Climate Limited-area Modelling Community

CLM-Community Newsletter

DWD

No. 3 **July 2014**

Content

Challenges of the CLM-Community

This third newsletter of the CLM-Community points to some community issues (CLM Assembly in September, COSMO-CLM contribution to EURO-CORDEX, effect of using an alternative convection scheme, …) as well as to some more general activities going on in the world of climate research (publication of IPCC AR5 WG I & WG II report).

One other important issue is the release of the new CLM-Community webpage (online since March 2014). Here I want to send a special thanks to all of you who helped to develop this new structure and submitted their valuable comments for improvements!

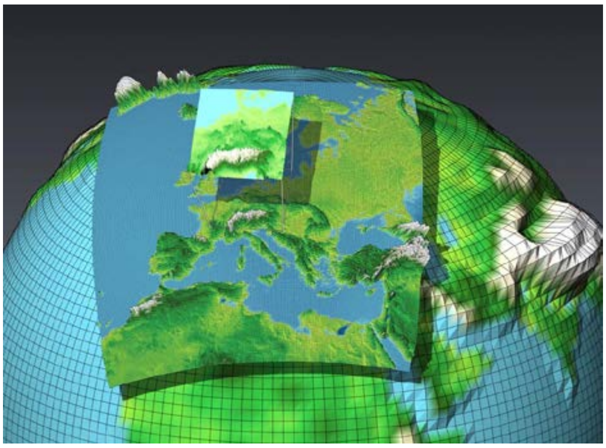

Figure 1 by A. Will

Another important achievement is that COSMO-CLM was again reunified with the weather forecasting model to the common version COSMO 5.0. It already passed the (technical) climate and NWP tests successfully. However, to get a new recommended CLM-Community version an intensive evaluation in the climate mode including the provision of an optimum configuration for regional climate simulations is needed. This is work currently ongoing mainly in the working group evaluation.

With this I want to stop the preliminary words. Enjoy reading!

Yours sincerely, Barbara Früh

CLM Assembly

02 – 05 September 2014

LOEWE Biodiversity and Climate Research Centre (BiK-F)
Frankfurt / Main, Germany

The current version of the schedule can be found here

CLM-Community issues

The CLM-Community is organized in a bottom-up structure where the members agree on common regulations and proceedings. Consequently, the main decisions must be taken by the members during the CLM Assembly. Another consequence of this organizational form is that regulations and proceedings come into effect only once a year.

However, in an active community the basic documents need to be adjusted regularly. In order to give you the possibility to be prepared for taking the decisions on the CLM-Community regulations and proceedings you will find the versions under revision at the CLM-Community homepage (www.clm-community.eu → community → Terms & conditions).

You can get an easy overview over the CLM-Community responsibilities at the CLM-Community homepage (www.clm-community.eu → community → Responsibilities). Please, login first!

CLM-Community issues for decision:

- **CLM-Community agreement**
  which everybody signs to become a CLM-Community member.
- **CLM-Community rules for internal procedure**
  which explains the bodies of the CLM-Community
- **COSMO agreement Annex D**
  which regulates the cooperation between the COSMO consortium and the CLM-Community.
- **CLM-Community science plan**
  which reflects the research focus of the CLM-Community. So, please, check, if your research topic is represented sufficiently.
- **COSMO standards for source code development (CSCD)**
  which explicates the coding standards and the proceeding for new model versions.

NEW at the CLM-Assembly 2015

Just before the regular start of the CLM Assembly (Tuesday 11:30 am) a "CLM-Community for beginners" session will take place. All new members of the CLM-Community are invited to participate.

Five questions to Beate Geyer, HZG

1. In which context are you using COSMO-CLM?

Figure 2 Beate Geyer (photo by Bianca Seth, HZG)

In our ‚Institute of Coastal Research' we produced the coastDat2 dataset to give a consistent and homogeneous database mainly for assessing weather and sea state statistics as well as long-term changes for Europe, especially in data sparse regions. I deliver, by using CCLM, the atmospheric part of the reconstruction of the last decades as the start of a sequence of numerical models employed to reconstruct all aspects of marine climate (such as storms, waves, surges etc.).
The output is used as forcing for sea state, water levels and current simulations using WAM 4.5 and TELEMAC-2D, tides using TRIMNP and chemical transports using CMAQ.

