

**MATTHEW W. ROSSI**

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**EDUCATION**

*Arizona State University, AZ* *Ph.D. in Geological Sciences, 2014*  
 Hydroclimatic controls on erosional efficiency in mountain landscapes  
 Advisor: Kelin X. Whipple, Ph.D.

*The College of William and Mary, VA* *B.S. in Geology, 2003*  
 An evaluation of the extent of Neoproterozoic magmatism in the Goochland Terrane, VA  
 Advisor: Brent E. Owens, Ph.D.

**RESEARCH INTERESTS**

I am a geomorphologist interested in developing a quantitative understanding of the processes and process interactions that control the structure and function of Earth's Critical Zone. I was drawn to the discipline both by its societal importance (e.g., soils and agriculture; steep topography and hazards; hydrology and water use) along with a broader curiosity about how the diverse landscapes on Earth are shaped by climatic and tectonic forces. My dissertation research focused on quantifying climatic controls on erosion rates in steep mountain landscapes (from desert to rainforest) by integrating digital topographic and hydrologic time-series analysis with measurements of millennial-scale erosion rates (using  $^{10}\text{Be}$  concentrations in quartz, river sands) and numerical modeling. My post-doctoral research at Earth Lab extends this prior work by examining the transition from snowmelt to rainfall dominated runoff variability along the Colorado Front Range. In addition, I am beginning new research on rock glaciers where I use image analysis (of drone- and space-borne remote sensing) with cosmogenic radionuclide dating to quantify surface velocities and constrain numerical models of rock glacier mechanics.

**EMPLOYMENT HISTORY**

2016 - <i>present</i>	<i>Post-Doctoral Research Associate, UC - Boulder, CO</i>
2014 - 2016	<i>Visiting Assistant Professor, Northwestern University, IL</i>
2013 - 2014	<i>Teaching Assistant, Arizona State University, AZ</i>
2009 - 2014	<i>Research Assistant, Arizona State University, AZ</i>
2008 - 2009	<i>Teaching Assistant, Arizona State University, AZ</i>
2007 - 2008	<i>Student Worker (part-time), Arizona State University, AZ</i>
2006 - 2008	<i>External Evaluator (contractual), AAAS—Project 2061, DC</i>
2004 - 2008	<i>Earth Science Curriculum Developer, Northwestern University, IL</i>
2003 - 2004	<i>Outdoor Education Coordinator, Ghost Ranch, NM</i>
1998 - 2000	<i>Computer Specialist (part-time), Spectrum Resources Towers, VA</i>

**AWARDS AND HONORS**

\* *Outstanding Student Paper Award, AGU Fall Meeting, 2011*  
*NSF GK-12 Fellow: Down to Earth Science, Arizona State University, 2009-2010*  
*SESE Outstanding TA Award, Arizona State University, 2008-2009; 2013-2014*

## PROFESSIONAL SERVICE

### *Committees*

Environmental Science Program Committee (NU: 2015-2016)

### *Reviewer*

Geophysical Research Letters; Journal of Arid Environments; Journal of Geology; Journal of Geophysical Research – Earth Surface; Science Advances; Water Resources Research

## PUBLICATIONS

### *Refereed Papers (published)*

- [1] **Rossi, M.W.**, Whipple, K.X., and Vivoni, E.R., 2016. Precipitation and evapotranspiration controls on daily runoff variability in the contiguous United States and Puerto Rico. *Journal of Geophysical Research – Earth Surface*, 121: 128-145, doi:10.1002/2015JF003446.
- [2] Forte, A.M., Whipple, K.X., Bookhagen, B., and **Rossi, M.W.**, 2016. Decoupling of modern shortening rates, climate, and topography in the Caucasus. *Earth and Planetary Science Letters*, 449: 282-294, doi:10.1016/j.epsl.2016.06.013.
- [3] **Rossi, M.W.**, Quigley, M.C., Fletcher, J.M., Whipple, K.X., Diaz-Torres, J., Seiler, C., Fifield, C.K., and Heimsath, A.M., *in press*. Along-strike variation in catchment morphology and cosmogenic denudation rates reveal the pattern and history of footwall uplift, Main Gulf Escarpment, Baja California. *Geological Society of America Bulletin*, doi:10.1130/B31373.1.
- [4] Alkire, M.B., Jacobson, A.D., Lehn, G.O., Macdonald, R.W., and **Rossi, M.W.**, *in press*. On the geochemical heterogeneity of rivers draining into the straights and channels of the Canadian Arctic Archipelago. *Journal of Geophysical Research – Biogeosciences*.

### *Refereed Papers (in preparation)*

- [5] **Rossi, M.W.**, Whipple, K.X., DiBiase, R.A., and Heimsath, A.M., *in preparation*. Hydroclimatic controls on erosional efficiency: A comparative study between desert and tropical tectonically active mountain ranges.
- [6] DiBiase, R.A., **Rossi, M.W.**, and Neely, A., *in preparation*. Fracture density and grain size controls on the relief structure of threshold landscapes.
- [7] Anderson, R.A., Anderson, L.S., Armstrong, W.H., **Rossi, M.W.**, and Crump, S., *in preparation*. Glaciation of alpine valleys: The glacier – debris-covered glacier – rock glacier continuum.

