

Joseph J. Vallino, Ph.D.

Senior Scientist, The Ecosystems Center, Marine Biological Laboratory
jvallino@mbi.edu
<http://eco37.mbl.edu>
508-289-7648

Education

University of California, Berkeley, CA

B.S. Chemical Engineering, June 1983.

California Institute of Technology, Pasadena, CA

M.S. Chemical Engineering, June 1985. Advisor: Prof. Gregory Stephanopoulos.

Thesis: On-Line Estimation of the Oxygen-Mass-Transfer Coefficient and Other State Variables in a Chemostat.

Massachusetts Institute of Technology, Cambridge, MA

Ph.D. Chemical Engineering, February 1991. Advisor: Prof. Gregory Stephanopoulos.

Thesis: Identification of Branch-Point Restrictions in Microbial Metabolism Through Metabolic Flux Analysis and Local Network Perturbations.

Professional appointments

California Institute of Technology, Pasadena, CA

Research Assistantships, August 1983 - June 1985

Massachusetts Institute of Technology, Cambridge, MA

Research and Teaching Assistantships, August 1985 - February 1991

Scripps Institution of Oceanography, UCSD, La Jolla, CA

Mellon Postdoctoral Fellow, February 1991-1993

Marine Biological Laboratory, Woods Hole, MA

Lakian Postdoctoral Scholar, July 1993 – 1995

Postdoctoral Scholar, August 1995 – January 1997

Research Associate, January 1997 – May 1997

Assistant Scientist, June 1997 – August 2005

Associate Scientist, August 2005 – Dec 2011

Senior Scientist, Dec 2011 – Present

Brown University, Providence, RI

Adjunct Assistant Professor (MBL), Ecology and Evolutionary Biology, 2004-2010

Assistant Professor (MBL), Geological Sciences, 2010-2013

Completed publications

Chapters in books

Vallino, J.J. and Stephanopoulos, G. (1990). Flux determinations in cellular bioreaction networks: applications to lysine fermentations. In: *Frontiers in Bioprocessing*. Sikdar, S. K., Todd, P. W., and Bier, M. (Eds.), CRC Press, Florida, 205-219.

Vallino, J.J. and Stephanopoulos, G. (1990). Intracellular flux analysis as means of identifying limiting nodes in amino acid fermentations. In: *Proc. - Eur. Congr. Biotechnol.*, 5th, Vol. 2., Christiansen, C., Munck, L., Villadsen, J. (Eds.), Munksgaard, Copenhagen, Den. 1063-1066.

Bowden, W. B., B. J. Peterson, L. A. Deegan, A. D. Huryn, J. P. Benstead, H. Golden, M. Kendrick, S. M. Parker, E. Schuett, **J. J. Vallino**, and J. E. Hobbie. (2014) Ecology of Streams of the Toolik Region. In J. E. Hobbie and G. W. Kling, editors. *Alaska's Changing Arctic: Ecological Consequences for Tundra, Streams, and Lakes*. Oxford University Press, New York, pp. 173-237.

Vallino, J.J., Algar, C.K., Fernandez Gonzalez, N., Huber, J.A.. (2014) Use of receding horizon optimal control to solve MaxEP-based biogeochemistry problems. In *Beyond the Second Law: Entropy Production and Non-Equilibrium Systems*, Dewar, R.C., Lineweaver, C., Niven, R. and Regenauer-Lieb, K., (eds), Springer, pp 337-359, doi: 10.1007/978-3-642-40154-1_18.