2. In addition you are working a lot for the CLM-Community in the background. What are your main tasks in this aspect?

The main advantage of the community is that we have several people which are able to help in every situation. I'm not in this circle but I feel responsible to disburden them from 'easy' questions and problems by working on the homepage for delivering information in a good structure. The content of the web site was delivered mainly by the former coordinator Andreas Will, but a lot of other community members contributed with figures and documentations, and especially on the working group pages where the work of the groups is documented by the working group leaders.
My work on the homepage is not continuously – it was especially intensive in 2008/2009 during the set-up of the old web page and from October last year to March for the current web page. Over the years we got more and more pages with more and more information on the former home page. The structure of the web site was not clear enough anymore and therefore we performed the site relaunch. The relaunch was actually more time consuming than the maintenance in between.
I managed the building of the topic browser to get the possibility to have the work of the community documented and to have access to the information not only once a year during the phase of writing the science plan.

3. Are you fine with the response from the CLM-Community to these activities? What would be your wish for improvement?

My feeling is that the potential of the topic browser is not exploited enough. It would be nice to get more feedback where possibilities for improvements are.
The best response to the topic browser activities would be the self-dependent delivering of topic updates once a year and the contributions to the publications list. Another important help for me would be to get feedback regarding errors on the web site as broken links, wrong logos, missing entries in the namelist-tool (which is developed and maintained by Andreas) etc.

4. Beate, you are a member of the CLM-Community for a quite long time now. What are, in your opinion the strength and the weaknesses of the CLM-Community?

The strength is that we communicate well and due to the time schedule of Assemblies and spring meetings regularly. The improving collaboration starts to produce fruits.
The weakness is that the most work is done by PhD students which have only short contracts so that we lose experts regularly.

5. What are your personal goals with respect to your scientific career?

My wish is that we can find standards for evaluation, so that we can prove the quality of our simulation results easily when one has to cope with new challenges concerning simulation area or resolution. A great help would be to have a common data base for observational data in the common file format netCDF.

Thank you very much for the interview!

WGII and WGIII IPCC report

Expected climate change impacts and associated adaptation and mitigation options

A. Ferrone, CRP-G. Lippmann

During two long plenaries of the Intergovernmental Panel on Climate Change (IPCC) characterized by difficult negotiations two further parts of the 5th Assessment Report (AR5) have been adopted by consensus between the 110 Parties represented. During the 37th session of the IPCC, from 25th to 30th March 2014 in Yokohama, Japan, the contribution of Working Group II (WGII) to the AR5, with the title "**Climate Change 2014: Impacts, Adaptation and Vulnerability**" has been discussed and adopted in the longest IPCC plenary session to date (nearly 70 hours in 5 days). After a break of only one week, the IPCC reconvened from 7th to 12th April in Berlin, Germany, to adopt the contribution of its third Working group (WGIII) to AR5, entitled: "**Climate Change 2014: Mitigation of Climate Change**".

Figure 3 A. Ferrone discussing with L. Morgenstern (BMUB) before the opening of the plenary. (Photograph courtesy of IISD/Earth Negotiations Bulletin (http://www.iisd.ca/climate/ipcc38/))

In its second volume of the AR5 the IPCC stressed that climate change impacts can be documented in human communities, agriculture and natural ecosystems. In particular impacts from recent climate-related extremes, such as heat waves, droughts, floods, cyclones, and wildfires, reveal significant vulnerability to current climate variability.

Impacts of future climate changes are expected to increase with rising temperatures, and eight major climate risks haven been identified:

- Death or harm in low-lying coastal zones due to coastal flooding and sea level rise.
- Harm or economic losses for large urban populations due to inland flooding.
- Extreme weather leading to breakdown of infrastructure and critical services.
- Extreme heat stress, particularly for vulnerable urban populations.
- Food insecurity linked to warming, drought, flooding, and precipitation variability.
- Water shortages causing insufficient access to drinking and irrigation water.
- Loss of marine and coastal ecosystems essential for fishing communities.
- Loss of terrestrial and inland water ecosystems and biodiversity.

The assessment concludes that a combination of adaptation and mitigation options can reduce these risks.

In comparison to the 4th Assessment Report (AR4), published in 2007, more emphasis was put on risk assessment in order to better address the needs of policy-makers. Additionally more emphasis was put on regional specific vulnerabilities to climate change and adaptation potentials, addressed in 9 chapters for each continent, polar regions, small islands and the oceans.

In the third volume of AR5, the IPCC assessed that greenhouse gases (GHG) have risen on global average by 2.2 % between 2000 and 2010, despite an increasing number of climate polices and the economic crisis of 2007/2008. Globally, economic and population growth continue to be the most important drivers of increases in CO_2 emissions from fossil fuel combustion.

