Regional Validation Working Group Oceanography Splinter Session Summary

The fine scales (1-100km) are a key oceanic regime controlling :

- energy cascades
- exchange of energy and matter between the ocean surface, the ocean interior and the atmosphere
- modulation of biogeochemical and ecological processes

Conventional Altimetry

Jason-type constellation

All-weather, global Sea Surface Height, resolution down to 70-100km, ~1 week

Scales 10-100km : « small mesoscale » and some submesoscale

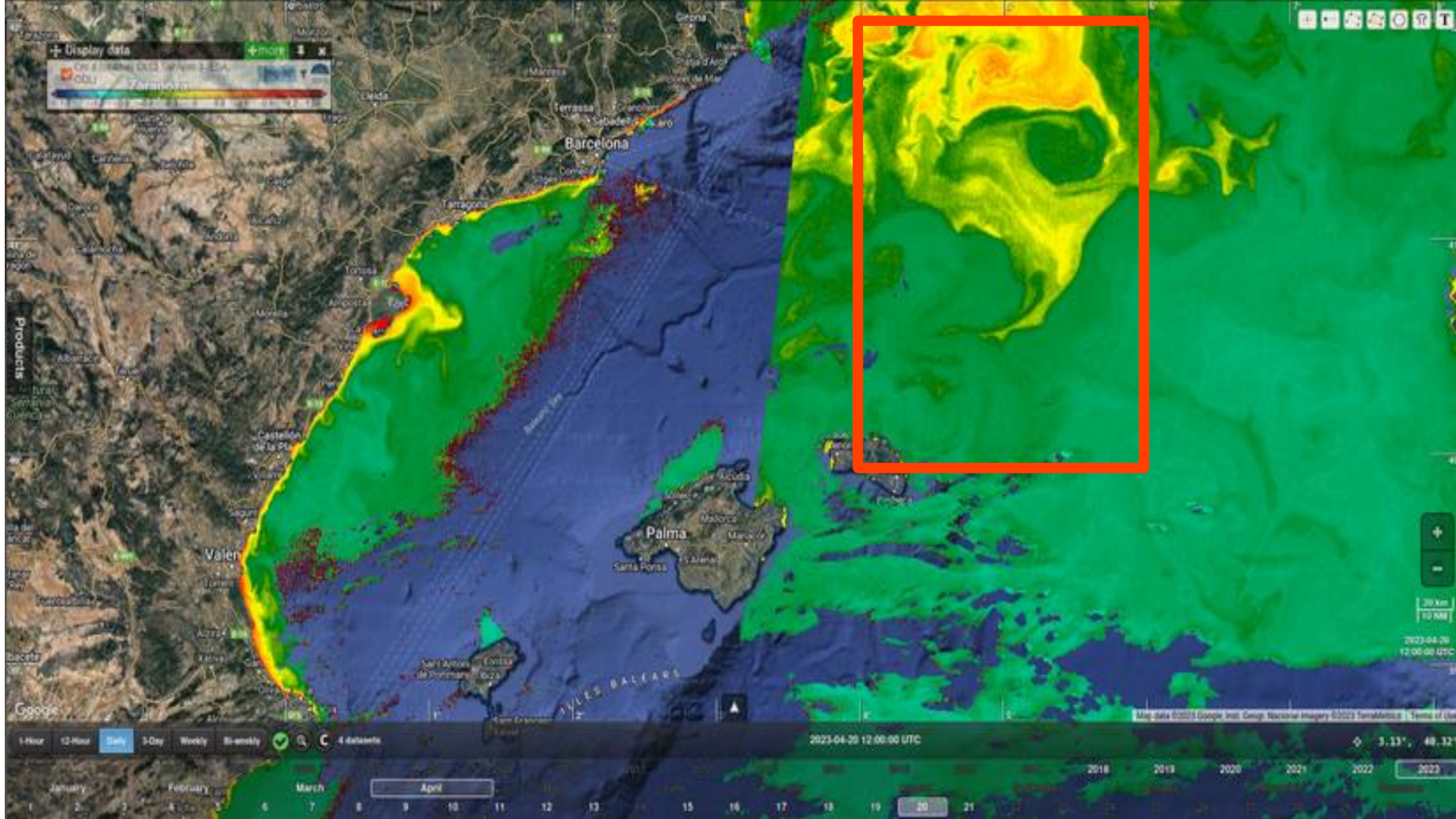
Scales 1-10 km, < ~1 week

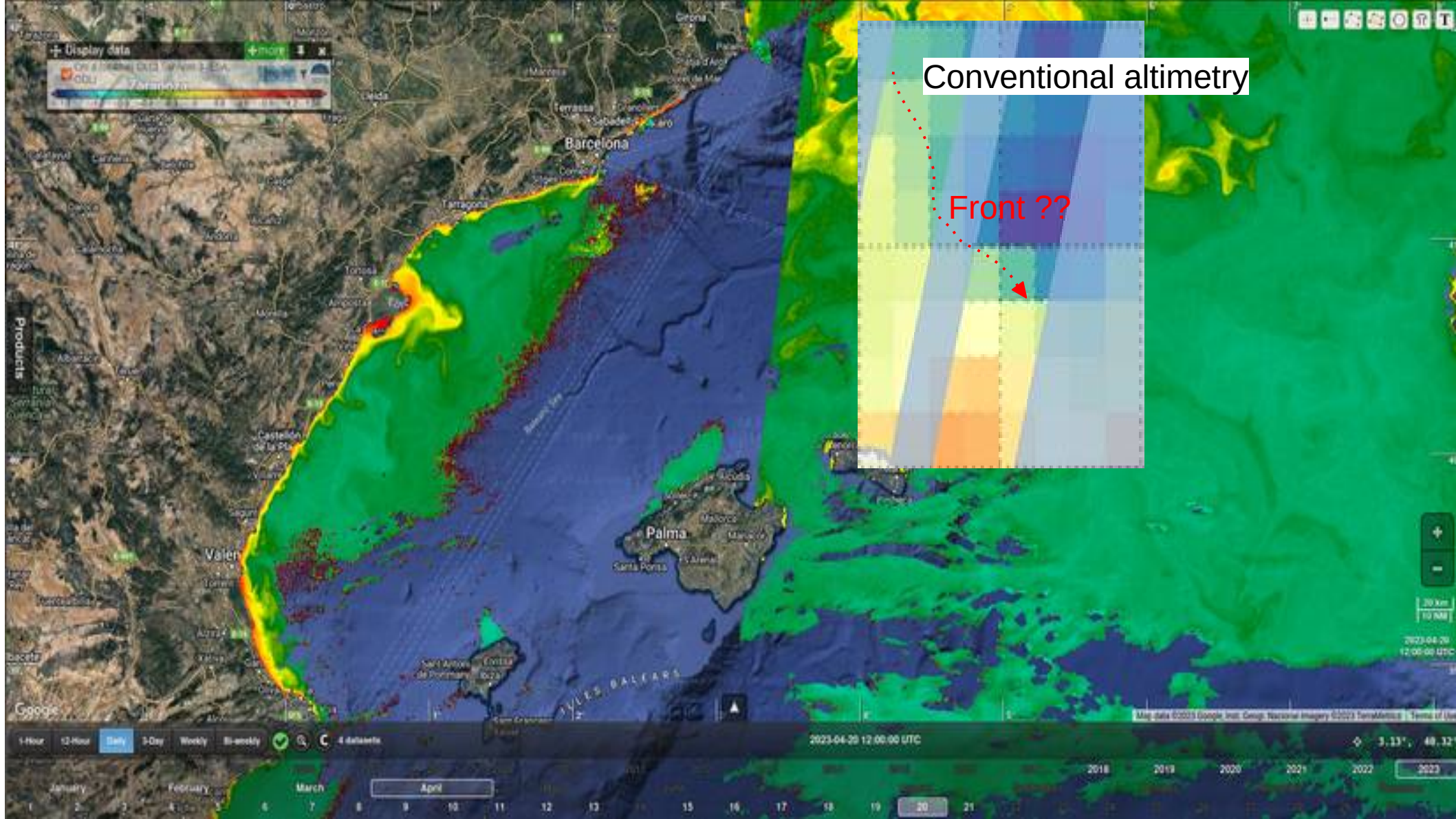
Coastal areas

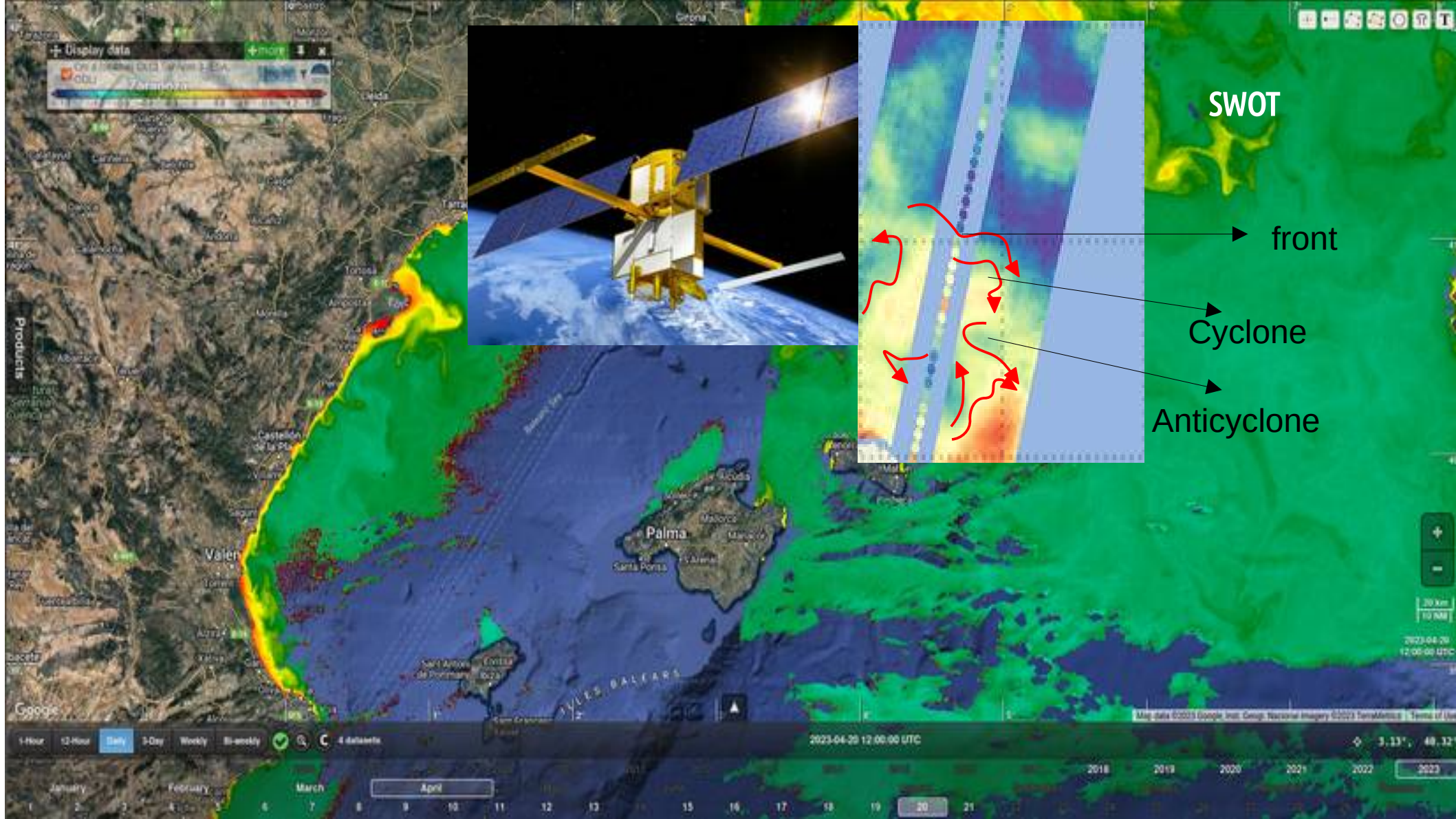
Ageostrophic dynamics

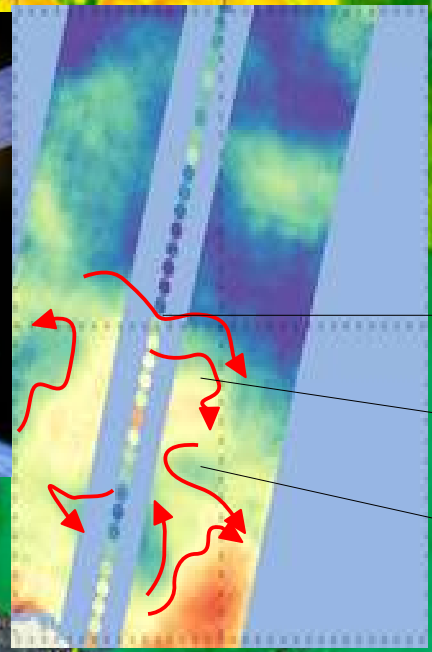
(some) internal wave dynamics

SWOT


Display data
Barcelona
Tarragona
Palma
Products
2023-04-20 12:00:00 UTC


Conventional altimetry
Front ??
Barcelona
Palma
Products


SWOT
front
Cyclone
Anticyclone
Palma
Products
Display data
2023-04-20 12:00:00 UTC



