SWOT-AdAC supports

L. Rousselet, F. d'Ovidio

SWOT-ST meeting, Toulouse, 18-22 September 2023

Plan

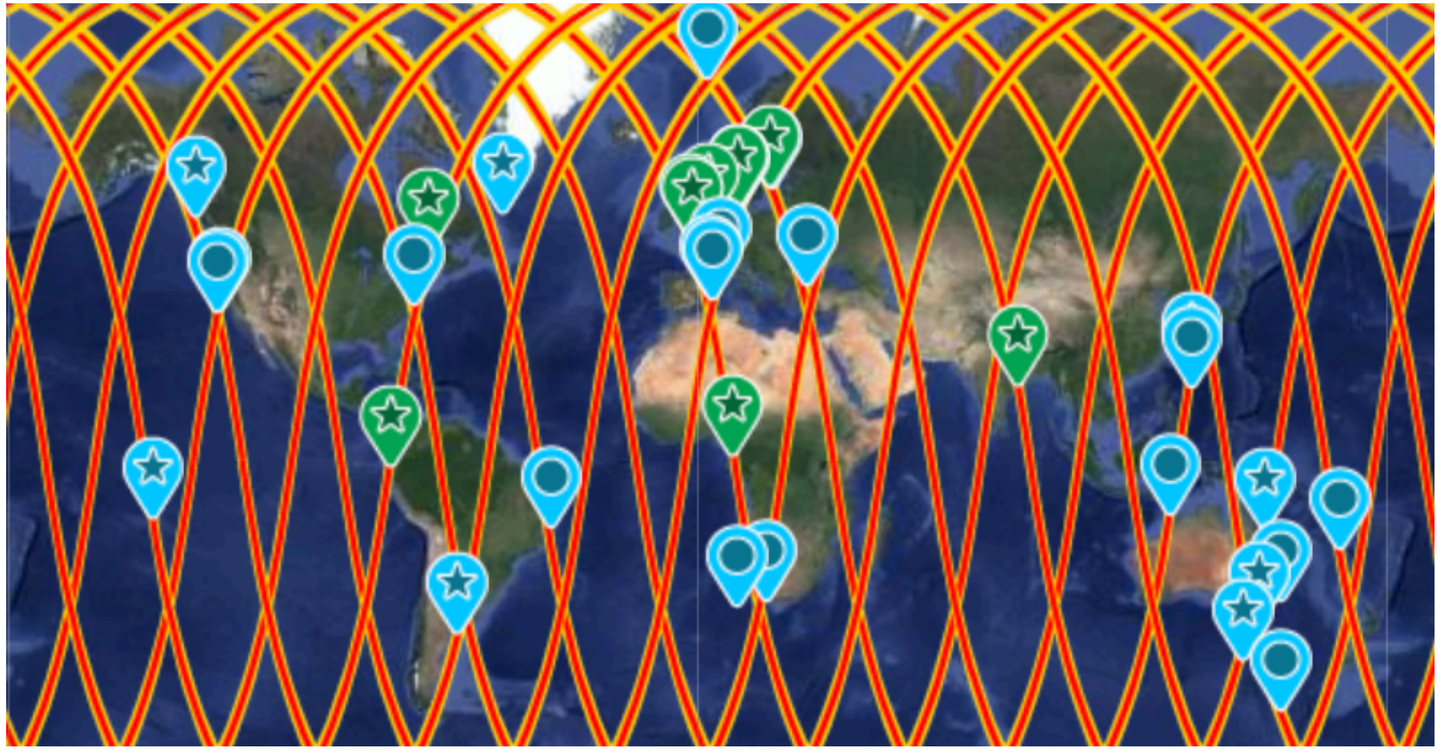
1) **Fast-sampling phase supports**
   → provided support summary

2) **BioSWOT-Med sampling strategy with SWOT**
   → How useful NRT KaRIn images are ? (Example for BioSWOT-Med)

3) **Tools for SWOT-AdAC community**
   → What is possible so far with L3_LR_SWOT ?

1) Fast-sampling phase

SWOT-AdAC support: assist in situ cruises with their sampling strategies by providing near-real time information of ocean state over the sampling region (SWOT crossover site)

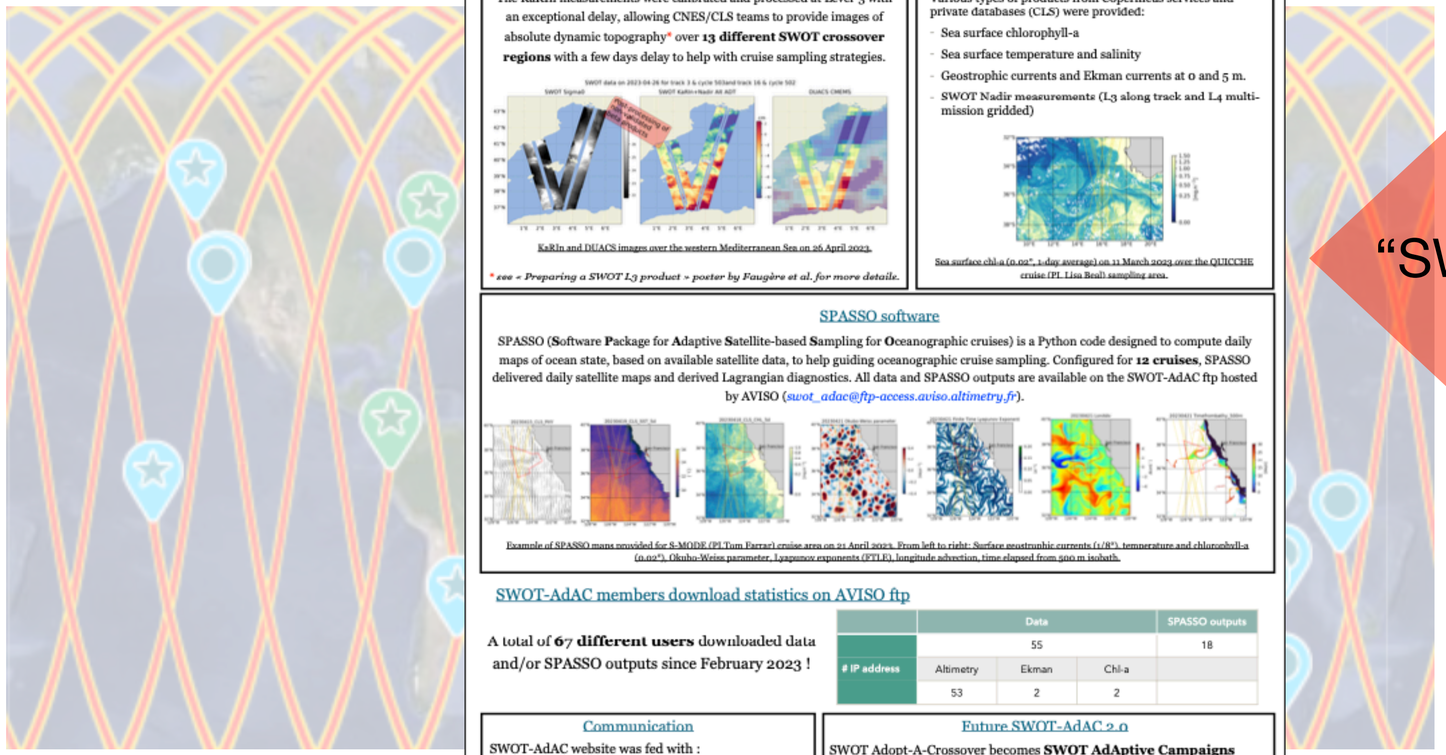


More than 30 offshore and coastal in situ measurements (cruises and infrastructures)

↳
- Satellite data
- SPASSO outputs
- NRT KaRIn images
- Communication

1) Fast-sampling phase

SWOT-AdAC support: g strategies by providing near-real time information of ocean state over th e)



2023 SWOT Science Team Meeting
18-22 September, Toulouse (FRANCE)

SWOT-AdAC support during SWOT fast sampling phase

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Since beginning of 2023, **19 in-situ campaigns** benefited from various supports including near-real time satellite products (~20 types), SPASSO bulletins (+1,000), KaRIn NRT images (+120) and communication.

