



**Międzynarodowa Środowiskowa Szkoła Doktorska**  
przy **Centrum Studiów Polarnych**  
w Uniwersytecie Śląskim w Katowicach

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**Title of PhD project:** Interannual variability of benthic fauna structure and functioning in an Arctic fiord in a context of global environmental changes

**The leading unit:** Institute of Oceanology Polish Academy of Sciences

**Requirements:**

- 1) MSc in Biological oceanography or related.
- 2) Knowledge of ecology of benthic communities in Arctic regions.
- 3) Knowledge of taxonomy of marine invertebrates, experience in laboratory analyses, including taxonomic identification of benthic organisms.
- 4) Knowledge of statistical methods of ecological data analyses.
- 5) Ability to join (experience in) fieldwork in polar marine conditions.
- 6) English language fluency.

**Tasks description:**

1. Participation in fieldwork.
2. Laboratory analyses, including geochemical analyses of sediments and taxonomical analyses of benthic samples.
3. Statistical data analyses.
4. Preparation of scientific publications and conference presentations.
5. Regular reporting of work progress.
6. Participation in scientific activities of the Benthic Ecology Lab.

**Abstract:**

Report ACIA predicts that the strongest and earliest global warming effects will be observed in marine environments in polar regions. One of the main mechanisms of environmental changes in the Arctic is connected with increased advection of Atlantic waters, that transport nutrients, organic matter and organisms from lower latitudes. In present century, increased advection of warm waters has already caused increases of water temperature by at least 1°C in west Spitsbergen fiords. Atlantic water advection influences pelagic systems, including timing and intensity of primary production blooms, taxonomic composition, age structure and biomass of phyto- and zooplankton. Much less is known about the effects of warm water advection and related variability in food availability on benthic organisms. In case of fiordic ecosystems, structure and functioning of biological communities is shaped by the interplay between advection of water masses from shelf and local processes, including terrestrial inflows (glacial meltwaters).

Determination of patterns of temporal variability and controlling factors is inevitable to understand the present functioning of biotic systems as well as to predict the future impacts of climate changes



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on their functioning. Benthic organisms play important role in carbon cycling and organic matter redistribution, via its mineralization, bioturbation and geochemical modification of marine sediments. Therefore understanding the direction of temporal trends in this group, especially in its functional traits composition and diversity is needed to determine the perspectives of marine ecosystems functioning in the era of global environmental changes.

The aim of the project is to determine the range of interannual variability and the direction of temporal trends in structure and functioning of benthic communities in Arctic coastal waters. The study will focus on benthic communities (meio- and macrobenthic), their structure (composition and taxonomic and functional traits diversity) and functioning (production, respiration, carbon demand). The study will be performed based on materials collected by Institute of Oceanology PAS in fiord Hornsund in 2001-2020 (and planned for 2021-2023). The work will be concentrated around three main scientific tasks: 1. Assessment of patterns of temporal and spatial variability of taxonomic and functional trait diversity of macrozoobenthos in Arctic fiord, 2. Assessment of patterns of interannual variability in biomass, production, respiration and carbon demand of meio- and macrofauna at monitoring stations, 3. Determination of impact of hydrographical conditions (Atlantic water advection) and productivity on benthic functioning with possible consequences for climate warming scenarios.

**Other information:**

The work will be carried out under supervision of: prof. Maria Włodarska-Kowalczyk, maria@iopan.gda.pl, Institute of Oceanology PAS, Sopot