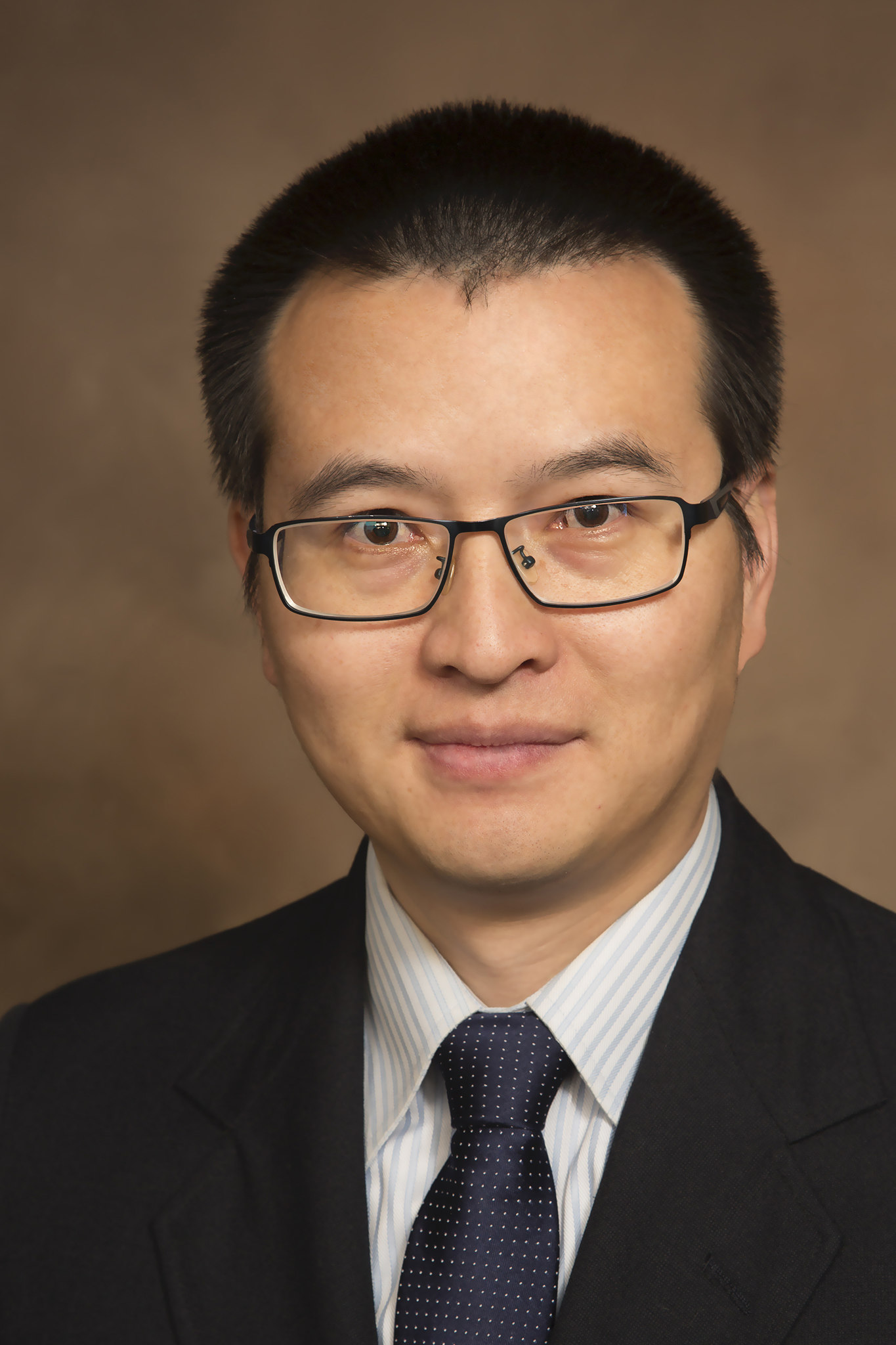
舒乐乐 水文学博士

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update: April 19, 2024

1983年生，籍贯陕西。水文学博士，现中国科学院西北生态环境资源研究院副研究员，中国科学院率先行动人才计划择优入选者。2017年毕业于美国宾夕法尼亚州立大学水资源工程专业。主要研究方向为数值方法流域水文模型、气候/人类活动对水循环的影响，及“大气-陆面-水文”模型耦合研究。

# 研究方向

* 数值方法水文模型
* 大气-陆面-水文耦合计算
* 干旱和洪水灾害预报预警系统；防灾减灾
* 古代文明与气候变化、水资源、水患的关系

# 教育经历

**2012-2017** 宾夕法尼亚州立大学 (Pennsylvania State University)， 水资源工程， 博士; 辅修计算科学 (Computational Sciences). 导师：Christopher Duffy.

