Theodore Langhorst

Postdoctoral fellow, UMass Amherst
https://tedlanghorst.github.io/

ted.langhorst@gmail.com
614-849-2254

Education

PhD Geological Sciences. University of North Carolina at Chapel Hill. 2023.
Dissertation Title: *Advancing Remote Sensing of Fluvial Sediment Transport and Storage*
M.S. Geological Sciences. University of North Carolina at Chapel Hill. 2019.
B.S. Geophysics. Ohio State University School of Earth Sciences. 2016.

Teaching Experience

Field Instructor. 2020-2022 *Integrating Geosciences and Engineering in the Arctic*	Undergraduate field course in Arctic hydrology. Helped undergraduates define and test field-based hypotheses on permafrost hydrology in Northern Alaska.
Teaching Assistant. 2019; 2021 *Water in Our World* (300-level hydrology course)	Weekly review and computational lab sections. Introduction to manipulating, graphing, and interpreting data for applications in hydrology and climate.
Teaching Assistant. 2016 *Introduction to Earth Science; Geology of our National Parks*	Weekly review and hands-on lab for introductory Earth Science classes. Wide variety of topics for non-science majors.

Service

Instrumentation Committee member - Consortium of Universities for the Advancement of Hydrologic Science (CUAHSI). Since 2022.
Department Senator - UNC Graduate and Professional Student Government. 2021-2022.

Invited Seminars

Deep learning and remote sensing of fluvial suspended sediment flux. *University of Cincinnati, Department of Chemical and Environmental Engineering*. 2024.

Publications

Langhorst, T., Pavelsky, T., Eidam, E., Cooper, L., Davis, J., Spellman, K., Clement, S., Arp, C., Bondurant, A., Friedmann, E., & Gleason, C. (2023). Increased scale and accessibility of sediment transport research in rivers through practical, open-source turbidity and depth sensors. *Nature Water*. https://doi.org/10.1038/s44221-023-00124-2

Langhorst, T., & Pavelsky, T. (2023). Global Observations of Riverbank Erosion and Accretion from Landsat Imagery. *Journal of Geophysical Research: Earth Surface*, *128*(2), e2022JF006774. https://doi.org/10.1029/2022JF006774

Yang, X., **Langhorst, T.**, & Pavelsky, T. (2023). Chapter A2.4: River Morphology in Cloud-Based Remote Sensing with Google Earth Engine: Fundamentals and Applications (1st ed.). https://www.eefabook.org

Harlan, M. E., Gleason, C. J., Flores, J. A., **Langhorst, T. M.**, & Roy, S. (2023). Mapping and characterizing Arctic beaded streams through high resolution satellite imagery. *Remote Sensing of Environment*, *285*(May 2022), 113378. https://doi.org/10.1016/j.rse.2022.113378

Wang, B., Smith, L. C., Gleason, C., Kyzivat, E. D., Fayne, J. V., Harlan, M. E., **Langhorst, T.**, Feng, D., Eidam, E., Munoz, S., Davis, J., Pavelsky, T. M., & Peters, D. L. (2023). Athabasca River Avulsion Underway in the Peace-Athabasca Delta, Canada. *Water Resources Research*, *59*(3), e2022WR034114. https://doi.org/10.1029/2022WR034114

Wang, C., Pavelsky, T. M., Kyzivat, E. D., Garcia-Tigreros, F., Podest, E., Yao, F., Yang, X., Zhang, S., Song, C., **Langhorst, T.**, Dolan, W., Kurek, M. R., Harlan, M. E., Smith, L. C., Butman, D. E., Spencer, R. G. M., Gleason, C. J., Wickland, K. P., Striegl, R. G., & Peters, D. L. (2023). Quantification of wetland vegetation communities features with airborne AVIRIS-NG, UAVSAR, and UAV LiDAR data in Peace-Athabasca Delta. *Remote Sensing of Environment*, *294*, 113646. https://doi.org/10.1016/j.rse.2023.113646

Yang, X., Pavelsky, T. M., Ross, M. R. V., Januchowski-Hartley, S. R., Dolan, W., Altenau, E. H., Belanger, M., Byron, D., Durand, M., Van Dusen, I., Galit, H., Jorissen, M., **Langhorst, T.**, Lawton, E., Lynch, R., Mcquillan, K. A., Pawar, S., & Whittemore, A. (2022). Mapping Flow-Obstructing Structures on Global Rivers. *Water Resources Research*, *58*(1), 1–10. https://doi.org/10.1029/2021wr030386

