Climate Limited-area Modelling Community
CLM-Community Newsletter
DWD

No. I August 2013

Content

Welcome to the 1st CLM-Community Newsletter

We are very pleased to present the first issue of the CLM-Community Newsletter.

The **intention** of this Newsletter is manifold. On the one hand we aim to inform the community about new projects, articles just published, and community activities. This should help to facilitate and enhance the personal communication between our members. On the other hand we want to attract the interest of scientists outside our community working on similar issues. So, please, feel free to forward this Newsletter to your colleagues and friends. Of course you can also find it on the internet: http://www.clm-community.eu/

This Newsletter will be published half-yearly. We welcome articles, comments, suggestions, and announcements from all CLM-Community members. Please, do not forget: The Newsletter can only be as good as your contributions. Please send them to the new **CLM-Community Coordination Office** (clm.coordination[at]dwd.de).

Community Issues

New coordination team

Since August 2013 the CLM-Community has a **new coordinator** and a **new coordinating office**. The coordination team is now based at the Deutscher Wetterdienst (DWD) in the climate modelling section with Dr Barbara Früh as the new coordinator, her deputy Dr Susanne Brienen and Anja Thomas.

Barbara Früh, Anja Thomas, Susanne Brienen (from left to right); Photo: Anja Ohrt

Since more than 2 years, the former coordinator of the CLM-Community Dr Andreas Will (BTU Cottbus) – whom we thank very much for all he has done for the community – announced that he will quit his position in the middle of 2013 and that new perspectives have to be found. This was the point when we at DWD started to think about meeting this challenge. Since we are convinced that the CLM coordination needs a long term perspective we finally decided to make such an offer to the scientific advisory board (SAB) which was accepted.

That is why the CLM-Community now has a new coordinator and a new coordination team. As a consequence, we suppose some things will change. We aim to improve some things but we are pretty much sure that we will also make some things worse. We will try to follow the road Andreas started to walk in trying to coordinate as efficiently as possible the improvement of our model system and to bring the community more closely together since a common effort will more likely be successful (remember Andreas' words: '*If you want to be fast, go alone; if you want to get far, go together!*'). But on this way we, of course, **need your help, your confidence, and your support**. We hope you will be patient with us in case things will not run perfectly in the transition phase and beyond. Thank you very much!

To **subscribe** to the CLM Newsletter please send an email to clm.coordination[at]dwd.de.
CLM-Community members have to send an email if they want to **unsubscribe** from the Newsletter.

COSMO/CLM training course 2013

From 18 to 22 February 2013, the **6th training course** on the implementation and first steps of the COSMO/CLM model took place in Langen (Germany). The course consisted of a theoretical part with talks on the different model components and of a technical part with practical exercises on the usage of the model. Exercises on all three main applications of the model (numerical weather prediction [NWP], regional climate simulations [CLM] and aerosol and reactive trace gases [ART]) have been provided in different groups. In the CLM exercise group the installation and first steps in the usage of the COSMO-CLM were practiced on the basis of the "CLM starter package".

A short overview of the CLM exercises can be found on the CLM pages:
(http://code.hzg.de/projects/cclm-sp/wiki Note that you need to login first)

The **next training course** is scheduled for **17 to 21 February 2014**.

COSMO/CLM user seminar 2013

The COSMO/CLM user seminar took place from 4 to 8 March 2013 in Offenbach (Germany). Since more than ten years now, this meeting brings together developers and users of the COSMO and COSMO/CLM model from weather services, research institutes and universities. A record number of over 200 persons from 15 countries participated in this year's meeting. Many different subjects around the COSMO and COSMO-CLM model were discussed in 56 oral and 24 poster presentations.

Photo: Annegret Biermann

All presentations can be found on the web:

http://www.clm-community.eu/index.php?menuid=179

The **next COSMO/CLM user seminar** is scheduled for **17 to 21 March 2014 (NEW!!!)**.

