

HOLLY A. MICHAEL

Department of Geological Sciences • College of Earth, Ocean, and Environment • University of Delaware
101A Penny Hall • 255 Academy Street • Newark, DE 19716 • (302) 831-4197 • hmichael@udel.edu

EDUCATION

- Massachusetts Institute of Technology** Cambridge, MA
Ph.D., Hydrology, February 2005
Department of Civil and Environmental Engineering
- University of Notre Dame** Notre Dame, IN
B.S., Civil Engineering, Summa Cum Laude, June 1998
Department of Civil Engineering and Geological Sciences
-

EXPERIENCE

- University of Delaware** Newark, DE
Professor, Department of Earth Sciences and Civil & Environmental Engineering (September 2019-present)
Interim Director, Delaware Environmental Institute (September 2019-present)
Associate Director for Interdisciplinary Initiatives, Delaware Environmental Institute (September 2017-2019)
Associate Professor, Department of Geological Sciences (September 2014-September 2019)
Unidel Fraser Russell Career Development Chair in the Environment (September 2013-present)
Assistant Professor, Department of Geological Sciences (September 2008 – September 2014)
Joint Faculty, Department of Geography
Joint Faculty, School of Marine Science and Policy
- Flinders University** Adelaide, Australia
Visiting Professor, School of Earth Sciences (October 2014-May 2015)
- Stanford University** Stanford, CA
Postdoctoral Researcher, Departments of Geological and Environmental Sciences and Energy Resources Engineering (January 2007-August 2008)
- United States Geological Survey** Reston, VA
National Research Council Postdoctoral Research Associate (December 2004 –December 2006)
-

HONORS and AWARDS

- Geological Society of America James B. Thompson, Jr. International Distinguished Lectureship (2018)
- National Academy of Engineering Kavli Fellow (2014)
- Water Resources Research Editor's Choice Award for Heiss and Michael (2014)
- Unidel Fraser Russell Career Development Chair in the Environment, University of Delaware (2013)
- National Science Foundation CAREER Award (2012)
- National Academy of Sciences Kavli Fellow (2012)
- Distinguished Oliver Lecturer, Jackson School of Geosciences, University of Texas (2011)
- Oak Ridge Associated Universities Ralph E. Powe Junior Faculty Award (2010)
- National Research Council RAP Postdoctoral Research Fellowship (2004-2006)
- National Science Foundation Graduate Research Fellowship (1998-2002)
- Massachusetts Institute of Technology Hydrology Fellowship (2001)
- Thomas A. Steiner Prize for excellence in the Notre Dame College of Engineering (1998)
- Walter L. Shilts Award for undergraduate achievement in Civil Engineering (1998)

RESEARCH INTERESTS

- Coastal groundwater dynamics
- Submarine groundwater discharge and associated chemical fluxes
- Groundwater-surface water interaction
- Groundwater flow and solute transport modeling
- Water supply sustainability
- Water resources in developing countries
- Geostatistical modeling of subsurface heterogeneity
- Hydro-economics

PROFESSIONAL MEMBERSHIPS

- American Geophysical Union
- Geological Society of America
- International Association of Hydrogeologists
- International Association of Mathematical Geosciences
- The Geochemical Society

JOURNAL PUBLICATIONS

*corresponding author

(I am generally listed last on publications for which *students or postdocs under my direction* are first author)

Published or In Press (48)

Xiao, K*, H Li, Y Xia, AM Wilson, **HA Michael**, X Geng, E Smith, MC Boufadel, P Yuan, X Wang (2019) Effects of tidally-varying salinity on groundwater flow and salt transport: insights from modelling an idealized creek-marsh aquifer, Water Resources Research, *in press*.

Kim, KH, **HA Michael***, EK Field, WJ Ullman (2019) Hydrologic shifts create complex transient distributions of particulate organic carbon and biogeochemical responses in beach aquifers, Journal of Geophysical Research – Biogeosciences, doi:10.1029/2019JG005114.

Yu, X, **HA Michael*** (2019) Mechanisms, configuration typology, and vulnerability of pumping-induced seawater intrusion in heterogeneous aquifers, Advances in Water Resources, doi: 10.1016/j.advwatres.2019.04.013.

Yu, X, **HA Michael*** (2019) Offshore pumping impacts coastal groundwater resources and land subsidence, Geophysical Research Letters, doi:10.1029/2019GL081910. (Selected for EOS Editor's Highlight, "Pumping Offshore Groundwater Resources has Consequences on Land", M. Bayani Cardenas, 22 March, 2019).

Provost, AM*, AD Werner, VEA Post, **HA Michael**, CD Langevin (2018) Rebuttal to "The case of the Biscayne Bay and aquifer near Miami, Florida: density-driven flow of seawater or gravitationally driven discharge of deep saline groundwater?" by Weyer (Environ Earth Sci 2018, 77:1-16), Environmental Earth Sciences, 77:710, doi: 10.1007/s12665-018-7832-5.

Suter, JF*, S Collie, JM Duke, KD Messer, and **HA Michael** (2018) Common pool resource management at the extensive and intensive margins: Experimental evidence, Environmental and Resource Economics, doi: 10.1007/s10640-018-0283-3.

Russoniello, CJ, JW Heiss, **HA Michael*** (2018) Variability in benthic exchange rate, mixing zone depth, and residence time in a shallow coastal estuary, Journal of Geophysical Research – Oceans, doi: 10.1002/2017JC013568.

- Koneshloo, M**, *P Kreyns*, **HA Michael** (2018) Combining process-based and surface-based models to simulate subsurface heterogeneity in volcanic aquifers, *Stochastic Environmental Research and Risk Assessment*, doi: 10.1007/s00477-018-1511-7.
- Yang, J**, H Zhang, *X Yu*, T Graf, **HA Michael** (2018) Assessing the impact of subsurface properties on groundwater salinization due to storm surge inundation, *Advances in Water Resources*, doi: 10.1016/j.advwatres.2017.11.017.
- Geng, X*, *JW Heiss*, **HA Michael**, MC Boufadel* (2017) Subsurface flow and moisture dynamics in response to swash motions: Effects of beach hydraulic conductivity and capillarity, *Water Resources Research*, 58, 10317–10335, 10.1002/2017WR021248.
- Heiss, JW*, VEA Post, T Laattoe, *CJ Russoniello*, **HA Michael*** (2017) Physical controls on biogeochemical processes in intertidal zones of beach aquifers, *Water Resources Research*, 53(11), 9225–9244, doi: 10.1002/2017WR021110.
- Kim, KH*, *JW Heiss*, **HA Michael***, W-J Cai, VEA Post, T Laattoe, WJ Ullman (2017) Spatial patterns of porewater reactivity in an intertidal beach aquifer, *Journal of Geophysical Research – Biogeosciences*, 122 (10), 2548-2562, doi: 10.1002/2017JG003943 (Selected for EOS Research Spotlight, Underwood, E. (2017), Sandy beaches are hotbeds of biochemical activity, *Eos*, 98, doi: 10.1029/2017EO087591).
- Michael, HA***, VEA Post, AM Wilson, AD Werner (2017) Science, society, and the coastal groundwater squeeze, *Water Resources Research*, 53 (4), 2610-2617, doi: 10.1002/2017WR020851. (Part of the *Earth and Space Science* special collection, "Earth and Space Science is Essential for Society")
- Michael, HA***, *MR Khan* (2016) Impacts of physical and chemical aquifer heterogeneity on basin-scale solute transport: Vulnerability of deep groundwater to arsenic contamination in Bangladesh, *Advances in Water Resources*, 98, 147-158, doi:10.1016/j.advwatres.2016.10.010.
- Michael, HA***, *KC Scott*, *M Koneshloo*, *X Yu*, *MR Khan*, *K Li* (2016) Geologic influence on groundwater salinity drives large seawater circulation through the continental shelf, *Geophysical Research Letters*, 43, doi:10.1002/2016GL070863.
- Khan, MR*, *M Koneshloo*, PSK Knappett, KM Ahmed, BC Bostick, BJ Mailloux, A Zahid, CF Harvey, A van Geen, and **HA Michael*** (2016) Mega-city pumping and preferential flow threaten groundwater quality, *Nature Communications*, 7:12833, doi: 10.1038/ncomms12833.
- Yu, X*, J Yang, T Graf, *M Koneshloo*, MA O'Neal, **HA Michael*** (2016) Impact of topography on groundwater salinization due to ocean surge inundation, *Water Resources Research*, 52, 5794-5812, doi: 10.1002/2016WR018814. (Publication highlights: AGUuniverse 7(15), AGUuniverse 7(18). HydroGeoSphere Research Highlight: <http://www.aquanty.com/blog/2016/9/19/hgs-research-highlight-topographic-control-on-groundwater-salinization-due-to-ocean-surge-inundation>. Figure used as Cover Art)
- Knappett, PSK*, BJ Mailloux, I Choudhury, *MR Khan*, **HA Michael**, S Barua, DR Mondal, MS Steckler, H Akhter, KM Ahmed, B Bostick, CF Harvey, M Shamsudduha, I Mihajlov, MR Mozumder, and A van Geen (2016) Vulnerability of intermediate and deep low-arsenic aquifers to municipal pumping in Bangladesh, *Journal of Hydrology*, doi: 10.1016/j.jhydrol.2016.05.035.
- Sawyer, AH*, **HA Michael**, AW Schroth (2016) From soil to sea: The role of groundwater in coastal critical zone processes, *WIREs Water*, 3(5), 706–726, doi: 10.1002/wat2.1157. Figure used as Cover Art.

*Russoniello, CJ, LF Konikow, KD Kroeger, C Fernandez, AS Andres, and HA Michael** (2016) Hydrogeologic controls on groundwater discharge and nitrogen loads in a coastal watershed, Journal of Hydrology, 538, 783-793, doi:10.1016/j.jhydrol.2016.05.013.