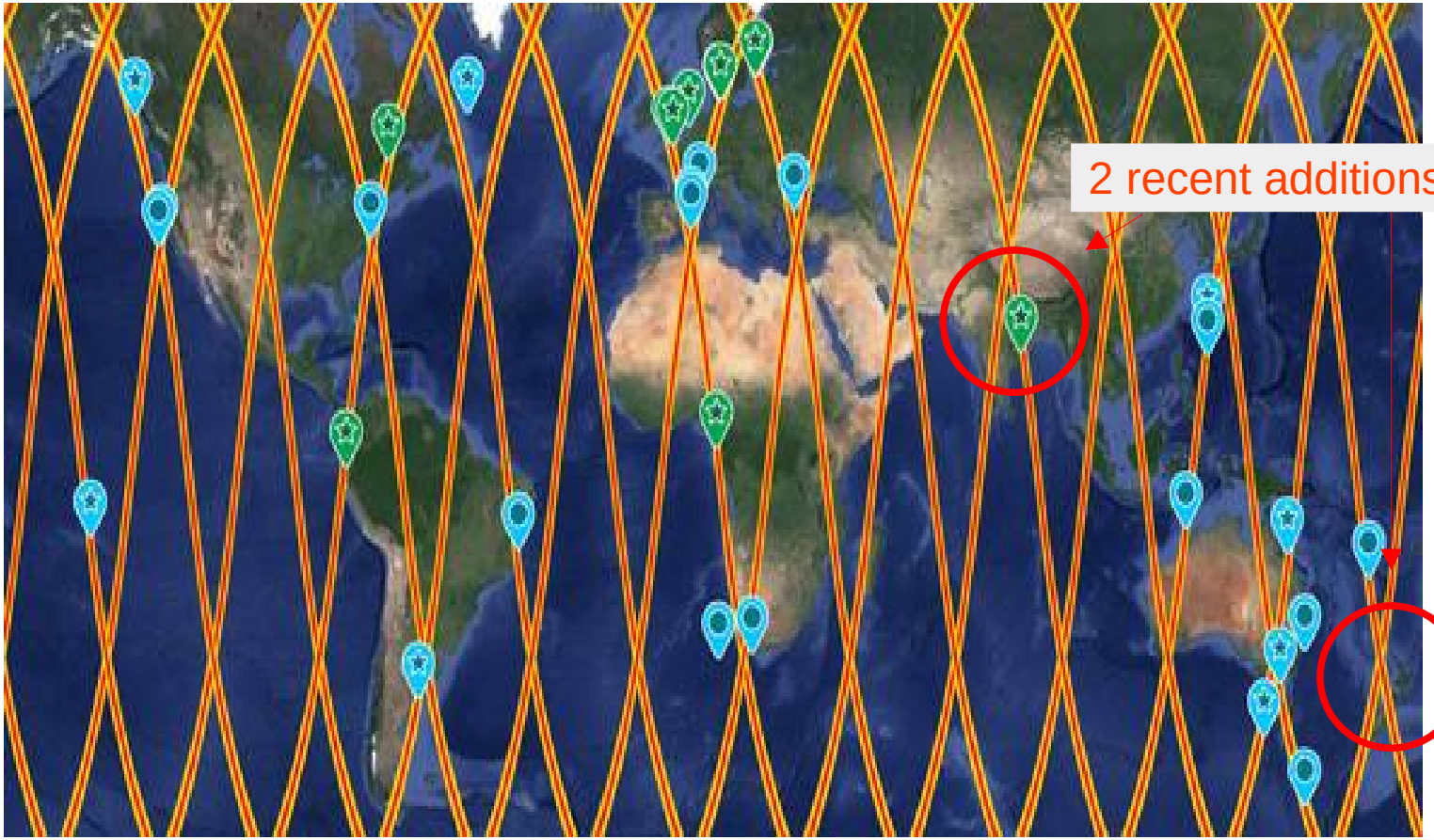
SWOT

A big thank you to our Ocean Leads and NASA, CNES, JPL, CLS, AdAC teams who have made possible to have data so early !

SWOT Adopt-a-Crossover Consortium

https://www.swot-adac.org

SWOT AdAC



14 offshore (ship)

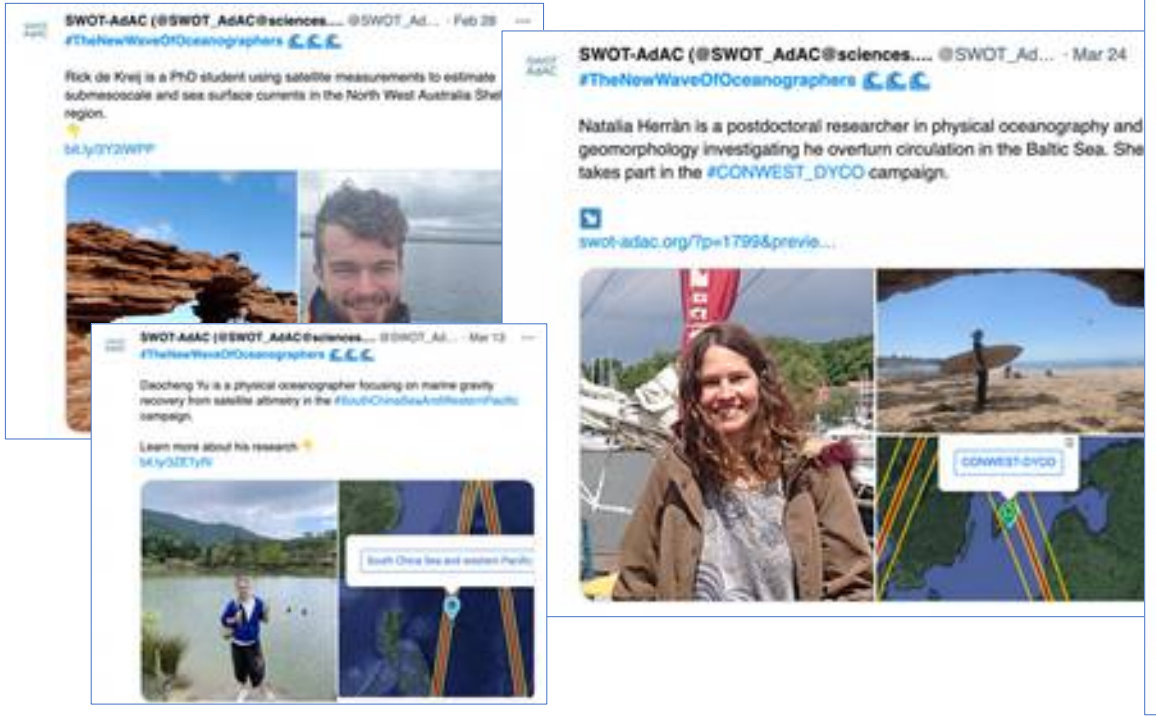
7 offshore (infrastructure)

