Curriculum Vitae - Roger BUICK

**Address:** Department of Earth & Space Sciences, University of Washington, Seattle WA 98195-1310, USA

**Phone:** +1-206-543-1913 **Fax:** +1-206-543-0489 **Email:** buick@ess.washington.edu

**Web:** http://www.ess.washington.edu/People/faculty\_bio/buick-bio.html

**Birthplace:** Adelaide, Australia **Nationality:** Australian **Birthdate:** 7/7/1954

**Tertiary Education:**

1986: **PhD** (with distinction), Geology & Geophysics, University of Western Australia

1976: **BSc** (Honours 1st class), Zoology & Geology, University of Western Australia

**Career History:**

2005-18: Professor, Dept. Earth & Space Sciences and Astrobiology Program, **University of Washington, Seattle**

2001-05: Associate Professor, Dept. Earth & Space Sciences and Astrobiology, **University of Washington, Seattle**

1995-01: Lecturer in palaeontology & stratigraphy (tenured); School of Geosciences, **University of Sydney**

1994-95: Australian Research Fellow; Dept. Geology & Geophysics, **University of Western Australia**

1991-94: Exploration geologist (contract); **Sipa, BHP, Pasminco, Lynas**; Precambrian base and precious metals

1986-91: Postdoctoral & Senior Teaching Fellow; Dept. Organismic & Evolutionary Biology, **Harvard University**

1983-86: Exploration geologist (contract); **Eastmet, Dresser, Fortuna**; Precambrian base and precious metals

1977: Research Officer; **Western Australian Museum**; estuarine ecological malacology and bat-catching

**Awards & Distinctions:**

2018: Organic Geochemistry Div., Geochemical Soc. Best Paper Award 2015: French et al., **PNAS** *112*, 5915-5920

2016: **Nature Geoscience** Editorial article on Som et al., 2016 **Nature Geoscience** *9*, 448-451.

2015: **Nature Geoscience** News & Views article on Stüeken *et al.*, 2015 **Earth Planet. Sci. Lett.** *411*, 1-10

2014: Bassett Distinguished Teaching Award, U.W. Earth & Space Sciences

2013: NASA Group Achievement Award, MSL “Curiosity” Science Development & Operations Team

2013: U.W. College of Environment teaching commendation for ESS 590 and ESS 213

2000: Editor’s Choice, **Science**, *289*, 511 and **Science**, *289*, 835

1999: Runner-up; ‘*Scientific Break-through of the Year 1999*’, **Science**, *286*, 2239.

1999: Eponymous trilobite species *Cordania buicki*.

1999: Invited Session Chair, Gordon Research Conference “Origin of Life”, Ventura

1999: Bye-Fellow; Selwyn College, **University of Cambridge**

1994-95: Australian Research Fellowship, Australian Research Council

1994: Eponymous acritarch species *Cerebrosphaera buickii*.

1992: Invited Special Symposium Chair, 29th International Geological Congress, Kyoto

1990: Outstanding Paper in **Palaios**, SEPM

1989-01: Visiting research scientist in Exobiology; **NASA Ames Research Center**

1986-88: Gledden Overseas Fellowship for postdoctoral research

1976: Prider Medal for outstanding Honours student in Geology & Geophysics

1975: Edward De Courcy Clarke Prize for outstanding Senior student in Geology & Geophysics

**Research Funding:**

2018-23: NASA NexSS/Astrobiology Institute “Virtual Planetary Laboratory” **$34,768** (Co-I)

2017-20: Simons Foundation “Constraining the environment for the origin of life” **$25,296** (Co-I)

2016-19: NASA Exobiology “Sustaining habitability: nutrient cycling on early Earth” **$334,453** (PI)

2015-18: NASA Exobiology “Biogeochemical studies of the atmosphere and oceans of early Earth” **$12,330** (Co-I)

2015-17: UW RRF “Fossil cycads, atmospheric nitrogen isotopic composition and symbiosis stability” **$35,382** (PI)

2013-18: NSF FESD “Dynamics of Earth system oxygenation” **$322,046** (Co-I)

2013-17: NASA Astrobiology Institute “Virtual Planetary Laboratory” **$34,000** (Co-I)

2010-16: Agouron Institute “Drilling the Australian Precambrian” **$1,328,469** (PI)

2009-14: NSF EAR “Selenium biogeochemistry as a deep-time redox proxy and biosignature” **$300,041** (PI)

2008-13: NASA Exobiology Program “Archean paleobarometry” **$196,943** (PI)

2008-10: Agouron Institute “Field reconnaissance for Australian drilling” **$20,653** (PI)

2008-10: UW Royalty Research Fund “Selenium isotopic geochemistry” **$36,990** (PI)

2005-11: NSF IGERT “Astrobiology” **$3,200,000** (Co-PI)

2004-07: NASA Astrobiology Drilling Program"Deep time drilling program" **$275,000** (PI)

2004-08: NSF EAR “Presaging Paleoproterozoic global change” **$79,930** (Co-I)

2004-08: NASA Exobiology Program “Metamorphism of Archean biosignatures”, **$249,763** (PI)

2001-07: NASA Astrobiology Institute "Habitable planets and evolution of biological complexity", **$273,910** (Co-I)

2001-03: Australian Research Council “Early Precambrian hydrocarbons”, AUD**$231,200** (PI)

2000: Australian Research Council Grant “Precambrian petroleum”, AUD**$24,000** (PI)

1998-2000: American Chemical Society PRF “Molecular fossils in Archean oil”, **$60,000** (PI)

1998-99: Australian Research Council “Origin of continental crust in the Pilbara Craton”, AUD**$33,000** (PI)

1997-99: Australian Research Council "Stratigraphic evolution of the Pilbara Craton", AUD**$148,000** (Co-PI)

1997-99: Sydney University Major Equipment "Off-line stable isotope analysis system", AUD**$89,000** (Co-PI)

