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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

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The article proposed a depth-integrated numerical model to simulate the dynamics of debris flow including erosion, deposition and material property changes. To consider a variety of characteristic of debris flow in different stage is significantly important for predicting its run-out distance and the corresponding risk. The text is well written and the analysis is outstanding. However, there still exist some issues need to be addressed.

General issues

1. Referring the equations (1)-(3), although they are very similar to the ones adopted by Takahashi et al., (1992) and Egashira et al., (2001), I think they are different on at least two sides. One side is the coordinate system (here is global coordinate with x-axial horizontal, while the x-axial is along the inclination of the original bed surface in the two references). The other side is originated from the way how they extend their

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one-dimensional mass and momentum equations to two-dimensional cases. Thus, the authors should clearly state the differences of the proposed model in this manuscript.

2. The pattern of manifestation of the equations (1)-(3) seems flawed. The left sides of equations are one of eight directions, while the right sides are physical quantities of comprehensive directions. Such as equation (1), the left side is referred to one of eight directions, while the right side is the whole erosion or deposition depth. Thus, the authors should check these equations and write them in a proper pattern.

3. The four computational cases are not very suitable to verify the model and numerical framework. Three cases are one-dimensional. And the fourth case is also hard to evaluate the advantage of the proposed model. As the way to extend to two-dimensional framework is unique in this manuscript, I think a two-dimensional dam-break/debris flow case without and one two-dimensional dam-break/debris flow case with erosion compared with experiments or previous results is needed.

4. The Introduction should be strengthened and more attention should be paid to the advances of depth-integrated model involving erosion/deposition and associated rheology model. The following references (even more) associated erosion effects should be included in Instruction.

Iverson. R.M., M.E. Reid, M. Logan, R.G. LaHusen, J.W. Godt, and J.G. Griswold (2011), Positive feedback and momentum growth during debris-flow entrainment of wet bed sediment. Nature Geosci., 4, 116-121 McDougall, S., and O. Hungr (2005), Dynamic modelling of entrainment in rapid landslides, Can. Geotech. J., 42, 1437–1448. Armanini, A., L. Fraccarollo, and G. Rosatti (2009), Two-dimensional simulation of debris flows in erodible channels, Computers & Geosciences, 35, 993-1006. Ouyang C., He S., Tang C. (2014). Numerical analysis of dynamics of debris flow over erodible beds in Wenchuan earthquake-induced area. Engineering Geology

Small issues

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1.7273/1-5, simulution should be modified to be simulation.

2.7280/1-5, the equations (29) and (30) seems to have some clerical mistakes.

3.In Figure 10 and 11, the description of sediment part is bad and need redraw.

4.7314/figure 16, Time(h) or Time(t)??

Interactive comment on Geosci. Model Dev. Discuss., 7, 7267, 2014.