Katherine Haines Freeman

Department of Geosciences khf4@psu.edu

235 Deike Building office: (814)-863-8177

Pennsylvania State University fax: (814)-863-7823

University Park, PA 16802 home: (814)-237-2389

**Education**

Ph.D. 1991 Department of Geology, Indiana University, Bloomington, IN USA

M.S. 1989 Department of Geology, Indiana University, Bloomington, IN USA

B.A. 1984 *Cum laude*, Geology and Classical Civilization, Wellesley College, Wellesley, MA USA

**Professional Appointments**

2016-present Evan Pugh University Professor, Pennsylvania State University

2015-2016 Distinguished Professor of Geosciences, Pennsylvania State University

2013-presentCo-Editor*, Annual Review of Earth and Planetary Sciences*

2014-2016 Chair, Organic Geochemistry Division, Geochemical Society

2011 Crosby Lecturer, Dept. of Earth, Atmospheric and Planetary Sciences, MIT

2011 Visiting Faculty, Dept. of Biology and Geology & Geophysics, University of Utah

2010 Visiting Scientist, National Museum of Natural History, Smithsonian Institution

2004-2009 Associate Head for Graduate Programs and Research, Department of Geosciences,

 Pennsylvania State University

2003-2007 Director, Penn State Biogeochemistry Research Initiative in Education

2002 Guest Investigator, Woods Hole Oceanographic Institution (sabbatical visitor)

1999-2002 Associate Director, Penn State Biogeochemistry Research Initiative in Education, NSF-IGERT graduate student training program

1991-2015 Assistant, Associate and Professor of Geosciences, Pennsylvania State University

1991 Postdoctoral Associate, Skidaway Institute of Oceanography, Savannah, GA; Advisor: S.G. Wakeham

* 1. Graduate Research Assistant, Dept of Geology, Indiana University; Advisor: J. M. Hayes
1. Associate Instructor, Geologic Field Station, Indiana University
	1. Visiting Investigator, Carnegie Institution of Washington, Geophysical Laboratory; Advisor: Thomas C. Hoering

**Honors and Awards**

2013 Fellow, American Geophysical Union

2013 Elected to membership, the U.S. National Academy of Sciences

2012 Cozzarelli Prize, the U.S. National Academy of Sciences

2012 Heinz Lowenstam Science Innovation Award, European Association of Geochemistry

2011 Fellow, Geochemical Society and European Association of Geochemistry

2011 Fellow, American Academy of Microbiology

2010-2011 Fellow, John Simon Guggenheim Memorial Foundation

2007 Fellow, Geological Society of America

2001-2014 Fellow, Canadian Institute for Advanced Research, Earth System Evolution Program

1999 James Lee Wilson Medal in Sedimentology, SEPM, the Society for Sedimentary Geology

1997 The Peter Schenck Award, European Association of Organic Geochemists

1987 NASA Graduate Student Researchers Program Fellowship

1984 The Patricia Roberts Harris Fellowship

1983 The Sarah F. Langer Award, Wellesley College

*At The Pennsylvania State University:*

2013 The Wilson Award for Excellence in Research, College of Earth and Mineral Sciences

2008 Faculty Mentoring Award, College of Earth and Mineral Sciences

2004 The Wilson Award for Excellence in Teaching, College of Earth and Mineral Sciences

2002 Graduate Faculty Teaching Award, the Graduate School

**PUBLICATIONS**

Citation metrics from *ISI - Web of Science*: 7631 total citations, H-index = 44, n=156 items

