



Supplement of

Storylines of UK drought based on the 2010–2012 event

Wilson C. H. Chan et al.

Correspondence to: Wilson C. H. Chan (wilson.chan@pgr.reading.ac.uk)

The copyright of individual parts of the supplement might differ from the article licence.

Supplementary information

Table S1: Description of selected catchment properties

Catchment properties	Description
Catchment area (km ²)	Total area of the catchment (km ²)
DPSBAR (m/km) – catchment steepness	Mean drainage path slope (DPSBAR) is an index for catchment steepness calculated as the mean inter-nodal slopes within a catchment. Higher values indicate steeper terrain and lower values flatter terrain.
PROPWET (%)	Proportion of time soils within a catchment are designated as being wet (i.e. higher values indicate wetter). PROPWET varies from <20% to >80% across the UK.
Proportion of horticultural/arable land (%)	Land use information derived from the Land Cover Map 2000 and the NRFA Land Cover Classes 2000
BFI	Baseflow Index (BFI) is a measure of the proportion of river flow that derives from groundwater storage. Higher values indicate more permeable catchments with high groundwater contribution to river flow during dry periods.
SAAR 1961-1990 (mm)	Standardized Annual Average Rainfall (SAAR) over 1961-1990 30-year period

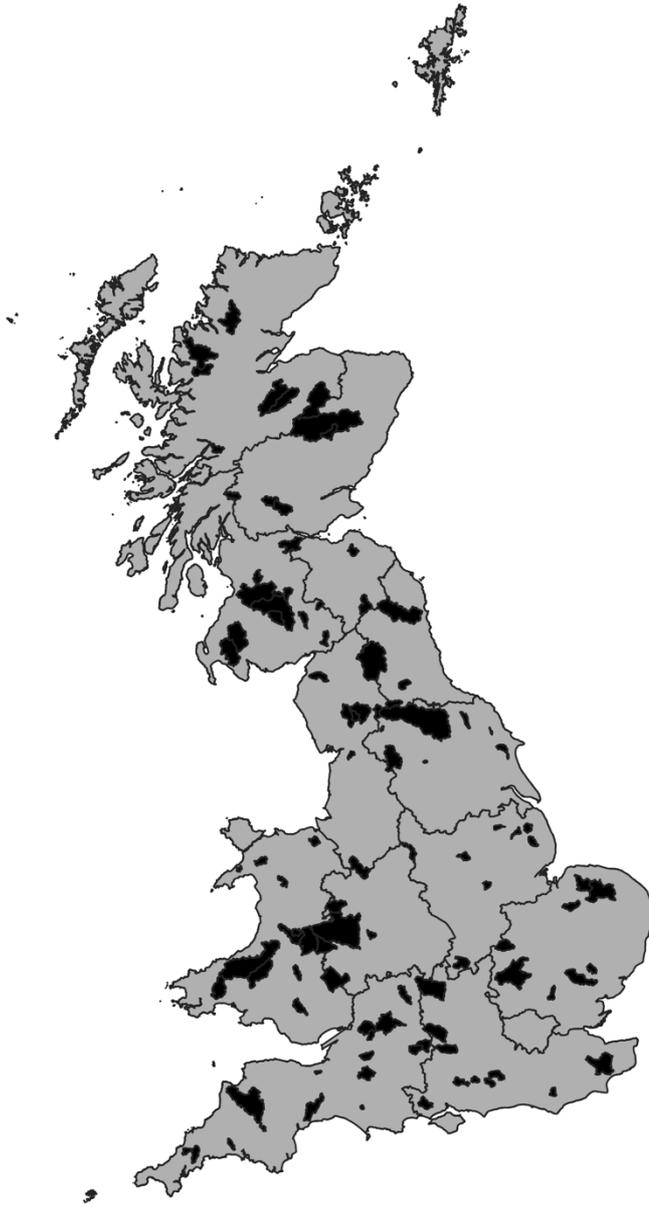


Figure S1 Catchments in the Low Flow Benchmark Network (LFBN) selected in this study