Preparing the

CLM assembly 2013 in Zurich

Hot topic café

As an innovative element, a hot topic café will be taking place at the Assembly to discuss community issues in small groups. The idea is to facilitate a joint dialogue among the members and to create feedback to the CLM-Community coordination group.
The key ideas and conclusions from the hot topic café will be presented in the next Newsletter due to the limited time at the Assembly.

Parallel discussions

■ Science plan
The science plan should reflect the model development done by the community, the needs of improvements and the research plans of all members. So, please, have a close look into it to see if your research focus is included.

■ Working group structure
Does the working group structure of the CLM-Community reflect the current research focus of all members? Are new working groups needed or are others obsolete?

CLM-Community issues for decision:

■ PG HORIZON2020
The first calls of the next EU research program - which is called HORIZON 2020 - are expected to be published in late 2013 or (more likely) in 2014. To be prepared to apply for a community project on COSMO-CLM model development a new project group "HORIZON2020" shall be established at the assembly to prepare the community proposal. Since time is running the first meeting should take place already in September. If you are interested to participate, please send an email to clm.coordination[at]dwd.de.

■ PG ICON
The new model ICON will soon replace the operational weather forecast COSMO-EU model. In this project group the possibility of using the ICON model for regional climate simulations in the CLM-Community shall be investigated. The first informative meeting of PG ICON should take place in Offenbach in November.

■ Procedure for new reference versions
Due to the changes in the CLM-Community coordination there is no more funding for the elaboration of the new reference COSMO-CLM model version. Therefore, a new strategy for carrying out the necessary evaluation runs has to be found and decided on.

■ CLM Assembly 2014 and thereafter…
A decision has to be taken on the location of the CLM Assembly 2014 and thereafter. University of Frankfurt already submitted an offer to host CLM Assembly 2014.

More details on these items can be found following
http://www.clm-community.eu/index.php?menuid=195

Five questions to Andrew Ferrone

Photo: private

Dr Andrew Ferrone from the Public Research Centre Gabriel Lippmann, Luxembourg, is a member of the CLM-Community since November 2006. He is coordinating the working group clouds-chemistry-aerosol-and-radiation (CCAR) since November 2008.

1. What are you using COSMO-CLM for or what are you doing with it?

My main objective is the exploration and understanding of the regional water cycle and its evolution, with a focus on Luxembourg. I will use COSMO-CLM in the framework of multi-model ensemble high resolution impact studies, in particular as an input to hydrological models, which is one of the main foci of our research group.

2. It was only recently that your affiliation changed to "Centre de Recherche Public - Gabriel Lippmann". Did your main tasks and responsibilities also change? And what are the main perspectives of your new job?

My job here at the CRP-GL is quite diverse. It involves the RCM part just mentioned, but I also work on observational time series of the climate in Luxembourg. Also interactions with the general public and policy-makers on the topic of climate change, in particular within the framework of IPCC, are part of my duties.

3. Andrew, could you please tell us something about your motivation to join the CLM-Community and to take over the lead for the working group CCAR?

The cooperation between the CLM and COSMO communities were one of the main aspects that made the CLM-Community for me attractive. This operational aspect of the model implies a strong quality control w/r to the results and the efficiency of the model, which provides a solid basis for a scientific model.

In my opinion, the interactions between clouds, aerosol and radiation are one of the main uncertainties in our current understanding of the climate system. The high resolutions and complexity of RCMs might offer the key to a better understanding of this topic, which is why I decided to take over the coordination of CCAR.

4. What are in your opinion the main goals of the WG CCAR?

Together with the members of CCAR, we have taken the decision, that our WG should be a platform for sharing knowledge and experiences on the topics related to the WG. This is important, as the meetings of CLM or COSMO do not offer the space to discuss specific topics of coupling chemistry and aerosol models to the COSMO model.

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

I have taken over a young but successful project of climate modelling here in Luxembourg and I would like to bring it to maturity so as to fully establish it as a pillar of our interdisciplinary research group, arranged around the topic of the water cycle.