Refereed journal articles

- Vallino, J.J.** and Stephanopoulos, G. (1987). Intelligent sensors in biotechnology: applications for the monitoring of fermentations and cellular metabolism. *Ann. N.Y. Acad. Sci.* **506**, 415-430.
- Stephanopoulos, G. and **Vallino, J.J.** (1991). Network rigidity and metabolic engineering in metabolite overproduction. *Science* **252**, 1675-1681.
- Vallino, J.J.** and Stephanopoulos, G. (1993). Metabolic flux distributions in *Corynebacterium glutamicum* during growth and lysine overproduction. *Biotechnol. Bioeng.* **41**, 633-646.
- Wikner, J., **Vallino, J.J.**, Steward, G., Smith, D., and Azam, F. (1993). Nucleic acids from the host bacterium as a major source of nucleotides for three marine bacteriophages. *FEMS Microbiol. Ecol.* **12**, 237-248.
- Ingram, K., C. S. Hopkinson, K. Bowman, H. Garritt and **J. Vallino.** (1994). From watershed to estuary: assessment of nutrient loading, retention and export from the Ipswich River Basin. *Biol. Bull.* **187**, 277-278.
- Vallino, J.J.** and Stephanopoulos, G. (1994). Carbon Flux Distributions at the Glucose 6-Phosphate Branch Point in *Corynebacterium glutamicum* during Lysine Overproduction. *Biotech. Prog.* **10**, 327-334
- Vallino, J.J.** and Stephanopoulos, G. (1994). Carbon Flux Distributions at the Pyruvate Branch Point in *Corynebacterium glutamicum* during Lysine Overproduction. *Biotech. Prog.* **10**, 320-326.
- Hopkinson, C.S. and **Vallino, J.J.** (1994). Toward the Development of Generally Applicable Models of the Microbial Loop in Aquatic Ecosystems. *Microb. Ecol.* **28**, 321-326.
- Alderman, D., B. Balsis, I. Buffam, R. Garritt, C. Hopkinson and **J. Vallino.** (1995). Pelagic metabolism in the Parker River/Plum Island Sound Estuarine System. *Biol. Bull.* **189**, 250-251.
- Balsis, B., D. Alderman, I. Buffam, R. Garritt, C. Hopkinson and **J. Vallino.** (1995). Total system metabolism in the Plum Island Sound estuary. *Biol. Bull.* **189**, 252-254.
- Hopkinson, C.S. and **Vallino, J.J.** (1995). The Relationship between Man's Activities in Watersheds and Rivers and Patterns of Estuarine Community Metabolism. *Estuaries* **18**, 598-621.
- Uhlenhopp, A. G., J. Hobbie and **J. Vallino.** (1995). Effects of land use on the degradability of dissolved organic matter in three watersheds of the Plum Island Sound estuary. *Biol. Bull.* **189**, 256-257.
- Carini, S., N. Weston, C. Hopkinson, J. Tucker, A. Giblin and **J. Vallino.** (1996). Gas exchange rates in the Parker River estuary, Massachusetts. *Biol. Bull.* **191**, 333-334.
- Vallino, J.J.**, Hopkinson, C.S., and Hobbie, J.E. (1996). Modeling Bacterial Utilization of Dissolved Organic Matter: Optimization Replaces Monod Growth Kinetics. *Limnol. Oceanogr.* **41**, 1591-1609.
- Jay, D.A., Uncles, R.J., Largier, J., Geyer, W.R., **Vallino, J.**, and Boynton, W.R. (1997). A Review of Recent Developments in Estuarine Scalar Flux Estimation. *Estuaries* **20**, 262-280.
- Hopkinson, C.S, Buffam, I., Hobbie, J., **Vallino, J.**, Perdue, M., Eversmeyer, B., Prahl, F., Covert, J., Hodson, R., Moran, M.A., Smith, E., Baross, J., Crump, B., Findlay, S., and

