Abigail L. Langston

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Education

Ph.D. Geological Sciences, University of Colorado, 2014

M.S. Geological Sciences, University of Florida, 2009

B.S. Environmental Management, University of Maryland, 2006

Research Interests

Quantitative geomorphology, landscape evolution modeling, formation of wide bedrock valleys, landscape response to climate change, evolution of river channel form and drainage networks

Experience

Kansas State University, Department of Geography and Geospatial Sciences
Assistant Professor, August 2019 – present
Research Assistant Professor, August 2016 – August 2019

Wageningen University, Soil Geography and Landscape Group
Visiting Scientist, September 2015 – December 2015

Publications

(* *indicates student author advised by A. Langston*)

Langston, A.L., Neudorf, C.M., *Marcotte, A.L., Rodrigues, K., Keen-Zebert, A. 2024. Interpreting depositional environments from modern floodplain sediments using optically stimulated luminescence. *Boreas*. In review.

*Groeber, O.H., Langston, A.L. 2024. The role of talus pile mobility in valley widening processes and the development of wide bedrock valleys, Buffalo River, AR. *Journal of Geophysical Research - Earth Surface*. Accepted.

*Ding, M., Wang, J., Song, C., Sheng,Y., Hutchinson, J.M.S., Langston, A.L., Marston, L. 2024. A framework of freshwater and saline lake typology classification through leveraging hydroclimate, spectral, and literature evidence. *Journal of Hydrology*, DOI: 10.1016/j.jhydrol.2024.130704.

Langston A.L., *Robertson C.H. 2023. Wide bedrock valley development and sensitivity to environmental perturbations: Insights from flume experiments in erodible bedrock. *Earth Surface Processes and Landforms*: p. 1–18. DOI: 10.1002/esp.5680

Rodrigues K., Keen-Zebert A., Shepherd S., Hudson M.R., Bitting C.J., Johnson B.G., Langston A.L. 2023. The role of lithology and climate on bedrock river incision and terrace development along the Buffalo National River, Arkansas. *Quaternary Research* 32: p. 179–193. DOI: 10.1017/qua.2023.16

*Marcotte, A.L., Neudorf, C.M., Langston, A.L., 2021. Lateral bedrock erosion and valley formation in a heterogeneously layered landscape, Northeast Kansas. *Earth Surface Processes and Landforms*, v. 46, 11, p. 2248-2263. DOI: 10.1002/esp.5172

Kwang, Jeffrey, Langston, A.L., Parker, Gary, 2021. The role of lateral erosion in the evolution of non-dendritic drainage networks to dendricity and the persistence of dynamic networks.*Proceedings of the National Academy of Sciences*, v. 118, 16, p. 1-6. DOI: 10.1073/pnas.2015770118

Langston, A.L., Temme, A.J.A.M, 2019. Impacts of lithologically-controlled erosion mechanisms on downstream bedrock valley widening. *Geophysical Research Letters*, 46, p. 12,056-12,064. DOI: 10.1029/2019GL085164

Langston, A.L., Temme, A.J.A.M, 2018. Bedrock erosion and changes in bed sediment lithology in response to an extreme flood event: The 2013 Colorado Front Range flood. *Geomorphology*, v. 328, p. 1-14. DOI: 10.1016/j.geomorph.2018.11.015

Langston, A.L., Tucker, G.E., 2018. Developing and exploring a theory for the lateral erosion of bedrock channels for use in landscape evolution models. *Earth Surface Dynamics*, v. 6, p. 1-27. DOI: 10.5194/esurf-6-1-2018

Langston, A.L., Tucker, G.E., Anderson, R.S., 2015. Interpreting climate-modulated processes of terrace development along the Colorado Front Range using a landscape evolution model. *Journal of Geophysical Research-Earth Surface*, v. 120(10), p. 2121-2138. DOI:10.1002/2014JF003403.

Menting, F., Langston, A.L., Temme, A.J.A.M., 2015. Downstream fining, selective transport, and hillslope influence on channel bed sediment in mountain streams, Colorado Front Range, USA. *Geomorphology*, v. 239, p. 91-105. DOI: 10.1016/j.geomorph.2015.03.018

Langston, A.L., Tucker, G.E., Anderson, R.S., Anderson, S.P. 2015. Evidence for climatic and hillslope-aspect controls on vadose zone hydrology and implications for saprolite weathering. *Earth Surface Processes and Landforms*, v. 40, p. 1254-1269. DOI: 10.1002/esp.3718

Langston, A.L., 2014. The torrential and the mundane: Climate controls on hillslope weathering, channel bed material, and landscape evolution in the Colorado Front Range. Ph.D. Dissertation, University of Colorado.

