

## Article

# Climate projections for precipitation and temperature indicators in the Douro Wine Region: the importance of bias correction

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## Supplementary materials

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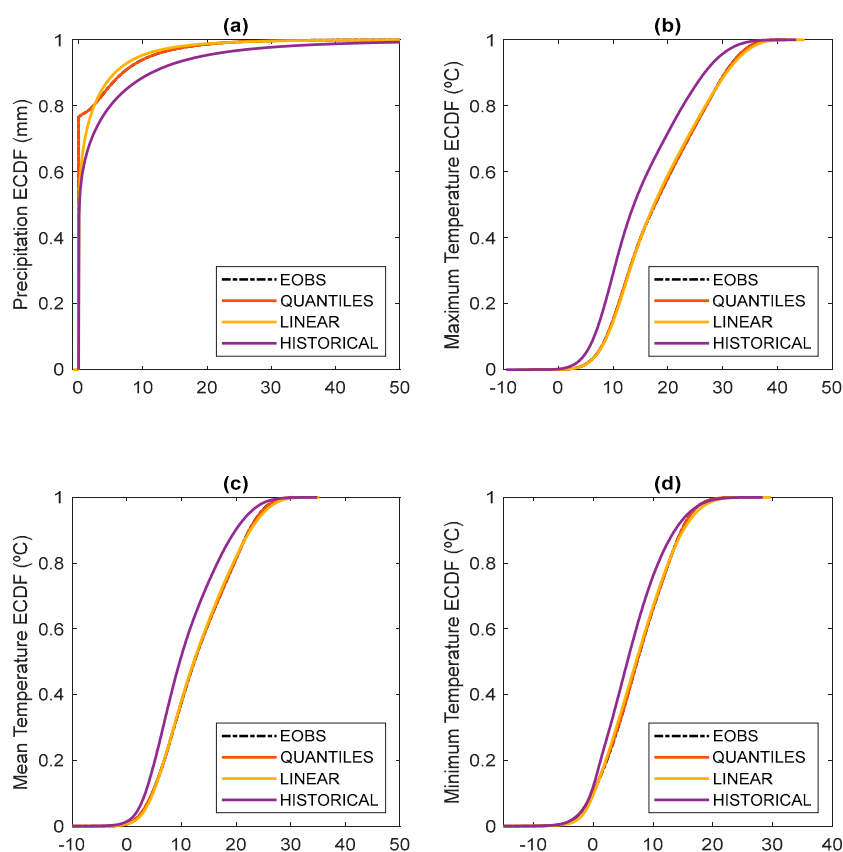


Figure S1. Empirical cumulative distribution functions (ECDF) for the historical period (1989–2005), for the daily (a) precipitation, (b) maximum temperature, (c) mean temperature, and (d) minimum temperature, for E-OBS data (dashed black line), bias-corrected data using the quantile mapping (orange line) and linear (yellow line) methods, and the original model simulation data (no bias correction for historical period; purple line).

