

Overview of Aladin/France D.A. activities and plans

Claude Fischer

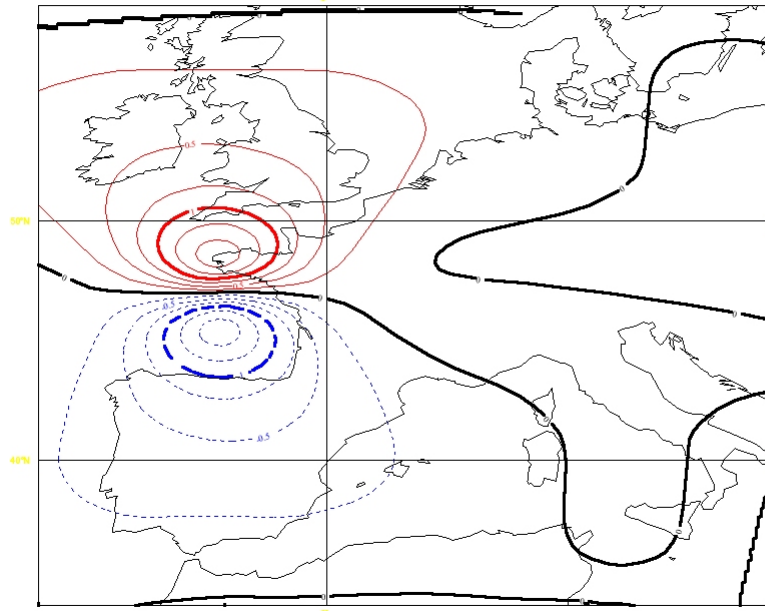
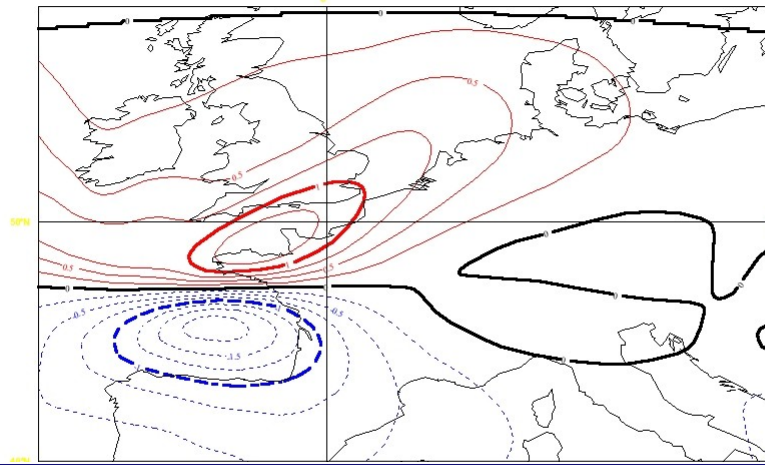
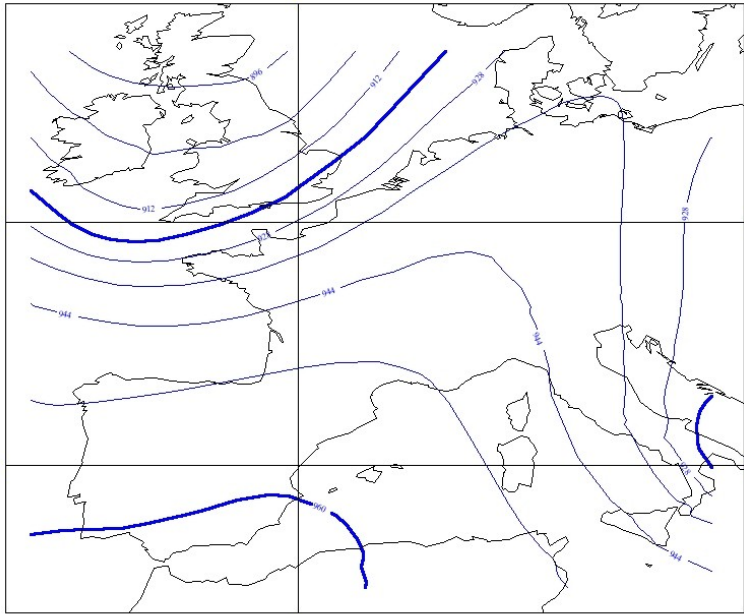
Stolen material from: Fatima Karbou, Pierre Brousseau, Loïk Berre, Olivier Caumont, Thibaut Montmerle

Outlook of the talk

- ▶ B matrix: NL and Ω balances
- ▶ AMSU-A/B microwave channels over land
- ▶ Radar reflectivities: the presently developed 1D retrieval and first results with Méso-NH
- ▶ Arôme high resolution, high frequency assimilation: the RUC approach
- ▶ Plans for the next \sim 12 months

NON LINEAR AND OMEGA BALANCES IN THE ALADIN Jb (G. Faure, L. Berre)

