

## Expression of interest for a doctoral thesis

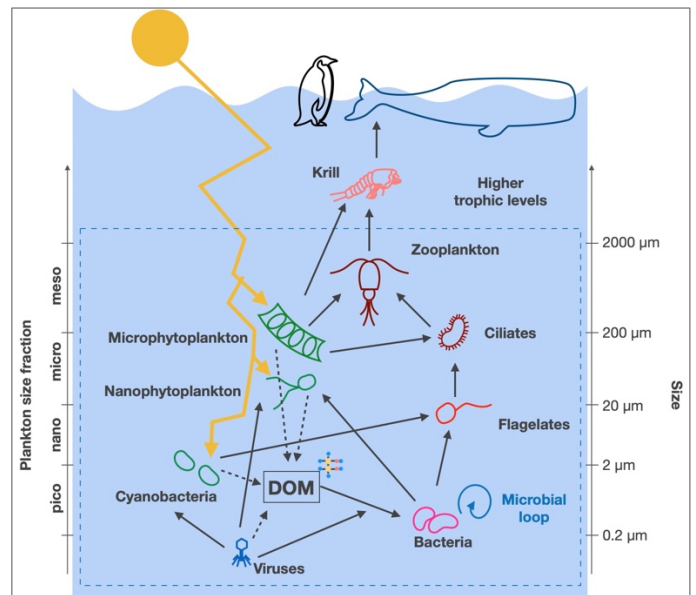
**PROJECT:** Bio-Physical-Chemical Coupling and Connectivity between the Phytoplankton Blooms in the Bransfield Strait and NW Weddell Sea (**COUPLING-II**) (ULPGC & IEO-CSIC).

**SUBPROJECT:** Plankton communities and Connectivity between the Bransfield Current System and the Western Boundary Current System of the Weddell Sea (IEO-CSIC, Málaga). Referencia: PID2023-148583NB-C22

The **Southern Ocean (SO)** is a critical region for water-mass formation, supplying nutrients to the global thermocline and shaping global primary production and carbon export. Particularly vulnerable to climate change, the **Antarctic Peninsula (AP)** undergoes significant transformations likely to impact the SO's role in biogeochemical cycles and the global climate system. A recent change observed in AP waters is the increasing significance of cryptophytes compared to diatoms, attributed to higher stabilization of the water column due to freshwater inputs. Phytoplankton, at the base of the trophic web, is crucial to ecological balance. Thus, the observed shift may have profound implications for microbial food webs and nutrition for higher trophic levels. However, the extent to which these changes are propagating through various trophic levels remains uncertain. This knowledge gap is, in part, because of the complex phytoplankton distribution determined by the presence of fronts and eddies, shaping the environmental variability crucial for phytoplankton proliferation. The overarching aim of **COUPLING II** is to conduct research that will yield new and significant scientific insights into this complex interplay. The primary action of the project involves an **inter- and multidisciplinary cruise**, focusing on in-depth physical, chemical, and biological research within the **Bransfield Strait (BS)** and its connectivity with the western margin of the **Weddell Sea (WS)**, from which a portion of the waters reaching the BS originates.

**COUPLING II** is a Coordinated Project between the SubProject 1 (SP1) led by the ULPGC that focuses on the dynamics of physical and chemical properties governing the bloom areas of the Bransfield Current System and the Western Boundary Current System of the WS, as well as the ocean dynamics connecting both basins, and the SubProject 2 (SP2) led by IEO-CSIC that focuses on the biogeochemical and biological characterization of plankton communities (from viruses to zooplankton) in the two regions and their connectivity.

The **SP2** will investigate the intricate relationships between physical structures and the taxonomic and functional diversity of various plankton groups. SP2 will explore the impact of spatial variability on phytoplankton communities and investigate how these changes ripple through the lower (microbial) and higher (zooplankton) trophic levels, combining genetic tools with estimations of primary and secondary productivity. Jointly, the coordinated project will elucidate the bio-physical-chemical processes shaping marine plankton in the studied areas.



### *Subject of the thesis project:*

The FPI predoctoral contract is linked to SP2, thus the thesis will focus on the impact of spatial variability on phytoplankton communities and investigate how these changes ripple through the lower (microbial) and higher (zooplankton) trophic levels, combining genetic tools with estimations of primary and secondary productivity. Nevertheless, the PhD candidate will interact with the partners from SP1, since the main goal of the project is to integrate physical-chemical-biological oceanographic data. The thesis project will have a strong component of genomic tools and data analyses. The thesis should cover (but not limit to) some of the main goals of the project:

- To assess the differences in phytoplankton abundance, physiological status, and diversity among areas of Bransfield Strait and the Weddell Sea with contrasting hydrographic features.
- To analyze the relationship among primary production, photoacclimation features, and production of organic matter of the phytoplankton communities in the different hydrographic domains.

- To assess the abundance of prokaryotes, their community structure, and functional potential in different hydrographic domains with contrasting phytoplankton communities.
- To assess the abundance and diversity of viral communities in different hydrographic domains with contrasting phytoplankton communities.
- To assess the distribution of zooplankton abundance, diversity, biomass, and metabolic rates (production and respiration) and their relationship with the phytoplankton and oceanographic variables in the different hydrographic domains.

#### *Requirements:*

Degree in Oceanography, Biology, Microbiology, Bioinformatics, Environmental Sciences or similar. Good academic record. High level of English. Knowledge of R and statistics as well as bioinformatics tools will be an asset. Motivation to learn and to work in a multidisciplinary team. The candidate is expected to join the Antarctic cruise (about 1 month long), probably early 2026.

#### *Research Team:*

The successful candidate will join the Plankton Ecology and Environmental Challenges CSIC Research Group based at the Centro Oceanográfico de Málaga, devoted to the study of plankton and composed of around 15 people including tenured researchers, technicians, postdocs, PhD candidates, master's and undergraduate students. The candidate will also closely interact with other members of the coordinated project, based primarily at the Universidad de Las Palmas de Gran Canaria ([www.polarcoupling.com](http://www.polarcoupling.com)). The host group maintains a strong commitment to training its students to ensure that they get the most out of their learning. This includes participation in courses and conferences, visits to other laboratories, seminars and other training strategies.

For more information, contact the PIs of the project:

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