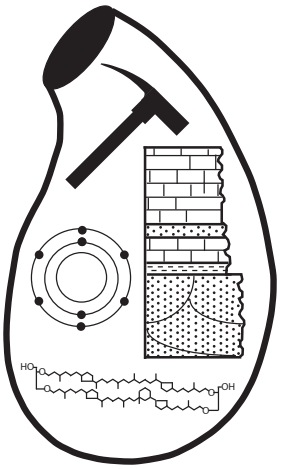
Northeastern Geobiology Symposium

Harvard University
Department of Earth and Planetary Sciences
Cambridge, Massachusetts
April 28th - 29th, 2016



Organizers:
Maya Gomes
Thomas Laakso
Leigh Anne Riedman
Alan Rooney
Yige Zhang
David Johnston (Faculty Mentor)

Sponsors:
Harvard University Department of Earth and Planetary Sciences
The Agouron Institute
The Paleontological Society
The NASA Astrobiology Node at Massachusetts Institute of Technology

Northeastern Geobiology Symposium

Harvard University, Department of Earth and Planetary Sciences

Thursday, April 28th, 2016

5 p.m. -7 p.m. Reception – 4th Floor Hoffman Lab

Friday, April 29th, 2016

8 a.m. – 9 a.m. Breakfast and Coffee – Geological Museum 100

9 a.m. – 10:20 a.m. Talks - Geological Museum 100

Zachary Adam, Harvard University: *A Laurentian record of the earliest fossil eukaryotes*

David Gold, Massachusetts Institute of Technology: *Sterol and genomic analyses validate the sponge biomarker hypothesis*

Lidya Tarhan, Yale University: *Depositional and Preservational Environments of the Ediacara Member, Rawnsley Quartzite (South Australia): Assessing the Timing of 'Ferruginization'*

Jacob Beam, Bigelow Laboratory for Ocean Sciences: *Bioturbation stimulates microbial iron oxidation and mineralization in coastal marine sediments*

10:20 a.m. – 10:50 a.m. Coffee Break - Geological Museum 100

10:50 a.m. – 12:00 p.m. Talks - Geological Museum 100

Drew Muscente, Virginia Tech: *Authigenic and early diagenetic minerals as indicators of geomicrobiological processes in shelly fossil preservation and their significance for late Neoproterozoic-early Palaeozoic near-surface environments*

Elise Wilkes, Harvard University: *Photosynthetic carbon isotope fractionation by the dinoflagellate Alexandrium tamarense*

KEYNOTE: Colleen Hansel, Woods Hole Oceanographic Institution

12:00 p.m. – 1:15 p.m. Lunch – Food Trucks in Science Plaza

1:15 p.m. – 2:35 p.m. Talks - Geological Museum 100

Lisa Warden, Royal Netherlands Institute for Sea Research: *Alkenone distributions reflect salinity changes in the Baltic Sea over the Holocene*

Amy Anderson, Rutgers University: *Uranium isotope ratios in the Southern Ocean over glacial and interglacial periods*

Adam Jost, Massachusetts Institute of Technology: *Additive effects of acidification and mineralogy on calcium isotopes in Triassic/Jurassic boundary limestones*

Blake Dyer, Princeton University: *A Probabilistic Perspective on the C and Ca Isotope Stratigraphic Expression of Meteoric Diagenesis During the Late Paleozoic Ice Age*

2:35 p.m. – 3 p.m. Coffee Break - Geological Museum 100

3:00 p.m. – 4:30 p.m. Talks - Geological Museum 100

Terry Tang, Yale University: *Tracking the Rise of Eukaryotes to Ecological Dominance with Zinc Isotopes*

C. Brenhin Keller, Princeton University: *Insight into surface earth oxygenation from redox-sensitive trace element geochemistry*

KEYNOTE: Pincelli Hull, Yale University

4:30 p.m. – 6:30 p.m. Discussion and Posters – Northwest Building Lower Atrium

6:30 p.m. – 8 p.m. Dinner - Northwest Building Lower Atrium

Northeastern Geobiology Symposium - Posters

Harvard University, Department of Earth and Planetary Sciences
April 29, 2016

1) Zachary Adam, Albert Fahrenbach, Henderson J. Cleaves, Yayoi Hongo, Masashi Aono and Andrew Knoll: *Exogenic production and concentration of formamide on the prebiotic Earth.*

