Climate Limited-area Modelling Community

Current activities in the CLM-Community

Barbara Früh
Deutscher Wetterdienst

COSMO General Meeting
September 10, 2015
Wroclaw, Poland

Deutscher Wetterdienst
Wetter und Klima aus einer Hand

DWD

Overview

COPAT - Coordinated Parameter Testing - Project

Anders et al.

Status of the CLM test suite –

Rockel, Keuler, Lüthi, Will, Anders

Review article on "Convection Resolving Climate Simulation"

Prein et al.

CLM-Community issues

COPAT - Coordinated Parameter Testing - Project

Aim: Coordinated parameter testing to give a recommendation on the parameters to the users and have an evaluated community version in the end based on COSMO5.0 including an evaluation report

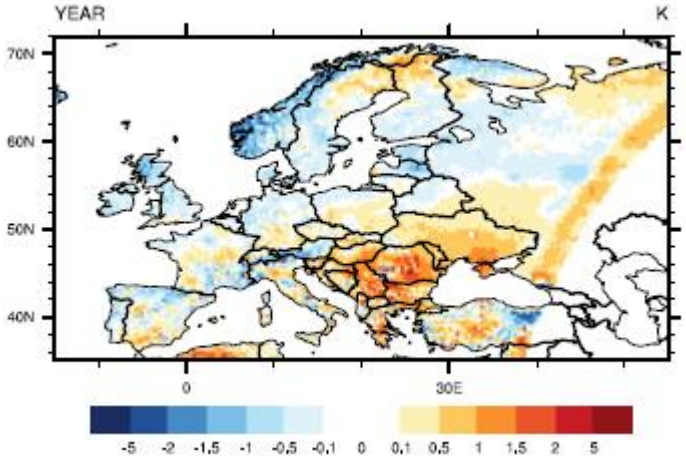
Participants

Susanne Brienen (DWD),
Beate Geyer (HZG),
Daniel Lüthi (ETHZ),
Hans-Jürgen Panitz (KIT),
Jan-Peter Schulz (DWD),
Ivonne Anders (ZAMG)

Andrew Ferrone (LIST),
Klaus Keuler (BTU),
Anne Roches (ETHZ),
Meriano Mertens (DLR),
Hendrik Wouters (KUL),

COPAT - Coordinated Parameter Testing - Project

Domain and Setup:



Model version:

COSMO5.0_clm1;
COSMO5.0_clm3a
together with int2lm2.0

Spatial resolution:

0.44° for all testruns,
0.165° for final evaluation run

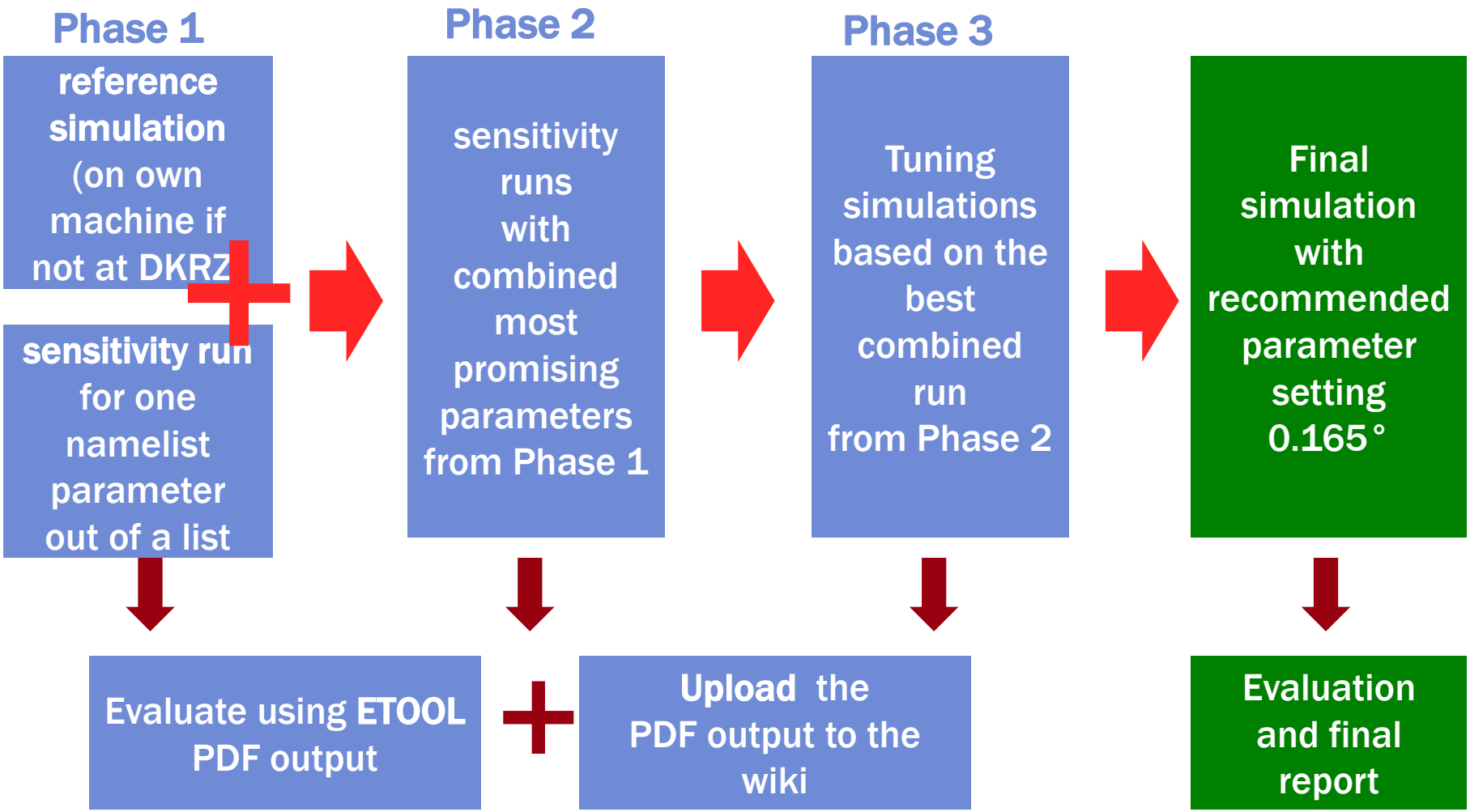
Forcing:

ERAinterim 1979-2000)
(preprocessed data available via DKRZ)

Setup for reference run

available via wiki and/or at DKRZ

COPAT - Coordinated Parameter Testing



Ivonne Anders, ZAMG

COPAT - Coordinated Parameter Testing - Project

All information in a redC – wiki

Under construction!

Coordinated Evaluation Project - COSMO5.0-CLM

General Description

Aim of this WG-task is to carry out a coordinated parameter testing of the new reunified version COSMO5.0-CLM and give a recommendation on the parameters to the users. We would like to end in an evaluated community version including an evaluation report.

For most of the simulations the following facts have been defined:

- **domain**: CORDEX-EU
- **simulation period**: 1979-2010 (currently only until 2000)
- **evaluation period**: 1981-2010 (1981 - 2000)

Procedure - Steps to take part *NEW

- Give a sign by Email you take part in the testing
- Login to DKRZ. We organized an area there where you find the cclm and int2lm model version, forcing and reference data.

```
/pool/data/CCLM-EVAL/
```

  In case you don't have an access to DKRZ or no permition to copy the data write an Email !
- For a set of parameter Klaus Keuler already prepared the forcing data, so we avoid differences in the results due to slight differences in the forcing due to other platforms. You can find the forcing data at DKRZ /pool/data/CCLM-EVAL/forcing/ .
- Choose the parameter(s) you want to test from the list below and decide which one(s) you would like to test and Email us.
- Before testing a parameter: perform exactly the same reference run Klaus already did! We need it to make the results comparable.
  After that you can change the parameter you want and carry out the tests

Phase 1
Phase 2
Phase 3

COPAT - Coordinated Parameter Testing - Project

List of parameters to test

ltkesso	New: to calculate SSO wake turbulence production for TKE	.TRUE. .FALSE.	.FALSE.	4.10	(should be tested)	?
itype_sher	New:type of shear production for TI	1: only vertical shear 2: full isotropic 3D-shear				
lprog_tke	pr to ity ar l3					
lmulti_snow	N la					
ke_snow	N la					
itype_aerosol	N					
itype_root	N					

