

CURRICULUM VITAE

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Vice President for Academic Programs and Dean

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EDUCATION:

B.S.: Geology, Stanford University (graduated with distinction, 1980).

M.S.: Geological Oceanography, University of Washington (1983).

Ph.D.: Geological Oceanography, University of Washington (1989).

Thesis title: Physical and Chemical Controls on the Growth of Hydrothermal Vent Structures: a Model of Transport and Chemical Reaction (R.E. McDuff, J.R. Delaney, Advisors).

PROFESSIONAL EXPERIENCE:

Vice President for Academic Programs and Dean, WHOI (November 1, 2017-present).

Associate Dean, WHOI (2010-2017).

Director, Deep Ocean Exploration Institute, WHOI (2008-2010).

Senior Scientist, Woods Hole Oceanographic Institution (2008-present).

Associate Scientist w/tenure, Woods Hole Oceanographic Institution (1999 to 2008).

Associate Scientist, Woods Hole Oceanographic Institution (1994 to 1998).

Assistant Scientist, Woods Hole Oceanographic Institution (1990 to 1994).

Post-Doctoral Investigator, Woods Hole Oceanographic Institution (1990).

Post-Doctoral Scholar, Woods Hole Oceanographic Institution (1989).

Research and teaching assistant, University of Washington (1982 to 1988).

Physical Science Technician/Geologic Field Asst, U.S.G.S., Office of Marine Geology (1979 to 1981).

FELLOWSHIPS/AWARDS:

Arnold B. Arons Award for Excellence in Teaching, Advising, and Mentoring (2010).

Woods Hole Post-Doctoral Scholarship (1989).

Achievement Rewards for College Scientists Foundation (ARCS) Dissertation Fellowship (Fall 1987).

Graduate Opportunities Program for Women and Minorities in Science Fellowship (Spring 1983).

University of Washington EGTVEDT Scholarship for new graduate students (1981 to 1982).

PROFESSIONAL AFFILIATIONS:

Member, Geochemical Society (1987 - present)

Member, American Geophysical Union (1983 - present)

RESEARCH INTERESTS:

Aqueous geochemistry

Formation of seafloor massive sulfide deposits.

Quantification of heat and mass transfer in hydrothermal systems.

Field studies of active vent sites, including development and use of instrumentation at active vent sites.

Examination of mineral textures, trace element distributions, and mineral precipitation processes in seafloor massive sulfide deposits.

PUBLICATIONS IN REFEREED JOURNALS AND BOOKS:

