

STEVEN M. GORELICK

APRIL 2023

CYRUS F. TOLMAN PROFESSOR

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EDUCATION

Ph.D. Hydrology, Stanford University, 1981
M.S. Hydrology, Stanford University, 1977
B.A. New College, 1975

PROFESSIONAL EXPERIENCE

2007-present Professor of Earth System Science (renamed 2015), Stanford University
2010-present Senior Fellow, Woods Institute for the Environment, Stanford University
2005-present Cyrus F. Tolman Professor, Stanford University
2009 - present Director, Global Freshwater Initiative, Stanford University
1996-2007 Professor, Dept. of Geological & Environmental Sciences and
Dept. of Geophysics, Stanford University (*joint appointment*)
2023 Visiting Scientist, CSIRO, Brisbane, AU (Spring-Summer)
2021-2022 Visiting Scientists, Helmholtz Centre for Environmental Research (Spring-Summer)
2019 Visiting Professor, Swiss Federal Institute of Technology ETH Zurich (Spring)
2013 Visiting Professor, Swiss Federal Institute of Technology ETH Zurich (Spring)
2012 Visiting Professor, Centre for Ecohydrology, UWA, Perth, AU (Spring)
2009 Visiting Scientist, CSIRO, Land and Water, Perth, AU (Spring-Summer)
2007 Visiting Scholar, University of Cambridge, Dept. of Zoology (Spring-Summer)
2006 Visiting Professor, Ecole Polytechnique Federale de Lausanne (EPFL),
Ecological Engineering Laboratory, Switzerland (Spring-Summer)
2005 Visiting Professor, Swiss Federal Institute of Technology (ETH), Zurich (Spring)
1997 Visiting Scholar, Harvard University, Division of Engineering and
Applied Sciences (Winter)
1997 Visiting Scientist, CSIRO, Perth, AU (Spring-Fall)
1993-96 Associate Professor, Dept. of Geological and Environmental Sciences,
and Dept. of Geophysics, Stanford University
1988-93 Associate Professor of Applied Earth Sciences, Stanford University
Associate Professor of Geophysics, Stanford University (appt. 1991)
1981-88 Consulting Professor, Applied Earth Sciences, Stanford University
1981-88 U.S. Geological Survey, Water Resources Division
Project Chief (1982-88), Assistant GW Research Advisor (1986-88)
1977-80 Hydrologic Consultant

HONORS AND AWARDS

- 2022-23 **Fulbright Fellow - Distinguished Chair** in Science, Technology and Innovation, Australian-American Program
- 2021-22 **Alexander von Humboldt Foundation Research Award, Germany**
- 2018 **Award**, THE Excellence in Teaching Award, School of Earth, Energy, and Environ. Sciences
- 2016 **Fellow**, American Association for the Advancement of Science (AAAS)
- 2015 **Best Paper of 2014**, *Environmental Research Letters (ERL)*
- 2014 **Distinguished Teacher**, School of Earth Sciences, Stanford
- 2013 **Editor's Choice Award**, AGU *Water Resources Research*
- 2012 **Elected Member**, US National Academy of Engineering (**NAE**)
- 2012 **Vice Provost Visiting Professor**, University of Western Australia, Perth
- 2011 **International Fellow**, Institute for Envir. Sci. and Research, ESR, New Zealand
- 2008 **Fulbright Fellow – Senior Scholar**, Australian-American Program
- 2005 **Fellow, John Simon Guggenheim Foundation**
- 1997 **Fulbright Fellow – Senior Scholar**, Australian-American Program
- 1990 **Fellow**, American Geophysical Union
- 1988 **Fellow**, Geological Society of America
- 2008 **Chester Keisel Memorial Lecturer**, University of Arizona
- 2008 **Pioneers in Groundwater**, Environmental and Water Resources Institute of the American Society of Civil Engineers (ASCE).
- 2006 **Award**, International Association for Mathematical Geology, Best Published Paper in *Computers and Geosciences* in 2005
- 2005 **Cyrus F. Tolman Professorship**, Stanford University
- 2004 **M. King Hubbert Award**, National Groundwater Association
- 1998 **Ineson Distinguished Lecturer**, Intl. Assoc. Hydrogeologists, UK & BGS
- 1994 **O.E. Meinzer Award**, Geological Society of America
- 1990 **James B. Macelwane Medal**, American Geophysical Union
- 1989 **Presidential Young Investigator Award**, The White House and the National Science Foundation
- 1987-97 **President**, International Commission on Groundwater, IAHS

