



*Status, Control and Role of the  
Pelagic Diversity of the Austral Ocean*



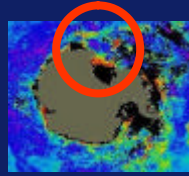
## Context of the research

1. The Austral Ocean pelagic diversity remains poorly documented and is probably larger than estimated initially. Many pelagic species, including zooplankton, ichthyoplankton and pelagic fishes, have been ignored, especially in ecological and biogeochemical studies and in modelling.

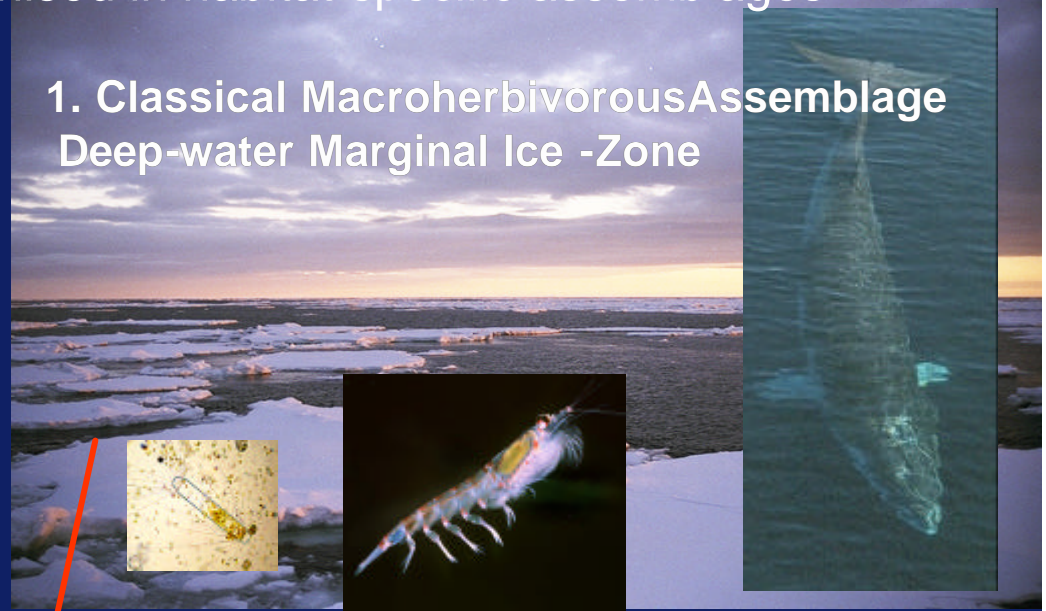




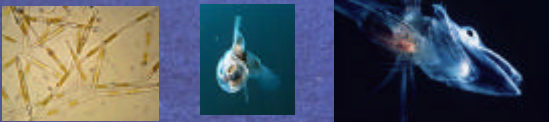
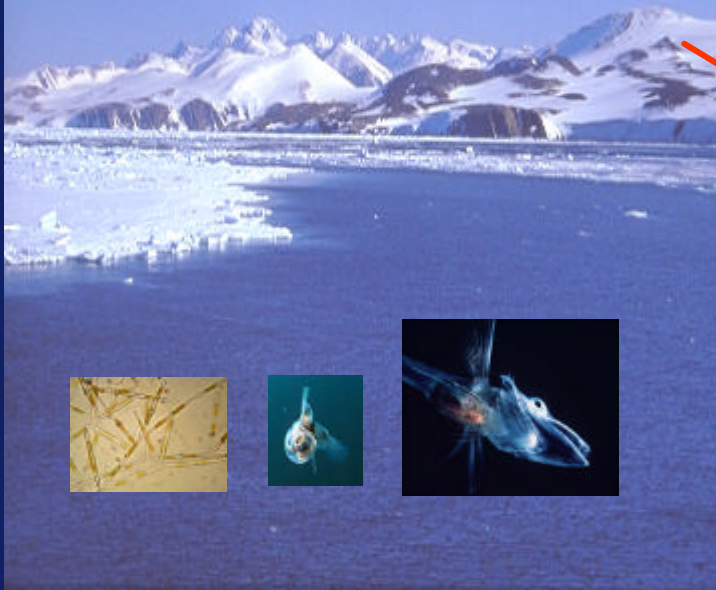
## 2. The pelagic species are organised in habitat-specific assemblages



