

## Daniel L. Swain

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## Research interests

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Dynamics & impacts of regional climate change, hydrological extremes, extreme event detection/attribution, tropical/Arctic teleconnections, natural hazard risk, climate adaptation, science writing & communication

## Education

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- Ph.D., Earth System Science, Stanford University** 2016  
Dissertation: "Character and causes of changing North Pacific climate extremes"  
Advisor: Dr. Noah Diffenbaugh
- B.S., Atmospheric Science, University of California, Davis (Highest Honors)** 2011

## Publications

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- Gonzales, K.R., **Swain, D.L.**, Barnes, E.A., K. Nardi, and N.S. Diffenbaugh, Recent warming of landfalling atmospheric rivers along the West Coast of the United States, *Journal of Geophysical Research: Atmospheres*, doi: 10.1029/2018JD029860, 2019.
- †**Swain, D.L.**, 2019. Weather: Is society ready for precipitation whiplash?, In: "Toward a Resilient Global Society: Air, Sea Level, Earthquakes, and Weather," *Earth's Future*, doi: 10.1029/2019EF001242, 2019
- Thackeray, C.W., A.M. DeAngelis, A. Hall, **D.L. Swain**, and X. Qu, On the Connection Between Global Hydrologic Sensitivity and Regional Wet Extremes, *Geophysical Review Letters*, 45, doi: 10.1029/2018GL079698, 2018.
- Touma, D., A. M. Michalak, **D.L. Swain**, and N.S. Diffenbaugh, Characterizing the spatial characteristics of extreme precipitation over the United States, *Journal of Climate*, 31, doi: 10.1175/JCLI-D-18-0019.1, 2018
- \***Swain, D.L.**, B. Langenbrunner, J.D. Neelin, and A. Hall, Increasing precipitation volatility in twenty-first-century California, *Nature Climate Change*, 8, 427-433, doi: 10.1038/s41558-018-0140-y., 2018.
- Swain, D.L.**, D. Singh, D.E. Horton, J.S. Mankin, T. Ballard, and N.S. Diffenbaugh, Remote linkages to anomalous winter atmospheric ridging over the northeastern Pacific, *Journal of Geophysical Research: Atmospheres*, 122, doi: 10.1002/2017JD026575, 2017.
- \*Diffenbaugh, N.S., Singh, D., Mankin, J.S., Charland, A., Horton, D.E., Haugen, M., **Swain, D.L.**, Rajaratnam, B., Touma, D., Quantifying the influence of global warming on

- unprecedented extreme climate events, *Proceedings of the National Academy of Sciences*, 114, 4881-4886, doi: 10.1073/pnas.1618082114, 2017.
- Singh, D., **D. L. Swain**, J.S. Mankin, D.E. Horton, L.N. Thomas, B. Rajaratnam, and N.S. Diffenbaugh, Recent amplification of the North American winter temperature dipole, *Journal of Geophysical Research: Atmospheres*, 121, doi: 10.1002/2016JD025116, 2016. 2016
- \*Swain, D. L.**, Horton, D.E., Singh, D., and N.S. Diffenbaugh, Trends in atmospheric patterns conducive to seasonal precipitation and temperature extremes in California, *Science Advances*, 2, doi: 10.1126/sciadv.1501344, 2016. 2016
- Swain, D.L.**, Lebassi-Habtezion, B., and N.S. Diffenbaugh, Evaluation of non-hydrostatic simulations of Northeast Pacific atmospheric rivers and comparison to in-situ observations, *Monthly Weather Review*, 143, 3556-3569, doi: 10.1175/MWR-D-15-0079.1, 2015. 2015
- \*Horton, D.E.**, N.C. Johnson, D. Singh, **D.L. Swain**, B. Rajaratnam and N.S. Diffenbaugh, Contribution of changes in atmospheric circulation patterns to extreme temperature trends, *Nature*, 522, 465–469, doi: 10.1038/nature14550, 2015. 2015
- \*Diffenbaugh, N.S.**, **D.L. Swain** and D. Touma, Anthropogenic warming has increased drought risk in California, 112, 3931-3936, *Proceedings of the National Academy of Sciences*, doi: 10.1073/pnas.1422385112, 2015. 2015
- †Swain, D.L.**, A tale of two California droughts: Lessons amidst record warmth and dryness in a region of complex physical and human geography, *Geophysical Review Letters*, doi:10.1002/2015GL066628, 2015 2015
- \*Swain, D.L.**, M. Tsiang, M. Haugen, D. Singh, A. Charland, B. Rajaratnam and N.S. Diffenbaugh, The extraordinary California drought of 2013-2014: character, context, and the role of climate change [in "Explaining Extremes of 2013 from a Climate Perspective"], *Bulletin of the American Meteorological Society*, 95 (9), S3–S7, 2014. 2014

