

## CURRICULUM VITAE – JOHN “CHIP” BREIER

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Applied Ocean Physics & Engineering  
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### PROFESSIONAL APPOINTMENTS & EXPERIENCE

2008-present Woods Hole Oceanographic Institution, Assistant Scientist  
2006-2008 Woods Hole Oceanographic Institution, NSF RIDGE2000 Postdoctoral Fellow  
2006 Stanford University, Postdoctoral Researcher,  
2001-2006 The University of Texas at Austin, Marine Science, Research Assistant  
2001-2003 Naval Reserve, Naval Research Laboratory Science & Technology Unit 510  
2000 Licensed as a Professional Engineer.  
1996 DOE Bettis Atomic Power Laboratory, Reactor Engineering School, Student  
1995-2000 United States Navy, Officer, Naval Reactors, Nuclear Power Engineer  
1993 Lockheed Martin, Summer Engineering Intern.

### EDUCATION

Ph.D. (2006) The University of Texas at Austin Department of Marine Science  
B.S. cum laude (1995) Texas A&M University Mechanical Engineering

### 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

Earth system biogeochemical cycles and their relationship to dynamic ocean processes – hydrothermal processes along the mid-ocean ridge and related tectonic and volcanic features, the dynamics of riverine and coastal aquifer chemistry, mineral formation and chemical reactivity, mineral and microbe interactions, chemical energy available for chemosynthesis

### PROFESSIONAL AFFILIATIONS

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

### PROFESSIONAL ACTIVITIES

- WHOI Deep Ocean Exploration Institute, Advisory Committee member.
- 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.

- Senior Design Clinic Sponsor (2009 & 2010), 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.
- WHOI, AOP&E Department, Postdoctoral Mentoring Committee member.

## JOURNAL REVIEWS

Annales de Limnologie – International Journal of Limnology

Biogeochemistry

Geochemistry, Geophysics, Geosystems

Geophysical Research Letters

IEEE Journal of Ocean Engineering

Journal of Environmental Management

Limnology & Oceanography

Marine Chemistry

Spectroscopy Letters

## COURSES TAUGHT

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

## PARTICIPATION IN SCIENTIFIC EXPEDITIONS

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. **Breier**, J.A., D. Gomez-Ibanez, E. Reddington, J.A. Huber, and D. Emerson, *Submitted*, A precision multi-sampler for deep-sea hydrothermal microbial mat studies, *Deep Sea Research I*.
2. **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.
3. 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.
4. **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,
5. **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.

6. **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.
7. **Breier**, J.A., N. Nidzieko, 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
8. **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.
9. **Breier**, J.A. and H.N. Edmonds, 2007, High <sup>226</sup>Ra and <sup>228</sup>Ra activities in Nueces Bay, Texas indicate large submarine saline discharges, *Marine Chemistry*, 103, 131-145, doi:/10.1016/J.MARCHEM.2006.06.015
10. **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.

#### 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. 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.
2. **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.
3. 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.
4. 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.
5. 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.
6. **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.

7. **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.
8. **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.
9. 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.
10. **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.
11. **Breier**, J. A., N. Nidziko, 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.
12. **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.
13. **Breier**, J.A., Jr., and H.N. Edmonds, 2005. Continuous sediment resistivity profiling with synoptic dissolved  $^{226}\text{Ra}$ ,  $^{228}\text{Ra}$ ,  $^{224}\text{Ra}$ ,  $^{223}\text{Ra}$  and surface salinity measurements detect and characterize submarine discharges to Nueces Bay, Texas. *The Geological Society of America*, 37, Fall Meeting, Abstract 211-12.
14. **Breier**, J.A., Jr. and H.N. Edmonds, 2005. Seawater circulation in coastal sediments. *Texas Bays and Estuaries*, Annual Meeting.
15. **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.
16. 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.
17. **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*
18. **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.
19. 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. Deep Ocean Exploration Institute, Woods Hole Oceanographic Institution, Board of Trustees Meeting 2012, Exploring the Limits of Life: Chemosynthesis in the Deep Sea.
2. Woods Hole Oceanographic Institution, Applied Ocean Physics & Engineering, April, 2008. Forward Deployed Suspended Particle Sampling and In Situ Analysis.
3. 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.
4. Aquifers of the Gulf Coast of Texas Conference, Texas Water Development Board, 2006. The impact of groundwater flows on estuaries.
5. 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 IN PAST 48 MONTHS:**

**WHOI:** C.F. Breier, T. Eglinton, C.R. German, H. Jiang, B. Peucker-Ehrenbrink, H. Singh, S.N. White, D. Yoerger

**Outside WHOI:** G. J. Dick (U. Michigan), D. Emerson (Bigelow Laboratory for Ocean Sciences), S. Fakra (Lawrence Berkeley National Lab), B. Glazer (UH), M. Marcus (Lawrence Berkeley National Lab), R. Peterson (Coastal Carolina University), A. M. Thurnherr (LDEO), B. Toner (UMN – Twin Cities)

**POSTDOCTORAL ADVISORS:** Adina Paytan (UC Santa Cruz), Chris German (Woods Hole Oceanographic Institution), Sheri White (Woods Hole Oceanographic Institution)

**Ph.D. ADVISOR:** Hedy Edmonds, The University of Texas at Austin (currently NSF).