Copernicus Marine Service

EU Coastal Use Cases Workshop

September 16, 2024

The e3HOPE Forecasting Service: Supporting Aquaculture Management & biodiversity preservation in Ebro Delta.

Author(s): Marcos G. Sotillo[1], Marc Mestres[2], Margarita Fernández[3], Tania López[1], Marta Balsells[2], José Maria Valdecasas[1], Óscar Ballesteros[1], Manel Grifoll[2], Ernesto Bielsa[1], Manuel García-León[1], Manuel Espino[2]

Affiliation: 1) **NOW Systems** 2) **LIM/UPC** 3) **IRTA**

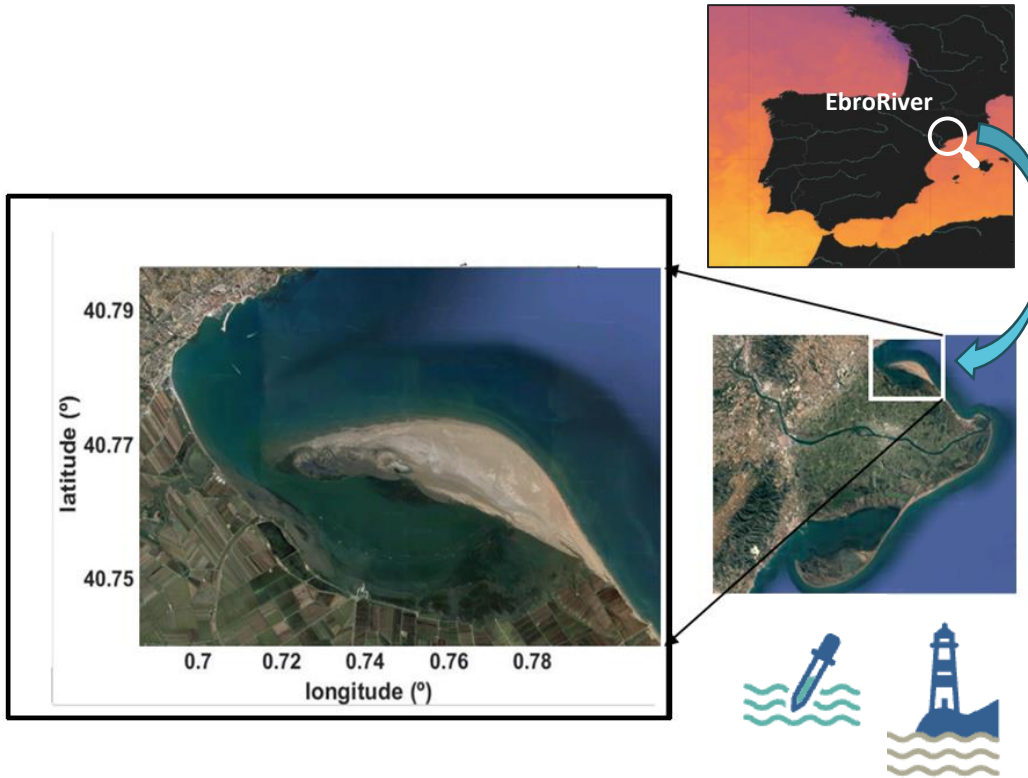
PROGRAMME OF THE EUROPEAN UNION

Copernicus Europe's eyes on Earth

implemented by MERCATOR OCEAN INTERNATIONAL

e3HOPE Project in a nutshell

- e3HOPE improves coastal operational ocean forecasting in the Ebro Delta.
  - Proposing a **Downstreaming Copernicus** Marine MED-MFC regional Forecast product.
  - **Improving model** (using an ocean-wave coupled) and **operational capacity** (achieving level 2).
  - Adding a User Interface layer: **NAUI Application**
- Special Focus on the Delta inner semi-enclosed bays.
  - **Fangar Bay** (daily forecast @ 70 m resolution)
- to support environmental protection and aquaculture management in such hot spot.
  - Highest **aquaculture (mussel) production** in Med Spanish Coast.



