

CLM-Community Agreement

on the joint utilization and further development of the CLM-Community Software

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1. History

version	status	author
V1	version translated from German original	U. Riebow, P. Frater (BTU Cottbus)
V2	accepted at the CLM-Community Assembly 2006 in Langen (adjustments)	A. Will (BTU Cottbus)
V3	accepted at the CLM-Community Assembly 2010 in Berlin (adjustments)	A. Will (BTU Cottbus)
V4	accepted at the CLM-Community Assembly 2011 in Cava de Tirreni (coding standards)	A. Will (BTU Cottbus)
V4.1	accepted at the CLM-Community Assembly 2012 in Leuven (adjustments)	A. Will (BTU Cottbus)
V5	material for the CLM-Community Assembly 2014 in Frankfurt	B. Früh, J. Brauch (DWD)
V5.1	Adjustments from the CLM-CO meeting in June, 2014; accepted CLM Assembly 2014 Frankfurt	B. Früh, J. Brauch (DWD)
V5.2	minor corrections	B. Früh (DWD)
V5.3	General adjustments, adjustments for General Data Protection Regulation (GDPR), inclusion of ICON-CLM	C. Steger (DWD), B. Früh (DWD)
V5.4	Development partnership agreement between DWD and the CLM-Community with respect to the ICON software included in CLM-Community agreement as appendix. Links to CLM-Community documents updated and removed where not necessary. Minor corrections.	C. Steger (DWD)
V5.5	Adjustments to account for all changes that are related to the use of the administration tool (incl. new registration process). General update of the document. Reordering of appendices.	C. Steger (DWD)
V5.6	Minor changes (e.g. management tool renamed to community portal).	C. Steger (DWD)
V5.7	Changes, because ICON is open source now.	C. Steger (DWD)
V5.8	Introduction of temporary membership Minor updates	C. Steger (DWD)

2. Ambition of the CLM-Community

Regional Climate Models (RCMs) are state-of-the-art tools for high-resolution climate modelling applications and allow the simulation of regional climate patterns with high temporal and spatial resolutions. With the information from global climate models at the boundaries and emission scenarios assumed, RCMs can give more detailed information on potential local climate changes compared to the global projections. The large ensembles of climate projections that build the basis for regional and local climate change information, climate impact research, mitigation strategies and policy consultancy are produced with RCMs in many regions of the world.

However, the operation of these models, the analysis of their results, as well as the continuous improvement of their efficiency and the quantitative examination are connected with considerable and continuously increasing costs. Thus, the most efficient way to use and further develop RCMs is through coordinated and joint actions of a large group of scientists like the Climate Limited-area Modelling-Community (CLM-Community).

The models employed in the CLM-Community are the regional climate models COSMO-CLM and ICON-CLM (hereafter the CLM-Community models).

The COSMO model has its origins at DWD and has been developed and applied by the COnsortium for Small scale MOdelling (COSMO) for weather forecasting applications for many years. COSMO-CLM is the climate mode of the COSMO model, which has been refined and extended by the CLM-Community for the last two decades. COSMO initiated the transition to ICON in 2018 and all member states have switched to the new model system. The COSMO version 6.0, released on 14 December 2021, was the last official release of the COSMO model. No further development of the code and no official tests will be performed by DWD and the consortium for small scale modelling the future.

The ICON modelling framework is a joint development of DWD, the Max-Planck-Institute for Meteorology in Hamburg (MPI-M), the German Climate Computing Center (DKRZ), the Karlsruhe Institute of Technology (KIT) and the Center for Climate Systems Modeling (C2SM). ICON has been operational for numerical weather prediction at DWD since 2015. At the beginning of 2021, the Limited-Area-Mode of ICON (ICON-LAM) replaced the high-resolution COSMO for the German domain and DWD stopped the operational use of the COSMO model after 20 years. In order to have a state-of-the-art tool for regional climate applications for the upcoming years, the CLM-Community has adopted ICON-LAM for regional climate applications. This configuration is called the Climate Limited-area-Mode of ICON (ICON-CLM). The ICON source code is available under a permissive open source licence (BSD-3C) since January 2024 and can be downloaded from www.icon-model.org

The ambitions of the CLM-Community are:

- to coordinate the work of model development and maintenance to have a scientifically and technically state-of-the-art regional climate model as CLM-Community model,
- to maximise scientific findings by regularly exchanging information and having close collaborations,
- to make substantial contributions to the international (regional) climate (modelling) research, and,
- to support external users (e.g. from the field of climate impact research) on the utilisation and interpretation of the simulation results.

