

CURRICULUM VITAE - *Stefan M. Sievert*

Stefan M. Sievert

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EDUCATION

1999 Ph.D. (summa cum laude), Microbial Ecology, Max-Planck-Institute for Marine Microbiology (MPI-MM) and University of Bremen, Germany.

1996 M.S., (Diplom), Biological Oceanography, Alfred-Wegener Institute for Polar- and Marine Research and University of Bremen, Germany.

1992/93 Visiting graduate student (Fulbright Grantee), University of Washington (WA).

1990 B.S. (Vordiplom), Biology, Johannes Gutenberg-University, Mainz, Germany.

PROFESSIONAL EXPERIENCE

2012 – Associate Scientist w/ Tenure, Woods Hole Oceanographic Institution (WHOI)

2007 – 2012 Associate Scientist, WHOI

2002 – 2006 Assistant Scientist, WHOI

2002 Postdoctoral Investigator, WHOI

2000 – 2002 Postdoctoral Scholar, WHOI

1999 – 2000 Postdoctoral Investigator, MPI-MM, Bremen, Germany

RESEARCH INTERESTS

Composition, diversity, and function of microbial communities, with the goal to understand the relationship between microorganisms and their biogeochemical transformations. Special interests include chemosynthetic processes that are important in a variety of environments, such as hydrothermal systems, oxygen minimum zones, and sulfidic marine sediments. An emphasis is on organisms involved in sulfur cycling, and the evolution and ecological importance of CO₂-fixation pathways other than the Calvin-Benson-Bassham cycle.

HONORS AND AWARDS

2010 Senior Fellowship of the Alfried Krupp Wissenschaftskolleg Greifswald (Institute for Advanced Studies), Greifswald, Germany.

2004 Fellowship of the Hanse Wissenschaftskolleg (Institute for Advanced Studies), Delmenhorst, Germany

2000 Postdoctoral Scholar Award in Ocean Science and Engineering, WHOI

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1992 Fulbright Scholarship, visiting graduate student at the School of Oceanography, University of Washington, Seattle, WA, sponsor: Prof. John A. Baross

CRUISE PARTICIPATION

Brazilian Antarctic Program Interbiota Operantar XXXIV, Southern Ocean, Western Antarctic Peninsula, Brazilian research vessel *Npo. Almirante Maximiano* (H41), February - March 2016. Chief Scientist: Eduardo Secchi

Dark Life - Expedition to Study Seafloor Life at Deep-Sea Vents (AT26-23). 9-10°N East Pacific Rise (EPR) R/V *Atlantis* and HOV *Alvin*, Nov 2, 2014 – Nov 26, 2014, *Alvin* Dives 4761 – 4776. Chief Scientist: Stefan Sievert, WHOI. <http://web.whoi.edu/darklife/>

Dark Life at Deep-sea Vents (AT26-10), 9-10°N East Pacific Rise (EPR) R/V *Atlantis* and ROV *Jason*, Dec 29, 2013 – Jan 26, 2014, *Jason II* Dives 758 – 762. Chief Scientist: Stefan Sievert, WHOI. <http://www.divediscover.whoi.edu/expedition15/index.html>

DOBS cruise, R/V *Endeavor*, July 23 – Aug 9, 2012. Chief Scientist: Stefan Sievert, WHOI

MESCAL leg 1, 9-10°N East Pacific Rise (EPR), N/O *L'Atalante* & DSV *Nautile*, April 27-May 2010, DSV *Nautile* dives 1726-1730. Chief Scientist: Nadine Le Bris, Observatoire Océanologique de Banyuls sur mer, France.

FIX08-II (AT15-38), Guaymas Basin and 9-10°N EPR, R/V *Atlantis* & DSV *Alvin*, Oct 13-Nov 5 2008, DSV *Alvin* dives 4457-4469. Chief scientist: Stefan Sievert, WHOI.

