LAMBDA PROJECT (λ) – Land-Marine Boundary Development & Analysis

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CoLAB +ATLANTIC

EMODnet Open Conference 14-16 June 2021

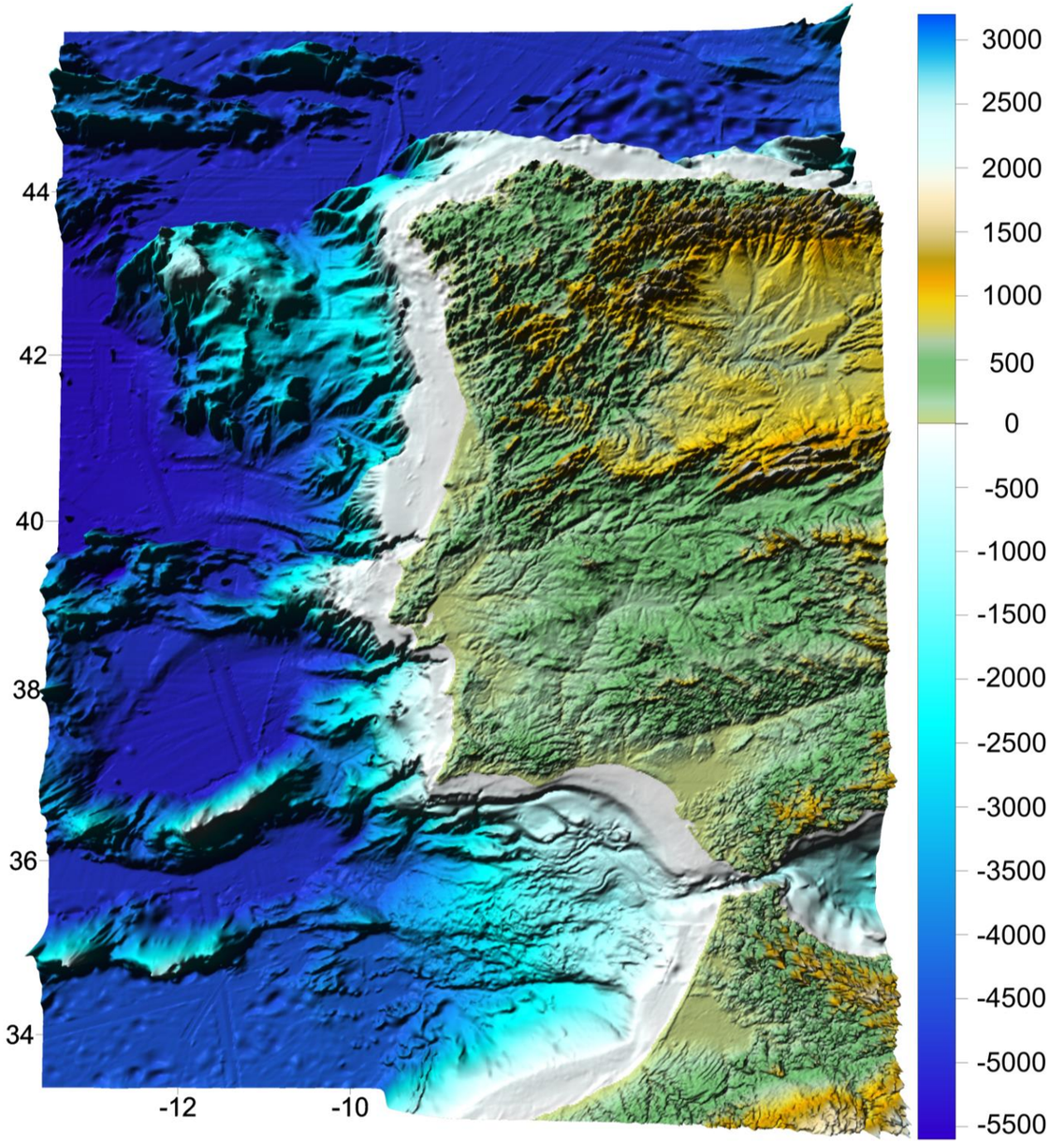
+ A paradigm shift

Integrated water cycle approach

The main objective of the present research was to **develop a methodology** and to explore the capacity to **improve** the thermohaline circulation in regional ocean model applications by a better characterisation of the **land-ocean boundary conditions** able to represent the salinity features described for the Western Iberia region.

