



Supplement of

What distinguishes 100-year precipitation extremes over central European river catchments from more moderate extreme events?

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Supplementary Material



Figure S1. Yearly distribution of the 99th, 99.9th and 99.99th percentile of the daily accumulated precipitation amounts over the Danube catchment. All percentiles decrease from 2003 until about 2008.



Figure S2. Yearly distribution of all MEPEs and LEPEs over all catchments combined.



Figure S3. Same as in Fig. 2b, but for events over the (a) Rhine, (b) Weser/Ems, (c) Elbe and (d) Oder catchment.



Figure S4. Return level plot from the generalised extreme value distribution, based on yearly precipitation maxima from the ensemble prediction data for the Danube catchment. The red lines mark the return level of a 100-year precipitation event.



Figure S5. Same as in Fig. 3b, but for events over the (a) Rhine, (b) Weser/Ems, (c) Elbe and (d) Oder catchment.



Figure S6. Monthly distribution of the (**a**) 7 and (**b**) 65 most intense precipitation events for each river catchment based in HYRAS data. The events can simply be considered as (**a**) 10- and (**b**) 1-year precipitation events.



Figure S7. Precipitation intensity distribution for the 6-hourly periods during (red) MEPEs and (blue) LEPEs over the Danube catchment, ranked by their precipitation intensity (descending).



Figure S8. Same as in Fig. 5a, but for events over the (a) Rhine, (b) Weser/Ems, (c) Elbe and (d) Oder catchment.



Figure S9. Geopotential height at 500 hPa (colour shading) and sea level pressure (black contours) of single MEPEs, 12 hours after the events started, over the (a) Danube (here 12 hours before the event), (b) Weser/Ems, (c) Elbe and (d) Oder catchment. All events deviate from their specific catchment composite, as described in section 4.2.1.



Figure S10. (a) Composites of CAPE for all MEPEs and (b) difference between the MEPE and LEPE composites for events in the Danube catchment, 12 hours after the start of the events. In panel (b), black dots mark significant differences and black contours indicate the LEPE composite.



Figure S11. (Left) MEPE composites of the absolute value of the geopotential height gradient at 500 hPa and (right) differences between MEPE and LEPE composites for events in the (upper row) Danube and (lower row) Elbe catchment, 12 hours after the start of the events. For the difference plots, black dots indicate statistical significance and black contours represent the LEPE composite.



Figure S12. Same as in Fig. 7, but for events over the Oder catchment.



Figure S13. Same as in Fig. 7, but for events over the Rhine catchment.



Figure S14. Same as in Fig. 7, but for events over the Weser/Ems catchment.