

Chunlin Song

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State Key Laboratory of Hydraulics and Mountain River Engineering, Sichuan University

No.24 South Section 1, Yihuan Road, Chengdu, China

RESEARCH INTERESTS

Riverine carbon cycle; aquatic GHGs; permafrost hydrology; permafrost carbon cycle; watershed ecohydrology

PROFESSIONAL EXPERIENCE

State Key Laboratory of Hydraulics and Mountain River Engineering, College of Water Resources and Hydropower, Sichuan University *Sept. 2023 - Present*

Associate Professor

State Key Laboratory of Hydraulics and Mountain River Engineering, College of Water Resources and Hydropower, Sichuan University *Jun. 2020 - Aug. 2023*

Tenure-track Associate Professor

Institute of Mountain Hazards and Environment, Chinese Academy of Sciences *Jul. 2019 - Jun. 2020*

Special Research Associate

EDUCATION

Institute of Mountain Hazards and Environment, Chinese Academy of Sciences & University of Chinese Academy of Sciences *Sept. 2015 - Jun. 2019*

PhD in Physical Geography, advisor: Professor Genxu Wang

Dissertation: Riverine Carbon Export Processes of the Yangtze River Source Region

Yale School of Forestry and Environmental Studies *Nov. 2017 - Jan. 2019*

Visiting PhD student, work on river biogeochemistry, advisor: Professor Peter A. Raymond

Institute of Mountain Hazards and Environment, Chinese Academy of Sciences & University of Chinese Academy of Sciences *Sept. 2013 - Aug. 2015*

Master student in Physical Geography, advisor: Professor Genxu Wang

College of Water Resources and Hydropower, Sichuan University *Sept. 2009 - Jun. 2013*

Bachelor of Engineering in Hydrology and Water Resources Engineering

PUBLICATIONS

Peer-reviewed Papers (First/*Corresponding Author)

17. Jinlong Li, Genxu Wang*, **Chunlin Song***, Shouqin Sun, Jiabei Ma, Ying Wang, Linmao Guo Dongfeng Li (2024). Recent Intensified Erosion and Massive Sediment Deposition in the Tibetan Plateau Rivers. *Nature Communications* 15, 722. <https://doi.org/10.1038/s41467-024-44982-0>
16. Ying Wang, Genxu Wang, Xiangyang Sun, Jinlong Li, **Chunlin Song*** (2024). Spatiotemporal variability of organic carbon in streams and rivers of the Northern Hemisphere cryosphere. *Science of The Total Environment*, 167370. <https://doi.org/10.1016/j.scitotenv.2023.167370>
15. Jinlong Li, Genxu Wang*, Kai Li, Yang Li, Linmao Guo, **Chunlin Song*** (2023). Impacts of climate change and freeze-thaw cycles on water and sediment fluxes in the headwater region of the Yangtze River, Qinghai-Tibet Plateau. *Catena*, 227C, 107112. <https://doi.org/10.1016/j.catena.2023.107112>

Updated January 2024. More info: [Google Scholar](#); [ResearchGate](#); [ORCID](#); [Website](#); [X](#); [CV in Chinese](#)

