



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

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Reference No: IEDS/2020/US/04

Pedogenesis and long-term evolution of pit-mound topography under the past and contemporaneous regime of forest dynamics in Tatra Mountains (Poland, Slovakia) and Alaska (U.S.A.)

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

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).



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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).

Requirements

1. Applicants must hold a postgraduate degree in physical geography, geomorphology, soil science, Quaternary geology, geophysics, climatology, GIS or similar.
2. A background in soil and hillslope evolution theory, disturbance regime of temperate forests, and knowledge on wind types of various genesis and their characteristics in the temperate climate zone will be an advantage. Field and laboratory experience in dendrochronology will be an additional asset.
3. Applicants should have at least basic knowledge and practical skills in data analysis, statistics and modeling in R and/or Python. Past practical experience in one of the most popular GIS software will be an additional asset.
4. Applicants should be fluent in English. The Ph.D. candidate will have to write at least three scientific papers published in journals with high IF. Additionally, during the Ph.D. course, a potential candidate will have to apply for grants and scholarships and work on presentations for international conferences. All these activities require excellent English skills.

Tasks description

A successful applicant will first analyze historical records of past windthrows and windstorm events. This will be conducted based on critical evaluation of various data sources: reports, data sets, satellite images, orthophotomaps and wind speed time series. A field stage of the project will involve soil profile analyses, soil sampling, tree sampling with the use of Pressler's borer, tree census and geomorphic mapping. A laboratory stage of the project will require soil sample analyses, tree-ring measurements, and wood anatomy evaluation of organic remnants. During the office stage, a Ph.D. candidate will statistically analyze soil data sets and meteorological time series of which results allow to build models of soil and hillslope evolution under windthrow impact. Based on original results a candidate will have to write scientific publications and prepare conference presentations in English. An important part will be an application for financial support of the Ph.D. project from domestic



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and international sources (grant agencies, European funds), and also an application for international scholarships that allow extension of international cooperation and the range of fieldwork planned for this project.

Abstract

Pit-mound morphology caused by tree uprooting is an ideal bioindicator of natural processes occurring in forest ecosystems. The process of tree uprooting responsible for pit-mound topography formation is a very effective but not entirely recognized pedogenic and geomorphic phenomenon. Most frequently occurs as an outcome of windstorms that in many instances are catastrophic and cause stand-replacing disturbances (e.g. Tatra bora in 2004 in the Slovak part of Tatra Mountains). Trees uprooted during the impact of hurricane-speed wind disturb soil profiles and are a factor of biotransport of soil material. This process combines very peculiar effects of the atmosphere (strong wind) and forest dynamics (windthrows and windsnaps) that have a direct influence on soil characteristics and geomorphic activity. However, a long-term pedogenic and geomorphic effects of the tree uprooting process have not been fully recognized so far, and especially in forest ecosystems of the Tatra Mountains and rain forest of Alaska (U.S.A.). The aim of the proposed doctoral project is a detailed evaluation of soils and hillslopes evolution within pit-mound topography, in comparison to undisturbed sites. As a result, we aim to build models of soil and hillslope evolution in selected areas disturbed by tree uprooting. One of the tasks will be finding an answer to the question: in what conditions pit-mound topography forms, and how does it impact a long-term soil and hillslope evolution in different environmental conditions?

Other information:

1. The supervisor will be dr hab. Łukasz Pawlik, prof. UŚ, lukasz.pawlik@us.edu.pl, University of Silesia in Katowice, Faculty of Natural Sciences, Institute of Earth Sciences. The auxiliary supervisor will be Brian Buma, brian.buma@ucdenver.edu, University of Colorado in Denver, the U.S.A.
2. An important part of the project will be conducted in the SW part of Alaska. A Ph.D. student will apply for a 6-month scholarship offered by the Polish National Agency for Academic Exchange under the Bekker Programme.
3. Contact to the Secretary of the IEDS Admission Committee: +48 32 3689 380, polarknow@us.edu.pl, www.mssd.us.edu.pl