Project No. 037005

CECILIA

Central and Eastern Europe Climate Change Impact and Vulnerability Assessment

Specific targeted research project

1.1.6.3.I.3.2: Climate change impacts in central-eastern Europe

D1.3: Completion of ARPEGE simulation at 50 km grid spacing over Europe for the 21st century under the A1B scenario. Provision of meteorological fields to WP2

Due date of deliverable: 1st December 2007
Actual submission date: 16th January 2008

Start date of project: 1st June 2006 Duration: 36 months

Lead contractor for this deliverable: CNRM

Project co-funded by the European Commission within the Sixth Framework Programme (2002-2006)		
Dissemination Level		
PU	Public	X
PP	Restricted to other programme participants (including the Commission Services)	
RE	Restricted to a group specified by the consortium (including the Commission Services)	
CO	Confidential, only for members of the consortium (including the Commission Services)	

ARPEGE simulation

In the framework of ENSEMBLES FP6 project a 101-year simulation has been produced with the global model ARPEGE. This model has a variable resolution of 50 km over southern Europe, decreasing to 300 km at the antipodes. The version used was version 4, which is an upgraded version of the one used in PRUDENCE FP5 project (version 3).

This simulation span over the the 1950-2050 period. Beyond 2000, the SRES-A1B radiative forcing were used. The model is not coupled with the global ocean, but uses sea surface temperature (SST) from the CNRM contribution to IPCC-AR4. The monthly mean SST are corrected for each calendar month by subtracting the mean error over the 1958-1999 period. This simulation has been used in ENSEMBLES to drive the ALADIN limited area model over Europe at 25 km resolution over the whole period.

In CECILIA, we want to study two periods: the 2021-2050 and the 2071-2100 period. The latter period is useful because the signal (global warming) to noise (natural variability) is greater than in the former period. In addition, the latter period allows comparison with PRUDENCE. To this aim, we have run the ARPEGE model for 50 additional years in the CECILIA project.

Figures 1 to 5 show the differences between the seasonal 30-year mean between each period and a reference period 1961-1990 (the same as in PRUDENCE). JJA mean sea level pressure is not shown because the model response is very weak. On can remark the good scalability of the patterns between the half and the end of the century. This scalability was an assumption of the PRUDENCE project.

