

## *Curriculum Vitae*

**Timothy John Shaw**- Professor, Department of Chemistry and Biochemistry  
**Address:** Department of Chemistry and Biochemistry, University of South Carolina, Columbia  
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### Education

**1981** B.S. California State Polytechnic University, Pomona (Honors in Chemistry)  
**1988** Ph.D. University of California, San Diego (Chemical Oceanography)  
Thesis Title: The Early Diagenesis of Transition Metals in Nearshore Sediments.

### Research Interests

**Chemical Oceanography:** Biogeochemical processes in coastal aquifers; Cycling and transport of trace elements and radionuclides in coastal environments; Geochemical production and cycling of Reactive Oxygen Species (ROS).

**Environmental/Analytical Chemistry:** Development and application of techniques for measuring process tracers in natural systems. Using competitive kinetics for the characterization of fast abiotic processes in natural waters.

### Professional Background

**Currently** **Professor**, Department of Chemistry and Biochemistry, University of South Carolina  
**Associate Editor**, *Geochimica et Cosmochimica Acta*  
**Associate Editor**, *Aquatic Geochemistry*

**2010-2011** **Fellow**, Hanse Institute for Advanced Study, Delmenhorst Germany.

**2006** **Chairman** Gordon Research Conference Series on "Permeable Sediments"

**2002** **Visiting Faculty**, University of Oldenburg, ICBM, Germany.

**2002-2004** **Undergraduate Director**, Marine Science Program, University of South Carolina

**2000-2002** **Graduate Director**, Marine Science Program, University of South Carolina

**1999-2004** **Associate Professor**, Department of Chemistry and Marine Science Program, University of South Carolina

**1999-2000** **Fellow**, Hanse Institute for Advanced Study, Delmenhorst Germany.

**1999-2000** **Visiting Faculty**, University of Oldenburg, ICBM, Germany.

**1993-1999** **Assistant Professor**, Department of Chemistry and Marine Science Program, University of South Carolina

**1991-1993** **Assistant Research Scientist**, CEES, University of Maryland System

**1990** **Visiting Scientist**, Massachusetts Institute of Technology

**1988-1990** **Postdoctoral Investigator**, Woods Hole Oceanographic Institution

**1981-1987** **Research Assistant**, University of California, San Diego

### **Teaching History (last 10 years)**

**CHEM 111** General Chemistry

**CHEM 321** Quantitative Analysis

**CHEM 624/729** Environmental Aquatic Chemistry

**MSCI 312** Chemical and Physical Oceanography

**MSCI 782** Chemical Oceanography

### **Funding History (last 10 years)**

**Hanse-Wissenschaftskolleg (HWK) Study Group/Book proposal**, Finding Common Ground: Interdisciplinary Teaching of Climate and Energy Research and Policy Decision Making, Funded through HWK. May 2016-October 2019 T.J. Shaw PI, C.J Murphy Co-I

**National Science Foundation, Chemical Oceanography**, A New Method for Assessing the Magnitude and Impact of Shallow Seawater/Pore water Exchange in Salt Marsh Systems, T. J. Shaw 3/15/2016-3/14/2018 \$259,309 Recommended for funding.

**South Carolina EPSCoR/IDeA**, Underrepresented Graduate Student Recruitment Using the NOBCChE Network, T. J. Shaw and K. Shimizu 7-01-10-30 2015 \$5,000.

**South Carolina EPSCoR/IDeA**, Rapid Redox Oscillations In Coastal Aquifers" T. J. Shaw 4-01-9-30 2015 \$8,051.

**South Carolina EPSCoR/IDeA**, Geochemical Production of Reactive Oxygen Species and Validation of a Kinetic Model for Fe(II) Cycling in Estuaries" T. J. Shaw 4-01-9-30 2015 \$8,051.

**National Science Foundation, Environmental Chemistry**, Reaction networks in environmental systems: connecting reactive oxygen species generation and particle formation during the oxidation of ferrous iron, J.L. Ferry (PI) T. J. Shaw 9/15/2013-9/14/2016, \$405,000.

**National Science Foundation, Ocean Technology**, Sensors for Characterization of Phytoplankton Size and Taxonomic Composition Using Spectral Fluorescence Signatures and Imaging Multivariate Optical Computing (IMOC). T. Richardson, M. Myrick, T.J. Shaw, 1/1/10-12/31/14, \$1,089,543.