ASSOCIATE EDITORSHIPS

- *Sustainable Horizons* (2022-present)
- *Optimization and Engineering* (1999-present)
- Transport in Porous Media* (2002-2004)
- Hydrogeology Journal* (1999-2002)
- Journal of Hydrology* (1990-1996)
- Water Resources Research* (1983-1987)

PROFESSIONAL ACTIVITIES SINCE 1990

- 1988-90 **Member, Geohydrology Panel**, National Research Council Committee on Solid Earth Sciences
- 1988-90 **Scientific Committee**, International Conference on the Scientific Basis for Water Resources Management, Beijing, China, 1990
- 1989 **Scientific Program Committee**, International Symposium on Groundwater Management: Quantity and Quality, Spain
- 1989 **Invited Presentation**, STL, Advance Education Seminar, IBM Lab
- 1989-90 **Co-Convenor**, Geologic Characterization of Media Heterogeneity for Improved Prediction of Subsurface Transport, AGU Special Session
- 1989-90 **Invited Speaker**, International Conference on Calibration and Reliability in Groundwater Modelling, The Hague, The Netherlands
- 1989-90 **Advisory Committee**, International Conference on Groundwater Resources Management, Bangkok, Thailand, 1990
- 1989-95 **Faculty Member**, EPA, Western Region Hazardous Substance Research Center, Stanford University and Oregon State University.
- 1990-91 **Member**, National Science Foundation Geology and Paleontology Panel
- 1990 **Workshop Leader**, DOE Meeting on Groundwater Monitoring Network Design
- 1990-91 **Groundwater Technical Advisory Committee**, CH2M HILL modelling of Santa Clara Valley, California
- 1991 **Invited Presentations**, University of Michigan, U.C. Berkeley, & EPA
- 1991-92 **Member**, National Science Foundation Continental Hydrology Panel and Hydrologic Sciences Panel
- 1992-1993 **Member**, AGU Water Resources Research Editor Selection Committee
- 1992-2009 **Member**, U.S. National Committee for IAHS
- 1992-1994 **Member**, AGU Horton Medal Committee
- 1992-93 **Scientific Advisory Committee**, International Conference on Groundwater Quality Management, Estonia
- 1992-93 **Advisor**, UNESCO International Hydrologic Program Planning Group
- 1992-94 **Member**, Battelle Labs Technical Support Group - Arid Zone VOC Integrated Demo
- 1992-94 **Member**, Geostatistics Experts Group & Conceptual Model Uncertainty Group, Sandia National Laboratory
- 1993 **Instructor**, Design of Groundwater Contaminant Capture Systems: Decision Analysis and Optimization (w/ A.Freeze, L.Smith, & J.Massmann), E-Cubed, Chicago
- 1993-94 **International Scientific Committee**, Assessing and Managing Health Risks from Drinking Water Contamination, Rome, Italy
- 1993-94 **Scientific Advisory Committee**, International Conference on Future Groundwater Resources at Risk, Helsinki, Finland
- 1995 **Invited Speaker**, Kovacs Colloquium, Paris, 1995