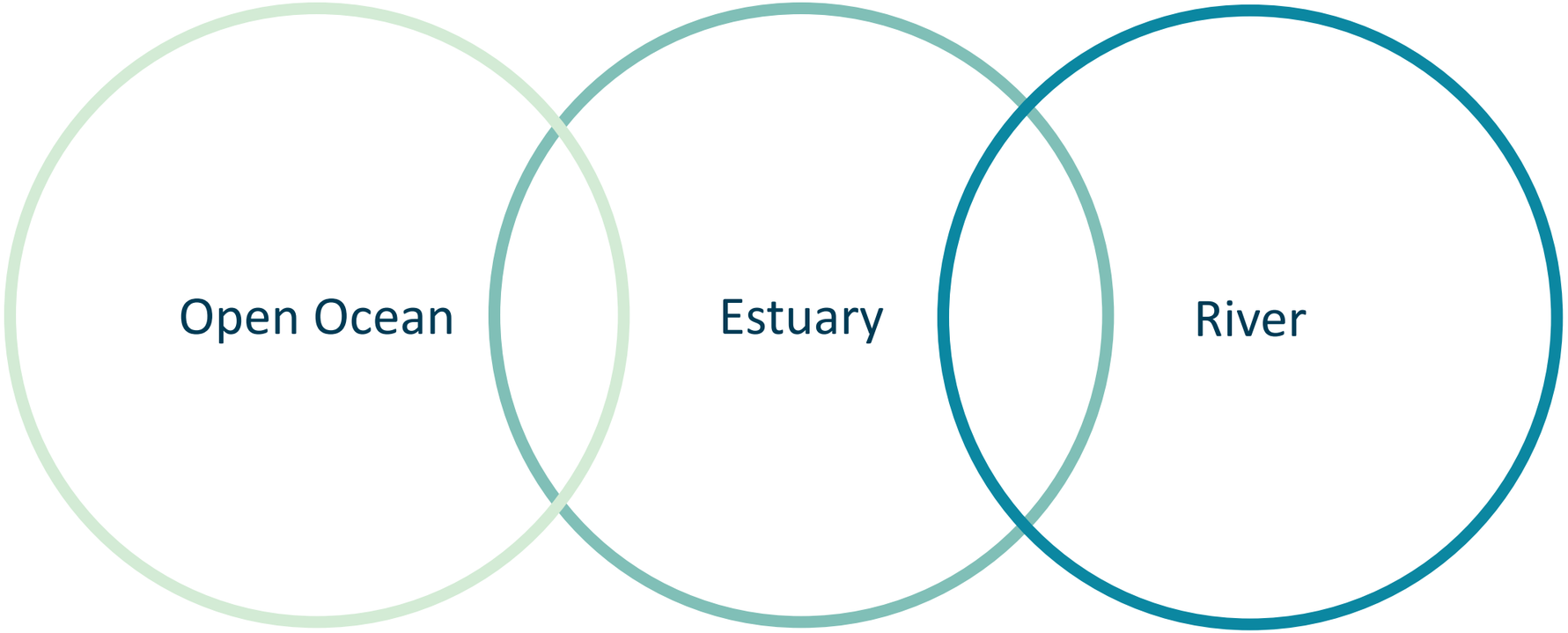
Main Challenges:

- Obtain data near the river mouth;
- How to impose those inputs in regional ocean models;
- How to validate the results.



