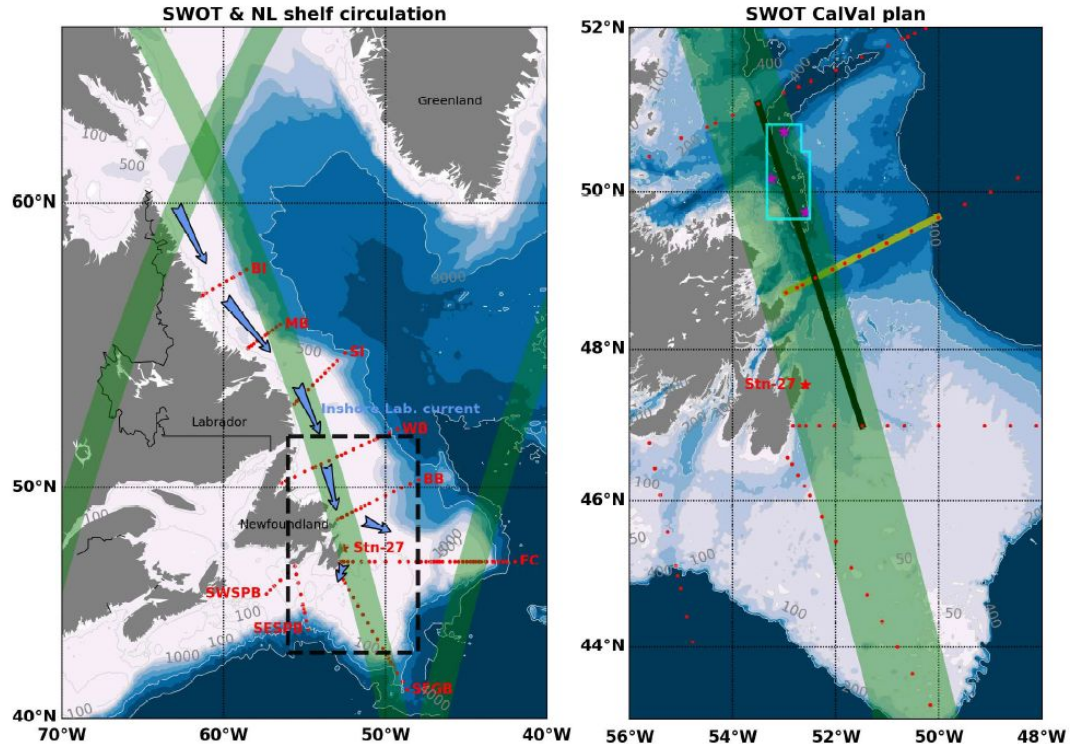


Coast - open ocean continuum

Labrador Sea (Newfoundland Shelf)

*Frédéric Cyr, Guoqi Han & Johannes Karstensen,
with Nicolai von-Oppeln Bronikowski & Jonathan Coyne*



SWOT AdAC campaign

Scientific objects

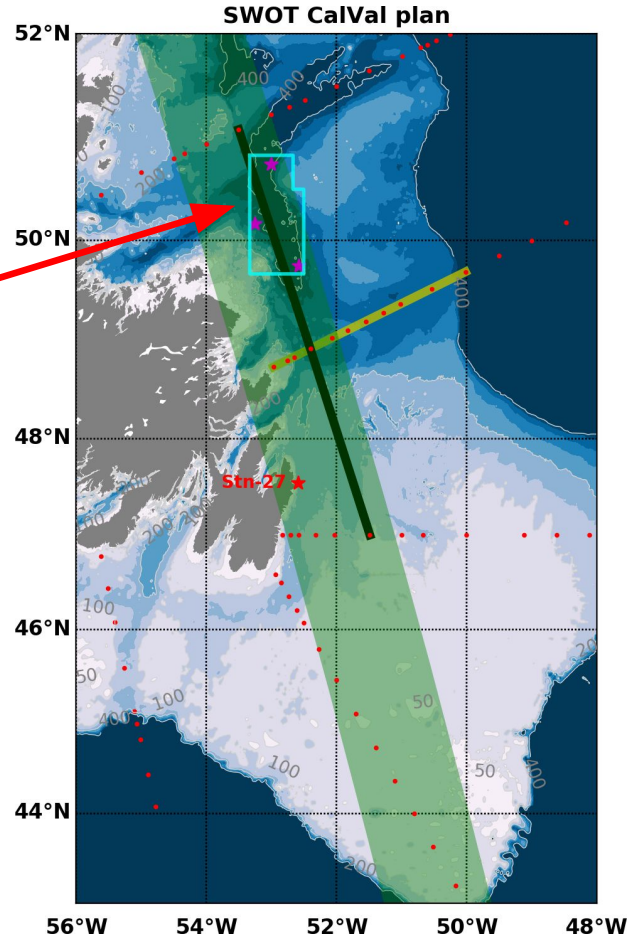
No direct funding was dedicated to this project. The data collection occurred as part of Fisheries and Oceans Canada (DFO) Atlantic Zone Monitoring Program (AZMP). In addition to regional SWOT validation, data will be used to better understand the dynamic of the Labrador Coastal Current (inshore branch of the Labrador Current).

