

Atmospheric circulation in the Arctic: assessment of modeling performance and resolution issue

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Abstract

The series of 10yr climate simulations using multiscale climate modeling system has been conducted. The RCM modeling domain comprises the Arctic and northern mid latitudes. Here we propose a "seamless" algorithm of extratropical cyclone tracking accounting for the high resolution RCM grid embedded into the coarser resolution grid of the GCM. The algorithm enables to increase the efficiency of high resolution RCM applications within the broader context of the global atmospheric circulation prediction and analysis. The internal structure of the cyclonic activity in the high latitudes is investigated depending upon different modeling resolution. It has been found that high resolution model allows realistic simulation of the extreme cyclones (polar lows) as compared to observation analysis. The polar lows are accompanied by the stormy near surface winds exceeding 15 m/s. A reasonable agreement between RCM simulated polar lows and that observed suggests high potential of RCM to reproduce the extreme wind statistics in the region. Further developments may include building ensembles of RCM applications over the Arctic in order to reduce the uncertainties in the simulations of polar lows. The study is supported by grants from RFBR 11-05-00733, 12-05-31033, 13-05-00541