



CLM-Community Agreement

on the joint utilisation and further development of the regional climate model COSMO-CLM

Version 5.2

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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)

2. Ambition of the CLM-Community

After more than 10 years of development, regional climate models (RCMs) have reached a level which allows the recording of regional climate patterns with high-resolution, long-term simulations. With the information from the global climate model at the boundaries and the emission scenarios assumed RCMs can give more detailed information on potential local climate change in the future compared to the global projections. However, the operation of these models, the analysis of their results, as well as the continuous improvement of their efficiency and its quantitative examination are connected with considerable and continuously increasing costs. Thus, the most efficient use and further development of a regional climate model is done to the best in coordinated, joint actions of a large group of scientists like in the [Climate Limited area Modelling-Community \(CLM-Community\)](#).

The tool of choice is the regional climate model COSMO-CLM. The COSMO model has its origins at the DWD and it is now developed and applied by COSMO (Consortium for Small scale Modelling) for weather forecasting applications. COSMO-CLM is the climate mode of the COSMO model which has been refined and extended by the CLM-Community over the last years.

The ambitions of the CLM-Community are



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- to coordinate the work of model development and maintenance to have a scientifically and technically state-of-the-art regional climate model COSMO-CLM as community model,
- to maximise scientific findings by regularly exchanging information and having close collaborations, and
- to make substantial contributions to the international regional climate modelling research.
- the 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 purpose of this document is to identify and eliminate model errors and to have common scientific goals for the next four years period. The science plan will undergo a regular update.

All CLM-Community documents can be found on the CLM-Community website¹.

3. Purpose of the Community Agreement

The signatories are obliged to implement and keep the rules and agreements specified in this document. 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 model 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 research institution or state agency who wishes to use the CLM-Community software (community model COSMO-CLM as well as all routines for 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. The membership comes into effect by a completion of the application form (*Appendix A*) and approval of the CLM-Community coordination office.

¹ <http://www.clm-community.eu> → [Community](#) → [Terms & conditions](#)



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The membership is documented by a public listing (name and institution) and a community intern description of the research objectives of the member (*Appendix B*) on the [CLM-Community website](#)².

The membership in the community ends when the member writes an informal notice to the hands of CLM-CO or the member leaves the research institution. In this case, the membership has to be renewed when the work with COSMO-CLM is continued at a new research institution or state agency.

The CLM-Community coordination office initiates the removal of former members from the members list, deletes the members email address from the mailing list, and disables the web access to the CLM-Community pages.

4.2 Utilisation of the Community Model

All CLM-Community software (*Appendix D*) is made available for every member for the time of his/her membership in the community over the [CLM-Community website](#)³.

Every community member is allowed:

- to change the model code in accordance with the community rules on model development (*section 4.3*),
- conduct simulations using the model and publish the results (*section 4.5*),
- pass on the results obtained to third parties.

It is explicitly forbidden to community members:

- to pass any parts the CLM-Community software to third parties,
- to use any parts of the CLM-Community software commercially (this is subject to a special contractual arrangement between DWD, the CLM-Community co-ordination office and the member).

The community member should:

- participate in joint user meetings,
- inform the community about publications containing results from model simulations (provide information to the CLM-Community coordination office for uploading to the CLM-Community website),
- stick to the recommendations made by the DFG for [Safeguarding good scientific practice](#)¹ (*Appendix E*),
- inform the community about problems and progress during the work in timely manner via CLM-Community website ([RedC](#))².

² <http://www.clm-community.eu> → [Community](#) → [Science](#)

³ <http://www.clm-community.eu> → [Model](#)



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The community member has to:

- explain the intended work (developments and simulations) to the community to enable a better coordination of CLM-Community's activities (*section 4.3*),
- take measures for quality assurance, which guarantee the reproducibility of the achieved results (*section 4.4*),
- release the achieved results to the community (*section 4.5*),
- return the CLM-Community software modifications to the community (*section 4.5*) and in accordance to the guidelines (*section 4.3*),
- pass on identified errors in the CLM-Community software or in the results immediately to the community via CLM-Community website (RedC).

