

GALEN A. MCKINLEY

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EDUCATION

June 2002	Massachusetts Institute of Technology <i>Ph.D. Climate Physics and Chemistry</i> Thesis: <i>Interannual Variability of Air-Sea Fluxes of Carbon Dioxide and Oxygen</i> Advisors: John Marshall and Mick Follows	Cambridge MA
May 1995	Rice University <i>B.S. Civil Engineering</i>	Houston TX

RESEARCH AND PROFESSIONAL EXPERIENCE

2017 to present	Columbia University / Lamont Doherty Earth Observatory <i>Professor, Earth and Environmental Sciences</i> I study the ocean carbon cycle and its role in the global carbon cycle. I am particularly interested in physical and biogeochemical drivers of variability in the ocean carbon cycle and distinguishing this variability from anthropogenic trends.	New York NY / Palisades NY
2017 to present	University of Wisconsin - Madison <i>Adjunct Professor, Atmospheric and Oceanic Sciences</i>	Madison WI
2016 to 2017	<i>Professor, Atmospheric and Oceanic Sciences and Bryson Professor, Center for Climatic Research</i>	
2011 to 2016	<i>Associate Professor, Atmospheric and Oceanic Sciences</i>	
2004 to 2011	<i>Assistant Professor, Atmospheric and Oceanic Sciences</i>	
summer 2011	Woods Hole Oceanographic Institution <i>Institution Visiting Scholar in Physical Oceanography and Marine Chemistry and Geochemistry</i>	Woods Hole MA
2003 to 2004	Princeton University / University of Wisconsin - Madison <i>Visiting Research Staff / Anna Julia Cooper Postdoctoral Fellow</i> Studied Ar and N ₂ in a ocean and atmospheric models; worked on refining the global air-sea exchange rate with ¹⁴ C and inverse techniques; and continued work on variability of air-sea CO ₂ and O ₂ fluxes.	Princeton NJ
2002 to 2003	Instituto Nacional de Ecología (National Institute of Ecology) <i>Consultant</i> Analyzed potential public health co-benefits from the simultaneous control of air pollutant and greenhouse gas emissions in Mexico City; capacity building for integrated environmental protection.	Mexico City, Mexico
1996 to 2002	Massachusetts Institute of Technology <i>Graduate Research assistant and Postdoctoral associate</i> Studied the impacts of physical variability on ocean biogeochemical cycles, particularly air - sea fluxes of CO ₂ and O ₂ , using ocean general circulation models.	Cambridge MA
1995 to 1996	Brown and Root Environmental <i>Environmental specialist</i> Assisted industrial clients with environmental compliance; duties included water and soil sampling, hazardous waste abatement, and air pollution modeling.	Houston TX
summer 1993	Clivius Multrum, USA <i>Project consultant</i>	Newton MA

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PEER-REVIEWED PUBLICATIONS (students: grad*, undergrad**; postdoc⁺)

Diffenbaugh, N.S., C.B. Field, E. Appel, I. Azevedo, D. Baldocchi, M. Burke, J. Burney, P. Ciais, S.J. Davis, A.M. Fiore, S. Fletcher, T. Hertel, D.E. Horton, S. Hsiang, R.B. Jackson, X. Jin, M. Levi, D. Lobell, G.A. McKinley, F.C. Moore, A. Montgomery, K.C. Nadeau, D. Pataki, J.T. Randerson, M. Reichstein, J.L. Schnell, S.I. Seneviratne, D. Singh, A. Steiner and G. Wong-Parodi (2020) The COVID-19 Lockdowns: A Window into the Earth System, *Nature Reviews Earth & Environment*, doi:10.1038/s43017-020-0079-1. (59)

Ridge, S.M.* and G.A. McKinley. Advective controls on the North Atlantic anthropogenic carbon sink, *Global Biogeochem. Cycles*, doi:10.1029/2019GB006457. (58)

McKinley, G.A., A. Fay , Y. Eddebbar, L. Gloege* and N.S. Lovenduski (2020) Forced mechanisms explain recent variability of the ocean carbon sink, *AGU Advances*, doi: 10.1029/2019AV000149. (57)

Gloege, L*, G.A. McKinley, R. Mooney, J.D. Allan, M. Diebel and P. McIntyre (2020) Lake hydrodynamics intensify the potential impact of watershed pollutants on coastal ecosystem service, *ERL*, doi:10.1088/1748-9326/ab7f62. (56)

Uchida, T., D. Balwada, R. Abernathey, G.A. McKinley, S. Smith & M. Levy (2020) Eddy iron fluxes control primary production in the open Southern Ocean, *Nature Communications*, doi:10.1038/s41467-020-14955-0. (55)

Uchida, T., D. Balwada, R. Abernathey, G.A. McKinley, S. Smith and M. Levy (2019) The contribution of submesoscale over mesoscale eddy iron transport in the open Southern Ocean, *J. Adv. Model. Earth Sys.*, doi:10.1029/2019MS001805. (54)

Chen, H.*, and G.A. McKinley (2019) Isopycnal processes allow for summertime net heterotrophy despite net oxygen accumulation in the lower euphotic zone of the North Atlantic subtropical gyre, *Global Biogeochem. Cycles*, doi: 10.1029/2018GB006094. (53)

McKinley, G.A., A.L. Ritzer*, and N.S. Lovenduski (2018) Mechanisms of northern North Atlantic biomass variability, *Biogeosciences* 15, 6049-6066, doi:10.5194/bg-15-6049-2018. (52)

Fay, A.R.*, N.S. Lovenduski, G.A. McKinley, D.R. Munro, C. Sweeney, A.R. Gray, P. Landschutzer, B. Stephens, T. Takahashi, N. Williams (2018) Utilizing the Drake Passage Time-series to understand variability and change in subpolar Southern Ocean pCO₂, *Biogeosciences*, 15, 3841-3855, doi:10.5194/bg-15-3841-2018. (51)

Muller-Karger, Frank; Hestir, Erin; Ade, Christiana; Turpie, Kevin; Roberts, Dar; Siegel, David; Miller, Robert; Humm, David; Izenberg, Noam; Keller, Mary; Morgan, Frank; Frouin, Robert; Dekker, Arnold; Gardner, Royal; Goodman, James; Schaeffer, Blake; Franz, Bryan; Pahlevan, Nima; Mannino, Antonio; Concha, Javier; Ackleson, Steven; Cavanaugh, Kyle; Romanou, Anastasia; Tzortziou, Maria; Boss, Emmanuel; Pavlick, Ryan; Freeman, Anthony; Rousseaux, Cecile; Dunne, John; Long, Matthew; Klein, Eduardo; McKinley, G.A.; Letelier, Ricardo; Kavanaugh, Maria; Roffer, Mitchell; Goes, Joaquim; Bracher, Astrid; Arrigo, Kevin; Dierssen, Heidi; Zhang, Xiaodong; Davis, Frank; Best, Ben; Guralnick, Robert; Moisan, John; Sosik, Heidi; Kudela, Raphael; Mouw, Colleen; Barnard, Andrew; Palacios, Sherry; Roesler, Collin; Drakou, Evangelia; Appeltans, Ward. (2018) Satellite Sensor Requirements for Monitoring Essential Biodiversity Variables of Coastal Ecosystems. *Ecological Applications*, 18, doi: 10.1002/eap.1682. (50)

Peters, G.P., C. LeQuere, R.M. Andrew, J.G. Canadell, P. Friedlingstein, T. Ilyina, R.B. Jackson, F. Joos, J.I. Korsbakken, G.A. McKinley, S. Sitch, and P. Tans (2017) Towards real-time verification of CO₂ emissions, *Nature Climate Change*, doi: 10.1038/s41558-017-0013-9. (49)

Golub, M., A.R. Desai, G.A. McKinley, C.K. Remucal, and E.H. Stanley (2017) Large uncertainty in estimating pCO₂ from carbonate equilibria in lakes, *J. Geophys. Res.- Biogeosci.*, 122 doi:10.1002/2017JG003794. (48)

Pilcher, D.J.*, G.A. McKinley, J. Kralj**, H.A. Bootsma and E.D. Reavie (2017) Modeled sensitivity of Lake Michigan productivity and zooplankton to changing nutrient concentrations and quagga mussels, *J. Geophys. Res. Biogeosci.*, 122, 2017–2032, doi:10.1002/2017JG003818. (47)

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Gloege, L.* , G.A. McKinley, Mouw, C.B.⁺ and A. Ciochetto (2017) Global evaluation of particulate organic carbon flux parameterizations, *Global Biogeochem. Cycles*, 31, 1192–1215, doi:10.1002/2016GB005535. (46)

Orr, J. C., Najjar, R. G., Aumont, O., Bopp, L., Bullister, J. L., Danabasoglu, G., Doney, S. C., Dunne, J. P., Dutay, J.-C., Graven, H., Griffies, S. M., John, J. G., Joos, F., Levin, I., Lindsay, K., Matear, R. J., McKinley, G. A., Mouchet, A., Oschlies, A., Romanou, A., Schlitzer, R., Tagliabue, A., Tanhua, T., and Yool, A. (2017) Biogeochemical protocols and diagnostics for the CMIP6 Ocean Model Intercomparison Project (OMIP), *Geosci. Model Dev.*, 10, 2169–2199, doi:10.5194/gmd-10-2169-2017. (45)