The outline of the future direction of work of the CLM-Community is summarized in the CLM-Community science plan[1]. The science plan sets the frame for the model developments and applications for the next years. This includes the identification and elimination of model deficits and the definition of common scientific goals. The science plan is updated regularly.

All CLM-Community documents can be found at the CLM-Community portal [1].

3. Purpose of the Community Agreement

The community members are obliged to implement and follow the rules and agreements specified in this document and its appendices. They agree that maintaining an active community and coordinated research can only be achieved by a joint implementation of the regulations stated herein.

The following sections regulate the handling of the community models and the cooperation of the community members. All members *(section 4.1*) of the CLM-Community have to accept the regulations stated herein.

4. Rights and Obligations

4.1 Membership

Every person affiliated at a university, research institution or state agency who wishes to use the CLM-Community software (COSMO-CLM and ICON-CLM as well as all scripts and programs for workflow control, pre- and post-processing, see *Appendix D*) for his/her own research purposes and accepts the guidelines stated herein without restrictions can become a member of the CLM-Community. To become a member of the CLM-Community, the interested person has to apply for membership via the CLM-Community portal. By applying for membership via the registration form of the

[1] http://www.clm-community.eu - Community - Terms & conditions

community portal, the person confirms, that he/she has taken note of the data protection information[1] (Appendix F). The membership comes into effect by approval of the CLM-Community coordination office.
The membership is documented by a public listing (name and institution) on the CLM-Community website. Further information about each member (e.g. email address, phone number, description of the research objectives, membership in working groups, picture (optional)) is available in the community portal.
The membership in the CLM-Community ends if the member has not logged into the CLM-Community Portal for three years. It can be renewed as often as required. Members are notified before their membership expires and can renew it through a simple process (e.g. logging in to the CLM-Community Portal). The membership also ends, when the member itself ends his/her membership in the community portal or writes an informal notice to the hands of the CLM-Community coordination office to do so. Furthermore, the membership ends when the member leaves the institution for which he/she is registered, unless the person changes the affiliation in the community portal. In this case, the membership persists for the transition period. If the membership has ended and the work with the CLM-Community software is continued at another institution, the membership must be renewed.
After a member leaves the CLM-Community, the membership is terminated automatically in the community portal, or by the member itself or by the CLM-Community coordination office. The person's name is removed from the public list of active members but the name, information about the start and end dates of the membership, the affiliations of the former member and the topic the former member worked on are archived (visible for community members) for documentary reasons. After the membership ends, the email address is deleted from the community portal and from all mailing lists, the phone number is deleted and the member account that gives access to the community portal is deactivated.

4.2 Utilisation of the CLM-Community Software

The CLM-Community software (*Appendix D*) is made available for every member of the CLM-Community via the CLM-Community portal[2] or an appropriate Git repository. The authorization to use the CLM-Community software ends with the end of the membership in the CLM-Community, unless the software has a license that permits the use also without membership.

Every community member is allowed

[2] http://www.clm-community.eu - Tools

- to change the model code. If the changes should flow back to an official code version, the changes and process must be in accordance with the community rules on model development (*section 4.3*),
- to conduct simulations using the model and publish the results (*section 4.5*), and
- to pass the results obtained to third parties.

It is explicitly forbidden for community members

- to pass any part of the CLM-Community software to third parties, unless the respective software has a licence that allows that.
- to use any part of the CLM-Community software commercially, unless the respective software has a licence that allows that.

