

## GALEN A. MCKINLEY

University of Wisconsin - Madison  
Department of Atmospheric and Oceanic Sciences  
and Center for Climatic Research  
1225 W. Dayton St. Madison, WI 53706 USA  
608 262 4817 (phone) 608 262 0166 (fax)  
gamckinley@wisc.edu  
<http://www.aos.wisc.edu/~galen>

### EDUCATION

- June 2002 **Massachusetts Institute of Technology** Cambridge, MA  
*Ph.D. Climate Physics and Chemistry*  
Thesis: *Interannual Variability of Air-Sea Fluxes of Carbon Dioxide and Oxygen*
- May 1995 **Rice University** Houston, TX  
*B.S. Civil Engineering with Environmental Option*

### RESEARCH AND PROFESSIONAL EXPERIENCE

- June 2004 **University of Wisconsin - Madison** Madison, WI  
to present *Assistant Professor of Atmospheric and Oceanic Sciences*  
I study the coupling of physics and biogeochemistry in the ocean and the Great Lakes in order to better understand and quantify the marine and large lake contributions to the global carbon cycle. I am particularly interested in variability of air-sea carbon and oxygen fluxes on seasonal to decadal timescales, quantification of carbon sinks, and ocean biogeochemical modeling.
- August 2003 **Princeton University / University of Wisconsin - Madison** Princeton, NJ  
to May 2004 *Visiting Research Staff / Anna Julia Cooper Postdoctoral Fellow*  
Studied Ar and N<sub>2</sub> in a ocean and atmospheric models; worked on refining the global air-sea exchange rate with <sup>14</sup>C and inverse techniques; and continued work on variability of air-sea CO<sub>2</sub> and O<sub>2</sub> fluxes.
- September 2002 **Instituto Nacional de Ecología (National Institute of Ecology)** Mexico City, Mexico  
to August 2003 *Consultant*  
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.
- May 2002 to **Massachusetts Institute of Technology** Cambridge, MA  
August 2002 *Postdoctoral associate*  
Extended thesis work and developed collaborations for continuing projects.
- September 1996 **Research assistant**  
to May 2002 Studied the impacts of physical variability on ocean biogeochemical cycles, particularly air - sea fluxes of CO<sub>2</sub> and O<sub>2</sub>, using ocean general circulation models. Made preliminary estimates of the impact on air-sea tracer fluxes of the assimilation of sea-surface height data into an ocean model.
- June 1995 **Brown and Root Environmental** Houston, TX  
to July 1996 *Environmental specialist*  
Assisted industrial clients with environmental compliance; duties included water and soil sampling, hazardous waste abatement, and air pollution modeling.
- Summer 1993 **Clivius Multrum, USA** Newton, MA  
*Project consultant*

## GALEN A. MCKINLEY

### PUBLICATIONS

Cassar, N., G.A. McKinley, M.L. Bender, R. Mika, and M. Battle (2008) Comparison of atmospheric Ar/N<sub>2</sub> time-series and paired ocean-atmosphere model predictions, *J. Geophys. Res.* 113, D21122, doi:10.1029/2008JD009817

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 CO<sub>2</sub>, *J. Geophys. Res.*, 113, G01010, doi:10.1029/2007JG000408.

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 CO<sub>2</sub> with recent bomb <sup>14</sup>C measurements, *Global Biogeochem. Cycles* 21, GB2015, doi:10.1029/2006GB002784.

McKinley, G.A., T. Takahashi, E. Buitenhuis, F. Chai, J. R. Christian, S. C. Doney, M.-S. Jiang, C. LeQuere, I. Lima, K. Lindsay, J.K. Moore, R. Murtugudde, L. Shi, P. Wetzel (2006) North Pacific carbon cycle response to climate variability on seasonal to decadal timescales, *J. Geophys. Res.* 111, C07S06, doi:10.1029/2005JC003173.

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).

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 CO<sub>2</sub> flux variations over land and oceans, *Global Biogeochem. Cycles* 19, GB1011, doi: 10/1029/2003GB002214.

McKinley, G.A., C. Rödenbeck, M. Gloor, S. Houweling and M. Heimann (2004) Pacific dominance to global air-sea CO<sub>2</sub> flux variability: A novel atmospheric inversion agrees with ocean models, *Geophys. Res. Lett.* 31, L22308, doi: 10.1029/2004GL021069.

McKinley, G.A., M. J. Follows, and J. Marshall (2004) Mechanisms of CO<sub>2</sub> air-sea flux variability in the Equatorial Pacific and North Atlantic with implications for atmospheric inversions, *Global Biogeochem. Cycles* 18, GB2011, doi:10.1029/2003GB002179.

