ALBERT J. VALOCCHI

Address: Department of Civil and Environmental Engineering
University of Illinois
205 N. Mathews Avenue, MC-250
Urbana, Illinois 61801-2352
phone: (217) 333-3176
e-mail: valocchi@illinois.edu

Education:
Ph.D. Civil Engineering, Stanford University, 1981
M.S., Environmental Engineering, Stanford University, 1976
B.S., Environmental Systems Engineering, Cornell University, 1975

Employment:
2020-2021, Interim Head, Dept. of Civil and Environmental Engineering, University of Illinois
2004-2011, Associate Head , Dept. of Civil and Environmental Engineering, University of Illinois
1992-present, Professor, Dept. of Civil and Environmental Engineering, University of Illinois
1986-1992, Associate Professor, Dept. of Civil and Environmental Engineering, University of Illinois
1981-1986, Assistant Professor, Dept. of Civil and Environmental Engineering, University of Illinois

Research Interests:

Modeling the fate and transport of reactive contaminants in the subsurface environment; aquifer remediation; groundwater hydrology; numerical methods ; parameter estimation and uncertainty quantification; computational science applications in environmental, hydrological and geological systems.

Professional Societies:

American Geophysical Union
American Society of Civil Engineers
American Society for Engineering Education
Sigma Xi
Association of Environmental Engineering and Science Professors
SIAM (Society for Industrial and Applied Mathematics)
National Ground Water Association
InterPore: International Society for Porous Media

Awards and Honors:

Shell Faculty Career Fellow, 1984-1987
NATO Fellow and Invited Professor, Summer School on Environmental Dynamics, Venice, 1990
Danish Research Academy Visiting Professorship Fellowship, Institute of Hydrodynamics and Hydraulic Engineering Technical University of Denmark, March-September, 1993
Invited Guest Instructor, Transport and Biodegradation in Heterogeneous Groundwater Aquifers, Advanced School/Ph.D. Course, Danish Center for Applied Mathematics and Mechanics, August 7-12, 2000.
Collins Award for Innovative Teaching, University of Illinois, College of Engineering, 2002.

University of Illinois Center for Advanced Study, Associate, 2003-2004
Fellow, American Geophysical Union, 2009
Abel Bliss Professorship, University of Illinois College of Engineering, 2011-
Stanley H. Pierce Faculty Award, College of Engineering, 2013.
Chi Epsilon Honor Member, Department of Civil and Environmental Engineering, University of Illinois, 2013
Graduate and Professional Teaching Award, University of Illinois, 2015

Selected Professional Activities and Service:

Invited Participant, DOE Workshop on Fundamental Geochemistry Needs for Nuclear Waste Isolation, Los Alamos National Laboratory, June 1984.
Invited Participant, Workshop on Integrated Microbiological, Chemical, and Hydrologic Experiments in the Subsurface - Future Needs and Directions, sponsored by U.S. Dept. of Energy, Lewes, Delaware, April 12-14, 1987.
Invited Lecturer and Scientific Committee Member, NATO Advanced Study Institute on "Migration and Fate of Pollutants in Soils and Subsoils," Maratea, Italy, 1992
Co-organizer, Workshop on Reactive Transport Modeling, Environmental Molecular Sciences Laboratory, Pacific Northwest Laboratory, Oct. 29-Nov. 1, 1997.
Member, Technical Advisory Council, Illinois State Water Survey, Ground-Water Section, 1999-2001
Invited Participant, Modeling and Management of Emerging Environmental Issues:Expert Workshop 2000, sponosored by DuPont, July, 2000.
Co-convener, Session on "Pore-scale characterization of contaminant transport and fate processes," Spring 2001 Meeting, American Geophysical Union.
Member, Committee on Environmental Remediation at Naval Facilities, National Research Council, Water Science and Technology Board, 1997-2003.
Invited Participant, Workshop on the Science Case for Large-scale Simulation (SCaLeS), U.S. Department of Energy, Office of Science, June 2003.
Invited Participant, International Workshop on Uncertainty, Sensitivity, and Parameter Estimation for Multimedia Environmental Modeling, U.S. Nuclear Regulatory Commission, August 2003.
Member, Subcommittee of U.S. DOE Biological and Environmental Research Advisory Committee to review Idaho National Engineering and Environmental Laboratory Subsurface Geosciences Laboratory, Feb. 2004.
Invited Participant, U.S. Federal Interagency Workshop on Conceptual Model Development for Subsurface Reactive Transport Modeling, April 2004.
Member, U.S. DOE Biological and Environmental Research Advisory Committee, Committee of visitors to review the Environmental Remediation Science Division, Office of Biological and Environmental Research, Oct. 2004
Campus Faculty Representative, Federal Demonstration Partnership, a cooperative university-federal organization to reduce administrative burdens of research grants and contracts, 2005-
Member, International Scientific Committee, IAHR-GW2006 Conference on "Groundwater in Complex Environments," Toulouse, June, 2006.
Invited Participant, U.S. Department of Energy, Office of Science, Computational Subsurface Sciences Workshop, Bethesda, MD, Jan. 9-12, 2007.
Member, International Scientific Committee, IAHR-GW2008 Conference on "Flow and Transport in Heterogeneous Subsurface Formations: Theory, Modelling & Applications," Istanbul, June, 2008.
Member, Technical Committee, MODFLOW and More 2008: Ground Water and Public Policy, International Ground Water Modeling Center, Golden, CO, May 2008.

