

## MATTHEW D. COVINGTON

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### **Education:**

**Ph.D. (2008) Physics**, University of California, Santa Cruz

Dissertation: *The production and evolution of scaling laws via galaxy merging*

Advisor: Professor Joel Primack, Distinguished Professor of Physics

**B.S. (2002) Physics**, University of Arkansas, Fayetteville, *Summa Cum Laude*

Honors thesis: *The Trebuchet: Physics, numerics, and connections to millennia of human activity*

Advisor: Professor William Harter

**B.A. (2002) Philosophy**, University of Arkansas, Fayetteville, *Summa Cum Laude*

Honors thesis: *Quantum mechanics and libertarian free will*

Advisor: Associate Professor Thomas Senior

### **Appointments:**

**Associate Professor (2018-present)**, Department of Geosciences, University of Arkansas, Fayetteville (teaching – 40%, research – 40%, service – 20%)

**Assistant Professor (2012-2018)**, Department of Geosciences, University of Arkansas, Fayetteville (teaching – 40%, research – 40%, service – 20%)

**NSF International Research Fellow (2010-2012)**, Karst Research Institute, ZRC SAZU, Postojna, Slovenia. Mentor: Dr. Franci Gabrovšek

**NSF Earth Sciences Postdoctoral Fellow (2008-2009)**, Department of Earth Sciences, University of Minnesota, Twin Cities. Mentors: Professor Carol Wicks and Professor Martin Saar, Gibson Chair of Hydrogeology and Geofluids

### **Research Interests:**

My research employs analytical mathematical models, numerical simulations, and field data in the study of hydrological and geomorphological processes near earth's surface, with a focus on karst hydrological systems. Current and recent projects explore:

- reactive transport, heat exchange, and hydraulics in karst conduits and their importance in the determination of spring signals
- the evolution and dynamics of subglacial hydrological systems
- incision processes in soluble bedrock channels and the relative importance of mechanical and chemical erosion
- CO<sub>2</sub> dynamics in karst systems
- landscape evolution in tectonically passive settings

### **Awards and Fellowships:**

Sigma Gamma Epsilon Teacher of the Year (2014)  
NSF International Research Fellowship (2010 – 2012)  
NSF Earth Sciences Postdoctoral Fellowship (2008 – 2009)  
National Speleological Society Cave Diving Section Exploration Award (2009)  
(awarded to U.S. Deep Caving Team for exploration in Cueva J2)  
University of California Santa Cruz Physics Department Dissertation Year  
Fellowship (2008)  
Lawrence Livermore National Lab-Institute for Geophysics and Planetary Physics  
Graduate Fellowship (2006 – 2007)  
NSF Graduate Research Fellowship (2002 – 2005)  
University of Arkansas's 2002 Phi Beta Kappa Distinguished Scholar

### **Research Funding (Total - \$1,211,097):**

*Collaborative Research: Understanding GrIS moulin hydrology and links to ice motion*

PIs: Jason Gulley (USF), Matthew Covington (UA)  
Funding agency: National Science Foundation, Office of Polar Programs  
Amount: \$691,150 (Total), \$262,037 (UA)  
Duration: 1/2017 – 12/2019

*Comparative microbial community dynamics in a karst aquifer system and proximal  
surface stream in Northwest Arkansas*

PI: Matthew Covington  
Co-PI: Kristen Gibson  
Funding agency: USGS 104b State Water Resources Institute Program  
Amount: \$22,931  
Duration: 3/2016 – 2/2017

*Instrumentation for Long Term Hydrogeochemical and Climatological Monitoring in the  
Omega Cave System, Wise County, Virginia*

PI: Benjamin Schwartz  
Co-PI: Matthew Covington  
Funding Agency: Cave Conservancy of the Virginias  
Amount: \$9397 (one-time for purchase of equipment)  
Date awarded: May 2013

*Modeling the influence of sediment, climate, and tectonics on the incision of bedrock  
channels through highly soluble strata*

PI: Matthew Covington  
Funding agency: National Science Foundation, Division of Earth Sciences,  
Geomorphology and Land Use Dynamics Program  
Amount: \$262,795  
Duration: 10/15/2012 – 9/31/2016

*Variable flow and sediment transport in speleogenetic models (OISE-0754495)*

PI: Matthew Covington  
Host: Franci Gabrovšek  
Funding agency: National Science Foundation, Office of International Science and Engineering  
Amount: \$144,824  
Duration: 9/1/2010 – 8/31/2012

*Modeling the effects of variable recharge and conduit geometry on flow through karstic aquifers (EAR-0816472)*

PI: Matthew Covington  
Hosts: Carol Wicks and Martin Saar  
Funding agency: National Science Foundation, Division of Earth Sciences  
Amount: \$80,000  
Duration: 11/1/2008 – 10/31/2009

**Teaching**

Courses taught

(\* - course developed)