Simulation ID	Namelist-Parameter	value in reference config CON502	tested values	priority	Tested by whom:	computing system	
CON024 CON031 CON501 CON502 CON431	4.8 ERA40 4.8 ERAInterim 5.0 new defaults 5.0 as CON031 CON031 on 0.44		RefConfig.pdf		K. Keuler	DKRZ (IBM)	co
CON502_LRZ CON502_KUL CON502_CSCS CON502_LIST CON502_DWD CON502_CIRA	as CON502						
CON508	itype_conv	0	2 (IFS Scheme)	1	S. Brienen	DWD (CRAY XC30)	pc ne is
CON506	itype_fast_waves	1	2	1	A. Ferrone	chn.hpc.crgl.lu	co ity

Status of the COSMO-CLM Test Suite

COSMO Standards for Source Code Development

Appendix D: Steps of Code Development for CLM-Community Model Versions

The test suite consists of two parts

- technical test suite
  - based on the COSMO technical test suite by Meteo Suisse
- climatological test suite
  - based on the starter package subchain scripts

The test suite is currently implemented on the HLRE3 „Mistral“ at DKRZ

Burkhardt Rockel, HZG

Status Technical TS - Presently implemented checks

General	name	test_1	
	checkers	The run success checker	Does the model run at all?
		The tolerance checker	Are the differences to the reference version tolerable?
		The identical checker	Are the results even identical to the reference version?
		The netCDF output checker	Does netCDF output work?
		The SAMOA checker	Do the output quantities are within realistic limits?

Restart	names	test_1r1, test_1r2	
	checkers	The run success checker	Does the restart work at all?
		The restart checker	Do continuous and restarted runs give identical results?

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Status of the COSMO-CLM climatological Test Suite

- **Continuous simulation:** (takes less than 2 days at DKRZ)
  - Period: 10-1979 - 12-1984 (5 years + 3 months spin-up)
  - Domain: Europe (EURO-CORDEX domain)
  - Grid: 0.44 degrees
  - Quantities:T_2M, TOT_PREC, and more

- **Evaluation:** (runs automatically, at the end of the simulation)
  - ETOOLS
    - EOBS and CRU
    - Graphics with ETOOL-VIS

Burkhardt Rockel, HZG

Status of the COSMO-CLM Test Suite

Outlook

- Climatological Test Suite:
  - Compare results to COSMO-CLM version which was taken as basis for the new developed version (released version)
- Implementation of additional tests
- Distribute the package through RedC

Burkhardt Rockel, HZG

Review article on "Convection Resolving Climate Simulation"

A. F. Prein, W. Langhans, G. Fosser, A. Ferrone, N. Ban, K. Goergen, M. Keller, M. Tölle, O. Gutjahr, F. Feser, E. Brisson, S. Kollet, J. Schmidli, N. P. M. van Lipzig, and R. L. Leung:

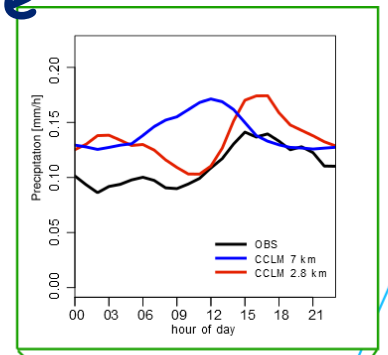
A review on regional convection-permitting climate modeling: Demonstrations, prospects, and challenges.

Rev. Geophys., 53, 323–361, doi:10.1002/2014RG000475, 2015).