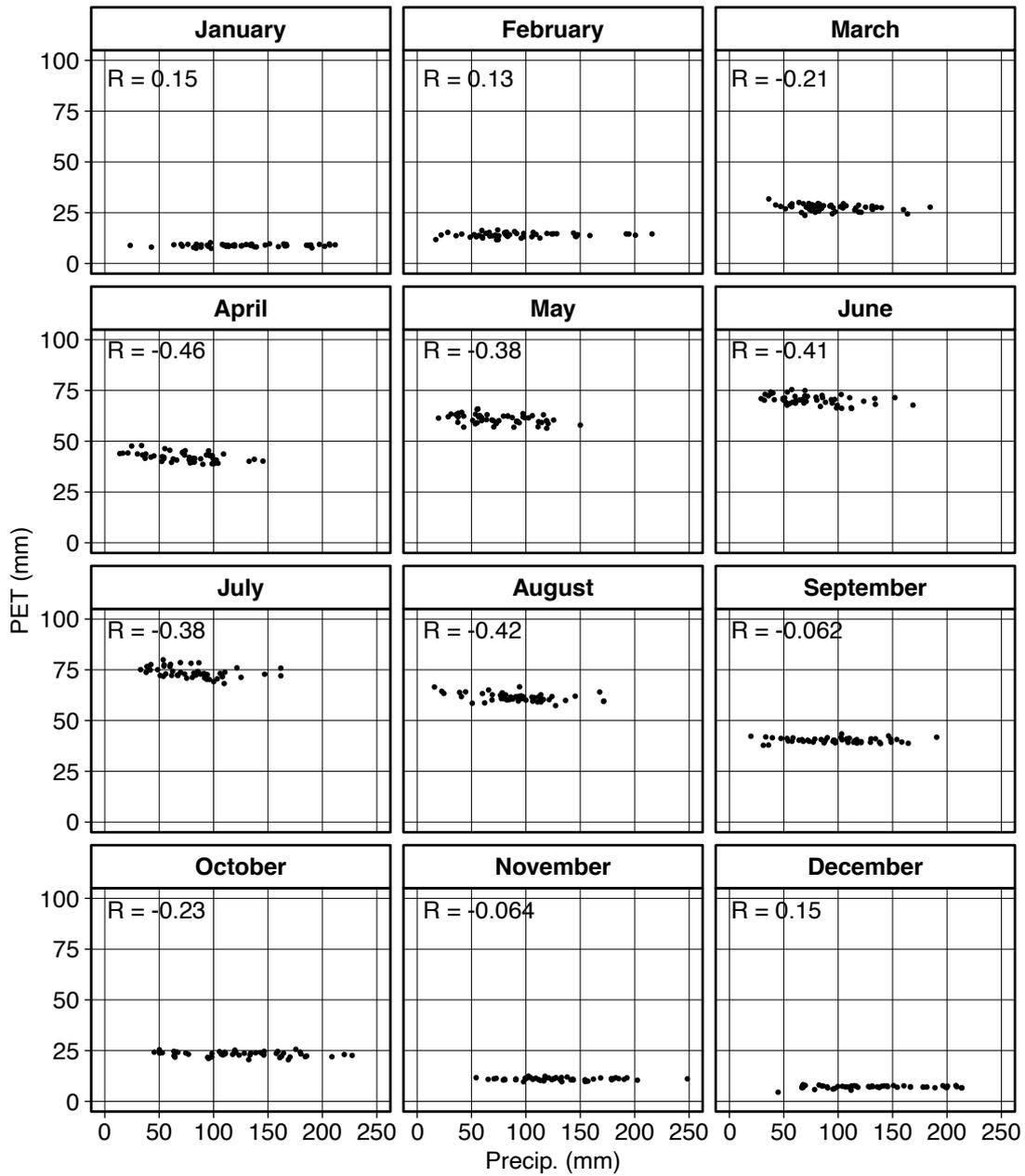


Figure S2: Observed relationship between PET and precipitation for each month for the period 1965-2015 averaged across 100 UK catchments. Correlation coefficient value is shown for each month.