*Heiss, JW, JA Puleo, WJ Ullman, and HA Michael** (2015) Coupled surface-subsurface hydrologic measurements reveal infiltration, recharge, and discharge dynamics across the swash zone of a sandy beach, Water Resources Research, 51, 8834-8853, doi:10.1002/2015WR017395.

McAllister, SM, JM Barnett, *JW Heiss*, AJ Findlay, DJ MacDonald, CL Dow, GW Luther III, **HA Michael**, and CS Chan* (2015) Dynamic hydrologic and biogeochemical processes drive microbially enhanced iron and sulfur cycling within the intertidal mixing zone of a beach aquifer, Limnology & Oceanography, 60 (1), 329-345, doi:10.1002/lno.10029.

*Russoniello, CJ and HA Michael** (2015) Investigation of seepage meter measurements in steady flow and wave conditions, Groundwater, 53, 959-966, doi: 10.1111/gwat.12302.

*Heiss, JW and HA Michael** (2014) Saltwater-freshwater mixing dynamics in a sandy beach aquifer on tidal, spring-neap, and seasonal cycles, Water Resources Research, 50, 6747-6766, doi: 10.1002/2014WR015574. (Selected for EOS Research Spotlight, *EOS* 96, doi:10.1029/2015EO023175, 4 February 2015; WRR Editor's Choice Award 2014)

*Li, J, HA Michael**, JM Duke, KD Messer, and JF Suter (2014) Impact of risk information in a spatially explicit groundwater environment with contamination risk: Experimental evidence, Water Resources Research, 50, 6390-6405, doi: 10.1002/2013WR015230.

*Sawyer, AH**, LA Kaplan, *O Lazareva*, and **HA Michael** (2014) Hydrologic dynamics and geochemical responses within a floodplain aquifer and hyporheic zone during Hurricane Sandy, Water Resources Research, 50, 4877-4892, doi: 10.1002/2013WR015101.

Liu, Z, KD Messer*, JM Duke, **HA Michael**, and JF Suter (2014) Strategic entry and externalities in groundwater resources: Evidence from the lab, Resource and Energy Economics, 38, 181-197, 10.1016/j.reseneeco.2014.07.002.

*Sawyer, AH**, *O Lazareva*, KD Kroeger, *K Crespo*, CS Chan, T Stieglitz, and **HA Michael** (2014) Stratigraphic controls on fluid and solute fluxes across the sediment-water interface of an estuary, Limnology & Oceanography, 59, 997-1010, doi: 10.4319/lno.2014.59.3.0997.

*Heiss, JW, WJ Ullman, and HA Michael** (2014) Swash zone moisture dynamics and unsaturated infiltration in two sandy beach aquifers, Estuarine, Coastal and Shelf Science, 143, 20-31, doi: 10.1016/j.ecss.2014.03.015.

*Khan, MR, CI Voss, W Yu, and HA Michael** (2014) Water resources management in the Ganges Basin: A comparison of three strategies for conjunctive use of groundwater and surface water, Water Resources Management, 28, 1235-1250, doi: 10.1007/s11269-014-0537-y.

Michael, HA* (2013) An arsenic forecast for China, Science, 341, 852-853, doi: 10.1126/science.1242212.

*Russoniello, CJ, C Fernandez, JF Bratton, DE Krantz, JF Banaszak, AS Andres, LF Konikow, and HA Michael** (2013) Geologic effects on groundwater salinity and discharge into an estuary, Journal of Hydrology, 498, 1-12, doi: 10.1016/j.jhydrol.2013.05.049.

Michael, HA*, *CJ Russoniello*, and *LA Byron* (2013) Global assessment of vulnerability to sea-level rise in topography-limited and recharge-limited coastal groundwater systems, *Water Resources Research*, 49, 2228–2240, doi: 10.1002/wrcr.20213.

Sahu, P*, **HA Michael**, CI Voss, and PK Sikdar (2013) Impacts on groundwater recharge areas of megacity pumping: Analysis of potential contamination of Kolkata, India, water supply, *Hydrological Sciences*, 58, 1340-1360, doi: 10.1080/02626667.2013.813946.

*Sawyer, AH**, F Shi, J Kirby, and **HA Michael** (2013) Dynamic response of surface water-groundwater exchange to currents, tides, and waves in a shallow estuary, *Journal of Geophysical Research – Oceans*, 118, 1-10, doi: 10.1002/jgrc.20154.

Konikow, LF*, *M Akhavan*, CD Langevin, **HA Michael**, and *AH Sawyer* (2013) Seawater circulation in sediments driven by interactions between seabed topography and fluid density, *Water Resources Research*, 49, 1-14, doi 10.1002/wrcr.20121.

Suter, J*, K Messer, J Duke, and **HA Michael** (2012) Behavior in a spatially-explicit groundwater resource: Evidence from the lab, *American Journal of Agricultural Economics*, 94, 1094-1112, doi: 10.1093/ajae/aas058.

Radloff, KA*, Y Zheng, **HA Michael**, M Stute, BC Bostick, I Mihajlov, M Bounds, MR Huq, I Choudhury, MW Rahman, P Schlosser, KM Ahmed, and A van Geen (2011) Arsenic migration to deep groundwater in Bangladesh influenced by adsorption and water demand, *Nature Geoscience*, 4, 793-798, doi: 10.1038/NCEO1283.

Michael, HA*, MA Charette, and CF Harvey (2011) Patterns and variability of groundwater flow and radium activity at the coast: a case study from Waquoit Bay, Massachusetts, *Marine Chemistry*, 127, 100-114, doi: 10.1016/j.marchem.2011.08.001.

Fendorf, SF*, **HA Michael**, and A van Geen (2010) Factors controlling the spatial and temporal variations of arsenic in groundwater of South and Southeast Asia, *Science*, 328, 1123-1127, doi: 10.1126/science.1172974.

Michael, HA*, H Li, A Boucher, T Sun, J Caers, and SM Gorelick (2010) Combining geologic-process models and geostatistics for conditional simulation of 3-D subsurface heterogeneity, *Water Resources Research*, 46, W05527, doi: 10.1029/2009WR008414. (Selected for EOS Research Spotlight, *EOS* 9, doi:10.1029/EO091i028p00252-05, 13 July 2010)

Burgess WG*, MA Hoque, **HA Michael**, CI Voss, GN Breit, and KM Ahmed (2010) Vulnerability of deep groundwater in the Bengal Aquifer System to contamination by arsenic, *Nature Geoscience*, 3, 83-97, doi: 10.1038/ngeo750.

Michael, HA* and CI Voss (2009) Controls on groundwater flow in the Bengal Basin of India and Bangladesh: regional modeling analysis, *Hydrogeology Journal*, 17, 1561-1577, doi:10.1007/s10040-008-0429-4.

Michael, HA* and CI Voss (2009) Estimation of regional-scale groundwater flow properties in the Bengal Basin of India and Bangladesh, *Hydrogeology Journal*, 17, 1329-1346, doi:10.1007/s10040-009-0443-1.

Michael, HA* and CI Voss (2008) Evaluation of the sustainability of deep groundwater as an arsenic-safe resource in the Bengal Basin, *Proceedings of the National Academy of Sciences*, 105, 8531-8536, doi: 10.1073/pnas.0710477105. (Selected for PNAS 'In This Issue' and Nature Research Highlight, *Nature*, 453, 19 June, 2008).

Harvey, CF*, AN Khandaker, W Yu, ABM Badruzzaman, MA Ali, PM Oates, **HA Michael**, RB Neumann, R Beckie, S Islam, and MF Ahmed (2006) Groundwater dynamics and arsenic contamination in Bangladesh, Chemical Geology, 228, 112-136, doi: 10.1016/j.chemgeo.2005.11.025.

Michael, HA, AE Mulligan, and CF Harvey* (2005) Seasonal oscillations in water exchange between aquifers and the coastal ocean, Nature, 436, 1145-1148, doi: 10.1038/nature03935.

Michael, HA, JS Lubetsky, and CF Harvey* (2003) Characterizing submarine groundwater discharge: a seepage meter study in Waquoit Bay, Massachusetts, Geophysical Research Letters, 30, 1297, doi: 10.1029/2002GL016000.

REFEREED CONFERENCE PROCEEDINGS AND REPORTS

Andres, AS, **HA Michael**, *CJ Russoniello*, *C Fernandez*, C He, and J Madsen (2017) Investigation of submarine groundwater discharge at Holts Landing State Park, Delaware: Hydrogeologic framework, groundwater level and salinity observations, Delaware Geological Survey Report of Investigations 80, 37 pp.

Cross, VA, JF Bratton, **HA Michael**, KD Kroeger, A Green, and E Bergeron (2013) Continuous resistivity profiling and seismic-reflection data collected in April 2010 from Indian River Bay, Delaware, US Geological Survey Open-File Report 2011-1039, 23 p., <http://dx.doi.org/10.3133/ofr20111039>.

Yu, W, CI Voss, **HA Michael**, KM Ahmed, L Feinson, *MR. Khan*, and A Tuinhof (2010) Implications of climate change on fresh groundwater resources in coastal aquifers in Bangladesh, Report of the World Bank, South Asia Reg., 2010, 105 pp.

Michael, HA, H Li, T Li, A Boucher, SM Gorelick, and J Caers (2008) Combining methods for geologically-realistic reservoir simulation, In: Proceedings of the Eighth International Geostatistics Congress, JM Ortiz and X Emery (eds.), Gecamin Ltd., Santiago, 1167-1172.

OTHER CONTRIBUTIONS

Messer, K, and HA Michael, Opinion: To stop trashing of Delaware's water supply, we must work together, *Delaware News Journal*, January 10, 2019.