Thank you very much for the interview!

New member institutions

TU Braunschweig

(http://www.tu-braunschweig.de)

Analysis of changes in flood, drought, and tropical cyclones due to climate change in Vietnam.

Contact: Nguyen Tien Thanh

(tien.nguyen[at]tu-braunschweig.de)

Lomonosov Moscow State University

(http://www.msu.ru/en/)

Mesoscale climate modelling especially for Russia and the Russian Arctic basin due to the very high impact of climate change in that region.

Urban canopy model MetGIS: Implementing MetGIS in COSMO-CLM to improve climate prediction quality in urbanized areas.

Contact: Pavel Konstantinov (kostadini[at]mail.ru)

Turkish Water Foundation

(http://www.turkwater.org/)

Impact of climate change on water resources and extreme events in Turkey. Comparing COSMO-CLM results with other dynamical and statistical simulations in that region.

Contact: Ahmet Öztopal (oztopal[at]suvakfi.org.tr)

Israel Meteorological Service

(http://www.ims.gov.il/IMSEng/All_tahazit/)

Dynamical downscaling of the climate in Israel and the Eastern Mediterranean. Investigating extreme events in the future and the mechanisms causing them.

Contact: Giora Gershtein (gershteing[at]ims.gov.il)

Hellenic National Meteorological Service

(http://www.hnms.gr/hnms/english/index_html)

Using COSMO-CLM to understand the climate of the Eastern Mediterranean area.

Contact: Euripides Avgoutoglou (euri[at]hnms.gr)

Tel Aviv University

(http://english.tau.ac.il/)

Assessing climate change trends in the in the Eastern Mediterranean. Investigating extreme events in in precipitation and air-temperature.

Contact: Simon Krichak (shimonk[at]post.tau.ac.il)

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.

Research notes

Challenges in climate modelling with COSMO-CLM in Africa

Steffen Kothe, Stefan Krähenmann, Bodo Ahrens

Institute for Atmospheric and Environmental Sciences

Goethe University Frankfurt

Topic **GUF-001, GUF-003, GUF-012**

The West African Monsoon (WAM) is a major component of the global monsoon system. The contrast between land surface temperature (LST) (in the Sahel and Sahara) and sea surface temperature (SST) dominates the WAM formation. We investigated the WAM representation, and the impact of surface temperature uncertainties in three regional climate simulations with COSMO-CLM (grid-spacing: 0.44°) [Kothe et al, 2013]. The simulations were driven by ECHAM5 present-day climate simulations (~1.9°), and by ERA-Interim re-analysis data (~0.7°).

The WAM dynamics were quantified using the WAM wind shear index (WAMI). In addition, indices for outgoing long-wave radiation (an indicator for convective clouds), and total precipitation were used to assess monsoon characteristics. The large-scale patterns of precipitation were adequately reproduced by COSMO-CLM compared to observations, but there were significant uncertainties at regional scales, such as a strong overestimation of precipitation in the Sahel. The model also significantly overestimated convective activity and simulated a too intense monsoon circulation as indicated by WAMI.

The impact of bare soil albedo on LST was investigated by implementing a MODIS-observation based bare-soil albedo parameterization, which led to a reduction of the simulated warm bias in the Sahara region during the monsoon season by up to 3 K (Fig. 1), and an improvement of simulated Sahel precipitation. However, the simulated monsoon circulation was not improved.

