



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

ul. Bedzińska 60
41-200 Sosnowiec
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Title of PhD project under the Preludium-BIS funding scheme:

BIOFORCLIM - biomorphodynamics of forested hillslopes driven by forest ecosystem disturbances due to hurricane wind events and their relation to changing climate conditions

The leading unit: University of Silesia in Katowice

Requirements

1. MSc diploma in geomorphology, physical geography, meteorology, climatology, GIS, cartography, geology, geophysics, or similar.
2. Good and practical knowledge of the English language (written and spoken).
3. Good knowledge and practical skills in programming or statistical analyses (in R or Python), or willingness and ability to learn one of these programs.
4. Good knowledge and practical skills of GIS (Geographic Information System) software (SAGA GIS, QGIS, or ArcGIS), or willingness and ability to learn one of these GIS platforms.
5. Knowledge of dendrochronology will be an additional advantage.
6. High motivation and no formal contraindications for completing a 6-month scholarship at the University of Colorado in Denver, USA.
7. High motivation for scientific work coupled with the ability to work in a team
8. Documented scientific achievements in Earth sciences (preferred co-authorship of the paper published in one of the journals from the Journal Citation Reports), and experience in presenting study results during conferences will be an additional advantage.



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Tasks description

A Ph.D. student will be responsible for all aspects of the study, including fieldwork and theoretical analyses. The main tasks between others include 1) preparation of an extensive database, based on the archive and historical resources, with information on the past wind-related damage of forest ecosystems in three national parks, 2) tree cores sampling, measurement of tree-rings and their statistical analysis, 3) time series analysis allowing deep characterization of wind regime of the study sites. A Ph.D. student will be obliged to publish his/her study results in the English language in the most prestigious scientific journals.

Abstract

Damage caused by hurricane wind in old-growth and managed forests may have geomorphic consequences. It is mainly due to windthrows when trees are uprooted, and some part of soil material attached to root systems is relocated. This factor in many geomorphic and soil studies was neglected, and in consequence, for many protected forest ecosystems, the process of windthrows occurrence stayed significantly understudied. It applies to the process's current activity and its long-term dynamics during the past several hundred years.

One of the natural archives that record the scope of wind damages in forests is tree-rings. A significant increase of the tree-rings width during the subsequent 5-10 years can be interpreted as an increase in solar radiation availability for trees growing under a closed forest canopy. Such a situation may occur when a gap in the forest canopy is formed by a fallen tree (uprooted or broken). One of the present project aims is the quantification and characteristic of the contemporaneous wind regime of national parks selected for this study and a description of the intensity and effectiveness of soil material biotransport induced by the tree uprooting process. The database created during the project realization will indicate which primary factors influence the range of this kind of biotransport. This information will be used to biotransport modeling modified by forest stand features, topography, and the sites' wind regime.



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Other information:

1. The supervisor will be Dr Łukasz Pawlik (<https://www.biomorpho.us.edu.pl/>), lukasz.pawlik@us.edu.pl, University of Silesia in Katowice, Faculty of Natural Sciences, Institute of Earth Sciences. The supporting supervisor will be Dr Brian Buma (<http://www.brianbuma.com/>), University of Colorado in Denver, the U.S.A.
2. An important part of the project will be conducted at the University of Colorado in Denver, the U.S.A. A Ph.D. student will apply for a 6-month scholarship offered by the Polish National Agency for Academic Exchange under the Bekker Programme