Linyin Cheng, PhD

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Education

- ✧ Ph.D.   **University of California, Irvine**
   Civil and Environmental Engineering (Hydroclimate), 2014
- ✧ M.S.   **Clarkson University**
   Civil and Environmental Engineering (Hydrodynamic), 2011
- ✧ B.S.   **Sichuan University**
   Civil Engineering (Hydraulic and Hydroelectric), 2009
- ✧ B.S.   **Sichuan University**
   Second Bachelor's degree in Law, 2009

Positions

- ✧ Assistant Professor, Department of Geosciences, **University of Arkansas** (08/2018 to present)
- ✧ Research Scientist, **CIRES, NOAA, ESRL/PSD** (10/2016 to 08/2018)
  - research focuses: 1) diagnose human-induced thermodynamic and dynamic drivers of weather and climate extreme events; 2) examine interrelationship between drought and heatwave in a changing climate; 3) develop conditional framework and concept for diagnosing combinations of extreme events with underlying conditions
- ✧ Research Associate, **CIRES, NOAA, ESRL/PSD** (10/2014 – 10/2016)
  - research focuses: 1) climate change impact assessment on water resources; 2) assess individual and mutual effects of climate change and internal modes of climate variability on climatic extremes
- ✧ Postdoctoral Scholar, **CIRES, University of Colorado, Boulder, and NOAA/ESRL PSD** (10/2014 – 10/2015)
  - research focus: develop frameworks for spatio-temporal extreme value analysis
- ✧ Advanced Study Program Graduate visitor, **NCAR** (6/2013 – 9/2013)
  - research focuses: 1) empirical Bayes estimation for conditional extreme value analysis; 2) develop non-stationary extreme value analysis model (NEVA)
- ✧ Research Assistant, **University of California, Irvine** (2011 – 2014)
  - research focus: extreme value analysis in hydrology and climatology
  - Ph.D. dissertation: Frameworks for Univariate and Multivariate Non-stationary Analysis of Climatic Extremes
- ✧ Research Assistant, **Clarkson University** (2009 – 2011)
  - M.S. thesis: A Numerical Study on the upper St. Lawrence River Ice Dynamics and the Need for the Ice Sluice Gates

Linyin Cheng, PhD

Teaching Experience and Interests
- ✧ Instructor
  - Climatology 4363/5363 at the University of Arkansas, Spring 2019
- ✧ Co-instructor
  - lectures on multivariate extreme value analysis at CU-Boulder in 2015
  - lectures on extreme value analysis in Climate Data Analysis course at UC-Irvine in 2014
- ✧ Teaching Assistant
  - Watershed Modeling at UC-Irvine in 2013 and 2014
- ✧ Geographic Information System course at UC-Irvine in 2014
- ✧ Organizing Committee
  - Copulas for Hydrology and Climate Applications Workshop, UC-Irvine, 2014
- ✧ Peer Mentors
  - Mentor fellow graduate students at UC-Irvine in 2012 and 2013 academic years

Professional Activities
- ✧ Reviewer for Journals:
  1) Journal of Climate, 2) Climate Research, 3) Journal of Geophysical Research: Atmospheres, 4) Theoretical and Applied Climatology, 5) International Journal of Climatology, 6) Climate, 7) Water, 8) Scientific Reports, 9) Natural Hazards and Earth System Sciences, 10) Journal of Hydrology, 11) Journal of Hydrologic Engineering, 12) Extremes, 13) Risk Analysis, 14) Environmental Modelling and Software, 15) Advances in Statistical Climatology, Meteorology and Oceanography, 16) Journal of Applied Meteorology and Climatology, 17) Advances in Water Resources, 18) Geophysical Research Letters, 19) Earth System Dynamics, 20) Biogeosciences, 21) Climatic Change, 22) Water Resources Research, 23) Hydrologic Process
- ✧ Reviewer for Technical Paper:
  California's Fourth Climate Change Assessment
- ✧ Reviewer for Proposals:
  National Science Foundation (NSF)

Fellowship, Honors and Awards
- ✧ 2017 Best Paper Award by the International Commission on Statistical Hydrology, International Association of Hydrological Sciences (IAHS)
- ✧ AGU's Natural Hazards Focus Group Award for Graduate Research 2015
- ✧ Received the Cooperative Institute for Research in Environmental Sciences (CIRES) Fellowship in Postdoctoral Program from 2014 –2015
- ✧ Competitively selected for the Advanced Study Program (ASP) Fellowship in Postdoctoral Program at the National Center for Atmospheric Research (NCAR) in 2014
- ✧ AGU's Outstanding Student Paper Awards (OSPAs) in Hydrology section, for the AGU Fall meeting, 2013 poster "Non-stationary Extreme Value Analysis in a Changing Climate: A Software Package"

