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Uncertainty evaluation of a regional real-time system for rain-induced landslides

Dalia Kirschbaum (1), Thomas Stanley (2), and Soni Yatheendradas (3)

(1) NASA Goddard Space Flight Center, Hydrological Sciences Laboratory, Greenbelt, United States (dalia.b.kirschbaum@nasa.gov), (2) Universities Space Research Association/NASA GSFC, (3) Earth System Science Interdisciplinary Center, University of Maryland/NASA GSFC

A new prototype regional model and evaluation framework has been developed over Central America and the Caribbean region using satellite-based information including precipitation estimates, modeled soil moisture, topography, soils, as well as regionally available datasets such as road networks and distance to fault zones. The algorithm framework incorporates three static variables: a susceptibility map; a 24-hr rainfall triggering threshold; and an antecedent soil moisture variable threshold, which have been calibrated using historic landslide events. The thresholds are regionally heterogeneous and are based on the percentile distribution of the rainfall or antecedent moisture time series. A simple decision tree algorithm framework integrates all three variables with the rainfall and soil moisture time series and generates a landslide nowcast in real-time based on the previous 24 hours over this region.

This system has been evaluated using several available landslide inventories over the Central America and Caribbean region. Spatiotemporal uncertainty and evaluation metrics of the model are presented here based on available landslides reports. This work also presents a probabilistic representation of potential landslide activity over the region which can be used to further refine and improve the real-time landslide hazard assessment system as well as better identify and characterize the uncertainties inherent in this type of regional approach. The landslide algorithm provides a flexible framework to improve hazard estimation and reduce uncertainty at any spatial and temporal scale.