

## SPECIAL PROJECT FINAL REPORT

All the following mandatory information needs to be provided.

<b>Project Title:</b>	HCLIM-NorCP: Nordic Convection Permitting Climate Projections with the HCLIM model
<b>Computer Project Account:</b>	spnodobl
<b>Start Year - End Year :</b>	2019 – 2019 (7 Months)
<b>Principal Investigator(s)</b>	Andreas Dobler
<b>Affiliation/Address:</b>	Norwegian Meteorological Institute Henrik Mohns Plass 1 0371 Oslo
<b>Other Researchers (Name/Affiliation):</b>	Oskar Landgren, Norwegian Meteorological Institute  Jan Erik Haugen, Norwegian Meteorological Institute

The following should cover the entire project duration.

## **Summary of project objectives**

(10 lines max)

The Nordic modelling collaboration “NorCP” is performing convection permitting climate simulations at 3km grid resolution over a northern European domain. The collaboration is using a common model setup for the climate-adapted version “HCLIM” of the numerical weather prediction model HARMONIE and includes DMI (Denmark), FMI (Finland), MET Norway (Norway) & SMHI (Sweden). Within this special project in 2019, HCLIM simulations have been carried out, starting to downscale the GFDL-CM3 global model to 3km for the future period 2080-2100, following the RCP8.5 emission scenario. Other time periods and scenarios are covered by the other institutes involved. Beside the provision of high-resolution climate data, NorCP aims to increase the knowledge of climate processes and changes over the Fenno-Scandinavian region using next generation high-resolution climate models.

## **Summary of problems encountered**

(If you encountered any problems of a more technical nature, please describe them here.)

There were no technical problems encountered. However, the 5 MSBUs allocated for 2019 covered roughly two years of the 21-year time slice we wanted to perform. Another 4.75 years were covered by the first year of the subsequent 3-year special project, and the remaining 14.25 years were covered by the national resources from MET Norway and FMI, allowing us to finalise the simulations in May 2020.

## **Experience with the Special Project framework**

(Please let us know about your experience with administrative aspects like the application procedure, progress reporting etc.)

The application procedure and progress reporting are easy to handle and include only a low level of bureaucracy. Also, answers to questions related to special projects or other technicalities at ECMWF were always quick and helpful.

## **Summary of results**

(This section should comprise up to 10 pages, reflecting the complexity and duration of the project, and can be replaced by a short summary plus an existing scientific report on the project.)

The GFDL-CM3 global model was successfully downscaled to 3km for the future period 2080-2100 (RCP8.5 scenario). Together with the other institutes contributing to NorCP, the simulations now provide a small ensemble of high-resolution climate runs for the time periods 1998-2018 (ERA-Interim driven), 1986-2005, 2041-2060 and 2081-2100 (RCP8.5; EC-EARTH and GFDL-CM3 driven). The resulting data for Northern Europe provides an important basis for the assessment of climate change and its impact on local scales, covering more than 150 years of convection permitting climate simulations.

Usage and evaluation of the climate model data at national climate and weather services has started recently and is expected to continue and intensify in the coming period. While one general paper (Lind et al., 2020) on the model evaluation has been written and is currently under revision, more specific papers based on the model data are in preparation. The evaluation paper shows an added-value of high-resolution modelling and that high-resolution models should be taken into consideration in future climate change studies, especially in mountain areas as well as the design and implementation of climate services.

## **List of publications/reports from the project with complete references**

- Lind et al., 2020: “Benefits and added value of convection-permitting climate modeling over Fenno-Scandinavia”, Climate dynamics, in revision

More papers on assessing the future projections, extremes etc. are in preparation.

## **Future plans**

(Please let us know of any imminent plans regarding a continuation of this research activity, in particular if they are linked to another/new Special Project.)

After the successful generation of more than 150 years of convection permitting climate simulations over northern Europe, analysing the simulated data with respect to extreme events and evaluating the added value are currently in our focus. With the upcoming CMIP6 simulations however, and taking the good results from the current simulations into account, further downscaling experiments are planned. This will be again partly done in a Special Project (spnodobl).