FIX08-I (AT15-28), 9-10°N and 13°N EPR, R/V *Atlantis* & DSV *Alvin*, Dec 28 2007-Jan 19 2008, DSV *Alvin* dives 4457-4469. Chief scientist: Stefan Sievert, WHOI. <http://www.interridge.org/node/5363>

AT15-25, Guaymas Basin, R/V *Atlantis* & DSV *Alvin*, Oct 18-28 2007. DSV *Alvin* dives 4355-4359. Chief Scientist: Costantino Vetriani, Rutgers University.

AT15-15, 9-10°N EPR, R/V *Atlantis* & DSV *Alvin*, Jan-Feb 7 2007, DSV *Alvin* dives 4297-4318. Chief Scientist: Timothy Shank, WHOI.

RESET06 (AT15-06), 9-10°N EPR, R/V *Atlantis* & DSV *Alvin*, June 18-July 7 2006, DSV *Alvin* dives 4201-4207. Chief Scientist: Karen von Damm, University of New Hampshire. Our project contributed two *Alvin* dives to this community driven rapid response cruise to study the aftermath of the '05/'06 eruption.

EXTREME 2002, 9-10°N EPR, R/V *Atlantis* & DSV *Alvin*, Oct 20-Nov 12 2002. Chief Scientist: Craig Cary, University of Delaware.

Hydrothermal Fluxes and Biological Production in the Aegean and Fluxes in the Anoxic Basins of the Mediterranean Ridge (M40/2), Dec 2 – Dec 23, 1998, R/V *Meteor*, Chief Scientist: Peter Linke, IfM-Geomar Kiel, Germany.

PUBLICATIONS

46. Mino, S., S. Nakagawa, H. Makita, T. Toki, J. Miyazaki, **S. M. Sievert**, M. Polz, F. Inagaki, A. Godfroy, S. Kato, H. Watanabe, T. Nunoura, K. Nakamura, H. Imachi, T. Watsuji, S. Kojima, K. Takai, T. Sawabe. Endemicity of the cosmopolitan mesophilic