1996-98: Australian Research Council "Early evolution of bacterial metabolism", AUD**$130,000** (PI)

1996-97: Sydney University Research "Mesoproterozoic palaeontology and sedimentology", AUD**$20,000** (PI)

**Publications** (*student or postdoc co-authors in italics*)**:** **81 total, *h* = 36 (Web of Science), = 43 (Google Scholar), average WoS citations = 68.79, total WoS citations = 5228, total GS citations = 8523.**

1. 2018: *Stüeken, E.E.* & BUICK, R. Environmental control on microbial metabolism and methane production in the Mesoarchean. **Precambrian Research**, *304*, 64-72.
2. 2017: *Stüeken, E.E*., BUICK, R., Anderson, R.E., Baross, J.A., Planavsky, N.J. & Lyons, T.W. Environmental niches and metabolic diversity in Neoarchean lakes. **Geobiology**,*15*, 767-783.
3. 2017: *Stüeken, E.E*., *Zaloumis, J*., *Meixnerová, J*. & BUICK, R. Differential metamorphic effects on nitrogen isotopes in kerogen extracts and bulk rocks. **Geochimica et Cosmochica Acta**, *217*, 80-94 (*1 WoS citation*).
4. 2017: *Kipp, M.A., Stüeken, E.E.,* Bekker, A. & BUICK, R. Selenium isotopes record extensive marine suboxia during the Great Oxidation Event. **Proceedings National Academy of Science USA**,*114*, 875-880 (*8 WoS citations*).
5. 2017: *Koehler, M.C., Stüeken, E.E., Kipp, M.A.,* BUICK, R. & Knoll, A.H. Spatial and temporal trends in Precambrian nitrogen cycling: a Mesoproterozoic offshore nitrate minimum. **Geochimica et Cosmochimica Acta**, *198*, 315-337 (*7 WoS citations – Highly Cited Paper*).
6. 2016: Dacks, J.B., Field, M.C., BUICK, R., Eme, L., Gribaldo, S., Roger, A.J., Brochier-Armanet, C. & Devos, D.P. The changing view of eukaryogenesis – fossils, cells, lineages and how they all come together. **Journal of Cell Science**,*129*, 3695-3703 (*10 WoS citations*).
7. 2016: *Som, S.M*., BUICK, R., Hagadorn, J.W., Blake, T.S., Perreault, J.M., *Harnmeijer, J.P*., & Catling, D.C. Earth's air pressure 2.7 billion years ago constrained to less than half of modern levels. **Nature Geoscience**, *9*, 448-451 (*15 WoS citations*).
8. 2016: *Stüeken, E.E., Kipp, M.A., Koehler, M.C*. & BUICK, R. The evolution of Earth’s biogeochemical nitrogen cycle. **Earth Science Reviews**,*160*, 220-239 (*14 WoS citations*).
9. 2016: *Stüeken, E.E., Kipp, M.A., Koehler, M.C*., Schwieterman, E.W., Johnson, B. & BUICK, R. Modeling pN2 through geologic time: implications for biosignatures in planetary atmospheres. **Astrobiology** *16*, 949-963 (*4 WoS citations*).
10. 2016: Zahnle, K.J. & BUICK, R. Atmospheric Science: Ancient air caught by shooting stars. **Nature**, *533*, 184-186 (*1 WoS citation*).
11. 2015: Bradley, K., Weiss, B.P. & BUICK, R. Records of geomagnetism, climate and tectonics across a Paleoarchean erosion surface. **Earth & Planetary Science Letters**, *419*, 1-13 (*2 WoS citations*).
12. 2015: French, K.L., Hallmann, C., Hope, J.M., Schoon, P.L., Zumberge, J.A., Hoshino, Y., Peters, C.A., George, S.C., Love, G.D., Brocks, J.J., BUICK, R. & Summons, R.E. Reappraisal of hydrocarbon biomarkers in Archean rocks. **Proceedings of the National Academy of Science USA**, *112*, 5915-5920 (*60 WoS citations; Highly Cited Paper*).
13. 2015: Krissansen-Totten, J., BUICK, R. & Catling D.C. A statistical analysis of the carbon isotope record from the Archean to Phanerozoic and implications for the rise of oxygen. **American Journal of Science**, *315*, 275-316 (*25 WoS citations*).
14. 2015: *Stüeken, E.E*., BUICK, R., & Anbar, A.D.Selenium isotopes support free O2 in the latest Archean. **Geology**, *43*, 259-262 (*26 WoS citations*).
15. 2015: *Stüeken, E.E*., BUICK, R., Bekker, A., Catling, D.C., *Foriel, J*., Guy, B.M., Kah,L.C., Machel, H.G. & Poulton, S.W.The evolution of the global selenium cycle: secular trends in Se isotopes and abundances. **Geochimica et Cosmochimica Acta**, *162*, 109-125 (*14 WoS citations*).
16. 2015: *Stüeken, E.E*., BUICK, R., Guy, B.M.&*Koehler, M.C.* Isotopic evidence for biological nitrogen fixation by Mo-nitrogenase from 3.2 Gyr. **Nature**, *520*, 666-669 (*44 WoS citations*).
17. 2015: *Stüeken, E.E*., BUICK, R. & Schauer, A.J. Nitrogen isotope evidence for alkaline lakes on late Archean continents. **Earth & Planetary Science Letters**, *411*, 1-10 (*23 WoS citations*).
18. 2015: *Stüeken, E.E., Foriel, J*., BUICK, R. & Schoepfer, S.D. Selenium isotope ratios, redox changes and biological productivity across the end-Permian mass extinction. **Chemical Geology**, *410*, 28-39 (*7 WoS citations*).
19. 2014: Claire, M.W., Kasting, J.F., Domagal-Goldman, S.D., *Stüeken, E*.*E*., BUICK, R. & Meadows, V.S. Modeling the signature of sulfur mass-independent fractionation produced in the Archean atmosphere. **Geochimica et Cosmochimica Acta**, *141*, 365-380 (*35 WoS citations*).
