

INTEGRATED STUDIES FROM GLIDER AND MULTIPLATFORM OBSERVATIONS IN THE SE BAY OF BISCAY

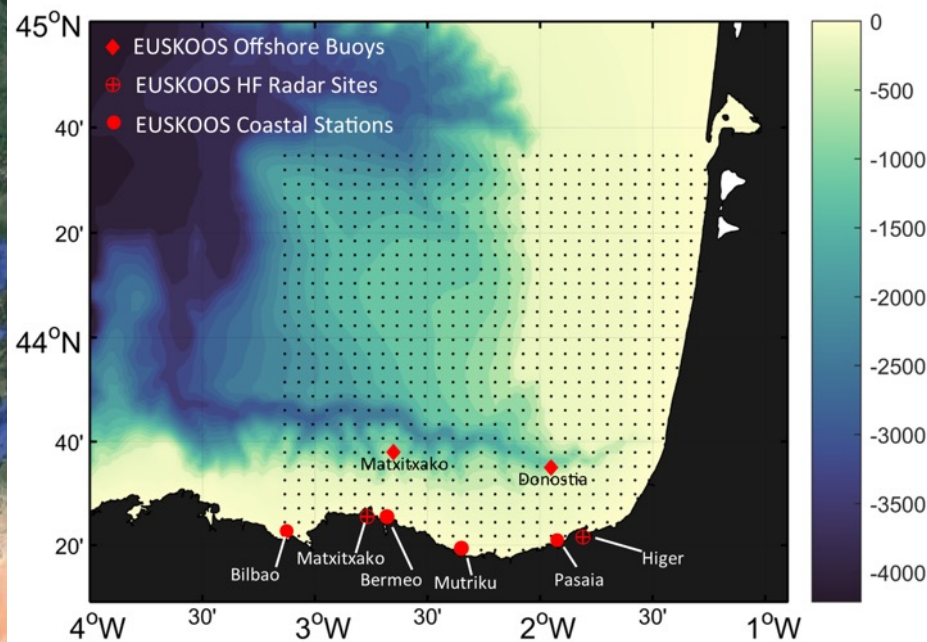
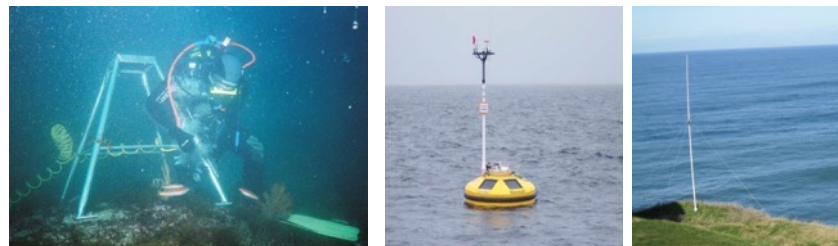
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INTRODUCTION

Pasaia Glider Port



2 SEAEXPLORER GLIDERS (2021 and 2024)

3 PAYLOADS



PAYLOAD 1

- CTD (RBRlegato3)
- Scientific **Echosounder** (Imagenex ES853)

PAYLOAD 2

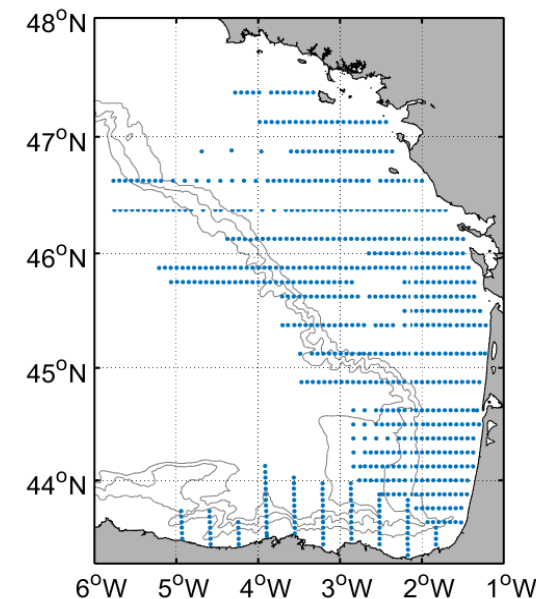
- CTD (RBRlegato3)
- **Dissolved Oxygen** (RBRcoda T.ODO.)
- **Chlorophyll-a @470/695nm + Turbidity @700nm + CDOM @370/460nm** WETLabs ECO Puck FLBB CD
- **Nitrates** (DeepSuna Sea-Bird)

PAYLOAD 3

- CTD (RBRlegato3)
- **Dissolved Oxygen** (RBRcoda T.ODO.)
- **Chlorophyll-a @470/695nm + Turbidity @700nm + CDOM @370/460nm** WETLabs ECO Puck FLBB CD

JUVENA 2022

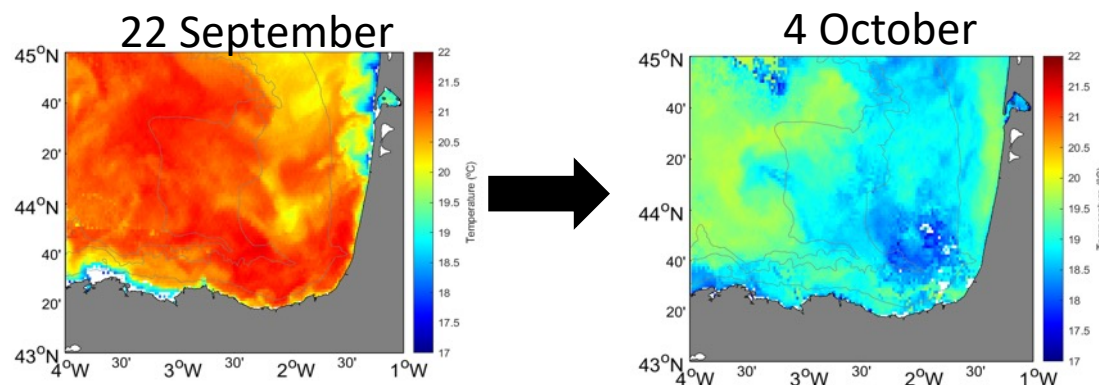
- From September 23 to October 13 (2022)
- Aimed to monitor the migration patterns of European anchovy juveniles
- Transects perpendicular to the coast covering: shelf-break, slope and open ocean
- Concurrent with the yearly JUVENA vessel survey
- Nose with CTD + Echosounder



The mission coincided with a 5-day storm: 26-30 September

SURFACE

- Cooling of the SST
- Strong NW winds (max values over 50 km/h)
- Currents transported towards the coast (max values over 60 cm/s)

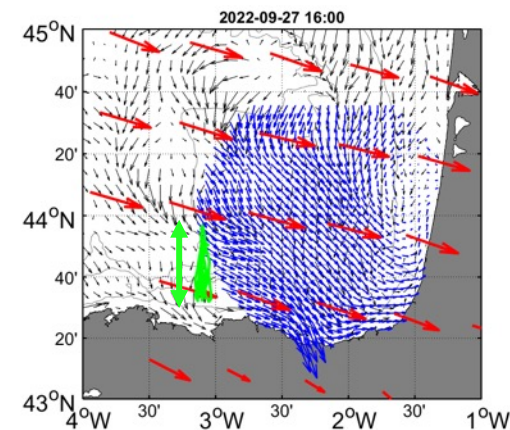


Wind (MeteoGalicia)

HFR (AZTI)

IBI (CMEMS)

Glider (AZTI)



