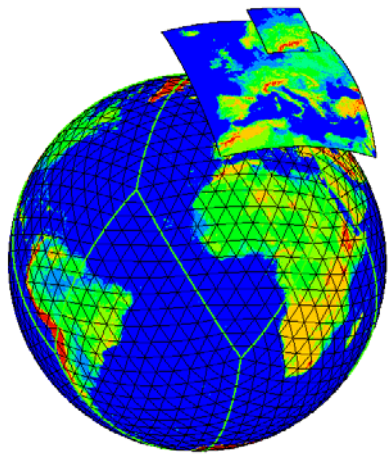
Consolidation of software for the generation of External Parameters and extension with new raw data sets

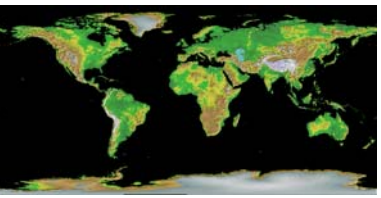
Hermann Asensio



Outline

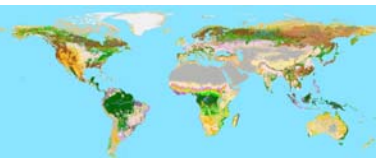
- current status of software system for external parameters
- Software Requirements Specification for new software
- planned extensions

