

Climate Limited-area Modelling Community

Current activities in the CLM-Community

Barbara Früh & CLM WG coordinators

COSMO – GM 12 September 2019 Rome, Italy







Overview

- 1. COSMO-CLM (in operation)
- 2. ICON-CLM (in development)
- 3. CLM-Community issues







CORDEX - Coordinated Regional Climate Downscaling Experiment

Co-Chairs: Filippo Giorgi and William Gutowski

Data Request Contact: Grigory Nikulin

- CORDEX is a CMIP6 diagnostic model intercomparison project (MIP) requesting specific CMIP6 output for regional climate downscaling.
- CORDEX builds on a foundation of previous downscaling intercomparison projects to provide a common framework for downscaling activities around the world.

Website: http://www.cordex.org/









CORDEX CORE

Goal: multiple GCMs downscaled by multiple RCMs over multiple domains for several scenarios.

Framework

- 10 domains
- 3 GCM
- RCM at resolution of 0.22
- 2 future emission scenarios (RCP2.6 and 8.5)









Contribute with CORE simulations to IPCC AR6

Simulations from CLM-Community are finishing now, however running the simulations is only one part of the effort...

- To be included in the Atlas for AR6
 - → model simulations must be standardized (e.g. CMORized) and published on an ESGF node by the end of 2019.
- Analyzing the model runs for a publication considered in AR6
 manuscript to be submitted by end of 2019.
- After this effort there exist a unique set of simulations with regional climate projections for different domains, forced by different GCMs. The data should be explored in great detail!









FPS LUCAS (Land Use & Climate Across Scales)

Objectives:

- develop new generation of RCMs, which couple regional atmosphere interactively with further components of the regional earth system, e.g. terrestrial biosphere and hydrosphere.
- Initiate a new era of coordinated RCM LUC ensemble experiments on high spatial resolutions and consistently implement land use dynamics for the past and future.
- Investigate feedbacks of local scale land use dynamics on climate in spatially refined pilot regions: high resolution experiments over multiple gridded nests to refine the continental simulations down to resolutions below 5 km.
- Quantify direct biophysical impacts of LUC on European climate across spatial and temporal scales.















FPS ELVIC: Climate Extremes in the Lake Victoria Basin





Region

One of world's convectively most active region: very vulnerable to heavy precipitation, heat waves, severe droughts and wind storms







Coordinate ensemble climate projections at the convectionpermitting scale





Project goals

- assess added value of convection-permitting simulations
- analysis climate extremes in the future
- provide information to impact community





https://ees.kuleuven.be/elvic/

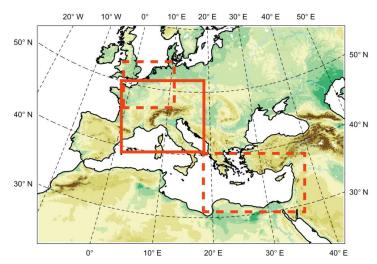
jonas.vandewalle@kuleuven.be & nicole.vanlipzig@kuleuven.be





FPS CPS - Convective phenomena at high resolution over **Europe and the Mediterranean**

Lead: Erika Coppola (ICTP) und Stefan Sobolowski (Met.No)



Mandatory domain:

Greater Alpine Region

Additional domains (optional) Eastern Mediterranen

Lowlands Benelux/Fr

Ivonne Andres, ZAMG





Aim

- learn about future climate change of convective precipitation and simulation
- have a set of comparable simulations for added value analysis.

Time ranges

- Evaluation run (ERAint): 1999-2014 (min 10 years)
- Historical run: 1996 2005
- Near future: 2041 2050
- Far future: 2090 2099
- Horizontal resolution: 3km

Finished until the end of 2019; public at ESGF 2019/2020



















ICON-CLM - new RCM for the CLM-Community

Background:

- weather forecast model: COSMO & ICON-NWP
- climate model: COSMO-CLM

Plan (2020+):

- switch DWD operational weather forecast chain to ICON-NWP
- limited support for COSMO-CLM
- last version of COSMO-CLM be based on COSMO 6.0
- CLM-Community agreed
 - to further develop ICON-CLM the climate mode of ICON-LAM,
 - to establish a recommended ICON-CLM configuration for Europe and
 - to compare the results with respective COSMO-CLM simulations





ICON-CLM Development

- tests with Netcdf data, restart, etc...
- SST/sea-ice updated at an user-defined interval (lnd_nml/sstice_mode=6)
- time-dependent GHG from external file
- reset for tot_prec after an user-defined interval (io_nml/tot_prec_interval) and for tmax/min_2m (io_nml/mxt_interval)
- user-defined number of model soil layers and model soil layer depths (lnd_nml/nlev_soil and lnd_nml/zml_soil)
- technical infrastructure:
 - ICLM-SP (ICLM Starter Package):
 - run routine "subchain": prep -> conv2icon -> icon -> arch -> post
 - climatological test suite (CTS)
 - evaluation routine ETOOLS
- ICON-CLM and ICLM-SP installed and tested on Cray (DWD) and Mistral (DKRZ)







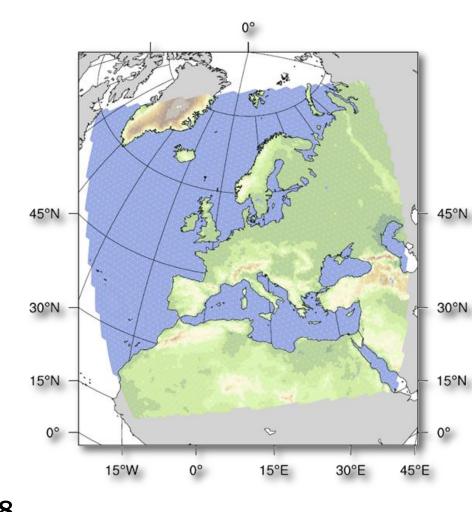
ICON-CLM Experiment setup

domain: EU-CORDEX

resolution: R2B8 (~10km)

time steps: 120s/90s

- with nudging at model top
- initial data: Atmospheric fields from ERA-Interim; surface fields from an ICON-CLM long run
- lateral, lower, upper boundary data:
 ERA-Interim
- period: 1979-2008 (30 years)
- model namelist settings: combined the namelist settings of R2B6 (with nest R2B7) and R3B7 with nest R3B8