Member, Scientific Advisory Committee, MODFLOW and More 2011: Integrated Hydrologic Modeling, International Ground Water Modeling Center, Golden, CO, June 2011.

Chair, Independent Peer Review Assessment (IPRA) of Advance Simulation Capacity for Environmental Management (ASCEM), U.S. DOE Office of Environmental Management, September, 2010.

Member, Peer Review Team, Advance Simulation Capacity for Environmental Management (ASCEM), U.S. DOE Office of Environmental Management, August, 2011.

Chair, XIX International Conference on Computational Methods in Water Resources (CMWR 2012), University of Illinois, June 17-21, 2012.

Invited Participant, Workshop on Pore-Scale Modeling of Multiphase Flow and Reactive Transport, Shell Global Solutions, Int., Netherlands, Jan 28-29, 2013.

Invited Participant, NSF Workshop "Expanding the role of Reactive Transport Modeling (RTM) within the Biogeochemical Sciences," Alexandria, VA, April 13-15, 2014.

Invited Instructor, International Workshop on the Advancement of Hydrologic Sciences, Southwest University, Beibei, Chongqing, China, April 22-24, 2014.

Invited Participant, Department of Energy, Office of Biological and Environmental Research, Molecular Science Challenge Workshop, May 27-29, 2014.

Scientific Organizing Committee, XX International Conference on Computational Methods in Water Resources (CMWR 2012), University of Stuttgart, June, 2014.

Scientific Organizing Committee, Modflow and More Conference, Colorado School of Mines, May, 2015 (also 2017 and 2019).

Scientific Organizing Committee, XXI International Conference on Computational Methods in Water Resources (CMWR 2012), University of Toronto, June, 2016.

Board of Directors, Consortium of Universities for the Advancement of Hydrologic Science, Inc., (CUAHSI) 2014-2020. Chair of Board of Directors, 2015. Chair of Search Committee for Executive Director, 2016.

Editorial Activities:

Editor-in-Chief, *Journal of Contaminant Hydrology*, 2003-2010.

Associate Editor, *Advances in Water Resources*, 1995-2019.

Associate Editor, *Vadose Zone Journal*, 2001-2004.

Guest Editor, Special Issue of the *Journal of Hydraulic Research*, "Bridging the Gap between Measurements and Modeling in Heterogeneous Media," 2004.

Associate Editor, *ASCE Journal of Hydrologic Engineering*, 1996-2003.

Teaching Activities:

Water Resources Engineering

Groundwater

Fate and Cleanup of Environmental Pollutants

Modeling of Groundwater Flow and Solute Transport

Stochastic Analysis of Groundwater Flow and Transport

Current and Recently CompletedSponsored Research Activities:

"Predicting the Movement of Subsurface Contaminants Using Massively Parallel, Multiscale, Multiphase, Multicomponent Reactive Flow Codes," Sponsored by the U.S. Department of Energy, SciDAC --Scientific Discovery through Advanced Computing (co-PI).

