

CURRICULUM VITAE

John A. Breier Jr.

Associate Professor (with tenure)

The University of Texas Rio Grande Valley
Marine and Coastal Sciences
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EDUCATION

2006 Ph.D. The University of Texas at Austin, Department of Marine Science
1996 DOE Bettis Atomic Power Laboratory, Reactor Engineering School
1995 B.S. cum laude, Texas A&M University, Mechanical Engineering

PROFESSIONAL APPOINTMENTS & EXPERIENCE

1993 Engineering Intern, Lockheed Martin
1995-2000 Officer, United States Navy, Naval Reactors, Nuclear Power Engineer
2001-2003 Officer, Naval Reserve, NRL Science & Technology Unit 510
2001-2006 Research Assistant, The University of Texas at Austin, Marine Science Institute
2006 Postdoctoral Researcher, Stanford University
2006-2008 NSF RIDGE2000 Postdoctoral Fellow, Woods Hole Oceanographic Institution
2008-2012 Assistant Scientist, Woods Hole Oceanographic Institution
2012-2015 Associate Scientist, Woods Hole Oceanographic Institution
2015-present Adjunct Scientist, Woods Hole Oceanographic Institution
2015-present Associate Professor, The University of Texas Rio Grande Valley

HONORS AND AWARDS

2011 WHOI Deep Ocean Exploration Institute Fellowship
2006 NSF RIDGE 2000 Postdoctoral Fellowship
2004 E.J. Lund Fellowship in Marine Science, The University of Texas at Austin
2002 Environmental Science Institute Summer Research Fellowship, The University of Texas

RESEARCH INTERESTS

Dynamic mixing processes including the mixing of coastal freshwater and seawater and the mixing of geofluids with seawater. Chemical and energy exchange between the lithosphere and the ocean and how this class of processes influences Earth's biogeochemical cycles. The scavenging and transport of trace elements, which involves to varying degrees questions of mineral formation and chemical reactivity, mineral and microbe interactions, and the chemical energy available for chemosynthesis. The development and application of ocean instrumentation and vehicles for the enhanced study of Earth system processes. Predictive environmental modeling and model validation.

PROFESSIONAL AFFILIATIONS

American Geophysical Union
American Society of Limnology and Oceanography
The Geochemical Society

IEEE

PROFESSIONAL ACTIVITIES

WHOI, Scientific Staff Executive Committee member.

MITWHOI, Joint Committee for Applied Ocean Science & Engineering

WHOI Deep Ocean Exploration Institute, Advisory Committee member.

WHOI, AOP&E Department, Postdoctoral Mentoring Committee member.

Senior Design Clinic Sponsor, Smith College Pickering Engineering Program – an outreach collaboration with Smith College to sponsor and mentor teams of four undergraduates per year during their senior design course.

Group Co-Moderator, Biogeochemical fluxes from mid-ocean ridges, RIDGE 2000 Integration and Synthesis Workshop, Meeting to integrate datasets and to synthesize conceptual and empirical models of oceanic spreading center processes, 30 Oct. 2010.

Group Moderator, Export of heat and material (living and nonliving) from hydrothermal systems to the water column, RIDGE 2000 Integration and Synthesis Workshop, Meeting to integrate datasets and to synthesize conceptual and empirical models of oceanic spreading center processes, 30 Sep. 2009.

