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OPENCoastS: An open-access service for on-demand coastal predictions

Anabela Oliveira, J. Rogeiro, J. Teixeira, A. Azevedo, A. B. Fortunato, M. Rodrigues, P. Lopes (LNEC)
J. Gomes, M. David, J. Pina, J.P. Martins, S. Bernardo (LIP)
X. Bertin, L. Lavaud (CNRS/LR)
S. Castanedo, F. Mendez (UC)

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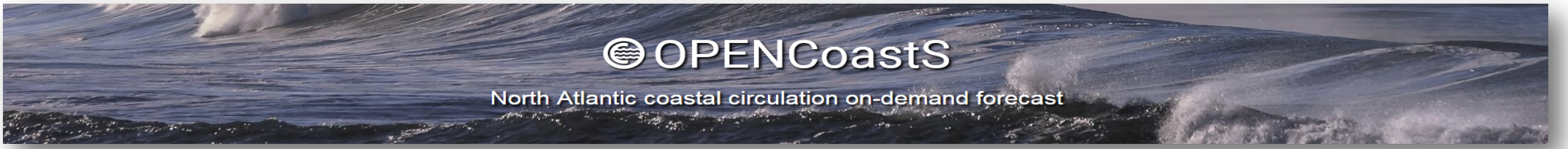
Water forecast systems: concept and context

Forcings → Operational forecasts → Post-processing, archiving and visualization of the results → Comparison with real-time data

- Daily service generates 48 h forecasts of water variables
- Web interface provides access to model predictions and field data

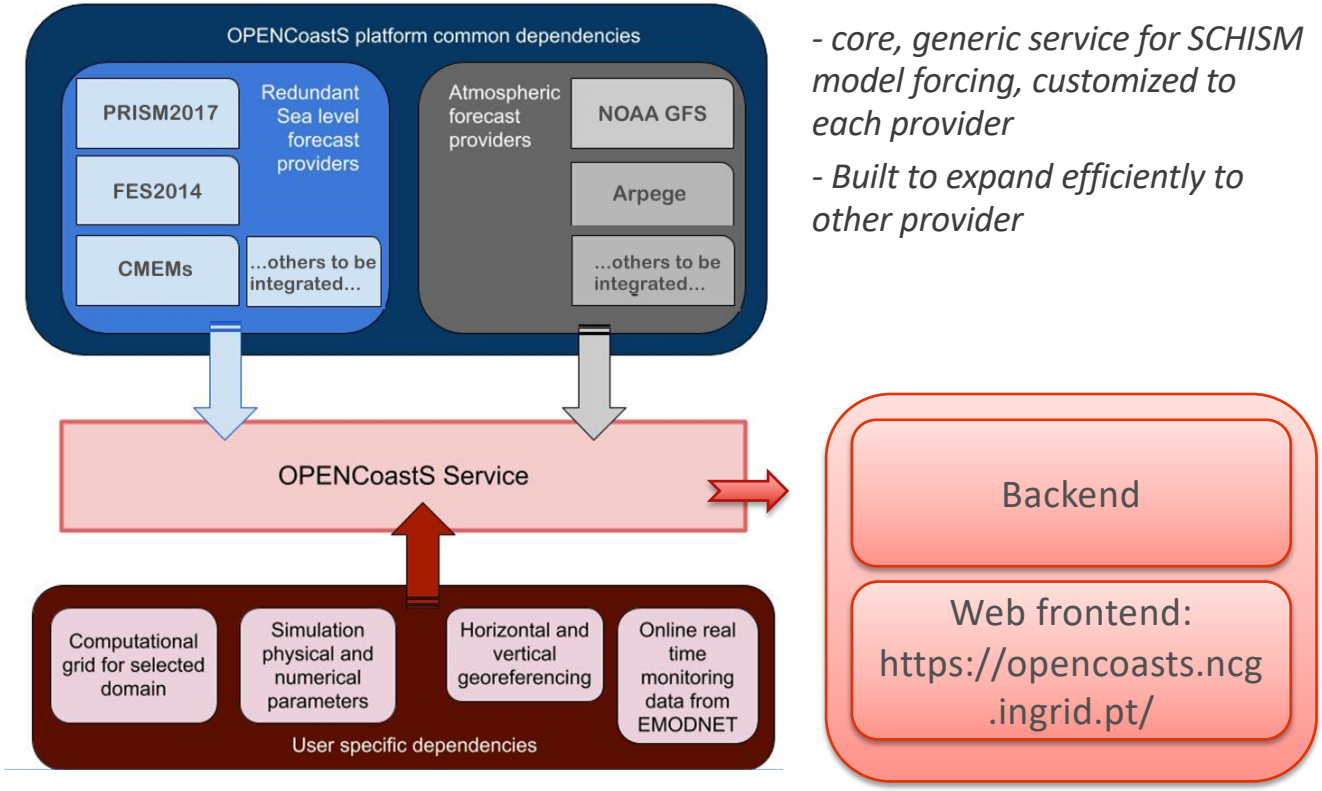
- Antecipate hazard situations and support emergency
- Guide management decisions to minimize risk
- Support water economy daily tasks as well as leisure and recreation

