

# 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** 2017 .....

**Project Title:** Simulating the climate in Last Millennium using EC-Earth  
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**Computer Project Account:** spdkyang .....

**Principal Investigator(s):** Shuting Yang .....

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

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

**Start date of the project:** January, 2017.....

**Expected end date:** December, 2018 .....

**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
<b>High Performance Computing Facility</b>	(units)	NA		2250000	35174
<b>Data storage capacity</b>	(Gbytes)	NA		2,000,000	

## Summary of project objectives

(10 lines max)

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The aim of the project is to develop the transient climate in the last millennium (850-1849 CE) using climate model EC-Earth in response to mainly natural forcing (i.e., solar variations, volcanic aerosols, orbital parameters and the atmospheric concentration of well mixed greenhouse gases) as well as to a less extent the land use/land cover changes. The experiment will contribute to the CMIP6 endorsed Paleoclimate Modeling intercomparison Project phase 4 (PMIP4), as well as to be used to study the characteristics and mechanisms of decadal to centennial climate variability.

## Summary of problems encountered (if any)

(20 lines max)

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The project plans to perform the Last Millennium (LM) climate simulation using EC-Earth3-LR, the low resolution version of the new EC-Earth3 model that is developed for CMIP6. However, the EC-Earth3 model is still under development. The EC-Earth consortium is currently working extensively to finalize the model (ie., EC-Earth3.3). The actual LM experiments will not be able to start before the EC-Earth3.3 is formally released.

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## 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

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While we are waiting for the release of EC-Earth3.3, we have started to set up the low resolution model, EC-Earth3-LR, on cca using the intermediate version EC-Earth3.2. As the technical setup for EC-Earth3.3 is expected to be fairly close to that of EC-Earth3.2, this work will help us be better prepared for running the experiment once EC-Earth3.3 is released. We have solved a number of problems encountered while adapting the model system and the associated boundary files that are at the standard resolution of T254 L91 for the atmosphere model to the EC-Earth3-LR which is at resolution of T159 L62.

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

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## Summary of plans for the continuation of the project

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The EC-Earth3.3 model is expected to be formally released by the consortium in October. We will then finalize the EC-Earth3-LR. A spin-up run of multiple centuries under the preindustrial condition will be developed to establish an unforced, reasonably stable climate as the initial state for the LM simulation. Meanwhile, we will implement the LM boundary conditions on to the model following the CMIP6-PMIP4 protocol. These boundary conditions include time varying forcings of orbital parameters, greenhouse gases, radiative forcing due to stratospheric aerosols by volcanoes, solar activities, and land use and have been made available by the provided by the PMIP4 LM working group, We expect to perform the spin-up run toward the end of 2017 and the production run in early 2018,  
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