Using either ERA-Interim or ECHAM5 at the lateral boundaries showed that the COSMO-CLM results were very sensitive to the driving data. And, on coarse grid scales (of the order of the grid-spacing of the driving datasets) the regional climate model was not able to perform substantially better than the forcing data. The differently driven COSMO-CLM

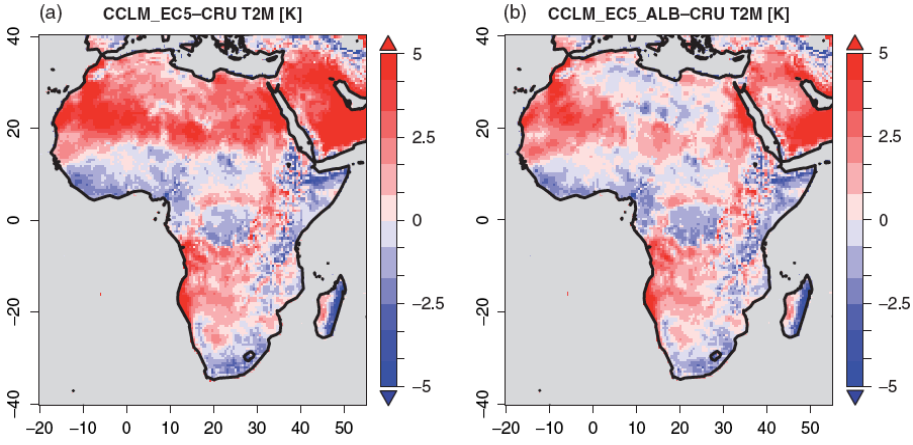

Figure 1 Spatial differences of mean 2m temperature (T2M) for (a) the standard albedo (CCLM_EC5), and (b) the MODIS albedo (CCLM_EC5_ALB) with respect to CRU observations for the monsoon seasons (June-Sept.) in 1961-2000.

simulations also indicated that the land-sea temperature gradient, and its impact on WAM, is dominated by SST and less by LST (in Sahara and Sahel).

This new albedo treatment showed promising results, and was therefore applied to examine the ability of COSMO-CLM to capture the statistics of daily maximum and minimum T2M (Tmin/ Tmax) over Africa [Krähenmann et al., 2013]. These simulations were carried out at two different horizontal grid-spacings (0.22° and 0.44°), and were driven by ERA-Interim reanalyses. As evaluation reference, a high-resolution gridded dataset of daily Tmin and Tmax for Africa was created covering the period 2008-2010.

Although the large-scale patterns of temperature were reproduced well, COSMO-CLM showed significant under- and overestimation of temperature at regional scales. The hemispheric summers were generally too warm, and the day-to-day temperature variability was overestimated over northern and southern extra-tropical Africa. The average diurnal temperature range was underestimated by about 2 K across arid areas, yet overestimated by around 2 K over the African tropics (Fig. 2a). Further, the annual number of summer days (Tmax >= 25 K) was overestimated by up to 100 days across the African tropics and southern Africa, but underestimated by about 30 days over the Sahara. The higher-resolution simulation (0.22°) was on average about 0.5°K warmer, and yielded no clear benefit over the lower-resolution simulation.

COSMO-CLM obviously had serious problems to reproduce the correct diurnal cycle of T2M. As a way to reduce this deficit the introduction of a soil water dependent soil thermal conductivity was tested. Currently a constant conductivity representing medium soil wetness is assumed. As a consequence of this modification the ground heat flux is reduced in dry regions, and enhanced in wet regions. Tests for Africa showed that the average diurnal range of T2M increased in arid regions (Fig. 2c). There was improvement in large parts of the Sahara desert and the Sahel (Fig. 2a,b). It is also expected this modification might improve the simulation of convective systems during the WAM.

Convection, surface albedo and heat conductivity are only parts of a multi process challenge, and show again the complexity of climate processes and their modelling.

