

# CSWOT2023 - testing the potential of a (fancy) unmanned surface vehicle for oceanography

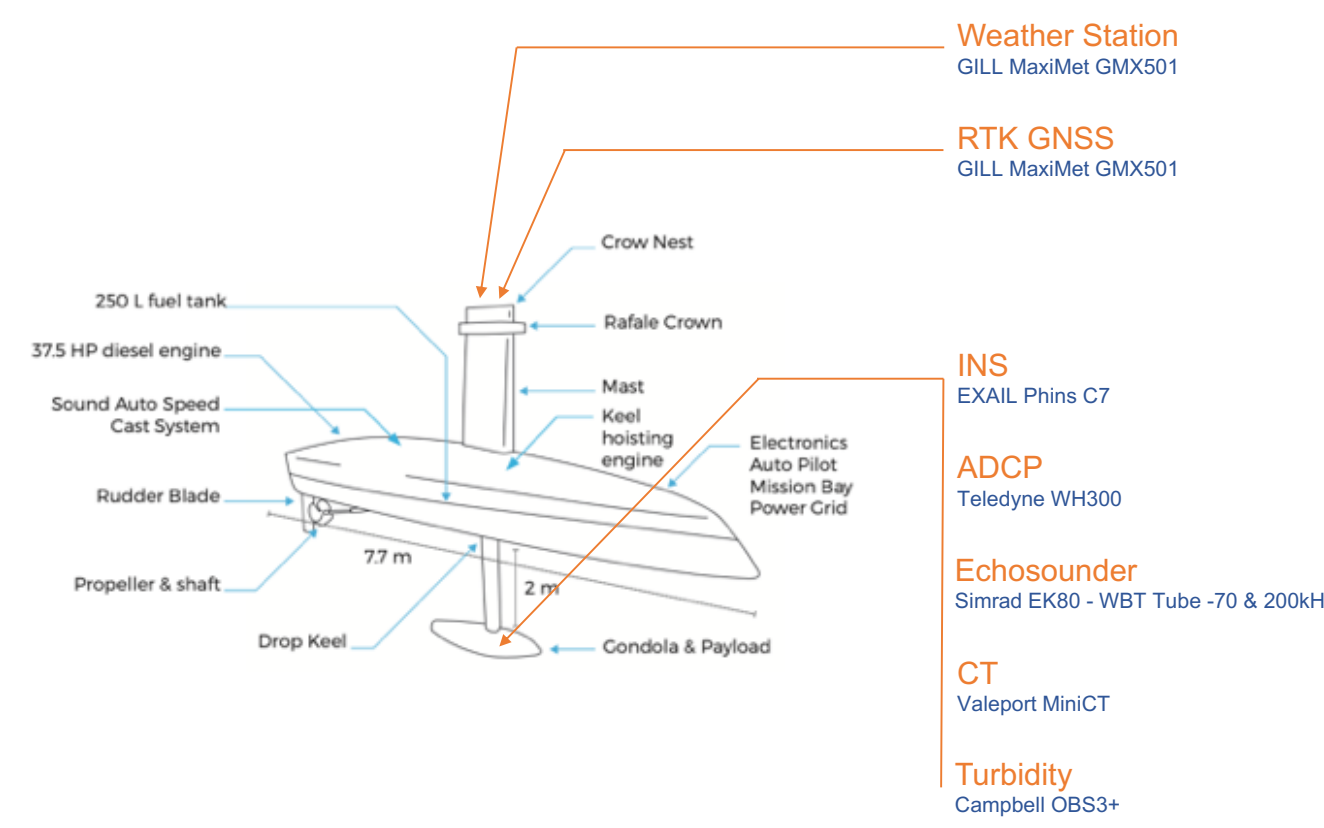
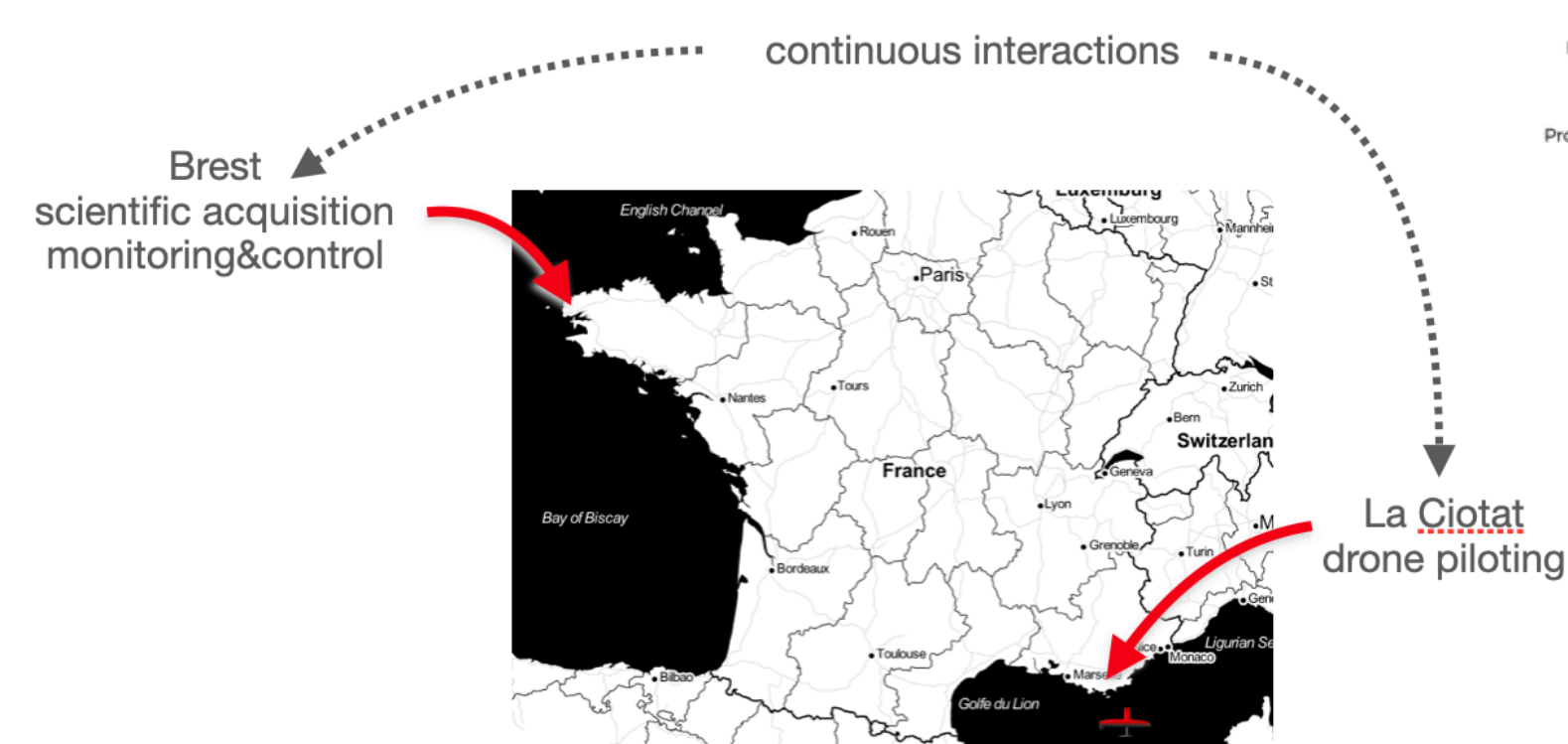


