Climate Limited-area Modelling Community

August 2017

Newsletter

No. 9

Content

See YOU at the

CLM-Assembly

19.-22. September 2017

Graz, Austria

Important dates:

Abstract Submission Deadline for Oral Presentations: *expired*

Abstract Submission Deadline for Poster Presentations: ***3rd of September***

Registration Deadline: ***15th of September***

More information at: https://wegcwww.uni-graz.at/clm2017

Welcome to the 9th CLM-Community Newsletter!

The CLM Assembly in Graz is just around the corner! We will discuss important and forward-looking issues there.

At first, one of the big community projects is the Coordinated Evaluation of Convection Permitting Climate simulations with COSMO-CLM5.0 (CECPC5.0). This effort will results in a recommendation for the COSMO-CLM configuration at convection permitting grid spacing. This in turn will affect the COSMO-CLM contributions to the CORDEX flagship pilot studies, like 'Convective phenomena at high resolution over Europe and the Mediterranean' or 'Impact of land use changes on climate in Europe across spatial and temporal scales'.

In addition, we will discuss the CORDEX Coordinated Output for Regional Evaluations (CORE) activity initiated by Filippo Giorgi and William Gutowski which has the aim to provide a core set of comprehensive and homogeneous projections across (almost) all CORDEX domains. The resulting climate projections will build the base for future climate impact studies world wide and serve as a solid base for IPCC AR6 WGII. Since this is a huge effort sharing the work load between the CLM-Community members will be essential.

The CLM Assembly in Graz is a perfect place for discussing and coordinating all these CLM-Community contributions. Make use of this opportunity!

Clocktower of Graz, Photo by Tourismus Graz

We hope to see many of you there!

Enjoy reading the Newsletter

Yours sincerely,
Barbara Früh and Christian Steger

Five questions to … Niels Souverijns

Katholieke Universiteit Leuven

Niels Souverijns studied Geography at the KU Leuven. He finished his Master thesis in 2015 on the drivers of future changes in precipitation over East Africa. In the end of 2015 he started his PhD about clouds and precipitation over Antarctica in which both observations and COSMO-CLM climate model runs are used.

1. *Which is your main research focus when using COSMO-CLM?*

In our research group in Leuven COSMO-CLM is used for various purposes ranging from future regional climate simulations to malaria research. I am using COSMO-CLM as a tool to investigate the climate over Antarctica. My main research focus lies in investigating how clouds and precipitation behave over Antarctica. Observations on clouds and precipitation are scarce over these southern latitudes. As such, a climate model is an excellent tool to investigate these issues. For the moment we were able to couple the climate model to the Community Land Model and adapt both the atmospheric and ground component to represent the Antarctic climate. In a next step, a long-term simulation for present day conditions will be executed over the whole of Antarctica at high resolution, making COSMO-CLM one of the few climate models achieving this.

2. *Why do you think is COSMO-CLM especially useful for answering your research question?*

The choice for COSMO-CLM in this respect is made for several reasons. In our research group there is a lot of experience present regarding the model. Several successful applications have been executed (mainly focusing on Africa and Belgium). Another reason for using COSMO-CLM is the fact that there are not many regional model climate models adapted for the Antarctic. Adding a new model could lead to a nice addition to the (for the moment small) ensemble of climate model simulations that are present.

3. *What is your experience with the CLM-Community so far?*

I followed the COSMO-CLM training course when I was in the last year of my master's study in 2015. This was the first time I was in contact with the community and it was very helpful to follow this course before starting my PhD. It gave me a head start since I knew already the basics and the people who I could contact in case of specific problems. Furthermore, I always try to be present at the user seminar and assembly. In my opinion it is very important to be present here and to show the work you performed. During each of the meetings I was able to get feedback on my work and to get help with the problems I encountered with the model.

4. *What are, in your opinion, the strength and the weaknesses of the CLM-Community?*

The main advantage of the community is the fact that you know which people are able to support you. The community is small but everybody knows everybody and what they are doing at the moment. This is also reflected in the assembly and meetings, where you get to know everyone after one or two attendances. Furthermore, I always had the feeling that people wanted to help you in case you have a question, even when they do not know you that well. I think this atmosphere is one of the major strengths of the community.

