

ANNA M. MICHALAK

260 Panama Street
 Stanford, CA 94305
 url: <https://dgc.carnegiescience.edu/michalak-lab>

Phone: 650-201-2667
 e-mail: michalak@stanford.edu

RESEARCH INTERESTS

Dr. Michalak’s research interests lie in two areas. The first is assessing the impacts of climate change on inland and coastal water quality via influences on nutrient delivery to, and on conditions within, water bodies. The second area is understanding and quantifying the cycling and emissions of greenhouse gases at the Earth surface at urban to global scales – scales directly relevant to informing climate and policy – primarily through the use of atmospheric observations that provide the clearest constraints at these critical scales. Her approach is highly data-driven, with a common methodological thread being the development and application of spatiotemporal statistical data fusion methods for optimizing the use of limited in situ and remote sensing environmental data.

EDUCATION

Stanford University, Stanford, California	Civil & Environmental Engineering	Ph.D. 2003
Stanford University, Stanford, California	Civil & Environmental Engineering	M.S. 1998
University of Guelph, Ontario, Canada	Environmental Engineering	B.Sc.(Eng.) 1997

POSITIONS HELD

Director	2020 – present
Faculty Member	2011 – present
Department of Global Ecology Carnegie Institution for Science, Stanford, California	
Professor, by courtesy	2016 – present
Associate Professor, by courtesy	2011 – 2016
Department of Earth System Science Stanford University, Stanford, California	
Affiliated Faculty	2011 – present
Emmett Interdisciplinary Program in Environment and Resources Stanford University, Stanford, California	
ASP Faculty Fellow	2010 – 2011
Institute for Mathematics Applied to Geosciences (IMAGe) Computational and Information Systems Laboratory National Center for Atmospheric Research (NCAR), Boulder, Colorado	
Adjunct Associate Professor	2011 – 2015
Frank and Brooke Transue Faculty Scholar	2010 – 2011
Associate Professor, with tenure	2009 – 2011
Assistant Professor	2004 – 2009
Department of Civil and Environmental Engineering, University of Michigan, Ann Arbor, Michigan	

<i>Associate Professor, with tenure</i>	2009 – 2011
<i>Assistant Professor</i>	2005 – 2009
Department of Atmospheric, Oceanic and Space Sciences, University of Michigan, Ann Arbor, Michigan	
<i>NOAA Climate and Global Change Postdoctoral Fellow</i>	2003 – 2004
Climate Monitoring and Diagnostics Laboratory (CMDL) National Oceanic and Atmospheric Administration, Boulder, Colorado	

PROFESSIONAL SERVICE (selected)

Scientific advisory board and committee service

- *Advisory Committee*, Earth and Biological Sciences Directorate, Pacific Northwest National Laboratory, 2021 – present
- *Committee on Earth Science and Applications from Space (CESAS)*, The National Academies of Sciences, Engineering, and Medicine, 2018 – present
- *Chair of Scientific Advisory Board*, Integrated Carbon Observation System (ICOS) European Research Infrastructure Consortium (ERIC), 2016 – present
- *External Advisory Committee*, Vermont Experimental Program to Stimulate Competitive Research (EPSCoR), 2011 – present
- *Scientific Advisory Board*, Oak Ridge National Laboratory Climate Change Science Institute, Oak Ridge, Tennessee, 2013 – 2018
- *Earth Science Subcommittee*, NASA Advisory Council, 2009 – 2017
- *Scientific Advisory Board*, Max Planck Institute for Biogeochemistry, Jena, Germany, 2014 – 2016
- *Earth Sciences Division Director's Review Board*, Lawrence Berkeley National Laboratory, Berkeley, California, 2014
- *North American Carbon Program Science Steering Group*, U.S. Global Change Research Program, 2010 – 2014
- *Body of Knowledge Second Edition (BOK2) task committee*, Committee on academic prerequisites for professional practice, American Society of Civil Engineers (ASCE), 2006 – 2008

Scientific community roles

- *Member*, NASA Science and National Interest Senior Review, Earth Science Operating Missions Evaluation Team, 2020
- *Member*, The National Academies of Sciences, Engineering, and Medicine, Division on Engineering and Physical Sciences Space Studies Board, Committee to Review the NASA Science Mission Directorate Science Plan, 2019
- *Co-Lead*, North American regional synthesis, Regional Carbon Cycle Assessment and Processes-2 (RECCAP2), Global Carbon Project, 2019 – present
- *Chapter Co-Lead*, 2nd State of the Carbon Cycle Report (SOCCR-2), U.S. Global Change Research Program (USGCRP), 2016 – 2018
- *Member*, Orbiting Carbon Observatory 2 (OCO-2) satellite science team, 2011 – present
- *Member*, NASA Carbon Monitoring System Science Definition Team, 2011 – present
- *Member*, Steering Committee, ASCENDS (Active Sensing of CO₂ Emissions over Nights, Days, and Seasons) Satellite Mission, , 2011 – present; *Co-chair* 2008 – 2011

- *Member*, The National Academies of Sciences, Engineering, and Medicine, Division on Earth and Life Studies, and Division on Engineering and Physical Sciences, Committee for “Models of the World for the National Geospatial-Intelligence Agency,” 2015 – 2016
- *University of Michigan Representative*, University Corporation for Atmospheric Research (UCAR), 2009 – 2011
- *Co-lead*, U.S. Carbon Cycle Science Working Group (CCS WG) charged with the development of the U.S. Carbon Cycle Science Plan, U.S. Global Change Research Program, 2008 – 2011
- *Associate*, Orbiting Carbon Observatory (OCO) satellite science team, 2005 – 2009

Editorial roles

- *Editor*, Water Resources Research, American Geophysical Union, 2013 – 2017; *Associate Editor* 2008 – 2013
- *Editorial board member*, Advances in Water Resources, Elsevier, 2009 – present
- *Guest Editor*, Inter-journal special issue on “9th International Carbon Dioxide Conference (ICDC9)” in European Geophysical Union journals of Atmospheric Chemistry and Physics, Earth System Dynamics, as well as Biogeosciences, 2013 – 2015
- *Co-editor*, Special issue on Water for Dædalus, the journal of the American Academy of Arts and Sciences, 2013 – 2015

Scientific conference planning and organization

- *Member of organizing committee*, Computational Methods in Water Resources XXIII (CMWR 2020), Stanford, California, December 2020.
- *Member of scientific steering committee*, 10th International Carbon Dioxide Conference, Interlaken, Switzerland, August 2017.
- *Co-lead*, American Academy of Arts & Sciences event on “Water: California in a Global Context,” Stanford, California, February 2016.
- *Member of scientific steering committee*, 9th International Carbon Dioxide Conference, Beijing, China, June 2013.
- *Co-organizer*, Program on “Simulating our complex world: Modeling, Computation and Analysis,” Institute for Mathematics and Its Applications (IMA), Minneapolis, Minnesota, 2010-2011.
- *Co-chair and local host*, ASCENDS Satellite Mission instrument and modeling workshop, University of Michigan, Ann Arbor, Michigan, April 2009.
- *Invited member*, Planning Committee, 2nd North American Carbon Program (NACP) Investigators’ Meeting, February 2009.
- *Co-organizer*, Symposium entitled “The Carbon Budget: Can We Reconcile Flux Estimates with Those Reported to the UNFCCC?” American Association for the Advancement of Science (AAAS) Annual Meeting, Chicago, Illinois, February 2009
- *Co-chair and local host*, ASCENDS Satellite Mission community workshop, University of Michigan, Ann Arbor, Michigan, July 2008.
- *Invited member*, International Scientific Committee, 6th International Conference on Inverse Problems in Engineering: Theory and Practice (ICIPE), Paris, France, June 2008
- American Geophysical Union Fall Meetings, special session planning and organization:
 - *Co-organizer and convener*, Special session entitled “A Decade of Progress in Carbon Cycle Science,” December 2020

