

IMUM 2018

17th International workshop on Multi-scale
(Un)-structured mesh numerical Modeling
for coastal, shelf, and global ocean dynamics

September 11th to 14th, 2018
Max Planck Institute for Meteorology
Hamburg, Germany



Generation of operational forecasts on demand:

The OPENCoastS platform hands-on course

A. Oliveira and A.B. Fortunato

LNEC – National Laboratory for Civil
Engineering



eosc-hub.eu



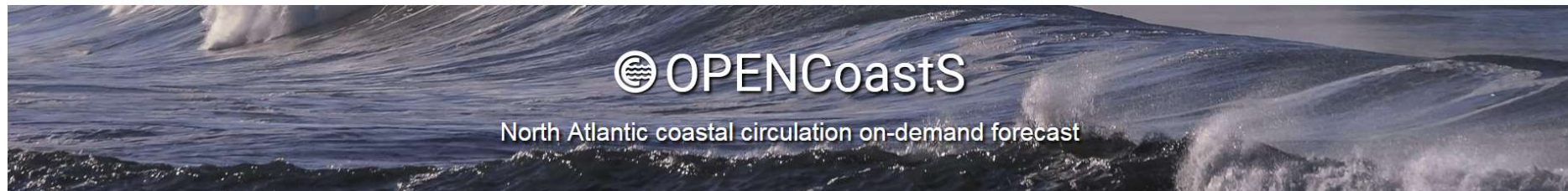
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EOSC-hub receives funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No. 777536.

- *Goals: What should you know at the end of the course*
- *Service access, registration, users manual and everything you need to get to the “pole position”*
- *The OPENCoasts platform hands-on tutorial*
 - *Configuration assistant step by step*
 - *Forecast manager – what can we do*
 - *Outputs Viewer and more*
- *Where are we going from here: our plans and your suggestions*

- *What is OPENCoastS?*
- *What do I need to use OPENCoastS?*
- *How do I use this platform?*
- *Are there limits on the forecasts? Are they confidential?*
- *What resources are included in EOSC-HUB project*
- *(I liked this platform and I would like to help the development team by ...proposing new features, evaluate new versions, contribute with my data/forcing models,...)*

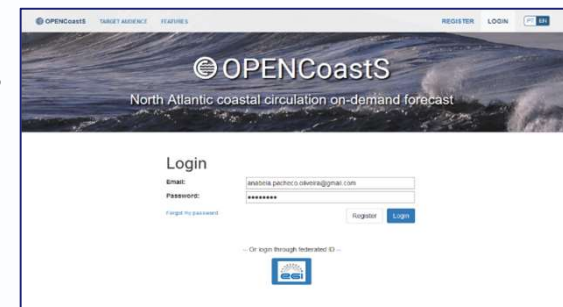
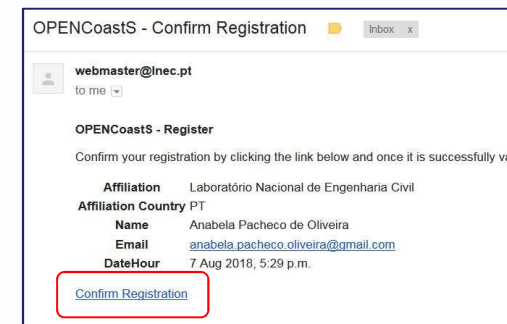


● A platform to:

- Implement forecast systems for a system chosen by the user, using 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 (EOSC-hub project)

Everything you need to get to the pole position (1)

- First, you need to register at
 - <https://opencoasts.ncg.ingrid.pt/register/>
 - After filling in the info (confidential, not be shared, anonymous, only used to compute resources usage/country)
- Then you will get an email acknowledging your registration request that you need to confirm through the provided [link](#) (so we know you are not a computer...)
- After your confirmation, an email is sent granting the access to the service. From that point onward, the user can login and start using the OPENCoastS service.



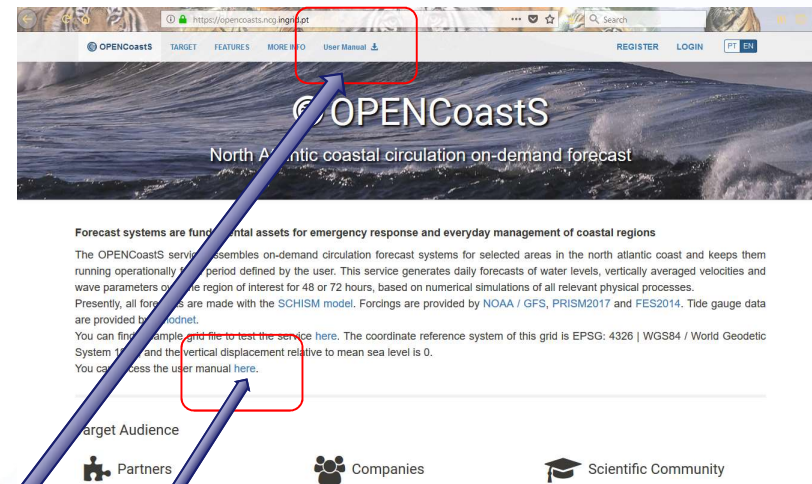
● Where can I get more information on this tool?

- Access the OPENCoastS service project information at:

http://opencoasts.lnec.pt/index_en.php






- Learn more about the EOSC-Hub project at:

<https://eosc-hub.eu/>



● Is there a users manual?

- Yes: https://opencoasts.ncg.ingrid.pt/static/OPENCoastS_manual.pdf
- If you have additional questions or suggestions email us: aoliveira@lnec.pt

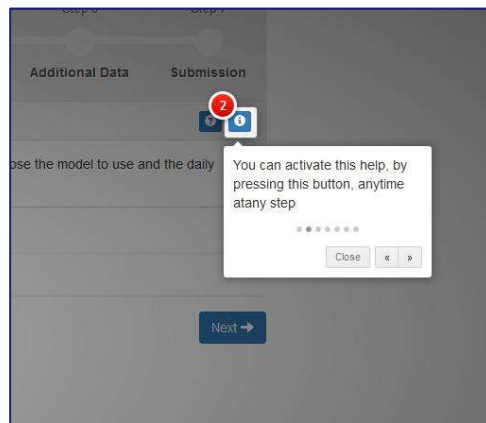
- Login at <https://opencoasts.ncg.ingrid.pt/>
- Configuration assistant step by step
 - Step 1: Select the model and the duration
 - Step 2: Upload and verify the grid  - time to answer questions
 - Step 3: Specify boundary conditions 
 - Step 4: Define output stations 
 - Step 5: Define physical and numerical parameters
 - Step 6: Define space-dependent parameters 
 - Step 7: Review and submit 

• First time usage:

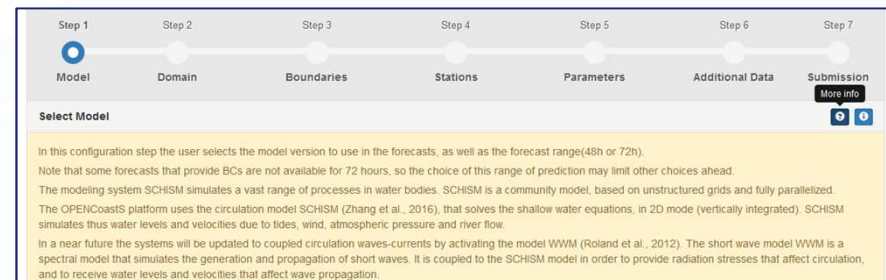
- Accept usage conditions
- guided tour on the configuration assistant is proposed (to skip it, just hit “close”)
- Help always present:



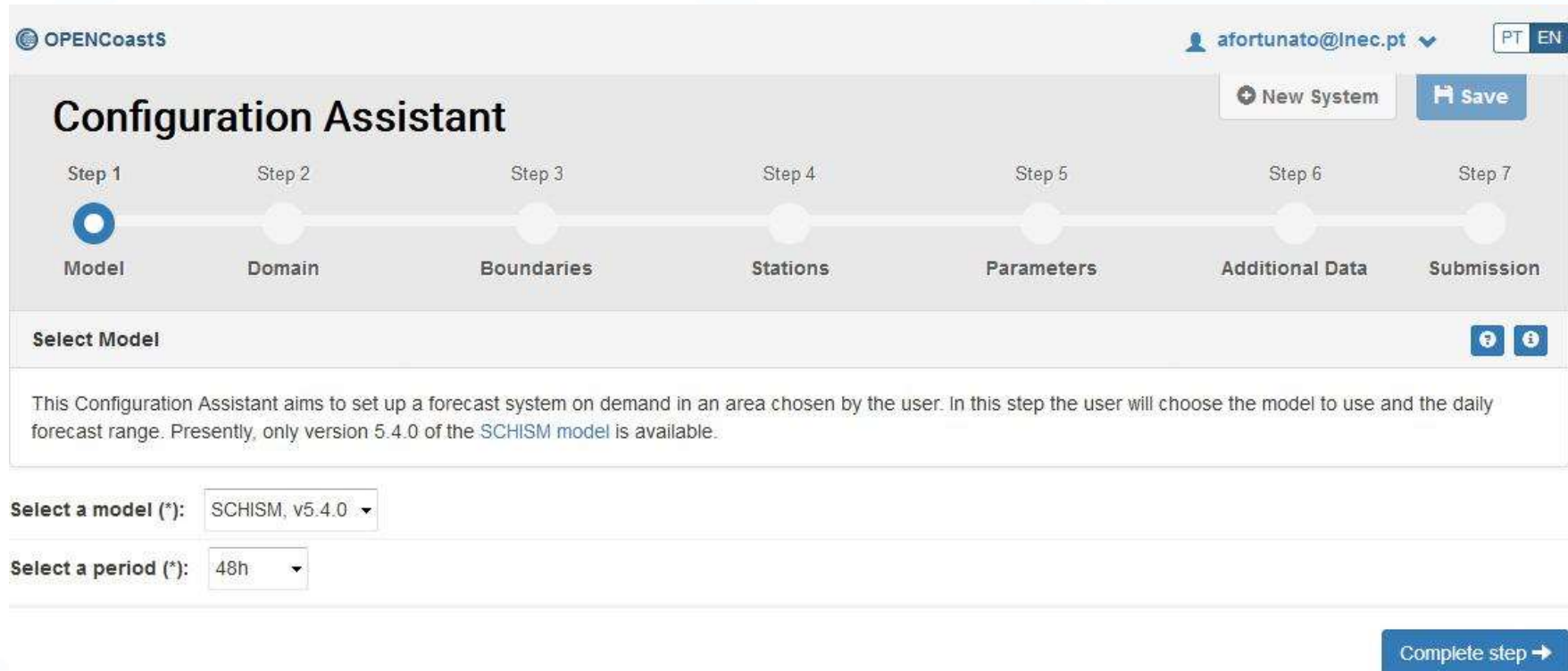
button



button



- *Step 1: Select the model and the duration*



OPENCoastS

afortunato@lnec.pt PT EN

Configuration Assistant

+ New System Save

Step 1 Step 2 Step 3 Step 4 Step 5 Step 6 Step 7

Model Domain Boundaries Stations Parameters Additional Data Submission

Select Model

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.

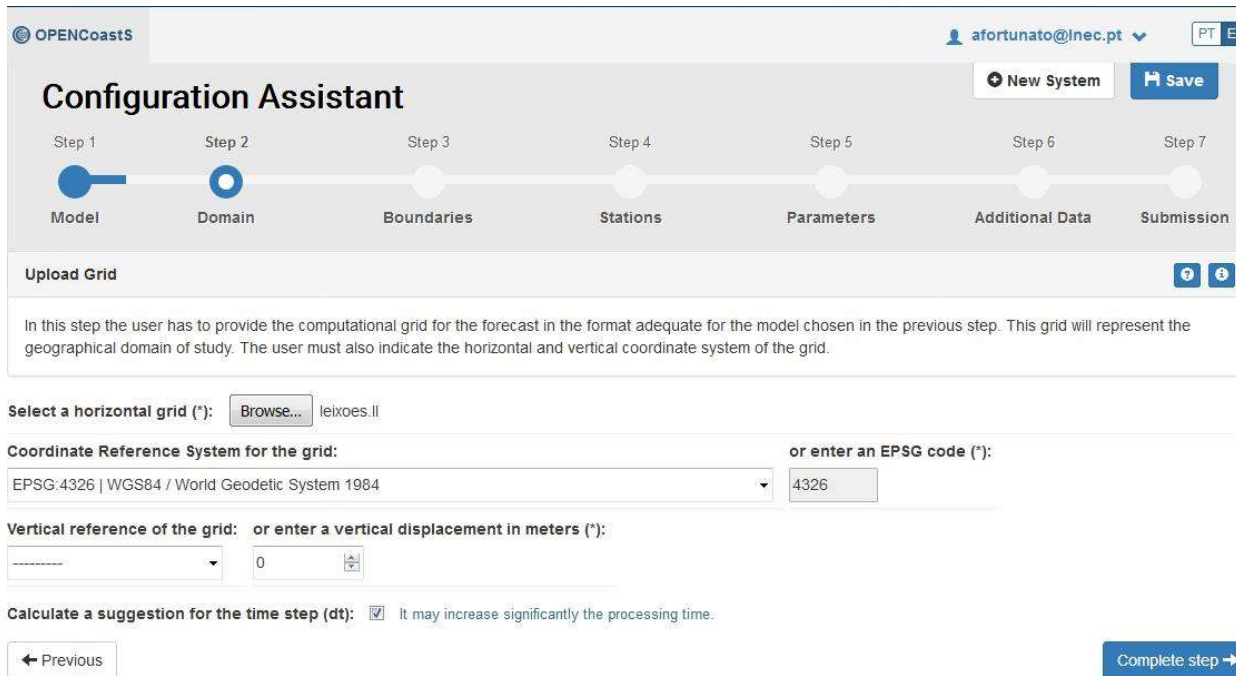
Select a model (*): SCHISM, v5.4.0

Select a period (*): 48h

Complete step →

- *Only one option for the model (and its version) – other versions and other models are planned*
- *Extension to 72 h also planned*
- *After, just hit “Complete step” and a new deployment is created*