SWOT AdAC campaign

Moorings

3 Moorings were deployed in a channel under the swath (purple stars). They include CTDs, ADCPs and sediment traps.

SWOT AdAC campaign - 2



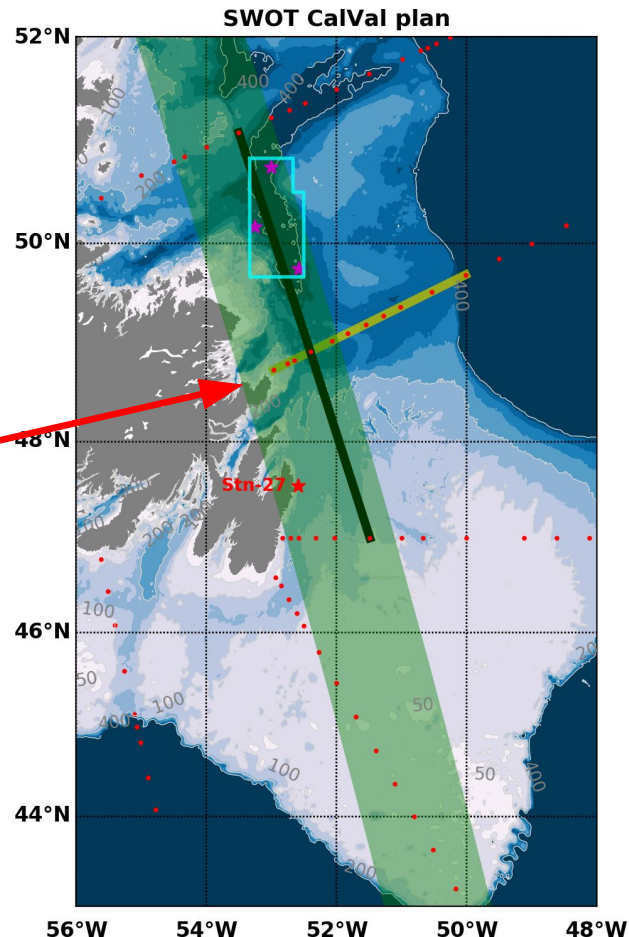
SWOT AdAC campaign

Moorings

3 Moorings were deployed in a channel under the swath (purple stars). They include CTDs, ADCPs and sediment traps.

2 glider missions occurred during the CalVal phase along a transect south of the moorings (yellow line)

SWOT AdAC campaign - 2



SWOT AdAC campaign

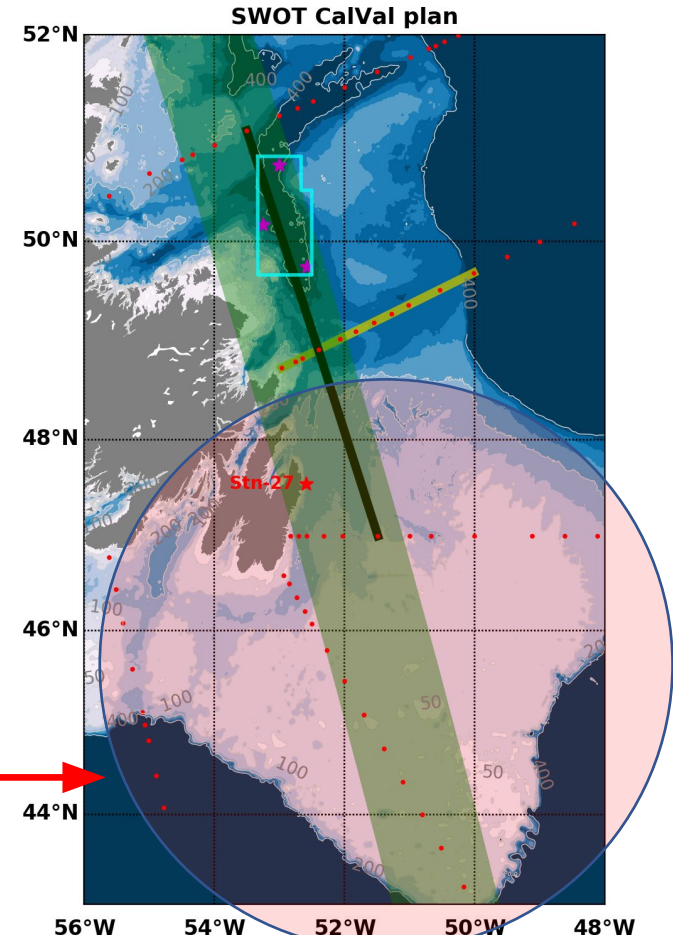
Moorings

3 Moorings were deployed in a channel under the swath (purple stars). They include CTDs, ADCPs and sediment traps.

2 glider missions occurred during the CalVal phase along a transect south of the moorings (yellow line)

A regular AZMP mission occurred on the Grand Banks of Newfoundland during the CalVal phase (physical-biogeochemical sampling), but the portion of the mission dedicated to SWOT was cancelled due to a strike involving seagoing staff

SWOT AdAC campaign - 2



SWOT AdAC campaign

Future perspectives

The moorings are still in the water and are planned to be retrieved this fall.
The glider mission data are being analyzed at the moment.

There is currently no dedicated funding for the analysis of the data (e.g. graduate student or postdoc), but we are exploring options to perform the analysis once all data will be retrieved. Ideas for collaboration are welcomed.

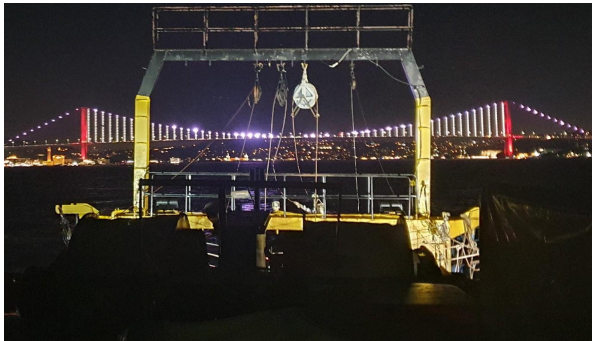
Marmara and Black Seas

Bettina Fach, Anıl Akpınar*, Hasan Örek

Institute of Marine Sciences, Middle East Technical University (IMS-METU), Erdemli/Turkey

