Climate Limited-area Modelling Community
CLM-Community Newsletter

No. 4 January 2015

Content

Happy New Year 2015!!!

Another year has gone by where we achieved many of our community goals. First of all, a new unified COSMO version "5.0" was released. This is the second consolidation between COSMO and COSMO-CLM (2007, 2014).

In addition, we completely reorganized our CLM-Community web page, updated most of our community documents, and accepted the CLM-Community science plan finally at the last assembly. The COSMO/CLM/ART training was extended by a couple of days to have more time for the additional model components. And there is a new CLM-Community flyer available to promote the work of our community.

Now, the release of a new COSMO-CLM version should be our most urgent community goal for 2015. The preparation already started and everybody is welcome to participate. This will definitely be discussed at the **CLM-Community Assembly** which will take place in **Belvaux, Luxembourg, from September 29** to October 02 2015 (please note the shift!). It would be a pleasure meeting as many as possible of you there. Please remember, that our assembly is the main annual meeting of all CLM-Community members where recent developments and exciting results are presented and discussed, further cooperation in working and project groups are initiated as well as community decisions taken.

But most of all it is also a chance to meet new colleagues, discuss mutual aims, and develop strategies for future cooperation!

From the organizational point of view, we had many changes in the working groupsin the last year. We appointed new working group coordinators: The working group "Chemistry, Clouds, Aerosol and Radiation" (CCAR) is now coordinated by Bernhard Vogel (KIT, Karlsruhe) and Patrick Jöckel (DLR), "Convection resolving climate simulations" (CRCS) by Andrew Ferrone (LIST) and Erwan Brisson (GUF) and "Atmosphere, Ice and Ocean" (AIO) by Bodo Ahrens (GUF). In addition the project groups "IPCC AR5" and "HORIZON 2020" are now transformed to steady working groups call "Climate Projections" and "Funding Opportunity Platform", respectively.

To this point I would like to thank all of you for supporting the CLM-Community in many ways. I hope you will continue similarly next year!

I remain with the warmest thoughts and best wishes for you and all your loved ones for a HAPPY and SUCCESSFUL NEW YEAR 2015.

Yours sincerely, Barbara Früh

Figure 1: Winter in the Frankfurt region (photo by K. Kämpfer)

Community Issues

CLM-Community Assembly in Frankfurt

In September 2014 we held our annual CLM-Community Assembly in Frankfurt am Main, Germany. It was a very interesting conference which gave many new stimuli. That is why I would like to take the opportunity to thank the organizers again for preparing the nice arrangement.

Figure 2: Oliver Gutjahr receiving the poster award (photo by B. Ahrens).

For the first time in the CLM assembly history we granted a poster award which was won by Oliver Gutjahr, University Trier this year.

Hot topic café

Short summary of the results not considering the decisions already taken as a consequence. For this the "CLM-Community decision" section next page.

Communication within the community

People agreed that the new webpage is better than the old one. Nevertheless, some improvements were suggested. A connection between WebPep and the projects was recommended as well as a general issue tracker. There are still some uncertainties who to ask on specific topics. Some news on the webpage would be nice and the project pages should be up to date.

The newsletters, the number of emails and of meetings per year were ranked as well balanced and sufficient. On the other hand it was criticized that important discussions involve only a small circle of people. Some information, especially the community documents, is simply overwhelming. A new working group focusing on impacts was suggested. And more discussion time after the invited talks was asked for.

The proposition to extend the assembly for another day was controversially discussed. Some thought it could be more attractive for members to have an additional day with topic-based external speakers, but others thought 4 days is already a long meeting.

Future RCM developments

A list of likely developments was composed during the discussion:

- towards a regional climate system
- towards modular toolboxes instead of monolithic models
- to even smaller scales and LES and smaller domains
- more complex with more modules

A long list of challenges evolved:

- seamless physics
- scale independent parameterization (and/or dynamics)
- common physics with the driving model (i.e. ICON)
- high resolution observations
- proof of added value with increasing resolution
- data archiving / analysis
- rising energy costs -> who will pay them? GreenTech
- Adjustment to new computational architectures like GPU/CPU hybrids

Working group structure

One central question during the discussion was how the working group efficiency could be improved. The group size should be manageable (merging of small groups or subgroups, i.e. EVAL) with a sufficient number of active persons and at least one joint effort of the participating members. A yearly quality control check could ensure this.

