MeteoSwiss

Developing the LM2LM

Overview

- **Generalities**

- **Algorithms**

- **Implementations and Tests**

- **Results**

- **Future**

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Generalities

MeteoSwiss

- based on INT2LM (general interpolation program)
- is optimised for vector and parallel computers
- includes IFS2LM with:
  - multi layer soil model
  - cloud ice
- different setup for grids, local and global variables
- different algorithm for vertical interpolation

Algorithms (1)

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- read namelist input, construct vertical levels, do general setup (domain decompositions), read constant fields and interpolate them horizontally

- loop over all input fields

- horizontal interpolation as in IFS2LM

- new vertical interpolation for u/v/t/grh/p'/w with optimised 2D tension splines in z coordinate

- fixed PBL treatment with extrapolation or shift

- special treatment for soil fields (keep differences)

Algorithms (2)

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z

u/v/t

LM_out shift

w/p'/grh

PBL

LM_in

Ψ

LM_out extrapolation

grh: generalized relative humidity

Implementation & Tests

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- On NEC SX-5 at MCH

- On IBM (without VCS) by DWD

- MAP IOP 2B Sept. 19-20, 1999:

  ECMWF analysis every 3h => IFS2LM
  LM 7km data assimilation => LM2LM

  LM 2.8km 24h run => visit interpolation/forecast

- Tests with more vertical resolution:
  => same vertical profiles
        because of tension splines

