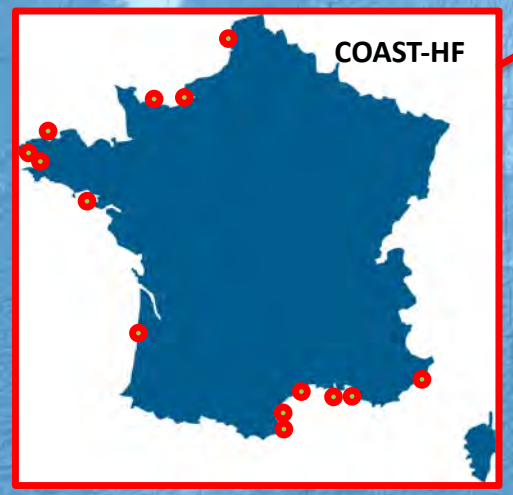
A fixed-platform network along French coasts

Guillaume **Charria** (LOPS/IFREMER), François **Schmitt** (LOG/CNRS), Eric Berthebaud, Armel Bonnat, François Bourrin, Yann Bozec, Pascal Claquin, Pascal Conan, Franck Delalée, Jean-Valéry Facq, Sophie Ferreira, Fabrice Garcia, Frédéric Gazeau, Jean-Michel Grisoni, Franck Jacqueline, Stéphane Kunesh, David Le Berre, Alain Lefebvre, Yann Leredde, Jean-François Le Roux, Sébastien Mas, Behzad Mostajir, Ivane Pairaud, Sébastien Petton, Coline Poppeschi, Stéphane Pouvreau, Loïc Quemener, Christophe Ravel, Patrick Raimbault, Peggy Rimmelin-Maury, Gilles Saragoni, Nicolas Savoye, Léon Serre, Philippe Souchu, Michel Repecaud, Michaël Retho, Romaric Verney, Renaud Vuillemin

www.coast-hf.fr

The COAST-HF network

A coastal observation network



14 fixed-platforms

Variables: temperature, salinity, in situ fluorescence, dissolved O_2 and turbidity

Depth: sub-surface (1 to 3m depth) / Frequency: hourly to sub-hourly

Today:
4 common parameters
(T, S, Fluo, Turb)

With other parameters

(partially implemented or under test phase) ...

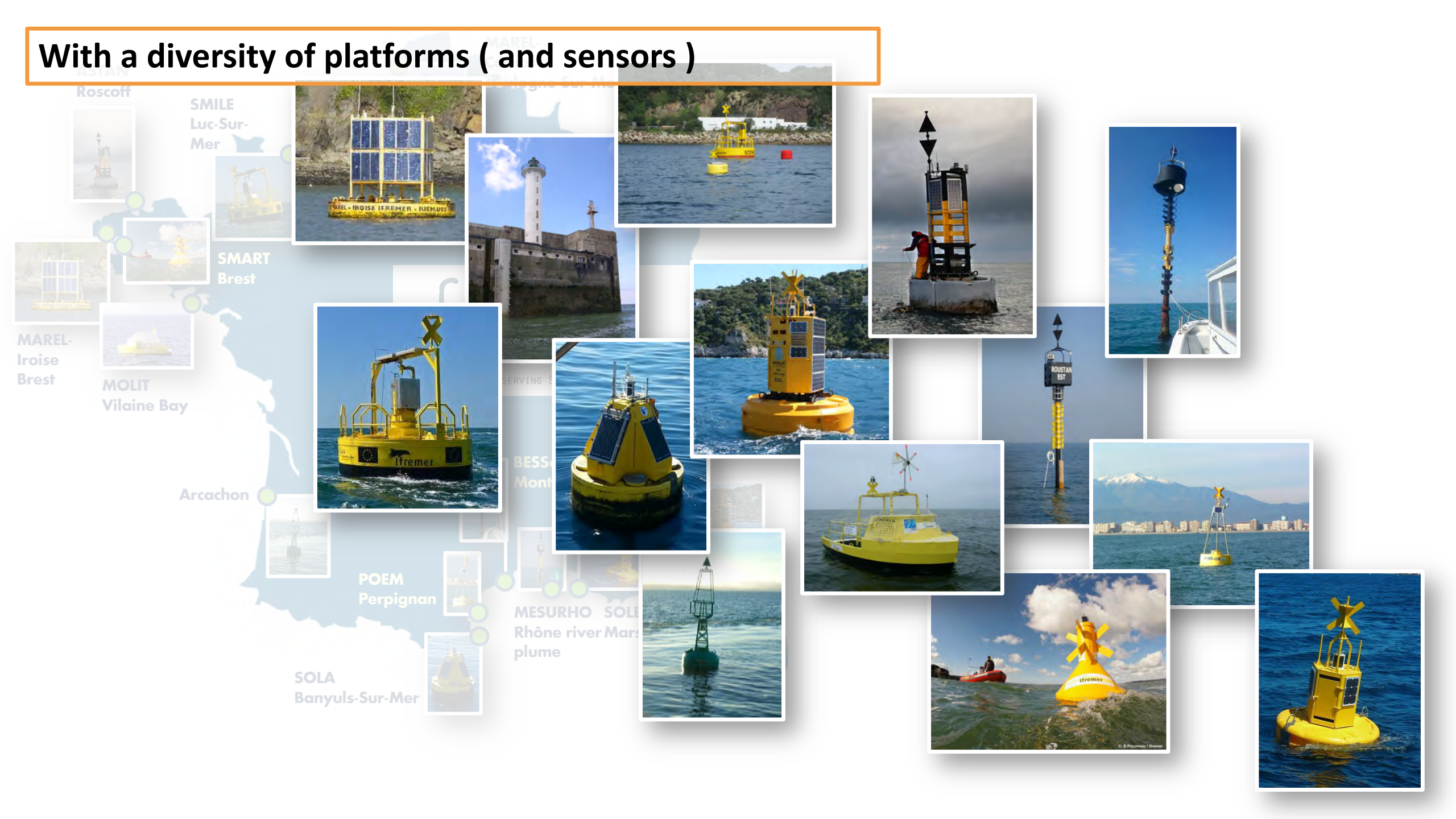
Dissolved O_2
Phytoplankton diversity
(*e.g. in situ* flow cytometry)
Currents (5 equipped stations)
pH / pCO2 (6 equipped stations or under deployment)