Step 2: Upload and verify the grid



The screenshot shows the 'Configuration Assistant' interface for 'OPENCoastS'. At the top, there's a user profile 'afortunato@lnec.pt' and language options 'PT' and 'EN'. Below the title, there's a progress bar with seven steps: Step 1 (Model), Step 2 (Domain), Step 3 (Boundaries), Step 4 (Stations), Step 5 (Parameters), Step 6 (Additional Data), and Step 7 (Submission). Step 2 is currently active. The main section is titled 'Upload Grid' and contains instructions: 'In this step the user has to provide the computational grid for the forecast in the format adequate for the model chosen in the previous step. This grid will represent the geographical domain of study. The user must also indicate the horizontal and vertical coordinate system of the grid.' Below this, there are input fields for 'Select a horizontal grid (*)' (with a 'Browse...' button and 'leixoes.il' entered), 'Coordinate Reference System for the grid:' (a dropdown menu showing 'EPSG:4326 | WGS84 / World Geodetic System 1984'), and 'or enter an EPSG code (*)' (a text box with '4326' entered). There's also a 'Vertical reference of the grid:' section with a dropdown menu and a text box for 'or enter a vertical displacement in meters (*)' (with '0' entered). At the bottom, there's a checkbox for 'Calculate a suggestion for the time step (dt):' which is checked, with a note 'It may increase significantly the processing time.' Below this are two buttons: 'Previous' and 'Complete step'.

- Grid format
SCHISM/SELF/ADCIRC
- WGS84 is the simplest format if you have trouble finding your grid's EPSG/coordinate system
- Vertical reference: we run the forecasts at MSL; this info is needed for model/data comparison

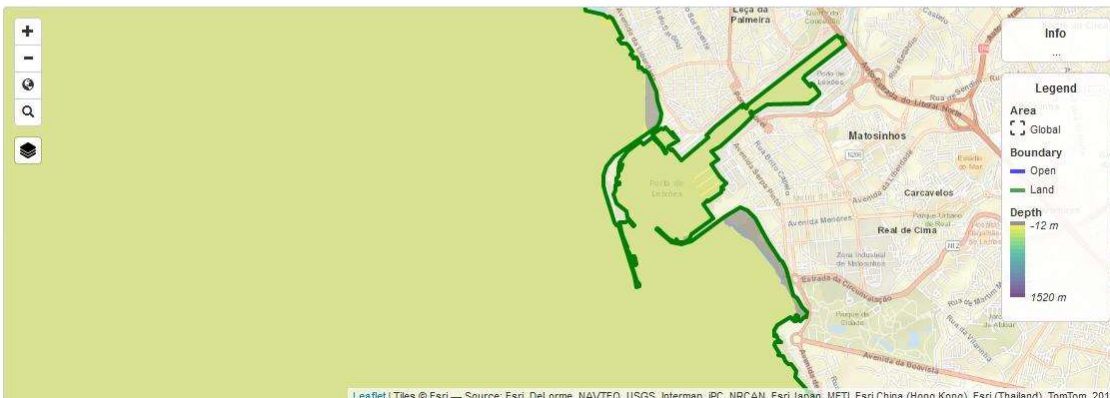
Step 2: Upload and verify the grid

Configuration Assistant

Step 1 Model Step 2 Domain Step 3 Boundaries Step 4 Stations Step 5 Parameters Step 6 Additional Data Step 7 Submission

Preview

File	EPSG	Vert. Ref.	Elements	Nodes	Boundaries
leixoes.ii	4326	0.00m	115139	58966	Open: 3; Land: 3; Island: 0



← Previous Restart step Next →

Intermediate step to verify the grid and its boundaries

Questions? Trouble getting here? Just ask us!



Step 3: Specify boundary conditions

Define 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

ID	Type	Forcing
<input checked="" type="checkbox"/> open-1	Ocean	FES2014 - Finite Element Solution
<input checked="" type="checkbox"/> open-2	River	Jan: 4.4, Feb: 4.4, Mar: 4.4, Apr: 4.4, May: 4.4, Jun: 4.4, Jul: 4.4, Aug: 4.4, Sep: 4.4, Oct: 4.4, Nov: 4.4, Dec: 4.4
<input checked="" type="checkbox"/> open-3	River	Jan: 2.4, Feb: 2.4, Mar: 2.4, Apr: 2.4, May: 2.4, Jun: 2.4, Jul: 2.4, Aug: 2.4, Sep: 2.4, Oct: 2.4, Nov: 2.4, Dec: 2.4
<input checked="" type="checkbox"/> open-4	River	Jan: 28.7, Feb: 28.7, Mar: 28.7, Apr: 28.7, May: 28.7, Jun: 28.7, Jul: 28.7, Aug: 28.7, Sep: 28.7, Oct: 28.7, Nov: 28.7, Dec: 28.7
<input checked="" type="checkbox"/> open-5	River	Jan: 8.0, Feb: 8.0, Mar: 8.0, Apr: 8.0, May: 8.0, Jun: 8.0, Jul: 8.0, Aug: 8.0, Sep: 8.0, Oct: 8.0, Nov: 8.0, Dec: 8.0

Define type and forcing condition

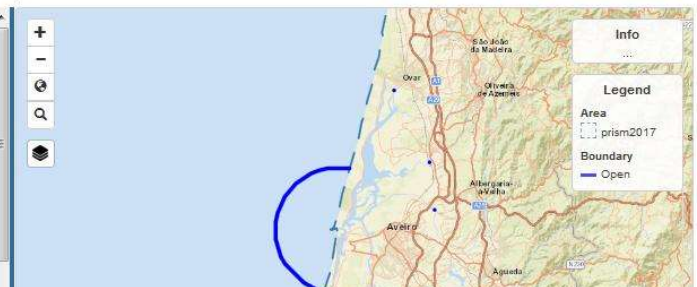
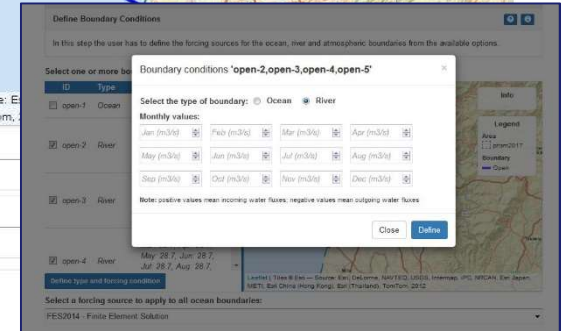
Select a forcing source to apply to all ocean boundaries:

FES2014 - Finite Element Solution

Select an atmospheric forcing:

GFS - Global Forecast System NOAA/NCEP

Previous Restart step

- Select boundary by clicking on the toggle box
- Multiple boxes allow for equal conditions in the several selected Boundaries
- For ocean and meteo, the user needs to specify sources below
- Same source for all ocean bc.
- For river, monthly values need to be specified.
- BCs: elevation at ocean, river flow at rivers

Questions? Trouble getting here?



Step 4: Define output stations

Configuration Assistant

Step 1 Model Step 2 Domain Step 3 Boundaries Step 4 Stations Step 5 Parameters Step 6 Additional Data Step 7 Submission

Define 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).

Select/Deselect desired stations. You can add new ones by selecting the location on the map or using the button New Station.