20. 2013: Pasek, M.A., *Harnmeijer, J.P*., BUICK, R., Gull, M. & Atlas, Z. Evidence for reactive reduced phosphorus species in the early Archean ocean. **Proceedings of the National Academy of Science USA**, *110*, 10089-10094 (*51 WoS citations*).
21. 2013: *Stüeken, E.E., Foriel, J.*, Nelson, B.K., BUICK, R. & Catling, D.C. Selenium isotope analysis of organic-rich shales: advances in sample preparation and isobaric interference correction. **Journal of Analytical Atomic Spectrometry**, *28*, 1734-1749 (*17 WoS citations*).
22. 2013: *Som, S.M*., Hagadorn, J.W., Thelen, W.A., Gillespie, A.R., Catling, D.C. & BUICK, R. Quantitative discrimination between geological materials with low density contrast by high resolution X-ray computer tomography: an example using amygdule size-distribution in ancient lava flows. **Computers & Geoscience**, *54*, 231-238 (*3 WoS citations*).
23. 2012: BUICK, R., Geobiology of the Archean eon, in Knoll, A.H., Canfield, D.E. & Konhauser, K.O. (eds) *Fundamentals of Geobiology*, Blackwell, Oxford, p. 351-370 (*4 GS citations*).
24. 2012: *Som, S.M*., Catling, D.C., *Harnmeijer, J.P*., Polivka, P.M. & BUICK, R. Air density 2.7 billion years ago limited to less than twice modern levels by fossil raindrop imprints**. Nature,** *484*, 359-362 (*69 WoS citations*).
25. 2012: *Stüeken, E.E*., Catling, D.C. & BUICK, R. Contributions to late Archaean sulphur cycling by life on land. **Nature Geoscience**, 5, 722-725 (*55 WoS citations*).
26. 2011: Summons, R.E., Amend, J.P., Bish, D.L., BUICK, R., Cody, G.D., Des Marais, D.J., Dromart, G., Eigenbrode, J.L., Knoll, A.H. & Sumner, D.Y., Preservation of Martian organic and environmental records: final report of the Mars Biosignature Working Group. **Astrobiology**, *11*, 157-181 (*76 WoS citations*).
27. 2010: BUICK, R., Early life: ancient acritarchs. **Nature**, *463*, 885-886 (*17 WoS citations*).
28. 2009: *Garvin, J*., BUICK, R., Anbar, A.D., Arnold, G.L. & Kaufman, A.J., Isotopic evidence for an aerobic nitrogen cycle in the latest Archean. **Science**, *323*, 1045-1048 (*99 WoS citations)*.
29. 2009: *Garvin, J*., BUICK, R., Anbar, A.D., Arnold, G.L. & Kaufman, A.J., Response to “**Analysis of Archean Nitrogen Isotopic Data”**. **Science**, <http://www.sciencemag.org/cgi/eletters/323/5917/1045>.
30. 2009: George, S.C., *Dutkiewicz, A*., Volk, H., Ridley, J., Mossman, D.J. & BUICK, R., Oil-bearing fluid inclusions from the Palaeoproterozoic: a review of biogeochemical results from time-capsules >2.0 billion years old. **Science in China Series D: Earth Sciences**, *52*, 1-11 (*4 WoS citations*).
31. 2009: Shen, Y., Farquhar, J., Masterson, A., Kaufman, A.J. & BUICK, R., Evaluating the role of microbial sulfate reduction in the early Archaean using quadruple isotope systematics. **Earth & Planetary Science Letters**,*279*, 383-391 (*73 WoS citations*)*.*
32. 2008: BUICK, R., When did oxygenic photosynthesis evolve? **Philosophical Transactions of the Royal Society B,** *363*, 2731-2743 (*130 WoS citations*).
33. 2008: BUICK, R., Microbes in the rocks. **Nature**, *455*, 569-570 (*1 WoS citations*).
34. 2008: George, S.C., Volk, H., *Dutkiewicz, A*., Ridley, J. & BUICK, R., Preservation of hydrocarbons and biomarkers in oil trapped inside fluid inclusions for >2 billion years. **Geochimica et Cosmochimica Acta**, *72*, 844-870 (*51 WoS citations*).
35. 2007: BUICK, R., Did the Proterozoic ‘Canfield Ocean’ cause a laughing gas greenhouse? **Geobiology**, *5*, 97–100 (*47 WoS citations*).
36. 2007: BUICK, R., The earliest records of life; in W.T. Sullivan III & J.A. Baross (eds) *Planets and Life: The Emerging Science of Astrobiology*, Cambridge Univ. Press, Cambridge, p. 237-264 (*6 WoS citations*).
37. 2007: Anbar, A.D., Duan, Y., Lyons, T.W., Arnold, G.L., Kendall, B., Creaser, R.A., Kaufman, A.J., Gordon, G.W., Scott, C., *Garvin, J*. & BUICK, R., A whiff of oxygen before the Great Oxidation Event. **Science**, *317*, 1903-1906 (*416 WoS citations; Highly Cited Paper*).
38. 2007: Kaufman, A.J., Johnston, D.T., Farquhar, J., Masterton, A.L., Lyons, T.W., Bates, S., Anbar, A., Arnold, G.L., *Garvin, J.* & BUICK, R., Astrobiological insights into global biospheric oxygenation and atmospheric evolution. **Science**, *317*, 1900-1903 (*202 WoS citations*).
39. 2007: Williford, K.H., Ward, P.D., Garrison, G.H. & BUICK, R., An extended stable organic carbon isotope record across the Triassic-Jurassic boundary in the Queen Charlotte Islands, British Columbia, Canada**. Palaeogeography Palaeoclimatology Palaeoecology**,*244*, 290-296 (*62 WoS citations)*.