"Coupling Hydrologic, Economic, and Social Network Models to Improve Understanding of Surface Water-Groundwater Interactions for Protection of Instream Flows," Sponsored by the National Science Foundation, Coupled Natural-Human Systems (co-PI).

"Integrated Experimentation and Hybrid Modeling for Prediction and Control of Multi-Phase Flow and Reaction in CO2 Injection and Storage," sponsored by Los Alamos National Laboratory (PI).

"Improving Prediction of Subsurface Flow and Transport through Exploratory Data Analysis and Complementary Modeling," sponsored by the National Science Foundation, Hydrologic Sciences Program (PI).

"Planning for Drought Preparedness in the Watershed Context: A Risk-Based Decision Analysis Approach," sponsored by the National Science Foundation, Civil and Mechanical Systems Program (co-PI).

"Microbiological-enhanced mixing across scales during in situ bioreduction of metals and radionu-clides at Department of Energy Sites," U.D. Department of Energy, Subsurface Biogeochemical Research Program (co-PI).

"Energy Frontier Research Center for Geologic Storage of Carbon Dioxide," U. S. Department of Energy, Office of Science, (co-PI).

"Biogeochemical Processes that Control Natural Attenuation of Trichloroethylene in Low Permeability Zones," US Dept of Defense, SERDP (co-PI).

Selected Past Sponsored Research Activities:

"Effects of Redox Conditions on the Bioavailability and Biodegradation of Non-aqueous Phase Chlorinated Ethenes at the Pore Scale," National Science Foundation, Environmental Geochemistry and Biogeochemistry Program (co-PI).

"Traveling Wave Behavior During Subsurface Transport of Biologically Reactive Contaminants: Implications for *In Situ* Bioremediations," U.S. Environmental Protection Agency (PI).

"Cost-Effective Monitoring Design for Intrinsic Bioremediation," U.S. Geological Survey Regional Water Resources Competitive Grants Program (co-PI).

"Enhancing Groundwater Flow and Pollutant Transport Education through Web-Based Interactive Simulation," University of Illinois (PI).

"Contaminant Transport through a Field-Scale Earthen Liner," National Science Foundation, Geomechanical, Geotechnical, and Geo-environmental Systems Program (co-PI).

"Develoment and Validation of a 3D Coupled Hydrologic-Biogeochemical Modle for Evaluation of the Impact of Water-Table Management on Nitrate Loads from Tile-Drained Agricultural Fields," U.S. Geological Survey National Competitive Grants Program (co-PI).

"Effect of Pore-Scale Mixing on Reactive Transport," National Science Foundation (PI)

"A New Framework for Adaptive Sampling and Analysis During Long-Term Monitoring and Remedial Action Management," U.S. Department of Energy, Environmental Management Science Program (co-PI).

"Influence of wetting and mass transfer properties of organic chemical mixtures in vadose zone materials on groundwater contamination by nonaqueous phase liquids," sponsored by the U.S. Department of Energy, Environmental Remediation Science Program (co-PI).

"Estimating Shallow Recharge and Discharge in Northeastern Illinois using a GIS and Pattern Recognition Tool," U.S.G.S. National Competitive Grants Program (co-PI).

"A Flow Dimension Approach to Characterize Aquifer Heterogeneity," Sandia National Lab, National Center for Supercomputing Applications and the Illinois State Water Survey (co-PI).

Selected Invited Presentations:

"Mathematical Modeling of the Transport of Pollutants from Hazardous Waste Landfills," Workshop on Land Disposal of Hazardous Wastes, Cambridge University, Cambridge, England, September 9-11, 1987.

"Use of the Method of Moments to Study Reactive Solute Transport in Aggregated Porous Media," Symposium on the Transport of Water and Solutes in Macropores, Soil Science Society of America, Annual Meeting, Anaheim, California, Nov. 27-Dec. 2, 1988.

"Transport of Adsorbing Contaminants in Heterogeneous Aquifers," California Institute of Technology, Environmental Engineering Science, Dec. 1, 1988.

"Numerical Simulation of the Transport of Adsorbing Solutes in Heterogeneous Aquifers," VIII International Conference on Computational Methods in Water Resources, Venice, June 11-15, 1990.