2) Anne-Sofie Ahm, Christian J. Bjerrum and Emma U. Hammarlund: *Disentangling local and global seawater redox chemistry during the latest Ordovician glaciation.*

3) Alliya Akhtar, John A. Higgins, and Adam C. Maloof: *Interpreting the geochemical signature of modern carbonates - what can current and recently active environments tell us about paleoclimate and diagenesis?*

4) Ross Anderson, Sean McMahon, Uyanga Bold, Francis A. Macdonald, and Derek E.G. Briggs: *A new early Ediacaran microfossil lägerstatte: The Shuurgat Formation, Zavkhan Terrane, southwestern Mongolia.*

5) Amber Annett, Robert Sherrell, Marie Seguret and Maria Lagerstrom: *Biological controls on trace metal distributions along the rapidly warming western Antarctic Peninsula.*

6) David Auerbach, Michael Hren, Astrid Pacini, Paige Breen, Rene Garreaud, and Mark Brandon: *A large shift in the hydrologic cycle associated with the Eocene-Oligocene transition in Patagonia.*

7) Rogier Braakman, Mick Follows, and Sallie Chisholm: *Evolution of electron flows and the organization of ecosystems.*

8) Alison Campion and Adam Maloof: *Constraining eustatic fall during the LPIA through the complete, unexposed mid-Carboniferous record in Spain.*

9) Abigail Caron, David Gold, Roger Summons, and Greg Fournier: *Molecular data suggests sterol biosynthesis evolved around the Great Oxygenation Event*.

10) Beverly Chiu, Erin K. Field, Shingo Kato, and Clara S. Chan: *Using kinetics to demonstrate a novel iron-oxidizing bacteria's potential link to the deposition of banded iron formations.*

11) Phoebe Cohen, Nicholas Tosca, Justin V. Strauss, and Alan Rooney: *Dating the First Appearance of Controlled Eukaryotic Biomineralization.*

12) Jesse Colangelo, Lyle Whyte, Boz Wing, Alex Loy, and Claus Pelikan: *Sulfur metabolic gene diversity and fractionation of sulfur isotopes along a polar hypersaline spring gradient in the Canadian High Arctic.*

13) Devon B. Cole, Christopher T. Reinhard, Xiangli Wang, Bleuenn Gueguen, Malcolm Hodgskiss, N. Ryan McKenzie, Timothy W. Lyons, and Noah J. Planavsky: *Low atmospheric oxygen during the Proterozoic.*

14) Peter Crockford, Marcus Kunzmann, Clara L. Blattler, Noah J. Planavsky, John A. Higgins, Galen P. Halverson, and Boswell A. Wing: *Ca, Mg, and Li isotope records leading into the Sturtian Glaciation.*

15) Mirna Daye, S. Rowland, V. Klepac-Ceraj, and T. Bosak: *Redox cycling of manganese before the rise of oxygen.*

16) David Evans: *The Ediacaran paleomagnetic enigma (true polar wander vs. geodynamo collapse): what it might mean for craton reconstructions, global geochemical cycles, and biotic evolution.*

17) Athena Eyster, Benjamin Weiss, Karl Karlstrom, and Francis Macdonald: *An updated Neoproterozoic Apparent Polar Wander Path for Laurentia with implications for tectonic and paleogeographic controls on the diversification of life.*

18) Shannon Flynn, Qiyang Gao, Leslie J. Robbins, Tyler Warchola, Johanna N.J. Weston, Samrat Alam, Yuxia Liu, Kurt O. Konhauser, and Danniel S. Alessi: *Measurements of bacterial mat metal binding capacity and surface reactivity in an alkaline and carbonate rich system.*

19) Julia Gauglitz, Matt R. McIlvin, Dawn M. Moran, John B. Waterbury, and Mak A. Saito: *Insights into Diazotrophic Cyanobacterial Metal Metabolism from Global Proteomic Analyses*.

