



Coastal modeling and forecasting

Marta Rodrigues, André B. Fortunato, Anabela Oliveira
- LNEC

 eosc-hub.eu

 [@EOSC_eu](https://twitter.com/EOSC_eu)

 www.incd.pt



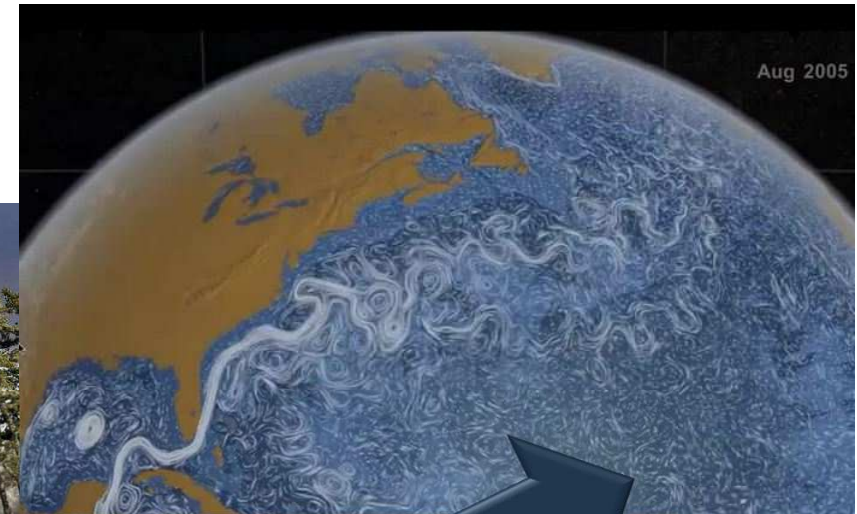
EOSC-hub receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 777536.

