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Do landslides follow landslides?

Jalal Samia (1), Arnaud Temme (1), Arnold Bregt (1), Jakob Wallinga (1), Fausto Guzzetti (2), Francesca Ardizzone (2), and Mauro Rossi (2)

(1) Environmental Sciences, Wageningen University, Wageningen, Netherlands (jalal.samia@wur.nl), (2) Istituto di Ricerca per la Protezione Idrogeologica, del CNR, Perugia, Italy

Landslide susceptibility maps are typically obtained by quantifying relations between landslides and conditioning attributes. Here, we take a fundamentally different starting point: path dependency and self-organization, i.e. the effect of landslides on landslides. We test two hypotheses: first, that landslides do preferentially follow landslides, and second, that follow-up landslides are different from those that do not follow other slides.
Results indicate that there is indeed a considerable amount of overlap among landslides that affect the overall affected area by landsliding. This is more than expected: the number of overlaps among landslides is more than would occur of slides were randomly placed in the study area. Overlaps of slides with previous slides occur frequently within a period of about ten years after a previous slide, yet decrease considerably over time. Also the second hypothesis is confirmed: follow-up landslides indeed have different properties in terms of power law and shape than those that are not associated. Particularly, follow-up landslides are larger and more elongated than non-follow up landslides. Moreover, after fitting an inverse gamma function to the magnitude-frequency distributions of follow-up and non-follow-up slides, it was found that the alpha parameter that controls the prevalence of very extreme events, is much larger for follow-up slides than for non-follow-up slides. Also the rollover value is substantially larger for follow-up landslides than non-follow up landslides .
The prevalence of follow-up slides in the first approximately ten years after a previous slides, and the fact that follow-up slides are different from other slides, should have implications for susceptibility studies. Apparently, susceptibility (conventionally a purely spatial concept) changes with the time since previous landslides happened. We explore possible mechanisms for this that may allow us to include these temporal changes in landslide susceptibility prediction.