Quasi-near-real time KaRIn images

The KaRIn measurements were calibrated and processed at Level-3 with an exceptional delay, allowing CNES/CLS teams to provide images of absolute dynamic topography* over **13 different SWOT crossover regions** with a few days delay to help with cruise sampling strategies.

KaRIn and DUACS images over the western Mediterranean Sea on 26 April 2023.

* *see « Preparing a SWOT L3 product » poster by Faugère et al. for more details.*

Near-real time satellite products

Various types of products from Copernicus services and private databases (CLS) were provided:

- Sea surface chlorophyll-a
- Sea surface temperature and salinity
- Geostrophic currents and Ekman currents at 0 and 5 m.
- SWOT Nadir measurements (L3 along track and L4 multi-mission gridded)

Sea surface chl-a (0.02°, 1-day average) on 11 March 2023 over the QUICCHE cruise (PI. Lisa Beal) sampling area.

SPASSO software

SPASSO (**S**oftware **P**ackage for **A**daptive **S**atellite-based **S**ampling for **O**ceanographic cruises) is a Python code designed to compute daily maps of ocean state, based on available satellite data, to help guiding oceanographic cruise sampling. Configured for **12 cruises**, SPASSO delivered daily satellite maps and derived Lagrangian diagnostics. All data and SPASSO outputs are available on the SWOT-AdAC ftp hosted by AVISO (*swot_adac@ftp-access.aviso.altimetry.fr*).

Example of SPASSO maps provided for S-MODE (PI Tom Farrar) cruise area on 21 April 2023. From left to right: Surface geostrophic currents (1/8°), temperature and chlorophyll-a (0.02°), Okubo-Weiss parameter, Lyapunov exponents (FTLE), longitude advection, time elapsed from 500 m isobath.

SWOT-AdAC members download statistics on AVISO ftp

A total of **67 different users** downloaded data and/or SPASSO outputs since February 2023 !

	Data			SPASSO outputs
	55			18
# IP address	Altimetry	Ekman	Chl-a	
	53	2	2	

Communication

SWOT-AdAC website was fed with :

- All SWOT-AdAC campaign description
- Early career researcher interviews (~ 30)
- Campaign blogs (~15)

News about SWOT-AdAC activities were also posted on social media accounts (~120 posts since November 2022):

@SWOT_AdAC
@SWOT_AdAC@sciences.re

Future SWOT-AdAC 2.0

SWOT Adopt-A-Crossover becomes **SWOT AdAptive Campaigns**

- Potential new satellite products:
  - Reprocessing of specific KaRIn images
  - Sea level L3 products with high posting-rate (5 to 20Hz) from SWOT-nadir and other altimeter mission
  - Enhanced L4 sea level products including SWOT KaRIn and nadir measurements
- New processing tools to analyse SWOT data (Lagrangian code, other ?)

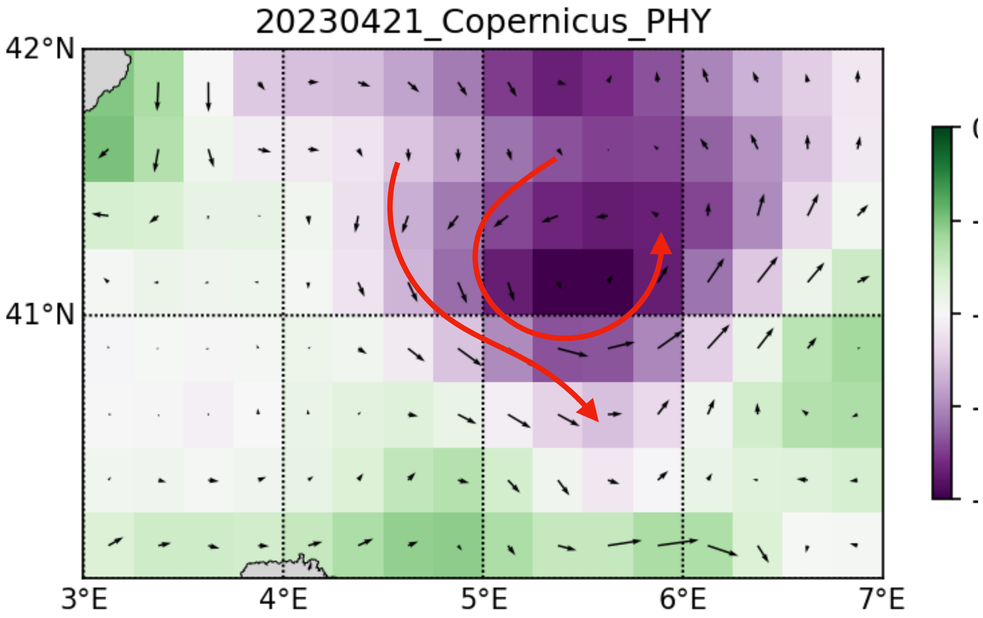
Acknowledgements
SPASSO is operated with the support of the SIP (Service Informatique de Pytheas) and in particular C. Yohia, J. Lecubin, D. Zeraco and C. Blanpain (Institut Pytheas, Marseille, France)

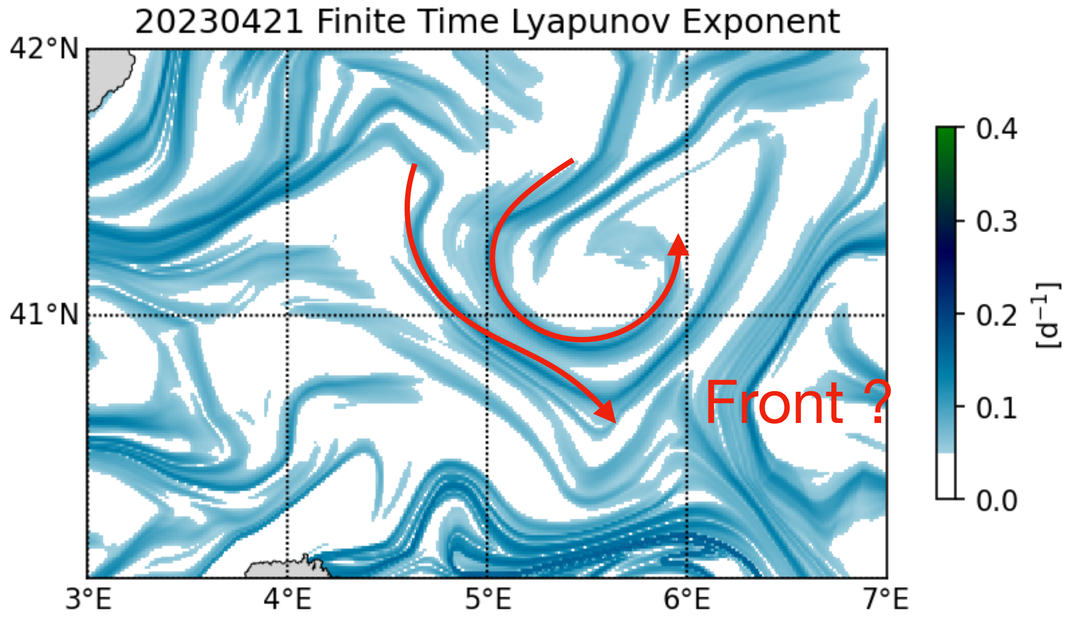
More details on poster:
“SWOT-AdAC support during SWOT fast sampling phase”

2) BioSWOT-Med sampling strategy

Objective: 1) Target a contrasted (chl-a) front

What did classical altimetry and FTLE show ?

