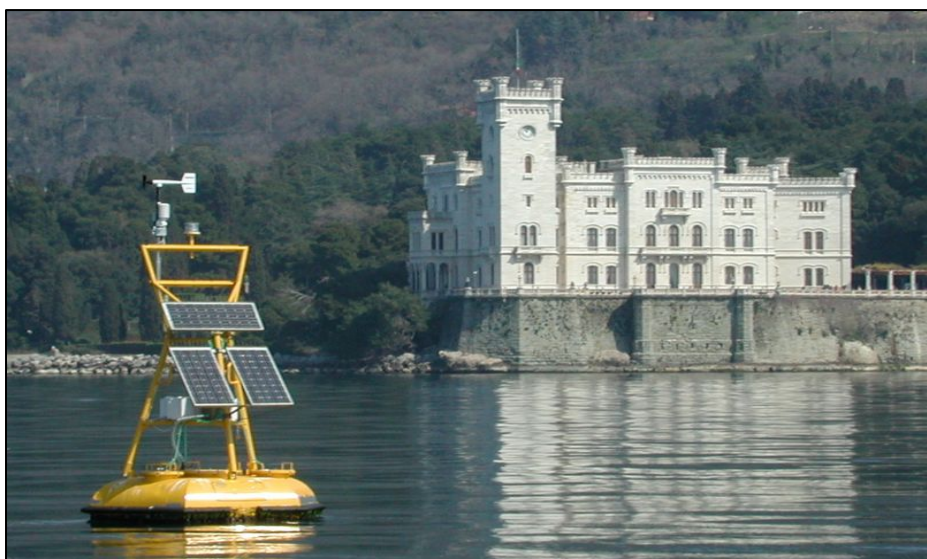
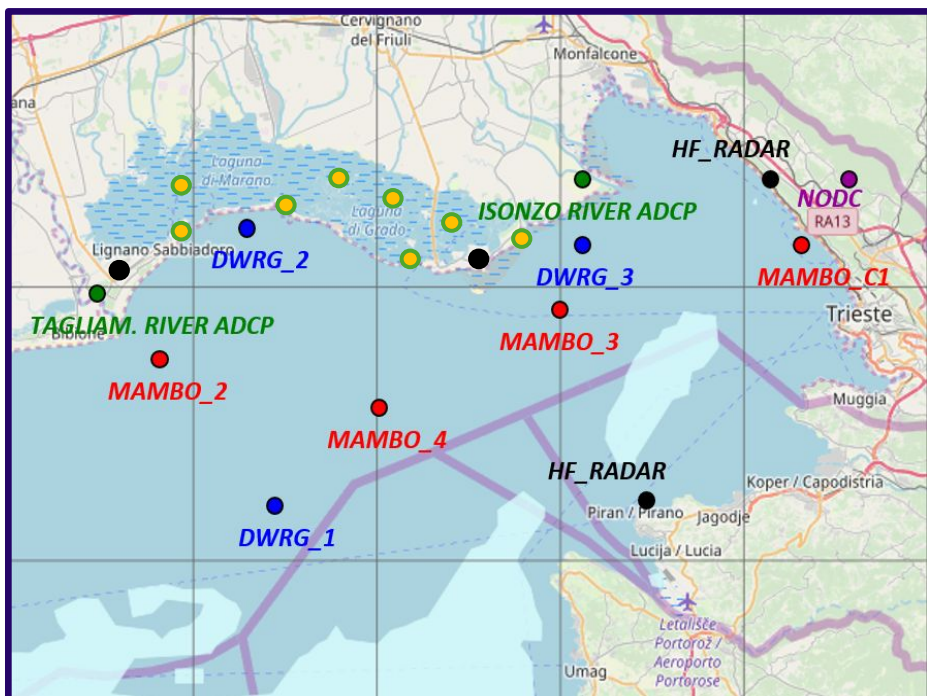


# Trieste marine observatory system



-  Civil Protection ADCP
-  Radar
-  Elastic Beacon
-  Directional Wave Buoy
-  NODC Data Center
-  Danubius –RI (ERIC)

# Meteo – Oceanographic buoys MAMBO\_miramare



# Meteo – Oceanographic buoys MAMBO\_miramare

## Meteorological Station:

- Air temperature, humidity
- Atmospheric pressure
- Wind speed and direction

## Probes at -2m:

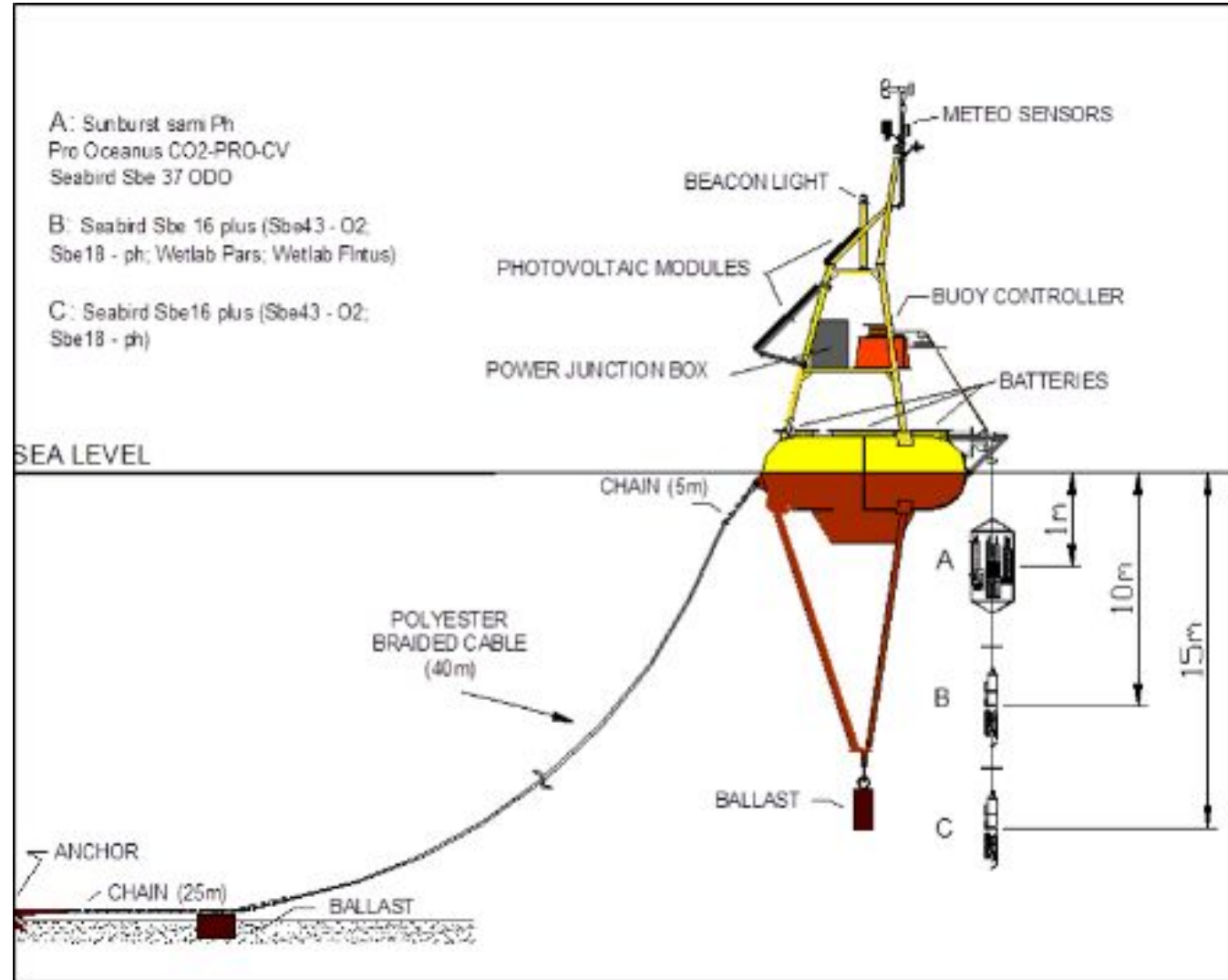
- Temperature.
- Conductivity/Salinity.
- Dissolved oxygen.
- pH and pCO<sub>2</sub>

## Probe at -10m:

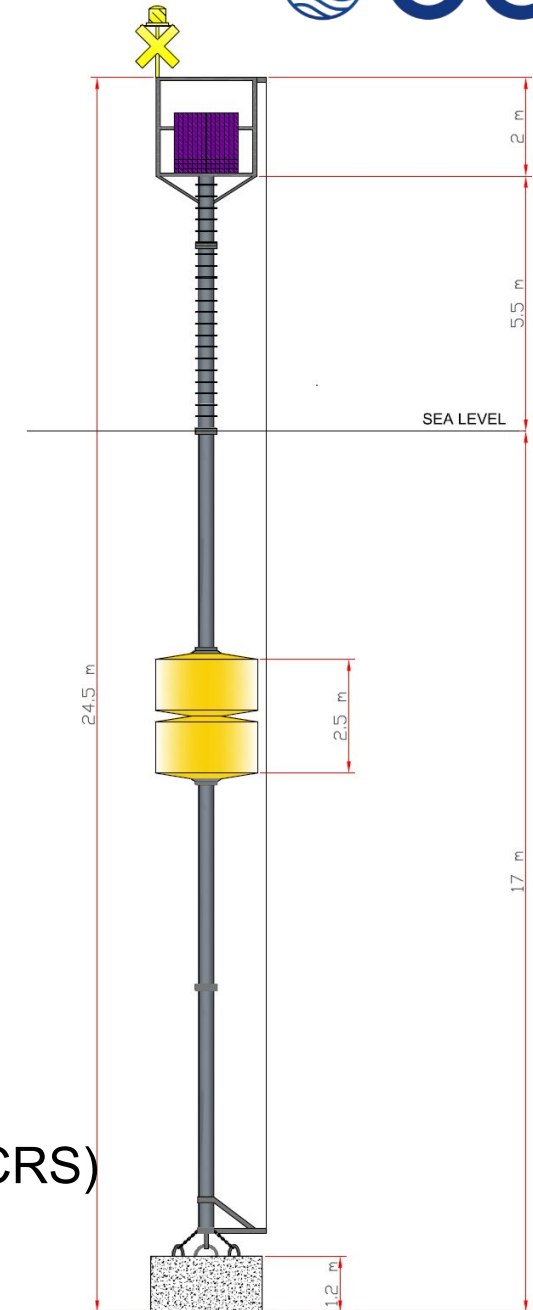
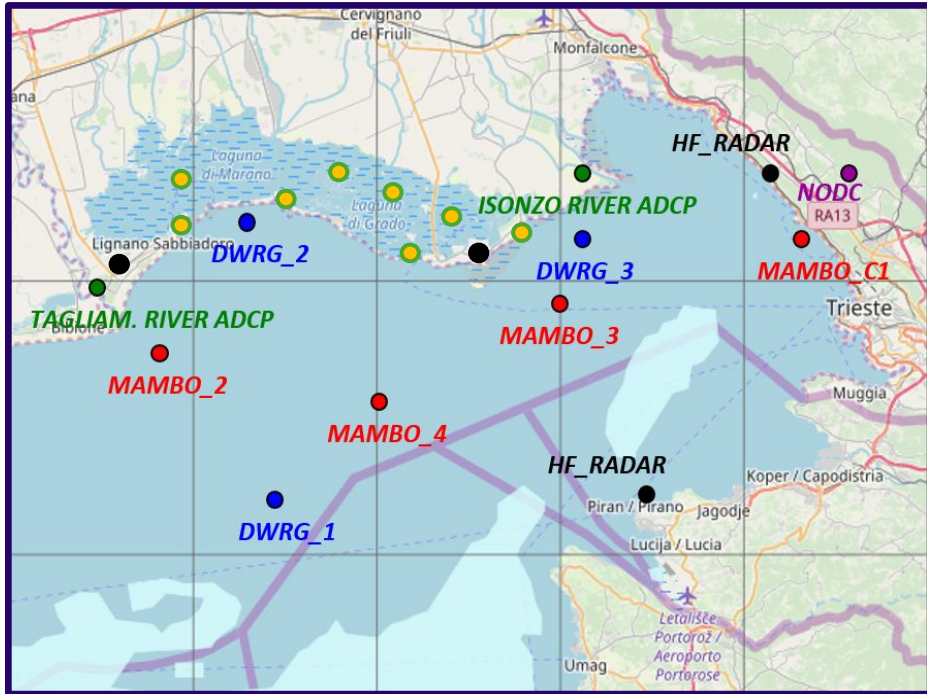
- Temperature.
- Conductivity/Salinity.
- Pressure.
- Dissolved Oxygen.
- Turbidity,

## Probe at -15m:

- Temperature.
- Conductivity/Salinity.
- pH.
- Dissolved oxygen.



# Oceanographic buoys MAMBO 2,3,4

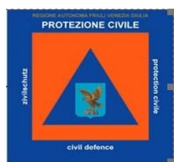


## Meteorological Station:

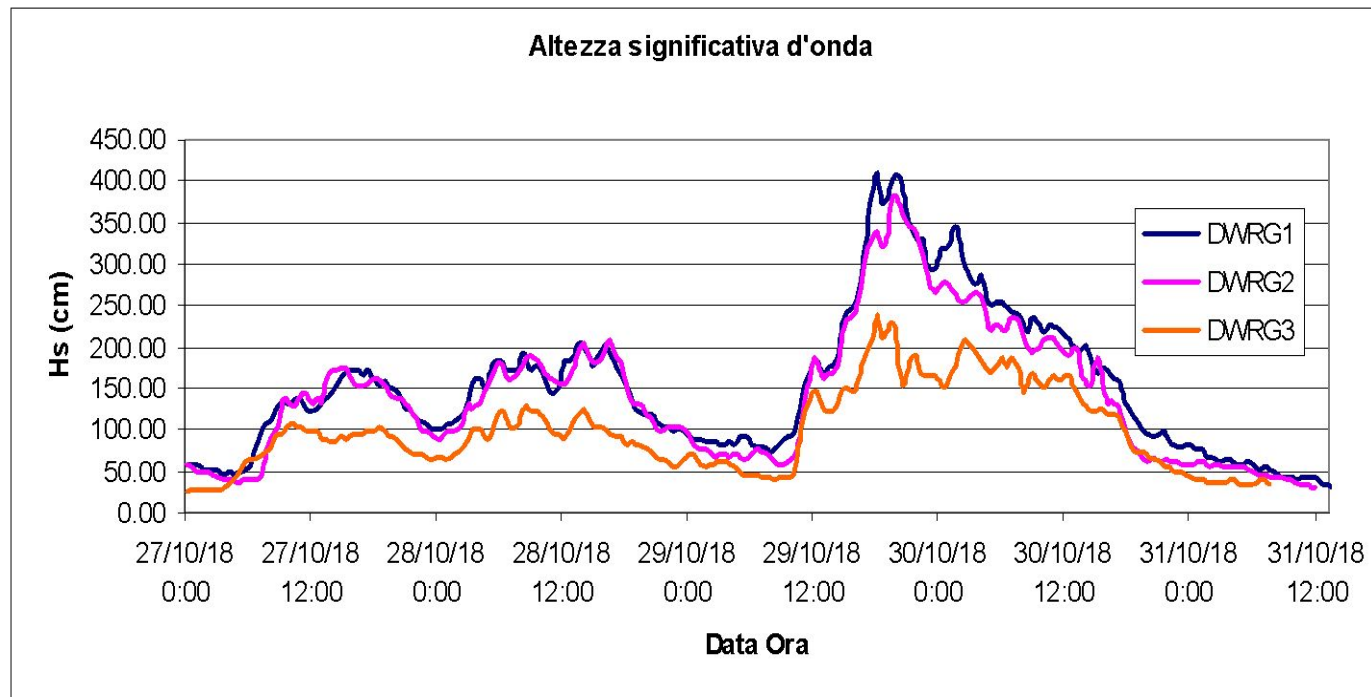
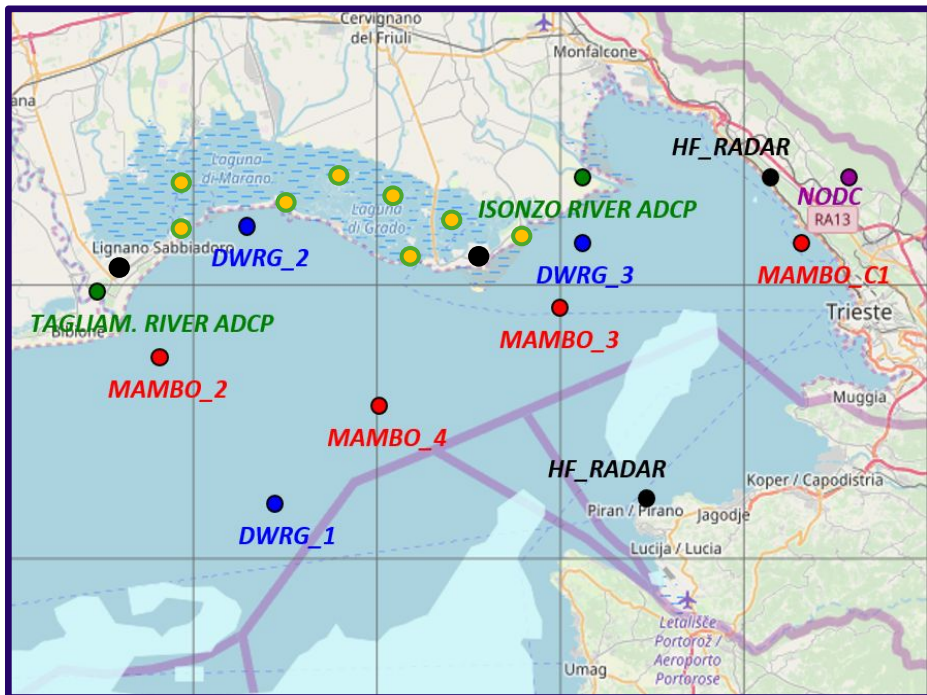
- Air temperature and humidity
- Atmospheric pressure
- Wind speed and direction

