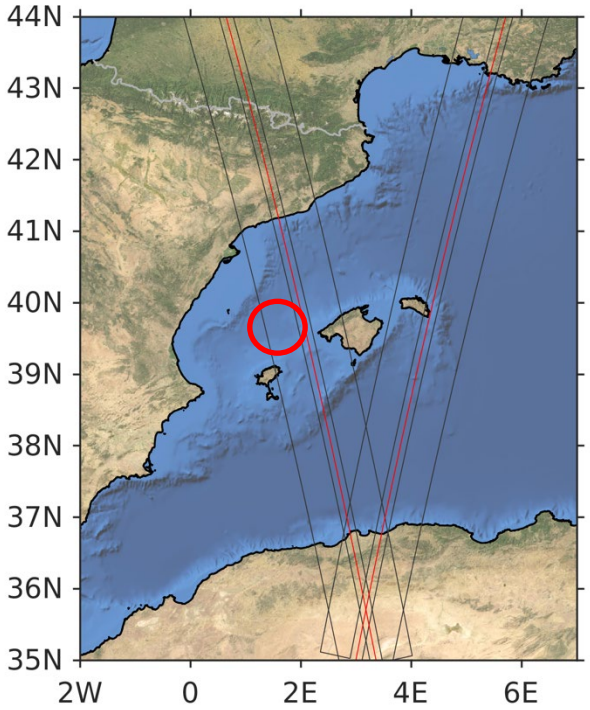
FaSt-SWOT campaigns

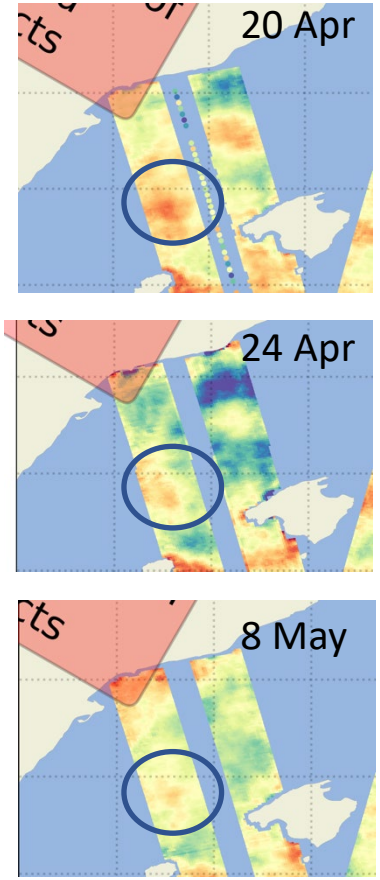
Ananda Pascual[1], Baptiste Mourre[2], Pau Balaguer[2], Bàrbara Barceló-Llull[1], Noemí Calafat[2], Benjamín Casas[2], Vincent Combes[1], Eugenio Cutolo[1], Lara Díaz-Barroso[2], Laura Gómez-Navarro[1], Juan Gabriel Fernández[2], Mélanie Juza[2], Irene Lizarán[2], Guiomar López[2], Albert Miralles[2], Emma Reyes[2], Pere Rossello[1], Daniel R. Tarry[1], Joaquín Tintoré1,[2], Elisabet Verger-Miralles[1], Guillermo Vizoso[1], Nikolaus Wirth[2] and Nikolaos Zarokanellos[2]

[1] IMEDEA, CSIC-UIB, Esporles, Spain
[2] SOCIB, Balearic Islands Coastal Observing and Forecasting System, Palma, Spain

2 x 3 days
Leg 1: 25-28 April 2023
Leg 2: 7-10 May 2023



Western Mediterranean Sea



SWOT early images. AVISO

FaSt-SWOT campaigns

Objectives

Monitor water column T-S and velocities associated with fine-scale oceanic feature within SWOT fast-sampling coverage.

