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# Identifying areas with high risk of wind gusts, precipitation and hail based on interpolated and recorded data in Hungary

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Risk identification, analysis and risk management measures are major components of the disaster prevention. Extreme climate events such as storms and heavy rain and hail are increasing weather phenomena in Hungary in the last decades. The set out of the especially hazardous settlements is introduced in this paper.
The examinations were performed are based on observations are stored in the climate database of the Hungarian Meteorological Service. The daily maximum wind gusts, daily precipitation sums and the hail records were used in the analysis. The daily data are coming from the meteorological network. The network of settlements is different from the meteorological network, thus the first step was the interpolation of daily measurements for the network of the settlements referred their latitude and longitude. The method MISH (Meteorological Interpolation based on Surface Homogenized Data Basis, Szentimrey, Bihari) were used for the interpolation of the station data. The idea behind the MISH interpolation scheme stems from the following principles: interpolated data can be created at higher quality with respect to certain climate statistical parameters; and these parameters can be modelled by using the long climate data series. In the MISH procedure the modelling of the statistical parameters for a given location is based on the long term homogenized monthly data of neighbouring stations. Additive (e.g. temperature) or multiplicative (e.g. precipitation) model and interpolation formula can be used depending on the climate elements. In this work the multiplicative formula were used for wind gust and precipitation data as well. In the case of hail the station based frequency was interpolated for the specific locations. In the case of wind gust measurements the period of 2001-2010 and in the case of precipitation data and hail records the period of 1981-2010 were used in the calculations.
The measure of the exposure to strong wind or heavy rain on a certain location could be defined with the probability of the events exceeding a specific high threshold. This level was determined by the average of the yearly mean 99% percentile for each settlement. The interpolated daily fields resulted in time series for each geographical position. With using the empirical probability distribution functions the threshold of the events with less than 1% probability is designed. The ordered probabilities of the exceeding of these thresholds made possible to assess categories for ranking the Hungarian settlements according to the degree of the exposure to either the wind storm or heavy rain. In the case of hail the categories were stated simply according to the measure of the interpolated empirical probabilities of the hail occurrence.
The risky locations regarding of wind, rain, hail or theirs combinations can be identified by combining the results. Category maps illustrate the Hungarian locations according to the exposure to the analysed risks.