

INTEGRATED OPERATIONAL OCEANOGRAPHY IN RESPONSE TO SCIENCE AND SOCIETY NEEDS IN THE WESTERN MEDITERRANEAN

SCIENCE AND APPLICATIONS AT SOCIB

8th MONGOOS ANNUAL MEETING

&

**WORKSHOP “MODELLING AND OBSERVATIONS IN THE COASTAL
MEDITERRANEAN SEA: PHYSICAL AND BIOGEOCHEMICAL PROCESSES”**

3-5 December 2019

Alvarez-Berastegui D., Reyes E., Mourre B., Alou E., Barroso L., Hernández-Carrasco I., Orfila A., March D., Rotllán P., Cabornero A., Allen J., Fernández J.G. Hernández-Lasheras J., Révelard À., Ruiz I., Tintoré J.

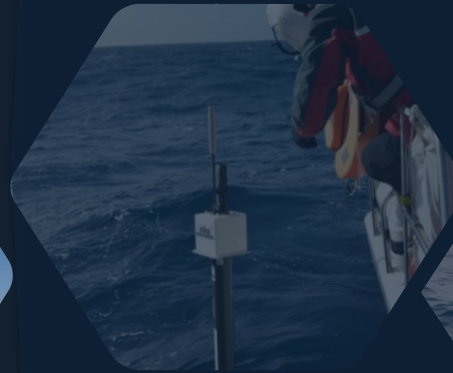
Gliders



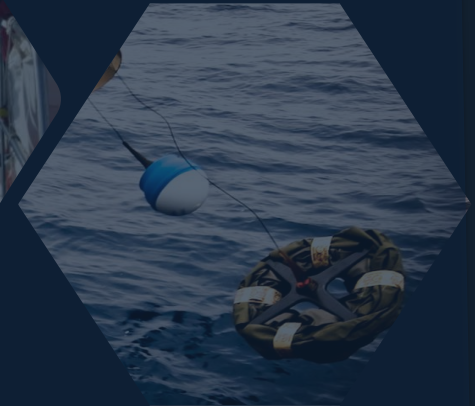
Research and
opportunity
vessels



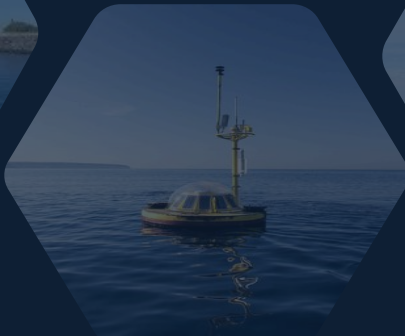
ARGO floats
profilers



Drifting
buoys



Tide Gauges



Moorings



HF radars

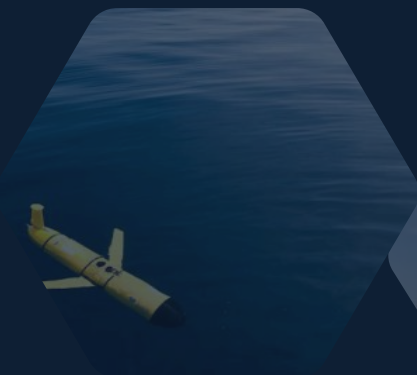


Beach
Monitoring



Marine animal
tracking

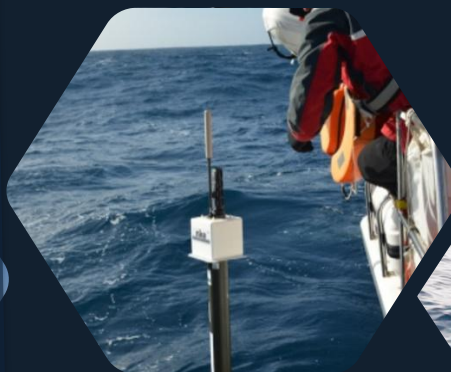
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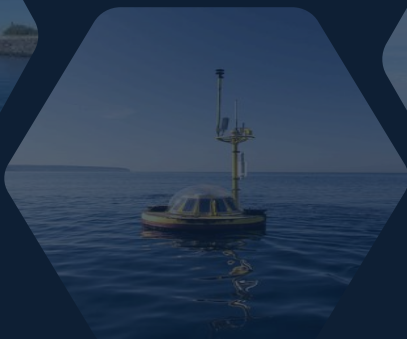