- 1995 **Invited Instructor**, ETH, Swiss Federal Institute of Technology,
16th International Course, Pollutant Transport and Management in
Heterogeneous Aquifers, (w/ J. Wilson)
- 1995 **Keynote Speaker**, International Conference on Groundwater Quality:
Remediation and Protection, Prague, 1995
- 1995-1997 **Member**, California Environmental Protection Agency Risk Assessment
Advisory Committee of the Office of Environmental Health Hazard
Assessment Science Advisory Board
- 1995-1996 **Scientific Advisory Committee**, Model Calibration and Reliability
Conference, Golden, CO.
- 1995-1997 **Scientific Program Committee**, IAHS Scientific Assembly, Morocco.
- 1995-1998 **Member, Chair**, Meinzer Award Committee, Geological Society of America
- 1996 **Invited Speaker**, Geologisches Institut, Universitat Tuebingen, Germany
- 1997 **Visiting Scholar**, Harvard University, Division of Engineering
and Applied Sciences
- 1997 **Visiting Scientist**, CSIRO, Perth, Australia
- 1997 **Visiting Professor**, University of Western Australia, Perth
- 1997 **Keynote Speaker**, MODSIM 97, Hobart, Tasmania.
- 1997 **Invited Speaker**, MIT, Harvard, University of Paris, USGS (Reston), CSIRO
Perth, CSIRO Canberra, Intl. Association of Hydrogeologists Perth,
Univ. of Western Australia/Envir. Dynamics Seminar, Institute of Engineers
Melbourne, CSIRO Adelaide, Intl. Assoc. Hydrogeologists Sydney.
- 1997 **Instructor**, Aquifer Heterogeneity and Optimal Capture of Contaminants,
short course, University of New South Wales, Sydney, Australia (with
J.L. Wilson and L. Townley).
- 1997 **Invited Speaker**, 1997 International Conference on Groundwater Quality
Protection : Technology and Management of NAPL Problems, Taiwan
- 1997-1999 **Member**, Scientific Committee, ModelCARE Conference (Joint IAHS/IAHR),
Zurich, Switzerland, Sept. 1999.
- 1998 **External Examiner**, Ph.D. Committee, Technical University of Denmark.
- 1998 **Invited Speaker**, Groundwater Research Centre, Technical University
of Denmark
- 1998 **External Juror**, Ph.D. Jury, University of Paris, France
- 1998-2000 **Member**, Scientific Advisory Committee, Groundwater 2000: Conference
on Groundwater Research, Copenhagen, Denmark, June 2000.
- 1998-2000 **Chair/Consultant**, Review Panel for Groundwater Model for Hanford
Site, Washington, PNNL/DOE.
- 1999-2000 **Member, National Research Council Panel** on Grand Challenges in
Environmental Sciences Research.
- 1999 **Member**, Expert Panel to Review Minimum Flows and Water Levels
Used for Regulatory Purposes in Southwest Florida.
- 1999-01 **Scientific Advisory Committee**, International Conference on Future
Groundwater Resources at Risk, Lisbon, Portugal, 2001
- 2000 **Invited Lecturer**, The Johns Hopkins University

2000-2001 **Member**, Hydrogeology Program Planning Group, Ocean Drilling Program/Joint Oceanographic Institutions (JOIDES) for Deep Earth Sampling

2001-2002 **Member**, Scientific Advisory Committee, ModelCARE 2002, Prague

2001-2008 **Representative**, from Stanford University to Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUAHSI)

2001-2004 **Advisor**, Regional Aquifer Model Development, Texas Water Development Board

2002-2003 **Member**, CUAHSI Executive Director Search Committee

2002-2004 **Member**, Hydrology Section AGU Fellows Committee

2002-2010 **Advisor**, Evaluation of Demand Uncertainty in Optimal Groundwater Management in Southwest Florida, Tampa Bay Water

2002-2004 **Member**, Hydrology Section AGU Fellows Committee

2003 **Member**, CUAHSI, Audit Committee and Legal Affairs Charter Mission Review Group

2003 **Invited Lecturer**, US Geological Survey Water Resources Division Seminar Series

2003-2004 **Member**, Scientific Advisory Committee, Finite Element Modeling and Modflow Conference, Carlsbad, Czech Republic

2004 **Invited Speaker**, UC Davis Distinguished Speaker Series

2004 **Invited Speaker and Panel Discussant**, Finite Element Modeling and Modflow Conference, Carlsbad, Czech Republic

2005 **Invited Lecturer**, University of Barcelona, Swiss Federal Institute of Technology (ETH), and Swiss National Research Center for Water Pollution Control (EAWAG)

2005 **Public Lecture**, Stanford University, The End of Oil series

2006 **Invited Lecturer**, Ecole Polytechnique Federale de Lausanne (EPFL), Ecological Engineering Laboratory, Switzerland

2007 **Invited Lecturer**, University of Paris, Université Pierre et Marie CURIE

2007 **Invited Lecturer**, Cambridge Conservation Forum, University of Cambridge

2007-2008 **Member**, Scientific Advisory Committee, *HydroPredict 2008*, Prague

2008 **Invited Plenary Lecturer**, World Environmental & Energy Conference, ASCE, Hawaii

2008 **Public Lecture**, Stanford University, Troubled Waters series

2008 **Member**, Peer Review Panel, National Science Foundation, Hydrologic Sciences

2009 **Invited Lectures**, University of Western Australia, School of Environmental Systems Engineering; CSIRO, Division of Land and Water; Engineers of Western Australia; International Association of Hydrogeologists, Perth, AU; USGS, Menlo Park.

