

CURRICULUM VITAE

Michael A. Celia

*Theodora Shelton Pitney Professor of Environmental Studies
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EDUCATION:

- Ph.D., Civil Engineering, Princeton University, 1983.
- M.A., Civil Engineering, Princeton University, 1981.
- M.S., Civil Engineering, Princeton University, 1979.
- B.S., Civil Engineering, Lafayette College, 1978.

POSITIONS HELD:

- Director, Princeton Environmental Institute, Princeton University, 2017-Present.
- Theodora Shelton Pitney Professor of Environmental Studies, 2008-Present.
- Professor of Civil and Environmental Engineering, Princeton University, 1997-Present.
- Director, Program in Environmental Engineering and Water Resources, Princeton University, 2013-2017.
- Chair, Department of Civil and Environmental Engineering, 2005-2011.
- Director, Program in Environmental Studies, 1998-2004.
- Director, Program in Environmental Engineering and Water Resources, Princeton University, 1997-2003.
- Associate Professor of Civil Engineering, Princeton University, 1993-1997.
- Assistant Professor of Civil Engineering, Princeton University, 1989-1993.
- Assistant Professor of Civil Engineering, M.I.T., 1985-1989.
- Lecturer, Dept. of Civil Engineering, Princeton University, 1984-1985.
- Research Associate, Dept. of Civil Engineering, Princeton University, 1983-1984.

RESEARCH INTERESTS:

Groundwater Hydrology, Geological Sequestration of Carbon Dioxide, Simulation Methods for Multi-phase Flow in Porous Media, Studies of Methane Leakage from Abandoned Oil and Gas Wells, Contaminant Transport Simulations

HONORS AND AWARDS:

- Honorary Doctoral Degree, University of Stuttgart, November 2018.
- Distinguished Teacher Award, School of Engineering and Applied Sciences, Princeton University, 2017.
- Elected to the US National Academy of Engineering, 2016 (Citation: *For contributions to the development of subsurface flow and transport models in groundwater remediation and CO₂ sequestration*).
- Darcy Visiting Professorship, jointly at Utrecht University and the Technical University of Eindhoven, 2016-2017.
- Graduate Mentoring Award, Princeton University, 2016.
- 2015 Argyris Visiting Professorship awarded by the University of Stuttgart, including the inaugural Argyris Honorary Lecture, given 8 July 2015.
- 2014 Honorary Lifetime Membership Award, International Society of Porous Media (Interpore), presented May 2014.
- 2012 Hydrology Days Award, presented March 2012.
- Named to List of Best Reviewers from 2007-2011, *International Journal for Greenhouse Gas Control*, 2012.
- EWRI Pioneers in Groundwater Lecturer, American Society of Civil Engineers, 2010.
- Elected Fellow of the American Association for the Advancement of Science (AAAS), 2008.

- Named Theodora Shelton Pitney Professor of Environmental Studies, 2008-Present.
- Darcy Lecturer, National Ground Water Association, 2008 (Lecture Title: *Geological Storage as a Carbon Mitigation Option*; the lecture was given at 52 different venues in 12 countries across North America, Europe, Asia, and Australia).
- Engineering Council Award for Outstanding Teaching, Princeton University, 2008.
- One of many IPCC contributing authors who share in the 2007 Nobel Peace Prize (Contributing author to IPCC Working Group III *Special Report on Carbon Dioxide Capture and Storage*).
- Hydrologic Sciences Award, American Geophysical Union, 2005 (Award citation: *For fundamental research contributions to subsurface hydrology and numerical methods in water resources, and for providing a model of Academia at its best*).
- Fulbright Fellowship, 2003-2004 (*Sabbatical leave at the University of Bergen*).
- Elected Fellow of the American Geophysical Union, 2000.
- Howard B. Wentz, Jr. '52 Faculty Award in Engineering, Princeton University, 1992.
- Harold Willis Dodds Presidential Preceptorship, Princeton University, 1989–1992.
- Presidential Young Investigator Award, National Science Foundation, 1987–1992.
- Edgerton Endowed Junior Faculty Chair, M.I.T., 1987-1989
- Excellence in Teaching Award, Dept. of Civil Engineering, M.I.T., 1987.
- George van Ness Lothrop Honorary Fellowship, Princeton University, 1981-1982.

PROFESSIONAL SOCIETIES:

American Geophysical Union, American Society of Civil Engineers, American Association for the Advancement of Science, National Ground Water Association, International Society for Porous Media (Interpore), Phi Beta Kappa, Tau Beta Pi

PROFESSIONAL SERVICE:

- Member, External Advisory Committee, International Institute for Carbon-Neutral Energy Research, Kyushu University, Japan, 2015-Present.
- Member, Academic Advisory Council, Petronas Technical University, Malaysia, 2015-Present.
- Member, Interpore Honors and Awards Committee, 2014-Present.
- Member, TOTAL (the French oil company) Scientific Advisory Board for CCUS, 2017-Present.
- Member, Advisory Board for CO₂ Capture Project (Phases 2, 3, and 4), 2010-Present.
- Member, Scientific Advisory Board, In Salah CO₂ Injection Project, BP, 2006-2014.
- Member, Science Advisory Committee, Environmental Molecular Sciences Laboratory (EMSL), Pacific Northwest National Laboratory, 2013-2016.
- Chair, Selection Committee for AGU Hydrologic Sciences Award, 2006-2008; 2011-2014.
- Member, International Scientific Committee, Second International Conference on Nonlinearities and Upscaling in Porous Media, Bergen, Norway, 2013.
- Member, Organizing Committee, Joint Meeting of the IEA Wellbore Integrity Network and IEA Modeling Network, Perth, Australia, 2011.
- Chair, Interpore Honors and Awards Committee, 2009-2011.
- Member, SIAM Geosciences Award Selection Committee, 2008-2010.
- Member, NGWA Darcy Lecturer Selection Committee, 2008-2011.
- Member, Organizing Committee, IEA Wellbore Integrity Network Workshops, 2007, 2008, 2009, 2010, 2013.
- Member, Organizing Committee, Svalbard Workshop on Modeling and Risk Assessment of Geological Storage of CO₂, Svalbard, Norway, August 2009.
- Member, Organizing Committee, Workshop on Numerical Models for Carbon Dioxide Storage in Geological Formations, University of Stuttgart, April 2008.
- Member, NGWA Committee for CCS Injection Regulation Review, January-December 2008.
- Co-leader, Panel on Carbon-related Research, DOE Workshop on Basic Research Needs in Geosciences, 2006-2007.
- Member, Editorial Board, *IES Journal A: Civil and Structural Engineering*, 2006-Present.

- Member, Expert Review Panel, International Energy Agency, Weyburn Phase II Project, Regina, Canada 2006-2009.
- Member, Advisory Board of the Geological Storage Certification Framework Project (a CCP2 Project), 2006-2008.
- Member, Expert Panel on Groundwater and Vadose-zone Modeling at Hanford, Dept. of Energy, 2006.
- Local Organizer, IEA Wellbore Integrity Workshop, Princeton, March 2006.
- Member, Symposium Advisory Board, International Symposium on Site Characterization for CO₂ Geological Storage, Lawrence Berkeley Laboratory, March 2006.
- External Examiner for Civil Engineering Program, Technical University of Petronas, Malaysia, 2005-2008.
- Member, External Advisory Board, Department of Civil and Environmental Engineering, Lafayette College, 2005-Present.
- Member, Review Panel for Hydrologic Sciences Program, NSF, 2001-2005.
- Member, Review Panel for Earth Sciences Division, Lawrence Berkeley Laboratory, 2002.
- Member, Editorial Board, *Advances in Water Resources*, 1997-2012.
- Co-organizer of special session: "Thirty-Five Years of Groundwater Modeling: A Tribute to George F. Pinder", AGU Meeting, Fall 2001.
- Co-organizer of special session on "Eulerian-Lagrangian Localized Adjoint Methods", XIII International Conference on Computational Methods in Water Resources, Calgary, Canada, June 2000.
- Member, Langbein Lecture Award Committee, American Geophysical Union, 1998 - 2000.
- Member, Committee of Visitors (evaluation committee) for the Division of Earth Sciences at NSF, 1998.
- Member of the Organizing Committee for Water Quality '98, Tuebingen, Germany, September 1998.
- Member of the Advisory Committee for the International Workshop on Characterization and Measurement of Hydraulic Properties of Unsaturated Soils, Riverside, CA, October 1997.
- Co-Editor, *Advances in Water Resources*, 1987-1997.
- Chair for Gordon Conference on *Modeling of Flow in Permeable Media*, 1996.
- Vice Chair for Gordon Conference on *Modeling of Flow in Permeable Media*, 1994.
- Member of the Organizing Committee for the SIAM Conference on Mathematical and Computational Issues in the Geosciences, held in Houston, April 1993.
- Member, Groundwater Hydrology Committee, American Geophysical Union (1988-1992).
- Organizer of symposium on "Modeling Fluid Flow and Contaminant Transport in Heterogeneous Porous Media," SIAM Geosciences Conference, April 1993.
- Organizer of special session "Recent Advances in Numerical Modeling of Contaminant Transport," AGU Fall Meeting, 1989.
- Co-organizer of special session "Pore-scale Models for Multiphase Flow in Porous Media," AGU Spring Meeting, 1989.
- Local organizer for Seventh Int'l. Conference on Computational Methods in Water Resources, M.I.T., June 1988.
- Principal lecturer in the short course "Fundamentals of Unsaturated Zone Modeling," Princeton University, July 1990, June 1991, January 1993.
- Principal lecturer in the short course "Groundwater Contaminant Transport Modeling," Princeton University Jan. 1985-1990; U. of Vermont, Jan. 1991.

UNIVERSITY SERVICE

- Director, Princeton Environmental Institute (2017-Present).
- Director, Program in Environmental Engineering and Water Resources (2013-2017).
- Chair, Department of Civil and Environmental Engineering (2005-2011)
- Member, Executive Committee, Princeton Environmental Institute (1996-Present)
- Member, Executive Committee, Program in Environmental Studies (2004-Present)
- Member, Executive Committee, Andlinger Center for Energy and the Environment (2017-Present).
- Member, Executive Committee, Program in Urban Studies (2006-Present)
- Member, Executive Committee, Program in Architecture and Engineering (2006-Present)
- Member, Princeton Sustainability Steering Council (2017-Present).
- Member, Princeton Committee on the Future of Climate Research (2008-2010)
- Member, University Priorities Committee (2004-2007)

- Director of Graduate Studies, Civil and Environmental Engineering Department (2004-2005)
- Director, Program in Environmental Studies (1998-2004)
- Director, Program in Environmental Engineering and Water Resources (1997-2003)
- Chair, School of Engineering and Applied Science Committee on Environmental Engineering (1997-1999)
- Member, Curriculum Committee, Princeton Environmental Institute (1997-1998)
- Member, University Course of Study Committee (1994-1997)
- Chair, Committee to define and implement the new university-wide Quantitative Reasoning course requirement (1995-1997)
- Departmental Representative for Department of Civil Engineering and Operations Research (responsible for all aspects of undergraduate affairs; 1992-1995)
- Member, Culpeper Awards Committee (1995)
- Member, University Teaching Awards Committee (1995)
- Member, Engineering Physics Committee (1992-1995)

