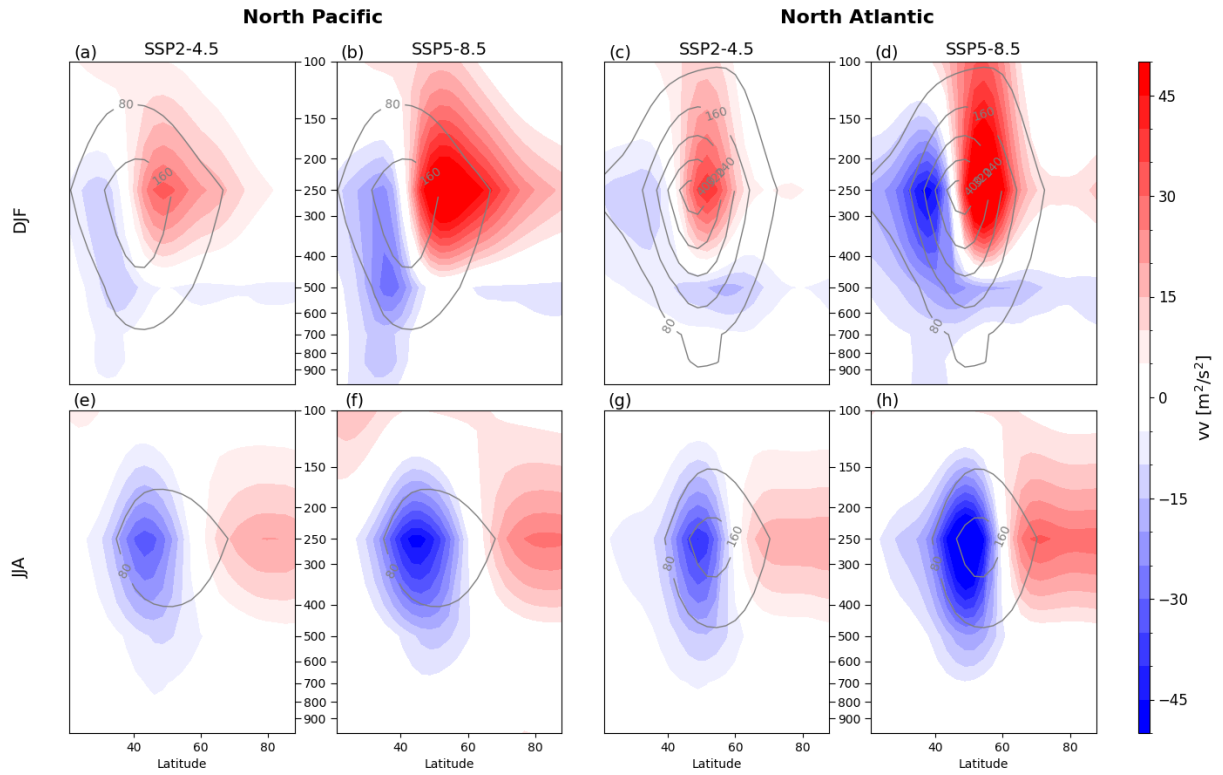




19 **Table S1.** Overview of the CMIP6 Large Ensemble simulations used in this study.