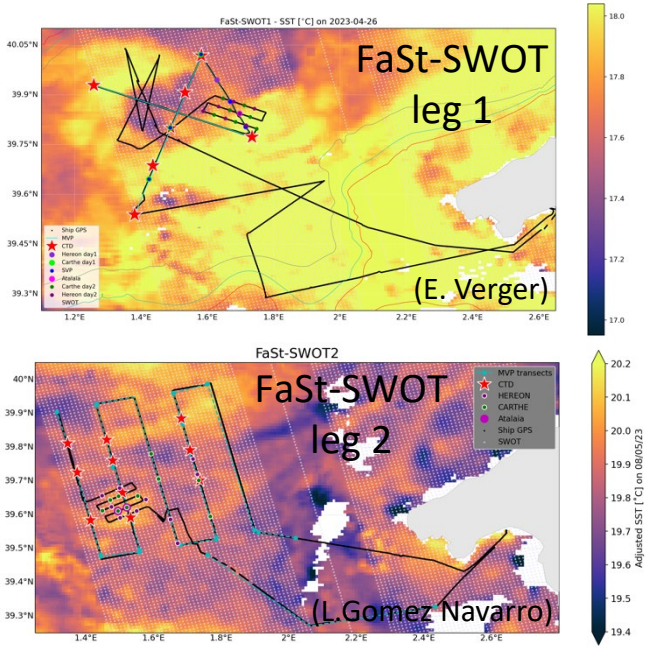
Repeat sampling after 10 days to track the evolution.

Measurements

Pascual et al., 2023 – CRUISE PLAN
https://digital.csic.es/handle/10261/309103

2 Slocum gliders
Moving Vessel Profiler (MVP) [0-200m]
Vessel mounted ADCP and thermosalinograph
45 surface drifters
CTD stations [0-700m]
Meteorological station
GoPros (Ocean Cleanup)