Overall description of the External Parameter System

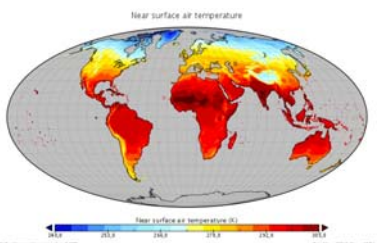


orography
GLOBE

soil data
DSMW

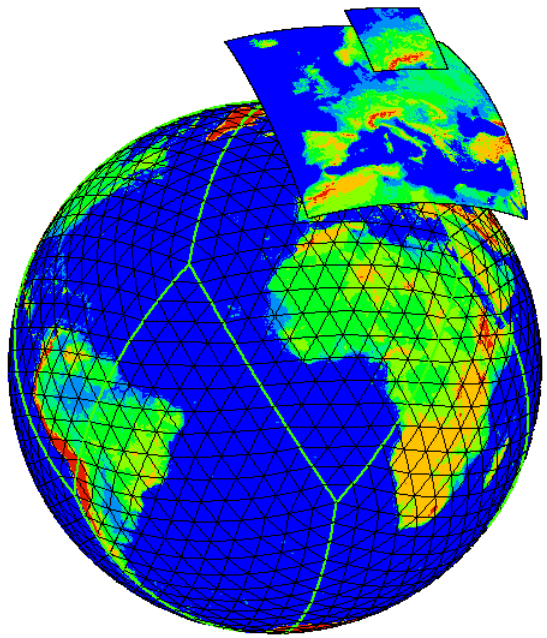


land use
GLC2000

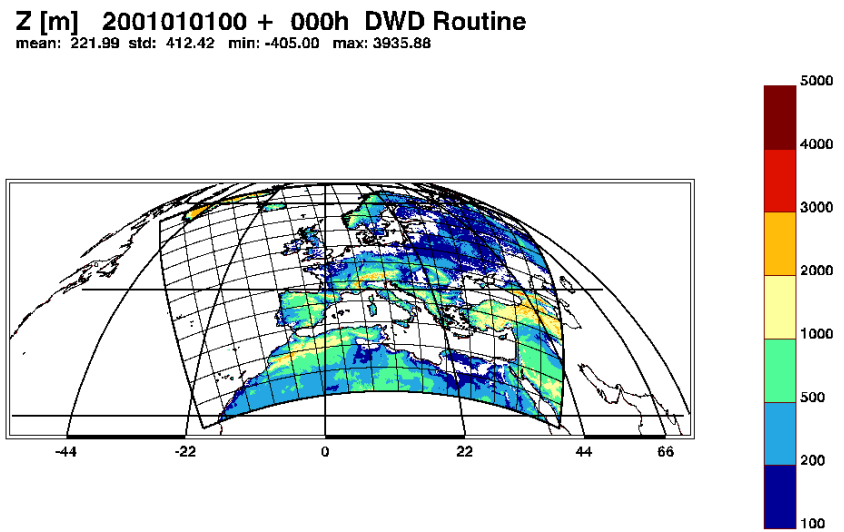


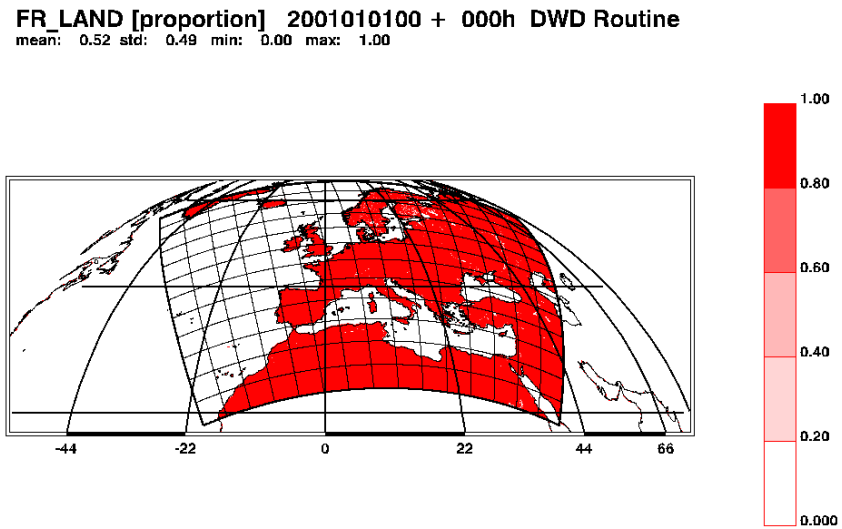
temperature
climatology
CRU

external
parameters
on
target
grid

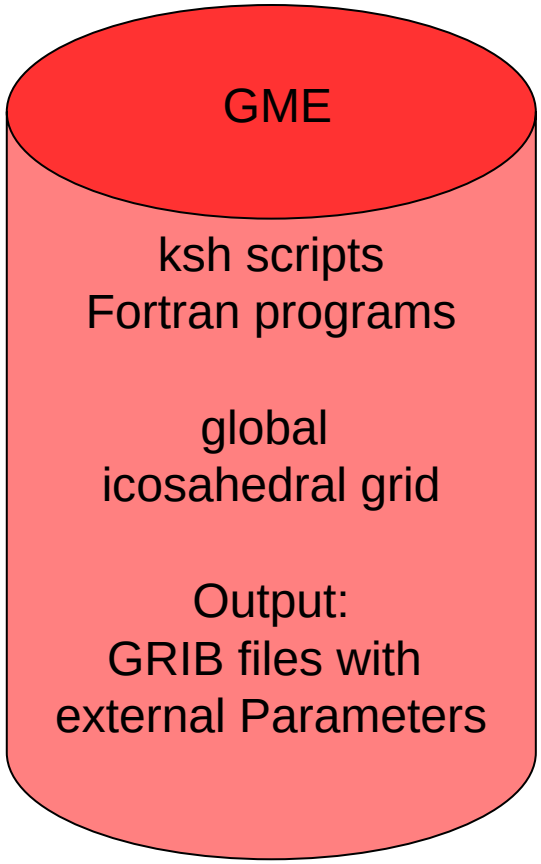


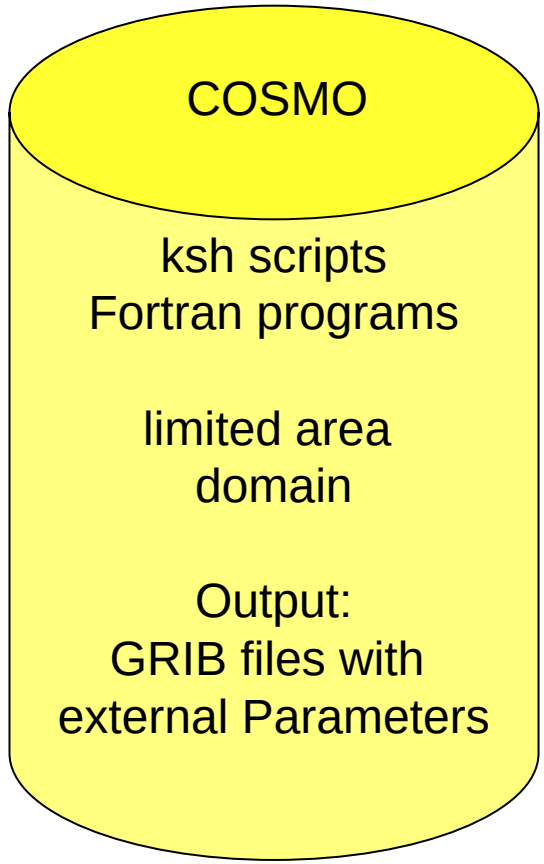
Examples for external parameters: surface geometrical height [m] and fraction of land cover (land-sea mask)



