Supporting Information

Climate responses and their hemispheric differences under an extreme quiet sun scenario

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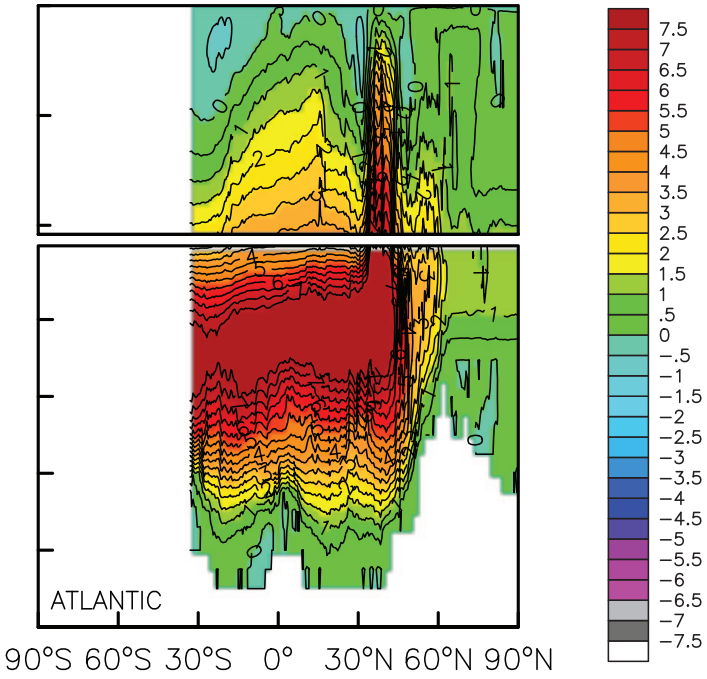

Figure S1: Atlantic meridional overturning circulation (AMOC) (unit: Sv.) from 200 years of Smax simulations

