Contributions to AEVUS at BTU Cottbus-Senftenberg

Andreas Will

COSMO GM 2019, 9. September, Roma

1. Lausitz Decision Support System Concept of Development

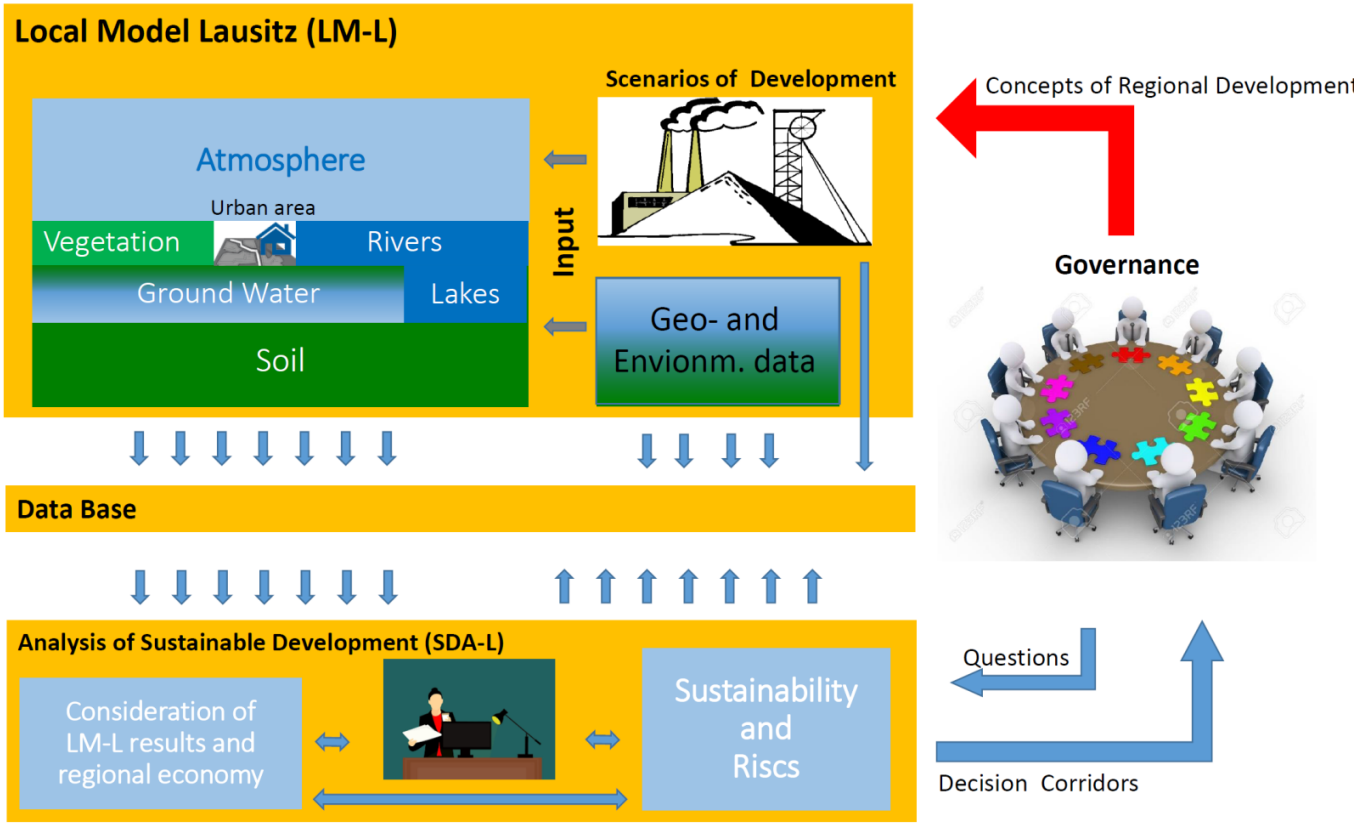
Andreas Will (BTU)

Regional Decision Support System

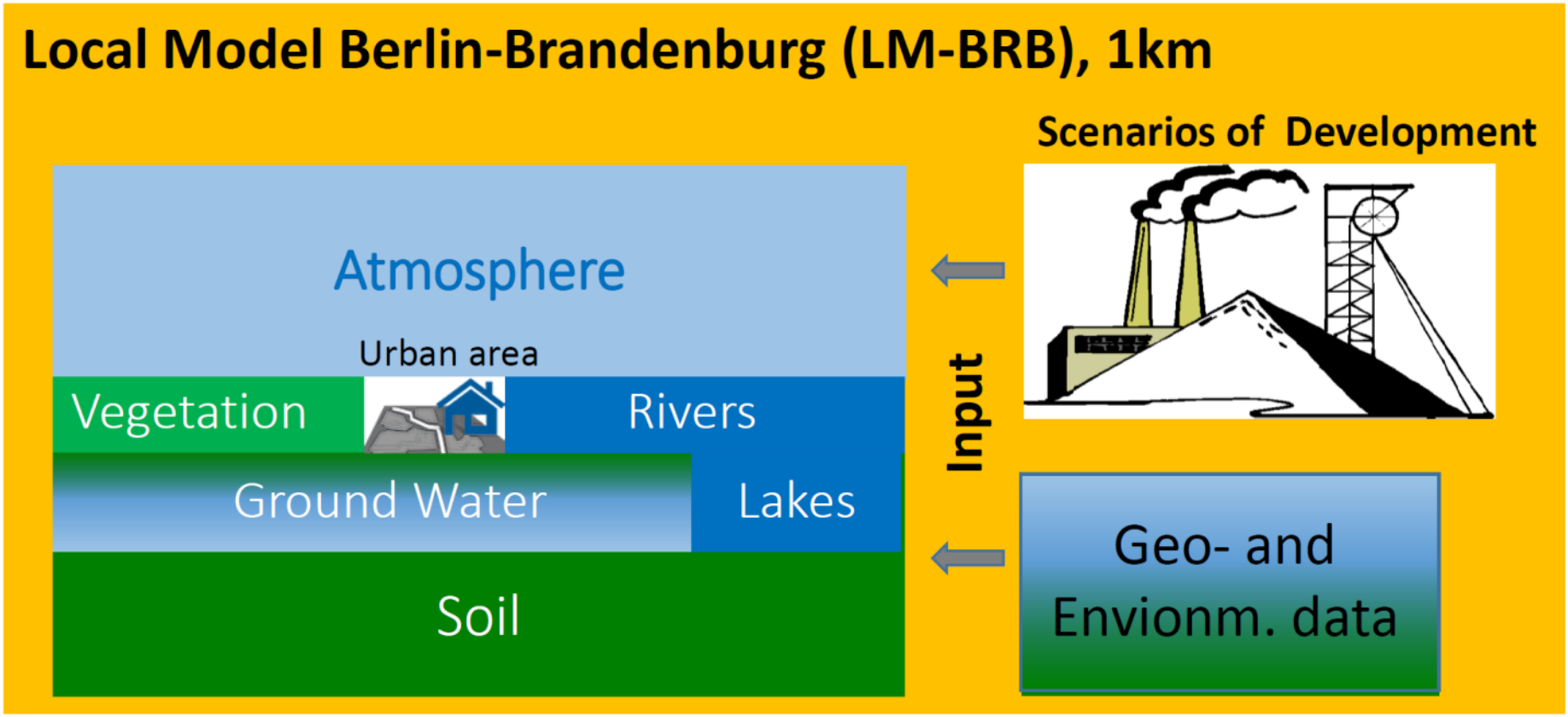
for support of transition between

open coal mining and sustainable development region

Lausitz



2. Brandenburg-Berlin Model
Concept of Development



2.2 LM BRB Cooperation partners

1. **City Modelling**
- AEVUS COSMO, TERRA-URB
- S. Schubert, HU Berlin (3D model)

2. Air Quality
- B. Vogel, COSMO-ART, KIT
- I. Kirchner, FU Berlin

3. Lake Physics and Ecology
- G. Kirillin and others, IGB Berlin

4. Soil physics and Hydrology
- BRB Agency for Geosciences and row materials

5. Non-dissipative HOS scheme
- M. Baldauf, DWD

6. Two-way coupling COSMO-COSMO
- E. Maisonnave, CERFACS, Toulouse

2.2 Aim and Challenges

In flat terrain the heterogeneity of land use is expected to be an important source of regional climate variability.