PARIS Analysis VT: Saturday 1 October 2005 06UTC 300hPa geopotential height

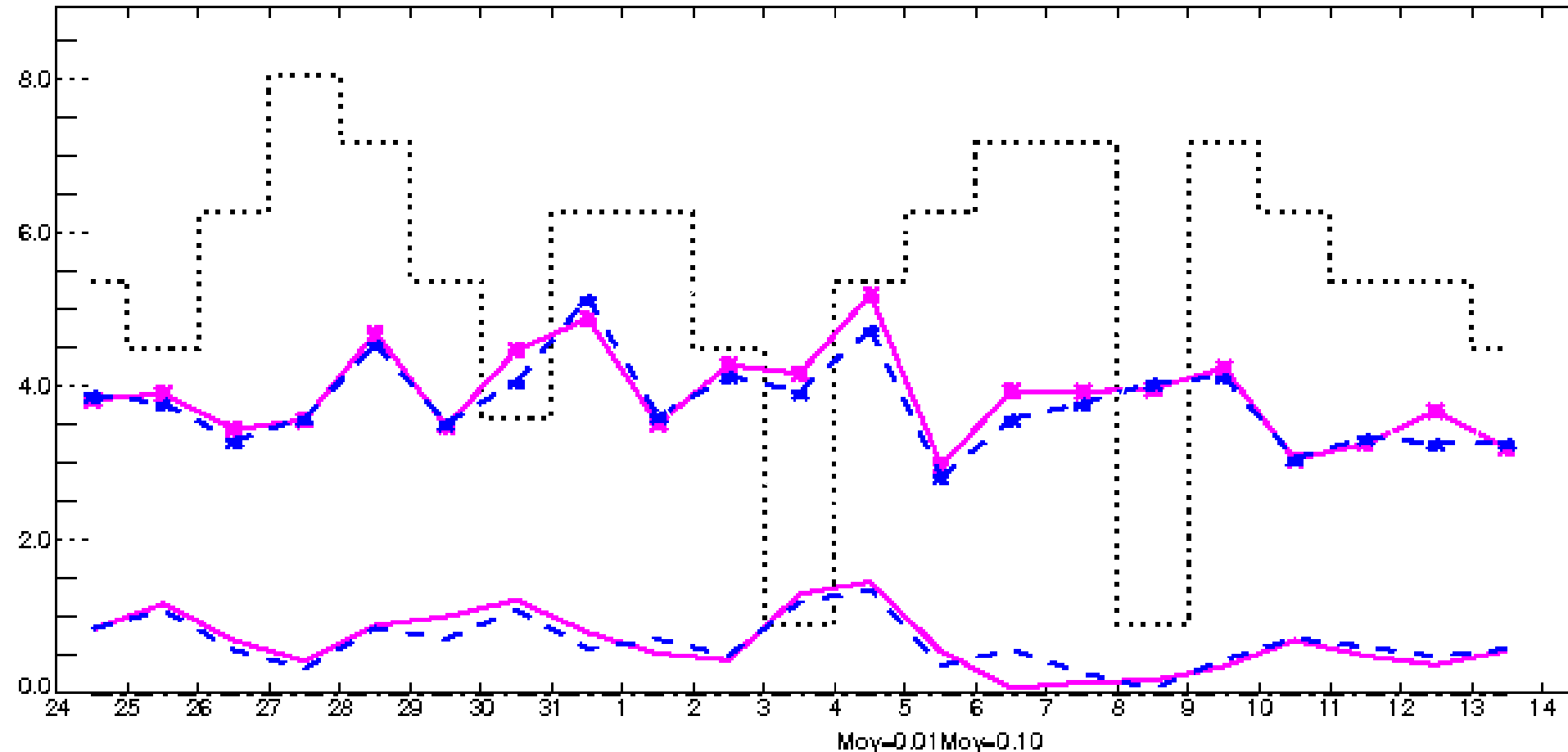


$$\Delta P_{bal} = -\nabla \cdot (V\psi \cdot \nabla V\psi + f\mathbf{k} \wedge V\psi)$$

$$(\sigma\Delta + f_0^2 \frac{\partial^2}{\partial p^2})\omega = -2\nabla Q$$

NON LINEAR AND OMEGA BALANCES IN THE ALADIN Jb (G. Faure, L. Berre)

