

Biogeochemistry of the Critical Zone Book Volume

Now Accepting Abstracts

As part of the Advances in Critical Zone Science Book Series (Edited by Steve Banwart, published by Springer-Nature) we are pleased to announce the development of the volume “*Biogeochemistry of the Critical Zone*”. We are currently seeking abstracts related to one of the many thematic topics outlined below with *abstracts due by May 15th, 2018*. We seek submissions that focus on how biogeochemical processes vary across the critical zone (CZ) as an integrated system, and how these processes are better informed by an improved understanding of CZ hydrology, geomorphology and ecology. *While the themes and organizing topics outlined below represent fundamental themes in biogeochemistry, they are intended to be suggestive rather than prescriptive. The final organization of the volume will be determined by the ultimate collection of accepted papers. Thus, authors should feel free to develop topics that are not listed.* We also encourage collaborative papers highlighting cross-site research and those that include early career researchers and graduate students. Submissions can be of original research, meta-analyses, or literature reviews. The target audience includes both researchers and land managers. Co-Editors of this special biogeochemistry volume include: Adam Wymore (University of New Hampshire), Wendy Yang (University of Illinois at Urbana-Champaign), Whendee Silver (University of California, Berkeley), Jon Chorover (University of Arizona) and Bill McDowell (University of New Hampshire).

Successful submissions will specifically highlight how the CZ framework (i.e., consideration of the complete permeable system, from bedrock to canopy) enhances or provides novel insights in the study of biogeochemistry. Thus, submissions must accomplish at least one following: treat the CZ as a whole and integrated system; or integrate the concepts/perspectives and methods of allied disciplines (e.g. hydrology, geomorphology, ecology, microbiology) to better understand biogeochemical processes throughout or in specific parts of the CZ. Abstracts and manuscripts will not be accepted that do not incorporate these integrative approaches. Editors will work with authors providing feedback through the submission process to ensure that this important aspect comes through in each submission.

All articles will be subject to peer-review.

Abstract submissions (as well as any general queries) should be sent to: Adam Wymore (adam.wymore@unh.edu)

Please send as PDF. In your submission please provide a tentative title, author line, and a 200 word abstract. Include contact information for the corresponding author. Please identify which theme (see below) you would like your submission to be included in. If authors wish to suggest a novel theme please contact Adam Wymore with a brief justification of how the submission will fit within the scope of the volume.

Objective of Book Volume: Biogeochemical processes are at the heart of energy, nutrient and lithogenic element fluxes in the critical zone. They control the quantity and quality of carbon and nutrients available for living organisms, the retention and export of nutrients or toxic elements affecting soil fertility and water quality, and the capacity of the critical zone to sequester carbon. As the term implies, biogeochemical cycles, and the rates at which they occur, result from the interaction of biological, chemical and physical processes. However, finding a unifying framework by which to study these interactions is challenging, and the different components of bio-geo-chemistry are often studied in isolation (Chorover et al. 2007).

The Earth's critical zone (CZ) is defined as that portion of the Earth's near surface extending from the bedrock weathering front and lowest extent of freely circulating groundwater up through the regolith and to the top of the vegetative canopy. The structure and function of the CZ is shaped through tectonic, lithologic, hydrologic, climatic and biological processes and is the result of processes occurring at multiple time scales from eons to seconds. The CZ is an open system in which energy and matter is both transported and transformed (Rasmussen et al. 2011). Critical zone science, which deliberately integrates biology, geology and hydrology toward the goal of better understanding coupled processes in this near-surface region, provides a novel and unifying framework to consider biogeochemical cycles and fluxes of energy and matter that are essential to sustaining a habitable planet.

Themes and Organizing Topics

(Please note: themes, topics and subjects are only suggestive)

1. Mass and Energy Fluxes through the Critical Zone

Biogeochemical reactions in the CZ are driven by phase disequilibria that are, for a given solid phase assemblage, controlled by temperature and fluid (gas and solution) composition and flux. Since phase composition varies with CZ location, dominant reactions are also expected to vary with location. Papers submitted to this theme will explore the physical, chemical and biological processes controlling fluid composition and flux in CZ systems of various lithologies.

2. Biological Weathering Processes

Biota play a significant role in regolith formation, but the precise nature of that role changes with location in the CZ. Submissions under this theme will examine the biological role in mineral weathering processes and regolith formation.

3. Weathering Processes across Space and Time

Weathering is usually described as a watershed-scale phenomenon based on contemporaneous solute mass balance (focusing on export of weathering products) or is quantified based on what is left behind in the soil and regolith profile (focusing on the residual products of weathering). Papers submitted under this theme should attempt to address this fundamental challenge in CZ science and integrate these two approaches in a way that incorporates spatial variability in weathering processes within a landscape.

4. Bio-inorganic Interfaces in the Critical Zone

Critical zone biogeochemistry is mediated by the interaction between biological and abiotic processes, many of which occur at solid-fluid interfaces that change with location in the CZ. Papers submitted under this theme should explore the role of plants, microorganisms and their exo-metabolites in altering the composition and reactivity of surfaces distributed through the weathering profile.

5. Microbial Ecology of the Critical Zone

Microbial communities and their metabolic engines play a central role in controlling biogeochemical reactions. Potential topics include, but are not limited to, how microbial diversity changes throughout the profile of the CZ and how microbial community dynamics and diversity drive CZ processes and elemental fluxes.

6. Retention and export of organic matter and nutrients

Contributions will examine how critical zone structure and function affects the retention, transformation and export of organic matter and key limiting nutrients. Potential themes include, organic matter storage and exports and to the fluvial network, how CZ structure affects redox conditions and the availability of

nutrients (e.g. N, P and S), and the role of disturbance (e.g. fire, floods) in controlling organic matter and nutrient fluxes.

7. Hydrology and Biogeochemical Cycles

Contributions will explore the role of hydrology in driving biogeochemical processes across CZ gradients. Potential topics include, but are not limited to, examining how changes in green vs. blue water reservoirs affect watershed-scale biogeochemical processes; snowpack hydrology and the export of elements and sediments; or concentration-discharge relationships across CZ gradients.

8. Global Carbon Cycling and Carbon Sequestration

Submissions under this theme will focus on how the CZ framework improves our understanding of the global carbon cycle and the mechanisms that influence carbon sequestration. Authors may explore the role of the critical zone as a reservoir of carbon, the missing terrestrial carbon sink, or how CZ structure influences carbon sequestration or fluxes of greenhouse gases.

9. Critical Zone Management

This theme will focus on the applied and societally relevant aspects to critical zone science. Contributions to this theme could focus on how the integrated framework of CZ science better informs best management practices with regard to soil fertility and soil management, food productivity, and water quantity and quality, for example.

Key Dates:

Abstract Submission: May 15th, 2018

Manuscript Submission: November 30th, 2018

Completion of Peer Review: February 15st, 2019

Revised Manuscript Submission: May 31st, 2019

Final Manuscript Approval: August, 2019

Submit Articles for Publication: September, 2019