40. 2006: Catling, D.C. & BUICK, R., Oxygen and life in the Precambrian. **Geobiology**, *4***,** 225-226 (*4 WoS citations)*.
41. 2006: *Dutkiewicz, A*., Volk, H., George, S.C., Ridley, J. & BUICK, R., Biomarkers from Huronian oil-bearing fluid inclusions: an uncontaminated record of life before the Great Oxidation Event. **Geology**, *34*, 437-440 (*68 WoS citations)*.
42. 2005: Ward, P.D., Botha, J., BUICK, R., De Kock, M.O., Erwin, D.H., Garrison, G., Kirschvink, J. & Smith, R., Abrupt and gradual extinction among late Permian land vertebrates in the Karoo Basin, South Africa. **Science** *307*, 709-714 (*173 WoS citations*).
43. 2005: Ward, P.D., BUICK, R. & Erwin, D.H., **Response to Comment on "Abrupt and gradual extinction among late Permian land vertebrates in the Karoo Basin, South Africa". Science, *308*, 1413.**
44. 2004: Blake, T.S., BUICK, R., Brown, S.J.A. & Barley, M.E., Stratigraphic geochronology of a late Archaean flood basalt province in the Pilbara Craton, Australia: constraints on basin evolution, mafic and felsic volcanism and continental drift rates. **Precambrian Research** *133*, 143-173 (*87 WoS citations*).
45. 2004: Shen, Y. & BUICK, R., The antiquity of microbial sulfate reduction. **Earth Science Reviews** *64*, 243-272 (*117 WoS citations*).
46. 2003: *Brocks, J.J*., BUICK, R., Logan, G.A. & Summons, R.E.,Composition and syngeneity of molecular fossils from the 2.78 to 2.45 billion-year-old Mount Bruce Supergroup, Pilbara Craton, Western Australia. **Geochimica et Cosmochimica Acta** *67*, 4289-4319 (*134 WoS citations*).
47. 2003: *Brocks, J.J*., BUICK, R., Summons, R.E. & Logan, G.A., A reconstruction of Archean biological diversity based on molecular fossils from the 2.78 to 2.45 billion year old Mount Bruce Supergroup, Hamersley Basin, Western Australia. **Geochimica et Cosmochimica Acta** *67*, 4321-4335 (*182 WoS citations*).
48. 2003: *Brocks, J.J*., Love, G.D., Snape, C.E., Logan, G.A., Summons, R.E. & BUICK, R., Release of bound aromatic hydrocarbons from late Archean and Mesoproterozoic kerogens via hydropyrolysis. **Geochimica et Cosmochimica Acta** *67*, 1521-1530 (*60 WoS citations*).
49. 2003: *Brocks, J.J*., Summons, R.E., BUICK, R. & Logan, G.A., Origin and significance of aromatic hydrocarbons in giant iron ore deposits of the late Archean Hamersley Basin, Western Australia. **Organic Geochemistry** *34*, 1161-1175 (*24 WoS citations*).
50. 2003: *Dutkiewicz, A*., Ridley, J. & BUICK, R., Oil-bearing CO2-CH4-H2O fluid inclusions: oil survival since the Palaeoproterozoic after high temperature entrapment. **Chemical Geology** *194*, 51-79 (*32 WoS citations*).
51. 2002: BUICK, R., Brauhart, C.W., Morant, P., Thornett, J.R., Maniw, J.G., Archibald, N.J., Doepel, M.G., Fletcher, I.R., Pickard, A.L., Smith, J.B., Barley, M.E., McNaughton, N.J. & Groves, D.I., Geochronology and stratigraphic relations of the Sulphur Springs Group and Strelley Granite: a temporally distinct igneous province in the Archaean Pilbara Craton, Australia. **Precambrian Research** *114*, 87-120 (*28 WoS citations*).
52. 2002: *Green, M.G*., Sylvester, P.J. & BUICK, R., Reply to the comment by Bolhar et al. On ‘Growth and recycling of early Archaean continental crust: geochemical evidence from the Coonterunah and Warrawoona Groups, Pilbara Craton, Australia’ by Green et al. [Tectonophysics 322 (2000) 69-88]. **Tectonophysics** *344*, 293-296.
53. 2001: BUICK, R., Life in the Archaean; in D.E.G. Briggs & P.R. Crowther (eds) *Palaeobiology II*, Blackwell, Oxford, 13-21 (*27 GS citations*).
54. 2001: Shen, Y., BUICK, R. & Canfield, D.E., Isotopic evidence for microbial sulphate reduction in the early Archaean era. **Nature** *410*, 77-81 (*329 WoS citations*).
55. 2000: *Green, M.G*., Sylvester, P.J. & BUICK, R., Growth and recycling of early Archaean continental crust: geochemical evidence from the Coonterunah and Warrawoona Groups, Pilbara Craton, Australia. **Tectonophysics** *322*, 69-88 (*76 WoS citations*).
56. 2000: Rasmussen, B. & BUICK, R., Oily old ores: evidence for hydrothermal petroleum generation in an Archean volcanogenic massive sulfide deposit. **Geology** *28*, 731-734 (*29 WoS citations*).
57. 1999: *Brocks, J.J*., Logan, G.A., BUICK, R. & Summons, R.E., Archean molecular fossils and the early rise of eukaryotes. **Science** *285*, 1033-1036 (*712 WoS citations*).
58. 1999: BUICK, R. & Doepel, M.G., Panorama VHMS zinc–copper prospects. **Geological Survey of Western Australia Mineral Resources Bulletin** *15*, 80-88 (*5 WoS citations*).