JOURNAL REVIEWS

Annales de Limnologie – International Journal of Limnology

Biogeochemistry

Environmental Science & Technology

Geobiology

Geochemistry, Geophysics, Geosystems

Geophysical Research Letters

IEEE Journal of Ocean Engineering

International Journal of Offshore and Polar Engineering

Journal of Environmental Management

Limnology & Oceanography

Marine Chemistry

Spectroscopy Letters

PROPOSAL REVIEWS

NSF Ocean Technology and Interdisciplinary Coordination

NSF Hydrological Sciences

NSF Chemical Oceanography

NSF Ocean Acidification

COURSES TAUGHT

2001-2002 Teaching Assistant, UT MNS307, Introduction to Oceanography Laboratory

PARTICIPATION IN SCIENTIFIC EXPEDITIONS

2015 M/Y *Alucia* Bikini Atoll, Pacific Ocean (7 days)

2014 E/V *Nautilus* Mississippi and Green Canyons, Gulf of Mexico (9 days)

2013 R/V *Falkor* Mid-Cayman Rise, Caribbean (4 weeks).

2012 R/V *Atlantis* Mid-Cayman Rise, Caribbean (3 weeks).

- 2010 R/V *Atlantis* North Atlantic Ocean (4 weeks).
 2009 R/V *Thomas G. Thompson* Lau Basin/Pacific Ocean (4 weeks).
 2007 R/V *Atlantis* East Pacific Rise (3 weeks).
 2004 R/V *Kilo Moana* Lau Basin/Pacific Ocean (6 weeks).
 2002 R/V *Longhorn* Gulf of Mexico shelf transect (3 days).

PUBLICATIONS

1. Govindarajan, A.F., J. Pineda, M. Purcell, J.A. **Breier**, 2015, Species- and stage-specific barnacle larval distributions obtained from AUV sampling and genetic analysis in Buzzards Bay, Massachusetts, USA, *Journal of Experimental Marine Biology and Ecology*, 472, 158-165, <http://dx.doi.org/10.1016/j.jembe.2015.07.012>.
2. Anantharaman, K., J.A. **Breier**, G.J. Dick, 2015. Metagenomic resolution of microbial functions in deep-sea hydrothermal plumes across the Eastern Lau Spreading Center. *The ISME Journal*, doi:10.1038/ismej.2015.81.
3. Reed, D.C., **Breier**, J.A., Jiang, J., Anantharaman, K., Klausmeier, C.A., Toner, B.M., Hancock, C., Speer, K., Thurnherr, A.M., Dick, G.J., Predicting the response of the deep-ocean microbiome to geochemical perturbations by hydrothermal vents, *The ISME journal*, 2015, doi:10.1038/ismej.2015.4
4. Sheik, C.S., Anantharaman, K., **Breier**, J.A., Sylvan, J.B., Edwards, K.J., Dick, G.J., Spatially resolved sampling reveals dynamics of microbial community assembly in rising hydrothermal plumes across a back-arc basin, *The ISME Journal*, accepted.
5. **Breier**, J.A., Sheik, C.S., Gomez-Ibanez, D., Sayre-McCord, R.T., Sanger, R., Rauch, Colemam, C.M., Bennett, S.A., Cron, B.R., Li, M., German, C.R., Toner, B.M., Dick, G.J., A large volume particulate and water multi-sampler with in situ preservation for microbial and biogeochemical studies, *Deep Sea Research Part I: Oceanographic Research Papers*, published online 6 September 2014, doi:10.1016/j.dsr.2014.08.008.
6. Jiang, H., **Breier**, J., Physical controls on mixing and transport within rising submarine hydrothermal plumes: A numerical simulation study, *Deep Sea Research Part I: Oceanographic Research Papers*, published online 27 June 2014, doi:10.1016/j.dsr.2014.06.006.
7. Anantharaman, K. Duhaime, M.B., **Breier**, J.A., Wendt, K., Toner, B.M., Dick, G.J., 2014. Sulfur oxidation genes in diverse deep-sea viruses, *Science*, published online 1 May 2014 doi:10.1126/science.1252229.
8. Li, M., Toner, B., Baker, B., **Breier**, J., Sheik, C., Dick, G., 2014. Microbial iron uptake as a mechanism for dispersing iron from deep-sea hydrothermal vents, *Nature Communications*, 5: 3192, doi:10.1038/ncomms4192.
9. Anantharaman, K., **Breier**, J.A., Sheik, C.S., Dick, G.J., 2013. Evidence for hydrogen oxidation and metabolic plasticity in widespread deep-sea sulfur-oxidizing bacteria. *Proceedings of the National Academy of Sciences* 110, 330-335, doi:10.1073/PNAS.1215340110.
10. Peterson, R.N., **Breier**, J.A., Harmon, L.R., Brusa, J., Hutchins, P.R., 2013. Development of a sparging chamber for field radon analysis. *Journal of Radioanalytical and Nuclear Chemistry* 298, 1347-1357, doi:10.1007/s10967-013-2589-5.
11. **Breier**, J.A., Gomez-Ibanez, D., Reddington, E., Huber, J.A., Emerson, D., 2012. A precision multi-sampler for deep-sea hydrothermal microbial mat studies. *Deep Sea Research Part I: Oceanographic Research Papers* 70, 83-90, doi:10.1016/J.DSR.2012.10.006.