Anderson, S.P., Hinckley, E., Kelly, P., Langston, A.L.. 2014. Variation in critical zone processes and architecture across slope aspects. *Procedia Earth and Planetary Science*, v. 10, p. 28-33.

Langston, A.L., Screaton, E.J., Martin, J.B., Bailly-Comte, V., 2012. Interactions of diffuse and focused allogenic recharge in an eogenetic karst aquifer (Florida, USA). *Hydrogeology Journal*, v. 20, p. 767-781. DOI: 10.1007/s10040-012-0845-3

Langston, A.L., Tucker, G.E., Anderson, R.S., Anderson, S.P., 2011. Exploring links between vadose zone hydrology and chemical weathering in the Boulder Creek Critical Zone Observatory. *Applied Geochemistry*, v. 26, p. S70-S71. DOI: 10.1016/j.apgeochem.2011.03.033

Bailly-Comte, V., Martin, J.B., Jourde, H., Screaton, E.J., Pistre, S., Langston, A.L., 2010. Water exchange and pressure transfer between conduits and matrix and their influence on hydrodynamics of two karst aquifers with sinking streams. *Journal of Hydrology*, v. 386, p. 55-66. DOI: 10.1016/j.jhydrol.2010.03.005

Langston, A.L., 2009. The relationship between specific conductivity and flow paths in a karst aquifer, north-central Florida. M.S. Thesis, University of Florida.

Funding, Awards, and Fellowships

External Funding

Collaborative Research: Beyond lithologic control of bedrock valley width: Investigating the role of persistent valley cover in bedrock valley width development, Buffalo River, AR. A.L. Langston as PI. National Science Foundation, Geomorphology and Land-use Dynamics Program. Award EAR-2051559. Award Period: 8/1/2021 - 7/31/2025. Total Award Amount: $412,813; Award to KSU: $252,940

LTER: Long-Term Research on Grassland Dynamics - Assessing Mechanisms of Sensitivity and resilience to Global Change. A.L. Langston as collaborator. National Science Foundation, Division of Environmental Biology, Award #1440484. Award Period: 11/1/2020 - 10/31/2026. Total Award Amount: $7,122,000

RII Track-4: Using Novel Applications of Luminescence Techniques to Evaluate Channel Mobility and Bedrock Valley Development. A.L. Langston as sole PI. National Science Foundation, EPSCoR RII Track-4, Award OIA-1833025. Total Award Period: 10/1/2019 - 09/30/2022. Total Award Amount: $197,599

Awards and Fellowships

Wildcat Hackathon: Innovative Solutions for Sustainable Water Use in Kansas. 2024. A.L. Langston as co-PI. Funded by Kansas Water Institute (KWI) and Testing Ag Performance Solutions (TAPS) program, value $19,000

Determining absolute ages of erosion-inhibiting talus piles in wide and narrow bedrock valleys: Quantifying conceptual frameworks of bedrock valley development. 2021. A.L. Langston as sole PI. Funded by University Small Research Grant, Kansas State University Office of Research Development, value $4,500

Spring 2020: KAWSE Advance Distinguished Lecture Series. value $1200

Spring 2017: Kansas State University, Alternative Textbook Initiative Award: $3000

Fall 2015: Wageningen University, Visiting Scientist Grant: €4400

Fall 2014: University of Colorado, Department of Geological Sciences Dissertation Completion Fellowship: $6600

Summer 2012: NSF-SoilTrec International Travel Award for reactive transport modeling workshop Chania, Greece: $2200

Summer 2011: NSF Critical Zone Observatory-SAVI International Scholars Program Fellowship: $5200

Conference Presentations

Oral Presentations

(** *indicates invited presentation*)

Langston, A.L. 2024. Dynamic hydrology of a karst river and implications for channel and valley morphology. American Association of Geographers Annual Meeting, Honolulu, Hawaii.

