

# Nicholas J. Pester, PhD

UC Berkeley and Lawrence Berkeley Lab  
One Cyclotron Road, MS 74R316C  
Berkeley, CA 94720, USA

office: (510) 486-6983  
mobile: (612) 201-6043  
email: [njpester@berkeley.edu](mailto:njpester@berkeley.edu)

---

## PROFESSIONAL DEVELOPMENT

---

<b>University of California, Berkeley, CA, USA</b> Assistant Research Scientist - Department of Earth and Planetary Science	2018–present
<b>Lawrence Berkeley National Laboratory, CA, USA</b> Affiliate Scientist - Earth and Environmental Sciences Area	2018–present
<b>Lawrence Berkeley National Laboratory, CA, USA</b> Postdoctoral Fellow - Energy Geosciences Division	2013–2017

## EDUCATION

---

<b>University of Minnesota, Twin Cities, MN, USA</b> Ph.D., Geology, Chemistry (minor) - Department of Earth Sciences Advisor: Prof. William Seyfried, Jr.	2005–2012
<b>Gustavus Adolphus College, St. Peter, MN, USA</b> B.A. (honors), Geology	1996–2000
<b>University of Edinburgh, Edinburgh, Scotland</b> Non-graduating studies - School of Geosciences (full academic year)	1998–1999

## RESEARCH SUMMARY

---

My research fields may be broadly defined as aqueous geochemistry and oceanography. I carry out laboratory and field investigations pertaining to chemical/isotope exchange reactions between fluids, minerals and gases, with implications for modeling mass transport between the crust and the biosphere. I have a particular interest in understanding processes that drive changes in seawater chemistry throughout Earth's history, because the evolution of the oceans links directly to the evolution of life and climate.

### Field Research

#### *Oceanographic/ Submersible Studies of Mid-Ocean Ridges*

East Pacific Rise, 9–10°N: Cruise AT-37-04 ( <i>R/V Atlantis, DSV Alvin</i> ) Lead scientist aboard Alvin dives 4840 and 4843.	2016
East Pacific Rise, 9–13°N: Cruise AT-15-28 ( <i>R/V Atlantis, DSV Alvin</i> ) Lead scientist aboard Alvin dive 4392.	2008

---

Mid-Atlantic Ridge, 26–37°N: Cruise KNOX18RR ( <i>R/V Roger Revelle, ROV Jason II</i> )	2008
Main Endeavour Field, Juan de Fuca Ridge: Cruise AT-11-31 ( <i>R/V Atlantis, DSV Alvin</i> ) Starboard scientist aboard Alvin dive 4142	2005
Galapagos Rift: Cruise AT-11-27 ( <i>R/V Atlantis, DSV Alvin</i> )	2005

### Demonstration Scale Carbon Sequestration

Subsurface (test) injections of CO <sub>2</sub> : CO2CRC Otway project, Victoria Australia	2014
--	------

## TEACHING EXPERIENCE

---

<b>Oceanography</b> , University of Minnesota, MN, USA (level 1)	
Lecturer and Teaching Assistant	2009–2012
Laboratory Manager/Curator and Instructor	2006–2009
<b>Geochemical Principles</b> , University of Minnesota, MN, USA (level 3)	
Writing Instructor (writing intensive course)	2010
<b>Geochemical Modeling</b> , University of Minnesota, MN, USA (level 5)	
Lecturer, Teaching Assistant, Curriculum Development (new course)	2008
<b>Geology and Cinema</b> , University of Minnesota, MN, USA (level 1)	
Laboratory Instructor	2009
<b>Earth and Its Environments</b> , University of Minnesota, MN, USA (level 1)	
Laboratory Instructor	2005–2006

