

Publication

A cross-comparison of threshold friction velocities for PM10 emissions between a traditional portable straight-line wind tunnel and PI-SWERL

JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)**ID** 4640367**Author(s)** Van Leeuwen, C. C. E.; Fister, Wolfgang; Vos, Heleen Cornelia; Cammeraat, L. H.; Kuhn, Nikolaus J.**Author(s) at UniBasel** [Vos, Heleen Cornelia](#) ; [Fister, Wolfgang](#) ; [Kuhn, Nikolaus J.](#) ;**Year** 2021**Title** A cross-comparison of threshold friction velocities for PM10 emissions between a traditional portable straight-line wind tunnel and PI-SWERL**Journal** Aeolian Research**Volume** 49**Pages / Article-Number** 100661**Keywords** Dust emission potential; Threshold friction velocity; Vertical PM10 flux; Wind tunnel experiment; PI-SWERL

Experiments in large wind tunnels have made vital contributions to our knowledge of aeolian processes. However, the size of these instruments makes them impractical for field application. To facilitate field measurements on the dust emission potential of soils, the Portable In-Situ Wind Erosion Lab (PI-SWERL) was developed. Previous research shows that the PI-SWERL can be used to quantify dust emission potentials and (threshold) friction velocities. Studies that compare the PI-SWERL to traditional wind tunnels mainly focus on the dust emission potential at various friction velocities. In the present study, we quantified the threshold friction velocity for PM10 emission using a PI-SWERL and compare it to results obtained with a straight-line wind tunnel: the Portable Wind and Rainfall Simulator of the University of Basel (PWRS). Tests were performed on two types of substrate: fine sand (NS1) and loamy sand (DS1). For NS1, a threshold friction velocity of 0.33 m s^{-1} was identified from both the PI-SWERL and the PWRS data. For DS1, identified threshold friction velocities showed differences: 0.25 m s^{-1} by the PI-SWERL and 0.39 m s^{-1} by the PWRS. The position of the DustTrak II monitor's inlet tube and variations of the fan's speed by different operators could explain the difference in identified thresholds. Although different threshold friction velocities were obtained for one of the substrates, we believe that comparable results can be achieved by adjusting the experimental design in future research. Therefore, the PI-SWERL can be successfully used to quantify thresholds, facilitating dust emission studies in more remote regions.

ISSN/ISBN 1875-9637**edoc-URL** <https://edoc.unibas.ch/87487/>**Full Text on edoc** No;**Digital Object Identifier DOI** 10.1016/j.aeolia.2020.100661**ISI-Number** 000628773900001**Document type (ISI)** Article