Undergraduate

GEOS 4873 – Geological Data Analysis\* (2013-2019)  
GEOS 4153 – Karst Hydrogeology (2013, 2014, 2016, 2019)  
GEOS 4686 – Geology Field Camp (2013, 2014, 2015, 2017, 2018)  
GEOS 436V – Spring Break Field Trip (2016)  
GEOS 410V – Tanzania study abroad: Ecology, evolution, and geology of East Africa\* (2016)

Graduate

GEOL 560V 004 – Research in Geomorphological Processes\* (2014)  
GEOL 560V 004 – Research in Hydrological Processes\* (2015)  
GEOS 560V 014 – Mathematical modeling of geological processes\* (2015, 2017)  
GEOS 510V 002 – Glacial Hydrology\* (2018)

Postdoctoral Researchers

Matija Perne (2013-2015)  
Joseph Myre (2013-2015), NSF Earth Sciences Postdoc Fellow

Phd Students supervised

Max Cooper (2014-2018). Speleogenesis in turbulent flow.  
Celia Trunz (2017-present)  
Katarina Kosič (2014-2015, visiting student)

MS Students supervised

Kiefer Vaughn (2012-2015). Controls on dissolution rate variation at a pair of underflow-overflow springs at the Savoy Experimental Watershed.  
Evan Thaler (2013-2015). Lithologic controls on bedrock channel morphology in the Buffalo River Basin.

Ginny Holcomb (2014-2016). Temporal CO<sub>2</sub> variations and the influence of bat colonies in speleogenesis: Continuous CO<sub>2</sub> monitoring in War Eagle Caverns, Arkansas.  
Holly Young (2015-2018). Quantifying Carbon Dioxide Fluxes in the Air and Water in Blowing Springs Cave  
Josue Rodriguez (2015-2018). Comparative Microbial Community Dynamics in a Karst Aquifer System and Proximal Surface Stream in NW Arkansas.  
Alex Breeding (2016-present)  
Emily Fletcher (2017-present)

Undergraduate researchers

Sarah Williams (2015-2018)  
Hannah Gnoza (2015-2017)  
Brandon Conlon (2017-present)  
David O’Hearn (2017)  
Spencer Wilbur (2017-present)  
Abigail Rhodes (2018-present)

**Service and Synergistic Activities:**

Professional affiliations:

American Geophysical Union  
European Geosciences Union  
Geological Society of America  
National Speleological Society

Departmental Service

Personnel committee (2016-2017)  
Faculty search committee – chair (2016-2017)  
Faculty search committee (2014-2015)  
Faculty search committee (2013-2014)  
Faculty search committee (2018-2019)  
Geosciences PhD admission (2014-present)  
Geology TA selection (2014-2016, 2017-2018)  
Geology Curriculum (2017-present)

Reviewer:

National Science Foundation (23), Water Resources Research (7), Acta Carsologica (5), Hydrology and Earth System Sciences (3), Advances in Water Resources (2) Hydrogeology Journal (2), Journal of Hydrology (5), Journal of Cave and Karst Studies (3), Geophysical Research Letters (3), J. Geophysical Research – Earth Surface (1), Geology (1), Chemical Geology (1), Earth Surface Processes and Landforms (2), Hydrological Processes (1), International Journal of Speleology (1), Theoretical and Applied Climatology (1), Geophysical and Astrophysical Fluid Dynamics (1), G-cubed (1), USGS (1).  
Dept. of Energy (1). **Total: 65**

### Educational Outreach:

- Developed presentations on cave science and exploration given to a number of elementary school, middle school, high school, and college students
- Gave public talks combining stories of cave exploration, science, and a message about the importance of cave and karst aquifer conservation
- Presented a public lecture on a scientific expedition to study glacier caves in Svalbard
- Led a cave field trip for University of Arkansas Outdoor Recreation Program

### Media coverage of my research and cave exploration

The New Yorker, Physics World, Discovery Channel, Muse Magazine, Beacon Online, Research Frontiers (U. Arkansas), Ozarks at Large (NPR), Arkansas Magazine

### Other synergistic activities:

- Karst Waters Institute Board Member (2013-present)
- Served on AGU Hydrology Groundwater Technical Committee, 2010-2016
- Convened sessions at: Fall AGU Meeting (2009, 2010, 2011, 2013), GSA Annual Meeting (2014), GSA Section Meetings (2010, 2014, 2018)
- Participated in numerous cave exploration and mapping expeditions in Alaska, Sumatra, Peru, Mexico, Svalbard, Slovenia, Croatia, China, France, Lechuguilla Cave, and Jewel Cave (1999-present)
- Co-led an exploration and scientific expedition to Cueva J2, Oaxaca, Mexico (2010)
- Leading a project to explore and map caves in the Julian Alps of Slovenia (2011-present, expeditions in 2013, 2014, 2015, and 2016)