The OPENCoastS service: concept



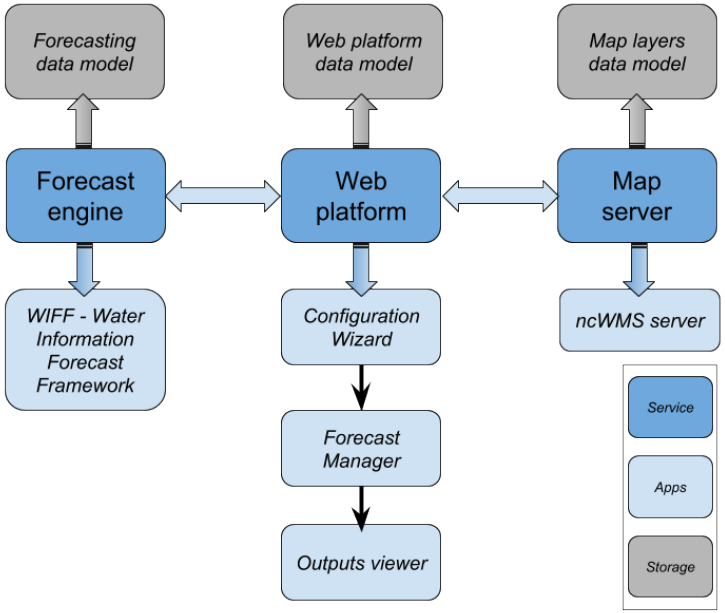
- *A service to:*
  - *Implement forecast systems for a system chosen by the user, using a browser-based, user-friendly, interface*
  - *Make the service flexible in its configuration (forcings, processes and models)*
  - *Allow multiple actions over forecast systems (configure, manage, view results)*
  - *Take advantage of the European Open Science Cloud (EOSC) to provide the required computational resources*

The OPENCoastS platform: architecture and interfaces, integrated with multiple European and Worldwide services



