

Climate Limited-area Modelling Community

July 2026

Newsletter

No. 27

Content

Five questions to… May Bohmann	2
CORDEX News	3
CLM Community issues	4
Research notes	7
Recent publications	13
New members	14
Upcoming events	14

See YOU at the

CLM Assembly 2026

22-25 September 2026

Lüneburg, Germany

Announcement:

ICCARUS 2027

08-12 March 2027

Offenbach, Germany

Dear Colleagues,

Welcome to the 27th CLM Community Newsletter.

The UDAG project, in which several partner institutions of the community collaborate, is slowly coming to an end. You can find an update of the project status and information about the availability of the data that has been produced in the project in this issue.

UDAG

Updating the Data basis for Adaptation to climate change in Germany

This newsletter also contains an interview with May Bohmann from KIT, a review of the ICCARUS 2026 conference and the ICON-CLM training course held in June, an overview of the CLM Community Assembly to be held in Lüneburg in September and a short information about the new ICON exchange platform. The research notes are provided by Eva Hartmann, who wrote about 'Implementing External Forcings in a Regional Climate Model: A Sensitivity Study around the Samalas Volcanic Eruption in the Eastern Mediterranean/Middle East', and Praveen Pothapakula, who wrote about 'How Do Tropical Monsoons Respond to Grid Spacing in the ICON Model?'.

Enjoy reading!

Five questions to….
May Meret Bohmann
KIT



Since December 2024: PhD in the Regional Climate Modelling group, Institute of Meteorology and Climate Research - Troposphere Research (IMKTRO)
2021- 2024: Master in Physics of the Earth and Atmosphere at the University of Bonn
2017-2020: Bachelor in Geography at the University of Freiburg
2023: Erasmus at Istanbul Technical University, Department of Climate Science and Meteorological Engineering.

1. *May, you work in the UDAG project at the Karlsruhe Institute of Technology in the Institute of Meteorology and Climate Research . Can you please tell us a bit about the project and the work of the group in general??*

The UDAG (Updating the data basis for adaptation to climate change in Germany) project aims to downscale a subset of CMIP6 global climate simulations selected to span a wide range of climate sensitivities, first to the EURO-CORDEX domain at 12 km grid spacing, and further to a hydrological Germany domain at 3 km. Following the ensemble selection, substantial work went into ICON parameter tuning for both domains before the actual dynamical downscaling of the historical period and four SSP scenarios could begin. Beyond dynamical downscaling, the project also includes statistical and AI-based approaches, with several institutions contributing across these work packages. I joined KIT in autumn 2024 as a PhD student in the Regional Climate Modelling group led by Patrick Ludwig. Our group works with ICON-CLM, combining model development and application across a broad range of topics, from decadal predictions and paleoclimate to severe convective storms and soil-atmosphere interaction, using methodical approaches such as storylines and idealized simulations.

2. *You're also working on your PhD at the same time. What exactly is it about?*

My PhD looks at the mesoscale interaction between urban areas and their rural surroundings and how this interaction changes under climate change. Currently I am working on soil moisture sensitivity tests in an idealized model setup to investigate how rural soil moisture influences the urban heat island and the urban plume, meaning the downstream transport of heat, aerosols and drier air from cities into the surrounding landscape. This helps me understand the physical mechanisms behind the urban-rural interaction and how the urban parameterization scheme TERRA_URB behaves in controlled settings. As the 3 km UDAG simulations are now becoming available, the next step will be to compare these idealized findings with real cities in Germany.

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

Urban climatology has traditionally relied on methods that are very high resolution but limited in spatial and temporal extent. In recent years, urban parameterization schemes have started to be implemented in regional climate models, opening up new possibilities. The CLM community is well positioned in this development, pushing towards higher resolutions and longer transient simulations across multiple SSP scenarios, as seen in initiatives like KICS, the UDAG simulations, and FPS Convection. The urban climate community is only beginning to work with datasets like these, so there are still many exciting questions to explore. Beyond the technical infrastructure, many people within the community support me with their technical and scientific expertise, and the warm personal exchange on top of that is a great help for my PhD.

4. *You joined the CLM Community in autumn 2024. What has been your experience of the community and its members so far?*

I joined in the middle of the UDAG project period, so it took some time to familiarize myself with the work. But everyone was willing to help and patiently answer my many questions.

I appreciated that I was given responsibilities quite early on, which allowed me to get involved in many activities, from CMORization to paper writing. I have learned a lot and I am sure that this will continue.

5. *What are your personal career goals?*

My main goal is to finish the PhD while learning as much as possible, both scientifically and in terms of how research is organized and conducted. I am keen to stay in the public sector, and through the partners in UDAG I have the opportunity to gain insights into various institutions, including universities, Helmholtz centers and government agencies. These are all potential employers, so it is a good opportunity to get to know the different working environments better.

Thank you very much for the interview!