LIST OF PUBLICATIONS

1. Pinder, G.F., E.O. Frind, and M.A. Celia, "Groundwater Flow Simulation using Collocation Finite Elements," *Proc. Second Int. Conf. Finite Elements in Water Resources*, Brebbia et al. (eds.), 1.171-1.185, Pentech Press, 1978.
2. Celia, M.A., G.F. Pinder, and L.J. Hayes, "Alternating Direction Collocation Simulation to the Transport Equation," *Proc. Third Int. Conf. Finite Elements in Water Resources*, Wang et al. (eds.), 3.36-3.48, Univ. of Miss., 1980.
3. Pinder, G.F., M.A. Celia, and W.G. Gray, "[Velocity Calculations from Randomly Located Hydraulic Heads.](#)" *Groundwater*, 19(3), 262-264, 1981.
4. Hayes, L.J., G.F. Pinder, and M.A. Celia, "[Alternating-Direction Collocation for Rectangular Regions.](#)" *Computer Methods in Applied Mechanics and Engineering*, 27(3), 265-277, 1981.
5. Celia, M.A. and G.F. Pinder, "Transport Simulation using Three-dimensional Alternating Direction Collocation," *Proc. Fourth Int. Conf. Finite Elements in Water Resources*, Holz et al. (eds.), 14.9-14.19, Springer-Verlag, 1982.
6. Celia, M.A., *Collocation on Deformed Finite Elements and Alternating Direction Collocation Methods*, Ph.D. Dissertation, Princeton University, 1983.
7. Celia, M.A. and W.G. Gray, "[An Improved Isoparametric Transformation for Finite Element Analysis.](#)" *International Journal for Numerical Methods in Engineering*, 20(8), 1443-1459, 1984.
8. Celia, M.A., "Density-dependent Transport Simulation using Alternating Direction Collocation," *Bull. Inst. Groundwater Studies*, 12, (Bloemfontein, South Africa), 1984.
9. Celia, M.A. and G.F. Pinder, "Collocation Solution of the Transport Equation using a Locally Enhanced Alternating Direction Formulation," Chapter 13, *The Unification of Finite Elements, Finite Differences, and Calculus of Variations*, Kardestuncer (ed.), 303-320, North-Holland, 1984.
10. Celia, M.A. and G.F. Pinder, "[An Analysis of Alternating-Direction Methods for Parabolic Equations.](#)" *Numerical Methods for Partial Differential Equations*, 1(1), 57-70, 1985.
11. Celia, M.A. and W.G. Gray, "[Improved Coordinate Transformations for Finite Elements: The Lagrange Cubic Case.](#)" *International Journal for Numerical Methods in Engineering*, 23(8), 1529-1545, 1986.
12. Celia, M.A., W.G. Gray, and L.A. Ferrand, "A Preprocessor for the Improved Isoparametric Element," *Proc. Sixth Int. Conf. Finite Elements in Water Resources*, Sa da Costa et al. (eds.), 735-746, Springer-Verlag, 1986.
13. Celia, M.A. and G.F. Pinder, "An Alternating-Direction Collocation Solution for the Unsaturated Flow Equation," *Proc. Sixth Int. Conf. Finite Elements in Water Resources*, Sa da Costa et al. (eds.), 395-410, Springer-Verlag, 1986.

14. Celia, M.A. and I. Herrera, "[Solution of General Ordinary Differential Equations using the Algebraic Theory Approach.](#)" *Numerical Methods for Partial Differential Equations*, 3(2), 117-129, 1987.
15. Celia, M.A., L.R. Ahuja, and G.F. Pinder, "[Orthogonal Collocation and Alternating-Direction Methods for Unsaturated Flow.](#)" *Advances in Water Resources*, 10(4), 178-187, 1987.
16. Hess, K., S. Wolf, D.R. LeBlanc, S.P. Garabedian, and M.A. Celia, "Natural-Gradient Tracer Test in Sand and Gravel: Preliminary Results of Laboratory and Field Measurements of Hydraulic Conductivity," *Proc. Third Tech. Meeting U.S.G.S. Program on Toxic Waste - Groundwater Contamination (USGS Open File report 87-109)*, B23-B24, 1987.
17. Celia, M.A., L.A. Ferrand, C.A. Brebbia, W.G. Gray, and G.F. Pinder, (editors), *Computational Methods in Water Resources, Volume 1: Modeling Surface and Subsurface Flows*, Proceedings of the Seventh International Conference, 389 pp., Elsevier, 1988.
18. Celia, M.A., L.A. Ferrand, C.A. Brebbia, W.G. Gray, and G.F. Pinder, (editors), *Computational Methods in Water Resources, Volume 2: Numerical Methods for Transport and Hydrologic Processes*, Proceedings of the Seventh International Conference, 465 pp., Elsevier, 1988.
19. Celia, M.A. and L.A. Ferrand, "Parameter Estimation for Multiphase Porous Media Systems," *Invited Paper, Proc. ASCE National Conf. on Hydraulic Engineering*, 558-563, 1988.
20. Celia, M.A. and E.T. Bouloutas, "Analysis of Optimal Test Function Methods for Advection-Dominated Flows," *Invited Paper, Proc. Int. Conf. on Computational Engineering Science*, Atluri and Yagawa (eds.), pp. 50.iii.1-50.iii.4, Springer-Verlag, 1988.
21. Celia, M.A. and R. Zarba, "A Comparative Study of Numerical Solutions for Unsaturated Flow," *Invited Paper, Proc. Int. Conf. on Computational Engineering Science*, Atluri and Yagawa (eds.), pp. 58.ii.1-58.ii.4, Springer-Verlag, 1988.
22. Soll, W.E., L.A. Ferrand, and M.A. Celia, "An Enhanced Percolation Model for the Capillary Pressure-Saturation Relation," *Proc. Seventh Int. Conf. Comp. Meth. Water Resources, Vol. 1: Modeling Surface and Subsurface Flows*, Celia et al. (eds.), 165-171, Springer, 1988.
23. Bouloutas, E.T. and M.A. Celia, "An Analysis of Some Classes of Petrov-Galerkin and Optimal Test Function Methods," *Proc. Seventh Int. Conf. Comp. Meth. Water Resources, Vol. 2: Numerical Methods for Transport and Hydrologic Processes*, Celia et al. (eds.), 15-20, Springer, 1988.
24. Herrera, I. and M.A. Celia, "Localized Adjoint methods as a New Approach to Advection Dominated Flows," *Proc. National/International Conf. on Adv. in Groundwater*, Tampa, Fla, November 1988.
25. Garabedian, S.P., L.W. Gelhar, and M.A. Celia, "Large-scale Dispersive Transport in Aquifers: Field Experiments and Reactive Transport Theory," Parsons Lab Report 315, R88-01, M.I.T., 1988.
26. Hess, K., S. Wolf, and M.A. Celia, "Spatial Variability of Hydraulic Conductivity in a Sand and Gravel Aquifer, Cape Cod, Massachusetts," *Proc. Fourth Tech. Meeting, USGS Program on Toxic Waste - Groundwater Contamination*, 1988.
27. Celia, M.A., I. Herrera, E.T. Bouloutas, and J.S. Kindred, "[A New Numerical Approach for the Advection-Diffusion Transport Equation.](#)" *Numerical Methods for Partial Differential Equations*, 5(3), 203-226, 1989.
28. Celia, M.A., J.S. Kindred, and I. Herrera, "[Contaminant Transport and Biodegradation: 1. A Numerical Model for Reactive Transport in Porous Media.](#)" *Water Resources Research*, 25(6), 1141-1148, 1989.
29. Kindred, J.S. and M.A. Celia, "[Contaminant Transport and Biodegradation: 2. Conceptual Model and Test Simulations.](#)" *Water Resources Research*, 25(6), 1149-1160, 1989.
30. Soll, W.E. and M.A. Celia, "Pore-scale Modeling of Immiscible Three-Phase Flow in Porous Media," *Proc. Multiphase Transport in Porous Media Symposium, ASME Winter Meeting*, December 1989.
31. Herrera, I. and M.A. Celia, "Advances in the Simulation of Steep Fronts," *Finite Element Analysis in Fluids*, Chung and Karr (eds.), 965-970, UAH Press, 1989.
32. Celia, M.A., I. Herrera, and E.T. Bouloutas, "Adjoint Petrov-Galerkin Methods for Multi-dimensional Flow Problems," *Finite Element Analysis in Fluids*, Chung and Karr (eds.), 953-958, UAH Press, 1989.

33. Ferrand, L.A. and M.A. Celia, "Development of a Three-Dimensional Network Model for Quasi-Static Immiscible Displacement," *Proc. Int. Symp. on Contaminant Transport in Groundwater*, Kobus and Kinzelbach (eds.), A.A. Balkema (Rotterdam), 397-403, 1989.
34. Bouloutas, E.T. and M.A. Celia, "Efficient Finite Element Methods for Modeling Fluid Flow in Partially Saturated Porous media," *Proc. Fifth Int. Symp. Num. Meth. in Eng.*, Gruber et al. (eds.), Springer, 673-678, 1989.
35. Gray, W.G. and M.A. Celia, "On the Use of Generalized Functions in Engineering Analysis," *Int. J. of Applied Engineering Education*, 6(1), 89-96, 1990.
36. Celia, M.A. and G.F. Pinder, "[Generalized alternating-direction collocation methods for parabolic equations. I. Spatially varying coefficients.](#)" *Numerical Methods for Partial Differential Equations*, 6(3), 193-214, 1990.
37. Celia, M.A. and G.F. Pinder, "[Generalized alternating-direction collocation methods for parabolic equations. II. Transport equations with application to seawater intrusion problems.](#)" *Numerical Methods for Partial Differential Equations*, 6(3), 215-230, 1990.
38. Celia, M.A. and G.F. Pinder, "[Generalized alternating-direction collocation methods for parabolic equations. III. Nonrectangular domains.](#)" *Numerical Methods for Partial Differential Equations*, 6(3), 231-243, 1990.
39. Celia, M.A., E.T. Bouloutas, and R.L. Zarba, "[A General Mass-Conservative Numerical Solution for the Unsaturated Flow Equation.](#)" *Water Resources Research*, 26(7), 1483-1496, 1990.
40. Celia, M.A., T.F. Russell, I. Herrera, and R.E. Ewing, "[An Eulerian-Lagrangian Localized Adjoint Method for the Advection-Diffusion Transport Equation.](#)" *Advances in Water Resources*, 13(4), 187-206, 1990.
41. Ferrand, L.A., M.A. Celia, and W.E. Soll, "Percolation-Based Models for Pore-to-Lab-Scale Calculations in Multifluid Porous media," Chapter XVI in *Dynamics of Fluids in Hierarchical Porous Formations*, Cushman (ed.), Academic Press, 463-483, 1990.
42. Celia, M.A. and S. Zisman, "An Eulerian-Lagrangian Localized Adjoint Method for Reactive Transport in Groundwaters," *Invited Paper, Proc. Eight Int. Conf. Comp. Meth. Water Resources*, Gambolati et al. (eds.), Springer, 383-392, 1990.
43. Ferrand, L.A. and M.A. Celia, "A Numerical Investigation of the Effects of Heterogeneity on the Pressure-Saturation Relation," *Proc. Eight Int. Conf. Comp. Meth. Water Resources*, Gambolati et al. (eds.), Springer, 181-186, 1990.
44. Celia, M.A., E.T. Bouloutas, and P. Binning, "Numerical Modeling of Nonlinear Flows in Porous Media," *Proc. Eight Int. Conf. Comp. Meth. Water Resources*, Gambolati et al. (eds.), Springer, 145-151, 1990.
45. Ewing, R.E. and M.A. Celia, "Multiphase Flow Simulation in Groundwater Hydrology and Petroleum Engineering," *Invited Paper, Proc. Eight Int. Conf. Comp. Meth. Water Resources*, Gambolati et al. (eds.), Springer, 195-204, 1990.
46. Garabedian, S.P., D.R. LeBlanc, L.W. Gelhar, and M.A. Celia, "[Large-scale Natural Gradient Tracer Test in Sand and Gravel, Cape Cod, Massachusetts: 2. Analysis of Spatial Moments for a Nonreactive Tracer.](#)" *Water Resources Research*, 27(5), 911-924, 1991.
47. Wolf, S.H., M.A. Celia, and K. Hess, "[Evaluation of Hydraulic Conductivities Calculated from Multiport-Permeameter Measurements.](#)" *Ground Water*, 29(4), 516-525, 1991.
48. Bouloutas, E.T. and M.A. Celia, "[An Improved Cubic Petrov-Galerkin Method for Simulation of Transient Advection-Diffusion Processes in Rectangularly Decomposable Domains.](#)" *Computer Methods in Applied Mechanics and Engineering*, 92(3), 289-308, 1991.
49. LeBlanc, D.R. and M.A. Celia, "Density-Induced Downward Movement of Solutes During a Natural-Gradient Tracer Test, Cape Cod, Massachusetts," in *U.S.G.S. Toxic Substances Hydrology Program: Proc. of the Technical Meeting*, Mallard (ed.), Monterrey, CA, March 11-15, 1991, 1991.
50. LeBlanc, D.R., D.L. Rudolph, R.G. Kachanoski, and M.A. Celia, "Design and Operation of an Infiltration Experiment in the Unsaturated Zone, Cape Cod, Massachusetts," in *U.S.G.S. Toxic Substances Hydrology Program: Proc. of the Technical Meeting*, Mallard (ed.), Monterrey, CA, March 11-15, 1991, 1991.

