SEMINAR

DEPARTMENT OF EARTH SCIENCES

DALHOUSIE UNIVERSITY

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"Building Canada's Highest Peaks:
Tectonics and Climate Interaction in the St. Elias Mountains"

Thursday, November 1, 2018

12:00 p.m.

Milligan Room, 8th Floor Biology-Earth Sciences Wing,
Life Sciences Centre, Dalhousie University

COFFEE AND DOUGHNUTS WILL BE AVAILABLE IN THE MILLIGAN ROOM BEFORE THE SEMINAR

Building Canada's Highest Peaks:
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Abstract: Canada's highest peaks are located in the St. Elias Mountain – the highest coastal mountain range on earth, which occupies southwestern Yukon and southeastern Alaska. This mountain range formed at the collision zone of the Yakutat microplate with North America. Investigations of tectonic and surface processes have shown a clear spatial coincidence between the distribution of climate-influenced erosion and of long-term uplift and exhumation of rocks in many active mountain belts. The St. Elias Mountains are a natural laboratory to study those interacting processes because both the tectonics and erosion signals are strong. A synthesis of thermochronology data in the St. Elias Mountains reveals large spatial and temporal differences in rates and amounts of rock exhumation along the strike of the collision zone. The region of the indenting Yakutat plate corner, where the dextral transform motion transitions to convergence, is the focal point for deformation, erosion, and exhumation. This region is currently characterized by the highest topography in the region (Mt. Logan 5959 m) and large ice fields that fuel fast moving glaciers (the Seward and Hubbard glacier).

The data reveal that the region was undergoing extremely rapid exhumation between ~5–2 Ma and it shifted towards the south during the Pleistocene. This is the region where geodynamic models predict very high strain rates and rapidly changing kinematics as thrust systems from the transpressional Fairweather transform converge into the central thrust belt producing rapid but shallow uplift and exhumation in a band that parallels the active thrust front. This thrust front coincides with largest GPS-constrained shortening rates, concentrated seismicity and the greatest erosive potential. The synthesis of geophysical, geological and surface process data, as well as model results, helps elucidate the evolving interplay of erosion and tectonics of the colliding Yakutat microplate, illuminating in particular, the important roles of crustal rheology, glaciers and climate.