JUVENA 2022

WATER COLUMN

Temperature

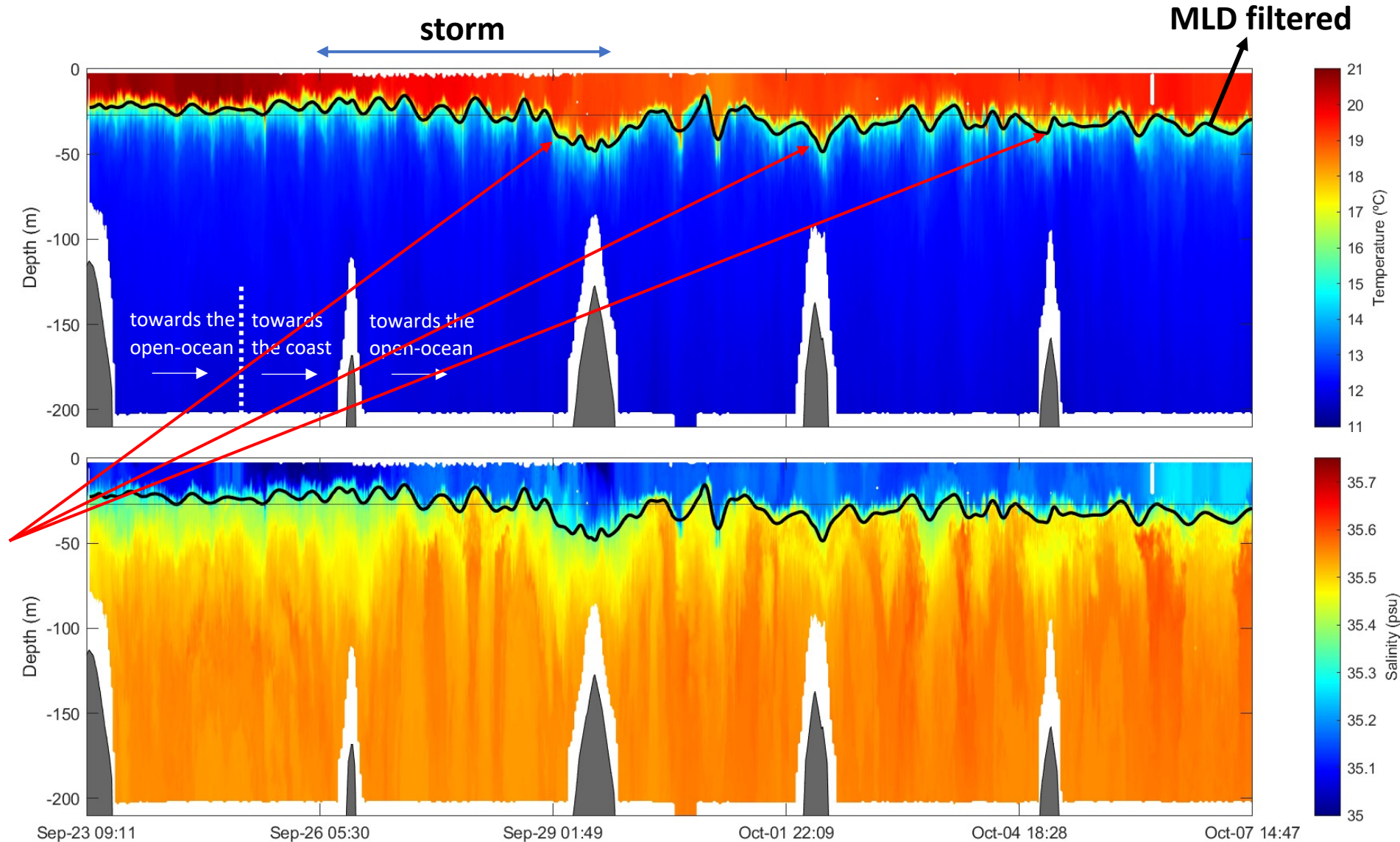
- Surface waters cool

Salinity

- Low values close to the coast during the storm

Downwelling (DOW)

- Downlift of water masses close to the coast
- Relaxation in time



JUVENA 2022

DOW

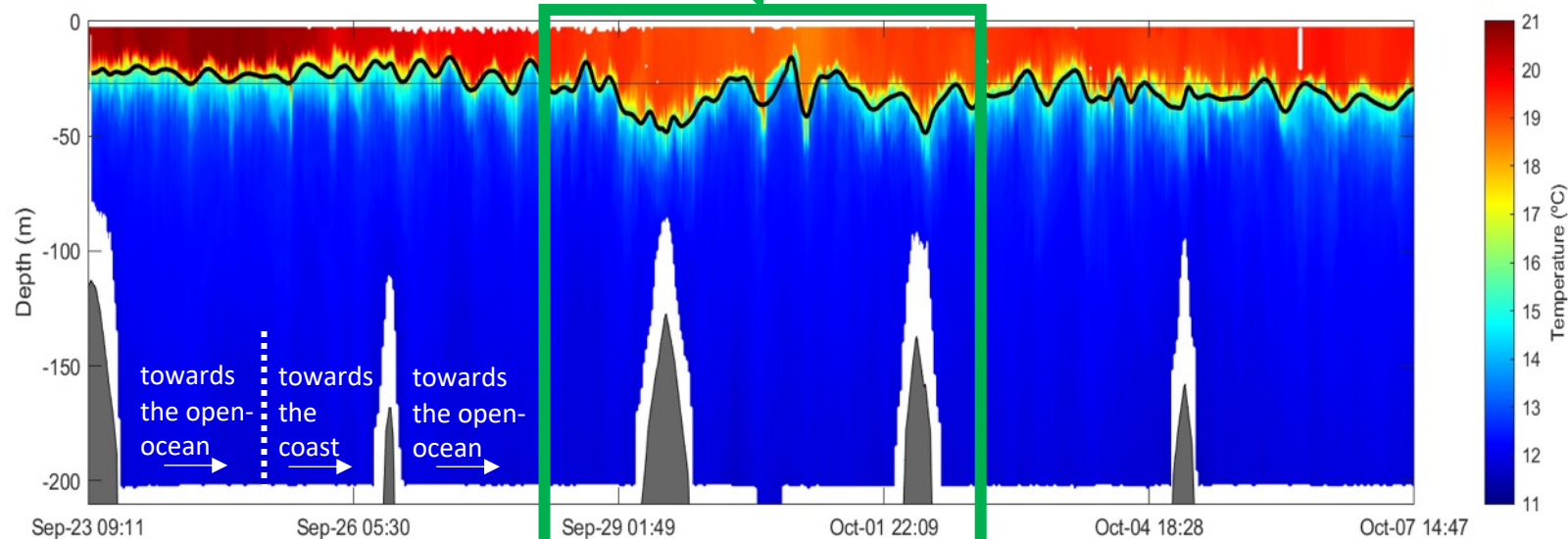
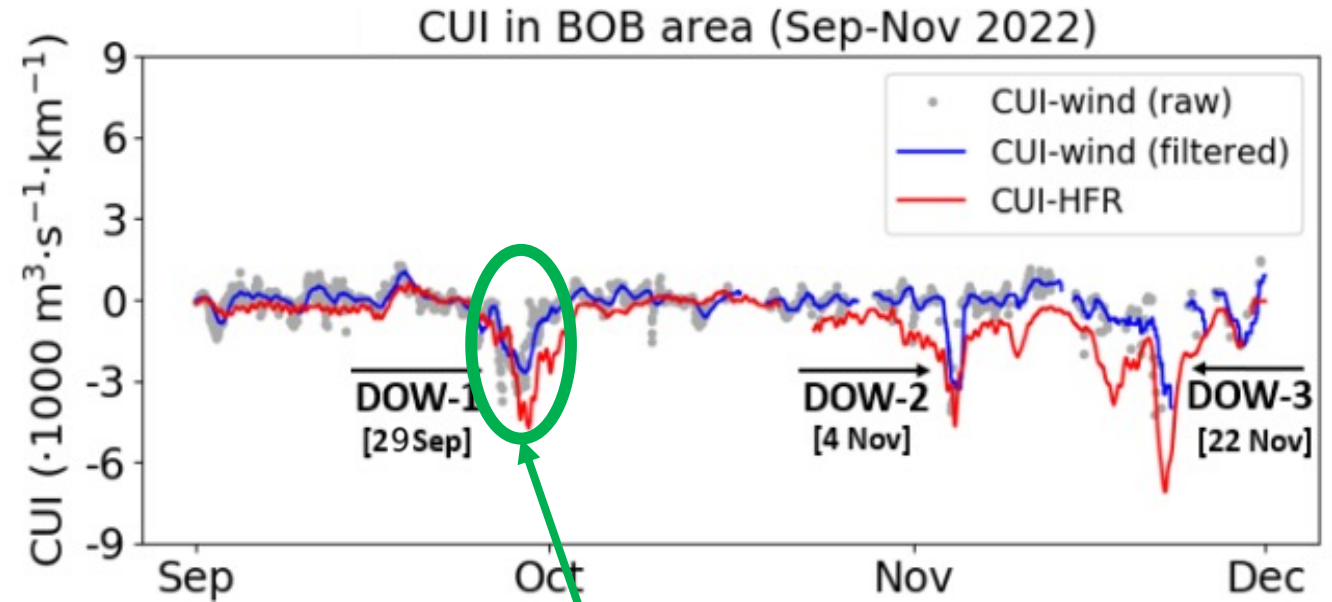
DOW detected by coastal upwelling indexes (CUIs) (Lorente et al., 2023):

- Estimated based on:
 - Hourly Wind data (Bilbao-Vizcaya buoy)
 - Hourly HFR surface current data
- Negative values depict downwelling