## PROFESSIONAL SERVICE

---

<b>Conference Session Convener</b>	
28 <sup>th</sup> V. M. Goldschmidt conference: <i>Seafloor diagenesis, hydrothermal processes, and biogeochemistry: Implications for the Earth system through time</i> (07c)	2018
27 <sup>th</sup> V. M. Goldschmidt conference: <i>Seafloor hydrothermal processes on modern and ancient Earth: Implications for life, elemental budgets, and oxidation states of the lithosphere-hydrosphere-atmosphere system</i> (10d)	2017
Fall Meeting, American Geophysical Union: <i>Dynamics of continental and seafloor hydrothermal systems</i> (2512)	2014
<b>Proposal Review Panelist</b>	
NASA Habitable Worlds program	2017
NASA Solar System Workings program	2015, 2017
<b>Proposal Reviewer (external)</b>	
US-DOE Basic Energy Sciences	2017
NSF, Marine Geology and Geophysics	2016, 2017
<b>Group Coordinator</b> , Basic Energy Sciences (geochemistry), LBNL	2014–2016

**Manuscript Reviewer:** American Mineralogist, Chemical Geology, Earth and Planetary Science Letters, Economic Geology, Geochimica et Cosmochimica Acta, IEEE Transactions on Mechatronics, International Journal of Greenhouse Gas Control, Nature Geoscience, Nature: Scientific Reports

## AWARDS AND FELLOWSHIPS

---

Outstanding Student Paper Award (oral presentation), AGU Fall Meeting	2008
William Emmons Fellowship, Univ. of MN	2007–2008
Richard Clarence Dennis Graduate Fellowship, Univ. of MN	2007–2008
Kimball Forrest Fellowship, Univ. of MN	2008–2009
Goldschmidt Student Travel Grant, Geochemical Society	2010, 2011, 2012

## INVITED PRESENTATIONS

---

Dept. of Chemistry, University of Guelph, Ontario, CA	2017
Graduate School of Oceanography, University of Rhode Island, RI, USA	2016
Center for Isotope Geochemistry, UC Berkeley, CA, USA	2015
Dept. of Earth Sciences, University of Cambridge, Cambridge, UK	2014
21 <sup>st</sup> Annual V.M. Goldschmidt Conference, Prague, Czech Republic	2011
Geology Seminar, Carleton College, MN, USA	2010
Deep-sea exploration lecture, Normandale College, MN, USA	2009

## PUBLICATIONS

---

- Hutchings, L., **N. Pester**, A. Singh, B. Bonner, S. Jarpe, S. Wang, H. Philson, Rock physics analysis of injection-induced geologic alterations in geothermal reservoirs using tomographic images obtained from micro-earthquake recordings, *Journal of Geophysical Research* (**in revision**).
- Pester, N. J.**, M. E. Conrad, K. G. Knauss, D. J. DePaolo (2018) Kinetics of D/H isotope fractionation between molecular hydrogen and water, *Geochimica et Cosmochimica Acta*, **242**, 191-212.
- Syverson, D. D., P. Scheuermann, J. A. Higgins, **N. J. Pester**, W. E. Seyfried, Jr. (2018) Coupled anhydrite – fluid Ca isotope and Sr partitioning signatures at mid-ocean ridge hydrothermal systems: An experimental study, *Geochimica et Cosmochimica Acta*, **236**, 160-178.
- Scheuermann, P.P., D. D. Syverson, J. A. Higgins, **N. J. Pester**, W. E. Seyfried, Jr. (2018) Ca isotope systematics at hydrothermal conditions: Mid-ocean ridge vent fluids and experiments in the CaSO<sub>4</sub>-NaCl-H<sub>2</sub>O system, *Geochimica et Cosmochimica Acta*, **226**, 18-35.
- Antonelli, M. A., **N. J. Pester**, S. T. Brown, D. J. DePaolo (2017) Effect of paleoseawater composition on hydrothermal exchange in mid-ocean ridges, *Proceedings of the National Academy of Sciences, U.S.A.*, **114**, 12413-12418.
- Pester, N. J.**, K. Ding, W. E. Seyfried, Jr. (2015) Vapor-liquid partitioning of alkaline earth and transition metals in NaCl-dominated hydrothermal fluids: An experimental study from 360 to 465 °C, near-critical to halite saturated conditions, *Geochimica et Cosmochimica Acta*, **168**, 111-132.