**Papers in Refereed Journals**

1. Freeman K.H., Hayes J.M., Trendel J.M. and P. Albrecht (1990) Evidence from carbon-isotope measurements for diverse origins of sedimentary hydrocarbons. *Nature* **343**, 254-256.
2. Hayes J.M., Freeman K.H., Popp B.N. and C. Hoham (1990) Compound -specific isotopic analyses: A novel tool for reconstruction of ancient biogeochemical processes. In: *Advances in Organic Geochemistry 1989,* (B. Durand and F. Behar, eds.), *Organic Geochemistry* **16**, 1115-1128.
3. Lichtfouse E., Freeman K.H., Collister J.W. and Merritt D.A. (1991) Enhanced resolution of organic compounds from sediments by isotopic gas chromatography-combustion-mass spectrometry. *Journal of Chromatography* **585**, 177-180.
4. Freeman K.H. and Hayes J.M. (1992) Fractionation of carbon isotopes by phytoplankton and estimates of ancient CO2 levels. *Global Biogeochemical Cycles* **6**, 185-198.
5. Freeman K.H. and Wakeham S.G. (1992) Variations in the isotopic composition and concen-trations of alkenones in Black Sea particles and sediments. *Organic Geochemistry* **19**, 277-285.
6. Wakeham S.G., Freeman K.H., Pease T.K. and Hayes J.M. (1993) A photoautotrophic source for lycopane in marine water columns. *Geochimica Cosmochimica Acta* **57**, 159-165.
7. Freeman K.H., Wakeham S.G. and Hayes J.M. (1994) Predictive isotopic biogeochemistry: hydrocarbons from two anoxic marine basins, *Organic Geochemistry,* **21**, 629-644.
8. Ricci M.P., Merritt D.A., Freeman K.H. and Hayes J.M. (1994) Acquisition and processing data for isotope-ratio-monitoring mass spectrometry. *Organic Geochemistry* **21**, 561-572.
9. Freeman K.H., Boreham C., Summons R. and Hayes J.M. (1994) The effect of aromatization on the isotopic compositions of hydrocarbons during diagenesis. *Organic Geochemistry* **21**, 1037-1050.
10. Merritt D.A., Freeman K.H., Ricci M.P., Studley S.A. and Hayes J.M. (1995) Performance and optimization of a combustion interface for isotope-ratio-monitoring GCMS. *Analytical Chemistry* **67**, 2461-2473.
11. Filley T.R., Freeman K.H. and P.G. Hatcher (1996) Carbon isotope relationships between sulfide-bound steroids and proposed functionalized lipid precursors in sediments from the Santa Barbara Basin, CA. *Organic Geochemistry* **25**, 367-377.
12. Bidigare R.B., Fluegge A., Freeman K.H., Hanson K.L., Hayes J.M., Hollander D.J., Jasper J.P., King, L.L., Laws E.A., Milder J., Millero F.J., Pancost R.D., Popp B.N., Steinberg P.A. and S.G. Wakeham (1997). Consistent fractionation of 13C in nature and in the laboratory: Growth-rate effects in some haptophyte algae. *Global Biogeochemical Cycles* **11**, 279-292. (Errata: vol. 13, 251-252).
13. Dias R.F. and K.H. Freeman (1997). Carbon-isotope analyses of semivolatile organic compounds in aqueous media using solid-phase microextraction and isotope-ratio-monitoring GCMS. *Analytical Chemistry* **69**, 944-950.
14. Filley T.R., Filley R.M., Eser S. and K.H. Freeman (1997). Compound-specific isotope analyses of products from carbonization of a FCC decant oil doped with 13C-enriched 4-methyldibenothiophene. *Energy and Fuels* **11**, 637-646.
15. Pancost R.D., K.H. Freeman, S.G. Wakeham and C.Y. Robertson (1997). Controls on carbon isotope fractionation by diatoms in the Peru Upwelling Region. *Geochimica et Cosmochimica Acta* **61**, 4983-4992.
16. Canuel E.A., Freeman K.H. and S.G. Wakeham (1997). Isotopic compositions of lipid biomarker compounds in estuarine plants and surface sediments. *Limnology and Oceanography* **42**, 1570-1583.
17. Patzkowsky M.E., Suplik L.M., Arthur A.M., Pancost R.D. and K.H. Freeman (1997). Late Middle Ordovician environmental change and extinction: Harbinger of the Late Ordovician or continuation of Cambrian patterns? *Geology* **25**, 911-914.
18. Pancost R. D., Freeman K. H., Patzkowsky M. E., Wavrek D. A. and J. W. Collister (1998) Molecular indicators of redox and marine phytoplankton composition in the Late Middle Ordovician of Iowa, USA. *Organic Geochemistry* **29**, 1649-1662.
19. Huang Y., Freeman K. H., Eglinton T. I. and F. A. Street-Perrott (1999) δ13C analyses of individual lignin phenols in the lacustrine environment: a novel proxy for deciphering past terrestrial vegetation changes. *Geology* **27**, 471-474.
20. Pancost R.D., Freeman K.H. and S.G. Wakeham (1999). Controls on photosynthetic carbon-isotope fractionation in the Peru upwelling region. *Organic Geochemistry* **30**, 319-340.
21. Pagani M., Arthur M. A. and K. H. Freeman (1999) Miocene evolution of atmospheric carbon dioxide. *Paleoceanography* **14**, 273-292.
22. Pagani M., Freeman K. H. and M. A. Arthur (1999) Late Miocene atmospheric CO2 concentrations and the expansion of C4 plants. *Science* **285**, 876-879.
23. Bidigare R. R., Hanson K. L., Buesseler K., Wakeham S. G., Freeman K. H., Pancost R. D., Miller F. J., Steinberg P., Popp B. N., Latas M., Landry M. R. and E. A. Laws (1999) Iron-stimulated changes in 13C fractionation and export by equatorial Pacific phytoplankton: Toward a paleogrowth rate proxy. *Paleoceanography* **14**, 589-595.
24. Pancost R.D., Freeman K.H. and Patzkowsky M.E. (1999) Organic matter source variation and the expression of a Middle Ordovician carbon-isotope excursion. *Geology,* **27**, 1015-1018.
25. Pagani M., Freeman K. H. and M. A. Arthur (2000) Isotope analyses of molecular and total organic carbon from Miocene sediments. *Geochimica et Cosmochimica Acta* **64**, 37-49.
26. Pagani, M., Arthur M. A. and K. H. Freeman. (2000) Variations in Miocene phytoplankton growth rates in the southwest Atlantic: Evidence for changes in ocean circulation. *Paleoceanography* **15**, 486-476.
27. Huang Y., Freeman K. H., Wilkin R. T., Jones D. and M. A. Arthur (2000) Black Sea chemocline oscillations during the Holocene: Molecular and isotopic studies of marginal sediments. *Organic Geochemistry* **31**, 1525-1532.
28. Joachimiski M. M., Ostertag-Henning C., Pancost R. D, Strauss H., Freeman K. H., Littke R., Sinninghe Damste J. S. and G. Racki (2001) Water column anoxia, enhanced productivity and concomitant changes in δ13C and δ34S across the Frasnian-Famennian boundary (Kowala—Holy Cross Mountans, Poland). *Chemical Geology* **175**, 109-131.
29. Mandernack K. W., Kinney C. A., Coleman D., Huang Y. S., Freeman K. H. and J. Bogner (2000)The biogeochemical controls of N2O production and emission in landfill cover soils: the role of methanotrophs in the nitrogen cycle. *Environmental Microbiology* **2**, 298-309.
30. Franks S. G., Dias, R.F., Freeman K. H., Boles J. R., Holba A., Fincannon A.L. and E. D. Jordan (2001). Carbon isotopic composition of organic acids in oil field waters, San Joaquin Basin, USA. *Geochimica et Cosmochimica Acta*, **65**, 1301-1310.
31. Freeman K. H. and L. A. Colarusso (2001). Molecular and isotopic records of C4 grassland expansion in the late Miocene. *Geochimica et Cosmochimica Acta*, **65**, 1439-1454.
32. Rosell-Mele A. and 39 others (2001) Precision of the current methods to measure the alkenone proxy Uk37’ and absolute alkenone abundance in sediments: Results of an interlaboratory comparison study. *Geochemistry, Geophysics and Geosystems* 2, paper number 2000GC000141 [9416 words, 13 figures, 6 tables].
33. Huang Y., Street-Perrott F. A., Metcalfe S. E., Brenner M., Moreland M. and K. H. Freeman (2001) Climate change as the dominant control on Glacial-Interglacial variations in C3 and C4 plant abundance. *Science* **293**, 1647-1651.
34. Filley T. R., Freeman K. H., Bianchi T., Colarusso L. A. and P. Hatcher (2001) An isotopic biogeochemical assessment of shifts in organic matter input to Holocene sediments from Mud Lake, Florida. *Organic Geochemistry* **32**, 1153-1167.
35. Pavlov A. A., Kasting J. F., Eigenbrode J. L. and K. H. Freeman (2001). Organic haze in Earth’s early atmosphere: the source of low-13C late Archean kerogens? *Geology* **29**, 1003-1006.
36. Joachimski M. M., Pancost R. D., Freeman K. H., Ostertag-Henning and W. Buggisch (2002). Carbon isotope geochemistry of the Frasnian-Famannian. Palaeogeography, Palaeoclimatology, Palaeoecology **181**, 91-109.
37. Filley T. R., Freeman K. H., Wilkin R. T and P.G. Hatcher (2002) Biogeochemical controls on reaction of sedimentary organic matter and aqueous sulfides in Holocene sediments of Mud Lake, Florida. *Geochimica et Cosmochimica Acta,* **66**, 937-954.
38. Dias R.F., Freeman K.H. and Franks S.G. (2002) Gas chromatography-pyrolysis-isotope ratio mass spectrometry: A new method for investigating intramolecular isotopic variation in low molecular weight organic acids. *Organic Geochemistry* **33**, 161-168.
39. Dias, R.F. , Freeman, K. H., Lewan, M. D., Franks, S. G. (2002) δ13C of low-molecular-weight organic acids generated by the hydrous pyrolysis of oil-prone source rocks. *Geochimica et Cosmochimica Acta* **66**, 2755-2769.
40. Pagani M., Freeman K. H., Ohkouchi N. and K. Caldeira (2002) Comparison of water column [CO2aq] with sedimentary alkenone-based estimate: A test of the alkenone-CO2 proxy. *Paleoceanography* **17**, 1069-1081.
41. Ono, S., Eigenbrode, J.L., Pavlov, A.A., Kharecha, P., Rumble, D., Kasting, J.F. and K. H. Freeman (2003). Sulfur isotopic constraints on the Archean atmosphere and ocean. *Earth and Planetary Science Letters* **213**, 15-30.
42. Sheridan P. P., Freeman K. H., and J. E. Brenchley (2003). Estimated minimal divergence times of the major Bacterial and Archeaeal phyla. *Geomicrobiology Journal.* **20**, 91-109.
43. Pedentchouk, N., Freeman K. H., Harris, N. B., Clifford D. J. and K. Grice (2004) Sources of alkylbenzenes in Lower Cretaceous lacustrine source rocks, West African rift basins. *Organic Geochemistry* **35**, 33-45
44. Ono, S., Eigenbrode, J.L., Pavlov, A.A., Kharecha, P., Rumble, D., Kasting, J.F. and K. H. Freeman (2003) Sulfur isotopic constraints on the Archean atmosphere and ocean. *Earth and Planetary Science Letters* **213**, 15-30.
45. Harris N.B., Freeman K.H., Pancost R. D., White T.S. and G.D. Mitchell (2004) The character and origin of lacustrine source rocks in the Lower Cretaceous synrift section, Congo Basin, west Africa.  *AAPG Bulletin* **88**, 1163-1184
46. Pearson A., Huang Z., Ingalls A.E., Romanek C.S., Wiegel J., Freeman K. H., Smittenberg R.H. and C.L. Zhang (2004) Nonmarine crenarchaeol in Nevada hot springs *Applied and Environmental Microbiology* **70**, 5229-5237.
47. Felipe M.A., Kubicki J. D. and K. H. Freeman (2005) A mechanism for carbon isotope exchange between aqueous acetic acid and CO2/HCO3-: an *Ab Initio* study. *Organic Geochemistry* **36,** 835-850.
48. Moran J. J., House C. H., Freeman K. H. and J. G. Ferry (2005) Trace methane oxidation in Euryarchaeota. *Archea* **1,** i-vii.
49. **Pagani M., Zachos J. C., Freeman K. H., Tipple B. and S. Bohaty (2005) Marked Decline in Atmospheric Carbon Dioxide Concentrations During the Paleogene** *Science*, 309: 600-603.
50. **Wing S. L., Harrington G. J., Smith F. A., Bloch, J. I., Boyer D. M. and K. H. Freeman (2005) Transient floral change and rapid global warming at the Paleocene-Eocene boundary. *Science* 310, 993-996.**
51. **Smith F. A. and K. H. Freeman (2006)** Influence of physiology and climate on δD of leaf wax *n*-alkanes from C3 and C4 grasses. *Geochimica et Cosmochimica Acta*. **70**(5): 1172-1187.
52. Pedenchouk N., Freeman K. H. and N. B. Harris. (2006) Hydrogen isotopic composition of organic matter from the Lower Cretaceous Lacustrine Gabon Basin. *Geochimica et Cosmochimica Acta* **70**(8): 2063-2072.
53. Eigenbrode J. L. and K. H. Freeman (2006) The rise of Late Archean aerobic microbial ecosystems. *Proc. Nat. Acad. Sci.* **103**, 15759-15764.
54. Turich C. H., Freeman K. H., Bruns M. A., Conte M., Jones A. D. and S. G. Wakeham (2007) Marine Archea lipid distributions: Patterns and provenance in the water column and sediments. *Geochimica et Cosmochimica Acta*, **71**, 3272-3291.
55. Moran J.J., House C. H. and K.H. Freeman (2007) Products of trace methane oxidation during non-methylotrophic growth by *Methanosarcina*. *J. Geophys. Res. Biogeosciences*. 112 (G2):G02011
56. Smith F. A., Wing S. and K. H. Freeman (2007) Carbon and hydrogen isotope compositions of plant lipids during the PETM as evidence for the response of terrestrial ecosystems to rapid climate change. *Earth and Planetary Science Letters* **262** (1-2): 50-65.
57. Wakeham S. G., Amann R., Freeman K. H., Hopmans E. C., Jorgensen B. B., Putnam I. F., Schouten S., Sinninghe Damste J. S., Talbot H. M.and D. Woebken (2007) Microbial ecology of the stratified water column of the Black Sea as revealed by a comprehensive biomarker study. *Organic Geochemistry* **39**, 2070-2097.
58. Moran J., Ventas, J., Beal, E., Orphan V., Freeman K. H. and C.H. House (2008) Methyl sulfides as intermediates in the anaerobic oxidation of methane. *Environmental Microbiology* **10** (1), 162–173.
59. Moran J.J., House C. H., Vrentas J. and K. H. Freeman (2008) Methyl sulfide production by a novel carbon monoxide metabolism in *Methanosarcina acetivorans. Applied and Environmental Microbiology* **74,** 540-542.
60. Turich, C.H., Freeman, K.H., Jones, A.D. , Bruns, M.A., Conte, M. and S.G. Wakeham (2008) Reply to the Comment by S. Schouten, M. van der Meer, E. Hopmans, and J.S. Sinninghe Damsté on “Lipids of marine Archaea: Patterns and provenance in the water column” G*eochimica et Cosmochimica Acta* **72**, 21, 1 November 2008, Pages 5347-5349
61. Junium C.K., Mawson D.H., Arthur M.A., Freeman K.H and B.J. Keely (2008) Unexpected occurrence and significance of zinc alkyl porphyrins in Cenomanian-Turonian black shales of the Demerara Rise. Organic Geochemistry **39**, 1081-1087
62. Eigenbrode J. L., Freeman K. H. and Summons R. E. (2008) Methylhopane biomarker hydrocarbons in Hamersley Province sediments provide evidence for Neoarchean aerobiosis. *Earth and Planetary Science Letters* **273**, 323-331.
63. Polissar, P. J., Fulton J., Turich C. H. and K. H. Freeman (2009) Measurement of 13C and 15N isotopic compositions on nanomolar quantities of organic materials. *Analytical Chemistry* **81**, 755-763
64. Thomas, R. B., Freeman K. H. and Arthur M.A. (2009) Intramolecular carbon isotopic analysis of acetic acid by direct injection of aqueous solution. Organic Geochemistry 40, 195-200*.*
65. Schouten S. and 28 others (2009) An interlaboratory study of TEX86 and BIT analysis using high-performance liquid chromatography-mass spectrometry. *Geochem. Geophys. Geosys.* 10, Art. No. Q03012Mar2012009
66. Polissar P. J., Freeman K. H., Rowley D. B., Smith F. A. and B. Currie (2009). Paleoaltimetry of the Tibetan Plateau from D/H Ratios of Lipid Biomarkers. *Earth and Planetary Science Letters* 287 (1), p.64-76.
67. Czaja A. D., Johnson, C. M., Beard, B. L., Eigenbrode, J. L., Freeman, K. H. and Yamaguchi K. E. (2010) Iron and carbon isotope evidence for ecosystem and environmental diversity in the ~2.7 to 2.5 Ga Hamersley Province, Western Australia. *Earth and Planetary Science Letters* **292**, 170-180.
68. Diefendorf, A.F., Mueller, K.E., Wing, S.L., Koch, P.L. and Freeman, K.H., (2010). Global patterns in leaf 13C discrimination and implications for studies of past and future climate. *Proceedings of the National Academies of Science*, **107,** 5738-5743.
69. Mueller, K.E., Diefendorf, A.F., Freeman, K.H., and Eissenstat, D.N., (2010) Appraising the roles of nutrient availability, global change, and functional traits during the angiosperm rise to dominance. *Ecology Letters,* **13**, E1-E6.
70. Polissar P. J. and Freeman K. H. (2010) Effects of aridity and vegetation on plant-wax δD in modern lake sediments. *Geochimica et Cosmochimica Acta*, **74**, *5785-5797*
71. McInerney F. A., Helliker B. R. and K. H. Freeman (2011). Hydrogen isotope ratios of leaf wax n-alkanes in grasses are insensitive to transpiration. *Geochimica et Cosmochimica Acta*. **75***, 541-554.*
72. Freeman K. H., Mueller K. E., Diefendorf, A. F., Wing, S. L. and P. L. Koch (2011) Clarifying the influence of water availability and plant types on carbon isotope discrimination by C3 plants. Letter, *Proceedings of the National Academies of Science* **108**, E59-E60
73. Turich C. H. and K. H. Freeman (2011) Archaea lipids record paleosalinity in hypersaline conditions. *Organic Geochemistry* **42**, 1147-1157
74. Junium, C.K., B.J., Keely, K.H., Arthur, M.A., Freeman (2011) Chlorins in mid-Cretaceous black shales of the Demerara Rise: the oldest known occurrence. Organic Geochemistry **42**, 856-859