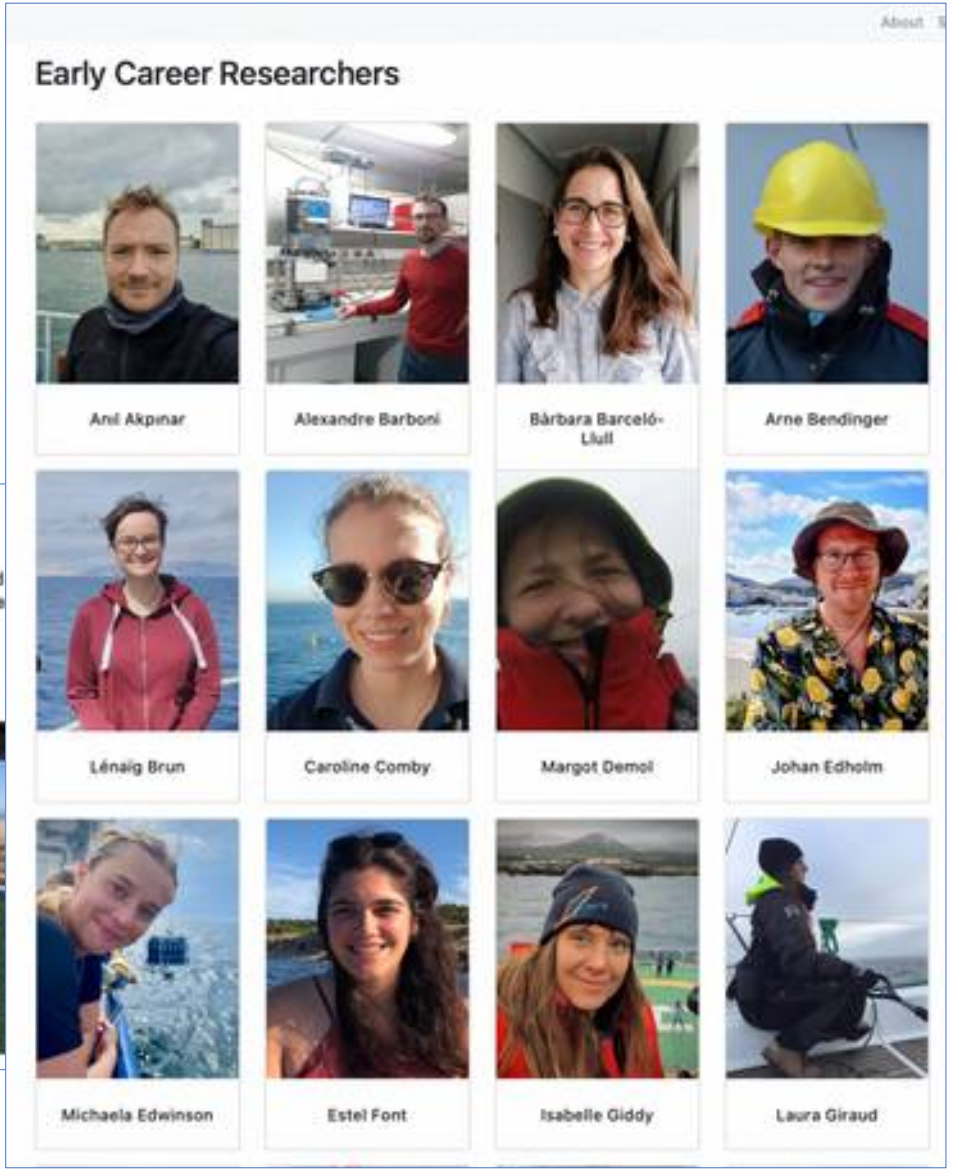
9 coastal/estuary

cnes NASA IPSL CLIVAR

The new wave of oceanographers

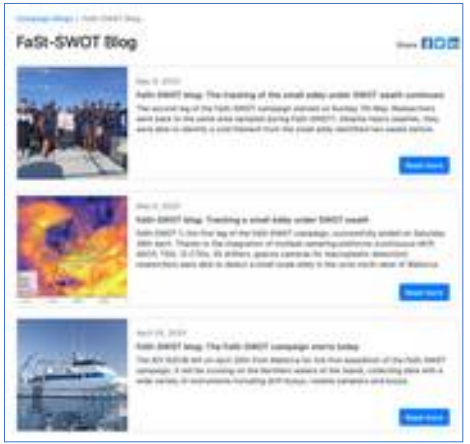
*Interviews with **28 early career researchers** published on SWOT