SOCIB Balearic Islands Coastal Observing and Forecasting System

TORTUGAS OCEANÓGRAFAS

Plataformas de observación para la conservación y gestión dinámica del océano

David March[1]*, Ohiana Revuelta[1], Ricardo Sagarminaga[2], Baptiste Mourre[1], Marc Torner[1], Andrea Cabornero[1], Diego Álvarez-Berastegui[1], Ananda Pascual[3], Gloria Fernández[4], Debora Morrison[4], Guillem Félix[4], Emma Heslop[1], Joaquín Tintoré[1,3]

1 Balearic Islands Coastal Observing and Forecasting System (SOCIB, Spain), **2** Alnitak (Spain), **3** Mediterranean Institute for Advanced Studies (IMEDEA-CSIC/UIB, Spain), **4** Fundación Palma Aquarium (Spain)
*dmarch@socib.es

PALMA, 26 OCTUBRE 2017

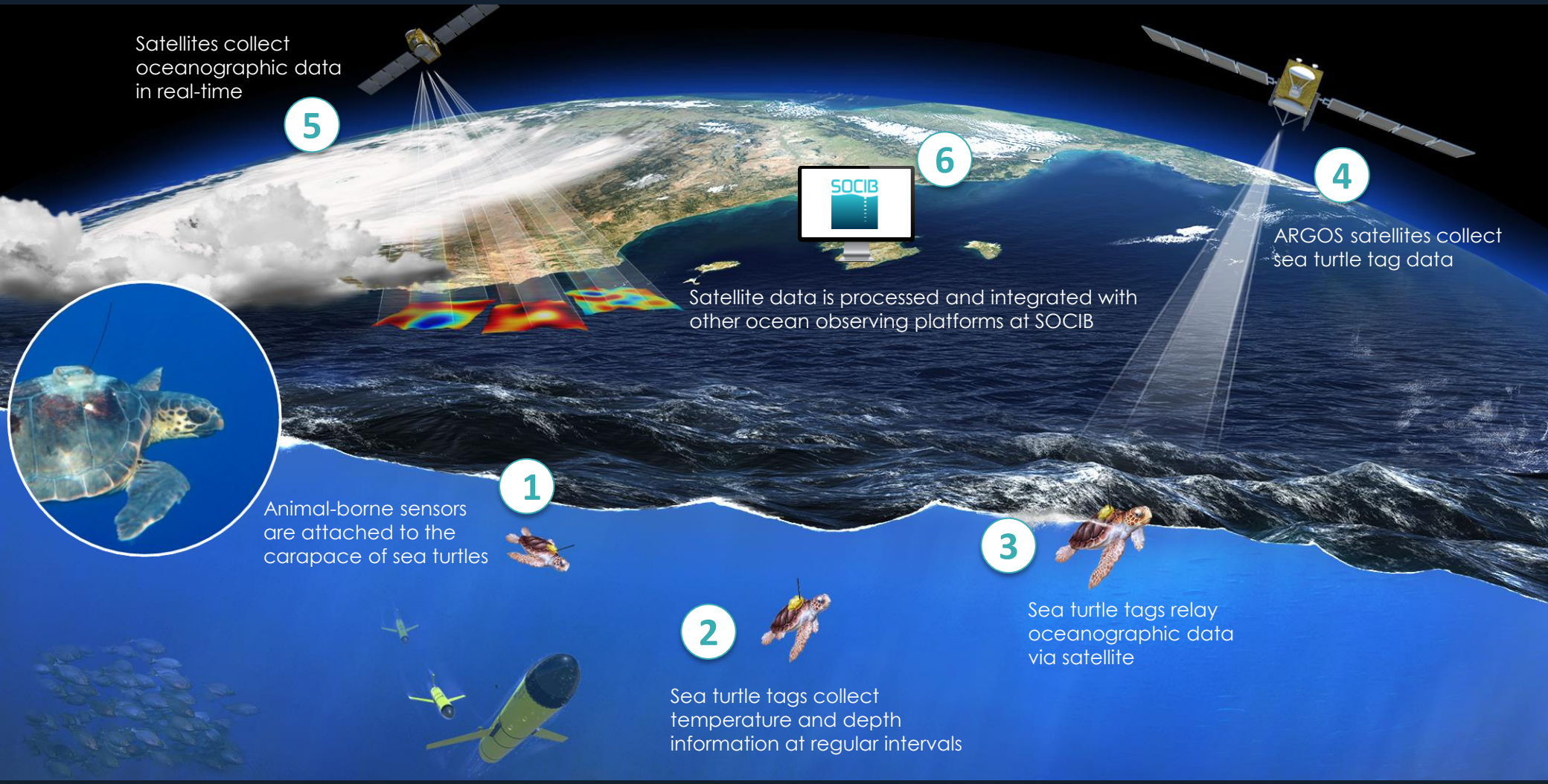
www.socib.es/tortugas

BALEARIC ISLANDS COASTAL OBSERVING AND FORECASTING SYSTEM (SOCIB)

A Marine Research Infrastructure: a multi-platform observing system, from nearshore to open-ocean

SOCIB provides multi-platform ocean observations *-in stiu* and satellite- and ocean forecasting in near real-time in the Western Mediterranean Sea

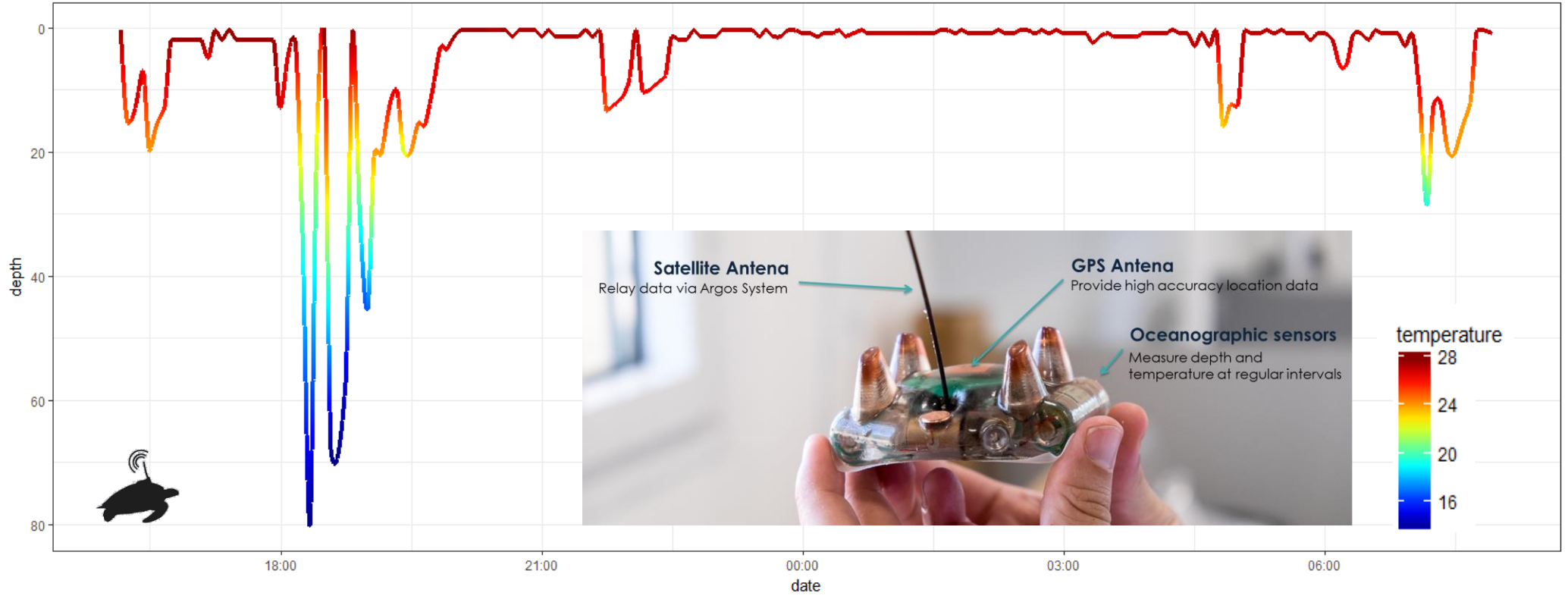
SEATURTLE SATELLITE TRACKING AND OCEAN OBSERVING SYSTEMS



SOCIB is working to integrate satellite tracking of juvenile loggerhead turtles (*Caretta caretta*) with Ocean Observing Systems

