



Rill erosion of mudstone slope—a case study of southern Taiwan

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Abstract

Soil erosion has been studied by many scientists for decades (Zingg, 1940; Meyer & Wischmeier, 1969; Foster, 1982; Luk, 1988) and many soil erosion prediction equations have already been developed, such as USLE, RUSLE. In spite of WEEP is based on hydrological physical model, all of the above models are restricted to predict concentrate flow. On the other hand, rill erosion is not understood completely. The amounts of rill erosion are always underestimated. Rill Erosion correlate closely to gradient (Cerda & Garcia-Fayos, 1997; Fox & Bryan, 1999; Fu,et al., 2011; Clarke & Rendell, 2006), slope length (Gabriel, 1999; Yair, 2004), particle distribution (Gabriel, 1999), proportion of clay (Luk,1977; Bryan2000), rainfall intensity (Römkens et al. 2001), and land use (Dotterweich, 2008). However, the effect of micromorphology of mud rock surface, such as mud-cracks, could be studied in more details.

This research aims to simulate rill development by hydraulic flume to observe the morphological change caused by rill/erosion process. Mudstone specimens sampled from the mudstone area of Long-Chi, southern Taiwan. The results show that:

- (1) The erosion pattern of mudstone slope can be divided into four steps: (a) inter-rill erosion, (b) rill erosion, (c) rill development, (d) slope failure.
- (2) Slopes with mud-cracks caused 125% soil loss than smooth slopes.
- (3) Mud-cracks affect spatial distribution of rill development
- (4) The sediment concentration decreased sharply in the beginning of experiments, however increased due to rill development.

This paper demonstrated such a rill development.

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