"Transport of Reactive Solvents in Randomly Heterogeneous Porous Media," University of Waterloo, Institute for Groundwater Research, March 19, 1991.

"A Method for Locating Groundwater Quality Monitoring Wells at Hazardous Waste Disposal Facilities," Lewis G. Weeks Lecture, University of Wisconsin-Madison, Department of Geology and Geophysics, Oct. 11, 1991.

"Modeling the Impact of Soil Heterogeneity on In Situ Bioremediation," Workshop on Mathematical Issues in Bioremediation, sponsored by the Center for Nonlinear Studies, Los Alamos National Laboratory and the Society for Industrial and Applied Mathematics, June 11-13, 1997.

"Characterization of Traveling Waves and Analytical Estimation of Pollutant Removal in One-Dimensional Subsurface Bioremediation Modeling," Fourth SIAM Conference on Mathematical and Computational Issues in the Geosciences, Albuquerque, NM, June 16-19, 1997.

"Parameter Sensitivity in Multicomponent Reactive Transport Models," Plenary Presentation at A Workshop on Reactive Transport Modeling, Environmental Molecular Sciences Laboratory, Pacific Northwest Laboratory, Oct. 29-Nov. 1, 1997.

"Transport and Reaction During Enhanced In-Situ Bioremediation in Stratified Aquifers," Special Session on Dillution and MIxing in Intrinsic and Enhanced Bioremediation, American Geophysical Union, Fall Meeting, December 1998.

"Transport, Mixing, and Reaction Processes in Aquifer Bioremediation," Workshop in Mathematics and the Geosciences, sponsored by the National Science Foundation and the Dept. of Mathematics and Statistics, University of Nebraska, Lincoln, March, 1999.

"New Methods for Investigation of Pore-Scale Processes in Groundwater Transport," Illinois State Water Survey, February 2000.

"Modeling Mixing Processes in Simulation of Halogenated Hydrocarbons in Heterogeneous Aquifers," Dupont Expert Workshop on Modeling and Management of Emerging Environmental Issues, Penn State Great Valley, July 2000.

"Challenges in Field-Scale Reactive Transport Modeling," DOE Natural and Accelerated Bioremediation Research (NABIR) Workshop on Biogeochemical Modeling, Penn State University, October 21-23, 2001.

"Newton-Krylov Methods for Fully Coupled Solution of Biogeochemical Reactive Transport Problems on Parallel Computers," SIAM Conference on Mathematical and Computational Issues in the Geosciences, Austin TX, March 2003.

"The Influence of Pore-Scale Mixing on Biodegradation and Biomass Growth," Department of Geography and Environmental Engineering, Johns Hopkins University, February 2004.

"Comparison of Pore-Scale and Continuum Models of Substrate Biodegradation Under Transverse Mixing Conditions ," Institute for Geosciences, University of Tuebingen, April 2005.

"Comparison of Pore-Scale and Continuum Models of Substrate Biodegradation Under Transverse Mixing Conditions ," Geological Institute, University of Copenhagen, May 2005.

"Modeling Mixing-Controlled Biogeochemical Reactions from the Pore to Continuum Scale," SIAM Conference on Mathematical and Computational Issues in the Geosciences, Santa Fe, NM, March 2007.

"Merging Physically-Based and Data-Driven Models to Improve Prediction of Groundwater Systems," IHE-UNESCO, Delft, The Netherlands, June 2007.

"Impact of Mixing-Controlled Reactions on the Fate and Transport of Groundwater Contaminants: Modeling and Pore-Scale Experiments," Department of Mechanical, Aerospace and Structural Engineering, Washington University St. Louis, November 1, 2007.

"Dealing with Local Bias in Calibrated Groundwater Flow Models: A Case Study of the Republican River Basin," Keynote Presentation, MODFLOW and More 2008 Conference, International Ground water Modeling Center, Golden CO, May 18-21 2008.

"Merging Physically-Based and Data-Driven Models to Improve Prediction of Groundwater Systems," CIMA Research Foundation, Universita di Genova, Italy, September 19, 2008.