SPONSORED RESEARCH and EDUCATION

Measurements and Modeling to Improve Prediction of Vulnerability of Coastal Water Resources and Ecosystems to Salinization by Storm Surges and Sea-Level Rise, **NIWR/USGS National Competitive Grant Program**, (2018DE01G, 9/1/18-8/31/21), Lead PI H Michael, Co-PIs X Yu (UD) and G Carleton (USGS).

Convergence: RAISE Nearshore Water-Land Interface During Extreme Storms, **National Science Foundation Physical Oceanography and Hydrologic Sciences** (OCE184865, 9/15/18-8/31/21) Lead PI B Raubenheimer (WHOI), PIs Steve Elgar (WHOI), H Michael, QJ Chen (Northeastern), L Moore (UNC-Chapel Hill), N Stark (Virginia Tech).

Connecting Hydrology, Biology, and Geochemistry in a Coastal Wetland: Feedbacks between Ecosystem Processes toward Predictive Understanding, **National Science Foundation Hydrologic Sciences** (EAR1759879, 8/1/18-7/31/20), Lead PI H Michael, PI A Seyfferth (UD).

RII Track-1: Water Security in Delaware's Changing Coastal Environment, **National Science Foundation EPSCoR Research Infrastructure Improvement and the State of Delaware** (OIA1757353, 10/1/18-9/31/23), Lead PI K Messer, PI and Research Lead, H Michael, PIs V Kalavacharla, D Sparks, M D'Souza.

Characterizing global variability in groundwater arsenic, **USGS Powell Center** (10/1/18-7/31/20), PI B Bostick (Lamont-Doherty Earth Observatory), Co-PIs M Stahl (Union College), C Voss (USGS), H Michael.

Water Sustainability Challenges Graduate Student Symposia, **University of Delaware Office of Graduate and Professional Education Grand Challenges** (2/1/18-6/15/19), PI H Michael, PIs J Miller, DL Sparks, D Vlachos, Y Yan, S Inamdar, S Ali, K Messer, Y Chin, A Razdan, S Freilich (UD), D Arscott (Stroud Water Research Center), T Keyser, Ed Hale (Delaware Department of Natural Resources and Environmental Control).

Using surface information for quantitative modeling of the subsurface, **National Science Foundation Hydrologic Sciences** (EAR1719638, 9/1/17-8/31/20), Lead PI P Passalacqua (University of Texas), PIs H Michael and C Paola (University of Minnesota).

CNH: Competing demands and future vulnerability of groundwater: Drinking water quality and food security in arsenic-impacted South and Southeast Asia, **National Science Foundation Coupled Natural Human Systems** (ICER1414131, 9/1/14-8/31/19), PI A van Geen (Columbia University), co-PIs B Bostick, W Schlenker, P Schlosser (Columbia University), C Harvey (MIT), H Michael (UD), J Duxbury (Cornell University).

Delaware EPSCoR: Meeting Delaware's 21st Century Water and Energy Challenges through Research, Education, and Innovation, **National Science Foundation EPSCoR RII and the State of Delaware** (EAR1301765, 6/1/2013-5/31/2018), Lead PI D Sparks, H Michael co-lead Research Theme 1.

Hydrological control of particle entrainment and nitrogen cycling in beach aquifer mixing and reaction zones, **National Science Foundation Hydrologic Sciences** (EAR1246554, 1/1/2013-12/31/15). Lead PI H Michael, PI W Ullman

CAREER: Quantitative education and analysis toward integrating scales of water exchange between land and sea, **National Science Foundation Hydrologic Sciences** (EAR1151733, 9/1/2012 – 8/31/2017). PI H Michael

WSC Category 1 Water Sustainability in Coastal Environments: Exploratory Research for an Integrated Study of the Effect of Anticipated Sea Level Rise on Contaminated Site Risk, **National Science Foundation Water Sustainability and Climate** (SES1204672, 8/1/2012-7/31/2013). Lead PI J Duke, PIs D Sparks, H Michael, K Messer (U Delaware)

Health Effects and Geochemistry of Arsenic and Manganese, **NIEHS Superfund Research Program** (4/1/2012-3/31/2017), Lead PIs J Graziano and L van Geen (Columbia University), H Michael co-PI on Hydrogeology Core D

Microbial Fe oxidation and carbon cycling in aquifers of the Christina River Critical Zone Observatory, **Delaware EPSCoR Seed Grant** (2/1/12 – 1/31/13), Lead PI C Chan (U. Delaware), PI H Michael

An experimental economics investigation of groundwater resource dynamics, **National Science Foundation Decision, Risk, and Management Science**, co-supported by **Hydrologic Sciences**, Environment, Society, and the Economy (ESE) (SES1024889, 9/1/2010 – 8/31/2013), Lead PI J Suter (Oberlin College) PIs K Messer, J Duke, and H Michael (U Delaware)

Quantifying Temporal and Geologic Controls on Water and Chemical Exchange between Groundwater and Surface Water in Coastal Estuarine Systems, **National Science Foundation Hydrologic Sciences** (EAR0910756, 10/1/2009-9/30/2013), Lead PI H Michael, PIs J Bratton and L Konikow (USGS), AS Andres (Delaware Geological Survey), D Krantz (University of Toledo)

CZO: Spatial and temporal integration of carbon and mineral fluxes: a whole watershed approach to quantifying anthropogenic modification of critical zone carbon sequestration, **National Science Foundation** (NSF0724971, 10/1/2009-9/30/2014), funded Collaborator with Lead PI Donald Sparks and PIs K Yoo, J Pizzuto (U Delaware), L Kaplan, A Aufdenkampe (Stroud Water Research Center)

Improving groundwater modeling in the Bengal Basin aquifer to support local and Transboundary water-resources management in the lower Ganges River, **The World Bank** (8/1/2010-4/30/2012), PIs H Michael and C Voss (USGS)

Investigation of tidal effects on nitrogen chemistry in subsurface mixing zones of coastal estuaries, **Oak Ridge Associated Universities Ralph E. Powe Junior Faculty Award** (6/1/2010-5/31/2011), PI H Michael

Recovering uncompromised samples of aquifer sands with in-situ groundwater from up to 300-m depth in South and Southeast Asia, **International Continental Scientific Drilling Program**, one of 10 lead proponents on a workshop proposal with lead PI A Van Geen (Columbia University)

Fluid and fine-grained particle dynamics in the variably-saturated zone of sandy estuarine beachfaces, **Delaware EPSCoR Seed Grant** (2/1/2009 – 1/31/2011), Lead PI H Michael, PI W Ullman (U. Delaware)

Modeling dynamic effects of climate change on coastal groundwater systems, **University of Delaware Research Foundation** (6/1/2008 – 12/31/2009), PI H Michael

Climate change implications on salt-water intrusion and groundwater resources in coastal aquifer systems in Bangladesh, **The World Bank** (4/1/2008 – 12/31/2009), PIs H Michael and C Voss (USGS)

Support for collaboration on groundwater modeling in Bangladesh and India and a MODFLOW workshop, **UNICEF** (2005-2006), PIs H Michael and C Voss (USGS)

Support for collaboration on groundwater modeling in Bangladesh and India and a MODFLOW workshop, **Department for International Development, UK** (2005), PIs H Michael and C Voss (USGS)

CONFERENCE SESSIONS ORGANIZED

E Tran, C Bandaragoda, AN Flores, **HA Michael**, Advancing Diversity, Equity, and Inclusion in the Hydrologic Sciences: Where Do We Want to Be and How Do We Get There?, American Geophysical Union Fall Meeting, Washington, DC, December 9-13, 2019.

HA Michael, KC Carroll, C Hatch, JL Druhan, Advances, breakthroughs, and challenges in hydrogeologic sciences, American Geophysical Union Fall Meeting, Washington, DC, December 9-13, 2019.

HA Michael, C Hatch, KC Carroll, Advances, breakthroughs, and challenges in hydrogeologic sciences, American Geophysical Union Fall Meeting, Washington, DC, December 10-14, 2018.

HA Michael, C Hatch, Advances, breakthroughs, and challenges in hydrogeologic sciences, American Geophysical Union Fall Meeting, New Orleans, LA, December 11-15, 2017.

Carroll, K, **HA Michael**, P Mishra, B Malama, Recent advances in groundwater hydrology, American Geophysical Union Fall Meeting, San Francisco, CA, December 12-16, 2016.

HA Michael, K Carroll, C Brown, Water resources, climate change, and sustainability, American Geophysical Union Fall Meeting, San Francisco, CA, December 14-18, 2015.

Carroll, K, **HA Michael**, P Mishra, B Malama, Advances and breakthroughs in Hydrogeology, American Geophysical Union Fall Meeting, San Francisco, CA, December 14-18, 2015.

Sanford, W, **HA Michael**, C Welty, Delivery of nutrients and contaminants by groundwater to estuaries and their watersheds, Geological Society of America Annual Meeting, Baltimore, MD, November 1-4, 2015.

Custodio, E, A Jeuken, SA Khan, **HA Michael**, G Oude Essink, Fresh Water Management, Deltas in Times of Climate Change II, Rotterdam, The Netherlands, September 24-26, 2014 (invited).

Michael, **HA**, KB Moffett, AH Sawyer, and T Bianchi, Hydrologic controls on biogeochemical and ecosystem processes at the land-sea interface, American Geophysical Union Fall Meeting, San Francisco, CA, December 9-13, 2013.

Bhattacharya, P, A Mukherjee, DK Nordstrom, **HA Michael** and J Bundschuh, Recent Advances in Studies of Dissolved Arsenic and Other Metals in Global Hydrologic Systems, Geological Society of America Annual Meeting, Minneapolis, MN, October 9 - 12, 2011.