Karlsruhe Institute of Technology

UDAG data now available

By Christian Steger (Deutscher Wetterdienst)

Over the past three years, the UDAG project (Updating the Data basis for Adaptation to climate change in Germany) has produced a wide range of regional climate projections for Europe using the ICON-CLM model. The global climate models MPI-ESM1-2-HR, EC-Earth3-Veg, MIROC6 and CNRM-ESM2-1 were downscaled to a resolution of 12 km for all four emission scenarios (SSP1-2.6, SSP2-4.5, SSP3-7.0 and SSP5-8.5). The 12 km simulations with boundary conditions from MPI-ESM1-2-HR, EC-Earth3-Veg and MIROC6 were then downscaled to a 3 km convection-permitting resolution for the SSP1-2.6 and SSP3-7.0 emission scenarios, covering the DACH region (Germany, Austria and Switzerland) and including the river catchments that drain into these countries. Additional 12 km simulations, for many more GCMs, were produced with the statistical downscaling method EPISODES.

The simulation results were standardised using CMOR (Climate Model Output Rewriter) in order to comply with the CORDEX protocol's data standards. Final technical tests are currently being conducted on the ESGF (Earth System Grid Federation) platform in preparation for publication. The 12 km simulations are expected to be published in July 2026. As an interim solution, however, the data has already been published via the DKRZ's FREVA tool (Free Evaluation System Framework, https://www.freva.dkrz.de/databrowser/?project=cordex-cmip6) and is available to all users with a DKRZ account. Furthermore, the data is available via the DKRZ Stac Catalogue (https://discover.dkrz.de/external/stac2.cloud.dkrz.de/fastapi/?.language=de). The published data will also include data extending beyond the year 2100 (up to 2150) for the SSP1-2.6 and SSP3-7.0 emission scenarios (EC-Earth3-Veg driver).

The 3 km simulations will subsequently be published in August 2026. In addition to being made available via the ESGF portal, the UDAG data, including additional variables, will be archived in the long term at the DKRZ's WDCC (World Climate Data Centre), where it will be publicly available. The WDCC data for the 3 km simulations will also include precipitation at a very high temporal resolution of 10 minutes, which is important for analysing heavy rainfall events and modelling flash floods.
Together with NUKLEUS, the UDAG project was the first to use ICON-CLM for the operational production of climate simulations. It also contributed to the development of the first recommended version of ICON-CLM, with a resolution of 12 km for the European domain and 3 km for the DACH region.



Gefördert durch:

Bundesministerium
für Forschung, Technologie
und Raumfahrt

CLM Community Assembly 2026

By Susanne Brienen (Deutscher Wetterdienst)

Our next CLM Community Assembly is approaching! We want to meet from 22 to 25 September 2026 in Lüneburg, Germany. You can still register until the end of August.

38 abstracts have been submitted, so we will have again a full program of interesting talks, poster presentations and discussions on regional climate modelling with COSMO-CLM and ICON-CLM. The final program will soon be available on the webpage. The working group coordinators will invite separately for their meetings (taking place in the afternoons), but every member is also welcome to join any of the meetings spontaneously. As social events, an icebreaker, a conference dinner and a city tour through Lüneburg are planned.

The invited talk will be given by Christopher Kadow from DKRZ (Germany) and he will give insight into machine learning based downscaling techniques.

For all information on the event, please visit https://assembly26.clm-community.eu/. Registration is possible until the end of August.

We thank Beate Geyer, Stefan Hagemann and their colleagues from the Helmholtz-Zentrum Hereon for organizing this event and hope to meet many community members in September in Lüneburg!



Helmholtz-Zentrum
hereon

ICCARUS 2026

By Daniel Rieger and Christian Steger (Deutscher Wetterdienst)

The hybrid ICCARUS Seminar (ICON/COSMO/CLM/ART User Seminar) took place from 16 to 20 March 2026 at the DWD site in Offenbach, continuing the conference's successful tradition. During the five-day event, developers and users of the ICON and COSMO communities met for an intensive exchange on current developments in numerical weather prediction, global and regional climate modelling, atmospheric chemistry and data assimilation. In addition, performance optimisation for modern high-performance computers and the further development of model architectures were discussed. A total of around 300 people attended the event, of whom approximately 170 were on-site.

The seminar programme spanned three days, featuring a total of 100 contributions comprising oral presentations and posters. On the following two days, working group meetings and workshops were held. These served to bring developers and users of the ICON model from the various communities (COSMO, CLM and ICON) closer together, facilitate better exchange and intensify collaboration.