Name	Latitude	Longitude	Comparison
<input type="checkbox"/> LaRochelleTG	46.15067	-1.23318	LaRochelleTG (46.15067, -1.23318)
<input type="checkbox"/> PortBlocTG	45.57033	-1.06878	PortBlocTG (45.57033, -1.06878)
<input type="checkbox"/> SocoaTG	43.40009	-1.68010	SocooaTG (43.40009, -1.68010)

New Station

Name	Latitude	Longitude	Comparison
<input type="checkbox"/> LaRochelleTG	46.15067	-1.23318	LaRochelleTG (46.15067, -1.23318)
<input type="checkbox"/> PortBlocTG	45.57033	-1.06878	PortBlocTG (45.57033, -1.06878)
<input checked="" type="checkbox"/> SocoaTG	43.40009	-1.68010	SocooaTG (43.40009, -1.68010)
<input checked="" type="checkbox"/> Santander	43.493746	-3.77037	SantanderTG (43.46256, -3.79829)
<input checked="" type="checkbox"/> north Santana	43.480793	-3.410568	

New Station

- Selected stations in EMODNet Physics are automatically proposed (just select the ones you want)
- A limit of 5 stations per forecast is allowed
- Real stations/Virtual stations can be added and will show up automatically in the VIEWER

New Station

Latitude (*): 43.478817 Longitude (*): -3.77758

Name (*): Santander

Select the type of station: ☒ Comparison ☐ Virtual

Compare with station (latitude, longitude) (*): SantanderTG (43.46256, -3.79829)

Note: this station is located at 2462m. Recommended maximum distance is 100m.

Order by distance

Close Add



Step 5: Define physical and numerical parameters

- Default based on LNEC's experience with SCHISM
- A few parameters can be set by the user – limited for robustness

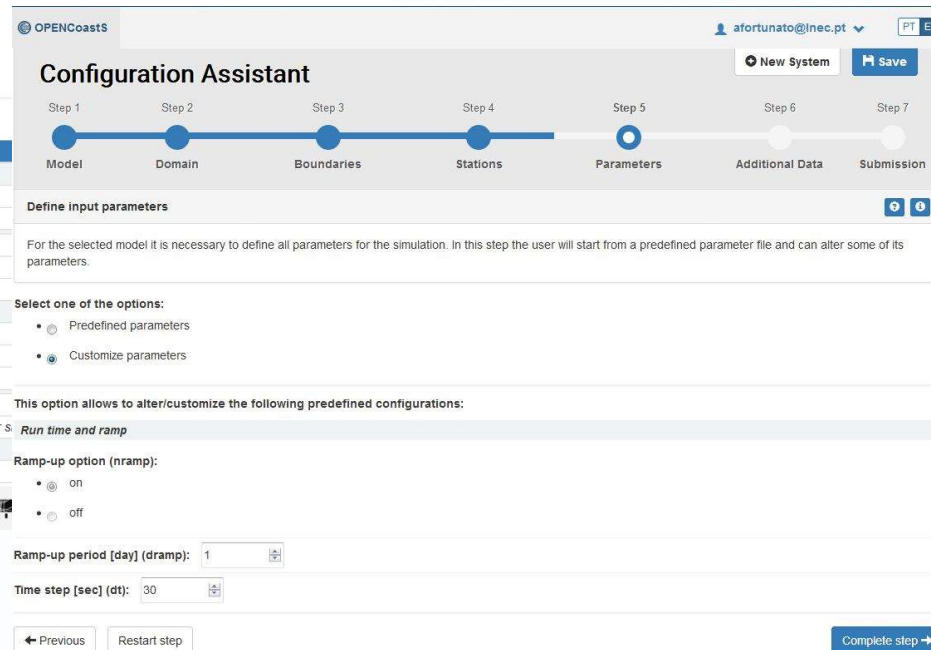


Select one of the options:

- ☒ Predefined parameters
- ☐ Customize parameters

15 records

Parameter	Description	Value
Model configuration parameters		
ics	Coordinate option	2 lon/lat
ncor	Coriolis	1
lpre	Pre-processor flag	0
lhot	Hotstart option	0 cold start
ihydraulics	Hydraulic model option	0
Point sources/sinks		
if_source	Point sources/sinks option	0
nramp_ss	Ramp-up flag for source/sinks	1
dramp_ss	Ramp-up period for source/sinks [day]	2
lupwind_mom	Method for momentum advection	0 ELM
indvel	Method for computing velocity at nodes	0 conformal linear s
Stabilization methods		
ihorcon	Horizontal viscosity option	0 no viscosity
	Conver. diffusion	
	Shapiro filter flag	



Select one of the options:

- ☐ Predefined parameters
- ☒ Customize parameters

This option allows to alter/customize the following predefined configurations:

Run time and ramp

Ramp-up option (nramp):

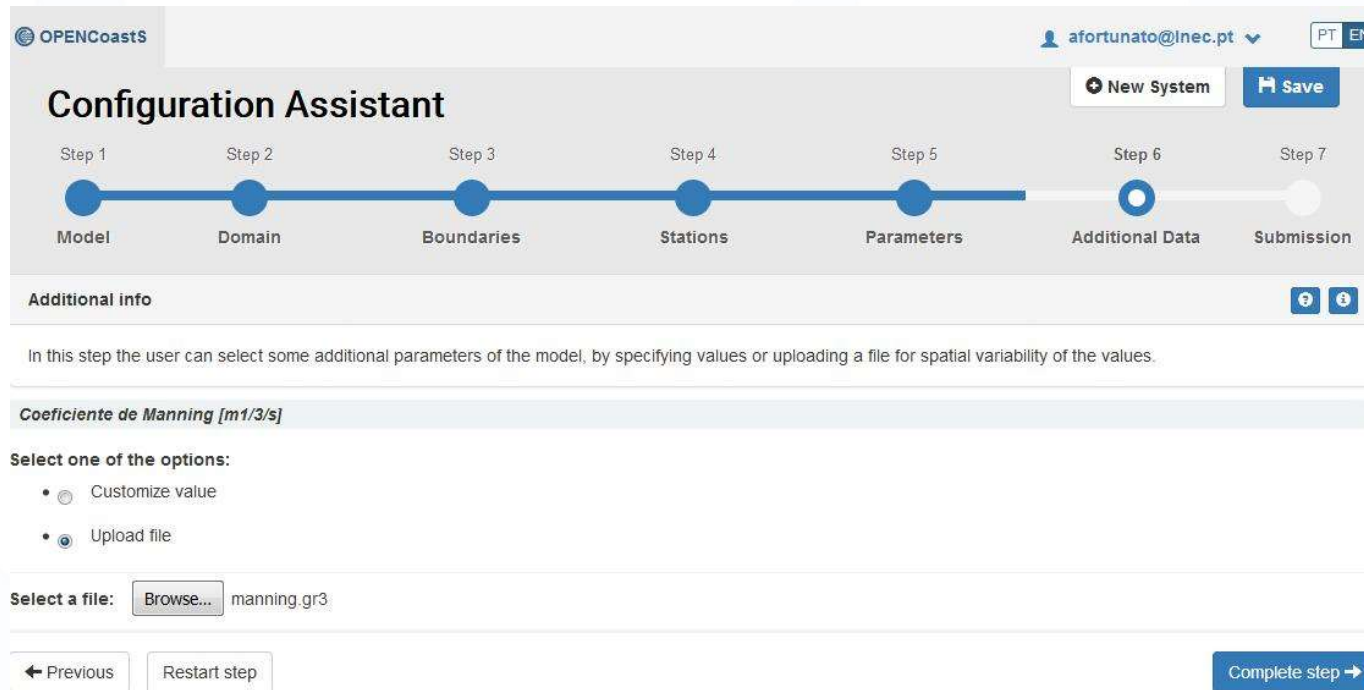
- ☒ on
- ☐ off

Ramp-up period [day] (dramp):

