

PROFESSOR AND CHAIR OF EARTH AND PLANETARY SCIENCES • NORTHWESTERN UNIVERSITY

DEPARTMENT OF EARTH AND PLANETARY SCIENCES • TEL 847.491.7539 • MATT@EARTH.NORTHWESTERN.EDU

PROFESSIONAL INTEREST

Earth history, biogeochemical cycles, sedimentary geology and geochemistry. My research efforts address both modern and ancient sedimentary systems, integrating field observations with a variety of geochemical tools (e.g., stable isotopes, elemental abundances) in order to investigate the chemical evolution of Earth's coupled ocean-atmosphere system through time. In particular, my research is driven by the hypothesis that sulfur plays a critical role in regulating the marine carbon cycle.

EDUCATION

Pennsylvania State University, University Park, PA

Ph.D., Geosciences, December 2003

Dissertation Advisor: M.A. Arthur

Dissertation Title: *Neoproterozoic sulfur isotopes, snowball Earth events and the evolution of microbial sulfur species*

University of Missouri, Columbia, MO

M.S., Geosciences, December 1998

Thesis Advisor: T.W. Lyons

Thesis Title: *The role of H₂S in iron sulfide transformations: examples from the Orca Basin and Effingham Inlet*

State University of New York, Fredonia, NY

B.S., Geosciences, Magna Cum Laude, August 1996

University of Rochester, Rochester, NY

B.A., Political Science, June 1991

PRE-DOCTORAL RECOGNITIONS

- Shell Doctoral Fellowship, department's most "prestigious" graduate fellowship, 2001-2002
- Keller Scholarship, awarded for graduate work in geology, 1996-1998
- Tarr Scholarship, awarded for graduate work in geochemistry, 1997
- Roy Angus MacDiarmid Award, outstanding graduating major in geosciences, 1996
- Paul D. Willette Award, outstanding junior in the geosciences, 1995

POST-DOCTORAL RECOGNITIONS

- National Science Foundation Faculty Early Development (CAREER) award, 2010-2015
- National Research Council Postdoctoral Fellow in Astrobiology, Harvard University, 2003-2005

EMPLOYMENT

Northwestern University, Evanston, IL, 2018 – present

Chair, Department of Earth and Planetary Sciences

Northwestern University, Evanston, IL, 2017 – present

Professor, Department of Earth and Planetary Sciences

Northwestern University, Evanston, IL, 2011 – 2017

Associate Professor, Department of Earth and Planetary Sciences

Northwestern University, Evanston, IL, 2005 – 2011

Assistant Professor, Department of Earth and Planetary Sciences

National Research Council Postdoctoral Fellow in Astrobiology, Harvard University, 2003 – 2005

Mentor: A.H. Knoll, Dept. of Organismic and Evolutionary Biology, Harvard University

Collaborator: D.P. Schrag, Dept. of Earth and Planetary Sciences, Harvard University

Collaborator: P.F. Hoffman, Dept. of Earth and Planetary Sciences, Harvard University

Tested hypotheses concerning the timing and importance of Earth-surface processes related to the oxidation of Earth's atmosphere and oceans and the evolution of microbial metabolisms by evaluating the oxygen and sulfur isotope composition of carbonate-associated sulfate in Proterozoic sediments.

Graduate Student Research Assistant in Astrobiology, 1/1999 – 10/2003

Penn State Astrobiology Research Center and Dept. of Geosciences, Pennsylvania State University

Thesis Advisor: Michael A. Arthur

Documented secular variations in the sulfur isotope composition of Neoproterozoic seawater sulfate and assessed variations in the sulfur cycle that accompanied the hypothesized "Snowball Earth" events and the evolution of biogeochemical processes associated with the oxygenation of the surface and deep oceans.

Graduate Student in Geosciences, 8/1996 – 8/1998

Department of Geological Sciences, University of Missouri-Columbia

Advisor: Timothy W. Lyons

Examined the role of H₂S in iron sulfide transformations (e.g., pyrite formation) and extrapolated reaction pathways responsible for pyrite formation in the laboratory to two fundamentally different marginal-marine settings: Effingham Inlet (a fjord on Vancouver Island) and the Orca Basin (an intraslope brine pool in the northern Gulf of Mexico).

COST CARE, INC., Newport Beach, CA, 2/1994 - 8/1994

Public Relations/Copywriter.

Researched and wrote marketing materials presenting Cost Care as optimum vendor of health utilization management services. Editor of employee newsletter. Selected and cropped photographs, edited articles and laid out monthly publication. Coordinated seven person writing staff. Responsible for public relations and advertising copy for fourth largest managed care firm. Acted as liaison for existing and potential clients.

"HMS" ROSE, Bridgeport, CT, 7/1993 - 11/1993

Deckhand/Instructor

Sailed the world's largest active wooden Tall Ship through the Great Lakes. Provided training in all aspects of sailing.

AMERICAN PLASTICS COUNCIL, Washington, D.C., 1992 - 1993

Legislative Specialist.

Responsible for researching, writing, editing and production of monthly newsletter on state legislative activity affecting the plastics industry. Coordinated state legislative tracking with four regional offices. Analyzed solid waste legislation and prepared 100 page monthly and 350 page annual legislative reports affecting the industry. Maintained legislative database and assisted in the planning and implementation of projects related to legislative tracking and reporting. Responded to public and member requests for information.

NATIONAL SOFT DRINK ASSOCIATION, Washington, D.C., 8/1991 – 12/1991

Research Analyst

Researched and reported on state recycling programs, legislative requirements, funding mechanisms and general recycling issues.

London Financial Times, Washington, D.C., 6/1990 – 8/1990

Research Assistant

Acted as research assistant to the U.S. editor. Contributed to several published articles.

RESEARCH SUPPORT

Grants funded, present:

Hurtgen M.T. (PI), Jacobson A.D. (Co-I), Sageman B.B. (Co-I) The strontium isotope composition of Neoproterozoic carbonates: Implications for the carbon cycle and the evolution of the biosphere, NASA, \$442,110, 07/10/2017 – 06/30/2023.

Grants funded, past:

Hurtgen M.T. (PI) CAREER: The role of sulfur in regulating the marine carbon cycle: Implications for understanding Oceanic Anoxic Events, National Science Foundation, \$511,882, 05/15/2010 – 11/14/2016, funded.

Hurtgen M.T. (PI) The Role of Sulfur in Regulating Carbon Sequestration in Cretaceous Seas. Initiative for Sustainability and Energy (ISEN) at Northwestern, \$45,000, 6/2011 -- 1/2014, funded.