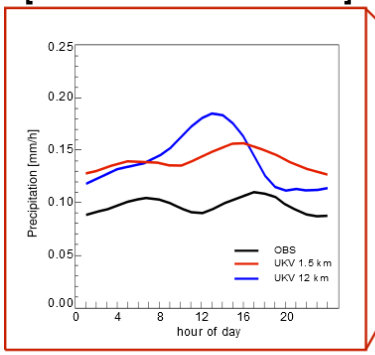
Andrew Ferrone, LIST

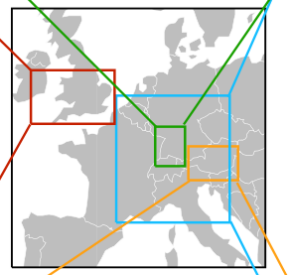
Review article Added value of CPMs Precipitation diurnal cycle

[Fosser et al. 2014]

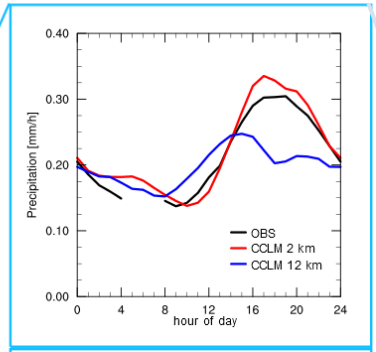


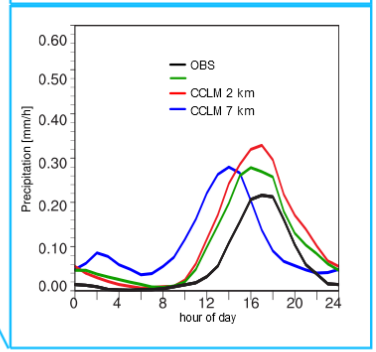
[Kendon et al. 2012]



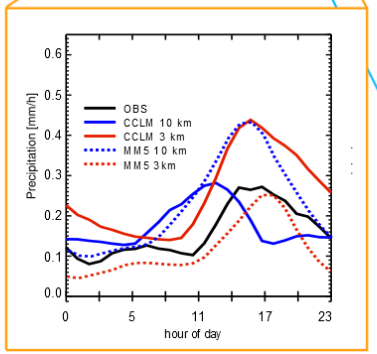


[Ban et al. 2014]





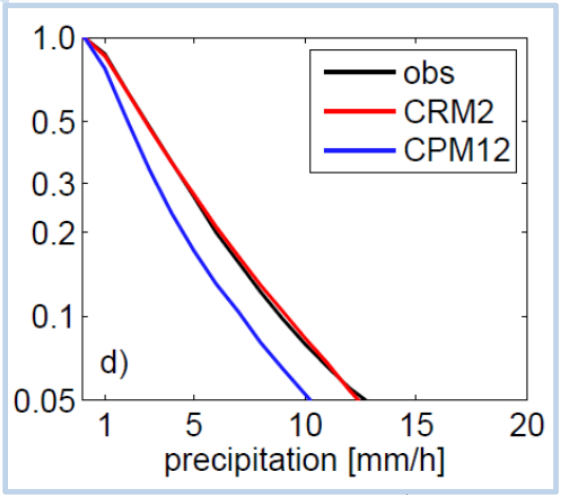
[Langhans et al. 2013]



[Prein el al. 2013]

