Modeling of gully erosion with the aim of geomorphic hazard evaluation

Yusuke Katsurada[1]

[1] Human Informatics, Nagoya Univ.

This study is aimed at proposing highly predictable models of gully development such as headward erosion and channel deepening. Following to the modeling of the event-based gullying model by means of hydraulics, a detailed DEM was made from the field survey and stereo-aerial photograph analyses of the gully-incised study site located in the mountainous region in Aichi, Central Japan. The model is applied to the DEM to examine the model predictability comparing the calculation results with the effect of the heavy precipitation which attacked Tokai Region in September, 2000. If the model shows adequate predictability, highly predictable evaluation of geomorphic hazards is expected combining this model with some ephemeral gully predictions.

Gully erosion is one of the indicators of evaluating geomorphic hazards. Many models which predict spatial patterns of ephemeral gullies/rills have been proposed (Desmet & Govers, 1996; Vandaele et al., 1996; Oostwoud Wijdenes et al. 2000 and others), however, prediction of gully development is not sufficiently studied in spite of the previously suggested models like bank gully controlling factors (Vandekerckhove et al., 2000) and dynamic and static models of gully erosion (Sidorchuk, 1999).

This study is aimed at proposing highly predictable models of gully development such as headward erosion and channel deepening. Following to the modeling of the event-based gullying model by means of hydraulics, a detailed DEM was made from the field survey and stereo-aerial photograph analyses of the gully-incised study site with 6.37 ha drainage area and 43.7 m height located in the mountainous region in Aichi, Central Japan. The model is applied to the gully pixels of the DEM to examine the model predictability comparing the calculation results with the effect of the heavy precipitation which attacked Tokai Region in September, 2000. If the model shows adequate predictability, highly predictable evaluation of geomorphic hazards is expected combining this model with some ephemeral gully predictions.