



ENSEMBLES multimodel simulations forced by ERA40: Analysis of CLM results

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Rockel

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ENSEMBLES Project



- EU - funded project with 72 Partners
(www.ensembles-eu.org)

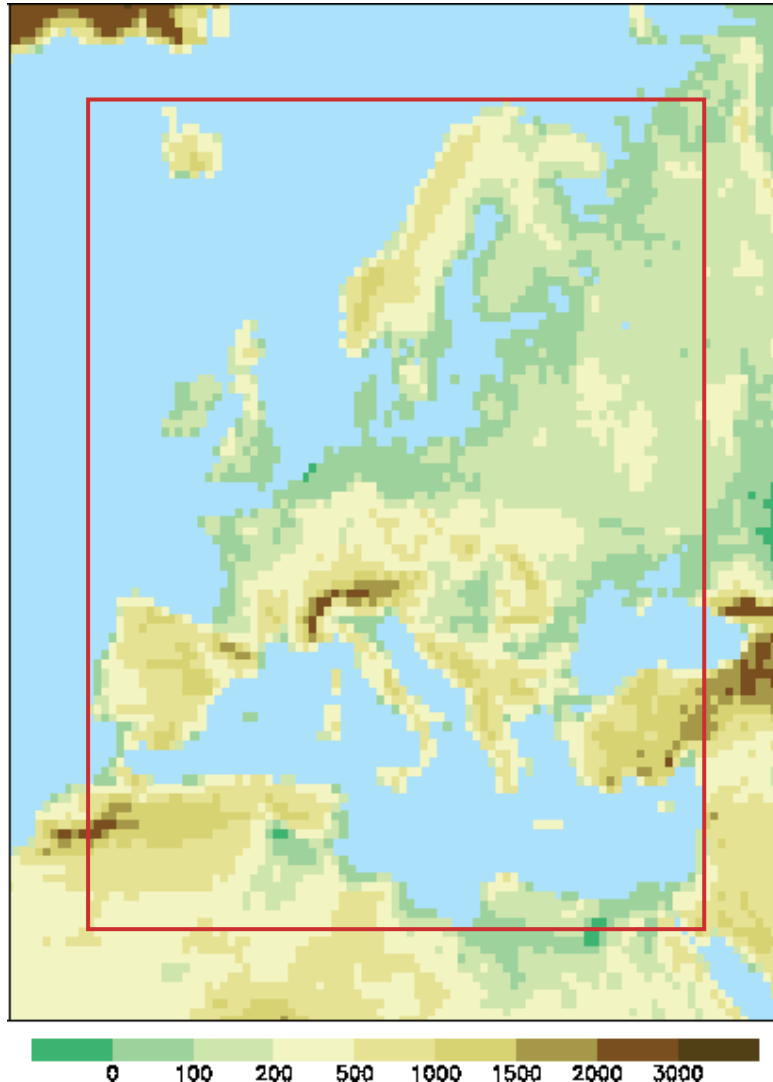
Projekt Goal

The overall goal of ENSEMBLES is to maintain and extend European pre-eminence in the provision of policy relevant information on climate and climate change and its interactions with society.

Scientific and Technological Objectives

- ...
- ...
- Develop higher resolution climate models to provide more regionally detailed climate predictions and better information on extreme events
- ...
- ...
- ...

ENSEMBLES Project



Research Theme 3 - RT3:

*Formulation of very high resolution
Regional Climate Model Ensembles for
Europe*

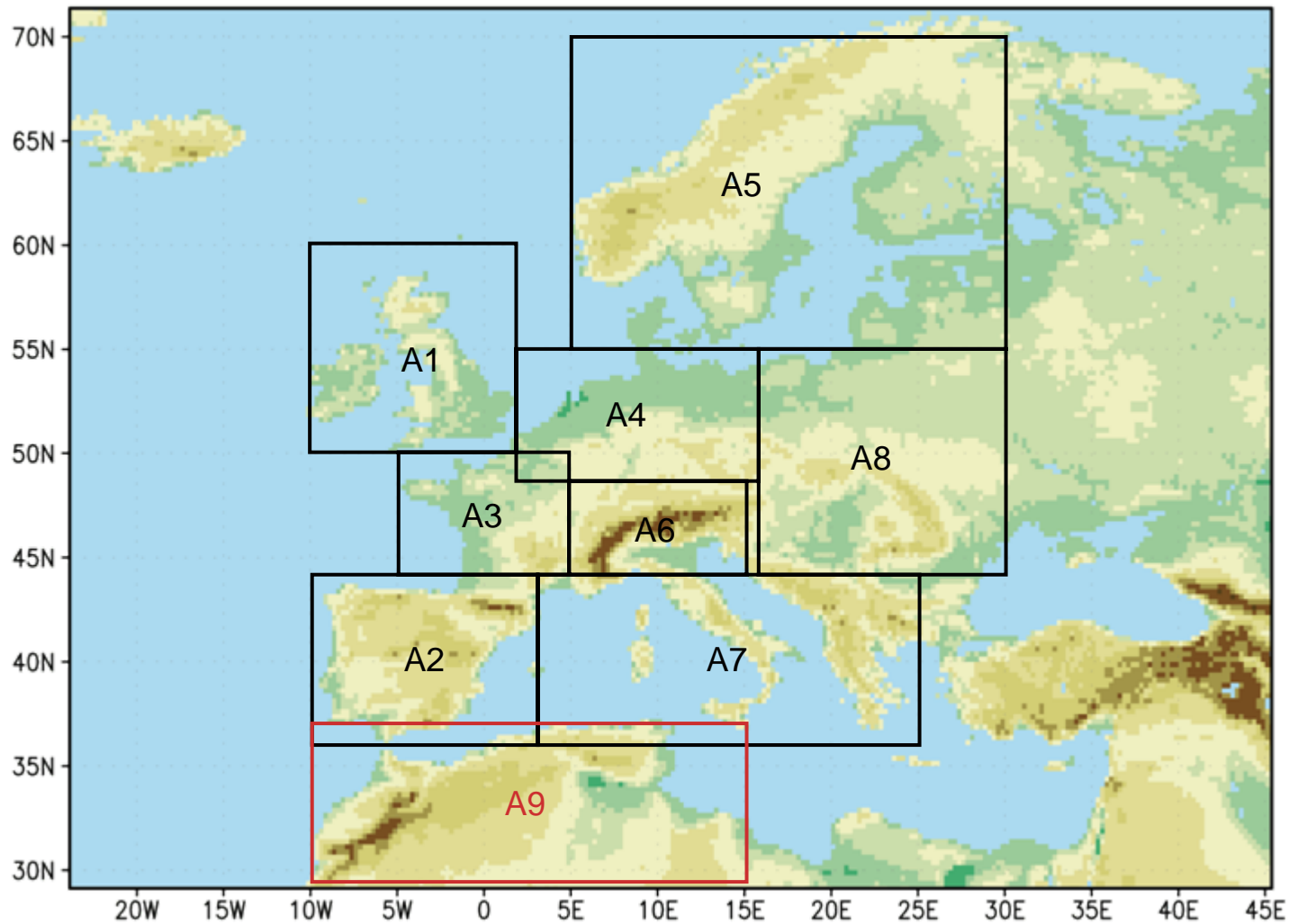
DMI, GKSS, SMHI, KNMI, METO-HC,
CNRM, MPIMET, ETH, UCLM, INM,
CUNI, CHMI, met.no

Run their models with same:

- European domain
- grid (0.44° , 0.22°)
- forcing data (ERA40)
- time period (1961-2000)

