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Southern hemisphere Tropical Storm response to global warming

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The atmospheric model ECHAM5 is used with T213 (approx. 60km) horizontal resolution to investigate the changes in tropical cyclone activity under future climate conditions, focusing on the Southern Hemisphere. Tropical cyclones are tracked in present-day (20C; 1969-1990) and a future (21C; 2069-2100) time slice simulations, using a tracking algorithm based on vorticity at 850 hPa. In contrast to the Northern Hemisphere, where tropical storm numbers reduce by 6 %, there is a more dramatic 22% reduction in the Southern Hemisphere. The strongest decrease in cyclone numbers is found in the South Indian Ocean. While an increase of static stability in 21C may partly explain the reduction in tropical storm number, it cannot explain the larger SH drop. The strong decrease of cyclones in the South Indian Ocean is related to large-scale circulations changes, associated with a weakening of Tropical Walker Circulation. Whereas the decrease found over the South Pacific, appears related to increased vertical wind shear, associated with an enhanced Hadley Circulation and meridional SST gradient. The difference between the hemisphere is mainly due to changes in the tropical cyclones of intermediate strength. In both hemispheres there is an increase in the frequency of strong storms and a decrease of weak storms, although the increase in SH intense storms is marginal.