Hurtgen M.T. (PI) Ecophysiology of S-isotope signatures in modern and ancient sediments. Agouron Institute, \$65,000, 9/1/2012 -- 8/31/2013, funded. These funds are used to pay the postdoc salary of Min Sub Sim.

Porter S.M. (PI), Hurtgen M.T. (Co-PI) Collaborative Research: Ocean oxidation and the biosphere during Neoproterozoic glaciation, National Science Foundation, \$219,213 (Northwestern portion), 9/1/2009 – 8/31/2013, funded.

Hurtgen M.T. (PI), Sulfur isotope fractionations in modern lakes: Implications for reconstructing the chemical evolution of the Precambrian Earth surface, NASA, \$90,000, 9/1/2009 -- 8/31/2012, funded. This is a NASA Earth and Space Science Fellowship that supported Maya Gomes.

Hurtgen M.T. (PI) Sulfur cycling through the Neoproterozoic interglacial interval: An integrated field and geochemical study of the Abenab Subgroup in northern Namibia, National Science Foundation, \$190,000, 9/1/2007 – 8/31/2011, funded.

Sageman B.B. (PI), Hurtgen M.T. (Co-PI) Upgrade of Sedimentary Geology Preparation and Marine Sedimentary Biogeochemistry Laboratories, National Science Foundation, \$81,450, 09/01/2009 – 08/31/2010, funded.

Hurtgen M.T. (PI) The Co-Evolution of the Nitrogen and Sulfur Cycles in the Neoproterozoic. Agouron Institute, \$108,000, 10/15/2009 -- 12/31/2011, funded. These funds were used to pay the postdoc salary of Chris Junium.

Lyons T.W. (PI), Hurtgen M.T. (Co-I), Mandernack K. (Co-I) Oxygen isotope composition of carbonate-associated sulfate—A tracer for the sources and cycling of sulfate in the early ocean, NASA, \$85,700 (to Co-I Hurtgen at Northwestern), 3/2006 – 2/2009, funded.

Maloof A. (PI), Hurtgen M.T. (collaborator), Halverson G.P. (collaborator) An integrated paleomagnetic, isotopic, and stratigraphic test of the inertial interchange true polar wander hypothesis, Bitter Springs Stage, Australia, National Science Foundation, 9/1/2005 – 8/31/2007, funded. I could not be listed as a Co-PI on this proposal because I did not have a faculty position at the time it was submitted. However, grant money from this proposal was allocated to me for 12 weeks of field work in Australia and geochemical analyses of the samples retrieved from these expeditions.

PUBLICATIONS (* starred names indicate student or postdoc co-authors)

*Linzmeier B.J., Jacobson A.D., Sageman B.B., Hurtgen M.T., Ankney M.E., Masterson A., Landman N.H. (in revision) Isotope systematics of subfossil, historical, and modern *Nautilus macromphalus* from New Caledonia. *PLOS ONE*.

*Wang J., Jacobson A.D., Sageman B.B., Hurtgen M.T. (nearing submission) $\delta^{44/40}\text{Ca}$ - $\delta^{88/86}\text{Sr}$ multi-proxy constrains primary origin of Marinoan cap carbonates. *Geochimica et Cosmochimica Acta*.

- *Kitch G.D., Jacobson A.D., Sageman B.B., Coccioni R., Chung-Swanson T., Ankney M.E., Hurtgen M.T. (in revision) Calcium isotope ratios of dwarfed foraminifera reveal biocalcification stress preceded OAE2. *Nature Communications Earth and Environment*.
- *Kitch G.D., Jacobson A.D., Hurtgen M.T., Sageman B.B., Harper D.T., Zachos J.C. (2021) Calcium isotope composition of *Morozovella* over the Late Paleocene-Early Eocene. *Geology*, v. 49, p. 723-727.
- *Wang J.W., Jacobson A.D., Sageman B.B., Hurtgen M.T. (2021) Stable Ca and Sr isotopes support volcanically-triggered biocalcification crisis during Oceanic Anoxic Event 1a. *Geology*, v. 49, p. 515-519. DOI: 10.1130/G47945.1.
- *Braun K.N., Theuerkauf E.J., Hurtgen M.T., Horton D.E., Masterson A.L. (2020) Loss-on-ignition estimates for soil organic carbon in a Great Lakes freshwater coastal wetland. *Wetlands Journal*. DOI: [10.1007/s13157-020-01270-z](https://doi.org/10.1007/s13157-020-01270-z).
- *Joo Y.J., Sageman B.B., Hurtgen M.T. (2020) Data-model comparison reveals key environmental changes leading to Cenomanian-Turonian Oceanic Anoxic Event 2. *Earth-Science Reviews*, v. 203, p. 1-15.
- *Linzmeier B.J., Jacobson A.D., Sageman B.B., Hurtgen M.T., Ankney M.E., Petersen S.V., Tobin T.S., Kitch G.D., Wang J (2020) Calcium isotope evidence for environmental variability before and across the Cretaceous-Paleogene mass extinction. *Geology*, v. 48, p. 34-38.
- *Wang J.W., Jacobson A.D., Zhang H., Ramezani J., Sageman B.B., Hurtgen M.T., Bowring S.A., Shen, S. (2019) Coupled $\delta^{44/40}\text{Ca}$, $^{87}\text{Sr}/^{86}\text{Sr}$, and $\delta^{88/86}\text{Sr}$ geochemistry across the end-Permian mass extinction event. *Geochimica et Cosmochimica Acta*, v. 261, p. 143-165.
- *Kristall B., Jacobson A.D., Sageman B.B., Hurtgen M.T. (2018) Coupled strontium-sulfur cycle modeling and the Early Cretaceous sulfur isotope record. *Palaeogeography, Palaeoclimatology, Palaeoecology*, v. 496, p. 305-322.
- *Mills J.V., *Gomes M.L., *Kristall, B., Sageman B.B., Jacobson A.D., Hurtgen M.T. (2017) Massive volcanism, evaporite deposition, and the chemical evolution of the Early Cretaceous ocean. *Geology*, v. 45, p. 475-478. doi:10.1130/G38667.1
- *Kristall B., Jacobson A.D., Hurtgen M.T. (2017) Modeling the seawater radiogenic strontium isotope record: A case study of the Late Jurassic – Early Cretaceous. *Palaeogeography, Palaeoclimatology, Palaeoecology*, v. 472, p. 163-176.
- Pruss S.B., Castagno K.A., Fike D.A., and Hurtgen M.T. (2016) Carbon isotope ($\delta^{13}\text{C}_{\text{carb}}$) heterogeneity in deep-water Cambrian carbonates, western Newfoundland. *Palaeogeography, Palaeoclimatology, Palaeoecology*, v. 458, p. 52-62.
- Holmden C., Jacobson A.D., Sageman B.B., and Hurtgen M.T. (2016) Response of the Cr isotope proxy to Cretaceous Ocean Anoxic Event 2 in a pelagic carbonate succession from the Western Interior Seaway. *Geochimica et Cosmochimica Acta*, v. 186, p. 277-295.