Figure 4: A. Ferrone still active after not having slept for more than 30 hours (Photograph courtesy of IISD/Earth Negotiations Bulletin (http://www.iisd.ca/climate/ipcc38/))

In comparison to AR4, the goal of limiting the global temperature rise to less than 2 °C with respect to pre-industrial levels was more thoroughly addressed. In order to reach this goal with a *likely* probability (i.e. more than 66 %), GHG concentrations have to be stabilized at 450 (430-480) ppm CO_2eq by 2100 (weighed by Global Warming Potentials with a 100-year time horizon from the IPCC Second Assessment Report). Presently they are at a level of 430 (340-520) ppm CO_2eq.

Scenarios compatible with the 2 °C target, are characterized by global GHG emissions 40 % to 70 % lower in 2050 with respect to 2010 levels and near zero or even negative emissions by 2100 (i.e. removal of CO_2 from the atmosphere). Scenarios consistent with these reductions have been assessed to lead to a reduction of consumption growth by 0.04 to 0.16 (median of 0.06) percentage points over the century, excluding benefits of avoided climate change as well as co-benefits and side-effects of mitigation. These numbers have to be put in context of the baseline projected growth between 1.6 to 3 % over this period.

The IPCC also concluded that the window of opportunities of cost-effective mitigation options has been closing since AR4. The pledges put forward by Parties in the framework of the meeting of the United Nations Convention on Climate Change (UNFCCC) in Cancún in 2010 are not consistent with assessed cost-effective pathways able to limit the global temperature below 2 °C with a *likely* probability. They do not however exclude meeting this target.

The final step completing the AR5 will be the publication of the synthesis report, addressing topics combining results from the three working groups of the IPCC. This report will be discussed and adopted during the next plenary from 27th to 31st October in Copenhagen, Denmark.

Further reading:

IPCC, WG2 contribution to AR5: http://ipcc-wg2.gov/AR5/

IPCC, WG3 contribution to AR5: http://mitigation2014.org/

Report of the Earth Negotiation Bulletin of the 37th session of the IPCC: http://www.iisd.ca/download/pdf/enb12596e.pdf

Report of the Earth Negotiation Bulletin of the 38th session of the IPCC: http://www.iisd.ca/download/pdf/enb12597e.pdf

Status COST action

COST is currently in a transition towards the Horizon 2020 framework and it was decided to combine the second call of 2014 with the first call of 2015. The efforts within the CLM-Community to submit a COST action are thus presently aiming at submitting a proposal in spring of 2015. The exact dates are not yet announced. It is important to note that COST covers the costs of networking activities such as meetings (e.g. travel, subsistence, local organiser support), conferences, workshops, short-term scientific exchanges, training schools, publications and dissemination activities. COST does not fund the research itself. If you are interested to get more information on our efforts in this context please get in touch with Andrew Ferrone (ferrone[at]lippmann.lu).

COSMO/CLM/ART Training Course 2014

The 7th training course took place from 17-25 February 2014 in Langen, Germany. For the first time, the course was extended by 2 days for special training on COSMO-ART and the Community Land Model. In the first week, over 50 participants took the opportunity to learn about installation and usage of the COSMO model system, from which 24 joined the exercises for the regional climate modelling mode. The additional courses of COSMO-ART and Community Land Model have been attended by about 30 people. The success of the training could be seen in a very concentrated and friendly atmosphere and a few new membership applications for the CLM-Community. The training material is available online (login first, http://www.clm-community.eu/index.php?menuid=208&reporeid=300)

The **next training course** is scheduled for **23 - 31 March, 2015**.

Figure 5 COSMO/CLM/ART User Seminar 2014, Offenbach (photo by A. Biermann)

COSMO/CLM/ART User Seminar 2014

From 17 - 21 March 2014, again over 200 scientists from over 20 different countries participated in the COSMO/CLM/ART user seminar in Offenbach, Germany. In the usual manner, the development and application of the COSMO model system was discussed in different oral and poster sessions in the first three days. The last two days were filled with different working group meetings of the weather forecast and climate modelling communities. The presentations can be found on the web: http://www.clm-community.eu/index.php?menuid=205

The date of the **next User Seminar** will be the **2 - 6 March, 2015**.

New member institutions

Cheikh Anta University Dakar, Senegal

(http://www.university-directory.eu/Senegal/Laboratory-of-Physics-of-the-Atmosphere-and-Ocean---University-Cheikh-Anta-Diop.html)

Providing WASCAL[1] climate change projections useful for impact studies and development of adaptation and mitigation strategies.

