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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "The assessment of earthquake-triggered landslides susceptibility with considering coseismic ground deformation" *by* Yu Zhao et al.

Anonymous Referee #1

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In the manuscript "The assessment of earthquake-triggered landslides susceptibility with considering coseismic ground deformation", the authors try to improve earthquake-triggered landslide susceptibility maps by introducing a new parameter that they call "coseismic ground deformation" Assuming as a study case the October 23, 2004, Mw 6.8 Niigata earthquake, the authors provide several landslide susceptibility maps at two different scales, using three different statistical methods, namely, the logical regression (LR), the Support Vector Machine (SVM), and the Artificial Neural Network (ANN). The authors conclude their study, saying that the "coseismic ground deformation" parameter is an "important" factor to evaluate the susceptibility of landslides. In my opinion, the small increase of the area under the receiver operating

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Discussion paper

characteristic (ROC) curve, i.e., from approximately 0.72 to 0.77, obtained by introducing the “coseismic ground deformation” parameter, does not support the conclusion stated by the authors. Such a small improvement is primarily affected by the generally low resolution of the other parameters introduced in the analysis. In particular, one of the most critical parameters, i.e., the lithological map, present a spatial resolution that could be not acceptable for a small scale analysis of the epicentral area. Another critical factor, i.e., the peak ground acceleration, is strongly scattered over the study area, and it presents an unacceptable resolution for the small scale study of the epicentral area. Even the “coseismic ground deformation” parameter and its definition are not explicit. The authors provide a map (Figure 5) given by the difference of two Lidar surveys performed in 2003 and 2007. The authors do not specify the orientation of the computed ground deformation (subsidence? Uplift?....) nor describe the “expected” coseismic ground deformation concerning the faulting mechanism. Moreover, the map shown in Figure 5 covers approximately four years; thus, it could be affected by ground movements that are not related to the earthquake. It is widely acknowledged that the most critical factors that affect earthquake-triggered landslides are the lithology, the slope, and the PGA. Regarding the latter, slope stability is affected not only by the PGA of the mainshock but also by the PGA of the several aftershocks, which always follow the main event. This aspect is neither introduced not discussed in the analysis. Therefore, according to the several uncertainties related to the selection, calibration, and description of the parameters affecting landslide susceptibility, the small increase in AOC associated with the introduction of the “coseismic ground deformation” parameter is not significant. According to the comments above, the manuscript is not acceptable for publication.

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