

Rachel R. McCrary

Project Scientist I

National Center for Atmospheric Research (NCAR)

CISL/ISD & RAL/WSAP

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Research Interests

Climate Change, Regional Climate Change Impacts, North American Snowpack, Land-atmosphere Interactions, Drought, West African Monsoon, Tropical Easterly Waves, Extreme Precipitation, Climate Downscaling, and Educational Outreach.

Education

- PhD.** Atmospheric Science, Colorado State University, Fort Collins, CO, **2012**
Dissertation: Seasonal, Synoptic, and Intraseasonal Variability in the West African Monsoon.
Advisor: David A. Randall
- M.S.** Atmospheric Science, Colorado State University, Fort Collins, CO, **2008**
Thesis: Long-term Drought in Simulations of the 20th Century
Advisor: David A. Randall
- B.S.** Atmospheric and Oceanic Sciences, University of California - Los Angeles, CA, **2005**
Research: Regional Climate Modeling for Southern California.
Advisor: Alex Hall.

Research Experience

2018 – present	Project Scientist I	NCAR in RISC in CISL & RAL
2015 – 2018	Project Scientist I	NCAR in CISL/IMAGe/RISC
2012 – 2015	Postdoctoral Fellow	NCAR in CISL/IMAGe/RISC
2005 – 2012	Graduate Research Assistant	Colorado State University
2003 – 2005	Undergraduate Research Intern	UCLA

Teaching Experience

Colorado State University, Fort Collins, CO

Teaching Assistant - *Introduction to Climate*, ATS 606, Fall 2010

Teaching Assistant - *Global Climate Change*, ATS 150, Spring 2010

Lecturer - *Crash course in IDL*, Fall 2009

Trainer for Academic Professionals - *Weather and Climate for Teachers*, July 2009, 2008, 2007.

Colorado College, Colorado Springs, CO

Instructor (full course) - *Introduction to Global Climate Change*, EV 128, April-May 2009.

Publications (Referred)

- McCrary, R. R.** and L.O Mearns, 2018: Future Changes in North American Snowpack from NARCCAP, *J. Hydromet.*, In prep.
- Birch, C., C. Rio, **R. McCrary**, P. Bechtold, M. Willette, J. Marsham, 2018: Does a better diurnal cycle of convection lead to a better representation of the West African Monsoon across modeling systems?. *Geoscientific Model Development*. In prep.
- Hare, J., D Borggaard, M. Alexander, M. Bailey, A. Bowden, K. Damon-Randall, J. Didden, D. Hasselman, **R. McCrary**, J. Nye, J. Pierce, E. T. Shultz, J. Scott, K. Sullivan, M. B. Tooley, and T. Kerns, 2018: A review of River Herring Science in support of conservation. *Marine and Coastal Fisheries*. In Prep.
- Bukovsky, M.S., **R. R. McCrary**, A. Seth, L. O. Mearns, 2017: A Mechanistically Credible, Poleward Shift in Warm-Season Precipitation Projected for the US Southern Great Plains? *J. Climate*, **30**, 8275-8298.
- McCrary, R.R.**, Seth McGinnis, L.O. Mearns, 2017: Evaluation of Snow Water Equivalent in NARCCAP Including Measures of Observational Uncertainty. *J. Hydromet*, **18**, 2425-2452.
- Randall, D., C. DeMott, C. Stan, M. Khairoutdinov, J. Benedict, **R. McCrary**, and K. Thayer-Calder, 2016: Simulations of the tropical general circulation with a multiscale global model. *Yanai Memorial Volume, a Meteorological Monograph* published by the American Meteorological Society, **56**, 15.1-15.15.
- Bukovsky, M., C. Carrillo, D. Gochis, D. Hammerling, **R. McCrary**, and L. Mearns, 2015: Towards Assessing NARCCAP Regional Climate Model Credibility for the North American Monsoon: Future Climate Simulations. *J. Climate*, **28**, 6707-6728. doi: <http://dx.doi.org/10.1175/JCLI-D-14-00695.1>
- Steinschneider, S., **R. McCrary**, L. Mearns, and C. Brown, 2015: The Effects of Climate Model Similarity on Probabilistic Climate Projections and the Implications for Local, Risk-Based Adaptation Planning. *Geophys. Res. Lett.*, **42**, 5014–5044. doi: [10.1002/2015GL064529](https://doi.org/10.1002/2015GL064529).
- Steinschneider, S., **R. McCrary**, S. Wi, K. Mulligan, L. Mearns, and C. Brown, 2015: Expanded Decision-Scaling Framework to Select Robust Long-Term Water-System Plans under Hydroclimatic Uncertainties. *J. Water Resour. Plann. Manage.* [10.1061/\(ASCE\)WR.1943-5452.0000536](https://doi.org/10.1061/(ASCE)WR.1943-5452.0000536) , 04015023.
- McCrary, R.R.**, D. Randall, and C. Stan, 2014: Simulations of the West African Monsoon with a Super-Parameterized Climate Model. Part 2: African Easterly Waves. *J. Climate*, **27**, 8323-8341. doi: <http://dx.doi.org/10.1175/JCLI-D-13-00677.1>
- McCrary, R.R.**, D. Randall, and C. Stan, 2014: Simulations of the West African Monsoon with a Super-Parameterized Climate Model. Part 1: The Seasonal Cycle. *J. Climate*, **27**, 8303-8322. doi: <http://dx.doi.org/10.1175/JCLI-D-13-00676.1>
- McCrary, R.R.** and D. Randall, 2010: Great Plains Drought in Simulations of the Twentieth Century. *J. Climate*, **23**, 2178-2196. doi: <http://dx.doi.org/10.1175/2009JCLI3061.1>