FRANX01



Wind 850 hPa

+12h

Sofia, May 15th-19th 2006

Aladin workshop/ Hirlam all staff meeting

~ 10 cases slightly >0

10 cases ~ neutral

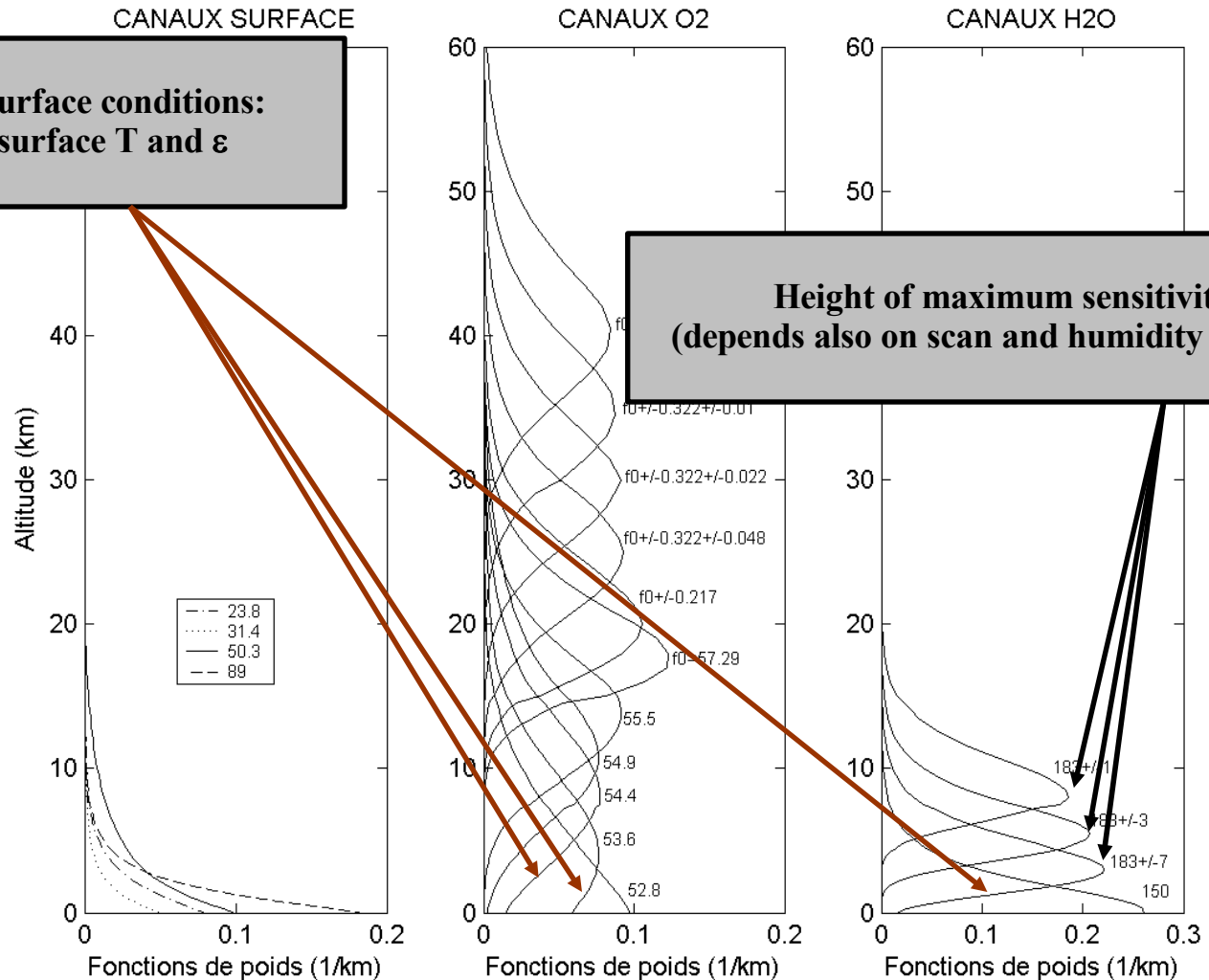
1 case slightly <0

AMSU-A and AMSU-B (F. Karbou):

AMSU-A and AMSU-B: temperature and humidity soundings

- polar orbiting satellites: NOAA (15, 16, 17, 18), AQUA, MetOp
- 20 channels: 23 to 190 GHz
- scanning angle from -58° to $+58^\circ$ with V and H polarisation

Tb contaminated by surface conditions:
Information about surface T and ϵ





4 different approaches are compared

Several assimilation experiments
Over periods in 2005

Best choice so far:

-Atlas : risk for bias

-Dynamical comp.: risk for
noise

Control run: operational model

Emissivities: - Atlas 2000
- Atlas 2005

Emissivities: dynamical computation

Emissivities: Atlas 2000 + estimation of Ts



Compute surface emissivity by inverting the RT equation:

$$\varepsilon(p, \nu) = \frac{T(p, \nu) - T(\nu, \uparrow) - T(\nu, \downarrow) \times \tau}{\tau \times (T_s - T(\nu, \downarrow))}$$

Atlas 2000

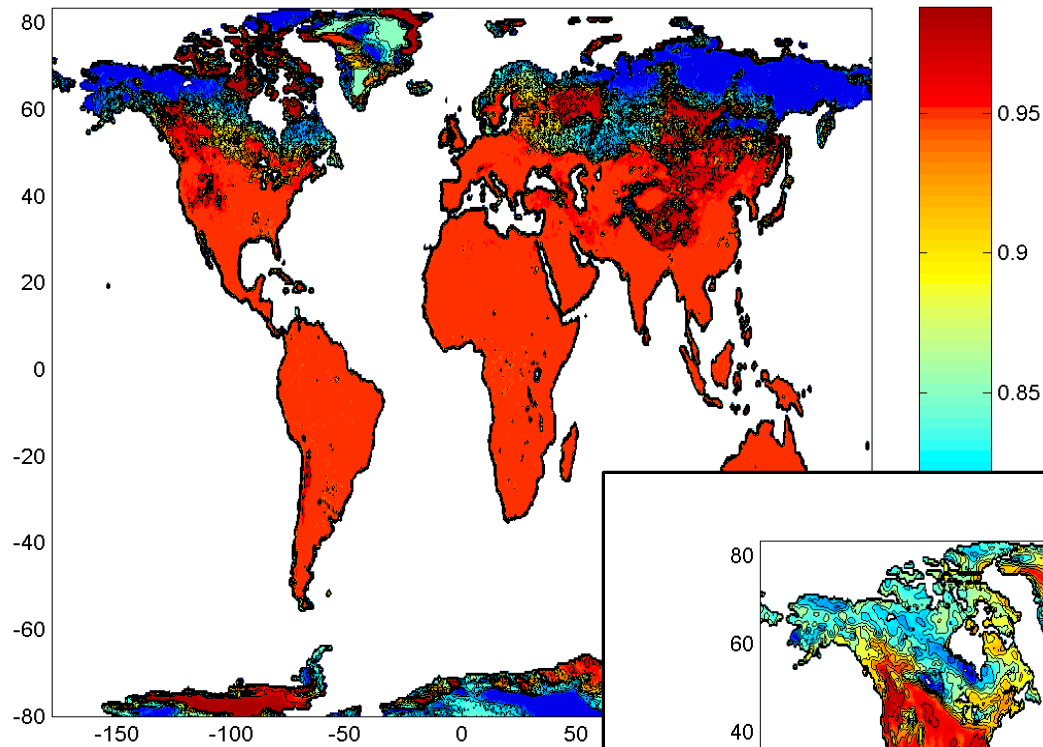
Monthly global maps at 23, 31, 50, 89 and 150 GHz for February 2000