**National Science Foundation, Chemical Oceanography**, Oxidant generation during Fe(II) oxidation in the mixing zone of subterranean estuaries: An integrated laboratory and field study, PIs, J. Ferry and T. Shaw, 2/15/2008-2/14/2011, \$492,000.

#### **National Science Foundation, MRI Program**,

MRI: Acquisition of ICPMS Instrumentation for Interdisciplinary Research, PIs R. Thunell, T.J. Shaw, H. Scher, M. Bizimas. 09/01/2008 – 08/31/2010, \$596,379.

#### **National Science Foundation, Ocean Technology**,

Collaborative Research: Oceanic Applications of Laser Induced Breakdown Spectroscopy: Laboratory Validation," PIs S. Michael Angel and T.J. Shaw, 09/01/2008 – 08/31/2011 \$338,645.

**National Science Foundation, Marine Geology and Geophysics,**

Fundamental investigation of glacial/interglacial deep-sea pH and carbonate saturation effects on paired benthic foraminiferal trace element and stable isotope signatures PIs T.J. Shaw, G.T. Chandler, C. Hintz, and D. McCorkle 4/1/07-3/31/09 \$251,000.

**National Science Foundation, Ocean Technology,**

In-situ classification of bloom-forming phytoplankton by imaging multivariate optical computing (IMOC), PI T.J. Shaw, Co-Is M. Myrick, T. Richardson, B. Twining, 8/15/07-2/14/11 \$525,000.

**National Science Foundation, Polar Programs,**

Collaborative Research: Free Drifting Icebergs as Proliferation Sites of Iron Enrichment, Organic Carbon Production and Export in the Southern Ocean. PIs T.J., Shaw and B. Twining 7/1/07-6/30/10 \$574,947.

**National Science Foundation, Ocean Technology** “Development of a Pump Array for the Two Dimensional Mapping of Chemical Tracers in the Upper Water Column” Shaw T.J. 8/15/03-8/14/06 \$197,000.

**National Science Foundation, Marine Geology and Geophysics,**

Collaborative Research: Culturing studies of the controls on benthic foraminiferal shell chemistry. J. Bernhart, G.T. Chandler, D. McCorkle, and T.J. Shaw 11/15/04-11-14-06 \$380,000.

**Publication History**

S.A. Murphy, S. Meng, B.M. Solomon, D.M.C. Dias, T.J. Shaw, J.L. Ferry. Hydrous Ferric Oxides in Sediment Catalyze Formation of Reactive Oxygen Species during Sulfide Oxidation. submitted *Frontiers in Marine Science*

S. McDermott, D. C. Salzberg, A. P. Anderson, T. Shaw, J. Lead. Systematic Review of Chromium and Nickel Exposure During Pregnancy and Impact on Child Outcomes. *Journal of Toxicology and Environmental Health Part A*, DOI: 10.1080/15287394.2015.1090939 (2015).

A.J. Findlay, A. Gartman, D.J., T.J. Shaw, G. W. Luther III. Trace metal concentration and partitioning in the first 1.5 meters of hydrothermal vent plumes along the Mid-Atlantic Ridge: TAG, Snakepit, and Rainbow. *Chemical Geology*, 117-131 (2015).

S.K. Tazik, M.R. Pearl, C.M. Rekully, N.S. Violen, S.A. DeJong T.J. Shaw, T.L. Richardson, M.L. Myrick. Focus-Independent Particle Size Measurement from Streak Images: A Comparison of Multivariate Methods. *Analyst*, 1579-1581 (2015).

P. Böning, T.J. Shaw, K. Pahnke, H.-J. Brumsack Nickel as indicator of fresh organic matter in upwelling sediments in press *Geochimica et Cosmochimica Acta*, 162: 99–108 (2015).

A.J. Findlay, A. Gartman, D.J. MacDonald, T.E. Hanson, T.J. Shaw, G.W. Luther. Distribution and size fractionation of elemental sulfur in aqueous environments: The Chesapeake Bay and Mid-Atlantic Ridge. *Geochimica et Cosmochimica Acta* 142: 334-348 (2014).

S.A. Murphy, B.M. Solomon, S. Meng, J.M. Copeland, T.J. Shaw, J.L. Ferry. Geochemical Production of Reactive Oxygen Species From Biogeochemically Reduced Fe. *Env. Sci. Tech.* 48: 3815–3821, (2014).

