

## **Ian N. Williams**

Climate and Ecosystem Sciences Division  
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### **Research Areas**

Atmospheric boundary layer, cloud and precipitation processes, surface water and energy exchanges, biosphere-atmosphere interactions, Earth system modeling, water and carbon cycles, climate sensitivity and feedbacks, climate and atmospheric dynamics.

### **Education**

Ph.D. Geophysical Sciences, University of Chicago, Chicago, IL, 2012  
M.S. Atmospheric Science, Cornell University, Ithaca, NY, 2007  
Minor concentration: Environmental Fluid Mechanics and Hydrology  
B.S. Atmospheric Science, Cornell University, Ithaca, NY, 2005

### **Professional Experience**

2016-present Research Scientist, Lawrence Berkeley National Laboratory  
Climate and Ecosystem Sciences Division  
2012-2016 Postdoctoral Scholar, Lawrence Berkeley National Laboratory  
Earth Sciences Division  
2008-2011 Graduate Teaching Assistant, University of Chicago  
Department of Geophysical Sciences  
2006-2007 Graduate Research Fellow, Cornell University  
Department of Earth and Atmospheric Sciences  
2004-2005 Meteorological Technician (Intern), National Weather Service, Kansas City, MO  
NOAA Central Region Climate Services

### **Fellowships**

- Cornell University Graduate School Fellowship (2006-2007)
- U.S. Department of Energy Science Undergraduate Laboratory Internship program (2005)

### **Awarded Grants**

- PI: “Land-Atmosphere Coupling and Convection in the Water Cycle”  
Department of Energy (SC/BER), 02/01/2018 thru 02/01/2021
- Co-I: “Land Surface Forcing and Land-Atmosphere Interactions” (PI: Margaret S. Torn)  
Department of Energy (SC/BER), 2015-2017

### **Teaching Experience**

- University of Chicago, Department of Geophysical Sciences
  - Introduction to Global Warming<sup>1,2</sup> (2009, 2011)
  - Introduction to Geophysical Fluid Dynamics<sup>2,3</sup> (2010, 2011)

- Physics of the Earth<sup>2</sup> (2010)
- Introduction to the Atmosphere<sup>2</sup> (2006)

<sup>1</sup>Session instructor; <sup>2</sup>Led problem-solving sessions, office hours; <sup>3</sup>Upper-/graduate-level.

- Institute for Genomic Diversity, Cornell University (2003)
  - Developed K-12 classroom presentations with Theresa Fulton, as outreach for the NSF grant “Genetic Architecture of Maize and Teosinte”

### Postdoctoral Advisees

- Shaoyue Qiu (LBNL), Remote sensing of convective clouds and land-atmosphere interactions, 01/2019-present
- Yi Dai (LBNL), Modeling convective organization and cold-pools over land, 09/2019-present

### Visiting Postdoctoral Scholars Hosted

- Jungmin Lee (LLNL), Modeling land-surface heterogeneity and boundary-layer clouds, 09/2018-06/2019

### Publications (under review)

17. Qiu, S., and **Williams, I.N.** (under review), Observational evidence of state-dependent positive and negative land-surface feedback on deep convection, *Geophysical Research Letters*.

16. **Williams, I.N.**, Lee, J., Tadic, J, Zhang, Y. , Chu, H. (under review), Modeling spatial heterogeneity in surface turbulent heat flux in the US Southern Great Plains, *J. Geophys. Res. Atmos.*

### Publications (peer-reviewed)

15. Tadić, J.M., **Williams, I.N.**, Tadić, V.M., Biraud, S.C. (2019), Towards Hyper-Dimensional Variography Using the Product-Sum Covariance Model. *Atmosphere*, 10, 148.

14. **Williams, I.N.** (2019), Evaluating soil moisture feedback on convective triggering: Roles of convective and land-model parameterizations, *J. Geophys. Res. Atmos.*, <https://doi.org/10.1029/2018JD029326>

13. **Williams, I.N.**, and Patricola, C.M. (2018), Diversity of ENSO Events Unified by Convective Threshold Sea Surface Temperature: A Nonlinear ENSO Index. *Geophysical Research Letters*, 45. <https://doi.org/10.1029/2018GL079203>

12. Phillips, T.J., Klein, S.A., Ma, H.-Y., Tang, Q., Xie, S., **Williams, I.N.**, ... Torn, M. S. (2017), Using ARM observations to evaluate climate model simulations of land-atmosphere coupling in the U.S. Southern Great Plains, *J. Geophys. Res. Atmos.*, 122, 11,524–11,548. <https://doi.org/10.1002/2017JD027141>

11. Bagley, J.E., Kueppers, L.M., Billesbach, D.P. , **Williams, I.N.**, Biraud, S.C. , and Torn, M.S. (2017), The influence of land cover on surface energy partitioning and evaporative fraction regimes in the U.S. Southern Great Plains, *J. Geophys. Res. Atmos.*, 122, 5793–5807,

doi:10.1002/2017JD026740.