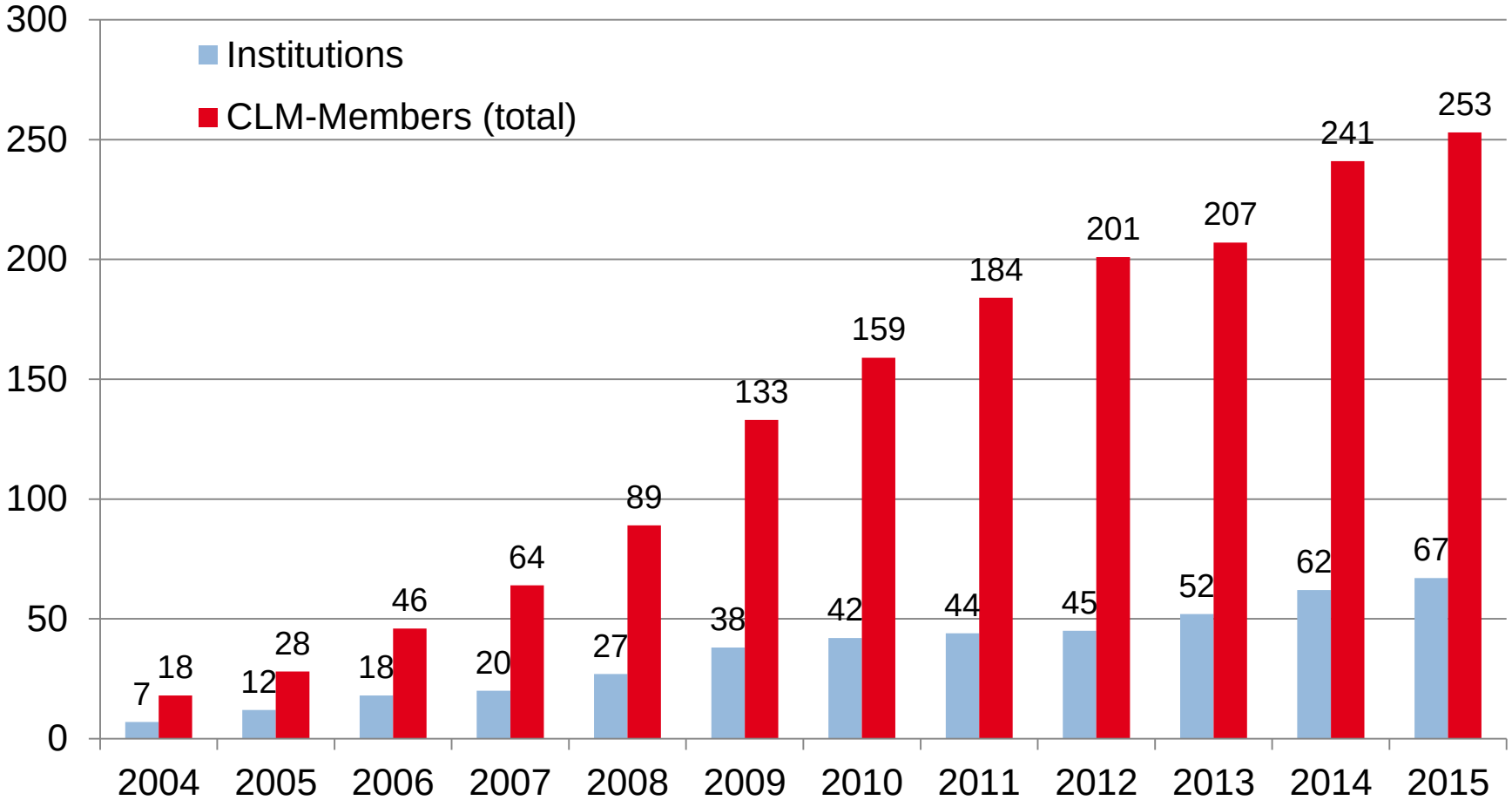
All CPMs **improve** shape (onset and peak) of precipitation **diurnal cycle** compared to large scale simulations but **not necessary** the **amplitudes**

