# CURRICULUM VITAE OF YUAN QIU

520-528-4909 | Yuan.Qiu.2@asu.edu | 777 E University Drive, AZ, USA 85281

**Education**

- Ph.D., September 2012 – June 2018; Cartography and Geography Information System; University of Chinese Academy of Sciences
- B.S., September 2008 – June 2012; Cartography and Geography Information System; North China University of Water Resources and Electric Power.

**Employment**

- July 2024 – present: Associate Research Professional; School of Sustainability, Arizona State University; Tempe, AZ, USA.
- August 2023 – July 2024: Postdoctoral Research Associate; Department of Hydrology and Atmospheric Sciences, University of Arizona; Tucson, AZ, USA.
- January 2019 – July 2023: Postdoctoral Research Associate; Institute of Atmospheric Physics, Chinese Academy of Sciences; Beijing, China.
- July 2018 – December 2018: Data Engineer; GAGO Inc.; Beijing, China.

**Main Achievements**

1. Western U.S. snowpack shapes late-spring downstream precipitation

Alphine snowpack anomalies strongly influence atmospheric downstream hydroclimate, yet the role of the western U.S. (WUS) snowpack in shaping downstream precipitation remains poorly understood. Using observations and reanalysis from 1982-2022, we show that March WUS snow water equivalent (SWE) is significantly correlated with May precipitation in both the Southern Great Plains (SGP; $r = -0.45, p < 0.001$) and Northeastern U.S. (NEUS; r= $0.47, p < 0.001$). Composite analyses contrasting low- and high-snow years reveal that SWE deficits enhance land surface heating, inducing tropospheric warming and a ridge anomaly that migrates eastward. By May, this ridge anomaly extends into the central and northeastern U.S., suppressing ascent and precipitation in the NEUS while enhancing moisture flux convergence and precipitation in the SGP. Random Forest analyses further identify WUS SWE as the most important predictor, with its inclusion substantially improving subseasonal-to-seasonal prediction skill. These findings establish a previously unrecognized snow-precipitation teleconnection and highlight snowpack as a critical source of seasonal predictability.

2. The strong impact of precipitation intensity on groundwater recharge and terrestrial water storage change in Arizona, a typical dryland

This study demonstrates the critical role of precipitation intensity in groundwater recharge generation and terrestrial water storage (TWS) change. We conducted two experiments driven by precipitation products with close annual totals but distinct intensity in Arizona, using the Noah-MP model with advanced soil hydrology. The experiment with higher precipitation intensity ($EXP_{HI}$) produces an annual groundwater recharge of 6.91 mm/year in Arizona during 2001-2020, ~15 times that of the experiment with lower precipitation intensity ($EXP_{LI}$). Correspondingly, $EXP_{LI}$ produces a declining groundwater storage (GWS) trend of $-0.51$ mm/month, nearly triple that of $EXP_{HI}$. GWS change dominates the TWS trend. $EXP_{LI}$ shows a declining TWS trend of $-0.57$ mm/month, nearly twice that of $EXP_{HI}$. Higher precipitation intensity reduces evapotranspiration and enhances infiltration and percolation, allowing more precipitation to recharge groundwater. This study underscores the need to ensure the accuracy of precipitation intensity in hydrological modeling for reliable water resources assessment and projection.

3. Water budgets estimation in Arizona (AZ) using the Noah-MP model with advanced soil hydrology

The Arizona Tri-University Research and Water Reliability (ATUR) Project was launched with the goal to study locations and methods for enhancing groundwater recharge across the state. The hydroclimate team we are in is to estimate water budgets in both historical and future periods in AZ. We used the Noah-Multiparameterization (Noah-MP) model with advanced soil hydrology to estimate water budgets during the last decades in Arizona. The model was systematically evaluated in simulating various variables, such as runoff, ET, and snow water equivalent, against different observations. The results show that the model has a good performance in AZ. Currently, we are projecting water budgets in AZ in the future using the calibrated model.

4. A method to evaluate land surface models in preserving soil memory

A GEWEX/GASS initiative called "Impact of initialized land temperature and snowpack on sub-seasonal to seasonal prediction (LS4P)" intended to simulate the effect of spring soil temperature (ST) anomalies over the Tibetan Plateau on late spring and summer precipitation in East Asia with multiple earth system models. Each model group conducted a control and sensitive experiment. The sensitive experiment imposed ST initial anomalies over the Tibetan Plateau. However, it was found that the LS4P models were generally unable to preserve the imposed ST anomalies and thus had difficulty in generating the observed 2-meter air temperature anomalies over the Tibetan Plateau. I suspected that this was related to the land surface modules used in the models. Therefore, I developed a method to evaluate the ability of three widely used land surface models to preserve the imposed ST anomalies and proved my suspicion was right. This study is helpful to the land surface model development.

