Baird Langenbrunner

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CAREER AND EDUCATION

Postdoctoral scholar

    UC Irvine Department of Earth System Science   July 2017–Present
        Advisors: Mike Pritchard and Jim Randerson

    UCLA Department of Atmospheric and Oceanic Sciences   December 2015–July 2017
        Advisor: J. David Neelin

University of California, Los Angeles, CA

    Ph.D. Atmospheric and Oceanic Sciences   December 2015
    M.S. Atmospheric and Oceanic Sciences   June 2013

Brown University, Providence, RI

    Sc.B. Geophysics   May 2009

RESEARCH EXPERIENCE

Graduate student researcher, UCLA   Summer 2010–Winter 2015

- Dissertation: *Quantifying uncertainty in precipitation climatology, twenty-first century change, and teleconnections in global climate models*
- Committee: J. David Neelin, Alex Hall, C. Roberto Mechoso, and Glen MacDonald

Senior thesis and part-time research scientist, Brown University   Fall 2008–Summer 2010

- Used empirical statistical downscaling techniques to explore the contribution of lightning to nitrogen oxide (NOx) deposition (with Meredith Hastings)

NSF Research Experience for Undergraduates Fellow, CSU, Fort Collins   Summer 2008

- Used an idealized estuary model to simulate the movement of point source pollution with implications for aquaculture (with Karan Venayagamoorthy)

Undergraduate student researcher, Brown University   Summer 2007–Fall 2008

- Analyzed environmentally stable isotopes in lake sediment to reconstruct temperature and hydrology over the Holocene (with Yongsong Huang)

WORK IN PROGRESS

Langenbrunner, B., M. S. Pritchard, and J. T. Randerson, 2018: Why does amazonian precipitation decrease in the plant physiological response to increased CO_2? **In preparation**.

Swain, D., B. Langenbrunner, A. Hall, and J. D. Neelin, 2017: Increasing weather whiplash in 21st century California. **In review** at Nature Climate Change.

PUBLISHED WORK

11. Langenbrunner, B., and J. D. Neelin, 2017: Pareto-optimal estimates of California precipitation change. *Geophysical Research Letters*, **44 (24)**, 12,436–12,446.

10. Langenbrunner, B., and J. D. Neelin, 2017: Multiobjective constraints for climate model parameter choices: Pragmatic pareto fronts in CESM1. *Journal of Advances in Modeling Earth Systems*, **9 (5)**, 2008–2026.

9. Lintner, B. R., B. Langenbrunner, J. D. Neelin, B. T. Anderson, M. J. Niznik, G. Li, and S.-P. Xie, 2016: Characterizing CMIP5 model spread in simulated rainfall in the Pacific Intertropical Convergence and South Pacific Convergence Zones. *Journal of Geophysical Research: Atmospheres*, **121 (19)**.

8. Langenbrunner, B., J. D. Neelin, B. R. Lintner, and B. T. Anderson, 2015: Patterns of precipitation change and climatological uncertainty among CMIP5 models, with a focus on the midlatitude Pacific storm track. *Journal of Climate*, **28**, 7858–7872.

7. Anderson, B. T., B. R. Lintner, B. Langenbrunner, J. D. Neelin, E. Hawkins, and J. Syktus, 2015: Sensitivity of terrestrial precipitation trends to the structural evolution of sea surface temperatures. *Geophysical Research Letters*, **42 (4)**, 1190–1196.

6. Berg, N., A. Hall, F. Sun, S. Capps, D. Walton, B. Langenbrunner, and J. D. Neelin, 2015: Twenty-first-century precipitation changes over the los angeles region. *Journal of Climate*, **28 (2)**, 401–421.

5. Maloney, E. D., S. J. Camargo, E. Chang, B. Colle, R. Fu, K. L. Geil, Q. Hu, X. Jiang, N. Johnson, K. B. Karnauskas, J. Kinter, B. Kirtman, S. Kumar, B. Langenbrunner, K. Lombardo, L. N. Long, A. Mariotti, J. E. Meyerson, K. C. Mo, J. D. Neelin, Z. Pan, R. Seager, Y. Serra, A. Seth, J. Sheffield, J. Stroeve, J. Thibeault, S.-P. Xie, C. Wang, B. Wyman, and M. Zhao, 2014: North american climate in CMIP5 experiments: Part III: Assessment of Twenty-first Century projections. *Journal of Climate*, **27 (6)**, 2230–2270.

4. Sheffield, J., S. J. Camargo, R. Fu, Q. Hu, X. Jiang, N. Johnson, K. B. Karnauskas, S. T. Kim, J. Kinter, S. Kumar, B. Langenbrunner, E. Maloney, A. Mariotti, J. E. Meyerson, J. D. Neelin, S. Nigam, Z. Pan, A. Ruiz-Barradas, R. Seager, Y. L. Serra, D.-Z. Sun, C. Wang, S.-P. Xie, J.-Y. Yu, T. Zhang, and M. Zhao, 2013: North american climate in CMIP5 experiments. Part II: Evaluation of historical simulations of intraseasonal to decadal variability. *Journal of Climate*, **26 (23)**, 9247–9290.