### Peer-Reviewed Publications:

(\* - indicates student or postdoc in Covington group)

1. **Covington, M.D.** and K. Vaughn\* (in press), Carbon dioxide and dissolution rate dynamics within a karst underflow-overflow system, Savoy Experimental Watershed, Arkansas, USA, *Chemical Geology*.
2. Thaler, E.A.\*, **Covington, M.D.**, Myre, J.M.\*, and G.S. Holcomb\* (in revision). A chemical mechanism for the formation of waterfalls and slot canyons, *Geology*.
3. Mankoff, K.D., Gulley, J.D., Tulaczyk, S.M., **Covington, M.D.**, Liu, X., Chen, Y., Benn, D.I., and P.S. Głowacki (2017). Roughness of a subglacial conduit under Hansbreen, Svalbard, *Journal of Glaciology*, 63, 239, 423-435.
4. Tennyson, R., Brahana, V., Polyak, V., Potra, A., **Covington, M.**, Asmerom, Y., Terry J., Pollock, E., and D. Decker (2017), Hypogene speleogenesis in the South Ozark Uplands, Mid-Continental United States, *Hypogene Karst Regions and*

- Caves of the World*, eds. Klimchouk, A., Palmer, A., De Waele, J., Auler, A. and P. Audra, Springer.
5. Knierim, K., Pollock, E., Hays, P., **Covington, M.**, and K.R. Brye (2017). Carbon cycling in the mantled karst of the Ozark Plateaus, central United States, *Geoderma Regional*, 10, 64-76.
  6. Brookfield, A.E., Macpherson, G.L., and **M.D. Covington** (2017). Effects of changing meteoric precipitation patterns on groundwater temperature in karst environments, *Groundwater*, 55, 2, 227-236.
  7. Perne, M.\*, **Covington, M.D.**, Thaler, E.A.\*, and J.M. Myre\* (2017). Steady state, erosional continuity, and the topography of landscapes developed in layered rocks. *Earth Surface Dynamics*, 5, 1, 85-100.
  8. Thaler, E.A.\*, and **M.D. Covington** (2016). The influence of sandstone caprock material on bedrock channel steepness within a tectonically passive setting: Buffalo National River Basin, Arkansas, USA. *Journal of Geophysical Research – Earth Surface*, 121, 9, 1635-1650.
  9. **Covington, M.D.** (2016). The importance of advection for CO<sub>2</sub> dynamics in the karst Critical Zone: an approach from dimensional analysis, *GSA Special Papers 516: Caves and karst across time*, eds. J.M. Feinberg, Y. Gao, and E.C. Alexander, Jr.
  10. **Covington, M.D.**, Gulley, J.D., and F. Gabrovšek (2015). Natural variations in calcite dissolution rates in streams: controls, implications, and open questions. *Geophysical Research Letters*, 42, 8, 2836-2843.
  11. **Covington, M.D.** and M.Perne\* (2015). Consider a cylindrical cave: A physicist's view of cave and karst science. *Acta Carsologica*, 44, 3, 363-380. (invited review article)
  12. Luhmann, A.J., **Covington, M.D.**, Myre, J.M.\*, Perne, M.\*, Jones, S.W., Saar, M.O., and E.C. Alexander, Jr. (2015). Thermal damping and retardation in karst conduits, *Hydrology and Earth System Sciences*, 19, 137-157.
  13. Perne, M.\*, **Covington, M.**, and F. Gabrovšek (2014). Evolution of karst conduit networks in transition from pressurised flow to free surface flow, *Hydrology and Earth System Sciences*, 18, 4617-4633.
  14. Porter, L., Somerville, R., Primack, J., Croton, D., **Covington, M.**, Graves, G., and Faber, S. (2014). Modeling the ages and metallicities of early-type galaxies in fundamental plane space. *Monthly Notices of the Royal Astronomical Society*, 445, 3092-3104.
  15. **Covington, M.D.** (2014). Calcite dissolution under turbulent flow conditions: a remaining conundrum, *Acta Carsologica*, 43, 1, 195-202.
  16. Gulley, J., Spellman, P., **Covington, M.D.**, Martin, J.B., Benn, D. and J. Catania (2014). Large values of hydraulic roughness in subglacial conduits during conduit enlargement: implications for modeling. *Earth Surface Processes and Landforms*, 39, 3, 296-310.
  17. **Covington, M.D.**, Prelovšek, M., and Gabrovšek, F. (2013). Influence of CO<sub>2</sub> dynamics on the longitudinal variation of incision rates in soluble bedrock channels: potential feedback mechanisms. *Geomorphology*, 186, 85-95.
  18. Luhmann, A.J., **Covington, M.D.**, Alexander, S.C., Chai, S.Y., Schwartz, B.F., Groten, B.S., and E.C. Alexander, Jr. (2012). Comparing conservative and non-