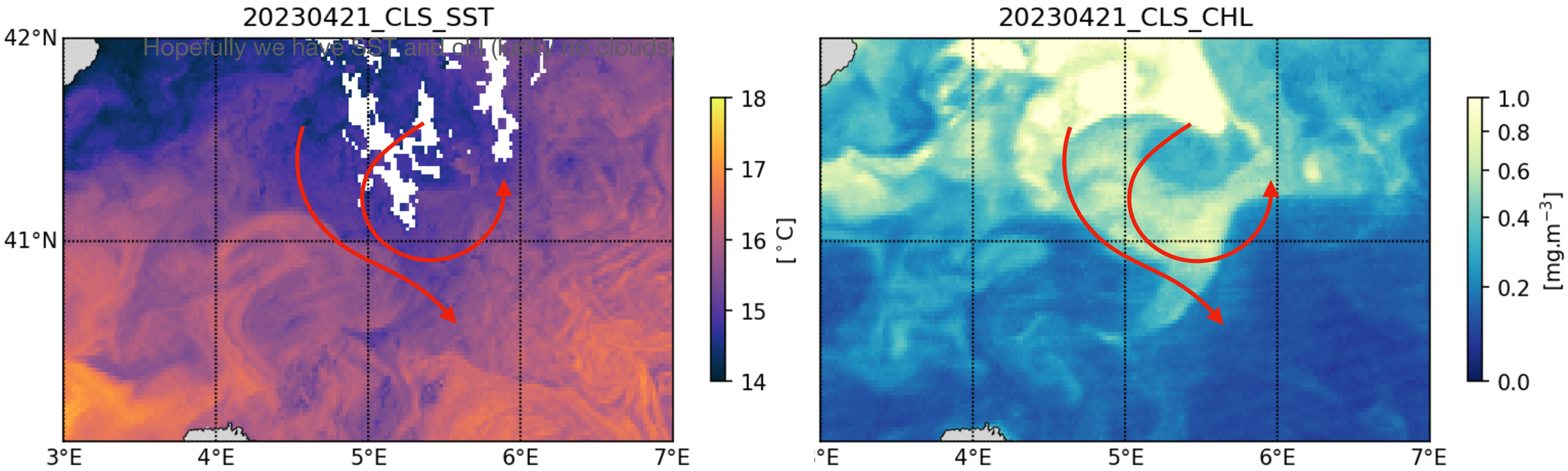




2) BioSWOT-Med sampling strategy

Objective: 1) Target a contrasted (chl-a) front

What did SST and Chl-a distribution show ?



🛑 Front position agree more or less but small-scale distribution of SST and Chl-a don’t match exactly with classical altimetry and FTLE analysis !

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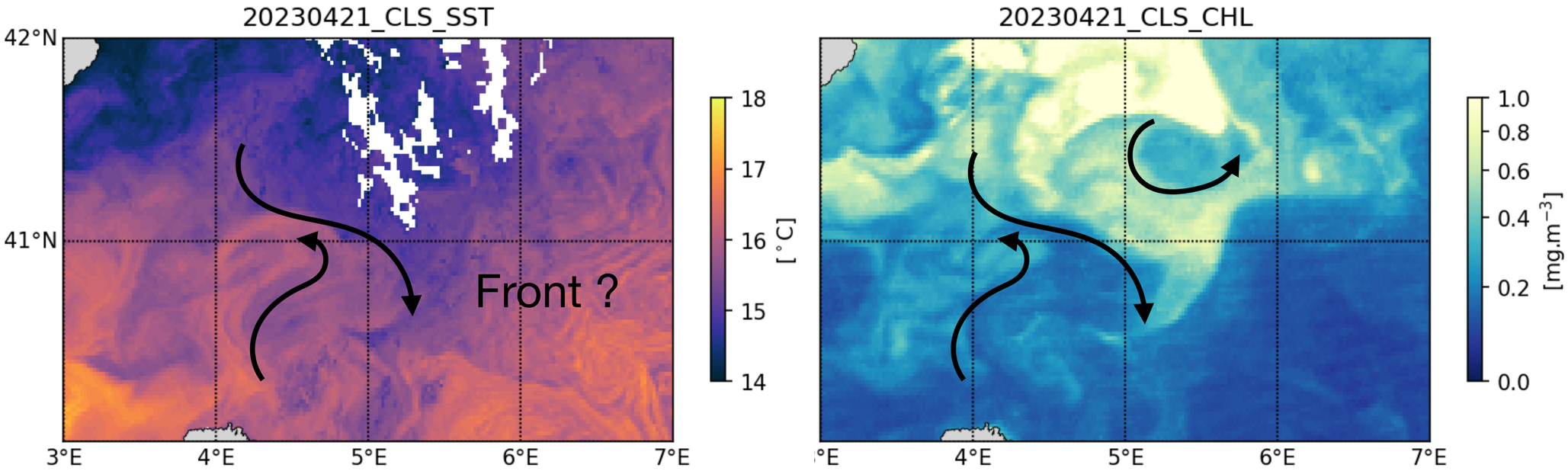


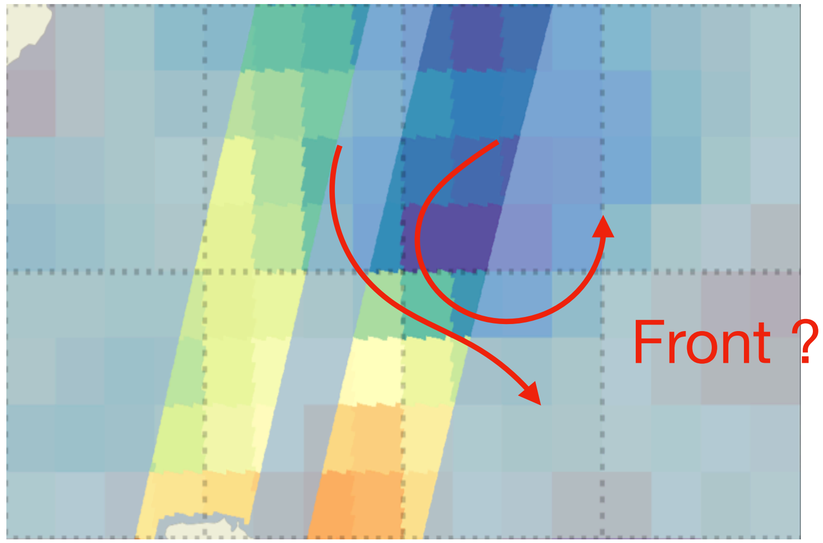
Instead SST/Chl-a distribution allows for identifying some small-scale features !

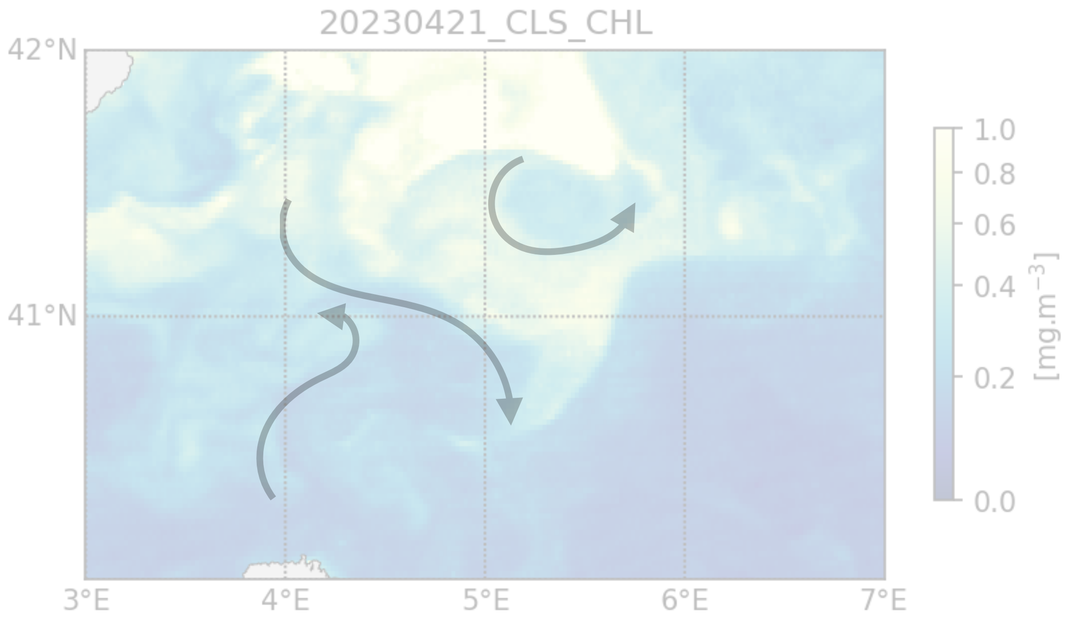
2) BioSWOT-Med sampling strategy

Objective: 1) Target a contrasted (chl-a) front

What did KaRIn preliminary images bring ?

