



Deducing changes in the extratropical storm tracks using Lagrangian diagnostics

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The extratropical storm tracks are shifting meridionally in observations and in simulations of the future climate. We investigate the storm-track response to warmer ocean surface temperatures (SSTs) by imposing idealized heating patterns in an atmospheric general circulation model with different fixed SST distributions. We conducted four simulations where SSTs were increased by 2K in four different regions: at low-latitudes equatorward of 45° , at high-latitudes poleward of 45° , in the tropics equatorward of 15° and uniformly at all latitudes. Additionally we cooled the ocean surface by 2K at latitudes poleward of 45 degrees in one additional run.

We examine the resulting storm-track changes by using the Lagrangian tracking routine TRACK (Hodges, 1995, 1999). We apply this routine to the relative vorticity field at the 850 hPa surface in both hemispheres.

The results suggest that the storm-track position, genesis latitude and lysis latitude all respond strongly both to low-latitude heating and to changes in the SST gradients. The response is moreover sensitive to the location of the altered gradients. Significant changes are also seen with other cyclone characteristics such as mean displacement, intensity and lifetime.