# STATO DI AVANZAMENTO DELLE ATTIVITÀ MODELLISTICHE

(State of progress of modeling activities)

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Internal meeting | Palmanova | $12^{th}$ October 2022

# Table of contents:

- ❑ Description of analysis-flow for SHYFEM simulations and related outputs
- ❑ BUFR: archiviation of in-situ buoy measures
- ❑ Buoys Data graph visualisation
- ❑Further developments

# Data Analysis

**Initialization file:**
- Nodes' Name
- Serial code analysed
- Time Period analysed

**Initialization file:**
- Statistical index
- Physical quantity

**Initialization file:**
- Plot type

SHYFEM simulations database

Data Extraction

Data Analysis

Graph realization & CSV archiviation

ecflow suite


AdriaClim Web-Page

CSV file archive

Interreg Italy - Croatia AdriaClim European Regional Development Fund

EUROPEAN UNION

ARPA FVG Agenzia Regionale per la Protezione dell'Ambiente del Friuli Venezia Giulia

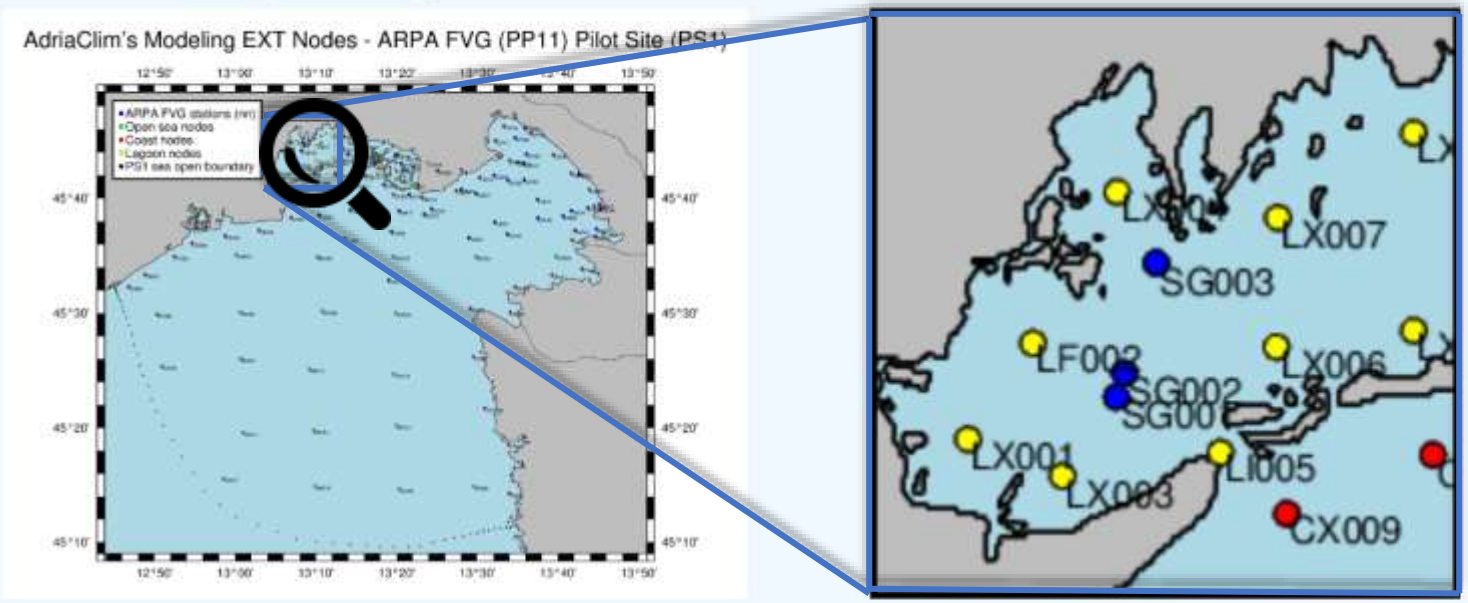
# SHYFEM BENCHMARK comparison

Interreg IT-HR AdriaClim @ ARPA FVG - CRMA

**For more informations about monitored points:** Monitored points coordinates

: RCP 2.6 : RCP 4.5 : RCP 8.5

118 analyzed nodes map:

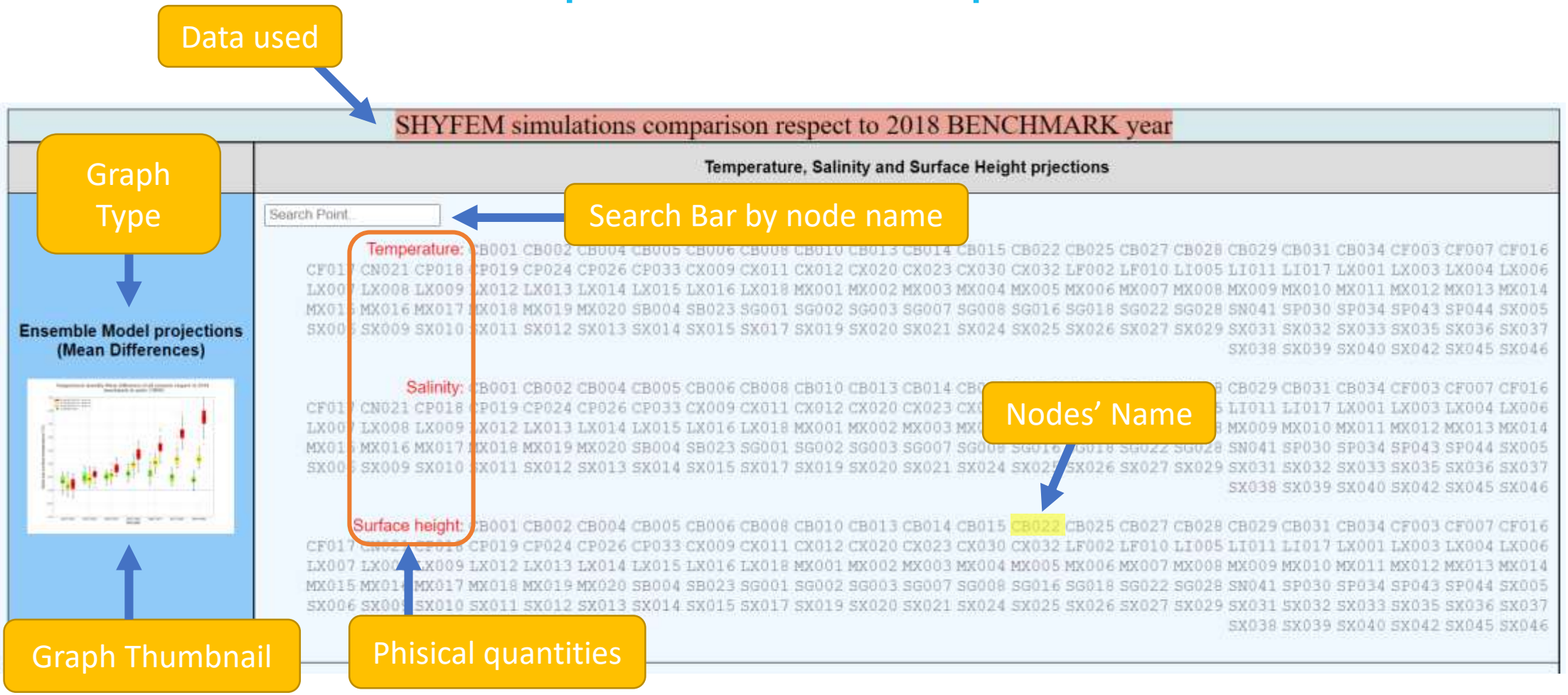



Graph Table

SHYFEM simulations comparison respect to 2018 BENCHMARK year

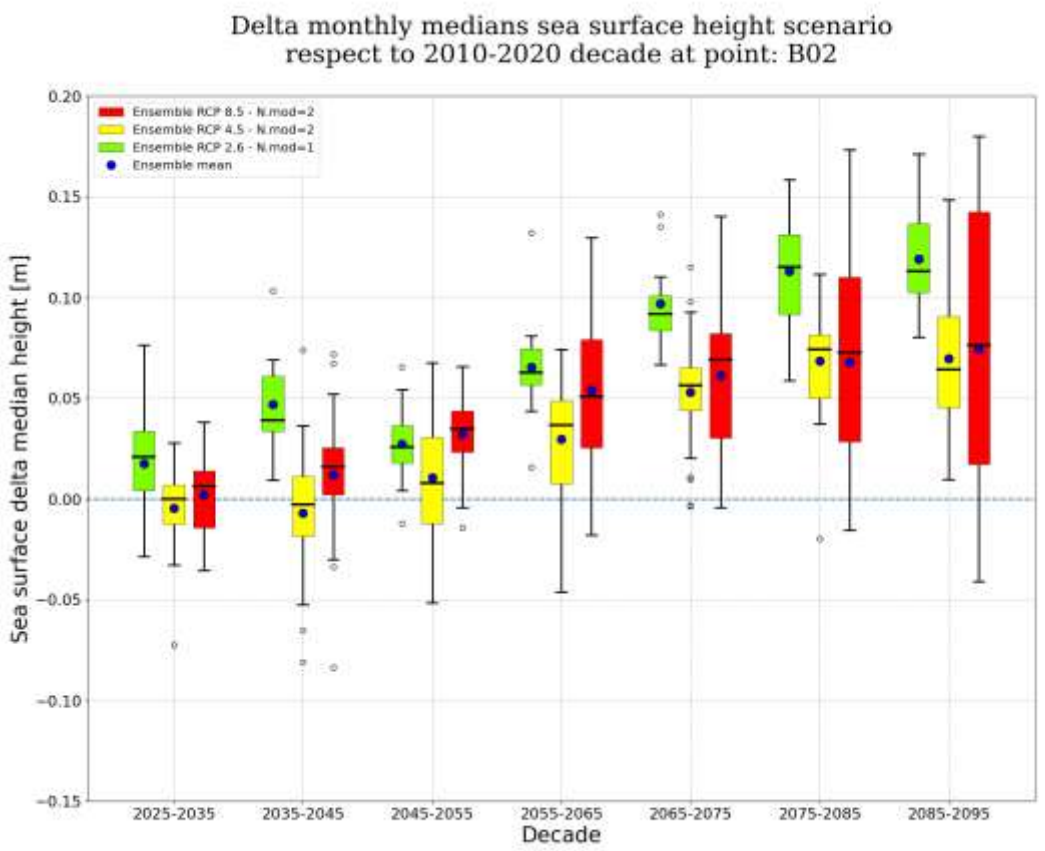
| Graphic | Temperature, Salinity and Surface Height prjections |
|---|---|