Atlas 2005

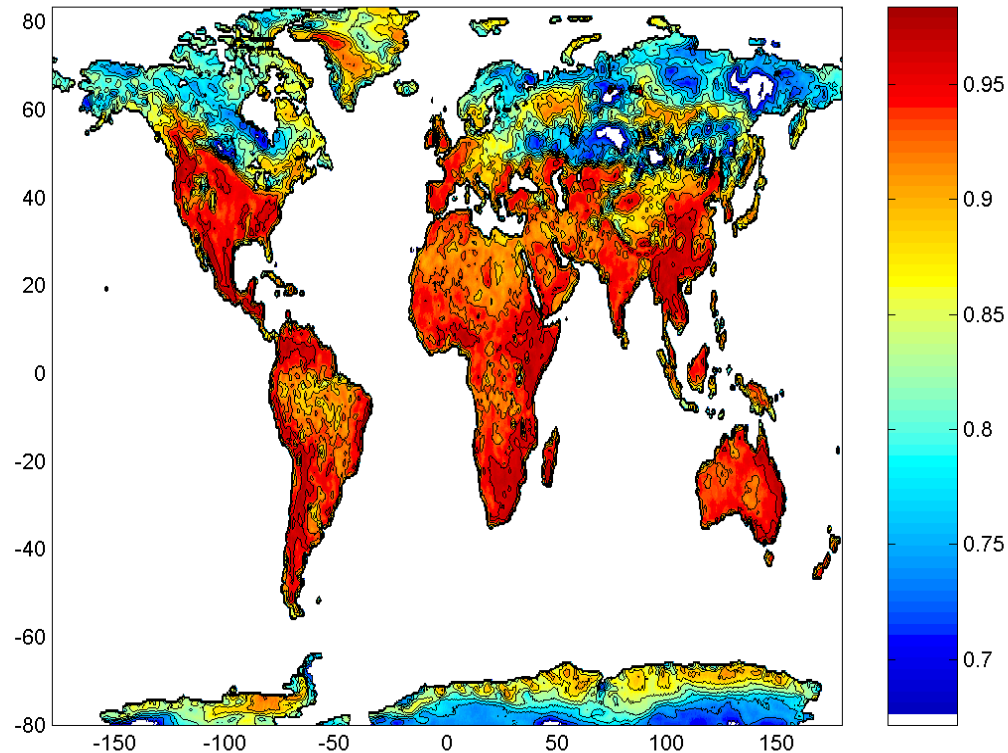
Monthly global maps for nadir at 23, 31, 50, 89 GHz from 01 through 20 March 2005 + parametrisation of ε (Karbou 2005) to take into account the scanning angle

Dynamical comp.

Emissivity computed for each meteorological situation for channel 1 AMSU-A (23GHz) and AMSU-B (89 GHz). These emissivities are attributed to the other channels without extrapolation.

