



Spatial differences in aeolian erosion of arid silty- sand soils due to surface features

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The significance of soil erosion by wind is substantial by means of soil degradation and air pollution. There is still a gap in quantifying the aeolian soil erosion in response to changes in surface features. The aim of this study is to quantify the aeolian erosion of silty-sand soil in an arid region (Yamin Plateau, Negev, Israel) under different wind and surface conditions. The study was conducted in experimental plots of sparse vegetation (SV), rock fragment (RF), and mechanical crust (MC) under natural and disturbed soil surfaces. Aeolian simulations were executed through the use of a portable wind tunnel with different wind speeds. Variables measured during the simulations include wind profile and shear stress, horizontal sand flux (saltation), vertical flux of total aeolian sediments (TAS), and concentration of PM10 (particle less than 10 micrometers in diameter). The results show that during experiments at 6 and 11 m/s in natural soil surface, the cumulative PM10 concentration (mg/m³) in plot MC was 5 and 6.8 times higher than in plots RF and SV, respectively. Soil loss calculation for PM10 at these wind speed in natural surface shows that the soil at plot MC was the most available for erosion with a loss of 253 and 1530 mg/m² (7 minutes), respectively. This is 2 and 6 times higher than in plots SV and RF, respectively. The impact of soil surface disturbance was more significant in plot MC under wind speed of 6 m/s and in plot RF under wind speed of 11 m/s. Soil loss calculation for sand (> 100 μ m) at speed of 6 m/s in natural surface shows that the loss at plot MC was 2 and 5.8 times higher than in plots RF and SV, respectively. The results indicate on spatial differences in the aeolian erosion of silty – sand soil in response to changes in wind speed and surface characteristics.