# Graph Table description

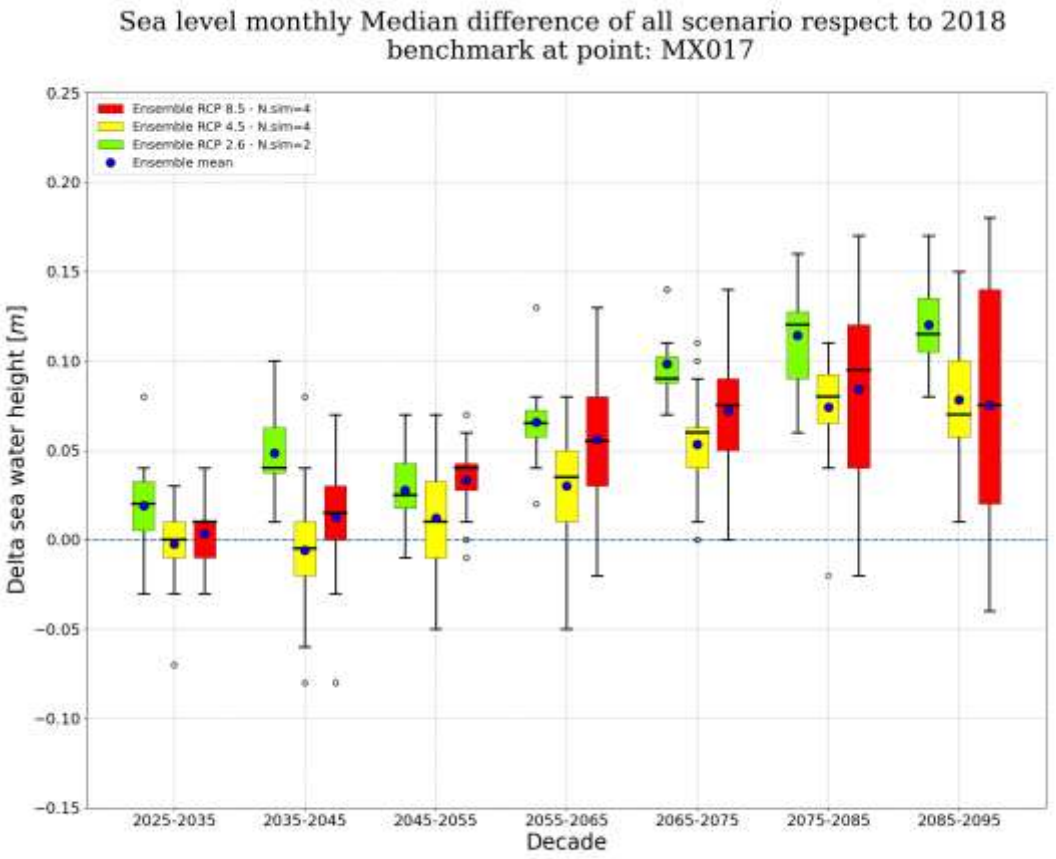


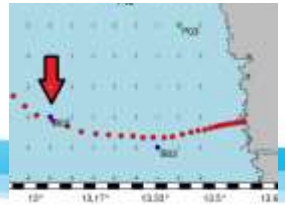
# Boxplots Delta Monthly Median Temperature, Salinity and Sea level height

