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Will climate change increase the risk for critical infrastructure failures in Europe due to extreme precipitation?

Katrin Nissen and Uwe Ulbrich
Freie Universität Berlin, Institute for Meteorology, Berlin, Germany (katrin.nissen@met.fu-berlin.de)

An event based detection algorithm for extreme precipitation is applied to a multi-model ensemble of regional climate model simulations. The algorithm determines extent, location, duration and severity of extreme precipitation events.
We assume that precipitation in excess of the local present-day 10-year return value will potentially exceed the capacity of the drainage systems that protect critical infrastructure elements. This assumption is based on legislation for the design of drainage systems which is in place in many European countries. Thus, events exceeding the local 10-year return value are detected. In this study we distinguish between sub-daily events (3 hourly) with high precipitation intensities and long-duration events (1-3 days) with high precipitation amounts. The climate change simulations investigated here were conducted within the EURO-CORDEX framework and exhibit a horizontal resolution of approximately 12.5 km. The period between 1971-2100 forced with observed and scenario (RCP 8.5 and RCP 4.5) greenhouse gas concentrations was analysed. Examined are changes in event frequency, event duration and size.
The simulations show an increase in the number of extreme precipitation events for the future climate period over most of the area, which is strongest in Northern Europe. Strength and statistical significance of the signal increase with increasing greenhouse gas concentrations.
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