"A Complementary Modeling Framework to Quantify and Reduce Groundwater Flow Model Uncertainty," Session H31: Uncertainty Analysis in Groundwater Modeling, Fall Meeting, American Geophysical Union, Dec. 2008.

"Use of Ground Water Models for Resource Assessment of Watersheds affected by Irrigation Pumping: Impact of Model Input and Parameter Uncertainty," National Ground Water Association, Ground Water Summit, Tucson AZ, April 20-22, 2009.

"Improving Prediction of Regional-Scale Groundwater Flow Models throughExploratory Data Analysis and Complementary Modeling," MODFLOW and More 2011: Integrated Hydrologic Modeling, June 5-8, 2011.

"Impact of Mixing-Controlled Reactions on Subsurface Fate and Transport: Pore-Scale Simulaiton and Experiments," University of Notre Dame, Department of Civil and Environmental Engineering, Feb. 7, 2012.

"Impact of Mixing-Controlled Reactions on Subsurface Fate and Transport: Pore-Scale Simulaiton and Experiments," MIT, Department of Civil and Environmental Engineering, Mar. 1, 2012.

"Modeling and Experimental Investigations of Mixing-Controlled Geochemical and Biological Reactions at the Pore Scale," Session H42: Recent Advances in Theoretical, Numerical, and Experimental Methods in Flow and Transport in Porous Media , Fall Meeting, American Geophysical Union, Dec. 20012.

"Multiphase flow lattice Boltzmann modeling including geochemistry," Pore Scale Modeling Workshop, Shell Global Solutions Int., Rijswijk, the Netherlands, Jan 29-29, 2013.

"Multicomponent Reactive Transport: First-order Decay to Multicomponent Biogeochemistry, Continuum to Pore, Algorithms to Applications," XX International Conference, Computational Methods in Water Resources, Stuttgart, Germany, June 10-13, 2014.

"Combining Physically-Based and Data-Driven Models to Improve Prediction of Regional Groundwater Flow," Iowa Institute for Hydraulic Research, March 6, 2015.

"Pore-scale simulation of two-phase flow with applications to geological sequestration of CO2," Fifteenth Pan American Congress of Applied Mechanics, Univ. of Illinois, May, 2015.

"A Bayesian Approach to Improved Calibration and Prediction of Groundwater Models with Structural Error," MODFLOW and More, Golden CO, May 2015.

"Numerical simulation of multiphase flow: from pore to core scale (and beyond)," International Annual Workshop. CO2 Storage Division of the I^2CNER (International Institute for Carbon-Neutral Energy Research), Kyushu University, Japan, Feb. 4, 2016.

"Simulation of Two-Phase Flow in Porous Media: Research at the Illinois Center for Geological Sequestration of CO2," Department of Petroleum and Geosystems Engineering, University of Texas, Austin, April 4, 2016.

"Computationally Efficient Methods for Modeling Diffusion and Reaction in Low Permeability Zones in Field-Scale Simulations using MODFLOW/MT3D/RT3D," MODFLOW and More, Golden, CO, May 2017.

"Combining Physically-Based and Data-Driven Models for Regional Groundwater Flow Forecasting," Keynote Lecture, 5th International Conference Novel Methods for Subsurface Characterization and Monitoring, TU Dresden, June 6-9, 2017.

"Using Multiscale Modeling to Study Coupled Flow, Transport, Reaction and Biofilm Growth Processes in Porous Media," Special Session "Coupled thermo-hydro-mechanical-chemical-biological processes in subsurface systems," American Geophysical Union Meeting, Dec. 2017.

"Combining Physically-Based and Data-Driven Models for Regional Groundwater Flow Forecasting," Conference on Machine Learning in Solid Earth Geoscience, Center for Nonlinear Studies, Los Alamos National Laboratory, Feb. 20-22, 2018.

"Combining Physically-Based and Data-Driven Models to Improve Forecasts of Regional Groundwater Flow," Univ. of Texas, Austin, Dept. of Civil, Environmental and Architectural Engineering, April, 2018.

"A Lagrangian scheme to model subgrid-scale mixing in heterogeneous porous media," Tenth Annual Conference of the International Society for Porous Media, New Orleans, May 7-11, 2018.

