



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

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No. of PhD project: IEDS/2024/IGF/A

Title of PhD project: Landslide hazard modeling for coastal cliffs

Providing institute: Institute of Geophysics, Polish Academy of Sciences, Warsaw

Requirements:

1. MSci degree in physical geography, geology, or related field
2. Experience in script writing (Python, MATLAB) and/or GIS analyses
3. Capability of using mathematical apparatus in science
4. Fluent spoken and written English and Polish
5. Ability to work independently and in a team
6. Creativity and ability to think critically and analytically
7. Willingness to build and develop a research network

Favorable qualities:

1. Confirmation of the acquired knowledge in geosciences (diplomas, theses, scientific publications, conference presentations, participation in research projects)
2. Experience in fieldwork or marine recreation (e.g. motorboat handling, sailing, scuba diving)
3. Experience in numerical modeling, remote sensing and/or photogrammetry

Description of the tasks:

1. Analysis of existing coastal landslide inventories
2. Topographic change detection within the Baltic coastal cliffs from field and cartographic datasets
3. Assessment of the utility of existing terrestrial landslide hazard models for rock coast environments; development of a coastal landslide hazard model
4. Landslide hazard assessment for the Baltic coastal cliffs
5. Preparation of scientific articles and outreach materials
6. Presentation of research results during national and international conferences
7. Expanding knowledge in the field through literature studies and participation in workshops, summer schools, etc.
8. Preparation of further project proposals
9. Active participation in preparing and executing field campaigns
10. Active participation in scientific cooperation at the national and international level
11. Assistance in everyday tasks of the Department of Polar and Marine Research



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Summary of the doctoral project:

The PhD project will be conducted under the research project '*Cliff erosion along the Baltic rock coasts: observations, reconstructions, predictions*' funded by the National Science Centre of Poland and led by Zuzanna Świrad.

Coastal landslides threaten lives and infrastructure. Rising sea level and changing storm patterns contribute to a higher hazard of coastal cliff failure. Recently, a progress has been made in using remotely sensed data to detect erosion at high spatial and temporal resolution and better understand erosional processes. Analyses focus on pre-failure slope deformation, erosion sequencing, magnitude frequency distribution, etc. However, there is a striking imbalance between measuring change and predicting the hazard of failure. While significant progress has been made in the former, the latter has been rarely tackled. It is partly due to the stochastic nature of coastal cliff failure, scarcity of landslide inventories, and the complexity of processes which are related to regional and local variability in coastal settings, geology, and climate. The missing knowledge stands in opposition to the progress made in terrestrial landslide hazard modeling where, despite similar level of complexity, multiple landslide hazard models have been constructed, extensively tested, and are used for sending alerts and in decision-making.

The successful candidate will (i) collate and analyze existing inventories of coastal landslides, (ii) create a new inventory for the Baltic region from field measurements and cartographic and remotely sensed datasets, (iii) explore statistical methods of landslide hazard modeling, (iv) optimize the landslide hazard modeling in coastal environments, and (v) combine hazard modeling with existing rock coast evolution model(s) to explore processes of erosion and predict directories of future change.

Other information:

The work will be carried out under the supervision of:
dr hab. Mateusz Moskalik, mmosk@igf.edu.pl, IGF PAN
dr Zuzanna Świrad, zswirad@igf.edu.pl, IGF PAN

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Information on the IEDS admissions: <https://www.mssd.us.edu.pl/en/admission-2024-2025>