Forecast of muddy floods using high-resolution radar precipitation forcasting data and erosion modelling

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In the federal province of Saxony, Eastern Germany, almost 60 % of the agricultural land is endangered by erosion processes, mainly caused by heavy rainfall events. Beside the primary impact of soil loss and decreasing soil fertility, erosion can cause significant effects if transported sediments are entering downslope settlements, infrastructure or traffic routes.

Available radar precipitation data are closing the gap between the conventional rainfall point measurements and enable the nationwide rainfall distribution with high spatial and temporal resolution. By means of the radar precipitation data of the German Weather Service (DWD), high-resolution radar-based rainfall data totals up to 5 minute time steps are possible. The radar data are visualised in a grid-based hourly precipitation map. In particular, the daily and hourly precipitation maps help to identify regions with heavy rainfall and possible erosion events. In case of an erosion event on agricultural land, these areas are mapped with an unmanned airborne vehicle (UAV). The camera-equipped UAV delivers high-resolution images of the erosion event, that allow the generation of high-resolution orthophotos. By the application of the high-resolution radar precipitation data as an input for the process-based soil loss and deposition model EROSION 3D, these images are for validation purposes.

Future research is focused on large scale soil erosion modelling with the help of the radar forecasting product and an automatic identification of sediment pass over points. The study will end up with an user friendly muddy flood warning tool, which allows the local authorities to initiate immediate measures in order to prevent severe damages in settlements, infrastructure or traffic routes.