Issue 2

RESCUER Newsletter

February 2025

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EDITORIAL

Welcome to the second issue of the RESCUER project newsletter!

We are thrilled to celebrate the first successful year of our project! Over this time, we have recruited nearly all our fellows and hosted the first RESCUER training workshop in Bergen, Norway, in December 2024.

We are now organizing our second training workshop, which will be held online, and prepare for our midterm meeting, scheduled to take place in Senigallia, Italy during the second week of May 2025.

The next issue of our newsletter will be published in August 2025 and will be available for download on the RESCUER website: https://www.rescuer-msca.net/.

Stay tuned and happy reading!

The Doctoral Network **RESCUER**

(Resilient Solutions for Coastal, Urban, Estuarine and Riverine Environments)

aims to train 10 young researchers to tackle medium and long term water challenges that face coastal communities, focusing on forecasting and modeling of coastal, riverine, and urban flooding and associated water quality issues.

Funded by the European Union

The project has received funding from the European Union's Horizon Europe research and innovation program under the grant agreement No. 101119437

1st RESCUER Workshop

The first RESCUER training workshop took place from 2–6 December 2024 in Bergen, Norway. It was an intense but highly rewarding experience for our fellows, who actively participated and brought great energy to every session. They enjoyed their time in Bergen, forming strong connections, sharing experiences, and building a collaborative network. United by shared goals, they found inspiration in the core aims of the RESCUER project.

The scientific program was demanding yet enriching, with multiple lectures and assignments each day. A short version of the program is available on the RESCUER website: https://www.rescuer-msca.net/workshop1.

Figure 1: 1st Rescuer workshop, 2-6 December 2024, Bergen, Norway

The workshop's lectures covered a broad range of topics, primarily focused on wave modeling:

- **Prof. Volker Roeber (UPPA)** delivered lectures on *Free Surface Wave Modeling*, covering essential mathematical foundations, modeling considerations, and numerical techniques for nearshore wave models. He provided a detailed review of state-of-the-art shallow water, Boussinesq, and spectral models, complemented by practical applications and exercises.
- **Prof. Magnus Svärd (UiB)** focused on *Numerical Theory for Evolution Equations*, discussing key concepts such as stability, consistency, and convergence across various numerical methods.
- **Prof. Henrik Kalisch (UiB)**, the project leader, lectured on the *Mathematical Theory of Wave Models*, addressing fundamental aspects like existence, uniqueness, and stability.

The feedback from participants was overwhelmingly positive, with many noting how the lectures provided a robust foundation for their future work within RESCUER.

Figure 2: Day 3 of the workshop

Meet RESCUER's Fellows

Figure 3: The Fellows!

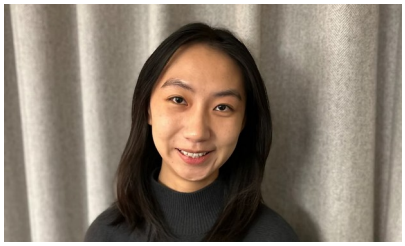
The heart of the RESCUER project lies in its talented and diverse team of fellows. Each brings unique expertise, curiosity and passion for addressing the challenges of wave modelling and coastal resilience.

On this section, we are excited to introduce our fellows. From advancing numerical methods to exploring real-world applications, these dedicated researchers are shaping the future of our field while building a strong network of collaboration and innovation.

Victor Loras Herrero, PhD fellow at UPPA France works on mixing and wave-driven transport pollutants in the surf zone.

Alessadro Del Piero , PhD Fellow at Inria Center of the University of Bordeaux France, works on advancing flood modeling for Urban flooding.

Laure Sicard, PhD Fellow at University of Zaragoza is working on multiphysics shallow water models for river and estuary dynamics.



Mengyun Wang, PhD Fellow at University of Zaragoza works on assessment os surface water interaction and pollutant dispersion between urban watershed, canals and coastal flows.

Yago Pego Martinez, PhD fellow at University of Bergen works on tracing ocean swell in fjord systems.

Adhemar Romero , is a PhD fellow at University of Coimbra works on flow patterns of pollutants and microplastics in estuaries.

Panu Pietkainenen is a PhD fellow at SUEZ-Rivage ProTech and UPPA and works on development of phase-resolved operational wave forecasting for sites with highly irregular bathymetry.

Gabor Albrecht is a PhD fellows at Aalborg University and works on Wind wave coupling for improved modelling of coastal flooding.

Bekan Chelkeba Tumsa is a PhD fellow at Università Politecnica della Marche and works on modelling flows in estuarine urban environments.