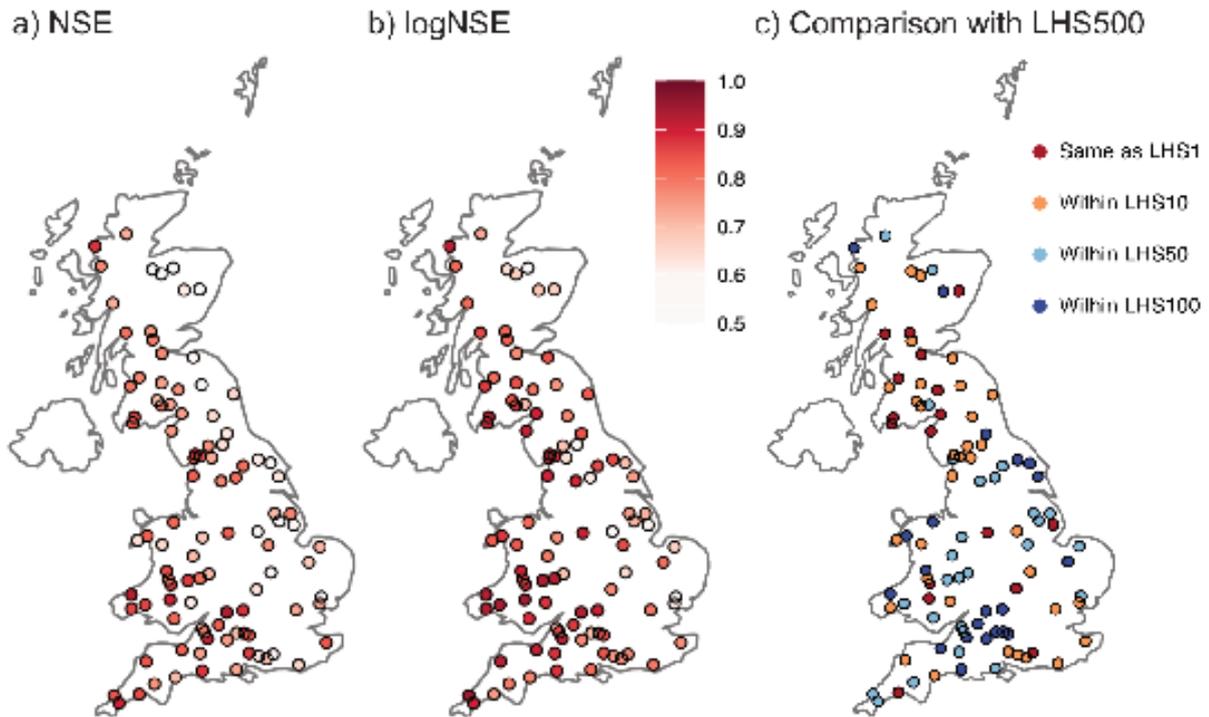


Figure S3: a) NSE and b) logNSE for each catchment for the top ranked parameter set in the Dry rank. c) Position of top ranked parameter set in the Dry rank in the original LHS500 ranking.

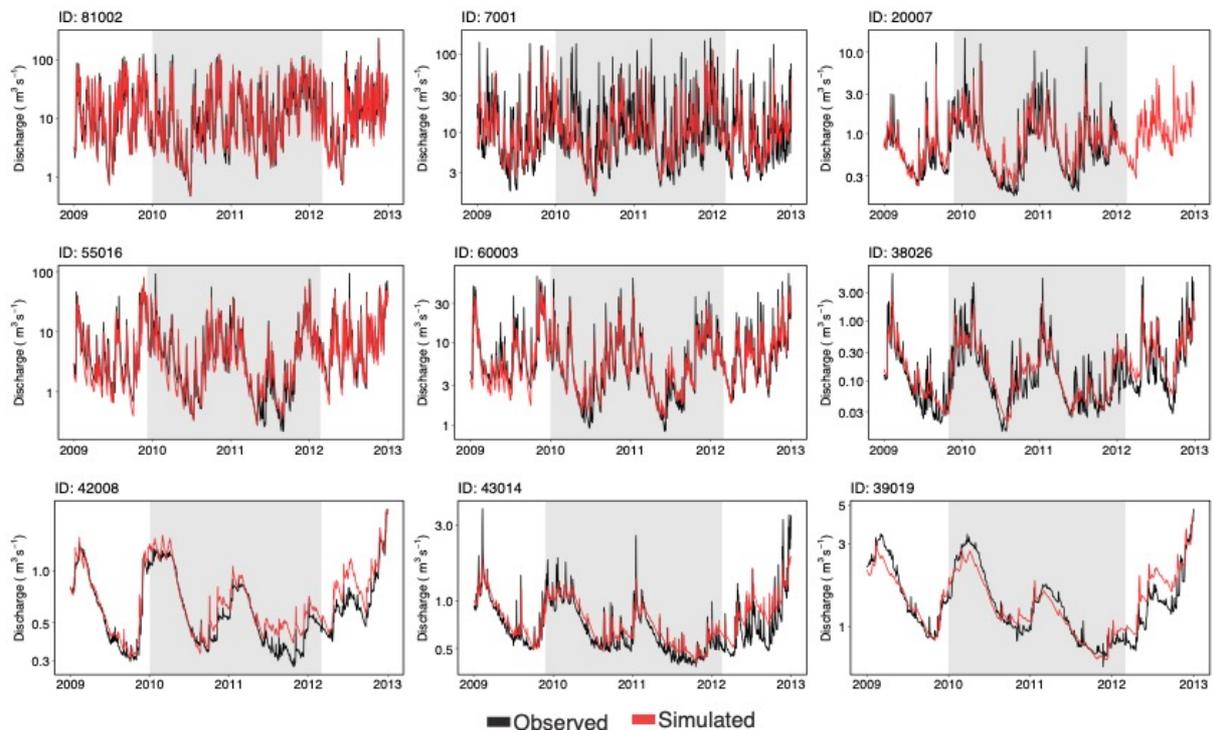


Figure S4: Daily observed (black) and simulated (red) river flow across nine example catchments from the top parameter set in the re-ranked parameter ensemble from Smith et al. (2019). The y axis is presented in log scale for better visualization of low flows