+ WATER CONTINUUM conceptual diagram

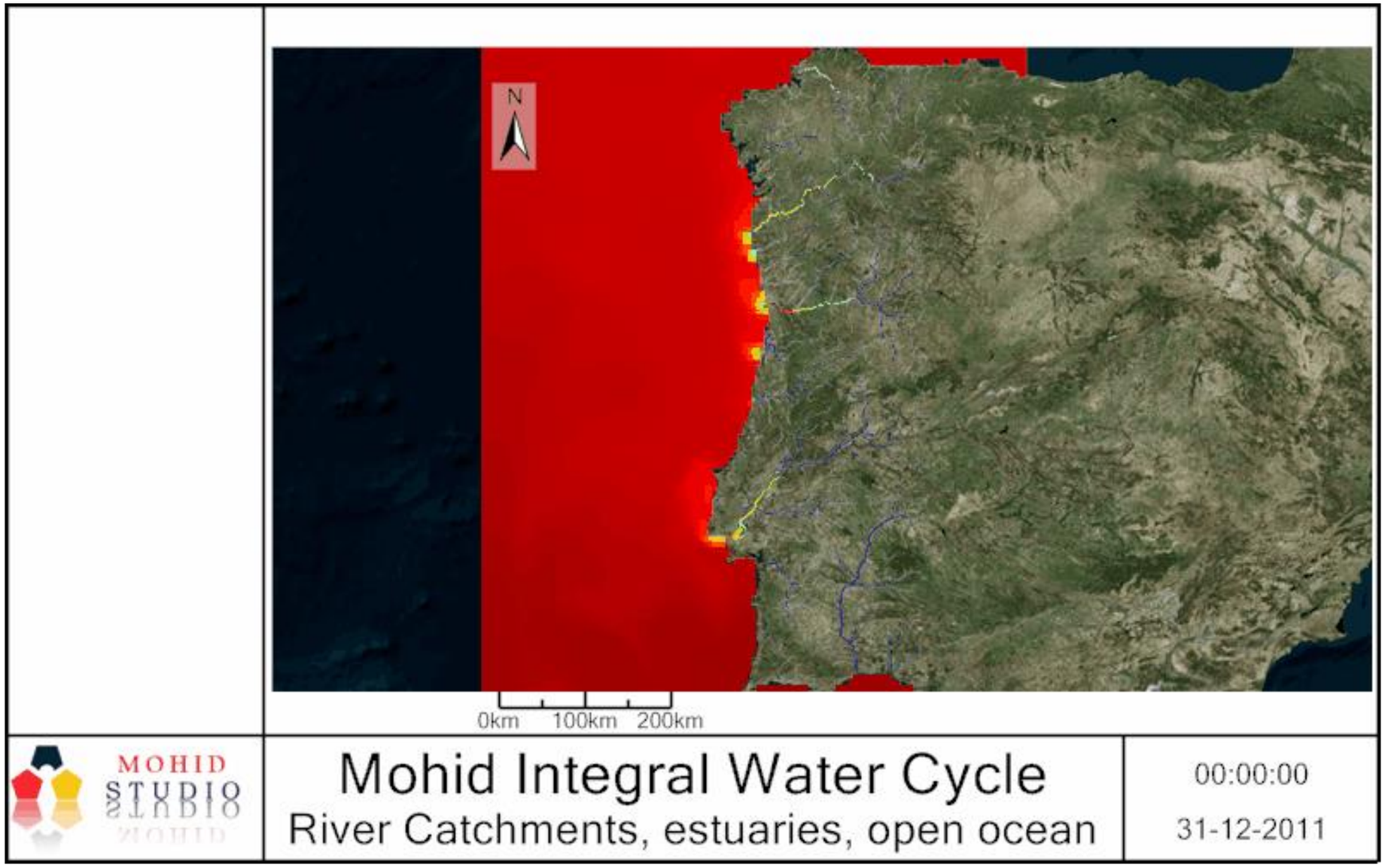
Coping with Water continuum interfaces



Complete description at:

Campuzano F (2018). Coupling watersheds, estuaries and regional seas through numerical modelling for Western Iberia. PhD Thesis, Instituto Superior Técnico, Universidade de Lisboa, Portugal.