Fay, A.R.* and G.A. McKinley (2017) Correlations of surface ocean pCO₂ to satellite chlorophyll on timescales from monthly to interannual, *Global Biogeochem. Cycles*, 31, 436–455, doi:10.1002/2016GB005563. (44)

McKinley, G.A., A.R. Fay*, N. Lovenduski, and D.J. Pilcher (2017) Natural variability and anthropogenic trends in the ocean carbon sink, *Ann. Rev. Mar. Sci.* 9: 125–150, doi: 10.1146/annurev-marine-010816-060529. (43)

Mouw, C.B.⁺, A. Barnett, G.A. McKinley, L. Gloege* and D.J. Pilcher* (2016) Phytoplankton size impact on export flux in the global ocean, *Global Biogeochem. Cycles*, 30, doi:10.1002/2015GB005355. (42)

Mouw, C.B.⁺, A. Barnett, G.A. McKinley, L. Gloege* and D.J. Pilcher* (2016) Global ocean particulate organic carbon flux merged with satellite parameters. *Earth Syst. Sci. Data*, 8, 531–541, doi:10.5194/essd-8-531-2016. (41)

Lovenduski, N., G.A. McKinley, A.R. Fay*, K. Lindsay and M.C. Long (2016) Partitioning uncertainty in ocean carbon uptake projections, *Global Biogeochem. Cycles*, 29, 416–426, doi: 10.1002/2016GB005426. (40)

McKinley, G.A., D.J. Pilcher*, A.R. Fay*, K. Lindsay, M.C. Long, and N. Lovenduski (2016) Timescales for detection of trends in the ocean carbon sink, *Nature*, 530, 469–472, doi:10.1038/nature16958. (39)

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Phillips, J.* , G.A. McKinley, V. Bennington*⁺, H. Bootsma, D. Pilcher*, R.W. Sterner, N.R. Urban (2015) Evaluating the potential for CO₂-induced acidification of the Laurentian Great Lakes, *Oceanography* 28(2), 136–145. doi:10.5670/oceanog.2015.37. (35)

Lovenduski, N., A.R. Fay*, G.A. McKinley (2015) Observing multi-decadal trends in Southern Ocean CO₂ uptake: What can we learn from an ocean model? *Global Biogeochem. Cycles*, doi: 10.1002/2014GB004933. (34)

Pilcher, D.J.* , G.A. McKinley, V. Bennington*⁺ and H. Bootsma (2015) Physical and biogeochemical mechanisms of internal carbon cycling in Lake Michigan, *J. Geophys. Res.*, doi: 10.1002/2014JC010594. (33)

Kitchell, J.F., T. Cline, V. Bennington*⁺ and G.A. McKinley (2015) Challenges of managing invasive sea lamprey in Lake Superior. In *Bioeconomics of Invasive Species: Integrating Ecology, Economics, Policy and Management*. ed: R. P. Keller, D. M. Lodge, M. A. Lewis, J. F. Shogren, University of Chicago Press. (32)

Fay, A.R.* , G.A. McKinley and N. Lovenduski (2014) Southern Ocean carbon trends: Sensitivity to methods, *Geophys. Res. Lett.* doi: 10.1002/2014GL061324. (31)

Fay, A. R.* , and G. A. McKinley (2014) Global ocean biomes: mean and temporal variability, *Earth Syst. Sci. Data*, 6, 273–284, doi:10.5194/essd-6-273-2014. (30).

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Cline, T., J.F. Kitchell, V. Bennington^{*,+}, G.A. McKinley, E.K. Moody and B.C. Weidel (2014) Climate impacts on landlocked sea lamprey: Implications for host-parasite interactions and invasive species management, *Ecosphere* 5(6), art68. dx.doi.org/10.1890/ES14-00059.1. (29).

Fay, A.R.* and G.A. McKinley (2013) Global trends in surface ocean pCO₂ from in situ data, *Global Biogeochem. Cycles*, 27, doi:10.1002/gbc.20051. (28).

Khatiwala, S., T. Tanhua, S. Mikaloff Fletcher, M. Gerber, S.C. Doney, H.D. Graven, N. Gruber, G.A. McKinley, A. Murata, A.F. Rios, C.L. Sabine and J.L. Sarmiento (2013) Global Ocean Carbon Storage, *Biogeosciences* 10, 2169-2191, doi:10.5194/bg-10-2169-2013. (27).

Wanninkhof, R., G.H. Park, T. Takahashi, C. Sweeney, R. Feely, Y. Nojiri, N. Gruber, S. C. Doney, G.A. McKinley, A. Lenton, C. Le Quéré, C. Heinze, J. Schwinger, H. Graven and S. Khatiwala (2013) Global ocean carbon uptake: magnitude, variability and trends, *Biogeosciences* 10, 1983-2000, doi:10.5194/bg-10-1983-2013. (26).

Mouw, C.B.⁺, H. Chen*, G.A. McKinley, S. Effler, D. O'Donnell, M.G. Perkins and C. Strait (2013) Evaluation and optimization of bio-optical inversion algorithms for remote sensing of Lake Superior's optical properties, *J. Geophys. Res.-Oceans* 118, doi:10.1002/jgrc.20139. (25)

Schuster, U., G.A. McKinley, N. Bates, F. Chevallier, S.C. Doney, A.R. Fay*, M. González-Dávila, N. Gruber, S. Jones, J. Krijnen, P. Landschützer, N. Lefèvre, M. Manizza, J. Mathis, N. Metzl, N., A. Olsen, A.F. Rios, C. Rödenbeck, J. M. Santana-Casiano, T. Takahashi, R. Wanninkhof, and A.J. Watson (2013) Atlantic and Arctic sea-air CO₂ fluxes, 1990–2009. *Biogeosciences* 10, 607-627, doi:10.5194/bg-10-607-2013. (24)

Bennington, V.*⁺, G.A. McKinley, N. Urban, and C. McDonald (2012) Can spatial heterogeneity explain the perceived imbalance in Lake Superior's carbon budget? a model study, *J. Geophys. Res. – Biogeosci.* 117, G03020 doi:10.1029/2011JG00189. (23)

McDonald, C.P., V. Bennington^{*,+}, N. Urban and G.A. McKinley (2012) Test-bed calibration of a Lake Superior biogeochemical model, *Ecol. Model.* 225, 115–126, doi: 10.1016/j.ecolmodel.2011.11.021. (22)

Vasys, V.N.**, A.R. Desai, G.A. McKinley, V. Bennington*, A.M. Michalak, and A.E. Andrews (2011). Influence of large lake carbon exchange on regional tracer transport inversions. *Envi. Res. Lett.*, 6 034016. (21)

McKinley, G.A., A. Fay*, T. Takahashi and N. Metzl (2011) Convergence of atmospheric and North Atlantic CO₂ trends on multidecadal timescales. *Nature Geoscience*, doi:10.1038/ngeo1193. (20)

Atilla, N.⁺, G. A. McKinley, V. Bennington*, M. Baehr, N. Urban, M. DeGrandpre, A. Desai and C. Wu (2011), Observed variability of Lake Superior pCO₂, *Limnol. Oceanogr.*, 56(3), 775–78, doi:10.4319/lo.2011.56.3.0775. (19)

Bennington, V.*⁺, G. A. McKinley, N. Kimura⁺ and C. Wu (2010) The general circulation of Lake Superior: Mean and interannual variability from 1979-2008, *J. Geophys. Res.* 115, C12015, doi:10.1029/2010JC006261. (18)

Saba, V. S., M. A. M. Friedrichs, M.-E. Carr, D. Antoine, R. A. Armstrong, I. Asanuma, O. Aumont, N. R. Bates, M. J. Behrenfeld, V. Bennington*, L. Bopp, J. Bruggeman, E. T. Buitenhuis, M. J. Church, A. M. Ciotti, S. C. Doney, M. Dowell, J. P. Dunne, S. Dutkiewicz, W. Gregg, N. Hoepffner, K. J. W. Hyde, J. Ishizaka, T. Kameda, D. M. Karl, I. Lima, M. W. Lomas, J. Marra, G. A. McKinley, F. Mélin, J. K. Moore, A. Morel, B. Salihoglu, M. Scardi, T. J. Smyth, S. Tang, J. Tjiputra, J. Uitz, M. Vichi, K. Waters, T. K. Westberry, and A. Yool (2010) The challenges of modeling marine primary productivity through multidecadal climate shifts: A case study at BATS and HOT, *Global Biogeochem. Cycles*. 24, GB3020, doi:10.1029/2009GB003655. (17)

Illari L., J. Marshall, P. Bannon, J. Botella, R. Clark, T. Haine, A. Kumar, S. Lee, K. J. Mackin, G.A. McKinley, M. Morgan, R. Najjar, T. Sikora, and A. Tandon (2009) Weather in a Tank: Exploiting laboratory experiments in the teaching of meteorology, oceanography and climate. *Bull. Amer. Meteorol. Soc.* 90(11), doi:10.1175/2009BAMS2658.1. (16)