There were five keynote presentations in total: Manuela Lehner (University of Innsbruck), programme coordinator of the TEAMx measurement campaign, presented the TEAMx project (https://www.teamx-programme.org/) and the dataset obtained from it. This unique dataset for mountainous regions opens up many opportunities for the validation and further development of numerical models, thus providing a relevant and exciting change of pace from the programme, which otherwise focused on the ICON model. Further keynote presentations were given by Günther Zängl (FE13) and Linda Schlemmer (FE14) on further developments to ICON for weather and climate applications, Ali Hoshyaripour (KIT) on news from the ICON Coordination Group and on ICON-ART (an extension for the description of aerosols and trace gases), Florian Prill (FE13) and Sven Ulbrich (FE13) on the operationalisation of AICON, and Claudia Frauen (DKRZ) and Jan Frederik Engels (DKRZ) on the ongoing projects preparing ICON for new HPC architectures and exascale systems.

The participants' presentations covered a wide range of topics, including further developments in the physics of the ICON model, high-resolution case studies, updates on data assimilation, AI methods and air quality forecasts. The tools required by the ICON model community also featured prominently:

- The ICON Community Interface ComIn provides an interface for extending ICON simulations with additional software (https://comin.icon-model.org)
- The web interface Zonda is used to configure the model grid and generate corresponding external data, e.g. land use and soil types (https://zonda.ethz.ch)
- The icon-exchange offers a modern platform for exchange within the community (https://exchange.icon-model.org)

The ICCARUS 2026 working group meetings were held as hybrid meetings during the ICCARUS week or as purely online meetings in the weeks before and after, and form a basis for exchange within the ICON community. Working groups were established on technical aspects ("ICON Consolidated"), "Soil, Vegetation and Land Surface", "Earth System Model", "Data Assimilation", "Ensemble", "Reanalysis", "Atmospheric Boundary Layer", "Dynamics", "Radiation, Clouds, Aerosols and Chemistry", "Evaluation" and "Community Interface ComIn". A workshop on "Performance Portability with C++/Kokkos in ICON" covered the key concepts for making ICON more portable across heterogeneous GPU/CPU architectures.

ICCARUS 2027 will take place from 08 – 12 March 2027.



ICCARUS 2026 Group picture



ICCARUS-Logo (Source: N. Leps, DWD)

ICON-CLM Training 2026

By Susanne Brienen , Vera Maurer and Christian Steger (Deutscher Wetterdienst

The 2026 ICON-CLM Training Course took place at the DWD headquarters in Offenbach from 23 to 25 June. We welcomed 31participants from all over the world to Offenbach for this year's course.

The programme included overview presentations and exercises. These overview talks covered topics such as 'Getting started with ICON' (Florian Prill, DWD), 'ICON Physics' (Linda Schlemmer, DWD), 'The Community Interface' (Roland Wirth, DWD), and 'The eva-suite' (Evgenii Churiulin, KIT). During the practical sessions, participants learnt how to install and work with SPICE, set up and run the model for different domains (including preparing the grid and external parameters), use data from a global climate model as boundary conditions, run a nested simulation with a coarser ICON-CLM simulation at the boundaries, conduct a sensitivity study and analyse the results using the eva-suite, and write additional model output using the community interface (ComIn).

The programme also included an icebreaker on the evening of the first day. The course was prepared and delivered by Beate Geyer from Hereon, Patrick Ludwig and Evgenii Churiulin from KIT, and Susanne Brienen, Vera Maurer, and Christian Steger from DWD. Anja Thomas, Daniel Egerer and Lukas Wirtz from DWD were responsible for the onsite organisation. We would like to thank everyone who contributed to organising the training, as well as their institutions for their support.



Logo Numerical Modelling Training Course 2026 (Source: N. Leps, DWD)



Group picture, source: DWD

ICON Exchange

By Christian Steger (Deutscher Wetterdienst)

The ICON Community has established a new platform for discussing ICON-related topics and providing mutual support to community members. The ICON Exchange platform (https://exchange.icon-model.org/) can be used to post questions or issues related to the ICON modelling framework. The idea is that other members will try to help by answering questions. Active participation is therefore always welcome. Please use the platform to ask questions and help others with theirs, too.

On the Implementation of External Forcings in a Regional Climate Model - A Sensitivity Study around the Samalas Volcanic Eruption in the Eastern Mediterranean / Middle East

Authors: Eva Hartmann, Mingyue Zhang, Sebastian Wagner, Muralidhar Adakudlu, Jürg Luterbacher, Elena Xoplaki

From: Hartmann, E., Zhang, M., Wagner, S., Adakudlu, M., Luterbacher, J., and Xoplaki, E.: On the implementation of external forcings in a regional climate model – a sensitivity study around the Samalas volcanic eruption in the Eastern Mediterranean/Middle East, Clim. Past, 21, 1699–1724, https://doi.org/10.5194/cp-21-1699-2025, 2025.