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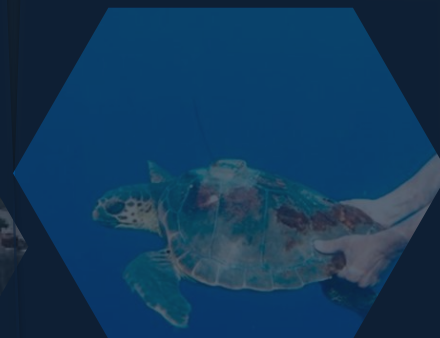
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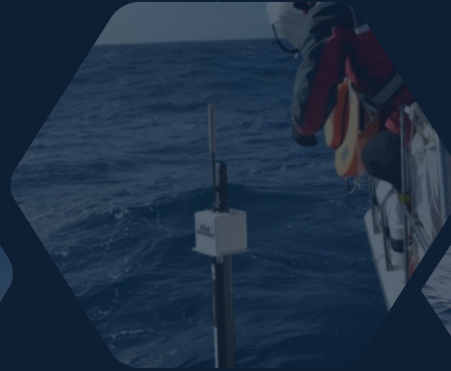
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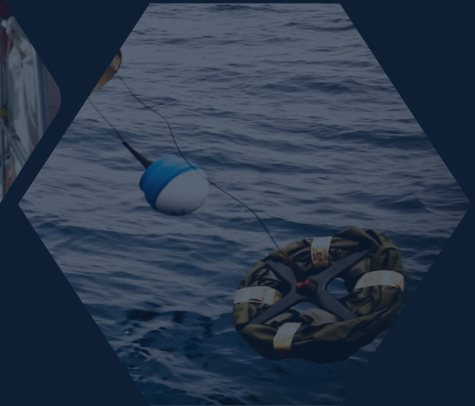
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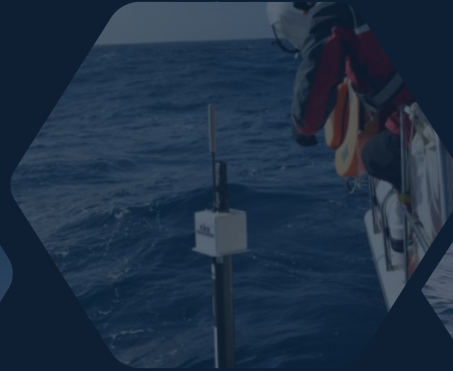
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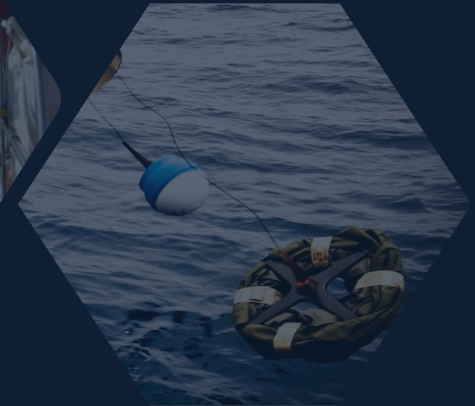
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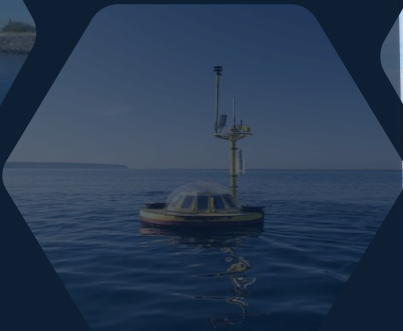
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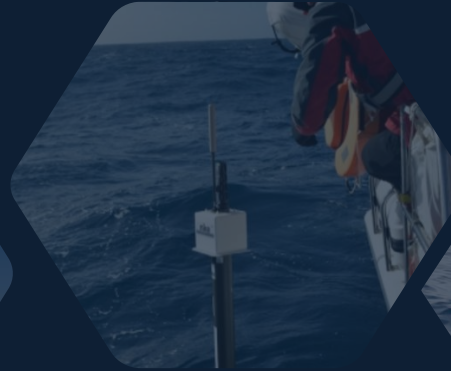
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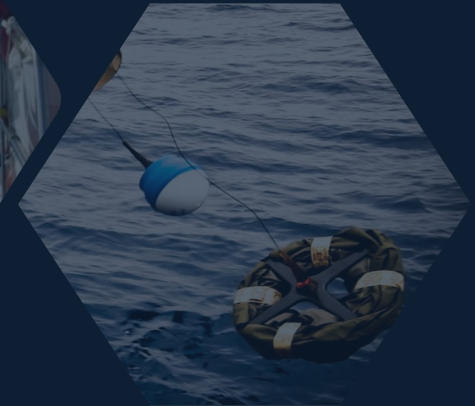
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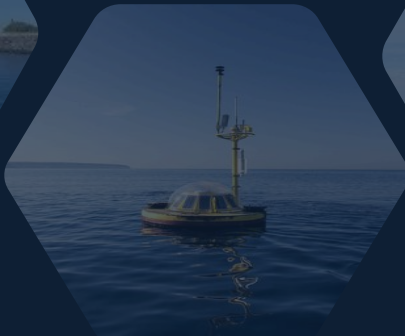
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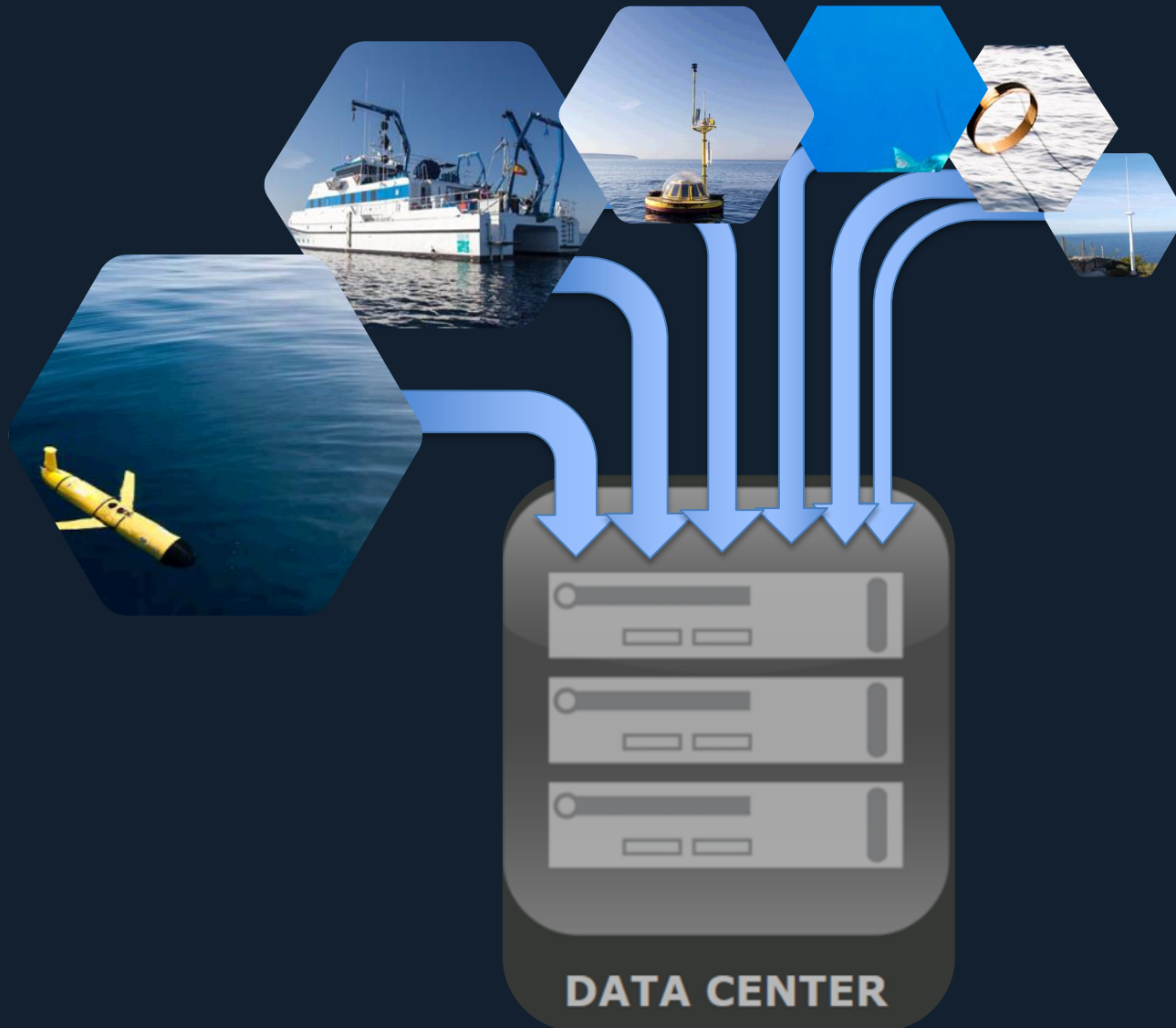