2009-2010 **Member**, Scientific Advisory Committee, *HydroPredict 2010*, Prague

2010 **Member**, Visiting Committee, Dept. of Earth Sciences, Dartmouth College

2010 – 2011 **Member**, Water Advisory Board, Natural Capital Project

2011 **Search Committee**, Hydrologist, Natural Capital Project

2011 **External Reviewer**, Doctorate of Xiang Zhao Kong, Swiss Federal Institute of Technology, ETH, Zurich

2011 **Invited Lecturer**, Environmental Science Research (ESR), New Zealand

2011 **Keynote Speaker**, River Corridor Restoration Conference – RCRC11, Monte Verità, Ascona, Switzerland

2011- present **Member**, AGU Hydrology Section, Water and Society Technical Committee

2011- 2015 **Member**, Scientific Advisory Board, NIREAS International Water Center, Cyprus

2011 **Invited Lectures**, Swiss Federal Institute of Technology (ETH Zurich), École Polytechnique Fédérale de Lausanne (EPFL), Switzerland, University of Paris – VI, California Independent Petroleum Association, Chevron Retirees Association, and Chevron Fellows meeting

2011 **Co-Organizer**, AGU Session, Assessing Global Soil Change, Impacts on Hydrological and Ecosystem Services

2011 **Co-Organizer**, AGU Session, Water and Society

2012 **Invited Lecture**, Nanyang Technological University, Earth Observatory of Singapore

2012 **Invited Lecture**, Prediction Under Change Workshop : Visionary Speaker, Boulder, Colorado

2012 **Plenary Lecturer**, 34th International Geologic Congress, Brisbane, Australia

2012 **Invited Lecture**, Centre for Ecohydrology, University of Western Australia

2012 **Invited Lecture**, CSIRO, Division of Land and Water, Perth, Australia

2012 **Invited Lecture**, Flinders University, National Groundwater Centre (NCGRT), Adelaide, Australia

2012 **Invited Lecture**, Distinguished Lecture Series, International Water Symposium, Geoscience Australia, Canberra

2012 **Invited Lecture**, Earth Resources Engineering Section, National Academy of Engineering, Washington DC

2013 **Invited Lecture**, Swiss Federal Institute of Technology, ETH, Zurich

2013 **Invited Lecture**, EAWAG, Swiss Federal Institute of Aquatic Science and Technology, Zurich

2013 **Keynote Lecturer**, Vienna Catchment Science Symposium, Austria

2013 **Invited Lecture**, International Workshop: Observation and Modeling of Ecohydrological Processes in Inland River Basins: A Vision for Transformative Science, Beijing, China

2013-15 **Member**, Stanford University, Committee on Research (C-Res)

2014 **Member**, Review Panel, National Science Foundation, Hydrologic Sciences

2014 **Invited Lecture**, Berkeley Civil and Environmental Engineering Seminar

2015 **Invited Lecture**, Stanford Center for Innovation in Global Health Symposium

2014-15 **International Advisory Board**, MODSIM 2015, Queensland, Australia

2015 **Invited Expert**, International Water Security Foresight Workshop, Rand Corp., Arlington, VA

2015 **Invited Lecture**, UFZ – Helmholtz Centre for Environmental Research, Leipzig, Germany

2015 **Invited Lecture**, Columbia University, Dept. of Earth and Environmental Engineering

2015-16 **Member**, Scientific Advisory Committee, Groundwater Quality 2016 (GQ16), Shenzhen, China

2015-2018 **Advisory Board**, Southern University of Science and Technology, School of Engineering and Environmental Science, Shenzhen, China