Vassilis Gergopoulos is a PhD fellow at University of Bergen and works on stable simulation methods for structured multi-block grids.

Find more info here: https://www.rescuer-msca.net/recruitment

Focus on the contribution from the consortium member SUEZ EAU FRANCE

by Matthias Delpey Research & Development Manager at center Rivages Pro Tech of SUEZ - Co-director of joint laboratory KOSTARISK

The consortium member: SUEZ EAU FRANCE, Center Rivages Pro Tech

The center Rivages Pro Tech (RPT) of SUEZ EAU FRANCE is a monitoring and forecasting center for the management of water environments. With headquarters in Bidart and Pessac (SW of France), SUEZ\RPT develops and operates operational oceanography solutions to support local authorities in coastal management. The services provided by SUEZ\ RPT target two main fields: (i) Water quality & Sanitary Risks and (ii) Waves & coastal hazards. SUEZ\RPT's multidisciplinary team is composed of experts in ocean dynamics, hydrology, numerical modelling, data analysis, microbiology and aquatic pollution management. RPT has always had a strong commitment to research activities to develop services based on innovative technologies. This commitment is reflected in multiple scientific and institutional collaborations, in particular the joint laboratory KOSTARISK shared by University of Pau (UPPA), Foundation AZTI and SUEZ\RPT. The cross-border joint lab KOSTARISK is the framework of the contribution of SUEZ\RPT to RESCUER project, which relies on a close collaboration of SUEZ\RPT with the laboratory SIAME of UPPA and the Marine Technology team of AZTI.

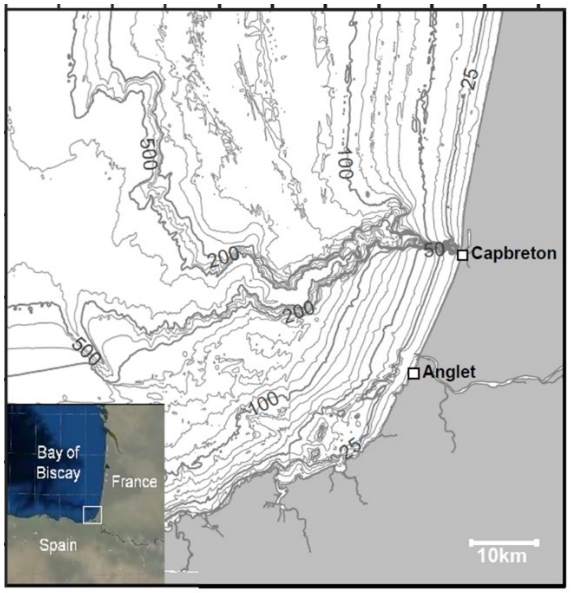
Research work conducted as part of RESCUER

As part of RESCUER, SUEZ\RPT is in charge of one of the 10 PhD projects, entitled “Development of phase-resolved operational wave forecasting for sites with highly irregular bathymetry” (Fellow 3), which is part of the Work Package 1 “Coastal Modelling & Hazard” of RESCUER. The PhD is shared and co-supervised with partners UPPA (thesis direction) and AZTI (secondment). The PhD work is conducted by the research fellow Panu Pietikainen, who joined the KOSTARISK lab team early November 2024. Originating from Finland, Panu has a strong background in coastal oceanography and wave modelling acquired at the Imperial College London, which will support his research in RESCUER.

RESCUER research fellow Panu Pietikainen working at RPT and UPPA

Panu’s PhD work focuses on the characterization of the wave field modifications induced by strong bathymetric gradients and heterogeneities, and the related effects on coastal flooding processes at the shoreline during storm conditions. Two types of coastal flooding will be examined: (i) wave (or runup)

overtopping on urban water fronts and (ii) wave-induced overflowing upstream tidal channels. As case studies for this crucial issue in terms of coastal management, Panu will conduct investigations in the coastal areas of Anglet and Capbreton, two municipalities in the southwest of Franc.



Study area with the isobath in gray

These two use cases will be the opportunity to the study the effects of both man-made (Anglet) and natural (Capbreton submarine canyon) bathymetric gradients on wave dynamics. The research will strongly rely on advanced numerical modelling of coastal hydrodynamics, with the support of modelling tools developed at UPPA and inside KOSTARISK, and more broadly with the support of the strong expertise of the RESCUER consortium in this field. As a final application, the results of Panu's research will especially feed the early warning systems deployed in the study area by SUEZ\RPT to support local authorities in the management of coastal hazards.