Ideas on new topics for WGs: (a) WG on Regional Climate System Modelling (RCSM) (in order to reflect the aims in the science plan), (b) seasonal-to-decadal prediction, (b) ensembles and initialization.

The integration of new community members in the working groups should be guided by the coordinator (suggestion of WG and a reminder after 1 year of indecision).

CLM-Community decisions

At the CLM-Community session on the last day of the Assembly 2014, the following decisions have been made with respect to the working group structures:

• A new WG on RCSM was not established

• The project group IPCC-AR5/CORDEX was transformed into a new WG CP (Climate projections) including the analysis of climate pro-

jections, the communication to other communities as well as to users (e.g., impact community), multi-model ensembles and the coordination of joint efforts such as CORDEX.

• A decision on the issues of ensembles and initialization as well as on seasonal to decadal forecasts was shifted to the next year

• The splitting into subgroups was not supported by the majority of the attendant CLM-Community members.

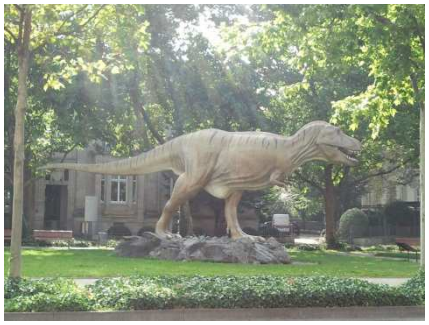

Figure 3 Venue of the conference dinner: Senckenberg museum, Frankfurt/ Main (photo by A. Thomas).

Outcome of Assembly survey

15 survey forms were handed back. Everyone liked the assembly a lot! Here is the essence of the results:

What did you like best?

Almost everyone praised the dinner with the dinosaurs at the Senckenberg museum and the choice of the invited speakers. The mix between plenary talks, poster sessions and discussions was according to several participants well balanced. A couple of people liked the short poster presentations and the hot topic café.

What did you dislike?

Many people who participated in the survey had problems finding a place for lunch in the short lunch break. The poster session was criticized various times: the posters were not easy to be found and the time of attendance was unclear. The lack of an excursion was lamented twice.

What could be improved next year?

Some members agreed that there was not enough food during ice breaker and diner. It was also suggested to provide a small lunch. More members should attend the assembly was mentioned repeatedly.

More space for the posters was asked for several times as well as a better structure for the poster session, i.e. WG oriented. One person suggested to reduce the assembly to three days and vote for the CLM-Community decisions via web or paper.

Status COST action

The idea of submitting a COST action proposal was appreciated by many CLM-Community members. However, since the time was too short for the September call we decided to prepare a proposal for the March 2014 call. Unfortunately, we have no volunteer for taking the coordination at the moment. So, if you are interested, please, contact clm.coordination[at]dwd.de

New community flyer

Since summer 2014, there is a new CLM-Community flyer available. It can be downloaded from the webpage (http://www.clm-community.eu/index.php?menuid=216) and distributed to advertise our CLM-Community.

COSMO/CLM/ART Training Course 2015

The COSMO/CLM/ART Training Course 2015 will take place from March 23rd – 31st, 2015, in Langen, Germany. Again the basic training (Mar 23-27) is accompanied by a parallel two day ART and Community Land Model training (Mar 30-31). The registration deadline ended already on Dec 19, 2015. We will be happy to welcome 57 participants.

COSMO/CLM/ART User Seminar 2015

The COSMO/CLM/ART User Seminar 2015 will take place from March 02nd - 06th, 2015, in the conference area of the DWD headquarters building in Offenbach, Germany. The registration already ended. We are looking forward to an exciting seminar with 84 interesting presentations including two invited speakers.

To ***subscribe to the 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.