Provide certain list of output data

Sub-Areas



A1 British Islands, A2 Iberian Peninsula, A3 France, A4 Mid-Europe, A5 Scandinavia, A6 Alps, A7 Mediterranean, A8 East-Europe, A9 North-West-Africa

2m Temperature

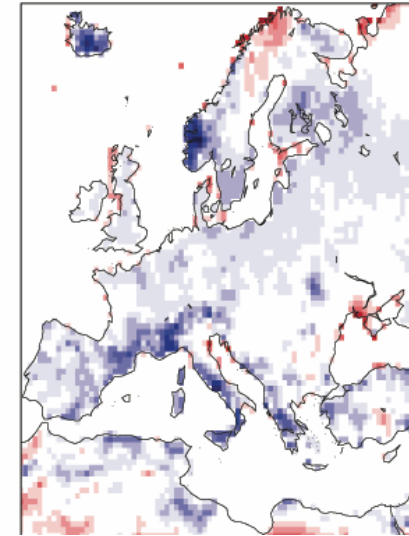
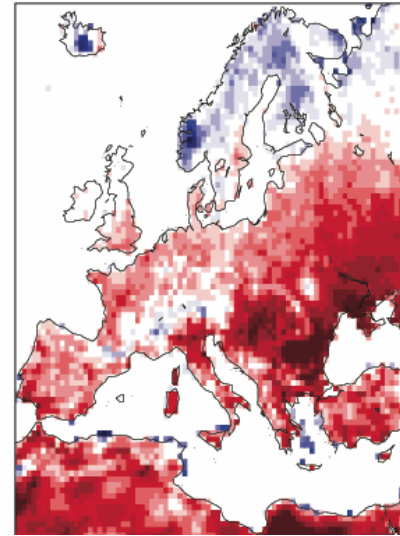
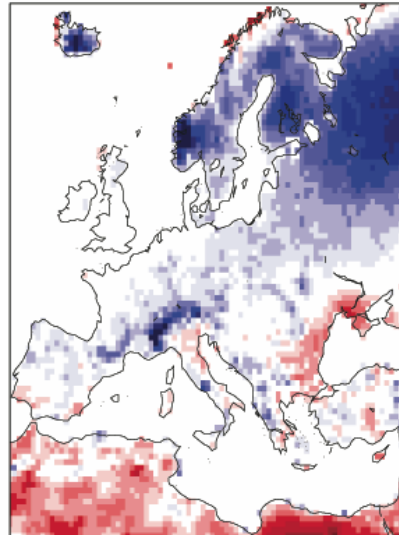
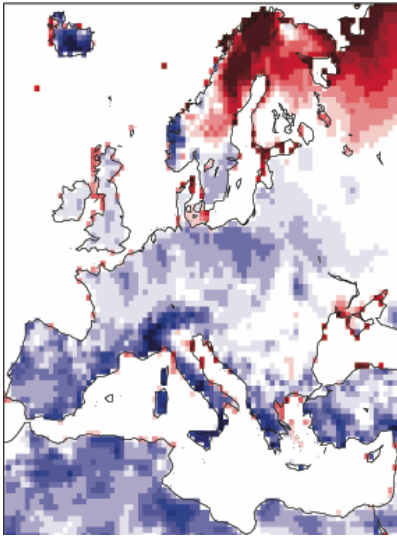
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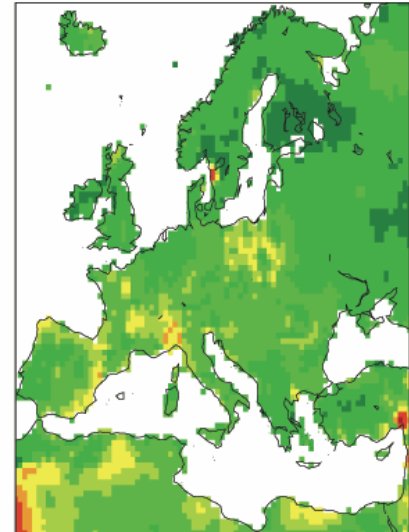
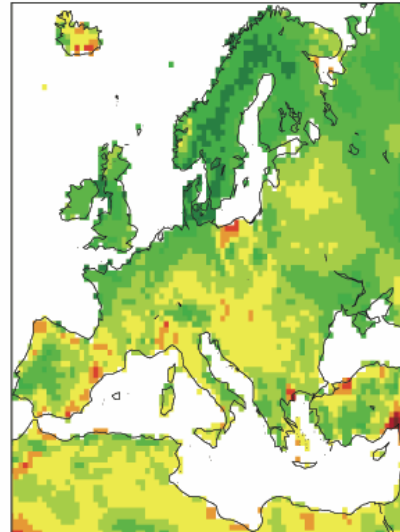
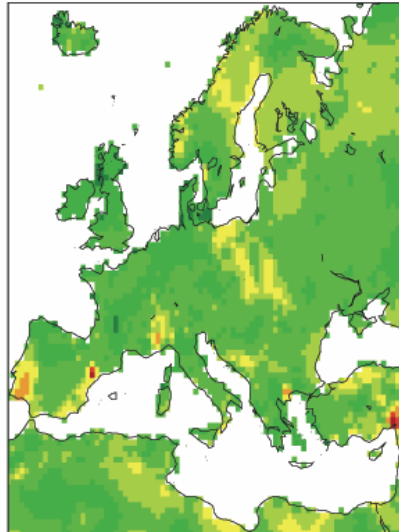
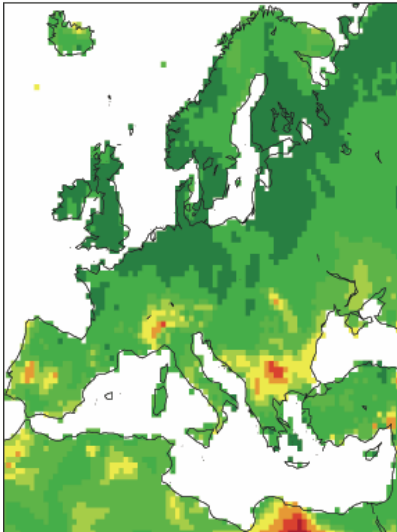
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CLM-CRU
(1961-2000)



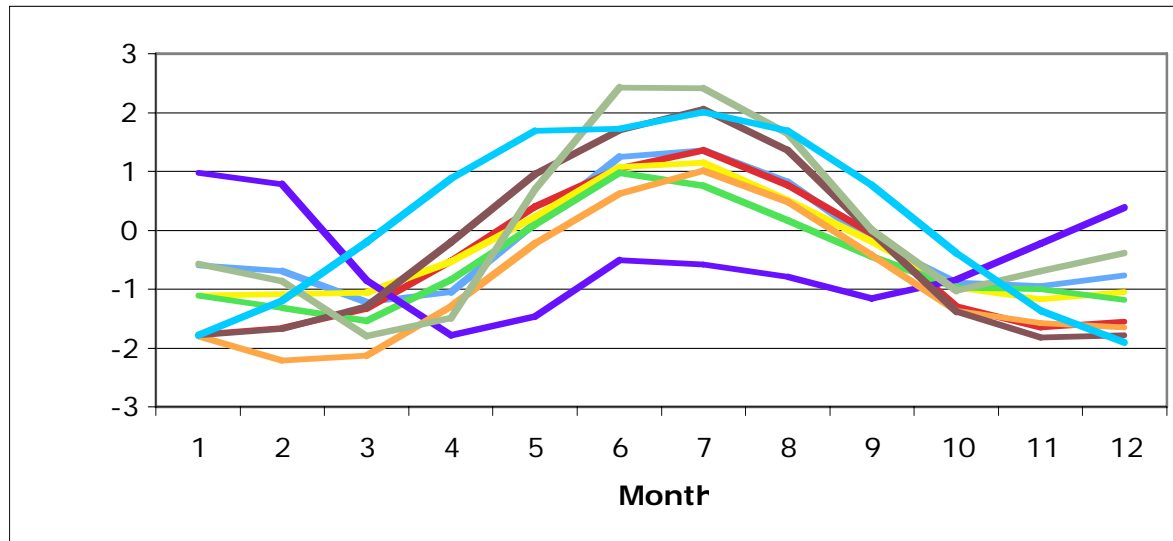
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CLM-CRU
(1961-2000)