Med-CORDEX data

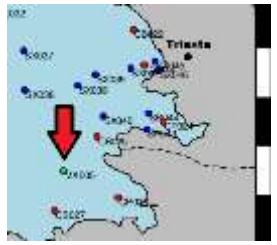



SHYFEM simulation

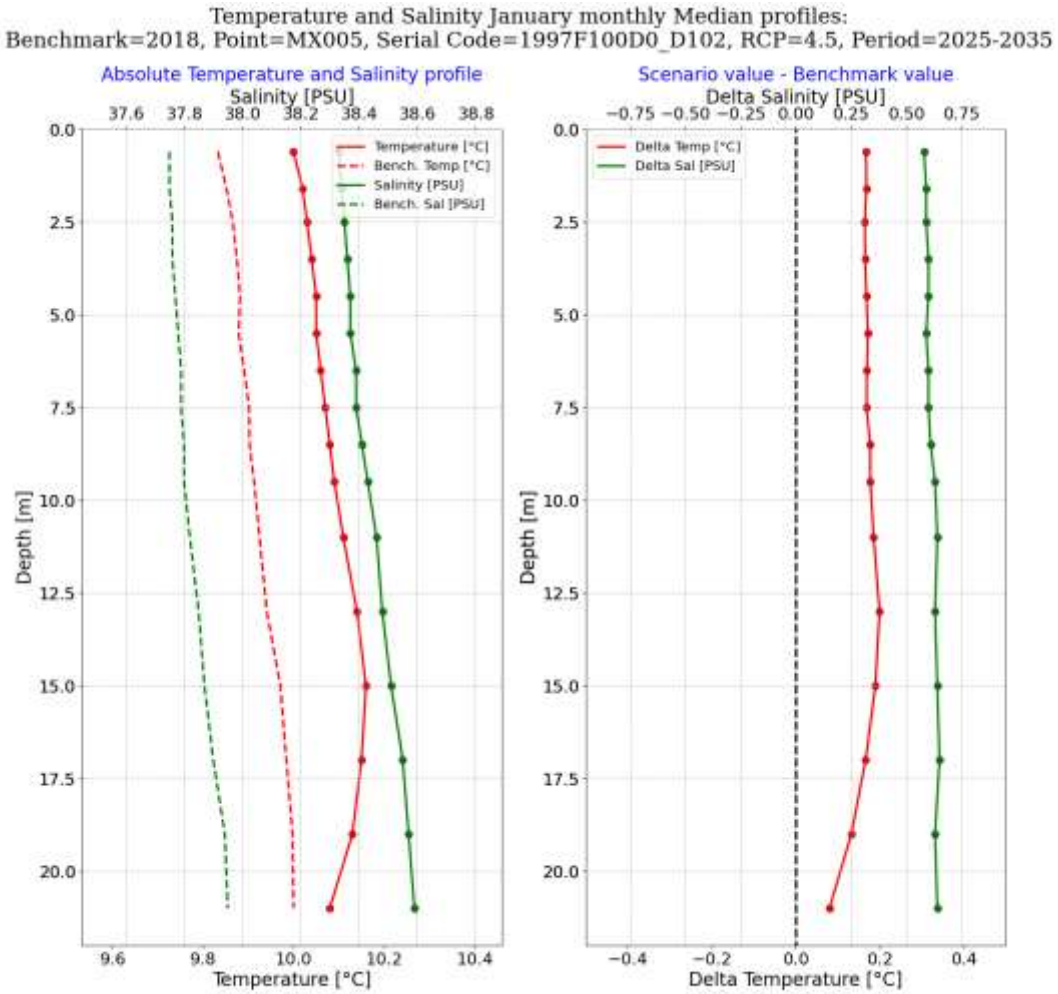


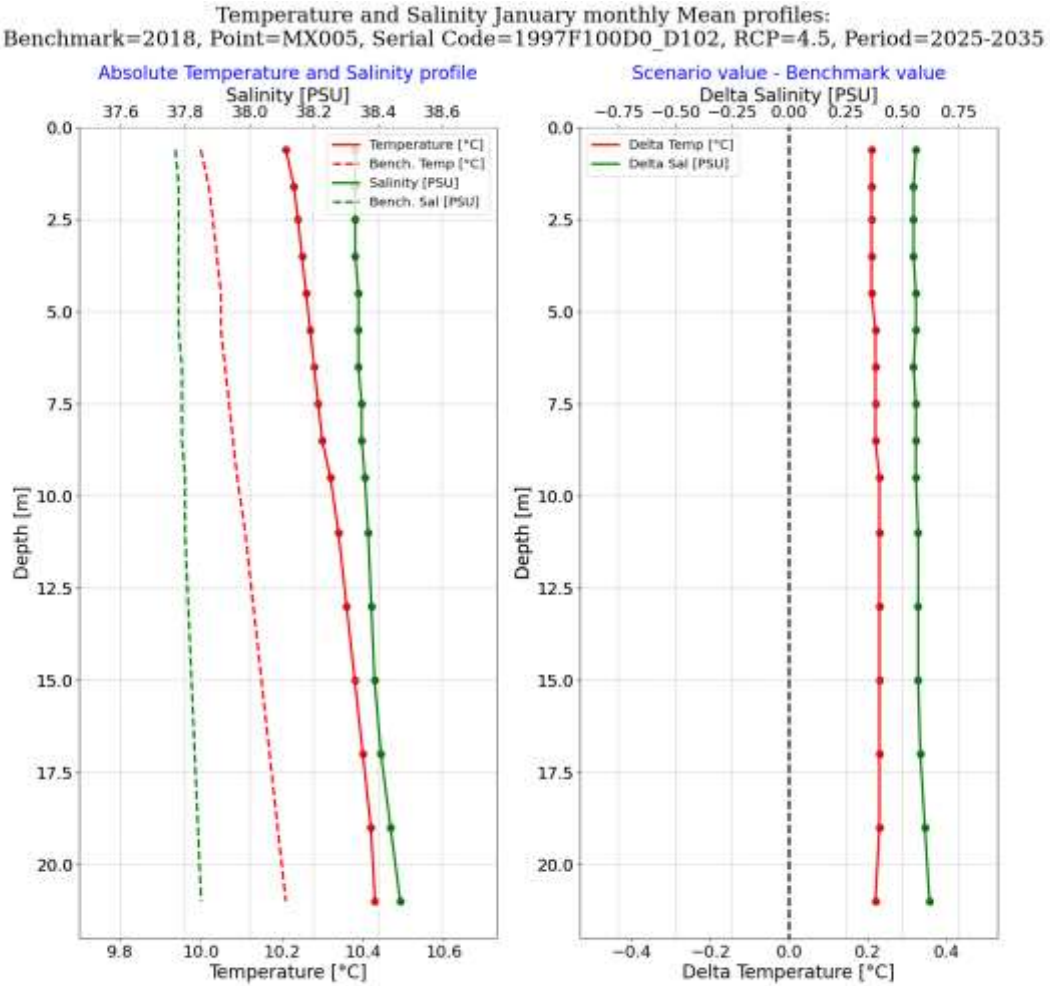



# Temperature-Salinity profiles




*Nodes available*: MX015 SX014 LX007 SG018 SX026 MX005 CX032
*Months available:* Jan, Apr, Jul, Oct

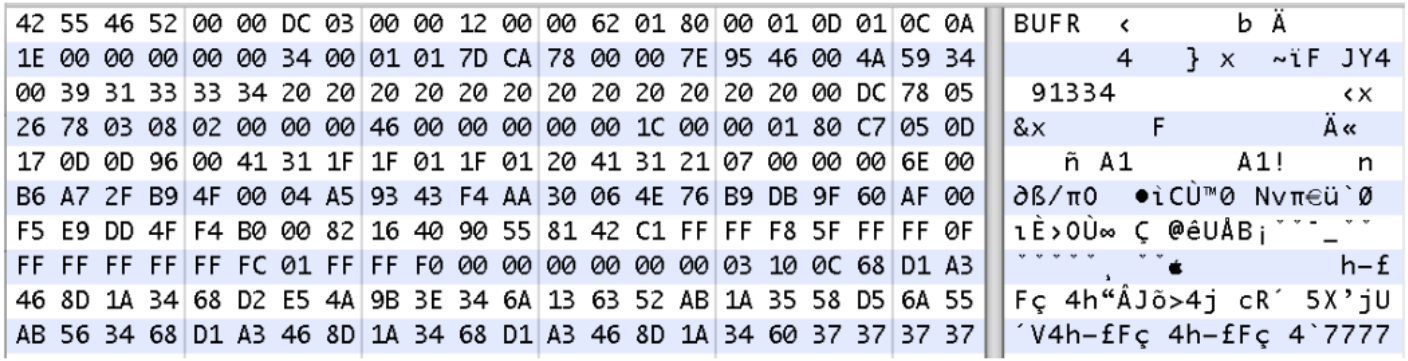