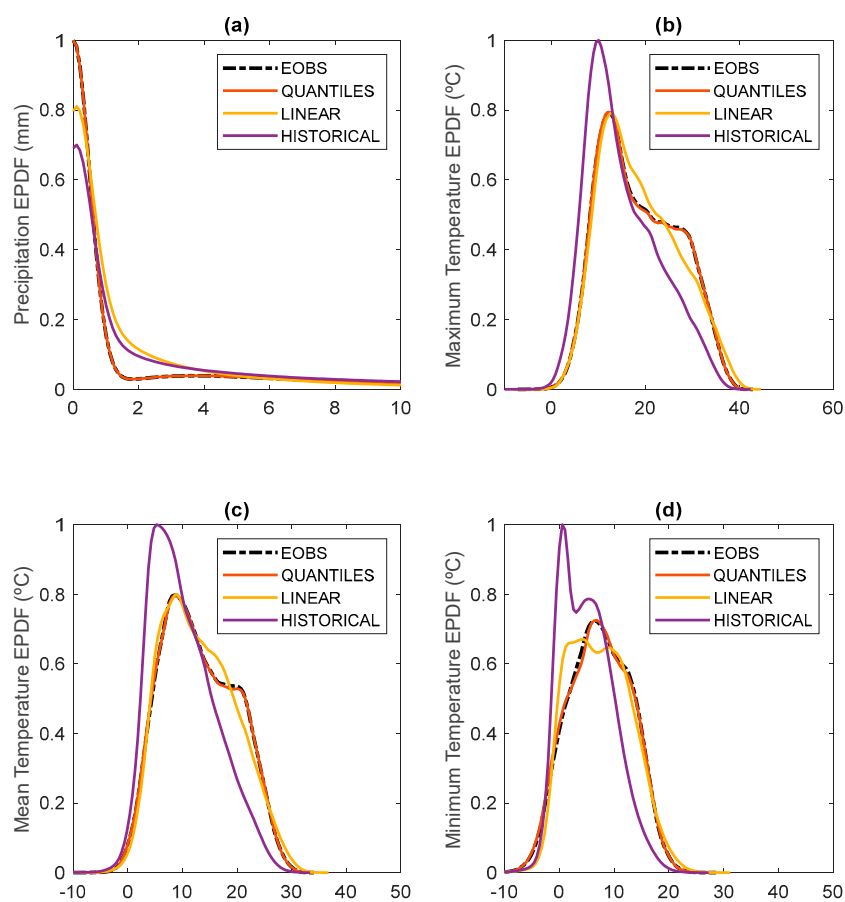


Figure S2. Empirical probability distribution functions (EPDF) for the historical period (1989–2005), for the daily (a) precipitation, (b) maximum temperature, (c) mean temperature, and (d) minimum temperature, for E-OBS data (dashed black line), bias-corrected data using the quantile mapping (orange line) and linear (yellow line) methods, and the original model simulation data (no bias correction for historical period; purple line), for the CNRM-CERFACS-CNRM-CM5 model.

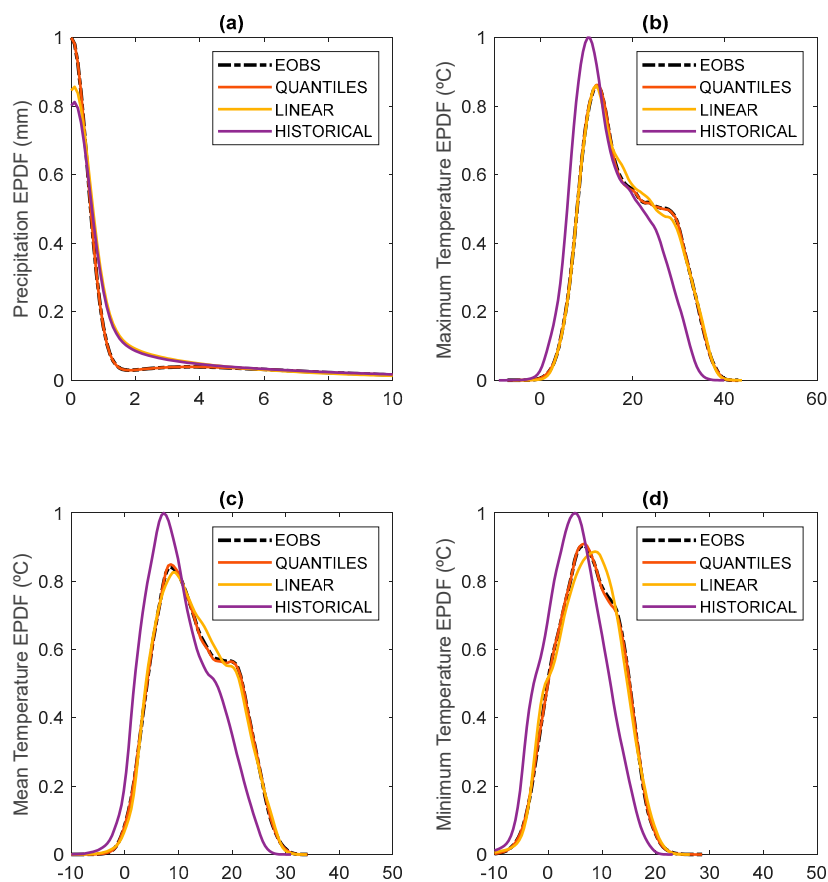


Figure S3. Empirical probability distribution functions (EPDF) for the historical period (1989–2005), for the daily (a) precipitation, (b) maximum temperature, (c) mean temperature, and (d) minimum temperature, for E-OBS data (dashed black line), bias-corrected data using the quantile mapping (orange line) and linear (yellow line) methods, and the original model simulation data (no bias correction for historical period; purple line), for the ICHEC-EC-EARTH model.