The community member should

- participate in joint user meetings, especially the annual CLM-Community Assembly,
- inform the community about publications containing results from model simulations (provide information to the CLM-Community coordination office for uploading to the CLM-Community portal),
- stick to the recommendations made by the DFG “Safeguarding good scientific practice[1]” (*Appendix I*), and
- inform the community quickly about problems and progress during the work via CLM-Community portal.

The community member has to

- explain the intended work (developments and simulations) to the CLM-Community to enable a better coordination of CLM-Community’s activities (*section 4.3)*. For model developments the procedure is described in the COSMO Standards for Source Code Development (CSCD)[5] (for the COSMO model) and the “Development partnership agreement between DWD and the CLM-Community with respect to the ICON software[1]“(Appendix C) (for the ICON model)
- take measures for quality assurance, which guarantee the reproducibility of the achieved results (*section 4.4*),
- provide the achieved results to the community (*section 4.5*),
- return the CLM-Community software modifications to the community (*section 4.5*) in accordance with the guidelines (section *4.3*), and

- pass identified errors or shortcomings in the CLM-Community software or in the results immediately to the community via the community portal.

A joint analysis of simulation results and an intensive exchange of experience during CLM-Community software development are explicitly desired and are supported by the CLM-Community coordination office.

4.3 Model Development and Documentation

A major aim of the CLM-Community is to develop the CLM-Community models systematically by continuously improving individual model components and by extending the CLM-Community models with additional process modules.

All members are allowed to change the code of the CLM-Community models for test purposes, for required adaptations and extensions as well as for the general improvements of the model quality. However, the procedure of model development in the community has to follow certain rules to prevent double or redundant work. These rules guide the member from the first idea to a new version of a CLM-Community model. They are explicitly described in the currently valid version of the "COSMO Standards for Source Code Development[3]" for COSMO and in the "Development partnership agreement between DWD and the CLM-Community with respect to the ICON software"[1] (Appendix C) for ICON.

4.4 Archiving and Reproducibility

In order to guarantee the community's high-quality demands to their scientific way of working, the details/configuration of relevant and especially published simulations need to be documented in a way that their reproduction is possible for a reasonable period (e.g. 10 years). Excluded from this rule are external factors, which cannot be controlled by the CLM-Community (e.g. change of HPC systems).

All relevant in- and output files as well as program code used for the simulation need to be archived by the author for a reasonable period (e.g. 10 years) to enable quality assurance, reproducibility and further utilisation.

The respective data and code need to be kept beyond the end of the scientific work in accordance with the suggestions made by the DFG for safeguarding good scientific practice[1] (*Appendix I*).

4.5 Availability of model modifications and results

Model Developments and Simulation results

[3] http://www.cosmo-model.org – Documentation - COSMO Coding Standards

The source code of the recommended version of a community model (including subsequent bug fixes) has to be made available to the CLM-Community members as quickly as possible via the corresponding source code administrator and the CLM-CO. New releases of the ICON source code are available under a permissive open source licence (BSD-3C) since January 2024 and can be downloaded from www.icon-model.org

Completed developments, which are not yet part of the recommended version, are made available by the developer upon request (for ICON-CLM the procedure for back merge of new developments has to be followed). This regulation also applies to the results achieved with the models (including the software and the driving data needed for the simulation) unless it is explicitly forbidden by stipulations from third parties (e.g. the project grantor).

Members are explicitly encouraged to pass their simulation results after finishing the evaluation (see CSCD) to all community members even if the work is not completely finished. In addition, it is highly appreciated to agree on the joint execution and analysis of climate simulations.

Guidelines for users

When working with the results the general guidelines of scientific work (e.g. indication of author, co-authors) have to be kept as they are also specified in the suggestions made by the DFG for safeguarding good scientific practice[1] (Appendix I).

In any case, the protection of the individual idea has to be guaranteed by the community members as a scientific principle.