## Probes:

- Temperature.
- Conductivity/Salinity.
- Dissolved oxygen.
- ADCP current profiler
- OBS sismografo di fondo (CRS)



# Directional Wave buoys

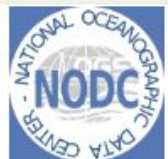
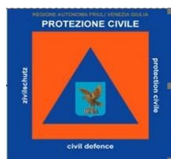


## Function:

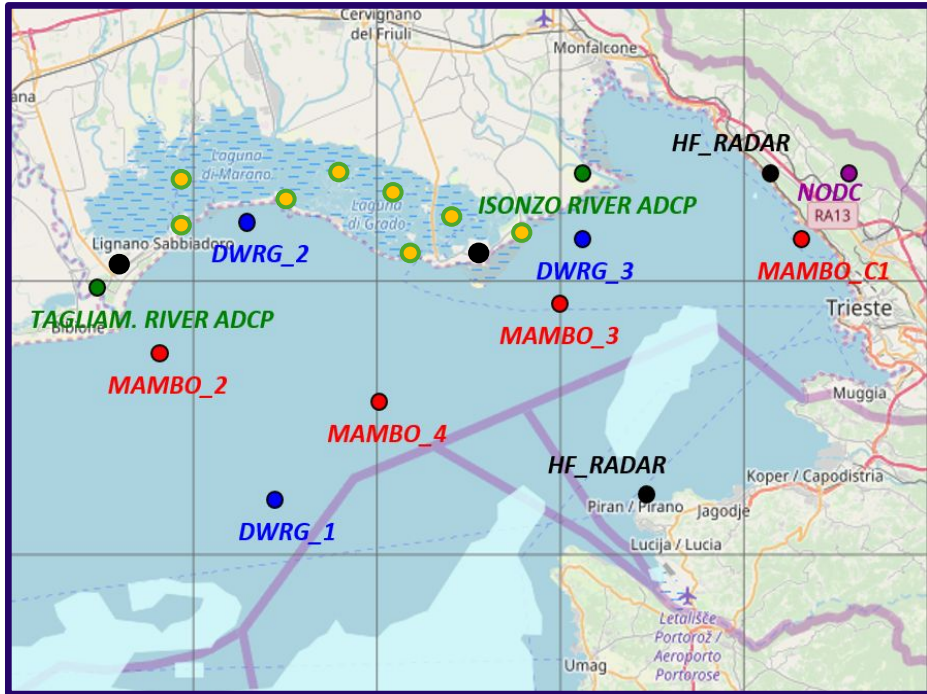
- Acquisition every 30 minutes
- Directional and source waves
- Maximum wave height
- Significant wave height



REGIONE  
AUTONOMA  
FVG

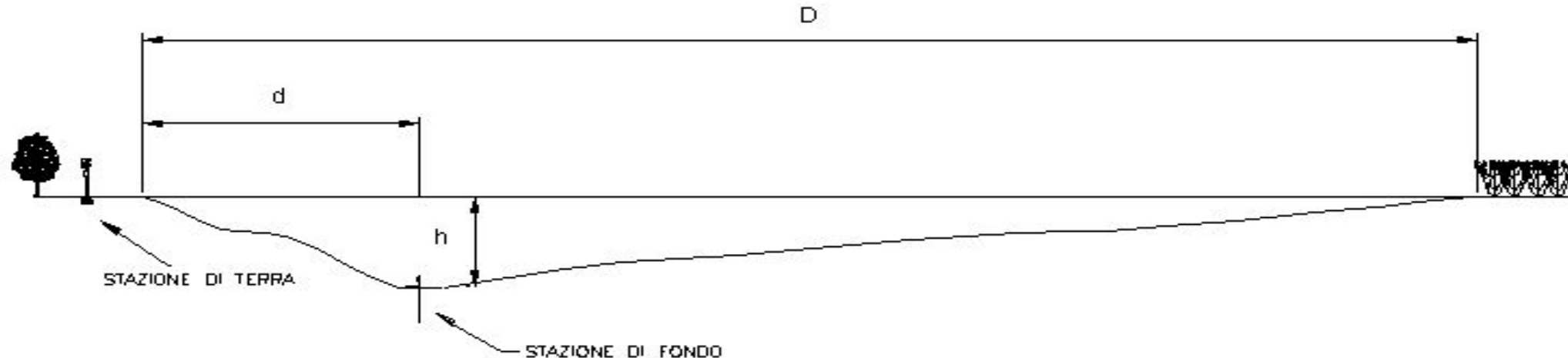


# Isonzo River ADCP

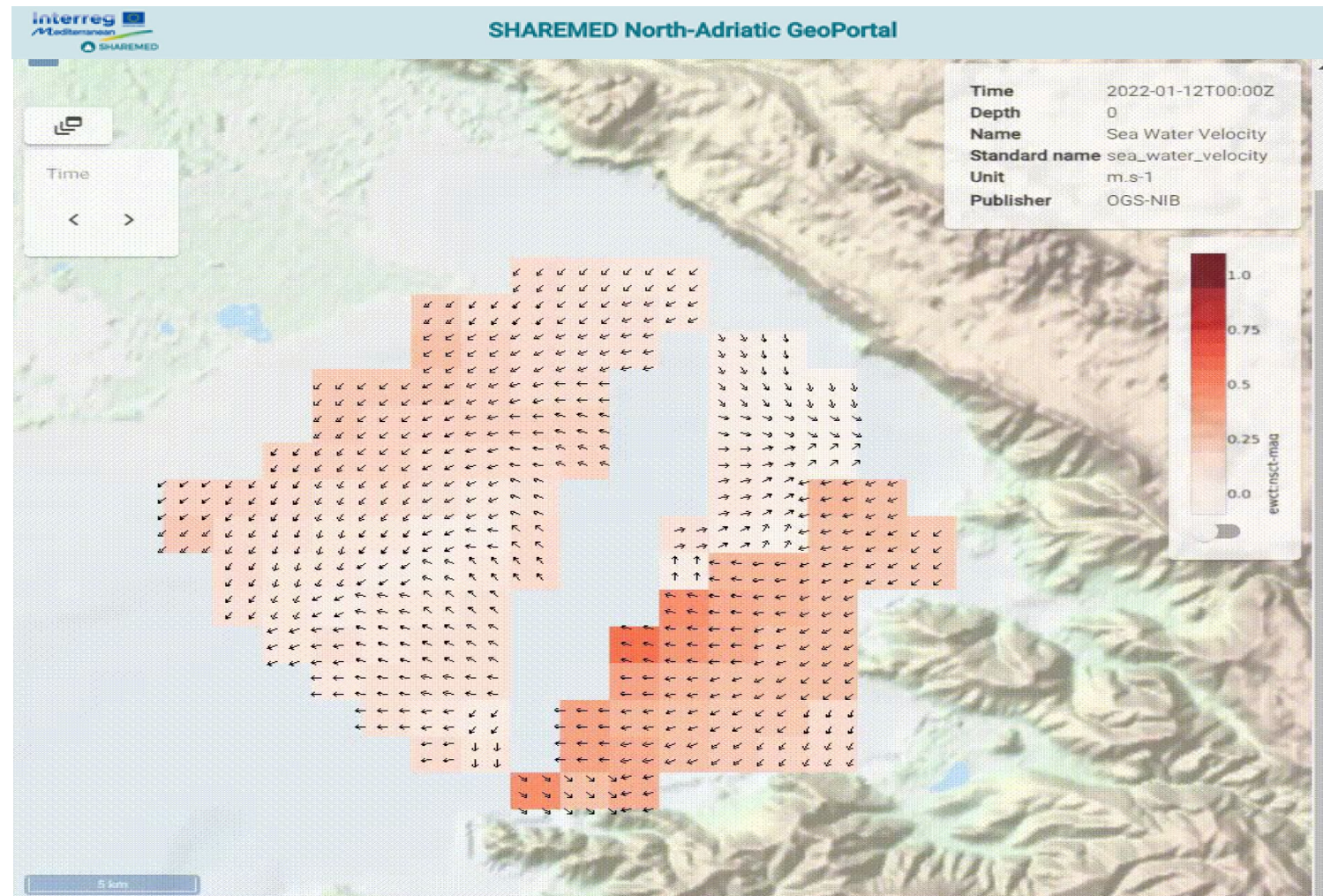
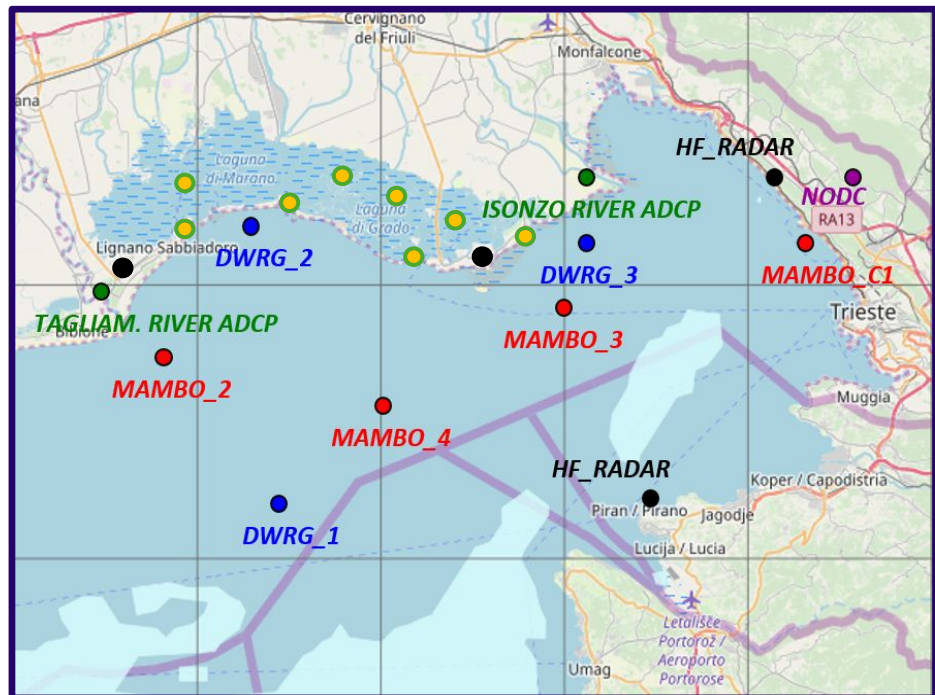


The monitoring stations is equipped with a Nortek 1000 kHz Aquadopp profilers fixed at the river bottom by means of an immobile stainless-steel structure.

Acquisition every 10 minutes (cell size = 0.5 m) over the entire water column (12 -13 meters)



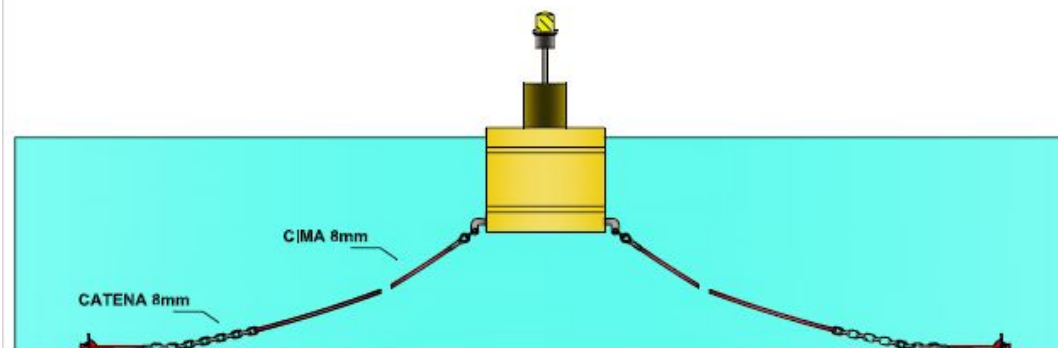
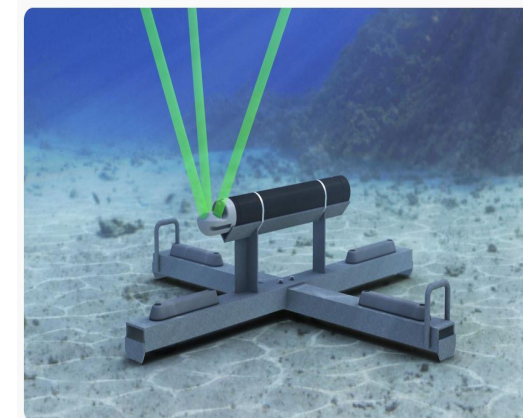
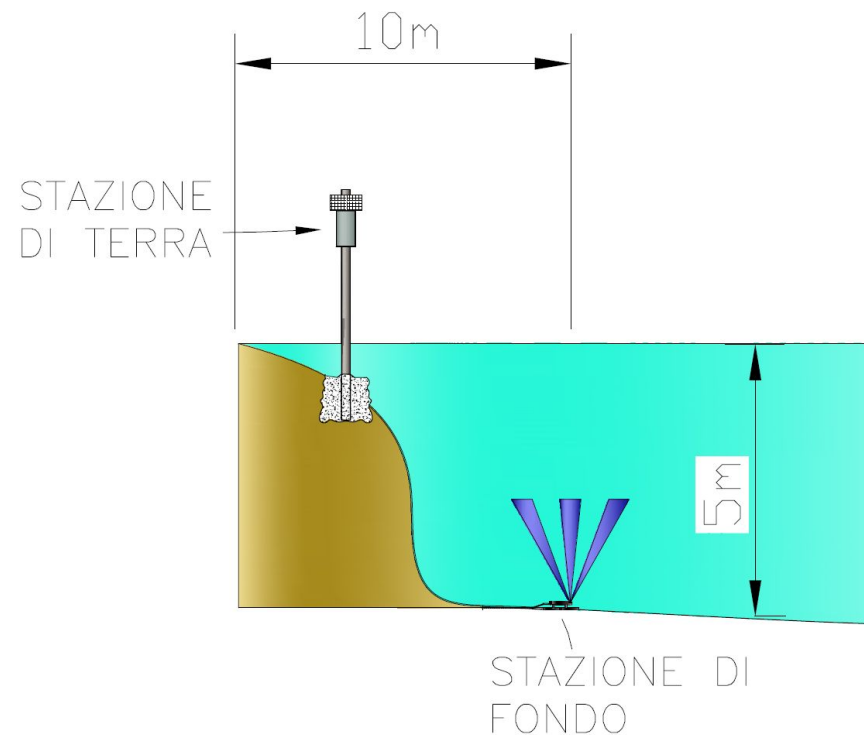
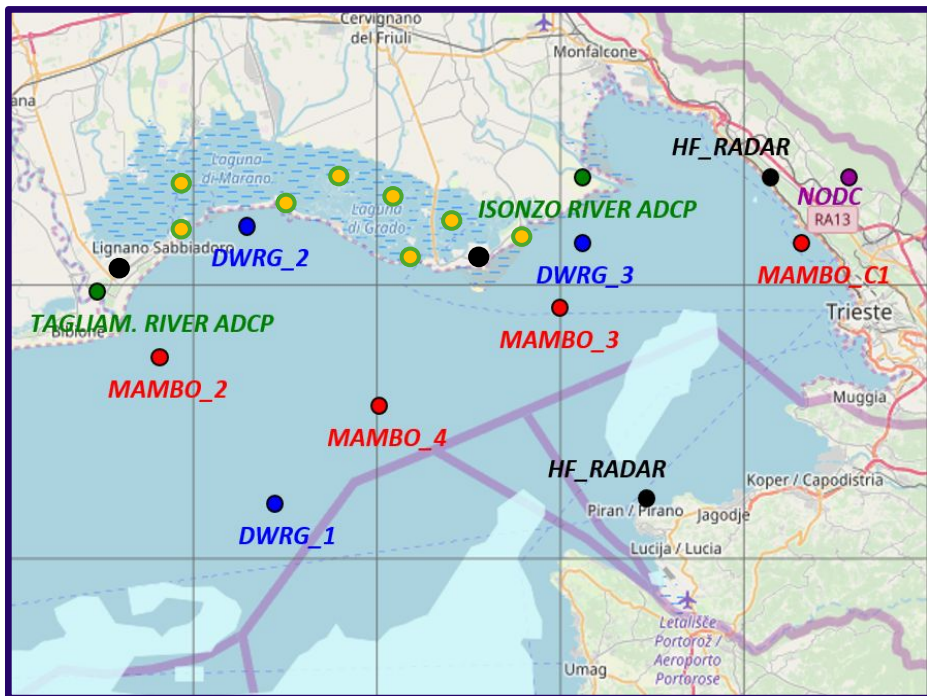
# HF\_Radar