5. Evaluation of the WRF model in Central Asia

I pioneered the evaluation of the Weather Research and Forecasting (WRF) model in simulating the climate in Central Asia (CA). After many one-year sensitivity experiments, I found the optimal combination of the physical schemes for the model in CA, which has been adopted by numerous studies.

6. Regional climate projection in Central Asia

Due to the complex terrain and heterogeneous land surface features in CA, the skills of the global climate models (GCMs) in simulating the local climate are limited, and the projected results based on the GCMs may have large uncertainties. In addition, the spatial resolutions of the GCMs are relatively low, and they are not suitable for driving ecological and hydrological models. High-resolution climate datasets are urgently needed for ecological and hydrological research in CA. To this end, I used the WRF model to downscale multiple bias-corrected GCMs to a resolution of 9KM. I systematically assessed the future climate changes in CA and the potential impact of future climate changes on local agriculture.

7. Mapping the spatial distribution of the spring ephemeral plants in northern Xinjiang, China

To adapt to arid conditions, spring ephemeral plants (SEP) have evolved to germinate in early spring and wither in late spring or early summer, with their life cycles as short as about two months. In China, they are mainly distributed in northern Xinjiang. They play an important role in due stability and are food for livestock and wild animals in the spring. However, their spatial distribution in northern Xinjiang was unclear. To fill this gap, I used the Moderate-Resolution Imaging Spectrodiometer (MODIS) Enhanced Vegetation Index (EVI) to map the spatial distribution of SEP based on their unique phenological characteristics. I also investigated the spatial-temporal evolution of SEP and the impact of climate change and human activities on the evolution.

8. Development of an agricultural information management system

I worked as a data engineer for a year in a tech company. I participated in the development of an agricultural information management system for Jilin Province, China. I produced and maintained about two-thirds of this system's data and wrote over 10,000 lines of code.

## Publications


1. **Qiu Y.,** Famiglietti J., Behrangi A., Farmani M., Sohi H., Gupta A., Huang F., Abdelmohsen K., and Niu G.: The strong impact of precipitation intensity on groundwater recharge and terrestrial water storage change in Arizona, a typical dryland. *Geophysical Research Letters*, 10.1029/2025GL114747, 2025.

2. **Qiu Y.**, Yan Z., Feng J., Hua L., Fan L., Li Z., Wang J., and Qian C.: Robust historical and future drying trends in Central Asia evidenced by the latest observation and modeling datasets, *Atmospheric Research*, 10.1016/j.atmosres.2023.107033, 2023.
3. **Qiu Y.**, Feng J., Yan Z., and Wang J.: Assessing the Land-Use Harmonization (LUH) 2 dataset in Central Asia for regional climate model projection, *Environmental Research Letters*, 10.1088/1748-9326/accfb2, 2023.
4. **Qiu Y.**, Feng J., Yan Z., and Wang J.: HCPD-CA: high-resolution climate projection dataset in central Asia, *Earth System Science Data*, 14, 2195-2208, 10.5194/essd-14-2195-2022, 2022.
5. **Qiu Y.,** Feng J., Yan Z., and Wang J.: High-resolution Projection Dataset of Agroclimatic Indicators over Central Asia, *Advances in Atmospheric Sciences*, 10.1007/s00376-022-2008-3, 2022.
6. **Qiu Y.**, Feng J., Yan Z., Wang J., and Li Z.: High-resolution dynamical downscaling for regional climate projection in Central Asia based on bias-corrected multiple GCMs, *Climate Dynamics*, 58, 777-791, 10.1007/s00382-021-05934-2, 2021.
7. **Qiu Y.**, Feng J., Wang J., Xue Y., and Xu Z.: Memory of land surface and subsurface temperature (LST/SUBT) initial anomalies over Tibetan Plateau in different land models, *Climate Dynamics*, 10.1007/s00382-021-05937-z, 2021.
8. **Qiu Y.**, Liu T., Zhang C., Liu B., Pan B., Wu S., and Chen X.: Mapping Spring Ephemeral Plants in Northern Xinjiang, China, *Sustainability*, 10, 10.3390/su10030804, 2018.
9. **Qiu Y.**, Hu Q., and Zhang C.: WRF simulation and downscaling of local climate in Central Asia, *International Journal of Climatology*, 37, 513-528, 10.1002/joc.5018, 2017.
10. Jawad M., Behrangi A., Farmani, A., **Qiu Y.**, Sohi H., Gupta A., and Niu G.: Improved evapotranspiration estimation using the Penman-Monteith equation with a deep learning (DNN) model over the dry southwestern US: Comparison with ECOSTRESS, MODIS, and OpenET, *Journal of Hydrology*, 660, 133460, 10.1016/j.jhydrol.2025.133460, 2025.
11. Zha J., Chuan T., **Qiu Y.**, et al.: Projected near-surface wind speed and wind energy over Central Asia using dynamical downscaling with bias-corrected global climate models, *Advances in Climate Change Research*, 15, 669-679, 10.1016/j.accre.2024.07.007, 2024.
12. Xue, Y. et al.: Spring Land Temperature in Tibetan Plateau and Global-Scale Summer Precipitation: Initialization and Improved Prediction, *Bulletin of the American Meteorological Society*, 103, E2756-E2767, 10.1175/BAMS-D-21-0270.1, 2022.
13. Wu, L., Feng, J., Qin, F., and **Qiu, Y.**: Regional Climate Effects of Irrigation Over Central Asia Using Weather Research and Forecasting Model, *Journal of Geophysical Research: Atmospheres,* 127,