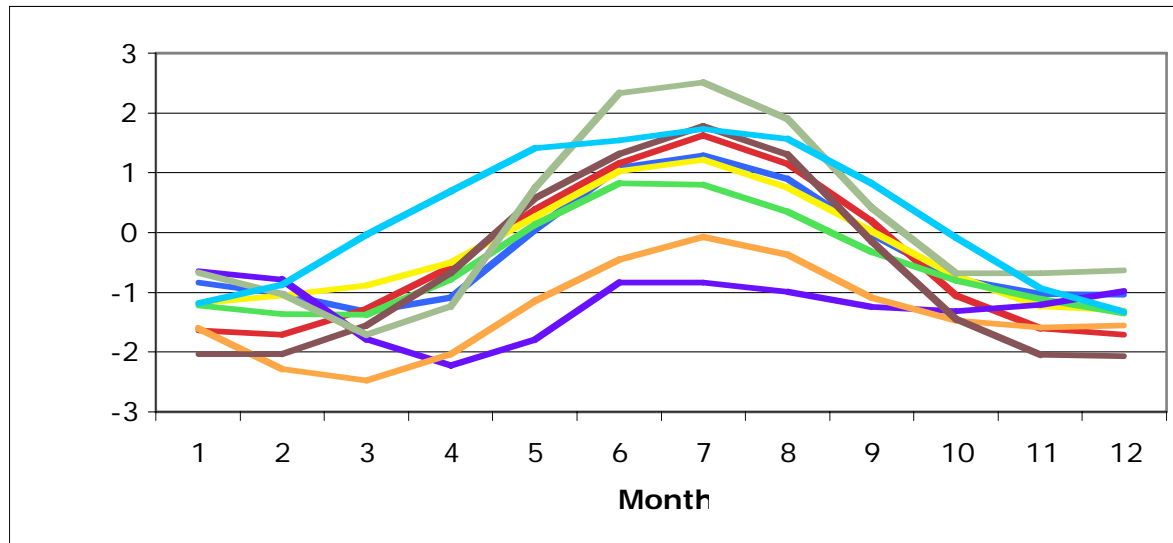


0.3 0.5 0.6 0.7 0.8 0.85 0.9 0.95 1

2m Temperature



- **A1** British Islands
- **A2** Iberian Peninsula
- **A3** France
- **A4** Mid-Europe
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- **A7** Mediterranean
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- **A9** North-West-Africa



Difference of 2m temperature CLM and ERA40 resp. CRU as multiyear monthly means for each sub-area (land points only)

Total precipitation amount (1)

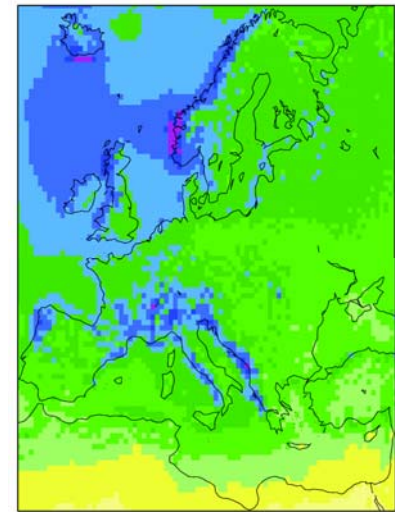
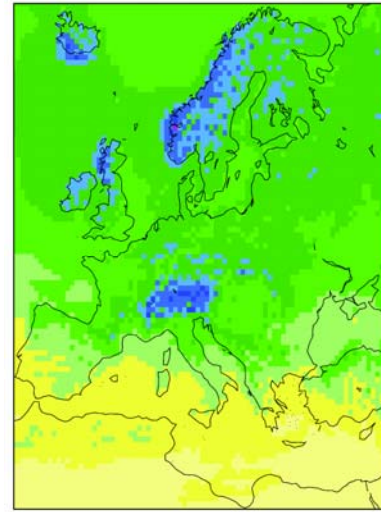
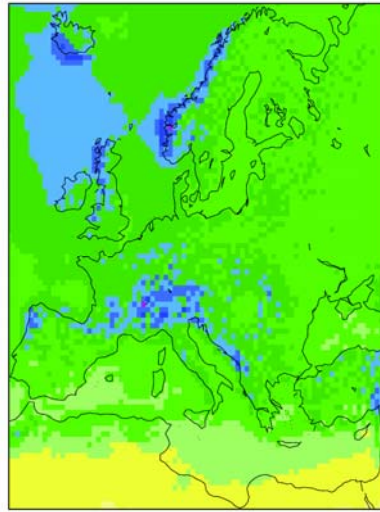
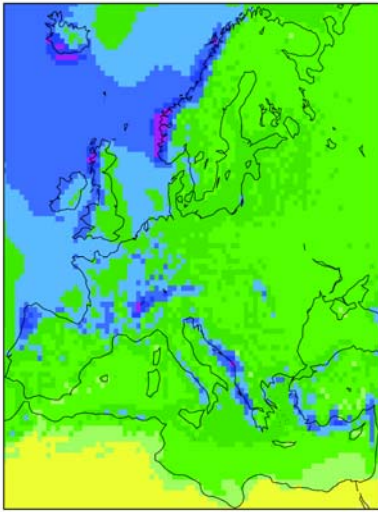
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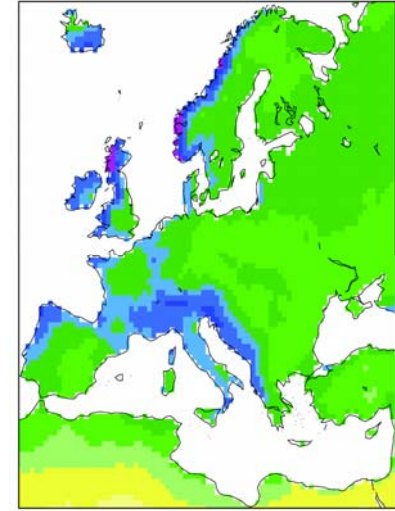
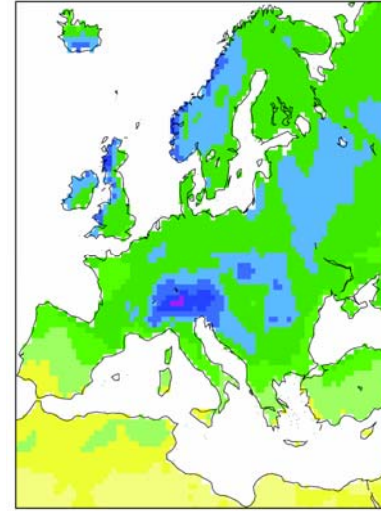
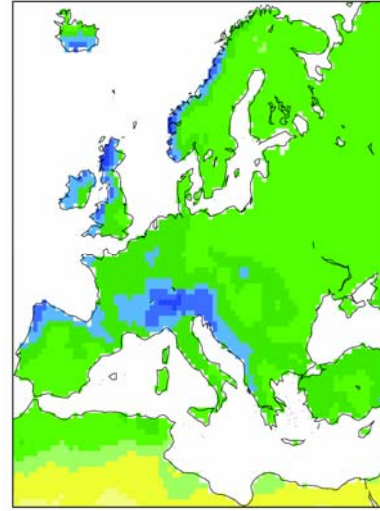
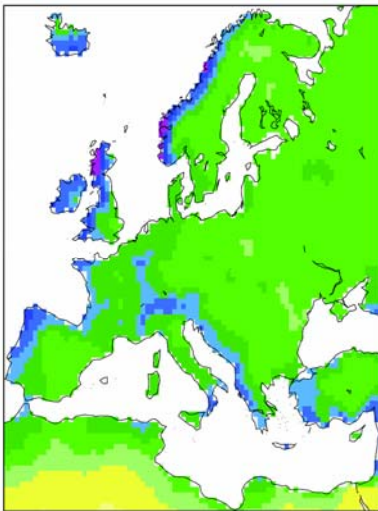
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CLM
(1981-2000)