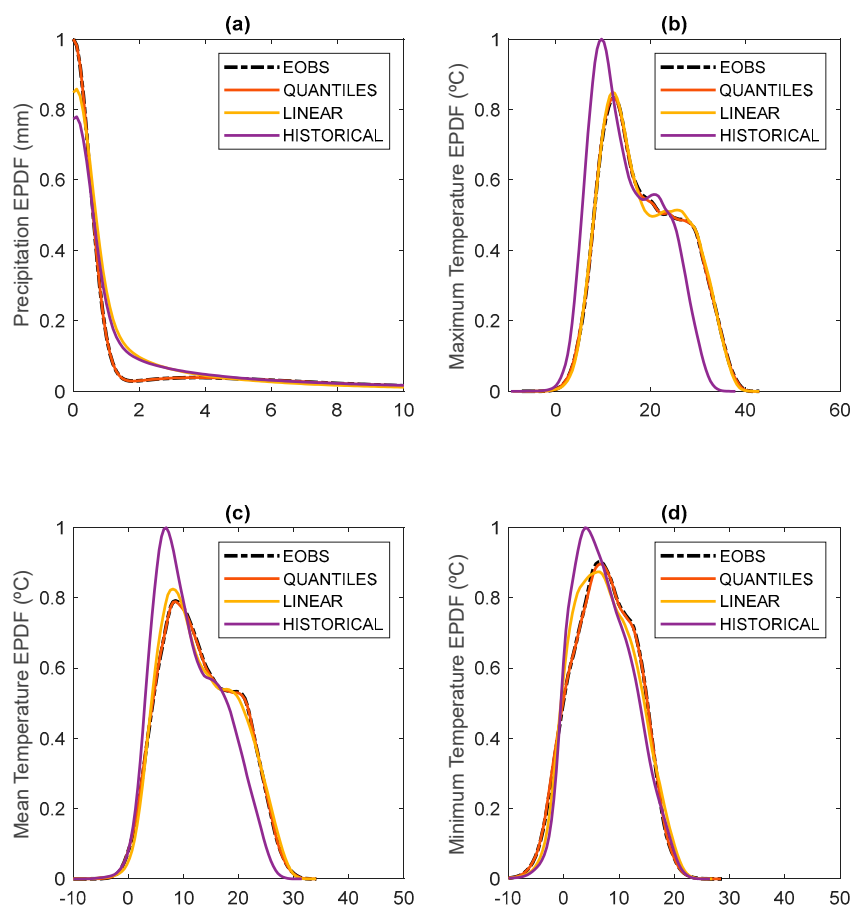


Figure S4. Empirical probability distribution functions (EPDF) for the historical period (1989-2005), for the daily (a) precipitation, (b) maximum temperature, (c) mean temperature, and (d) minimum temperature, for E-OBS data (dashed black line), bias-corrected data using the quantile mapping (orange line) and linear (yellow line) methods, and the original model simulation data (no bias correction for historical period; purple line), for the IPSL-IPSL-CM5A-MR model.

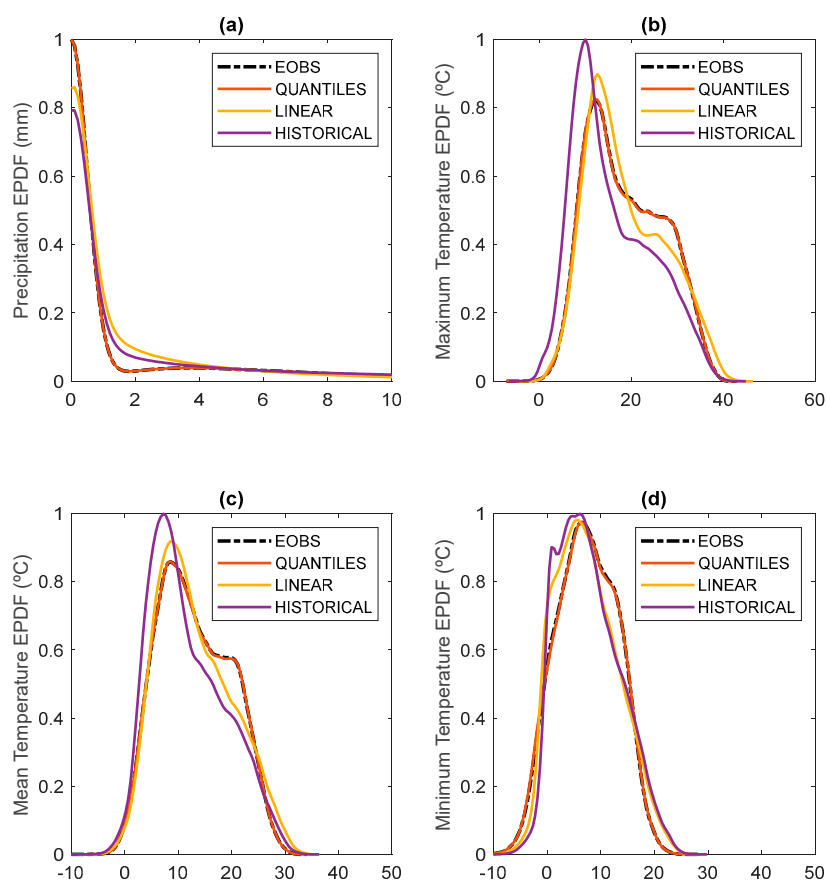


Figure S5. Empirical probability distribution functions (EPDF) for the historical period (1989–2005), for the daily (a) precipitation, (b) maximum temperature, (c) mean temperature, and (d) minimum temperature, for E-OBS data (dashed black line), bias-corrected data using the quantile mapping (orange line) and linear (yellow line) methods, and the original model simulation data (no bias correction for historical period; purple line), for the MPI-M-MPI-ESM-LR model.

