Geophysical Research Abstracts
Vol. 17, EGU2015-8536-2, 2015
EGU General Assembly 2015

Rainfall and sheet power model for interrill erosion in steep slope

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The two-phase process of interrill erosion consist of the splash and detachment of individual particles from soil mass by impact of raindrops and the transport by erosive running water. Most experimental results showed that the effect of interaction between rainfall impact and surface runoff increases soil erosion in low or gentle slope. Especially, the combination of rain splash and sheet flow is the dominant runoff and erosion mechanism occurring on most steep hillslopes. In this study, a rainfall simulation was conducted to evaluate interrill erosion in steep slope with cover or non-cover. The kinetic energy of raindrops of rainfall simulator was measured by disdrometer used to measure the drop size distribution and velocity of falling raindrops and showed about 0.563 rate of that calculated from empirical equation between rainfall kinetic energy and rainfall intensity. Surface and subsurface runoff and sediment yield depended on rainfall intensity, gradient of slope, and existence of cover. Sediment from steep plots under rainfall simulator is greatly reduced by existence of the strip cover that the kinetic energy of raindrop approximates to zero. Soil erosion in steep slope with non-cover was nearly 4.93 times of that measured in plots with strip cover although runoff was only 1.82 times. The equation of a rainfall and sheet power was used to evaluate sediment yields in steep slope with cover or non-cover. The power model successfully explained physical processes for interrill erosion that combination of raindrop impact and sheet flow increases greatly soil erosion in steep slope.
This research was supported by Basic Science Research Program through the National Research Foundation of Korea(NRF) funded by the Ministry of Education, Science and Technology(No. 2013R1A1A3011962).