Andres, AS and **HA Michael**, Submarine Discharge of Groundwater and Nutrients into Estuaries and the Ocean, National Ground Water Association Ground Water Summit, Baltimore, MD, May 1-5, 2011.

Zheng, Y, and **HA Michael**, Sustainable Management of Safe Aquifers in Areas Affected by High Arsenic, Goldschmidt Conference on Earth, Energy, and the Environment, Knoxville, TN, June 13-18, 2010.

INVITED ABSTRACTS

*presenting author

HA Michael*, *M Khan*, CI Voss, CF Harvey, A van Geen, PSK Knappett, Vulnerability to groundwater arsenic in the Bengal Basin: The interplay between dense populations, geologic complexity, and large-scale geogenic contamination, American Geophysical Union Fall Meeting, San Francisco, CA, December 9-13, 2019. (Invited)

HA Michael*, *KH Kim*, WJ Ullman, CS Chan, S McAllister, Dynamic hydrologic and biogeochemical hotspots along coastlines as potential targets for biogeophysical investigation, , American Geophysical Union Fall Meeting, San Francisco, CA, December 9-13, 2019. (Invited)

Michael, **HA***, *X Yu*, Extending coastal hydrogeology from onshore to offshore: Geologic and hydrologic connections through the continental shelf, Geological Society of America Annual Meeting, Phoenix, AZ, September 25, 2019. (Invited)

Michael, **HA***, *Z Xu*, J Hariharan, P Passalacqua, C Paola, E Steel, MC Perignon, Surface to subsurface connectivity in river deltas: From depositional processes to preferential groundwater flow, American Geophysical Union Fall Meeting, Washington, DC, December 10-14, 2018. (Invited)

Michael, **HA*** Climate, Population, and the Squeeze on Coastal Groundwater, Symposium on Water Sustainability, Hohai University, Nanjing, China, October 20-22, 2018. (Keynote)

Michael, **HA***, Vulnerability of coastal aquifers to salinization by seawater: Influence of sea-level rise, storm surges, and geologic structure, Indo-US Bilateral Workshop on Coastal Groundwater Dynamics Combining Future Climate Change and Human Development, Pondicherry University, India, June 7-9, 2018. (Invited)

Michael, HA*, *KH Kim, JA Guimond, JW Heiss, WJ Ullman, A Seyfferth*, Hydrologic influence on redox dynamics in estuarine environments, American Geophysical Union Fall Meeting, New Orleans, LA, December 11-15, 2017. (Invited)

Michael, HA*, *C Duque, X Geng, J Guimond, JW Heiss, KH Kim, M Koneshloo, P Kreyns, CJ Russoniello, KC Scott, X Yu*, Submarine groundwater discharge across scales from marsh to shelf, Geological Society of America Annual Meeting, Seattle, WA, October 22-25, 2017. (Invited)

Michael, HA*, *KC Scott, X Yu, MR Khan, M Koneshloo*, Continental shelf-scale aquifer-ocean interactions: The impact of geological heterogeneity, Australasian Groundwater Conference, Sydney, Australia, July 11-13th, 2017. (Keynote)

Michael, HA*, *C Duque, JW Heiss, KH Kim, KC Scott, CJ Russoniello, TW Brooks, WJ Ullman*, Physical-biogeochemical linkages controlling land-sea solute fluxes from beach to shelf, American Society of Limnology and Oceanography Meeting, Honolulu, Hawaii, February 26-March 3, 2017. (Invited)

Michael, HA*, *X Yu, J LeMonte, DL Sparks, KH Kim, J Heiss, WJ Ullman, J Guimond, A Seyfferth*, Geochemical response to hydrologic change along land-sea interfaces, American Geophysical Union Fall Meeting, San Francisco, CA, December 12-16, 2016. (Invited)

Michael, HA*, *J Heiss, KH Kim, WJ Ullman, CJ Russoniello, C Duque, TW Brooks*, The influence of groundwater flowpaths and mixing on nutrient fluxes to estuaries and the ocean, Geological Society of America Annual Meeting, Denver, CO, September 25-28, 2016. (Invited)

Michael, HA*, The influence of geologic heterogeneity on large-scale groundwater flow and solute transport: Continental shelves and mega-cities, Gordon Research Conference on Flow and Transport in Permeable Media, Girona, Spain, July 31-August 5, 2016. (Invited)

Michael, HA*, *KC Scott, M Koneshloo, MR Khan*, Geological Influence on Salinity Distributions and Submarine Groundwater Discharge on the Continental Shelf, 24th Salt Water Intrusion Meeting, Cairns, Australia, July 4-8, 2016 (Keynote).

Michael, HA*, *KC Scott, M Koneshloo, MR Khan, K Li*, The influence of geologic heterogeneity on groundwater salinity and aquifer-ocean exchange along the continental shelf, American Geophysical Union Fall Meeting, San Francisco, CA, December 14-18, 2015. (Invited)

Vargas, R*, **HA Michael**, *Z Sanchez, A Seyfferth*, Ecohydrology of greenhouse gas fluxes in a temperate estuary, American Geophysical Union Fall Meeting, San Francisco, CA, December 15-19, 2014. (Invited)

*AH Sawyer**, *O Lazareva, CS Chan, K Crespo, TC Stieglitz, HA Michael*, Shallow stratigraphic controls on fluid and solute fluxes across the sediment-water interface of an estuary, American Geophysical Union Fall Meeting, San Francisco, CA, December 9-13, 2013. (Invited)

Michael, HA*, *LA Byron, LS Feinson, CI Voss, CJ Russoniello*, Vulnerability of topography-limited and recharge-limited groundwater systems to sea-level rise-induced salinization, American Geophysical Union Fall Meeting, San Francisco, CA, December 7, 2012. (Invited)

*Sawyer, AH**, *F Shi, JT Kirby, HA Michael*, Dynamic response of surface water-groundwater exchange to currents, tides, and waves in a shallow estuary, American Geophysical Union Fall Meeting, San Francisco, CA, December 7, 2012. (Invited)

Michael, HA *, Impacts of small-scale geologic heterogeneity on large-scale groundwater flow: Implications for sustainable arsenic-safe water supply in the Bengal Basin, The Geological Society of London, Water Futures Conference, London, England, March 6-7, 2012. (Invited)

Michael, HA *, Transport of Solutes through Hydraulically and Chemically Heterogeneous Sediments of the Bengal Basin, Goldschmidt Conference, Prague, Czech Republic, August 14-19, 2011. (Keynote)

Michael, HA *, CI Voss, KA Radloff, and Y Zheng, Assessment of the physical and chemical sustainability of deep, low-arsenic groundwater in the Bengal Basin: Regional- and local-scale considerations, American Geophysical Union Fall Meeting, San Francisco, CA, December 13-17, 2010. (Invited)

Michael, HA *, CI Voss, KA Radloff, and Y Zheng, Evaluation of water supply sustainability in the Bengal Basin through regional modeling of flow patterns and arsenic sorption, Geological Society of America Annual Meeting, Denver, CO, October 31 - November 3, 2010. (Invited)

Michael, HA * and CI Voss, Regional modeling of groundwater flow and arsenic transport in the Bengal Basin: challenges of scale and complexity, American Geophysical Union Fall Meeting, San Francisco, CA, December 14, 2009. (Invited)

Michael, HA * and CI Voss, Is deep groundwater a sustainable source of arsenic-safe water in the Bengal Basin? Management insights from a regional modeling analysis, AGU Chapman Conference on arsenic in groundwater of southern Asia, Siem Reap, Cambodia, March 24-27, 2009. (Invited)

Michael, HA *, Driving Mechanisms of Submarine Groundwater Discharge: Review of Recent Advancements and Observations in a Cape Cod Estuary, Geological Society of America Annual Meeting, Houston, TX, October 5-9, 2008. (Invited)

CONTRIBUTED ABSTRACTS (last 5 years)

*presenting author

2019 *Dominguez, JP**, **HA Michael**, A Meglioli, Groundwater modeling in the high Andes of Argentina: resource assessment and potential impacts, American Geophysical Union Fall Meeting, San Francisco, CA, December 9-13, 2019.

*J Guimond**, *X Yu*, **HA Michael**, Using hydrological-biogeochemical linkages to elucidate carbon dynamics in coastal wetlands subject to relative sea-level rise, American Geophysical Union Fall Meeting, San Francisco, CA, December 9-13, 2019.

*R Frederiks**, **HA Michael**, J Raphael, Quantifying vulnerability to storm surge induced saltwater intrusion in Atlantic coastal aquifers, American Geophysical Union Fall Meeting, San Francisco, CA, December 9-13, 2019.

*C Peters**, **HA Michael**, F Ahsanuzzaman, *M Hingst*, L Palm-Forster, Feedbacks Between Groundwater Pumping Decisions and Salinization Risks in Coastal Aquifers, American Geophysical Union Fall Meeting, San Francisco, CA, December 9-13, 2019.

*MR Khan**, **HA Michael**, B Nath, B Huhmann, CF Harvey, A Mukherjee, M Chakraborty, I Choudhury, MS Ullah, KM Ahmed, SL Goodbred, P Schlowwer, BC Bostick, BJ Mailloux, T Ellis, A van Geen, Arsenic-contaminated deep groundwater in the Bengal Basin: origin and implications for mitigation, San Francisco, CA, December 9-13, 2019.

Y Huang*, PSK Knappett, N Dimova, A Hossain, K Rhodes, M Lipsi, Z Nichols, I Choudhury, S Datta, MB Cardenas, KM Ahmed, **HA Michael**, RH Mozumder, A van Geen, Quantifying the timing

and source of baseflow into the tidally fluctuating Meghna River, Bangladesh, American Geophysical Union Fall Meeting, San Francisco, CA, December 9-13, 2019.

