

The COSMO-CLM Preprocessor PEP

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I. Preprocessor PEP

- Available options
- Operation of PEP
- Outlook

II. Geodata Input

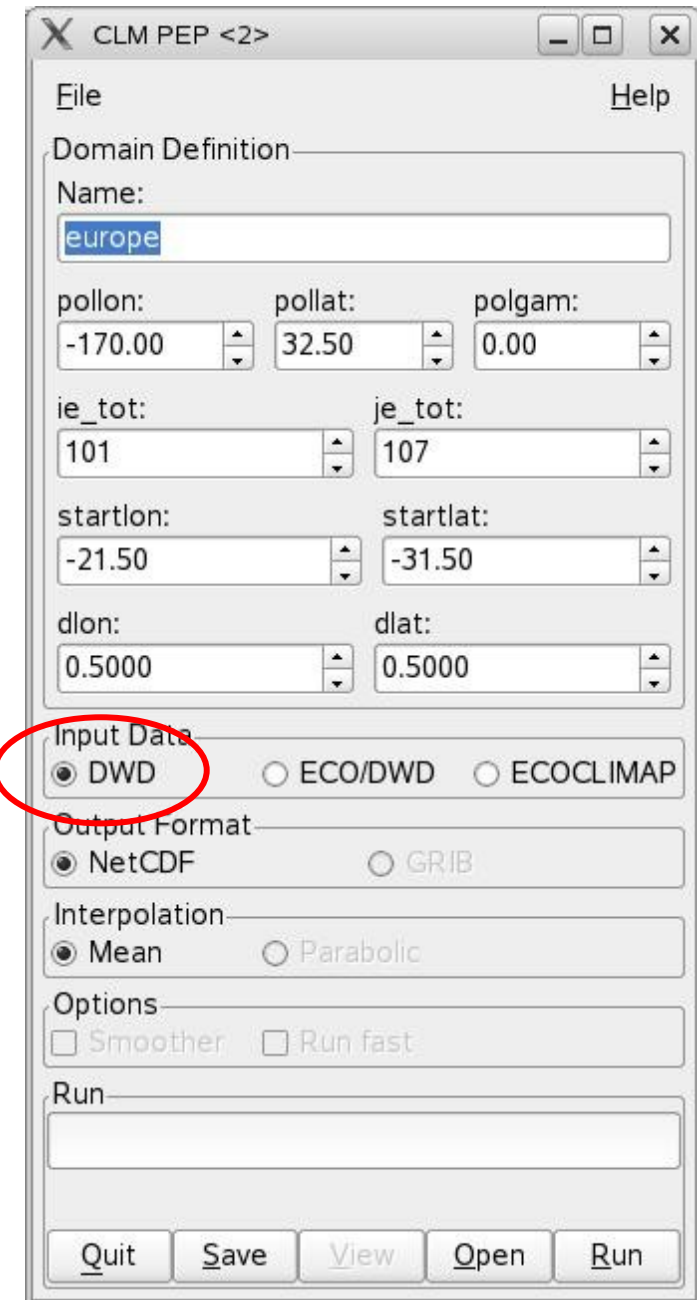
- Vegetation data
- Soil data
- Other

Preprocessor PEP Version 0.5

Provision of time invariant boundary data:
Topography, vegetation, soils and others

- Option DWD (operational):
- Option ECO/DWD
 - monthly resolution of the vegetation parameters + FAO/DWD Soil
- Option ECOCLIMAP
 - Monthly resolution + FAO/STASGO Soil