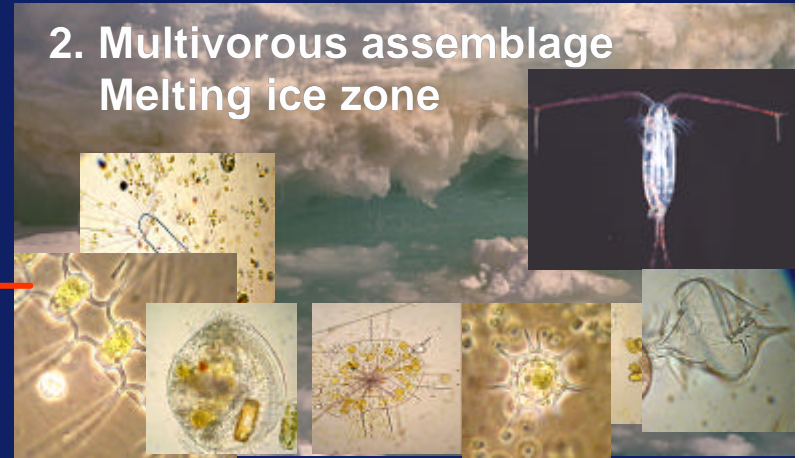
### 1. Classical Macroherbivorous Assemblage Deep-water Marginal Ice -Zone



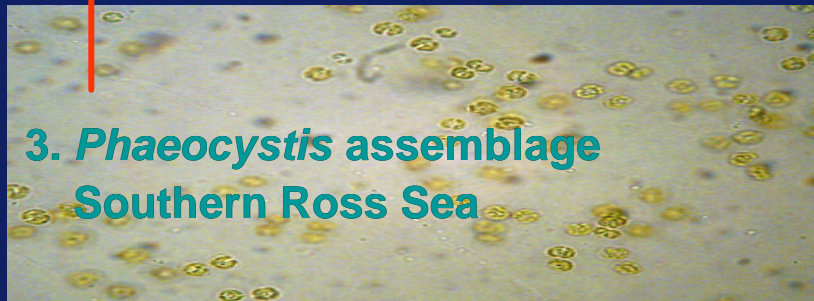
### 4. *Limacina* assemblage Coastal Pack Ice area