**\* = ISI Highly Cited Paper**

**† = Perspective or commentary**

## Publications submitted/in preparation

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- Goss, M., **Swain, D.L.**, Sarhadi, A., Kolden, C.A., Abatzoglou, J.T., Williams, A.P., and N.S. Diffenbaugh, Climate change is increasing the risk of extreme autumn wildfire conditions across California (*in review, Proceedings of the National Academy of Sciences*) 2019
- Gibson, P.B., Waliser, D.E., Guan, B., DeFlorio, M.J., and **D.L. Swain**, Ridging associated with drought in western and southwestern United States: characteristics, trends and predictability (*in review, Journal of Climate*) 2019
- Huang, X., **Swain, D.L.**, Walton, D.B., Berg, N., and A. Hall, Importance of spatial resolution in simulating extreme precipitation during atmospheric rivers (*in review, Scientific Reports*) 2019
- Goldenson, N., Thackeray, C.W., **Swain, D. L.**, Hall, A., and N. Berg, Distinguishing Epistemic Uncertainties in Global Climate Simulations of Extreme Precipitation (*in review, Journal of Climate*) 2019

## Published reports

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- Hanak, E. et al., California's Water, *Public Policy Institute of California*, 2018. 2018
- Mount, J. et al., Managing Drought in a Changing Climate: Four Essential Reforms, *Public Policy Institute of California*, 2018. 2018

## Selected honors and awards

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- National Academy of Sciences Kavli Frontiers of Science Fellow 2019
- Finalist, AAAS Early Career Award for Public Engagement with Science 2018
- NatureNet Postdoctoral Fellowship, Nature Conservancy/University of California 2016-2018
- ARCS Fellowship, Achievement Rewards for College Scientists Foundation 2015-2016
- Switzer Environmental Fellowship, Robert and Patricia Switzer Foundation 2015-2016
- Graduate Student Award for Scholarly & Research Achievement, Stanford University 2015
- "Ten under 30: Young leaders changing the American West," *High Country News* 2015
- Fellow, Rising Environmental Leaders Program, Stanford Woods Inst. for the Environment 2013
- Centennial Teaching Assistant Award, School of Earth Sciences, Stanford University 2013
- College Medal, College of Agricultural & Environmental Sciences, Univ. of California, Davis 2011
- Departmental Citation, Atmospheric Science, University of California, Davis 2011
- Winner, Prized Writing Competition, Scientific & Technical Writing, Univ. of California, Davis 2010, 2008
- Guillermo Salazar Rodriguez Undergraduate Scholarship, American Meteorological Society 2010
- Regents Scholarship, University of California, Davis 2009-2011
- American Meteorological Society Undergraduate Scholar 2007-2009
- Henry A. Jastro Recruitment Scholarship, University of California, Davis 2007-2009
- NASA Ames/AIAA Galileo Memorial Scholarship 2007

