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Changes in cyclone circulation and storm tracks under different future climate scenarios

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Extratropical cyclones have the potential to cause large damages across the mid-latitudes. Future climate change is projected to have a large impact on the location of the storm tracks, and the frequency of these cyclones, however the sign and magnitude of these responses has been uncertain for regions near the end of the storm tracks in previous coupled and idealized modelling studies.

Through the use of a Lagrangian cyclone tracking method we quantify changes in the storm tracks for both summer and winter seasons in both hemispheres for four future climate scenarios using a number of CMIP6 models. A cyclone compositing technique is employed to identify changes in cyclone circulation for the strongest cyclones in the lower, middle, and upper troposphere. We identify an intensification of the cyclone circulation in all seasons, apart from NH summer, where a weakening is detected. Cyclone size is also projected to increase, with a widening of the pressure and wind fields.

These results have significant implications from a socio-economic perspective. Despite a projected decrease in cyclone numbers, an increase in severity may lead to more drastic windstorms and larger impacts across heavily populated regions of the mid-latitudes.