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- chemolithoautotroph *Sulfurimonas* at deep-sea hydrothermal vents. Accepted at ISME Journal.
45. McNichol, J., S. P. Sylva, Fr. Thomas, C. D. Taylor, **S. M. Sievert**, and J. S. Seewald. 2016. Assessing microbial processes in deep-sea hydrothermal systems by incubation at in situ temperature and pressure. *Deep-Sea Research Part 1* 155:221-232.
 44. He, Y., M. Li, V. Perumal, X. Feng, J. Fang, J. Xie, **S. M. Sievert**, F. Wang. 2016. Genomic and enzymatic evidence for acetogenesis among multiple lineages of the archaeal phylum Bathyarchaeota widespread in marine sediments. *Nature Microbiology* 1. Article number 16035.
 43. Gulmann, L. K., S. E. Beaulieu, T. M. Shank, K. Ding, W. E. Seyfried, and **S. M. Sievert**. 2015. Bacterial diversity and successional patterns during biofilm formation on freshly exposed basalt surfaces at diffuse-flow deep-sea vents. *Frontiers in Microbiology – Extreme Microbiology* doi: 10.3389/fmicb.2015.00901
 42. Signori, C. N., F. Thomas, A. Enrich-Prast, R. C. G. Pollery, and **S. M. Sievert**. 2014. Microbial diversity and community structure across environmental gradients in Bransfield Strait, Western Antarctic Peninsula. *Frontiers in Microbiology - Aquatic Microbiology*, 5:647
 41. Honjo, S., T. I. Eglinton, C. D. Taylor, K. M. Ulmer, **S. M. Sievert**, A. Bracher, C. R. German, V. Edgcomb, R. Francois, M. D. Iglesias-Rodriguez, B. van Mooy, and D. J. Repeta. 2014. Understanding the role of the biological pump in the global carbon cycle: An imperative for ocean science. *Oceanography* 27(3):10–16
 40. Thomas, F., A. E. Giblin, Z. G. Cardon, and **S. M. Sievert**. 2014. Rhizosphere heterogeneity shapes abundance and activity of sulfur-oxidizing bacteria in vegetated salt marsh sediments. *Frontiers in Microbiology - Terrestrial Microbiology*, 24 June 2014, 5:309
 39. Zhang Y., and **S. M. Sievert**. 2014. Pan-genome analyses identify lineage- and niche-specific markers of evolution and adaptation in Epsilonproteobacteria. *Frontiers in Microbiology - Evolutionary and Genomic Microbiology*, March 19 2014, 5:110
 38. Rinke C., P. Schwientek, A. Sczyrba, N. N. Ivanova¹, I. J. Anderson, J.-F. Cheng, A. Darling, S. Malfatti, B. K. Swan, E. A. Gies, J. A. Dodsworth, B. P. Hedlund, G. Tsiamis, **S. M. Sievert**, W.-T. Liu, J. A. Eisen, S. J. Hallam, N. C. Kyrpides, R. Stepanauskas, E. M. Rubin, P. Hugenholtz, and T. Woyke. 2013. Insights into the phylogeny and coding potential of microbial dark matter. *Nature* 499:431-437.
 37. Yücel, M., **S. M. Sievert**, C. Vetriani, D. I. Foustoukos, D. Giovannelli, and N. Le Bris. 2013. Eco-geochemical dynamics of a shallow-water hydrothermal vent system at Milos Island, Aegean Sea (Eastern Mediterranean). *Chemical Geology* 356:11-20.
 36. **Sievert, S. M.**, and C. Vetriani. 2012. Chemoautotrophic at deep-sea vents: Past, Present, and Future. *Oceanography Magazine* 25(1): 218-233.
 35. Gardebrecht A., S. Markert, **S. M. Sievert**, H. Felbeck, A. Thürmer, D. Albrecht, A. Wollherr, J. Kabisch, N. Le Bris, R. Lehmann, R. Daniel, H. Liesegang, M. Hecker, T. Schweder. 2011. Comparative proteogenomics reveals physiological homogeneity among endosymbionts of the deep-sea vent tubeworms *Riftia pachyptila* and *Tevnia jerichonana*. *ISME Journal*. 6: 766-776.