Model name	Forcing (Number of Members)	Horizontal resolution
CanESM5	Historical (20), SSP2-4.5 (20), SSP5-8.5 (20)	$2.8^{\circ} \times 2.8^{\circ}$
EC-Earth3	Historical (50), SSP2-4.5 (50), SSP5-8.5 (50)	$0.7^{\circ} \times 0.7^{\circ}$
MPI-ESM1.2-LR	Historical (50), SSP2-4.5 (50), SSP5-8.5 (50)	$1.9^{\circ} \times 1.9^{\circ}$

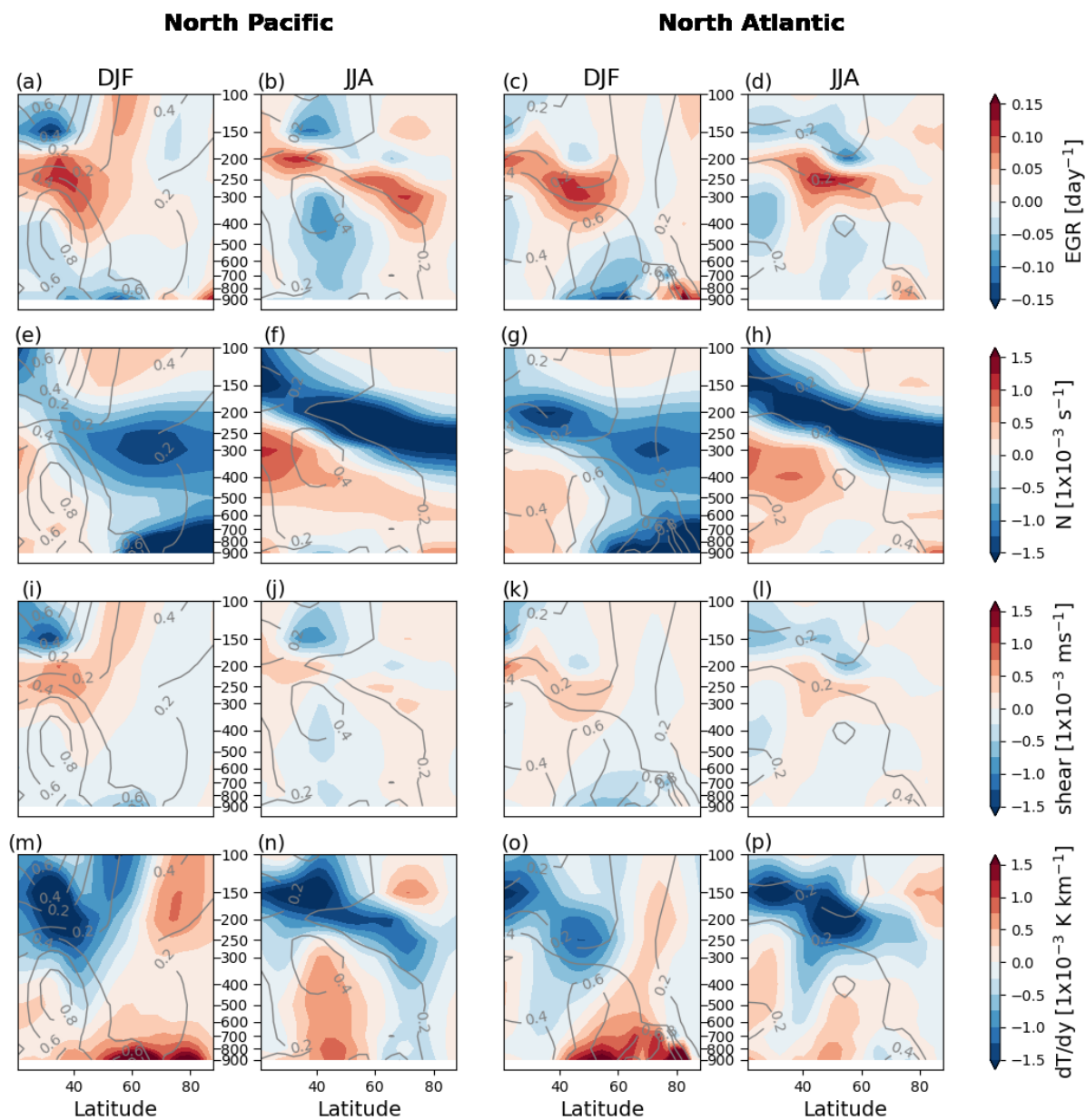
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**Figure S1.** The zonal mean DJF and JJA  $vv$  changes (2070-2100 minus 1984-2014) for SSP5-8.5 and SSP2-4.5 over the Atlantic and Pacific, using CanESM5 large ensemble. The contour lines show the historical (1984-2014) zonal mean  $vv$  (contour interval:  $80 \text{ m}^2\text{s}^{-2}$ ).