" Are full tensors making you cross? How to handle all the negativity and stay positive with MT3DMS ," MODFLOW and More, Golden, Colorado, June, 2019.

"Pore-scale simulation of two-phase flow for geologic sequestration of CO2: Great expectations, sober reality," Keynote, XXII International Conference on Computational Methods in Water Resources, Dec. 2020.

Selected Consulting Activities:

U.S. Army Construction Engineering Research Lab, Champaign, IL, 1987. Evaluation of a research program on physical modeling of leachate migration using a geotechnical centrifuge.

North Dakota Mining and Mineral Resources Research Institute, Grand Forks, ND, 1991. Co-author of a review report on *in situ* bioremediation.

Beautiful Environment Corporation, Korea, 2004, Review and assessment of bioreactor landfills.

Environ Corp. (now Ramboll-Environ), 2008-2009, Assessment of hydraulic containment for contaminated groundwater sites in the US and Italy.

Environ Corp. (now Ramboll-Environ), 2012-2015, Technical support to evaluate hydraulic containment for contaminated groundwater sites in coastal regions of Italy.

LIST OF PUBLICATIONS

Books:

Rittmann, B.E., E.A. Seagren, B.A. Wrenn, A.J. Valocchi, L. Raskin, and C. Ray, *In Situ* Bioremediation, 2nd ed., Noyes Publications, Park Ridge, N.J., 1994.

National Research Council, Committee on Environmental Remediation at Naval Facilities, Environmental Cleanup at Naval Facilities: Risk-Based Methods, National Academy Press, Washington, D.C., 1999.

National Research Council, Committee on Environmental Remediation at Naval Facilities, Environmental Cleanup at Naval Facilities: Adaptive Site Management, National Academy Press, Washington, D.C., 2003.

Chapters in Books:

Valocchi, A.J. and B.L. Herzog. Mathematical modeling of the transport of pollutants from hazardous waste landfills, pp. 153-164 in *Land Disposal of Hazardous Wastes: Engineering and Environmental Issues*, J.R. Gronow, A.N. Schofield and R.K. Jain, eds., Ellis Horwood, Ltd., Chichester, England, 1988.

Valocchi, A.J., and H.A.M. Quinodoz. Impact of small-scale variability upon the transport of reactive contaminants, pp. 355-380, in Fate and Transport of Pollutants in Soils and Subsoils, D. Petruzzelli and F.G. Helfferich, eds., Springer Verlag, Berlin, 1993.

Das, B., R. Govindaraju, G. Kluitenberg, A.J. Valocchi, and J.M. Wraith, Theory and applications of time moment analysis to study the fate of reactive solutes in soil, Chapter 6, pp. 239-280 in *Stochastic Methods in Subsurface Contaminant Hydrology*, R. Govindaraju (ed.), ASCE, 2002.

Simunek, J. and A.J. Valocchi, Geochemical Transport, Chapter 6.9 in *Methods of Soil Analysis, Part I, Physical Methods*, C. Topp and J. Dane, eds., Soil Science Society of America, Madison, WI, 2002.

Valocchi, A.J., P.A. Herrera, and H. Viswanathan, Incorporating transverse mixing into streamline-based simulation of transport in heterogeneous aquifers, pp. 294-304 in *Groundwater Quality Modeling and Management Under Uncertainty*, Srikanta Mishra, Editor, American Society of Civil Engineers, 2003.

Demissie, Y., Valocchi, A., Minsker, B. & Bailey, B., Bias-Corrected Groundwater Model Prediction Uncertainty Analysis, In: *ModelCARE2007 Calibration and Reliability in Groundwater Modeling: Credibility in Modeling*, K. Kovar (Editor), IAHS Publ. 320-3, 2008.

Valocchi, A.J., Hydrogeochemical Models, Chapter 4 in *Delivery and Mixing in the Subsurface: Processes and Design Principles for In Situ Remediation,* P.K. Kitanidis and P.L. McCarty, eds., DoD SERDP/ESTCP Monograph Series, Springer, 2012.