CRU
(1981-2000)



Total precipitation amount (2)

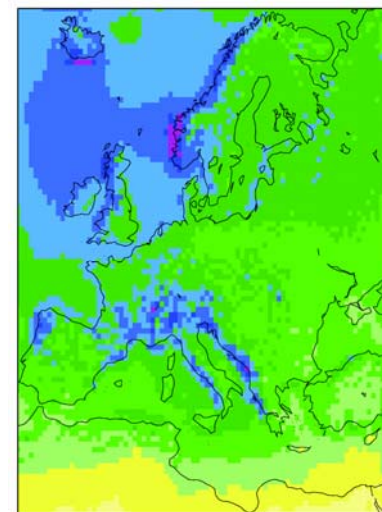
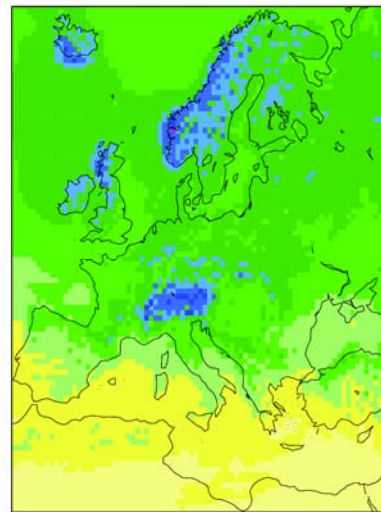
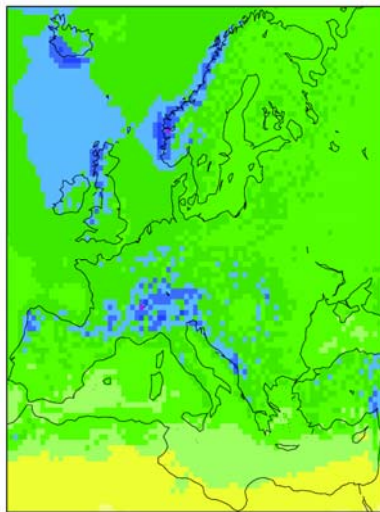
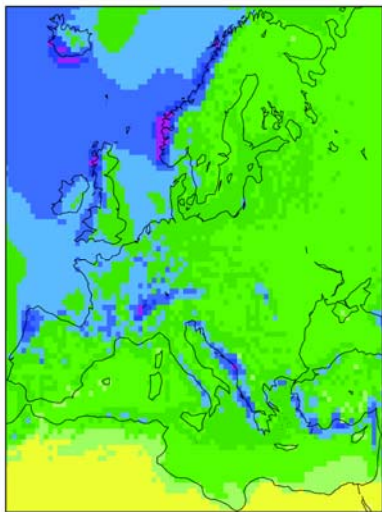
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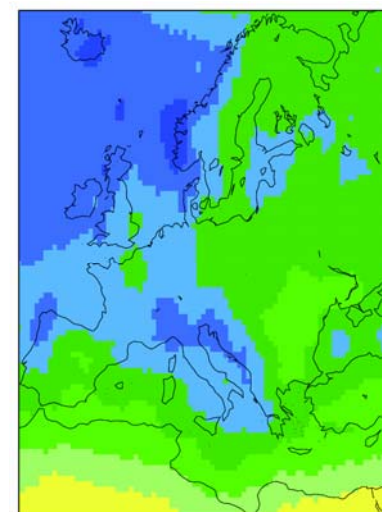
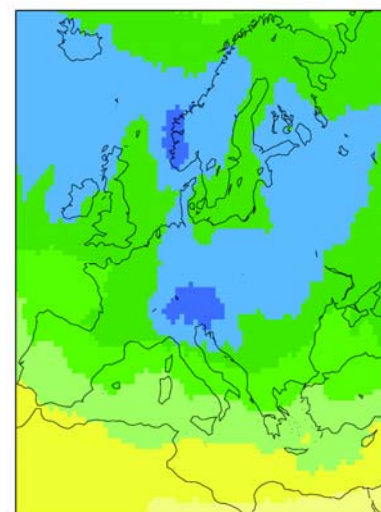
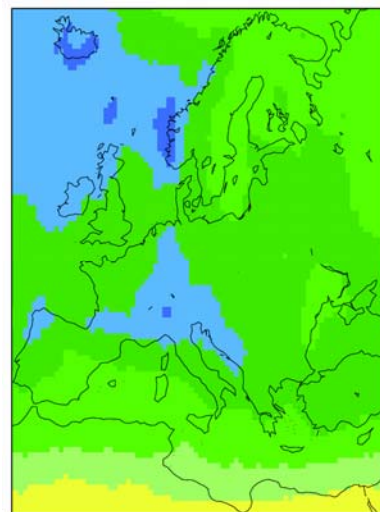
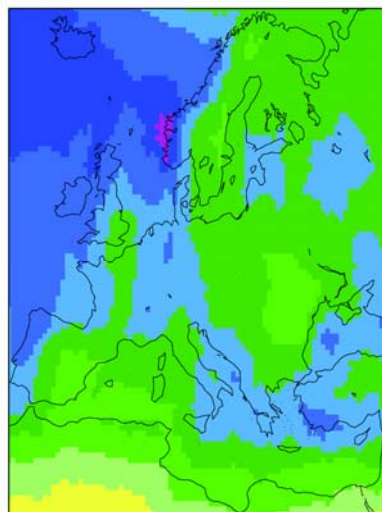
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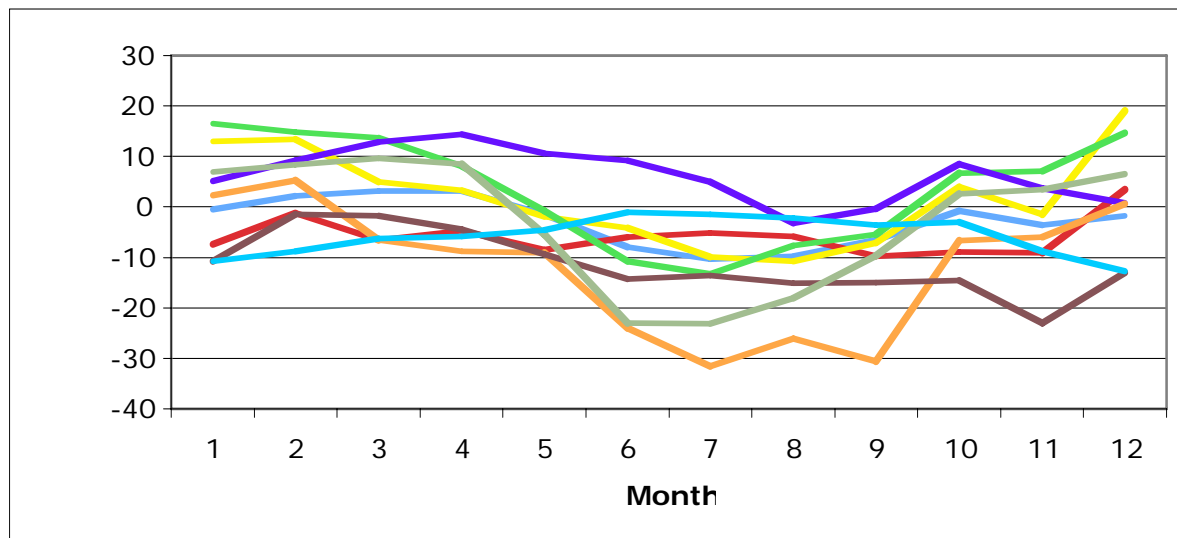
CLM
(1981-2000)