Maximum DOW value
obtained on 29 September



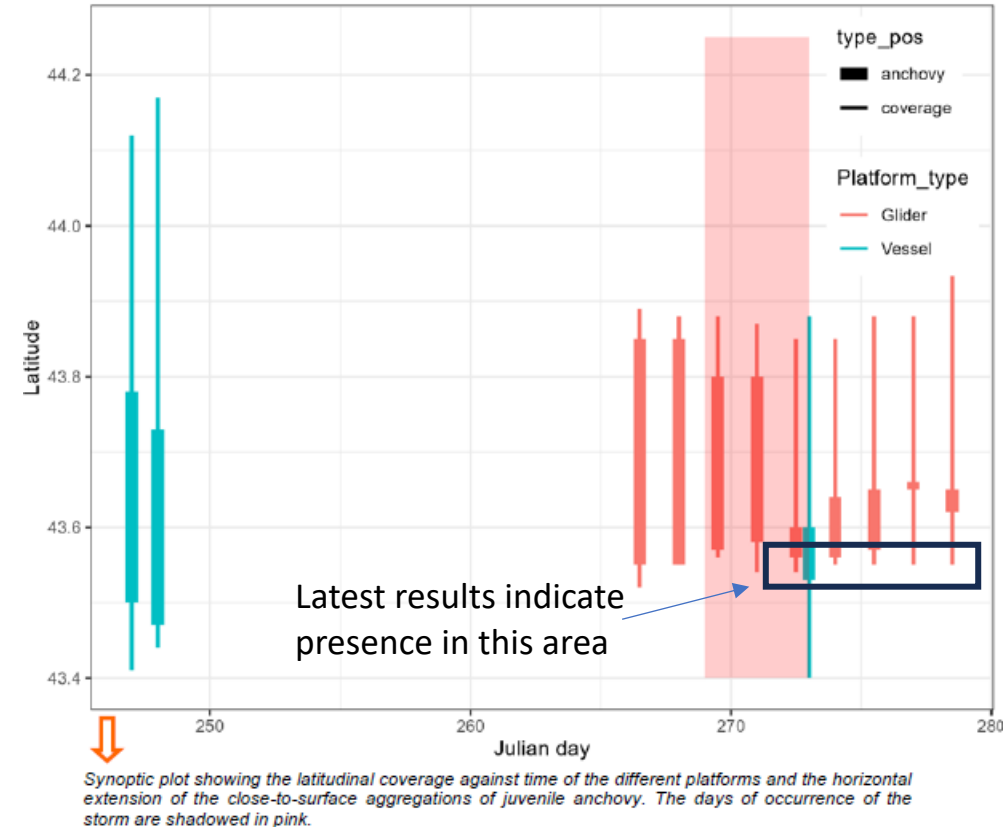
Qualitative agreement with
glider observations



JUVENA 2022

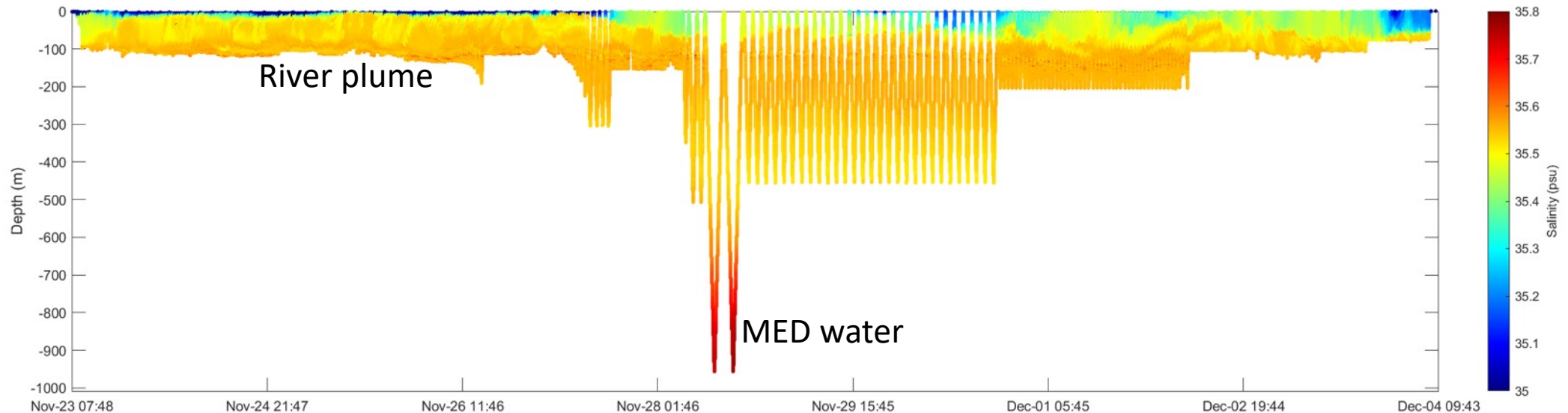
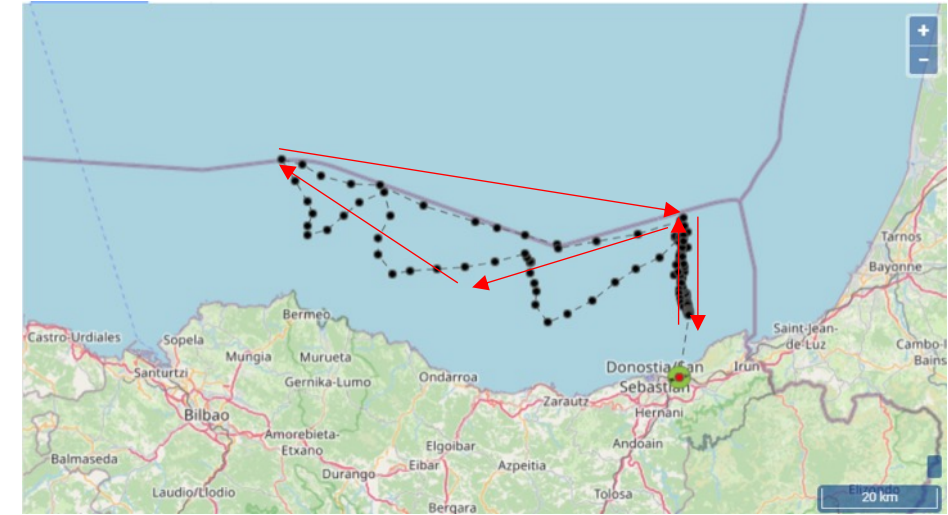
- ✓ Before the storm:
 - Anchovy at the surface until the shelf-break (migrating towards the coast)
 - Captured by both: JUVENA and glider
- ✓ During and after the storm:
 - No anchovy detected offshore by the glider
 - More concentrated close to the coast

Strong currents towards the coast reinforced the migration of anchovy



BGCD3 2023

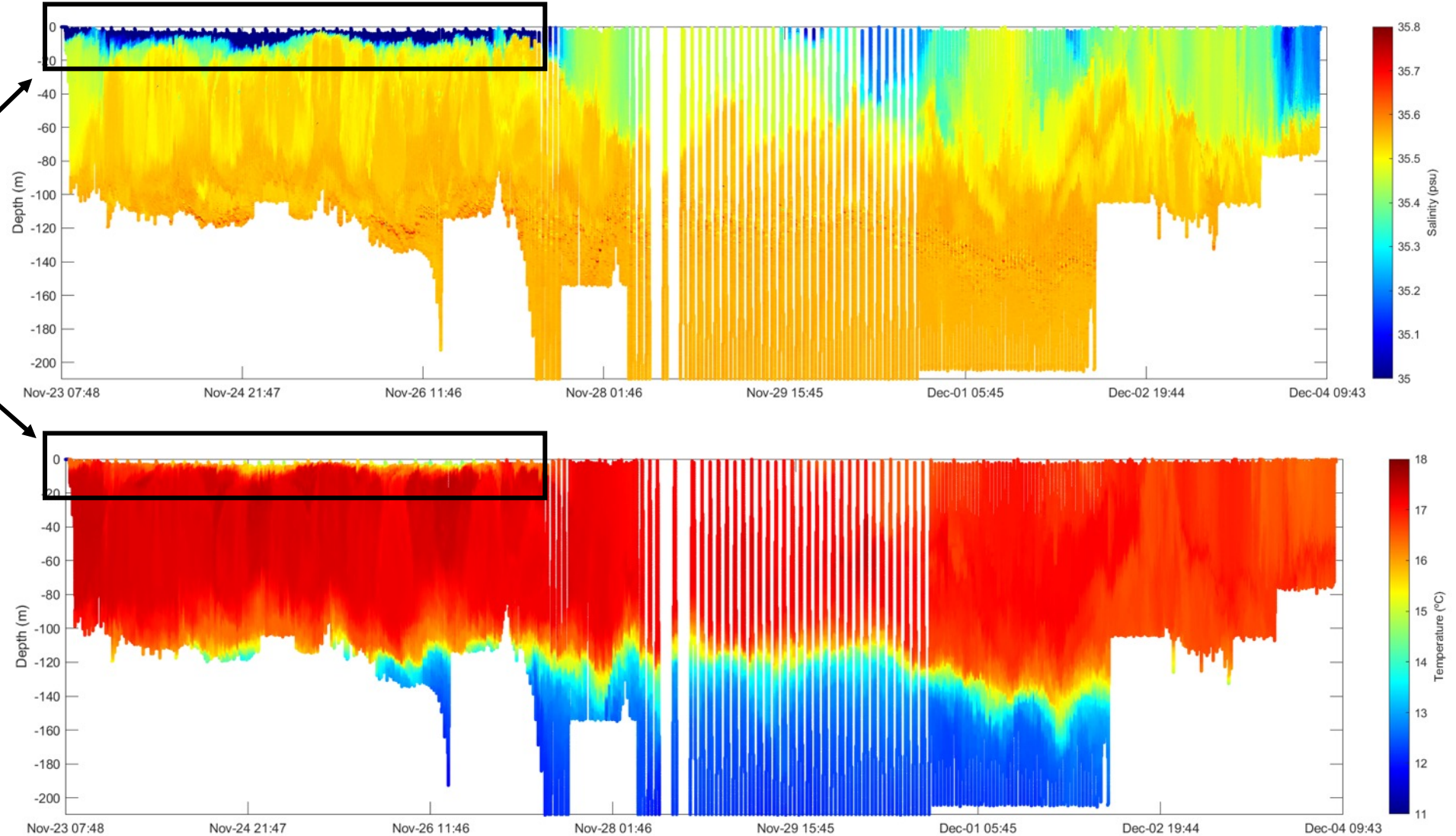
- From November 23 to December 4 (2023)
- Aimed to cover locations routinely sampled in-situ for climate change studies
- Nose with CTD + BGC sensors, collected:
 - Hydrography: T, S
 - BGC: turbidity, chlorophyll-a (Chl-a), dissolved oxygen (DO), coloured dissolved organic matter (CDOM) and nitrate
 - Advanced QC pending



