



Tracing sources of suspended sediment in a Canadian agricultural watershed using a Bayesian model: Testing different groups of fingerprinting properties

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An understanding of sediment redistribution processes and the main sediment sources within a watershed is needed to support catchment management strategies, to control soil erosion processes, and to preserve water quality and ecological status. The fingerprinting technique is increasingly recognised as a method for establishing the source of the sediment transported within a catchment. However, the different behaviour of the various fingerprinting properties has been recognised as a major limitation of the technique, and the uncertainty associated with tracer selection has to be addressed. Do the different properties give similar results? Can we combine different groups of tracers?

This study aims to compare and evaluate the differences between fingerprinting predictions provided by a Bayesian mixing model using different groups of tracer properties for use in sediment source identification. We are employing fallout radionuclides (^{137}Cs , ^{210}Pb) and geochemical elements as conventional fingerprinting properties, and colour parameters and compound-specific stable isotopes (CSSIs) as emerging properties; both alone and in combination. These fingerprinting properties are being used to determine the proportional contributions of fine sediment in the South Tobacco Creek Watershed, an agricultural catchment located in south-central Manitoba in Canada. We present preliminary results to evaluate the use of different statistical procedures to increase the accuracy of fingerprinting outputs and establish protocols for the selection of appropriate fingerprint properties.