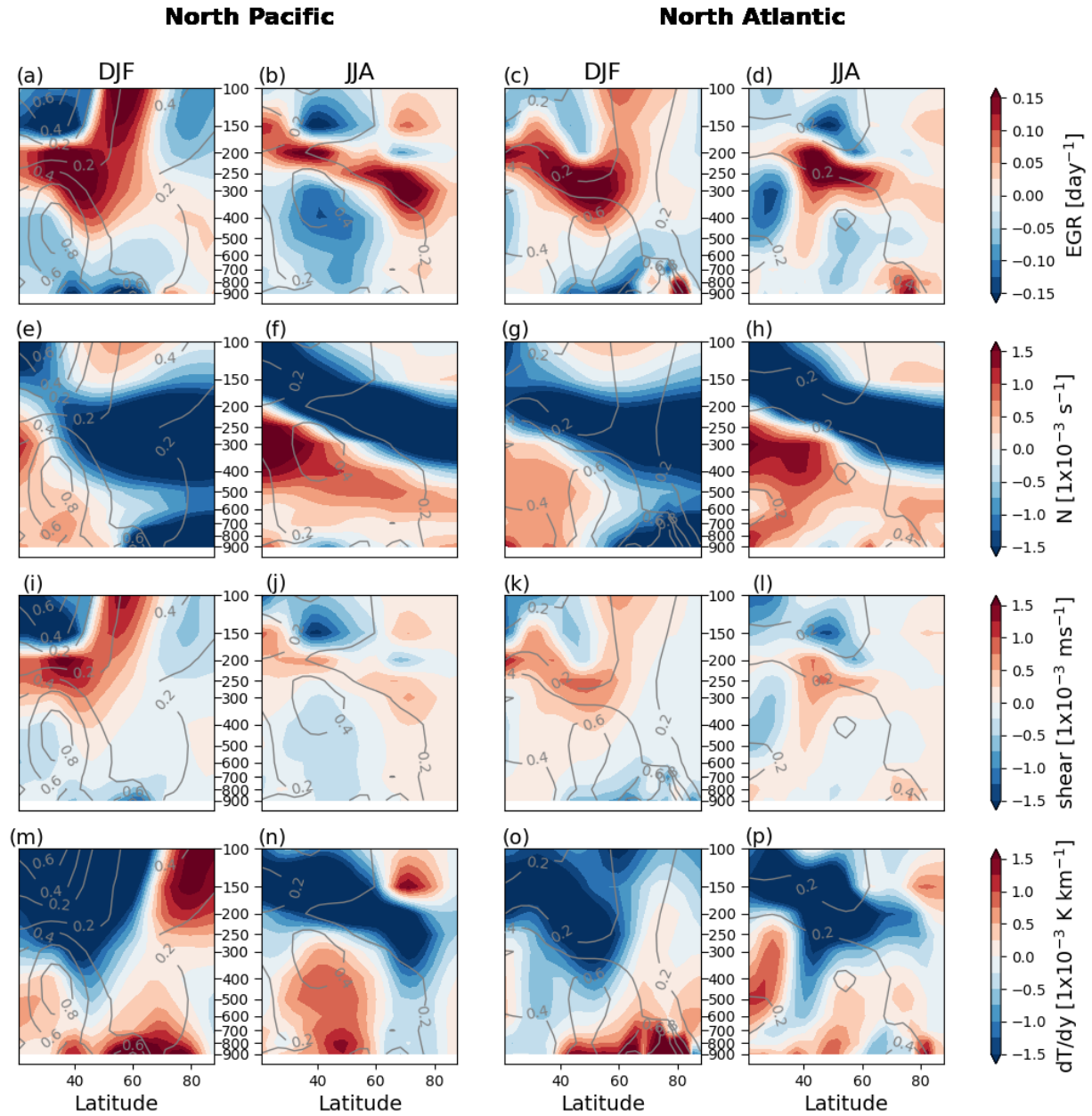
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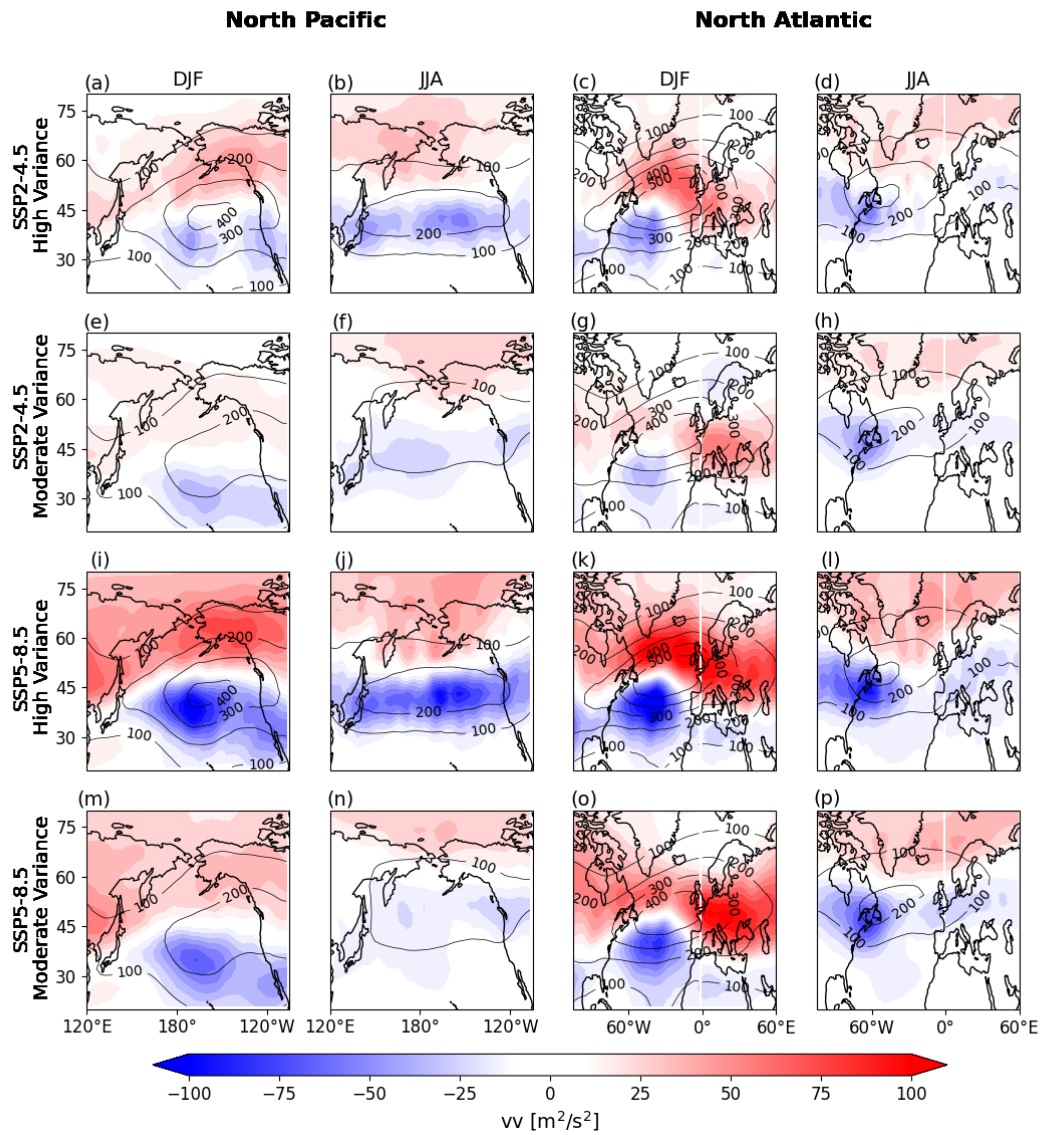
**Figure S2.** The DJF and JJA changes (2070-2100 minus 1984-2014) for SSP2-4.5 over the Atlantic and Pacific for (a-d) maximum Eady growth rate (units:  $\text{day}^{-1}$ ), (e-h) Brunt-Vaisala frequency (units:  $\text{s}^{-1}$ ), (i-l) vertical wind shear (units:  $\text{ms}^{-1}$ ), and (m-p) meridional temperature gradient (units:  $\text{K km}^{-1}$ ), using CanESM5 large ensemble. The contours show 1984-2014 zonal means of maximum Eady growth rate (contour interval:  $0.2 \text{ day}^{-1}$ ).

