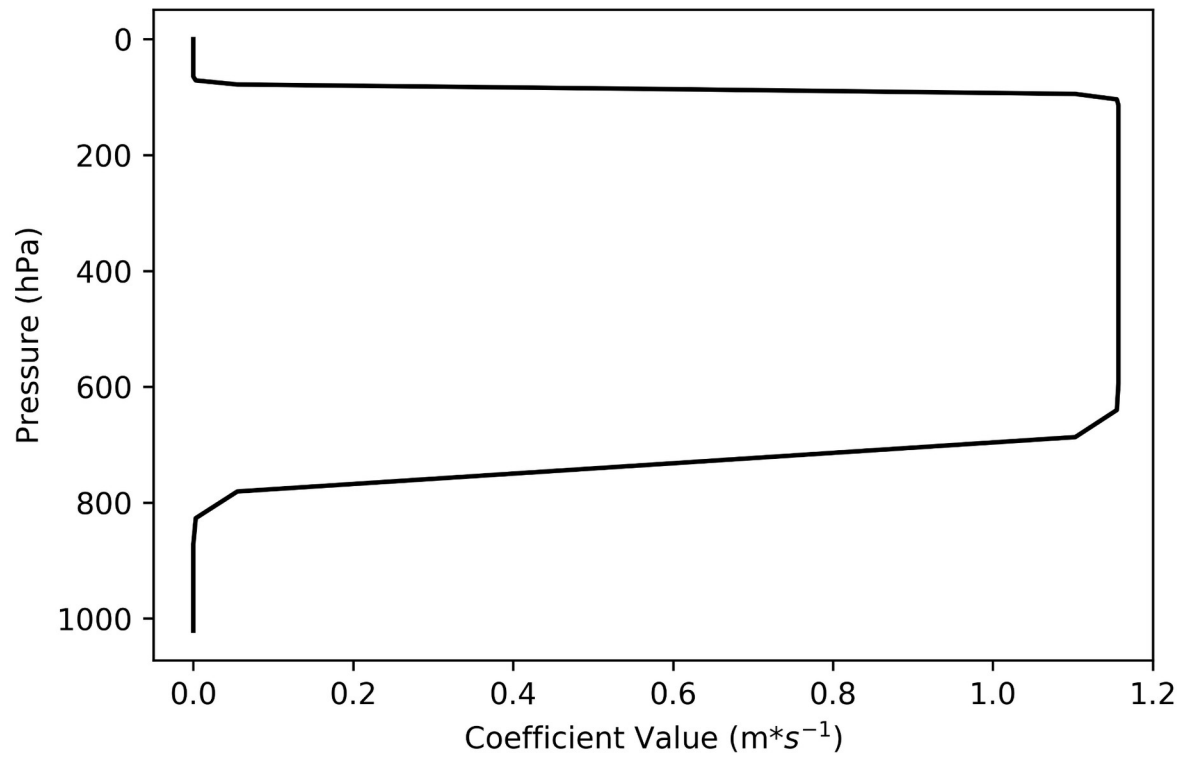


Supplemental Material.



*Figure S1. Vertical profile of the nudging coefficient used in our simulations.*