- *Gomes M.L., Hurtgen M.T., and Sageman B.B. (2016) Biogeochemical sulfur cycling during Cretaceous Ocean Anoxic Events: A comparison of OAE1a and OAE2. *Paleoceanography*, v. 31, p. 233-251, doi:10.1002/2015PA002869.
- *Sim M.S., Ono S., Hurtgen M.T. (2015) Sulfur isotope evidence for low and fluctuating sulfate levels in the Late Devonian ocean and the potential link with the mass extinction event. *Earth and Planetary Science Letters*, v. 419, p. 52-62.
- *Gomes M.L., Hurtgen M.T. (2015) Sulfur isotope fractionation in modern euxinic systems: Implications for paleoenvironmental reconstructions of paired sulfate-sulfide isotope records. *Geochimica et Cosmochimica Acta*, v. 157, p. 39-55.
- Du Vivier A.D.C., Jacobson A.D., Lehn G.O., Selby D., Hurtgen M.T., Sageman, B.B. (2015) Ca isotope stratigraphy across the Cenomanian-Turonian OAE2: links between volcanism, seawater geochemistry, and the carbonate fractionation factor. *Earth and Planetary Science Letters*, v. 416, p. 121-131.
- Riedman L., Porter S.M., Halverson G.P., Hurtgen M.T., Junium C.K., (2014) Organic-walled microfossil assemblages from glacial and interglacial Neoproterozoic units of Australia and Svalbard. *Geology*, v. 42, p.1011-1014.
- *Gomes M.L., Hurtgen M.T. (2013) Sulfur isotope systematics of a euxinic, low-sulfate lake: Evaluating the importance of the reservoir effect in modern and ancient oceans. *Geology*, v. 41, p. 663-666.
- Swanson-Hysell N.L., Maloof A.C., Kirschvink J.L., Evans D.A.D, Halverson G.P., Hurtgen M.T. (2012) Constraints on Neoproterozoic paleogeography and Paleozoic orogenesis from paleomagnetic records of the Bitter Springs Formation, Amadeus Basin, central Australia. *American Journal of Science*, v. 312, p. 817-884.
- Hurtgen M.T. (2012) The marine sulfur cycle, revisited. *Science*, v. 337, p. 305-306.
- Halverson G.P., Wade B.P., Hurtgen M.T., Barovich K.M. (2010) Neoproterozoic chemostratigraphy. *Precambrian Research*, v. 182, p. 337-350.
- Jones D.S., Maloof A.C., Hurtgen M.T., Rainbird R.H., Schrag D.P. (2010) Regional and global chemostratigraphic correlation of the Early Neoproterozoic Shaler Supergroup, Victoria Island, Northwestern Canada. *Precambrian Research*, v. 181, p. 43-63.
- Swanson-Hysell N.L., Rose C.V., Calmet C.C., Halverson G.P., Hurtgen M.T., Maloof A.C. (2010) Cryogenian glaciation and the onset of carbon-isotope decoupling. *Science*, v. 328, p. 608-611.
- *Adams D.D., Hurtgen M.T., Sageman B.B. (2010) Volcanic triggering of a biogeochemical cascade during Oceanic Anoxic Event 2. *Nature Geoscience*, v. 3, p. 201-204.
- Halverson G.P., Hurtgen M.T., Porter S.M., Collins A.C. (2010) Neoproterozoic-Cambrian Biogeochemical Evolution. In: Gaucher, C., Sial, A., Halverson, G.P., and Frimmel, H. (Eds.): *Neoproterozoic-Cambrian Tectonics, Global Change and Evolution: a focus on southwestern Gondwana. Developments in Precambrian Geology Series*, v. 16, Elsevier, p. 351-365.

- Hurtgen M.T., Pruss S.B., Knoll A.H. (2009) Evaluating the relationship between the carbon and sulfur cycles in the later Cambrian ocean: An example from the Port au Port Group, western Newfoundland, Canada. *Earth and Planetary Science Letters*, v. 281, p. 288-297.
- Halverson, G.P., Hurtgen, M.T. (2007) Ediacaran growth of the marine sulfate reservoir. *Earth and Planetary Science Letters*, v. 263, p. 32-44.
- Halverson G.P., Maloof A.C., Schrag D.P., Dudas F., Hurtgen M. (2007) Stratigraphy and geochemistry of a ca. 800 Ma negative carbon isotope interval in northeastern Svalbard. *Chemical Geology*, v. 237, p. 23-45.
- Hurtgen M.T., Halverson, G.P., Arthur M.A., Hoffman P.F. (2006) Sulfur cycling in the aftermath of a 635-Ma snowball glaciation: Evidence for a syn-glacial sulfidic deep ocean. *Earth and Planetary Science Letters*, v. 245, p. 551-570.
- Hurtgen M.T., Arthur M.A., Halverson G.P. (2005) Neoproterozoic sulfur isotopes, the evolution of microbial sulfur species, and the burial efficiency of sulfide as sedimentary pyrite. *Geology*, v. 33, p. 41-44.
- Ingall E., Kolowith L., Lyons T., Hurtgen M. (2005) Sediment carbon, nitrogen and phosphorus cycling in an anoxic fjord, Effingham Inlet, British Columbia. *American Journal of Science*, v. 305, p. 240-258.
- Hurtgen M.T., Arthur M.A., Prave A.R. (2004) The sulfur isotope composition of carbonate-associated sulfate in Mesoproterozoic to Neoproterozoic carbonates from Death Valley, California, in Amend, J.P., Edwards, K.J., and Lyons, T.W., eds., *Sulfur Biogeochemistry-Past and Present: Geological Society of America Special Paper*, v. 379, p. 177-194.
- Hurtgen M.T. (2003) Ancient Oceans and Oxygen. *Nature*, v. 423, p. 592-593.
- Pavlov A.A., Hurtgen M.T., Kasting J.F., Arthur M.A. (2003) Methane-rich Proterozoic atmosphere? *Geology*, v. 31, p. 87-90.
- Hurtgen M.T., Arthur M.A., Suits N., Kaufman A.J. (2002) The sulfur isotopic composition of Neoproterozoic seawater sulfate: implications for a snowball Earth? *Earth and Planetary Science Letters*, v. 203, p. 413-429.
- Hurtgen M.T., Lyons T.W., Ingall E.D., Cruse A.M. (1999) Anomalous enrichments of iron monosulfide in euxinic marine sediments and the role of H₂S in iron sulfide transformations: examples from Effingham Inlet, the Orca Basin and the Black Sea. *American Journal of Science*, v. 299, p. 556-588.

