Geophysical Research Abstracts
Vol. 19, EGU2017-10212, 2017
EGU General Assembly 2017

Thresholds for soil cover and weathering in mountainous landscapes

Jean Dixon and Sarah Benjaram

Montana State University, Department of Earth Sciences and The Institute on Ecosystems, Bozeman, United States (jean.dixon@montana.edu)

The patterns of soil formation, weathering, and erosion shape terrestrial landscapes, forming the foundation on which ecosystems and human civilizations are built. Several fundamental questions remain regarding how soils evolve, especially in mountainous landscapes where tectonics and climate exert complex forcings on erosion and weathering. In these systems, quantifying weathering is made difficult by the fact that soil cover is discontinuous and heterogeneous. Therefore, studies that attempt to measure soil weathering in such systems face a difficult bias in measurements towards more weathered portions of the landscape. Here, we explore current understanding of erosion-weathering feedbacks, and present new data from mountain systems in Western Montana. Using field mapping, analysis of LiDAR and remotely sensed land-cover data, and soil chemical analyses, we measure soil cover and surface weathering intensity across multiple spatial scales, from the individual soil profile to a landscape perspective. Our data suggest that local emergence of bedrock cover at the surface marks a landscape transition from supply to kinetic weathering regimes in these systems, and highlights the importance of characterizing complex critical zone architecture in mountain landscapes. This work provides new insight into how landscape morphology and erosion may drive important thresholds for soil cover and weathering.