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Progress of Use Cases up to M18

4rd Project Meeting Manchester

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UC1 – Digital Twins for Just Climate Urban Resilience Service (Just-CURS)

4rd Project Meeting Manchester

UC1 Partners: [EGL, NCSRD, NOA]

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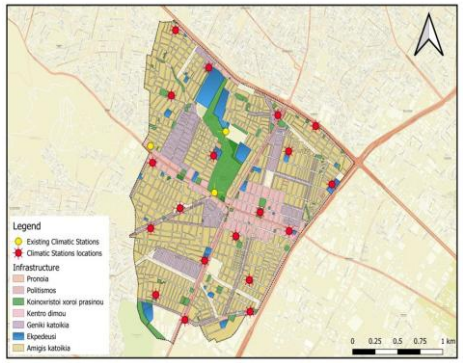
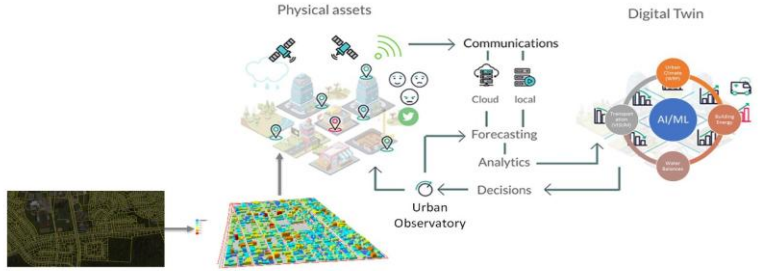
UC1 AGL: Digital Twins for Just Climate Urban Resilience Service (Just-CURS) in Socially Vulnerable Communities



AGL Case Study



- Egaleo faces extreme heat (up to 45°C), fire, and flood risks.
- The city is updating its SECAP plan for the next decade.

Smart climate stations, Rock the Block, Environmental & climatic stations network

Replicators

GK-1 (demo r2): Aveiro Port, Portugal

- Climate risk assessment
- Resilience assessment for port personnel and commuters.
- Digital twin to optimize climate adaptation NBS

GK-2 (demo r3): West Athens, Greece

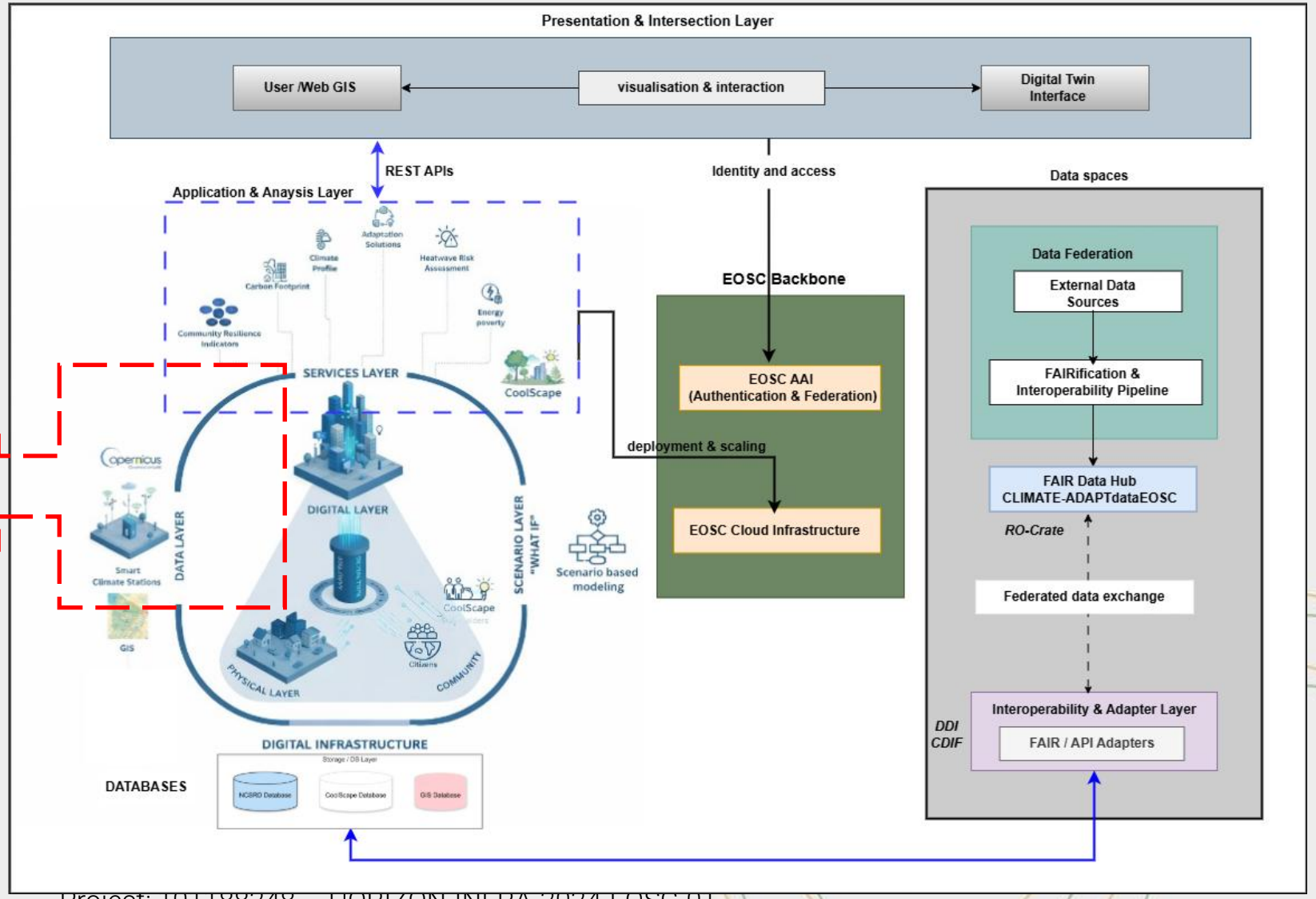
- Climate risk assessment
- Digital Twin
- Assessment of the benefits from implementing large scale ecological corridors

GK-3 (demo r3): Aradippou, Cyprus

- Climate risk assessment
- Community Resilience assessment for the local vulnerable groups
- Digital twin for identifying CCA interventions

UC1 - Just-CURS description under EOSC framework

T2.1 Data analysis from different dataspaces



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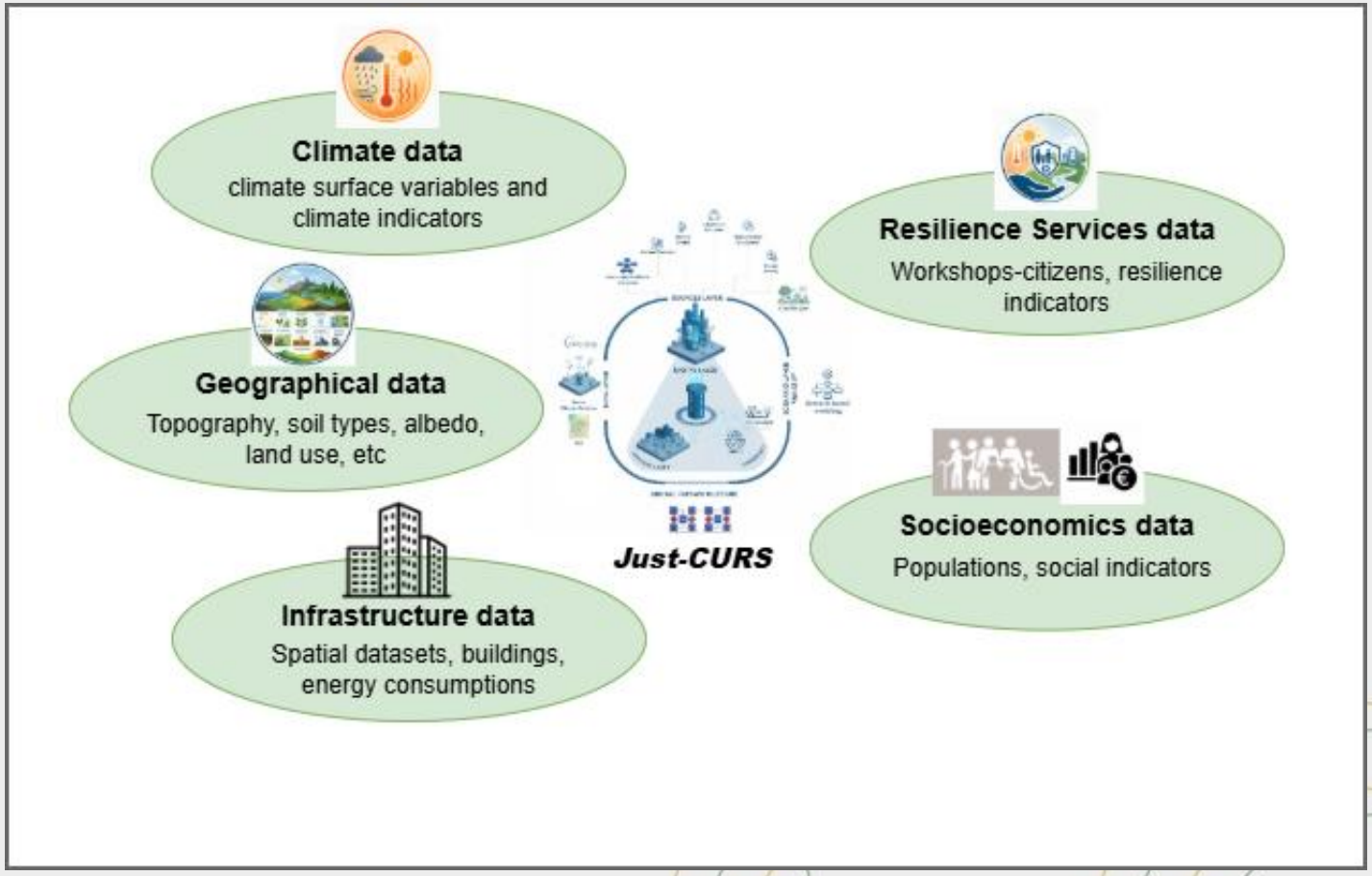
UC1 - Just-CURS description under EOSC framework

D2.1 Report on data analysis at use case level



Categories of datasets implemented into the 8 sub-services of Just-CURS

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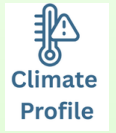
UC1 Just-CURS Services

1. CLIMATE PROFILE AND HEAT-RELATED INDICATORS 

2. SUMMER ENERGY POVERTY ASSESSMENT 

3. HEAT RISK ASSESSMENT – CLIMAAX 

4. CARBON FOOTPRINT 

5. CITIZENS' ENGAGEMENT 

→ Green areas, as input in CoolScape
6. GIS TOOL 

7. COOLSCAPE 

8. COMMUNITY RESILIENCE ASSESSMENT 

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UC1 Just-CURS Services: CoolScape

Explore **urban overheating mitigation and adaptation strategies** and quantify their impact on near-surface air temperature (T2) and human outdoor thermal comfort (OTC) for Aigaleo and greater West Athens area.

Run **Numerical Model*** simulations for a baseline and mitigation and adaptation scenarios and compare T2 and OTC outputs.

*** 1. WRF model: cool roofs**

2. ENVI-met model: Greening

1. T2 differences (scenario – baseline) in the area of interest for key periods (day/night means), delivered as **GeoTIFF** and **CSV**.
2. T2 and OTC differences (scenario – baseline) in the area of interest delivered as GeoTIFF.

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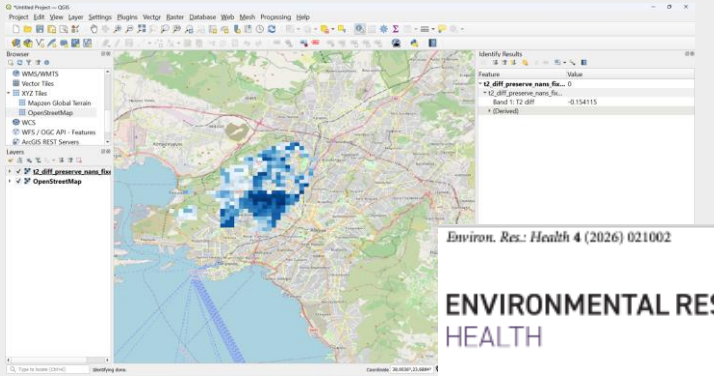
UC1 Just-CURS Services: CoolScape



1. WRF model: cool roofs

OUTPUT a1-2: Atmospheric data in **GeoTIFF** & **CSV** format (OGC): (i) T2 m difference (scenario – baseline) – **COMPLETED**

Environ. Res.: Health 4 (2026) 021002 https://doi.org/10.1088/2752-5309/ae6095

ENVIRONMENTAL RESEARCH
HEALTH

LETTER

Scenario-based modeling for exploring urban cooling pathways: a targeted, health-relevant approach toward just resilience

Christos Giannaros[1,2,*], **Vassiliki Kotroni**[2] **and Konstantinos Lagouvardos**[2]

[1] Laboratory of Meteorology and Climatology, Department of Physics, University of Ioannina, Ioannina, Greece
[2] National Observatory of Athens, Institute for Environmental Research and Sustainable Development, Palea Penteli, 15236 Athens, Greece
[*] Author to whom any correspondence should be addressed.

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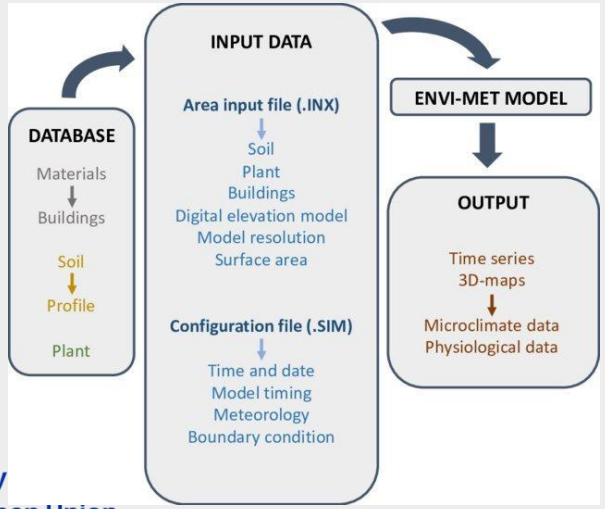
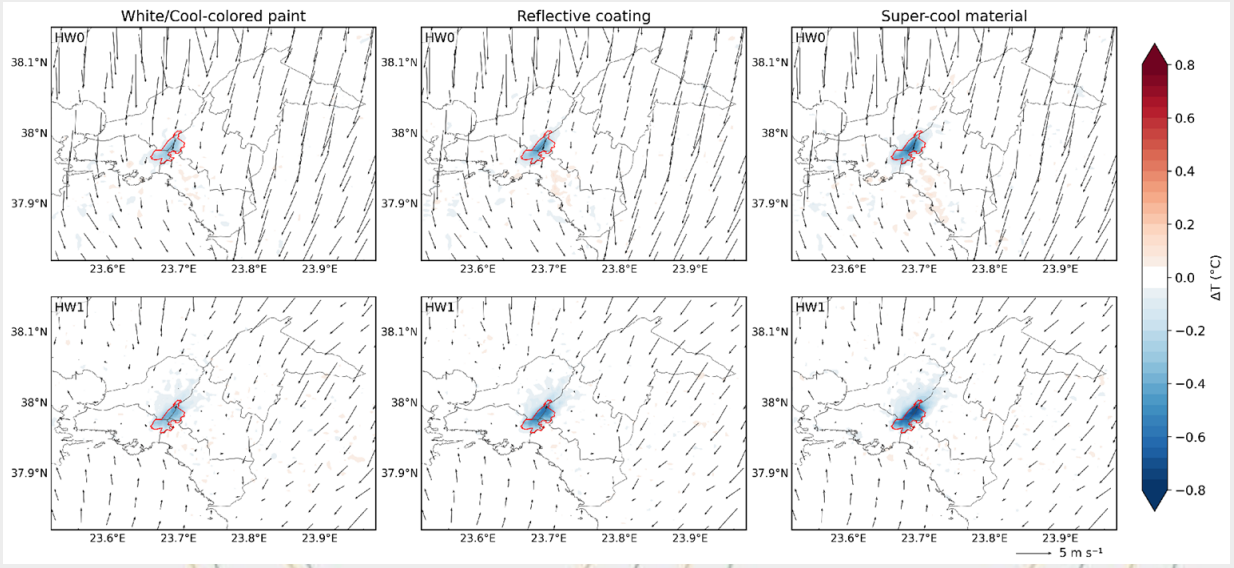
Keywords: urban overheating, human thermal comfort, health, cool roofs, targeted mitigation and adaptation, WRF, urban climate modeling

Supplementary material for this article is available online

2. ENVI-met model: Greening

OUTPUT b1: Atmospheric & Biometeorological data in **GeoTIFF** format (OGC): (i) 2 m temperature, (ii) PET, (iii) UTCI – **ENVIMET LICENCE ACQUIRED AND WORK INITIATED**





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Summary

- Start collecting input datasets for Replicator (Cyprus)
  - Climate data, buildings etc.

- Citizen engagement workshop at 17 Feb
- FAIRification template with of input/output
  - UC1 - DDI Fairification of Climate Data (DDI harmonisation to support structured, interoperable, and policy-aware metadata)
  - UC1 - GSBPM-Based FAIRification Workshop

- User's perspective questionnaires for UC1, for users access control, authorization, operate with independent databases /APIs

GK-3 (demo r3): Aradippou, Cyprus

- Climate risk assessment
- Community Resilience assessment for the local vulnerable groups
- Digital twin for identifying CCA interventions

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Summary

Just-Curs	In progress	8,33	1 de enero de 2026 → 31 de diciembre de 2027

1. Climate Profile Service 1	Just-Curs	Prototype (25%)
2. Summer Energy Poverty Assessment 1	Just-Curs	Prototype (25%)
3. Heatwave risk assessment service 1	Just-Curs	Prototype (25%)
4. Carbon Footprint 1	Just-Curs	Prototype (25%)
5. Citizen Engagement 1	Just-Curs	Prototype (25%)
7. Community Resilience Assessment	Just-Curs	Prototype (25%)

Application - > Functional component code exists and produces outputs.
-> Component outputs have been verified for accuracy and technical standards in a standalone setup.