59. 1999: BUICK, R. & Knoll, A.H., Acritarchs and microfossils from the Mesoproterozoic Bangemall Group, northwestern Australia. **Journal of Paleontology** *73*, 744-764 (*25 WoS citations*).
60. 1999: Rasmussen, B. & BUICK, R., Redox state of the Archean atmosphere: evidence from detrital heavy minerals in ca. 3250-2750 Ma sandstones from the Pilbara Craton, Australia. **Geology** *27*, 115-118 (*134 WoS citations*).
61. 1999: Rasmussen, B., BUICK, R. & Holland, H.D., Redox state of the Archean atmosphere: evidence from detrital heavy minerals in ca. 3250-2750 Ma sandstones from the Pilbara Craton, Australia: reply. **Geology** *27*, 1152 (*4 WoS citations*).
62. 1999: Van Kranendonk, M., Brauhart, C., Morant, P., Thornett, J., BUICK, R**.**, Maniw, J., Archibald, N., Pawley, M., Collins, W., Baker, D. & Pryer, L., North Shaw W.A. **Geological Survey of Western Australia 1:100,000 Geological Map Series** *2755*.
63. 1998: BUICK, R., Rasmussen, B. & Krapez, B., Archaean oil: evidence for extensive hydrocarbon generation and migration 2.5-3.5 billion years ago. **AAPG Bulletin** *82*, 50-69 (*52 WoS citations*).
64. 1998: *Dutkiewicz, A*., Rasmussen, B. & BUICK, R., Oil preserved in fluid inclusions in Archaean sandstones. **Nature** *395*, 885-888 (*69 WoS citations*).
65. 1998: Rasmussen, B., BUICK, R. & Taylor, W.R., Removal of oceanic REE by authigenic precipitation of phosphatic minerals. **Earth & Planetary Science Letters** *164*, 135-149 (*59 WoS citations*).
66. 1995: BUICK, R., Thornett, J.R., McNaughton, N.J., Smith, J.B., Barley, M.E. & Savage, M., Record of emergent continental crust ~3.5 billion years ago in the Pilbara Craton, Australia. **Nature** *375*, 574-577 (*166 WoS citations*).
67. 1995: BUICK, R., Des Marais, D.J. & Knoll, A.H., Stable isotopic compositions of carbonates from the Mesoproterozoic Bangemall Group, Australia. **Chemical Geology** *123*, 153-171 (*94 WoS citations*).
68. 1995: BUICK, R., Groves, D.I. & Dunlop, J.S.R., Abiological origin of described stromatolites older than 3.2Ga: comment. **Geology** *23*, 191 (*23 WoS citations*).
69. 1992: BUICK, R., The antiquity of oxygenic photosynthesis: evidence from stromatolites in sulphate–deficient Archaean lakes. **Science** *255,* 75–77 (*211 WoS citations*).
70. 1990: BUICK, R., Microfossil recognition in Archean rocks: an appraisal of spheroids and filaments from a 3500 m.y. old chert-barite unit at North Pole, Western Australia. **Palaios** *5*, 441-459 (*209 GS citations*).
71. 1990: BUICK, R. & Dunlop, J.S.R., Evaporitic sediments of early Archaean age from the Warrawoona Group, North Pole, Western Australia. **Sedimentology** *37*, 247-277 (*153 WoS citations*).
72. 1988: BUICK, R., Carbonaceous filaments from North Pole, Western Australia: are they fossil bacteria in Archaean stromatolites? a reply. **Precambrian Research** *39*, 311-317 (*25 WoS citations*).
73. 1987: BUICK, R., Early Archean silicate spherules of probable impact origin, South Africa and Western Australia: comment. **Geology** *15*, 180-181 (*9 WoS citations*).
74. 1984: BUICK, R., Carbonaceous filaments from North Pole, Western Australia: are they fossil bacteria in Archaean stromatolites? **Precambrian Research** *24*, 157-171 (*53 WoS citations*).
75. 1984: BUICK, R. & Barnes, K.R., Cherts in the Warrawoona Group: early Archaean silicified sediments deposited in shallow-water environments. **Publications Geology Department & Extension Service, University of Western Australia** *9*, 37-53 (*41 GS citations*).
76. 1981: BUICK, R., Dunlop, J.S.R. & Groves, D.I., Stromatolite recognition in ancient rocks: an appraisal of irregularly laminated structures in an early Archaean chert-barite unit from North Pole, Western Australia. **Alcheringa** *5*, 161-181 (*150 WoS citations*).
77. 1981: Dunlop, J.S.R. & BUICK, R., Archaean epiclastic sediments derived from mafic volcanics, North Pole, Pilbara Block, Western Australia. **Special Publications Geological Society Australia** *7*, 225-233 (*61 GS citations*).
78. 1981: Groves, D.I., Dunlop, J.S.R. & Buick, R., An early habitat of life. **Scientific American** *245*, 64-73 (*42 WoS citations*).
79. 1980: Walter, M.R., BUICK, R. & Dunlop, J.S.R., Stromatolites 3,400-3,500 Myr old from the North Pole area, Western Australia. **Nature** *284*, 443-445 (*234 WoS citations*).
80. 1979: Dunlop, J.S.R., Groves, D.I. & BUICK, R., Evidence for Archaean evaporites. **Open Earth** *6*, 15-16.
81. 1979: BUICK, R., Evidence for Archaean life: a selected bibliography. **Publications Geology Department & Extension Service, University of Western Australia** *2*, 82-88.