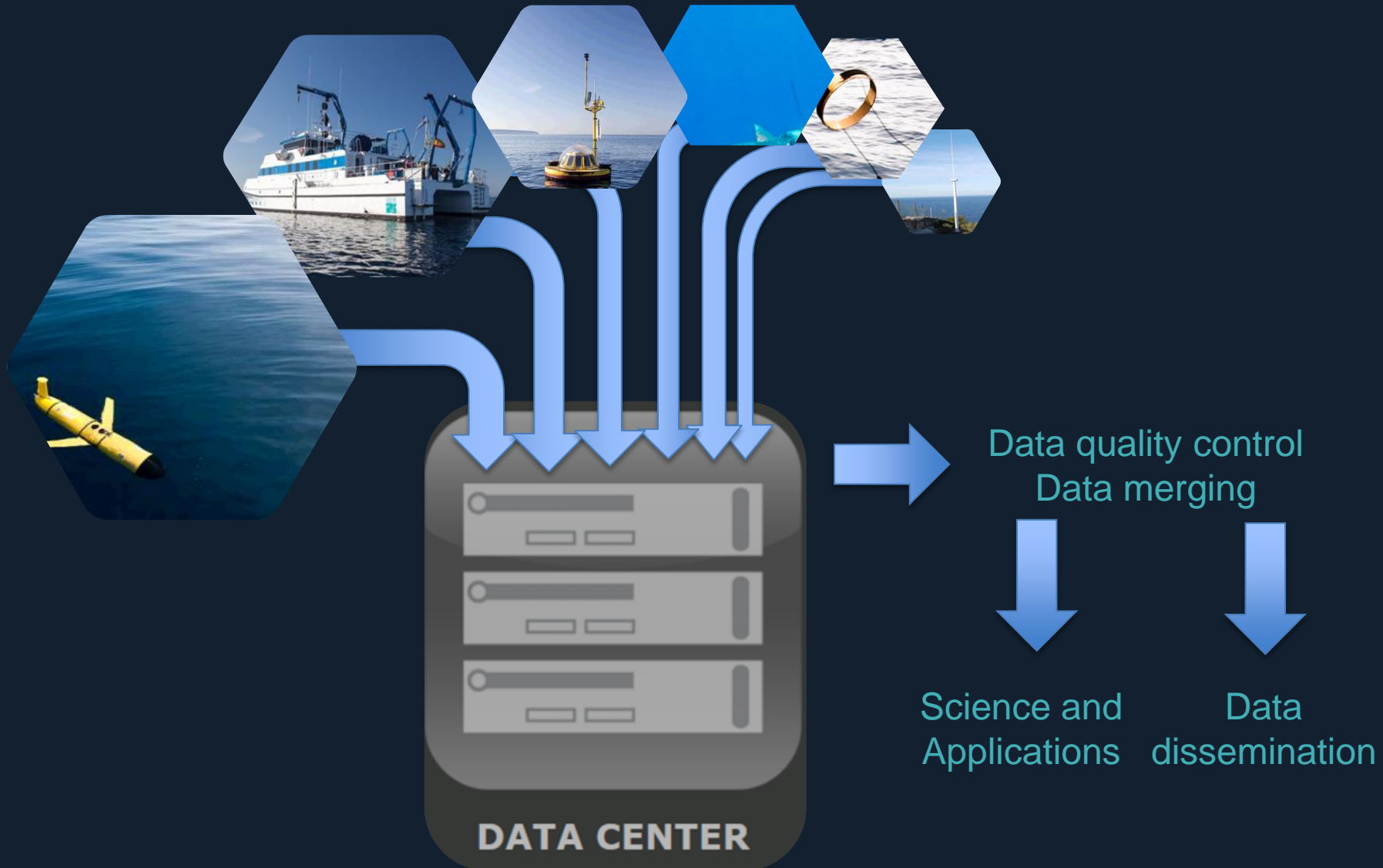
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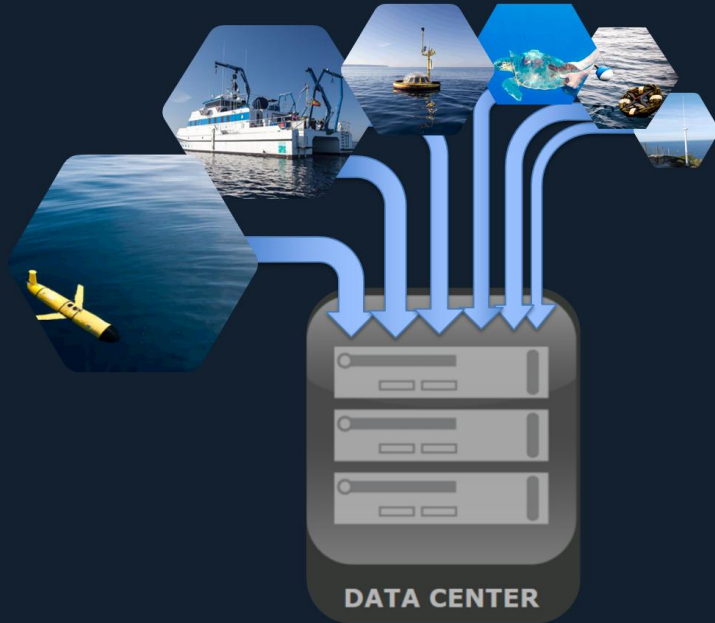
Marine animal
tracking

