

RiOMar (2023-2027): Observing and anticipating the evolution of River-dominated ocean margins in the 21st century

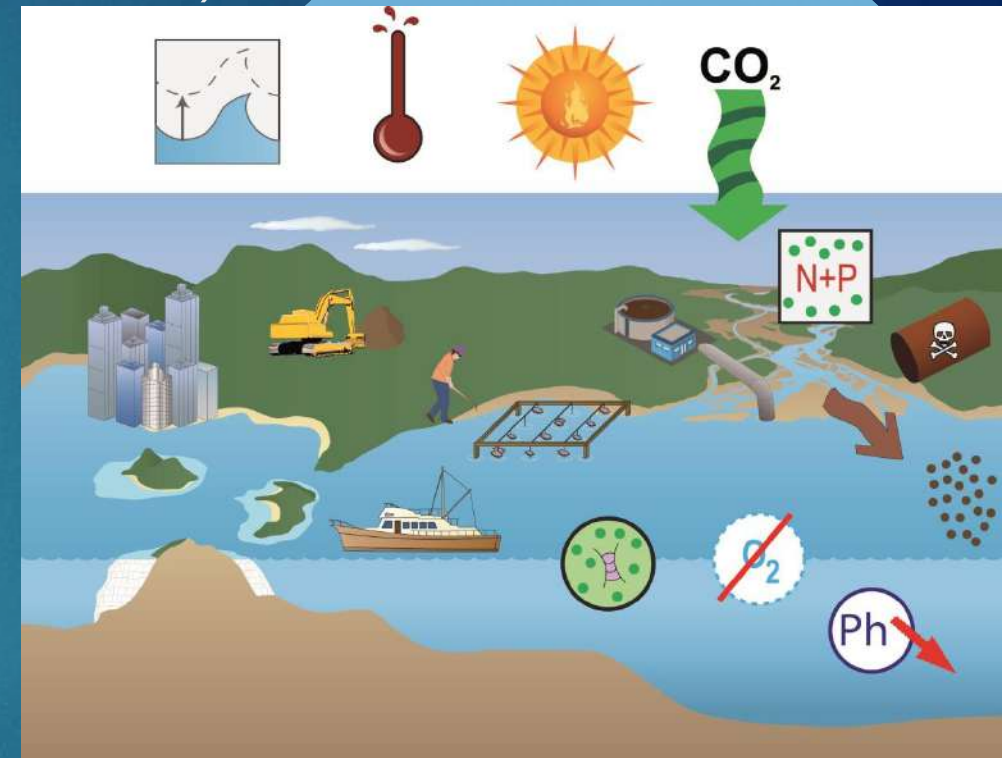
C. Rabouille (LSCE), F. Cayocca (OFB), G. Charria (Ifremer)

River dominated ocean margins (RiOMar's) ecosystems are **crucial for humanity** (ressources, energy, services)

These ecosystems are particularly vulnerable to **combined human and climatic stressors**

Eutrophication, hypoxia, acidification, warming, contamination, extreme events characterizes the **exposome of coastal ecosystems**

Their **evolution in the future** is largely unknown



Research questions

What is the fate of RiOMar's **ecosystems in the 21st century**?

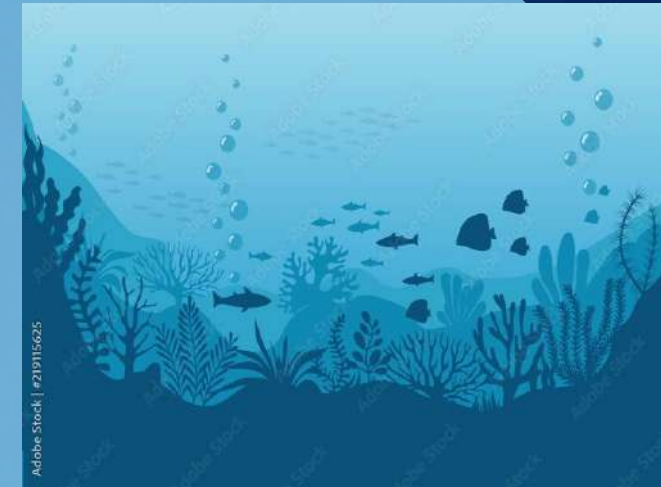
Can we provide **scientifically-grounded solutions**?

