

## Xiaodong Chen, Ph.D.

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## Research Interests

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

## Research Experience

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2021.2 - now	Earth Scientist Pacific Northwest National Laboratory, Richland, WA, USA
2018.3 - 2021.1	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

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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

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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 <sup>nd</sup> 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

Editorial	Associate Editor: Journal of Hydrometeorology (2018 - present) Review Editor: Frontiers in Water (2021 - present) Frontiers in Climate (2021 – present)
Reviewer	IPCC AR6 WG I report (SOD expert reviewer)
Convener	AGU 2021: GC052 - Integrated investigations of hydroclimate variability and extremes across multiple scales: processes and implications over complex terrains
Referee	Advances in Atmospheric Sciences; Atmosfera; Atmosphere; Atmospheric Sciences Letters; Climate Dynamics; Earth's Future; Earth Interactions; Estuarine, Coastal, and Shelf Science; Geophysical Research Letters; International Journal of Biometeorology; 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, 2021)

## Publications

\* Indicates corresponding author(s)

1. **Chen, X.\***, L. R. Leung\*, Y. Gao, and Y. Liu (2021), 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.* 22, 1045-1062.
2. 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.* 126, e2020JD033180.
3. **Chen, X.\*** and L. R. Leung\* (2020), Response of landfalling atmospheric rivers on the U.S. west coast to local sea surface temperature perturbations. *Geophys. Res. Lett.* 47, e2020GL089254.

4. Yan, H., N. Sun, **X. Chen**, and M. Wigmosta (2020): Next-Generation Intensity-Duration-Frequency Curves for Climate-Resilient Infrastructure Design: Advances and Opportunities. *Frontiers in Water*, 2, 59.
5. Anderson, C. et al. (2020), Soil moisture and hydrology projections of the permafrost region - A model intercomparison, *The Cryosphere*, 14, 445–459.
6. **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](#)]
7. Perkins et al. (2019), Parallel distributed hydrology model using global arrays, *Env. Mod. Soft.*, 122, 104533.
8. **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](#)]
9. **Chen, X.** and F. Hossain (2019), Understanding future safety of dams in a changing climate, *B. Am. Meteorol. Soc.*, 100, 1395-1404.
10. Eldardiry, H. et al. (2019), Atmospheric river-induced precipitation and snowpack during the western United States cold season, *J. Hydrometeor.*, 20, 613-630.
11. **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.
12. **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.
13. **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.
14. **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.
15. Xia, J., 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.
16. **Chen, X.** and F. Hossain (2016), Revisiting extreme storms of the past 100 years for future safety of large water management infrastructures. *Earth's Future*, 4, 306–322.
17. 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.
18. 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.
19. 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.
20. Peng, S., et al. (2016), Simulated high-latitude soil thermal dynamics during the past 4 decades, *The Cryosphere*, 10, 179-192.

21. 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.
22. **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.
23. Rawlins, M. A., et al. (2015), Assessment of model estimates of land-atmosphere CO<sub>2</sub> exchange across Northern Eurasia, *Biogeosciences*, 12, 4385-4405.
24. 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.
25. 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. Wang, L., Y. Qian\*, L.R. Leung, **X. Chen\***, et al., Multiple metrics informed projections of future precipitation in China. *Geophys. Res. Lett.* (in revision)
2. **Chen, X.\***, L. R. Leung\*, and L. Dong, Antecedent hydrometeorological conditions of wildfire occurrence and their trends in the western U.S. during 1984-2018. (in revision)

#### 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.**, Introduction to VIC model and its application in wetland methane emissions estimation (invited), National Institute of Environmental Studies workshop (Tsukuba, Japan, 2013)
  3. **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)

4. **Chen, X.**, L. R. Leung, Y. Gao, Y. Liu, Understanding the Response of U.S. West Coast Mountain Snowpack to Sea Surface Temperature Perturbations: A Local Perspective, American Meteorological Society 101<sup>st</sup> Annual Meeting (online, 2021)
5. **Chen, X.**, Understanding the hydro-climate system of western U.S. with regional climate modeling and machine learning, PNNL ASGC Seminar (Richland, WA, 2020)
6. Leung, L. R. and X. Chen, Response of Landfalling Atmospheric Rivers on the U.S. West Coast to Local Sea Surface Temperature Perturbations, 2020 International Atmospheric Rivers Conference (online, 2020)
7. **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) 100<sup>th</sup> Annual Meeting (Boston, MA, 2020)
8. **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)
9. **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)
10. **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)
11. **Chen, X.**, and F. Hossain, Climate Controls on the Extreme Rainstorms in the Contiguous US: 1979-2015, American Meteorological Society 97<sup>th</sup> Annual Meeting (Seattle, WA, 2017)

## Memberships

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- 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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