- Seyfried, W. E., Jr., **N. J. Pester**, B. M. Tutolo, K. Ding (2015) The Lost City hydrothermal system: Constraints imposed by vent fluid chemistry and reaction path models on subseafloor heat and mass transfer processes, *Geochimica et Cosmochimica Acta*, **163**, 59-79.
- Pester, N. J.**, G. Saldi, N. Lee, K. G. Knauss (2014) Laboratory experiments: Geochemical interactions between CO<sub>2</sub> - saturated brines and sandstone 2-41R, in Mukhopadhyay, S., N. Spycher, **N. Pester**, G. Saldi, J. Beyer, J. Houseworth, & K. Knauss, *Final Report on Experimental and Numerical Modeling Activities for the Newark Basin*. - *Report Number: LBNL-6901E*, pp. 76-90.
- Syverson, D. D., **N. J. Pester**, P. R. Craddock, W. E. Seyfried, Jr. (2014) Fe isotope fractionation during phase separation in the NaCl-H<sub>2</sub>O system: An experimental study with implications for seafloor hydrothermal systems, *Earth and Planetary Science Letters*, **406**, 223-232.
- Pester, N. J.**, K. Ding, W. E. Seyfried, Jr. (2014) Magmatic eruptions and iron volatility in deep-sea hydrothermal fluids, *Geology*, **42**, 255-258.
- Pester, N. J.**, E. P. Reeves, M. E. Rough, K. Ding, J. S. Seewald, W. E. Seyfried, Jr. (2012) Subseafloor phase equilibria in high-temperature hydrothermal fluids of the Lucky Strike Seamount (Mid-Atlantic Ridge, 37°17'N), *Geochimica et Cosmochimica Acta*, **90**, 303-322.
- Brant, C., L. A. Coogan, K. M. Gillis, W. E. Seyfried, **N. J. Pester**, J. Spence (2012) Lithium and Li isotopes in young altered upper oceanic crust from the East Pacific Rise, *Geochimica et Cosmochimica Acta*, **96**, 272-293.
- Pester, N. J.**, M. E. Rough, K. Ding, W. E. Seyfried, Jr. (2011) A new Fe/Mn geothermometer for hydrothermal systems: Implications for high-salinity fluids at 13°N on the East Pacific Rise. *Geochimica et Cosmochimica Acta*, **75**, 7881-7892.
- Wu, S., C. Yang, **N. Pester**, Y. Chen (2011) A new hydraulically actuated titanium sampling valve for a deep-sea hydrothermal fluid sampler. *IEEE Journal of Oceanic Engineering*, **36**, 462-469.
- Seyfried W. E., Jr., **N. J. Pester**, K. Ding, M. Rough (2011) Vent fluid chemistry of the Rainbow hydrothermal system (36°N, MAR): Phase equilibria and in-situ pH controls on subseafloor alteration processes. *Geochimica et Cosmochimica Acta*, **75**, 1574-1593.
- Seyfried, W. E., Jr., **N. J. Pester**, Fu Qi (2010) Phase equilibria controls on the chemistry of vent fluids from hydrothermal systems on slow spreading ridges: Reactivity of plagioclase and olivine solid solutions and the pH-silica connection, in *Diversity of Hydrothermal Systems on Slow Spreading Ocean Ridges*, *Geophys. Monogr. Ser.*, **188**, edited by P. Rona, C. Davey, J. Dymant and B. Murton, pp. 297-320, AGU, Washington, D.C.
- Foustoukos, D.I., **N. J. Pester**, K. Ding, W.E. Seyfried, Jr. (2009) Dissolved carbon species in associated diffuse and focused flow hydrothermal vents at the Main Endeavour Field, Juan de Fuca Ridge: Phase equilibria and kinetic constraints, *Geochemistry, Geophysics, Geosystems*, **8**, Q10003. doi: [10.1029/2009/GC002472](https://doi.org/10.1029/2009/GC002472).
- Pester, N. J.**, D. A. Butterfield, D. I. Foustoukos, K. K. Roe, K. Ding, T. M. Shank, W. E. Seyfried, Jr. (2008) The chemistry of diffuse-flow vent fluids on the Galapagos Rift (86°W): Temporal variability and subseafloor phase equilibria controls, in *Magma to Microbe: Modeling Hydrothermal Processes at Oceanic Spreading Centers*, *Geophys. Monogr. Ser.*, **178**, edited by R. P. Lowell, J. S. Seewald, M. R. Perfit and A. Metaxas, pp. 123-144, AGU, Washington, D.C.