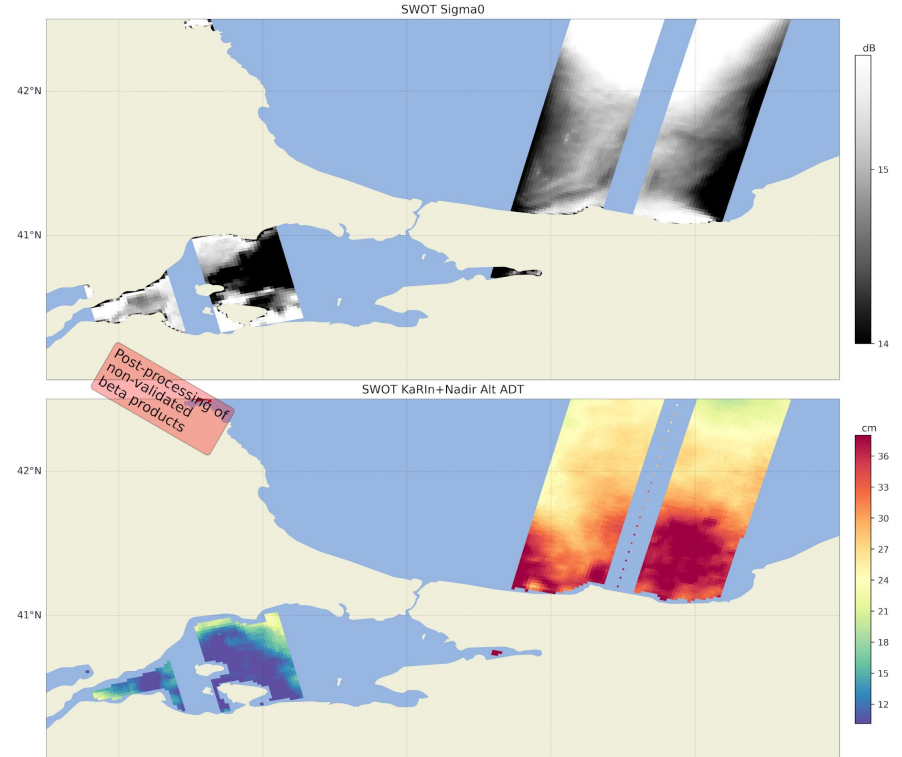


R/V Bilim-2



R/V Bilim-2 at Bosphorus Strait, İstanbul

SWOT data on 2023-06-02 for track 1 & cycle 540 and track 14 & cycle 540



First SWOT images for the region, courtesy of Dr.Pujol, CLS

Marmara and Black Seas SWOT AdAC campaign

Scientific objects

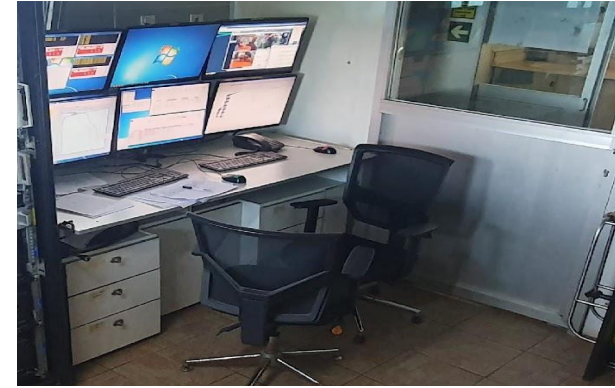
The Marmara Sea campaign focuses on understanding mesoscale processes and their influence on bloom dynamics and consequent anoxic events.

The Black Sea campaign focuses on the western Black Sea, where the boundary current meets complex topography and Mediterranean Sea waters injected through the Bosphorus Strait. Eddies, filaments and meanders of the boundary current are often observed, which contribute to cross-shelf transport as well as increased productivity. The Black Sea campaign aims to unravel the contribution of these fine scale processes.

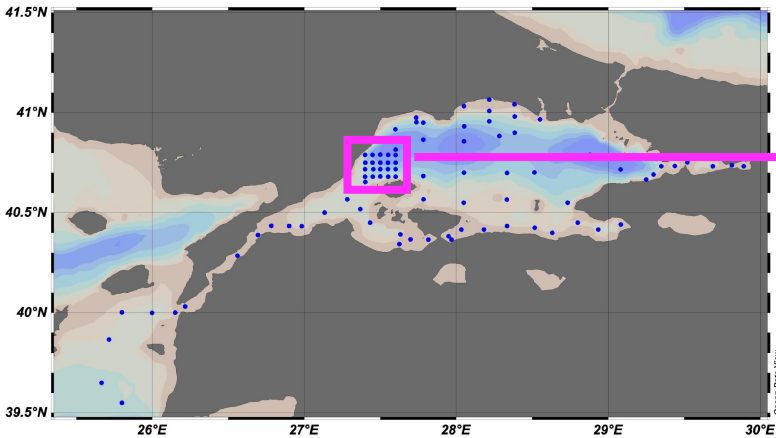
Marmara and Black Seas SWOT AdAC campaign

Measurements done

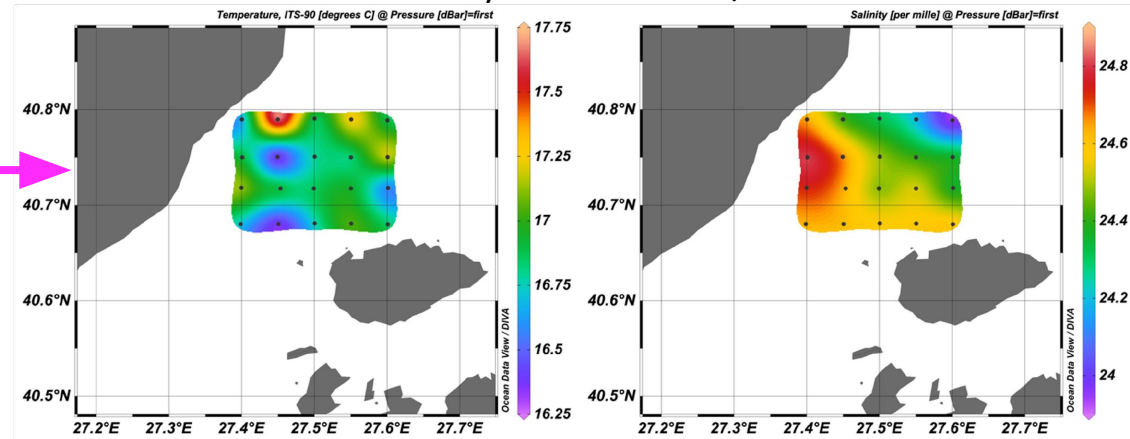
- CTD and vessel mounted ADCP measurements
- Oxygen, turbidity, pH measurements
- Thermosalinograph and fluorometer measurements