2015-2018 **Chair**, Stanford University Committee on Research (C-Res)

2016 **Keynote Lecturer**, Groundwater Quality 2016, Shenzhen, China

2016-17 **Advisory Committee**, IPWE 2017, International Perspective on Water Resources and the Environment, Wuhan, China

2016 **Invited Speaker**, American Geophysical Union meeting, San Francisco, Session: International Transdisciplinary Approaches toward Resilience and Adaptation for Societal, Managed, and Natural Systems

2017 **Keynote Lecture**, HydroEco 2017, Birmingham, UK

2017 **Invited Lecture**, University of Birmingham, UK

2017 **Panelist**, Round Table Discussion, Shenzhen Environmental Forum, China

2018 **Panelist**, Day Zero: Water, Climate Change, and Governance in MENA, University of Southern California

2018 **Invited Lecture**, New Zealand Ministry for the Environment, Wellington, NZ

2018 **Invited Lecture**, Massey University, Palmerston North, NZ

2018 **Invited Lecture**, *Geoscience Australia* Distinguished Lecturer, Canberra, AU

2018 **Invited Speaker**, Symposium on Sustainable Groundwater Management: The Path Forward, San Jose, CA

2018 **Invited Speaker**, Water Systems Symposium, Stanford University, CA

2018-present ***Member**, Intl Advisory Board, Water and Climate in SE Asia Project

2018-present ***Chair**, Advisory Board, Southern University of Science and Technology, School of Engineering and Environ. Science, Shenzhen, China

2018-present ***Member**, Visiting Committee, MIT, Dept of Civil and Environ. Engineering

2019 **Invited Lecture**, World Bank, New Delhi, India

2019 **Invited Lecture**, ETH-Zurich, Institute of Science, Technology and Policy

2019 **Invited Lecture**, EPFL, Lausanne, Environmental Engineering Seminar Series

2020 **Citationist**, Stockholm Water Prize (winner John Cherry), (Stockholm, Sweden, virtual)

2021 **Citationist**, Stockholm Water Prize (winner Sandra Postel), (Stockholm, Sweden, virtual)

2021 **Plenary Lecturer and Discussion Panelist**, 3rd International Forum on Water Security and Sustainability, Nanjing, China (virtual)

2021 **Invited Lecture**, Disruptive Technologies for Improved Groundwater Management, Mashreq Water Knowledge Series, Lebanon (virtual)

2021 **Invited Lecture**, Development Lecture Series, Austrian Foundation for Development Research (OEFSE), Vienna, Austria (virtual)

- 2022 Invited Lecture, Institut für Physische Geographie, Goethe-Universität Frankfurt, Germany
- 2022 Invited Lecture, Helmholtz Centre for Environmental Research, Leipzig, Germany

PUBLICATIONS: WEB OF KNOWLEDGE –> CITATIONS 9,462, H=55
 GOOGLE SCHOLAR –> 17,072 CITATIONS, H=70
 RESEARCH GATE –> READS 72,593 AND 14,107 CITATIONS, H=66

1. Gorelick, S.M., I. Remson, and R.W. Cottle. 1979. Management model of a groundwater system with a transient pollutant source. *Water Resources Research*. vol. 15, no. 5, p. 1243-1249.
2. Remson, I. and S.M. Gorelick. 1980. Management models incorporating groundwater variables. In: D. Yaron and C.S. Tapiero, eds., *Operations Research in Agriculture and Water Resources*. North Holland Publishing Co., Amsterdam, The Netherlands, p. 333-356.
3. Remson, I., S.M. Gorelick, and J.F. Fliegner. 1980. Computer models in groundwater exploration. *Groundwater*. vol. 18, no. 5, p. 447-451.
4. Remson, I., and S.M. Gorelick. 1982. Hydrologic issues in repository siting: In: P.L. Hofmann, ed., *The technology of high-level nuclear waste disposal: Advances in the Science and Engineering of the Management of High-level Nuclear Waste*. vol. 2, p. 46-52.
5. Remson, I., and S.M. Gorelick. 1982. Optimal location and management of waste disposal facilities affecting groundwater quality. *Water Resources Bulletin*. vol. 18, no. 1, p. 43-51.
6. Gorelick, S.M. 1982. A model for managing sources of groundwater pollution. *Water Resources Research*. vol. 18, no. 4, p. 773-781.
7. Remson, I., and S.M. Gorelick. 1982. Optimal dynamic management of groundwater pollutant sources, *Water Resources Research*. vol. 18, no. 1, p. 71-76.
8. Gorelick, S.M., and S. Gustafson. 1983. Linear models for managing sources of groundwater pollution. In: *Proceedings of the Computational Techniques and Applications Conference*, Sydney, Australia.
9. Gorelick, S.M. 1983. A review of distributed parameter groundwater management modelling methods. *Water Resources Research*. vol. 19, no. 2, p. 305-319. (Reprinted by United Nations, *Water Resources Journal*, December 1985, p. 18-32)