+MOHID Integral Water Cycle in the Portuguese continental coast



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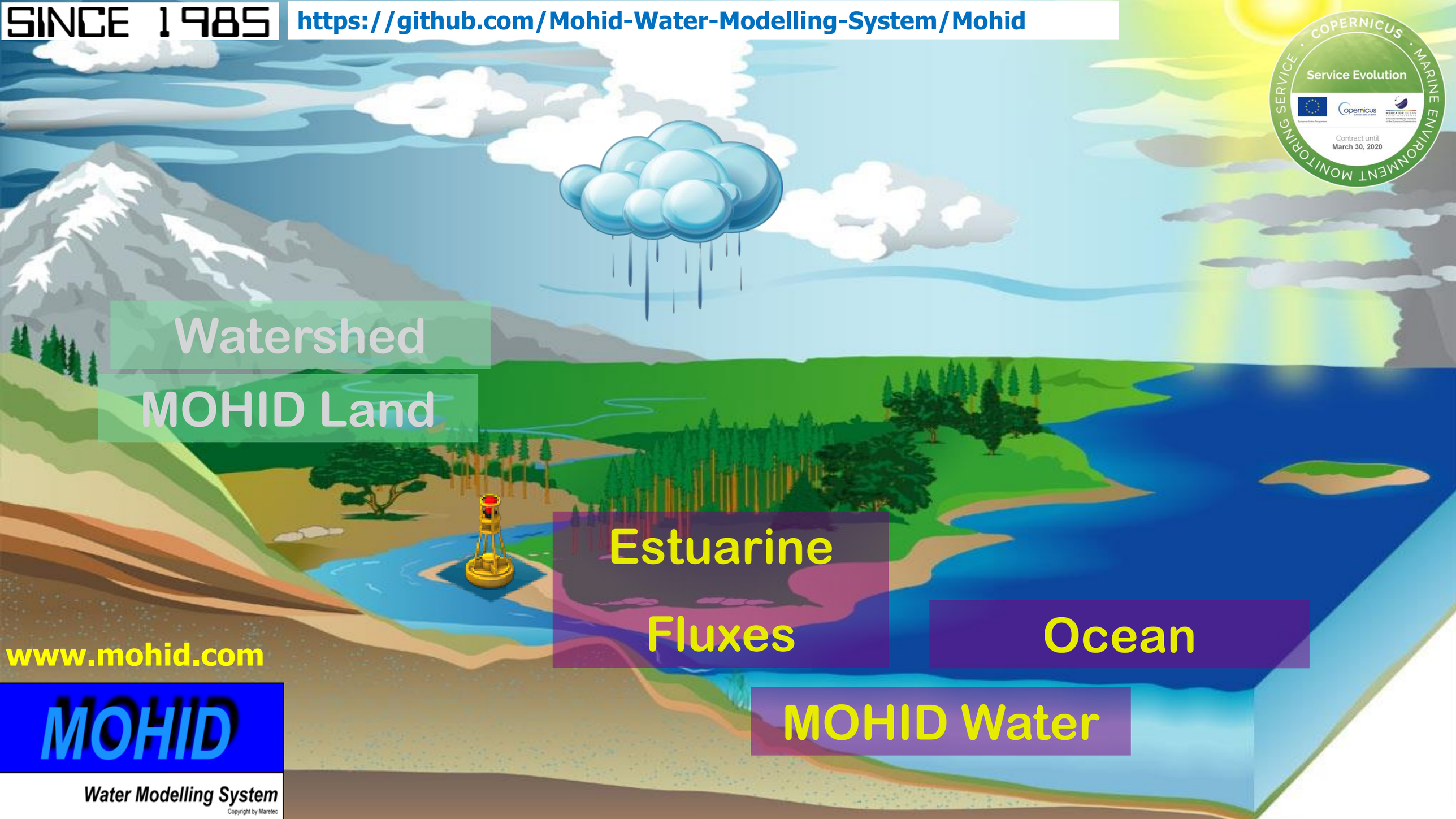
Service Evolution
Contract until
March 30, 2020

SINCE 1985

https://github.com/Mohid-Water-Modelling-System/Mohid



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www.mohid.com

MOHID

Water Modelling System

Copyright by Maretec

+Watershed Modelling Setup

Estuarine, Coastal and Shelf Science
Volume 167, Part A, 20 December 2015, Pages 138–146
Coastal systems under change: tuning assessment and management tools