AdAC and shared on social media.*





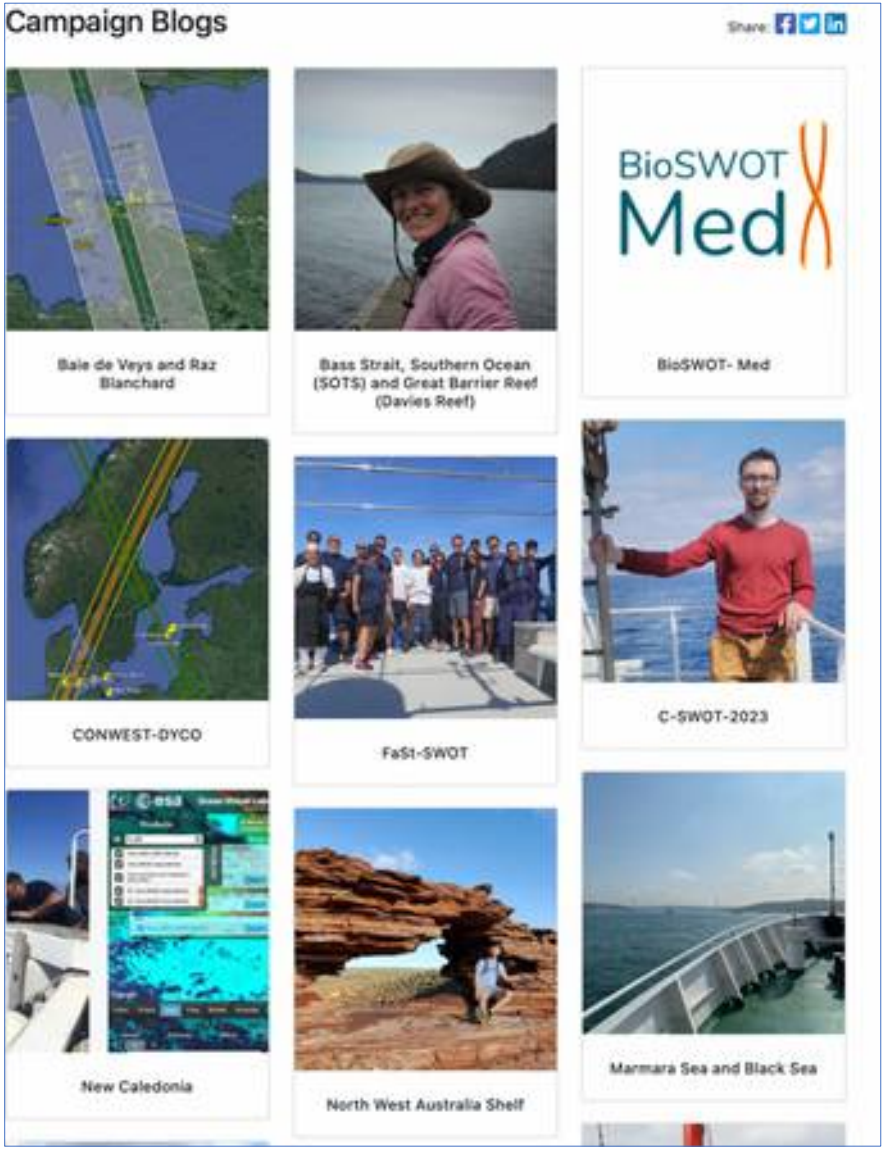
Campaign Blogs

Published campaign blogs:
(Baie de Veys and Raz Blanchard, BioSWOT-Med, CONWEST-DYCO, C-SWOT-2003, FaSt-SWOT, SWOTALIS, …)