Requirements: Fortran Compiler,
NetCDF library, Perl, Perl-NetCDF,
PerlGTK2



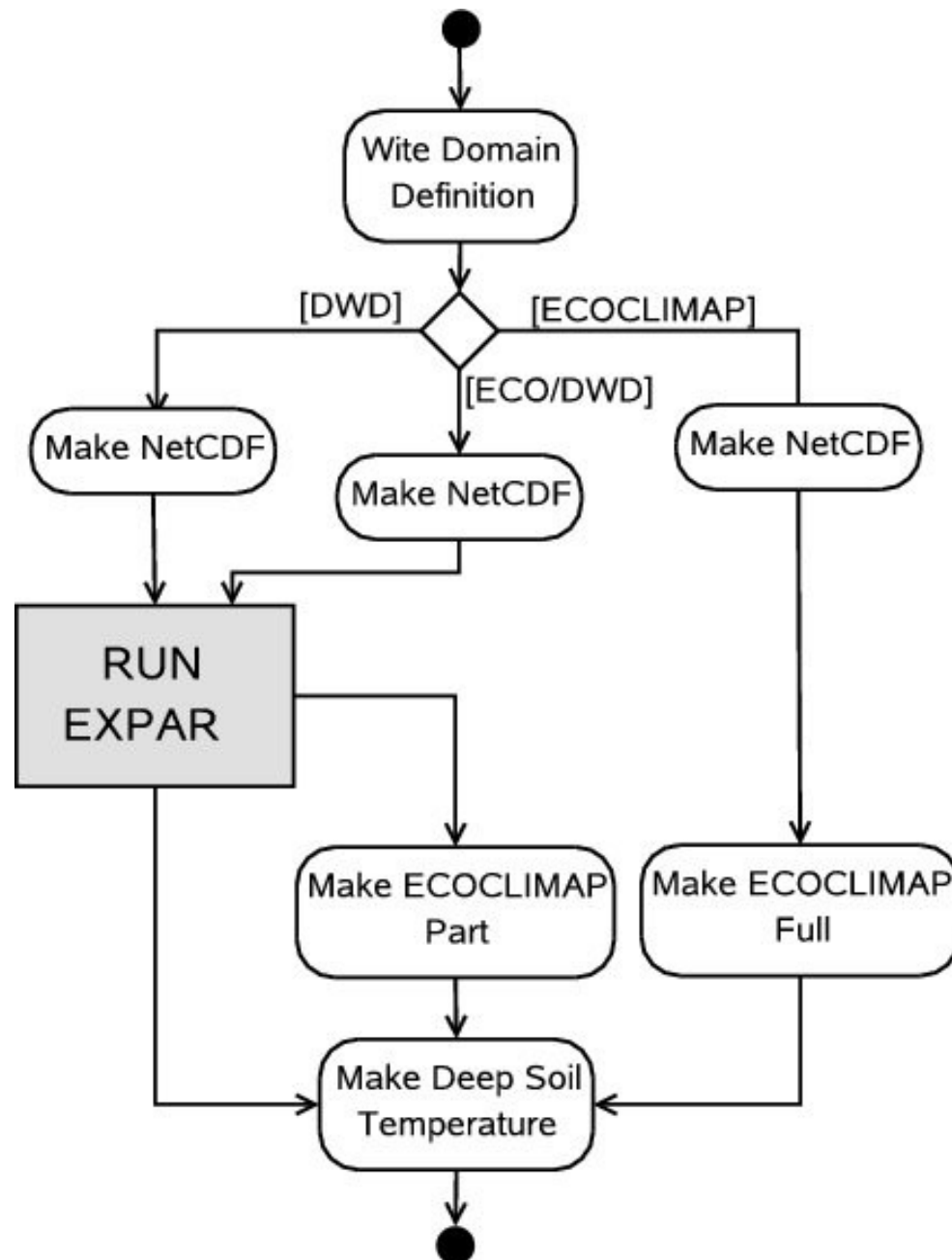
The screenshot shows the CLM PEP <2> GUI with the following settings:

- Domain Definition: Name: europe
- pollon: -170.00, pollat: 32.50, polgam: 0.00
- ie_tot: 101, je_tot: 107
- startlon: -21.50, startlat: -31.50
- dlon: 0.5000, dlat: 0.5000
- Input Data: DWD, ECO/DWD, ECOCLIMAP
- Output Format: NetCDF, GRIB
- Interpolation: Mean, Parabolic
- Options: Smoother, Run fast
- Run: [Empty field]

Buttons at the bottom: Quit, Save, View, Open, Run

IN DWD Option Makefiles for

- PGF90
- GNU Fortran (Intel, AMD)
- GNU Fortran /Mac



Available parameter data

Variable	Description	Unit	DWD	Option DWD/ ECOCLIMAP	ECO- CLIMAP
HSURF	Surface height	m	●	●	●
Z0	Surface roughness length	m	●		
Z0_VEG	Surface roughness length due to vegetation	m	○		
Z012	Monthly Surface roughness length	m		●	●
Z012_VEG	Monthly surface roughness length due to vegetation	m		●	●
LAI_MX	Leaf Area Index vegetation period		●		
LAI_MN	Leaf Area Index resting period		●		
LAI12	Leaf Area Index monthly values			●	●
LANDUSE	Land use category		○	●	●
FR_LAND	Land-sea fraction		●	●	●
FR_DECI	Fraction deciduous forest		●	●	●
FR_EVER	Fraction evergreen forest		●	●	●
FR_LAKE	Lake area fraction		○	●	●
PLCOV_MX	Vegetation area fraction vegetation period		●		
PLCOV_MN	Vegetation area fraction resting period		●		
PLCOV12	Monthly vegetation area fraction			●	●
ROOTDP	Root depth	m	●	●	●
SOILTYP	Soil texture		●	●	
SOILTYP	Soil texture 0 -30 cm				●
SOILTYP	Soil texture 30 -100cm				●
T_CL	Deep soil temperature	K	●	●	●
ALBEDO	Surface albedo			○	○
DEPTH_LK	Lake depth	m	○	○	○