51. Hess, K.M., S.H. Wolf, and M.A. Celia, "Estimation of Macrodispersivities from the Spatial Variability of Hydraulic Conductivity in a Sand and Gravel Aquifer, Cape Cod, Massachusetts," in *U.S.G.S. Toxic Substances Hydrology Program: Proc. of the Technical Meeting*, Mallard (ed.), Monterey, CA, March 11-15, 1991, 1991.
52. Hess, K.M., S.H. Wolf, M.A. Celia, and S.P. Garabedian, *Macrodispersion and Spatial Variability of Hydraulic Conductivity in a Sand and Gravel Aquifer, Cape Cod, Massachusetts*, EPA Environmental Research Brief EPA/600/M-91/005, 1991.
53. Celia, M.A. and W.G. Gray, *Numerical Methods for Differential Equations: Fundamental Concepts for Scientific and Engineering Applications*, Prentice Hall, 436 pp., 1992.
54. Celia, M.A. and W.G. Gray, *Solution Guide to accompany "Numerical Methods for Differential Equations,"* 90 pp., 1992.
55. Ferrand, L.A. and M.A. Celia, "[The Effect of Heterogeneity on the Drainage Capillary Pressure - Saturation Relation.](#)" *Water Resources Research*, 28(3), 859-870, 1992.
56. Hess, K.M., S.H. Wolf and M.A. Celia, "[Large-scale natural gradient tracer test in sand and gravel, Cape Cod, Massachusetts: 3. Hydraulic conductivity variability and calculated macrodispersivities.](#)" *Water Resources Research*, 28(8), 2011-2027, 1992.
57. Celia, M.A. and P. Binning, "[A Mass-Conservative Numerical Solution for Two-Phase Flow in Porous Media with Application to Unsaturated Flow.](#)" *Water Resources Research*, 28(10), 2819-2828, 1992.
58. Soll, W.E., M.A. Celia, and J.L. Wilson, "Quantitative Comparison of Computational and Experimental Models for Three-Phase Immiscible Transport," *Subsurface Contamination by Immiscible Fluids*, K.U. Weyer (ed.), A.A. Balkema, Rotterdam, 229-238, 1992.
59. Celia, M.A. and L.A. Ferrand, "A Percolation-Based Model for the Soil Water Retention Function," *Indirect Methods for Estimating the Hydraulic Properties of Unsaturated Soils*, van Genuchten and Leij (eds.), University of California, Riverside, 71-79, 1992.
60. Celia, M.A. and P. Binning, "Multiphase Models of Unsaturated Flow: Approaches to the Governing Equations and Numerical Methods," Invited Paper, *Computational Methods in Water Resources IX Vol. 2: Mathematical Modeling in Water Resources* (Russell et al., eds.), Elsevier Applied Science, 257-272, 1992.
61. Forkel, C. and M.A. Celia, "Numerical Simulation of Unsaturated Flow and Contaminant Transport with Density and Viscosity Dependence," *Computational Methods in Water Resources IX Vol. 2: Mathematical Modeling in Water Resources* (Russell et al., eds.), Elsevier Applied Science, 351-358, 1992.
62. Ewing, R.E. and M.A. Celia, "Numerical Methods for Reactive Transport and Biodegradation," *Computational Methods in Water Resources IX Vol. 1: Numerical Methods in Water Resources* (Russell et al., eds.), Elsevier Applied Science, 51-58, 1992.
63. Guarnaccia, J.F., P.T. Imhoff, B.C. Missildine, M. Oostrom, M.A. Celia, J.H. Dane, P.R. Jaffe, and G.F. Pinder, *Multiphase Chemical Transport in Porous Media*, EPA Environmental Research Brief EPA/600/S-92/002, 1992.
64. Celia, M.A., H. Rajaram, and L.A. Ferrand, "[A Multi-Scale Computational Model for Multiphase Flow in Porous Media.](#)" *Advances in Water Resources*, 16(1), 81-92, 1993.
65. Soll, W.E. and M.A. Celia, "[A Modified Percolation Approach to Simulating Three-Fluid Capillary Pressure-Saturation Relationships.](#)" *Advances in Water Resources*, 16(2), 107-126, 1993.
66. Soll, W.E., M.A. Celia, and J.L. Wilson, "[Micromodel Studies of Three-Fluid Porous Media Systems: Pore-Scale Processes relating to Capillary Pressure-Saturation Relationships.](#)" *Water Resources Research*, 29(9), 2963-2974, 1993.
67. Herrera, I., R.E. Ewing, M.A. Celia, and T.F. Russell, "[Eulerian-Lagrangian Localized Adjoint Methods: The Theoretical Framework.](#)" *Numerical Methods for Partial Differential Equations*, 9(4), 431-458, 1993.
68. Sweed, H.G., P. Binning, and M.A. Celia, *Vapor Phase Transport of Low-Level Radioactive Waste in the Unsaturated Zone*, Water Resources Program Report, Princeton University, 1993.

69. Celia, M.A. and L.A. Ferrand, "A Comparison of ELLAM Formulations for Simulation of Reactive Transport in Groundwater," Invited Paper, *Proc. 1993 Intl. Conf. on Hydrosience and Engineering*, Wang, S.Y.Y. (ed.), University of Mississippi, 1829-1836, 1993.
70. Ewing, R.E., M.A. Celia, P. O'Leary, J. Pasciak, and A. Vassilev, "Parallelization of Multiphase Models for Contaminant Transport in Porous Media," *Proc. SIAM Conf. on Parallelization*, 1993.
71. Celia, M.A., "Eulerian-Lagrangian Localized Adjoint Methods for Contaminant Transport Simulations," Featured Paper, *Proc. X Int. Conf. Computational Methods in Water Resources*, Peters et al. (Eds.), Kluwer Publ., 207-216, 1994.
72. Ferrand, L.A., M.A. Celia, H. Rajaram, and P.C. Reeves, "A Pore-scale Algorithm for Simulation of Dissolution in Porous Media," *Proc. X Int. Conf. Computational Methods in Water Resources*, Peters et al. (Eds.), Kluwer, 457-464, 1994.
73. Binning, P. and M.A. Celia, "Two-dimensional Eulerian-Lagrangian Localized Adjoint Method for the Solution of the Contaminant Transport Equation in the Saturated and Unsaturated Zones," *Proc. X Int. Conf. Computational Methods in Water Resources*, Peters et al. (Eds.), Kluwer Publ., 165-172, 1994.
74. Ewing, R.E., M. Espedal, and M.A. Celia, "Solution Methods for Multiscale Porous Media Flows," *Proc. X Int. Conf. Computational Methods in Water Resources*, Peters et al. (Eds.), Kluwer Publ., 449-456, 1994.
75. Ewing, R.E., H. Wang, M.A. Celia, and R.C. Sharpley, "A Three-dimensional Finite Element Simulation for Transport of Nuclear-waste Contamination in Porous Media," *Proc. Eighth Int. Conf. on Computer Methods and Advances in Geomechanics*, Morgantown, West Virginia., Siriwardanw and Zaman (eds.), 2673-2679, 1994.
76. LeBlanc, D.R. and M.A. Celia, "Numerical Simulation of Downward Movement of Solutes during a Natural-Gradient Tracer Test in Sand and Gravel, Cape Cod, Massachusetts," *U.S.G.S. Toxic Substances Hydrology Program: Proc. of the Technical Meeting*, 1994.
77. Ewing, R.E., H. Wang, and M.A. Celia, "[An Eulerian-Lagrangian Localized Adjoint Method for Reactive Transport with Biodegradation.](#)" *Numerical Methods for Partial Differential Equations*, 11(3), 229-254, 1995.
78. Celia, M.A., P.C. Reeves, and L.A. Ferrand, "Pore-scale Models for Multiphase Flow in Porous Media," *Reviews of Geophysics, Supplement*, 1049-1057, July 1995.
79. Binning, P. and M.A. Celia, "[A Finite Volume Eulerian-Lagrangian Localized Adjoint Method for Solution of the Contaminant Transport Equations in Two-Dimensional Multipurpose Flow Systems.](#)" *Water Resources Research*, 32(1), 103-114, 1996.
80. Rudolph, D.L., R.G. Kachanoski, M.A. Celia, D.R. LeBlanc, and J. Stevens, "[Infiltration and Solute Transport Experiments in Unsaturated Sand and Gravel, Cape Cod, Massachusetts: Experimental Design and Overview of Results.](#)" *Water Resources Research*, 32(3), 519-532, 1996.
81. Reeves, P.C. and M.A. Celia, "[A Functional Relationship between Capillary Pressure, Saturation, and Interfacial Area as Revealed by a Pore-Scale Network Model.](#)" *Water Resources Research*, 32(8), 2345-2358, 1996.
82. Binning, P. And M.A. Celia, "Practical Application of the Fractional Flow Approach to Multi-Phase Flow Simulation", *Proc. Computational Methods in Water Resources*, Cancun, July 1996.
83. Rajaram, H., L.A. Ferrand, and M.A. Celia, "[Prediction of Relative Permeabilities for Unconsolidated Soils using Pore-Scale Network Models.](#)" *Water Resources Research*, 33(1), 43-52, 1997.
84. Celia, M.A., "Fundamental Concepts for Numerical Simulation of Contaminant Transport and Biodegradation," in *Bioremediation: Principles and Practice, Volume I: Principals and Practice*, Irvine and Sikdar (eds.), Technomic Publishing, 59-88, 1997.
85. Johnson, L.S., A. Kaulgud, R.C. Sharpley, M.A. Celia, R.E. Ewing, Z. Leyk, J. Pasciak, and J.R. Brannan, "Integration of Contaminant Transport Simulators on Parallel Machines with a Graphical User Interface for Remote Interactive Modeling", in *High Performance Computing 1997: Grand Challenges in Computer Simulation*, A. Tentner (ed.), The Society for Computer Simulation International, 319-324, 1997.

