Zhengchao Tian, Ph.D.

Associate professor
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Education:

2011.09 – 2016.06: Ph.D. in Soil Science, Department of Soil and Water Sciences, China Agricultural University, Dissertation: "Measurement and prediction of hydraulic and thermal properties of frozen soils: thermo-time domain reflectometry technology".

2007.09 – 2011.07: B.S. in Resources and Environmental Sciences, Collage of Resources and Environmental Sciences, China Agricultural University.

Professional Experience:

2018.08 – Present: Associate professor, College of Resources and Environment, Huazhong Agricultural University

2016.09 – 2018.08: Postdoctoral Researcher, Department of Crop and Soil Sciences, North Carolina State University

Research Interests:

Environmental soil physics, Soil hydrology, Measurement and modeling water and heat processes in soil.

Teaching:

1) **Soil Physics** for first-year graduate students, 40 lecture hours (including 8 hours of Lab), 2018-present.
2) **Hydrology and Water Resources** for second/third-year undergraduate students (twice a year), 32 lecture hours, 2019-present.
3) **Soil and Fertilization B** for second/third-year undergraduate students (twice a year), 30 lecture hours, 2019-2020.

4) **Advances in Resource Utilization and Plant Protection Science** for first-year graduate students, team taught, 4 lecture hours, 2020-present.

Peer-Reviewed Journal Publications:

1. Qiu, Y., Fu, Q., Yang, Y., Zhao, J., Li, J., Yi, F., Fu, X., Huang, Y., **Tian, Z.***, Heitman, J.L. and Yao, Z., Dai, Z., Qiu, Y., Chen, H.*, 2024. Soil and stone terraces offset the negative impacts of sloping cultivation on soil microbial diversity and functioning by protecting soil carbon. Journal of Environmental Management, 369, 122339.
2. Qin, L., **Tian, Z.***, Lin, L., Yi, C. and Chen, J., 2024. Evaluation and development of pedotransfer functions of saturated hydraulic conductivity for subtropical soils. Geoderma, 448, p.116976.
3. Zhang, M., **Tian, Z.***, Zhu, Q. and Chen, J., 2023. In-situ assessment of soil shrinkage and swelling behavior and hydro-thermal regimes with a thermo-time domain reflectometry technique. Soil and Tillage Research, 227, 105617.
4. **Tian, Z.***, Wang, L. and Ren, T.*, 2023. Measuring soil freezing characteristic curve with thermos-time domain reflectometry. European Journal of Soil Science, 74(1), e13335.
5. Qin, L., L. Lin, S. Ding, C. Yi., J. Chen, **Z. Tian***, 2022. Evaluation of pedotransfer functions for predicting particle density of soils with low organic matter contents. Geoderma, 416, 115812.
6. Zhang, M., **Tian, Z.***, 2022. Evaluation of the heat pulse method for determining evaporation of a red soil in southern China. Transactions of the Chinese Society of Agricultural Engineering, 38(5).
7. **Tian, Z.***, Chen, J., Cai, C., W. Gao, T. Ren, J.L. Heitman, R. Horton. 2021. New pedotransfer functions for soil water retention curves that better account for bulk density effects. Soil and Tillage Research, 205, 104812.
8. **Tian, Z**., Kojima, Y., Heitman, J.L., Horton, R. and Ren, T.*, 2020. Advances in thermos-time domain reflectometry technique: Measuring ice content in partially frozen soils. Soil Sci. Soc. Am. J., 84(5), 1519-1526.
9. **Tian, Z.**, D. Kool, T. Ren, R. Horton, J.L. Heitman*. 2020. Estimating soil bulk density with combined commercial soil water content and thermal property sensors. Soil and Tillage Research, 196, 104445.
10. **Tian, Z.***, Ren, T., Heitman, J.L. and Horton, R., 2020. Estimating thermal conductivity of frozen soils from air-filled porosity. Soil Sci. Soc. Am. J., 84(5), 1650-1657.
11. **Tian, Z.**, Y. Kojima, J.L. Heitman, R. Horton, T. Ren*. 2019. Advances in Thermo-Time

Domain Reflectometry Technique: Measuring Ice Content in Partially Frozen Soils. Methods of Soil Analysis, 4(1).