BGCD3 2023

WATER COLUMN

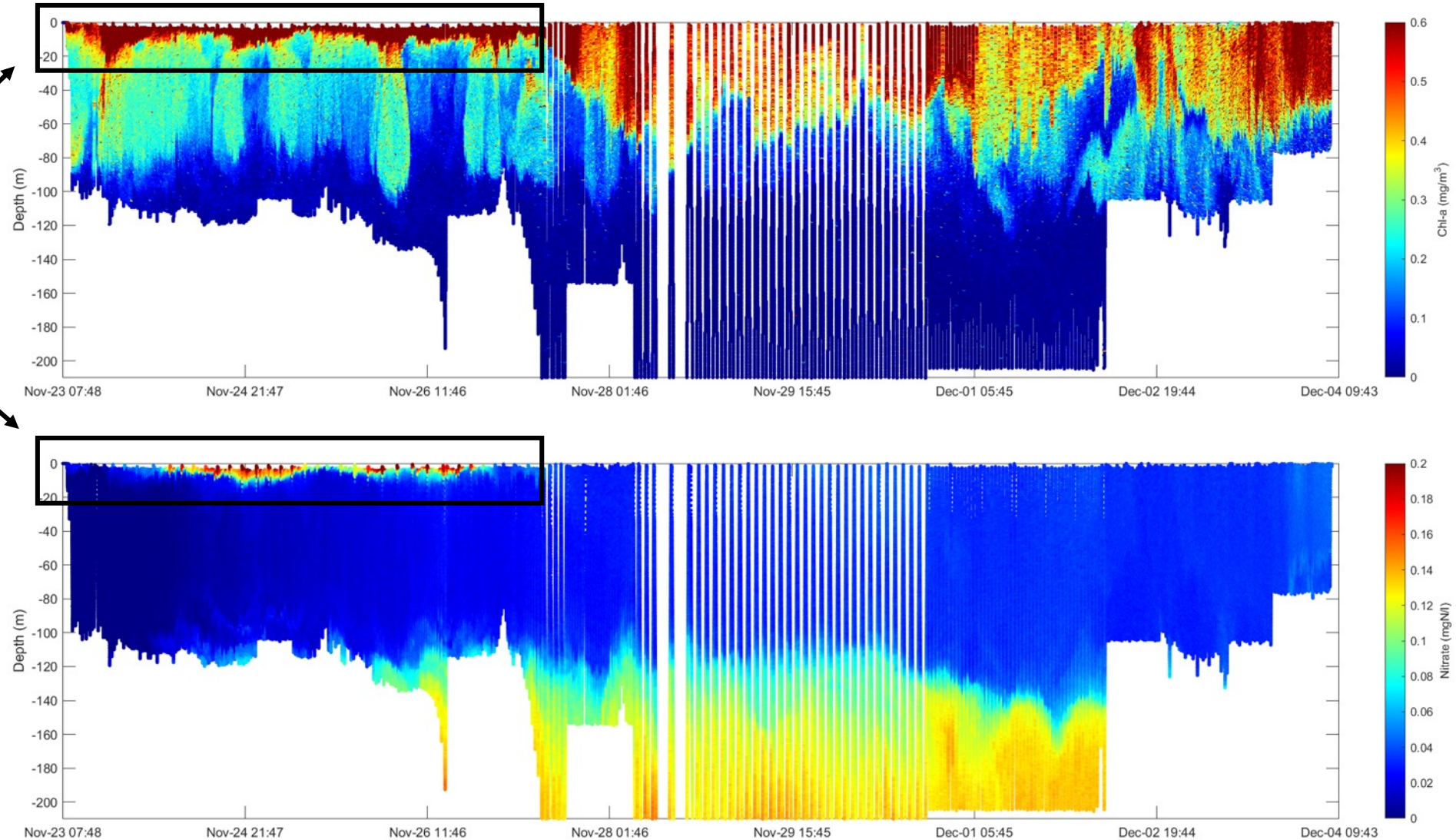
PLUME



BGCD3 2023

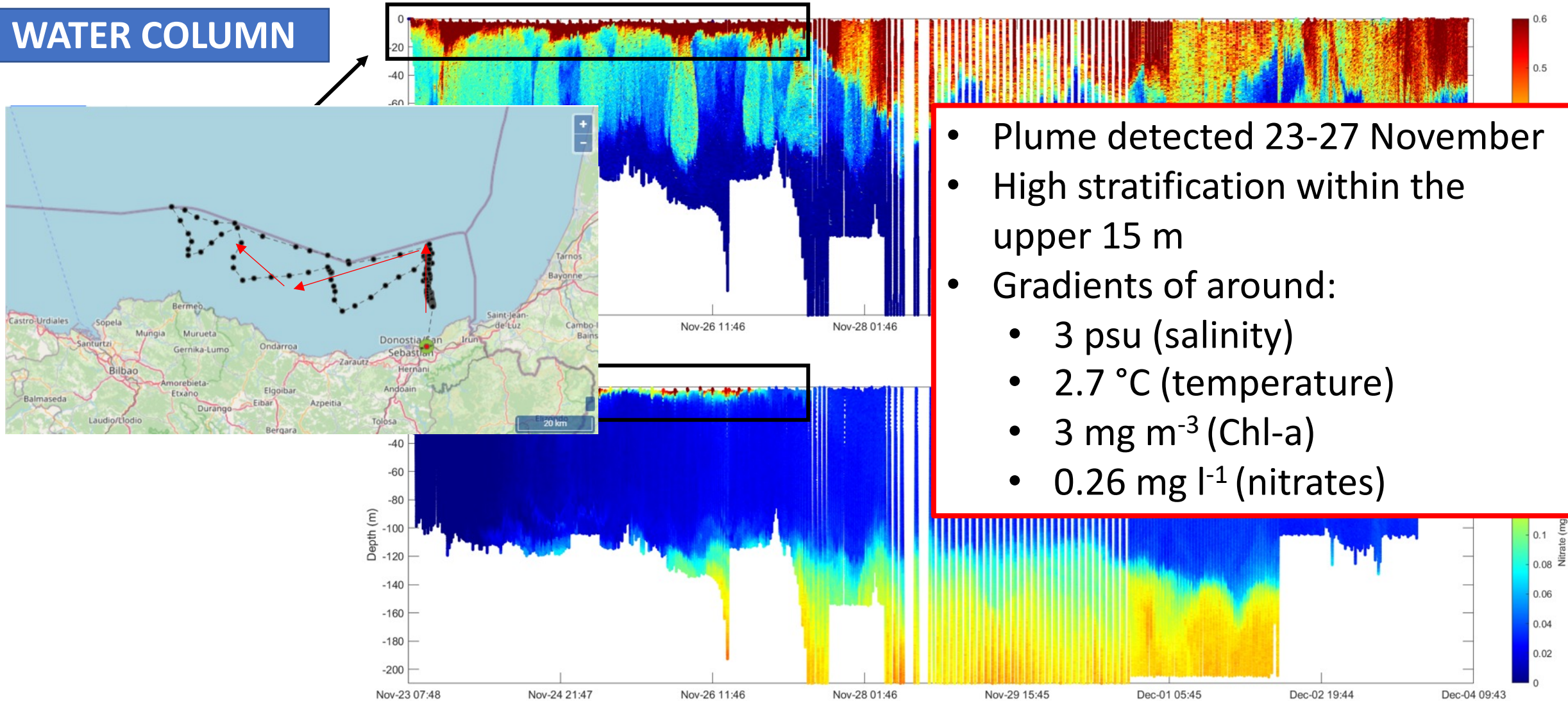
WATER COLUMN

PLUME



BGCD3 2023