- Coastal processes
- Numerical models
- Forecasts
- Introduction to SCHISM

Oceanic currents

Tsunamis

Waves

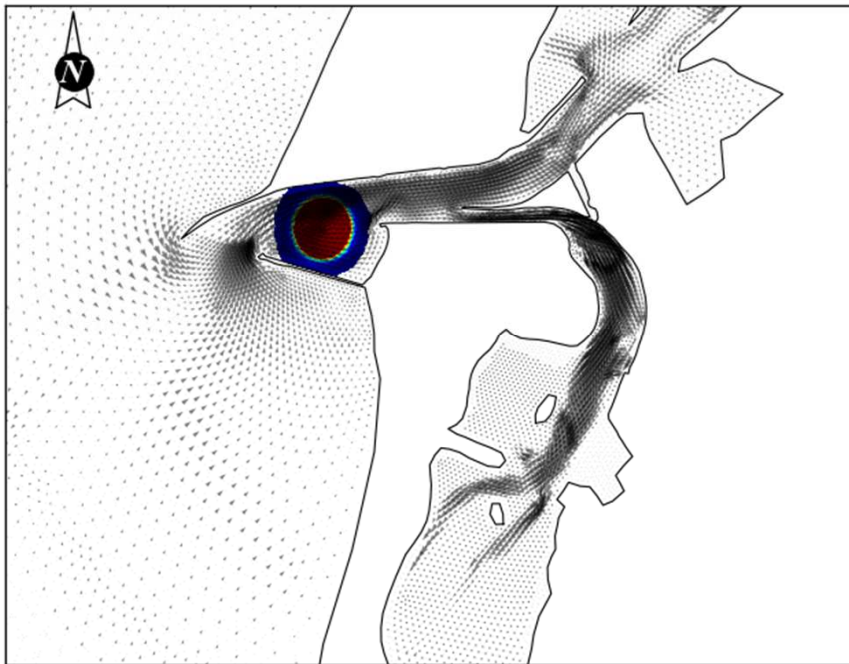


Temporal and spatial scales

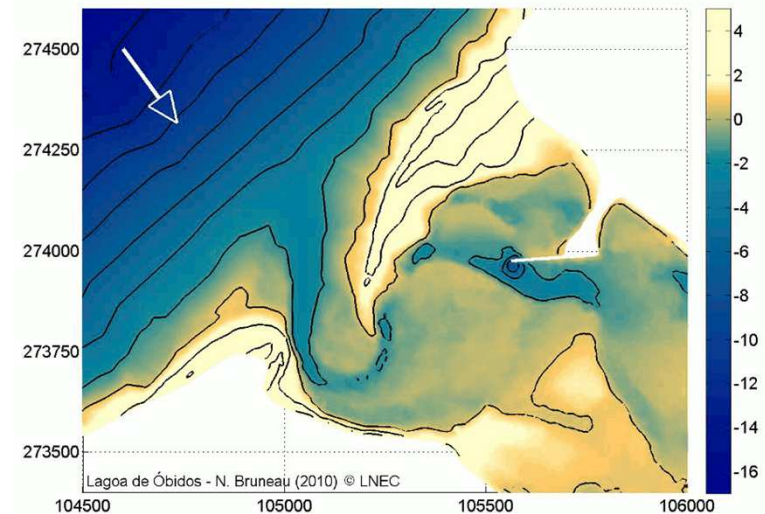