## Grants

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- Co-PI, National Science Foundation Prediction of and Resilience against Extreme Events (NSF PREEVENTS) Program, Track 2: "COEXIST: Connected EXtremes In Space and Time," Award ID: 1854761, Award total: \$345,446 (UCLA portion) 2019-2021

## Invited scientific presentations

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- "Hydroclimatic intensification in a warming world: is society ready for increasing precipitation whiplash?" *American Geophysical Union Fall Meeting*, Washington, D.C. (*invited speaker*) Dec. 2018
- "Thinking about climate risk in an era of extremes: California's increasingly wide swings between drought and flood," *Department of Geography Seminar*, University of California, Berkeley (*invited lecturer*) Oct. 2018

- “Atmospheric rivers as a scientific (and conversational) bridge between weather and climate,” *International Atmospheric Rivers Conference*, Scripps Institute of Oceanography, La Jolla, CA (*invited speaker*) Jun. 2018
- “California’s increasingly extreme climate future,” Rusch Honors Colloquium, Viterbi School of Engineering, Univ. of Southern California, Los Angeles, CA (*invited lecturer*) Nov. 2017
- “Causes and impacts of climate change—a California perspective,” Climate and Law Policy Seminar, UCLA School of Law, Los Angeles, CA (*invited lecturer*) Sep. 2017
- “Teleconnections and regional impacts under anthropogenic forcing” & “Global warming influence on extreme events,” *US Climate Variability and Predictability Program (CLIVAR) Summit*, Baltimore, MD (*invited speaker and panelist*) Aug. 2017
- “Trends in persistent seasonal-scale atmospheric circulation patterns responsible for precipitation and temperatures extremes in California,” *American Geophysical Union Fall Meeting*, San Francisco, CA (*invited speaker*) Dec. 2015
- “Drought causes,” *American Geophysical Union Chapman Conf. on California Drought: Causes, Impacts, & Policy*, Univ. of California, Irvine (*invited panelist*) Apr. 2015
- “The extraordinary 2012-2015 drought in California and its context in a warming world,” *Water Scarcity in the West: Past, Present, Future Conference*, Univ. of California, Davis (*invited speaker and panelist*) Apr. 2015
- “Persistent atmospheric patterns and the ongoing California drought: the role of the Ridiculously Resilient Ridge,” *NASA Earth Science Seminar*, NASA Ames, Mountain View, CA (*invited speaker*) Mar. 2015
- “The extraordinary California drought of 2012-2015: Historical context and the role of climate change,” *Pacific Climate Workshop 2015*, Pacific Grove, CA (*invited speaker*) Mar. 2015
- “The extraordinary California drought of 2012-2015: Historical context and the role of climate change,” *Atmosphere and Energy Departmental Seminar*, Stanford University, Stanford, CA (*invited speaker*) Mar. 2015

## Professional experience

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### ***Scientific Research Appointments***

- Climate Scientist** 2018-Present  
**Inst. of Environment & Sustainability, University of California, Los Angeles**  
 Lead research on dynamics & impacts of regional climate change and serve as primary media point of contact on weather/climate-related topics.
- California Climate Fellow** 2018-Present  
**The Nature Conservancy**  
 Lead interdisciplinary research aimed at understanding of dynamics of future climate changes (including extreme events) and implications for human infrastructure and ecosystems; evaluate risk-reduction interventions & co-benefits to society & natural systems.
- Capacity Center for Weather & Climate Extremes Fellow** 2018-Present  
**National Center for Atmospheric Research**

Lead research into atmospheric/Earth system dynamics of hydrologic cycle extremes.

**Postdoctoral Fellow**

2016-2018

**Inst. of Environment & Sustainability, University of California, Los Angeles**

Investigate the character and causes of changes in hydrological cycle extremes in California.

**Graduate Research Assistant**

**Climate and Earth System Dynamics Group, Stanford University**

2011-2016

Develop and conduct scientific investigations of climate variability and change in the North Pacific/western North America region, with a focus on extreme meteorological events and persistent circulation patterns.

