CURRICULUM VITAE

JEFFREY S. SEEWALD
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EDUCATION

Ph.D., Geology, 1990, University of Minnesota, Minneapolis, MN
M.Sc., Geology, 1987, University of Minnesota, Minneapolis, MN
B.A., Geology, 1984, Colgate University, Hamilton, NY

PROFESSIONAL EXPERIENCE

Senior Scientist, Woods Hole Oceanographic Institution, 2008 to present
Chair, Marine Chemistry & Geochemistry Dept., WHOI, May 2010 to July 2014
Associate Scientist with tenure, Woods Hole Oceanographic Institution, 2001 to 2008
Associate Scientist, Woods Hole Oceanographic Institution, 1996 to 2001
Assistant Scientist, Woods Hole Oceanographic Institution, 1992 to 1996
Postdoctoral Investigator, Woods Hole Oceanographic Institution, 1991 to 1992
Postdoctoral Scholar, Woods Hole Oceanographic Institution, 1990 to 1991

AWARDS

J. Seward Johnson Chair in Oceanography, WHOI, 2017-present
Stanley W. Watson Chair for Excellence in Oceanography, WHOI, 2015 to 2018
Fellow, Hanse-Wissenschaftskolleg, 2009
Best Paper in Organic Geochemistry for 1994, Geochemical Society

PROFESSIONAL AFFILIATIONS

Geochemical Society
American Geophysical Union
American Chemical Society

RESEARCH INTERESTS

Hydrothermal organic geochemistry
Organic-inorganic interactions during sediment diagenesis
Sediment and basalt alteration processes in subseafloor hydrothermal systems
Petroleum geochemistry
Application of experimental techniques to study naturally occurring geological processes

CRUISE PARTICIPATION

E/V *Nautilus/Hercules*, Guaymus Basin, October 2017
M/V *Alucia/Deep Rover/Nautile,* St. Paul's Rocks, June 2017
R/V *Revelle/Jason II*, Lau Basin, April 2015
R/V *Atlantis/Alvin*, 9-10°N East Pacific Rise, November 2014
E/V *Nautilus/Hercules*, Gulf of Mexico, July 2014

R/V *Atlantis/Jason II*, 9-10°N East Pacific Rise, January 2014
RV *Falkor/Nereus*, Mid-Cayman Trough, June 2013
RV *Atlantis/Jason II,* Mid-Cayman Trough, January 2012
RV *Cape Hatteras/Nereus*, Mid-Cayman Trough, October 2009
RV *Natsushima/Hyperdolphin*, South Chamorro Seamount, January 2009
RV *Atlantis/Alvin*, Guaymas Basin, October 2008.
RV *Revelle/Jason II*, Rainbow/Lucky Strike, Mid-Atlantic Ridge, July 2008.
RV *Melville/Jason II*, Manus Basin, August 2006.
RV *Melville/Jason II*, Lau Basin, April 2005.
RV *Atlantis/Alvin*, 9-10°N East Pacific Rise,, February 2004.
RV *Western Flyer/Tiburon*, Guaymas Basin, March 2003.
Co-Chief Scientist-R/V *Atlantis/Alvin*, Middle Valley & Main Endeavour Vent Field, July 2000.
RV *Atlantis/Alvin*, Main Endeavour Vent Field, Sept. 1999.
RV *Atlantis/Jason*, Jason IX Expedition to Guaymas Basin, April 1998.
RV *Atlantis II/Alvin*, ADVENTURE Cruise to 9-10°N East Pacific Rise, April 1991.

STUDENTS AND POSTDOCS ADVISED:

Niya Grozeva (Ph.D. 2012-present), Jill McDermott (Ph.D. 2014), Eoghan Reeves (Ph.D. 2010), Anna Cruse (Ph.D. 2004), Brian Nelson (M.S.), Karyn Rogers (Postdoc), Giora Proskurowski (Postdoc), Tom McCollom (Postdoc), David Darby (Postdoc), Peter Saccocia (Postdoc), Diane Carney (REU), Charles Labbe (REU), Yea-Ling Ong (REU), Nick Boekelheide (REU), Bill Bird (REU), Justin Snook (REU), Haley Muir (RUI), Doug McLeod (RUI), Adam Schaen (RUI), Seth McFadyen (RUI), Jean Galluccio (RUI), Julia Moore (RUI), Jason MacLean (RUI), Meghan Wert (RUI), Daniel Desousa (RUI), Karen Hurley (RUI), Dane Percy (RUI), Hallie Marbet (RUI), Emily Walsh (RUI), Tom Neilsen (Guest Student), Kerry McCulloch (Guest Student). Tobias Moore (Guest Student).

