2015 Nepal Earthquake: A Mass Wasting Balance

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Following the 7.8 Mw earthquake that struck Nepal on April 25th, 2015, a high-resolution earthquake-induced landslide inventory was prepared. 21,151 landslides have been mapped using Google Earth's pre- and post-earthquake images, helicopter footage and Google Crisis data. For a representative subset of landslides (~7%), the main scar area was manually distinguished from the landslide transport and deposition areas. Starting from this subset of scar areas, six different relationships between scar area and total landslide area were attained for six different intervals of the landslide aspect ratio (AR, i.e. ratio between landslide length and width) which is used as a proxy of landslide mobility. These relationships were used to estimate the scar area for the entire dataset. For landslides with AR lower than 3 (i.e. low-mobility landslides) the total volume was calculated with the equations proposed by Larsen et al. (2010) by using the total landslide area values. For landslides with an AR larger than 3 (i.e. high-mobility landslides) the volume was computed by applying the equation by Larsen et al. (2010) to landslide scar area only, and considering a constant thickness for the runout area (1m based on field activities). By comparing the landslide denudation and mass wasting to uplift and subsidence measured by InSAR (ALOS-2 satellite data) following the Nepal earthquake, the net volume change in the earthquake-affected area was calculated.