- core, generic service for SCHISM model forcing, customized to each provider

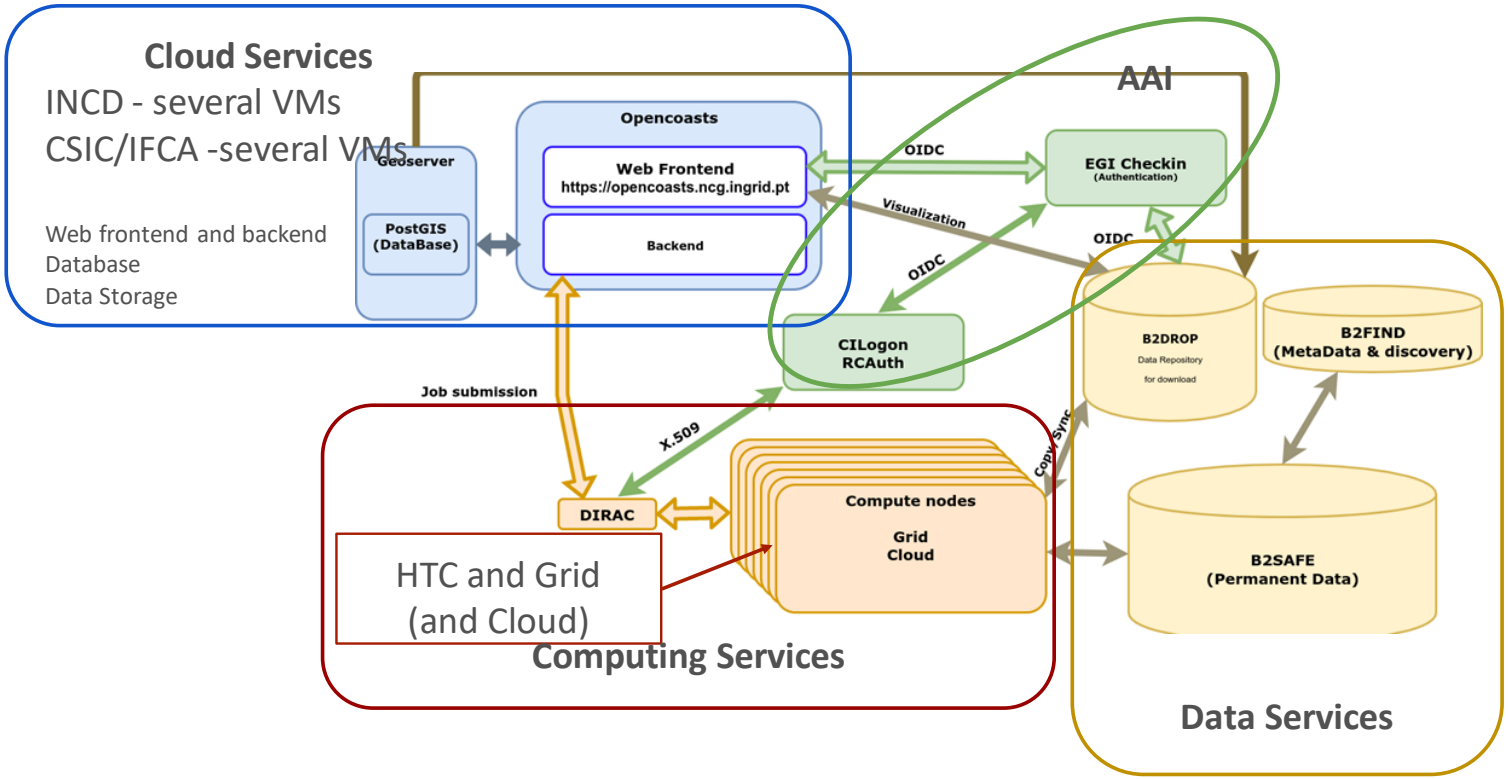
- Built to expand efficiently to other provider



- Need for CPU and storage resources on all 3 services: forecast, web and map server