K.L. Smith Jr., A.D. Sherman, T.J. Shaw, and J. Sprintall. Icebergs as Unique Lagrangian Ecosystems in Polar Seas. *Annu. Rev. Mar. Sci.* 5:14.1–14.19, (2013).

J. A. Swanstrom, L. S. Bruckman, M. Pearl, E. Abernathy, T. L. Richardson, T. J. Shaw, M. L. Myrick. Taxonomic Classification of Phytoplankton with Multivariate Optical Computing, Part II: Design and Experimental Protocol of a Shipboard Fluorescence Imaging Photometer. *Appl. Spec.* 67/6, 630-639, (2013).

M. Pearl, J. A. Swanstrom, L. S. Bruckman, E. Abernathy, T. L. Richardson, T. J. Shaw, H. Sosik, M. L. Myrick. Taxonomic Classification of Phytoplankton with Multivariate Optical Computing, Part III: Demonstration. *Appl. Spec.* 67:6, 640-649, (2013).

J.M. Burns, P.L. Pennington, P.N. Sisco, R. Frey, S. Kashiwada, M.H. Fulton, G.I. Scott, A.W. Decho, C.J. Murphy, T.J. Shaw and J.L. Ferry. Surface Charge Controls the Fate of Au Nanorods in Saline Estuaries. *Env. Sci. Tech.* 47: 12844-12851, (2013).

L. S. Bruckman, T. L. Richardson, J. A. Swanstrom, K. A. Donaldson, M. Allora, Jr., T. J. Shaw, M. L. Myrick. Linear Discriminant Analysis of Single-Cell Fluorescence Excitation Spectra of Five Phytoplankton Species. *Appl. Spec.* 66:1, 60-65 (2012).

T.J. Shaw, R.W. Raiswell, C.R. Hexel, H.P. Vu, W.S. Moore, R. Dudgeon, K.L. Smith. Input, composition, and potential impact of terrigenous material from free-drifting icebergs in the Weddell Sea. *Deep-Sea Research II* 58, 1376–1383 (2011).

T.J. Shaw, C.R. Hexel, K.L. Smith, A.D. Sherman, R. Dudgeon, M. Vernet and R. Kaufmann. <sup>234</sup>Th –based carbon export around free-drifting icebergs in the Southern Ocean. *Deep-Sea Research II* 58, 1384–1391 (2011).

W.S. Moore, M. Beck, T. Riedel, M. Rutgers van der Loeff, O. Dellwig, T.J. Shaw, B. Schnetger, H.-J. Brumsack. Radium-based pore water fluxes of silica, alkalinity, manganese, DOC, and uranium: A decade of studies in the German Wadden Sea. *Geochim. Cosmochim. Acta* 75 (21), 6535-6555 (2011).

H. Lin, S. Rauschenberg, C.R. Hexel, T.J. Shaw and B.S. Twining Free-drifting icebergs as sources of iron to the Weddell Sea. *Deep-Sea Research II* 58, 1392-1406 (2011).

K.L. Smith, A.D. Sherman, T.J. Shaw, A.E. Murray, M. Vernet, A.O. Cefarelli . Carbon export associated with free-drifting icebergs in the Southern Ocean. *Deep-Sea Research II* 58, 1485-1496 (2011).

J.M. Burns, P.S. Craig, T.J. Shaw, J.L. Ferry. Combinatorial parameter space as an empirical tool for predicting water chemistry: Fe(II) oxidation across a watershed. *Environ. Sci. Technol.* 45, 4023–4029 (2011).

J.M. Burns, P.S. Craig, T.J. Shaw, J.L. Ferry. Short-Term Fe Cycling during Fe(II) Oxidation: Exploring Joint Oxidation and Precipitation with a Combinatorial System. *Environ. Sci. Technol.* 45, 2663-2669 (2011).

J.M.; Craig, P.S.; Shaw, T.J. Ferry, J.L. Multivariate examination of Fe(II)/Fe(III) cycling and consequent hydroxyl radical yield. Burns, *Environmental Science & Technology* 44(19):7226-31 (2010).

L. S. Hill, T. L. Richardson, L. T. M. Profeta, T. J. Shaw, C. J. Hintz, B. S. Twining, E. Lawrenz, M. L. Myrick. Construction, figures of merit, and testing of a single-cell fluorescence excitation spectroscopy system. *Rev. Sci. Instrum.* 81, (2010).