Consortium

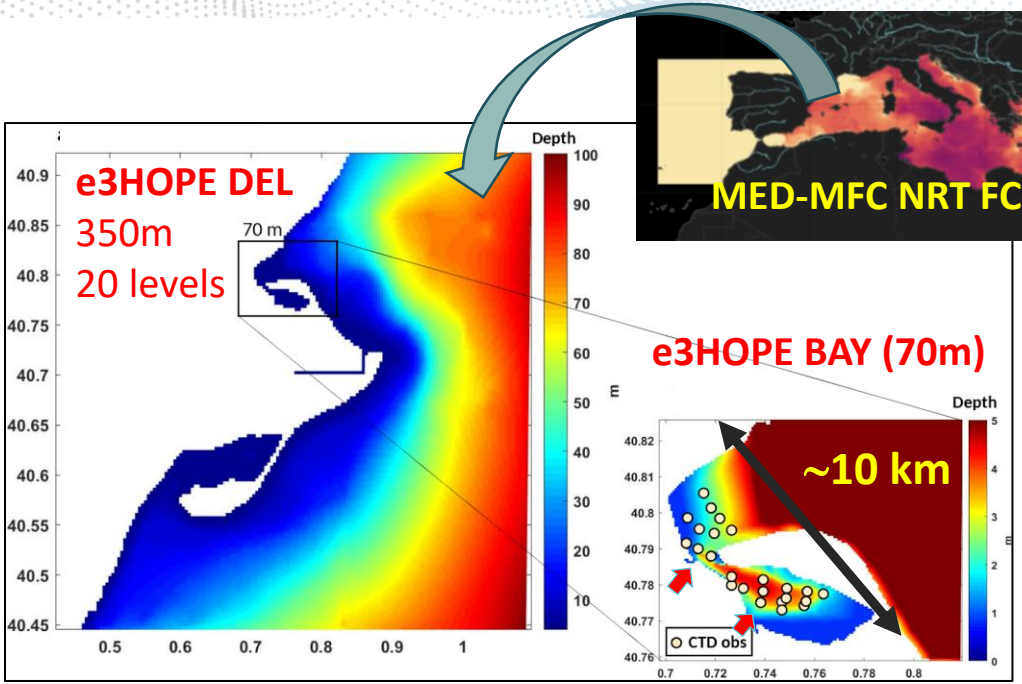
A quite Complementary Partnership!

- **IRTA**. Public institution. Stakeholder & Focal Point for Local Users
  - Monitoring & Research activity in the zone

- **LIM/UPC**. Academia. Scientific knowledge
  - Modelling experience in the area

- **NOW Systems.** SME. Service Provider **[Coordinator]**
  - Operational Services (inc. Models & User Applications –NAUI-).

Copernicus Marine Products and Coastal model



Previous studies in the area: *Cerralbo et al. (2015, 2016), Grifoll et al. (2016, 2019), F-Pedrera et al. (2020,2021)*

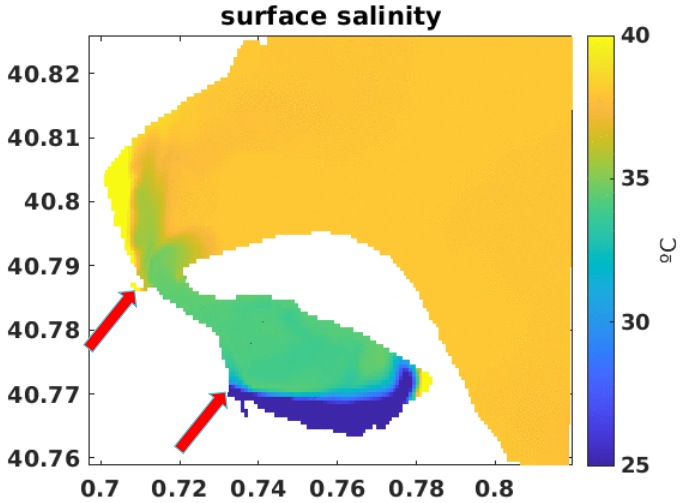
Operational Coastal Downscaling

- Daily Forecast (+3Days)
- COASWST Coupled wave-current (ROMS&SWAM)
- Nested in CMS MED-MFC
- hourly ATM forcing (GFS; Harmonie –V2-)
- Freshwater inputs: Ebro River + canals (NRT obs).

Model Qualification

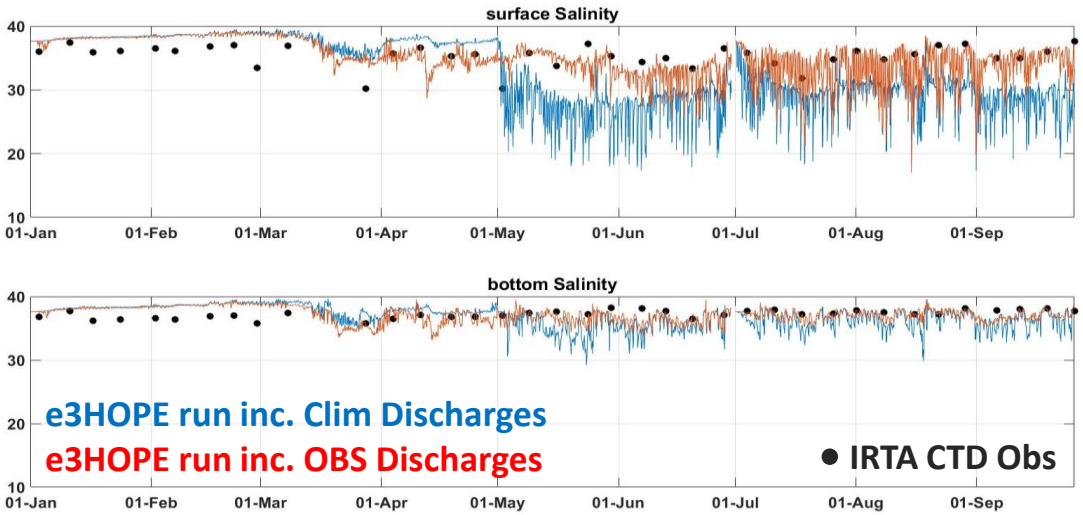
- In situ (CTDs from IRTA, INSTAC, local campaigns)
- Satellite (CMS SSTTAC, OCTAC)
- Model intercomparison (CMS MED-MFC & IBI-MFC).

