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# Natural land cover in agricultural catchments alters flood effects on DOM composition and decreases nutrient levels in streams

Christina Fasching (1), Henry Wilson (2), Sarah D'Amario (1), and Marguerite Xenopoulos (1)

(1) Department of Biology, Trent University, Peterborough, CANADA (christinafasching@trentu.ca), (2) CanadaAgriculture and Agri-Food Canada | Agriculture et Agroalimentaire Canada, Brandon Research and Development Centre, 2701 Grand Valley Road, Brandon, CANADA (Henry.Wilson@AGR.GC.CA)

Streams and rivers play a major role in carbon cycling at the reach to global scale, controlling the input, transport and transformation of both terrestrial and autochthonous organic matter. Flooding events are expected to significantly alter the inputs and the ability of streams to effectively process received nutrients and dissolved organic matter (DOM). In light of increasing extreme events in the Anthropocene, a better understanding of agriculture and managed system is required so that we are prepared for a possible change in their ecological resilience. Here we analyzed spatio-temporal event-based data from 21 predominantly agricultural catchments with varying contributions of natural land cover like wetlands in Manitoba, Ontario. We studied the effect of extreme hydrological events on stream dissolved phosphorus (TDP) and nitrogen (TDN) concentrations and DOM composition and bioavailability, monitoring streamwater dissolved organic carbon (DOC) and a suite of DOM characteristics across varying hydrological and climatic conditions over four years. Our results suggest the flow regime to control stream DOM dynamics, modulated by seasonal processes and catchment characteristics, like soil organic matter (SOC) content. General additive models revealed the nonlinear interaction between catchments characteristics and discharge to control nutrient and DOM dynamics as well as its bioavailability. While high flow event generally led to an increase of DOM and nutrients, this increase was much more pronounced in predominately agricultural catchments with little or no natural land cover. In these catchments DOC concentration was generally elevated but characterized by a more microbial-like fluorescence signal (as characterized by EEMs and absorbance measurements). The combined occurrence of elevated autochthonous DOM and higher levels of nutrients at higher flows likely supported the increased microbial degradation (BDOC). In contrast, catchments with natural land cover, such as wetlands and grassland, led to more variable DOC concentrations and a greater proportion of terrestrial-like DOM, with high flow events having a less pronounced effect on the export of nutrients from the catchments. Our study highlights the relevance of natural land cover and catchment characteristics in determining how the flow regime controls the composition and dynamics of DOM and nutrients in streams.