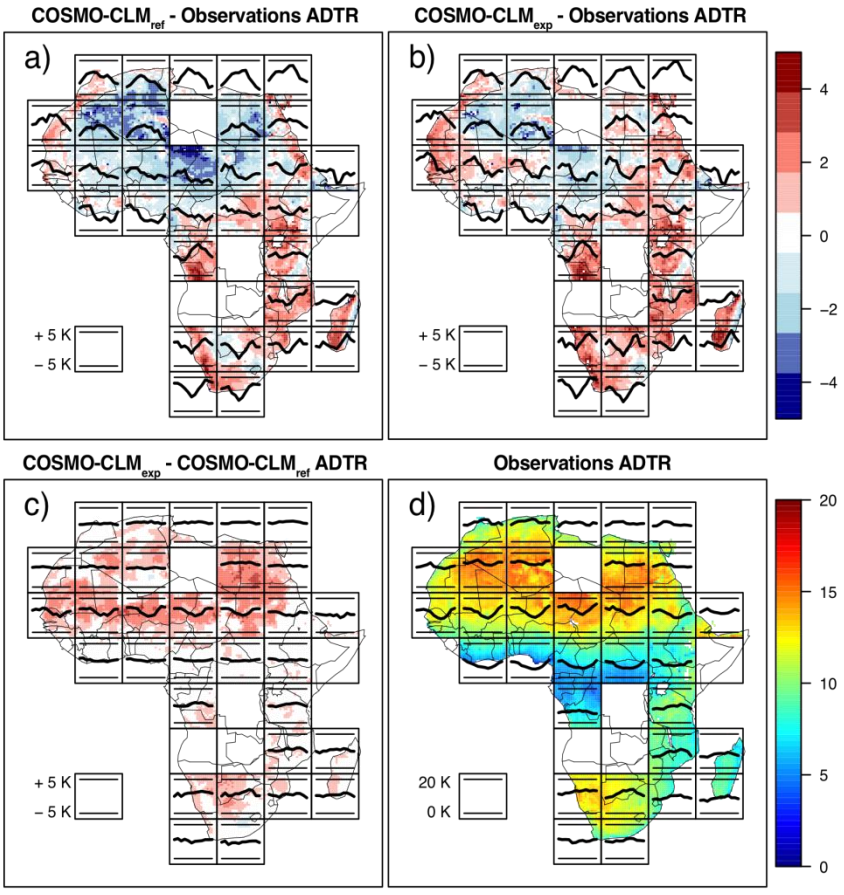

Figure 2 *Average diurnal temperature range (ADTR) [K] for the period 2008-2010: a) COSMO-CLM reference minus observation, b) COSMO-CLM with modified soil model minus observation, c) difference new minus reference simulation, d) observation. Thick lines show the annual ADTRs cycles (panels a, b, c refer to the upper colorbar, panel d to the lower colorbar).*

References

Kothe, S., Luethi, D., Ahrens, B. (2013): Analysis of the West African Monsoon system in the regional climate model COSMO-CLM. Int. J. of Climatology. DOI: 10.1002/joc.3702. Early online.

Krähenmann, S., Kothe, S., Panitz, H.-J., Ahrens, B. (2013): Evaluation of daily maximum and minimum 2-m temperatures as simulated with the regional climate model COSMO-CLM over Africa. Met. Z. accepted.

Added Value of Convection Permitting Seasonal Simulations

A. F. Prein[1], A. Gobiet[1], M. Suklitsch[1], H. Truhetz[1], N. K. Awan[1], K. Keuler[2], G. Georgievski[2]

1: Wegener Center for Climate and Global Change (WEGC) University of Graz

2: Brandenburg University of Technology, Cottbus

Topic WEG-004

More details about this work can be found in:

Prein AF, A Gobiet, M Suklitsch, H Truhetz, NK Awan, K Keuler, G Georgievski (2013): Added Value of Convection Permitting Seasonal Simulations. *Clim. Dyn.*, doi: 10.1007/s00382-013-1744-6

Introduction

Simulating deep convection is very challenging in state of the art climate models. Although much progress has been made in terms of improvements of old parameterization schemes as well as formulation of new ones, they are still the source of major errors and uncertainties. Convection permitting climate simulations (CPCSs; horizontal grid spacing <4 km) are promising because they can omit error-prone deep convection parameterization schemes by partly resolving deep convection explicitly (Weisman et al. 1997). Furthermore, increasing the resolution leads to a more realistic representation of the orography and land surface. However, CPCSs are far from being established because of their immense demand of computational resources and their still widely unknown quality. The goal of this study is to evaluate if an added value in CPCSs compared to coarser gridded simulations can be detected in an ensemble of regional climate models (RCMs).