- *Co-organizer*, Special session entitled “Remote Sensing of CH₄ and CO₂ from Space: The Advancing Observing System,” New Orleans, Louisiana, December 2017
- *Co-organizer*, Special session entitled “Combining Physical Simulation and Machine Learning across Geophysical Sciences,” New Orleans, Louisiana, December 2017
- *Co-organizer and convener*, Special session entitled “*Remote Sensing of CO₂ and CH₄ from space: Moving towards an observing system*,” San Francisco, California, December 2016
- *Co-organizer and convener*, Special session entitled “*Remote Sensing of CO₂ and CH₄ from space: Exploiting New Measurements*,” San Francisco, California, December 2015
- *Co-organizer and convener*, Special session entitled “*Remote Sensing of the Carbon Cycle: Exploiting New Measurements and Linkages to the Water Cycle*,” San Francisco, California, December 2014
- *Co-organizer and convener*, Special session entitled “*Remote sensing of CO₂, CO, and CH₄: From missions to science*,” San Francisco, California, December 2013
- *Co-organizer and convener*, Special session entitled “*Model Intercomparisons: Syntheses That Inform Scientific Understanding*,” San Francisco, California, December 2013
- *Co-organizer and convener*, Special session entitled “*Remote sensing of CO₂, CO, and CH₄*,” San Francisco, California, December 2012
- *Co-organizer and convener*, Special session entitled “*Remote sensing of CO₂: Observations, modeling, and synthesis*,” San Francisco, California, December 2011
- *Co-organizer and convener*, Special session entitled “*Remote sensing of CO₂ emissions and atmospheric transport*,” San Francisco, California, December 2010
- *Co-organizer and convener*, Special session entitled “*Atmospheric carbon dioxide: Observation, validation, modeling, and assimilation*,” San Francisco, California, December 2009
- *Co-organizer and convener*, Special session entitled “*Towards a policy-relevant, open and transparent global greenhouse gas monitoring and information system (GHGIS)*,” San Francisco, California, December 2009
- *Co-organizer and convener*, Special session entitled “*Space Observations of Atmospheric Carbon Dioxide: Retrieval, Validation, Modeling, and Assimilation*,” San Francisco, California, December 2008
- *Co-organizer and convener*, Special session entitled “*Space Observations of Atmospheric Carbon Dioxide: Retrieval, Validation, Modeling and Assimilation*,” San Francisco, California, December 2007
- *Co-organizer and convener*, Special session entitled “*Remote Sensing and Modeling of Greenhouse and Related Gases and Implications for Understanding Their Sources and Sinks*,” San Francisco, California, December 2005
- *Co-organizer and convener*, Special session entitled “*Inverse Modeling and Conditional Uncertainty Propagation in Heterogeneous Aquifers*,” San Francisco, California, December 2005
- *Co-organizer and convener*, Special session entitled “*Use of Inverse Modeling for Constraining Global and Regional Budgets of Atmospheric Trace Gases*,” San Francisco, California, December 2004
- *Co-organizer and convener*, Special session entitled “*Use of Inverse Modeling for Constraining Global Budgets of Atmospheric Trace Gases*,” San Francisco, California, December 2003

TEACHING EXPERIENCE

New Courses Introduced at Stanford University

ESS 214 Introduction to Geostatistics and Modeling of Spatial Uncertainty

Department: Earth System Science

First introduced: Spring 2012

CEE 333 / GES 333, Water Policy Colloquium

Department: Geological and Environmental Sciences

First introduced: Spring 2002

New Courses Introduced at the University of Michigan

CEE 682 Section 039: Inverse Problems in Environmental Science and Engineering

Department: Civil and Environmental Engineering

First introduced: Winter 2008

CEE 570 / NRE 569: Introduction to Geostatistics

Department: Civil and Environmental Engineering, and
School of Natural Resources and the Environment

First introduced: Winter 2005

CEE 270: Statistical Methods for Data Analysis and Uncertainty Modeling

Department: Civil and Environmental Engineering

First introduced: Fall 2005

Short Courses Taught

Autumn School on Data Assimilation in Biogeochemical Cycles

Location: International Centre for Theoretical Physics, Trieste, Italy

Workshop on Geostatistical Inverse Modeling

Location: University of Michigan, Ann Arbor, Michigan

Summer Colloquium on Regional Biogeochemistry, Needs and Methodologies

Location: National Center for Atmospheric Research, Boulder, Colorado

Summer Graduate Workshop on Data Assimilation for the Carbon Cycle

Location: Mathematical Sciences Research Institute, University of California at
Berkeley, Berkeley, California

Ecosystem Modeling Workshop

Location: University of Michigan Biological Station (UMBS), Pellston, Michigan

Mathematical Geophysics Summer School

Location: Stanford University, Stanford, California

HONORS AND AWARDS (selected)

Leopold Leadership Fellow	2015
Frank and Brooke Transue Faculty Scholar	2010 – 2011
University of Michigan Henry Russel Award	2011
National Center for Atmospheric Research (NCAR) ASP Faculty Fellowship	2010 – 2011
Department of Civil and Environmental Engineering Merit Award	2010
University of Michigan College of Engineering 1938E Award	2009
AEESP Outstanding Educator Award for “ Outstanding Teaching in Environmental Engineering and Science”	2008
Presidential Early Career Award for Scientists and Engineers (PECASE)	2007
Michigan Memorial Phoenix Energy Institute (MMPEI) Faculty Fellow	2007 – 2011
NSF CAREER Award, National Science Foundation	2007
Elizabeth Crosby Research Award, University of Michigan	2005
NOAA Postdoctoral Program in Climate and Global Change Fellowship, University Corporation for Atmospheric Research	2003 – 2005
Roe Legal Fellowship, Property and Environmental Research Center	2002
PERC Summer Fellowship, Property and Environmental Research Center	2001
Hydrology Section Outstanding Student Paper Award, American Geophysical Union	1999
Gabilan Fellowship, Stanford University	1999
Stanford Graduate Fellowship, Stanford University	1997 – 2000

STUDENTS AND RESEARCHERS SUPERVISED

Completed committee service as principal Ph.D. advisor or co-advisor:

- *Nina Randazzo*, Department of Earth System Science (ESS), Stanford University, *Principal advisor*, Ph.D. completed 03/2021
- *Eva Sinha*, Department of Earth System Science (ESS), Stanford University, *Principal advisor*, Ph.D. completed 11/2018
- *Jeff Ho*, Department of Civil and Environmental Engineering (CEE), Stanford University, *Principal advisor*, Ph.D. completed 08/2018
- *Yoichi Shiga*, CEE, Stanford University, *Principal advisor*, Ph.D. completed 03/2018
- *Daniel R. Obenour*, CEE / School of Natural Resources and Environment, University of Michigan, *Co-advisor*, Ph.D. completed 08/2013
- *Yuntao Zhou*, CEE, University of Michigan / Carnegie Institution for Science, *Principal advisor*, Ph.D. completed 01/2013
- *Abhishek Chatterjee*, CEE, University of Michigan / Carnegie Institution for Science, *Principal advisor*, Ph.D. completed 11/2012
- *Dorit Hammerling*, CEE, University of Michigan, *Principal advisor*, Ph.D. completed 11/2012
- *Kimberly Mueller*, CEE, University of Michigan, *Principal advisor*, Ph.D. completed 02/2011

- *Sharon Gourджи*, CEE, University of Michigan, *Principal advisor*, Ph.D. completed 02/2011
- *Alanood Alkhaled*, CEE, University of Michigan, *Principal advisor*, Ph.D. completed 03/2009
- *Shahar Shlomi*, CEE, University of Michigan, *Principal advisor*, Ph.D. completed 02/2009
- *Meng-Ying Li*, CEE, University of Michigan, *Co-advisor*, Ph.D. completed 02/2008

Current service as Ph.D. advisor or co-advisor:

- *Tristan Ballard*, ESS, Stanford University, *Principal advisor*, 2017 – present
- *Kelsey Foster*, ESS, Stanford University, *Principal advisor*, 2019 – present

Postdoctoral research advisor:

- *Julian Merder*, Carnegie Institution for Science, 10/2020 – present
- *Gang Zhao*, Carnegie Institution for Science, 06/2020 – present
- *Wu Sun*, Carnegie Institution for Science, 04/2019 – present
- *Yuanyuan Fang*, Carnegie Institution for Science, 08/2012 – 11/2018
- *Dario del Giudice*, Carnegie Institution for Science, 11/2015 – 01/2018
- *Scot Miller*, Carnegie Institution for Science, 07/2015 – 12/2017
- *Chao Li*, Carnegie Institution for Science, 07/2013 – 07/2016
- *Jovan Tadic*, Carnegie Institution for Science, 03/2013 – 06/2016
- *Yuntao Zhou*, Carnegie Institution for Science, 02/2013 – 02/2015
- *Kimberly Mueller*, University of Michigan, 02/2011 – 08/2011
- *Sharon Gourджи*, University of Michigan, 02/2011 – 06/2011
- *Vineet Yadav*, University of Michigan and Carnegie Institution for Science, 02/2008 – 09/2014
- *Deborah Huntzinger*, University of Michigan, 10/2007 – 08/2011

Completed service as doctoral external examiner (international):

- *Martine Rivest*, Génie civil, géologique et des mines, Université de Montréal, Canada, 2012
- *Andrew Keats*, Dept. of Mechanical Engineering, University of Waterloo, Canada, 2009
- *Arun Kansal*, Dept. of Civil and Environmental Engineering, Indian Institute of Technology, 2007

PUBLICATIONS

Journal Publications (double underline denotes Michalak group students, dashed underline denotes Michalak group postdoctoral scholars and research associates)

2021

1. Sun, W., Y. Fang, X. Luo, Y.P. Shiga, Y. Zhang, A.E. Andrews, K.W. Thoning, J.B. Fisher, T.F. Keenan, **A.M. Michalak** (*in press*) "Midwest U.S. croplands determine model divergence in North American carbon fluxes, *AGU Advances*.
2. Ho, J.C., **A.M. Michalak**, N. Pahlevan (2021) "Reply to: Concerns about phytoplankton bloom trends in global lakes," *Nature*, 590, E48-E50, doi:10.1038/s41586-021-03255-2.

