SOCIB Balearic Islands Coastal Observing and Forecasting System

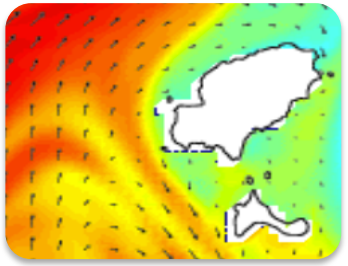
OPERATIONAL DATA DELIVERY AND FORECASTING FOR EMERGENCY RESPONDERS (SAR OPERATORS)

E. Reyes, B. Mourre, A. Orfila, E. Comerma,
TST. Bakhsh, C. De Lera Fernández, J. Tintoré,

OUTLINE

- One goal, three institutions
  - SOCIB
  - RPS Ocean Science
  - SASEMAR
- Joint efforts
  - EDS: data collection and dissemination
  - Metocean data integration
  - SAR case history
  - Skill Score Application
- Benefits of collaboration

02 GOAL, MOTIVATION & TEAM



GOAL

- Evaluate the dimensionless skill score application
  - Integration of SOCIB data into SASEMAR EDS
  - Assessment of ocean circulation models

MOTIVATION

- Improve response capabilities
- Enhance SAR actions efficiency

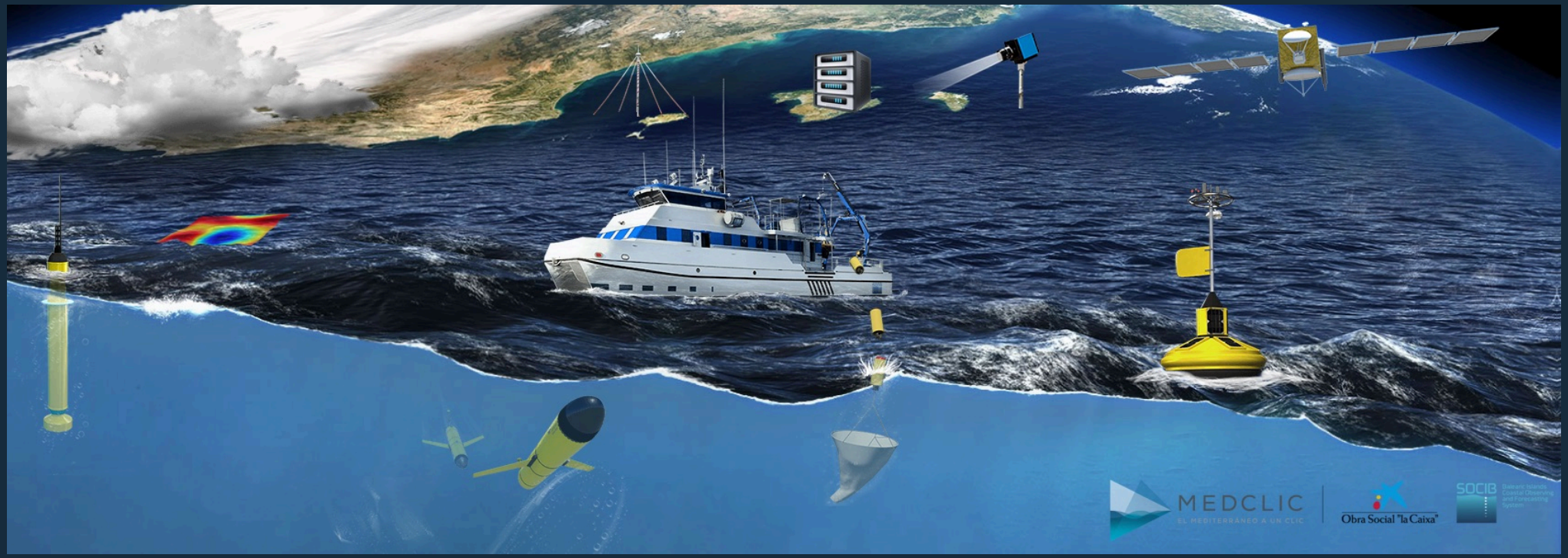
TEAM

- SOCIB : advanced data provider
- RPS : downstream service provider
- SASEMAR : end-user

02

SOCIB

A MULTI-PLATFORM OBSERVING AND FORECASTING SYSTEM



...a new way of doing oceanography responding to society needs

www.socib.es

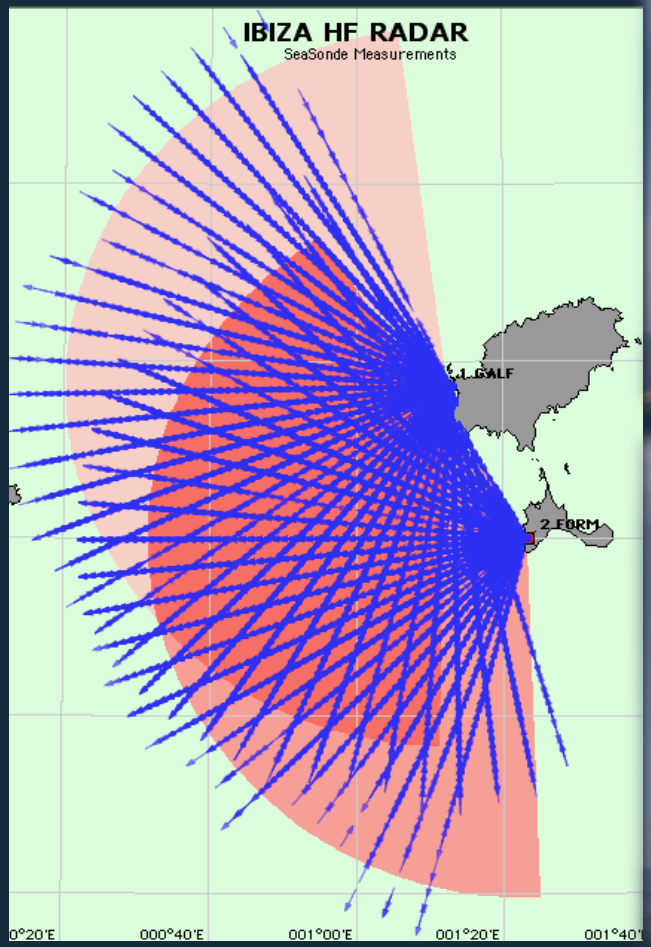
02 SOCIB

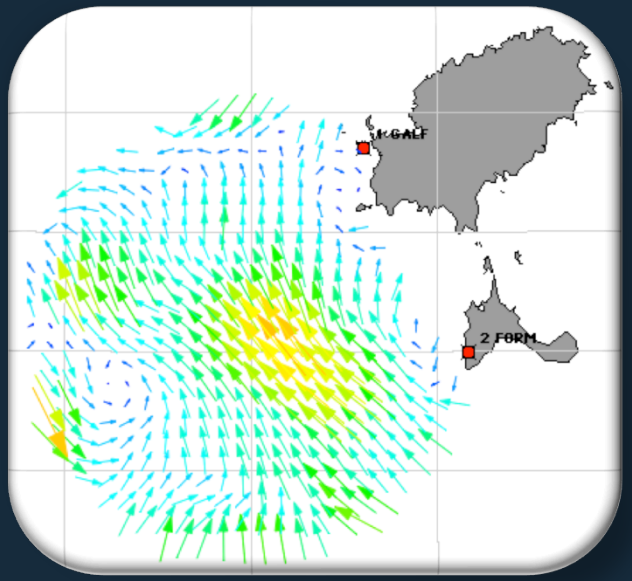
HF RADAR SYSTEM

2 CODAR SeaSonde HF radar stations

Frequency= 13.5 MHz

Bandwidth= 90 kHz





HF radar surface currents

SETTINGS

Output interval	1 h
Grid resolution	3 km
Averaging radius	6 km
Maximum range totals	65 km
Azimuth range	5°
Range cell / resolution	1.6 km
Average Depth	~0.9 m
Resonant Bragg condition	Λ_{radar}= 22.2 m Λ_{wav}=11.1 m

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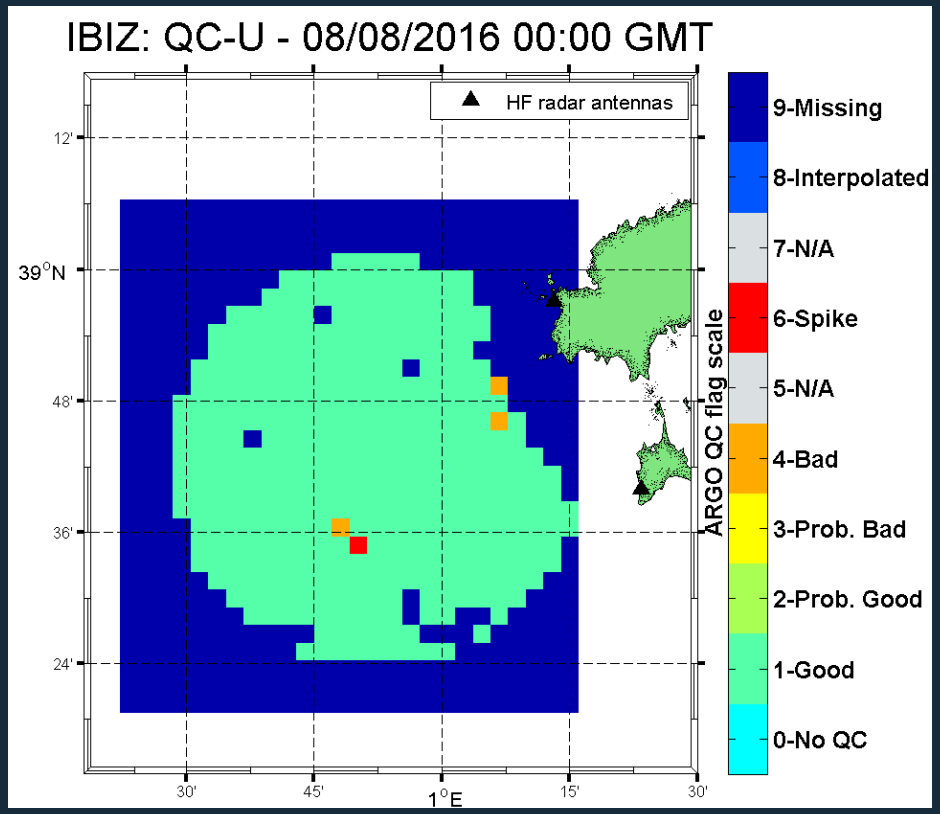
HF RADAR SYSTEM : QA/QC

Near-real time quality controlled data
- QC flag: data quality indicator
- For each variable