Before SWOT





Only front position agrees with tracers distribution

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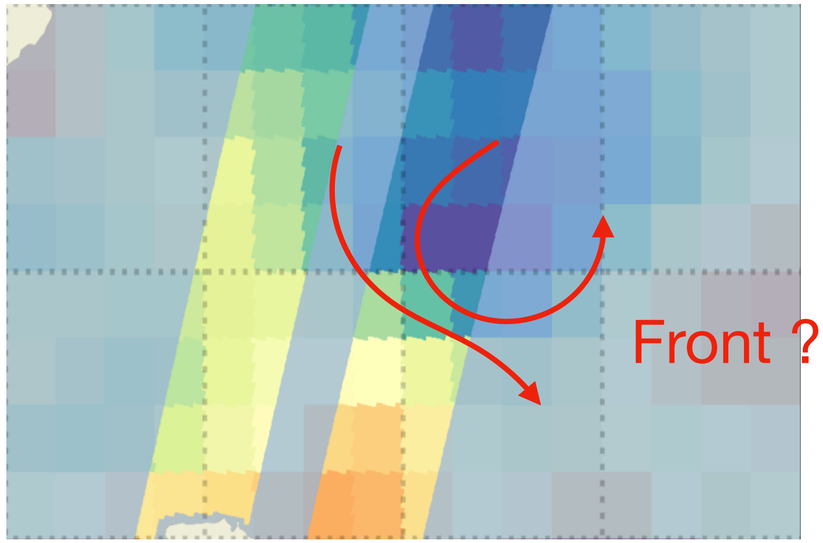
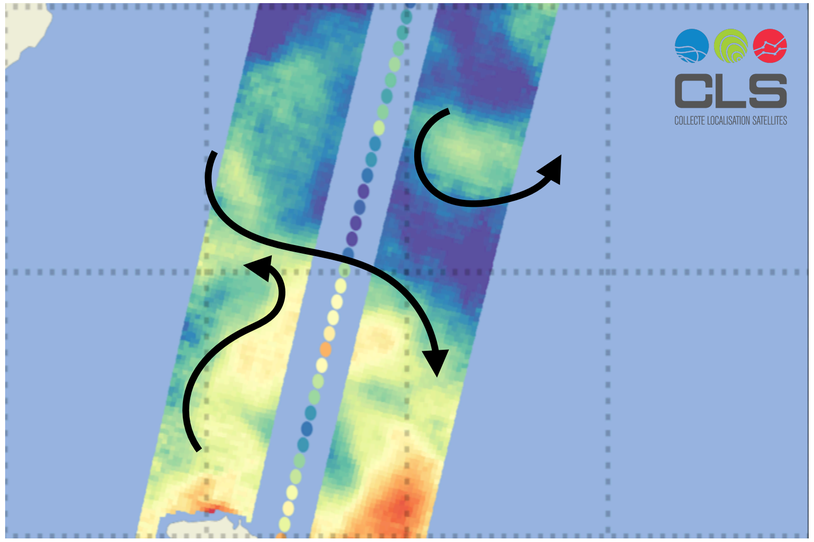


with SWOT



Only front position agrees with tracers distribution

SWOT identifies small-scale features visible on tracers distribution

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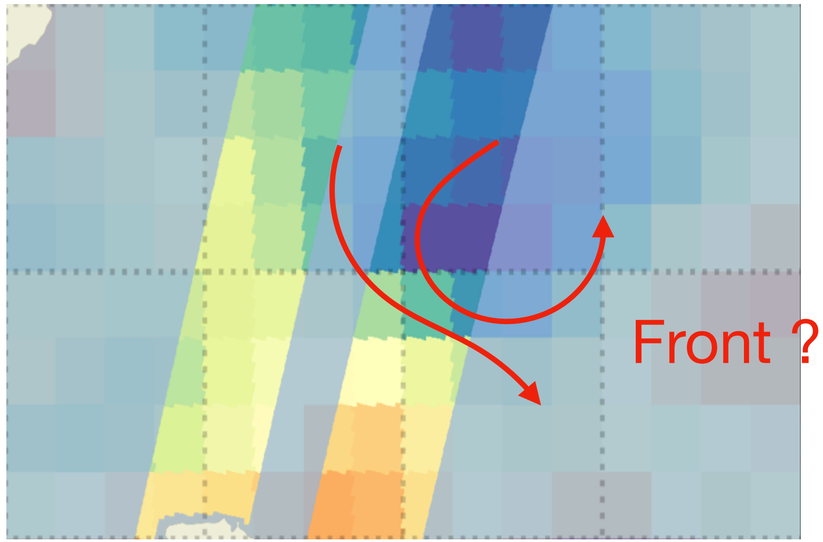

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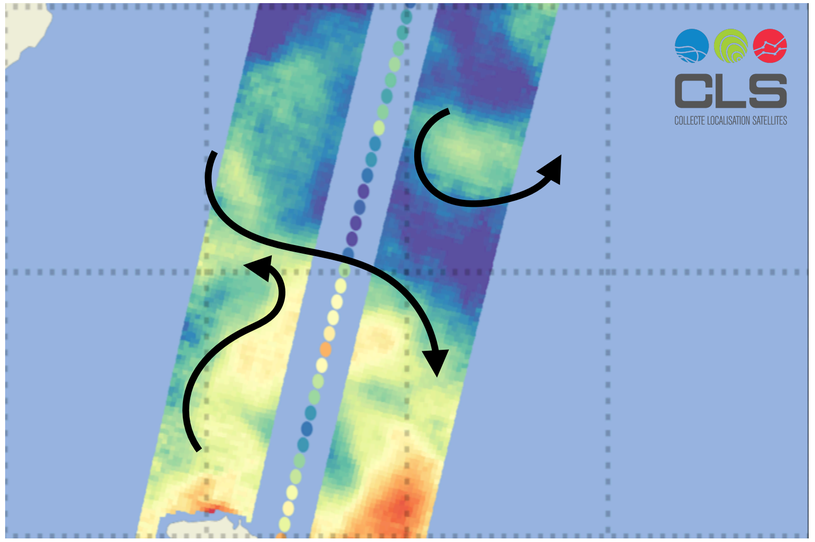

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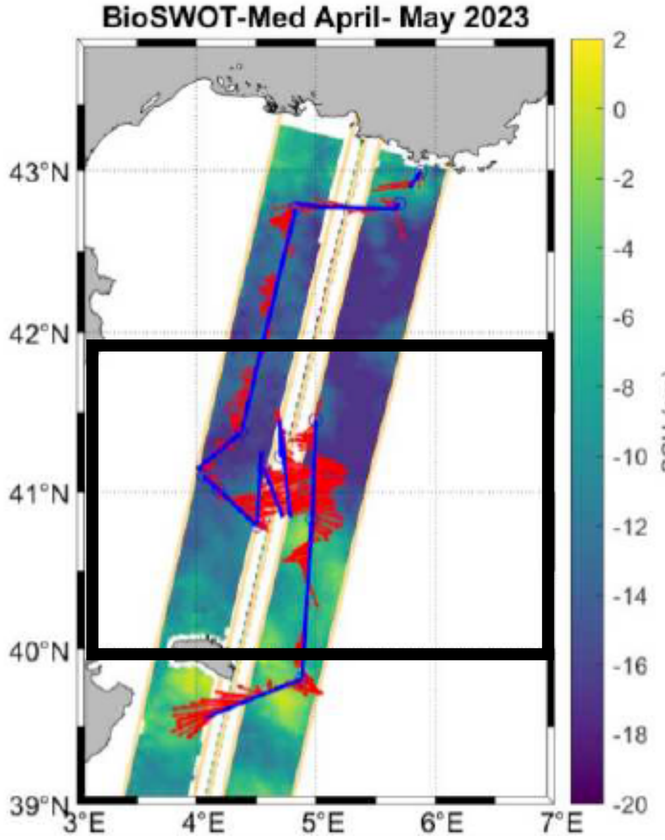


