BIANZO II

Biodiversity of three representative groups of the Antarctic Zoobenthos - Coping with Change

DURATION OF THE PROJECT
Phase 1 : 01/01/2007 – 31/01/2009
Phase 2 : 01/02/2009 – 31/01/2011

BUDGET
791.350 €

KEYWORDS
Benthos, diversity, climate change, functional biology

CONTEXT

BIANZO II is not only a continuation of the research conducted during the BIANZO I (2002-2006) project, which focused mainly on ecology, biodiversity and biogeography. It also expands the research in the context of our changing climate (cf. IPCC Fourth Assessment Report, 2007). As indicated by the subtitle ('Coping with Change'), the focus here is on the ability of the Antarctic zoobenthos to adapt to a changing environment. BIANZO II directly contributes to the SCAR EBA programme (Evolution and Biodiversity in the Antarctic). It is also accepted as IPY (International Polar Year) activity #391 as a part of CAML (Census of Antarctic Marine Life). The partners are also involved in other IPY projects (ANDEEP-SYSTCO and ClicOPEN) and SCAR-MarBIN (SCAR Marine Biodiversity Information Network).

PROJECT DESCRIPTION.

Objectives

BIANZOII will investigate biodiversity patterns of the Antarctic zoobenthos and their causal processes for three representative groups of different size categories: nematodes (meiobenthos), amphipods (macrobenthos) and echinoids (megabenthos) (WP 1: NOWBIO). Trophodynamic aspects of these benthic groups and their ability to cope with temperature and temperature-related changes (food composition and availability, pH of the seawater...) will be studied mainly in an experimental approach (WP 2: DYNABIO). Information collected in previous studies and in the first two work packages will be used to initiate the development of a model about the possible changes in the benthic communities due to global environmental change (WP 3: FOREBIO).

Methodology

WP 1: NOWBIO
Most of the material for the analysis of morphology, ecology, diversity, distribution and phylogeny of the Antarctic zoobenthos (*e.g.* from the Weddell abyssal plain and the Larsen A & B areas) is already available from recent campaigns. Identifications, morphological analyses and taxonomy will be carried out using the appropriate equipment. Molecular phylogeny analyses include sequencing of COI, 16S and 18S rDNA.

WP 2: DYNABIO
Trophic position structure
The trophic position of the Antarctic meiobenthos will be investigated by stable isotope analyses (from frozen multicorer samples) and enrichment experiments with labeled food (sediment cores incubated in the lab). Our knowledge of amphipod trophic position will be refined by gut content analyses, morphological observations, stable isotope analyses and fatty acid analyses. The importance of prokaryotes in their diet will be assessed using epifluorescence, SE microscopy, immunological and DNA techniques, and laboratory experiments. The diet and feeding plasticity of echinoids will be inferred from litterature, preserved wet material, fresh material and experiments on living animals.

Coping with change
Sediment cores will be incubated in the lab under different conditions of temperature, food quantity and quality, in order to assess the ability of the meiobenthos to cope with change. Densities, biomass, nematode community composition and diversity, benthic respiration rates and nutrient fluxes will be measured. Changes in food supply and its effect on macrobenthos will be studied by feeding experiments with amphipods, using different labeled substrates. The effect of trophic stress on the energy budget of amphipods will be assessed by measurements of their energy demand. The impact of sea water acidification on skeletal growth of echinoids and their larval development, will be assessed under different CO_2 levels and analyzed by image analysis and SEM.

WP 3: FOREBIO
Only two steps in the development of a biogeographical model will be taken within BIANZO II: (1) the gathering of

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biological, abiotic and climatic information and (2) defining filters for changes: climate variables and biological variables.

INTERACTION BETWEEN THE DIFFERENT PARTNERS.

Direct communication and a close cooperation between the partners will assure the integration of information from different taxa and different size classes. From their expertise, each of the partners will provide new and valuable insights, in this way adding to a more complete view of the interactions between these taxa, their trophic position and the impact of a changing environment.

Link with international programmes

BIANZO II is IPY activity #391. It is part of CAML (Census of Antarctic Marine Life) and contributes to SCAR EBA (Evolution and Biodiversity in the Antarctic). The partners are also involved in other IPY projects: ANDEEP-SYSTCO and CIicOPEN. BIANZO II is also involved in SCAR-MarBIN. (SCAR Marine Biodiversity Information Network)

EXPECTED RESULTS AND/OR PRODUCTS

1. An improved knowledge of the composition and biogeography of the target groups in poorly known parts of the Southern Ocean, e.g. the deep-sea and a recently collapsed ice shelf east of the Antarctic Peninsula;
2. An improved knowledge of species diversity and distribution patterns and similarities with oceans worldwide;
3. A better understanding of the trophic position of the three benthic taxa;
4. An evaluation of the share of prokaryotes in benthic energy flows through amphipods;
5. An estimation of metabolic rates of scavenger amphipods based on respiration and excretion measurements;
6. Characterization of the trophic categories of Antarctic echinoids and feeding plasticity of selected taxa;
7. Measuring the effect of seawater acidification on the skeletogenesis of selected taxa.

PARTNERS - ACTIVITIES

Ghent University, Marine Biology Section: general coordination. Taxonomy, biodiversity and biogeography of meiobenthos. Enrichment and environmental change experiments.

IRScNB/KBIN: Taxonomy, biogeography and phylogeny of Antarctic amphipods, including study of museum collections. Trophic characterization of amphipods.

ULB: Taxonomy, biogeography and phylogeny of Antarctic echinoids. Trophic characterization of echinoids. Ectosymbiosis. Influence of seawater acidification on skeletogenesis of echinoids.

ULg: Distribution and trophic characterization of amphipods. Energy budget in scavenging Amphipoda. Tolerance of amphipods to temperature-related changes.

Université de Bourgogne: Taxonomy, biogeography and phylogeny of Antarctic echinoids. Ectosymbiosis.

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Follow-up Committee

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