Contact: Mame Diarra Bousso Dieng

(mamediarraboussodieng[at]yahoo.fr)

University of North Carolina at Chapel Hill

(http://unc.edu/)

Synchronization is a common phenomenon in engineering and science that easily emerges when two or more nonlinear, weakly coupled oscillators progressively adapt their originally different natural frequencies to each other to end up oscillating in unison. The available data seems to point to the synchronization of the polar climates during at least the last ice age. The project is to model polar synchronization over the last 100ky.

Contact: José Rial

(jose_rial[at]unc.edu)

Instituto Tecnologico Simepar

(http://www.simepar.br/)

Investigating impacts on climate and weather due to land use (agricultural purposes or energy hydroelectric plants) as well as to projection of future climate scenarios. Investigating the occurrences of extreme wind events in the west portion of Paranta State and the possibility of reconstruction of maximum wind values.

Contact: Reinaldo Silveira

(rsilveira[at]simepar.br)

Ecole polytechnique fédérale de Lausanne

(http://www.epfl.ch/)

A unique set of high-resolution polarimetric radar measurements collected in the Swiss Alps in Davos during a past experiment and one to be conducted for this project provides a nice opportunity to evaluate at local scales the simulation capability of the COSMO model used by MeteoSwiss for weather prediction.

Contact: Daniel Wolfensberger

(daniel.wolfensberger[at]epfl.ch)

Nigerian Meteorological Agency

(http://nimet.gov.ng/)

Forecasting seasonal precipitation.

[1] https://icg4wascal.icg.kfa-juelich.de/

Contact: Eniola Olaniyan
(olaniyan_eni[at]yahoo.com)

King Abdulaziz University
(http://www.kau.edu.sa/home_ENGLISH.aspx)

Running COSMO-CLM for the CORDEX-MENA domain and Saudi Arabia to improve the understanding of the present climate and the future climate of our regionContact: Mansour Almazroui
(Mansour[at]kau.edu.sa)

Lanzhou University
(http://www.lzu.edu.cn/notice/english/Introduction.htm)

Analysis of the climate change impact on the Tibet Plateau effecting the area of frozen ground and snow cover but also the general circulation of the east Asian and global scale.

Contact: Wang Chenghai
(wch[at]lzu.edu.cn)

Research notes

The application of the new IFS convection scheme in COSMO-CLM

Burkhardt Rockel[1], Hans-Jürgen Panitz[2]
[1]HZG, [2]KIT

By default, the most recent versions of COSMO, respectively COSMO-CLM (CCLM), offer only one parameterization scheme for convection, namely the Tiedtke scheme (Tiedtke, 1989). However, the option exists to use the convection scheme of the Integrated Forecasting System (IFS) of ECMWF. This option was already available in previous versions of CCLM using version Cy33r1 of the IFS scheme (Bechtold, 2009). But as several studies (e.g. Brockhaus et al., unpublished manuscript) and sensitivity simulations within the frame of CORDEX showed, the IFS scheme produced to much rain of light intensity (< 3 mm), and the daily cycle of convective rain was also not correct. The precipitation maximum occurred a few hours too early, a shortcoming, which is also apparent when using the Tiedtke scheme. In summer 2013 ECMWF published a new version (Cy40r1) of its IFS convection scheme, which improved the diurnal cycle of convection considerably (Bechtold et al, 2013), at least when being applied within the IFS. In the meantime, this new version of the IFS scheme has been implemented in CCLM and can be chosen as the single alternative to the Tiedtke scheme. CCLM simulations applying the old and the new IFS scheme have been and are going to be carried out. On the one hand, these simulations are based on the ERA-Interim driven CORDEX Africa configuration, on the other hand it has been tried to confirm results of IFS simulation for the continental USA (Bechtold et al., 2013), but applying CCLM in connection with the new IFS scheme. Unfortunately, the latter CCLM simulations did not show improvements in the diurnal cycle of convection when compared to simulations using the old version (Cy33r1) of the IFS scheme. In collaboration with P. Bechtold from ECMWF we are going to find out the reasons for this. The current status of the development will be presented during the upcoming CLM-Assembly in Frankfurt/Main.

References:

Bechtold, P., 2009: Chapter IV-5: Convection. ECMWF IFS documentation, www.ecmwf.int

Bechtold et al., 2013: Breakthrough in forecasting equilibrium and non-equilibirium convection. ECMWF Newsletter No. 136, 15-22.

Brockhaus et al.: The ECMWF IFS convection scheme applied in the COSMO-CLM limited-area model. Unpublished manuscript.