An integrated data management approach



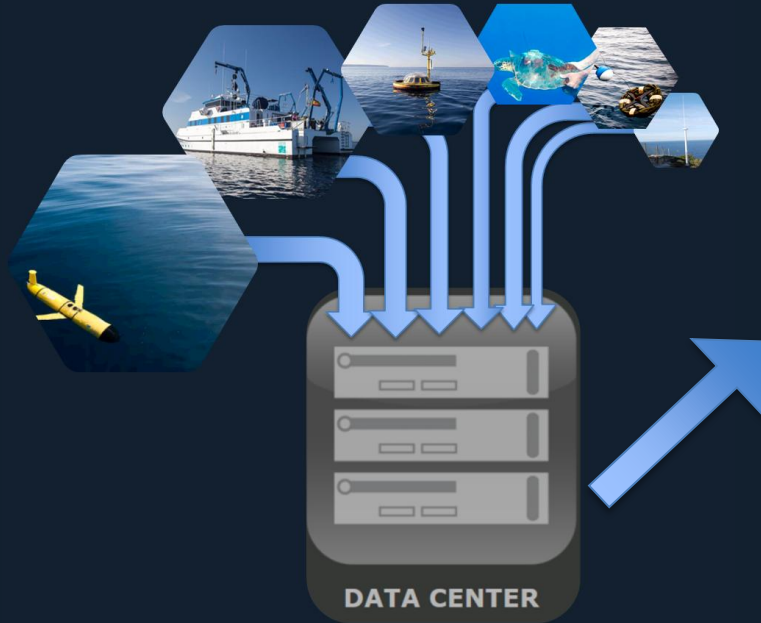


KEY EXAMPLES AT SOCIB



SCIENCE AND APPLICATIONS

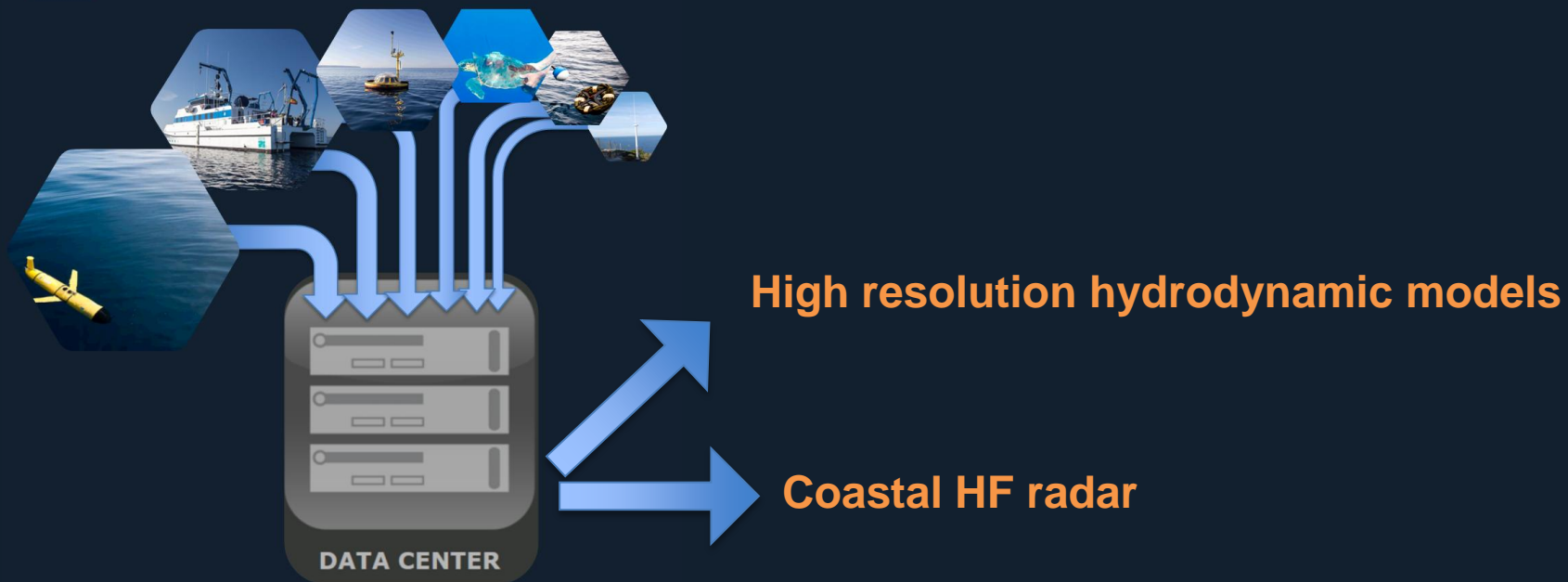
KEY EXAMPLES AT SOCIB



High resolution hydrodynamic models,

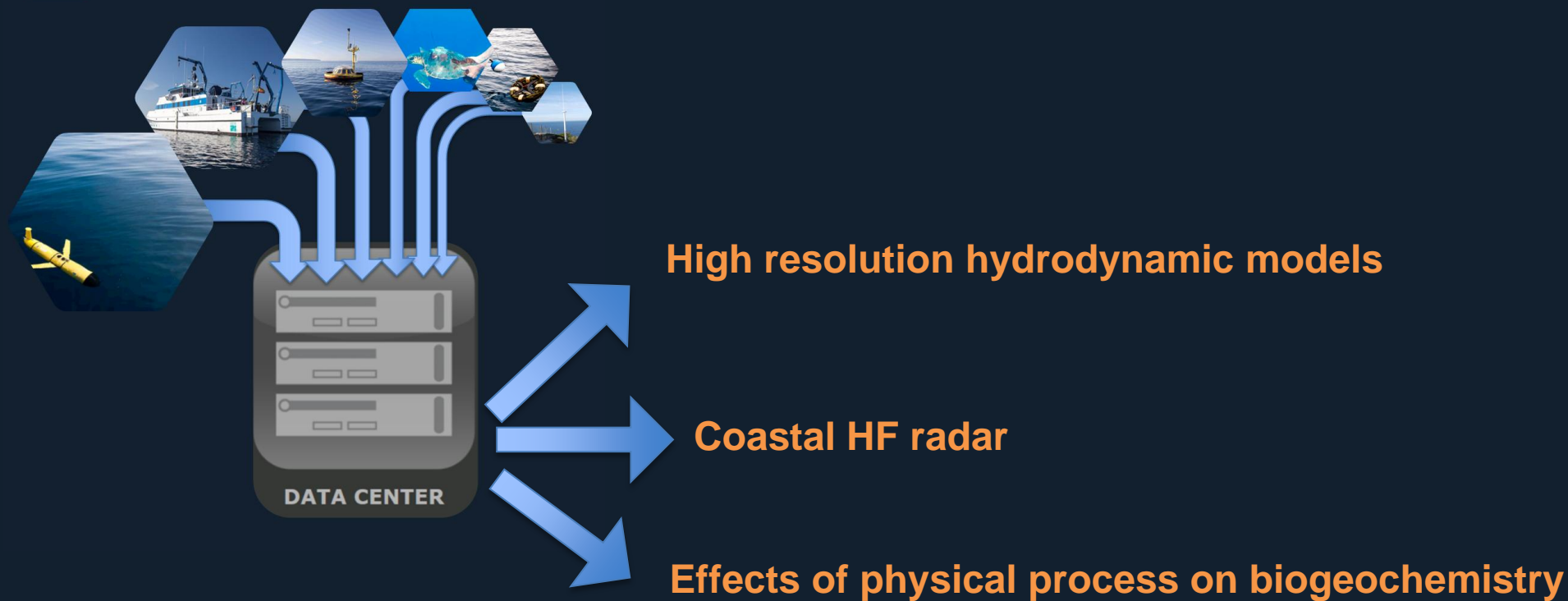
SCIENCE AND APPLICATIONS

KEY EXAMPLES AT SOCIB



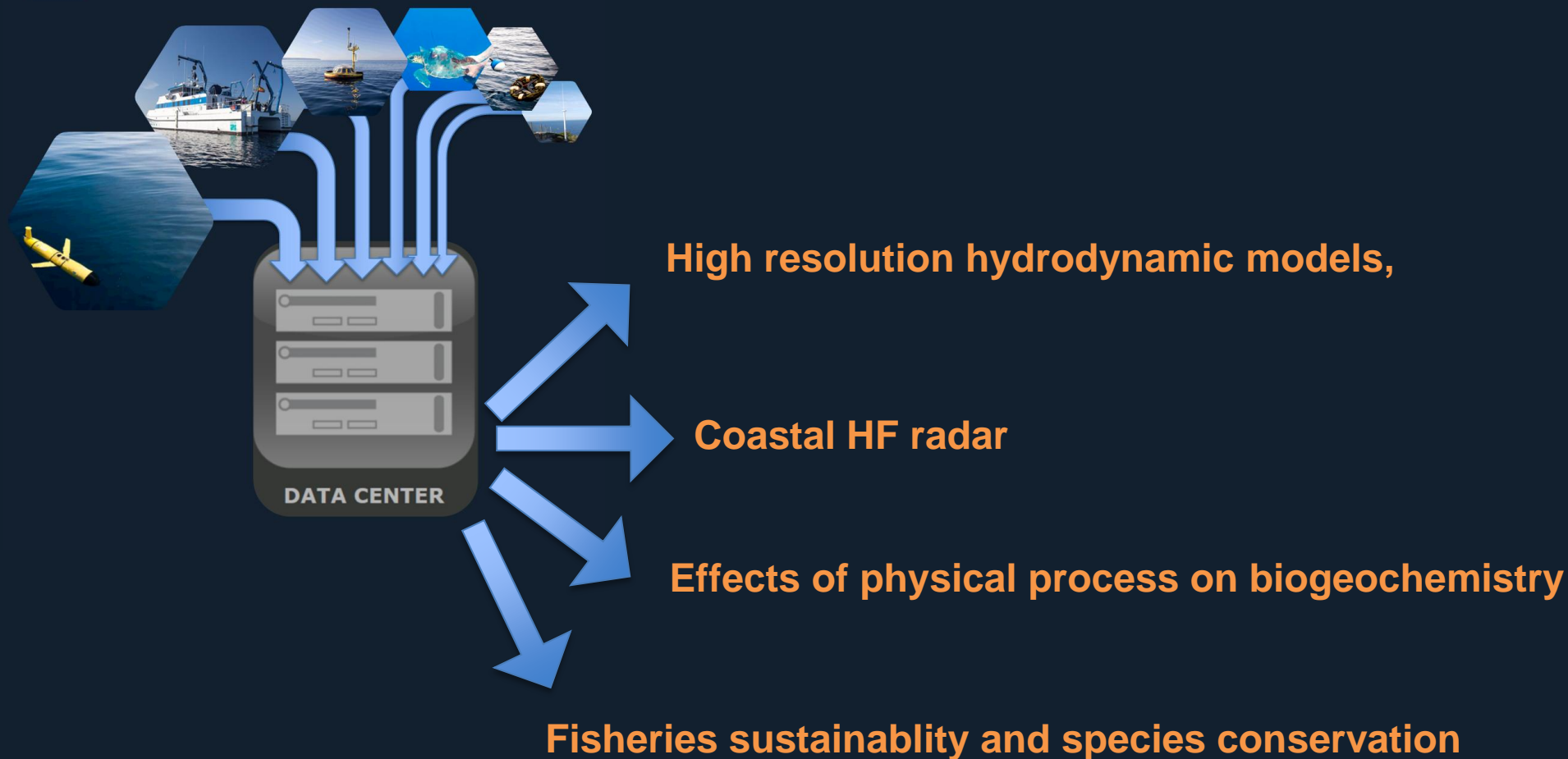
SCIENCE AND APPLICATIONS

KEY EXAMPLES AT SOCIB



SCIENCE AND APPLICATIONS

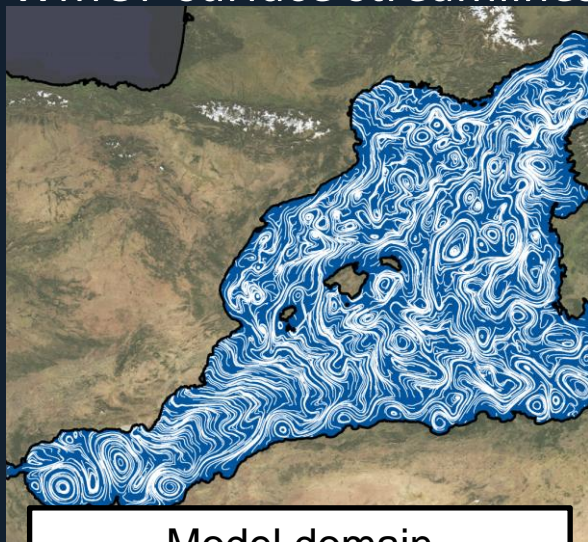
KEY EXAMPLES AT SOCIB



Development and validation of High resolution hydrodynamic models

WMOP Western Mediterranean high-resolution **OP**erational model

WMOP surface streamlines



Model domain

Regional ROMS, 2km resolution

Initial & boundary conditions: CMEMS model

High-resolution atmospheric forcing from
AEMET Harmonie data set (1h, 2.5km)