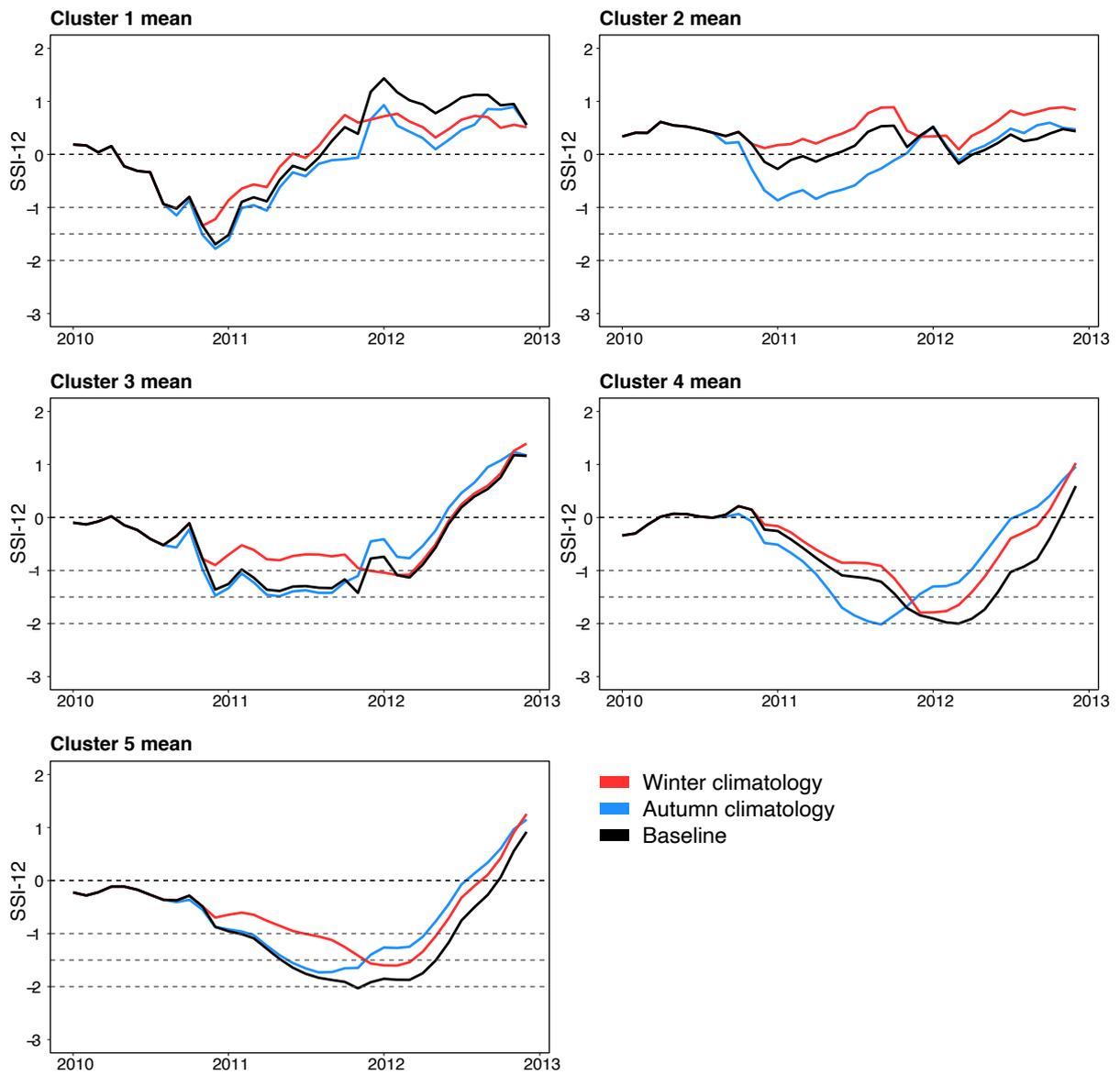


Figure S5: Cluster mean SSI-12 for the storylines of seasonal contributions with winter 2010/11 and 2011/12 (red) and autumn 2010 and 2011 (blue) replaced by daily climatological values.