- Evans, G.N., M.K. Tivey, B. Monteleone, N. Shimizu, J.S. Seewald, O.J. Rouxel (2020) Trace element proxies of seafloor hydrothermal fluids based on secondary ion mass spectrometry (SIMS) of black smoker chimney linings. *Geochimica et Cosmochimica Acta* **269**, 346-375.
- 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 and Valu Fa Ridge, *Geochimica et Cosmochimica Acta* **215**, 214-246. <http://dx.doi.org/10.1016/j.gca.2017.08.010>
- Teske, A., D. de Beer, L.J. McKay, M.K. Tivey, J.F. Biddle, D. Hoer, K.G. Lloyd, M.A. Lever, H. Røy, D.B. Albert, H.P. Mendlovitz and B.J. MacGregor (2016) The Guaymas Basin Hiking Guide to Hydrothermal Mounds, Chimneys, and Microbial Mats: Complex Seafloor Expressions of Subsurface Hydrothermal Circulation. *Front. Microbiol.* **7**:75. doi: 10.3389/fmicb.2016.00075
- Jamieson, J., M.D. Hannington, M.K. Tivey, T. Hansteen, N. Williamson, M. Stewart, J. Fietzke, D.A. Butterfield, M. Frische, L. Allen, and B. Cousens (2016) Precipitation and growth of barite within hydrothermal vent deposits from the Endeavour Segment, Juan de Fuca Ridge. *Geochimica et Cosmochimica Acta* **173**, 64–85.
- Humphris, S.E., M.K. Tivey and M.A. Tivey (2015) The Trans-Atlantic Geotraverse Hydrothermal Field: A Hydrothermal System on an Active Detachment Fault. *Deep Sea Research II* **121** (2015) 8–16; DOI information: 10.1016/j.dsr2.2015.02.015
- McDermott, J.M., S. Ono, M.K. Tivey, J.S. Seewald, W.C. Shanks III, and A. Solow (2015). Identification of sulfur sources and isotopic equilibria in submarine hot-springs using multiple sulfur isotopes *Geochim. Cosmochim. Acta* **160**, 169–187.
- Jamieson, J.W., M.D. Hannington, D.A. Clague, D.S. Kelley, J.R. Delaney, J.F. Holden, M.K. Tivey, L.E. Kimpe (2013) Sulfide geochronology along the Endeavour Segment of the Juan de Fuca Ridge, *Geochem. Geophys. Geosyst.* doi: 10.1002/ggge.20133.
- Gribbin, J. L., W. Zhu, and M. K. Tivey (2012) Anisotropy in seafloor flange, slab, and crust samples from measurements of permeability and porosity: Implications for fluid flow and deposit evolution, *Geochem. Geophys. Geosyst.* **13**, Q03018, doi:10.1029/2011GC003840.
- Tivey, M.K., E. Becker, R. Beinart, C.R. Fisher, P.R. Girguis, C.H. Langmuir, P.J. Michael, and A.-L. Reysenbach (2012) Links from mantle to microbe at the Lau Integrated Study Site: Insights from a back-arc spreading center. *Oceanography* **25**(1):62–77, <http://dx.doi.org/10.5670/oceanog.2012.04>.
- Flores, G.E., J. H. Campbell, J. D. Kirshtein, J. Meneghin, M. Podar, J. I. Steinberg, J. S. Seewald, M. K. Tivey, M. A. Voytek, Z. K. Yang and A.-L. Reysenbach (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.
- Mottl, M., J. Seewald, C.G. Wheat, M.K. Tivey, P.J. Michael, G. Proskurowski, T. M. McCollom, E. Reeves, J. Sharkey, C-F. You, L.H. Chan, T. Pichler (2011) Chemistry of hot springs along the Eastern Lau Spreading Center, *Geochimica et Cosmochimica Acta* **75**, 1013-1038.
- Craddock, P.R., W. Bach, J.S. Seewald, O. Rouxel, E. Reeves, and M.K. Tivey (2010) Rare Earth Element Abundances in Hydrothermal Fluids from the Manus Basin, Papua New Guinea: Indicators of Sub-seafloor Hydrothermal Processes in Back-Arc Basins, *Geochimica et Cosmochimica Acta*, **74**, 5494-5513.
- Sarrazin, J., P. Rodier, M.K. Tivey, H. Singh, A. Schultz, P.M. Sarradin (2009) A dual sensor device to estimate fluid flow velocity at diffuse hydrothermal vents, *Deep-Sea Research I*, **56**, 2065-2074.
- Ferrini, V. L., M. K. Tivey, S. M. Carbotte, F. Martinez, and C. Roman (2008) Variable morphologic expression of volcanic, tectonic, and hydrothermal processes at six hydrothermal vent fields in the Lau back-arc basin, *Geochem. Geophys. Geosyst.*, **9**, Q07022, doi:10.1029/2008GC002047.