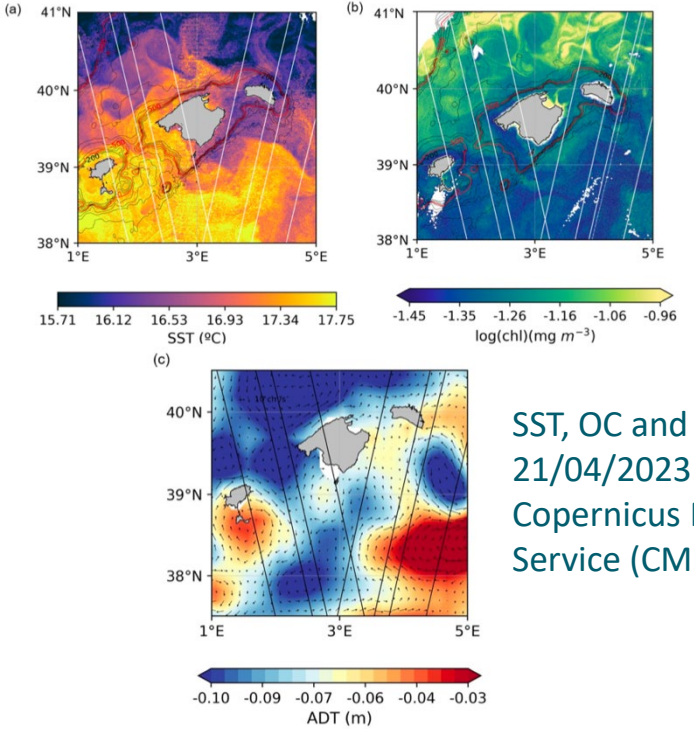
+ high-res data-assimilative modelling



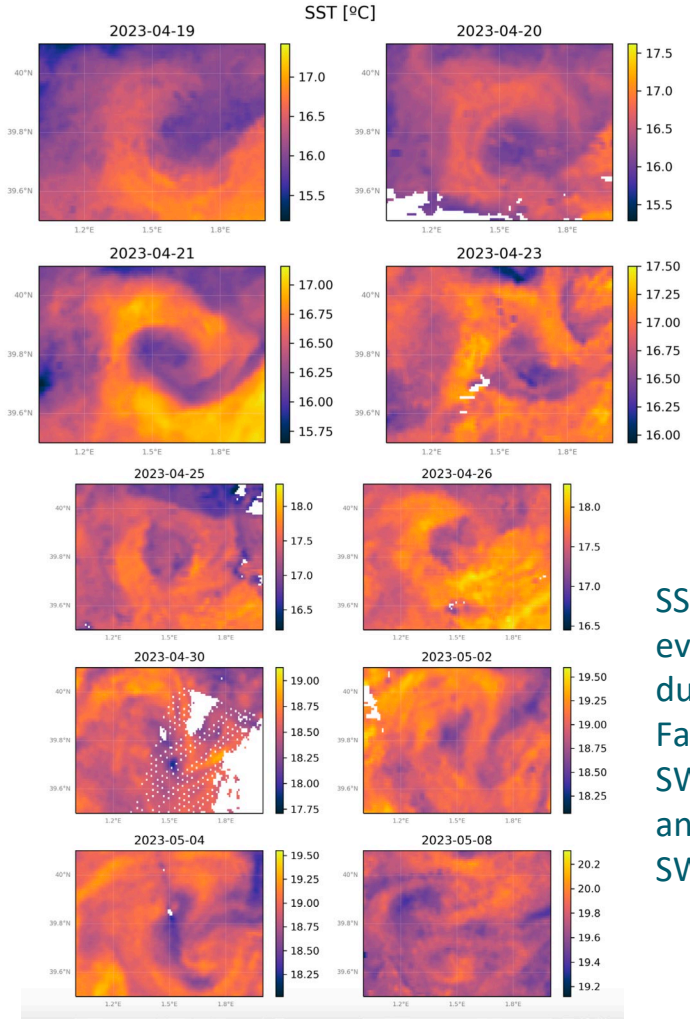
FaSt-SWOT campaigns

Preliminary results

Satellite images



SST, OC and SSH on 21/04/2023. Source: Copernicus Marine Service (CMEMS)

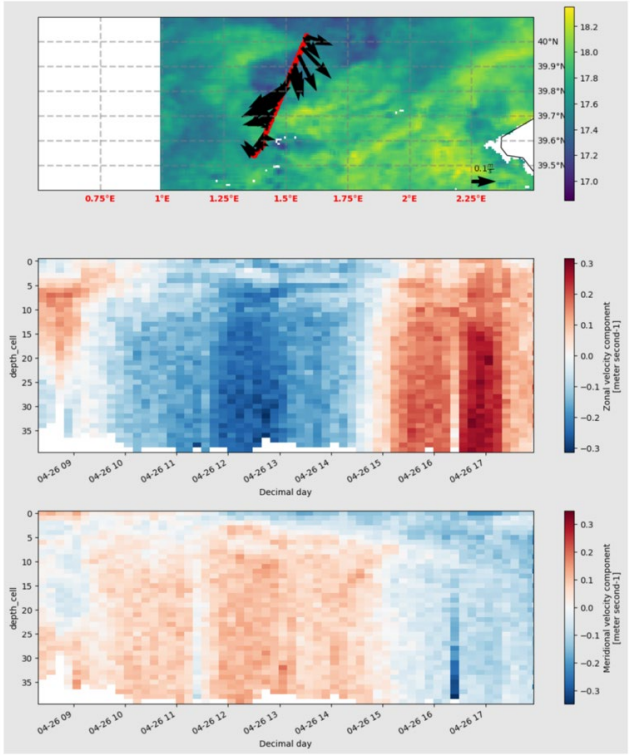


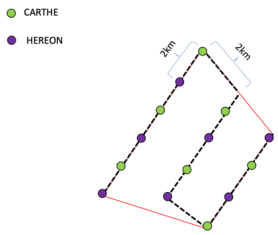
SST evolution during FaSt-SWOT1 and FaSt-SWOT2