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- Ullman, D.*, G.A. McKinley, V. Bennington*, and S. Dutkiewicz (2009) Trends in North Atlantic carbon sink: 1992-2006. *Global Biogeochem. Cycles*, 23, GB4011, doi:10.1029/2008GB003383. (14)
- Bennington, V.*, G. A. McKinley, D. Ullman* and S. Dutkiewicz (2009) What does chlorophyll variability tell us about export and CO₂ flux variability? *Global Biogeochem. Cycles*, 23, GB3002, doi:10.1029/2008GB00341. (13)
- Koch, J.***, G. A. McKinley, V. Bennington*, and D. Ullman* (2009), Do hurricanes cause significant interannual variability in the air-sea CO₂ flux of the subtropical North Atlantic?, *Geophys. Res. Lett.*, 36, L07606, doi:10.1029/2009GL037553. (12)
- Cassar, N., G.A. McKinley, M.L. Bender, R. Mika, and M. Battle (2008) Comparison of atmospheric Ar/N₂ time-series and paired ocean-atmosphere model predictions, *J. Geophys. Res.* 113, D21122, doi:10.1029/2008JD009817. (11)
- Nevison, C. D., N. M. Mahowald, S. C. Doney, I. D. Lima, G. R. van der Werf, J. T. Randerson, D. F. Baker, P. Kasibhatla, and G. A. McKinley (2008), Contribution of ocean, fossil fuel, land biosphere, and biomass burning carbon fluxes to seasonal and interannual variability in atmospheric CO₂, *J. Geophys. Res.*, 113, G01010, doi:10.1029/2007JG000408. (10)
- Sweeney, C., E. Gloor, A.R. Jacobson, R.M. Key, G.A. McKinley, J. L. Sarmiento, R. Wanninkhof (2007) Constraining global air-sea gas exchange for CO₂ with recent bomb ¹⁴C measurements, *Global Biogeochem. Cycles* 21, GB2015, doi:10.1029/2006GB002784. (9)
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- McKinley, G.A., M. Zuk, M. Höjer, M. Avalos, I. Gonzalez, R. Iniestra, I. Laguna, M.A. Martinez, P. Osnaya, and J. Martinez (2005) Quantification of local and global benefits from air pollution control in Mexico City. *Envi. Sci. Technol.* 39, 1954-1961, doi:10.1021/es035183e. (7)
- Peylin, P., P. Bousquet, C. LeQuere, S. Sitch, P. Friedlingstein, G.A. McKinley, N. Gruber, P. Rayner and P. Ciais (2005) Multiple constraints of regional CO₂ flux variations over land and oceans, *Global Biogeochem. Cycles* 19, GB1011, doi: 10.1029/2003GB002214. (6)
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PUBLICATIONS IN REVIEW

Gloege, L.*, G.A. McKinley, P. Landschützer, N.S. Lovenduski, K.B. Rodgers, A. Fay, T. Frölicher, J.C. Fyfe, T. Illyina, S.D. Jones, C. Rödenbeck, S. Schlunegger and Y. Takano: Large ensemble testbed to evaluate pCO₂ interpolation methods, *GBC in review*.

Ridge, S.M.*, and G.A. McKinley. Ocean carbon uptake under aggressive emission mitigation, *Biogeosciences Discussion / Biogeosciences, in review*.

Stamell, J.*, R.R. Rustagi*, L. Gloege*, and G.A. McKinley. Strengths and weaknesses of three Machine Learning methods for pCO₂ interpolation, *Geoscientific Model Development Discussions / in review for Geoscientific Model Development*.

PUBLICATIONS IN PREPARATION

Ridge, S.M.*, G.A. McKinley and M. Long. Impacts of future freshening on the subpolar North Atlantic, *GRL in prep*.

Gloege, L.*, M. Yan, T. Zheng and G.A. McKinley. A Hybrid Physics Data (HPD) approach to global mapping of sparse surface ocean carbon data, *in prep*.

SCIENTIFIC PLANNING AND REVIEW DOCUMENTS

Bingham, F., L. Juranek, M. Mazloff, G.A. McKinley, N. Nelson, S. Wijffels (2019) Review of US GO-SHIP (Global Oceans Ship-Based Hydrographic Investigators Program) An OCB and US CLIVAR Report. Report 2019 (OCB) and 2019-6 (US CLIVAR). 112pp. doi:10.1575/1912/24897.

Benway, H., S. Alin, E. Boyer, W.-J. Cai, P. Coble, J. Cross, M. Friedrichs, M. Goñi, P. Griffith, M. Herrmann, S. Lohrenz, J. Mathis, G.A. McKinley, R. Najjar, C. Pilska, S. Siedlecki, R. Smith (2016). A Science Plan for Carbon Cycle Research in North American Coastal Waters. Report of the Coastal CARbon Synthesis (CCARS) community workshop, August 19-21, 2014, Ocean Carbon and Biogeochemistry Program and North American Carbon Program, 84 pp., doi: 10.1575/1912/7777.

Michalak, A.M., R.B. Jackson, G. Marland, C. Sabine and The Carbon Cycle Working Group: R.F. Anderson, D. Bronk, K.J. Davis, R.S. Defries, A. S. Denning, L. Dilling, A. Jacobson, S. Lohrenz, A.D. McGuire, G.A. McKinley, C. Miller, B. Moore III, D.S. Ojima, B. O'Neill, J.T. Randerson, S.W. Running, B. Sohngen, P.P. Tans, P.E. Thornton, S.C. Wofsy, N. Zeng (2011) A U.S. Carbon Cycle Science Plan, a UCAR report.

Alin S.R., J. Day, G.A. McKinley, C. Stow, M. Baker, E. Brody, R. Bohn, T. Nalepa, T. Heatlie, A.J. Sutton, and R.A. Feely (2010) Great Lakes Region Acidification Research Plan—NOAA Ocean Acidification Steering Committee: NOAA Ocean and Great Lakes Acidification Research Plan, NOAA Special Report, 143 pp.

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OTHER PUBLICATIONS AND PRODUCTS

Mouw, C.B.⁺ A. Barnett, G.A. McKinley, L. Gloege* and D.J. Pilcher* (2016) Global Ocean Particulate Organic Carbon flux merged with satellite parameters. doi:10.1594/PANGAEA.855600.

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Bracco, A., M.C. Long, N.M. Levine, R.Q. Thomas, C. Deutsch and G.A. McKinley (2015) NCAR's Summer Colloquium: Capacity Building in Cross-Disciplinary Research of Earth System Carbon–Climate Connections. *Bull. Amer. Meteor. Soc.*, **96**, 1381–1384. doi:10.1175/BAMS-D-13-00246.1.

Fay, A.R.* and G.A. McKinley (2014) Global Ocean Biomes: Mean and time-varying maps. doi:10.1594/PANGAEA.828650.

Thomas, R.Q., G.A. McKinley, and M.C. Long (2013) Examining uncertainties in representations of the carbon cycle in Earth System Models. *EOS* 94:460.

Mooney, M.E., S. Ackerman, S., G.A. McKinley, T. Whittaker and T. Jasmin (2012) Lesson plans and classroom activities from the Climate Literacy Ambassadors community. *The Earth Scientist* 28, 30-32.

McKinley, G.A., N. Urban, V. Bennington*⁺, D. Pilcher* and C. McDonald (2011) Preliminary carbon budgets for the Laurentian Great Lakes, OCB News, Spring/Summer 2011.

McKinley, G. A. (2008), Fixing Climate: What Past Climate Changes Reveal About the Current Threat—And How to Counter It (*Book review*), *Eos Trans. AGU*, 89(43), 422–422, doi:10.1029/2008EO430009.

GALEN A. MCKINLEY

PROFESSIONAL SERVICE

2020 to present **OCB Working Group on Ocean Carbon Gaps**
Chair

2020 to present **The Oceanography Society**
Chemical Oceanography Councilor, 2020-2022

2019 to present **Annual Reviews of Earth and Planetary Science, Editorial Board**
Editorial Board, 2019-2024

2019 to present **Defense Science Study Group Alumni Outreach Committee**
Committee of 10 recent DSSG alumni; tasked by IDA to advise on alumni engagement

2014 to present **Ocean Model Intercomparison Project Scientific Steering Committee (OMIP6-SSC)**
This is the 6th round of ocean model intercomparison under the CMIP6 umbrella.

April 2020 **ECCO Review Panel, NASA, Washington DC**
Invited panel member

February 2020 **AGU/ASLO/TOS Ocean Sciences 2020, San Diego CA**
Co-convener and chair: “The Evolving Ocean Carbon Sink: Processes and Impacts ”

October 2019 **Expert Workshop on Integrated Ocean Carbon Research (IOCR), Paris, France**
Invited participant and speaker

October 2019 **CMIP6 Hackathon, Boulder CO / Palisades NY / Seattle WA / ETH Zurich**
Co-organizer of OCB and CLIVAR sponsored hackathon

September 2019 **Vetlesen Prize Selection Committee**
Awarded bi-annually for distinction in earth science research

2018 to 2019 **GO SHIP Program Review Committee**
Committee of 6; tasked by OCB and US CLIVAR to review the repeat hydrography program

2017 to 2019 **AGU Chapman Conference, La Jolla CA**
Program committee for conference: “Understanding carbon climate feedbacks”, August 2019

December 2018 **American Geophysical Union Fall Meeting, Washington DC**
Co-convener and chair: “Understanding changing ocean biogeochemistry”

December 2018 **Ocean carbon uptake in CMIP6 models, Washington DC**
Co-organizer of OCB-sponsored workshop

2014 to 2018 **Global Carbon Project Scientific Steering Committee (GCP-SSC)**
The GCP coordinates international carbon cycle activities under Future Earth.

