



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

ul. Bedzińska 60
41-200 Sosnowiec
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www.mssd.us.edu.pl



Reference No: IEDS/2020/US/03

Title of PhD project: *Evolution of drainage system in glacierized Arctic basin driven by climate changes at Werenskioldbreen catchment, Svalbard.*

Leading unit: International Environmental Doctoral School associated with the Centre for Polar Studies at the University of Silesia in Katowice (IEDS)

Mode of study: full-time

Degree to be obtained: PhD in the field of natural sciences, in the discipline of Earth and related environmental sciences

Duration: 4 years (8 semesters), from October 2020

Language: English

Scholarship: approx. 2370 PLN monthly (1-2nd year); approx. 3650 PLN monthly (3-4th year)

Requirements and regulations: www.mssd.us.edu.pl/kandydat-mssd/

Registration online: www.irk.us.edu.pl

Conditions of recruitment:

I STAGE: Knowledge test in the field of discipline. The test is scored on points: from 0 to 10 points.

A positive result of the test is that the candidate gets a minimum of 7 points. Absence on the test disqualifies the candidate from the entire qualification procedure.

II STAGE: a) the final result of the candidate's completion of higher education (maximum 6 points, diploma grading ratio: 6.0 (excellent) - 6 points, 5.0 - 5 points, 4.5 - 4 points, 4.0 - 3 points, 3.5 - 2 points, 3.0 - 1 point), b) for candidates (students) referred to in art. 186 para. 2 of the Act - a certificate of average grade from at least three years of uniform Master's studies, rounded to one decimal place, according to the conversion factor: 6.0 (excellent) - 6 points; 5.0 - 5 points; 4.5 - 4 points; 4.0 - 3 points; 3.5 - 2 points; 3.0 - 1 point).

III STAGE: Interview for assessing: the candidate's intellectual level, knowledge of English, substantive level of the doctoral dissertation project, motivations and predispositions for scientific work, previous scientific achievements of the candidate (maximum 15 points).



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Requirements:

1. MSc degree (or equivalent) in Geography, Geology, Geophysics, Physics, Surveying, GIS or equivalent in Earth and related environmental sciences in the field of natural sciences.
2. General knowledge of research related to hydrology, glaciology, meteorology with focus on glacier hydrology and environment of polar areas.
3. Good knowledge of hydrological modelling, statistical methods for hydrological and meteorological research purposes.
4. Candidates should have good skills in use of Geographic Information Systems (GIS) software (e.g. ArcGIS, QGIS, etc.). A significant asset will be a proper skill in use of software for numerical modelling of hydrological and hydrogeological processes (eg. SWAT, MODFLOW, FEFLOW) as well as generating and analyzing digital terrain models (3D).
5. Good communication skills in English in order to provide excellence in research in the area, preparation of papers and presentations during international conferences and internships abroad (Polish is not required for foreigners).
6. Ability to work independently and as part of a team environment.
7. Creativity and ability to think critically.

Tasks description:

1. Compilation of data base necessary for the project research development (i.a. meteorological, hydrological, glaciological data and cartographic as well as remote sensing images) related to the Werenskioldbreen catchment.
2. Studies and critical analysis of publications on the research subject and methods & techniques planned to be applied.
3. Analysis of remote sensing and cartographic data sources (e.g. aerial photos, satellite images, DTMs and archival maps to detect and quantify changes in the Werenskioldbreen catchment.
4. Development of functional model of evolution of the glacier catchment drainage system in the light of recent literature and own observations.
5. Preparation, organization and execution of field research in Spitsbergen.
6. Processing and analysis of data acquired from the field campaigns.
7. Preparation and processing of data necessary for building up numerical model of water circulation in the Werenskioldbreen glacierized basin.



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8. Preparation and submission of papers to scientific journal and presentations to international conferences.
9. Reporting of progress in the PhD project research on a regular basis.
10. Help in the maintenance of the day-to-day work of the “Cryosphere and Geoinformatics Research Group” and Centre for Polar Studies of the University of Silesia including organization of research, teaching, popularization and promotion of science and co-responsibility for the research equipment as well.

Abstract.

In response to warming of Arctic climate melting of glaciers is more intensive. It stimulates an evolution of water drainage system of glaciers and in their forefields. Progressed recession of land ice masses increases importance of marginal zones in hydrology of glacierized catchments. As a consequence in changes of air temperature and structure of precipitation, more water appears in glacier basins. It affects glacial processes and thus impacts glacier drainage system. Moreover, the total water balance of glacierized catchment is altered as well. Despite many studies of hydrological processes in Svalbard and attempts to develop models of response of glacier drainage system and entire glacierized catchments to climate warming, a holistic and general numerical model of functioning of Svalbard glacierized basins under changing climate conditions hasn't been proposed yet. This is the main aim of the proposed PhD project. The objective of study consists of quantification of water balance of the Werenskioldbreen catchment taking into account series of factors as glacial conditions, meteorological, hydrological and hydrogeological ones for the entire catchment including the polythermal glacier its bedrock and marginal zone. One can expect that as a consequence of progress in climate warming amount of ablation water will change and dynamics of runoff will be affected.

Quantitative characteristics of such processes and development of a numerical model of hydrological evolution of the Werenskioldbreen catchment is the central element of the subject of this project. Results which have to be achieved should permit to indicate of leading factors and evaluate trends of changes in water circulation within this Arctic catchment affected by climate warming. They have to allow present predictions of changes in future taking into account different climatic scenarios. An important additional goal of the PhD project is related to assessment of capabilities and limitations in application of numerical modelling of drainage system of Arctic catchments for predictions of their changes under climate change in future.



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Other information:

1. The supervisor will be Prof. dr hab. Jacek A. Jania; Institute of Earth Sciences, University of Silesia in Katowice, Research Group “Cryosphere and Geoinformatics” and the Centre for Polar Studies, jacek.jania@us.edu.pl
2. Contact to the Secretary of the IEDS Admission Committee: +48 32 3689 380, polarknow@us.edu.pl, www.mssd.us.edu.pl