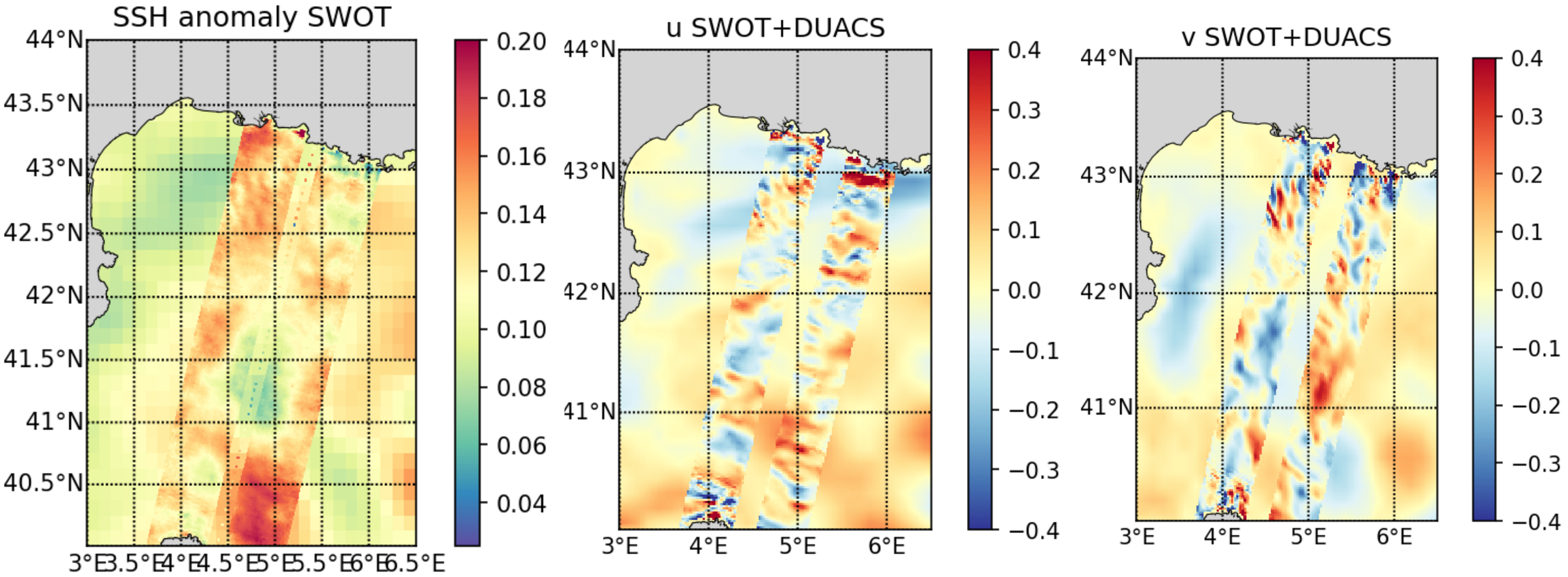
Front induced by intense currents; small-scale feature identified by ADCP data !

A. Petrenko courtesy

3) Tools for SWOT-AdAC community

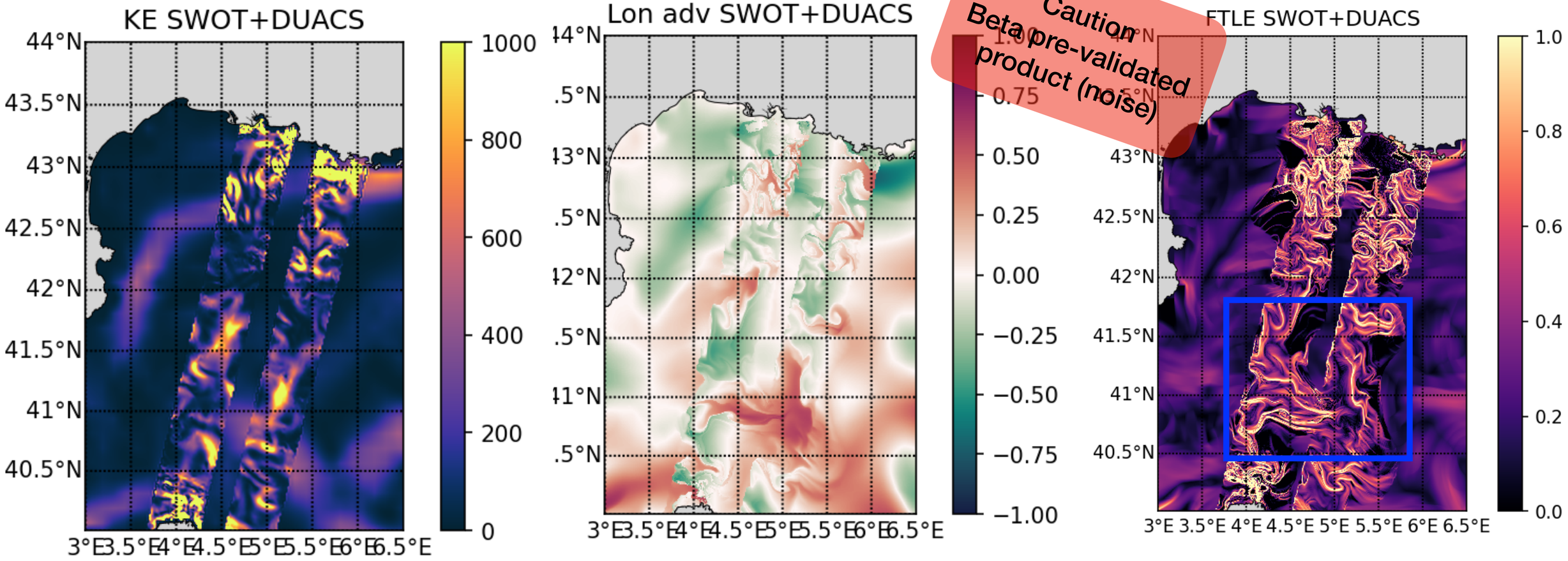
New L3 LR SWOT preliminary data

Tutorials by R. Chevrier → don’t hesitate to ask !



3) Tools for SWOT-AdAC community

Lagrangian code adapted to L3 SWOT preliminary data (LAMTA)