20) Sarabeth George, Benjamin Twining, and David Emerson: *Biogenic iron oxides stimulate growth in marine phytoplankton.*

21) Maya Gomes and David Johnston: *Biogeochemical sulfur cycling in modern euxinic systems and implications for exploring oxygen availability in the surface ocean and atmosphere.*

22) Michael Henehan, Pincelli M. Hull, Noah J. Planavsky, and Shuang Zhang: *Just how strange was the Strangelove Ocean?*

23) Gregory Henkes, Jiaheng Shen, David Naafs, Ellery Ingall, Erdem Idiz, Yanan Shen, Alan Rooney, Gordon Love, Scott Wankel, and Ann Pearson: *Novel observation of the nitrogen isotope composition of phytoplankton in deep time: Advancing compound-specific measurements of sedimentary porphyrins.*

24) Malcolm Hodgskiss, M. Kunzmann, A. Poirier, and G.P. Halverson: *The role of microbial dissimilatory iron reduction in the formation of Proterozoic molar tooth structures.*

25) Tristan Horner and Helena V. Pryer: *Microbially-mediated barite formation in the water column at micromolar sulfate.*

26) Benjamin Jelen, Donato Giovannelli, and Costantino Vetriani: *Sulfur Vs. Nitrate reduction in the deep-branching, thermophilic chemolithoautotroph, Thermovibrio ammonificans.*

27) Betul Kacar, Victor Hanson-Smith, Zachary R. Adam, Nicholas Boekelheide: *Reconstruction and Dynamic Modeling of Ancestral RuBisCO Proteins.*

28) Thomas Laakso and Daniel Schrag: *Atmospheric Oxygen, Archean to Present.*

29) Jessica Labonté and Beth N. Orcutt: *Enabling single cell genomic studies of deep crust samples.*

30) William Leavitt, Theodore M. Flynn, Melanie K. Suess, and Alexander S. Bradley: *Growth rate and electron-bifurcation influence H-isotopic fractionation in anaerobic bacterial lipids.*

31) Hui Li, Ruth E. Blake, and Peter. Girguis: *New internal biothermometer in biomass-PO4 to study vent macrobiota at the seafloor.*

32) Frasier Liljestrand, Benjamin R. Cowie, Gregory A. Henkes, Nicholas J. Tosca, Andrew H. Knoll, and David T. Johnston: *The triple oxygen isotope composition of Precambrian cherts.*

33) Ying Ran Lin and Boswell Wing: *Conventional nitrogenase can cause large nitrogen isotope fractionations.*

34) Winnie Liu, Paul Falkowski, and Nathan Yee: *Photochemical reactions of natural species under anaerobic conditions.*

35) Scott MacLennan, Yuem Park, Adam Maloof, Nick Swanson Hysell, Blair Schoene, Elliel Antilla, Tadele Tasema, Mulubrhan Gebreslassie, Mulugeta Alene, and Berekat Haileab: *New geochronological constraints on the upper Tambien Basin, northern Ethiopia, reveal that it records a continuous record of paleoenvironmental conditions leading into the Sturtian glaciation.*

36) Jeffrey Marlow, Connor Skennerton, Zhou Li, Karuna Chourey, Robert Hettich, Chongle Pan, and Victoria Orphan: *Proteomic Stable Isotope Probing Reveals Biosynthesis Dynamics of Slow Growing Methane Based Microbial Communities.*

37) Andrew Masterson, Marc J Alperin, Gail L Arnold, Will M. Berelson, and David T. Johnston: *Multiple Sulfur Isotope Diagenetic Models of Continental Margin Sediments: Aarhus Bay and Alfonso Basin.*

38) Sean McMahon, Victoria E. McCoy, and Derek E. G. Briggs: *Exceptional Fossil Preservation is Complicated: Mapping The Taphonomic Network.*

39) Darcy McRose, Anne M.L. Kraepiel, and François M.M. Morel: *Spending Money to Make Money: The Nitrogen Cost of Siderophore Production in Diazotrophs.*

40) Akshay Mehra: Visualizing Cloudina: *A Digital Reconstruction of One of the First Biomineralizing Organisms.*

41) Michael Meyer: Estimating oxygen availability and gas exchange in a fossil microbial mat using computed tomography X-ray imaging: *Implications for life-sediment interactions and early trace maker metabolisms in the late Ediacaran of South China.*

42) Yoshinori Miyazaki and Noah Planavsky: *Organic carbon weathering in the Neoproterozoic.*

43) Angel Mojarro, G. Ruvkun, M. T. Zuber, and C.E. Carr: *The Search for Extra-Terrestrial Genomes: Nucleic Acid Extraction from Mars Analog Soils*.

44) Eli Moore, Ben Jelen, Donato Giovannelli, and Paul Falkowski: *Global Redox Influence on Metal Availability and the Emergence of Archean Metabolisms*.

