

Supplement: Southern Germany's 100-year flash flood peaks might increase by 30 % under an RCP8.5 climate

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1 Spatial distribution of changes in 100-year precipitation

Figures S1 and S2 show the spatial distribution within the Danube catchment. No clear spatial pattern can be distinguished. One reason for this is surely that the 30-year simulation period is not long enough to be representative and to ensure that every catchment gets affected by an extreme precipitation event.

5 2 Spatial distribution of changes in 100-year flood return levels

Figure S3 shows the spatial distribution of the changes in 100-year return levels for each ensemble member. Figure S4 shows the spatial distribution of 100-year return levels derived from the pooled dataset.

3 Number of subbasins

In total there are $3128 < 750 \text{ km}^2$ in the study area. We excluded subbasins from the analysis where the estimated shape parameter for either the historical and/or the RCP8.5 scenario flood peaks was outside the range of -0.3 - 0.5. Hence, the amount of subbasins respected in the analysis is slightly different for every ensemble member. Table S1 summarizes the number of subbasins for each ensemble member, as well as the for the combined data set.

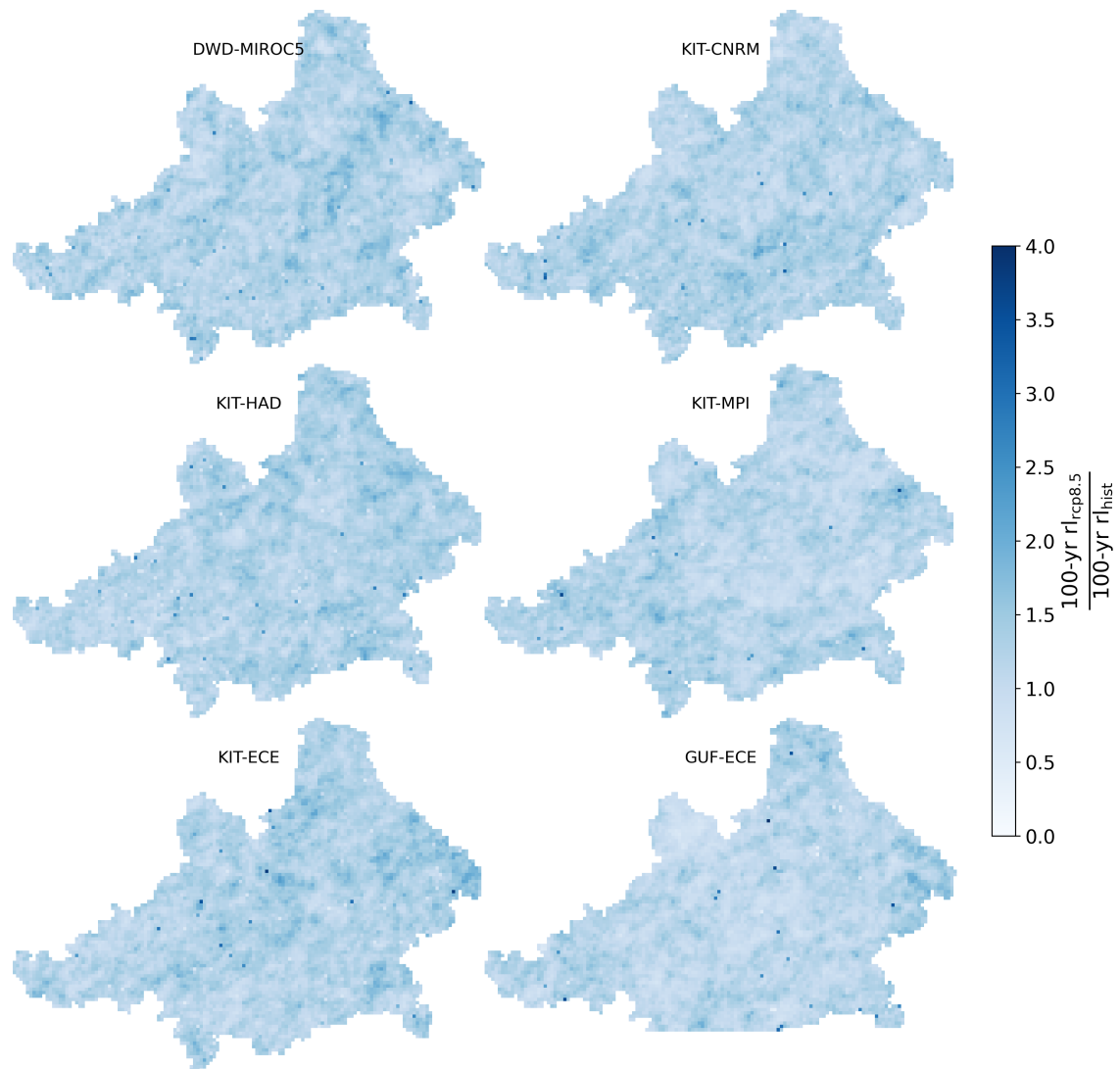


Figure S1. Fraction of RCP8.5 and historical 100-year return levels of 1h rainfall for every pixel within the Danube catchment and every member of the CPM ensemble

