

<b>Tytuł projektu</b>
Późnovistuliańskie megapowodzie lodowcowe południowego sektora lądolodu skandynawskiego: zapis geomorfologiczny i implikacje paleogeograficzne
<b>Project title</b>
Late Weichselian glacial megafloods at the southern sector of the Scandinavian ice sheet: geomorphic records and palaeogeographic implications
<b>Dyscyplina /Area of science</b>
nauki o Ziemi i środowisku
<b>PROJECT DESCRIPTION</b>
<p><b>Project goals</b></p> <ul style="list-style-type: none"> <li>• To identify and analysis of landforms and sediments which prove the existence of extreme and sudden discharges of large quantities of meltwaters in the south-eastern periphery of the ice sheet during the last glaciation.</li> <li>• To assess magnitude of extreme processes associated with NE Poland's deglaciation which unambiguously indicate catastrophic megafloods.</li> <li>• To determine the impact that glacial megafloods on the formation of Europe's valley system during the last glaciation.</li> <li>• To identification of the source of meltwaters and magnitude glacial floods.</li> </ul> <p><b>Outline</b></p> <p>Geological processes with catastrophic environmental consequences are often initiated by climate changes. They caused glacial processes to intensify and often to become extreme. Such phenomena undoubtedly include cataclysmic glacial megafloods. These processes may have caused a significant transformation in the morphology and geological structure of the proglacial area and may have been one of the main causes of the formation of the European valley system, which transferred significant quantities of meltwaters to the Atlantic ocean. For this reason also, flood-related landforms are indicators of a sudden changes in climate conditions. The research hypothesis for the project is that systems of landforms exist in the proximal part of the outwash plains would indicate attest to glacial megafloods. In this PhD project we will try to identify and analyze landforms which unambiguously prove the existence of extreme glacial events – sudden discharges of large quantities of meltwaters in the south-eastern periphery of the ice sheet during the last glaciation. Such Pleistocene landforms have been identified along the flow pathways of meltwaters in North America and</p>

in Altai, which makes this project's anticipated research results of global significance.

Research methodology includes analysis of landforms morphology using GIS tools, building of geomorphological and geological digital databases, geomorphological research to identify the morphology and geological structure of landforms created by sub- and proglacial floods, interpretation of field-study and laboratory results, paleohydraulic estimations, building semi-quantitative models of extreme processes in the marginal zone of the Scandinavian Ice Sheet.

This PhD project will be conducted as a part of National Science Centre project "Geomorphic records and palaeogeographic implications of Late Weichselian glacial megafloods and surges at the southern sector of the Scandinavian ice sheet (MEASSIS)" (2018/31/B/ST10/00976). These grant supports lab and field researches, attendance at conferences and additional scholarship.

### **Work plan**

1. Review of the literature relating to the geology and geomorphology of the study area and the processes associated with Pleistocene and contemporary glacial megafloods, collecting geological and geomorphological maps of test fields, developing high-resolution elevation models (DEM) and maps of the geomorphometric variability of landforms based on LIDAR data and building a digital model of the ice margin topography.
2. Identifying the morphological and genetic types of landforms and their morphometric characteristics and parameters which typify the individual genetic types of indicator landforms for glacial megafloods and publishing research results
3. Sedimentological and geomorphological investigations at key sites - identifying the geological structure of subglacial landforms (at key sites), creating a database which includes the lithofacial characteristics of glaciofluvial sediments, lab analysis results, geomorphometric parameters of megaflood-related landforms
4. Drawing up digital geomorphological maps of the identified test areas and maps showing paleogeography of NE Poland during Late Weichselian; developing a database of hydraulic, geomorphometric and lithological parameters and characteristics of their mutual relations and publishing research results.

### **Literature**

- Baker, V.R., Eastern Washington. Special Paper 144 (1973) pp. 79  
Carling, P.A.; Sedimentology 43 (1996) 647–664  
Carling, P.A.; Journal of Sedimentary Research 69 (1999) 534–545  
Herget, J.; Geological Society of America, Special Paper 386 (2005) pp. 118  
Russell, A.J. et al.; Quat. Sci. Rev. 29 (2010) 1363–1381  
Toucanne, S. et al. Earth Planet. Sci. Lett. 290 (2010) 459–473  
Weckwerth et al.; 2019, Earth-Science Reviews 194 (2019) 216–233

**Required initial knowledge and skills of the PhD candidate**

- ➔ Analytical thinking
- ➔ Eager to learn
- ➔ Understanding of fluvial and glacial processes
- ➔ Understanding and knowledge about glacial and fluvial geomorphology and sedimentology,
- ➔ Knowledge about geomorphometric analysis for characterizing glacial flood-related landforms using GIS methods and LIDAR data
- ➔ Eager to work hard

**Zgłaszający projekt/ Author of the project**

dr hab. Piotr Weckwerth

stopień/tytuł, imię, nazwisko

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e-mail

Wydział Nauk o Ziemi

jednostka organizacyjna

**Proponowani promotorzy i mentorzy/prospective supervisors****1) promotor główny/ main supervisor**

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**2) promotor pomocniczy / co-supervisor**

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