10. Gorelick, S.M., B.J. Evans, and I. Remson. 1983. Identifying sources of ground-water pollution: An optimization approach. *Water Resources Research*. vol. 19, no. 3, p. 779-790.
11. Gorelick, S.M., C.I. Voss, P.E. Gill, W. Murray, M.A. Saunders, and M.H. Wright. 1984. Aquifer reclamation design: The use of contaminant transport simulation combined with nonlinear programming. *Water Resources Research*. vol. 20, no. 4, p. 415-427.
12. Gorelick, S.M., B.J. Evans, and I. Remson. 1984. Comment Reply to D. A. Woolhiser on "Identifying sources of groundwater pollution: An optimization approach." *Water Resources Research*. vol. 20, no. 6, p. 745.
13. Atwood, D.F., and S.M. Gorelick. 1985. Hydraulic gradient control for groundwater contaminant removal. *Journal of Hydrology*. vol. 76, no. 1, p. 85-106.
14. Atwood, D.F., and S.M. Gorelick. 1985. Optimal hydraulic containment of contaminated groundwater. *Proceedings of the National Water Well Association 5th National Symposium on Aquifer Restoration and Groundwater Monitoring*. p. 328-344.
15. Danskin, W.R., and S.M. Gorelick. 1985. A policy evaluation tool: Management of a multi-aquifer system using controlled stream recharge. *Water Resources Research*. vol. 21, no. 11, p. 1731-1747.
16. Gorelick, S.M. 1985. Book Review: Groundwater Quality, C.A. Ward, W. Giger, and P.L. McCarty, eds. *Water Resources Bulletin*. vol. 21, no. 6, p. 1060-1067.
17. Gorelick, S.M. 1985. Contaminant transport models for groundwater quality simulation. *Keynote Paper*, International Association of Hydrogeologists 18th Congress, Hydrogeology in the Service of Man. p. 238-249.
18. Lefkoff, L.J., and S.M. Gorelick. 1985. Rapid removal of groundwater contaminant plume. In: K.D. Schmidt, ed., *Groundwater Contamination and Reclamation*. p. 125-131.
19. Rice, W., and S.M. Gorelick. 1985. Geologic inference from flow net transmissivity determination: Three case studies. *Water Resources Bulletin*. vol. 21, no. 6, p. 919-930.
20. Gorelick, S.M., and B.J. Wagner. 1986. Evaluating strategies for groundwater contaminant plume stabilization and removal. *Selected Papers in the Hydrologic Sciences*. WSP no. 2209, p. 81-89.
21. Lefkoff, L.J., and S.M. Gorelick. 1986. AQMAN: Linear and quadratic programming matrix generator using two-dimensional ground water flow simulation for aquifer management modelling. *Water Resources Investigation* 86-4016. 164 p.