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

Currently, I am halfway my PhD and have two more years to go. My main goals in this would be to investigate the cloud and precipitation interactions with the surface mass balance of Antarctica further. By using both observations from our research station (Princess Elisabeth station) and the COSMO-CLM model, I hope to synthesize this within the next two years. Furthermore, I would like to continue on improving COSMO-CLM over Antarctica. A personal goal of mine is that at some point in the future the COSMO-CLM model can contribute to the CORDEX-Antarctica ensemble .

Thank you very much for the interview! ■

IPCC activities

45th Session of IPCC

by Andrew Ferrone

The Intergovernmental Panel On Climate Change (IPCC) met from 28 to 31 March in Guadalajara, Mexico. In this session the IPCC decided on the outlines of a Special Report on Climate Change and Land (*SRCCL*) and a Special Report on Oceans and Cryosphere in a Changing Climate (*SROCC*). The *SRCCL* will focus on land-climate interactions, desertification, land degradation, food security and the interlinkages between these topics. The *SROCC* covers high mountain areas, polar regions, sea level rise, oceans and extreme events, including hurricanes. Both reports will be approved by the IPCC plenary in September 2019. A detailed outline of the reports, as well as the time lines of the production of these reports can be found on the following page : http://www.ipcc.ch/scripts/_session_template.php?page=_45ipcc.htm

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SBSTA46/SBI46/APA1-3

by Andrew Ferrone and Hans-Jürgen Panitz

Under the United Nations Framework Convention on Climate Change (UNFCCC) the 46th sessions of the Subsidiary Body on Scientific and Technical Advice (*SBSTA*) and the Subsidiary Body on Implementation (*SBI*) as well as the third part of the first session of the Ad-hoc Working group on the Paris Agreement (*APA*) have taken place from May 8th to 18th. The main aim of these sessions was to progress in the development of a rule book for the Paris Agreement, which will be finalised by the end of 2018.

During the *SBSTA* session, the chair also convened the 9th Research Dialogue on 10th of May. This Dialogue is convened once per year and aims at giving Parties the possibilities to directly engage with scientists on selected topics. This year the dialogue focused on two topics:

(1) Regional climate research data, information, and gaps,
(2) Science to take stock and assess progress on mitigation.

The presentations and posters covered under topic (1) highlights from CORDEX, as well as high resolution observation data, both in situ and from satellites. Under topic (2) the development of socio-economic scenarios compatible with the 1.5°C temperature goal of the Paris Agreement, as well as challenges of combining nationally determined contributions to assess progress under the Paris Agreement, were addressed.

Under topic (1) Hans-Jürgen Panitz from Karlsruhe Institute of Technology (KIT) presented a poster “Added value of regional downscaling with COSMO-CLM in the context of CORDEX-Africa”, which highlighted the activities of the CLM-Community for CORDEX Africa.

Some interested visitors, coming from various institutions, discussed the contents of the poster with Hans-Jürgen. They were mainly impressed by the ability of COMSO-CLM to reproduce extreme indices much better than GCMs do.

The full list of posters of the 9th Research Dialogue can be found here:
http://unfccc.int/science/workstreams/research/items/10154.php

A short summary is available here:
http://newsroom.unfccc.int/unfccc-newsroom/experts-call-for-better-regional-climate-observation-and-services/

■

CORDEX

CORDEX-CORE experiment

Within the CORDEX community a Coordinated Output for Regional Evaluations (CORE) activity is initiated to provide a core set of comprehensive and homogeneous projections across almost all CORDEX domains. The resulting climate projections will presumably not serve as outstanding research in the field of climate modelling, but they will build the base for future climate impact studies world wide and hopefully serve as a solid base for IPCC AR6 WGII.

However, it will be a huge effort. Therefore, as CLM-Community we should take advantage in sharing tasks. Especially since ETHZ is willing to provide computing resources to perform large parts of the experiments needed. However, ETHZ needs to collaborate with groups that have experience and interest in the different regions to set up the model configuration and perform analysis.

If you are interested in being part of this exciting activity, please, contact clm.coordination[at]dwd.de or Soerland Silje (silje.soerland[at]env.ethz.ch). ■

CLM-Community issues

COSMO/CLM/ICON/ART User Seminar 2017

The COSMO/CLM/ICON/ART User Seminar 2017 took place from Monday March 06th to Wednesday March 08th. In total 199 registered scientists discussed in 10 sessions on 'data assimilation', 'model input data', 'dynamics and numeric', 'clouds, chemistry, aerosol and radiation', 'planetary boundary layer', 'soil, vegetation, and ocean', 'verification (NWP) and evaluation (RCM)', 'predictability and ensemble systems', 'NWP model applications and case studies', and 'RCM model applications' new developments and applications.