Hourly precipitation

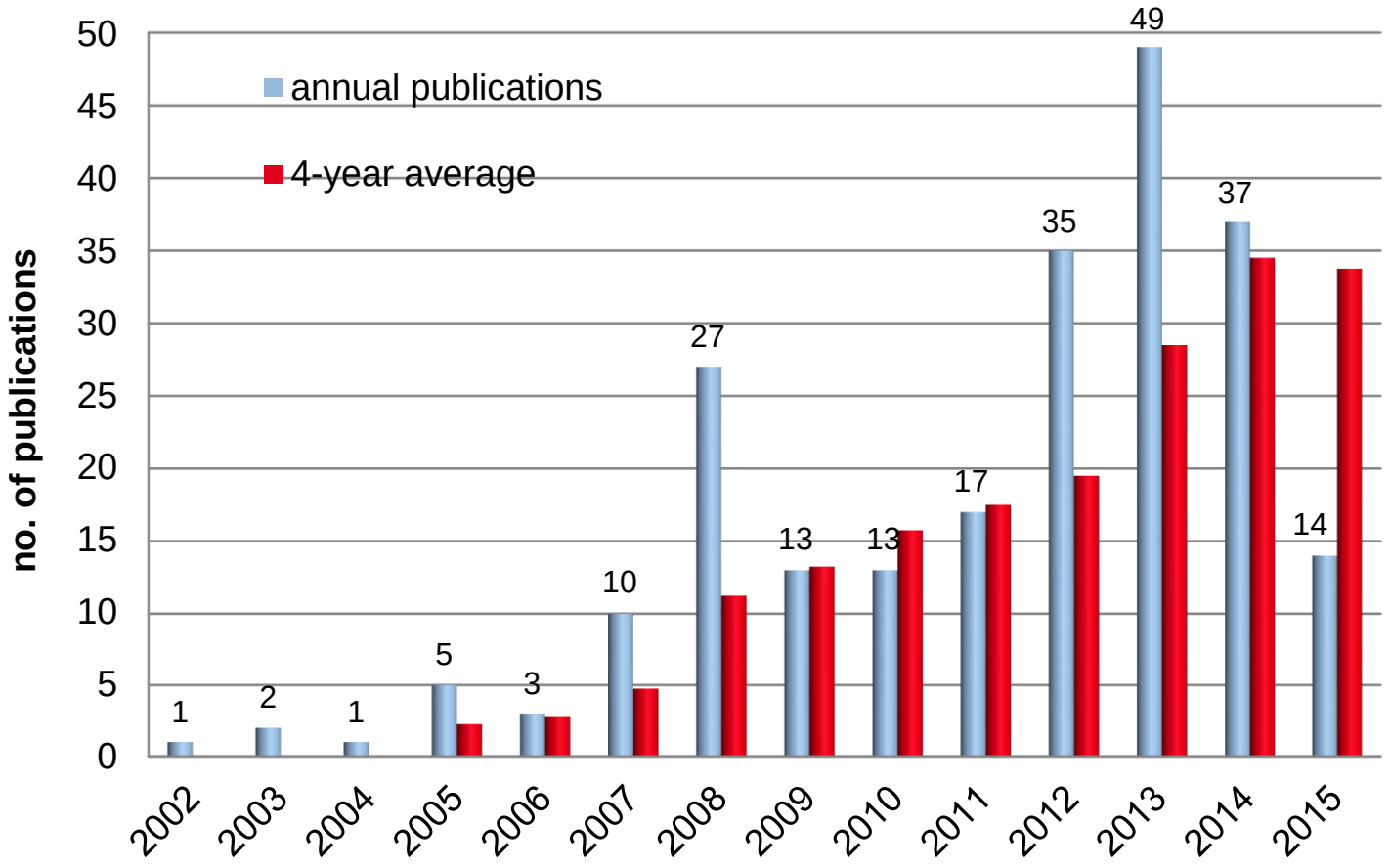


[Ban et al. 2014]

CLM-Community development



CLM-Community development of publications



Cooperation between COSMO Consortium and CLM Community

is highly desirable

… some collaborations already exist

- External parameters for COSMO (NWP) and COSMO-CLM (climate)
  EXTPAR/PEP Source Code Administration (SCA) D. Lüthi
- Closely cooperating Working groups
  - WG2/WG DYNNUM
  - WG3b/WG SOILVEG

… but it could still be improved!

Burkhardt Rockel, HZG

CLM-Community Assembly 2015

September 29 – October 02, 2015

Centre de Recherche Public Gabriel Lippmann

CRP - Gabriel Lippmann
41, rue du Brill
4422 Belvaux

Luxembourg

http://www.crpgl.lu/index.php?id=27&L=2

CLM-Community Assembly 2016

September 20 – 23, 2016

Helmholtz-Zentrum Geesthacht
Zentrum für Material- und Küstenforschung

Leuphania University

Lüneburg, Germany

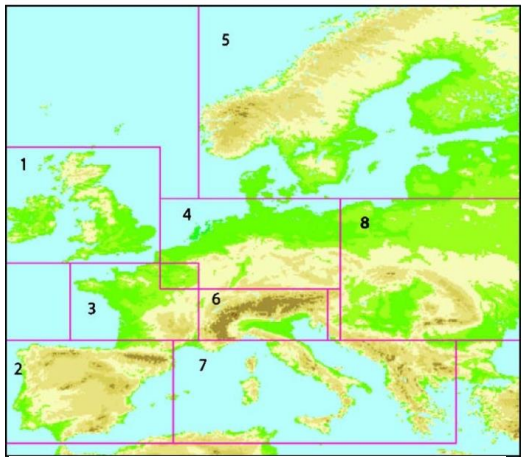

Thank you very much for your attention!!!