Near-real time validation
- HFR vs. buoy comparison
- Systematic data assessment



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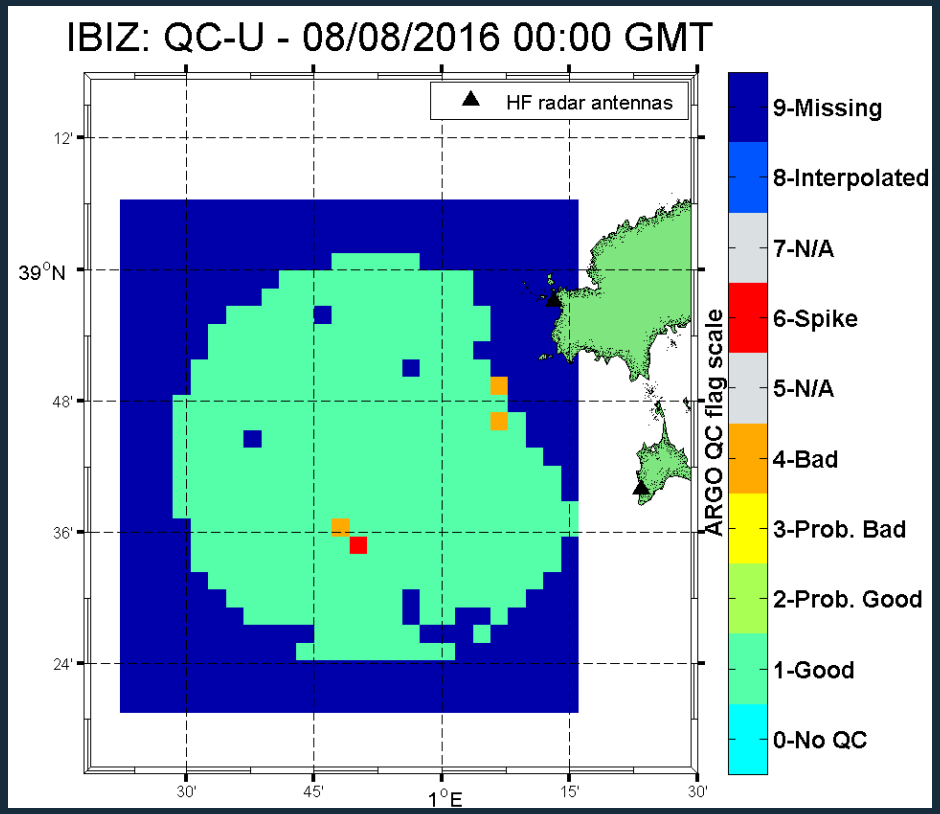
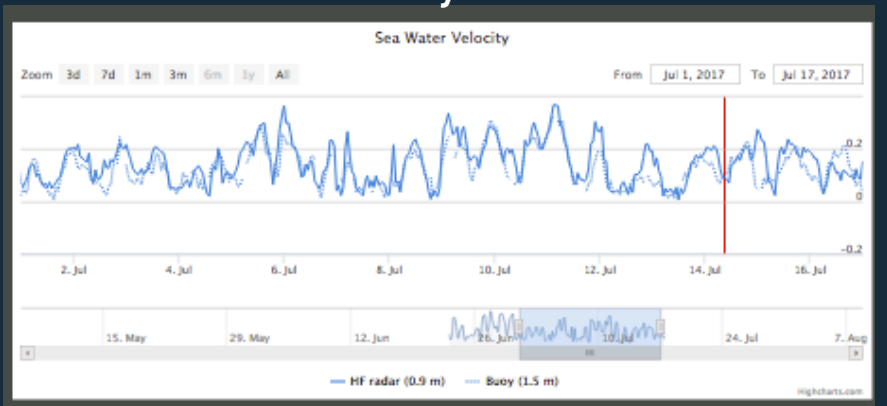
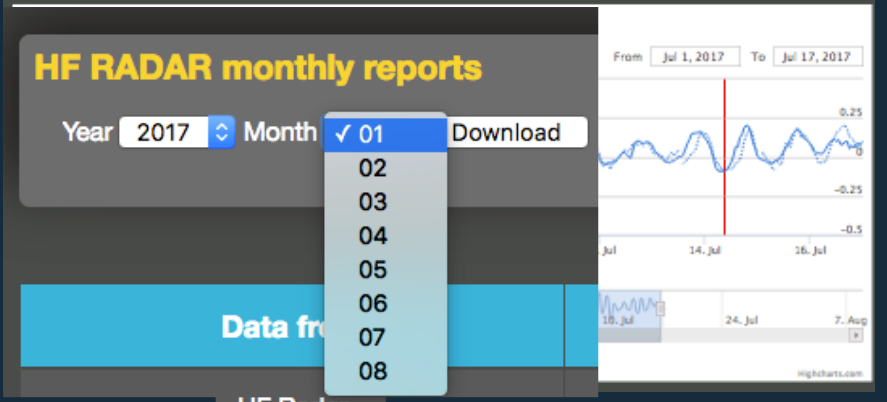


Near-real time validation
- HFR vs. buoy comparison
- Systematic data assessment
- Automatic monthly QuIDs





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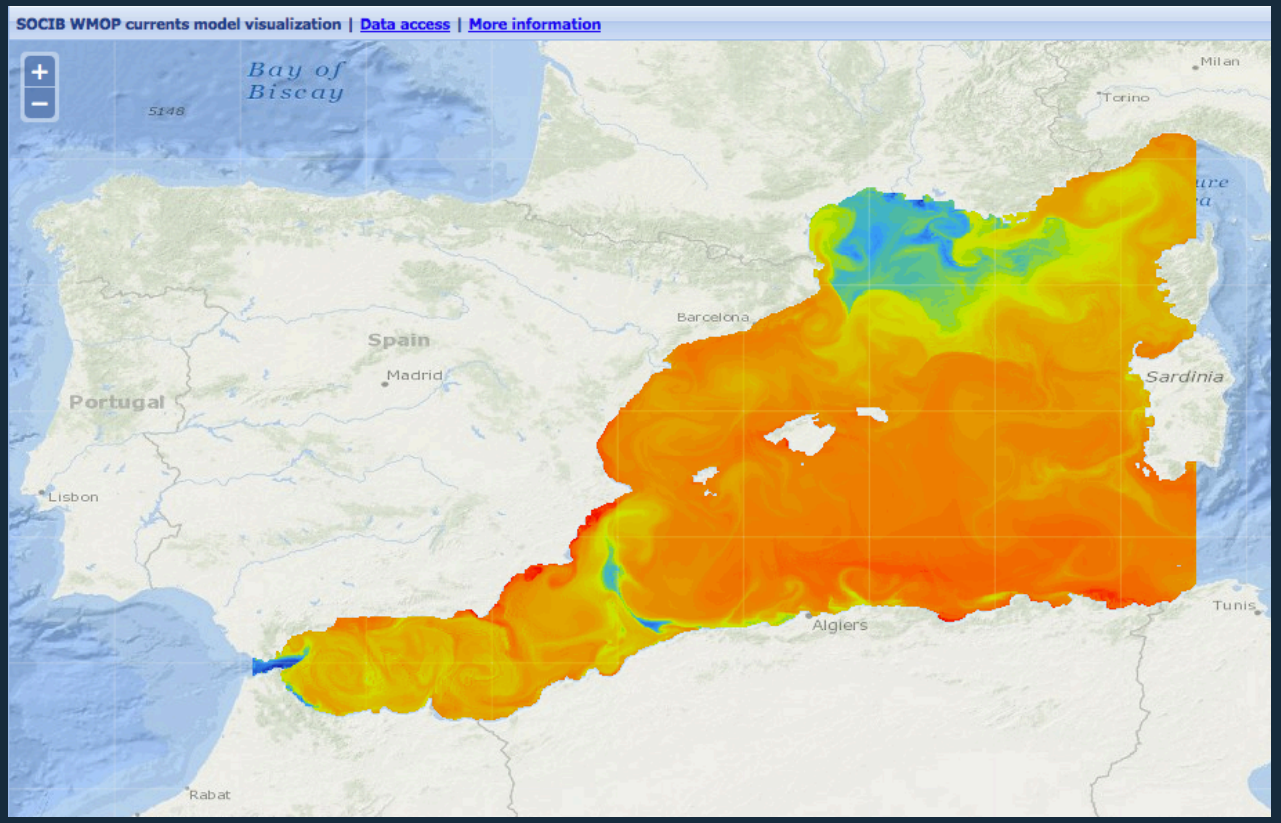
WMOP (WESTERN MEDITERRANEAN OPERATIONAL) MODEL

High resolution is needed:

- **to address regional and coastal studies**
- **to respond to the requirements of operational applications**



MODEL CONFIGURATION	
Forecast Length	72 hours
Spatial Resolution	~2 km
Temporal Resolution	3 hours
Temporal Coverage	27/08/2013-ongoing
Update frequency	Daily
Atm. Forcing	3h HIRLAM
Tides	NO
Rivers	11
Open boundaries	MFS-MED
Assimilation	No
Analysis	Weekly (on Tuesday)

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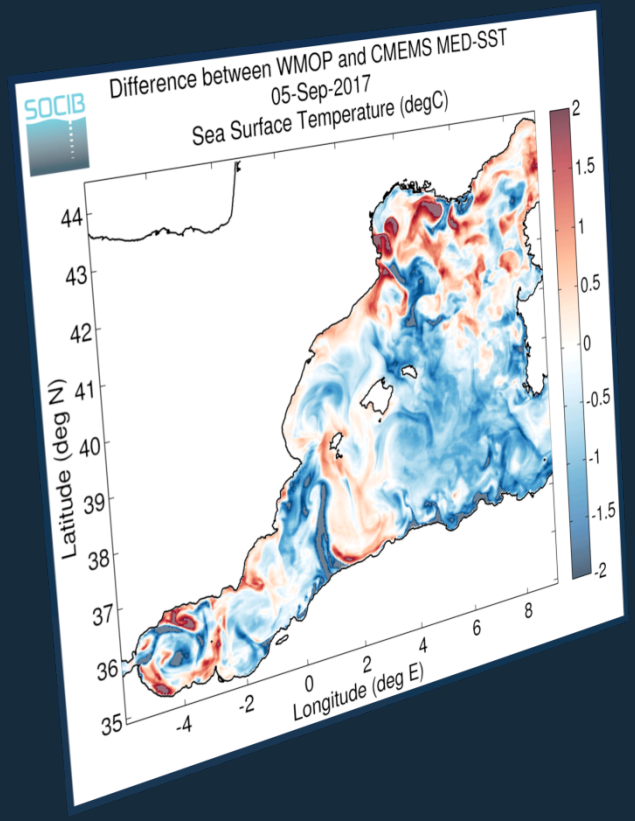
WMOP VALIDATION

WMOP vs. satellite L4 SST product : Night-time Sea Surface Temperature maps



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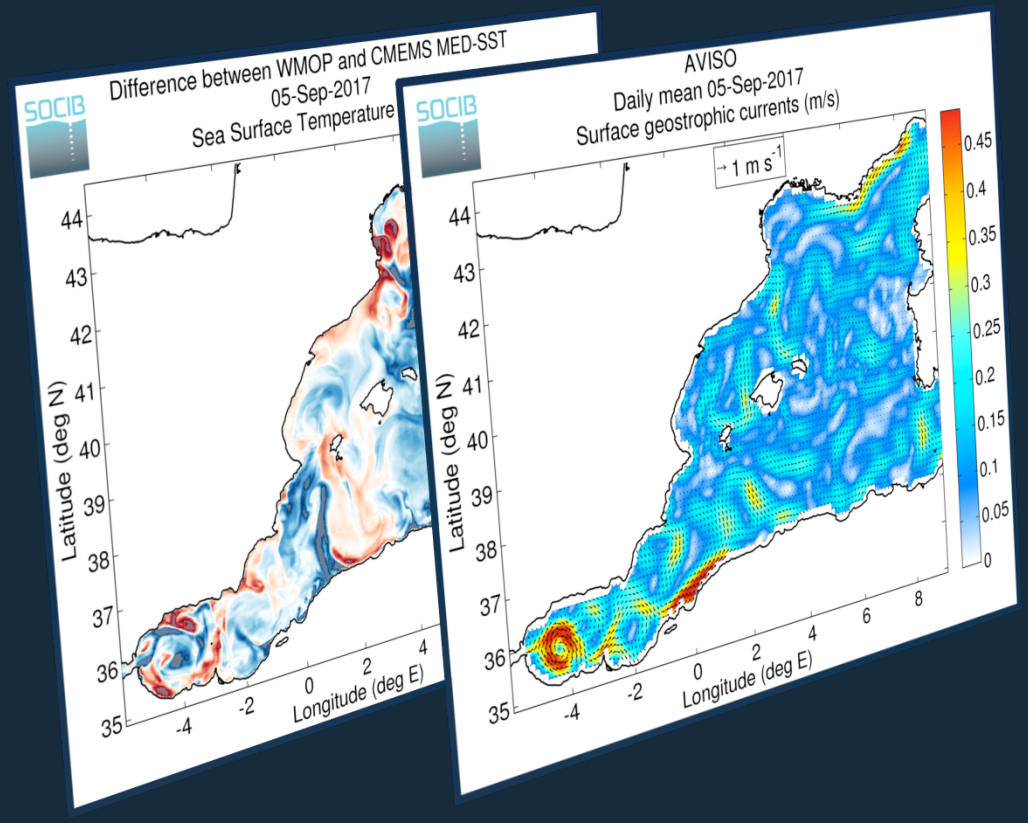
WMOP vs. AVISO Ssalto /Duacs: Daily mean surface geostrophic current maps