2020

3. Schwalm, C.R., D.N. Huntzinger, **A.M. Michalak**, K. Schaefer, J.B. Fisher, Y. Fang, Y. Wei (2020) "Modeling suggests fossil fuel emissions have been driving increased land carbon uptake since the turn of the 20th Century," *Scientific Reports*, 10 (9059), doi:10.1038/s41598-020-66103-9.
4. Ho, J.C., **A.M. Michalak** (2020) "Exploring temperature and precipitation impacts on harmful algalblooms across continental U.S. lakes," *Limnology and Oceanography*, 63, 992-1009, doi: 10.1002/lno.11365.
5. Stough, N., N. Cressie, E.L. Kang, **A.M. Michalak**, K. Sahr (2020) "Spatial analysis and visualization of global data on multi-resolution hexagonal grids," *Japanese Journal of Statistics and Data Science* 3:107–128, doi.org/10.1007/s42081-020-00077-w. (April)
6. He, Y., S. Peng, Y. Liu, X. Li, K. Wang, P. Ciais, M.A. Arain, Y. Fang, J.B. Fisher, D. Goll, D. Hayes, D.N. Huntzinger, A. Ito, A.K. Jain, I.A. Janssens, J. Mao, C. Matteo, **A.M. Michalak**, C. Peng, J. Penuelas, B. Poulter, D. Qin, D.M. Ricciuto, K. Schaefer, C.R. Schwalm, X Shi, H. Tian, S. Vicca, Y. Wei, N. Zeng. Q. Zhu (2020) "Global vegetation biomass production efficiency constrained by models and observations," *Global change biology*, 26 (3), 1474-1484, doi:10.1111/gcb.14816.
7. Huntzinger, D.N., K. Schaefer, C. Schwalm, J.B. Fisher, D. Hayes, E. Stofferahn, J. Carey, **A.M. Michalak**, Y. Wei, A.K. Jain, H. Kolus, J. Mao, B. Poulter, X. Shi, J. Tang, H. Tian (2020) "Evaluation of simulated soil carbon dynamics in Arctic-Boreal ecosystems," *Environmental Research Letters*, 15, 025005, doi:10.1088/1748-9326/ab6784.
8. Randazzo, N.A., **A.M. Michalak**, A.R. Desai (2020) "Synoptic Meteorology Explains Temperate Forest Carbon Uptake," *Journal of Geophysical Research: Biogeosciences*, 125, e2019JG005476, doi:10.1029/2019JG005476.
9. Miller, S.M., **A.M. Michalak** (2020) "The impact of improved satellite retrievals on estimates of biospheric carbon balance," *Atmospheric Chemistry and Physics*, 20 (1), 323–331, doi:10.5194/acp-20-323-2020.

2019

10. Rayner, P.J. , **A.M. Michalak**, F. Chevallier (2019) "Fundamentals of data assimilation applied to biogeochemistry," *Atmospheric Chemistry and Physics*, 19, 13911–13932, doi: 10.5194/acp-19-13911-2019.
11. Schwalm, C.R., K. Schaefer, J.B. Fisher, D. Huntzinger, Y. Elshorbany, Y. Fang, D. Hayes, E. Jafarov, **A.M. Michalak**, M. Piper, E. Stofferahn, K. Wang, Y. Wei (2019) "Divergence in land surface modeling: linking spread to structure," *Environmental Research Communications*, 1, 111004, doi:10.1088/2515-7620/ab4a8a.

12. Ho, J.C., **A.M. Michalak**, N. Pahlevan (2019) "Widespread global increase in intense lake phytoplankton blooms since the 1980s," *Nature*, 574, 667–670, doi:10.1038/s41586-019-1648-7.
13. El Masri, B., C. Schwalm, D.N. Huntzinger, J. Mao, X. Shi, C. Peng, J.B. Fisher, A.K. Jain, H. Tian, B. Poulter, **A.M. Michalak** (2019) "Carbon and Water Use Efficiencies: A Comparative Analysis of Ten Terrestrial Ecosystem Models under Changing Climate," *Scientific Reports*, 9, 14680, doi:10.1038/s41598-019-50808-7.
14. Liu, Y., S. Piao, T. Gasser, P. Ciais, H. Yang, H. Wang, T.F. Keenan, M. Huang, S. Wan, J. Song, K. Wang, I.A. Janssens, J. Penuelas, C. Huntingford, X. Wang, M.A. Arain, Y. Fang, J.B. Fisher, M. Huang, D.N. Huntzinger, A. Ito, A.K. Jain, J. Mao, **A.M. Michalak**, C. Peng, B. Poulter, C. Schwalm, X. Shi, H. Tian, Y. Wei, N. Zeng, Q. Zhu, T. Wang (2019) "Field-experiment constraints on the enhancement of the terrestrial carbon sink by CO₂ fertilization," *Nature Geoscience*, doi:10.1038/s41561-019-0436-1.
15. Ballard, T.C., **A.M. Michalak**, G.F. McIsaac, N.N. Rabalais, R.E. Turner (2019) "Comment on 'Legacy nitrogen may prevent achievement of water quality goals in the Gulf of Mexico'," *Science*, 365 (6455), doi:10.1126/science.aau840.
16. Hu, L., A.E. Andrews, K.W. Thoning, C. Sweeney, J.B. Miller, **A.M. Michalak**, E. Dlugokencky, P.P. Tans, Y.P. Shiga, M. Mountain, T. Nehrkorn, S.A. Montzka, K. McKain, J. Kofler, M. Trudeau, S.E. Michel, S.C. Biraud, M.L. Fischer, D.E.J. Worthy, B.H. Vaughn, J.W.C. White, V. Yadav, S. Basu, I.R. van der Velde (2019) "Enhanced North American carbon uptake associated with El Nino," *Science Advances*, 5 (6), doi:10.1126/sciadv.aaw0076.
17. Ryoo, J., L.T. Iraci, T. Tanaka, J.E. Marrero, E.L. Yates, I. Fung, **A.M. Michalak**, J. Tadic, W. Gore, T.P. Bui, J.M. Dean-Day, C.S. Chang (2019) "Quantification of CO₂ and CH₄ emissions over Sacramento, California, based on divergence theorem using aircraft measurements," *Atmospheric Measurement Techniques*, 12, 2949-2966, doi:10.5194/amt-12-2949-2019
18. Cui, E., K. Huang, M.A. Arain, J.B. Fisher, D.N. Huntzinger, A. Ito, Y. Luo, A.K. Jain, J. Mao, **A.M. Michalak**, S. Niu, N.C. Parazoo, C. Peng, S. Peng, B. Poulter, D.M. Ricciuto, K.M. Schaefer, C.R. Schwalm, X. Shi, H. Tian, W. Wang, J. Wang, Y. Wei, E. Yan, L. Yan, N. Zeng, Q. Zhu, J. Xia (2019) "Vegetation Functional Properties Determine Uncertainty of Simulated Ecosystem Productivity: A Traceability Analysis in the East Asian Monsoon Region," *Global Biogeochemical Cycles*, 33, doi:10.1029/2018GB005909.
19. Ballard, T.C., E. Sinha, **A.M. Michalak** (2019) "Long-Term Changes in Precipitation and Temperature Have Already Impacted Nitrogen Loading," *Environmental Science & Technology*, 53, 5080-5090, doi:10.1021/acs.est.8b06898.
20. Sinha, E., **A.M. Michalak**, K.V. Calvin, P.J. Lawrence (2019) "Societal decisions about climate mitigation will have dramatic impacts on eutrophication in the 21st century," *Nature Communications*, 10 (939), doi:10.1038/s41467-019-08884-w.
21. Kolus, H.R., D.N. Huntzinger, C.R. Schwalm, J.B. Fisher, N. McKay, Y. Fang, **A.M. Michalak**, K. Schaefer, Y. Wei, B. Poulter, J. Mao, N.C. Parazoo, X. Shi (2019) "Land carbon models underestimate the severity and duration of drought's impact on plant productivity," *Scientific Reports*, 9 (2758), doi:10.1038/s41598-019-39373-1.
22. Miller, S.M., **A.M. Michalak**, R.G. Detmers, O.P. Hasekamp, L.M.P. Bruhwiler, S. Schwietzke (2019) "China's coal mine methane regulations have not curbed growing emissions," *Nature Communications*, 10 (303), doi:10.1038/s41467-018-07891.