## CODER ARRAY:

With the 2 new radar improvement of the resolution in front of the Istrian Coast

# Danubius-RI implementation in the Marano-Grado lagoon



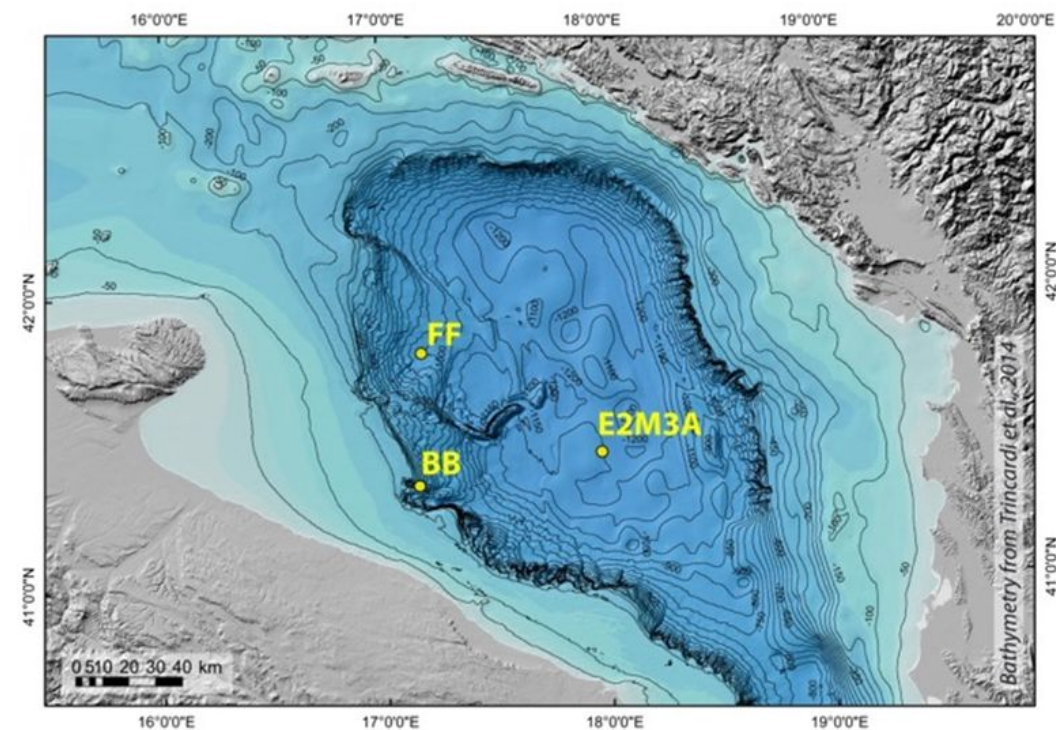
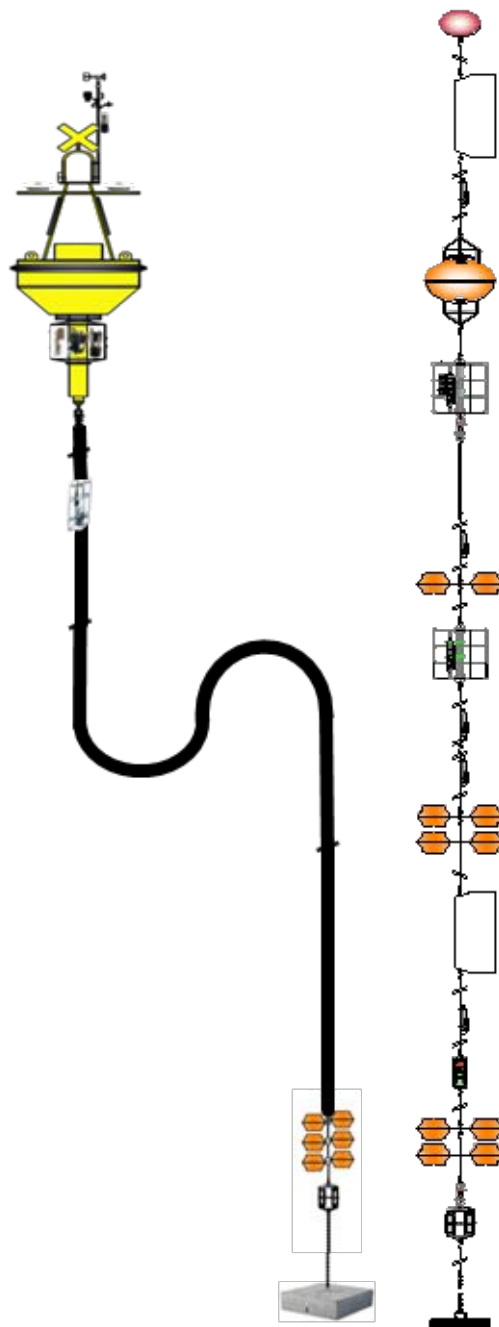
## Probes buoys:

- Temperature.
- Conductivity/Salinity
- Dissolved oxygen
- Chlorophyll A
- SUNA Nitrates

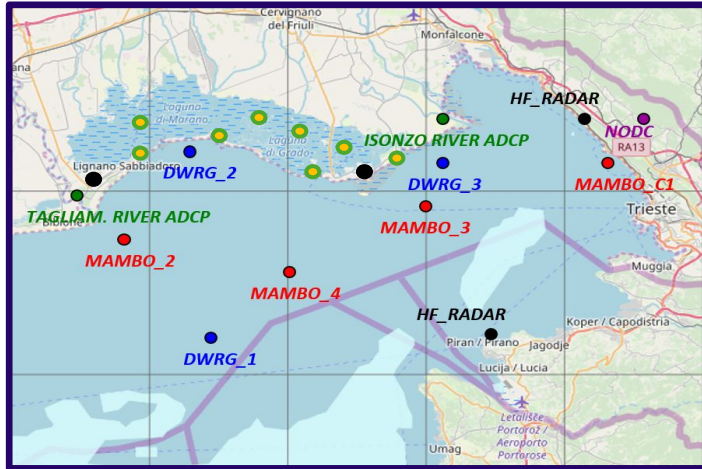
analyzer

# E2M3A - South Adriatic Sea

Parameters measured during LAST deployment	Depth
Temperature and salinity	120, 591, 889, 989, 1156, 1165 m
Temperature and salinity	332, 770 m
Pressure	591, 889, 989, 1156, 1165 m
Pressure	332, 770 m
Turbidity	1165 m
Dissolved Oxygen	770, 889, 989, 1156, 1165 m
Dissolved Oxygen	332, 770 m
Transmittance	332, 770 m
Currents (profiling)	170-318 m
Currents	1165 m
Particulate	1153 m

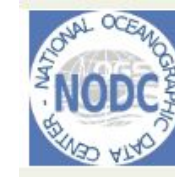


# Data flow and products

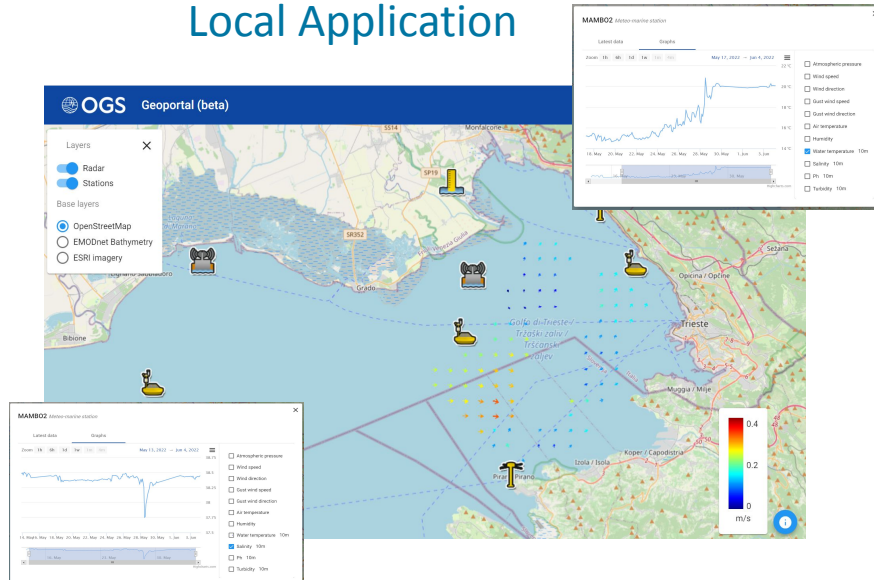


Realtime and delayed mode data

NODC  
National  
Oceanographic  
Data Centre at OGS



## Local Application



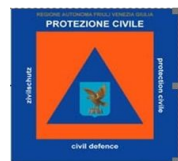
## International Infrastructures as:



## Regional services:



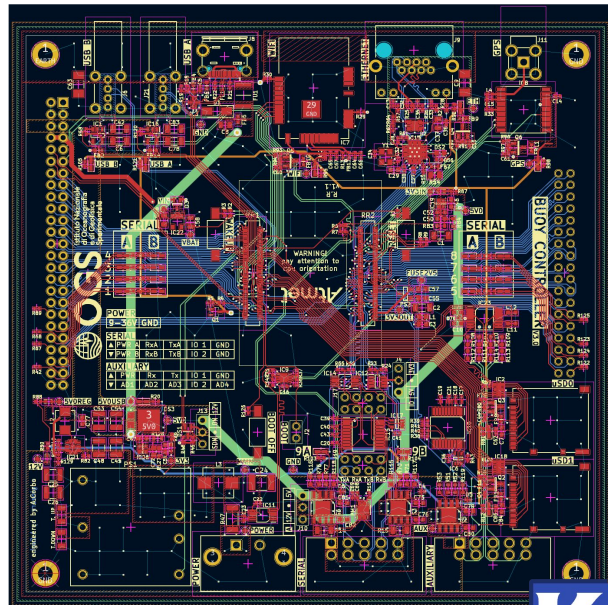
REGIONE  
AUTONOMA  
FVG



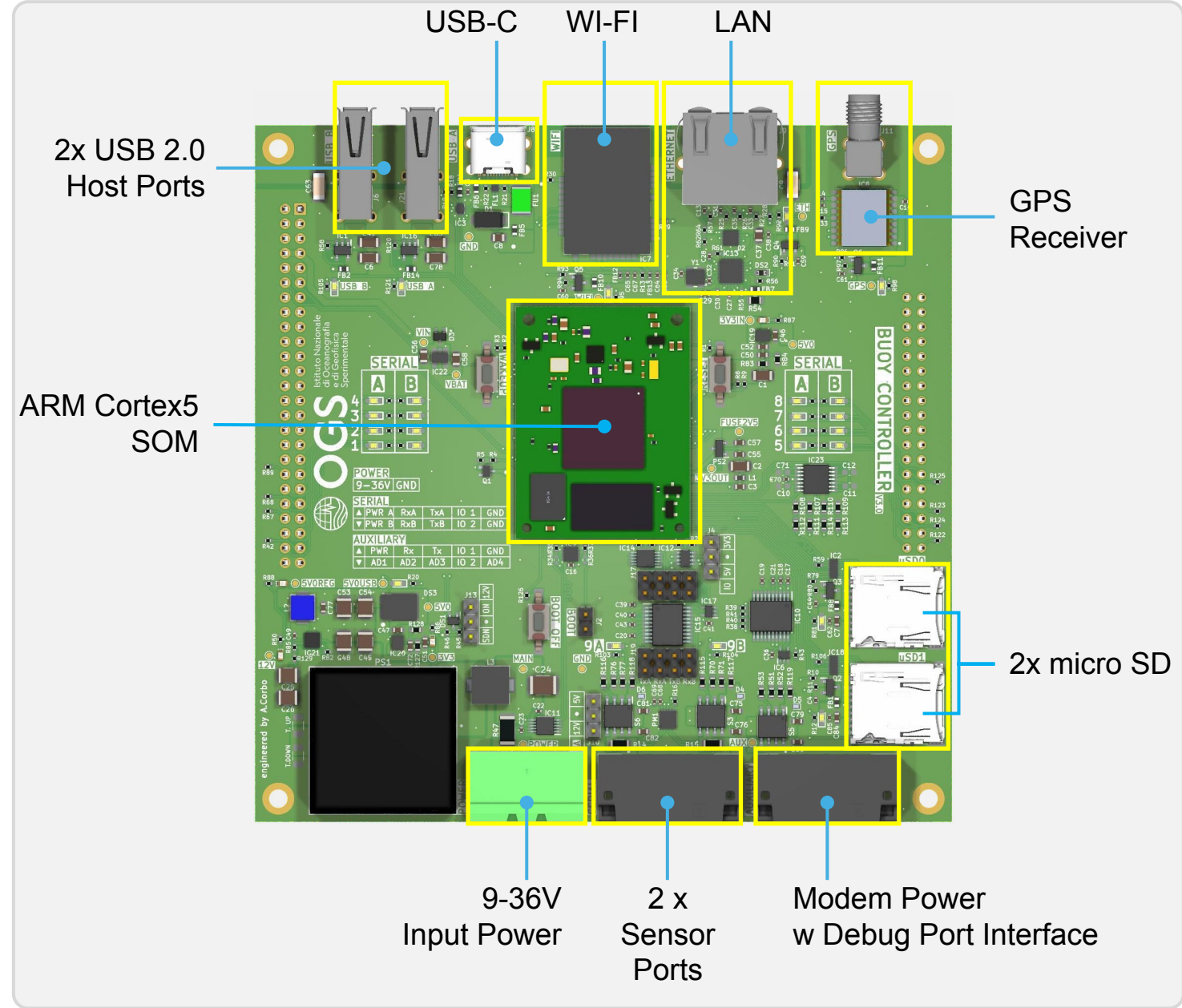
arpa FVG  
agenzia regionale per la  
protezione dell'ambiente  
del Friuli Venezia Giulia

# Buoy Controller v 3.0

- Low energy consumption
- Highly robust
- Custom hardware
- In-house Firmware and Software