CONFERENCE ABSTRACTS (* starred names indicate student or postdoc co-authors)

- *Sarvian N.L., Jacobson A.D., Hurtgen M.T., Wang J. (2022) Utilizing stable Ca and Sr isotopes to understand marine carbonate dynamics through time. 5th International Symposium on the Ocean in a High CO₂ World, Lima, Peru.

- *Sarvian N.L., Jacobson A.D., Chung-Swanson T., Hurtgen M.T., Osburn M.R., Bergmann K. (2022) Constraining the Shuram $\delta^{13}\text{C}$ Excursion with the $\delta^{44/40}\text{Ca}$ - $\delta^{88/86}\text{Sr}$ multi-proxy. Annual V M Goldschmidt Conference, Hawaii.
- *Wang J., Jacobson A.D., Sageman B.B., Hurtgen M.T. (2021) Stable Ca and Sr isotope multi-proxy provides evidence for primary signal preservation in Marinoan cap carbonates. Geological Society of America annual meeting, Portland, OR.
- *Podrecca L., Hurtgen M.T., Masterson A.L., Todes J., Sageman B.B. (2021) The role of relative sea level in microbial sulfate reduction and the local S-isotope record. Geological Society of America annual meeting, Portland, OR.
- *Sarvian N.L., Jacobson A.D., Hurtgen M.T., Osburn M., Bergmann K. (2021) Application of the $\delta^{44/40}\text{Ca}$ - $\delta^{88/86}\text{Sr}$ multi-proxy to the Shuram Carbon Isotope Excursion. Annual V M Goldschmidt Conference, Virtual.
- *Kitch G.D., Jacobson A.D., Coccioni R., Chung-Swanson T., Hurtgen M.T., Sageman B.B. (2021) Bulk carbonate and foraminiferal calcium isotope ratios indicate calcification stress preceded Oceanic Anoxic Event 2. Annual V M Goldschmidt Conference, Virtual.
- *Kitch G.D., Jacobson A.D., Coccioni R., Harper D.T., Chung-Swanson T., Hurtgen M.T., Sageman B.B., Zachos J.C. (2020) Foraminiferal calcium isotope response to carbon cycle perturbations: comparison of the Paleocene-Eocene Thermal Maximum to Ocean Anoxic Event 2. Annual American Geophysical Union meeting (Virtual).
- *Wang J., Kitch G.D., Linzmeier B.J., Jacobson A.D., Sageman B.B., Hurtgen M.T. (2020) Calcium isotope variability across ancient candidate ocean acidification events. Geological Society of America annual meeting, Montreal (Virtual).
- *Sarvian N.L., Jacobson A.D., Osburn M.R., Maloof A.C., Hurtgen M.T. (2020) Stable strontium isotopes and the Neoproterozoic carbonate cycle. Geological Society of America annual meeting, Montreal (Virtual).
- *Kitch G.D., Jacobson A.D., Hurtgen M.T., Sageman B.B., Harper D.T., Zachos J.C. (2020) Calcium isotope response of *Morozovella spp.* to Paleocene-Eocene ocean acidification. Annual V M Goldschmidt Conference, Virtual.
- *Wang J.W., Jacobson A.D., Sageman B.B., Hurtgen M.T. (2020) Stable Ca and Sr isotopes indicate biocalcification crisis during OAE1a. Annual V M Goldschmidt Conference, Virtual.
- *Sarvian N.L., Jacobson A.D., Hurtgen M.T., Osburn M.R., Maloof A.C., (2020) Radiogenic and Stable Sr isotope records preceding the Sturtian Snowball Earth event. Annual V M Goldschmidt Conference, Virtual.
- *Sageman I., D'Emic D., Hoffmann S., Foreman B.Z., Randall E., Hurtgen M.T., (2020) Climatic and paleoenvironmental changes associated with the evolution of the first mammalian megaherbivore *Coryphodon* during Paleogene hyperthermal events, Bighorn Basin, Wyoming. Geological Society of America (Virtual).

- *Linzmeier B.J., Jacobson A.D., Sageman B.B., Hurtgen M.T., Ankney M.E., Masterson A.L., Landman N.H. (2019) Calibrating cephalopod isotope responses using *Nautilus Macromphalus* from New Caledonia. Geological Society of America annual meeting, Phoenix, AZ.
- *Sarvian N.L., Hurtgen M.T., Jacobson A.D., Maloof A.C. (2019) Stable strontium isotope ($\delta^{88/86}\text{Sr}$) record of pre-Sturtian carbonate rocks spanning a large $\delta^{13}\text{C}$ anomaly. Annual V M Goldschmidt Conference, Barcelona, Spain.
- *Linzmeier B.J., Jacobson A.D., Sageman B.B., Hurtgen M.T., Ankney M.E., Petersen S.V., Tobin T.S. (2019) Calcium isotope evidence for environmental change before and across the K-Pg extinction. Annual V M Goldschmidt Conference, Barcelona, Spain.
- *Kitch G.D., Jacobson A.D., Ankney M.E., Masterson A.L., Hurtgen M.T., Sageman B.B. (2019) Calcium isotope composition ($\delta^{44/40}\text{Ca}$) of bulk carbonate spanning Ocean Anoxic Event 2: kinetic effects or diagenesis? Annual V M Goldschmidt Conference, Barcelona, Spain.
- *Linzmeier B., Jacobson A.D., Sageman B.B., Hurtgen M.T., Ankney M.E., Landman N.H. (2018) Using sub-fossil and historic nautilus to test potential links between calcium isotope fractionation and P_{CO_2} . Geological Society of America annual meeting, Indianapolis, IN.
- *Linzmeier B., Jacobson A.D., Sageman B.B., Hurtgen M.T., Ankney M.E., Petersen S.V., Tobin T.S. (2018) Linking Deccan volcanism and the bolide impact with Ca isotope stratigraphy from the Late Maastrichtian of Seymour Island, Antarctica. Annual V M Goldschmidt Conference, Boston, MA.
- Holmden C., Jacobson A., Sageman B., Hurtgen M., Dickson A. (2018) Deciphering the unexpected response of the Cr isotope proxy to OAE 2. Annual V M Goldschmidt Conference, Boston, MA.
- Hurtgen M., *Wang J., Jacobson A., Sageman B. (2017) Radiogenic and stable Sr isotope records reveal changes in weathering and carbonate burial rates following Marinoan Glaciation. Geological Society of America annual meeting, Seattle, WA.
- *Kitch G., Jacobson A., Hurtgen M., Sageman B., Harper D., Zachos J. (2017) Calcium isotope ($\delta^{44/40}\text{Ca}$) composition of *Morozovella Velascoensis* during the Paleocene Eocene Thermal Maximum ocean acidification event. Annual American Geophysical Union meeting, New Orleans, LA.
- *Wang J., Jacobson A., Zhang H., Ramezani J., Sageman B., Hurtgen M., Bowring S., and Shen S. (2017) Ca and Sr isotope records support ocean acidification during end-Permian mass extinction. Annual American Geophysical Union meeting, New Orleans, LA.
- Holmden C., Jacobson A., Sageman B., and Hurtgen M (2017) A Cr isotope fingerprint of submarine LIP volcanism. Annual V M Goldschmidt Conference, Paris, France.
- *Wang J., Jacobson A., Zhang H., Ramezani J., Sageman B., Hurtgen M., Bowring S., and Shen S. (2016) A Permo-Triassic Ca isotope record from Meishan, China. Annual V M Goldschmidt Conference, Yokohama, Japan.