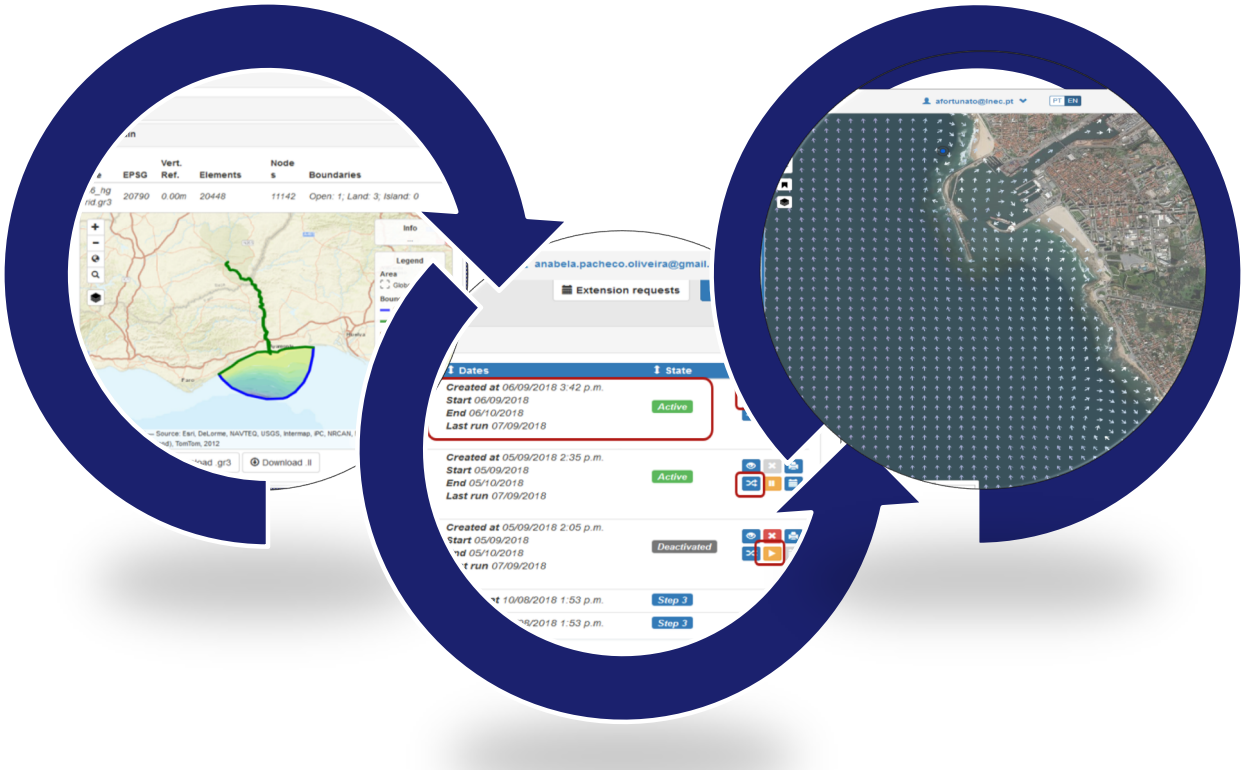
The OPENCoastS platform: integration with EOSC-hub core services

- *Authentication and Authorization:*
  - *EGI check-in (OpenIDConnect) - front-end*
  - *CILogon/RCAuth - X.509 for Computing Elements and DIRAC (robot certificates)*
- *Cloud computing:*
  - *INCD OpenStack cloud integrated in the EGI Fedcloud*
  - *CSIC/IFCA OpenStack cloud integrated in the EGI Fedcloud*
  - *Housing the front-end, back-end and Geo-processing*
  - *Data management: Nextcloud*
  - *Additional cpu for the simulations.*
- *EGI High Throughput Compute service:*
  - *Provides additional computing capacity*
  - *Using Computing Elements (batch clusters) for simulation*
  - *Brokering of compute tasks via DIRAC*
- *EUDAT data management services*
  - *B2Drop: input data, simulation output datasets, visualization.*
  - *B2Safe: permanent storage.*