ANIMAL-BORNE SENSORS

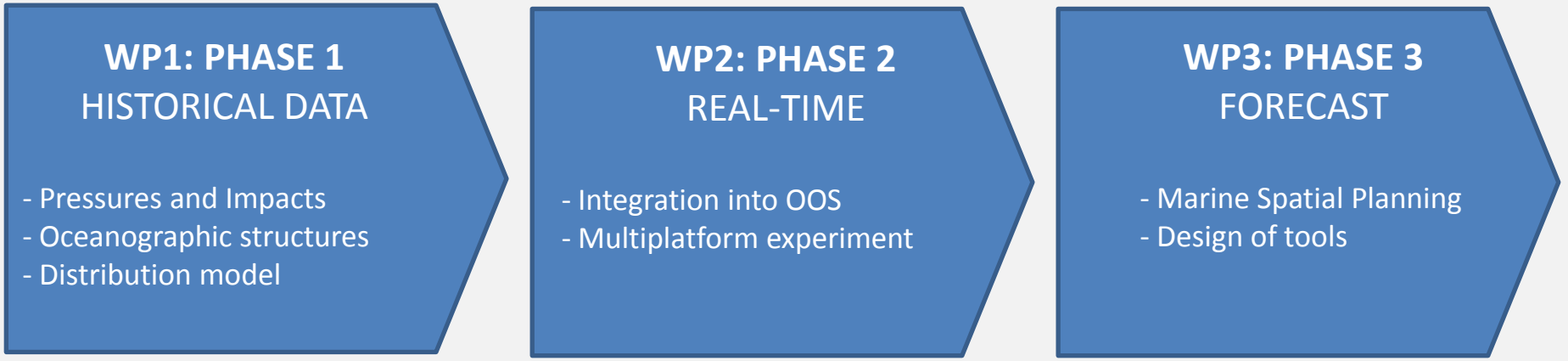
Time-temperature-depth recorders were attached on juvenile loggerheads



ARGOS platform terminal transmitters (PPT, SPLASH tags from Wildlife Computers) were configured to relay data (i.e. depth and temperature) at regular short time intervals (i.e. 5 minutes).

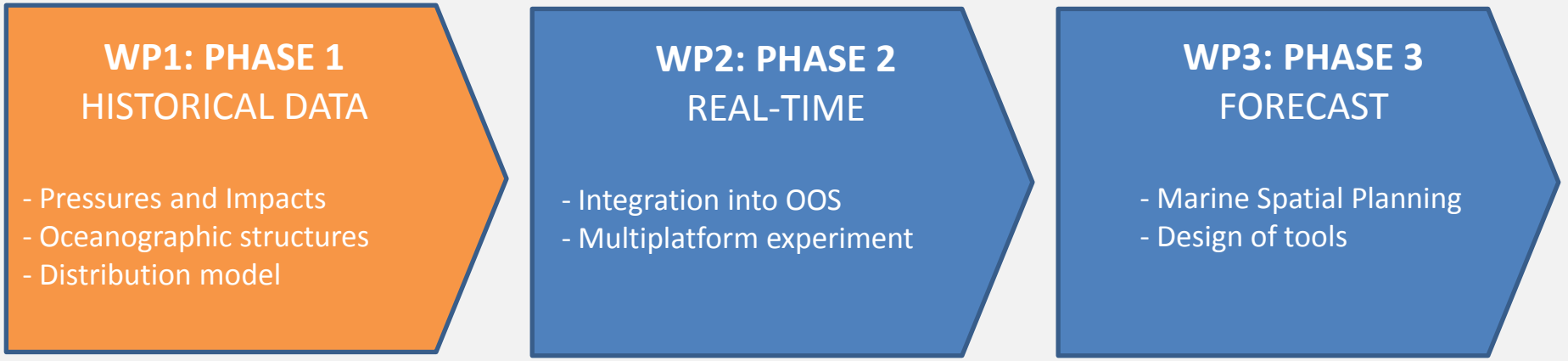
PROJECT OVERVIEW

The Project is structured in 3 main phases



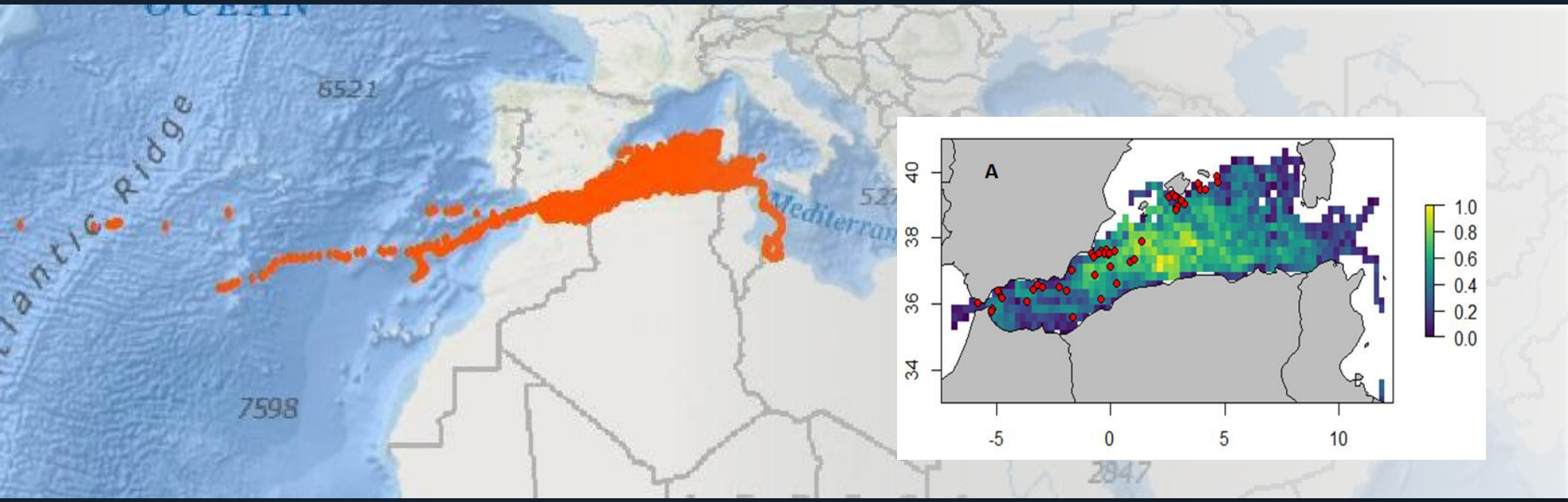
PROJECT OVERVIEW

The Project is structured in 3 main phases



LOGGERHEAD TRACKING IN THE WESTERN MEDITERRANEAN

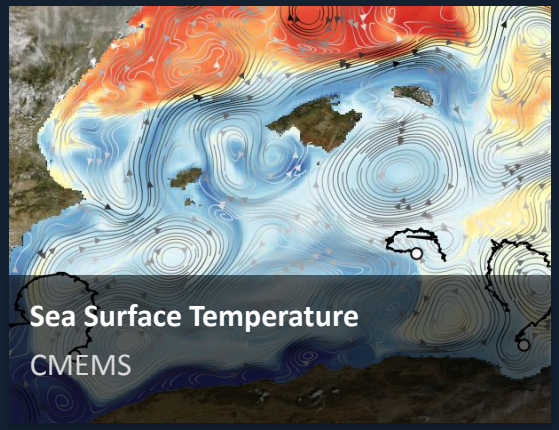
Compilation and quality-control of loggerhead trajectories (n=62, 2004-2017)