2.2.1 External parameter fields regarded as relevant in BRB

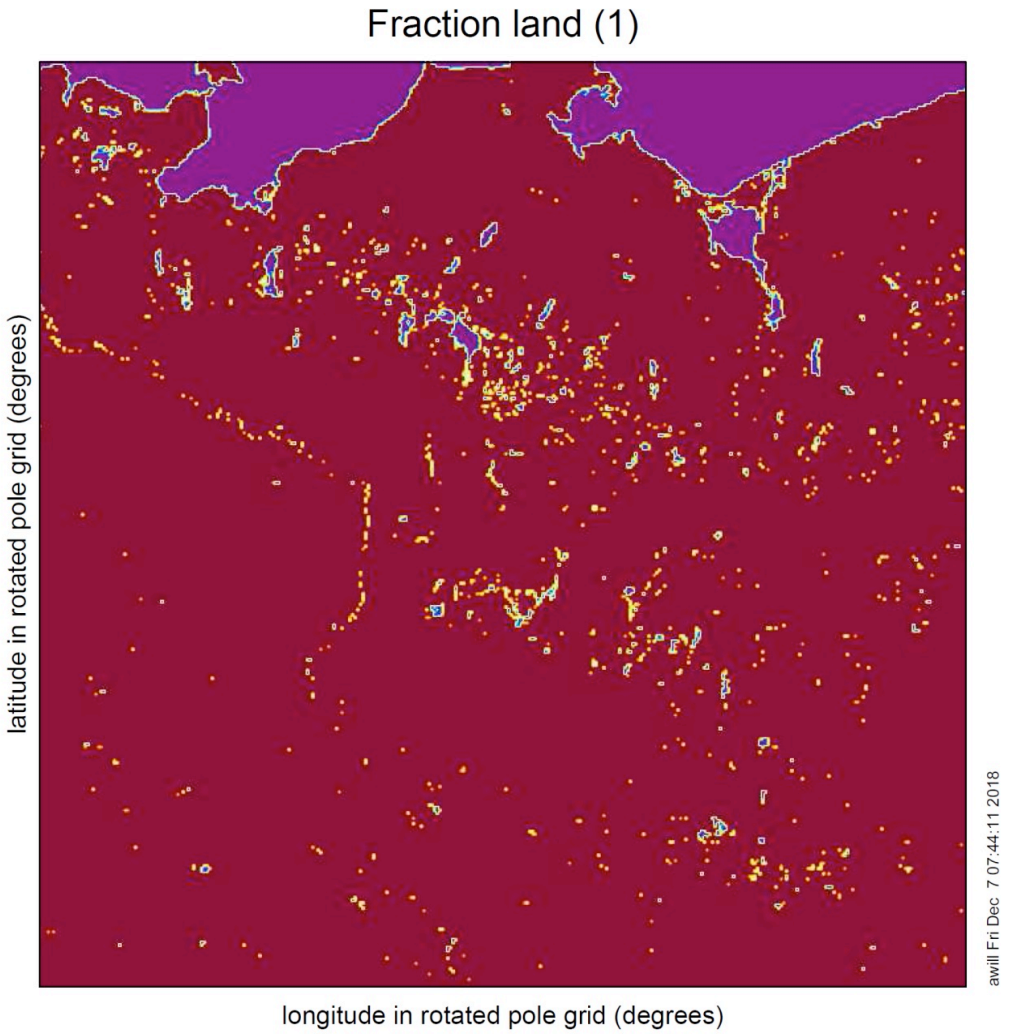
- Lake fraction
- Vegetation fraction
- Soil type
- Urban fraction and anthropogenic heat emission

2.2.2 Aspects of dynamics regarded as relevant

- Scale of land use variability should be resolved by dynamics as well **-> approximately 1 km**
- Effective model resolution -> non-dissipative higher order schemes
- Boundary Effect in multiple nesting -> Two-Way Coupling COSMO-COSMO
- Effective model resolution of physics and dynamics resolving relevant physical forcing