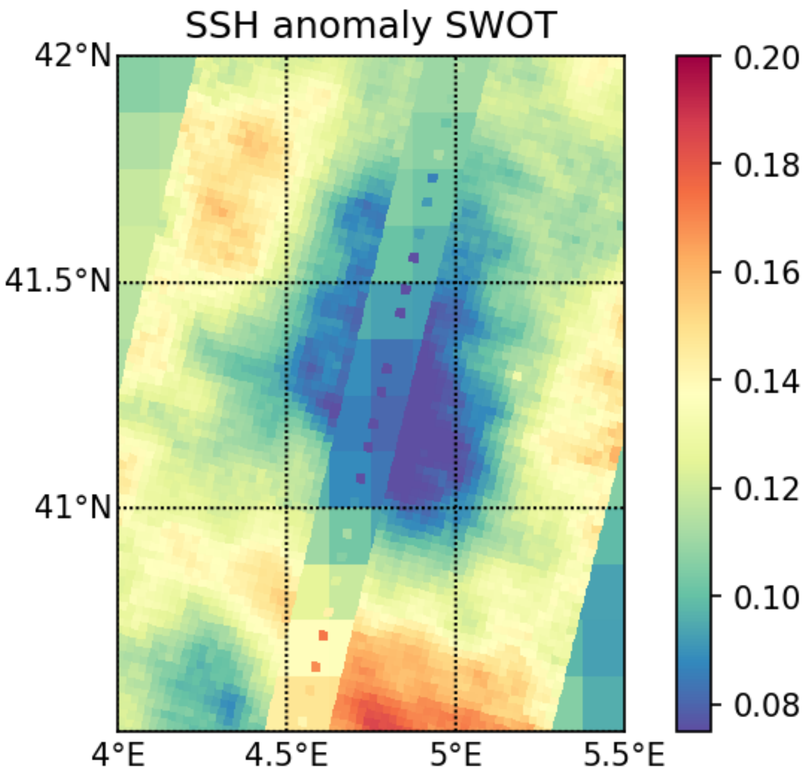
Eulerian diagnostics

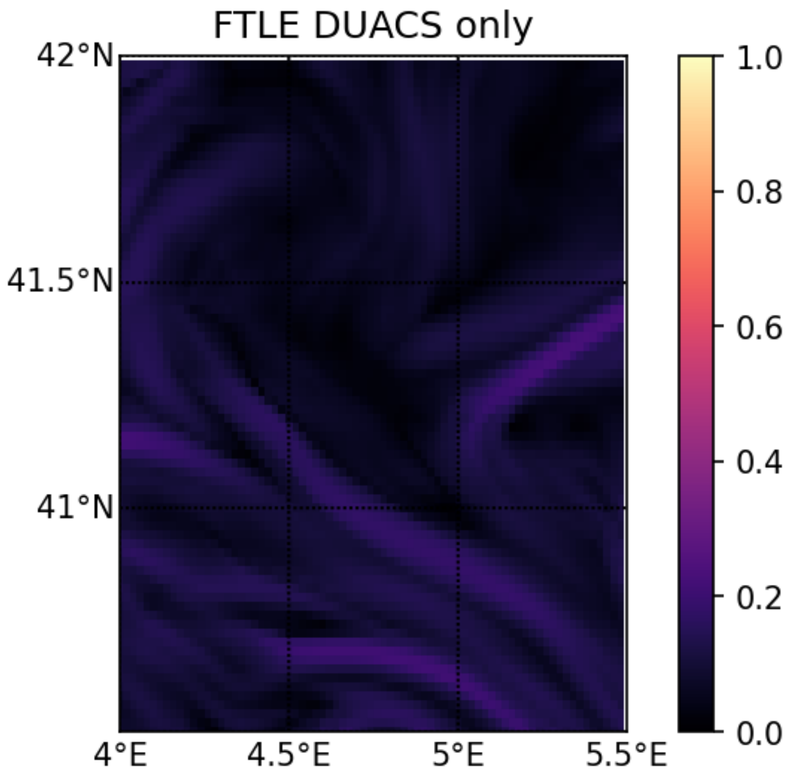
Lagrangian diagnostics

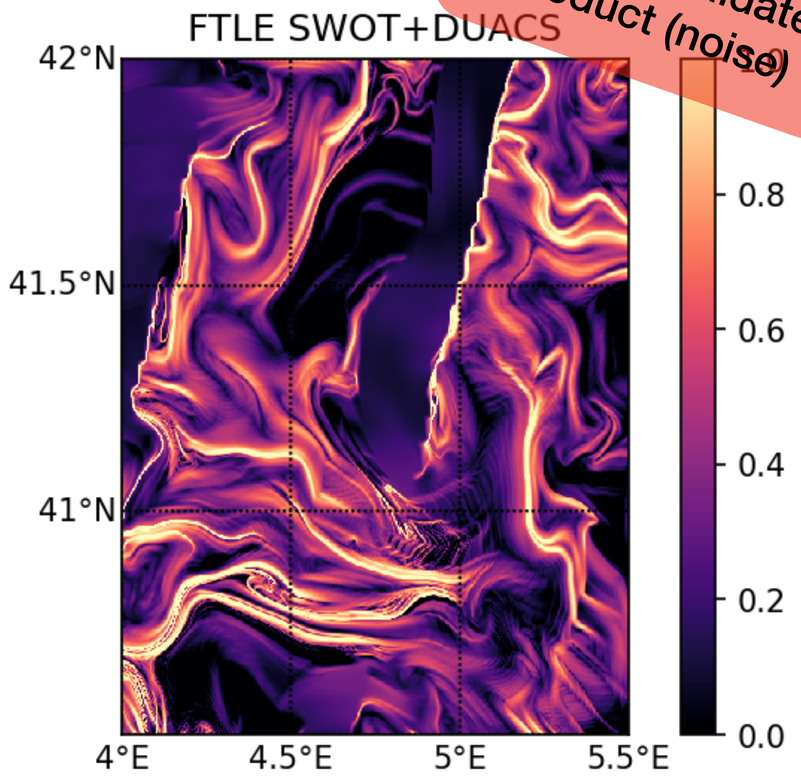
3) Tools for SWOT-AdAC community

Frontal area example

Caution
Beta pre-validated product (noise)





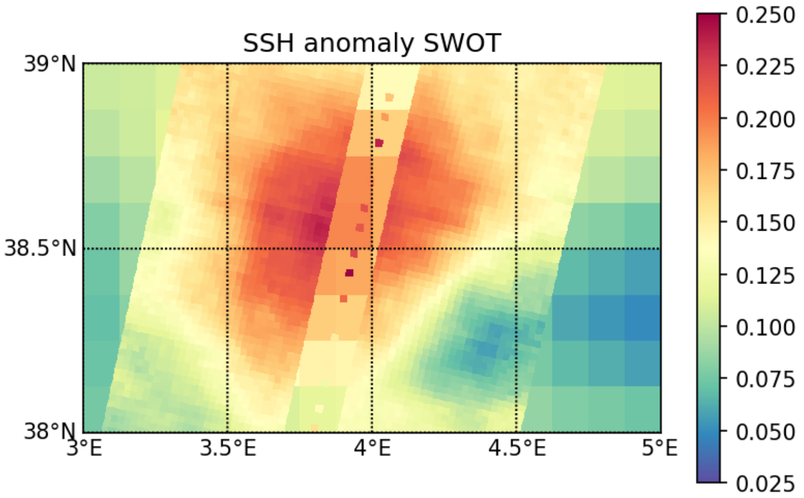


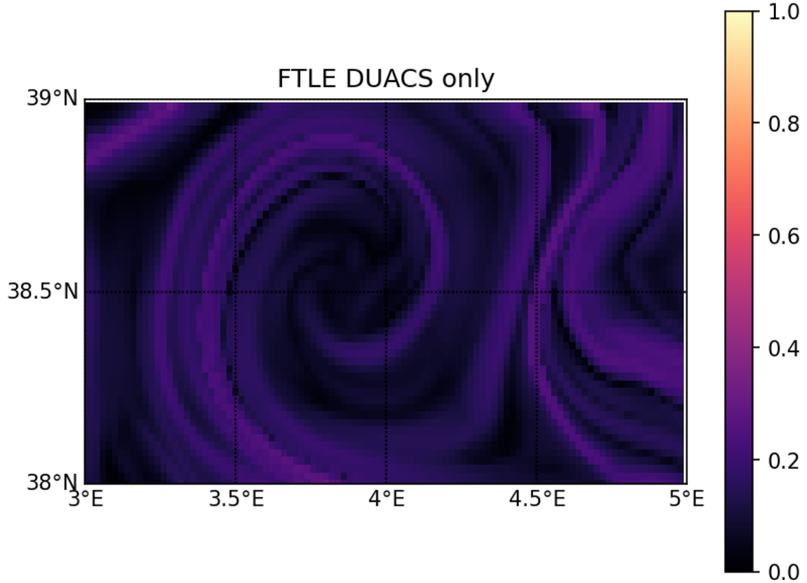
Much more fine-scale features with SWOT !