Group photo at the COSMO/CLM/ICON/ART User Seminar 2017
Photo by Daniel Egerer, DWD.

For the first time the COSMO/CLM/ART user seminar was held together with the partners working on ICON development. As a consequence the name of the seminar changed to longish and difficult to remember COSMO/CLM/ICON/ART User Seminar. To find a better name a contest was announced. The winning name was ICCARUS (ICON COSMO CLM ART User Seminar). It was suggested by 8 participants. The price was a DWD mug.
A logo was also already found by Nora Leps, University Frankfurt.

Award ceremony with Nora Leps and Ulrich Blahak.
Photo by Michael Kügler, DWD

New logo drawn by Nora Leps (GUF, DWD)

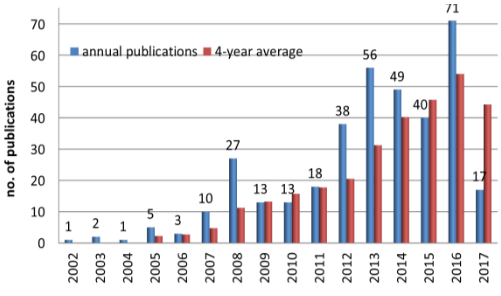
CLM Assembly 2017

All members of the CLM-Community are invited to participate in the CLM-Community Assembly 2017. This year, the assembly takes place in the city of Graz, Austria.
Supporting the general progress of convection-permitting climate simulations Sam Vanden Brouke (KUL, Belgium) will give a solicited talk on orographic effects on added value in such highly resolved simulations, Matthias Rotach (UIBK, Austria) will present an outlook on what awaits us beyond convection-permitting scales, and Bruce Hewitson (UCT, South Africa) is asked to raise questions from the Climate Information Distillation problem that climate services are facing.
The city of Graz and its historic background is introduced via a guided "Ghost Walk" though the city scheduled for Thursday evening. .

Murinsel
Photo: by
Tourismus Graz

COSMO-CLM publications

In recent years there has been a clear positive development in COSMO-CLM publications.



Number of articles (per year) reporting on COSMO-CLM development and application.

This is especially true for last year, where 71 articles reporting on COSMO-CLM developments and applications were published. This impressive number is only marginally raised by the 16 articles in the special issue 'Recent developments in Regional Climate Modelling with COSMO-CLM' Part I (*Met. Z. Vol. 25 No. 2*) and Part II (*Met. Z. Vol. 25 No. 5*). Keep up the good work.

Research notes

Evaluation of convection-resolving models using satellite data: The diurnal cycle of summer convection over the Alps

Michael Keller[1,2], Oliver Fuhrer[3], Juerg Schmidli[1,4], Martin Stengel[5], Reto Stöckli[3], Christoph Schär[1]

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More details and additional references can be found in:
Keller, M., O. Fuhrer, J. Schmidli, M. Stengel, R. Stöckli, and C. Schär (2016): Evaluation of convection-resolving models using satellite data: The diurnal cycle of summer convection over the Alps. *Meteorol. Z.*, doi:10.1127/metz/2015/0715

Introduction

Summertime moist convection over Central Europe and the Alps is characterized by a pronounced diurnal cycle. With most convection-parameterizing models (CPMs), a too early precipitation peak is found, often around noon (e.g. BROCKHAUS et al., 2008). Convection-resolving models (CRMs) with a grid spacing of less than approximately 4 km need no parameterization for deep convection. Recent decade-long studies over the Alps show that this approach significantly improves the mean diurnal cycles of precipitation, wet-day frequency and heavy precipitation events, as well as the representation of the frequency-intensity relation of precipitation (BAN et al. 2014; 2015).

In addition to precipitation, clouds can indicate convection. The process can then be observed with satellite measurements. Radiative transfer models, as for example RTTOV, can be used in atmospheric models to generate synthetic satellite radiances in order to allow a direct comparison of modelled states and satellite measurements. With this approach, no assumptions about the observed atmosphere have to be made. Using such a direct comparison, BÖHME et al. (2011) found for two years of operational numerical weather predication (NWP) with the COSMO model at the Deutscher Wetterdienst (DWD) a large positive high cloud cover bias in a CPM, which is improved but still positive when changing to a CRM.