14. **Chunlin Song**, Genxu Wang*, Xiangyang Sun, Yang Li, Silu Ye, Zhaoyong Hu, Juying Sun, Shan Lin (2023). Riverine CO₂ variations in permafrost catchments of the Yangtze River source region: Hot spots and hot moments. *Science of The Total Environment*, 863, 160948, <https://doi.org/10.1016/j.scitotenv.2022.160948>
13. Zhiwei Wang, Shouqin Sun, Genxu Wang*, **Chunlin Song*** (2023). Determination of low-flow components in alpine permafrost rivers. *Journal of Hydrology*, 617, 128886, <https://doi.org/10.1016/j.jhydrol.2022.128886>
12. Zhiwei Wang, Shouqin Sun, **Chunlin Song***, Genxu Wang*, Shan Lin, Silu Ye (2022). Variation characteristics of high flows and their responses to climate change in permafrost regions on the Qinghai-Tibet Plateau, China. *Journal of Cleaner Production*, 376, 134369, <https://doi.org/10.1016/j.jclepro.2022.134369>
11. **Chunlin Song** and Genxu Wang* (2021). Land carbon sink of the Tibetan Plateau may be overestimated without accounting the aquatic carbon export. *Proceedings of the National Academy of Sciences of the United States of America*, 118(46), e2114694118, <https://doi.org/10.1073/pnas.2114694118> (Letter)
10. **Chunlin Song**, Genxu Wang*, Xiangyang Sun, Zhaoyong Hu (2021). River runoff components change variably and respond differently to climate change in the Eurasian Arctic and Qinghai-Tibet Plateau permafrost regions. *Journal of Hydrology*, 601, 126653, <https://doi.org/10.1016/j.jhydrol.2021.126653>
9. **Chunlin Song**, Genxu Wang*, Zhaoyong Hu, Kewei Huang, Tao Zhang, Xiaopeng Chen, Yang Li (2020). Net ecosystem carbon budget of a grassland ecosystem in central Qinghai-Tibet Plateau: integrating terrestrial and aquatic carbon fluxes at catchment scale. *Agricultural and Forest Meteorology*, 290, 108021, <https://doi.org/10.1016/j.agrformet.2020.108021>
8. **Chunlin Song**, Genxu Wang*, Negar Haghipour, Peter A. Raymond (2020). Warming and monsoonal climate lead to a large export of millennial-aged carbon from permafrost catchments of the Qinghai-Tibet Plateau. *Environmental Research Letters*, 15(7): 074012. <https://doi.org/10.1088/1748-9326/ab83ac>
7. **Chunlin Song**, Genxu Wang*, Tianxu Mao, Kewei Huang, Xiangyang Sun, Zhaoyong Hu, Ruiying Chang, Xiaopeng Chen, Peter A. Raymond (2020). Spatiotemporal variability and sources of DIC in permafrost catchments of the Yangtze River source region: insights from stable carbon isotope and water chemistry. *Water Resources Research*, 56(1): e2019WR025343. <https://doi.org/10.1029/2019WR025343>
6. **Chunlin Song**, Genxu Wang*, Tianxu Mao, Junchen Dai, Daqing Yang (2020). Linkage between permafrost distribution and river runoff changes across the Arctic and the Tibetan Plateau. *Science China Earth Sciences*, 63(2): 292-302. <https://doi.org/10.1007/s11430-018-9383-6>
5. **Chunlin Song**, Genxu Wang*, Tianxu Mao, Xiaopeng Chen, Kewei Huang, Xiangyang Sun, Zhaoyong Hu (2019). Importance of active layer freeze-thaw cycles on the riverine dissolved carbon export on the Qinghai-Tibet Plateau permafrost region. *PeerJ*, 7:e7146. <https://doi.org/10.7717/peerj.7146>
4. **Chunlin Song**, Genxu Wang*, Guangsheng Liu, Tianxu Mao, Xiangyang Sun, Xiaopeng Chen (2017). Stable isotope variations of precipitation and streamflow reveal the young water fraction of a permafrost watershed. *Hydrological Processes*, 31(4), 935-947. <https://doi.org/10.1002/hyp.11077>
3. **Chunlin Song**, Genxu Wang*, Xiangyang Sun, Ruiying Chang, Tianxu Mao (2016). Control factors and scale analysis of annual river water, sediments and carbon transport in China. *Scientific Reports*, 6:25963. <https://doi.org/10.1038/srep25963>
2. **Chunlin Song**, Xiangyang Sun, Genxu Wang* (2015). A study on precipitation stable isotopes characteristics and vapor sources of the subalpine Gongga Mountain, China. *Resources and Environment in the Yangtze Basin*, 24(11), 1860-1869. (in Chinese with English Abstract)
1. **Chunlin Song**, Xiangyang Sun, Genxu Wang* (2015). A review on carbon and water interactions of forest ecosystem and its impact factors. *Chinese Journal of Applied Ecology*, 26(9), 2891-2902. (in Chinese with English Abstract)

Peer-reviewed Papers (Co-author)

