Capture of metal-ligand interactions in speleothem carbonate: lessons learned and future prospects

ADAM HARTLAND[1]

[1]Environmental Research Institute, School of Science, University of Waikato, Hamilton, New Zealand

Advances in the development of speleothem proxies have to some extent lagged behind advances in analytical technology, most notably in regard to trace elements. This in part reflects a paucity of information on the speciation of different elements in cave dripwaters and their modes of transmission, but also the mechanisms of incorporation in speleothem carbonate. Hence, while we can measure a great many trace elements at high spatial resolution in speleothems, we are constrained in making our interpretations for all but a few trace elements (e.g. Sr, Mg).

Over the last four years, research into metal-ligand interactions in cave waters has identified the common association of the first-row transition metals with natural organic ligands (NOL) in cave waters. The limited data from cogenetic carbonates suggest that these complexes partition to a large and variable extent, depending on the metal in question.

Opportunities for the development of proxies based on the differential partitioning of metals from NOL complexes will be discussed in the context of the data currently available.
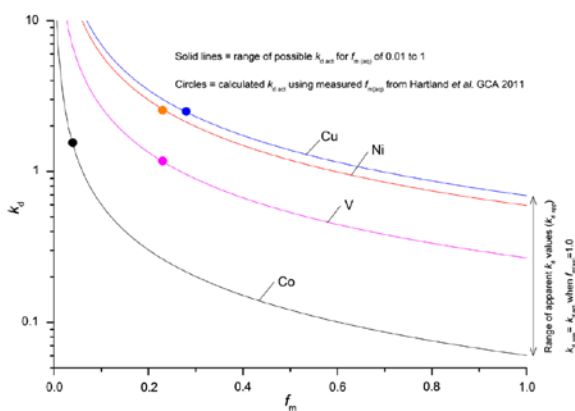

Figure 1 Effect of the labile metal fraction on the calcite partition coefficient (k_d) [1].

[1] Hartland et al. (2014) *Geochim. Cosmochim. Acta* **128**, 29-43.