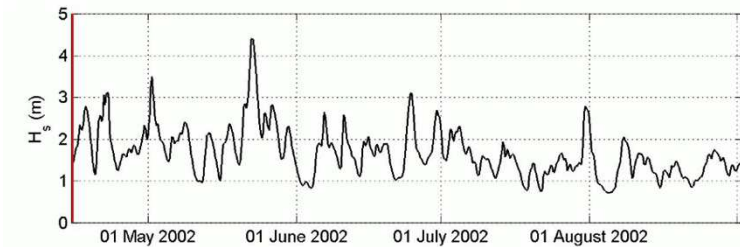


Using numerical models to simulate the coastal dynamics

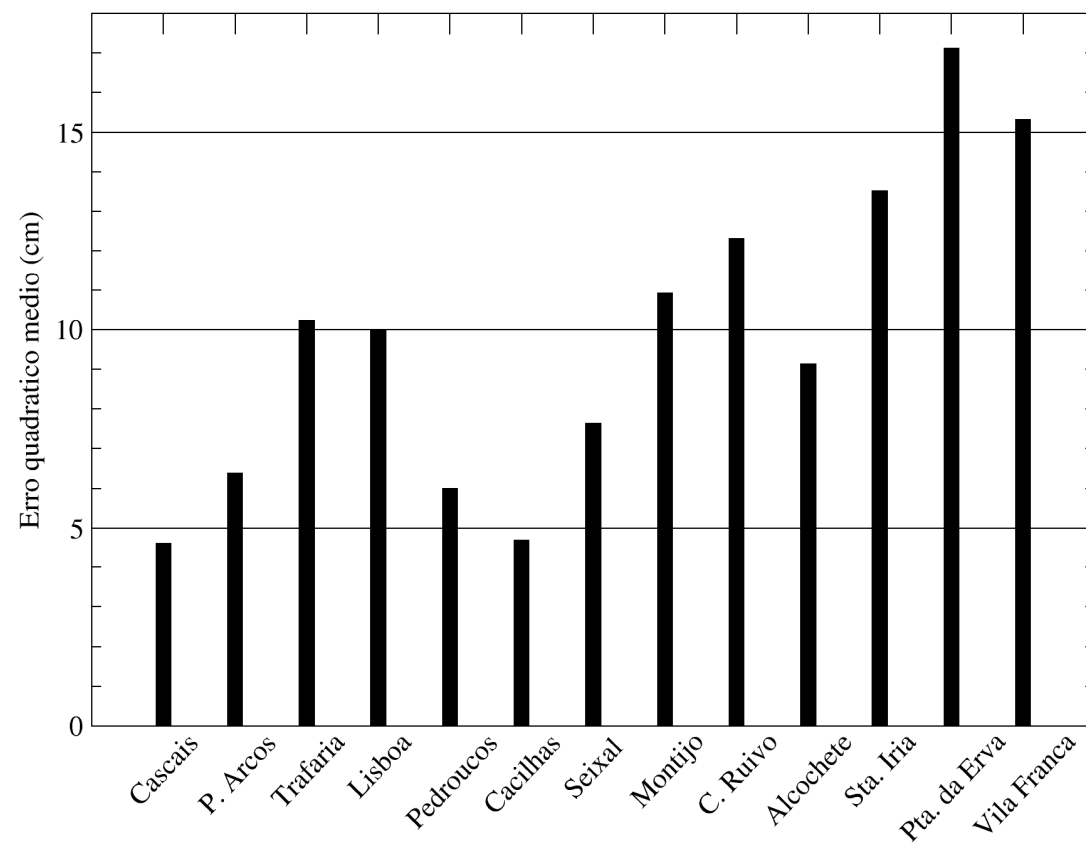
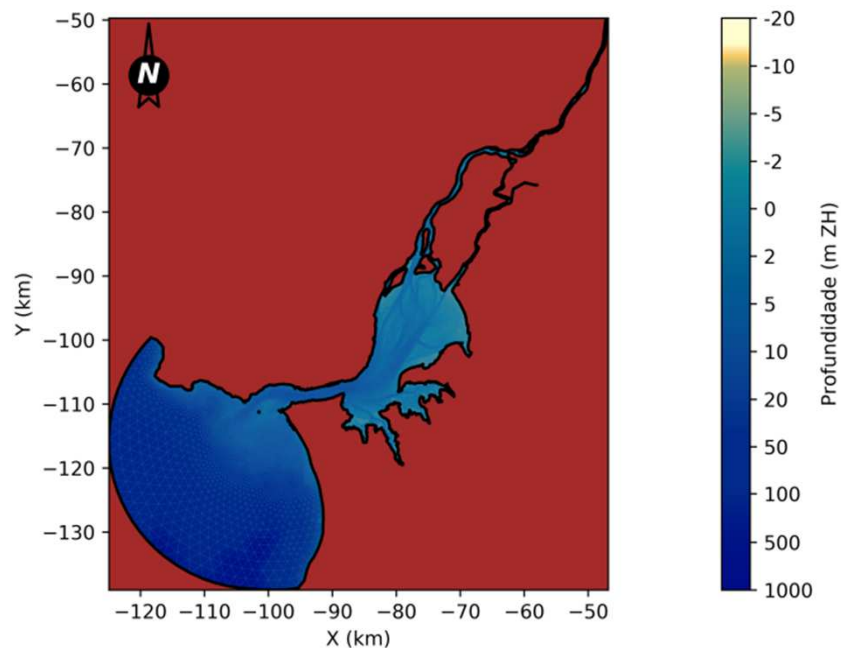
Time=0.0 h