Integrating operational watershed and coastal models for the Iberian Coast: Watershed model implementation – A first approach

David Brito, F.J. Campuzano, J. Sobrinho, R. Fernandes, R. Neves

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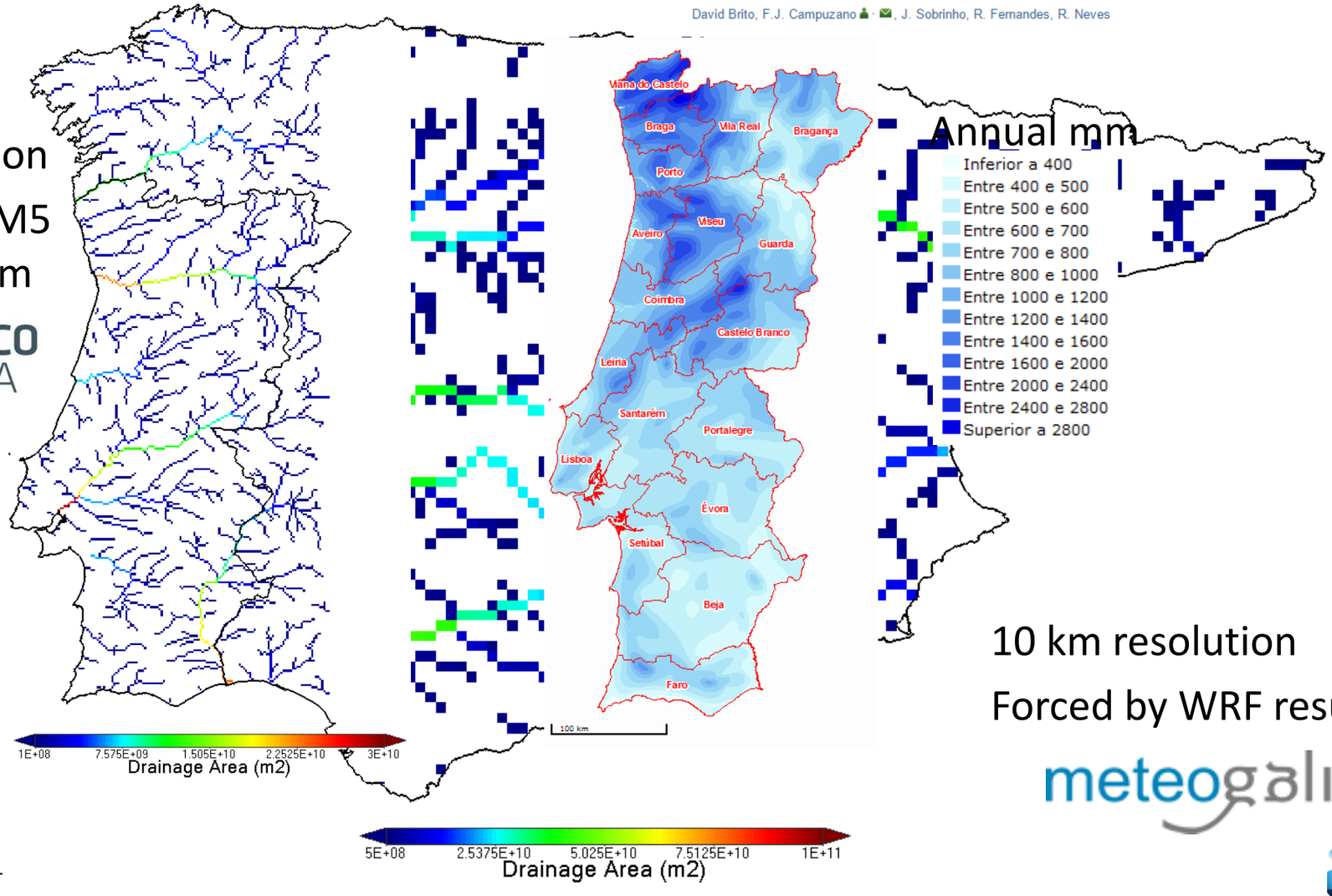
2 km resolution