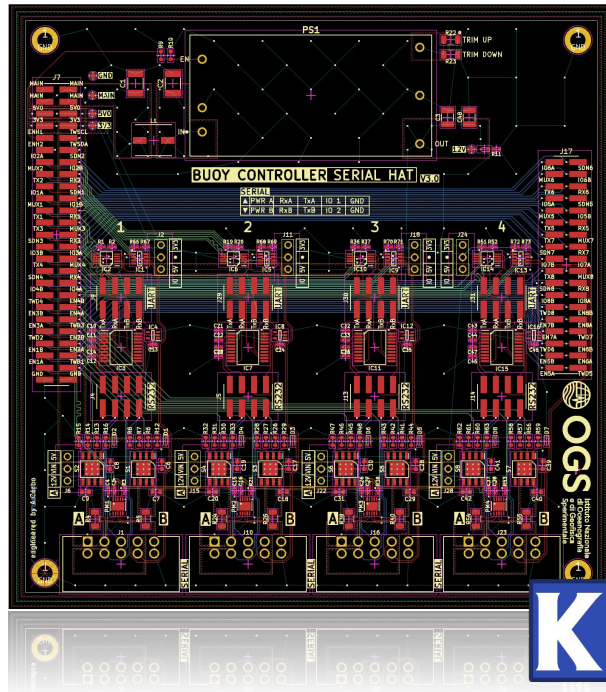


**KiCad**

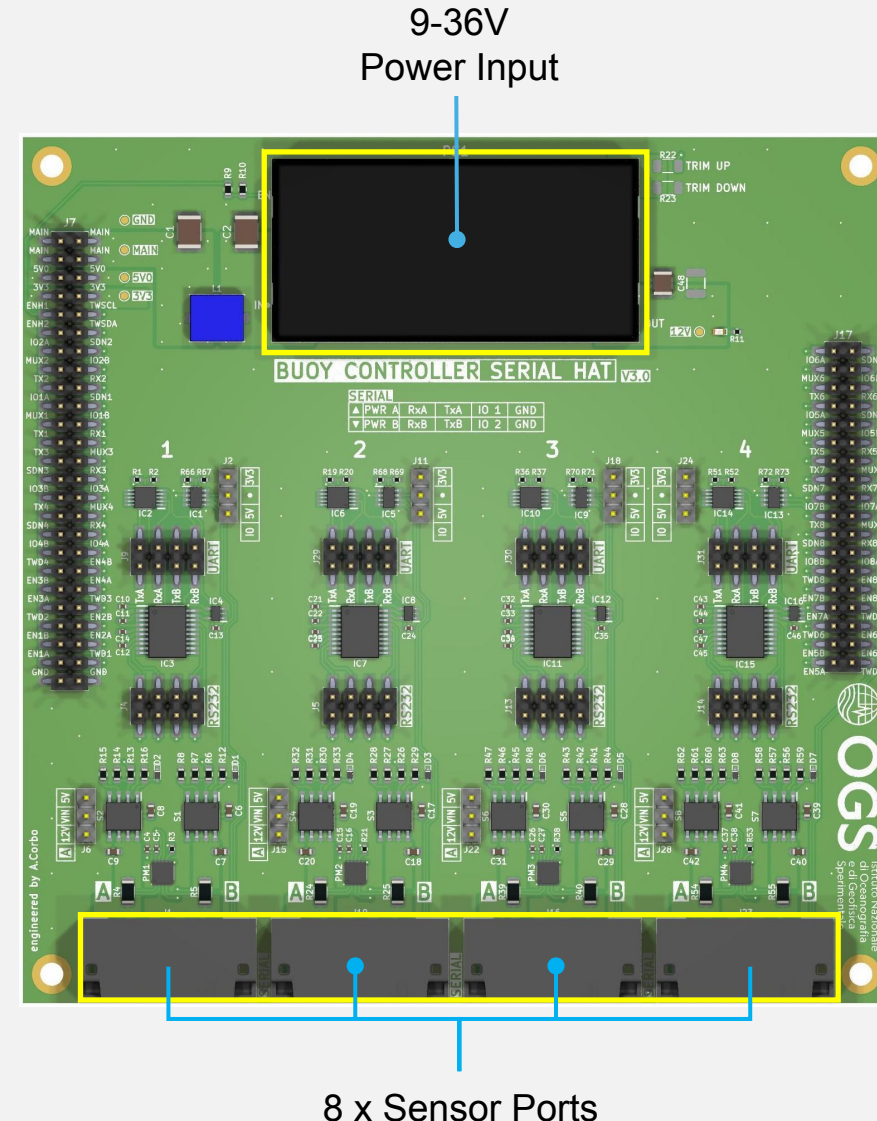


# Buoy Controller v 3.0 – Serial Hat v 3.0

- Modular
- Scalable
- Application-Specific requirements
- Up to 2 stackable expansion boards
- Up to 18 sensors

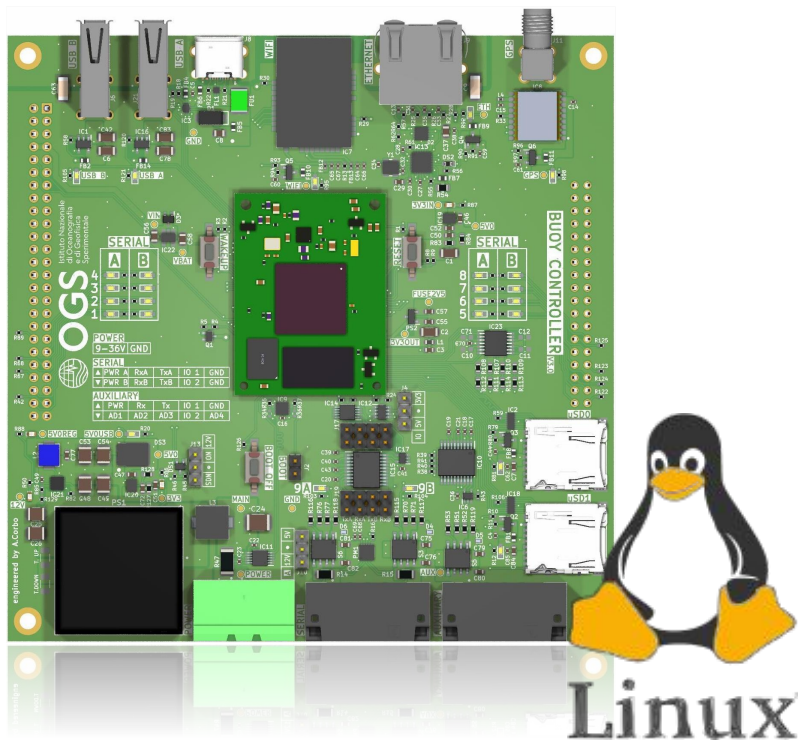


KiCad



# Buoy Controller v 3.0 – Linux Operating System

- Customized **Linux** OS distribution
- Only necessary **Kernel** modules
- Small size **Root File System**
- Fast boot up and Energy saving
- Industrial grade memory support



# Buoy Controller v 3.0 – Web Interface

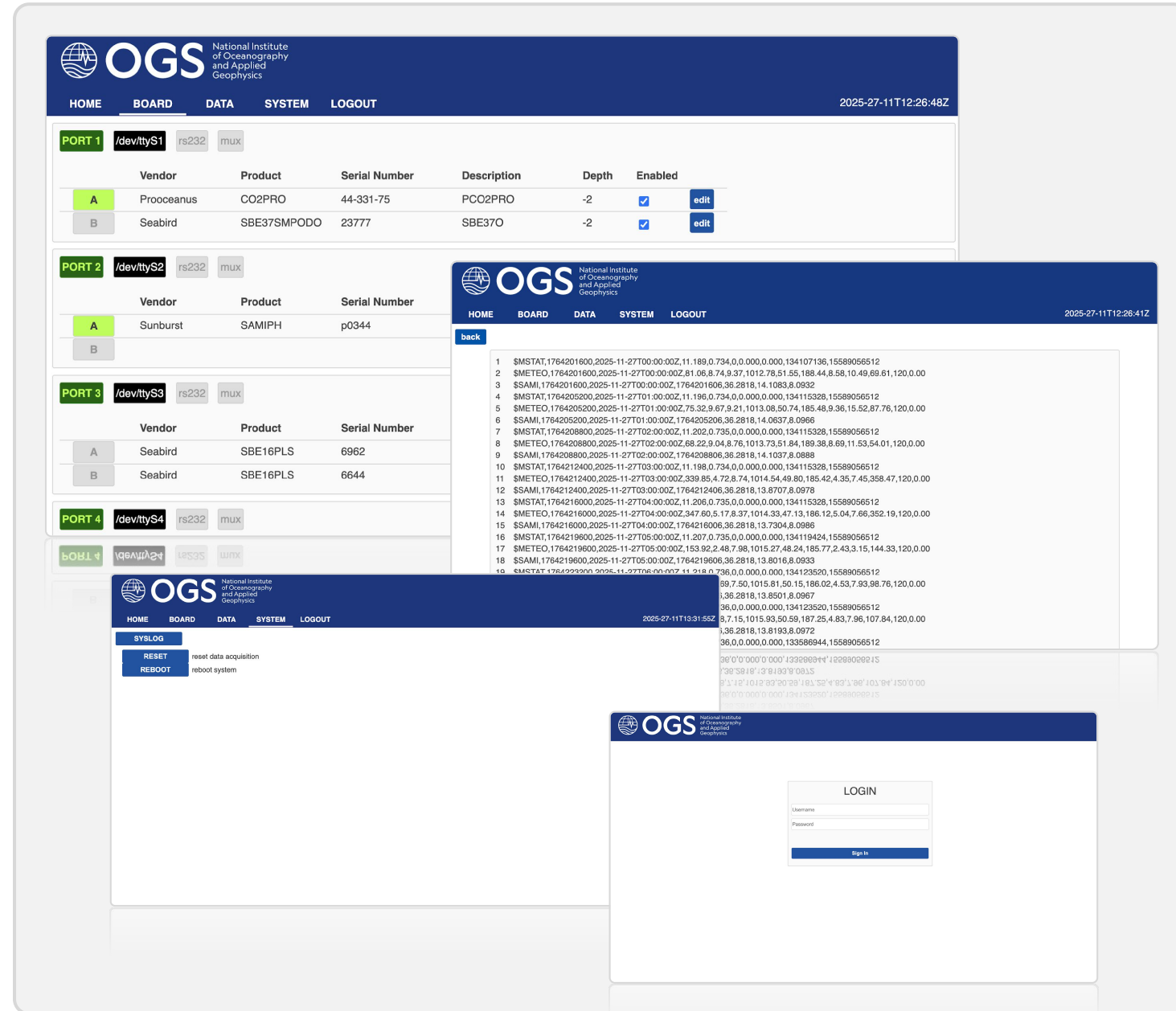
- Local and remote access
- **Graphical User Interface**
- System status monitoring
- Real-Time data visualization
- On site configuration



```
<!DOCTYPE HT
<html lang="en"
<head>
  <title>{{hos
  <meta http-e
  <meta name="
html
```

```
html: {
margin: 0;
padding: 0;
border: none;
font-size:100%;
font: inherit;
CSS
```

```
jQuery( docu
$( '#main-menu
if ( window.l
$( this ).pa
}
});
js
```



The screenshot displays the OGS (National Institute of Oceanography and Applied Geophysics) web interface for the Buoy Controller v 3.0. The interface is divided into several sections:

- Header:** OGS logo and name, navigation tabs (HOME, BOARD, DATA, SYSTEM, LOGOUT), and a timestamp (2025-27-11T12:26:48Z).
- PORT 1:** Configuration for /dev/ttyS1, rs232, mux. It shows a table of sensors:

	Vendor	Product	Serial Number	Description	Depth	Enabled	
A	Proceanus	CO2PRO	44-331-75	PCO2PRO	-2	<input checked="" type="checkbox"/>	<a href="#">edit</a>
B	Seabird	SBE37SMPODO	23777	SBE37O	-2	<input checked="" type="checkbox"/>	<a href="#">edit</a>

- PORT 2:** Configuration for /dev/ttyS2, rs232, mux. It shows a table of sensors:

	Vendor	Product	Serial Number
A	Sunburst	SAMIPH	p0344
B			

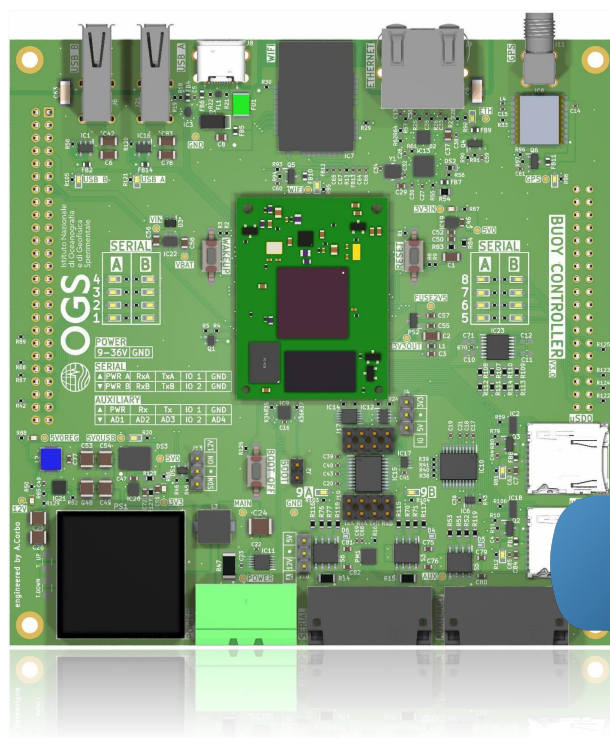
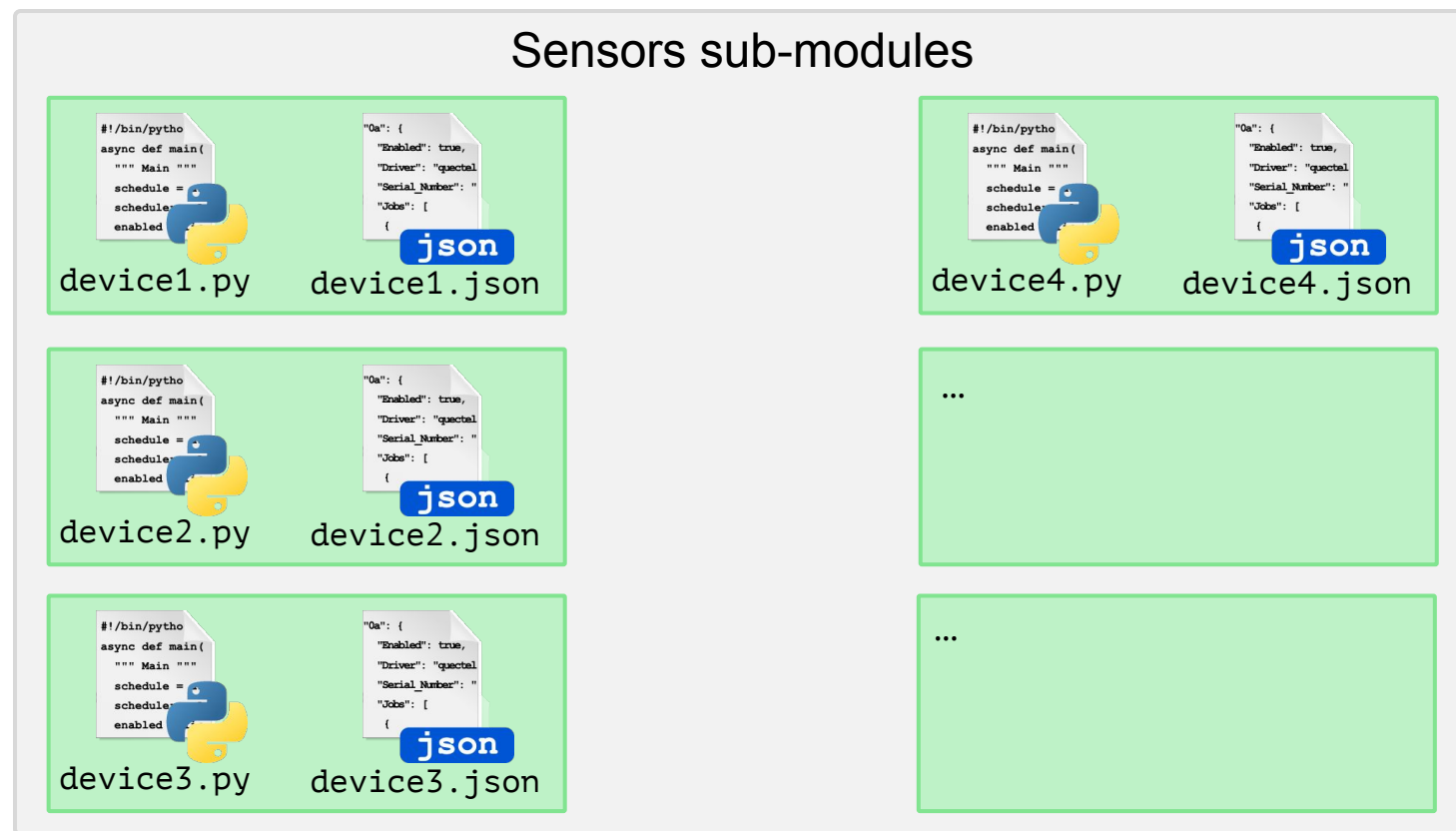
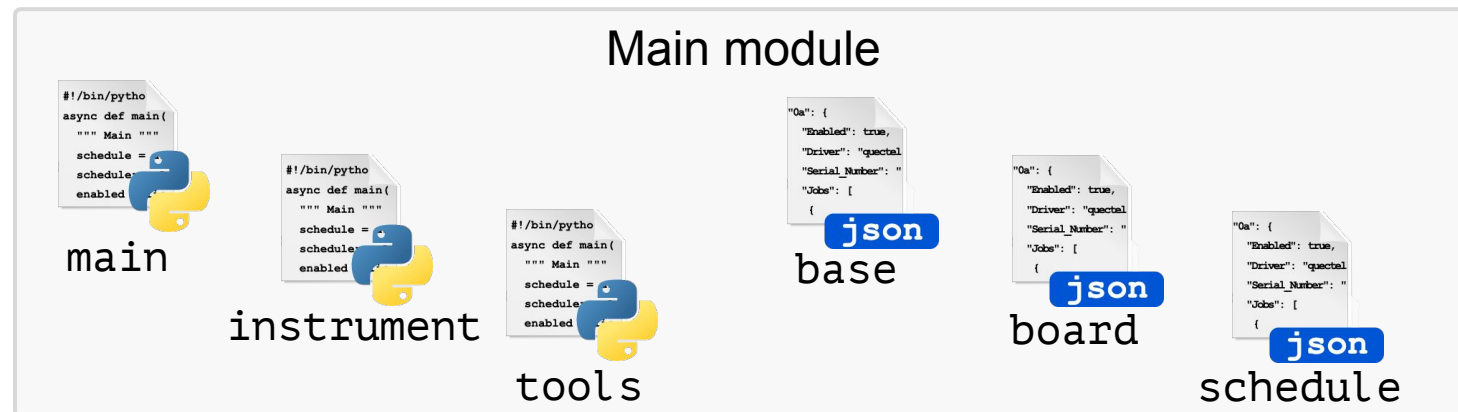
- PORT 3:** Configuration for /dev/ttyS3, rs232, mux. It shows a table of sensors:

	Vendor	Product	Serial Number
A	Seabird	SBE16PLS	6962
B	Seabird	SBE16PLS	6644

- PORT 4:** Configuration for /dev/ttyS4, rs232, mux.
- PORT 5:** Configuration for /dev/ttyS5, rs232, mux.
- SYSTEM LOG:** A section for system logs with buttons for RESET and REBOOT.
- LOGIN:** A section for user login with fields for Username and Password, and a Sign In button.