Linyin Cheng, PhD

✧ Received the Advanced Study Program support to participate in the Graduate Visitor Program at the National Center for Atmospheric Research (NCAR), 2013

Software Development

Non-stationary Extreme Value Analysis (NEVA) Toolbox

- URL:http://www.mathworks.com/matlabcentral/fileexchange/48238-nonstationary-extreme-value-analysis--neva--toolbox
- Selected as one of the MATLAB Community Toolboxes and Apps for the *Teaching Quantitative Finance and Risk Management*

Publications

1. **Cheng, L.**, AghaKouchak, A., Gilleland, E., Katz, R., 2014, Non-stationary Extreme Value Analysis in a Changing Climate, *Climatic Change*, 127, 353-369, doi: 10.1007/s10584-014-1254-5.
2. **Cheng, L.**, AghaKouchak, A., 2014, Nonstationary Precipitation Intensity-Duration-Frequency Curves for Infrastructure Design in a Changing Climate, *Scientific Reports*, 4, 7093, doi: 10.1038/srep07093.
3. **Cheng, L.**, Gilleland, E., Heaton, M., AghaKouchak, A., 2014, Empirical Bayes estimation for the conditional extreme value model, *Stat*, 3, 391-406, doi: 10.1002/sta4.71.
4. AghaKouchak, A., **Cheng, L.**, Mazdiyasni, O., Farahmand, A., 2014, Global Warming and Changes in Risk of Concurrent Climate Extremes: Insights from the 2014 California Drought, *Geophysical Research Letters*, 41, 8847-8852, doi: 10.1002/2014GL062308.
5. **Cheng, L.**, AghaKouchak, A., 2015, A Methodology for Deriving Climate Response from Multimodel Ensemble Climate Simulations, *Journal of Hydrology*, 522, 49-57, doi: 10.1016/j.jhydrol.2014.12.025.
6. **Cheng, L.**, AghaKouchak, A., Phillips, T., 2015, Non-stationary Return Levels of Monthly Temperature Extremes based on CMIP5 Multi-Model Simulations, *Climate Dynamics*, 44, 2947-2963, doi: 10.1007/s00382-015-2625-y.
7. Nasrollahi, N., AghaKouchak, A., **Cheng, L.**, Damberg, L., Phillips, T., Miao, C., Hsu, K., and Sorooshian, S., 2015, How Well Do CMIP5 Climate Simulations Replicate Historical Trends and Patterns of Meteorological Droughts? *Water Resources Research*, 51, 2847-2864, doi: 10.1002/2014WR016318.
8. **Cheng, L.**, Hoerling, M., AghaKouchak, A., Livneh, B., Quan, X., Eischeid, J., 2016, How Has Human-induced Climate Change Affected California Drought Risk? *Journal of Climate,* 29.1, 111-120, doi: 10.1175/JCLI-D-15-0260.1.
9. Hoerling, M., Eischeid, J., Perlwitz, J., Quan, X., Wolter, K., **Cheng, L.**, 2016, Characterizing Recent Trends in U.S. Heavy Precipitation, *Journal of Climate*, 29, 2313-2332, doi: 10.1175/JCLI-D-15-0441.1.
10. Hoell, A., Hoerling, M., Eischeid, J., Wolter, K., Dole, R., Perlwitz, J., Xu, T., **Cheng, L.**, 2016, Does El Nino Intensity Matter for California Precipitation, *Geophysical Research Letters*, 43, 819-825, doi: 10.1002/2015GL067102.

11. Madadgar, S., AghaKouchak, A., Shukla, S., Wood, A., **Cheng, L.**, Hsu, K., Svoboda, M., 2016, A hybrid statistical-dynamical drought prediction framework: application to the southwestern U.S., *Water Resources Research*, 52, 5095-5110, doi: 10.1002/2015WR018547.

12. Bracken, C., Rajagopalan, B., **Cheng, L.**, Kleiber, W., Gangopadhyay, S., 2016, Spatial Bayesian hierarchical modeling of precipitation extremes over a large domain, *Water Resources Research*, 52, 6643-6655, doi: 10.1002/2016WR018768.