# BUFR format

**BUFR**=(**B**inary **U**niversal **F**orm for the **R**epresentation of meteorological data)

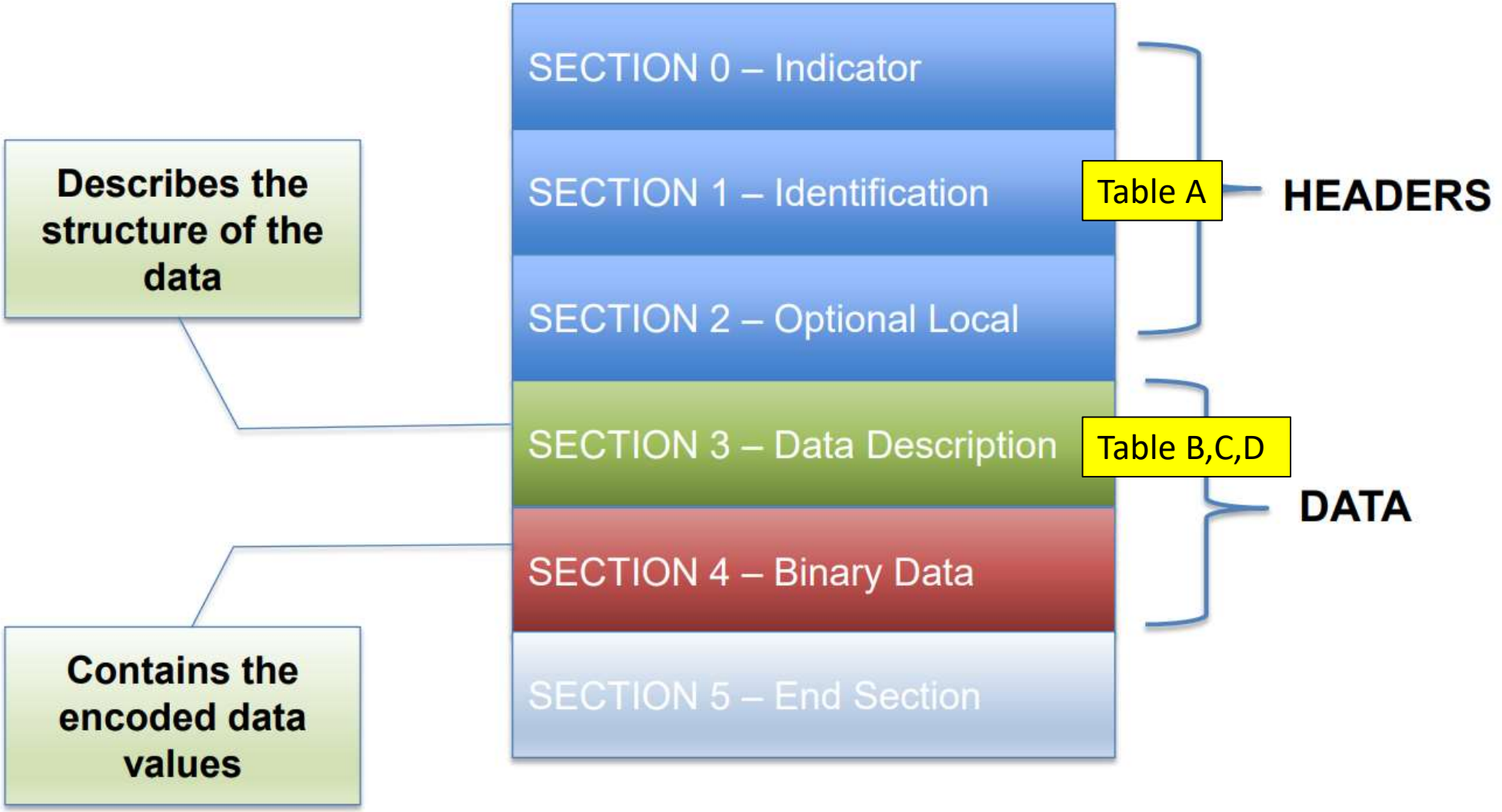
- Flexible binary format
- Fast in Reading and Writing
- Mainly used to encode in-situ and satellite observations
- Can also represent forecast data
- Low memory occupation



| | | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 42 | 55 | 46 | 52 | 00 | 00 | DC | 03 | 00 | 00 | 12 | 00 | 00 | 62 | 01 | 80 | 00 | 01 | 0D | 01 | 0C | 0A |
| 1E | 00 | 00 | 00 | 00 | 00 | 34 | 00 | 01 | 01 | 7D | CA | 78 | 00 | 00 | 7E | 95 | 46 | 00 | 4A | 59 | 34 |
| 00 | 39 | 31 | 33 | 33 | 34 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 20 | 00 | DC | 78 | 05 |
| 26 | 78 | 03 | 08 | 02 | 00 | 00 | 00 | 46 | 00 | 00 | 00 | 00 | 00 | 1C | 00 | 00 | 01 | 80 | C7 | 05 | 0D |
| 17 | 0D | 0D | 96 | 00 | 41 | 31 | 1F | 1F | 01 | 1F | 01 | 20 | 41 | 31 | 21 | 07 | 00 | 00 | 00 | 6E | 00 |
| B6 | A7 | 2F | B9 | 4F | 00 | 04 | A5 | 93 | 43 | F4 | AA | 30 | 06 | 4E | 76 | B9 | DB | 9F | 60 | AF | 00 |
| F5 | E9 | DD | 4F | F4 | B0 | 00 | 82 | 16 | 40 | 90 | 55 | 81 | 42 | C1 | FF | FF | F8 | 5F | FF | FF | 0F |
| FF | FF | FF | FF | FF | FC | 01 | FF | FF | F0 | 00 | 00 | 00 | 00 | 00 | 00 | 03 | 10 | 0C | 68 | D1 | A3 |
| 46 | 8D | 1A | 34 | 68 | D2 | E5 | 4A | 9B | 3E | 34 | 6A | 13 | 63 | 52 | AB | 1A | 35 | 58 | D5 | 6A | 55 |
| AB | 56 | 34 | 68 | D1 | A3 | 46 | 8D | 1A | 34 | 68 | D1 | A3 | 46 | 8D | 1A | 34 | 60 | 37 | 37 | 37 | 37 |

Documentation:
https://confluence.ecmwf.int/display/ECC/Documentation
https://apps.ecmwf.int/codes/bufr/validator/
https://community.wmo.int/activity-areas/wmo-codes/manual-codes/bufr-edition-3-and-crex-edition-1

# BUFR structure



# BUFR handling

European Centre for Medium-Range Weather Forecasts

**ecCodes** is a package developed by ECMWF which provides an application programming interface and a set of tools for decoding and encoding messages in the following BUFR formats:
WMO FM-94 **BUFR** edition 3 and edition 4

https://confluence.ecmwf.int/display/ECC/ecCodes+Home

A useful set of command line tools provide quick access to the messages.

bufr_compare
bufr_copy
bufr_count
bufr_dump
…

https://confluence.ecmwf.int/display/ECC/BUFR+tools

C, Fortran 90 and Python interfaces provide access to the main ecCodes functionality.

eccodes Python module.