**Intern**

2010

**NASA/National Center for Suborbital Research, University of California, Irvine**

Obtain “ground truth” measurements for comparison to NASA overflights with hyperspectral imager as part of agricultural evapotranspiration study.

***Science Communication and Science Writing***

**Author & Founder, Weather West Blog ([www.weatherwest.com](http://www.weatherwest.com))**

2006-Present

Write regular articles focusing on a wide range of California/western North America weather and climate topics; answer questions from public, decision-makers, and scientists regarding meteorology/climatology/general science/science policy. Strong emphasis on making scientific and technical topics accessible to a broad audience (readership of >10 million to date). Extensive social media outreach (via Twitter as @Weather\_West).

**Atmospheric and Climate Science Media Liaison**

2013-present

Frequent, sustained engagement with local, national, and international news media on weather & climate-related issues. Over 400 interviews with a wide range of outlets, including:

Newspaper: New York Times, Washington Post, USA Today, Wall Street Journal, Bloomberg, Los Angeles Times, San Francisco Chronicle, Sacramento Bee & local outlets

Long-form/magazine: Time, The Economist, Newsweek, The Atlantic, Wired, Scientific American, Popular Science, National Geographic, Vogue, Outside Magazine, Sunset Magazine, Bay Nature Magazine, Mother Jones

Radio: NPR (and numerous local affiliates), BBC World Service  
ABC & CBS national radio (and local affiliates), various local and university stations

Television: CNN, ABC, NBC, PBS, Democracy Now, Al Jazeera, Global National  
Canada, HBO, German and Danish public television

Web outlets: Vox, Slate Magazine, Vice Magazine, BuzzFeed, Mashable, The Verge

Climate/weather-focused: Climate Central, Climate Nexus, InsideClimate News, Generation Anthropocene podcast, The Weather Channel, Wunderground, The Weather Network

**Science Writing**

Occasional contributor of invited popular science/current event-related perspective pieces in print and online media, including selected publications below.

2010-present

**Swain, D.L.,** Kolden, C., and J. Abatzoglou, “The era of megafires: the crisis facing California and what will happen next,” article in *The Guardian*, 08 August 2018

2018

- Swain, D.L.** and V. Carranza, “The science behind ‘An Inconvenient Sequel,’” article for UCLA Institute of the Environment & Sustainability blog, 08 August 2017. 2017
- Swain, D.L.**, *Outside Magazine* contributor, various articles 2015-2016
- Swain, D.L.**, *KQED Public Media* contributor, various articles 2015-2016
- Diffenbaugh, N.S. and **D.L. Swain**, “Climate Change and the California Drought,” article for Brookings Institution *PlanetPolicy* blog, 06 October 2014. 2014
- Swain, D.L.**, and N.S. Diffenbaugh, “Viewpoints: Climate change is increasing the chances of drought,” *Sacramento Bee* Op-Ed, 30 September 2014. 2014
- Swain, D.L.**, 2010, “Of Ice and Men: How changes in Arctic sea ice affect our climate, our weather, and our ways of life,” *Prized Writing 2009-2010*, P. Demory, Ed., Univ. of California, Davis, 210-217. 2010

### ***Teaching***

**Teaching Assistant, Department of Earth System Science, Stanford University** 2013  
 Course: “Atmosphere, Ocean & Climate Dynamics: The Atmospheric Circulation.” Give guest lectures, develop and implement practical laboratory sessions, hold office hours, and evaluate student performance.