Forced by MM5 results from

TÉCNICO LISBOA



Annual mm

- Inferior a 400
- Entre 400 e 500
- Entre 500 e 600
- Entre 600 e 700
- Entre 700 e 800
- Entre 800 e 1000
- Entre 1000 e 1200
- Entre 1200 e 1400
- Entre 1400 e 1600
- Entre 1600 e 2000
- Entre 2000 e 2400
- Entre 2400 e 2800
- Superior a 2800

10 km resolution

Forced by WRF results from

meteogalicia

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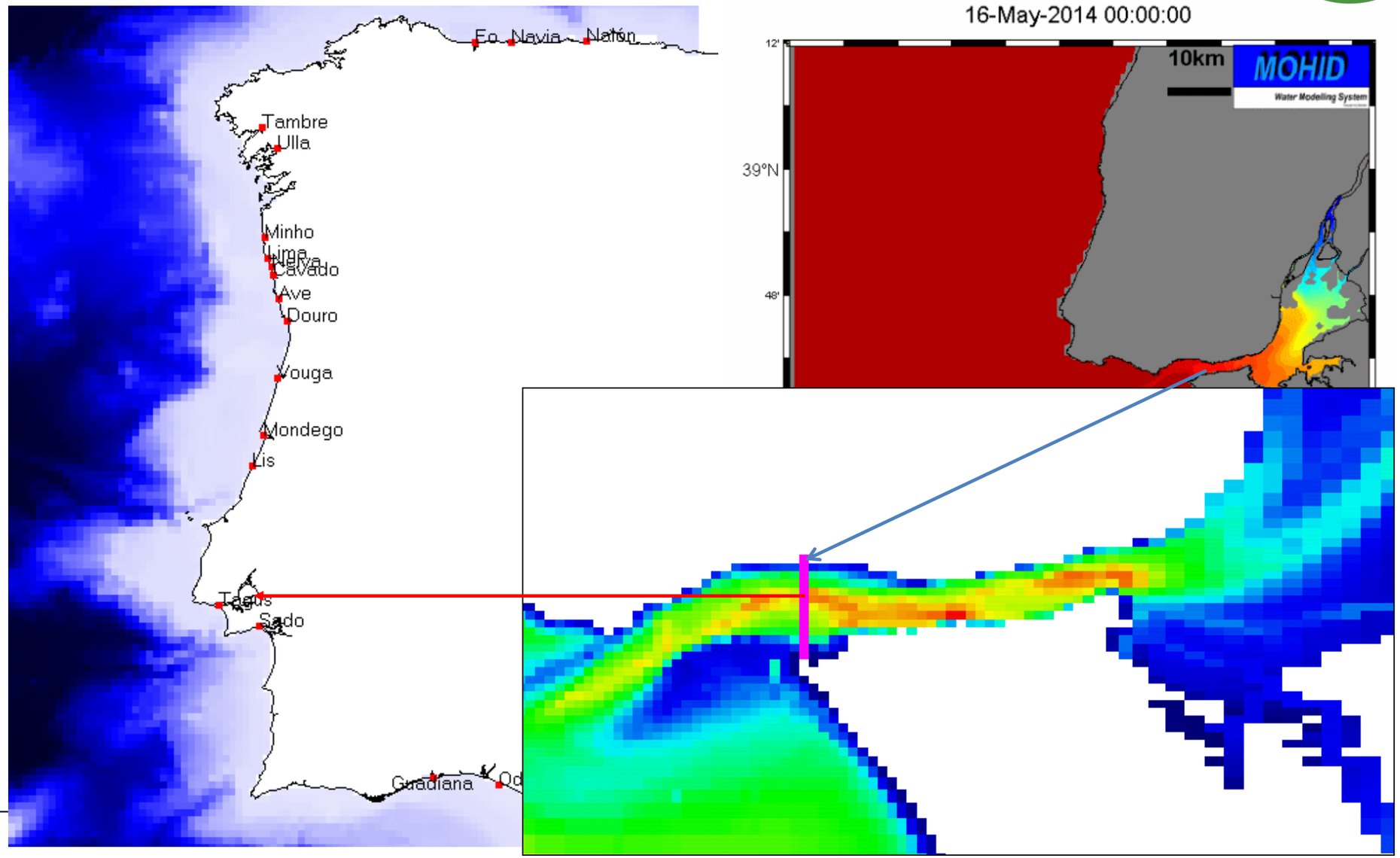
+RIVER-ESTUARY-OCEAN COUPLING