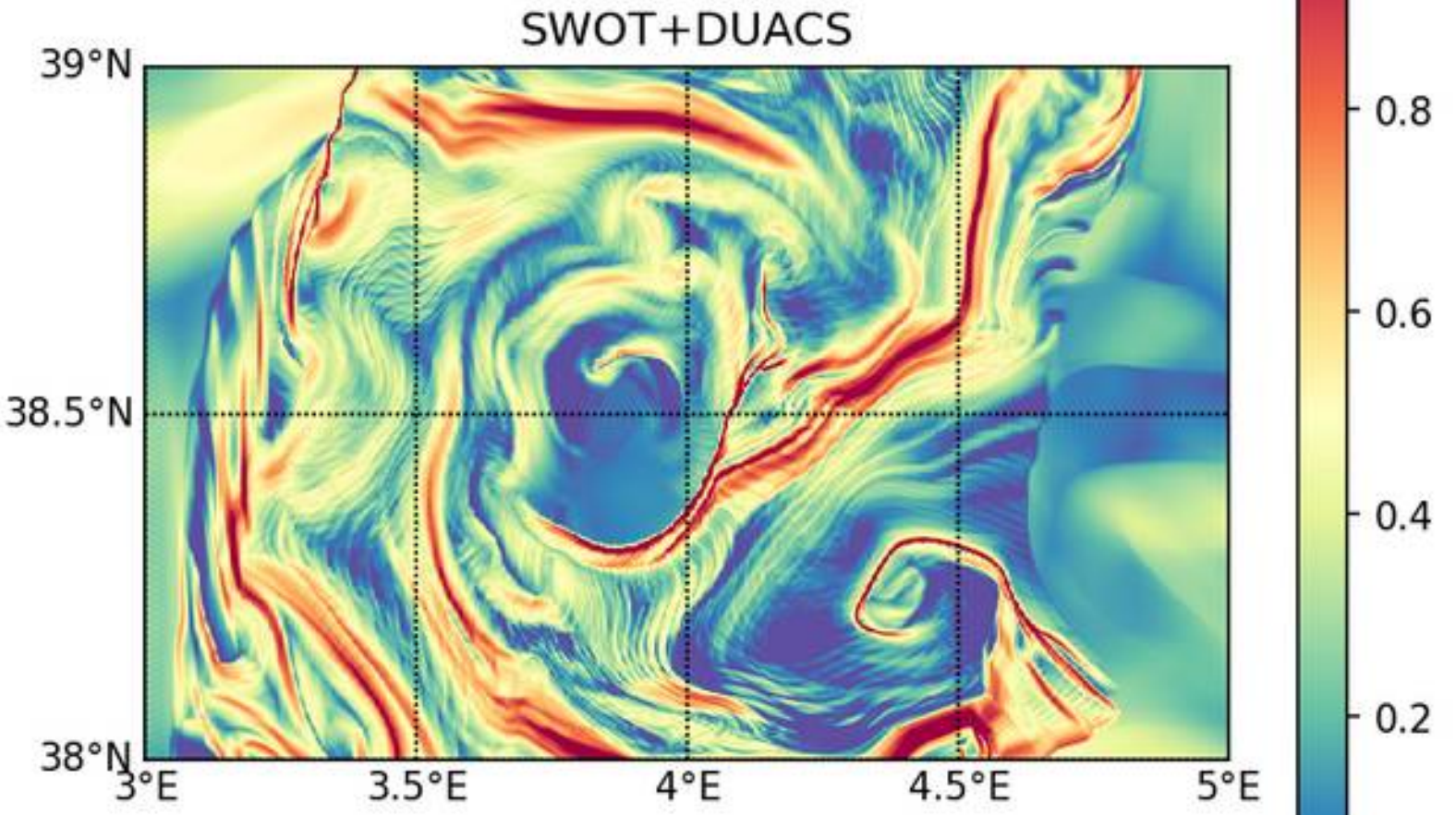


Curated the BioSWOT-Med blog:

- *BioSWOT-Med Timeline*
- *Interviewed 20 researchers;*
- *Currently editing a book on the campaign that will be published by Aix-Marseille University.*