2018

23. Huang K., J. Xia, Y. Wang, A. Ahlstrom, J. Chen, R.B. Cook, E. Cui, Y. Fang, J.B. Fisher, D.N. Huntzinger, Z. Li, **A.M. Michalak**, Y. Qiao, K. Schaefer, C. Schwalm, J. Wang, Y. Wei, X. Xu, L. Yan, C. Bian, Y. Luo (2018) "Enhanced peak growth of global vegetation and its key mechanisms," *Nature Ecology & Evolution*, 2, 1897-1905, doi:10.1038/s41559-018-0714-0.

24. Touma D., **A.M. Michalak**, D.L. Swain, N.S. Diffenbaugh (2018) "Characterizing the Spatial Scales of Extreme Daily Precipitation in the United States," *Journal of Climate*, 31, 8023-8037, doi:10.1175/JCLI-D-18-0019.1.
25. Shiga, Y.P., **A.M. Michalak**, Y. Fang, K. Schaefer, A.E. Andrews, D.H. Huntzinger, C.R. Schwalm, K. Thoning, Y. Wei (2018) "Forests dominate the interannual variability of the North American carbon sink," *Environmental Research Letters*, 084015, doi:10.1088/1748-9326/aad505.
26. Jeong, S, A.A. Bloom, D. Schimel, C. Sweeney, N.C. Parazoo, D. Medvigy, G. Schaepman-Strub, C. Zheng, C.R. Schwalm, D.N. Huntzinger, **A.M. Michalak**, C.E. Miller (2018) "Accelerating rates of Arctic carbon cycling revealed by long-term atmospheric CO₂ measurements," *Science Advances*, 4 (7), eaao1167, doi:10.1126/sciadv.aao1167.
27. Del Giudice, D., R.L. Muenich, M.M. Kalcic, N.S. Bosch, D. Scavia, **A.M. Michalak** (2018) "On the practical usefulness of least squares for assessing uncertainty in hydrologic and water quality predictions," *Environmental Modelling & Software*, 105, 286-295, doi:10.1016/j.envsoft.2018.03.009.
28. Miller, S.M., **A.M. Michalak**, V. Yadav, J.M. Tadić (2018) "Characterizing biospheric carbon balance using CO₂ observations from the OCO-2 satellite," *Atmospheric Chemistry and Physics*, 18 (9), 6785-6799, doi:10.5194/acp-18-6785-2018.
29. Shiga, Y.P., J.M. Tadić, X. Qiu, V. Yadav, A.E. Andrews, J.A. Berry, **A.M. Michalak** (2018) "Atmospheric CO₂ observations reveal strong correlation between regional net biospheric carbon uptake and solar-induced chlorophyll fluorescence," *Geophysical Research Letters*, 45, doi:10.1002/2017GL076630.
30. Li, C., Y. Fang, K. Caldeira, X. Zhang, N.S. Diffenbaugh, **A.M. Michalak** (2018) "Widespread persistent changes to temperature extremes occurred earlier than predicted," *Scientific Reports*, 8 (1007), doi:10.1038/s41598-018-19288-z.
31. Del Giudice, D., Y. Zhou, E. Sinha, **A.M. Michalak** (2018) "Long-Term phosphorus loading and springtime temperatures explain interannual variability of hypoxia in a large temperate lake," *Environmental Science & Technology*, 52(4) 2046-2054, 10.1021/acs.est.7b04730.

2017

32. Zhou, S., B. Yu, C.R. Schwalm, P. Ciais, Y. Zhang, J.B. Fisher, **A.M. Michalak**, W. Wang, B. Poulter, D.N. Huntzinger, S. Niu, J. Mao, A. Jain, D.M. Ricciuto, X. Shi, A. Ito, Y. Wei, Y. Huang, G. Wang (2017) "Response of water use efficiency to global environmental change based on output from terrestrial biosphere models," *Global Biogeochemical Cycles*, 31, doi:10.1002/2017GB005733.
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Book Chapters, Conference Proceedings, and Other Significant Publications

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152. Body of Knowledge Committee of the Committee on Academic Prerequisites for Professional Practice (2008), "Civil Engineering Body of Knowledge for the 21st Century: Preparing the Civil Engineer for the Future," Second Edition, American Society of Civil Engineers, 181p., Reston, Virginia, Contributor to Outcome 12: Risk and Uncertainty.
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155. Shlomi, S., T. Sakaki, T. Illangasekare, and **A.M. Michalak** (2007), "Evaluation of geostatistical data assimilation methodologies for estimating groundwater plume distributions using 3D sand-tank tracer-tests," in *Proceedings of the 37th Mid-Atlantic Industrial & Hazardous Waste Conference*, pp. 86-92, edited by G.A. Sorial and A. Bagtzoglou, Cincinnati, Ohio.
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157. **Michalak, A.M.** (2004), "Feasibility of contaminant source identification for property rights enforcement," in *Incentives and Conservation, The Next Generation of Environmentalists*, pp. 81-106, edited by Daniel K. Benjamin, PERC, Bozeman, Montana.
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159. **Michalak, A.M.** (2003), "Application of Bayesian Inference Methods to Inverse Modeling for Contaminant Source Identification," *Ph.D. Dissertation submitted to the Department of Civil and Environmental Engineering*, Stanford University, Stanford, California, 292 p.
160. **Michalak, A.M.**, and P.K. Kitanidis (2002), "Application of Bayesian inference methods to inverse modeling for contaminant source identification at Gloucester Landfill, Canada," in *Computational Methods in Water Resources XIV, Volume 2*, pp.1259-1266, edited by S.M. Hassanizadeh, R.J. Schotting, W.G. Gray and G.F. Pinder, Elsevier, Amsterdam, Netherlands.
161. **Michalak, A.M.**, and P.K. Kitanidis (2002), "Application of geostatistical inverse modeling to contaminant source identification at Dover AFB, Delaware," in *International Groundwater Symposium: Bridging the Gap between Measurement and Modeling in Heterogeneous Media*, pp. 137-139 (extended abstract), edited by A.N. Findikakis, IAHR, Madrid, Spain.
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INVITED PRESENTATIONS (selected; major conference plenary or keynote addresses marked with *)

2021

1. **Michalak, A.M.**, A. Andrews, A. Bloom, K. Bowman, B. Byrne, A. Chatterjee, R. Commane, K.J. Davis, S. Feng, K. Foster, H. Graven, L. Hu, J. Liu, C. Miller, S. Miller, N. Parazoo, W. Peters, N. Randazzo, A. Schuh, Y. Shiga, W. Sun, Y. Yin, “Using atmospheric observations to assess drivers of terrestrial carbon flux variability across scales, Invited talk presented to the North American Carbon Program 7th Open Science Meeting, A Series of Virtual Events, March 2021.

2020

2. **Michalak, A.M.**, “Exploring climate impacts on inland and coastal eutrophication,” Talk presented at the Institut für Chemie und Biologie des Meeres (ICBM) Colloquium Series, University of Oldenburg, Oldenburg, Germany, November 2020.
3. **Michalak, A.M.**, “Climate, carbon, and water – Tracking and anticipating human impacts,” Keynote address presented to New York Scientific Data Summit 2020: Data-Driven Discovery in Science and Industry, Brookhaven National Laboratory, Upton, New York, October 2020.
4. **Michalak, A.M.**, “Leveraging atmospheric observations to constrain regional controls on carbon fluxes,” Invited talk presented to the Ecoinformatics seminar series, Northern Arizona University, Flagstaff, Arizona, September 2020.
5. **Michalak, A.M.**, “Carbon and climate: Tracking and anticipating human impacts,” Invited seminar at the Carnegie Science interactive webinar series, June 2020.
6. **Michalak, A.M.**, “Exploring climate impacts on inland and coastal water quality,” Invited talk presented to the Environmental Science & Engineering seminar series, California Institute of Technology, Pasadena, California, May 2020.
7. **Michalak, A.M.**, “Climate, carbon, and water: Tracking and anticipating human impacts,” Invited Tech Talk presented at Google, Mountain View, California, March 2020.
8. **Michalak, A.M.**, “Untangling atmospheric greenhouse gas observations to inform controls on terrestrial carbon flux variability,” Invited talk presented at the Western Photosynthesis Conference, Bodega Bay, California, January 2020.