12. **Breier**, J.A., B.M. Toner, S.C. Fakra, M.A. Marcus, S.N. White, A.M. Thurnherr, and C.R. German, 2012, Sulfur, sulfides, oxides, and organic matter aggregated in submarine hydrothermal plumes at 9° 50' N East Pacific Rise, *Geochimica Cosmochimica Acta* 88, 216-236, doi:10.1016/J.GCA.2012.04.003.
13. Holden, J.F., J.A. **Breier**, K.L. Rogers, M.D. Schulte, and B.M. Toner, 2012, Biogeochemical processes at hydrothermal vents: Microbes and minerals, bioenergetics, and carbon fluxes. *Oceanography* 25(1), 196–208, doi:/10.5670/OCEANOGRAPHY.2012.18.
14. **Breier**, J.A., C.F. Breier, and H.N. Edmonds, 2010, Seasonal dynamics of dissolved Ra isotopes in the semi-arid bays of south Texas, *Marine Chemistry*, 122, 39-50, doi:/10.1016/J.MARCHEM.2010.08.008,
15. **Breier**, J.A., S.N. White, and C.R. German, 2010, Mineral–microbe interactions in deep-sea hydrothermal systems: a challenge for Raman spectroscopy, *Philosophical Transactions of the Royal Society A*, 368, 3067-3086, doi:10.1098/RSTA.2010.0024.
16. **Breier**, J.A., C.R. German, and S.N. White, 2009, Mineral phase analysis of deep-sea hydrothermal particulates by a Raman spectroscopy expert algorithm: Towards autonomous in situ exploration and experimentation, *Geochemistry, Geophysics, and Geosystems*, 10, Q05T05, doi:/10.1029/2008GC002314.
17. **Breier**, J.A., N. Nidziko, S. Monismith, W. Moore, and A. Paytan, 2009, Tidally regulated chemical fluxes across the sediment–water interface in Elkhorn Slough, California: Evidence from a coupled geochemical and hydrodynamic approach, *Limnology & Oceanography*, 54(6), 1964-1980, doi:/10.4319/LO.2009.54.6.1964
18. **Breier**, J.A., C.R. Rauch, K. McCartney, B.M. Toner, S. Fakra, S.N. White, and C.R. German, 2009, A suspended-particle rosette multi-sampler for discrete biogeochemical sampling in low-particle-density waters, *Deep Sea Research I*, 56, 1579-1589, doi:/10.1016/J.DSR.2009.04.005.
19. **Breier**, J.A. and H.N. Edmonds, 2007, High ²²⁶Ra and ²²⁸Ra activities in Nueces Bay, Texas indicate large submarine saline discharges, *Marine Chemistry*, 103, 131-145, doi:/10.1016/J.MARCHEM.2006.06.015
20. **Breier**, J.A., C.F. Breier, and H.N. Edmonds, 2005, Detecting submarine groundwater discharge with synoptic surveys of sediment resistivity, radium, and salinity, *Geophysical Research Letters*, 32, L23612, doi:/10.1029/2005GL024639.

WORKS IN PROGRESS

1. Reed, D.C., **Breier**, J.A., Jiang, H., Anantharaman, K., Klausmeier, C.A., Toner, B.M., Hancock, C., Speer, K., Thurnherr, A.M., Dick, G.J., Predicting the response of the deep-ocean microbiome to geochemical perturbations by hydrothermal vents, *The ISME Journal*, in revision.

CONFERENCE PAPERS

1. **Breier**, J. A., C. G. Rauch, and C. R. German, 2007, A suspended particle rosette sampler for investigating hydrothermal plumes, *OCEANS 2007 IEEE Press*, Vancouver, Canada.
2. **Breier** J. A., 2006, The impact of groundwater flows on estuaries, In *Aquifers of the Gulf Coast of Texas*, Report 365, Texas Water Development Board, Austin, Texas, pp. 165-172.