- Pagé, A., M.K. Tivey, D.S. Stakes, and A-L. Reysenbach (2008) Temporal and spatial archaeal colonization of hydrothermal vent deposits, *Environmental Microbiology*, doi:10.1111/j.1462-2920.2007.01505.x
- Tivey, M.K. (2007) Generation of Seafloor Hydrothermal Vent Fluids and Associated Mineral Deposits, *Oceanography* **20**, No. 1, 50-65.
- Zhu, W., M.K. Tivey, H. Gittings, and P.R. Craddock (2007) Permeability-porosity relationships in seafloor vent deposits: Dependence on pore evolution processes, *J. Geophys. Res.*, **112**, B05208, doi:10.1029/2006JB004716.
- Reysenbach, A-L., Y. Liu, A. Banta, T.J. Beveridge, J.D. Kirshtein, S. Schouten, M.K. Tivey, K.L. Von Damm, and M.A. Voytek (2006) A ubiquitous thermoacidophilic archaeon from deep-sea hydrothermal vents, *Nature* **442**, 444-447.
- Kormas, K., M.K. Tivey, K.L. Von Damm, and A. Teske (2006) Bacterial and archaeal phylotypes associated with distinct mineralogical layers of a white smoker spire from a deep-sea hydrothermal vent site (9°N, East Pacific Rise), *Environmental microbiology*, **8**(5), 909-920.
- Ding, K., W. E. Seyfried, Jr., Z. Zhang, M. K. Tivey, K. L. Von Damm and A. M. Bradley (2005) The in situ pH of hydrothermal fluids at mid-ocean ridges, *Earth Planet. Sci. Lett.*, **237**, 167-174.
- Daly, K.L., R.H. Byrne, A.G. Dickson, S.M. Gallagher, M.J. Perry, and M.K. Tivey (2004) Chemical and biological sensors for time-series research: current status and new directions, *Marine Tech. Soc. Journal*, **38**, no. 2, 121-143.
- Tivey, M.K. (2004) Environmental conditions within active seafloor vent structures: sensitivity to vent fluid composition and fluid flow. In Wilcock, W., Cary, C., DeLong, E., Kelley, D., Baross, J. (Eds.) *Subseafloor Biosphere at Mid-Ocean Ridges*, Geophysical Monograph Series, No. 144. American Geophysical Union, Washington, DC, pp. 137-152.
- Von Damm, K.L., M.D. Lilley, W.C. Shanks III et al. (2003) Extraordinary phase separation and segregation in vent fluids from the southern East Pacific Rise, *Earth and Planet. Sci. Lett.* **206**, 365-378.
- Sarrazin, J., Levesque, C., Juniper, S. K. and Tivey, M.K. (2002) Mosaic community dynamics on Juan de Fuca Ridge sulfide edifices : Substratum, temperature and implications for trophic structure. *Cahiers de Biologie Marine*, **43**, 275-279.
- Tivey, M.K., A.M. Bradley, T.M. Joyce, and D. Kadko (2002) Insights into tide-related variability at seafloor hydrothermal vents from time-series temperature measurements. *Earth and Planet. Sci. Lett.* **202**, 693-707.
- Ding, K., W.E. Seyfried Jr., M.K. Tivey and A.M. Bradley (2001) In-situ measurement of dissolved H₂ and H₂S in high temperature hydrothermal fluids at the Main Endeavour Field, Juan de Fuca Ridge, *Earth Planet. Sci. Lett.* **186**, 417-425.
- Humphris, S.E. and M.K. Tivey (2000) A synthesis of geological and geochemical investigations of the TAG Hydrothermal Field: Insights into fluid flow and mixing processes in a hydrothermal system, In: Y. Dilek, E. Moores, D. Elthon, A. Nicholas (eds.), *Ophiolites and Oceanic Crust: New Insights from Field Studies and the Ocean Drilling Program*: Boulder, Colorado, GSA Special Paper 349, p. 213-235.
- Tivey, M.K., D.S. Stakes, T.L. Cook, M.D. Hannington, and S. Petersen (1999) A model for growth of steep-sided vent structures on the Endeavour Segment of the Juan de Fuca Ridge: results of a petrologic and geochemical study. *J. Geophys. Res.*, **104**, 22,859-22,883.
- Mills, R.A., and M.K. Tivey (1999) "Seawater entrainment and fluid evolution within the TAG hydrothermal mound: Evidence from analyses of anhydrite." In: Cann, J. H. Elderfield, and A. Laughton (eds.), *Dynamics of Processes Associated with New Ocean Crust*, Cambridge University Press, Cambridge, U.K., pp. 225-248.