17. Zhaoyong Hu, Genxu Wang, Xiangyang Sun, Kewei Huang, **Chunlin Song**, Yang Li, Shouqin Sun, Juying Sun, Shan Lin (2024). Energy partitioning and controlling factors of evapotranspiration in an alpine meadow in the permafrost region of the Qinghai-Tibet Plateau. *Journal of Plant Ecology*, rtæ002.
16. Xiangyang Sun, Xinyu Zhang, Genxu Wang, Zhaoyong Hu, **Chunlin Song**, Shan Lin, Juying Sun, Shouqin Sun (2023). An Increasing Effect of Soil Moisture on Semiempirical WaterUse Efficiency Models From Wet to Dry Climate Regions. *Journal of Geophysical Research: Biogeosciences*, 128(6), e2022JG007347.
15. Zhaoyong Hu, Shouqin Sun, Xiangyang Sun, Shan Lin, **Chunlin Song**, Genxu Wang (2023). Controlling Factors of the SpatialTemporal Fluctuations in Evapotranspiration Along an Elevation Gradient Across Humid Montane Ecosystems. *Water Resources Research*, 59(1), e2022WR033228.
14. Xiangyang Sun*, Genxu Wang*, Juying Sun, Shouqin Sun, Zhaoyong Hu, **Chunlin Song**, Shan Lin (2022). Contrasting water sources used by a coniferous forest in the high-altitude, southeastern Tibetan Plateau. *Science of The Total Environment*, 849, 157913. <https://doi.org/10.1016/j.scitotenv.2022.157913>
13. Yang Li, Genxu Wang, Haijian Bing, Tao Wang, Kewei Huang, **Chunlin Song**, Xiaopeng Chen, Zhaoyong Hu, Pengfei Rui, Xiaoyan Song, Ruiying Chang (2021). Watershed scale patterns and controlling factors of ecosystem respiration and methane fluxes in a Tibetan alpine grassland. *Agricultural and Forest Meteorology*, 306, 108451. <https://doi.org/10.1016/j.agrformet.2021.108451>
12. Judith A. Rosentreter, Alberto V. Borges, Bridget R. Deemer, Meredith A. Holgerson, Shaoda Liu, **Chunlin Song**, John Melack, Peter A. Raymond, Carlos M. Duarte, George H. Allen, David Olefeldt, Benjamin Poulter, Tom I. Battin Bradley D. Eyre (2021). Half of global methane emissions come from highly variable aquatic ecosystem sources. *Nature Geoscience*, 14, 225-230. <https://doi.org/10.1038/s41561-021-00715-2>
11. Kewei Huang, Junchen Dai, Genxu Wang, Juan Chang, Yaqiong Lu, **Chunlin Song**, Zhaoyong Hu, Naveed Ahmed, Renzheng Ye (2020). The Impact of Land Surface Temperatures on Suprapermafrost Groundwater on the Central Qinghai-Tibet Plateau. *Hydrological Processes*. <https://doi.org/10.1002/hyp.13677>
10. Xiangyang Sun, Genxu Wang, Mei Huang, Ruiying Chang, Zhaoyong Hu, **Chunlin Song**, Juying Sun (2020). The asynchronous response of carbon gain and water loss generate spatio-temporal pattern of WUE along elevation gradient in southwest China. *Journal of Hydrology*, 124389. <https://doi.org/10.1016/j.jhydrol.2019.124389>
9. Xiaoyan Song, Genxu Wang, Fei Ran, Kewei Huang, Juying Sun, **Chunlin Song**. (2020). Soil moisture as a key factor in carbon release from thawing permafrost in a boreal forest. *Geoderma*, 357, 113975. <https://doi.org/10.1016/j.geoderma.2019.113975>
8. Zhaoyong Hu, Genxu Wang, Xiangyang Sun, Jian Wang, Xiaopeng Chen, **Chunlin Song**, Xiaoyan Song, Shan Lin (2019). Variations in belowground carbon use strategies under different climatic conditions. *Agricultural and Forest Meteorology*, 268, 32-39. <https://doi.org/10.1016/j.agrformet.2019.01.005>
7. Zhaoyong Hu, Genxu Wang, Xiangyang Sun, Meizhuang Zhu, **Chunlin Song**, Kewei Huang and Xiaopeng Chen (2018). Spatial-Temporal Patterns of Evapotranspiration Along an Elevation Gradient on Mount Gongga, Southwest China. *Water Resources Research*, 54(6), 4180-4192. <https://doi.org/10.1029/2018WR022645>
6. Xiaopeng Chen, Genxu Wang, Tao Zhang, Tianxu Mao, Da Wei, **Chunlin Song**, Zhaoyong Hu, Kewei Huang (2017). Effects of warming and nitrogen fertilization on GHG flux in an alpine swamp meadow of a permafrost region. *Science of the Total Environment*, 601, 1389-1399. <https://doi.org/10.1016/j.scitotenv.2017.06.028>