T4.1/T4.2 Provide details for UC1 services, frequent meetings with NOA partners, preparing the D4.1

T4.3 Description of variables, uploaded in sharepoint -> Ontology

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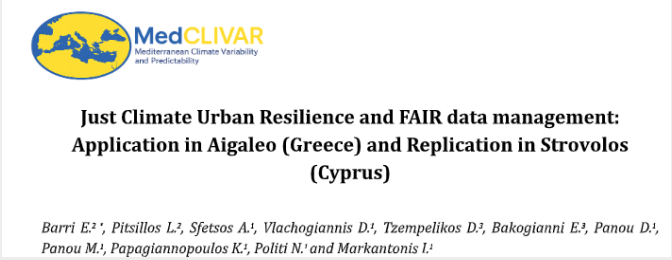
Future work

- Services for replicator (Cyprus)

Participation in Medclivar Conference (September 2027): "*Just CURS and FAIR data management: Application in Aigaleo and Replication in Cyprus*"



- Preparation for Aveiro –West Athens replicators
- Processing of AGL social data
- Just-CURS platform design and integration (*under development*)
- Paper under review " *Fair Digital Services and data for adapting to extreme heat in an urban area.*"

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UC2 – A Climate Change Adaptation Service for Ports and Coastal Areas (OPENHIDRA)

4rd Project Meeting Manchester

UC2 Partners: [LNEC, APA]

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OPENHIDRA - A Climate Change Adaptation Service for Ports and Coastal Areas

- **OPENHIDRA** is envisioned as an **innovative climate adaptation service** designed to enhance the resilience of **European ports and coastal areas** against climate-related hazards
- By integrating **HIDRALERTA** (a port alert system) with **OPENCoastS** (an EOSC-based coastal forecasting service), OPENHIDRA aims to provide **on-demand, high-resolution simulations** for coastal and lagoon circulation, overtopping assessment, and port operations, enabling both **long-term climate adaptation planning** and **real-time early warning systems**
- Once developed, this **open-access service** will empower **port authorities, coastal managers, and communities** to make **data-driven decisions**, reducing risks from **coastal flooding, sea-level rise, and extreme weather events** while fostering collaboration through the **European Open Science Cloud (EOSC)**

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WP4: CLIMATE-ADAPTservice4EOSC: Service Providers and interoperability for the Exchange and for the EOSC-core (M3-M36)

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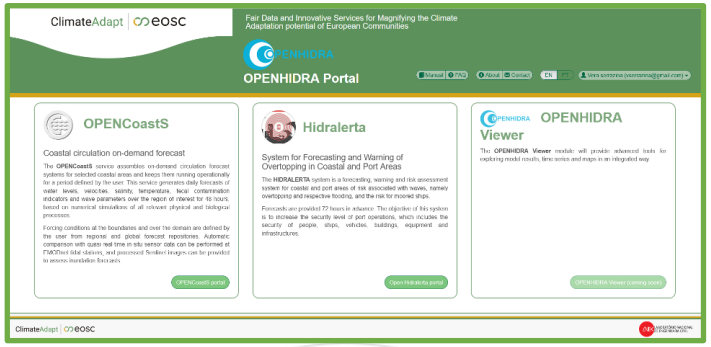

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Use Case 2 – OPENHIDRA by Alberto Azevedo

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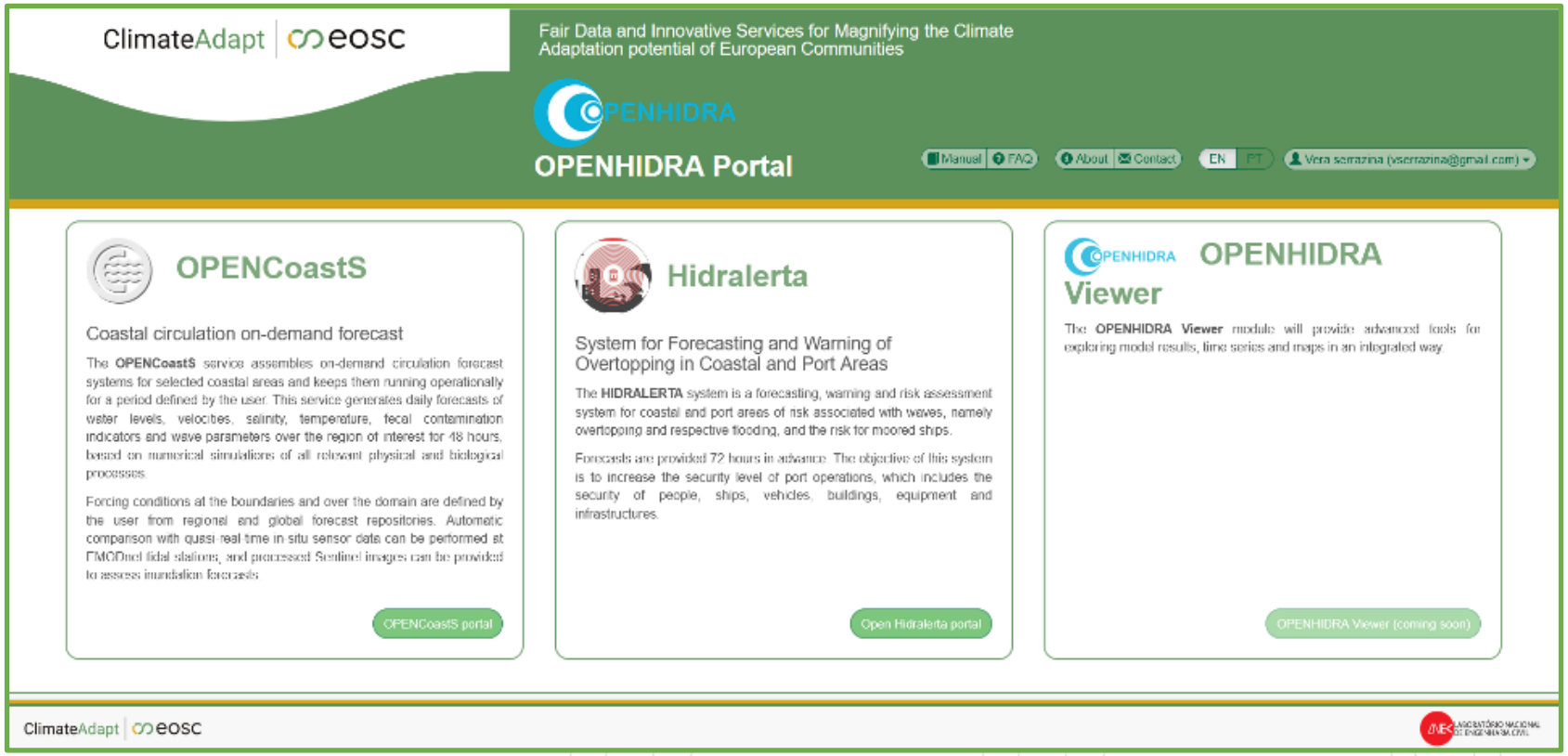

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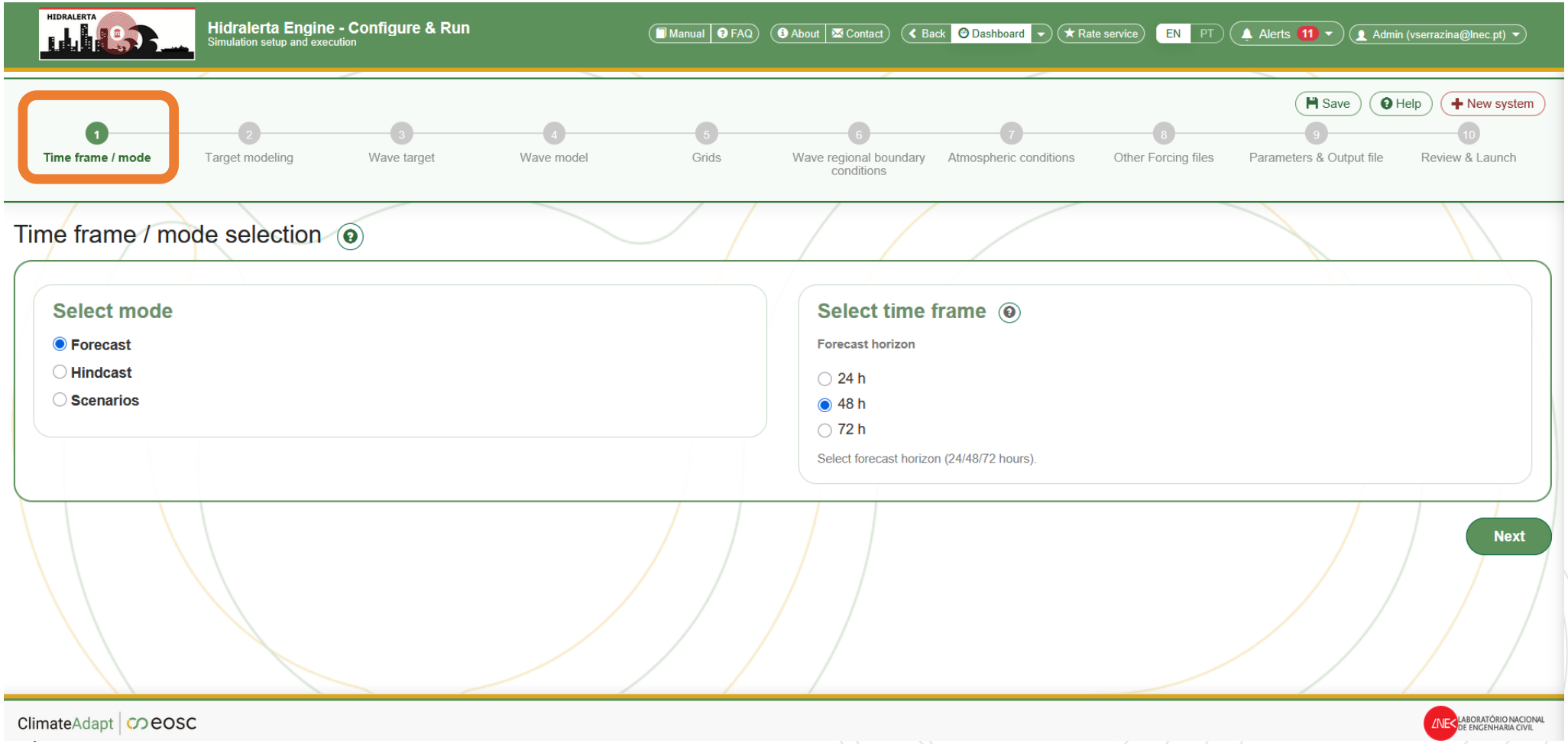

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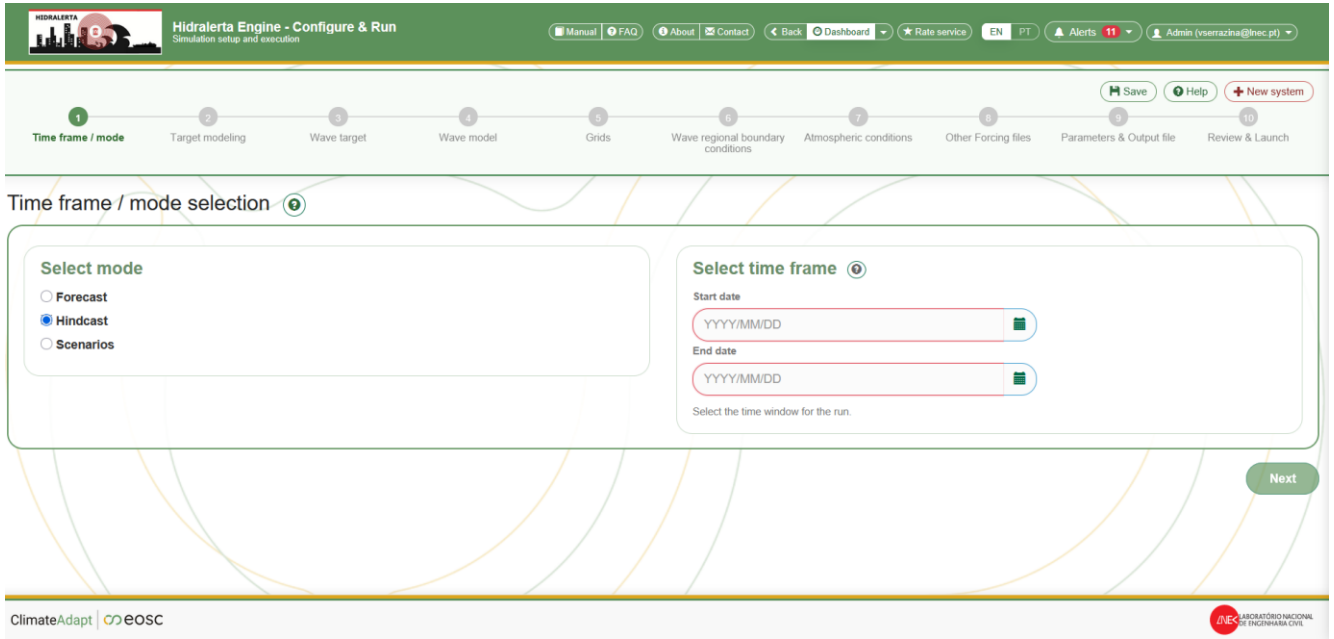

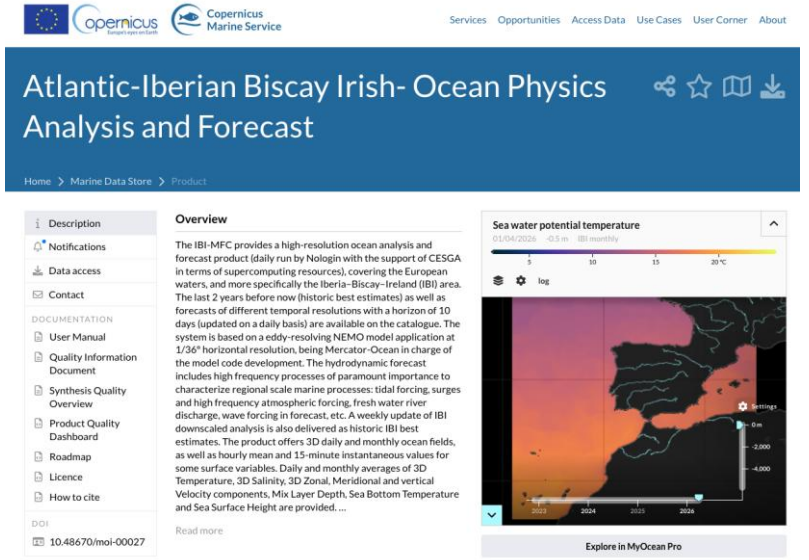

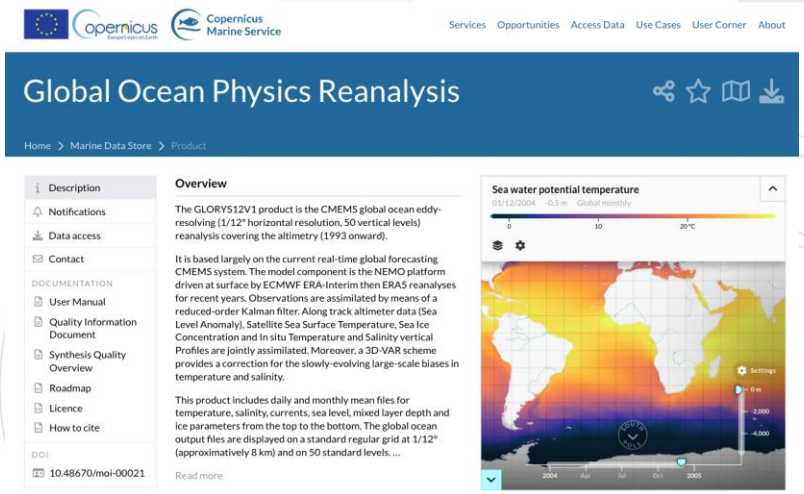

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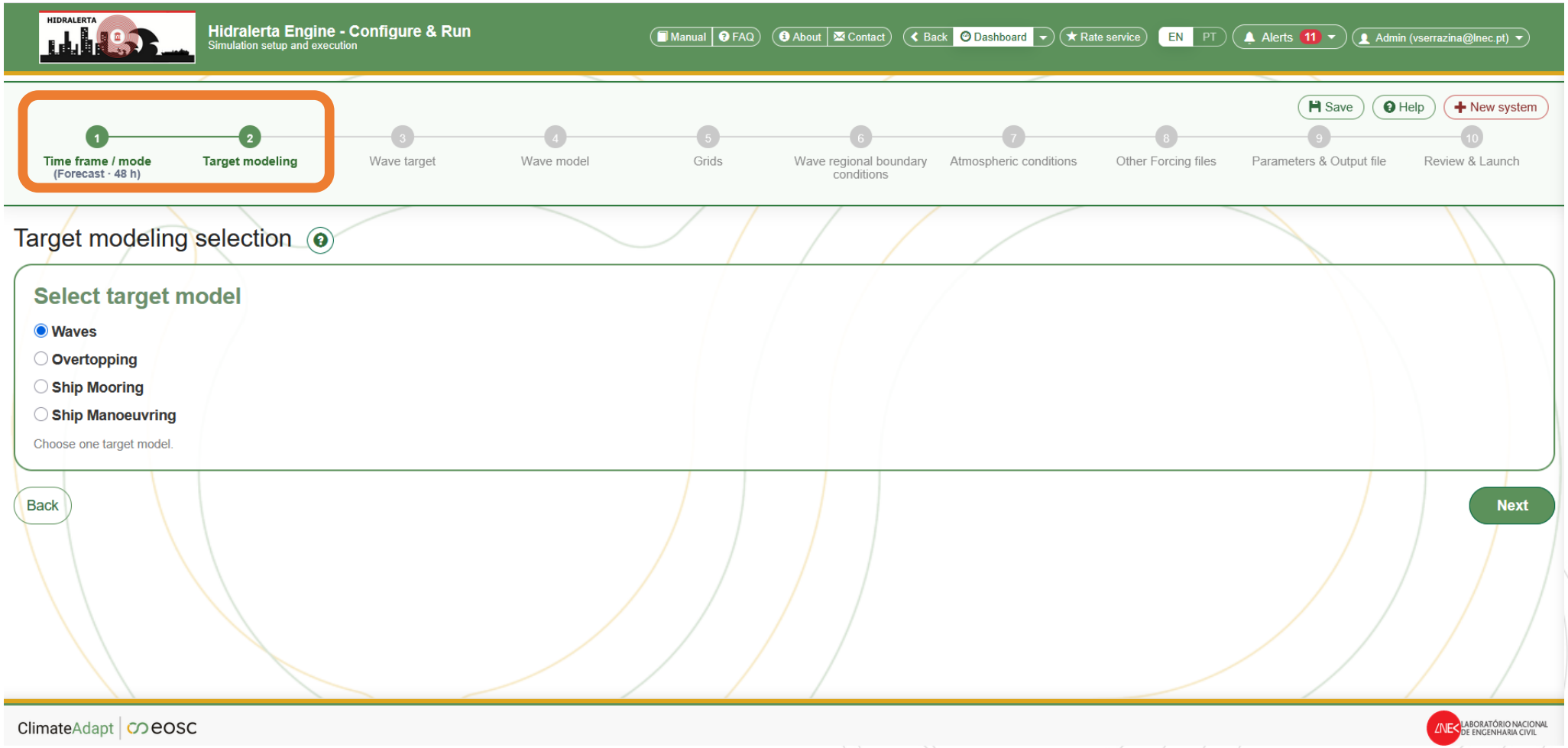