CONFERENCE ABSTRACTS

1. **Breier**, J. A.; Toner, B.; Sheik, C.; Jiang, H. S.; Dick, G., 2014, Deep-sea hydrothermal

- plumes: chemical, microbial, and physical controls on mass and energy transfer between the lithosphere and the ocean, Abstract 16559 presented at 2014 *AGU Ocean Sciences Meeting*.
2. Reed, D. C., **Breier**, J. A., Jiang, H., Klausmeier, C. A., Dick, G. J., Coupled microbial-geochemical dynamics in a model deep-sea hydrothermal plume, Abstract 16166 presented at 2014 *AGU Ocean Sciences Meeting*.
 3. Gomez-Ibanez, D., McCartney, K., German, C., Yoerger, D., **Breier**, J., Recent advances in geochemical and biological sampling instrumentation: from remote and autonomous vehicles to the *Clio* biogeochemical profiler, Abstract 16609 presented at 2014 *AGU Ocean Sciences Meeting*.
 4. Dick, G., Li, M., Toner, B.M., Cron-Kamermans, B., Baker, B.J., **Breier**, J.A., Sheik, C.S., 2013, The geomicrobiology of iron in deep-sea hydrothermal plumes, Abstract B14B-04 presented at 2013 Fall Meeting, AGU, San Francisco, Calif., 9-13 Dec. *Invited*.
 5. **Breier**, J.A., B. Toner; C. Sheik; K. Anantharaman; J. B. Sylvan, K. J. Edwards, P. R. Girguis; K. Wendt, J. Sorensen, A. Madison, G. W. Luther, H. Jiang, G. Dick, 2012, Linking hydrothermal plume geochemistry with deep-sea microbial community structure along the Eastern Lau Spreading Center, Abstract B44B-05 presented at 2012 Fall Meeting, AGU, San Francisco, Calif., 3-7 Dec.
 6. Dick, G., J.A. **Breier**, B.M. Toner, C. Sheik, B.R. Cron, M. Li, D.R. Reed, K. Anantharaman, B.J. Baker, S. Jain, C.A. Klausmeier, H. Jiang, C.R. German, J. Seewald, S.P. Sylva, J.M. McDermott, S.A. Bennett, 2012, Microbial geochemistry in rising plumes of two hydrothermal vents at the Mid-Cayman Rise, Abstract OS22B-05 presented at 2012 Fall Meeting, AGU, San Francisco, Calif., 3-7 Dec, *Invited*.
 7. Huber, J.A., J. Reveillaud, E. Reddington, J.M. McDermott, S.P. Sylva, J.A. **Breier**, C.R. German, J. Seewald, 2012, Subseafloor Microbial Life in Venting Fluids from the Mid Cayman Rise Hydrothermal System, Abstract B41F-03 presented at 2012 Fall Meeting, AGU, San Francisco, Calif., 3-7 Dec, *Invited*.
 8. Cron, B.R., B.M. Toner, S.A. Bennett, C.R. German, G. Dick, J.A. **Breier**, 2012, The spatial distribution and speciation of iron in buoyant hydrothermal plumes of the Mid-Cayman Rise, Abstract OS13B-1741 presented at 2012 Fall Meeting, AGU, San Francisco, Calif., 3-7 Dec.
 9. **Breier**, J.A., O.N. Osicki, K. Wendt, J.V. Sorenson, B. Toner, K. Anantharaman, G. Dick, H. Jiang, 2012, Distribution of chemical energy in a rising hydrothermal plume of the Lau Basin, Abstract 11943 presented at 2012 *AGU Ocean Sciences Meeting*.
 10. Toner, B.M., J.A. **Breier**, K.J. Edwards, S.C. Fakra, C.R. German, M.A. Marcus, O.J. Rouxel, 2012, Measuring the speciation of iron in hydrothermal plume particles, Abstract presented at 2012 *Goldschmidt Conference*.
 11. **Breier**, J.A., O. Osicki, H. Jiang, K. Anantharaman, G. Dick, Wendt, K., Sorenson, J.V., B. Toner, 2011, Mineral formation and trace element uptake in rising hydrothermal plumes of the Lau basin, Abstract OS23B-01 presented at 2011 Fall Meeting, AGU, San Francisco, Calif., 5-9 Dec.
 12. Jiang, H., J.A. **Breier**, G. Dick, B. Toner, 2011, Computational fluid dynamics simulation of the rising portion of a seafloor hydrothermal plume, Abstract OS11B-1472 presented at 2011 Fall Meeting, AGU, San Francisco, Calif., 5-9 Dec.
 13. Sorenson, J.V., B. Toner, G. Dick, J.A. **Breier**, H. Jiang, 2011, Major and trace-element speciation in deep-sea hydrothermal plumes of Eastern Lau Spreading Center, Abstract OS23B-02 presented at 2011 Fall Meeting, AGU, San Francisco, Calif., 5-9 Dec.
 14. Wendt K., K. Anantharaman, J.A. **Breier**, G.J. Dick, K.J. Edwards, P.R. Girguis, J.V.

