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Interactive comment on “Modelling of the hydrological connectivity changes in the Minjiang Upstream after the Wenchuan earthquake using satellite remote sensing and DEM data” by H. Z. Zhang et al.

Anonymous Referee #2

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This paper deals with a very interesting issue: the assessment of connectivity changes in a catchment (the upper Minjiang catchment in China) after the occurrence of the Wenchuan earthquake in 2008 that triggered several landslides causing a widespread removal of vegetation and producing a large amount of loose material in the area. The main aims of this study are to model the stability of material on slope and hydrological connectivity in the catchment in order to investigate changes in debris-flow susceptibility over time. To do this the authors used a rich dataset of multi-temporal satellite images to identify vegetation recovery and developed a model to assess hydrological

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connectivity. Results show that the progressive vegetation recovery plays a fundamental role in stabilizing slopes and reducing connectivity. My major concern is related to the hydrological connectivity developed. First of all, I'm not sure the authors are dealing with hydrological connectivity but rather with sediment connectivity. The authors developed their index inspiring by the index by Borselli et al. (2008) and, since they use D-infinite flow direction algorithm (P. 1121 L. 2-3), by its variant proposed by Cavalli et al. (2013). These sources of inspiration should be acknowledge in the text. Furthermore, the original index by Borselli et al (2008) is dimensionless while it is not clear which unit of measurement is used in the proposed index. This is also difficult to understand because the units of the variables of a formula should be listed in the text and this is not the case. Furthermore, the derivation of the weighting factor (w) related to the slope materials stability is not clearly described in the manuscript. However, this parameter seems to be too simplified especially in the case of the classification of the lithology of the area into classes of rock competence that does not take into account the bedrock deeply fractured and highly weathered conditions (P. 1116 L. 18-19). In general, I think that, despite the interesting results obtained, the authors need to strengthen the methodology of their work. Furthermore, since the connectivity is at the core of the paper, I would have expect that in the introductory chapter the authors presented this important and emerging issue by providing at least a brief overview on the state of the art of existing connectivity conceptual frameworks and indices (e.g., Bracken et al., 2013, 2015; Brierley et al., 2006; Fryirs, 2013). Moreover, the discussion of the obtained results is very limited and needs to be expanded including also references to other works and the English needs to be strongly improved since the paper is not always comprehensible throughout.

References

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