Uncertainty Associated with Hillslope Delineation in Watershed Erosion Modeling

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Abstract. Most watershed runoff and erosion modeling tools represent a complex watershed as a network of hillslopes, channels, ponds, and an outlet. In modeling practices, a hillslope is commonly treated as a planar surface of constant slope. However, hillslopes are actually irregular in geometry and non-uniform in slope. Soil type, vegetation cover, and land-use management might vary within a single hillslope. To solve this problem, some models like Erosion And Sedimentation Impacts (EASI) addressed complex hillslope geometries by cascading water and sediment from one hillslope to another. More recently, based on the development of spatial analysis tools in the GIS platform, a watershed can be delineated into as many hillslopes/channels as possible. Therefore, it is important to get a deeper understanding about uncertainty associated with hillslope delineation in watershed erosion modeling. In this study, a sensitivity analysis is conducted by partitioning typical concave or convex hillslopes into a series of planar surface with constant slope. Preliminary results show significant uncertainty and imply future improvements to watershed erosion models.