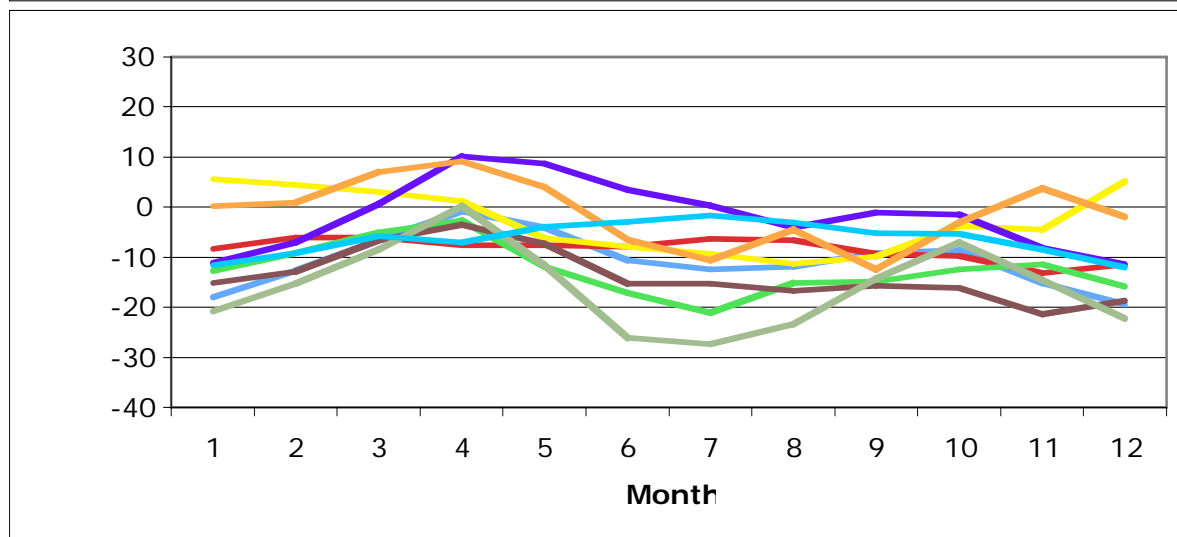
GPCP
(1981-2000)



Total precipitation amount

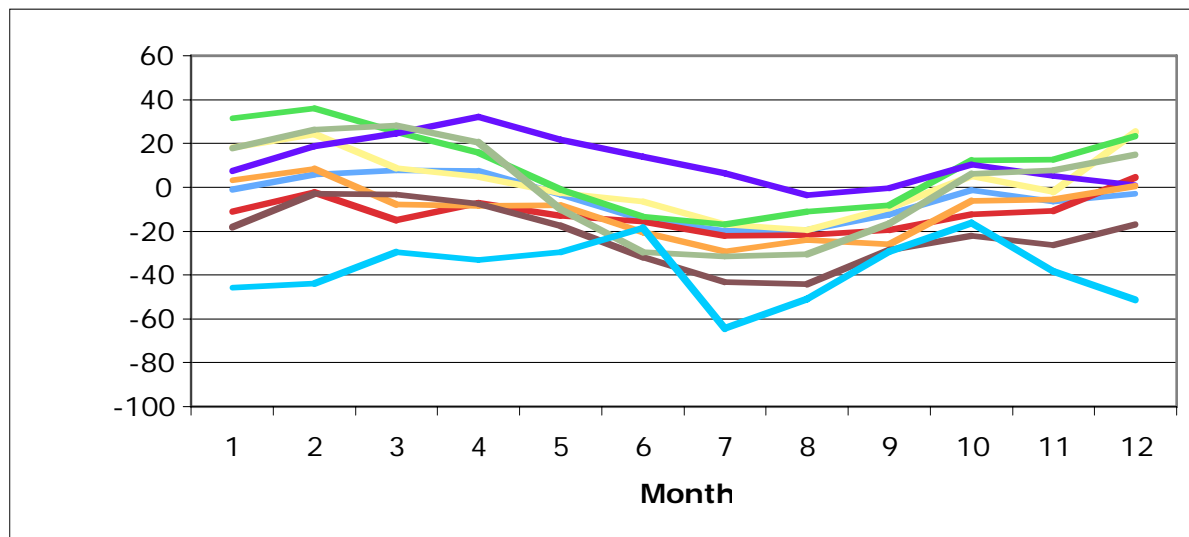


- A1** British Islands
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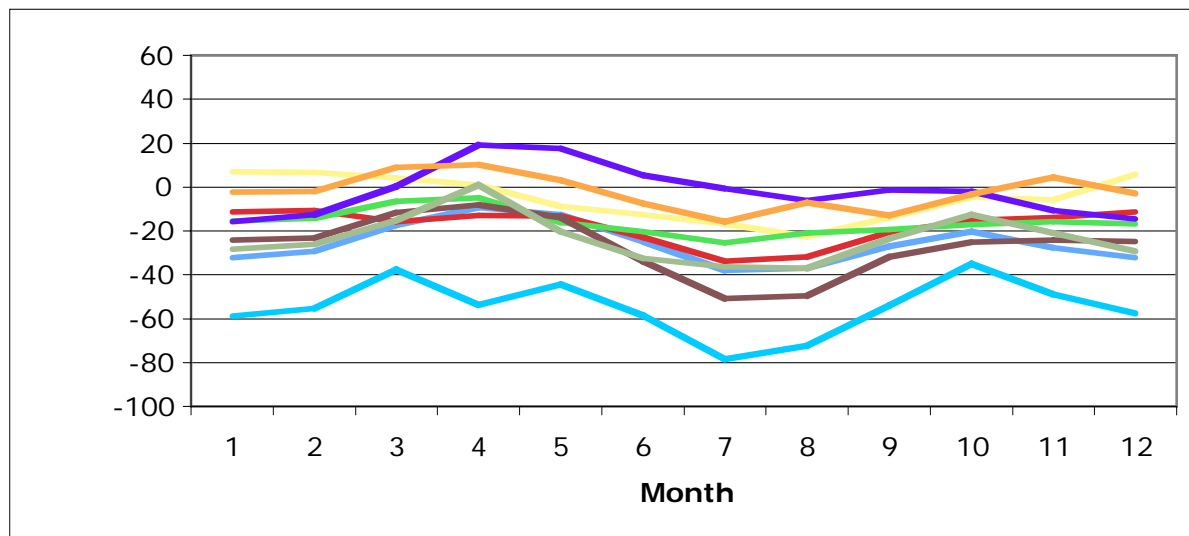


