



Wind-driven rain and its implications for natural hazard management

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Prediction and risk assessment of hydrological extremes are great challenges. Following climate predictions, frequent and violent rainstorms will become a new hazard to several regions in the medium term. Particularly agricultural soils will be severely threatened due to the combined action of heavy rainfall and accompanying winds on bare soil surfaces. Basing on the general underestimation of the effect of wind on rain erosion, conventional soil erosion measurements and modeling approaches lack related information to adequately calculate its impact. The presented experimental-empirical approach shows the powerful impact of wind on the erosive potential of rain. The tested soils had properties that characterise three different environments 1. Silty loam of semi-arid Mediterranean dryfarming and fallow, 2. clayey loam of humid agricultural sites and 3. cohesionless sandy substrates as found at coasts, dune fields and drift-sand areas. Erosion was found to increase by a factor of 1.3 to 7.1, depending on site characteristics. Complementary tests with a laboratory procedure were used to quantify explicitly the effect of wind on raindrop erosion as well as the influence of substrate, surface structure and slope on particle displacement. These tests confirmed the impact of wind-driven rain on total erosion rates to be of great importance when compared to all other tested factors. To successfully adapt soil erosion models to near-future challenges of climate change induced rain storms, wind-driven rain is supposed to be introduced into the hazard management agenda.