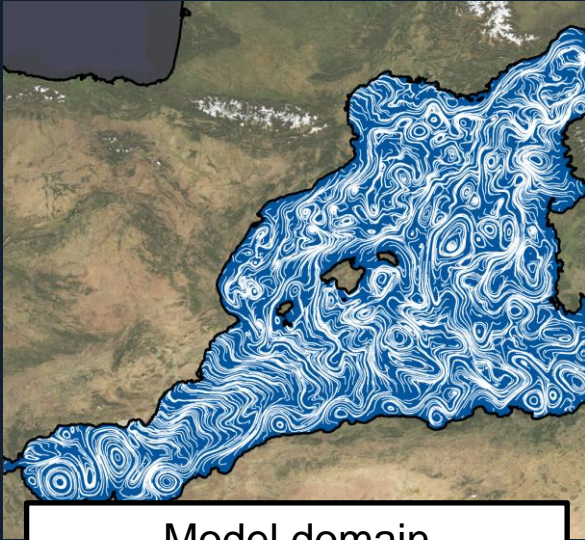
Data assimilation, Ensemble Optimal
Interpolation with 3-day cycles,
-assimilating satellite SLA, SST, Argo TS & Ibiza
Channel HF radar velocities

(Juza et al., 2016, Mourre et al., 2018, Hernández-Lasheras et al., 2018)

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High-resolution mesoscale-resolving simulations

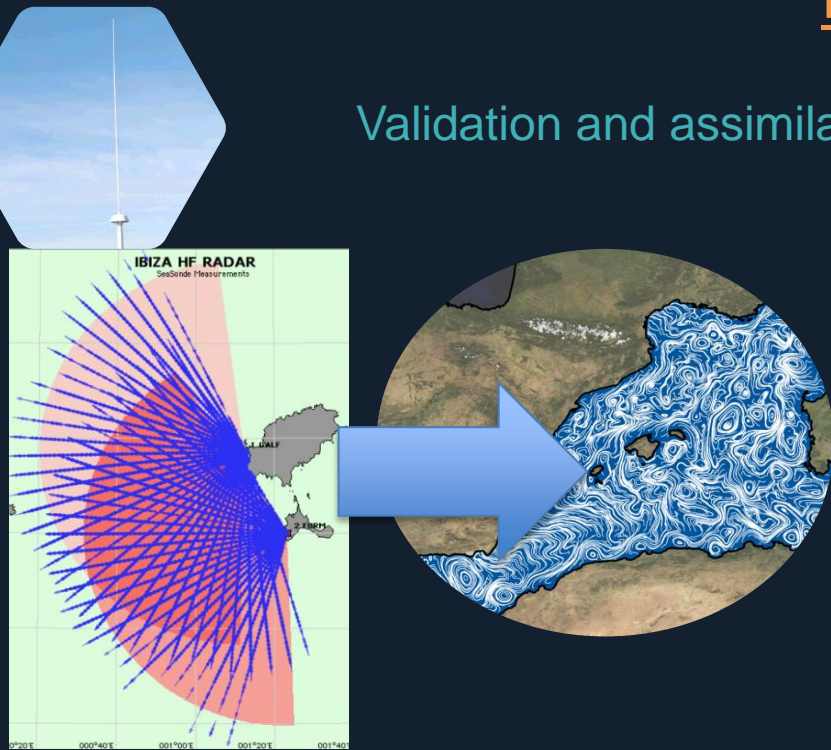
A-Forecast- Daily predictions (72h horizon)

B- Hindcast 2009-2017; free run daily river discharges

(Juza et al., 2016, Mourre et al., 2018, Hernández-Lasheras et al., 2018)

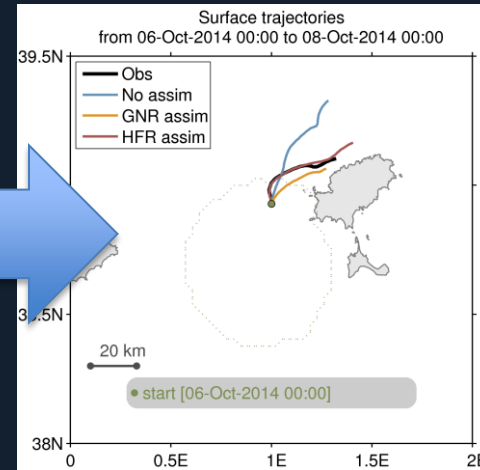
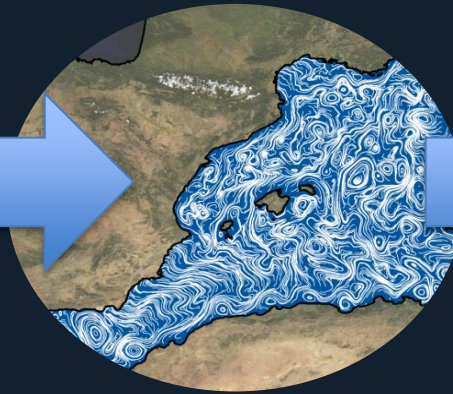
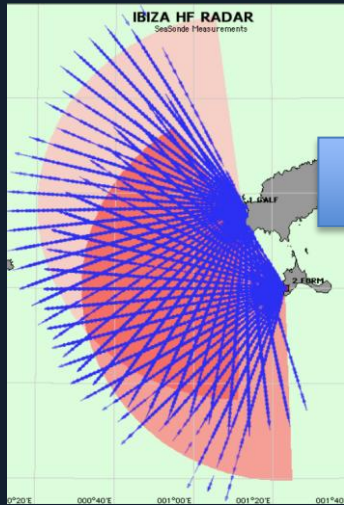
HF Radar

Validation and assimilation in WMOP hydrodynamic model



HF Radar

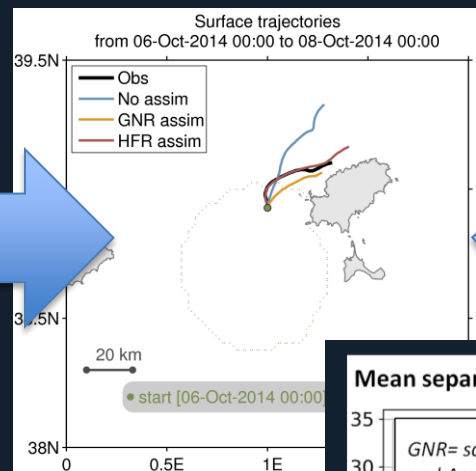
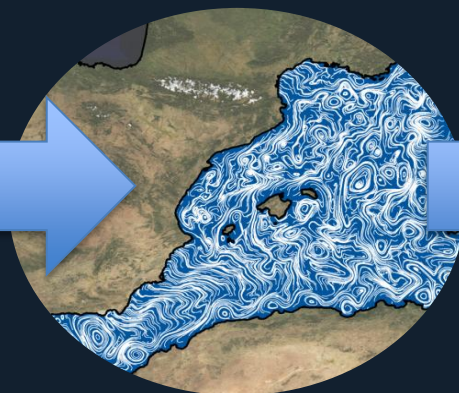
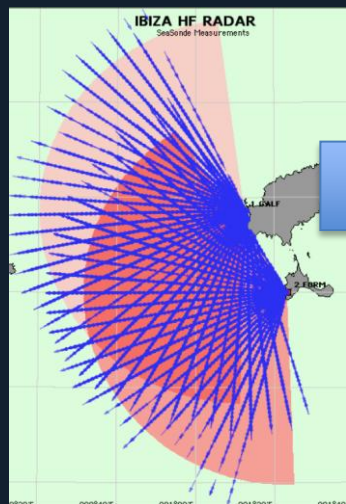
Validation and assimilation in WMOP hydrodynamic model



