SPECIAL PROJECT PROGRESS REPORT

Progress Reports should be 2 to 10 pages in length, depending on importance of the project. All the following mandatory information needs to be provided.

Reporting year 2018

Project Title: Links between warming Arctic and climate extremes in northern Eurasia (LAWINE)

Computer Project Account: SPFIUOTI

Principal Investigator(s): Petteri Uotila

Affiliation: University of Helsinki (was Finnish Meteorological Institute)

Name of ECMWF scientist(s) collaborating to the project (if applicable) ……

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Start date of the project: 1.1.2017

Expected end date: 31.12.2019

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)	2,000,000	1,176,221	2,500,000	1,358,046
Data storage capacity	(Gbytes)	300	12	300	12

Summary of project objectives

(10 lines max)

We use ECMWF computational resources to assist us in completing model simulations on the EC-Earth climate model to address the LAWINE scientific objectives which aim to better understanding of complex processes linking Arctic amplification with mid-latitude climate extremes. Specifically, we carry out surface temperature perturbed climate model simulations to determine teleconnections between the Arctic and lower latitutes. Most simulations are carried out on CSC and FMI supercomputers in Finland, some on the ECMWF system when deemed necessary due to heavy computational load on the Finnish computers, for example.

Summary of problems encountered (if any)

(20 lines max)

No bigger problems. File transfers of order of 100s Gbs from ECMWF to CSC computers on sftp stopped occasionally. Not sure whether the issue was in our end of transfer.

Summary of results of the current year (from July of previous year to June of current year)

This section should comprise 1 to 8 pages and can be replaced by a short summary plus an existing scientific report on the project

We have upgraded and tested the latest version of EC-Earth for CMIP6 on cca successfully, including the updated version of the barakuda software, which is used to diagnose and visualise the NEMO ocean model output. The EC-Earth simulations carried out on cca became members of the simulation ensemble created for the project. At the same time, the coupled EC-Earth runs are supporting the CMIP6 effort of the consortium by testing and implementing features required for the CMIP6 configuration, such as the standard model output and ocean model upgrades.

List of publications/reports from the project with complete references

The project has produced following publications:

1) Benestad, R., Sillmann, J., Thorarinsdottir, T. L., Guttorp, P., d. S. Mesquita, M., Tye, M. R., Uotila, P., Fox Maule, C., Thejll, P., Drews, M., and Parding, K., New vigour involving statisticians to overcome ensemble fatigue, Nature Climate Change, 7(10), 697–703, doi:10.1038/nclimate3393, 2017.

2) Uotila, P., Goosse, H., Haines, K., Chevallier, M., Barthélemy, A., Bricaud, C., … Zhang, Z., An assessment of ten ocean reanalyses in the polar regions. Climate Dynamics, pp. 1–38. https://doi.org/10.1007/s00382-018-4242-z, 2018.

4) Vihma, T., Uotila P., et al. Towards the Marine Arctic Component of the Pan-Eurasian Experiment, submitted to the Atmospheric Chemistry and Physics, 2018.

3) Vihma, T., Björnsson, H., Chen, L., Dethloff, K., Francis, J., Graversen, R., Handorf. D., Hanna, E., Hall, R., Karpechko, A., Overland, J. E., Skific, N., Tyrrell, N., and Uotila, P., How does Arctic change affect European weather and climate? To be submitted to the International Journal of Climatology, 2018.

Summary of plans for the continuation of the project

(10 lines max)

We'd like to continue simulations on the EC-Earth climate model on the CSC and ECMWF supercomputers. We are already analysing observed teleconnections based on atmospheric ERA-20C, ERA-Interim and oceanic ORAS5 reanalyses, and will compare those findings with the model produced Arctic-mid-latitudes linkages. This will help in evaluating the model skill, particularly in terms of air-sea heat exchange which is of high importance in generating teleconnections. We'd do high resolution coupled simulations to investigate the role of mesoscale ocean eddies and their effects on atmospheric circulation using somewhat idealised configurations to investigate physical mechanisms responsible for initiating teleconnections. These will results will be written in manuscripts and published in scientific journals in 2019.