10. Lu, Y., **Williams, I.N.**, Bagley, J.E., Torn, M.S., and Kueppers, L.M. (2017), Representing winter wheat in the Community Land Model (version 4.5), *Geosci. Model Dev.*, 10, 1873-1888, doi:10.5194/gmd-10-1873-2017, 2017.

9. **Williams, I.N.**, and Pierrehumbert, R.T. (2017), Observational evidence against strongly stabilizing tropical cloud feedbacks, *Geophysical Research Letters*, 44, doi:10.1002/2016GL072202.

8. **Williams, I.N.**, Lu, Y., Kueppers, L.M., Riley, W.J., Biraud, S.C., Bagley, J.E., and Torn, M.S. (2016), Land-atmosphere coupling and climate prediction over the U.S. Southern Great Plains, *J. Geophys. Res. Atmos.*, 121, 12,125– 12,144, doi:10.1002/2016JD025223.

7. **Williams, I.N.**, Riley, W.J., Kueppers, L.M., Biraud, S.C., and Torn, M.S. (2016), Separating the effects of phenology and diffuse radiation on gross primary productivity in winter wheat, *J. Geophys. Res. Biogeosciences*, 121, 19031915, doi:10.1002/2015JG003317.

6. **Williams, I.N.**, and Torn, M.S. (2015), Vegetation controls on surface heat flux partitioning, and land-atmosphere coupling, *Geophysical Research Letters*, 42, doi:10.1002/2015GL066305.

5. **Williams, I.N.**, Torn, M.S., Riley, W.J., and Wehner, M.F. (2014), Impacts of climate extremes on gross primary production under global warming, *Environmental Research Letters*, 9 (9), 094011.

4. **Williams, I.N.**, Riley, W.J., Torn, M.S., Biraud, S.C., and Fischer, M.L (2014), Biases in regional carbon budgets from covariation of surface fluxes and weather in transport model inversions, *Atmospheric Chemistry and Physics*, 14 (3), 1571-1585.

3. **Williams, I.N.**, Riley, W.J., Torn, M.S., Berry, J.A., and Biraud, S.C. (2011), Using boundary layer equilibrium to reduce uncertainties in transport models and CO<sub>2</sub> flux inversions, *Atmospheric Chemistry and Physics*, 11, 9631-9641, doi:10.5194/acp-11-9631-2011.

2. **Williams, I.N.**, and Colucci, S.J. (2010), Characteristics of baroclinic wave packets during strong and weak stratospheric polar vortex events, *Journal of the Atmospheric Sciences*, 67(10), 3190- 3207.

1. **Williams, I.N.**, Pierrehumbert, R.T., Huber, M. (2009), Global warming, convective threshold and false thermostats, *Geophysical Research Letters*, 36. doi:10.1029/2009GL03984.

### **Synergistic Activities**

- Session Co-Chair, Interactions Between Land Surface, Convective Boundary Layer, Clouds, and Aerosols: Linking Observations with Models, American Geophysical Union Fall Meeting, 2018.
- Member, GEWEX Local Land-Atmosphere Coupling (LoCo) Project Working Group.
- Member, Warm Boundary Layer Processes Working Group, DOE Atmospheric System Research (ASR) Program.
- Reviewer: JGR-Atmospheres, JGR-Biogeosciences, *Geophysical Research Letters*, *Climate*

- Dynamics, Journal of Hydrometeorology, Journal of Advances in Modeling Earth Systems.
- California State University East Bay STEM Graduate Student Internship (participating scientist)

### **Invited Seminars and Plenary Talks**

- Toward combining observations and model experiments to improve soil moisture-precipitation feedback in Earth system models (2019) Joint ARM User Facility and ASR PI Meeting, Rockville, MD., June 12.
- Land-Atmosphere Coupling and Convection in the Water Cycle (2018), Argonne National Laboratory, Lemont, IL., August 23.
- Land-atmosphere interactions in Earth system models and observations (2016), Auburn University, Auburn, AL., April 28.
- Vegetation controls on surface heat flux partitioning, and land-atmosphere coupling (2015), American Geophysical Union, December 14-18, San Francisco, CA.
- Challenges in constraining regional carbon budgets with atmospheric measurements (2012), Iowa State University, Ames, IA, November 5.