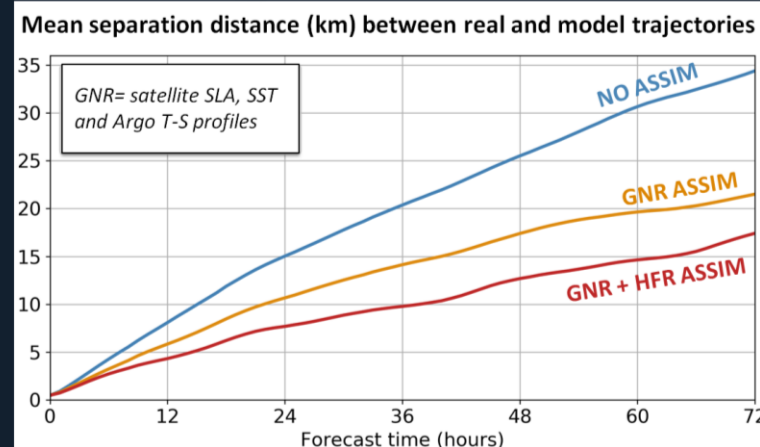
Validation using the trajectories of 14 surface drifters during 10 days, (Oct 2014)

HF Radar

Validation and assimilation in WMOP hydrodynamic model



Validation using the
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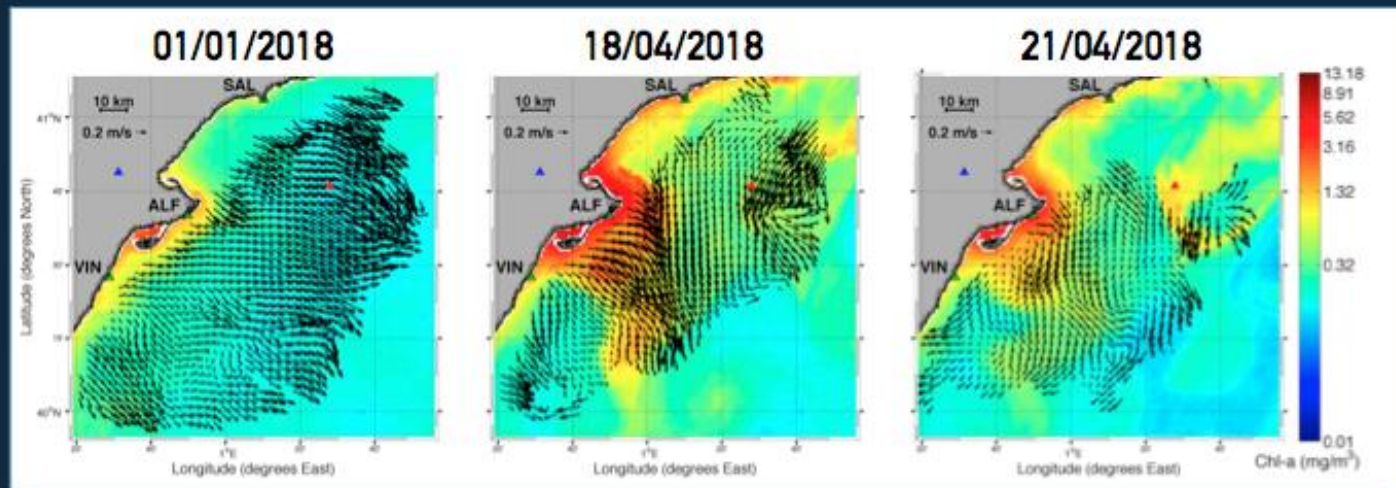


(Hernández Lasheras et al., 2019, in prep.)

HF Radar

Extreme events monitoring and understating impacts on mesoscale oceanography

- **Impact of the last extreme Ebro river discharge event on the surface circulation.**



Maps of HFR surface currents and surface Chlorophyll-a concentration for reference conditions (left) and extreme discharge events (middle and right).

Ruiz et al, 2019.

HF Radar

IBISAR service in support to SAR operations

- Evaluates the performance of ocean current forecasts available in the Iberian-Biscay-Irish (IBI) regional seas.
- Helps to choose the most accurate ocean current prediction.

IBISAR: How it works



www.ibisar.es



Generated using E.U. Copernicus Marine Service Information

Biogeochemistry

Understanding the links between physical and biogeochemistry processes

Monitoring “key physical & BGC parameters”

Application of automatic data quality procedures



Biogeochemistry

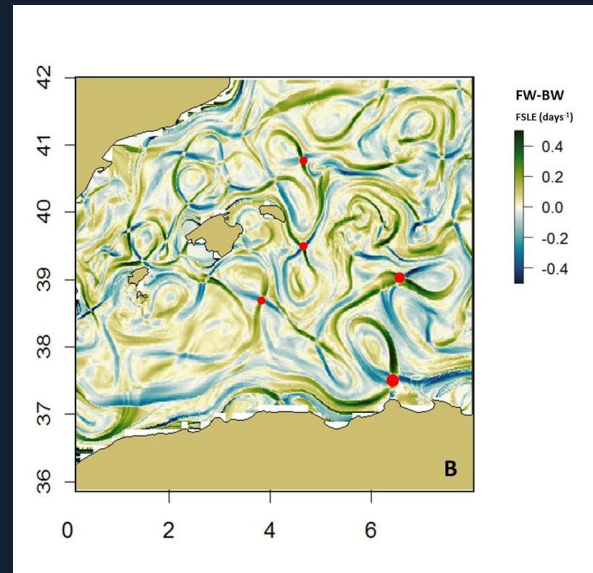
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Biogeochemistry information is combined with hydrographic descriptors

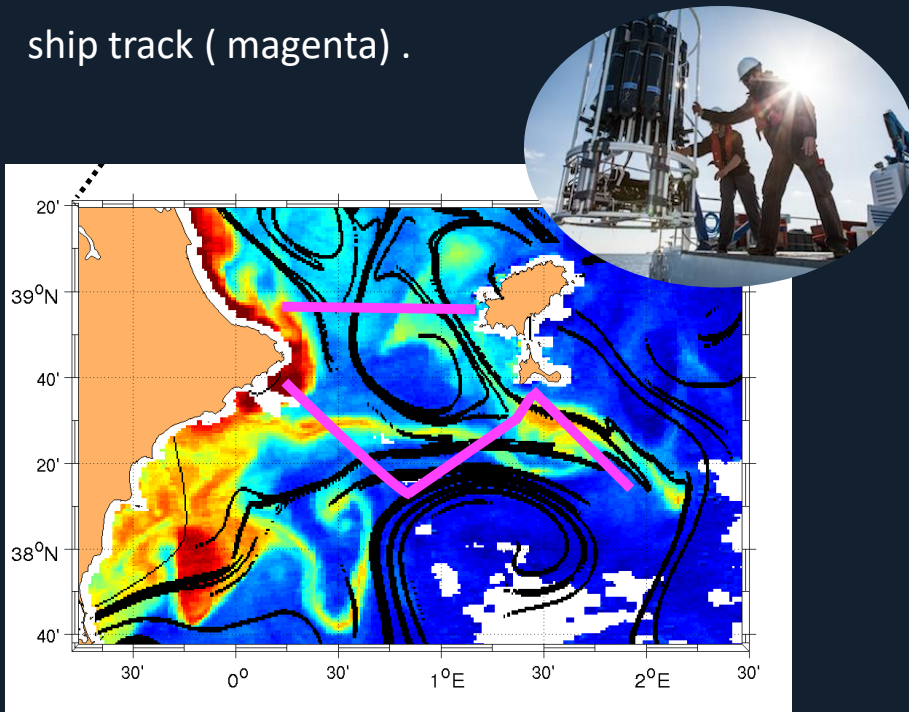


Biogeochemistry

Understanding the links between physical and biogeochemistry processes

SHEBEX EXPERIMENT

Altimetry derived LCS (in black)
chl from satellite ocean color
ship track (magenta) .