Evolution of an oil spill



Evolution of an inlet



“ALL MODELS HAVE ERRORS...

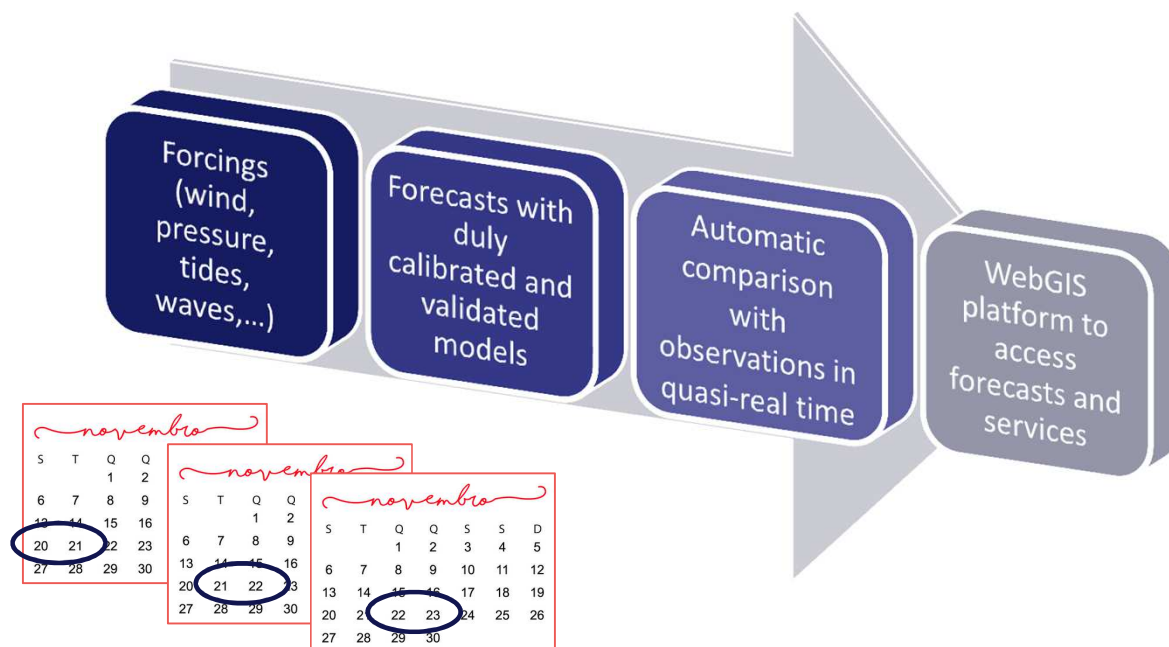
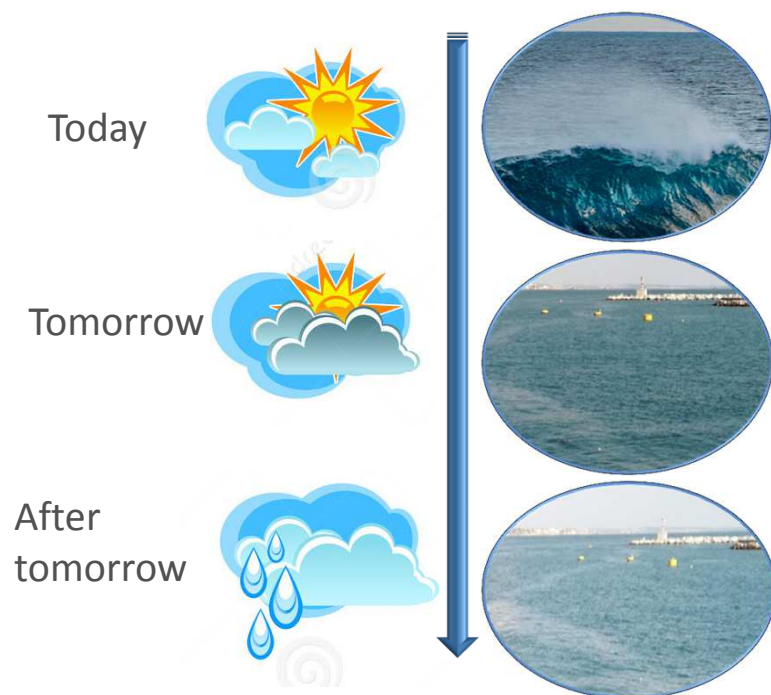
...BUT THEY CAN BE USEFUL”

Using models to support daily and long-term management



- Anticipate contamination events and support emergency actions
- Support water economy daily tasks and leisure & recreation
- Guide management to minimize risks in the coastal areas (water resources, harbours, critical infrastructures, ...)