Distribution of loggerhead tracks in the Western Mediterranean. Sizes ranged between 26 to 79 CCL(cm)

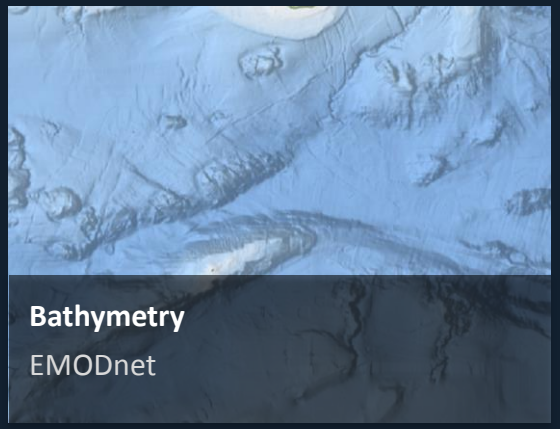
INTEGRATION OF DATA FROM OBSERVING SYSTEMS

Environmental information, anthropogenic impacts and marine management components are integrated



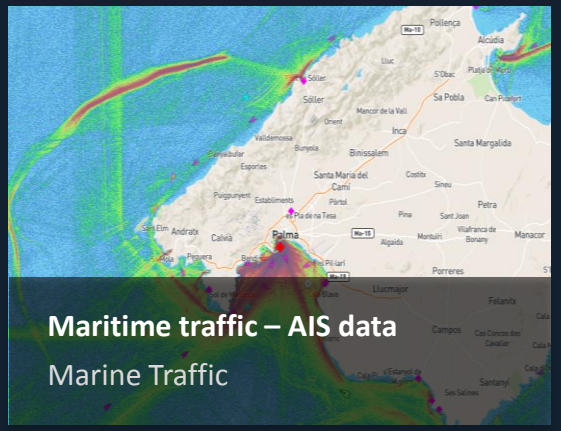
Sea Surface Temperature

CMEMS



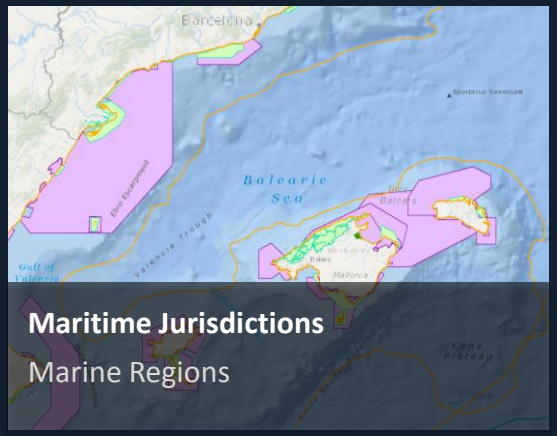
Bathymetry

EMODnet



Maritime traffic – AIS data

Marine Traffic



Maritime Jurisdictions

Marine Regions

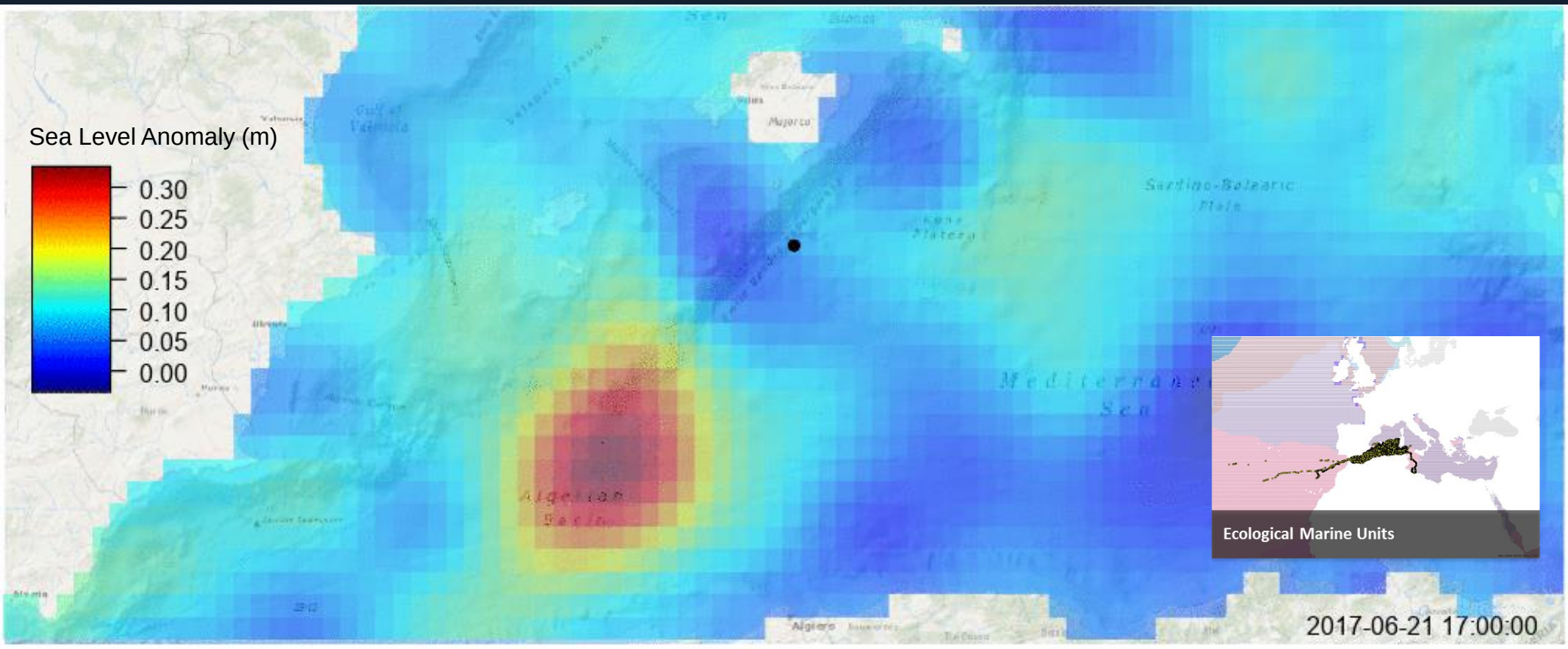
Ecological Marine Units

ESRI

Eddies

IMEDEA

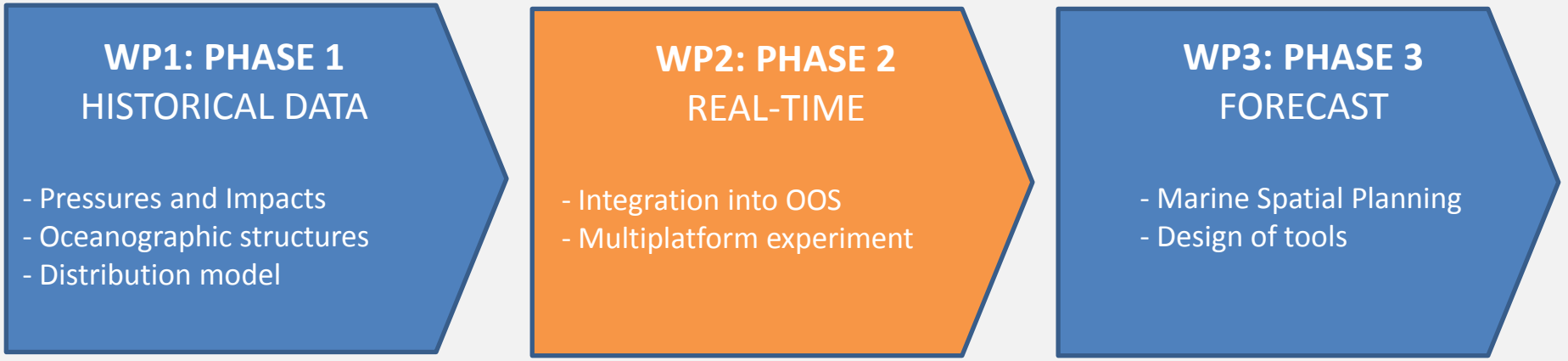
INFLUENCE OF OCEANOGRAPHIC VARIABILITY AT MULTIPLE SCALES



▲ Remote sensing observations provide long-term continuous information on a regular (i.e. daily) basis