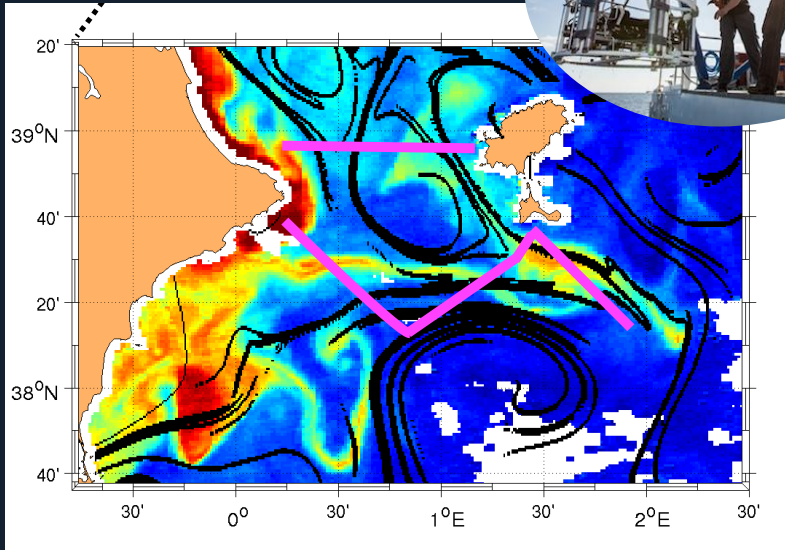


Biogeochemistry

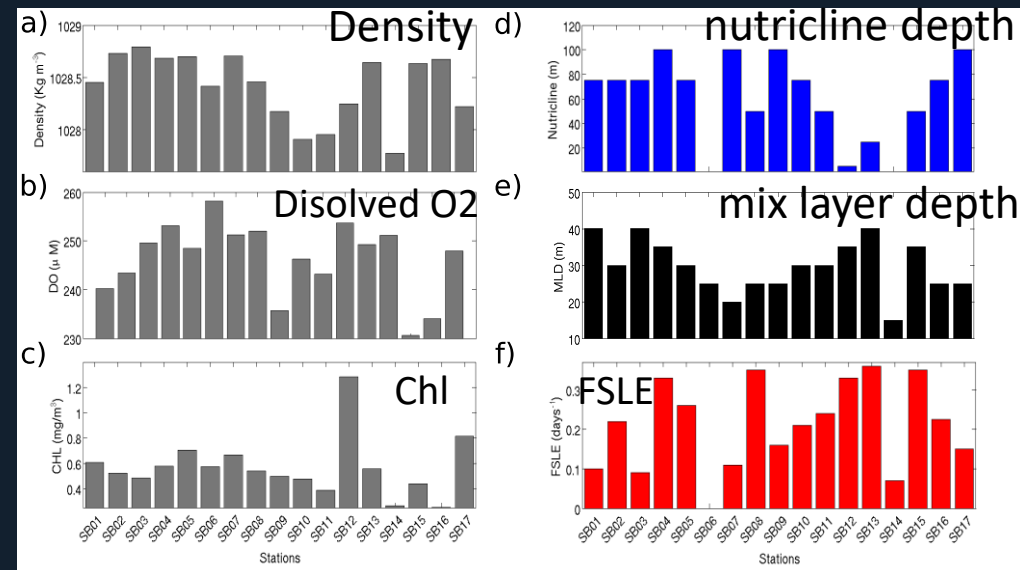
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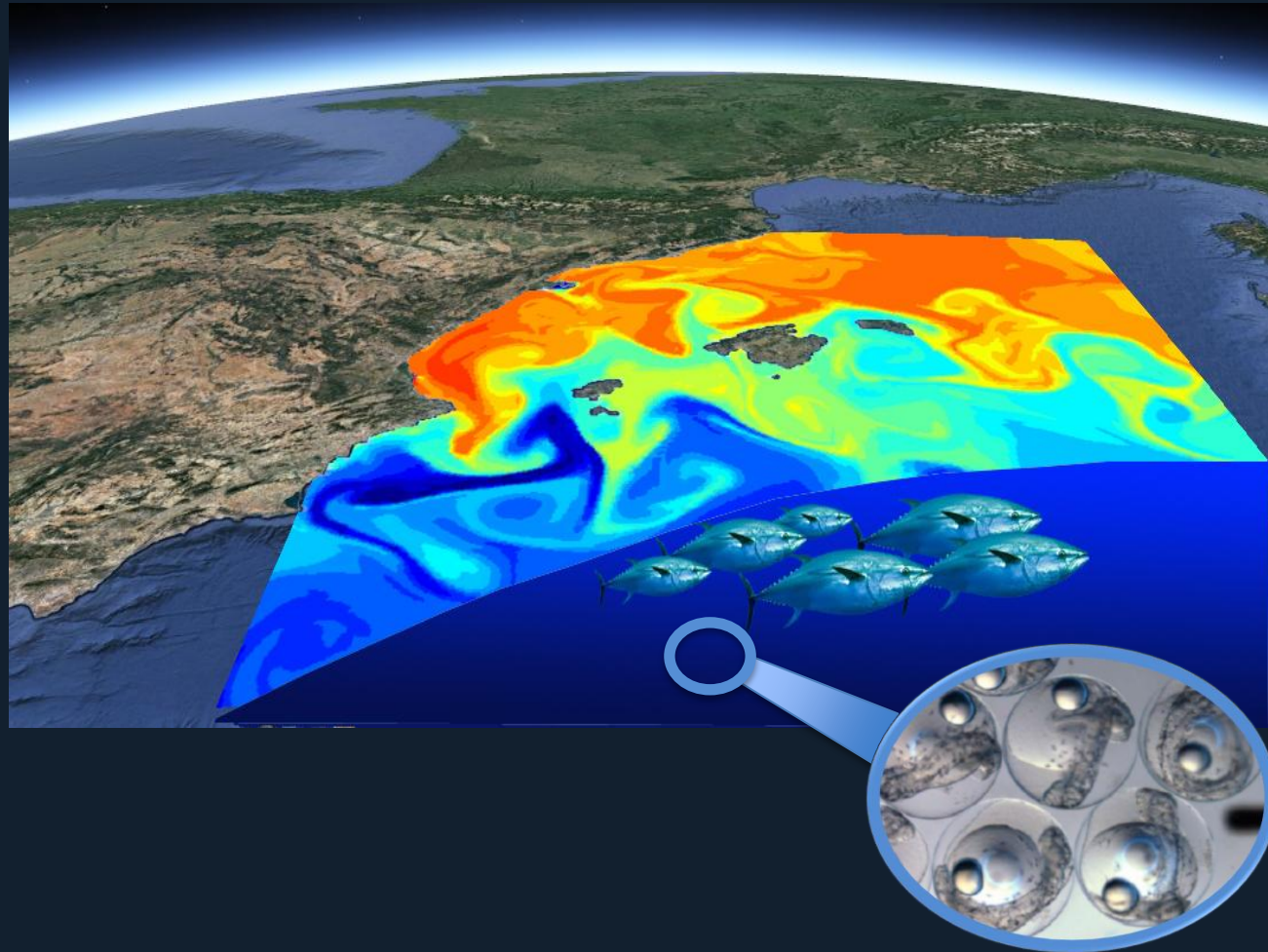
Integrated values over the top 100 m



* A strong correlation between the spatial variability of the nutricline depth, mixed layer depth and FSLE.

