

Supplementary Information for:

Identifying regions of Europe which may be less prepared for extreme rainfall

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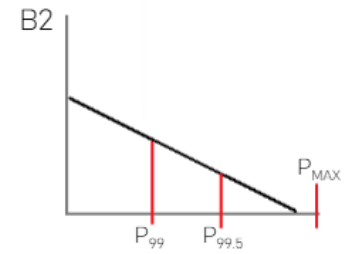
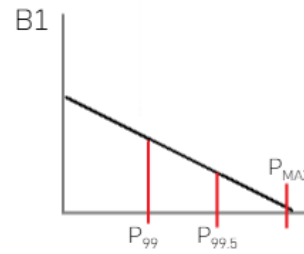
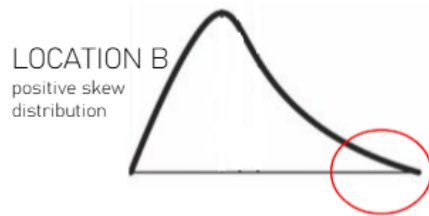
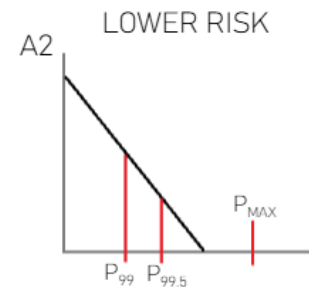
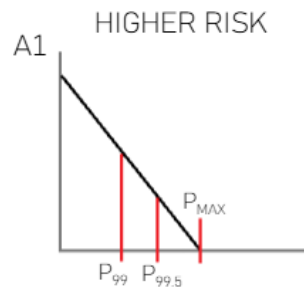
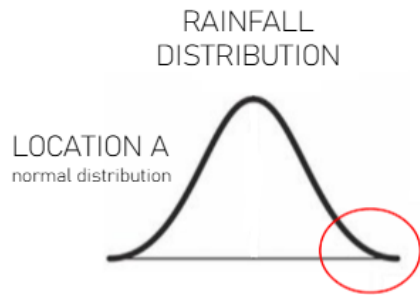
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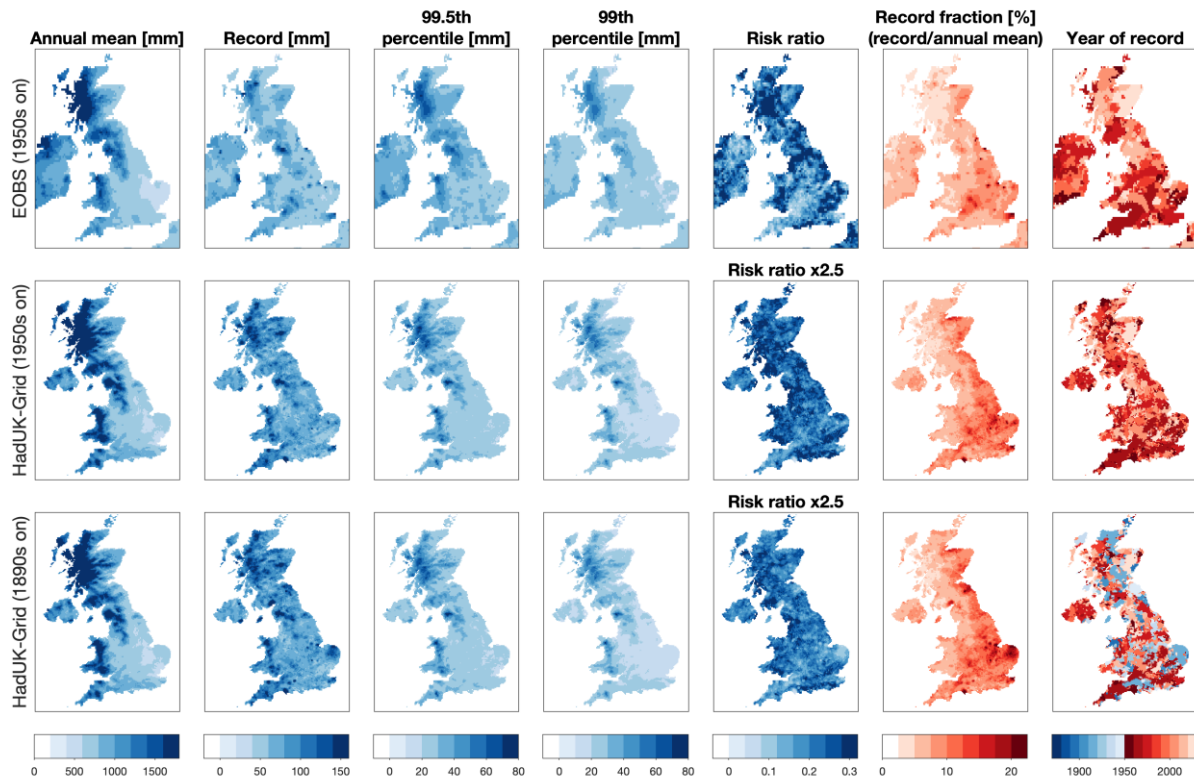
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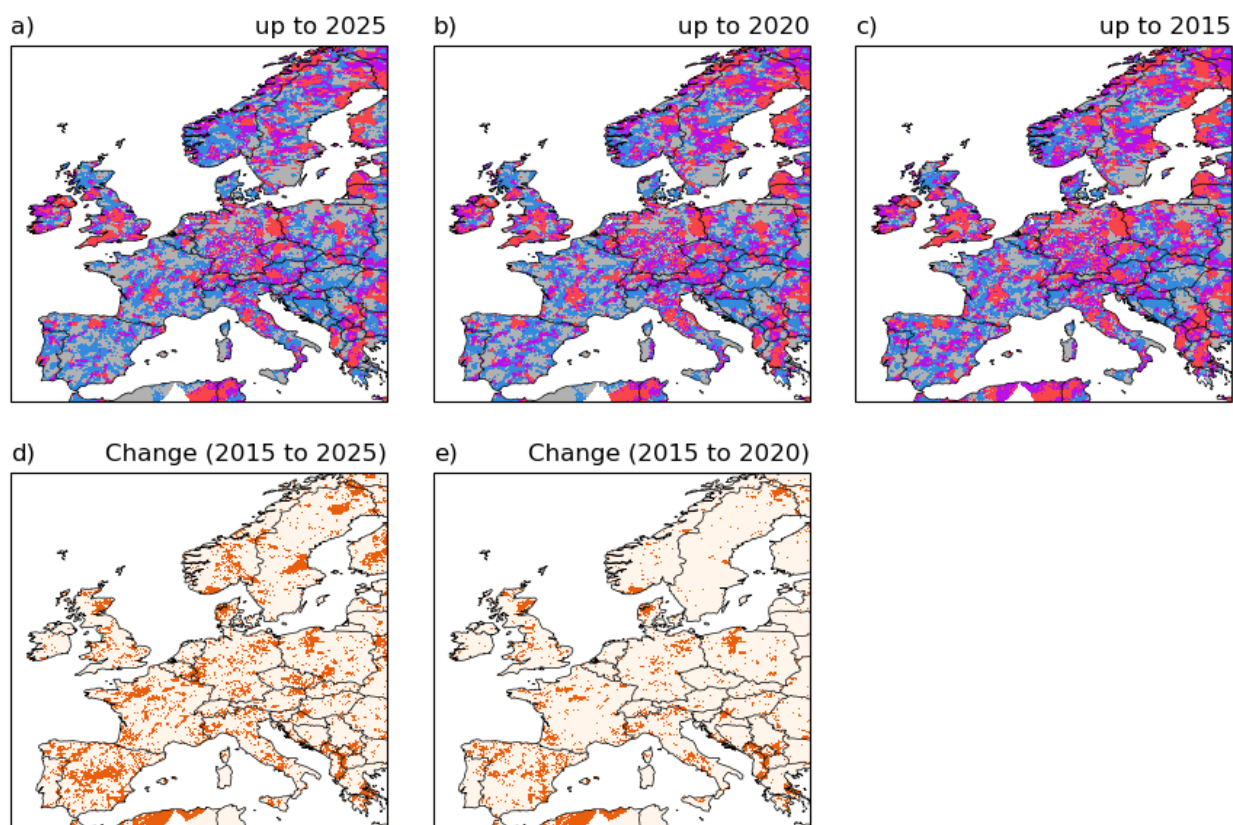
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Supplementary Figure 1: Illustration of the second metric in assumed preparedness: chance of a new record. P_{MAX} refers to the current record. At any given location, a higher P_{MAX} relative to the 99th percentile (P_{99}) of rainfall indicates a lower chance of breaking a record (A2 lower than A1 and B2 lower than B1). When comparing across locations, a location that has a larger relative difference between P_{MAX} and P_{99} compared to the difference between $P_{99.5}$ and P_{99} at that location would have a lower chance of breaking a record (location A2 lower than B2).

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Supplementary Figure 2: Comparing the E-OBS 0.1° and HadUK-Grid 5km datasets for the UK. The top row is from E-OBS as in the main text, with HadUK-Grid for the same time period (1950-2025) in the middle row. The bottom row extends the analysis back to 1891 using HadUK-Grid. Most notable is that HadUK-Grid has a larger record rainfall amount over large parts of the UK, even when considering the same time period as E-OBS. This difference cascades into reducing the risk ratio for the UK in HadUK-Grid. This is likely because E-OBS uses fewer stations than HadUK-Grid; it is not a resolution issue as the 12km HadUK-Grid dataset produces similar risk ratios to the 5km dataset (not shown). There are also some UK locations with record rainfall amounts earlier than 1950, which would not be captured by E-OBS.



Supplementary Figure 3: Assumed preparedness across Europe for three time periods. Showing each location classified by the assumed preparedness framework, using E-OBS **(a)** 1950-2025; **(b)** 1950-2020; and **(c)** 1950-2015. Regions where the classification has changed in the period **(d)** 2015 to 2025 or **(e)** 2015 to 2020 are highlighted in orange.