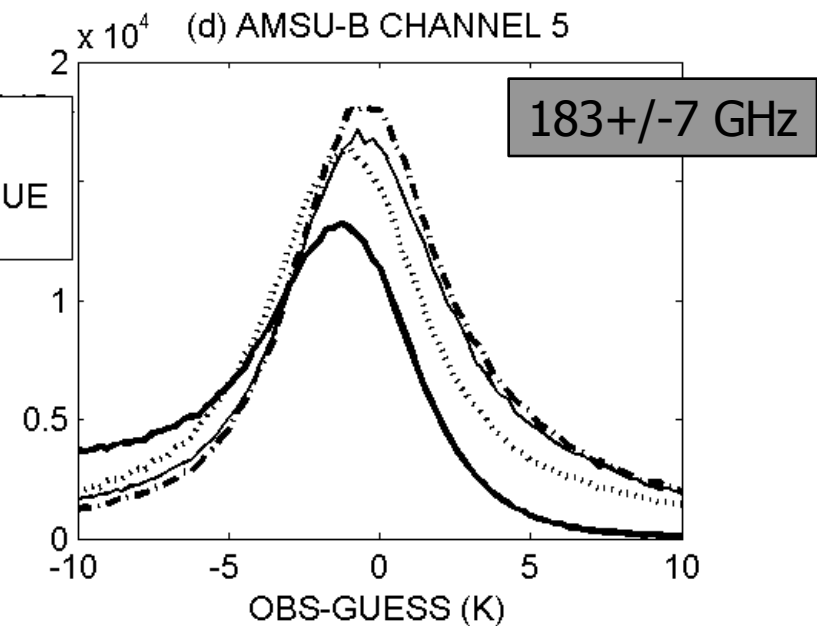
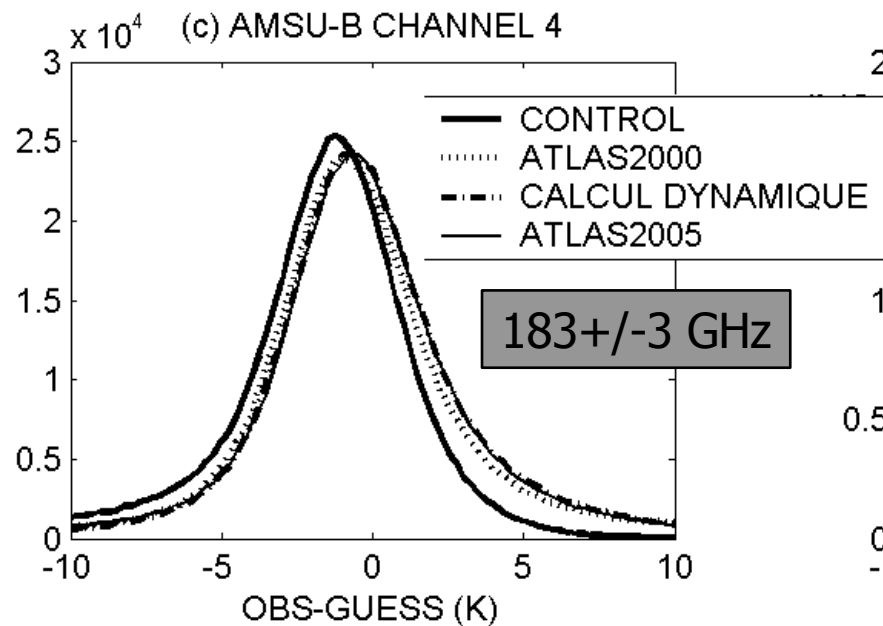
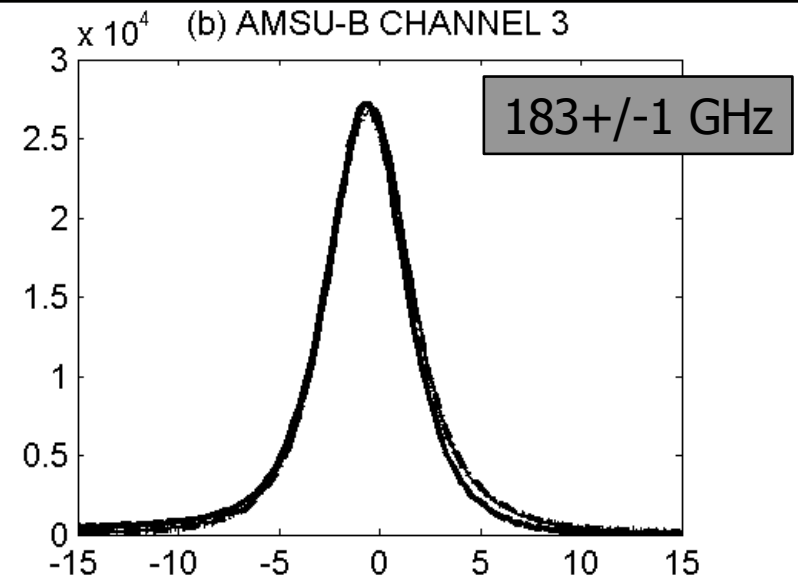
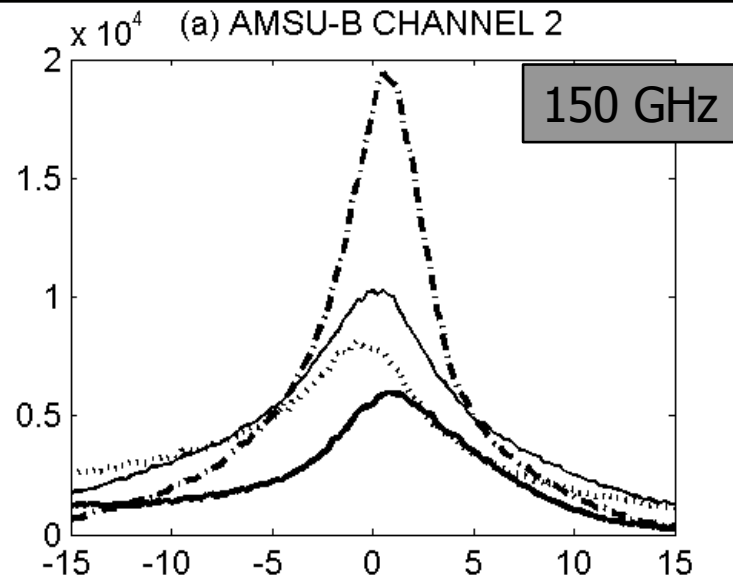