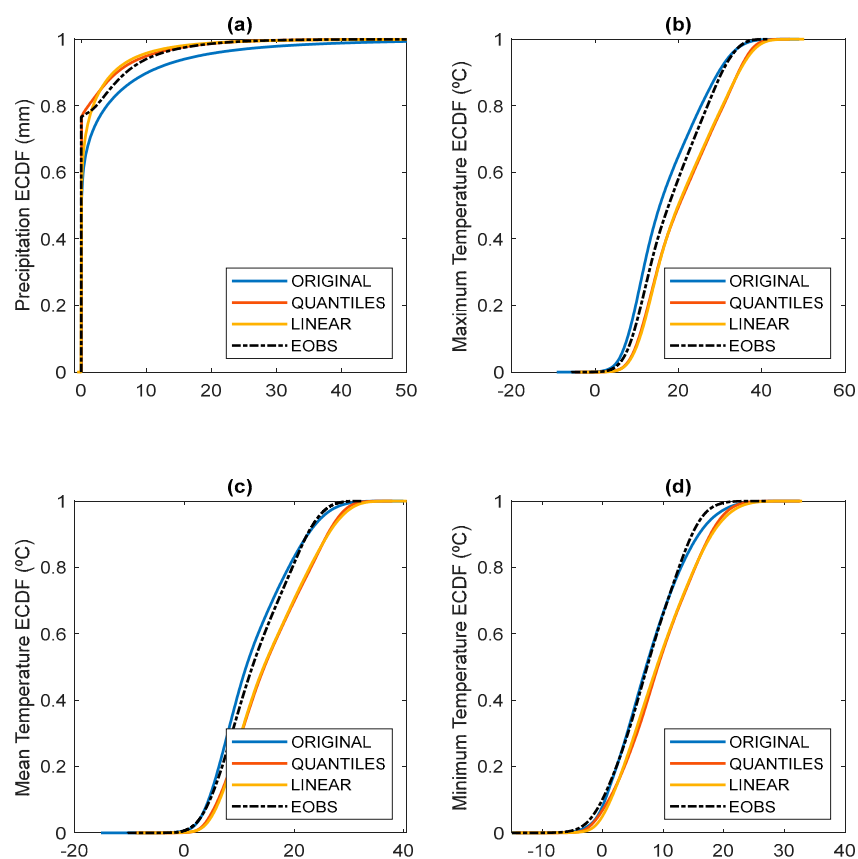


Figure S6. Empirical cumulative distribution functions (ECDF) for the future period (2051-2080), under the RCP8.5 scenario, for the daily (a) precipitation, (b) maximum temperature, (c) mean temperature, and (d) minimum temperature, for the original model simulation data (no bias correction; blue line), bias-corrected data using the quantile mapping (orange line) and linear (yellow line) methods. The corresponding ECDF for E-OBS data are also depicted (historical data; dashed black line).

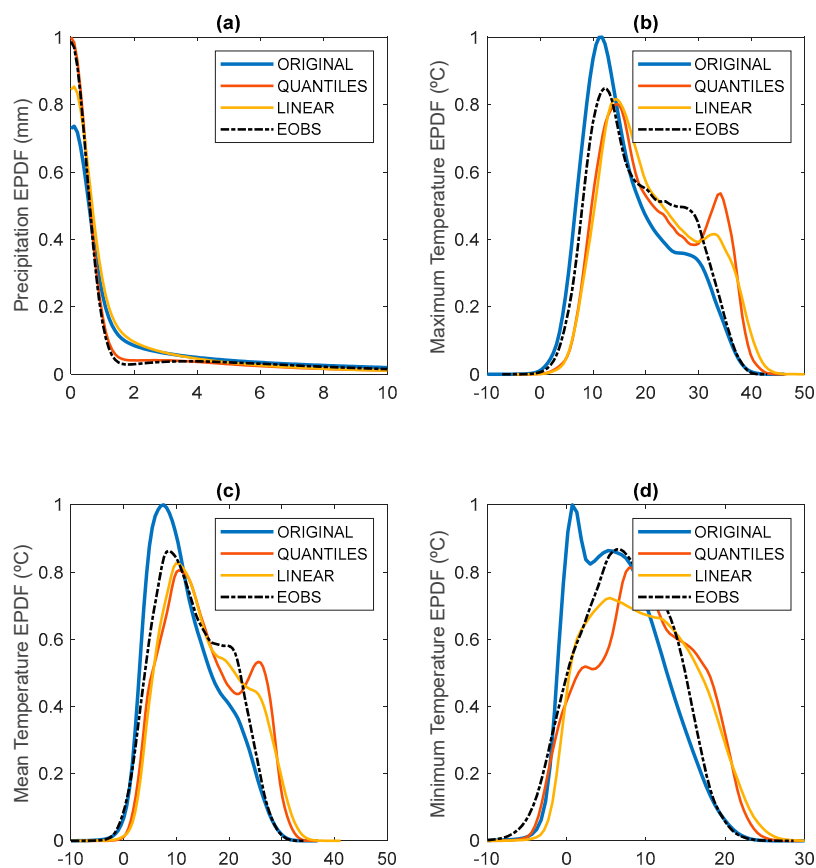


Figure S7. Empirical probability distribution functions (EPDF) for the future period (2051-2080), under the RCP8.5 scenario, for the CNRM-CERFACS-CNRM-CM5 model, for the daily (a) precipitation, (b) maximum temperature, (c) mean temperature, and (d) minimum temperature, for the original model simulation data (no bias correction; blue line), bias-corrected data using the quantile mapping (orange line) and linear (yellow line) methods. The corresponding ECDF for E-OBS data are also depicted (historical data; dashed black line).