Submitted: *Kipp, M.A*., *Stüeken*, *E.E.*, Yun, M., Bekker, A. & BUICK, R. Pervasive aerobic nitrogen cycling in the surface ocean across the Paleoproterozoic era. **Earth & Planetary Science Letters**.

Submitted: *Koehler, M.C*., BUICK, R., *Kipp, M.A., Stüeken, E.E.* & *Zaloumis, J.* A transient Archean oxygen oasis recorded in the ~2.66 Ga Jeerinah Formation, Australia. **Proceedings National Academy of Science USA.**

Submitted: Muller, E., Thomazo, C., *Stüeken, E*., Hallmann, C., Leider, A., Chaduteau, C., BUICK, R., Baton, F., Philippot, P., Ader, M. Bias in carbon concentration and δ13C measurements of organic matter due to cleaning treatments with organic solvents. **Chemical Geology**.

Submitted: Zhelezinskaia, I.A, Kaufman, A.J., Farquhar, J., *Koehler*, *M.C.*, BUICK, R., Johnston, D.T., Olson, S. & Lyons, T., Environmental controls on the preservation of atmospheric sulfur in Neoarchean marine facies. **Earth & Planetary Science Letters**.

In prep: *Koehler*, *M.C.*, BUICK, R. & Barley, M.E. Nitrogen isotope evidence for anoxic deep marine environments from the Mesoarchean Mosquito Creek Formation, Australia.

**Principal Abstracts:**

2017: BUICK, R., *Stüeken, E.E., Koehler, M.C. & Kipp, M.A.* The evolution of early Earth's biogeochemical nitrogen cycle. **GeoBremen 2017**, Bremen, Germany.

2016: BUICK, R., *Stüeken, E.E., Koehler, M.C. & Kipp, M.A*. Evolution of Earth's biogeochemical nitrogen cycle: an example of an integrated system influencing planetary habitability. **4th International ELSI Symposium**, Tokyo.

2015: BUICK, R. Chemical fossil evidence for the early evolution of Eukarya and Archaea. **Company of Biologists Eukaryogenesis/Archaeogenesis meeting**, Wiston House UK.

2014: Schauer, A.J., *Stüeken, E.E.* & BUICK, R. Measuring δ15N of N-poor rocks: In-tube combustion meets continuous flow. **Advances in Stable Isotope Techniques and Applications Conference**, UC Davis.

2010: BUICK, R., Deep-time drilling in the Australian Archean: the Agouron Institute geobiological drilling project. **Abs.** **American Geophysical Union Fall Meeting**, San Francisco.

2009: *Foriel, J., Stüeken, E.E.,* Nelson, B.K. & BUICK, R., Selenium biogeochemistry as a deep-time redox proxy. **Geochim. Cosmochim. Acta** *73 (13)*, A389.

2009: George, S.C., Dutkiewicz, A., Volk, H., Ridley, J. & BUICK, R., Stability of complex hydrocarbons within fluid inclusions in rocks exposed to high temperatures. **Geochim. Cosmochim. Acta** *73 (13)*, A427.

2007: BUICK, R. [Earliest evidence of life on Earth](http://www-ca6.csa.com/ids70/view_record.php?id=2&recnum=2&log=from_res&SID=8a993d619fe4872851c399f062309b50). **Geochim. Cosmochim. Acta**, *71(15S)*, A131.

2005*: Harnmeijer, J.* & BUICK, R. Metamorphism and geological survivability of carbonaceous biosignatures. **Astrobiology**, *5(2)*, 192.

2005: Waldbauer, J.R., BUICK, R., Hayes, J.M. & Summons, R.E., Molecular biosignatures from the NAI Archean Biosphere Drilling Project. **Astrobiology**, *5(2)*, 277.

2005: BUICK, R., The Archean fossil wars: why nobody won. **Gordon Origin of Life Conference**, Ventura CA.

2004: BUICK, R., Dunlop, J.S. & Bonser, L.C., 2004 NAI-ADP Deep Diamond Drill Cores: Transects Through Archean Time in the Pilbara Craton, Australia. **Eos Trans. AGU**, 85*(47)*, Fall Meet. Suppl., Abstract B32B-04.

2004: BUICK, R., Dunlop, J.S.R. & Anbar, A.D., Deep Time Drilling Program: Pilbara deep diamond drill holes. **AbSciCon 2004**, Moffett Field, CA.

2003: BUICK, R., Anbar, A., Mojzsis, S., Scientific drilling of Archean stratigraphic successions in Western Australia: a mission to early Earth. **Abs. NAI General Meeting**, *2003*, 423-424.

2001: BUICK, R., Anbar, A.D., Mojzsis, S.J., Kaufman, A.J., Kieft, T.L., Lyons, T.W., Humayun, M., The Case for Scientific Drilling of Precambrian Sedimentary Sequences: A Mission to Early Earth. **Abs. American Geophysical Union Fall Meeting**, *P22B*, 0544.

1998: BUICK, R., *Dutkiewicz, A.* & Rasmussen, B., Primordial petroleum: live oil in fluorescent fluid inclusions in Archean and early Paleoproterozoic sandstones from Australia, South Africa and Canada. **Abs. Geological Society of America Annual Meeting**, *30(7)*, A290.

1993: BUICK, R., Early Archean stratigraphy of the eastern Pilbara Craton, Australia: tabular or complex? **Abs. Geological Society of America Annual Meeting,** *25(6),* A457.

1992: BUICK, R., Archaean life and environments: the Australian record. **Abs. 29th International Geological Congress,** *1*, 9.

1990: BUICK, R., Diverse lacustrine stromatolites from the Archean Tumbiana Formation, Western Australia. **Abs. Geological Society of America Annual Meeting**, *Dallas 22(7)*, A356.

1987: BUICK, R. & Dunlop, J.S.R., Early Archaean evaporatic sediments from the Warrawoona Group, North Pole, Western Australia. **Abs. Geological Society of America Annual Meeting**, *Phoenix 19(7)*, 604.

1984: BUICK, R., Warrawoona Group cherts: early Archaean silicified sediments deposited in a shallow-water environment. **Abs. Archaean & Proterozoic Basins of the Pilbara Conference**, *Perth*, 12-18.

1981: BUICK, R., Did life exist in the early Archaean? Evidence from shallow-water sediments, North Pole, Western Australia. **Abs. 5th Australian Geological Convention**, *Perth*, 45.

1979: BUICK, R. & Dunlop, J.S.R., Archaean micro-organisms from a shallow-water environment. **Abs. 4th International Symposium on Environmental Biogeochemistry**, *Canberra*, 11.