*M Hingst**, R McQuiggan, AS Andres, *C Peters*, **HA Michael**, 'A-Salt' on Delaware Farmland: Investigation of Pathways and Dynamics of Saltwater Intrusion near Dover, American Geophysical Union Fall Meeting, San Francisco, CA, December 9-13, 2019.

*Xu, Z**, J Hariharan, P Passalacqua, E Steel, C Paola, **HA Michael**, Contaminant transport in deltaic aquifers: The impact of surface-to-subsurface connectivity, American Geophysical Union Fall Meeting, San Francisco, CA, December 9-13, 2019.

E Steel, C Paola, P Passalacqua, **HA Michael**, J Hariharan, Z Xu, Linking surface dynamics to the subsurface record: the effectiveness of overhead imagery in quantifying depositional architecture, American Geophysical Union Fall Meeting, San Francisco, CA, December 9-13, 2019.

Yu, X, **HA Michael***, Offshore pumping impacts onshore groundwater resources and land subsidence, International Association of Mathematical Geologists Conference, State College, PA, August 12-15, 2019.

*Yu, X**, **HA Michael**, Mechanisms, classification, and vulnerability of pumping-induced seawater intrusion in heterogeneous aquifers, 16th Annual Meeting of Asia Oceania Geosciences Society, July 28 – August 2, 2019.

*Yu, X**, **HA Michael**, Mechanisms, classification, and vulnerability of pumping-induced seawater intrusion in heterogeneous aquifers, International Union of Geodesy and Geophysics General Assembly, Montreal, Canada, July 8-18, 2019.

*Guimond, JA**, **HA Michael**, Marsh crab impacts on hydrology and biogeochemistry alter coastal carbon cycling, Fourth Xiamen Symposium on Marine Environmental Sciences, Xiamen, China, January 6-9, 2019.

*Kim, KH**, **HA Michael**, WJ Ullman, Spatiotemporal variability of chemical reactions in a beach aquifer, Fourth Xiamen Symposium on Marine Environmental Sciences, Xiamen, China, January 6-9, 2019.

2018 *Kim, KH**, **HA Michael**, WJ Ullman, Short-timescale variability in redox conditions of a coastal aquifer, American Geophysical Union Fall Meeting, Washington, DC, December 10-14, 2018.

*Xu, Z**, **HA Michael**, J Hariharan, P Passalacqua, C Paola, MC Perignon, E Steel, Relations between static and dynamic connectivity in a deltaic aquifer, American Geophysical Union Fall Meeting, Washington, DC, December 10-14, 2018.

*Guimond, JA**, **HA Michael**, Marsh crab impacts on hydrology and biogeochemistry alter coastal carbon cycling, American Geophysical Union Fall Meeting, Washington, DC, December 10-14, 2018.

*Geng, X**, **HA Michael**, Lateral movement of groundwater and its effects on seawater-groundwater interactions in coastal volcanic aquifers, American Geophysical Union Fall Meeting, Washington, DC, December 10-14, 2018.

Hariharan, J*, MC Perignon, P Passalacqua, Z Xu, **HA Michael**, C Paola, E Steel, Quantifying connectivity between the surface and subsurface in numerically modeled deltas, American Geophysical Union Fall Meeting, Washington, DC, December 10-14, 2018.

Loheide, SP*, DM Ciruzzi, C Lowry, C Tague, **HA Michael**, DW Hyndman, AD Kendall, S Tyler, M Thompson, E Tran, CUAHSI Virtual University: An inter-institutional framework for graduate education applied to the hydrologic sciences, American Geophysical Union Fall Meeting, Washington, DC, December 10-14, 2018.

Steel, E*, C Paola, P Passalacqua, **HA Michael**, Surface to subsurface connectivity in River Deltas: Building stratigraphy from limited surface information, American Geophysical Union Fall Meeting, Washington, DC, December 10-14, 2018.

Mozumder, RH*, **HA Michael**, I Mihajlov, MR Khan, I Choudhury, BJ Mailloux, BC Bostick, P Knappett, P Schlosser, TNB Koffmann, T Ellis, KM Ahmed, A van Geen, American Geophysical Union Fall Meeting, Washington, DC, December 10-14, 2018.

Heiss, J, **HA Michael**, M Koneshloo, Aquifer heterogeneity forms denitrification hotspots and increases reactivity in intertidal sediments, American Geophysical Union Fall Meeting, Washington, DC, December 10-14, 2018.

Michael, HA*, Vulnerability of coastal aquifers to salinization by seawater: Influence of sea-level rise, storm surges, and geologic structure, Geological Society of America Annual Meeting, Indianapolis, IN, November 4-7, 2018.

Van Geen, A*, RH Mozumder, B Bostick, B Mailloux, P Schlosser, CF Harvey, **HA Michael**, MR Khan, I Choudhury, KM Ahmed, How Earth processes can poison millions but also provide a solution: the case of well-water arsenic in South Asia, Geological Society of America Annual Meeting, Indianapolis, IN, November 4-7, 2018.

*Yu, X, HA Michael**, Effects of offshore pumping on groundwater resources in coastal aquifers, 25th Salt Water Intrusion Meeting, Gdansk, Poland, June 17-22, 2018.

Duque, C, HA Michael*, The subterranean estuary: Descriptive term or confusing jargon?, 25th Salt Water Intrusion Meeting, Gdansk, Poland, June 17-22, 2018.

*Duque, C**, S Jenssen, TW Brooks, *CJ Russoniello*, P Engesgaard, **HA Michael**, Hydrogeological flow paths in coastal areas: A dismissed factor for the delivery of nutrients?, 25th Salt Water Intrusion Meeting, Gdansk, Poland, June 17-22, 2018.

Kiro, Y*, **HA Michael**, *C Duque*, Y Yechieli, Estimating the potential role of long-term seawater circulation in aquifers in ocean chemistry, European Geophysical Union Meeting, Vienna, Austria, April 8-13, 2018.

2017 Guimond, J*, A Seyfferth, **HA Michael**, Hydrologically mediated iron reduction/oxidation fluctuations and dissolved organic carbon exports in tidal wetlands, American Geophysical Union Fall Meeting, New Orleans, LA, December 11-15, 2017.

Geng, X, P Kreyns, M Koneshloo, HA Michael*, Impacts of preferential flow on coastal groundwater-surface water interactions: The heterogeneous volcanic aquifer of Hawaii, American Geophysical Union Fall Meeting, New Orleans, LA, December 11-15, 2017.

*Kim, KH**, **HA Michael**, W-J Cai, WJ Ullman, Spatial distributions of biogeochemical reactions in freshwater-saltwater mixing zones of sandy beach aquifers, American Geophysical Union Fall Meeting, New Orleans, LA, December 11-15, 2017.

Harvey, CF*, **HA Michael**, What drives saline circulation cells in coastal aquifers? An energy balance for density-driven groundwater systems, American Geophysical Union Fall Meeting, New Orleans, LA, December 11-15, 2017.

Tan, F*, K Yoo, P Imhoff, **HA Michael**, The impact of organo-mineral complexation on mineral weathering in the soil zone under unsaturated conditions, American Geophysical Union Fall Meeting, New Orleans, LA, December 11-15, 2017.

Russoniello, CJ*, JW Heiss, **HA Michael**, Variability in benthic exchange rate, depth, and residence time beneath a shallow coastal estuary, American Geophysical Union Fall Meeting, New Orleans, LA, December 11-15, 2017.

Yu, X*, **HA Michael**, Impact of heterogeneity on groundwater salinization due to coastal pumping, American Geophysical Union Fall Meeting, New Orleans, LA, December 11-15, 2017.

Guimond, J*, **HA Michael**, Spatial and temporal impacts of crab burrows on groundwater-surface water interactions and redox conditions in a tidal wetland, Geological Society of America Annual Meeting, Seattle, WA, October 22-25, 2017.

Kim, KH*, **HA Michael**, W-J Cai, WJ Ullman, Dynamic migration of biogeochemical reaction zones in an intertidal beach aquifer, Geological Society of America Annual Meeting, Seattle, WA, October 22-25, 2017.

Russoniello, CJ*, **HA Michael**, Spatial and temporal variability of global wave pumping, Geological Society of America Annual Meeting, Seattle, WA, October 22-25, 2017.

Kiro, Y*, **HA Michael**, C Duque, Y Yechieli, Identifying long-term seawater circulation in coastal aquifers and its potential role in ocean chemistry, Geological Society of America Annual Meeting, Seattle, WA, October 22-25, 2017.

Field, EK*, KL Hoppes, KH Kim, **HA Michael**, TE Hanson, CS Chan, The microbial role in nutrient cycling in a dynamic coastal aquifer system, Goldschmidt Conference, Paris, France, August 13-18, 2017.

2016 Guimond, J*, X Yu, C Duque, C Medlock, S Gangrade, **HA Michael**, Spatial patterns in salt marsh porewater dissolved organic matter over a spring-neap tidal cycle: insight to the impact of hydrodynamics on lateral carbon fluxes, American Geophysical Union Fall Meeting, San Francisco, CA, December 12-16, 2016.

Stuckey, J*, JJ LeMonte, X Yu, M Schaefer, BD Kocar, SG Benner, J Rinklebe, R Tappero, HA Michael, SE Fendorf, DL Sparks, **HA Michael**, Hydrologically Controlled Arsenic Release in Deltaic Wetlands and Coastal Riparian Zones, American Geophysical Union Fall Meeting, San Francisco, CA, December 12-16, 2016.

Passalacqua, P*, C Paola, **HA Michael**, Linking Delta Surface Patterns and Subsurface Architecture, American Geophysical Union Fall Meeting, San Francisco, CA, December 12-16, 2016.

Yu, X*, JJ LeMonte, DL Sparks, JG Cargill, CJ Russoniello, **HA Michael**, Hydrologic control on arsenic cycling due to tidal fluctuation, American Chemical Society, Philadelphia, PA, August 21-25, 2016.