Tiedtke, M., 1989: A comprehensive mass flux scheme for cumulus parameterization in large-scale models. Monthly Weather Review, 117, 1779-1800.

Remember

… part of your scientific success relies on the work of those people providing the reference model, maintain the codes, etc. Therefore, it would be more than a sign of courtesy to offer them co-authorships once in a while.

Please, do not forget to state that you used the “COSMO model in Climate Mode (COSMO-CLM)” and, please, also include the statement “COSMO-CLM is the community model of the German regional climate research” in each publication.

Regional climate modeling on European scales: Performance of COSMO-CLM in the EURO-CORDEX model ensemble

Sven Kotlarski[1], Klaus Keuler[2], Daniel Lüthi[1]
[1]Institute for Atmospheric and Climate Science, ETH Zurich, Zurich, Switzerland
[2]Chair of Environmental Meteorology, Brandenburg University of Technology (BTU), Cottbus-Senftenberg, Germany

More details about this work can be found in:

Kotlarski, S., K. Keuler, O.B. Christensen, A. Colette, M. Déqué, A. Gobiet, K. Goergen, D. Jacob, D. Lüthi, E. van

Meijgaard, G. Nikulin, C. Schär, C. Teichmann, R. Vautard, K. Warrach-Sagi, V. Wulfmeyer, 2014: Regional climate modeling on European scales: a joint standard evaluation of the EURO-CORDEX RCM ensemble, Geosci. Model Dev., 7, 1297-1333, doi:10.5194/gmd-7-1297-2014.

Introduction

Climate model evaluation and the quantification of model performance is an integral component of climate change research. Besides their relevance for model development, evaluation results are an important piece of information for end users of regional climate projections since they allow for an approximate assessment of the credibility of the involved modelling tools. Against this background and as a community effort, the recent study by Kotlarski et al. (2014) presents an evaluation of the EURO-CORDEX regional climate model (RCM) ensemble. EURO-CORDEX is the European branch of the global CORDEX initiative (Giorgi et al., 2009) and provides regional climate projections for Europe applying an ensemble of RCMs in their most recent versions, among them COSMO-CLM. Based on a number of simply reproducible metrics Kotlarski et al. (2014) document the performance of the individual EURO-CORDEX RCMs in representing the basic spatio-temporal patterns of the European climate in the period 1989-2008 when driven by perfect boundary conditions (ERA-Interim). It establishes a quality standard for future model developments. We here provide a brief summary of this study, explicitly focusing on the performance of COSMO-CLM. For a complete picture the reader is referred to the original manuscript.

Data and Methods

Model evaluation addresses near-surface air temperature and precipitation, and uses the E-OBS dataset (Haylock et al., 2008) as observational reference. The analysed RCM ensemble consists of 17 simulations carried out by seven different RCMs (including one stretched-grid global model in a special regional setup) at grid resolutions of 12 km (nine experiments) and 50 km (eight experiments). The ensemble includes three different configurations of the WRF model that differ in their choice of physical parameterization schemes. The individual regional model domains can slightly differ from each other, but all models fully cover the common European domain required for EURO-CORDEX experiments. Lateral boundary conditions are provided by the