The current work investigates the diurnal cycle of moist convection over Central Europe with CRMs during 11 days in June 2007, when a pronounced convective activity was observed. Three simulations are undertaken. The CPM run with 12 km spatial resolution uses a one-moment microphysics scheme (1M) and is called 12km1M. The two CRM runs with 2.2 km resolution use either the 1M or a two-moment microphysics scheme (2M, SEIFERT and BEHENG, 2006), and are called 2km1M and 2km2M, respectively. All simulations are analysed over Central Europe or Switzerland. The model runs are compared with brightness temperature (BT) from satellite observations using RTTOV-7. Further, they are compared with hourly precipitation data (RdissagH (v1.0)) provided by MeteoSwiss .

Cloud cover biases

During the period of interest, temperatures below -20°C can be found for cloud tops higher than 6 – 7 km. Accordingly, areas with BT < -20°C can be attributed to thick high clouds and are called BT_HC. Clouds with -20°C < BT < 0°C can be attributed to thick mid-level clouds or thin high-level clouds, and are referred to as BT_MC. Mid-level cloud categories are only visible from satellite if they are not covered by higher clouds.

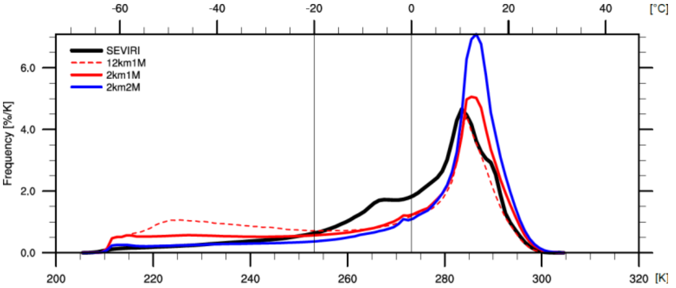

Figure 1: Brightness temperature (BT) histogram of satellite observations (black) and three simulations (12km1M (dashed red), 2km1M (solid red), 2km2M (blue)) for each grid point in the full analysis region and all hours from 3 to 13 June 2007. BT is measured at 10.8 µm wavelength. The frequency on the y-axis is in %/K.

Fig. 1 presents a BT histogram for each grid point in the full analysis region and all hours of the 11-day period. It confirms that there are generally too many BT_HC for 12km1M and that there is a significant (but only partial) improvement
for 2km1M and a further improvement for 2km2M.

For the range of BT_MC, all simulations underestimate the frequency of these BTs, which is consistent with findings from BÖHME et al. (2011) for NWP simulations.

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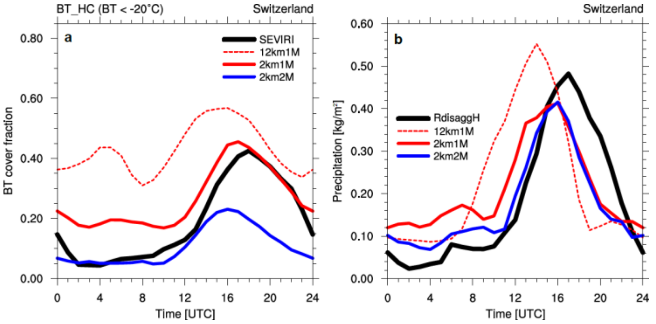

Figure 2: (a) The diurnal cycle of fractional cover of BT at 10.8 µm < -20°C over Switzerland for 3 to 13 June 2007 from satellite observations and three simulations. (b) The diurnal cycle of precipitation from radar-disaggregated rain-gauge data (RdissagH) and three simulations for the same period and region.

Diurnal cycle of high clouds precipitation

In order to investigate the timing of the diurnal cycle of convection, the diurnal cycles of fractional cloud cover for BT_HC over Switzerland are analyzed (Fig. 2a). The peak in the late afternoon is a result of the peak convective activity. For 12km1M, a too early peak (two hours), a large positive mean bias and a smaller diurnal range than in the observations are found. For 2km1M, the bias and the range improve, but a too early peak of about one hour is also found. Changing to the 2M further decreases the mean bias, which becomes even negative, in contrast to the full analysis region (Fig. 1). Further, the diurnal cycle becomes less pronounced and the peak is about two hours too early.