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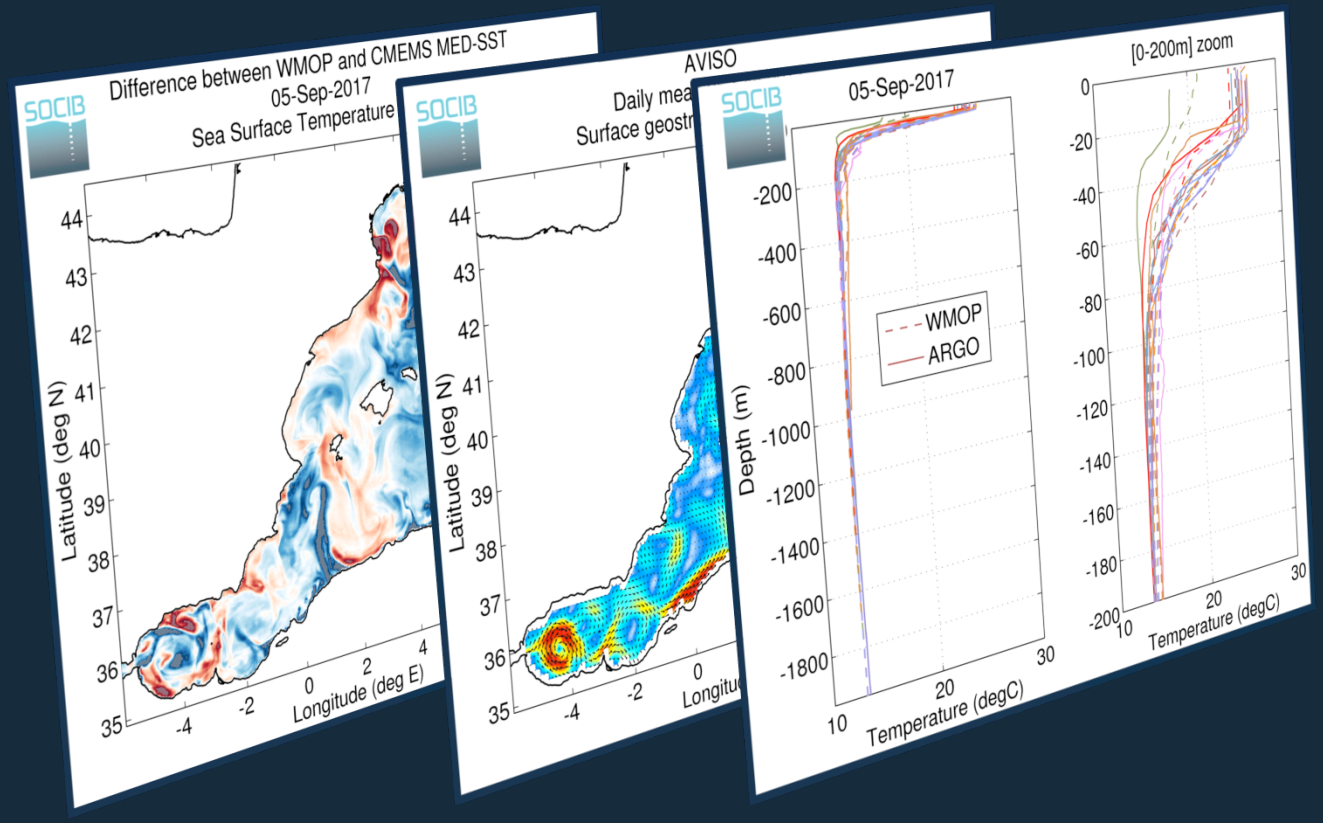
WMOP vs. Argo floats: Daily vertical temperature profiles from ARGO



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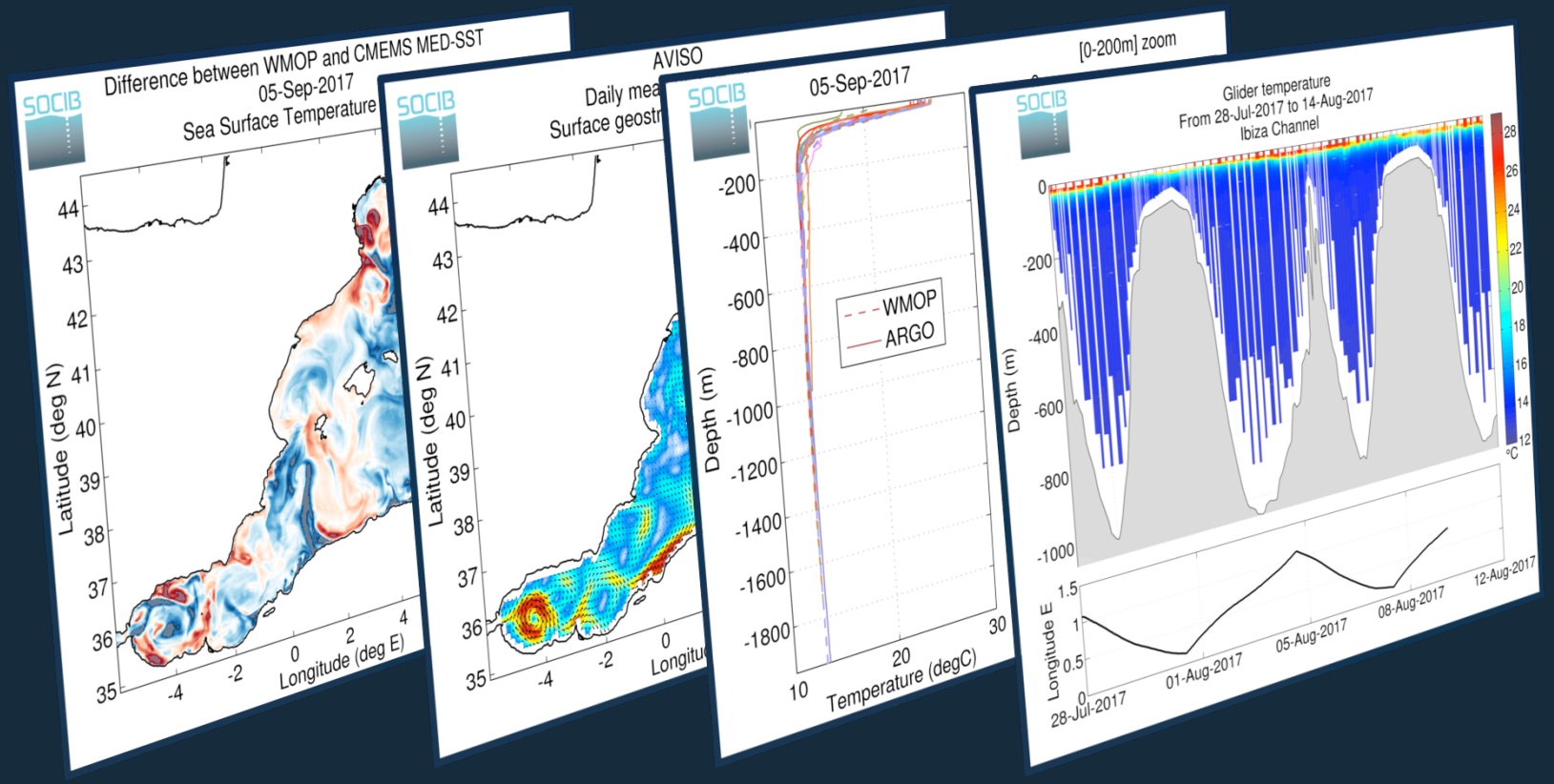

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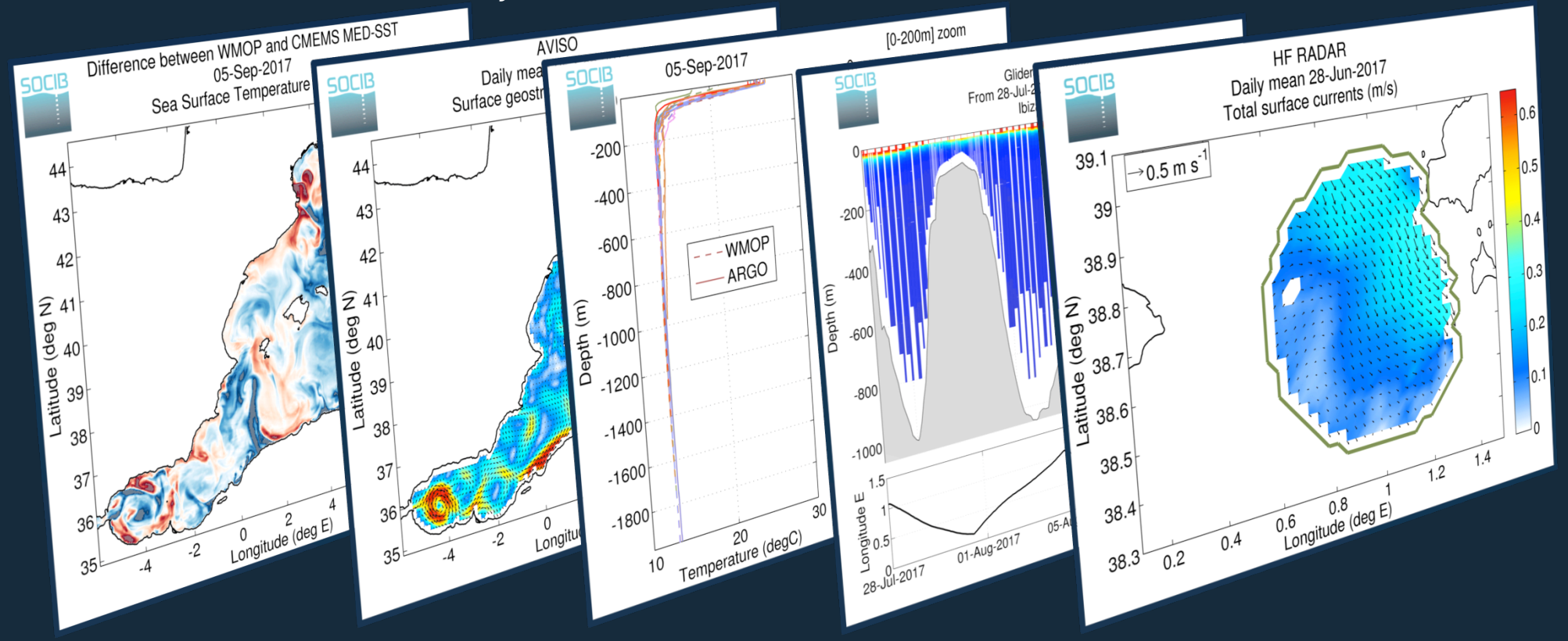
WMOP vs. HFR radar: daily mean of surface currents in the Ibiza Channel



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RPS

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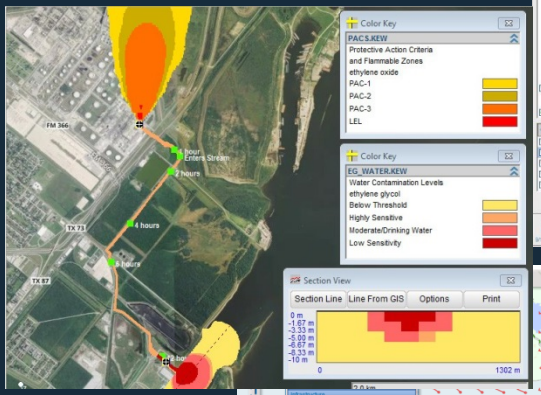
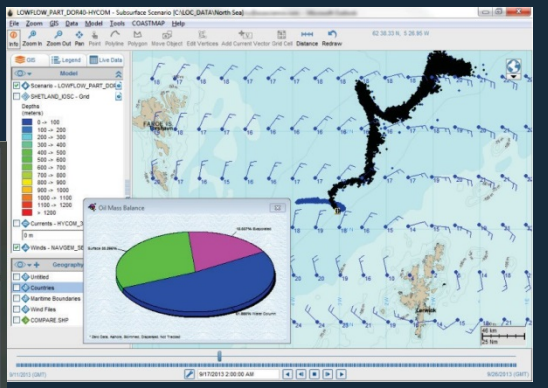
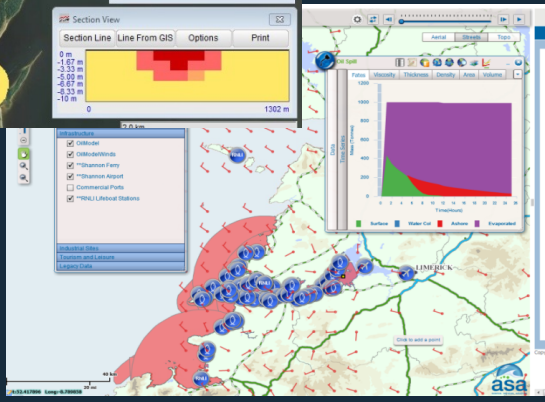
02 RPS Ocean Science (formerly ASA)