14 fixed-platforms

Variables: temperature, salinity, in situ fluorescence, dissolved O_2 and turbidity

Depth: sub-surface (1 to 3m depth) / Frequency: hourly to sub-hourly

With a diversity of platforms (and sensors)



Today:
4 common parameters
(T, S, Fluo, Turb)

With other parameters

(partially implemented or under test phase) ...

Dissolved O_2
Phytoplankton diversity
(*e.g. in situ* flow cytometry)
Currents (4 equipped stations)
pH / pCO2 (6 equipped stations or under deployment)

A network born in 2016
(based on existing buoys with until 20 years of continuous measurements in 2020)

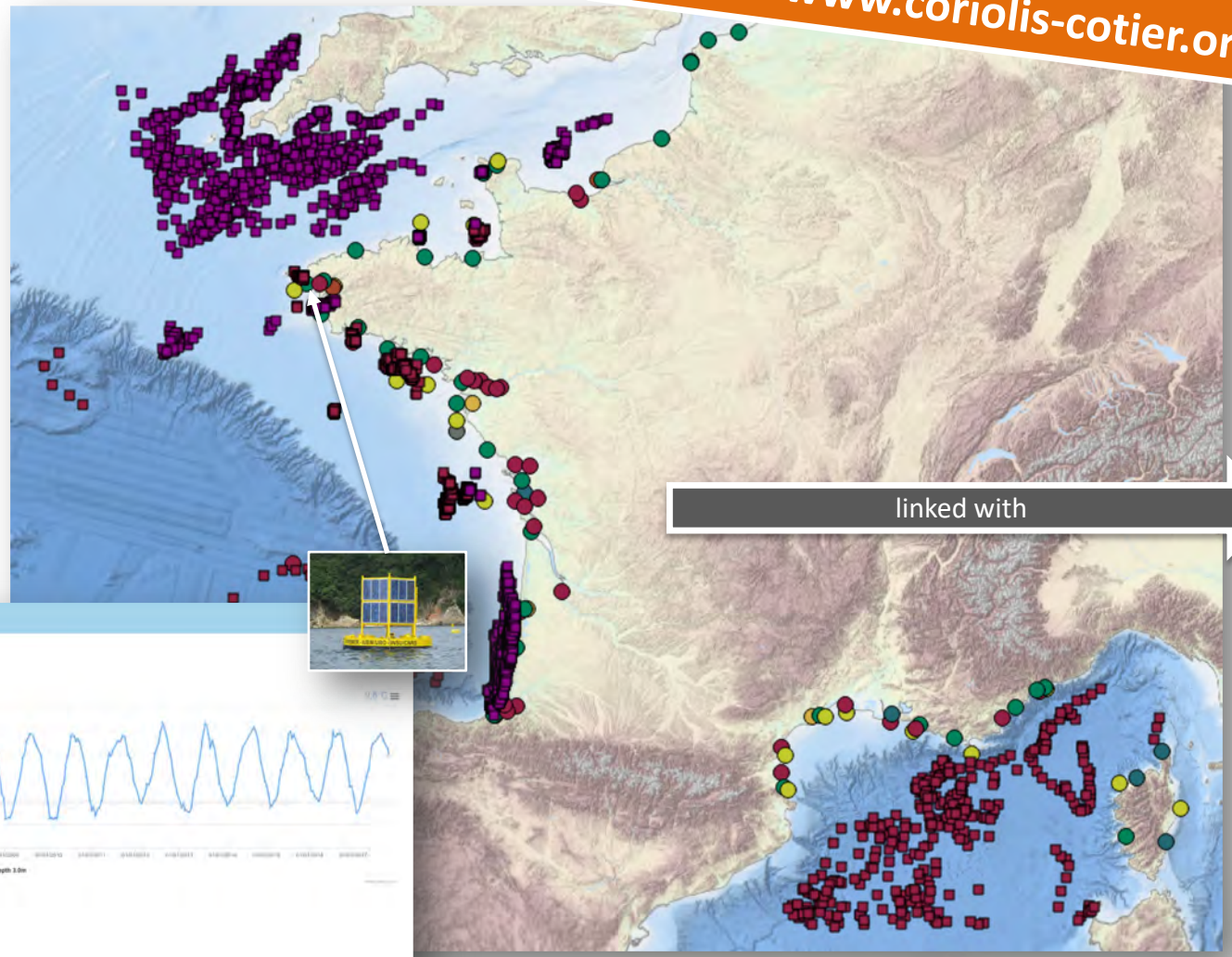
Recognized as a National Observation Service in 2018