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Emeline Veit / Naig Le Bouffant / Cyrille Poncelet<sup>2</sup>, Frank Dumas<sup>4</sup>  
<sup>1</sup> Ifremer - LOPS, <sup>2</sup> Ifremer - NSE, <sup>3</sup> ENSTA-Bretagne, <sup>4</sup> SHOM



## A continuous 5 days experiment

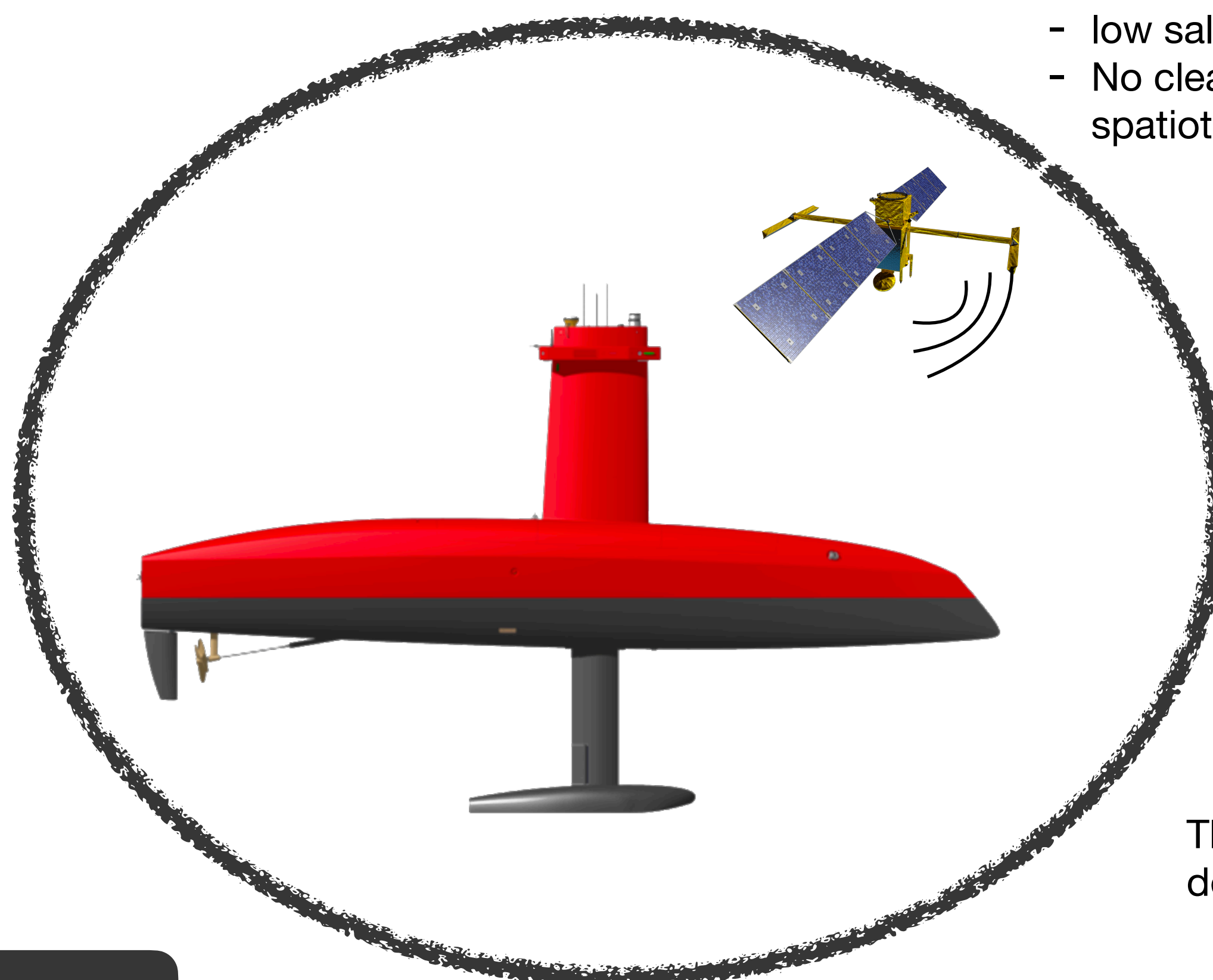
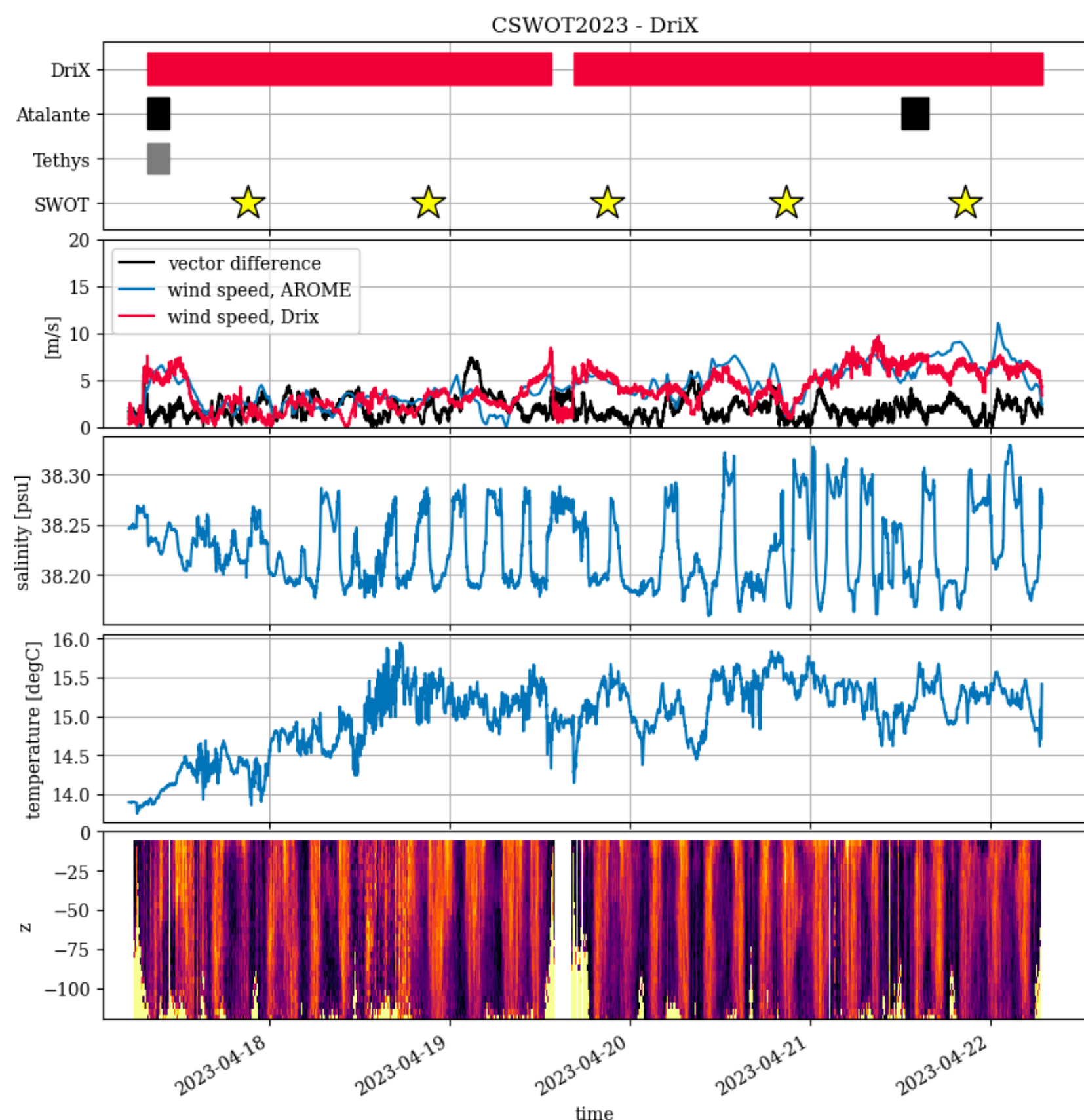
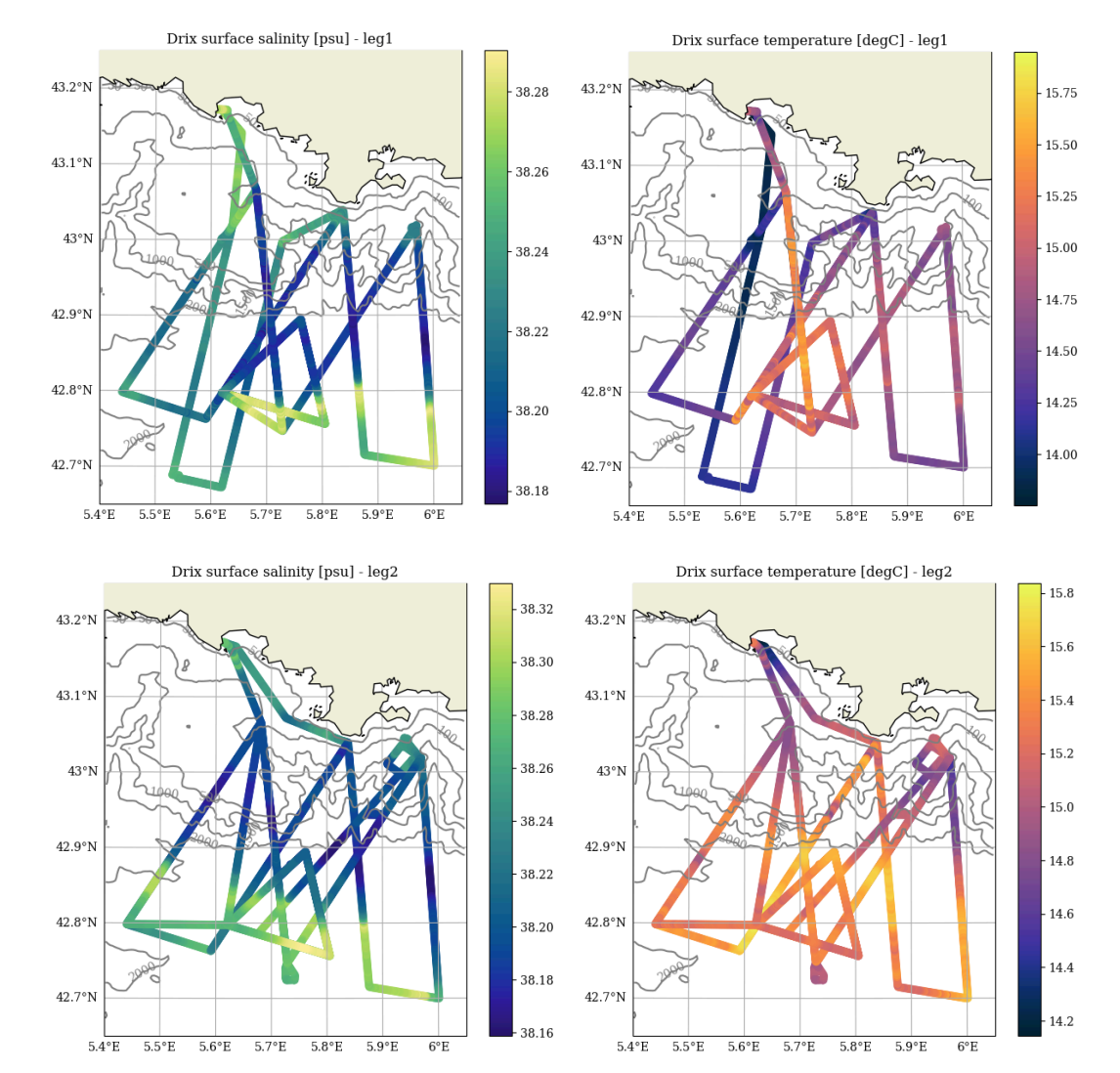
- offshore of Toulon under SWOT swath and over the Liguro-Provençal (LP) current.
- fully remote operations with continuous distant monitoring of acquisitions and control by scientific teams
- on the fly adjustments of sampling strategy in coordination with pilotes