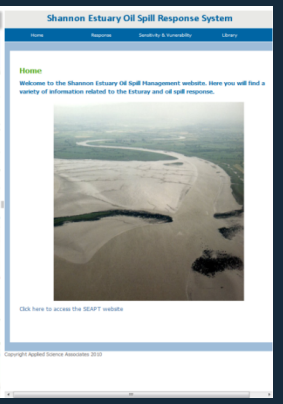
Environmental Consultancy And Technology Solutions

- Environmental Modeling Consultancy Services (ASA ~ 30 years)
- Global coverage, supporting Environmental Agencies and Private Sector
- Modeling systems for emergency response (OILMAP/SARMAP/CHEMMAP)
- Operational data management (OceansMap)
- Working with many Coast Guards, including Sasemar/Jovellanos for 10+ years









RPS

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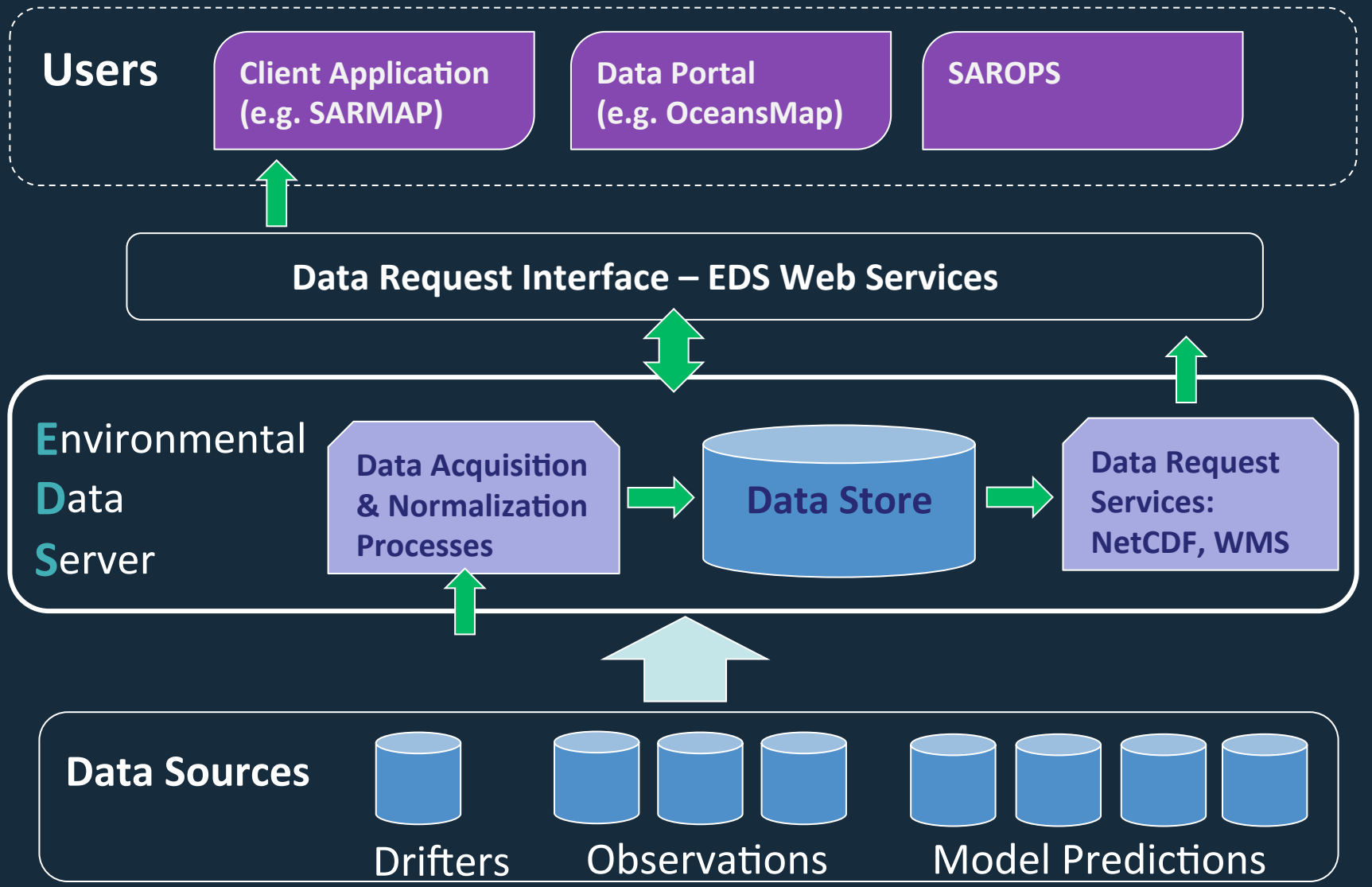
RPS Ocean Science

EDS: ENVIRONMENTAL DATA SERVER



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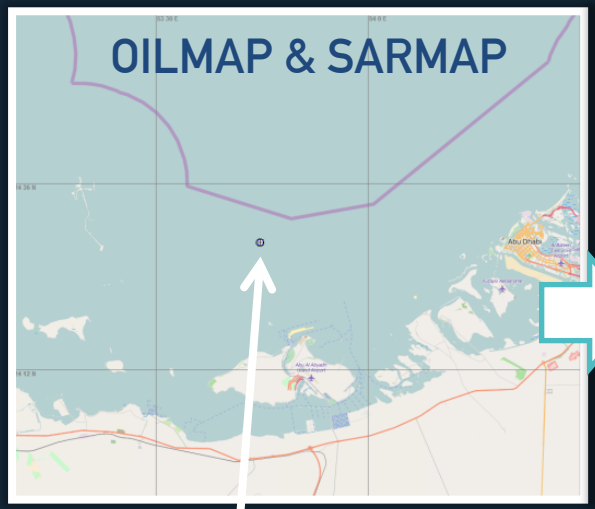
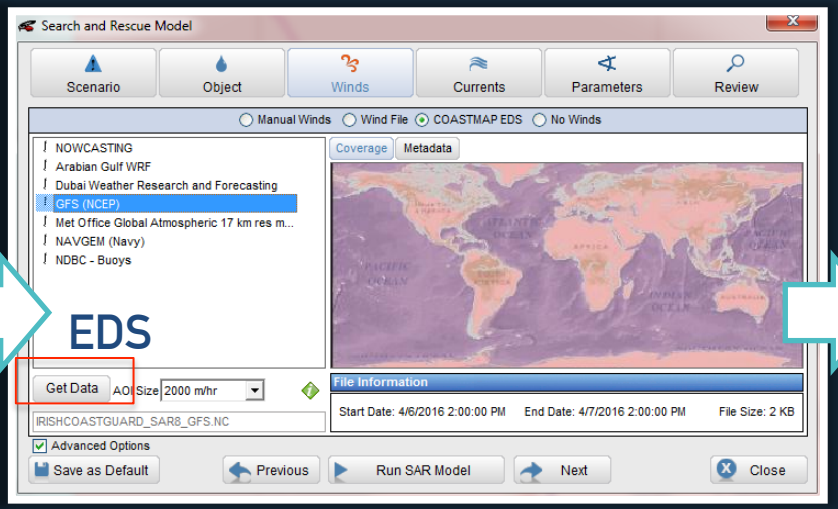
02 **RPS Ocean Science**

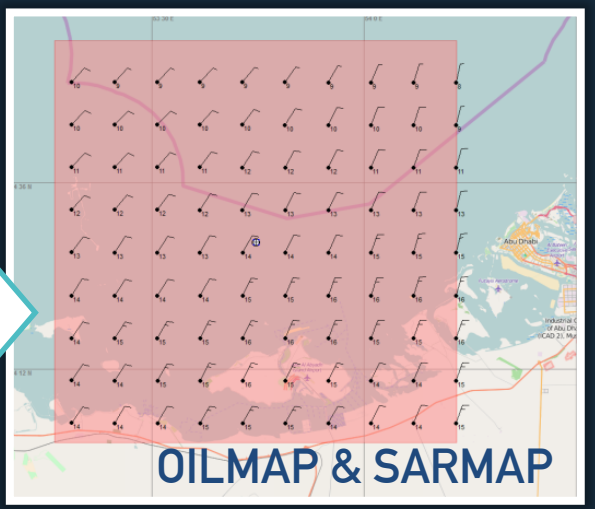
SAR TOOLS

1 - Selects Area of Interest, Time range and Data product

2 – Provides Wind/Current Forecast File







SAR exercise parameters definition

EDS shows available NRT wind and currents datasets in the area

Met-ocean data integration into SAR applications

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02

SASEMAR

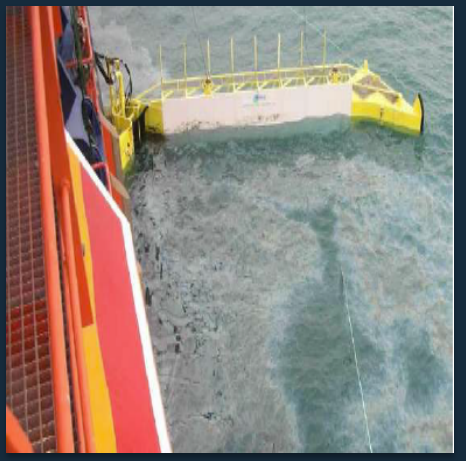
SPANISH MARITIME SAFETY AND RESCUE AGENCY

SASEMAR's role:

- SAR & Maritime emergencies
- Pollution prevention and response
- Maritime traffic control
- Training

SAR & MARITIME EMERGENCIES

POLLUTION PREVENTION AND RESPONSE



MARITIME TRAFFIC CONTROL

TRAINING

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SASEMAR's activities [2016]

- > 5,700 interventions (15/day)
- > 4,000 SAR operations (11/day)
- ~18,000 people assisted (49/day)
- > 400 oil spill interventions

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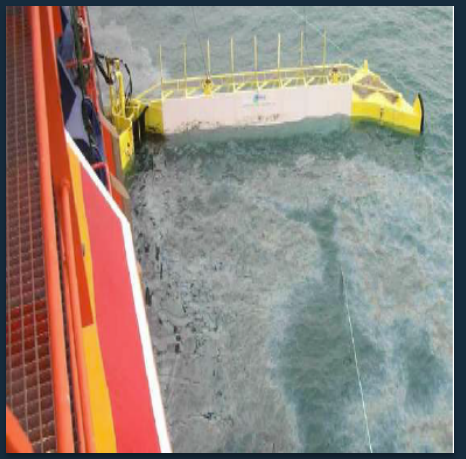

MARITIME TRAFFIC CONTROL

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SASEMAR's resources

- 1,500 professionals
- 20 MRCC & VTS centres
- Aerial & Maritime units
- Strategic bases
- Jovellanos Training Centre

SAR & MARITIME EMERGENCIES

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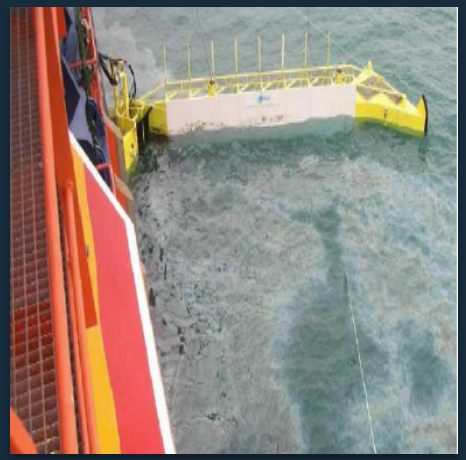