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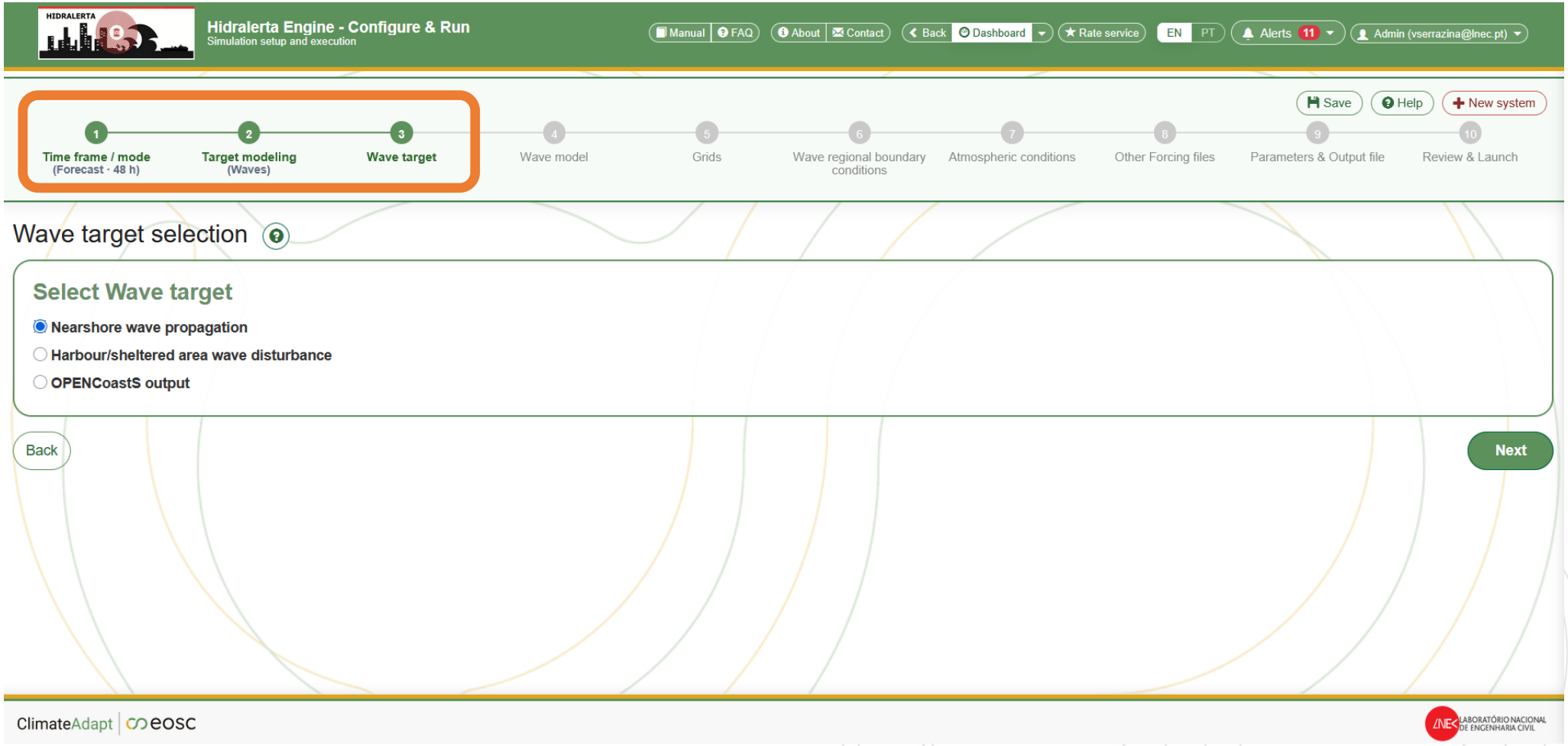

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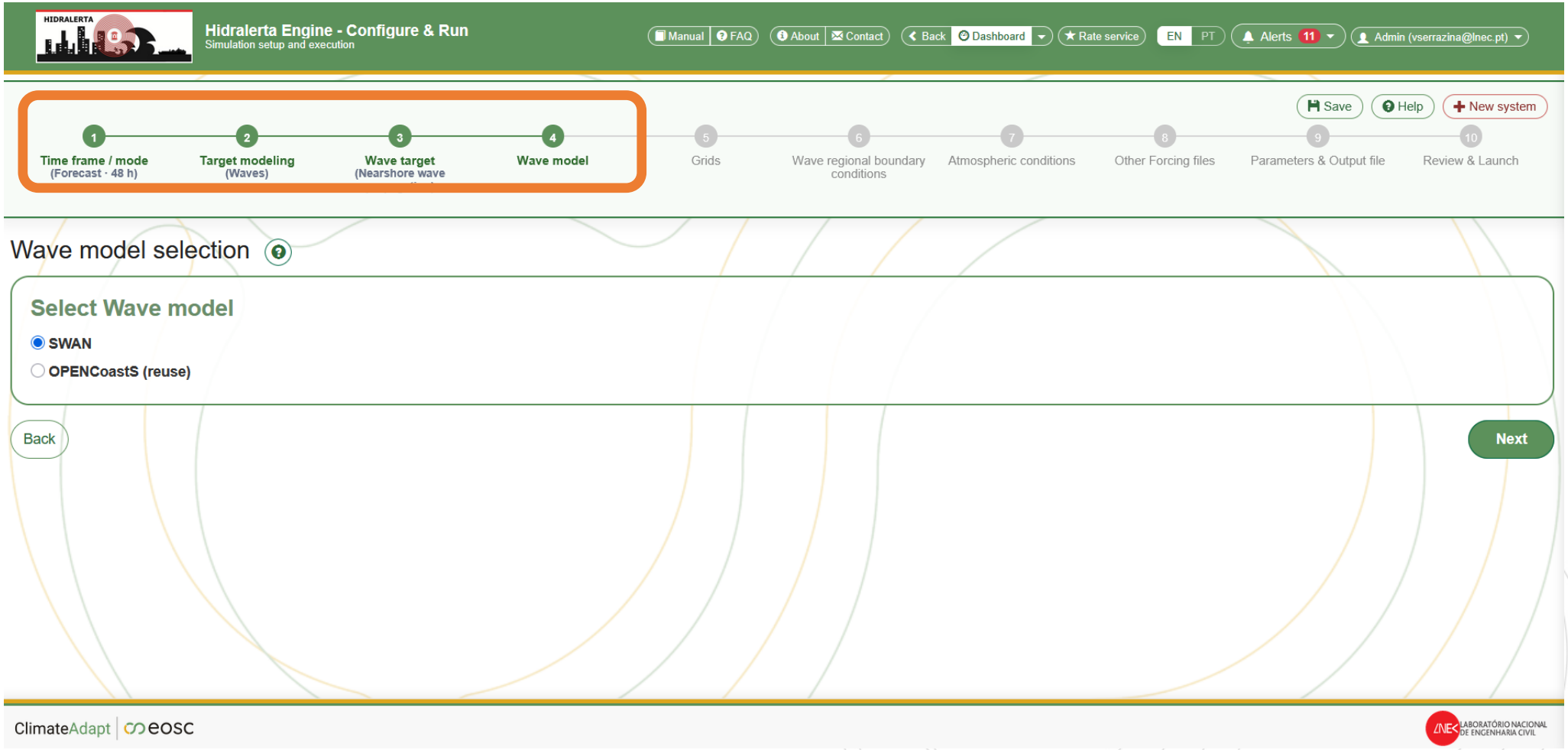

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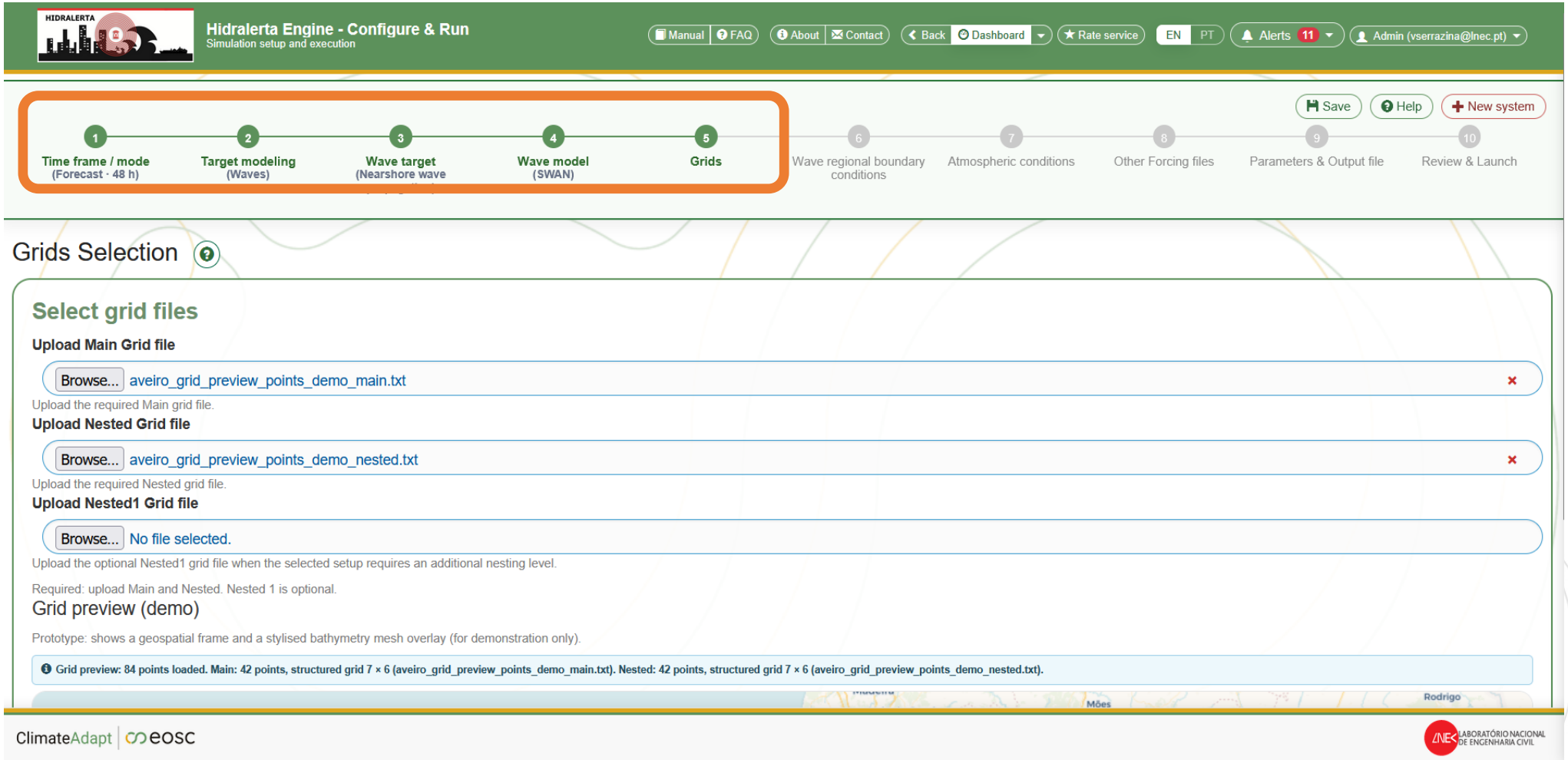

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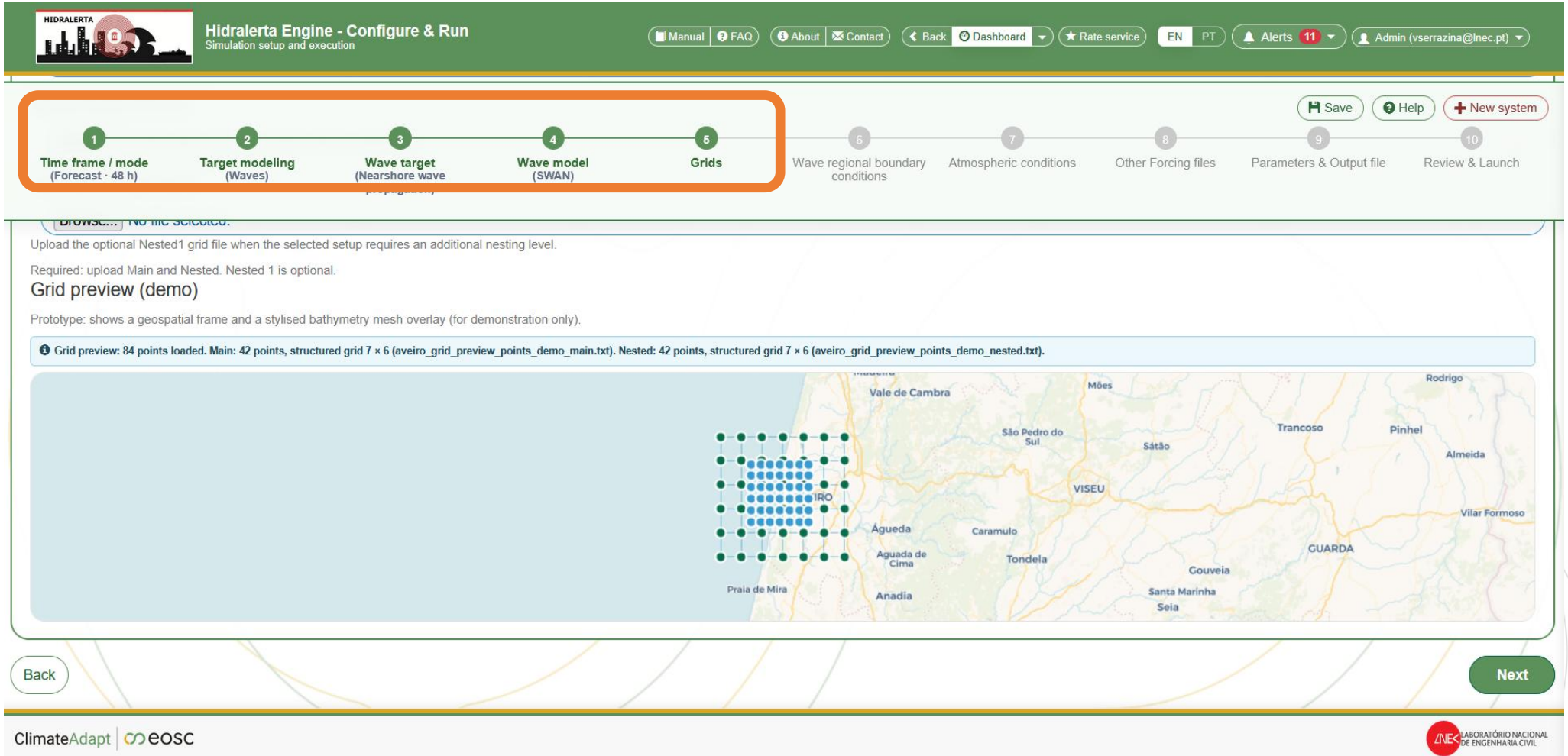

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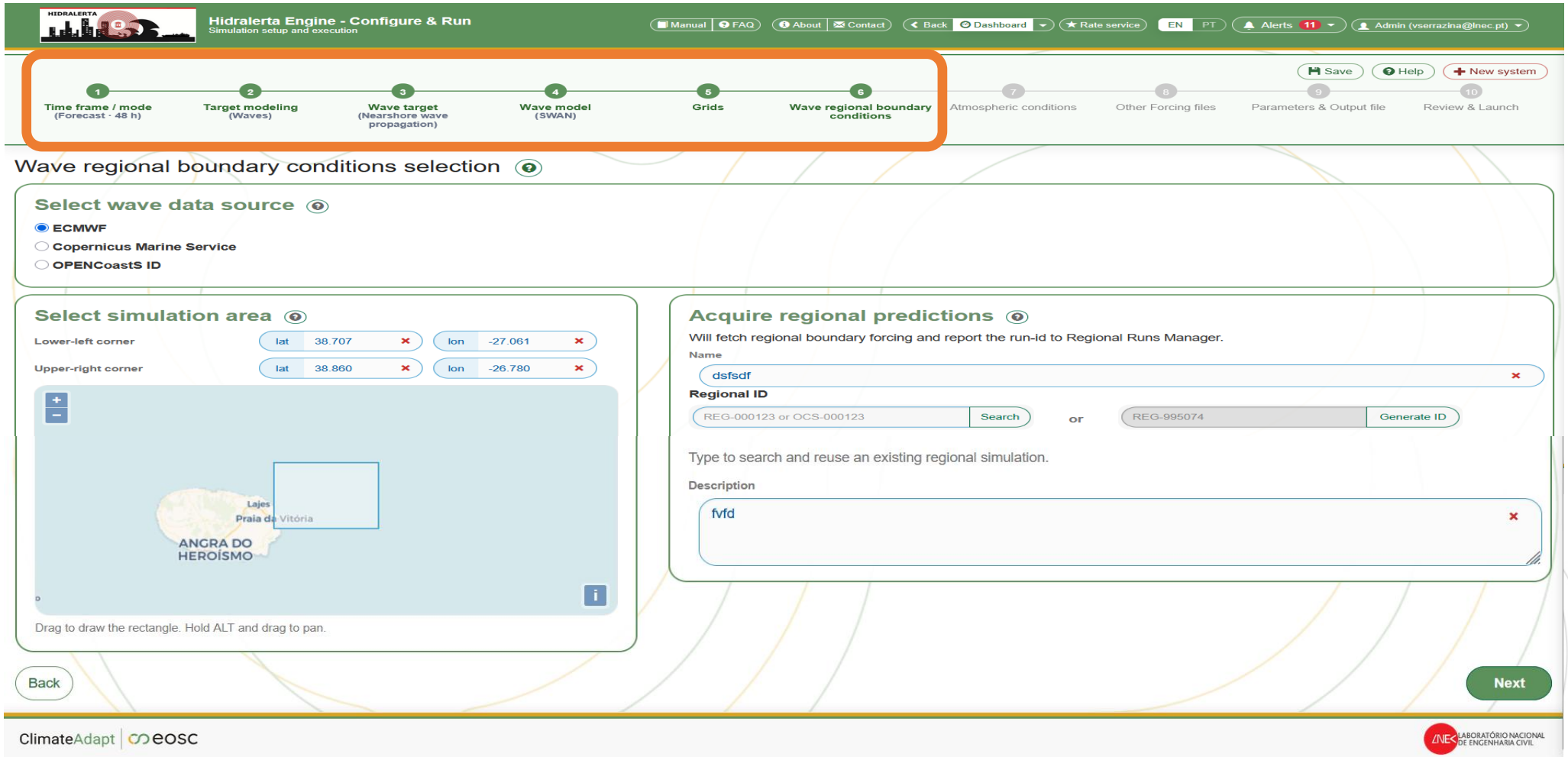

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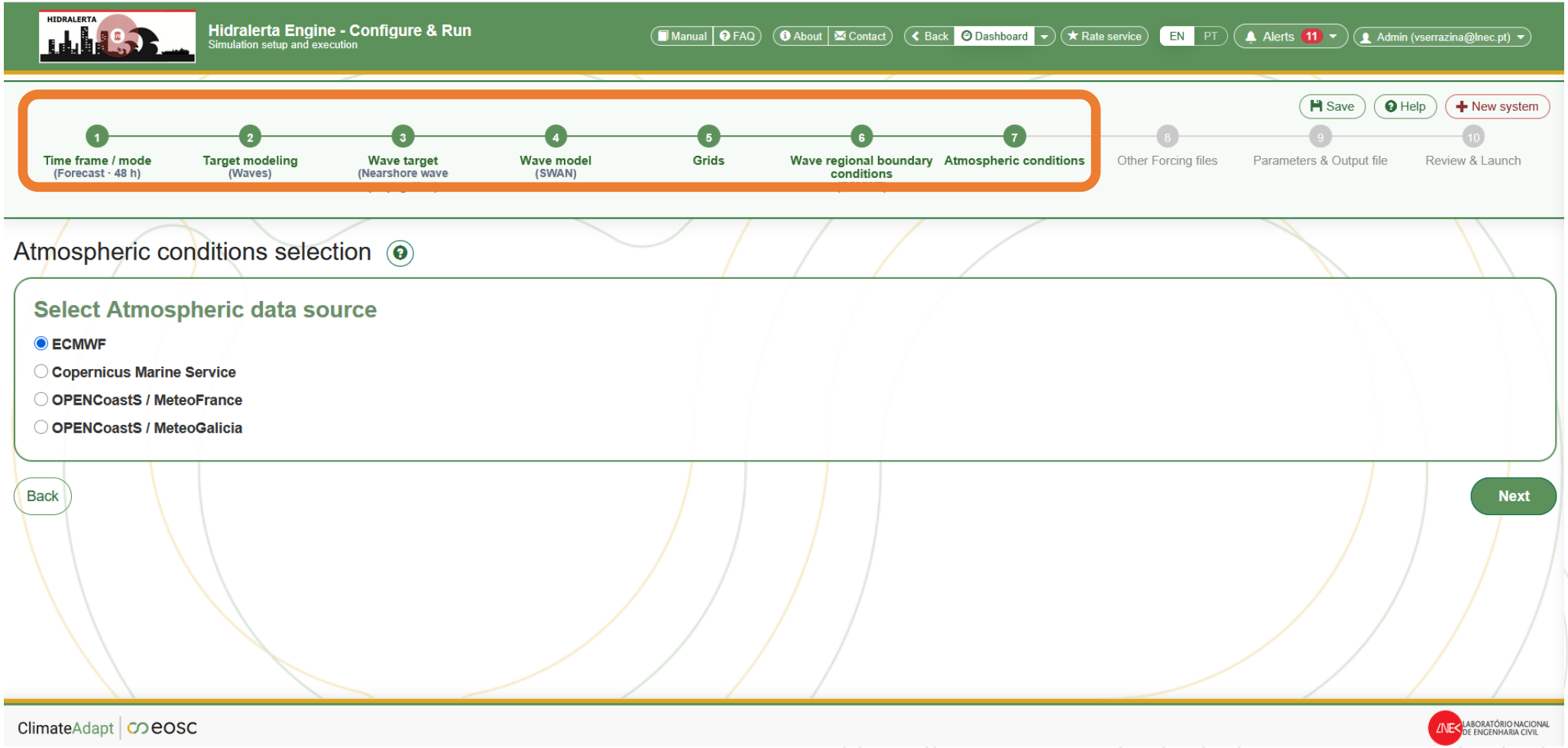