Physics lab inside R/V Bilim-2



CTD stations in the Marmara Sea



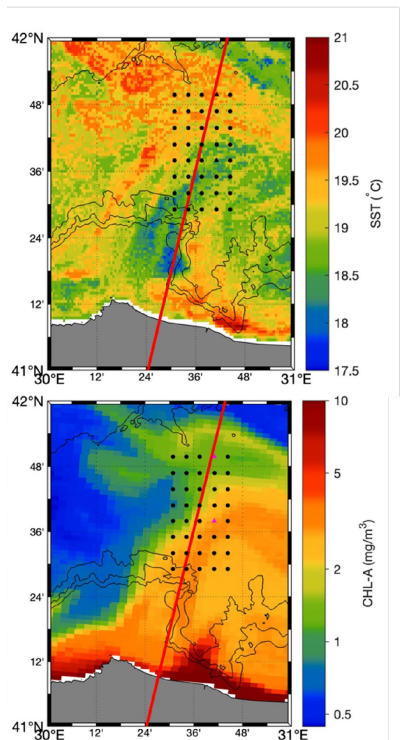
SWOT AdAC campaign - 2

SWOT-CTD grid in the Marmara Sea

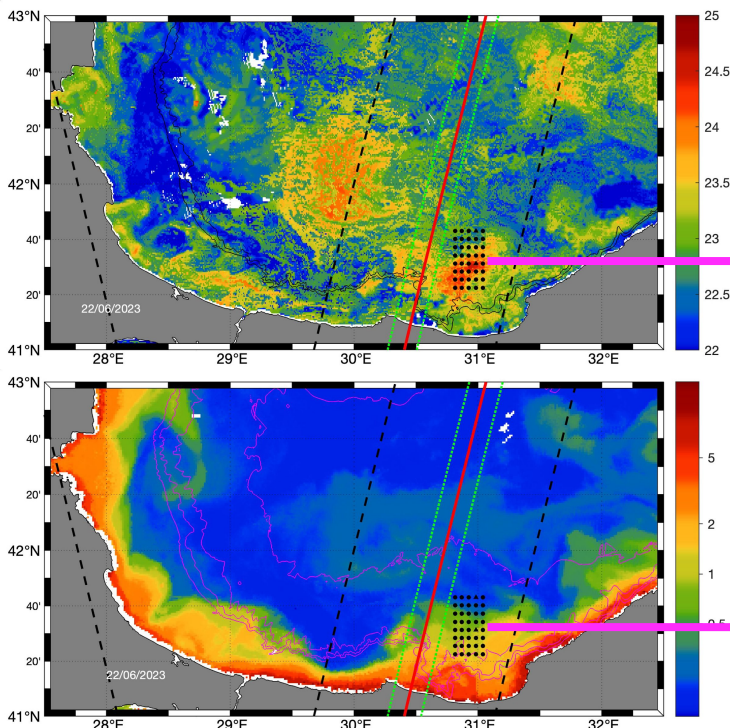
Marmara and Black Seas SWOT AdAC campaign

Preliminary results

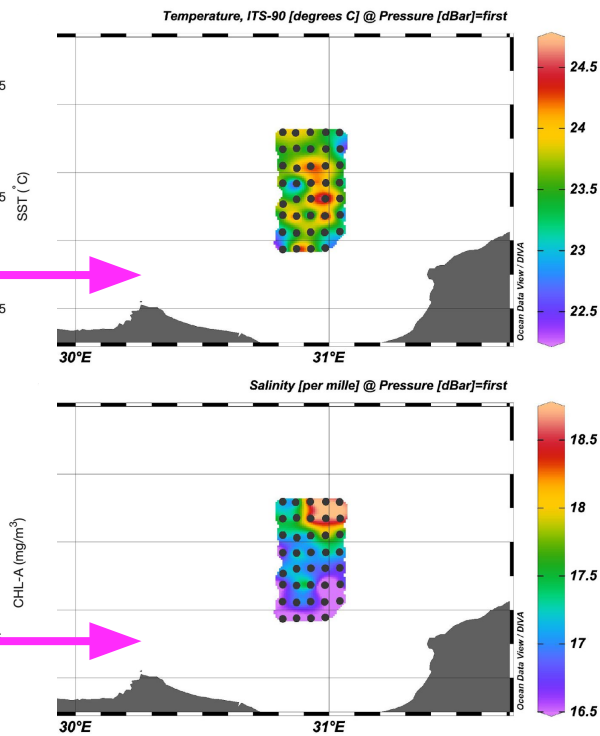
- ❖ CTD grid (~5km spacing) on an anticyclonic eddy (a.k.a: “Sakarya eddy”) on both 1st and 2nd leg.
- ❖ We observed the propagation and dissipation of the anticyclone over the month.
- ❖ Interesting high-salinity on the eddy periphery. Data are still under investigation.



CTD Grid on 1st leg: June 02, 2023



CTD Grid on 2nd leg: June 22, 2023



Fine-scale T/S gradients

Marmara and Black Seas SWOT AdAC campaign

Future perspectives

- Further data analysis (ADCP) and quality controls
-
- Investigation of the observed fine-scale structures in detail
-
- Validated SWOT data and comparisons with *in-situ* data, and old altimetry products
-
-
-
-

