Postdoctoral Position in Astrobiology June 2015

University of Wisconsin -Madison, WiscSIMS Laboratory
http://www.geology.wisc.edu/facilities/wiscsims

This position is sponsored by the NASA Astrobiology Institute. Research into the early evidence and environments for life will include in situ analysis by ion microprobe (IMS-1280, see below) of S 3- and 4-isotope ratios in Archean pyrite and C, S, Si, and O isotope ratios in associated minerals and organic matter. One area of emphasis will be 3.4 to 3.5 Ga cherts from the Pilbara Craton in Western Australia. Interest in collaborative interdisciplinary research is required. Experience with astrobiology, Precambrian geology, stable isotope geochemistry, SIMS, SEM, EPMA, or mass-spectrometry is desirable.

Please submit by e-mail a cover letter, reprints of papers, and a CV with the contact information of 3 or more potential references to John Valley, Dept. of Geoscience at valley@geology.wisc.edu. UW-Madison is an Equal Opportunity Employer.

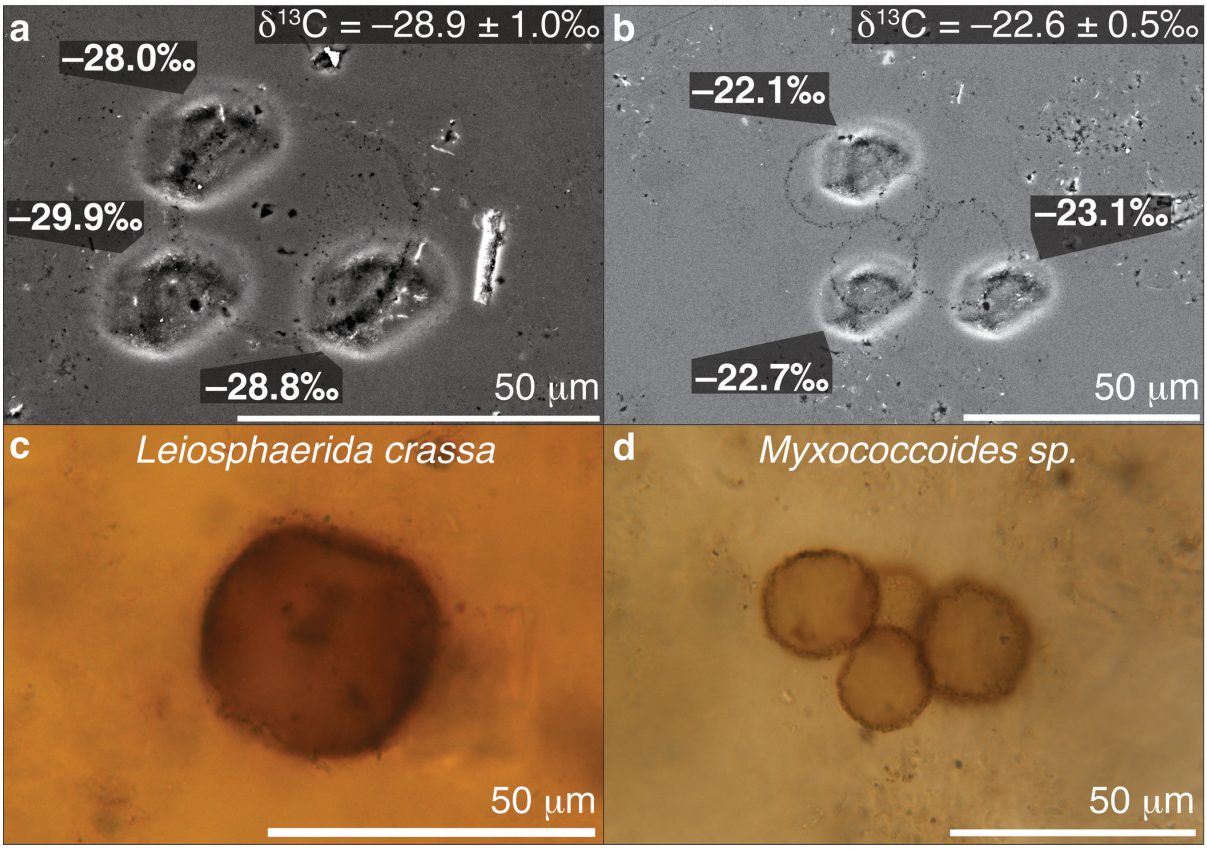

Fig. 1. Improved techniques for in situ $\delta^{13}C$ analysis of individual microfossils are employed at WiscSIMS. Backscattered electron (a,b) and transmitted light (c,d) images showing SIMS carbon isotope analyses of *Leiosphaerida crassa* (a,c) and *Myxococcoides sp.* microfossils located 8 mm apart in a single sample from the 650 Ma Chichkan Formation. Carbon isotope ratios (‰, VPDB) and individual analysis numbers are shown next to analytical pits; average and total range of $\delta^{13}C$ is indicated at top right in (a) and (b). Scale bars are 50 μm in all panels. L. crassa has $\delta^{13}C$ consistent with eukaryotic photosynthesis, whereas *Myxococcoides sp.* has $\delta^{13}C$ consistent with cyanobacterial photosynthesis. (from Williford KH et al. (2013) see below).