Estuaries are very dynamic areas with influence from tides, river inputs and the open ocean conditions. Due to the tide, and their cycles, their discharges vary in time from ebb to flow and varying from spring to neap tides.



Complete description at:

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MOHID Water

Estuarine Proxy

OCEAN INPUTS

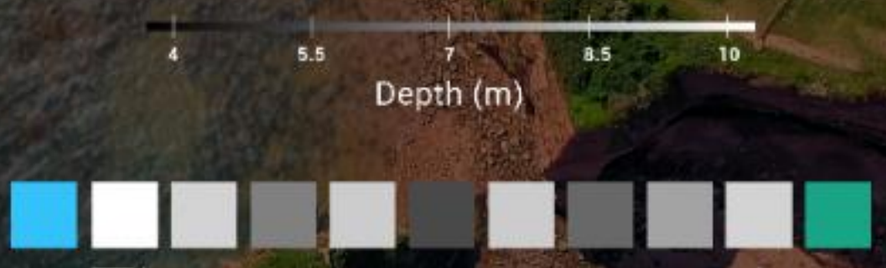
Tides and ocean water properties

FES2014

Tides

PCOMS

Timeseries of ocean salinity and temperature



Outer estuarine cell & outputs

- Water salinity
- Temperature
- Flow
- Velocity
- Oxygen
- Nutrients

LAND INPUTS

River flow and temperature

MOHID Land

Modelled flow +
Modelled Temperature +
Salinity constant 0.01

Observations

Observed flow +
Modelled Temperature +
Salinity constant 0.01

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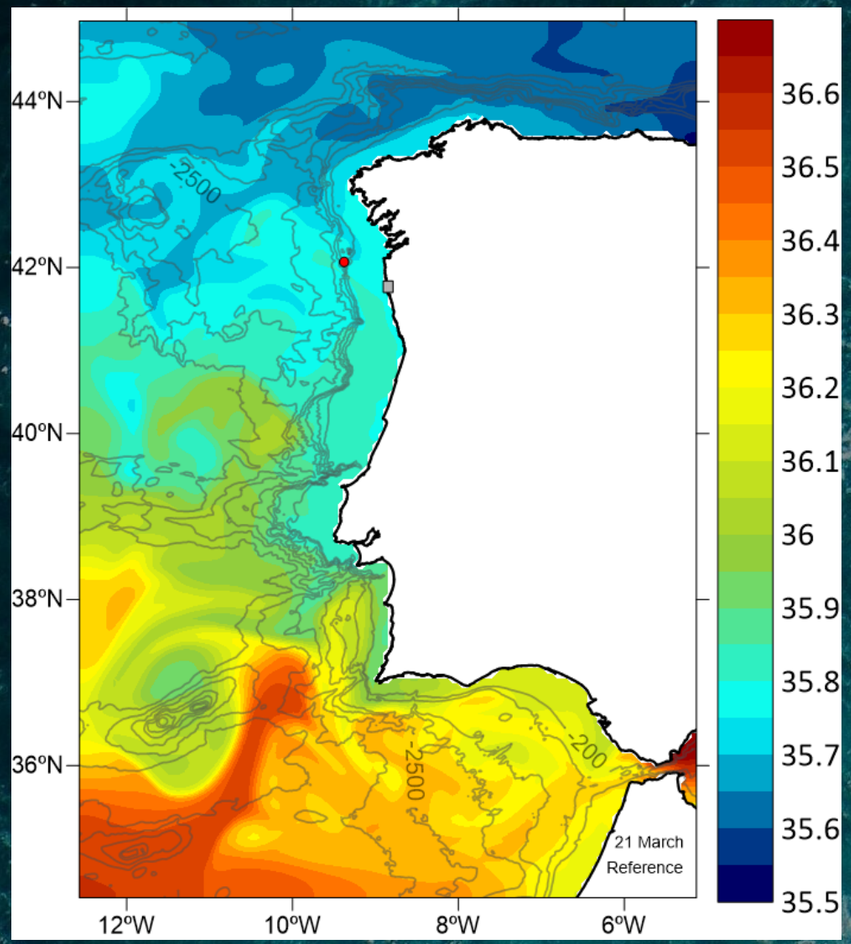