2019

9. **Michalak, A.M.**, “Exploring climate impacts on inland and coastal eutrophication,” Invited talk presented to the Carnegie Scientific Advisory Council, Washington, D.C., September 2019.
10. **Michalak, A.M.**, “Can you un-stir a creamy cup of coffee? Untangling atmospheric greenhouse gas variability to inform terrestrial carbon balance and its drivers,” Invited talk presented at the Climate Change Seminar at the Pacific Forestry Centre, Victoria, British Columbia, Canada, July 2019.

2018

11. * **Michalak, A.M.**, “Exploring climate impacts on inland and coastal eutrophication,” Opening keynote presented at the 18th International Conference on Harmful Algae, Nantes, France, October 2018.

12. **Michalak, A.M.**, “Exploring climate impacts on inland and coastal water quality,” Distinguished Lecture presented at the Scientific Computing and Imaging (SCI) Institute at the University of Utah, Salt Lake City, Utah, September 2018.
13. **Michalak, A.M.**, “Observational needs for informing modeling in support of climate action,” Invited talk presented at the Better Metrics for More Effective Decision-Making: The Need for a Regionally based Global Environmental Measurement and Monitoring Network, Stanford Photonics Research Center and The Optical Society, Stanford, California, September 2018.
14. * **Michalak, A.M.**, “The expanding role of inverse problems in informing climate science and policy,” Plenary lecture presented to the Society for Industrial and Applied Mathematics (SIAM) Imaging Science conference, University of Bologna, Bologna, Italy, June 2018.
15. **Michalak, A.M.**, “Exploring climate impacts on inland and coastal eutrophication,” Invited talk presented to the Western Numeric Nutrient Criteria Workshop, U.S. EPA Region 9, San Francisco, California, May 2018.
16. **Michalak, A.M.**, “Global perspective on status of HABs,” Invited talk presented to the 2018 Science-Policy Confluence Conference, Great Lakes Harmful Algal Blooms: Science-based Policy Solutions, Environmental Law and Policy Center, Ann Arbor, Michigan, May 2018.
17. **Michalak, A.M.**, “Can you un-stir a creamy cup of coffee? Untangling atmospheric greenhouse gas signatures to reveal what controls emissions,” Invited talk presented to the Physics Colloquium, University of Toronto, Toronto, Canada, March 2018.
18. Sinha, E., **A.M. Michalak**, “Eutrophication will increase during the 21st century as a result of precipitation changes,” Invited talk presented to the OneNOAA Science Seminar Series, Silver Springs, Maryland, January 2018.

2017

19. **Michalak, A.M.**, “Exploring climate impacts on inland and coastal waters,” Invited talk presented at the 9th US Symposium on Harmful Algae, Baltimore, Maryland, November 2017.
20. **Michalak, A.M.**, “Moving from water quantity to quality: Exploring climate impacts on eutrophication,” Invited talk presented to the Paulson School of Engineering and Applied Sciences and the Department of Earth and Planetary Sciences, Harvard University, Cambridge, Massachusetts, September 2017.
21. **Michalak, A.M.**, “Moving from water quantity to quality: Exploring climate impacts on eutrophication,” Invited talk presented at the Berkeley Geography Colloquium, University of California at Berkeley, Berkeley, California, September 2017.
22. * **Michalak, A.M.**, “From ‘missing sink’ to process understanding: The expanding role of top-down studies in carbon cycle science,” Keynote address presented at the Fourth International Conference on Earth System Modelling, Hamburg, Germany, August/September 2017.
23. * **Michalak, A.M.**, “Missing sink or moving target? The expanding landscape of top-down studies in carbon cycle science,” Keynote address to be presented at the 10th International Carbon Dioxide Conference (ICDC10), Interlaken, Switzerland, August 2017.
24. **Michalak, A.M.**, “Key opportunities and challenges in using space-based observations for greenhouse gas flux estimation at regional to global scales,” Invited talk presented at the 13th International Workshop on Greenhouse Gas Measurements from Space (IWGGMS), Helsinki, Finland, June 2017.
25. **Michalak, A.M.**, “Moving from quantity to quality: Exploring climate impacts on inland and coastal waters,” Invited talk presented at the Geophysical Fluid Dynamics Laboratory seminar series, Princeton, New Jersey, March 2017.

2016

26. **Michalak, A.M.**, “Inverse problems for process understanding in carbon cycle science,” Invited talk presented to the Society for Industrial and Applied Mathematics (SIAM) Imaging Science conference, Albuquerque, New Mexico, May 2016.
27. **Michalak, A.M.**, “The role of sustained observations in the US Carbon Cycle Science Plan,” Invited talk presented to the Workshop on Sustained Observations for Carbon Cycle Science and Decision Support, NOAA Earth System Research Laboratory, Boulder, Colorado, April 2016.
28. **Michalak, A.M.**, “Statistical and computational challenges of constraining greenhouse gas budgets,” Invited seminar presented to the Computational Infrastructure for Geodynamics webinar series, University of California at Davis, California, March 2016.
29. **Michalak, A.M.**, “Atmosphere as an integrator of the carbon cycle system,” Invited talk presented to the Development of Predictive Carbon Cycle Science workshop, College Park, Maryland, March 2016.

2015

30. **Michalak, A.M.**, “The North American Carbon Program: It take a village,” Invited talk presented at the American Geophysical Union Fall Meeting, San Francisco, California, December 2015.
31. **Michalak, A.M.**, “Level 3 constraint provided by OCO-2,” Invited talk presented at the OCO-2 Science Team Meeting, Pasadena, California, November 2015.
32. **Michalak, A.M.**, “Convergence of data-intensive and numerically intensive computing in environmental modeling and inverse problems,” Invited talk presented at the White House National Strategic Computing Initiative Workshop, McLean, Virginia, October 2015.
33. **Michalak, A.M.**, “A bird’s eye view of the carbon cycle: Using the atmosphere to inform processes at the land surface,” seminar presented to the Biogeochemical Signals seminar series, Max Planck Institute for Biogeochemistry, Jena, Germany, May 2015.
34. * **Michalak, A.M.**, “Closing science gaps: Bridging across scales and integrating across platforms,” Plenary talk presented to the NASA Carbon Cycle & Ecosystems Joint Science Workshop, College Park, Maryland, April 2015.
35. **Michalak, A.M.**, “Inverse methods,” Invited talk presented to the NRC Committee on Models of the World, Washington, D.C., March 2015.
36. **Michalak, A.M.**, “Extremes in Lake Erie in the 2010s,” Invited talk presented at the 2015 Science-Policy Confluence Conference: Great Lakes Nutrient Management & Water Quality, Environmental Law & Policy Center, Chicago, Illinois, March 2015.
37. * **Michalak, A.M.**, “Statistical and computational challenges of constraining greenhouse gas budgets,” Plenary talk presented at the SIAM Conference on Computational Science and Engineering, Salt Lake City, Utah, March 2015.
38. **Michalak, A.M.**, “The promise of OCO-2 in addressing new questions in carbon cycle science,” Invited talk presented at the OCO-2 Science Team meeting, California Institute of Technology, Pasadena, California, February 2015.
39. **Michalak, A.M.**, “A bird’s eye view of the carbon cycle: Using the atmosphere to inform processes at the land surface,” se presented to the Harvard Atmospheric Sciences Seminar Series, Cambridge, Massachusetts, February 2015.

40. * **Michalak, A.M.**, “The view from above: How have atmospheric observations informed our understanding of the North American carbon cycle?” Plenary talk presented to the North American Carbon Program (NACP) All Investigators’ Meeting, Washington, D.C., January 2015.