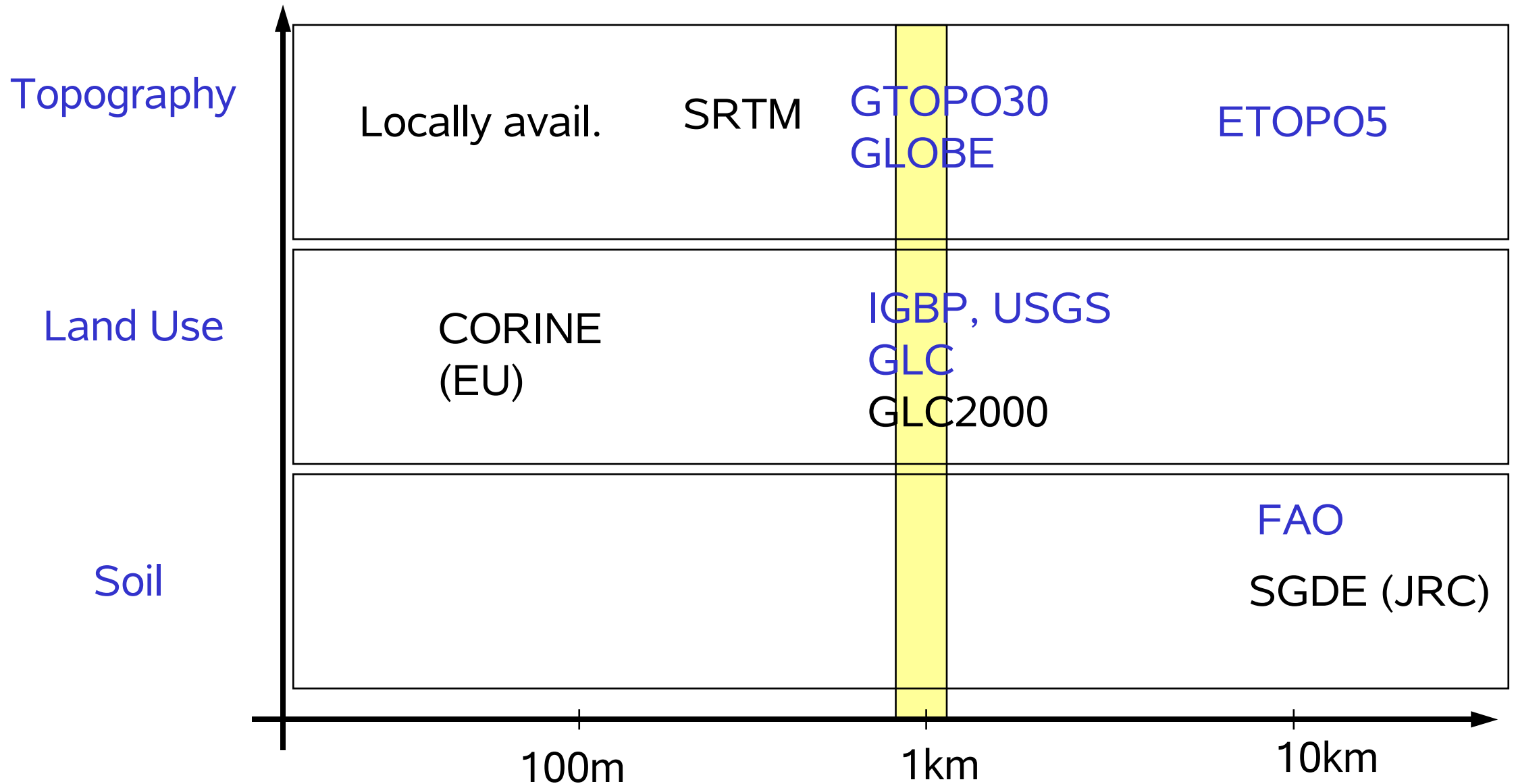
System parameter data in COSMO-CLM

Parameter	Source	Status
Topography	GTOPO30 GLOBE	Very good
Land use	GLC2000 ECOCLIMAP	good
Soil Texture	FAO, STATSGO/FAO	poor
Lake-Parameter	-	No data yet
Deep Soil Temperature	CRU	Rather poor