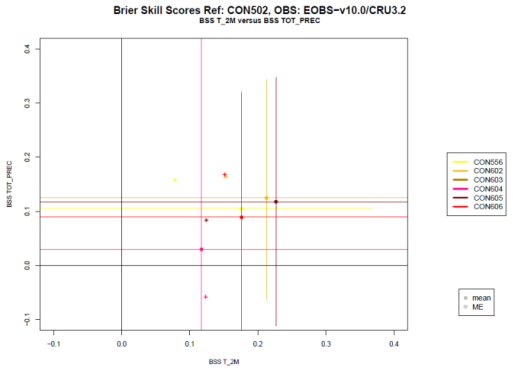
COPAT - Coordinated Parameter Testing

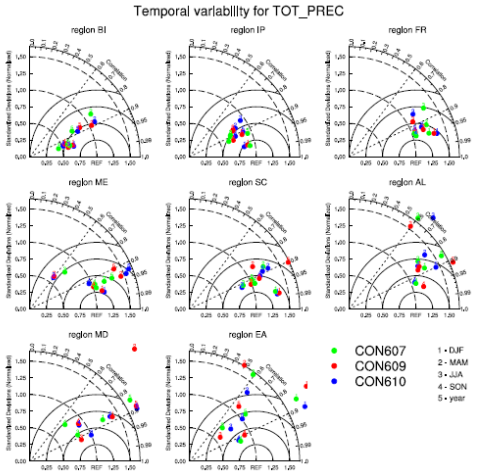
ETOOL (based on Shell, CDO and NCL)

- to analyse simulation output
- to compare to gridded observation data from EOBS & reference run
- to identify best setup

- **subregions**: from PRUDENCE for Europe (see Figure)
- **measures**: bias in annual cycle, correlation, Taylor plots, Brier Skill Score