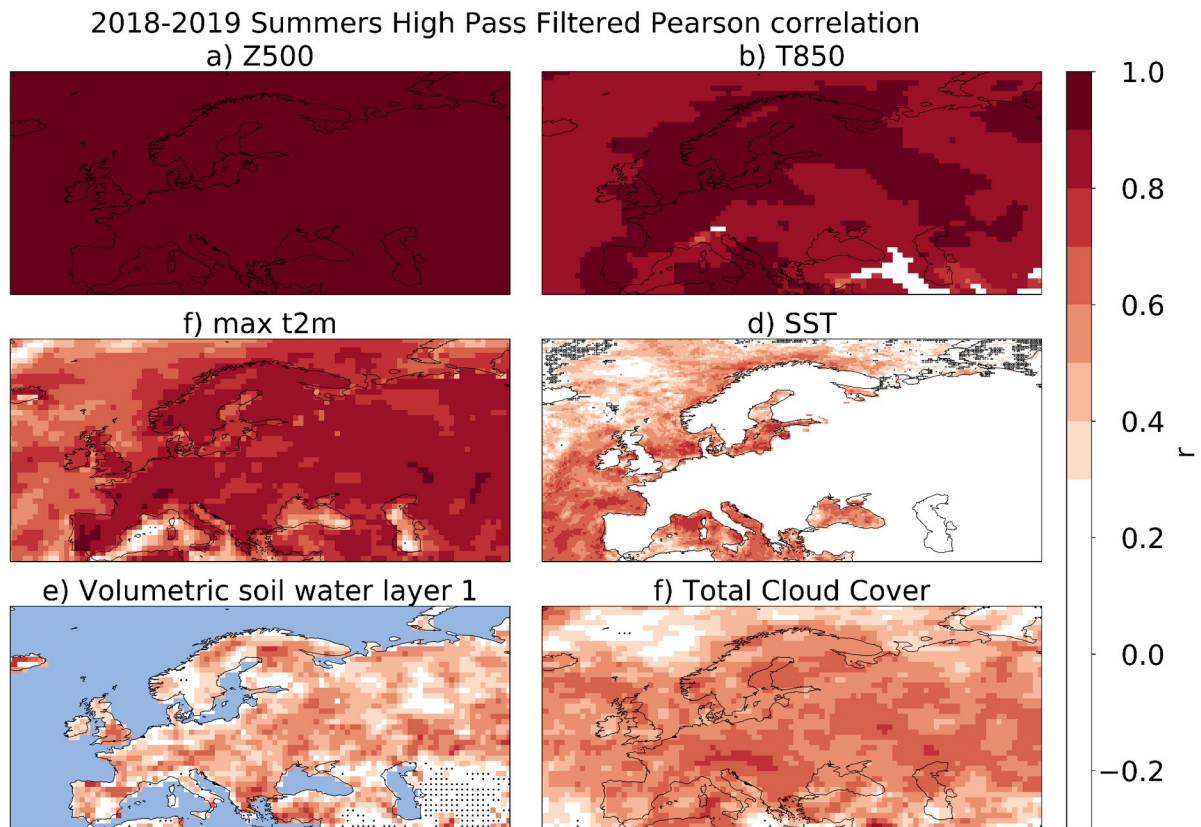


Figure S2. As Fig.6 but computed after having removed low-frequency variability (15-days running mean).