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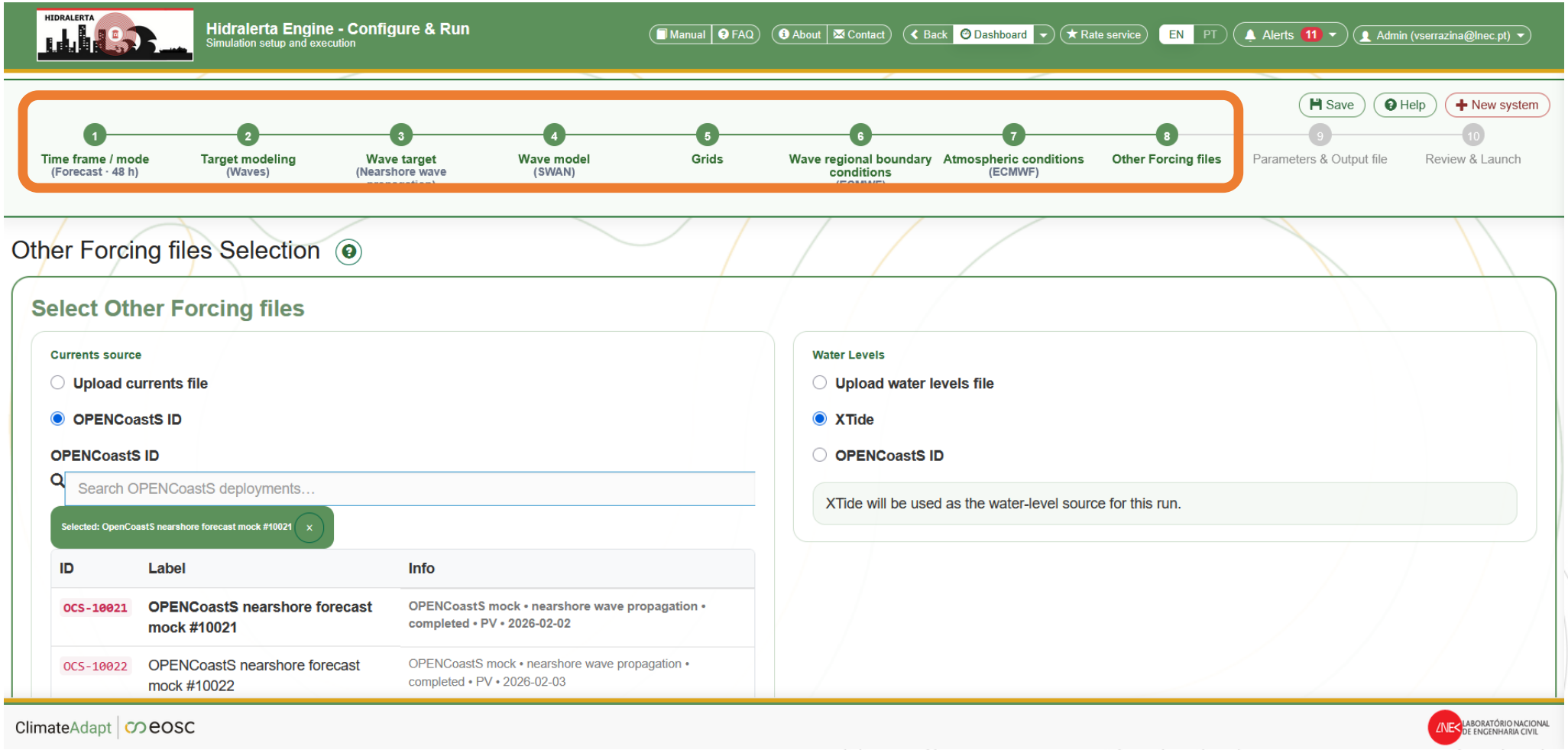

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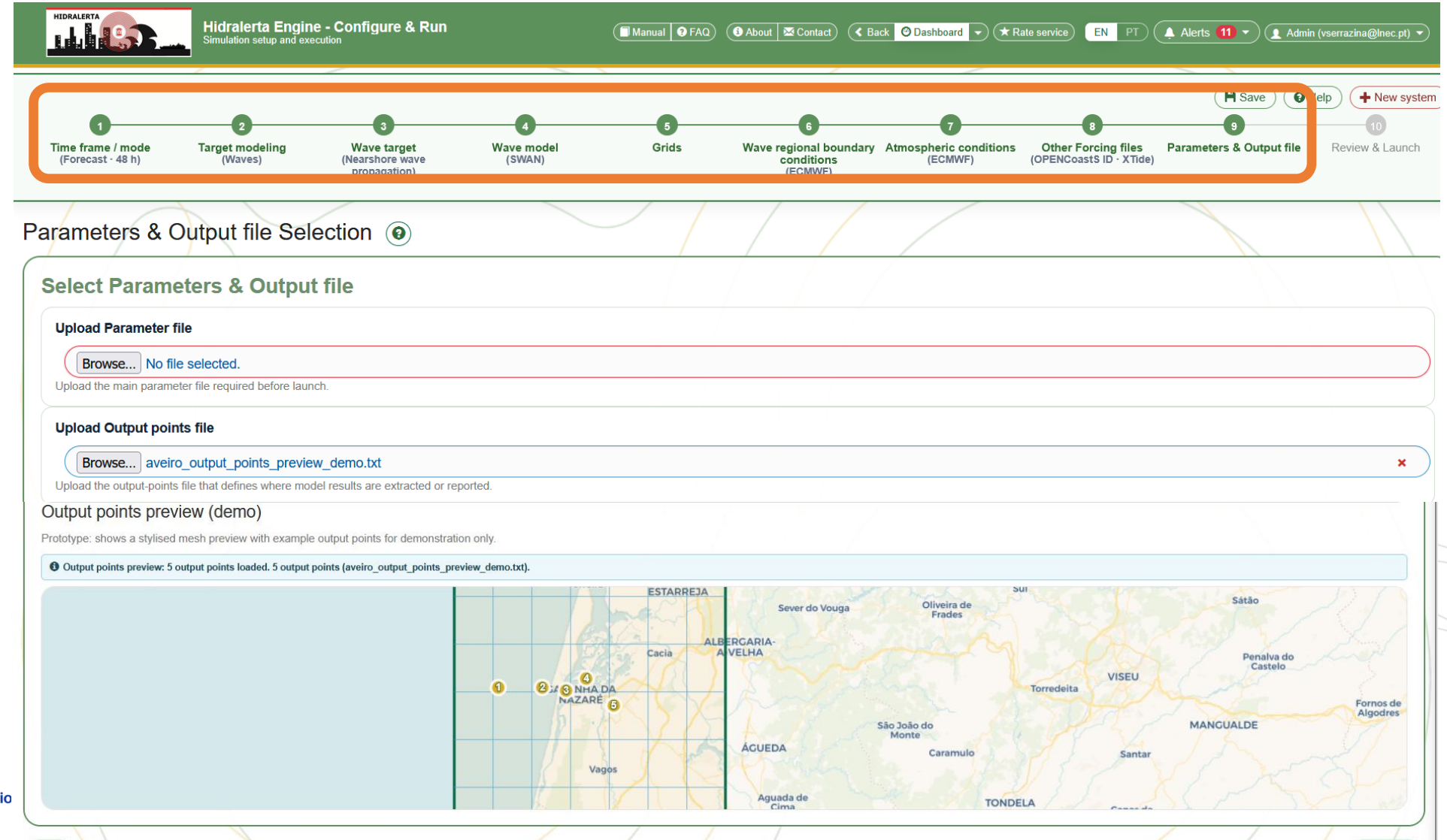

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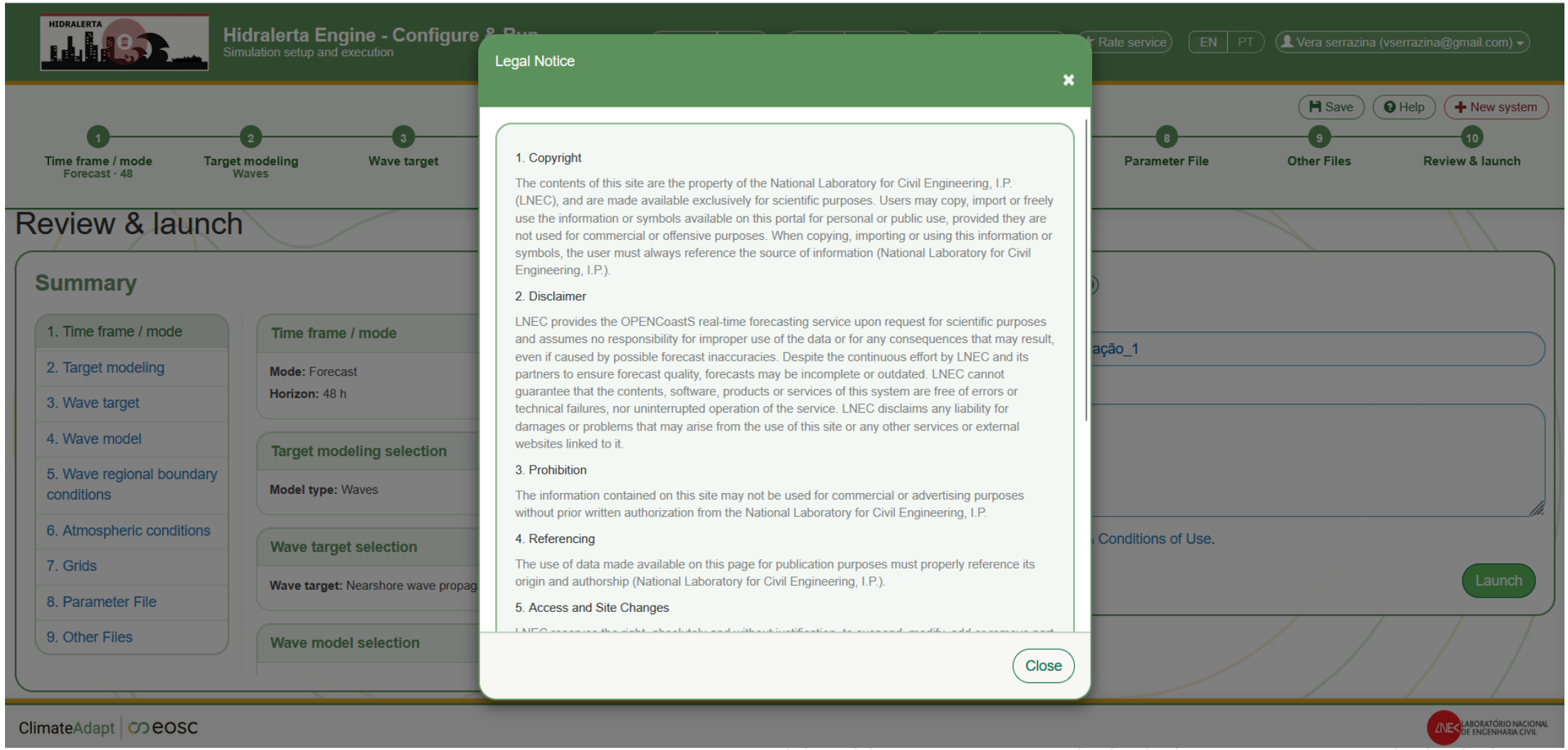

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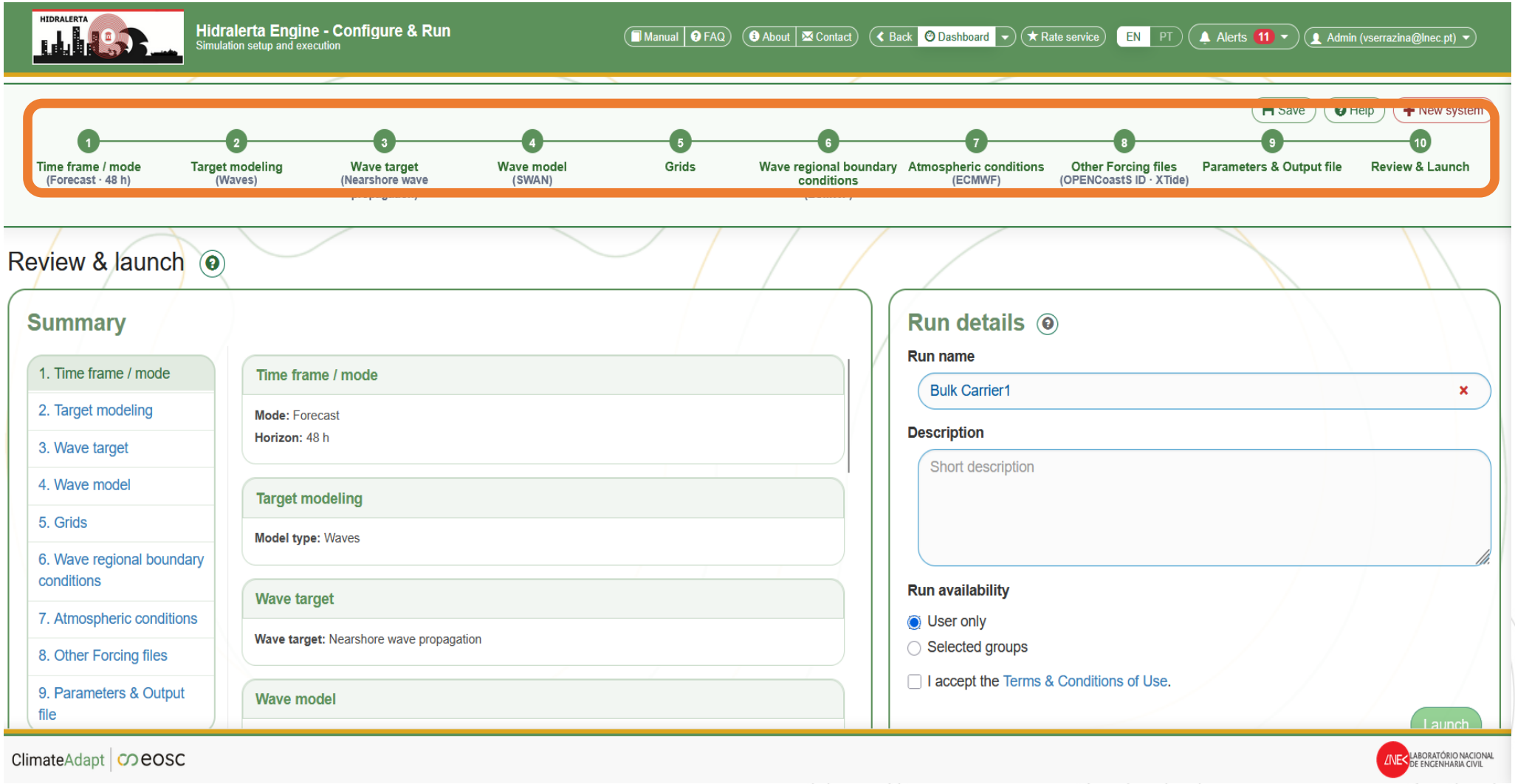

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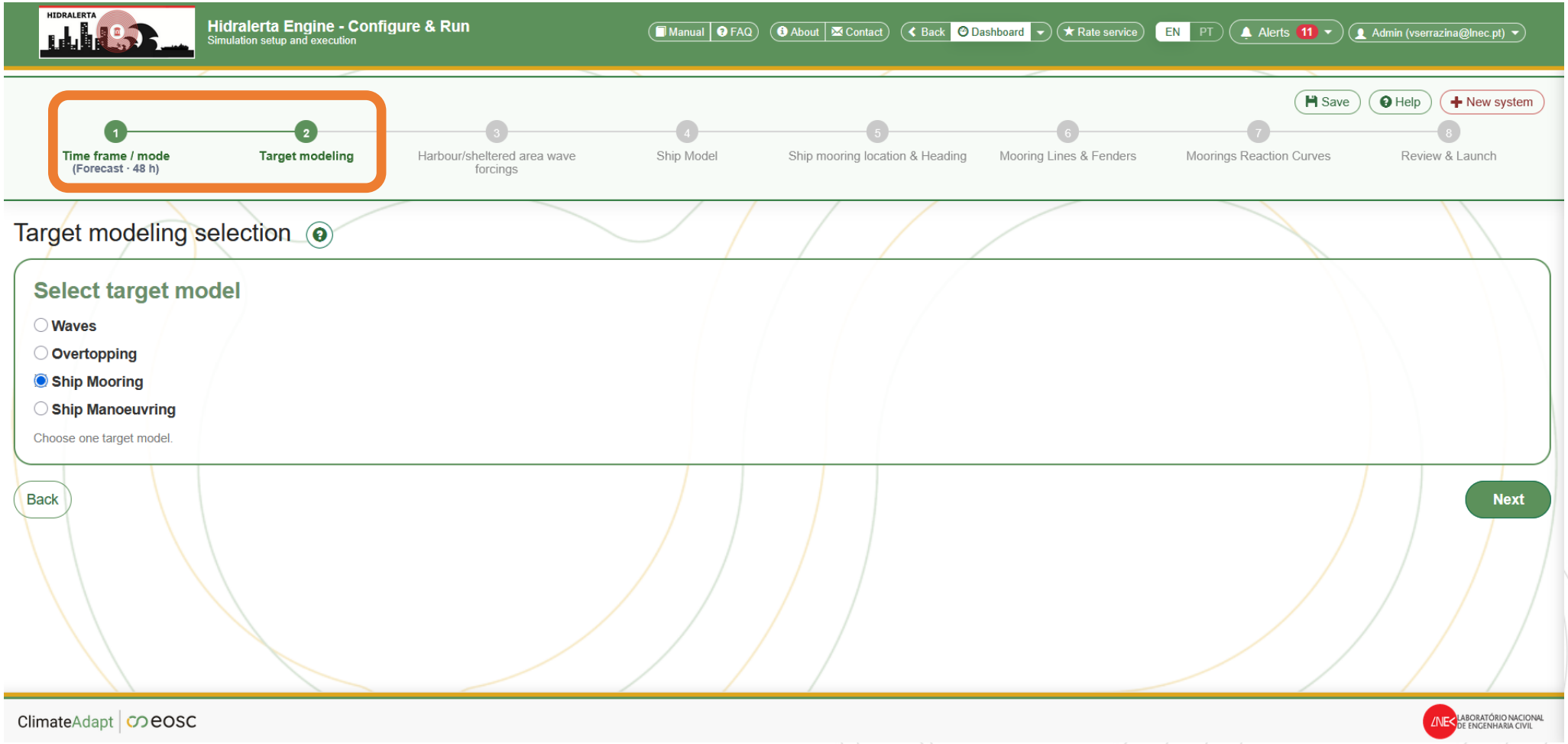

