Khait rock avalanche / mud flow, Tajikistan: validation of a remote sensing-based methodology for characterization and analysis of catastrophic landslides

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The 1949 Khait earthquake, Tajikistan triggered numerous landslides that buried 33 villages. The largest and most deadly landslide, the Khait rock avalanche / mud flow, buried two villages. A previous case study of the Khait landslide presented a methodology for pre-site visit investigation of large-scale landslide disasters using easily-accessible, low-cost, remotely-collected data. Datasets considered were moderate resolution optical orbital imagery, coarse resolution digital elevation data, and gridded population estimations. Results of a recent detailed field investigation of the 1949 earthquake-triggered landslides are compared to results of the previous remote assessment to demonstrate utility of the latter. Comparative analysis specifically considers area and volume, three-dimensional morphology, mortality estimation, and risk assessment. Analysis results are discussed with reference to quality, resolution and temporal record of remotely-collected data, and with consideration of transport mechanics and social policy. Although some disagreement occurs, the initially presented remote sensing-based methodology provides a starting point for analysis of low accessibility landslide disasters and a means for initial rapid assessment of landslide disasters in the future. Initial assessment of large-scale landslide disasters using remotely-sensed data requires at least some field-collected data. Performance of the presented methodology relies on the quality of such data. Inaccuracy in reported on-ground conditions, therefore, limits the utility of the methodology. A complicating factor in assessment of any landslide disaster is politically-driven suppression or inflation of fatally records. Erroneous fatality records falsely disagree with and, wrongly, indicate inaccuracy in mortality estimations based on analysis of remotely-sensed data.