Factors controlling the soil thickness of profiles in a karst terrain, Guizhou, Southwest China

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Chemical weathering and physical erosion control the evolution process of weathering crust. ^{137}Cs and ^{10}Be methods have been widely used in many areas of the world as an effective method to evaluate the short-term and long-term rates of soil erosion, but the application of these methods in the study of erosion in Karst area has been controversial. We have established a set of suitable on karst soil erosion ^{137}Cs moving boundary model, and preliminary validation in the soil erosion study of carbonate rock weathering profiles in southern karst areas (Yunnan, Guizhou, Guangxi, Chongqing). Now, we studied the landscape gradients of some profiles from two small hills in Guizhou province, and obtained the physical erosion and chemical weathering rates, respectively. The long-term erosion rates of ^{10}Be were of which 28.6 t/ (km^2•a) and 10.92 t/ (km^2•a) in two soil profiles of the hilltop, respectively. We found that topography and land use played a great role in the erosion in the area. Our results support the conclusion that the surface erosion is occurred in karst areas. The effect of slope erosion on the slope of the study area was the obvious downward accumulation of the soil in the karst terrain. The contribution ratio of the rock layer and the soil layer to the weathering products was 4:1. Our study confirms that the soil in Karst area is mainly derived from the weathering of carbonate rocks, which is one of the main ways of forming the residual soil. We proposed a “doline” formation model of the hill slope soils.