Langston, A.L. 2023. Discharge variability in a karst river and the effects on rates of sediment transport and bedrock erosion. American Association of Geographers Annual Meeting, Denver, CO.

Langston, A.L. 2023. Investigating the role of mobile vs. persistent talus piles on bedrock valley width using field data and numerical modeling. Chilean Geological Congress, Santiago, Chile.

Neudorf, C.M., Wriston, T., Langston, A.L., *Robertson, C.H., Jenkins, G.T.H., Keen-Zebert, A., 2022. The dating potential of rocks from lake and river depositional environments: Preliminary results from Coal Valley, NV and Buffalo National River, AR. New World Luminescence Dating Workshop, Palisade, CO.

**Langston, A.L., October 21, 2021. "Beyond lithologic control of bedrock valley width: Characterizing the role of persistent valley cover in bedrock valley width development with examples from the field and the flume". Landscapes Live weekly seminar series, affiliated with the Geomorphology (GM) division of the European Geophysical Union (EGU). https://www.landscapeslive.org/home

Langston, A.L., Temme, A.J.A.M., 2019. Evaluating lithologically-controlled mechanisms of downstream bedrock valley widening with topographic data and numerical models. American Geophysical Union Fall Meeting, San Francisco, CA.

Kwang, J.S., Langston, A.L., Parker, G., 2019. Steady state behavior and initial condition signal shredding in landscape evolution models incorporating lateral incision. American Geophysical Union Fall Meeting, San Francisco, CA.

Langston, A.L., Tucker, G.E., Anderson, R.S., 2013. Interpreting climate-modulated processes of terrace development along the Colorado Front Range using a landscape evolution model. Geological Society of America Fall Meeting, Denver, CO.

Langston, A.L., Tucker, G.E., Anderson, R.S., 2013. Using landscape evolution models to interpret climatic drivers of cyclic aggradation and incision along the fringes of a decaying mountain range. Eighth International Conference on Geomorphology, International Association of Geomorphologists, Paris, France.

Langston, A.L., Tucker, G.E., Anderson, R.S., Anderson, S.P., 2012. Moving water through the critical zone: Linking observations and models of vadose zone dynamics and chemical weathering. Colorado State University, Hydrology Days, Fort Collins, CO.

Poster Presentations

(* *indicates student author*)

*McClellan, J.S., Langston, A.L. 2024. Fluctuating Flames: Illuminating Fire Patterns through Charcoal Stream Sediment. American Association of Geographers Annual Meeting, Honolulu, Hawaii. (*winner of the Undergraduate Student Poster Award, Geomorphology Specialty Group*)

*Chakravarty, M., Spencer, J.E.Q., Langston, A.L. 2024. Illuminating the Past: OSL Dating Unveils Kings Creek's Dynamic Evolution and Human Impact. American Association of Geographers Annual Meeting, Honolulu, Hawaii.

Langston, A.L., *Robertson, C.H., *Groeber, O.H. 2023. What controls valley width? Exploring the relationship between valley morphology and valley widening rates using field data and numerical modeling. American Geophysical Union Annual Meeting, San Francisco.

*Chakravarty, M., Langston, A.L. 2023. Geomorphic Changes and Timescales of Incisional and Aggradational Periods in Kings Creek, Northeast Kansas. American Geophysical Union Annual Meeting, San Francisco.

*Robertson, C.H., Langston, A.L., 2023. Valley Widening in an Experimental Bedrock River: Using Flume Experiments to Explore Valley Widening Rates Under Changing Boundary Conditions. American Geophysical Union Annual Meeting, San Francisco.

*Hon, K., Marshall, J.A., Langston, A.L., *Groeber, O.H., 2023. Rock Wall Fracture Density as a Potential Control on River Valley Width in the Buffalo River National River, Arkansas. American Geophysical Union Annual Meeting, San Francisco.

*Chakravarty, M., Langston, A.L. 2023. Geomorphic Changes and Timescales of Incisional and Aggradational Periods in Kings Creek, Northeast Kansas. American Association of Geographers GPRM Regional Meeting, Sioux Falls, SD. (*member GPRM Geobowl team 2024 National AAG meeting*)

Langston, A.L., 2022. Modeling the development of wide bedrock valleys as a function of collapsed bedrock block size, bed sediment, and discharge variability. CSDMS Annual Meeting, Boulder, CO.