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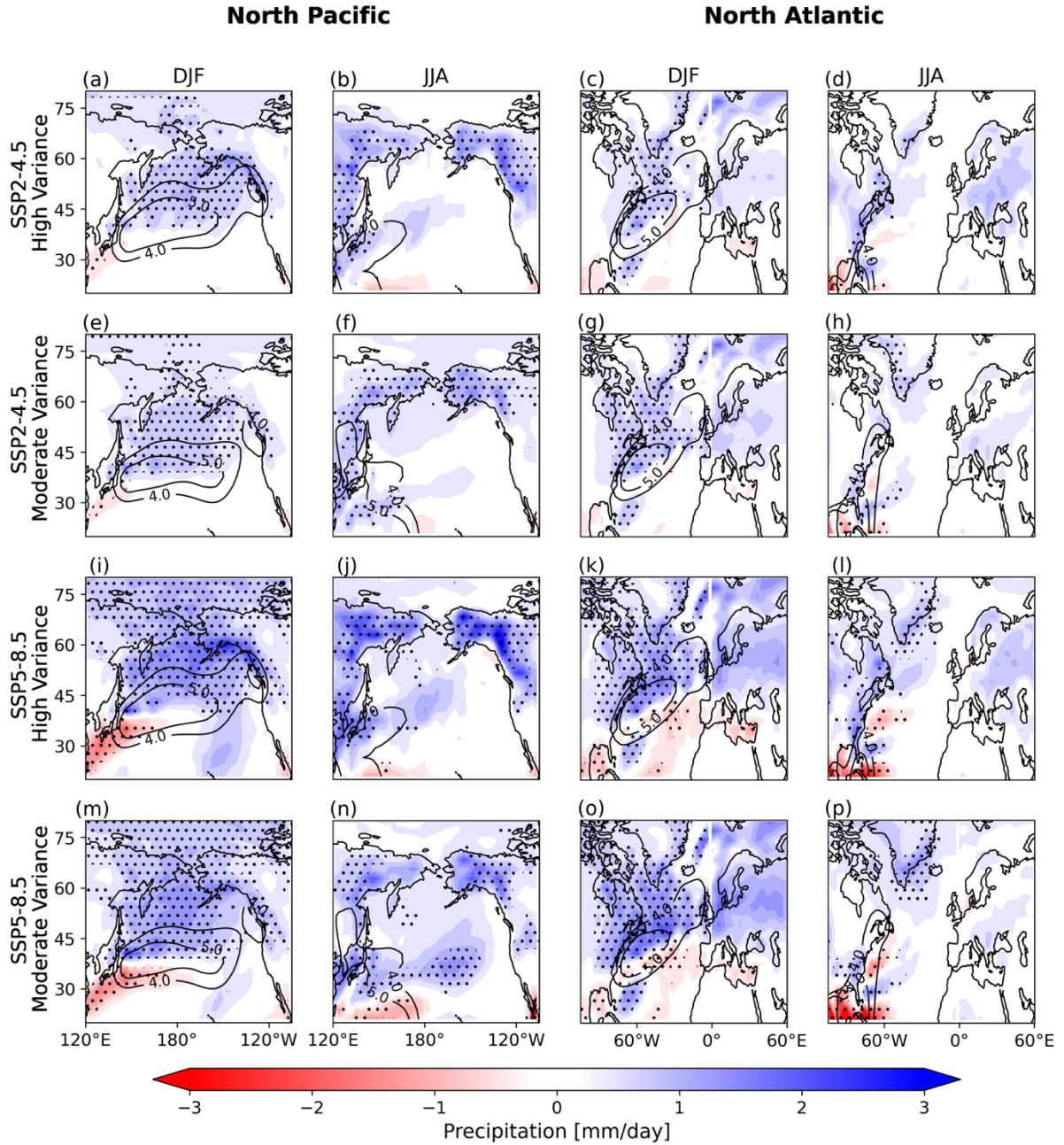
Figure S3. Same as Figure S2, but for SSP5-8.5.