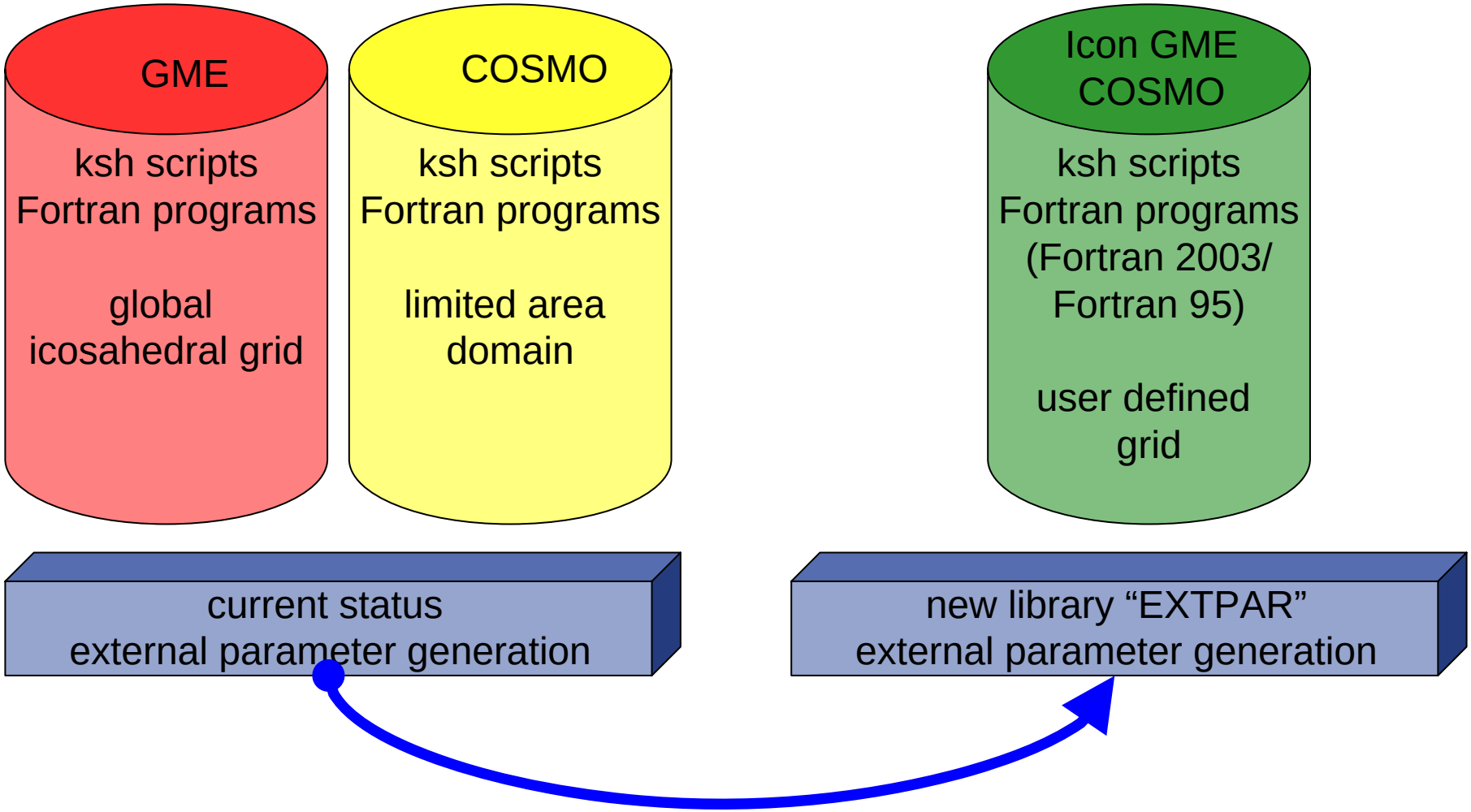


Current status of software system for external parameters





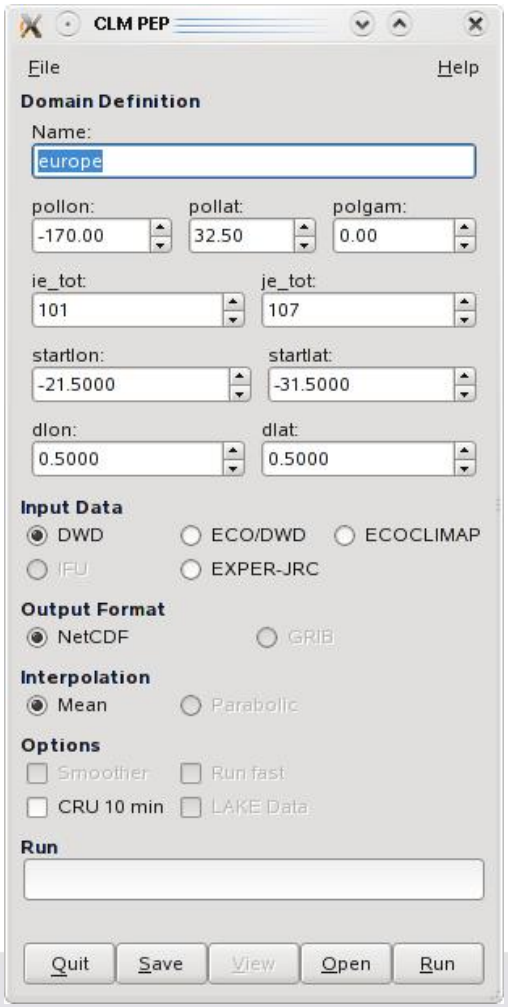
➔ Both systems use the same raw data sets.


GME
ksh scripts
Fortran programs
global
icosahedral grid
COSMO
ksh scripts
Fortran programs
limited area
domain
Icon GME
COSMO
ksh scripts
Fortran programs
(Fortran 2003/
Fortran 95)
user defined
grid
current status
external parameter generation
new library “EXTPAR”
external parameter generation