PATASWOT – Patagonian SWOT cal/Val Experiment

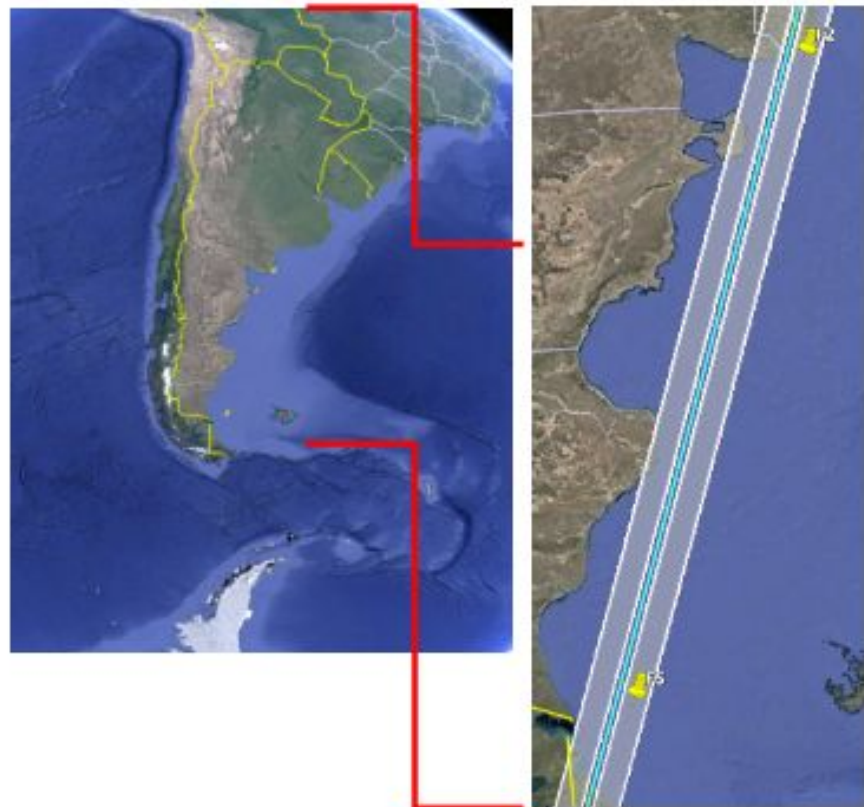
Martin Saraceno

Laura Ruiz Etcheverry

Nicolas Aubone

Melina Martinez

University of Buenos Aires/CONICET- Argentina



PATASWOT AdAC campaign

Scientific objectives

- Understand the signal obtained by SWOT in the ACS
- Obtain in-situ measurements of currents, T, C and P in two distant points along the path of SWOT over the Argentine Continental Shelf (ACS)
- Can we see rapid continental shelf wave propagation in the ACS with SWOT during the 1-day repeat orbit?
- How biased will SWOT data be during the science mission due to this continental shelf wave propagation?



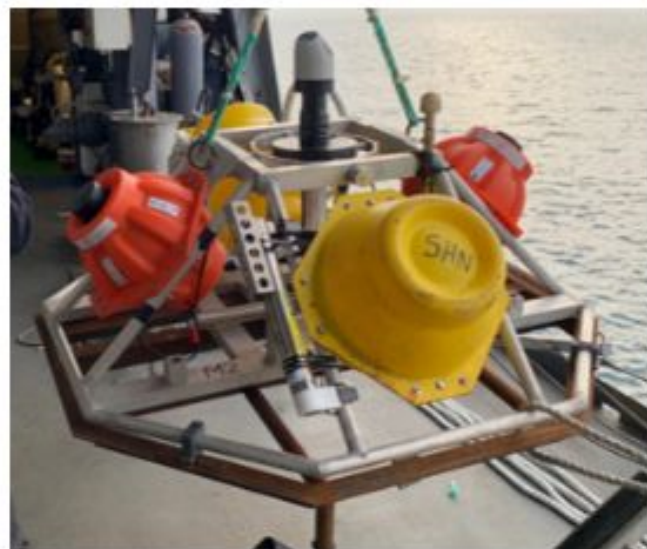
SWOT AdAC campaign

Measurements done

Horizontal currents in the water column;
T, C and P at the bottom

Instruments deployed between 12 and 15 of
April 2023

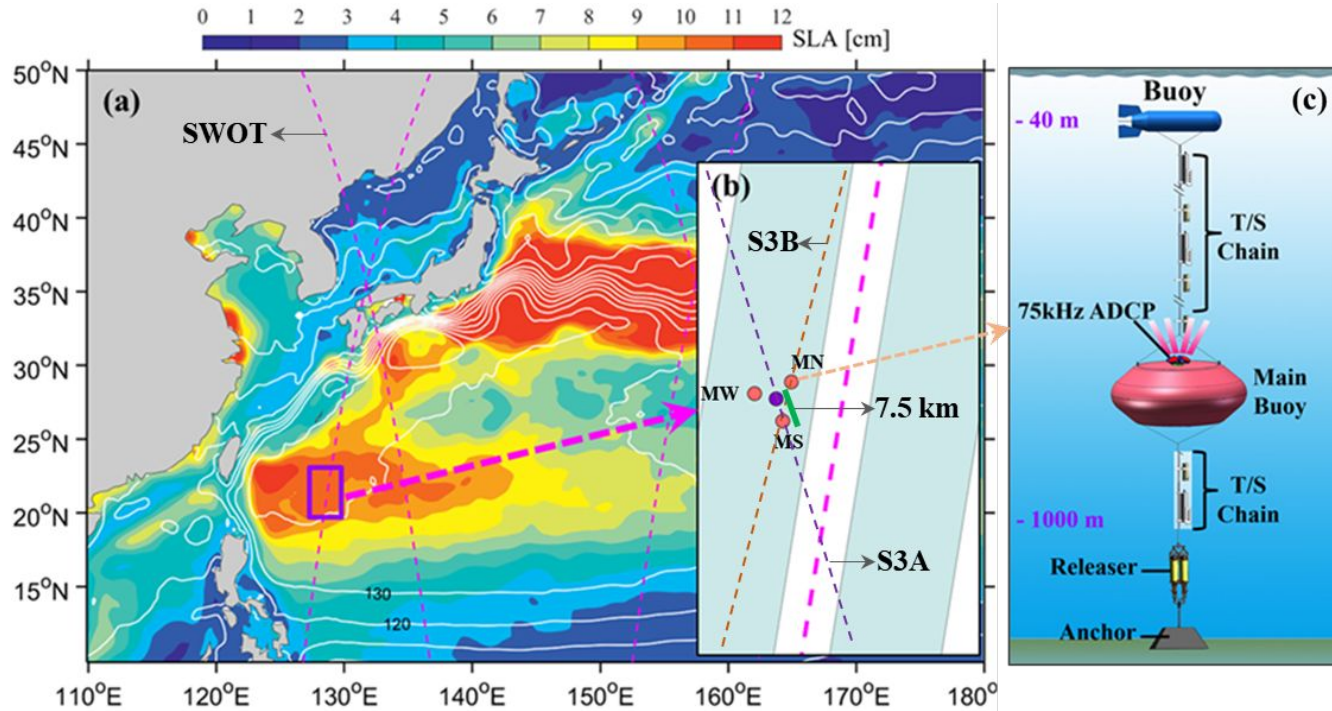
Recovery: TBC (expected: October 2023)