Emissivity, AMSU-B, channel1, operational



Emissivity, AMSU-B, channel1, atlas2005

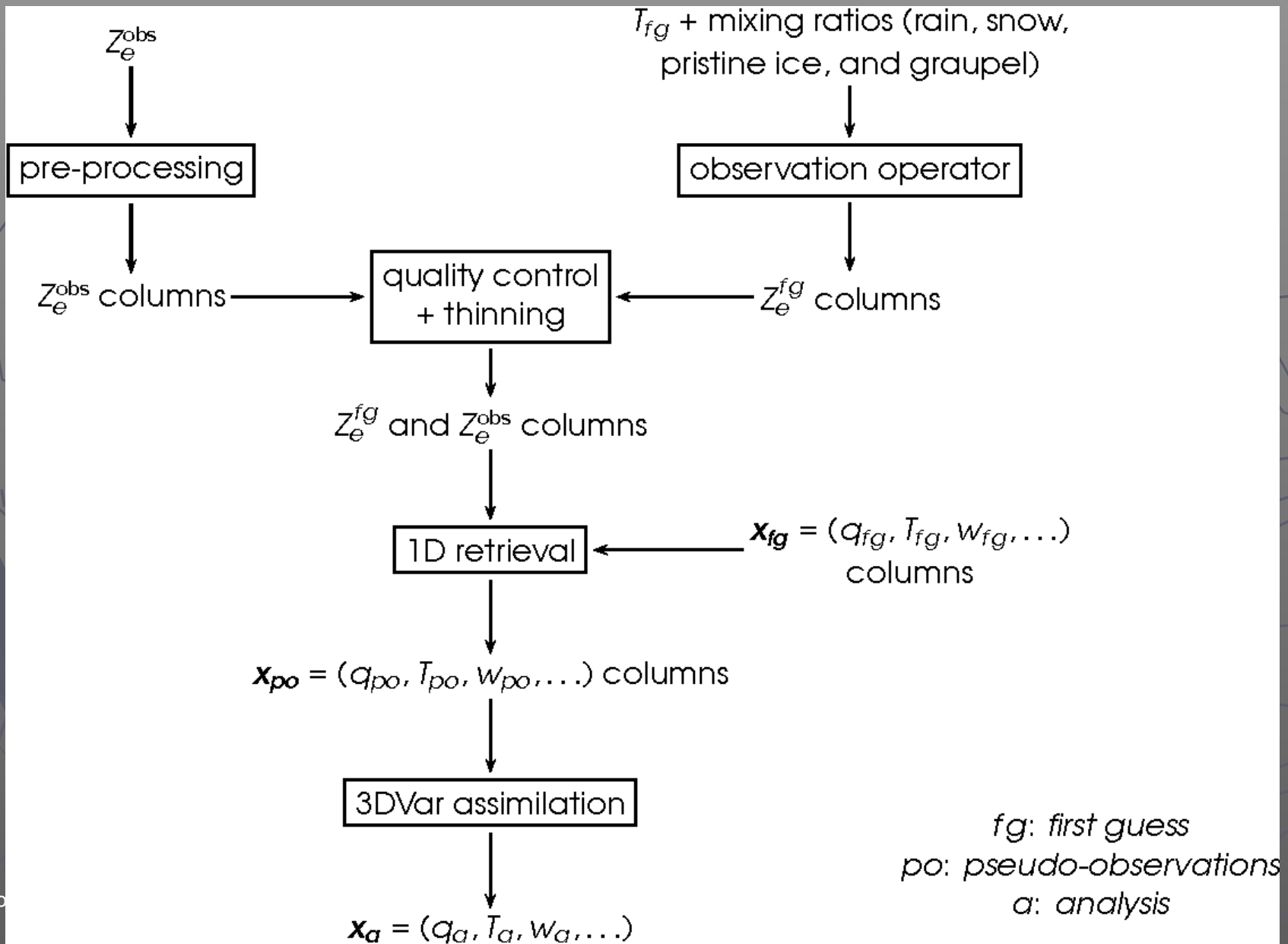
Comparison of obs-guess without bias correction, **22 March through 4 April 2005**