1. Meyer K.M., Macalady J. L., Fulton J. M., Kump L.R., Schaperdoth I., K.H. Freeman (2011) Carotenoid biomarkers as an imperfect reflection of the anoxygenic phototrophic community in meromictic Fayetteville Green Lake. *Geobiology***9**, 321-329.
2. Diefendorf A. F., Freeman K. H., Wing S. L. and H. V. Graham (2011) Production of n-alkyl lipids in living plants and implications for the geologic past. *Geochimica et Cosmochimica Acta* **75**, 7472-7485.
3. Cui Y. Kump L. R., Ridgwell A. J., Charles A. J., Junium C. K., Diefendorf A. F, Freeman K. H., Urban N. M. and Harding I. C. (2011) Slow release of fossil carbon during the Palaeocene-Eocene Thermal Maximum. *Nature Geosciences* **4**, 481-485.
4. Cui Y., Kump L. R., Ridgwell A. J., Charles A. J., Junium C. K., Diefendorf A. F., Freeman K. H., Urban N. M. and I. C. Harding (2012) Reply to 'Constraints on hyperthermals.' *Nature Geoscience* **5**, 231–232
5. Medeiros P.M., Sikes E. L., Thomas B. and K. H. Freeman (2012) Flow discharge influences on input and transport of particulate and sedimentary organic carbon along a small temperate river. *Geochimica et Cosmochimica Acta* **77**, 317-334.
6. Jones D. S., Albrecht H. L., Dawson K. S., Schaperdoth I., Freeman K. H., Pi, Y., Pearson A. and J. L. Macalady (2012) Community genomic analysis of an extremely acidophilic sulfur-oxidizing biofilm. *The ISME Journal* **6,** 158–170.
7. Diefendorf A. F., Freeman K. H. and S. L. Wing (2012). Diterpenoids and Triterpenoids in Temperate C3 Trees. *Geochimica et Cosmochimica Acta* **85**, 342-256.
8. Sachse D., White J., Kahmen A., Dawson T., West J. B., Sessions A., van der Meer M., Chikaraishi Y., Schmidt H.-L., Feakins S., Robins R., McInerney F., Pedentcouk N., Magill C., Freeman K. H. and Polissar P.J. (2012) Sources of variability in the hydrogen isotopic composition of organic compounds from photosynthetic organisms. *Annual Reviews in Earth and Planetary Sciences* **40**, in press (available online 3/2012).
9. Fulton, J., Arthur M. A. and K. H. Freeman (2012) Black Sea nitrogen cycling and the preservation of phytoplankton δ15N signals during the Holocene. *Global Biogeochemical Cycles* **26**, GB2030, doi:10.1029/2011GB004196
10. Algeo T., Henderson C., Ellwood B., Rowe H., Elswick E., Bates S., Lyons T., Hower J. C., Smith C., Maynard B., Hays L., Summons R. E., Fulton J. M. and K. H. Freeman (2012). Elevated sediment fluxes in the Sverdrup Basin prior to the end-Permian mass extinction: A link to Siberian Traps volcanism? *GSA Bulletin* **124**, 1424-1448.
11. Mueller K. E., Polissar P. J., Oleksyn J. and K. H. Freeman (2012). Plant lipid biomarkers in leaves, roots, and soils of eleven temperate tree species. *Organic Geochemistry* **52**, 130-141.
12. Dawson K. S., Freeman K. H. and J. L. Macalady (2012). Molecular characterization of lipids from halophilic archaea grown under different salinity conditions. *Organic Geochemistry* **48,** 1–8.
13. Fulton J. M., Arthur M. A. and K. H. Freeman (2012). The cyanobacterial biomarker scytonemin in the Holocene Black Sea. *Organic Geochemistry* **49**, 47-55.
14. Pancost R.D., Freeman K. H., Hermann H. D., Patzkowsky M. E., Ainsaar, L. and T. Martma (2013) Reconstructing Late Ordovician carbon cycle variations. *Geochimica et Cosmochimica Acta* **105**, 433–454.
15. Magill C., Ashley G. M. and K. H. Freeman (2013) Ecosystem variability and early human habitats in eastern Africa. Proceedings of the National Academy of Sciences 110 (4), 1167-1174.
16. Magill C., Ashley G. M. and K. H. Freeman (2013) Water, plants and early human habitats in eastern Africa. Proceedings of the National Academy of Science 110 (4), 1175-1180.
17. Kennett D. J., Hajdas I., Culleton B. J., Belmecheri S., Martin S., Neff H., Awe J., Graham H. V., Freeman K. H., Newsom L., Lentz D. L., Anselmetti F. S., Robinsom M., Marwan N., Southon J., Hodell D. A. and G. H. Haug (2013) Correlating the Ancient Maya and Modern European Calendars with High-Precision AMS 14C Dating. *Nature Scientific Reports,* 3, article 1597.
18. Close H. G., Shah S. R., Ingalls A. E., Diefendorf A. F., Brodie E. L., Hansman R. L., Freeman K. H., Aluwihare L. I. and A. Pearson (2013) Export of submicron particulate organic matter to mesopelagic depths in an oligotrophic gyre, *PNAS*, 110 (31), 12565-12570
19. Dawson S. K., Schaperdoth I., Freeman K. H. and J. L. Macalady (2013) Anaerobic biodegradation of the isoprenoid biomarker analogues pristane and phytane. *Organic Geochemistry* 65, 118-126.
20. Mueller K.E., Eissenstat D.M., Muller C.W., Oleksyn J., Reich P.B. and K.H. Freeman (2013) What controls the concentration of various aliphatic lipids in soil?  *Soil Biol. and Biochem*. 63, 14-17.
21. Belmecheri S., Maxwll S.R., Taylor, A., Davis K. Freeman K.H., Munger, W. (2014) Tree-ring δ13C tracks flux tower ecosystem productivity estimates in a NE temperate forest. *Environment Research Letters* **9**, 074011.
22. Diefendorf A.F., Freeman K.H., Wing S.L. (2014) A comparison of terpenoid and leaf fossil vegetation proxies in Paleocene and Eocene Bighorn Basin sediments. *Organic Geochemistry* **71**, 30-42.
23. Graham H. V., Patzkowsky M. E., Wing S. L., Parker G.G. Fogel M. L. and K. H. Freeman (2014). Isotopic characteristics of canopies in leaf assemblages. *Geochimica et Cosmochimica Acta*, **144**, 82-95.
24. Junium C.K., Freeman K.H., Arthur M.A. Interpreting nitrogen isotope signatures during Oceanic Anoxic Events: Lessons from OAE2. *SEP Interpretations*, accepted.
25. Junium C.K., Freeman K.H., Arthur M.A. (2015) Controls on the stratigraphic distribution and nitrogenisotopic composition of zinc, vanadyl and free base porphyrins through Oceanic Anoxic Event 2 at Demerara Rise, *Organic Geochemistry* **80**, 60-71.
26. Junium, C.K., Arthur, M.A., Freeman K.H. (2015) Compound-specific delta N-15 and chlorin preservation in surface sediments of the Peru Margin with implications for ancient bulk delta N-15 records. *Geochim. Cosmochim. Acta* **160**, 306-318.
27. Magill C., Denis E. and K. H. Freeman (2015) Rapid sequential separation of sedimentary lipids via selective accelerated solvent extraction. *Organic Geochemistry* **88**, 29-34.
28. Magill C., Ashley G. M., Domingues-Rodrigo M. and K. H. Freeman (2016) Dietary options and behavior suggested by plant biomarker evidence in an early human habitat. *Proc. Nat. Acad. Sciences* **113**, 2874-2879.
29. Henderson A. K., Graham H., Magill C. R., Fox D., Patzkowsky M. E. and K. H. Freeman. Angiosperm n-alkane distribution patterns and the geologic record of C4 grasslands. *Geochimica et Cosmochimica Acta*, in revision.
30. Diefendorf A.F., Freeman K.H., Wing S.L., Currano E.D., Mueller K.E. (2015) Paleogene plants fractionated carbon isotopes similar to modern plants. *Earth Planet. Sci. Let.* **429**, 33-44.
31. Currie, B.S., Polissar P.J. Rowley D.B., Ingals M., Li, S.Y., Olack G., Freeman K.H. (2016) Multiproxy paleoaltimetry of late Oligocene-Pliocene Oiyug Basin, Southern Tibet. *Amer. J. Sci.* **316**, 401-436.
32. Baczynski A.A., McInerney F. A., Wing S.L., Kraus M.J., Morse P.E., Bloch J.I., Chung A. H., Freeman K.H. (2016) Distortion of carbon isotope excursion in bulk soil organic matter during the Paleocene-Eocene thermal maximum. *Geol. Soc. of Amer. Bull.* **128**, 1352-1366.