External usage of simulation results

Passing on simulation results to colleagues or institutions outside the CLM-Community (external users) is subject to the explicit agreement of all people involved in the production of the simulation.

4.6 Publications

Right to publish

The right to publish scientific results achieved by using the CLM-Community software belongs to the respective user of the software without limitation. Individual results can be presented at conferences at any time.

Citation of the CLM-Community models

In each publication the use of the “COSMO model in Climate Mode (COSMO-CLM)” or the “Climate Limited-area Mode of ICON (ICON-CLM)” has to be indicated. It is

recommended to cite basic publications and evaluation results from the CLM-Community. The current list of publications can be found on the CLM-Community portal[4]. When presenting joint results, the participating partners have to be informed.

Information about publications

The CLM-Community coordination office must be informed about publications, which are directly connected to the use of CLM-Community software. The list of publications serves for the exchange of information within the community and, if needed, can be used for the documentation of the community's efficiency. This information is published on the CLM-Community portal.

5. Final clause

German law is exclusively applicable for all affairs of the CLM-Community. The place of jurisdiction is Offenbach am Main, Germany.

Each person who signs up for membership via the CLM-Community portal agrees to all rules stated in this document.
By applying for membership in the CLM-Community, the person also complies with the further applicable documents:

- Rules of internal procedure[1] (*Appendix A*)
- Safeguarding good scientific practice[1] (*Appendix I*)
- COSMO standards for source code development (CSCD[7]) (*Appendix H*)
- Annex D of the COSMO agreement[1] (see *Appendix G)*
- CLM-Community Science Plan[1] (Appendix B)
- Development partnership agreement between DWD and the CLM-Community with respect to the ICON software[1] (Appendix C)

Future updates of

- the CLM-Community agreement,
- the CLM-Community rules of internal procedure,
- the COSMO standards for source code development,
- the CLM-Community science plan and
- the Development partnership agreement between DWD and the CLM-Community with respect to the ICON software

come into effect after the adoption by the CLM-Community.

[4] https://wiki.coast.hzg.de/clmcom - Outcome - Publications

If changes on

- the CLM-Community agreement,
- the CLM-Community rules of internal procedure,
- the COSMO standards for source code development,
- the CLM-Community science plan and
- the Development partnership agreement between DWD and the CLM-Community with respect to the ICON software

should be adopted at the CLM-Community meeting, the drafts of the revised documents must be provided to all CLM-Community members at least four weeks before the CLM-Community meeting to allow for assessment before the vote.

Appendix A. Rules of Internal Procedure

See CLM-Community Rules of Internal Procedure

Appendix B. CLM-Community Science Plan

The CLM-Community prepared a science plan outlining the research goals of the CLM-Community.

Appendix C. Development partnership agreement between DWD and the CLM-Community with respect to the ICON software

See Development partnership agreement between DWD and the CLM-Community with respect to the ICON software.

Appendix D. CLM-Community Software

See CLM-Community Software,

Appendix E. CLM-Community Acronyms

See list of CLM-Community Acronyms.

Appendix F. Data Protection Information

The data protection information can be found on the CLM-Community webpage.

Appendix G. Cooperation with COSMO

By means of close cooperation between the CLM-Community and the COSMO consortium, the COSMO versions of the current operational forecast model and the

corresponding regional climate model are reunified regularly. This involves the willingness of COSMO to provide new model versions to the CLM-Community and to integrate CLM-Community model developments into the code package of the current operational forecast model. The details of the cooperation are described in Annex D of the COSMO agreement1.

Appendix H. Documentation and Programming standards

The “COSMO standards for source code development” form the basis for programming and documentation of the model extensions in the CLM-Community models. They are accepted by the CLM-Community. This aims to guarantee a common source code development with COSMO.

Appendix I. Securing good scientific practice

The community members commit themselves to keep a high scientific-ethical standard when communicating with each other and while handling their scientific results. The recommendations of the DFG commission “Safeguarding good scientific practice[1]” serves as the basis for the scientific work. The DFG’s recommendations are a subject of this agreement.