PEER REVIEWED PUBLICATIONS

[#]indicates first author was a student or postdoc advised by JSS at WHOI during study

Wang D.T, Reeves E.P, McDermott J.M, Seewald J.S., and Ono S. (2017) Clumped isotopologue constraints on the origin of methane at seafloor hot springs. *Geochim. Cosmochim. Acta* (submitted).

[#]McDermott J.M., Sylva S.P., Ono S., German C.R., and Seewald J.S. (2017) Geochemistry of fluids from Earth's deepest ridge-crest hotsprings: Piccard hydrothermal field, Mid-Cayman Rise. *Geochim. Cosmochim. Acta* (in revision).

Wilckens F.K., Reeves E.P., Bach W., Meixner A., Seewald J.S., Koschinsky A., Kasemann S.A. (2017) The influence of magmatic fluids and phase separation on B systematics in submarine hydrothermal vent fluids – case studies from the Manus Basin and Nifonea volcano. *Geochim. Cosmochim. Acta* (in revision).

Anderson R.E., Reveillaud J., Reddington E., Delmont T.O., Eren A.M., McDermott J.M., Seewald J.S., and Huber J.A. (2017) Genomic variation in microbial populations inhabiting the marine subseafloor at deep-sea hydrothermal vents. *Nature Communications*, (in press).

Seewald J.S. (2017) Laboratory simulations of organic geochemical processes at elevated temperatures. *Encyclopedia of Geochemistry: Encyclopedia of Earth Science Series*

(W.M. White, ed.) Springer International Publishing, doi:10.1007/978-3-319-39193-9_164-1

Evans G.N., M.K. Tivey J.S .Seewald C.G. Wheat (2017) Influences of the Tonga Subduction Zone on Seafloor Massive Sulfide Deposits along the Eastern Lau Spreading Center, *Geochim Cosmochim. Acta* **215**, 214-246.

[#]Grozeva N.G., Klein K., Seewald J.S., and Sylva S.P. (2017) Experimental study of carbonate formation in oceanic peridotite. *Geochim. Cosmochim. Acta* **199**, 264-286.

[#]McNichol J., Sylva S.P., Thomas F., Taylor C.D., Sievert S.M., Seewald J.S. (2016) Assessing microbial processes in deep-sea hydrothermal systems by incubation at *in situ* temperature and pressure. *Deep Sea Research Part 1***115**, 221-232.

Wang B., Socolofsky S.A., Breier J.A., and Seewald J.S. (2016) Observations of bubbles in natural seep flares at MC 118 and GC 600 using *in situ* quantitative imaging. *J. Geophys. Res.* **121**, 2203–2230, doi:10.1002/2015JC011452..

Reveillaud J., Reddington E., McDermott J., Algar C., Meyer J.L., Sylva S., Seewald J.S., German C.R., and Huber J.A. (2016) Subseafloor microbial communities in hydrogen-rich vent fluids from hydrothermal systems along the Mid-Cayman Rise. *Environmental Microbiology* **18**, 1970-1987, doi:10.1111/1462-2920.13173.

Wang D.T., Gruen D.S., Sherwood Lollar B., Hinrichs K.-U., Stewart L.C., Holden J.F., Hristov A.N., Pohlman J.W., Morrill P.L., Könneke M., Delwiche K.B., Reeves E.P., Sutcliffe C.N., Ritter D.J, Seewald J.S., McIntosh J.C., Hemond H.F., Kubo M.D., Cardace D., Hoehler T.M., Ono S. (2015) Nonequilibrium clumped isotope signals in microbial methane. *Science* **348**, 428-431.

Van Mooy B.A.S., Krupke A., Dyhrman S.T., Fredricks H.F., Frischkorn K.R., Ossolinski J.E., Repeta D.J., Rouco M., Seewald J.S., Sylva S. P. (2015) Major role of planktonic phosphate reduction in the marine phosphorus redox cycle. *Science* **348**, 783-785.

Saccocia P.J., Seewald J.S., and Shanks W.C., III (2015) Oxygen isotope fractionation in the portlandite-water and brucite-water systems from 125° to 450°C, 50 MPa. *Geochim. Cosmochim. Acta* **169**, 151-167.

