

Influence of hillslope aspect on landscape evolution: Inferences from analysis of landscape morphology in central New Mexico

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Abstract. We investigate the influence of hillslope aspect on landscape morphology in central New Mexico, where differences in soils, vegetation, and landforms are observed between mesic north and xeric south facing slopes. Slope–area and curvature–area relations, derived from digital elevation data, are used to characterize the opposing hillslope morphologies. Topographic data reveal steeper (shallower) slopes in north (south) facing aspects across all geologies and elevation ranges studied. North facing slope curvatures are also higher than their south facing counterparts. In the majority of the data, slope differences between opposing hillslopes are statistically significant. Using a simple conceptual slope-area model, we suggest that for a given area, steeper north facing slopes would imply lower soil erodibility. We argue that this interpretation, consistent with recent views of ecosystem control on semiarid erosion rates, shows the topographic imprint of hillslope aspect and its associated vegetation communities. Observed valley asymmetry in the region reinforces this concept and suggests a long-term legacy of hillslope aspect, modulating regional ecogeomorphology.