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Improved hillslope erosion prediction for the Great Barrier Reef Catchments

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Abstract: Sediment delivery from hillslope is one of three distinct sources of sediments for the Great Barrier Reef (GBR) catchments. The contribution of hillslope erosion to overall sediment budget is critical to informed land management decisions. The revised Universal Soil Loss Equation (RUSLE) is currently used as an integral component of Dynamic SedNet to predict hillslope sediment generation and delivery throughout the GBR catchments. A lack of sensitivity to the effect of ground cover on runoff, time lag between daily rainfall and runoff, and the need for the sediment delivery ratio as another model parameter are incentives for model improvement. Modified USLE, for which a combination of event runoff amount and the peak runoff rate is used as the rainfall-runoff erosivity index, addresses these issues associated with the RUSLE. A daily flow erosivity model was developed and tested for nearly 2000 sub-catchments of the Fitzroy Basin in Central Queensland that allows estimation of the daily rainfall-runoff erosivity, in a framework that is similar to the daily rainfall erosivity model currently used in the RUSLE implementation for the GBR catchments. The paper shows that Modified USLE, along with the daily flow erosivity model, is able to address satisfactorily the effect of time lag between daily rainfall and runoff, and predict sediment delivery to streams without requiring the sediment delivery ratio as an unknown parameter. However, at the sub-catchment scale of 100-1000 km^2, the effect of temporal variations in ground cover on runoff is largely undetectable as the ground cover is mostly in excess of 50-60% for most of the time when averaged spatially at this scale.

Keywords: *Great Barrier Reef Catchments, Modified USLE, Dynamic SedNet*