**Figure S4.** The northern hemisphere storm tracks at 250 hPa during high-, and moderate-variance days for DJF and JJA, using CanESM5 large ensemble. The contour lines represent the historical storm track values (contour interval:  $100 \text{ m}^2\text{s}^{-2}$ ).

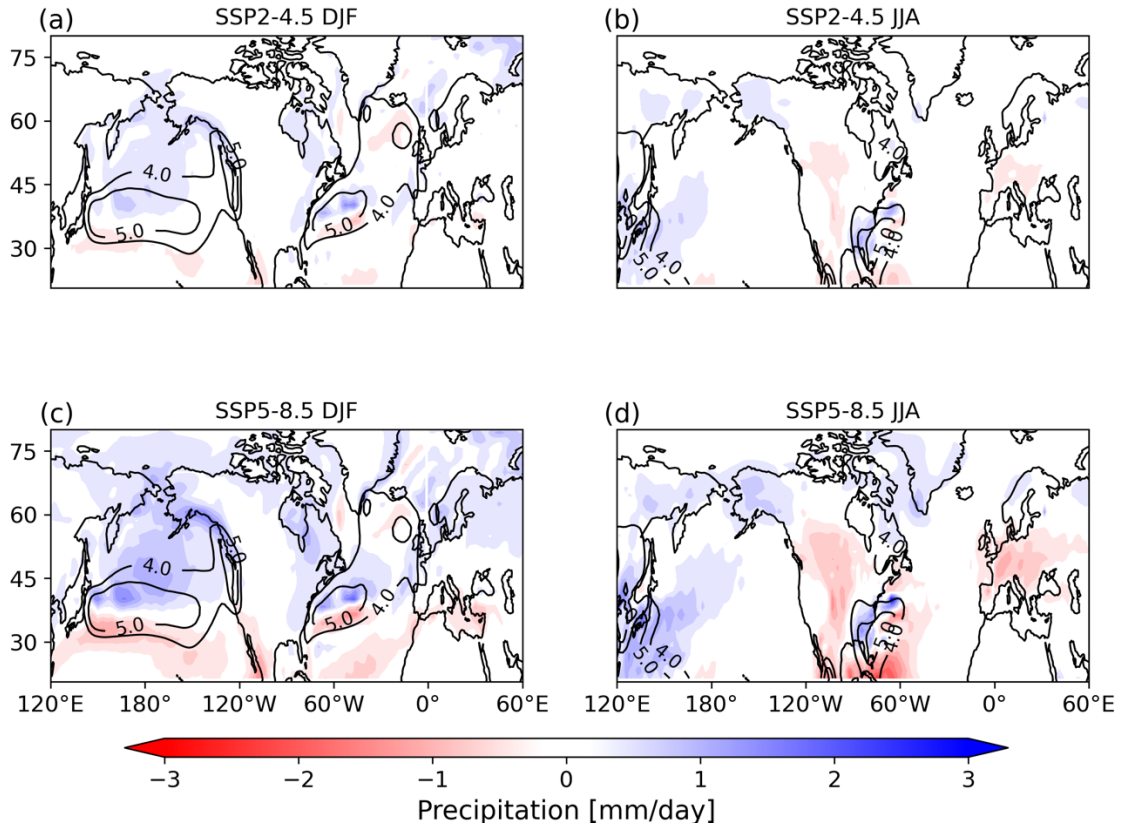
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**Figure S5.** The northern hemisphere precipitation during high-, and moderate-variance days for DJF and JJA, using CanESM5 large ensemble. The dots indicate areas where more than 70% of the forced precipitation change is attributable to storm track variability. The contour lines represent the historical precipitation values (contour interval: 1.0 mm day<sup>-1</sup>).



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**Figure S6.** The northern hemisphere precipitation change for DJF and JJA, using MPI large ensemble. The contour lines represent the historical precipitation values (contour interval: 1.0 mm day<sup>-1</sup>).

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