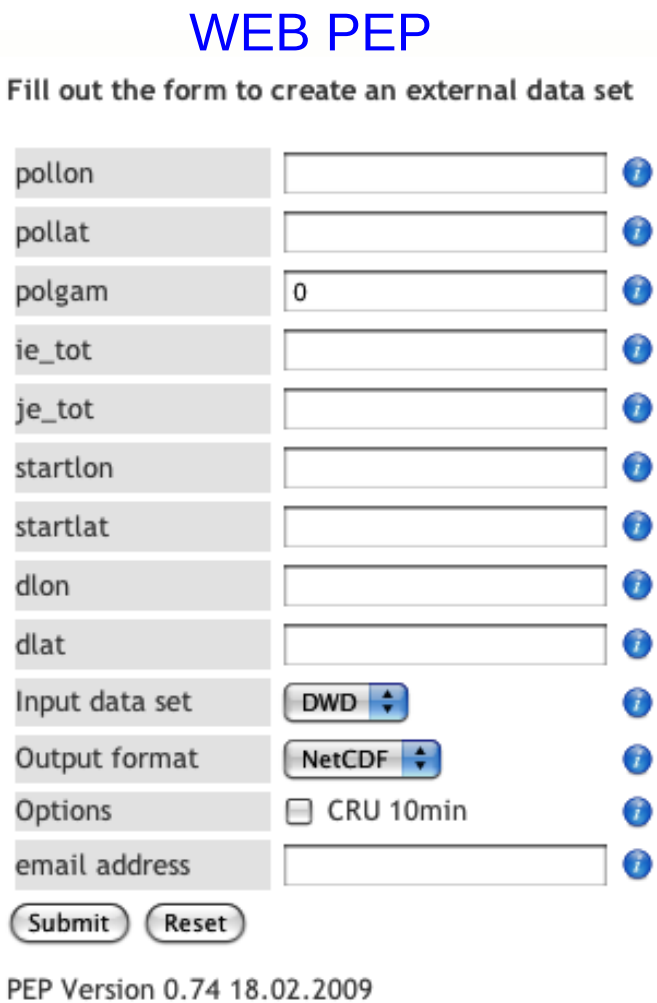
EXTPAR and PEP

Usage of PEP

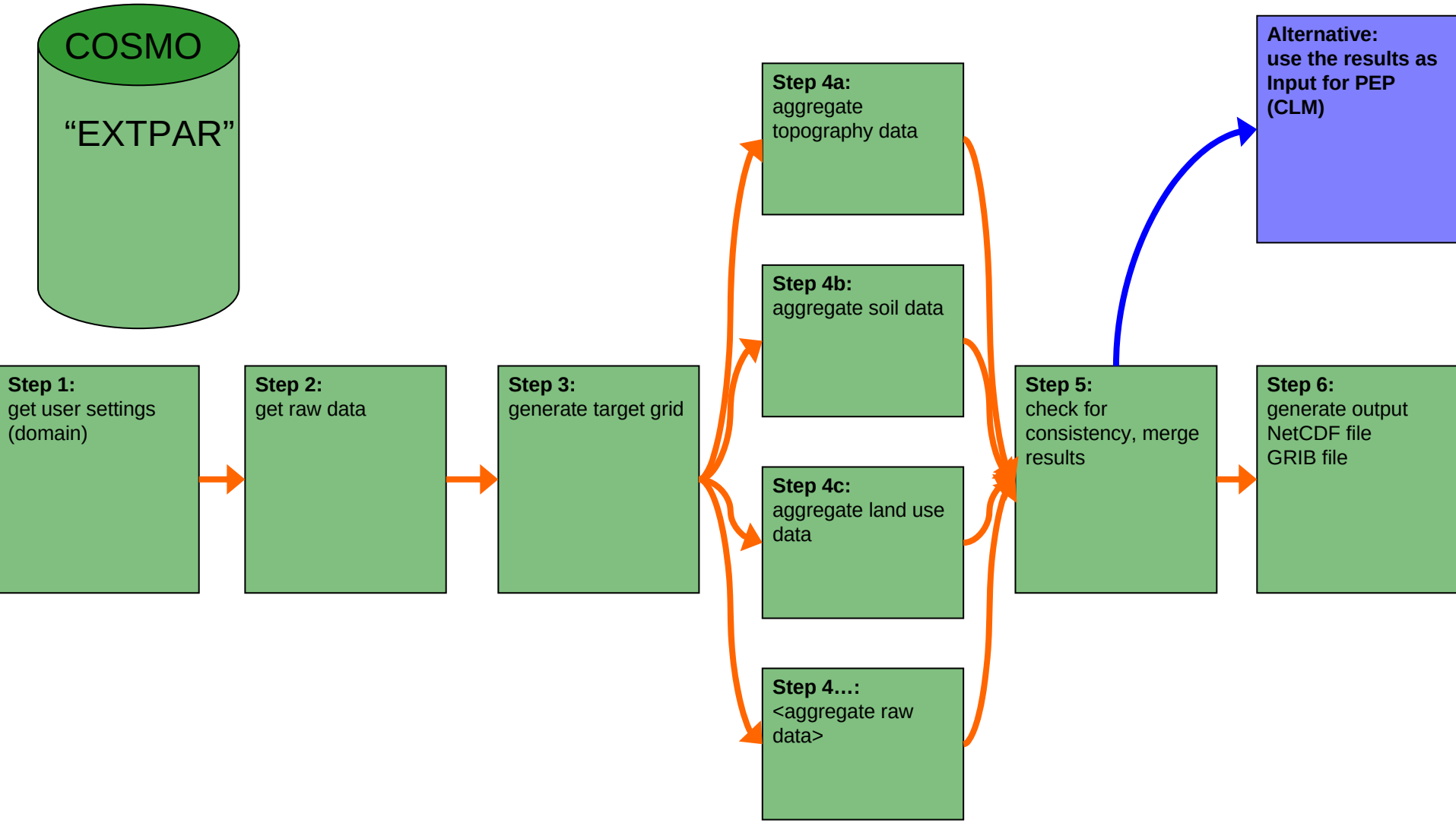
GUI Version



WEB PEP



System for generation of external parameters



Software Requirements Specifications for EXTPAR

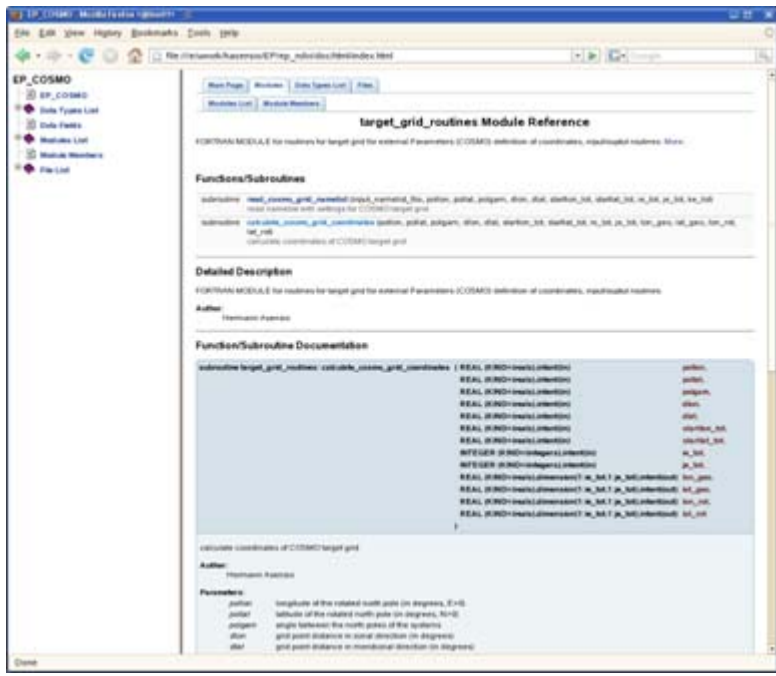
user requirements:

- support of variable domains (including poles) on the earth
- the output data should contain information on the processing software and input raw data (reproducibility)
- the EXTPAR software system should be run from a shell
- addition of further external parameter fields should be feasible

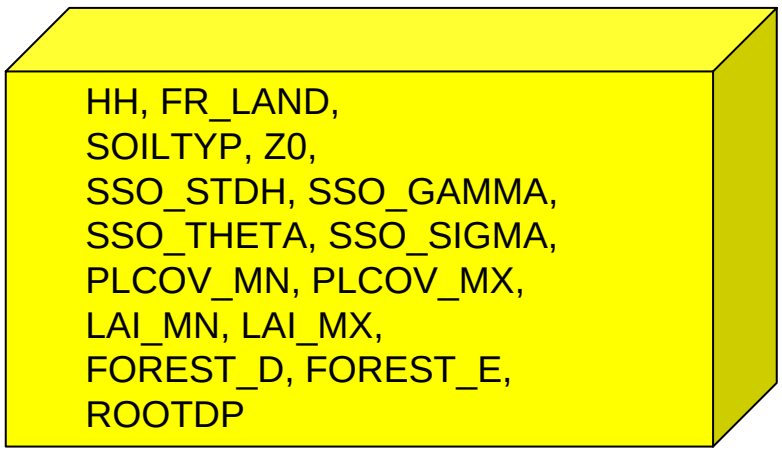
Software Requirements Specifications

technical requirements:

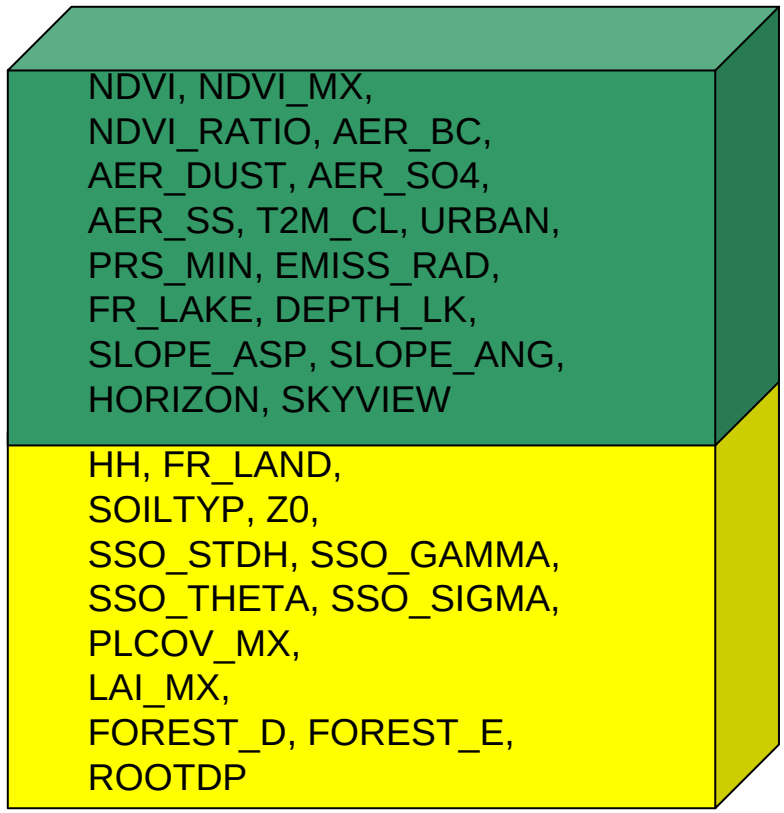
- ➔ NetCDF as basic file format for Input/Output
- ➔ source code in Fortran 2003 / Fortran 95 Standard
- ➔ technical documentation with doxygen (HTML and/or Latex style documentation generated with the help of “tags” from comments in the Fortran source code)



