High resolution speleothem fluorescence records: what do they mean?

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Dissolved organic carbon (DOC) loss from soil has increased in the 20th century in the Northern Hemisphere. However, the environmental causes and mechanisms behind this phenomenon are hotly contested in the literature [1, 2]. In New Zealand, there are no long-term records of DOC in terrestrial systems, yet such records would be useful for contextualising change in industrialised Northern Hemisphere catchments. Laser-induced fluorescence (LIF) is a non-destructive technique which has a resolution "beyond the dental drill" and has been used in this study to characterise two speleothem samples (secondary cave carbonates) comprising a flowstone from New Zealand (41°S) and a stalagmite from NW Scotland (69°N).

LIF is applied here to quantify the flux of organic material entering cave dripwaters through time, providing information on the drivers of pre-historic soil carbon trends in relation to temperature change. Our New Zealand sample grew slowly through the Holocene, but has visible laminations and clear structure implying significant changes in DOC export, whilst the sample from Scotland is annually laminated at a microscopic level and was strongly influenced by North Atlantic SST anomalies.

We will present LIF data from both speleothems at 50-micron resolution, along with other high-resolution geochemical data, and interpret these in terms of DOC flux in relation to regional palaeoclimate.

[1] Monteith *et al*. (2007) *Nature* ***450***, 537-540. [2] Evans *et al*. (2005) *Environmental Pollution* ***137***, 55-71.