

Fifty Mile active-layer detachment failures

Location: 63.822632°N 140.298913°W

DETAILS:

The Fifty Mile Creek watershed lies within the northwestern sector of the Klondike Plateau and the extensive discontinuous permafrost zone (Heginbottom et al., 1995; Bonnaventure et al., 2012). Lipovsky et al. (2006) characterize the failure of more than 28 active-layer detachments within one year of forest fires that burned during the summer of 2004 in the Fifty Mile Creek watershed. The post-forest fire landslides occurred on all aspects and only where permafrost was present. They generally initiated on the upper portions of convex valley slopes, and on slope angles ranging between 11° and 25°. Lipovsky et al. (2006) report that many of the failures initiated in the upper portions of convex tributary valley slopes which are unglaciated and mantled by colluvium with loess veneers. The surficial materials in the initiation zones of the failures consisted of brown, silt-rich (up to 37-60% silt) colluvium with 20-50% angular to subangular schistose clasts. The slides ranged in size up to several hundred metres long and 25 m wide.

The distribution of black spruce and sphagnum moss suggest that all north-facing and many south-facing slopes are underlain by permafrost. The isolated areas of deciduous trees and steep open grassy areas on south-facing slopes suggest well-drained conditions and a lack of permafrost. Within the area burned, frost probing above the slides on SW facing slopes in mid July 2005 revealed frost tables were generally 44-106 cm deep, whereas sliding planes were at depths of 15-50 cm (Lipovsky et al., 2006).



Figure 1. Oblique aerial view of four detachments that occurred on the lower portion of a moderately steep east-facing slope (05PL056a,b,c,d). This photograph was taken one year after the forest fire (July 2005).



Figure 2. Oblique aerial view of a north-facing detachment that reached the valley floor and a tributary stream channel (05PL088). This photograph was taken one year after the forest fire.



Figure 3. Northwest-facing detachment developed within silt-rich colluvium. This slide is 63 m long and 19 m wide and initiated on a 19 degree slope (05PL012).

REFERENCES AND FURTHER READING

Jackson, L.E., Jr, 2005. Surficial Geology, Enchantment Creek, Yukon Territory. Geological Survey of Canada, Open File 4580, scale 1:50,000.

Lipovsky, P.S., Coates, J., Lewkowicz, A.G. and Trochim, E., 2006. Active-layer detachments following the summer 2004 forest fires near Dawson City, Yukon. *In: Yukon Exploration and Geology 2005*,(eds.), D.S. Emond, G.D. Bradshaw, L.L. Lewis and L.H. Weston (eds.), Yukon Geological Survey, p. 175-194.