Documentation: http://download.ecmwf.int/test-data/eccodes/html/namespaceec_codes.html

# Buoy Data encoding

csv and xml data format

**cortek**

**Buoys measures:**

- Alimentazione [V]
- Temp interna strumento [°C]
- Temp acqua [°C]
- Conducibilità spec a 25°C [mS/cm]
- Salinità [PSU]
- Torbodity [NTU]
- Profondità [m]

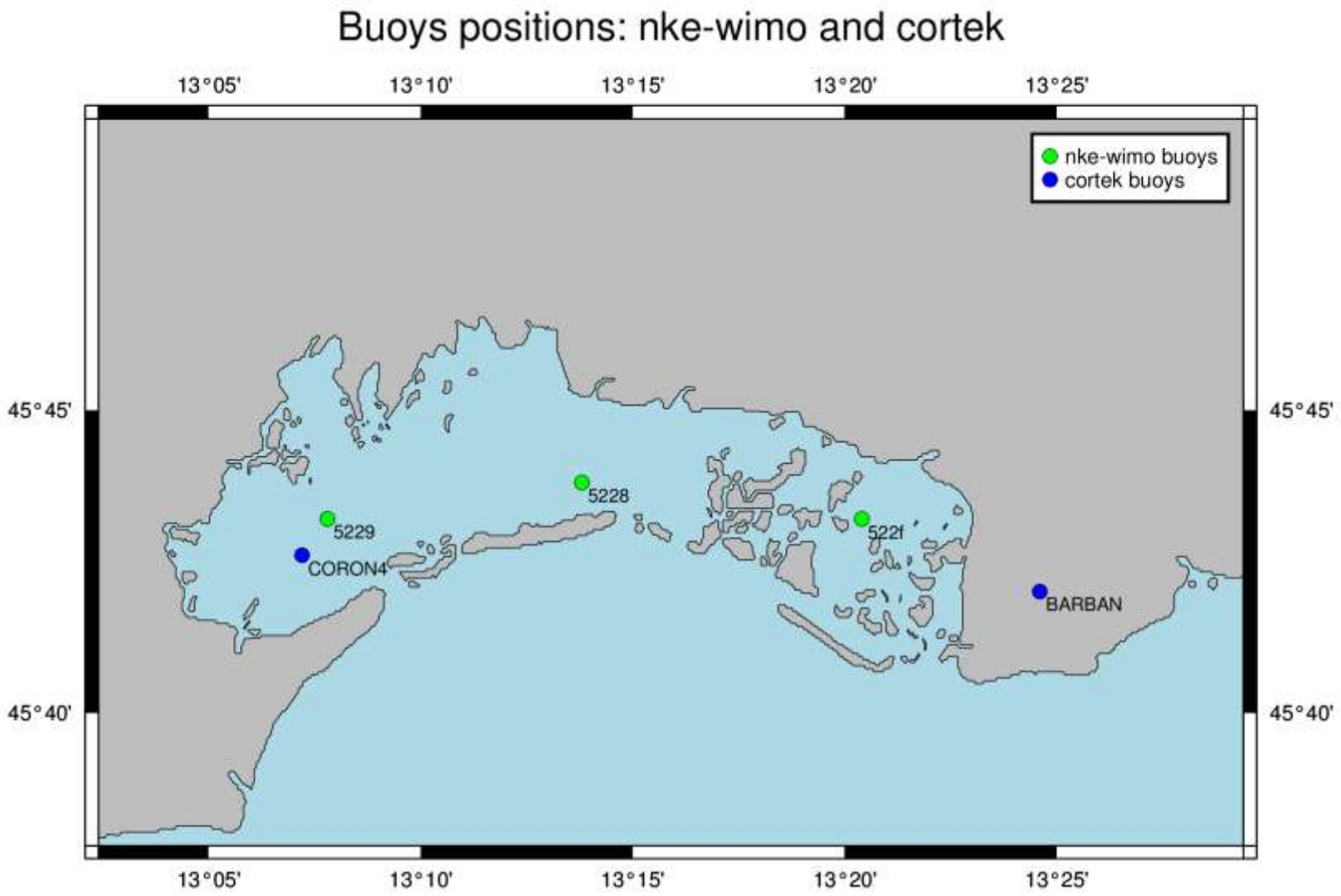
**nke-wimo**

**Buoys measure**

- Pressione [dbar]
- Conducibilità spec [mS/cm]
- Temperatura acqua [°C]
- Concentrazione Ossigeno [mg/L]
- Saturazione ossigeno [%]
- pH [pH]
- Salinità [PSU]
- Profondità [m]