Five questions to Patrick Jöckel, DLR

Figure 4 Patrick Jöckel

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

I am using COSMO-CLM as part of the MECO(n) system, where COSMO-CLM is on-

line nested into the global EMAC model (short for ECHAM/ MESSy Atmospheric Chemistry). With this approach, we achieve a consistent dynamical and chemical downscaling and a high frequency of boundary updates. This provides a zooming capability for atmospheric chemistry applications with regional aspects. With this we hope to better simulate and understand regional scale features as observed from aircraft (e.g., HALO and CARAIBIC). Moreover, regional effects of air pollution (e.g., the role of traffic emissions) can, hopefully, be better quantified.

2. *As a rather new member, what is your experience with the CLM-Community so far?*

I am impressed by the high level of organization of the CLM-Community, which – given the large number of people involved – is, of course, a prerequisite for efficient collaboration. It seems to me a real community effort to continuously improve the joined model which every member applies as a research tool. I very much like this idea of an open, decentralised model development from which at the end everybody gains.

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

One strength is certainly the direct connection to the Deutscher Wetterdienst (DWD). But strengths are, of course, that the workload (e.g., development and evaluation) can be shared and the established communication channels (at least my impression), all driven by the common goal. A weakness might be its size, which could slow down discussions and decision finding. But this can be handled by a flexible organizational structure.

4. *In which way do you plan to contribute to CLM-Community activities?*

Well, given our research interests, we (not just me but also my colleagues!) want to share our expertise in atmospheric chemistry modelling. Maybe we can also contribute to further reduce the gaps between global and regional modelling.

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

I want to be a good teacher for my PhD students.

Thank you very much for the interview!

New member institutions

Pakistan Meteorological Department

(http://www.pmd.gov.pk/)

Using COSMO-CLM for downscaling CMIP5 GCMs for South Asia with focus on Pakistan. Evaluation of the past climate. Analysis of the results for climate change impact assessment in various sectors including water resources and agriculture. Special focus will be on Indus river basin.

Contact: Syed Ahsan Ali Bokhari
(ahsan@pmd.gov.pk)

Universidad Autónoma de la Ciudad de México

(http://www.uacm.edu.mx/uacm/)

Analysis of possible heat island growth due to scenarios of climate change and urban expansions in the Metropolitan Area of Mexico City.

Contact: Jose Lizardi
(jose.lizardi@uacm.edu.mx)

National Center of Meteorology & Seismology, Abu Dhabi

(http://www.ncms.ae/english/index-5.htmlhttp://www.uacm.edu.mx/uacm/)

Investigating the influence of land surface processes changes of the vegetation cover or the soil moisture on the weather and short-term climate changes when

Contact: Taha AlHosari
(talhosari@ncms.ae)

National University of Ireland Galway (NUIG)

(http://www.nuigalway.ie/)

Providing projections at a relatively low resolution for Europe (50 km & 18 km) and at high-resolution (at least 4 km) for Ireland.

Contact: Paul Nolan
(paul.nolan@ichec.ie)

Forschungszentrum Jülich

(http://www.fz-juelich.de/portal/DE/Home/home_node.html)

Improving the land surface simulations by assimilating the multi-sources remote sensing data to COSMO-CLM to study the impact of soil moisture assimilation on the precipitation forecast with COSMO-CLM.

Contact: Han Xujun
(x.han@fz-juelich.de)

Istanbul Technical University

(http://www.itu.edu.tr/en/home)

Study on the local climate change in 3 different cities (Istanbul, Nairobi and Cairo) with different population, land use, urban structure,

and climate characteristics. Testing different climate change adaptation strategies.

Contact: Yurdanur Unal
(sunal@itu.edu.tr)

Research notes

How the African Great Lakes influence the regional climate

Wim Thiery[1], Edouard Davin[2], Hans-Jürgen Panitz[3], Matthias Demuzere[1], Stef Lhermitte[1] and Nicole van Lipzig[1]

[1] KU Leuven - University of Leuven, Belgium

[2] Swiss Federal Institute of Technology, Switzerland

[3] Karlsruhe Institute of Technology, Germany

Topic: KUL-009

More details about this work can be found in:

Thiery, W., Davin, E., Panitz, H.-J., Demuzere, M., Lhermitte, S., van Lipzig, N.P.M., The impact of the African Great Lakes on the regional climate, *J. Climate* (in review).

