

## SPECIAL PROJECT FINAL REPORT

All the following mandatory information needs to be provided.

<b>Project Title:</b>	Downscaling a wetter/hotter outlier GCM for the EURO-CORDEX initiative
<b>Computer Project Account:</b>	SPIESWEE
<b>Start Year - End Year :</b>	2012 - 2014
<b>Principal Investigator(s)</b>	Conor Sweeney
<b>Affiliation/Address:</b>	UCD, Dublin, Ireland
<b>Other Researchers (Name/Affiliation):</b>	None

The following should cover the entire project duration.

## **Summary of project objectives**

(10 lines max)

The aim of this special project is to provide high resolution regional climate model (RCM) data for Europe over the period 1950-2100. This will contribute to a larger voluntary project, EURO-CORDEX, which is gathering data from a range of RCMs driven by different global climate models (GCMs). Recent GCM analyses have shown a need for downscaling “hotter/wetter” GCMs. The “Model for Interdisciplinary Research on Climate” (MIROC) GCM, developed in Japan, was found to be suitable. This special project uses data from MIROC to drive the CCLM RCM at a resolution of 0.11 degrees. EURO-CORDEX is a collaborative initiative, and by producing these downscaled data, the project team will have access to data produced by other members of the EURO-CORDEX initiative. It is expected that analyses of these data will lead to publications in leading, peer-reviewed journals.

## **Summary of problems encountered**

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

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

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

Everything went smoothly with the Special Project administrative aspects. Communication was good, and any questions I had were quickly and effectively answered.

## **Summary of results**

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

The GCM data are stored on the Earth System Grid Federation (ESGF) nodes. There were initially some problems with retrieving data. This may have been related to the ESGF introducing new peer technology during late 2012/early 2013, or perhaps due to some change in the MIROC host server. The system later became stable, and GCM data were retrieved successfully using scripts.

After initial tests with MIROC GCM data, and in consultation with the EURO-CORDEX community, it was decided to use MIROC5 GCM data instead of MIROC-ESM-CHEM. The MIROC5 data are available at a higher resolution, removing the requirement for the 0.44 degree simulations.

The CCLM code was installed and optimised on c2a. This step was quite straight-forward, as the code has been previously run on similar systems. Speedup tests were performed to decide on the optimal balance between wall time and SBU, and to ensure that performance was in line with expectations, which it was.

CCLM output data and restart data files were generated in \$SCRATCH on c2a. They were then copied to the ECFS, and from there ectrans was used to copy them regularly to the local data server in UCD.

The CCLM model had not been used with MIROC5 data before. Although other programs were available that processed different GCM data for CCLM, it was found that MIROC5 data would not work with these. A new program had to be written, therefore, to process the MIROC5 data.

Unfortunately, although the RCM ran successfully with data produced by this program, there were errors in the data. One error was due to the handling of leap days, and a second error involved the a and b values for the sigma pressure coordinates not being scaled correctly for the CCLM RCM downscaling. The full downscaling was not completed on the ECMWF computer.

I am helping Christian Steger at DWD who has taken over the downscaling of this data, to be run on the DKRZ high performance computing platform. Unfortunately, due to errors with leap days and sigma pressure coordinates, it was decided that the best thing to do would be to run generate the entire data again on the DKRZ computer. The tool to transform data from MIROC to caf has been passed on to the EURO-CORDEX community. Correct values are now being used by DWD for their downscaling of this data.

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

I presented a poster on preparing MIROC5 data for CCLM at the CCLM Assembly in ETH Zurich, August 2013. This was a worthwhile trip, as I met other members of the EURO-CORDEX community who will be continuing these simulations.

The RCM data produced in this project are part of EURO-CORDEX and will be used in future publications. When these simulations are complete, we plan to use data from multiple EURO-CORDEX RCMs to prepare a publication on extreme value analysis of climate model data.

### **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.)

No continuation of project planned.