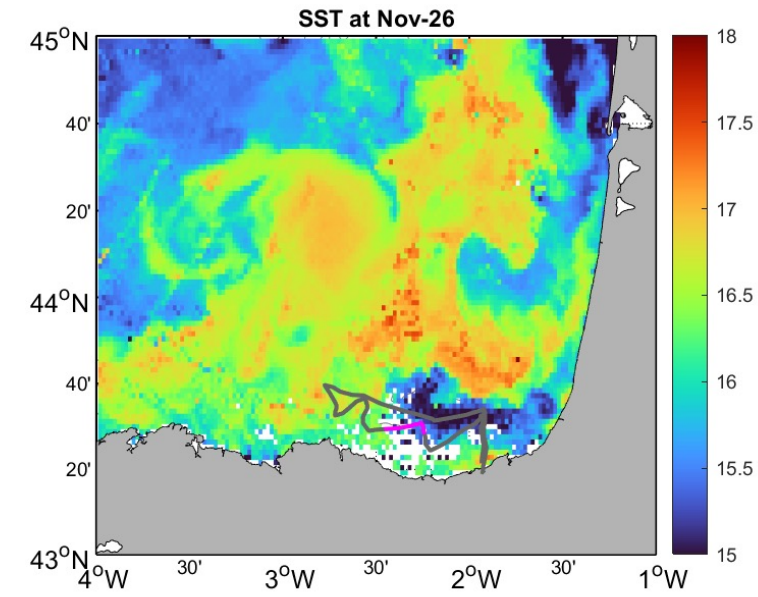
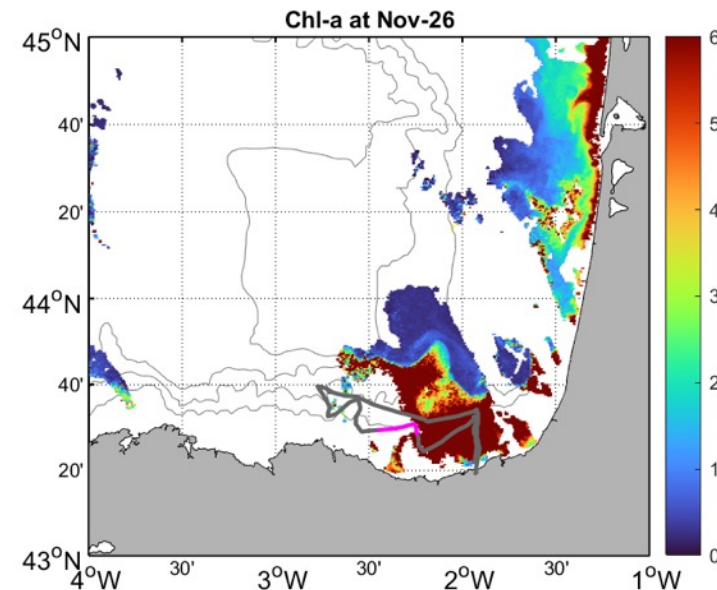
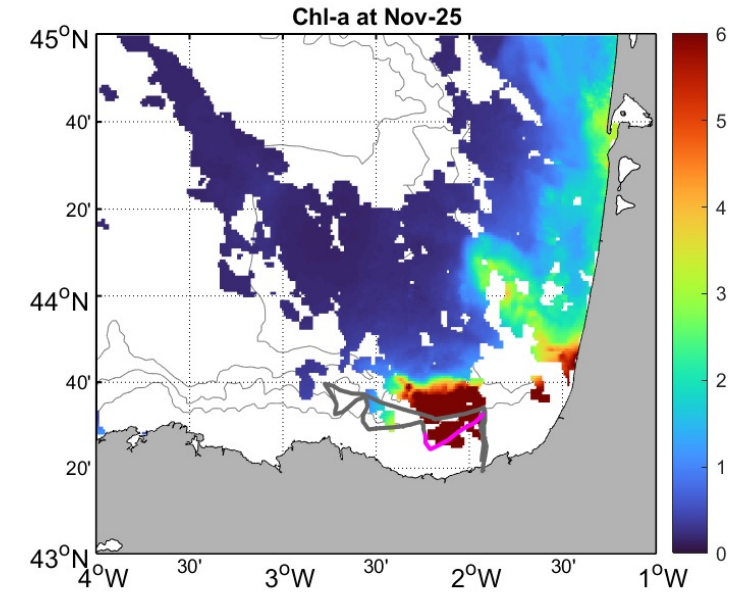
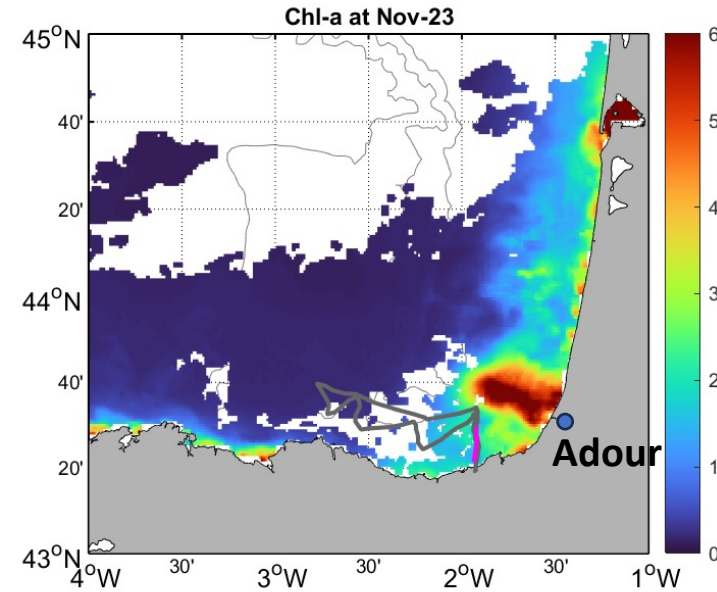
WATER COLUMN



