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The highest glacio-isostatically tilted shorelines in the world, Canadian Cordillera

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To date, our understanding of the glacio-isostasy related to the Canadian Cordilleran Ice Sheet has been dominated by results from studies completed along the western, marine margin of the ice sheet. Glacio-isostatic rebound data are largely absent for the interior of the Cordilleran Ice Sheet. Such data are vital to understanding not only glacial lake paleogeographies, but also crust–ice sheet interactions. To help fill this knowledge gap, we have completed high-resolution paleo-water plane reconstructions of deglacial lakes for an area in the central region of the Cordillera Ice Sheet. These lakes developed during the decay of the Cordilleran Ice Sheet 10,000 – 13,000 BP.

A robust methodology was employed that has general application. This methodology entails (i) inventory of all landforms that permit inference of paleo-water planes, (ii) determining the genesis of landforms using GPR, geomorphic and sedimentologic data, (iii) surveying the position and elevation of landforms using a Differential GPS, (iv) discovering paleo-water planes using 3-D graphical assessment of water plane indicator data and statistical trend surface analysis, and (v) numerical description of paleo-water plane geometries.

Our results indicate that the differential glacio-isostatic deformation of the paleo-water planes of these lakes is among the highest in the world (1.7 – 1.8 m km^{-1}). This reflects the thin crust ($\sim$33 km), the low viscosity mantle, the paleo-topography of the Cordilleran Ice Sheet, rapid deglaciation, the timing and size of the lakes and possible tectonic activity.