

Interactive comment on “Modelling catchment-scale shallow landslide occurrence by means of a subsurface flow path connectivity index” by C. Lanni et al.

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We thank Referee #1 for reviewing our manuscript. Below we address the questions raised by the referee:

RC = Referee comment AC = Author comment

1) RC: The hydrological model is combined with an existing slope stability model based on the infinite slope assumption. This may be a conceptual inconsistency with the hydrologic model and I invite the authors to comment on this in their revised version. Perhaps more appropriate slope stability models could have been selected for their

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coupled model.

AC: In our paper we used a generalized factor of safety, defined as the ratio of shear strength to shear stress, for a one-dimensional infinite slope under both saturated and unsaturated conditions. As far as we know, the assumptions used in the development of the hydrological model are consistent with those used for the slope stability analysis. So, we cannot identify any inconsistency between the two models. A more thorough description of the potential inconsistency from the reviewer would be helpful on this point.

2) RC: The authors have applied their model to three experimental catchments in Italy with good results. The need for detailed soil depth measurements should be discussed in the paper. Most areas will not have this information available and methods to overcome this problems need to be discussed.

AC: We agree with the reviewer on this point. In our work we used soil depth measurements to identify a relationship between soil thickness and local slope. The relationship has been used to generalize the measures to ungauged topographic elements. In the revised version of the manuscript we will report on how our methodology relates to recent empirical approaches on this issue (Tesfa et al., 2009; Catani et al., 2010). Moreover, we will discuss the applicability of process-based approaches for predicting the spatial variation of colluvial soil depth in our sites (Dietrich et al, 1995; Heimsath et al., 2005; Saco et al., 2006).

References

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