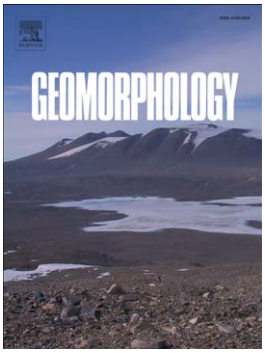

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Prediction of spatially explicit rainfall intensity-duration thresholds for post-fire debris-flow generation in the western United States.

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Highlights

1) A fully predictive method for calculating rainfall thresholds is proposed.
2) Predictions of rainfall thresholds are site-specific.
3) Model predictions are as accurate as previous models requiring more data.
4) Method demonstrates potential for real-time early warning.

Abstract

Early warning of post-fire debris-flow occurrence during intense rainfall has traditionally relied upon a library of regionally specific empirical rainfall intensity-duration thresholds. Development of this library and the calculation of rainfall intensity-duration thresholds often requires several years of monitoring local rainfall conditions and hydrologic response to rainstorms; a time-consuming approach where results are often only applicable to the specific region where data was collected. Here, we present a new, fully predictive approach that utilizes rainfall, hydrologic response, and readily available geospatial data to predict rainfall intensity-duration thresholds for recently burned locations in the western United States. Unlike the traditional approach to defining regional thresholds from historical data, the proposed methodology permits the direct calculation of predictive rainfall intensity-duration thresholds for areas where no such data exist.

The thresholds calculated by this method are demonstrated to provide predictions that are of similar accuracy, and in some cases objectively outperform, previously published regional intensity-duration

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