A joint utilisation 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 systematically further develop the regional climate model COSMO-CLM through continuously improving individual model components and by extending additional process modules.

All members are allowed to change the model code for test purposes, for required adaptations, and extensions as well as for the general improvements of the model quality. But 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 COSMO-CLM with the improvements inside. They are explicitly described in the document [“COSMO Standards for Source Code Development”](#)¹ (Schättler, 2011, 2012), CSCD in the following.

In the following sections the most important points of CSCD are summarized, but each member should read the document thoroughly before starting any model development.

First steps:

- Careful reading of the CSCD
- Before starting a new development of the CLM-Community software CLM-Community Coordination Group (CLM-CO) should be informed about the basic intention. This aims to avoid unnecessary double work and to use already existing experience more efficiently.

Version management:

- The administration of the community model versions is organized by the CLM-Community Technical Advisory Group (CLM-TAG) as part of the working group CLM-SUPTECH. All source code administrators (SCAs) are mandatory members of the CLM-TAG.



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- A version control system (VCS) has to be used for all components of the CLM-Community software by the SCA so that accessing older versions and reconstructing alterations made are possible at any time.
- Only if a model development is provided to the SCA and checked into the VCS, it is part of a **CLM-Community model version**. For every such version the SCA defines a certain status to identify its availability for the users. The details on how to achieve the different levels of model versions (development version, test version, released COSMO version, and released CLM-Community version) are contained in the CSCD (Section 6).

Coding rules:

- The source code provided must be properly designed and conform to the CSCD which have to be fulfilled by all code developers.
- Alterations and extensions of the model code needs to be integrated in such a way that results of previous versions can be reproduced at any time. Exceptions are corrections of model bugs.

Documentation:

Together with the modified source code the developer has to deliver a product and a process documentation of the implementation (i.e. extensions, changes, bug fixes) in a form accepted by the SCA. All details on the product and process documentation can be found in the CSCD (Section 5).

Quality Control and Quality Assurance (Testing):

- Three types of quality tests need to be conducted to achieve the status of a released CLM-Community model version the technical test suite, a process-oriented evaluation, and a standard evaluation. For further information refer to CSCD (Section 6.6⁴),
- The quality of model extensions and/or modifications has to be checked by the colleagues who implemented it by application of the technical test suite and by a thorough evaluation of the relevant processes (process-oriented evaluation) before first submission to the SCA,
- In preparation of a new released CLM-Community model version the standard evaluation is conducted under the responsibility of the working group evaluation (WG EVAL).

4.4 Archiving and Reproducibility

In order to guarantee the community's high quality demands to their scientific way of working, the results of relevant and especially published simulations need to be documented in a way that their reproduction is possible at any time.

⁴ work in progress



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All relevant in- and output files as well as programme codes used for the simulation need to be archived by the author to enable quality assurance, reproducibility and further utilisation.

The respective data and codes need to be kept beyond the end of the scientific work in accordance with the suggestions made by the DFG for safeguarding good scientific practice¹ (*Appendix E*).

4.5 Availability of model modifications and results

Model Developments and Simulation results

After fulfilling the **CSCD** the development and the modified source code has to be made available for the CLM-Community as quickly as possible via the corresponding source code administrator and the CLM-CO. This regulation also applies to the results achieved with the model (including the programme code 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 on 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 conduction and analysis of joint 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 practice¹ (*Appendix E*).

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 by all authors.

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 model without limitation. Individual results can be presented at conferences at any time.

Citation of the model

In each publication the use of the “COSMO model in Climate Mode (COSMO-CLM)” has to be indicated and the statement “COSMO-CLM is the community model of the German regional climate research” has to be used. It is recommended to cite basic publications and evaluation results from the CLM-Community. The current list of pub-



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lications can be found on the CLM-Community webpage⁵. When presenting joint results the participating partners have to be informed.

Information about publications

The CLM-Community coordination office should be informed about publications which are directly connected to the use of the CLM-Community software. The list of publications generated 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 website⁵.

