CONSORTIUM FOR SMALL SCALE MODELING

COSMO

WG3b

Some community tools

EXTPAR, fieldextra, TERRA standalone

Extpar

Preparation of external parameters, COSMO software

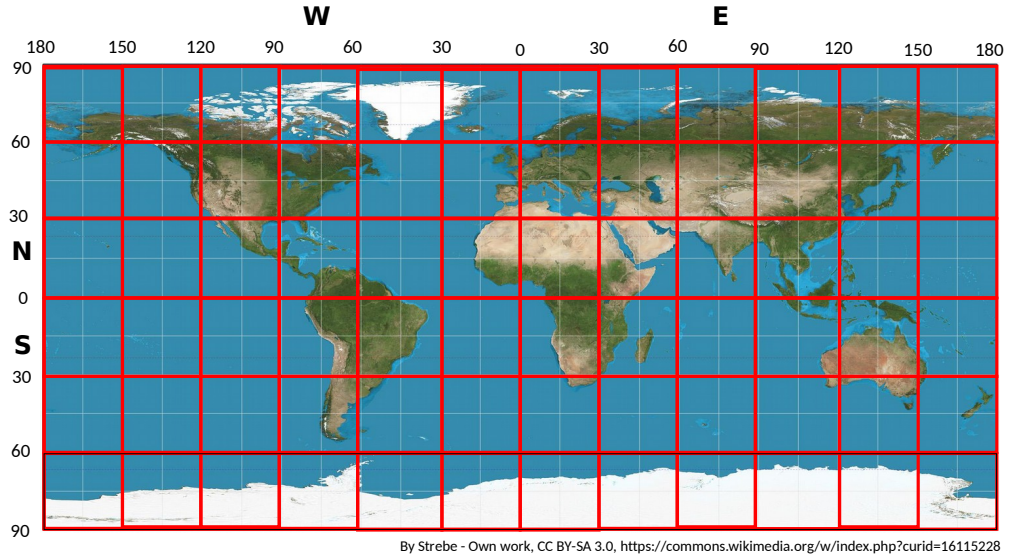
SCA is Jonas Jucker / C2SM

Latest release 5.7 (06.09.2021)

https://github.com/C2SM-RCM/extpar

Merit-Rema topography

- **Global topography dataset with ~100m resolution**
- Antarctica (Rema)
- Rest of the world (Merit)
- Namelist switch itopo_type = 3
- Available for COSMO and ICON



By Strebe - Own work, CC BY-SA 3.0, https://commons.wikimedia.org/w/index.php?curid=16115228

Other new datasets

CAMS aerosols

- Aerosol climatology (2003-2013)
- Namelist switch iaot_type = 5
- Due to unresolved bug, only with Intel compiler on Mistral at DKRZ
- Available for ICON only

ERA temperature climatologies

- Namelist switch iera_type = 1 for ERA5, iera_type = 2 for ERA-I
- Extpar finally provides ALL necessary external parameters for ICON

Outlook (1)

Urban

- Integrate new urban parameters as defined in PT AEVUS 2
- Follow developments from PP CITTA
- Hackaton at ETHZ to speed-up these tasks (?)

JSBACH

- Work on-going at MPIM to include external parameters required by JSBACH

Outlook (2)

Technical

- Fix CAMS *aerosols bug* for GCC compiler
- Find solution for processing *large input data* (> 4 GB) for global grids
- Continue *Python rewrite* of Fortran code
- Provide Docker container in order to be *platform independent*
- Consolidate *test suite*
- Provide up-to-date code version for the new *Web-Pep interface* in the CLM-community
- Improve consistency of *NetCDF output*
  (e.g. consistency with GRIB short names and units, meaningful long names)

Information about Extpar

GitHub

- Readme: https://github.com/C2SM-RCM/extpar/blob/master/README.md
- Release Notes: https://github.com/C2SM-RCM/extpar/blob/master/ReleaseNotes.md
- Full documentaion: https://github.com/C2SM-RCM/extpar/blob/master/doc/user_and_implementation_manual.pdf
- Issues: https://github.com/C2SM-RCM/extpar/issues
- Open Pull Requests: https://github.com/C2SM-RCM/extpar/pulls

C2SM-Wiki

- https://wiki.c2sm.ethz.ch/MODELS/IconCosmoExtpar

Source-Code Administrator

- jonas.lucker, jonas.jucker@c2sm.ethz.ch

Fieldextra

Pre- and post-processing, COSMO software

SCA is Jean-Marie Bettems / MeteoSwiss

Latest release 13.4.0 (01.04.2021)

https://github.com/COSMO-ORG/fieldextra

Why (not) fieldextra?