Difference of total precipitation CLM and CRU resp. GPCP in mm as multiyear monthly means for each subregion (land points only)

Total precipitation amount



- **A1** British Islands
- **A2** Iberian Peninsula
- **A3** France
- **A4** Mid-Europe
- **A5** Scandinavia
- **A6** Alps
- **A7** Mediterranean
- **A8** East-Europe
- **A9** North-West-Africa



Difference of total precipitation CLM and CRU resp. GPCP in % as multiyear monthly means for each subregion (land points only)

Total precipitation amount

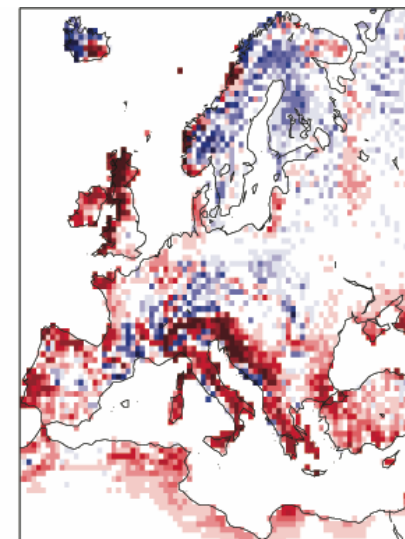
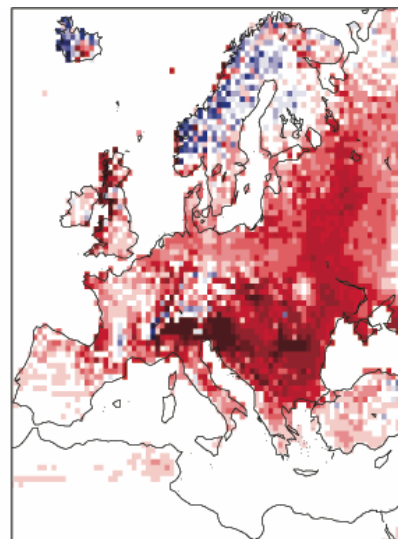
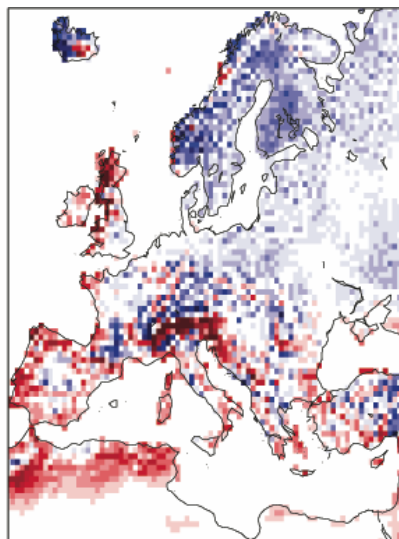
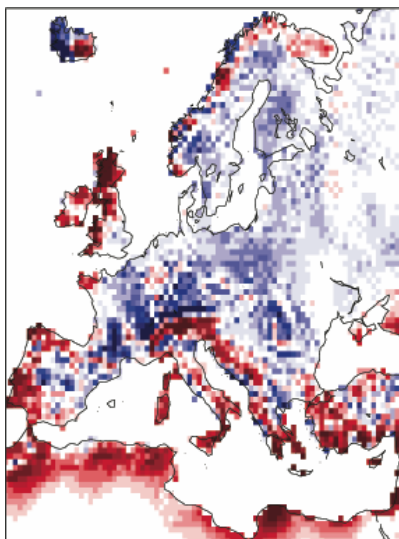
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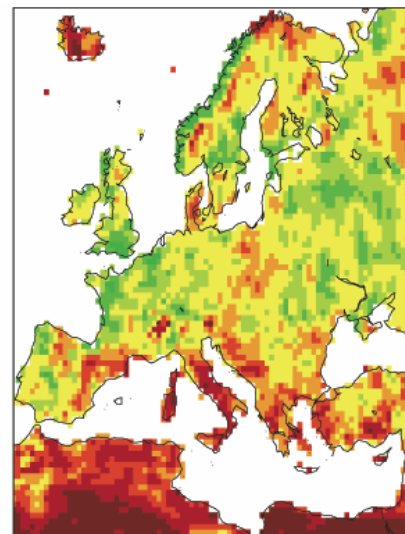
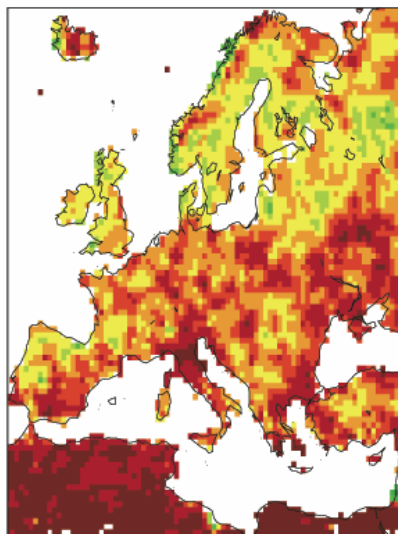
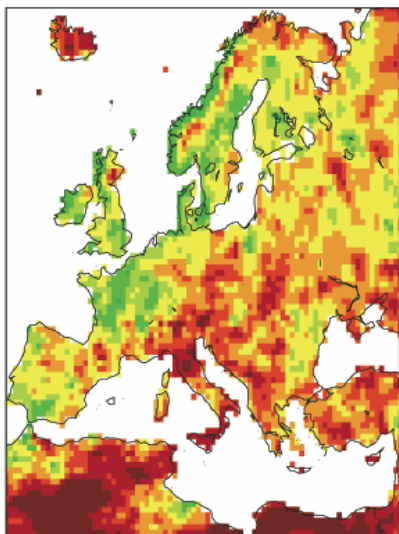
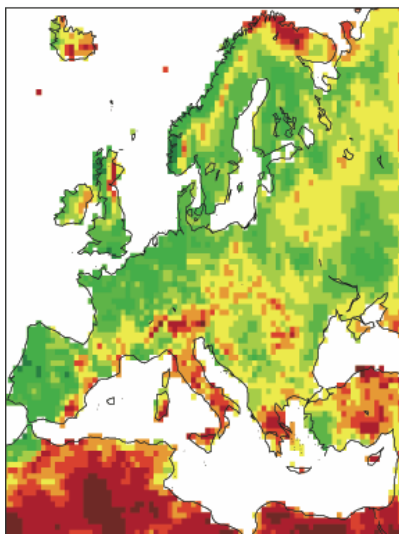
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CLM-CRU
(1961-2000)



CLM-CRU
(1961-2000)