- conservative tracers in karst and using them to estimate flow path geometry. *Journal of Hydrology*, 448-449, 201-211.
19. **Covington, M.D.**, Luhmann, A., Wicks, C.M., and M.O. Saar (2012). Process length scales and longitudinal damping in karst conduits. *Journal of Geophysical Research – Earth Surface*, 117, F01025.
  20. **Covington, M.D.**, Banwell, A.F., Gulley, J., Saar, M.O., and C.M. Wicks (2012). Quantifying the effects of glacier conduit geometry and recharge on proglacial hydrograph form. *Journal of Hydrology*, 414-415, 59-71.
  21. **Covington, M.D.**, Luhmann, A., Gabrovšek, F., Saar, M.O., and C.M. Wicks (2011). Mechanisms of heat exchange between water and rock in karst conduits. *Water Resources Research*, 47, W10514.
  22. **Covington, M.D.**, Primack, J.R., Porter, L., Croton, D., Somerville, R. and A. Dekel (2011). The role of dissipation in the scaling relations of cosmological merger remnants. *Monthly Notices of the Royal Astronomical Society*, 415 (4), 3135-3152.
  23. Luhmann, A.J., **Covington, M.D.**, Peters, A.J., Alexander, S.C., Anger, C.T., Green, J.A., Runkel, A.C. and E.C. Alexander, Jr. (2011). Classification of thermal patterns at karst springs and cave streams. *Ground Water*, 49 (3), 324-335.
  24. **Covington, M.D.**, Kassin, S.A., Dutton, A.A., Weiner, B.J., Cox, T.J., Jonsson, P., Primack, J.R., Faber, S.M., and D.C. Koo (2010). Evolution of the Stellar Mass Tully-Fisher Relation in Disk Galaxy Merger Simulations. *Astrophysical Journal*, 710 (1), 279-288.
  25. **Covington, M.D.**, Wicks, C.M. and M.O. Saar (2009). A dimensionless number describing the effects of recharge and geometry on discharge from simple karstic aquifers. *Water Resources Research*, 45 (11), W11410.
  26. **Covington, M.D.**, Dekel, A., Cox, T.J., Jonsson, P. and J.R. Primack (2008). Predicting the Properties of the Remnants of Dissipative Galaxy Mergers. *Monthly Notices of the Royal Astronomical Society*, 384 (1), 94-106.

#### **Non peer-reviewed articles:**

1. **Covington, M.** (2015). Beginnings: The discovery of Evklidova piščal and early exploration on Viševnik. *National Speleological Society News*, 73, 1, 4-9.
2. Covington, E., **Covington, M.**, Di Batista, M., Elor, G., Heltsley, W., and B. Miller (2015). Return to Viševnik: Summer 2013 Expedition. *National Speleological Society News*, 73, 1, 9-17.
3. **Covington, M.D.**, Doctor, D.H., King, J.N., and C.M. Wicks (2011). Research in karst: A model for future directions in hydrologic science. *AGU Hydrology Section Newsletter, Summer 2011 Issue*.
4. **Covington, M.D.** (2010). Sistema J2-Last Bash: The 2010 J2 Expedition. *Association for Mexican Cave Studies Activities Newsletter*, 33, 39-44.
5. **Covington, M.D.** (2010). J2: The Journey to Camp 4 – Beyond the Sump. *National Speleological Society News*, 68 (1), 11-14.
6. **Covington, M.D.** and M. Minton (2008). How to make a major cave connection in two weeks, or the shifting sands of time. *Association for Mexican Cave Studies Activities Newsletter*, 31, 52-63.

### **Conference Presentations:**

(\* - indicates student or postdoc in Covington group; † - indicates invited contribution)

