Decolorisation of peaty water by natural Mn oxide minerals

K.L. JOHNSON, C.E. DOWDING, J. DAVILL AND J. KING

School of Engineering, Durham University, South Road, Durham, DH1 3LE, UK

The decolorisation of peaty water is a pertinent issue for rural communities in countries such as Scotland and Ireland. Current treatment technologies such as membrane filtration [1] are costly and impractical for rural communities, thus the development of a water treatment technique utilising natural Mn oxide minerals which are widely available as 'waste' in the UK and internationally is appealing.

The manganese oxide minerals were reacted with peaty water from the North Pennines in the UK. Results obtained using UV-visible spectroscopy and attenuated total reflectrance Fourier transform infrared spectroscopy show that the Mn oxide tailings succesfully decolorise the peaty water and there is evidence that the colour removal process is a chemisorptive process. The dissolved organic matter has been monitored throughout the reaction using fluorescence spectrophotometry.

[1] Domany Z, Galambos I, Vatai G & Bekassy-Molnar E (2002) *Desalination* **145**, 1-3, 333-337.

Comparison of seasonal geochemical variability in Chinese speleothems under different climatic states

K.R. JOHNSON[1,3]*, C. HU[2], J. STEWART[3] AND G.M. HENDERSON[3]

[1]Current address: Department of Earth System Science, University of California, Irvine, CA 92697 (*correspondence: kathleen.johnson@uci.edu)
[2]China University of Geosciences, Wuhan, 430074, China
[3]Department of Earth Sciences, University of Oxford, OX1 3PR, UK (gideon.henderson@earth.ox.ac.uk)

Seasonal variations in speleothem geochemistry reflect past changes in rainfall amount and temperature, though the processes through which these signals are recorded are complex and related to atmospheric, soil, vegetation, hydrologic, and crystal growth mechanisms [1]. Detailed monitoring of modern cave environments, hydrology, hydrochemistry, and calcite precipitation is necessary to assess the relative importance of these controls. There is still, however, a paucity of such studies on caves from which speleothem-based paleoclimate archives have been reported. Heshang Cave, China (30.44°N, 110.42°E) is one such cave where both extensive cave monitoring and speleothem based paleoclimate reconstruction are being conducted [2,3], and therefore provides an ideal site to test and develop new seasonal resolution climate proxies.

We have measured multiple minor and trace element ratios (Mg/Ca, Sr/Ca, Ba/Ca) and stable isotope ratios ($\delta^{13}C$ and $\delta^{18}O$) in samples micromilled from two Heshang Cave speleothems: HS-4 (9.2 - 0 ka) and HS-2 (20.1 – 10.8 ka). We supplement a previously reported mid-Holocene section of HS-4 [4] with a 10-year section of HS-2 representing Last Glacial Maximum growth (20 ka) and a modern section of HS-4 (~1950-2001 A.D). Clear seasonal cycles are observed during all three periods but exhibit significant differences between the three time periods, possibly reflecting past climatic differences. During all three periods, Mg/Ca, Sr/Ca, Ba/Ca, and $\delta^{13}C$ strongly covary, while $\delta^{18}O$ exhibits a non-stationary relationship relative to the other proxies. Through comparison of these seasonal cycles with instrumental climate data, paleoclimate model data, and Heshang cave monitoring data, we will assess the paleoclimate reconstruction potential of seasonal proxies in Heshang Cave speleothems.

[1] Fairchild *et al.* (2006) *Earth-Sci. Rev*. **75**, 105-153. [2] Hu *et al.* (2008) *Earth Planet Sc. Lett.* **266**, 221-232. [3] Hu *et al.* (in press) *Int. J. Speleol.* [4] Johnson *et al.* (2006) *Earth Planet Sc. Lett.* **244**, 394-407.