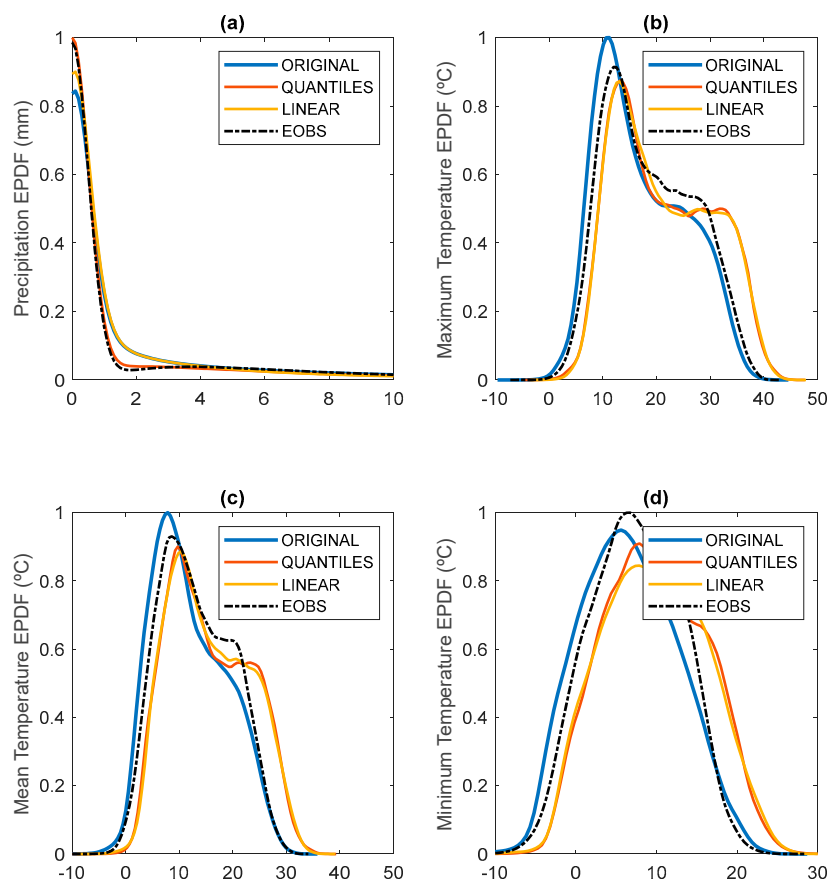


Figure S8. Empirical probability distribution functions (EPDF) for the future period (2051-2080), under the RCP8.5 scenario, for the ICHEC-EC-EARTH model, for the daily (a) precipitation, (b) maximum temperature, (c) mean temperature, and (d) minimum temperature, for the original model simulation data (no bias correction; blue line), bias-corrected data using the quantile mapping (orange line) and linear (yellow line) methods. The corresponding ECDF for E-OBS data are also depicted (historical data; dashed black line).