5. Final clause

The member who signs the application form (see Appendix A) agrees to all rules stated in this document. The application form has to be send electronically as well as the print version to the CLM-Community coordination office.

With the members' signature, she or he also complies with the further applicable documents:

- [Rules of internal procedure](#)¹ (see *Appendix C*)
- [Safeguarding good scientific practice](#)¹ (see *Appendix E*)
- [COSMO standards for source code development](#) (CSCD, see *Appendix F*)
- [Annex D](#) of the [COSMO agreement](#)¹ (see *Appendix G*)
- CLM-Community Science Plan

Future updates of the agreement and all related documents coming into effect after the vote at the CLM assembly (except "Safeguarding good scientific practice" which is maintain by the Deutsche Forschungsgemeinschaft DFG) are binding.

The revised documents will be provided to all CLM-Community members at least four weeks before the annual CLM-Community Assembly to allow for objections before the reconciliation.

Appendix A. Application Form

The [application form](#)² for admission to the CLM-Community is available from the CLM-Community website.

Appendix B. List of community members and their area of work

The [members list](#)⁶ is published on the CLM-Community homepage. Their area of work is outlined in the [topic browser](#)² also on the CLM-Community webpage.

⁵<http://www.clm-community.eu> → [Outcome](#) → [Publications](#)

⁶<http://www.clm-community.eu> → [Community](#) → [People](#)



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Appendix C. Organisational Structure

Bodies

For the coordination of the activities of the CLM-Community members, the support of the exchange of information, as well as the maintenance of the source code and documentation the following bodies of the CLM-Community were established:

- regular CLM-Community meetings,
- a CLM-Community coordination office,
- Working and Project Groups,
- the Scientific Advisory Board, and
- the Technical Advisory Group (CLM-TAG).

The character, competence and decision rules of the bodies are specified in the [“Rules of Internal Procedure of the CLM-Community”](#).

Responsibilities

The responsibilities for the community tasks are shared between the CLM-Community coordination office and the working and project groups. The responsibilities are decided on at the CLM-Community meetings and listed on the [CLM-Community webpage](#)⁷.

Appendix D. CLM-Community software

The CLM-Community software comprises the community model COSMO-CLM as well as all routines for pre- and post-processing COSMO-CLM: EXTPAR, INT2LM-CLM, webPEP, and all scripts providing the parameters of global models in a form readable for INT2LM-CLM.

Appendix E. 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” serves as the basis for the scientific work. The DFG’s recommendations are a subject of this agreement; please find them on the CLM-Community website².

Appendix F. Documentation and Programming standards

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

⁷ <http://www.clm-community.eu> → [Community](#) → [Responsibilities](#)



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Appendix G. Cooperation with COSMO

By means of close cooperation between the CLM-Community and COSMO the versions of the operational forecast model COSMO and the regional climate model COSMO-CLM are reunified regularly. This involves the willingness of COSMO to provide new model versions of the COSMO model to the CLM-Community and to integrate CLM-Community model development into the code package of the COSMO model. The details of the cooperation are described in the [Annex D](#) of the [COSMO agreement](#)¹.

Appendix H. CLM-Community Science Plan

The CLM-Community prepared a [Science Plan](#) summarizing the research goals of the CLM-Community.

Appendix I. Acronyms

CLM-CO	CLM-Community Coordination Group
CLM-SUPTECH	CLM-Community working group SUPport and TECHnical Issues
CLM-TAG	Technical Advisory Group of the CLM-Community
COSMO	COnsortium for Small scale Modelling
COSMO-CLM	COSMO model version of the CLM-Community
CSCD	COSMO Standards for Source Code Development
DFG	German Research Foundation
DWD	German Meteorological Service
INT2LM-CLM	CLM-Community software int2lm for interpolation of initial and boundary conditions for the COSMO-CLM model
PG	Project Group of the CLM-Community
RedC	Redmine website for model development and dissemination in the CLM-Community, access via the CLM-Community website
RCM	Regional Climate Models
SCA	Source Code Administrator (see General Aspects)
VCS	version control system
webPEP	Processor for external Parameters
WG	Working Group of the CLM-Community