Reports/Non-referred publications

- Brown, C., J. Weatherly, L. Mearns, S. Steinschneider, S. Wi, M. Case, T. Hayden, A. Koster, M. Bukovsky, **R. McCrary**, 2016: Decision-scaling: A decision framework for DoD climate risk assessment and adaptation planning. Technical Report. SERDP Project RC-2204.
- Brown, C., S. Steinschneider, S. Wi, J. Weatherly, M. Case, T. Hayden, A. Koster, L. Mearns, M. Bukovsky, **R. McCrary**, 2016: Climate Risk Assessment: Technical Guidance Manual for DoD Installations and Built Environment. Technical Report. SERDP Project RC-2204.

- Moss, R.H., L. O. Mearns, J. Brandenberger, A. Delgado, E. L. Malone, J. Rice, T. Wang, Z. Yang, M. Bukovsky, **R. McCrary**, S. McGinnis, A. Blohm, S. Broomell, J.J. Henriques, 2016: Understanding Data Needs for Vulnerability Assessment and Decision Making to Manage Vulnerability of Department of Defense Installations to Climate Change. Technical Report. SERDP Project RC-2206.
- McCrary, R.** 2015: Book Review: "Rain: A Natural and Cultural History" by Cynthia Barnett, *Science*, 348(6241), pp.1311, June 2015.
- Moss, R., L. Mearns, A. Blohm, M. Bukovsky, J. Henrique, **R. McCrary**, 2015. *Climate Outlook for the Mid-Atlantic*. SERDP Project # RC-2206. April 2015.
- Moss, R., L. Mearns, A. Blohm, M. Bukovsky, J. Henrique, **R. McCrary**, J. VanDervort 2015. Installation Report. *Fort Bragg Climate Change Vulnerability Assessment*. SERDP Project # RC-2206. March 2015.
- Moss, R., L. Mearns, A. Blohm, M. Bukovsky, J. Henriques, E. Malone, **R. McCrary**, J. Rice, S. Sain, C. Tebaldi, Z. Yang 2014. Installation Report. *Joint Base Langley Eustis Climate Change Vulnerability Assessment*. SERDP Project # RC-2206. August 2014.
- Moss, R., L. Mearns, A.J. Blohm, J. Brandenberger, M. Bukovsky, J.J. Henriques, E.L. Malone, R. Moss, **R. McCrary**, J. Rice, 2013. Installation Report. *United States Navel Academy Climate Change Vulnerability Assessment*. SERDP Project # RC-2206. 3 December 2013.
- McCrary, R.**, M.S. Bukovsky, L.O. Mearns, 2013, Event History for the United States Navel Academy. SERDP Project # RC-2206. Internal report 17 September 2013.

Seminars and Guest Lectures

Climate Change Impacts

Presentation to the USAA. NCAR, Boulder CO, February 2018.

Climate Change Basics.

Presentation to National Security Stakeholders. NCAR, June 2017.

Climate Model Downscaling: Research and Applications.

Webinar, Lyndon State College Department of Atmospheric Science, October 2015.

Future Climate Outlooks for the Mid-Atlantic and Southeast

SERDP Climate Change Program Review and NOAA Partnership Meeting, July 2015.

Evaluation of Land Surface Processes in NARCCAP: Snow and Land-Atmosphere Interactions.

NCAR/NRCM Seminar Series, Boulder, CO, 14 March 2014.