3. Sheffield, J., A. P. Barrett, B. Colle, D. Nelun Fernando, R. Fu, K. L. Geil, Q. Hu, J. Kinter, S. Kumar, B. Langenbrunner, K. Lombardo, L. N. Long, E. Maloney, A. Mariotti, J. E. Meyerson, K. C. Mo, J. David Neelin, S. Nigam, Z. Pan, T. Ren, A. Ruiz-Barradas, Y. L. Serra, A. Seth, J. M. Thibeault, J. C. Stroeve, Z. Yang, and L. Yin, 2013: North american climate in CMIP5 experiments. Part I: Evaluation of historical simulations of continental and regional climatology. *Journal of Climate*, **26 (23)**, 9209–9245.

2. Neelin, J. D., B. Langenbrunner, J. E. Meyerson, A. Hall, and N. Berg, 2013: California winter precipitation change under global warming in the Coupled Model Intercomparison Project phase 5 ensemble. *Journal of Climate*, **26 (17)**, 6238–6256.

1. Langenbrunner, B., and J. D. Neelin, 2013: Analyzing ENSO teleconnections in CMIP models as a measure of model fidelity in simulating precipitation. *Journal of Climate*, **26 (13)**, 4431–4446.

TEACHING EXPERIENCE

Certificate in Teaching Excellence   In progress
　　　UC Irvine Division of Teaching Excellence and Innovation

Guest lecturer, UCLA   Fall 2016, Spring 2017
　　　AOS 112: Climate Change Assessment for undergraduates (course lead: J. David Neelin)
　　　AOS 209: Climate Change Assessment for graduate students (course lead: J. David Neelin)
　　　Developed interactive Python scripts; taught upper-level undergraduates and graduate students how to analyze climate model data using a hierarchy of open-source software (five total lectures)

Lecturer and co-organizer, UCLA   Spring 2016
　　　AOS 281: Introduction to Python in the Atmospheric and Oceanic Sciences
　　　Weekly seminar with ∼20 participants composed of AOS undergraduate and graduate students, faculty, and staff

Lecturer, UCLA   Winter 2016
　　　AOS C110/C227: Advanced dynamic and synoptic meteorology
　　　Cross-listed gundergraduate and graduate course in midlatitude atmospheric dynamics, quasigeostrophic theory, and weather forecasting; 6 hours per week (4 hours of lecture and 2 hours of forecasting lab)

Teaching assistant, UCLA   Spring 2012, 2013, 2014
　　　AOS 102: Climate Change and Climate Modeling (course lead: J. David Neelin)
　　　Upper-level undergraduate course for science majors; taught weekly discussion sections, held office hours, graded homework and exams (responsible for 70+ students); guest lecturer when instructor absent

INVITED TALKS

UC Irvine Department of Earth System Science Seminar, Irvine, CA.	March 2017
NOAA Geophysical Fluid Dynamics Laboratory Dynamics Seminar; Princeton University, Princeton, NJ.	June 2016

SELECTED CONFERENCE PRESENTATIONS

Langenbrunner, B., and J. D. Neelin, 2016: Seeking deep convective parameter updates that improve tropical Pacific climatology in CESM using Pareto fronts. American Geophysical Union Fall Meeting. December 12–16, San Francisco, CA. **(Talk)**

Langenbrunner, B., and J. D. Neelin, 2016: Multiobjective constraints for CESM1 parameter choices: High-dimensional model reduction strateies and pragmatice Pareto fronts. National Center for Atmospheric Research. June 20–23, Breckenridge, CO. **(Poster)**

Langenbrunner, B., J. D. Neelin, B. R. Lintner, and D. N. Bernstein, 2016: Identifying leading spatial patterns of model uncertainty and bias in perturbed physics ensembles and multi-model ensembles. American Meteorological Society 96th Annual Meeting. January 10–14, New Orleans, LA. **(Talk)**

Langenbrunner, B., J. D. Neelin, B. T. Anderson, and B. R. Lintner, 2015: Precipitation change uncertainties in global warming simulations, and why they matter for California. Los Angeles Basin Earth and Planetary Sciences Student Research Symposium. April 24, UCLA, Los Angeles, CA. **(Talk, awarded 2nd place)**

Langenbrunner, B., J. D. Neelin, A. Hall, N. Berg, B. T. Anderson, and B. R. Lintner, 2015: Twenty-first century climate model precipitation projections and uncertainty patterns for the California region. American Geophysical Union Chapman Conference on California drought: Causes, impacts, and policy. April 20–22, UC Irvine, Irvine, CA. **(Poster)**

Langenbrunner, B., J. D. Neelin, and D. N. Bernstein, 2014: Investigating intermodel uncertainty in global and regional precipitation change within the CMIP5 ensemble. Graduate Climate Conference. October 31–November 2, Pack Forest Conference Center, Eatonville, WA. **(Poster)**

