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The changes of flash flood hazard in Hungary due to climate change

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The aim of the research is to outline the effects of the expected climate change on flash flood hazard. The change of flash flood hazard due to climate change was evaluated by overlapping analysis of the sensitivity and exposure to climate stimuli.
The climate change projections were produced with the help of two regional models ALADIN and REMO (resolution 22' $\sim$ 25 km) for the periods 2021-2050 and 2071-2100 in A1B scenario. Precipitation data (daily and extreme events) were analysed especially since they determine mostly the occurrence of flash floods.
On the basis of the climate models, the change of the yearly precipitation will be not significant, however variations between the years and within a year (decreasing summer and increasing winter precipitation is expected) will be more definite and the number of extreme precipitation events (extremely heavy precipitation days (over 30 mm/d and Simple daily intensity index) will increase. In the period of 2071-2100 the number of extremely heavy precipitation days (over 30 mm/d) will be nearly the double of the 1961-1990 average. Consequently extreme climate situation could occur more frequently on the basis of the climate models.
On the hilly areas the vulnerability of flash flood was assessed by determining the runoff depth in catchments areas. Runoff was calculated by the AGWA-KINEROS2 watershed runoff and erosion model. The AGWA-KINEROS2 is an event model describing the processes of interception, dynamic infiltration, surface runoff, and erosion from watersheds. It can be used for simulation of extreme precipitation events. This model uses basic and easily accessible GIS data (Digital Elevation Model (DEM), land cover (Corine) and soil data) therefore it is applicable on a country-wide scale. The higher sensitivity of the catchments is indicated by higher rate of runoff.
As a result of the model simulation, the catchments were classified into different categories of flash flood hazard based on the rate of runoff to describe the sensitivity to climate stimuli. The rate of change of the climatic factors was also classified into different categories to assess the exposure to climate stimuli in the periods of 2021-2050 and 2071-2100. Finally matrix based assessment of the climate change impact was applied to link exposure of the predicted climate factor and the landscape sensitivity against flash flood. With this method the potentially endangered areas in the periods of 2021-2050 and 2071-2100 can be assessed assuming fixed land cover and the A1B emission scenario.