McKinley, G.A., M. J. Follows, J. Marshall, and S. Fan (2003) Interannual variability of air-sea O<sub>2</sub> fluxes and the determination of CO<sub>2</sub> sinks using atmospheric O<sub>2</sub>/N<sub>2</sub>, *Geophys. Res. Lett.* 30(3), 1101, doi: 10.1029/2002GL016044.

Battle, M., M. Bender, M.B. Hendricks, D.T. Ho, R. Mika, G.A. McKinley, S. Fan, T. Blaine, and R. Keeling (2003) Measurements and models of the atmospheric Ar/N<sub>2</sub> ratio, *Geophys. Res. Lett.* 30(15), 1786, doi:10.1029/2003GL017411.

McKinley, G.A., M. J. Follows, and J. Marshall (2000) Interannual variability of the air-sea flux of oxygen in the North Atlantic, *Geophys. Res. Lett.* 27, 2933-2936.

## GALEN A. MCKINLEY

### PUBLICATIONS IN PRESS, IN REVIEW, IN PREPARATION

Bennington, V., G. A. McKinley, D. Ullman and S. Dutkiewicz (2009) What does chlorophyll variability tell us about export and CO<sub>2</sub> flux variability?, *Global Biogeochem. Cycles*, *in review*.

Ullman, D., G.A. McKinley, V. Bennington, and S. Dutkiewicz (2009) Trends in North Atlantic carbon sink: 1992-2006. *Global Biogeochem. Cycles*, *in review*.

Koch, J., G.A. McKinley, V. Bennington, D. Ullman (2009) Hurricane impacts on air-sea CO<sub>2</sub> fluxes in subtropical North Atlantic, *Geophys. Res. Lett.*, *submitted*.

Illari L., J. Marshall, A. Tandon, S. Lee, P. Bannon, R. Najjar, G.A. McKinley, M. Morgan, T. Haine, R. Clark, T. Sikora, and K. J. Mackin (2009) Weather in a Tank: exploiting laboratory experiments in the teaching of meteorology, oceanography and climate, *in preparation for Bull. Amer. Meteorol. Soc.*

Atilla, N., G. A. McKinley, V. Bennington, N. Urban, C. Wu and A. Desai (2009), Spatial and temporal variability of the carbon cycle of Lake Superior, *in preparation*.

Bennington, V., G. A. McKinley, N. Kimura, C. Wu, N. Atilla, and N. Urban (2009), The general circulation of Lake Superior: Mean and interannual variability from 1979-2008, *in preparation*.

### AWARDS AND HONORS

2008 - 2011	NASA New Investigator
2003 - 2004	Anna Julia Cooper Postdoctoral Fellow, from University of Wisconsin - Madison
1999 - 2002	Earth System Science Fellowship, NASA
2000 - 2001	Martin Fellow for Sustainability, MIT
1999	Teaching Assistant Prize, MIT Department of Earth, Atmospheric and Planetary Science

## GALEN A. MCKINLEY

### PRESENTATIONS

- 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**, Madison, WI  
Colloquium, "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 talk "Carbon sink trends in the Northern Oceans"
- June 2008 **Workshop on Teaching Weather and Climate Using Laboratory Experiments**, U. Chicago  
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  
Talk, "Trends in the North Atlantic carbon sink"
- April 2008 **NASA Ocean Color Research Team Meeting**, Adelphi, MD  
Poster, "The changing North Atlantic carbon cycle"
- March 2008 **Princeton University**, Princeton, NJ  
Talk, "Trends and variability in the carbon cycle of the North Atlantic"
- March 2008 **American Geophysical Union, Ocean Sciences**, Orlando, FL  
Talk, "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 CO<sub>2</sub> flux variability: Physical and ecological drivers"
- April 2007 **Surface Ocean CO<sub>2</sub> Variability and Vulnerability Workshop**, UNESCO, Paris, France  
Talk, "North Atlantic CO<sub>2</sub> 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 CO<sub>2</sub> flux variability: Physical and ecological drivers"
- December 2006 **American Geophysical Union, Fall Meeting**, San Francisco, CA  
H. Brix, G.A. McKinley, C. Deustch, N. Gruber: Talk, "Mode and intermediate waters in models"
- July 2006 **Ocean Carbon and Biogeochemistry Workshop**, Woods Hole, MA  
Poster, "Modeling the seasonal cycle of pCO<sub>2</sub> in the North Atlantic"
- June 2006 **The Art of Climate Modeling, NCAR/ASP Summer School**, Boulder, CO  
Summer School Lecture, "Modeling ocean biogeochemistry"
- February 2006 **American Geophysical Union, Ocean Sciences**, 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 CO<sub>2</sub> flux variability on seasonal, interannual and decadal timescales"
- November 2005 **University of Maryland**, College Park, MD  
Invited seminar, "Air-sea CO<sub>2</sub> flux variability on seasonal, interannual and decadal timescales"
- November 2005 **Great Lakes Environmental Research Laboratory**, Ann Arbor, MI  
Invited seminar, "Air-sea CO<sub>2</sub> flux variability on seasonal, interannual and decadal timescales"
- September 2005 **Seventh International Carbon Dioxide Conference**, Broomfield, CO  
Invited plenary talk, "Pacific dominance to global air-sea CO<sub>2</sub> 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"