45) Kelsey Moore, Tanja Bosak, Francis A. Macdonald, Dan J. G. Lahr, Sharon Newman, Charles Settens, and Sara B. Pruss: *Microfossil assemblages in the Cryogenian nonglacial interlude (~660—640 Ma) of Namibia, Zambia, and Mongolia.*

46) Charlotte O'Brien, Stuart A. Robinson, David B. Kemp, J. Alistair Crame, Jane E. Francis, Jon R. Ineson, Rowan J. Whittle, Vanessa Bowman, James Witts, Joanna Hall and Richard D. Pancost: *Paleoclimatic and paleoenvironmental changes through the latest Cretaceous to early Paleogene: Geochemical reconstructions from Seymour Island, Antarctica.*

47) Beth Orcutt: *Buried Life - Life Beneath the Seafloor.*

48) Mihkel Pajusalu, Andras Zsom, Tanja Bosak, and Sara Seager: *Measuring Biosignature Gas Production in Lab for Detecting Signs of Life on Other Planets*.

49) Aude Picard, Amy Gartman, and Peter Girguis: *Microbial influence on sulfide mineral formation.*

50) Alexandra Pontefract, H. M. Sapers, G. R. Osinski, K. M. Cannon and J. F. Mustard: *The Habitability of Impact Generated Lithologies.*

51) Alexandra Pontefract, A. Mojarro, A. Smith, V. Walker, M. Zuber, G. Ruvkun, and C.E. Carr: *The Search for Unambiguous Biosignatures: DNA Extraction and Sequencing in Mars Analogue Environments*.

52) Jeemin Rhim and Shuhei Ono: *Experimental study of Methane Isotopologue Fractionation during Microbial Methanogenesis.*

53) Leslie Robbins, S.V. Lalonde, N.L. Macpherson, S.L. Flynn, D.S. Alessi and K.O. Konhauser: *Thermodynamic considerations on Precambrian seawater chemistry from equilibrium in the greenalite-siderite system.*

54) Danielle Santiago Ramos and John A. Higgins: *Understanding potassium isotope fractionation during authigenic clay formation in pore-fluid systems: Implications for the δ41K of seawater.*

55) Marie Thoby, S.V. Lalonde, P. Fralick, and Konhauser, K.O.: *The isotopic composition of molybdenum and redox evolution of seawater over geological time: new insights from stromatolitic carbonates spanning 2.94 Ga to present.*

56) Annemiek Waajen, Boswell Wing, and Thi Hao Bui: *Sulfur isotope effects during microbial elemental sulfur reduction.*

57) Anna Waldeck, Peter W. Crockford, Malcolm S.W. Hodgskiss, Frasier L. Liljestrand, Kevin M. Sutherland: *Ripening the Dole Effect: A Tale of More Boxes.*

58) Xiangli Wang, Noah Planavsky, Axel Hofman, Pascal Philippot, Stefan Lalonde, Noah Jemison, Brian De Corte, Huijuan Zou, Matt Larson, Harilaos Tsikos, Andrew Knudsen, Chris Reinhard, Tom Johnson, and Kurt Konhauser: *A geochemical record of the emergence of oxygenic photosynthesis.*

59) Scott Wankel, Wiebke Ziebis, Carolyn Buchwald, and Chawalit Charoenpong: *Interrogating the complexity of nitrous oxide production: New insights from a triple oxygen isotope perspective.*

60) Tyler Warchola, S.V. Lalonde, L.J. Robbins, D.S. Alessi, P. Philippot, and K.O. Konhauser: *Major and trace element chemostratigraphy of the Turee Creek Group, W. Australia: a unique record of marine redox just before the Great Oxidation Event.*

61) Kristin Woycheese, D'Arcy Meyer-Dombard, Dawn Cardace, and Caloy Arcilla: *Microbial methane and sulfur cycling in terrestrial serpentinizing fluid springs of the Philippines*.

62) Shuang Zhang, Michael J. Henehan, Noah J. Planavsky, Dalton S. Hardisty, and Pincelli M. Hull: *On the reliability of ocean pH estimates derived from boron isotopes in shallow marine inorganic carbonates.*

63) Yige Zhang, Albert Benthien, Liang Dong, Jorijntje Henderiks, and Ann Pearson: *Validating the alkenone-pCO2 method over glacial – interglacial cycles.*

64) Yinsui Zheng, James T. Dillon, Yifan Zhang, Yongsong Huang: *Discovery of alkenones with variable methylene interrupted double bonds in Emiliania huxleyi: Implications for biosynthetic pathways*.