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34. Smith A., M. Fisk, M. Nielsen, C. G. Wheat, H. W. Jannasch, A. T. Fisher, K. Becker, **S. M. Sievert**, G. Flores, and R. Popa. 2011. *In situ* enrichment of ocean crust microbes on igneous minerals and glasses using an osmotic flow-through device. *Geochemistry, Geophysics, Geosystems* 12 (6) doi:10.1029/2010GC003424
33. Markert S., A. Gardebrecht, H. Felbeck, **S. M. Sievert**, A. Thürmer, D. Becher, J. Klose, D. Albrecht, A. Wollherr, R. Daniel, M. Kleiner, M. Hecker, T. Schweder. 2011. Status quo in physiological proteomics of *Endoriftia persephone*, the uncultured endosymbiont of the giant tubeworm *Riftia pachyptila*. *Proteomics* 11:3106-3117.
32. Hügler M, and **S. M. Sievert**. 2011. Beyond the Calvin Cycle: Autotrophic Carbon Fixation in the Ocean. *Annual Review of Marine Science*. Vol. 3:261-289.
31. Foustoukos D. I., J. L. Houghton, W. E. Seyfried Jr., **S. M. Sievert**, and G. D. Cody. 2011. Kinetics of H₂-H₂O redox equilibria and formation of metastable H₂O₂ under low temperature hydrothermal conditions. *Geochimica et Cosmochimica Acta* 75:1594-1607.
30. Hügler M., J. M. Petersen, N. Dubilier, J. F. Imhoff, and **S. M. Sievert**. 2011. Pathways of carbon and energy metabolism of the epibiotic community associated with the deep-sea hydrothermal vent shrimp *Rimicaris exoculata*. *PLoS One* 6(1): e16018. doi:10.1371/journal.pone.0016018
29. Bühring S. I., **S. M. Sievert**, H. M. Jonkers, T. Ertefai, M. S. Elshahed, L. R. Krumholz, and K.-U. Hinrichs. 2011. Insights into chemotaxonomic composition and carbon cycling of phototrophic communities in an artesian sulfur-rich spring (Zodletone, Oklahoma, USA), a possible analogue for ancient microbial mat systems. *Geobiology* 9:166-179.
28. Xie W., F. Wang, L. Guo, Z. Chen, **S. M. Sievert**, J. Meng, G. Huang, Y. Li, Q. Yan, S. Wu, X. Wang, S. Chen, G. He, X. Xiao, and A. Xu. 2011. Comparative metagenomics of microbial communities inhabiting deep-sea hydrothermal vent chimneys with contrasting chemistries. *ISME Journal* 5:414-426.
27. Walker, C. B., J. R. de la Torre, M. G. Klotz, H. Urakawa, N. Pinel, D. J. Arp, C. Brochier-Armanet, P. S. G. Chain, P. P. Chan, A. Golabgir-Anbarani, J. Hemp, M. Hügler, E. A. Karr, M. Könneke, D. Lang, T. Lowe, W. Martens-Habbena, L. A. Sayavedra-Soto, M. Shin, **S. M. Sievert**, A. C. Rosenzweig, G. Manning, and D. A. Stahl. 2010. The *Nitrosopumilus maritimus* genome reveals unique mechanisms for nitrification and autotrophy in globally distributed marine Archaea. *Proc. Natl. Acad. Sci.* 107:8818-8823.
26. Ehrhardt, C. J., R. M. Haymon, **S. M. Sievert**, and P. A. Holden. 2009. An improved method for nanogold *in situ* hybridization visualized with environmental scanning electron microscopy. *Journal of Microscopy* 236:5-10
25. Voordeckers J. W., M. Do, M. Hügler, V. Ko, **S. M. Sievert**, and C. Vetriani. 2008. Culture dependent and independent analyses of 16S rRNA and ATP citrate lyase genes: a comparison of microbial communities from different black smoker chimneys on the Mid-Atlantic Ridge. *Extremophiles* 12:627-640.

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24. **Sievert S. M.**, K. M. Scott, M. Klotz, et al. 2008. The genome of epsilonproteobacterial chemolithoautotroph *Sulfurimonas denitrificans*. Applied and Environmental Microbiology 74:1145-1156
23. **Sievert, S.M.**, M. Hügler, C. O. Wirsen, and C. D. Taylor. 2008. Sulfur oxidation at deep-sea hydrothermal vents. Pp 238-258 In "Microbial Sulfur Metabolism", C. Dahl & C. G. Friedrich (eds), Springer, Berlin, Germany. ISBN-13 978-3-540-72679-1
22. Kniemeyer O., F. Musat, **S. M. Sievert**, K. Knittel, H. Wilkes, M. Blumenberg, W. Michaelis, C. Bolm, S. B. Joye, and F. Widdel. 2007. Anaerobic oxidation of propane and butane by novel marine sulphate-reducing bacteria. Nature 449:898-901.
21. **Sievert, S. M.**, R. Kiene, and H. Schulz. 2007. The sulfur cycle. The Oceanography Society June '07 special issue "A Sea of Microbes" edited by Lita Procter and David Karl.
20. Tait, E., M. Carman, and **S. M. Sievert**. 2007. Phylogenetic diversity of bacteria associated with ascidians in Eel Pond (Woods Hole, Massachusetts, USA). Journal of Experimental Marine Biology and Ecology. 342:138-146
19. Markert S., C. Arndt, H. Felbeck, R. A. Feldman, D. Becher, **S. M. Sievert**, M. Hügler, D. Albrecht, J. Robidart, S. Bench, M. Hecker, and T. Schweder. 2007. Approaching the uncultivable endosymbiont of *Riftia pachyptila* by physiological proteomics. Science 315:247-250.
18. Hügler M., H. Huber, S. J. Molyneaux, C. Vetriani, and **S. M. Sievert**. 2007. Autotrophic CO₂ fixation via the reductive tricarboxylic acid cycle in different lineages within the phylum *Aquificae*: Evidence for two ways of citrate cleavage. Environmental Microbiology 9:271-276.
17. **Sievert, S. M.**, E. B. A. Wieringa, C. O. Wirsen, C. D. Taylor. 2007. Growth and mechanism of filamentous-sulfur formation by *Candidatus Arcobacter sulfidicus* in opposing oxygen-sulfide gradients. Environmental Microbiology 9:81-92.
16. Scott, K. M., **S. M. Sievert** et al. The genome of deep-sea vent chemolithoautotroph *Thiomicrospira crunogena* XCL-2. PLoS Biology, Vol. 4, No. 12, e383 doi:10.1371/journal.pbio.0040383
15. Bach, W., K. E. Edwards, J. M. Hayes, J. A. Huber, **S. M. Sievert**, and M. L. Sogin. 2006. Energy in the Dark: Fuel for Life in the Deep Ocean and Beyond. EOS Transactions, American Geophysical Union, Vol. 87, No. 7, 14 February 2006
14. J. D. Tolli, **S. M. Sievert**, and C. D. Taylor. 2006. Unexpected Diversity of Bacteria Capable of Carbon Monoxide Oxidation in a Coastal Marine Environment, and Contribution of the Roseobacter-Associated Clade to Total CO Oxidation. Applied and Environmental Microbiology 72:1966-1973.

