



Warm Conveyor Belts in Idealized Moist Baroclinic Wave Life-Cycles

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This simulation study investigates the occurrence of Warm Conveyor Belts (WCB) in idealized extratropical cyclones. WCBs are key structures of extratropical cyclones associated with intense precipitation, strong cross-isentropic mass fluxes and latent heating, leading to diabatic Potential Vorticity (PV) modification along the WCB and hence influencing the upper level Rossby waveguide. To investigate these processes in detail, idealized moist baroclinic simulations on an f-plane are performed using a channel version of the weather prediction model COSMO. The model has periodic zonal and relaxing lateral boundary conditions. The basic states comprise a baroclinic jet structure and different moisture profiles corresponding to wetter and drier initial conditions. To investigate up- and downstream development, a finite amplitude upperlevel perturbation in the form of a positive PV anomaly is implemented. To quantitatively investigate WCBs, forward trajectories are calculated and objective selection criteria are applied to identify WCBs. Along these flows, we track the evolution of PV, pressure, potential temperature, relative humidity and equivalent potential temperature. Sensitivity experiments are performed with varying baroclinicity, initial relative humidity profiles and basic jet barotropic wind shear to cover various archetypes of cyclogenesis and to assess the sensitivity of key parameters along the WCB flow to the structure and condition of the cyclone.