[#]McDermott J.M., Seewald J.S., German C.R., and Sylva S.P. (2015) Pathways for abiotic organic synthesis at submarine hydrothermal fields. *Proc. Nat. Acad. Sci.* **112**, 7668-7672.

Seewald J.S., Reeves E.P., Bach W., Saccocia P.J, Craddock P.R., Shanks W.C. III, Sylva S.P., Pichler T., Rosner M., and Walsh E. (2015) Submarine venting of magmatic volatiles in the Eastern Manus Basin, Papua New Guinea. *Geochim. Cosmoshim. Acta* **163**, 178-199.

Klein F., Grozeva N.G., Seewald J.S., McCollom T.M., Humphris S.E., Moskowitz B., Berquó T.S., and Kahl W.A. (2015) Experimental Constraints on Fluid-Rock Reactions During Incipient Serpentinization of Harzburgite. *American Mineralogist* **100**, 991-1002.

McCollom T.M., Seewald J.S., and German C.R. (2015) Investigation of Non-volatile Organic Compounds in Deep-sea Hydrothermal Vent Fluids along the Mid-Atlantic Ridge. *Geochim. Cosmoshim. Acta* **156**, 122-144.

[#]McDermott J.M, Ono S., Tivey M.K., Seewald J.S, Shanks W.C. III, and Solow A.R. (2015) Identification of sulfur sources and isotopic equilibria in submarine hot-springs using multiple sulfur isotopes. *Geochim. Cosmoshim. Acta* **160**, 169-187.

[#]Reeves E.P., McDermott J.M., and Seewald J.S. (2014) The origin of methanethiol in mid-ocean ridge hydrothermal fluids. *Proc. Nat. Acad. Sci.* **111**, 5474-5479.

Garimella S., Keeler R.H., Huang Y.-w., Seewald J.S., and Cziczo1 D.J. (2014) Droplet activation measurements for dry- and wet- generated mineral dust aerosol: The significance of soluble material. *Atmospheric Chemistry and Physics* **14**, 60003-6019.

[#]de Quirós Y.B., Seewald J.S., Sylva S.P., Greer W., Niemeyer M., Bogomolni A.L., and Moore M.J. (2013) Compositional discrimination of decompression and decomposition gas bubbles in bycaught seals and dolphins. *PLOS ONE* **8,** article e83994.

McIntyre C.P.; McNichol A.P.; Roberts M.L., Seewald J.S., von Reden K.F., Jenkins W.J. (2013) Improved precision of radiocarbon measurements for CH_4 and CO_2 using GC and continuous-flow AMS achieved by summation of repeated injections. *Radiocarbon* **55**, 677-685.

McCollom T.M. and Seewald J.S. (2013) Serpentinites, hydrogen, and life. *Elements* **9**, 129-134.

Bennett S.A., Coleman M., Huber J.A., Reddington E., Kinsey J.C., McIntyre C., Seewald J.S. and German C.R. (2013) Trophic regions of a hydrothermal plume dispersing away from an ultramafic-hosted vent-system: Von Damm vent-site, Mid-Cayman Rise. *Geochemistry, Geophysics, and Geosystems* **14**, 317-327.

Ryerson, T. B., Camilli R., Kessler J. D., Kujawinski E. B., Reddy C. M., Valentine D. L., Atlas E. L., Blake D.R., de Gouw J. A., Meinardi S., Parrish D. D., Peischl J., Seewald J. S. and Warneke C. (2012) Chemical composition measurements quantify *Deepwater Horizon* hydrocarbons in the marine environment. *Proc. Nat. Acad. Sci.* **109**, 20246-20253.

Camilli R., Di Iorio D., Bowen A., Reddy C.M., Techet A.H., Yoerger D.R., Whitcomb L.L., Seewald J.S., Sylva S.P., and Fenwick J. (2012) Acoustic measurement of the Deepwater Horizon Macondo well flow rate. *Proc. Nat. Acad. Sci.***109**, 20235-20239.

Reddy C.M., Arey J.S., Seewald J.S. Sylva S.P., Lemkau K.L., Nelson R.K., Carmichael C.A., McIntyre C.P., Fenwick J., Ventura G.T., Van Mooy B.A.S., Camilli R. (2012) Composition and fate of gas and oil released to the water column during the Deepwater Horizon oil spill. *Proc. Nat. Acad. Sci.* **109**, 20229-202234.

