



2023 Master internship at University of Gdańsk



TITLE : Tracking geomorphological effects of storm surges in the coastal zone of the Gulf of Gdańsk

LAB & PEOPLE

- Name of the hosting lab: Geomorphological Reconstruction Laboratory
- General activities of the lab: Research related to coastal and glacial geomorphology
- Website: (in reimplementation)
- Number of staff / PhD: 4/4
- Supervisor name and contact:

Dr Damian Moskalewicz – Principal Investigator of the NCN/2021/43/D/ST10/00185 project. Contact: damian.moskalewicz@ug.edu.pl

Dr hab. Piotr Paweł Woźniak – Head of the Geomorphological Reconstruction Laboratory. Contact: piotr.wozniak@ug.edu.pl

TOPIC OF THE INTERNSHIP

- Scientific context of the internship

Recently Baltic Sea (semi-enclosed, nearly tideless basin) coastal area has been evaluated as endangered by consequences of future sea-level rise and increasing threat from storm events related to ongoing climate change. The current research project (funded by National Science Centre Grant no. 2021/43/D/ST10/00185) aims to investigate storm-induced landforms and sediments to provide a better understanding of coastal processes and storm surge hazards. The knowledge gained in the project could help and extend perspective on including geological/geomorphological records in coastal management.

The main research questions are related to environmental factors that play a vital role in forming storm surge sedimentary records at sandy barriers and wetlands, and the classification potential of digital data to recognise storm effects in the coastal zone. Innovative, remote sensing equipment is used in the project – UAV (Unmanned Aerial Vehicle) equipped with LiDAR (Light Detection and Ranging) and camera, MBES (Multibeam Echosounder). Measurements are planned and executed before, during (after an extreme event), and at the end of storm season. Sediment distribution and properties are monitored seasonally.

Keywords : storm surges, washovers, natural hazards, floods, geomorphology, coast, sedimentology

Bibliography :

Leszczyńska, K., Stattegger, K., Moskalewicz, D., Jagodziński, R., Kokociński, M., Niedzielski, P., Szczuciński, W., 2022. Controls on coastal flooding in the southern Baltic Sea revealed from the late Holocene sedimentary records. *Scientific Reports* 12, 9710.

<https://doi.org/10.1038/s41598-022-13860-4>

Moskalewicz, D., Szczuciński, W., Mroczek, P. 2022. Characterization of storm surge deposits along the shore of the Gulf of Gdańsk (Baltic Sea) applying heavy mineral analysis. *Quaternary International* 630, 34-47. <https://doi.org/10.1016/j.quaint.2021.05.011>

Janowski, Ł., Tysiąc, P., Wróblewski, R., Rucińska, M., Kubowicz-Grajewska, A., 2022. Automatic classification and mapping of the seabed using airborne LiDAR bathymetry. *Engineering Geology* 301, 106615. <https://doi.org/10.1016/j.enggeo.2022.106615>

Moskalewicz, D., Szczuciński, W., Mroczek, P., Vaikutiene, G. 2020. Sedimentary record of historical extreme storm surges on the Gulf of Gdańsk coast, Baltic Sea. *Marine Geology* 420, 106084. <https://doi.org/10.1016/j.margeo.2019.106084>

Sitkiewicz, P., Rudowski, S., Wróblewski, R., Dworniczak, J., 2020. New insights into the nearshore bar internal structure using high-resolution sub-bottom profiling: The Vistula Spit case study. *Marine Geology* 419, 106078. <https://doi.org/10.1016/j.margeo.2019.106078>

Tasks and duties entrusted to the student:

The student will be involved in the daily activities of the research team. The main task will be the integration of freely available remote sensing datasets from the past two decades and conducting spatiotemporal analysis of storm-induced landforms as an extension of the planned project research goals. Simultaneously, the student will have the opportunity to acquire new remote sensing data during the internship. The supervisors are also open to new ideas related to the project scope. The duties comprise assistance in the fieldwork, performing laboratory work (pretreatment of samples for sedimentological analyses), attending team meetings, and actively working on the research topic and team publications.

Skills to be acquired or developed:

- Expertise in coastal morphodynamics in the nearly tideless basin
- Knowledge about storm-induced coastal landforms and sediments
- Remote sensing data processing and interpretation skills
- Scientific writing, visualisation and presentation skills

PROFILE OF THE DESIRED STUDENT

- Minimum level of study required: achieved BSc/Eng degree
- Field(s) of study: relevance to Earth Sciences (e.g., geology, geography, oceanography, environmental engineering, geoinformatics, geodesy)
- Scientific skills: student should have good writing skills, the ability to critical thinking and the motivation to resolve scientific problems
- Language skills required: English – sufficient for daily conversations, performing scientific tasks – reading and writing

THE INTERNSHIP ASSIGNMENT:

Desired duration of the internship (in months): 3-6 months

Desired Starting date of the mission: *October (mostly preferred) to December 2023*

Indicative weekly schedule: *35h / week*

Remuneration:

Erasmus grant: could be asked to your own university

Internship agreement: *an internship agreement will be signed.*

To SEA-EU students:

If you're interested, please send your CV and letter of motivation to the scientist in charge, email: damian.moskalewicz@ug.edu.pl before 30.09.2023 (the sooner, the better)