

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

Towards an international T-NAWDEX field experiment: Aircraft observations within a warm conveyor belt

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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. Quasi-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 and summarizes the challenging planning process. Observations of one selected IOP that aimed for Lagrangian matches of two consecutive flights are shown. The two flights over northwestern France and the English Channel were separated by about 4 hours.

T-NAWDEX-Falcon served as an important preparatory campaign for a future international T-NAWDEX campaign which is currently scheduled for 2016. In this future research effort to study the role of forecast errors e.g. diabatic processes on the mid-latitude waveguide different aircraft shall operate over the Atlantic. The presentation will give an overview on the planning process and the idea to use the novel German research aircraft HALO.