Introduction

Although the African Great Lakes (AGL) are important regulators for the East-African climate, their influence on atmospheric dynamics and the regional hydrological cycle remains poorly understood. The need to enhance this understanding is urgent since every year, countless fishermen lose their life on these lakes as a consequence of hazardous weather conditions. However, a number of issues challenge climatic research in this region, such as the tropical environment which calls for a climate model able to reproduce deep convection and tropical vegetation characteristics. Or the presence of the water bodies, which requires the implementation of a lake model capable of predicting realistic water surface temperatures. In addition, the horizontal grid resolution should be sufficiently high to resolve individual lakes and steep orography of the region. The recent study by Thiery et al. (in review) addresses these challenges and aims to quantify the im-

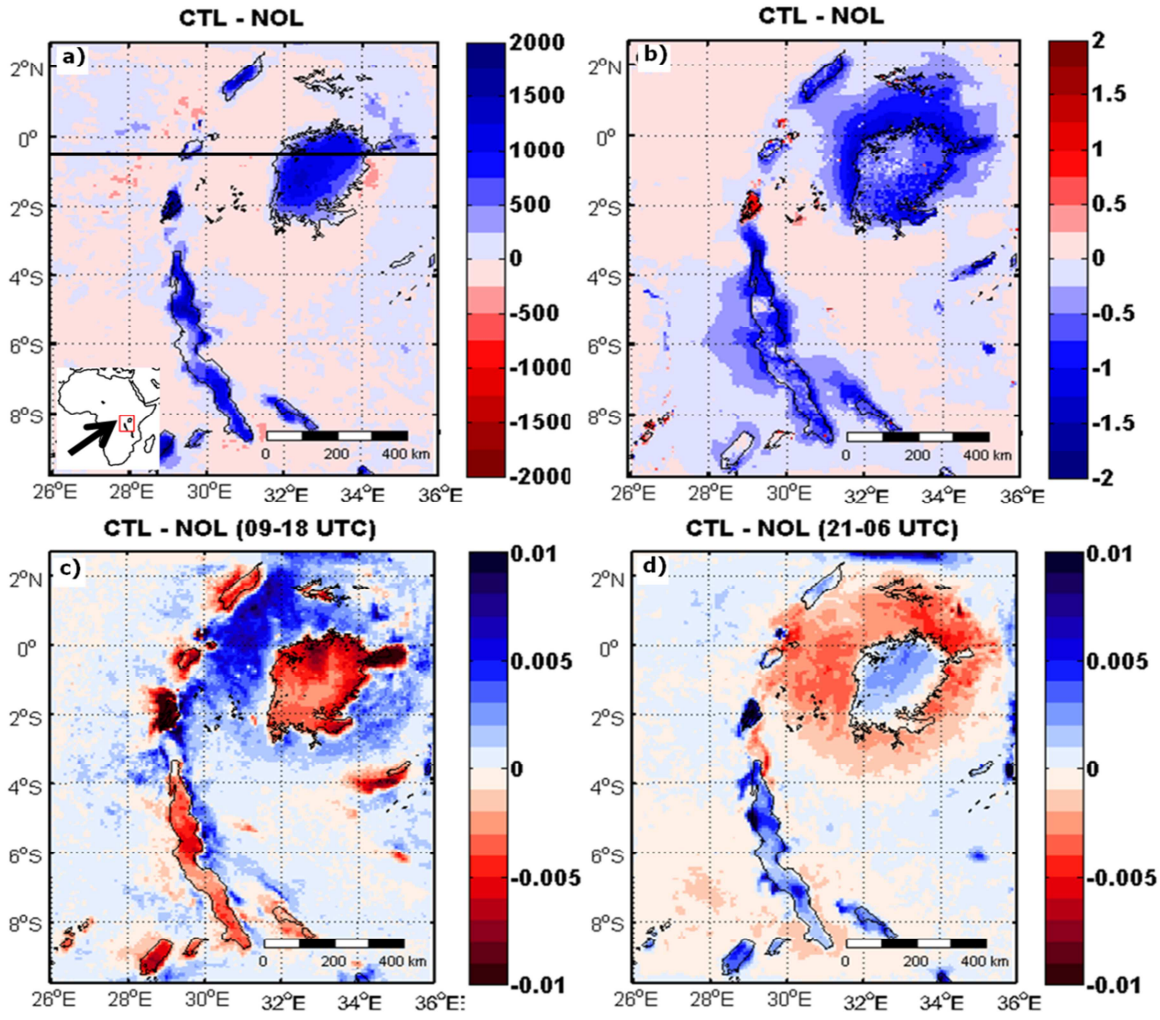

Figure 5: Influence of the African Great Lakes on (a) Annual precipitation [mm yr^{-1}], (b) 2m air temperature [K] and (c) daytime and (d) nighttime convective mass flux density at cloud base height [kg m^{-2} s^{-1}]. The black line in (a) denotes the transect shown in Figure 6.

pact of the African Great Lakes on the regional climate.

Data and methods

The regional climate model COSMO4.8-CLM11, coupled to the Freshwater Lake model and the Community Land Mo-del version 3.5 (CLM3.5), is employed to dynamically downscale the COSMO-CLM CORDEX-Africa evaluation simulation (Panitz et al., 2014) to 7 km grid spacing. This model set-up, termed COSMO-CLM² (Davin and Seneviratne, 2012), has previously been applied to tropical Africa (Akkermans et al., 2014), whereas FLake was extensively tested in off-line mode over several AGL, and judged an adequate tool to compute lake surface temperatures in comparison to other one-dimensional lake models (Thiery et al., 2014 a, b). A control simulation for the period 1999-2008 (CTL) is extensively evaluated and subsequently compared to a simulation where all lake pixels are replaced by representative land pixels (NOL).