e2021JD036210, 10.1029/2021JD036210, 2022.

14. Xue, Y. et al.: Impact of Initialized Land Surface Temperature and Snowpack on Subseasonal to Seasonal Prediction Project, Phase I (LS4P-I): organization and experimental design, *Geoscientific Model Development*, 14, 4465-4494, 10.5194/gmd-14-4465-2021, 2021.
15. Wang, J., Feng, J., Yan, Z., **Qiu, Y.**, and Cao, L.: An analysis of the urbanization contribution to observed terrestrial stilling in the Beijing–Tianjin–Hebei region of China, *Environmental Research Letters*, 15, 034062, 10.1088/1748-9326/ab7396, 2020.
16. Wang, Y., Feng, J., Luo, M., Wang, J., and **Qiu, Y.**: Uncertainties in simulating central Asia: Sensitivity to physical parameterizations using Weather Research and Forecasting model, *International Journal of Climatology*, 40, 5813-5828, 10.1002/joc.6567, 2020.
17. Zhang, M., Luo G., Hamdi R., **Qiu Y.**, et al.: Numerical Simulations of the Impacts of Mountain on Oasis Effects in Arid Central Asia, Atmosphere 8, 212, 10.3390/atmos8110212, 2017.

**Main Presentations**

1. **Qiu Y.**, Xue Y., Niu G., Behrangi A., Famiglietti, J.: The Teleconnection between Snowpack in the Western U.S. and Late-spring Precipitation in the Southern Great Plains, *AGU Fall Meeting*, 2025.
2. **Qiu Y.**, et al.: The Significant Impact of Precipitation Intensity on Natural Groundwater Recharge and Terrestrial Water Storage Change in Arid Regions, *AGU Fall Meeting*, 2024. [oral]
3. **Qiu Y.**: Regional Climate Model, *Yunnan University,* 2023. [lecture]
4. **Qiu Y.**, Feng J., and Wang J.: The Response on Temperature Variation over Tibetan Plateau in Different Cumulus/PBL/LSM Schemes, *AGU Fall Meeting*, 2019. [oral]
5. **Qiu Y.,** Hu Q., and Zhang C.: WRF Simulation and Downscaling of Local Climate in Central Asia, *The 2nd International Workshop of Meteorological Science and Technology in Central Asia*, 2016. [poster]

**Main Grants**

1. The Arizona Water Innovation Initiative. [Co-I]
2. *The Arizona Tri-University Recharge and Water Reliability Project* funded by the Arizona Board of Regents through the Technology Research Initiative Fund, 2023 – 2025. [Co-I]
3. The Strategic Priority Research Program of Chinese Academy of Sciences (grant no. XDA20020201), *Climate change impacts and countermeasures of extreme weather in the great-lake region of Central Asia*, 2018 – 2023. [Co-I]

4. Global Energy and Water Exchanges (GEWEX) program, *Phase I of the "Impact of Initialized Land Temperature and Snowpack on Sub-seasonal to Seasonal Prediction (LS4P)"*, 2018-2022. [Co-I]
5. The Chinese National Basic Research Program (grant no. 2014CB954204), *Dynamic simulation and protection strategy of Eurasian inland desert ecosystem evolution under climate change*, 2014 – 2018. [Co-I]