

Spatial variability in aquatic carbon fluxes in boreal forested catchments

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Objective: Examine how spatial variability in catchment characteristics and hydrological conditions interact to affect dissolved organic carbon (DOC) concentrations in forested headwater streams.

Study site: The International Institute for Sustainable Development-Experimental Lakes Area is a boreal forested site on the Precambrian Shield in northwestern Ontario, Canada

Methods: High-frequency stream DOC and discharge samples were collected from three inflow streams during snowmelt and rain events from 2016-2017.

Hysteresis and flushing indices were calculated and plotted following Lloyd et al. (2016) and Vaughan et al. (2017)

References:
Lloyd, C. E. M. et al. (2016). Science of the Total Environment, 543, 388-404.
Vaughan et al. (2017). Water Resources Research, 53(7), 5345-5363.

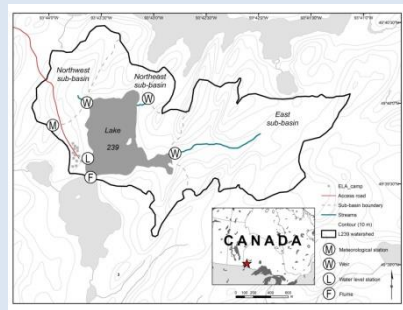


Fig. 1: Study site

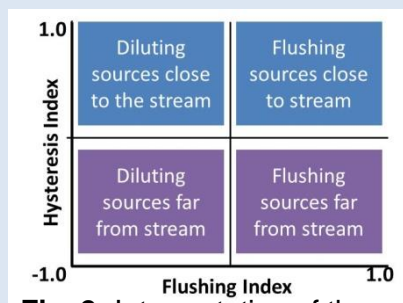


Fig. 2: Interpretation of the hysteresis/flushing index plots (Vaughan et al. 2017)

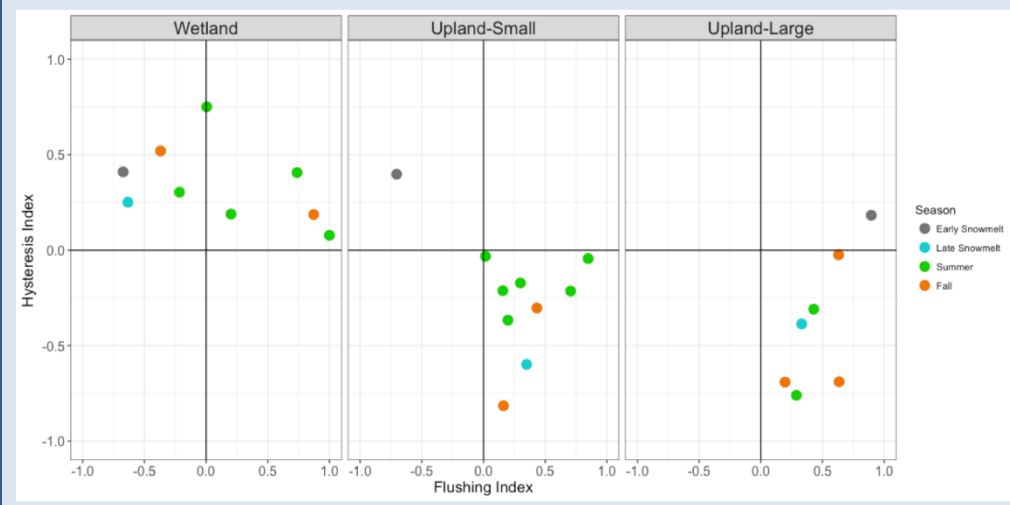


Fig. 3: Categorization of snowmelt and rain events from 3 catchments with contrasting characteristics during 2016-2017

Results:

- 1) Sources of DOC were always proximal to the stream at the wetland-dominated catchment, but only proximal to the stream during snowmelt at upland-dominated catchments.
- 2) Both upland-dominated catchments had very distinct flushing patterns during all events, suggesting stream concentrations are sustained by surface soil sources.

Next steps:

- 1) Investigate patterns spatial variability of catchment carbon stocks and hot spots of carbon transport
- 2) Investigate impact of changing climatic and hydrological patterns on DOC dynamics