Data and Methods

The focus area of this study is the Eastern Alpine region. In order to efficiently capture a significant part of the broad range of weather regimes the periods June, July, and August 2007 (JJA) and December 2007 and January and February 2008 (DJF) are chosen for the simulations.

Simulations have been performed with three RCMs: (1) COSMO4.0_CLM1 (Böhm et al., 2006); (2) COSMO4.8_CLM6; (3) MM5 version 3.7.4 (Dudhia, 1993); (4) and WRF version 2.2.1 (Skamarock et al., 2005). The major difference between the simulations with 10 km horizontal grid spacing and the CPCSs with 3 km is that the deep convection parameterizations are switched off in the latter. For the 10 km simulations the LBCs were taken from the Integrated Forecast System (IFS) of ECMWF (T799 L91). The CPCSs get their LBCs from the corresponding 10 km parent simulations. The evaluations in this study are performed with the Integrated Nowcasting through Comprehensive Analysis (INCA) dataset (Haiden et al., 2011). The INCA dataset has a high spatial and temporal resolution and provides data for the two meter air temperature (T2M), precipitation amount, relative humidity, and global radiation.

The analyses in this study focuses on four major issues: (1) the characteristics of the seasonally averaged spatial fields; (2) diurnal cycles of the spatially averaged fields and temporal correlations and standard deviations; (3) extremes in the combined temporal and spatial distributions; (4) and high resolution precipitation features investigated with the fractions skill score (FSS) (Roberts and Lean, 2008) and the structure, amplitude, and location (SAL) method (Wernli et al., 2008).

Results

Clear evidence is given that CPCSs can add value to coarser gridded simulations. The most consistent improvement is found in precipitation. Resolving deep convection is essential for the correct development of convective precipitation, which is shown by the improved timing of the diurnal cycle of summer precipitation (see Fig. 3). In addition to those temporal aspects the intensity of the most intense precipitation extreme events is improved. The FSS analysis shows that added value is more apparent at medium to higher, than at low intensities and SAL evaluations reveal that most CPCSs more realistically represent spatial patterns of precipitation objects (smaller and more peaked). It could be demonstrated that the improvements are caused by explicitly resolved deep convection and the better represented atmospheric dynamics, rather than by the higher resolved orography (cf., Fig. 3).

Most of the above described improvements can only be found on small spatial and/or temporal scales and become undetectable by averaging. In contrast, monthly or spatial averages are generally not improved or even deteriorated. One exception for this are the error

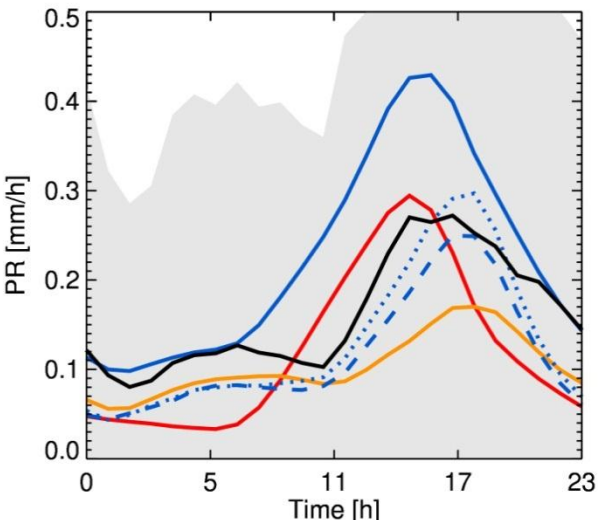

Figure 3 *Example diurnal cycle of the average MM5 JJA precipitation. The solid blue line depicts the total precipitation of the 10 km simulation, the red line the parameterized (convective scheme) part, and the orange line depicts the resolved part. The dashed blue line shows the diurnal cycle of the corresponded 3 km CPCS and the dotted blue line shows the precipitation of a 3 km simulation with a 10 km orography. The black line represents the observed precipitation and the gray background depicts its daily variability.*

ranges of T2M which are strongly related to the improved orography.