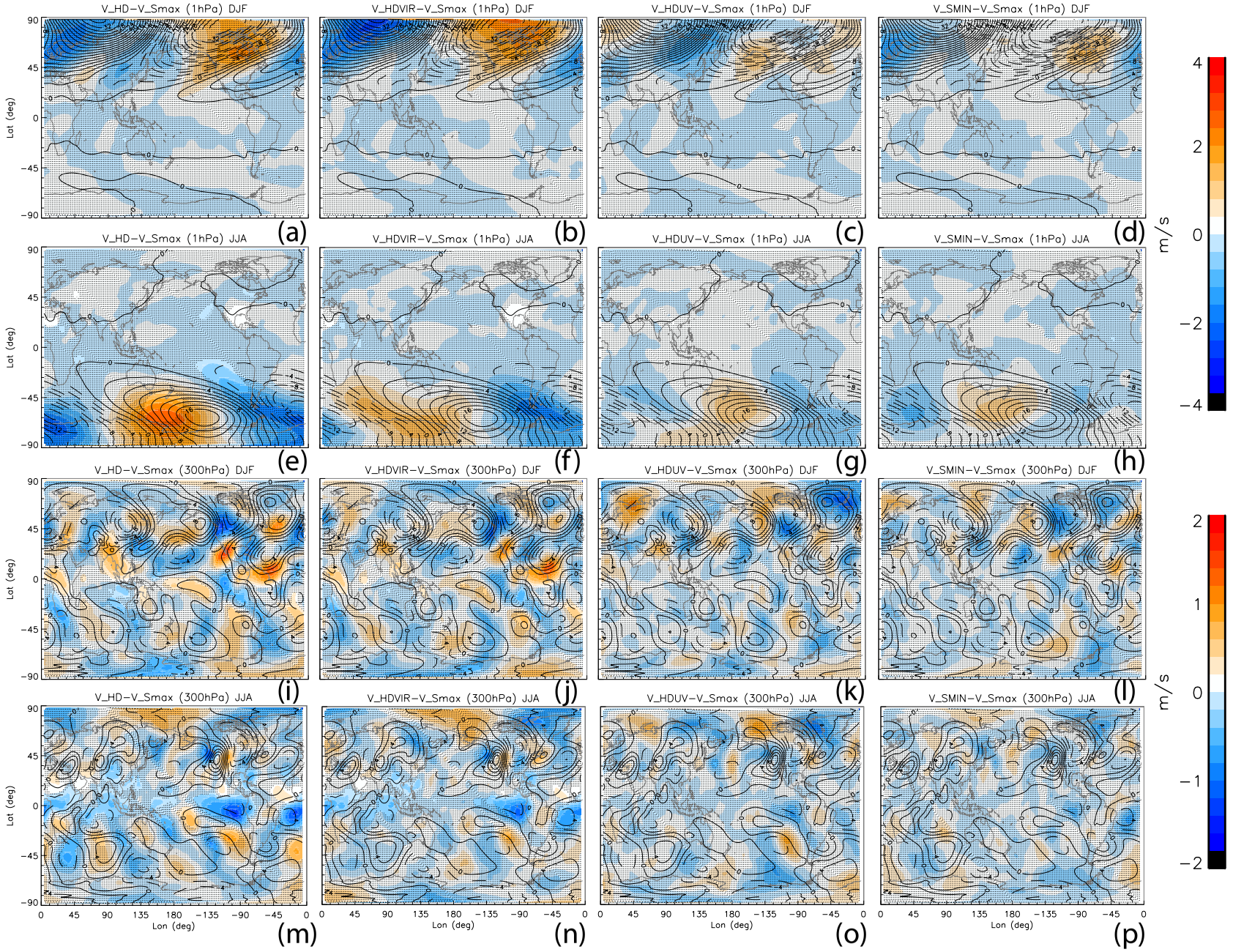

Figure S2: Differences of average meridional wind (color contour) between 50–200 year of (a) HD, (b) HDVIR, (c) HDUV and (d) Smin and Smax simulations at 10 hPa for boreal winter (DJF). Line contours are average meridional wind (in a, solid: northward, contour intervals: 2 ms^{-1}) from Smax simulations. (e-h): Similar to (a-d), but for austral winter (JJA). (i-l): Similar to (a-d), but for 300 hPa. (m-p): Similar to (e-h), but for 300 hPa. (i) is the same as Fig. 4a, and included here for convenient comparison.

