

Xiaodong Chen, Ph.D.

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Research Interests

- Hydroclimate Extreme Events (extreme precipitation and flooding)
- Regional Climate Modeling and Applications
- Machine Learning and Neuralhydrology
- Engineering Hydrometeorology

Research Experience

2018.3 - now	Postdoctoral Research Associate Pacific Northwest National Laboratory, Richland, WA, USA
2013.7 - 2013.8	Visiting Scholar National Institute for Environmental Studies, Tsukuba, Ibaraki, Japan

Degrees

2015.3 – 2017.12	Ph.D. in Civil and Environmental Engineering <i>Dissertation: “Understanding probable maximum precipitation and safety of water management infrastructures under a changing climate”</i> Department of Civil and Environmental Engineering, University of Washington, USA
2011.9 – 2015.3	M.S. in Civil and Environmental Engineering <i>Thesis: “Model estimate of Pan-Arctic wetland methane emissions and their climate sensitivity during 1960-2006”</i> Department of Civil and Environmental Engineering, University of Washington, USA
2007.9 – 2011.7	Bachelor in Hydraulic Engineering Department of Hydraulic Engineering, Tsinghua University, China

Honors and Awards

2020	Editor’s Award (<i>Journal of Hydrometeorology</i>)	American Meteorological Society
2019	EED Of-The-Year Award	PNNL Energy and Environment Directorate
2019	Editor’s Award, <i>Advances in Atmospheric Sciences</i>	Springer Sciences+Business Media and Science Press

2015	Graduate Student Fellowship	University of Washington
2010	Friend of Tsinghua-Huang Qianheng Scholarship	Tsinghua University
2010	Second Prize in 2 nd Hydrological Innovation Competition	Tsinghua University
2009	Allen T. Chwang Award of Fluid Mechanics	Tsinghua University

Grants

PNNL	Approaching High-resolution Downscaling of Climate Projections with Machine Learning	\$7,000	PI	10/19-09/20
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Community Services

Associate Editor	Journal of Hydrometeorology (2018 - present)
Reviewer	IPCC AR6 WG I report (SOD expert reviewer)
Referee	Advances in Atmospheric Sciences; Atmosfera; Atmosphere; Atmospheric Sciences Letters; Earth's Future; Estuarine, Coastal, and Shelf Science; Geophysical Research Letters; Journal of Applied Meteorology and Climatology; Journal of Geophysical Research: Atmosphere; Journal of Hydrologic Engineering; Journal of Hydrology; Journal of Hydrometeorology; Water Resources Research; WIREs Water
Mentor	Hisham Eldardiry (Ph.D. student at University of Washington, 2016-2017) Asif Mahmood (Ph.D. student at University of Washington, 2015-2016)
Judge	PNNL Post Graduate Research Symposium (2018)

Publications

* Indicates corresponding author(s)

1. **Chen, X.*** and L. R. Leung*, Response of landfalling atmospheric rivers on the U.S. west coast to local sea surface temperature perturbations. *Geophys. Res. Lett.* (in press)
2. Anderson, C. et al. (2020), Soil moisture and hydrology projections of the permafrost region - A model intercomparison, *The Cryosphere*, 14, 445–459.
3. **Chen, X.***, Z. Duan, L. R. Leung*, and M. Wigmosta (2019), A framework to delineate precipitation-runoff regimes: Precipitation vs. snowpack in the western U.S., *Geophys. Res. Lett.*, 46, 13044–13053. [[EOS Highlight](#)]
4. Perkins et al. (2019), Parallel distributed hydrology model using global arrays, *Env. Mod. Soft.*, 122, 104533.
5. **Chen, X.***, L. R. Leung*, M. Wigmosta, and M. Richmond (2019), Impact of atmospheric rivers on surface hydrological processes in western U.S. watersheds, *J. Geophys. Res.: Atmos.*, 124, 8896–8916. [[EOS Highlight](#)] [[Cover Image](#)]
6. **Chen, X.**, and F. Hossain (2019), Understanding future safety of dams in a changing climate, *B. Am. Meteorol. Soc.*, 100, 1395-1404.
7. Eldardiry, H. et al. (2019), Atmospheric river-induced precipitation and snowpack during the

western United States cold season, *J. Hydrometeor.*, 20, 613-630.