- Foreman, D. (1998). Terrestrial inputs of organic matter to coastal ecosystems: an intercomparison of chemical characteristics and bioavailability. *Biogeochemistry* **43**, 211-234.
- Vallino, J.J.** and Hopkinson, C.S. (1998). Estimation of Dispersion and Characteristic Mixing Times in Plum Island Sound Estuary. *Estuarine, Coastal and Shelf Science* **46**, 333-350.
- Canfield, S., L. Claessens, C. Hopkinson, E. Rastetter and **J. Vallino**. (1999). Long-term effect of municipal water use on the water budget of the Ipswich River basin. *Biol. Bull.* **197**, 295-297.
- Pease, K.M., L. Claessens, C. Hopkinson, E. Rastetter, **J. Vallino**, and N. Kilham. (1999). Ipswich River nutrient dynamics: preliminary assessment of a simple nitrogen-processing model. *Biol. Bull.* **197**, 289-290.
- Kirkby, R., L. Claessens, C. Hopkinson, E. Rastetter, **J. Vallino**. (2000). Modeling the effects of land-use change on nitrogen biogeochemistry in the Ipswich watershed, Massachusetts. *Biol. Bull.* **199**, 218-219.
- Perring, A., M. Williams, C. Hopkinson, Jr, E. Rastetter, and **J. Vallino**. (2000). Solute dynamics in storm flow of the Ipswich River basin: effects of land use *Biol. Bull.*, **199**, 219-221.
- Vallino, J.J.** and Stephanopoulos, G. (2000). Metabolic flux distributions in *Corynebacterium glutamicum* during growth and lysine overproduction. *Biotechnol. Bioeng.* **67**, 872-885.
- Vallino, J.J.** (2000). Improving marine ecosystem models: use of data assimilation and mesocosm experiments. *J. Mar. Res.* **58**, 117-164.
- Hopkinson, C.S., **Vallino, J.J.** and Nolin, A. (2002). Decomposition of dissolved organic matter from the continental margin. *Deep-Sea Res. II*, **49**, 4461-4478.
- Vallino, J.J.** (2003). Modeling microbial consortiums as distributed metabolic networks. *Biol. Bull.*, **204**, 174-179.
- Tobias, C.R., Cieri, M., Peterson, B.J. Deegan, L.A., **Vallino, J.** and Hughes, J. (2003). Processing watershed-derived nitrogen in a well-flushed New England estuary. *Limnol. Oceanogr.*, **48**, 1766-1778.
- Giblin, A.E. and **Vallino, J.** (2003). The role of models in addressing coastal eutrophication problems. In: Canham, C. D., Cole, J. J. and Lauenroth, W. K. (eds), *The Role of Models in Ecosystem Science*. Princeton University Press, 327-343.
- Filoso, S., **Vallino, J.**, Hopkinson, C. and Rastetter, E. (2004). Modeling Nitrogen Processing and Transport in the Ipswich River Basin, Massachusetts, Using HSPF: Present Conditions and Future Scenarios. *J. Amer. Wat. Res. Assoc.*, **40**(5), 1365-1384.
- Williams, M., Hopkinson, C., Rastetter, E., **Vallino, J.** (2004). N Budgets and Aquatic Uptake in the Ipswich River Basin, Northeastern Massachusetts. *Water Resources Research*, **40** (11), W11201, 12 pp.
- Hopkinson, C.S. and **Vallino, J.J.** (2005). Efficient export of carbon to the deep ocean through dissolved organic matter. *Nature*, **433**, 142-145.
- Williams, M., Hopkinson, C., Rastetter, E., **Vallino, J.** and Claessens, L. (2005). Relationships of land use and stream solute concentrations in the Ipswich River basin, Northeastern Massachusetts. *Water, Air and Soil Pollution*, **161**, 55-74.
- Vallino, J.J.**, Hopkinson, C.S., and Garritt, R.H. (2005). Estimating estuarine gross production, community respiration and net ecosystem production: A nonlinear inverse technique. *Ecol. Model.*, **187**, 281-296.
- Wan, Z. and **Vallino, J.** (2005). An Inverse Ecosystem Model of Year-to-year Variations with First Order Approximation to the Annual Mean Fluxes. *Ecol. Model.*, **187**, 369-388.
- Claessens, L., Hopkinson Jr, C., Rastetter, E. and **Vallino, J.** (2006). Effect of historical changes in land-use and climate on the water budget of an urbanizing watershed. *Water Resources Research*, **42**, W03426, doi:10.1029/2005WR004131.