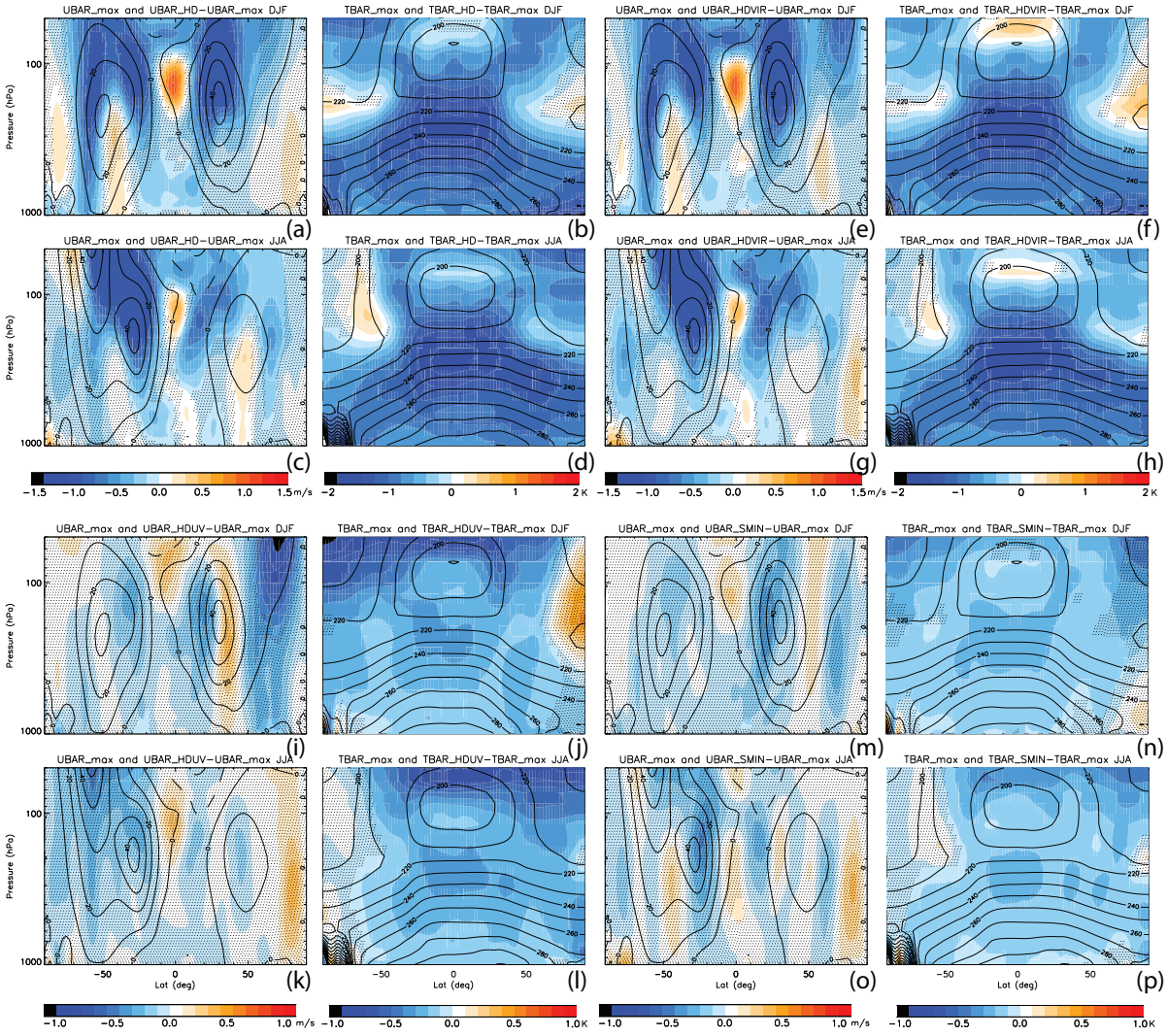

Figure S3: Differences of average zonal mean zonal wind (color contour) in the troposphere and lower stratosphere between 50–200 year of HD and Smax simulations for (a) DJF and (c) JJA. Line contours are average zonal mean zonal wind from Smax simulations (contour intervals: 10 ms^{-1}). (b) and (d): similar to (a) and (c) but for average zonal mean temperature differences (color contour). Line contours are average zonal mean temperature from Smax simulations (contour intervals: 10 K). (e-h): Similar to (a-d), but for differences between HDVIR and Smax simulations. (i-l): Similar to (a-d), but for differences between HDUV and Smax simulations. (m-p): Similar to (a-d), but for differences between Smin and Smax simulations.