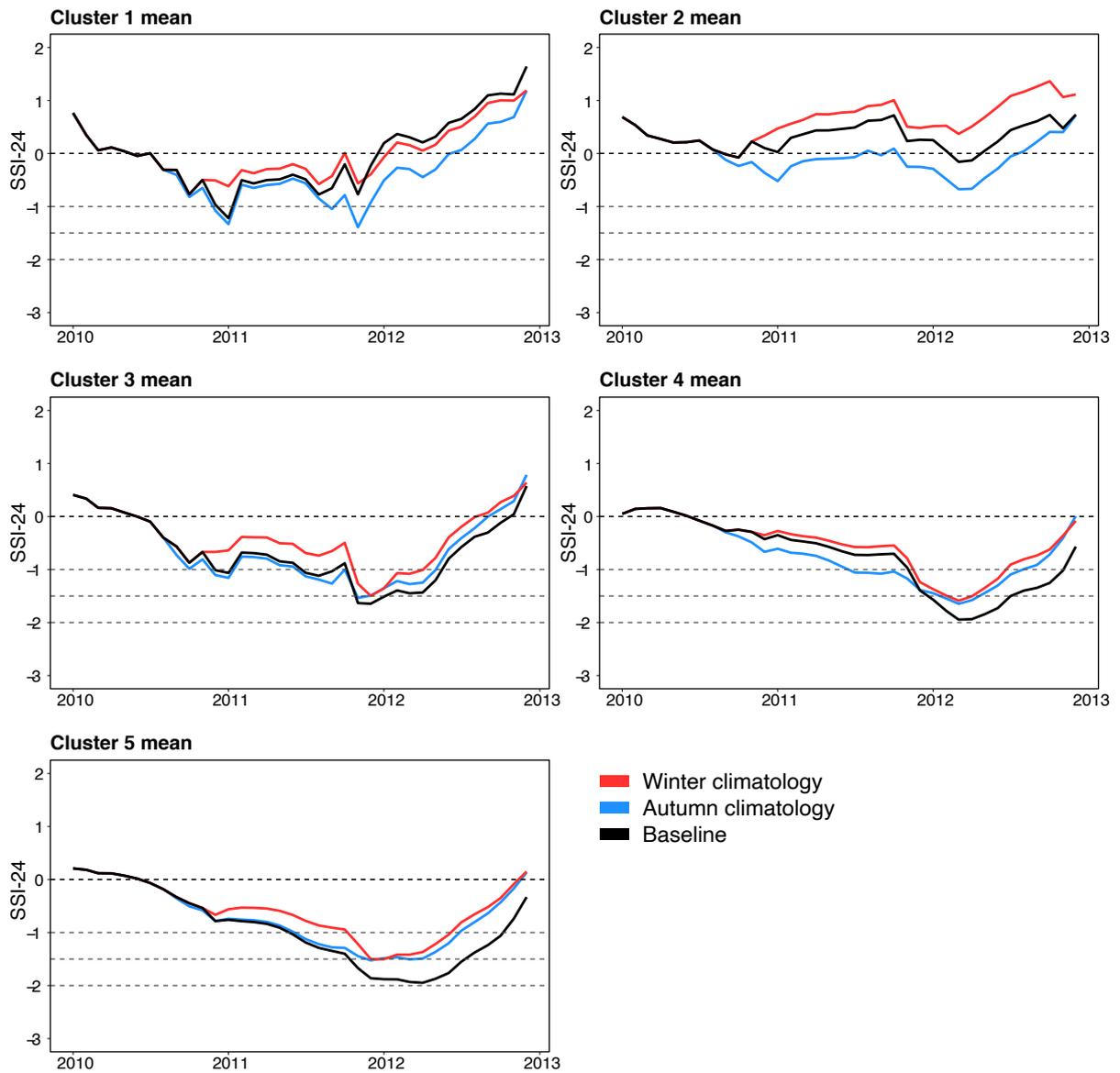


Figure S6: Same as Figure S5 but for cluster mean of SSI-24.

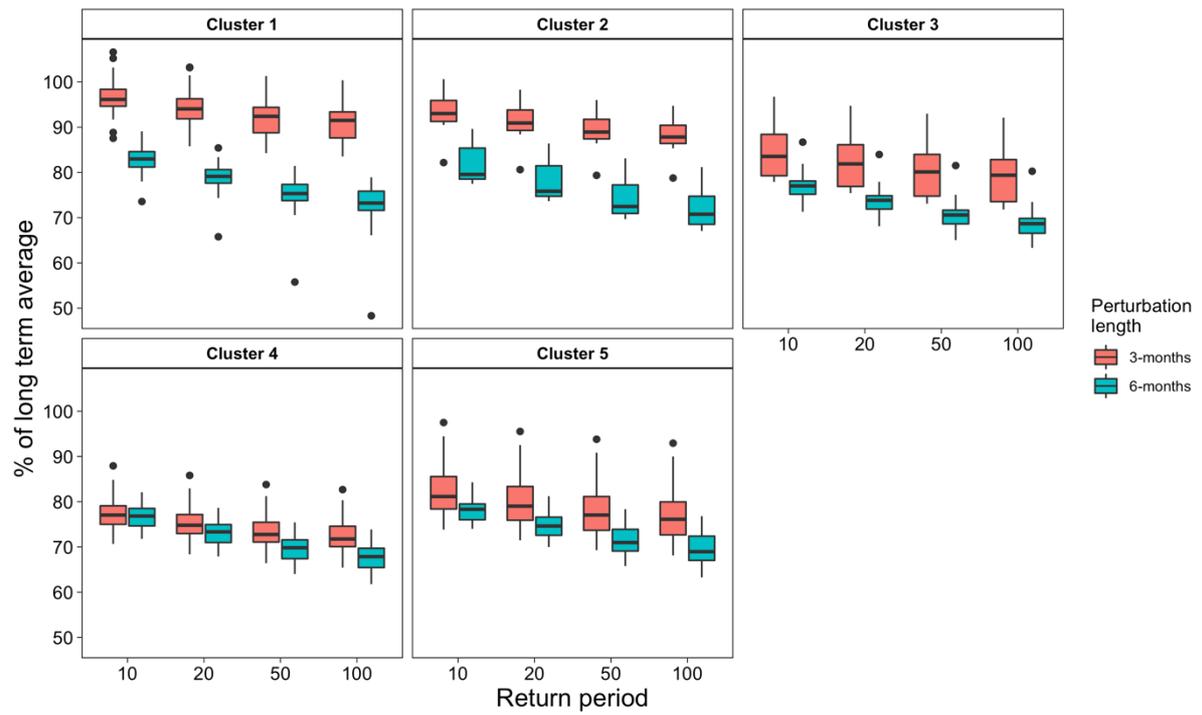


Figure S7: 12-months precipitation deficit relative to long term average for each return period and each cluster for the storylines of precondition severity with a 3- and 6-months perturbation prior to the 2010-12 drought.