Results

Evaluation of the CTL simulation reveals adequate performance compared to both in-situ and satellite observations, especially for spatio-temporal variability of lake surface temperatures (LST), and precipitation. The model reproduces the most important spatial patterns, including enhanced over-lake precipitation, absolute LST values and inter- and intra-LST gradients.

Model integrations indicate that the four major African Great Lakes almost double the annual precipitation amounts over their surface, but hardly exert any influence on precipitation beyond their shores (Figure 5a). Except for Lake Kivu, the largest lakes also cool the annual near-surface air by -0.6 to -0.9 K on average, this time with pronounced downwind influence (Figure 5b). The lake-induced cooling happens during daytime, when the lakes absorb incoming solar radiation and inhibit upward turbulent heat transport. At night, when this heat is released, the lakes warm the near-surface air.

Furthermore, analysis of the dynamical response using day- and night-time cross sections over lake Victoria highlights the importance of circulation changes induced by the lake-land temperature contrast. During daytime, the lake breeze transports cold air across the lake borders and generates over-land updraughts and over-lake subsidence (Figure 6a). This secondary circulation and associated drying at higher levels stabilizes the atmosphere above ~1.5 km (Figure 6d) and therewith effectively suppresses convection from the unstable surface layer (Figure 5c). At night, the thermal inertia of the lake surface generates a positive temperature anomaly and a pressure deficit, and maintains the daytime evaporation rates, inputting large amounts of moisture into the boundary layer (Figure 6b). These three effects together cause a strong destabilization of the lower atmosphere (Figure 6d). As the land breeze and secondary circulation subsequently induce near-surface convergence and the lifting of these highly unstable air masses (Figure 6b), strong convection is triggered and precipitation is released over the lake (Figure 5a, d).

