Ariel D. Anbar **July 2006**
Associate Professor
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Education

1996	Ph.D.	(Geochemistry) California Institute of Technology, Pasadena, CA
1991	M.S.	(Geochemistry) California Institute of Technology, Pasadena, CA
1989	A.B.	(Geological Sciences and Chemistry) Harvard College, Cambridge, MA

Advisors

Graduate**:** G. J. Wasserburg & Y. L. Yung; Undergraduate: H. D. Holland

Professional Experience

2004 – present	Associate Professor Dept. of Geological Sciences Dept. of Chemistry & Biochemistry Arizona State University
2002 – 2004	Associate Professor
1996 – 2002	Assistant Professor Dept. of Earth & Environmental Sciences Dept. of Chemistry University of Rochester
1989 - 1996	Graduate Research Assistant and Graduate Teaching Assistant Division of Geological and Planetary Sciences California Institute of Technology

Courses Taught (1996 – present)

General Chemistry (’05); Isotope Geochemistry (’05); Habitable World: An Introduction to Environmental Science (’02 – ‘04); The Chemistry of Global Change (’01 - ‘03); Aqueous Geochemistry (‘98, ‘00); Chemistry of Atmospheres (‘97, ‘99); Environmental Geochemistry (‘97 – ‘00); Seminar in Biogeochemistry (‘96 – ‘99); Seminar in Isotope Geochemistry (‘00); The Early Earth & the Origin of Life (‘96, ‘97)

Student Research Supervisees

Graduate: 3 Ph.D. (2 graduated; 3 in progress), 6 M.S. (all graduated); Undergraduate: 20 B.S./B.A.

Postdoctoral Supervisees

Dr. Gail Arnold, Ph.D. 2004, U. Rochester, Postdoctoral Fellow, 2005 - present
Dr. Christopher Siebert, Ph.D. 2002, U. Bern (Switzerland), Postdoctoral Fellow, 2005 - present
Dr. Laura Wasylenki, Ph.D. 1998, Caltech; Assistant Research Scientist, 2004 - present
Dr. Gwyneth (Williams) Gordon, Ph.D. 2002, Yale University; Postdoctoral Fellow, 2003 – present
Dr. Jane Barling, Ph.D. 1990, Monash University; Research Scientist, 1998 – 2002
Dr. Gregory Wortman, Ph.D. 1998, Syracuse University; Research Associate, 1999 – 2001

Awards & Honors

Fellow, Geological Society of America (Elected 2003)
Young Scientist Award (Donath Medal), Geological Society of America, 2002
Faculty Mentor, Outstanding Student Poster, AGU 2000.
Cindy Arveson Memorial Award, California Institute of Technology, 1993
NSF Graduate Research Fellowship, California Institute of Technology, 1989 – 1992
Homestake Mining and Economic Geology Award, Harvard University, 1988
Harvard College Scholarship, 1986 - 1989
National Merit Scholarship, 1985

Professional Service

Editorial Advisory Board, *Geobiology* (Blackwell Publishing)
Editorial Board, *Geology* (GSA), 2003 - 2005
Invited Oral Testimony to President's Commission on Moon, Mars and Beyond, 2004
Member, Planetary Sciences Subcommittee of the NASA Advisory Council, 2006 - present
Member, Mars-Moon Science Steering Group, NASA, 2004
Member, Lunar Exploration Analysis Group (LEAG), NASA, 2005 - present
Co-Chair, Mission to Early Earth Focus Group, NASA Astrobiology Institute, 2001 – present
Co-Chair, Deep Time Drilling Project, 2002 – present
Member of Steering Committee, Astrobiology Drilling Program, 2003 – present
Panelist, NASA Early Career Workshop, LPSC Meeting, '04
Member, International Program Committee (Heavy Element Stable Isotopes), Goldschmidt '05
Co-Convener: ~ 15 special sessions at AGU, GSA and Goldschmidt meetings
Invited Participant, Life Detection workshop, National Academy of Sciences, Spring '00
Invited Participant, Geobiology workshop, American Academy of Microbiology, Fall '00
Reviewer of ~ 50 publications for GCA, EPSL, Chem. Geol., Anal. Chem., Science, Nature, etc.
Reviewer of ~ 50 proposals for NSF and NASA
Panelist for NSF and NASA funding programs

Institutional Service – Arizona State University

Dept. of Geological Sciences: Honors Disciplinary Advisor (2005 – '06); Faculty Safety Officer (2004 – 2006); Graduate Committee (2005 – 2008); Lunar Geologist Search Committee (2005 – 2006); School of Earth & Space Exploration Founding Director Search Committee (2005 – 2006) Dept. of Chemistry: Seminar Committee (2004 – 2005); Septennial Review Committee (2005 – 2006); Bioinorganic Chemist Search Committee (2005 – 2006)

