Jeffrey S. Kwang (He/Him/His)

Contact Information

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Education

University of Illinois Urbana-Champaign, Urbana, Illinois USA
Ph.D., Civil Engineering, 2019
Dissertation Title: *Overcoming Unrealistic Behavior of Landscape Evolution Models Attributed to the Stream Power Incision Model: Scale Invariance and Ultra-sensitivity to Initial Conditions*

University of Illinois Urbana-Champaign, Urbana, Illinois USA
M.S., Civil Engineering, 2016
Thesis Title: *Effects of Differential Rainfall on the Dynamics of Landscape Evolution*

Johns Hopkins University, Baltimore, Maryland USA
B.S., Environmental Engineering, 2013

Professional Appointments

University of Massachusetts Amherst, Amherst, Massachusetts USA
Postdoctoral Associate, Department of Geosciences, (August 2019 to present)
- Develop numerical model to simulate soil organic carbon redistribution
- Forecast future soil loss in the United States Cornbelt

University of Minnesota, Minneapolis, Minnesota USA
Undergraduate Researcher, Saint Anthony Falls Laboratory, (Summer 2012)
- Flume studies on the role of large woody debris in riverine sediment transport

Awards and Fellowships

- **National Science Foundation Earth Sciences Postdoctoral Fellow**, (2022-2024)
- **National Science Foundation Graduate Research Fellow**, (2015 - 2019)
- **Ben Yen Fellow**, University of Illinois Urbana-Champaign, (2013 - 2014)
- **Lucien Brush Award for Excellence in Environmental Engineering**, Johns Hopkins University, (2013)

Papers

Yan, Q., Wainwright, H., Dafflon, B., Uhlemann, S., Steefel, C. I., Falco, N., **Kwang, J. S.**, & Hubbard, S. S. A hybrid data–model approach to map soil thickness in mountain hillslopes. Earth Surface Dynamics 9, 1347-1361 (2021).

Kwang, J. S., Langston, A. L. & Parker, G. 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 of the United States of America 118, e2015770118 (2021).

Zhang, L., Li, T., Wang, G., **Kwang, J. S.**, Nittrouer, J. A., Fu, X. & Parker, G. How canyons evolve by incision into bedrock: Rainbow Canyon, Death Valley National Park, United States. Proceedings of the National Academy of Sciences of the United States of America 117, 14730–14737 (2020).

Kwang, J. S. & Parker, G. Extreme Memory of Initial Conditions in Numerical Landscape Evolution Models. Geophysical Research Letters 46, 6563–6573 (2019).

Zhang, L., Stark, S., Schumer, R., **Kwang, J. S.**, Li, T., Fu, X., Wang, G. & Parker, G. The Advective-Diffusive Morphodynamics of Mixed Bedrock-Alluvial Rivers Subjected to Spatiotemporally Varying Sediment Supply. Journal of Geophysical Research: Earth Surface 123, 1731–1755 (2018).

Kwang, J. S. & Parker, G. Landscape evolution models using the stream power incision model show unrealistic behavior when m/n equals 0.5. Earth Surface Dynamics 5, 807–820 (2017).

Papers in Revision

Kwang, J. S., Thaler, E. A., Quirk, B. J., Quarrier, C. L. & Larsen, I. J. A landscape evolution modeling approach for predicting three-dimensional soil organic carbon redistribution in agricultural landscapes. Journal of Geophysical Research: Biogeosciences.

Thaler, E. A.*, **Kwang, J. S.***, Quirk, B. J., Quarrier, C. L. & Larsen, I. J. Rates of historical anthropogenic soil erosion in the Midwestern United States. Earth's Future. *Equal Author Contributions

Papers in Preparation

Kwang, J. S., Thaler, E. A. & Larsen, I. J. Forecasting soil loss across the US Corn Belt.

Theses

Kwang, J. S. Overcoming Unrealistic Behavior of Landscape Evolution Models Attributed to the Stream Power Incision Model: Scale Invariance and Ultra-sensitivity to Initial Conditions. Ph.D. Dissertation, University of Illinois at Urbana-Champaign, Urbana, Illinois USA (2019).

Kwang, J. S. Effects of Differential Rainfall on the Dynamics of Landscape Evolution. M.S. Thesis, University of Illinois at Urbana-Champaign, Urbana, Illinois USA (2016).

