



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

ul. Bedzińska 60  
41-200 Sosnowiec  
tel. +48 32 368 93 80  
polarknow@us.edu.pl  
www.mssd.us.edu.pl



### **Titles of two PhD projects:**

1. Applied remote sensing in recognition of the changes of the water balance in High Arctic catchments
2. Applied remote sensing and geophysical imaging in recognition of water-permafrost interactions in High Arctic catchments

**The leading unit:** Institute of Geophysics Polish Academy of Sciences

### **Requirements:**

- 1) He/She should have a Master of Science Degree or equivalent qualification in geoinformatics, geophysics, geography, physics, environmental or related engineering.
- 2) The candidate should have knowledge on hydrology, climatology and permafrost, and will be expected to work partially in the Arctic.
- 3) The ideal candidate should be familiar with hydrological measurements, remote sensing methods, geophysical methods, statistical data analysis, and be familiar with programming (MATLAB, R, Python) and GIS (e.g. ArcGIS).
- 4) Fluent English enabling the presentation of results at international conferences, communication, reading and writing scientific papers.

### **Tasks description:**

- 1) A comprehensive water balance study in two High Arctic mountainous catchments located in Svalbard to investigate the heterogeneity in the cryo-hydro-meteorological conditions and their seasonal dynamics.
- 2) Acquisition, processing and analysis of hydrometeorological time series in-situ and remote measurements (GPS and UAV) of runoff, precipitation gradient, evapotranspiration, soil moisture, glacier mass balance, snow cover, ground temperature, and groundwater level.
- 3) Investigate and model relationships between permafrost and hydrology to understand the dynamics of the cryo-hydro-geological system in the mountainous catchments.
- 4) Preparing, organizing and conducting field experiments in the Svalbard region, processing the acquired data.
- 5) Preparation or contribution to publication of papers in JCR journals and conference presentations.
- 6) Writing regular reports on progress and presentation of the results to the project management board according to the agreed schedule.



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### Abstract:

The **main objective** of this proposal is a **comprehensive water balance study in two High Arctic mountainous catchments located in Svalbard to investigate the heterogeneity in the cryo-hydro-meteorological conditions and their seasonal dynamics.**

Such complex investigation will be achieved by interdisciplinary approach:

1. **Investigation of water balance** in each catchment taking into account new measurements of runoff, precipitation gradient, evapotranspiration, soil moisture, glacier mass balance, snow cover, ground temperature, and groundwater.
2. **Analyses of hydro-meteorological time series** using **in-situ and remote measurements (GPR and UAV)**, to recognize the **dynamics of hydrological and topoclimatological processes** at a range of temporal scales in different sites.
3. **Analyses of the added value of new time series** (evaporation, precipitation, soil moisture, groundwater) on the constraining hydrological models to **limit uncertainty of simulations.**

We propose an integrated approach taking into account the freeze-thaw cycles of water in the soil, to describe and to model hydrological processes. These cycles influence river discharge by changing the hydraulic properties of the soil and by either contributing to or preventing infiltration. It is planned to use cryo-hydro-geological models for **better understanding of processes linking hydrology and permafrost under varying climatic conditions for the first time in Svalbard.** In particular, we would like to analyse (i) **an influence of active layer thickness on the surface and near-surface water storage, drainage, and routing;** (ii) **test the effect of surface water, soil moisture, and groundwater on permafrost distribution and degradation;** (iii) **analyse how active layer thickness changes in the past have altered observed discharge patterns;** (iv) **and how future permafrost degradation will influence the hydrological regime.**

### Other information:

The work will be carried out under supervision of:

dr hab. Marzena Osuch ([marz@igf.edu.pl](mailto:marz@igf.edu.pl)) and dr Tomasz Wawrzyniak ([twawrzyniak@igf.edu.pl](mailto:twawrzyniak@igf.edu.pl)),  
Institute of Geophysics Polish Academy of Sciences



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**The amount of the scholarship: 5000 PLN (gros gros)**

**Deadline for applications, conditions and procedure of admission as well as the date of the competition result:**

According to the regulations of the IEDS

- 11.10-31.10.2021 Online recruitment in the IRK system (<https://irk.us.edu.pl/>), including the creation of an account in the online recruitment system IRK; payment of the enrollment fee (the date of the transfer is decisive); entering relevant information and documents
- 05.11.2021 – deadline for delivery of documents (title and outline of the project, list of achievements with their confirmation and others)
- 08.11.2021 – information on the mode and time of the test of knowledge in the discipline in which the doctoral dissertation is planned.
- 16.11.2021 – test of knowledge in the discipline in which the doctoral dissertation is planned (the time will be determined by the recruitment committee depending on the number of candidates for each topic). Failure to pass the competency test disqualifies from further admission procedure
- 17.11.2021 – individual information about the test result and admission to the next stages of recruitment to the IEDS as well as the date of the interview.
- 23.11.2021 – deadline for sending presentations for job interviews.
- 24.11.2021 – interviews with candidates
- 25.11.2021 – announcement of lists of shortlisted candidates and reserve lists.
- 26–30.11.2021 – registration of candidates qualified for admission.



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**Information on the conditions for awarding a doctoral scholarship:**

The project is financed under the NCN SONATA BIS competition no. " Applied remote sensing and geophysical imaging in recognition of the changes of the water balance in High Arctic catchments". The duration of the project is planned for 48 months.

NCN scholarships for students and doctoral students involved in the implementation of a research project may be awarded for the period of performing specific tasks in the research project.

The entity disburses the NCN scholarships only on the terms set out in the Regulations on awarding NCN scholarships in research projects financed by the National Science Center, introduced by the resolution of the Council of the National Science Center no. Entity.

The NCN scholarship is paid to the scholarship recipient on the basis of a scholarship agreement concluded in writing between the Entity and the scholarship recipient. The contract specifies the scope of work in the research project and the period of its implementation, the amount of the NCN scholarship, the period and conditions for its payment. One scholarship agreement should be concluded for each scholarship holder selected as a result of the competition. The agreement may include various periods for the payment of the NCN scholarship.

The doctoral scholarship may be paid only to a doctoral student at a doctoral school, assuming that the doctoral student meets the requirements set out in the relevant provisions of the Act of July 20, 2018, Law on Higher Education and Science (i.e. Journal of Laws of 2020, item 85, as amended) ) necessary to receive a doctoral scholarship for the entire period of implementation of the planned tasks in the project.