Averaged annual budget: 300k€ per year for 14 platforms
(including investment in sensors and platforms)

76 people involved (for 11.7 full-time equivalent)

Data access

Data freely available on **www.coriolis-cotier.org**



linked with

Copernicus
Europe's eyes on Earth

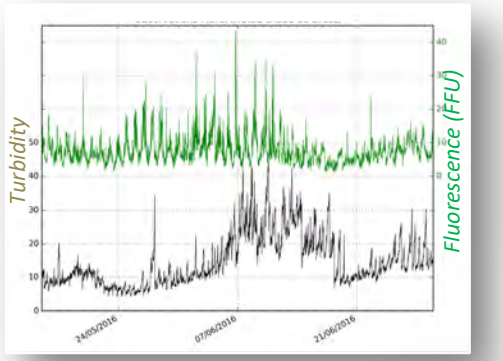
http://marine.copernicus.eu/

European Commission

Key science questions and few examples

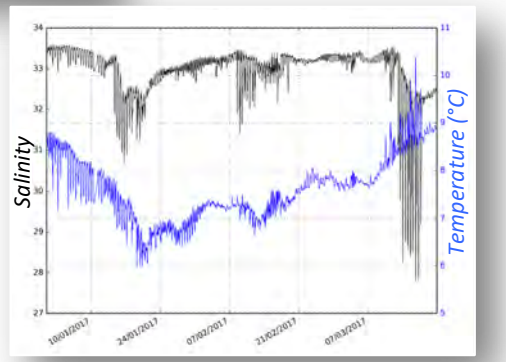
Key science questions

Marel IROISE observations (Bay of Brest)



Marel IROISE buoy

SMILE observations (Bay of Seine)



SMILE buoy

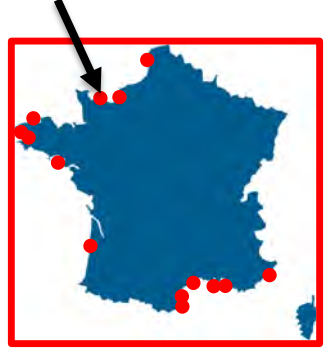
Eulerian platforms to observe **continuously and at high frequency** the coastal ocean along the french coasts