Mean sea level pressure

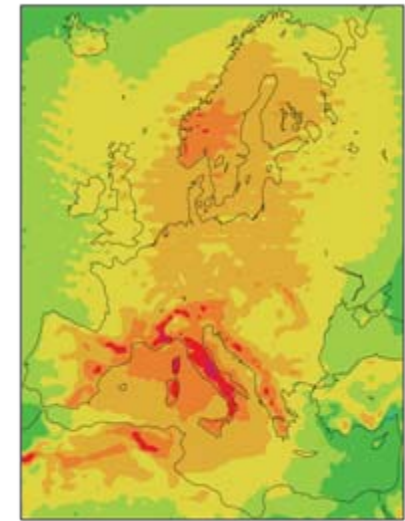
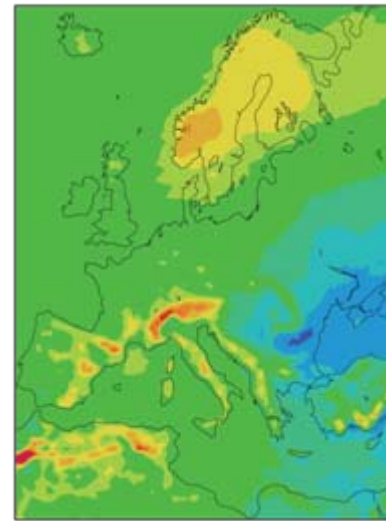
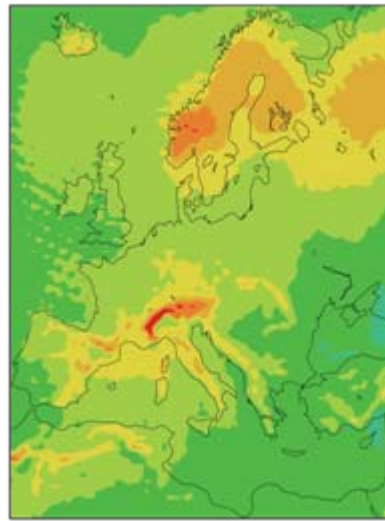
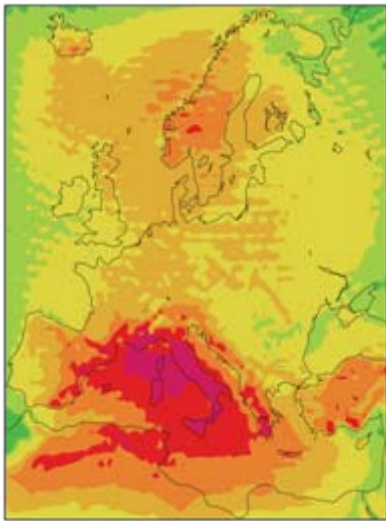
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CLM-ERA
(1961-2000)



Mean sea level pressure and 2m temperature

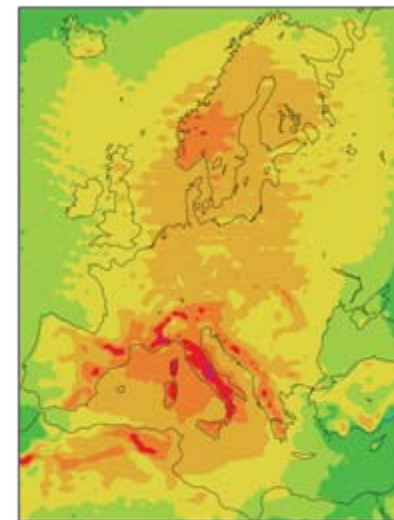
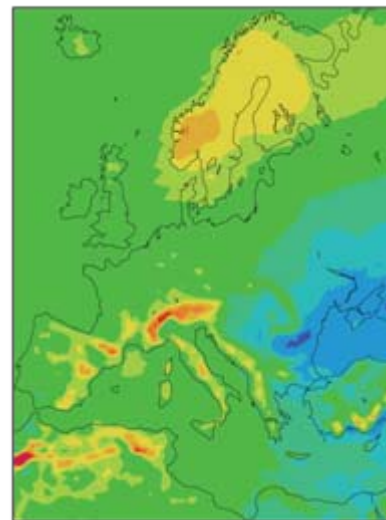
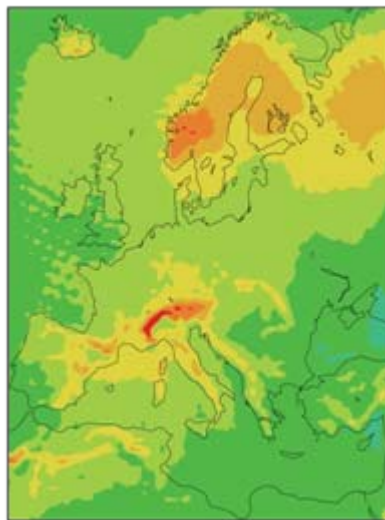
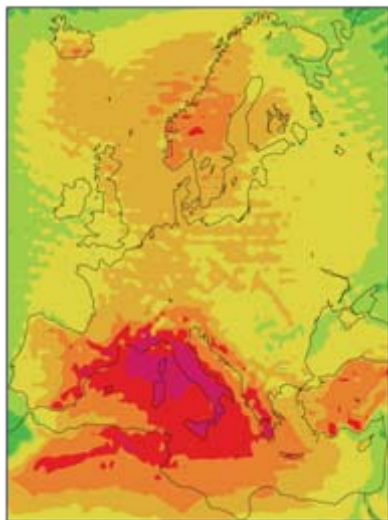
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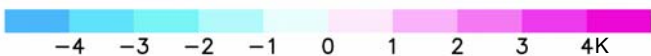
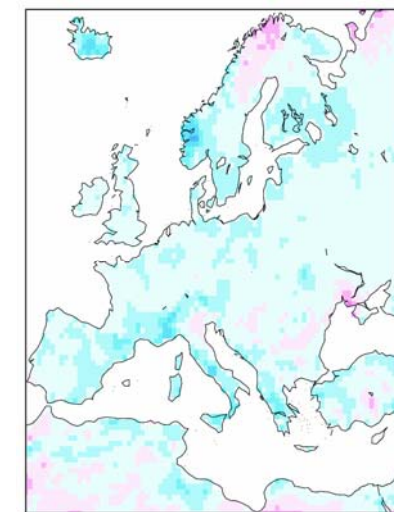
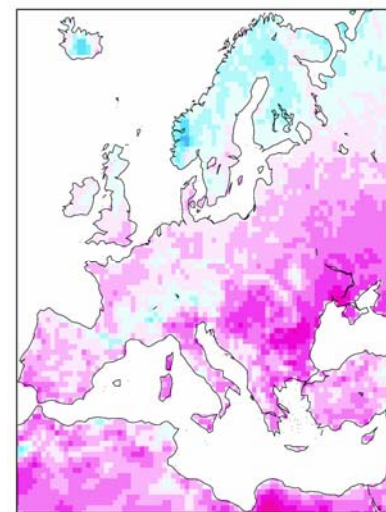
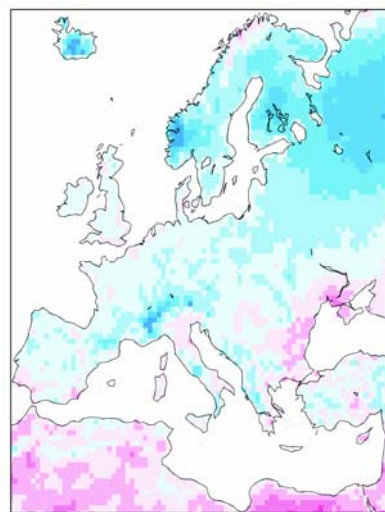
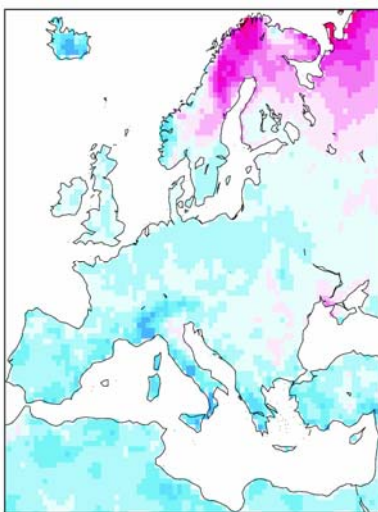
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CLM-ERA
(1961-2000)



CLM-CRU
(1961-2000)