### 2. Multivorous assemblage Melting ice zone

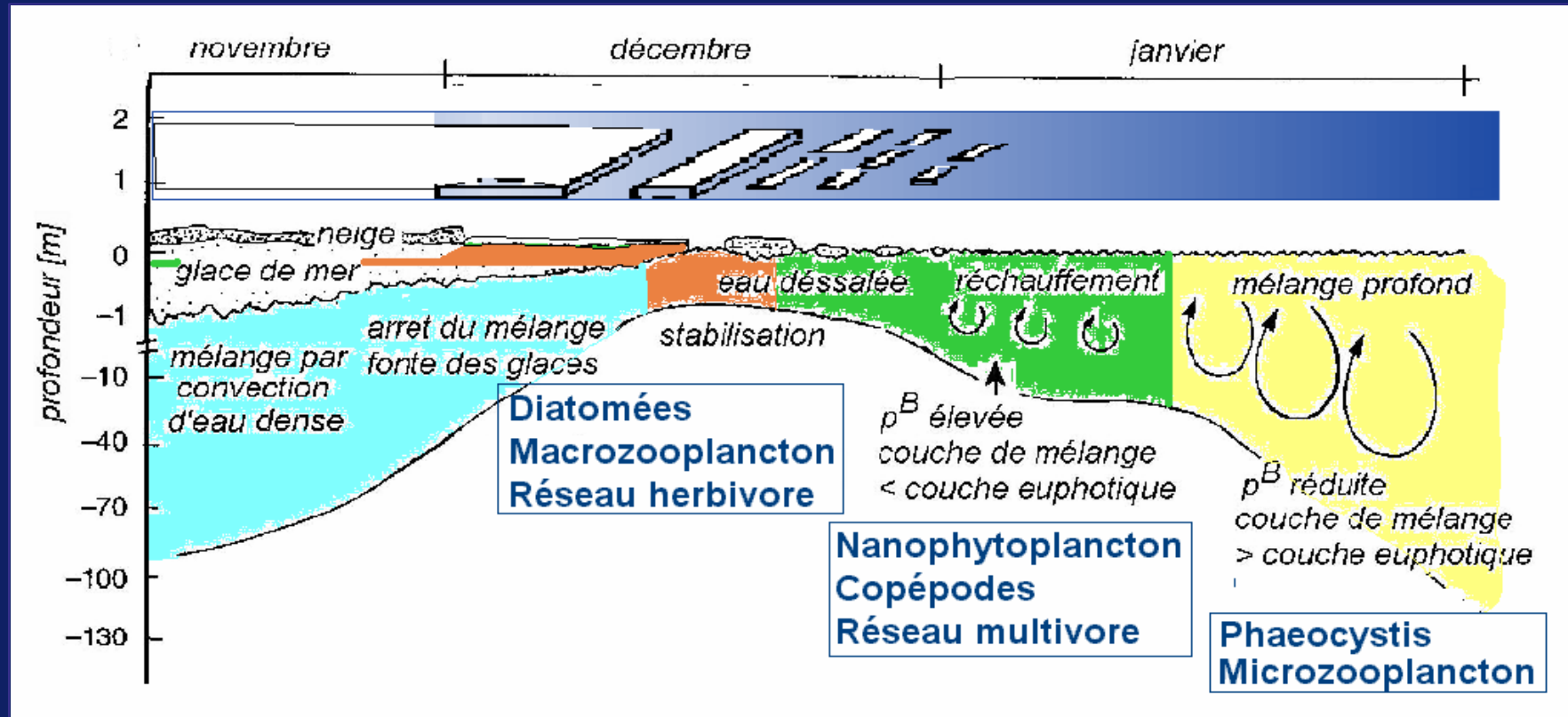


### 3. *Phaeocystis* assemblage Southern Ross Sea





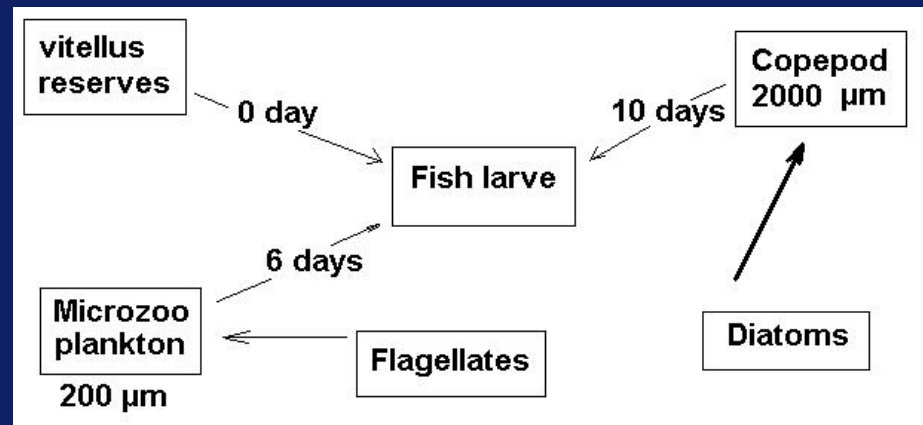
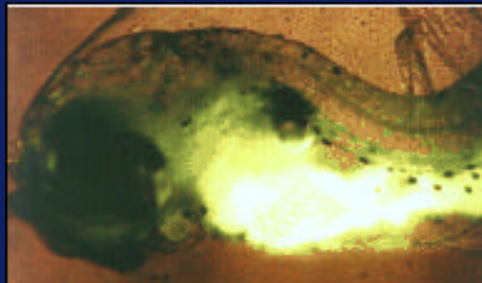
3. The diverse pelagic assemblages correspond to various stades of a unique Austral Ocean Pelagic ecosystem which changes gradually during the ice formation and melting processes