Concept and building blocks of a forecasting system



novembro

S	T	Q	Q
		1	2
6	7	8	9
13	14	15	16
20	21	22	23
27	28	29	30

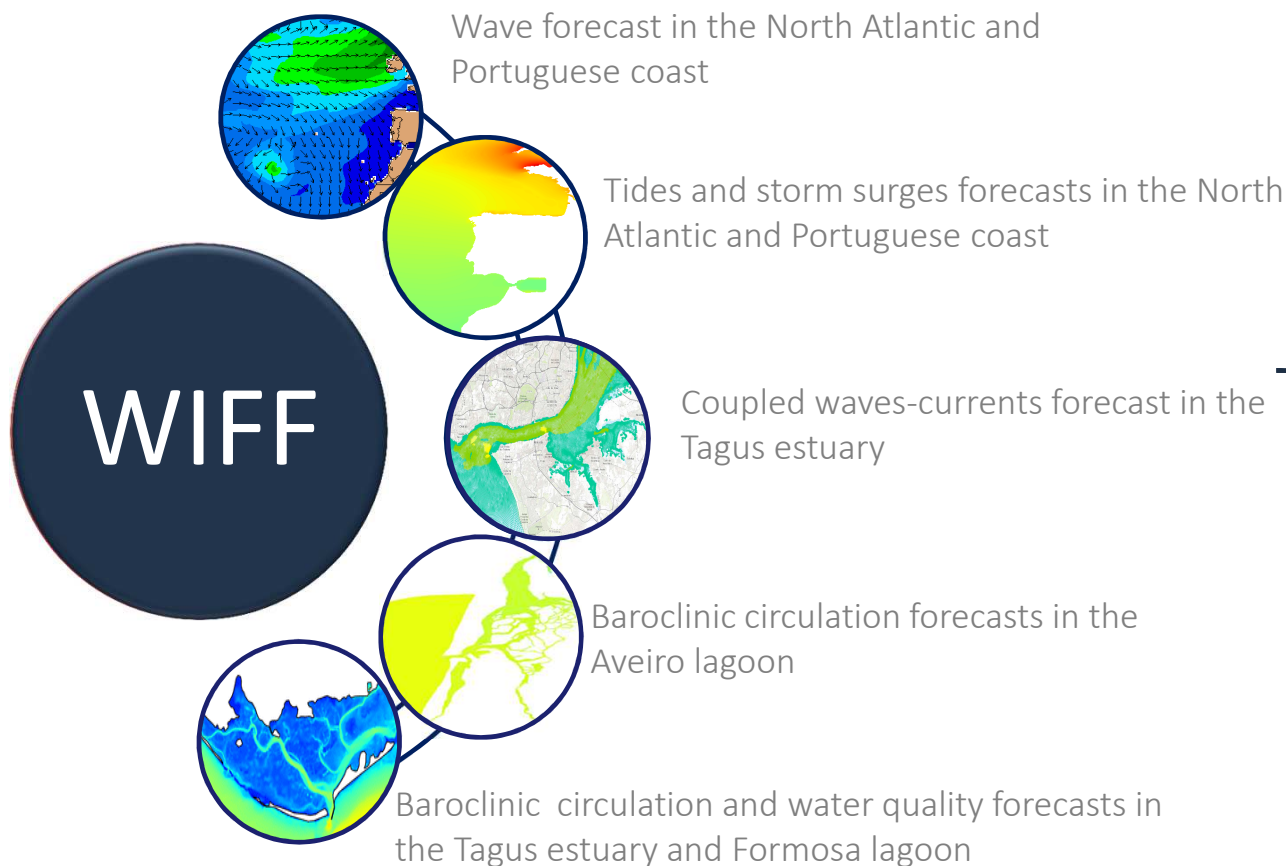
novembro

S	T	Q	Q
		1	2
6	7	8	9
13	14	15	16
20	21	22	23
27	28	29	30

novembro

S	T	Q	Q	S	S	D
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30			

*WIFF is in operation
for over 10 years for
several coastal
systems and the
simulation of the
physical and water
quality dynamics*