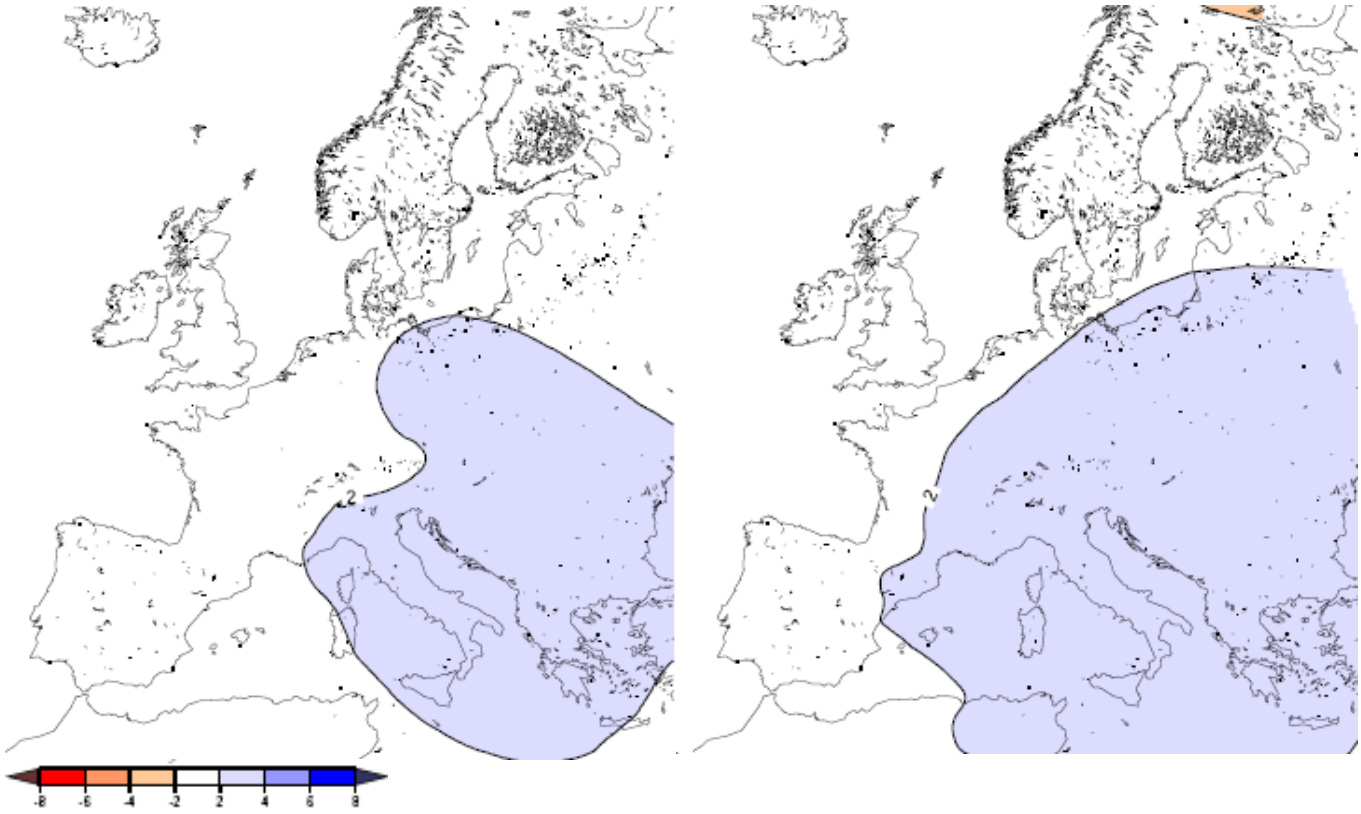

Fig. 1 ARPEGE response in DJF for 2021-2050 (left) and 2071-2100 (right) mean sea level pressure (hPa)