Field, EK*, KL Hoppes, *KHK Kim*, **HA Michael**, TE Hanson, CS Chan, Just another day at the beach? The microbial role in iron and sulfur cycling in a beach aquifer system, International Society for Microbial Ecology, Montreal, CA, August 21-26, 2016.

*Duque, C**, *CJ Russoniello*, *TW Brooks*, **HA Michael**, Spatial variability of submarine groundwater discharge: Field experiments and numerical modelling, CUAHSI Biennial Meeting, Shepherdstown, WV, July 24-27, 2016.

*Medlock, C**, *J Guimond*, **HA Michael**, *S Gengrade*, Assessing spatial variations in pore water salinity across a tidal salt marsh: Insights into groundwater-surface water interactions, CUAHSI Biennial Meeting, Shepherdstown, WV, July 24-27, 2016.

*Kim, KHK**, **HA Michael**, WJ Ullman, Spatial patterns of aerobic respiration in an intertidal beach aquifer, CUAHSI Biennial Meeting, Shepherdstown, WV, July 24-27, 2016.

*Yu, X**, **HA Michael**, Big data and models for coastal communities, CUAHSI Biennial Meeting, Shepherdstown, WV, July 24-27, 2016.

*Brown, R**, *C Duque*, *CJ Russoniello*, M Sherif, UA Risha, K Knee, NC Sturchio, **HA Michael**, Assessing methods for studying submarine groundwater discharge: pre-filling of bags in seepage meters, tidal impact over measured fluxes, and use of radon, CUAHSI Biennial Meeting, Shepherdstown, WV, July 24-27, 2016.

2015 *Khan, MR**, **HA Michael**, Vulnerability of deep groundwater in the Bengal Basin to contamination: the role of physical and chemical aquifer heterogeneity and pumping, American Geophysical Union Fall Meeting, San Francisco, CA, December 14-18, 2015.

Shuai, P, A Hossain, K Rhodes, PSK. Knappett, N Dimova, MB Cardenas, KM Ahmed, **HA Michael**, R Mozumder, A van Geen, Modeling arsenic mobilization in a riverbank aquifer under the influence of tidally fluctuating river and irrigation pumping, American Geophysical Union Fall Meeting, San Francisco, CA, December 14-18, 2015.

*Heiss, JW**, JA Puleo, WJ Ullman, **HA Michael**, Temporal and spatial variability of sediment saturation and patterns of groundwater-surface water exchange in the intertidal zone at swash and tidal time scales, American Geophysical Union Fall Meeting, San Francisco, CA, December 14-18, 2015.

*Yu, X**, J Yang, T Graf, *M Koneshloo*, **HA Michael**, Assessing the impact of topography on groundwater salinization due to storm surge inundation, American Geophysical Union Fall Meeting, San Francisco, CA, December 14-18, 2015.

*Russoniello, CJ**, LF Konikow, **HA Michael**, Estimating groundwater transit times through a coastal aquifer using MODPATH, Geological Society of America Annual Meeting, Baltimore, MD, November 1-4, 2015.

*Yu, X**, JJ LeMonte, DL Sparks, JG Cargill, **HA Michael**, Potential impacts of sea-level rise on contaminant mobility and groundwater pollution, Geological Society of America Annual Meeting, Baltimore, MD, November 1-4, 2015.

*Heiss, JW**, **HA Michael**, The effects of transient oceanic and terrestrial forcing and beach topography on flow and solute transport in coastal aquifers, Geological Society of America Annual Meeting, Baltimore, MD, November 1-4, 2015.

*Koneshloo, M**, *KC Scott*, **HA Michael**, Which connectivity metrics can be used to predict salinity patterns in heterogeneous coastal aquifers?, Geological Society of America Annual Meeting, Baltimore, MD, November 1-4, 2015.

*Kim, KH**, **HA Michael**, WJ Ullman, Sediment and porewater oxygen demand in a sandy beach aquifer, Cape Henlopen, Delaware, Geological Society of America Annual Meeting, Baltimore, MD, November 1-4, 2015.

*Khan, MR**, B Nath, B Huhmann, I Choudhury, M Chakraborty, A Mukherjee, KM Ahmed, CF Harvey, A van Geen, **HA Michael**, Origin of arsenic-rich, young groundwater in deep tubewells in the central southwestern Bengal Basin, Geological Society of America Annual Meeting, Baltimore, MD, November 1-4, 2015.

Nath, B*, *MR Khan*, B Huhmann, I Choudhury, T Ellis, M Chakraborty, A Mukherjee, KM Ahmed, **HA Michael**, CF Harvey, B Bostick, B Mailloux, P Schlosser, A van Geen, Groundwater chemistry of deep (>300 feet) high-As aquifers across the India-Bangladesh border, Geological Society of America Annual Meeting, Baltimore, MD, November 1-4, 2015.

Hoppes, K*, CS Chan, K Cabaniss, KH Williams, M Moore, **HA Michael**, J Caplan, Microbial iron oxidation and contribution to Fe oxide coatings in aquifer sediment, Geological Society of America Annual Meeting, Baltimore, MD, November 1-4, 2015.

A van Geen*, *MR Khan*, B Nath, B Huhmann, I Choudhury, M Chakraborty, C Harvey, **H Michael**, B Bostick, B Mailloux, P Schlosser, A Mukherjee, KM Ahmed, Young high-arsenic groundwater confirmed to 250 m depth across the India-Bangladesh border, Goldschmidt Conference, Prague, Czech Republic, August 16-21, 2015.

Duke, J, Z Liu*, KD Messer, **H Michael**, J Suter, Optimal taxes and welfare in a spatially explicit aquifer: Experimental evidence, NAREA & CAES Joint Annual Meeting and Workshop, Newport, RI, June 27-30, 2015.

Graf, T*, **H Michael**, I Neuweiler, A Peche, T Ptak, J Yang, *X Yu*, M Walther, Integrated hydrosystem modeling of coastal and urban areas, Integrated Hydrosystem Modeling 2015 Conference, Tubingen, Germany, April 7-10, 2015.

INVITED PRESENTATIONS to Universities and Organizations (last 5 years) *presenting author

2019 Michael, HA*, Vulnerability of groundwater resources in Bangladesh: intersection of dense populations, geologic complexity, and large-scale arsenic contamination, *Temple University*, September 27, 2019.

Michael, HA*, Global in-situ data needs to advance groundwater resource analysis, *National Academy of Sciences Workshop on Groundwater Recharge and Flow*, Washington, DC, June 27-28, 2019. (Keynote)

Michael, HA*, The influence of geologic heterogeneity on large-scale groundwater flow and solute transport: Continental shelves and mega-cities, *University of Massachusetts, Amherst*, April 6, 2019.

Michael, HA*, Climate, Population, and the Squeeze on Coastal Groundwater, *University of Tennessee*, March 14, 2019.

2018 Michael, HA*, Climate, Population, and the Squeeze on Coastal Groundwater, *Aarhus University*, Denmark, December 4, 2018.

Michael, HA*, Challenges in characterizing submarine groundwater discharge across scales, *University College London*, November 28, 2018.

Michael, HA*, Challenges in characterizing submarine groundwater discharge across scales, *Universitat Politècnica de Catalunya*, Barcelona, Spain, November 20, 2018.

Michael, HA*, Challenges in characterizing submarine groundwater discharge across scales, *Oldenburg University*, Oldenburg, Germany, November 17, 2018.

Michael, HA*, Vulnerability of groundwater resources in Bangladesh: Dense populations, geologic complexity, and large-scale arsenic contamination, *Federal Institute for Geosciences and Natural Resources (BGR) and Leibniz University*, Hannover, Germany, November 14, 2018.

Michael, HA*, Climate, Population, and the Squeeze on Coastal Groundwater, Deltas and *University of Utrecht*, Utrecht, The Netherlands, November 12, 2018.

Michael, HA*, Climate, Population, and the Squeeze on Coastal Groundwater, *Hong Kong University*, October 26, 2018.

Michael, HA*, Climate, Population, and the Squeeze on Coastal Groundwater, *Sun Yat-sen University*, Guangzhou, China, October 25, 2018.

Michael, HA*, Challenges in characterizing submarine groundwater discharge across scales, *Southern University of Science and Technology*, Shenzhen, China, October 23, 2018.

Michael, HA*, Climate, Population, and the Squeeze on Coastal Groundwater, *Southern University of Science and Technology*, Shenzhen, China, October 23, 2018.

Michael, HA*, Vulnerability of groundwater resources in Bangladesh: Dense populations, geologic complexity, and large-scale arsenic contamination, *Westlake Distinguished Lecture*, Westlake University, October 22, 2018.

Michael, HA*, Challenges in characterizing submarine groundwater discharge across scales, *Seoul National University*, October 16, 2018.

2017 Michael, HA*, Land-Sea Water Exchange from Ripples to Shelves: Implications for Chemical Inputs to the Coastal Ocean, *Woods Hole Oceanographic Institution*, May 24, 2017.

Michael, HA*, Land-sea water exchange from ripples to shelves: Exploring physical-biogeochemical linkages, *University of Minnesota*, May 5, 2017.

Michael, HA*, The influence of geologic heterogeneity on large-scale groundwater flow and solute transport: Mega-cities and continental shelves, *University of Minnesota*, May 4, 2017.

Michael, HA*, Vulnerability of groundwater resources in Bangladesh: Interplay between dense populations, geologic complexity, and large-scale arsenic contamination, *K. Douglas Nelson Colloquium Series*, *Syracuse University*, April 27, 2017.

Michael, HA*, Land-sea water exchange from ripples to shelves: Exploring physical-biogeochemical linkages, School of Earth, Ocean and Environment, *University of South Carolina*, April 13, 2017.