MARITIME TRAFFIC CONTROL

TRAINING

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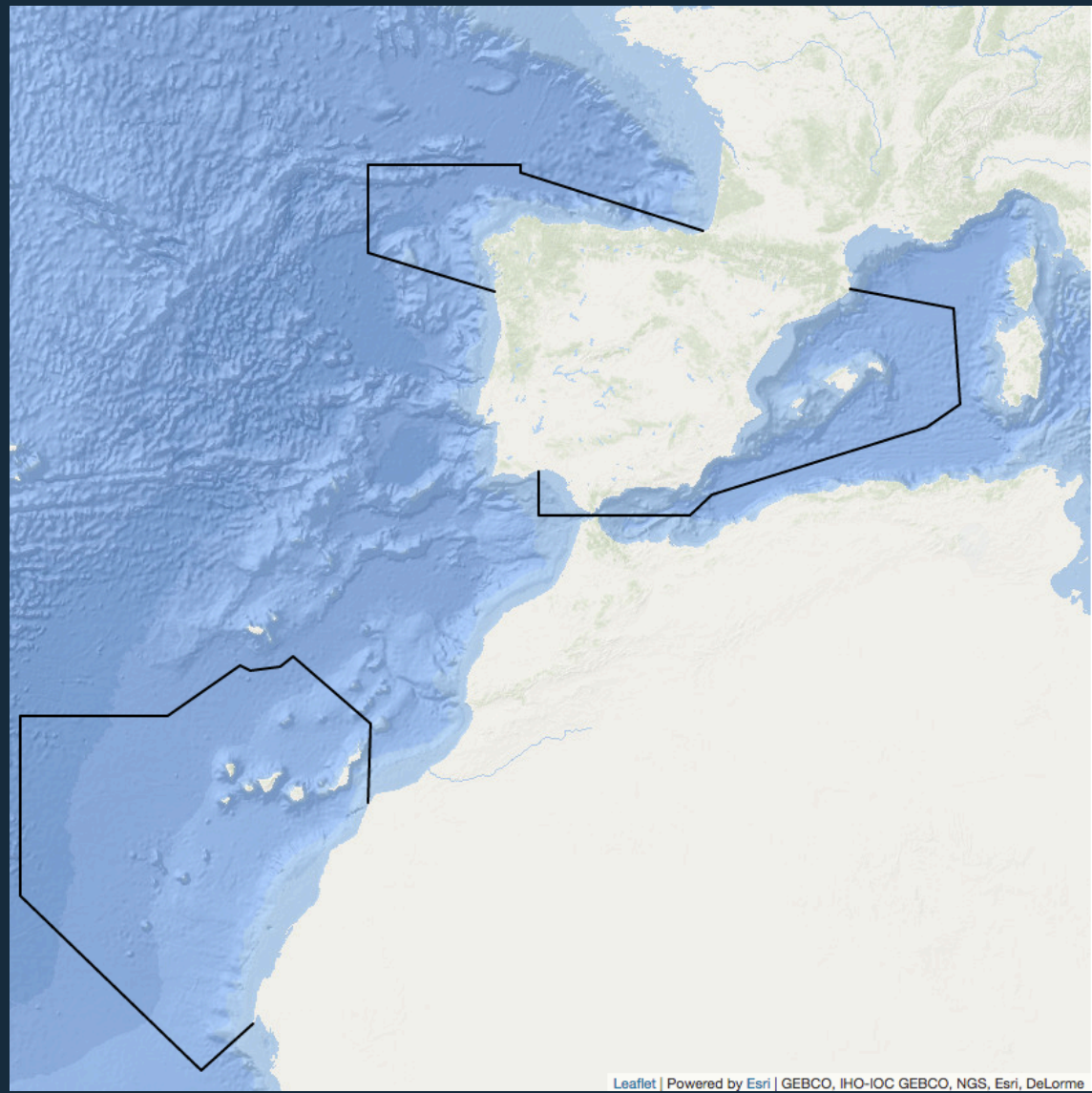
SASEMAR

SPANISH MARITIME SAFETY AND RESCUE AGENCY

Maritime SAR areas

- Spanish coastline: 8,000 km
- SAR region area: 1,500,000 km^2
- 4 main SAR areas:
  - Atlantic
  - Strait of Gibraltar
  - Mediterranean
  - Canary Islands



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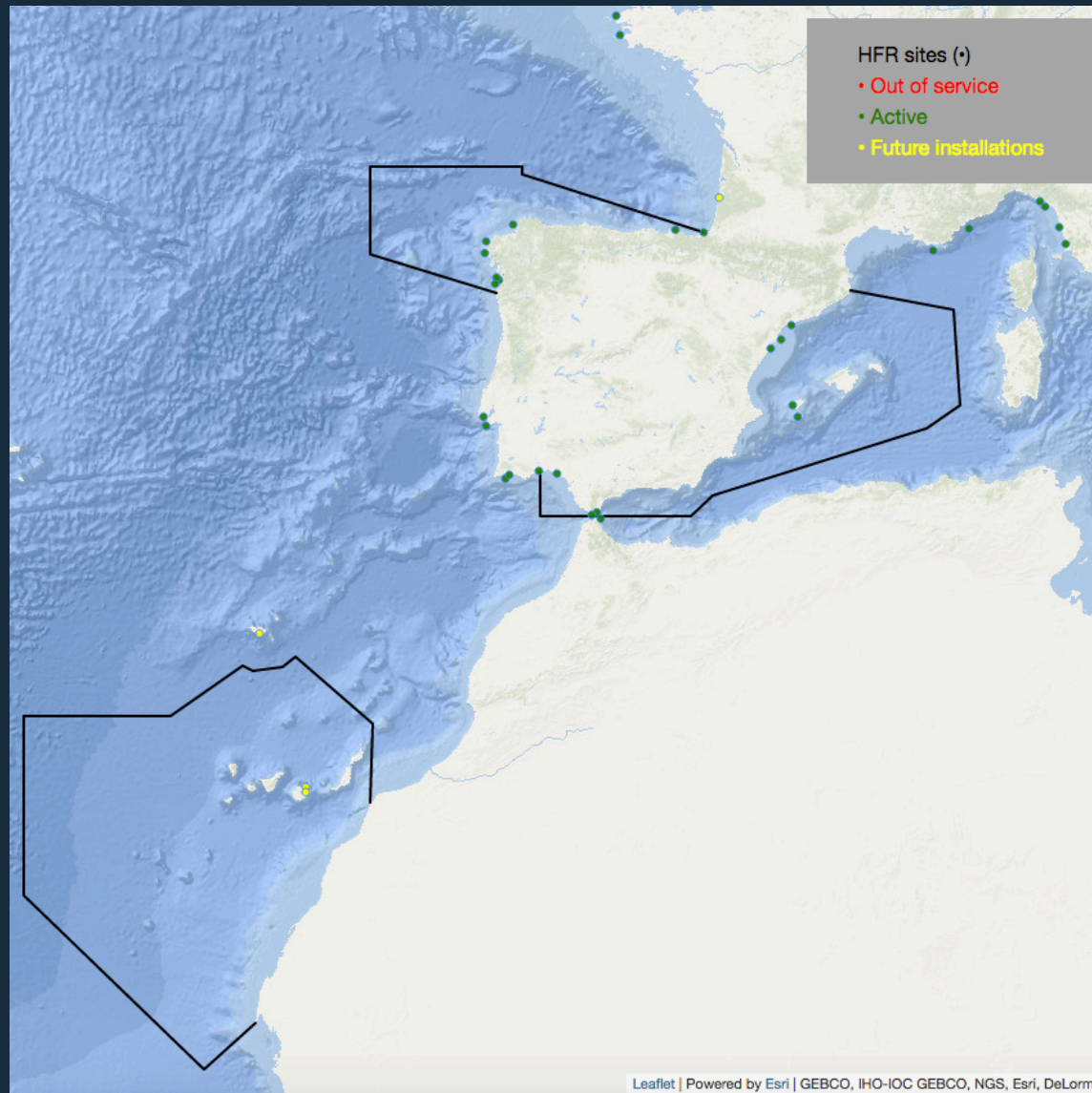
Reliable ocean observations and forecasting are essential



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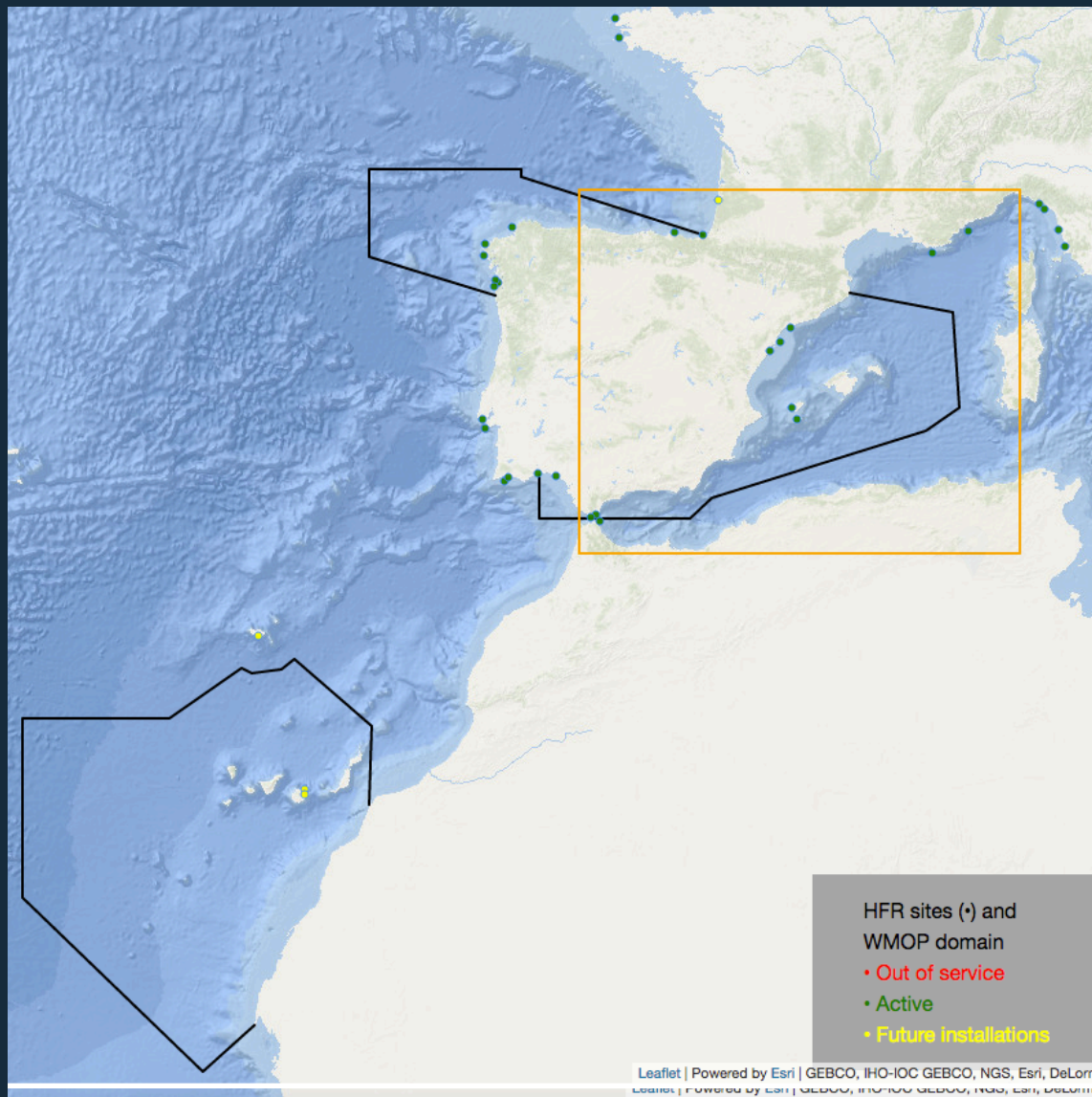