FaSt-SWOT campaigns

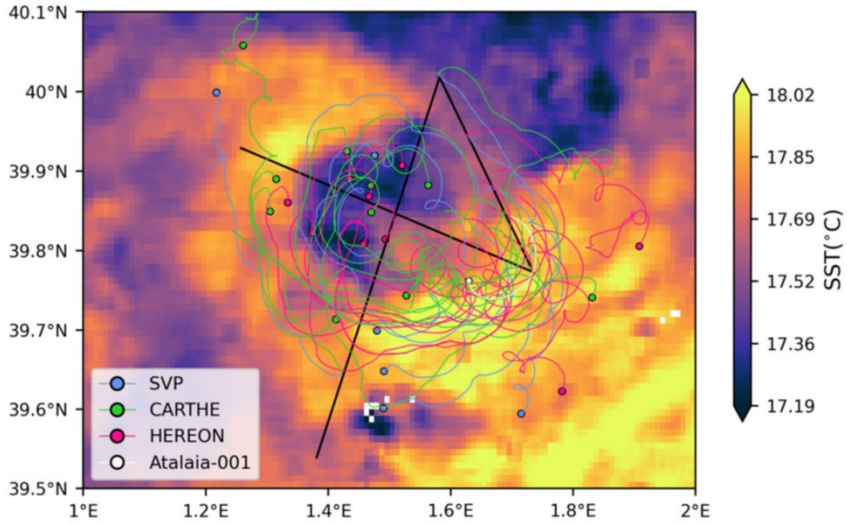
Preliminary results

ADCP and drifters



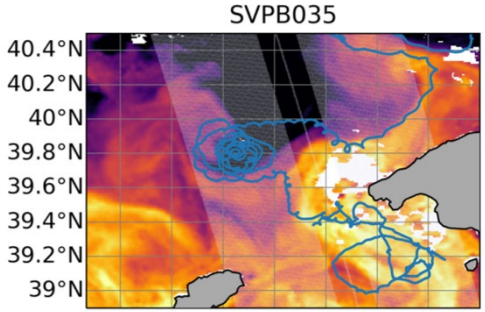


Deployment drifter strategy (D. R. Tarry)



SST (CMEMS) on 26 April 2023 with the drifter trajectories of deployed during leg 1 until 2 May 2023.

Horizontal currents from ADCP on 26 April 2023 (E. Cutolo)

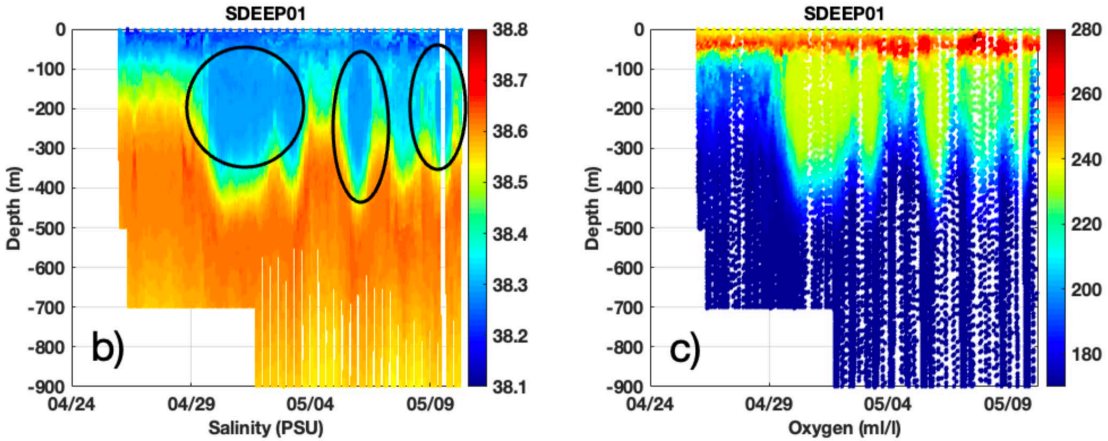


SST on 15 May 2023 with the trajectories of SVP-B drifter deployed during leg 1 until 15 May 2023.