8. **Chen, X.**, L. R. Leung, Y. Gao, Y. Liu, M. Wigmosta, and M. Richmond (2018), Predictability of extreme precipitation in western U.S. watersheds based on atmospheric river occurrence, intensity, and duration, *Geophys. Res. Lett.*, 45, 11693–11701.
9. **Chen, X.**, and F. Hossain (2018), Understanding model-based probable maximum precipitation estimation as a function of location and season from atmospheric reanalysis, *J. Hydrometeor.*, 19, 459-475.
10. **Chen, X.**, F. Hossain, and L. R. Leung (2017), Probable maximum precipitation in the U.S. Pacific Northwest in a changing climate, *Water Resour. Res.*, 53, 9600-9622.
11. **Chen, X.**, F. Hossain, and L. R. Leung (2017), Establishing a numerical modeling framework for hydrologic engineering analyses of extreme storm events, *J. Hydrol. Eng.* 22, 04017016.
12. Xia, J., McGuire, A. D., Lawrence, D., Burke, E., Chen, G., **X. Chen**, et al. (2017), Terrestrial ecosystem model performance in simulating net primary productivity and its vulnerability to climate change in the northern permafrost region. *J. Geophys. Res.: Biogeosciences.*, 122, 430-446.
13. **Chen, X.** and Hossain, F. (2016), Revisiting extreme storms of the past 100 years for future safety of large water management infrastructures. *Earth's Future*, 4, 306–322.
14. Sikder, S., **X. Chen**, F. Hossain, J. Roberts, F. Robertson, C. Shum, and F. Turk (2016), Are general circulation models ready for operational streamflow forecasting for water management in the Ganges and Brahmaputra river basins? *J. Hydrometeor.*, 17, 195–210.
15. McGuire, A. D., et al. (2016), Variability in the sensitivity among model simulations of permafrost and carbon dynamics in the permafrost region between 1960 and 2009, *Global Biogeochem. Cycles*, 30, 1015–1037.
16. Wang, W., et al. (2016), Evaluation of air–soil temperature relationships simulated by land surface models during winter across the permafrost region, *The Cryosphere*, 10, 1721-1737.
17. Peng, S., et al. (2016), Simulated high-latitude soil thermal dynamics during the past 4 decades, *The Cryosphere*, 10, 179-192.
18. Bonnema, M., S. Sikder, Y. Miao, **X. Chen**, F. Hossain, I. Ara Pervin, S. M. Mahbubur Rahman, and H. Lee (2016), Understanding satellite-based monthly-to-seasonal reservoir outflow estimation as a function of hydrologic controls, *Water Resour. Res.*, 52, 4095–4115.
19. **Chen, X.**, Bohn, T. J., and Lettenmaier, D. P. (2015), Model estimates of climate controls on pan-Arctic wetland methane emissions, *Biogeosciences*, 12, 6259-6277.
20. Rawlins, M. A., et al. (2015), Assessment of model estimates of land-atmosphere CO₂ exchange across Northern Eurasia, *Biogeosciences*, 12, 4385-4405.
21. Koven, C. D., et al. (2015), A simplified, data-constrained approach to estimate the permafrost carbon–climate feedback. *Phil. Trans. R. Soc. A*, 373: 20140423.
22. Bohn, T. J., et al. (2013), Modeling the large-scale effects of surface moisture heterogeneity on wetland carbon fluxes in the West Siberian Lowland, *Biogeosciences*, 10, 6559-6576.

