

Thursday, April 29, 2010
FREE OXYGEN: PROXIES, CAUSES AND CONSEQUENCES
10:30 a.m. Crystal Salon E

This session seeks to clarify the evolution of the redox state of Earth's surface environments, with an emphasis on the elements and/or molecules required by biota.

Chairs: Mark Claire
Shawn Domagal-Goldman

- 10:30 a.m. Meyer K. M. Kump L. R. * Ridgwell A.
[*Nutrient Cycling and the Onset of Oceanic Anoxia in Earth History*](#) [#5348]
 The rise of atmospheric oxygen led to stratified oceans with anoxic and sulfidic (euxinic) deepwaters. This paper quantitatively explores nutrient cycling during the onset of euxinia and whether it posed an N crisis for the biosphere.
- 10:45 a.m. Planavsky N. J. * LaLonde S. Konhauser K. Lyons T. W.
[*Nutrient Limitation in the Precambrian*](#) [#5523]
 We present Fe and P concentrations from distal hydrothermal sediments and iron formations through time in order to evaluate the evolution of the marine P reservoir. P concentrations appear to have been elevated in Precambrian oceans.
- 11:00 a.m. Hallmann C. * Summons R. E.
[*Eukaryotes and Euxinia Before the Great Oxidation Event*](#) [#5543]
 Sedimentary sterane concentrations in drill core ABDP-9 respond to the ~2500 Ma anomaly of redox-sensitive elements. Together with molecular markers for Chlorobiaceae, and thus euxinia, this supports the idea of oxygen fluxes before the GOE.
- 11:15 a.m. Sleep N. H. *
[*Free Oxygen: Interaction of Biology and Tectonics*](#) [#5375]
 Photosynthesis produces effects that are evident in the oxidation state of crustal rocks and the trace element and isotopic chemistry of mantle-derived magmas. I attempt to correlate events in the geological record with genomic events.
- 11:30 a.m. Swingley W. D. Raymond J. *
[*Biochemical Network Rewiring During the Transition to Aerobiosis or How to Build an Aerobe in Just a Few Hundred Million Years*](#) [#5550]
 We discuss the role of enzymatic innovations in expanding the biochemical repertoire of early organisms in laying the foundations for the subsequent evolution of complex life in response to oxygen.
- 11:45 a.m. Lyons J. R. * Stark G. Blackie D. Pickering J.
[*High-Resolution SO₂ Isotopologue Spectra and Sulfur Non-Mass-Dependent Isotope Fractionation due to SO₂ Photolysis*](#) [#5549]
 We report moderate-resolution FTS spectra of SO₂ isotopologues, and demonstrate via photochemical modeling that SO₂ self-shielding is the mechanism of sulfur non-mass-dependent fractionation in broadband SO₂ photolysis.

- 12:00 p.m. Claire M. W. * Kasting J. F.
[*The Magnitude of Atmospheric Sulfur Mass-Independent Fractionation*](#) [#5630]
We use a 1-D photochemical model with high-resolution SO₂ cross sections to calculate the magnitude of anomalous sulfur isotope fractionation as a function of atmospheric composition. The results shed light on the composition of the Archean atmosphere.
- 12:15 p.m. Watanabe Y. * Ohmoto H.
[*Connections Between Depositional Environments and Multiple Sulfur Isotope Ratios of Sulfides and Sulfates in Archean Sedimentary Rocks*](#) [#5584]
Connections between multiple sulfur isotopic characteristics and depositional environments of sulfides and sulfate were investigated in order to increase our understanding origins of AIF-S.
- 12:30 p.m. LUNCH