W. S. Moore, M. Beck, T. Reidel, M. R. van der Loeff, O. Dellwig, T.J. Shaw, H-J. Brumsack, Fluxes of pore waters which transport metals and nutrients to the German Wadden Sea *Geochim. Cosmochim. Acta* 73:13 A900-A900 (2009).

J.L. Ferry, P.S. Craig, C.R. Hexel, P. Sisco R. Frey, P. Pennington, M. Fulton, G. Scott, A. Decho, S. Kashiwada, C.J. Murphy, and T.J. Shaw. Transfer of Gold Nanoparticles from the Water Column to the Estuarine Food Web. *Nature:Nano* v4:441-444 (2009).

Alkilany A. M., Nagaria P.K., Hexel C.R. , Shaw T.J., Murphy C.J., and Wyatt M.D., Cellular Uptake and Cytotoxicity of Gold Nanorods: Molecular Origin of Cytotoxicity and Surface Effects *Small* 5:6, 701-708 (2009).

P.S. Craig, T.J. Shaw, P.L. Miller, P.J. Pellechia, J.L. Ferry. Use of Multiparametric Techniques To Quantify the Effects of Naturally Occurring Ligands on the Kinetics of Fe(II) Oxidation. *Env. Sci. Tech.* 43/2: 337-342 (2009).

W.S. Moore and T.J. Shaw, Fluxes and behavior of radium isotopes, barium, and uranium in Southeastern US rivers and estuaries. *Mar. Chem.* 108: 236-254 (2008).

McCorkle, D. C., J. M. Bernhard, C. J. Hintz, J. K. Blanks, G. T. Chandler, T. J. Shaw. The Carbon and Oxygen Stable Isotopic Composition of Cultured Benthic Foraminifera. *Geological Society of London, Special Publication* vol. 303 (1): 135 - 154 (2008).

K.L. Smith, B.H. Robison, J.J. Helly, R.S. Kaufmann, H.A. Ruhl, T.J. Shaw, B.S. Twining, M. Vernet, Free-Drifting Icebergs: Hot Spots of Chemical and Biological Enrichment in the Weddell Sea. *Science* 317: 478-482 (2007).

C.J. Hintz, T.J. Shaw, G.T. Chandler, J.M. Bernhard, D.C. McCorkle, J.K. Blanks. Trace/minor Element:Calcium Ratios in Cultured Benthic Foraminifera, Part I: Interspecies Differences. *Geochim. et Cosmochim. Acta* 70(8) 1952-1963 (2006).

C.J. Hintz, T.J. Shaw, G.T. Chandler, J.M. Bernhard, D.C. McCorkle, J.K. Blanks. Trace/minor Element:Calcium Ratios in Cultured Benthic Foraminifera, Part II: Ontogenetic Variation. *Geochim. Cosmochim. Acta* 70(8) 1964-1976 (2006).

C. J. Hintz, G.T.Chandler, J.M. Bernhard, D.C. McCorkle, S. Havach, J.K. Blanks, and T.J. Shaw. A physicochemically-constrained seawater culturing system for production of viable,

calcite-producing, paleoceanographically-important benthic foraminifera *Limnol. Oceanogr. Methods* 2, 160-170 (2004).

T.J.Shaw, Methods and models for estimating advective pore water exchange in tidal flats. in "Biogeochemistry of tidal flats" Forschungszentrum Terramare Berichte, Nr. 12 pp.103-105 (2003).

T. Duncan and T. J. Shaw. The mobility of rare earth elements and redox sensitive metals in the groundwater/seawater mixing zone of a shallow coastal aquifer. *Aquat. Geochem.* 9, 233-255 (2003).

T.J. Shaw. Preface: Biogeochemical processes in coastal aquifers and permeable sediments. *Aquat. Geochem.* 9, 1-5 (2003).

T. J. Shaw, T. Duncan, and B. Schnetger. A Preconcentration/Matrix Reduction Method for the Analysis of Rare Earth Elements in Seawater and Groundwaters by ID-ICP-MS *Anal. Chem.* 75, 3396-3403 (2003).

T. J. Shaw and W. S. Moore. Analysis of <sup>227</sup>Ac in seawater by delayed coincidence counting *Mar. Chem.* 78, 197-203 (2002).

