



Seasonal dynamics of the parameters determining wind erosion on rangeland in Eastern Niger

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Wind erosion constitutes a major threat for sustainable land use in the Sahel. Whereas aeolian processes have been extensively studied in cultivated fields, mostly in Western Niger, little information exists regarding areas covered by natural vegetation such as grazing lands. Hence, a study was carried out in order to assess aeolian fluxes on a pasture in Tchago (Eastern Niger, North-West of Gouré) from 2004 to 2006 during several months each year. In addition, continuous monitoring of wind characteristics and threshold wind velocity for saltation permitted to estimate potential and actual aeolian fluxes on a daily basis all along the year using the equation of Lettau and Lettau (1978).

Sediment fluxes measured during convective storms ranged between $1,1 \pm 1,3$ and $78,9 \pm 45,2$ kg/m. The fluxes estimated by the model of Lettau and Lettau were in agreement with the measured fluxes. However, measured fluxes may overestimate the equilibrium fluxes because of the nearby presence of a deflation area. Based on the Lettau and Lettau model and the temporal variations in wind and vegetation characteristics, aeolian fluxes appear to follow strong seasonal dynamics due in part to variations in wind velocity but mostly due to changes in the aerodynamic roughness length (Z_0). The latter reflects the vegetation cover and varies between 0.05 m for 3,2 T/ha of dry matter when the vegetation is most developed (mid-August – September) up to a minimum of 0.0001 m for 0,25 T/ha at the time when the ground is least covered (from April till the start of the rainy season). No seasonal dynamics were observed in a fenced-off area. An exponential relation was found between vegetation dry matter and Z_0 . This relation is specific to the type of vegetation found on the dune, dominated by *Cenchrus biflorus*. The threshold friction velocity was linearly related to Z_0 and varies between 0.26 and 0.49 m/s for Z_0 values of $1 \cdot 10^{-4}$ and $1.5 \cdot 10^{-3}$ m, respectively. For the critical periods of wind erosion (end of dry season and first half of the rainy season), threshold wind speed at 2 m height is less than 7 m/s, which is frequently exceeded during convective storms. Results show that large aeolian fluxes may occur on Sahelian rangeland throughout the dry season and the early part of the rainy season and that it is predominantly caused by grazing and gathering of biomass by the local population.