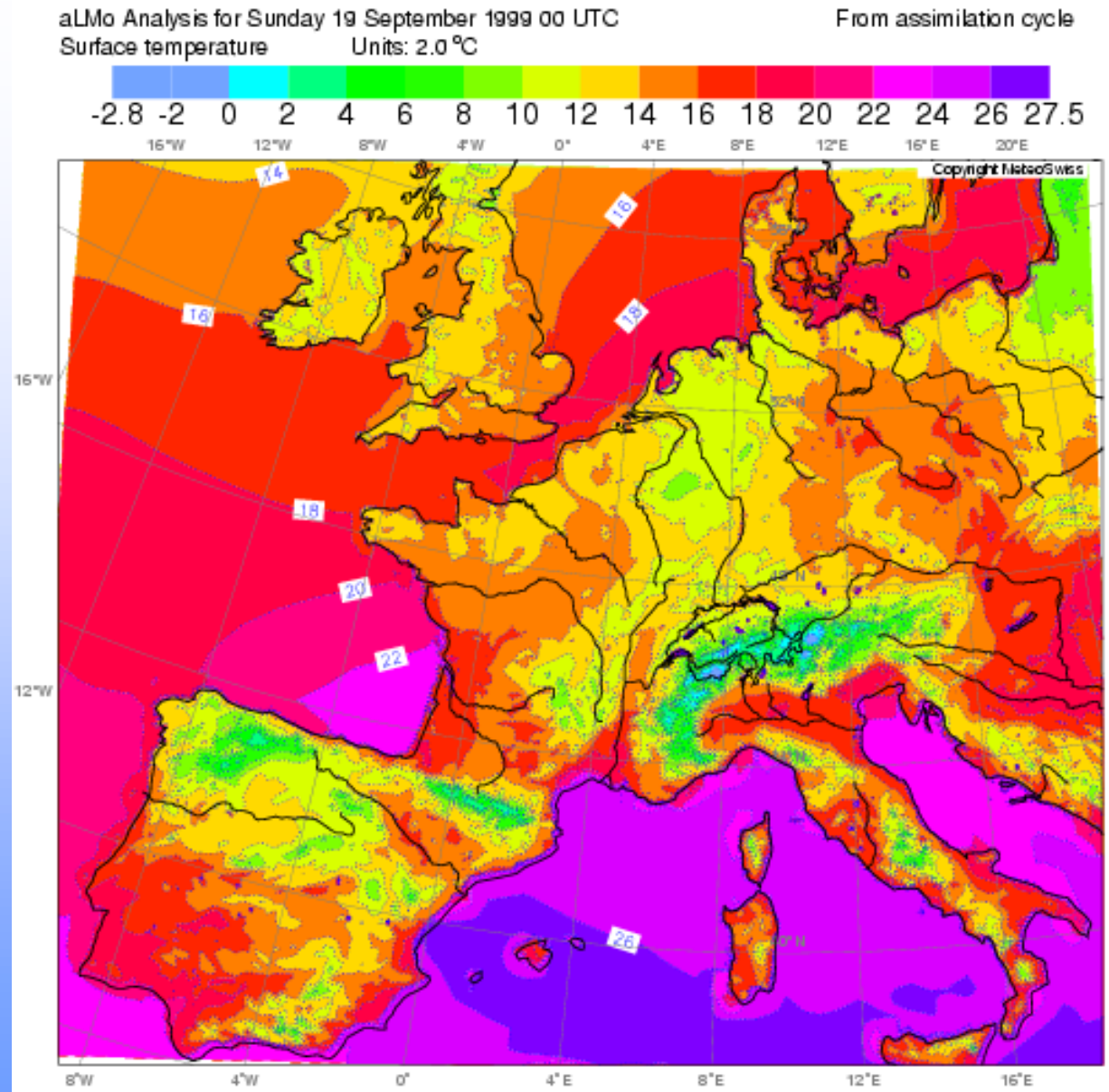# Results

INPUT:

LM 7km

after

24h DA

aLMo Analysis for Sunday 19 September 1999 