

SCA Reports for the COSMO-Model and INT2LM

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COSMO Versions Implemented since September 2019

Version	Date	Contents (Highlights)	Results Changes
5.06b_4	03.12.19	• Several minor fixes • Limit terminal fall velocity of snow / rain / graupel	no yes
_1	16.10.19		
_2	22.10.19		
_3	08.11.19		

Version	Date	Contents (Highlights)	Results Changes
5.07	21.02.20	- Bug fix in shallow convection interface: a loop index „k“ was used outside the loop - GPU port of Tiedtke-Bechtold scheme and update to latest ICON version - GPU Performance optimization for PGI compiler - Replaced STELLA by GRIDTOOLS - Run surface schemes in double precision, even when running model in single (First) Modifications for MESSy	yes if used yes no

Version	Date	Contents (Highlights)	Results Changes
5.07a	11.05.20	• Added EULAG dynamical core • Modifications for better (NEC SX) vectorization • Changes for Data Assimilation (definition and processing of new observation types; changes to redundancy checks; fixes) • Updates for EMVORADO • Added hailcast diagnostics • Modification to sunshine duration	if used no if used if used no

Version	Date	Contents (Highlights)	Results Changes
5.07b	19.06.20	• Another update for EMVORADO	if used

Version	Date	Contents (Highlights)	Results Changes
5.07c	03.07.20	• Modifications to avoid NEC compiler problems • Update of TERRA with latest ICON version, including a fix: use snow-weighted potential evaporation to ensure that sum of evaporation terms does not exceed potential evaporation	if used yes: at grid points with snow

Version	Date	Contents (Highlights)	Results Changes
5.08	to be expected	- Removed coarse radiation grid - SPPT: if targeted diffusion is turned on, the behaviour of SPPT has changed - Fixes for PGI compilation - Modifications to run assimilation in single precision - Modified hailcast variable names (to fit with naming rules) - Unification with CLM, crCLIM, MESSy - added more diagnostics - replace deprecated MPI constructs for data types: compile with -DMPI3 - Modifications to use GRIDTOOLS 2.0	no if used could be no no

INT2LM Versions Implemented since September 2019

Version	Date	Contents (Highlights)	Results Changes
2.06a	16.10.19	• Running COSMO-LEPS in GRIB 2 • Additional packing for GRIB 2 • Modifications for MESSy	no no no
2.06a_1	08.11.19	• Fix to avoid deadlock, if no record to read has a local section 28 • added check of the rotated pole for a regular input grid	

Version	Date	Contents (Highlights)	Results Changes
2.07	21.04.20	• Reading / writing RBF coefficient files to interpolate ICON fields (saves setup time) • Implemented a technical testsuite for INT2LM • Modifications for MESSy	no no
2.07a	18.06.20	• Added several NEC compiler directives • Bug fix for GRIB 2: set encoding of bitmap • Corrections for HadGEM input and itype_profiles_vert_interp=2	no no if used

Version	Date	Contents (Highlights)	Results Changes
2.08	to be expected	• CLM unification (input of W_SNOW, T_SNOW is optional) • Several technical fixes for Kinne aerosol climatology • pack HSURF also with 24 bits (as HHL)	no no no

COSMO-ICON Physics

Status of COSMO-ICON Physics

- Two packages are unified between COSMO and ICON
 - Turbulence Scheme
 - Soil and surface schemes: TERRA, FLake, Sealce
- We did not manage to work on the other schemes in the last year
 - Microphysics
 - SSO scheme
 - Tiedtke-Bechtold
- There are opinions at DWD, that this is not necessary any more.
 - Any remarks?

Documentation

Documentation for Model Version 5.0 has got DOIs

- ➔ Colleagues from the CLM Community asked for permanently available Model Documentation for specific model versions, to be cited in peer-reviewed papers.
- ➔ Or for a peer-reviewed model documentation (which is not practical).
- ➔ Therefore we restored the documentation for COSMO Version 5.00 (which is the basis for the CLM work in the last years) and provided DOIs.
 - ➔ Example: DOI: 10.5676/DWD_pub/nwv/cosmo-doc_5.00_I for „Part I: Dynamics and Numerics“
 - ➔ Available on the COSMO Web Page (Documentation) and on https://www.dwd.de/EN/ourservices/cosmo_documentation/cosmo_documentation.html
- ➔ In preparation: Documentation for Model Version 5.05 with modified physics (blocked data structure; modified packages)
- ➔ Final Version 6.0 will also get DOIs

Update of Documentation

- ➔ Release Notes for the latest versions are available
- ➔ Update of User Guides is in preparation

The Last Episode

Developments Integrated since last GM

- Radar Forward Operator
- GPU port of Tiedtke-Bechtold convection
- GPU performance optimization for PGI Compiler
- Replaced STELLA by GRIDTOOLS
- Run SFC schemes in double precision
- Hailcast Diagnostics

Already in the github-master (but not yet in an official numbered COSMO version)

- Fixes to run assimilation in single precision
- Removed coarse radiation grid
- Updates for MESSy
- Use GRIDTOOLS 2.0

Outstanding Developments

- ➔ Unification with CLM / crCLIM: 3 branches under review / testing
 - ➔ New hydrology scheme (working since end of July)
 - ➔ crCLIM diagnostics (available since end of July)
 - ➔ CLM diagnostics (available since end of May)
 - ➔ Status: Colleagues from CLM / crCLIM could not do much testing in the last weeks!
- ➔ Integration of work from PT SAINT: new multi-layer snow model
 - ➔ Status: Model now running also on GPUs (could be problematic on NEC); about ready to be integrated
- ➔ Integration of work from PT AEVUS, AEVUS2
 - ➔ Status: Version available based on COSMO 5.05; Integration into latest version will be done in steps (poor man's tile approach; additional fields; modifications to TERRA, ...)

COSMO → ICON

Actions in the Last Year

- ➔ Following branches are now existing in the ICON Repository:
 - ➔ icon-cosmo-master (to be synchronized with icon-nwp/icon-nwp-dev)
 - ➔ icon-cosmo-dev (to be synchronized with icon-cosmo-master)
 - ➔ icon-clm-dev (to be synchronized with icon-cosmo-master)
- ➔ All COSMO developments have to branch from icon-cosmo-dev (and CLM developments from icon-clm-dev)
- ➔ icon-cosmo-master (and icon-cosmo-dev/icon-clm-dev) have been synchronized with icon-nwp/icon-nwp-dev several times
- ➔ Up to now there is one active development below icon-cosmo-dev
 - ➔ Developments for 2d aerosols within PP CAIR (by Daniel Rieger)



Thank you
very much
for your
attention!