SCHISM
Unstructured grid
numerical modeling
systems

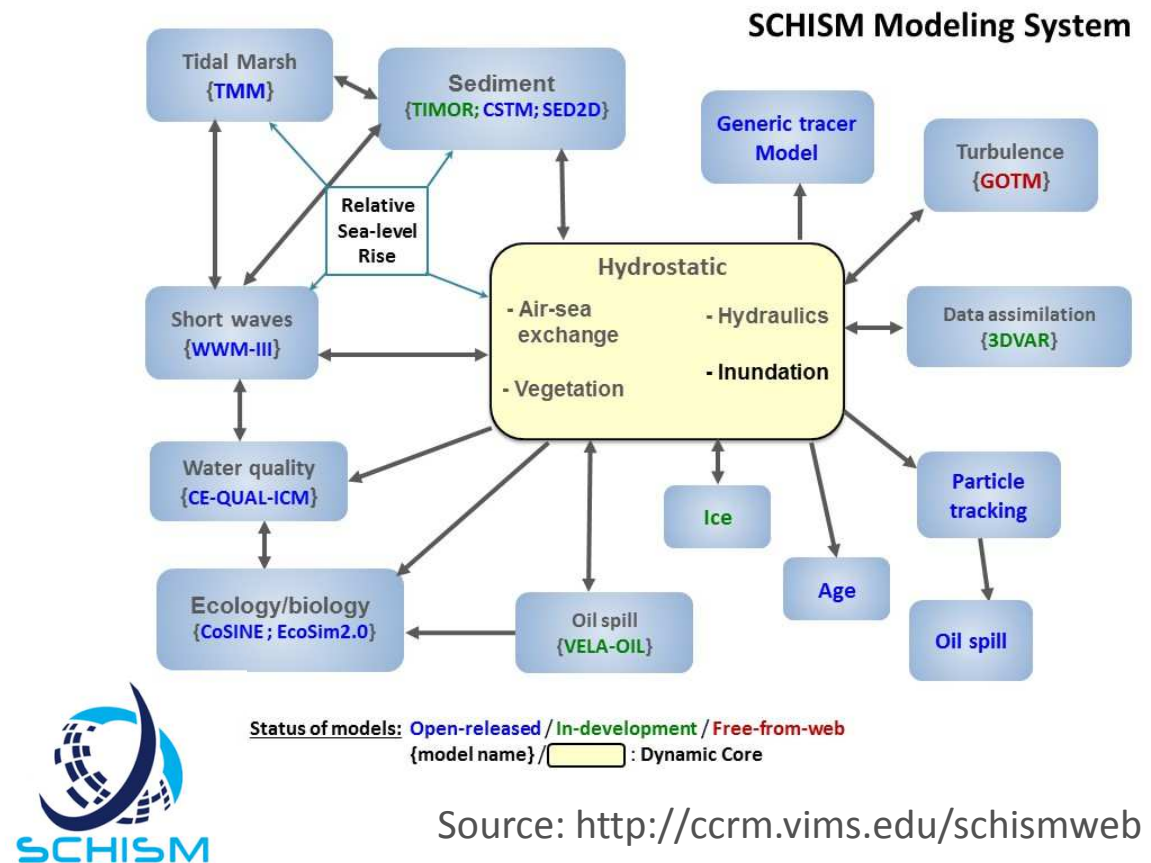


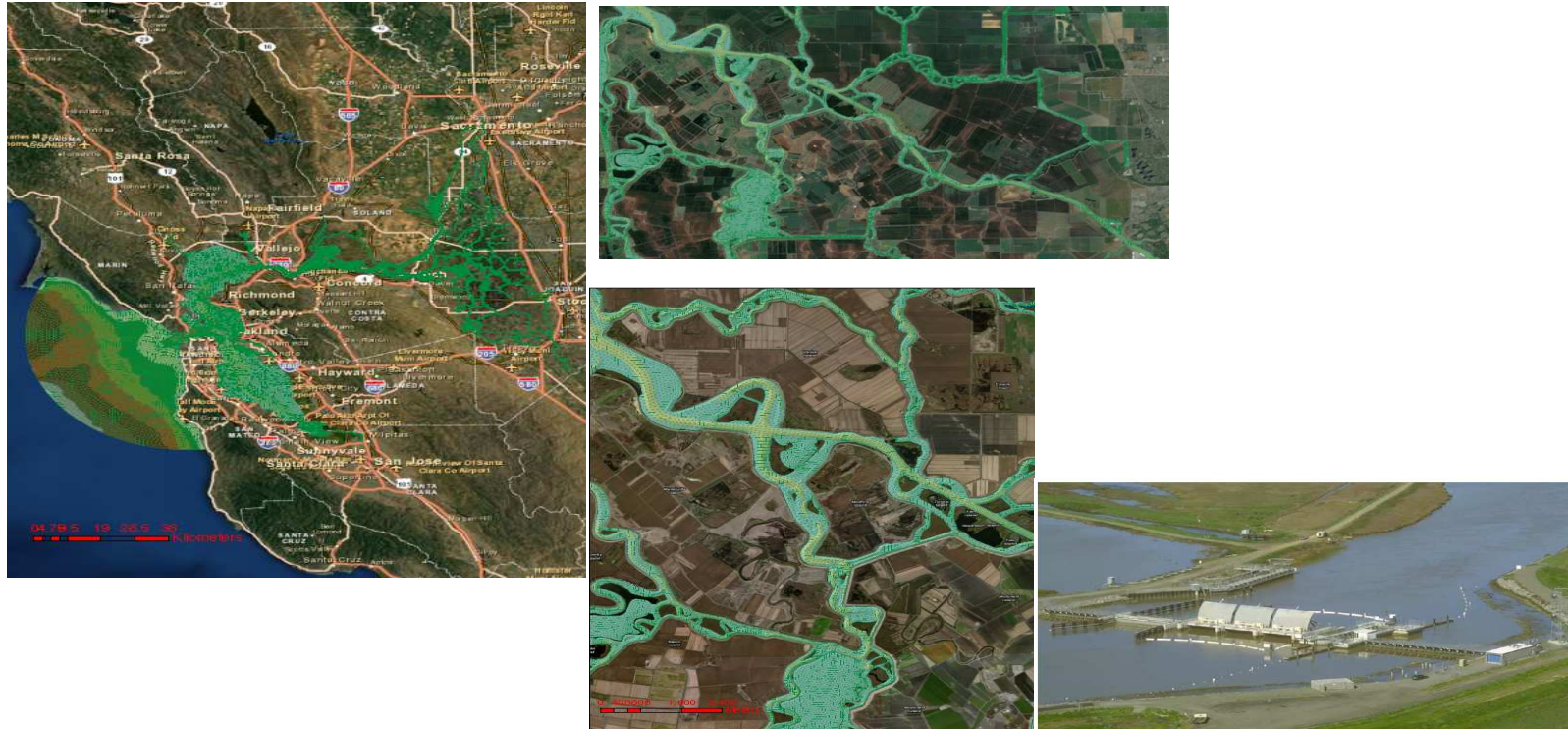
Introduction to SCHISM

Semi-implicit Cross-scale Hydrosience Integrated System Model



- Tides and storm-surges
- Waves and interaction with circulation
- 3D baroclinic circulation
- Tsunamis
- Sediments dynamics and hydrodynamics
- Ecosystems dynamics and water quality
- Oil spills





Fonte: Prof. Joseph Zhang

- Implements forecast systems for a coastal site chosen by the user, using a user-friendly web interface
- Flexible in its configuration (forcings, parameters,...)
- Allow multiple actions over forecast systems (configure, manage, view)



The screenshot shows the OPENCoastS website interface. At the top, there is a navigation bar with links for OPENCoastS, TARGET, FEATURES, MORE INFO, and User Manual. On the right side of the navigation bar are links for REGISTER, LOGIN, and language options (PT, EN). The main header features the OPENCoastS logo and the tagline "Coastal circulation on-demand forecast" over a background image of ocean waves. Below the header, a paragraph states: "Forecast systems are fundamental assets for emergency response and everyday management of coastal regions". This is followed by a detailed description of the service, its operational parameters, and the models used. It mentions that forecasts are generated daily for 48 or 72 hours based on numerical simulations. It also lists data sources for forcings (NOAA, GFS, MétéoFrance, PRISM2017, FES2014) and tide gauge data (EMODnet Physics). Links are provided for a sample grid file, the user manual, and several podcasts related to coastal processes and the service itself. Below