22. Solow, A.R., and S.M. Gorelick. 1986. Estimating missing streamflow values by cokriging. *Mathematical Geology*. vol. 18, no. 8, p. 785-809.
23. Umari, A.M.J. and S.M. Gorelick. 1986. The problem of complex eigensystems in the semianalytic solution for advancement of time in solute transport simulations: A new method using real arithmetic. *Water Resources Research*. vol. 22, no. 7, p. 1149-1154.
24. Wagner, B.J. and S.M. Gorelick. 1986. A statistical methodology for estimating transport parameters: Theory and applications to one-dimensional advective-dispersive systems. *Water Resources Research*. vol. 22, no. 8, p. 1301-1316.
25. Lefkoff, L.J., and S.M. Gorelick. 1986. Design and cost analysis of rapid aquifer restoration systems using flow simulation and quadratic programming. *Ground Water*. vol. 25, no. 6, p. 777-790.
26. Gorelick, S.M., ed. 1986. *Conjunctive Water Use: Understanding and Managing Surface Water-Groundwater Interactions*. International Association of Hydrologic Science Press, Publication no. 156, Wallingford, UK, 547 p.
27. Umari, A.M.J. and S.M. Gorelick. 1986. Evaluation of the matrix exponential for use in ground-water-flow and solute-transport simulations: Theoretical framework. US Geological Survey. *Water Resources Investigation*. 86-4096, 33 p.
28. Gorelick, S.M. 1987. Sensitivity analysis of optimal groundwater contaminant capture curves: Spatial variability and robust solutions. Proceedings of the National Water Well Association Conference, *Solving Ground Water Problems with Models*. p. 133-146.
29. Wagner, B.J., and S.M. Gorelick. 1986. Optimal groundwater quality management under parameter uncertainty. *Water Resources Research*. vol. 23, no. 7, p. 162-1174.
30. Gorelick, S.M. 1988. A review of groundwater management models. In: G.T. O'Mara, ed., *Efficiency in Irrigation: The Conjunctive Use of Surface and Groundwater Resources*. The World Bank, Washington, D.C., p. 103-120.
31. Gorelick, S.M. 1986. Incorporating assurance into groundwater quality management models. In: E. Custodio, A. Gurgui, and L.P. Lobo Ferreira, eds., NATO ASI Series, Mathematical and Physical Sciences. *Groundwater Flow and Quality Modelling*. vol. 224, p. 135-150.
32. Gomez-Hernandez, J., and S.M. Gorelick. 1989. Effective groundwater model parameter values: Influence of spatial variability of hydraulic conductivity, leakance and recharge. *Water Resources Research*. vol. 25, no. 3, p. 405-420.

33. Greenwald, R.M., and S.M. Gorelick. 1989. Particle travel times of contaminants incorporated into a planning model for groundwater plume capture. *Journal of Hydrology*. vol. 107, p. 73-98.
34. Wagner, B.J., and S.M. Gorelick. 1989. Reliable aquifer remediation in the presence of spatially variable hydraulic conductivity: From data to design. *Water Resources Research*. vol. 25, no. 10, p. 2221-2225.
35. Gomez-Hernandez, J. and S.M. Gorelick. 1990. Reply to comment by R. Ababou and E.F. Wood on "Effective groundwater model parameter values: Influence of spatial variability of hydraulic conductivity, leakance, and recharge." *Water Resources Research*. vol. 26, no. 8, p. 1847-1848.
36. Gorelick, S.M. 1990. Large-scale nonlinear deterministic and stochastic optimization: Formulations involving simulation of subsurface contamination. *Mathematical Programming*. vol. 48, p. 19-39.
37. Lefkoff, L.J. and S.M. Gorelick. 1990. Simulating physical processes and economic behavior in saline, irrigated agriculture: Model development. *Water Resources Research*. vol. 26, no. 8, p. 1359-1369.
38. Lefkoff, L.J., and S.M. Gorelick. 1990. Benefits of an irrigation water rental market in a saline stream-aquifer system. *Water Resources Research*. vol. 26, no. 7, p. 1371-1381.
39. van Genuchten, M. Th., S.M. Gorelick, and W. W-G. Yeh. 1990. Application of parameter estimation techniques to solute transport studies. Proceedings of the International Symposium on Water Quality Modeling of Agricultural Non-Point Sources. *Agricultural Research Service, ARS-81*, p. 731-752.
40. Gvirtzman, H., and S.M. Gorelick. 1991. Dispersion and advection in unsaturated porous media enhanced by anion exclusion. *Nature*. vol. 352, p. 793-795.
41. Gailey, R.M., A.S. Crowe, and S.M. Gorelick. 1991. Coupled process parameter estimation and prediction uncertainty using hydraulic head and concentration data. *Advances in Water Resources*. vol. 14, no. 5, p. 301-314.
42. McCarty, P.L., L. Semprini, M.E. Dolan, T.C. Harmon, C. Tiedeman, and S.M. Gorelick. 1991. In-situ methanotrophic bioremediation for contaminated groundwater at St. Joseph, Michigan. *Proceedings of the International Symposium on In-situ and On-site Bioreclamation*, San Diego, California.
43. Gvirtzman, H. and S.M. Gorelick. 1992. The concept of in-situ vapor stripping for removing VOCs from groundwater. *Transport in Porous Media*. vol. 8, no. 1, p.71-92.

