



Separation of dry and wet periods from regular weather station data for the analysis of wind erosion risk

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Soil moisture is one of the most important dynamic factors determining soil erodibility, because it affects the stability of soil aggregates and threshold velocities for particle detachment by wind. Soil moisture should, therefore, be included in wind erosion risk assessments. However, despite its importance, soil moisture content is often ignored in the analysis of wind data for wind erosion studies. The main reason most probably being the lack of soil moisture sensors in conventional climate stations.

Soil moisture at a given point in time is determined by rain (e.g. rainfall amount, duration), climate (e.g. air temperature, solar radiation, evaporation) and soil (e.g. infiltration rate, adhesion). The purpose of this study is to overcome the lack of soil moisture data for wind erosion risk assessment by developing a method to estimate the soil wetness based on easy available weather data, such as daily precipitation, hourly/sub hourly ambient air temperature and hourly/sub hourly relative humidity. This new method was used to identify periods of wet and dry soil moisture conditions of a time series from 20 weather stations in Denmark. The length of the time series varied between 8 to 37 years and depended on data availability at each station. To analyse if the proposed method is applicable for wind erosion studies, a Wilcoxon and t-test was used to analyse in total 360 different scenarios.

Significant differences were found between the conventional and the proposed approach, which indicates that using wind data without the influence of soil moisture most likely lead to an overestimation of the wind erosion risk. It is, therefore, strongly recommended for wind erosion risk assessments to associate more importance to winds that occur during dry times of the year, by including soil moisture into the calculations.