



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

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Title of PhD project: Feeding frequency of Arctic filter feeders in the era of Atlantification – comparison of warm (2017) and cold (2020) years

The leading unit: Institute of Oceanology Polish Academy of Sciences in Sopot.

Requirements:

1. Completed second-cycle studies (master's degree) in the field of biological oceanography, marine biology, ecology or similar. Knowledge of research topics related to the feeding of benthic filtering organisms
2. Knowledge of issues related to computer image analysis, typical tools and methods used in computer programs such as PhotoShop
3. Knowledge of statistical methods, typical tools and methods used in R type computer programs
4. Knowledge of the English language enabling communication, reading and writing scientific papers.

Tasks description:

1. Automatic image analysis in terms of feeding of filter organisms using computer programs;
2. Analysis of environmental data from loggers
3. Analysis of zooplankton samples and sediment from sedimentation traps
4. Preparation of scientific articles and conference presentations;
5. Regular reporting of work progress.

Abstract:

The future Arctic marine ecosystem with its current state, structure and productivity will be fundamentally different from what we observe today. Climate change is predicted to be the strongest in the next decades, with rising temperatures and Atlantification among the most important consequences. Filter feeders are an important group of benthic organisms which constitute an important link between processes taking place in the water column and on / in the bottom, and thus shape the pelagic-benthic coupling and affect organic matter cycling. Yet the response of many benthic organisms to climate change and its consequences is not well understood. The concept of the proposed Ph.D. dissertation assumes tracing the feeding frequency of filter organisms such as barnacles, sessile polychaetes or mussels in still photographs taken with a 30-minute time resolution over two contrasting hydrological years (2017 and 2020) in Isjorden (Spitsbergen).

Due to logistical difficulties and a large amount of material for analysis, very few such studies were conducted as far. However, such studies carry an important scientific potential. We propose to contrast the data collected in 2017, which in Spitsbergen, due to the greater inflow of Atlantic



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waters, was a relatively warm and ice-free year, with data from 2020, when the hydrological conditions were completely different - the seawater temperature was almost 5° C lower and the fjords began to freeze. Such conditions have not been recorded since the beginning of the measurements in 2002 (except for 2011), which suggests that the environmental conditions, including food (organic matter quality and quantity) for the filtering epifauna were significantly different from those in warmer years. Hence, the main goal of the proposed study will be to compare the feeding activity of various representatives of epibenthic fauna (filtering feeders) against the background of extremely different environmental conditions (i.e. temperature, salinity, currents, chl a, seawater turbidity, the quality and quantity of bacterial- and zooplankton). Ecological modeling will be used to answer the question of how will look like future Arctic in terms of productivity, and thus functioning of the entire polar ecosystem.

Other information:

The work will be carried out under supervision of: dr hab. Monika Kędra, prof. IO PAN (supervisor, kedra@iopan.pl) and dr Piotr Bałazy (co-supervisor, balazy@iopan.pl), Institute of Oceanology Polish Academy of Sciences in Sopot.