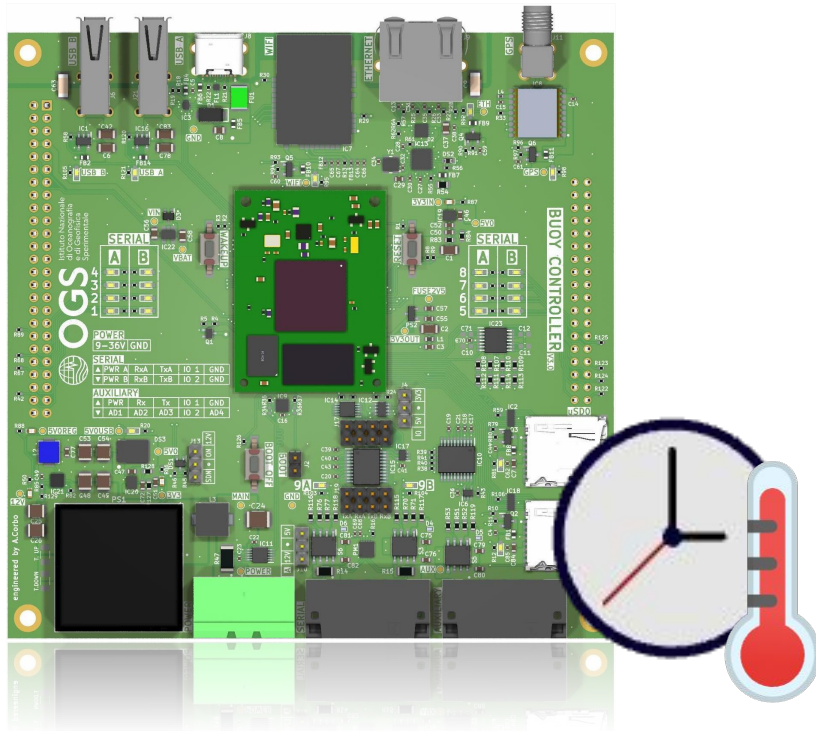
# Buoy Controller v 3.0 – Control Software

- **Asynchronous Python Scheduler**
- Modular architecture
- Main common module
- Sensors specific sub-modules
- Json configuration files

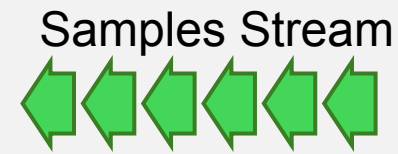
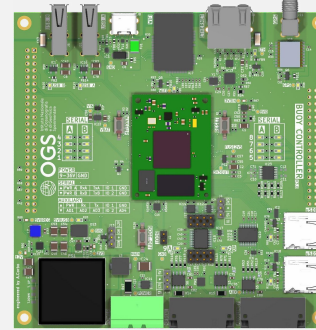


# Buoy Controller v 3.0 – Asynchronous Data Acquisition

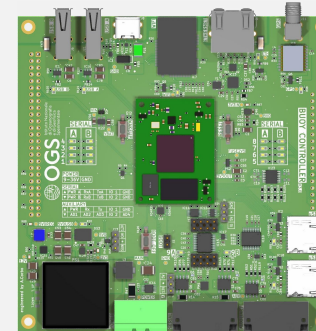
- Asynchronous sensors activation
- Sensor initialization
- Sensors power management
- Customized sampling interval
- Streamed or Polled sampling
- Data conversion and formatting



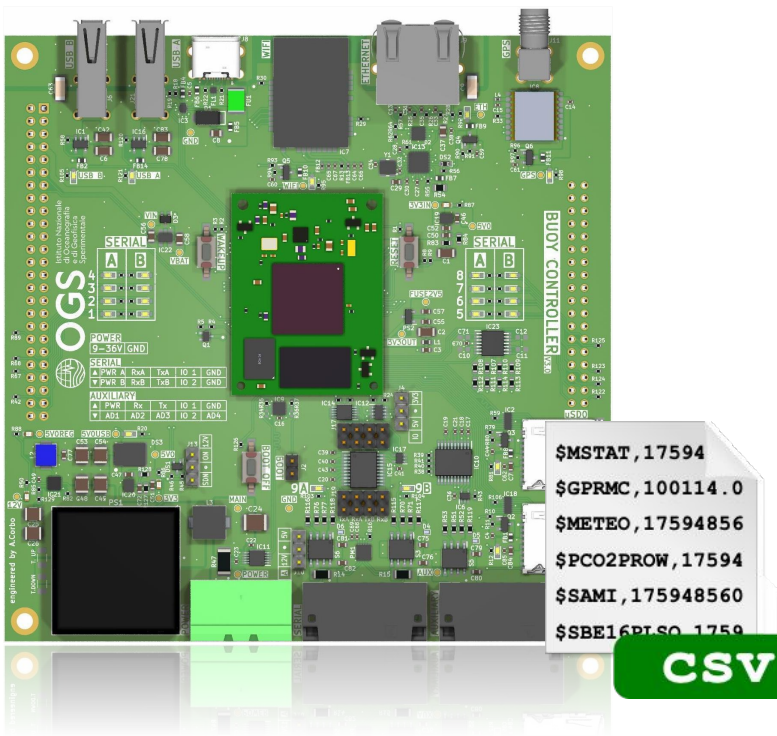
## Streamed Sampling



## Polled Sampling



- Plain ASCII strings
- Comma Separated Values
- NMEA sentence syntax
- Controller UTC timestamp
- Daily file / Periodic transmission



CSV

## Sensors data

label	unix epoch	iso 8601 timestamp	instrument	payload
\$SBE370,	1764505800,	2025-11-30T12:30:00Z,	21.2064,	5.39146, 5.245...
\$SBE16PLS01,	1764505800,	2025-11-30T12:30:00Z,	21.2064,	5.391467...
\$SBE16PLS02,	1764505800,	2025-11-30T12:30:00Z,	21.2064,	5.391462...
\$PC02PRO,	1764505800,	2025-11-30T12:30:00Z,	21.2064,	5.39146, 5sd...

## System Status

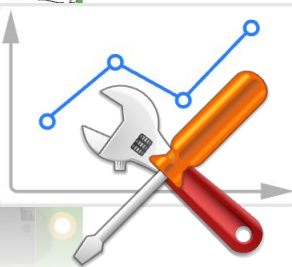
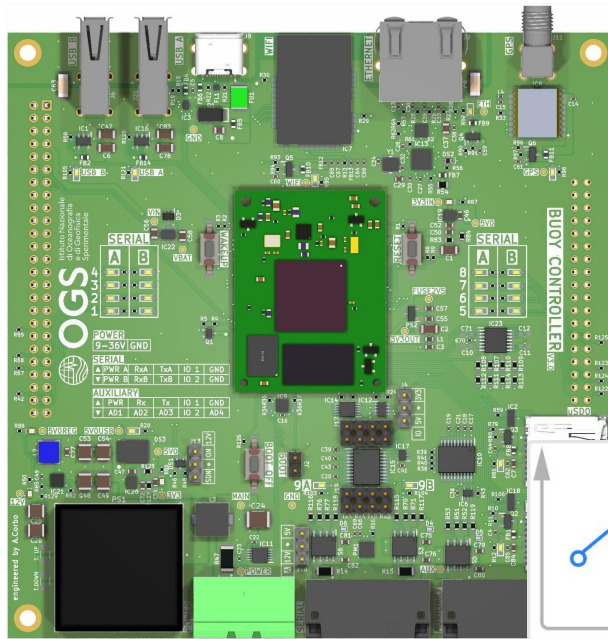
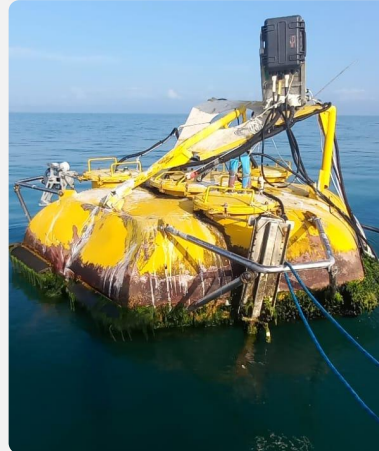
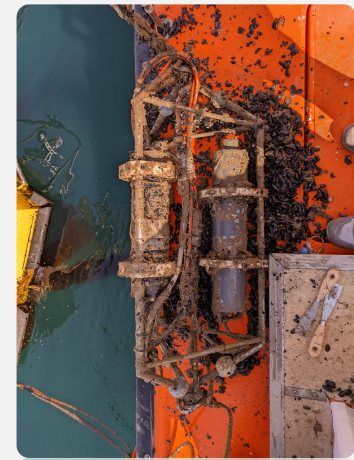
label	battery V	current A	RH%	temp °C	uSD used bytes	uSD free bytes
\$MSTAT, ... ,	.12.710,	0.233,	1,	66.445,	18.478,	115699712, 15589056512

## System Log

```
$SYSLOG,2025-11-30 00:15:31,091,CRITICAL,Starting - As...  
$SYSLOG,2025-11-30 01:00:05,164,ERROR,'NoneType' objec...
```

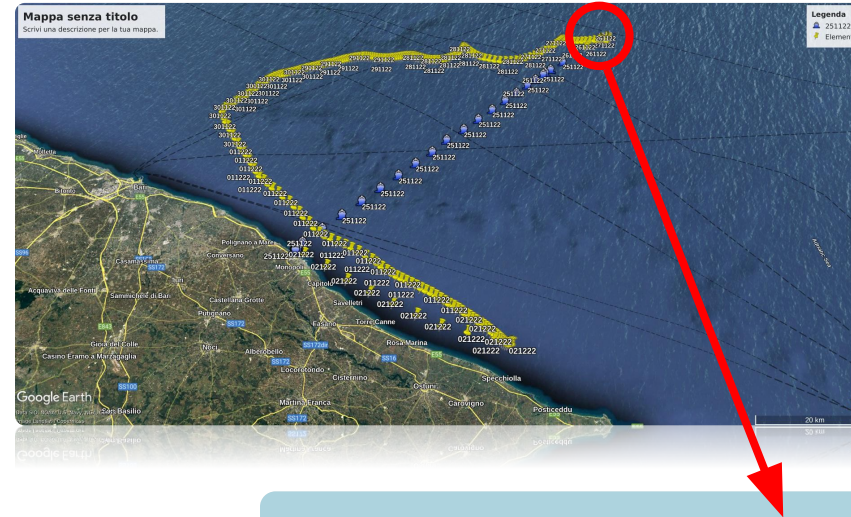
# Buoy Controller v 3.0 – Instrument Maintenance

- Biofouling
- Corrosion
- Vessels collisions
- Extreme weather conditions
- Periodic cleaning and maintenance
- Laboratory calibration - CTMO

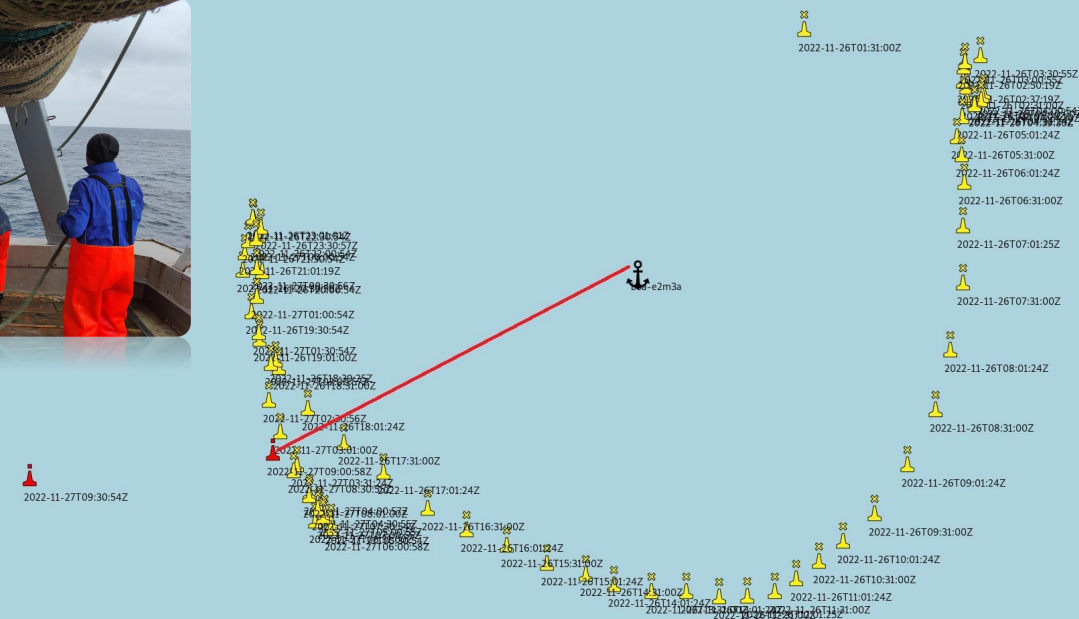
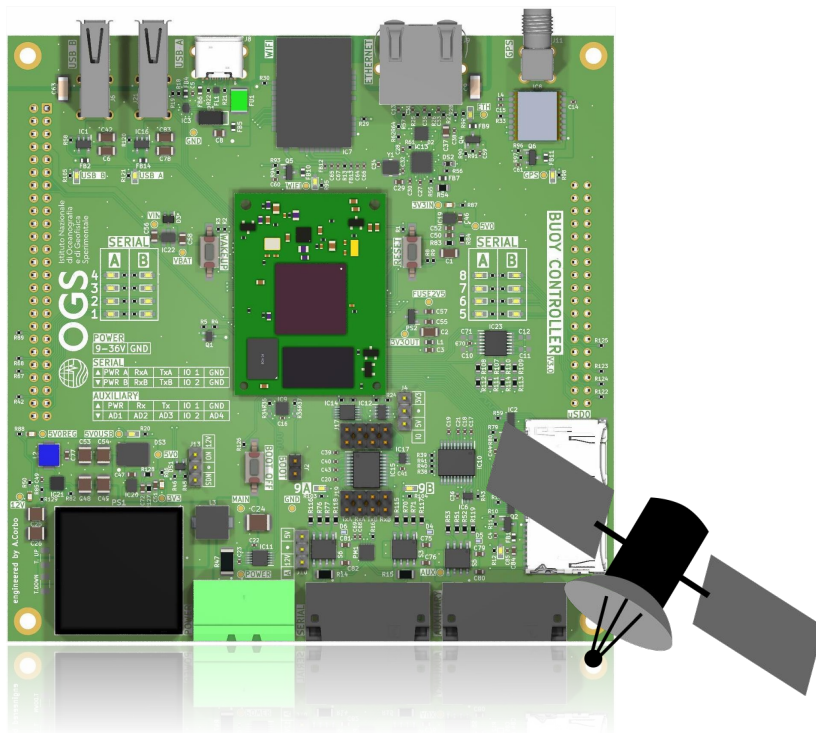


# Buoy Controller v 3.0 – Geofencing

- Location-based technology
- Virtual boundary around mooring
- SMS alert messages (coastal)
- Server side email with maps



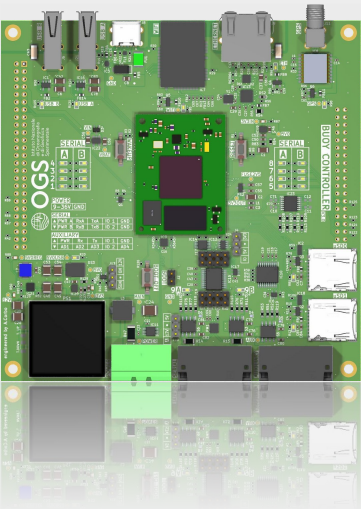
2023 march, E2M3A mooring **S.A.R.** cruise (52nm off the Italian coast at a depth of 1200m). All the instruments that sank due to the mooring break have been recovered.