June 2018 **The effects of climate change on the world’s oceans, Washington DC**
Co-convener and chair: “Carbon uptake, ocean acidification, and ecosystem and human impacts”

February 2018 **AGU/ASLO/TOS Ocean Sciences 2018, Portland OR**
Co-convener and chair: “The ocean carbon cycle across timescales”

2016 to 2018 **MPOWIR mentor**
Co-lead of monthly mentoring teleconferences with 10 junior women in physical oceanography

2015 to 2017 **NASA Ocean Biology and Biogeochemistry Pre-Decadal Survey / Advanced Plan Review Team**
Reviewed community-proposed input to the NASA Decadal Survey for the OBB program

2016 to 2017 **Great Lakes Advisory Board Science and Information Subcommittee**
Appointed by the EPA administrator to advise the Great Lakes Interagency Task Force

2015 to 2017 **CONCORDE Scientific Advisory Panel**
CONCORDE is a GoMRI-funded group pursuing science needs identified with Deepwater Horizon.

January 2017 **Panelist, NOAA Climate Program Office, Ocean Observing & Monitoring, Washington DC**
Review panelist for OOM program

2011 to 2016 **Carbon Cycle Science Scientific Steering Group (CCSSG)**
CCSSG discusses science with the US Carbon Cycle Interagency Working Group (CCIWG)

2008 to 2016 **North American Carbon Program / Ocean Carbon and Biogeochemistry Coastal CARBON Synthesis, Leader: Great Lakes Working Group; Co-author of final CCARS Science Plan**

February 2016 **AGU/ASLO/TOS Ocean Sciences 2016, New Orleans, LA**
Co-convener: “How do the carbon pumps pump? Mechanisms of the solubility and biological pumps”

2012 to 2015 **US CLIVAR - OCB Working Group**
Oceanic carbon uptake in the CMIP5 models, Core Member

2011 to 2014 **Global Biogeochemical Cycles**
Associate Editor

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- November 2014 **External evaluator, Helmholtz Center Geesthacht, Germany**
Evaluation of candidates for director
- April 2014 **Planning Workshop: Int'l Research on the Coupled N. Atlantic-Arctic System**, Washington DC
Invited participant
- February 2014 **AGU/ASLO/TOS Ocean Sciences 2014**, Honolulu, HI
Co-convener and session chair: "Mechanisms of biogeochemical variability in the global oceans"
- 2012 to 2013 **Defense Science Study Group (DSSG)**, Institute for Defense Analysis (IDA)
Selected from 150+ nominees to be one of 15 members of the 2012-2013 class. DSSG tours the country to learn about the activities and STEM needs of US defense and intelligence agencies.
- 2012 to 2013 **NCAR ASP Colloquium, Summer 2013**
Co-organizer and lecturer for workshop on "Carbon Climate Connections in the Earth System"
- 2012 to 2013 **External Review Committee for US CLIVAR AMOC program**
Attendance and interviews at annual meeting, survey of AMOC PI community, report preparation
- 2010 to 2013 **REgional Carbon Cycle Assessment and Processes (RECCAP)**
Co-lead: Arctic and Atlantic; co-author: Global Carbon Storage and Global Air-Sea Flux
- 2008 to 2011 **Carbon Cycle Science Working Group (CCS-WG)**
The CCS-WG wrote the New US Carbon Cycle Science Plan (2012)
- October 2011 **Patullo Conference**, MPOWIR, Warrenton, VA
Senior participant; Meeting goal is to promote retention of women in physical oceanography
- December 2010 **NACP/OCB Coastal Carbon Synthesis Workshop**, San Francisco, CA
Co-organizer and speaker
- March 2010 **Caltech Keck Institute for Space Studies (KISS)**, Pasadena, CA
Invited participant in study program "Quantifying the Sources and Sinks of Atmospheric CO₂"
- February 2010 **AGU/ASLO/TOS Ocean Sciences 2010**, Portland, OR
Co-convener and session chair: "Carbon Cycling in the Coastal Oceans"
- May 2009 **International Association of Great Lakes Research Annual Meeting**, Toledo, OH
Co-convener and session chair: "Carbon Cycling in the Laurentian Great Lakes"
- 2005 to 2008 **Ocean Carbon and Biogeochemistry Scientific Steering Committee (OCB-SSC)**
Committee member, tasked to advise NSF, NASA and NOAA on research directions
- 2005 to 2008 **Earth Science Women's Network (ESWN)**
Leadership Board member
- December 2008 **American Geophysical Union Fall Meeting**, San Francisco, CA
Co-convener and session chair: "Ocean Carbon Cycle: Decadal Trends"
- July 2007 **Ocean Carbon and Biogeochemistry Summer Workshop**, Woods Hole, MA
Co-organizer and session chair for "Changing ocean biogeochemistry: The prediction challenge"
- April 2005 **External Review Committee for JISAO at NOAA-University of Washington**, Seattle, WA
- September 2005 **North American Coastal Margins: The Coastal CO₂ Workshop**, Boulder, CO
- June 2004 **NOAA GCC Workshop: Understanding North Pacific Carbon-cycle Changes**, Seattle WA
- June 2004 **UCAR/NCAR Junior Faculty Forum on Future Scientific Directions**, Boulder, CO
- December 2003 **American Geophysical Union Fall Meeting**, San Francisco, CA
Co-convener and session chair for Union session: "Health, Air Pollution and Climate"
- 2002 to present **Reviewer for Papers and Proposals**
Papers and books: AGU Books, BAMS, BG/BGD, Cambridge U. Press, DSR, Ecology Lett, ESD/ESDD, EST, EI, EOS, Frontiers, GBC, GMD/GMDD, GRL, Inland Waters, JAMES, JES, JGR, L&O, Nature, Nature Climate Change, Nature Geoscience, Ocean Dynamics, OS/OSD, PNAS, Prog. Oceanog., Princeton U. Press, Science, Springer, Tellus B, U. Chicago Press
Assessment Reports: National Academy of Science review of SOCCR2 (2018), IPCC SROCC (2018)
Proposals: NASA (OBB, Carbon Cycle, MAP), NOAA, NSF (DEB, CO, OTIC, PO), ArcticNet, Leaders Opportunity Fund (Quebec), Ocean Frontier Institute (CA), NSERC (CA), SeaGrant (WI, HI, OH), Marsten Fund (NZ), U. Michigan Water Center
Proposal Panels: NASA - Ocean and Ice (2004), Impacts of Climate Variability and Change on NASA Centers (2011), High Latitude Ocean / Aquatic Ecology (2013); NSF – Chemical Oceanography (2008, 2017)

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AWARDS AND HONORS

2020	Ocean Sciences Voyager Award, American Geophysical Union
2019	ATOC Distinguished Lecturer, University of Colorado Boulder
2016	Kavli Fellow
2012 to 2013	Defense Science Study Group
2011	Class of 1955 Distinguished Teaching Award, University of Wisconsin - Madison
2008 to 2011	NASA New Investigator
2010	Faculty teaching award from UW-Madison AOS Graduate Student Association
2003 to 2004	Anna Julia Cooper Postdoctoral Fellow, from University of Wisconsin – Madison
2000 to 2001	Martin Fellow for Sustainability, MIT
1999 to 2002	NASA Earth System Science Fellowship
1999	Teaching Assistant Prize, MIT Department of Earth, Atmospheric and Planetary Sciences

PROFESSIONAL MEMBERSHIPS

American Geophysical Union (1998-present)
American Society of Limnology and Oceanography (2011-present)
Earth Science Women's Network (2003-present)
The Oceanography Society (2008-present)

SERVICE at COLUMBIA UNIVERSITY

2018 to present	Diversity Committee , Earth and Environmental Sciences Chair 2019-present
2020	Diversity, Equity and Inclusion Task Force , Lamont Doherty Earth Observatory
2020	Vision Committee , Lamont Doherty Earth Observatory
2018 to present	Graduate Admissions Committee , Earth and Environmental Sciences
2017	RISE Competition , reviewer

SERVICE at UNIVERSITY OF WISCONSIN - MADISON

2015 to 2017	Physical Sciences Divisional Committee , Campus-level faculty tenure review committee
2013 to 2017	Curriculum Committee chair , AOS
2011 to 2017	Women Faculty Mentoring Program Advisory Committee
2004 to 2017	Curriculum, Strategic Planning, Budget, Faculty Recruitment, Computing, Qualifying Exam, Award, Graduate Recruitment Committees , AOS
2015 to 2016	Ad-hoc Committee on Post-Tenure Review , Campus-level faculty committee
2013 to 2016	Curriculum Committee , College of Letters & Science
2010 to 2015	Co-chair for Undergraduate Education . AOS
2013 to 2015	Major in Environmental Science, L&S Faculty Advisor, and Executive Committee
2013 to 2014	Center for Climatic Research Science Council
2013 to 2014	Ad-hoc Committee on Fossil Fuel Use and Climate Change , Campus-level committee
2011 to 2012	Nelson Institute Director Search and Screen Committee

PROFESSIONAL DEVELOPMENT

November 2004	UW System Women & Science, Workshop for STEM Faculty , Wisconsin Dells, WI
March 2003	Dissertations Initiative for the Advancement of Climate Change Research , Guanica, PR
May 2002	Carbon Cycle Data Assimilation Institute , Boulder, CO
June 2001	American Meteorological Society Summer Policy Colloquium , Washington, DC
January 1999	JGOFS Training Course on Biogeochemical Modeling of the Ocean , Bangalore, India