00 UTC — Surface temperature — Units: 2.0 °C — From assimilation cycle
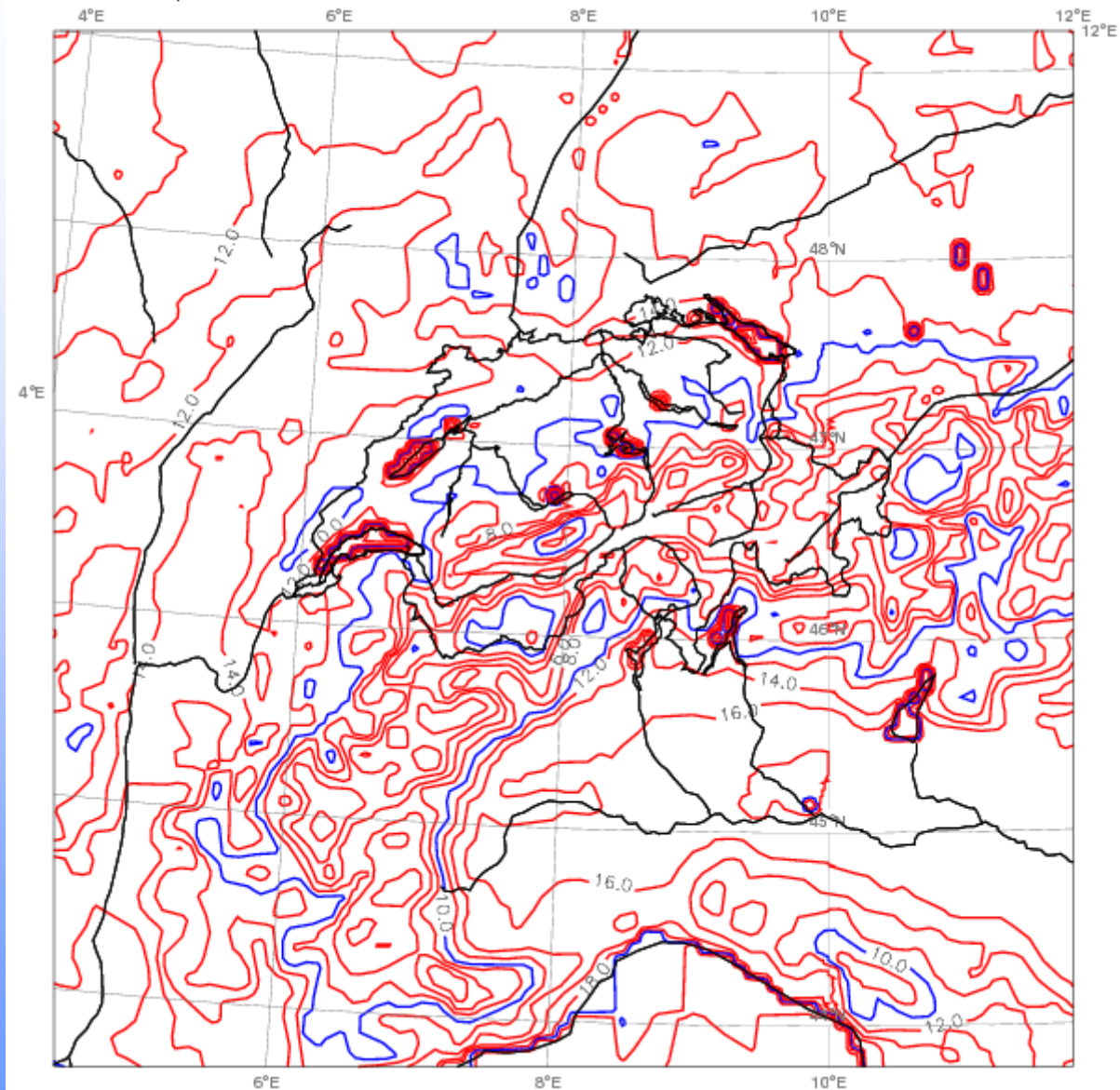
Results