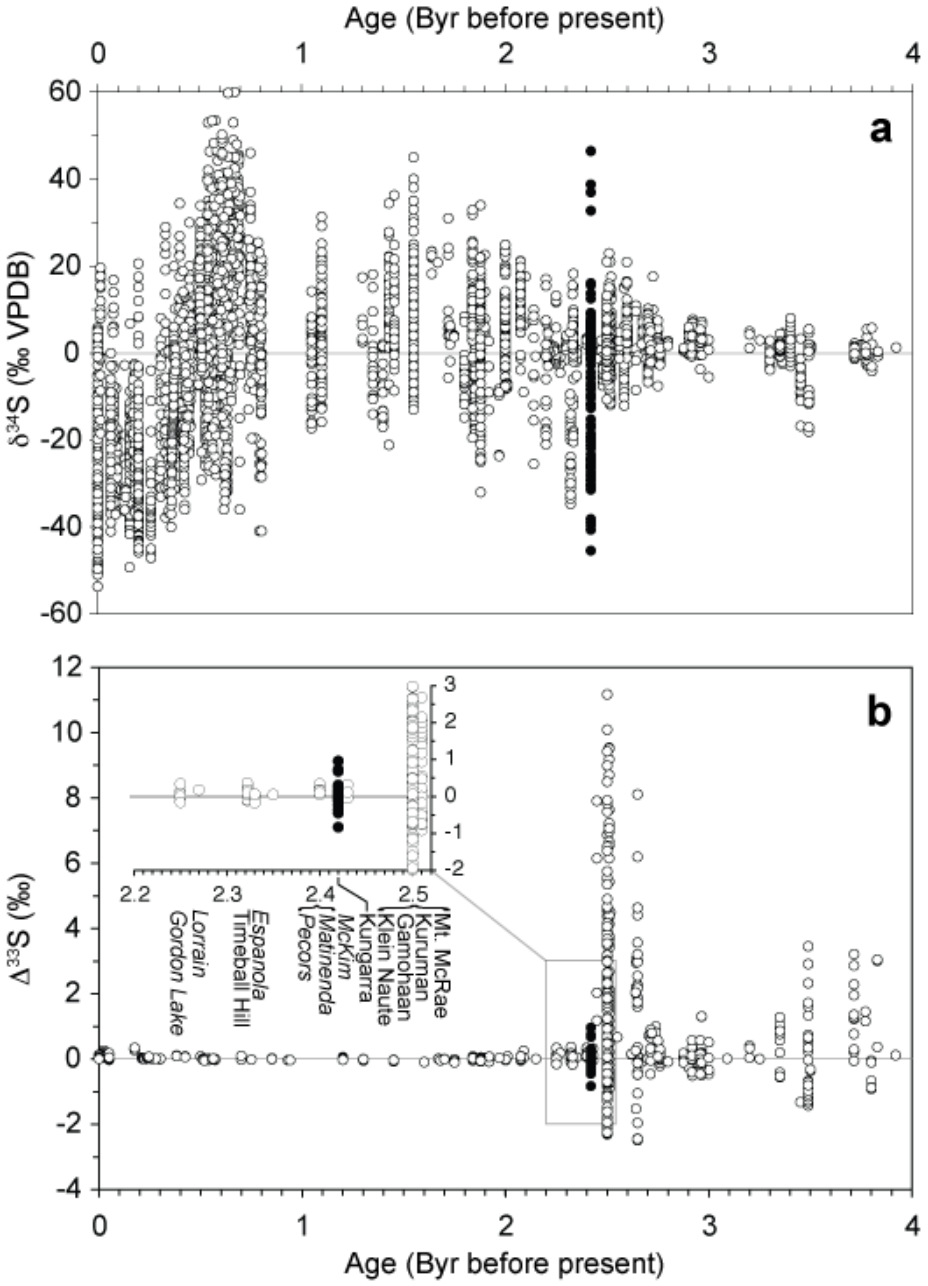

Fig. 2. Compilations of $\delta^{34}S$ (a) and $\Delta^{33}S$ values (b) including previously published data (open circles) and WiscSIMS data (filled circles). Only sulfide data are shown in (a), whereas sulfide and sulfate data are shown in (b). Enlargement in (b) shows the critical time interval for atmospheric oxygenation. $\Delta^{33}S$ data shown from this study exclude pyrite of detrital or ambiguous origin. Figures are adapted from previously published compilations (Canfield and Farquhar, 2009; Domagal-Goldman et al., 2008; Farquhar et al., 2007) and incorporate more recent data (Ono et al., 2009; Papineau et al., 2007; Ueno et al., 2008; Williford et al., 2009; Wu et al., 2010). (from Williford KH et al. (2011) , see Ushikubo et al. (2014), BELOW)

RECENT PAPERS

Lepot K, Williford KH, Ushikubo T, Sugitani K, Mimura K, Spicuzza MJ, Valley JW (2013) Biogenicity of 3.4 Gyr old carbon indicated by texture-specific isotopic compositions. Geochim. Cosmochim. Acta, 112: 66-86. doi.org/10.1016/j.gca.2013.03.004.

Schopf JW, Kudryavtsev AB, Walter MW, Van Kranendonk MJ, Williford KH, Kozdon R, Valley JW, Gallardo VA, Espinoza C, Flannery DT (2015) A fossil sulfur-cycling microbiota from the 1.8 Ga Duck Creek Formation provides promising evidence of evolution's null hypothesis. PNAS. *doi:10.1073/pnas.1419241112*.

