



## **Spatial and temporal variability of compound-specific stable isotope (CSSI) biomarkers in soil and sediment tracing: towards improved sampling protocols**

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The use of CSSI in biomarkers, specifically fatty acids and derivatives thereof, has recently been investigated as a potential tracer in soil and sediment fingerprinting. The use of CSSIs is of interest because of the potential to discern sediment provenance based on land use, which is often difficult or not possible with other tracing techniques alone, such as geochemistry and fallout radionuclides. However, challenges exist in producing a representative sample of potential source materials. This presentation focuses on the development of improved protocols for sample collection.

The data presented here are part of a larger investigation into using CSSIs as tracers in an agricultural watershed (South Tobacco Creek) in southern Manitoba, Canada. Extensive sampling was performed throughout the 2012 and 2013 growing seasons in several locations within the watershed, with a focus on capturing within and between field spatial and temporal variability in one particular sub-watershed (the “Stepler” watershed). The Stepler watershed provided a unique opportunity to perform sampling in a natural environment where agricultural crops were hydrologically separated, thereby allowing for a sampling regime of transects strategically placed with little influence from nearby crops. A portion of the data which has been analyzed, showing temporal and spatial variability in terms of carbon stable isotope signal, biomarker concentrations and soil organic carbon, is presented. As CSSI protocols for tracing are still in development, these data aid in determining the robustness of the technique as well as helping to inform sampling approaches.