Open ocean circulation and energy cascade

The North West Pacific SWOT Cal/Val campaign

Zhao Jing, Ge Chen, Zhiwei Zhang, Zhaohui Chen (Ocean University of China)



The central mooring (purple dot, MC) is equipped with an upward-looking ADCP.

Another three moorings (pink dots) are equipped with an upward-looking ADCP and the T/S chain.

SWOT AdAC campaign

Scientific objects

1. A better understanding of submesoscale processes in a highly stratified current system, including their induced energy cascade and vertical transport.
2. A benchmark for validating sea level anomaly (SLA) observations by SWOT.
3. An assessment of accuracy of surface currents reconstructed from SLA based on the geostrophic balance.

SWOT AdAC campaign

Measurements done

Observation between July 27, 2022 and June 26, 2023

Sites	Current profiles	T/S profiles
MN	Hourly 60-500 m	Hourly 200-1200 m
MS	Hourly 60-400 m	Hourly 40-1040 m
MW	Hourly 60-450 m	Hourly 90-1090 m
MC	Hourly 60-550 m	/



SBE 56

SBE 37
CTD



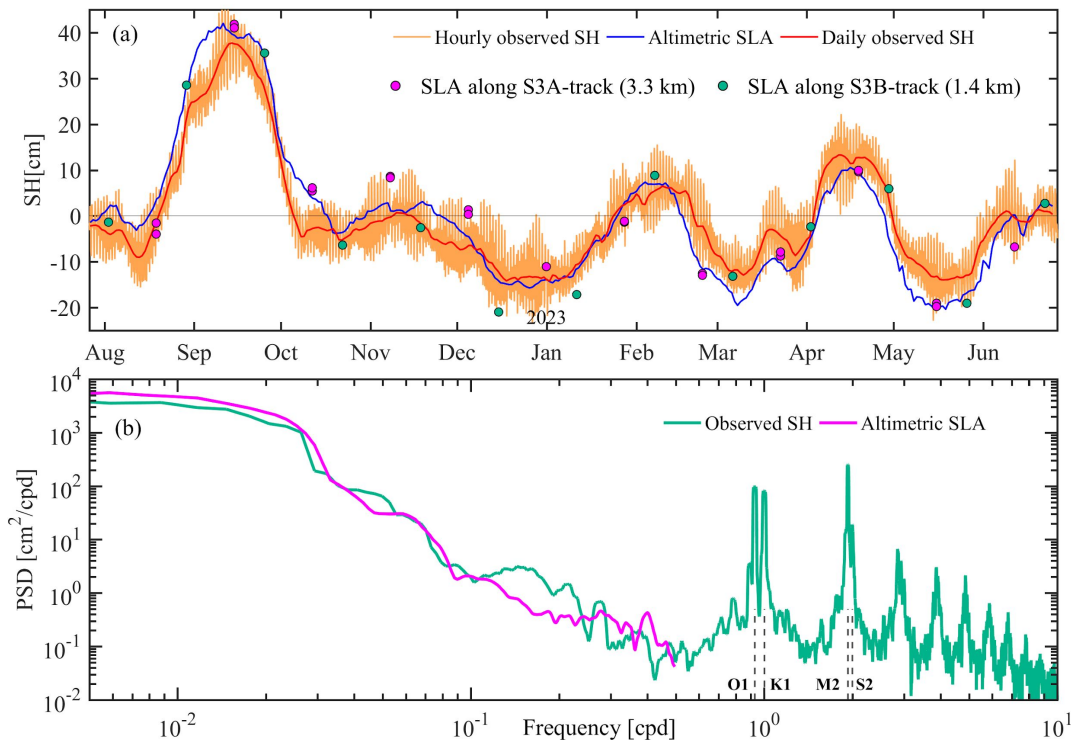
75 kHz
ADCP



SWOT AdAC campaign

Preliminary results

1. Steric height (SH) is computed based on the T/S profiles at the mooring MS.
2. SH is mainly resulted from eddies and internal gravity waves.
3. The gridded (0.25°) and along-track altimetric SLA are broadly consistent with the observed SH at the mooring MS.



Comparison between observed SH and altimetric SLA.

