An integrated study of deep-seated gravitational slope deformations at Handcar Peak, southwestern British Columbia

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I propose an integrated methodology for the study of deep-seated gravitational slope deformation (DSGSD) in southwestern British Columbia and apply the methodology to a gravitationally deforming slope at Handcar Peak. I mapped DSGSD-related geomorphologic features such as antislope scarps, trenches, ponds, rockslides, and rockfalls on aerial photographs and in the field, and conducted an investigation of sediments deposited behind an antislope scarp to determine the history of movement of the feature. I also characterized the structure and strength properties of the deforming rock mass through engineering geological mapping and investigated the mechanics of movement by kinematic analysis and distinct element numerical modelling. Results suggest that the current episode of movement at Handcar Peak began during or shortly after deglaciation and is continuing, although activity in the past several hundred years has been minimal. Gravitational lineaments are the surface expression of displacement on steeply dipping, weak fault planes. Rock mass deformation in numerical models is driven by slip on these faults and on downhill-dipping joints.