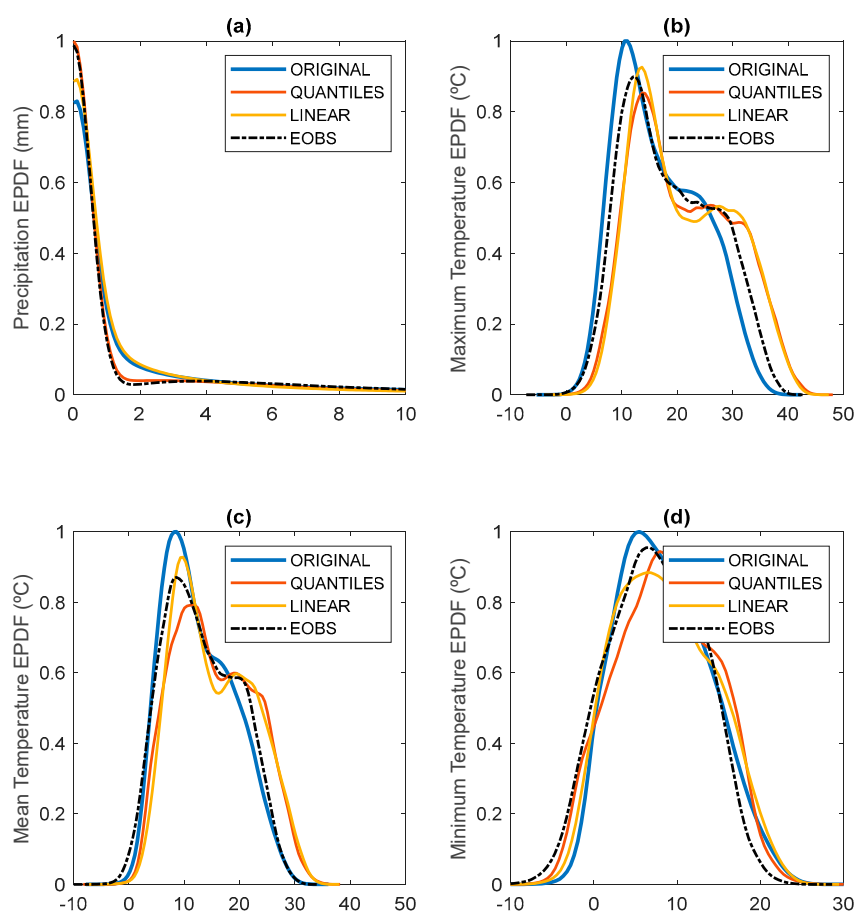


Figure S9. Empirical probability distribution functions (EPDF) for the future period (2051-2080), under the RCP8.5 scenario, for the IPSL-IPSL-CM5A-MR model, for the daily (a) precipitation, (b) maximum temperature, (c) mean temperature, and (d) minimum temperature, for the original model simulation data (no bias correction; blue line), bias-corrected data using the quantile mapping (orange line) and linear (yellow line) methods. The corresponding ECDF for E-OBS data are also depicted (historical data; dashed black line).

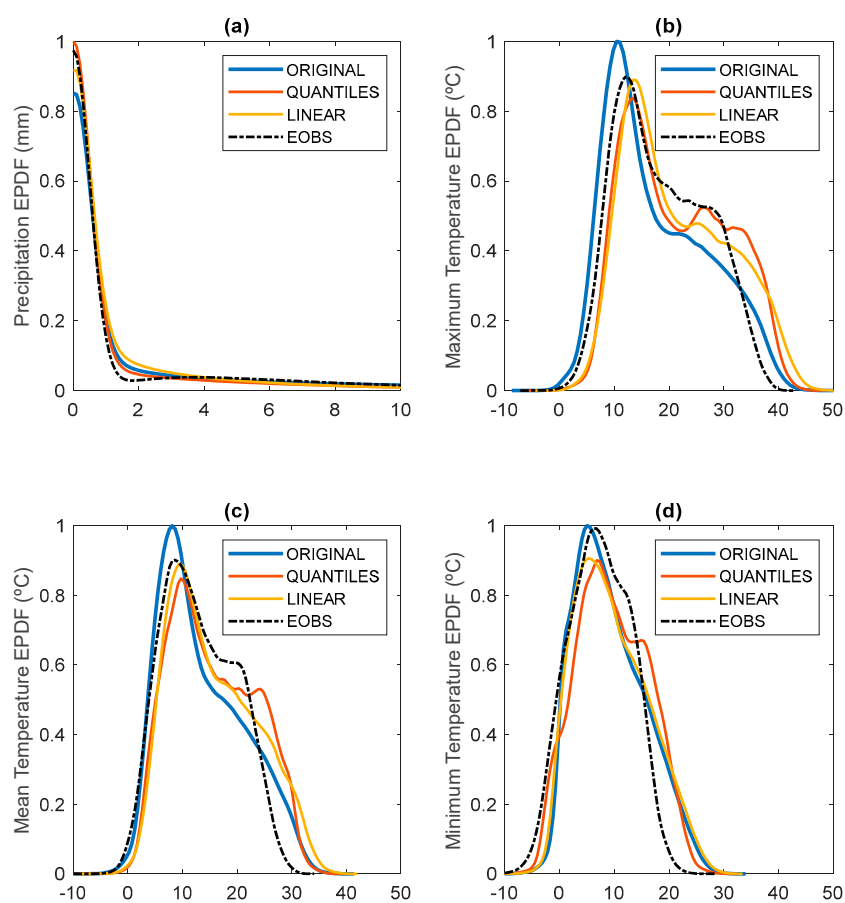


Figure S10 Empirical probability distribution functions (EPDF) for the future period (2051-2080), under the RCP8.5 scenario, for the MPI-M-MPI-ESM-LR model, for the daily (a) precipitation, (b) maximum temperature, (c) mean temperature, and (d) minimum temperature, for the original model simulation data (no bias correction; blue line), bias-corrected data using the quantile mapping (orange line) and linear (yellow line) methods. The corresponding ECDF for E-OBS data are also depicted (historical data; dashed black line).

