



Comparative rates of wind versus water erosion from a small semi-arid watershed in southern Arizona

Mark Nearing (1), Yong-guang Zhang (1,2), Boa-yuan Liu (2), R.S. VanPelt (3), Jeff J. Stone (1), and Haiyan Wei (1)

(1) USDA-ARS Southwest Watershed Research Center, Tucson, AZ, United States (mark.nearing@ars.usda.gov), (2) School of Geography, Beijing Normal University, Beijing 100875, P. R. of China, (3) USDA-ARS Wind Erosion and Water Conservation Unit, Big Spring, TX 79415 USA

Both wind erosion and water erosion can be serious land degradation processes in arid and semi-arid drylands. However, the relative erosion rates of wind and water erosion have rarely been studied simultaneously and are poorly quantified. In this study, we established a method for long-term monitoring of wind erosion fluxes into and out of a small watershed area. Wind erosion and water erosion rates were simultaneously measured and compared over 12 months for a small rangeland watershed in the Santa Rita Experimental Range in southern Arizona. Average horizontal, wind-driven sediment flux was 4.0 g m⁻²d⁻¹. The net soil erosion balance rate by water and wind combined was 14.67 t ha⁻¹, with only 0.07 t ha⁻¹ attributed to wind. This compares to a 35 yr. record of sediment yield by water for this area of 2.31 t ha⁻¹. Wind measurements showed that the wind speeds for the measuring period were representative of long term wind speeds. The results of this study call into question the hypothesis of other researchers who utilize a "gate" concept for characterizing wind and water fluxes as an index for comparing wind and water erosion rates.