5. Xiaopeng Chen, Genxu Wang, Kewei Huang, Zhaoyong Hu, **Chunlin Song**, Yiming Liang, Jian Wang, Xiaoyan Song, Shan Lin (2017). The effect of nitrogen deposition rather than warming on carbon flux in alpine meadows depends on precipitation variations. *Ecological Engineering*, 107, 183-191. <https://doi.org/10.1016/j.ecoleng.2017.07.018>
4. Xiaoyan Song, Genxu Wang, Fei Ran, Ruiying Chang, **Chunlin Song**, Yao Xiao (2017). Effects of topography and fire on soil CO₂ and CH₄ flux in boreal forest underlain by permafrost in northeast China. *Ecological Engineering*, 106, 35-43. <https://doi.org/10.1016/j.ecoleng.2017.05.033>
3. Genxu Wang, Tianxu Mao, Juan Chang, **Chunlin Song**, Kewei Huang (2017). Processes of runoff generation operating during the spring and autumn seasons in a permafrost catchment on semi-arid plateaus. *Journal of Hydrology*, 550:307-317. <https://doi.org/10.1016/j.jhydrol.2017.05.020>
2. Xiaopeng Chen, Genxu Wang, Tao Zhang, Tianxu Mao, Da Wei, Zhaoyong Hu, **Chunlin Song** (2017). Effects of warming and nitrogen fertilization on GHG flux in the permafrost region of an alpine meadow. *Atmospheric environment*, 157, 111-124. <https://doi.org/10.1016/j.atmosenv.2017.03.024>
1. Xiangyang Sun, Genxu Wang, Mei Huang, Zhaoyong Hu, **Chunlin Song** (2017). Effect of climate change on seasonal water use efficiency in subalpine *Abies fabri*. *Journal of Mountain Science*, 14(1), 142-157. <https://doi.org/10.1007/s11629-016-3867-9>

Monograph

- WANG Genxu, YI Shuhua. *Ecological process of cryosphere changes and carbon cycle impact* (in Chinese). Beijing: Science Press. 2019. Contributed a chapter.
- WANG Genxu, ZHANG Zhiqiang, LI Xiaoyan. *Introduction to Ecohydrology* (in Chinese). Beijing: Science Press. 2019. Contributed a chapter.

PRESENTATIONS

Oral Presentations

- Chunlin Song**, Genxu Wang. Riverine carbon content, fluxes, sources, and impacts in the Qinghai-Tibet Plateau permafrost watersheds. 28th IUGG General Assembly, Berlin, Germany. 13 July 2023.
- **Chunlin Song**. Carbon export from permafrost catchments of the Qinghai-Tibet Plateau. 2022 International Symposium on Ecohydraulics. Online Meeting. 10/11/2022.
 - **Chunlin Song**, Genxu Wang, Negar Haghipour, Peter A. Raymond. Millennial-aged carbon export from permafrost catchments of the Qinghai-Tibet Plateau. Cryosphere Forum 2021: Status of research on changing permafrost and associated impacts in the Hindu Kush Himalaya. Online Meeting. 09/23/2021.
 - **Chunlin Song**. The dynamics, sources and effects of carbon export from rivers in permafrost regions of the Qinghai-Tibet Plateau. Young Scientists Forum of the Chinese Academy of Sciences. Chengdu, China, 9/8/2021.
 - **Chunlin Song**. The influence of permafrost changes in the Qinghai-Tibet Plateau on the riverine export of dissolved carbon. The 7th Young Scientist Forum of Earth Science. Guiyang, China, 7/11/2021.
 - **Chunlin Song**. Basin-scale Net Ecosystem Carbon Budget with the Consideration of Aquatic Carbon Flux: A Case Study of Fenghuoshan Watershed in Qinghai-Tibet Plateau. The 2nd China Ecohydrology Forum. Changsha, China, 7/3/2021.
 - **Chunlin Song**. The patterns and mechanisms of carbon export from permafrost rivers on the Qinghai-Tibet Plateau. The 19th China Ecology Conference. Online, 11/21/2020.
 - **Chunlin Song**. Carbon export patterns and mechanisms in typical permafrost draining rivers in of the Qinghai-Tibet Plateau permafrost region. Mountain Science Young Scholars Development Forum, Chengdu, China. 09/20/2019.
 - Peter A. Raymond, **Chunlin Song**, Shaoda Liu, George H. Allen. Stream and River Methane Emissions. AGU Fall Meeting 2018, Washington, D.C., USA. 12/14/2018.

- **Chunlin Song**, Genxu Wang, Tianxu Mao. Seasonal riverine export of dissolved carbon affected by active layer freeze-thaw cycles in headwater streams of the Qinghai-Tibet Plateau permafrost region. AGU Fall Meeting 2017, New Orleans, USA. 12/13/2017.
- Genxu Wang, **Chunlin Song** (speaker). Mechanism of the surface runoff processes of a permafrost watershed in the Qinghai-Tibet plateau. The 2nd Asian Conference on Permafrost, Sapporo, Japan. 07/03/2017.
- **Chunlin Song**, Tianxu Mao. Carbon export and its control factors of Yangtze River source region. Institute of Mountain Hazards and Environment, Chinese Academy of Sciences, Chengdu, China. 11/13/2016.
- **Chunlin Song**. Invited to give a presentation about doctoral life to undergraduates at the mountain science summer school. Institute of Mountain Hazards and Environment, Chinese Academy of Sciences, Chengdu, China. 07/21/2016.
- **Chunlin Song**. Theory and application of Meta-analysis. Institute of Mountain Hazards and Environment, Chinese Academy of Sciences, Chengdu, China. 05/03/2016.

