

Detection of North Atlantic Polar Lows in Climate Mode Simulations

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Polar lows are not properly resolved in global re-analyses. Atmospheric limited area models (LAMs), which post-process re-analysis data, may be an appropriate tool for describing the year-to-year variability and decadal trends in the formation of Polar Lows.

The merits and potential of this approach are examined in case studies of reproducing polar low occurrences with a LAM. A series of three week long ensemble simulations of weather situations over the NE Atlantic with a RCM/LAM (CLM) was conducted and its capability to reproduce polar lows was investigated. To keep the influence of the initial field low, the simulations were begun approximately two weeks prior to the polar low formation.

It is shown that polar lows can be reproduced with the LAM. When „spectral nudging“ is applied a polar low develops in all ensemble members and the simulations are very insensitive to the initial conditions. However there are differences in detail compared to observational data, e.g extent of pressure decline and polar low's location.

In a second step towards our goal of determining trends in changing frequencies and characteristics, an algorithm for automatical detection polar lows has been designed and tested. This algorithm was applied to the output fields of a long-term simulation and first results are shown.