### *Abstracts*

- Klein, T.I., Anderson, S.P., Murphy, S.F., **Rossi, M.W.**, Hammack, G.S, and Anderson, R.S., 2017, High intensity rain storm connects hillslopes to channels in a steep, semi-arid catchment: Chapman Conference on Extreme Climate Event Impacts on Aquatic Biogeochemical Cycles and Fluxes, AGU, San Juan, PR, 22-27 Jan.
- Alkire, M.B., Jacobson, A.D., Lehn, G.O, Macdonald, R.W., and **Rossi, M.W.**, 2016. Geochemical heterogeneity of rivers draining the Canadian Arctic Archipelago: EOS, AGU Transaction 96, B13C-0577.

- DiBiase, R.A., **Rossi, M.W.**, and Neely, A., 2015. Fracture density and grain size controls on the relief structure of threshold landscapes: EOS, AGU Transaction 96, EP41C-0934.
- Forte, A.M., Whipple, K.X., Bookhagen, B., and **Rossi, M.W.**, 2015. Reconciling invariant topography with significant along-strike gradients in climate and tectonics in the Greater Caucasus. EOS, AGU Transaction 96, Abstract T32B-07.
- Rossi, M.W.**, Quigley, M.C., Fletcher, J., Whipple, K.X., Díaz-Torres, J.J., Seiler, C., Fifield, L.K., and Heimsath, A.M., 2015. Neogene tectonic history of the Sierra San Pedro Mártir, Baja California revealed by careful pairing of cosmogenic sampling with topographic analysis: EOS, AGU Transaction 96, Abstract T13C-3010.
- Rossi, M.W.**, Whipple, K.X., DiBiase, R.A., and Heimsath, A.M., 2015. Hydroclimatic controls on erosional efficiency: A comparative study between desert and tropical tectonically active mountain ranges: FACET Workshop 2015, Taipei, TW. 28 May – 2 June.
- Rossi, M.W.**, Whipple, K.X., Vivoni, E.R., DiBiase, R.A., and Heimsath, A.M., 2014. The influence of the soil water balance within catchment hillslopes on runoff variability and fluvial incision: EOS, AGU Transaction 95, Abstract EP33D-05.
- Rossi, M.W.**, Whipple, K.X., and Vivoni, E.R., 2013. Precipitation and evapotranspiration controls on event-scale runoff variability in the continental U.S.: EOS, AGU Transaction 94, Abstract EP51C.
- Whipple, K.X., DiBiase, R.A., and **Rossi, M.W.**, 2013. The topographic imprint of spatial and temporal patterns of rock uplift encoded in bedrock river profiles: GSA Abstracts with Programs, v. 45, no. 7.
- Rossi, M.W.**, Whipple, K.X., and Vivoni, E.R., 2013. Climatic controls on discharge variability: STRESS 4 Workshop 2013, NCED/DRI, Glenbrook, NV, 24-26 Apr.
- Rossi, M.W.**, Whipple, K.X., and Vivoni, E.R., 2012. From precipitation to runoff: Climatic controls on discharge variability: EOS, AGU Transaction 93, Abstract EP53C-1058.
- \***Rossi, M.W.**, Whipple, K.X., DiBiase, R.A., and Heimsath, A.M., 2011. Climatic controls on steady state erosion using the relationship between channel steepness and cosmogenic <sup>10</sup>Be-derived catchment averaged erosion rates: EOS, AGU Transaction 92, Abstract EP31A-0809.
- Rossi, M.W.**, Whipple, K.X., DiBiase, R.A., and Heimsath, A.M., 2010. Climate and the erosional efficiency of fluvial systems: EOS, AGU Transaction 91, Abstract EP23C-06.
- Rossi, M.W.**, Whipple, K.X., and DiBiase, R.A., 2009. Inferring landscape response to climate from the relation between mean hillslope angle and channel steepness: EOS, AGU Transaction 90, Abstract EP51B-0604.
- DeLong, S.B., Johnson, J.P., Whipple, K.X., Post, D.F., Malmon, D., Chu, D., Hellerstein, J., Klues, K., Levis, P., **Rossi, M.W.**, and Martin, R., 2008. Hydrology and channel head erosion in a semiarid discontinuous ephemeral stream network near Oracle, Arizona: EOS, AGU Transaction 89, Abstract H43F-1075.
- Lee, E., and **Rossi, M.**, 2006. Middle school students' understanding of convection as a causal mechanism for generating winds: NARST Annual Conference.
- Jona, K., and **Rossi, M.**, 2006. Authentic scientific inquiry in online science courses: Using student-friendly data analysis and modeling tools: NACOL Annual Conference.

**Rossi, M.**, and Smith, D., 2005. Students as scientists: Using visualization in the classroom: NSTA—Midwestern Convention.

### INVITED TALKS

May 12, 2014 *Job Talk* Environmental Sciences, Northwestern University, IL  
 April 14, 2017 *Colloquium* Geography, University of Colorado, Boulder, CO  
 April 28, 2017 *Colloquium* Earth and Environmental Sciences, Tulane University, LA

### UNDERGRADUATE TEACHING EXPERIENCE

<i>Earth Systems Revealed (for Engineers)</i>	2 sections	200-level (w/lab)
<i>U.S. Water and Society</i>	1 section	300-level (seminar)
<i>Applied GIS</i>	3 sections	300-level (w/lab)
<i>Applied GIS II</i>	1 section	300-level (w/lab)
<i>Physical Hydrology</i>	2 sections	300-level (w/lab)
<i>Geomorphology</i>	2 sections	300-level (w/lab)