2014

41. **Michalak, A.M.**, Y. Fang, V. Yadav, S. Gourджи, K.L. Mueller “Environmental controls on CO₂ flux variability across spatial and temporal scales,” Invited talk presented at the American Geophysical Union Fall Meeting, San Francisco, California, December 2014.
42. **Michalak, A.M.**, J. Ray, Y.P. Shiga, V. Yadav “Assessing regional anthropogenic emissions from observations of atmospheric CO₂,” Invited talk presented at the American Geophysical Union Fall Meeting, San Francisco, California, December 2014.
43. **Michalak, A.M.**, “The *est: Extremes in Lake Erie in the 2010s,” seminar presented to the Environmental Engineering Seminar Series, University of California at Berkeley, November 2014.
44. **Michalak, A.M.**, “The 2011/2012 one-two punch to Lake Erie: Impacts of agricultural management and meteorological trends on eutrophication,” seminar presented to the Environmental & Water Studies Summer Program seminar series, Stanford University, Stanford, California, July 2014.
45. * **Michalak, A.M.**, D.R. Obenour, Y. Zhou “Statistical approaches for assessing and predicting hypoxic extent,” Keynote address presented at the Computational Methods in Water Resources XX. International Conference, University of Stuttgart, Germany, June 2014.
46. **Michalak, A.M.**, “A bird’s eye view of the carbon cycle: Using the atmosphere to inform processes at the land surface,” seminar presented to the Yale School of Forestry & Environmental Studies Seminar Lecture Series, Yale University, New Haven, Connecticut, February 2014.
47. **Michalak, A.M.**, “The 2011/2012 one-two punch to Lake Erie: Impacts of agricultural management and meteorological trends on eutrophication,” seminar presented to the Yale School of Forestry & Environmental Studies, Yale University, New Haven, Connecticut, February 2014.
48. **Michalak, A.M.**, “WSC Category 2: Extreme events impacts on water quality in the Great Lakes: Prediction and management of nutrient loading in a changing climate,” Invited talk presented at the Water Sustainability and Climate PI meeting, Washington, District of Columbia, January 2013.

2013

49. **Michalak, A.M.**, Y. Fang, S.M. Miller, J. Ray, Y.P. Shiga, V. Yadav, J. Zscheischler, “Targeting patterns: A path forward for uncertainty quantification in carbon cycle science?” Abstract GC34C-04 presented at 2013 Fall Meeting, AGU, San Francisco, California, December 2013.
50. **Michalak, A.M.**, “A Bird's-Eye View of the Carbon Cycle: Using the atmosphere to inform processes at the land surface,” Seminar presented to The Centre for Global Change Science, University of Toronto, Toronto, Canada, October 2013.
51. **Michalak, A.M.**, “The 2011/2012 one-two punch to Lake Erie: Impacts of agricultural management and meteorological trends on eutrophication,” Seminar presented to Center for Applied Geoscience, University of Tübingen, Tübingen, Germany, October 2013.

52. **Michalak, A.M.**, “Large scale inverse problems in quantifying emissions and uptake of atmospheric greenhouse gases,” Seminar presented to the Water Earth System Science competence cluster and the Integrated Hydrosystem Modelling International Research Training Group, University of Tübingen, Tübingen, Germany, October 2013.
53. **Michalak, A.M.**, “A Bird's-Eye View of the Carbon Cycle: Spatiotemporal Tools for Constraining the CO₂ Budget from Atmospheric Observations,” Invited talk presented at the Joint Statistical Meeting, Montréal, Canada, August 2013.
54. **Michalak, A.M.**, “Big data meets big models in carbon cycle science: Spatiotemporal tools for constraining the CO₂ budget from atmospheric observations,” Invited talk presented at the Workshop on Large-Scale Inverse Problems and Quantification of Uncertainty: Big Data Meets Big Models, Santa Fe, New Mexico, May 2013.
55. **Michalak, A.M.**, “A bird’s eye view of the carbon cycle: Using the atmosphere to inform processes at the land surface,” Seminar presented to the Atmosphere and Energy Program, Department of Civil and Environmental Engineering, Stanford University, Stanford, California, May 2013.
56. **Michalak, A.M.**, “Big data meets big models in carbon cycle science,” Invited talk presented at the UC Davis Statistical sciences symposium 2013: Analysis of complex and Massive Data, April 2013.
57. * **Michalak, A.M.**, “State of the carbon cycle (NACP and GCP): Have components and their uncertainties changed over time?” Invited plenary talk presented at the NASA Terrestrial Ecology meeting, La Jolla, California, April 2013.
58. **Michalak, A.M.**, “Big data meets big models in carbon cycle science,” Invited talk presented at the Society for Industrial and Applied Mathematics (SIAM) Computational Sciences conference, Boston, Massachusetts, February 2013.
59. * **Michalak, A.M.**, “Mapping NACP progress onto long-term carbon cycle science goals,” Invited plenary talk presented at the 4th North American Carbon Program All-Investigators Meeting, Albuquerque, New Mexico, February 2013.
60. **Michalak, A.M.**, “WSC Category 2: Extreme events impacts on water quality in the Great Lakes: Prediction and management of nutrient loading in a changing climate,” Invited talk presented at the Water Sustainability and Climate PI meeting, Washington, District of Columbia, January 2013.

2012

61. **Michalak, A.M.**, M. Goeckede, S.M. Gourdjji, D. Huntzinger, S.M. Miller, K. Mueller, V. Yadav “Informing improvements to terrestrial biogeochemical models through statistical integration of environmental datasets,” Abstract B34B-07 presented at 2012 Fall Meeting, AGU, San Francisco, California, December 2012.
62. **Michalak, A.M.**, “A bird’s eye view of the carbon cycle,” Invited talk presented at opening workshop for the Program on Statistical and Computational Methodology for Massive Datasets, Statistical and Applied Mathematical Science Institute, Raleigh, North Carolina, September 2012.
63. * **Michalak, A.M.**, “A bird’s eye view of the carbon cycle: Geostatistical approaches for constraining the CO₂ budget from atmospheric observations,” Invited plenary talk presented at the 9th Conference on Geostatistics for Environmental Applications (GeoENV), Valencia, Spain, September 2012.

64. **Michalak, A.M.**, “A bird’s eye view of the carbon cycle,” Invited talk presented at New Methods for Measurements of Photosynthesis from Space, Keck Institute for Space Studies, Caltech, Pasadena, California, August 2012.
65. **Michalak, A.M.**, “A bird’s eye view of the carbon cycle,” Invited talk presented at Lawrence Livermore National Laboratory, Livermore, California, May 2012.
66. **Michalak, A.M.**, R.B. Jackson, G. Marland, C.L. Sabine “A U.S. Carbon Cycle Science Plan, Invited talk presented at the National Aeronautics and Space Administration headquarters, Washington, D.C., March 2012.
67. **Michalak, A.M.**, R.B. Jackson, G. Marland, C.L. Sabine “A U.S. Carbon Cycle Science Plan, Invited talk presented at the United States Department of Agriculture headquarters, Washington, D.C., March 2012.
68. **Michalak, A.M.**, R.B. Jackson, G. Marland, C.L. Sabine “A U.S. Carbon Cycle Science Plan, Invited talk presented at the Department of Energy headquarters, Germantown, Maryland, March 2012.
69. **Michalak, A.M., D. Hammerling**, C. O’Dell, S.R. Kawa “ACOS GOSAT Level 3 data products,” Invited talk presented at The GOSAT Workshop 2012 – Towards GOSAT-2 Mission, Tokyo, Japan, February/March 2012.

2011

70. **Michalak, A.M., K.L. Mueller, S. Gourdjii, V. Yadav** “Uncertainty quantification and parameter estimation for multi-scale systems: Lessons learned from inverse problems aimed at constraining the CO₂ budget from atmospheric observations,” Abstract H11J-03 presented at 2011 Fall Meeting, AGU, San Francisco, California, December 2011.
71. **Michalak, A.M.**, “WSC Category 2: Extreme events impacts on water quality in the Great Lakes: Prediction and management of nutrient loading in a changing climate,” Invited talk presented at the Water Sustainability and Climate PI meeting, Washington, District of Columbia, December 2011.
72. **Michalak, A.M.**, “Mining sparse water quality data using spatial statistics,” Invited talk presented at the Environmental Engineering and Science seminar series, Department of Civil and Environmental Engineering, Stanford University, Stanford, California, December 2011.
73. **Michalak, A.M.**, “A bird’s eye view of the carbon cycle,” Invited talk presented at the Department of Plant Biology seminar series, Carnegie Institution for Science, Stanford, California, November 2011.
74. **Michalak, A.M.**, “A bird’s eye view of the carbon cycle,” Invited talk presented at the Department of Environmental Earth System Science seminar series, Stanford University, Stanford, California, October 2011.
75. **Michalak, A.M.**, “Why can’t we (yet) exploit the Earth Sciences data tsunami,” Invited talk presented at the *What can’t we (yet) do to exploit the Earth Sciences data tsunami* Computational Earth Sciences Forum, Stanford University, Stanford, California, September 2011.
76. **Michalak, A.M.**, “Assimilations and inversions from simulated measurements of CO₂ mixing ratio: A pro-typical example,” Invited talk presented at the ASCENDS (Active Sensing of CO₂ Emissions over Nights, Days, and Seasons) workshop, Greenbelt, Maryland, April 2011.
77. **Michalak, A.M.**, “Assimilations and inversions from simulated measurements: Issues, approaches, and value,” Invited talk presented at the ASCENDS (Active Sensing of CO₂ Emissions over Nights, Days, and Seasons) workshop, Greenbelt, Maryland, April 2011.