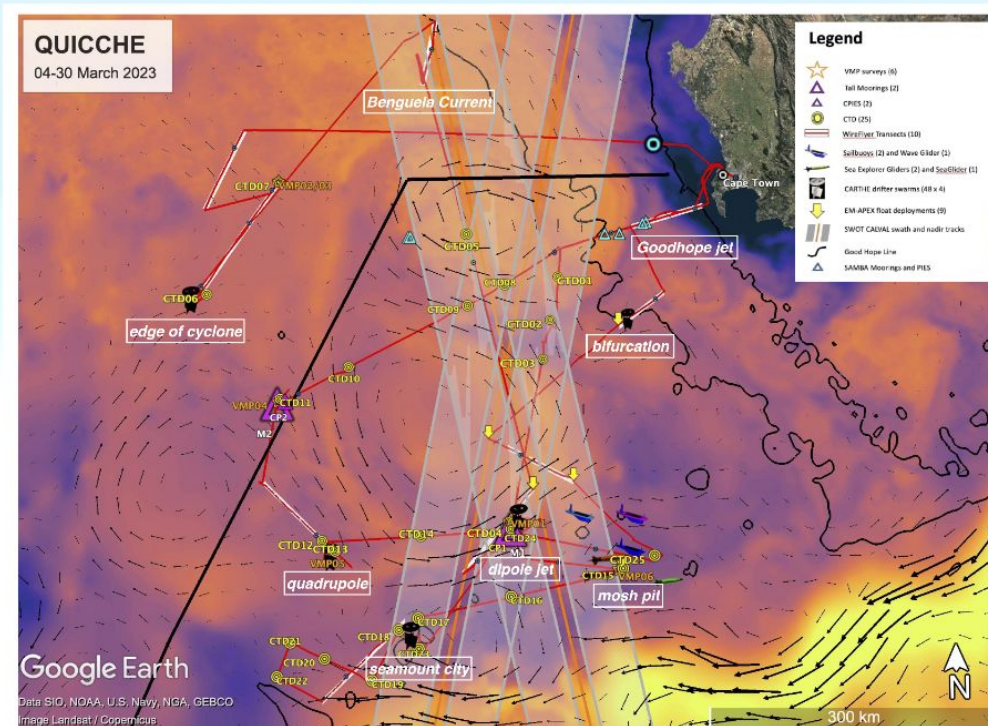
SWOT AdAC campaign

Future perspectives

1. Analyze the dynamics of submesoscale processes, including their induced energy cascade and vertical transport.
3. Compare steric height (SH) observed by moorings with SLA measured by SWOT.
4. Quantify the accuracy of surface currents reconstructed from SLA based on the geostrophic balance.

Quantifying Interoceanic fluxes in the Cape Cauldron Hotspot of Eddy kinetic energy

Rapid warming, strengthening winds, and increasing eddy kinetic energy within the Cape Basin point to more Agulhas waters leaking into the Atlantic, but hindcasts are inconclusive. More leakage could stabilize the AMOC, depending on how these waters, their heat, salt, content, are transformed as they pass through the basin. During our 26-day cruise to the Cape Basin in March 2023 we used a variety of instrumentation—including moorings, CPIES, CTDs, gliders, WireFlyer, microstructure profiler, drifters, profiling floats, and uncrewed surface vessels—to capture mesoscale stirring, submesoscale features, vertical mixing, and air-sea fluxes. From these new observations we can quantify Agulhas leakage using theoretical eddy diffusivity and eddy flux frameworks. We can also account for surface heat loss and turbulent mixing on the transformation of Agulhas waters. And, we can *relate the diffusivity and fluxes we observe to daily SWOT crossover measurements* and to decades of existing satellite data, looking for relationships that may infer change in Agulhas leakage.



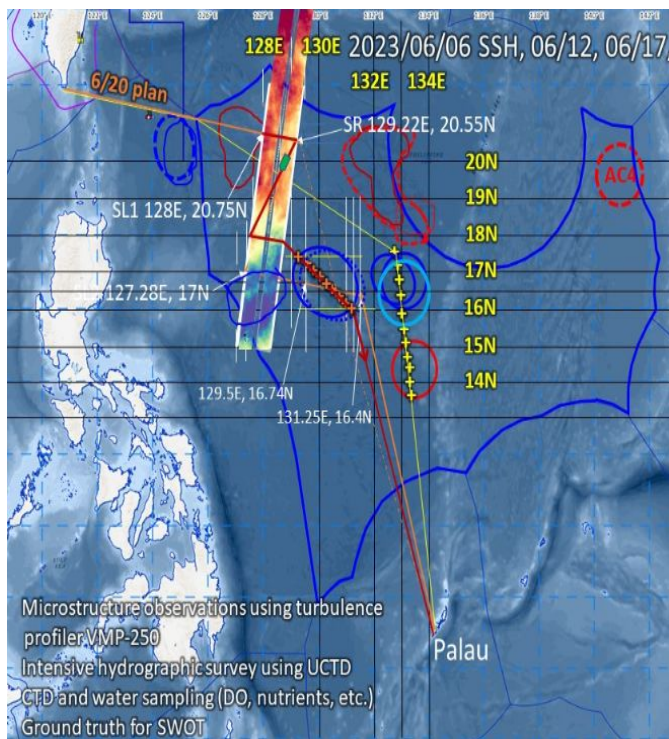
Lisa Beal, Kathleen Donohue, and Chris Roman (US), Yueng Djern Lenn (UK), Sebastian Swart (Sweden), Sarah Nicholson and Sarah Fawcett (South Africa)

ADAC western Pacific: Cruise name LGD2308 from Taiwan to Palau

Cheinway Hwang, National Yang Ming Chiao Tung University, Taiwan

Emmy TY Chang, National Taiwan University, Taiwan

Daocheng Yu, Liaoning Technical University, China



SWOT AdAC western Pacific

Scientific objects

- Use GNSS to collect sea surface heights across a SWOT swath (pass 21) to validate SWOT Karin observations
- Collecting data along 41 turbulence profiles. This is the first time that the Taiwanese team conducted intensive turbulence observations inside large-scale ocean eddies, setting the record for the easternmost and southernmost direct measurements of turbulence
- Exploring the energy exchange and transfer caused by the interactions between mesoscale oceanic eddies and inertial internal waves

Geodesy

SWOT AdAC western Pacific

GNSS measurements

The GNSS receiver and level gauge employed for precise measurements of sea surface heights with an accuracy reaching the centimeter level. The image was taken on June 27, 2023.