- *Kristall B., Hurtgen M., Sageman B., Jacobson A. (2015) The Early Cretaceous sulfur isotope record: New data, revised ages, and updated modeling. Annual American Geophysical Union meeting, San Francisco, CA.
- Sageman B., Hurtgen M., Jacobson, A., Selby D. (2015) Multi-proxy study of Ocean Anoxic Event 2 (Cenomanian-Turonian) yields new perspective on the drivers for Mesozoic anoxic events. Annual American Geophysical Union meeting, San Francisco, CA.
- Holmden C., Jacobson A., Sageman B., Hurtgen M. (2015) Cr isotope response to Ocean Anoxic Event 2. Annual American Geophysical Union meeting, San Francisco, CA.
- *Kukla T.J., Sageman B.B., Hurtgen M.T., Kristall B., Jarvis, I. (2015) Comparative sulfur isotope study of the Mid Cenomanian event and the Cenomanian-Turonian OAE2. Geological Society of America annual meeting, Baltimore, MD.
- *Junium C.K., Hurtgen M.T., Porter S.M., Halverson G.P., Riedman L. (2014) The nitrogen cycle in the aftermath of the mid-Cryogenian snowball Earth glaciation. Annual American Geophysical Union meeting, San Francisco, CA.
- *Gouldey J, Hurtgen M.T. (2014) Coupled Changes in Sulfur and Carbon Isotopes Preceding the Sturtian Glaciation of the Neoproterozoic. Annual American Geophysical Union meeting, San Francisco, CA.
- Jacobson A.D., Lehn G.O., Du Vivier A.D.C., Selby D., Hurtgen M.T., Sageman, B.B. (2014) Ca Isotope Evidence for Changes in the Carbonate Geochemistry of Seawater Across OAE 2. American Geophysical Union annual meeting, San Francisco, CA.
- Holmden C., Jacobson A., Sageman B., Hurtgen M. (2014) Marine carbonate $\delta^{53}\text{Cr}$ values reflect inputs from LIP volcanism during OAE 2. American Geophysical Union annual meeting, San Francisco, CA.
- Hurtgen M.T., *Mills J.V., *Gomes M.L., *Kristall B, Sageman B.B., Jacobson, A.D. (2014) Massive volcanism, evaporite desposition and the chemical evolution of the Cretaceous ocean. Geological Society of America annual meeting, Vancouver, BC, Canada.
- Halverson G.P., Cox G.M., Hurtgen M.T., Sansjofre P., Kunzmann M., Macdonald F. (2014) A continental flood basalt driver for Neoproterozoic climate and oxygenation. Geological Society of America annual meeting, Vancouver, BC, Canada.
- *Gomes M.L., *Mills J.V., Hurtgen M.T., Sageman B.B. (2013) Implications of variance in biogeochemical proxy records spanning Mesozoic oceanic anoxic events. Annual American Geophysical Union Meeting, San Francisco, CA.
- *Mills J.V., *Gomes M.L., Sageman B.B., Jacobson A.D., Hurtgen M.T. (2013) Reinterpreting the Early Cretaceous sulfur isotope records: Implications for the evolution of seawater chemistry. Annual American Geophysical Union Meeting, San Francisco, CA.
- *Sim M.S., Ono S., Hurtgen M.T. (2013) Contrasting sulfur isotope records during the Late Devonian *punctata* and Upper Kellwasser events. Annual American Geophysical Union Meeting, San Francisco, CA.