To do

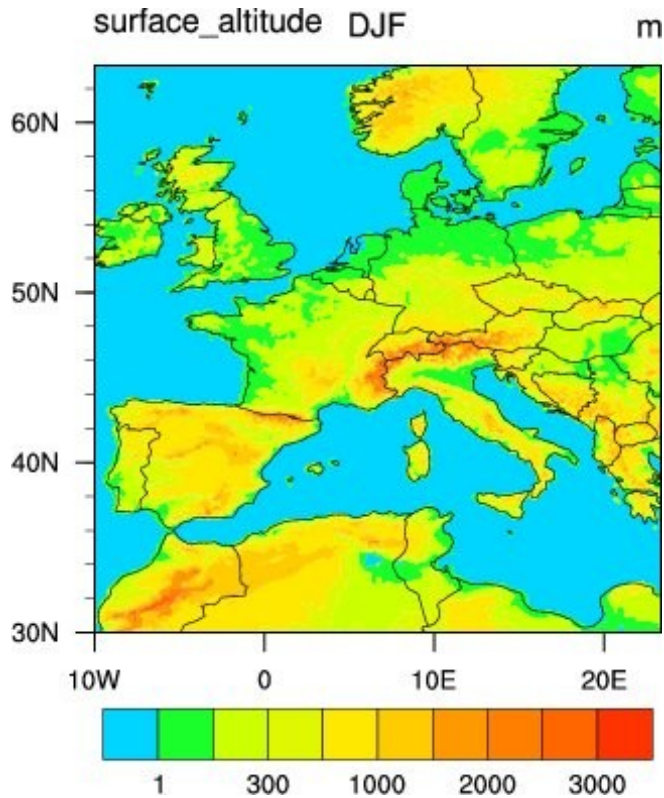
- Make look-up table for albedo
- Improve the parameter upscaling
- Make world coverage for ECOCLIMAP
- Extend the soil data
- Unify topography to GLOBE data
- Verify all look-up tables
- Provide `--no_gui` Version of PEP
- Speed up the data calculation
- Provide data on lakes