### **Invited Guest Lecturer**

*University of California, Los Angeles* 2016-2017  
 Courses: Climate Law and Policy; The Blue Planet: Introduction to Oceanography

*Stanford University* 2013-2016  
 Courses: Atmosphere, Ocean & Climate Dynamics 1 & 2; Stanford Pre-Collegiate Institutes

### **Public and community outreach**

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- Climate Feedback expert reviewer, assessing national/international media coverage on climate change and extreme weather as member of accredited fact-checking organization Sep. 2016-present
- Invited speaker, “Wetter, drier, or both? Increasing hydroclimatic variability in 21<sup>st</sup> century California,” University of California Agriculture & Natural Resources Water Strategic Initiative meeting, Davis, CA\* May 2019
- Invited Speaker, “Is California ready for increasing precipitation whiplash?” American River Operations Work Group meeting, Folsom, CA\* May 2019
- Invited Speaker, “Forces of Nature: H2-Uh-Oh,” First Fridays event at Natural History Museum of Los Angeles, Los Angeles, CA May 2019
- Invited Speaker, “The Wild West of Online Science Communication,” University of Washington Program on Climate Change, Seattle, WA\* Apr. 2019
- Invited Panelist, “LA’s New Abnormal: Megafires,” UCLA Institute of the Environment and Sustainability & The Nature Conservancy, Los Angeles, CA Feb. 2019
- Invited Speaker, “Fire & Water from the 30,000-Foot Level,” Water Education Foundation Jan. 2019

“Water Leaders” Orientation, Sacramento, CA\*

Invited Keynote Speaker, “Drought, flood, and wildfire amidst increasing climate whiplash: the challenging road ahead for water management in the West,” Water Education Foundation Water Summit, Sacramento, CA Sep. 2018

Invited Interactive Speaker, “Climate Change Cliff Notes,” A Climate Series for the Ages, hosted by UCLA Institute of Environment and Sustainability & Natural History Museum of Los Angeles, Los Angeles, CA Oct. 2017

Invited Speaker, “Change in a land of extremes: what we know (and don't know) about California's climate future,” Krotona Institute/Ojai Valley Conservancy, Ojai, California May 2017

Featured Speaker, Stanford Connects 2016: “The Rise of the Ridiculously Resilient Ridge and the Future of California Drought,” Stanford University, Stanford, CA May 2016

Project Mentor, Stanford University course: “International Climate Negotiations (COP 21)” Dec. 2015

Invited Speaker, “Flood in a time of drought? Effects of a powerful El Niño in the midst of California’s record dry spell,” Association of Bay Area Governments, Oakland, CA Sep. 2015

Invited Speaker, “Climate Change in a Land of Extremes: Drought and Flood in California’s Past, Present, and Future,” U.S. National Park Service Parsons Memorial Lodge Lecture Series, Yosemite National Park, CA Aug. 2015

Invited Speaker and Panelist, "California Drought Panel," Water in the West/Woods Institute for the Environment, Stanford University, Stanford, CA Mar. 2015

Invited Panelist, “Earth Matters/A Matter of Degrees,” Stanford Continuing Studies Program, Stanford University, Stanford, CA Feb. 2015

Invited Science Speaker, "Stanford to the Sea" Science Hike, “The Ridiculously Resilient Ridge in Context: Climate Variability of California’s Past, Present, and Future,” Bill Lane Center for the American West, Stanford University, Stanford, CA May 2014

Invited Speaker and Panelist, "Current Drought: Causes, how bad is it, and will we see more?" University of California Drought Summit, California State Capitol, Sacramento, CA Apr. 2014

Invited Speaker and Panelist, "The California Drought: Causes, Context, and Response," Bill Lane Center for the American West/Woods Institute for the Environment, Stanford University, Stanford, CA Feb. 2014

Founder and leader, Aggie Forecasting Team at University of California, Davis 2008-2011

Co-leader, Atmospheric Profiling & Stratospheric Photography Project, Univ. of Calif., Davis 2009-2011

\*Denotes remote attendance via teleconference software or telephone

## Other awards and recognitions

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“Must Follow” Social Media Meteorologist/Climatologist, Forbes Magazine 2016

Best Talk Award, Environmental Science, SES Research Review, Stanford University 2016