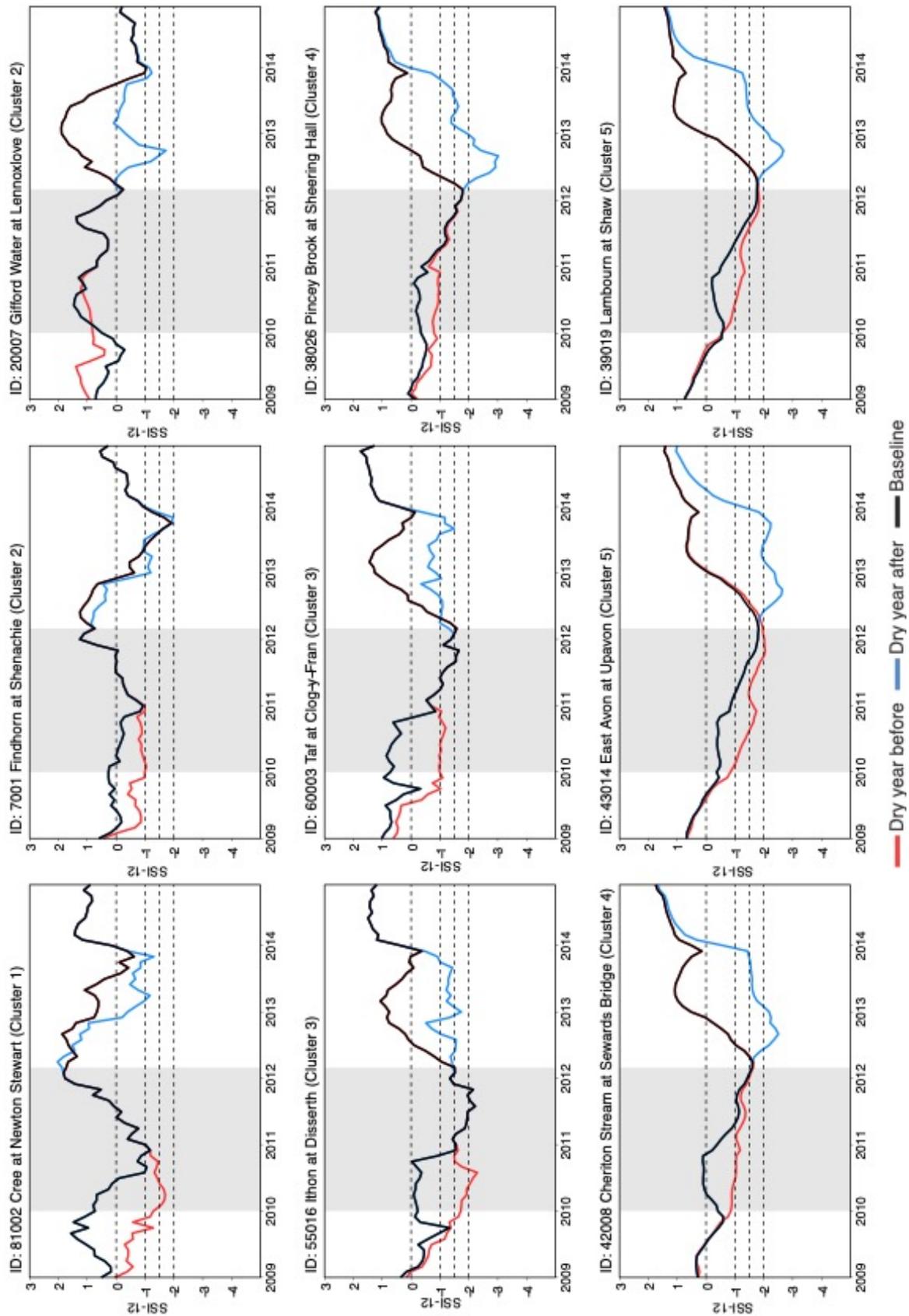


Figure S8: Baseline (black) and simulated SSI-12 for either a repetition of a dry year before (red) or after (blue) the 2010-12 drought for nine example catchments spanning five hydrograph clusters. The shaded region indicates the duration of the baseline 2010-12 drought (Jan 2010 to Mar 2012).