In addition, SUEZ\RPT is also actively involved in the RESCUER PhD project hosted by UPPA (Fellow 10), which deals with mixing and wave-driven transport of pollutants in the surf zone.

Other activities

In connection with research activities, SUEZ\RPT also takes part to the Work Package 6 of RESCUER let by the partner INRIA, which deals with Dissemination, Exploitation & Public Engagement. More specifically, as a representative of the economic actors involved in RESCUER, SUEZ\RPT is in charge of the exploitation activities and the management of the Intellectual Property throughout the project, with the aim of maximizing the impact of RESCUER's research on both the scientific community and the society.

Project News

This month, we celebrate the successful first year of our project! We have completed all scheduled deliverables on time and are fully aligned with the project timeline. This month, we are focusing on the secondment deliverable and the career development plan for each fellow!

We are excited to announce the upcoming **RESCUERWorkshop 2**, which will cover the following key areas:

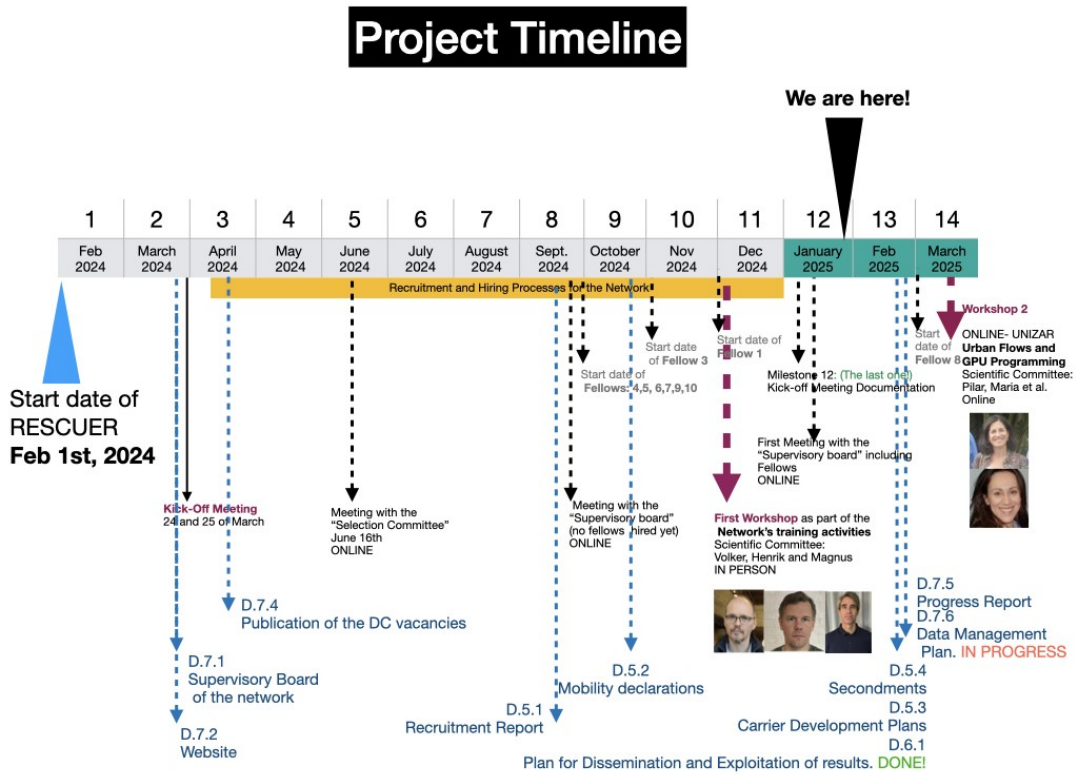
- Numerical models for hydraulic simulation
- Urban flows
- GPU programming
- Transferable skills

The workshop is organized by **Pilar Garcia-Navarro** from **UNIZAR** and **Maria Kazolea** from **INRIA Center at the University of Bordeaux.** A wide range of speakers will bring diverse expertise and experience from different fields of study.This workshop will be held online from **March 6th to 19th**, with **sessions**

We are thrilled to announce two **publications** concerning the RESCUER project.

- Wave-driven current and vortex patterns at an open beach: Insights from phase-resolving numerical computations and Lagrangian measurements, Andreas Bondehagen et al. 2024, published in Coastal Engineering (https://doi.org/10.1016/j.coastaleng.2024.104591)
- A novel energy-bounded Boussinsq model and well balanced and stable numerical discretisation, Svard and Kalich 2025, published in Journal of Computational Physics (https://doi.org/10.1016/j.jcp.2024.113516)

More on the RESCUER website https://www.rescuer-msca.net/events



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