this, a "Target Audience" section is divided into three categories: Partners, Companies, and Scientific Community, each with a brief description of how the service benefits them. The footer of the website includes logos for EOSC-hub, the European Union flag, and various partner institutions like LNEC, LIP, CNRS, and UC.

Forecast systems are fundamental assets for emergency response and everyday management of coastal regions

The OPENCoastS service assembles on-demand circulation forecast systems for selected coastal areas and keeps them running operationally for a period defined by the user. This service generates daily forecasts of water levels, vertically averaged velocities and wave parameters over the region of interest for 48 or 72 hours, based on numerical simulations of all relevant physical processes.

Presently, all forecasts are made with the [SCHISM model](#).

Forcings are provided by [NOAA](#) / [GFS](#), [MétéoFrance](#), [PRISM2017](#) and [FES2014](#).


Tide gauge data are provided by [EMODnet Physics](#).

You can find a sample grid file to test the service [here](#). The coordinate reference system of this grid is EPSG: 4326 | WGS84 / World Geodetic System 1984, and the vertical displacement relative to mean sea level is 0.

You can access the user manual [here](#).

You can access several podcasts on coastal processes, the SCHISM model, grid generation, forecast systems and OPENCoastS itself [here](#).

Target Audience

**Partners**




Provide tools for emergency agents and civil protection agents anticipating natural disasters (such as: flooding, storms, algae blooms), anticipating the impacts of anthropogenic accidents on the coast and helping in search and rescue operations.