**Book Chapters (Refereed)**

1. Freeman D.H., Angelese R.M., Freeman K.H., Hoering T.C., Flynn J.S., Lango T.A. and Homanay-Preyer T.C. (1987) Group isolation of nickel and vanadyl porphyrins from crude oil using macrporous silica gel. A.C.S. Symposium Series: *Metalloporphyrins and metal complexes in petroleum source rocks*. H.Filby and J.F. Branthaver,eds.
2. Pancost R.D., K.H. Freeman and M.A. Arthur (1997). The Organic Geochemistry of the Cretaceous Western Interior Seaway through the Cenomanian-Turonian interval. In: Stratigraphy and Paleoenvironments of the Cretaceous Western Interior Seaway, USA, Concepts in Sedimentology and Paleontology, 6 (W. Dean, M.A Arthur, eds) 173-188.
3. Freeman K. H. (2001) Isotopic biogeochemistry of marine carbon. In: *Stable Isotope Geochemistry* (J. W. Valley and D. R. Cole, eds.), Reviews in Mineralogy and Geochemistry, volume 43, 579-605.
4. Freeman, K. H. and Pagani M. (2005) Alkenone-based estimates of past CO2 levels: A consideration of their utility based on an analysis of uncertainties. In: Ehleringer J., Cerling T. and Dearing D. (eds). *A history of atmospheric CO2 and its implications for plants, animals, and ecosystems.* American Geophysical Union, pages 55-78.
5. Freeman K. H. and Pancost R. D. (2014) Biomarkers for terrestrial plants and climate. In: Organic Biogeochemistry, Treatise on Geochemistry (Falkowski and Freeman, eds), Elsevier.

###### Book Editorships

1. Yelcin N., Derrine S., Farrimond P. Freeman K. H., Littke R., Maxwell J., Requejo R., Welhelms, A. (2001) Advances in Organic Geochemistry 1999, Proceedings of the International Meeting of Organic Geochemists, Istanbul, Turkey. Published as special volumes of *Organic Geochemistry*, Pergamon Press.
2. Falkowski P. and Freeman K. H. (2014) Organic Biogeochemistry, Treatise on Geochemistry, K. K. Turekian and H.D. Holland, series editors; Elsevier.

**Undergraduate, Master and Doctoral Theses**

1. Freeman, K. H. (1984) Chromatographic Isolation of Petroporphyrins: A Sample Preparative Sequence. Honors Thesis, Wellesley College, 97 pp.
2. Freeman K. H. (1989) Isotopic Composition of Individual Compounds in the Messel Shale (Eocene). Master thesis, Indiana University, 58 pp.
3. Freeman K. H. (1991) The Carbon Isotopic Compositions of Individual Compounds from Ancient and Modern Depositional Environments. Doctoral dissertation, Indiana University, 146 pp.

###### Book Reviews and Other Publications (Non-refereed)

1. Freeman K.H. (1987) Introduction of T.C. Hoering for the 1987 Alfred E. Triebs Award. *Geochimica et Cosmochimica Acta*, **52**, 944-945.
2. Freeman, K.H. (1995) Review of Organic Geochemistry, Principles and Applications (M. Engel and S. Macko, eds.), Plenum Press, New York, 861 pp., for *Journal of Sedimentary Geology* (formally *Journal of Sedimentary Petrology),* January, 1995.
3. Freeman K.H. (1997) A new look at old carbon. *Science* **277**, 777-778. [Perspective article on paper by Eglinton *et. al., Science* **277**, 796(1997).]
4. Freeman K.H. (1998) Review of Organic Acids in Geologic Processes (E.D. Pittman and M.D. Lewan, eds.) Springer-Verlag Press, New York, 482pp., for *Geochimica et Cosmochimica Acta*, **62** (4), 730-731.
5. Freeman K. H. (2004) Citation for presentation of the 2003 Distinguished Service Award to Hubert L. Barnes. *Geochimica et Cosmochimica Acta* **68**, 1967.
6. Summons R.E., Freeman K.H., Grice K. et al., (2008) Where would we be without the isotopes? Organic Geochemistry 39, 483-484
7. Freeman, K.H. (2009) Bounty from Biomarkers. Review of Echoes of Life: What Fossil Molecules Reveal about Earth History, *Science* **323**, 879.
8. Freeman, K.H. (2009) A biogeochemist ponders muddy molecules and past climates. *Nature* 462: 701 (Research Highlights, Journal Club).
9. Jeanloz R. and Freeman K.H. (2014) Annual Review of Earth and Planetary Sciences Volume 42, 2014 Introduction. *AREPS* **42**, v-viii.
10. Freeman K.H. (2014) Controls on isotopic gradients in rain. News & Views, *Nature* 516: 41-42.
11. Baker P.A., Fritz S.C., Silva C.G., Rigsby C.A., and 26 others (2015) Trans-Amazon Drilling Project (TADP): Origins and evolution of the forests, climate, and hydrology of the South American tropics. *Scientific Drilling* **20**, 41-49.
12. Freeman K.H. (2016) Geoffrey Eglinton (1927-2016) *Nature* **532**, 314.

