

Boen Zhang

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I am a postdoctoral fellow at the Department of Land Surveying and Geo-Informatics at the Hong Kong Polytechnic University, where I obtained my PhD in hydrology and climate sciences in 2022. My research focuses on extreme climatic and hydrological events such as floods and droughts, as well as compound events. I combine climate models, outputs from hydrologic models, and probabilistic methods to understand the response of hydrologic extreme events to climate change. My area of interest includes multivariate statistics (copula and pair-copula constructions), hydrologic modeling (SWAT and VIC), coastal flooding, statistical downscaling, and poverty and climate change.

Education

2018 - 2022 Ph.D., The Hong Kong Polytechnic University, Hong Kong, China

2015 - 2018 M.S., Wuhan University, China

2011 - 2015 B.S., Wuhan University, China

Projects

- RCoI, Incorporating Spatial Heterogeneity of Rainfall Response to Climate Change into the Design of Slope Drainage Provisions in Hong Kong, Public Policy Research (PPR) Funding Scheme, 2023–2024. (Interactive web map: chinaidf.com)
- RCoI, Integration of InSAR, GNSS, and Earth System Modeling Techniques for Predicting Future Change in Coastal Inundation Risk, LSGI Collaborative Research Grant, 2021–2023.
- RCoI, Development of a Machine Learning Model for the Prediction of Extreme Storm Surges in Hong Kong, Undergraduate Research and Innovation Scheme (URIS), 2021–2022.
- RCoI, A Stochastic Multi-Model Ensemble Framework for Probabilistic Hydrological Forecasting, National Science Foundation of China, 2019–2021.

- RCol, Integration of Emerging Drought Risk into Hong Kong's Climate Adaptation Planning and Environmental Policy, RILS Strategic Supporting Scheme, 2022–2024.

Publications

- **Zhang, B.**, Wang, S., Moradkhani, H., Slater, L., Liu, J. (2022). A vine copula-based ensemble projection of precipitation intensity–duration–frequency curves at sub-daily to multi-day time scales. *Water Resources Research*, 58, e2022WR032658
- **Zhang, B.**, Wang, S., Qing, Y., Zhu, J., Wang, D., & Liu, J. (2022). A vine copula-based polynomial chaos framework for improving multi-model hydroclimatic projections at a multi-decadal convection-permitting scale. *Water Resources Research*, 58, e2022WR031954
- **Zhang, B.**, Wang, S., & Wang, Y. (2021). Probabilistic projections of multidimensional flood risks at a convection-permitting scale. *Water Resources Research*, 57, e2020WR028582
- **Zhang, B.**, & Wang, S. (2021). Probabilistic characterization of extreme storm surges induced by tropical cyclones. *Journal of Geophysical Research: Atmospheres*, 126, e2020JD033557
- **Zhang, B.**, Wang, S., & Wang, Y. (2019). Copula-based convection-permitting projections of future changes in multivariate drought characteristics. *Journal of Geophysical Research: Atmospheres*, 124, 7460–7483
- **Zhang, B.**, Wang, S., Zscheischler, J., & Moradkhani, H. (2023). Higher exposure of poorer people to emerging weather whiplash in a warmer world. *Geophysical Research Letters*. (Under Review)
- **Zhang, B.**, Wang, S. & Zhu, J. (2022). A weighted ensemble of regional climate projections for exploring the spatiotemporal evolution of multidimensional drought risks in a changing climate. *Climate Dynamics*, 58, 49–68
- **Zhang, B.**, Xu, G., Jiao, L., Liu, J., Dong, T., Li, Z., Liu, X., & Liu, Y. (2019). The scale effects of the spatial autocorrelation measurement: Aggregation level and spatial resolution. *International Journal of Geographical Information Science*. 33, 945–966
- **Zhang, B.**, Jiao, L., Xu, G., Zhao, S., Tang, X., Zhou, Y., & Gong, C. (2018). Influences of wind and precipitation on different-sized particulate matter concentrations (PM_{2.5}, PM₁₀, PM_{2.5–10}). *Meteorology and Atmospheric Physics*, 130, 383–392
- Shen, Y., Wang, S., **Zhang, B.**, & Zhu, J. (2022). Development of a stochastic hydrological modeling system for improving ensemble streamflow prediction. *Journal of Hydrology*, 608, 127683