Introduction

Earth system models used in CMIP6 and PMIP4 provide essential information on past, present and future climate, but their relatively coarse spatial resolution limits their use for regional palaeoclimate applications. Dynamical downscaling with regional climate models can better represent coastlines, orography and regional circulation features, thereby improving the comparison between model output and palaeoclimate evidence. However, when a regional climate model is driven by a global model, the regional simulation remains strongly influenced by the large-scale boundary conditions. To better assess the direct role of external forcings, we implemented orbital, solar, volcanic and greenhouse gas forcings directly in COSMO-CLM. This allows us to test how individual and combined forcings affect the simulated regional climate, relative to a reference simulation calibrated to present-day conditions. Periods of strong volcanic activity are particularly suitable for such sensitivity experiments. The 1257 eruption of Samalas volcano on Lombok, Indonesia, was one of the largest volcanic eruptions of the last millennium. It caused a sharp increase in stratospheric aerosol optical depth, leading to stratospheric warming and surface cooling. The following years were among the coldest in the Northern Hemisphere during the last millennium and have been discussed in relation to historical evidence for agricultural stress, social disruption, disease and migration. Here, we focus on the decade 1255–1264 CE and on the Eastern Mediterranean and Middle East domain, a region of high historical relevance and rich documentary and proxy evidence.

Methods

The external forcings are defined based on the recommendations for the PMIP4 past1000 contribution to CMIP6. Orbital forcing, represented by the eccentricity, the obliquity and the longitude of perihelion, is crucial for long time scales spanning centuries to millennia. Solar (total solar irradiance, TSI), greenhouse gas (CO2, CH4 and N2O via equivalent CO2) and land-use change forcings (not implemented here) exhibit effects within decades, albeit indirectly, leading to a comparably slower climate response. In contrast, volcanic forcing has a direct strong, rapid and short-term impact and up to decadal climate effects through secondary processes, described by variations in aerosol optical depth (AOD). Other potential forcings such as ice sheets or tropospheric aerosols are not specifically implemented.

We conducted simulations using single forcings and their combination, comparing them with the CCLM standard configuration. The CCLM standard configuration, tuned for present-day climate serves as the reference simulation (REF). All experiments use the same boundary forcing of the fully forced ESM simulation and employ EXTPAR external land-use data. The reference simulation maintains fixed values for GHG concentration, TSI and stratospheric AOD, and the orbital forcing. For the sensitivity simulations, the orbital (ORB), solar (SOL), volcanic (VOL) and greenhouse gas (GHG) forcings are implemented in a transient mode. Each forcing is individually incorporated into the CCLM source code, enabling direct assessment of their influence on the simulated climate. For the fully forced simulation, all transient forcings are combined, ensuring consistency between the global ESM and the high-resolution RCM.

Results and Discussion

The higher resolution of CCLM, compared with MPI-ESM-LR, enables a more detailed depiction of topographic features, including coastlines and complex mountain ranges. The overall patterns of 2m temperature in the ESM and RCM simulations are generally consistent; substantial differences arise in areas with complex terrain, which are prevalent throughout the EMME region. The higher resolution leads to an increased frequency of cold temperatures, which can be attributed to elevated regions where lower temperatures are better captured due to the more detailed representation of orography.

After a major volcanic eruption, the surface cooling is generally expected to lead to lower atmospheric humidity and reduced precipitation on a global scale. On the regional scale, this pattern may be modified or even reversed because of changes in major regional circulation systems. In areas with much precipitation (ITCZ, mountains, coasts), the CCLM shows significantly higher precipitation totals and standard deviations compared to the MPI-ESM-LR. The distribution of precipitation appears to be less influenced by external forcing than 2m temperature and shows stronger internal variability.