SURFACE

- Strong westward extension along 85 km
- Detected by satellite:
 - SST
 - Chl-a

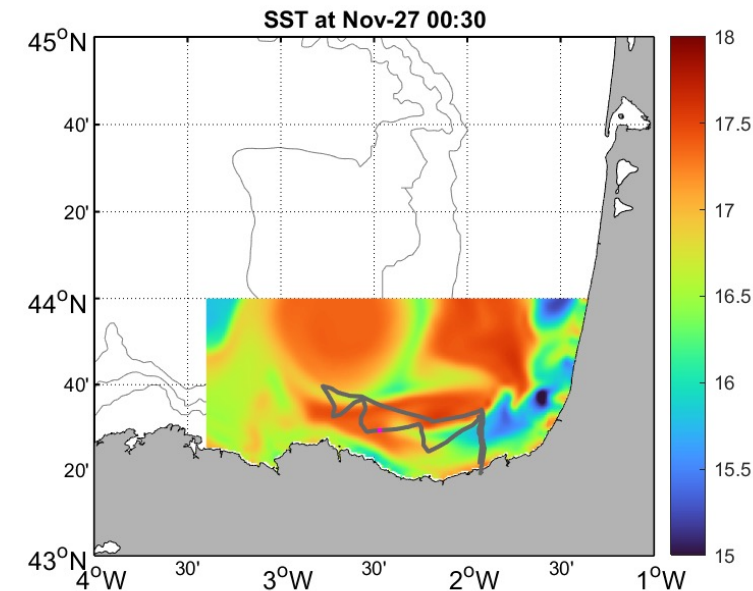
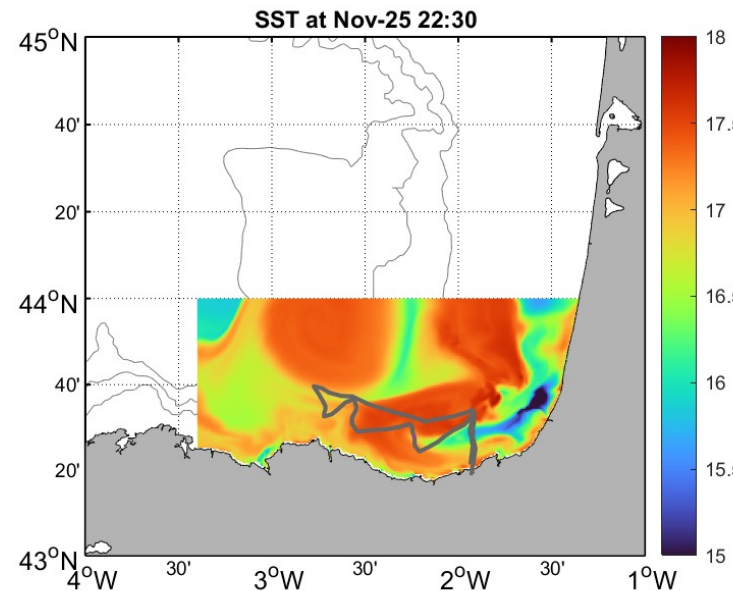
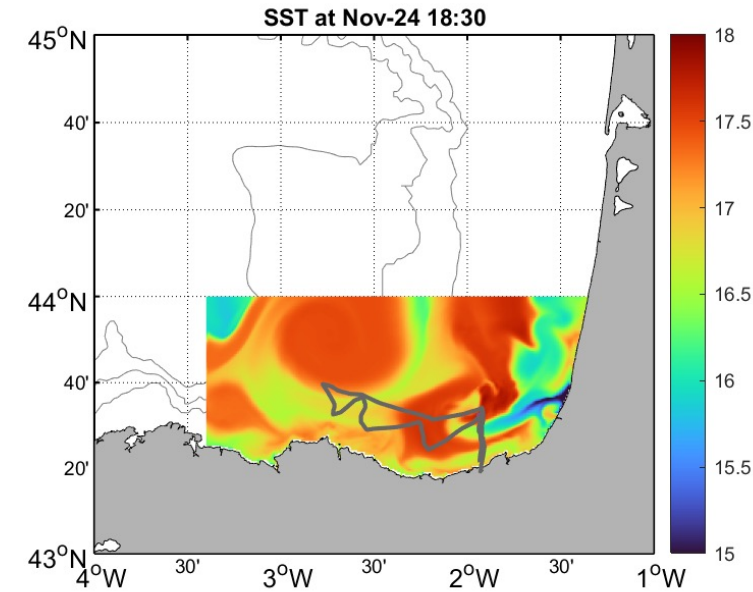
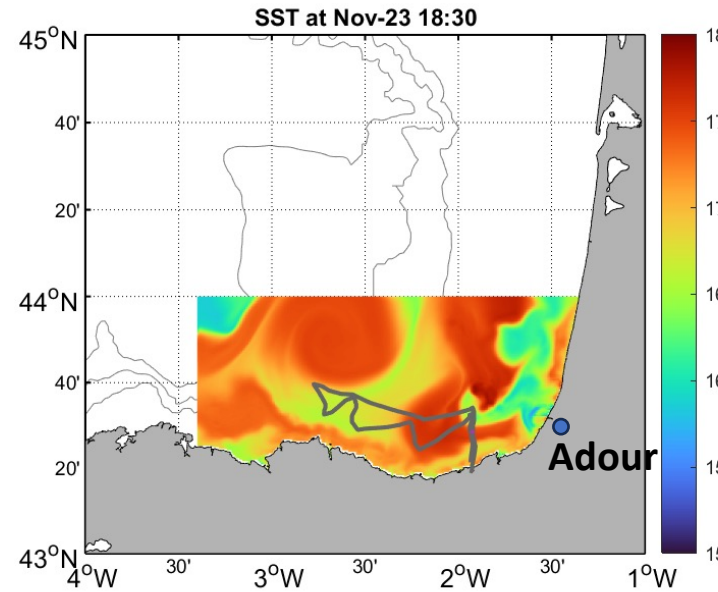
BGCD3 2023



SURFACE

- Strong westward extension along 85 km
- Detected by satellite:
 - SST
 - Chl-a
- Detected by the model:
 - SST
 - SSS

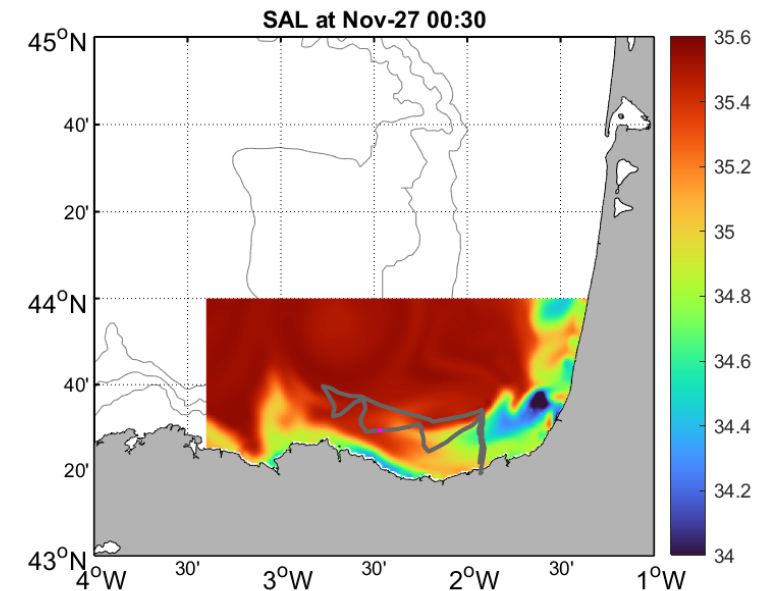
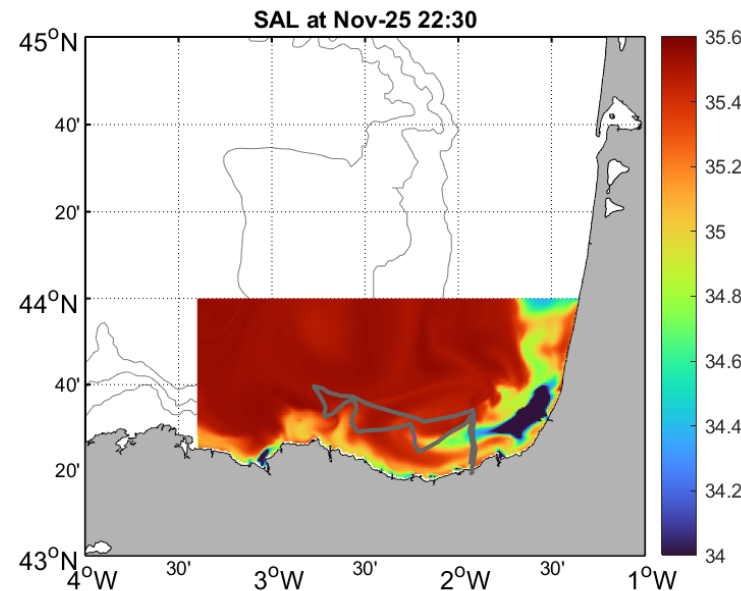
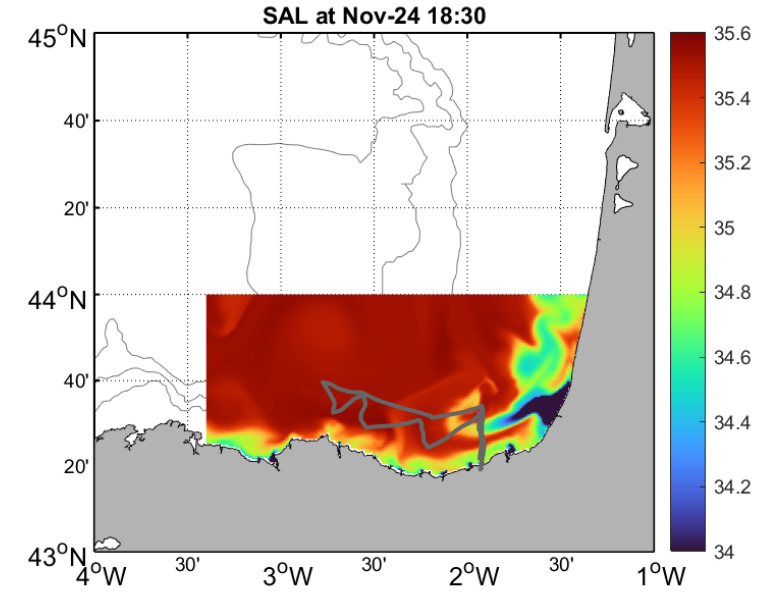
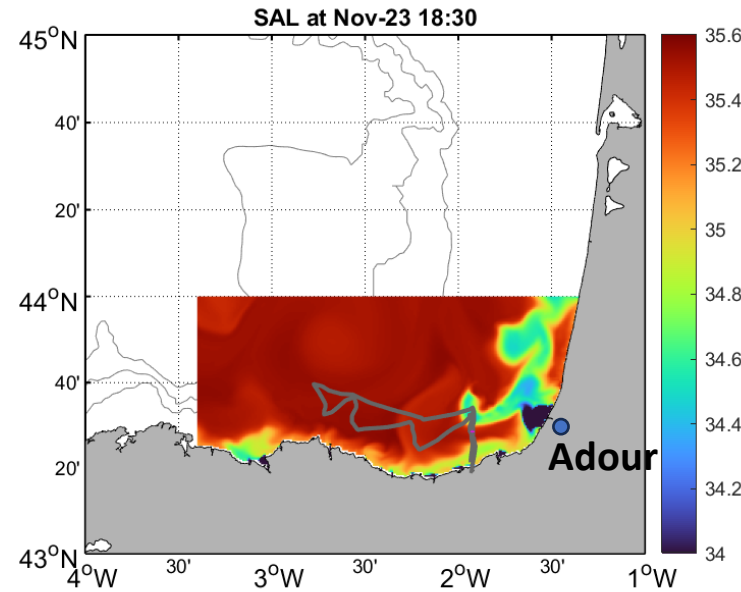
BGCD3 2023