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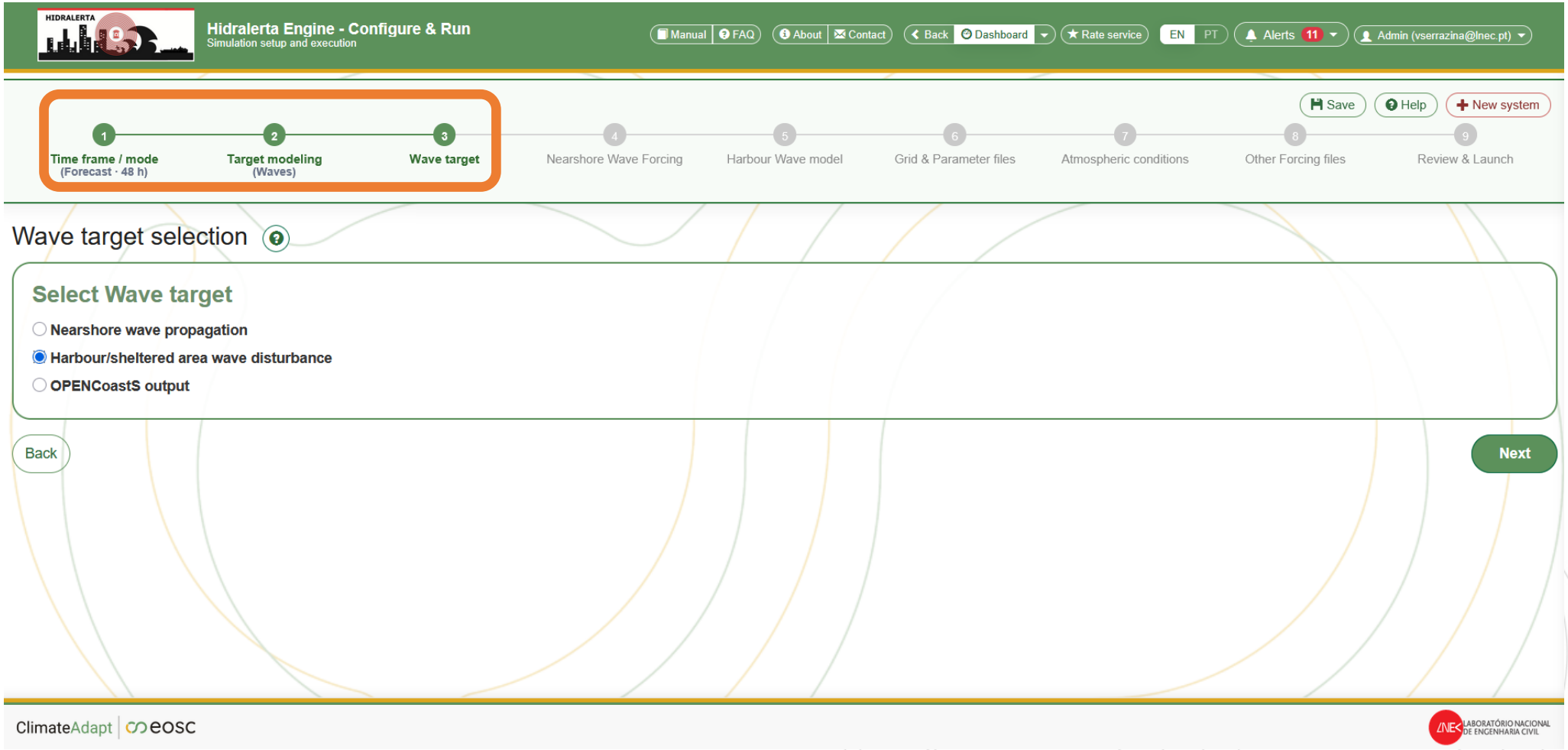

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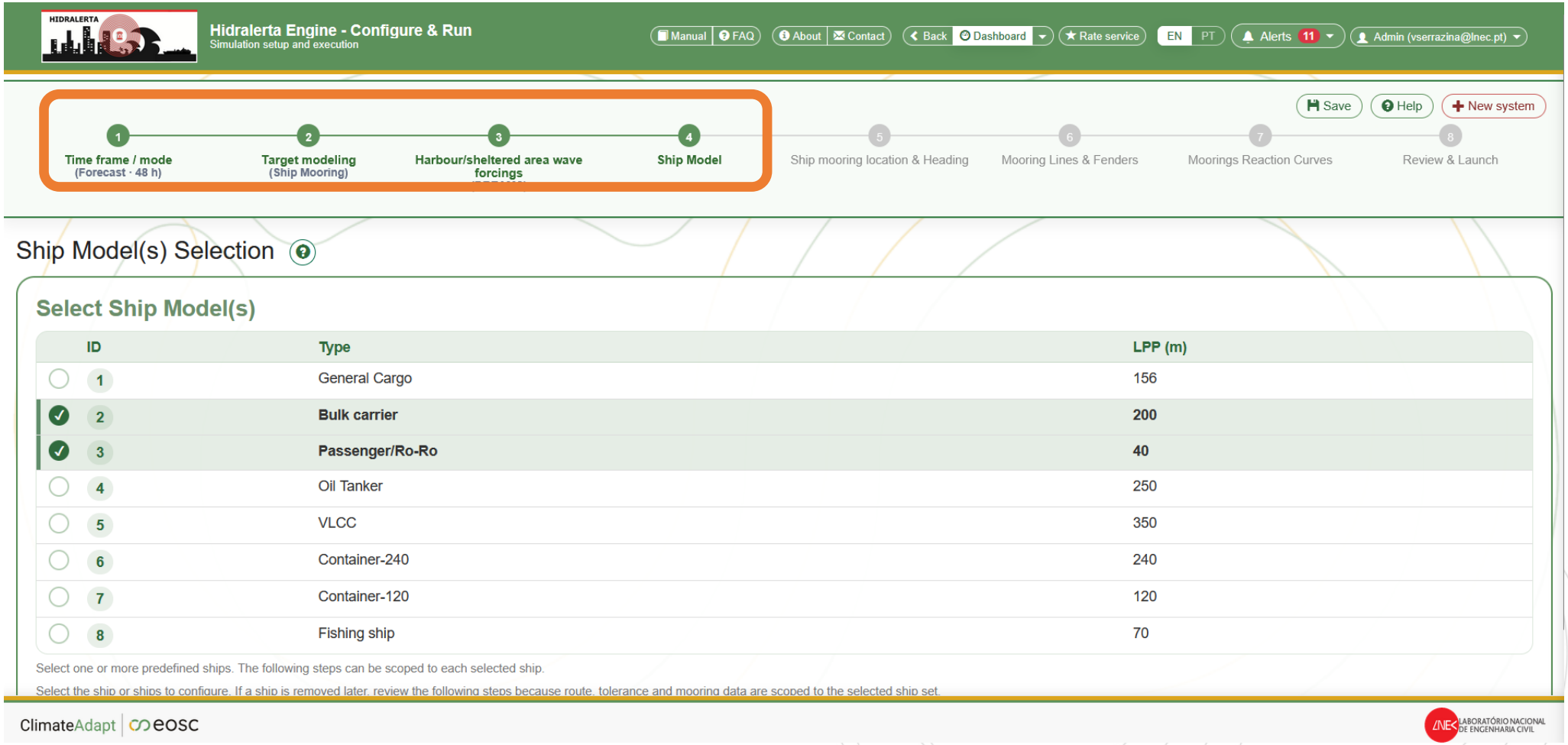

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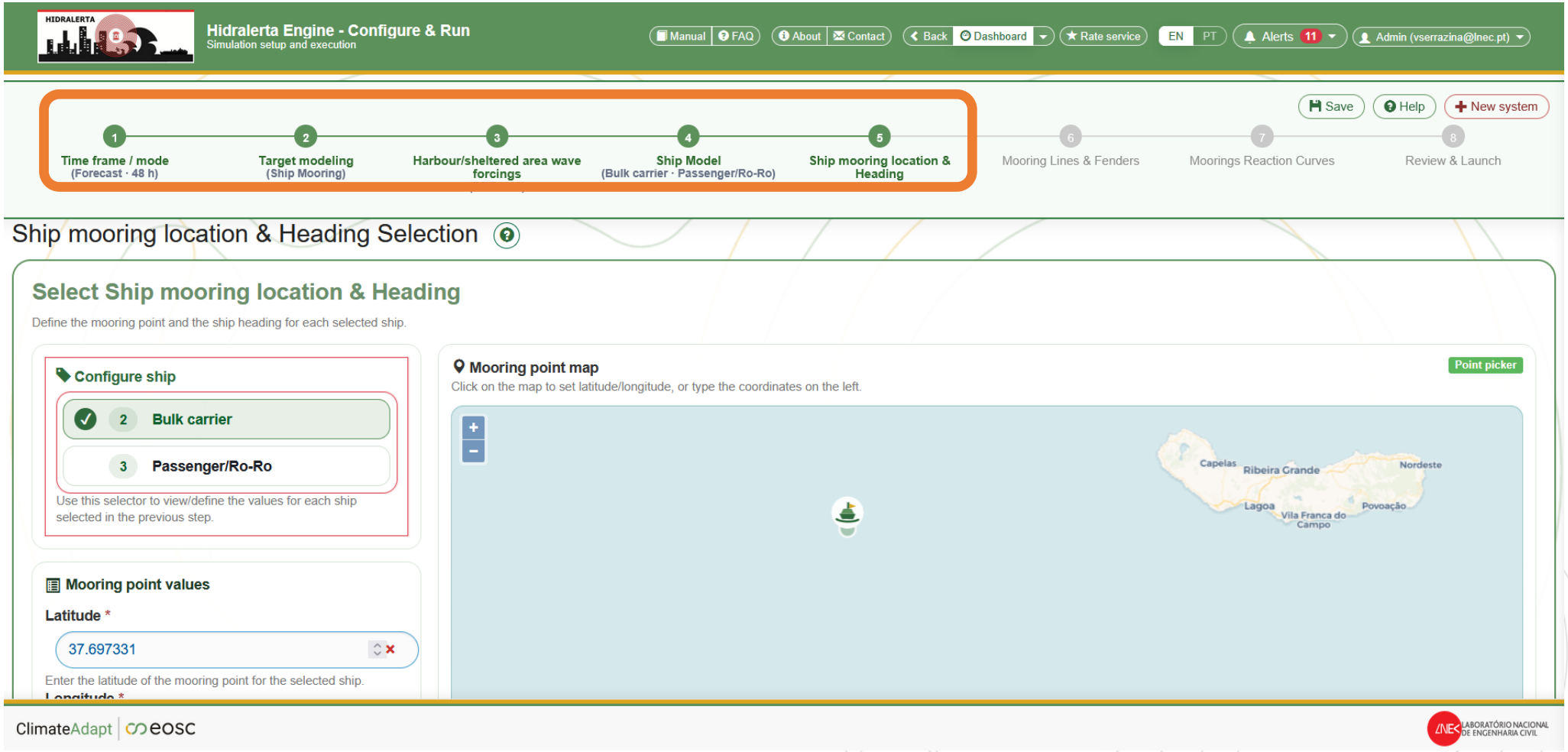

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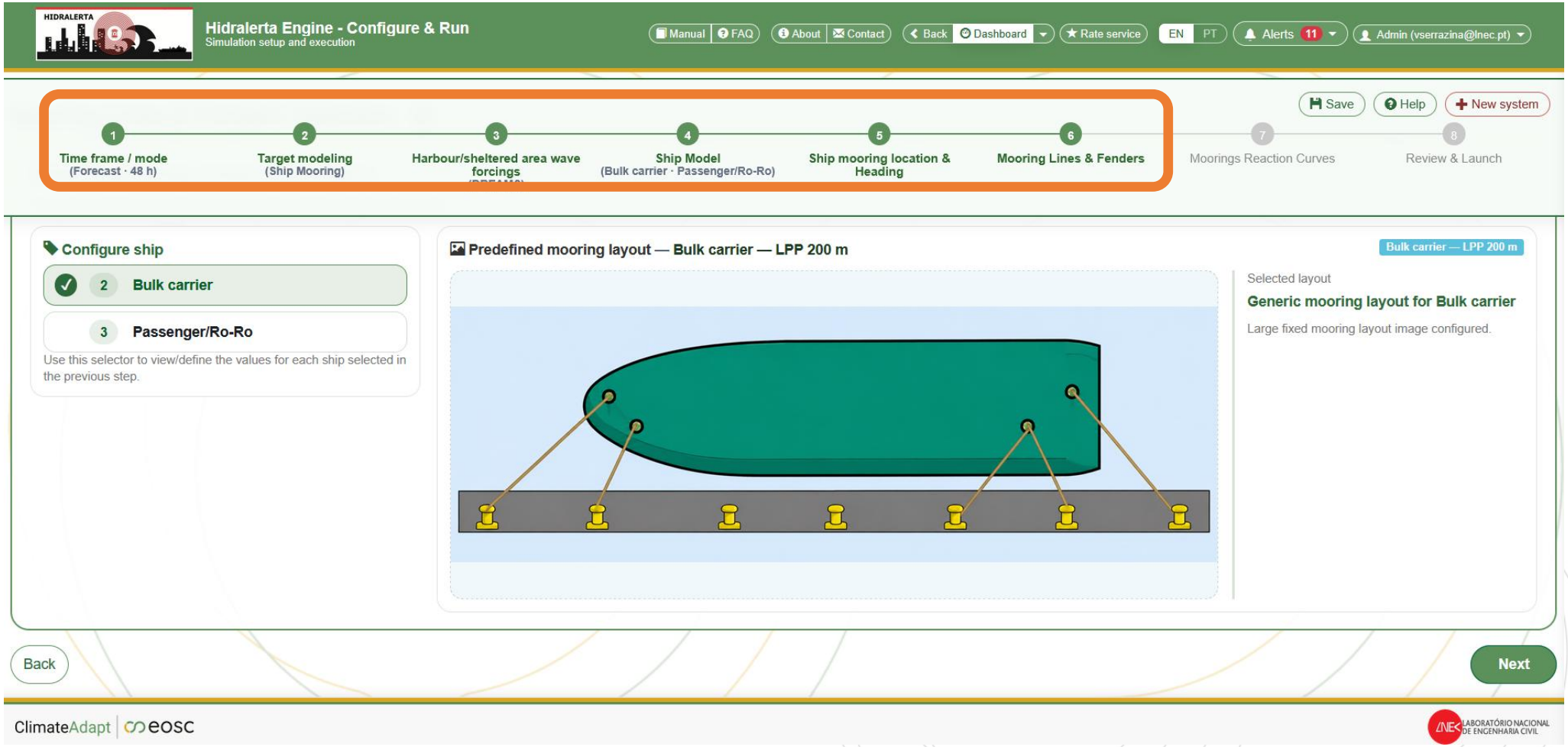

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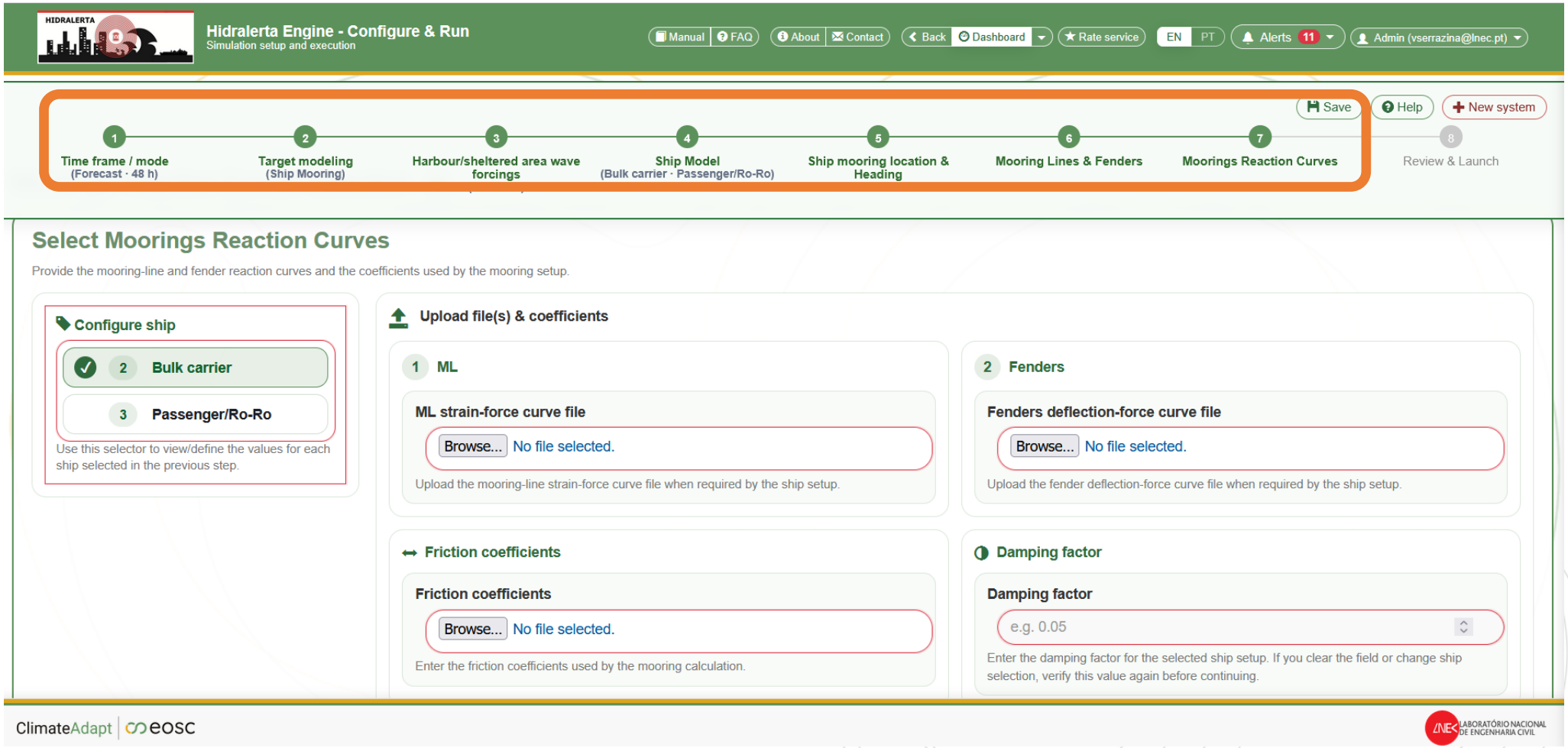