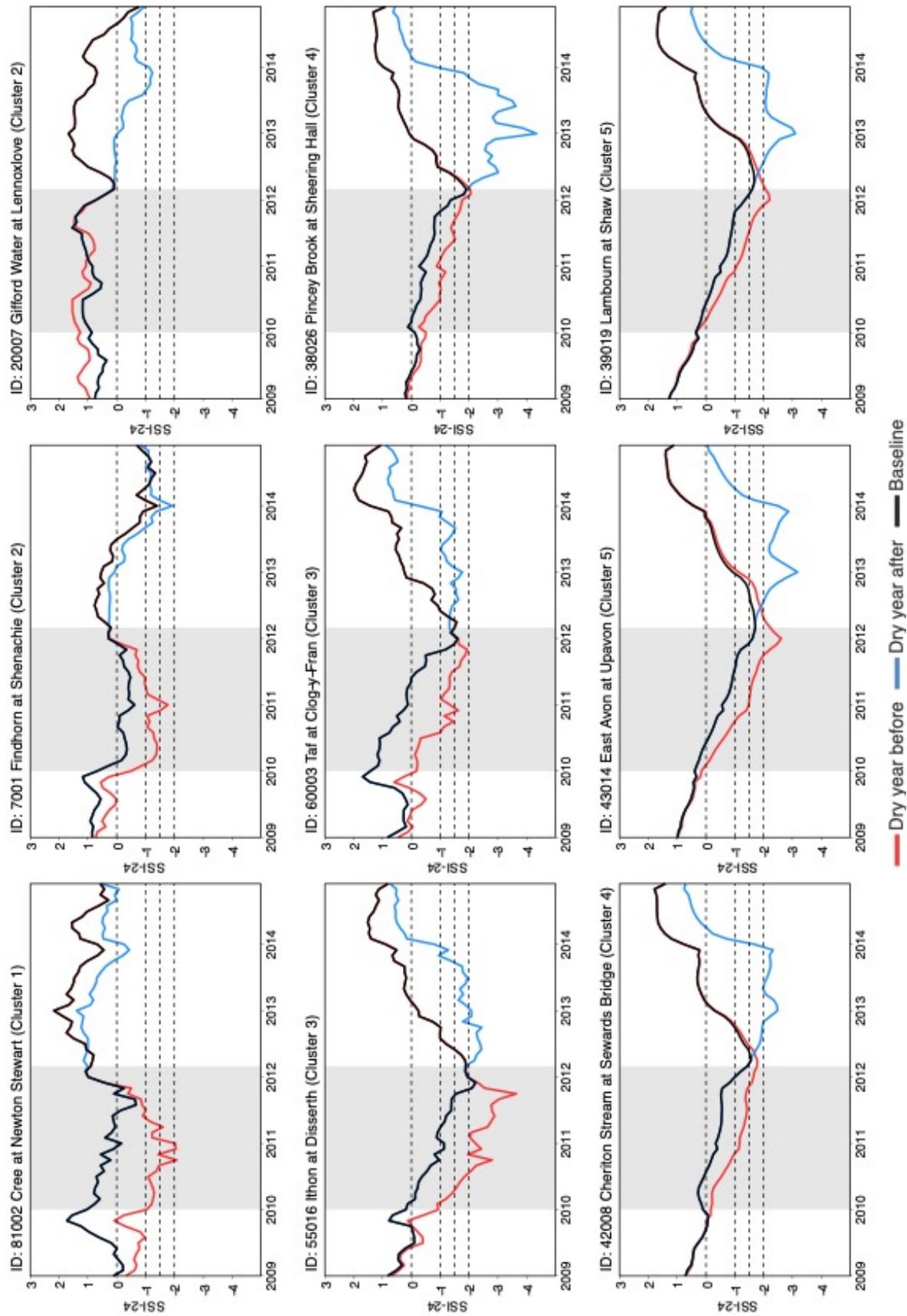


Figure S9: Same as Figure S8 but for SSI-24.