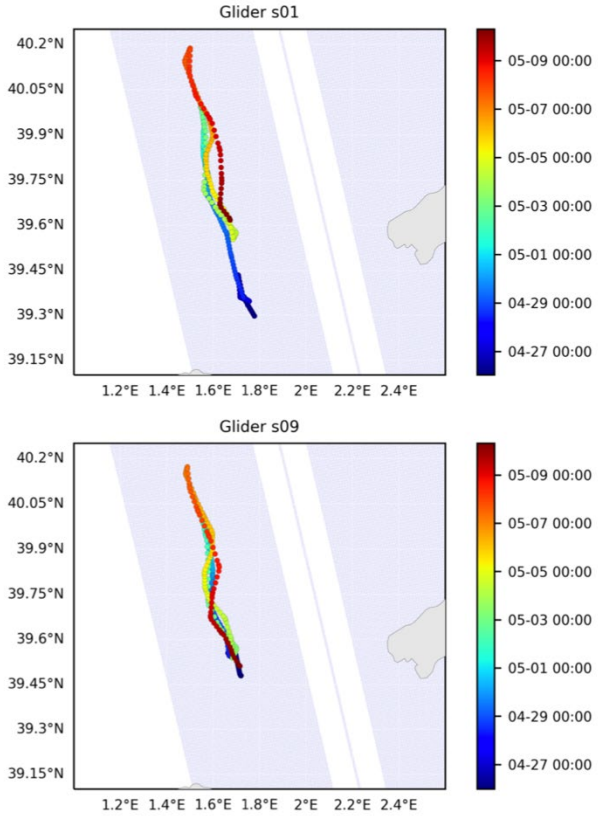
FaSt-SWOT campaigns

Preliminary results

Glider observations



Back-and-forth transects



Tracks of gliders s01 and s09 during the FaSt-SWOT experiments. The color indicate the time between 26 April and 10 May 2023 (B. Barceló-Llull)

FaSt-SWOT campaigns

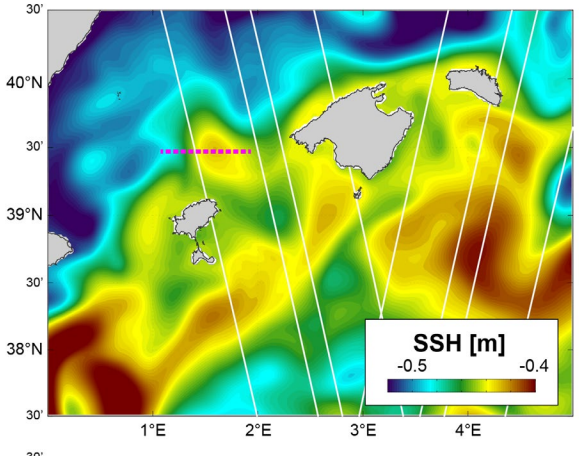
Preliminary results

Numerical modelling

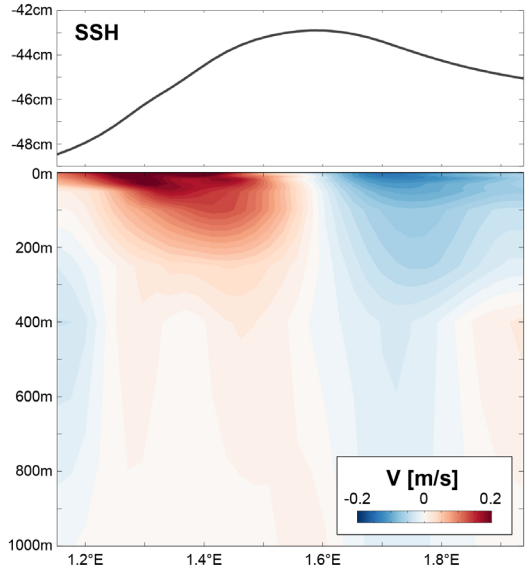
WMOP 2km-resolution data-assimilative model (ROMS / EnOI)