86. Celia, M.A., P.C. Reeves, and H.K. Dahle, "On the Use of Pore-Scale Computational Models for Two-Phase Porous-Media Flows", in *Proc. 12th Int'l Conf. Computational Methods in Water Resources, Vol. 1, Computational Methods in Contamination and Remediation of Water Resources*, Burganos et al. (eds.), 397-404, 1998.
87. Held, R.J. and M.A. Celia, "Pore-Scale Modeling of Mass Transfer from Nonaqueous Phase Liquids", in *Proc. 12th Int'l Conf. Computational Methods in Water Resources, Vol. 1, Computational Methods in Contamination and Remediation of Water Resources*, Burganos et al. (eds.), 445-452, 1998.
88. Peters, C.A., E.D. Blackburn, and M.A. Celia, "Spatial and Temporal Variation in Composition of Multicomponent NAPL's", in *Proc. 12th Int'l Conf. Computational Methods in Water Resources, Vol. 1, Computational Methods in Contamination and Remediation of Water Resources*, Burganos et al. (eds.), 191-198, 1998.
89. Celia, M.A., W.G. Gray, C.D. Montemagno, and P.C. Reeves, "On the Inclusion of Interfacial Area in Models of Two-Phase Flow in Porous Media", in *Groundwater Quality: Remediation and Protection (GQ 98)*, M. Herbert and K. Kovar (editors), Int. Assoc. of Hydrological Sciences, Publication Number 250, pages 81-88, 1998.
90. Binning, P. and M.A. Celia, "Coupled Air-water Flow and Contaminant Transport in the Unsaturated Zone: A Numerical Model," in *Shallow Groundwater Systems*, P. Dillon and I. Simmers (eds.), A.A. Balkema (Rotterdam), 157-167, 1998.
91. Binning, P. and M.A. Celia, "[Practical Implementation of the Fractional Flow Approach to Multiphase Flow Simulation](#)", *Advances in Water Resources*, 22(5), 461-478, 1999.
92. Dahle, H.K. and M.A. Celia, "[A Dynamic Network Model for Two-Phase Immiscible Flow](#)", *Computational Geosciences*, 3(1), 1-22, 1999.
93. Fischer, U. and M.A. Celia, "[Prediction of Relative and Absolute Permeabilities for Gas and Water from Soil Water Retention Curves using a Pore-Scale Network Model](#)", *Water Resources Research*, 35(4), 1089-1100, 1999.
94. Gray, W.G., M.A. Celia, and P.C. Reeves, "Incorporation of Interfacial Areas in Models of Two-Phase Flow," in *Vadose Zone Hydrology - Cutting Across Disciplines*, M.B. Parlange and J.W. Hopmans (eds.), Oxford University Press (New York), 58-85, 1999.
95. Fischer, U., M.A. Celia, H. Flühler, and M.Th. van Genuchten, "Modeling Nonwetting Phase Permeability using Analytical and Network Models", *Characterization and Measurement of the Hydraulic Properties of Unsaturated Soils, Part 1*, van Genuchten et al. (eds.), 145-154, 1999.
96. Reeves, P.C. and M.A. Celia, "Calculations of Fluid-Fluid and Fluid-Solid Interfacial Areas in Two-Fluid Porous Media as a Function of Capillary Pressure and Saturation", *Characterization and Measurement of the Hydraulic Properties of Unsaturated Soils, Part 1*, van Genuchten et al. (eds.), 53-62, 1999.
97. Celia, M.A., H.Dahle, and S.M. Hassanizadeh, "Dynamic Pore-Scale Network Models for Two-Phase Flow in Porous Media", in *Computational Methods in Water Resources XIII*, Bentley et al. (eds.), A.A. Balkema, 217-223, 2000.
98. Binning, P. and M.A. Celia, "A Three-Dimensional Forward Tracking Eulerian-Lagrangian Localized Adjoint Method for Solution of the Contaminant Transport Equation", in *Computational Methods in Water Resources XIII*, Bentley et al. (eds.), A.A. Balkema, 611-618, 2000.
99. Held, R.J. and M.A. Celia, "Constitutive Relationships derived from Pore-Scale Network Models", in *Computational Methods in Water Resources XIII*, Bentley et al. (eds.), A.A. Balkema, 85-91, 2000.
100. Nordhaug, H.F., H.K. Dahle, M.S. Espedal, W.G. Gray, and M.A. Celia, "Two Phase Flow including Interfacial Area as a Variable", in *Computational Methods in Water Resources XIII*, Bentley et al. (eds.), A.A. Balkema, 231-238, 2000.
101. Held, R.J. and M.A. Celia, "[Modeling Support of Functional Relationships between Capillary Pressure, Saturation, Interfacial Area, and Common Lines](#)", *Advances in Water Resources*, 24(3-4), 325-343, 2001.

102. Held, R.J. and M.A. Celia, "[Pore-Scale Modeling Extension of Constitutive Relationships in the Range of Residual Saturations](#)", *Water Resources Research*, 37(1), 165-170, 2001.
103. Held, R. and M.A. Celia, "[Pore-Scale Modeling and Up-Scaling of Nonaqueous Phase Liquid Mass Transfer](#)", *Water Resources Research*, 37(3), 539-549, 2001.
104. Ataie-Ashtiani, B., S.M. Hassanizadeh, M. Oostrom, M.A. Celia, and M.D. White, "[Effective Parameters for Two-Phase Flow in a Porous Medium with Periodic Heterogeneities](#)", *Journal of Contaminant Hydrology*, 49(1-2), 87-109, 2001.
105. Bruant, R.G., R.J. Held, C.A. Peters, and M.A. Celia, "Simulation of Multicomponent Non-Aqueous Phase Liquid (NAPL) Dissolution Using a Pore-Scale Network Model", *Proc. 2001 International Symposium on Environmental Hydraulics*, 2001.
106. Binning, P.J. and M.A. Celia, "[A Forward Particle Tracking Eulerian Lagrangian Localized Adjoint Method for Solution of the Contaminant Transport Equation in Three Dimensions](#)", *Advances in Water Resources*, 25(2), 147-157, 2002.
107. Guswa, A.J., M.A. Celia, and I. Rodriguez-Iturbe, "[Models of Soil-Moisture Dynamics in Ecohydrology: A Comparative Study](#)", *Water Resources Research*, 38, 1166, 10.1029/2001WR000826, 2002.
108. Ataie-Ashtiani, B., S.M. Hassanizadeh, and M.A. Celia, "[Effects of Heterogeneities on Capillary Pressure - Saturation - Relative Permeability Relationships](#)", *Journal of Contaminant Hydrology*, 56(3-4), 175-192, 2002.
109. Bruant, R.G., A.J. Guswa, M.A. Celia, and C.A. Peters, "[Safe Storage of Carbon Dioxide in Deep Saline Aquifers](#)", *Environmental Science and Technology*, 36(11), 240A-245A, 2002.
110. Celia, M.A., "[How Hydrogeology Can Save the World](#)", (An Editorial), *Ground Water*, 40(2), 113, 2002.
111. Hassanizadeh, S.M., M.A. Celia, and H.K. Dahle, "Dynamic Effects in the Capillary Pressure - Saturation Relationship and their Impacts on Unsaturated Flow", *Vadose Zone Hydrology*, 1, 38-57, 2002.
112. Celia, M.A. and A.J. Guswa, "Hysteresis and Upscaling in Two-Phase Flow through Porous Media", *Proc. Joint Summer Research Conference on Fluid Flow and Transport in Porous Media: Mathematical and Numerical Treatment*, Chen and Ewing (Eds.), American Mathematical Society, 93-104, 2002.
113. Russell, T.F. and M.A. Celia, "[An Overview of Research on Eulerian-Lagrangian Localized Adjoint Methods \(ELLAM\)](#)", *Advances in Water Resources*, 25(8-12), 1215-1231, 2002.
114. Hassanizadeh, S.M., M.A. Celia, and H.K. Dahle, "Dynamic Effects in Capillary Pressure – Saturation Relationship and its Impact on Unsaturated Flow", *Agricultural Sciences*, 7(2), 69-71, 2002.
115. Dahle, H.K., M.A. Celia, S.M. Hassanizadeh, and K.H. Karlsen, "A Total Pressure - Saturation Formulation of Two-Phase Flow incorporating Dynamic Effects in the Capillary Pressure - Saturation Relationship", *Proc. XIV Int. Conf. on Comp. Meth. in Water Resources*, Delft, The Netherlands, Hassanizadeh et al. (Eds.), 1067-1074, 2002.
116. Rodriguez-Iturbe, I., M.A. Celia, and A.J. Guswa, "Climate, Soil, and Vegetation: A Dynamical Perspective of Ecohydrology", *Proc. XIV Int. Conf. on Comp. Meth. in Water Resources*, Delft, The Netherlands, Hassanizadeh et al. (Eds.), 1459-1470, 2002.
117. Altevogt, A. and M.A. Celia, "Modeling Carbon Dioxide Transport in Unsaturated Soils", *Proc. XIV Int. Conf. on Comp. Meth. in Water Resources*, Delft, The Netherlands, Hassanizadeh et al. (Eds.), 41-47, 2002.
118. Held, R.J., W. Kinzelbach, and M.A. Celia, "Characterization of Stable and Unstable Flow Regimes via Dynamic Pore-Scale Network Simulation", *Proc. XIV Int. Conf. on Comp. Meth. in Water Resources*, Delft, The Netherlands, Hassanizadeh et al. (Eds.), 1059-1066, 2002.
119. Gielen, T., S.M. Hassanizadeh, M.A. Celia, and H.K. Dahle, "Study of Pc-Sw Relationship using a Dynamic Pore-Scale Network Model", *Proc. XIV Int. Conf. on Comp. Meth. in Water Resources*, Delft, The Netherlands, Hassanizadeh et al. (Eds.), 1099-1110, 2002.

120. Celia, M.A. and S. Bachu, "Geological Sequestration of CO₂: Is Leakage Unavoidable and Acceptable?", *Proc. Sixth Intl. Greenhouse Gas Technologies Conference*, Kyoto, J. Gale and Y. Kaya (eds.), Volume I, 477-482, 2003.
121. Nordhaug, H.F., M.A. Celia, and H.K. Dahle, "[A Pore Network Model for Calculation of Interfacial Velocities](#)", *Advances in Water Resources*, 26(10), 1061-1074, 2003.
122. Zaman, M.S.U., L.A. Ferrand, and M.A. Celia, "[Type Curves for Effective Parameters in Unsaturated Systems with Structured Heterogeneities](#)", *Advances in Water Resources*, 27(4), 399-410, 2004.
123. Guswa, A.J., M.A. Celia, and I. Rodriguez-Iturbe, "[Effect of Vertical Resolution on Predictions of Transpiration in Water-limited Ecosystems](#)", *Advances in Water Resources*, 27(5), 467-480, 2004.
124. Altevogt, A. and M.A. Celia, "[Numerical Modeling of Carbon Dioxide in Unsaturated Soils Due to Deep Surface Leakage](#)", *Water Resources Research*, 40, W03509, doi:10.1029/2003WR002848, 2004.
125. Nordbotten, J.M., M.A. Celia, and S. Bachu, "[Analytical Solutions for Leakage Rates through Abandoned Wells](#)", *Water Resources Research*, 40, W04204, doi:10.1029/2003WR002997, 2004.
126. Gasda, S.E., S. Bachu, and M.A. Celia, "[Spatial Characterization of the Location of Potentially Leaky Wells Penetrating a Deep Saline Aquifer in a Mature Sedimentary Basin](#)", *Environmental Geology*, 46 (6-7), 707-720, 2004.
127. Gasda, S.E. and M.A. Celia, "Upscaling Relative Permeabilities in a Structured Porous Medium", *Proc. XVth CMWR Conference*, 13-17 June 2004, Chapel Hill, NC, C.T. Miller, M.W. Farthing, W.G. Gray, and G.F. Pinder (Eds.), Elsevier, New York, 793-804, 2004.
128. Celia, M.A., H.K. Dahle, and S.M. Hassanizadeh, "Dynamic Effects in Capillary Pressure Relationships for Two-phase Flow in Porous Media: Insights from Bundle-of-Tubes Models and their Implications", *Proc. XVth CMWR Conference*, 13-17 June 2004, Chapel Hill, NC, C.T. Miller, M.W. Farthing, W.G. Gray, and G.F. Pinder (Eds.), Elsevier, New York, 127-138, 2004.
129. Gielen, T., S.M. Hassanizadeh, M.A. Celia, H.K. Dahle, and A. Leijnse, "A Pore-scale Network Approach to Investigate Dynamic Effects in Multiphase Flow", *Proc. XVth CMWR Conference*, 13-17 June 2004, Chapel Hill, NC, C.T. Miller, M.W. Farthing, W.G. Gray, and G.F. Pinder (Eds.), Elsevier, New York, 83-94, 2004.
130. Celia, M.A., S. Bachu, J.M. Nordbotten, S.E. Gasda, and H.K. Dahle, "Quantitative Estimation of CO₂ Leakage from Geological Storage: Analytical Models, Numerical Models, and Data Needs", *Proc. GHGT-7 Meeting*, Vancouver, September 2004.
131. Bachu, S., J.M. Nordbotten, and M.A. Celia, "Evaluation of the Spread of Acid Gas Plumes injected into Deep Saline Aquifers in Western Canada as an Analogue for CO₂ Injection in Continental Sedimentary Basins", *Proc. GHGT-7 Meeting*, Vancouver, September 2004.
132. Duguid, A., M. Radonjic, R. Bruant, T. Mandeck, G. Scherer, and M. Celia, "The Effect of CO₂ Sequestration on Well Cements", *Proc. GHGT-7 Meeting*, Vancouver, September 2004.
133. Li, L., C.A. Peters, and M.A. Celia, "Upscaling Calcite Dissolution Rates using Network Model Simulations", *Water-Rock Interactions: Proceedings of the Eleventh International Symposium on Water-Rock Interactions*, 961-965, 2004.
134. Nordbotten, J., M.A. Celia, S. Bachu, and H.K. Dahle, "[Semianalytical Solution for CO₂ Leakage through an Abandoned Well](#)", *Environmental Science and Technology*, 39(2), 602-611, 2005.
135. Nordbotten, J., M.A. Celia, and S. Bachu, "[Injection and Storage of CO₂ in Deep Saline Aquifers: Analytical Solution for CO₂ Plume Evolution during Injection](#)", *Transport in Porous Media*, 58(3), 339-360, 2005.
136. Dahle, H.K., M.A. Celia, and S.M. Hassanizadeh, "[Bundle-of-Tubes Model for Calculating Dynamic Effects in the Capillary Pressure – Saturation Relationship](#)", *Transport in Porous Media*, 58(1-2), 5-22, 2005.
137. Gasda, S.E. and M.A. Celia, "[Upscaling Relative Permeabilities in a Structured Porous Medium](#)", *Advances in Water Resources*, 28(5), 493-506, 2005.
138. Puma, M.J., M.A. Celia, I. Rodriguez-Iturbe, and A.J. Guswa, "[Functional Relationship to Describe Temporal Statistics of Soil Moisture averaged over Different Depths](#)", *Advances in Water Resources*, 28(6), 553-566,