Michael, HA*, The influence of geologic heterogeneity on large-scale groundwater flow and solute transport: Mega-cities and continental shelves, Center for Environmental & Applied Fluid Mechanics, *Johns Hopkins University*, April 7, 2017.

Michael, HA*, The influence of geologic heterogeneity on large-scale groundwater flow and solute transport: Continental shelves and mega-cities, *University of Hawaii*, Honolulu, HI, February 24, 2017.

2016 Michael, HA*, Land-Sea Water Exchange from Ripples to Shelves: Implications for Coastal Ecosystems and Ocean Chemistry, *Lamont-Doherty Earth Observatory, Columbia University*, New York, NY, October 21, 2016.

Michael, HA*, Linking Hydrology, Geology, and Engineering toward Sustainable Solutions to Widespread Arsenic Contamination in the Bengal Delta, Challenges and Innovation in Civil and Environmental Engineering and Earth Sciences Seminar Series, *University of Notre Dame*, Notre Dame, IN, September 15, 2016.

Michael, HA*, Vulnerability of groundwater resources in Bangladesh: The interplay between dense populations, geologic complexity, and large-scale arsenic contamination, Weston Roundtable on Sustainability, *University of Wisconsin*, Madison, WI, April 21, 2016.

Michael, HA*, Land-Sea Water Exchange from Ripples to Shelves: Implications for Groundwater Management and Chemical Inputs to the Coastal Ocean, Weeks Lecture, Department of Geoscience, *University of Wisconsin*, Madison, WI, April 22, 2016.

Michael, HA*, The Role of Preferential Flow in Large-Scale Groundwater Systems: Arsenic and Salinity in the Bengal Delta, *University of Maryland Baltimore County*, Baltimore, MD, April 1, 2016.

Michael, HA*, Transport of Solutes through Heterogeneous Delta Sediments: Implications for Groundwater Resources in Bangladesh, *Vanderbilt University*, Nashville, TN, January 22, 2016.

2015 Michael, HA*, Intertidal groundwater-surface water exchange in Delaware, *New Jersey Institute of Technology*, Newark, NJ, December 11, 2015.

Michael, HA*, Geologic effects on land-sea water and solute exchange across scales: examples from Delaware and Bangladesh, *USGS MD-DE-DC Water Science Center*, Baltimore, MD, November 20, 2015.

Michael, HA*, Land-Sea Water Exchange across Scales: from Muck to Models, *Pennsylvania State University*, Department of Geosciences, State College, PA, November 17, 2015.

Michael, HA*, Land-Sea Water Exchange across Scales: from Muck to Models, *University of North Carolina*, Curriculum for the Environment and Ecology and Department of Geology, Chapel Hill, NC, September 24, 2015.

Michael, HA*, Transport of solutes through hydraulically and chemically heterogeneous sediments of the Bengal Basin, *CSIRO Land and Water*, Floreat, Australia, May 12, 2015.

Michael, HA*, Land-sea water exchange: Implications for groundwater management and chemical inputs to the coastal ocean, *CSIRO Land and Water*, Floreat, Australia, May 11, 2015.

Michael, HA*, Land-Sea Water Exchange across Scales: Examples from Delaware, USA, *University of Queensland*, St. Lucia, Australia, April 28, 2015.

Michael, HA*, The Influence of Hydrologic, Geologic, and Geochemical Interactions on Solute Fluxes to the Sea: Examples from the Atlantic Coast, USA, *Southern Cross University*, Coffs Harbour, Australia, April 23, 2015.

Michael, HA*, Coastal groundwater-surface water interactions: methods and applications in Delaware, USA, *National Centre for Groundwater Research and Training*, Adelaide, Australia, February 13, 2015.

Michael, HA*, Land-sea water exchange from ripples to shelves, *CSIRO Land and Water*, Adelaide, Australia, January 23, 2015.

MEDIA COVERAGE (Selected)

Geophysical Research Letters Editor's Highlight: "Pumping Offshore Groundwater Resources has Consequences on Land" for doi:10.1029/2019GL081910.

EOS Research Spotlight: Underwood, E. (2017), Sandy beaches are hotbeds of biochemical activity, *Eos*, 98, doi: 10.1029/2017EO087591

International Business Times: "Overpopulation in Dhaka 'will see groundwater contaminated with arsenic within next decade'", 27 September 2016. < <http://www.ibtimes.co.uk/overpopulation-dhaka-will-see-groundwater-contaminated-arsenic-within-next-decade-1583603>> (and multiple other international outlets covering Khan et al., Nature Communications, 2016).

Delaware News Journal: "Pollution gains prove elusive in Delaware", by M Murray, April 21, 2016. (Coverage of beach work on nitrogen pollution).

EOS Research Spotlight: Betz, E. O. (2015), A new level of understanding for coastal aquifers, *Eos* 96, doi:10.1029/2015EO023175.

EOS Research Spotlight: Kumar, M., L. Ofori, and E. Tretkoff (2010) Realistic models of aquifer conduits, *Eos Trans. AGU* 91, 252, doi:10.1029/EO091i028p00252-05.

The New York Times: "Poisoned Wells: In Asia, Cutting Arsenic Risk in Water Through Well-Drilling Techniques", by DG McNeil, Jr., May 31, 2010. (and multiple other international outlets covering Fendorf et al., Science, 2010).

Water Resources Research Editor's Highlight: "Realistic Models of Aquifer Conduits" for DOI:10.1029/2009WR008414.

Research Highlights: "Arsenic Detectives", *Nature*, 453 (19), June 19, 2008.

In This Issue: "Dig deep to avoid arsenic", *Proceedings of the National Academy of Sciences*, 105 (25), June 24, 2008.

Perkins, S (2005) Invisible rivers: fresh water also flows to sea through the ground, *Science News*, 168 (16) 248-249.

TEACHING

University of Delaware

Course Number
S2019 GEOL 630

Course Title
Hydrogeological Modeling Seminar

Newark, DE

Enrollment

5

F2018	GEOL 667	Advanced Topics in Hydrology (online collaboration)	9
S2018	GEOL 428/628	Hydrogeology	18/9
F2017	GEOL 667	Advanced Topics in Hydrology (online collaboration)	3
	CIEG 469	Independent Study	1
S2017	GEOL 630	Groundwater-Surface Water Interactions Seminar	4
	GEOL 203	Earth Surface Processes (with J Pizzuto)	18
F2016	GEOL 603	Groundwater Modeling	5
S2016	GEOL 203	Earth Surface Processes (with J Pizzuto)	19
F2015	GEOL 428/628	Hydrogeology	15/14
S2014	GEOL 203	Earth Surface Processes (with J Pizzuto)	19
F2013	GEOL 667	Classic Papers in Hydrogeology Seminar	7
S2013	GEOL 659/STAT 659	Spatial Statistics (with D Legates)	7
	GEOL 203	Earth Surface Processes (with J Pizzuto)	18
F2012	GEOL 428/628	Hydrogeology	8/4
S2012	GEOL 467/667	Groundwater Modeling	1/4
F2011	GEOL 428/628	Hydrogeology	14/6
S2011	GEOL 667	Mathematical Modeling for Geoscientists (with J Pizzuto)	6
	GEOL 467/667	Coastal Hydrogeology Seminar	1/5
F2010	GEOL 428/628	Hydrogeology	7/5
S2010	GEOL 467/667	Groundwater Modeling	1/6
F2009	GEOL 428/628	Hydrogeology	3/13
S2009	GEOL 428/628	Hydrogeology	9/5

Guest Lectures: FREC 100: Sustainable Development, F2009; F2010
GEOG 320: Water and Society, S2010
CIEG 437: Water Quality, S2017
STAT 659: Spatial Statistics, S2016

University of Cagliari

Cagliari, Italy

Practical Modeling of Seawater Intrusion Course, Sept 20-23, 2006

University of Dhaka, Department of Geology

Dhaka, Bangladesh

MODFLOW Groundwater Modeling Workshop, September 11-15, 2005

MIT, Department of Civil and Environmental Engineering

Cambridge, MA

Teaching Assistant, Computing and Data Analysis for Environmental Applications, 2001-2003

MIT, Department of Athletics

Cambridge, MA

Assistant Varsity Women's Lacrosse Coach, 1999-2004

RESEARCH and GRADUATE ADVISING

Postdoctoral Researchers

- Anner Paldor, 2019-present
- Chelsea Peters, 2019-present
- Xiaolong Geng, 2017-present
- Xuan Yu, 2014-2018
- Carlos Duque Calvache, 2015-2017 (Marie Curie Postdoctoral Fellow)
- Mohammad Koneshloo, 2013-2015
- Jingyuan Li, 2012-2013
- Audrey Sawyer, 2011-2012

PhD Students

- Ryan Frederiks, Geological Sciences, in progress

- Mary Hingst, Water Science and Policy, in progress
- Zhongyuan Xu, Water Science and Policy, in progress
- Julia Guimond, Geological Sciences, in progress
- Kyra Han Kyul Kim, Geological Sciences, in progress
- Fang Tan, Water Science and Policy, in progress (co-advised with P. Imhoff, CEE)
- Christopher Russoniello, Geological Sciences, 2018
- James Heiss, Geological Sciences, December 2016
- Mahfuzur Khan, Geological Sciences, May 2016

MS Students

- Juan Pablo Dominguez, Geological Sciences, in progress
- Pieter Kreyns, in progress
- Kaileigh Scott, Civil and Environmental Engineering, May 2015
- Christopher Russoniello, Geological Sciences, August 2012
- Cristina Fernandez, Geological Sciences, May 2012
- James Heiss, Geological Sciences, May 2011