Time step [sec] (dt):

← Previous Restart step Complete step →

• Step 6: Define space-dependent parameters



The screenshot shows the OPENCoastS Configuration Assistant interface. At the top, there's a user profile 'afortunato@inec.pt' and language options 'PT' and 'EN'. Below this is a progress bar with seven steps: Step 1 (Model), Step 2 (Domain), Step 3 (Boundaries), Step 4 (Stations), Step 5 (Parameters), Step 6 (Additional Data), and Step 7 (Submission). Step 6 is currently active. The main content area is titled 'Additional info' and contains instructions: '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.' Below this, there's a section for 'Coeficiente de Manning [m¹/3/s]'. It asks to 'Select one of the options:' and provides two choices: 'Customize value' (selected) and 'Upload file'. Under 'Customize value', there's a 'Select a file:' label, a 'Browse...' button, and the filename 'manning.gr3'. At the bottom, there are three buttons: 'Previous', 'Restart step', and 'Complete step'.

- Possibility to define spatial variability
- In the future, validation procedures will be added to minimize model failure due to poor parameter choice



Step 7: Review and submit

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Configuration Assistant

Step 1 **Step 2** **Step 3** **Step 4** **Step 5** **Step 6** **Step 7**

Model Domain Boundaries Stations Parameters Additional Data Submission

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**

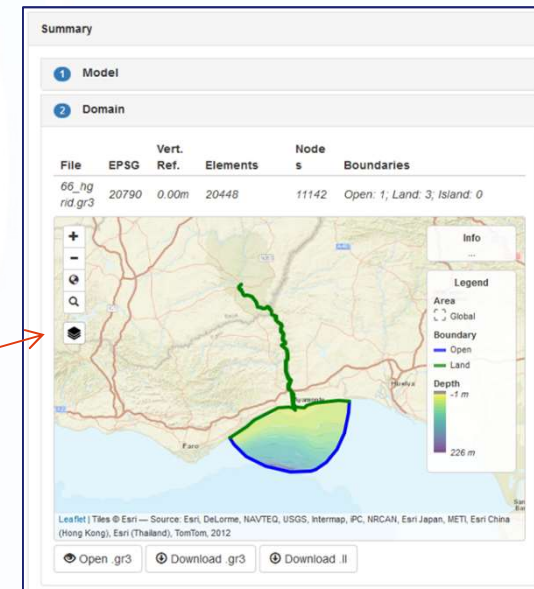
Submit

Name (*):
Leixoes_PRISM+GFS

Description:
Leixoes and Douro grid, forced by PRISM2017 and GFS

☒ I Accept Terms and conditions of use

Activate System



Submit

Name (*):
my grid

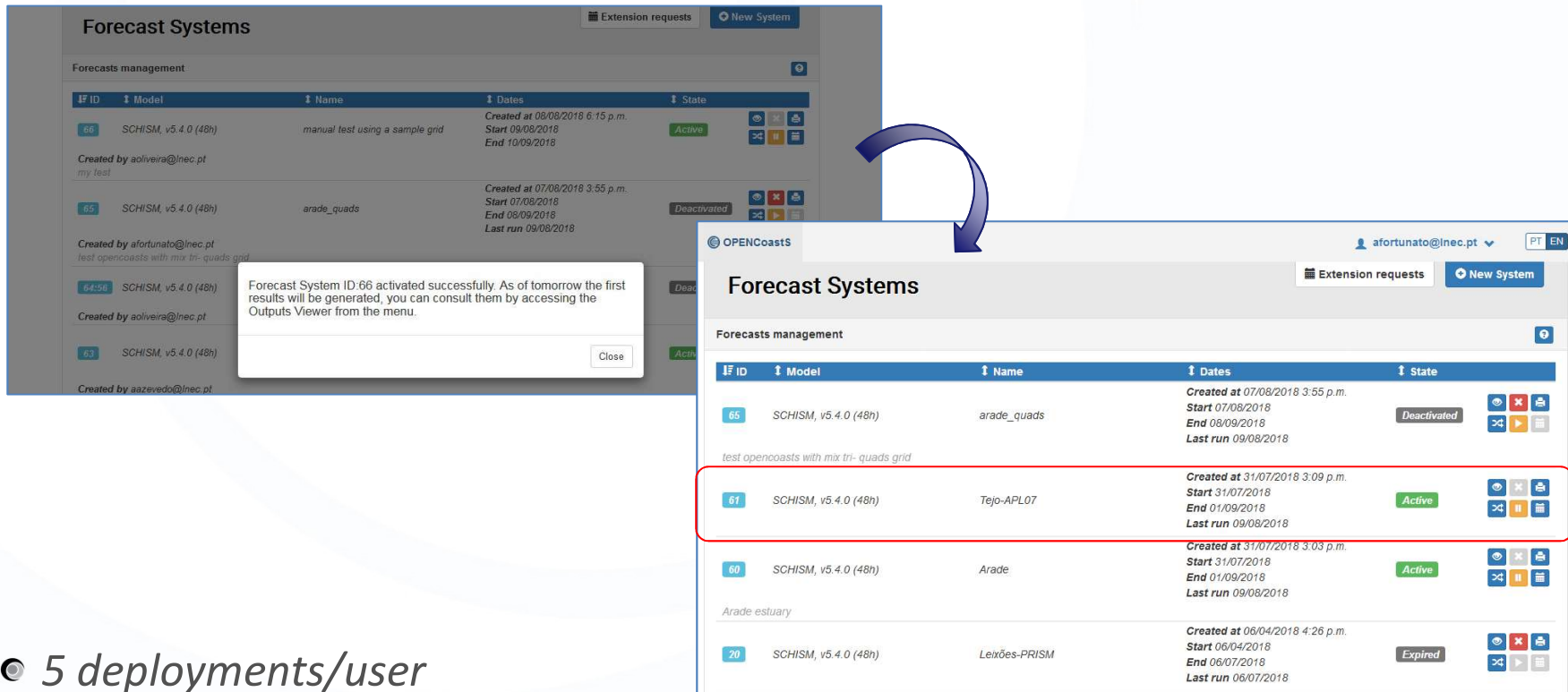
Description:
Manual test using a sample grid

☒ I Accept Terms and conditions of use

Activate System

- Possibility to download input files for outside check
- Possibility to go back to any step (after step 2) and correct everything

