Your abstract submission has been received

Print this page

You have submitted the following abstract to GSA Annual Meeting in Denver, Colorado, USA - 2016. Receipt of this notice does not guarantee that your submission was complete or free of errors.

EXPLORING LINKAGES BETWEEN SUBCRITICAL CRACK GROWTH AND ROCK TYPE DEPENDENT EROSION RESISTANCE, A CASE STUDY FROM THE BLUE RIDGE, VA

EPPES, Martha Cary[1], HANCOCK, Gregory S.[2], MOSER, Faye L.[1], WEISERBS, Benjamin[1], AREY, Jordan[1], TANNU, Nakul[1] and KIESSLING, Spencer[1], (1)Department of Geography & Earth Sciences, University of North Carolina at Charlotte, 9201 University City Boulevard, Charlotte, NC 28223, (2)Department of Geology, College of William & Mary, Williamsburg, VA 23187, meppes@uncc.edu

The ridge-forming rocks of the Valley and Ridge and Blue Ridge physiographic provinces in the eastern United States have long been cited as exemplars of erosion resistant rock types. Few if any studies, however, have explored the specific processes behind the lithology-erosion susceptibility relationship. New data derived from Shenandoah National Park in central Virginia suggest a correlation between 10Be-derived bedrock outcrop erosion rates (Hancock, unpublished) and mechanical weathering rates for different rock types and outcrops (this study). Building on these results, we hypothesize that surface and near surface rock fracture is a rate-limiting process that influences observed erosion rates, and further, that variables which influence subcritical crack growth provide a primary control on each outcrop's susceptibility to erosion.

Weathering-related stresses that typically arise in surface or near surface bedrock are relatively low and unlikely to exceed the tensile strength of most rock types. Thus mechanical weathering in these rocks likely occurs most commonly through subcritical crack growth, an idea that has been largely overlooked (Eppes et al., 2016). Here, we explored this hypothesis by comparing and contrasting known fracture mechanics properties for the Shenandoah study rock types: sandstone, quartzite and granitoids. From the exact outcrops for which 10Be samples were collected, we also gathered in-situ crack data (size, density, degree of rounding of crack edges, spall thickness), as well as samples for SEM analysis, thermal conductivity and uniaxial compression tests. Preliminary results support causal relationships between rock properties that influence subcritical crack growth and cracking patterns. For example, observed high crack density in slowly eroding quartzite outcrops is consistent with measures of a low subcritical crack growth index but high fracture toughness for that rock type and with the complex microstructure of the skolithos-bearing Antietam quartzite of Shenandoah. Ultimately we believe that conceptualizing erosion resistance in terms of subcritical crack growth could provide a unifying mechanistic paradigm for other previously observed relationships between erosion and rock properties like joint spacing, quartz content and

compressive strength.

Abstract ID#: 284687
Password: 190390
Meeting: GSA Annual Meeting in Denver, Colorado, USA - 2016
Session Type: Topical Sessions
Primary Selection: T55. Heterogeneity in Geomorphic Systems: Driving Forces and Landscape Response
Final Session Number:
Abstract Title: EXPLORING LINKAGES BETWEEN SUBCRITICAL CRACK GROWTH AND ROCK TYPE DEPENDENT EROSION RESISTANCE, A CASE STUDY FROM THE BLUE RIDGE, VA
Preferred Presentation Format: Poster
Discipline Categories: Geomorphology Quaternary Geology Soils

Abstract Submission Fee: Paid (gsa-2016AM-9692-3976-3853-7751)

Presenting Author
Martha Cary Eppes
University of North Carolina at Charlotte
9201 University City Boulevard
Department of Geography & Earth Sciences
Charlotte, NC 28223
Phone Number: 704 687-5993
Fax Number: 704-687-5966
Email: meppes@uncc.edu
Student? N

Gregory S. Hancock
College of William & Mary
Department of Geology
Williamsburg, VA 23187
Phone Number: 7572212446
Email: gshanc@wm.edu
Student? N

Faye L. Moser
University of North Carolina at Charlotte

9201 University City Boulevard
Department of Geography & Earth Sciences
Charlotte, NC 28223
Phone Number: 8284892351
Email: fvisco@uncc.edu
Alternate Email: fmluvsherdoxies@gmail.com
Student? Y

Benjamin Weiserbs
University of North Carolina at Charlotte
9201 University City Boulevard
Department of Geography & Earth Sciences
Charlotte, NC 28223
Phone Number: 717-291-4133
Email: bweiserb@uncc.edu
Student? Y

Jordan Arey
University of North Carolina at Charlotte
9201 University City Boulevard
Department of Geography & Earth Sciences
Charlotte, NC 28223
Phone Number: 7046875993
Email: jarey4@uncc.edu
Student? Y

Nakul Tannu
University of North Carolina at Charlotte
9201 University City Boulevard
Department of Geography & Earth Sciences
Charlotte, NC 28223
Phone Number: 7046875993
Email: ntannu@uncc.edu
Student? Y

Spencer Kiessling
University of North Carolina at Charlotte
9201 University City Boulevard
Department of Geography & Earth Sciences
Charlotte, NC 28223

Charlotte, NC 28223
Phone Number: 7046875993
Email: skiessli@uncc.edu
Student? Y

If necessary, you can make changes to your abstract submission until Tuesday, 12 July 2016.

- To access your submission in the future, use the direct link to your abstract submission from one of the automatic confirmation emails that were sent to you during the submission.
- *Or* point your browser to /gsa/reminder.cgi to have that URL mailed to you again. Your username/password are 284687/190390.

Any changes that you make will be reflected instantly in what is seen by the reviewers. You DO NOT need to go through all of the submission steps in order to change one thing. If you want to change the title, for example, just click "Title" in the abstract control panel and submit the new title.

When you have completed your submission, you may close this browser window.

Tell us what you think of the abstract submission process

Home Page