*Robertson, C.H., Neudorf, C.M., Langston, A.L., 2022. The Role of Talus Piles on the Genesis of Wide Bedrock Valleys: Using Optically Stimulated Luminescence to Estimate the Residence Times of Talus Blocks in Wide and Narrow Bedrock Valleys. American Geophysical Union Annual Meeting, Chicago, IL.

Langston, A.L., *Robertson, C. H., 2021. Exploring the necessary and sufficient conditions for wide bedrock valley development: insights from flume experiments in an erodible bedrock substrate. American Geophysical Union Fall Meeting, New Orleans, LA.

*Robertson, Clay H., Langston, A.L., *Groeber, Olivia, 2021. Timescales of Bedrock Valley Widening: Using Optically Stimulated Luminescence and Field Measurements to Explore the Roles of Talus Pile Age, Talus Volume, and Valley Wall Height on the Genesis of Wide Bedrock Valleys. American Geophysical Union Fall Meeting, New Orleans, LA.

*Groeber, Olivia, Langston, A.L., 2021. Talus Block Characterization of Wide and Narrow Bedrock Valleys and the Implications of the Frequency of Talus Block Transport on Bedrock Valley Widening, Buffalo River, AR. American Geophysical Union Fall Meeting, New Orleans, LA.

*Robertson, Clay H., Langston, A.L., *Groeber, Olivia, 2021. Timescales of Bedrock Valley Widening: The Roles of Talus Pile Age, Talus Volume, and Valley Wall Height on the Genesis of Wide Bedrock Valleys. American

Association of Geographers-GPRM Regional Meeting, Lincoln, NE. (first prize for best graduate student poster)

Langston, A.L., *Marcotte, A.L., *Basilotta, J., 2021. Uncovering the modern and Holocene record of geomorphic change on Kings Creek, Konza Prairie. Konza Prairie LTER Annual Meeting, Manhattan, KS.

*Marcotte, Abbey, Langston, A.L., Keen-Zebert, A., 2019. Investigating rates and mechanisms of lateral erosion in a small bedrock river using erosion pins, structure-from-motion photogrammetry, and luminescence dating. American Geophysical Union Fall Meeting, San Francisco, CA.

Langston, A.L., Keen-Zebert, A., *Marcotte, A.L., 2019. Shining light on novel applications of luminescence techniques to interpret geomorphic processes. 26th NSF EPSCoR National Conference, Columbia, SC.

*Marcotte, Abbey, Langston, A.L., 2018. Using Structure-from-Motion Photogrammetry and Erosion Pins to Quantify Controls on Bedrock Erosion and Sediment Transport in a Heterogeneously Layered Landscape, Flint Hills, KS. American Association of Geographers-GPRM Regional Meeting, Manhattan, KS. *(first prize for best graduate student poster)*

*Gonzalez, Ricardo, Langston, A.L., 2018. Quantifying the Effects of Sediment Flux and Water Discharge on Lateral Bedrock Erosion using Flume Experiments. American Association of Geographers-GPRM Regional Meeting, Manhattan, KS. *(second prize for best undergraduate poster)*

Langston, A.L., Tucker, G.E., 2017. Working towards interpreting strath terraces as records of climate change: Evaluating a model of lateral bedrock erosion. American Geophysical Union Fall Meeting,, New Orleans, LA.

Temme, A.J.A.M., Langston, A.L., 2017. Emancipating traditional channel network types: quantification of topology and geometry, and relation to geologic boundary conditions. American Geophysical Union Fall Meeting, New Orleans, LA.

Langston, A.L., Tucker, G.E., 2017. Downstream sweep erosion as a mechanism for bedrock valley widening: comparison between model simulations and field examples. Community Surface Dynamics Modeling System Annual Meeting (CSDMS), Boulder, CO.

Langston, A.L., Tucker, G.E., 2016. Developing and evaluating a theory for lateral erosion by bedrock channels in a landscape evolution model. American Geophysical Union Fall Meeting, San Francisco, CA.

Temme, A.J.A.M., Langston, A.L., Reimann, T., Vanwalleghem, T., Sanchez, A.R., 2015. Out of the dark - inverse modelling to make sense of luminescence properties of soils. EGU Spring Meeting, Vienna, Austria.