Beinart R.A., Sanders J.G., Faure B., Sylva S.P., Lee R.W., Becker E.L., Gartman A., Luther G.W. III, Seewald J.S., Fisher C.R., and Girguis P.R. (2012) Evidence for the role of endosymbionts in regional-scale habitat partitioning by hydrothermal vent symbioses. *Proc. Nat. Acad. Sci.***109**, 3241-3250.

Pester N.J., Reeves E.P., Rough M.E., Ding K., Seewald J.S., Seyfried W.E. Jr. (2012) Subseafloor phase equilibria in high-temperature hydrothermal fluids of the Lucky Strike Seamount (Mid-Atlantic Ridge, 37°17'N). *Geochim. Cosmochim. Acta* **90**, 303-322.

Flores, G.E., Shakya M., Meneghin J., Yang Z.K., Seewald J.S., Wheat C.G., Podar M., and Reysenbach A.L. (2012) Inter-field variability in the microbial communities of hydrothermal vent deposits from a back-arc basin. *Geobiology* **10**, 333-346.

[#]Reeves E.P, Seewald J.S., and Sylva S. (2012) Hydrogen isotope exchange between n-alkanes and water under hydrothermal conditions. *Geochim. Cosmochim. Acta* **77**, 582-599.

Flores G.E., Campbell J.H., Kirshtein J.D., Meneghin J., Podar M., Steinberg J.I., Seewald J.S., Tivey M.K., Voytek M.A., Yang Z.K. and Reysenbach A.-L. (2011) Microbial community structure of hydrothermal deposits from geochemically different vent fields along the Mid-Atlantic Ridge. *Environmental Microbiology* doi:10.1111/j.1462-2920.2011.02463.x

[#]Reeves E.P, Seewald J.S., Saccocia P., Walsh E., Bach W., Craddock P., Shank W.C. III, Sylva S.P., Pichler T., and Rosner M. (2011) Geochemistry of hydrothermal fluids from the PACMANUS, Northeast Pual and Vienna Woods vent fields, Manus Basin, Papua New Guinea. *Geochim. Cosmochim Acta* **75**, 1088-1123.

Mottl M.J., Seewald J.S., Wheat C.G., Tivey M.K., Proskurowski G., Reeves E., Sharkey J., McCollom T.M., You C.-F., Chan L.H., Pichler T., and Michael P. (2011) Chemistry of hot springs along the Eastern Lau Spreading Center. Geochim. Cosmochim. Acta **75**, 1013-1038.

Lizarralde D.S., Soule A., Seewald J.S., and Proskurowski G. (2011) Carbon release by off-axis magmatism in a young sedimented spreading centre. *Nature Geosci.* **4**, 50-54.

Ertefai T.S, Heuer V.B., Prieto-Mollar X., Vogt C., Sylva S. P., Seewald J.S., Hinrichs K. U. (2010) The biogeochemistry of sorbed methane in marine sediments. *Geochim. Cosmochim. Acta* **74**, 6033-6048

#Cruse A.M. and Seewald J.S. (2010) Low-Molecular Weight Hydrocarbons in Vent Fluids from the Main Endeavour Field, northern Juan de Fuca Ridge. *Geochim. Cosmochim. Acta* **74**, 6126-6140.

#Craddock P.R., Bach W., Seewald J.S., Rouxel O.J. Reeves E., and Tivey M.K. (2010) Sub–seafloor Processes Controlling Rare Earth Element Abundances in Hydrothermal Fluids from the Manus Basin, Papua New Guinea. .*Geochim. Cosmochim. Acta* **74**, 5494-5513.

German C.R., Bowen A., Coleman M.L., Honig D.L., Huber J.A., Jakuba M.V., Kinsey J.C., Kurz M.D., Leroy S., McDermott J.M., Mercier de Lépinay B., Nakamura K., Seewald J.S., Smith J., Sylva S.P., Van Dover C.L., Whitcomb L.L., and Yoerger D.R. (2010) Diverse styles of submarine venting on the ultra-slow spreading Mid-Cayman Rise. *Proc. Nat. Acad. Sci.* **107**, 14020-14025.

McCollom T.M., Sherwood Lollar B., Lacrampe-Couloume G., Seewald J.S. (2010) The influence of carbon source on abiotic organic synthesis and carbon isotope fractionation under hydrothermal conditions. *Geochim. Cosmochim. Acta* **74**, 2717–2740.