# Buoy Controller v 3.0 – Near Real-Time Data Transmission



## LTE or Satellite Network



```
$MSTAT,17594
$GPRMC,100114.0
$METEO,17594856
$PCO2PROW,17594
$SAMI,175948560
$SBE16PISO,1759
```

csv

Samples,  
System Status and  
Logs



Google Cloud

OAuth v2



System Updates

```
"0a": {
  "Enabled": true,
  "Driver": "quectel",
  "Serial_Number": "
  "Jobs": [
    {
```

json

```
#!/bin/pytho
async def main(
  """ Main """
  schedule =
  schedule
  enabled
```



OGS



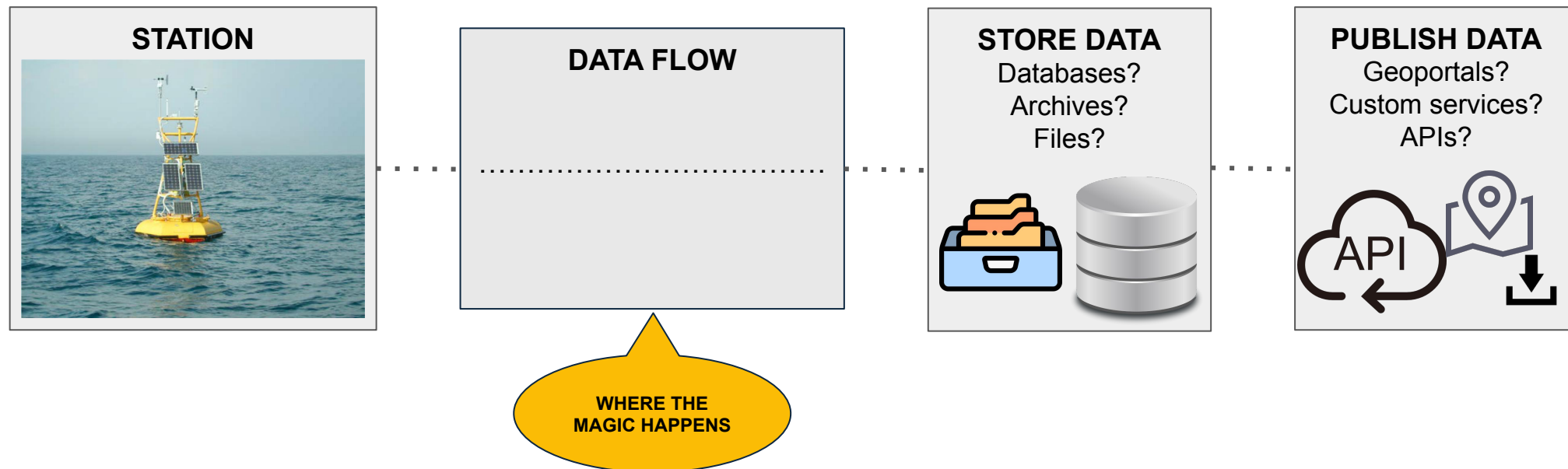
As data managers we want:

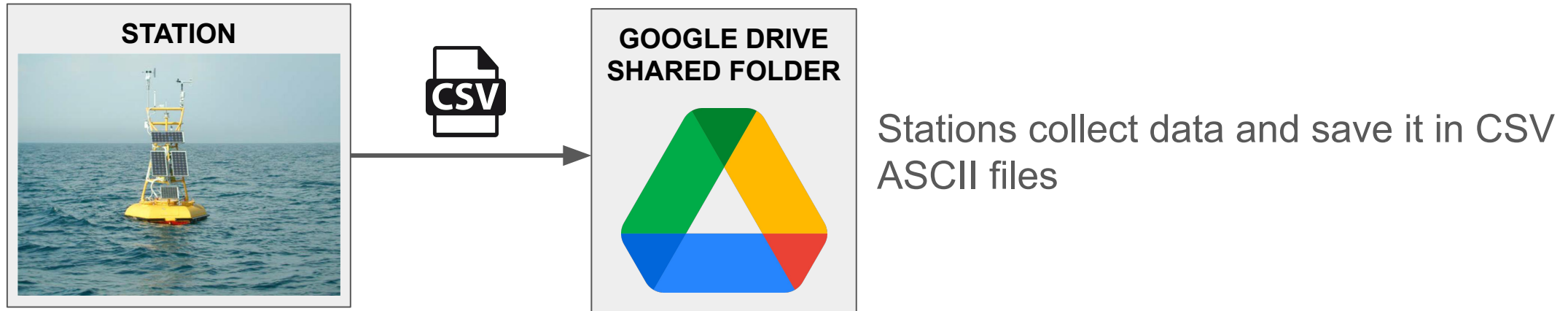
## 1) Store data in a standardized way

- Databases are a great tool if used correctly
- Metadata are essential

## 2) Make data available to the public

- Services and API that let users download / interpolate / graph data





Let's see an Example:

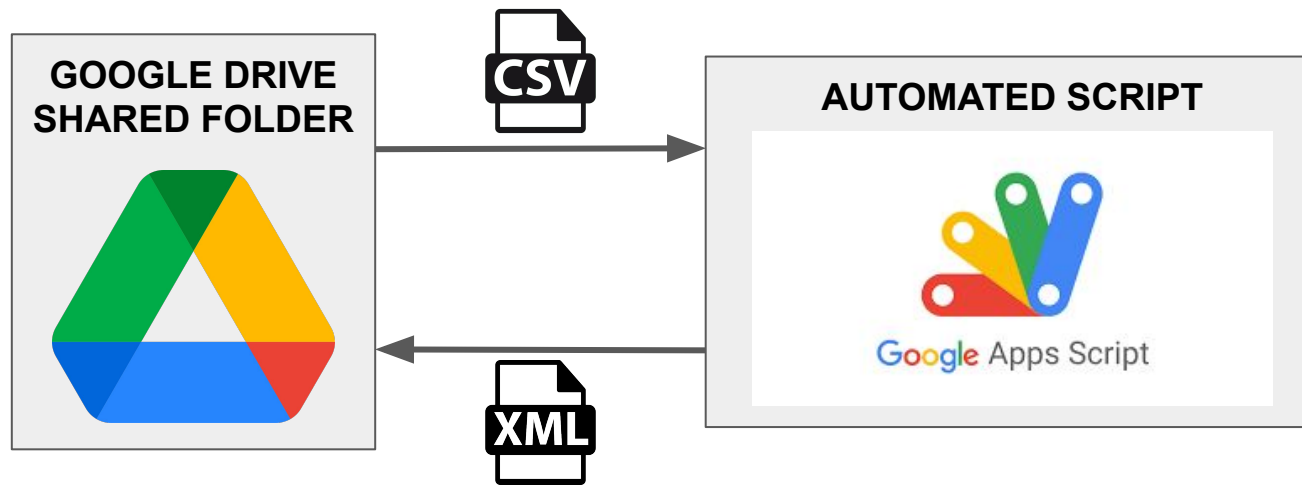
```
$SEAFET,1711252810,2024-03-24T04:00:10.827714Z,SEAFET02003,2024-03-24T
$PCO2PROW,1711252823,2024-03-24T04:00:23.783219Z,W M,2024,03,24,04,00,
$SBE370,1711252849,2024-03-24T04:00:49.323829Z,13.1879,4.28663,1.935,6
$SBE16PLS01,1711252870,2024-03-24T04:01:10.546259Z,12.5855,4.30839,10.
$METEO,1711252919,2024-03-24T04:01:59.068983Z,68.04,15.32,7.58,859.46,
```



What do this characters and numbers mean?  
How can i distinguish different data?

**WE NEED METADATA!**

To solve the previous problem we have made an automated script that converts data from the CSV ASCII format to a standardized XML

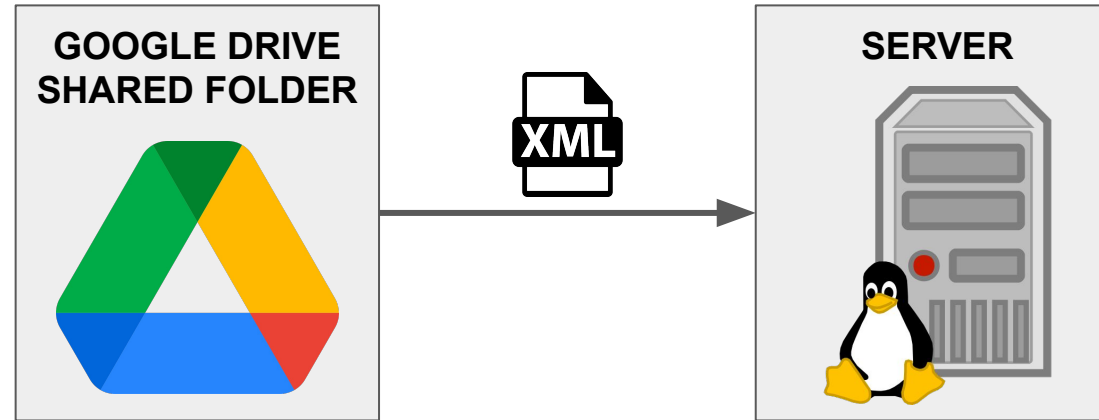


## IMPORTANT:

To make the script works correctly a configuration must be kept updated with the current station metadata

Let's see an Example of the XML:

```
1 <?xml version="1.0" encoding="UTF-8"?>
2 <capture siteId="MAMBO1">
3   <item line_number="1" field_name="temperature">
4     <date>2024-03-11T23:01:10.000Z</date>
5     <parameter>TEMPR01</parameter>
6     <parameter-unit>UPAA</parameter-unit>
7     <instrument-category>130</instrument-category>
8     <instrument-identifier>SBE16PLS01</instrument-identifier>
9     <results-mean>11.9525</results-mean>
10  </item>
11  <item line_number="2" field_name="conductivity">
12    <date>2024-03-11T23:01:10.000Z</date>
13    <parameter>CONDZ01</parameter>
14    <parameter-unit>UECA</parameter-unit>
15    <instrument-category>130</instrument-category>
16    <instrument-identifier>SBE16PLS01</instrument-identifier>
17    <results-mean>4.28682</results-mean>
18  </item>
19  <item line_number="3" field_name="pressuredbar">
20    <date>2024-03-11T23:01:10.000Z</date>
21    <parameter>PRDBR01</parameter>
22    <parameter-unit>UPDB</parameter-unit>
23    <instrument-category>130</instrument-category>
24    <instrument-identifier>SBE16PLS01</instrument-identifier>
25    <results-mean>10.626</results-mean>
26  </item>
27  <item line_number="4" field_name="salinity">
28    <date>2024-03-11T23:01:10.000Z</date>
29    <parameter>SSALS01</parameter>
30    <parameter-unit>UUUU</parameter-unit>
31    <instrument-category>130</instrument-category>
32    <instrument-identifier>SBE16PLS01</instrument-identifier>
33    <results-mean>0.0000</results-mean>
34  </item>
35 </capture>
```



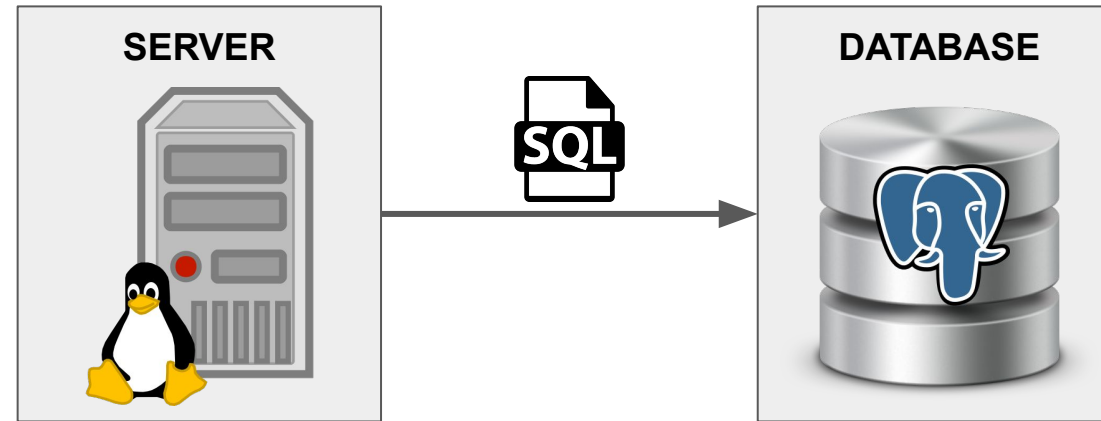
Data in XML format gets transferred into the main server at NODC.

**Note:**

This step is done automatically by the server, every 5 minutes (**Near** Real-Time)

**Keep in mind:**

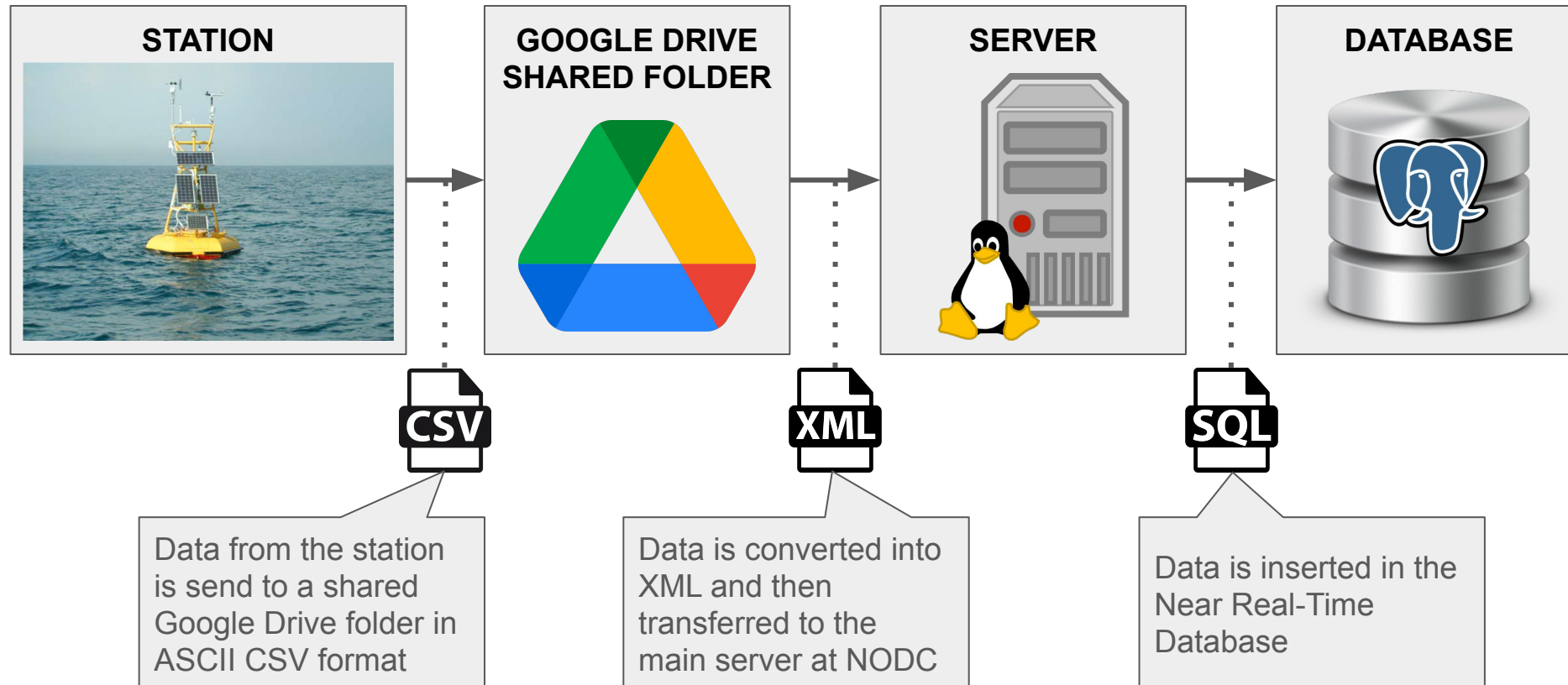
there is another configuration that specifies where the data is located and where it should be stored



Data is taken from a custom software and inserted into the database

This custom software written in Java  
has been developed and now  
maintained internally in NODC

## RECAP of the data flow



# Data publication - ERDDAP



(As said previously)

## We want to Make data available to the public

We choose ERDDAP<sup>TM</sup> data server

### Why ERDDAP?

- Open source  
(developed by NOAA)
- Enables users to:
  - filter / interpolate
  - graph
  - download data (lot of standard formats)
- Built in API service  
(based on DAP, Data Access Protocol)
- Custom library for many programming languages  
(python, R, matlab, javascript)
- Easy configuration for publishing dataset from databases
- Customizable with metadata standards we use

The screenshot displays the NODC's ERDDAP web interface. At the top, there's a header with the NODC logo and the text 'Easier access to OGS's data'. Below this, the 'ERDDAP' section explains its purpose: '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.' It also mentions 'Easier Access to Scientific Data' and 'Different scientific communities have developed different types of data servers.' A sidebar on the right offers 'Start Using ERDDAP' options: 'Search for Interesting Datasets', 'Do a Full Text Search for Datasets', 'View a List of All 39 Datasets', and 'Search for Datasets by Category'.