## GALEN A. MCKINLEY

- March 2005 **The Pennsylvania State University**, State College, PA  
Invited seminar, “CO<sub>2</sub> air-sea flux variability: Ocean models and atmospheric inversions”
- March 2005 **Princeton University**, Princeton, NJ  
Talk, “Argon as a tracer of physical processes in the atmosphere and ocean”
- 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  
Talk, “Local and global benefits of air pollution control in Mexico City”
- October 2004 **University of Wisconsin, Chaos and Complexity Seminar Series**, Madison, WI  
Talk, “CO<sub>2</sub> air-sea flux variability: Ocean models and atmospheric inversions”
- October 2004 **SOLAS Science 2004**, Halifax, Canada  
Poster, “Atmospheric Ar/N<sub>2</sub>: A Tool for Constraining Atmosphere and Ocean Models”
- June 2004 **NOAA GCC Workshop: Understanding North Pacific Carbon-cycle Changes**, Seattle WA  
Invited plenary talk, “Modeled North Pacific carbon cycle variability”
- May 2004 **Geophysical Fluid Dynamics Laboratory**, Princeton, NJ  
Talk, “CO<sub>2</sub> air-sea flux variability: Ocean models and atmospheric inversions”
- March 2004 **Princeton Environmental Institute Postdoctoral Colloquium**, Princeton, NJ  
Talk, “Local and global benefits of air pollution control in Mexico City”
- January 2004 **American Geophysical Union, Ocean Sciences Meeting**, Portland, OR  
Sweeney, C., E. M. Gloor, A. J. Jacobson, R. M. Key, G.A. McKinley, J.L. Sarmiento,  
Poster, “Estimating air-sea gas exchange using bomb <sup>14</sup>C: Revisited”
- December 2003 **American Geophysical Union, Fall Meeting**, San Francisco, CA  
Talk, “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  
Talk, “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  
Talk, “CO<sub>2</sub> air-sea flux variability: ocean models and atmospheric inversions”
- May 2003 **JGOFS Open Science Conference**, Washington, DC  
Poster, “Mechanisms of CO<sub>2</sub> air-sea flux variability in the North Atlantic and Equatorial Pacific”
- April 2003 **National University of Mexico, Center for Atmospheric Sciences**, Mexico City  
Talk, “Carbon sink variability from ocean models and atmospheric inversions” (in Spanish)
- July 2002 **Princeton University, Atmosphere and Ocean Sciences Program**, Princeton, NJ  
Talk, “Interannual variability of air-sea fluxes of carbon dioxide and oxygen”
- February 2002 **American Geophysical Union, Ocean Sciences**, Honolulu, HI  
Poster, “Interannual variability in air-sea fluxes of CO<sub>2</sub> and O<sub>2</sub>”
- December 2000 **American Geophysical Union, Fall Meeting**, San Francisco, CA  
Talk, “A novel approach to export parameterization with application to estimation of global interannual variability in air-sea fluxes of O<sub>2</sub> and CO<sub>2</sub>”
- February 2000 **American Geophysical Union, Ocean Sciences**, San Antonio, TX  
Talk, “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)