Step 7: Review and submit



Forecast Systems

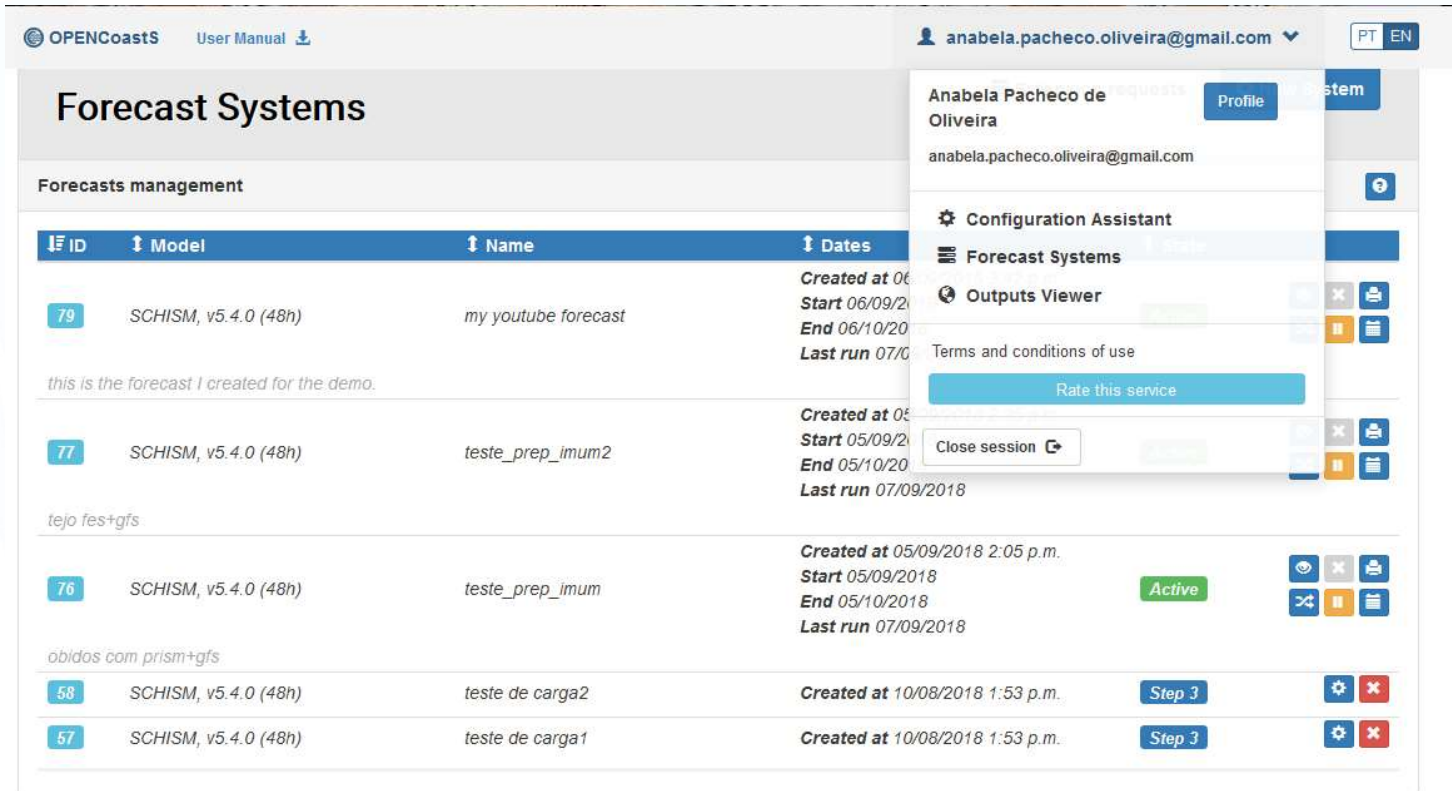
Forecasts management

ID	Model	Name	Dates	State
66	SCHISM, v5.4.0 (48h)	manual test using a sample grid	Created at 08/08/2018 6:15 p.m. Start 09/08/2018 End 10/09/2018	Active
65	SCHISM, v5.4.0 (48h)	arade_quads	Created at 07/08/2018 3:55 p.m. Start 07/08/2018 End 08/09/2018 Last run 09/08/2018	Deactivated
6458	SCHISM, v5.4.0 (48h)	test opencoasts with mix tri- quads grid	Created at 31/07/2018 3:09 p.m. Start 31/07/2018 End 01/09/2018 Last run 09/08/2018	Active
60	SCHISM, v5.4.0 (48h)	Arade	Created at 31/07/2018 3:03 p.m. Start 31/07/2018 End 01/09/2018 Last run 09/08/2018	Active
20	SCHISM, v5.4.0 (48h)	Leixões-PRISM	Created at 06/04/2018 4:26 p.m. Start 06/04/2018 End 06/07/2018 Last run 06/07/2018	Expired

Forecast System ID:66 activated successfully. As of tomorrow the first results will be generated, you can consult them by accessing the Outputs Viewer from the menu.

- 5 deployments/user
- Resources – EOSC/European Grid Initiative
- European institutions use – covered by EOSC-Hub until end of 2020





OPENCoasts User Manual

anabela.pacheco.oliveira@gmail.com PT EN



Forecast Systems

Forecasts management

ID	Model	Name	Dates
79	SCHISM, v5.4.0 (48h)	my youtube forecast	Created at 06/09/2018 Start 06/09/2018 End 06/10/2018 Last run 07/09/2018
this is the forecast I created for the demo.			
77	SCHISM, v5.4.0 (48h)	teste_prep_imum2	Created at 05/09/2018 Start 05/09/2018 End 05/10/2018 Last run 07/09/2018
tejo fes+gfs			
76	SCHISM, v5.4.0 (48h)	teste_prep_imum	Created at 05/09/2018 2:05 p.m. Start 05/09/2018 End 05/10/2018 Last run 07/09/2018
obidos com prism+gfs			
58	SCHISM, v5.4.0 (48h)	teste de carga2	Created at 10/08/2018 1:53 p.m. Step 3
57	SCHISM, v5.4.0 (48h)	teste de carga1	Created at 10/08/2018 1:53 p.m. Step 3

User Profile: Anabela Pacheco de Oliveira
anabela.pacheco.oliveira@gmail.com

Configuration Assistant
Forecast Systems
Outputs Viewer
Terms and conditions of use
Rate this service
Close session

- Forecast System Manager: monitor and make changes to my forecasts – confidentiality 
- Outputs viewer (follow my demo) 
- Rate this service – your evaluation (and comments) are the path for our improvement

OPENCoastS User Manual [User Manual](#) [anabela.pacheco.oliveira@gmail.com](#) PT EN

Forecast Systems

Extension requests New System

Forecasts management

ID	Model	Name	Dates	State
79	SCHISM, v5.4.0 (48h)	my youtube forecast	Created at 06/09/2018 3:42 p.m. Start 06/09/2018 End 06/10/2018 Last run 07/09/2018	Active
this is the forecast I created for the demo.				
77	SCHISM, v5.4.0 (48h)	teste_prep_imum2	Created at 05/09/2018 2:35 p.m. Start 05/09/2018 End 05/10/2018 Last run 07/09/2018	Active
tejo fes+gfs				
76	SCHISM, v5.4.0 (48h)	teste_prep_imum	Created at 05/09/2018 2:05 p.m. Start 05/09/2018 End 05/10/2018 Last run 07/09/2018	Deactivated
obidos com prism+gfs				
58	SCHISM, v5.4.0 (48h)	teste de carga2	Created at 10/08/2018 1:53 p.m.	Step 3
57	SCHISM, v5.4.0 (48h)	teste de carga1	Created at 10/08/2018 1:53 p.m.	Step 3

