

Figure S1: Histograms of WCB air parcels in terms of their pressure location and time. The colour indicates the number of WCB parcels per time-pressure bin, where the bin width is 1 h and 10 hPa in the x and y directions, respectively. The figure is based on simulations with 1-moment cloud microphysics.



Figure S2: Histograms of WCB air parcels in terms of their 1-hour pressure changes,  $\Delta P_1h$ , and their pressure level across model setups. For the hour 't' along the trajectory,  $\Delta P_1h(t)$  is calculated as P(t + 1h) - P(t). The colour indicates the number of WCB parcels per pressure bin, where a bin width of 10 hPa is used. The figure shows simulations with 1-moment cloud microphysics.



Figure S3: Total diabatic heating rate along pressure levels for different resolutions calculated as the mean over trajectories. Different from Fig. 8a; all simulation data has been interpolated to a common 40 km grid before the analysis. The lines with filled and empty markers represent simulations with parametrized and explicit convection. All simulations shown here use 1-moment cloud microphysics.