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Natural Hazards and Earth System Sciences
Discussions

Interactive comment on "From examination of natural events a proposal for risk mitigation of lahars by a cellular automata methodology: a case study for Vascún valley, Ecuador" *by* Valeria Lupiano et al.

Anonymous Referee #2

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In this manuscript the authors present the model LLUNPIY (Lahar modelling by Local rules based on an UNderlying PIck of Yoked processes) following a cellular automata methodology. After describing the model, the case study of Vascún valley (Ecuador) is presented. In my opinion the cellular automata method, in reproducing lahars, is very interesting and it represents an alternative compared to "classical" approaches (Eulerian one based on conservation of mass and momentum, or Lagrangian one, i.e., particle-based method). However, before the publication, the authors should clarify some points:

1) The description of the model is rather brief! In table 1 the physical and empirical parameters are described, but their unit of measurement and values are missing. Then, how are these parameters calculated? The substates should be describe more extensively and clearly (for example Q_{TH} in equation 1 is not indicated in table 2). In equation 3, the effect of turbulence is considered. The latter is specified by means of the Reynolds number that depends on viscosity. I am surprised to not see in cinematic equation 8 a viscosity term depending on velocity. Could you clarify this point? Finally, what are the initial conditions to start a simulation?

2) The sections regarding the simulations (3.3 and 4.2) need some improvements. It seems that the model is calibrated on 2008 event and then validated with secondary lahar events of February 2005 and August 2008, but only the latter is shown. In table 3 some field data are compared, but regarding only the 2008 event used for calibration if I have not misunderstood. To me, these points should be clarified.

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