#### **Oral:**

- Trunz, C.\*, **Covington, M.D.**, and Gulley, J.D. (2018), Understanding the timescales that control coupling between meltwater delivery and ice motion, *International Glaciological Society Symposium - Timescales, Processes, and Glacier Dynamics*, Albany, NY, June 2018.
- Breeding, A.\* and **Covington, M.D.** (2018), Removal and transport of sandstone caprock material as a rate-limiting step in landscape evolution, Buffalo River Basin, AR, *GSA South-central region meeting*, Little Rock, AR March 2018.
- Covington, M.D.**, Vaughn, K.A.\*, and Young, H.A.\* (2018), The impact of ventilation on dissolution rates within karst conduits, *GSA South-central region meeting*, Little Rock, AR March 2018.
- Williams, S.G.\*, Blackstock, J.M.\*, and **Covington, M.D.\*** (2018), Carbon dioxide dynamics within the Critical Zone of a karst landscape: Savoy Experimental Watershed, Arkansas, *GSA South-central region meeting*, Little Rock, AR March 2018.
- Blackstock, J.M.\*, and **Covington, M.D.**, Williams, S.G.\*, Myre, J.\*, Rodriguez, J.\*, Hays, P.D., Cooper, M.P.\*, and M. Perne\*, Low-cost monitoring of CO<sub>2</sub> concentrations and fluxes within the Critical Zone: Insights from the Springfield Plateau Aquifer of Northwest Arkansas, *GSA South-central region meeting*, Little Rock, AR March 2018.
- Covington, M.D.**, Trunz, C.\*, Gulley, J.D., Mejia, J.Z., Breithaupt, C (2017). Dynamics of subglacial conduits driven by diurnal meltwater pulses to moulins. *AGU Fall Meeting*.
- Covington, M.D.**, Perne, M.\*, Thaler, E.A.\*, and J. Myre\* (2017). Modeling landscape evolution within layered rocks: Whither equilibrium? *GSA Annual meeting*.
- Breeding, A.\*, **Covington, M.D.**, and E.A. Thaler\* (2017). Removal and transport of sandstone caprock material as a rate-limiting step in landscape evolution, Buffalo River Basin, Arkansas. *South-Central GSA Section Meeting*.
- †Schwartz, B.F., **Covington, M.D.**, Ficco, K.K\*, Myre, J.M.\*, and E. Thaler\* (2016). Two years of continuous data from the Omega Cave System: What have we learned so far? *GSA Annual Meeting*.
- †Luhmann, A.J., **Covington, M.D.**, and E.C. Alexander, Jr. (2016). Using water temperature to infer recharge type and flow path geometry in karst aquifers. *GSA Annual Meeting*.
- Brookfield, A.E., Macpherson, G.L., and **M.D. Covington** (2016). Effect of increasing cool-season precipitation on groundwater temperature in merokarst environments., *GSA Annual Meeting*.
- †**Covington, M.D.** (2015). Recent exploration in the Cheve area, Oaxaca, Mexico. 23<sup>rd</sup> International Karst School, Postojna, Slovenia.
- Cooper, M.P.\*, Thaler, E.A.\*, Turner, N., Whetstone, C.\*, Holcomb, G.\* and **M.D. Covington** (2015). Controls on the variability in calcite dissolution rates in surface streams across the contiguous United States, *GSA Annual Meeting*.
- Schwartz, B.F., **Covington, M.D.**, Myre, J.M.\*, Kosič, K.\*, Thaler, E.\* and M. Perne\* (2015). Designing, building, and operating a long-term instrumentation network in the Omega Cave System, VA, USA: Results from the first year, *GSA Annual Meeting*.
- Covington, M.D.**, Vaughn, K.A.\*, Young, H.A.\*, Myre, J.M.\* and K. J. Knierim (2015).



- Interactions among cave airflow, carbon dioxide, and dissolution rates within karst conduits, *GSA Annual Meeting*.
- †Myre, J.M.\* and **M.D. Covington** (2015). 3-Dimensional recording of karst morphologies: The next leap forward in cave survey? *GSA Annual Meeting*.
- Myre, J.M.\* and **M.D. Covington** (2015). Peeling apart the conundrum surrounding the morphogenesis of scallops using computational fluid dynamics. *GSA Annual Meeting*.
- Thaler, E.A.\* and **M.D. Covington** (2015). Apparent disequilibrium of channel profiles in the Buffalo River Basin, AR. *GSA Annual Meeting*.
- Cooper, M.P.\* and **M.D. Covington** (2015). A simple computer model of paragenetic gallery formation. *GSA Annual Meeting*.
- M.D. Covington** (2015). The importance of advection for carbon dioxide dynamics and weathering patterns within the Critical Zone. *AGU Fall Meeting*.
- Perne, M.\*, **Covington, M.D.** and J. Myre\* (2014). Modeling of bedrock channel and cave evolution using computational fluid dynamics. *GSA Abstracts with Programs*, 46, 6, 457.
- Myre, J.\* and **M.D. Covington** (2014). A new view of turbulent flow over soluble bedrock forms. *GSA Abstracts with Programs*, 46, 6, 832.
- Covington, M.D.** (2014). The relative importance of dissolution and mechanical erosion in limestone bedrock channels: A general framework and an example from a high-gradient stream cave, Sistema J2, Oaxaca, Mexico, *GSA Abstracts with Programs*, 46, 6, 393.
- Perne, M.\*, **Covington, M.D.** and M. Cooper\* (2014). Bedrock channel and cave evolution models based on computational fluid dynamics, EP34B-07, *AGU Fall Meeting*.
- Covington, M.D.**, Luhmann, A.J., Myre, J.\*, Perne, M.\*, Jones, S., Alexander, E.C., and M.O. Saar (2014). Relationships between conduit properties and the damping and retardation of thermal pulses in karst conduits, H41K-04, *AGU Fall Meeting*.
- Covington, M.D.**, Prelovšek, M. and F. Gabrovšek (2013), Dissolution rates, carbon dioxide dynamics, and geomorphological feedbacks in open channel cave streams. 16<sup>th</sup> *International Congress of Speleology – Brno, Czech Republic*.
- Covington, M.D.** and F. Gabrovšek (2013), A theoretical framework for understanding the relative importance of chemical and mechanical erosion processes in cave streams, 16<sup>th</sup> *International Congress of Speleology – Brno, Czech Republic*.
- Covington, M.D.**, and M. Di Batista (2013), Discovery and exploration of Evklidova piščal, Julian Alps, Slovenia. 16<sup>th</sup> *International Congress of Speleology – Brno, Czech Republic*.
- Covington, M.D.**, Gulley, J., and D. Ochel (2013), Glacier cave expeditions 2012: Nepal and Svalbard. 16<sup>th</sup> *International Congress of Speleology – Brno, Czech Republic*.
- †**Covington, M.D.** (2013), Process length scales as a framework for understanding flow, transport, and evolution of the karst critical zone. *Geological Society of America Annual Meeting*. Denver, October 2013.
- †Schwartz, B.F., Ficco, M.J., and **M.D. Covington** (2013), 17 Years of research and exploration in the Omega Cave System: Joint management of Virginia's longest and deepest cave by the Cave Conservancy of the Virginias and the U.S. Forest Service. *Geological Society of America Annual Meeting*. Denver, October 2013.
- †**Covington, M.D.** (2013). A simple theoretical framework to interpret spring variations