- Qing, Y., Wang, S., **Zhang, B.**, & Wang, Y. (2020). Ultra-high resolution regional climate projections for assessing changes in hydrological extremes and underlying uncertainties. *Climate Dynamics*, 55, 2031–2051
- Shen, Y., **Zhang, B.**, Chue, C.Y., Wang, S., (2023). Improving risk projection and mapping of coastal flood hazards caused by typhoon-induced storm surges and extreme sea levels. *Atmosphere*, 14(1), 52
- Liu, J., Jiao, L., **Zhang, B.**, Xu, G., Yang, L., Dong, T., ... & Zhou, Z. (2021). New indices to capture the evolution characteristics of urban expansion structure and form. *Ecological Indicators*, 122, 107302
- Chen, H., Wang, S., Zhu, J, & **Zhang, B.** (2020). Projected changes in abrupt shifts between dry and wet extremes over China through an ensemble of regional climate model simulations. *Journal of Geophysical Research: Atmospheres*, 125, e2020JD033894
- Li, Z., Jiao, L., **Zhang, B.**, Xu, G., Liu, J., (2021). Understanding the pattern and mechanism of spatial concentration of urban land use, population and economic activities: a case study in Wuhan, China. *Geo-spatial Information Science*, 24, 678–694
- Xu, G., Jiao, L., **Zhang, B.**, Zhao, S., Yuan, M., Gu, Y., ... & Tang, X. (2017). Spatial and temporal variability of the PM2.5/PM10 ratio in Wuhan, Central China. *Aerosol and Air Quality Research*, 17, 741–751
- Xia, C., Zhang, A., Wang, H., **Zhang, B.**, & Zhang, Y. (2019). Bidirectional urban flows in rapidly urbanizing metropolitan areas and their macro and micro impacts on urban growth: A case study of the Yangtze River middle reaches megalopolis, China. *Land Use Policy*, 82, 158–168
- Li, Z., Wang, J., Kong, X., **Zhang, B.**, Liu, J., Ding, S., & Du, Y. (2021). Effects of ecosystems preservation on economic growth in China's coastal region: Multilevel modelling and exploration. *Ecological Indicators*, 132, 108224
- Zhu, J., Wang, S., Wang, D., Zeng, X., Cai, Y., & **Zhang, B.** (2021). Upholding labor productivity with intensified heat stress: Robust planning for adaptation to climate change under uncertainty. *Journal of Cleaner Production*, 322, 129083
- Jiao, L., Liu, J., Xu, G., Dong, T., Gu, Y., **Zhang, B.**, Liu, Y. and Liu, X. (2018). Proximity Expansion Index: An improved approach to characterize evolution process of urban expansion. *Computers, Environment and Urban Systems*, 70, 102–112
- Jiao, L., Xu, G., Jin, J., Dong, T., Liu, J., Wu, Y., & **Zhang, B.** (2017). Remotely sensed urban environmental indices and their economic implications. *Habitat International*, 67, 22–32
- Jiao, L., Xu, G., Xiao, F., Liu, Y., & **Zhang, B.** (2017). Analyzing the impacts of urban expansion on green fragmentation using constraint gradient analysis. *The Professional Geographer*, 69, 553–566
- Xu, G., Jiao, L., Yuan, M., Dong, T., **Zhang, B.**, & Du, C. (2019). How does urban population density decline over time? An exponential model for Chinese

cities with international comparisons. *Landscape and Urban Planning*, 183, 59–67

Skills

- **Programming Languages:** Python, R, MATLAB, Bash; previous experience with IDL.
- **Operating Systems:** Linux, Windows.
- **Geophysical Models:** SWAT (Soil & Water Assessment Tool) and VIC (Variable Infiltration Capacity) hydrologic models; MODFLOW groundwater model; SWAT-MODFLOW coupled model; basic experience with WRF (Weather Research & Forecasting Model) climate model.

Awards & Honors

- National Scholarship for Postgraduate Students in China, 2017
- Outstanding Graduate Student of Wuhan University, 2018
- Encouragement Award of IAHR-HK 5MD Competition, 2022
- Second Prize of National Postgraduate Mathematical Contest in Modeling in China, 2016
- Second Prize of National Graduate Contest on Smart-City Technology and Creative Design in China, 2016