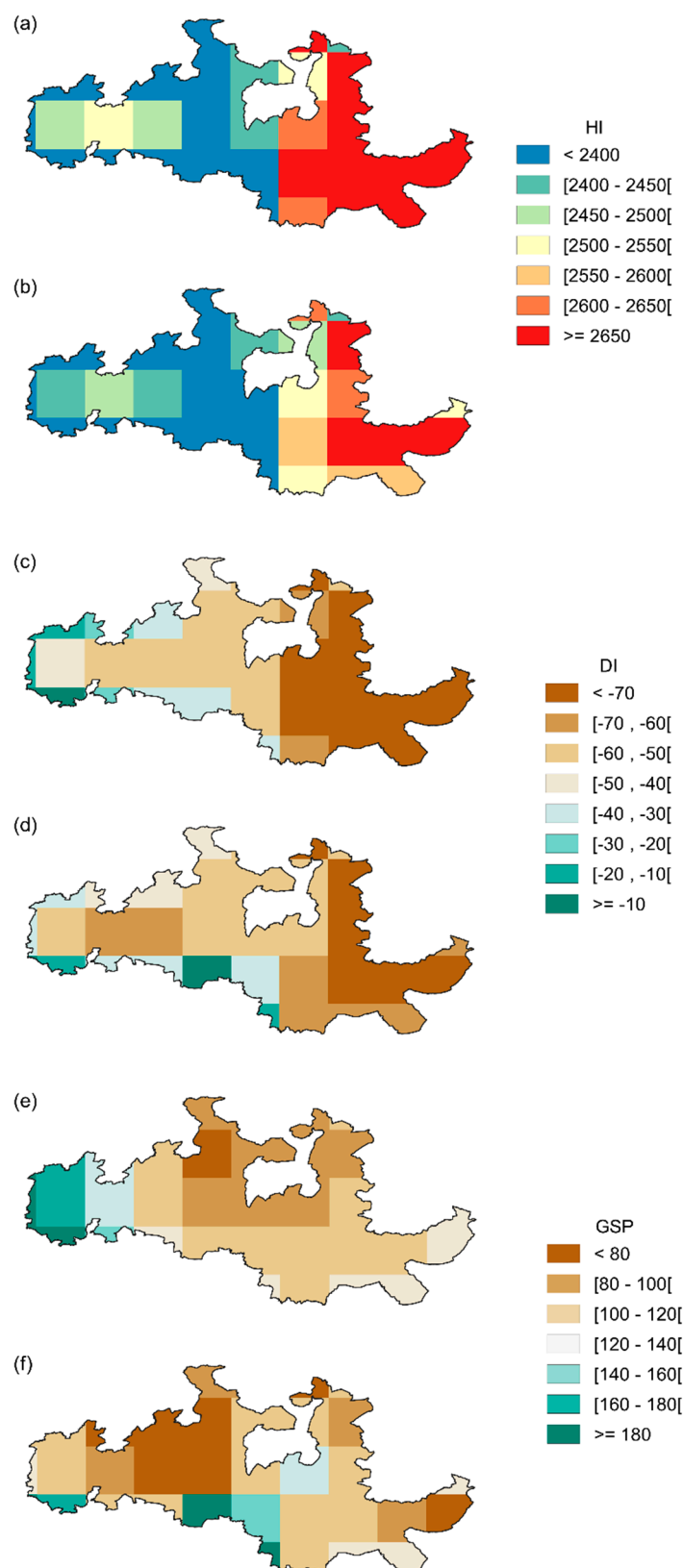


Figure S11. Huglin Index (HI) for Douro Wine Region and the future period (2051–2080), under the RCP8.5, with a bias correction following the (a) linear and (b) quantile mapping methods. (c,d) The same as for (a,b) but for the Dryness Index (DI). (e,f) The same as for (a,b) but for the Growing Season Precipitation (GSP).

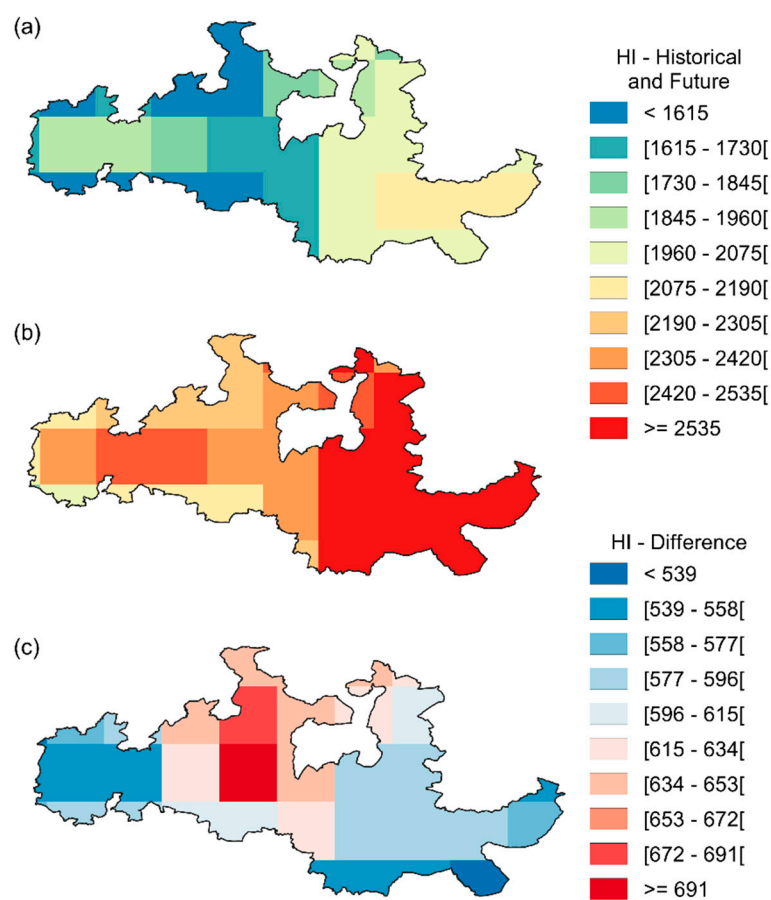


Figure S12. Huglin Index (HI) for the Douro Wine Region, bias-corrected by quantile mapping, for the (a) historical period (1989-2005), (b) future period (2051-2080) under the RCP8.5, and (c) future – historical difference.

