



Extreme weather events in southern Germany – Climatological risk and development of a large-scale identification procedure

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Extreme weather events such as thunderstorms, hail and heavy rain or snowfall can pose a threat to human life and to considerable tangible assets. Yet there is a lack of knowledge about present day climatological risk and its economic effects, and its changes due to rising greenhouse gas concentrations. Therefore, parts of economy particularly sensitive to extreme weather events such as insurance companies and airports require regional risk-analyses, early warning and prediction systems to cope with such events. Such an attempt is made for southern Germany, in close cooperation with stakeholders.

Comparing ERA40 and station data with impact records of Munich Re and Munich Airport, the 90th percentile was found to be a suitable threshold for extreme impact relevant precipitation events. Different methods for the classification of causing synoptic situations have been tested on ERA40 reanalyses. An objective scheme for the classification of Lamb's circulation weather types (CWT's) has proved to be most suitable for correct classification of the large-scale flow conditions. Certain CWT's have been turned out to be prone to heavy precipitation or on the other side to have a very low risk of such events. Other large-scale parameters are tested in connection with CWT's to find out a combination that has the highest skill to identify extreme precipitation events in climate model data (ECHAM5 and CLM). For example vorticity advection in 700 hPa shows good results, but assumes knowledge of regional orographic particularities. Therefore ongoing work is focused on additional testing of parameters that indicate deviations of a basic state of the atmosphere like the Eady Growth Rate or the newly developed Dynamic State Index.

Evaluation results will be used to estimate the skill of the regional climate model CLM concerning the simulation of frequency and intensity of the extreme weather events. Data of the A1B scenario (2000-2050) will be examined for a possible climate change signal.