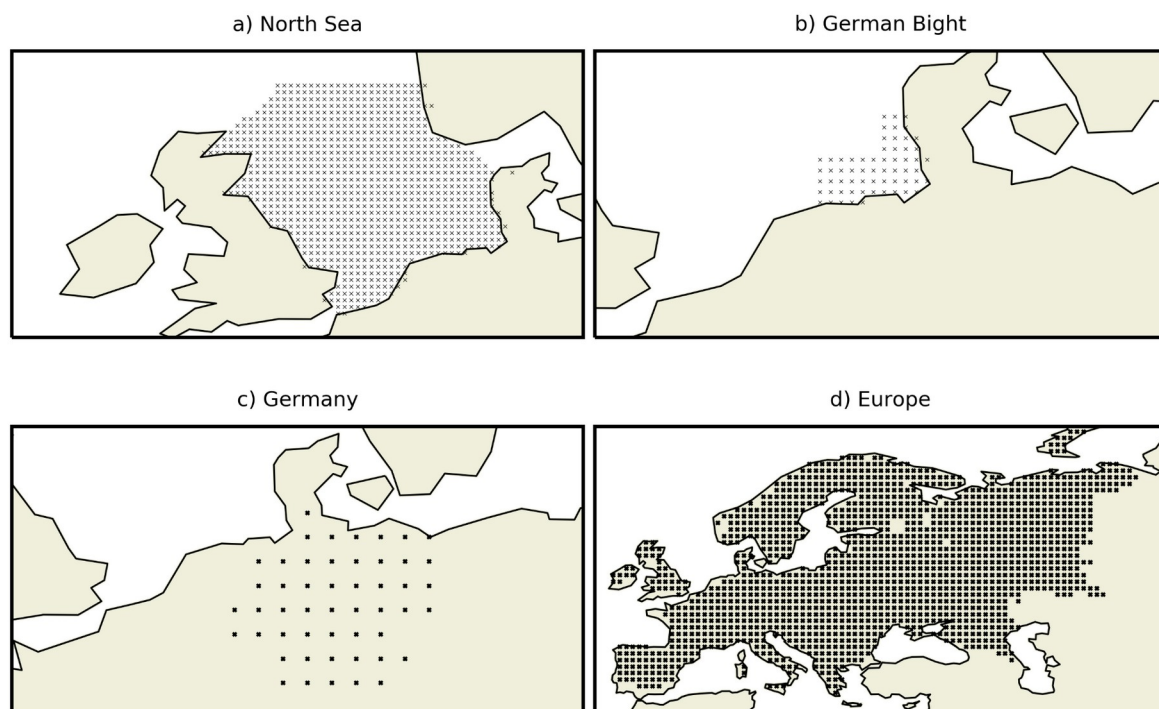


Figure S3. Illustration of the different areas used in this study.