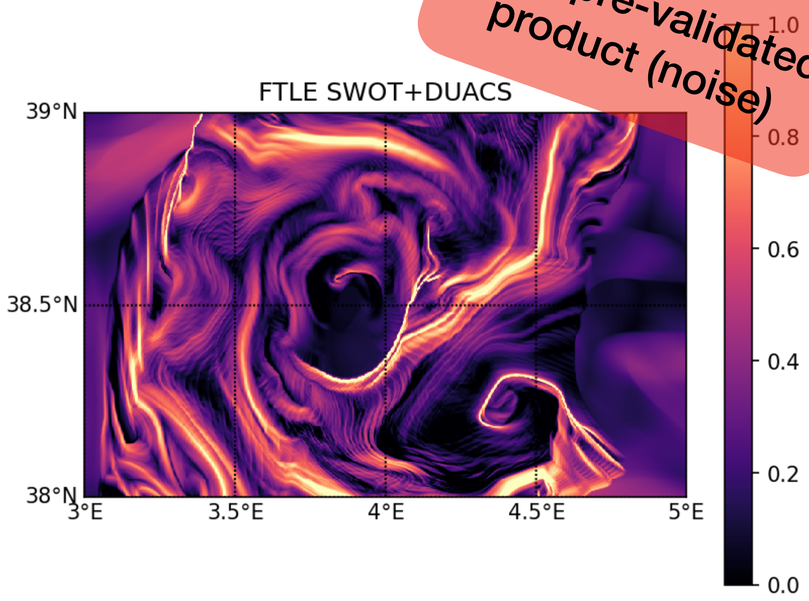
3) Tools for SWOT-AdAC community

Caution
Beta pre-validated product (noise)

Algerian eddy example







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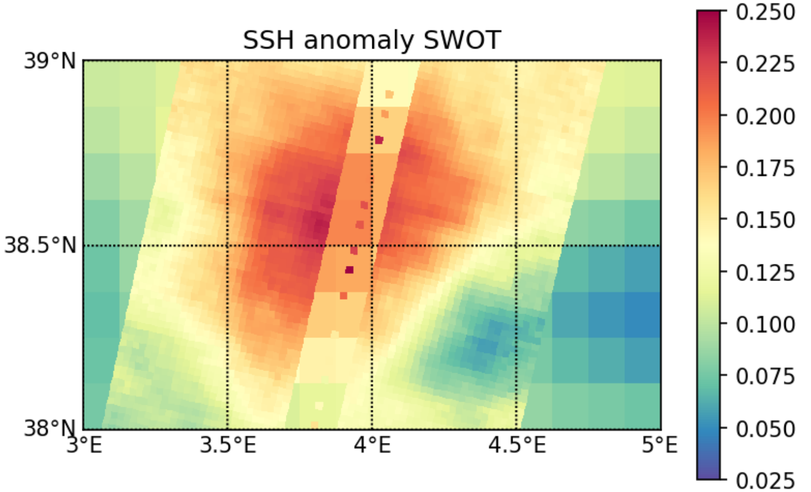

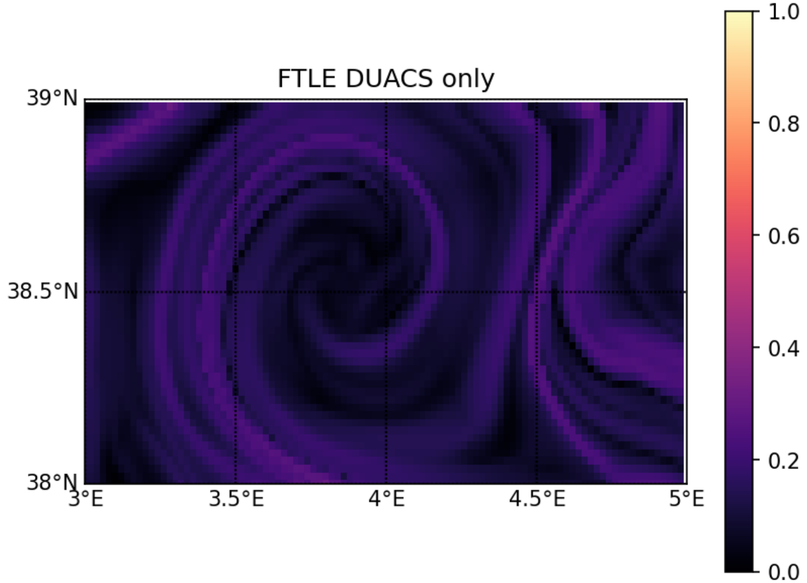

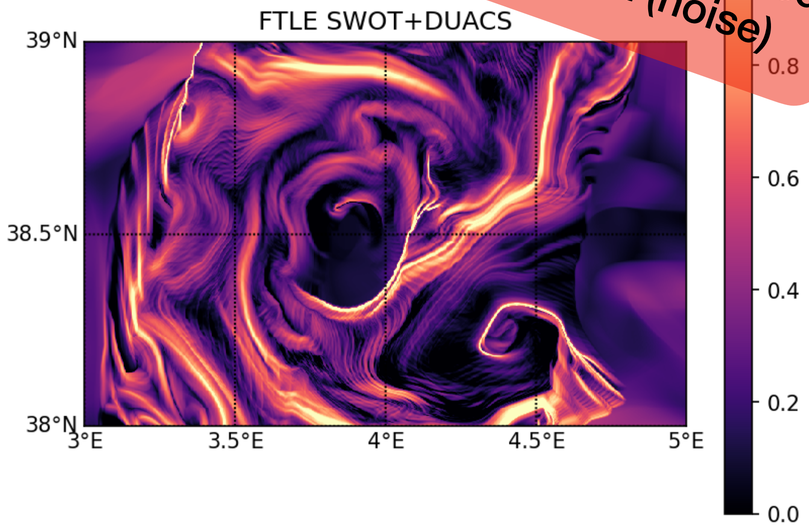

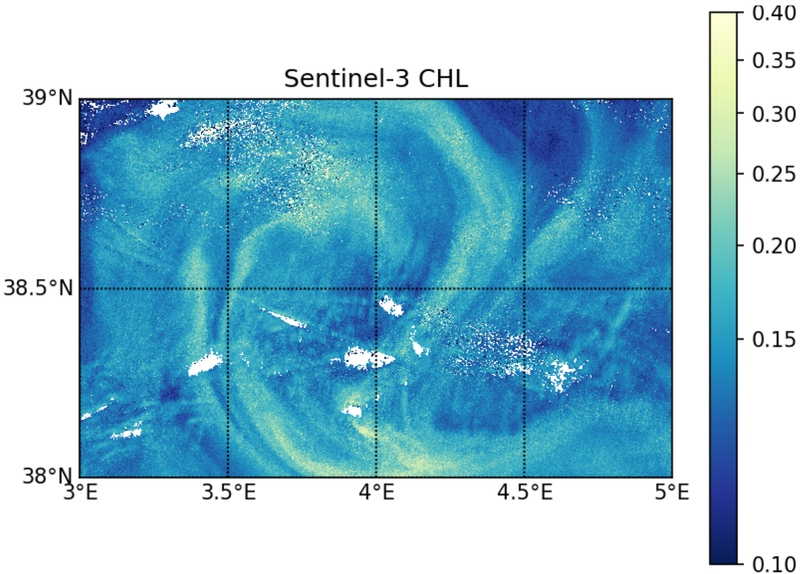

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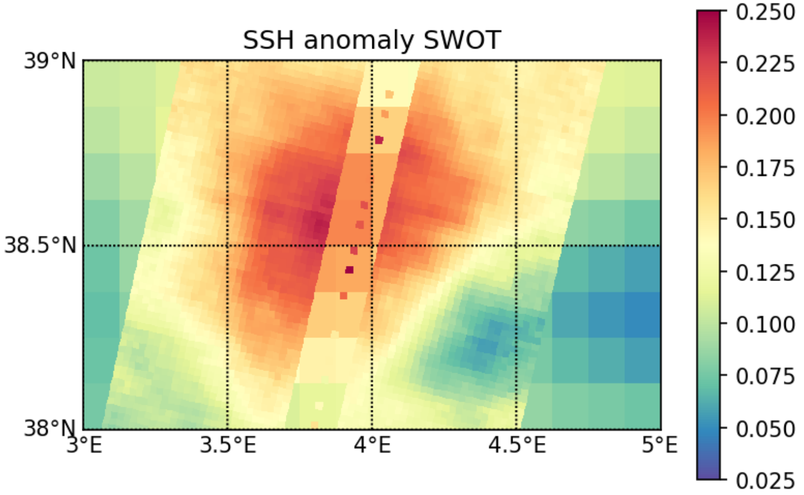