→ real-time predictions
→ reanalysis to be generated assimilating FaSt-SWOT in-situ data and SWOT measurements

WMOP SSH - April 25, 2023



WMOP - April 25, 2023



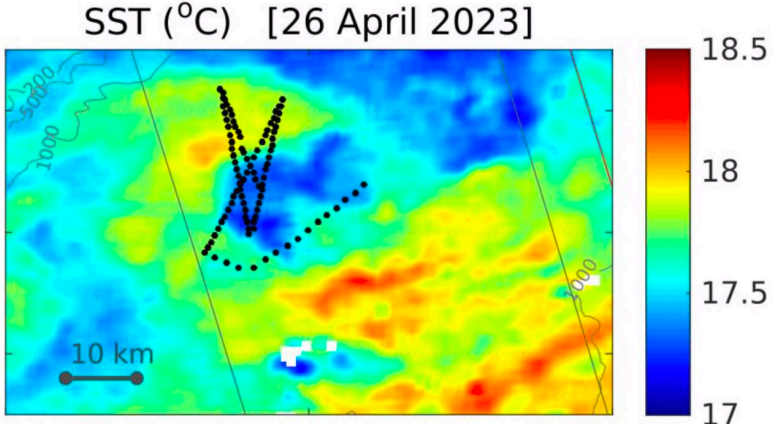
Representation of a ~40km-diameter anticyclonic eddy close to the sampling area in real-time model predictions.
→ Useful to provide an estimate of the vertical structure and define the depth of the sampling.

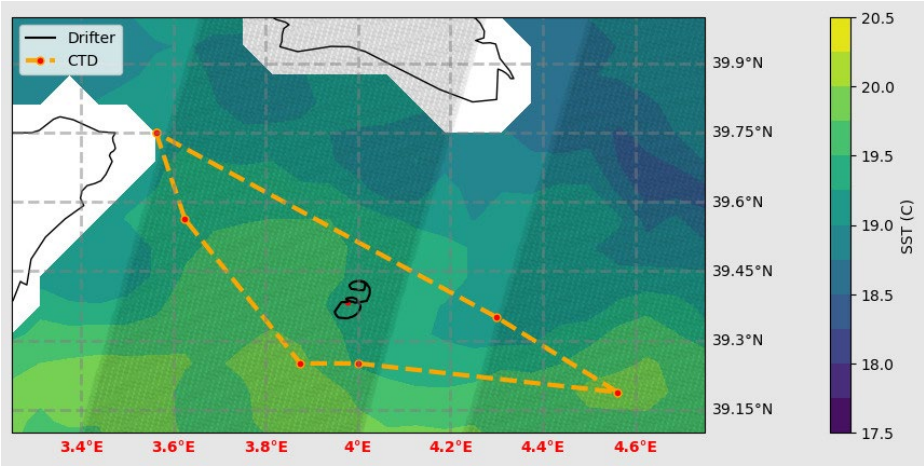
FaSt-SWOT campaigns

Preliminary results

Adaptive sampling

Based on deep-learning CLOinet algorithm trained with high-res. SST. Implemented on 28 April. See details in poster by Cutolo et al.

