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Aircraft measurements within a warm conveyor belt during the T-NAWDEX-FALCON campaign

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Warm Conveyor Belts (WCBs) are air streams that are highly relevant for the dynamics in the mid-latitudes as they strongly influence the evolution and intensity of northern hemispheric mid-latitude weather systems. For the predictability of cyclones the representation of diabatic processes associated with latent heat release due to phase transitions of water, surface fluxes, or radiative effects are believed to be a limiting factor. Diabatic processes in cyclones strongly depend on the transport of water vapor and are mainly organized and controlled by the coherently ascending WCB air masses.

In October 2012 the T-NAWDEX-Falcon (THORPEX-North Atlantic Waveguide and Downstream Impact Experiment) campaign was organized by DLR Oberpfaffenhofen and ETH Zurich. During 9 research flights over Europe in-cloud measurements in WCBs were obtained with the DLR aircraft Falcon. Lagrangian flights were conducted with the aim to measure in the same air mass during different stages of the WCB to quantify the transport of moisture and the net latent heating along WCBs and their importance for forecast errors associated with mid-latitude weather systems. Besides in-situ observations of wind, temperature and humidity to characterize the thermodynamic structure of the WCBs, a set of dropsondes was deployed to gain a complete view on the complex structure of the cyclone.

This presentation gives an overview of the three successful IOPs performed during the T-NAWDEX-Falcon campaign. To address forecast uncertainty and to enable flight planning up to four days in advance of the flights novel diagnostics based on deterministic and ensemble prediction NWP data were employed during the campaign. Furthermore a number of different trajectory models were applied for this field experiment. Based on selected flights from one intensive observation period the challenging planning process of Lagrangian matches of flight paths is described and first results are presented.