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SELECTED PRESENTATIONS

- November 2020 **Atmospheric and Oceanic Sciences, University of Wisconsin**, Madison WI
postponed Invited seminar, “Understanding change in ocean carbon sink”
- April 2020 **Woods Hole Oceanographic Institution**, Woods Hole MA
Invited seminar, “Understanding change in ocean carbon sink” (presented remotely)
- April 2020 **Geochemistry Seminar**, Lamont Doherty Earth Observatory, Palisades NY
Seminar, “Mechanisms of decadal variability in the ocean carbon sink” (presented remotely)
- February 2020 **AGU/ASLO/TOS Ocean Sciences 2020**, San Diego CA
Oral, “Forced mechanisms of decadal variability in the ocean carbon sink”
- October 2019 **Atmospheric and Oceanic Sciences, University of Colorado**, Boulder CO
Distinguished Lecture, “Understanding recent decadal variability of the global ocean carbon sink”
- August 2019 **Observing Carbon Climate Feedbacks, Chapman Conference**, La Jolla CA
Invited Plenary Speaker, “Forced change in the ocean carbon sink”
- July 2019 **Chemical Oceanography, Gordon Conference**, Holderness NH
Invited Plenary Speaker, “Forced change in the ocean carbon sink”
- May 2019 **Princeton University**, Princeton NJ
Invited seminar, “Forced change in the ocean carbon sink”
- April 2019 **University of Connecticut**, Avery Point CT
Invited seminar, “Forced change in the ocean carbon sink”
- December 2018 **Ocean carbon uptake in CMIP6 models workshop**, Washington DC
Oral, “Forced changes and internal variability in the ocean carbon sink”
- June 2018 **The Effects of Climate Change on the World’s Oceans, 4th Int’l Symposium**, Washington DC
Oral, “Variability and trends in ocean carbon uptake: 1981-2016”
- April 2018 **Massachusetts Institute of Technology**, Earth Atmospheric and Planetary Sciences, Cambridge MA
Invited seminar, “Diagnosing change in the ocean carbon sink”
- April 2018 **University of Pennsylvania**, Philadelphia, PA
Invited seminar, “Diagnosing change in the ocean carbon sink”
- February 2018 **AGU/ASLO/TOS Ocean Sciences 2018**, Portland OR
Poster, “Correlations of surface ocean pCO₂ to satellite chlorophyll, monthly to interannual”
- January 2018 **NASA GISS**, New York, NY
Invited seminar, “Variability in the ocean carbon sink”
- November 2017 **Geophysical Fluid Dynamics Laboratory**, Princeton NJ
Invited seminar, “Variability in the ocean carbon sink: Drivers and challenges to detection”
- October 2017 **Distinguished Scientist Seminar, Marine Biological Laboratory**, Woods Hole MA
Invited seminar, “Understanding the ocean’s role in the global carbon cycle”
- September 2017 **Ocean Carbon Hotspots Workshop of CLIVAR and OCB**, Monterey CA
Plenary, “Timescales and mechanisms of change in ocean carbon sink”
- August 2017 **International Carbon Dioxide Conference 10**, Interlaken, Switzerland
Plenary, “Detecting and understanding the changing ocean carbon sink with data and models”
- April 2017 **Nelson Institute Earth Day Conference**, University of Wisconsin, Madison WI
Moderator and Speaker, “What now? Preparing for Environmental Change”
- January 2017 **Cooperative Inst. Limnology & Ecosystems Research**, U. Michigan, Ann Arbor MI
Invited seminar, “Spatial variability and potential long-term trends in Great Lakes carbon”
<https://www.youtube.com/watch?v=m80c5Zbxctk>
- December 2016 **American Geophysical Union, Fall Meeting**, San Francisco CA
Oral, “Seasonal cycles and long-term growth in Southern Ocean carbon uptake”
- November 2016 **Climate People and the Environment Program**, University of Wisconsin, Madison WI
Seminar, “Mechanistic connections between carbon and chlorophyll in the global ocean”
- October 2016 **Kavli Frontiers of Science Symposium**, Irvine CA
Invited poster “Natural Variability and Anthropogenic Trends in the Ocean Carbon Sink”
- July 2016 **Ocean Carbon and Biogeochemistry Workshop**, Woods Hole MA
Invited plenary, “Detecting trends in the ocean carbon sink”
- June 2016 **Scripps Institution of Oceanography**, La Jolla CA
Seminar, “Detection of trends in the ocean carbon sink”

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June 2016	Lamont-Doherty Earth Observatory of Columbia University , Palisades NY Invited colloquium, “Detection of trends in the ocean carbon sink”
April 2016	University of Wisconsin – Climate Change Symposium , Madison WI Invited plenary, “Ocean mitigation of climate change: past, present and future”
March 2016	Sarmiento Symposium , Princeton NJ Invited speaker and panelist, “The breath of life — a changing carbon cycle”
February 2016	AGU/ASLO/TOS Ocean Sciences 2016 , New Orleans LA Oral, “Detectability of change in the ocean carbon sink”
February 2016	Climate People and the Environment Program , University of Wisconsin, Madison WI Invited seminar, “Variability and trends in ocean carbon uptake from models and data”
January 2016	NOAA –Pacific Marine Environmental Laboratory , Seattle WA Invited seminar, “Variability and trends in ocean biogeochemistry from models and data”
September 2015	University of Southern Mississippi , Hattiesburg, MS Invited seminar, “The ocean carbon sink: Separating trends from variability”
June 2015	Global Carbon Project Scientific Steering Committee Meeting , Oslo, Norway Invited plenary, “Ocean carbon research and integration in the global carbon cycle”
June 2015	JASON summer study , La Jolla, CA Invited brief, “Changing ocean carbon: Observations and models”
May 2015	University of Wisconsin Water Symposium , Madison WI Invited plenary, “Circulation and carbon: Oceans and Great Lakes”
March 2015	Pre-decadal survey workshop on Carbon and Climate , Norman OK Invited plenary, “Uncertainties and unknowns in the ocean carbon sink (+coastal and inland)”
December 2014	American Geophysical Union, Fall Meeting , San Francisco CA Oral, “Carbon cycle variability associated with AMO, NAO and AMOC”
December 2014	US CLIVAR / OCB Joint Workshop on ocean heat and carbon uptake , San Francisco CA Invited plenary, “Quantifying carbon uptake and its trends”
November 2014	JASON 2014 fall meeting , Washington DC Invited plenary, “The changing ocean: Carbon, climate and coupled feedbacks”
November 2014	Carbon Cycle Interagency Working Group , Washington DC Invited plenary, “The ocean carbon sink: Present knowledge and critical gaps”
August 2014	Coastal Carbon Synthesis Community Workshop , Woods Hole MA Invited plenary, “Great Lakes carbon budgets”
June 2014	Oak Ridge National Lab , Oak Ridge TN Talk, “Carbon and biogeochemistry in the oceans and Great Lakes”
April 2014	Center for Climatic Research and Climate People and Environment Program , Madison WI Seminar, “Climate change and national security: Implications and preparedness”
March 2014	Institute for Defense Analysis , Alexandria VA Invited seminar, “What I learned and some recommendations”
March 2014	Lamont-Doherty Earth Observatory of Columbia University , Palisades NY Invited seminar, “Natural variability and anthropogenic trends in the ocean carbon sink” http://tinyurl.com/mrj3bo8
February 2014	AGU/ASLO/TOS Ocean Sciences 2014 , Honolulu HI Oral, “CO ₂ -acidification of the Laurentian Great Lakes”
August 2013	NCAR ASP Key Uncertainties in the Global Carbon Cycle , Boulder CO Invited plenary, “Using data to elucidate feedback mechanisms in the ocean carbon cycle”
August 2013	NCAR ASP Graduate Student Colloquium , Boulder CO Invited lecture, “Mechanisms of ocean carbon climate feedback: What do the data support?”
July 2013	NCAR ASP Graduate Student Colloquium , Boulder, CO Invited lecture, “Ocean carbon biogeochemistry: Productivity, export, remineralization”
June 2013	9th International Carbon Dioxide Conference , Beijing, China Oral, “Regional distribution and seasonal mechanisms of carbon uptake in the global oceans”
March 2013	Biogeochemistry of the Great Lakes System , Wayne State University, Detroit MI Invited plenary, “Spatio-temporal variability and long-term trends in Great Lakes carbon cycling”
January 2013	University of Wisconsin - Madison , Atmospheric and Oceanic Sciences, Madison WI Seminar, “The ocean carbon sink: How strong? How vulnerable?”

