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# Testing Shelter Index and a Simple Wind Speed Parameter to Characterize Vegetation Control of Sand Transport Threshold and Flux

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Wind erosion and dust emissions occur in the Chihuahuan Desert surrounding Las Cruces NM from a range of surfaces with different types and amounts of vegetation. Understanding how vegetation modulates these processes remains a research challenge. One important aspect of research is to develop a relationship between a descriptor of the surface roughness that can be used to provide an indication of how susceptible the sediment transport system is to activation by wind. Here we present results from a study that examines the relationship between an index of shelter (distance from a point to the nearest upwind vegetation/vegetation height), as originally proposed by Okin (2008), and particle threshold expressed as a ratio of wind measured at 0.45 times the plant height divided by the wind speed at 17 m, and saltation flux (g cm-2 s-1). Saltation flux was measured using sediment traps positioned 15 cm above the surface and nearby optical gate sensors (Wenglor® model YH03PCT8)measuring saltation activity also placed at a height of 15 cm. The results are used to evaluate shelter index as a parameter to characterize the local winds as influenced by the vegetation and sediment transport conditions (threshold and transport). Wind speed, wind direction, saltation activity and point saltation flux were measured at 35 locations in defined test areas (∼13,000 m2) in three vegetation communities: mature mesquite covered nebkha dunes, incipient nebkha dunes dominated by low mesquite plants, and a mature creosote bush area. Measurement positions represent the most open areas, and hence those places most susceptible to wind erosion among the vegetation elements. Shelter index was calculated for each measurement position for each approximately 10 degree wind direction bin using digital elevation models for each site acquired using terrestrial laser scanning.