INPUT:

LM 7km

after

24h DA

ZOOM

aLMo Analysis for Sunday 19 September 1999 00 UTC
Surface temperature   Units: 2.0 °C   From assimilation cycle
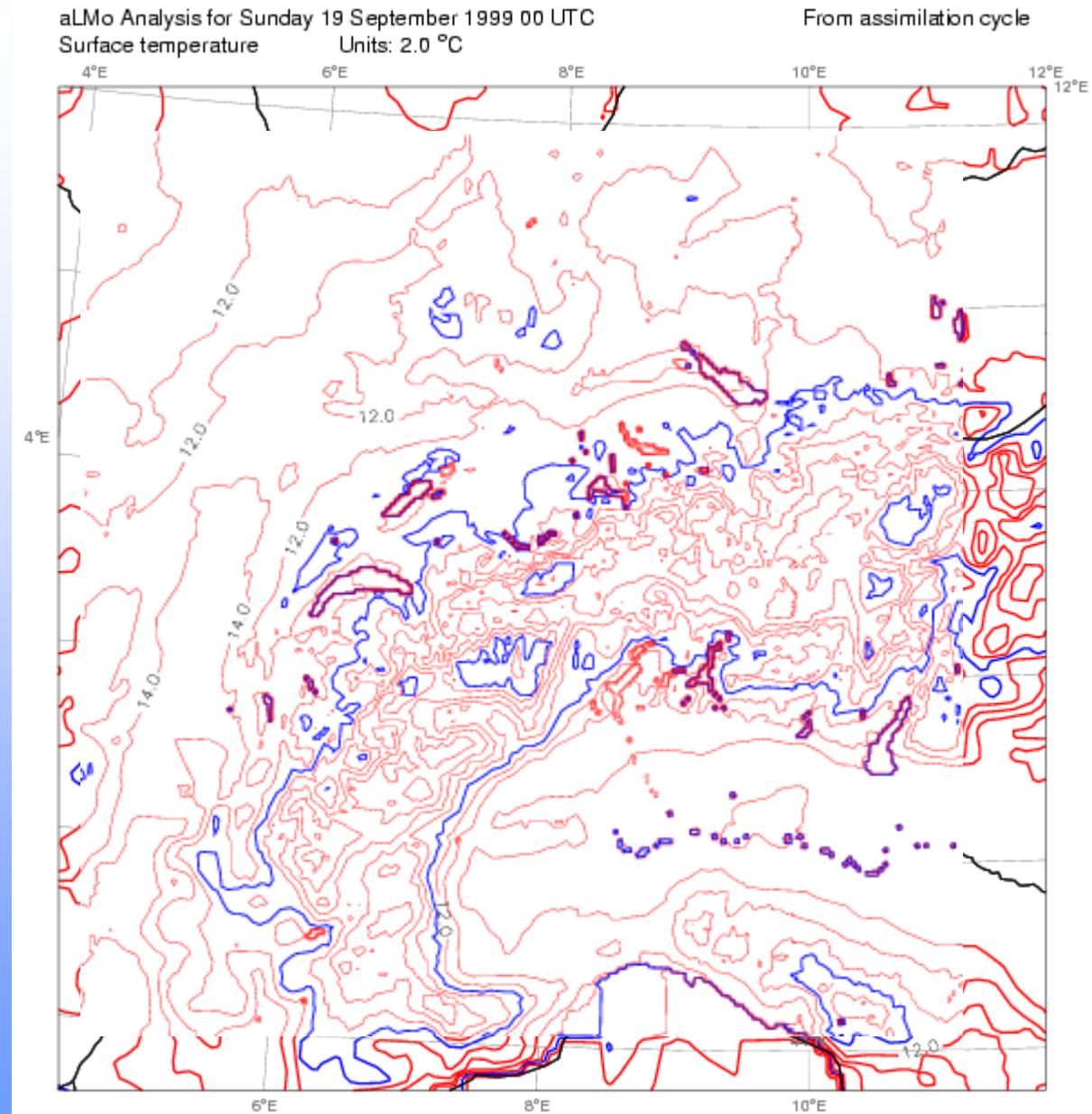
Results