## GALEN A. MCKINLEY

### PROFESSIONAL ACTIVITIES AND SERVICE

- 2008 to present **Carbon Cycle Science Working Group (CCS-WG)**  
Committee member, tasked to rewrite the US Carbon Cycle Science Plan
- 2002 to present **Reviewer**  
NSF, NASA, NOAA, ArcticNet  
GBC, JGR, GRL, DSR, EST, EI, OS/OSD, Biogeoscience, AGU Books, EOS
- 2004 to present **Review Panel Member**  
NASA - Ocean and Ice (2004)  
NSF – Chemical Oceanography (2008)
- 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-convenor and session chair: "Ocean Carbon Cycle: Decadal Trends in the Global Ocean and Autonomous Observations of the North Atlantic Spring Bloom"
- July 2007 **Ocean Carbon and Biogeochemistry Summer Workshop**, Woods Hole, MA  
Co-organizer and session chair for "Changing ocean biogeochemistry: The prediction challenge"
- September 2005 **North American Coastal Margins: The Coastal CO<sub>2</sub> Workshop**, Boulder, CO  
Invited participant and session leader
- November 2004 **UW System Women & Science, Opening Workshop for STEM Faculty**, Wisconsin Dells, WI  
Participant
- June 2004 **NOAA GCC Workshop: Understanding North Pacific Carbon-cycle Changes**, Seattle WA  
Invited speaker and participant
- June 2004 **UCAR/NCAR Junior Faculty Forum on Future Scientific Directions**, Boulder, CO  
Co-organizer and co-chair for "The role of coastal zones in global biogeochemical cycles"
- December 2003 **American Geophysical Union Fall Meeting**, San Francisco, CA  
Co-convenor and session chair for Union session: "Health, Air Pollution and Climate"
- March 2003 **Dissertations Initiative for the Advancement of Climate Change Research**, Guanica, PR  
Participated in a one-week symposium for recent PhDs in climate change.
- May 2002 **Carbon Cycle Data Assimilation Institute**, Boulder, CO  
Participated in the design of an optimal global CO<sub>2</sub> measurement network.
- June 2001 **American Meteorological Society Summer Policy Colloquium**, Washington, DC  
Attended a 10-day symposium introducing scientists to the US policy-making process.
- January 1999 **JGOFS Training Course on Biogeochemical Modeling of the Ocean**, Bangalore, India  
Participated in a two-week workshop on ocean biogeochemical modeling.

### TEACHING

- University of Wisconsin - Madison** Madison, WI
- Fall 2004-08 *Global Climate Processes (ATM OCN 425)*
- Spring 2008 Course for senior undergraduates and graduate students covering global energy balance, general circulation of the atmosphere and ocean, climate feedbacks, climate modeling, and global change.
- Spring 2008 *Threats to Wildlife from Global Warming (ATM OCN 980)*  
Graduate seminar on the science and policy important to the listing of polar bears as endangered.
- Fall 2007 *Introduction to Physical Oceanography (ATM OCN 660)*  
Course for senior undergraduates and graduate students offering an introduction to the physical structure and dynamical processes governing the ocean.
- Fall 2006 *The Ocean Carbon Cycle (ATM OCN 925)*  
Graduate seminar covering key ocean carbon cycle processes and their importance to climate.
- Spring 2005,06 *Dynamics of the Atmosphere and Ocean II (ATM OCN 311)*  
Course for junior undergraduates on intermediate geophysical fluid dynamics. Basic equations of motion and key balances, thermal wind, vorticity, frictional effects, and basic wave concepts.

## GALEN A. MCKINLEY

- Spring 2005,06 *Senior Capstone Seminar (ATM OCN 405)*  
Undergraduate seminar introducing students to current research in atmospheric and oceanic sciences, and promoting development of writing and presentation skills
- Spring 2006 *Climate Change: Science and Impacts (ATM OCN 980)*  
Graduate seminar illuminating the variety of climate change research being done at Wisconsin.
- Fall 2005 *Chemical Transport Modeling in the Atmosphere and Ocean (ATM OCN 915)*  
Graduate seminar focusing on current research in chemical transport modeling
- Fall 2005 *Independent Study – “Understanding Climate Change” (ATM OCN 699)*  
Advisor for undergraduate independent study. Reading books, papers, and a term paper.

### ADVISING

#### University of Wisconsin - Madison Graduate Students

Madison, WI

- 2005-present Valerie Bennington, PhD Candidate  
2008-present Amanda Fay, MS Candidate  
2005-2007 David Ullman, MS, January 2008 (Best MS thesis award for 2007-2008, AOS Department)

#### Postdoctoral Scholars

- 2009-present Dr. Colleen Mouw  
2007-present Dr. Nazan Atilla  
2007 Dr. Nobuaki Kimura (now at National United University of Taiwan)

### INTERVIEWS AND OUTREACH

- 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 and Response: “UW Professors et al: As climate scientists at UW, we don't agree with Bryson's opinions on global warming”
- 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 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