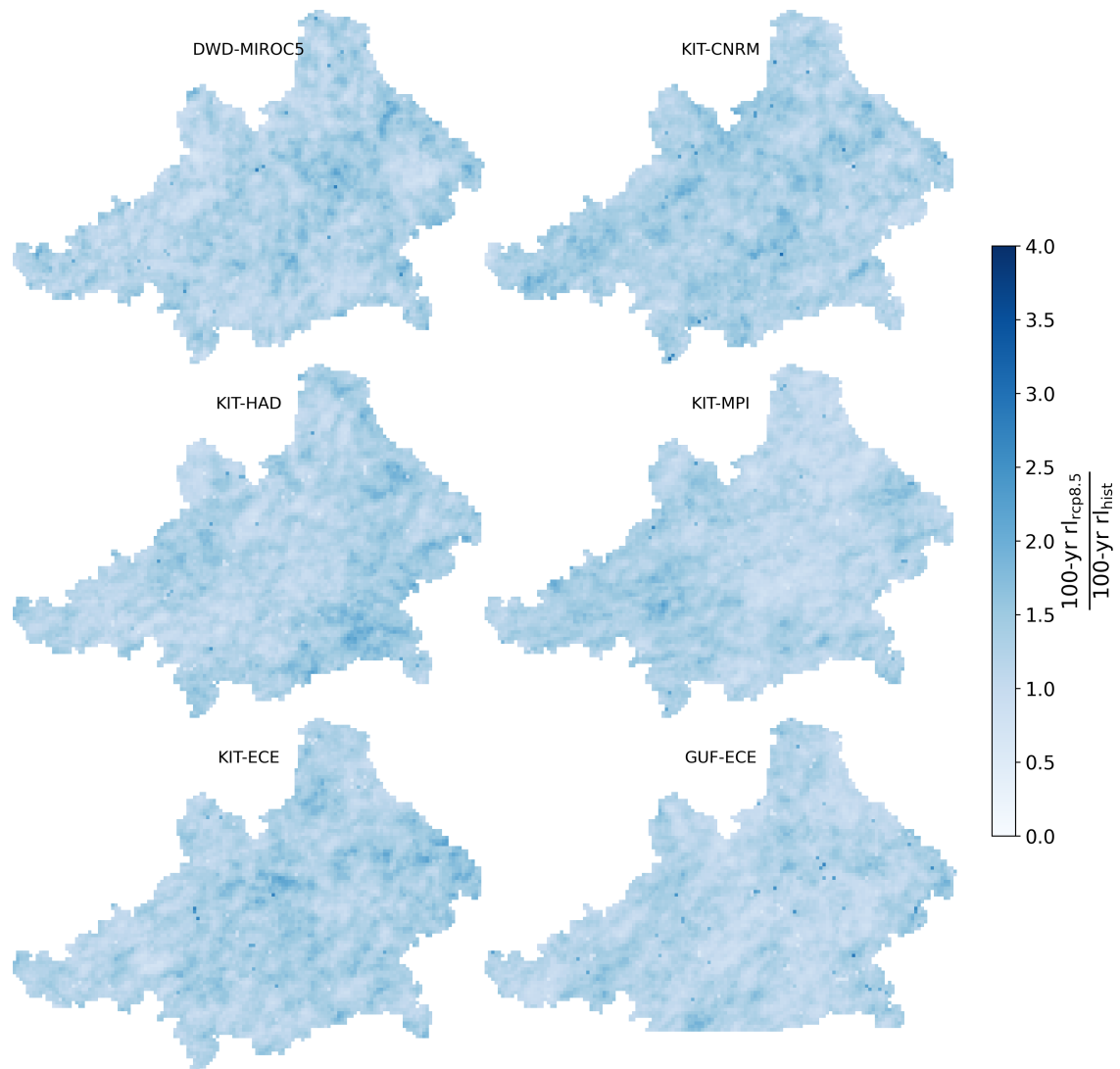


Figure S2. Fraction of RCP8.5 and historical 100-year return levels of 6h rainfall for every pixel within the Danube catchment and every member of the CPM ensemble