The Drone was equipped with a complete suite of sensors for the description of the physical environment.

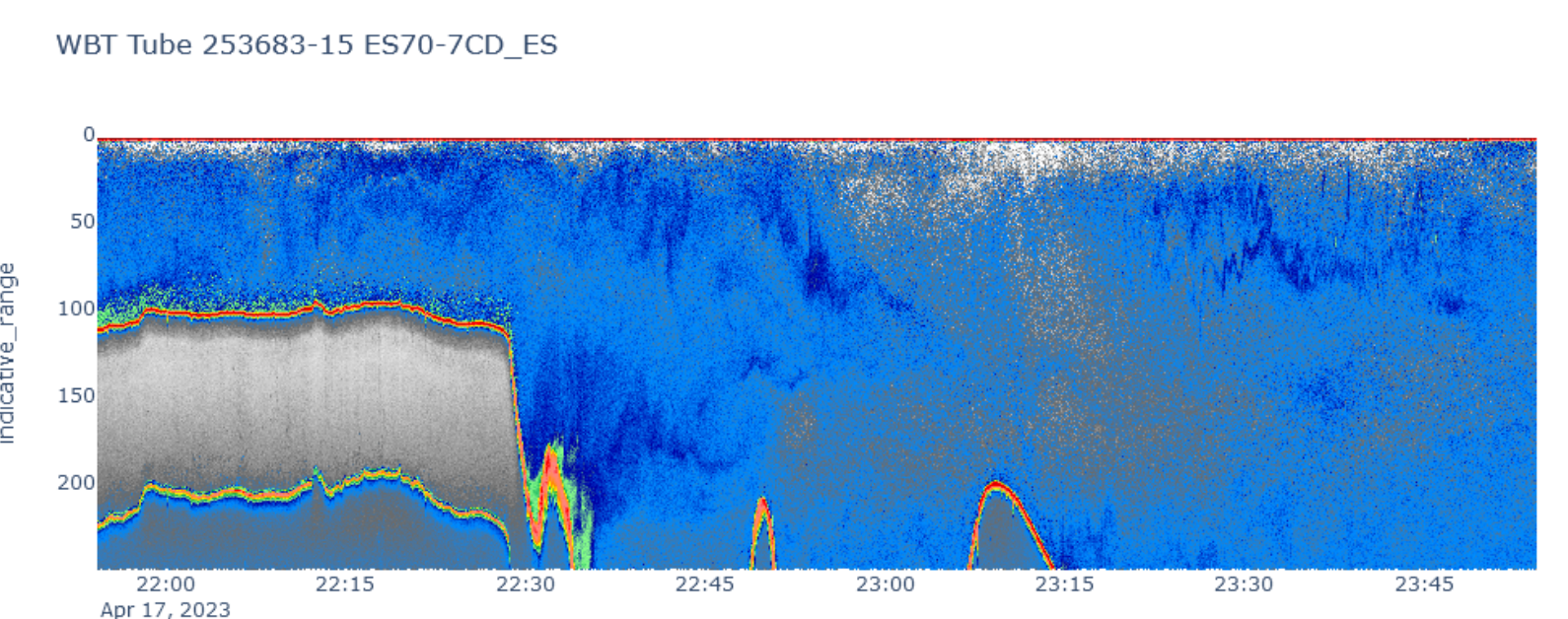
## Hydrology

Standard hydrological conditions:  
- low salinity signature of the LP  
- No clear temperature spatiotemporal patterns