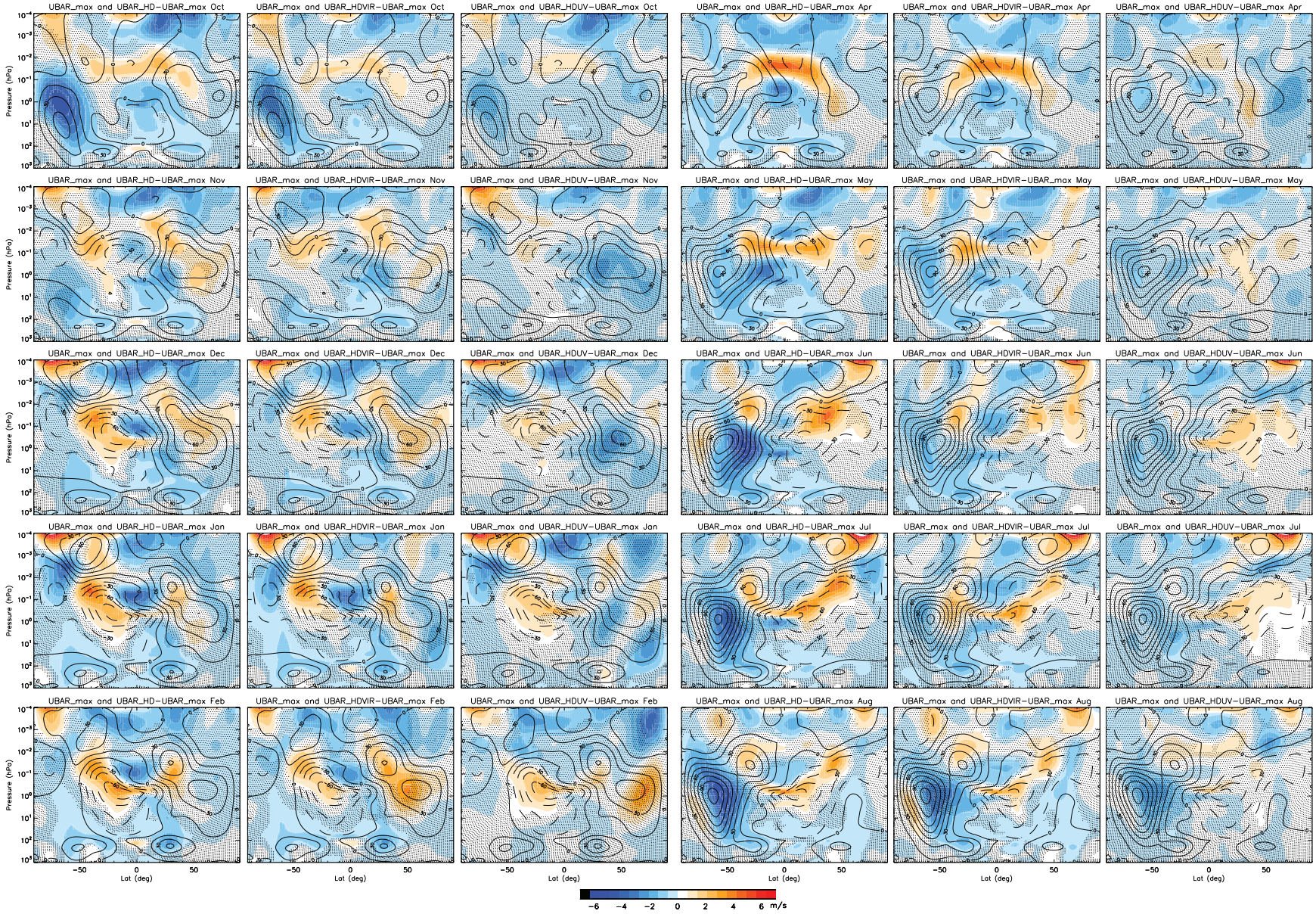

Figure S4: Differences of average zonal mean zonal wind (color contours) for boreal winter months (October to February, 3 columns on the left) and austral winter months (April to August, 3 columns on the right) between 50–200 year of HD (first column), HDVIR (second column) and HDUV (third column) and Smax simulations. Line contours are average zonal mean zonal wind from Smax simulations (contour intervals: 15 ms^{-1}).

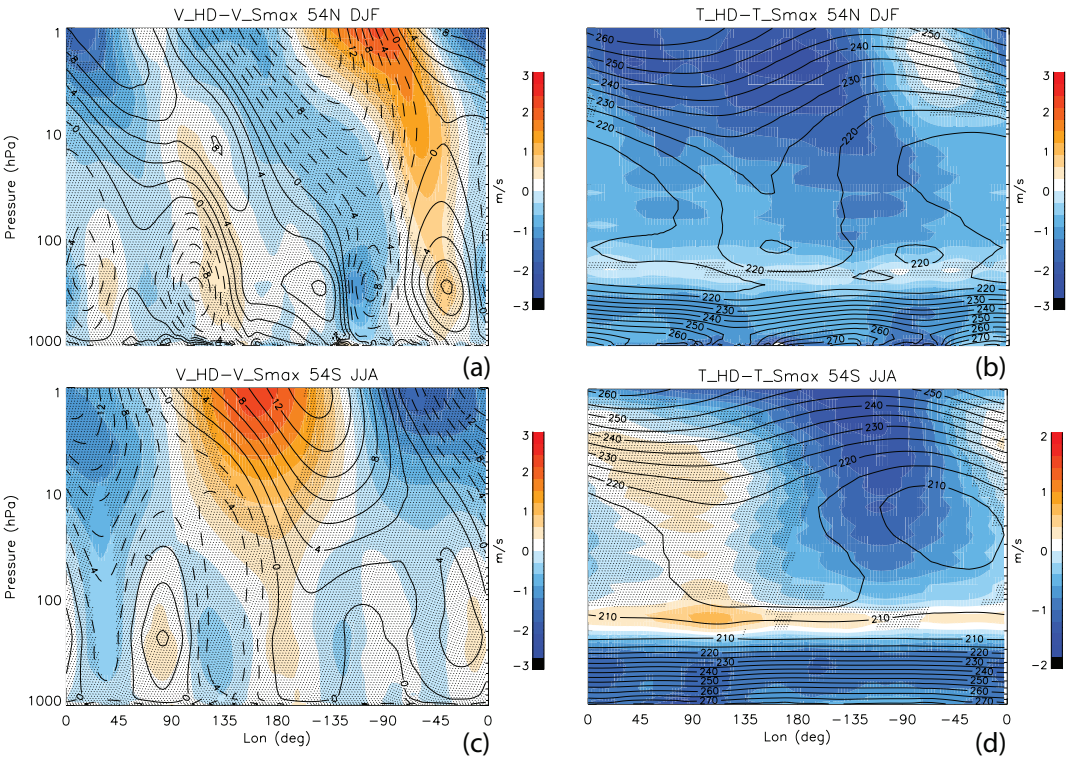

Figure S5: Differences of average (a) meridional wind and (b) temperature (color contours) between 50–200 year of HD and Smax simulations at 54°N for boreal winter (DJF). Line contours are average meridional wind (in a, solid: northward, contour intervals: 2ms^{-1}) and temperature (in b, contour intervals: 5K) from Smax simulations. (c-d): Similar to (a-b), but at 54°S for austral winter (JJA).