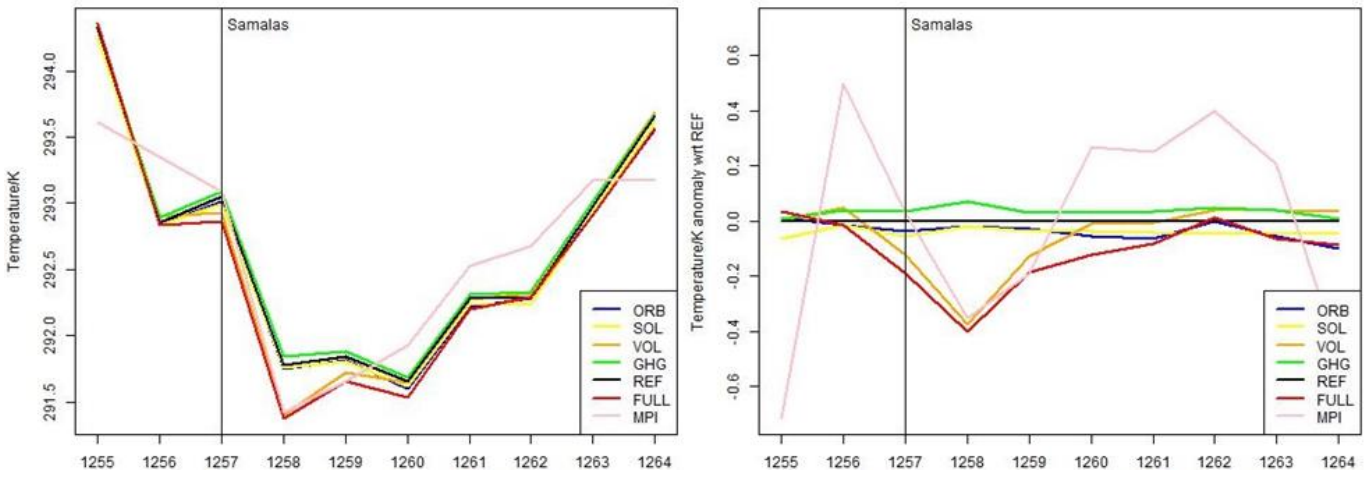

Figure 1 Annual mean 2m temperature averaged over the EMME domain (left) for the CCLM simulations with the different forcings and the MPI-ESM-LR showing the posteruption cooling. The RCM simulations are in good agreement with the driving MPIESM-LR. In 1258, the annual mean temperature was more than 1K cooler than in 1257. By 1259, the concentration of the stratospheric aerosols began to decline again, initiating a gradual return to pre-eruption temperature levels between 1260 and 1263. The anomaly (right) with respect to the reference CCLM from 1255 to 1264 is mostly influenced by the volcanic eruption through direct implementation (VOL, FULL). In 1258, the annual mean temperature was more than 1.5K cooler than before the eruption and about 0.4K cooler than the REF simulation. By 1259, differences started to decrease and nearly disappeared in the subsequent years. The FULL simulation reproduces the lowest temperatures during the studied decade as the effects of the different forcings are aggregated. In this context, the positive temperature anomalies due to the GHG forcing are outweighed by the negative temperature anomalies due to solar, orbital, and most importantly, volcanic forcing.

