



HAL
open science

Prediction of the size distribution of soil fragments detached by interrill erosion

Sophie Leguédou, N. Kuhn, Frédéric Darboux

► **To cite this version:**

Sophie Leguédou, N. Kuhn, Frédéric Darboux. Prediction of the size distribution of soil fragments detached by interrill erosion. 3. European Geosciences Union (EGU) General Assembly, European Geosciences Union (EGU). DEU., 2006. hal-02750472

HAL Id: hal-02750472

<https://hal.inrae.fr/hal-02750472v1>

Submitted on 3 Jun 2020

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.



Prediction of the size distribution of soil fragments detached by interrill erosion

S. Legu dois (1), N. Kuhn (2) and F. Darboux (1)

(1) INRA, Soil Science Research Unit, BP 20 619 Ardon, 45 166 Olivet cedex, France, (sophie.leguedois@orleans.inra.fr) (2) University of Exeter, School of Geography, Archaeology and Earth Resources, Amory Building, Rennes Drive, Exeter EX4 4RJ, United Kingdom

During rainfall, mechanical breakdown, swelling, dispersion and slaking detach soil fragments from crumbs formed by tillage or from crusted soil surfaces, providing sediment for interrill erosion. The destruction of the aggregates and subsequent erosion can change the size distribution of sediment significantly compared to the original soil. Knowing the size distribution of the detached soil fragments is essential for understanding the amount and temporal and spatial patterns of interrill erosion, as well as the potential off-site effects on the water quality of streams and lakes receiving the sediment.

Size distribution of sediment has been successfully included into several erosion models, for example WEPP or GUEST. However, obtaining size parameter values for a wide application of the models remains difficult, because there is no easy-to-use tool to predict the size distribution of soil fragments detached by interrill processes. A preliminary work showed that, for a seedbed-like initial soil structure, aggregate stability tests can be used to determine the size distribution of soil particles available at the soil surface for interrill erosion. The objective of this study is to generalise these results to other soil surface conditions.

A set of laboratory experiments was carried out to measure the size distribution of soil fragments produced during rainfall on different soil types and soil surface conditions (i.e. fresh seedbed, coherent crusts, and depositional layers of loose aggregates). The different surface conditions were produced under controlled laboratory conditions. Then these soil samples were subjected to simulated rainfall in a custom-

designed fragment sampler and the size distribution of the collected fragments was measured. Aggregate stability of the different samples was determined by a standardised test. Fragment and aggregate size distribution were compared and showed good correlation, indicating the potential of aggregate stability tests for predicting the size distribution of interrill erosion sediment for a wide range of soil surface conditions.