Natural Wind Erosion Events Sediment Flux Compared with Field Wind Tunnel Tests on the Same Field

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Portable field wind tunnels have been used to quantify the effects of land management on wind erosion for undisturbed and disturbed field surfaces for many years. However, direct comparisons of natural wind erosion events with field wind tunnel measurements on the same fields are rare. In this study, we compare measurements of saltation and dust emission fluxes of a bare fine sandy loam soil observed during several natural wind erosion events in Big Spring, Texas with measurements taken using a field wind tunnel at the same site. Sediment transport by wind erosion during natural events was measured using MWAC and BSNE passive dust samplers and a slot sampler also used to collect sediment with the field wind tunnel. Wind erosion was also measured using a 6 m long and 0.5 m wide field wind tunnel using a standard procedure that included introducing abrader sand. The wind tunnel employed an isokinetic slot sampler with a 3 mm wide and 1 m tall slot to collect saltating and suspended dust. Suspended dust < 25 μm was measured in the slot sampler using a GRIMM dust monitor. The field saltation flux measured by the passive saltation samplers was about 75% of that measured by the isokinetic slot sampler. While the mean slot sampler saltation flux during natural dust storms was about 60% that observed in the field wind tunnel tests, the suspended dust flux of natural storms was about 5 times that observed in the wind tunnel tests.