Langston, A.L., Tucker, G.E., Hobley, D.E.J., 2014. Developing and evaluating algorithms for lateral erosion of bedrock channels in landscape evolution models. CSDMS Annual Meeting, Boulder, CO.

Langston, A.L., Tucker, G.E., Anderson, R.S., Foster, M.A., Anderson, S.P., 2012. Interpreting climate-driven aggradation and incision along the fringes of a decaying mountain range. American Geophysical Union Fall Meeting,, San Francisco, CA.

Langston, A.L., Tucker, G.E., Anderson, R.S., Anderson, S.P., 2011. Turning rock into saprolite: Linking observations and models of vadose zone dynamics and chemical weathering. American Geophysical Union Fall Meeting, San Francisco, CA.

Langston, A.L., Tucker, G.E., Anderson, R.S., Anderson, S.P., 2011. Exploring fracture dominated flow and spatially variable chemical weathering in the Boulder Creek Critical Zone Observatory, Colorado, USA. Goldschmidt Conference, Prague, Czech Republic.

Langston, A.L., Tucker, G.E., Anderson, R.S., Anderson, S.P., 2010. Exploring subsurface flow paths as a precursor to understanding the spatial pattern of weathering in a rocky landscape. American Geophysical Union Fall Meeting, San Francisco, CA.

Langston, A.L., Screaton, E.J., Martin, J.B., 2009. Matrix heterogeneity in an eogenetic karst aquifer and implications for preferential flow paths. GSA Fall Meeting, Portland, OR.

Langston, A.L., Screaton, E.J., Martin, J.B., Moore, P.J., 2008. Effect of Recharge Events and Repeated Well Sampling on Monitoring Well Specific Conductivity in An Unconfined Karst Aquifer near a Sinking Stream. GSA Fall Meeting, Houston, TX.

Langston, A.L., Screaton, E.J., Martin, J.B., Ritorto, M.J., 2007. Using slug tests to characterize hydraulic conductivity in a karstic sink-rise system. GSA Fall Meeting, Denver, CO.

Teaching and Advising

Courses Taught

Modeling Landscapes (GEOG 850)

Fluvial Geomorphology (GEOG 740)

Research and Professional Development (GEOG 821)

Spatial Analysis of Surface Water Hydrology (GEOG 440)

Introduction to Physical Geography - Earth System Science (GEOG 121)

Undergraduate Research in Geography (GEOG 497)

NRES Capstone Course (BAE/DAS/GENAG 582)

Student Advising

Current Students

Clay Robertson, Ph.D. student. Anticipated graduation Spring 2025.

Moupyali Chakravarty, Ph.D. student. Anticipated graduation Spring 2026.

Meng Ding, Ph.D. student. Anticipated graduation Spring 2025.

Jessie McClellan, undergraduate research assistant. Anticipated graduation Spring 2024.

Former Students

Olivia Groeber, Masters student. Graduated Spring 2022. Thesis title: " The role of talus size distribution and the frequency of transport in wide and narrow valleys on bedrock valley widening: Buffalo National River, Arkansas"

Abbey Marcotte, Masters student. Graduated Spring 2020. Thesis title: " Investigating rates and mechanisms of lateral erosion in a small bedrock river using erosion pins, structure-from-motion photogrammetry, and optically stimulated luminescence dating: Konza Prairie, northeast Kansas"

Jeffrey Basilotta, undergraduate research project May 2021 - August 2021: "Uncovering the modern and Holocene record of geomorphic change on Kings Creek, Konza Prairie"

Ricardo Gonzalez, awarded Kale Undergraduate Fellowship May 2018 - August 2018: "Quantifying the Effects of Sediment Flux and Water Discharge on Lateral Bedrock Erosion with Flume Experiments"

Service and Mentoring

Community Service

2020 - present, spring and fall semesters : Workshop Leader for KAWSE Girls Researching Our World (GROW) Saturday program

Internal Service

January 2023 - present: Director of the Marston Earth System Science (MESS) Laboratory, Department of Geography and Geospatial Sciences, Kansas State University

June 2024 - present: Member of the Environmental Science Advisory Board, Kansas State University

June 2019 - present: Member of the Board of Directors for Natural Resources and Environmental Sciences (NRES) secondary major, Kansas State University

January 2018 - present: Member of the Geography and Geospatial Sciences Department graduate admissions committee