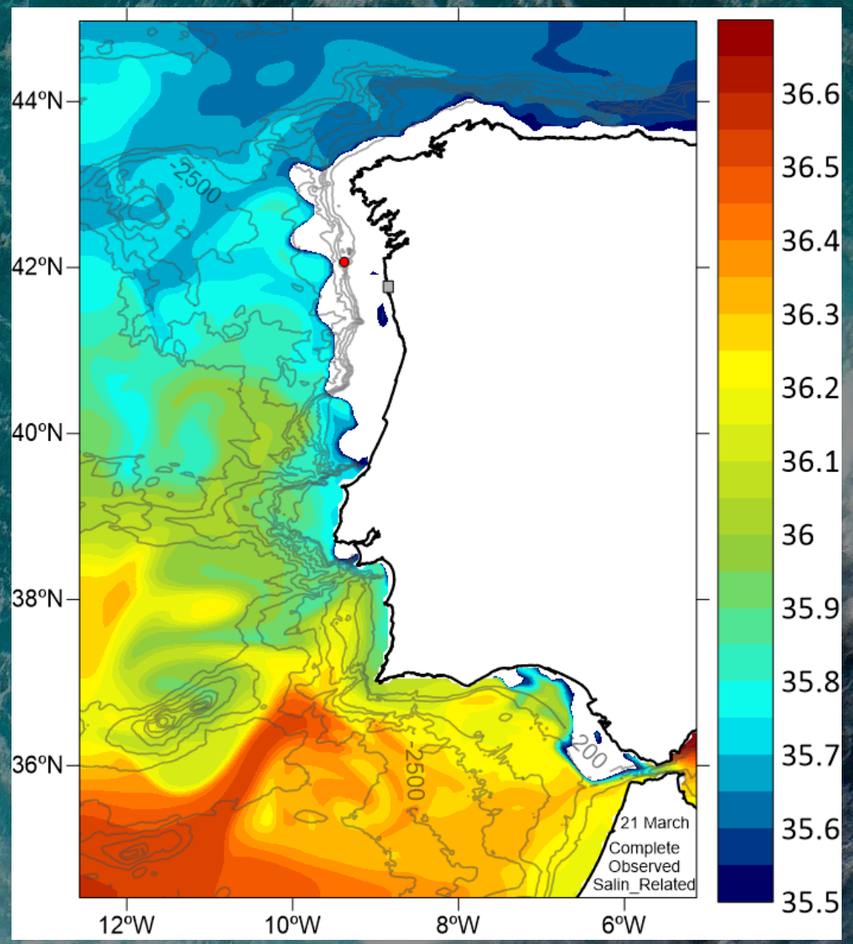
+ Fresh Water Influence

Large rain event in late March 2018





+Benefits for users

- ✓Generated improved and standardised freshwater flows and associated river inputs;
- ✓Explored the capacity of hydrological models to represent observed river outflows by implementing state-of-the-art models;
- ✓An estuarine proxy based on MOHID WATER was designed allowing to estimate in a simple way the estuarine mixing and the contributions to the open ocean;
- ✓Enhanced the development of satellite salinity products to improve the quality of coastal products;
- ✓A one-stop-shop was designed to access to the developed products and user interface to work and interact with the **CMEMS** and **EMODnet** products.

Thank you so much for your attention!

Questions?

Stay in touch: francisco.campuzano@colabatlantic.com

More info at http://www.cmems-lambda.eu/