

EDUCATION

Doctor of Philosophy, Environment and Sustainability

University of Saskatchewan, Saskatoon, SK, Canada, Completed 10/2021

- Thesis: Modeling Land Surface Heterogeneity in Land Surface and Regional Climate Models
- Committee: Yanping Li (Advisor), Andrew Ireson (Chair), Michael Barlage, Jay Famiglietti, Warren Helgason, Peter Lawrence

Exchange Student, Meteorology

University of Reading, Reading, UK, 2014 – 2015

- Advisor: Dr. Sue Grimmond

Bachelor of Science, Atmospheric Science

Lanzhou University, Lanzhou, China, 2012 – 2016

RESEARCH INTERESTS

My research interests are to understand and improve the representation of **hydrological and biometeorological processes on Earth's land surface and their feedback in regional climate.**

In particular, these processes include the **shallow groundwater dynamics, wetland hydrology, crop growth, and irrigation management** in the Noah-MP Land Surface Model, and the coupled Weather Research & Forecasting model at convection-permitting resolution (< 5km).

RESEARCH AND WORK EXPERIENCES

Postdoc Fellow, Advanced Study Program, NCAR, Boulder, CO, 01/2023 – present

- Work with the Noah-MP LSM group in Research Applications Laboratory (RAL)
- Study of the US Corn Belt contributions to regional precipitation recycling
- Investigate climate change impacts on the food-water system and explore potential adaptation strategies

Postdoc Researcher, University of Saskatchewan, 01/2022 – 12/2022

- Collaborate with Institute for Wetland and Waterfowl Research, Ducks Unlimited Canada
- Develop a sub-grid parameterization to represent surface wetland hydrology in the Noah-MP LSM and their feedback to regional climate in WRF model

Graduate Student Visitor, National Center for Atmospheric Research, 07/2016 – 05/2019

- Visit and collaborate with Noah-MP LSM group in Research Applications Laboratory
- Conduct research on heatwaves, groundwater hydrology, crop growth within CPM simulations

AREAS OF TEACHING INTERESTS

- Land-Atmosphere Interactions Boundary Layer Meteorology Global Water Cycle

TEACHING AND MENTORING EXPERIENCE

Lecturer: English instructor for TOFEL test

High School Attached to Northwest Normal University, Lanzhou, China, 2016

- A part-time tutor responsible for oral and listening session for a class of 40 people
- strongly encourage students to speak out loud

Teaching Assistant: Climate Change, ENVS826

University of Saskatchewan, Saskatoon, SK, Canada, fall 2019

- Responsible for developing course materials, grading quizzes and assignments, and engaging in-class discussions

Tutorial Instructor: Community Noah-MP LSM user workshop

NCAR, Boulder, CO, 05/2023

- Teach two hand-on practice sessions and answer questions from attendees
- Develop tutorial notes via online Jupyter Notebook and provide accessible resources on official GitHub repository
- Collect feedback from users and provide suggestions for next year's workshop

GRANTS & FELLOWSHIP

NCAR Advanced Study Program Postdoctoral Fellowship: 01/2023 – 01/2025

Co-I (Wildlife Habitat Canada - Habitat Conservation Stamp Initiative – Grant Program - 2023-2024): Total budget: \$64k for 1 year.

Co-I (Alberta Innovates – Water Innovation Program 2022): Total budget: \$250k for 4 years.

Global Mitacs Accelerate Internship Program, collaborate with Ducks Unlimited Canada and University of Saskatchewan, \$45k for 18 months, 10/2018 – 04/2020

AWARDS

Echo Travel Award – Institute for Waterfowl and Wetland Research, 2021

IWWR Best Publication Award – Ducks Unlimited Canada, 2021

IWWR Best Publication Award – Ducks Unlimited Canada, 2020

Best Student Presentation Award – Canadian Society of Agricultural and Forest Meteorology, 2019