13. Wolter, K., Hoerling, M., Eischeid, J., **Cheng, L.**, 2016, What History Tells Us About 2015 US Daily Rainfall Extremes, [in "Explaining Extremes of 2015 from a Climate Perspective"], *Bulletin of the American Meteorological Society*, 97, S9-S13, doi: 10.1175/BAMS-D-16-0166.1.

14. Hoell, A., **Cheng, L.**, 2017, Austral Summer Southern Africa Precipitation Extremes Forced by the El Niño-Southern Oscillation and the Subtropical Indian Ocean Dipole, *Climate Dynamics*, 1-18, doi: https://doi.org/10.1007/s00382-017-3801-z.

15. Newman, M., Wittenberg, A., **Cheng, L.**, Compo, G.P., Smith, C., 2017, The Extreme 2015/2016 El Niño, in the Context of Historical Climate Variability and Change, *Bulletin of the American Meteorological Society,* doi: 10.1175/BAMS-D-17-0116.1.

16. Zhang, T., Hoerling, M., Wolter, K., Eischeid, J., **Cheng, L.**, Hoell, A., Perlwitz, J., Quan X., Barsugli, J., 2017, Predictability and Prediction of Southern California Rains during strong El Niños: A Focus on the Failed 2016 Winter Rains, *Journal of Climate,* doi: 10.1175/JCLI-D-17-0396.1.

17. **Cheng, L.**, Hoerling, M., Smith, L., Eischeid, J., 2017, Diagnosing Human-Induced Dynamic and Thermodynamic Drivers of Extreme Rainfall, *Journal of Climate,* doi: 10.1175/JCLI-D-16-0919.1.

18. Liu, Z., **Cheng, L.***, Hao, Z., Li, J., Thorstensen, A., Gao, H., 2018, A Framework for Exploring Joint Effects of Conditional Factors on Compound Floods, *Water Resources Research*, doi: 10.1002/2017WR021662.

19. Ragno, E., AghaKouchak, A., Love, C., **Cheng, L.**, Vahedifard, F., Lima, C., 2018, Quantifying Climate Change Impacts on the Intensity-Duration-Frequency of Extreme Precipitation across the United States, *Water Resources Research*, doi: 10.1002/2017WR021975.

20. **Cheng, L.**, Hoerling, M., Liu, Z., Eischeid, J., 2019, Physical understanding of human-induced changes in U.S. hot droughts using equilibrium climate simulations, *Journal of Climate* (in press)

21. Chen, L., Chen, X., **Cheng, L.**, Zhou, P., Liu, Z., 2019, Compound hot droughts over China: identification, risk patterns and variations, *Atmospheric Research* (in press)

22. Deng, C., Zhang, B., **Cheng, L.**, Hu, L., Chen, F., 2019, Vegetation Dynamics and their Effects on Surface Water-Energy Balance in the Three-North Region of China, *Agricultural and Forest Meteorology* (in press)

Under Revision:

23. Ragno, E., AghaKouchak, A., **Cheng, L.**, Sadegh, M., 2019, A Generalized Framework for Process-based Nonstationary Extreme Value Analysis

<u>Under Review:</u>

24. Zhou, P., **Cheng**, **L.**, Huang, Y., Liu, Z., A conditional approach for quantitatively estimating climate variability over China under the effects of ENSO events
25. Ren, K., Huang, S., Huang, Q., Wang, H., Leng, G., **Cheng, L.**, Wei, F., Li, P., A nature-based reservoir optimization model for resolving the conflict in human water demand and riverine ecosystem protection

Technical Reports

1. Skahill, B., AghaKouchak, A., **Cheng, L.**, Byrd, A., Kanney, J., Bayesian Inference of Nonstationary Precipitation Intensity-Duration-Frequency Curves for Infrastructure Design, 2016, US Army Corps of Engineers ERDC/CHL, CHETN-X-2
2. **Cheng, L.**, Huang, F., Knack I., and Shen, H., 2011, A Study on the Need of Ice Sluice Gates for St. Lawrence/FDR Power Project, Report to New York Power Authority

Selected Conference Papers, Presentations and Posters

✧ Bracken, C., Rajagopalan, B., **Cheng, L.**, Gangopadhyay, S., Efficient Bayesian Hierarchical Modeling of Spatial Precipitation Extremes, Proceedings of the Fifth International Workshop on Climate Informatics: CI 2015. J. G. Dy, J. Emile-Geay, V. Lakshmanan, Y. Liu (Eds.). September 2015. ISBN: 978-0-9973548-0-5

