Supplementary Material to "Modeling erosion and sedimentation coupled with hydrological and overland flow processes at the watershed scale"

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S.1. Spatial distributions of morphologic variables for the verification cases of rainfall-induced and overland flow-induced erosion

Figure S1 illustrates the longitudinal distributions of sediment concentrations and the fractions of deposited mass at different times after the simulation start for simulation case 2 (see Section 4.1). The amount of sediment in the water column for the smallest particle size (*i*=1) decreases with time, while the concentration of the largest particles (*i*=10) somewhat grows. Eventually, the same sediment concentration for all particle classes is achieved at steady state. At this time, the mass fractions of the deposited sediment for smaller particles are relatively small, as compared to the fractions for larger particle sizes.

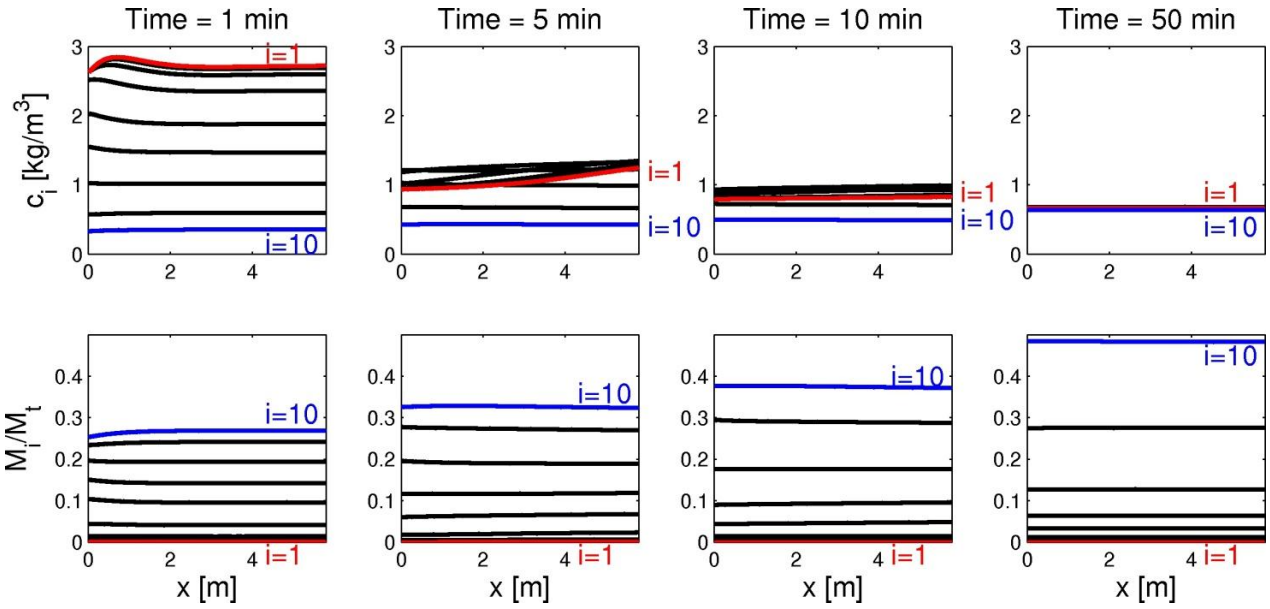

Figure S1: The simulated longitudinal distributions of sediment concentration (the top panel) and the fractions of deposited mass of each sediment class "*i*" relative to the total mass (the bottom panel) for the simulation case 2 (see Section 4.1). Each column panel represents distributions for a given simulation time, i.e., 1, 5, 10, and 50 min.

Figure S2 illustrates the spatial distributions of sediment concentrations and the fractions of deposited mass at different times after the simulation start. This temporal sequence illustrates several interesting features of sediment movement: (1) sediment entering the domain moves continuously downstream and arrives to the outlet after about 30 sec; (2) smallest particles stay suspended over the entire duration of the domain and thus most of them flow out; (3) largest particles get deposited in the upstream area and only ~13 % of the sediment mass given as a boundary influx flows out of the domain; (4) the concentration profiles approach steady-state, while the deposited mass continuously increases.

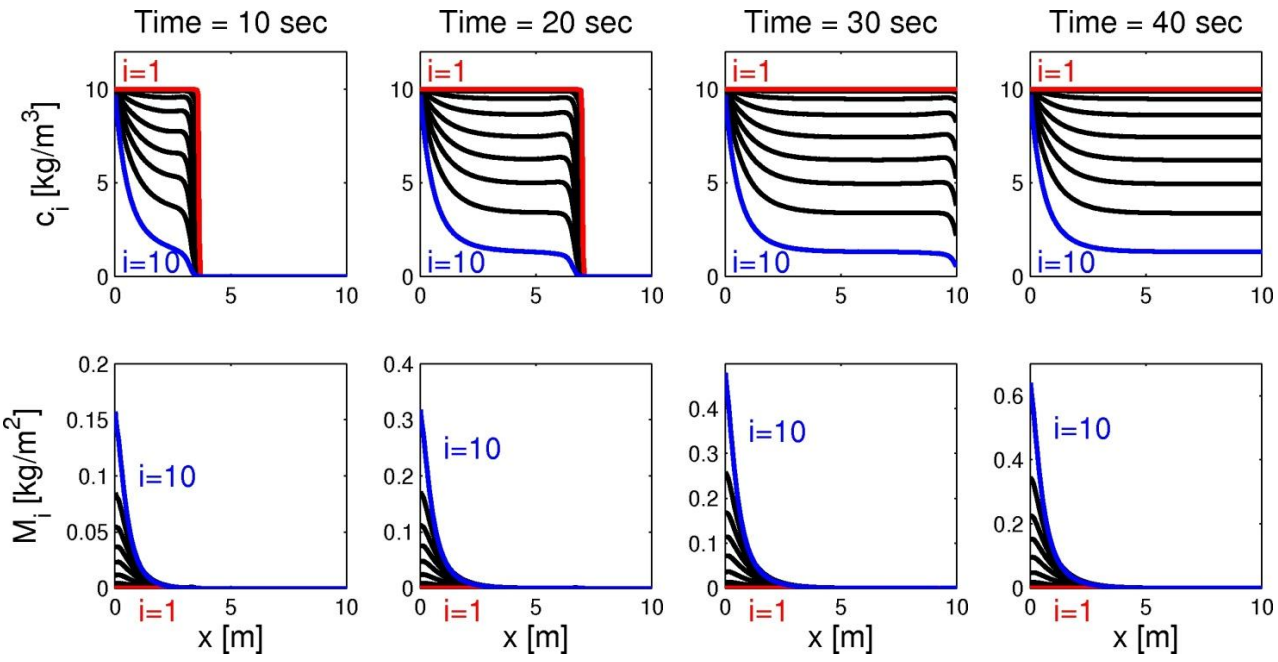

Figure S2: The simulated spatial distributions of sediment concentrations (the top panel) and the deposited masses (bottom panels) of each sediment class for the overland induced erosion problem. Each column panel represents distributions at a given time, i.e., 10, 20, 30, 40 sec.