- and constrain mechanistic models of karst processes. *Carbon and Boundaries in Karst. Carlsbad, New Mexico, USA.*
- †**Covington, M.D. (2012).** Process length scales in karst: from simple models to applications. *20<sup>th</sup> International Karstological School, Postojna, Slovenia.*
- Covington, M.D. (2012).** A theoretical framework for the interpretation of karst spring signals. *EGU General Assembly, 14, EGU2012-853.*
- Covington, M.D.,** Prelovšek, M. and F. Gabrovšek (2011). Longitudinal variation in dissolution rates in a cave stream: lessons from length scales. *2011 GSA Annual Meeting in Minneapolis (9–12 Oct).*
- Luhmann, A.J., **Covington, M.D.,** and E.C. Alexander, Jr. (2011). Using a multi-tracer experiment to estimate flow path geometry. *2011 GSA Annual Meeting in Minneapolis (9–12 Oct).*
- Covington, M.D.,** Luhmann, A.J., Saar, M.O., Wicks, C.M., and F. Gabrovšek (2011). Dimensionless metrics that characterize the relationships between signals observed at springs and karst aquifer geometry. *Proceedings of the 9<sup>th</sup> Conference on Limestone Hydrogeology, Besançon, France, 107-110.*
- Covington, M.D.,** Luhmann, A.J., Gabrovšek, F., Saar, M.O., and C.M. Wicks (2011). The relative importance of heat exchange mechanisms in karst conduits. *EGU General Assembly, 13, EGU2011-10017.*
- Luhmann, A.J., **Covington, M.D.,** Alexander, S.C., Chai, S.Y. and E.C. Alexander, Jr. (2011). Comparison of discharge, conductivity, temperature, dye, deuterium, and turbidity responses from a multiple tracer test in karst. *12<sup>th</sup> Interdisciplinary Conference on Sinkholes and the Engineering and Environmental Impacts of Karst.*
- Covington, M.D.,** Banwell, A., Gulley, J., Saar, M.O., Wicks, C.M., Willis, I.C. and N. Arnold (2010). Recharge-discharge relations for glacial conduit systems: a simple theoretical approach. *Eos Trans. AGU, 91 (52), Fall Meet. Suppl.*
- Covington, M.D.,** Luhmann, A.J., Wicks, C. M. and M.O. Saar (2010). Process length scales: a conceptual tool for karst hydrogeology, geomorphology, and hydroecology. *2010 GSA Annual Meeting in Denver (31 Oct – 3 Nov).*
- Luhmann, A.J., **Covington, M.D.,** and E.C. Alexander, Jr. (2010). Thermograph recessions. *2010 GSA Annual Meeting in Denver (31 Oct–3 Nov).*
- Covington, M.D.,** Myre, J., Luhmann, A.J., Wicks, C.M. and M.O. Saar (2010). Comparison of observed and modeled storm responses in a Minnesota cave stream: Connections between geometry and response. *North Central/South Central GSA Meeting in Branson (11-13 Apr).*
- Covington, M.D.,** Wicks, C.M. and M.O. Saar (2009). Thermal signals as a means of characterizing karst aquifers. *Eos Trans. AGU, 90 (52), Fall Meet. Suppl.*
- Covington, M.D. (2007).** Stellar-Mass Tully-Fisher Relation Evolution in Galaxy Merger Simulations. *Santa Cruz Galaxy Formation Workshop.*
- Covington, M.D. (2006).** Predicting the Sizes of Merger Remnants. *Santa Cruz Galaxy Formation Workshop.*

