Seasonal and hydrological controls on riverine brGDGT export

P.ANJEWIERDEN[1*], C. DE JONGE[1], M.S. SCHWAB[1], T.I. EGLINTON[1]

[1]Geological Institute, ETH Zürich, 8092, Switzerland
(*correspondence: [apien@student.ethz.ch])

Branched Glycerol Dialkyl Glycerol Tetraethers (brGDGTs) are lipid biomarkers which are used both as tracers of soil-derived organic matter and as proxies to reconstruct continental Mean Annual Temperature (MAT), and soil pH. Applications in freshwater environments have proven complex due to mixed brGDGT inputs (from soils within the watershed, as well as from *in-situ* production in rivers and lakes), as well as potential seasonal biases introduced by brGDGTs derived from aquatic productivity. Lastly, the effects of hydrological variability on brGDGT fluxes and signals are poorly constrained.

To address some of these concerns, we examine temporal and spatial variability in brGDGT export from a continuously monitored sub-alpine river catchment – the Sihl River, Switzerland. Suspended sediments have been collected approximately every two weeks over the course of 2.5 years, with additional samples taken during high-discharge events in order to constrain both seasonal and hydrological variability in brGDGT fluxes and distributions.

Our results reveal seasonal variations in the fractional abundances of various brGDGT compounds. These variations, which correlate with temperature on the sampling date and affect brGDGT-based MAT reconstructions, may reflect aquatic production in the river or in waterlogged soils within the catchment. Further sampling of headwaters and soils within the catchment is being conducted in order to further constrain the brGDGT sources within the system.

Relationships between brGDGT fractional abundances and discharge show large scatter at low levels of discharge, and convergence towards a smaller range of values at higher discharge, suggesting a change in relative source contributions as a function of discharge. The greater scatter at low discharge may be introduced by seasonal effects on aquatic brGDGT production, whereas the values at high discharge may be more representative of a soil signal, with diminished seasonal effects due to their slow turnover within soils. The total flux of brGDGTs is furthermore dominated by high-discharge events, suggesting that seasonal influences may be relatively small when integrated over the the total annual brGDGT flux.