Additional external parameters

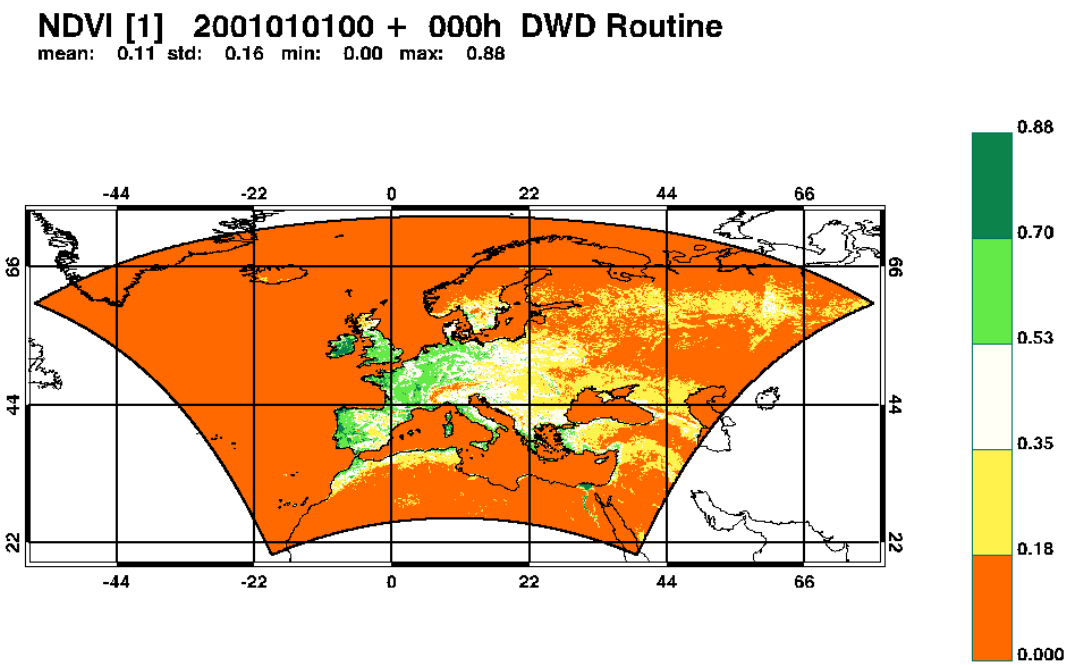


➔ Current external parameter fields for the COSMO model, total 15 fields

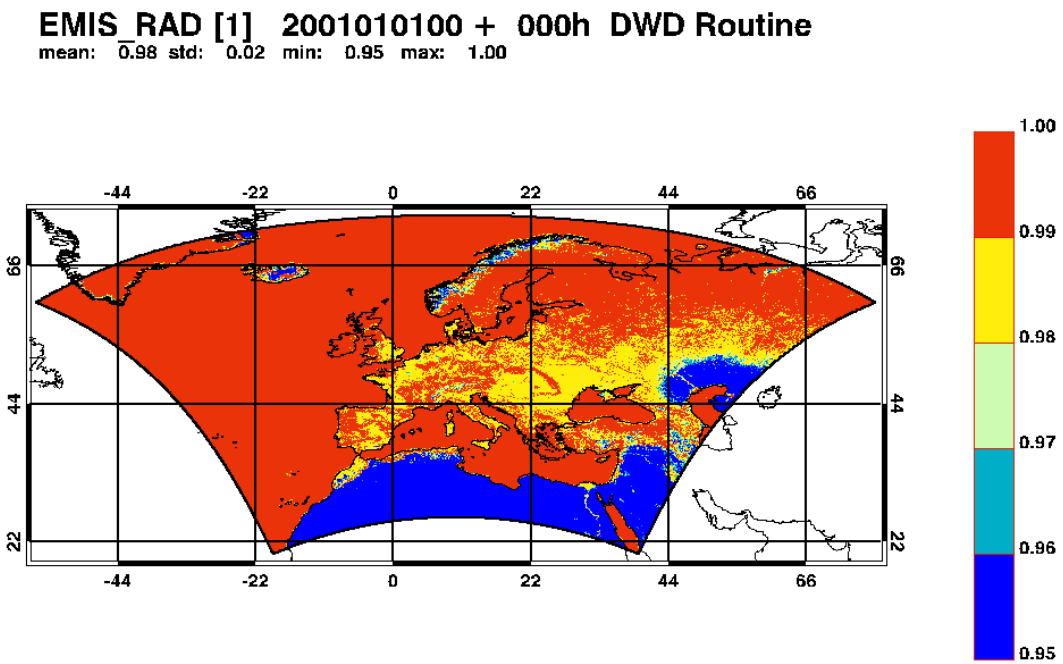


➔ planned extensions for the COSMO model, total 30 fields

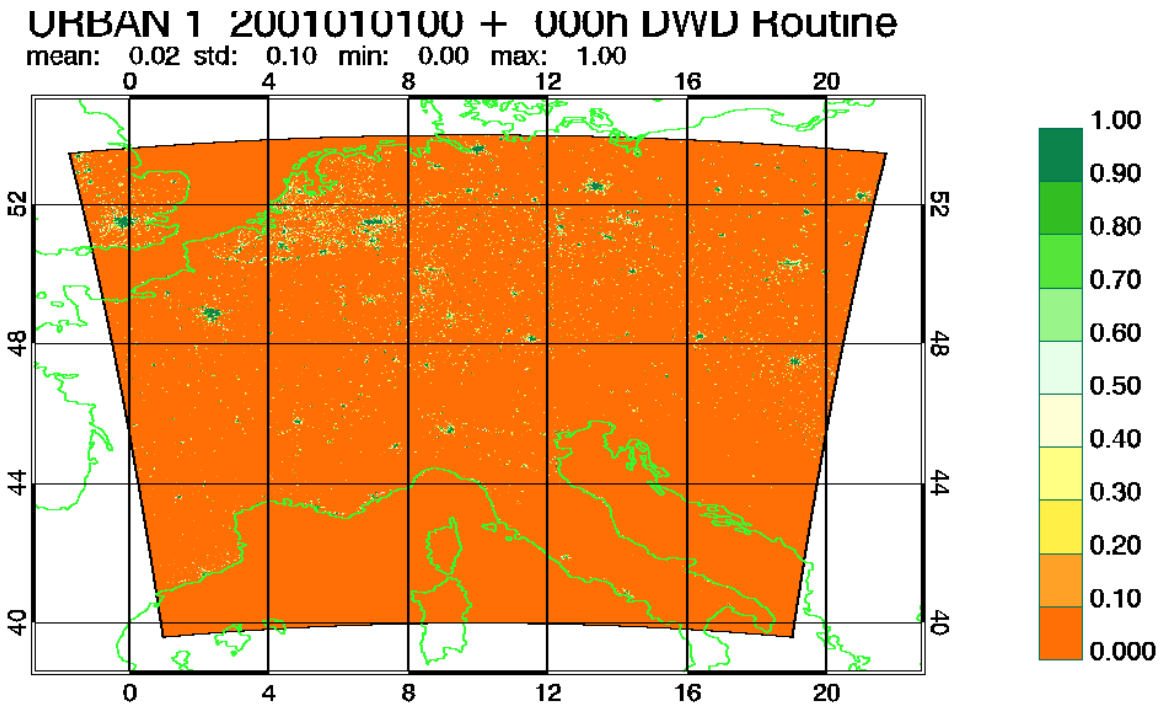
Additional external parameters
Normalized Differential Vegetation Index (NDVI)
(seasonal cycle)



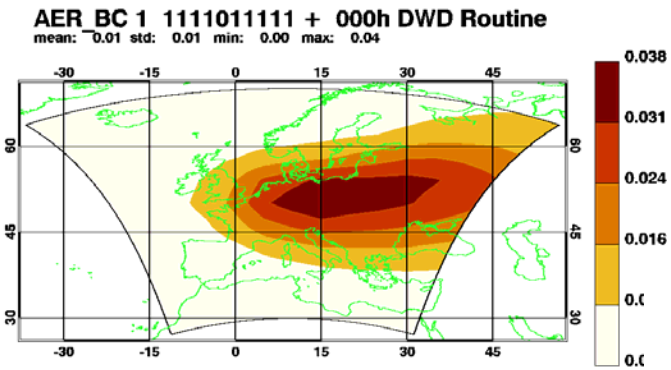
Additional external parameters longwave surface emissivity

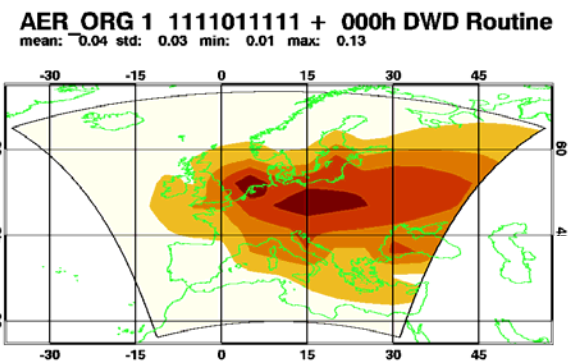


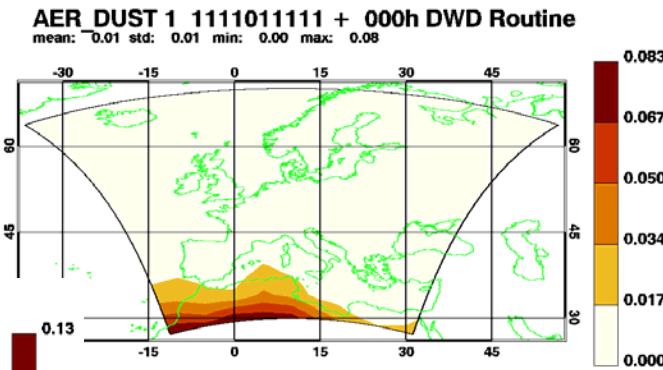
Additional external parameters urban fraction