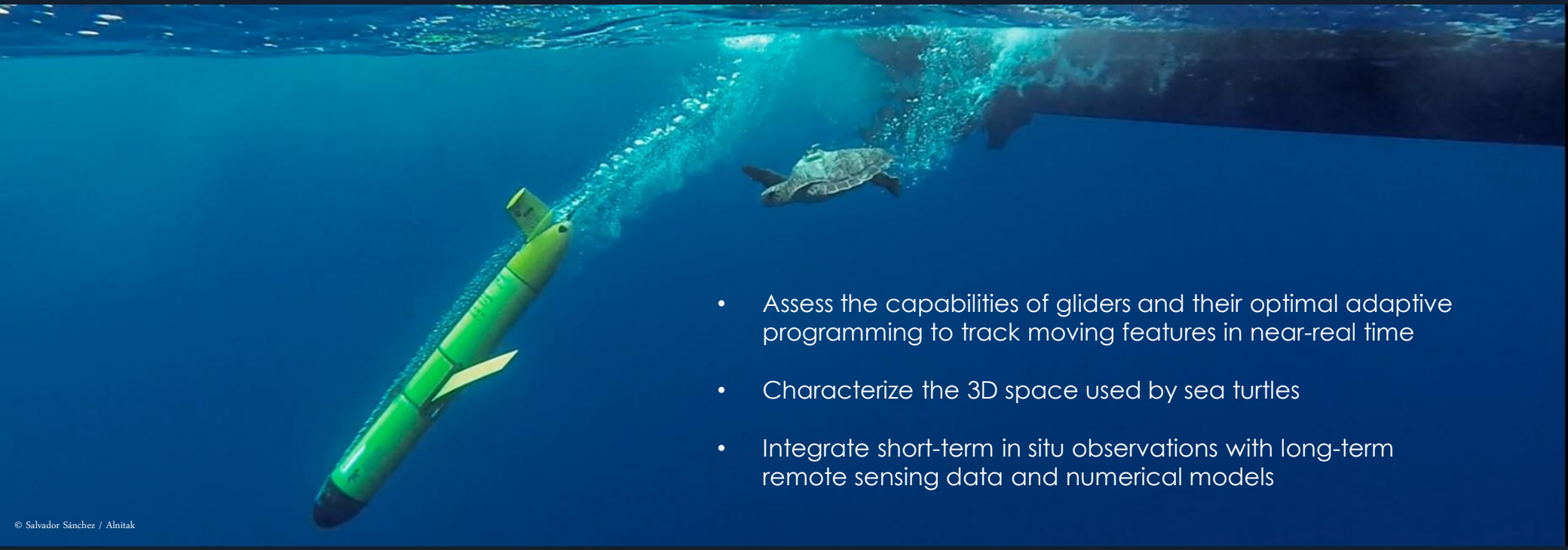
PROJECT OVERVIEW

The Project is structured in 3 main phases



MULTIPLATFORM EXPERIMENT

Ocean gliders are used to monitor biophysical paramenters while following the trajectory of sea turtles in real-time



- Assess the capabilities of gliders and their optimal adaptive programming to track moving features in near-real time
- Characterize the 3D space used by sea turtles
- Integrate short-term in situ observations with long-term remote sensing data and numerical models

© Salvador Sánchez / Alnitak

SEA TURTLE

GLIDER

CTD

DRIFTING BUOYS

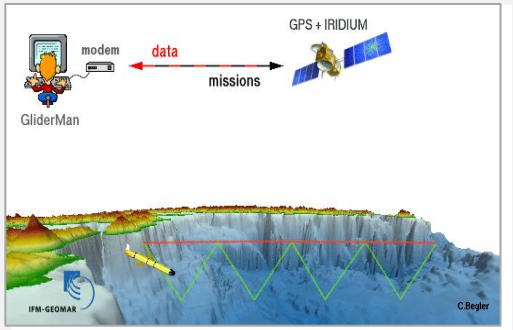
SATELIITE

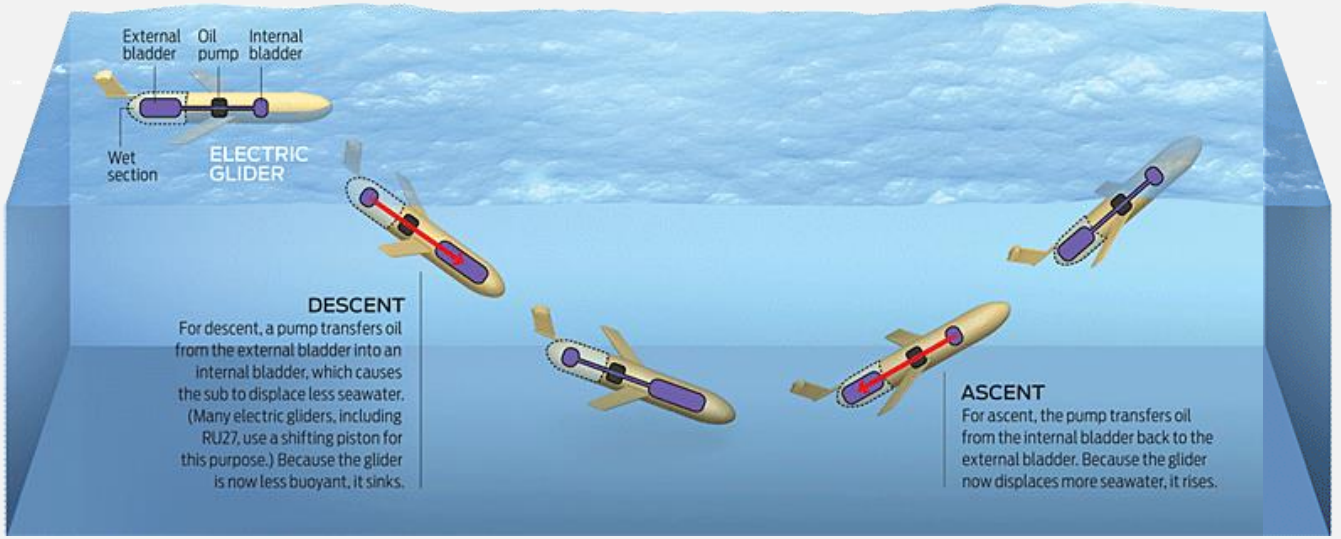
NUMERICAL MODELS

AIS ANTENNAS

OCEAN GLIDER

Underwater drones monitoring the oceans





Long-endurance autonomous underwater vehicles (AUV) measure biophysical parameters in a 3D space. Gliders are controlled remotely via satellite communications (Iridium)

SEA TURTLE TAGGING

Loggerhead turtles (*Caretta caretta*) were captured by NGO Alnitak on board the RV Toftevaag