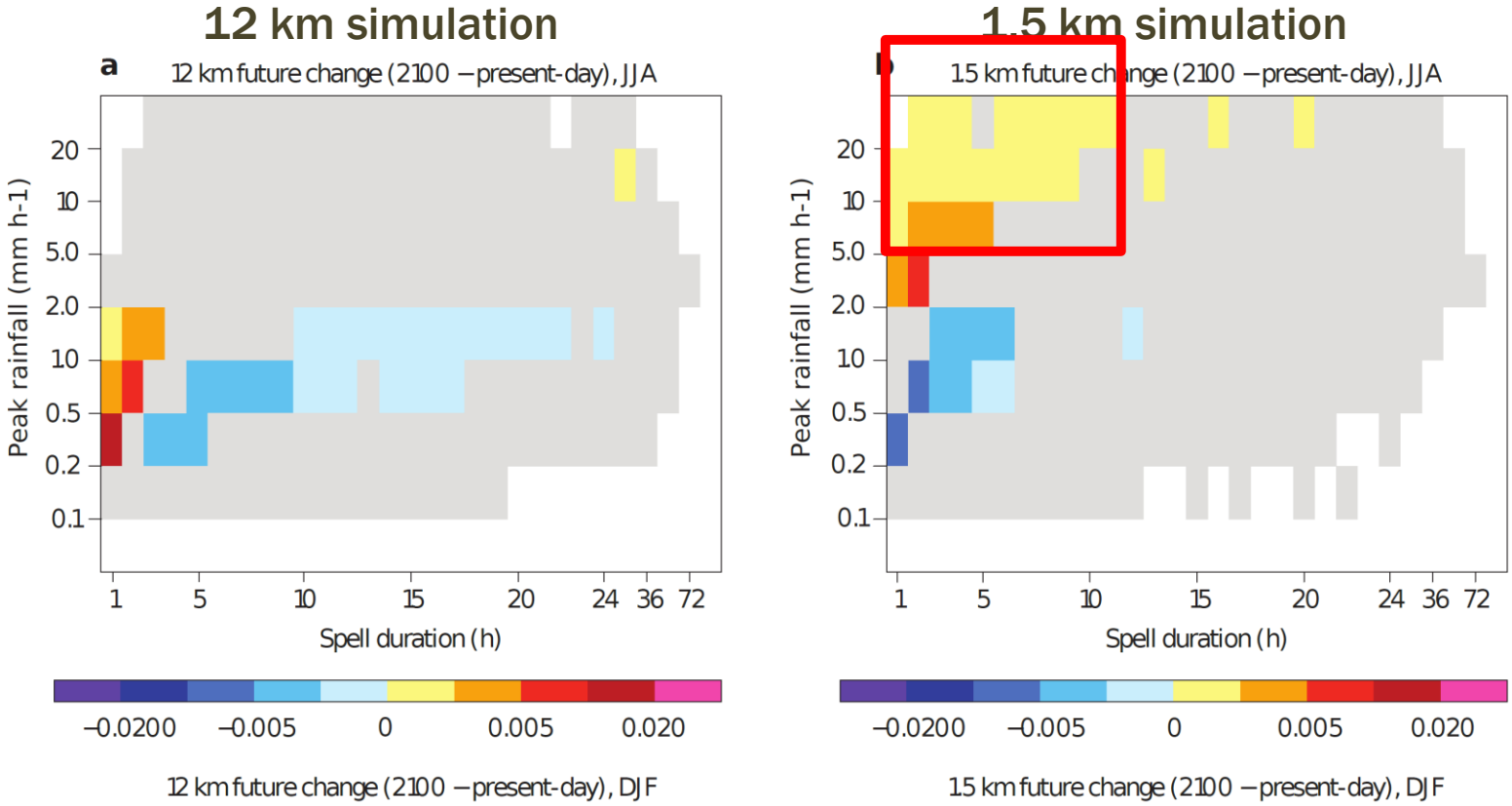




Ivonne Anders, ZAMG

Review article: Differences in Climate Change Signal & Feedback Processes Precipitation

[Kendon et al., 2014]



- Increase in short-term future extreme precipitation in the 1.5 km model (flashfloods)
- This is not seen in the 12 km model.

Andrew Ferrone, LIST

CLM-Community Newsletter

To improve the communication within the growing community:
CLM-Community Newsletter

- 5rthissue published in July

If you are interested in receiving, please, send an email to:
clm.coordination@dwd.de

Climate Limited-area Modelling Community
CLM-Community Newsletter
No. 5
July 2015

Content

Welcome to the 5th newsletter of the CLM-Community

We are approaching our 10th anniversary very fast and a lot has happened in all these years of community work. In the last years, we have agreed to follow standards of source code development and a common science plan was accepted during the last assembly. These are major achievements of our community work and it is up to us now to fill the science plan with our research and the source code with our new developments. Please remember, the common source code improvement and cooperation across the community are the pillars of our CLM-Community. So please participate in our meetings and be part of the ongoing discussions. The Newsletter is about exciting locations of our next assemblies, introducing community members and presenting a glimpse of our community work with three brand new publications.
Enjoy reading!
Yours sincerely, Barbara Früh

CLM Assembly 2015....

By Andrew Ferrone

After nearly a decade of successful regional climate research, the 10th Assembly of the CLM-Community is going to be hosted this year at the Luxembourg Institute of Science and Technology (LIST) from 28th September to 2nd October 2015 in Belvaux, Luxembourg. As each of the previous Assemblies, also this year's meeting will feature highlights of scientific work done with COSMO-CLM, lots of community news, and an interesting social program, including a river cruise on the Moselle, where we will have our conference dinner.

Furnace in Belval (photo: LIST)

Luxembourg city (photo: LIST)

The highlights of this year's program include an evening keynote of Filippo Giorgi (ICTP) and three solicited talks. Concerning the community decisions we have to answer the question if the model version 5.0 of COSMO will be adopted as new recommended version of the community.
Following the community approach we all chose to take, the Assembly can only be a success if everybody will contribute to it.
For more information about the program of the Assembly, the venue and for registering, please go to:
http://clm2015.list.lu

Moselle (photo: Navitour)

July 2015