## Echo sounding

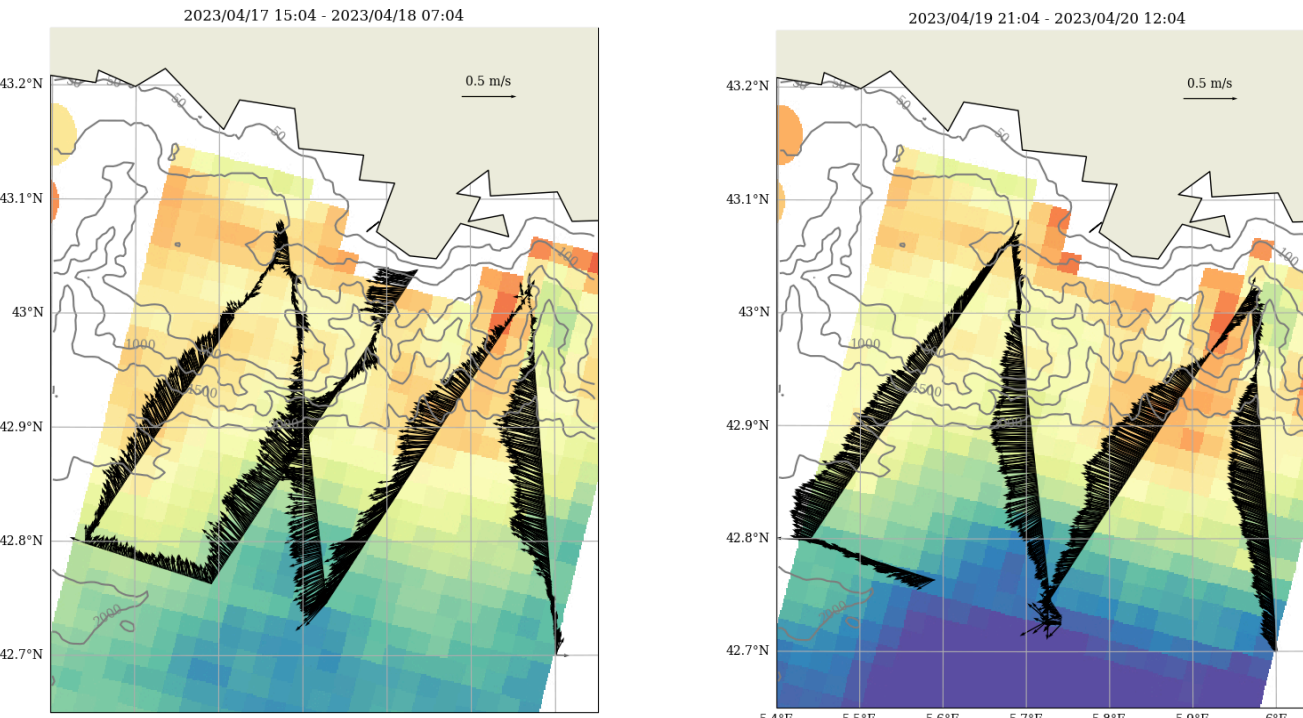
The echosounder revealed variability whose origin remains to be deciphered, to complete and refine physical layers description



