

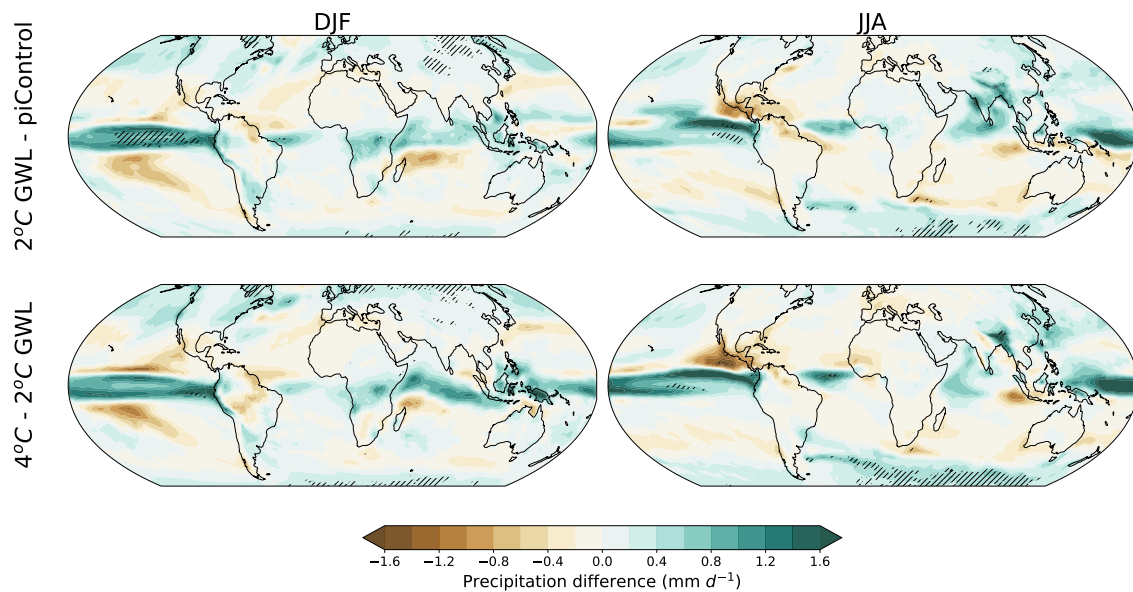


Figure S1: Multi-model mean precipitation differences between the stabilization runs at 2°C GWL and piControl (top) and 4°C GWL and 2°C GWL (bottom) for DJF (left) and JJA (right) seasons. Hatching denotes regions where at least 5 out of 7 models agree on the sign of change, and at least 4 out of 7 models show a robust signal-to-noise ratio ($\text{SNR}_{\geq 1}$)