T. J. Shaw Subterranean Coastal Environments: Biogeochemical Processes, Fluxes and Impacts. *EOS Trans. Am. Geophys. Union*, 82 No. 50, pg 622-623 (2001).

S.M. Havach, G.T. Chandler, A. Wilson-Finelli and T.J. Shaw Experimental determinations of trace element partition coefficients in cultured benthic foraminifera *Geochim. Cosmochim. Acta* 65:1277-1283 (2001).

T.A. Hagopian, G.T. Chandler and T.J. Shaw. The acute toxic effects of sediment-associated metals, individually and in a mixture, to the meiobenthic harpacticoid copepod *Amphiascus tenuiremis* *Mar. Env. Res.* 51 (3) 247-264 (2001).

B. Schnetger, J. Hinrichs, O. Dellwig, T. Shaw, H.-J. Brumsack. The significance of radionuclides and trace elements in a back barrier tidal area: results from the German Wadden Sea. In: Inaba J. Hisamatsu S. & Ohtsuka Y. (eds.) *Distribution and Speciation of Radionuclides in the Environment. Proceedings of the International Workshop on Distribution and Speciation of Radionuclides in the Environment, Rokkasho, Aomori, Japan, October 11-13, 200*, p. 99-107. (2001).

H. A. Alegria, J.P. d'Autel, and T.J. Shaw. Offshore Transport of Pesticides in the South Atlantic Bight: Preliminary Estimates of Transport Budgets *Mar. Poll. Bull.* 40 No.12, 1178-1185 (2000).

H. A. Alegria, T.F. Bidleman, and T.J. Shaw Organochlorine Pesticides in Ambient Air in Belize, Central America. *Env. Sci.Technol.* 34(10); 1953-1958 (2000).

H. Alegria and T. J. Shaw Rain deposition of atrazine and trifluralin in coastal waters of the South Atlantic Bight. *Env. Sci.Technol.*, 33, 850-856 (1999).

W. S. Moore and T. J. Shaw. Chemical signals from submarine fluid advection onto the continental shelf. *J. Geophys. Res.*, 103 No.C10, 21,543-21,552 (1998).

- T. J. Shaw, W. S. Moore, J. Kloepfer, and M. A. Sochaski. The flux of barium to the coastal waters of the southeastern United States: The importance of submarine Groundwater Discharge. *Geochim. Cosmochim. Acta* 62 No.18, 3047-3054 (1998).
- J. M. Smoak, W. S. Moore, R.C. Thunell and T. J. Shaw. Comparison of  $^{234}\text{Th}$ ,  $^{228}\text{Th}$ , and  $^{210}\text{Pb}$  fluxes with fluxes of major sediment components in the Guymas Basin, Gulf of California. *Mar. Chem.* 65, 177-194 (1999).
- T. J. Shaw, J. M. Smoak, and L. Lauerman. Scavenging of  $^{234}\text{Th}$ ,  $^{230}\text{Th}$ , and  $^{210}\text{Pb}$  by particulate matter in the deep waters of the California continental margin. *Deep Sea Research II* 45 763-779 (1998).
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- L. Lauerman, J. Smoak, T. J. Shaw, W. Moore, and K. Smith K.  $^{234}\text{Th}$  and  $^{210}\text{Pb}$  evidence of rapid ingestion of settling particles by mobile epibenthic megafauna in the abyssal NE Pacific. *Limnol. Oceanogr.* 42(3), 589-595 (1997).
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- T. J. Shaw, E. Sholkovitz, and G. Klinkhammer, Redox dynamics in the Chesapeake Bay: The effect on sediment/water uranium exchange, *Geochim. Cosmochim. Acta* 58, 2985-2995 (1994).
- E. R. Sholkovitz, T. J. Shaw, and D. L. Schneider, The response of rare earth elements to seasonal anoxia in the water column and pore waters of Chesapeake Bay, *Geochim. Cosmochim. Acta* 56, 3389-3402 (1992).
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T. J. Shaw, An apparatus for fine-scale sampling of pore waters and solids in high porosity sediments, *J. Sed. Petrol.* 59, 633-634 (1989).

J. M. Gieskes, B. R. T. Simoneit, T. Brown, T. Shaw, Y-C. Wang, and A. Maggenheim, Hydrothermal fluids and petroleum in surface sediments of the Guymas Basin, Gulf of California: A case study, *Can. Mineral.* 26, 589-602 (1988).