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02 SASEMAR

Maritime SAR areas

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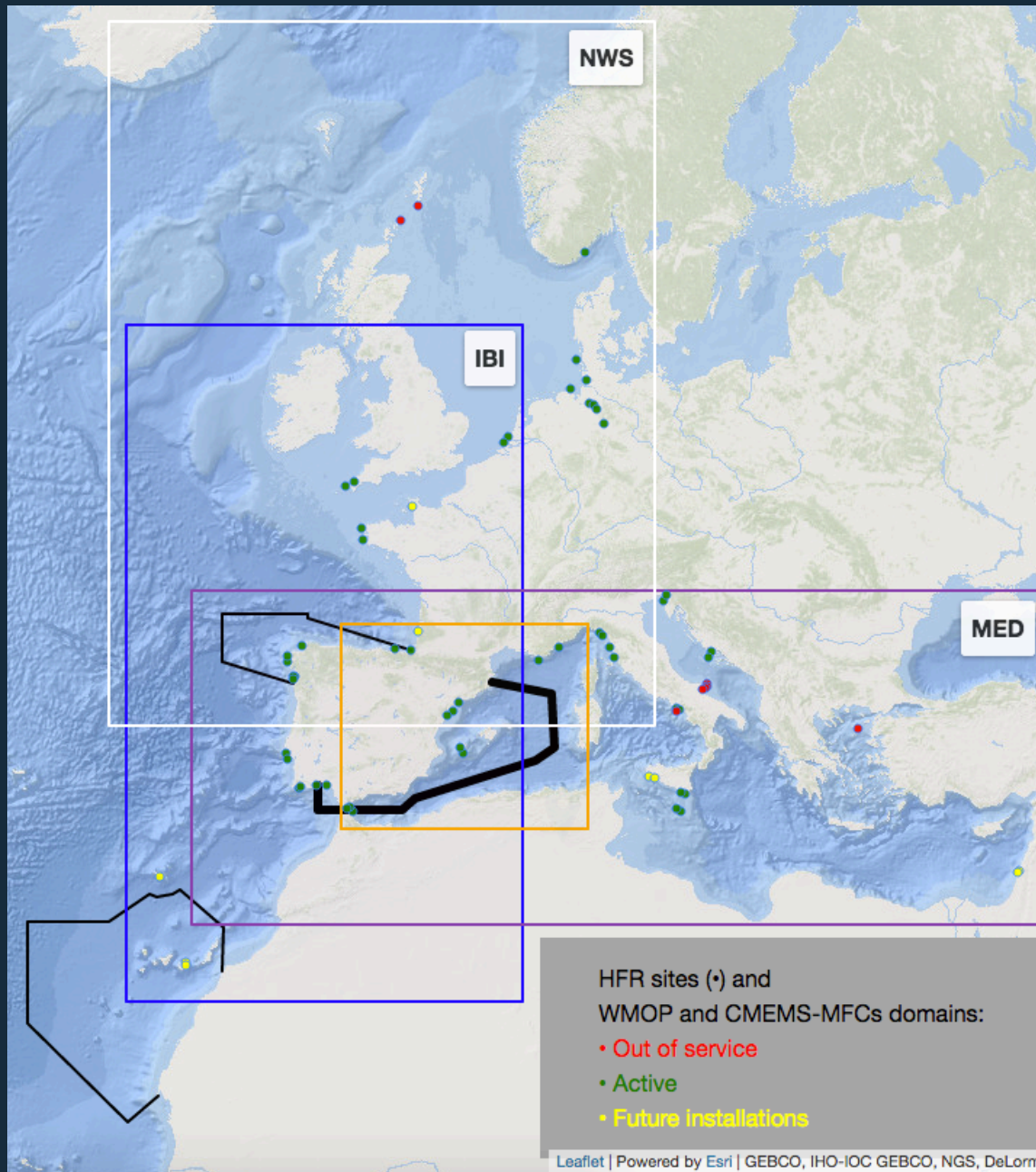

03 JOINT EFFORTS

EDS: DATA COLLECTION AND DISSEMINATION

EDS Data Service

[data provider]

[data manager]

[end-user]

03 JOINT EFFORTS

EDS: DATA COLLECTION AND DISSEMINATION

[data provider]

[data manager]

[end-user]

SOCIB

03 JOINT EFFORTS

EDS: DATA COLLECTION AND DISSEMINATION

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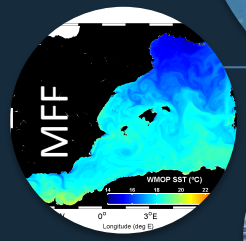


AEMet Agencia Estatal de Meteorología

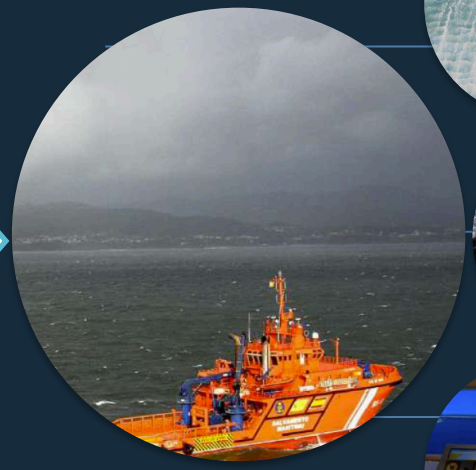
NCEP

EDS Data Service

NOAA

Puertos del Estado

Copernicus



SOCIB Balearic Islands Coastal Observing and Forecasting System

[data provider]

RPS

[data manager]

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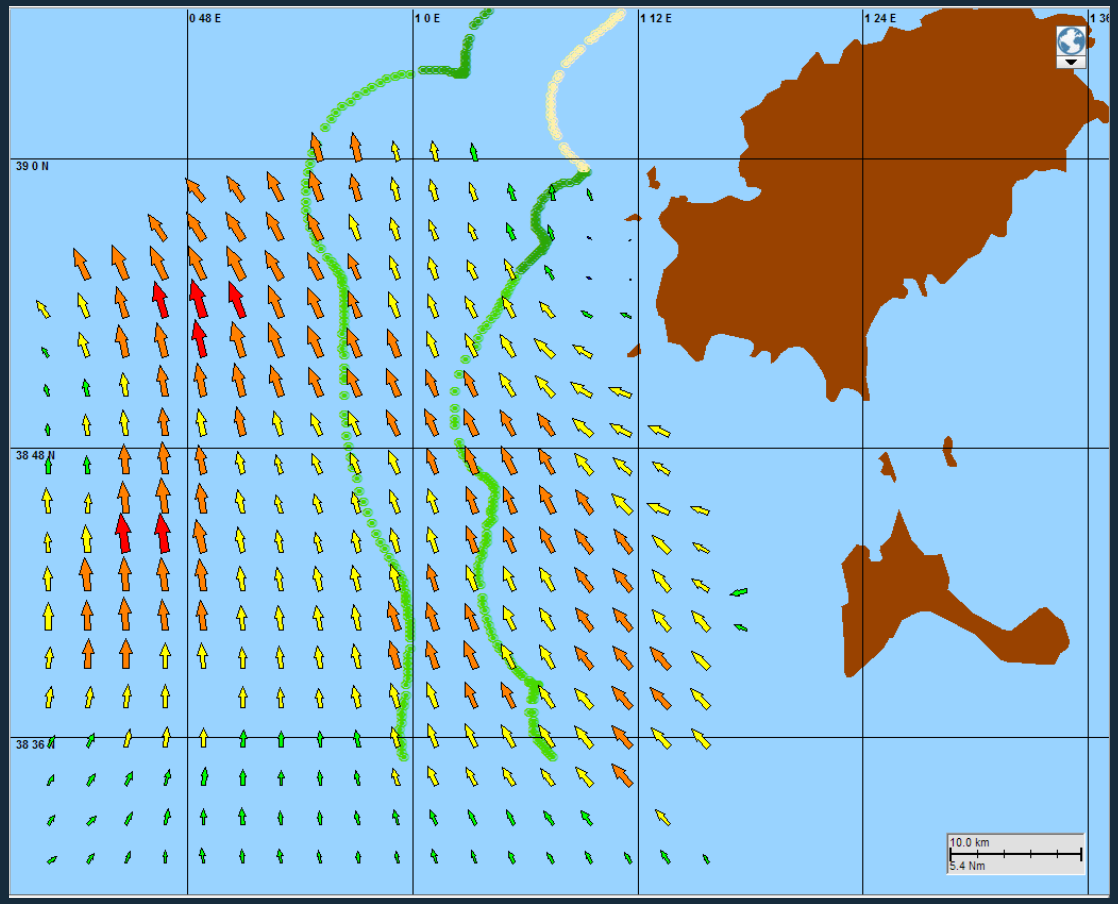
[end-user]

03 JOINT EFFORTS
METOCEAN DATA INTEGRATION



OILMAP viewer: HFR current data & drifters

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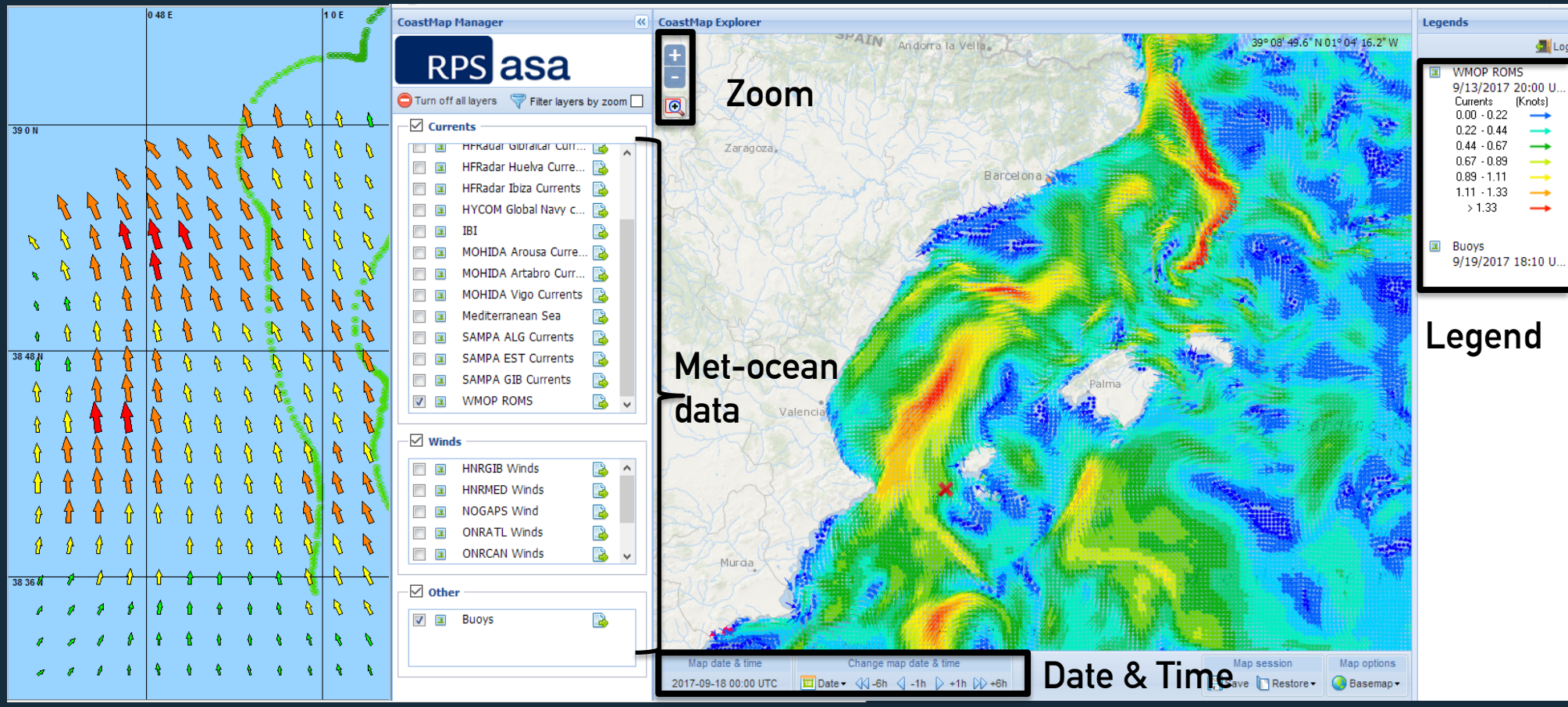
METOCEAN DATA INTEGRATION