2.2.1 External parameter fields regarded as relevant in BRB

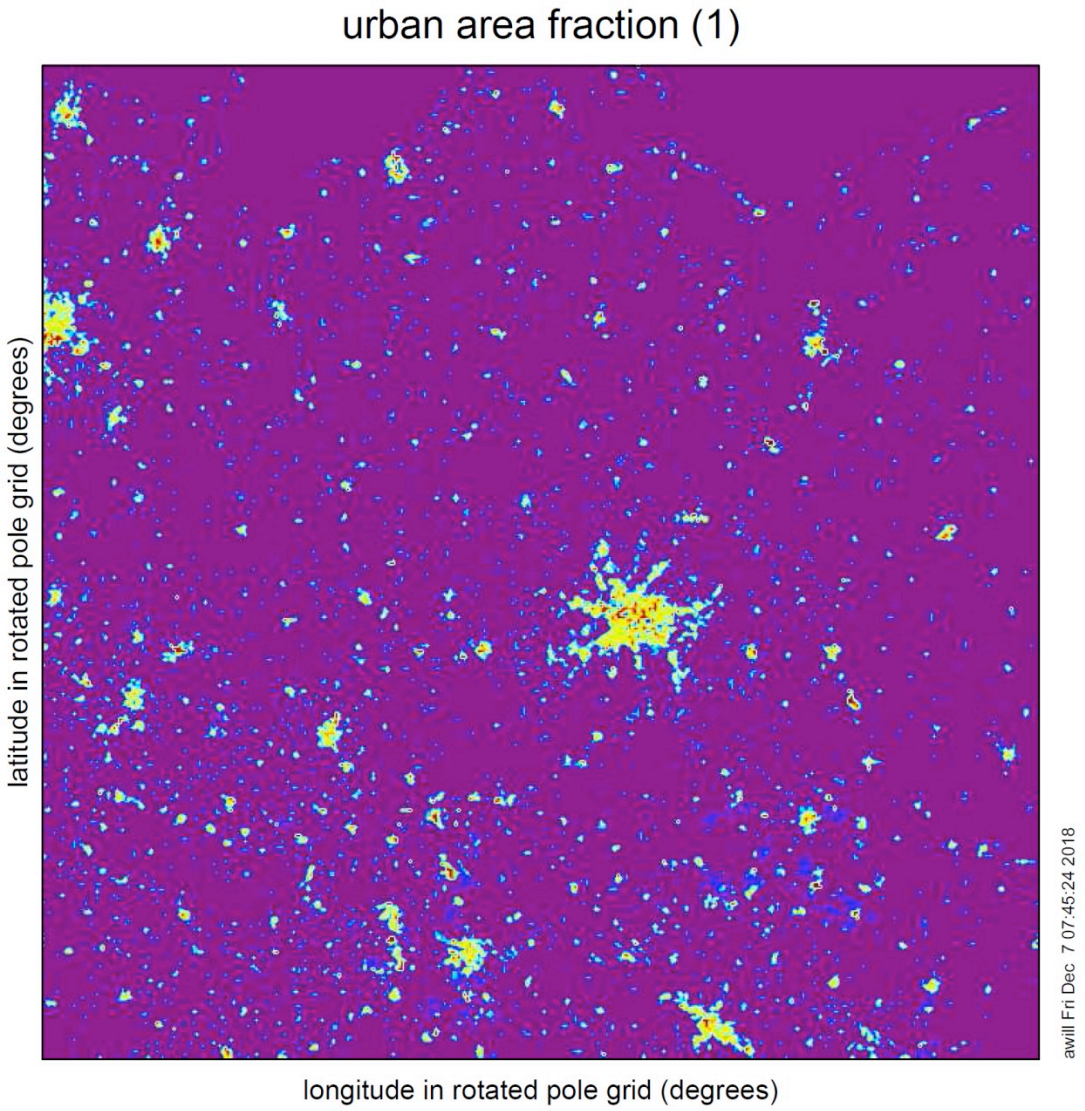
Fraction Land



2.2.1 External parameter fields regarded as relevant in BRB

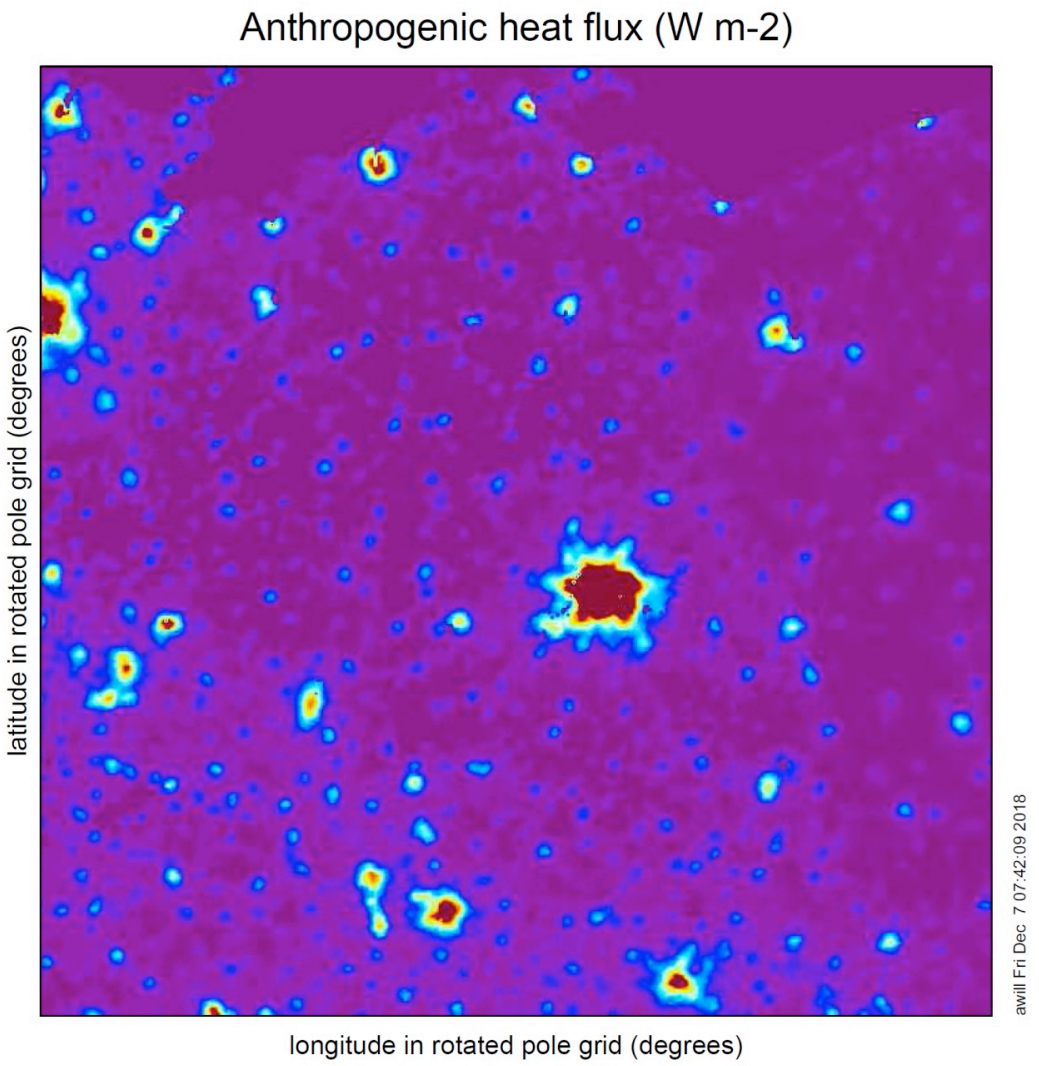
Urban fraction

- **One City: Berlin**



2.2.1 External parameter fields regarded as relevant in BRB

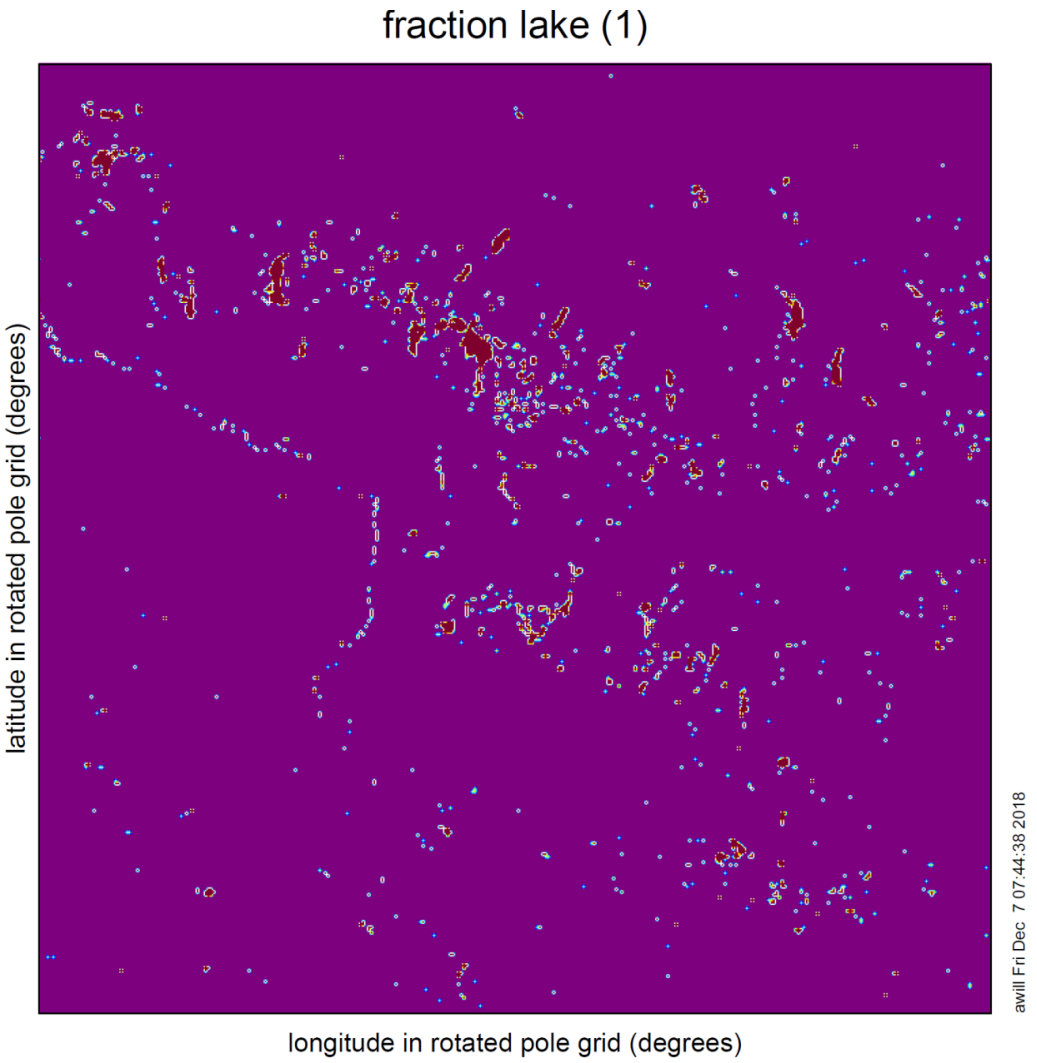
Anthropogenic Heat Flux



2.2.1 External parameter fields regarded as relevant in BRB

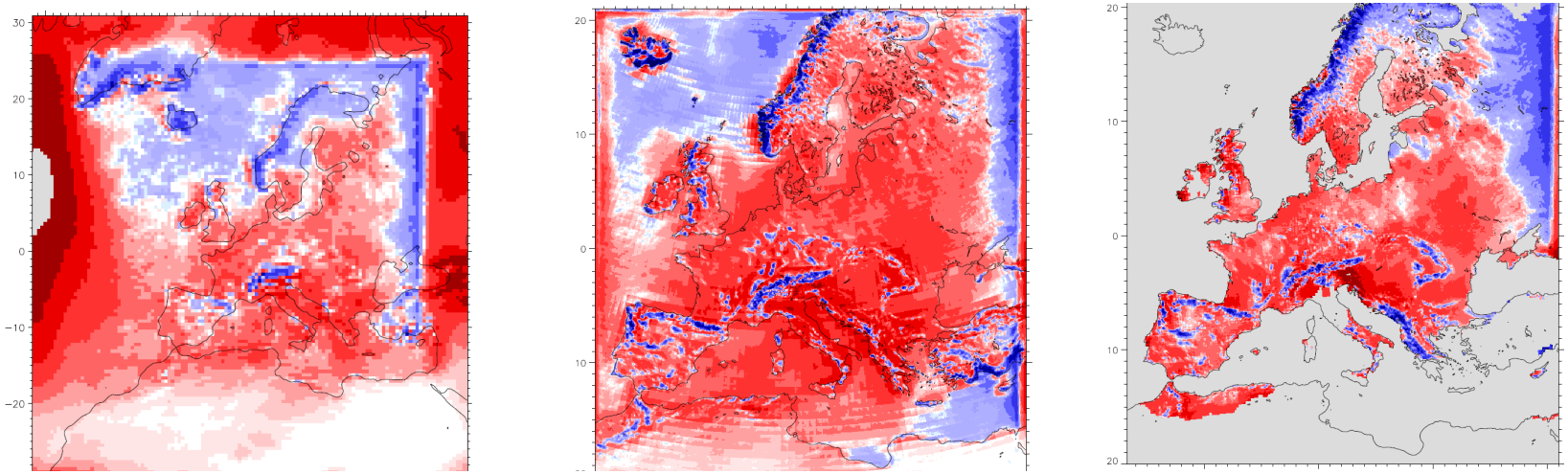
Fraction Lake