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January 2013	Ohio State University , Climate Change Webinar Invited, “Climate, carbon impacts on productivity, chemistry & invasive species in the Great Lakes.”
July 2012	Ocean Carbon and Biogeochemistry Workshop , Woods Hole MA Invited Plenary, “RECCAP: Results from a global synthesis on ocean carbon uptake”
April 2012	NASA Ocean Color Research Team Meeting , Seattle WA Plenary, “Trends in ocean carbon uptake”
February 2012	AGU/ASLO/TOS Ocean Sciences 2012 , Salt Lake City UT Oral, “Physical drivers of biogeochemical and carbon cycling in Lake Superior”
January 2012	Lake Superior Research Symposium, University of Minnesota , St. Paul MN Invited talk, “Modeling circulation, carbon and climate for Superior”
November 2011	Department of Chemistry and Biochemistry, University of Montana , Bozeman MT Invited seminar, “Trends in ocean carbon uptake”
November 2011	School for Freshwater Science, University of Wisconsin - Milwaukee , Milwaukee WI Invited seminar, “Circulation, carbon cycling and invasive species in Lake Superior”
September 2011	The Ocean Carbon Cycle at A Time Of Change: Synthesis And Vulnerabilities , Paris, France Invited plenary, “Attribution: What drives CO ₂ sink trends?” (given by A. Fay due to injury)
August 2011	Gordon Research Conference , Andover NH Poster, “Convergence of atmospheric and North Atlantic CO ₂ trends on multidecadal timescales”
July 2011	Woods Hole Oceanographic Institution , Woods Hole MA Seminar, “Biogeochemistry, carbon cycling and invasive species in Lake Superior”
July 2011	Ocean Carbon and Biogeochemistry Workshop , Woods Hole MA Poster, “Convergence of atmospheric and North Atlantic CO ₂ trends on multidecadal timescales”
July 2011	Woods Hole Oceanographic Institution , Woods Hole MA Seminar, “Convergence of atmospheric and North Atlantic CO ₂ trends on multidecadal timescales”
February 2011	North American Carbon Program Meeting , New Orleans LA Poster, “Lake Superior’s influence on regional carbon budgets”
December 2010	American Geophysical Union, Fall Meeting , San Francisco CA Poster, “The carbon cycle of Lake Superior: Balancing the budget with spatial heterogeneity”
December 2010	NACP/OCB Coastal Carbon Synthesis Workshop , San Francisco CA Oral, “Modeling carbon in the coastal zone”
November 2010	Environmental Chemistry and Technology Program , University of Wisconsin, Madison WI Invited seminar, “Spatio-temporal variability in the carbon cycle of Lake Superior”
October 2010	Michigan Technological University , Houghton MI Invited seminar, “Spatio-temporal variability in the carbon cycle of Lake Superior”
October 2010	Duke University , Durham NC Invited seminar, “Decadal variability and multidecadal trends in the North Atlantic carbon sink”
July 2010	Ocean Carbon and Biogeochemistry Workshop , La Jolla CA Poster, “Decadal variability and multidecadal trends in the North Atlantic carbon sink”
June 2010	JASON Study on Carbon Treaty Verification , La Jolla CA Invited talk, “Carbon in water: Open ocean, coastal zone and inland waters”
June 2010	Scripps Institution of Oceanography , La Jolla CA Seminar, “Understanding recent variability in the North Atlantic carbon sink”
May 2010	Aquatic Ecosystem Health and Management: Ecology of Lake Superior , Duluth MN Oral, “Carbon cycle variability in Lake Superior and impacts on the regional carbon budget”
May 2010	Subpolar North Atlantic Workshop , Durham NC Invited talk, “North Atlantic carbon uptake from biogeochemical models and data”
March 2010	Caltech Keck Institute for Space Studies (KISS) , Pasadena CA Invited plenary, “Air-sea CO ₂ fluxes: Climatology, variability and land-ocean links”
February 2010	AGU/ASLO/TOS Ocean Sciences 2010 , Portland OR Invited oral, “Reconciling observed and modeled trends in the North Atlantic carbon sink”
November 2009	North American Carbon Program 2nd Joint Workshop , Oak Ridge TN Invited oral, “Carbon cycling in North American coastal waters”
August 2009	Biogeochemistry and Carbon Cycle of Lake Superior , Woodruff WI Oral, “Biogeochemical variability in Lake Superior – A modeling perspective”
July 2009	Ocean Carbon and Biogeochemistry Workshop , Woods Hole MA Poster, “Understanding the carbon budget of Lake Superior”

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- May 2009 **International Association of Great Lakes Research Annual Meeting**, Toledo OH
Oral, "The magnitudes and mechanisms determining the carbon budget of Lake Superior"
- May 2009 **NASA Ocean Color Research Team Meeting**, New York NY
Poster, "Do hurricanes drive variability of the air-sea CO₂ flux in the subtropical North Atlantic?"
- December 2008 **American Geophysical Union, Fall Meeting**, San Francisco CA
Oral, "The changing North Atlantic carbon sink: 1992-2006"
- December 2008 **University of Wisconsin - Madison**, Atmospheric and Oceanic Sciences, Madison WI
Seminar, "Variability in the ocean carbon cycle: A North Atlantic perspective"
- October 2008 **Colorado State University**, Fort Collins CO
Invited seminar, "Variability in the ocean carbon cycle: A North Atlantic perspective"
- July 2008 **Ocean Carbon and Biogeochemistry Workshop**, Woods Hole MA
Invited plenary, "Carbon sink trends in the Northern Oceans"
- June 2008 **Workshop on Teaching Weather and Climate Using Laboratory Experiments**, Chicago IL
Poster, "Rotating tank experiments in an atmospheric and oceanic science undergraduate curriculum"
- May 2008 **Effects of Climate Change on the World's Oceans**, Gijon, Spain
Oral, "Trends in the North Atlantic carbon sink"
- April 2008 **NASA Ocean Color Research Team Meeting**, Adelphi MD
Plenary, "The changing North Atlantic carbon cycle"
- March 2008 **Princeton University**, Princeton NJ
Seminar "Trends and variability in the carbon cycle of the North Atlantic"
- March 2008 **AGU/ASLO/TOS Ocean Sciences 2008**, Orlando FL
Oral, "Carbon cycle variability and trends at Bermuda and across the North Atlantic"
- January 2008 **American Meteorological Society Annual Meeting**, New Orleans LA
Co-author on one talk and 2 posters on undergraduate teaching with the 'Weather in a tank' project
- October 2007 **Stony Brook University**, Stony Brook NY
Invited public lecture, "The oceans and the climate system"
- July 2007 **Ocean Carbon and Biogeochemistry Workshop**, Woods Hole MA
Poster, "Carbon cycle variability in the North Atlantic: Timescales of change"
- April 2007 **Johns Hopkins University**, Baltimore MD
Invited seminar, "Air-sea CO₂ flux variability: Physical and ecological drivers"
- April 2007 **Surface Ocean CO₂ Variability and Vulnerability Workshop**, UNESCO, Paris, France
Plenary, "North Atlantic CO₂ flux variability: Physical and ecological drivers"
- April 2007 **NASA Ocean Color Research Team Meeting**, Seattle WA
Poster, "Physical and biological drivers of carbon cycle variability in the North Atlantic"
- April 2007 **Michigan Technological University**, Houghton MI
Invited seminar, "Air-sea CO₂ flux variability: Physical and ecological drivers"
- July 2006 **Ocean Carbon and Biogeochemistry Workshop**, Woods Hole MA
Poster, "Modeling the seasonal cycle of pCO₂ in the North Atlantic"
- June 2006 **The Art of Climate Modeling, NCAR/ASP Summer School**, Boulder CO
Invited lecture, "Modeling ocean biogeochemistry"
- February 2006 **AGU/ASLO/TOS Ocean Sciences 2006**, Honolulu HI
Talk, "North Pacific carbon cycle response to climate variability on seasonal to decadal timescales"
- February 2006 **Old Dominion University**, Norfolk VA
Invited seminar, "Air-sea CO₂ flux variability on seasonal, interannual and decadal timescales"
- November 2005 **University of Maryland**, College Park MD
Invited seminar, "Air-sea CO₂ flux variability on seasonal, interannual and decadal timescales"
- November 2005 **Great Lakes Environmental Research Laboratory**, Ann Arbor MI
Invited seminar, "Air-sea CO₂ flux variability on seasonal, interannual and decadal timescales"
- September 2005 **Seventh International Carbon Dioxide Conference**, Broomfield CO
Invited plenary, "Pacific dominance to global air-sea CO₂ flux variability"
- August 2005 **Ocean Carbon Cycle and Climate Change Workshop**, Woods Hole MA
Poster "North Pacific carbon cycle response to climate variability on seasonal to decadal timescales"
- March 2005 **The Pennsylvania State University**, State College PA
Invited seminar, "CO₂ air-sea flux variability: Ocean models and atmospheric inversions"
- March 2005 **Princeton University**, Princeton NJ
Seminar, "Argon as a tracer of physical processes in the atmosphere and ocean"