- Deegan, L.A., Bowen, J.L., Drake, D., Fleeger, J.W., Friedrichs, C.T., Galván, K.A., Hobbie, J.E., Hopkinson, C., Johnson, J.M., Johnson, D.S., Lemay, L.E., Miller, E., Peterson, B.J., Picard, C., Sheldon, S., **Vallino, J.**, Warren, R.S. (2007). Susceptibility of salt marshes to nutrient enrichment and predator removal. *Ecological Applications*, **17** (sp5), S42-S63.
- Lyons, M.M., Lau, Y.-T., Carden, W.E., Ward, J.E., Roberts, S.B., Smolowitz, R., **Vallino, J.**, Allam, B. (2007) Characteristics of marine aggregates in shallow-water ecosystems: Implications for disease ecology. *EcoHealth*, **4**(4), 406-420, doi:10.1007/s10393-007-0134-0.
- Wan, Z., **Vallino, J.J.**, and Peterson, B.J. (2008) Study of the inter-annual food web dynamics in the Kuparuk River with a first order approximation inverse model. *Ecol. Model.* **211** (1-2), 97-112, doi: 10.1016/j.ecolmodel.2007.08.022.
- Vallino, J.J.** (2010) Ecosystem biogeochemistry considered as a distributed metabolic network ordered by maximum entropy production. *Phil. Trans. R. Soc. B*, **365**, 1417-1427, doi:10.1098/rstb.2009.0272.
- Zhao, L., Chen, C., **Vallino, J.**, Hopkinson, C., Beardsley, R.C., Lin, H., and Lerczak, J. (2010) Wetland-estuarine-shelf interactions in the Plum Island Sound and Merrimack River in the Massachusetts Coast. *JGR-Oceans*, **115**, C10039, 13 pp. doi:10.1029/2009JC006085.
- Vallino, J.J.** (2011) Differences and implications in biogeochemistry from maximizing entropy production locally versus globally. *Earth Syst. Dynam.* **2**, 69-85, doi: 10.5194/esd-2-69-2011
- Xia, Li C., Steele, Joshua A., Cram, Jacob A., Cardon, Zoe G., Simmons, Sheri L., **Vallino, Joseph J.**, Fuhrman, Jed A., Sun, Fengzhu (2011) Extended local similarity analysis (eLSA) of microbial community and other time series data with replicates. *BMC Systems Biology*, **5**(Suppl 2):S15, 12 pp., doi: 10.1186/1752-0509-5-S2-S15
- Dunaj, Sara; **Vallino, Joseph**; Hines, Mark; Gay, Marcus; Kobyljanec, Christine; Rooney-Varga, Juliette (2012) Relationships between soil organic matter, nutrients, bacterial community structure, and the performance of microbial fuel cells. *Environ. Sci. Technol.* **46** (3):1914-1922, doi: 10.1021/es2032532.
- Algar, C.K. and **Vallino, J.J.** (2014) Predicting microbial nitrate reduction pathways in coastal sediments. *Aquat. Microb. Ecol.* **71** (3): 223-238, doi: 10.3354/ame01678.
- Rastetter, E.B. and **Vallino, J.J.** (2015) Ecosystem's 80th and the Reemergence of Emergence. *Ecosystems* **18** (5), 735-739, doi: 10.1007/s10021-015-9893-6.
- Chapman, E.J., Childers, D.L. and **Vallino, J.J.** (2016) How The Second Law of Thermodynamics has informed ecosystem ecology through its history. *BioScience* **66** (1), 27-39, doi: 10.1093/biosci/biv166.
- Vallino, J.J.** and Algar, C.K. (2016) Thermodynamics of marine biogeochemical cycles: Lotka revisited. *Ann. Rev. Mar. Sci.* **8**, 333-356, doi: 10.1146/annurev-marine-010814-015843.
- Fernandez-Gonzalez, N., Huber, J.A., **Vallino, J.J.** (2016) Microbial communities are well adapted to disturbances in energy input. *mSystems* **1** (5), 15 pp., doi: 10.1128/mSystems.00117-16.

