Geophysical Research Abstracts
Vol. 18, EGU2016-12479, 2016
EGU General Assembly 2016

Geomorphic Flux From Himalayan Flashflood Equates to 1000 yrs Average Erosion Rate

Hugh Sinclair (1), Simon Mudd (1), Tom LeDivellec (2), Kirsten Dallas (1), and Hein Andy (1)
(1) The University of Edinburgh, United Kingdom (hugh.sinclair@ed.ac.uk), (2) ENSEGID INP Bordeaux, France

Extreme flood events are increasingly reported from the western Himalaya; we use geomorphic analyses to reconstruct both the spatial distribution and approximate the recurrence interval for these events. During the summer of 2010, an enhanced monsoon resulted in extensive flooding of the Indus Valley of Pakistan. An unusual aspect of this event was the intense precipitation in the arid upper reaches of the Indus River in Ladakh. On August 5th, a mesoscale convective system caused intense, short-lived precipitation, with estimates of 75-100 mm falling in approximately 30 minutes. The short-lived convective nature of the rainfall meant TRMM data was unable to locate the main event. However, a geomorphic reconstruction of river discharge and hillslope activity demonstrates that the precipitation was limited to a 3 to 6 km wide band on the southward facing slopes of the Ladakh Range, and that this can be traced approximately 120 km along the strike of the range. In addition to mapping out the extent of the event, we also reconstruct the total flux mobilised on selected hillslopes by debris flows; this was achieved by measuring width/depth ratios across a range of scales, and then assigning a stream order to the debris flows which are then mapped over selected sub-catchments. This process provided a volume of mass flux which was then compared to background erosion rates derived from detrital cosmogenic 10Be measurements. This comparison reveals that the Ladakh event mobilised the equivalent of 800-1200 yrs of the mean background erosion rate in these catchments. Repeat 10Be measurements from the same catchments before and after the event record a reduction in concentrations which are explored in terms of the scale of debris flows principally responsible for the flux.
Two years after the Ladakh event, another major flood event occurred in Uttarakhand, resulting in >5700 deaths. Initial investigations of the erosion of dated moraines and the deposition of new terraces indicate that this was also the most significant for at least 1000 years. Whether the occurrence of two major events with repeat intervals on a millennial timescale is significant in terms of changing frequency of extreme monsoonal storms remains uncertain.