Mid-Atlantic Climate Change and Implications for Fort Bragg

Fort Bragg Kickoff Meeting, November 2014.

Fort Bragg Climate Vulnerability Research

Webinar with Stakeholders, October 2014.

Climate information for adaptation planning: Salamanders, water, and military bases.

1st NCAR Adaptation Day, Boulder, CO, 2013. (Co-presenter)

Seasonal, Synoptic and Intraseasonal Variability of the West African Monsoon

CGD Seminar Series, NCAR, Boulder CO, October 2012

Seasonal, Synoptic and Intraseasonal Variability of the West African Monsoon

Colorado State University, Department of Atmospheric Science, September 2012.

Climate Change and the IPCC

Guest Lecture, Introduction to Public Policy at Colorado State University, September 2011.

What are Cloud Feedbacks?

CMMAP Team Meeting, Los Angeles, CA, January 2008.

Conference Presentations

- McCrary, R., M. Bukovsky, L. Mearns, 2018: Uncertainty in Future Changes in Snowpack and Rain-on-Snow events in the US Northern Great Plains using High-Resolution Climate models. *75th Eastern snow conference*. June 2018. (Talk)
- McCrary, R and L. O. Mearns, 2018: Uncertainty in the Future of Seasonal Snowpack over North America. *86th Western Snow Conference*. April 2018. (Talk)
- McCrary, R and L. O. Mearns 2017: Uncertainty in the Future of Seasonal Snowpack over North America. *AGU Fall Meeting*. December 2017. (Talk)
- McCrary, R., S. McGinnis and L. Mearns, 2016: Snow Water Equivalent in NARCCAP and NA-CORDEX Simulations Including measures of Observational Uncertainty. *SERDP Team Meeting*. November 2016. (Talk)
- McCrary, R., S. McGinnis and L. Mearns, 2016: Snow Water Equivalent in NARCCAP and NA-CORDEX Simulations Including measures of Observational Uncertainty. *AGU Fall Meeting*, December 2016. (Talk)
- McCrary, R., L. Mearns, S. McGinnis, and L. McDaniel 2015: Effect of Downscaling Methodology on Decision Making, AGU Fall Meeting, December 2015. (Talk)
- McCrary, R. and L. Mearns, 2014: Future Changes in Snowpack over North America from NARCCAP. *AGU Fall Meeting*. December 2014. (Poster)
- McCrary, R. 2014: African Easterly Waves in the CMIP5 Models. *Climate, Land Use, and Conflict in Africa Workshop*, September 2014. (Poster)
- McCrary, R. and L. Mearns, 2014: Future Changes in Snowpack over North America from NARCCAP, *ASP Uncertainty Colloquium*, July 2014. (Poster)
- Bukovsky, M.S., R. McCrary, L.O. Mearns, 2014: Coastal inundation in the Chesapeake Bay: Current and Future. Presentation. *26th Conf. on Climate Variability and Change*, Atlanta, GA. (Talk, presenter)
- R. McCrary, M.S. Bukovsky, J.M. Thibeaut, L.O. Mearns and A. Seth, 2014: Coastal inundation in the Chesapeake Bay: Current and Future. *28th Conf. Hydrology*, Atlanta, GA. (Talk)
- R. R. McCrary and L.O. Mearns, 2013: Snowpack in the NARCCAP Regional Climate Models. *2013 AGU Fall Meeting*, San Francisco, CA. (Poster)
- Bukovsky, M.S., R. R. McCrary, L.O. Mearns, 2013: Coastal inundation in the Chesapeake Bay: Current and Future. *AGU Fall Meeting*, December 2013. (Poster)
- McCrary, R. and D.A. Randall, 2012: The Influence of Superparameterization on the Representation of African Easterly Waves. *AGU Fall Meeting*. December 2012. (Poster)
- McCrary, R. and D. A. Randall, 2012: African Easterly Waves in the Superparameterized Community Atmosphere Model. *30th Conference on Hurricanes and Tropical Meteorology*. April 2012. (Talk)
- McCrary, R. and D.A. Randall, 2012: Evaluating the West African Monsoon in the SP-CCSM. *CMMAP Team Meeting*, Ft. Lauderdale, FL, January 2012. **(Invited Talk)**
- McCrary, R. and D.A. Randall, 2011: African Easterly Waves in the Superparameterized Community Atmosphere Model. *AGU Fall meeting*, December 2011. (Poster)
- McCrary, R. and D.A. Randall 2011: Modeling the West African Monsoon using the Superparameterized CAM. *91st AMS Annual Meeting*, Seattle, WA, January, 2011. (Talk)
- McCrary, R. and D.A. Randall 2010: Modeling the West African Monsoon. *CMMAP Team Meeting*, Fort Collins, CO, July 2010. (Poster)
- McCrary, R. and D.A. Randall 2009: Great Plains Drought in Simulations of the 20th Century. *IAS winter school: Reducing the uncertainty in the prediction of global warming*, Jerusalem, Israel, January 2009. (Poster)