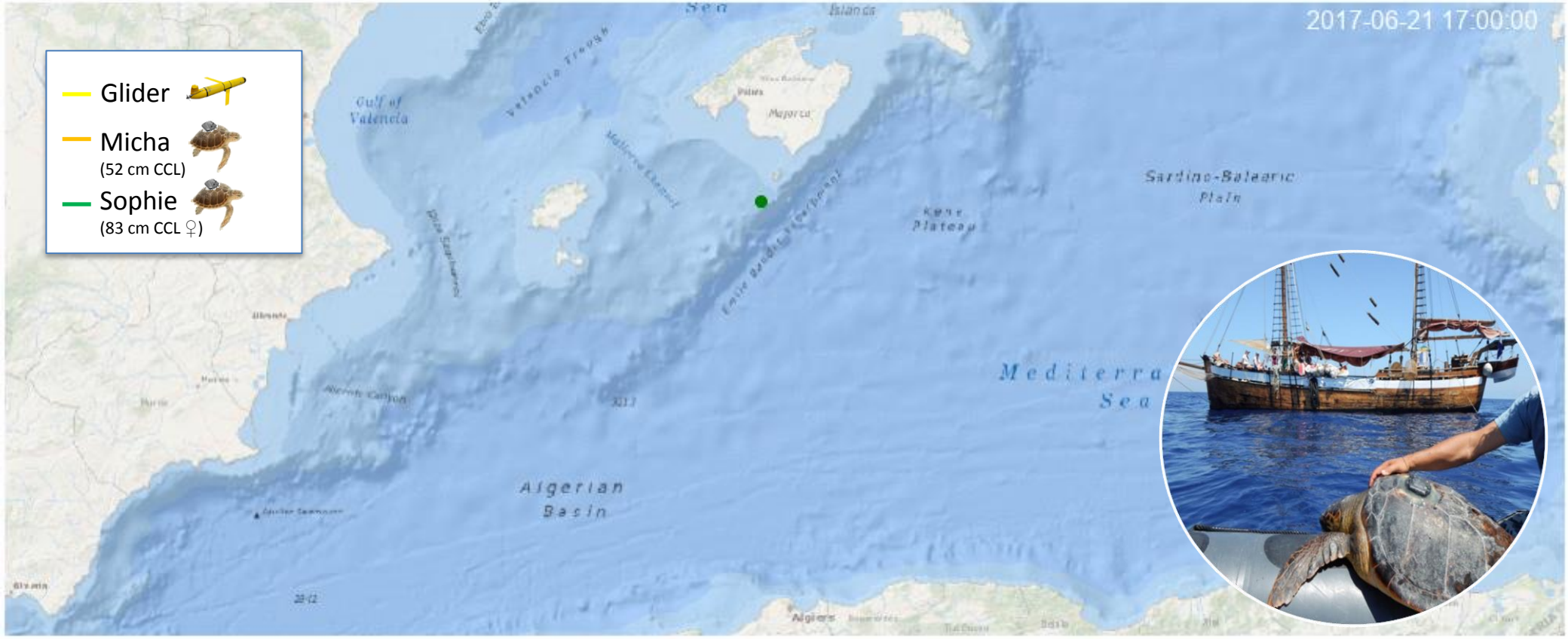
▲ Sea turtles observed at the surface were captured by hand by an observer leaping from an inflatable boat

SEA TURTLE RELEASE

Tagging procedure took ~1h. Sea turtles were released at the same location of capture

OCEAN GLIDER

Adaptive piloting: Second trial on June 2017 (17 days)

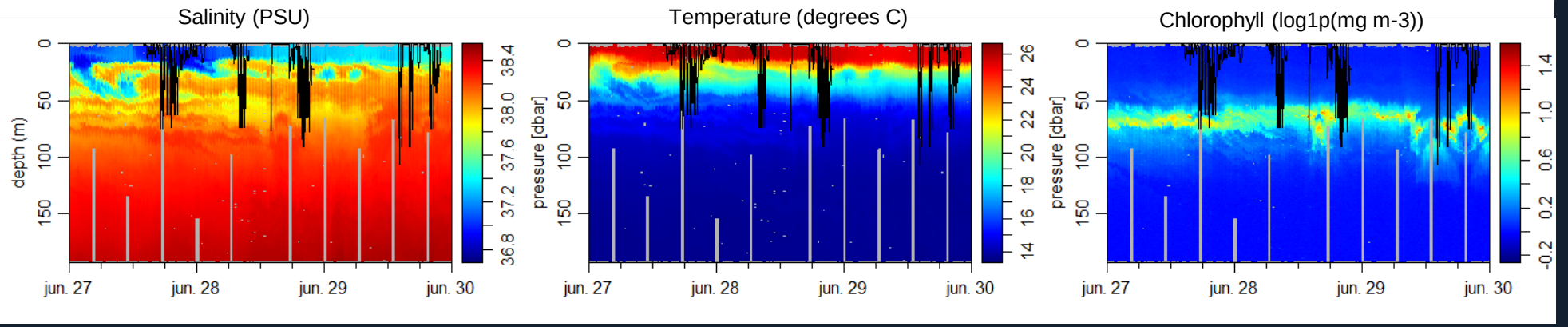


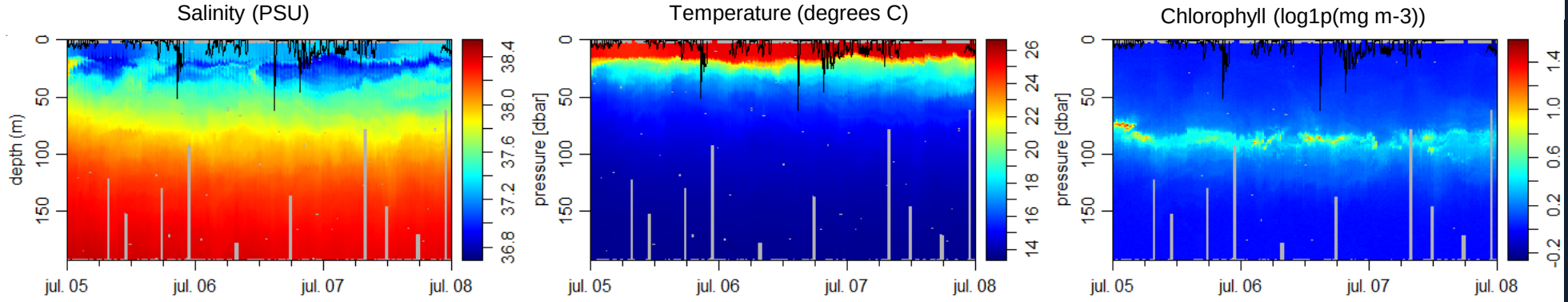
We used the same glider but with fluorescence sensor enabled

DATA INTEGRATION

Integration of biophysical data collected by the Slocum glider and sea turtle TTDR tags

Sophie (83 cm CCL)