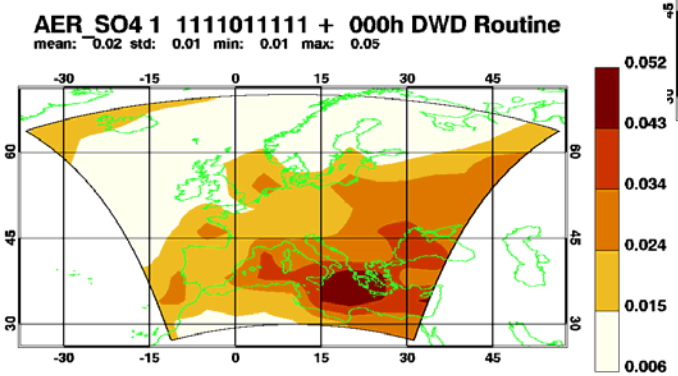


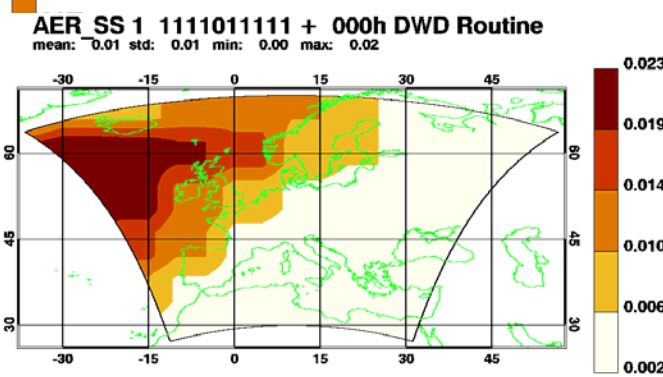
Additional external parameters
aerosol optical thickness (seasonal cycle)



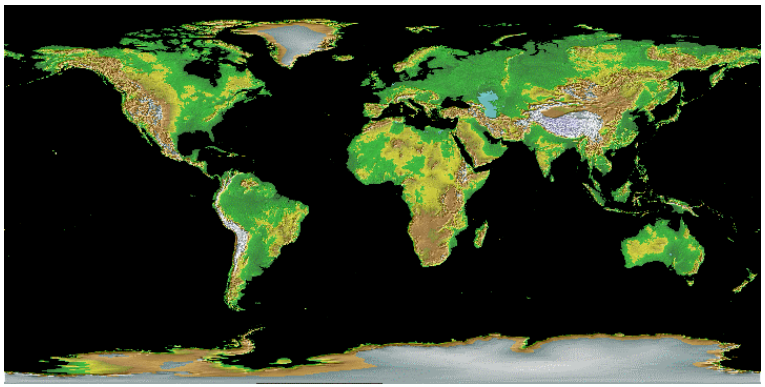




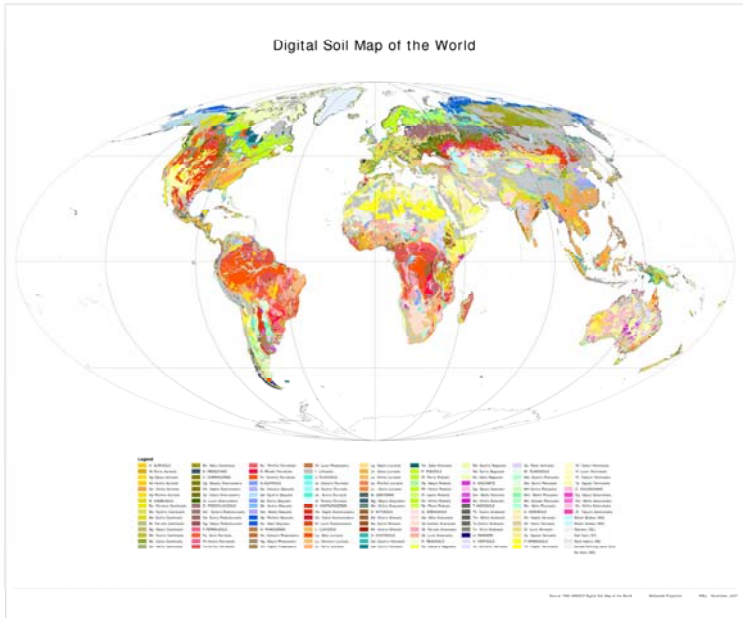




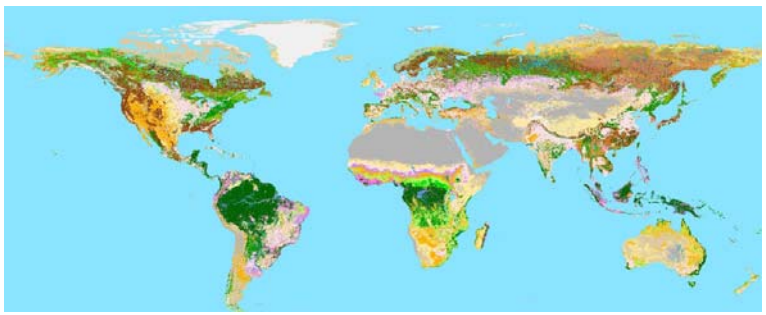
Currently used raw data for external parameters



