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The projected slow-down of mid-latitude temperature anomalies

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The impacts of temperature extremes are strongly amplified with the duration by which they persist over a specific region. In the mid-latitudes, surface-weather as characterized by warm and cold temperature anomalies generally propagates eastward, following the movement of cyclones and anti-cyclones that govern the weather conditions in those regions. It has been suggested that surface weather might become more persistent in the future as a response to changes in land-atmosphere feedbacks and changes to the large-scale circulation, such as a weakening of the zonal winds or a shift in the jet due to the Hadley cell expansion.

In this study, we employ a tracking algorithm to recover the tracks of warm and cold near surface temperature anomalies in comprehensive climate simulations of current and future climates. This enables us to quantify their properties statistically. We focus on their propagation speeds, and find that the eastward movement of both warm and cold temperature anomalies is projected to significantly decrease across the Northern hemisphere mid-latitudes by the end of the century, suggesting an amplified risk of longer lasting hot- and cold extremes under future climate scenarios.

We investigate to what extent this slow-down of mid-latitude temperature anomalies can be attributed to future atmospheric circulation changes on hemispheric and regional levels, and assess how the projected changes in each model are linked to respective trends in high-latitude and land warming.