## CONFERENCE PROCEEDINGS/ABSTRACTS

---

- Pester, N. J.**, S. T. Brown, M. A. Antonelli, D. J. DePaolo (2018) Relationships between Na-Ca exchange, reaction temperature, and Sr isotopes in deep-sea hydrothermal fluids, Abstract V43G-3816, to be presented at the 2018 Fall Meeting, AGU: Washington, D.C., USA, 10-14 Dec.
- Pester, N. J.** (2018) Effects of sea level change on the deep-sea hydrothermal flux of transition metals to the ocean, presented at the 28<sup>th</sup> V.M. Goldschmidt conference, Boston, MA, USA, 12-17 Aug.

- Antonelli, M. A., D. J. DePaolo, S. T. Brown, **N. J. Pester** (2018) Radiogenic  $^{40}\text{Ca}$  in seawater, presented at the 28<sup>th</sup> V.M. Goldschmidt conference, Boston, MA, USA, 12-17 Aug.
- Pester, N.**, M. Conrad, D. Stolper, D. DePaolo (2018) Kinetics of D/H isotope exchange between  $\text{H}_2$  and  $\text{H}_2\text{O}$  and potential use of isotope geothermometry on plume data from Enceladus, Abstract 6034 presented at the Ocean Worlds conference, Lunar and Planetary Institute, Houston, TX, USA, 21-24 May.
- Scheuermann, P., **N. J. Pester**, B. M. Tutolo, S. F. Simmons, W. E. Seyfried, Jr. (2017) Geochemistry of seafloor hydrothermal vent fluids at EPR 9°50'N: Time series data from 2004-2016, Abstract V14A-03, presented at the 2017 Fall Meeting, AGU: New Orleans, LA, USA, 11-15 Dec.
- Pester, N.**, M. Conrad, K. Knauss (2017) Kinetics of D/H fractionation between  $\text{H}_2\text{O}$  and dissolved  $\text{H}_2$  at hydrothermal conditions, presented at the 27<sup>th</sup> V.M. Goldschmidt conference, Paris, France, 13-18 Aug.
- Antonelli, M. A., D. J. DePaolo, **N. J. Pester**, S. T. Brown (2017) Effects of seawater  $\text{Ca}/\text{SO}_4$  and Mg on Sr isotope exchange in MOR hydrothermal systems, presented at the 27<sup>th</sup> V.M. Goldschmidt conference, Paris, France, 13-18 Aug.
- Pester, N. J.**, D. D. Syverson, J. A. Higgins, W. E. Seyfried, Jr. (2016) Ca and Sr isotope systematics in mid-ocean ridge hydrothermal fluids, Abstract V53E-02, presented at the 2016 Fall Meeting, AGU: San Francisco, CA, USA, 12-16 Dec.
- Syverson, D. D., P. Scheuermann, **N. J. Pester**, J. A. Higgins, W. E. Seyfried, Jr. (2016) Ca isotope fractionation and Sr/Ca partitioning associated with anhydrite formation at mid-ocean ridge hydrothermal systems: An experimental approach, Abstract V51A-3055, presented at the 2016 Fall Meeting, AGU: San Francisco, CA, USA, 12-16 Dec.
