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Assessing wind erosion in South Tunisia

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Wind erosion in arid and semi-arid regions of South Tunisia is the main process of land degradation because the precipitations in these areas are low (below 200 mm) and the soils are shallow and sandy, that is to say the easiest to erode [Chepil, 1951].
Even sporadic, precipitations are sufficient to allow vegetation and agriculture (crops and livestock farming) to develop in these regions. In natural conditions, the perennial vegetation cover (even low) protects soils against wind erosion and surface crusting contributes to the stability of the non-vegetated areas by increasing soil cohesion. The use of these natural surfaces for agricultural purposes disturbs this equilibrium and favours wind erosion (i) by lowering/suppressing the vegetal cover, and (ii) by destroying soil crusts, by tillage or by livestock grazing and trampling.
In South Tunisia, the use of modern ploughing techniques, replacing the traditional ones, has led to an increase in wind erosion. As an example, the increasing use of the one-way disc plough instead of the traditional tiller plough has had important consequences on the land degradation by modifying soil structure and the characteristics of soil surfaces. The measurements of the wind erosion fluxes acquired by Labiadh et al. [2013] in a field of South Tunisia ploughed using different tillage tools (mouldboard, tillage, disc) exhibited differences in the wind erosion fluxes of about a factor 4 between disc and tiller and of an order of magnitude between disc and mouldboard.
There is a lack of quantitative estimates of this phenomenon at the regional scale. The aim of this work is to develop and validate a numerical model that will allow wind erosion quantification in South Tunisia. Once validated, the methodology and the model could be used to quantify wind erosion in other semi-arid cultivated regions of the world.