**Companies**

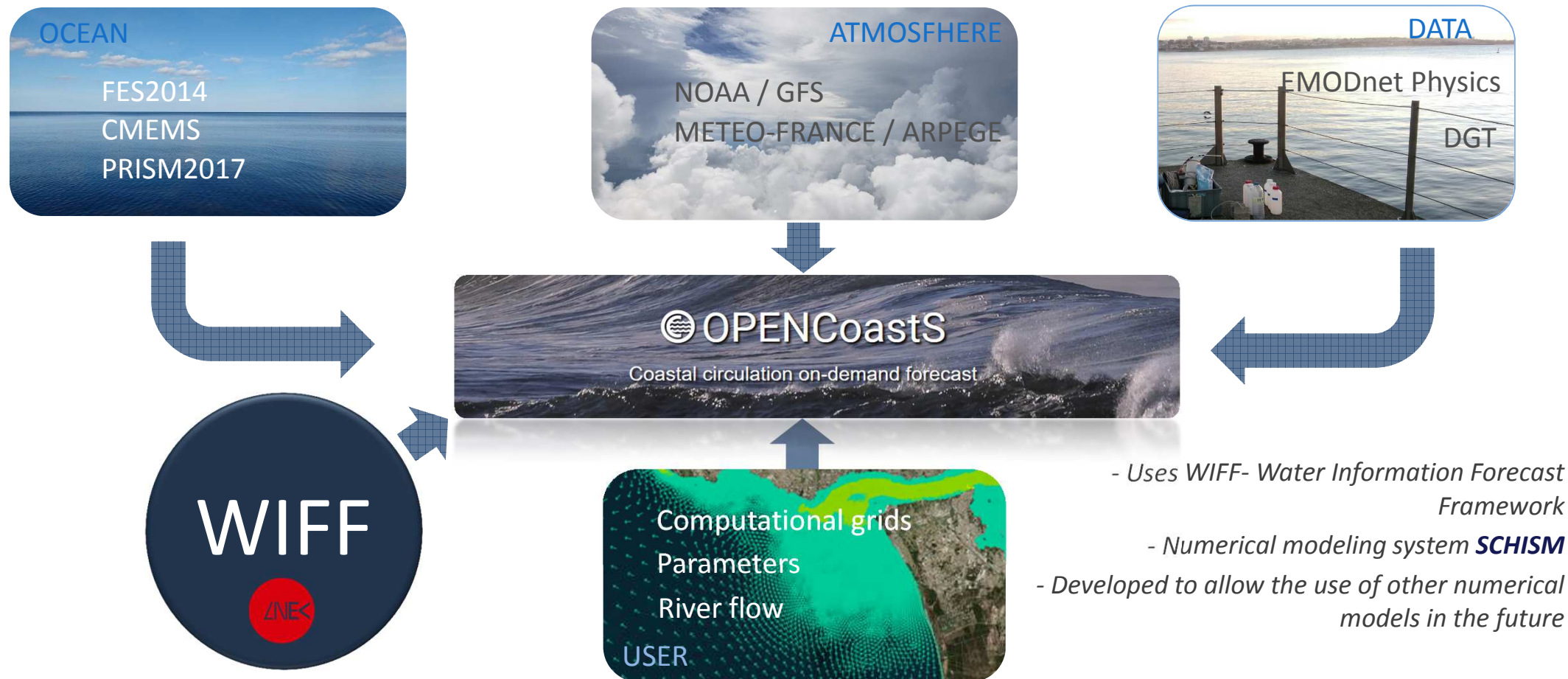
Provide all coastal managers the predictions on water conditions timely and accurately, supporting multiple uses such navigation aid, water monitoring harbour activities, dredging works and building works on the coast.

**Scientific Community**

Forecast systems are also useful for the scientific community, supporting, for instance, field work and helping to understand the physical, biogeochemical and ecosystemic dynamics in the estuarine and coastal areas.

      © LNEC/LIP 2018

OPENCoastS: information requirements and global services available



**Thank you for your
attention!**

Questions?



EOSC-hub

 eosc-hub.eu  [@EOSC_eu](https://twitter.com/EOSC_eu)



 www.incd.pt



This material by Parties of the EOSC-hub Consortium is licensed under a [Creative Commons Attribution 4.0 International License](https://creativecommons.org/licenses/by/4.0/).