- Antonelli, M. A., D. J. DePaolo, S. T. Brown, **N. J. Pester**, E. Sonnenthal (2016) Effect of paleoseawater composition on hydrothermal outputs at mid-ocean ridges, *Goldschmidt Abstracts, 2016*. Paper presented at the 26<sup>th</sup> V.M. Goldschmidt conference, Yokohama, Japan, 26 June-1 July.
- Pester, N. J.**, W. E. Seyfried, Jr. (2015) Abiotic hydrocarbon synthesis using a hydrothermal flow reactor: Implications of the C1/C2 ratio, *Goldschmidt Abstracts, 2015* 2466. Paper presented at the 25<sup>th</sup> V.M. Goldschmidt conference, Prague, Czech Republic, 16-21 Aug.
- Pester, N. J.**, A. T. Schaen, K. Ding, W. E. Seyfried, Jr. (2014) Experimental constraints on hydrothermal circulation in mid-ocean ridges, *Goldschmidt Abstracts, 2014* 1943. Paper presented at the 24<sup>th</sup> V.M. Goldschmidt conference, Sacramento, CA, USA, 9-13 Jun.
- Seyfried, W. E., Jr., **N. J. Pester**, K. Ding (2014) Geochemical controls on the composition of hydrothermal vent fluids at mid-ocean ridges (*keynote*), *Goldschmidt Abstracts, 2014* 2254. Paper presented at the 24<sup>th</sup> V.M. Goldschmidt conference, Sacramento, CA, USA, 9-13 Jun.
- Seyfried, W. E., Jr., **N. J. Pester**, K. Ding (2012) Ultramafic-hosted hydrothermal systems at mid-ocean ridges: Serpentinization, chloritization and geochemical controls on mass-transfer processes (*invited*), Abstract V52A-01 presented at the 2012 Fall Meeting, AGU: San Francisco, CA, USA, 3-7 Dec.
- Pester, N. J.**, K. Ding, W. E. Seyfried, Jr. (2012) Experimental vapor-liquid partitioning of transition metals in NaCl dominated fluids, *Mineralogical Magazine*, 76(6) 2223. Paper presented at the 22<sup>nd</sup> V.M. Goldschmidt conference, Montreal, Canada, 25-29 Jun.
- Pester, N. J.**, W. E. Seyfried, Jr. (2011) Kinetic and thermodynamic controls on the concentration of carbon gases in hydrothermal fluids, *GSA Abstracts with Programs*, 43, 532. Paper 220-11 presented at the GSA annual meeting and exposition, Minneapolis, MN, USA, 9-12 Oct.
- Pester, N. J.**, W. E. Seyfried, Jr. (2011) Abiogenic formation of carbon species at hydrothermal conditions using a novel flow apparatus, *Mineralogical Magazine*, 75(3), 1626. Paper presented at the 21<sup>st</sup> V.M. Goldschmidt conference, Prague, Czech Republic, 14-19 Aug. (**invited**)
- Pester, N. J.**, W. E. Seyfried, Jr. (2010) Vapor-liquid partitioning of iron and manganese in hydrothermal fluids: An experimental investigation with application to the integrated study of basalt-hosted hydrothermal systems, Abstract OS14A-03 presented at the 2010 Fall Meeting, AGU: San Francisco, CA, USA, 13-17 Dec.