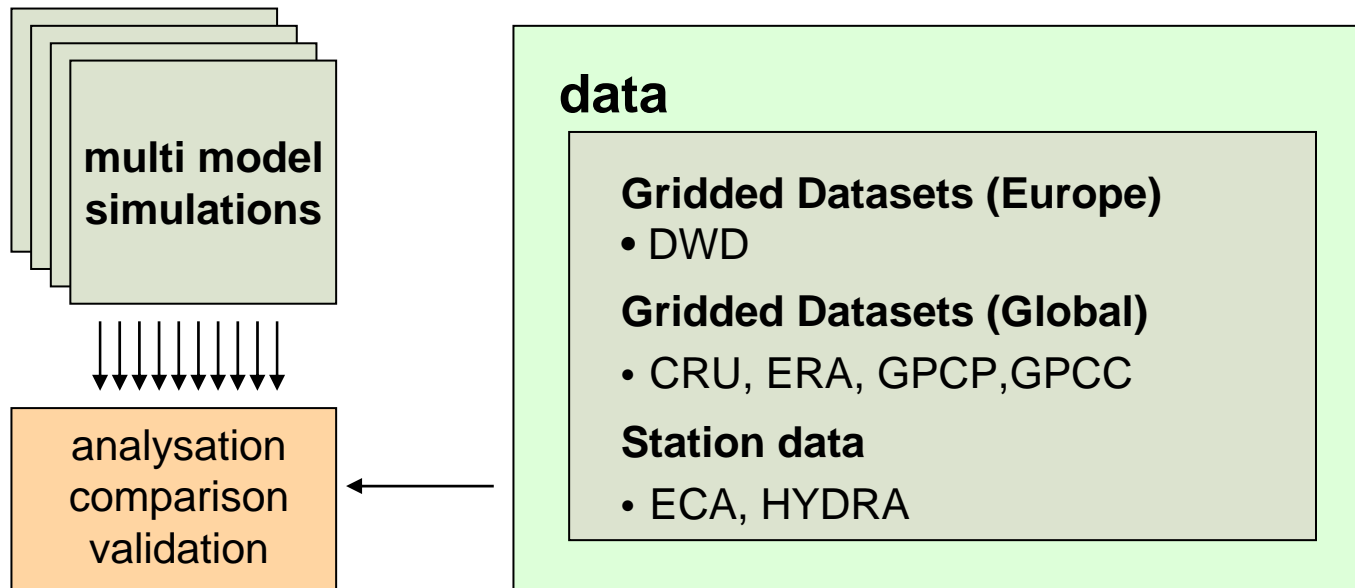
Conclusions

CLM performed 2m temperature with positive and negative differences compared to the datasets of CRU and ERA40. These differences have a strong annual cycle. Differences between ERA40 data and CRU data within the Scandinavian Region have been detected.

Compared to the precipitation datasets of CRU and GPCP the CLM is able to perform the patterns and the range of values very good. The annual cycle is reproduced realistically.

Outlook - Assessing Model Performance

Further analysis will investigate performance of all participating models of temperature, mean sea level pressure and precipitation, but also of wind direction and wind speed within the simulation area.



Danish Meteorological Institute (DMI)	HIRHAM
Royal Netherlands Meteorological Institute (KNMI)	RACMO
Swedish Meteorological and Hydrological Institute (SMHI)	RCA
The Abdul Salam International Centre for Theoretical Physics (ICTP)	RegCM
Met Office , Hadley Centre for Climate Prediction and Research	HadRM
Météo-France, Centre National de Recherches Meteorologiques	ALADIN
GKSS Research Centre	CLM
Max-Planck Institut für Meteorologie	REMO
Universidad de Castilla La Mancha	PROMES
Instituto Nacional de Meteorologic	RCA
Norwegian Meteorological Institute	HIRHAM
Charles University Prague, Faculty of Mathematics and Physics in coop. with Czech Hydrometeorological Institute	ALADIN
Swiss Federal Intitute of Technology Zurich (ETH)	CLM

ERA40

ECMWF 40-year Re-analysis

- Global data base from 1957 to 2002
- Meteorological parameters, stratospheric ozone, ocean sea-wave and soil conditions
- Based on measurements (stations, buoys, balloon soundings, aircrafts, satellites)
- ERA40 surface data is available at $1.125^\circ \times 1.125^\circ$ for the whole globe, 60 vertical levels (lowest level height: 18m)

Sub-Areas

	Region	West	East	South	North
A1	British Islands	-10	2	50	59
A2	Iberian Peninsula	-10	3	36	44
A3	France	-5	5	44	50
A4	Mid-Europe	2	16	48	55
A5	Scandinavia	5	30	55	70
A6	Alps	5	15	44	48
A7	Mediterranean	3	25	36	44
A8	East-Europe	16	30	44	55
A9	North-West-Africa	-10	15	30	37

2m Temperature

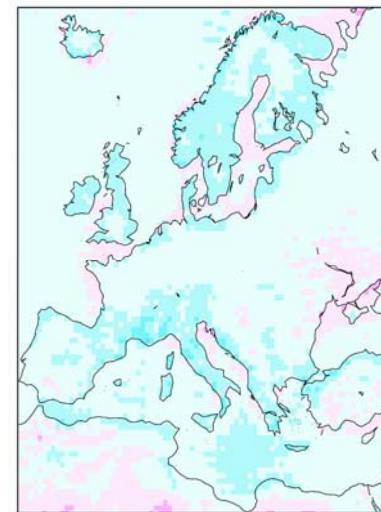
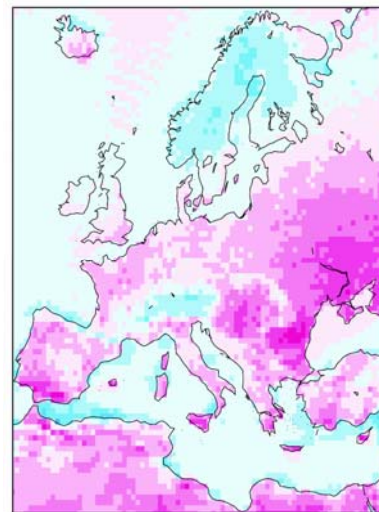
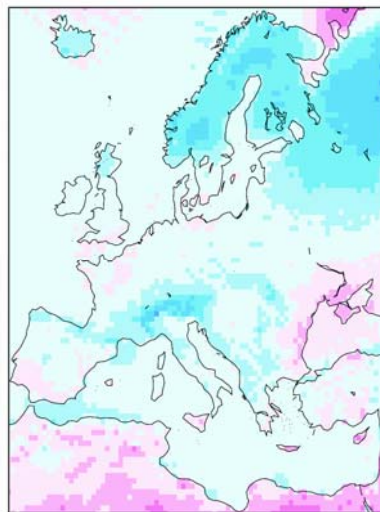
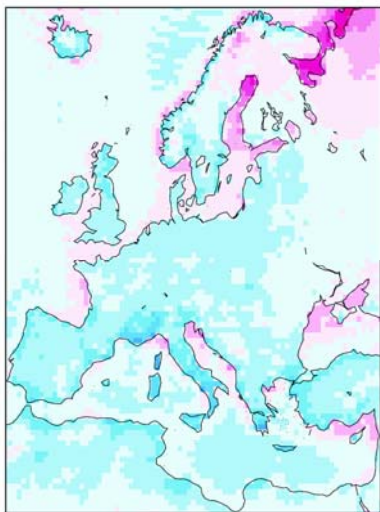
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CLM-ERA
(1961-2000)



CLM-CRU
(1961-2000)