Evolution and variability of hydrological structure: **from extreme events to interannual scales**

Land – coastal ocean exchanges

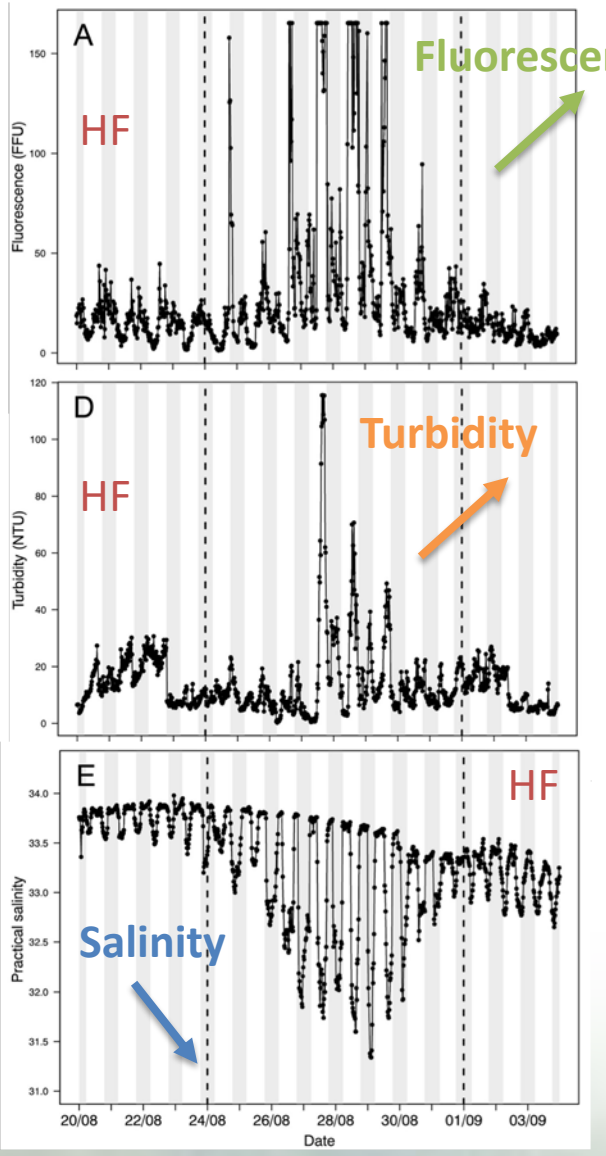
To understand the **ecosystem** response to those evolutions

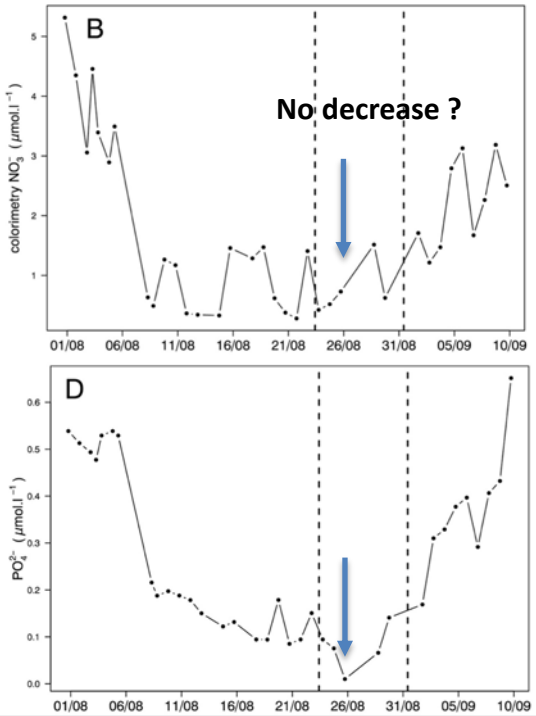
Coupling high frequency monitoring and bioassay experiments to investigate a harmful algal bloom in the Bay of Seine