- *Joo Y.J., Hurtgen M.T., Sageman B.B. (2013) Changes in carbon and sulfur cycles during Mid-Cenomanian Event: a "failed OAE"? Annual American Geophysical Union Meeting, San Francisco, CA.
- *Kristall B., Hurtgen M.T., Sageman B.B. (2013) Decoupling of the geochemical cycles of sulfur and carbon during the Early Cretaceous (Hauterivian). Annual American Geophysical Union Meeting, San Francisco, CA.
- *Spokas K., Sansjofre P., *Cox G., Hurtgen M.T., Halverson G.P. (2013) Investigating the early Neoproterozoic seawater sulfur isotope record. Geological Society of America annual meeting, Denver, CO.
- *Gomes M.L., Hurtgen M.T. (2013) The preservation of sulfur isotope signals in low sulfate systems: How low is low? Annual V M Goldschmidt Conference, Florence, Italy.
- *Cox G., Halverson G., Hurtgen M., Poirier A., Theou-Hubert L., Wing, B. (2013) Volcanic degassing of the Gunbarrel large igneous province and its environmental repercussions. Annual V M Goldschmidt Conference, Florence, Italy.
- Pruss S., Fike D., Castagno K., Hurtgen M. (2013) Carbon isotope analysis of conglomerates of the Cambro-Ordovician Cow Head Group, Western Newfoundland as a proxy for the origin of carbonate cements. Annual V M Goldschmidt Conference, Florence, Italy.
- *Gomes M.L., Hurtgen M.T. (2012) Multi-proxy investigation of paleoredox indicators in a permanently euxinic, low sulfate lake. Annual V M Goldschmidt Conference, Montreal, Quebec.
- *Junium C.K., Hurtgen M.T., Halverson G.P., (2012) Constraining the early Neoproterozoic nitrogen cycle. Geological Society of America annual meeting, Charlotte, NC.
- *Junium C.K., Hurtgen M.T., Riedman L.A., Porter S.M., (2012) Fueling the snowball Earth biogeochemical recovery: Evidence for a bio-inorganic bridge. Geological Society of America annual meeting, Charlotte, NC.
- *Joo Y.J., Hurtgen M., Sageman B., (2012) Late Cretaceous stable carbon isotope chemostratigraphy, Western Interior Basin: A new time-calibrated carbon isotope curve for global correlation. Geological Society of America annual meeting, Charlotte, NC.
- *Riedman L.A., Porter S.M., Halverson G.P., Hurtgen M.T., Junium C.K., (2012) Fossil evidence for a Cryogenian diversity crisis. Geological Society of America annual meeting, Charlotte, NC.
- *Gomes M.L., *Mills J.V., *Beckerman L.G., *Mayer A., Sageman B.B., Hurtgen M.T., (2012) Are long-term trends in the sulfur isotope composition of Cretaceous seawater sulfate linked with Oceanic Anoxic Events? Annual American Geophysical Union Meeting, San Francisco, CA.
- *Mills J.V., *Gomes M.L., Sageman B.B., Hurtgen M.T., (2012) Testing the sulfate-phosphorous hypothesis for initiation of the early Aptian OAE1a. Annual American Geophysical Union Meeting, San Francisco, CA.

- *Gouldey J., Hurtgen M.T., Halverson G.P. (2012) The importance of sulfur on enriched carbon isotopes and extreme carbon cycle perturbations of the Cryogenian. Annual American Geophysical Union Meeting, San Francisco, CA.
- *Gomes M.L., *Mills J., Hurtgen M.T., Sageman B.B., (2011) Role of LIP-related changes in oceanic sulfate level for initiation of Cretaceous OAE's? Annual American Geophysical Union Meeting, San Francisco, CA.
- *Gouldey J., Hurtgen M.T., Halverson G.P. (2011) The role of sulfur on major fluctuations in the carbon cycle during the Neoproterozoic interglacial interval. Annual American Geophysical Union Meeting, San Francisco, CA.
- *Castagno K.A., Pruss S.B., Hurtgen M.T. (2011) Geochemical analysis of the Cambro-Ordovician Cow Head Group, western Newfoundland, Geological Society of America annual meeting, Minneapolis, MN.
- Maloof A.C., Swanson-Hysell N., Rose C.V., Husson J.M., Dyer B.C., Halverson G.P., Hurtgen M.T. (2011) The regolith hypothesis for the Tonian-Cryogenian transition. Annual American Geophysical Union Meeting, San Francisco, CA.
- Hurtgen M.T., Swanson-Hysell N.L., Halverson G.P., Maloof A.C., (2011) The role of sulfur in triggering early Neoproterozoic oxygenation. Annual V M Goldschmidt Conference, Prague, Czech Republic.
- *Joo Y.J., Hurtgen M., Sageman B., (2011) Stable carbon isotope chemostratigraphy and implications for global carbon cycling, Cretaceous Western Interior Basin. Annual V M Goldschmidt Conference, Prague, Czech Republic.
- *Joo Y.J., Hurtgen M., Sageman B., (2011) Late Cretaceous Stable Carbon Isotope Chemostratigraphy, Western Interior Basin. Geological Society of America annual meeting, Minneapolis, MN.
- Sageman B.B., Hurtgen M.T., McElwain J., *Adams D., *Barclay R.S., *Joo Y. (2010) Evidence for volcanic initiation of Cretaceous Oceanic Anoxic Events. Annual American Geophysical Union Meeting, San Francisco, CA.
- *Barclay R.S., *Joo Y., *Adams D., Hurtgen M.T., McElwain J., Sageman B.B. (2010) Reconciling $p\text{CO}_2$ estimates and stable isotope records (S & C) with a global carbon cycle model during the Cenomanian-Turonian OAE2. Annual American Geophysical Union Meeting, San Francisco, CA.
- Hurtgen M.T. (invited, 2010) The role of sulfur in regulating the exogenic carbon and oxygen cycles. Geological Society of America annual meeting, Denver, CO.
- *Gomes M.L., Hurtgen M.T. (2010) Sulfur isotope systematics in a low sulfate, permanently anoxic lake. Geological Society of America annual meeting, Denver, CO.
- *Adams D.D., Hurtgen M.T., Sageman B.B. (2010) Highly reactive Fe limitation during Oceanic Anoxic Event 2. Geological Society of America annual meeting, Denver, CO.
- *Adams D.D., Hurtgen M.T., Sageman B.B. (2010) Volcanic activation of biogeochemical cascade regulates Oceanic Anoxic Event 2. Goldschmidt, Knoxville, TN.

Hurtgen M.T., *Adams D.D., Sageman B.B., *Gomes M.L. (2009) The role of S in regulating the exogenic cycles of C and O on early Earth: Lessons learned from modern lakes and Cretaceous Oceanic Anoxic Event 2. Annual American Geophysical Union Meeting, San Francisco, CA.

*Gomes M.L., Hurtgen M.T. (2009) Sulfur isotope systematics and the link between fluctuating sulfate levels and P recycling in a low sulfate, permanently anoxic lake (Lake McCarrons, MN): Implications for the Precambrian rise of oxygen. Annual American Geophysical Union Mtg, San Francisco, CA.

*Gouldley J., Hurtgen M.T., Halverson G.P. (2009) The relationship between the geochemical cycles of carbon and sulfur during the Neoproterozoic interglacial interval. Annual American Geophysical Union Meeting, San Francisco, CA.

Hurtgen M.T., *Adams D.D., Sageman B.B. (2009) Volcanic activation of Oceanic Anoxic Event 2 and the role of sulfur in regulating the marine carbon cycle. Geological Society of America annual meeting, Portland, OR.

*Joo Y.J., Sageman B.B., Hurtgen M.T. (2009) Carbon, phosphorus, and sulfur cycling during Cenomanian-Turonian OAE2 in Western Interior Seaway. Geological Society of America annual meeting, Portland, OR.

