Modeling of the Shovi Disaster: Analysis and Simulation of the August 2023 Debris Flow Event

Tamar Tsamalashvili

e-mail: tamar.tsamalashvili@tsu.ge

Department of Geography, Faculty of Exact and Natural Sciences
Ivane Javakhishvili Tbilisi State University
3, I. Chavchavadze Ave., Tbilisi, 0179, Georgia

In this presentation, we delve into the catastrophic debris flow event that occurred in Shovi, Georgia, on August 3rd, 2023. Utilizing advanced modeling techniques, specifically the RAMMS::debrisflow model, we reconstructed the event to understand its underlying processes and dynamics. This study provides a comprehensive analysis of the event, beginning with the initial rockslide at Mt. Buba, followed by the transformation into a debris flow that ultimately devastated the village of Shovi.

The analysis includes a detailed examination of the geological and meteorological conditions leading up to the event, with a particular focus on the effects of climate change on periglacial processes. The presentation covers the methodologies used for data collection, including aerial and terrestrial photo documentation, and the subsequent data evaluation and simulations conducted with the RAMMS::debrisflow model.

Our findings highlight the critical factors that contributed to the event, such as the geological instability of the rock mass, the melting of glaciers and permafrost, and the meteorological conditions at the time. By back-simulating the event, we were able to calibrate the model and accurately reproduce the debris flow's velocity, deposition heights, and runout distances. This model not only helps us understand the August 2023 event but also serves as a predictive tool for assessing the hazard potential of future debris flows in the region.

Additionally, the study explores possible mitigation measures, including monitoring systems and land-use planning, to protect the region from similar events. The integration of satellite data for ongoing monitoring and the application of multi-stage analysis processes are recommended for effective hazard management.