

Rob Rye – Curriculum Vitae

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Nationality	American		

Personal Profile

I seek interesting intellectual challenges that require integration of traditionally disparate or seemingly conflicting fields of inquiry, education, or endeavor in unique manners. My greatest strength is my ability to see outside of traditional boxes, to make connections where others see division, and integrate ideas previously viewed as unrelated.

Education

- 1986-1990** A.B. in History (Russian History Emphasis) - Stanford University
- 1992-1999** Ph.D. in Geology/Geochemistry - Harvard University
Advisor - Heinrich D. Holland (deceased)
Dissertation Title - *Soil-Atmosphere Relationships Until the Rise of Oxygen*

Employment History

- Aug 2018 - Present** Founder and Headmaster of Kairos Education Solutions
Teacher and Educational Innovator
- Designed and taught a full four-year course of study for homeschooled high school students. Courses include: Biology, Chemistry, Physics, Geology/Astronomy, The Physical Universe (based on Frank Shu's classic college textbook of the same name); Geometry, Introduction to Algebra, Intermediate Algebra, Number Theory, Precalculus; Ancient History, Medieval History, Renaissance History, British and American History; Ancient Literature and College Preparatory Writing, Medieval Literature and College Preparatory Writing, Renaissance History and College Preparatory Writing, British and American Literature and College Preparatory Writing. Subject matter in literature and history courses for each era are interwoven with one another to give the students a sense for how these fields inform one another. Where feasible, students are guided through exercises that show how developments in science and mathematics impacted contemporaneous events. All students were encouraged to think holistically about knowledge rather than accepting the siloing common in modern education.
- Outcomes:** All students who have taken national standardized tests have scored in excess of 1450 or equivalent on SAT (some took CLT or ACT). One student was awarded a national prize and another a regional prize on the CLT10, a competitor with the PSAT.
- Jun 2013 - Present** Trail Life USA
Charter Board Member

One of eight men who served on the Board at the time of the founding of Trail Life USA, a national Christian youth adventure ministry. I am the only remaining charter member still serving on the Board. Spent 40-80 hours per week for about 18 months helping to launch the corporation. TLUSA currently has over 950 troops and 40,000 members in 50 states. Helped set the course of the corporation.

Corporate Secretary (Oct 2013 - present) and Chair of Governance/Board Development Committee (Oct 2013 - Sept 2018)

Has served as Corporate Secretary for the corporation since October 2013. Has led the effort to establish consistent governing policies that help assure the corporation fulfills its mission in a manner consistent with its values and the law. Established vetting procedures for potential board members and wrote key documents that defined the behavioral and performance expectations for the board and its members.

Mar 2013 - Present American Heritage Girls, 175 Tri-County Parkway, Cincinnati, OH, United States
President (June 2016 - Present)

Highest ranking officer in the corporation. Leads the National Board of Trustees. Provides oversight and guidance for the National Executive Director. Responsible for setting vision for the Board and guiding the Board to set vision for the corporation.

Vice President / Chair of Board Development Committee (June 2014 - May 2016)

Second-highest ranking officer in the corporation. Chaired the committee responsible for identifying and vetting potential new Board members. Tasked with determining whether candidates are qualified to lead as well as whether they possess the skills the board needs to grow in its effectiveness.

Board Member-at-Large (March 2013-June 2014)

Served on Strategic Planning Committee. Helped guide the effort to encourage the establishment of the corporation that eventually became Trail Life USA as a “brother” organization to American Heritage Girls.

Oct 2009 - Sep 2014 Kairos Educational Solutions Founder and Owner (primarily contracted with Virtual Planetary Laboratory)
Independent Consulting Scientist

Served as lead geophysicist on Virtual Planetary Laboratory effort to develop a numerical model of tidal heating for exoplanets.

Technologies: Fortran 77/95, MYSQL.

Oct 2001 - Oct 2009 University of Southern California, Department of Earth Sciences, Los Angeles, CA, United States
Research Assistant Professor

Directed several research projects. Primary supervisor for one graduate student. Designed and taught several graduate geobiology courses.

- Served as principal Investigator on a 3-year \$450,000 project linking a novel geological database with state-of-the-art numerical models to reconstruct the climate on early Earth.
- Served as sole investigator on an \$80,000 project investigating a newly discovered geo-microbial environment.
- Served as co-Investigator, deputy lead scientist, and key proposal writer on VPL (Virtual Planetary Laboratory), for the first 10 years (with hiatus) of an interdisciplinary 20-year (2001-2021) \$26M 40-scientist project aimed at developing criteria for detecting life on planets around other stars (Led two teams on this project (2001-2006): leading the efforts of ~ 20 total scientists including geologists, physicists, chemists, and biologists)
- Served as lead astrobiologist on proposed \$325M life detection mission to Mars, MARVEL (Mars Volcanic Emissions and Life) (Led development of life-detection criteria and methods and liaised between science and technology teams. Proposal advanced to the final round of 4 and was ranked #2 overall out of 40 proposals). This mission was subsequently funded in largely the same form but this scientist had moved on in his career.
- Explored the development of microbial metabolism through laboratory experiments and field studies.