Pruss S., Hurtgen M., Breus A. (2009) Environmental insights into paleobiological patterns of the Cambro-Ordovician Port au Port and St. George Groups, western Newfoundland. Walcott 2009, An international conference on the Cambrian Explosion, Banff, Alberta.

Maloof A.C., Swanson-Hysell N.L., Halverson G.P., Hurtgen M.T., Kirschvink, J.L. (2009) Testing the true polar wander hypothesis for coincident paleomagnetic isotopic and sea level change in the middle Neoproterozoic of Australia. Geological Society of London Fernor Meeting: Rodinia: Supercontinents, Superplumes and Scotland, Edinburg, Scotland.

Sageman B., Hurtgen M., *Adams D., Barclay R., *Joo Y.J. (2009) OAE's and the interdependence of P, N and trace metals. Goldschmidt, Davos, Switzerland.

Hurtgen M.T., Halverson G.P., Swanson-Hysell N.L., Maloof A.C. (2008) Early Neoproterozoic sulfur isotopes and the rise (and fall) of oxygen. Annual American Geophysical Union Meeting, San Francisco, CA.

Pruss S.B., Hurtgen M.T., Knoll A.H. (2008) Geochemical insights into paleobiological patterns of the Middle-Upper Cambrian Port au Port Group, western Newfoundland. Annual American Geophysical Union Meeting, San Francisco, CA.

Swanson-Hysell N.L., Maloof A.C., Halverson G.P., Hurtgen M.T. (2008) Covariation of $\delta^{13}\text{C}_{\text{carb}}$ and $\delta^{13}\text{C}_{\text{org}}$ across the Neoproterozoic Bitter Springs Stage. Annual American Geophysical Union Meeting, San Francisco, CA.

*Adams D.D., Hurtgen M.T., Sageman B.B. (2008) Sulfur isotopes and iron chemistry: Constraining oceanic anoxic event 2 in the Late Cretaceous Western Interior Seaway. Crossroads Geology Conference at Indiana University, February 22, 2008.

- Reinhard C., Gilhooly W.P., Lyons T.W., Gill B.C., Planavsky N., and Hurtgen M. (2007) Trace metal cycling in meromictic Mahoney Lake, British Columbia: Implications for molybdenum burial in sulfidic environments. Geological Society of America annual meeting, Denver, CO.
- Gilhooly W.P., Reinhard C., Lyons T.W., Planavsky N.J., Gill B., and Hurtgen M.T. (2007) Stable isotopic composition of sulfate in meromictic Mahoney Lake and implications for the early ocean. Geological Society of America annual meeting, Denver, CO.
- Hurtgen M.T., Pruss S., Knoll A.H. (2006) Sulfur and carbon isotope systematics in Middle-Upper Cambrian Port au Port Group from western Newfoundland, Canada: Implications for seawater sulfate concentrations. Annual American Geophysical Union meeting, San Francisco, CA.
- Turchyn A.V., Hurtgen M.T., Schrag D.P., Lyons T. (2006) The oxygen isotope composition of carbonate-associated sulfate: Evaluating the efficacy of a relatively new paleoceanographic proxy. Annual American Geophysical Union meeting, San Francisco, CA.
- *Adams D.D., Hurtgen M.T., Sageman B.B., Flaum J. (2006) The sulfur isotope composition of carbonate-associated sulfate and pyrite from the middle Cretaceous Western Interior Seaway. Annual American Geophysical Union meeting, San Francisco, CA.
- Lyons T., Gill B., Balci N., Gilhooly W., Reinhard C., Bekker A., Planavsky N., Hurtgen M. (2006) Oxygen isotope composition of carbonate-associated sulfate and the sources and cycling of sulfate in the early ocean. Geological Society of America annual meeting, Philadelphia, PA.
- Flaum J.A., Sageman B.B., Meyers S.R., Hurtgen M.T. (2006) Causal mechanisms for OAE's III: The role of phosphorous? Geological Society of America annual meeting, Philadelphia, PA.
- Halverson G.P., Poitras F., Hurtgen M.T. (2006) Fe isotope composition of Neoproterozoic cap dolostones: implications for snowball seawater composition? Annual Goldschmidt Conference, Australia.
- Hoffman P.F., Halverson G.P., Husson J.M., Hurtgen M.T., Schrag D.P. (2006) Cap carbonate stratigraphy and ocean hyperstratification during meltdown of the Snowball/Slushball Earth in 635 Ma. Snowball Earth Conference 2006, Ascona, Switzerland.
- Sageman B.B., Barclay R.S., DeJtrakulwong P., Flaum J., Hurtgen M.T., McElwain J.C. (2006) Multi-proxy approach to understanding the initiation and termination of OAE II. EGU meeting in Vienna.
- Hurtgen M.T., Halverson, G.P., Arthur M.A., Hoffman P.F. (2005) Sulfur cycling in the aftermath of a Neoproterozoic (Marinoan) snowball glaciation: Evidence for a syn-glacial sulfidic deep ocean. Earth Systems Processes 2, Calgary, Alberta, Canada.
- Halverson G.P., Hoffman P.F., Hurtgen M.T. (2005) Ocean hyperstratification following the Marinoan (Neoproterozoic) glaciation. Earth Systems Processes 2, Calgary, Alberta, Canada.
- Lyons T.W., Hurtgen M.T., Gill B.C. (2005) New insight into the utility of carbonate-associated sulfate. Annual Goldschmidt Conference, Moscow, Idaho.

Hurtgen M.T., Arthur M.A., Halverson G.P. (2004) Neoproterozoic S isotopes, evolution of microbial S species and the burial efficiency of sulfide as sedimentary pyrite. Geologic Society of America annual meeting, Denver, CO.

Halverson G.P., Hoffman P., Dudas F., Bowring S.A., Maloof A.C. and Hurtgen M.T. (2004) Geochemical evidence for a stratified ocean after a Neoproterozoic (Marinoan) snowball glaciation. Geologic Society of America annual meeting, Denver, CO.

Hurtgen M.T., Arthur M.A. (2003) Neoproterozoic seawater sulfur isotopes and the evolution of microbial sulfur species. American Geophysical Union fall meeting, San Francisco, CA.

Hurtgen M.T., Arthur M.A., Halverson G.P. (2002) Constraining perturbations to the sulfur cycle in the aftermath of snowball Earth: Geochemistry of the Neoproterozoic Maieberg Formation, Namibia. Geologic Society of America annual meeting, Denver, CO.

