Generation of operational forecasts on demand:

The OPENCoastS platform


eosc-hub.eu
@EOSC_eu

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

The OPENCoasts platform
  - Concept
  - Interface components
  - Examples

Summary and perspectives
Forecast systems

Forcings

Operational forecasts

Post-processing and archiving

Visualization and comparison with real-time data
The development requires mixed teams, with expertise in both numerical modeling and information technologies.

Significant effort for development and maintenance.

Redundancies are necessary to minimize failures.

Computational resources must be available every day.
Forecast systems: present challenges

- Develop forecast systems as a service
- Make it accessible to people with modeling expertise, but not necessarily IT experts
- Make the service flexible in the choice of forcings, processes and models (and their versions)
- Take advantage of available online data and model results
- Provide computational resources
- Manage output files generated daily
- Make the development quick and easy
A platform to:
- Implement forecast systems through a browser-based, user-friendly, interface
- Allow the choice of the processes, model and forcings
- Allow the replication and change of forecast systems
- Avoid the need of a large team to generate forecast systems
- Take advantage of the European Open Science Cloud (EOSC) to provide the required computational resources
The OPENCoastS platform: information requirements

- **OCEAN**
  - PRISM2017
  - FES2014
  - ...

- **ATMOSPHERE**
  - NOAA / GFS
  - ...

- **DATA**
  - EMODnet Physics
  - ...

© OPENCoastS
North Atlantic coastal circulation on-demand forecast

**USER**
- Grid
- Parameters
- ...

9/7/2018
1. **Configuration Assistant**
   - Guides the user through the generation of a forecast system
   - Provides guidance, detailed information and suggestions
   - Performs basic verifications
2. **Forecast manager**
   - Lists all present and past forecasts of the user
   - Allows viewing the forecast configurations, stopping and restarting forecasts, cloning forecasts, etc.
3. Outputs viewer
   - Provides access to the outputs files
   - Shows scalar and vector maps through a Web-GIS
   - Shows time series and data-model comparisons
Step 1: Select the model and the duration

This Configuration Assistant aims to set up a forecast system on demand in an area chosen by the user. In this step the user will choose the model to use and the daily forecast range. Presently, only version 5.4.0 of the SCHISM model is available.

Select a model (*): SCHISM, v5.4.0
Select a period (*): 48h
**Step 2: Upload and verify the grid**

**Configuration Assistant**

- **Upload Grid**
  - In this step, the user has to provide the computational and geographical domain of study. The user must also indicate a suitable coordinate reference system for the grid.

- **Select a horizontal grid (•)**: Browse...

- **Coordinate Reference System for the grid:**
  - EPSG:4326 / WGS84 / World Geodetic System 1984

- **Vertical reference of the grid:** or enter a vertical reference

- **Calculate a suggestion for the time step (ct):**

**Files**

- **File**: leieres II
- **EPSG**: 4326
- **Vert. Ref.**: 0.00m
- **Elements**: 115139
- **Nodes**: 58986
- **Boundaries**:
  - Open: 3; Land: 3; Island: 0

---

**9/7/2018**

- **Previous**
- **Restart step**
- **Next**
Step 3: Specify boundary conditions

In this step the user has to define the forcing sources for the ocean, river and atmospheric boundaries from the available options.

Select one or more boundaries and define their type and forcing condition:

<table>
<thead>
<tr>
<th>ID</th>
<th>Type</th>
<th>Forcing</th>
</tr>
</thead>
</table>

Select a forcing source to apply to all ocean boundaries:

- PRISMST - Portuguese Tide-Surge Model

Select an atmospheric forcing:

- GFS - Global Forecast System NCEP/NOAA
**Step 4: Define output stations**

In this step, the user selects the stations (virtual sensors) in which time series are extracted with full model resolution. These can be locations where real-time data is available, predefined comparison stations, or other places of interest (virtual stations).
Step 5: Define physical and numerical parameters
Step 6: Define space-dependent parameters

In this step the user can select some additional parameters of the model, by specifying values or uploading a file for spatial variability of the values.

Select one of the options:
- Customize value
- Upload file

Select a file: Browse... manning gr3
Generating a forecast system

Step 7: Review and submit

Configuration Assistant

Submit Forecast System

Confirm the selected configurations and activate the forecast system.

Summary

1. Model
   SCHISM, v5.4.0 (48h)
2. Domain
3. Boundaries
4. Stations
5. Parameters
6. Additional Data

Submit

Name (*)
Lagos_PRISM+GFS

Description:
Lagos and Douro grid, forced by PRISM2017 and GFS.

I Accept Terms and conditions of use

Activate System

9/7/2018
Example: flow in the Arade estuary
Example: flow, elevation and time series in the Aveiro lagoon
Example: tidal propagation in the Tagus estuary
Innovative platform to generate on-demand ocean forecasts is publicly available (opencoasts.nce.ingrid.pt)
Forcings (FES2014 and GFS) allow worldwide applications
Limited physics: 2D barotropic shallow water flows
3D baroclinic physics (SCHISM)
Improved viewer
Improved and extended NE Atlantic model for boundary conditions (PRISM2018)
Atmospheric forcings from METEO-FRANCE
Coupled wave-current model (SCHISM-WWM), including forcing by WW3
Perform 72 hour forecasts
Migrate to larger computational resources
Open code at the end of the project (2021)
This afternoon, from 18:00 to 19:00

Please register as an OPENCoastS user at https://opencoasts.ncg.ingrid.pt/

Please register for the course at https://docs.google.com/forms/d/e/1FAIpQLSeESZ0hi2Pea3WN9PblPD9hKyO_wL1ZiwG1zPGWFzMPuCqU8A/viewform

Bring your own triangular grid – limited to 150,000 nodes (or use one of ours)
Thank you for your attention!

Acknowledgments:
SCHISM (model)
GFS (atmospheric predictions)
FES2014 (tidal predictions)
EMODnet (tidal data)