- 2005.
139. Scherer, G.W., M.A. Celia, J.H. Prevost, S. Bachu, R. Bruant, A. Duguid, R. Fuller, S.E. Gasda, M. Radonjic, and W. Vichit-Vadakan, "Leakage of CO₂ through Abandoned Wells: Role of Corrosion of Cement", in *The CO₂ Capture and Storage Project (CCP), Volume II*, D.C. Thomas and S.M. Benson (Eds.), 823-844, 2005.
 140. Benson, S. and P. Cook (Coordinating Lead Authors), J. Andersen, S. Bachu, H.B. Nimir, B. Basu, J. Bradshaw, G. Deguchi, J. Gale, G. von Goerne, W. Heidug, S. Holloway, R. Kamal, D. Keith, P. Lloyd, P. Richa, B. Senior, J. Thomson, T. Torp, T. Wildenborg, M. Wilson, F. Zarlenga, and D. Zhou (Lead Authors), M. Celia, B. Gunter, J. Ennis King, E. Lindeberg, S. Lombardi, C. Oldenburg, K. Pruess, A. Rigg, S. Stevens, E. Wilson, and S. Whittaker (Contributing Authors), "Underground Geological Storage", *IPCC Special Report on Carbon Dioxide Capture and Storage, Chapter 5*, Intergovernmental Panel on Climate Change, 2005.
 141. Pinder, G.F. and M.A. Celia, *Subsurface Hydrology*, John Wiley and Sons (New York), 2006.
 142. Nordbotten, J., I. Rodriguez-Iturbe, and M.A. Celia, "[Non-uniqueness of Evapotranspiration due to Spatial Heterogeneity of Plant Species](#)", *Proceedings of the Royal Society A*, 462, 2359-2371, 2006.
 143. Li, L., C.A. Peters, and M.A. Celia, "[Upscaling Geochemical Reaction Rates using Pore-scale Network Models](#)", *Advances in Water Resources*, 29(9), 1351-1370, 2006.
 144. Nordbotten, J.M. and M.A. Celia, "[Similarity Solutions for Fluid Injection into Confined Aquifers](#)", *Journal of Fluid Mechanics*, 561, 307-327, 2006.
 145. Nordbotten, J.M. and M.A. Celia, "[An Improved Analytical Solution for Interface Upconing Around a Well](#)", *Water Resources Research*, 42, W08433 (doi:10.1029/2005WR004738), 2006.
 146. Celia, M.A., S. Bachu, J.M. Nordbotten, D. Kavetski, and S. Gasda, "A Risk Assessment Modeling Tool to Quantify Leakage Potential through Wells in Mature Sedimentary Basins", *Proc. 8th Int. Conf. on Greenhouse Gas Control Technologies*, Trondheim, Norway, 2006.
 147. Gasda, S.E., M.A. Celia, and J.M. Nordbotten, "Significance of Dipping Angle on CO₂ Plume Migration in Deep Saline Aquifers", in *Proceedings of the XVI International Conference on Computational Methods in Water Resources*, edited by Philip J. Binning Peter Engesgaard, Helge Dahle, George F. Pinder and William G. Gray. Copenhagen, Denmark, June, 2006 (<http://proceedings.cmwr-xvi.org>).
 148. Nordbotten, J.M., M.A. Celia, H.K. Dahle, and S.M. Hassanizadeh, "On the Definition of Macroscale Pressure in Multi-phase Flow in Porous Media", in *Proceedings of the XVI International Conference on Computational Methods in Water Resources*, edited by Philip J. Binning Peter Engesgaard, Helge Dahle, George F. Pinder and William G. Gray. Copenhagen, Denmark, June, 2006 (<http://proceedings.cmwr-xvi.org>).
 149. Nordbotten, J.M. and M.A. Celia, "Analysis of Plume Extent using Analytical Solutions for CO₂ Storage", in *Proceedings of the XVI International Conference on Computational Methods in Water Resources*, edited by Philip J. Binning Peter Engesgaard, Helge Dahle, George F. Pinder and William G. Gray. Copenhagen, Denmark, June, 2006 (<http://proceedings.cmwr-xvi.org>).
 150. Peters, C.A., J.A. Lewandowski, M.L. Maier, M.A. Celia, and L. Li, "[Mineral Grain Spatial Patterns and Reaction Rate Up-scaling](#)", in *Proceedings of the XVI International Conference on Computational Methods in Water Resources*, edited by Philip J. Binning Peter Engesgaard, Helge Dahle, George F. Pinder and William G. Gray. Copenhagen, Denmark, June, 2006 (<http://proceedings.cmwr-xvi.org>).
 151. Puma, M.J., M.A. Celia, I. Rodriguez-Iturbe, J.M. Nordbotten, and A.J. Guswa, "Threshold Scales for Spatially Averaged Soil Moisture and Evapotranspiration with Rainfall Heterogeneity", in *Proceedings of the XVI International Conference on Computational Methods in Water Resources*, edited by Philip J. Binning Peter Engesgaard, Helge Dahle, George F. Pinder and William G. Gray. Copenhagen, Denmark, June, 2006 (<http://proceedings.cmwr-xvi.org>).
 152. Kavetski, D., J.M. Nordbotten, and M.A. Celia, "[Analysis of Potential CO₂ Leakage through Abandoned Wells using a Semi-analytical Model](#)", in *Proceedings of the XVI International Conference on Computational Methods in Water Resources*, edited by Philip J. Binning Peter Engesgaard, Helge Dahle, George F. Pinder and William G. Gray. Copenhagen, Denmark, June, 2006 (<http://proceedings.cmwr-xvi.org>).
 153. Binning, P.J., M.A. Celia, and L. Li, "[Pseudokinetics arising from the Upscaling of Equilibrium](#)", in *Proceedings of the XVI International Conference on Computational Methods in Water Resources*, edited by

- Philip J. Binning Peter Engesgaard, Helge Dahle, George F. Pinder and William G. Gray. Copenhagen, Denmark, June, 2006 (<http://proceedings.cmwr-xvi.org>).
154. Haegland, H., H.K. Dahle, G.T. Eigestad, J.M. Nordbotten, M.A. Celia, and A. Assteerawatt, "[Streamline Methods on Fault Adapted Grids for Risk Assessment of Storage of CO₂ in Geological Formations](#)", in *Proceedings of the XVI International Conference on Computational Methods in Water Resources*, edited by Philip J. Binning Peter Engesgaard, Helge Dahle, George F. Pinder and William G. Gray. Copenhagen, Denmark, June, 2006 (<http://proceedings.cmwr-xvi.org>).
 155. Meng, K., R. Williams, and M.A. Celia, "[Opportunities for Low-cost CO₂ Demonstration Projects in China](#)", *Energy Policy*, 35(4), 2368-2378, 2007.
 156. Puma, M.J., I. Rodriguez-Iturbe, M.A. Celia, and A.J. Guswa, "[Implications of Rainfall Temporal Resolution for Soil-moisture and Transpiration Modeling](#)", *Transport in Porous Media*, 68(1), 37-67, 2007.
 157. Li, L., C.A. Peters, and M.A. Celia, "[The Effects of Mineral Spatial Distribution on Reaction Rates in Porous Media](#)", *Water Resources Research*, 43, W01419, doi:10.1029/2005WR004848, 2007.
 158. Nordbotten, J.M., I. Rodriguez-Iturbe, and M.A. Celia, "[Stochastic Coupling of Rainfall and Biomass Dynamics](#)", *Water Resources Research*, 43, W01408, doi:10.1029/2006WR005068, 2007.
 159. Li, L., C.A. Paters, and M.A. Celia, "[Reply to 'Comment on Upscaling Geochemical Reaction Rates using Pore-scale Network Modeling' by P.C. Lichtner and Q. Kang](#)", *Advances in Water Resources*, 30, 691-695, 2007.
 160. Nordbotten, J.M., M.A. Celia, H.K. Dahle, and S.M. Hassanizadeh, "[Interpretation of Macroscale Variables in Darcy's Law](#)", *Water Resources Research*, 43, W08430, doi:10.1029/2006WR005018, 2007.
 161. Li, L., C.A. Peters, and M.A. Celia, "[Applicability of Averaged Concentrations in Determining Geochemical Reaction Rates in Chemically Heterogeneous Porous Media](#)", *American Journal of Science*, 307, 1146-1166, DOI 10.2475/10.2007.02, 2007.
 162. DePaolo, D.J., F.M. Orr Jr., S.M. Benson, M. Celia (*Co-Lead, Multiphase Fluid Transport*), A. Felmy, K.L. Nagy, G.E. Fogg, R. Snieder, J. Davis, K. Pruess, J. Friedmann, M. Peters, N.B. Woodward, *Basic Research Needs for Geosciences: Facilitating 21st Century Energy Systems*, Report from the Workshop Held February 21-23, 2007, Office of Basic Energy Sciences, U.S. Department of Energy, June 2007.
 163. Gasda, S.E., J.M. Nordbotten, and M.A. Celia, "[Upslope Plume Migration and Implications for Geological CO₂ Sequestration in Deep Saline Aquifers](#)", *IES Journal A: Civil and Structural Engineering*, 1(1), 2-16, 2008.
 164. Gasda, S.E., J.M. Nordbotten, and M.A. Celia, "[Determining Effective Wellbore Permeability from a Field Pressure Test: A Numerical Analysis of Detection Limits](#)", *Environmental Geology*, 54(6), 1207-1215, 2008.
 165. Nordbotten, J.M., M.A. Celia, H.K. Dahle, and S.M. Hassanizadeh, "[On the Definition of Marco-scale Pressure in Multi-phase Flow in Porous Media](#)", *Water Resources Research*, 44, W06S02, doi:10.1029/2006WR005715, 2008.
 166. Binning, P.J. and M.A. Celia, "[Pseudo-kinetics arising from the Upscaling of Geochemical Equilibrium](#)", *Water Resources Research*, 44, W07410, doi:10.1029/2007WR006147, 2008.
 167. Celia, M.A., "[On the Road with the Darcy Lecture](#)", *Ground Water*, 46(6), 809-810, 2008.
 168. Celia, M.A., J.M. Nordbotten, S. Bachu, M. Dobossy, and B. Court, "[Risk of Leakage versus Depth of Injection in Geological Storage](#)", *Proc. GHGT-9 Conference*, Washington DC, November 2008.
 169. Crow, W., D.B. Williams, J.W. Carey, M. Celia, and S. Gasda, "[Wellbore Integrity Analysis of a Natural CO₂ Producer](#)", *Proc. GHGT-9 Conference*, Washington, DC, November 2008.
 170. Crow, W., D.B. Williams, B. Carey, M. Celia, and S. Gasda, "CO₂ Capture Project Field Study of a Wellbore from a Natural CO₂ Reservoir", *Proc. NETL Conference*, Pittsburgh, May 5-8, 2008.
 171. Nordbotten, J.M., D. Kavetski, M.A. Celia, S. Bachu, "[Model for CO₂ Leakage including Multiple Geological Layers and Multiple Leaky Wells](#)", *Environmental Science and Technology*, 43(3), 743-749, 2009.