Institutional Service – University of Rochester

Hillel of Rochester Area Colleges, V.P.- Campus Affairs, 2001 – 2002; Faculty Advisor, Sigma Epsilon Fraternity, 2001 – 2003; Freshman Housing Implementation Committee/Freshman Advisory Committee, 2000 – 2002; Residential College Commission: Residential Life Subcommittee, Fall '97 – '99; Faculty-in-Residence, 1996 – 1999

Publications

Publications in Print:

A. D. Anbar, A. Jarzecki and T. Spiro (2005). Theoretical investigation of iron isotope fractionation between $Fe(H_2O)_6^{3+}$ and $Fe(H_2O)_6^{2+}$: implications for iron stable isotope geochemistry. *Geochim. Cosmochim. Acta*, **69**: 825-837.

A. D. Anbar, G. L. Arnold, T. W. Lyons and J. Barling (2005). Response to comment on "Molybdenum isotope evidence for widespread anoxia in mid-Proterozoic oceans". Science 309: doi:10.1126/science.1105521.

B. M. Jakosky, A. D. Anbar, D. Des Marais, D. Morrison and N. R. Pace (2005). Don't dismiss astrobiology. *Science* **308**: 496.

L. J. Liermann, A. Marin, V. LeBron, R. L. Guynn, J. Barling, A. D. Anbar and S. L. Brantley (2005). Metal-targeted dissolution of silicates by soil bacteria. *Chem. Geol.* **220**: 285-302.

S. Weyer, C. Münker, G. Brey, A. Woodland, K. Metzger and A. D. Anbar (2005). Iron isotope fractionation during planetary differentiation. *Earth Planet Sci. Lett.*, **240**: 251-264.

A. D. Anbar (2004). Molybdenum stable isotopes: Observations, interpretations and directions. *Rev. Mineral. Geochem.* **55**: 429-454.

G. L. Arnold, A. D. Anbar, J. Barling and T. W. Lyons (2004). Molybdenum isotope evidence of widespread anoxia in mid-Proterozoic oceans. *Science* **304**: 87-90.

S. L. Brantley, L. J. Liermann, A. D. Anbar, G. A. Icopini, R. L. Guynn and J. Barling (2004). Fe isotopic fractionation during mineral dissolution. *Geochim. Cosmochim. Acta*, **68**: 3189-3204.

A. Jarzecki, A. D. Anbar and T. Spiro (2004). DFT investigation of vibrational spectra of $Fe(H_2O)_6^{3+}$ and $Fe(H_2O)_6^{2+}$. *J. Phys. Chem. A* **108**: 2726-2732.

G. A. Icopini, S. Ruebush, M. Tien, A. D. Anbar and S. L. Brantley (2004). Iron isotope fractionation during microbial reduction of iron: the importance of adsorption. *Geology* **32**: 205-208.

A. D. Anbar (2004). Iron stable isotopes: beyond biosignatures. *Earth Planet. Sci. Lett. (Frontiers)* **217**: 223-236.

G. L. Arnold, S. Weyer and A. D. Anbar (2004). Iron isotope variations in natural materials measured using high mass resolution MC-ICP-MS. *Anal. Chem.* **76**: 322-327.

J. Barling and A. D. Anbar (2004). Molybdenum isotope fractionation during adsorption by manganese oxides. *Earth Planet. Sci. Lett.* **217**: 315-329.

O. Katz, M. Beyth, N. Mille, R. Stern, D. Avigad, A. R. Basu and A. D. Anbar (2004). A Late Neoproterozoic (~630 Ma) Boninitic Suite from southern Israel: Implications for the consolidation of Gondwanaland. *Earth Planet. Sci. Lett.* **218**: 475-490.

J. E. Roe, A. D. Anbar and J. Barling (2003). Nonbiological fractionation of Fe isotopes: Evidence of an equilibrium isotope effect. *Chem. Geol.* **195**: 69-85.

A. D. Anbar and A. H. Knoll (2002). Proterozoic ocean chemistry and evolution: A bioinorganic bridge? *Science* **297**, 1137-1142.

J. Barling, G. L. Arnold and A. D. Anbar (2001). Natural mass-dependent variation in the isotopic composition of molybdenum. *Earth Planet. Sci. Lett.* **193**: 447-457.

M. Sharma, M. L. Polizzotto and A. D. Anbar (2001). Iron isotopes in hydrothermal fluids at the Juan de Fuca ridge. *Earth Planet. Sci. Lett.* **194**: 39-51.

A. D. Anbar, K. A. Knab and J. Barling (2001). Precise determination of mass-dependent variations in the isotopic composition of Mo using MC-ICP-MS. *Anal. Chem.* **73**: 1425-1431.