Langenbrunner, B., J. D. Neelin, and D. N. Bernstein, 2014: Spatial modes of model uncertainty in global and regional precipitation change. Institute for Mathematics Applied to Geosciences (IMAGe): Pattern scaling, climate model emulators, and their application to the new scenario process. April 23–24, NCAR, Boulder, CO. **(Poster)**

Langenbrunner, B., J. D. Neelin, and J. E. Meyerson, 2013: Analysis of teleconnections in CMIP models as a measure of model fidelity in simulating precipitation. World Climate Research Programme, Coupled Model Intercomparison Project phase 5 (CMIP5) Model Analysis. March 5–9, University of Hawaii, Honolulu, HI. **(Poster)**

Langenbrunner, B., J. D. Neelin, and J. E. Meyerson, 2011: Analysis of precipitation teleconnections in CMIP models as a measure of model fidelity in simulating precipitation. American Geophysical Union Fall Meeting. December 5–9, San Francisco, CA. **(Poster)**

AWARDS AND FELLOWSHIPS

California Council on Science and Technology Policy Fellowship – selected as finalist (interview declined)	2017
NOAA Climate & Global Change Postdoctoral Fellowship – selected as alternate	2016
Dissertation Year Fellowship (UCLA Graduate Division)	2014–2015
Morris Neiberger Award – for excellence in graduate teaching (UCLA AOS)	2014
AOS Fellowship – for science communication and outreach on behalf of department (UCLA AOS)	2013
Brian Bosart Award – for service to students and the department (UCLA AOS)	2012
Chancellor's Prize – awarded on basis of academic merit (UCLA Graduate Division)	2010–2013
Elected to Sigma Xi (Brown University)	2009
NSF Research Experience for Undergraduates (REU) Fellowship (CSU Fort Collins)	2008
Undergraduate Teaching and Research Award (Brown University Dept. of Geological Sciences)	2008
CRC Press Award for Achievement in Undergraduate Chemistry (Brown University Dept. of Chemistry)	2007

SERVICE AND PUBLIC OUTREACH

Science advisor, Berkeley, CA   Spring 2015–Present
- The Learning Design Group at UC Berkeley
- Advise and provide digestible climate data to curriculum specialists developing K–12 earth science lesson plans that adhere to Next Generation Science Standards; topics have included ocean circulation and precipitation/convection

SolarReserve, Green Lunch Speaker Series (with Kathleen Schiro); Santa Monica, CA.   April 2017

Climate change assembly, Citizens of the World Mar Vista Charter School, CA   January 2017
- Prepared and taught hour-long climate change lesson to 100 3rd graders (with AOS outreach group)

Children's Water Education Festival, UC Irvine   2012–2017
- Two-day event held at UC Irvine every spring; prepared and taught 30-minute lessons to 3rd–5th graders about water resources and climate change in the Los Angeles region

Math and Physical Sciences Council (MPSC), UCLA   2013–2015
- Part of the UCLA Graduate Student Association; represented the interests of STEM graduate students to the campus-wide Graduate Student Association; interacted with department representatives and attended Graduate Council meetings during the academic year; helped organize school-wide events for graduate students

AOS Chi Epsilon Pi, UCLA   2011–2015
- Atmospheric and Oceanice Sciences graduate student organization; served as treasurer, student-faculty representative, outreach coordinator, and president through the course of five years

Explore your universe!, UCLA   2011–2015
- Annual weekend event held in the fall at UCLA; helped organize and staff departmental participation; gave a talk on the California drought in 2014 (with Daniel Dauhajre)

Weather dance performance, UCLA Center for the Art of Performance   October 2013
- Organized and gave an invited talk with other UCLA AOS graduate students about the climate system, followed by a question and answer session with audience

Aquarium of the Pacific Education Volunteer, Long Beach, CA   October 2010–2011

Sustainable Food Initiative (SuFI), Brown University   2005–2009

PROFESSIONAL ACTIVITIES

- Community Earth System Model (CESM) Tutorial   Summer 2015
  National Center for Atmospheric Research (NCAR), Boulder, CO
- American Meteorological Society (AMS) member   2012–Present
- American Geophysical Union (AGU) member   2008–Present
- Reviewer for *Journal of Climate*, *Climatic Change*, *Geophysical Research Letters*, *Journal of Atmospheric and Oceanic Technology*, *Nature*

TECHNICAL SKILLS

- **Advanced knowledge** of Python/Numpy/Scipy, UNIX/LINUX shell environments and scripting, the NCAR Command Language (NCL), and command-line tools for NetCDF analysis (NCO, CDO)
- **Basic knowledge** of MATLAB, Fortran, GrADS
- **Research experience:** Modifying, running, and analyzing the Community Earth System Model (CESM) and the Weather Research and Forecasting Model (WRF); advanced geospatial techniques (objective analysis, methods in linear algebra); linear and nonlinear multivariate regression; multiobjective optimization; evolutionary algorithms

Last updated March, 2018