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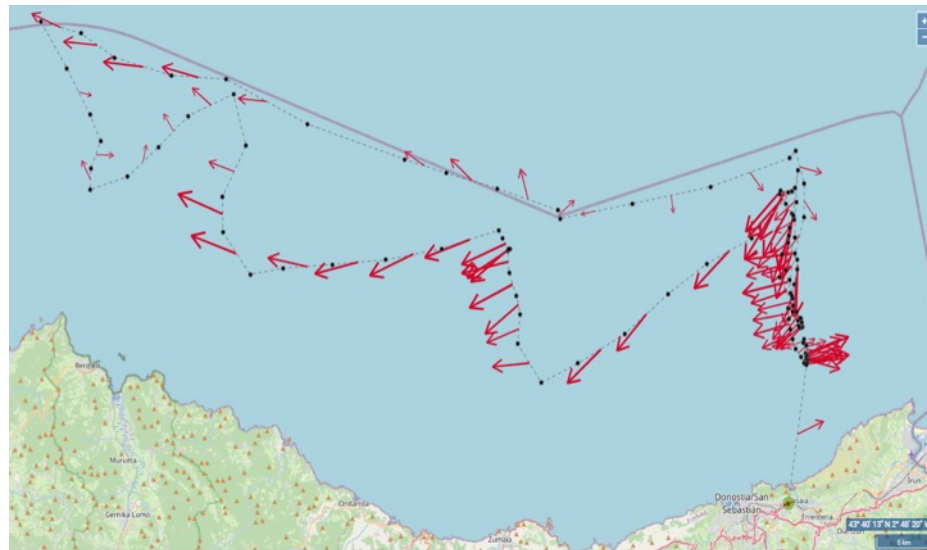
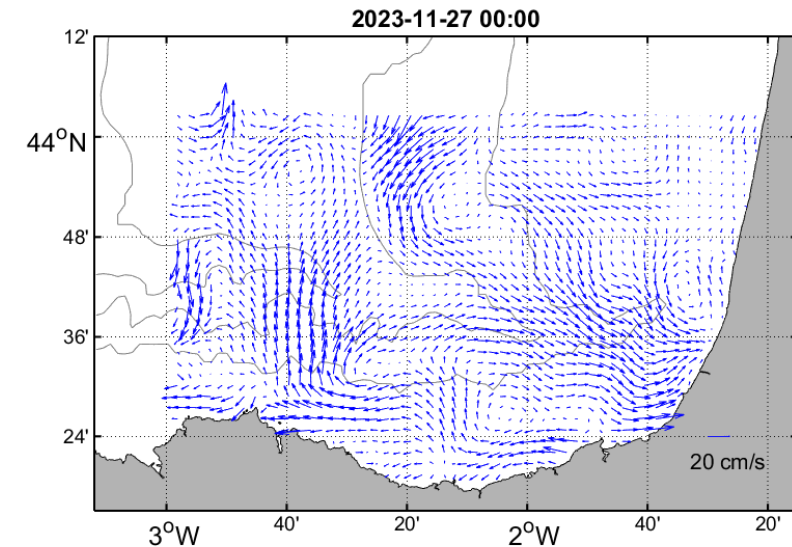
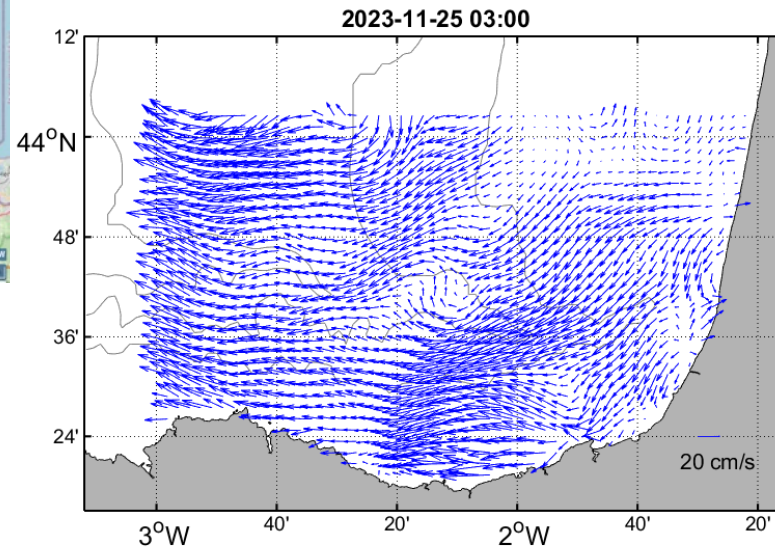
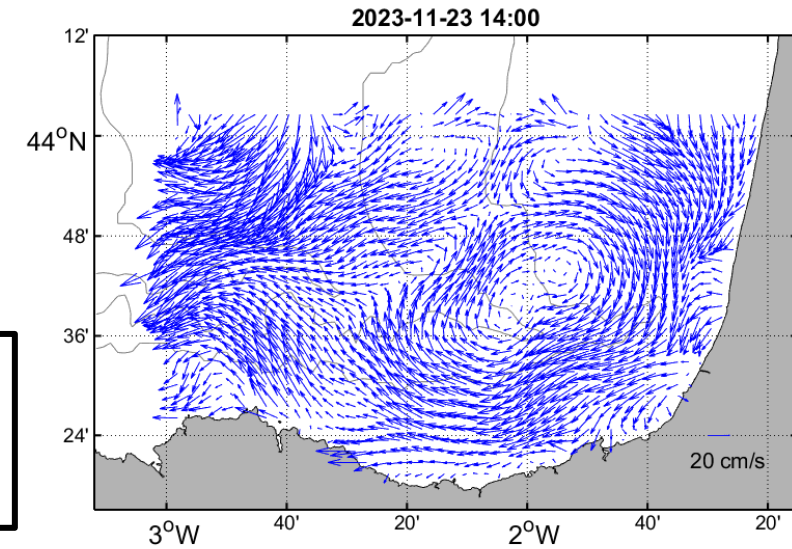
BGCD3 2023



BGCD3 2023

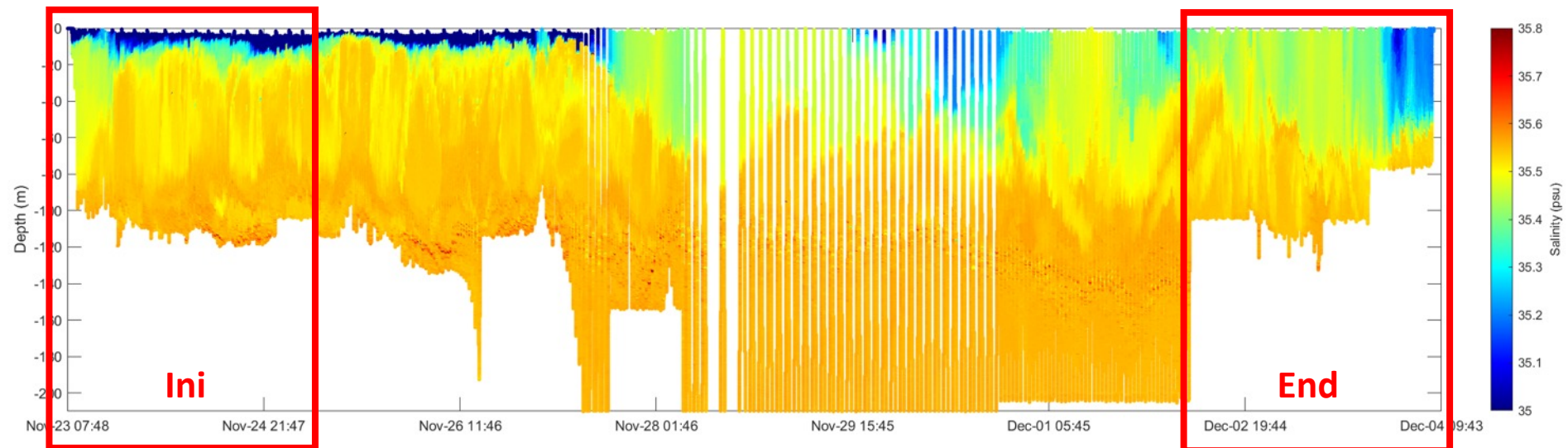
Strong water column
average currents detected
by the glider (max. 30 cm/s)