A. D. Anbar, K. J. Zahnle, G. L. Arnold and S. J. Mojzsis (2001). Extraterrestrial iridium, sediment accumulation and the habitability of the early Earth's surface. *J. Geophys. Res.* **106**: 3219-3236.

P. A. Karam, S. A. Leslie and A. D. Anbar (2001). The effects of changing atmospheric oxygen concentrations and background radiation levels on radiogenic DNA damage rates. *Health Phys.* **81**: 545-553.

A. D. Anbar (2001). Iron isotope biosignatures: promise and progress. *EOS* **83**: 173, 178-179.

A. D. Anbar, J. E. Roe, J. Barling and K. H. Nealson (2000). Non-biological fractionation of iron isotopes. *Science* **288**: 126-128.

A. D. Anbar, D. A. Papanastassiou and G. J. Wasserburg (1997). The determination of iridium in natural waters by clean chemical preconcentration and negative thermal ionization mass spectrometry. *Anal. Chem.* **69**: 2444-2450.

A. D. Anbar, G. J. Wasserburg, D. A. Papanastassiou and P. S. Andersson (1996). Iridium in natural waters. *Science* **273**: 1524-1528.

A. D. Anbar, F. Chavez and Y. L. Yung (1996). Methyl bromide: Ocean sources, ocean sinks and climate sensitivity. *Global Biogeochem. Cycles* **10**: 175-190.

Nair, H., M. Allen, A. D. Anbar, Y. L. Yung and R. T. Clancy (1994). Photochemistry of the Martian atmosphere. *Icarus* **111**: 124-150.

A. D. Anbar and M. Allen (1993). Photodissociation in the atmosphere of Mars: Impact of high resolution, temperature-dependent CO_2 cross section measurements. *J. Geophys. Res.- Planets* **98**: 10,925-10,931.

A. D. Anbar, M-T. Leu, H. A. Nair and Y. L. Yung (1993). The adsorption of HO_x on aerosol surfaces: Implications for the atmosphere of Mars. *J. Geophys. Res.- Planets* **98**: 10,933-10,940.

A. D. Anbar, D. A. Papanastassiou, R. A. Creaser and G. J. Wasserburg (1992). Rhenium in seawater: Confirmation of generally conservative behavior. *Geochim. Cosmochim. Acta* **56**: 4099-4103.

A. D. Anbar and H. D. Holland (1992). The photochemistry of manganese and the origin of banded iron formations. *Geochim. Cosmochim. Acta* **56**: 2595-2603.

M-T. Leu, J. Blamont, A. D. Anbar, L. F. Keyser, and S. P. Sander (1992). Adsorption of CO on water-ice and oxide surfaces: Implications for the Martian atmosphere. *J. Geophys. Res.- Planets* **97**: 2621-2627.

Reports and White Papers (not peer reviewed):

Taylor, G J.. and the rest of the Lunar Exploration Analysis Group SASS-SAT (2005). Rapid Response Report: LEAG Science Activities and Site Selection Specific Action Team (SASS-SAT). Unpublished white paper, commissioned by the NASA Chief Scientist.

Jakosky, B, Anbar, A. D., Taylor, G. J. and Lucey, P. (2004). Astrobiology Science Goals and Lunar Exploration. Unpublished white paper, 12 p, posted July, 2004 by the NASA Astrobiology Institute (NAI) at http://nai.arc.nasa.gov/institute/lunar_astrobiology.cfm.

Shearer, C., Beaty, D.W., Anbar, A.D., Banerdt, B., Bogard, D., Campbell, B.A., Duke, M., Gaddis, L., Jolliff, B., Lentz, R.C.F., McKay, D., Neumann, G., Papanastassiou, D., Phillips, R., Plescia, J., and Wadhwa, M. (2004). Findings of the Moon-Mars Science Linkage Science Steering Group. Unpublished white paper, 29 p, posted October, 2004 by the Mars Exploration Program Analysis Group (MEPAG) at http://mepag.jpl.nasa.gov/reports/index.html.

Anbar, A. D., Buick, R., Meadows, V., Runnegar, B. (2004). Exploring Earth's past as a guide in the search for habitable worlds. NASA Astrobiology Institute White Paper in response to the Nov. 3, 2004, call for input from the NASA Science Mission Directorate.

Jakosky, B., Anbar, A. D., des Marais, D., Hoehler, T., D'Hondt, S., Onstott, T. (2004). Subsurface Life on the Earth and Planets. NASA Astrobiology Institute White Paper in response to the Nov. 3, 2004, call for input from the NASA Science Mission Directorate.

Anbar, A. D. (2002). Isotopes of iron: biomarker prospects. In: Signs of Life: A Report Based on the April 2000 Workshop on Life Detection Techniques, organized by the Committee on the Origins and Evolution of Life of the Board of Life Sciences and the Space Studies Board.