Supplementary Figures

Figure S1 - Observed relationship between 1200 UTC zonal wind difference and maximum precipitation rate for early-evening Sahelian MCSs between 2003 and 2012. Figure created by Chris Taylor using precipitation observations from the Climate Prediction Centre MORPHing technique dataset (Joyce et al., 2004) coarse-grained to 0.25° horizontal resolution, and wind output from the European Centre for Medium Range Weather Forecasting ERA-Interim dataset (Dee et al., 2011). MCSs are identified as any contiguous precipitating system of area greater than 5000 km² and maximum precipitation rate greater than 10 mm/hr within the domain 15W – 15E, 10 – 17.5N present between 1630 UTC and 1930 UTC. Mean ambient (1200 UTC) wind conditions over the same region are evaluated for comparison. Production of this result closely follows the work of Taylor et al., (2017) which can be referred to for a more complete methodology.
Figure S2 – Recreation of Fig. 2 displaying the diurnal cycle of daily precipitation rate (a) and zonal wind difference (b) between the current climate (red line) and future climate (blue line), as well as the absolute difference at each time across climates (black line). Model output is averaged across the Sahel region used within this study.
Figure S3 - Spatial changes in midday zonal wind shear across climates. Climatological midday wind shear values (calculated between 925 and 650 hPa) are presented for the current climate and future climate (top row), with the future change presented in the bottom panel.
Figure S3 - Recreation of Fig. 4, with storms categorized using mean OLR across the MCS at 1800 UTC. Composites are made for MCSs with the lowest 10% of mean OLR values (blue lines) and highest 25% of mean OLR values (red) in each climate.
Figure S5 - Recreation of Fig. 7 using only MCSs located over the West Sahel (15 – 0°W, 10 – 18°N) at 1800 UTC.
Figure S6 - Recreation of Fig. 8 using only MCSs located over the West Sahel (15 – 0°W, 10 – 18°N) at 1800 UTC.
Figure S7 - Recreation of Figure 7 using only MCSs located over the East Sahel (0 – 15°E, 10 – 18°N) at 1800 UTC.
Figure S8 - Recreation of Fig. 8 using only MCSs located over the East Sahel (0 – 15°E, 10 – 18°N) at 1800 UTC.
Figure S9 - Recreation of Fig. 7 using only MCSs located over the region 15°W – 15°E, 11 – 12°N at 1800 UTC.
Figure S10 - Recreation of Fig. 8 using only MCSs located over the region 15°W – 15°E, 11 – 12°N at 1800 UTC.
Figure S11 - Recreation of Fig. 7 using only storms located over the region 15°W – 15°E, 16 – 17°N at 1800 UTC.
Figure S12 - Recreation of Fig. 8 using only storms located over the region 15°W – 15°E, 16 – 17°N at 1800 UTC.
Figure S13 – Weighted density contour relationships between cold pool strengths and surface wind gusts. (a) relationship between cold pool marker intensity and 99th percentile 10-meter wind speed, and (b) relationship between cold pool marker and the 99th percentile of wind speed cubed. All metrics are measured at 1800 UTC. Current climate contours are displayed in black (purple shading for weight) with future climate displayed in yellow/green. In each panel, linear trend lines for each climate as well as the Pearson correlation coefficient are provided (black line for future climate, red line for current climate). Solid lines of best fit denote correlations significant beyond the 95th confidence interval.
Figure S14 – Probability Density Function plots for different cold-pool metrics. Values are taken for all current climate (red) and future climate (blue) storms with mean value of each metric in each climate provided in subplot legends and the colored dots underneath each histogram. The time of storm metrics evaluated are: (a) 1800 UTC 1st percentile 1.5 meter Temperature, (b) 1800 UTC 99th percentile surface pressure, (c) 1800 UTC 99th percentile 10-meter horizontal wind speed, and (d) 1800 UTC mean 10-meter horizontal wind speed cubed (a proxy for dust uplift potential). For each time of storm metric, the anomaly between 1800 UTC and mean ambient conditions (normalized for changes in ambient conditions across climates) are provided in panels (d-h) respectively. Confidence intervals measure the interval at which the null hypothesis for a Welch test (i.e. no change in populations across climates) can be rejected.
Figure S14 – Probably Density Function plot for the change in 99th percentile precipitation volume (extreme precipitation rate multiplied by area over which this rate occurs or is exceeded). Values are taken for all current climate (red) and future climate (blue) storms with mean value of each metric in each climate provided in subplot legends and the colored dots underneath each histogram.