- **Many small lakes**
- **20 New Lakes after coal mining**

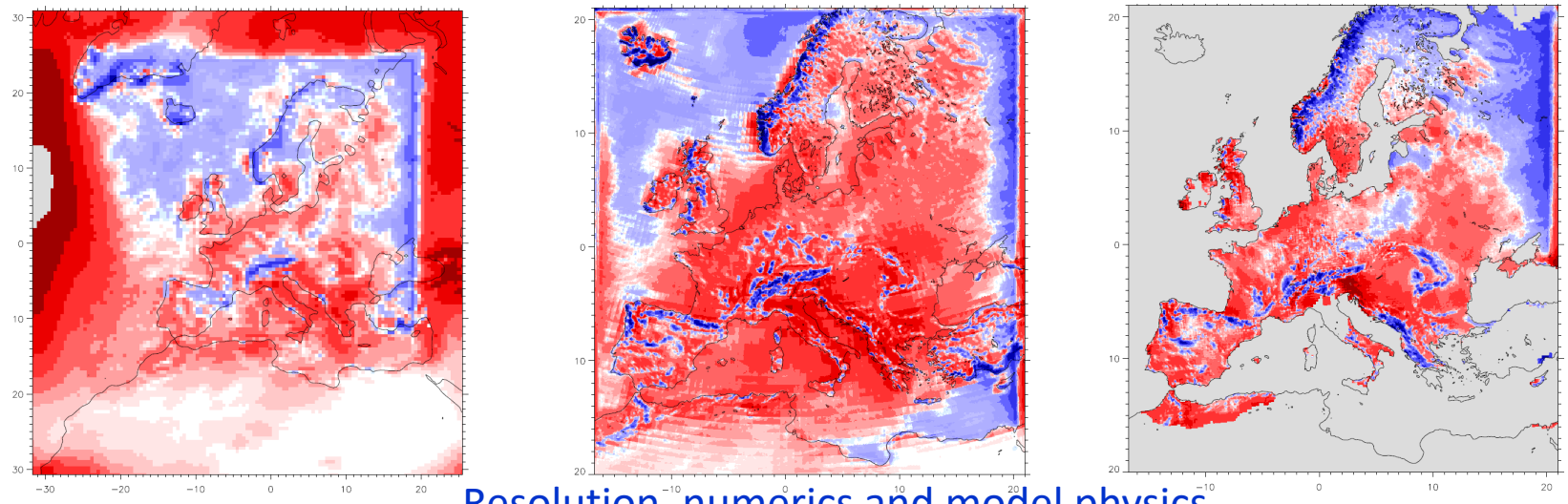


2.2.2 TOT_PREC
mean annual sum 2000-2010

TEU007- ERAINT CEU012-ERAINT CEU012-ECAD

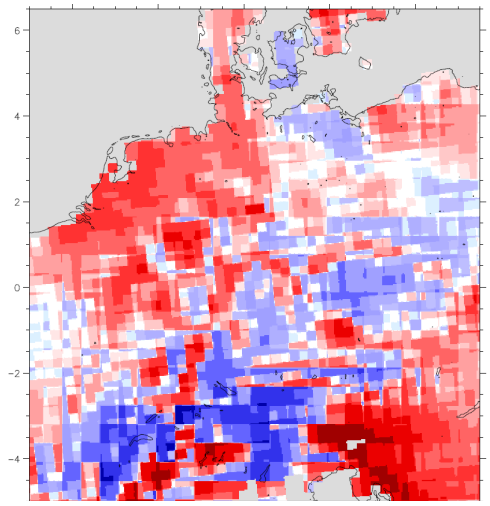


TEU006- ERAINT CEU011-ERAINT CEU011-ECAD

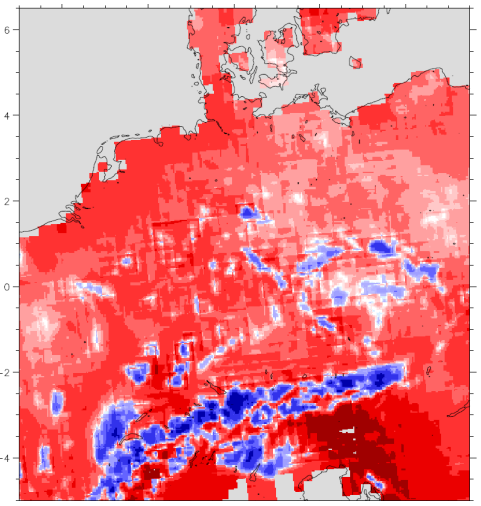


2.2.2 TOT_PREC
mean annual sum 2000-2010

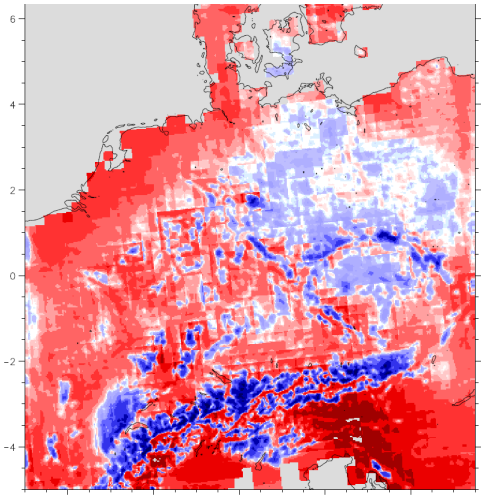
TEU007-ECAD



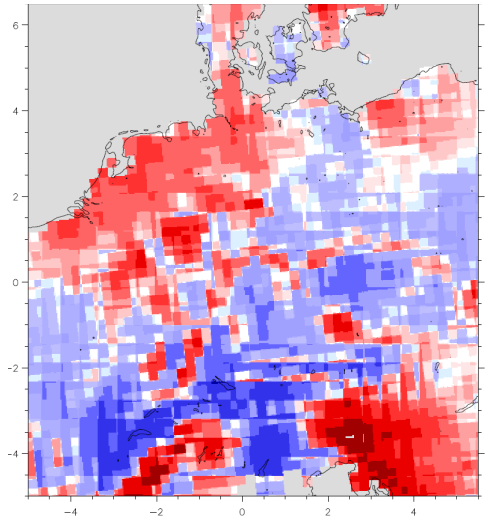
CEU012-ECAD



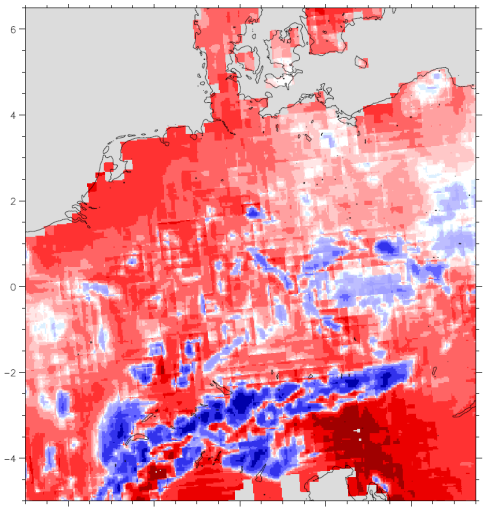