**Published Reports (Reviewed)**

1. Jordan, T. et al. (2001) Basic Research Opportunities in Earth Science. (A report to the NRC recommending funding opportunities for NSF-Earth Sciences.) National Academy Press, 154 pp.
2. Sachs J. P., Schneider R. R., Eglinton T. I., Freeman K. H., Ganssen G., McManus J. F. and D. W. Oppo (2000) Alkenones as paleoceanographic proxies. *Geochemistry Geophysics Geosystems* (G3) **1**, 13 p. (paper # 2000GC000059). Report from a workshop on alkenone-based paleoceanographic indicators, Woods Hole Oceanographic Institution, October 1999.
3. Lunine J. I. et al. (2003) Life in the Universe, an Assessment of U.S. and International Programs in Astrobiology. (A report to the Space Studies Board, NRC) The National Academy Press, 48pp.
4. Freeman K. H. and M. Goldhaber (2011) Future Directions in Geobiology and Low-Temperature Geochemistry, NSF-sponsored workshop report. *Elements*, 7(2) 138-139 (abridged).
5. Freeman K. H. and M. Goldhaber (2011) Future Directions in Geobiology and Low-Temperature Geochemistry, NSF-sponsored workshop report. (Full version)
6. Montanez I. P. et al. (2011) Understanding Earth’s Deep Past: Lessons for our Climate Future (A report to the NRC by the Committee on the Importance of Deep-Time Geological Records for Understanding Climate Change Impacts.) National Academy Press, 194.
7. Dietl G., Kidwell, S., Brenner M., Durney D., Flessa K., Jackon S., Koch P. (Writing Committee), Freeman K. H., Hadly E., Jablonski D., McGill B. (Consulting Authors) (2012) "Conservation Paleobiology: Opportunities for the Earth Sciences" A report on an NSF-Sponsored workshop. http://www.conservationpaleobiology.org

**EDUCATION, TEACHING AND RESEARCH TRAINING**

**Supervision of Graduate Student Research**

 ***Past Students***

*As major advisor:*

Richard Pancost Ph.D. (Geosciences) 1998 Professor, University of Bristol

Lee Colarusso M.S. (Geosciences) 1998 MFG Sheppard Miller

Francis Cooper M.S. (Geosciences) 1995 Software engineer, Geosoft

Robert Dias Ph.D. (Geosciences) 2000 U.S.G.S., Denver

Melinda Foland M.S. (Geosciences) 2001 Engineer, ThermoFisher

Kenneth McRowe M.S. (Geosciences) 2003 Consulting hydrologist

Nicolai Pendentchouk Ph.D. (Geosciences) 2004 RCUK Fellow, Univ. of East Anglia

Jennifer Eigenbrode Ph.D. (Geosciences) 2004 Scientist, NASA Goddard

Courtney Turich Ph.D. (Geosciences) 2006 ConocoPhillips

Kristine Nielson M.S. (Geosciences) 2006 Ph.D. student, Purdue University

James Moran Ph.D. (Geosciences) 2007 Scientist, Pacific Northwest Natl. Lab Katja Meyer Ph.D. (Geosciences) 2008 Postdoc, Stanford Univ.

Aaron Diefendorf Ph.D. (Geosciences) 2010 Asst. Professor, U. Cincinnati

Heidi Albrecht Ph.D. (Geosciences) 2011 Shell Oil

Katherine Dawson Ph.D. (Geosciences) 2011 Assist. Prof. Rutgers

Clayton Magill Ph.D. (Geosciences) 2013 Lecturer, Hariott-Watt

Heather Graham Ph.D. (Geosciences) 2014 Research Scientist, NASA

Angela Chung M.S. (Geosciences) 2015 PhD student, Univ. Pittsburgh

Christine Doman M.S. (Geosciences) 2015 employed with an environmental non-profit

Elizabeth Denis Ph.D. (Geosciences) 2016 Postdoc, PNNL

Laurence Bird Ph.D. (Geosciences) 2016 Postdoc, Caltech

*As co-advisor or research supervisor:*

Timothy Filley Ph.D. (Geosciences) 1997 Professor, Purdue University

Daniel McKinney Ph.D. (Fuel Sciences) 1998 Shell Oil

Mark Pagani Ph.D. (Geosciences) 1998 Professor, Yale University

Mark Strynar Ph.D. (Soil Science) 2002 Researcher, U.S. EPA

Jamie Fulton Ph.D. (Geosciences) 2010 Postdoc, WHOI

Christopher Junium Ph.D. (Geosciences) 2010 Assitant Professor, Syracuse University

Kevin Mueller Ph.D. (Ecology) 2011 Postdoc, Univ. Minnesota

***Current students***

Laura Herren M.S. (Geosciences) (2013-present)

Shelby Lyons Ph.D. (Geosciences (2015-present)

Allison Karp Ph.D. (Geosciences) (2015-present) passed cand. exam 9/2016; NSF fellow

Allison Fox Ph.D. (Geosciences) (2016-present)

#### Supervision of Postdoctoral Scholars

Hiroshi Naraoka, 2/96-12/96 (supported by Japanese Government); Tokyo University

Yongsong Huang 1/97-12/99(supported by grants to Freeman and Arthur); Brown University

Andy Zimmerman 7/00-02 (supported by IGERT-BRIE; Brantley Freeman); Univ. Florida

Gary Icopini 7/00-01 (supported by IGERT-BRIE; Brantley, Freeman)

Francesca (Smith) McInerney 8/02-2006 (supported by BRIE, Smithsonian Institution and Freeman), University of Adelaide

Pratigya Polissar 1/05-2008 (supported by Freeman via CIFAR awards to Freeman, D. Rowley, U. Chicago, S. Willett, ETH), LDEO, Columbia University

Anna Henderson 2010-2012 (supported by CIFAR; Freeman and S. Cowling); Planning Director Climate and Energy, State of Minnesota

Sara Lincoln 2013-present (supported by C-IMAGE award to Freeman)

Allie Baczynski 2014-present (supported by NASA award to Freeman)

**Visiting Scholars**

Michael Joachimski 5/97-7/97 (supported by German Government)

Larissa Dsikowitzky 5/00-6/00 (supported by German Government)

Ros Rickaby 12/00 (supported by Harvard University)

Thomas Kuhn 1-2/01; 9-11/01; 2/02; 11/02 (supported by German Government)

Lidia Katarzyna Trocha 2011-2013 (supported by Freeman and D. Eissenstat)

Rosemary Bush 2011 visiting student from Northwestern University

Allie Baczynski 2011 visiting student from Northwestern University

Kendra Chritz 2011-2012 visiting student from University of Utah

Abigail Rooney 2012 visiting student from Trinity College, Dublin, Ireland

Sarah Enders 2012 visiting student from University of California at Davis

Ross Williams 2013 visiting student from MIT

Thomas Elliott Arnold 2014 visiting student from University of Florida

**Supervision of Undergraduate Research**

*One-semester projects*

Ryabtseva, M.A., 1992, A study of Oil Spills

Sunderland, T., 1993, Biological Effects of Oil Spills in the Marine Environment

Hosterman, J., 1993, Transport and Microbial Degredation of Halogenated Organic Compounds in the Subsurface

Bogle, C, 1994, Humic Substances: Structure, Transformations and Interactions with Contaminants

Cuno, C., 1994, Detoxification and Removal of BTEX Compounds from Unsat-urated Zones and Groundwater Sources

Voght, E., 1995, Legislation, Assessment and Remediation of Sites Contaminated with Petroleum Hydrocarbons

Darcy, J., 1996, The Origins of life at Hydrothermal Vents (J. Kastings, advisor)

Harvey, M., 1996, Acid Rain and Its Effects on Aquatic Ecosystems

*Senior and Honors Theses (Two-semester projects)*

Follweiler, D., 1994, Compound-Specific Isotope Analyses of Plants and Sediments from Mud Lake, Florida. Honors Thesis in Chemistry

Laukonen, K., 1997, Century-Long Sediment Record of Golf Course Herbicide Applications, Green Lake, Fayetteville, N.Y. Honors Thesis in Geosciences

Sandomenico, T., 1997, Caffeine and Other Organic Tracers of Sewage in Soils and Groundwaters Associated with the Living Filter Project, State College, PA. Senior Thesis in Geo-Environmental Engineering

Moreland, M., 1999, Isotopic Records of Ecosystem Shifts in Tropical Lakes. Senior Thesis in Geosciences

Potisk, S. (2004). Isotopic analyses of microbial RNA monomers. Senior Thesis in Geosciences

Beausang, D.H. (2005) Spatial associations between climate and leaf wax n-alkanes from C3 and C4 grasses. Honors thesis in Geography.

Thornburg, J. (2006) The Younger Dryas transition observed in lacustrine sediments from Castor Lake, Washington. Senior Thesis in Geosciences

Galligan, K. (2009) Carbon and hydrogen isotopic compositions of plants past and present.

Sayles, Masoud (2010) Carbon sequestration in forest soils and the effects of tree species on soil organic matter.

Tavalavage, Annie (2012) Lipid biomarkers in sedge specimens.

Pederson, Eric (2013) Organic carbon in Eocene soils.

*Summer student project supervision*

D. Beausang (2003, 2004), S. Harman (2003), S. Potisk (2003), A. Kleinhesselink (2004), D. Zemirah (2004); J. Thornburg (2004-2005); K. Galligan (2004-2005; 2007-2008); N. Patel (2009); N. Rivera (2009); P. Crooks (2009); J. Harris (2010); E. Pederson (2013); A. Tamalavage (2013); Robert Smith (2014); Safiya Alphius (2016-present); Ellen Polites (2016-present)