172. Gasda, S.E., J.M. Nordbotten, and M.A. Celia, "[Vertical Equilibrium with Sub-scale Analytical Methods for Geological CO₂ Sequestration](#)", *Computational Geosciences*, 13(4), 469-481, 2009.
173. Class, H., A. Ebigbo, R. Helmig, H. Dahle, J.M. Nordbotten, M.A. Celia, P. Audigane, M. Darcis, J. Ennis-King, Y. Fan, B. Flemisch, S. Gasda, M. Jin, S. Krug, D. Labregere, A. Naderi, R.J. Pawar, A. Sbai, S.G. Thomas, and L. Trenty, "[A Benchmark Study on Problems Related to CO₂ Storage in Geological Formations: Summary and Discussion of the Results](#)", *Computational Geosciences*, 13(4), 409-434, 2009.
174. Celia, M.A. and J.M. Nordbotten, "[Practical Modeling Approaches for Geological Storage of Carbon Dioxide](#)", *Ground Water*, 47(5), 627-638, 2009.
175. Bachu, S. and M.A. Celia, "Assessing the Potential for CO₂ Leakage, Particularly through Wells, from CO₂ Storage Sites", in *The Science of CO₂ Storage*, (B.J. McPherson and E. Sundquist, eds.), Geophysical Monograph Series GM148, American Geophysical Union, Washington, DC, pp. 203-216, 2009.
176. Crow, W., J.W. Carey, S. Gasda, D.B. Williams, and M. Celia, "[Wellbore Integrity Analysis of a Natural CO₂ Producer](#)", *International Journal of Greenhouse Gas Control*, 49(2), 186-197, 2010.
177. Franz, T.E., K.K. Caylor, J.M. Nordbotten, I. Rodriguez-Iturbe, and M.A. Celia, "[An Ecohydrological Approach to predicting Regional Woody Species Distribution Patterns in Dryland Ecosystems](#)", *Advances in Water Resources*, 33(2), 215-230, 2010.
178. Person, M., A. Banerjee, J. Rupp, C. Medina, P. Lichtner, C. Gable, R. Pawar, M. Celia, J. MacIntosh, and V. Bense, "[Assessment of Basin-scale Hydrologic Impacts of CO₂ Sequestration, Illinois Basin](#)", *International Journal of Greenhouse Gas Control*, 4, 840-854, 2010.
179. Nordbotten, J.M., J.P. Noguees, and M.A. Celia, "Appropriate Choice of Average Pressure for Upscaling Relative Permeability in Dynamic Flow Conditions", *SPE Journal*, 15(1), 228-237, doi:10.2118/113558-PA, 2010.
180. Gasda, S.E., J.M. Nordbotten, and M.A. Celia, "[The Impact of Local-scale Processes on Large-scale CO₂ Migration and Immobilization](#)", *XVIII International Conference on Water Resources* (Carrera, J. et al., eds.), Barcelona, Spain, June 2010.
181. Celia, M.A. and J.M. Nordbotten, "[How Simple Can We Make Models for CO₂ Injection, Migration, and Leakage?](#)", *Proc. GHGT-10 Conference*, Amsterdam, The Netherlands, September 2010.
182. Court, B., M.A. Celia, J.M. Nordbotten, and T.R. Elliot, "[Active and Integrated Management of Water Resources Throughout CO₂ Capture and Sequestration Operations](#)", *Proc. GHGT-10 Conference*, Amsterdam, The Netherlands, September 2010.
183. Dobossy, M.E., M.A. Celia, and J.M. Nordbotten, "[An Efficient Software Framework for Performing Industrial Risk Assessment of Leakage for Geological Storage of CO₂](#)", *Proc. GHGT-10 Conference*, Amsterdam, The Netherlands, September 2010.
184. Gasda, S.E., J.Z. Wang, and M.A. Celia, "[Analysis of In-Situ Wellbore Integrity Data for Existing Wells with Long-Term Exposure to CO₂](#)", *Proc. GHGT-10 Conference*, Amsterdam, The Netherlands, September 2010.
185. Gasda, S.E., J.M. Nordbotten, and M.A. Celia, "[The Impact of Local-Scale Processes on Large-Scale CO₂ Migration and Immobilization](#)", *Proc. GHGT-10 Conference*, Amsterdam, The Netherlands, September 2010.
186. Noguees, J.P., J.M. Nordbotten, and M.A. Celia, "[Detecting Leakage of Brine or CO₂ Through Abandoned Wells in a Geological Sequestration Operation Using Pressure Monitoring Wells](#)", *Proc. GHGT-10 Conference*, Amsterdam, The Netherlands, September 2010.
187. Celia, M.A., J.M. Nordbotten, B. Court, M. Dobossy, and S. Bachu, "[Field-scale Application of a Semi-analytical Model for Estimation of CO₂ and Brine Leakage along Old Wells](#)", *J. Greenhouse Gas Control*, Vol. 5, Issue 2, pages 257-269, 2011.
188. Gasda, S.E., J.M. Nordbotten, and M.A. Celia, "[Vertically-averaged Approaches for CO₂ Migration with Solubility Trapping](#)", *Water Resources Research*, 47, W05528, doi:10.1029/2010WR009075, 2011.
189. Buscheck, T.A., Y. Sun, Y. Hao, M. Chen, B. Court, M.A. Celia, W.L. Bourcier, and T.J. Wolery, "Geothermal Energy Production from Actively Managed CO₂ Storage in Saline Formations", *Proc. Geothermal Resources Council 35th Annual Meeting*, San Diego, October 2011.

190. Nordbotten, J.M. and M.A. Celia, [Geological Storage of CO₂: Modeling Approaches for Large-scale Simulation](#), John Wiley and Sons, Hoboken, NJ, 235 pages, 2012.
191. Court, B., K.W. Bandilla, M.A. Celia, A. Janzen, M. Dobossy, and J.M. Nordbotten, “[Applicability of Vertical-equilibrium and Sharp-interface Assumptions in CO₂ Sequestration Modeling](#)”, *International Journal for Greenhouse Gas Control*, 10, 134-147, 2012.
192. Franz, T.E., K.K. Caylor, E.G. King, J.M. Nordbotten, M.A. Celia, and I. Rodriguez-Iturbe, “[An Ecohydrological Approach to Predicting Hillslope Scale Vegetation Patterns in Dryland Ecosystems](#)”, *Water Resources Research*, 48, W01515, DOI: 10.1029/2011WR010524, 2012.
193. Court, B., T.R. Elliot, J.A. Dammal, T.A. Buscheck, J. Rohmer, and M.A. Celia, “[Promising Synergies to Address Water, Sequestration, Legal, and Public Acceptance Issues associated with Large-scale Implementation of CO₂ Sequestration](#)”, *Mitigation and Adaptation Strategies for Global Change (Special Issue on Carbon Capture and Storage)*, 17(6), 569-599, 2012.
194. Court, B., K.W. Bandilla, M.A. Celia, T.A. Buscheck, J.M. Nordbotten, A. Janzen, and M. Dobossy, “[Initial Evaluation of Advantageous Synergies associated with Simultaneous Brine Production and CO₂ Geological Sequestration](#)”, *International Journal for Greenhouse Gas Control*, 8, 90-100, 2012.
195. Nogues, J.P., B. Court, M. Dobossy, J.M. Nordbotten, and M.A. Celia, “[A Methodology to Estimate Maximum Probable Leakage along Old Wells in a Geological Sequestration Operation](#)”, *International Journal for Greenhouse Gas Control*, 7, 39-47, 2012.
196. Buscheck, T.A., Y. Sun, M. Chen, Y. Hao, T.J. Wolery, W.L. Bourcier, B. Court, M.A. Celia, S.J. Friedmann, and R.D. Aines, “[Active CO₂ Reservoir Management for Carbon Storage: Analysis of Operational Strategies to Relieve Pressure Buildup and Improve Injectivity](#)”, *International Journal of Greenhouse Gas Control*, 6, 230-245, 2012.
197. Elliot, T.R. and M.A. Celia, “[Potential Restrictions for CO₂ Sequestration Sites due to Shale and Tight Gas Production](#)”, *Environmental Science and Technology*, 46, 4223-4227, 2012.
198. Nordbotten, J.M., Flemisch, B., S.E. Gasda, H.M. Nilsen, Y. Fan, G.E. Pickup, B. Wiese, M.A. Celia, H.K. Dahle, G.T. Eigestad, and K. Pruess, “[Uncertainties in Practical Simulation of CO₂ Storage](#)”, *International Journal of Greenhouse Gas Technologies*, 9, 234-242, 2012.
199. Gasda, S.E., J.M. Nordbotten, and M.A. Celia, “[Application of Simplified Models to CO₂ Migration and Immobilization in Large-scale Geological Systems](#)”, *International Journal of Greenhouse Gas Technologies*, 9, 72-84, 2012.
200. Bandilla, K., M.A. Celia, T.R. Elliot, M. Person, K. Ellet, J. Rupp, C. Gable, and M. Dobossy, “[Modeling Carbon Sequestration in the Illinois Basin using a Vertically-integrated Approach](#)”, *Computing and Visualization in Science*, 15, 39-51, DOI: 10.1007/s00791-013-0195-2, 2012.
201. Bandilla, K.W., B. Court, T.R. Elliot, and M.A. Celia, “[Comparison of Brine Production Scenarios for Geologic Carbon Sequestration Operations](#)”, *Proc. Carbon Management Technology Conference*, Orlando, February 2012.
202. Duguid, A., R. Butsch, J.W. Carey, M. Celia, N. Chuganov, S. Gasda, T.S. Ramakrishnan, V. Stamp, J. Wang, “[Pre-injection Baseline Data Collection to Establish Existing Wellbore Leakage Properties](#)”, *Proc. of the 11th International Conference on Greenhouse Gas Technologies (GHGT-11)*, Kyoto, Japan, November 2012.
203. Gasda, S.E., M.A. Celia, J.Z. Wang, and A. Duguid, “[Wellbore Permeability Estimates from Vertical Interference Testing of Existing Wells](#)”, *Proc. of the 11th International Conference on Greenhouse Gas Technologies (GHGT-11)*, Kyoto, Japan, November 2012.
204. Buscheck, T.A., T.R. Elliot, M.A. Celia, M. Chen, Y. Sun, Y. Hao, C. Lu, T.J. Wolery, and R.D. Aines, “[Integrated Geothermal-CO₂ Reservoir Systems: Reducing Carbon Intensity through Sustainable Energy Production and Secure CO₂ Storage](#)”, *Proc. of the 11th International Conference on Greenhouse Gas Technologies (GHGT-11)*, Kyoto, Japan, November 2012.
205. Elliot, T.R., T.A. Buscheck, and M.A. Celia, “[Active CO₂ Reservoir Management for Sustainable Geothermal Energy Extraction and Reduced Leakage](#)”, *Greenhouse Gases: Science and Technology*, 3:50-65, DOI: 10.1002/ghg, 2013.

