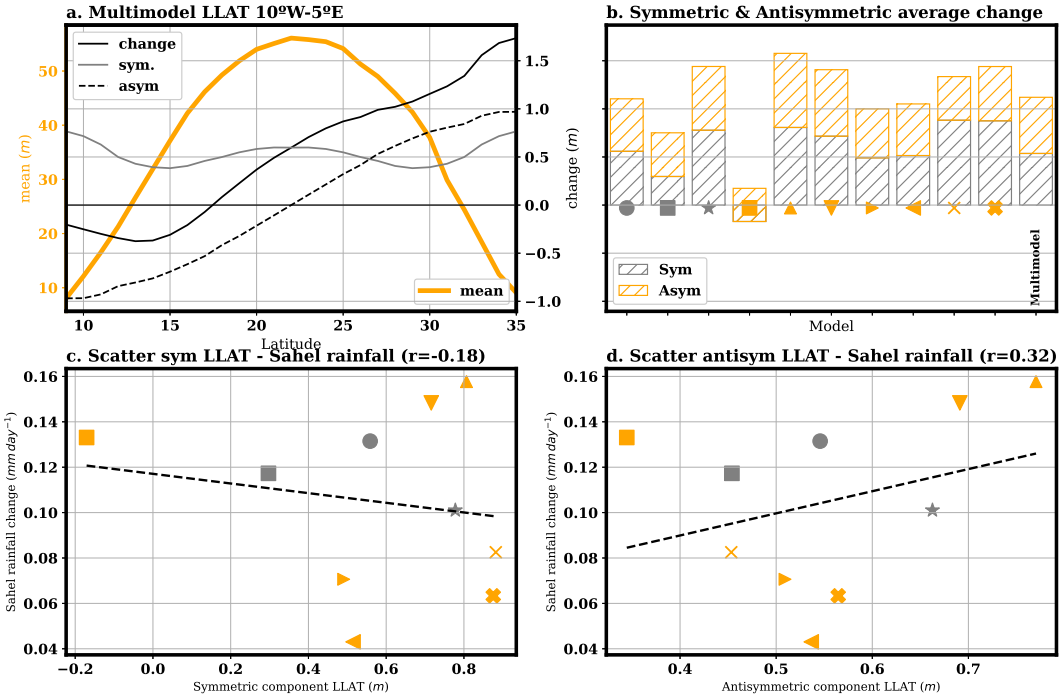

Figure S1. Decomposition of changes in the low-level atmospheric thickness with respect to the tropical mean (LLAT, in m) into symmetric and antisymmetric components. a) Multimodel mean climatology of LLAT in JAS averaged between 10ºW and 5ºE (orange, left axis) and AMV+ minus AMV- change (black continuous line, right axis). The change has been decomposed into symmetric (gray line, right axis) and antisymmetric (dashed line, right axis), taking the maximum climatological value as the central point. b) Symmetric and antisymmetric components of AMV+ minus AMV- average LLAT change in the latitudinal window between the maximum value and 35ºN in JAS for all models and the multimodel mean. Scatter plots of rainfall change in the Sahel box as a function of the c) symmetric and d) antisymmetric LLAT components. For the models following the PRIMAVERA protocol (marked as orange symbols), only half the anomalies are shown. The legend for the symbols in the scatter plots is the same as in Fig. 2c in the main article. In the scatter plots, the dashed line shows the linear regression fit, and the correlation coefficient is shown in the title. Correlations are marked with one asterisk if they are statistically significant at the $\alpha = 0.05$ level when considering all models as independent samples. Two asterisks are used if correlations are statistically significant when lowering the number of independent samples to 6.

