

Distributed Watershed Modeling of Flash Floods in South Korean Mountains

Jaehoon Kim¹ and Pierre Y. Julien²

Department of Civil and Environmental Engineering, Colorado State University

Abstract. In recent years, there has been an increase in extreme rainfall precipitation in South Korea. The mountainous area of Inje county, Gangwon province, has been severely damaged by extreme rainfall in 2006 where 168 mm fell in 3 hours for a daily total of 286 mm. The distributed model TREX (Two-Dimensional Runoff Erosion and Export) was applied to Duksan Creek (watershed covering 33.4 km²) to simulate peak flash flood discharge from this intense rainfall precipitation. The peak flash flood discharge from TREX was computed at 446 m³/s and this value compared well with discharges calculated from three other methods (SCS, Clark, and Nakayasu Method). During this event, the shear stress values in the main channel reached 2.5 kPa as calculated by the TREX model. At such high shear stress, large boulders could be mobilized in the main channel and tributaries. Field measurements also showed that 1.5 m boulders were transported in Duksan Creek. Shear stress mapping was compared with different hazard area maps (including a landslide hazard map and RUSLE). The severely damaged areas viewed from the aerial photograph were better delineated by the TREX shear stress map than any other map.

¹ jaehoonk@engr.colostate.edu

² pierre@engr.colostate.edu