

How does air pollution influence the precipitation and cloud structure in extratropical cyclones?

- Warm conveyor belts (WCBs) are coherently ascending airstreams in extratropical cyclones (ETCs) and form large-scale cloud bands
- WCB ascent and associated cloud formation influence the larger-scale flow (e.g. ridge amplification) >> link between thermodynamics and dynamics

Open questions:

- How does the CCN concentration influence the cloud structure?
- Does polluted air change the surface precipitation associated with ETCs?
- How do varying CCN concentrations influence WCB ascent?
- Does the model representation of CCN activation matter for the large-scale flow evolution?

Tasks:

- Sensitivity study with varying CCN concentrations with kilometer-scale ICON simulations of a WCB case study in the North Atlantic
- Analyse four existing simulations with high, intermediate, low CCN concentrations
 - General cloud characteristics and large-scale flow (e.g., T , q_v , q_i , q_s , PV, u)
 - Eulerian and Lagrangian perspective (use online trajectories in ICON)
 - Detailed diabatic heating rates from microphysical processes (e.g. CCN activation, vapor deposition, evaporation of rain, etc.)
- Perform and analyse additional ICON simulations with refined CCN perturbations