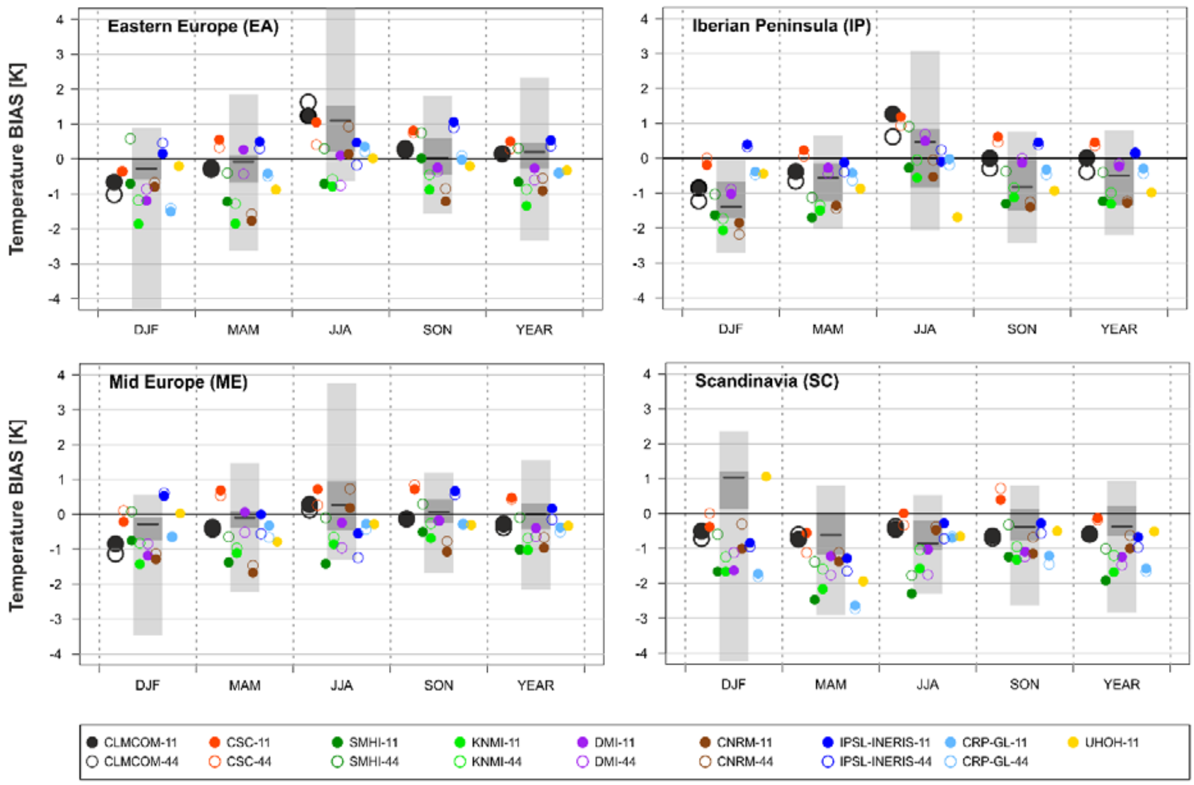

Figure 6 Mean seasonal and annual temperature bias [K] for the 12 km-resolution (filled circles; EUR-11) and the 50 km-resolution ensemble (open circles; EUR-44) and for sub-domains EA, IP, ME and SC. The gray bars denote the bias range of the ENSEMBLES experiments carried out at 25 km resolution: entire range in light gray, inter-quartile range (corresponding to eight models) in dark gray and median as solid line. COSMO-CLM is highlighted by large black markers. The figure is based on Figure 5 of Kotlarski et al., 2014.

ERA-Interim re-analysis.

Several evaluation metrics computed from monthly and seasonal mean values are used to assess model performance over eight sub-domains of the European continent. We here focus on only four of these domains (namely Eastern Europe, the Iberian Peninsula, Mid Europe and Scandinavia and on the bias metric which represents annual and seasonal mean biases averaged over each analysis sub-domain. Results are compared to those for the ERA40-driven ENSEMBLES simulations that were carried out at 25 km grid spacing.

Results

The evaluation results confirm RCM bias characteristics identified by previous studies based on the ENSEMBLES data. This concerns both the general magnitude as well as the sign of model biases. One of the most prominent deficiencies across members of both the 12 km and the 50 km EURO-CORDEX ensemble is the predominant cold bias in most seasons and for most sub-domains (Figure 6). The spatially averaged bias often reaches -1 to -2 K but can be larger in individual cases. COSMO-CLM is mostly well located within the model range, but is prone to an exceptional warm summer bias in southern and south-eastern Europe. The temperature bias spread across different configurations of one individual model (WRF in this case) can be of a similar magnitude as the spread across different models, demonstrating a strong influence of the specific choices in physical parameterizations and experimental setup on model performance.

Regarding regional and seasonal mean precipitation biases, the evaluation reveals an overall wet bias of the EURO-CORDEX models over most sub-domains and for most seasons (**Figure 7**). An exception to this is a dry summer bias over southern and south-eastern Europe in some models, which is particularly pronounced in COSMO-CLM and which is possibly linked to the warm biases over these regions. As a general picture, COSMO-CLM is mostly located at the dry end of the model ensemble. Comparing the 12 km and the 50 km ensembles a general tendency to higher precipitation sums and a larger wet bias with increased model resolution is apparent. However, wet biases can - in many cases and at least to some extent - be explained