Sep 2000 - California State University, Northridge, Department of Biology, Los Angeles, CA, United States
Aug 2003 *Adjunct Assistant Professor, Microbiology*

- Designed and led chemostat-based studies of metal-induced mutations to examine the role of ocean metal abundances in changes in microbial metabolism after the rise of oxygen in Earth's atmosphere.
- Designed and led oxygen-free studies of gases and organisms from a hyper-alkaline (pH ~12) environment to determine their potential role in the formation of stromatolites and other carbonate structures. Explored whether Ca^{2+} pumping could replace proton pumping in hyperalkaline environments that lack significant sodium.

Apr 1999 - California Institute of Technology, Division of Geological and Planetary Sciences, Pasadena, CA, United States
Sep 2001 *Postdoctoral Scholar for Geobiology*

- Explored the linkages amongst ocean chemistry, atmospheric composition, biological processes, physical processes (e.g. erosion), and solar radiation in governing the variations of Earth's climate and surface redox state prior to the rise of atmospheric oxygen ~ 2.2 Ga (billion years ago).
- Served as co-Investigator on Virtual Planetary Laboratory (described above).
- Continued numerical modeling work started at Harvard (described below).

Aug 1992 - Harvard University, Department of Earth and Planetary Sciences, Cambridge, MA, United States
Apr 1999 *Postdoctoral Fellow - 1999*

- Pioneered the use of numerical models to establish physically and chemically rigorous bounds on estimates of the conditions under which soils formed 2-3 billion years ago. (work continued at Cal-Tech)
- Studied Earth's early atmosphere, using laboratory, field, and numerical methods.

Research and Teaching Fellow (Aug 1992 - Jan 1999)

- Helped design and implement multiple highly successful courses, including an undergrad course on the Earth, Its Resources, and the Environment for non-science majors – one of my students from this course was inspired to pursue MD/PhD degrees from Yale. Four undergrads I taught chose me as their laboratory mentor for senior theses, three of whom did not major in my field.
- Provided the first empirical constraints on atmospheric greenhouse gas abundances during the first half of Earth history. The implications of this work forced the redefinition of the paradigm for the search for life on planets around other stars.
- Showed that life was probably present on land ~2 billion years earlier than previous studies had indicated. I derived this conclusion from detailed textural and geochemical (stable isotope) studies of ancient soils.

Jun 1991 - University of California, Berkeley CA, United States
Aug 1992 *Research Assistant to Prof. Aaron Wildavsky (deceased)*

- Wrote three chapters of *But Is It True? A Citizen's Guide to Environmental Health and Safety Issues* with Aaron Wildavsky.
- Helped edit all chapters of Aaron Wildavsky's *But is it True?*.
- Compiled and defined the methodological errors common to most environmental health and safety studies and reports.

Jun 1990 - Yale University, Department of Geology & Geophysics New Haven, CT, United States
Jun 1991 *Manager, Stable Isotope Laboratory*

- Operated, maintained, and repaired Stable Isotope Mass Spectrometers, including Finnegan Mat 251
- Designed and implemented data archiving system for laboratory
- Developed and implemented novel laboratory techniques including a system for analyzing oxygen isotopes in water samples.

Skills

■ Academic / Scientific

Public Speaker - Have delivered talks on four continents to audiences from homeschooling parents, to public school children, to the general public, to professional colleagues on topics ranging from parenting advice to the search for life on other planets.

Small Class Teacher - Highly popular teacher in the homeschooling community, at Harvard (Teaching Fellow), and USC (Professor)

Tutor - Tutored several youth in science & math - played key role in several gaining admission to college of their choice

Curriculum Writer / Developer - Helped design several successful university courses for undergrad and grad students. Designed and executed a complete core academic high school curriculum for homeschooled high school students.

Grant Writer - Highly successful (roughly 50% success rate over fifteen years).

Reviewer / Editor - Highly sought after by grant review panels and journals to review research grant proposals and professional papers.