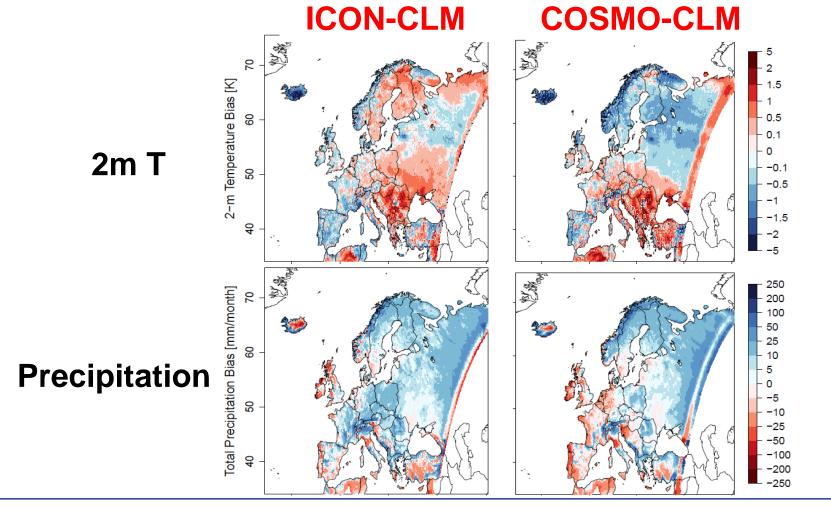








ICON-CLM vs. COSMO-CLM: 1981-2000 averages



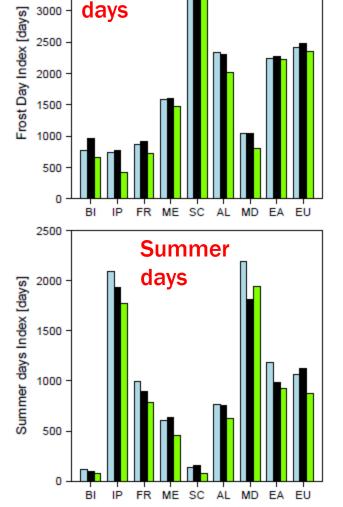


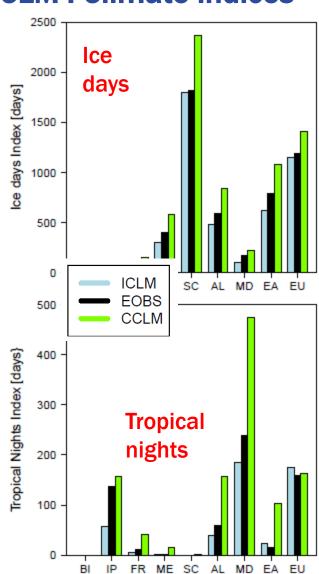
4000

3500

Frost

ICON-CLM vs. COSMO-CLM : Climate indices

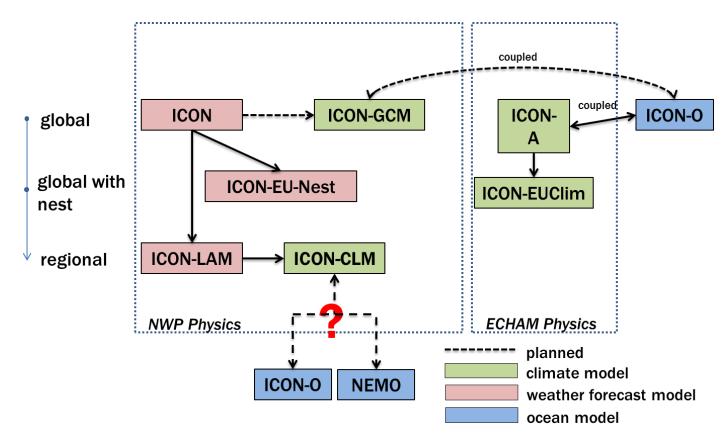




- COSMO-CLM
 overestimated
 numbers of ice days
 and tropical nights
- COSMO-CLM almost doubled the number of tropical nights in Mediterranean
- In general: ICON-CLM is better with temperature-related climate indices

Next steps

- ICON-CLM already quite good compared with the latest COSMO-CLM
- publication
 (Pham et al.) in preparation



- CLM-Community PG-ICON:
- Steps towards the first recommended version
- comparison with COSMO-CLM 6.x
- coupling of ocean model → towards regional Earth system model







CLM-Community New Science Plan - Status

- A draft for the new science plan was produced until July 2019
- During the SAB review several points were raised which require a major reorganization of the structure of the document (shift of contents, new chapters, new topics, ...)
- It was not possible to consider these comments and suggestions until mid of August (deadline if vote on new science plan should take place at Community Meeting 2019 in Paestum)
- NO vote on the science plan this year, but at the Assembly in 2021







CLM-Community Coordination

... will change!

- Barbara Früh will step back as CLM-Community Coordinator after the CLM Assembly 2019 in Paestum
- Christian Steger (DWD) has been selected by the SAB members as new coordinator



Welcome to the CLM-Assembly 17 – 20 September 2019 Paestum, Italy

Thank you very much for your attention!!!

