

Geochemistry Group student bursary

Report and expense claims for Kim Handley

Conference: Goldschmidt 2008, July 13-18, Vancouver.

Oral presentation of the abstract entitled: Impact of microbial Fe^{3+} & SO_4^{2-} reduction on arsenic solid-phase cycling in Fe- and As-rich sediment (K.M. Handley, C. Boothman, J.M. McBeth, J.M. Charnock, P.L. Wincott, D.J. Vaughan, D.A. Polya, J.R. Lloyd).

Highlights of the conference included, most notably, critical feedback on my talk regarding the temperature of analysis of Mössbauer spectroscopy. Recently enabled analyses of mine and other samples at Manchester have thus far been limited to room temperature Mössbauer, excluding detection of any magnetically ordered iron minerals activated at lower temperatures. The possibility of lower temperature analyses has been suggested, but not confirmed. Questioning on this point during the conference, however, has given much needed support and impetus for the cooling system to be set up as soon as possible, and has important implications in terms of interpretation and publication of results. Other useful information included novel research demonstrating the abiotic oxidation of arsenic sorbed to amorphous iron oxyhydroxides from trivalent to tetravalent species (Kappler et al., A449), providing a plausible mechanisms for otherwise enigmatic arsenic oxidation detected in my research on an iron oxyhydroxide-rich system (at Santorini, Greece). In comparison, other research added weight to the poorly examined ability for bacteria to access and reduce tetravalent arsenic sorbed to iron oxyhydroxides (Huang et al., A399) – relevant to earlier research in my PhD in which an arsenic reducing bacterium was isolated from the sediment at Santorini. Further to this, modelling-based research on a similar high iron environment demonstrated arsenic retention on iron minerals under anoxic conditions (Root et al., A805), corroborating the major point concluded from my experimental study. This is contrary to the general assumption that arsenic is always released into the aqueous phase (posing a much more serious health risk) upon reduction (Fe^{3+} to Fe^{2+}) and dissolution of ferruginous minerals hosting arsenic.