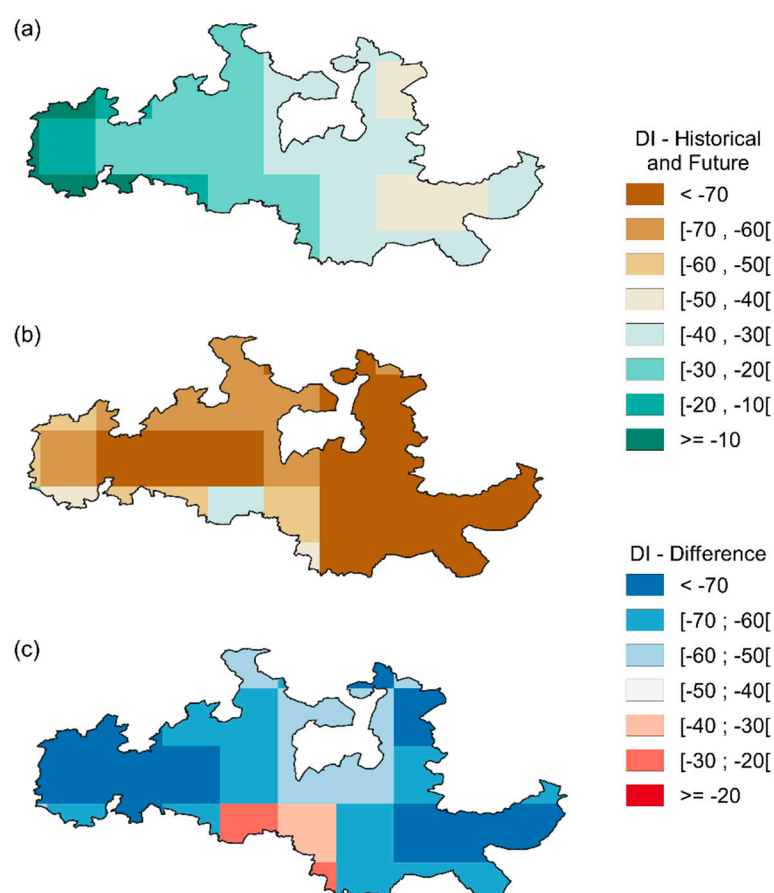


Figure S13. Dryness Index (DI) for the Douro Wine Region, bias-corrected by quantile mapping, for the (a) historical period (1989-2005), (b) future period (2051-2080) under the RCP8.5, and (c) future – historical difference.

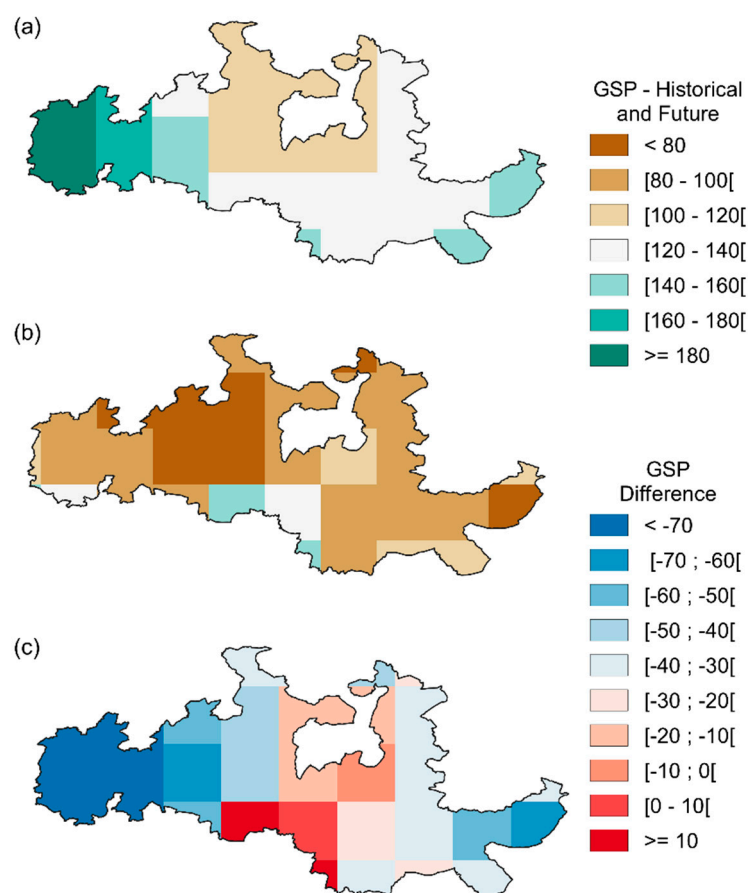


Figure S14. Growing Season Precipitation (GSP) for the Douro Wine Region, bias-corrected by quantile mapping, for the (a) historical period (1989-2005), (b) future period (2051-2080) under the RCP8.5, and (c) future – historical difference.