Spatial resolution of the input data

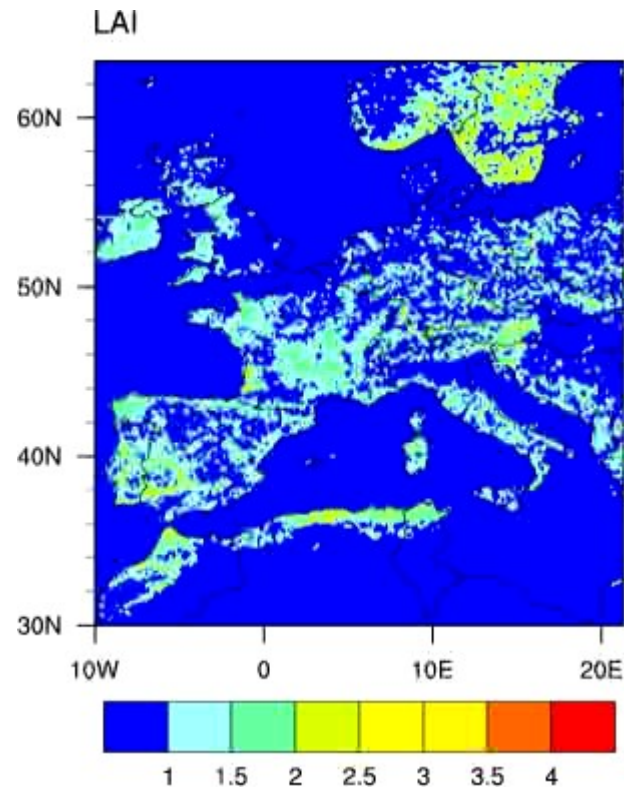


Example of the system parameters

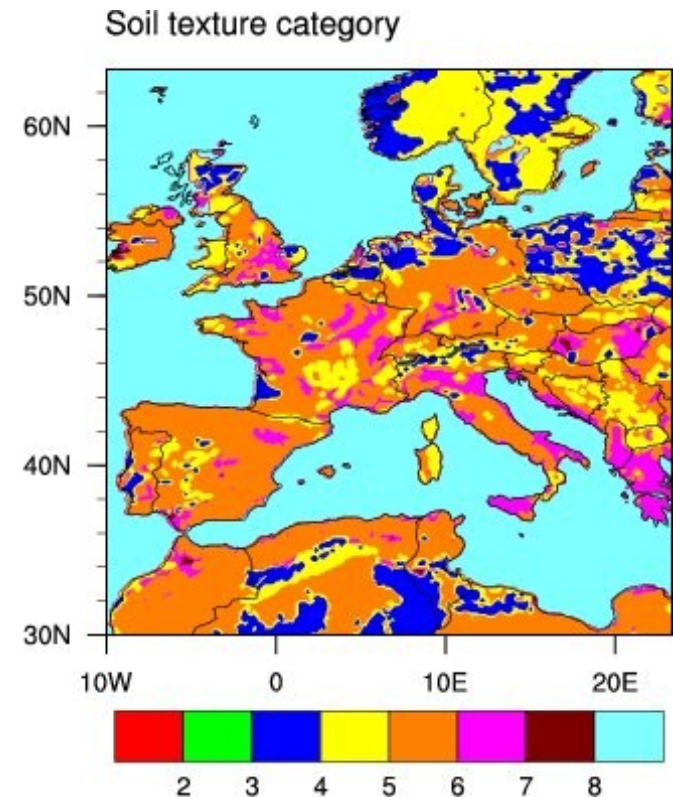
Topography



Leaf Area Index



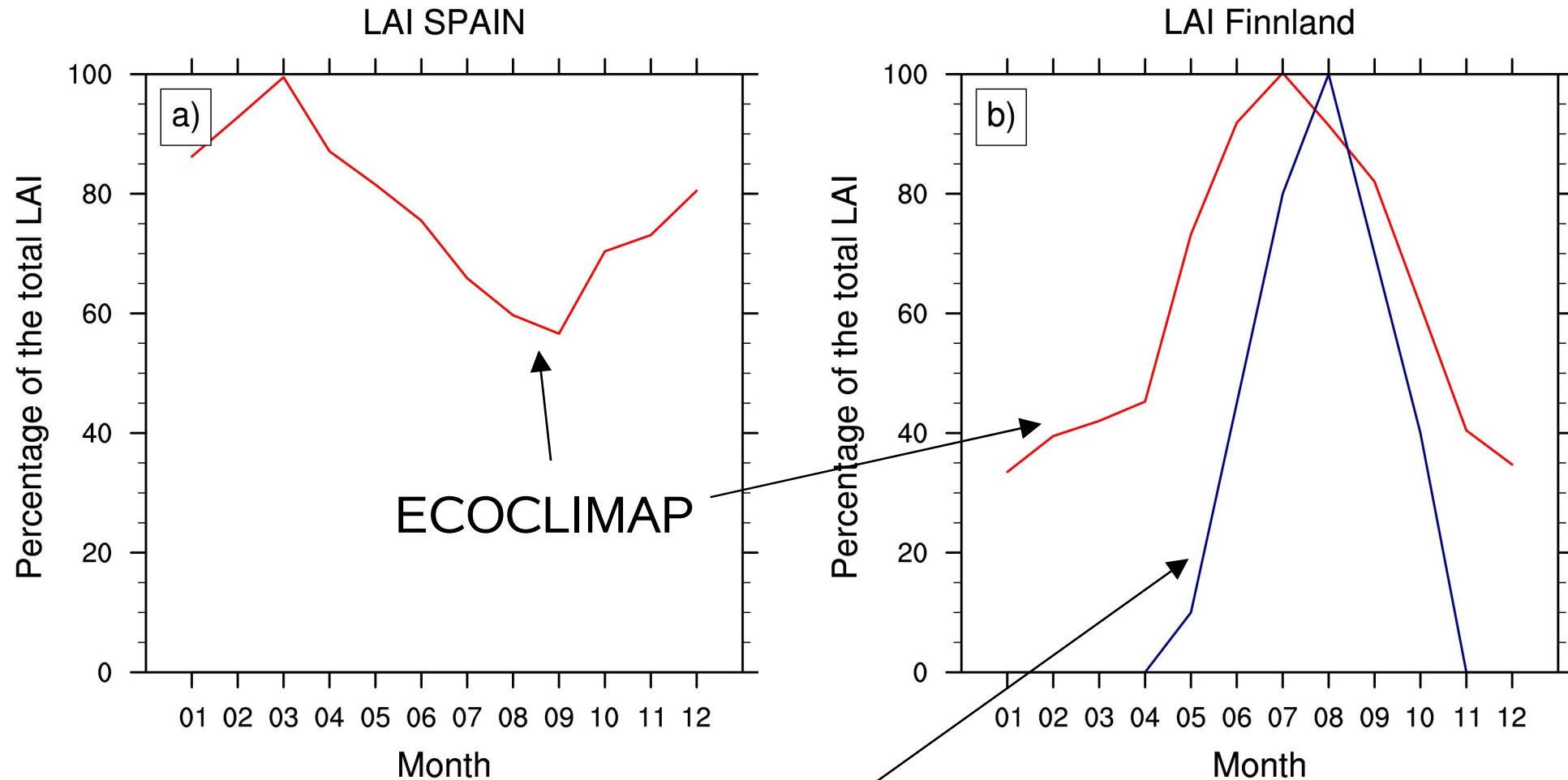
Soil Texture