- Sorensen, J. Sylvan, B. M. Toner, 2011, Biogeochemical patterns and processes in buoyant, deep-sea hydrothermal plumes, Abstract presented at 2011 *Goldschmidt* Conference.
15. **Breier**, J. A., S. N. White, and C. R. German, 2010, Applications and challenges for the application of Raman spectroscopy in deep-sea hydrothermal systems, *GeoRaman 2010*, *invited plenary speaker*.
 16. **Breier**, J. A., K. Anantharaman, B. M. Toner, and G. J. Dick, 2010, Biotic-abiotic interactions in deep-sea hydrothermal plumes, Abstract presented at 2010 *Goldschmidt* Conference.
 17. **Breier**, J.A., K. Anantharaman, J.B. Sylvan, S.N. White, K.J. Edwards, G. Dick, B.M. Toner, 2010, Early-stage hydrothermal particle formation along the Eastern Lau Spreading Center *Eos Trans. AGU*, 91(26), Ocean Sci. Meet. Suppl., Abstract IT45G-12.
 18. Toner, B.M., S.C. Fakra, M.A. Marcus, O. Rouxel, K.J. Edwards, C.R. German, J.A. **Breier**, 2009, Integrated biogeochemistry of mid-ocean ridge hydrothermal plumes (Invited), *Eos Trans. AGU*, 90(52), Fall Meet. Suppl., Abstract OS12A-01.
 19. **Breier**, J.A., B. Toner, S.J. Manganini, and C.R. German, 2008, Hydrothermal plume particles deconstructed: evidence of biotic and abiotic interactions in particle formation at 9N East Pacific Rise, *Eos Trans. AGU*, 89(53), Fall Meet. Suppl., Abstract B21A-0339.
 20. **Breier**, J. A., N. Nidzicko, S. Monismith, and A. Paytan, 2006, Quantifying seawater recirculation through subtidal estuarine sediments in Elkhorn Slough, California: coupling Ra isotope geochemistry with hydrodynamic modelling, *Eos Trans. AGU*, 87(52), Fall Meet. Suppl., Abstract B22C-08.
 21. **Breier**, J. A., C. F. Breier, and H.N. Edmonds, 2006, Regional-scale investigation of submarine discharge to Texas bays, *Eos Trans. AGU*, 87(36), Ocean Sciences Meet. Suppl., Abstract OS14A-05.
 22. **Breier**, J.A., Jr., and H.N. Edmonds, 2005. Continuous sediment resistivity profiling with synoptic dissolved ^{226}Ra , ^{228}Ra , ^{224}Ra , ^{223}Ra and surface salinity measurements detect and characterize submarine discharges to Nueces Bay, Texas. *The Geological Society of America*, 37, Fall Meeting, Abstract 211-12.
 23. **Breier**, J.A., Jr. and H.N. Edmonds, 2005. Seawater circulation in coastal sediments. *Texas Bays and Estuaries*, Annual Meeting.
 24. **Breier**, J.A., Jr. T.A. Villareal, and H.N. Edmonds, 2004. Radium derived groundwater fluxes and nutrient inputs to Nueces Bay, Texas. *EOS, Trans. AGU*, 84(52), 84(52), Ocean Sciences Meet. Suppl., Abstract OS21D-05.
 25. Edmonds, H. N., C. R. German, J. A. **Breier**, D. P. Connelly, A. Townsend-Small, J. A. Resing, C. Aumack, E. T. Baker, and C. H. Langmuir, 2004. Plume mapping and shipboard chemical data used to locate new vent sites in the Lau Basin. *EOS, Trans. AGU*, 85(47), Fall Meet. Suppl., Abstract B13A-0191.
 26. **Breier**, J.A., Jr., H.N. Edmonds, T.A. Villareal, 2002. Measuring groundwater inflow to Nueces Bay using natural radium isotopes as tracers. *National Estuarine Research Reserve System 2003 Spring Symposium*
 27. **Breier**, J.A., Jr., H.N. Edmonds, T.A. Villareal, and L. Tinnin, 2002. Groundwater and nutrient infiltration in an inverse estuary: Nueces Bay, Texas. *The Geological Society of America*, 34, Fall Meeting, Abstract 156-7.
 28. Edmonds, H.N., J.A. **Breier**, and C.R. German, 2002. Particle geochemistry and radionuclides in the Edmond and Kairei hydrothermal plumes, Indian Ocean: Preliminary results. *EOS, Trans. AGU*, 84(4), Ocean Sciences Meet. Suppl., Abstract OS31F-103.

