



## **Rethinking the critical zone in drylands: It's the small things that count**

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In most ecosystems, ecologists define the “critical zone” as the soil region where the majority of plant roots are concentrated. Thus, for instance, the critical zone in forested ecosystems is considered as the top several meters of soil. I propose a new way of thinking for deserts: that the critical zone is not where plant roots are found but is instead where the surface poikilohydric organisms are found: that is, just above, on, or within the top few centimeters of rock or soil surfaces. This extremely thin veneer of life is critical in almost every ecosystem process in deserts, including weathering, C and N cycles, dust capture, bio-availability of P and metals, decomposition, and soil stability. In addition, as these communities cover most soil and rock surfaces, they mediate almost all inputs (water, gases, and nutrients) and outputs (gases) to underlying strata. They also facilitate delivery of C and nutrients from the soil interspace to plants. The direct connection between lithic communities and soil surface BSC communities and the connection between BSCs living in the nutrient-rich soil surface zone and nearby vascular plants may be a critical process unique to dryland ecosystems.