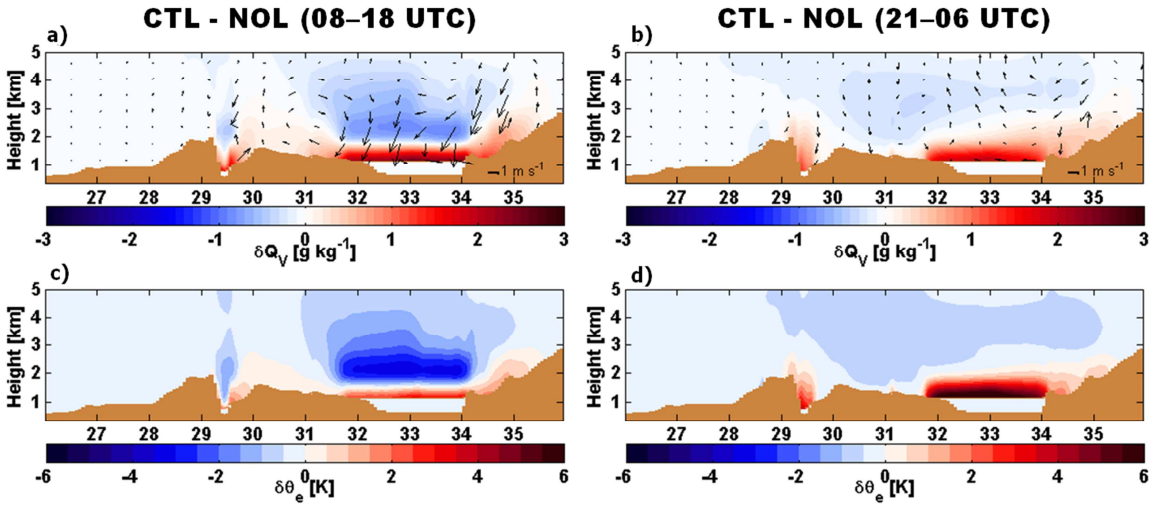

Figure 6: Vertical cross sections along the transect indicated in Figure 5a for the daytime mean change due to lake presence (CTL minus NOL) in (a) specific humidity [g kg^{-1}] and wind vectors [m s^{-1}], and (c) equivalent potential temperature [K]. (b)-(d): same as (a)-(c) but for night-time. Lake depth and vertical wind velocity were height-exaggerated by factor 10 and 200, respectively.

Conclusions

This is the first study to consider lake-atmosphere interactions over all the AGL, and to use FLake interactively coupled to COSMO-CLM over the region. Simulation results show a daytime cooling and a profound increase in nighttime precipitation induced by lake presence. Modulated by the different dynamical response during day and night, the precipitation increase is restricted to the lake surface, whereas the cooling influence is smeared out over large areas. Overall, this study shows the added value of resolving individual lakes and realistically representing lake surface temperatures for climate studies in this region.

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High-resolution atmospheric reconstruction for Europe

1948–2012: coastDat2

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Helmholtz-Zentrum Geesthacht

Topic HZG-012

The coastDat data sets were produced to give a consistent and homogeneous database mainly for assessing weather statistics and climate changes since 1948, e.g., in frequencies of extremes for Europe, especially in data sparse regions. A sequence of numerical models was employed to reconstruct all aspects of marine climate (such as storms, waves, surges, etc.) over many decades. The acronym coastDat stands for the set of consistent ocean and atmospheric data, where the atmospheric data were used as forcing for the reconstruction of the sea state. The atmospheric part of coastDat2 was done with the CCLM 4.8 and a grid width of 0.22°. The si mulation was driven by NCEP1 reanalyses with the application of spectral nudging. More than 70 2D- and 3D-variables are stored hourly and were published at the World Data Center for Climate (Geyer and Rockel, 2013). As the data are frequently used interdisciplinary (details to be found in Weisse et al., 2014) a detailed description of the model set up was necessary. Therefore the possibility was used to publish the set up and basic evaluation plots in the journal Earth System Science Data. The focus was set on monthly