Hurtgen M.T., Arthur M.A., Kump L.R. (2001) The sulfur isotopic composition of Neoproterozoic seawater sulfate. Geologic Society of America annual meeting, Boston, MA.

Hurtgen M.T., Arthur M.A., Suits N., Kaufman A.J., Prave A.R. (invited, 2001) The sulfur isotope composition of trace sulfate and pyrite associated with Neoproterozoic 'cap carbonates' from Namibia, South Australia and Death Valley, California, USA: Implications for a snowball Earth. Earth Systems Processes, Edinburgh, Scotland.

Ingall E.D., Clark L.L., Lyons T.W., Hurtgen M.T. (2000) Organic matter diagenesis in an anoxic fjord, Effingham Inlet (Vancouver Island, British Columbia). American Geophysical Union Ocean Sciences Meeting.

Hurtgen M.T., Arthur M.A., Suits N. (2000) The sulfur isotopic composition of Neoproterozoic seawater sulfate: Implications for a snowball Earth. Geologic Society of America annual meeting, Reno, NV.

Hurtgen M.T., Lyons T.W., Cruse A.M., Ingall E.D. (1998) The role of H₂S in iron sulfide transformations; examples from the Orca Basin and Effingham Inlet. Geologic Society of American annual meeting, Toronto, Ontario, Canada.

Hurtgen M.T., Lyons T.W., Cruse A.M., Ingall E.D., Clementz M.T. (1998) Pyrite formation and the anomalous persistence of FeS; a comparative study of the Orca Basin and Effingham Inlet. American Geophysical Union spring meeting, Boston, MA.

Hurtgen M.T., Lyons T.W., Cruse A.M., Ingall E.D., Clark L.L. (1997) Anoxia in sites of rapid accumulation: the modern paradigm for an under-recognized distinctive euxinic environment in the ancient record. Geologic Society of America annual meeting, Salt Lake City, UT.

PROFESSIONAL TALKS

Invited Speaker, Dept. of Geology and Geophysics, LSU, 1/2017

Invited Speaker, Dept. of Geological and Planetary Sciences, Caltech, 4/2013
 Invited Speaker, ISEN Climate Change Symposium, Northwestern University, 3/2012
 Invited Speaker, Dept. of Geoscience, University of Wisconsin, Madison, 2/2012
 Invited Speaker, Dept. of Geosciences, Smith College, 2/2012
 Invited Speaker, Dept. of Earth Sciences, University of Southern California, 2/2012
 Invited Keynote Speaker, Annual Research and Creativity Expo, SUNY Fredonia, 4/2011
 Invited Speaker, Dept. of Geoscience, SUNY Fredonia, 4/2011
 Invited Speaker, Astrobiology Program, University of Washington, 4/2011
 Invited Speaker, Dept. of Geosciences, Princeton University, 5/2009
 Invited Speaker, Dept. of Geology and Geophysics, Yale University, 11/2008
 Invited Plenary Speaker, Annual Astrobiology Conference, Santa Clara, CA, 4/2008
 Invited Speaker, Dept. of Geology, University of Cincinnati, 4/2008
 Invited Speaker, Dept. of the Geophysical Sciences, University of Chicago, 2/2007
 Invited Speaker, Dept. of Geology and Environmental Geosciences, N. Illinois University, 4/2006
 Invited Speaker, Dept. of Civil and Environmental Engineering, Northwestern University 3/2006
 Invited Speaker, Dept. of Earth and Environmental Sciences, University of Illinois, Chicago 3/2006
 Invited Speaker, Department of Earth and Atmospheric Sciences, Purdue University 3/2005
 Invited Speaker, Department of Geological Sciences, Arizona State University 3/2005
 Invited Speaker, Department of Geology and Geophysics, University of Minnesota, 3/2005
 Participant, NSF new Proxy Workshop, San Francisco, CA, 12/2005

FIELD EXPERIENCE

Research Cruises:

- Saanich and Effingham Inlets, Vancouver Island R/V Barnes, 5/1997
- Northern Gulf of Mexico EPA-OSV Anderson, 11/1997

Land-based expeditions:

- Flinders ranges South Australia Summer 1999, 2006, 2010
- Western Australia Summer, 2000
- Namibia Summer 2001, 2007, 2009
- Svalbard Summer, 2002
- Mackenzie Mountains, NWT, Canada Summer, 2003
- Victoria Island, Nunavut, Canada Summer, 2004
- Central Australia Summer, 2006, 2010
- Lake McCarrons, Minnesota Fall 2006, Summer 2007, 2009
- Mahoney and Green Lakes, British Columbia, Canada Summer, 2006
- Guerrero, Mexico Winter, 2008
- northern Italy/southern France Summer, 2011

TEACHING AND ADVISING

Courses taught:

Stable Isotope Geochemistry (GEOL 318/EARTH 312), Winter 2006, Fall 2008, Fall 2010, Winter 2013,
 Spring 2014, Fall 2015, Spring 2018, Winter 2020, Spring 2022

Format: lecture-style, using a combination of classic papers in stable isotope geochemistry, recent reviews by leaders in the field, and recently published works.

Climate Catastrophes in Earth History (GEOL 105/EARTH 105), Spring 2006, Winter 2007, Spring 2008, Spring 2009, Spring 2010, Winter 2011, Fall 2011, Spring 2013, Winter 2014, Fall 2014, Spring 2016, Spring 2017, Spring 2018, Spring 2021 (remote)

Format: lecture-style (three one-hour lectures).

Earth Systems History (EARTH 203), Winter 2011, Fall 2013, Spring 2017, Fall 2018, Fall 2019, Fall 2020 (remote), Fall 2021

Format: lecture-style course (Historical Geology).

Sedimentary Geology (GEOL 313/EARTH 330), Spring 2007, Spring 2009

Format: lecture-style.

Field Problems in Sedimentary Geology (EARTH 331), Summer/Fall 2007, Summer/Fall 2011, Summer/Fall 2018

Format: Spent nearly four weeks of Summer teaching a group of undergraduate and graduate students geological field techniques in Colorado and Utah. Once we returned, the class met twice a week for the Fall Quarter to discuss papers related to what was witnessed in the field.

Advanced Topics in Geochemistry—Marine Chemistry/Paleoceanography (EARTH 440), Fall 2009, Fall 2014, Winter 2017

Format: Discussion-based course.

Advanced Topics in Geochemistry—Math Modeling in Earth Sciences (EARTH 440), Spring 2010

Format: Discussion and lab-based course.