Localized lithologic controls on slope forming processes along the Sandia Mountain front


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The western slope of the Sandia Mountains is dominated by corestone topography with weak soils forming between large granite boulders. Rarely slopes are mantled by thick well developed soils. In multiple locations these stable slopes are observed to be capped by rocktypes that are more resistant to weathering than the surrounding granite, but are of limited spatial extent. We propose that these volumetrically minor cap rocks have a significant impact on slope form through a variety of processes that decrease retreat rates.

We tested this hypothesis by comparing slopes that are underlain entirely by coarse-grained granite to slopes that are underlain by granite and capped by more resistant rocktypes. Given enough time, the thick, clay rich, soils observed on slopes that are capped by resistant rocktypes could form by weathering of the local bedrock. However, a more likely explanation is that the soils formed through weathering of fine-grained material, probably dust, from an external source. In either case, a significant period of slope stability was required for the observed soils to develop.

Preliminary data suggests that the spatially restricted cap rocks are responsible for increased slope stability by converting weathering-limited to transport-limited slopes. In contrast to the grus found on slopes underlain entirely by granite, weathering of the resistant rocktypes produces large clasts. These clasts are less mobile than grus and appear to play an important role in decreasing sediment transport rates on slopes while possibly increasing the dust trapping efficiency of the surface.

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