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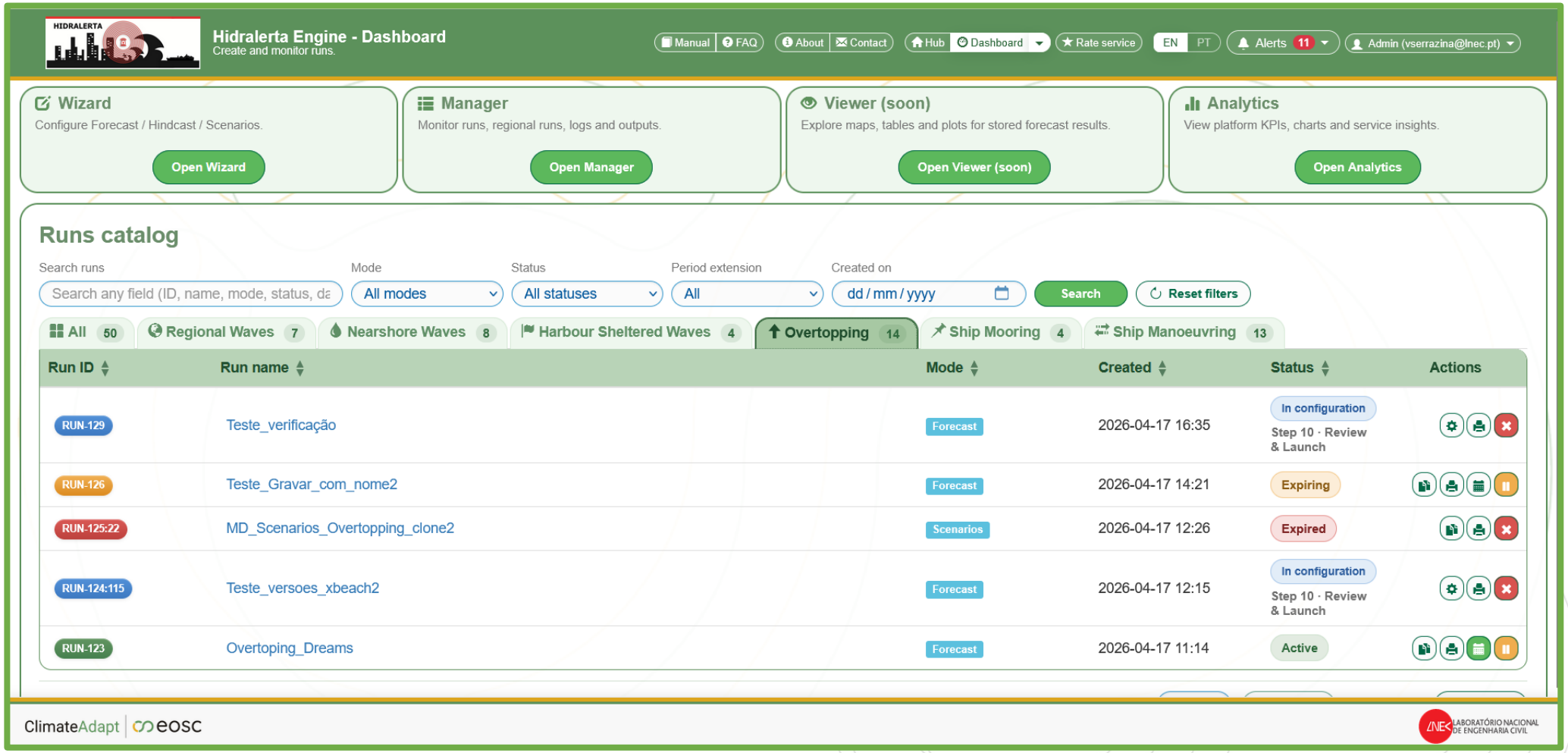

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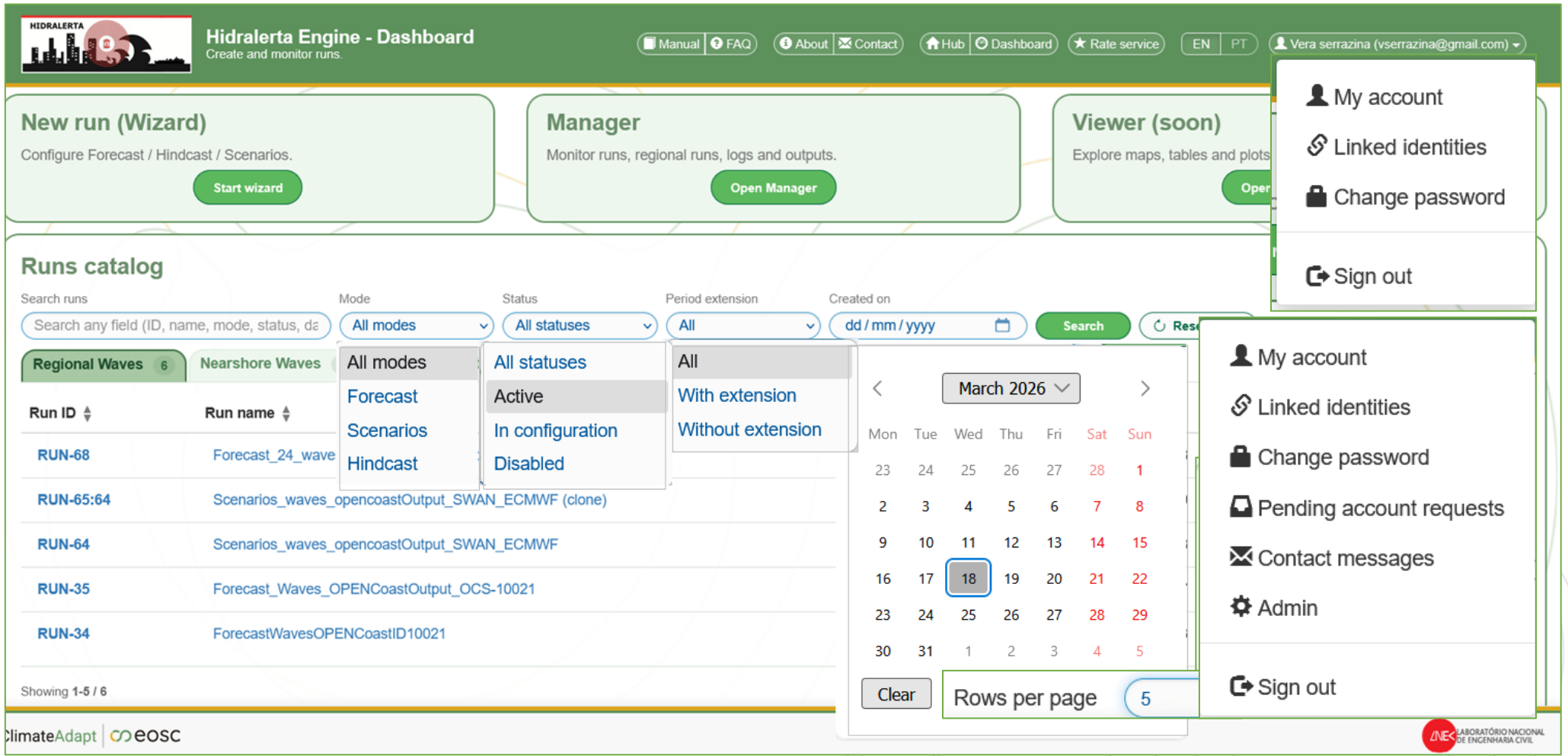

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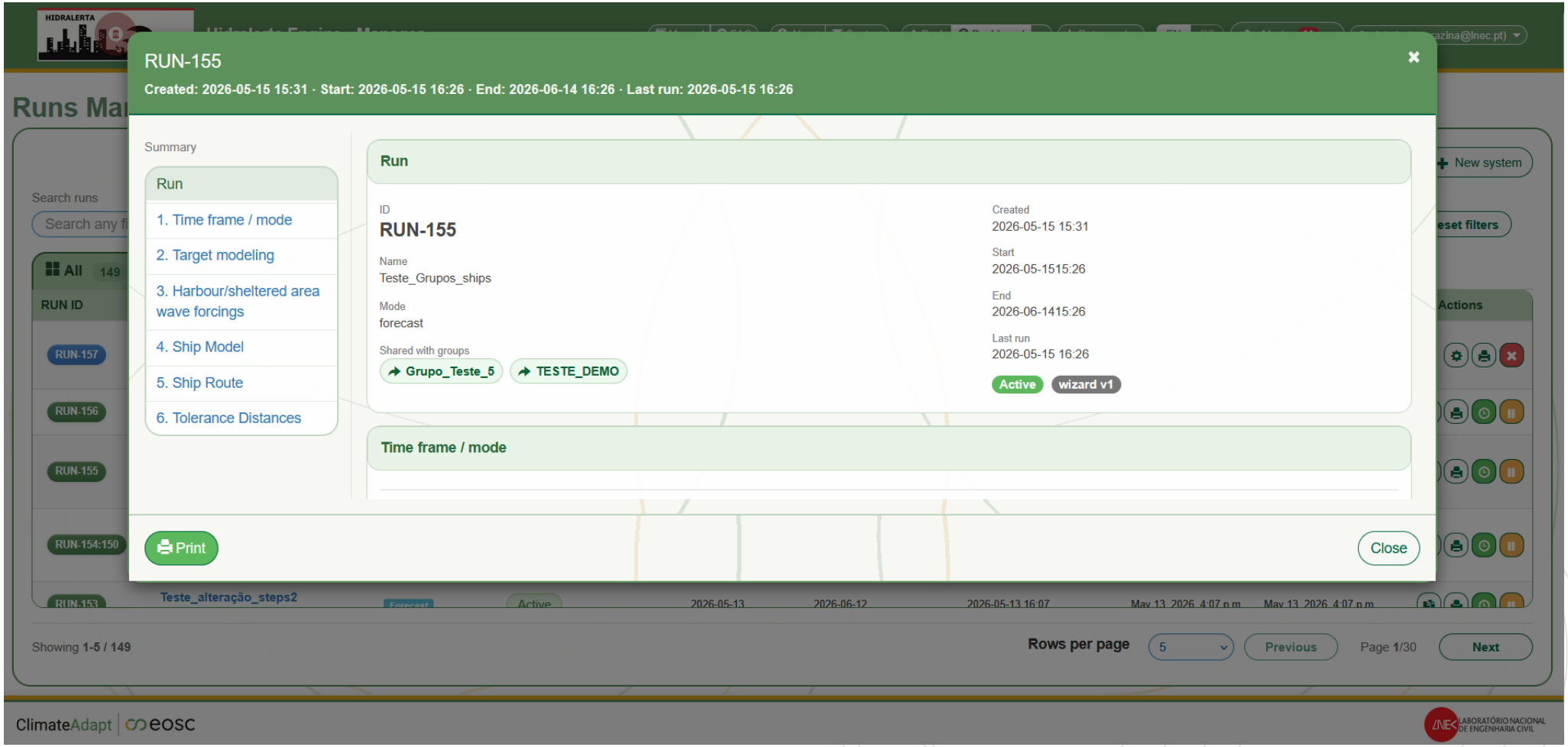

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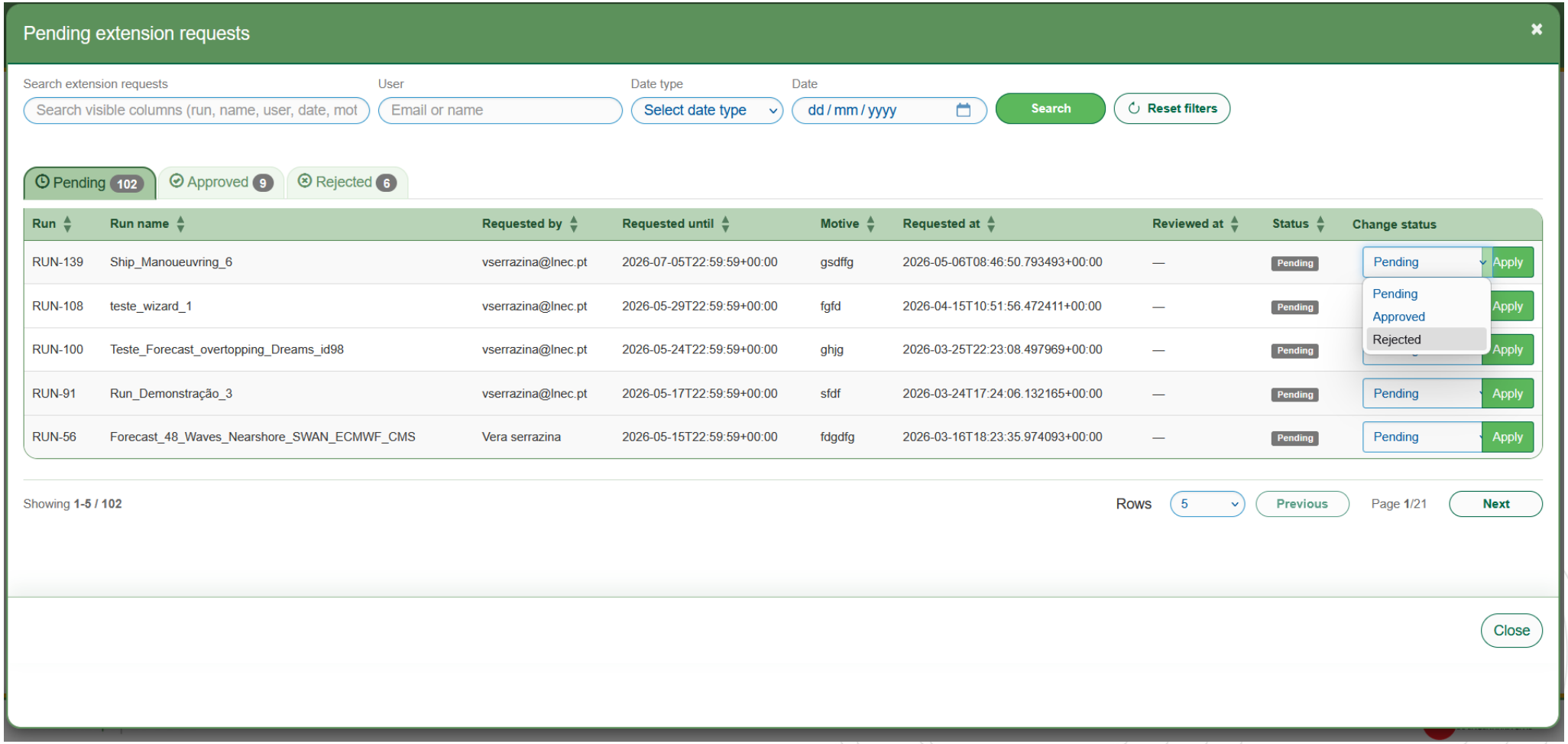

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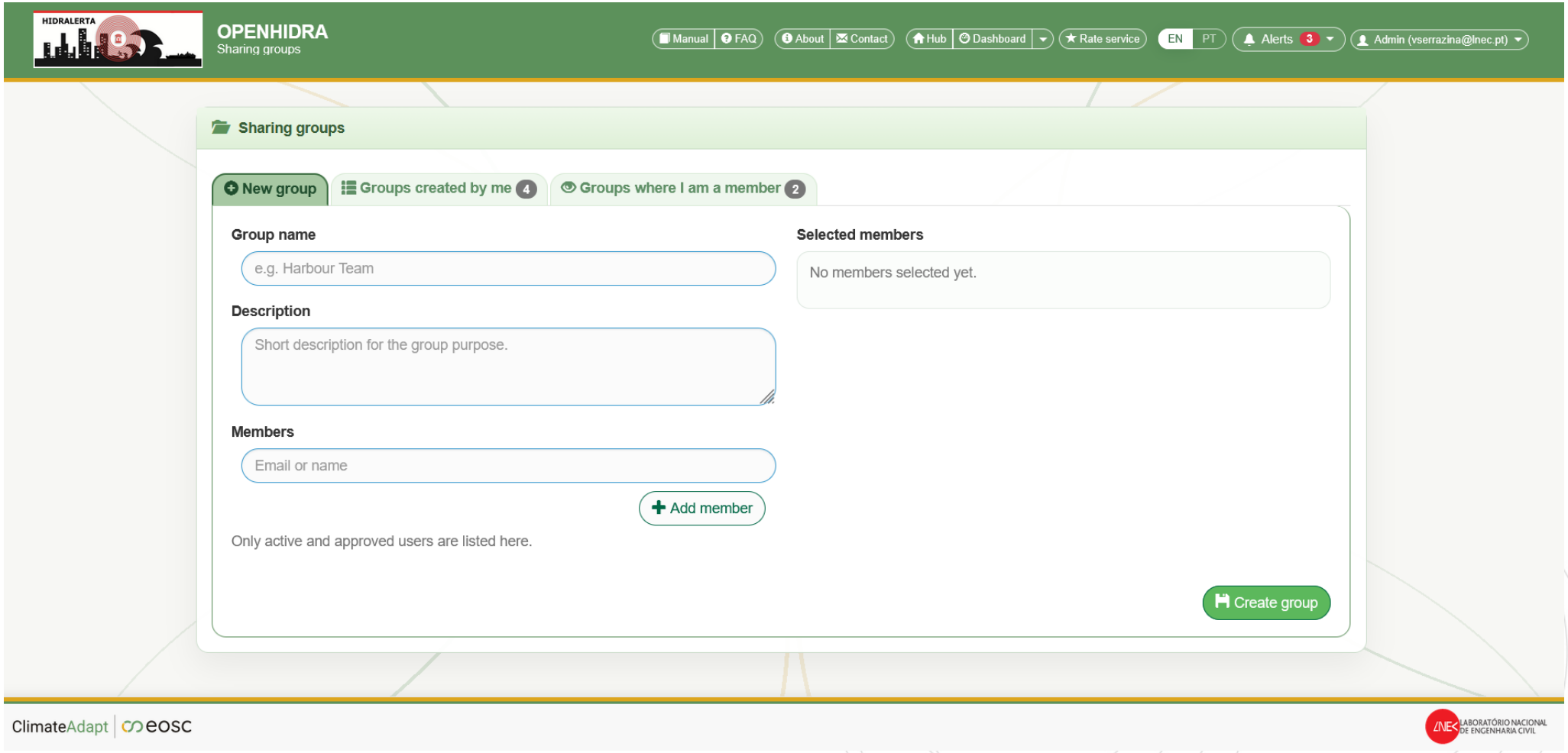

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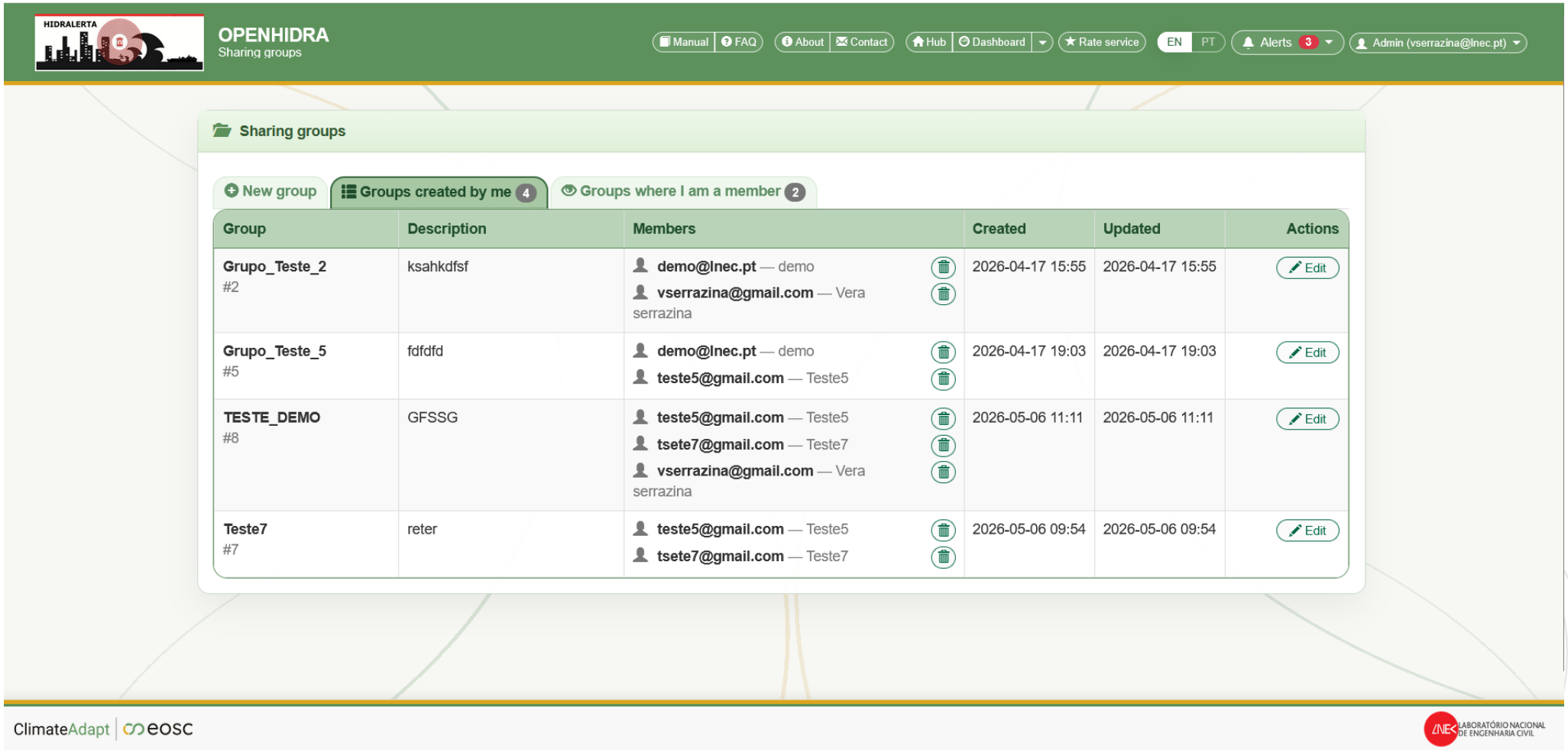