- Pester, N. J.**, M. E. Rough, K. Ding, W. E. Seyfried, Jr. (2010) Phase equilibria controls on mass transfer reactions in the Rainbow hydrothermal system, *Geochimica et Cosmochimica Acta*, 74, A809. Paper presented at the 20<sup>th</sup> V.M. Goldschmidt conference, Knoxville, TN, USA, 13-18 Jun.
- Ding, K., W. E. Seyfried, Jr., **N. J. Pester**, E. Seyfried (2010) A new approach for deducting in-situ pH value of hydrothermal fluid in the reaction zone at mid-ocean ridges, *Geochimica et Cosmochimica Acta*, 74, A234. Paper presented at the 20<sup>th</sup> V.M. Goldschmidt conference, Knoxville, TN, USA, 13-18 Jun.
- Pester, N. J.**, W. E. Seyfried, Jr. (2009) Possible phase separation effects on the Na/Ca ratio in mid-ocean ridge hydrothermal vent fluids. Abstract presented at the Ridge 2000 workshop: *Developing a holistic view of oceanic spreading center processes*, St. Louis, MO, USA, 1-3 Oct.
- Pester, N. J.**, K. Ding, W. E. Seyfried, Jr. (2009) Recent hydrothermal fluid chemistry from EPR 13°N: Phase equilibria constraints with applicability to the integrated study of basalt-hosted hydrothermal systems, *Eos, Trans. Am. Geophys. Union*, 90 (52), Fall Meet. Suppl., Abstract OS12A-05 presented at the annual fall meeting of the American Geophysical Union, San Francisco, CA, USA, 14-18 Dec.
- Pester, N. J.**, M. Rough, K. Ding, W. E. Seyfried, Jr. (2008) Phase equilibria controls on fluid chemistry at the Lucky Strike hydrothermal field, Mid-Atlantic Ridge, *Eos, Trans. Am. Geophys. Union*, 89 (53), Fall Meet. Suppl., Abstract V54B-06 presented at the annual fall meeting of the American Geophysical Union, San Francisco, CA, USA, 15-19 Dec. (**outstanding presentation award**)
- Seyfried, W. E., Jr., K. Ding, **N. Pester**, Q. Fu. (2008) Geochemical controls on the composition of hydrothermal vent fluids at EPR 9°N: pH and redox constraints from in situ chemical sensor deployments and experimental and theoretical model results (*invited*), *Eos, Trans. Am. Geophys. Union*, 89 (53), Fall Meet. Suppl., Abstract V44B-04 presented at the annual fall meeting of the American Geophysical Union, San Francisco, CA, USA, 15-19 Dec.
- Ding, K., W. E. Seyfried, **N. Pester**, E. Seyfried (2008) In-situ measurement of pH of hydrothermal vent fluids at EPR 9°N: Implications for acidity in seafloor reaction zones, *Eos, Trans. Am. Geophys. Union*, 89 (53), Fall Meet. Suppl., Abstract B21A-0333 presented at the annual fall meeting of the American Geophysical Union, San Francisco, CA, USA, 15-19 Dec.
- Pester, N. J.**, D. A. Butterfield, D. I. Foustoukos, K. K. Roe, K. Ding, T. M. Shank, W. E. Seyfried, Jr. (2007) The chemistry of diffuse-flow vent fluids on the Galapagos Rift (86°W): Temporal variability and seafloor phase equilibria controls, *Geochimica et Cosmochimica Acta*, 71, A780. Paper presented at the 17<sup>th</sup> V.M. Goldschmidt conference, Cologne, Germany, 19-24 Aug.
- Foustoukos, D. I., W. E. Seyfried, K. Ding, **N. Pester** (2006) Dissolved carbon species in diffuse and focused flow hydrothermal vents at the Main Endeavour Field, Northern Juan de Fuca Ridge, *Eos, Trans. Am. Geophys. Union*, 87 (52), Fall Meet. Suppl., Abstract B34A-03 presented at the annual fall meeting of the American Geophysical Union, San Francisco, CA, USA, 11-15 Dec.
- Ding, K., W. E. Seyfried, Z. Zhang, D. Foustoukos, **N. J. Pester** (2006) Redox and pH evolution of the seafloor hydrothermal system at the Main Endeavour Field, JDF: Constraints from time series measurement using in-situ chemical sensors, *Eos, Trans. Am. Geophys. Union*, 87 (52), Fall Meet. Suppl., Abstract B31B-1106 presented at the annual fall meeting of the American Geophysical Union, San Francisco, CA, USA, 11-15 Dec.