CDE012-ECAD



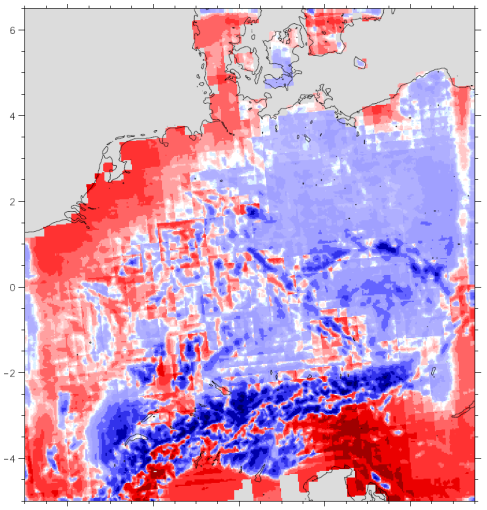
TEU006-ECAD

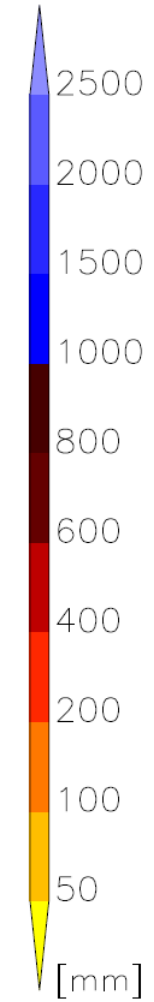


CEU011-ECAD

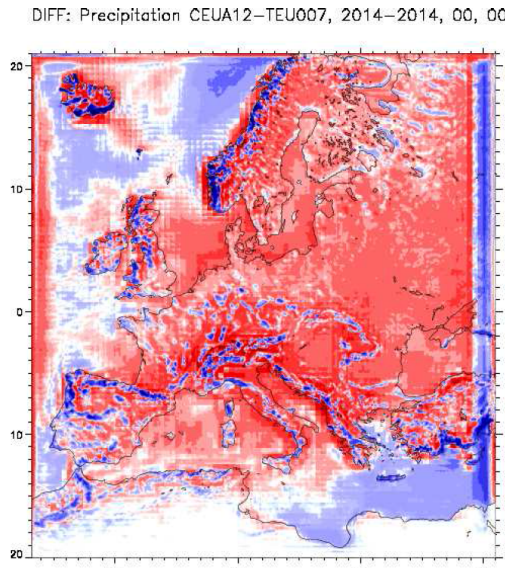


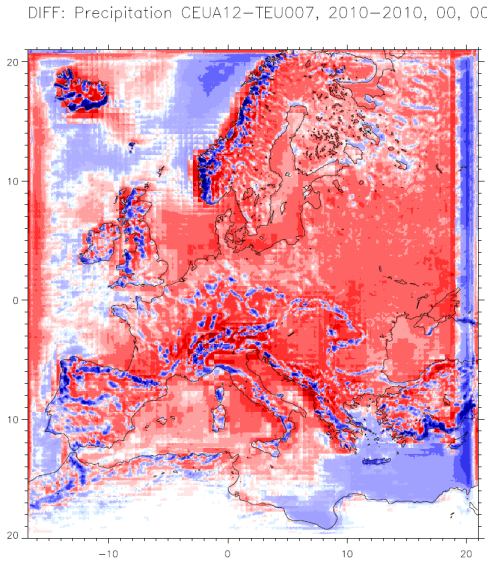
CDE011-ECAD





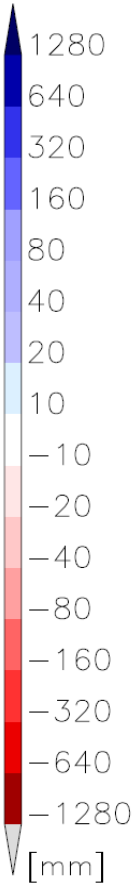
2.2.2 TOT_PREC
mean annual sum 2000-2010



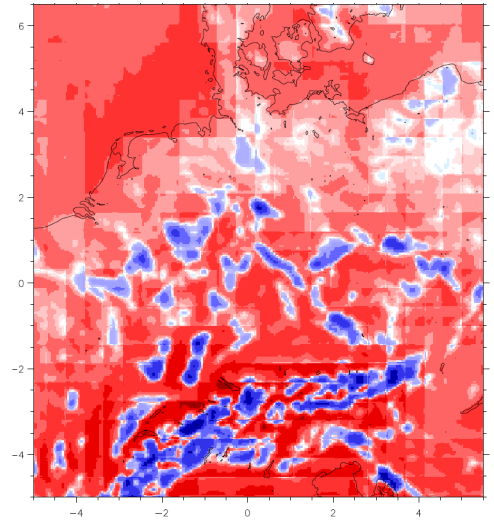


Impact of resolution+BC

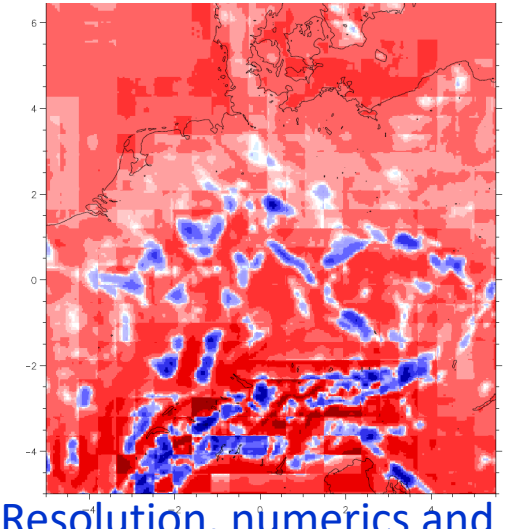
CEU011-TEU006:, f=7,C3p2D0.25
CEU012-TEU007:, f=7, S4p4D0
CDE012-CDE014: f=1.5, S4p4D0



