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Demonstration of the WEPS 1.0 Wind Erosion Model[1]

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Abstract

The Wind Erosion Prediction System (WEPS) is a process-based, daily time-step, computer model that predicts soil erosion via simulation of the physical processes controlling wind erosion. WEPS is intended primarily for soil conservation and environmental planning. WEPS 1.0 is the first implementation of WEPS intended for use by the United States Department of Agriculture, Natural Resources Conservation Service (USDA-NRCS). It includes a graphical user interface allowing the user to easily select climate stations, specify field-site dimensions, pick a predominant soil type, and describe wind barriers and management practices applied to an agricultural field. The interface allows a user to quickly assess a site's susceptibility to wind erosion and evaluate the impacts that alternate practices and conditions might have on reducing that susceptibility. The demonstration will allow Symposium attendees to see the WEPS 1.0 model in action and to interact with the developers to discuss the science, architecture, and interface.

Keywords. Erosion modeling, Erosion models, Erosion prediction, Modeling, Wind erosion.

Introduction

Development of the Wind Erosion Prediction System (WEPS) was initiated by scientists in the USDA-Agricultural Research Service (ARS) in response to customer requests for improved wind erosion technology. WEPS is intended to replace the predominately empirical Wind Erosion Equation (Woodruff and Siddoway, 1965) as a prediction tool for those who plan soil conservation systems, conduct environmental planning, or assess off-site impacts caused by wind erosion. WEPS incorporates improved technology for computing soil loss by wind from agricultural fields. It also provides new capabilities such as separate calculation and reporting of creep/saltation size particles, suspension loss, and PM-10 emission estimates from the field (Wagner, 1996).

WEPS 1.0 is the first implementation of WEPS to be released and includes a graphical user interface to simplify the use of the model. WEPS 1.0 implements a subset of all the features and capabilities envisioned for WEPS. The mix of features in WEPS 1.0 was determined based upon USDA-NRCS's current primary needs for a wind erosion prediction tool and its desire to have a version of WEPS available for agency-wide use prior to implementation of an anticipated 2002 Farm Bill. It includes the full process-based, daily time-step, organizational structure; input databases; and the process-based erosion prediction technology. Features and capabilities of WEPS 1.0 user interface include 1) ability to define wind barrier characteristics and their location on boundaries of the simulation region, 2) selection of soils obtained from the NRCS National Soil Information System (NASIS) soil database, and 3) detailed specification of actual management practices employed by land managers.

Future releases of WEPS are projected to include additional functionality and other capabilities as customer demand dictates. Users trained in the use of WEPS 1.0 should find their knowledge, databases, and management/crop rotation input files for WEPS 1.0 to be directly transferable to future versions of WEPS.

References

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