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Reduction in soil aggregate size distribution due to wind erosion

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Soil erosion process by wind causes emission of fine soil particles, and thus alters the topsoil's properties, fertility, and erodibility. Topsoil resistance to erosion depends on its physicochemical properties, especially on the soil aggregation. Although the key role of aggregates in soil erodibility, quantitative information on the relations between soil aggregate size distribution (ASD) and erosion is still lucking. This study focuses on ASD analyses before and after soil erosion by wind. Wind tunnel experiments and soil analyses were conducted on semiarid loess topsoils with different initial conditions of aggregation. The results show that in all initial soil conditions saltation of sand particles caused the breakdown of macro-aggregates > 500 μm, resulting in increase of micro-aggregates (63-250 μm). The micro-aggregate production increases with the wind shear velocity (up to 0.61 m s-1) for soils with available macro-aggregates. The findings highlight dynamics in soil aggregation in response to erosion process, and therefore the significance of ASD in quantifying soil degradation and soil loss potential.