



Investigation of giant mass movements in the Lesser Caucasus and assessment of the spatial relationship between landslides and major fault zones and volcanoes

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Two landslides of assumed seismic origin in the vicinity of Garni, Armenia, were investigated during a geophysical field campaign in September 2016. On the basis of geophysical prospecting (microseismic ambient noise measurements, i.e. H/V method), the thickness of the landslide deposits has been estimated and a trigger scenario model was developed. The original trigger of those landslides is not known – but one major reactivation by an earthquake in 1679 has been proved (see below).

Additionally, the spatial distribution of landslides was analysed with respect to the location of major fault zones and volcanic areas. For that, a spatial analysis with GIS has been carried out on the basis of two landslide catalogues. The catalogue that was generated during this work covers the areas of including the Pambak-Sevan-Syunik and the Garni Faults as well as several volcanic areas. These NW-SE faults are mainly marked dextral strike-slip movements locally combined with reverse mechanisms. Along these fault zones strong historical earthquakes occurred, as for example one major event in 1139 ($M \sim 7.5 - 7.7$). The 1679 Garni earthquake caused widespread destruction and also reactivated landslides located near the Garni Fault, including the two investigated landslides. According to historical sources, the event reached a magnitude of $M=5.5-7$ with an intensity between VIII and X. The volcanic areas on the other hand include the NNW-SSE-oriented Ghegham and the NW-SE Vardeniss ridges. Some of the ridges' volcanoes erupted during the Holocene, i.e. 2090 ± 70 BP for the Ghegham ridge. Nowadays, more than 80% of Armenia is covered by Quaternary volcanic formations or friable deposits which are favourable to the formation of landslides. Nevertheless, our first analysis showed that the faults have a stronger influence on landslide distribution than the volcanoes. This is also due to the indirect fact that many volcanic areas are marked by more gentle slopes than the valleys hosting the fault zones.