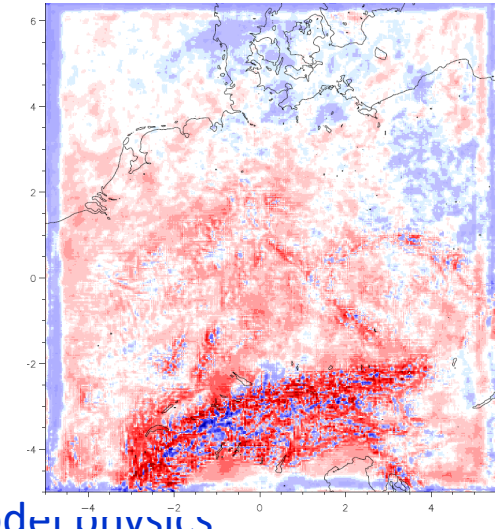
CEU011-TEU006



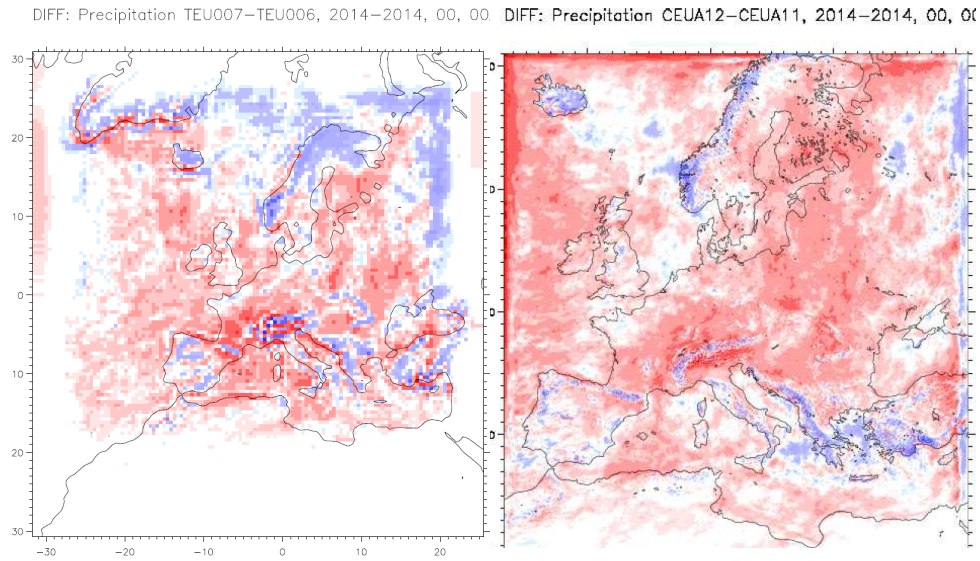
CEU012- TEU007



CDE012-CDE014



2.2.2 TOT_PREC, 2000-2010



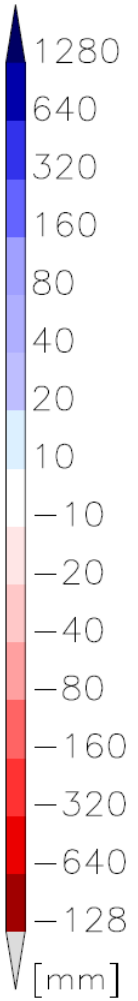
Impact of numerics + hor. diffusion:

(S4p4D0.0 – C3p2D0.25)

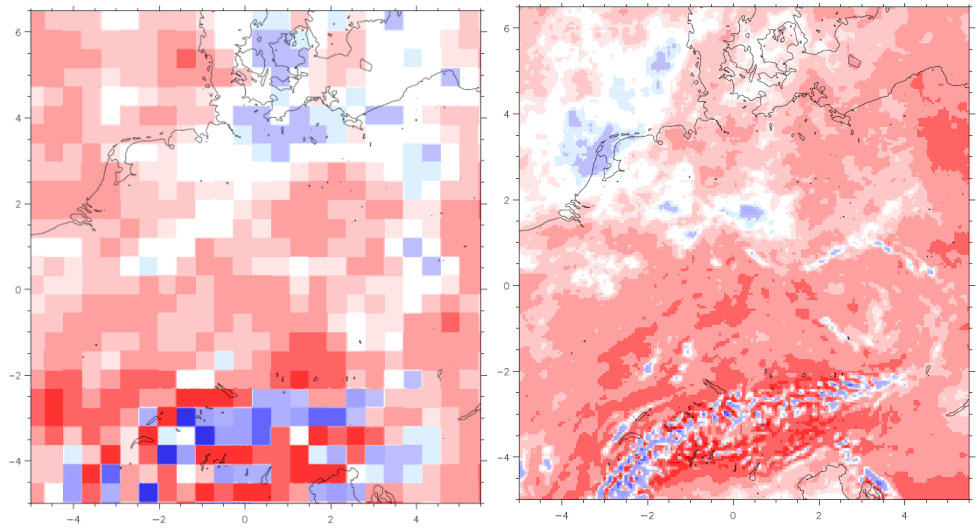
TEU007-TEU006: 50km, Ct

CEU012-CEU011: 7km, Ct.

CDE012-CDE011: 2.8km, D0C0



TEU007-TEU006



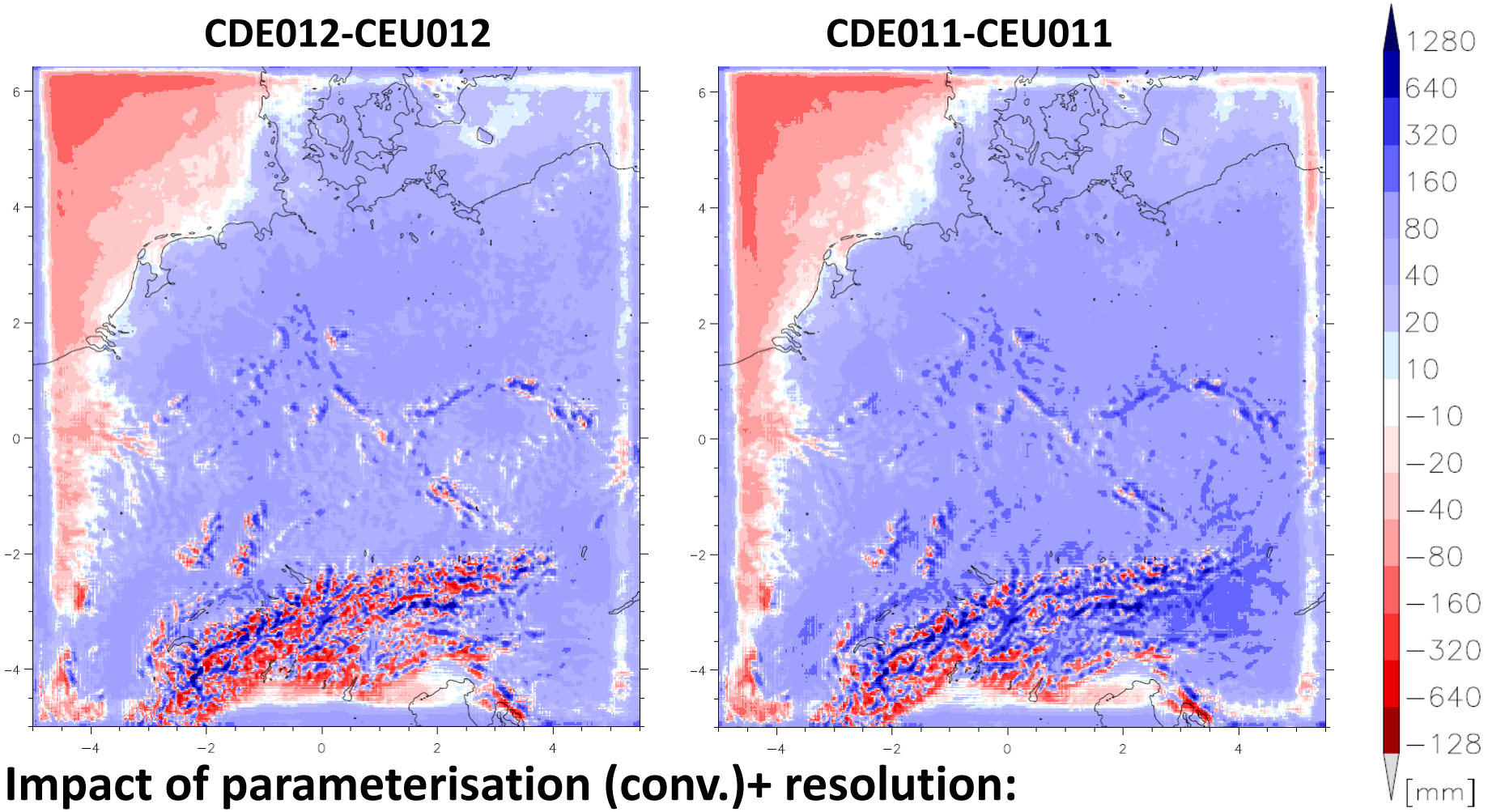
CEU012-CEU011

CDE012-CDE011

2.2.2 TOT_PREC, 2000-2014

CDE012-CEU012

CDE011-CEU011



Impact of parameterisation (conv.)+ resolution:

CEU012-CDE012: +80 mm/y, D0, S4p4

CEU011-CDE011: +40 mm/y, D0.25, C3p2

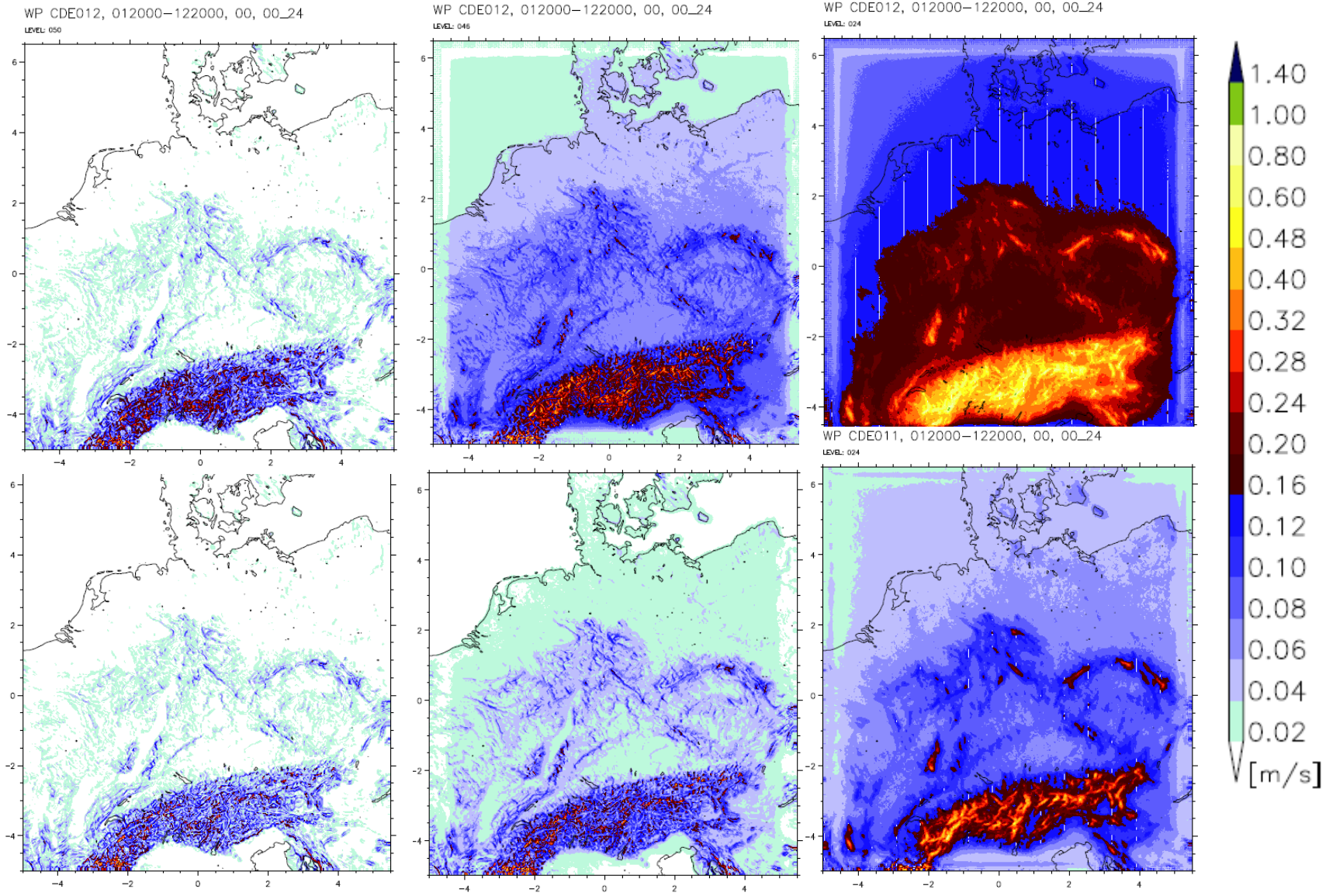
2.2.2 RESULTS for WP (W>0)