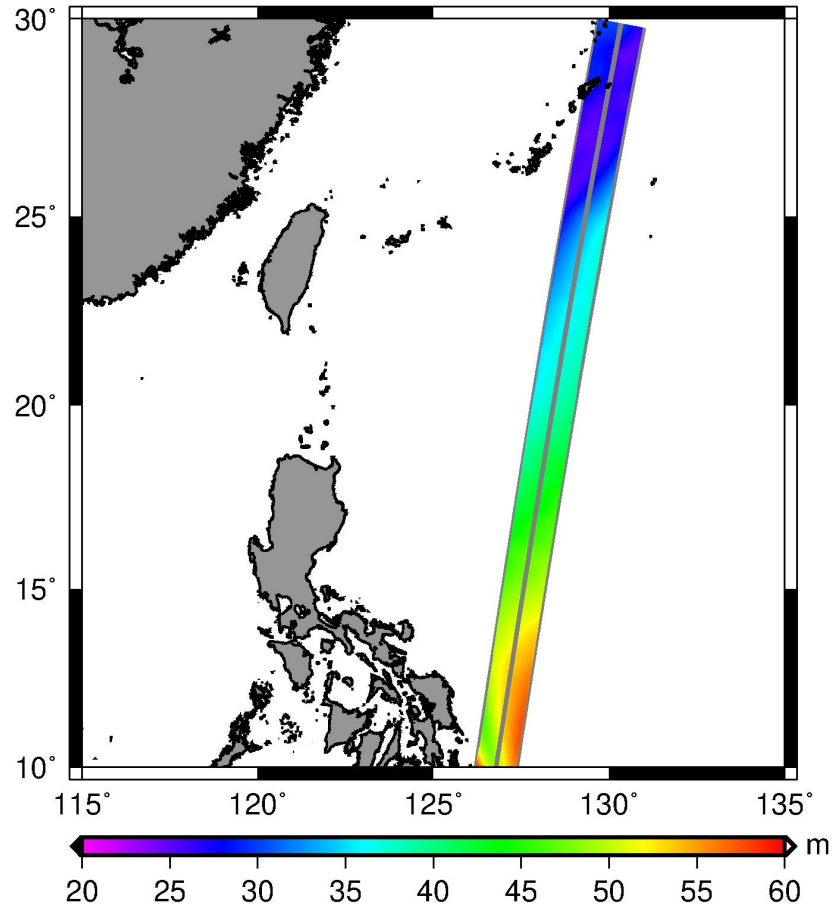
SWOT AdAC campaign – western pacific

SWOT AdAC western Pacific

Preliminary results

- Sea surface heights from SWOT Karin in western Pacific
- **PPP results from GNSS measurements**
- **Ocean tide and solid earth tide corrections**

Sea surface heights from Karin observations along pass 21 in the ADAC western validation area

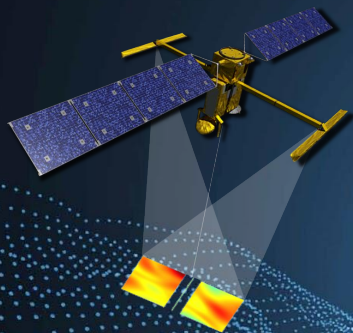


AdAC western Pacific

Future perspectives

- Enhance the GNSS sea surface heights
- Analyzing eddy geometry and dynamics using SWOT Karin observation
- A new cruise to collect GNSS sea surface heights

Opportunistic campaigns



SWOT AdAC

North Atlantic cross-overs opportunity

A Laloue, M-I Pujol, Y Faugère (CLS)
G Dibarboure (CNES)

- 2 cross-overs considered
- 5 WAVY buoys for MELOA project (<https://www.ec-meloa.eu/>) : direct measure of waves height and indirect measure of the surface current



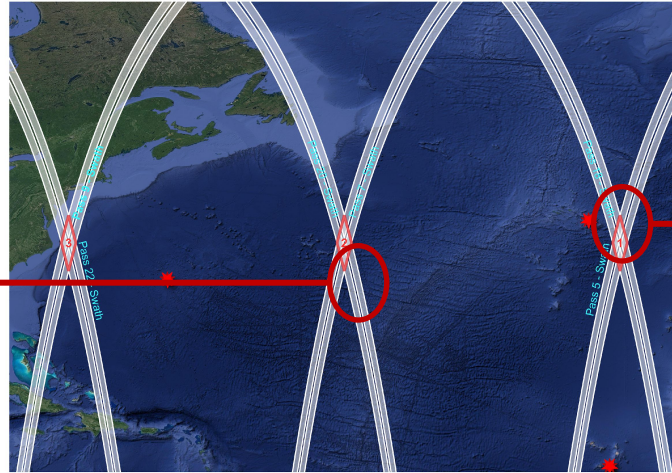
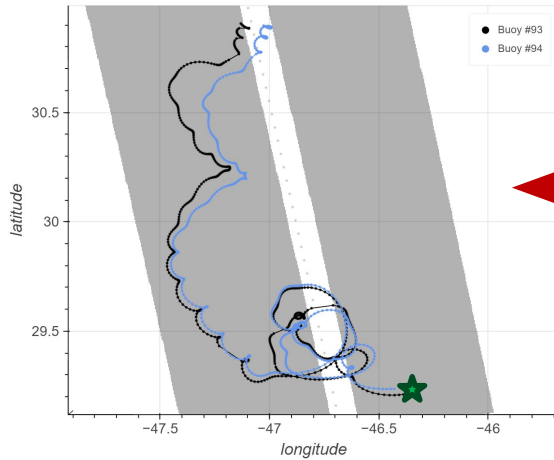
WAVY buoy

EXPEDITION 7^e CONTINENT

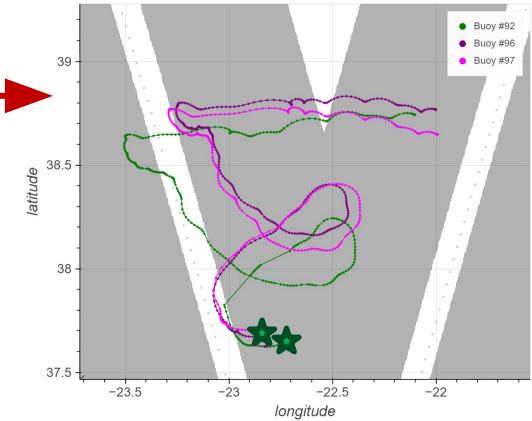
septiemecontinent.com | seventh-continent.com



Trajectory of 2 WAVY launched under the SWOT 1-day swath over the [2023/06/05, 2023/07/11] period



Trajectory of 3 WAVY launched under the SWOT 1-day swath over the [2023/06/18, 2023/07/11] period



★ Starting point

- Comparison of SWH measurements with SWOT
- Comparison of surface current and mesoscale with SWOT