Eidam, E. F., **Langhorst, T.**, Goldstein, E. B., & McLean, M. (2021). OpenOBS: Open-source, low-cost optical backscatter sensors for water quality and sediment-transport research. *Limnology and Oceanography: Methods*, *20*(1), 46–59. https://doi.org/10.1002/lom3.10469

Whittemore, A., Ross, M. R. V., Dolan, W., **Langhorst, T.**, Yang, X., Pawar, S., Jorissen, M., Lawton, E., Januchowski-Hartley, S., & Pavelsky, T. (2020). A Participatory Science Approach to Expanding Instream Infrastructure Inventories. *Earth's Future*, *8*(11). https://doi.org/10.1029/2020EF001558

Kyzivat, E. D., Smith, L. C., Pitcher, L. H., Fayne, J. V., Cooley, S. W., Cooper, M. G., Topp, S. N., **Langhorst, T.**, Harlan, M. E., Horvat, C., Gleason, C. J., & Pavelsky, T. M. (2019). A high-resolution airborne color-infrared camera water mask for the NASA ABoVE campaign. *Remote Sensing*, *11*(18). https://doi.org/10.3390/rs11182163

Langhorst, T., Pavelsky, T. M., Frasson, R. P. D. M., Wei, R., Domeneghetti, A., Altenau, E. H., Durand, M. T., Minear, J. T., Wegmann, K. W., & Fuller, M. R. (2019). Anticipated improvements to river surface elevation profiles from the surface water and ocean topography mission. *Frontiers in Earth Science*, *7*. https://doi.org/10.3389/feart.2019.00102

Tuozzolo, S., **Langhorst, T.**, de Moraes Frasson, R. P., Pavelsky, T., Durand, M., & Schobelock, J. J. (2019). The impact of reach averaging Manning's equation for an in-situ dataset of water surface elevation, width, and slope. *Journal of Hydrology*, *578*. https://doi.org/10.1016/j.jhydrol.2019.06.038

Conference Submissions

Multi-Model Comparison of Suspended Sediment Flux in the Sagavanirktok River, Alaska. EGU General Assembly 2024.

Simultaneous remote sensing of river discharge and suspended sediment on the Sagavanirktok River, Alaska. *AGU Fall Meeting 2022. Oral.*

The first year of OpenOBS deployments: successful turbidity measurements in diverse environments and applications. *OSM 2022. Poster.*

Global riverbank migration from 36 years of satellite imagery. *AGU Fall Meeting 2021. Oral.*

Variability and controls of riverbank erosion in the United States from 35 years of satellite imagery. *AGU Fall Meeting 2020. Poster.*

Remotely sensed discharge and sediment flux of the Sagavanirktok River. *AGU Fall Meeting 2019. Poster.*

Anticipated improvements to in-river DEMs from the Surface Water and Ocean Topography mission. *AGU Fall Meeting 2018. Poster.*

Successful Funding

Title: Sediment fluxes in boreal rivers: determining relative seasonal loads and expanding long-term monitoring capability
Funding Agency: NSF, #2153778
Principal Investigator: Emily Eidam, Oregon State University
Role: Contributing Researcher (funded but not named as an investigator)
Duration: Fall 2022 - Fall 2024
Amount: $336,638 (2 semesters + $15,000 instrument development funds for Langhorst)
Description: This proposal was based on my previous work on low-cost, do-it-yourself turbidity sensors These sensors allowed us to continuously monitor sediment loads under ice without risking expensive commercial devices and allowed students to build their own sensors. My work on this project was detailed in the Langhorst et al. (2023) publication in *Nature Water*.

Pending Proposals

Title: Characterizing global river-to-lake connectivity using SWOT elevation and inundation data
Funding Agency: NASA
Role: PI
Duration: Fall 2024 - Fall 2028
Submitted: 12/15/2023
Amount: $1,033,543
Description: This proposal was submitted to the NASA Surface Water and Ocean Topography (SWOT) Science Team solicitation. Our goals are to use elevation and inundation data to define the global phenology of river floodplain connectivity on a monthly timescale. I collaborated with three Co-Is to build project expertise in remote sensing of fluvial geomorphology, floodplain biogeochemistry, field methods, and data assimilation.