



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

ul. Bedzińska 60
41-200 Sosnowiec
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Project number: IEDS/2025/IGF/A

Title of PhD project: Analysis of the variability of ice coverage in the bays of Hornsund Fjord, Spitsbergen: driving factors, dynamics and impact on glacier/ocean interactions

Providing institute: Institute of Geophysics, Polish Academy of Sciences

Requirements:

1. MSci degree in oceanography, physics, geology, or related field
2. Interest in polar research and willingness to fully engage in scientific work, including participation in field measurements in Spitsbergen
3. Practical programming skills (e.g., Python, MATLAB)
4. Capability of using mathematical apparatus
5. English proficiency sufficient for fluent discussion and further development towards writing scientific articles
6. Ability to work independently and as a team member
7. Creativity and ability to think critically and analytically
8. Fitness to participate in fieldwork in the area of the Polish Polar Station Hornsund

The following will be considered as additional strengths of the candidate:

1. Proven track record in Earth Sciences, including diplomas, theses, scientific publications, conference presentations, participation in research projects
2. Experience in fieldwork or recreational activities related to marine, mountain or polar environments (e.g., motor boat operation, sailing, scuba diving, skiing, climbing, bicycle expeditions)
3. Experience with remote sensing and/or photogrammetry, including the use of spatial analysis software (e.g., ArcGIS, QGIS, Global Mapper)

Description of the tasks:

1. Participation in the fieldwork based at the Polish Polar Station Hornsund (measurements in the coastal zone and at sea lasting several weeks at a time; <https://www.youtube.com/watch?v=3k1DXFwZ3xg>)
2. Processing and analysis of archival and newly acquired data, including but not limited to time-lapse images, satellite images, orthophotomaps, meteorological and oceanographic measurements



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3. Critical interpretation of the results obtained on the ice cover variability in Hornsund Fjord, Spitsbergen, including its driving factors and impact on glacier/ocean interactions
4. Preparation of scientific articles and promotion of the project results (with support from the supervisors)
5. Scientific development through literature studies, as well as participation in training courses, workshops and scientific conferences
6. Involvement in establishing and maintaining scientific cooperation at the national and international levels
7. Supporting employees in carrying out the tasks of the Department of Polar and Marine Research at the Institute of Geophysics, Polish Academy of Sciences.

Summary of the doctoral project:

Glaciarized bays - the places where large glaciers flow into the sea - are some of the most fascinating and yet least understood places on our planet; this is where icebergs the size of multi-story buildings break away from marine-terminating glaciers in a spectacular and dangerous process called "calving". It is in these bays that glacier cliffs melt in contact with the water deep below the sea surface, which we cannot observe with the naked eye and measure with typical methods (such as satellite imagery). Finally, the melt of ice drifting on the sea surface changes the temperature and salinity of the water, affecting the intensity of calving and underwater melting of glaciers. A better understanding of these processes is critically needed for our society to better predict the effects of ice mass loss in a changing climate, including sea level rise and freshening of the ocean.

The PhD project will focus on analyzing the ice cover variability in the numerous glaciarized bays of Hornsund Fjord, Spitsbergen. Two types of ice will be considered: (i) glacial ice, i.e., formed by glacier calving, and (ii) sea ice, which is formed by freezing of the seawater. The PhD student will create maps of ice coverage, analyze its temporal and spatial variability, determine the environmental factors driving this variability, and attempt to quantify the impact of ice coverage in glaciarized bays on the retreat of marine-terminating glaciers. The implementation of the PhD will primarily involve participation in field work in the area of the Polish Polar Station Hornund, analysis of archival and newly acquired data (mainly time-lapse and satellite images), as well as interpretation of results and preparation of scientific publications. The PhD student will present the results of their work at numerous national and



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international conferences, as well as participate in workshops and meetings with world-class international partners.

Information about the project: The dissertation will be carried out within the framework of the research project “Studying glacier/ocean interactions using a natural laboratory of Hornsund fjord, Svalbard”, funded by the Polish National Science Center and led by Assoc. Prof. Oskar Glowacki. Six renowned institutions from the US, UK, Norway and Singapore are partners in the project: 1. Scripps Institution of Oceanography, University of California San Diego; 2. University of Connecticut; 3. British Antarctic Survey; 4. Scott Polar Research Institute, University of Cambridge; 5. UiT The Arctic University of Norway; 6. National University of Singapore.

Other information:

The work will be carried out under the supervision of Assoc. Prof. Oskar Głowacki (oglowacki@igf.edu.pl) and Asst. Prof. Zuzanna Świrad (zswirad@igf.edu.pl). See the next page for the short bios of supervisors.

Contact to the IEDS office: +48 32 3689 380, e-mail: polarknow@us.edu.pl.

More information regarding the admission to IEDS:
<https://www.mssd.us.edu.pl/en/admission-2025-2026/>.



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Assoc. Prof. Oskar Głowacki: oceanographer and geophysicist, professor at the Department of Polar and Marine Research, IG PAS. His main research interests are the interactions between glaciers and the ocean, the development of new measurement methods in glacier research, and underwater acoustics. He spent a total of more than a year doing field work in the Arctic, and completed a 2.5-year postdoctoral fellowship at Scripps Institution of Oceanography, University of California San Diego (USA). He was awarded the Prime Minister's PhD Dissertation Award, a scholarship for outstanding young scientists from the Ministry of Science and Higher Education, the Maurycy Pius Rudzki Prize of Department III of the Polish Academy of Sciences, and the Prof. Kacper Rybicki Scholarship (twice).



Asst. Prof. Zuzanna Świrad: geomorphologist, employed as an adjunct at the Department of Polar and Marine Research, IG PAS. She specializes in the study of coastal erosion and analysis of ice processes using satellite methods. She gained her experience through overwintering at the Arctowski Polish Antarctic Station, a PhD at Durham University (UK), a postdoctoral fellowship at Scripps Institution of Oceanography, University of California San Diego (USA), and numerous research trips abroad. She has won prestigious awards and prizes: the L'Oréal-UNESCO "For Women in Science" award, the scholarship for outstanding young scientists of the Ministry of Science and Higher Education, the Prof. Kacper Rybicki scholarship, and awards from the Rector of the University of Wrocław.

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date and signature