**Technical Staff Supervised & Supported**

Denny Walizer, Senior Research Assistant 1991-present

Margaret Ricci, Senior Research Assistant 1996-2002

Robert Burfield Research Assistant 1997-1998

Gabriel Montemurro, Research Assistant 1997-1999

Tracy Michelle Henniger, Research Assistant 2001-2004

Pratigya Polissar, part-time technician 2002-2005

Chris Lernihan, Research Assistant 2002-2006

Nevin Whitman, Laboratory Assistant Summer 2007

Laurie Eccles 2010-2013

**Courses Taught (all at Penn State University)**

### Semester Course # Title Enrollment

Spring 1992 Geosc 454 Geology of Oil and Gas (80%) 24

 Geosc 497 Marine Biogeochemistry (33%) 6

Fall 1992 Geosc 419 Organic Geochemistry (50%) 10

Spring 1993 Geosc 454 Geology of Oil and Gas 15

 Earth 002 Gaia--The Earth System 60

 Geosc 597a Hydrosciences Colloquium 2

Fall 1993 Geosc 419 Organic Geochemistry of Natural Waters & Sediments 15

Spring 1994 Geosc 454 Geology of Oil and Gas (10%) 13

 Geosc 497c Marine Biogeochemistry (33%) 9

 Earth 002 Gaia-The Earth System 97

Fall 1994 Geosc 419 Organic Geochemistry of Natural Waters & Sediments 28

 Geosc 597i Organic Matter and Earth History 8

Spring 1995 Geosc 494 Geology of Oil and Gas (5%) 14

 Geosc 597 Field Biogeochemistry 10

 Earth 002 Gaia-The Earth System 117

Fall 1995 Geosc 419 Organic Geochemistry of Natural Waters & Sediments 21

Spring 1996 Earth 002 Gaia-The Earth System 95

 Geosc 597d Origin and Early Evolution of Life (33%) 15

Fall 1996 Geosc 419 Organic Geochemistry of Natural Waters & Sediments 21

 Geosc 597d Hydrosciences Colloquium

Spring 1997 Earth 002 Gaia- The Earth System 108

Geosc 497i Field Techniques in Environmental Geochemistry (20%) 9

Fall 1997 Geosc 497i Field Techniques in Environmental Geochemistry (20%) 12

Spring 1998 Geosc 597d Molecular Indicators of Geologic Processes 5

Fall 1998 Geosc 419 Organic Geochemistry of Natural Waters & Sediments 25

 Geosc 497i Field Techniques in Environmental Geochemistry (20%) 13

Spring 1999 Earth 100 Environment Earth 175

 Geosc 502 Evolution of the Biosphere (5%) 20

 Geosc 504 Advanced Geochemistry (10%) 5

Fall 1999 Geosc 419 Organic Geochemistry of Natural Waters & Sediments 23

 Geosc 413 Field Techniques in Environmental Geochemistry (20%) 12

 Geosc 4/597a Astrobiology (10%) 8

Spring 2000 Geosc 597c Microbial Biogeochemistry 6

 Geosc 597a Biogeochemical Analysis (7 %) 5

Fall 2000 Geosc 419 Organic Geochemistry of Natural Waters & Sediments 23

 Geosc 413 Field Techniques in Environmental Geochemistry (20 %) 15

 Geosc 597a Biogeochemical Analyses (1 lecture & lab) 11

 Geosc 597f Issues in Geosciences (5 %) 18

 Geosc 597c Astrobiology Seminar (1 lecture) 4

Spring 2001 Geosc 597a Microbial Biogeochemistry (50%) 9

 Earth 002 Gaia – The Earth System 190

Fall 2002 Geosc 419 Organic Geochemistry of Natural Waters & Sediments 8

 Geosc 597c Methane Biogeochemistry (25%) 13

Spring 2003 Earth 002 Gaia—The Earth System 140

 Geosc 597a Microbial Biogeochemistry (50%) 5

Fall 2003 Geosc 419 Organic Geochemistry of Natural Waters & Sediments 12

 Geosc 597 Biogeochemical Analyses (2.5 weeks) 5

Spring 2004 Earth 002 Gaia—The Earth System 100

 Geosc 597x Stable isotopes in Terrestrial Ecosystems 8

Fall 2004 Geosc 519 Stable Isotope Geochemistry 8

 Geosc 597 Biogeochemical Analyses (20%) 5

Spring 2005 Geosc 597 Microbial Biogeochemistry (25%) 6

Fall 2005 Geosc 419 Organic Geochemistry of Natural Waters and Sediments 8

 Geosc 500 Issues in Geosciences (20%) 22

Spring 2006 Geosc 597A Molecular Isotope Systems 6

Fall 2006 Geosc 518 Stable Isotope Geochemistry 10

 Geosc 500 Issues in Geosciences (10%) 19

Spring 2007 Earth 002 Gaia—The Earth System 90

Fall 2007 Geosc 419 Organic Geochemistry of Natural Waters & Sediments 11

Fall 2008 Geosc 518 Stable Isotope Geochemistry 18

 Geosc 500 Issues in Geosciences (50%) 25

Fall 2009 Geosc 419 Organic Geochemistry of Natural Waters & Sediments 15

 Geosc 500 Issues in Geosciences (50%) 20

Spring 2010 Geosc 518 Stable Isotope Geochemistry 8

 Geosc 597 Isoscapes Seminar 7

Fall 2011 Geosc 419 Organic Geochemistry of Natural Waters & Sediments 20

 Abio 590 Astrobiology seminar (10%) 8

Spring 2012 Geosc 518 Stable Isotope Geochemistry 12

 Earth 2 Gaia—The Earth System 125

Fall 2012 Geosc 419 Organic Geochemistry of Natural Waters & Sediments 24

 Geosc 587 Preparing for an Academic Career in the Geosciences (50%) 8

 Geosc 597E Topics in Biogeochemistry (50%) 16

 Geosc 597C Petroleum Geosystems (10 %) 16

Spring 2013 Geosc 518 Stable Isotope Geochemistry 17

 Geosc 597 B Words to Live by: Writing Science 12

Fall 2013 Geosc 419 Organic Geochemistry of Natural Waters & Sediments 19

 Geosc 597 E Topics in Biogeochemistry (50%) 5

Spring 2014 Geosc 518 Stable Isotope Geochemistry 5

 Geosc 597E Words to Live by: Writing Science 10

Fall 2014 Geosc 587 Preparing for an Academic Career in the Geosciences (50%) 12

 Geosc 597J Advanced Biomarkers and Biosignatures 10

Spring 2015 Geosc 518 Stable Isotope Geochemistry 17

 Geosc 597E Words to Live by: Writing Science 14

Fall 2015 Geosc 419 Organic Geochemistry of Natural Waters & Sediments 18

 Geosc 597 Ocean Acidification: Past, Present, and Future 12

Spring 2016 Geosc 597 Words to Live By: Writing Science 17

 Geosc 518 Stable Isotope Geochemistry 18

Fall 2016 Geosc 419 Organic Geochemistry of Natural Waters & Sediments

 Geosc 587 Preparing for an Academic Career in the Geosciences (50%)

 Geosc 597 Future of Paleoceanography (25%, seminar)

 Geosc 597 Petroleum Geosystems (10%)

# Other Teaching & Curricular Activities

Associate Head for Graduate Programs and Research, Department of Geosciences, 2004-2010.

Stable Isotope Ecology (Biology 581), University of Utah, Salt Lake City UT, (instructor); 1999, 2000, 2002, 2003, 2004, 2005, 2006, 2007, 2008, 2009, 2010, 2011, 2012, 2013, 2014, 2016

Professor-in-charge, Geobiology B.S. degree program, Department of Geosciences, 2004-2005

Director, IGERT Biogeochemistry Research Initiative in Education (BRIE), 2003-2007 (Associate director, 1999-2003)

Dual-Title Ph.D. program in Biogeochemistry (lead author on proposal; with Chris House); program approved Spring 2008.

**Participation in Seminars and Workshops**

Gordon Research Conference on Organic Geochemistry, Plymouth, N.H., 13-17, August 1990 (invited speaker)

Workshop on Interfacing a Gas Chromatograph to an Isotope-Ratio Mass Spectrometer, Department of Chemistry, University of Bristol, England, 23-24 September, 1991 (co-organized workshop;  wrote report summarizing workshop for Finnigan MAT)

Symposium on Compound Specific Isotope Analyses in Organic and  Petroleum Geochemistry, American Chemical Society National  Meeting, San Francisco, 5-10 April 1992 (session chair)

Gordon Research Conference on Organic Geochemistry, Plymouth, N.H. 10-14 August, 1992 (invited speaker)

International Association of Geochemistry and Cosmochemistry, 3rd International Symposium on Geochemistry of the Earth Surface 1-4 August 1993 (invited keynote speaker)

IAGC-SEPM Field Trip, Paleosols, Paleoclimate and Paleoatmospheric p-CO2: Paleosols in Central Pennsylvania, 5-6 August 1993 (participant)

SEPM 1993 Theme Meeting: Climate Eustasy and Life, 8-12 August 1993, University Park, PA (member of organizing committee and technical session convener)

Chesapeake-Region Association of Biogeochemists (CRABS), 1st Annual Meeting, 19-20 May, 1994, Chesapeake Biological Laboratory, Solomons, MD (co-organizer)

International Symposium on Biogeochemical Cycles and Global Change, Max-Planck-Gesellschaft, Max Planck Institute for Meteorology, Hamburg, Germany, January 16-18, 1995 (invited speaker)

Chesapeake-Region Association of Biogeochemists (CRABS), 2nd Annual Meeting, 27-28 May, 1995, Penn State University, University Park, PA (co-organizer)

American Chemical Society National Meeting: Isotopic and Molecular Biogeochemistry of Organic Matter In Ancient and Modern Environments, 20-24 August, 1995, Chicago, IL (symposium organizer; 37 papers)

Geological Society of America, Organic Geochemistry Division of the Geochemical Society Symposium: Variability of Isotope Compositions in Modern and Fossil Organic Matter, 5 November 1995 (symposium co-organizer; 26 papers)

Chesapeake-Region Association of Biogeochemists (CRABS), 3rd Annual Meeting, 24-25 May, 1996, University of Virginia, Charlottesville, VA (co-organizer; 25 papers; co-author on 3 papers)

Gordon Research Conference on Organic Geochemistry: Organic and Isotopic Records of Paleoclimate, Plymouth, NH, 11-16 August 1996 (session chair and discussion leader)

