



Tien Shan geohazards database: earthquake and landslide size-frequency statistics

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Recently compiled landslide and earthquake data covering a large part of the Tien Shan, Central Asia, are analysed with respect to their size-frequency behaviour. For the same area, only partial databases for sub-regions had been presented previously. They were combined and new data were added to fill the gaps between the databases. The new compiled landslide inventory contains existing records of 1600 previously identified mass movements and more than 1800 new landslide data mapped over a target region of 1200 km (E-W) by 600 km (N-S). On the basis of the new landslide inventory and an updated earthquake catalogue (> 10000 records), the link between landslide and earthquake activity is analysed. Here we focus on the size-frequency relationships developed for both types of geohazards, in terms of Gutenberg-Richter Law for the earthquakes and in terms of probability density function for the landslides. Some similarities can be found in the spatially changing b-value of earthquake events and the power law exponent of the landslide data – lowest values are found in mountain areas where very large mass movements had occurred near major fault zones. The supra-regional landslide inventory will also be compared with sub-regional ones. For one of them, we also possess a multi-temporal landslide inventory and assessed landslide size-frequency relationships for each time period. Those show a decreasing power law exponent with time – due to the coalescence of smaller landslides to form fewer larger ones. However, at (supra-)regional scale, temporal data are very scarce; thus, a major hazard component is still insufficiently known and scaling in time is almost impossible. We may only counteract this problem by dating rockslides and any large mass movement. Finally, we would like to emphasize the role of coupling effects related to various types of geohazards that may also be expressed by similarities between size-frequency relationships.