Checking the status and the settings of my runs

Clone it – duplicate to change: b.c., parameters, outputs

Re-activate a deactivated system or eliminate it

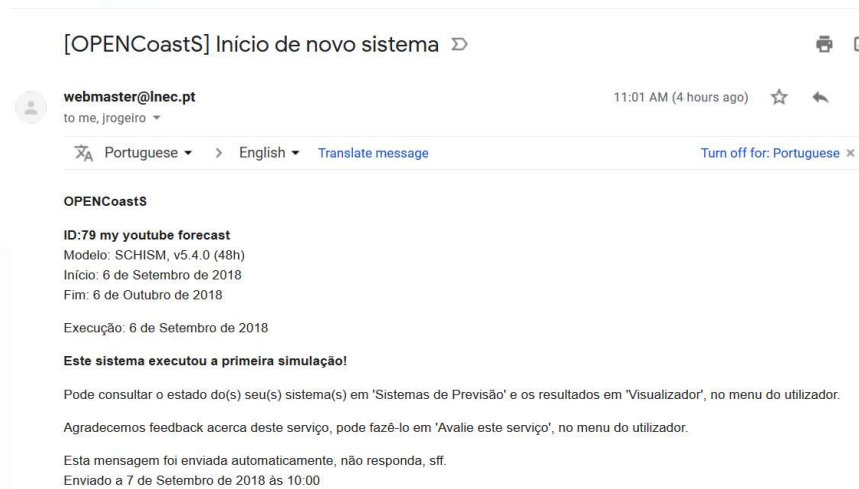
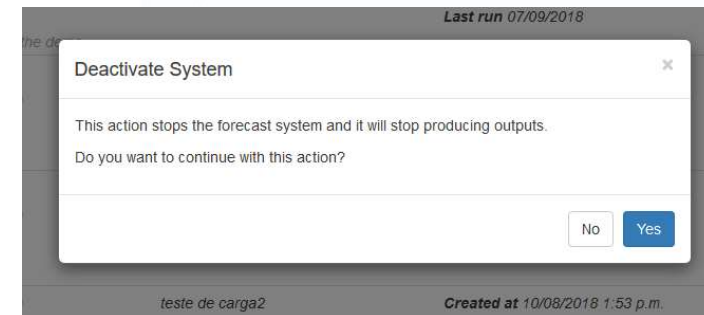
Return to C.Assist. to continue to setup my forecast

Many states are possible:

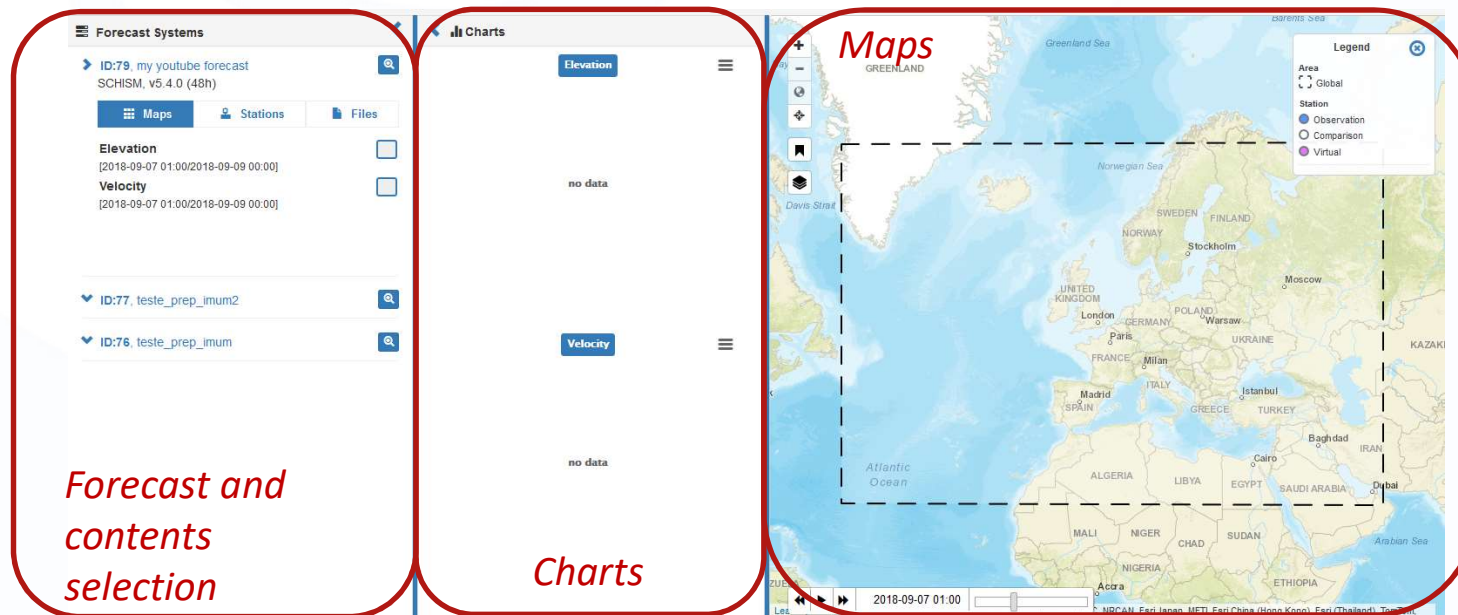
- “step k” – in construction, we can continue later or just eliminate it
- Active – we can deactivate, clone it, check it,...
- Deactivated – we can activate it again or eliminate it

Forecast Systems Manager & Configuration Assistant control

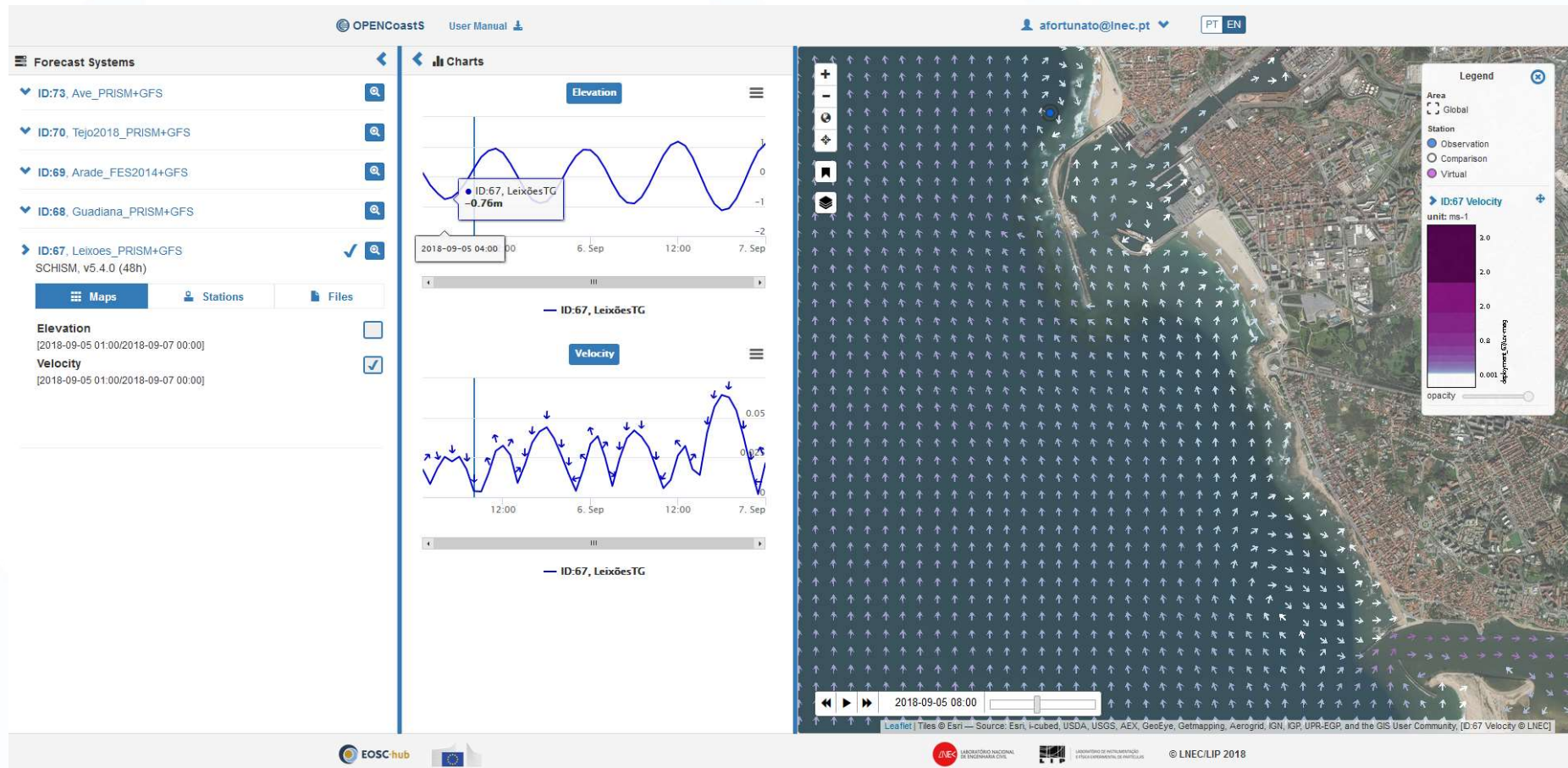
- Warnings either through the interface or by email help the user to: 1) make sure he/she is doing the intended action 2) follow their deployments closely
- Examples:
 - When a system runs for the 1st time
 - When a status change is requested



