We would like to thank Dr. Liao for his review of our manuscript. We hope our responses will help in clarifying and improving the shortcomings he pointed out.

This documented work represents a very good approach in basin-scale landslides modeling and is recommended to be accepted with some minor comments. The current work is smart because with more and more satellite data available, it is a good time to pursue dynamic and deterministic approach for landslide studies at larger scale (i.e., basin scale; here I suggest to cite some recent work on basin scale modeling, e.g., Cannon and Gartner, 2005 and so on). Particularly, this work links the landslide mechanism with hydrologic dynamics, which is of much help for future landslide research at temporal and spatial resolution.

(1) It mentioned that Eq. 3 is equal to the equation proposed by Iverson (2000) (page 1341 line 4). The essential part of Iverson's equation is the dynamic response of rainfall and I didn't see this responding part in your draft.

The dynamic response to the rainfall input is captured by the modeling of the soil moisture dynamic. At each time step the model redistribute the rainfall input, as explained on page 6 line 26. Moreover, after Reviewer#2 comments, we will improve the paragraph that now will read (new text in ***bold***):

The dynamics of each computational element are simulated separately, but spatial dependencies are introduced by considering the surface and subsurface moisture transfers among the elements***; within each soil layer of a cell, the subsurface flux is redistributed to the corresponding layer of the receiving cell along the direction of steepest descent based upon the unsaturated hydraulic conductivity of the latter one,*** which affects local dynamics via the coupled energy-water interactions. ***The unsaturated hydraulic characteristics, both in term of hydraulic conductivity and soil water potential are related to soil-moisture content through the Brooks and Corey (1964) parameterization scheme (Ivanov, 2006; Sivandran and Bras, 2012), as a function of the saturated hydraulic conductivity in the normal to the soil's surface direction (K_{sat}), the air entry bubbling pressure, ψ_b and the pore-size distribution index λ.*** Consequently, when applied to a catchment, the model offers a quasi-three-dimensional framework by which lateral moisture transfers and difference in topographic characteristics may lead to the spatio-temporal variability of states (Ivanov et al., 2008b).

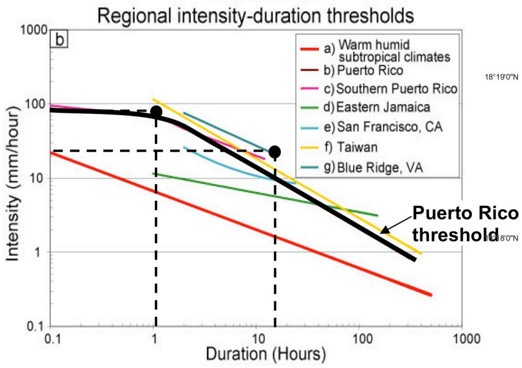
To further improve the explanation about this section and the connection between the model capabilities and the slope stability module, we will add some text on page 9 line 12 (new text in ***bold***):

"The final product of the module is thus a spatially distributed vertical ***dynamic*** FS profile that takes into account the local moisture and soil conditions within the computational element: the first depth at which the condition FS $\leq$ 1 is obtained, is designated as the failure surface depth and consequently represents the depth used to estimate the volume of detached material. During a rainfall event, this modeling framework ***utilizes the soil moisture dynamics response to*** monitor the time evolution of FS, and by setting different warning thresholds, can dynamically define a spatial distribution of instability levels of the basin.

(2) Did you use any observation data of landslide events to verify your simulation result? Before you do so, much analysis becomes over-interpretation, e.g., section 6.3. Please at least clarify this problem ahead.

Unfortunately we have little details about the most recent failure events; the available landslide database, eg. Lepore et al. 2011 and reference therein, does not report the time of failure, but only the location, moreover the Bisley tower was not deployed yet at that time.

The April 2008 event did cause failures, some landslides were measured outside of the basin, but we were not aware of specific landslides within the basin. The rainfall intensity, however, falls well above the regional intensity duration thresholds, for both short and long durations, as shown in the figure below (extracted from Kirschbaum PhD thesis and obtained as a personal communication in 2009). Therefore it is reasonable to believe that this rainfall represents an event capable of causing slope failure.



The scope of this paper is not to define a real-time forecasting of slope failure just yet, because we acknowledge (pag.13 lines 8-9) the limits of the information available at this time.

We will add more text to stress the specific intent of this work, in particular (new text in ***bold***):

- Page 2 line 17, will read: The new modeling framework couples the capabilities of the detailed hydrologic model to describe soil moisture dynamics with the Infinite Slope model creating a powerful tool for the assessment of ***rainfall triggered*** landslide risk.
- Page 5 line 17, This model can be utilized to test different rainfall scenarios at the catchment scale to identify high-risk storm characteristics***; in the future, when more data and measurements will be available, it*** can possibly be integrated into an early warning system.

(3) Moreover, it used homogeneous cohesion and friction, which are two of the most important parameters determining the FS. I understand it is limited by the availability of data, however, I think it is quit necessary to comment the limitation of this work at this point.

We agree that the assumption of homogeneous cohesion and friction angle may be a limitation in any landslide analysis, however the results shown in our work in term of FS are not significantly affected by this limitation. In fact, we analyzed from an hydrological point of view the relationship between the soil moisture dynamics (mainly due to infiltration, lateral redistribution and other hydrological processes, all correctly modeled in tRIBS-VEGGIE) and the failure phenomenon. Therefore, even if a specific landslide is strictly dependent on the local geotechnical parameters, these are not fundamental for a correct interpretation of the overall relationship between hydrology and the slope failure process.

In the phase of the definition of the experiments, we have thoroughly reviewed the literature available on this area, in order to characterize with as many details as possible the characteristics of the soils under investigation. However, to our knowledge, there is no more information that what we have stated in the manuscript (page 13 line 6-13):

Simon et al. (1990) and Lohnes and Demirel (1973) reported values for cohesive strength and friction angle for some of the geological units, and illustrated the expected high variability of these two quantities. The uncertainty associated with these parameters is large when we consider their spatial distribution across four soil types within the domain.

We, of course, agree that the more data and parameters we have about the area the more our results will be close to reality. However, as stated above, at this stage, the choice of homogenous values of cohesive strength and frictional angle allows for an easier understanding of the links between hydrological and failure processes in case of shallow rainfall triggered-landslides, which in turn provides a more efficient assessment of the proposed methodology.

Thanks for the suggested reference, we will include them where relevant.

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