Further results and plans

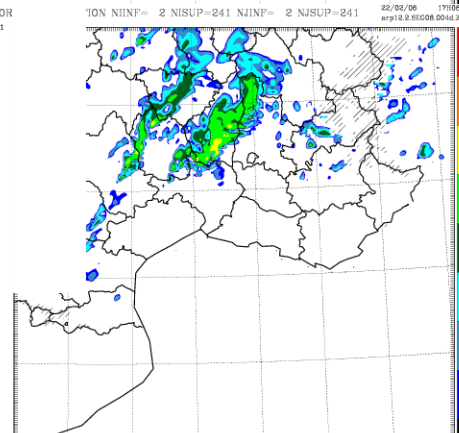
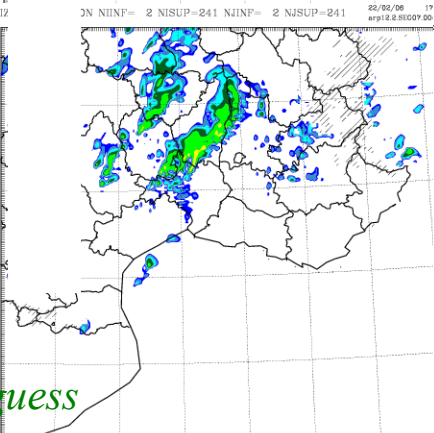
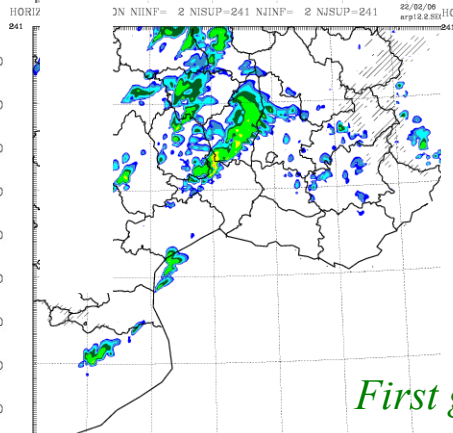
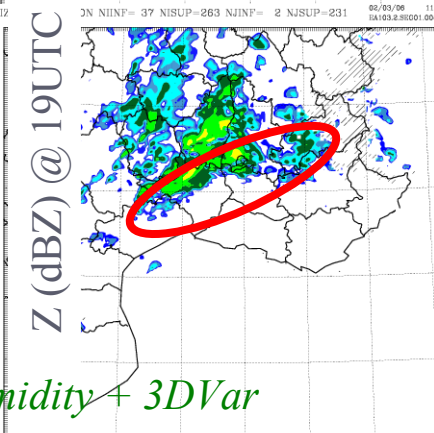
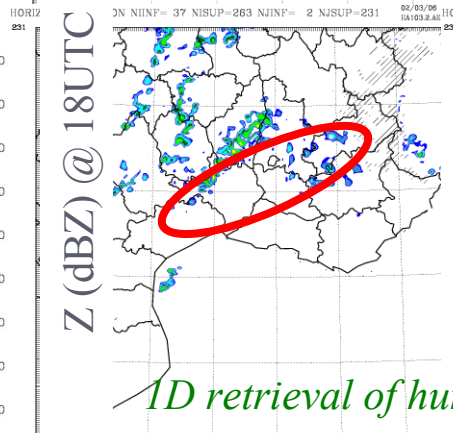
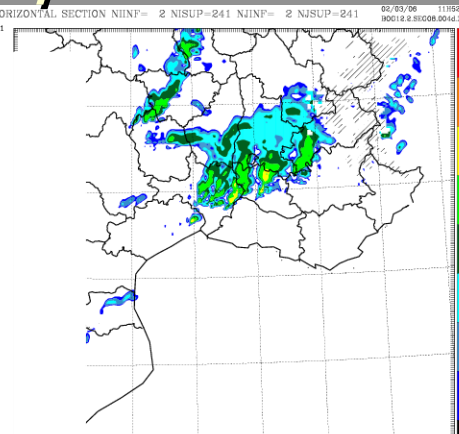
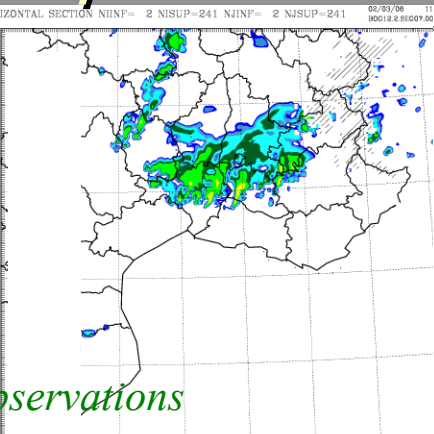
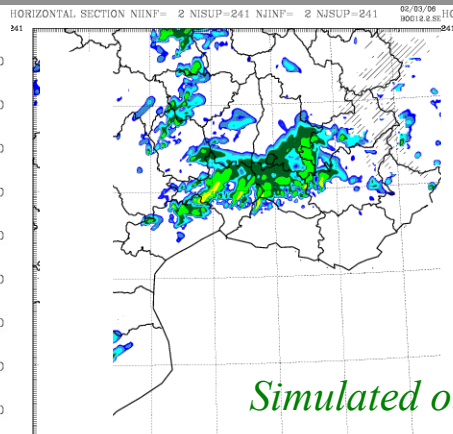
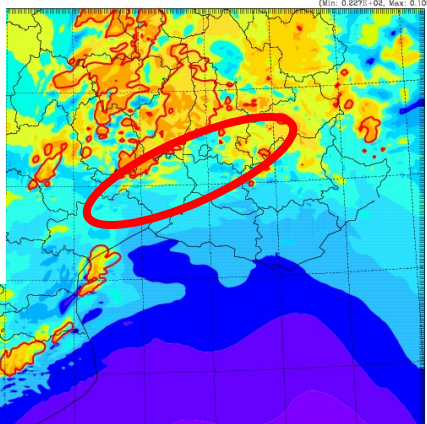
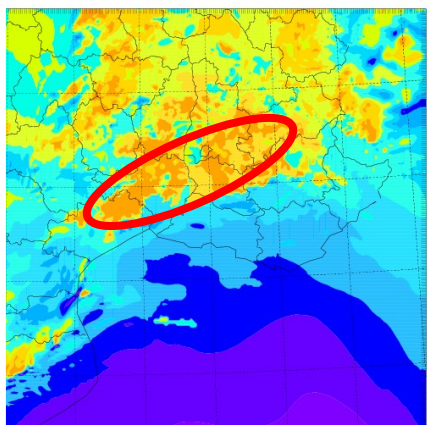
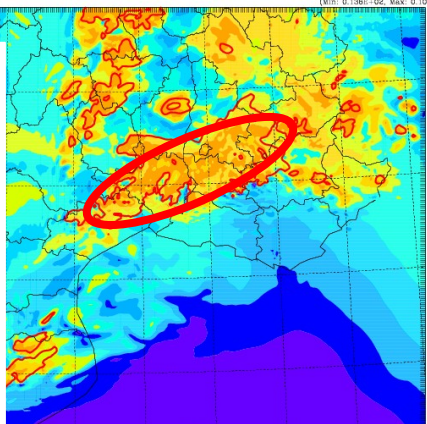
- ▶ Best choice so far: mix the atlas with ϵ s of the day (dynamical)
- ▶ Same 4 approaches also compared for the specification of Ts; mix atlas+dynamical also recommended
- ▶ Test in assimilation mode, over August-September 2005 with all 4 configurations
- ▶ Modelize ϵ s = $f(\text{frequency, soil type, ...})$
- ▶ Adapt to Aladin

