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Advance in simulating a polar low with the convection-permitting weather forecasting model AROME-Arctic.

Patrick Stoll (1), Rune Graversen (1), and Teresa Maaria Valkonen (2)

(1) University of Tromsø, Institute for physics and technology, Tromsø, Norway (pst019@post.uit.no), (2) The Norwegian Meteorological Institute, Oslo, Norway

In this study the capability of the weather-prediction model AROME-Arctic for simulating a well-observed polar low is investigated. This polar low developed on 3-4 March 2008 and was measured by dropsondes released from three flights during the IPY-THORPEX campaign. The simulation could hence be compared to dropsondes, a rarity for a polar low. The low is additionally validated against satellite images. Both validations reveal a high quality, but also weaknesses, of the forecasting model. The model seems to be sensitive to the initial condition and overestimate deep convection and surface heat fluxes.
A comparison of the AROME-Arctic simulation to the ECMWF operation forecast, and the reanalyses datasets ERA-Interim, ERA-5 and ASR, shows that differences are small in the initial baroclinic phase of the polar low, but increased model resolution improves the simulation in the convective mature phase of the low.
Sensitivity experiments performed with AROME-Arctic show that surface heat fluxes are fundamental for maintaining the polar low. Especially the sensible heating in the vicinity of the center and the release of condensational heat are fueling the low after the initial baroclinic development.