**2006-2009** 中科院寒旱所， 遥感与地理信息系统，硕士。

**2001-2005** 兰州大学，地理信息系统，学士

# 工作经历

**2020.09**至今中国科学院西北生态环境资源研究院，副研究员

2017.08-2020.08 加州大学戴维斯分校 (University of California, Davis)，博士后研究员

2012.05-2017.08 宾夕法尼亚州立大学 (Pennsylvania State University)，研究助理

2011.07-2012.05 奥本大学 (Auburn University)，研究助理

# 研究性成果

* **SHUD (Simulator for Hydrological Unstructured Domains)** 水文模型

<https://shud.xyz>

* 全球水文数据云平台**(Global Hydrological Data Cloud)**

<https://ghdc.ac.cn>

* 实时全国水文模拟系统**(National Water Model)**原型

<https://nwm.ac.cn>

* **rSHUD** 水文分析工具

<https://github.com/shud-system/rSHUD>

* **AutoSHUD** 自动化水文建模

<https://github.com/shud-system/autoSHUD>

# 文章发表

## 代表作：

1. 舒乐乐, 陈昊, 孟宪红, 常燕, 胡立堂, 王文科, et al. (2024). 地表-地下过程耦合的数值水文模型综述. 中国科学：地球科学, 67. <https://doi.org/10.1360/SSTe-2022-0420>
2. 舒乐乐, 常燕, 王建, 陈昊, 李照国, 赵林, & 孟宪红. (2022). SHUD数值方法分布式水文模型介绍. 地球科学进展, 37(7), 680–691.<https://doi.org/10.11867/j.issn.1001-8166.2022.025>
3. 舒乐乐, 南卓铜, 基于类Twitter服务的低成本近实时野外监测数据获取系统, 冰川冻土, 2010, 32(5): 976-981
4. **Shu, L.**, Ullrich, P. A., & Duffy, C. J. (2020). Simulator for Hydrologic Unstructured Domains (SHUD v1.0): numerical modeling of watershed hydrology with the finite volume method. Geoscientific Model Development, 13(6), 2743–2762. <https://doi.org/10.5194/gmd-13-2743-2020>
5. **Shu, L.**, Chen, H., Meng, X., Chang, Y., Hu, L., Wang, W., et al. (2024). A review of integrated surface-subsurface numerical hydrological models. SCIENTIA SINICA Terrae. <https://doi.org/10.1007/s11430-022-1312-7>
6. **Shu, L.**, Ullrich, P., Meng, X., Duffy, C., Chen, H., & Li, Z. (2024). rSHUD v2.0: advancing the Simulator for Hydrologic Unstructured Domains and unstructured hydrological modeling in the R environment. Geoscientific Model Development, 17(2), 497–527. <https://doi.org/10.5194/gmd-17-497-2024>
7. **Shu, L.**, Li, X., Chang, Y., Meng, X., Chen, H., Qi, Y., et al. (2024). Advancing understanding of lake–watershed hydrology: a fully coupled numerical model illustrated by Qinghai Lake. Hydrology and Earth System Sciences, 28(7), 1477–1491. <https://doi.org/10.5194/hess-28-1477-2024>
8. **Shu, L.** (2020). Avoid stigmatizing names for 2019 novel coronavirus. Nature, 578(7795), 363–363. <https://doi.org/10.1038/d41586-020-00458-x>
9. **Shu, L.**, & Xu, Z. (2020). China’s different shades of greening. Nature, 577(7788), 29–29. <https://doi.org/10.1038/d41586-019-03940-3>