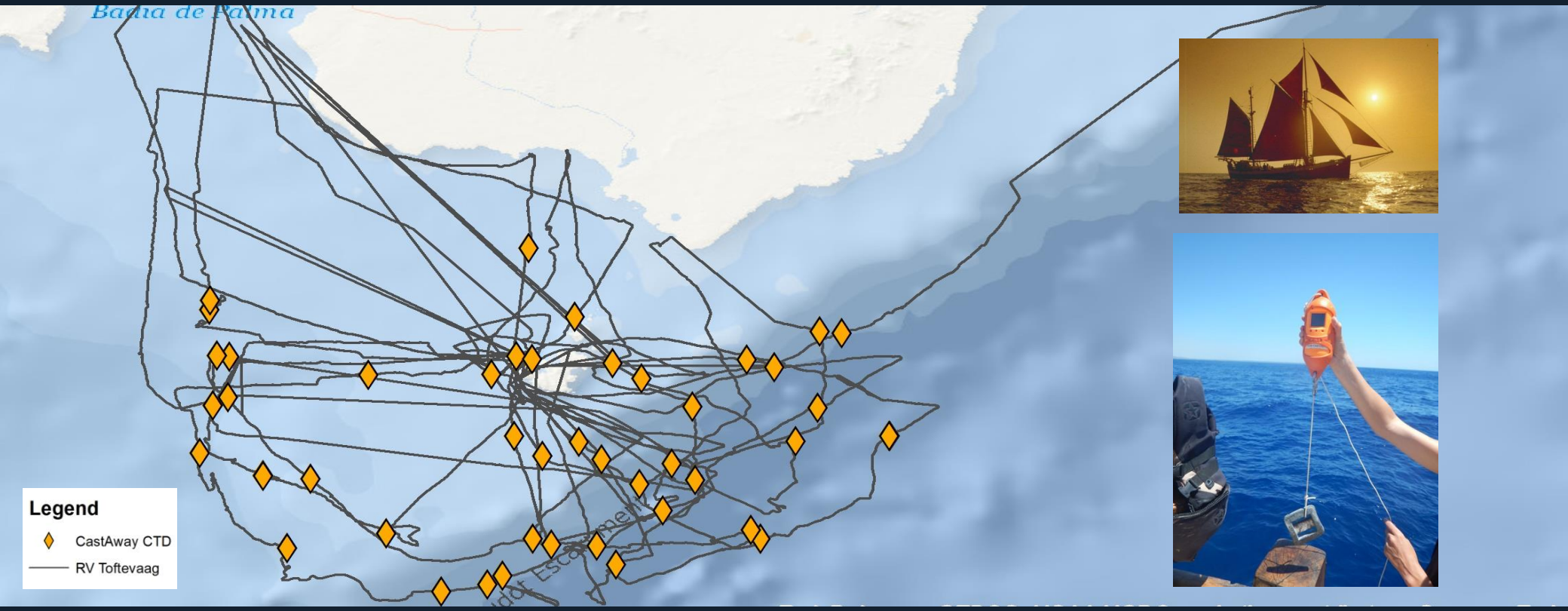


Micha (52 cm CCL)

▲ Black lines represent sea turtle dive profiles

CTD & CITIZEN SCIENCE

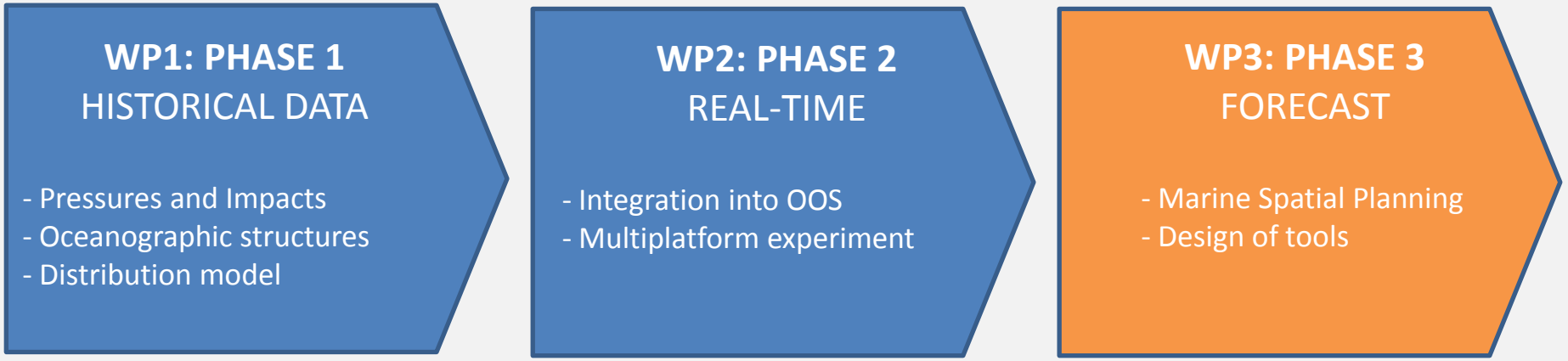
Conductivity-temperature-depth (CTD) profiles were conducted using a handheld instrument (CastAway-CTD)



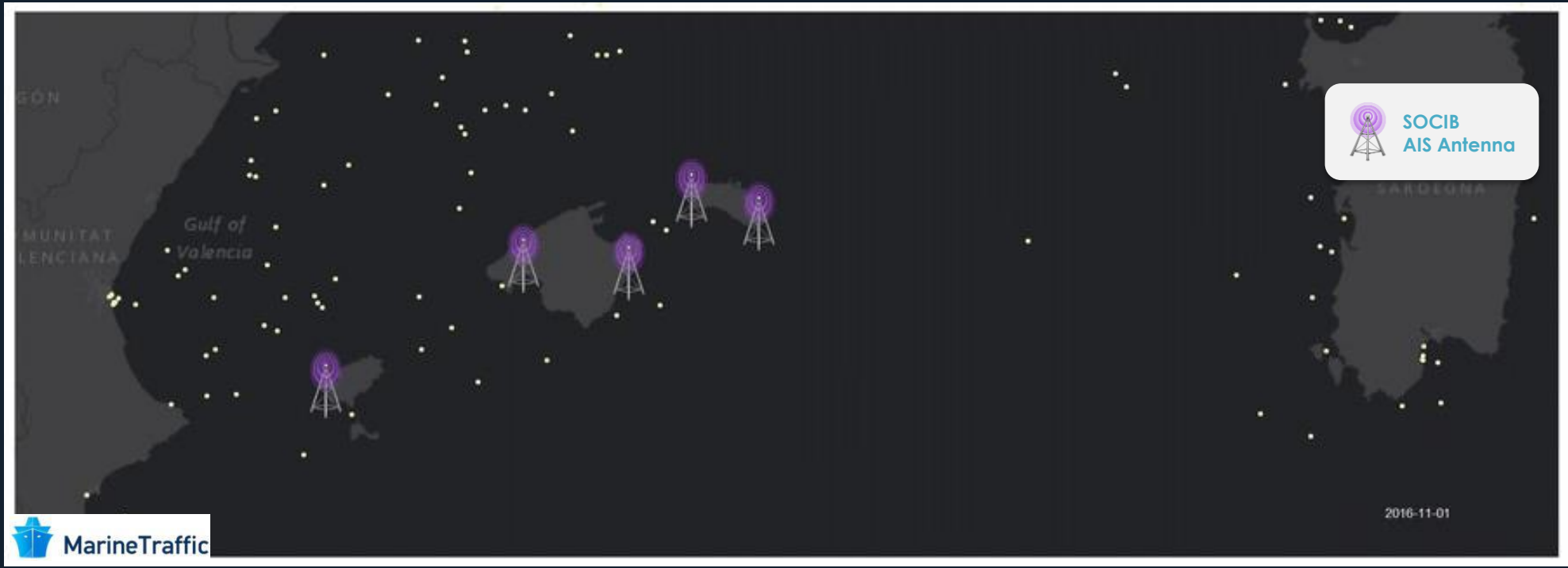
54 CTD profiles were performed up to 60 m deep by the citizen-science team on board the RV Toftevaag during the multiplatform experiment. On every sea turtle release, one cast was conducted simultaneously.