The main content area shows a 'List of All Datasets' table with columns for 'Grid DAP', 'Sub DAP', 'Table DAP', 'Make DAP', 'W Data', 'Source Files', 'Title', 'Summary', and 'Format'. The table lists various datasets, including 'MAMBO1 timeSeries ALL INSTRUMENTS, NRT in situ Observations'. Below the table, the 'ERDDAP unifies the different types of data data you want, in the format you want.' section explains that ERDDAP acts as a middleman between request data from ERDDAP, ERDDAP remote server, sends the request to the into the format that you requested, and different data servers to get data from c.

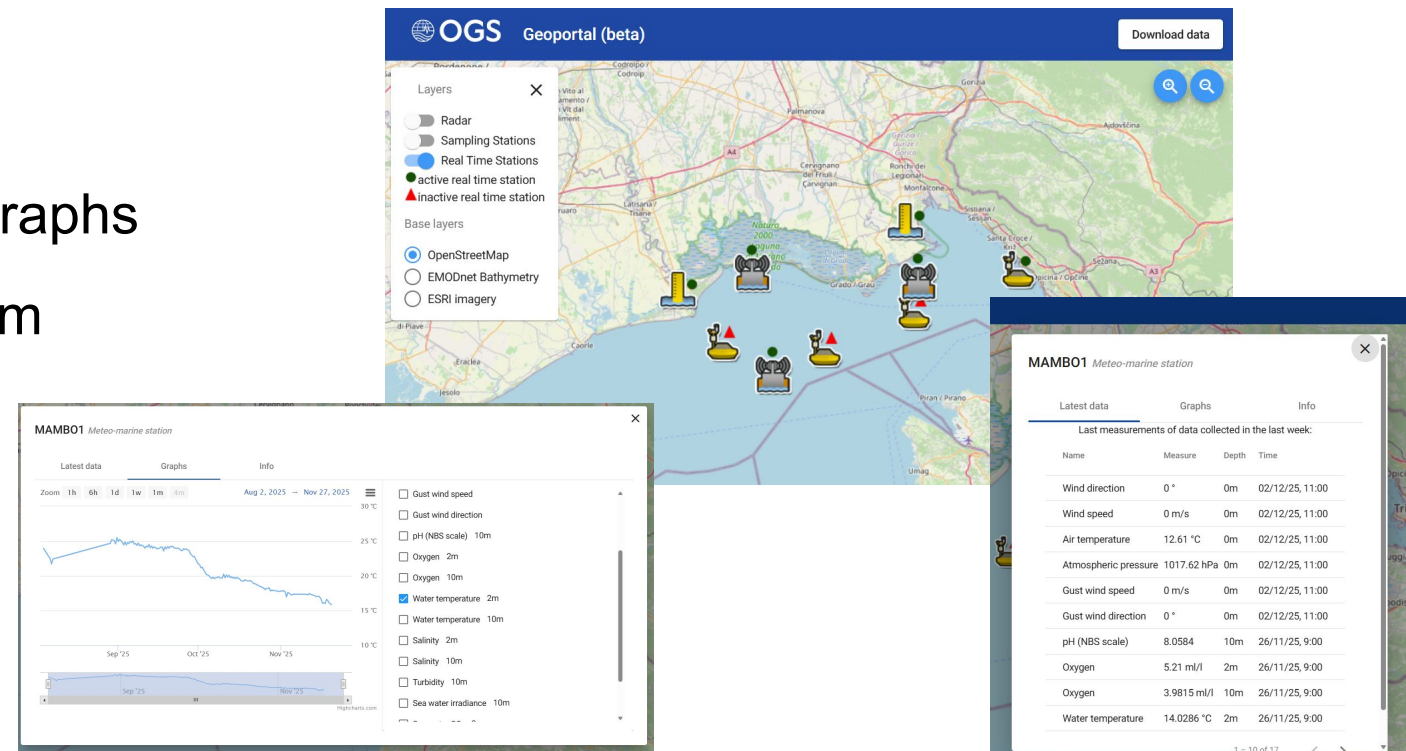
The 'ERDDAP > tabledap > Data Access Form' section shows a detailed form for the 'MAMBO1 timeSeries ALL INSTRUMENTS, NRT in situ Observations' dataset. It includes fields for 'Time', 'latitude', 'longitude', 'depth', 'WDIR', 'WDIR\_OC', 'WSPD', 'WSPD\_OC', 'DRY', 'DRY\_OC', 'ATMS', 'ATMS\_OC', 'RELH', and 'RELH\_OC'. The form also has checkboxes for 'Variable', 'Check All', 'Uncheck All', and 'Optional Constraint #1' and 'Optional Constraint #2'. A 'Graph' section shows a line graph of the data over time, with a 'Time range' of 10 months. The graph is titled 'MAMBO1 timeSeries ALL INSTRUMENTS, NRT in situ Observations' and shows a peak in the data around May 2021.

## Data accessibility is an important theme with data publication!

= Not all users needs or know how to access data servers or APIs

That's why NODC developed a new Geoportal with the following properties:

- Open source
- Web application
- Easy to use / visualize data in graphs
- Constantly upgraded by our team
- Uses ERDDAP as it's API



# Data publication - ERDDAP and NODC Geoportal

## RECAP of the data publication



### ERDDAP

**NODC's ERDDAP**  
Easier access to OGS's 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.

**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.
- ERDDAP offers an easy-to-use, consistent way to request data: via the OPeNDAP standard.

**Start Using ERDDAP:  
Search for Interesting Datasets**

- **Do a Full Text Search for Datasets**
- **View a List of All 39 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, iioos\_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.

### GEOPORTAL

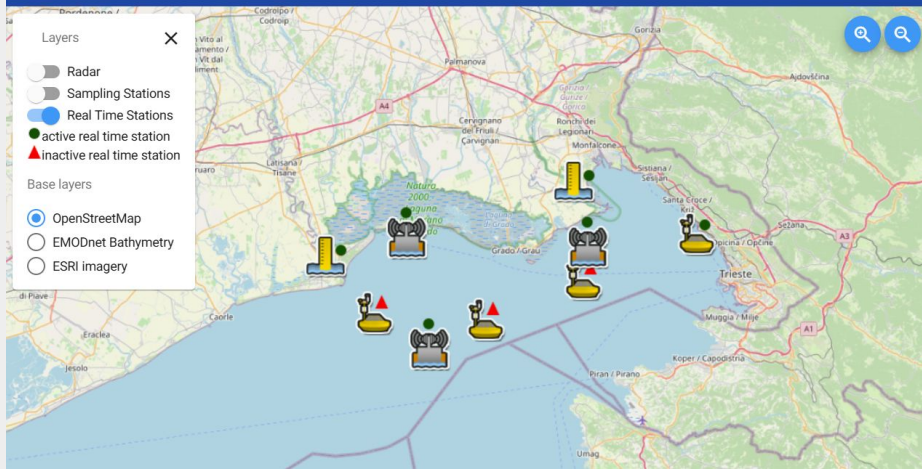
**OGS Geoportal (beta)** [Download data](#)

Layers

- ☐ Radar
- ☐ Sampling Stations
- ☒ Real Time Stations
- ☐ active real time station
- ☐ inactive real time station

Base layers

- ☒ OpenStreetMap
- ☐ EMOdnet Bathymetry
- ☐ ESRI Imagery



An open source data server that gives users the ability to filter, download and graph published data  
(Developed by NOAA)



An open source web app that enables users to view data from stations managed by NODC  
(Developed internally by NODC)



Findable



Accessible



Interoperable



Reusable

Why?

To make research data more open (and easier to reuse) and thus promote Open Science more generally

# FAIR Principles

## Box 2 | The FAIR Guiding Principles

<https://www.nature.com/articles/sdata201618>

### To be Findable:

- F1. (meta)data are assigned a globally unique and persistent identifier
- F2. data are described with rich metadata (defined by R1 below)
- F3. metadata clearly and explicitly include the identifier of the data it describes
- F4. (meta)data are registered or indexed in a searchable resource

### To be Accessible:

- A1. (meta)data are retrievable by their identifier using a standardized communications protocol
  - A1.1 the protocol is open, free, and universally implementable
  - A1.2 the protocol allows for an authentication and authorization procedure, where necessary
- A2. metadata are accessible, even when the data are no longer available

### To be Interoperable:

- I1. (meta)data use a formal, accessible, shared, and broadly applicable language for knowledge representation.
- I2. (meta)data use vocabularies that follow FAIR principles
- I3. (meta)data include qualified references to other (meta)data

### To be Reusable:

- R1. meta(data) are richly described with a plurality of accurate and relevant attributes
  - R1.1. (meta)data are released with a clear and accessible data usage license
  - R1.2. (meta)data are associated with detailed provenance
  - R1.3. (meta)data meet domain-relevant community standards

**ERDDAP** is a data server designed to help organizations like NOAA comply with the FAIR (Findable, Accessible, Interoperable, Reusable) principles for scientific data management.

It provides a standardized framework that improves how data is shared and managed, primarily for oceanographic and environmental data.

ERDDAP supports each of the FAIR principles:



ERDDAP helps make data and metadata easy for both humans and machines to find.

Metadata Appending: It allows administrators to easily add missing or required metadata attributes to datasets in the configuration files, ensuring rich documentation.

Standardized Metadata: It can generate standardized metadata documents (such as ISO metadata or Schema.org) on demand, which are harvestable by external systems and search engines.

Persistent Identifiers: ERDDAP supports the creation of packages that can be assigned persistent identifiers, such as Digital Object Identifiers (DOIs), which are crucial for long-term discovery.



## A

# ccessible

Once data is found, ERDDAP ensures it can be retrieved using standardized, open protocols, often through RESTful services.

Multiple Access Formats: It provides access to data in numerous file formats (e.g., .csv, .netCDF), allowing users to select the format that best suits their needs.

Machine-to-Machine Access: It supports machine-readable requests (e.g., OPeNDAP, WMS), allowing computational systems to access data with minimal human intervention.

Open Protocols: Access relies on standard web protocols like HTTPS.



## I

# nteroperable

Interoperability ensures data can be integrated and used with various applications and workflows.

ERDDAP acts as a bridge between different systems.

Standardized Units: It enforces the use of standardized, making data from different sources comparable and mergeable.

Middleware Approach: ERDDAP can pull data from different types of source servers (OPeNDAP, OBIS, SOS, WMS) and convert them into a consistent internal format, effectively making data sources interoperable.

Standard Vocabularies: It supports the use of community-accepted languages and controlled vocabularies for metadata, which facilitates data integration.



# R reusable



The ultimate goal of FAIR is to maximize the utility of data by making it well-described so it can be reused in future research.

Rich Provenance: The detailed metadata capabilities allow users to include information on how the data was collected or generated (provenance).

Clear Licensing: ERDDAP facilitates the inclusion of clear, human- and machine-readable usage licenses, which defines the terms for reuse.

Through these features, ERDDAP simplifies the process of managing and sharing scientific data in a way that aligns with global best practices for open science.



# I nteroperable

## FOCUS ON -> Interoperability

When are data interoperable? Only if the following hold:

- (Meta)data formats utilize shared **vocabularies** and **ontologies**
- (Meta)data are **machine-readable** and **machine-actionable**

FOCUS ON -> Interoperability -> metadata standard

## European Directory of Marine Organisations (EDMO)

*EDMO contains up-to-date addresses and activity profiles of research institutes, data holding centres, monitoring agencies, governmental and private organisations, that are in one way or another engaged in oceanographic and marine research activities, data & information management and/or data acquisition activities.*

*Currently, EDMO lists and describes more than 4.000 organisations.*

institution_edmo_code	120
institution_edmo_uri	<a href="https://edmo.seadatanet.org/report/120">https://edmo.seadatanet.org/report/120</a>



## FOCUS ON -> Interoperability -> Standard Vocabularies

Common vocabularies consist of lists of **standardised terms** that cover a broad spectrum of disciplines of relevance to the oceanographic and wider community. Using standardised sets of terms solves the problem of **ambiguities** associated with data markup and also enables records to be interpreted by **computers**.