Objectives

Simulate coastal ocean ecosystems under the influence of anthropogenic inputs and climate change **during the 21st century**

Co-construct evolution scenarios and indicators for environmental managers in order to **propose relevant and sustainable solutions** for public policies

Define and design a **future integrated observation network** dedicated to provide constraints for modelling and monitor pluri-decadal changes of RiOMar areas



Research organisation

3 main actions

WP1: Co-construction with environmental managers and communication

WP2: Augmented observation and data management

WP3: Coastal Ocean Digital Twin and simulations of 21st century

Developed on **5 types of RiOMars**

Co-construction with environmental managers

Build a **strong link between environmental managers and scientists** to prioritize research actions towards public policies

Co-construction of scenarios for regional RiOMars

Provide training for tools **to share research products** with environmental managers



Augmented observations

Multidisciplinary observing systems (physics/ biogeochemistry/ biology)
characterizing ecosystems and their exposome

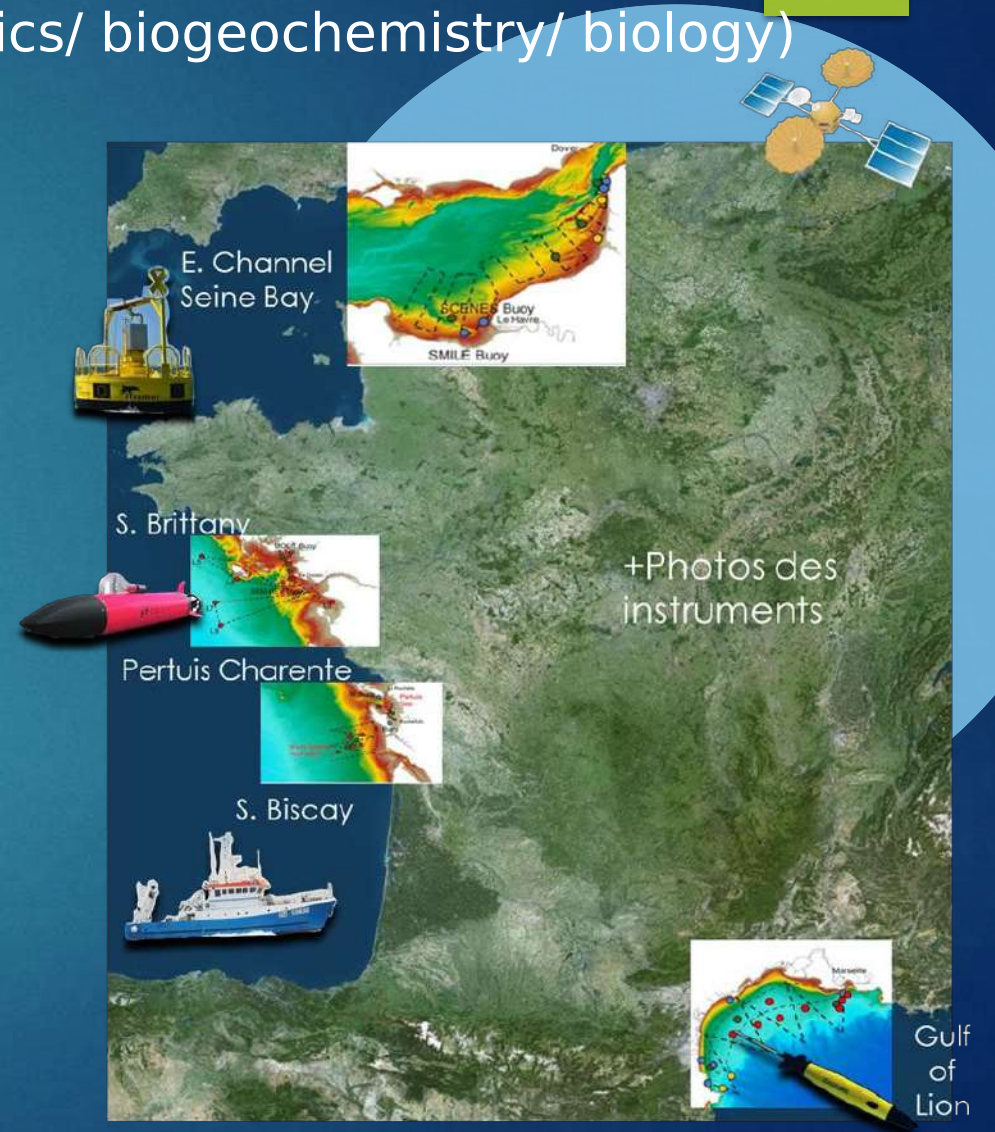
Extending spatial observation scale

low cost mooring, gliders and drones,
satellite imagery, participative observation

A step forward to interconnected
observing systems and **smart observation**

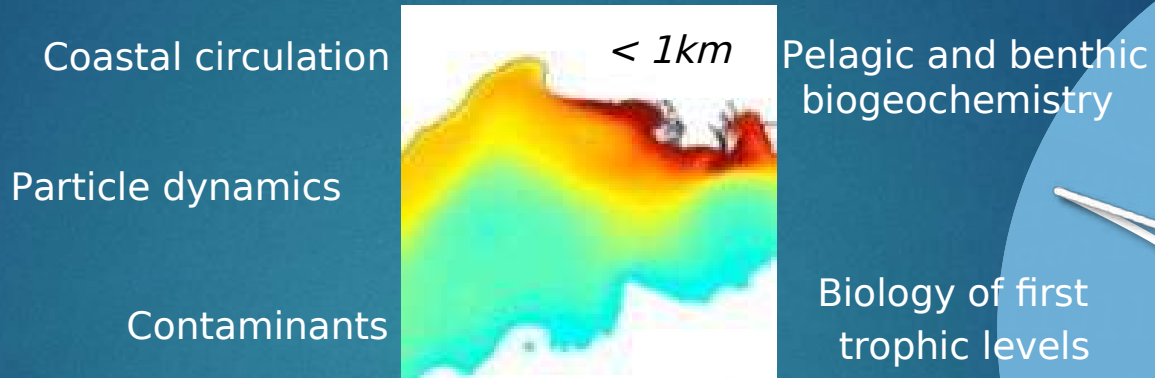
FAIR databases for **enhanced integration
with modelling**