## Temporal evolution of the Liguro-Provençal current

### @mesoscales

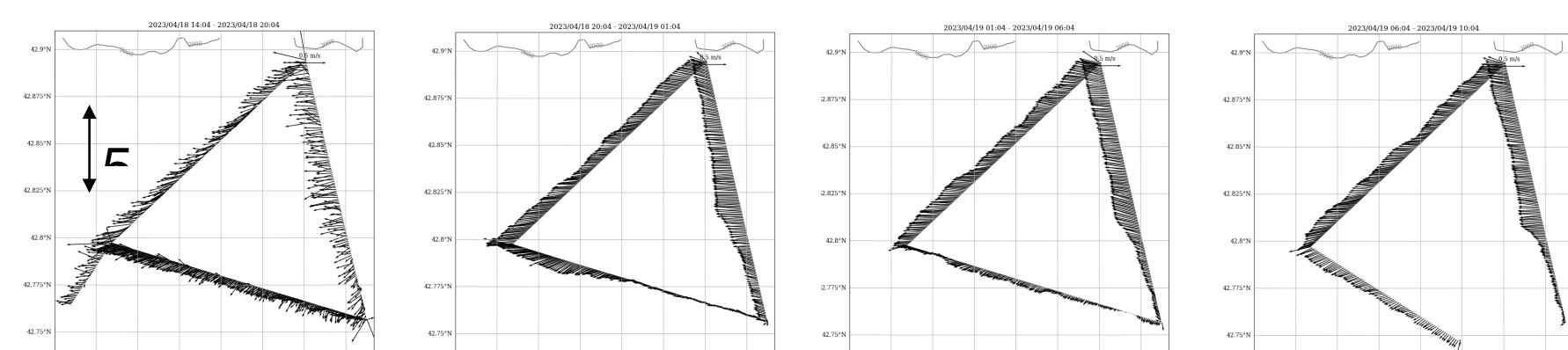
The LP current exhibits variability on timescales of days which will ultimately be completed with SWOT and independent satellite observations (e.g. sea surface temperature, Chlorophyll, SAR)



color = SWOT « preview »

### @submesoscales

Surveys over reduced areas at the edge of the LP current provide a finer description of the variability



## Perspectives

October 2023: opening of SWOT data. Currents derived from SWOT sea level (via geostrophy or other methods) will be compared with DriX currents.

This dataset provides an novel perspective on the LP short term variability.

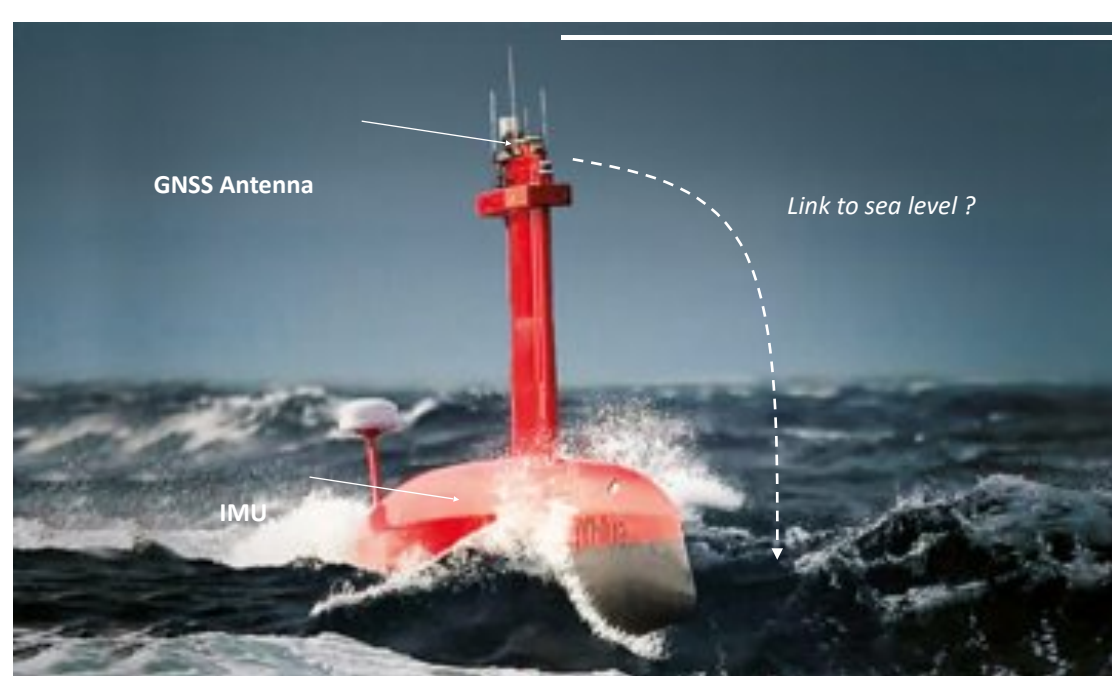
Along with DRIMED22 experiment that took place in September 2022, this experiment completes a series of experiments led by Ifremer aiming at testing USVs for the monitoring of the Ocean.