**Research Interests:**

1) *Early evolution of bacterial metabolism* - a palaeontological and isotopic geochemical (C, N, O, S) study of Archaean sedimentary rocks from the Pilbara Craton of northwestern Australia, with the aim of using the best-preserved and most complete record of Earth's early history to determine when the main forms of microbial metabolism first arose, whether this caused environmental change in the atmosphere and oceans, affecting in particular global biogeochemical cycles, and if such information can be used to better constrain the potential temporal distributions of sediment-hosted metal ores; with D.J. DesMarais (NASA Ames Research Center), D.E. Canfield (Odense Universitet) and Y. Shen (U. Ottawa).

2) *Palaeontology and sedimentology of the Mesoproterozoic Bangemall Group* - a study of the early evolution of eukaryotic organisms and their influence on microbial ecology and environmental conditions, with the aim of providing a model for a time of significant global change, when biogeochemical cycling shifted from a stable pattern into a highly variable state coincident with the rise to ecological dominance of complex organisms; with A.H. Knoll (Harvard U.).

3) *Stratigraphic evolution of the Pilbara Craton using SHRIMP 2 zircon geochronology* - a geochronological study of the best-preserved and most continuous supracrustal succession of Archaean age, with the aim of providing more robust temporal constraints upon the stratigraphic, tectonic and metallogenic evolution of the craton; with M.E. Barley (U. Western Australia) and T.S. Blake (Pilbara Manganese).

4) *Evidence for early Precambrian hydrocarbon genesis* - a sedimentological and geochemical study of bituminous and fluid-inclusion relics of ancient oil and gas in Archaean and Palaeoproterozoic sedimentary and igneous rocks from the Western Australian Shield, with the aims of demonstrating that extensive hydrocarbon generation and migration occurred long before generally accepted, determining whether this petroleum was generated from biologically-derived organic matter by conventional processes or was inorganic in origin and sourced in the mantle, and evaluating if economically-viable hydrocarbon resources could be found in temporally unconventional plays; with B. Rasmussen, B. Krapez (Curtin U. of Technology) and A. Dutkiewicz (U. Sydney).

5) *Early Archaean atmospheric composition* - a study of detrital heavy minerals in fluvial sandstones and a possible paleosol along an early Archaean unconformity surface in the Pilbara Craton, with the aim of determining whether their alteration patterns indicate a primordial atmospheric greenhouse effect modulated by carbon dioxide or some other gas in order to counteract the weaker solar luminosity during Earth's early history; with H.D. Holland (Harvard U.) and B. Rasmussen (Curtin U. of Technology).

6) *Secular trends in marine nutrient fluxes and their ecological impact* – a study of phosphorus and nitrogen abundances in sedimentary rocks through time, with the aim of better quantifying oceanic fluxes and budgets for these elements, identifying temporal trends in their sources and sinks, and determining whether these reflect or influenced ecosystem evolution; with B. Rasmussen (Curtin U. of Technology).

7) *Early evolution of continental crust* - a study of trace-element and radiogenic-isotope geochemistry of basalts and granitoids ~3.5 billion years old across an ancient unconformity in the Pilbara Craton, with the aim of contraining the primordial growth rate of continental crust, the evolution of the depleted mantle and the tectonic impacts of ancient crustal differentiation; with M.G. Green (Tanami Gold) and P.J. Sylvester (Memorial U.).

8) *Molecular fossils from Precambrian oil and kerogen* – an organic geochemical study of well-preserved Archaean and Palaeoproterozoic hydrocarbons from Australia, South Africa and Canada, with the aim of discovering organic geochemical biomarkers that constrain the early evolution of microbial ecosystems; with J.J. Brocks (Australian National U.), R.E. Summons (MIT), G.A. Logan (Geoscience Australia) and S. George (Macquarie U.).

9) *Causes of Phanerozoic mass-extinctions* – a palynological, sedimentological and isotopic geochemical study of non-marine sections through the Permian-Triassic boundary in Australia and South Africa, with the aim of determining whether extraterrestrial impacts or endogenous atmospheric-oceanographic causes were responsible for biospheric destruction; with D.C. Catling, P.D. Ward (U. Washington) and M. Claire (U. St. Andrews).

10) *Archean paleobarometry* – an investigation of geological proxies for atmospheric pressure in the late Archean in Australia and South Africa, with the aim of determining whether some of the more extreme end-member models for atmospheric composition could be correct, particularly those concerning early oxygenation and high greenhouse-gas partial pressures; with D.C. Catling (U. Washington) and S.M. Som (NASA Ames) .

11) *Precambrian selenium isotopic geochemistry* – an investigation into the utility of using selenium isotopic geochemistry, redox state and relative abundance in diverse Precambrian sedimentary rocks as a proxy for environmental oxygenation, particularly at intermediate oxidation states; with D.C. Catling and B.K. Nelson (U. Washington)

12) *Precursors to the Great Oxygenation Event* – a study of drill-cores from Australia for geochemical indicators of transient small environmental oxygenation episodes prior to the permanent oxygenation of the atmosphere; with A.D. Anbar (Arizona State U.), A.J. Kaufman (U. Maryland) and T.W. Lyons (U. California Riverside).