Deployed regionally in **5 different RiOMars**
connected to major rivers in mainland France



Digital twin of the Coastal Ocean

Coastal Ocean coupled Model



Augmented observations



Simulations for the 21st century

(2000-2020; 2030-2050 and 2080-2100)

including **climate change** (RCP 8.5) and **anthropogenic inputs scenarios** co-designed with the environmental managers

To propose **science-based solutions** for vulnerable coastal regions influenced by rivers

(AI based predictions and merged key indicators)

Integration

Digital twin of the Coastal Ocean

... for the 21st century ...

A unique and diverse consortium

Multidisciplinary skills from circulation to biogeochemistry, biology, observation, modelling, AI, data management spread in **20 research laboratories** from all over France (Nice to Boulogne)

New effort coordinated with the entire **French coastal research network (ILICO-RI)**

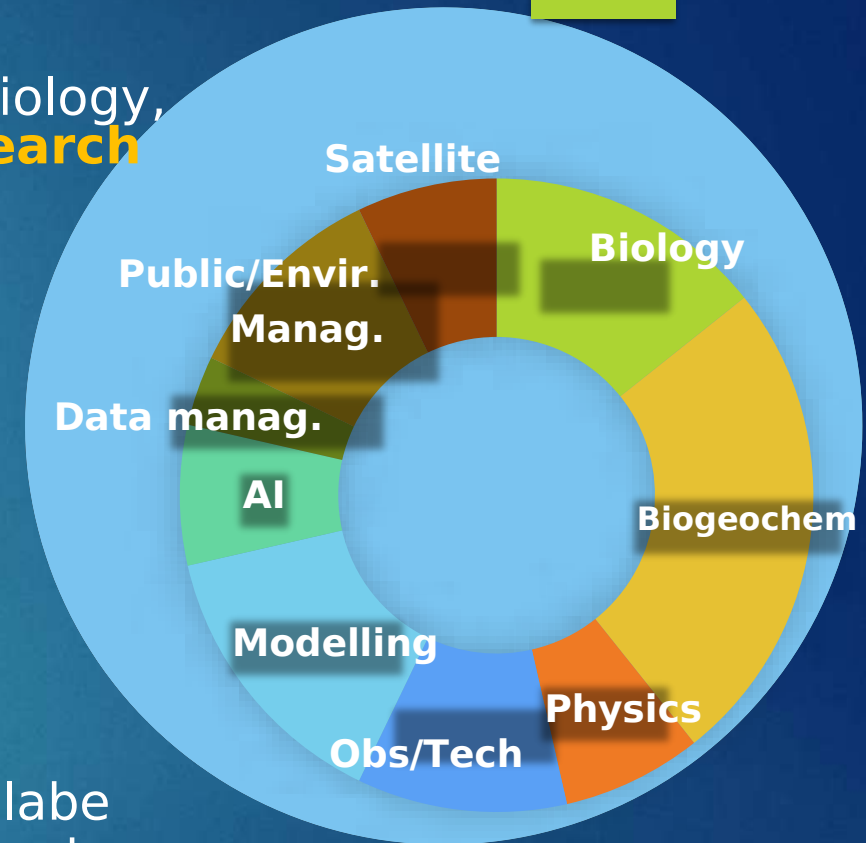
4 National Observation Services coordinators (SOMLIT, COAST-HF, MOOSE, PHYTOBS)

1 National Modelling Service coordinator (SiROCCO)

1 Ocean Data Center coordinator (ODATIS)

OFB partner: National institution **leading the environmental management** for the coastal ocean

1 non profit company (Mercator) and **2 citizen NGO** (Astrolabe Expédition, citizen observation and Climates, youth for climate and oceans)



Towards solutions for a sustainable ocean

RiOMar's ecosystems are under pressure (climatic and anthropogenic) in a complex exposome

Urgent need of co-construction with environmental managers to initiate science-based solutions for the 21st century

We propose a new generation of integrated *in situ* observations, modelling and AI approaches to define these solutions

Strong link with international efforts

UN Ocean Decade: CoastPredict and GOOD

JERICO effort at the European level

Needs

Ocean color products (SPM, Chla, ...)

for the different RIOMARs

Access to raw data for scientists and advanced users

Low-level access for managers

Gains for ODATIS

Match-ups with in-situ data