

Ian N. Williams

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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

- 2020- Assistant Professor, Geological and Atmospheric Sciences
Iowa State University
- 2020- Affiliate Faculty, Lawrence Berkeley National Laboratory
- 2016-2020 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
- 2005 Science Undergraduate Laboratory Internship program
Lawrence Berkeley National Laboratory
- 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 (at Iowa State University)

- PI: “Interactions Between Clouds and Wind-Driven Surface Heat Exchanges over Land”
Department of Energy (SC/BER)
Project Dates: 08/15/2021-08/14/2024
Total funding: \$354k/3 years
- PI: “Land-Atmosphere Coupling and Convection in the Water Cycle”
(subcontract with LBNL)
Project Dates: 05/17/2021-06/22/2022
Total funding: \$123k

Awarded Grants (at LBNL)

- PI: “Land-Atmosphere Coupling and Convection in the Water Cycle”
Department of Energy (SC/BER)
Project Dates: 02/01/2018 - 02/01/2021
Annual funding: \$665k/year
- Co-I: “Land Surface Forcing and Land-Atmosphere Interactions” (PI: Margaret S. Torn)
Department of Energy (SC/BER)
Project Dates: 2015 - 2017
Annual funding: \$700k/year

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

Courses Taught (Iowa State University)

- Radar Applications in Meteorology (MTEOR 435/535)
- Boundary Layer Meteorology (MTEOR/AGRON 605)

Publications (under review)

19. Dai, Y. and **Williams, I.N.**, Land surface effects on shear balance of squall lines, J. Geophys. Res. Atmos. (in revision)

Publications (peer-reviewed)

18. Dai, Y., **Williams, I.N.**, and Qiu, S. (2021), Simulating the effects of surface energy partitioning on convective organization: Case study and observations in the US Southern Great Plains, J. Geophys. Res. Atmos., <https://doi.org/10.1029/2020JD033821>

17. **Williams, I.N.**, Lee, J., Tadic, J, Zhang, Y., Chu, H. (2020), Modeling spatial heterogeneity

in surface turbulent heat flux in the US Southern Great Plains, *J. Geophys. Res. Atmos.*

16. Qiu, S., and **Williams, I.N.** (2020), Observational evidence of state-dependent positive and negative land-surface feedback on deep convection, *Geophysical Research Letters*.
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](https://doi.org/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](https://doi.org/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](https://doi.org/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](https://doi.org/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, 1903-1915, [doi:10.1002/2015JG003317](https://doi.org/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](https://doi.org/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 CO₂ 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.
- California State University East Bay STEM Graduate Student Internship (participating scientist), 2018-2020.

Institutional Service

- DOE program-manager site visit at LBNL (2019), Berkeley, CA, February 20-22 (coordinator and presenter for LBNL's Atmospheric System Research program).
- 2019 DOE ASR PI Meeting, Rockville, MD (2019), June 10-13 (oral presentation as LBNL's representative).
- 2018 DOE ASR PI Meeting, Tysons, VA (2018), March 19-22 (oral presentation as LBNL's representative).
- LBNL Scientific Advisory Board, Climate and Ecosystem Science Division (2018), Berkeley, CA, October 2 (oral presentation).
- LBNL Earth and Environmental Sciences Area External Review (2017), Berkeley, CA, February 21-22 (oral presentation).
- LBNL DOE Scientific Focus Area (ASR) Review (2014), Gaithersburg, MD, April 9 (oral and poster presentations; panel discussion).
- Earth Sciences Division External Review (2014), Berkeley, CA, March 8-9 (oral

presentation).

Invited and Plenary Talks

- ‘Connecting the surface, boundary-layer, and convective storms in Earth system models’, Atmospheric Science/CIRA Colloquia, Colorado State University (2021, February 25).
- ‘Land-Atmosphere Interactions in Earth system models’, AmeriFlux/DOE Workshop on Improving understanding of land-atmosphere interactions (2021, June 10-11).
- ‘Toward combining observations and model experiments to improve soil moisture-precipitation feedback in Earth system models’, Joint ARM User Facility and ASR PI Meeting, Rockville, MD (2019, June 12).
- ‘Land-Atmosphere Coupling and Convection in the Water Cycle’, Argonne National Laboratory, Lemont, IL (2018, August 23).
- ‘Land-atmosphere interactions in Earth system models and observations’, Auburn University, Auburn, AL (2016, April 28).
- ‘Vegetation controls on surface heat flux partitioning, and land-atmosphere coupling’, American Geophysical Union, San Francisco, CA (2015, December 14-18).

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)

Williams, I.N., S.J. Colucci (2009), Characteristics of baroclinic wave packets over the North Atlantic during strong and weak polar vortex events, American Meteorological Society, June 9, Stowe, VT. (talk)

Affiliations

American Meteorological Society

American Geophysical Union