Larger differences, which are not necessarily improvements, of the CPCSs compared to their parent simulations, are found in the surface energy balance. This is caused by a general increase of the global radiation in all CPCSs (on average 11.5 % in JJA and 3.5 % in DJF) which can be mainly attributed to an increase of areas with low integrated cloud liquid water content and/or a decrease of the cloud area fractions (in case of CCLM).

Conclusions

The improved fine scale structure of precipitation can have significant benefits for climate change impact studies which focus, for example, on mesoscale river catchments or flash flood prediction because the correct representation of the spatial extend, location and intensity of severe precipitation events is crucial for such applications.

Typically, differences between the CPCSs and their parent simulations are largest on small spatial and temporal scales and do often cancel out by averaging. Differences are typically larger in summer than in winter and in mountainous than in flat regions, because of the stronger dominance of small scale processes like deep convection.

Literature

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Upcoming events

2013 August 27th - 30th CLM-Community Assembly, Zurich, Switzerland

2013 September 2nd - 6th COSMO General Meeting, Sibiu, Romania

2013 September 2nd - 6th DACH-Meteorologentagung, Innsbruck, Austria

2013 September 9th - 13th EMS/ECAM, Reading, England

2013 September 22th - 25th ICYESS - Interdisciplinary Conference of Young Earth System Scientists 2013, Hamburg, Germany

2013 September 23rd - 24th First Annual Conference of Italian Society for Climate Sciences, Castello Carlo V, Lecce, Italy

2013 November 4th - 7th International Conference on Regional Climate - CORDEX 2013, Brussels, Belgium

2014 February 17th -21st COSMO/CLM Training Course, Langen, Germany

2014 March 10th -14th COSMO/CLM User Seminar, Offenbach, Germany

2014 June 16th - 19th Third International Regional-scale Climate Modelling Workshop 2014, Lund, Sweden

Further meetings are listed on
http://www.clm-community.eu/index.php?menuid=11

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

2013

Asharaf, S., B. Ahrens (2013): Soil-moisture Memory in a Regional Climate Model for the Indian Summer Monsoon Season. *J. Geophys. Res.,* accepted.

Klehmet,K., B. Geyer, B. Rockel, 2013: A regional climate model hindcast for Siberia: analysis of snow water equivalent. *The Cryosphere*, 7, 1017-1034, doi:10.5194/tc-7-1017-2013

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Kumar, P., A. Wiltshire, C. Mathison, S. Asharaf, B. Ahrens, P. Lucas-Picher, J.H. Christensen, A. Gobiet, F. Saeed, S. Hagemann, D. Jacob (2013): Down scaled climate change projections with uncertainty assessment over India using high resolution multi model approach. *Science of the Total Environment*. Early Online. http://dx.doi.org/10.1016/j.scitotenv.2013.01.051

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Akkermans, T., D. Lauwaet, M. Demuzere, G. Vogel, Y. Nouvellon, J. Ardö, B. Caquet, A. De Grandcourt, L. Merbold, W. Kutsch, N. Van Lipzig (2012): Validation and comparison of two soil-vegetation-atmosphere transfer models for Tropical Africa. *Journal of Geophysical Research*, 117, art.nr. G02013.

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

We would be very happy to receive ***your contribution*** to any topic of this newsletter, as well as any comments which could help us to improve the newsletter. Please send us an email to clm.coordination[at]dwd.de in order to match the next issue of the Newsletter ***until November 15th, 2013***.

CLM-Community
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