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Interactive comment on "EDDA: integrated simulation of debris flow erosion, deposition and property changes" *by* H. X. Chen and L. M. Zhang

Anonymous Referee #1

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The here presented model gives very valuable ideas to describe the complex processes in debris flows in particular the increase in sediment load due to erosion , the deposition of material and the changing rheologic properties in relation to the changing sediment concentration. It proposes new concepts to calculate the changing yield stress especially at low solid concentrations. The erosion and sedimentation process are described following the concepts of Takahashi et al., 1992; Egashira et al., The authors stresses that a change in the rheology in relation to changing concentration, can be significant which may be true. However whether that plays a major role in the run-out velocity or run out distance was not clearly demonstrated in the different tests. Comparisons between measured and calculated velocities are missing. Probably sensitivity analyses with the proposed model can at least as a first step demonstrate in a theoretical way the importance of the transient rheology

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The discussion can be extended a bit. For example:how far this erosion module cover all the debris flow and entrainment processes of these debris flows: break through of landslide dams, cascading effects of dams, side wall failure by undercutting, bed failure. Also it should be mentioned that this model describes a special category of debris flows which are run-off driven . Debris flows originated from landslide failure is another category requiring a different modeling approach

Some small remarks :

7268/25 Explain these processes

7269/14 Add also Medina et al 2008 and Quan-Luna et al 2009 who considers bed erosion as a Mohr-Coulomb failure process

(Quan Luna, B., A. Remaître, A., Van Asch, Th.W.J., Malet, J.P. Van Westen, C.J., 2012. Analysis of debris flow behavior with a one dimensional run-out model incorporating entrainment. Engineering Geology 128, 63-75)

7284/13 Does the partition not disturb the entrainment process?

7285 /13-29 Fig 13 How did you monitor the different phases in time of the deposition process?

7288/17 This is a bit strange that the Cv value at 1-1 is zero assuming no entrainment at all in the source catchment

7308Fig. 10 It is not clear how the debris flow is simulated. The figure suggest that the water " bumps"again the back side of the sediment I presume that this back side is protected by an impermeable shield and the water flows over the surface of the sediment. So a bit more detail here

7309 Fig 11 Same question as for Fig 10

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