Web interface: 3 Building blocks

- *Configuration assistant: building a deployment step by step*

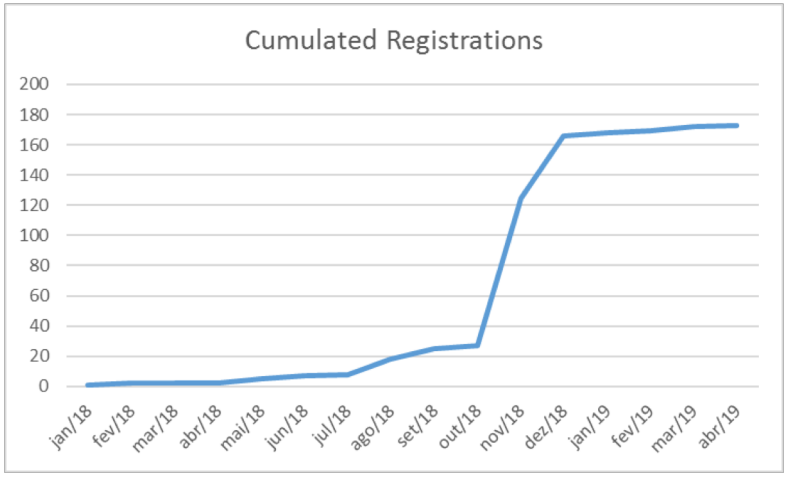


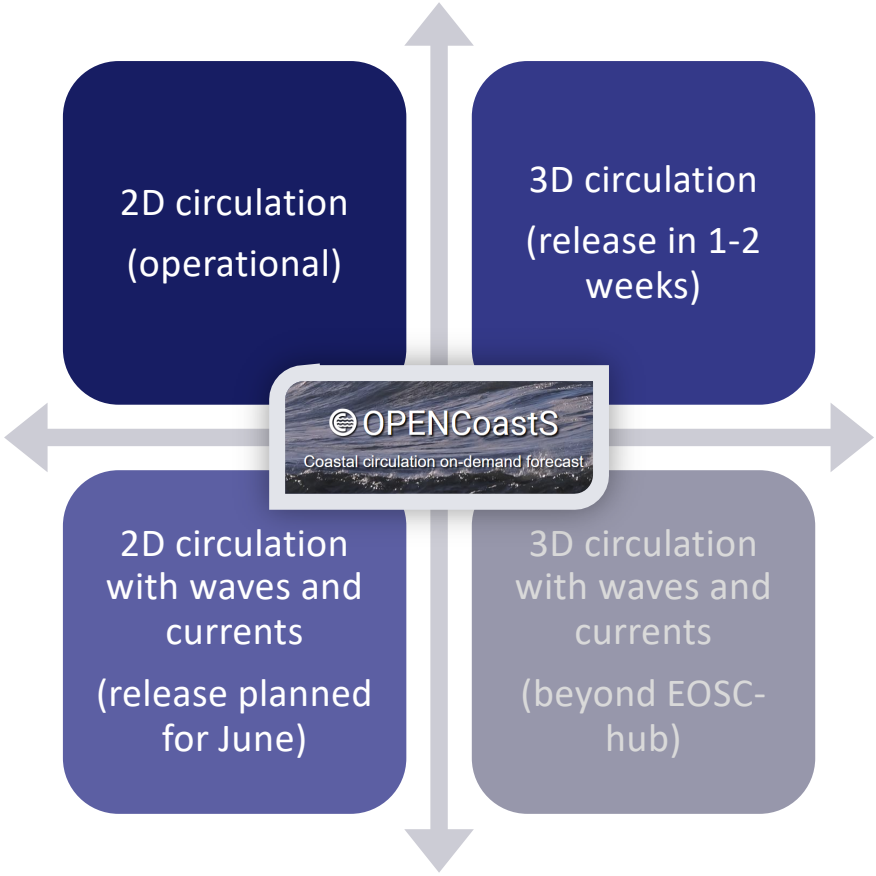
- *Outputs viewer – visualize results:*
  - *Adding data/model points on the fly*
  - *Saving time series and model outputs in your PC*
  - *Compare time series from several deployments*

- *Forecast manager – what can we do with our forecasts: check status, check details, clone it, freeze/restart it, delete it,…*