Example: $dx : 1667^\circ \times 0.1667^\circ$

Vegetation parameter: LAI

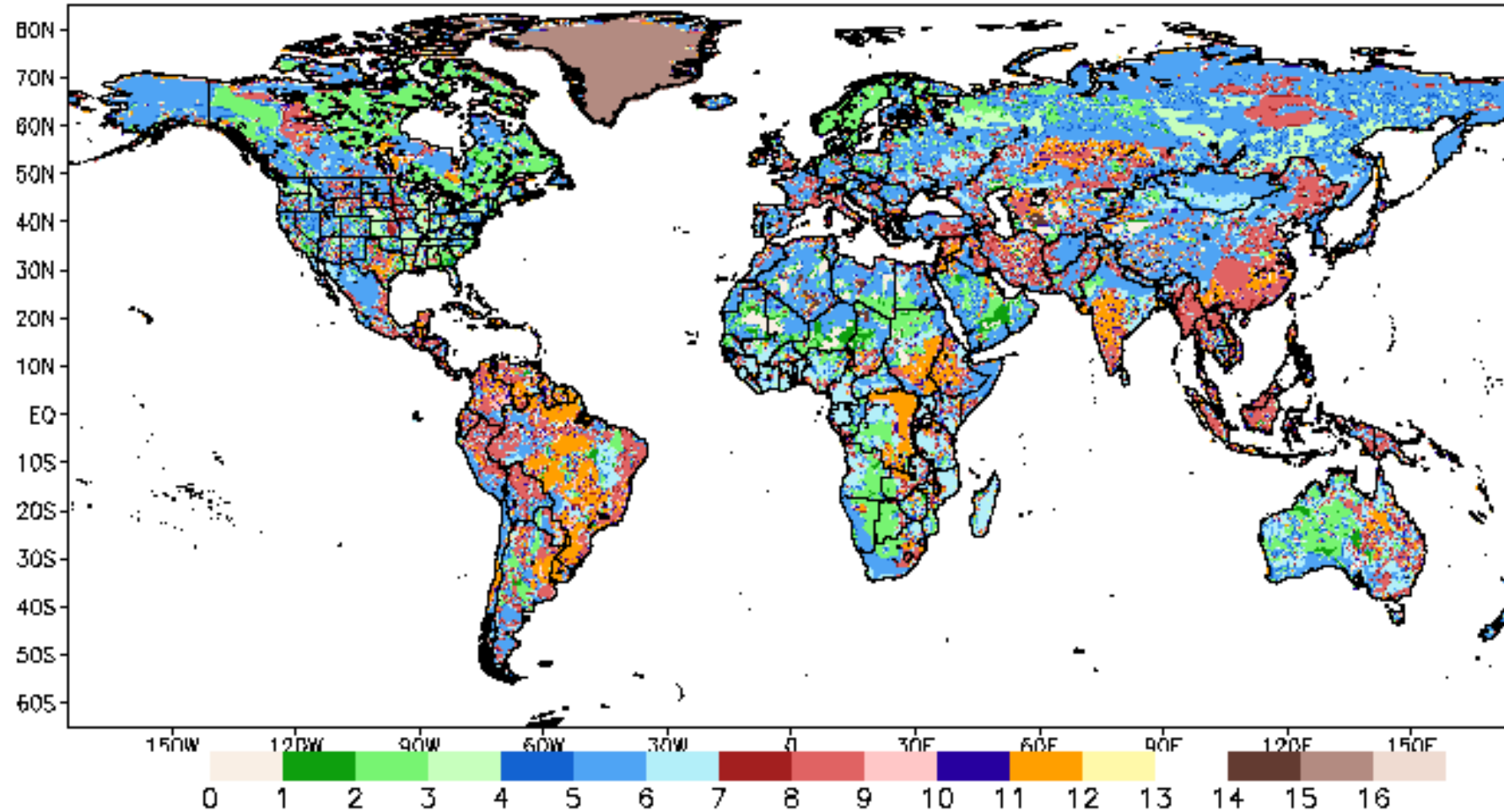
(Fraction of deciduous forest > 0.5)



Kellomäki et al. 2001

Two Layer Soil data

Hybrid FAO/STATSGO Soil Type (0–30 cm depth)