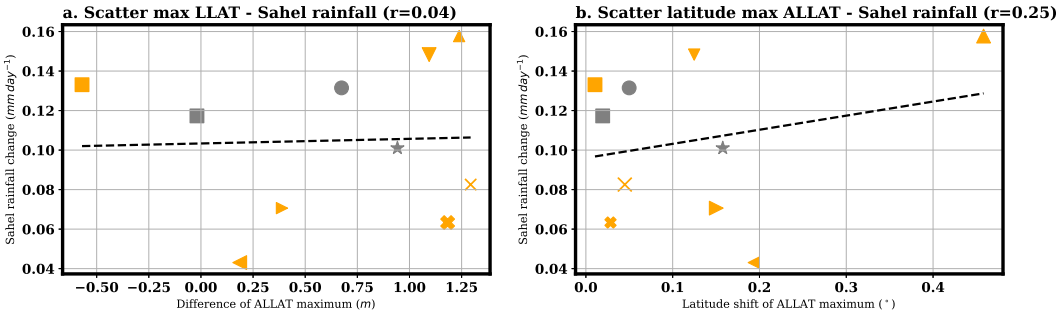

Figure S2. Scatter plots of rainfall change in the Sahel box as a function of the changes in: a) the maximum value of the LLAT (m); and b) the location of the maximum of LLAT (º). For the models following the PRIMAVERA protocol (marked as orange symbols), only half the anomalies are shown. The peak and latitude location of the LLAT have been calculated from a cubic-spline interpolation of the zonal average in the 10ºE-10ºE. The legend for the symbols in the scatter plots is the same as in Fig. 2c. In the scatter plots, the dashed line shows the linear regression fit, and the correlation coefficient is shown in the title. Correlations are marked with one asterisk if they are statistically significant at the $\alpha = 0.05$ level when considering all models as independent samples. Two asterisks are used if correlations are statistically significant when lowering the number of independent samples to 6.