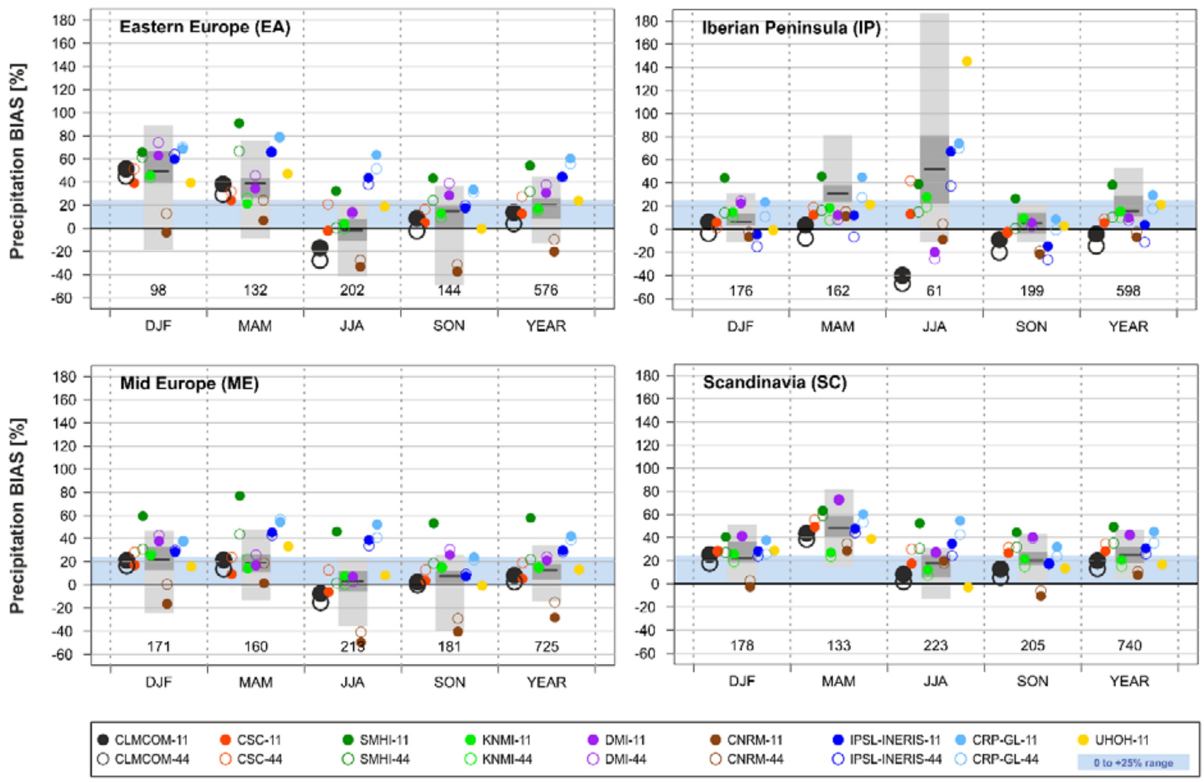

Figure 7 *As Figure 6 but for the mean seasonal and annual relative precipitation bias [%]. The numbers along the x-axis indicate mean seasonal [mm/season] and mean annual [mm/year] precipitation sums for the period 1989-2008 in the E-OBS reference. The blue shading indicates a bias range between 0 and +25%, corresponding to acceptable model biases in case of a systematic rain gauge undercatch. COSMO-CLM is highlighted by large black markers. The figure is based on Figure 6 of Kotlarski et al., 2014.*

by the systematic undercatch of rain gauges which is not corrected for in the E-OBS reference.

The comparison of bias characteristics in EURO-CORDEX against ENSEMBLES indicates some improvements such as a reduced overestimation of southern and south-eastern European summer temperatures, a less pronounced overestimation of interannual summer temperature variability as well as a slightly better representation of the spatial climatic variability within the sub-domains. In some cases, however, individual EURO-CORDEX experiments are subject to bias magnitudes beyond the range found for ENSEMBLES. For sub-domain mean values at seasonal resolution, no apparent benefit of a finer grid resolution (12 km vs. 50 km) can be identified.

Conclusions

The evaluation exercise presented above confirms the ability of the EURO-CORDEX RCMs to capture the basic features of the European climate, including its variability in space and time. But it also identifies non-negligible deficiencies for selected metrics, regions and seasons. Some of these deficiencies, such as a predominant cold and wet bias in most seasons and over most of Europe as well as a warm and dry summer bias over southern and south-eastern Europe, are found in the majority of experiments and reflect common model biases. For most cases COSMO-CLM's biases are located well within the model range, with the exception of an exceptionally strong dry and warm summer bias over the southern parts of Europe.

Neglecting the influence of slightly incompatible setups (different driving re-analysis, differrent simulation and evaluation period), no general improvements of the EURO-CORDEX simulations with respect to ENSEMBLES can be identified for the temporal and spatial scales considered in the present work.

