Case studies of embedded convection in warm conveyor belts based on satellite data during the NAWDEX field campaign

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The role of convective activity embedded in WCBs and its impact on the dynamics through PV modification is a long-standing, but yet unresolved question. This gives rise to the question whether embedded convection in extratropical cyclones can be associated with (i) extreme surface weather, (ii) cyclone intensification and (iii) increased forecast error growth.

We analyze the structure and frequency of convective activity embedded in WCBs based on geostationary satellite data in the North Atlantic and European region and observations from the 'North Atlantic Waveguide and Downstream Impact Experiment' (NAWDEX). Satellite derived cloud top pressure with high temporal and spatial resolution are combined with WCB trajectories (calculated as trajectories with an ascent rate of at least 600 hPa within 48 hours) for selected case studies during the NAWDEX field campaign. Potential convective activity is identified through the comparison of the minimum pressure level of the WCB air parcels and the satellite derived cloud top pressure along the trajectories and used as a first-order approximation for embedded convection in WCBs. In addition, a satellite derived cloud classification product, which distinguishes between high-level cirrus and cumulonimbus clouds, is applied to further differentiate between convective and non-convective upper-level clouds.

Preliminary results indicate that most frequently the WCB trajectories coincide with the satellite derived cloud top, while deep convective activity is mainly found over the WCB inflow and ascent region.