Finally, we shift our attention to the diurnal cycle of precipitation over Switzerland. Observations show a pronounced diurnal cycle with a peak at 17 UTC (Fig 2b). For 12km1M, the diurnal cycle is more pronounced and the onset and peak are about three hours too early. For 2km1M, an improvement in timing is found. Therefore, the biases and shifts in timing are similar as for the fractional cover of BT_HC. The use of a 2M has no significant impact on the diurnal cycle and amount of precipitation (Fig. 2b) but on high clouds as seen above (Fig. 2a). This underlines the importance of comparing models also with satellite observations.

Conclusions

Overall, we can state that the CPM simulation exhibits a significant overestimation of high cloud cover. This bias is reduced by the use of CRM simulations, and further reduced with the use of a 2M.

An underestimation of mid-level clouds is found for all simulations. This is evident from an underestimation of BT in the range of 255-283 K. This bias occurs irrespective of the microphysics scheme and should be further investigated in the future.

Despite the pronounced impact on clouds and radiative properties, the aforementioned sensitivities to the 2M only marginally affect the diurnal cycle of precipitation in CRM. This indicates that for many applications, the 2M only becomes relevant if feedbacks associated with cloud-radiative or aerosol effects are investigated.

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Mid-to-late Holocene temperature evolution and atmospheric dynamics over Europe in regional model simulations

Emmanuele Russo and Ulrich Cubasch

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More details and additional references can be found in:
E. Russo, U. Cubasch, 2016: Mid-to-late Holocene temperature evolution and atmospheric dynamics over Europe in regional model simulations. *Clim. Past*, **12**, 1645-1662, doi:10.5194/cp-12-1645-2016, 2016.

Introduction

The improvement in resolution of climate models has always been mentioned as one of the most important factors when investigating past climatic conditions, especially in order to evaluate and compare the results against proxy data. Motivated by such considerations, in this paper we present a set of high-resolution simulations for different time slices of the mid-to-late Holocene (from 6000 years ago to the pre-industrial period) performed over Europe using the state-of-the-art regional climate model COSMO-CLM (CCLM).

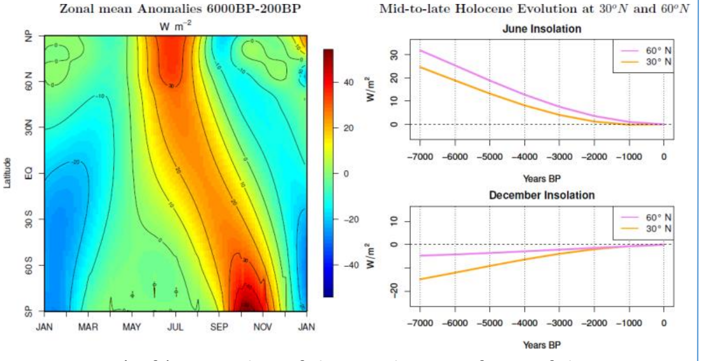

Figure 1: (Left) Anomalies of the zonal mean of Top Of the Atmosphere (TOA) insolation between 6000 years BP and the pre-industrial period. (Right) Mid-to-late Holocene trends of the anomalies, with respect to present-day values, of December and June TOA incoming insolation, calculated for 30 and 60 degrees North (N). Units are Wm^{-2}.

The evolution of European climate during the mid-to-late Holocene is an important case study. The large number of proxy data available for this region and the particular configuration of the Earth astronomical parameters make it a useful period for the evaluation of the models' response to changes in insolation. During the mid-to-late Holocene, over northern latitudes in general, changes in the total amount of insolation during the year (with respect to present-day conditions) were negligible (4.5 Wm^{-2}) when compared to the seasonal variations (up to more than 30 Wm^{-2} for summer insolation at high latitudes (Fig. 1)) (Fischer and Jungclaus, 2011).

Indeed, relevant variations in the seasonal values of surface variables would be expected. However, evidence shows that reconstructed climatic parameters, such as surface temperature, over Europe, did not always follow directly the astronomical forcing.

In this work, after proposing and testing a model configuration suitable for paleoclimate applications, the aforementioned mid-to-late Holocene simulations were compared against a new pollen-based climate reconstruction data set, covering almost all of Europe, with two main objectives: testing the advantages of high-resolution simulations for paleoclimatic applications, and investigating the response of temperature to variations in the seasonal cycle of insolation during the mid-to-late Holocene.