Saccocia P.J., Seewald J.S., and Shanks W.C., III (2009) Oxygen and hydrogen isotope fractionation in the serpentine-water and talc-water systems from 250 to 450°C. *Geochim. Cosmochim. Acta* **73**, 6789-704.

#Cruse A.M., Seewald J.S., Saccocia P.J., and Zierenberg R., (2008) Hydrothermal Fluid Composition at Middle Valley, northern Juan de Fuca Ridge: Temporal and Spatial Variability. *AGU Monograph, Modeling Hydrothermal Processes at Oceanic Spreading Centers: Magma to Microbe* (eds. R. Lowell, J. Seewald, A. Metaxis, and M. Perfit), pp. 145-166.

#Proskurowski, G., Lilley, M.D., Seewald, J.S., Olson, E.J., Früh-Green, G.L., Lupton, J.E., Sylva, S.P., Kelley, D.S. (2008) Abiogenic Hydrogen and Hydrocarbon Production at the Lost City Hydrothermal Field. *Science* **319**, 604-607.

McCollom T.M. and Seewald J.S. (2007) Abiotic synthesis of organic compounds in deep-sea hydrothermal environments. *Chemical Reviews* **107**, 382-401.

Seewald J.S., Zolotov M., and McCollom T.M. (2006) Experimental investigation of single carbon compounds under hydrothermal conditions, *Geochim. Cosmochim. Acta* **70**, 446-460.

#McCollom T.M. and Seewald J.S. (2006) Carbon isotope composition of hydrocarbons produced by abiotic organic synthesis under hydrothermal conditions, *Earth Planet. Sci Lett* **243**, 74-84.

#Cruse A.M. and Seewald J.S. (2006) Geochemistry of low-molecular weight hydrocarbons in hydrothermal fluids from Middle Valley, northern Juan de Fuca Ridge, *Geochim. Cosmochim. Acta* **70**, 2073-2092.

Pearson A., Seewald J. S., and Eglinton T. I., (2005) Bacterial incorporation of relict carbon in

the hydrothermal environment of Guaymas Basin, *Geochim. Cosmochim. Acta* **69**, 5477-5486

Seewald J.S., Cruse A., Saccocia P.J. (2003) Aqueous volatiles in hydrothermal fluids from the Main Endeavour Field, northern Juan de Fuca ridge: temporal variability following earthquake activity. *Earth Planet. Sci. Lett.* **216**, 575-590.

Seewald J.S. (2003) Organic-inorganic interactions in petroleum-producing sedimentary basins. *Nature* **426**, 327-333.

Seyfried W.E. Jr., Seewald J.S., Berndt M.E., Ding K., and Foustoukos D. (2003) Chemistry of hydrothermal vent fluids from the Main Endeavour Field, Northern Juan de Fuca Eidge: Geochemical controls in the aftermath of the June 1999 seismic events. *Journal of Geophysical Research* **108**, 2429-2452.

#McCollom T.M. and Seewald, J.S. (2003a) Experimental constraints on the hydrothermal reactivity of organic acids and acid anions: I. formic acid and formate. *Geochim. Cosmochim. Acta* **67**, 3625-3644.

#McCollom T.M. and Seewald, J.S. (2003b) Experimental Study of the Hydrothermal Reactivity of Organic Acids and Acid Anions: II. Acetic Acid, Acetate, and Valeric Acid. *Geochim. Cosmochim. Acta* **67**, 3645-3664.

Seewald, J.S., Doherty K.W., Hammar T.R. and Liberatore S.P. (2002). A new gas-tight isobaric sampler for hydrothermal fluids, *Deep-Sea Research* **49**, 189-196.

Seewald, J.S. (2001). A model for the origin of carboxylic acids in basinal brines. *Geochim. Cosmochim. Acta* **65**, 3779-3789.

Seewald J.S. (2001) Aqueous geochemistry of low molecular weight hydrocarbons at elevated temperatures and pressures: constraints from mineral buffered laboratory experiments. *Geochim. Cosmochim. Acta* **65**, 1641-1644.

#McCollom, T.M. and Seewald, J.S. (2001). A reassessment of the potential for reduction of dissolved CO_2 to hydrocarbons during serpentinization of olivine. *Geochim. Cosmochim. Acta* **65,** 3769-3778.

#Cruse A.M. and Seewald J.S. (2001) Metal mobility in sediment-covered ridge-crest hydrothermal systems: Experimental and theoretical constraints. *Geochim. Cosmochim. Acta* **65**, 3233-3247.

