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## **Fuzzy mathematical model for estimating wind erosion based on wind tunnel data, comparison of results with laboratory measured and SWEEP model results**

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Fuzzy logic is often used for calculation and simulation of real environmental situations. Wind erosion can often be complex, and from various erosion situations it is one of the hardest to be calculated and exactly described. In our research, we based the structure of the fuzzy system on the soil loss of six soils with different mechanical compositions measured in wind channels. Measurement of soil loss in four wind speed ranges during soil channel testing of soils. During the wind tunnel analysis of the soils, the topsoil loss was measured in four wind speed ranges (I. 11,2-11,6 m/s; II. 12.5-13.3 m/s, III. 14.4-14.7 m/s, IV. 15.5-15.7 m/s) on six soils with different mechanical compositions (four sand and two clayey sand soil). The mathematical model programmed and built up in MATLAB, this mamdani type fuzzy evaluation system uses two input parameters wind speed and ErosionFactor. The mathematical model requests the soils mechanical composition and identifies it based on the USDA triangle diagram. Many mathematical methods applicable to fine tune a fuzzy system. We have chosen the method of exhaustive design to cover the whole parameter space. The mathematical model calculated the soil loss. Model runs were also performed with the SWEEP model according to the soils examined in the wind tunnel. Based on our results, we found that using our fuzzy mathematical model, we obtained estimated soil loss values similar to the SWEEP model compared to the soil loss measured in the wind tunnel. However, it should be noted that the USDA SWEEP model requires a much larger amount of data to estimate the extent of soil loss caused by a wind erosion damage event.