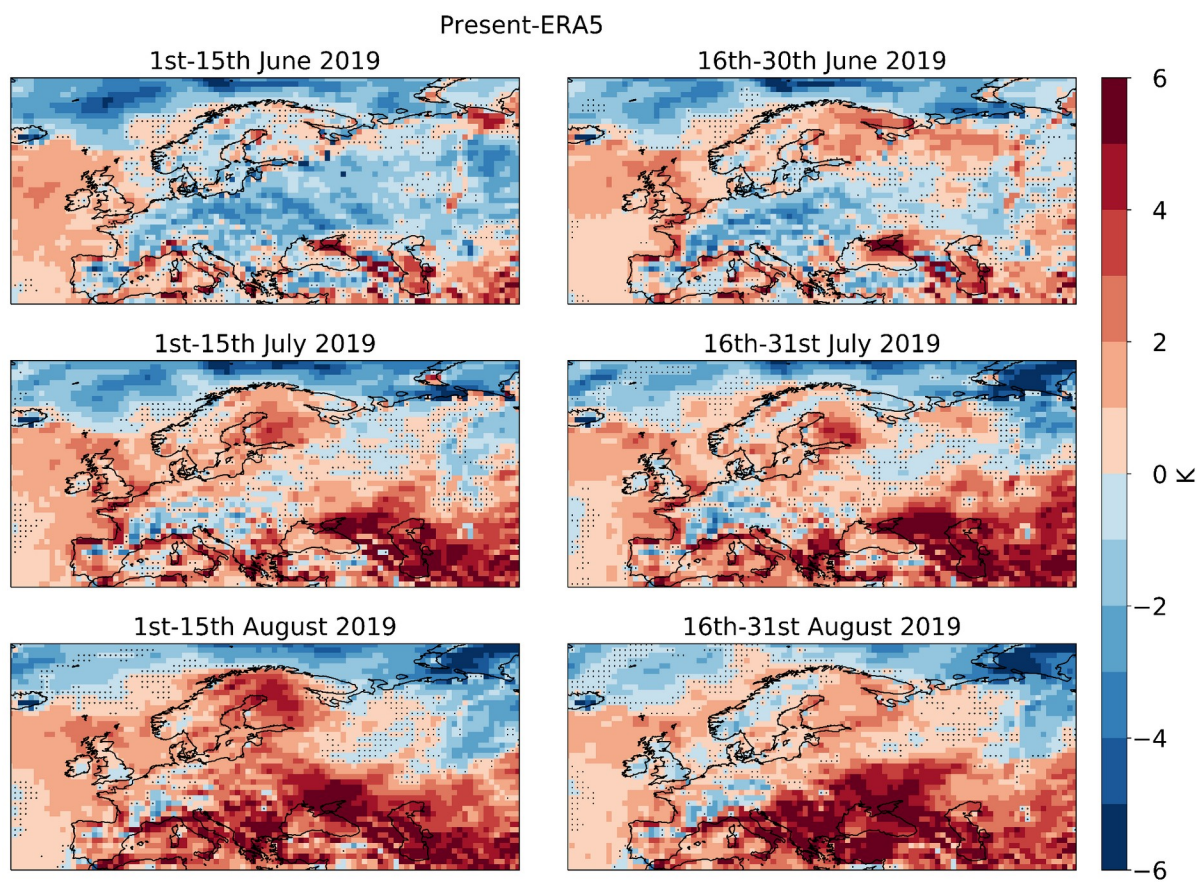


Figure S4. Evolution of the mean maximum t2m differences (in °C) between the present-day nudging simulations and ERA5 in summer 2019. Locations where the ensemble overlaps with ERA5 are indicated by dots.

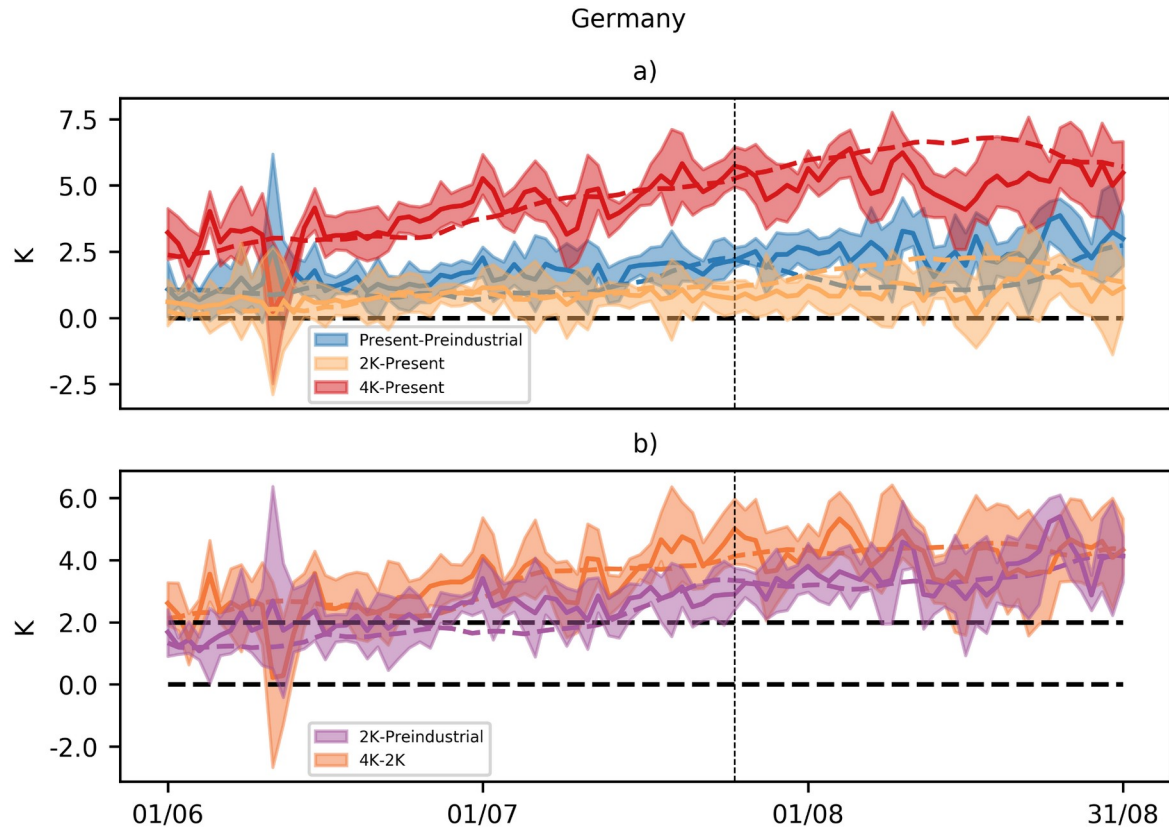


Figure S5. Seasonal evolution of daily maximum t2m differences averaged for Germany heatwave different climates. (a) Present-day minus pre-industrial (blue), +2K minus present-day (yellow), and +4K minus present-day (red). (b) +2K minus pre-industrial (purple) and +4K minus +2K (orange). Shading spans the min/max range of values obtained by the respective 5-member ensembles. Solid and dashed lines show differences for the ensemble mean and the climatology (from the free-run), respectively. The peak of the European heatwave on 25 July 2019 is marked by the vertical dashed line.