* LCS modify locally the biogeochemical properties in the water column

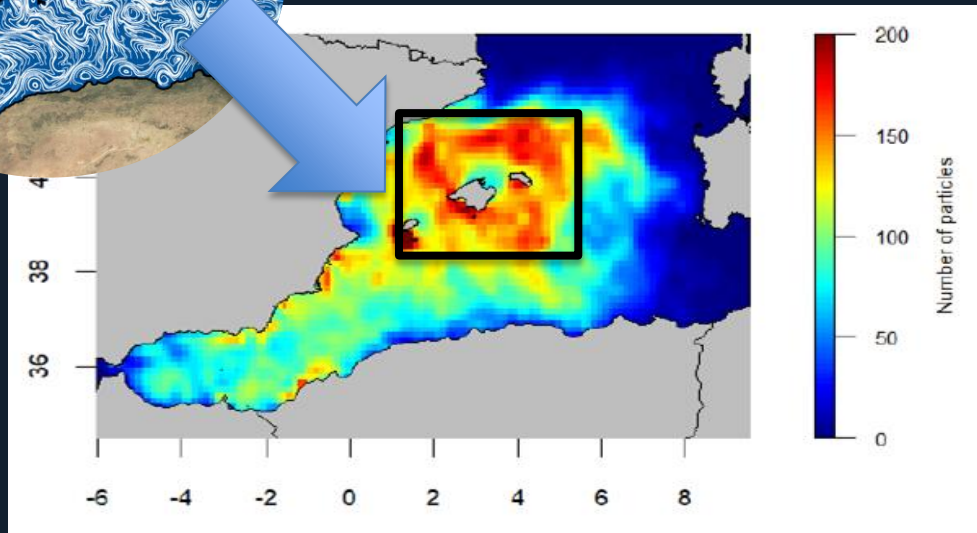
Sustainable fisheries and conservations



Sustainable fisheries and conservations

Investigate the links between physical processes and species ecology

Retention/dispersion process and spatio-temporal synchronization with species ecology
(Tuna spawning and larval habitats)

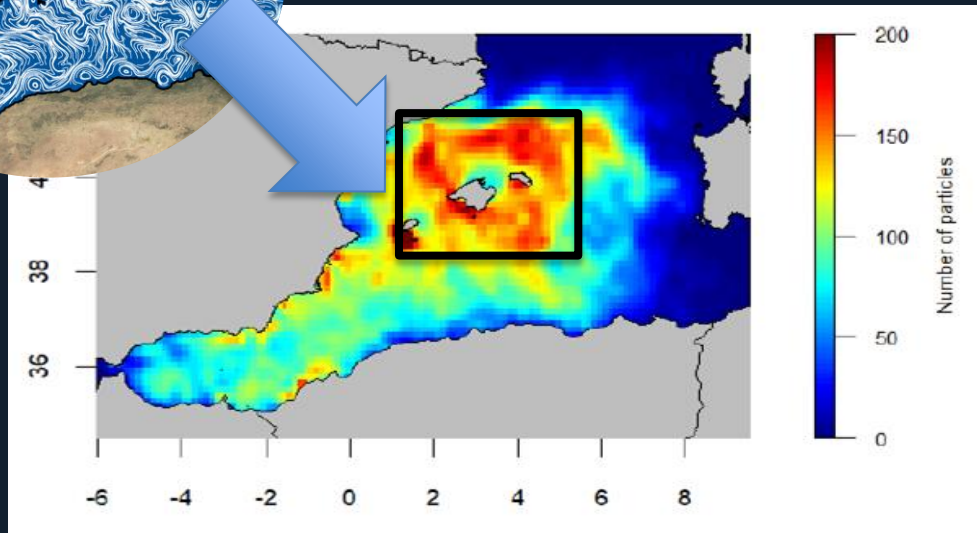


Diaz-Barroso et al. 2018

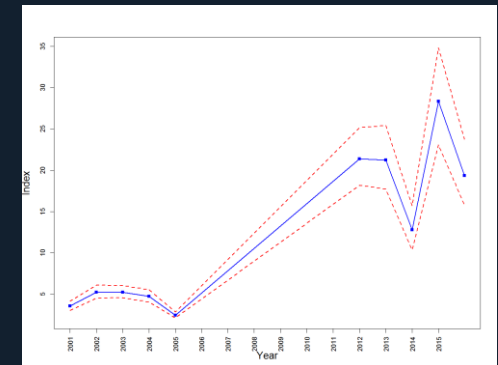
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Diaz-Barroso et al. 2018



Ingram et al. 2017

Alvarez-Berastegui et al. 2018

Operational fisheries oceanography

“The activities directed to link fisheries ecology and operational oceanography for developing information about environmental processes affecting species dynamics and distribution, and the systematic integration of those products into the fisheries assessment and management”
(Alvarez-Berastegui et al. 2018)

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FAO/ GFCM

DESSIGN A STARTEGY



FORUM ON FISHERIES SCIENCE IN THE MEDITERRANEAN AND THE BLACK SEA

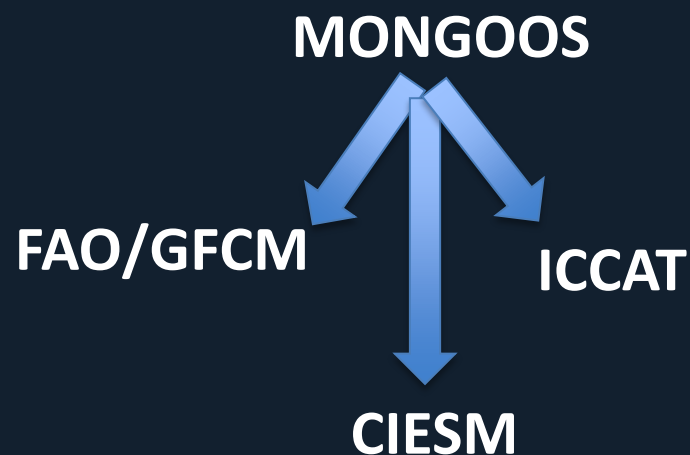
FISHFORUM²⁰¹⁸

SOCIB  

WORKSHOP

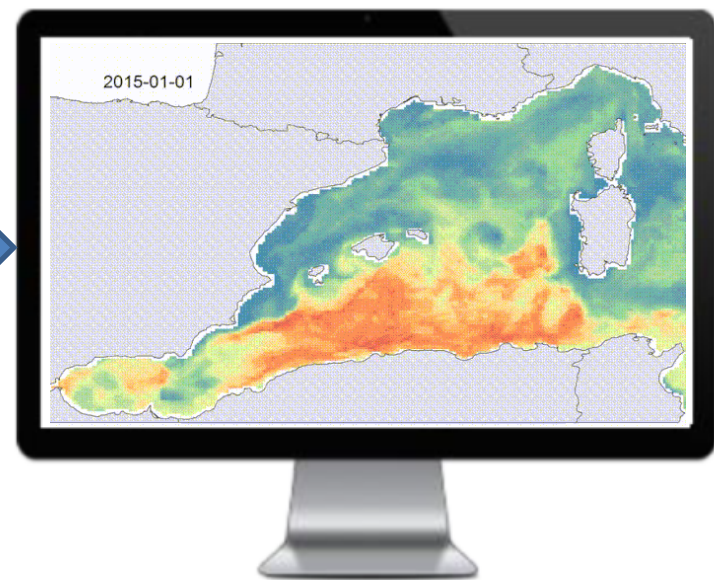
Toward operational fisheries oceanography in the Mediterranean Sea: gaps, challenges, opportunities from open access data and integrated tools

Monday 10 December, Malaysia Room, 15:00 – 17:30



Sustainable fisheries and conservations

Understanding the links between physical processes and species ecology





CONTACT PERSONS

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BIOGEOCHEMISTRY: EVA ALLOU

FISHERIES SUSTAINABILITY: DIEGO ALVAREZ-BERASTEGUI

ANIMAL BORNE: DAVID MARCH