Coastal modeling and forecasting

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- LNEC
Coastal processes
Numerical models
Forecasts
Introduction to SCHISM
Oceanic and coastal processes

Waves

Tsunamis

Oceanic currents

Temporal and spatial scales
Consequences of the hydrodynamics

Cyclone Idai, Moçambique

Coastal erosion, EUA

Oil slick

Effluents discharge, Argélia

Hercules storm, Portugal

Sedimentation processes, Portugal
Using numerical models to simulate the coastal dynamics

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, ...)

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INCD: Infraestrutura Nacional de Computação Distribuída
Concept and building blocks of a forecasting system

Today

Tomorrow

After tomorrow

Forcings (wind, pressure, tides, waves,...)

Forecasts with duly calibrated and validated models

Automatic comparison with observations in quasi-real time

WebGIS platform to access forecasts and services
LNEC’s coastal forecasts

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

- Wave forecast in the North Atlantic and Portuguese coast
- Tides and storm surges forecasts in the North Atlantic and Portuguese coast
- Coupled waves-currents forecast in the Tagus estuary
- Baroclinic circulation forecasts in the Aveiro lagoon
- Baroclinic circulation and water quality forecasts in the Tagus estuary and Formosa lagoon

SCHISM Unstructured grid numerical modeling systems

North Atlantic coastal circulation on-demand forecast.
Introduction to SCHISM

Semi-implicit Cross-scale Hydroscience 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

Source: http://ccrm.vims.edu/schismweb
Cross-scale simulation with SCHISM

Fonte: Prof. Joseph Zhang
The OPENCoastS service

• 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)
OPENCoastS: information requirements and global services available

- Uses WIFF - Water Information Forecast Framework
- Numerical modeling system SCHISM
- Developed to allow the use of other numerical models in the future
Thank you for your attention!

Questions?

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