Kinematic wave technique applied to hydrologic distributed modeling using stationary storm events: an application to synthetic rectangular basins and an actual watershed

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Abstract. The purpose of this investigation was to evaluate the use of the kinematic wave technique as applied to hydrologic distributed modeling. Distributed models were developed for several artificial rectangular basins and an actual drainage basin using the U.S. Geological Survey Modular Modeling System. Distributed rainfall was applied to the selected basins as stationary storm events. Impervious watershed conditions were assumed for each simulation. The kinematic wave technique was used to route both overland and channel flow. The distributed rainfall was applied as three individual cases over equal areas of the upper, middle, and lower sections of both the synthetic rectangular basins and the actual drainage basin (Cowleech Fork Sabine River near Greenville, Texas). Hydrologic simulations were conducted for each case and the hydrologic responses, as measured by the peak flow and overall shape of the hydrographs at the basin outlets, were compared. Both peak flow and hydrograph shape were similar. No appreciable flow attenuation occurred. Distributed modeling has great potential for the advancement of the hydrologic sciences. Knowledge gained from this investigation may be useful in determining the practical applicability of the kinematic wave technique for use in distributed models.

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