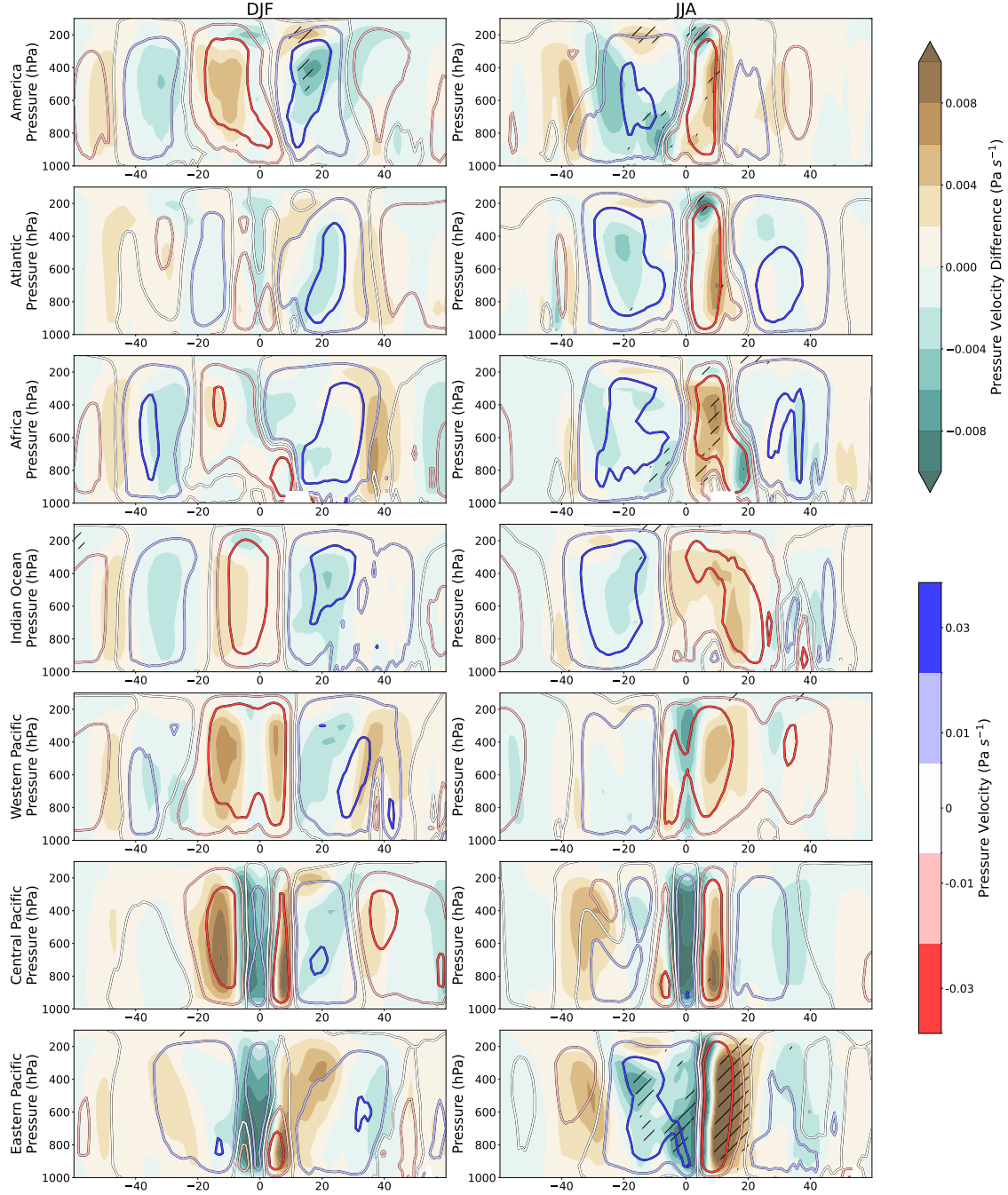


Figure S2: Zonal mean of multi-model mean pressure velocity changes between 4°C and 2°C GWL for the different longitudinal regions, for the DJF (left) and JJA (right) seasons. The multi-model mean of the change is shown with filled contours, while the solid contours indicate the values of the multi-model mean climatology for the 2°C GWL run. Hatching denotes regions where at least 5 out of 7 models agree on the sign of change and where at least 4 out of 7 models show a robust signal-to-noise ratio ($\text{SNR} \geq 1$). Positive values of the pressure velocity mean downward velocities, and negative values mean upward velocities.

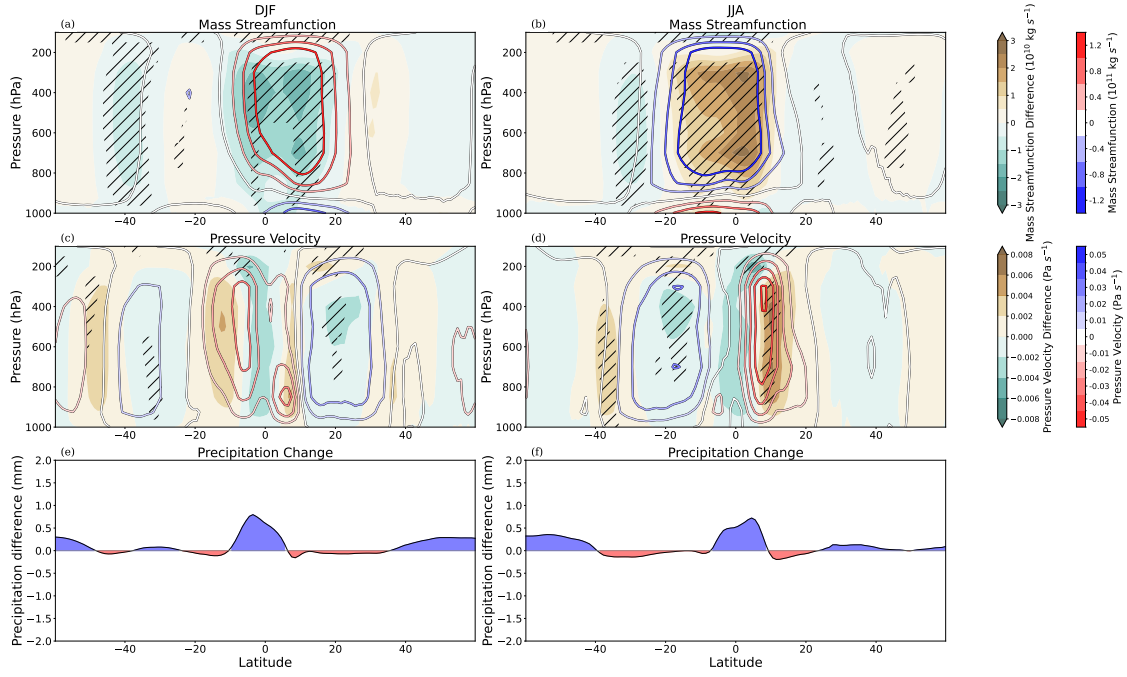


Figure S3: Multi-model mean circulation changes between 4°C and 2°C GWL. Zonal mean mass streamfunction changes are shown for the (a) DJF and (b) JJA seasons, with filled contours, while solid contours indicate the values of the multi-model mean climatology for the 2°C GWL run. Panels (c) and (d) are as in (a) and (b), but for the pressure velocity. Panels (e) and (f) show the changes in the zonal mean of precipitation between the 4°C and the 2°C GWL run. Hatching denotes regions where at least 5 out of 7 models agree on the sign of change and where at least 4 out of 7 models show a robust signal-to-noise ratio ($\text{SNR} \geq 1$). Positive values of mass-streamfunction indicate clockwise direction of movement, and negative values indicate counter-clockwise direction.