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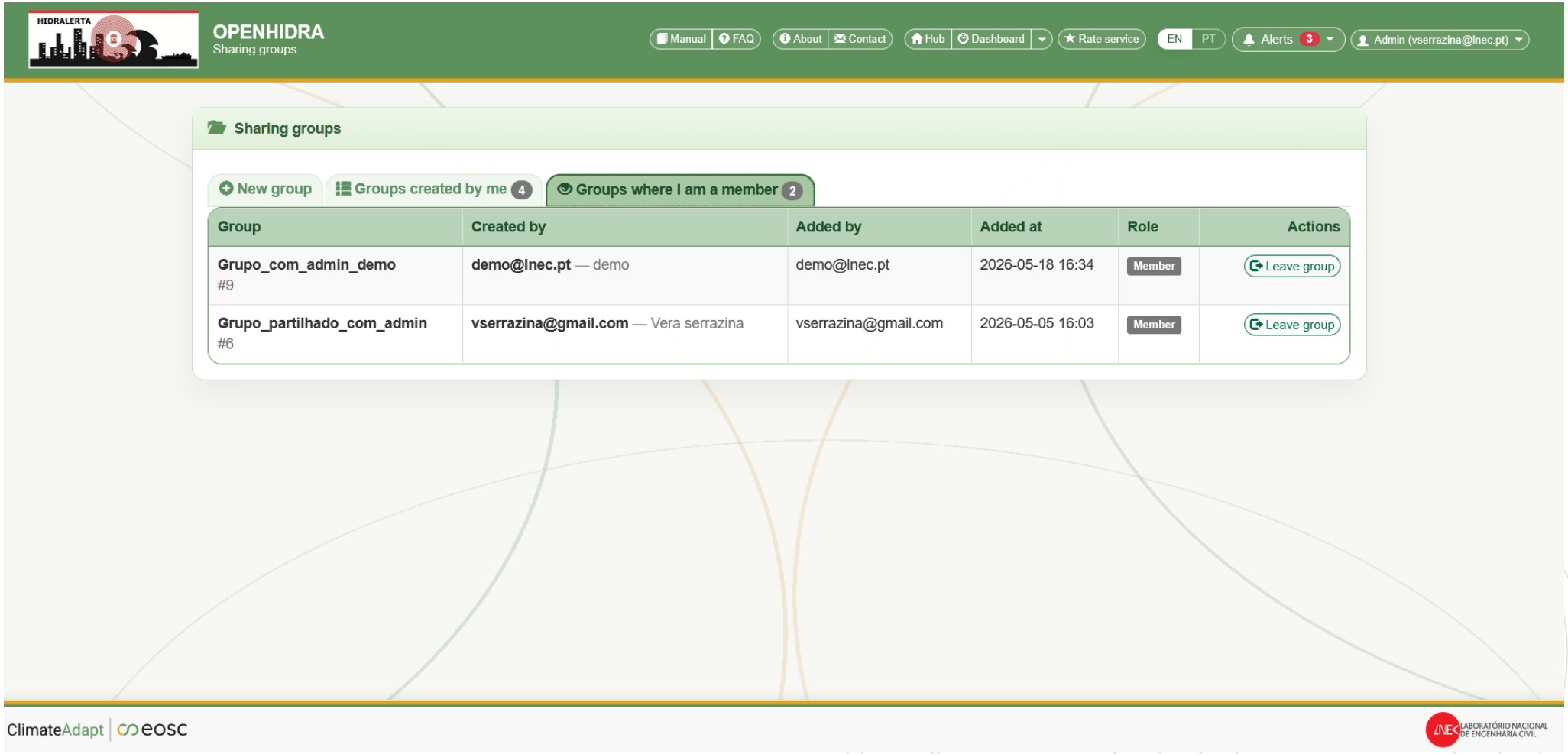

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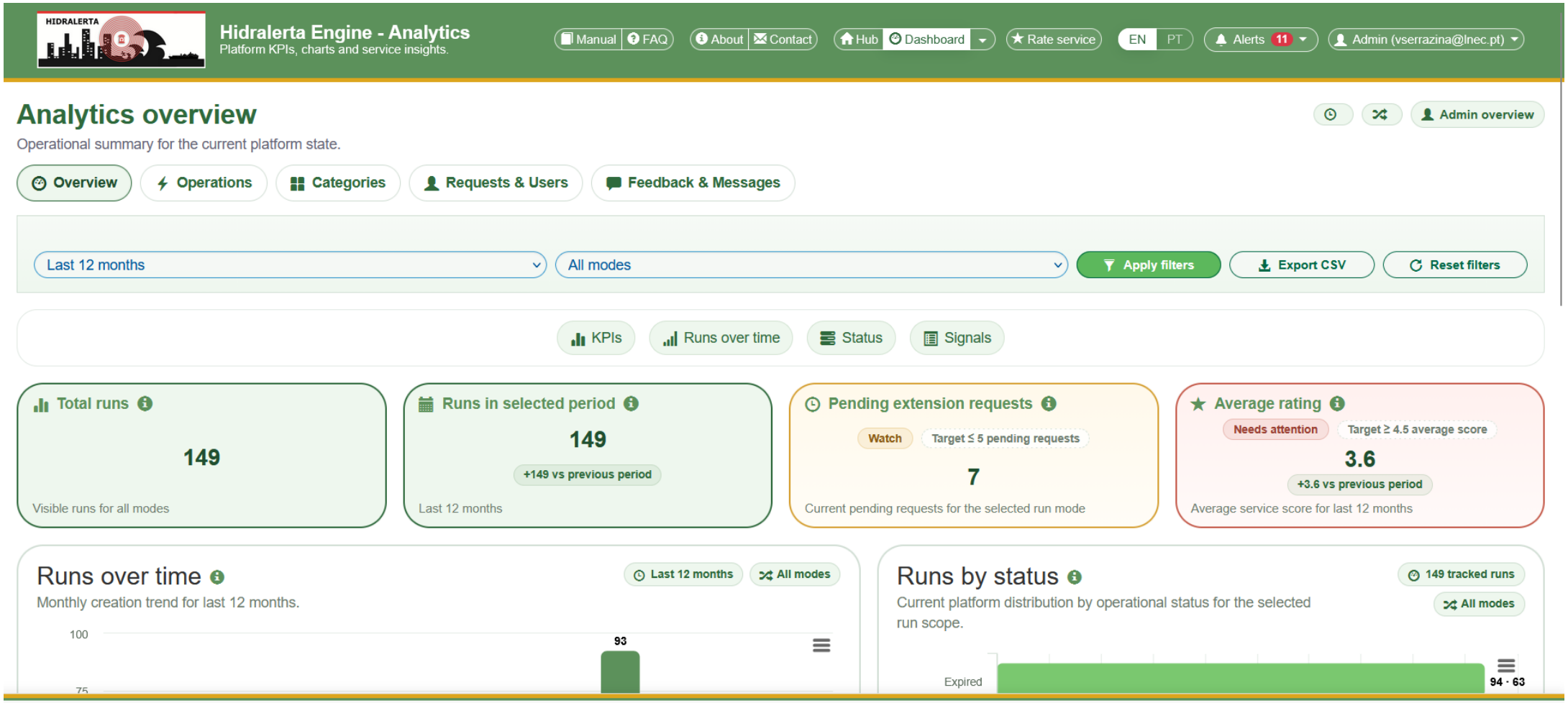

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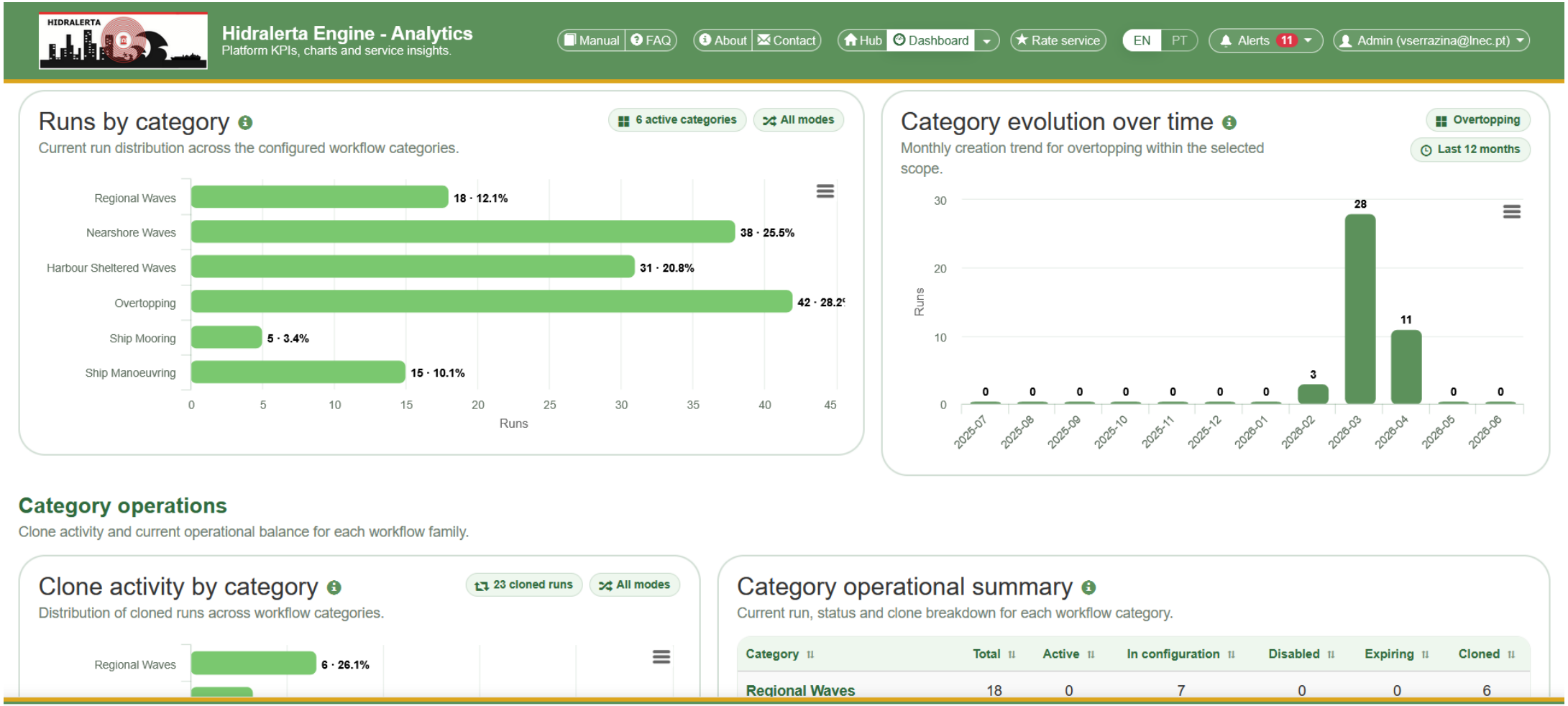

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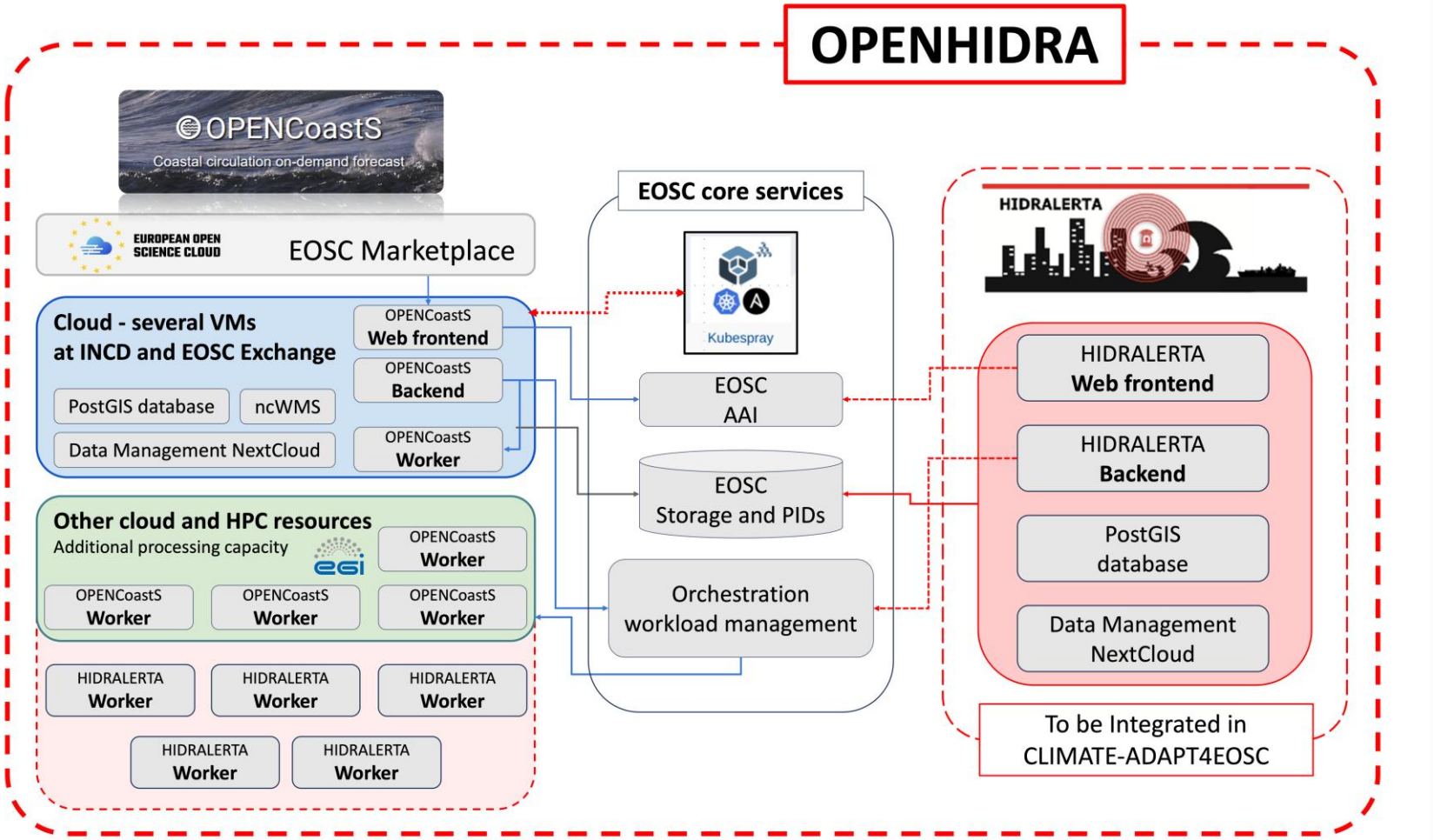
EOSC services adaptation and infrastructure integration

- AAI Federated Authentication
- Storage and PIDs
- Orchestration and workload balance
- Data management



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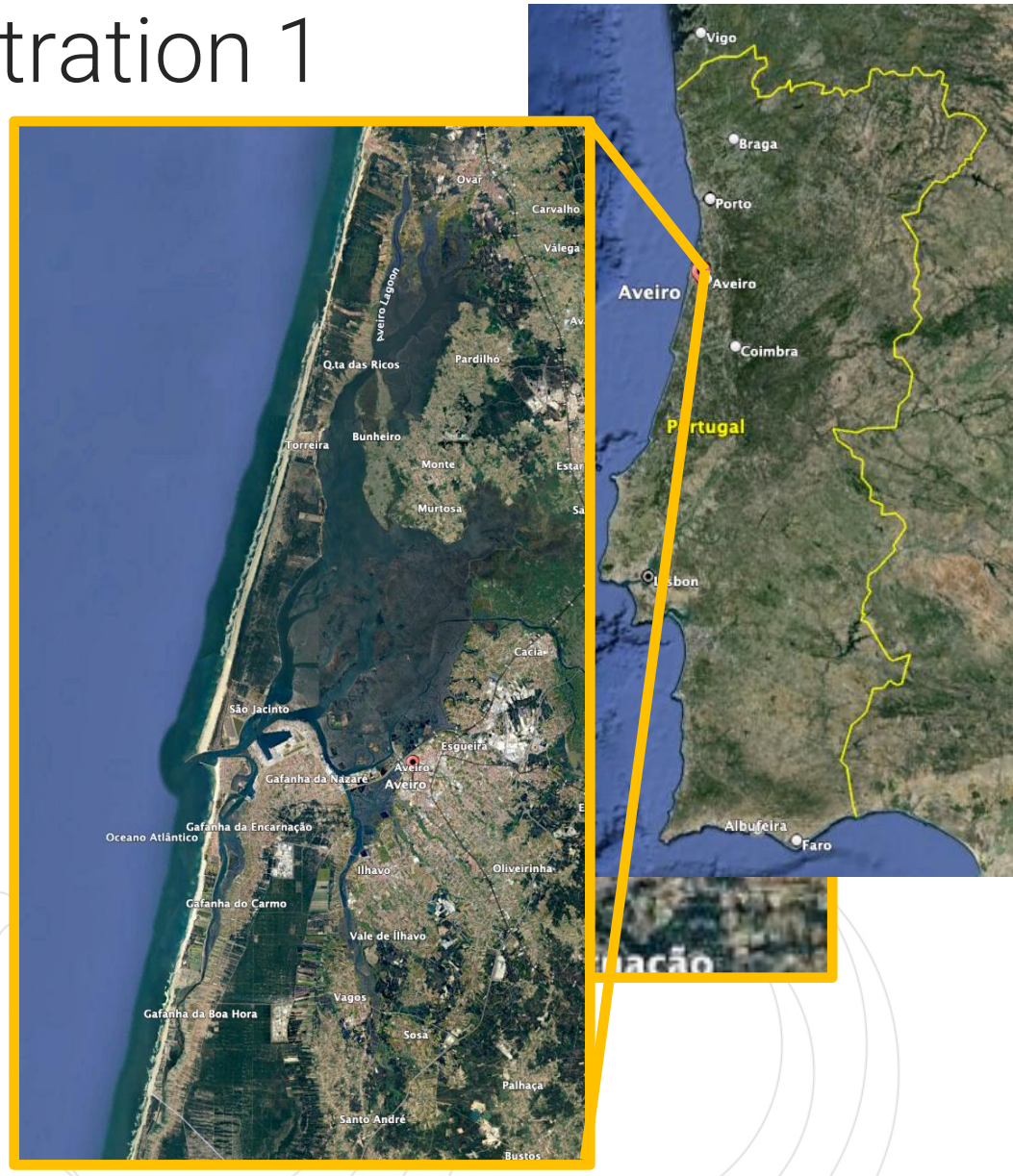
Aveiro - UC2's Region of Demonstration 1

Climate Change & Coastal Hazards

- Coastal areas are highly vulnerable to sea-level rise, storm surges, erosion, recurring road flooding, and damage to coastal infrastructure
- As a direct result, beach erosion negatively impacts tourism

Port hazards

- Port activities and navigation routes are affected by sedimentation due to accretion events and extreme weather conditions
- The overtopping of port infrastructure has frequently caused operational challenges
- Navigation and mooring issues lead to significant economic losses



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Replicators

Replicator PT-1/2 (Demonstration round 2): Ports of Piraeus and Rhodes, Greece

- **Port of Piraeus:** The service will provide the port with detailed hydrodynamic conditions and wave disturbance data to improve climate adaptation planning and protect maritime operations and economic assets.
- **Port of Rhodes:** The service will provide wind and wave data for climate adaptation planning, ensuring uninterrupted port operations and protecting the supply chains critical to the island, while demonstrating how targeted strategies safeguard vital infrastructure in isolated areas.
- Several meetings were held with the NOA partner, who already sent valuable information for each port. However, they are still having difficulty finding specific information about the ports and vessels.

