



High resolution digital mapping and geomorphological analysis of the 2010 Mount Meager rock-debris avalanche (BC, Canada).

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This study examines the large landslide that occurred at Mt. Meager, 200 km NNW of Vancouver, British Columbia, Canada, on August 6, 2010. We studied the source area and deposits to reconstruct the failure of the south flank of Mt. Meager from slow deformation to catastrophic collapse, the subsequent transformation into a debris avalanche, and the 11 km run-out. We use a Structure from Motion (SfM) photogrammetric approach and processed both historical British Columbia Provincial airphotos (1948, 1962, 1964-1965, 1973, 1981, 1990, and 2006) and digital images taken with a commercial camera during low-level helicopter traverses. The SfM products have been used to calculate volumes and the geometry of the south flank of Mt. Meager before and after the catastrophic failure, and to produce an orthophoto that we have used to map and describe the deposit. Oblique helicopter photos provide information on the scar geometry and rock units exposed by the failure. The SfM-derived orthophoto and ground observations allowed us to map deposit facies, lithologies, and structures, including thrust, normal, and strike-slip faults. We identified five sub-areas in the accumulation zone based on the association of facies and deformation structures. Based on our interpretation of the remotely sensed data and ground observations, we propose that the landslide had two main rheological phases: one richer in water and highly mobile, and another massive and water-poor. The water-rich phase spread quickly and superelevated high on valley walls as it moved down valley. It left a discontinuous veneer of debris, typically <1 m thick. The main, unsaturated mass moved more slowly and left a thicker (up to about 20 m) deposit with hummocks and brittle-ductile faults and shear zone in the distal part of the run-out zone.