# Predicting climate change effects in the Black Sea using an ensemble prediction system coupling the ocean and the atmosphere.

A 4-year PhD or 3-year postdoctoral mobility position[i] is available at the Liège University (the Modelling for Aquatic Systems-MAST group, Department of Astrophysics, Geophysics and Oceanography and the laboratory of Climatology, Department of Geography) to project and understand the effect of climate change on the Black Sea's physics and biogeochemical cycles and to identify the main drivers of change and uncertainties. The position is offered in the frame of the Horizon Europe RIVIERADE project *Improving modelling methods to produce climate services for resilient European seas and coasts in a decadal to multidecadal horizon.*

The research project aims at performing an ensemble of model simulations of the physical and biogeochemical state of the Black Sea over different scenarios of atmospheric conditions and river discharges and investigating different coupling options between the ocean and the atmosphere. The modelling system consists of a coupled (i.e. currently in one way) atmosphere-ocean model. The atmospheric model is the regional atmospheric model (MAR), the oceanographic model couples the Nucleus for European Modelling of the Ocean (NEMO) hydrodynamical model and the BiogeochemicAl Model for Hypoxic and Benthic Influenced areas (BAMHBI). The different components of the modelling system are run at the Liège University in the frame of various European projects.

## Research activities

The candidate will have to:

(1) Develop and implement an ensemble predicting system for the Black that considers sources of uncertainty on atmospheric forcings, lateral conditions, model parameterization.
(2) Run and analyse an ensemble of historical simulations, assess its quality and ability to represent the distribution of observation.
(3) Run and analyse an ensemble of scenarios simulations, assess trends and uncertainties in the physics and biogeochemistry.
(4) Investigate the impact of using a two-way coupled ocean-atmosphere modelling system on the quality of the prediction and, in particular, on the modelling of extreme events like quasi-tropical cyclone passage.

## In addition to the scientific project described here above, the successful candidate will have to:

- Travel to project and international scientific meetings.
- For the PhD candidate, to follow the Doctoral Formation mandatory for obtaining a PhD.
- To help in the supervision of master students and teaching activities performed by the group.

## Requirements for application

- For PhD candidate: Applicants must have completed a master's degree in a field closely related to geosciences, physics, engineering, meteorology or equivalent.

- For post-doc candidate: Applicants must have a PhD in geoscience (ocean, atmosphere, climate), physics , mathematics or equivalent. An expertise in (big) data analysis is an added value.
- Skill in programming in languages like Phyton, FORTRAN, is required.
- Good to very good written and verbal English communication skills are required.
- Good communication skills for communicating results to different audiences

**Our offer**

- A 4-year (for the PhD) and 3-year (for the post-doc) full time contract starting as early as possible
- An attractive salary.
- The successful candidate will benefit from a dynamic working environment benefiting from the research projects of the groups in different fields of oceanography connecting modelled predictions with observations and end-users requirements (e.g., Horizon Europe NECCTON, the Copernicus Marine Service, UN Decade GOOD program, EU BioGeoSeaT).
- Enjoyable living and working conditions. The Liège University offers comprehensive and innovative training programs, which enable early-career scientists to carry out their research in the best possible conditions, in compliance with the European Charter for Researchers. The candidate will work closely with Profs. Marilaure Grégoire and Xavier Fettweis.

**How to Apply**: The candidate should send by e-mail his/her curriculum vitae, a covering letter of motivation, together with two references (name and email address), to **Marilaure Grégoire** (email: mgregoire@uliege.be) and Xavier Fettweis (email: Xavier.Fettweis@uliege.be) with copy to Mrs. Célia Norgia (email: cnorga@uliege.be).
The position will remain open until filled; but the selection will start from **February 1st, 2026**.

ULiege is strongly committed to promoting equality and diversity, and is labelled HRS4R for Human Resources 'Excellence in Research Award' for institutions (https://euraxess.ec.europa.eu/jobs/hrs4r). All appointements will be made on merit.

[i] The candidate must not have spent more than 12 months in Belgium during the last 3 years (counted at the date of hiring of the candidate).