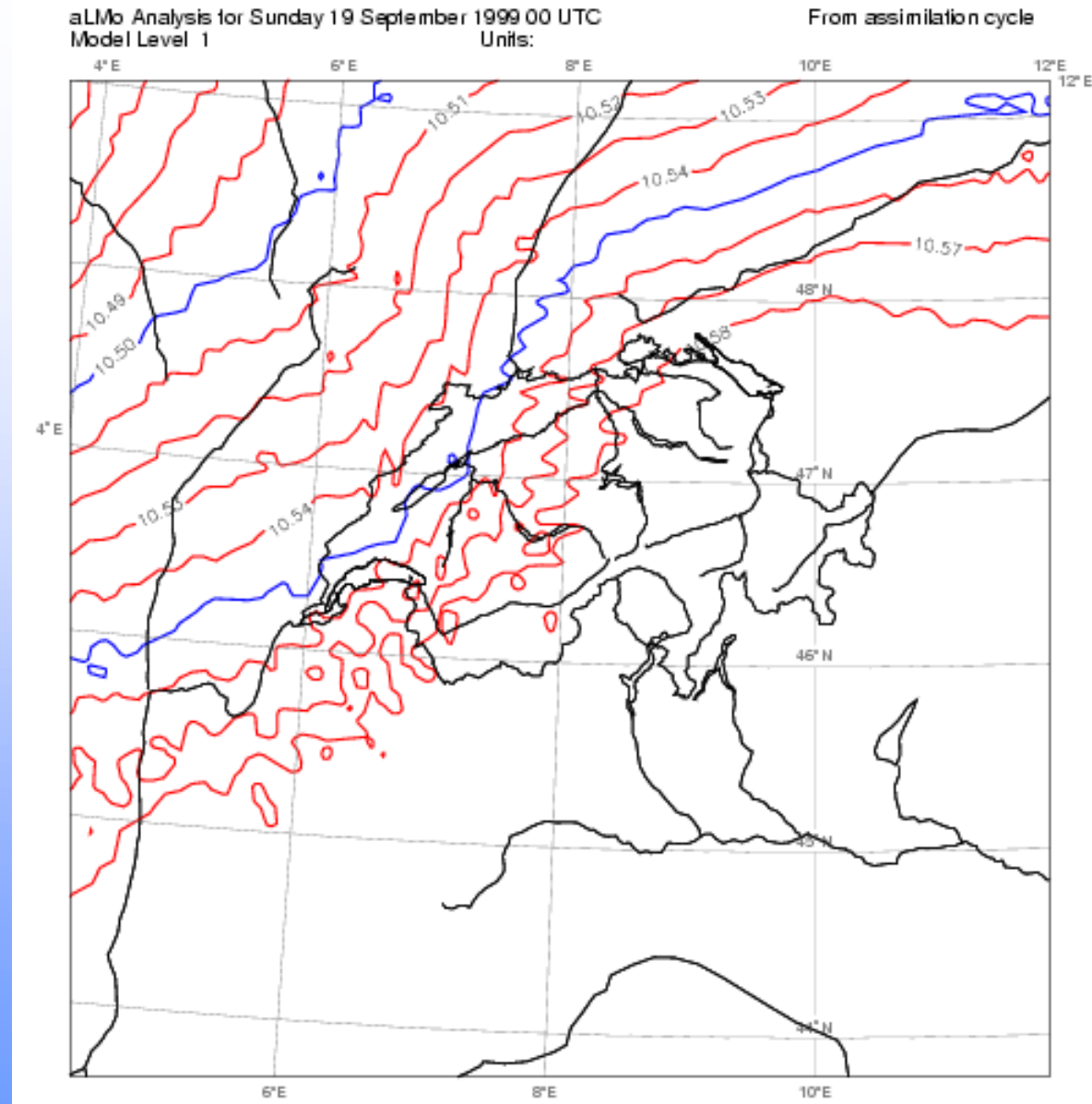INPUT:

LM 7km

after

24h DA

ZOOM

INT2LM:

LM 2.8km

aLMo Analysis for Sunday 19 September 1999 00 UTC
Surface temperature   Units: 2.0 °C   From assimilation cycle

Results

INPUT:

LM 7km

after

24h DA

ZOOM

aLMo Analysis for Sunday 19 September 1999 00 UTC
Model Level 1   Units: From assimilation cycle

Results

INPUT:

LM 7km

after

24h DA

ZOOM

aLMo Analysis for Sunday 19 September 1999 00 UTC   From assimilation cycle
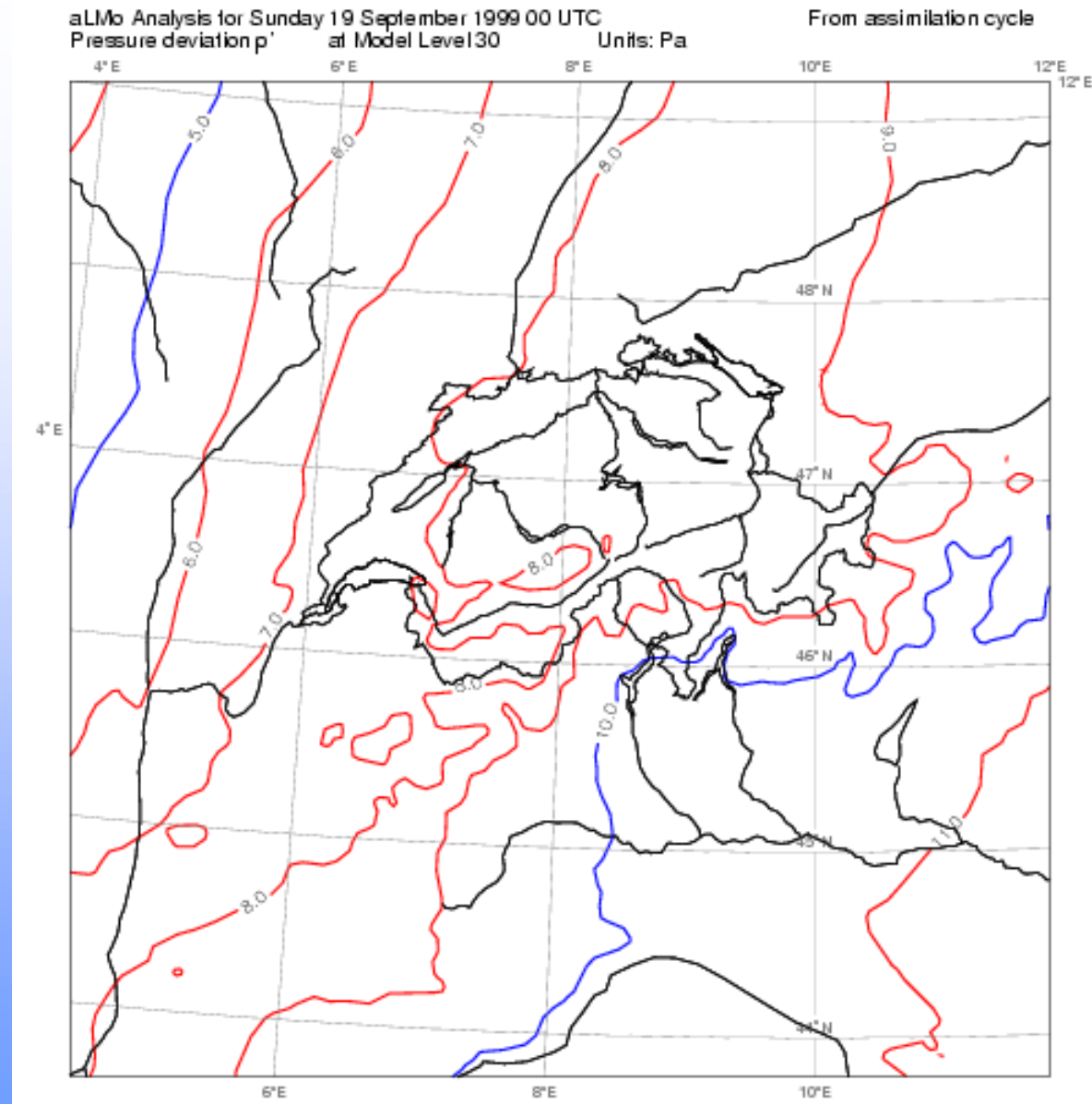Pressure deviation p'   at Model Level 30   Units: Pa