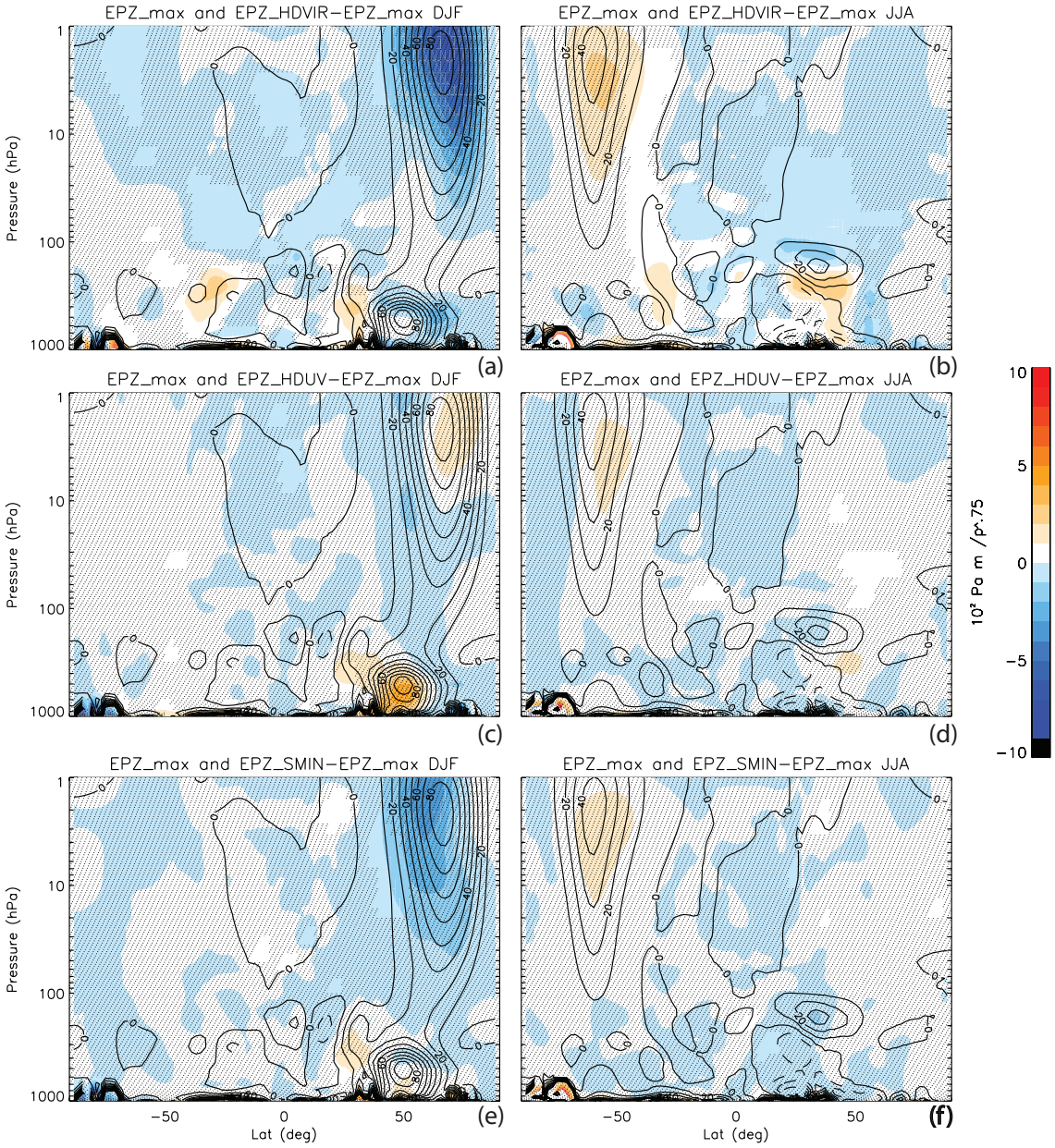

Figure S6: Differences of average vertical EP flux component between 50–200 year of HDVIR and Smax simulations for (a) DJF and (b) JJA. The EP flux (unit: Pa m) is normalized by $p^{0.75}$ (p: atmosphere pressure) to better visualize the change at all altitudes (color contour). Line contours are average normalized vertical EP flux component from Smax simulations (contour intervals: 10×10^2). (c-d): Similar to (a-b), but for HDUV and Smax. (e-f): Similar to (a-b), but for Smin and Smax.