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13. Hügler M., C. O. Wirsen, G. Fuchs, C. D. Taylor, and **S. M. Sievert**. 2005. Evidence for autotrophic CO₂ fixation via the reductive tricarboxylic acid cycle by members of the ϵ -subdivision of proteobacteria. *Journal of Bacteriology*, 187: 3020-3027
12. Zemmelink, H. J., L. Houghton, **S. M. Sievert**, N. M. Frew, and J. W. H. Dacey. 2005. Dimethylsulphide, Dimethylsulphonioacetate, Dimethylsulphoxide, and bacteria in the sea-surface microlayer and subsurface water. *Marine Ecology Progress Series*, 295:33-42.
11. Simmons S. L., **S. M. Sievert**, R. B. Frankel, D. A. Bazylinski, and K. J. Edwards. 2004. Spatio-temporal distribution of marine magnetotactic bacteria in a seasonally stratified coastal salt pond. *Appl. Environ. Microbiol.* 70: 6230-6239.
10. Wirsen C. O., **S. M. Sievert**, C. M. Cavanaugh, S. J. Molyneaux, A. Ahmad, L. T. Taylor, E. F. DeLong, and C. D. Taylor. 2002. Characterization of an autotrophic sulfide-oxidizing marine *Arcobacter* that produces filamentous sulfur. *Appl. Environ. Microbiol.*, 68:316-325.
9. Kuever J., **S. M. Sievert**, H. Stevens, T. Brinkhoff, and G. Muyzer. 2002. Microorganisms of the oxidative and reductive part of the sulphur cycle at a shallow-water hydrothermal vent in the Aegean Sea (Milos, Greece). *Cahiers de Biologie Marine* 43: 413-416
8. **Sievert S. M.**, W. Ziebis, J. Kuever, and K. Sahm. 2000. Relative abundance of *Archaea* and *Bacteria* along a thermal gradient quantified by rRNA slot-blot hybridization at a shallow-water hydrothermal vent. *Microbiology*, 146:1287-1293.
7. **Sievert, S. M.**, T. Heidorn, and J. Kuever. 2000. *Halothiobacillus kellyi* sp. nov., a mesophilic obligately chemolithoautotrophic sulfur-oxidizing bacterium isolated from a shallow-water hydrothermal vent in the Aegean Sea and emended description of the genus *Halothiobacillus*. *Int. J. Syst. Evol. Microbiol.*, 50:1229-1237.
6. **Sievert, S. M.**, and J. Kuever. 2000. *Desulfacinum hydrothermale*, sp. nov., a thermophilic sulfate-reducing bacterium from geothermally heated sediments near Milos island (Greece). *Int. J. Syst. Evol. Microbiol.*, 50:1239-1246.
5. **Sievert S. M.**, J. Kuever, and G. Muyzer. 2000. Identification and distribution of 16S rDNA-defined bacterial populations at a shallow submarine hydrothermal vent. *Applied and Environmental Microbiology*, 66:3102-3109.
4. Dando, P. R., S. Aliani, C. N. Bianchi, S. Cocito, S. W. Fowler, J. Gundersen, L. Hooper, R. Kölbl, J. Kuever, P. Linke, K. C. Makropoulos, R. Meloni, J.-C. Miquel, C. Morri, S. Müller, C. R. Robinson, H. Schlesner, **S. Sievert**, R. Stöhr, D. Stüben, M. Thomm, S. P. Varnavas, W. Ziebis. 2000. Hydrothermalism in the Aegean Sea. *Chemistry and Physics of the Earth*, Part B. 25:1-8
3. **Sievert, S. M.**, T. Brinkhoff, G. Muyzer, W. Ziebis, and J. Kuever. 1999. Spatial heterogeneity of bacterial populations along an environmental gradient at a shallow