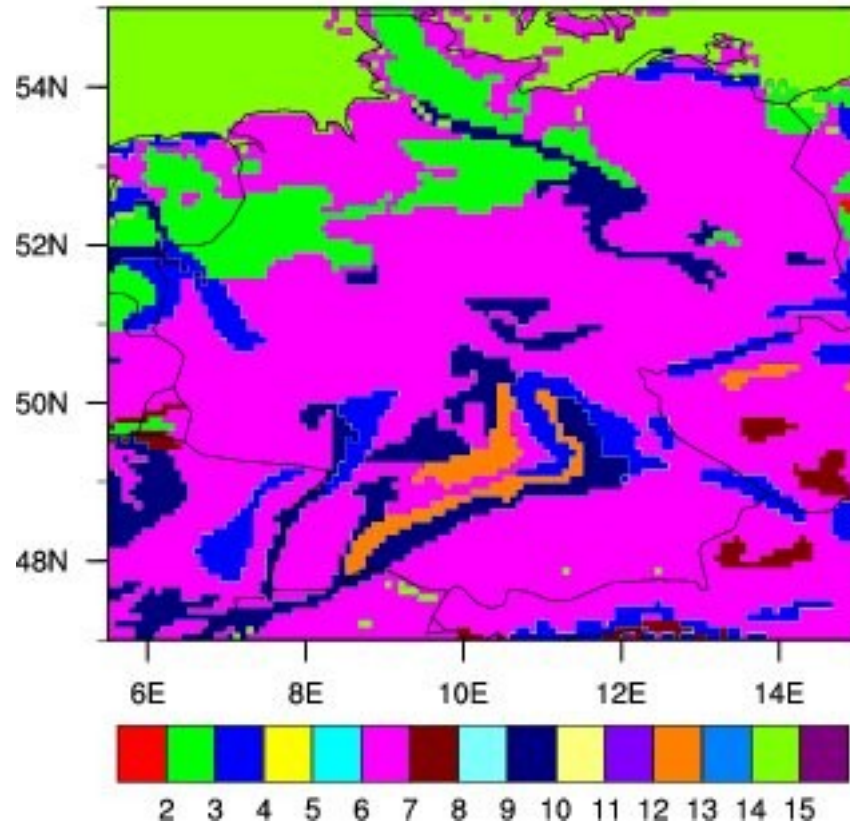
- | | | |
|-----------------------|--------------------|---------------|
| 1: SAND | 2: LOAMY SAND | 3: SANDY LOAM |
| 4: SILT LOAM | 5: SILT | 6: LOAM |
| 7: SANDY CLAY LOAM | 8: SILTY CLAY LOAM | 9: CLAY LOAM |
| 10: SANDY CLAY | 11: SILTY CLAY | 12: CLAY |
| 13: ORGANIC MATERIALS | 14: WATER | 15: BEDROCK |
| 16: other | | |