The 3rd Canadian Continuous-Flow Isotope Ration Mass-Spectrometry Workshop, National Hydrology Research Institute, Saskatoon, Saskatchewan, Canada, 9-11 September 1996 (keynote speaker)

Keynote Symposium: Linkages Among Dynamic Processes of Oceans, Continents and Atmospheres, Geological Society of America Annual Meeting, 28-31 October 1996 (invited speaker)

Gordon Research Conference on Chemical Oceanography, 10-15 August, 1997, Meriden, NH (invited speaker; co-authored with M. Pagani and M. Arthur)

6th International Conference on Paleoceanography, Discussion Panel: *Details of Tertiary global cooling: is CO2 still the major cause?* 23-28 August 1998, Lisbon, Portugal (invited panel member)

Union Session: Research Opportunities in the Solid Earth Sciences: A 10-Year Vision. Advisory session for NSF and NRC in developing a long-term vision for basic research in earth sciences. AGU national meeting, December 1998, San Francisco, CA (invited speaker)

Ocean Meeting, Biosphere 2, Oracle, AZ, July 1999 (invited participant)

Low-Temperature Geochemistry workshop, Boston, MA, June 1999 (invited participant and co-author)

Workshop on alkenone-based paleoceanographic indicators, Woods Hole Oceanographic Institution, October 1999 (invited participant and report co-author)

Molecular Biogeochemistry, a technical session at the Goldschmidt Meeting, May, 2001 (session organizer)

Stable Isotope Geochemistry, a short course sponsored by the Mineralogical Society of America and the Geochemical Society, November, 2001 (invited speaker and author)

History of Atmospheric CO2 and its Effect on the Evolution of Plants, Animals and Ecosystems, a symposium sponsored by the David and Lucile Packard Foundation and the University of Utah, December, 2001, Snowbird, Utah (invited speaker)

Gordon Research Conference on Organic Geochemistry, Plymouth, NH, August 2002 (invited speaker)

ASTID working group for molecular and isotopic analyses of Martian regolith. University of Michigan, 10/2002 (invited speaker and workshop participant)

American Chemical Society, National Meeting, session honoring Geochemistry Division Medal recipient, J. M. Hayes, 3/2003 (invited speaker)

Weathering System Science Workshop, University of Deleware (NSF-EAR sponsored) 10/2005 (Breakout group Moderator and participant)

Archaeal Lipids, The Goldschmidt Conference, Moscow, ID, 5/2005 (Session organizer)

Workshop on *Proxy Development and Applications in Paleoceanography and Paleoclimatology*.  Sponsored by the U.S. National Science Foundation (ATM, EAR and OCE), 12/2005 (steering committee member and invited speaker).

Roundtable Discussion on Life in a Material World, annual meeting, Board on Earth Sciences and Resources, NRC (organizer and moderator)

AAAS Abelson Advancing Science Seminar: Microbes, Minerals and the Environment, October 26, 2006, Washington, DC (invited speaker)

Paul W. Gast Lecture, Geochemical Society, V.M. Goldschmidt Meeting, August, 2007 Cologne, Germany (invited speaker).

International Meeting on Organic Geochemistry, Stable Isotope Applications, Torquay, England, September 2007 (session chair)

Short Course: Stable Isotopes in Biogeochemistry, held in association with the International Meeting on Organic Geochemistry, Torquay, England, September 2007 (Organizer and speaker)

Workshop on Biosignatures in Ancient Rocks, Sudbury, Ontario, Canada, September 2007; sponsored by NASA Astrobiology, the Agouron Institute and the Canadian Institute for Advanced Research (invited speaker).

Workshop on Equable Climates, Harvard University Center for the Environment, Harvard University, Cambridge, MA, 4-5 April, 2008 (invited participant).

Scientific Steering Committee, Workshop entitled: Unknown Knowns and Known Unknowns: Chemical Oceanography in a Changing World, 22-24 February, 2009; Savannah GA

Scientific Steering Committee, ISOCOMPOUND: Advances in analyses and applications of compound specific stable isotopes in ecology, ecosystem- and earth sciences; funded by the ESF network MOLTER and NSF network BASIN, 1-5 June 2009, Potsdam, Germany

Participant, and invited speaker, planning meeting and workshop for program in Astrobiology, Canadian Institute for Advanced Research (CIFAR); Toronto; 2/09

Steering Committee member and co-organizer, NSF-sponsored workshop, Future Directions in Geobiology and Low-Temperature Geochemistry, Washington, D.C., August, 2010

Invited Participant, NSF-sponsored workshop, Conservation Paleobiology, Paleontological Research Institution in Ithaca, NY, June 3-5, 2011

Invited speaker, “Hydrogen isotopes as environmental recorders: from water to sedimentary biomarkers through biological systems,” Le Studium conference, Institute for Advanced Studies, Orleans, France, September 15-16, 2011.

Invited speaker, Environmental Contexts of Early Human Evolution, Lamont Climate Center, Lamont-Doherty Earth Observatory, April 18-19, 2012

Session Chair, Gordon Research Conference on Organic Geochemistry, Holderness, NH, August, 2012

Participant and invited speaker, Olduvai Coring Project, the Stone Age Institute, Bloomington, IN March 4-6, 2014

Session Chair, the V.M. Goldschmidt Conference on geochemistry, Sacramento, CA, June 2014

Keynote Speaker and Invited Panelist, Gordon Research Seminar, August 2-3, 2014

Session Chair, Gordon Research Conference on Organic Geochemistry, Holderness, NH, August 3-8 2014

## Speaking Engagements (invited; does not include professional meetings)

School of Oceanography, University of Washington, May, 1991

Skidaway Institute of Oceanography, University System of Georgia, September, 1991

Department of Chemistry and Biochemistry and Department of Geology, University of Maryland, November, 1991

Petroleum and Natural Gas Engineering, Penn State, February,1992

Department of Geology, University of Pennsylvania, February,1992

Department Earth and Planetary Sciences, Harvard University, December,1992

Department of Geological Science, Northwestern University, September, 1993

Department of Earth, Atmospheric and Planetary Sciences, Massachusetts Institute of Technology, October,1993 (paleoceanography colloquium series)

Max Planck Institute for Marine Microbiology, Bremen, Germany, January, 1995

Finnigan MAT, Research and Development Division, Bremen, Germany, January, 1995

Department of Geological Sciences, Cornell University, May, 1995

Atlantic Richfield Oil Company (ARCO), Research Division, Plano, TX, October, 1995

Department of Geography, Penn State University, October,1995

Department of Geology, Lehigh University, January, 1995

Marine Science Program, University of North Carolina, Chapel Hill, February, 1996

Department of Geology & Geophysics, Yale University, February, 1997 (series on global change)

Department of Geology and Marine Geology & Geophysics Group, Graduate School of Oceanography, University of Rhode Island, March, 1997

Atlantic Richfield Oil Company (ARCO), Research Division, Plano, TX, May, 1997

Department of Geosciences, University of Minnesota, November, 1998

Department of Marine Chemistry and Geochemistry, Woods Hole Oceanographic Institution, April, 1999

Department of Geological Sciences, Indiana University, April, 1999

Department of Geological Sciences, The University of Chicago, May, 2000

Department of Geological Sciences, The University of Michigan, October, 2000 (Turner Lecture Series)

Department of Geology and Geophysices, University of Connecticut, November, 2000

Petroleum and Marine Division, Australia Geologic Survey Organization, Canberra, Australia, October, 2000

Canadian Institute for Advanced Research, Earth System Evolution; Montreal, November, 2000

Canadian Institute for Advanced Research, Earth System Evolution; Toronto, 11/02

Department of Earth and Planetary Sciences, University of Tennesee, Knoxville, 2003 (Klepser Lecturer)

Department of Geological Sciences, University of South Carolina, 2003

College of Marine Sciences, the University of South Florida, St. Petersburg, FL, March, 2005

School of Earth and Atmospheric Sciences, The Georgia Institute of Technology, Atlanta, GA., November, 2005 (Keynote Speaker for Graduate Student Symposium)

Geophysical Laboratory, Carnegie Institute of Washington, Washington, D.C., January, 2006

Department of Geology, Portland State University, Portland, OR, May, 2006

Department of Marine Sciences, Rutgers University, March, 2007

College of Science, University of Arizona, Tucson, January, 2008

Microbial Science Institute, Harvard University, Cambridge MA, April, 2008

Department of Geology, Yale University (Biogeochemistry seminar), February, 2010

Department of Marine Sciences, University of North Carolina, April, 2010

Department of Geology, University of Cincinnati, April, 2010

National Museum of Natural History, Smithsonian Institution, 11/9/2010

Department of Biology, University of Utah, 2/8/2011

Department of Earth, Atmospheric and Planetary Science, MIT, March, 2011 (Organic Geochemistry Seminar)

Craig Venter Institute, San Diego, CA, Paleobiology during the Genomics Era, 5/12/2011

Department of Earth, Atmospheric and Planetary Science, MIT, March, 2011 (Crosby Lecture)

Department of Geology, Wellesley College, Wellesley, MA, 10/18/2011

Lamont-Doherty Earth Observatory, Columbia University, Lamont, NY, 2/19/2012

Origins Lecture, Department of Geology, McMaster University, Toronto, Canada, 3/12/2012

School of Earth and Atmospheric Sciences, Georgia Institute of Technology, 2/28/2013

