Landslide susceptibility mapping based on two step cluster and self-organizing mapping-random forest: A case study of the Zigui basin, Three Gorges Reservoir Area, China

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The Zigui basin is one of the most landslide-prone areas where thousands of landslides are distributed. Performing the landslide susceptibility mapping is a heated issue in the area. Whereas, whether the random selection of the landslides or non-landslides grid cells are reasonable in research of landslide susceptibility mapping is the existence problem nowadays. Based on the two step cluster (TSC) algorithm and the self-organizing mapping - random forest (SOM-RF) model, a novel hybrid model is proposed to overcome the above drawbacks in this study. Rough set (RS) theory is employed as an attribute reduction tool to identify the significant influencing factors of landslides, and SOM is used to produce a preliminary landslide susceptibility mapping. Two step cluster algorithm is applied in telling apart the most reasonable True-Positive (TP) from landslide grid cells in high-susceptibility zones and the False-Positive (FP) in low-susceptibility zones. Afterwards, the TP and FP are imported into the RF model as samples to produce the improved landslide susceptibility mapping. The proposed method is utilized to develop landslide susceptibility mapping in the Zigui basin. Compared with the susceptibility mapping produced by RF model, which selects landslides and non-landslides grid cells randomly, the results of TSC and SOM-RF model demonstrates to have the superior prediction skill and higher reliability in landslides susceptibility mapping.