4. The pelagic ecosystem is particularly sensitive to variations in temperature, ice coverage dynamics, solar irradiation and the vertical structure of the water column. By consequence, climate changes indirectly affect the dynamics and diversity of pelagic food webs



4. The diversity of the pelagic system is essential to assume the fitness of the consumers. In response to a dominant plankton community, specific communities of consumers will evolve. This is particularly true for the various life stages of fishes (larvae, juvenile and adults), which require specific plankton nutrition.





## Objectives

- To identify the Antarctic Pelagic species and study their distribution in relation to the biotic and abiotic factors of the environment
- To analyse the pelagic diversity at species, population and ecosystem levels
- To increment a conceptual and numerical écohydrodynamical model of the Austral Ocean Pelagic Ecosystem in the perspective of determining the stability of biotic assemblages, their sensitivity to the environmental constraints and specially the response to climate changes.



## Participants

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## Methodology

1. Banking of the relevant data to calibrate the models (data collection).
  - Austral Ocean cruises, field acquisition and data compilation on micro-, meso- and macroplankton and fishes
  - Storage in a original dedicated database (PELAGANT) compatible to existing databases ( Global Biodiversity Initiative Facility or FishBase)
  
2. Conceptualisation of the pelagic diversity and its spatio-temporal variation with morphological and ecophysiological, genetic, and ecosystemological tools.
  - Determination of “umbrella” fish species will be determined with complementary molecular markers and a very complete statistical analysis.
  - Morphological and nutritional analysis of the relationship between the development stages and the selection and exploitation of planktonic preys.
  - Exploration of the pelagic assemblages with statistical tools in search for consistent patterns or systematic relationships between variables
  
3. Development and implementation of a pelagos ecosystem model.
  - Development of a multi-annual Population Dynamics Model of young and adult fish stages, coupled with 1D biological/physical plankton model.





## Expected results

- A knowledge of the pelagic species, their spatial and temporal distribution and a recognition of the major pelagic assemblages and links with the habitats.
- A genetic molecular support of morphological identification of fish larvae
- A description of the phylogeographical pattern of selected fish species.
- A pilot study on the dispersal dynamics of selected fish species.
- A new conceptual view of the interactions between the species in the pelagic assemblages and the control by biotic and abiotic factors.
- A numerical modelling tool of the pelagic system, taking in account the pelagic diversity and applicable to the sampling strategy and the scientific discussion.
- A dynamical model of fish.
- A large-scale description of the distribution of pelagic assemblages and an estimation of the effects of simulated climate changes on this distribution.



## Perspective of valorisation

A modelling tool able to test the level of stability and resilience of the pelagic assemblages in reaction to local environmental changes.

The results of the research will be available for the international community by publications in specialized journals and diffusion in international meetings.

The international diffusion of the integrated database produced by the research will be a specific valorisation action of the research (creation of an international Austral Ocean plankton data centre). For that reason, the criteria of formatting the data base will follow those of the GBIF- Global Biodiversity Initiative Facility (metafiles) and specific FISHBASE.

Many contacted people, specialists of single taxonomic groups, would be interested to adhere to the data bank and would accept to diffuse they own data if the criteria are well defined.