Maximum westward surface
currents detected by the HF
radar (model) of 74 (61) cm/s

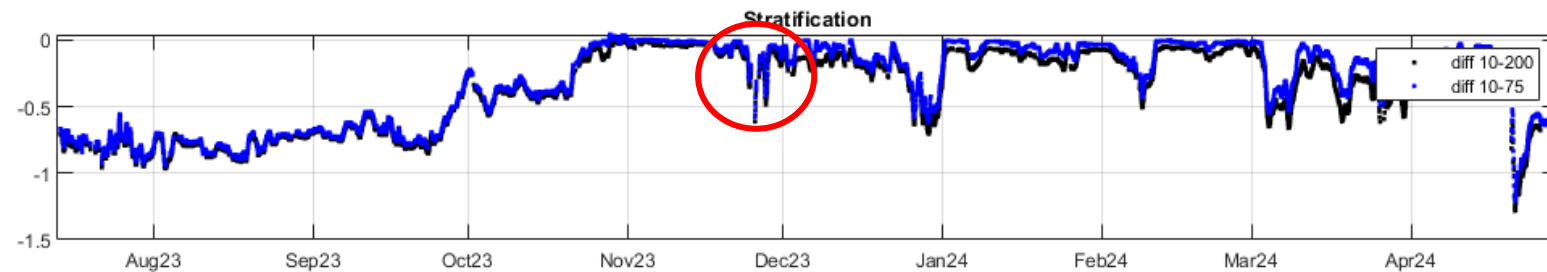
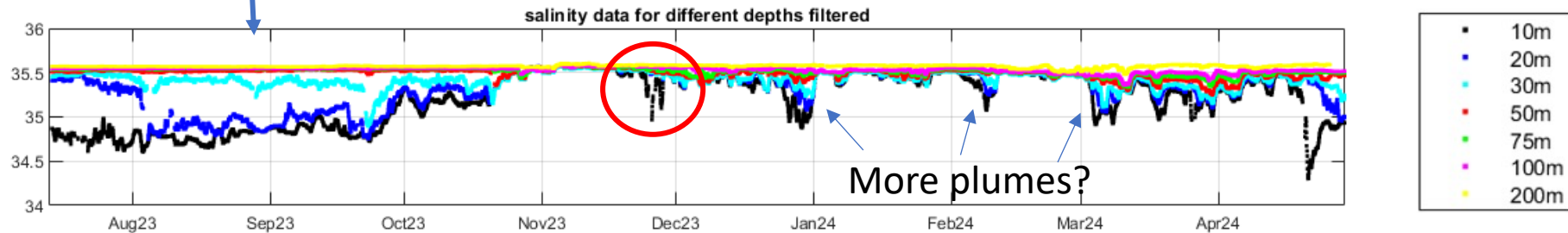
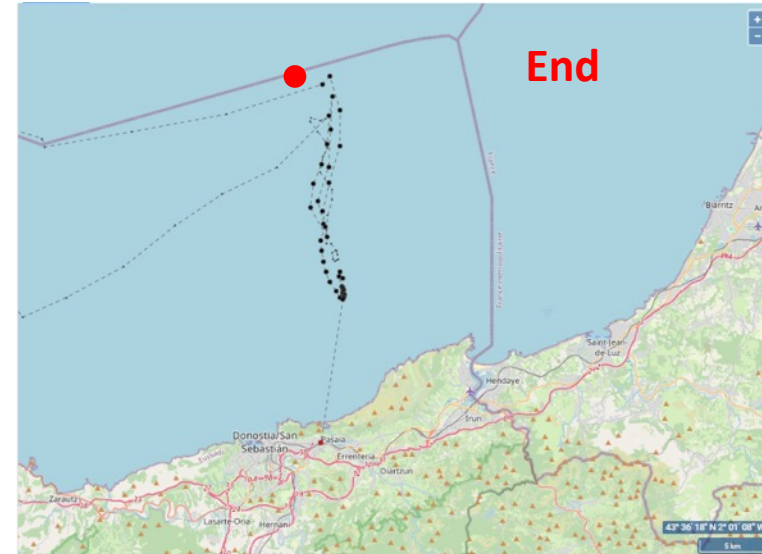


BGCD3 2023

- The glider revisited the initial area: Found more mixed conditions
- Area sampled by a mooring: Captured the mixing process

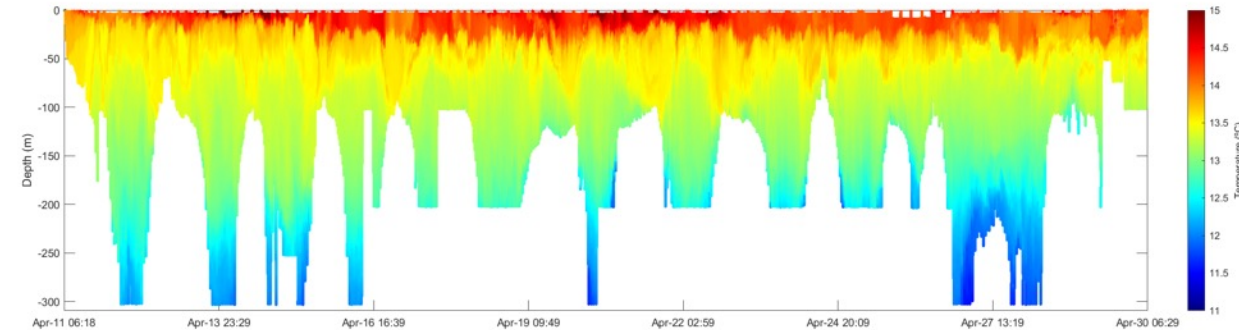
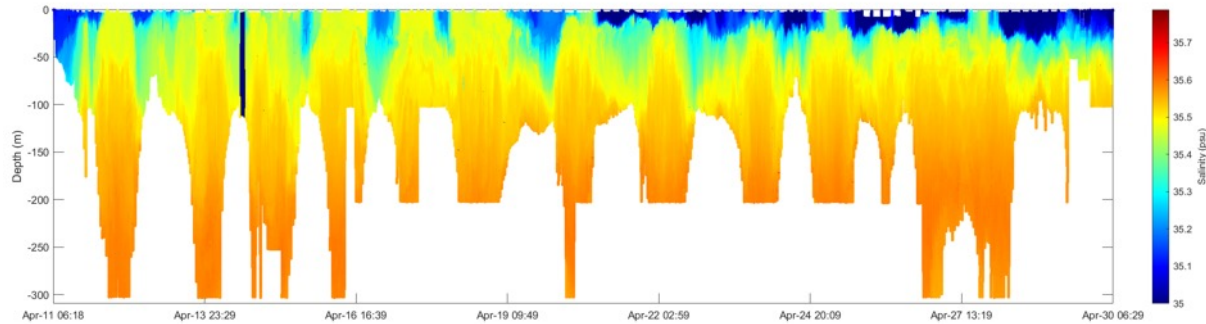


BGCD3 2023



PELACUS 2024

- April 11 - 30 (2024)
- Aimed to study the migration patterns of the European mackerel
- Nose with CTD + Echosounder
- Raw hydrographic data



- Echosounder data being processed



OVERALL CONCLUSIONS

- The missions have greatly shown the added value of glider data in the area (combined with other platforms):
 - A downwelling process was detected in 3D for the first time in the area
 - Migration of juvenile anchovy towards the coast was captured by glider and JUVENA data
 - River plume analyzed in 3D
- Still work to be done in the QC and analyses
- We hope to routinely deploy the gliders and run regular missions to complement existing observational efforts (JUVENA, BGC sampling)
- Glider port services: give access to research groups in AZTI or other centers