Non-refereed journal articles

- Vallino, J. J.**, C. S. Hopkinson, R. Garritt, J. Tucker. (1999). A non-linear inverse technique to estimate estuarine ecosystem metabolism from whole system oxygen measurements, Proceedings of the 3rd International Symposium on Ecohydraulics, Salt Lake City, UT, July 1999 (CD ROM)
- Pontius Jr, R.G., L. Claessens, C. Hopkinson Jr, A. Marzouk, E.B. Rastetter, L.C. Schneider, **J. Vallino**. (2000). Scenarios of land-use change and nitrogen release in the Ipswich watershed, Massachusetts, USA. in Parks, B.O., K.M. Clarke, M.P. Crane, editors. 2000. Proceedings of the 4th international conference on integrating geographic information systems and

environmental modeling: problems, prospects, and needs for research; 2000 Sep 2-8; Boulder, CO. Boulder: University of Colorado, Cooperative Institute for Research in Environmental Science. (www and CD ROM).

Research Grants

Current grants

- MOORE Foundation: Functional Dynamics, Interactions and Biogeochemical Impact of Chemolithoautotrophic Subseafloor Microbial Ecosystems at Axial Seamount, a Mid-Ocean Ridge Cabled Observatory, Jul 2012-Jun2017, **Co-PI**, \$2,258,547.
- NOAA/WHOI Sea Grant: The impacts of increased nitrogen loadings on decomposition in salt marshes: Does eutrophication enhance marsh accretion or erosion? May 2014-Apr 2016, **Co-PI**, \$119,998 (plus \$ 62,360 matching).
- Anonymous Donor: Continuous production of methane from algae lacking cell walls. Oct 2014 – Sep 2016, **Co-PI**, \$360,000.
- NSF-GEO-1451356: Application of thermodynamic theory for predicting microbial biogeochemistry, Apr 2015-Apr 2016, **Lead PI**, \$203,658.
- DOE-EMSL-JGI-49028: 3D Reality Check: Developing Structural Support for Predicting Microbial Function and Interpreting Microbial "Omics" Data, Jul 2015-Jun 2016, **Co-PI**, JGI Genomic and transcriptomic sequencing of *Methanosarcina barkeri str. Fusaro*.
- NSF-OCE-1558710, Collaborative Research: Predicting the Spatiotemporal Distribution of Metabolic Function in the Global Ocean, Apr 2016-Feb 2019, **Lead PI**, \$687,302.
- NSF-OCE-1637630, LTER-Plum Island Ecosystems: Dynamics of coastal ecosystems in a region of rapid climate change, sea-level rise, and human impacts, Oct 2016-Sep 2022, **Co-PI**, \$6,761,476.

Completed grants

- NSF-DEB-9726862, W/WS: Integrated, Ecological-Economic Modeling of Watersheds and Estuaries at Multiple Scales, Oct 1997-Sep 2002, **Co-PI**, \$815,000.
- NSF-OCE-9726921. LTER: Plum Island Sound Comparative Ecosystem Study (Pisces) Effects of Changing land Cover, Climate and Sea Level on Estuarine Trophic Dynamics, Jul 1998-Jun 2004, **Co-PI**, \$4,646,609.
- NSF-EAR-9807632, (EGB) Predictions of Bioavailability of Riverine Dissolved Organic Matter from Bulk Measures of Geochemical Composition Across Landscape and Continental Gradients, Oct 1998-Sep 2000, **Co-PI**, \$259,483.
- NSF-DEB-9815598. Ecosystem Controls on the Biogeochemical Processing of Watershed-Derived Nitrogen in Tidal Rivers, Sep 1999-Aug 2002, **Co-PI**, \$823,000.
- NSF-EAR-0083839, BIOCOMPLEXITY – INCUBATION ACTIVITY: Quantitative Description of The Response of a Complex System to Disturbance: Subsurface Microbial Communities and Chemical Contaminants, Oct 2000-Mar 2003, **Co-PI**, \$67,211.
- NSF-OPP-9911278, Aquatic Ecosystem Responses to Changes in the Environment of an Arctic Drainage Basin, Jul 2000-Jun 2005, **Co-PI**, \$3,257,870.
- NSF-DEB-0213767, Trophic Cascades and Interacting Control Processes in a Detritus-Based Aquatic Ecosystem, Oct 2002-Sep 2006, **Co-PI**, \$2,699,971.
- NSF-0301231, Controlled Environment Facilities for Examination of the Effects of Climate Change and Human Land Use on Terrestrial and Aquatic Ecosystems. (Equipment Grant), Jul 2003-Jun 2005, **Co-PI**, \$240,000 plus \$120,000 MBL cost share.