### **Other selected presentations**

Williams, I. N., Qiu, S., Dai, Y., Patricola, C.M., Influences of surface energy partitioning on convective initiation and organization: Observations and cloud-permitting model experiments (2019), American Geophysical Union, December 9-13, San Francisco, CA. (talk)

Williams, I.N., J. Lee, J. Tadic, H. Chu, S. Biraud Y., Zhang (2019), Characterizing vegetation spatial heterogeneity for cloud-resolving hindcasts in the SGP, 2019 Joint ARM User Facility and ASR PI Meeting, June 10, Rockville, MD. (Breakout Session talk)

Williams, I.N., Evaluating Soil Moisture Feedback on Convective Triggering: Roles of Convective and Land-model Parameterizations (2018), American Geophysical Union, December, Washington DC. (poster)

Williams, I.N., M.S. Torn, W.J. Riley, M.F. Wehner, and W. Collins (2013), Climate extremes and ecosystem productivity in global warming simulations, American Geophysical Union, December 9-12, San Francisco, CA. (talk)

Williams, I.N., Y. Lu, J.E. Bagley, L.M. Kueppers, S.C. Biraud, and M.S. Torn (2016), Land-atmosphere coupling and climate prediction over the U.S. Southern Great Plains, American Meteorological Society, June 20, Salt Lake City, UT. (talk)

Williams, I.N., W.J. Riley, L.M. Kueppers, M.S. Torn, and S.C. Biraud (2016), Separating the effects of phenology and diffuse radiation on gross primary productivity in winter wheat, American Meteorological Society, June 21, Salt Lake City, UT. (talk)

Williams, I.N., and M.S. Torn (2016), Land-atmosphere coupling and climate prediction over the U.S. Southern Great Plains, Atmospheric System Research Science Team Meeting, May 2-5, Vienna, VA. (poster)

Williams, I.N., and M.S. Torn (2015), Surface turbulent heat flux partitioning and warm-season

boundary layer clouds, Atmospheric System Research Science Team Meeting, March 16-20, Vienna, VA. (poster)

Williams, I.N., and M.S. Torn (2014), The roles of soil moisture and vegetation in surface turbulent flux partitioning, Atmospheric System Research Fall Working Group Meeting, November 20, Bethesda, MD. (talk)

Williams, I.N. (2014), Coupled carbon-water cycles and the influence of land surface processes on climate prediction, Lawrence Berkeley National Laboratory ASR Scientific Focus Area Review, April 9, Gaithersburg, MD. (talk)

Williams, I.N. (2014), Atmospheric carbon in the Southern Great Plains: Diagnosis, attribution, and prediction, Lawrence Berkeley National Laboratory ASR Scientific Focus Area Review, April 9, Gaithersburg, MD. (poster)

Williams, I.N. (2014), Using atmospheric measurements to advance a predictive understanding of the coupled carbon-climate system (2014), Lawrence Berkeley National Laboratory Earth Sciences Division Review, March 8-9, Berkeley, CA. (talk)

Williams, I.N., M.S. Torn, W.J. Riley, M.F. Wehner, and W. Collins (2013), Climate extremes and ecosystem productivity in global warming simulations, American Geophysical Union, December 9-12, San Francisco, CA. (talk)

Williams, I.N., M.S. Torn, and W.J. Riley (2013), Clouds, aerosols, and the water and carbon cycles over the Southern Great Plains, Atmospheric System Research Science Team Meeting, March 18- 21, Potomac, MD. (poster)

Williams, I.N., W.J. Riley, M.S. Torn, S.C. Biraud, M.L. Fischer, and J.A. Berry (2012), A Stochastic method to evaluate carbon cycle and atmospheric transport models using atmospheric observations, Third Atmospheric System Research Science Team Meeting, March 12-16, Arlington, VA. (poster)

Williams, I.N., W.J. Riley, M.S. Torn, J.A. Berry, and S.C. Biraud (2011), Challenges in constraining surface trace gas exchanges from observations, American Geophysical Union, December 5-9, San Francisco, CA. (talk)

### **Graduate and Postdoctoral Advisors**

Ray Pierrehumbert (University of Chicago; now at the University of Oxford); Stephen Colucci (Cornell); Margaret Torn (LBNL)

### **Technical Skills**

Analysis and software development (Matlab, Python, Fortran, Shell, Perl); Software porting and high-performance computing; NCAR Community Earth System Model; WRF Weather Research and Forecasting Model