PROJECT OVERVIEW

The Project is structured in 3 main phases



AIS INFRASTRUCTURE AND APPLICATIONS OF INTEREST

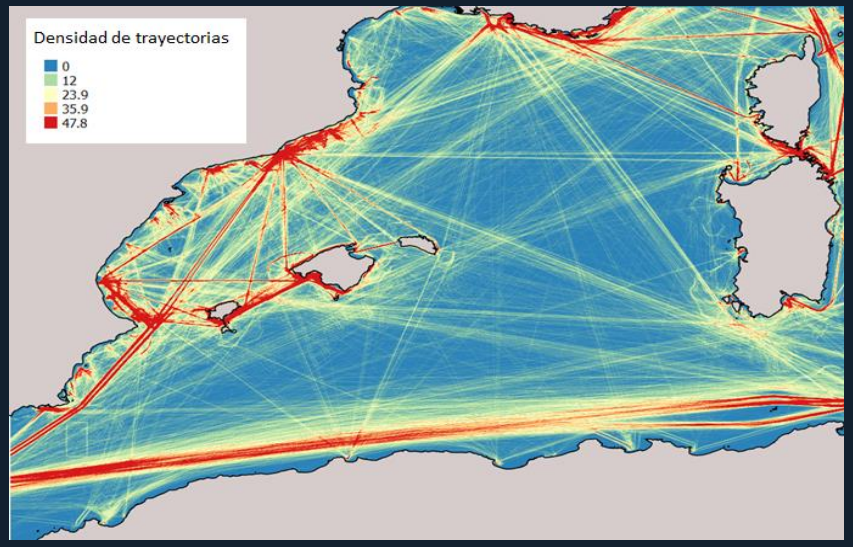


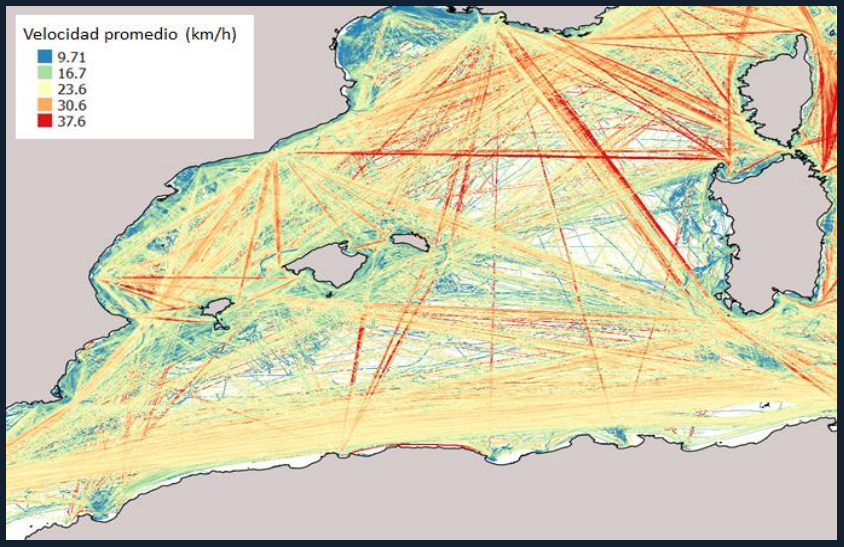
COLLISION RISK
WITH AUVs

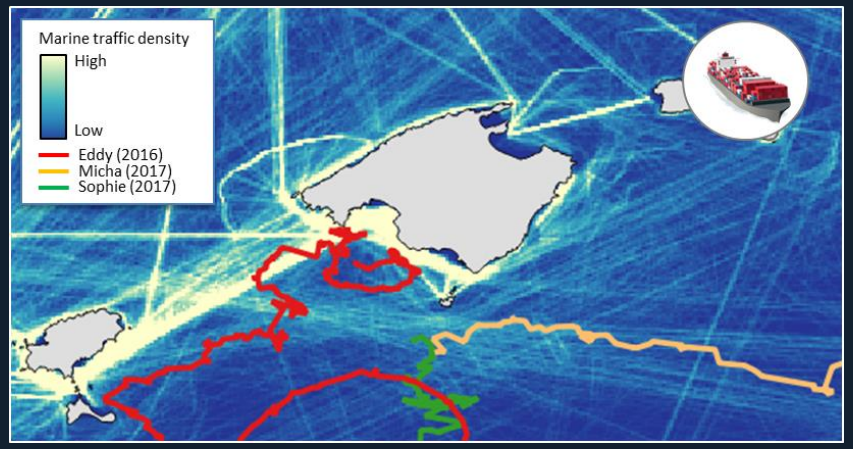
HUMAN IMPACTS ON
MEGAFAUNA & MARINE ECOSYSTEMS

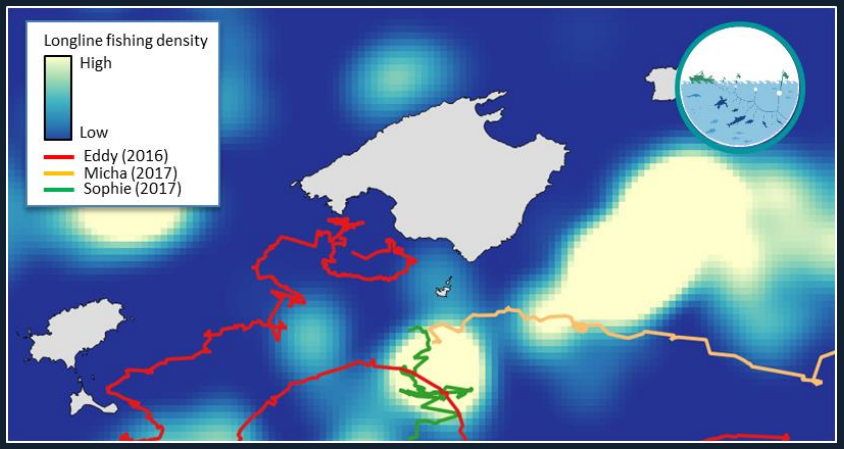
MARINE SPATIAL
PLANNIG

MAPPING HUMAN PRESSURES USING AIS DATA

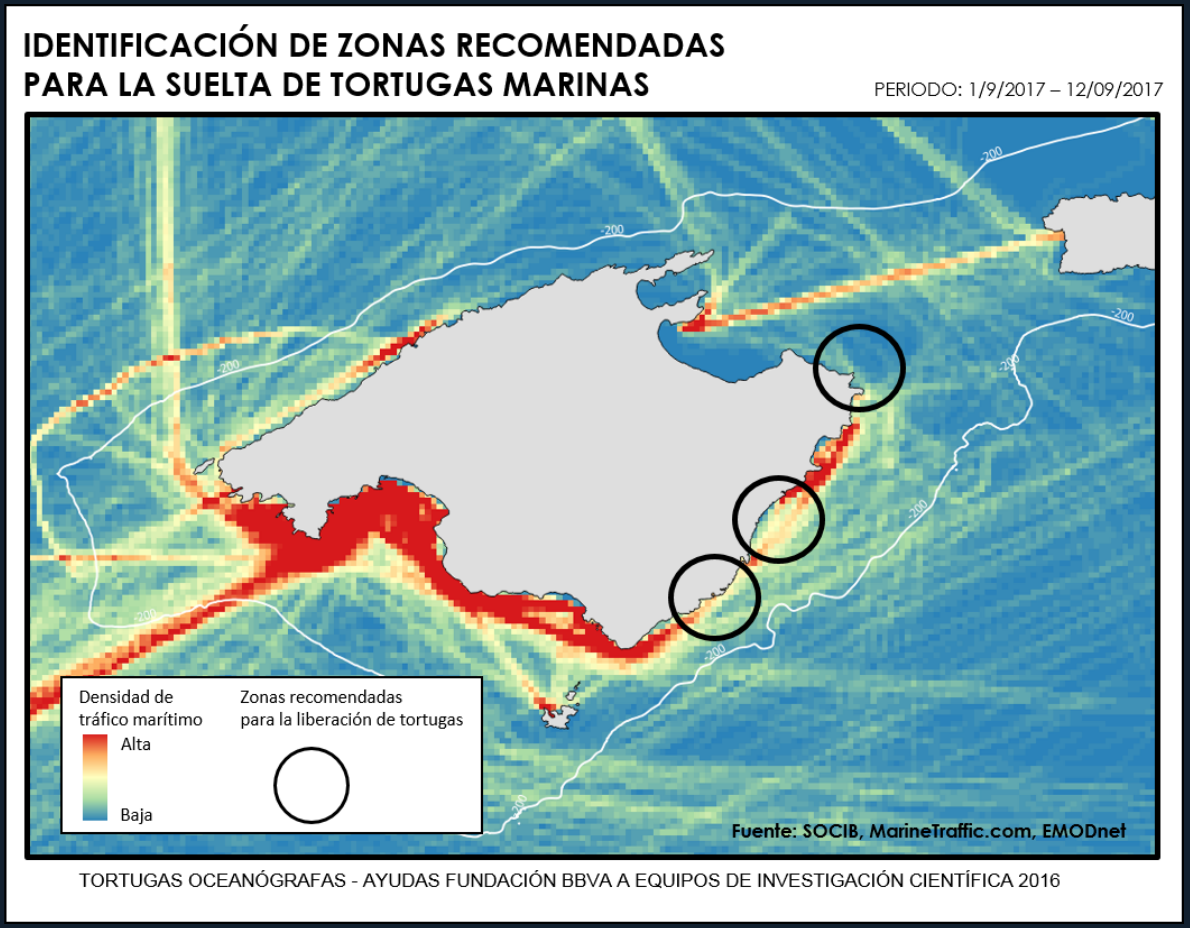




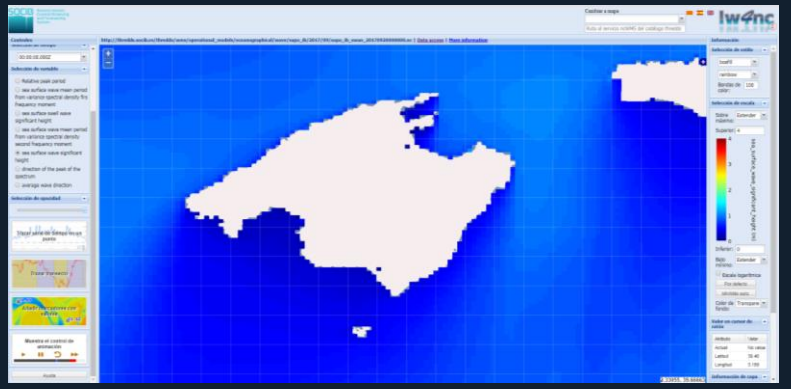




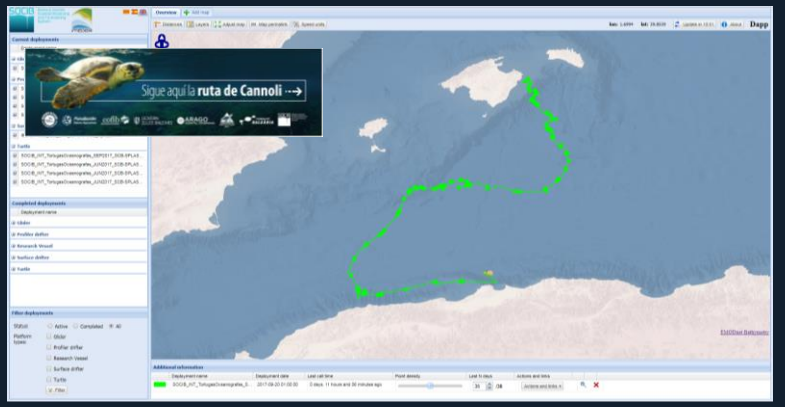
DESIGN AND DEVELOPMENT OF TOOLS TO SUPPORT CONSERVATION MANAGEMENT



Marine traffic density map was generated using recent AIS data



SOCIB Wave Forecast for the date of release



Real-time data using SOCIB viewer connected from www.fundacionpalmaaquarium.org

CONCLUSIONES Y PERSPECTIVAS DE FUTURO