SPASSO ready on L3 products



L. Roussoulet
AdAC Science Officer

Lidar succesfully validated KaRIn at long wavelengths

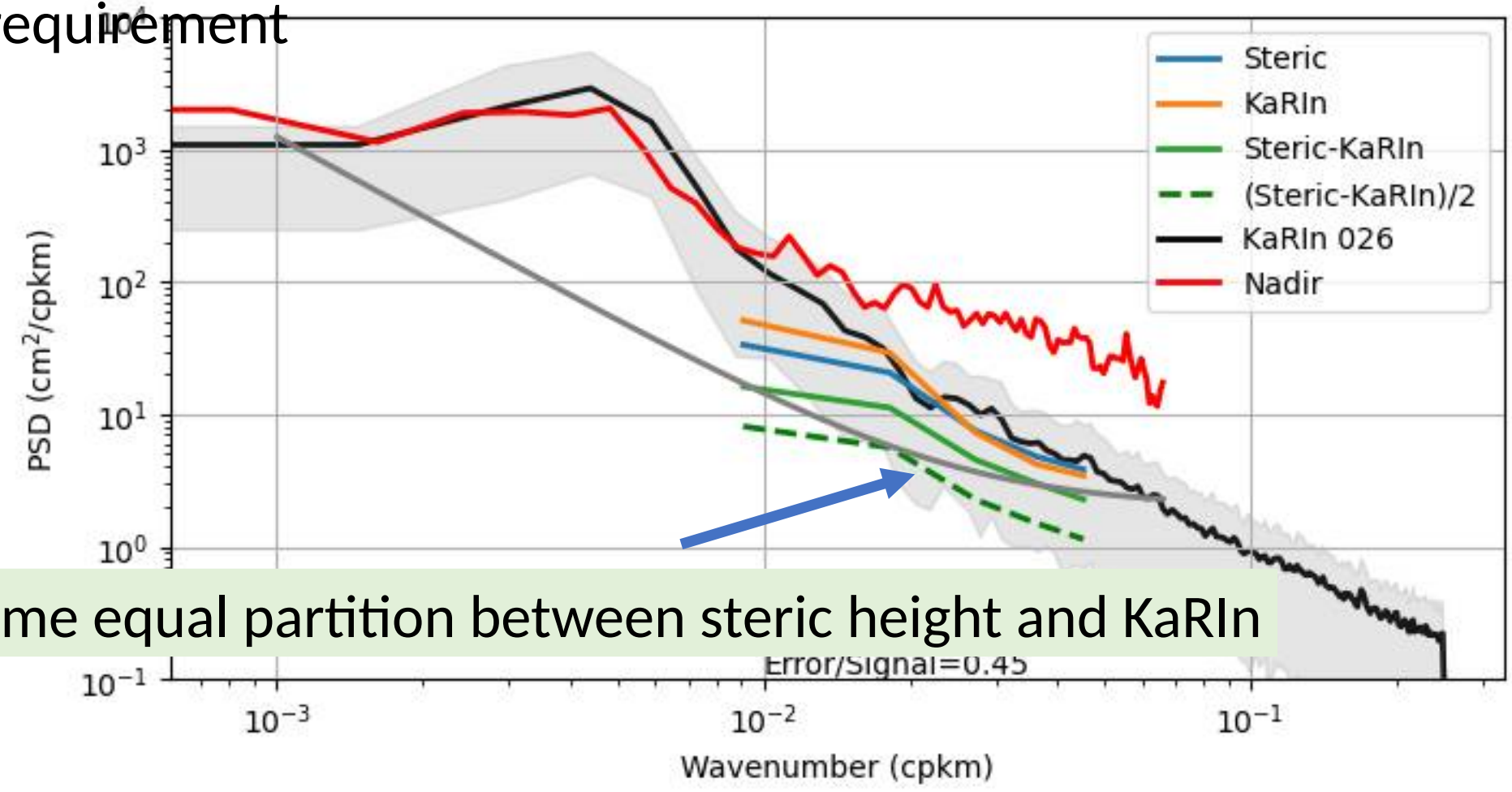
On-going work for the short wavelengths

S-MODE campaigns was carried out during the Cal/Val period and produced large amount of freely accessible data for validation

GNSS

- **PPP allows to process GNSS data everywhere even far from any fixed receiver**
  - Comparisons with independent observations (e.g. altimetry and tide gauges) **suggest absolute accuracies of SSH are 1–2 cm** (DSSH < 1 cm).
  - **The experiments bring tremendous datasets to validate aspects of SWOT**, and SSH signals. They also drive processing strategies and testing and intercomparison approaches.
  - **Many emerging applications**
    - Altimeter calibration/validation.
    - Sea level monitoring (“open ocean tide gauge”)
    - Sea-floor geodesy and natural hazards
    - Tsunamis (direct detection and traveling ionospheric disturbances).
    - Atmospheric river monitoring (continuous, integrated precipitable water from GPS).
  - **Adaptable to several platforms** (e.g., wavegliders, SailDrones).

