**Hydrology and
Earth System
Sciences
Discussions**

Interactive
Comment

Interactive comment on "Rainfall threshold for hillslope outflow: an emergent property of flow pathway connectivity" by P. Lehmann et al.

P. Lehmann et al.

The reviewer mentions several flow phenomena that can affect the subsurface flow as well and that are not included in the model. Now, we list and discuss these phenomena in the text.

Specific comments:

- Comment #1: The effect of the redistribution is shown in the reply to the short comment of B. Schlaefli and is now discussed at the end of paragraph 5.2.

- Comment #2: The given reference is included and the role of bedrock topography is discussed in more detail at the end of section 5.2.

- Comment #3: The description of the water storage capacity was misleading and has

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been clarified (section 3.1.1).

- Comment #4: The reviewer writes that the slope of the rainfall-runoff relationship can be smaller than 1.0 because only the drainable fraction contributes to the outflow. This is true but this effect can not explain the small slope. The number of drainable fraction increases very quickly for rainstorm amounts higher than the threshold and the slope should become 1.0 rather quickly if the drainable fraction is the only relevant factor.

- Comment #5: The outflow was correlated with the maximum intensity (determined by the maximum rainfall during a one hour interval) but with no other measured property of the rainstorm (time interval between rainstorm events). But we agree that other mechanisms can explain the increase of runoff with intensity and we add this in section 4.1.

- Comment #6: The reviewer mentions that we give the impression that the capability of the model to capture the measured behavior corresponds to the proof that the model gives a correct description of small scale hillslope processes. We added some comments in paragraph 5.2 to show that the model is only a simplified description and we list now the shortcomings as well.

Technical issues

- Page 2927: The two assumptions about the random fields have been combined.

- Section 2.1: A sentence about the hillslope represented by a lattice is added.

- Page 2925, lines 10-14: The threshold behavior is now specified.

- The comments regarding the expressions/mistakes in the pages 2925-2926 have been modified/corrected.

- Page 2929, lines 26-27: A sentence about the size dependency of the percolation threshold was added.

- Page 2932, line 14: the expression rainfall depth is added.

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- Page 2933, line 15: The possibility of water flow from the bedrock into the soil is now mentioned in section 3.1.3.

- Page 2934, line 5, page 2935, line 27: The sentences are corrected.

- Page 2938, lines 16-19: We prefer the total squared error because the error is dominated by the few events with high rainstorm amounts and the mean value per event would be less meaningful.

- Figure 7 and Figure 9: The captions have been modified.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 3, 2923, 2006.

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