Yoon, H., Q. Kang, A.J. Valocchi, Lattice Boltzmann-Based Approaches for Pore-Scale Reactive Transport, pp. 393-431 in *Pore-Scale Geochemical Processes*, *Reviews in Mineralogy & Geochemistry,* v. 80, C. Steefel, S. Emmanuel, and L. Anovitz (eds.), 2015, http://dx.doi.org/10.2138/rmg.2015.80.12

Papers in Refereed Journals:

Valocchi, A.J., R.L. Street, and P.V. Roberts. Transport of ion-exchanging solutes in groundwater: Chromatographic theory and field simulation, *Water Resources Research, 17*(5), 1517-1527, 1981.

Valocchi, A.J., P.V. Roberts, G.A. Parks, and R.L. Street. Simulation of the transport of ion-exchanging solutes using laboratory-determined chemical parameter values, *Ground Water, 19*(6), 600-607, 1981.

Roberts, P.V. and A.J. Valocchi. Principles of organic contaminant behavior during artificial recharge, *The Science of the Total Environment, 21*, 161-172, 1981.

Roberts, P.V., M. Reinhard, and A.J. Valocchi. Movement of organic contaminants in groundwater: Implication for water supply, *Journal of the American Water Works Association, 74*, 408-413, Aug., 1982.

Valocchi, A.J., and P.V. Roberts. Attenuation of groundwater contaminant pulses, *J. Hyd. Engr., ASCE, 109*(12), 1665-1682, 1983.

Valocchi, A.J. Describing the transport of ion-exchanging contaminants using an effective K_d approach, *Water Resources Research, 20*(4), 499-503, 1984.

Valocchi, A.J. Validity of the local equilibrium assumption for modeling sorbing solute transport through homogeneous soils, *Water Resources Research, 21*(6), 808-820, 1985.

Valocchi, A.J. Effect of radial flow on deviations from local equilibrium during sorbing solute transport through homogeneous soils, *Water Resources Research, 22*(12), 1693-1701, 1986.

Parker, J.C., and A.J. Valocchi. Constraints on the validity of equilibrium and first-order kinetic transport models in structured soils, *Water Resources Research, 22*(3), 399-407, 1986.

Valocchi, A.J. Theoretical analysis of deviations from local equilibrium during sorbing solute transport through idealized stratified aquifers, *J. Contam. Hydrol., 2*, 191-207, 1988.

Valocchi, A.J. Spatial moment analysis of the transport of kinetically adsorbing solutes through stratified aquifers, *Water Resources Research, 25*(2), 273-279, 1989.

Baveye, P., and A.J. Valocchi. An evaluation of mathematical models of the transport of biologically reacting solutes in saturated soils and aquifers, *Water Resources Research*, 25(6), 1413-1421, 1989.

Meyer, P.D., A.J. Valocchi, S.F. Ashby, and P.E. Saylor. A numerical investigation of the conjugate gradient method as applied to three-dimensional groundwater flow problems in randomly heterogeneous porous media, *Water Resources Research*, 25(6), 1440-1446, 1989.

Valocchi, A.J. Use of temporal moment analysis to study reactive solute transport in aggregated porous media, *Geoderma, 46*, 233-247, 1990.

Odencrantz, J.E., W. Bae, A.J. Valocchi, and B.E. Rittmann. Stimulation of biologically active zones (BAZ's) in porous media by electron-acceptor injection, *J. Contam. Hydrol., 6*, 37-52, 1990.

Bae, W., J.E. Odencrantz, B.E. Rittmann, and A.J. Valocchi. Transformation kinetics of trace-level halogenated organic contaminants in a biologically active zone (BAZ) induced by nitrate injection, *J. Contam. Hydrol., 6*, 53-68, 1990.

Eheart, J.W., M.R. Rahman, S.M. Keith, and A.J. Valocchi. A game-theoretic parameter configuration technique for aquifer restoration design, *J. Contam. Hydrol., 6*(3), 205-226, 1990.

Elnawawy, O.A., A.J. Valocchi, and A.M. Ougouag. The cell analytical-numerical method for solution of the advection-dispersion equation: Two-dimensional problems, *Water Resources Research*, 26(11), 2705-2716, 1990.

Valocchi, A.J., and M. Malmstead. Accuracy of operator splitting for advection-dispersion-reaction problems, *Water Resources Research, 28*(5), 1471-1476, 1992.