Undergraduate Researchers

- Allie Bailey, Civil and Environmental Engineering, 2017-2018
- Caitlyn Sarno, Chemistry, 2016
- Shailja Gangrade, Civil and Environmental Engineering and Marine Biosciences, 2016
- Catherine Medlock, CZO REU & continuing, 2016
- Riley Brown, CZO REU, 2016
- Samuel Dever, Civil Engineering, 2015-2016
- Katie Li, CZO REU, 2015
- Eric Lunn, CZO REU, 2014
- Nathan Veale, DENIN Environmental Scholar, 2013-2014
- Kyle Crespo, Environmental Engineering, 2012
- Matthew Kereszi, Civil Engineering, 2012
- Deon Knights, Geology, 2011
- Andrew Musetto, Environmental Science, 2010-2011
- Emily Olson, Marine Biosciences, 2008-2010

Visiting Students and Researchers

- Jie Yang, Leibniz University Hannover, Germany, 2014
- Sophie Ravel, Ecole Polytechnique, France, 2013

Service on Student Committees and Thesis Examinations

PhD Dissertations

- Rachel Housego, Woods Hole Oceanographic Institution/MIT Joint Program (Advisor: S Elgar), in progress
- Nur Syahiza Zainuddin, University of New South Wales (Advisor: Martin Andersen)
- Sebastien Huizer, Utrecht University (Advisor Marc Bierkens), 2019
- Joseph Rawson, University of Western Australia (Advisor H Prommer), 2018
- Gordon Osterman, Rutgers University Newark, Earth and Environmental Sciences (Advisor: K Keating), 2017
- Jing Yan, UD Plant and Soil Sciences (Advisor: Yan Jin), 2016
- Bartholomew Wilson, UD Geological Sciences (Advisor: J Madsen), 2016
- Megan Sebben, Flinders University, School of the Environment (Advisor: A Werner), 2016
- Tyler Evans, University of S Carolina, Earth and Ocean Sciences (Advisor: A Wilson), 2016
- Tariq Laattoe, Flinders University, School of the Environment (Advisor: V Post), 2016
- Jennifer Egan, UD Water Science and Policy Program (Advisor: J Duke), 2016
- Aline Pieterse, UD Geological Sciences (Advisor: J Puleo), 2015
- Adam Pearson, UD Geological Sciences (Advisor: J Pizzuto), 2015
- Shannon Holder, Simon Fraser University, Earth Sciences (Advisor: D Allen), 2014
- Leanne Morgan, Flinders University, Earth Sciences, (Advisors: A Werner and C Simmons), 2014

- Sittinan Benjasupattananan, UD Civil and Environmental Engineering (Advisor: C Meehan), 2013
- Maryan Akhavan, UD Civil and Environmental Engineering (Advisor: P Imhoff), 2013
- Yoojin Jung, UD Civil and Environmental Engineering (Advisor: P Imhoff), 2009

MS Theses

- Goabaone Jacqueline Ramatlapeng, UD Geological Sciences (Advisor: Eliot Atekwana), in progress
- Kopo Oromeng, UD Geological Sciences (Advisor: Eliot Atekwana), in progress
- Catherine Medlock, UD Geological Sciences (Advisor: Tom McKenna), in progress
- Alexis Cunningham, UD Water Science and Policy Program (Advisor: J Firestone), 2018
- Thomas Brooks, UD Geological Sciences (Advisor: J York), 2018
- Frances Bothfield, UD Plant and Soil Sciences (Advisor: Angelia Seyfferth), 2015
- Zhuo Liu, UD Applied Economics and Statistics (Advisor: K Messer), 2012
- Robert Carver, McGill University, Earth and Planetary Sciences (Advisor: J McKenzie), 2012
- Erin McVey, UD School of Public Policy and Administration (Advisor: G Kauffman), 2011

UNIVERSITY, COLLEGE, & DEPARTMENTAL COMMITTEES and ACTIVITIES

University

- Campus Master Plan Research Committee (2019-present)
- Co-lead of cluster hire of 6 faculty in Coastal Water Security and service on the search committees (2018-2019, 2 faculty searches for 3 hires)
- Associate Director for Interdisciplinary Initiatives of the Delaware Environmental Institute (DENIN) (2017-present)
- Budget Model Graduate Tuition/Education Subcommittee (2017-present)
- Civil and Environmental Engineering Graduate Committee (2017-present)
- CAREER award junior faculty mentor (2017-present)
- University Research Council (2010-present)
- Program Committee and founding faculty member, Water Science and Policy Graduate Program (2010-present)
- Senior Vice Provost for Graduate and Professional Education Search Committee (2015-2016)
- Civil and Environmental Engineering Search Committee (2015-2016)
- Civil and Environmental Engineering Search Committee (2009-2010)

College

- International Task Force (2017-present)
- Dean of College of Earth Ocean and Environment Search Committee (2016-2017)
- Delaware Geological Survey Director Search Committee (2010-2011)
- College Transitional Academic Council (2009-2011)
- Physical Ocean Science and Engineering Search Committee (2008-2009)

Department

- Strategic Planning Committee (2017-present)
- Graduate Program Committee (2016-present)
- Chair, Geological Sciences External Department Chair Search Committee (2013-2014)
- Geological Sciences Internal Department Chair Search Committee (2012)
- Geological Sciences Department Graduate Admissions Committee (2011-2012)
- Organized Geological Sciences Seminar Series (Spring 2010, Fall 2013)

PROFESSIONAL ACTIVITIES and SERVICE (selected)

Service to Professional Organizations

- Member, American Geophysical Union Groundwater Technical Committee (2019-present)
- Chair, American Geophysical Union Groundwater Technical Committee (2017-2019)
- Associate Editor: Water Resources Research (2014-present)

- Board of Directors (elected), Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUAHSI) (2013-present)
- Geological Society of America Hydrogeology Division Birdsall-Dreiss Lecture Award Committee (2017-present)
- Salt Water Intrusion Meeting (SWIM) Scientific Committee (2008, 2010, 2016, 2018), Organizing Committee (2016)
- Co-organizer of 2018 CUAHSI Biennial Conference in Shepherdstown, WV
- Lead organizer of 2016 CUAHSI Biennial Conference in Shepherdstown, WV
- CUAHSI representative to the Geological Society of America Hydrogeology Division (2014-present)
- Deputy Chair, American Geophysical Union Groundwater Technical Committee (2015-2017)
- American Geophysical Union Groundwater Technical Committee member (2013-present)
- Presenter in National Ground Water Association webinar: “Groundwater and Salt Town Hall: Restoring the Equilibrium after Severe Weather Events” (February 19, 2014 and Q&A for re-broadcast, December 2, 2014)
- Associate Editor: Hydrogeology Journal, the journal of the International Association of Hydrogeologists (2009-2013)
- University of Delaware representative to CUAHSI (2011-present)

Service to Government Agencies

- Delaware Sea Level Rise Technical Committee (2015-2018)
- NSF EPSCoR review panel member (2018)
- Search committee member for Delaware Department of Natural Resources and Environmental Control Director of Coastal Programs (Fall 2016)
- Department of Energy review panel member (2013; 2014; 2016; 2019)
- NSF Hydrologic Sciences review panel member (Fall 2009, Spring 2010, Fall 2013; Fall 2015)
- Participated, by invitation, in National Academy of Engineering Kavli Frontiers of Science Brazil Symposium (2014)
- Belmont Forum /G8 HORCs International Opportunities Fund Coastal Vulnerability Theme review panel member, pre- proposals and full proposals (2012 and 2013)
- Participated, by invitation, in National Academy of Sciences Kavli Frontiers of Science U.S. Symposium (2012)
- Participated, by invitation, in NSF EarthCube Early Career Strategic Visioning Workshop (2012)
- NSF International Research Experience for Students review panel member (2009)
- Participated, by invitation, in NSF-sponsored workshop on *Marine Constituent Dynamics in Coastal Egypt* as part of the 3rd International Conference on Aquatic Resources (ICAR) conference in Alexandria, Egypt (2009)
- USGS Colleague Reviewer for 3 manuscripts, one book foreword, and many conference abstracts
- Wrote letter of evaluation for USGS promotion review process.

Other Activities

- Board of Directors, Stroud Water Research Center (2016-present); Science Committee (2019-present)
- Invited participant and speaker for first Indo-US Bilateral Workshop on Coastal Groundwater Dynamics Combining Future Climate Change and Human Development, Pondicherry University, India (2018)
- Board of Directors, NorthSouth Group for Poverty Reduction (2008-present)
- Invited participant and speaker for first Indo-US Bilateral Workshop on Coastal Groundwater Dynamics Combining Future Climate Change and Human Development, Pondicherry University, India (2018)
- Instructor for NCED2 Summer Institute on Earth-surface Dynamics (2017)
- External Promotion and Tenure letter writer (2; University of Alabama, Georgia Southern University)

- Invited participant in ONE-Delta (synthesizing Observational, Numerical, and Experimental data to unravel the complex dynamics of deltas and margin sequences) STEPPE (Sedimentary geology, Time, Environment, Paleontology, Paleoclimatology, and Energy) consortium workshop, Vanderbilt University (2016)
- Represented DENIN and the Department of Geological Sciences at UD Day in Washington DC, Capitol Hill (2013)
- Local organizing committee member and panel co-chair for the Sixth International Conference on Sustainable Water Environment, “Water Infrastructures in Time of Climate Change”, Newark, DE (2010)

Reviewer of manuscripts for the following journals:

Aquatic Geochemistry, Biogeochemistry, Environmental Monitoring and Remediation, Environmental Science and Technology, Geochimica et Cosmochimica Acta, Geophysical Research Letters, Geology, Ground Water, Hydrogeology Journal, Hydrological Processes, Journal of Geophysical Research, Journal of Hydrology, Journal of Hydrology – Regional Studies, Limnology and Oceanography, Marine Chemistry, Nature, Nature Geoscience, Science, Proceedings of the National Academy of Sciences, Water Resources Research