**Fig. S1.** Globally-averaged annual surface air temperature (Tas) anomalies (relative to 1851–1880 mean) for the SSP2-4.5 and SSP5-8.5 scenarios from 25 CMIP6 models. (a) Time series of the ensemble median (solid lines) and the 25th-75th percentile range among the 25 models (colored shading). Anomalies from observations in the updated HadCRUT (version 5) global temperature data set (Morice et al., 2021) are shown in black using the same 1851–1880 baseline. (b) Box and jitter plots of the Tas change for 2071-2100 for the two SSP scenarios, with the line inside the box as the median, the box representing the 25th-75th percentile range, and black dots for individual models.
Fig. S2. Same as Fig. 11, but for attribution of surface SM changes from April-September.
Fig. S3. Same as Fig. 11, but for attribution of surface SM changes from October-March.
Fig. S4. Same as Fig. 4, but for the PDFs (with the future mean change) estimated for each of the 25, 22, 23, 23, and 24 models for scPDSIpm, top-10cm soil SM, total SM, surface R, and total R, respectively, with each line for one model run.
**Fig. S5** Same as Fig. 4, but for the PDFs of top-10 cm soil moisture estimated from (a-v) 22 individual models and (w) ensemble mean (MMM) over the western US. The solid (dashed) colored lines represent the future PDFs without (with) the future annual-mean change.
Fig. S6. Same as Fig. S5, but for the PDFs of total runoff from 23 models over the western US.
Fig. S7. Same as Fig. 4 but for (a-d) top-10cm soil moisture, (e-h) total soil moisture, (i-l) surface runoff, and (m-p) total runoff from the CanESM5 50-member large ensemble runs. The mean change of the future PDFs is not removed.
Fig. S8. Similar to Fig. 4, but for comparison of the PDFs with (dashed lines) and without (solid lines) the future monthly mean changes. The colored numbers at the bottom right corner of each panel are the standard deviation for 1970–1999 (blue) and 2070–2099 under the SSP2-4.5 (green) and SSP5-8.5 (red) scenario without (with) the future monthly mean change.
Fig. S9. Same as Fig. 5, but for standard deviation changes without the future *monthly* mean change.
Fig. S10. Same as Fig. 6, but for the peak frequency change estimated without the future *monthly* mean change.
Fig. S11. The July-minus-January difference of the multimodel ensemble mean change from 1970-1999 to 2070-2099 under the SSP2-4.5 (left) and SSP5-8.5 (right) scenarios for scPDSIpm (top row), surface (2nd row) and total (3rd row) soil moisture, surface (4th row) and total (bottom row) runoff. The monthly changes for all variables except scPDSIpm were normalized into units of the standard deviation of 1970-1999.
References cited in Table 1 and Fig. S1:
EC-Earth Consortium, 2019d: EC-Earth-Consortium EC-Earth3-Veg model output prepared for CMIP6


