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The atmospheric boundary layer structure over sea-ice in Fram Strait: Comparison of aircraft observations and model analyses

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In March 2007, as part of the IPY, the Fram Strait Cyclone experiment (FRAMZY) took place in the region between Spitsbergen and Greenland. One goal of the campaign was the observation of the atmospheric boundary layer (ABL) in cyclones and frontal systems over sea-ice. Among others the German research aircraft Falcon was used for in situ measurements of the ABL. The results of observations are compared with the operational analyses of three weather forecast models (ECMWF, German GME, and Norwegian HIRLAM). Model analyses of cyclones and frontal systems in the surface pressure fields are comparable with the observations, however with deviations of the exact positions of the systems. Vertical profile-flights of Falcon have been assayed with regard to the stability of atmosphere. In cases with neutral or weak stable stratification the comparisons of temperature and humidity profiles show a good agreement between models and measurements. In contrast in cases with strong stable stratification (distinct temperature inversions) the models show large deviations from the measurements. Differences of the ABL structure between the individual models are remarkable large.