Results

INPUT:

LM 7km

after

24h DA

ZOOM

INT2LM:

LM 2.8km

Results

INPUT:
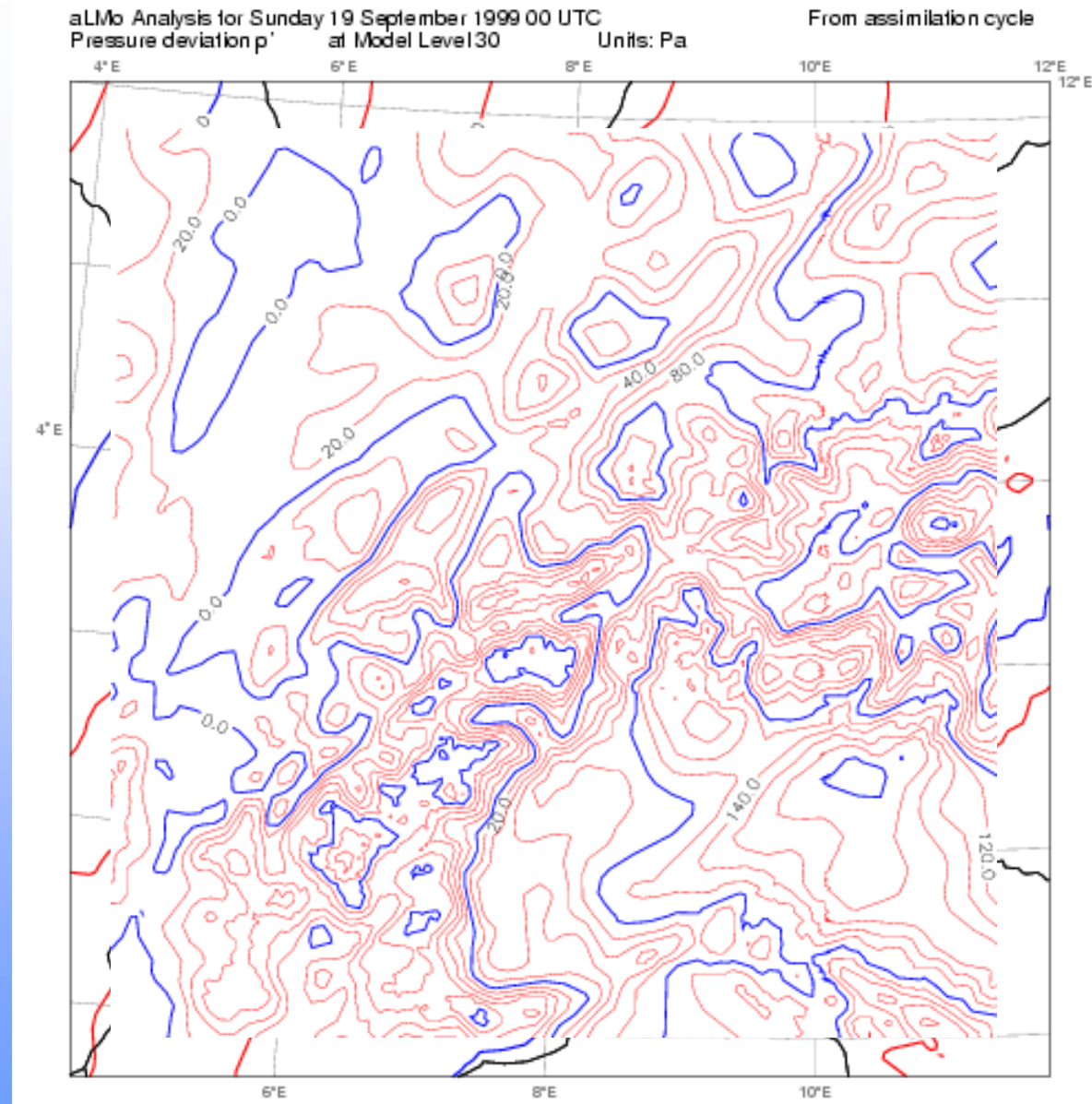
LM 7km

q_c isoline
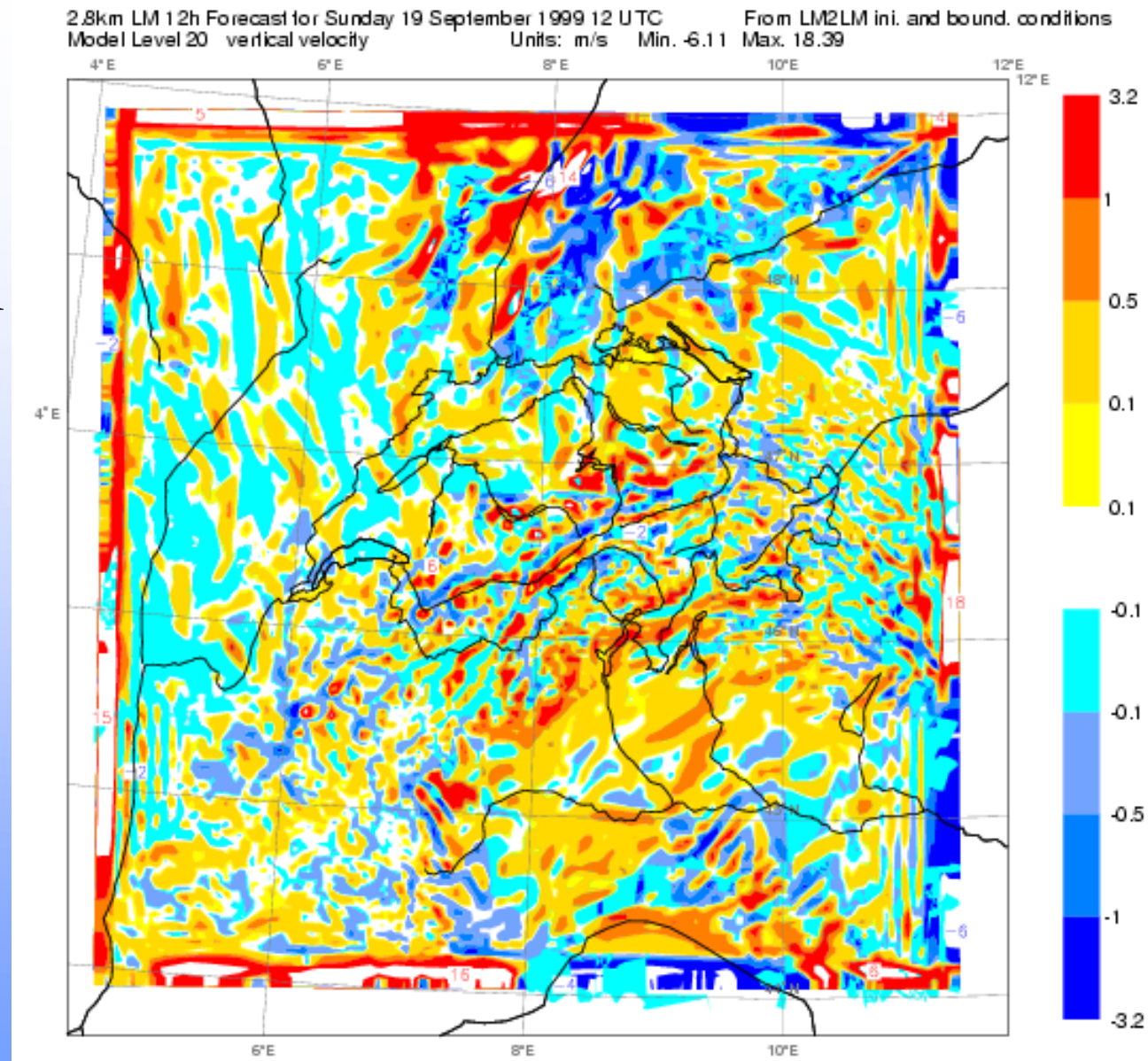
OUTPUT:

INT2LM

2.8km

q_c shaded

aLMo Analysis for Sunday 19 September 1999 00 UTC
Model Level 40   specific cl.w. content   From assimilation cycle
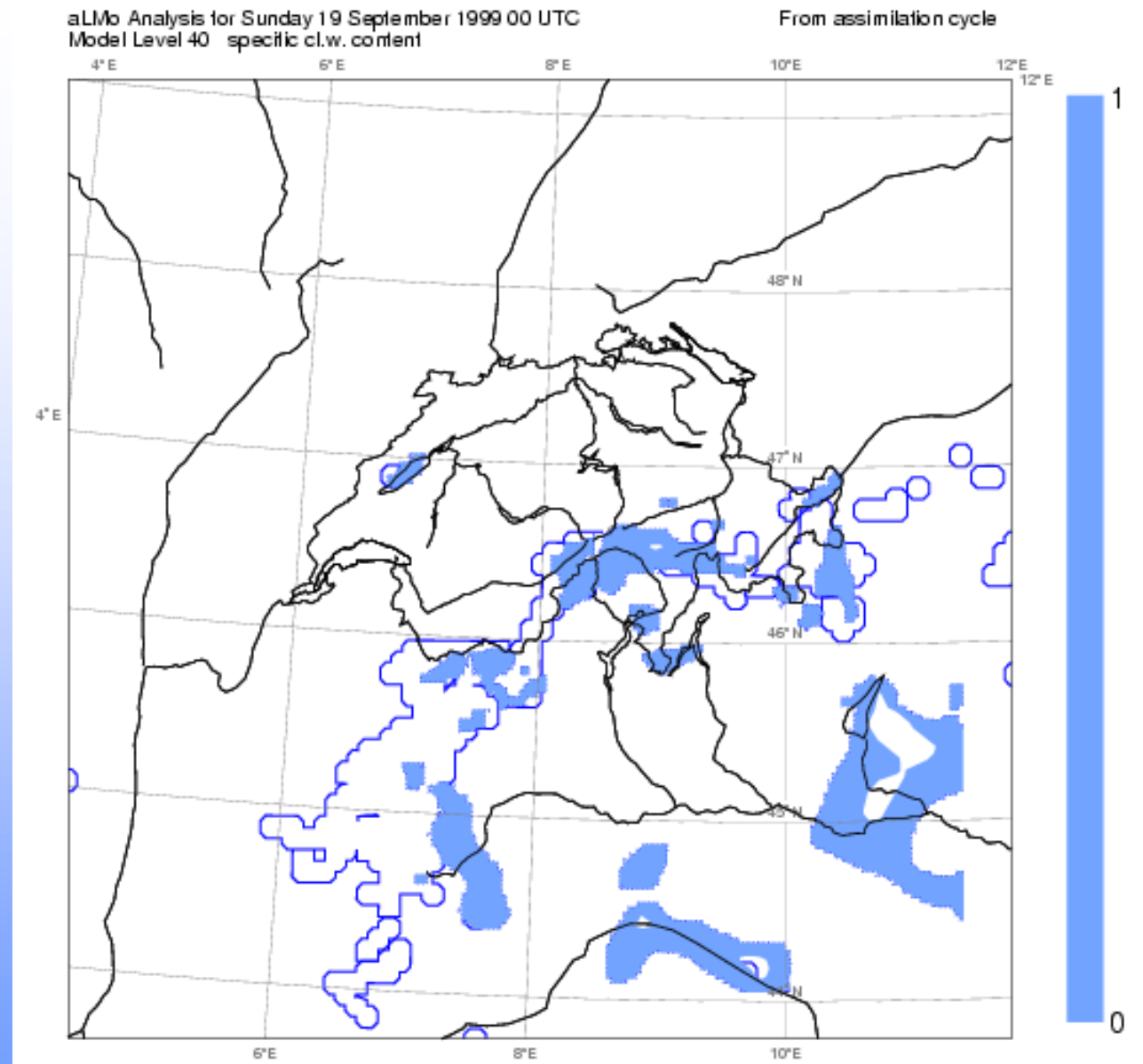
Results

LM 2.8km

12h Forecast

w @ k=20

2.8km LM 12h Forecast for Sunday 19 September 1999 12 UTC   From LM2LM ini. and bound. conditions
Model Level 20   vertical velocity   Units: m/s   Min. -6.11   Max. 18.39

Results

- Surface and soil fields are OK
- Dynamical fields for boundaries are ~ OK
- For initial conditions:
  - u, v, T, q_v , q_c and w OK
  - p' could be less noisy
- Forecasts need more diagnostics and comparisons

Future

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- Distribution for COSMO (next week)

- Code version in VCS (DWD)

- Experiment with high resolution interpolated orography

- Tests with Daniel Leuenberger (MCH) and others are welcome!