**Courses taught at UW:**

1. ESS 104 Prehistoric Life: lectures and laboratory classes
2. ESS 213 Earth Evolution: lectures and laboratory classes
3. ESS 313 Geobiology: lectures and laboratory classes
4. ESS 450 Paleobiology: lectures and seminars
5. ESS 517 Early Earth Evolution: lectures and seminars
6. ESS 590 Geomicrobiology: lectures and seminars
7. ESS 599 Earth & Space Science Seminar: seminars
8. ASTBIO 115 Astrobiology: lectures and laboratory classes
9. ASTBIO 501 Astrobiology Disciplines: lectures and seminars
10. ASTBIO 502 Astrobiology Topics: lectures and seminars
11. ASTBIO 575 Astrobiology Origin of Life Seminar: lectures and seminars
12. ASTBIO 599 Astrobiology Seminar: seminars

**Graduate students supervised:**

**M.C. Ebach** (“A cladistic and biogeographic analysis of a lower Devonian trilobite fauna”), MSc 1999

**J.J. Brocks** (“Molecular fossils in Precambrian rocks”), PhD 2001

**M.G. Green** (“Evolution of Early Archean continental crust in the Pilbara Craton”), PhD 2001

**J.P. Harnmeijer** (“Metamorphism of early Archean biosignatures”), PhD 2009

**S.M. Som** (“Archean paleobarometry”), PhD 2010

**C. Pew** (“Isotopic and floral CO2 proxies across the Paleocene-Eocene Thermal Maximum”), MS 2013

**E.E. Stüeken** (“**Early evolution of environments and metabolism: insights from N, Se and S isotopes**”), PhD 2014

**B. Buskirk** (“Taxonomy, taphonomy and stable isotope records of freshwater invertebrates from the Florissant Fm., Colorado: terrestrial reconstruction at the Eocene-Oligocene boundary”), MS 2014

**M.C. Koehler** (“Late Archean nitrogen isotopes across a basinal gradient”)

**M.A. Kipp** (“Redox evolution of the early Earth”)

**J. Meixnerova** (“Early evolution of the phosphorus biogeochemical cycle”)

**E. Goosman** (“Aeolianites as paleobarometers”)

**Postdoctoral fellows advised:**

**A. Dutkiewicz**:oil-bearing fluid inclusions and organic geochemistry (Australian Postdoc Fellow 2000-01)

**J. Foriel**: sulfur and selenium biogeochemistry in Precambrian sedimentary rocks (NASA Postdoc 2005-09)

**E.E. Stüeken**: geochemistry of non-marine Archean sedimentary rocks (NASA Postdoc 2014-2016)

**Current Administration:**

ESS Graduate Admissions Committee (Chair), COE REIF committee (ESS representative)

**Principal Invited Lectures:**

2017: GeoBremen 2017 (DGGV & DMG joint annual meeting), Universität Bremen Germany.

2016: 4th International ELSI Symposium, Tokyo Tech, Tokyo Japan.

2015: Company of Biologists Eukaryogenesis/Archaeogenesis meeting, Wiston House UK.

2013: Gordon Research Conference (Geobiology), Ventura CA; AIDP workshop, Arizona State University.

2012: Agouron Institute Biomarker Workshop, Riverside CA; Institutes des Origines de Lyon Spring School on Early Life, Lyon France; Agouron Institute Australian drilling meeting, San Francisco CA.

2011: RNA World Origins workshop, Arizona State University; MIT.

2010: Institut de Physique du Globe de Paris, Université de Paris VII.

2009: European Science Foundation Archaean Environment Conference, Mekrijarvi Finland; University of Kansas, Lawrence.

2008: University of Arizona; European Science Foundation Archaean Environment Conference, Vienna; Rockefeller University Evolution Symposium; University of Southern California International Geobiology Symposium; Mars Science Laboratory 3rd Workshop, Monrovia CA.

2007: The Royal Society, London; University of the Free State, Bloemfontein; University of California, Berkeley; University of Southern California; V.M. Goldschmidt Conference, Koln.

2006: International Paleontological Congress, Beijing; University of Vermont, Burlington; Ludwig-Maximilians-University, Munich

2005: Joint Meeting of the Japanese Earth & Planetary Sciences Societies, Tokyo; Gordon Research Conference (Origin of Life)

2001: University of Rochester; Syracuse University

2000: University of Washington

1999: University of Cambridge; University of Michigan; Odense Universitet

1998: University of Michigan; NASA Ames Research Center

1997: Harvard University; NASA Ames Research Center

1995: MIT

1993: University of Cambridge

1992: International Geological Congress, Kyoto Japan; Shinshu University

1990: Gordon Research Conference (Origin of Life)

1988: Texas A&M University

1986: Harvard University, Boston University

**Journal Editor:**

Geobiology

**Journal Reviews:**

Science, Nature, PNAS, Nature Geoscience, Geology, American Journal of Science, Journal of Geology, JGR Biogeosciences, Precambrian Research, Origins of Life, Proceedings of the Royal Society of London B, Chemical Geology, Geobiology, Economic Geology, SEPM Special Publications, Astrobiology, Sedimentary Geology.

**Grant Reviews:**

NSF Earth Sciences, NASA Exobiology, American Chemical Society PRF; Australian Research Council, Natural Environment Research Council (UK), European Research Council, Deutsche Forschungsgemeinschaft Netherlands Organization for Scientific Research, National Geographic Research, Agouron Institute, Am. Phil. Soc. Lewis & Clark, U.W. Royalty Research Fund.

**Society Membership:**

Geological Society of America, American Geophysical Union, International Society for the Study of the Origin of Life

**Other Scientific Service:**

2017: GSA annual meeting, Seattle; session organizer & chair

2016: Arizona State U, U California Riverside, Harvard U; promotion & tenure review

2016: Promotion to chair review: University of Pretoria (South Africa)

2015: Research assessment, NSR (South Africa)

2014: NASA Exobiology/NSF workshop on future early Earth research, panel chair; UC Riverside promotion & tenure evaluator

2013: USC, U. Colorado Boulder, U. Tennessee Knoxville, MIT; promotion & tenure evaluator

2011: University of Waterloo, promotion & tenure evaluator

2009: South Africa National Research Foundation, research evaluator

2008-09: Mars Science Laboratory biosignatures working group, member

2008, 2014: NASA Astrobiology Postdoctoral Program, reviewer

2008: USC/Agouron Institute International Geobiology Course, instructor

2005: USC/Agouron Institute International Geobiology Course, field trip co-leader

2002, 2006, 2009: NASA Exobiology grant review panel, member

2001-05: NASA Astrobiology Institute "Early Earth" focus group, Co-Chair

2000-01: International Society for the Study of the Origin of Life, Regional Representative