THE 2002 ROCK AVALANCHE AT McAULEY CREEK, NEAR VERNON, BRITISH COLUMBIA; IMPLICATIONS FOR REGIONAL LANDSLIDE HAZARD ASSESSMENT

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In late May or early June, 2002 a major rock avalanche occurred at the boundary of the Okanagan Highland and Thompson Plateau in British Columbia's southern Interior Plateau. 30 km east-southeast of Vernon. The exact pre-failure conditions are unknown but the slide is thought to have been related to the occurrence of heavy rains. The landslide is significant because it is the first major catastrophic rock slope failure recorded in the region in historical time. It occurred on the west side of McAuley Creek, a tributary of Harris Creek, which occupies a steeply incised glacial meltwater channel. Failure involved gneissic rocks of the Okanagan Plutonic and Metamorphic Complex of Paleozoic-Mesozoic age which, at the site, exhibit strong easterly dipping foliation. Initial sliding appears to have been facilitated by this element of the rock mass structure. The source slope averaged 38° and ranged between 420 and 480 m in height. The initial landslide involved an estimated volume of 5 x 10^6 m^3. Approximately 4 x 10^6 m^3 of this material was deposited immediately below the source area against the opposite valley wall in a steep-sided pile; but approximately 1 x 10^6 m^3. traveled 1.6 km downstream as a mobile distal flow destroying forest cover along McAuley Creek. This resulted in the slide exhibiting long run-out behaviour with a H/L of 0.18, equivalent to a fahrböschung of only 10°. The mobility of the debris is explained in part by the presence of fine-grained glacial/glaciolacustrine deposits in McAuley Creek which appear to have been liquefied under impact loading by the debris thus generating the distal flow. The 2002 failure occurred at a location that had been identified in pre-event terrain mapping as a potential slide area; tension cracks 4 m wide and 400-500 m long were identified at the slide site on aerial photographs dating back to the 1950s and in pre-slide field investigations. This indicates that the source rock slope had undergone considerable pre-failure movement. In addition, a prehistoric rockslide is present just upstream from the 2002 failure. The landslide debris blocked McAuley Creek and formed a small temporary lake upstream that subsequently drained through the debris. The occurrence of the McAuley Creek rock avalanche in a region which hitherto had not experienced a major historical rock slope failure has significant implications for landslide hazard assessment in the Okanagan Highland/Thompson Plateau and other areas in the region underlain by the Okanagan Plutonic and Metamorphic Complex, particularly steep slopes along steeply-incised glacial meltwater channels. These landslides may also have downstream hazard implications due to landslide damming. In a wider context, the McAuley Creek rock slope failure was one of three major rock slope failures to have occurred in British Columbia in the Spring of 2002. The event is also an addition to a growing list of recent rock slope failures in the Cordillera in which a distal debris flow, involving some fraction of the initial failure mass, travels a significant distance downstream from the main deposit thus enhancing the travel distance of the landslide and its possible destructive effect.