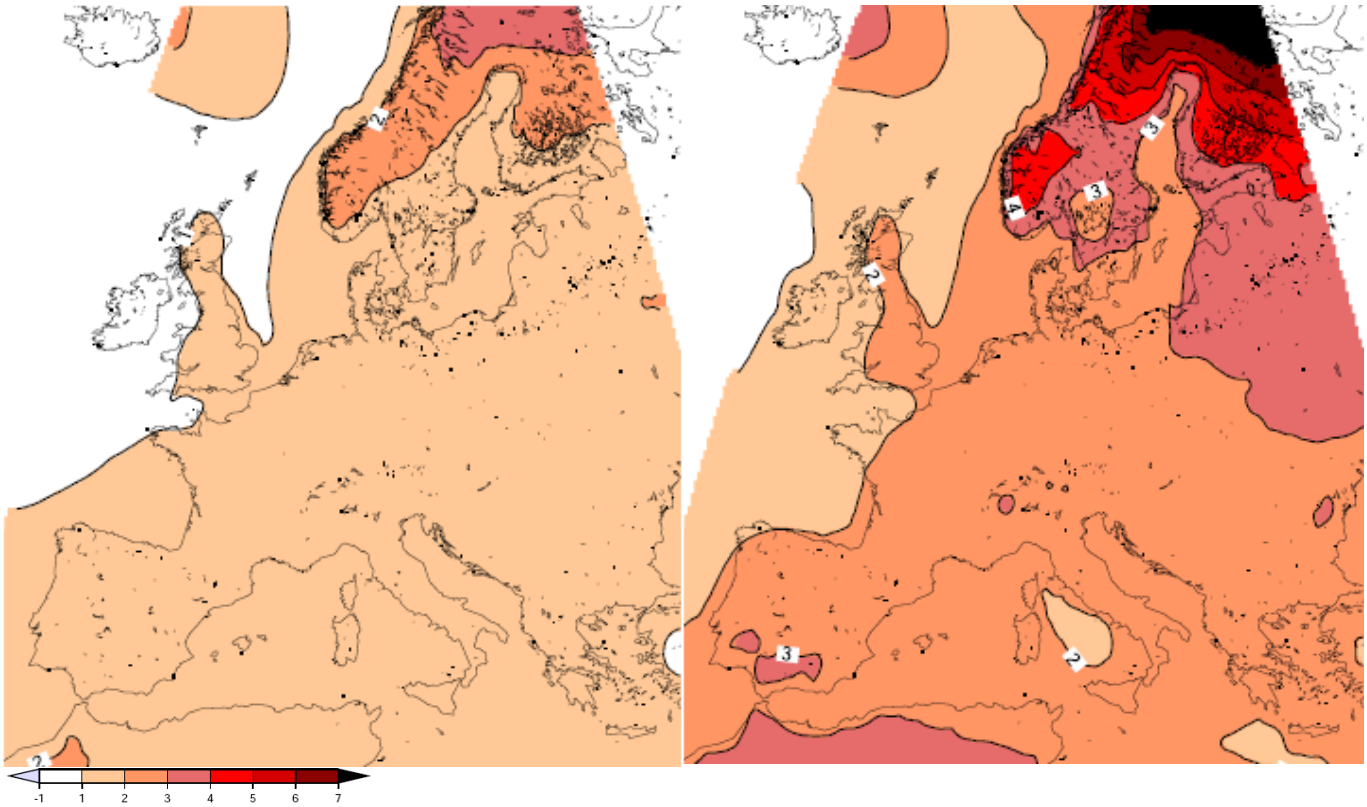

Figure 2: As Figure 1 for DJF temperature (°C)

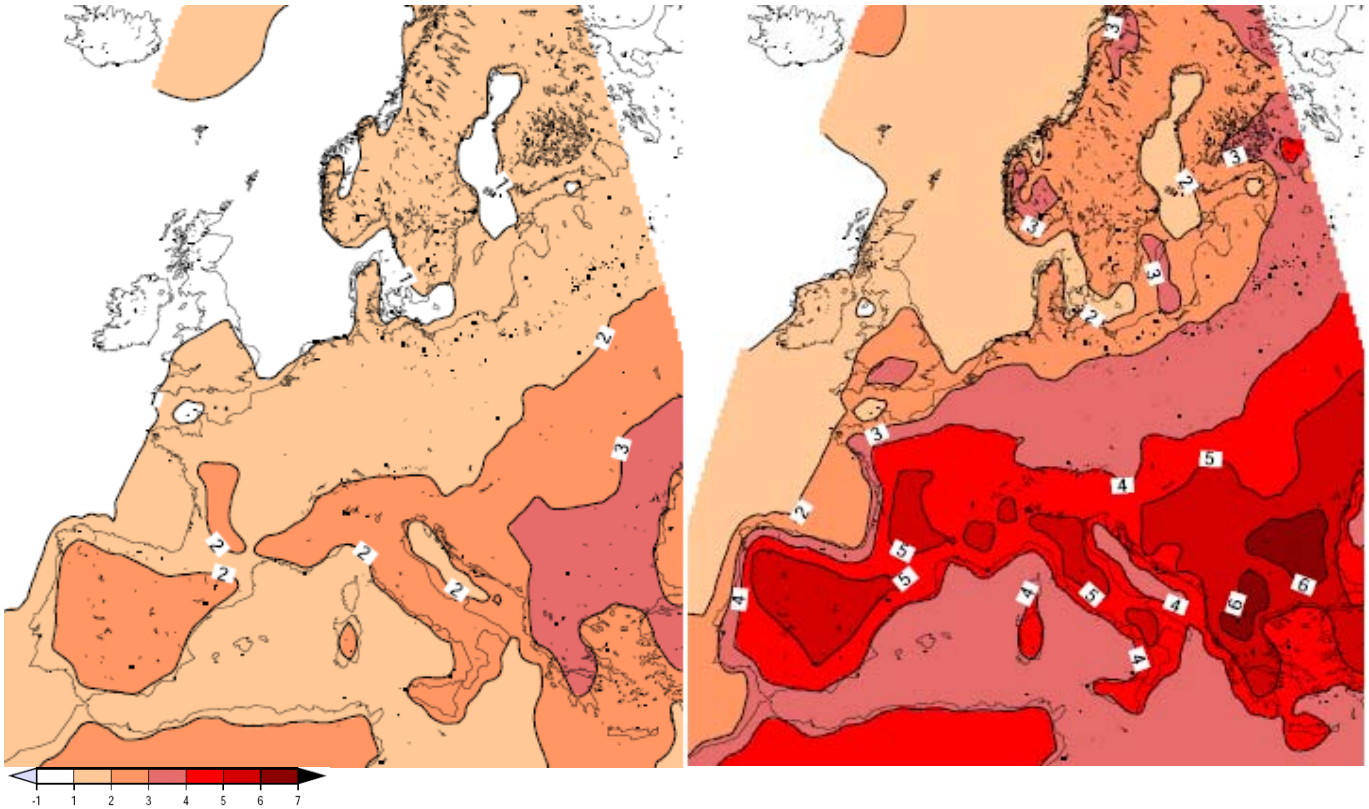

Figure 3: As Figure 1 for JJA temperature (°C)