- **Designed for *automated production***
- Systematic use of meta-data for *automatic error detection* (product consistency)
- Consequent handling of *missing values* (data, meta-data)
- Understand *specificities of target models* (GME, IFS, COSMO, ICON)
- Focus on *robustness* (fault tolerant)
- Focus on *performance*, in particular for large problems (memory footprint, time to solution)
- *Versatility* (from simple single file operation to full set of products generation in real time production)

- … but correctly setting the namelist for a specific task is *not intuitive*

ICON specific

- Interpolation from the triangular grid to any regular grid *in the import step* is available in the current production release ***v13.4.0***
  - No other operations on fields defined on the triangular grid are supported…
  - … but all fieldextra functionalities can be applied on the interpolated fields

- A release ***v14.0.0*** which will *fully support the triangular grid* is planned before the end of this year
  - Support of the triangular grid is implemented by using the DWD ICON tools library

ICON specific

- Many features are *already available* in the *head of the develop branch*
  - NetCDF import/export, GRIB 2 import/export, BLK_TABLE (ASCII format) import/export, data subset defined by geog. locations, merging/comparing fields under some conditions, lateral smoothing of fields, grins, fxclone, fxfilter, fxconvert ...
  - Of course, all features not depending on the horizontal grid are also available: ASCII export, EPS operators, vertical operators (e.g. vertical interpolation), meteorological operators not using differential operators (e.g. RELHUM), ...
- The features *we are currently working on*, and that we hope having ready in November:
  - support all possible interpolations (currently only regular ↔ regular and unstructured → regular are implemented), support products mixing multiple subgrid (e.g. VN and T)
- The table summarizing the *state of the developments* is available on GitHub
  - https://github.com/orgs/COSMO-ORG/projects/8

Documentation

- *Starting point* available at the fieldextra GitHub master page
  (https://github.com/COSMO-ORG/fieldextra)
- *Basic introduction* (recommended, almost required to be able to setup a namelist)
  (https://github.com/COSMO-ORG/fieldextra/blob/develop/documentation/1_FirstContact.pdf)
- Rich set of *commented examples* … including input and reference results
  (in subdirectory ./cookbook)
- Systematic and extensive *documentation of usage and of all features*
  (in ./documentation/README.user)

Documentation

- Summary of *features introduced in each release*
  (https://github.com/COSMO-ORG/fieldextra-wiki/wiki/History)
- *Detailed history* of modifications
  (in ./admin/HISTORY)
- *Backward compatibility* is not always guaranteed, the required modification of namelists, the modifications of resources, the modifications of output format are all documented (in ./compatibility)
- *Planning* is organized and documented in GitHub milestones & issues
  (https://github.com/COSMO-ORG/fieldextra/milestones)

Access

- Full self-contained package of official release on ***COSMO web site***, includes all libraries & regression (https://www.cosmo-model.org/content/support/software/default.htm)
- Official releases and *stable* head of develop branch deployed at ***CSCS*** (Tsa & Daint) and at ***ECMWF*** (at cscs in /project/s83c/fieldextra, at cca in /perm/ms/ch/ch7/projects/fieldextra/)
- Code base in ***GitHub***, requires independent access to support libraries and regression input (https://github.com/COSMO-ORG/fieldextra)
  - Official releases in branch *master*, stable head of develop in branch *develop_tested*
  - Branch ***develop_tested*** supports *automatic deployment* of the latest stable state of the code, for a quick access to the most recent features and bug fixes!

TERRA standalone

Off line soil&surface module, not a COSMO software

Latest release 5.07 (16.12.2020)

https://github.com/COSMO-ORG/terra-standalone

Originally developed by Felix Ament in 2006, then contribution by Bettems & Morsier

T S A

Status : in 2019 and 2020, work invested to restructure TERRA standalone for using TERRA in blocked data format (Schaettler & Liermann @DWD). *Result of this work is now available on GitHub in tag 5.07.*

- using TERRA module from ***COSMO 5.07***,
- support ***GRIB 2*** for both input and output,
- can use both ***COSMO*** and ***ICON*** forcing (but no tile and only full fields).

Required short term actions **:** update code to latest TERRA version from 6.0, in particular

- merge work done for ***SNOWPOLINO*** (SAINT) with code taged 5.07,
- include latest work from ***TERRA-URB*** (AEVUS 2),
- include work from ETHZ for new ***hydrology scheme*** (Schlemmer, Regenass) (?),
- update ***documentation.***

TSA

Outlook **:** *essential* tool for efficient development of soil & surface related parameterizations, as shown e.g. in the process of developing SNOWPOLINO, but also to spin-up the model to provide a balanced state of the soil and the surface in case of a new configuration. Can also be useful for DA applications and for climate applications.

Presently *no permanent resources to keep it in a shape that it can be used by the community* ! What could be done...

- Minimal effort to *consolidate existing code* (short term action)
- Find a *Source Code Administrator* caring for the code
- New off-line soil&surface module *integrated in ICON framework* (ICON-LAND ...)

Thank you for your attention !

Questions, comments?