Oakland Museum of California “Agent of Change”	2015
“Research as Art” competition winner, School of Earth Sciences, Stanford University	2015, 2012
ThinkSwiss Award, Swiss National Science Foundation, “NCCR Climate Summer School,” Grindelwald, Switzerland	2013
Invitee, NCAR Undergraduate Leadership Workshop, Boulder, CO	2010
UC Davis Integrated Studies Honors Program International Education Award	2008
UC Davis International Relations Study Abroad Award	2008
Edward Kraft Prize, University of California, Davis	2008

## **Other scientific presentations**

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### ***Oral Presentations***

“Dynamics of and precursors to California megafloods, present and future,” <i>American Meteorological Society Annual Meeting</i> , Phoenix, AZ	Jan. 2019
“Increasing climate whiplash in 21st century California,” <i>American Geophysical Union Fall Meeting</i> , New Orleans, LA	Dec. 2017
“California precipitation extremes in a warming world,” <i>Sustainable LA Water Research Grand Challenge Research Symposium</i> , Los Angeles, CA	Nov. 2017

### ***Poster Presentations***

“Connections between the tropical Pacific Ocean, Arctic sea ice, and anomalous northeastern Pacific ridging,” <i>American Geophysical Union Fall Meeting</i> , San Francisco, CA	Dec. 2016
“Character and causes of changing Pacific climate extremes: Special focus on the extraordinary 2012-2015 California drought,” <i>Young Environmental Scholars Conference</i> , Stanford, CA	Dec. 2015
“The Extraordinary California Drought of 2013-2014: Character, Context, and the Role of Climate Change,” <i>American Geophysical Union Fall Meeting</i> , San Francisco, CA	Dec. 2014
“The Extraordinary California Drought of 2013-2014: Character, Context, and the Role of Climate Change,” <i>Graduate Climate Conference</i> , Seattle, WA	Nov. 2014
“The Extraordinary California Drought of 2013-2014: Character, Context, and the Role of Climate Change,” <i>Fourth Workshop on understanding Climate Change from Data</i> , National Center for Atmospheric Research, Boulder, CO	Jun. 2014
“Evaluation of high-resolution simulations of Northeast Pacific atmospheric rivers,” <i>American Geophysical Union Fall Meeting</i> , San Francisco, CA	Dec. 2013
“Mid-Latitude Precipitation Extremes: Latitudinal Linkages and Climate Change,” <i>Swiss National Center for Competence in Research (NCCR Climate)</i> , Grindelwald, Switzerland	Sep. 2013
“High-resolution seasonal simulations of Northeast Pacific atmospheric rivers and comparison to in-situ observations,” <i>American Geophysical Union Fall Meeting</i> , San Francisco, CA	Dec. 2012

## **Professional affiliations and service activities**

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Expert Reviewer, United Nations International Strategy for Disaster Reduction (UNISDR) Global Assessment Report on Disaster Risk Reduction (GAR) 2019	2019
Expert Reviewer, California's Fourth Climate Change Assessment	2018
Journal Manuscript Referee ( <i>Nature</i> , <i>Nature Climate Change</i> , <i>Climatic Change</i> , <i>Geophysical Research Letters</i> , <i>Journal of Climate</i> , <i>Bulletin of the American Meteorological Society</i> , <i>Scientific Reports</i> , <i>Advances in Water Resources</i> , <i>Journal of Geophysical Research: Atmospheres</i> )	2013-present
Member, American Association for the Advancement of Science (AAAS)	2017-present
Member, American Geophysical Union (AGU)	2010-present
Member, American Meteorological Society (AMS)	2007-present
President, American Meteorological Society Student Chapter, UC Davis	2009-2011
AGU Fall Meeting session co-convenor: "Bridging the Gap from Climate to Extreme Weather: Observations, Theory and Modeling" (2019), "Tropical Cyclones in the Global Climate System" (2010)	2010, 2019