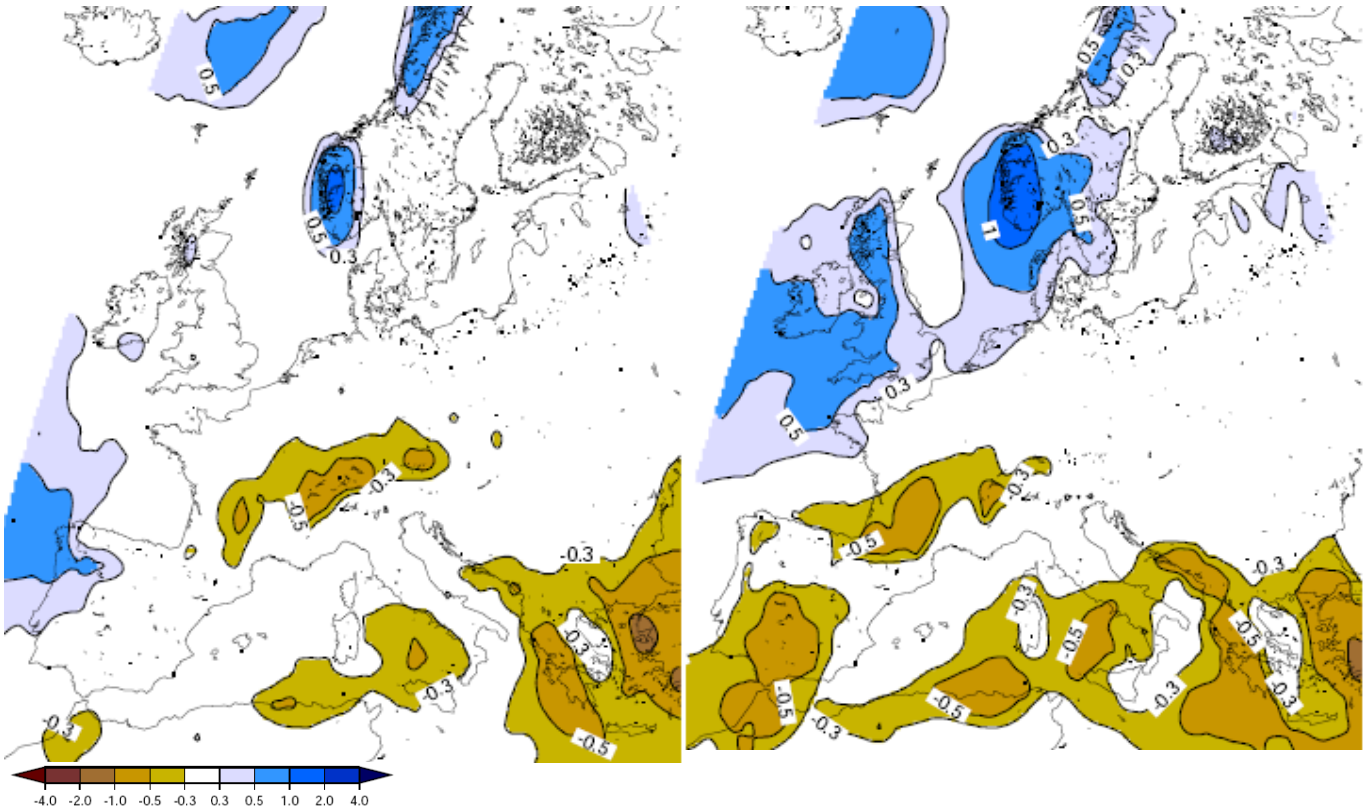

Figure 4: As Figure 1 for DJF precipitation (mm/day)