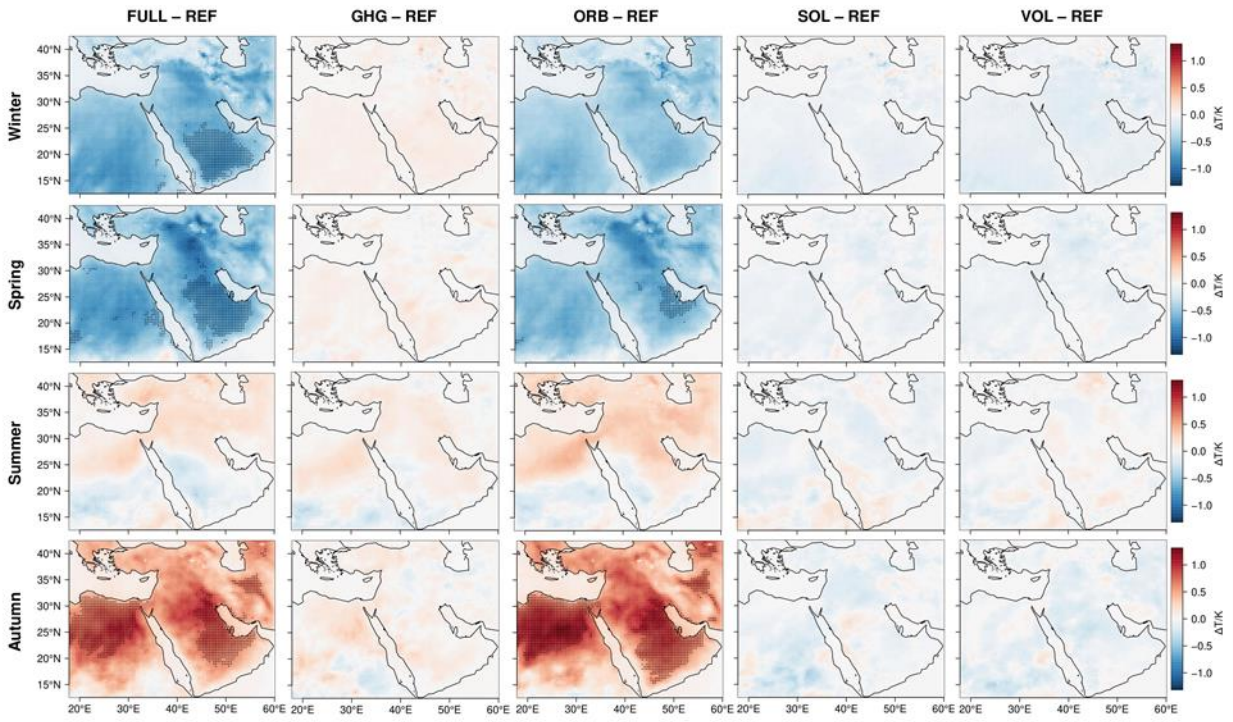

Figure 2 Mean seasonal 2m temperature for the decade 1255-1264 for the different experiments compared to REF. Significant differences are marked with a dot (Wilcoxon-test, α=0.05). From left to right - FULL, GHG, ORB, SOL, VOL and top to bottom - winter, spring, summer, autumn. Spatially and seasonally distributed temperatures are up to 1.5K cooler in the FULL and ORB simulations compared to REF, and only here statistically significant. The FULL simulation represents a combination of all individually forced simulations, with orbital forcing playing a dominant role in shaping seasonal temperature patterns. The simulations with implemented orbital forcing (ORB, FULL) show cooler winters and springs but warmer summers and autumns across large parts of the domain compared to the REF simulation.

Conclusions and Outlook

We conducted decade-long simulations using various configurations: the original CCLM setup (REF), each forcing implemented separately, namely greenhouse gases (GHG), orbital (ORB), solar (SOL), and volcanic (VOL) forcing, and a fully forced model (FULL). While solar and greenhouse gas forcings played minor roles due to their limited variability within the chosen period, volcanic forcing had a significant impact, particularly in response to the Samalas eruption. Direct implementation of volcanic forcing led to an additional cooling effect after the eruption in the test simulations. The standard CCLM reference simulation is calibrated to the present state, thereby accentuating time-dependent influence of orbital forcing. The orbital forcing influenced the timing and intensity of the seasons by changing the position of the Earth in relation to the Sun from centuries to millennia. During the Samalas period, there were slight changes in seasonality compared to the present-day configuration in REF. Our findings indicate that reduced insolation led to lower temperatures in winter and spring, while increased insolation caused a rise in temperatures during autumn. The simulated 2m temperature is strongly linked to elevation, while precipitation patterns are influenced by topography and coastlines. Both are better represented in the RCM than in the ESM, resulting in cooler mean temperatures and higher total precipitation amounts in respective regions.

The implementation of external climate forcings provides the basis for a 2500-year transient RCM simulation focusing on the Eastern Mediterranean and Middle East region. Through the comparison of model outputs with paleoclimate evidence, documentary sources, and proxy reconstructions, we will enhance our understanding of the impacts of individual and combined forcings on regional climate, extreme events, and the underlying processes and dynamics, thereby enabling interdisciplinary paleoclimate studies.

How Do Tropical Monsoons Respond to Grid Spacing in the ICON Model?

***Contributions**: Anusha S., Samir P., Hemanth Kumar C., Rahaman H., Subodh K. Saha.*

Acknowledgments: CLM community, EXCLAIM (ETH), C2SM, CSCS, DWD, MPI-M, IITM Pune, India.

Source Articles:

1. Pothapakula, P. K et al., 2026. Global Monsoon in ICON: The Scale-Dependent Response of Northern Hemisphere Monsoons. https://doi.org/10.5194/wcd-7-979-2026
2. Pokhrel, S., et al., 2026. Multiscale assessment of Indian monsoon rainfall using ICON and CMIP6 model simulations. https://doi.org/10.5194/egusphere-2026-1644

Short Summary: We investigate how horizontal grid spacing in the ICOsahedral Non-hydrostatic (ICON) model affects both the mean and the variability of Northern Hemisphere monsoons across various timescales. Irrespective of grid spacing, the simulations show substantial skill in capturing the global monsoon system characteristics across timescales. Furthermore, we find that the finer grid spacing does not uniformly improve monsoon simulations, highlighting the region-dependent sensitivity to grid spacing.

Introduction

The global monsoon system encompasses coupled dynamics of the ocean, atmosphere, land, and ice systems. Monsoon precipitation affects regions inhabited by more than 60% of the world's population, particularly in tropical and subtropical regions. It undergoes significant changes on daily, seasonal, annual, and decadal timescales. Weather and climate models are very useful tools for simulating and predicting the monsoon system and its associated variability. While the existing literature shows that CMIP, CORDEX and HighResMIP simulations do simulate monsoon systems reasonably well, still large biases exist in capturing the mean and variability. Furthermore, limited studies have reported the added value of fine grid spacing in simulating the monsoon rainfall characteristics. Here, we conduct a systematic study to investigate how changing grid spacing affects rainfall in different monsoon regions. By maintaining identical model physics and dynamics in all experiments, we isolate the effects of horizontal resolution on the simulation of monsoon system.

Specifically, we address the following questions:

- How are monsoons simulated in ICON?
- How do monsoonal characteristics, such as onset, interannual, intraseasonal and diurnal scales respond to horizontal grid spacing?

Model Setup: We leverage a refactored code of the ICON developed at ETH Zürich. We conduct systematic grid spacing sensitivity experiments ranging from 80 km, 40 km and 10 km with a single model. We used Grace Hopper-200 GPU nodes on the ALPS for computation.

