

CURRENT PROJECTS

The role of extreme events in shaping the earth surface

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Introduction

The role of extreme events in shaping the earth's surface is one that has held the interests of earth scientists for centuries. The catastrophic 2011 flood in south east Queensland provided a unique opportunity to assess the role of extreme events in a post-orogenic setting. This rainfall event, whose frequency has been estimated as a > 1 in 100 year event, stripped (both sediment and vegetation) many of the streams that fell within the storm centre.

This GeoQuest research has shown that normalised erosion (erosion per unit area) is scaled to basin area (as a surrogate for increasing discharge) and negatively correlated to channel slope (Fig.1; Baggs-Sargood et al., 2015). This event decreased topographic variance in the river channels significantly and exposed planar bedrock surfaces, marginal bedrock straths and bedrock steps. The question remains though as to how much of the landscape was lowered or eroded in such an event. Was this flood important for eroding the bedrock and thereby a process that increases drainage relief?

Hillslope response

The 2011 rain event triggered over 1800 landslides and debris flows and our analysis shows that 84% of these occurred within one sandstone lithology and with the bulk of them occurring on moderate slopes of 7 – 20 degrees. Our ongoing research will quantify the net erosional effects of these landslides with regards to

hillslope erosion (lowering) and use this topographic and DEM-of-difference analysis to stratify our sampling for cosmogenic radionuclide analyses (to be collected in February 2016).

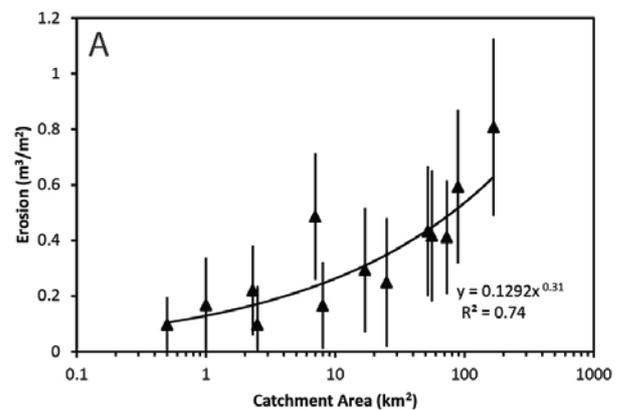


Figure 1 - Relationship between catchment area and normalised erosion for three field and ten desktop reaches in the upper Lockyer Valley, derived from DoDs between the 2010 and 2011 LiDAR data.

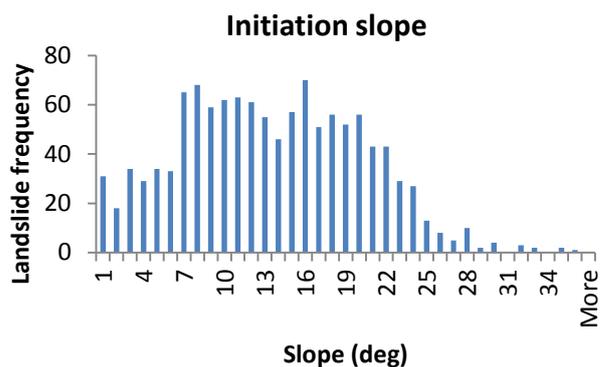


Figure 2 – Frequency of landslides and slope angle in the Lockyer valley derived from the 30m DEM.

Publications from GeoQuest funding:

Baggs-Sargood, M., Cohen, T.J., Thompson, C.J., Croke, J. (2015) *Earth Surface Dynamics*. doi:10.5194/esurf-2-1093-2014.