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- December 2004 **American Geophysical Union, Fall Meeting**, San Francisco CA
Poster, “Testing ocean models with argon and nitrogen”
- November 2004 **University of Wisconsin, Sustainability and the Global Environment (SAGE)**, Madison WI
Seminar, “Local and global benefits of air pollution control in Mexico City”
- October 2004 **University of Wisconsin, Chaos and Complexity Seminar Series**, Madison WI
Seminar, “CO₂ air-sea flux variability: Ocean models and atmospheric inversions”
- October 2004 **SOLAS Science 2004**, Halifax, Canada
Poster, “Atmospheric Ar/N₂: A Tool for Constraining Atmosphere and Ocean Models”
- June 2004 **NOAA GCC Workshop: Understanding North Pacific Carbon-cycle Changes**, Seattle WA
Invited plenary, “Modeled North Pacific carbon cycle variability”
- May 2004 **Geophysical Fluid Dynamics Laboratory**, Princeton NJ
Seminar, “CO₂ air-sea flux variability: Ocean models and atmospheric inversions”
- March 2004 **Princeton Environmental Institute Postdoctoral Colloquium**, Princeton NJ
Seminar, “Local and global benefits of air pollution control in Mexico City”
- December 2003 **American Geophysical Union, Fall Meeting**, San Francisco CA
Oral, “Local and global benefits of air pollution control in Mexico City”
- June 2003 **World Congress on Risk**, Brussels, Belgium
Poster, “Mexico City Co-Benefits: Air pollution health risk reduction from GHG emission controls”
- June 2003 **MIT, Department of Earth, Atmospheric & Planetary Sciences**, Cambridge MA
Seminar, “Mexico City Co-Benefits: Air pollution health risk reduction from GHG emission controls”
- May 2003 **University of Wisconsin, Department of Atmospheric and Oceanic Sciences**, Madison WI
Invited seminar, “CO₂ air-sea flux variability: ocean models and atmospheric inversions”
- May 2003 **JGOFS Open Science Conference**, Washington DC
Poster, “Mechanisms of CO₂ air-sea flux variability in the North Atlantic and Equatorial Pacific”
- April 2003 **National University of Mexico, Center for Atmospheric Sciences**, Mexico City
Seminar, “Carbon sink variability from ocean models and atmospheric inversions” (in Spanish)
- July 2002 **Princeton University, Atmosphere and Ocean Sciences Program**, Princeton NJ
Invited seminar, “Interannual variability of air-sea fluxes of carbon dioxide and oxygen”
- February 2002 **AGU/ASLO/TOS Ocean Sciences 2002**, Honolulu HI
Poster, “Interannual variability in air-sea fluxes of CO₂ and O₂”
- December 2000 **American Geophysical Union, Fall Meeting**, San Francisco CA
Oral, “A novel approach to export parameterization with application to air-sea fluxes of O₂ and CO₂”
- February 2000 **American Geophysical Union, Ocean Sciences**, San Antonio TX
Oral, “Interannual variability of the air-sea flux of oxygen in the North Atlantic”
- January 1999 **JGOFS Arabian Sea Symposium**, Bangalore, India
Poster, “Interannual variability of the air-sea flux of oxygen in the North Atlantic” (best poster award)

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TEACHING

Columbia University / Lamont Doherty Earth Observatory

New York NY / Palisades NY

Semester Courses

- 2018 *Humans and the Carbon Cycle (EESC GU4020)*
Graduate / undergraduate course on the global carbon cycle and its connections to climate.
- 2019, 2020 *The Climate System (EESC UN2100)*
Intensive undergraduate survey course on climate science, with weekly laboratory session.
- 2019 *Idealized Models of Climate Processes (EESC GU6926)*
Graduate course on applying idealized models to coupled physical-chemical-climate processes.

University of Wisconsin - Madison

Madison, WI

Semester Courses

- 2016 *Physical-Biogeochemical Coupling in the Ocean and Lakes (ATM OCN 750)*
Mechanisms of physical-biogeochemical coupling in oceans and lakes; hands-on data and modeling
- 2015, 2016 *The Science of Climate Change (ATM OCN 323)*
Quantitative treatment of climate processes for science and engineering, non-AOS, students
- 2013,15,17 *Global Warming: Science and Impacts (ATM OCN 332)*
Undergraduate intermediate level course on the science and expected impacts of climate change
- 2007-2014 *Introduction to Physical Oceanography (ATM OCN 660)*
Graduate introduction to the physical structure and dynamics of the ocean
- 2004-2010 *Global Climate Processes (ATM OCN 425)*
Global energy balance, circulation of the atmosphere and ocean, climate and climate modeling
- 2008-2016 *Laboratory in Rotating Fluid Dynamics (ATM OCN 801, 615)*
Use rotating tank and data analysis to elucidate key principles of geophysical fluid dynamics
- 2005,06,14 *Dynamics of the Atmosphere and Ocean II (ATM OCN 311)*
Intermediate geophysical fluid dynamics for undergraduate majors

Semester Seminars

- 2012, 2017 *Ocean Biogeochemical Cycles (ATM OCN 965)*
- Spring 2008 *Threats to Wildlife from Global Warming (ATM OCN 980)*
- Fall 2006 *The Ocean Carbon Cycle (ATM OCN 925)*
- Spring 2005,06 *Senior Capstone Seminar (ATM OCN 405)*
- Spring 2006 *Climate Change: Science and Impacts (ATM OCN 980)*

GALEN A. MCKINLEY

ADVISING

Columbia University / Lamont Doherty Earth Observatory

New York NY / Palisades NY

Graduate Students

2018-present Lauren Moseley, PhD candidate in Earth and Environmental Sciences
2017-2020 Sean Ridge, PhD 2020 Earth and Environmental Sciences
2017-2020 Lucas Gloege, PhD 2020 Earth and Environmental Sciences (now postdoc at Columbia, Envi. Eng.)

Student Researchers at Columbia University / Lamont Doherty Earth Observatory

2020 Luke Stammel (Data Science Institute Scholar, MS student in Data Science)
2020 Rea Rustagi, undergraduate researcher (Class of 2022, Applied Math)
2019 Monica Yan (Data Science Institute Scholar, MS student, now at JP Morgan)
2018 Leonard Boncenne, ENSTA ParisTech, summer student intern

University of Wisconsin - Madison

Madison WI

Graduate Students

2015-2017 Sean Ridge, MS AOS 2017 (PhD 2020 Columbia Earth and Environmental Sciences)
2014-2017 Lucas Gloege, MS AOS 2017 (PhD 2020, now postdoctoral fellow at Columbia University)
2016-2017 Collin Tuttle, MS AOS 2018 (now US Coast Guard)
2010-2015 Darren Pilcher, PhD AOS 2015 (now research scientist at NOAA PMEL/JISAO)
2010-2015 Haidi Chen, PhD AOS 2015 (postdoctoral fellow at Princeton University, 2015-2019)
2011-2014 Alexis Ritzer, MS AOS 2014 (now at Luminant Energy Services)
2010-2012 Jennifer Phillips, MS Envi. & Resources 2012 (Sr. Scientist, Governor's Planning and Research, CA)
2009-2012 Jesse Roberts, MS AOS 2012 (now at Wisconsin Dept of Public Instruction)
2008-2010 Amanda Fay, MS AOS 2010 (now Researcher with McKinley)
2008-2010 Valerie Bennington, PhD AOS 2010 (now at Epic Systems)
2005-2007 David Ullman, MS AOS 2008 (PhD Geoscience 2013, now Professor at Northland College, WI)

Postdoctoral Scholars

2010-2011 Dr. Val Bennington (UW-Madison Center for Climatic Research, 2012-14; now at Epic Systems)
2009-2010 Dr. Colleen Mouw (now Professor, University of Rhode Island; 2016 PECASE awardee)
2007-2009 Dr. Nazan Atilla (now at UW-Madison Department of Zoology)
2007 Dr. Nobuaki Kimura (now at Kyushu University, Japan)

Undergraduate Student Researchers at University of Wisconsin - Madison

2015-2017 Gabriela Negrete (BS Chemistry 2017, now PhD student at Scripps with Prof. A. Barton)
2012-2015 James Kralj (BS Microbiology 2015, MS 2018 U. Washington);
2012-2015 Melissa Breeden (BS AOS 2013, PhD AOS 2018, NOAA Global Change Postdoc Fellow, 2019-2021)
2009-2010 Victoria Vasys (BS AOS 2010)
2007-2008 Jennifer Koch (BS AOS '08, EPA '08-11, MS Portland State '13, Rhodeside & Harwell '14-present)

Visiting Students

2008-2009 Nsikak Benson, Fulbright Scholar (Nigeria)

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STUDENT COMMITTEES (* = McKinley students)

Columbia University / Lamont Doherty Earth Observatory

New York NY / Palisades NY

PhD Thesis Committees

Ms. Annie Leal (PhD expected 2026)

Ms. Lauren Moseley* (PhD expected 2023)

Ms. Suki Wong (PhD expected 2022)

PhD Theses at Columbia University / Lamont Doherty Earth Observatory

Dr. Sean Ridge* (PhD Earth and Environmental Sciences 2020)

Dr. Lucas Gloege* (PhD Earth and Environmental Sciences 2020)

Dr. Takaya Uchida (PhD Earth and Environmental Sciences 2019)

PhD Theses at University of Wisconsin - Madison

Madison WI

Dr. Erin Thomas (PhD AOS 2017)

Dr. Cristian Martinez (PhD AOS 2016)

Dr. Malgorzata Golub (PhD Freshwater and Marine Science 2016)

Dr. Jiaxu Zhang (PhD AOS 2016)

Dr. Benjamin Kraemer (PhD Freshwater and Marine Science 2015)

Dr. Darren Pilcher* (PhD AOS 2015)

Dr. Haidi Chen* (PhD AOS 2015)

Dr. Katherine Holman (PhD AOS 2013)

Dr. Benjamin Sulman (PhD AOS 2012)

Dr. Justin Bagley (PhD AOS 2011)

Dr. Fung He (PhD AOS 2011)

Dr. Wei Liu (PhD AOS 2011)

Dr. Val Bennington* (PhD AOS 2010)

Dr. Claudia Cyganowski (PhD Astronomy 2010)

Dr. Jerry Tjiputra (PhD AOS 2007)

Masters Theses at University of Wisconsin - Madison

Madison WI

Mr. Lucas Gloege* (MS AOS 2017)

Mr. Sean Ridge* (MS AOS 2017)

Ms. Nicole Colasacco-Thumm (MS AOS 2015)

Ms. Amanda Stone (MS Freshwater and Marine Science, 2012)

Mr. Jesse Roberts* (MS AOS 2012)

Ms. Jennifer Phillips* (MS Environment and Resources 2012)

Ms. Alexis Santos-Ritzer* (MS AOS 2012)

Ms. Amanda Fay* (MS AOS 2010)

