Headwater stream network length: highly sensitive to climate change and mostly underestimated

Name: Christine Leclerc

SFU Faculty/Major: Faculty of Environment, Physical Geography (geoscience stream)

Presentation Description:

Stream networks expand and contract through time due to streamflow and stream network hydraulic scaling factors, impacting aquatic ecosystem habitat. Streamflow variability is projected to increase with climate change, so we used an analytical framework and data compilation to learn how streamflow and stream network length variability relate.

Abstract:

Headwater stream networks expand and contract over time impacting chemical export, aquatic ecosystem habitat, and water quality. While stream network length prediction based on streamflow at watershed outlets has improved, controls on stream network length variability remain poorly understood and unquantified. As climate change is projected to result in fewer and larger precipitation events in many parts of the world, and because this will result in more variable streamflow, a better understanding of how stream network length will respond is needed. Will stream network length become more or less variable? Using an analytical framework and a globally comprehensive data compilation of co-located stream network length surveys and streamflow data, we look at how streamflow (representing the influence of climate) and network hydraulic scaling factors (representing the influence of the landscape) impact relative variability in stream network length. What we found is that stream network length variability is dampened relative to streamflow variability due to the relationship between the two, and that this relationship is elastic. The nature of the elasticity of this relationship indicates that headwater stream networks will experience more-than-proportional increases

in stream network length variability for a given increase in streamflow variability. We also found that headwater stream network length is mostly underestimated on maps, with implications for decision making.