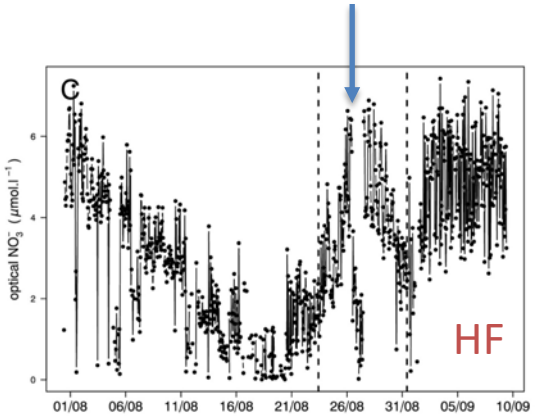
Serre-Fredj *et al.*, Marine Bulletin Pollution, 2021

A bloom of Dinophyceae *Lepidodinium chlorophorum*

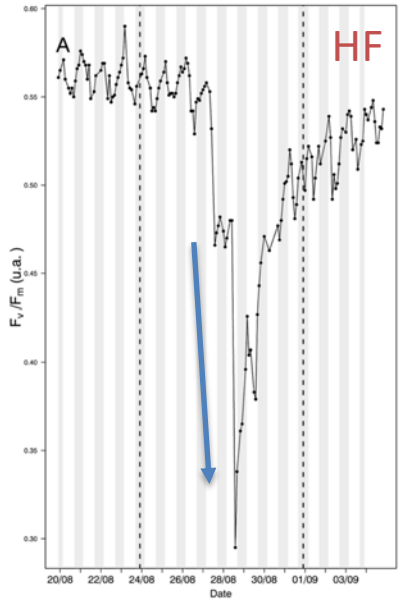




Phosphate limitation



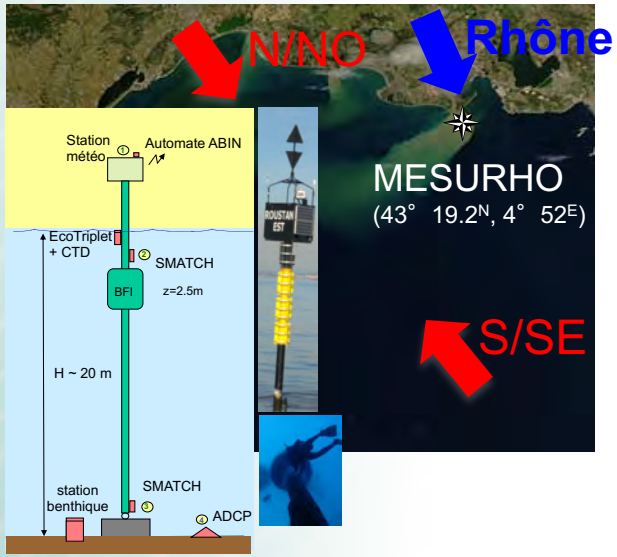
Nitrate decrease only visible in HF

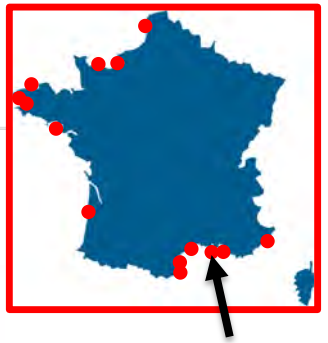


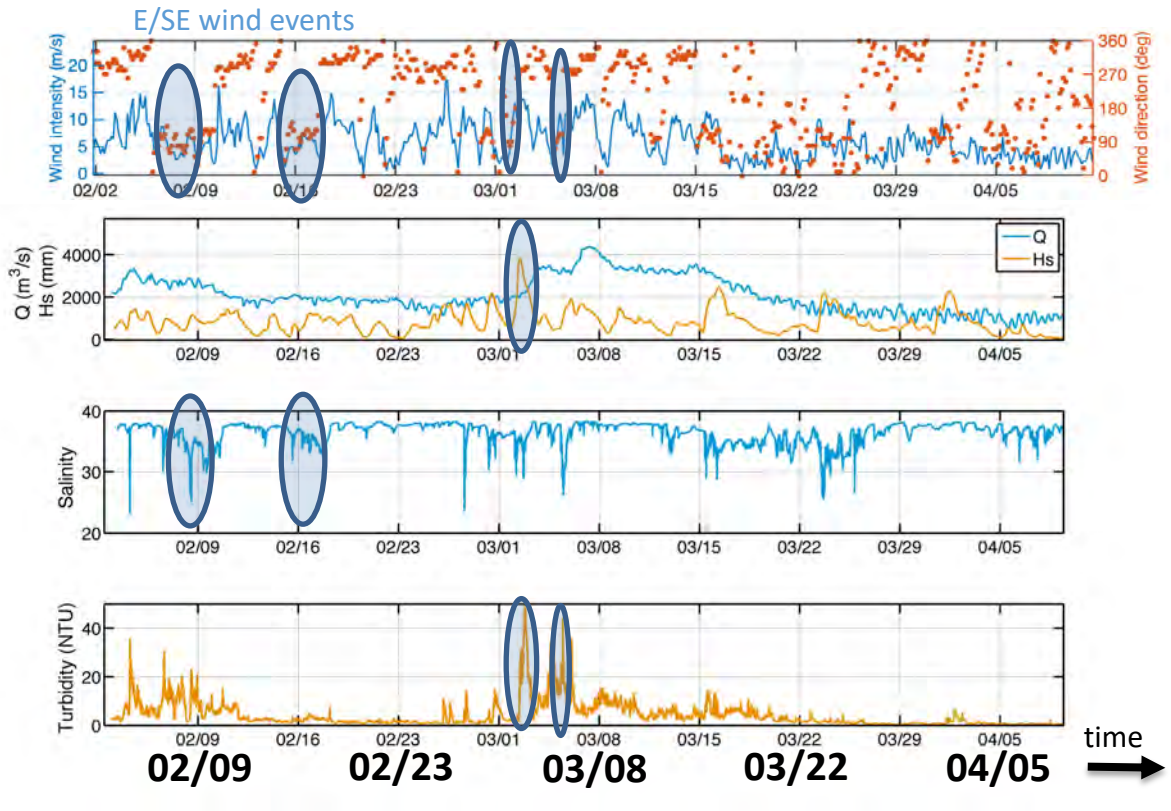
Decrease in physiological state due to P limitation