Identifying possible reasons for both common and model-specific bias characteristics and formulating specific recommendations for model development will require a refined analysis, including additional metrics and variables and explicitly taking into account uncertainties in the observational reference and the effect of RCM-internal climate variability. These aspects will be the subject of upcoming studies within the EURO-CORDEX framework. The same is true for studies explicitly addressing the added value of an increased grid resolution. In terms of regionally and seasonally averaged quantities the present work cannot identify such an added value.

Data access

Since October 1, 2013, the simulations of the EUR-11 and EUR-44 ensembles are being published and distributed via the Earth System Grid Federation (ESGF) under the project name "CORDEX". This includes the ERA-Interim driven experiments and the GCM-driven climate change scenarios. Data can be accessed via several ESGF data nodes, such as esgf-data.dkrz.de, esgf-index1.ceda.ac.uk, cordexesg.dmi.dk, esgf-node.ipsl.fr, and esg-dn1.nsc.liu.se.

References

Giorgi, F., Jones, C., and Asrar, G.R.: Addressing climate information needs at the regional level: the CORDEX framework, WMO Bulletin, 58(3), 175-183, 2009.

Haylock, M. R., Hofstra, N., Klein Tank, A. M. G., Klok, E. J., Jones, P. D., and New, M.: A European daily high-resolution gridded data set of surface temperature and precipitation for 1950–2006, J. Geophys. Res., 113, D20119, 2008.

Kotlarski, S., Keuler, K., Christensen, O. B., Colette, A., Déqué, M., Gobiet, A., Goergen, K., Jacob, D., Lüthi, D., van Meijgaard, E., Nikulin, G., Schär, C., Teichmann, C., Vautard, R., Warrach-Sagi, K., and Wulfmeyer, V.: Regional climate modeling on European scales: a joint standard evaluation of the EURO-CORDEX RCM ensemble, Geosci. Model Dev. Discuss., 7, 217-293, doi:10.5194/gmdd-7-217-2014, 2014.

Upcoming events

2014 September 2nd – 5th, CLM-Community Assembly 2014 in Frankfurt, Germany

2014 September 8th – 11th, COSMO General Meeting in Athens, Greece

2014 October 6th – 10th, EMS & ECAC in Prague, Czech Republic

2015 March 2nd - 6th, COSMO / CLM / ART User Seminar in Offenbach, Germany

2015 March 23rd - 31st, COSMO / CLM / ART Training Seminar in Langen, Germany

2015 April 12th - 17th, EGU - European Geosciences Union General Assembly in Vienna, Austria

2015 September 7th - 11th, EMS & ECAM in Sofia, Bulgaria

see also

http://www.clm-community.eu/index.php?menuid=203

Please send all information on *new publications related to COSMO-CLM* (*peer-reviewed as well as reports, theses*, etc.) with corresponding links to clm.coordination[at]dwd.de for *listing on the community web page and in the Newsletter*. Please do not forget to *name the project* in the topic browser to which it is related.

Recent publications

Akkermans, T., W. Thiery, N.P.M. van Lipzig (2014): The Regional Climate Impact of a Realistic Future Deforestation Scenario in the Congo Basin. *J. Climate*, **27**, 2714-2734, doi: 10.1175/JCLI-D-13-00361.1.

Geyer, B. (2014): High-resolution atmospheric reconstruction for Europe 1948–2012: coastDat2, *Earth Syst. Sci. Data*, **6**, 147-164, doi:10.5194/essd-6-147-2014.

Junk, J., A. Matzarakis, A. Ferrone, A. Krein (2014): Evidence of past and future changes in health-related meteorological variables across Luxembourg. *Air Quality, Atmosphere & Health*, 1873-9318, doi:10.1007/s11869-013-0229-4

Kotlarski, S., K. Keuler, O.B. Christensen, A. Colette, M. Déqué, A. Gobiet, K. Goergen, D. Jacob, D. Lüthi, E. van Meijgaard, G. Nikulin, C. Schär, C. Teichmann, R. Vautard, K. Warrach-Sagi, V. Wulfmeyer (2014): Regional climate modeling on European scales: a joint standard evaluation of the EURO-CORDEX RCM ensemble. *Geosci. Model Dev.*, **7**, 1297-1333, doi:10.5194/gmd-7-1297-2014.

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CLM-Community
Dr Barbara Früh
Deutscher Wetterdienst
Frankfurter Str. 135
63067 Offenbach, Germany
clm.coordination@dwd.de