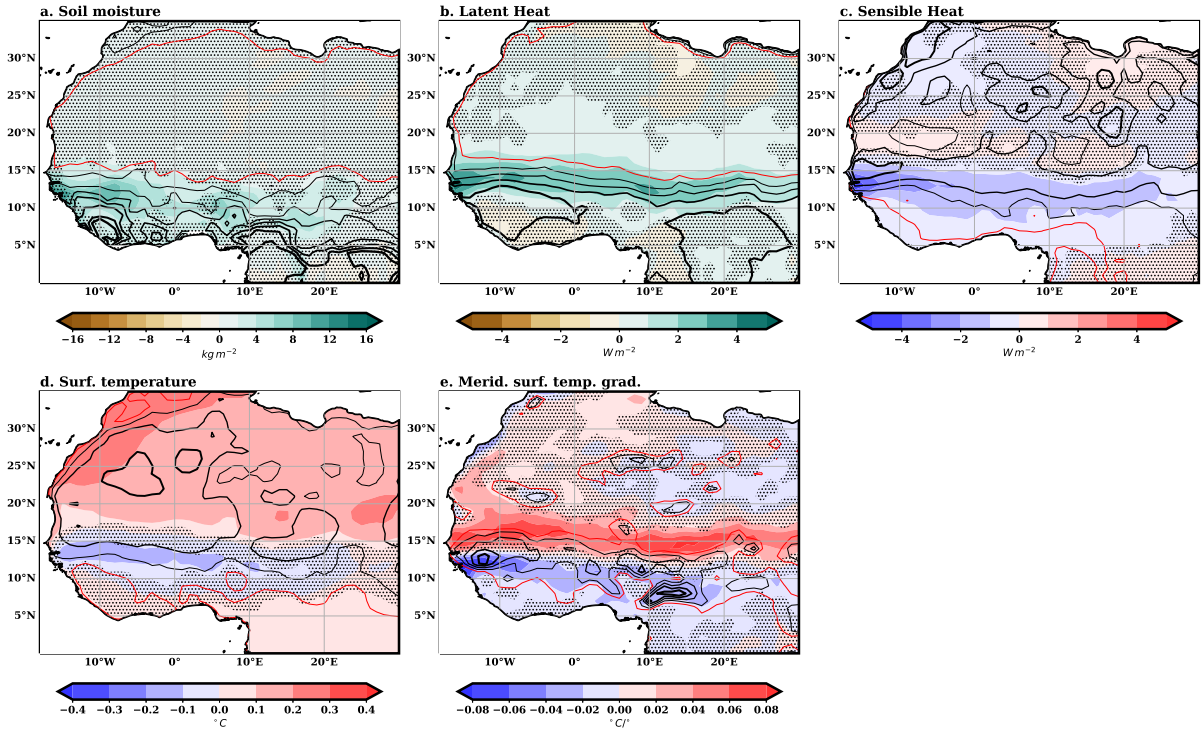

Figure S3. Multimodel average changes (shaded) in AMV+ minus AMV- in JAS and climatological values (contours starting from the red one and increasing in thickness with magnitude) of: a) soil moisture ($\mathrm{kg\,m^{-2}}$, contours drawn every 100 $\mathrm{kg\,m^{-2}}$ starting from 100 $\mathrm{kg\,m^{-2}}$); b) latent heat flux ($\mathrm{W\,m^{-2}}$, contours drawn every 20 $\mathrm{W\,m^{-2}}$ starting from 20 $\mathrm{W\,m^{-2}}$); c) sensible heat ($\mathrm{W\,m^{-2}}$, contours drawn every 15 $\mathrm{W\,m^{-2}}$ starting from 30 $\mathrm{W\,m^{-2}}$); d) surface temperature ($^{\circ}\mathrm{C}$, contours drawn every 3$^{\circ}\mathrm{C}$ starting from 25$^{\circ}\mathrm{C}$); e) meridional component of the surface temperature gradient (ºC per degree of latitude, contours drawn every 0.5$^{\circ}\mathrm{C}$ per degree of latitude starting from 0.5$^{\circ}\mathrm{C}$ per degree of latitude).

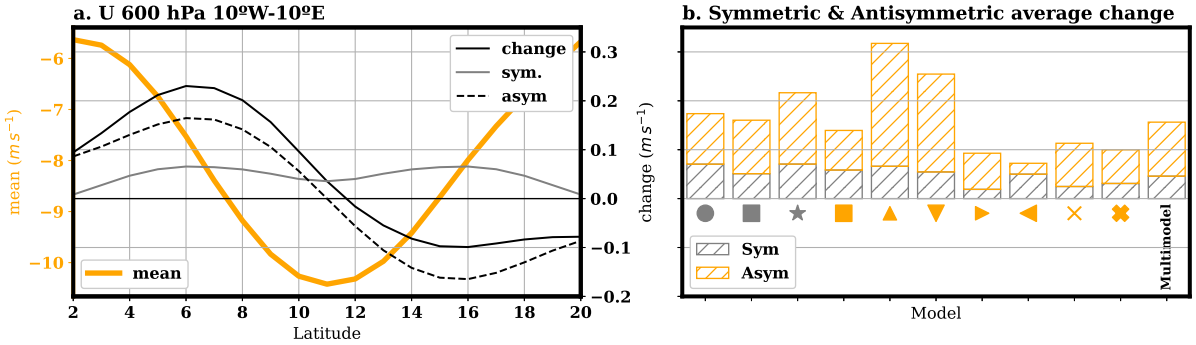

Figure S4. Decomposition of changes in the core of the AEJ (in $\mathrm{m\,s^{-1}}$ into symmetric and antisymmetric components. a) Multimodel mean climatology of the zonal wind at 600hPa in JAS averaged between 10ºW and 10ºE (orange, left axis) and AMV+ minus AMV- change (black continuous line, right axis). The change has been decomposed into symmetric (gray line, right axis) and antisymmetric (dashed line, right axis), taking the maximum climatological value as the central point. b) Symmetric and antisymmetric components of AMV+ minus AMV- average AEJ change in the latitudinal window between the maximum value and 20ºN in JAS for all models and the multimodel mean. The legend for the symbols in the scatter plots are the same as in Fig.2c in the main text.

