

The influence of land use and geomorphology on water and sediment dynamics in the Canadian Prairies

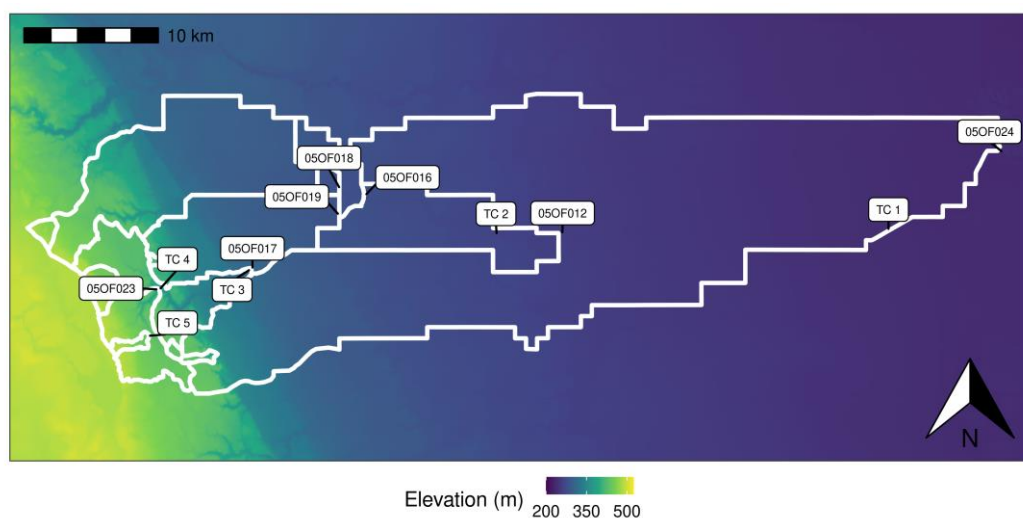
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Geomorphology, land use, and their interactions have a strong influence on water and sediment dynamics. Within Canada, the Prairie region contains approximately 80% of the total agricultural land area. The Manitoba Escarpment is a major physiographic feature of the Canadian Prairies extending for more than 600 km. Despite the prevalence of this large physiographic feature its influence on sediment and water dynamics has not been well investigated. The Tobacco Creek Watershed extends over the Manitoba Escarpment; its upper reaches lay in undulating glacial tills, within the escarpment the streams are deeply incised into the underlying Cretaceous shale bedrock, and its lower reaches lay in the lacustrine sediments of glacial Lake Agassiz. Using sediment and water budgets, in combination with sediment source fingerprinting, sediment and water dynamics were explored at a range of spatial and temporal scales of observation from low-order headwater streams with small catchment areas ($\sim 5 \text{ km}^2$) on an annual basis, to high-order streams at the watershed outlet ($\sim 1000 \text{ km}^2$) over a six-year period. Over this period, two years accounted for $\sim 80\%$ of the total water discharge and sediment load indicating that management practices aimed at mitigating large magnitude events may have the greatest impact on water quality. The sediment source fingerprinting identified shale bedrock as the dominant source of sediment within the escarpment; however, below the escarpment the relative contributions from streambanks and nutrient-rich topsoil increase substantially.



Conference Topic: Source, Fate and Effect of Sediments in Freshwater and Marine Ecosystems

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