The 4 dimensions of OPENCOastS: Applicable to multiple uses

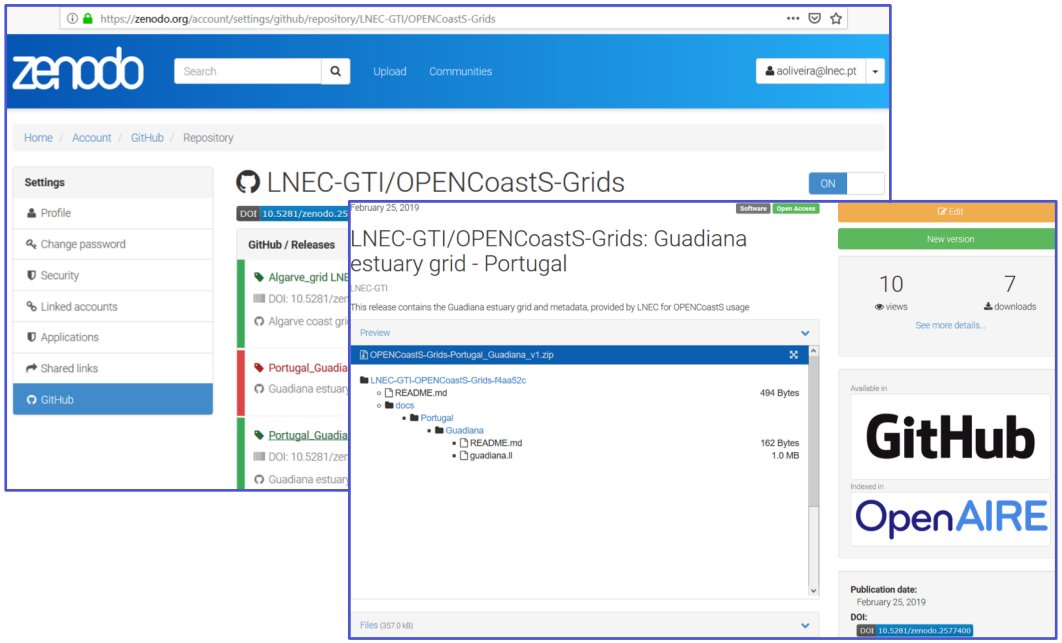
- One model (SCHISM), multiple *flavours* for distinct needs, multiple infrastructure needs
- 2D OPENCoastS figures:
  - In operation inside EOSC-hub for the past 10 months
  - 174 users
  - 133 deployments
  - 2 training events

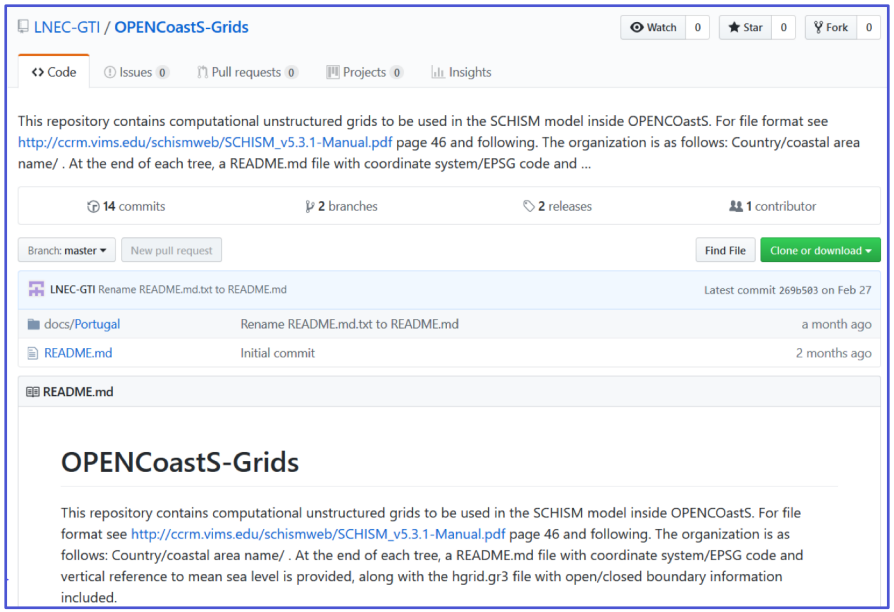




An open data repository for OPENCoastS

- Current limitation:
  - the vast majority of users are from the research community
  - Availability of computational grid limits the coastal managers' use