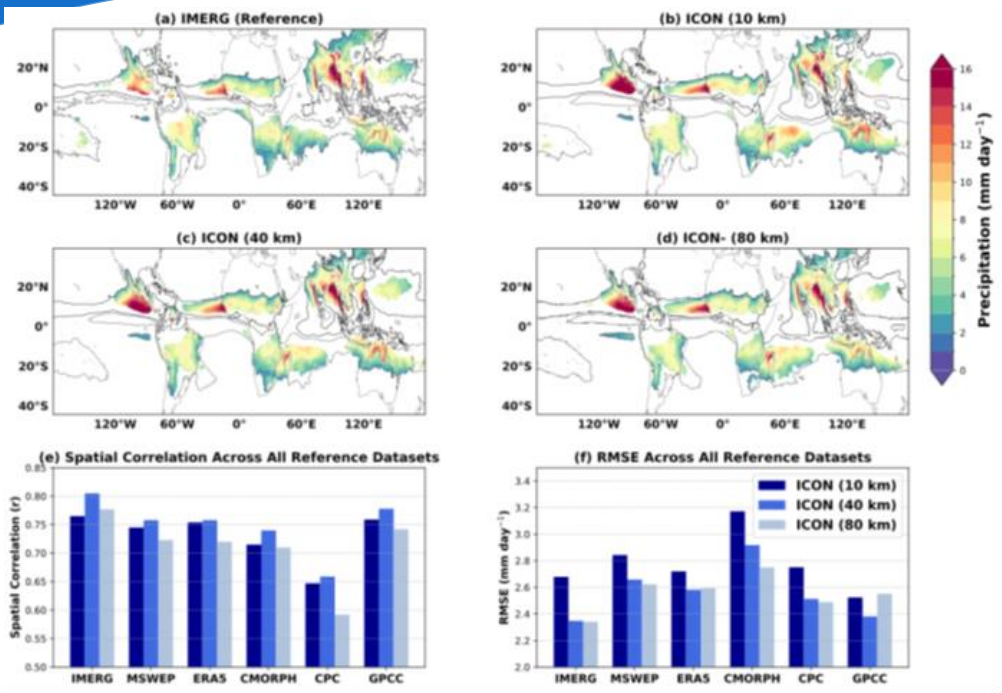

Figure 1: *Global monsoon domains (contours), defined by regions where local summer minus winter precipitation difference is > 2 mm/day and summer precipitation contribution is ≥ 55 % of annual total.*

Key Findings: We delineated the global monsoon domain using the criteria of Wang et al., 2008 in Fig. 1. The contours mark the monsoon boundaries, while the shading depicts the annual range (local summer minus winter). All simulations capture the large-scale spatial pattern of global monsoon domains, with spatial correlations exceeding 0.7 compared with observations. The finest-resolution simulation (10 km) exhibits larger precipitation biases, resulting in a higher root- mean-square error (RMSE) compared to the coarser-resolution simulations.

Fine grid spacing improves some regional features (e.g., orographic gradients) but amplifies wet biases. This demonstrates that increased resolution alone does not necessarily improve performance; it can instead more vigorously activate both realistic and biased physical processes. As expected, simulations with fine grid spacing exhibit a greater contribution from grid-scale (resolved) precipitation and a reduced contribution from parameterized convective precipitation. Nevertheless, the increase in resolved precipitation is not proportional to the decrease in convective precipitation. Over South Asia, for instance, the increase in grid-scale precipitation is approximately 1.7 times larger than the reduction in convective precipitation, leading to a net increase in total rainfall. This behaviour suggests enhanced resolved precipitation, through efficient microphysical processes with stronger convective updrafts.

Table 1: Quantification of convective (Vs) grid-scale precipitation

Resolution	**South Asia** % grid-scale (% conv)	**North Africa** (% grid-scale)/ (% conv)	**North America** (% grid-scale)/ (% conv)
10 km	46% (54%)	30% (70%)	10% (90%)
40 km	32% (68%)	16% (84%)	6% (94%)
80 km	28% (72%)	12% (86%)	4% (96%)

Additionally, fine grid spacing increases the variance at intraseasonal scale (low and high frequency) compared to coarse grid simulations over South Asia and North Africa. Process oriented diagnostics reveal that fine grid spacing produces intense synoptic systems such as monsoon low pressure systems over South Asia and African easterly waves over Africa, thereby contributing to increased variance. All simulations show excellent peak diurnal signal, with fine grid spacing marginally improving the timing over two monsoon domains.

Take away message: Fine grid spacing is not a universal solution for improving monsoons. It improves some processes (diurnal timing, orographic gradients) while exacerbating others (mean wet biases, extreme event frequency). Our results highlight a critical need for scale-aware parameterizations to truly unlock the value of fine-grid modeling in ICON.