Dr. David Ullman* (MS AOS 2008; PhD Geoscience 2013)

Mr. William Ahue (MS AOS 2008)

Ms. Erin Hokanson (MS AOS 2006)

Delta Teaching & Learning Internship Advisees at University of Wisconsin - Madison

Madison WI

Dr. Andrew Winters (PhD AOS 2015)

PhD External Committees

PhD Committee Member

Dr. Cory McDonald (PhD Michigan Technological University, 2010)

PhD External Evaluator

Dr. Precious Mongwe (PhD University of Cape Town, 2018)

Dr. Peisheng Huang (PhD University of Western Australia, 2010)

GALEN A. MCKINLEY

OUTREACH, INTERVIEWS and EDITORIALS

- 2009 to present **Lead developer for Carbon/Climate educational website, with interactive carbon budget applet**
 English: carboncycle.ldeo.columbia.edu (Launch 12/2009, ~5,000 new sessions per month, 2019)
 Spanish: carboncycle_spanish.ldeo.columbia.edu (Launch 2/2011, ~2,000 sessions/month, 2019)
 Previously hosted at carboncycle.aos.wisc.edu and carboncycle.es.wisc.edu
- April 2020 **Hunter College High School**, New York, NY
 Invited panelist for Earth Day programming (postponed)
- December 2019 **Field trip for Fieldston Ethical Culture High School**, New York NY
 Hosted Climate and Weather class for rotating tank experiments
- April 2019 **College Club of Northern New Jersey**, Ridgewood NJ
 Invited speaker “Carbon, climate and the oceans”
- October 2017 **LDEO Open House**, Palisades NY
 Speaker for “A year in a life of a scientist”
- February 2017 **Field trip for Randall School 4th Grade**, Madison WI
 Hosted 56 4th graders for rotating tank experiments and “science on a sphere” presentations
- January 2017 **Perpetual Notion, WORT**, Madison WI
 On-air interview on “Stability of the Atlantic Meridional Overturning Circulation”, 19 Jan 2017
- December 2016 **Central Time, Wisconsin Public Radio**, Madison WI
 On-air interview on “Global warming snapshot for 2016”, 22 Dec 2016
- December 2016 **The Buzz, WORT**, Madison WI
 On-air interview on “NASA contributions to Earth Science”, 5 Dec 2016
- November 2016 **WISC TV 3 / Channel3000.com**, Madison WI
 On-air interview on “The Record Warmth of 2016” (<http://tinyurl.com/hy4pqb7>), 16 Nov 2016
- October 2016 **Nelson Institute and University of Wisconsin News**
 Q&A on climate change “Explaining ‘terrifying’ trends of climate change: Q&A” J. Peek
- February 2016 **UW News, Science Daily, Insurance Journal, phys.org, Eureka Alert, Nature News & Views**
 Various articles associated with McKinley et al. (2016), *Nature* doi:10.1038/nature16958
- December 2015 **The Daily Climate**, Charlottesville VA
 “Acid trip: Great Lakes could face similar acidification risks as the seas” B. Bienkowski
- November 2015 **Yale Environment 360**, New Haven CT
 “On thin ice: Big northern lakes are being rapidly transformed” C. Katz
- October 2015 **Wisconsin Science Festival**, Madison WI
 Invited plenary talk “Keeping the Great Lakes Great”
- July 2015 **Wisconsin Public Radio**, Madison WI
 Guest on “Joy Cardine Show”, 9 July 2015
- June 2015 **Capital Times**, Madison WI
 Op-ed, “Scott Walker, Legislature should stop swinging hammers at education”
- December 2014 **BioHouse, UW-Madison**, Madison WI
 Evening seminar speaker on the ocean and climate change
- October 2014 **Wisconsin Science Festival**, Madison WI
 Invited plenary talk “Ocean Acidification: The other CO₂ problem”
- September 2014 **National Geographic News**, Washington DC
 “New reports offer clearest picture yet of rising greenhouse gas emissions” B.C. Howard
- June 2014 **Radio Ciudad**, Buenos Aires, Argentina
 Radio interview on the new US EPA carbon rules (in Spanish)
- December 2013 **Climate Change: What it means for Wisconsin’s economy and natural resources**, Madison WI
 Invited Panelist for Forum hosted by Wisconsin Legislature (Representatives Clark and Mursau) and Wisconsin Academy of Sciences, Arts and Letters (<http://tinyurl.com/mhzlxem>)
- November 2013 **Adhoc Committee on Climate Change and Fossil Fuel Use, UW-Madison**, Madison WI
 Panelist, Town Hall
- October 2013 **Wisconsin Energy Institute, UW-Madison**, Madison WI
 Panelist, IPCC Report and EPA Rules
- April, Oct 2013 **Bradley Learning Center, UW-Madison**, Madison WI
 Dinner speaker on climate change science and impacts
- April 2013 **Wisconsin Gazette**, Shorewood WI
 “Extreme Wisconsin: Warmer, wetter, weirder weather ahead” L. Neff

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- September 2012 **Women in Science and Engineering, UW-Madison**, Madison WI
Dinner speaker for living group supporting freshman women planning on STEM majors
- April 2012 **Aldo Leopold Nature Center**, Monona WI
Presenter on Antarctic response to climate change; Climate Education Center Grand Opening
- November 2011 **Wisconsin State Journal**, Madison WI
“Curiosities: Why does warm Coke go flat so much faster than cold Coke?” J. Sakai
- September 2011 **WORT**, Perpetual Notion Machine, Madison WI
Interview on air September 1, 2011 (archive.wort-fm.org/mp3/wort_110901_190001science.mp3)
- July 2011 **Voice of America**, Washington DC
“Study: Ocean Less Able to Mitigate Climate Change” R. Skirble
- July 2011 **CNN International**, London, UK
“Ocean carbon sinks feeling the heat” M. Knight
- June 2011 **In Common, Nelson Institute for Environmental Studies**, UW-Madison, Madison WI
“Illuminating water’s role in the carbon cycle and future climate” M. Lepisto
- Jan-Aug 2011 **Mini Workshop for Carbon Cycle Applet Lesson Plans**, Madison WI
Organizer. Detailed G6-12 lesson plans developed to accompany carboncycle.aos.wisc.edu
- January 2011 **Climate Ambassadors Workshop, University of Wisconsin - Madison**, Madison WI
Lecturer, “Climate and Climate Change: Science Basics”
- December 2010 **NASA Television**, <http://www.youtube.com/watch?v=hXg4ugCajkE>
“NASA Science on the Road: Oceans, Carbon, and Climate” S. Cole
- August 2010 **Chicago Tribune**, Chicago IL
“Sink or source? Figuring Great Lakes’ role in climate change” and “Could acidification threaten Great Lakes?” D. Lockwood
- June 2010 **Climate Ambassadors Workshop, University of Wisconsin - Madison**, Madison WI
Lecturer, “Climate and Climate Change: Science Basics”
- April 2010 **Whiteside Forum**, Morrison IL
Invited panelist for community forum on the oceans
- November 2009 **New York Times, Wisconsin Week, Science Daily, Bloomberg**
Reports, interviews on Nature Geoscience paper, Desai et al. (2009)
- November 2009 **Wisconsin Public Radio**, Superior WI
“Increasing winds over the Great Lakes” M. Simonson
- September 2009 **Badger Herald, University of Wisconsin - Madison**, Madison WI
“2050: Temperature to increase by 4 degrees” K. Mianulli
- July 2009 **AOS & CIMSS, University of Wisconsin - Madison**, Madison WI
Organizer and lead lecturer, Carbon Cycle and Climate Modeling - A Teacher’s Workshop
- July 2008 **CIMSS, University of Wisconsin - Madison**, Madison WI
Invited lecturer, Geosciences Time Scales and Global Climate Change Teacher’s Workshop
- April 2008 **Daily Cardinal, University of Wisconsin - Madison**, Madison WI
“Report finds public transit key to curb global warming in state”, C. Brace
- January 2008 **“The Pulse” WTDY 1670AM**, Madison WI
Interview with host S. Wisniewski on the science of global climate change (on air 1/20/08)
- October 2007 **Wisconsin State Journal**, Madison WI
“Why is The Ocean Salty”, J. Sakai. Also appeared in Science Daily
- October 2007 **Second Annual Wisconsin Climate Change Forum**, Madison, WI
Invited panelist
- July 2007 **CIMSS, University of Wisconsin - Madison**, Madison WI
Invited lecturer, Remote Sensing Applications in the Geosciences Teacher’s Workshop
- June 2007 **Capital Times**, Madison WI
“Local scientist calls global warming theory ‘hooey’”, S.K. Derby
- February 2007 **Capital Times**, Madison WI
“City lakes offer lesson in climate change – The winter’s freeze was second latest”, A. Weier
- October 2006 **First Annual Wisconsin Climate Change Forum**, Madison WI
Invited panelist
- September 2006 **Women In Science and Engineering, UW-Madison**, Madison WI
Dinner speaker for living group supporting freshman women planning on STEM majors

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- September 2005 **The Why Files**, Madison WI
“Hurricanes: The Heat is On”, D. Tannebaum
- March 2005 **Capital Times**, Madison WI
“Global warming debate is over, UW prof says – Calls new study as solid proof as that smoking causes cancer”, A. Nathans
- March 2005 **Daily Cardinal, University of Wisconsin - Madison**, Madison WI
“Greenhouse gases further implicated in global warming”, P. Dohnal