FAO/STATGO soil data

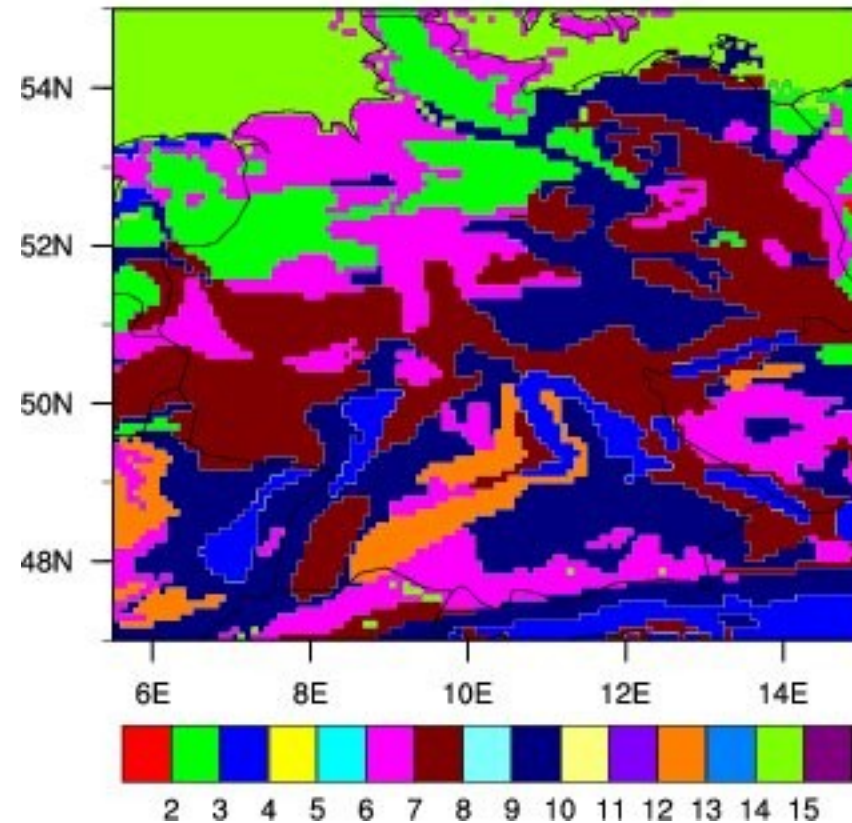
0 - 30cm depth

30 -100 cm depth

Soil texture category



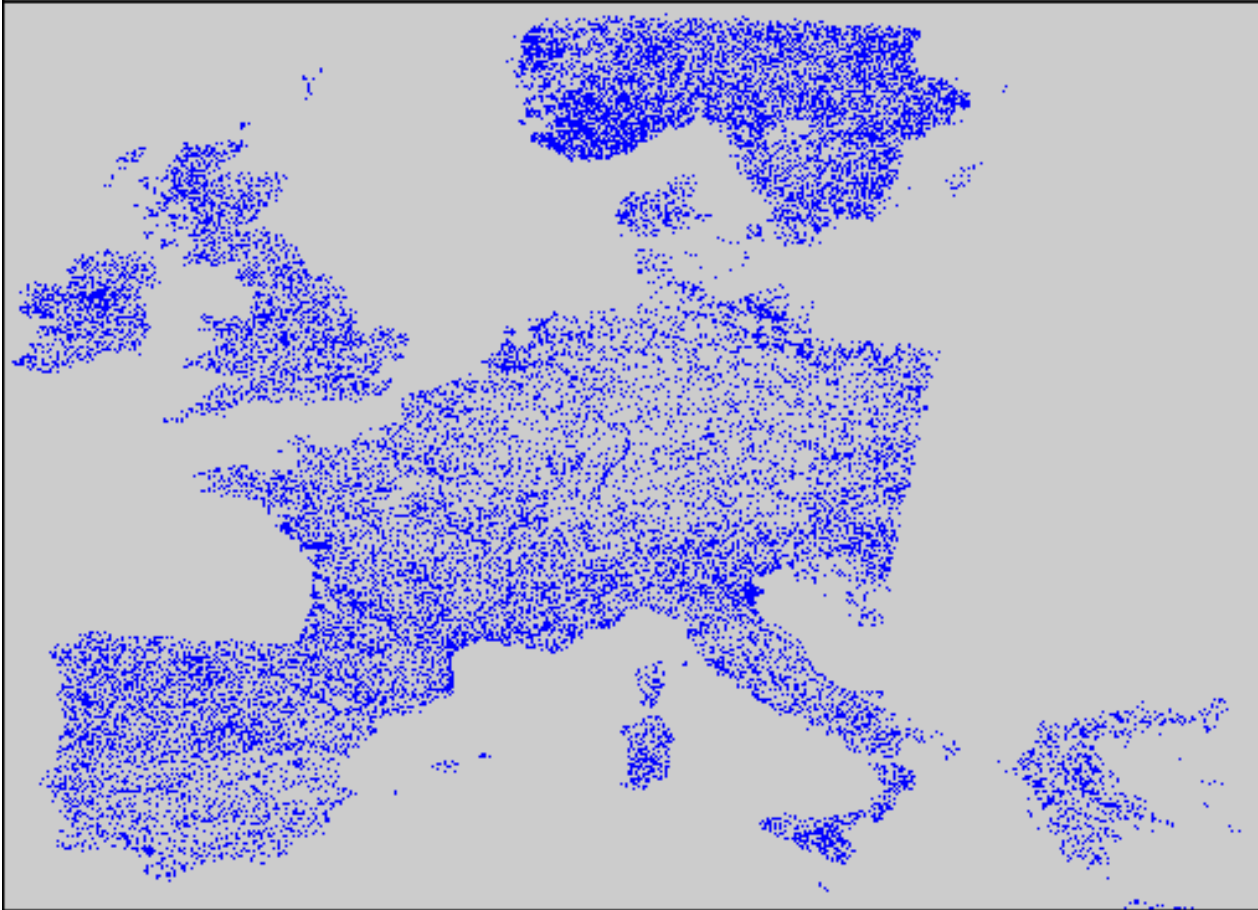
Soil texture category



- Data in resolution of 30 x 30 arc seconds (resampled from 5 x 4 arc minutes)
- Will be extended step by step as new data become available
- Possible data sources:
 - JRC soil (at the current stage only 10 km by 10 km data available)
 - Local authorities (in Germany already in contact)

Model	Required data
Lake-Model	location Lake depth Typical winds Optical parameters Sediment temperature

Water Patterns and Lake Boundaries of the European Community



PROJECTION: Geographic
SOURCE: STATISTICAL OFFICE OF THE EUROPEAN COMMUNITIES
(EUROSTAT; LUX.)

- 500 000 natural Lakes
- 16 000 Area $> 1 \text{ km}^2$
- 24 Area $> 400 \text{ km}^2$

EEA Waterbase - Lakes

- Topography and vegetation data (Europe, USA) satisfactory
- More detailed data on soils required
- Testing and evaluation of vegetation/soil data required (here IMK-IFU will contribute)
- Review of all look-up tables (Soil and vegetation parameters could be useful)