## 合作文章：

1. Lin, J., Bryan, B. A., Zhou, X., Lin, P., Do, H. X., Gao, L., et al. (2023). Making China’s water data accessible, usable and shareable. Nature Water, 1(4), 328–335. https://doi.org/10.1038/s44221-023-00039-y
2. Deng, M., Meng, X., Lu, Y., **Shu, L.**, Li, Z., Zhao, L., et al. (2023). Impact of climatic and vegetation dynamic change on runoff over the Three Rivers Source Region based on the Community Land Model. Climate Dynamics, 61(3–4), 1193–1208. https://doi.org/10.1007/s00382-022-06619-0
3. 谭晓晴, 罗斯琼,舒乐乐, 李晓旭, 王景元, 曾礼, et al. (2022). 基于机器学习的土壤温度预估研究综述. 高原气象, 41(2), 268–281. <https://doi.org/10.7522/j.issn.1000-0534.2022.00024>
4. Li, G., Meng, X., Blyth, E., Chen, H., **Shu, L.**, Li, Z., … Ma, Y. (2021). Impact of fully coupled hydrology-atmosphere processes on atmosphere conditions: Investigating the performance of the wrf-hydro model in the three river source region on the tibetan plateau, china. Water (Switzerland), 13(23). https://doi.org/10.3390/w13233409
5. Zhang, B., Yuan, Y., **Shu, L**., Grosholz, E., Guo, Y., Hastings, A., Cuda, J.P., Zhang, J., Zhai, L. and Qiu, J. (2021), Scaling up experimental stress responses of grass invasion to predictions of continental-level range suitability. Ecology. <https://doi.org/10.1002/ecy.3417>.
6. Yu, X., Xu, Z., Moraetis D., Nikolaidis N., Schwartz F., Zhang Y., **Shu L.**, Duffy C., Liu B., Capturing hotspots of fresh submarine groundwater discharge using a coupled surface–subsurface model. Journal of Hydrology. 598, 2021, <https://doi.org/10.1016/j.jhydrol.2021.126356>
7. Ladwig, R., Hanson P., Dugan H., Carey C., Zhang Y., **Shu, L.,** Duffy C., Cobourn, K.(2020). Disentangling the drivers of inter-annual variability in summer hypolimnetic anoxia in a eutrophic lake. Hydrology and Earth System Sciences. <https://doi.org/10.5194/hess-2020-349>
8. Duan, S., Ullrich, P., **Shu, L.**(2020). Using Convolutional Neural Networks for Streamflow Projection in California. Frontiers in Water. <https://10.3389/frwa.2020.00028>
9. Garijo, D., Khider, D., Ratnakar, V., Gil, Y., Deelman, E., da Silva, R. F., **Shu**, L., … et al. (2019). An Intelligent Interface for Integrating Climate, Hydrology, Agriculture, and Socioeconomic Models. In Proceedings of the 24th International Conference on Intelligent User Interfaces: Companion (pp. 111–112). New York, NY, USA: Association for Computing Machinery. <https://doi.org/10.1145/3308557.3308711>
10. Yu, X., Lamačová, A., **Shu**, L., Duffy, C., Krám, P., Hruška, J., … Lin, K. (2019). Data rescue in manuscripts: a hydrological modelling study example. Hydrological Sciences Journal, 1–7. <https://doi.org/10.1080/02626667.2019.1614593>
11. Ward, N. K., Fitchett, L., Hart, J. A., **Shu**, L., Stachelek, J., Weng, W., … Weathers, K. C. (2019). Integrating fast and slow processes is essential for simulating human–freshwater interactions. Ambio, 48(10), 1169–1182. <https://doi.org/10.1007/s13280-018-1136-6>
12. Cobourn, K. M., Carey, C. C., Boyle, K. J., Duffy, C.,…, **Shu**, L., … Zhang, Y. (2018). From concept to practice to policy: modeling coupled natural and human systems in lake catchments. Ecosphere, 9(5), e02209. <https://doi.org/10.1002/ecs2.2209>
13. 南卓铜，舒乐乐，赵彦博，李新, 丁永建. 集成建模环境研究及其在黑河流域的初步应用. 中国科学E. 2011, 41(8): 1043—1054..