McCrary, R. and D.A. Randall 2009: Great Plains Drought in Simulations of the 20th Century. *AGU Fall meeting*, San Francisco, CA, December 2008. (Poster)

McCrary, R. and D.A. Randall 2009: Great Plains Drought in Simulations of the 20th Century. *NOAA's 33rd Climate Diagnostics and Prediction Workshop/CLIVAR Drought Workshop (CDPW)*, Lincoln, NE, October 2008. (Poster)

McCrary, R. and D.A. Randall 2007: An Investigation of Long Term Drought over the Great Plains. *CMMAP Team Meeting*, Fort Collins, CO, July 2007. (Poster)

McCrary, R. and D.A. Randall 2007: Do the IPCC AR4 Models Simulate the Dust Bowl? *CMMAP Team Meeting*, Kauai, HI, February 2007. (poster)

Awards

Early Career Scientists Visitor Fund Award, NCAR, (2018)

NSF Student Travel Fellowship for DYNAMO Field Campaign (October-November 2011)

Outstanding Student Paper Award in Hydrology, AGU Fall Meeting, (December 2008)

University Programs for Research and Scholarly Excellence Fellowship, CSU, (2005-2006)

Undergraduate Research Scholars Program Scholarship, UCLA, (2004-2005)

Workshops

Western Snow Conference Short Course, 2018: *Communicating Science: Suggestions for Scientists* 16 April, 2018. Albuquerque, NM.

The Infrastructure and Climate Network (ICNet) workshop, 2015, Portland, ME.

ASP Summer Colloquium, 2014: *Uncertainty in Climate Change Research: An Integrated Approach*. July 21 – August 6, 2014. NCAR, Boulder CO.

ISP Summer School, 2011: *African Weather and Climate: Unique Challenges and Application of New Knowledge*. July 25 – August 5, 2011. NCAR, Boulder, CO

Community Climate System Modeling Tutorial. July 12-16, 2010. NCAR, Boulder, CO

IAS Winter School, 2009: *Reducing the Uncertainty in the Prediction of Global Warming*. Jerusalem, Israel, January 2009.

Community Climate System Model Workshop, 2006, 2007, 2010.

NCAR Atmospheric Modeling Working Group meetings, 2011, 2012

Center for Multiscale Modeling of Atmospheric Processes, Team Meetings:

9-11 August 2012, Fort Collins, CO
10-12 January 2012, Ft. Lauderdale, FL
9-11 August 2011, Fort Collins, CO
11-12 January 2011, Berkeley, CA
3-5 August 2010, Fort Collins, CO
12-14 January 2010, SCRIPPS, La Jolla, CA
28-30 July 2009, Fort Collins, CO

6-8 January 2009, New York City, NY
29-31 July 2008, Fort Collins, CO
5-7 January 2007, Los Angeles, CA
20-22 August 2007, Fort Collins, CO
20-22 February, 2007, Kauai, HI

Service

- Member, NCAR Director Search Committee, 2018.
- Chair, Early Career Scientists Assembly 2014-Present.
- Member, NCAR Scientists Assembly, 2014-Present.

Mentorship

- Science Co-supervisor of RISC student hourly assistants. Aaron Schroeder (2017). Thomas Young (2018).
- SIParCS Science Mentor for Statistics Graduate Student. Development of SDSM in R. Summer 2015. Student: Lee Richardson.
- SIParCS Science Mentor for Statistics Graduate Student. Building a blended SWE dataset for the Rocky Mountains. Summer 2015/2016. Student: Colette Smirniotis.
- SOARS Writing Mentor, Summer 2014. Student: Steven Naegele

Outreach

- NCAR Mesa Lab public tour guide. 2018
- Test Creator and Judge of Meteorology exam for Northern Colorado Regional Science Olympiad. 2018.
- Judge for the Wyoming State Science Fair, 2015, 2016, 2018.
- Girls and Science Day at the Denver Science Museum, 2015.
- Hands on Science with the Little Shop of Physics (<https://www.lsop.colostate.edu>). 2006-2012.