Methods

In a first place, changes to the CCLM original code were necessary in order to implement values of astronomical forcings and CO_2 equivalent concentration for the different mid-to-late Holocene time-slices. The model with the applied changes was tested for present days, setting corresponding values of both the mentioned forcings and comparing the results against different observational datasets.

Successively, a set of different climate models at different resolution was employed for the mid-to-late Holocene paleo-simulations. The modus operandi consisted of three parts and was based on the so-called time-slice technique (Cubasch et al., 1995):

1. First a transient simulation covering the last 7000 years with the coupled Global Circulation Model (GCM) ECHO-G, at a spectral resolution of T31, was performed (Wagner et al. 2007).
2. Then, the ECHO-G results were used to drive seven different time slice simulations, at a spectral resolution of T106, with the atmosphere-only GCM ECHAM5. The time-slices were selected at a temporal distance of approximately 1000 years from each other, from 6000 years ago to the pre-industrial period.
3. Finally, the ECHAM5 outputs were dynamically downscaled at a horizontal resolution of 0.44 longitude degrees, by means of the COSMO-CLM version 4.8-19. As a benchmark for the comparison of the paleo-simulations, the gridded pollen-based climate reconstructions of Mauri et al. (2015) were used.

Results

The test of the model with the applied changes for present days produced results comparable with the ones of other studies.

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Time Slice	T2M	
	DFJ	JJA
6000 BP	+2.9%	+3.3%
5000 BP	+2.9%	0.0%
4000 BP	+6.9%	+2.5%
3000 BP	+3.5%	+9.5%
2000 BP	0.0%	+7.1%
1000 BP	0.0%	+11.5%

Table 1: Relative improvement of CCLM simulated temperature with respect to its driving GCM, in the comparison against proxy reconstructions.

Qualitative and quantitative analyses of the paleo-climate simulations showed that, the results of CCLM were closer to the values of the reconstructions in comparison to the driving GCM, in some cases by more than 10 % (Tab. 1).

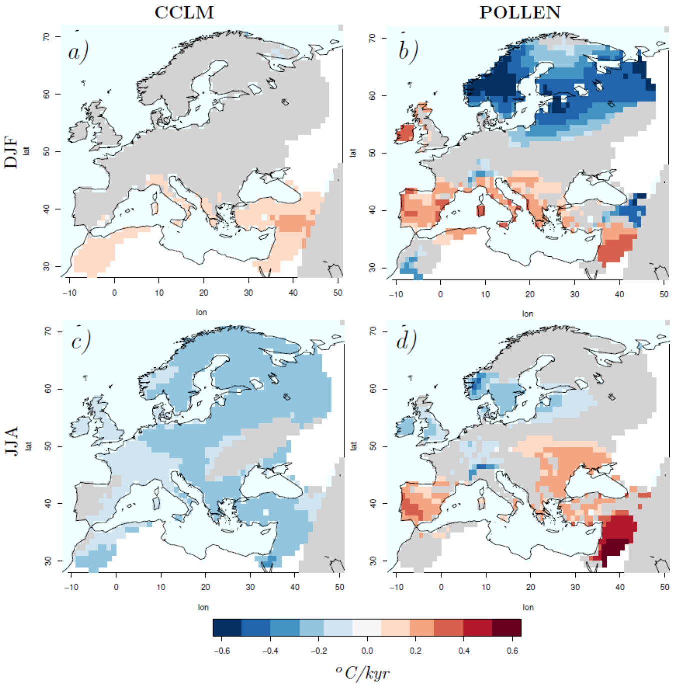

Figure 2: Mid-to-late Holocene temporal evolution of the anomalies, with respect to the pre-industrial period, of near-surface temperature of winter (first row) and summer (second row) seasonal means. Values from the CCLM simulations are presented on the left and the ones from the pollen-based reconstructions of Mauri et al. 2015 on the right. The maps show the slopes of the linear trends calculated (for every grid box) taking into consideration the uncertainties associated to the two datasets by means of a weighted least squares method. The area masked out in grey indicates the area where the trends are not significant, according to an F-test at a significance level of 10%.

Analysis of the mid-to-late Holocene evolution of seasonal values of near surface temperature derived from the pollen reconstructions and CCLM results reinforced previous findings. Results showed that summertime temperatures during the mid-to-late Holocene were driven mainly by changes in insolation and that the model was too sensitive to such changes, in particular over Southern Europe, resulting in significantly drier and cooler conditions. In winter the model captures the trend reproduced by the reconstructions only over Southern Europe. Nonetheless, the amplitude of changes over the area is smaller with respect to the proxy data. The model seems to be mainly driven by changes in the incoming insolation, more pronounced over Southern Europe (Fig. 1). The effects of other drivers, such as changes in atmospheric variability, are negligible in this case. (Fig. 2).