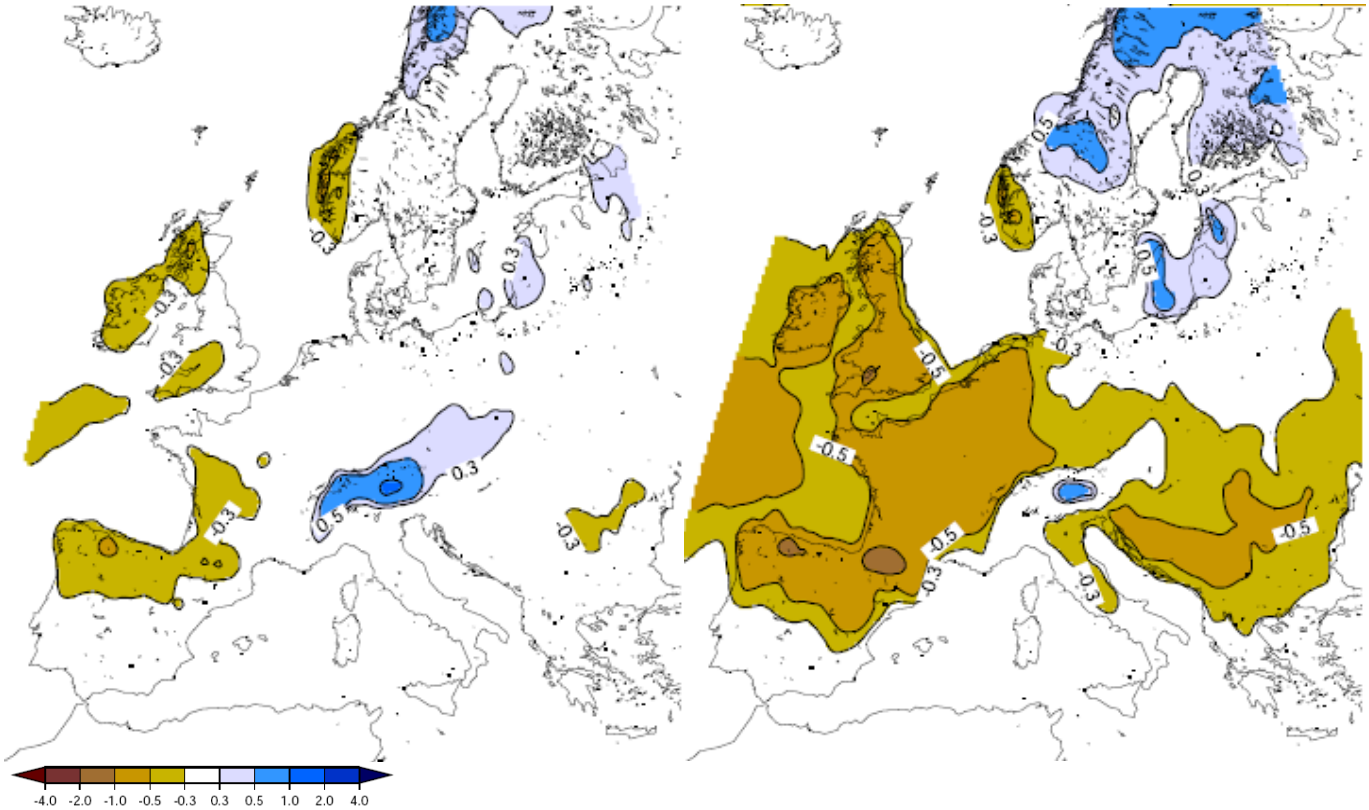

Figure 5: As Figure 1 for JJA precipitation (mm/day)

Provision of meteorological fields to WP2

From the ARPEGE experiment, year-by-year monthly means of all variables processed by ARPEGE were saved. In addition time series were also saved. This concerns daily fields of 4 meteorological variables (temperature, precipitation, mean sea level pressure and 500 hPa height) over the globe and daily fields of 21 usual variables (based on the PRUDENCE list) over a European domain. This fields are available to partners for the sake of comparison between the driving model and the high resolution ALADIN runs. But the most important archive is the 6-hourly database of all model prognostic variables (on model sigma vertical levels). These fields are designed to drive the limited area models (ALADIN over Czech Republic, Hungary and Bulgaria) in WP2 (deliverable D2.2).