PUBLICATIONS

- Zhang, Z.**, Li, Y., He, C., Chen, F., Valayamkunnath, P., Famiglietti, J., Li, Z., Xu, L. Early planting adaptation makes the coupled food-water system more sustainable under climate change. (under review *Nature Communications*)
- Zhang, Z.**, Li, Y., Chen, F., Harder, P., Helgason, W. and Famiglietti, J. (2023) Developing spring wheat in the Noah-MP land surface model (v4.4) for growing season dynamics and responses to temperature stress, *Geoscience Model Development*. <https://doi.org/10.5194/gmd-16-3809-2023>
- Zhang, Z.**, Chen, F., Barlage, M., Bortolotti, L., Famiglietti, F., Li, Z., Ma, X., Li, Y. (2022) Cooling effects revealed by modeling of wetlands and land-atmosphere interactions. *Water Resources Research*. <https://doi.org/10.1029/2021WR030573>
- Huang, Y., **Zhang, Z.**, Li, Z., Dai, D., Li, Y. (2021). Evaluation of water use efficiency and optimal irrigation quantity of spring maize in Hetao Irrigation District using the Noah-MP land surface model. *Agricultural Water Management*. <https://doi.org/10.1016/j.agwat.2022.107498>
- Zhang, Z.**, Bortolotti, L. E., Li, Z., Armstrong L. M., Bell, T. W., Li, Y. (2021). Heterogeneous changes to North America prairie pothole wetlands under future climate. *Water Resources Research*. <https://doi.org/10.1029/2020WR028727>. **(IWR Best Paper Award 2021)**
- Xu T., Chen, F., He, X., Barlage, M., **Zhang, Z.**, Liu, S., He, X. (2021). Improve the performance of the Noah-MP-Crop model by jointly assimilating soil moisture and vegetation phenology data. *Journal of Advances in Modeling Earth Systems*. <https://doi.org/10.1029/2020MS002394>
- Barlage, M., Chen, F., Rasmussen, R., **Zhang, Z.**, & Miguez-Macho, G. (2021). The importance of scale-dependent groundwater processes in land-atmosphere interactions over the central United States. *Geophysical Research Letters*. <https://doi.org/10.1029/2020GL092171>
- Zhang, Z.**, Barlage, M., Chen, F., Li, Y., Helgason, W., Xu, X., et al. (2020b). Joint modeling of crop and irrigation in the Central United States using the Noah-MP land surface model. *Journal of Advances in Modeling Earth Systems*. <https://doi.org/10.1029/2020MS002159>
- Zhang, Z.**, Li, Y., Barlage, M., Chen, F., Miguez-Macho, G., Ireson, A., & Li, Z. (2020a). Modeling groundwater responses to climate change in the Prairie Pothole Region. *Hydrology and Earth System Sciences*, 24(2), 655–672. doi:10.5194/hess-24-655-2020. **(IWR Best Paper Award 2020)**
- Li, Y., Li, Z., **Zhang, Z.**, Chen, L., Kurkute, S., Scaff, L., & Pan, X. (2019). High-resolution regional climate modeling and projection over western Canada using a weather research forecasting model with a pseudo-global warming approach. *Hydrology and Earth System Sciences*, 23(11), 4635–4659. <https://doi.org/10.5194/hess-23-4635-2019>
- Zhang, Z.**, Li, Y., Chen, F., Barlage, M. and Li, Z. (2018). Evaluation of convection-permitting WRF CONUS simulation on the relationship between soil moisture and heatwaves. *Climate Dynamic*. doi:10.1007/s00382-018-4508-5.
- Chen, L., Li, Y., Chen, F., Barlage, M., **Zhang, Z.** and Li, Z. (2018). Using 4-km WRF CONUS simulations to assess impacts of the surface coupling strength on regional climate simulation. *Climate Dynamic*. doi:10.1007/s00382-019-04932-9
- Lindberg, F., Grimmond, C. S. B., et al & **Zhang, Z.**, Urban Multi-scale Environmental Predictor (UMEP): An integrated tool for city-based climate services, *Environmental Modelling and Software*, Jan 2018.

SELECTED PRESENTATIONS

- (Invited Webinar) Cooling Effects of Wetlands in the Prairie Pothole Region. Prairies Got the Goods Week workshop, Saskatchewan Prairie Conservation Action Plan (SK PCAP), Mar 2023 (177 online attendees).
- (Invited Guest Lecture) Food-Water Nexus – Modeling and Application Study of North America’s food basket. Cornell University, CEE 6021 – Seminar: Environmental Engineering and Water Resources, Apr 2023. (23 students attended in-person or online)
- (Oral) Importance of fine-scale forcing on integrated climate-crop-water simulations, American Geophysical Union, San Francisco, Dec 2022
- (Oral) Exploring the climate-groundwater-wetland nexus using the convection-permitting model, American Geophysical Union, 2020 (Online)
- (Oral) Modeling the interactions among crop, irrigation, and regional climate in central North America, Canadian Society of Agricultural and Forest Meteorology and Campell Scientific Canada, Saskatoon, Jul 2019. **(Best Student Presentation)**
- (Oral) An application of convection-permitting climate forcing to simulate prairie pothole wetlands. GEWEX Convection-Permitting Modeling workshop, Sep, 2018, Boulder, CO.
- (Poster) Climate-Groundwater Interaction in Simulating Prairie Pothole Wetlands. GEWEX Annual Science Meeting, May 8, 2018, Canmore, AB, Canada.
- (Poster) Soil Moisture Impacts on Summer Hot Extremes in North America in Convection-Permitting WRF Regional Climate Simulation. American Meteorological Society Annual Conference, Jan 12, 2018, Austin, TX, USA.
- (Oral) 1-km WRF dynamical downscaling to assess impacts of land-use change on 2006 summer heatwave in Central U.S. Canadian Meteorological and Oceanographic Society annual conference, Jun 12, 2017 Toronto, ON.

COMMUNITY SERVICES

- *Remote Sensing*, Special Issue Guest Editor, (IF: 5.3 last 5 years) 08/2023 – present
- NCAR Postdoc Research Review Committee (Chair) 08/2023 – present
- NCAR ASP High-Performance Computing manager 04/2023 – present
- GEWEX, US – Regional Hydrometeorology Program, Land-Atmosphere Interactions working group 03/2023 – present
- Noah-MP LSM physics and code review committee 2020 – present
- Global Water Futures – Young Professionals committee 2018 – 2020
- Reviewers for *Earth’s Future*, *Journal of Hydrology*, *Geoscientific Model Development*, *Earth System Science Data*, etc.