#McCollom T.M., Seewald J.S., and Simoneit B.R.T. (2001) Reactivity of monocyclic aromatic compounds under hydrothermal conditions. *Geochim. Cosmochim. Acta* **65**, 455-468.

Seewald J.S., Eglinton L.B., and Ong Y.L. (2000) An experimental study of organic-inorganic interactions during vitrinite maturation. *Geochim. Cosmochim. Acta* **64**, 1577-1591.

Seewald J.S. and Eglinton (1999) T.I. Laboratory Simulations of Organic Matter Thermal Maturation. *The Encyclopedia of Geochemistry: Earth Science Encyclopedia Series* (C.P. Marshall, ed.) Kluwer, The Netherlands.

Seewald J.S., Nelson B.C. and Whelan J.K. (1998) Laboratory and theoretical constraints on the origin and composition of natural gas. *Geochim. Cosmochim. Acta* **62**, 1599-1617.

Seewald J.S. (1997) Mineral redox buffers and the stability of organic compounds under hydrothermal conditions. Materials Research Society Symposium Proceedings **432**, 317-331.

#Saccocia P.J., Seewald J.S., and Shanks W.C. III (1998) Hydrogen and oxygen isotope fractionation between brucite and aqueous NaCl solutions from 250-450°C. *Geochim. Cosmochim. Acta* **62**, 485-492.

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Seewald, J.S. (1994). Evidence for metastable equilibrium between hydrocarbons under hydrothermal conditions. *Nature,* **370**, 285-287.

Seewald, J.S., Seyfried W.E. Jr., and Shanks W.C. III (1994). Variations in the chemical and stable isotope composition of carbon and sulfur species during organic-rich sediment alteration: An experimental and theoretical study of hydrothermal activity at Guaymas Basin, Gulf of California. *Geochim. Cosmochim. Acta* **58**, 5065-5082.

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Seewald, J.S., Seyfried W.E. Jr., and Thornton E.C. (1990). Organic-rich sediment alteration: An experimental and theoretical study at elevated temperatures and pressures. *Applied Geochemistry,* **5**, 193-209.

Seewald, J.S. and Seyfried W.E. Jr. (1990). The effect of temperature on heavy and base metal mobility in subseafloor hydrothermal systems: constraints from basalt alteration experiments and field studies. *Earth Planet. Sci. Lett.,* **101**, 388-403.

Seyfried, W. E., Jr., Berndt M.E., and Seewald J.S. (1988). Hydrothermal alteration processes at mid-ocean ridges: constraints from diabase alteration experiments, hot-spring fluids and composition of the oceanic crust. *Can. J. Earth Sci.,* **26**, 787-804.

OTHER PUBLICATIONS

Seewald J.S. (2017) Detecting molecular hydrogen on Enceladus. *Science* **356**, 132-133

Camilli R., Bowen A,, Reddy C.M., Seewald J.S., and Yoerger D.R. (2012) When Scientific Research and Legal Practice Collide. *Science* **337,** 1608-1609.

German C.R., Tyler P.A., McIntyre C., Amon D., Cheadle M., Clarke J., John B., McDermott J.M., Bennett S., Huber J., Kinsey J., Seewald J.S., Van Dover C., and Elliott. K. (2012) Exploration of the Mid-Cayman Rise. *Oceanography* **25**, 52-53 .

Lowell R.P., Seewald J.S., Metaxas A., and Perfit M.R. (2008) Modeling hydrothermal processes at ocean spreading centers: magma to microbe—overview. *AGU Monograph, Modeling Hydrothermal Processes at Oceanic Spreading Centers: Magma to Microbe* (eds. R. Lowell, J. Seewald, A. Metaxis, and M. Perfit) pp. 1-13.

Seewald J. and Michael P. (2008) Studies at the Lau Basin. *Ridge Events* **3**, 25-27.

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pressure seals. Proceedings of workshop on: Overpressures in Petroleum Exploration, Pau, France, March 1998, 10pp.

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Saccocia, P.J., Ding K., Berndt M.E., Seewald J.S., and Seyfried W.E. Jr. (1994). Experimental and theoretical perspectives on crustal alteration at mid-ocean ridges. In: *Alteration and Alteration Processes Associated with Ore-forming Systems: Geological Association of Canada, Short Course Notes* (D.R. Lentz, ed.) **11**, 403-431.

10/10/2017