



Advances in wind erosion modelling in Europe

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Soil erosion by wind is a serious environmental problem often resulting in severe forms of soil degradation. Wind erosion is also a phenomenon relevant for Europe, although this land degradation process has been overlooked until very recently. The state-of-the-art literature presents wind erosion as a process that locally affects the semi-arid areas of the Mediterranean region as well as the temperate climate areas of the northern European countries. Actual observations, [U+FB01]eld measurements and modelling assessments, however, are all extremely limited and highly unequally distributed across Europe. As a result, we currently lack comprehensive understanding about where and when wind erosion occurs in Europe, and the intensity of erosion that poses a threat to agricultural productivity.

Today's challenge is to integrate the insights of local experiments and field-scale models into a new generation of large-scale wind erosion models. While naturally being less accurate than field-scale models, these large-scale modelling approaches still provide essential knowledge about where and when wind erosion occurs and can disclose the level of risk for agricultural productivity in specific areas.

Here, we present a geographic information system (GIS) version of the RWEQ (named GIS-RWEQ) to quantitatively assess soil loss by wind over large study areas (Land Degradation & Development, DOI: 10.1002/ldr.2588). The model designed to predict the daily soil loss potential at a ca. 1 km² spatial resolution shows high consistency with local measurements reported in literature. The average soil loss predicted by GIS-RWEQ for the European arable land totals ~62 million Mg yr⁻¹, with an average area-specific soil loss of 0.53 Mg yr⁻¹. The JRC model RUSLE2015, for the same area estimates ~295 million Mg yr⁻¹ of soil loss due to water erosion. Notably, soil loss by wind erosion in the European arable land could be as high as ~20% of water erosion, even though the areas affected are mainly concentrated in hotspots.