



Dynamics of the Yukon sector of the northern Cordilleran ice sheet

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The history of the Cordilleran ice sheet (CIS) of western North America is relatively poorly understood despite over one hundred years of field studies. In contrast to other ice sheets, except for the West Antarctic ice sheet, the CIS was largely resting on mountainous terrain. Due to its physiographic characteristics, of having been fed by confluent flow from both the Coast Range and the Rocky Mountains, it appears to have been one of the most dynamic ice age features on Earth. There is a reasonably good understanding of the timing of maximum glaciation for the last glacial cycle (LGM) and for the almost instantaneous onset of postglacial conditions, based on radiocarbon dates. This generalized picture is better-documented for the southern than for the northern CIS.

We focus on the succession of flow patterns of the CIS by mapping glacial lineation systems and ribbed moraine. These landforms define the spatial flow organisation, and give insight into the subglacial thermal regime. In addition to the dominating Late Wisconsinan flow pattern, we discovered numerous fragments of older, overridden and partially destroyed lineation systems. These shed light on older, albeit undated, ice sheet configurations with more easterly ice divide locations than during the late Wisconsinan ice sheet configuration.

Mapping in the Pelly Mountains region, Yukon Territory, shows remnant relict glacial lineation systems, relict upland surfaces, well-defined end- and lateral moraine systems and abundant LGM lineation systems in the major glacial troughs. We test the hypothesis that subglacial preservation of relict lineation systems and relict uplands

define the subglacial temperature distribution of subsequent ice sheets (i.e. LGM), particularly the potential occurrence of frozen bed conditions. We will present cosmogenic beryllium ages on end- and lateral moraines that define the upper/distal limit of the CIS in this region, to test whether mountain summits were likely overridden (and preserved beneath cold-based ice) or were in effect nunataks during maximum of glaciation.

A preliminary study of fabric of two superimposed till sheets exposed in a section along the Nisutin River, in an area inferred to have relict lineation systems, showed consistency with inferred ice flow directions from satellite imagery. The presence of a till sheet above the till sheet which, based on till fabric analysis, forms the relict lineations in the area, potentially shows that preservation may have been under influence of slow-flowing ice rather than (just) cold-based conditions.