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Towards Large-area Dynamic Modeling of Landslides Hazard and Risk with Spatiotemporal Point Processes

Massimiliano Pittore[1,2], Ugur Oezturk[1,3], and Stefan Steger[1]
[1]EURAC Research, Institute for Earth Observation, Bozen / Bolzano, Italy (massimiliano.pittore@eurac.edu)
[2]German Research Institute for Geosciences Helmholtz Center Potsdam (GFZ-Potsdam), Potsdam, Germany
[3]University of Potsdam, Potsdam, Germany

Landslides are one of the most relevant natural threat in mountainous regions, resulting each year in billion of direct and indirect losses incurred worldwide. Furthermore, it is widely acknowledged that these processes are both strongly dependent on local geomorphological, geological and environmental features and highly sensitive to weather- and climate-related events such as intense precipitation or snowmelt. However, most regional landslides hazard and risk models to date struggle capturing this complex interplay of quasi-static and dynamic drivers and triggering factors, hence severely hampering their operational use for implementing timely risk mitigation and adaptation measures.

We aim to introduce a sound and relatively straightforward geostatistical approach to landslides hazard and risk modelling based on heterogeneous spatiotemporal point processes, which has potential for the assimilation of empirical observations from different sources (including, e.g., remote sensing) for iterative calibration and free from thresholds of continuous monitoring parameters. Such approach could be efficiently used to obtain large-area, near-real time stochastic simulation of landslide processes as input to further risk analysis and management activities by civil protection authorities and policy planners. Perspectives and limitations of the proposed approach stemming from a preliminary exemplification in a case study in Central Asia will be outlined and discussed.