PUBLICATIONS (non-peer reviewed)

1. **Breier**, J.A., H.N. Edmonds, and T.A. Villareal, 2004, Submarine groundwater discharge and associated nutrient fluxes to the Corpus Christi Bay system, *Report 2002483416*, 54 pp., Texas Water Development Board, Austin, TX.

INVITED SEMINARS

1. The University of Texas Pan American, Biological Sciences, October, 2014.
2. Nautilus Science Communication Workshop, University of Rhode Island, 2014, Gulf Integrated Spill Research: SEEP 2014 Expedition.
3. Deep Ocean Exploration Institute, Woods Hole Oceanographic Institution, Board of Trustees Meeting 2012, Exploring the Limits of Life: Chemosynthesis in the Deep Sea.
4. Woods Hole Oceanographic Institution, Applied Ocean Physics & Engineering, April, 2008. Forward Deployed Suspended Particle Sampling and In Situ Analysis.
5. The University of New Hampshire, Earth Sciences Department, March 30, 2007. Quantifying porewater and surface water exchange with Ra isotopes: a complete hydrology of a shallow estuary.
6. Aquifers of the Gulf Coast of Texas Conference, Texas Water Development Board, 2006. The impact of groundwater flows on estuaries.
7. The University of Texas at Austin, Environmental Science Institute, October 25, 2002. The Dynamics of groundwater inflow and coastal nutrient supply: A study of Nueces Bay, Texas

COLLABORATORS & OTHER AFFILIATIONS:

Collaborators and Co-Editors (previous 48 months)

Karthik Anantharaman (Univ. California Berkeley), Brett Baker (UT Austin), Greg Dick (Univ. Michigan Ann Arbor), Dave Emerson (Bigelow Laboratory for Ocean Sciences), Meg Estapa, (Skidmore), Sirine Fakra (Lawrence Berkeley National Lab), Annette Govindarajan (WHOI), Julie Huber (Marine Biological Laboratory), Mike Jakuba (WHOI), Scott Jarrod (Bigelow Laboratory for Ocean Sciences), Houshuo Jiang (WHOI), Meng Li (The Institute for Advanced Study of Shenzhen University), George Luther (University of Delaware), Mathew Marcus (Lawrence Berkeley National Lab), Jesus Pineda (WHOI), Rick Peterson (Coastal Carolina University), Bernhard Peucker-Ehrenbrink (WHOI), Mike Purcel (WHOI), Daniel Reed (Washington State University), Mak Saito (WHOI), Cody Sheik (Univ. Minnesota Duluth), Hanu Singh (WHOI), Kevin Speer (Florida State University), Jason Sylan (Texas A&M University), Andreas Thurnherr (LDEO), Brandy Toner (UMN-Twin Cities), Dana Yoerger (WHOI) – 27 collaborators

Graduate Advisors and Postdoctoral Sponsors (Total = 4)

Ph.D. ADVISOR: H. Edmonds, The University of Texas at Austin.

Postdoctoral Advisors: A. Paytan (UC Santa Cruz), C. German (Woods Hole Oceanographic Institution), S. White (Woods Hole Oceanographic Institution)

Graduate students or postdoctoral scholars advised (Total = 0)