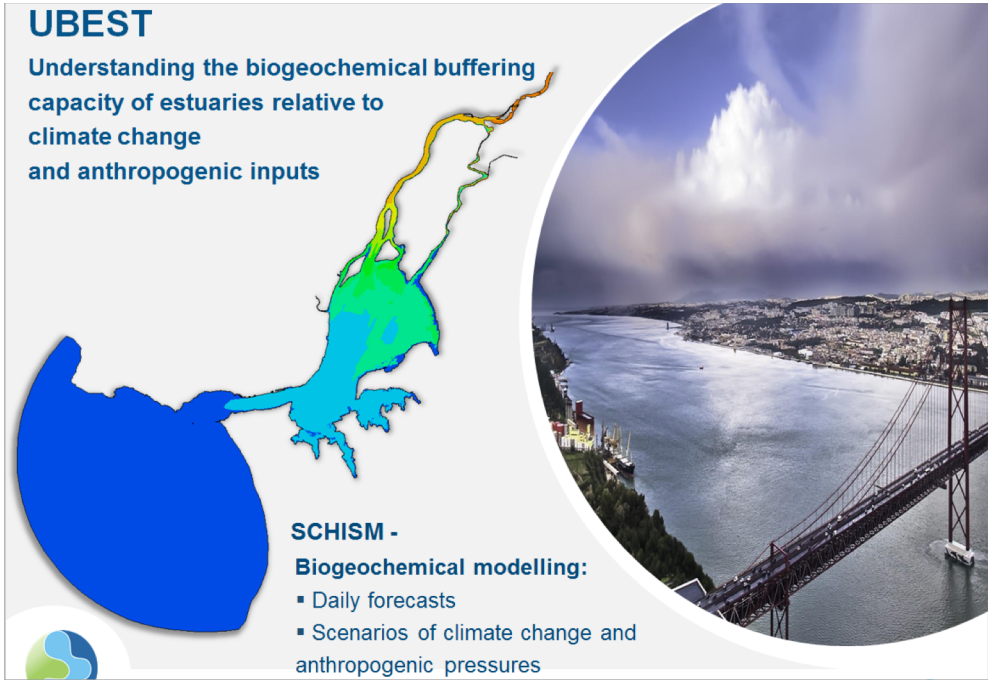




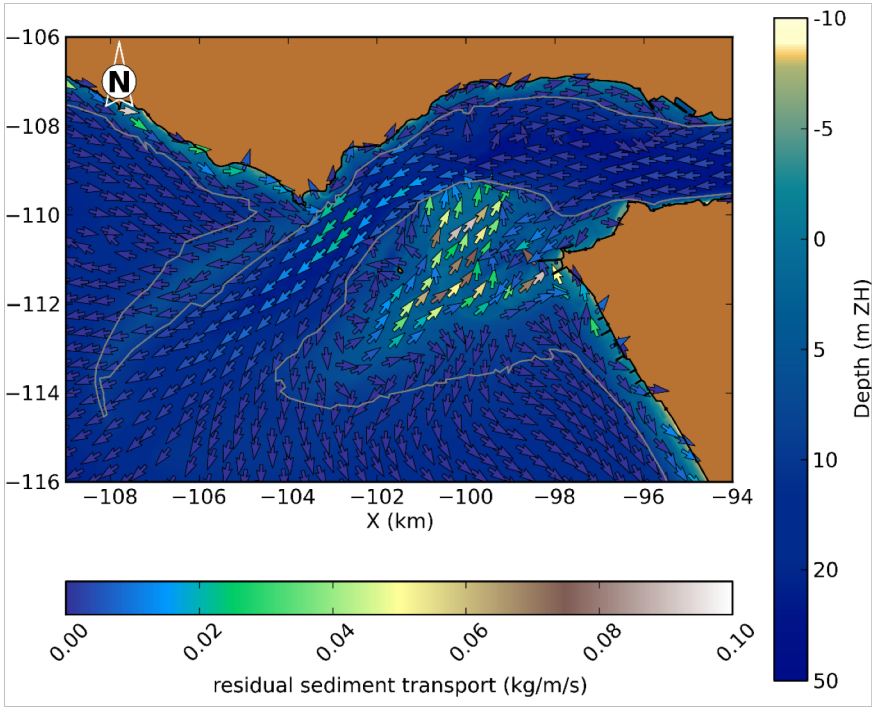
- Strategy:
  - to build a open repository for hosting computational grids
  - This repository is linked to Zenodo to provide a DOI to each shared grid