12. **Tian, Z.**, D. Kool, T. Ren, R. Horton, J.L. Heitman*. 2019. Approaches for estimating unsaturated soil hydraulic conductivities at various bulk densities with the extended Mualem-van Genuchten model. J. Hydrol., 572:719-731.
13. **Tian, Z.**, W. Gao, D. Kool, T. Ren, R. Horton, and J. Heitman*. 2018. Approaches for estimating soil water retention curves at various bulk densities with the extended van Genuchten model. Water Resources Research. 54.
14. **Tian, Z.**, D. Kool, T. Ren, R. Horton, and J. Heitman*. 2018. Determining in-situ unsaturated soil hydraulic conductivity at a fine depth scale with heat pulse and water potential sensors. Journal of Hydrology. 564, 802–810.
15. **Tian, Z.**, Y. Lu, T. Ren, R. Horton, and J.L. Heitman*. 2018. Improved thermo-time domain reflectometry method for continuous in-situ determination of soil bulk density. Soil and Tillage Research. 178, 118–29.
16. **Tian, Z.**, T. Ren, Y. Kojima, Y. Lu, R. Horton, and J.L. Heitman*. 2017. An improved thermo-time domain reflectometry method for determination of ice contents in partially frozen soils. Journal of Hydrology. 555, 786–796.
17. **Tian, Z.**, Y. Lu, R. Horton, and T. Ren*. 2016. A simplified de Vries–based model to estimate thermal conductivity of unfrozen and frozen soil. European Journal of Soil Science. 67(5), 564–572.
18. **Tian, Z.**, Z. Li, G. Liu, B. Li, and T. Ren*. 2016. Soil water content determination with cosmic-ray neutron sensor: Correcting aboveground hydrogen effects with thermal/fast neutron ratio. Journal of Hydrology.540, 923–933.
19. **Tian, Z.**, J.L. Heitman, R. Horton, and T. Ren*. 2015. Determining soil ice contents during freezing and thawing with thermo-time domain reflectometry. Vadose Zone Journal. 14(8).
20. Chen, X., Wang, J., Wei, Y., Zhou, X., Chen, F., **Tian, Z.** and Cai, C., 2024. Geospatial variation of granitic soil erodibility along a hydrothermal gradient in the gully region. Catena, 245, 108343.
21. Gao, Y., Zhu, Y., Chen, J., Yang, X., Huang, Y., Song, F., He, Y., **Tian, Z.**, Lin, L., Cai, C. and Chen, J., 2024. Temporal and spatial distribution and development of permanent gully in cropland in the rolling hill region (phaeozems area) of northeast China. Catena, 235, p.107625.
22. Zou, Z., Tao, Y., Gao, Y., Liu, Z., Li, W., **Tian, Z.**, Lin, L., He, Y. and Chen, J., 2023. Soil

moisture dynamics near a gully head in relation to the trigger of collapse in granite red soil slope in southern China. Geomorphology, 420, 108493.

23. Wang, Y., Zhang, Z., **Tian, Z.**, Lu, Y., Ren, T. and Peng, X., 2022. Determination of soil bulk density dynamic in a Vertisol during wetting and drying cycles using combined soil water content and thermal property sensors. Geoderma, 428, 116149.

24. Gao, Y., Liu, C., Zou, Z., Liu, Z., Yang, X., **Tian, Z.**, He, Y., Lin, L. and Chen, J., 2022. Effects of sediment yield fluctuations on the niche-like ephemeral gully formation in granite red soil. CATENA, 219, 106624.

25. Huang, X., Lin, L., Ding, S., **Tian, Z.**, Zhu, X., Wu, K. and Zhao, Y., 2022. Characteristics of soil erodibility K value and its influencing factors in the changyan watershed, southwest hubei, China. Land, 11(1), 134.

26. Wang, L., Wang, H., **Tian, Z.**, Lu, Y., Gao, W. and Ren, T., 2020. Structural changes of compacted soil layers in northeast China due to freezing-thawing processes. Sustainability, 12(4), 1587.

27. Fu, Y., **Tian, Z.**, Amoozegar, A., Heitman, J. 2019. Measuring dynamic changes of soil porosity during compaction. Soil and Tillage Research. 193, 114-121.

28. Kool, D., Tong, B., **Tian, Z.**, Heitman, J., Sauer, T.J., Horton, R. 2019. Soil water retention and hydraulic conductivity dynamics following tillage. Soil and Tillage Research. 193, 95-100.

29. Gao, W., W.R. Whalley, **Z. Tian**, J. Liu, and T. Ren. 2016. A simple model to predict soil penetrometer resistance as a function of density, drying and depth in the field. Soil and Tillage Research. 155, 190–198.

30. Zhang, B., Y. Li, T. Ren, **Z. Tian**, G. Wang, X. He, and C. Tian. 2014. Short-term effect of tillage and crop rotation on microbial community structure and enzyme activities of a clay loam soil. Biology and Fertility of Soils.50(7), 1077–1085.

Research Grants:

1. Development of heat method for estimating hillslope interflow properties. National Natural Science Foundation of China, 2023.01-2026.12, **P.I.**
2. Development of technologies for reducing obstacles and improving quality in sloping farmland in Hubei Province, The Key Research and Development Program of Hubei Province, 2023.4-2025.12, **P.I.**
3. Thermal and hydrological processes in clayey soils as related to shrink-swell behaviors during wetting-drying cycles. National Natural Science Foundation of China, 2020.01-2022.12, **P.I.**

4. Quantification of tillage-induced bulk density variation and its effect on soil physical properties. China Fundamental Research Funds for the Central Universities, 2019.01-2021.12, **P.I.**
5. Effects of Basalt Powder Application on Physicochemical Properties of Red Soils and Wheat Growth. China Fundamental Research Funds for the Central Universities, 2022.1-2023.12, **P.I.**
6. Reconstruction Mechanisms and Control Technologies for Eroded and Degraded Black Soils, The National Key Research and Development Program of China, 2021.12-2024.11.

Honors and Awards:

2023 Third Prize in the Young Teachers' Teaching Skills Competition of Huazhong Agricultural University

2020 Second Prize in the Young Teachers' Teaching Skills Competition of the College of Resources and Environment, Huazhong Agricultural University

2020 Excellent Undergraduate Student Class Adviser of the College of Resources and Environment, Huazhong Agricultural University