- NSF-EF-0429004, Linking Marine Pathogens to Molluscan Shellfish: The Ecological Role of Marine Aggregates, Sep 2004-Aug 2007, **Co-PI**, \$1,053,000.
- NOAA-CICEET, Effectiveness of Reactive Barriers for Reducing N-Loading to the Coastal Zone, Sep 2004-Aug 2007, **Lead PI**, \$210,000.
- NASA- NNH04ZSS001N Astrobiology, Do thermodynamic goal functions describe microbial biogeochemical dynamics?, Aug 2005-July 2006, **Lead PI**, \$74,000.
- NSF-OCE-0423565, Plum Island Ecosystems LTER, Aug 2004-Jul 2010, Co-I, \$5,738,000.
- NSF-DEB-0542682, Collaborative Research: Benthic Microalgal Regulation of Carbon and Nitrogen Turnover in Land Margin Ecosystems: A Dual Stable Isotope Tracer Approach, Feb 2006-Feb 2012, **Co-PI**, \$92,827.
- NSF-CBET-0756562: Modeling Microbial Biogeochemistry in Permeable Reactive Barriers, May 2008-Apr 2012, **Lead PI**, \$300,000.
- NSF-OCE-0852263: Collaborative Research: Environmental Controls on Anammox and Denitrification Rates in Estuarine and Marine Sediments, Jul 2009-Jun 2012, **Co-PI**, \$482,144.
- NSF-OCE-1058747, Plum Island Ecosystems LTER, Oct 2010-Sep 2012, **Co-PI**, \$2,213,777.
- NSF-EF-0928742: Theory: Biological systems organize to maximize entropy production subject to information and biophysicochemical constraints, Sep 2009-Aug 2013, **Lead PI**, \$750,000.
- NOAA/MIT Sea Grant: Microbial Community Composition of Permeable Reactive Barriers: Who is Really Doing the Work?, Feb 2012-Jan 2015, **Co-PI**, \$26,359 sub award.
- DOE-EMSL-48391: Integration of Pore-Scale Simulations and Multi-Omics Data to Develop Insights into Functional Heterogeneity in Microbial Communities, Oct 2014-Sep 2015, **Co-PI**, Computing: Cascade (Atipa 1440 Intel Xeon-Phi Node FDR-Infiniband Linux Cluster): 70,000 hrs.
- NSF-OCE-1238212: LTER-PIE: Interactions Between External Drivers, Humans and Ecosystems in Shaping Ecological Process in a Mosaic of Coastal Landscapes and Estuarine Seascapes, Oct 2012-Sep 2016, **Co-PI**, \$4,171,697.

Proposals submitted

- NASA-Exobiology, Application of thermodynamic theory for predicting planetary microbial biogeochemistry, **Lead PI**, \$772,321.
- NSF-MCB, Collaborative Research: Importance of quorum sensing and other strategies in organizing methylotrophic communities over space: testing thermodynamically-based model predictions, **Lead PI**, \$718,314
- DOE, 3D Structural Support for Scaling Distributed Microbial Metabolic Activity Belowground: a Test Case in Net Methanogenesis, **Co-PI**, \$394,333.
- NSF-OCE, Collaborative Research: Linking Organic Matter Composition to Shifting Baselines in the Coastal Sedimentary Nitrogen Cycle, **Co-PI**, \$1,081,263.
- NSF-DEB, Investigating the connectivity of microbial food webs using thermodynamic models, stable isotope probing and genomics, **Lead PI**, \$780,307.