# 科普文章

* 为什么所谓五十年一遇、百年一遇的自然灾害几乎年年发生？<https://www.zhihu.com/question/21315165/answer/22317520>
* 如何看待《自然》（Nature）报道声称中国西北荒漠绿化可能导致水资源枯竭？<https://www.zhihu.com/question/347717753/answer/835860948>

# 学术兼职

* **EGU**模型顶级期刊**Geoscientific Model Development** 编辑

负责水文学(hydrology), 数值方法(numeric method), 气候与地球系统模式(climate and earth system modeling)三个方向。Hydrology方向唯一中国编辑。

* 中国自然资源学会资源持续利用与减灾专业委员会
* 甘肃省气象学会青年工作委员会青年委员

# 科研项目

## 主持

* 2023-01~2025-12；中国科学院率先行动人才计划择优支持；陆面-水文耦合数值模型；300万元
* 2020-09~2023-12；中国科学院率先行动人才计划；数值方法水文模型；300万元
* 2021.01~2021.12; 国家冰川冻土沙漠科学数据中心开放基金；5万元

## 参与

* 2023-01~2027.12；中国科学院中国科学院基础与交叉前沿科研先导专项（B类先导专项）：干旱区内陆河流域水资源百年演变过程与未来预估；1286万元；骨干
* 2023.01-2026.12; 中国科学院“西部之光”交叉团队：寒旱区陆面过程与气候变化研究；200万元；骨干
* 2021.01-2024.12; 中国科学院“西部之光”交叉团队：青藏高原湖-气相互作用及其生态环境效应研究；200万元； 骨干
* 2023.01-2027.12; 甘肃省科技局：冰冻圈快速退化及其对区域可持续发展的影响；1000万；参与
* 2019-01~2020-12；美国自然科学基金(NSF) NSF #1934600；Knowledge-Guided Machine Learning: A Framework to Accelerate Scientific Discovery；16万美元；博士后，参与
* 2019-01~2021-12；美国国防高级研究计划局(DARPA) W911NF-18-1-0027；Model Integration through Knowledge-Rich Data and Process Composition；1300万美元；博士后，骨干
* 2017-01~2020-12；加州能源局(CEC) CEC EPC-16-063；Advanced Statistical-Dynamical Downscaling Methods and Products for California Electrical System Climate Planning；140万美元；博士后，参与
* 2016-01~2019-12；美国美国能源部(DOE)，DOE DE-FOA-0001531；An Integrated Evaluation of the Simulated Hydroclimate System of the Continental US；600万美元；博士后，参与
* 2015-01~2019-12；美国自然科学基金(NSF)，NSF #1517823；CNH-L: Linking Landuse Decision Making, Water Quality, and Lake Associations to Understand Human-Natural Feedbacks in Lake Catchments；180万美元；博士后，参与
* 2016-01~2017-12；美国自然科学基金(NSF)，NSF #1211809；Land, Water, and Territory: A 3,000-Year Study of Niche Construction and Cultural Evolution in the Tikal National Park, Guatemala；24万美元；博士生，参与

# 会议报告

* 2023.12 AGU年会-Challenges and Solutions for Hydrologic Scaling Across Multiple Processes and Scales；Reductionism in Hydrology: Advancements and Challenges in the Development of Integrated Surface-Subsurface Numerical Hydrological Models；San Francisco, California, USA；特邀报告
* 2023.10 中国地理学会地理模型与地理信息分析专业委员会；数值水文模型发展；武汉；特邀报告
* 2021.05 Deployment, calibration, and efficiency of SHUD model in cold and arid watersheds， EGU（在线 )
* 2020.08 SHUD水文模型发展及应用, 国际华人青年水科学协会 2020 夏季会议（在线 )
* 2019.12, Quick and reproducible automated watershed modeling with the SHUD: Essential data, simulation, applications and visualization, AGU, San Francisco, California, USA
* 2018.12 Model simulated spatial distribution and the variation of ground water level in Sacramento Watershed, California from 1985 to 2017, AGU, Washington, DC, USA
* 2018.04 Groundwater and Snow Storage Simulation with PIHM, California Water& Environmental Modeling Forum, Sacramento, California, USA
* 2017.12 Coupling Cellular Automata Land Use Change with Distributed Hydrologic models, AGU, New Orleans, Louisiana, USA
* 2015.12 Catchment hydrological change from soil degradation — A model study for assessing urbanization on the terrestrial water cycle AGU, San Francisco, California, USA
* 2014.12 Reconstructing the role of landuse change on water yield at the Maya urban center Tikal, Guatemala [700-800 AD], AGU, San Francisco, California, USA
* 2014.10 PIHM and PIHMgis workshop. Global Lake Ecological Observatory Network (GLEON) 16, Orford, Quebec, Canada
* 2013.12 Center for Green Infrastructure and Stormwater Management: Urbanization-driven hydrological process change in Lancaster of Pennsylvania,AGU, San Francisco, California, USA