orography
GLOBE



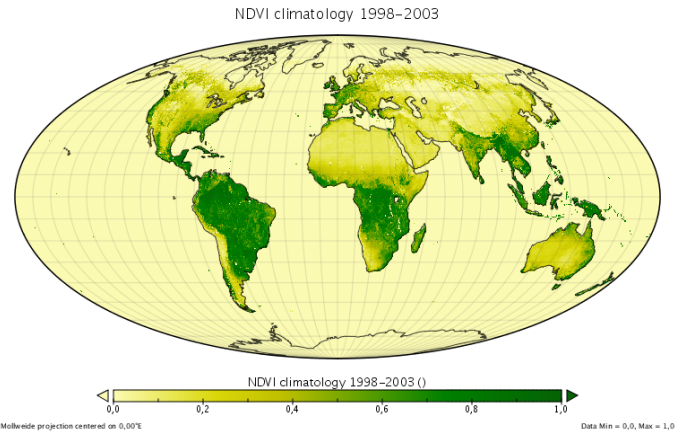
soil data
DSMW

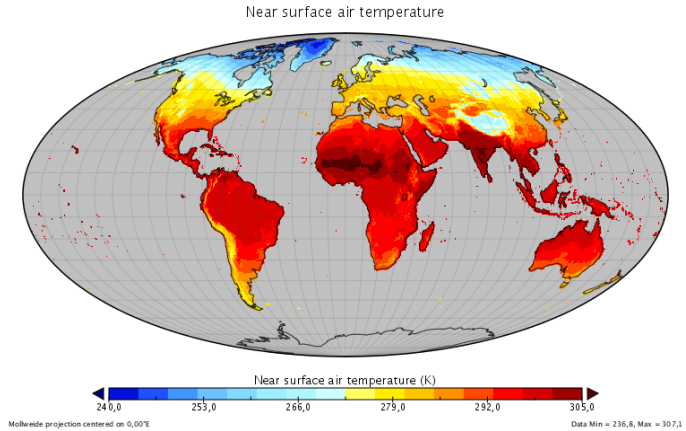


land use
GLC2000

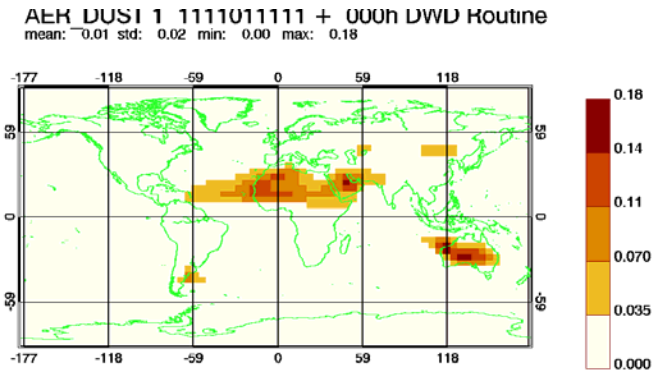
Raw data for external parameters

additional raw data sets





NDVI (SEAWiFS)



climatology of near surface temperature (CRU)

Aerosol climatology

(NASA/GISS, Global Aerosol Climatology Project, Ina Tegen)

planned extensions/ outlook

further topics/ open questions:

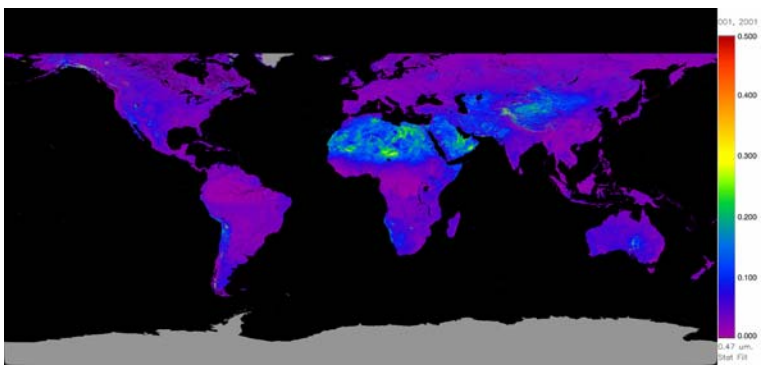
- ➔ more alternative sources of raw data
- ➔ fraction lake and lake depth
- ➔ area fraction in target grid element of each land use class
- ➔ filtering of orography (low-pass filter 2 dx)

technical issues:

- ➔ Input/output file format (netcdf, GRIB2)
- ➔ source code management (version control system etc.) and distribution

Additional/Alternative raw dataset

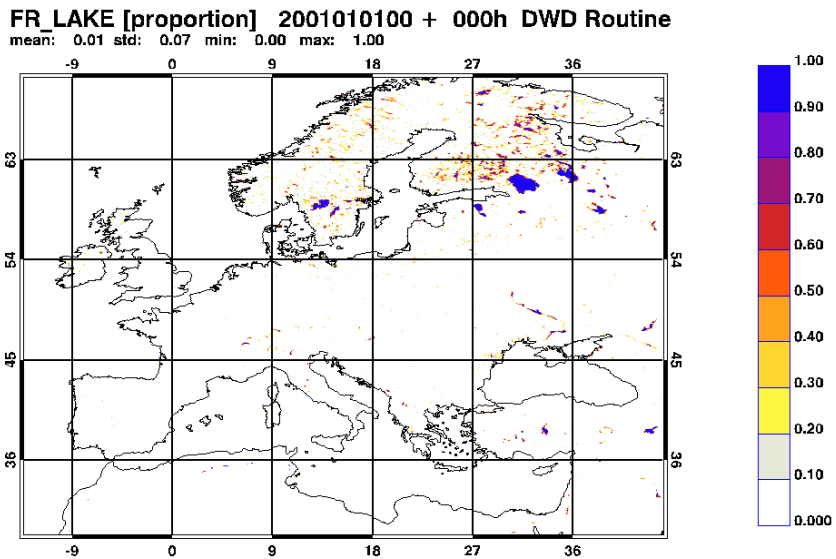
- Modis data for background albedo (?)
- Harmonized World Soil Database; BUEK1000 (Germany only)
- lake database (DWD); gridded dataset for lake depth from E. Kourzeneva
- (Very) high resolution orography data (SRTM, ASTER)
- Globcover for land use (?)

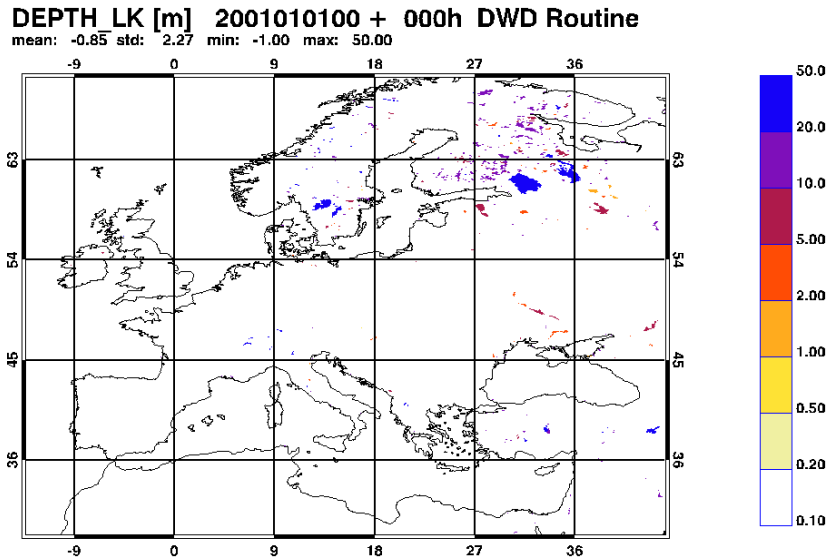


further external parameter fields

- Fraction Lake FR_LAKE
- Lake Depth DEPTH_LK

(currently available only for COSMO-EU)





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Thank you for your attention!