Service

To the MBL

- Fellowships and Research Awards Committee, Jan 2006-Dec 2008
Director's Counsel, Mar 2015 – Present
MBL IT Advisory Committee, Aug 2015 - Present

To the university (Brown)

Research Committee for Brown/IBM High Performance Computing Center, March-October 2009.

Energy/Environment Working Group, Office of the Vice President for Research, December 2009.

To the university (Chicago)

Served on the Planning Committee for the MBL and UChicago May 2014 retreat

To the profession

NATO Science of Stability Program: Advisory committee for the TU-Black Sea Project, 1994 - 1995.

NSF JGOFS-Southern Ocean Modeling panel member, 1995.

Editorial Board, *Mangroves and Salt Marshes*, 1998 - 1999.

EPA Water and Watersheds Program panel member, 1999.

Editorial Board, *Wetlands Ecology and Management*. 1999 - 2001.

NSF Biocomplexity Math/Theory/Computation panel member, 2000.

NOAA Coastal Hypoxia Research Program panel member, 2005.

NSF Ecosystems Cluster panel member, 2006.

LTER Site Review Committee, Dry Valleys, Antarctica. Jan 2008.

Nature Reader Panel. 2008 - 2009.

Review Editor, *Aquatic Microbial Ecology*. 2007 - Present.

NSF Advancing Theory in Biology panel member, 2010 and 2011.

NSF Center for Coastal Margin Observation and Prediction site review committee, 2012.

Session Chair/Organizer for:

Novel Approaches to Modeling Food Web and Ecosystem Biogeochemistry, ASLO, Salt Lake City, UT, Feb 2003.

Ecology and Population Biology, MBL General Scientific Meeting, Woods Hole, Aug 2003.

Understanding and Modeling Aquatic Ecosystems Using Fundamental Laws, ASLO, Santa Fe, NM, Feb 2007.

Reviewed numerous proposals for: NSF, NOAA, UNH CICEET, EPA, DOE, Sea Grant, and Hudson River Foundation.

Reviewed manuscripts for: *American naturalist, Aquatic Microbial Ecology, Biogeochemistry, Biological Bulletin, Biotechnology & Bioengineering, Biotechnology Progress, Deep-Sea Research, Ecological Applications, Ecological Modelling, Ecological Monographs, Ecosphere, Ecosystems, Entropy, Environmental Microbiology, Environmental Modeling Software, Estuaries, Estuarine Coastal and Shelf Science, Frontiers in Microbiology, Global Biogeochemical Cycles, Journal of Geophysical Research, Journal of Marine Research, Journal of Marine Systems, Limnology and Oceanography, L&O Methods, Marine Ecology Process Series, Microbiology, Oceanography and Philosophical Transactions of the Royal Society B: Biological Sciences, Proceedings of the National Academy of Sciences.*

Organizations: Society for Mathematical Biology, American Geophysical Union; American Society of Limnology and Oceanography, Coastal and Estuarine Research Federation.

To the community

WGBH interview for *Fresh Water, Salt Water – Part III – Simple Solutions*. Use of permeable reactive barriers for groundwater bioremediation.

Academic honors, fellowships, honorary societies

Outstanding Sophomore Award, American Institute of Chemical Engineers, UCLA. 1981.

Northern California Section Award for AIChE. 1983.

Corning Glass Fellowship, Caltech. 1983-1984.

Mellon Postdoctoral Fellowship Award at Scripps Institution of Oceanography. 1991-1993.

Lakian Postdoctoral Scholar Award at Marine Biological Laboratory, 1993-1994.

