

## **Predicting location and length of ephemeral gullies with a process-based Topographic Index model**

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**Abstract** Ephemeral gully (EG) erosion can be a major source of sediment in agricultural watersheds and predicting the location and length of EGs is important to assess sediment source areas. Topographic index (TI) models utilize topographic-only factors to locate concentrated flow paths on agricultural fields. In this paper, the TI-model is expanded by incorporating an overland flow equation that describes surface excess rate, roughness, and soil critical shear stress. An un-calibrated Process-Based (PB) topographic index model was applied to an agricultural watershed in Central Kansas and the results were compared with a calibrated Slope-Area (SA) model. The analysis showed that the PB model slightly over-predicted topographic properties of ephemeral gullies compared to the observed data. Accuracy of the SA model depended on the selected threshold value.

**Key words** ephemeral gully; erosion; topographic index model; hydrology; GIS