Conference Proceedings

Gasparini, N. M., Roth, D. L., Madoff, R., Mukherjee U., Callahan, R. P., Mahon, R., Sklar, L. S., Gagliardi, J., Lehnigk, K., Luna, L., Merritts, D., **Kwang, J. S.**, Del Vecchio, J., Sun, X., Koppes, M. N., McDowell, C., Straub, K. M. & Hassenruck-Gudipati, H. J. Lessons learned from the AGU EPSP URGE pod on how to structure an equitable, inclusive, and safe committee space. American Geophysical Union Fall Meeting (2021). *Poster Presentation*

Kwang, J. S., Thaler, E. A. & Larsen, I. J. Forecasting soil loss across the US Corn Belt. American Geophysical Union Fall Meeting (2021). *Poster Presentation*

Quarrier, C. L., Larsen, I. J., Quirk, B. J., Thaler, E. A. & **Kwang, J. K**. Quantifying Natural Soil Erosion Rates in Agricultural Landscapes of the Midwestern U.S. to Promote Sustainable Soil Management. American Geophysical Union Fall Meeting (2021). *Poster Presentation*

Kwang, J. S., Thaler, E. A. & Larsen, I. J. Predicting anthropogenic soil organic carbon redistribution in the Midwestern United States. American Geophysical Union Fall Meeting (2020). *Poster Presentation*

Quirk B. J., David S. R., Thaler, E. A., **Kwang, J. S.** & Larsen, I. J. Using cosmogenic ^{10}Be in detrital quartz to quantify erosion rates in the Des Moines Lobe region of Iowa. American Geophysical Union Fall Meeting (2020). *Poster Presentation*

Thaler, E. A, **Kwang, J. S.** & Larsen, I. J. Quantifying the magnitude of historical anthropogenic soil loss in the Midwestern United States. American Geophysical Union Fall Meeting (2020). *Poster Presentation*

Kwang, J. S., Langston, A. L. & Parker, G. Steady state behavior and initial condition signal shredding in landscape evolution models incorporating lateral incision. American Geophysical Union Fall Meeting (2019). *Oral Presentation*

Kwang, J. S. & Parker, G. Ultra-sensitivity of numerical landscape evolution models to their initial conditions. American Geophysical Union Fall Meeting (2018). *Poster Presentation*

Kwang, J. S. & Parker, G. Do Landscapes have good memories? Community Surface Dynamics Modeling System, Coupling of Tectonic and Surface Processes Workshop (2018).

Kwang, J. S. & Parker, G. Interactions between landslides and landscape evolution using a sediment flux-dependent bedrock incision model incorporating bed macro-roughness. American Geophysical Union Fall Meeting (2017). *Oral Presentation*

Kwang, J. S. & Parker, G. Landscape evolution using a sediment flux-dependent bedrock incision model incorporating bedrock macro-roughness. American Geophysical Union Fall Meeting (2016). *Poster Presentation*

Kwang, J. S. & Parker, G. Scale Invariance in Landscape Evolution Models. American Geophysical Union Fall Meeting (2014). *Poster Presentation*

Kwang, J. S. Effects of spacing between engineered log jams on flow, scour, and depositional patterns, Geological Society of America (2012). *Poster Presentation*

Presentations

Kwang, J. S. Modeling landscape evolution from small to big spatiotemporal scales: bedrock mountains and agricultural fields. Professional Seminar. University of Massachusetts Amherst, Amherst, Massachusetts USA (2021).

Kwang, J. S. Ultra-sensitivity of Numerical Landscape Evolution Models to their Initial Conditions. Ven Te Chow Hydrosystems Seminar. University of Illinois at Urbana-Champaign, Urbana, Illinois USA (2018).

Kwang, J. S. Dynamic River Networks in Landscape Evolution Models. Ven Te Chow Hydrosystems Seminar. University of Illinois at Urbana-Champaign, Urbana, Illinois USA (2016).

Teching Experience

Introduction to Computation and Mathematical Modeling
Teaching Assistant, Johns Hopkins University (Spring 2013)
Environmental Fluid Mechanics
Teaching Assistant, University of Illinois at Urbana-Champaign (Fall 2017)
River Morphodynamics
Teaching Assistant, University of Illinois at Urbana-Champaign (Spring 2019)

Technical Skills and Training

Numerical Modeling Development
River Morphodynamics, Landscape Evolution, Soil Dynamics, Sediment Transport
Software and Coding
Python, MATLAB, R, ArcGIS, LaTeX, HEC-RAS, Microsoft Office, FORTRAN, Linux, HTML, JavaScript, ffmpeg
Laboratory
Sediment transport flume experiments, spectroscopy, sediment grain size analysis, laser scanning
Field Geology
Soil coring, field surveying, RTK-GPS, stream-cross sections and profiles, sediment sampling, total station
Bystander Intervention Training
Workshop held by the American Geophysical Union, Hydrology Section Student Subcommittee

Service

- Pod Member, Unlearing Racism in Geoscience (URGE), American Geophysical Union, Earth and Planetary Surface Processes, (2021)
- Workshop Presenter, Eureka! at the University of Massachusetts Amherst, (2020 - 2021)
- Big Brother, Big Brothers Big Sisters of America of Central Illinois, (2014 - 2019)
- Exhibitor, Engineering Open House at University of Illinois Urbana-Champaign, (2014 - 2019)

Memberships

- American Geophysical Union
- Tau Beta Pi
- Geological Society of America
- Community Surface Dynamics Modeling System
- Geo-Hydro Discussion Group - article featured in AGU connect

Manuscript Reviewer

Earth Surface Dynamics, Geology, Geophysical Research Letters, Geoscientific Model Development, Journal of Geophysical Research: Earth Surface, Water Resources Research