

## PhD proposal in France

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start: September-October 2017

deadline for the choice of the candidate: end of June 2017

### Marine Ecosystem Biodiversity and Dynamics of Carbon around Kerguelen: The role of the small phytoplankton at the single cell level

#### Thesis overview

Marine phytoplankton is responsible for half of the photosynthetic activity on Earth and plays the main role in the biological pump (atmospheric CO<sub>2</sub> export to the deep ocean). Subsequently, the vast majority of studies have been conducted on large phytoplanktonic cells (>10µm) because of their higher putative sedimentation capacities to the deep ocean. However, small phytoplanktonic cells (<10µm) are the main contributors to the CO<sub>2</sub> fixation because of their high cellular activities and abundances. The temperature increase at the surface of the oceans is leading to a higher stratification of the water column and thus to the oligotrophisation of the photic zone. Because of their better competition capacities for the acquisition of nutrients, phytoplanktonic cells of small size are becoming more abundant.

The Austral Ocean contributes to half the oceanic absorption of CO<sub>2</sub> of anthropic origin. This Ocean hosts unique ecosystems. Global changes (e.g. warming, acidification) that can alter its functioning already have impacts on this fragile environment. Nevertheless, this Ocean has still not been studied sufficiently. Improving our knowledge on the functioning of the ecosystems in the Austral Ocean is both of high priority and of great scientific challenge. This thesis project will focus on the phytoplankton of small size in the oceanic region. It will be part of the oceanographic project *Mobydick* in the region of the Kerguelen Islands. The oceanographic campaign will take place in January-February 2018.

The objectives of the thesis in this context are to determine:

- the molecular diversity and spatial distribution of small sized phytoplankton.
- the in situ metabolic activity of different phylogenetic groups through measurements at the cellular level.
- the capacity of CO<sub>2</sub> sequestration played by this functional group.

The candidate should have good skills in oceanography, ecology, and environmental microbiology, with sound knowledge in statistical analyses. Although not mandatory, experience in dataset analysis obtained by high throughput sequencing would be an advantage. They must be able to demonstrate their motivation for laboratory work and the setting up of experimental protocols. They will have to participate in an oceanographic mission for several weeks in the Southern Ocean. A high level of English would be required.