OILMAP viewer: HFR current data & drifters

EDS viewer: WMOP predicted current velocity

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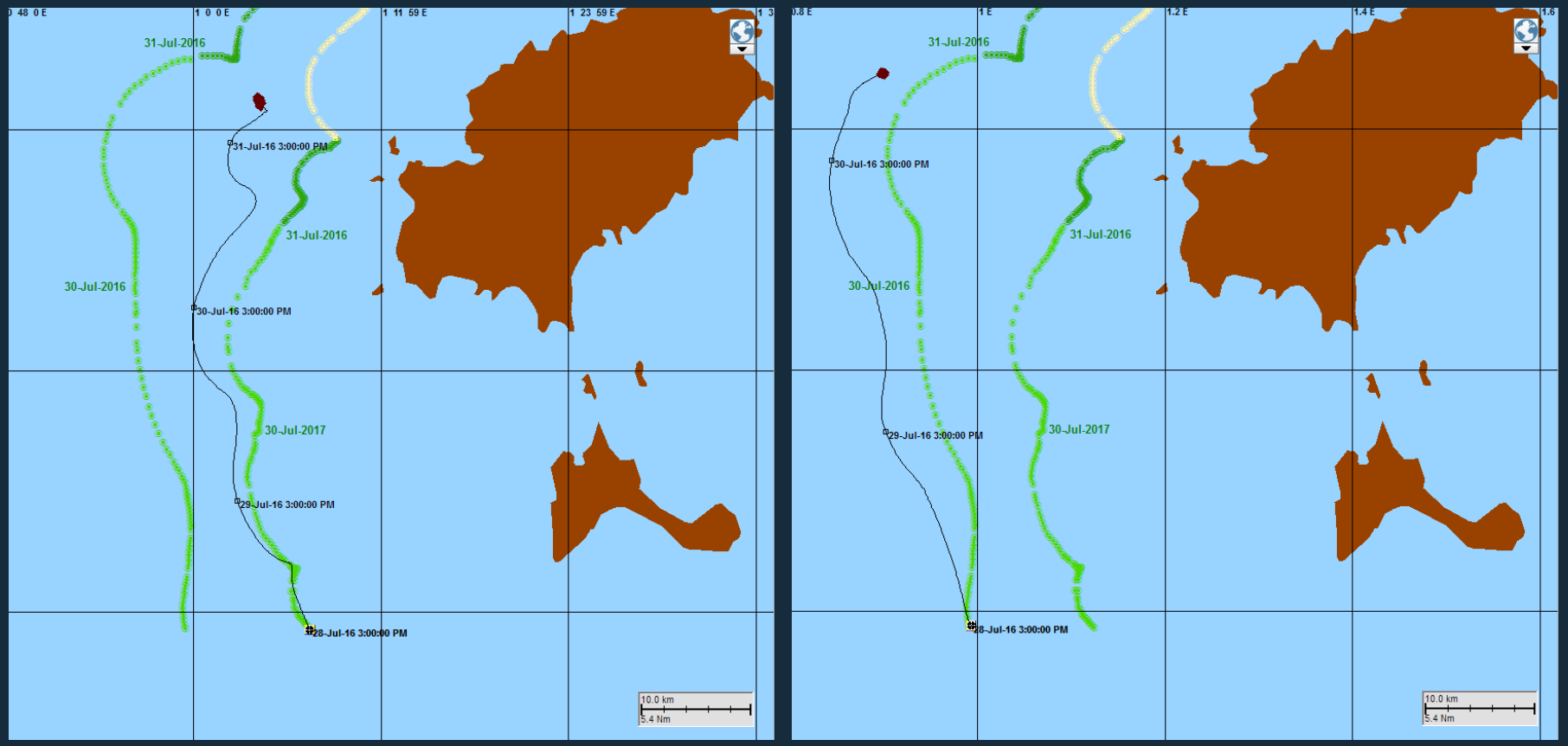
METOCEAN DATA INTEGRATION



OILMAP viewer: Oil spill trajectory (using HFR currents) –black- vs. real drifters trajectories –colored-

03

JOINT EFFORTS

SAR CASE HISTORY: DRIFTING SAILING VESSEL "BAHAYA"

10.AUG.2017: Windy storm at Ibiza and Formentera Islands

- Vessel name: Bahaya
- Vessel type: sailboat with 1 mast
- Initial position: 38º 50.6' N ; 001º 23.70' E
- Final position : 38º 27.4' N; 001º 24.48' E
- Initial time: 10/08/2017_01:00 UTC
- Location time: 12/08/2017_15:11 UTC

Windy storm at Pitiusas Islands on the 10th August, 2017

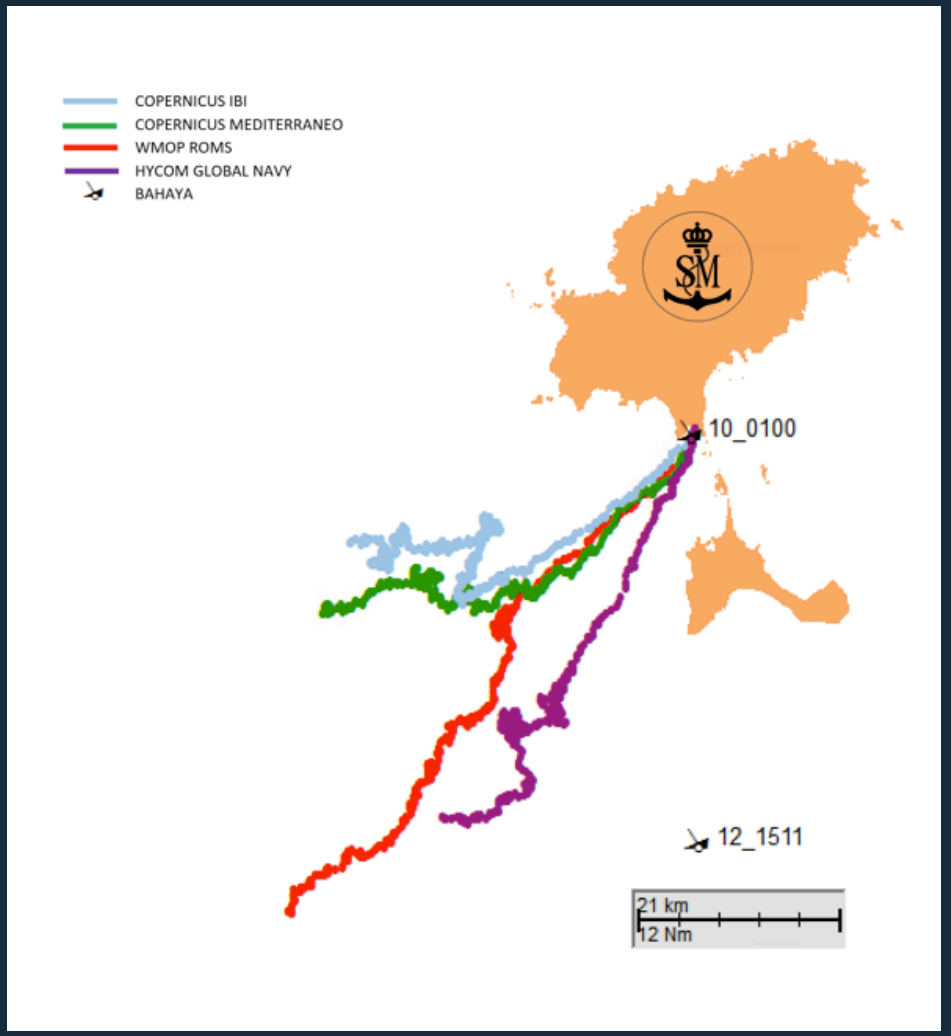
03 JOINT EFFORTS

SAR CASE HISTORY: DRIFTING SAILING VESSEL "BAHAYA"

SARMAP simulation:

- Time step: 10 min
- Number of particles: 5000
- Wind: AEMET HIRLAM HR (5 km)
- Currents: different models
- Drifting for 62 hours

Vessel detection & found



SARMAP: Simulated trajectories and vessel initial/final location

03 JOINT EFFORTS

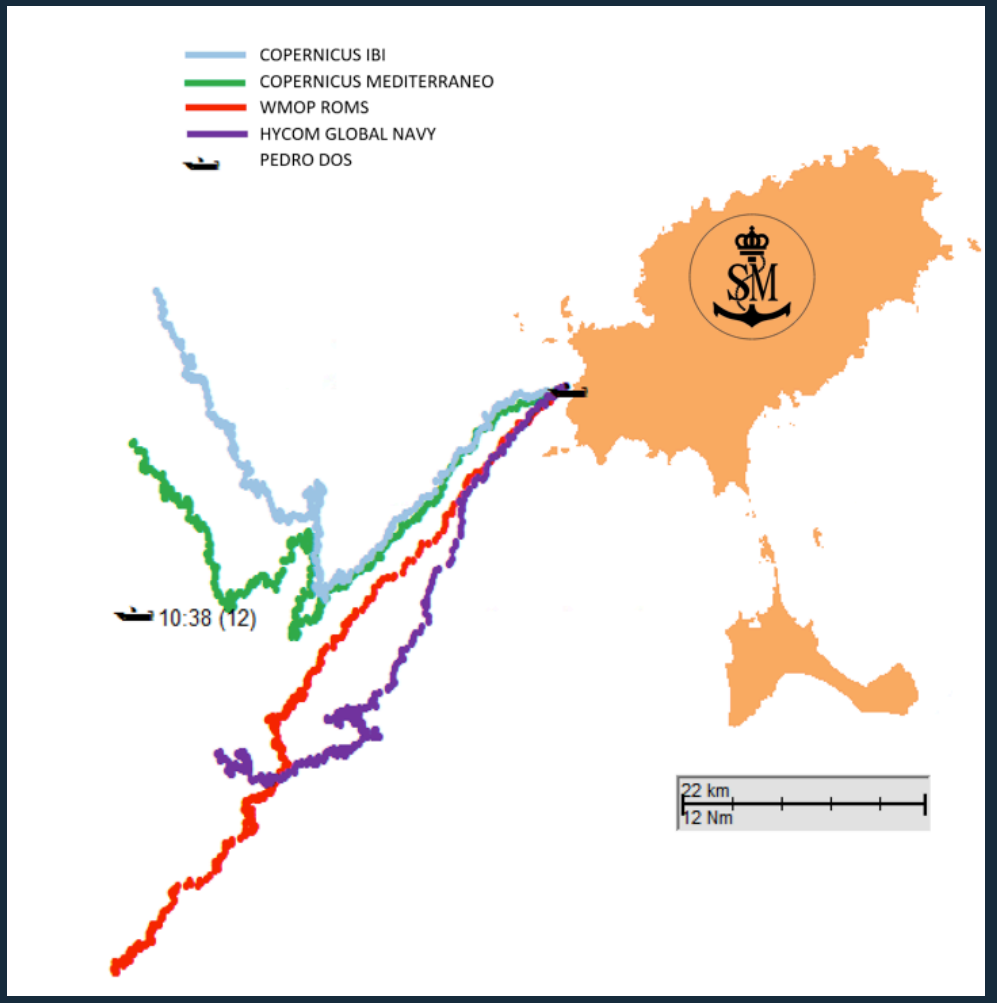
SAR CASE HISTORIES: DRIFTING MOTORBOAT "PEDRO II"

10.AUG.2017: Windy storm at Ibiza and Formentera Islands

- Vessel name: Pedro II
- Vessel type: motorboat
- Initial position: 38º 55.2' N ; 001º 12.80' E
- Final position : 38º 44.2' N; 000º 45.50' E
- Initial time: 10/08/2017_21:00 UTC

SARMAP simulation:

- Time step: 10 min
- Number of particles: 5000
- Wind: AEMET HIRLAM HR (5 km)
- Currents: different models
- Drifting for 61 hours and 40 min



