

Candidate: **Karin Kure**

Study Programme: Environmental and regional studies (3rd Cycle)

Study Module: 4D Earth

Mentor: Asst. Prof. Mateja Jemec Auflič, PhD

Summary of the Doctoral Dissertation Topic Presentation

Dynamics of Landslides: The Influence of Geomorphology, Lithology, and Rainfall

The increasing frequency and intensity of extreme rainfall is one of the most significant consequences of climate change, as such events affect hydrological systems, increase the risk of natural disasters, and indirectly threaten both the natural environment and infrastructure. Due to its highly varied topography and the convergence of different climate types, Slovenia exhibits high spatial variability in rainfall, which increases the likelihood of extreme weather events. Owing to this spatial variability in precipitation, combined with geological and geomorphological characteristics, a large part of Slovenia is prone to landslides, particularly during intense or prolonged rainfall. In recent decades, these risks have been increasing, as evidenced by extreme events such as the floods and numerous landslides in 2023, which constitute one of the largest natural disasters in the history of independent Slovenia.

Landslides are among the most common natural hazards in Slovenia; therefore, studying them is crucial for understanding their origin, development, and dynamics, as well as for improving hazard assessment and forecasting. The source areas where landslides originate have been investigated for many years. The methodology for determining the source areas of landslides has been gradually refined and upgraded since 2012. However, despite the provisions of the 2002 Water Act, which classifies these areas as being at risk of landslides or rockfalls (landslide-prone areas), a methodology for determining landslide displacement and deposition zones has not yet been established. Identifying relocation and disposal areas is crucial for risk assessment and for developing strategies to mitigate the consequences of landslides. The purpose of this doctoral dissertation is to develop a methodology for identifying relocation areas and predicting the extent of landslides. This study aims to identify the geomorphological, geological, pedological, hydrological, anthropogenic and rainfall factors that influence the spatial development, runout and extent of landslides. The main research question I aim to answer is: "What are the extent and displacement of landslides on a specific lithological unit, given a certain amount of rainfall?"

The doctoral dissertation will consist of three interrelated thematic sections. Within each section, specific research questions concerning the extent and runout of landslides will be addressed. Their synthesis will allow the formulation of a comprehensive answer to the central research question and contribute to a better understanding of the factors influencing the extent and runout of landslides.

The first research step will focus on identifying and evaluating the factors that influence the extent of landslides in various geological environments. The second research step will focus on the geomorphic imprint of landslides and the relationships between their shape, morphometric characteristics, and geomorphological factors. The last research step will focus on investigating the influence of rainfall and hydrological conditions on landslide runout and extent.