✧ **Cheng, L.**, Hoerling, M., Smith, L., Eischeid, J., Assessing the Individual and Mutual Effects of Climate Change and ENSO on Extreme Events, CIRES Review, August 29-31, 2016, NOAA, Boulder, CO, USA

✧ Yang, P., **Cheng, L.**, Ng, T., 2016, Quantifying Uncertainty of Return Periods for Multiple Extremes: A Comparison between Bootstrapping and Markov Chain Monte Carlo, AOGS 13th Conference, 31st July to 5th Aug, 2016, Beijing, China

✧ Hoerling, M., **Cheng, L.**, Smith, L., Eischeid, J., Some Lessons in Event Attribution: The Texas/Oklahoma Rains of May 2015, The International Detection and Attribution Group (IDAG), February 1-3, 2016, NCAR, Boulder, CO, USA

✧ **Cheng, L.**, Hoerling, M., AghaKouchak, A., Livneh, B., Quan, X., Eischeid, J., How Has Human-induced Climate Change Affected California Drought Risk?, AGU Fall Meeting, December 14-18, 2015, San Francisco, California, USA.

✧ Bracken, C., Rajagopalan, B., **Cheng, L.**, Gangopadhyay, S., Coupled Bayesian Hierarchical Modeling of Streamflow and Precipitation Extremes, AGU Fall Meeting, December 14-18, 2015, San Francisco, California, USA.

✧ Madadgar, S., **Cheng, L.**, Wood, A., Svoboda, M., AghaKouchak, A., A Hybrid Framework for Improving NMME Precipitation Forecasts, AGU Fall Meeting, December 14-18, 2015, San Francisco, California, USA.

✧ Ragno., E., **Cheng, L.**, Cui, X., AghaKouchak, A., Nonstationarity in Extremes and Changes in Flood Risk in a Warming Climate, International Conference on Advances in Extreme Value Analysis and Application on Natural Hazards, Sep. 16-18, 2015, Santander, Spain

- **Cheng, L.**, Current Effects of Human-induced Climate Change on California Drought, ESRL Physical Sciences Division Review 2015, May 12-14, 2015, NOAA, Boulder, CO, USA

- **Cheng, L.**, Hoerling, M., AghaKouchak, A., Livneh, B., Quan, X., Current Effect of Human-induced Climate Change in California Drought, AGU Chapman Conference, April 20-22, 2015, University of California, Irvine, Irvine, CA, USA

- Mazdiyasni, O., AghaKouchak, A., **Cheng, L.**, Farahmand, A., Multivariate Hot-Drought Risk Assessment: The 2014 California Drought, AGU Chapman Conference, April 20-22, 2015, University of California, Irvine, Irvine, CA, USA

- **Cheng, L.**, Rajagopalan, B., AghaKouchak, A., Bracken, C., A Generalized Spatio-temporal Framework for Climate Informed Extreme Precipitation Analysis, Hydrology Days, March 23-25, 2015, Colorado States University, Fort Collins, CO, USA

- **Cheng, L.**, Hoerling, M., AghaKouchak, A., Livneh, B., Quan, X., Extreme Value Theory and the California Drought: Multivariate Assessment on the Role of Climate Change in California Drought, The International Detection and Attribution Group (IDAG), January 21-23, 2015, NCAR, Boulder, CO, USA

- **Cheng, L.**, AghaKouchak, A., An Empirical Bayes Conditional Extreme Value Model for Detecting Changes in the Hydrological Cycle, AGU Fall Meeting, December 15-19, 2014, San Francisco, CA, USA

- Luke, A., Schubert, J., **Cheng, L.**, AghaKouchak, A., Sanders, B., Predicting Flood Hazards in Systems with Multiple Flooding Mechanisms, AGU Fall Meeting, December 15-19, 2014, San Francisco, CA, USA

- **Cheng, L.**, AghaKouchak, A., Gilleland, E., Katz, E., Non-stationary Extreme Value Analysis in a Changing Climate: A Software Package, AGU Fall Meeting, December 9-13, 2013, San Francisco, CA, USA (AGU OSPAs Awards)

- **Cheng, L.**, AghaKouchak, A., Deriving Climate Response from CMIP5 Ensemble Climate Projections: Application to Analysis of Temperature and Precipitation Extremes, AGU Fall Meeting, December 3-7, 2012, San Francisco, CA, USA