Department of Plant Pathology, Penn State University, 2/25/2013

Monsanto, research division, St. Louis, MO, 5/29/2013

Krumbein Lecture, University of Chicago, 1/16/2014

Department of Geoscience, Penn State University, 1/28/14

Department of Geography, Penn State University, 2/21/14

Hewett Club Speaker, Environmental Dynamics and GeoEcology (EDGE) Institute and Department of Earth Sciences Seminar, University of California, Riverside, April 1-2, 2014

**SERVICE TO THE UNIVERSITY, PUBLIC AND PROFESSION**

**Service to the Pennsylvania State University**

**Service to the Department**

1991-1998 Member, Undergraduate Program Committee

1993-1995 Member, Graduate Program Committee, Candidacy Panel

1994-1996 Alternate Representative to Dept. Executive Committee

1994 Member, Faculty Search Committee for Geochemical Record of Global Change

1995-1999 Chair, Global Change and Earth History Curriculum Committee

1996 Member, Staff Functioning Evaluation Committee

1997 Member, Search Committee for Environmental Geochemistry faculty position

1997 Member, Advisory Search Committee for Head of Geosciences Department

1997-1999 Member, Department Promotion & Tenure Committee

1997 Member, Ad Hoc Committee to evaluate appointment of S. Lvov to faculty

1997-2000 Member, Admissions Committee for graduate program in geosciences

1998 Member, Department Executive Committee

1998-1999 Member, Search Committee for Geofluids/Astrobiology faculty position

1999-2000 Member, Search Committee for C-cycle faculty position in Meteorology

1999-2001 Member, Graduate Program Committee

2000 Judge, Graduate Student Colloquium

2000-2001 Member, Search Committee for Ice and Climate faculty position in Geosciences

2000-2004 Ombudsperson, Graduate Program in Geosciences

2000-2001 Member, Promotion and Tenure Committee

2003-2004 Chair, Task Force to develop B.S. Curriculum in Geobiology

2003 Member, Search Committee for Astrobiology faculty position

2003-2004 Member, Department Executive Committee (Diversity Representative)

2004-present Associate Head of Graduate Programs and Research

2004-present Member, Department Executive Committee (as Associate Head)

2004-2007 Member, multiple *ad hoc* search committees for staff positions (Geoscience & EESI)

2008-2009 Member, Search Committee for Carbon Sequestration faculty position (Geosc & EME)

2009 Member, search committee for faculty position in Sedimentary Geology

2009, 2010 Participant, Shake, Rattle and Rocks (departmental outreach activity)

2011-2012 Member, Promotion and Tenure Committee

2011-2013 Member, Nominations Committee

2012 Instructor, summer course for high school science teachers, NASA Space Grant

2012 Member, Graduate Admissions Committee

2012-2014 Member, search committee for faculty position in Hydrogeology

2013-2014 Member, strategic planning committee

2014-Present Graduate Program Candidacy Exams Rover

2014-2015 Faculty advisor, Department Colloquium Committee

2014-2015 Ad-Hoc faculty committee to address sexual harassment during geology field experiences

2016-present Chair, ad-hoc postdoc applications evaluation committee

**Service to the College**

* 1. Member, Facilities Committee
	2. EMS Representative at Faculty Meetings of the College of Agricultural Sciences

2002-2003 Chair, Environment Committee and ad hoc task force on Diversity

2003-2004 Member, College Diversity Council

2004 Member, EESI Strategic Planning Committee

2005 Member, EESI ad hoc committee on future faculty hires in Earth Science and Ecology

2007 Member, Search Committee for the Associate Dean for Diversity in EMS

2012 Member, ad-hoc committee on EMS college communication (SWAE)

2013-present Member, EMS Faculty Advisory Committee

2012-present EMS Faculty Ombudsman

2016-present Chair, ad-hoc committee to evaluate the status of women faculty in EMS

2016-present Member, search committee for faculty position in Earth Science and Ecology

**Service to the University**

1992-present Member, Marine Sciences Minor Committee

2000-2004 Chair, Marine Sciences Minor Committee

1. Mentor, NSF-sponsored “Ms. Wiz” program for elementary school girls

1994-1996 Advisor, Women in Science and Engineering Research Internship Program

1995, 1996 Faculty Judge, Graduate Student Research Exposition

1999 Member, Ad-Hoc Committee on Recruitment of Women Scientists at Penn State

2002-2005 Member, Selection Committee, Faculty Scholar Medal in the Physical Sciences

2005 Chair, Selection Committee, Faculty Scholar Medal in the Physical Sciences

2008 Chair, Ad Hoc Task Force, Water and Energy in a Changing World

2008 Member, Search Committee, Director of Water Resources Research Center, PSIEE

2010-present Advisor, light-element stable isotope facility, Environmental Sustainability Laboratory

2016-present Member, search committee for Assist. VP Research

2017-present Member, search committee for Dean of the College of Earth and Mineral Sciences

**Service to the Profession and the Public**

**Service to Business and Industry**

1992 Consultant on analytical methods in environmental research for Nittany Geosciences, a hydroscience firm in State College, PA

1993-1995 Reviewer, geochemistry textbooks (3 total) for John Wiley & Sons, Inc

1995-1999 Consultant on organic and isotope geochemistry of oil-field brines, ARCO,

Plano, TX

1. Instructor, 2-day short course on reservoirs, seals and source rocks in rift basins, Japan National Oil Corporation, Technology Research Center, Chiba, Japan

2000 Consultant on molecular isotopic analyses of petroleum products; Stanford University

# Service to U.S. Government Agencies

* 1. Panel Member, National Science Foundation, Division of Ocean Sciences, Program in Chemical Oceanography

1995, 1997 Panel Member, National Science Foundation, Divisions of Ocean and Earth

Sciences, Program in Environmental Geochemistry and Biogeochemistry

1998-2000 Member, Committee on Basic Research Opportunities in the Solid Earth Sciences,

U.S. National Research Council

2000 Participant and report co-author, Workshop on Terrestrial Carbon Cycle, Division

of Earth Sciences, National Science Foundation

2001-2003 Member, U.S. National Committee for SCOPE (Scientific Committee on Problems of the Environment); sponsored by the U.S. National Research Council

2001-2004 Member, Committee on the Origins and Evolution of Life, U.S National Research Council

2002 Panel Member, National Science Foundation, Division of Earth Sciences, Program in

Geology and Paleontology

2004 Member, Chronos geochemical database working group (funded by NSF)

2005-2010 Member, Board on Earth Sciences and Resources, U.S. National Research Council

2006 Panel Member, NASA Exobiology

2008-2010 Member, Committee on the Importance of Deep-Time Geologic Records for Understanding Climate Change Impacts, U.S. National Research Council

2013 Chair and Member, NASA Exobiology Funding Proposal Review Panel

**Professional Journal Editorships**

1993-1996 Associate Editor, *Organic Geochemistry*

1996-1999 Member, Editorial Advisory Board, *Geochimica et Cosmochimica Acta*

1999-2001 Associate Editor, *Geochimica et Cosmochimica Acta*

2005-2011 Member, Editorial Board, *Geobiology*

2000-present Member, Editorial Committee, *Annual Review of Earth and Planetary Sciences*

2006-2013 Associate Editor, *Annual Review of Earth and Planetary Sciences*

2013-presentCo-Editor*, Annual Review of Earth and Planetary Sciences*

###### Service to Professional Organizations

1999 Member, Scientific Committee, 19th International Meeting in Organic Geochemistry, European Association of Organic Geochemists

1997-2000 Member, Best Paper Award Committee, Organic Geochemistry Division, Geochemical Society

1999-2001 Member, Patterson Medal Committee, Geochemical Society

2000-2006 Member, Awards Committee, European Association of Organic Geochemists

2004-2006 Vice Chairman, 2006 Gordon Research Conference in Organic Geochemistry

2006-2008 Chairman, 2008 Gordon Research Conference in Organic Geochemistry

2007-2009 Chair, Triebs Medal award committee, The Geochemical Society

2012 Member, Joint Publication Committee, The Geochemical Society

2011-2012 Member, Geochemical Fellows selection committee

2012-2016 Chair-Elect, Chair, past-chair, Organic Geochemistry Division, The Geochemical Society

2014-2015 Member, Board of Directors, The Geochemical Society

2015-present Member, honors selection committee, American Geophysical Union

2016 Member, honors selection committee, National Academy of Science

2017 Member, scientific committee for IMOG 2017

**Advisory and Review Boards**

2007- present Member, Geological Sciences Advisory Board, Department of Geological Sciences, Indiana University, Bloomington, IN

2009 Member, External Review Committee, Woods Hole-MIT Joint Ph.D. Program in Oceanography

2009-2017 Member, MIT Corporation Visiting Committee, Department of Earth, Atmospheric and Planetary Sciences (EAPS)

2010-2012 Member, National Ocean Sciences Accelerator Mass Spectrometry facility (NOSAMS) Advisory Board (Committee Chair: 2012)

2011 Member, Evaluation Committee, Department of Earth Sciences, ETH Zurich

2014 Chair, External Review Committee, Department of Earth and Planetary Sciences, Northwestern University

**Membership in Professional Societies**

American Chemical Society, American Geophysical Union, European Association of Organic Geochemists, Geochemical Society, Geological Society of America, Canadian Institute for Advanced Research, American Academy of Microbiology, The Cosmos Club (Washington, DC)

**Community Service**

2016-2019 Elected member, Vestry, St. Andrew’s Episcopal Church, State College, PA

2006-present Various leadership positions, Girl Scout Troop 41374, State College, PA