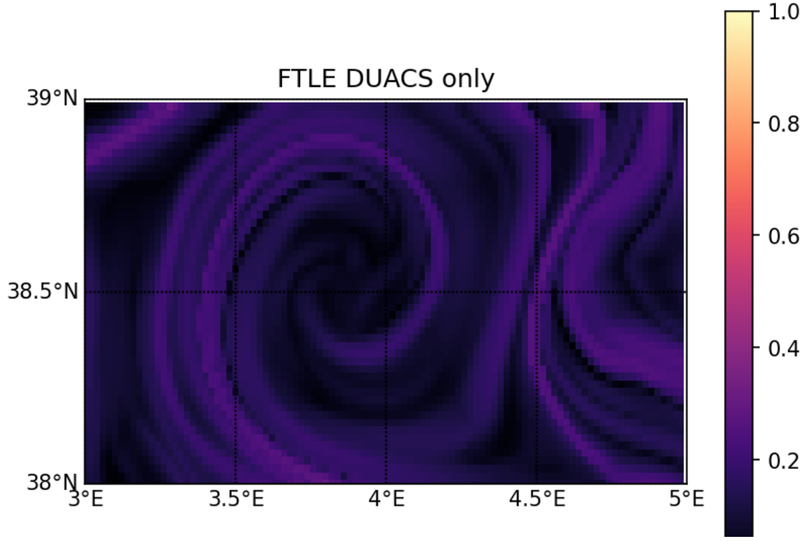

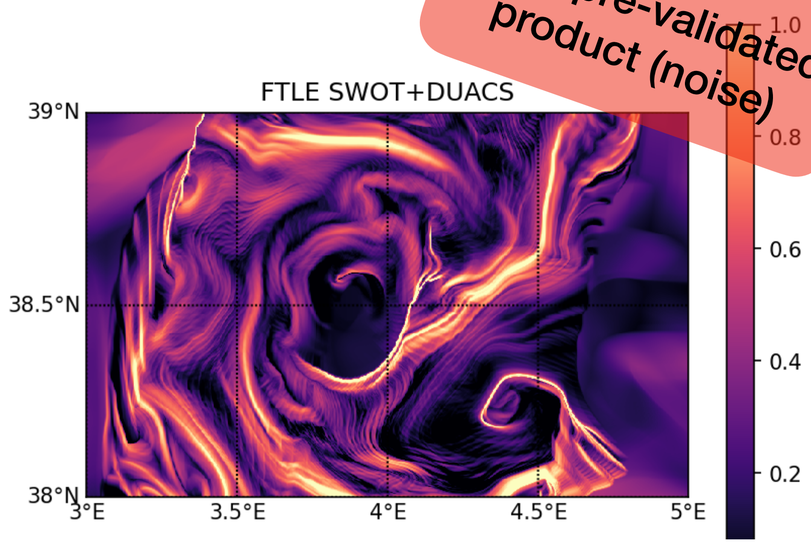

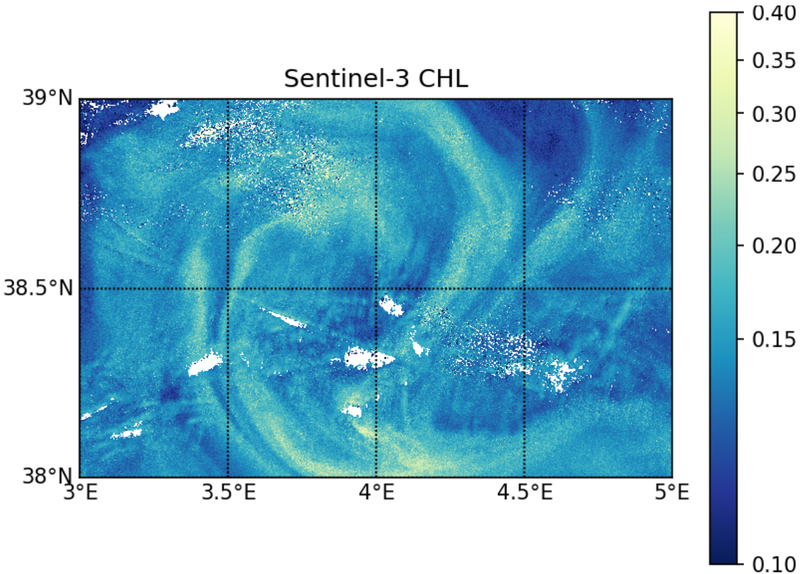

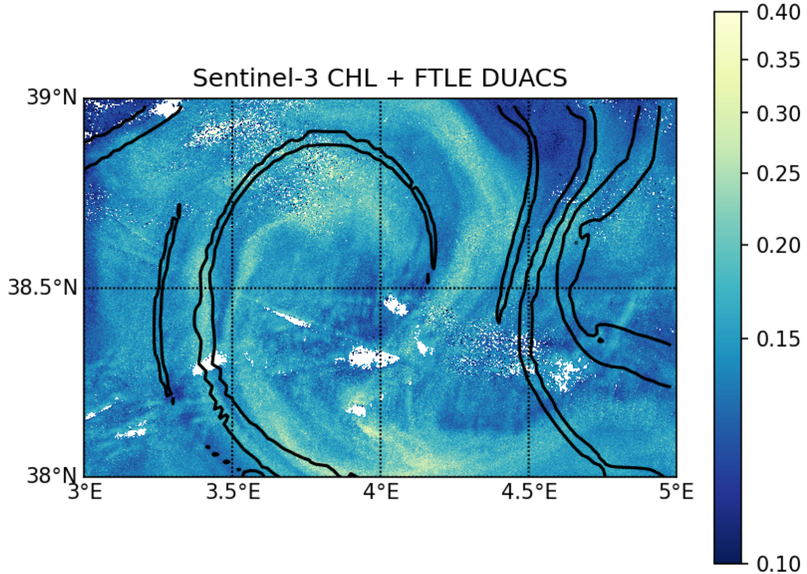

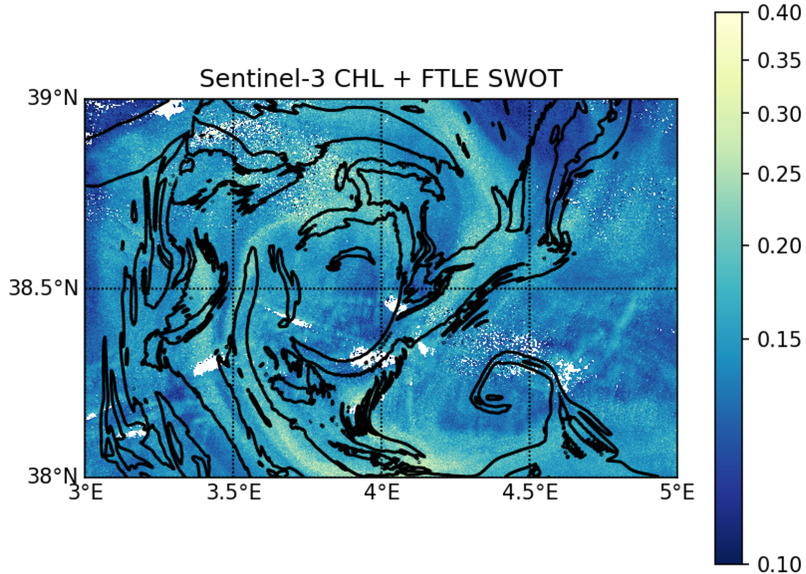

Tools for SWOT-AdAC community

✅ Lagrangian code ready to work with validated L3 SWOT data (LAMTA)

Processing tools to cross-compare in situ and L3 SWOT data (Data Officer recruited early 2024)

Reprocessing some other Lagrangian diagnostics with
SWOT gridded products (L4, when released!)

SWOT-AdAC website and social media communication still supported by Tosca Ballerini

2023/2024 cruises can still benefit from SPASSO and KaRIn images support !