Poster:

- Mejia, J.Z., Gulley, J.D., **Covington, M.D.,** Trunz, C.\*, Breithaupt, C., Dixon, T.H., and A. Barnes. Down the drain: Understanding how meltwater cascades through the GrIS hydrological system to impact its ice velocity (2017). *AGU Fall Meeting.*

- Cooper, M.P.\* and **M.D. Covington**. Modeling paragenesis: Erosion opposite to gravity in cave channels. *AGU Fall Meeting*.
- Blackstock, J.M.\*, Covington, M.D.\*, Williams, S.G.W.\*, Myre, J.M.\*, and J. Rodriguez\* (2017). Measurements of soil, surface water, and groundwater CO<sub>2</sub> concentration variability within Earth's critical zone: low-cost, long-term, high-temporal resolution monitoring. *AGU Fall Meeting*.
- Williams, S.G.\*, Blackstock, J.M.\*, and **M.D. Covington** (2017). Carbon dioxide dynamics with the Critical Zone of a karst landscape: Savoy Experimental Watershed, Arkansas. GSA Annual Meeting, Seattle.
- Rodriguez, J.\*, **Covington, M.D.**, Gibson, K.E., Almeida, G., and J. Jackson (2017). Comparative microbial community dynamics in a karst aquifer system and proximal surface stream. *South-Central GSA Section Meeting*.
- Young, H.A.\*, and **M.D. Covington** (2017). Quantifying carbon dioxide fluxes in the air and water of Blowing Spring Cave, Arkansas. *South-Central GSA Section Meeting*.
- Covington, M.D.**, Perne, M.\*, Thaler, E.\*, and J.M. Myre\* (2016). The curious behavior of steep channels in layered rocks. *AGU Fall Meeting*.
- Whetstone, C.\*, and **M.D. Covington** (2016). Carbon dioxide dynamics at the Savoy Experimental Watershed. *South-Central Section GSA Meeting*.
- Thaler, E.A.\*, Myre, J.M.\* and **M.D. Covington** (2015). The influence of dissolution on bedrock channel evolution: Insights from model and field observations.
- Knierim, K., Pollock, E., Hays, P. and **M. Covington** (2014). Carbon cycling in the karst of Northwestern Arkansas: Linking the soil and cave environments, EP23B-3606, *AGU Fall Meeting*.
- Myre, J.\* and **M.D. Covington** (2014). Using computational fluid dynamics to investigate the generation of soluble bedrock forms, EP43C-3599, *AGU Fall Meeting*.
- Thaler, E.\*, **Covington, M.D.**, Myre, J.\*, Perne, M.\* and G. Holcomb\* (2014). The occurrence of knickpoints in soluble strata in the Buffalo River Basin, Arkansas, EP53A-3602, *AGU Fall Meeting*.
- Cruz, M., Myre, J.\*, and **M.D. Covington** (2014). A low-cost data-logging platform for long-term field sensor deployment in caves, H13G-1195, *AGU Fall Meeting*.
- Myre, J.\*, **Covington, M.D.**, Perne, M.\* and K. Kosič\* (2014). The Microsoft Kinect as a low-cost recorder of 3-dimensional karst morphologies, *GSA Abstracts with Programs*, 46, 6, 534.
- Cooper, M.P.\*, Perne, M.\*, and **M.D. Covington** (2014). Simple shear stress approximations and a first step in modeling mechanical erosion in caves. *GSA Abstracts with Programs*, 46, 6, 534.
- Vaughn, K.A.\* and **M.D. Covington**, Characterizing CO<sub>2</sub> concentration variations in two karst springs and testing dissolution models. *Geological Society of America Annual Meeting*. Denver, October 2013.
- Covington, M.D.**, Gabrovšek, F. and J.D. Gulley (2013), A theoretical framework for quantifying the relative importance of dissolution and mechanical erosion in soluble bedrock channels, *American Geophysical Union Fall Meeting – December 2013, San Francisco*.
- Perne, M.\*, **Covington, M.D.**, Gabrovšek, F. and D. Juričič (2013), Modeling bedrock channel cross-section evolution in soluble rocks. *American Geophysical Union Fall Meeting – December 2013, San Francisco*.