- Un cambio de paradigma en la observación del océano, fundamentado en la integración de nuevos sistemas multiplataforma, puede contribuir a la conservación de especies amenazadas

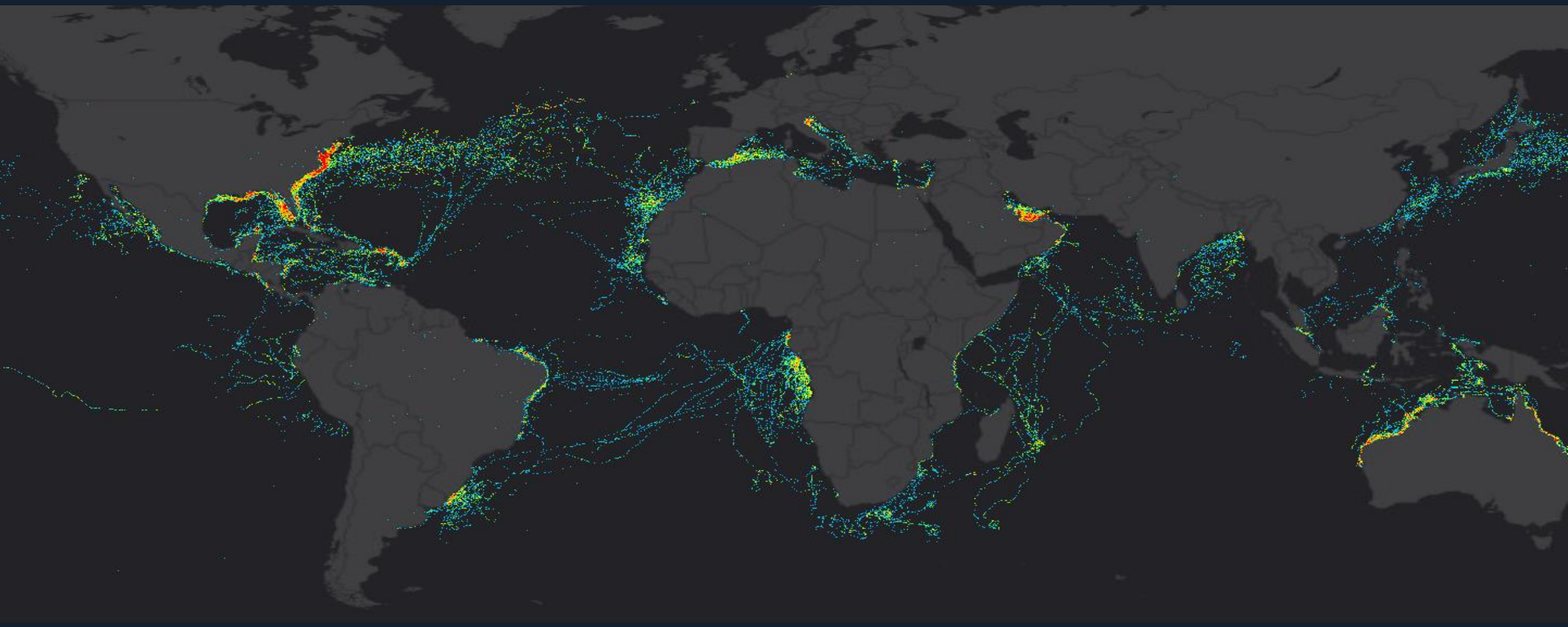
- Los experimentos multiplataforma ofrecen nuevas oportunidades para mejorar nuestro conocimiento sobre los patrones de movimiento y de inmersión de especies pelágicas en relación con estructuras oceanográficas y actividades humanas.

- La ecología operacional facilita el desarrollo de herramientas en tiempo real que den apoyo a la conservación y gestión dinámica del océano.

¡MUCHAS GRACIAS!

Dr. David March
dmarch@socib.es

¿POR DÓNDE SE MUEVEN LAS TORTUGAS MARINAS?



Mapa de la distribución de trayectorias de tortugas marinas monitorizadas con sensores satelitales (Datos: OBIS-SEAMAP)

ASSESSING THE EFFECT OF ENVIRONMENTAL VARIABLES ON SPATIAL DISTRIBUTION