mean 2000

P= 998 hPa 975 hPa 500 hPa

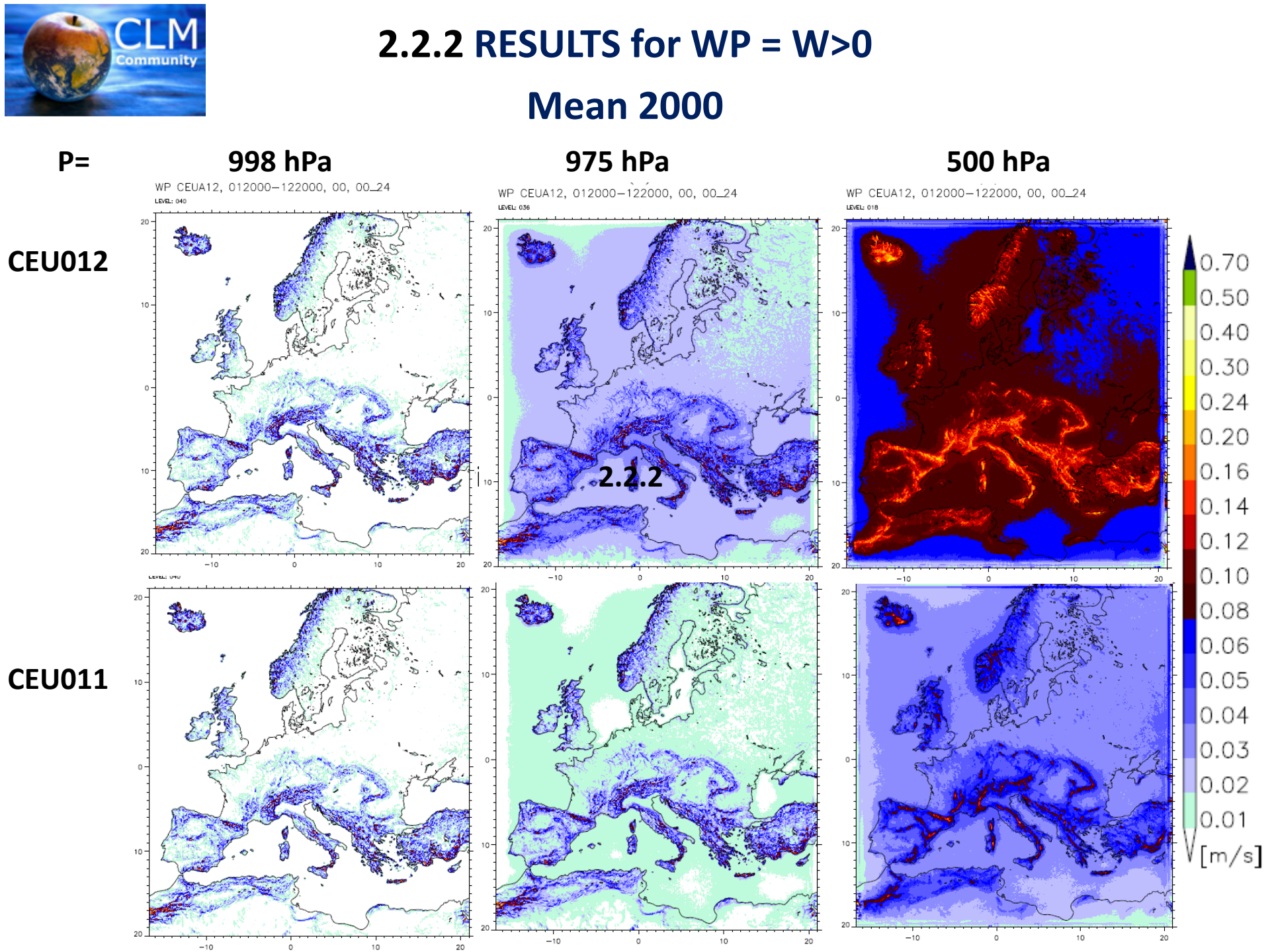
CDE012

CDE011



2.2.2 RESULTS for WP = W>0

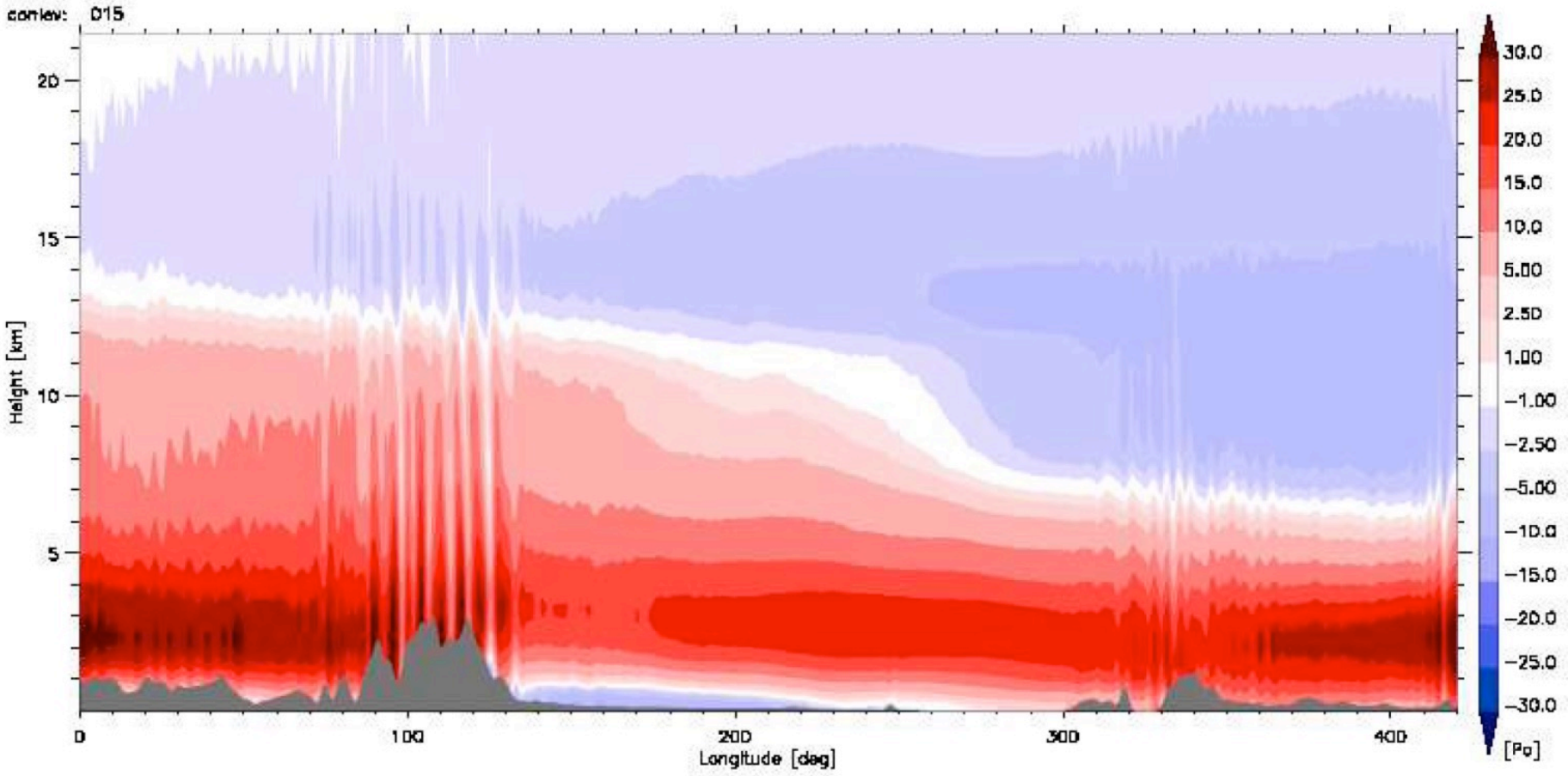
Mean 2000



2.2.2 RESULTS for P

Mean 2000-2014

CDE012- CDE011, July, 00h

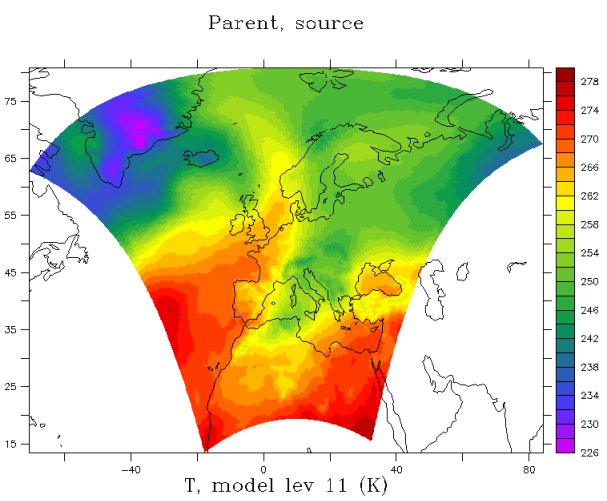


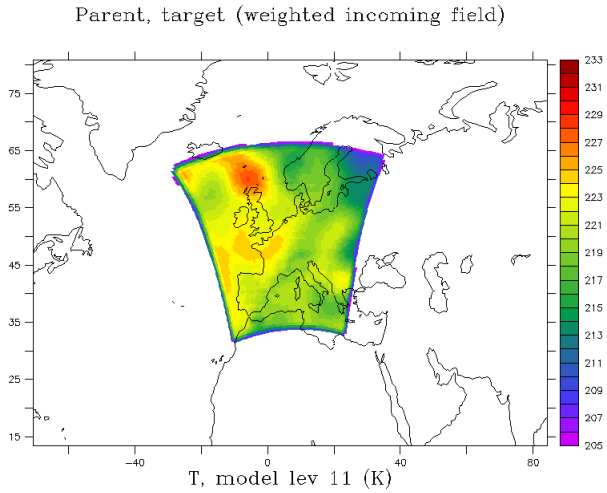
Open Issues:

- **Sound wave damping probably too weak in CDE012**
- **Vertical mixing probably too strong in CDE012 -> turbulence scheme**

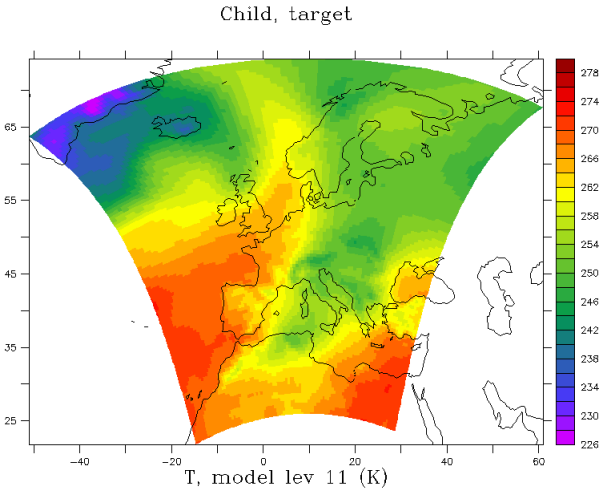
2.2.2 TWC COSMO-COSMO : Field Exchange working

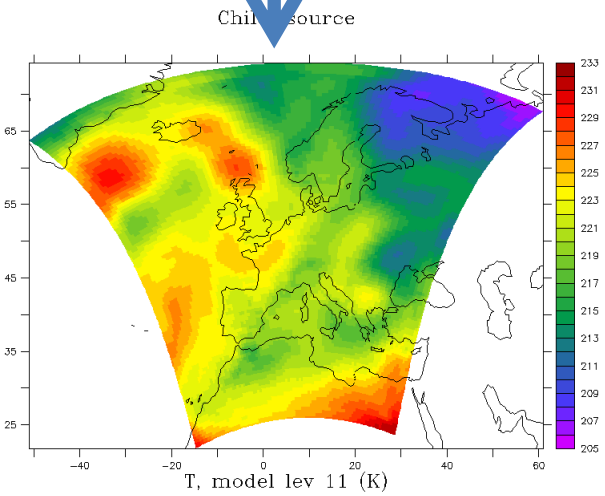
Parent





Child





2.3 Ongoing and Future Work

1. Global Lake Data Base
    1. Additional lakes implemented
    2. Location of several lakes corrected
2. Generation of External Parameters
    1. Priority of GLDB in EXTPAR (ongoing)
3. BUEK300 for TERRA
    1. Generation of a gridded data file (ongoing)
4. HOS in COSMO 5.6
    1. Debugging ongoing
5. Simulations
    1. Planned for 11-12 2019