ETH zürich

Recent publications

2024

Sauerland, F., N. Souverijns, A. Possner, H. Wex, P. Van Overmeiren, A. Mangold, K. Van Weverberg, N. van Lipzig (2024): Ice-nucleating particle concentration impacts cloud properties over Dronning Maud Land, East Antarctica, in COSMO-CLM2. ATMOSPHERIC CHEMISTRY AND PHYSICS, 24 (23), 13751-13768. doi: 10.5194/acp-24-13751-2024

2025

Adams, N., R. Borgers, J. Neirynck, H. Wouters, K. Allacker, N. van Lipzig (2025): Impact of photonic properties of a new radiative cooling material on the urban heat island and the radiation balance. Urban Climate, 60, Art.No. 102364, doi: 10.1016/j.uclim.2025.102364

Borgers, R., J. Meyers, N.P.M. van Lipzig (2025): Energy production and inter-farm wake losses in future North Sea wind farms. ENVIRONMENTAL RESEARCH LETTERS, 20 (7), Art.No. ARTN 074036. doi: 10.1088/1748-9326/add8a2

Dolado, J.S., G. Goracci, G. Moutaoukil, R.O. Agbaoye, M. Beruete, A.E. Torres-García, L. Carlosena, A. Prabhu, J.A. Ibáñez, N. Adams, N. van Lipzig, K. Allacker (2025): A Modern Roman-Inspired Concrete with Daytime RadiativeCooling Capacity. ADVANCED SCIENCE, 12 (47), Art.No. ARTN e11691. doi: 10.1002/advs.202511691

Ramon, D. C. Heaviside, O. Brousse, C. Simpson, I. Amuron, E.W. Jjemba, J. Van de Walle, W. Thiery,N.P.M van Lipzig (2025): Projected population exposure to dangerous heat stress around Lake Victoria under a high-end climate change scenario. Environmental Research Letters, 20 (10), DOI 10.1088/1748-9326/ae05b1

Singh, P., B. Ahrens (2025) Lightning-intense deep convective transport of water vapour into the UTLS over the Third Pole region. Atmospheric Chemistry and Physics, 25 (23), 17869–17888, https://doi.org/10.5194/acp-25-17869-2025

2026

Campanale, A., A. Bevrnja, M. Raffa, R. Potthast, P. Mercogliano, J.P. Schulz (2026): Exploring the regional coupled capabilities of the ICON modelling framework: The case of medicane Ianos. Atm. Research, 338(108975), https://doi.org/10.1016/j.atmosres.2026.108975

Heinemann, G., Schefczyk, L. (2026): A climatology of low-level jets at the Tiksi observatory (Laptev Sea, Siberia) using high-resolution regional climate model simulations. Atmosphere, 17(2), 218; https://doi.org/10.3390/atmos17020218

Serra, E., M. Debolini, G. Giuliano, G. Barbato, M. Adinolfi, S. Marras, L. Mercenaro, A. Trabucco, V. Mereu, H. Fraga, D. Spano (2025): Land suitability for viticulture under present and future climate conditions: Sardinia as a regional case study. Italian Journal of Agronomy, 20(4), https://doi.org/10.1016/j.ijagro.2025.100068

Vichot-Llano, A., M. Raffa, A. Campanale, M. Adinolfi, G. Ceci, P. Mercogliano (2026): Projected 21st Century Changes in Precipitation and Temperature Over Italy Using CMIP6 CMCC-CM2-SR5 Model and COSMO-CLM Dynamical Downscaling. Int. Journal of Climatology, 46(6):e70311, https://doi.org/10.1002/joc.70311

Please send all information about new publications related to COSMO-CM or ICON-CLM (peer-reviewed, reports, thesis etc.) with the corresponding links to clm.coordination[at]dwd.de. Please do not forget to name the project in the topic browser to which the publication is related. Thank you very much!

Welcome to new Members

Indian Samsun University
(https://samsun.edu.tr)

Contact: Ali Caliskan

Anhui Meteorological Observatory
(http://ah.cma.gov.cn/)

Contact: Jianing Zhu

Ca'Foscari University of Venice

(http://www.unive.it/web/en/497/home)

Contact: Prof. Davide Zanchettin

Upcoming events

2026
September 14 – 18: COSMO General Meeting 2026, Rome, Italy
September 22 – 25: CLM Community Assembly 2026, Lüneburg, Germany
October 19 – 20: ICON Seamless Meeting, Offenbach, Germany
November 30 – December 03: ICON All Hands Meeting, Karlsruhe Germany

2027
March 08 – 12: ICCARUS (**I**CON/**C**OSMO/**C**LM/**ART** **U**ser **S**eminar), Offenbach, Germany



CLM-Community Coordination Office
Dr. C. Steger, Dr. S. Brienen, A. Thomas
Deutscher Wetterdienst
Frankfurter Str. 135
63067 Offenbach, Germany
clm.coordination[at]dwd.de