



No. of PhD project: IEDS/2022/IGF/01

Title of PhD project: *Influence of glaciers recession, from tidewater to land-based, on the fiord sedimentology*

The leading unit: The leading unit Institute of Geophysics Polish Academy of Sciences, Warszawa

Requirements

1. MSc degree (or equivalent) in Physics, Geophysics, Geography, Geology, Oceanography or equivalent science discipline. A candidate may submit application if receives the MSc Degree till August, 26, 2022.
2. An additional advantage will be two studies' topics: Earth Sciences (Geophysics, Geography, Geology, Oceanography or equivalent), and science like physics, mathematics, IT or equivalent.
3. General knowledge of sedimentology, glaciology, geomorphology, physical oceanography.
4. General knowledge of research issues, typical tools and methods used in fjord sedimentation studies (ADCP, CTD, Turbidity Sensor, LISST, sedimentation traps, sediment profiler, side sonar, multiple beam sonar, etc.).
5. Knowledge of IT software like: GIS, Matlab and other specialized software used in the above-mentioned issues, measuring tools and research methods.
6. An additional advantage will be confirmation of knowledge from the above points through previous scientific achievements: bachelor's, master's dissertation, scientific publications, conference presentations, participation in research projects.
7. An additional advantage will be experience in research or tourist activities in marine environment, in particular motorboat handling, sailing, SCUBA diving
8. Good communication skills in English in order to provide excellence in research in the area, (Polish is not required for foreigners).
9. Ability to work independently and as part of a team environment.
10. Creativity and ability to think critically.
11. Excellent networking skills in order to develop strong relationships with partners and with academics and researchers from other institutions.



Task description

1. Processing and interpretation of polar marine research data especially: (i) archival data: satellite images for glacier retreat, hydrographical and sedimentological data, bathymetry data (ii) fjord geomorphology and geophysics; (iii) sedimentological processes, (iv) physical oceanography.
2. Preparing, organizing and conducting field experiments in the Svalbard region, processing the acquired data.
3. Preparation or contribution to publication of papers in JCR journals and conference presentations.
4. Acquiring and maintenance a thorough and up-to-date knowledge of the scientific literature related to the research aims of the project.
5. Writing regular reports on progress and presentation of the results to the project management board according to the agreed schedule.
6. Help in the maintenance of the day-to-day work of the Department of Polar and Marine Research in the Institute of Geophysics Polish Academy of Sciences including organization of research, teaching and responsibility for the research equipment, mostly used in oceanography.

Abstract

The proposed Ph.D. topic relates to the analysis of sedimentation processes in the changing polar fjords environments as a result of the recession of the glaciers. It is one of the key issues for analyzing polar fjords' productivity. Productivity of marine ecosystems is an important factor conditioning element and organic matter cycling on Earth. It also has the potential to influence the composition of the atmosphere and thus to shape our climate. The world's oceans are a great source of O₂ and sink for atmospheric CO₂ because they absorb about 22% of anthropogenic CO₂ emissions and therefore limit global warming and all its consequences. The Arctic Ocean, due to its relatively high productivity and low water temperatures enhances CO₂ solubility, and is responsible for as much as 5-14% of the global CO₂ uptake by marine regions. This makes the Arctic marine ecosystems important components in the global carbon cycle. Recent findings show that Arctic fjords are especially effective in absorbing atmospheric CO₂. The biogeochemistry of the fjord systems is, however, very complex and not yet fully understood. The great unknowns that remain include the effect of glacial retreat on the CO₂ budget of coastal waters. Climate change is disproportionately strong in the Arctic, which is the most rapidly warming region on Earth. One of the observable consequences of the transformation of the Arctic environment is the rapidly receding glaciers, which are leaving behind new bays. Due to glaciers calving, submarine melting and drainage of meltwater



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through glacial outflows, glaciers are recognised as the main source not only of freshwater supply into the fjord, but also mineral, organic matter and nutrients.

Other information

The work will be carried out under supervision of: dr hab. Mateusz Moskalik, mmosk@igf.edu.pl and dr Oskar Głowacki, oglowacki@igf.edu.pl, Institute of Geophysics Polish Academy of Sciences

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Information on the IEDS admissions: https://www.mssd.us.edu.pl/en/admission_2022_2023