Geophysical Research Abstracts
Vol. 13, EGU2011-12016, 2011
EGU General Assembly 2011

Remotely Identifying Geomorphic Processes on Alluvial Fans Using The Bidirectional Reflectance Distribution Function (BRDF)

Sarah Doyle (1,3,4) and Louis Scuderi (2,3,4)

(1) United States (sld474@unm.edu), (2) United States (tree@unm.edu), (3) University of New Mexico (epsdept@unm.edu/1-505-2778843), (4) Center for Rapid Environmental Assessment and Terrain Evaluation (create@unm.edu)

Alluvial fans can be described by the primary processes by which they are formed, such as debris flow and sheetflood mass movement events, and the secondary processes that modify them, such as gully and desert pavement formation. These different primary and secondary processes result in quantifiable variability in the roughness of a fan's surface. For example debris flows have a larger range in deposit particle sizes than more homogeneous sheetflood events. As well, over time secondary processes remove finer particles changing the roughness characteristics of a fan's surface. Enhanced access to satellite imagery of earth's surface has allowed the development of new remote sensing techniques and analytic approaches that aid our understanding of geomorphic processes on large scales and in inaccessible areas. The applicability of a Bidirectional Reflectance Distribution Function (BRDF) approach that utilizes differences in directional reflectance at different times of the year to delineate the surface roughness of facies on alluvial fans in Death Valley is investigated in this preliminary study. The BRDF represents the ratio of changes in surface roughness, with this parameter correlated over a range of spatial scales allowing estimation of roughness at sub-pixel resolution. We find that use of multi-temporal Landsat 7 imagery over the course of a year allows definition of a BRDF that can quantify differences in particle size at the earth's surface. This technique, using multiple images from a single year to find roughness-based differences in directional radiance across sparely vegetated fan surfaces, provides accurate assignments of deposit types and locations of secondary alteration.