FUNDED GRANTS

PI: Sichuan University From 0 to 1 Innovation Research Project, 140,000 CNY 2024.01 - 2025.12
Fine characterization and evolution mechanism on water and sediment dynamic processes in the cold region watersheds of the Qinghai-Tibet Plateau

PI: Sub-Project of National Key Research and Development Program of China, 580,000 CNY 2022.12 - 2025.11
The influence and simulation of energy and water phase changes on the processes of flow generation and yield in the source area of the Yangtze River and the Yellow River

PI: National Natural Science Foundation of China Young Scientists Fund, 300,000 CNY 2022 - 2024
Carbon dioxide emissions from water-air interface of permafrost rivers and the effects of freeze-thaw processes in the Qinghai-Tibet Plateau

PI: Sichuan University Startup Funding for Research, 300,000 CNY 2020 - 2023
Key Processes of River Carbon Cycle in Permafrost Regions of the Qinghai-Tibet Plateau and Their Effects on Watershed Carbon Balance

PI: Sub-Project of Sanjiangyuan National Park Joint Research Program of the Chinese Academy of Sciences and The Peoples Government of Qinghai Province, 400,000 CNY 2020 - 2022
1.4 Water and heat transport and coupling processes of the SPAC system of typical underlying surface in the three-rivers headwater region & 4.2 Safety Protection Strategy of the water system of three-rivers headwater region

PI: China Postdoctoral Science Foundation Project, 80,000 CNY 2019 - 2021
Age and Source of Riverine Dissolved Carbon in Continuous Permafrost Region of the Qinghai-Tibet Plateau

Co-PI: Sub-Project of the Second Tibetan Plateau Scientific Expedition and Research Program (STEP), 800,000 CNY 2019 - 2022
The Eco-hydrological Process and Water Conservation of Typical Wetland Ecosystem in the Qinghai-Tibet Plateau

TEACHING & ADVISING EXPERIENCE

Teaching

Joint-teaching graduate course: *Ecohydrology*

Fall 2021 - present

Advising Experience

Mentees: 4 Master students (2020-); 2 undergraduate research group (2020-); co-mentoring 4 PhD students (2020-)

AWARDS & HONORS

Outstanding Instructor Award in the National College Student Water Conservancy Innovation Design Competition in 2023

Outstanding Doctoral Dissertation of the Chinese Academy of Sciences, 2020

China Scholarship Council Fellowship for Joint Ph.D. Training Program, 2017

Bronze Prize of ACOP 2017 Photo Contest

Pacemaker of Merit Student Award, 2017 (1%)

National Scholarship for Doctoral Students, 2016 (6%)

First Class Prize of the IMHE Academic Award, 2016 (10%)

Second Class Prize of the Director Scholarship of the Chengdu Branch of the Chinese Academy of Sciences, 2015 (1.7%)

National Scholarship for Master Students, 2014 (3%)

First Class Prize of the IMHE Academic Award, 2014 (6%)

Merit Student Award of the University of Chinese Academy of Sciences, 2014, 2015, & 2016 (15%)

Sichuan University Excellent Undergraduate Thesis Award, 2013 (5%)

PROFESSIONAL ENGAGEMENT ACTIVITIES

Field Trips

Qinghai-Tibet Plateau, Gongga Mountain, Tuotuo River, Tongtian River, Lancang River, Yellow River, Nu River, Jinsha River, Min River (Sichuan), Dadu River, Yalong River, Jialing River, Yangtze River, Connecticut River

Review Services

Journal Reviews

Advances in Water Resources, Catena, Earth and Space Science, Environmental Research Letters, Frontiers in Earth Science, Frontiers in Environmental Science, Geoderma, Hydrology and Earth System Sciences, Hydrological Processes, Journal of Hydrology, Journal of Hydrology: Regional Studies, Journal of Mountain Science, Limnology and Oceanography, Quaternary International, Science of the Total Environment, Sustainability, The Cryosphere, Water, Water Research, Water Resources Research

Other Reviews

Second Order Draft of the IPCC AR6 (group review)

Professional Organizations

American Geophysical Union; Permafrost Young Researchers Network; Chinese Society of Cryospheric Science; Ecological Society of China; Chinese Hydraulic Engineering Society