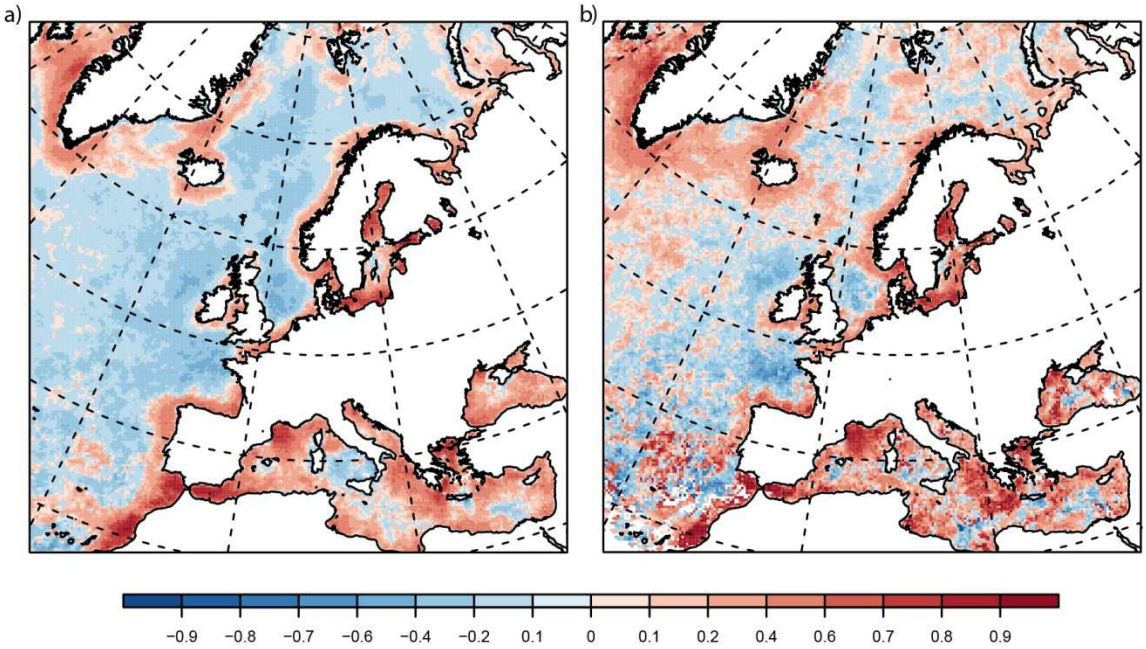

Figure 7: Modified Brier skill score for the time period of 1999—2009 using the QuikSCAT L2B12 version 2 data set for observations, the NCEP1 reanalysis as the reference and the coastDat2-CCLM hindcast as the simulation. The individual panels are for observational wind speeds of a) 12-25m/s and b) 17-25m/s. The white pixels denote missing data.

mean differences plots mainly to E-OBS8.0 for the common used variables temperature at a height of 2 m, and total precipitation. The uncertainty of the observations in case of precipitation was taken into account, by using the range of the three Europe wide available datasets E-OBS, GPCC and CRU to compare with. The evaluation of the wind at a height of 10 m was done mainly over water only exemplarily for two buoys (near shore and far off shore) as from earlier studies (Winterfeldt et al., 2010) we know that the regional model can only add value to the forcing data near the coasts.

We used the data to compile a climatology of the North Sea wind energy, wherefore we had to present the data quality with respect to wind speed in more detail. Beside an evaluation for the wind speed at a height of 100 m at Cabauw (51.971° N, 4.927° E) and Fino1 (54.01° N, 6.588° E) we delivered the Brier-Skill-Score calculations. Figure 7 shows the skill of the regional model to add value to the forcing data (red areas where the skill score is greater zero) especially for the wind speed ranges 12 to 25 m/s.

For further information on coastDat2 please visit the homepage at www.coastdat.de.

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Upcoming events

2015 January 4th - 8th, 95th AMS Annual Meeting**,** Phoenix, Arizona, USA

•**2015 January** 28th-29th, COSMO SMC meeting, Turin, Italy

2015 March 02nd - 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 07th - 11th, EMS & ECAM in Sofia, Bulgaria

2015 September 07th -11th COSMO General Meeting in Wroclaw (Breslau), Poland

2015 September 29th- October 2nd, CLM-Community Assembly in Belvaux, Luxembourg

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

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