- Mills, R.A., D.A.H. Teagle, and M.K. Tivey (1998) Fluid mixing and anhydrite precipitation within the TAG mound. In: Herzig, P.M., S.E. Humphris, D.J. Miller, and R.A. Zierenberg (Eds.), *Proc. ODP, Sci. Results*, **158**: College Station, TX (Ocean Drilling Program), 119-127.
- Tivey, M.K., R.A. Mills and D.A.H. Teagle (1998) Temperature and salinity of fluid inclusions in anhydrite as indicators of seawater entrainment and heating in the TAG active mound. In: Herzig, P.M., S.E. Humphris, D.J. Miller, and R.A. Zierenberg (Eds.), *Proc. ODP, Sci. Results*, **158**: College Station, TX (Ocean Drilling Program), 179-190.
- Tivey, M.K. (1998) Documenting textures and mineral abundances in minicores from the TAG active hydrothermal mound using x-ray computed tomography. In: Herzig, P.M., S.E. Humphris, D.J. Miller, and R.A. Zierenberg (Eds.), *Proc. ODP, Sci. Results*, **158**: College Station, TX (Ocean Drilling Program), 201-210.
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- Langmuir, C., S. Humphris, D. Fornari, C. Van Dover, K. Von Damm, M.K. Tivey, D. Colodner, J.-L. Charlou, D. Desonie, C. Wilson, Y. Fouquet, G. Klinkhammer, and H. Bougault (1997) Hydrothermal vents near a mantle hot spot: the Lucky Strike vent field at 37°N on the Mid-Atlantic Ridge. *Earth Planet. Sci. Lett.*, **148**, 69-91.
- Humphris, S.E., P.M. Herzig, D.J. Miller, J.C. Alt, K. Becker, D. Brown, G. Burgmann, H. Chiba, Y. Fouquet, J.B. Gemell, G. Guerin, M.D. Hannington, N.G. Holm, J.J. Honnorez, G.J. Iturrino, R. Knott, R. Ludwig, K. Nakamura, S. Petersen, A.-L. Reysenbach, P.A. Rona, S. Smith, A.A. Sturz, M.K. Tivey, and X. Zhao (1995) The internal structure of an active sea-floor massive sulphide deposit. *Nature*, **377**, 713-716.
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- Hannington, M.D., M.K. Tivey, A.C.L. Larocque, S. Petersen, and P.A. Rona (1995) The occurrence of gold in sulfide deposits of the TAG hydrothermal field, Mid-Atlantic Ridge. *Can. Mineralogist*, **33**, 1285-1310.
- Tivey, M.K., S.E. Humphris, G. Thompson, M.D. Hannington, and P.A. Rona (1995) Deducing patterns of fluid flow and mixing within the TAG active hydrothermal mound using mineralogical and geochemical data. *Journal of Geophysical Research*, **100**, 12,527-12,555.
- Tivey, M.K. (1995a) The influence of hydrothermal fluid composition and advection rates on black smoker chimney mineralogy: Insights from modeling transport and reaction. *Geochim. Cosmochim. Acta*, **59**, 1933-1949.
- Tivey, M.K. (1995b) Modeling Chimney Growth and Associated Fluid Flow at Seafloor Hydrothermal Vent Sites. In: Seafloor Hydrothermal Systems: Physical, Chemical, Biological, and Geological Interactions (S. E. Humphris, R. A. Zierenberg, L. S. Mullineaux, and R. E. Thomson, eds.). *AGU Monograph Series*, No. **91**. American Geophysical Union, Washington, DC, pp. 158-177.
- Zhu, C., H. Xu, E.S. Ilton, D.R. Veblen, D.J. Henry, M.K. Tivey, and G. Thompson (1994) TEM-AEM observations of Cl-rich amphibole and biotite and possible petrologic implications. *American Mineralogist*, **79**, 909-920.
- Rona, P.A., M.D. Hannington, C.V. Raman, G. Thompson, M.K. Tivey, S.E. Humphris, C. Lalou, and S. Petersen (1993) Active and relict seafloor hydrothermal mineralization at the TAG hydrothermal field, Mid-Atlantic Ridge. *Economic Geology*, **88**, 1989-2017.
- Delaney, J.R., V. Robigou, R.E. McDuff and M.K. Tivey (1992) Geology of a vigorous hydrothermal system on the Endeavour segment, Juan de Fuca Ridge. *Journal of Geophysical Research*, **97**, 19663-19682.