Cross-disciplinary Communicator - Comfortable moving between disparate disciplines (geology, geochemistry, microbiology, micropaleontology, astrobiology, geophysics, to name a few)

Interdisciplinary Visionary - Able to converse with colleagues from a wide variety of disciplines and then integrate their ideas and work into a coherent vision that takes advantage of their diverse skills and insights

Laboratory Scientist - Led successful laboratory-based research projects in geochemistry, geobiology, and paleontology, often developing novel or improving considerably on existing laboratory procedures and techniques. Also, sadly, demonstrated on multiple occasions that the published research of others was irreproducible and almost certainly fraudulent.

Selected Scientific Community Service Experience

- NASA Exobiology Review Panel Member 1999-2001
- NASA ASTEP Review Panel: Member 2002
- Lunar and Planetary Science Conference Program Committee: Member 2000
- co-Editor of widely hailed special issue of American Journal of Science entitled Quantitative Approaches Towards Biogeochemistry: Processes, Scaling, and Interfaces 2005

Peer-Reviewed Publications

- (1) R Rye and VS Meadows. Modeling extrasolar planets. *Astrobiology*, 5:212, 2005.
- (2) edited by A Luttge, R Rye, and PG Conrad. Quantitative Approaches Towards Biogeochemistry: Processes, Scaling, and Interfaces. *American Journal of Science*, 305(6-8, Sp. Iss. SI):449-873, 2005.
- (3) J Baross, KH Nealson, and R Rye. Potential atmospheric biosignatures on Mars. In *Proceedings for the MACA Workshop Dec 2001*, in press.
- (4) KH Nealson and R Rye. *Treatise on Geochemistry*, volume 8: Biogeochemistry, chapter 2: Evolution of Metabolism, pages 41-61. Pergamon Press, Oxford, 2003.
- (5) WB Yang, HD Holland, and R Rye. Evidence for low or no oxygen in the late archean atmosphere from the ~ 2.76 Ga Mt. Roe #2 paleosol, Western Australia: Part 3. *Geochimica et Cosmochimica Acta*, 66(21):3707-3718, NOV 2002.
- (6) R Rye and HD Holland. Life associated with a 2.76 Ga ephemeral pond?: Evidence from Mount Roe #2 paleosol. *Geology*, 28(6):483-486, JUN 2000.
- (7) R Rye and HD Holland. Geology and geochemistry of paleosols developed on the Hekpoort basalt, Pretoria Group, South Africa. *American Journal of Science*, 300(2):85-141, FEB 2000.

- (8) R Rye and HD Holland. Paleosols and the evolution of atmospheric oxygen: A critical review. *American Journal of Science*, 298(8):621-672, OCT 1998.
- (9) CI Steefel and R Rye. Constraints on Archaean and Palaeoproterozoic pO₂ levels based on multicomponent reactive transport modeling of chemical weathering in the Hekpoort palaeosol. *Mineralogical Magazine*, 62A, 1998.
- (10) R Rye. Highly negative $\delta^{13}\text{C}$ values in organic carbon in the Mt. Roe #2 paleosol: terrestrial life at 2.765 Ga. *Mineralogical Magazine*, 62A:1447-1448, 1998.
- (11) HD Holland and R Rye. Evidence in pre-2.2 Ga paleosols for the early evolution of atmospheric oxygen and terrestrial biota: Comment. *Geology*, 25(9):857-858, SEP 1997.
- (12) Rob Rye and Aaron Wildavsky. *But Is It True?: A Citizens Guide to Environmental Health and Safety Issues*, chapter 14: Detecting Errors in Environmental and Safety Studies, pages 410-426. Harvard University Press, 1997.
- (13) Rob Rye and Aaron Wildavsky. *But Is It True?: A Citizens Guide to Environmental Health and Safety Issues*, chapter 9: The Effects of Acid Rain on the United States (with an Excursion to Europe), pages 274-303. Harvard University Press, 1997.
- (14) Rob Rye and Aaron Wildavsky. *But Is It True?: A Citizens Guide to Environmental Health and Safety Issues*, chapter 10: CFCs and Ozone Depletion: Are They as Bad as People Think?, pages 304-339. Harvard University Press, 1997.
- (15) R Rye, PH Kuo, and HD Holland. Atmospheric carbon-dioxide concentrations before 2.2-billion years ago. *Nature*, 378(6557):603-605, DEC 7 1995.
- (16) N Tanaka, DM Rye, R Rye, H Avak, and T Yoshinari. High-precision mass-spectrometric analysis of isotopic abundance ratios in nitrous-oxide by direct-injection of N₂O. *International Journal of Mass Spectrometry and Ion Processes*, 142(3):163-175, APR 25 1995.
- (17) HD Holland, PH Kuo, and R Rye. O₂ and CO₂ in the late Archaean and early Proterozoic atmosphere. *Mineralogical Magazine*, 58A:424-425, 1994.