



Development of a muddy flood early warning system in agricultural landscapes using high-resolution weather radar forecasting data and physical erosion modelling

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In the Free State of Saxony, Eastern Germany, almost 60 % of the agricultural land is endangered by soil erosion, mainly caused by heavy rainfall events. Beside the primary impact of soil loss and decreasing soil fertility, water erosion can cause significant effects if rainfall-induced muddy floods inundate neighbouring settlements, traffic routes or water ecosystems. In late spring 2016, extreme heavy rain events triggered flash floods and rainfall-induced muddy floods causing severe devastations of infrastructure and settlements throughout Germany. In a first step, this approach illustrates the reconstruction of three rainfall-induced muddy floods in ungauged agricultural landscapes in the Free State of Saxony at the end of May 2016. This reconstruction was performed by physical erosion modelling, high-resolution weather radar data of the German Meteorological Service (DWD) and Unmanned Aerial Vehicle (UAV) monitoring. In a further step, historical weather radar forecasting data of the DWD serve as input data for the physically-based erosion model to test the forecast of the rainfall-induced muddy floods retrospectively. Model results indicate a possible warning, but, at best, 10 minutes in advance. Finally, this approach assesses the feasibility of a muddy flood early warning system in agricultural landscapes by high-resolution weather radar forecasting data and physical erosion modelling.