Seamless Coastal Marine Service

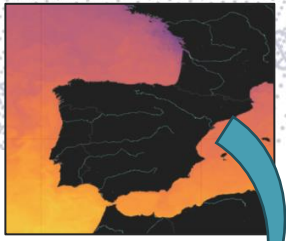


Freshwater discharges to the Bay from drainage canals (agriculture -rice crops-).
NRT Obs data provided by Conferencia Hidrográfica Ebro (CHE).

Significant Benefit by using realistic river freshwater discharges as forcing.



e3HOPE: Seamless Coastal Marine Service in support of aquaculture and biodiversity protection.



e3HOPE Use Cases,
contributing to:

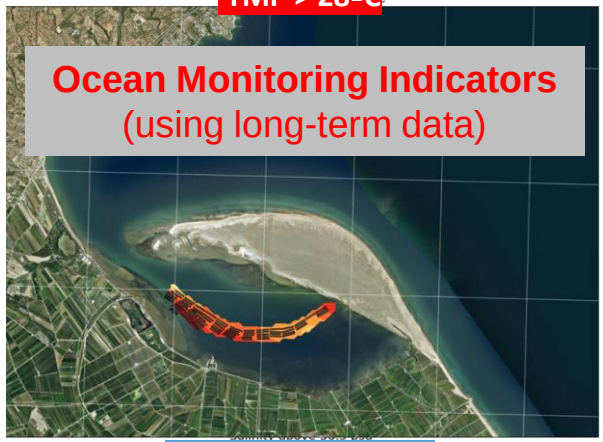
- **characterize suit habitat conditions for Pinna Nobilis**
  - endangered Med species in the Bay.
  - Identification (/Frequency) of unfavorable conditions (**related to salinity**).
- **Local Forecasting of high temperatures.**
  - High temperatures: major **risk for mussel farming**.
  - Summer 2022: significant local economic losses (~1.5 M€), related to high temp (**MHW**).

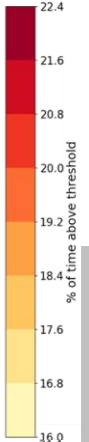
e3HOPE: Seamless Coastal Marine Service in support of acquaculture and biodiversity protection.

Copernicus Marine Service

TMP > 28ºC

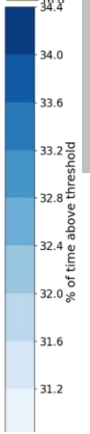
Ocean Monitoring Indicators
(using long-term data)





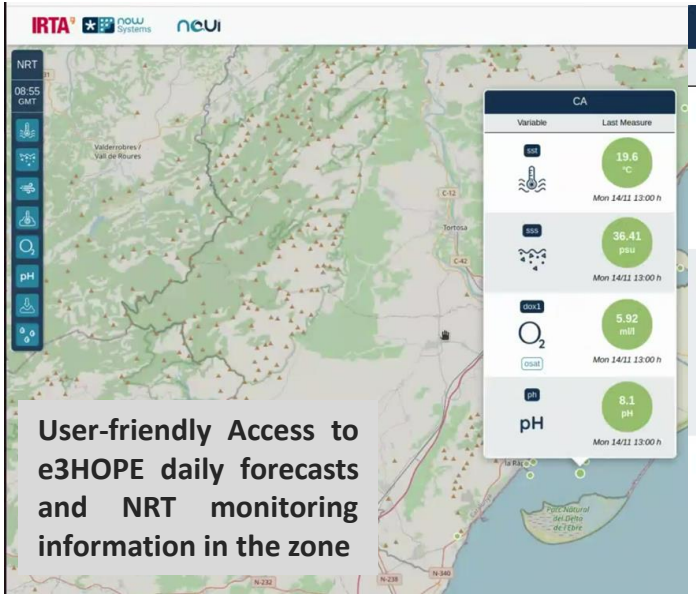
SALINITY > 36.5 psu

Source: e3HOPE 2022 data



% of time above thresholds

Service Platform using NAUI
(co-designed with stakeholders)



User-friendly Access to e3HOPE daily forecasts and NRT monitoring information in the zone

Early Warning System
(linked to e3HOPE FCs)

E OF EAN UNION

Copernicus Europe's eyes on Earth

implemented by MERCATOR OCEAN INTERNATIONAL

The e3HOPE Service today (& Service Evolution)

- e3HOPE ensures an Operational Coastal Forecast capability (daily running) for the Ebro Delta.
- With a new NAUI Service Platform to access forecasting (& monitoring) data.
- IRTA, the Key stakeholder, already using the e3HOPE tools and products.
- Extending e3HOPE uses among the local community.
  - Series of Stakeholders meetings on-going (next month, last meeting within the Project).
- Very good feedback from users
  - asking for more e3HOPE functionalities (i.e., HABs, beach management, BGC) to face local challenges.