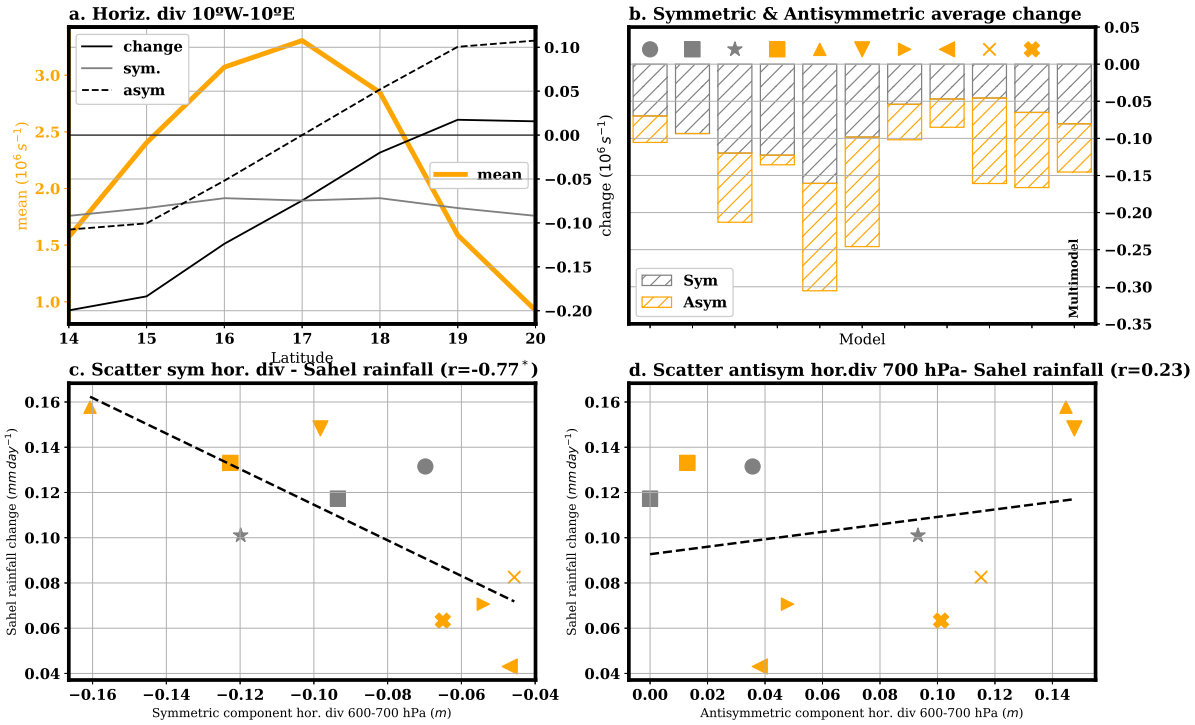

Figure S5. Decomposition of changes in the mid-level divergence associated with the shallow meridional circulation (units are 10^{-6} s^{-1}) into symmetric and antisymmetric components. a) Multimodel mean climatology of horizontal wind divergence averaged between 10ºW-10ºE and the levels of 600 hPa and 700 hPa in JAS (orange, left axis) and AMV+ minus AMV- change (black continuous line, right axis). The change has been decomposed into symmetric (gray line, right axis) and antisymmetric (dashed line, right axis), taking the maximum climatological value as the central point. b) Symmetric and antisymmetric components of AMV+ minus AMV- averaged change in the latitudinal window between the maximum value and 20ºN in JAS for all models and the multimodel mean. For easy comparison between the symmetric and antisymmetric components, the sign of the antisymmetric component has been reversed in plot b. Scatter plots of rainfall change in the Sahel box as a function of the c) symmetric and d) antisymmetric components. For the models following the PRIMAVERA protocol (marked as orange symbols), only half the anomalies are shown. The legend for the symbols in the scatter plots is the same as in Fig. 2c in the main text. In the scatter plots, the dashed line shows the linear regression fit, and the correlation coefficient is shown in the title. Correlations are marked with one asterisk if they are statistically significant at the α= 0.05 level when considering all models as independent samples. Two asterisks are used if correlations are statistically significant when lowering the number of independent samples to 6.