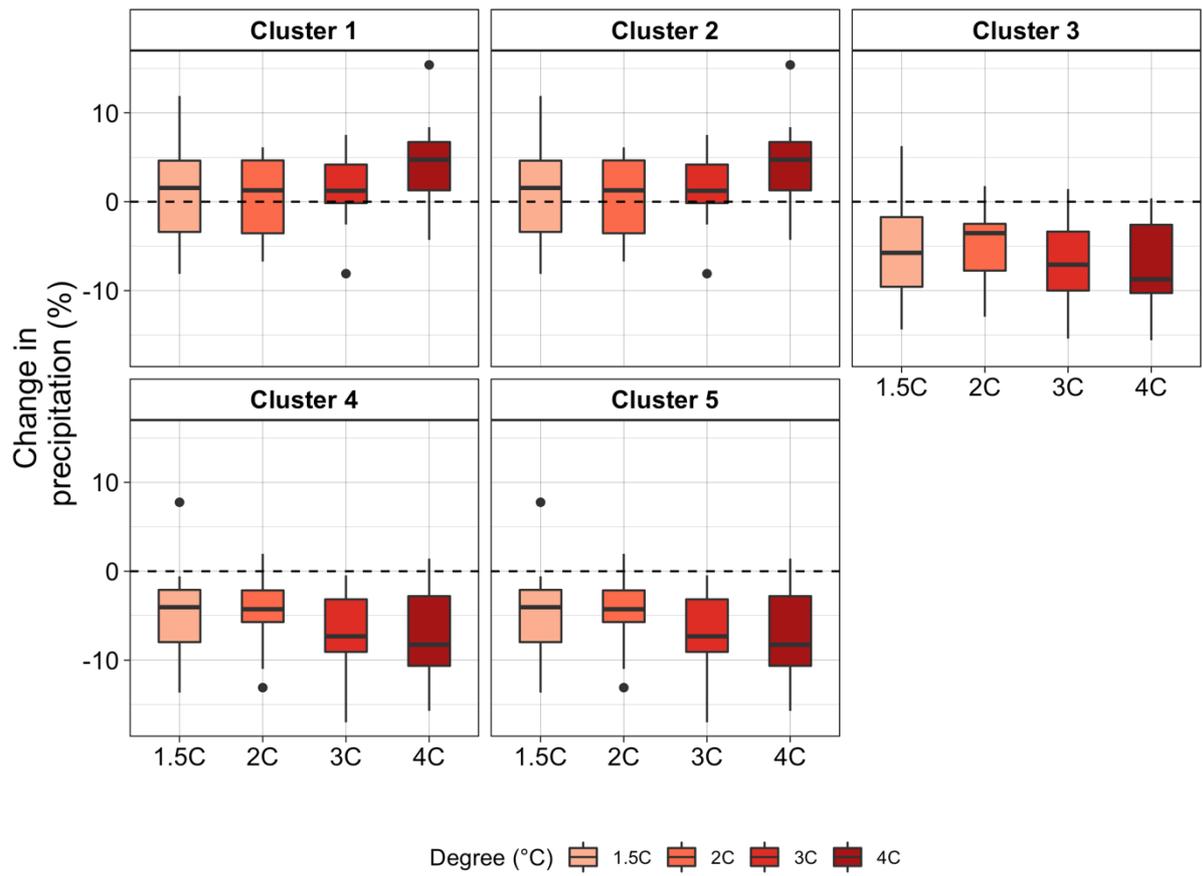


Figure S10: Change in mean annual precipitation (%) across the 12 UKCP18 RCM projections and catchments for each cluster

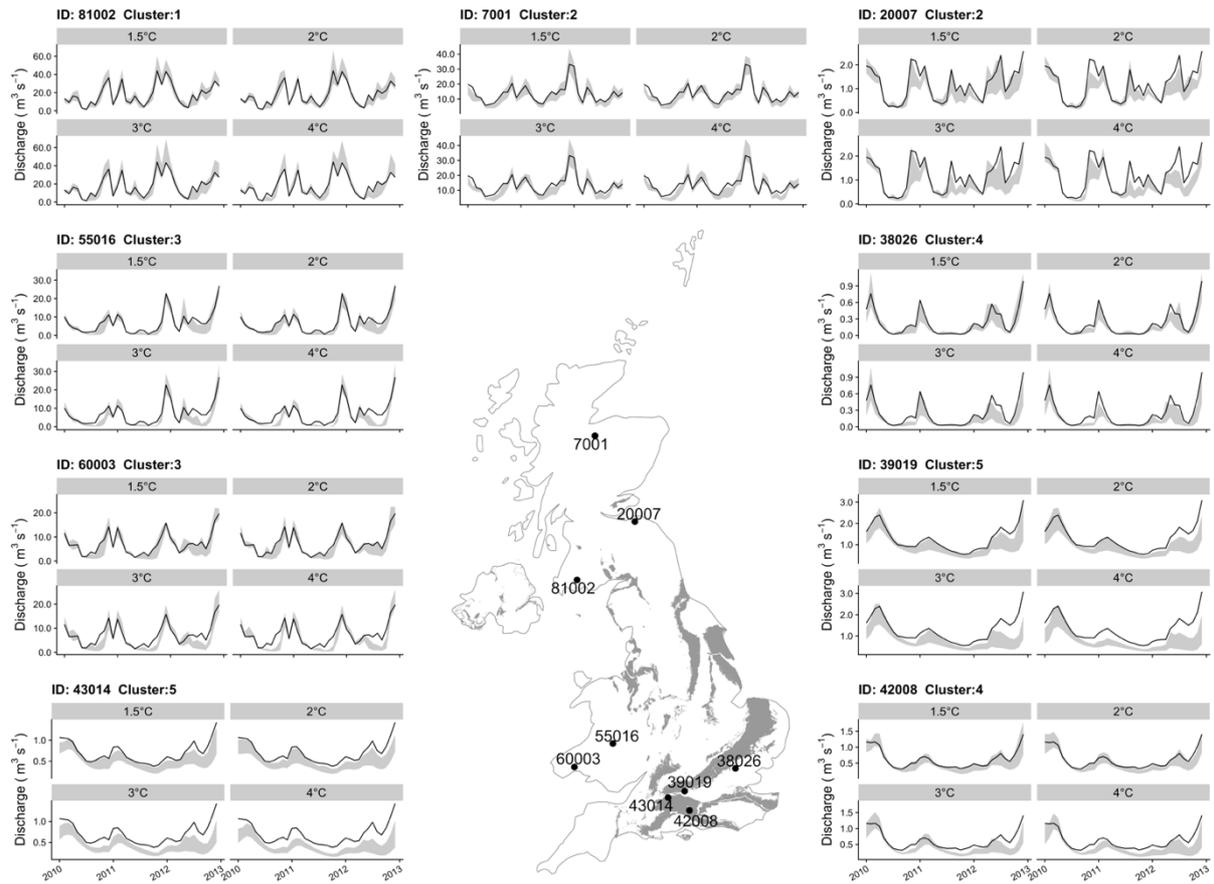


Figure S11: Projected change in river discharge across 2010-2012 at four warming levels. Nine example catchments spanning the five hydrograph clusters are presented here. The solid line represents the baseline simulation, and the shaded region represents the uncertainty range of the 12 UKCP18 regional projections. Shaded regions on the map indicate the location of major aquifers.