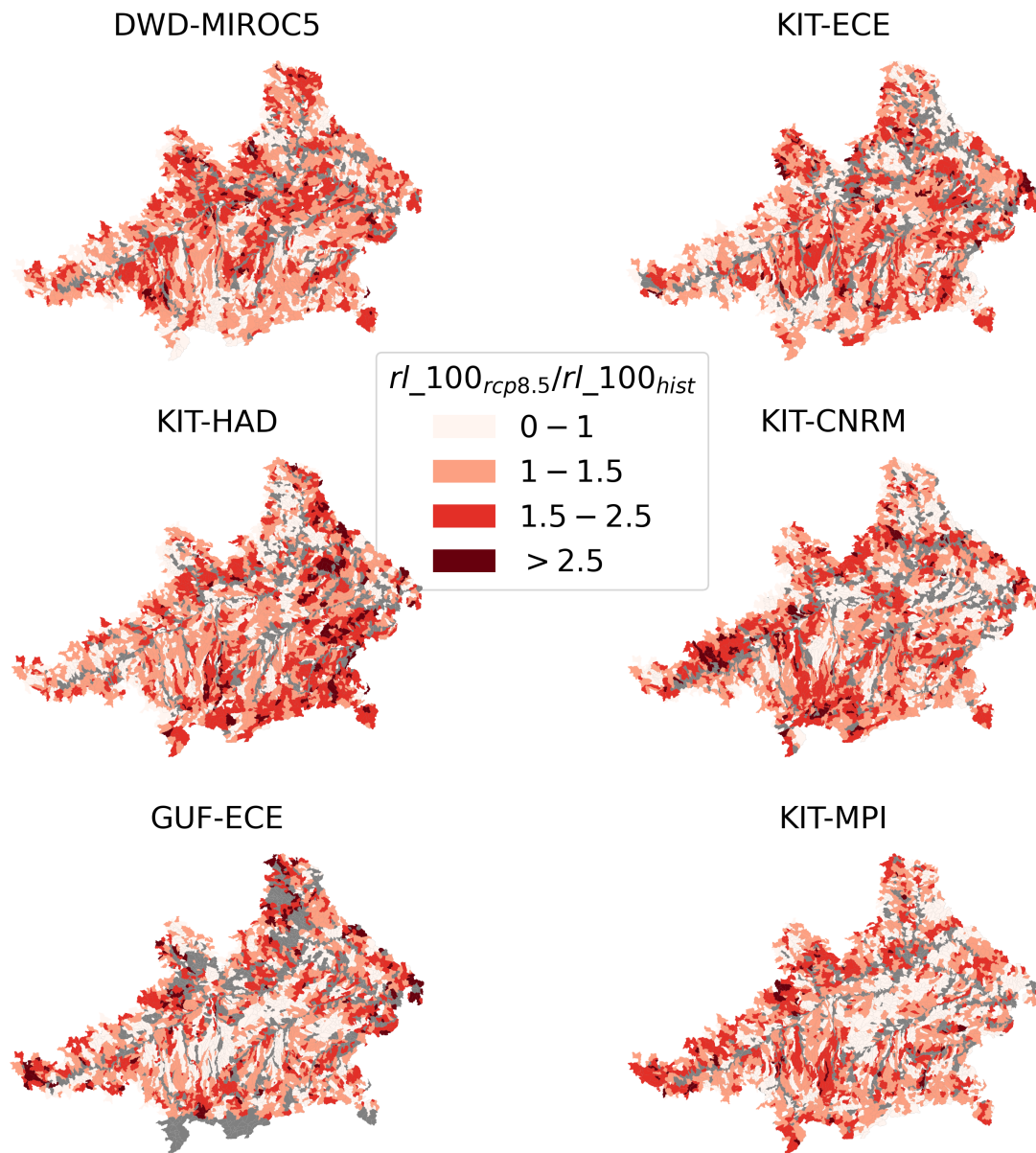


Figure S3. Ratio of future (RCP8.5) and historical 100-year return levels (orange) for each subbasins and ensemble member. Grey: subbasin which are either larger than 750 km² or with a shape parameter outside the range of -0.3 - 0.5.

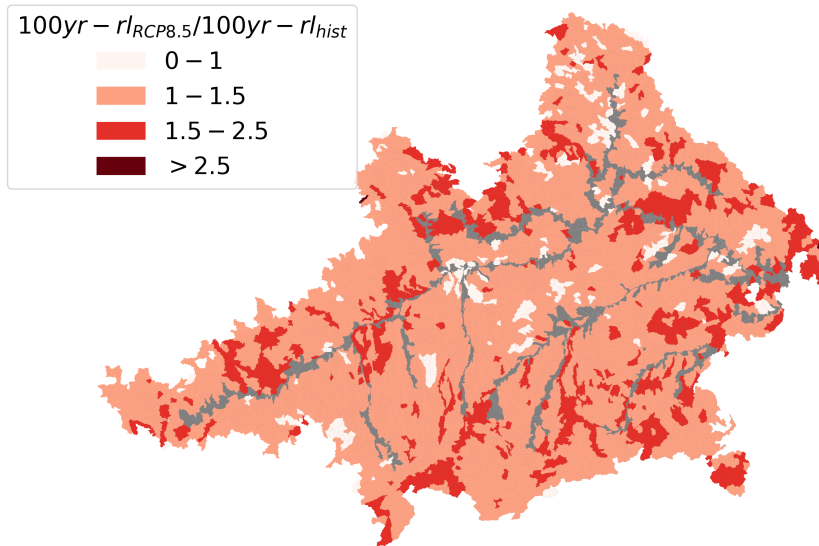


Figure S4. Ratios of the future (RCP8.5) and historical 100-year return levels of flood peak discharge for each subbasin in the Danube catchment based on the pooled dataset of all ensemble members. The median of the ratios are provided with 95 % confidence intervals.

Table S1. Number of subbasins with a valid shape parameter (between -0.3 - 0.5) for each ensemble member and the pooled dataset.

CPM	Nr. of basins	percentage of total nr. of basins
DWD-MIROC5	3016	96.4
KIT-CNRM	2905	92.8
KIT-HAD	2914	93.1
KIT-MPI	2907	92.9
KIT-ECE	2871	91.8
GUF-ECE	2645	84.6
pooled data	3128	100