78. **Michalak, A.M.**, “Towards a global carbon monitoring system: Assimilating environmental data in a geostatistical framework,” Invited talk presented at the Environmental Science and Engineering seminar series, Colorado School of Mines, Golden, Colorado, March 2011.
79. **Michalak, A.M.**, “Bridging across spatial and temporal scales in carbon dioxide flux estimation,” Invited talk presented at the National Ecological Observing Network, Boulder, Colorado, February 2011.
80. * **Michalak, A.M.**, G. Marland, R. Jackson, and C. Sabine, “The New U.S. Carbon Cycle Science Plan,” Plenary talk presented at the North American Carbon Program All Investigators Meeting, New Orleans, Louisiana, February 2011.
81. **Michalak, A.M.**, “Towards a global carbon monitoring system: Novel approaches for characterizing fluxes, and ongoing research needs,” Invited talk presented at the Jet Propulsion Laboratory, Pasadena, California, January 2011.

2010

82. **Michalak, A.M.**, “Research needs and current approaches for a global carbon monitoring system: Monitoring requirements, synthesis of existing data streams, and emissions verification,” Abstract GC41G-05 presented at 2010 Fall Meeting, AGU, San Francisco, California, December 2010.
83. **Michalak, A.M.**, “Evaluation of constraint provided by current atmospheric monitoring network for quantifying anthropogenic emissions and biospheric carbon fluxes” Abstract A24A-06 presented at 2010 Fall Meeting, AGU, San Francisco, California, December 2010.
84. * **Michalak, A.M.**, “The C-Train: Highlights of A-Train Contributions to Carbon Cycle Science,” Invited keynote address presented at the NASA International Symposium on the A-Train Satellite Constellation, New Orleans, Louisiana, October 2010.
85. **Michalak, A.M.**, G. Marland, R. Jackson, and C. Sabine, “A New U.S. Carbon Cycle Science Plan,” Invited talk presented at the NASA Carbon Monitoring System Scoping Workshop, Boulder, Colorado, July 2010.
86. **Michalak, A.M.**, G. Marland, R. Jackson, and C. Sabine, “A New U.S. Carbon Cycle Science Plan,” Invited talk presented at the Carbon Cycle Science Steering Group meeting, Washington, D.C., June 2010.
87. **Michalak, A.M.**, “Geostatistical inverse modeling for characterizing the global carbon cycle,” Invited seminar presented to the Department of Statistics, University of Michigan, Ann Arbor, Michigan, May 2010.
88. **Michalak, A.M.**, “Towards a global carbon monitoring system: Assimilating in situ and remote sensing observations in a geostatistical framework,” Invited talk presented to Sandia National Laboratories, Livermore, California, April 2010.
89. **Michalak, A.M.**, “Towards a global carbon monitoring system: Assimilating in situ and remote sensing observations in a geostatistical framework,” Invited seminar presented to the Department of Global Ecology of the Carnegie Institution at Stanford University, California, April 2010.
90. * **Michalak, A.M.**, “Overview of Research in Carbon Cycle Science,” Invited plenary talk presented at the NASA Terrestrial Ecology meeting, LaJolla, California, March 2010.
91. **Michalak, A.M.**, “Monitoring Future Climate Treaties,” Invited public panel presentation at the *Quantifying the Sources and Sinks of Atmospheric CO₂* workshop, Keck Institute for Space Studies, California Institute of Technology, Pasadena, California, March 2010.

92. **Michalak, A.M.**, P. Rayner “Overview of top-down methods,” Invited presentation at the *Quantifying the Sources and Sinks of Atmospheric CO₂* workshop, Keck Institute for Space Studies, California Institute of Technology, Pasadena, California, March 2010.

2009

93. **Michalak, A.M.**, A. Chatterjee, S.R. Paradise, A.J. Braverman, C.E. Miller “A geostatistical data fusion technique for merging remote sensing and ground-based observations of aerosol optical thickness,” Invited presentation at the *American Geophysical Union Fall Meeting, EOS Transactions, American Geophysical Union 90 (52)*, Fall Meeting Supplement, Abstract A21G-01, December 2009.
94. **Michalak, A.M.**, “Merging Across Spatial and Temporal Scales in North American Carbon Dioxide Flux Estimation,” Invited seminar presented to the Department of Atmospheric and Oceanic Sciences, University of Wisconsin, Madison, Wisconsin, October 2009.
95. **Michalak, A.M.**, “Mapping Global CO₂ using AIRS data,” Invited talk presented at the Atmospheric Sounding Science Team Meeting, Greenbelt, Maryland, October 2009.
96. **Michalak, A.M.**, “Modeling studies in support of the development of the ASCENDS instrument,” Invited talk presented at the 3rd International Workshop on CO₂ Active Remote Sensing by DiAL, Hampton, Virginia, October 2009.
97. **Michalak, A.M.**, “Prior Error Structures,” Invited talk presented at the TransCom 2009 meeting, Jena, Germany, September 2009.
98. **Michalak, A.M.**, “Geostatistical inverse modeling for characterizing the global carbon cycle,” Invited talk presented at the opening workshop of the Program on Space-time Analysis for Environmental Mapping, Epidemiology, and Climate Change, at the Statistical and Applied Mathematical Science Institute, Research Triangle Park, North Carolina, September 2009.
99. **Michalak, A.M.**, “Contribution of terrestrial land surface to the carbon cycle, evidence from atmospheric models.” Invited plenary talk presented at the Workshop on Land Use / Land Cover Change and the Carbon Cycle, Ann Arbor, Michigan, June 2009.
100. **Michalak, A.M.**, G. Marland, R. Jackson, and C. Sabine, “Status and Review of New Carbon Cycle Science Plan,” Invited talk presented at the Carbon Cycle Science Steering Group meeting, Reston, Virginia, June 2009.
101. **Michalak, A.M.**, “Atmospheric Inverse Modeling, Data Assimilation, and Top-down / Bottom-up Reconciliation,” Invited talk presented at the Greenhouse Gas Information System Workshop, Sandia National Laboratory, Albuquerque, New Mexico, May 2009.
102. **Michalak, A.M.**, “Bridging across Spatial and Temporal Scales in North American Carbon Dioxide Flux Estimation,” Invited seminar presented to the Department of Physics, University of Toronto, Ontario, Canada, April 2009.
103. **Michalak, A.M.**, “Inferring historical forcing using geostatistical methods: Examples from atmospheric and water quality monitoring,” Invited seminar presented to the Department of Civil and Environmental Engineering, University of Illinois at Urbana-Champaign, April 2009.
104. **Michalak, A.M.**, “Improving understanding of carbon flux variability using atmospheric inverse modeling,” Invited talk presented at the symposium “The Carbon Budget: Can We Reconcile Flux Estimates,” at the Annual Meeting of the *American Association for the Advancement of Science (AAAS)*, Chicago, Illinois, February 2009.
105. * **Michalak, A.M.**, C. Sabine, R. Jackson, G. Marland, “The New U.S. Carbon Cycle Science Plan,” Invited plenary talk presented at the 2009 North American Carbon Program (NACP) Investigators’ Conference, San Diego, California, February 2009.

106. **Michalak, A.M.**, “The global carbon cycle and the role of the Orbiting Carbon Observatory,” Invited talk presented at the *Launch Minus 30 Days* press briefing for the Orbiting Carbon Observatory, Washington, D.C., January 2009.
107. **Michalak, A.M.**, G. Marland, R. Jackson, and C.Sabine, “Status and Review of New Carbon Cycle Science Plan,” Invited talk presented at the North American Carbon Program (NACP) Interim Synthesis Meeting, Oak Ridge National Laboratory, Tennessee, January 2009.