# measuring sea level in situ ... or at least trying to !



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<sup>1</sup> ENSTA-Bretagne, <sup>2</sup> LIENS, <sup>3</sup> Ifremer - LOPS, <sup>4</sup> SHOM

### Using an Uncrewed Surface Vehicle (USV)



Drix in operation

### Using a low-cost GNSS system deployed on a buoy



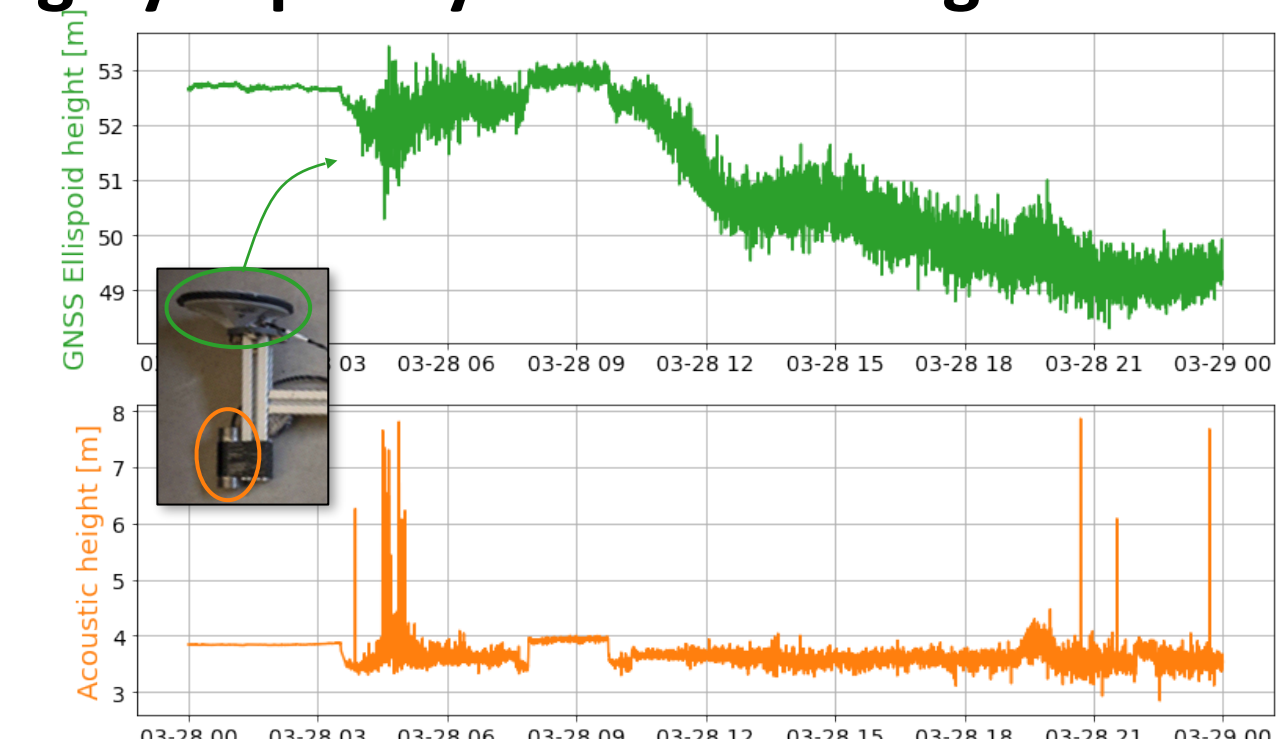
« Trefle » buoy with low-cost GNSS system

### Using geodetic GNSS antenna from NO Atalante & Thetys



NO Atalante in operation

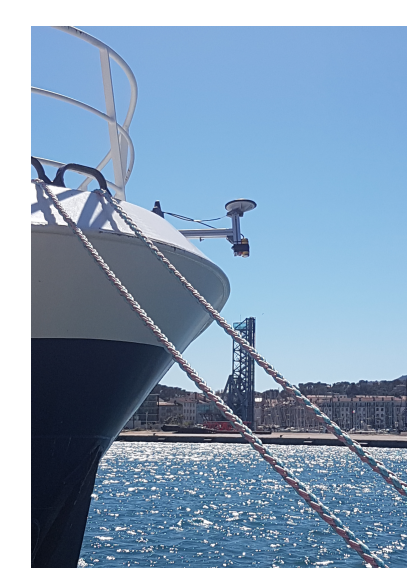
### Using Cyclopee system mounting on NO Thetys



Cyclopee measurements during 2023/03/28 - C.Chupin

GNSS systems to map sea surface height

Mouting on the front side of NO Thetys, the Cyclopee system combine a geodetic GNSS antenna (precise position) and an acoustic altimeter (air draft).



Sea Surface Height above ellipsoid from DRIX measurements during the DRIMED22 campaign - Analyses carried out as part of an end-of-study