206. Zhang, Y., M. Person, J. Rupp, K. Ellett, M.A. Celia, C.W. Gable, B. Bowen, J. Evans, K. Bandilla, P. Mozley, T. Dewers, and T. Elliot, "[Hydrogeologic Controls on Induced Seismicity in Crystalline Basement Rocks Due to Fluid Injection into Basal Reservoirs](#)", *Ground Water*, 51(4), 525-538, 2013.
207. Joekar-Niasar, V., F. Doster, R.T. Armstrong, D. Wildenschild, and M.A. Celia, "[Trapping and Hysteresis in Two-phase Flow in Porous Media: A Pore-network Study](#)", *Water Resources Research*, 49, 4244-4256, doi:10.1002/wrcr.20131, 2013.
208. Noguees, J.P., J.P. Fitts, M.A. Celia, and C.A. Peters, "[Permeability Evolution due to Dissolution and Precipitation of Carbonates using Reactive Transport Modeling in Pore Networks](#)", *Water Resources Research*, Vol. 49, 6006-6021, doi:10.1002/wrcr.20486, 2013.
209. Doster, F., J.M. Nordbotten, and M.A. Celia, "[Impact of Capillary Hysteresis and Trapping on Vertically Integrated Models for CO₂ Storage](#)", *Advances in Water Resources*, 62, 465-474, 2013.
210. Doster, F., J.M. Nordbotten, and M.A. Celia, "Hysteretic Upscaled Constitutive Relationships for Vertically Integrated Porous Media", accepted for publication, *Computing and Visualization in Science*, 2013.
211. Huang, X., K.W. Bandilla, M.A. Celia, and S. Bachu, "[Basin-scale Modeling of CO₂ Storage using Models of Varying Complexity](#)", *International Journal for Greenhouse Gas Control*, 20, 73-86, 2014.
212. Kang, M., J.M. Nordbotten, F. Doster, and M.A. Celia, "[Analytical Solutions for Two-phase Subsurface Flow to a Leaky Fault considering Vertical Flow Effects and Fault Properties](#)", *Water Resources Research*, 50(4), 3536-3552, 2014.
213. Guo, B., K.W. Bandilla, F. Doster, E. Keilegavlen, and M.A. Celia, "[A Vertically-integrated Model with Vertical Dynamics for CO₂ Storage](#)", *Water Resources Research*, 50(8), 6269-6284, 2014.
214. Kang, M., C. Kanno, M. Reid, X. Zhang, D.L. Mauzerall, M.A. Celia, Y. Chen, and T.C. Onstott, "[Direct Measurements of Methane Emissions from Abandoned Oil and Gas Wells in Pennsylvania](#)", *Proceedings of the National Academy of Sciences*, 111 (51), 18173-18177, doi:10.1073/pnas.1408315111, 2014.
215. Bandilla, K.W., M.A. Celia, and E. Leister, "[Impact of Model Complexity on CO₂ Plume Modeling at Sleipner](#)", *Energy Procedia*, 63, 3405-3415, 2014.
216. Guo, B., K.W. Bandilla, E. Keilegavlen, F. Doster, and M.A. Celia, "[Application of Vertically-integrated Models with Subscale Vertical Dynamics to Field Sites for CO₂ Sequestration](#)", *Energy Procedia*, 63, 3523-3531, 2014.
217. Bandilla, K., M.A. Celia, J.T. Birkholzer, A. Cihan, and E.C. Leister, "[Multi-phase Modeling of Geologic Carbon Sequestration in Saline Aquifers](#)", *Ground Water*, 53(3), 362-277, 2015.
218. Zheng, Z., B. Guo, I. Christov, M. Celia, and H. Stone, "[Flow Regimes for Fluid Injection into a Confined Porous Medium](#)", *Journal of Fluid Mechanics*, 767, 881-909, 2015.
219. Kang, M., E. Baik, A.R. Miller, K.W. Bandilla, and M.A. Celia, "[Effective Permeabilities of Abandoned Oil and Gas Wells: Analysis of Data from Pennsylvania](#)", *Environmental Science and Technology*, 49, 4757-4764, 2015.
220. Wang, H., Y. Ren, J. Jia, and M.A. Celia, "[A Probabilistic Collocation Eulerian-Lagrangian Localized Adjoint Method on Sparse Grids for Assessing CO₂ Leakage through Wells in Randomly Heterogeneous Porous Media](#)", *Computer Methods in Applied Mechanics and Engineering*, 292, 35-53, 2015.
221. Edwards, R.E.J., M.A. Celia, K.W. Bandilla, F. Doster, and C.M. Kanno, "[A Model to Estimate Carbon Dioxide Injectivity and Storage Capacity for Geological Sequestration in Shale Gas Wells](#)," *Environmental Science and Technology*, 49, 9222-9229, 2015.
222. Celia, M.A., S. Bachu, J.M. Nordbotten, and K.W. Bandilla, "[Status of CO₂ Storage in Deep Saline Aquifers with Emphasis on Modeling Approached and Practical Simulations](#)", *Special 50th Anniversary Issue of Water Resources Research*, DOI 10.1002/2015WR017609, 2015.
223. Huang, X., K.W. Bandilla, and M.A. Celia, "[Multi-physics Pore-network Modeling of Two-phase Shale Matrix Flows](#)", *Transport in Porous Media*, 111, 123-141, DOI 10.1007/s11242-015-0584-8, 2016.
224. Guo, B., Z. Zhong, M.A. Celia, and H.A. Stone, "[Axisymmetric Flows from Fluid Injection into a Confined](#)

- [Porous Medium](#)”, *Physics of Fluids*, 28(2), 2016.
225. Guo, B., Z. Zheng, K.W. Bandilla, M.A. Celia, and H.A. Stone, “[Flow Regime Analysis for Geological CO₂ Sequestration and Other Subsurface Fluid Injections](#)”, *Int. J. of Greenhouse Gas Control*, 53, 284-291, 2016.
226. Guo, B., K.W. Bamdilla, J.M. Nordbotten, M.A. Celia, E. Keilegavlen, and F. Doster, “[A Multiscale Multilayer Vertically Integrated Model with Vertical Dynamics for CO₂ Sequestration in Layered Geological Formations](#)”, *Water Resources Research*, 52, doi:10.1002/2016WR018714, 2016.
227. Kang, M., S. Christian, M.A. Celia, D.L. Mauzerall, M. Bill, A.R. Miller, Y. Chen, M.E. Conrad, T.H. Darrah, and R.B. Jackson, “[Identification and Characterization of High Methane-emitting Abandoned Oil and Gas Wells](#)”, *Proc. Of the National Academy of Sciences*, 113(48), 13636-13641, 2016.
228. Celia, M.A., “[Geological Storage of Captured Carbon Dioxide as a Large-scale Carbon Mitigation Option](#)”, *Water Resources Research*, 53, 3527-3533, doi:10.1002/2017WR020841, 2017.
229. Bandilla, K. and M.A. Celia, “[Active Pressure Management through Brine Production for Basin-wide Deployment of Geologic Carbon Sequestration](#)”, *International Journal of Greenhouse Gas Control*, 61, 155-167, 2017.
230. Celia, M. and D.H. Feng, “[How China and Asia Can Lead the Fight Against Global Warming along the Belt and Road](#)”, Opinion Piece published in the *South China Morning Post*, 8 September 2017.
231. Bandilla, K.W., B. Guo, and M.A. Celia, “[Applicability of Vertically Integrated Models for Carbon Storage in Structured Heterogeneous Domains](#)”, *Energy Procedia*, 114, 3312-3321, 2017.
232. Guo, B., Y. Tao, K. Bandilla, and M. Celia, “[Vertically Integrated Dual-porosity and Dual-permeability Models for CO₂ Sequestration in Fractured Geological Formations](#)”, *Energy Procedia*, 114, 3343-3352, 2017.
233. Edwards, R.W.J., F. Doster, M.A. Celia, and K.W. Bandilla, “[Numerical Modeling of Gas and Water Flow in Shale Gas Formations with a Focus on the Fate of Hydraulic Fracturing Fluids](#)”, *Env. Sci. and Tech.*, 51, 13779-13787, 2017.
234. Becker, B., B. Guo, K. Bandilla, M.A. Celia, B. Flemisch, and R. Helmig, “[A Pseudo Vertical Equilibrium Model for Slow Gravity Drainage Dynamics](#)”, *Water Resources Research*, 53 (12), 10491-10507, <https://doi.org/10.1002/2017WR021644>, 2017.
235. Duguid, A., R. Butsch, J.W. Carey, M. Celia, N. Chugunov, S. Gasda, T.S. Ramakrishnan, V. Stamp, and J. Wang, “[Baseline Integrity Property Measurement of Legacy Oil and Gas Wells for Carbon Storage Projects](#)”, *Greenhouse Gas Science and Technology*, 7, 866-890, 2017.
236. Edwards, R.W.J. and M. A. Celia, “[Shale Gas, Hydraulic Fracturing, and Formation Data to Support Modeling of Gas and Water Flow in Shale Formations](#)”, *Water Resources Research*, 54, 3196-3206, 2018.
237. Becker, B., B. Guo, K. Bandilla, M.A. Celia, B. Flemisch, and R. Helmig, “[An Adaptive Multiphysics Model Coupling Vertical Equilibrium and Full Multidimensions for Multiphase Flow in Porous Media](#)”, *Water Resources Research*, 54, 4347-4360, <https://doi.org/10.1029/2017WR022303>, 2018.
238. Edwards, R.W.J. and M.A. Celia, “[Infrastructure to Enable Deployment of Carbon Capture, Utilization, and Storage in the United States](#)”, *Proc. of the National Academy of Science*, 115(38), E8815-E8824, 2018.
239. Celia, M. and R. Edwards, “Carbon Sequestration”, in *Groundwater: State of the Science and Practice*, W..M. Alley (Ed.), National Ground Water Association, 2018.
240. Riddick, S.N., D.L. Mauzerall, M.A. Celia, M. Kang, K. Bressler, C. Chu, and C.D. Gun, “[Measuring Methane Emissions from Abandoned and Active Oil and Gas Wells in West Virginia](#)”, *Science of the Total Environment*, 651, 1849-1856, 2019.
241. Bandilla, K. and M.A. Celia, “Numerical Modeling of Fluid Flow during Geologic Carbon Storage”, Ch. 8 in *Science of Carbon Storage in Deep Saline Formations: Process Coupling across Time and Spatial Scales*, Newell, P. and A.G. Ilgen (Eds.), Elsevier (Amsterdam), 2019.
242. Aslannejad, H., S.M. Hassanizadeh, and M.A. Celia, “Characterization of the Interface between Coating and Fibrous Layers of Paper”, to appear, *Transport in Porous Media*, 2019.
243. Tao, Y., B. Guo, K. Bandilla, and M.A. Celia, “Vertically-integrated Dual-continuum Models for CO₂

Injection in Fractured Geological Formations”, to appear, *Computational Geosciences*, 2019.

INVITED PRESENTATIONS (LAST 5 YEARS)

- Computational Investigation of Carbon Dioxide Injection into Depleted Shale Gas Formations*
Interpore Conference, Milwaukee, Wisconsin, USA, May 2014.
- Computational Models for Subsurface Flows: Four Decades of Advances as Reflected in the FEWR/CMWR Conference Series*
20th International Conference on Computational Methods in Water Resources, Stuttgart, Germany, June 2014.
- Geological Carbon Storage: Models for Injection, Migration, and Leakage*
Department of Mathematical Sciences, Fudan University, Shanghai, China, July 2014.
- Practical Multi-scale Models for Large-scale CO₂ Sequestration*
Department of Mathematics, Shandong University, Jinan, China, July 2014.
- Practical Multi-scale Models for Large-scale CO₂ Sequestration*
Department of Mathematical Sciences, Shandong Normal University, Jinan, China, July 2014.
- Greenhouse Gases: Engineering Solutions (CO₂) and Source Characterization (CH₄)*
Workshop on Reactive Flows in Deformable Complex Media, Oberwolfach, Germany, September 2014.
- Model Complexity and Simulation Approaches for Geological Sequestration of Carbon Dioxide*
Department of Applied Mathematics, City University of Hong Kong, January 2015.
- Model Complexity and Simulation Approaches for Geological Sequestration of Carbon Dioxide*
Department of Applied Mathematics, Polytechnic University of Hong Kong, January 2015.
- Energy and Sustainability in a Carbon-Constrained World*
University of Macau, January 2015.
- Leakage along Old Wells with Applications to CO₂ Sequestration and Methane Emissions*
Department of Geology, University of Kansas, February 2015.
- Leakage along Old Wells with Applications to CO₂ Sequestration and Methane Emissions*
Distinguished Scientist Lecture Series, Division of Earth Sciences, Lawrence Berkeley National Laboratory, April 2015.
- Modeling CO₂ Injection in Depleted Shale Gas Formations*
Special Session to Honor the Career of Michael Celia, Interpore Conference, Padua, Italy, May 2015.
- Groundwater and the Subsurface: Water, Energy, Climate*
Nassau Hall Society International Conference on Water, Amsterdam, The Netherlands, June 2015.
- Energy and Sustainability in a Carbon-constrained World*
Plenary Lecture, University of Bergen Summer School on Sustainability, Bergen, Norway, June 2015.
- Carbon Capture and Storage*
University of Bergen Summer School on Sustainability, Bergen, Norway, June 2015.
- Modeling Approaches for CO₂ Sequestration in Conventional and Unconventional Reservoirs*
Inaugural Argyris Honorary Lecture, University of Stuttgart, July 2015.
- Modeling Approaches for CO₂ Sequestration in Conventional and Unconventional Reservoirs*
Invited lecture, PetroChina, Beijing, China, August 2015.
- CO₂ Sequestration in Conventional and Unconventional Reservoirs*
Department of Hydraulic Engineering, Tsinghua University, Beijing, China, August 2015.
- CCS: Current Status, Future Prospects, and the Role of NUPUS*
NUPUS Annual Meeting, Freudenstadt, Germany, September 2015.
- Modeling Approaches for CO₂ Sequestration in Conventional and Unconventional Reservoirs*
Department of Chemical Engineering, University of Houston, October 2015.
- Modeling Approaches for CO₂ Sequestration in Conventional and Unconventional Reservoirs*
International Institute for Carbon-Neutral Energy Research, Kyushu University, Japan, January 2016.
- Geological Storage as a Carbon Mitigation Option*
National Ground Water Association Summit, Denver Colorado, April 2016.
- Measurement of Methane Fluxes from Abandoned Wells in Pennsylvania*
Penn State University, May 2016.
- The Role of Public Policy in Science, Engineering, and Mathematical Modeling*