44. Koltermann, C., and S.M. Gorelick. 1992. Paleoclimatic signature in terrestrial flood deposits. *Science*. vol. 256, p. 1775-1782.
45. Gailey, R.M. and S.M. Gorelick. 1993. Design of optimal, reliable plume capture schemes: Application to the Gloucester landfill groundwater contamination problem. *Ground Water*. vol. 31, no. 1, p. 107-114.
46. Gvirtzman, H. and S.M. Gorelick. 1993. Using air-lift pumping as an in-situ aquifer remediation technique. *Water Science Technology*. vol. 27, no. 7-8, p. 195-201.
47. Tiedeman, C. and S.M. Gorelick. 1993. Analysis of uncertainty in optimal groundwater contaminant capture design. *Water Resources Research*. vol. 29, no. 7, p. 2139- 2153.
48. Haggerty, R. and S.M. Gorelick. 1994. Design of multiple contaminant remediation: Sensitivity to rate-limited transport. *Water Resources Research*. vol. 30, no. 2, p. 435-446.
49. Harvey, C., R. Haggerty, and S.M. Gorelick. 1994. Aquifer Remediation: A method for estimating mass transfer rate coefficients and an evaluation of pulsed pumping. *Water Resources Research*. vol. 30, no. 7, p. 1979-1991.
50. Hyndman, D.W., J.M. Harris, and S.M. Gorelick. 1994. Coupled seismic and tracer-test inversion for aquifer property characterization. *Water Resources Research*. vol. 30, no. 7, p. 1965-1977.
51. James, B. and S.M. Gorelick. 1994. When enough is enough: The worth of monitoring data in aquifer remediation design. *Water Resources Research*. vol. 30, no. 12, p. 3499-3513.
52. Bredehoeft, J.D., E.G. Reichard, and S.M. Gorelick. 1995. If it works, don't fix it: Benefits from regional groundwater management. Chapter 7, *Groundwater Models for Resources Analysis and Management*. Edited by A.I. El-Kadi, Lewis Publishers, p. 101-121.
53. Harvey, C.R. and S.M. Gorelick. 1992. Mapping hydraulic conductivity: Sequential conditioning with measurements of solute arrival time, hydraulic head, and local conductivity. *Water Resources Research*. vol. 31, no. 7, p. 1615-1626.
54. Haggerty, R. and S.M. Gorelick. 1995. Multiple-rate mass transfer for modeling diffusion and surface reactions in heterogeneous media. *Water Resources Research*. vol. 31, no. 10, p. 2383-2400.

55. Harvey, C.R. and S.M. Gorelick. 1995. Temporal moment generating equations: Modeling transport and mass-transfer in heterogeneous aquifers. *Water Resources Research*. vol. 31, no. 8, p. 1895-1911.
56. Koltermann, C. and S.M. Gorelick. 1995. The fractional packing model for hydraulic conductivity derived from sediment mixtures. *Water Resources Research*. vol. 31, no. 12, p. 3283-3297.
57. Wilson, A. and S.M. Gorelick. 1996. The effects of pulsed pumping on land subsidence in the Santa Clara Valley, California. *Journal of Hydrology*. no. 174, p. 375-396.
58. Koltermann, C. and S.M. Gorelick. 1996. Heterogeneity in sedimentary deposits: A review of structure-imitating, process-imitating, and descriptive approaches. *Water Resources Research*. vol. 32, no. 9, p. 2617-2658.
59. Francois, O., T. Gilmore, M. Pinto and S.M. Gorelick. 1996. A physically based model for air-lift pumping. *Water Resources Research*. vol. 32, no. 8, p. 2383-2399.
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