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Evaluation of WRF Boundary Layer Profiles against Radiosoundings in Northern Greenland in winter conditions

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The boundary-layer processes in High Arctic area are studied based on consecutive radiosoundings and numerical simulations with Weather Research and Forecasting (WRF) model version 3.3.1 during a late winter period. The measurements consist of about 30 radiosondings performed every 12 hours in March 3 – 18, 2012. The model was initialized with US NCEP Final Analyses (FNL) with $1x1^0$ spatial and 6 hours temporal resolution. WRF was run with two-way nesting on 3 domains with horizontal grid step 36 km, 12 km 4 km, on 26 vertical levels up to the model top of 50 hPa. Numerical experiments with WRF were performed using Mellor – Yamada – Janjic scheme for planetary boundary processes with corresponding Monin – Obukhov (Janjic Eta) the surface layer scheme and the Noah land surface model. The variability of the correlation coefficient with height for all studied meteorological fields (temperature, humidity and wind) shows clear change at height of about 500 m; above this height the correlation coefficient values are around 0.9, while closer to the surface its values are between 0.6 and 0.8. WRF over-estimates the temperature and humidity characteristics and the wind speed within up to 300 - 500 m. The modelled boundary-layer height is compared to its expert evaluation from measurements.