2008

108. **Michalak, A.M.**, K. Mueller, V. Yadav, A. Alkhaled, Y. Zhou, S. Gourdjii, D. Huntzinger, A. Hirsch, A. Andrews, S. Wofsy, “Applications of Geostatistics to Data Assimilation in Biogeochemical Models,” Invited presentation at the *American Geophysical Union Fall Meeting, EOS Transactions, American Geophysical Union 89 (53)*, Fall Meeting Supplement, Abstract B33A-0391, December 2008.
109. **Michalak, A.M.**, G. Marland, R. Jackson, and C. Sabine, “Status and Review of New Carbon Cycle Science Plan,” Invited presentation at the Carbon Cycle Science Steering Group meeting, Washington, D.C., December 2008.
110. **Michalak, A.M.**, “Differences in terminology, techniques, and approaches between statisticians and earth scientists,” Invited plenary talk presented at the *Workshop on Uncertainty Management in Remote Sensing of Climate Data*,” organized by the National Academies’ Climate Research Committee (CRC), Committee on Applied and Theoretical Statistics (CATS), and Committee on Earth Studies (CES), Washington, D.C., December 2008.
111. **Michalak, A.M.**, “The role of atmospheric observations in improving understanding of the global carbon cycle,” Invited talk presented at a press conference at NASA Headquarters and to be broadcast on NASA TV (<http://www.nasa.gov/multimedia/nasatv/>), Washington, D.C., November 2008.
112. **Michalak, A.M.**, “Determining regional emissions patterns of non-CO₂ greenhouse gases,” Invited talk presented at the *Spatial and Temporal Distributions of Sources of non-CO₂ Greenhouse Gases (CH₄, CO, N₂O) over North America* Workshop, Boulder, Colorado, October 2008.
113. **Michalak, A.M.**, “Atmospheric CO₂ and ASCENDS Science Background,” Invited plenary talk presented at the NASA ASCENDS Community Workshop, University of Michigan, Ann Arbor, Michigan, July 2008.
114. **Michalak, A.M.**, “Improving Understanding of Global and Regional Carbon Dioxide Flux Variability through Assimilation of in Situ and Remote Sensing Data in a Geostatistical Framework,” Invited talk presented at the 8th Summer Institute for the NOAA Climate and Global Change Postdoctoral Fellowship Program, Steamboat Springs, Colorado, July 2008.
115. **Michalak, A.M.**, A.A. Alkhaled, N. Cressie, A. Braverman, S.R. Kawa, S.C. Olsen, J.-W. Wang, “Mapping global CO₂: Development and application of geostatistical algorithms for gap filling and uncertainty assessment for the Orbiting Carbon Observatory,” Invited talk presented at the 5th International Workshop of Greenhouse Gas Measurements from Space (IWGGMS), California Institute of Technology, Pasadena, California, June 2008.

2007

116. **Michalak, A.M., K. Mueller, S.M. Gourdjji, A. Hirsch, A.E. Andrews, J.C. Lin, and T. Nehrkorn**, “Bridging across spatial and temporal scales in North American CO₂ flux estimation through geostatistical analysis of scale-dependent relationships between carbon flux and auxiliary environmental data,” Invited talk presented at the American Geophysical Union fall meeting, *EOS Transactions, AGU 88 (52)*, Fall Meeting Supplement, Abstract B42C-01, December 2007.
117. **Michalak, A.M.**, “Atmospheric inverse modeling as a tool for constraining the global and regional budgets of carbon dioxide,” Invited talk presented to the interdisciplinary faculty-graduate student seminar series “Engineering Climate Change: Knowledge, Responsibilities, and Actions,” University of Michigan, November 2007.
118. **Michalak, A.M.**, “Inferring historical forcing using geostatistical inverse modeling: Examples from hydrogeology and atmospheric monitoring,” Invited talk presented to the *Department of Civil and Environmental Engineering*, Clarkson University, Potsdam, New York, April 2007.
119. **Michalak, A.M.**, “Improving understanding of global and regional carbon dioxide flux variability through assimilation of in situ and remote sensing data in a geostatistical framework,” Invited talk presented at the *Atmospheric Sciences Seminar Series*, Harvard University, Cambridge, Massachusetts, March 2007.
120. **Michalak, A.M.**, “Improving understanding of global and regional carbon dioxide flux variability through assimilation of in situ and remote sensing data in a geostatistical framework,” Invited talk presented at the *Department of Atmospheric Oceanic and Space Sciences Seminar Series*, University of Michigan, Ann Arbor, Michigan, March 2007.
121. * **Michalak, A.M.**, Invited plenary presentation at wrap-up panel session, U.S. North American Carbon Program (NACP) Investigators Meeting, Colorado Springs, Colorado, January 2007.

2006

122. **Michalak, A.M.**, “Application of Geostatistical Tools for Quantifying Complexity and Uncertainty in Environmental Systems,” Invited talk presented at the *International Symposium on Soil, Groundwater Environment & Waste Management*, The University of Seoul, Seoul, Korea, May 2006.
123. **Michalak, A.M.**, “Application of Geostatistical Tools for Quantifying Complexity and Uncertainty in Environmental Systems,” Invited talk presented at the *IIHR Hydroscience & Engineering seminar series*, University of Iowa, Iowa City, Iowa, March 2006.
124. **Michalak, A.M.**, “Applications of geostatistical tools to constraining the global carbon cycle,” Invited talk presented to the *Department of Chemical and Biochemical Engineering*, University of Iowa, Iowa City, Iowa, March 2006.
125. **Michalak, A.M.**, “Quantifying the Spatial Covariance Structure of Modeled X_{CO2} Distributions: A Tool for Informing the Level 1b Subsampling Strategy,” Invited talk presented at the *Orbiting Carbon Observatory (OCO) Science Team Meeting*, Pasadena, California, March 2006.
126. **Michalak, A.M.**, “Improved Carbon Flux Estimates through Assimilation of Auxiliary Environmental Data,” Invited talk presented at the *Data Assimilation Techniques for Regional Estimates of North American Carbon Fluxes* workshop, NOAA, Boulder, Colorado, February 2006.

2005

127. **Michalak, A.M.**, “Estimating Sources and Sinks of Atmospheric Trace Gases Using Geostatistical Inverse Modeling,” Invited talk presented to the *Physical Sciences group, Women in Science and Engineering group, and Natural Resources group* of the University of Michigan Undergraduate Research Opportunity Program, Ann Arbor Michigan, November 2005.
128. **Michalak, A.M.**, “Estimating Sources and Sinks of Atmospheric Trace Gases Using Geostatistical Inverse Modeling, *or Why Should Atmospheric Scientists Care about a South African Mining Engineer Named Dr. Krige?*,” Invited talk presented at the *Department of Atmospheric Oceanic and Space Sciences Seminar Series*, University of Michigan, Ann Arbor, Michigan, October 2005.
129. **Michalak, A.M.**, “Inferring historical forcing using geostatistical inverse modeling: Examples from hydrogeology and atmospheric monitoring,” Invited talk presented at the *Smith Lecture Series*, Department of Geological Sciences, University of Michigan, Ann Arbor, Michigan, September 2005.
130. **Michalak, A.M.**, “Atmospheric Inverse Modeling as a Tool for Constraining the Global and Regional Budgets of Carbon Dioxide,” Invited talk presented at the headquarters of the *Meteorological Service of Canada*, Toronto, Ontario, Canada, May 2005.
131. **Michalak, A.M.**, “Data-driven Inverse Modeling Methods for Constraining Global and Regional Budgets of Carbon Dioxide,” Invited talk presented at the *Department of Geography*, University of Toronto, Toronto, Ontario, Canada, May 2005.
132. **Michalak, A.M.**, I.G. Enting “Residual analysis as a statistical diagnostics tool for carbon flux inversions,” Invited talk presented at the *Orbiting Carbon Observatory (OCO) Science Team Meeting*, California Institute of Technology, Pasadena, California, March 2005.

1999-2004

133. **Michalak, A.M.**, “Application of Geostatistical Inverse Modeling to High Resolution Carbon Flux Estimation Involving Disparate Data Types,” Invited talk presented at the *Modeling and Data Analysis of Atmospheric CO₂ Observations in North America* workshop, Boulder, Colorado, October 2004.
134. **Michalak, A.M.**, “Using Geostatistics to Constrain Groundwater Contaminant Source Identification... and more!” Invited talk presented to the *Hydrologic Science and Water Resources Seminar Series* at the Department of Civil, Environmental and Architectural Engineering at the University of Colorado, Boulder, Colorado, February 2004.
135. **Michalak, A.M.**, “Environmental Contamination with Multiple Potential Sources: Scientific Methods for Source Identification and Their Legal Applicability,” Invited talk presented to the *Environmental and Energy Systems Institute* at Rice University, Houston, Texas, November 2002.
136. **Michalak, A.M.**, “Environmental Contamination with Multiple Potential Sources and the Common Law: Problems, Opportunities and Statistics,” Invited talk presented at *The Association of Private Enterprise Education International Convention*, Cancun, Mexico, April 2002.
137. **Michalak, A.M.**, “Approaches to Contaminant Source Identification for Environmental Law Enforcement,” Invited talk presented at the *Environmental Crime Prevention Program (ECPP) Plenary Inter-Ministerial Meeting*, EPA Region 2 Headquarters, New York City, New York, November, 2000.

138. **Michalak, A.M.**, “Feasibility of Contaminant Source Identification for Property Rights Enforcement,” Invited talk presented at the *1999 Political Economy Forum*, Chico, Montana, December 1999.

CONTRIBUTED PUBLISHED ABSTRACTS AND CONFERENCE PRESENTATIONS

Contributed published abstracts and conference presentations are not listed for brevity.