

Abstract

Urgent action is required to create resilient and forward-looking solutions for the early detection and effective management of harmful algal blooms (HABs). These blooms pose a significant threat to society and the environment, necessitating a proactive approach to limit their detrimental socio-ecological consequences by gaining deeper insights into their origins and triggering factors. As our planet experiences global warming, changes in rainfall patterns, and an escalation in nutrient pollution, coupled with the continued growth of the aquaculture industry, the intensification and broader geographic spread of HABs become increasingly likely due to the synergistic effects of all these factors. Although significant efforts have focused on monitoring and predicting HABs, progress remains limited without the knowledge of the HAB holobiont dynamics that shape the bloom.

The overall aim of HALOBISE is to generate comprehensive knowledge about HAB holobiont dynamics, enhancing the predictive capabilities of aquatic monitoring programs. By addressing HABs' biological and societal complexity, the project will develop governance tools to improve management strategies and reduce their impacts on ecosystem services (ES) under multiple environmental pressures.

HALOBISE will address this problem by offering new tools to understand the drivers of HABs and improve HAB prediction and management. The taxonomical and functional metaproteomics analysis of HAB holobionts, co-culture experiments, and adverse outcome prediction in environmental species will offer data to assess the predictive capability.

Outcomes from this proposal will lead to the inclusion of holobiont data in the next generation HAB monitoring programs. Finally, the pilot platform will assess the effects of multiple pressures on the HAB holobiont and the ES impact using a more efficient approach to decision-making. We will promote the harmonisation of the different stakeholders, their needs, and their approaches to implementing ES management and how innovation could respond to the multiple pressures in a changing environment by introducing new methods and tools that improve the prediction of HABs and their impacts on ES. By safeguarding our water bodies' ES, the proposal will contribute to more sustainable management of aquaculture fisheries sectors and increased water security.

The specific objectives are:

- Advancing in understanding HAB holobiont to address HAB drivers and dynamics.
- Mitigate the impact of HABs by predicting the adverse effects of phycotoxins on species supporting ES.
- Co-create a prototype platform to improve valuation, mapping, assessment, and mitigation of impacts of HAB in ES in collaboration with stakeholders.
- Engage stakeholders to integrate their knowledge, interests, and needs to identify gaps to improve the assessment of HAB ES.

Partners at HALOBISE are interdisciplinary leaders in plankton, population and chemical ecology, dynamic modelling, environmental microbiology, phytoplankton, harmful algal blooms, environmental proteomics, and metaproteomics, as well as intradisciplinary members from HAB monitoring programs. Together, we can fill the knowledge gaps hampering our capability to detect HABs early and predict their impacts on ES.



▶ Project coordinator

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▶ Project partners

- COMMISSARIAT À L'ENERGIE ATOMIQUE ET AUX ENERGIES ALTERNATIVES - FRANCE
- CENTRO INTERDISCIPLINAR DE INVESTIGAÇÃO MARINHA E AMBIENTAL - PORTUGAL
- UNIVERSIDADE DE SANTIAGO DE COMPOSTELA - SPAIN

▶ Funding organisations

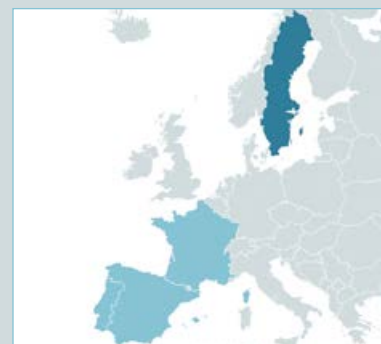
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▶ Duration

3 years

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KEYWORDS

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harmful algal bloom