In Progress

1. **Chen, X.***, L. R. Leung*, Y. Gao, and Y. Liu, Response of U.S. West Coast mountain snowpack to local sea surface temperature perturbations: Insights from regional climate

- simulations and machine learning models. *J. Hydrometeor.* (in revision)
2. Yan, H., N. Sun, **X. Chen**, and M. Wigmosta, Next-generation intensity-duration-frequency curves for climate-resilient infrastructure design: advances, opportunities, and design scaling. *Frontiers in Water* (in revision)
 3. Dong L., L. Leung, Y. Qian, Y. Zou, F. Song, and **X. Chen**, Meteorological environments associated with California wildfires and their role in wildfire changes during 1984-2017. *J. Geophys. Res.: Atmos.* (under review)
 4. Wang, L., Y. Qian*, L.R. Leung, **X. Chen***, et al., Multiple metrics informed projections of future precipitation in China. (under review)

Book Chapters

1. **Chen, X.*** (2020), Safety design of water infrastructures in a modern era, *Resilience of Large Water Management Infrastructure: Solutions from Modern Atmospheric Science*, Springer.
2. **Chen, X.**, F. Hossain, and L. R. Leung (2020), Application of numerical atmospheric models, *Resilience of Large Water Management Infrastructure: Solutions from Modern Atmospheric Science*, Springer.
3. **Chen, X.** and F. Hossain (2020), Infrastructure-relevant storms of the last century, *Resilience of Large Water Management Infrastructure: Solutions from Modern Atmospheric Science*, Springer.

Non Peer-reviewed Articles

1. Miao, Y., **X. Chen**, and F. Hossain (2016), Maximizing Hydropower Generation with Numerical Modeling of the Atmosphere, *J. Hydrol. Eng.* (forum article), 21, 02516002.

Talks and Oral Presentations

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1. **Chen, X.**, L. R. Leung, Z. Duan, Y. Gao, Y. Liu, M. Wigmosta, M. Marshall, Footprint of atmospheric rivers on land and implications for managing water resources (invited), California Extreme Precipitation Symposium (Davis, CA, 2020)
 2. **Chen, X.**, L. R. Leung, C. Dang, Y. Gao, and Y. Liu, Precipitation Morphology in the Western United States: Its Relationship to Ambient Atmospheric Conditions and Future Changes, American Meteorological Society (AMS) 100th Annual Meeting (Boston, MA, 2020)
 3. **Chen, X.**, L. R. Leung, Y. Gao, Y. Liu, Z. Duan, M. Wigmosta, M. Richmond Atmospheric rivers, extreme precipitation, and rain-on-snow: A model-based investigation of hydroclimate extremes in the western U.S., PNNL ASGC Division Seminar (Richland, WA, 2019)
 4. **Chen, X.**, Z. Duan, L. R. Leung, M. Wigmosta, A framework to delineate precipitation-runoff regimes: Precipitation vs. snowpack in the western U.S., PNNL Post Graduate Research Symposium, Richland (Richland, WA, 2019)
 5. **Chen, X.**, L. R. Leung, Y. Gao, Y. Liu, M. Wigmosta, M. Richmond, Predictability of Extreme Precipitation in Western U.S. Watersheds Based on Atmospheric River Occurrence, Intensity, and Duration, PNNL Post Graduate Research Symposium (Richland, WA, 2018)
 6. **Chen, X.**, and F. Hossain, Climate Controls on the Extreme Rainstorms in the Contiguous US: 1979-2015, American Meteorological Society 97th Annual Meeting (Seattle, WA, 2017)

7. **Chen, X.**, Introduction to VIC model and its application in wetland methane emissions estimation (invited), National Institute of Environmental Studies workshop (Tsukuba, Japan, 2013)
8. **Chen, X.**, T. J. Bohn, M. Glagolev, S. Maksyutov, D. P. Lettenmaier, Model Estimates of Pan-Arctic Lakes and Wetlands Methane Emissions (invited), ENVIROMIS-2012 Summer Workshop (Irkutsk, Russia, 2012)

Memberships

- American Geophysical Union (2012 - present)
- American Meteorological Society (2015 - present)
- American Society of Civil Engineers (2015 - present)
Observer of the Task Committee “Infrastructure Impacts of Landscape-driven Weather Change”

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