Ushikubo T, Williford KH, Farquhar J, Johnston D, Valley JW (2014) In situ sulfur four-isotope analysis of detrital pyrite from the Paleoproterozoic Turee Creek Group, Western Australia. Chem. Geol. 383: 86-99.

Valley JW and Kita NT (2009) *In situ* Oxygen Isotope Geochemistry by Ion Microprobe, In: Fayek M. (ed) MAC Short Course: Secondary Ion Mass Spectrometry in the Earth Sciences, v 41, 19-63

Valley JW, Reinhard DA, Cavosie AJ, Ushikubo T, Lawrence DF, Larson DJ, Kelly TF, Snoeyenbos D, Strickland A (2015) Nano- and Micro-geochronology in Hadean and Archean Zircons by Atom-Probe Tomography and SIMS: New Tools for Old Minerals. Am. Mineral, doi.org/10.2138/am-2014-5134. In press.

Williford KH, Van Kranendonk MJ, Ushikubo T, Kozdon R, Valley JW (2011) Sulfur three-isotope micro-distribution in pyrite deposited during Paleoproterozoic atmospheric oxygenation in glaciogenic sediments of the Turee Creek Group, Western Australia. Geochim. Cosmochim. Acta, 75: 5686-5705. doi;10.1016/j.gca.2011.07.010.

Williford KH, Ushikubo T, Schopf JW, Lepot K, Kitajima K, Valley JW (2013) Preservation and detection of microstructural and taxonomic correlations in the carbon isotopic compositions of individual Precambrian microfossils, Geochim Cosmochim Acta, 104: 165-182.

Williford KH, Ushikubo T, Lepot K, Kitajima K, Hallmann C, Spicuzza MJ, Kozdon R, Eigenbrode JL, Summons RE, Valley JW (2015) Isotopic signatures of ancient life and environment at the microbial scale: Neoarchean shales and carbonates. Geobiology, in review.