- Hands-on only if you tested OPENCoastS before (and already have simulations available)
- If not, just follow my demo
- Later, you can browse your results and/or you can check the recorded hands-on tutorial on youtube:
<https://www.youtube.com/watch?v=TRomoXBxdOc&feature=youtu.be>
- Viewer: 3 areas

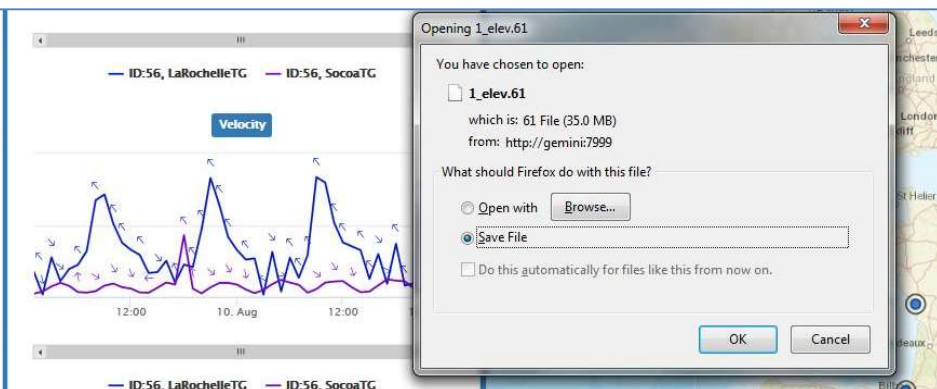
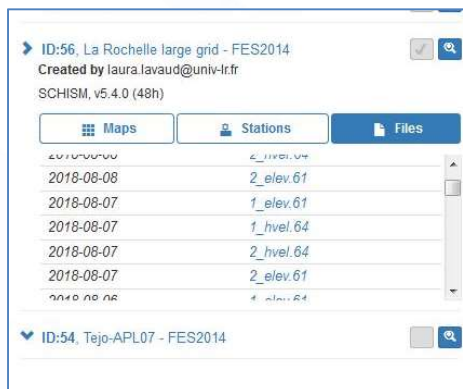
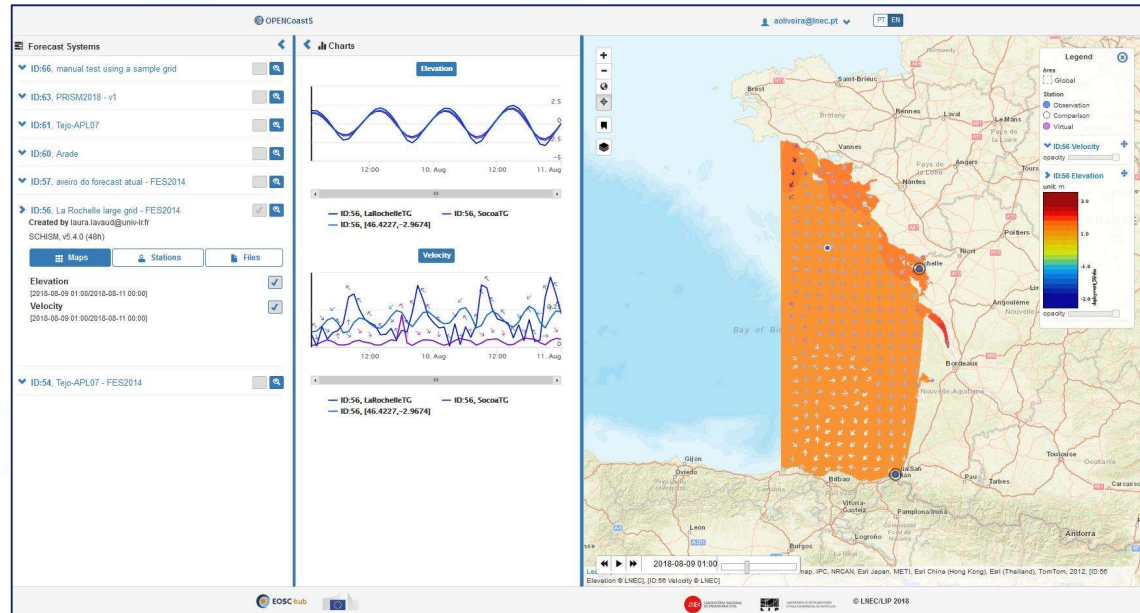


Example: flow and time series in the Leixões Harbour



Example: elevation and time series in La Rochelle region

- Adding points on the fly
- Saving time series and model outputs in your PC



- We can see Time Series forecasts at the same time

- 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
- Include more EMODnet stations
- Open code at the end of the project (2021)

- Stay tuned for new developments!
- Send us your comments and suggestions (aoliveira@lnec.pt or through the rating service)
- If you would like to participate in the development, send us a proposal

- If your institution is outside Europe and you would like to use OPENCoasts beyond testing and evaluation, we will be glad to evaluate with you the possibility to link to other resources providers

Thank you for your attention!

Please fill-in the evaluation report and leave it on the box before you leave the room

If you need a certificate for the course, request at aoliveira@lnec.pt



EOSC-hub

The trainers would like to thank the IMUM 2018 organizers for providing the opportunity and all conditions for the OPENCoasts course.

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Jorge Gomes, Mário David, João Pina

Université de La Rochelle:

Xavier Bertin, Laura Lavaud

Universidad de Cantabria:

Sonia Castanedo, Fernando Mendes



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