Mahinthakumar, G., and A.J. Valocchi. Application of the Connection Machine to flow and transport problems in three-dimensional heterogeneous aquifers, *Advances in Water Resources, 15*, 289-302, 1992.

Morgan, D.R., J.W. Eheart, and A.J. Valocchi. Aquifer remediation design under uncertainty using a new chance constrained programming technique, *Water Resources Research*, 29(3), 551-562, 1993.

Seagren, E.A., B.E. Rittmann, and A.J. Valocchi. Quantitative evaluation of flushing and biodegradation for enhancing *in situ* dissolution of nonaqueous phase liquids, *J. Contam. Hydrol., 12*, 103-132, 1993.

Quinodoz, H.A.M., and A.J. Valocchi. Stochastic analysis of the transport of kinetically adsorbing solutes in aquifers with randomly heterogeneous hydraulic conductivity, *Water Resources Research*, 29(9), 3227-3240, 1993.

Meyer, P.M., A.J. Valocchi, and J.W. Eheart. Monitoring network design to provide initial detection of groundwater contamination, *Water Resources Research, 30*(9), 2647-2660, 1994.

Seagren, E.A., B.E. Rittmann, and A.J. Valocchi. Quantitative evaluation of the enhancement of NAPL-pool dissolution by flushing and biodegradation, *Environmental Science and Technology, 28*(5), 833-839, 1994.

Malmstead, M.J., F. Brockman, A.J. Valocchi, and B.E. Rittmann. Modeling biofilm biodegradation requiring cosubstrates: The quinoline example, *Water Science and Technology, 31*(1), 71-84, 1995.

Ray, C., C.W. Boast, T.R. Ellsworth, and A.J. Valocchi. Simulation of the impact of agricultural management practices on chemical transport in macroporous soils, *Transac. Amer. Soc. Agric. Engr., 39*(5), 1697-1707, 1996.

Leitão, T.E., J.P. Lobo-Ferreira, and A.J. Valocchi. Application of a reactive transport model for interpreting non-conservative tracer experiments: The Rio Major case-study, *J. Contam. Hydrol., 24*(2), 167-181, 1996.

Oya, S., A.J. Valocchi, and T. Furuichi. Numerical modeling of transport and cometabolic degradation of trichloroethylene in groundwater, *J. of Groundwater Hydrology (Japan), 39*(1), 17-31, 1997.

Oya, S., and A.J. Valocchi. Characterization of traveling waves and analytical estimation of pollutant removal in one-dimensional subsurface bioremediation modeling, *Water Resources Research, 33*(5), 1117-1127, 1997.

Espinoza, C., and A.J. Valocchi. Stochastic analysis of one dimensional transport of kinetically absorbing solutes in chemically hetergeneous aquifers, *Water Resources Research*, 33(11), 2429-2445, 1997.

Ray, C., T.R. Ellsworth, A.J. Valocchi, and C.W. Boast. An improved dual porosity model for chemical transport in macroporous media, *Journ. Hydrology*, 193, 270-292, 1997.

Storck, P., J.W. Eheart, and A.J. Valocchi, A method for the optimal location of monitoring wells for detection of groundwater contamination in three-dimensional heterogeneous aquifers, *Water Resources Research*, 33(9), 2081-2088, 1997.

Oya, S., and A.J. Valocchi. Analytical approximation of the biodegradation rate for *in situ* bioremediation of groundwater under ideal radial flow conditions, *J. Contam. Hydrol.* 31(3-4),275-294, 1998.

Espinoza, C., and A.J. Valocchi. Temporal moments analysis of transport in a chemically heterogeneous porous medium, ASCE *Journal of Hydrologic Engineering*, 3(4), 276-284, 1998.

Tebes-Stevens, C., A.J. Valocchi, J.M. Van Briesen, and B. E. Rittmann. Multicomponent transport with coupled geochemical and microbiological reactions: model description and example simulations, *J. Hydrology*, 209, 8-26, 1998.

Viswanathan, H., B.A. Robinson, A.J. Valocchi, and I.R. Triay. A reactive transport model of neptunium migration from the potential repository at Yucca Mountain, *J. Hydrology*, 209, 251-280, 1998.

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