- University of Bergen, Norway, September 2016.
- Geological Carbon Storage in Conventional and Unconventional Reservoirs*
The National Academy of Engineering, Washington DC, October 2016.
- Carbon Capture and Storage (CCS): Is it Feasible? Will it Happen?*
FEST Lecture Series, Utrecht University, The Netherlands, October 2016.
- Carbon Capture and Storage (CCS): Is it Feasible? Will it Happen?*
DARSim Lecture Series, Delft University of Technology, The Netherlands, November 2016.
- Models for Fluid Flow in Shale Gas Reservoirs*
The Technical University of Eindhoven, November 2016.
- An Overview of the Princeton Environmental Institute*
University of Bergen, Norway, February 2017.
- Modeling Geological Storage of Carbon Dioxide with a Focus on Groundwater Protection*
School of Environment, Tsinghua University, March 2017.
- Models for Fluid Flow in Shale Gas Reservoirs*
Department of Hydraulic Engineering, Tsinghua University, March 2017.
- Quantitative Estimation of CO₂ Leakage in Large-scale CCS*
Special Symposium for Retirement of Robert Williams, Princeton University, April 2017.
- Energy and Sustainability in a Carbon-constrained World*
Public Lecture, University of Hong Kong, April 2017.
- Large-scale Models for Fluid Flow in Shale Gas Reservoirs*
Department of Civil Engineering, Univ. of Hong Kong, April 2017.
- Modeling Geological Storage of Carbon Dioxide with a Focus on Leakage along Old Wells*
Department of Civil Engineering, Univ. of Hong Kong, April 2017.
- Modeling Geological Storage of Carbon Dioxide with a Focus on Leakage along Old Wells*
Department of Geography, Chinese University of Hong Kong, April 2017.
- Models for Fluid Flow in Shale Gas Reservoirs*
Department of Civil Engineering, Delft University of Technology, May 2017.
- Modeling Geological Storage of Carbon Dioxide with a Focus on Model Complexity and Practical Simulations*
Opening Plenary lecture, Math for Industry Conference, Univ. of Hawaii, October 2017.
- Quantitative Estimation of CO₂ Leakage in Large-scale CCS*
National Academy of Sciences Workshop on Negative Emissions and CCS, Stanford Univ., November 2017.
- Groundwater Contamination from Shale Gas Development and Geological Carbon Storage*
School of Environment, Tsinghua University, March 2018.
- Modeling Geological Storage of Carbon Dioxide with a Focus on Model Complexity and Storage Security*
China University of Geosciences, Beijing, China, March 2018.
- Geological Storage of Carbon Dioxide: Opportunities for Large-scale Implementation*
Opening Plenary lecture, International Workshop on Geothermal Energy, Univ. of Manchester, June 2018.
- Modeling Geological Storage of Carbon Dioxide with a Focus on Leakage Risk Assessment*
8th International Congress on Environmental Geotechnics, Hangzhou, China, October 2018.
- Modeling Options for Two-phase Flow in Porous Media*
Institute for Rock and Soil Mechanics, Chinese Academy of Sciences, Wuhan, China, October 2018.
- What Pore-scale Processes are Important for Geological Carbon Storage?*
Special Symposium on Pore-scale Processes in Porous Media, Utrecht University, December 2018.

THESES SUPERVISED

PhD Theses:

Bouloutas, E.T., "Improved Numerical Methods for Flow and Transport in Partially Saturated Porous Media," Ph.D. Thesis, Dept. of Civil Engineering, M.I.T., 1989.

Soll, W.E., "Development of a Pore-Scale Model for Simulating Two and Three Phase Capillary Pressure - Saturation Relationships," Ph.D. Thesis, Dept. of Civil Engineering, M.I.T., 1991.

Binning, P.J., "Modeling Unsaturated Zone Flow and Contaminant Transport in the Air and Water Phases", PhD Thesis, Department of Civil Engineering and Operations Research, Princeton University, 1994.

Reeves, P.C., "The Development of Pore-scale Network Models for the Simulation of Capillary Pressure - Saturation - Interfacial Area - Relative Permeability Relationships in Multi-fluid Porous Media", PhD Thesis, Department of Civil Engineering and Operations Research, Princeton University, 1997.

Goode, D.J., "Ground-water Age and Atmospheric Tracers: Simulation Studies and Analysis of Field Data from the Mirror Lake Site, New Hampshire", PhD Thesis, Department of Civil Engineering and Operations Research, Princeton University, 1998.

Held, R.J., "Pore-Scale Modeling of Extended Two-Phase Flow and Mass Transfer in Porous Media". PhD Thesis, Department of Civil Engineering and Operations Research, Princeton University, 2000.

Puma, M.J., "Space-time Scaling Properties of Soil Moisture and Evapotranspiration in Water-limited Ecosystems", PhD Thesis, Department of Civil and Environmental Engineering, Princeton University, 2006.

Duguid, A., "The Effect of Carbonic Acid on Well Cements", PhD Thesis, Department of Civil and Environmental Engineering, Princeton University, 2006.

Gasda, S.E., "Numerical Models for Evaluating CO₂ Storage in Deep Saline Aquifers: Leaky Wells and Large-scale Geological Features", PhD Thesis, Department of Civil and Environmental Engineering, Princeton University, 2007. Available at <http://dspace.princeton.edu/jspui/handle/88435/dsp01j098zb09n>.

Franz, T.E., "Characterizing Dryland Surface Hydrological Dynamics using Ecohydrological Modeling and Geophysical Observations", PhD Thesis, Department of Civil and Environmental Engineering, Princeton University, 2010.

Court, B., "Safety and Water Challenges in CCS: Modeling Studies to Quantify CO₂ and Brine Leakage Risk and Evaluate Promising Synergies for Active and Integrated Water Management", PhD Dissertation, Department of Civil and Environmental Engineering, Princeton University, 2011. Available at <http://dspace.princeton.edu/jspui/handle/88435/dsp01ms35t861f>.

Nogues, J., "Investigations in Upscaling Transport and Geochemistry in Porous Media: Modeling CO₂ at the Pore, Continuum, and Reservoir Scales" PhD Dissertation, Department of Civil and Environmental Engineering, Princeton University, 2012.

Kang, M., "CO₂, Methane, and Brine Leakage through Subsurface Pathways: Exploring Modeling, Measurement, and Policy Options", PhD Dissertation, Department of Civil and Environmental Engineering, Princeton University, 2014.

Guo, B., "Fluid Injection and Migration in the Subsurface: Reduced-order Models and Multiscale Modeling Approaches", PhD Dissertation, Department of Civil and Environmental Engineering, Princeton University, 2016.

Huang, X., "Modeling Subsurface Porous Media Flows in Conventional and Unconventional Formations: Carbon Sequestration, Shale Gas, and Policy Implications", PhD Dissertation, Department of Civil and Environmental Engineering, Princeton University, 2016.

Edwards, R.W.J., "Energy and the Subsurface: Modeling Hydraulic Fracturing and Geological Carbon Storage", PhD Dissertation, Department of Civil and Environmental Engineering, Princeton University, 2018.

NOTE: Three PhD graduates - Mary Kang, Juan Nogues, and Trenton Franz - each received Best Student Paper Awards for presentations made at the annual Fall Meetings of the American Geophysical Union.

MS Theses:

Kindred, J.S., "A Numerical Investigation of Transport and Biodegradation of Groundwater Contaminants," M.S. Thesis, Dept. of Civil Engineering, M.I.T., 1987.

Zarba, R.L., "A Numerical Investigation of Unsaturated Flow," M.S. Thesis, Dept. of Civil Engineering, M.I.T., 1988.

Wolf, S.H., "Spatial Variability of Hydraulic Conductivity in a Sand and Gravel Aquifer," Civil Engineer Degree, Dept. of Civil Engineering, M.I.T., 1988.

Zisman, S., "Simulation of Contaminant Transport in Groundwater Systems using Eulerian-Lagrangian Localized Adjoint Methods," M.S. Thesis, Dept. of Civil Engineering, M.I.T., 1989.

Stevens, J., "Analysis and Modeling of Unsaturated-zone Flow and Transport Experiments, Cape Cod, Massachusetts," M.S. Thesis, Department of Civil Engineering and Operations Research, Princeton University, 1994.

Blackburn, E.A., "Modeling the Dissolution and Transport of a Multicomponent NAPL", M.S. Thesis, Department of Civil Engineering and Operations Research, Princeton University, 1998.

LeBlanc, D.R., "Analysis and Simulation of Density and Recharge Effects on Plume Migration at the Cape Cod Experimental Site", Department of Civil and Environmental Engineering, MIT, 2001.

Gasda, S.E., "CO₂ Sequestration into a Mature Sedimentary Basin: Determining the Capacity and Leakage Potential of a Saline Aquifer Formation", M.S. Thesis, Department of Civil and Environmental Engineering, Princeton University, 2004.

Faulkner, A., "Soil Biogeochemistry Changes due to Elevated CO₂ Concentrations", M.S. Thesis, Department of Civil and Environmental Engineering, Princeton University, 2005.

Franz, T.E., "Ecohydrology of the Upper Ewaso Ngiro River Basin, Kenya", M.S. Thesis, Department of Civil and Environmental Engineering, Princeton University, 2007.

Janzen, A., "Development and Application of a Multi-scale, Multi-layer Model for CO₂ Injection", M.S. Thesis, Department of Civil and Environmental Engineering, Princeton University, 2010. Available at http://dspace.princeton.edu/jspui/bitstream/88435/dsp01np193917f/1/Thesis_Janzen.pdf.

Wang, J.Z., "Development of a Parameter Estimation Software Package to Determine CO₂ Leakage Potential from Abandoned Wells", M.S.E. Thesis, Department of Civil and Environmental Engineering, Princeton University, 2011.

Leister, E.C., "Evaluation of Model Complexity: CO₂ Plume Modeling at Sleipner", M.S.E. Thesis, Department of Civil and Environmental Engineering, Princeton University, 2014.

Edwards, R.W.J., "Understanding the Shale Gas System and Modeling Carbon Dioxide and Water Injection", M.S.E. Thesis, Department of Civil and Environmental Engineering, Princeton University, 2014.

Tao, Y., "Vertically-integrated Dual-continuum Models for CO₂ Injection in Fractured Geological Formations", M.S.E. Thesis, Department of Civil and Environmental Engineering, 2017.

BS Theses:

Total of more than 40 Senior Theses Supervised.

Two of my undergraduate advisees have received the award for the best thesis in the School of Engineering and Applied Science.

CURRENT EXTERNAL FUNDING

BP: *Extension of The Carbon Mitigation Initiative*, Total funding \$2.1 Million per year for 5 years (2016-2020; extended from earlier grant that was 2001-2015), Multiple PI's.

Department of Energy: *Multiscale Modeling of CO2 Migration and Trapping in Fractured Reservoirs with Validation by Model Comparison and Real-Site Applications*, Total funding to Princeton is \$400,000 (2014-2018). Project is joint with Lawrence Berkeley National Laboratory and Heriot Watt University (Scotland).