Vallino and Stephanopoulos (1993) selected as one of the top 20 papers of special significance over the last 40 years of publication in *Biotechnology & Bioengineering*. 2000.

Teaching

Marine Biological Laboratory, Woods Hole, MA

Semester in Environmental Science Program (see <http://www.mbl.edu/SES>)

Course Instructor, Microbial Methods in Ecology (fall 1999-present): Undergraduate course combines lectures on microbial biogeochemistry and ecology with laboratory methods. Lectures and labs on bacterial counts, leucine-¹⁴C bacterial productivity, hydrogen sulfide and methane production in Winogradsky columns, extracellular enzyme assays, bacterial grazers, bacteria-phytoplankton competition, and PCR (see <http://ecosystems.mbl.edu/SES/MicrobialMethods>).

SES Undergraduate Research Projects and REU's, Advisor to (last 5 years only):

Alice Carter (2010) Microbial community productivity and diversity as responses to pH oscillation frequency.

George Allen (2010) Maximizing ecosystem productivity via nutrient recycling: consequences of thermodynamics in phytoplankton microcosms.

Meghan Short (2010) Contrasting nutrient dynamics of litter decomposition in a deciduous forest and pond ecosystem.

Sarah Berry (2010) The Role of Pond Sediments in the Removal of DOC and Tannin Compounds Through Abiotic and Bacterial Action.

Camille Sogin (2011) The role of nitrate as a control on N cycling pathways in marine sediments; A switch between heterotrophic denitrification and anammox (REU).

Joseph Hakam (2011) Ecosystem Energy-Use Efficiency: Positive Effects of Predation on Productivity.

Aliza Ray (2012) How does ocean acidification impact phytoplankton productivity and community structure?

Michael Marty-Rivera (2012) Effects of high and low nutrient concentrations on anti-herbivory compounds in macroalgae.

Chelsea Westra (2013) Effects of carbon source and particle size on nitrogen cycling in aggregated "Bio-Floc" microbial communities.

Kelsey Gosselin (2013) Aerobic and anaerobic microbial degradation of weathered and fresh oil from the BP Deepwater Horizon Oil Spill.

Leah Hayden (2013) Effects of ocean acidification and nutrient enrichment on growth of the planktonic coccolithophore *Emiliana huxleyi*.

Ruby An (2015) A2M: Experimental and modeling approaches to optimize an algae-to-methane coupled bioreactor system. (U. of Chicago, Metcalf).

Petra Byl (2015) Assessing Microbial Coordination over Space and Time in Siders Pond. (U. of Chicago, Metcalf).

Jessie Yang (2015) Effect of microbial fuel cells on nitrogen removal processes in wastewater organic matter.

Gabriela Atsepoyi (2015) Comparison of microbial respiration between heated and control plots in the Harvard Forest soil warming experiment.

Emily Geoghegan (2015) Understanding decomposition of organic matter in anaerobic environments: improving breakdown of algal mass in A2M methanogenic bioreactor.

Emily Okikawa (2015) The importance of microbial mats versus "pink berries" in altering nutrient cycles between sediments and the water column in Little Sippewissett marsh.

Brown University, Providence, RI

Co-instructor, Geomicrobiology (GEOL1950F), fall 2011. Course examines the influence of microbes in geological and environmental processes by integrating molecular, microbiological, and modeling approaches.

Thesis Committees

Jennifer Bowen. Boston University, Ph.D. Program, 2002-2007.
Yawei Luo. Brown University, Ph.D. Program, 2007-2009.
Sara Schloth, UMass Lowell, M.S. Program, 2010-2012
Angus Angermeyer, Brown University, Ph.D. Program, 2014-Present.

Postdoctoral Students Mentored

Zhenwen Wan (2002-2004)
Lora Harris (2005-2007)
Liuzhi Zhao (2006-2009)
Nuria Fernandez-Gonzalez (2010-2014)
Chris Algar (2010-2014)