



Interactive comment on “A dynamic landslide hazard assessment system for Central America and Hispaniola” by D. B. Kirschbaum et al.

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The manuscript by Kirschbaum et al. presents a very interesting now-casting system for rainfall-induced landslides, which has been applied to Central America and Hispaniola. This is a very challenging task, considering the width of the study area and the scarcity of data available. The topic is of great interest among NHESS readers and the quality of the manuscript is very high. In my opinion, the manuscript could be improved further by adding a few details, as specified in my forthcoming comments.

Main comments

1- One of the apparently weak points of the work is that, looking at the validation statistics, the results could be considered low in terms of predictive capability. However,

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the results should be contextualized in the framework of the very ambitious objective of the work: a now-casting system for a very wide area, calibrated using few and low quality input data. From this point of view, results can be considered encouraging.

2- The landslide typology is never mentioned in the manuscript. Which typologies are present in the landslide catalog? Which have been used to draw the susceptibility map? Which have been used to define the rainfall thresholds of the algorithm? Which are the target of the now-casting system? Answering these questions is important because if the landslide typologies are different from a model segment to another, I see a potential lack of consistency, which could affect the applicability of the model. Moreover, in the existing literature, both rainfall thresholds and susceptibility maps are usually conceived for a specific landslide typology. Only few works exist (to my knowledge) that are targeted to landslides of every kind. The authors should clearly state to what extent the landslide typology is known, which is the dominant landslide typology and if their system is targeted to landslides in general or to a specific landslide typology.

3- Reading this manuscript, I found some similitudes with previously published works. Martelloni et al. (2012) presented a warning system which makes use of a similar decisional algorithm, based on rainfall thresholds derived from a statistical analysis of rainfall time series and using a combination of daily rainfall and antecedent rainfall. Lagomarsino et al. (2013) further refined the model and Segoni et al. (2014) combined the rainfall-threshold-based warning system with a susceptibility map. The originality of the present work is not in doubt: it has a different scale of application, it uses different input data and it has a very challenging objective. However, I think that previous works that present similar approaches should receive adequate credits and references.

4- References do not always include the latest advances of the state of the art, especially concerning regional scale rainfall thresholds.

Minor comments

5- Which is the difference between high and moderate hazard? A higher probability

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of landslide occurrence or a more severe effect to the ground (e.g. higher number of landslides, higher landslide volumes . . .)?

6- Authors write that the thresholds used in the algorithm were defined with a calibration and the values used in Fig. 6 were chosen because they provided the best outcomes in terms of r_j . It would be interesting to know which other threshold values were evaluated and which results they provided. The authors could easily present this comparison with a table.

7- 2858, 5. In the last few years several models have been applied also at the regional scale.

8- 2858, 24. What does it exactly mean “optimizing the predominant threshold for these instances”? Please, provide additional details.

9- 2859, 25 - 2860, 1. This sentence is not very clear to me, at least at this point. It becomes clear later on, when the statistics of Table 2 are presented.

10- 2863, 11. In my opinion, there could be a possible additional reason for the worst performance of the model in some areas. The thresholds chosen for the algorithm portrayed in Fig. 6 are considered valid for the whole study area, which is very wide. The threshold values have been empirically chosen by means of a test on the existing landslide inventory. This provides values that may not be valid for some locations or for some geomorphological occurrences that are not well represented in the calibration dataset. Ideally, the threshold values should be calibrated independently for different geomorphological areas. As an instance, ARI threshold could be 50th percentile in a given area and 60th percentile in another one. Of course, adjusting these values would require a calibration dataset with more landslides. However, I think that this issue could be briefly discussed.

11- 2864, 7. Actually, you are not using soil moisture measurements, but you are using an index derived by antecedent rainfall values as a proxy for soil moisture. Please, be

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clearer on this point.

12- 2865,1. How much time is needed for commercial computers to make all the computations and to provide a model output? This is important in perspective of operating the model in regional now-casting systems.

13- Is there any ongoing plan about performing an update of the system in the near future? In a few years, updated landslide inventories could be used for a new model calibration, which could possibly improve the performance of the model.

14- Have the authors observed any systematic scheme in the errors? E.g. missed alarms at the beginning of the rainy season could be an indicator of a poor constraining of the antecedent rainfall conditions.

15- Tab 2. TPR is an important evaluator of model performances, however the effectiveness of forecasting and nowcasting systems could be better evaluated with an index that balances TPR and FPR. I suggest adding a similar table showing r_j values.

Typos and small corrections

16- Fig 6, legend. ARI instead of AR

17- FIG 7, legend. I suggest displaying landslide events with a cross instead of a line.

Cited references

Lagomarsino, D., Segoni, S., Fanti, R., and Catani, F.: Updating and tuning a regional-scale landslide early warning system, *Landslides*, 10, 91–97, 2013.

Martelloni, G., Segoni, S., Fanti, R., and Catani, F.: Rainfall thresholds for the forecasting of landslide occurrence at regional scale, *Landslides*, 9, 485–495, 2012.

Segoni, S., Lagomarsino, D., Fanti, R., Moretti, S., and Casagli, N.: Integration of rainfall thresholds and susceptibility maps in the Emilia Romagna (Italy) regional-scale landslide warning system, *Landslides*, doi:10.1007/s10346-014-0502-0, in press,

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Interactive Discussion

Discussion Paper

C699