The BODC NVS2.0 URL follows the following structure:

**Controlled Vocabulary:** <http://vocab.nerc.ac.uk/collection/{listid}/{version}/>

Concept: <http://vocab.nerc.ac.uk/collection/{listid}/{version}/{termid}/>



## FOCUS ON -> Interoperability -> Standard Vocabularies

## Extended Checklist

- Vocabularies **MUST** be documented
- Vocabularies **SHOULD** be self-descriptive
- Vocabularies **SHOULD** be described in more than one language
- Vocabularies **SHOULD** be used by other datasets
- Vocabularies **SHOULD** be accessible for a long period
- Vocabularies **SHOULD** be published by a trusted group or organization
- Vocabularies **SHOULD** have persistent URLs
- Vocabularies **SHOULD** provide a versioning policy

Reference: [<https://www.w3.org/TR/ld-bp/#VOCABULARIES>]



title-:	<b>SeaDataNet Parameter Disciplines</b>
alternative-:	<b>SeaDataNet Disciplines</b>
description-:	<b>Terms used to classify SeaDataNet Agreed Parameter Groups to provide topic/theme discovery interface.</b>
date-:	<b>2008-05-01 02:00:03.0</b>
publisher-:	<b>Natural Environment Research Council</b>
creator-:	<b>SeaDataNet</b>
versionInfo-:	<b>3</b>
RE_RegisterManager:	<b>British Oceanographic Data Centre</b>
RE_RegisterOwner:	<b>SeaDataNet</b>
comment-:	<b>Governance for vocabularies used in the EU SeaDataNet project implemented as cons members of the SeaDataNet Technical Task Team</b>

## ↑ -- Administration and dimensions --

URI	<a href="http://vocab.nerc.ac.uk/collection/P08/current/DS07/">http://vocab.nerc.ac.uk/collection/P08/current/DS07/</a>
Identifier ()	SDN:P08::DS07
Preferred label (en)	<b>Administration and dimensions</b>
Alternative label ()	Administration and dimensions
Version Info ()	1
Definition (en)	Parameters related to spatial and temporal co-ordinates, entity referencing (eg record numbering
Deprecated ()	false
Same as ()	<a href="http://vocab.nerc.ac.uk/collection/P03/current/Z005/">http://vocab.nerc.ac.uk/collection/P03/current/Z005/</a>
Broader	<a href="http://vocab.nerc.ac.uk/collection/L19/current/001/">http://vocab.nerc.ac.uk/collection/L19/current/001/</a>
Narrower	<a href="http://vocab.nerc.ac.uk/collection/W01/current/035/">http://vocab.nerc.ac.uk/collection/W01/current/035/</a>
Date ()	2005-03-10 14:31:52.0

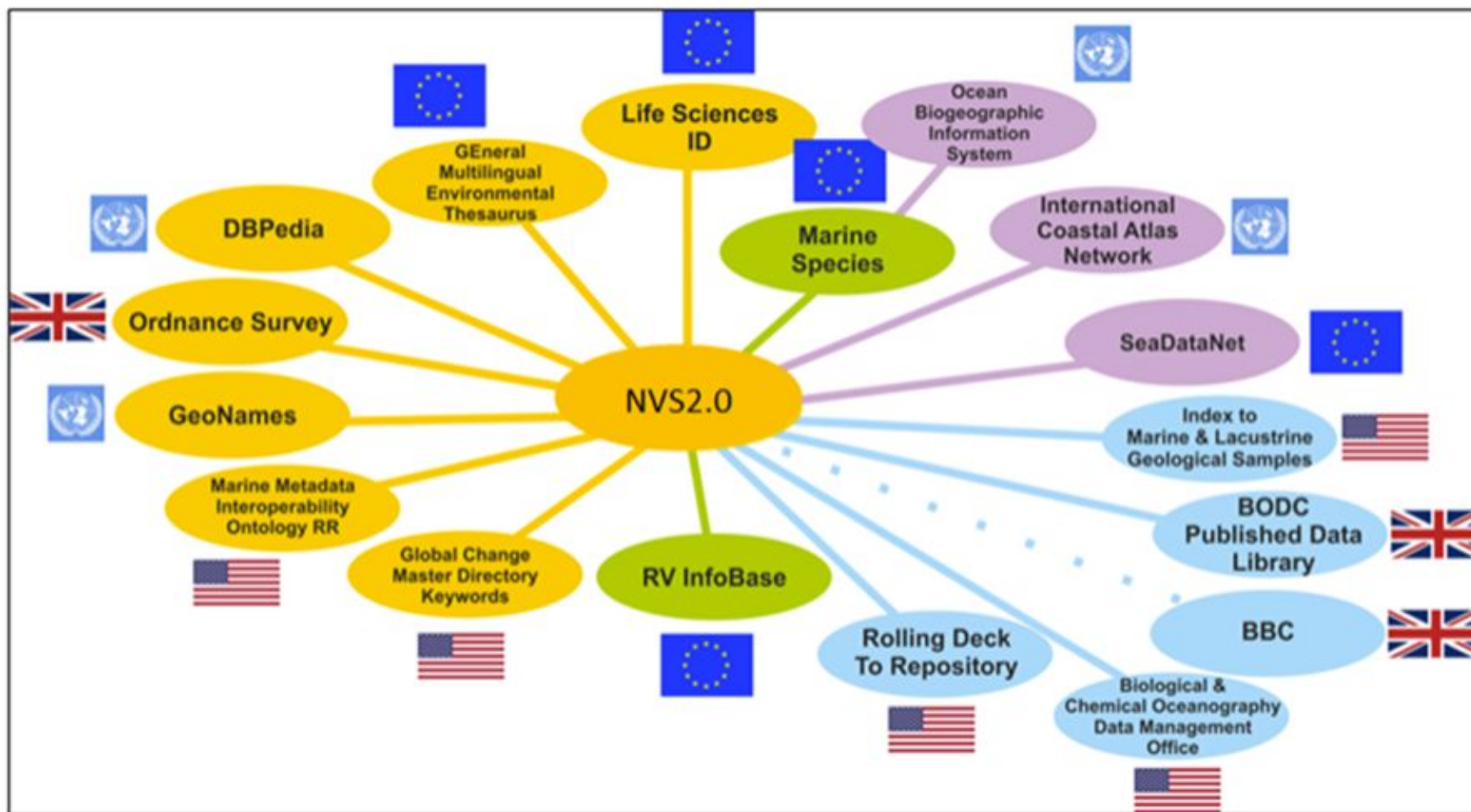
# Semantic modeling of vocabularies



There are a few BODC vocabularies that are built from an underlying semantic model, which use other BODC vocabularies as the building blocks or components.

<http://vocab.nerc.ac.uk/collection/P01/current/WB000284/>

*Concentration of lipids per unit wet weight of biota {Mytilus galloprovincialis (ITIS: 79456: WoRMS 140481) [Sex: male Subcomponent: gill]}*

- ✓ **Measurement property** Concentration
- ✓ **Measurement statistical qualifier**
- ✓ **Chemical substance** lipids
- ✓ **Measurement-matrix relationship** per unit wet weight of
- ✓ **Matrix** biota
- ✓ **Biological entity** {Mytilus galloprovincialis (ITIS: 79456: WoRMS 140481) [Sex: male Subcomponent: gill]}



	RDF Vocabulary resources
	Non RDF Vocabulary resources
	Non RDF datasets
	RDF Datasets

# Vocab Tools:

## NVS2 search

## The NERC Vocabulary Server (NVS)

Service Status

[NVS Home](#) | [Vocabularies](#) | [Thesauri](#) | [Search NVS](#) | [SPARQL](#) | [Other Tools](#) | [About NVS](#)

### Search for a term in a vocabulary collection

Enter search string using % as wildcard if required. Example: chlorophyll%sediment.

Vocab ID

Search

☒ Identifier ☒ Preferred label ☒ Alternative label ☐ Definition ☐ Exact match ☐ Case sensitive [toggle advanced options](#)

A01	A02	A03	A04	A05	B02	B03	B04	B05	B06	B07	B09	B11	B12	B20	B21	B22	B39	B75	B76	BQ1	BQ2	BQ3	C00	C10	C16
C17	C18	C19	C22	C30	C31	C32	C33	C34	C35	C36	C37	C38	C39	C40	C41	C43	C45	C46	C47	C48	C59	C60	C61	C62	C64
C67	C71	C72	C75	C77	C86	C87	C88	C89	C96	C98	D01	E01	E02	EF1	EL1	EL2	EPL	EXV	F02	G01	G02	G03	G04	G05	G06
G07	G08	G09	G10	G11	G12	G13	G14	G15	G17	G18	G20	G21	G22	G23	G25	G26	G28	G29	G30	G8X	GGB	GG5	GGT	GS1	GS2
GS3	GS4	GS5	GS6	GS8	GS9	GSA	GSB	GSC	GXM	H01	H02	H03	H04	H05	H06	HA2	I01	I02	I03	I10	I11	I12	I13	I14	I15
L02	L03	L04	L05	L06	L07	L08	L10	L11	L12	L13	L14	L15	L18	L19	L20	L21	L22	L23	L24	L26	L27	L30	L31	L33	L34
L35	M01	M03	M04	M05	M06	M09	M10	M11	M12	M13	M14	M15	M16	M17	M18	M20	M21	M22	M23	M24	M25	M26	M27	M28	M29
MVB	N01	N02	N03	N04	N05	N06	OD1	OG1	P01	P02	P03	P04	P05	P06	P07	P08	P09	P10	P11	P12	P13	P14	P15	P17	P18
P19	P20	P21	P22	P23	P24	P25	P26	P27	P28	P29	P30	P31	P33	P35	P36	P37	P38	P64	Q01	R01	R03	R04	R05	R06	R07
R08	R09	R10	R11	R12	R13	R14	R15	R16	R18	R19	R20	R21	R22	R23	R24	R25	R26	R27	R28	R31	R40	RD2	RMC	RP2	RR2
RTV	S01	S02	S03	S04	S05	S06	S07	S09	S10	S11	S12	S13	S14	S15	S18	S19	S20	S21	S22	S23	S24	S25	S26	S27	S28
S29	S30	T01	V12	V22	V23	W01	W02	W03	W04	W05	W06	W07	W08	W09	W10	W11									

Vocabulary collection selector; hover on the coloured cells to see the collection's title and click to select. Note that the codes and the colours have no meaning but related vocabularies tend to be given a code starting with the same letter.

### Search for a term across vocabulary collections

Enter search string

Search

☒ Identifier ☒ Preferred label ☒ Alternative label ☒ Definition ☐ Exact match ☐ Case sensitive

### Search for vocabulary collections

Enter search string using % as wildcard if required. Example: parameter%vocabulary.

Search

☒ Identifier ☒ Title ☒ Short title ☒ Description ☒ Governance ☐ Exact match ☐ Case sensitive

### Explore mappings


Select a vocabulary

Show

# Vocab Tools:

## NVS2 search

### BODC WEBSERVICES V2 (LIBRARIES) CL12

Library	Thesaurus	Title	Alt Title	Version	Members	Modified
<a href="#">A05</a>		AtlantOS Essential Variables	AtlantOS EVs	4	24	3/29/2019 2:01:22 AM
<a href="#">BQ1</a>		EMODnet Bathymetry Quality Indicators of horizontal accuracy (QI_Horizontal)	EMODnet Bathy QI_Horizontal	1	4	7/15/2023 4:00:03 AM
<a href="#">BQ2</a>		EMODnet Bathymetry Quality Indicators of vertical accuracy (QI_Vertical)	EMODnet Bathy QI_Vertical	1	5	7/15/2023 4:00:03 AM
<a href="#">BQ3</a>		EMODnet Bathymetry Quality Indicators of survey purpose (QI_Purpose)	EMODnet Bathy QI_Purpose	1	4	7/15/2023 4:00:03 AM
<a href="#">C16</a>		SeaDataNet sea areas	SDN sea areas	9	127	11/7/2012 2:00:06 AM
<a href="#">C17</a>		ICES Platform Codes	ICES Platforms	1182	13423	11/12/2025 2:00:01 AM
<a href="#">C19</a>		SeaVoX salt and fresh water body gazetteer	SeaVoX water bodies	26	271	8/7/2025 4:00:01 AM
<a href="#">C32</a>		International Standards Organisation countries	ISO countries	10	282	11/18/2020 2:00:03 AM
<a href="#">C34</a>		Activity purpose categories	Purpose categories	4	22	8/27/2011 3:00:05 AM
<a href="#">C35</a>		European Nature Information System Level 3 Habitats	EUNIS3 Habitats	1	56	2/19/2010 2:01:37 AM
<a href="#">C36</a>		Monitoring activity legislative drivers	Monitoring drivers	10	92	4/28/2022 4:00:03 AM
<a href="#">C37</a>		Ten-degree Marsden Squares	Marsden-10	3	612	1/9/2009 2:00:05 AM
<a href="#">C38</a>		SeaDataNet Ports Gazetteer	SeaDataNet Ports	92	4993	8/20/2025 4:00:00 AM
<a href="#">C39</a>		World Meteorological Organisation sea states	WMO sea states	1	10	9/30/2009 3:01:08 AM
<a href="#">C45</a>		Marine Strategy Framework Directive descriptors 2010/477/EU	MSFD descriptors 2010	3	11	2/25/2017 2:00:02 AM
<a href="#">C46</a>		Marine Strategy Framework Directive criteria 2010/477/EU	MSFD criteria 2010	1	29	11/11/2010 2:00:07 AM
<a href="#">C47</a>		Marine Strategy Framework Directive Indicators 2010/477/EU	MSFD indicators 2010	1	56	11/11/2010 2:00:07 AM

# Vocab Tools:

## Vocab Builder

### P01 Physical Entity and Other Parameter Code Builder [help](#)

Preferred label

Bathymetric depth not specified

[show/hide match results](#) | [reset all](#)


Found 29 matches

✓ Select a measurement property

Approved

Select approved concept

Total 184 records found

 The measurement of the depth of a body of water, such as

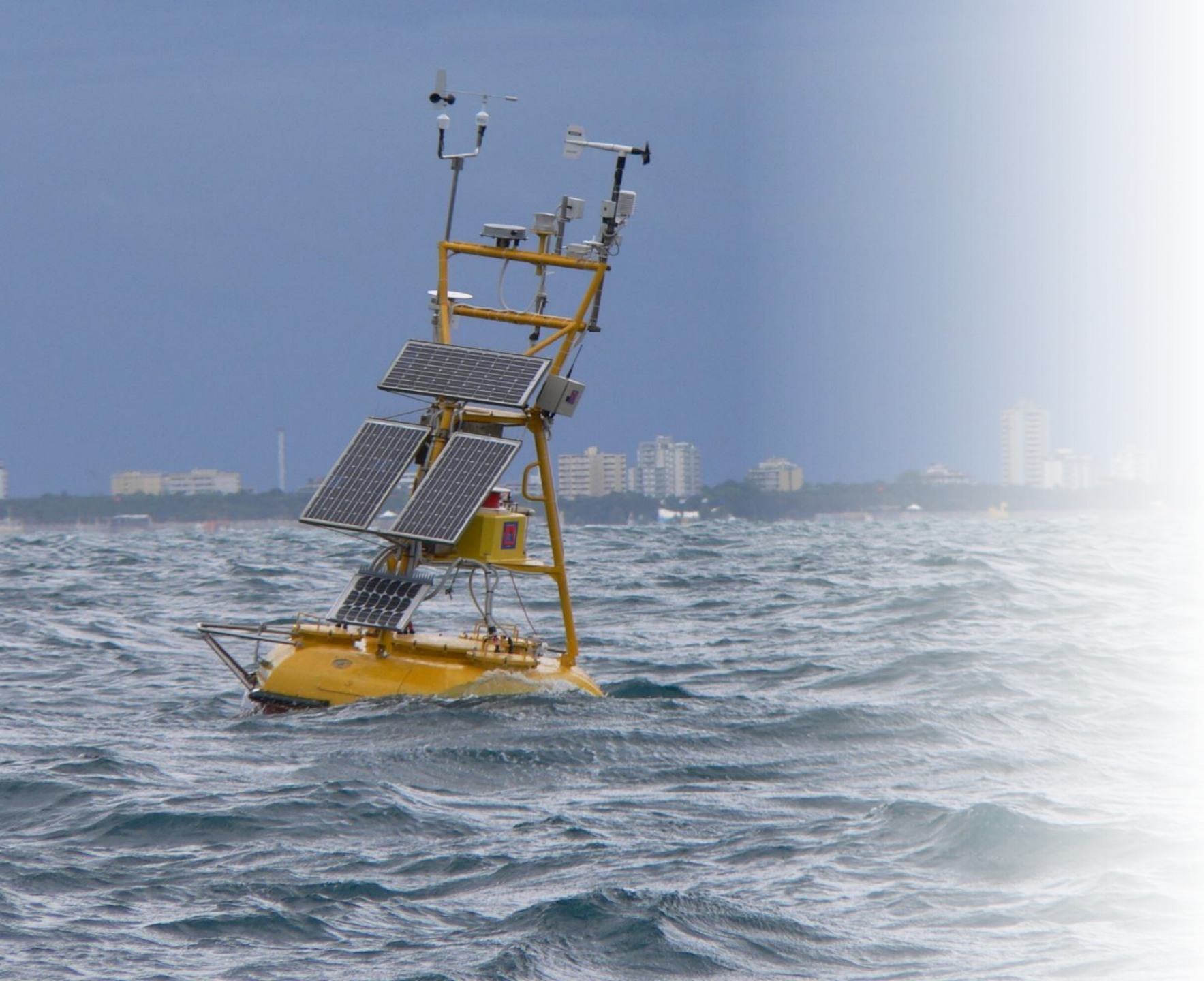
Bathymetric depth

Clear selection

Abundance  
Acceptable proportion  
Accumulation rate  
Activity ratio  
Amplitude

✓ Select a statistical qualifier (if applicable)

Select a physical entity (if applicable)



**Thank you!**



Finanziato  
dall'Unione europea  
NextGenerationEU



Ministero  
dell'Università  
e della Ricerca



Italiadomani  
PIANO NAZIONALE  
DI RIPRESA E RESILIENZA



E-ARGO



CERIC

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- “NFFA-DI cod. IR0000015, Missione 4, “Istruzione e Ricerca” – Componente 2, “Dalla ricerca all'impresa” – Linea di investimento 3.1, “Fondo per la realizzazione di un sistema integrato di infrastrutture di ricerca e innovazione” – Azione 3.1.1, “Creazione di nuove IR o potenziamento di quelle esistenti che concorrono agli obiettivi di Eccellenza Scientifica di Horizon Europe e costituzione di reti” (CUP B53C22004310006).
- “EFC cod. SSU2024-00002, Missione 4 “Istruzione e ricerca” - Componente 1, “Potenziamento dell'offerta dei servizi all'istruzione: dagli asili nido all'università” - Investimento 3.4 “Didattica e competenze universitarie avanzate” - Sub-Investimento “Rafforzamento delle scuole universitarie superiori” (CUP: G97G24000100007).