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Replicators

Replicator PT-3 (Demonstration round 3): Port of Dunkirk, France

- As the 7th largest port in the North Sea, the Port of Dunkirk plays a pivotal role in European trade and logistics. Replicating the Aveiro Lagoon use case in Dunkirk offers insights into addressing the distinct meteo-oceanographic conditions of the North Sea region.
- This replication serves as a model for enhancing the resilience of European ports against the impacts of climate change, ensuring continuity in maritime operations and supply chains.
- Initial contact has been made with the Artelia partner to retrieve all the data needed for this replicator. **However, some meetings need to be rescheduled to reengage with the Artelia team and proceed with preparation of the Dunkirk replicator.**

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Future work

- Start of WP5, covering the Demonstrators and Replicators
- Implementation of the Climate Change Scenarios in OPENHIDRA (and in the respective OPENCoastS and HIDRALERTA services)
- Preparation of the Dunkirk replicator
- Implementation of the FAIRification methodologies and tools

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Thank You!

Team:

Alberto Azevedo, Alphonse Nahon, Ana Catarina Zózimo, Anabela Oliveira,

André Fortunato, António Antunes, Conceição Fortes, Gonçalo Jesus,

Liliana Pinheiro, Luís Portela, Ricardo Martins, Rui Capitão, Vera Serrazina

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Shrink-Swell from Space2Earth Service (3SES)

ARTELIA-CSTB-BRGM-DATA4

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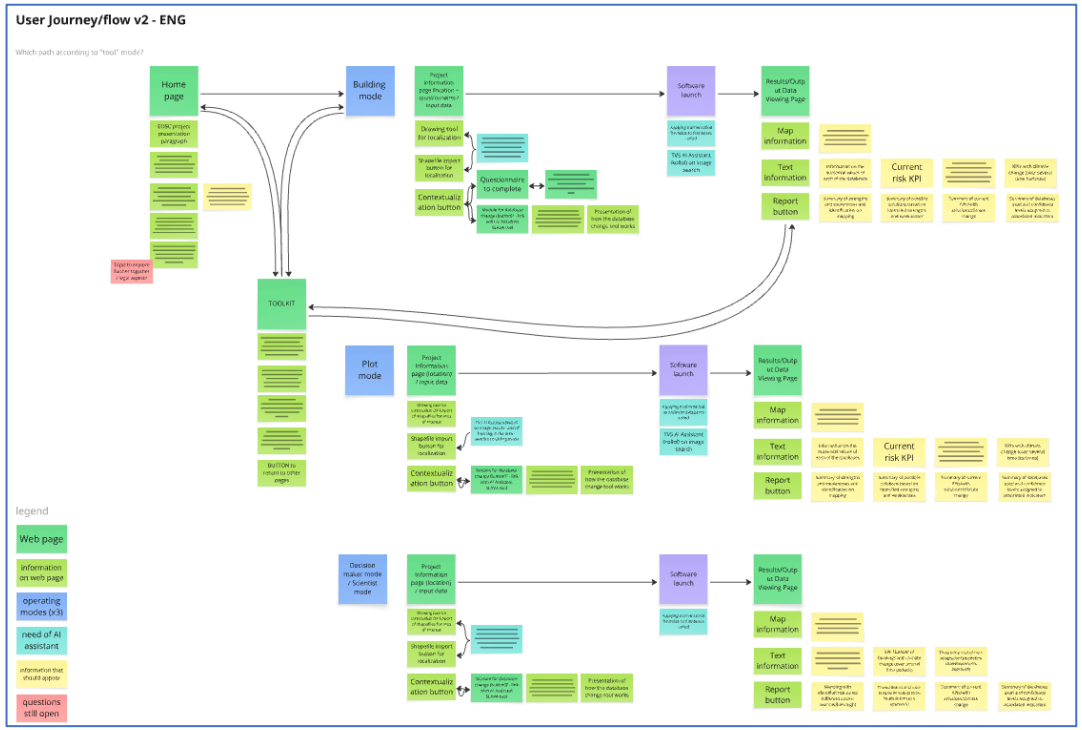
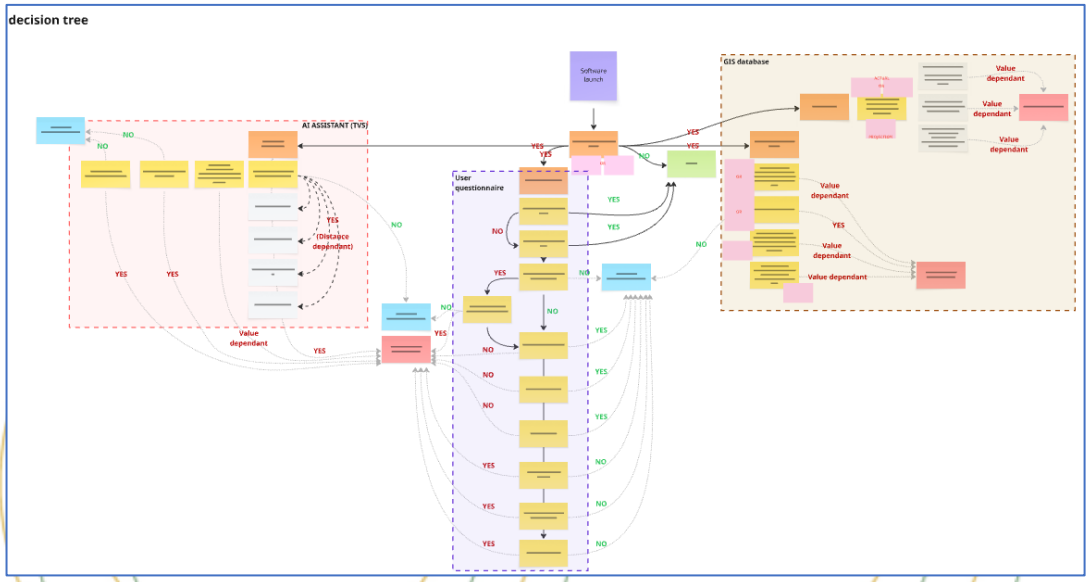
Key developments since Aveiro

- **Operational development : Analysis of the influence of different factors** (in particular, understanding the climatic parameters that could bring clay shrinkage and swelling) :
  - Determining parameters on a first set of municipalities and replicating them on a second (work carried out by Alice and Rosalie)
  - Consolidation in progress on more than 5,000 municipalities (work carried out by Lydie)
- **Service development** : Configuration and clarification of **service requirements** (User journey, decision tree, etc. **see MIRO** (3SES service – Miro)
- **Demo Version and Mock Up** : work carried out by Novitopia (Gökhan and colleagues) with the participation of TVS (AI Assistant - Kollol and colleagues)





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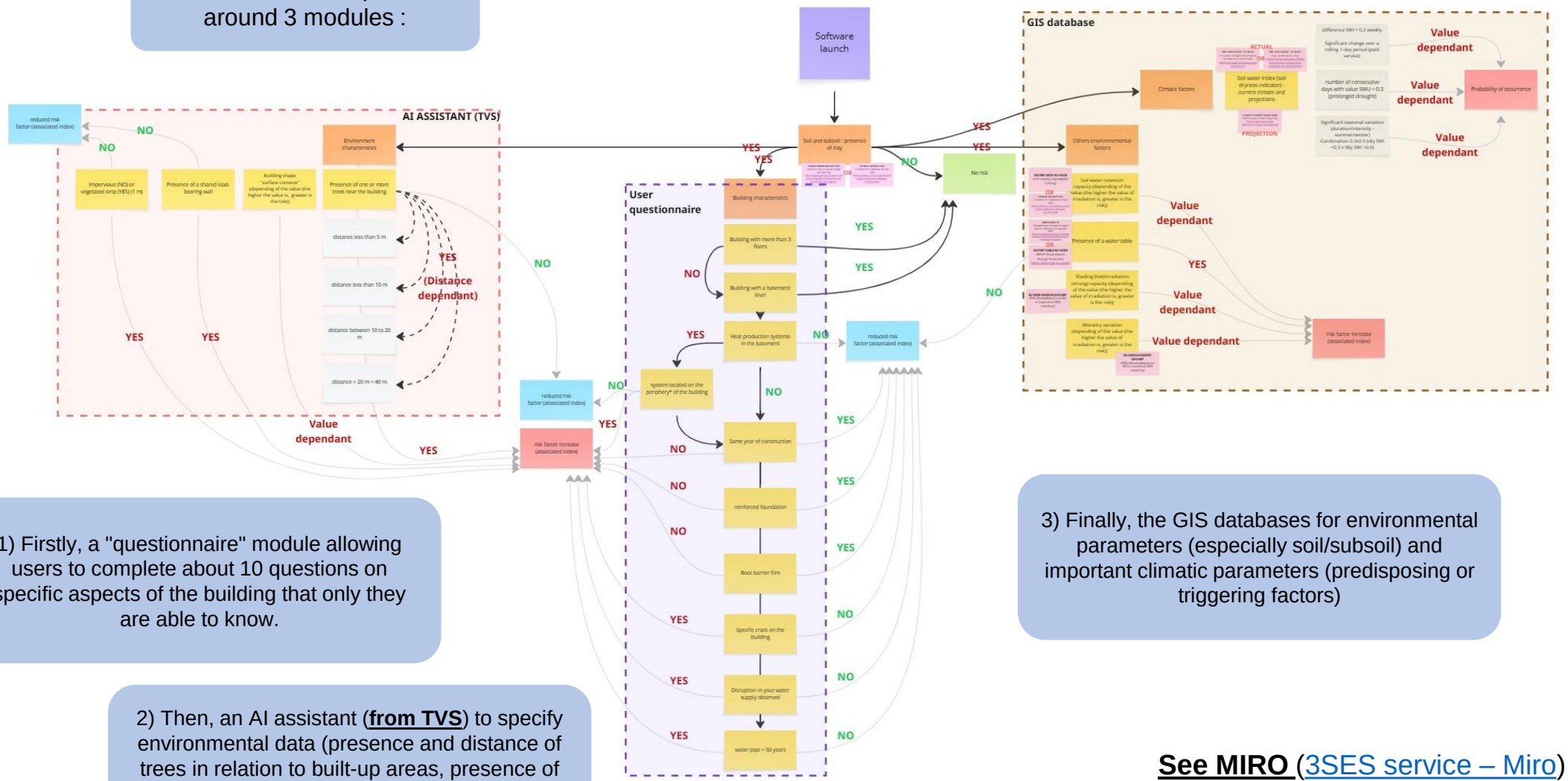
decision tree

The service will operate around 3 modules :



1) Firstly, a "questionnaire" module allowing users to complete about 10 questions on specific aspects of the building that only they are able to know.

2) Then, an AI assistant (**from TVS**) to specify environmental data (presence and distance of trees in relation to built-up areas, presence of permeable zones, definition of building shape coefficient)

3) Finally, the GIS databases for environmental parameters (especially soil/subsoil) and important climatic parameters (predisposing or triggering factors)

See MIRO (3SES service – Miro)

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Influence of climatic factors

We believe we have identified the key elements we were looking for: 3 meteorological criteria governing the risk of clay shrinkage and swelling *(work carried out by Rosalie and Alice)* :

- Number of days with **SWI* < 0.3** x Number of days **SWI > 0.9**
- Number of **days with SWI < 0.3**
- **Weekly pattern** (SWI +/- 0.2)

➔ **67%** of the occurrences of the clay shrink swell can be explained by at least one of these criteria in in Bourgogne (first study area)

➔ It's **more than 82%** in the second study area : Occitanie.

Bourgogne exemple

1st dynamic

2nd dynamic

3rd dynamic

Relation found (0 (no)/ 1 (Yes)) for years with disorder

City	Cohorte	Year of CatNat order	Identified cause ?	Nb days SWI < 0.3 x Nb days SWI > 0.9	Rank max - min	Nb days SWI < 0.3	Rang max - min2	Weekly pattern ?
Cudot	1	2018	1	7535	2			
Cudot	1	2019	1	2444	14		1	
Cudot	1		1	1040	24	104	8	YES
Saint-Martin-d'Ordon	1		1	9384	1	138	2	NO
Saint-Martin-d'Ordon	1		1	2772	16	99	11	YES
Vergigny	1		1	13400	1	134	4	NO
Vergigny	1		1	0	41	100	16	YES
Villechétive	1	2018	1	6804	2	108	6	NO
Villechétive	1	2019	1	1824	13	96	11	NO
Auxerre	3	1989	1	0	38	111	7	NO
Auxerre	3	1990	1	111	36	111	7	NO
Auxerre	3	1991	1	2139	21	93	14	YES
Auxerre	3	1992	0	1008	24	63	22	NO
Auxerre	3	1993	1	840	26	42	27	YES
Auxerre	3	1994	0	0	38	0	40	NO
Auxerre	3	1995	0	99	37	1	39	NO
Auxerre	3	1996	1	10100	2	100	9	YES
Auxerre	3	1997	0	420	32	10	32	NO
Auxerre	3	1998	0	2346	20	46	25	NO
Auxerre	3	2003	1	6251	6	133	3	NO
Auxerre	3	2011	0	2784	18	96	12	NO
Auxerre	3	2018	1	12257	1	119	6	NO
Auxerre	3	2019	0	4840	12	88	18	NO
Auxerre	3	2020	1	7857	3	97	11	YES
Auxerre	3	2022	1	828	27	92	16	YES
Chevannes	3	1989	0	420	32	105	8	NO
Chevannes	3	1993	1	945	26	35	30	YES
Chevannes	3	2003	1	6030	6	134	3	NO
Chevannes	3	2011	0	2528	20	79	19	NO
Chevannes	3	2018	1	12064	1	116	6	NO
Chevannes	3	2019	0	5152	12	92	12	NO
Chevannes	3	2020	1	7872	3	96	10	YES
Chevannes	3	2022	1	900	27	90	15	YES
Monéteau	3	1988	1	0	42	124	8	NO
Monéteau	3	1990	1	0	42	131	5	NO
Monéteau	3	1991	0	824	34	103	11	NO
Monéteau	3	1992	0	616	37	77	21	NO
Monéteau	3	1993	1	689	35	53	30	YES
Monéteau	3	1994	0	2288	22	26	38	NO
Monéteau	3	1995	0	2366	21	26	38	NO
Monéteau	3	1996	1	8632	3	104	10	YES
Monéteau	3	1997	0	1260	30	36	36	NO
Monéteau	3	1998	0	2142	23	63	24	NO
Monéteau	3	2003	1	6251	7	133	3	NO
Monéteau	3	2011	1	3024	19	108	9	NO
Monéteau	3	2018	1	12446	1	127	7	NO
Monéteau	3	2019	1	3168	18	99	13	NO
Monéteau	3	2020	1	7700	6	100	12	NO
Monéteau	3	2022	1	0	42	99	13	YES

*SWI : Soil Wetness Index // **years with "Natural Disaster" declarations

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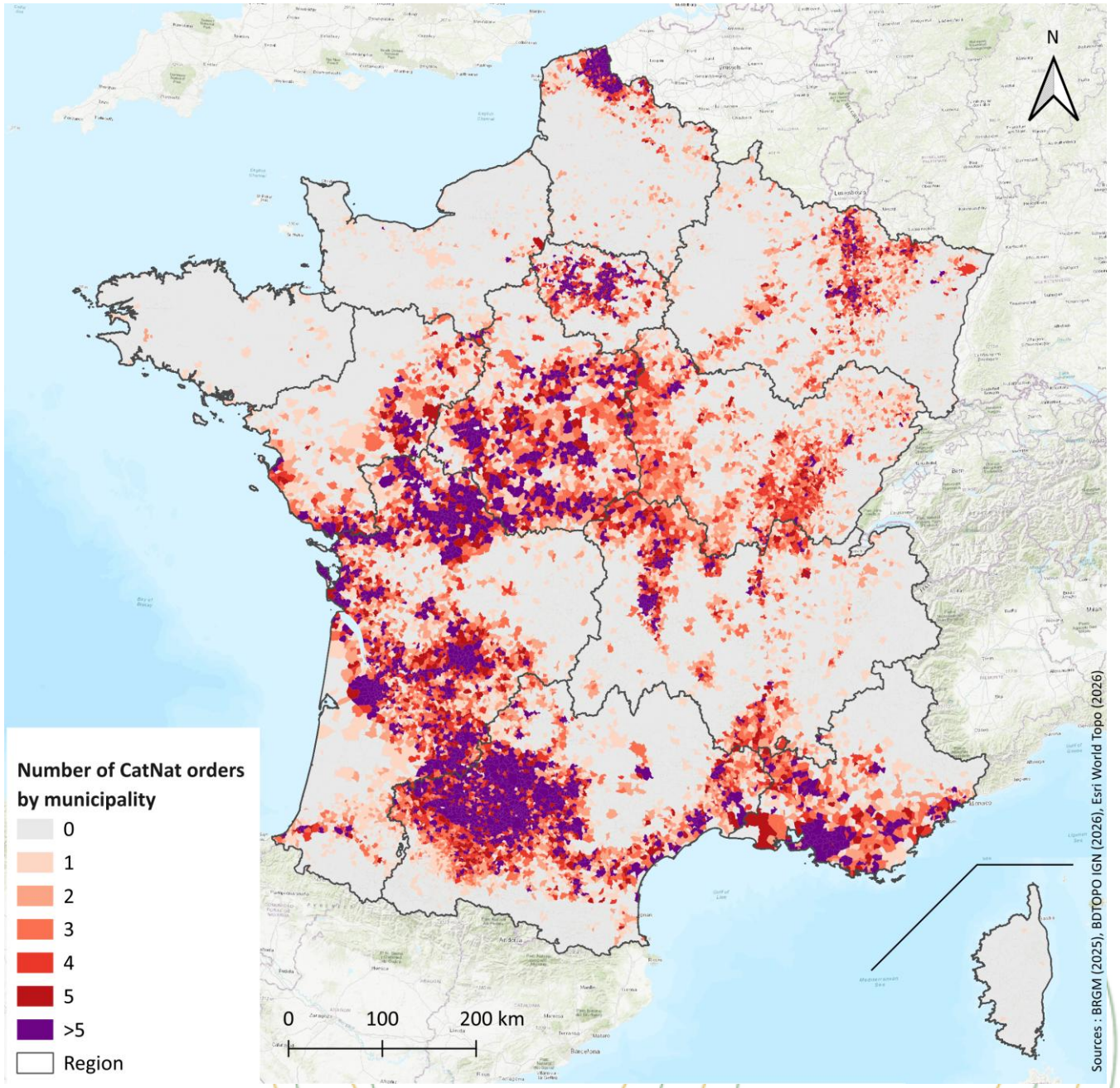
Influence of climatic factors

Next step : French wide scaling up *(work carried out by Lydie)*

- 14 000 municipalities with at least 1 CatNat declaration
- We are going to **work on 5000 of them** spread all over France
- And look for if the **3 criteria can be applied everywhere in France** or if there are climatic regional specificities



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