



A comparison of aircraft-based surface-layer observations over Denmark Strait and the Irminger Sea with meteorological analyses and QuikSCAT winds

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A compilation of aircraft observations of the atmospheric surface layer are compared against several meteorological analyses and QuikSCAT wind products. The observations are taken during the Greenland Flow Distortion Experiment (GFDex), in February and March 2007, during cold-air outbreak conditions and moderate to high wind speeds. About 150 data points spread over six days are used, with each data point derived from a 2-minute run (equivalent to a 12km spatial average). The observations were taken 30-50m above the sea surface and are adjusted to standard heights. Surface-layer temperature, humidity and wind, as well as sea surface temperature (SST) and surface turbulent fluxes are compared against co-located data from the ECMWF operational analyses; NCEP Global-Reanalyses; NCEP North-American-Regional-Reanalyses (NARR); Met Office North-Atlantic-European (NAE) operational analyses; two MM5 hindcasts; and two QuikSCAT products.

In general, the limited area models are better at capturing the mesoscale high windspeed features and their associated structure – often the models underestimate the highest windspeeds and gradients. The most significant discrepancies are a poor simulation of relative humidity in the NCEP-Global and MM5 models; a cold bias in 2-m air temperature near the sea-ice edge in the NAE model; and an overestimation of wind speed above 20 m s⁻¹ in the QuikSCAT wind products. In addition, the NCEP Global, NARR and MM5 models all have significant discrepancies associated with the parameterization of surface turbulent heat fluxes. A high-resolution prescription of the SST field is crucial in this region, although these were not generally used at this time.