Simulated trajectories and motorboat locations

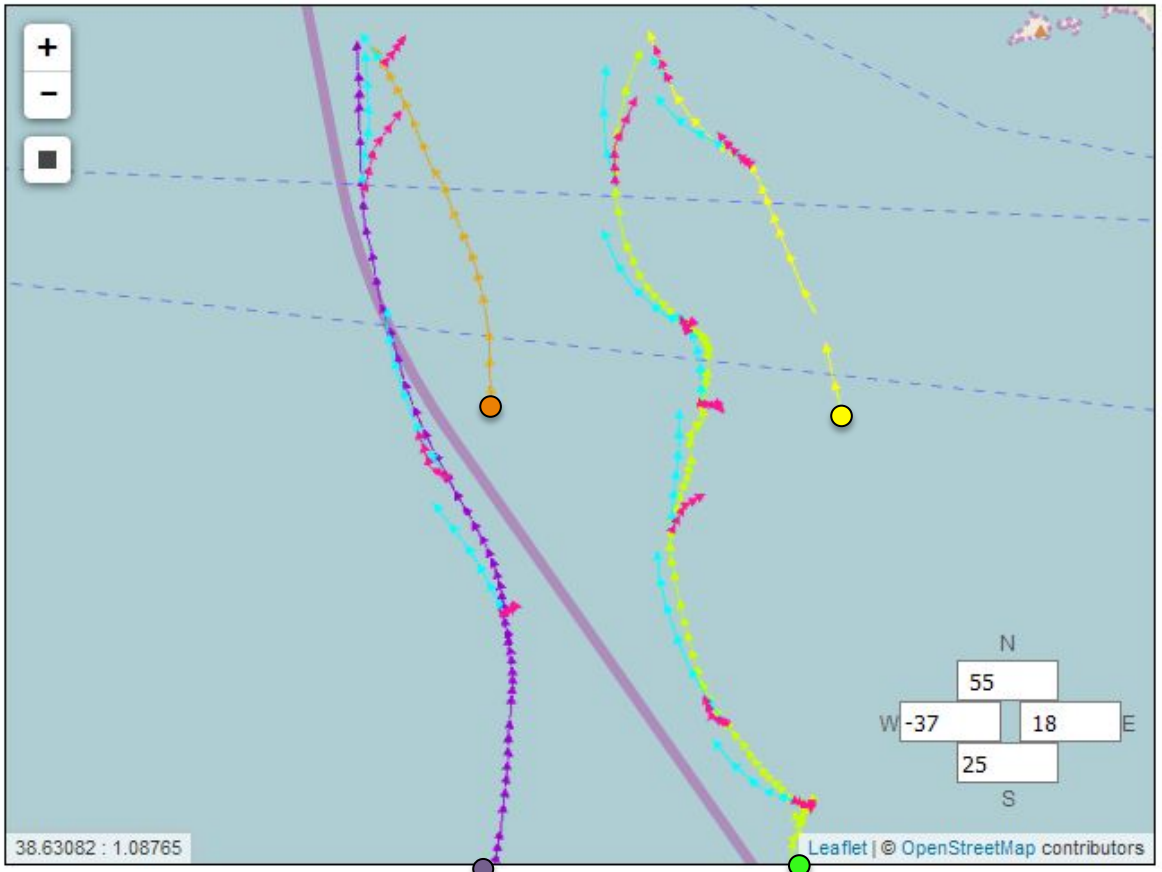
03 JOINT EFFORTS

SKILL SCORE APPLICATION

Welcome, manager !

Control Panel

- Software Key Management
- EDS Account Management
- WMS Management
- EDS Orders
- EDS Charts
- Skill Scores
- EDS Status Monitoring



Case Start: 2016-07-28 00:00 Case End: 2016-08-01 00:00

Display Skill Scores | Download Skill Data

Reference source

Average score of data source

Target source

Average skill scores in AOI (25.00,-37.00 to 55.00, 18.00)

Model	6 Month						Case					
	SLDMB			Moored			SLDMB			Moored		
	Skill Score	Num Buoys	Num Obs.	Skill Score	Num Buoys	Num Obs.	Skill Score	Num Buoys	Num Obs.	Skill Score	Num Buoys	Num Obs.
HFRADAR_IBIZA	0	0	0	0	0	0	0.7458	4	21	0	0	0
WMOP	0	0	0	0	0	0	0.3062	4	25	0	0	0

Welcome, manager !

Control Panel

- Software Key Management
- EDS Account Management
- WMS Management
- EDS Orders
- EDS Charts
- Skill Scores
- EDS Status Monitoring

Data for Moored Buoys in AOI (25.00, -37.00 to 55.00, 18.00)

2016-07-22 00:00 - 2016-07-31 00:00 .

Moored Buoy	Model	Average Skill Score	Average Depth	Last Updated	Number Observations

Skill score for each forecast-observation pair

Data for SLDMBs in AOI (25.00,-37.00 to 55.00, 18.00)

2016-07-22 00:00 - 2016-07-31 00:00

SLDMB	Model	Average Skill Score	Last Updated	Track Hours
odi013	HFRADAR_IBIZA	0.7237	7/30/2016 6:00:00 AM	4
odi013	WMOP	0.4797	7/30/2016 6:00:00 PM	6
odi014	HFRADAR_IBIZA	0.6825	7/30/2016 12:00:00 AM	3
odi014	WMOP	0.1862	7/30/2016 12:00:00 AM	3
odi015	HFRADAR_IBIZA	0.7632	7/31/2016 6:00:00 AM	8
odi015	WMOP	0.2085	7/31/2016 6:00:00 AM	8
odi016	HFRADAR_IBIZA	0.769	7/30/2016 6:00:00 PM	6
odi016	WMOP	0.3187	7/31/2016 6:00:00 AM	8

Display Skill Scores | Download Skill Data

Reference source

Average score of data source

Target source

Average skill scores in AOI (25.00,-37.00 to 55.00, 18.00)

Model	6 Month						Case					
	SLDMB			Moored			SLDMB			Moored		
	Skill Score	Num Buoys	Num Obs.	Skill Score	Num Buoys	Num Obs.	Skill Score	Num Buoys	Num Obs.	Skill Score	Num Buoys	Num Obs.
HFRADAR_IBIZA	0	0	0	0	0	0	0.7458	4	21	0	0	0
WMOP	0	0	0	0	0	0	0.3062	4	25	0	0	0

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04 BENEFITS OF COLLABORATION

SOCIB Balearic Islands Coastal Observing and Forecasting System

RPS

New data sources available
Check Skill Assessment
Improve applications

NRT reliable data
Better use of data
Improve knowledge
Maximise the potential of met-ocean data

Salvamento Marítimo

Working together to achieve the same goal:
Better data for a better response

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04 BENEFITS OF COLLABORATION

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Ensure user uptake
Promote full interoperability
Expand coastal oceanography services

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Tailor-made products
User-friendly tools
Seamless service
Encourage industry Involvement
Downstream user

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04 BENEFITS OF COLLABORATION

SOCIB Balearic Islands Coastal Observing and Forecasting System

RPS

Ensure user uptake
Promote full interoperability
Expand coastal oceanography services

New data sources available
Check Skill Assessment
Improve applications

NRT reliable data
Better use of data
Improve knowledge
Maximise the potential of met-ocean data

Uncertainty estimation
User-request metrics
Pilot exercises

Tool improvement
User-feedback
Client

Tailor-made products
User-friendly tools
Seamless service
Encourage industry Involvement
Downstream user

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Better data for a better response

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Balearic Islands
Coastal Observing
and Forecasting
System

THANKS FOR YOUR ATTENTION

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MINISTERIO DE FOMENTO
Salvamento Marítimo
SOCIB

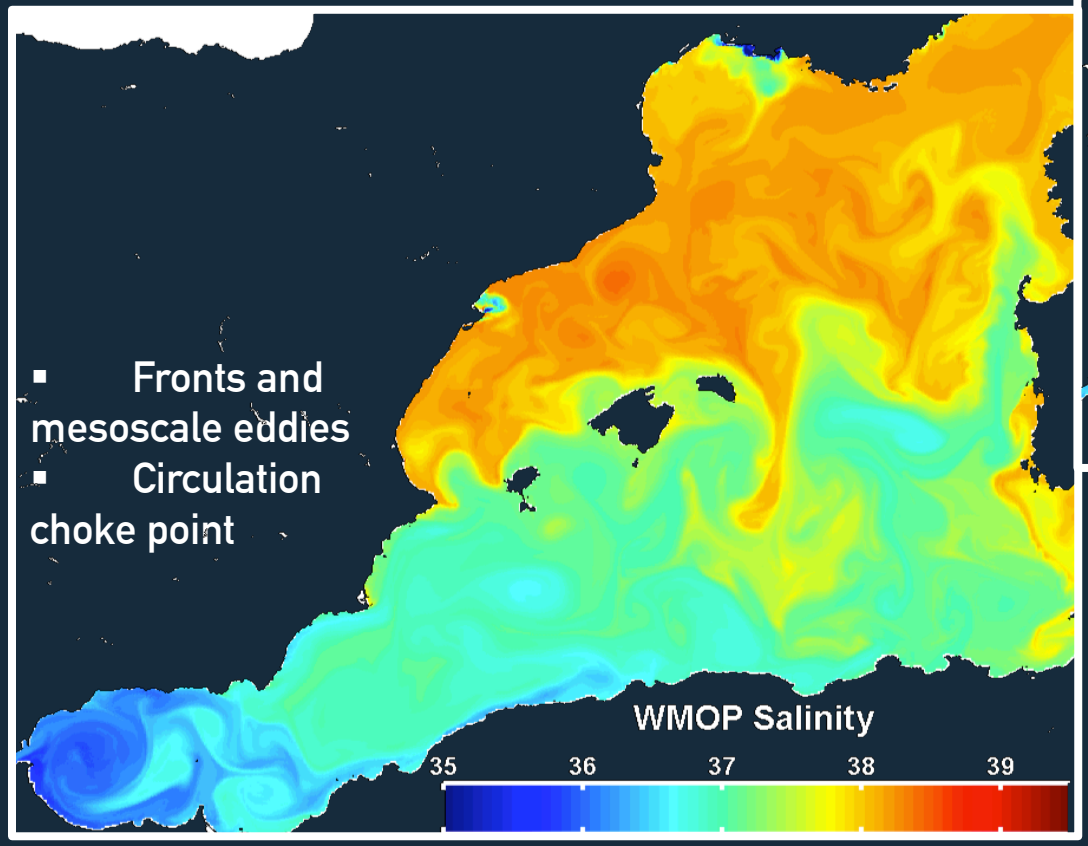
ACKNOWLEDGEMENTS

- SASEMAR
  - Men and women who, risking their own lives, save many others
- RPS ASA
  - team dedicated to the support and improvement of the EDS
- SOCIB Divisions
  - SOS (Systems Operation and Support)
  - ETD (Engineering and Technology Development)

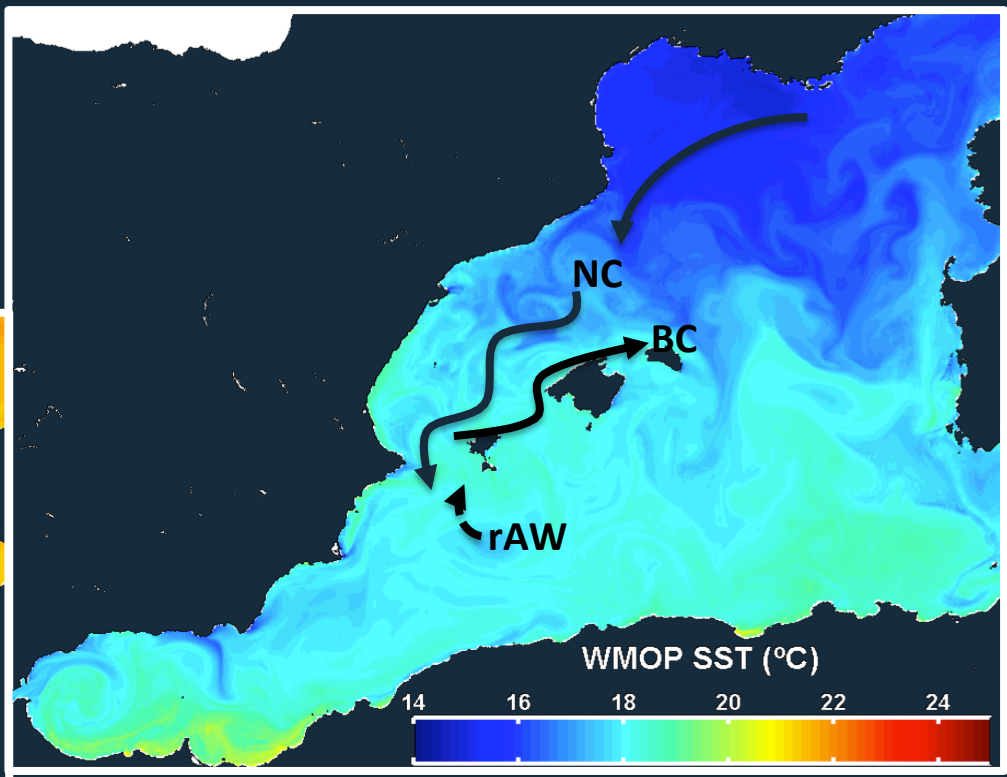
USE PERMISSION

SOCIB

01 THE MEDITERRANEAN SEA
A WELL KNOWN OCEAN LABORATORY



- Fronts and mesoscale eddies
- Circulation choke point



- Interaction between Atlantic and Mediterranean waters:

- Southward NC: saltier and cooler waters
- Northward BC: fresher and warmer waters