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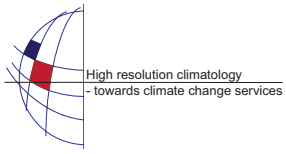

Influence of diabatic processes on the PV development in a warm conveyor belt

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Warm conveyor belts are frequent features of extratropical cyclones in the Northern Hemisphere. In the strongly ascending airstreams clouds are forming whereas the latent heat release further increases the upward motion. The potential vorticity (PV) in the conveyor belt is strongly influenced by the microphysical processes occurring during the formation of clouds. In general, the PV increases below the maximum diabatic heating and decreases above. Thus, the conveyor belt reaches the upper troposphere with low PV values and therefore has the potential to influence the large scale dynamics. In order to assess the influence of the different microphysical processes like condensation, freezing, evaporation, sublimation, etc. on the PV development during the ascent, a Lagrangian based analysis is used. First, simulations with the COSMO Model are performed in order to calculate the individual diabatic heating rates caused by various transfer processes between hydrometeors. Then, the diabatic heating rates and the associated change in PV are calculated along trajectories in a warm conveyor belt. It can be seen that ice phase processes as well as condensation/evaporation strongly modify the PV during the ascent. Therefore, small scale microphysical processes have the potential to modify the large scale dynamics as airstreams with a strongly modified PV reach the upper troposphere.