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Geoscientific Model Development

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EDDA: integrated simulation of debris flow erosion, deposition and property changes

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Response to Comments from M. Peng:

Reviewer's Comments	**Response by the Authors**
1. The model combined many empirical equations, like Eq. (21) from Takahashi et al. (1992), Eq. (32) from Chang et al. (2011) and so on. However, most of the empirical equations have their limitation due to incomplete or local data sets. Thus, the application of each empirical equation may bring some degree of uncertainty. The combination of so many empirical equations, however, may bring an amount of uncertainties. For example, The Ke in Equation (32) is very sensitive to the parameter of void ratio. While the debris flow in real case varies largely in void ratio.	Thanks so much for the comments. The limitations of the empirical equations have been specified in Section 5. Sensitivity analyses for erosion and deposition have been conducted to investigate the uncertainties to some extent. For a specific area, detailed field tests and laboratory tests can be conducted to obtain soil properties and hydrological parameters, which can reduce the uncertainties to certain extent. The investigation of the model and parameter uncertainties in debris flow analysis is beyond the scope of the paper.
2. The debris flow may not flow to only one of the eight directions in real case. Some may flow to two or more directions at the same time. Errors may increase when the cells become larger, for example, the Xiaojiagou case with limited number of cells.	In EDDA, a debris flow is allowed to flow to all the eight directions at the same time. It is right that a smaller cell size gives more accurate results. The computational time is longer of course.
3. Is that model able to consider landslide dam breach with variety of soil particles? For instance, the dams with both large particles (rocks) and small particles.	The grain size distribution of material highly influences the soil properties such as friction angle, cohesion, critical erosive shear stress, coefficient of erodibility and so on. In a sophisticated analysis, detailed tests are required to get the soil properties at different locations. Based on this, soil properties are assigned to all the cells. The variability at different depth can also be incorporated. If all the work is well done, the model is able to

	consider landslide dam breach with variety of soil particles.