Earth science applications and EOSC: beyond OPENCoastS

- Climate Change & Biogeochemical studies

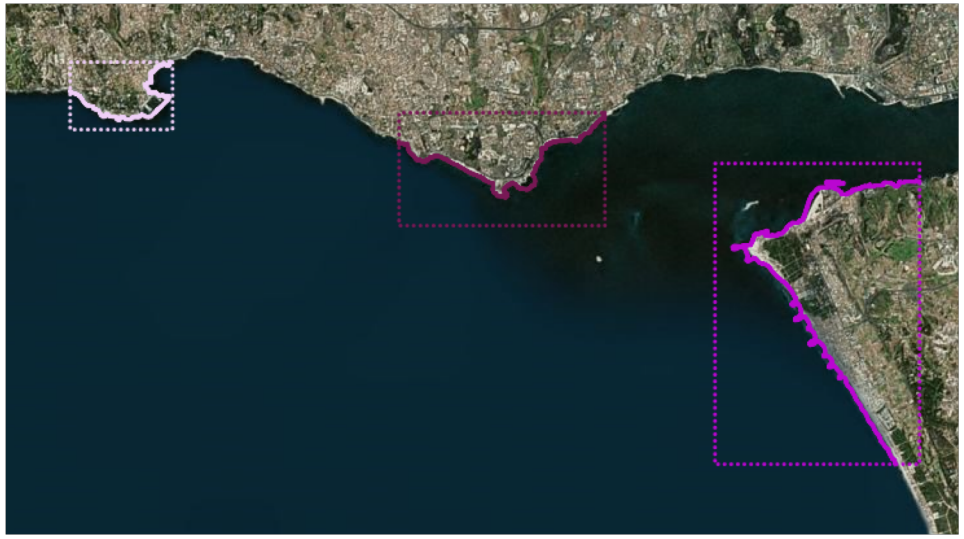


- Simulating inlet morphodynamics



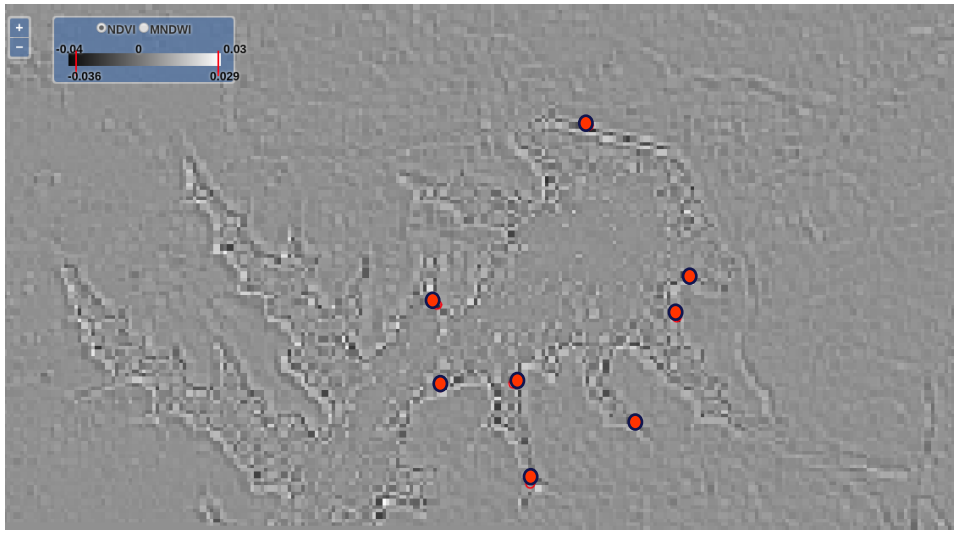
Earth science applications and EOSC: beyond OPENCoastS

- Remote sensing applications based on Sentinel images



Automatic detection of inundation areas

Automatic detection of water leaks in large water distribution networks



Thank you
for your attention!

Questions?

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