HF: High-Frequency measurements

MesuRho station at the Rhone River mouth (NW Med) : influence of the meteorological forcing and the Rhone River flow on turbidity



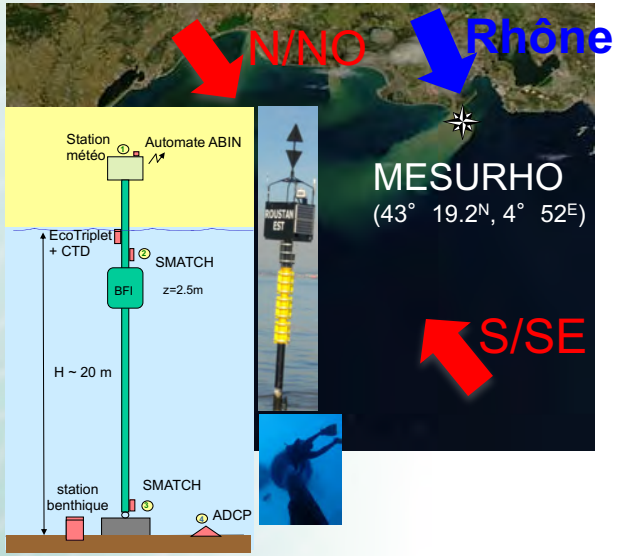


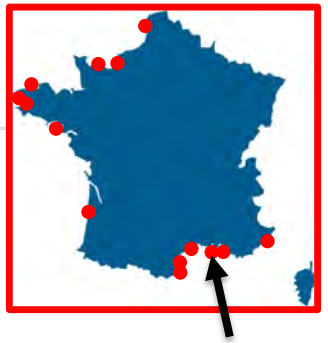


Weak SE wind events in early February => low salinity events, high turbidity (the plume is pushed toward the coast and deepens)