- †**Covington, M.D.** and J. Gulley (2012). Characterization of solute-discharge relationships in springs and rivers in eogenetic and telogenetic karst aquifers. *2012 GSA Annual Meeting in Charlotte (4-7 Nov)*.
- Covington, M.D. and F. Gabrovšek** (2011). Models of dissolution and mechanical erosion in bedrock channels in soluble strata. *Eos Trans. AGU, 92 (52), Fall Meet. Suppl.*
- Myre, J.M., **Covington, M.D.**, Luhmann, A.J., and M.O. Saar (2011). A GPGPU accelerated modeling environment for quantitatively characterizing karst systems. *Eos Trans. AGU, 92 (52), Fall Meet. Suppl.*
- Covington, M.D.**† and A.J. Luhmann (2011). Water temperatures and heat transport in karst: a review of recent advances. *2011 GSA Annual Meeting in Minneapolis (9–12 Oct)*.
- Myre, J.M., **Covington, M.D.**, Luhmann, A.J., and M.O. Saar (2011). Accelerating the characterization of karst aquifer systems. *2011 GSA Annual Meeting in Minneapolis (9–12 Oct)*.
- Covington, M.D.**, Luhmann, A.J., Gabrovšek, F., Saar, M.O., and C.M. Wicks (2011). Water temperatures in cave streams and karst springs. *19th International Karstological School, Postojna, Slovenia*.
- Myre, J.M., **Covington, M.D.**, Walsh, S.D., Saar, M.O., Luhmann, A.J. and D. Lilja (2010). A GPU powered investigation of the relationship between observed and modeled storm responses of a Minnesota cave stream. *Eos Trans. AGU, 91 (52), Fall Meet. Suppl.*
- Covington, M.D.**, Wicks, C.M. and M.O. Saar (2009). What's in a spring hydrograph? *2009 GSA Annual Meeting in Portland (18-21 Oct)*.
- Covington, M.D.**, Walsh, S.D.C., Wicks, C.M. and M.O. Saar (2008). Modeling the effects of variable recharge and conduit geometry on flow through karstic aquifers. *Eos Trans. AGU, 89 (52), Fall Meet. Suppl.*
- Covington, M.D.**, Dekel, A., and J.R. Primack (2007). Predicting the Properties of the Remnants of Galaxy Merger Simulations,” *Structure Formation in the Universe, Chamonix, France*.

### **Other Presentations:**

#### Keynote lectures:

The future of speleogenesis models, *Eurokarst, Neuchâtel, Switzerland, Sept 2016*.  
Beneath Ice, *Arkansas Undergraduate Research Conference, 2013*.

#### Departmental Seminars:

University of Cincinnati, Department of Geology (Sept 2018)  
Texas A&M, Department of Geology and Geophysics (Sept 2017)  
University of Arkansas, Little Rock, Department of Earth Sciences (Apr 2017)  
Northeastern State University, Department of Natural Sciences (Mar 2017)  
Missouri State, Department of Geography, Geology, and Planning (Jan 2017)  
University of Arkansas, Department of Physics (Nov 2016)  
University of Kansas, Department of Geology (Apr 2016)

University of Arkansas, Department of Geosciences (Nov 2014)  
Oklahoma State University, School of Geology (Nov 2013)  
Missouri State, Department of Geography, Geology, and Planning (Nov 2012).  
Université de Neuchâtel, Centre d'hydrogéologie, Jan 2012.  
Technische Universität Dresden, Department of Hydrosociences (Dresdener  
Wasserseminar), June 2011.  
University of Texas – Austin, Jackson School of Geosciences, Mar 2011.  
University of Arkansas, Dept. of Geosciences, Jan 2011.  
University of Minnesota – Twin Cities, Dept. of Geology and Geophysics, Feb 2010.  
Louisiana State University, Dept. of Geology and Geophysics, Sept 2009.  
University of Arkansas, Dept. of Geosciences, Oct 2009.  
Max Planck Institute für Astrophysik, May 2007.

Public lectures on cave science and exploration:

- Covington, M.D.** (2016). Exploration of Cueva J2, *Arkansas Regional Adventure Programming Conference*, April, 2016.
- Covington, M.D.** (2013). Beneath Ice. *University of Arkansas* (lecture on glacier cave science in Svalbard).
- Covington, M.D.** (2009-11). Arduous exploration in one of the world's deepest cave systems. *Outdoor Adventure Expo*, Minneapolis, November 2009. (a version of this talk was also given at the University of Arkansas, LSU, the University of Ljubljana, and the University of Zagreb).
- Covington, M.D.** J2 2009: Beyond the Sump (2009). *International Congress of Speleology*.
- Covington, M.D.** and M. Minton (2007). The 2007 Huautla Expedition: Connecting Rio Iglesia to Sistema Huautla, *National Speleological Society Convention*.
- Covington, M.D.** (2007). High and Low Places in Lechuguilla Cave. *Stanford Alpine Club*.
- Covington, M.D.** (2005). Caving at High Altitude in the Peruvian Andes. *National Speleological Society Convention: International Exploration Session*.
- Covington, M.D.** and Lane, J. (2001). Gunung Ngalu Seribu, Sumatra: Mountain of 1000 Caves. *National Speleological Society Convention*.