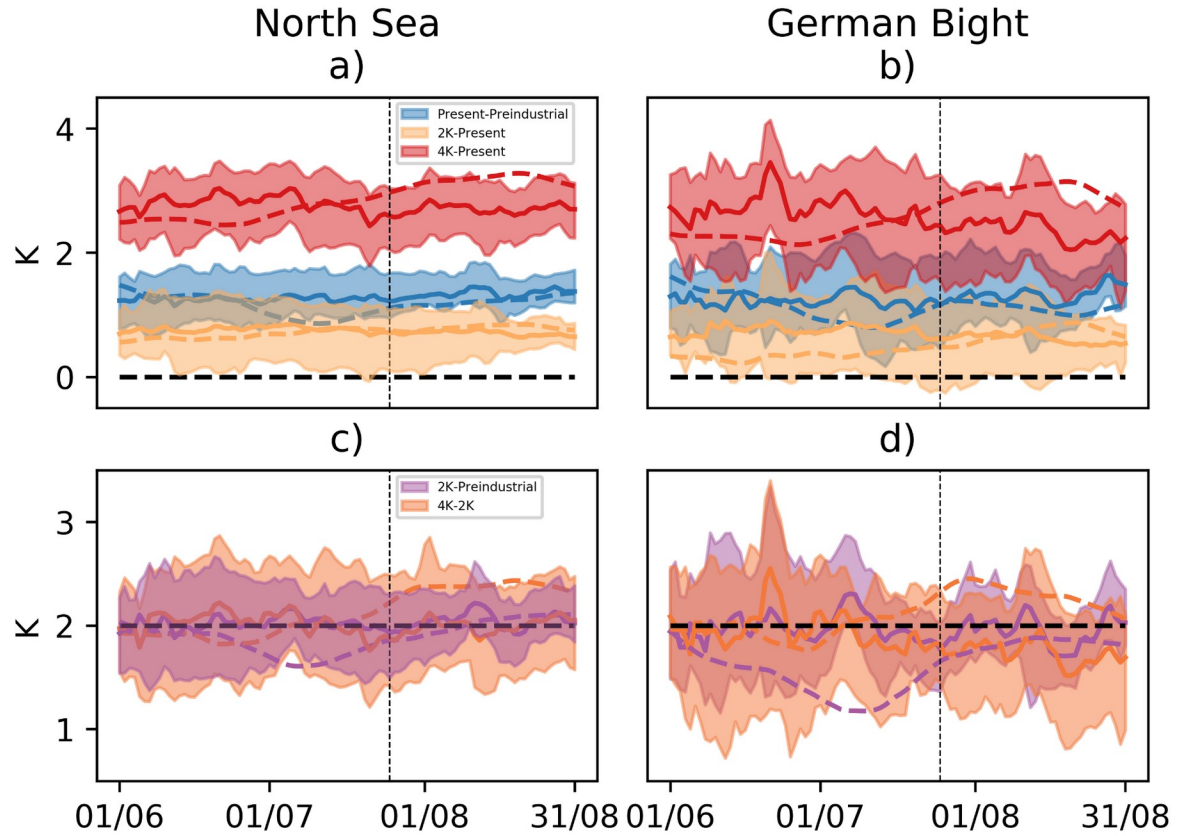


Figure S6. Seasonal evolution of SST differences averaged for (a,c) the North Sea and (b,d) German Bight between different climates. (a,b) Present-day minus pre-industrial (blue), +2K minus present-day (yellow), and +4K minus present-day (red). (c,d) +2K minus pre-industrial (purple) and +4K minus +2K (orange). Shading spans the min/max range of values obtained by the respective 5-member ensembles. Solid and dashed lines show the ensemble mean and the climatology (from the free-run), respectively. The peak of the European heat wave on 25 July 2019 is marked by the vertical dashed line.