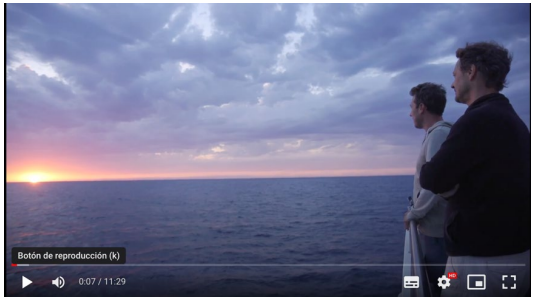


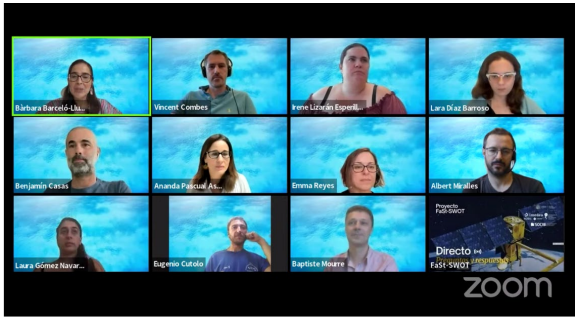


Also applied during MARBEFES cruise on board R/V Sarmiento de Gamboa. South of Minorca. CTD adaptive sampling using CLOinet (inputs SST). (6-9 May 2023).

FaSt-SWOT campaigns

Outreach





- Educational Project: Boya al agua ! : participation > 600 students (primary to secondary school)
- Short documentary (to be released soon)
- Youtube live (Q&A) on World Oceans Days
- Media coverage (press, TV, radio…), AdAC blog & social networks

FaSt-SWOT

Future perspectives

- Quality control and processing of in situ data
- Dataset release (DOI – public access, tentatively Spring 2024)
- In-situ data analysis
- Dynamic height reconstruction (OI, variational and AI)
- Comparison to SWOT observations
- Analysis of HF radar (temporal and spatial scales)
- High resolution modelling and data assimilation
- More details: see poster Mourre et al.
- New PhD student (Elisabet Verger)

- **Interested in joining us? We are hiring a postdoc for 2.5 years! (see LinkedIn IMEDEA)**

Universitat de les Illes Balears

MASTER'S THESIS

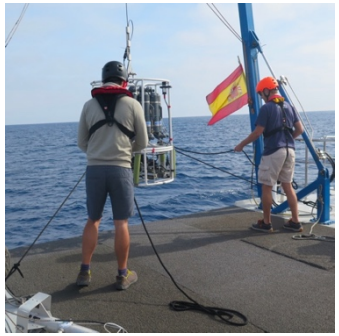
Mesoscale ocean structure reconstruction through data collection and analysis in the framework of the FaSt-SWOT project

Elisabet Verger Miralles

Successfully defended last week !!!

FaSt-SWOT campaigns

Integrating platforms but more important: people !

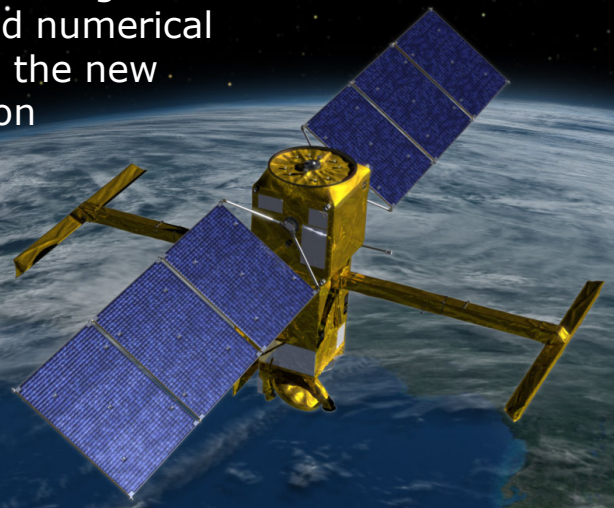


Debriefing and preparation meeting
Bottom-up approaches implemented

Thank you !

Fine-Scale ocean currents from integrated multi-platform experiments and numerical simulations: contribution to the new SWOT satellite mission

FaSt-SWOT



Acknowledgements:
International collaborators: F. D'Ovidio, A. Doglioli, R. Morrow, T. Farrar, R. Fablet, J. Le Sommer
FaSt-SWOT technical team and R/V SOCIB crew
HEREON drifters support team: J. Horstmann, R. Carrasco
BIO-SWOT project