For short wavelength (20-100km) KaRIn meets the science requirement

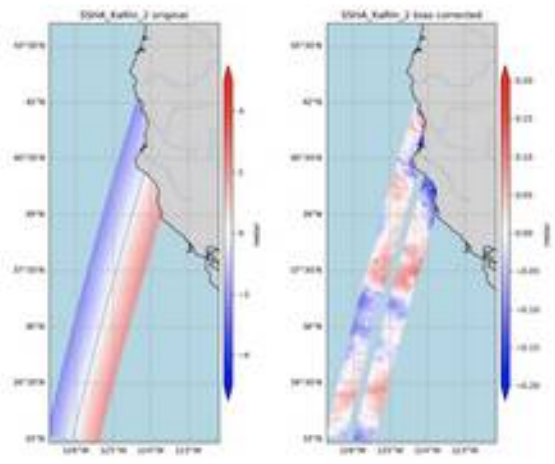


Assume equal partition between steric height and KaRIn

https://github.com/podaac/SWOT-OpenToolkit

Quick Examples

1. Remove cross-swath bias in 2km-resolution ssha_Karin_2.



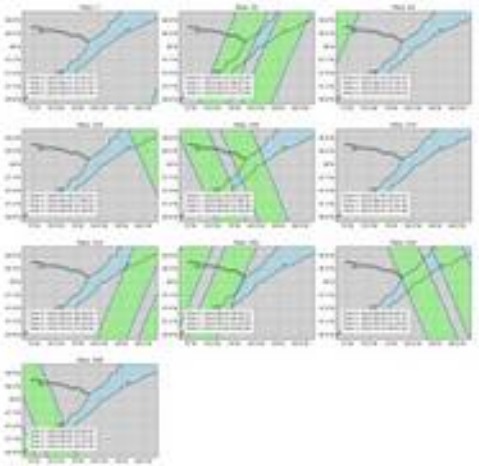
```
# Plot original data
swot.plot_a_segment(ax[0], lon, lat, ssha, title='SSHA_KaRIn_2 original', vmin=-5, vmax=5)

# Bias correction (optional)
ssha_1 = swot.fit_bias(
    ssha, distance,
    check_bad_point_threshold=0.1,
    remove_along_track_polynomial=True
)

# mask out data in nadir and outside of 60km swath width
distance = np.nanmean(distance, axis=0 )
msk = (np.abs(distance) < 60e3) & (np.abs(distance) > 10e3)
lon[:, ~msk] = np.nan
lat[:, ~msk] = np.nan
ssha_1[:, ~msk] = np.nan

# Plot bias corrected data
swot.plot_a_segment(ax[1], lon, lat, ssha_1, title='SSHA_KaRIn_2 bias corrected', vmin=-0.2, vmax=0.2)

# Save and display plot
plt.tight_layout()
plt.savefig('../media/figures/ssha_karin_2_california.png', dpi=100)
```

3. Identify the pass number and timing of the science orbit over a region.

Run the program as follows:

```
python find_swot_timing_science.py -sw_corner -130.0 35.0 -ne_corner -125.0 40.0 -output
```

You will get something like the following figure. It contains the pass number, the satellite passing time (UTC) and the associated visualization.



What is the future of AdAC and Regional Validation WG after the fast sampling phase ?

1. AdAC still needed ? Survey : 100 % (15/15) yes !

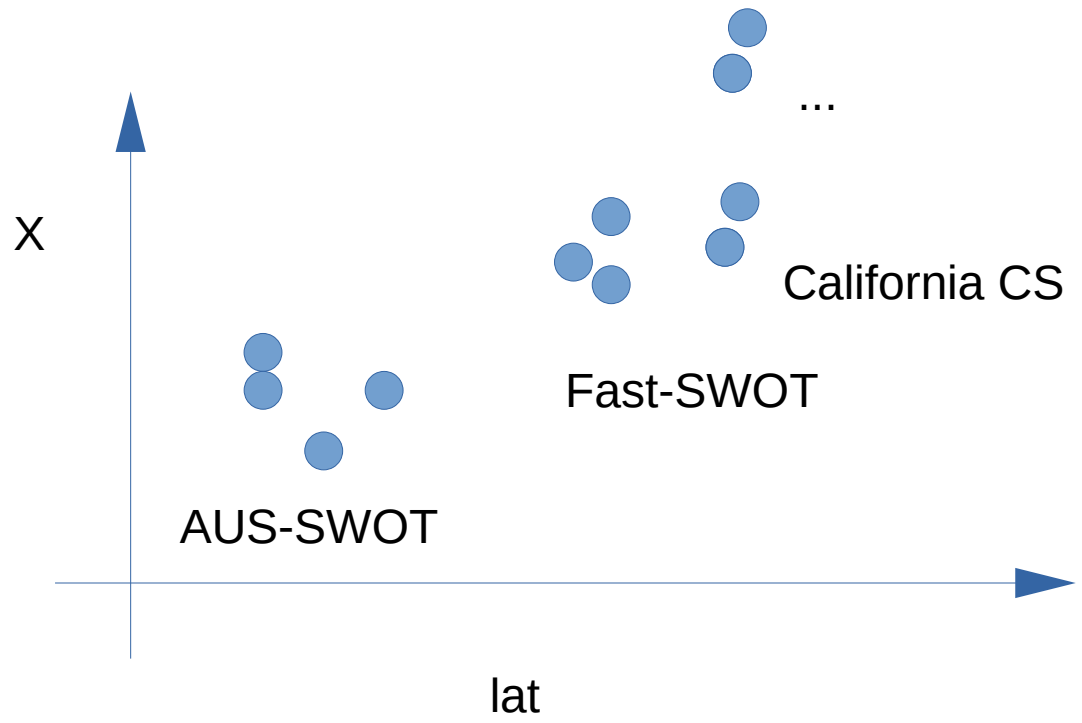
2. What are the best way of using in situ data ?

3. what are the possible synergies with other WG ?

4. Which plan for conferences, special issues, etc. ?

5. Which capacity building actions ?

To be discussed in WG meetings in incoming months



AdAC conference at the end of 2024 ?

Synergies with other WGs ?

1-day orbit		21-day orbit
SWOT **Adopt-A-Crossover** (AdAC)	→	SWOT **Adaptive-Campaigns** (AdaC) as part of Center for Topographic studies of the Ocean and Hydrosphere

1. Community

Pis of campaigns in SWOT swaths/crossovers	→	Pis of campaigns with strong fine-scale component

2. Science support

- Multi-satellite products, SPASSO and other software tools for sampling strategy. 1 Science Officer (Louise)	→	- Multi-satellite products, SPASSO and other software tools for sampling strategy + Support for SWOT L3/L4 products handling + Support for in situ data qualification 1 Science Officer (Louise) 1 Data Officer (Lloyd Izard)

3. Comm support

Comm Officer