

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 year2021.....

Project Title: ...The Danish Climate Atlas: HCLIM experiments

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Computer Project Account: ...SPDKPEDE.....

Principal Investigator(s): ...Rasmus A. Pedersen

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Affiliation: ...Danish Meteorological Institute.....

Name of ECMWF scientist(s) collaborating to the project

(if applicable)

Start date of the project: ...January 1, 2019.....

Expected end date: ...December 31, 2021.....

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)	9,000,000	8,880,122	9,000,000	0
Data storage capacity	(Gbytes)	20,000	20,000	20,000	20,000

Summary of project objectives (10 lines max)

The Danish Meteorological Institute will in the coming years (2018-2021) develop a so-called Climate Atlas with detailed information on future climate projections for Denmark. The work will have a particular focus on extreme events, e.g. precipitation extremes and cloud bursts. Consequently, model simulations with high geographical detail, high temporal resolution and physics that improve the treatment of convective processes are needed. We will perform a series of regional climate model simulations with HCLIM (Belusic et al. 2020). Part of the planned work is done in a Nordic collaboration on HCLIM involving DMI (Denmark), SMHI (Sweden), MET Norway (Norway), and FMI (Finland); creating a consistent future projection ensemble of 3 km simulations over a Fennoscandinavian domain. DMI is responsible for two simulations covering 2081-2100 following the RCP4.5 and RCP8.5 emission scenarios (van Vuuren et al., 2011).

Summary of problems encountered (10 lines max)

Principle investigator Rasmus A. Pedersen has moved to an administrative position in the beginning of 2021. The plans for the special project remain unchanged, but as the tasks are gradually being taken over by other colleagues, there has been no resources spent in 2021 until this point. We do, however, expect to spend the allocated resources on the planned simulations in the second part of the year.

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

The allocated resources for 2021 will be used in the second half-year for additional HCLIM simulations exploring benefits of higher resolution experiments focusing on Denmark, and contributing to the Danish Climate Atlas.

List of publications/reports from the project with complete references

The Special Project resources are contributing to the ensemble of Nordic Convection-Permitting climate projections (*NorCP*), performed in collaboration between DMI (Denmark), SMHI (Sweden), MET Norway (Norway), and FMI (Finland). Several additional publications and presentations are planned; the following are selected references from the last year:

- Lind, P., Belušić, D., Christensen, O. B., Dobler, A., Kjellström, E., Landgren, O., Lindstedt, D., Matte, D., **Pedersen, R. A.**, Toivonen, E., Wang, F., 2020: Benefits and added value of convection-permitting climate modelling over Fenno-Scandinavia. *Clim. Dyn.*, doi: 10.1007/s00382-020-05359-3.
- **Pedersen, R.A.**, D. Belušić, O.B. Christensen, A. Dobler, P. Lind, D. Lindstedt, E. Toivonen, F. Wang. *Future climate change in the Nordic region - new insights from a convection-permitting climate model*. Latsis symposium, ETH, Zürich, Switzerland, August 2019.
- D. Lindstedt, P. Lind, D. Belušić, F. Wang, E. Kjellström, A. Dobler, O. Landgren, E. Toivonen, J.-P. Pietikäinen, **R.A. Pedersen**, R. Mottram, D. Matte; *Validation of the snow climate in a regional climate model at 3 km grid spacing over Scandinavia*, EMS2019-506, EMS Annual Meeting 2019. DTU, Copenhagen, Denmark, 9 – 13 September 2019.
- P. Lind, D. Belušić, E. Toivonen, **R.A. Pedersen**; D. Lindstedt; F. Wang; A. Dobler; E. Kjellström. *Future response of precipitation extremes over the Nordic region in a convection-permitting regional climate model*. REKLIM 2nd International Conference, Berlin, Germany, 23 – 25 September 2019.
- E. Toivonen, D. Belušić, E.D. Thomassen, P. Berg, O.B. Christensen, A. Dobler, A.V. Dyrørdal, J.E. Haugen, K. Jylhä, E. Kjellström, O. Landgren, P. Lind, D. Lindstedt, D. Matte, A. Mäkelä, J. Olsson, **R.A. Pedersen**, F. Wang, and W. Yang; *Evaluation of extreme precipitation over the Nordic region using a convection-permitting regional climate model*, EGU2020-10506, EGU General Assembly 2020

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. If submitted **during the second project year**, this summary should be more detailed and cover the period from the project start. The length, at most 8 pages, should reflect the complexity of the project. Alternatively, it could be replaced by a short summary plus an existing scientific report on the project attached to this document. If submitted **during the third project year**, please summarise the results achieved during the period from July of the previous year to June of the current year. A few paragraphs might be sufficient.

As explained above, no new experiments have been carried out since last progress report. Analysis of the simulation ensemble that these resources have contributed to is ongoing in the consortium. Since last progress report, Lind et al. 2020 has been published (see publication list above).