SPECIAL PROJECT PROGRESS REPORT

All the following mandatory information needs to be provided. The length should *reflect the complexity and duration* of the project.

Reporting year	2020
Project Title:	HCLIM-NorCP: Nordic Convection Permitting Climate Projections with the HCLIM model
Computer Project Account:	spnodobl
Principal Investigator(s):	Andreas Dobler
Affiliation:	Norwegian Meteorological Institute
Name of ECMWF scientist(s) collaborating to the project (if applicable)	
Start date of the project:	01.01.2020
Expected end date:	31.12.2022

Computer resources allocated/used for the current year and the previous one
(if applicable)
Please answer for all project resources

		Previous year		Current year	
		Allocated	Used	Allocated	Used
High Performance Computing Facility	(units)	–	–	9500000	9551264.50
Data storage capacity	(Gbytes)	–	–	10000	7200

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, HCLIM simulations have been carried out in 2020, downscaling 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 (10 lines max)

There were no technical problems encountered. However, the 9.5 MSBUs allocated for 2020 covered roughly 4.75 years of the 21-year time slice we have performed. Another two years were covered by a previous 1-year special project, while 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.

Summary of plans for the continuation of the project (10 lines max)

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, and taking the good results from the current simulations into account, further downscaling experiments are planned within the project.

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.

Summary of results

If submitted **during the first project year**, please summarise the results achieved during the period from the project start to June of the current year. A few paragraphs might be sufficient.

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.

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.