Hydrol. Earth Syst. Sci. Discuss., 3, S256–S259, 2006
www.hydrol-earth-syst-sci-discuss.net/3/S256/2006/

Hydrology and Earth System Sciences Discussions

Interactive comment on "A new method for determination of Most Likely Initiation Points and the evaluation of Digital Terrain Model scale in terrain stability mapping" *by* P. Tarolli and D. G. Tarboton

P. Tarolli and D. G. Tarboton

Received and published: 19 May 2006

The authors thank D. Miller for the detailed review and comments on this paper. Following is our response. Some comments refer to the concerns of Reviewer #3 and our response to that posted as a separate author comment on that review.

Miller (2006) notes that since the paper is a contribution to methods to evaluate slope stability models that it would benefit from description of methods currently employed. We agree that this is a good idea and plan to add additional description to the paper. Dietrich et al., (2001) evaluated the SHALSTAB model using landslide density and cumulative percent of landslides and area in each stability index class. Borga et al., (2002)

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

EGU

extended the cumulative percent idea to cumulative frequency plots of stability index at mapped landslide initiation locations in comparison to the cumulative frequency over the entire domain to quantify the discriminating capability of a terrain stability map. Chinnayakanahalli (2004) used a similar approach but constructed an integral comparison measure from the integral of cumulative frequency plots that could be used with a generalized likelihood uncertainty estimation approach to optimize model parameters and quantify uncertainty. Increasingly statistical methods involving split sampling techniques, either in time or space are also being used with measures of a terrain stability models discriminating capability to evaluate terrain stability models (e.g. Chung and Fabbri 2003; 2005; Brenning, 2005).

We agree with Miller that examples of the Stability Index maps being compared are informative so will add some of these to the revised paper.

We agree with Miller that the MLIP density could be used to compare between different models and that MLIP can be applied to any spatially distributed index. In fact we have a paper under preparation that compares SINMAP and SHALSTAB models. Given the concerns of Reviewer #3 regarding the assumptions and dependence on contributing area, we applied the MLIP to "slope". Slope is perhaps the simplest index of terrain stability. The table with results of slope and MLIP percentage comparison will be included in the revised paper.

We agree with Miller that we have not presented sufficient examples to establish the general applicability of SINMAP. The paper did not conclude this. The paper concluded, (page 408, line 6) that "the MLIP approach has generality beyond our specific study area." We like to distinguish between SINMAP which is one model that can provide an index that can be used with MLIP and the MLIP approach that identifies the least stable (according to the stability index) value along each possible flow path. We do believe that the fact that the MLIP approach gives good results without any calibration of SINMAP is suggestive of the generality of MLIP, but concede that further evaluation in different areas is needed to establish generality, so in the revised paper will modify the

HESSD
3, S256–S259, 2006

conclusion. The fact that, without calibration or input of site specific information, ratios in excess of 3 of most likely landslide initiation point density between within landslide and outside of landslide area were obtained suggests that the most likely landslide initiation point approach has generality beyond our specific study area, a suggestion that merits further evaluation at other locations.

References

Borga, M., G. Dalla Fontana, C. Gregoretti, and L. Marchi, (2002), “Assessment of shallow landsliding by using a physically based model of hillslope stability”, Hydrological Processes, 16(14), 2833-2851.

Brenning, A., (2005), "Spatial Prediction Models for Landslide Hazards: Review, Comparison and Evaluation," Natural Hazards and Earth Systems Sciences, 5, 853-862.

Chinnayakanahalli, K., (2004), "An Objective Method for the Intercomparison of Terrain Stability Models and Incorporation of Parameter Uncertainty," MS Thesis, Civil and Environmental Engineering, Utah State University.

Chung, C. J., and A. G. Fabbri, (2003), “Validation of spatial prediction models for landslide hazard mapping”, Natural Hazards, 30, 451-472.

Chung, C. J., and A. G. Fabbri, (2005), “Systematic procedures of landslide-hazard mapping for risk assessment using spatial prediction models”, in Landslide Hazard and Risk, edited by T. Glade, M. G. Anderson and M. J. Crozier, pp. 139-174, John Wiley & Sons, Ltd., Chichester, England.

Dietrich, W. E., D. Bellugi, and R. R. de Asua, (2001), “Validation of the shallow landslide model, SHALSTAB, for forest management”, in Land Use and Watersheds, edited by M. S. Wigmosta and S. J. Burges, pp. 195-227, American Geophysical Union, Washington, D.C.

Iverson, R. M., (2000), "Landslide Triggering by Rain Infiltration," Water Resources Research, 36(7), 1897-1910.

HESSD

3, S256–S259, 2006

Miller, D., (2006), "Interactive Comment on "a New Method for Determination of Most Likely Initiation Points and the Evaluation of Digital Terrain Model Scale in Terrain Stability Mapping"," Hydro. Earth. Syst. Sci. Discuss., 3, S174-S179.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 3, 395, 2006.