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submarine hydrothermal vent near Milos island (Greece). Applied and Environmental Microbiology, 65:3834-3842

2. Brinkhoff, T., **S. M. Sievert**, J. Kuever, and G. Muyzer. 1999. Distribution and diversity of sulfur-oxidizing *Thiomicrospira* spp. at a shallow-water hydrothermal vent in the Aegean Sea (Milos, Greece). Applied and Environmental Microbiology, 65:3843-3849.
1. Böttcher, M. E., **S. M. Sievert**, and J. Kuever. 1999. Fractionation of sulfur isotopes during dissimilatory reduction of sulfate by a thermophilic gram-negative bacterium at 60°C. Archive of Microbiology, 172:125-128.

PROFESSIONAL AFFILIATIONS

American Society for Microbiology (ASM), American Society of Limnology and Oceanography (ASLO), American Association for the Advancement of Science (AAAS), American Geophysical Union (AGU), International Society for Microbial Ecology (ISME), Vereinigung für Allgemeine und Angewandte Mikrobiologie e.V. (VAAM)

GRADUATE AND POST DOCTORAL ADVISORS

Advisor during Fulbright: Dr. J. A. Baross (School of Oceanography, UW); Master thesis advisor: Dr. Karin Lochte (AWI Bremerhaven, Germany); Ph.D. adviser: Dr. F. Widdel (MPI Bremen, Germany); Postdoctoral advisors: Dr. C. Taylor, Mr. C. Wirsen (both WHOI), Dr. A. Teske (WHOI, now UNC Chapel Hill)

STUDENTS AND POSTDOCS ADVISED

François Thomas (postdoc, now a CNRS Researcher at Station Biologique de Roscoff, France), Ying Zhang (postdoc, now Assistant Professor at University of Rhode Island), Karyn Rogers (postdoc, co-sponsored w/ J. Seewald, now Assistant Professor at Rensselaer Polytechnic Institute), Lara Gulmann (postdoc), Cornelia Wuchter (postdoc), Michael Hügler (postdoc, now Staff Scientist at Water Technology Center, Karlsruhe, Germany), Jesse McNichol (WHOI/MIT JP graduate student, PhD 2016, now postdoc at The Chinese University of Hong Kong), Kevin Richberg (WHOI/MIT JP graduate student, MSc 2010), Erica Hildebrand (WHOI summer student fellow 09 (SSF), Toby Hammer (WHOI SSF 08) Dorothea Paulssen (WHOI SSF 07), Melissa Duhaime (guest student 05), Elia Tait (WHOI SSF 04, won poster award at ASLO AqSciMtg, 2005), Whitney Krey (WHOI SSF 03, REU 04), Caroline Graeber (guest student 03), Geoffrey Morris (WHOI SSF 02)