Through the analysis of variations in atmospheric circulation we suggested that the hierarchy of models employed in this study seemed to underestimate the changes in the amplitude of the North Atlantic Oscillation, overestimating the contribution of secondary modes of atmospheric variability.

Conclusions

In this work we performed for the first time a set of highly resolved climate simulations over Europe for different time-slices of mid-to-late Holocene, by means of the state-of-the-art regional climate model COSMO-CLM. Results showed:

- that the employed model configuration can be considered a valid reference for future paleoclimate applications.
- the possible advantages of the use of an RCM for the simulation of past changes in near-surface temperature.
- that CCLM and the entire hierarchy of models employed in this study, seemed to be too sensitive to changes in insolation in summer. Conversely, in winter, the same models were not able to correctly reproduce the same amplitude of changes in the NAO as deduced from proxy-reconstructions.

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

Remember!

… part of your scientific success relies on the work of those people providing the reference model setup, 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 community jointly further developed by the CLM-Community" in each publication.

Pätsch J., H. Burchard, C. Dieterich, U. Gräwe, M. Gröger, M. Mathis, H. Kapitza, M. Bersch, A. Moll, T. Pohlmann, J. Su, H.T.M. Ho-Hagemann, A. Schulz, A. Elizalde, C. Eden, 2017: An evaluation of the North Sea circulation in global and regional models relevant for ecosystem simulations. *Ocean Modelling,* **116**:70-95, doi: 10.1016/j.ocemod.2017.06.005

Pham, Trang Van; J. Brauch, B. Früh, B. Ahrens, 2017: Simulation of snowbands in the Baltic Sea area with the coupled atmosphere-ocean-ice model COSMO-CLM/NEMO. *Met. Z.*, doi: 10.1127/metz/2016/0775.

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Previous publications can be found at
http://www.clm-community.eu/index.php?menuid=26

Welcome to new Members

Meteorological Services Department of Zimbabwe
(http://www.weather.co.zw/)

Topic: Assessment of the influence of climate change and variability on extreme weather events over Zimbabwe using Regional Climate model (COSMO-CLM)

Contact: Sinclair Chinyoka (sinclairshalome@gmail.com)

Max Planck Institute for Meteorology, Germany
(https://www.mpimet.mpg.de/en/home/)

Topic: Improvements of COSMO-CLM for simulations in the Arctic

Contact: Oliver Gutjahr (oliver.gutjahr@mpimet.mpg.de)

Universität Pierre und Marie Curie - Sorbonne Universités, France
(http://www.upmc.fr/en/index.html)

Topic: Water vapor origin and heavy precipitation events

Contact: Keunok Lee (keun-ok.lee@latmos.ipsl.fr)

A.M. Obukhov Institute of Atmospheric Physics of Russian Academy of Sciences, Russia
(http://www.ifaran.ru/index.html?locale=en)

Topic: Analysis and prediction of the spatial and temporal structure of anthropogenic heat fluxes in urban areas for a more complete description of ecological–climatic conditions

Contact: Iya Belova (iya@ifaran.ru)

Bu-Ali Sina University, Iran
(http://www.basu.ac.ir/????.aspx)

Topic: Analysis of soil moisture COSMO-CLM

Contact: Elham Fakharizadeshirazi (e_f_sh@yahoo.com)

Upcoming events 2017

Sep 04 – 08	EMS, Dublin, Ireland
Sep 11 – 14	COSMO General Meeting, Jerusalem, Israel
Sep 19 – 22	CLM-Community Assembly, Graz, Austria

Upcoming events 2018

Feb 11 – 16	Ocean Science Meeting , Portland, USA
Feb 26 – Mar 02	ICCARUS 2018, Offenbach, Germany
Mar 12 – 20	COSMO/CLM/ART Training-Course, Langen, Germany
Apr 18 – Apr 28	EGU General Assembly, Vienna, Austria
Sep 03 – 07	EMS Annual Meeting, Budapest, Hungary
Sep 11 – 14	20th COSMO General Meeting, St. Petersburg, Russia
Sep 18 – 21	CLM Assembly, Karlsruhe, Germany

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