- Tivey, M.K., L.O. Olson, V.W. Miller and R.D. Light (1990) Temperature measurements during initiation and growth of a black smoker chimney. *Nature*, **346**, 51-54.
- Tivey, M.K. and R.E. McDuff (1990). Mineral precipitation in the walls of black smoker chimneys: a quantitative model of transport and chemical reaction. *Journal of Geophysical Research*, **95**, 12617-12637.
- Koski, R., S.D. Scott, M.D. Hannington, J.R. Delaney and M.K. Tivey (1987) "Hydrothermal processes and massive sulfide deposits on the Juan de Fuca Ridge and other northeast Pacific spreading axes." In: *Geology and Resource Potential of the Continental Margin of Western North America and Adjacent Ocean Basins --- Beaufort Sea to Baja California* (D.W. Scholl, A. Grantz and J.G. Vedder, eds.), Circum-Pacific Council for Energy and Mineral Resources, Earth Sciences Series volume 6, Houston, Texas, pp. 621-638.
- Tivey, M.K. and J.R. Delaney (1986) Growth of large sulfide structures on the Endeavour Segment of the Juan de Fuca Ridge. *Earth and Planetary Science Letters*, **77**, 303-317.
- Lupton, J.E., J.R. Delaney, H.P. Johnson and M.K. Tivey (1985) Entrainment and vertical transport of deep-ocean water by buoyant hydrothermal plumes. *Nature*, **316**, 621-623.
- Tivey, M.K. and J.R. Delaney (1985) Sulfide deposits from the Endeavour Segment of the Juan de Fuca Ridge. *Marine Mining*, **5**, 165-179.

OTHER PUBLICATIONS:

- Jamieson, J.W., Petersen, S., Hannington, M.D. and Tivey, M.K. (2014) Volcanogenic Massive Sulfide Deposits. Encyclopedia of Marine Geosciences, Harff, J., Meschede, M., Petersen, S., Thiede, J. (Eds.), Springer Publishing (www.springerreference.com). Springer-Verlag Berlin Heidelberg.
- Tivey, M. (2014) Black and White Smokers. Encyclopedia of Marine Geosciences, Harff, J., Meschede, M., Petersen, S., Thiede, J. (Eds.), Springer Publishing (www.springerreference.com). Springer-Verlag Berlin Heidelberg, 2014-05-06 09:44:30 UTC
- Tivey, M.K. (2011) American (U.S.) activities in marine mineral deposits, in Proceedings of the OCEANS 2011 MTS/IEEE KONA Conference & Exhibition, Sept. 2011.
- Schofield, O., and M.K. Tivey (2005), ORION Ocean Research Interactive Observatory Networks: a report of the workshop held January 4-8, 2004, San Juan, Puerto Rico, Geosciences Professional Services, Inc., 140 pp.
- Tivey, M.K. (2004) The Remarkable Diversity of Seafloor Vents, *Oceanus* 42, no. 2, 60-65.
- Schofield, O., and M.K. Tivey (2004), Meeting Report: Building a Window to the Sea: Ocean Research Interactive Observatory Networks (ORION), *Oceanography* 17, no. 2, 113-120.
- Tivey, M.K. and R.E. McDuff (2001) RIDGE Endeavour Observatory Results Workshop, RIDGE Workshop Report, http://ridge2000.bio.psu.edu/wkshop_repts/Endeavourobservatory.pdf
- Williams, A.J. and M.K. Tivey (2001) Tidal currents at hydrothermal vents, Juan de Fuca Ridge, *Sea Technology* 42, 62-64.
- Seyfried, W.E., K.S. Johnson, and M.K. Tivey conveners (2001) In situ sensors: their development and application for the study of chemical, physical and biological systems at Mid-Ocean Ridges, RIDGE Workshop Report.
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- Tivey, M.K., Bemis, K., Bradley, A.M., Butterfield, J., Delaney, J.R., Ding, K., Dziak, R.P., Fisher, C., Fox, C.G., Hautala, S., Jackson, D., Jannasch, H.W., Johnson, H.P., Juniper, S.K., Kadko, D., Kelley, D.S., Lilley, M., McDuff, R.E., Rona, P., Sarrazin, J., Schultz, A., Seyfried, W.E., Jr., Thomson, R.E., Wheat, C.G., Wilcock, W., Wright, D., and Yoerger, D. (2000) The RIDGE Endeavour Segment

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- Tivey, M.K., S. Carbotte, J. Cowen, C. Fox, J. Hildebrand, D. Kelley, A-L. Reysenbach, K. Rubin, T. Shank, R. Thomson, and K. Von Damm (2000) NEPTUNE Science White Paper #4: Opportunities for Investigating Ridge-Crest Processes (<http://www.neptune.washington.edu>).
- Tivey, M.K. (1998) Time-series measurements at seafloor vent sites, WHOI 1998 Annual Report, pp. 19-20.
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