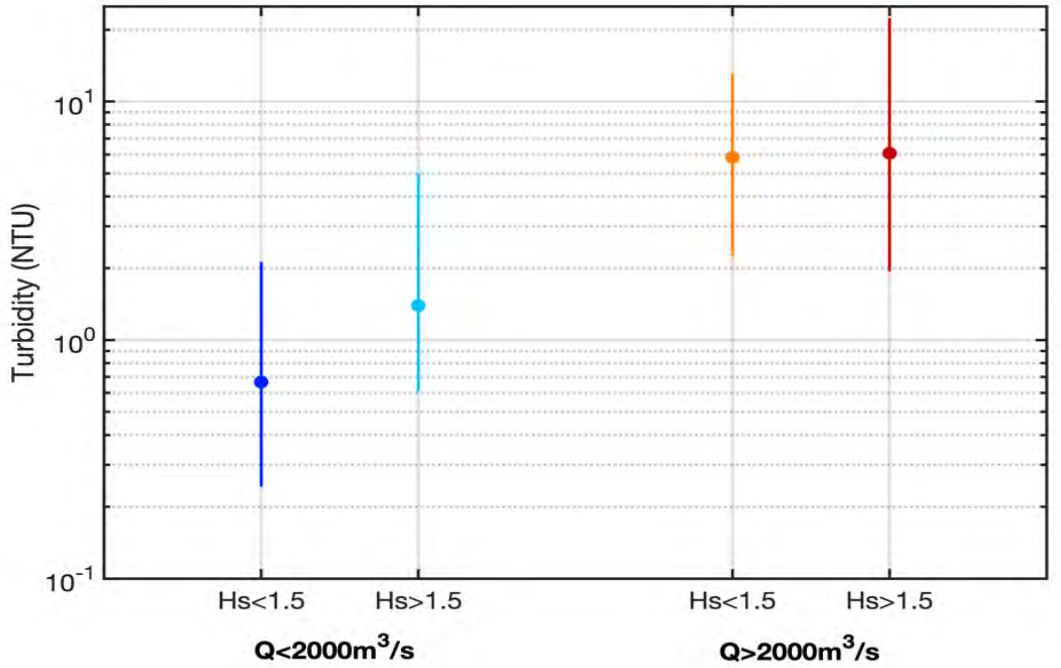
Strong S/SE/E wind events in early March => wave height > 4m, turbidity > 40 NTU

MesuRho station at the Rhone River mouth (NW Med) : influence of the meteorological forcing and the Rhone River flow on turbidity





Turbidity (median and 10/90 percentiles) by flow and wave height ranges over February-April 2020.



Sensitivity to river flow: high turbidity during floods

flood (Q>2000m3/s) => high turbidity 2-10 NTU (lasting for a few days in March)

low flow (Q<2000 m3/s) => turbidity < 2NTU

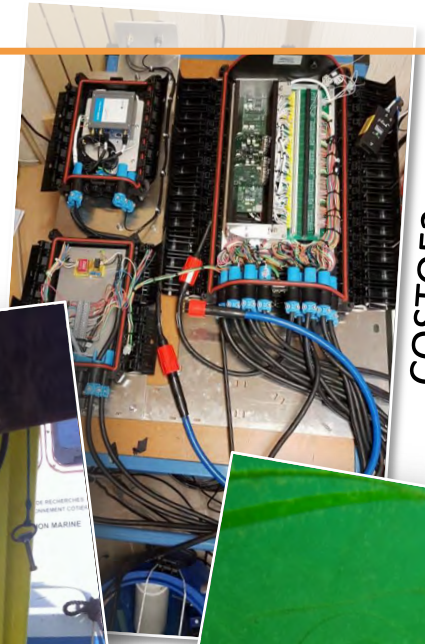
Sensitivity to wave height: particles resuspension and turbidity increase if high wave height

low flow, low wind & Hs>1.5m => turbidity 0.5-5 NTU

high flow & Hs<1.5 => tubidity up to 10NTU, high flow & Hs>1.5 => turbidity up to 20NTU or more

Technological developments

Technological developments



COSTOF2 - Storage and communication system

EOL buoy system
Up to 8 sensors hub

To improve communication and storage systems
(*e.g.* EOL *8 sensors* hub, COSTOF2)

To observe plankton diversity and ecosystem dynamics
(*e.g.* in situ flow cytometry and primary production)

To extend low cost observation of spatial variability
(*e.g.* MASTODON O_2 system)

Links between national and European infrastructures

… where a coastal local observation network can feed the global system

National Research Infrastructure & an operational oceanography programme

To a European Research Infrastructure

Linked with European programmes

Data

Network

Coast-HF
Coastal Ocean Observing System – High Frequency

ODATIS

JERICO RI
Science - Services - Sustainability

EuroGOOS
European Global Ocean Observing System

EOOS

Copernicus
The European Earth Observation Programme

ILICO

Coriolis

The Global Ocean Observing System
GOOS

To global

Thanks for your attention !

www.coast-hf.fr