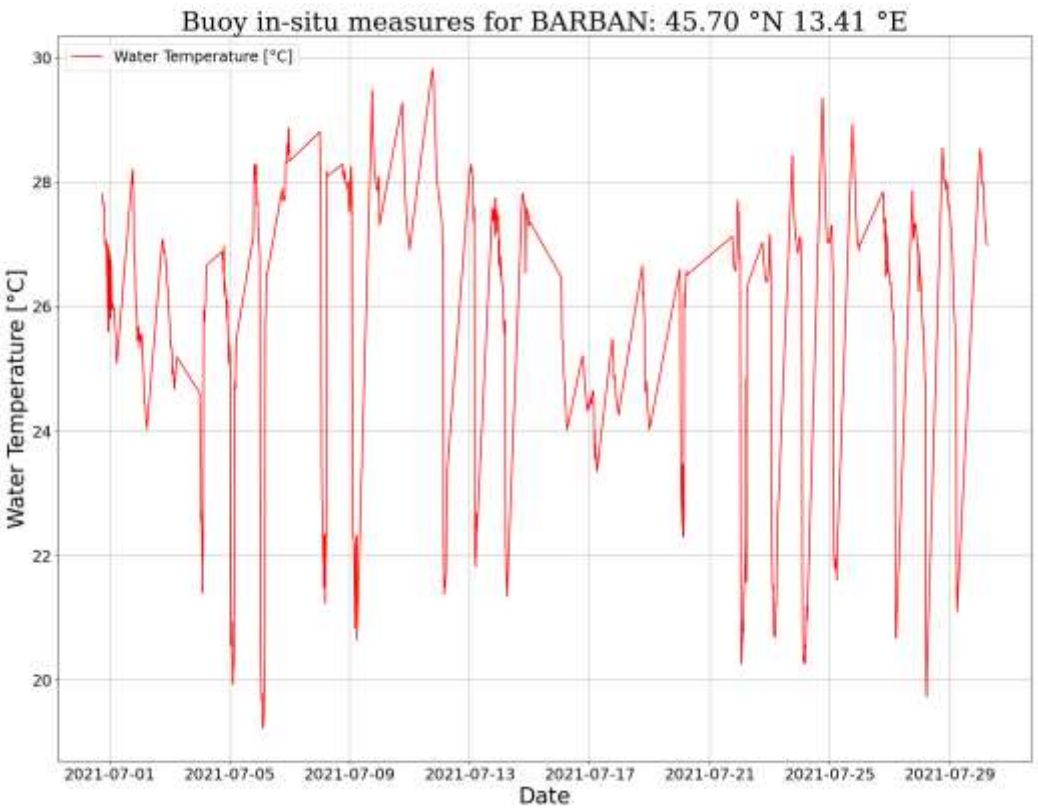
Download last 10 days → BUFR encoding process → Archiviation

# Buoys positions

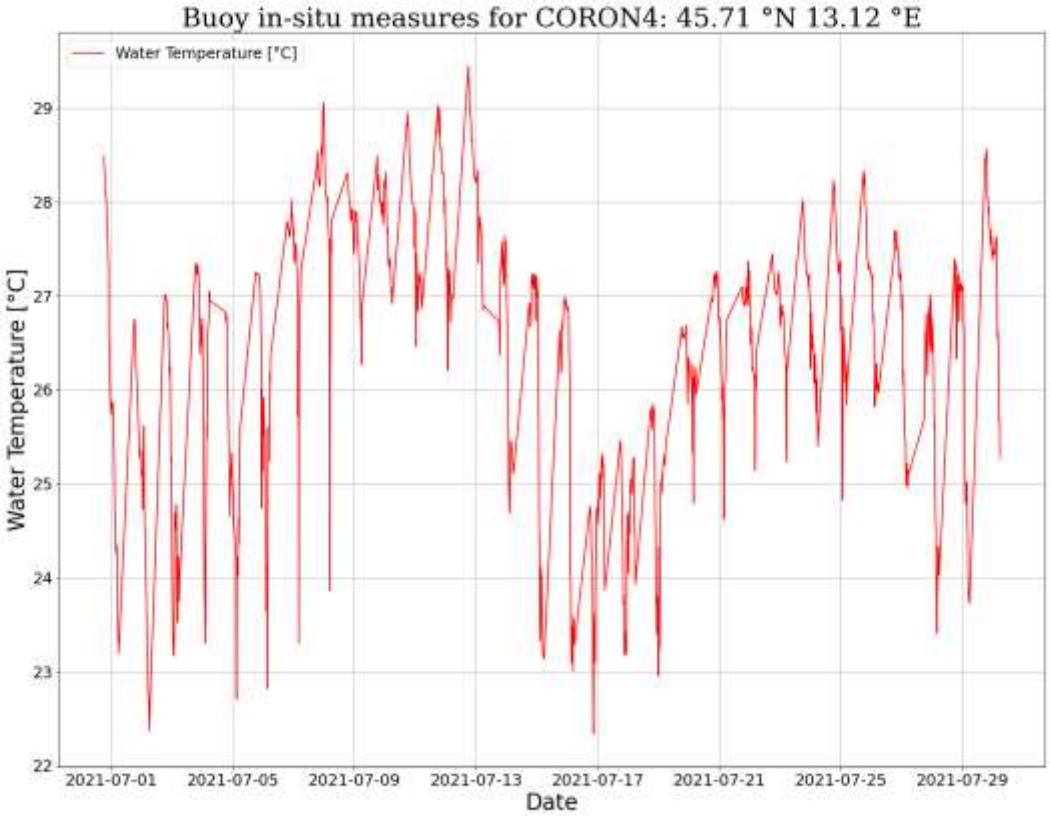


# Buoys data time series

*BARBAN*




*CORON4*



# Foreseen next activities and further developments:

- Implementation of an ecflow suite for buoy data conversion into BUFR files
- Creation of a web-page for buoy-graphs sharing
- SHYFEM simulations by CMCC's boundary conditions RCP 8.5 (2006-2050)

# CONTACT INFORMATION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