1D+3DVar assimilation scheme for reflectivities



OSSE for reflectivities w/ Meso-NH/Aladin

Hu (%) + 10-dBZ contour @ 18UTC



Summary & outlook for reflectivities

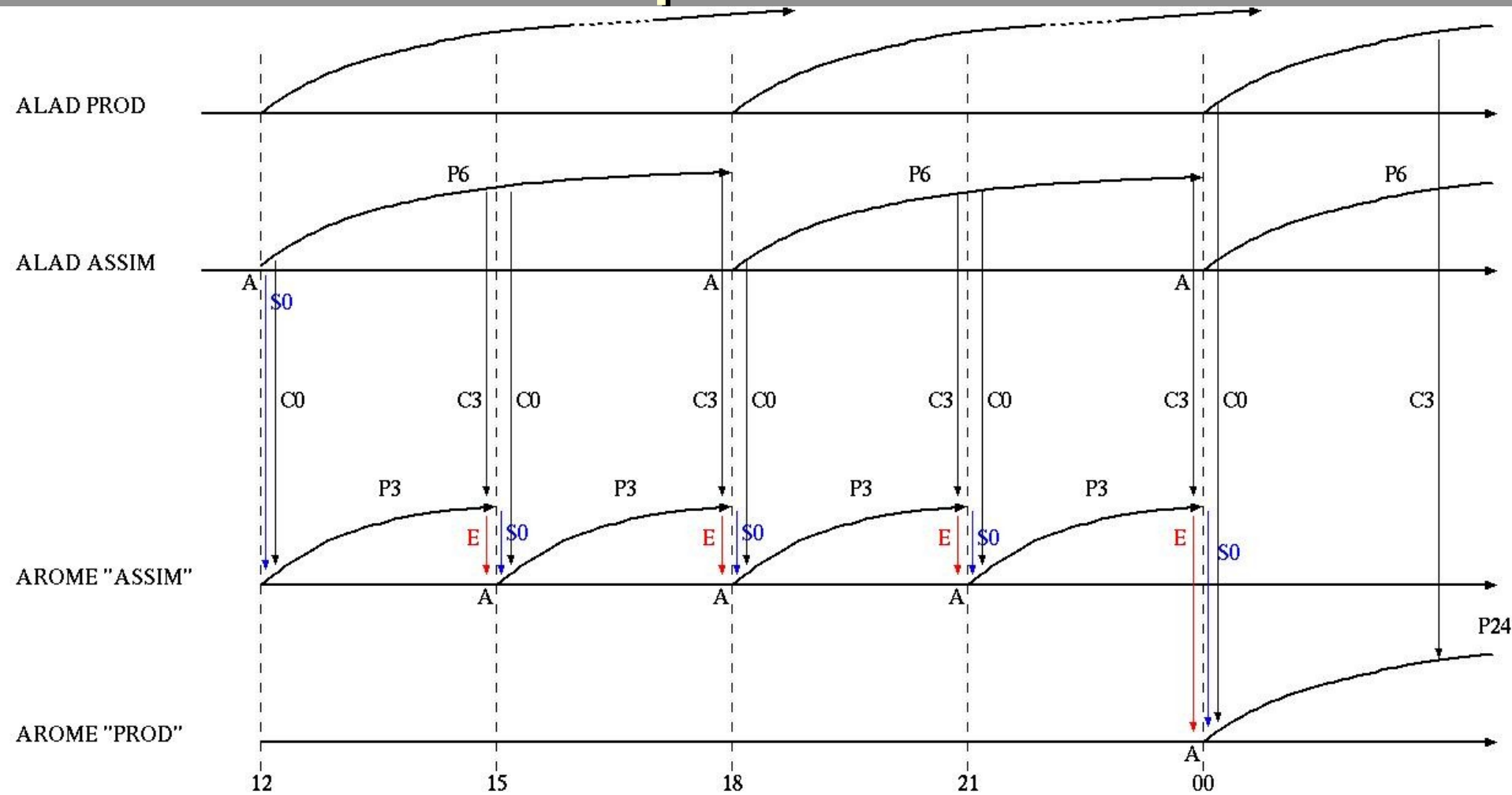
Summary:

- ▶ 1D retrieval able to correct for humidity,
- ▶ 1D+3DVar assimilation expts do not blow up numerically,
- ▶ For this case, need for a good low-level initialisation to improve the analysis.

Future work:

- ▶ perform 1D+3DVar assimilation expts with real data using a first guess that accounts for surface obs,
- ▶ Perform cycling experiments,
- ▶ Implement the 1D+3Dvar into Arome.

Principle of RUC



E : first guess

S0 : Arome surface file at t0

September 6th 2005

- 4 simulations of 24h for 06/09 starting at 00 UTC with the initial conditions provided by:
 - spin up model starting from 0 UTC (Y.Seity)
 - 1 single analysis at 0 UTC using an Arôme 6h forecast as bg.
 - 1-hourly RUC assimilation between 12 UTC 05/09 and 0 UTC 06/09
 - 3-hourly RUC assimilation *ibid*
- observation handling like in Aladin (type, thinning,...)
- B matrix obtained by « jconv » from the Aladin ensemble B

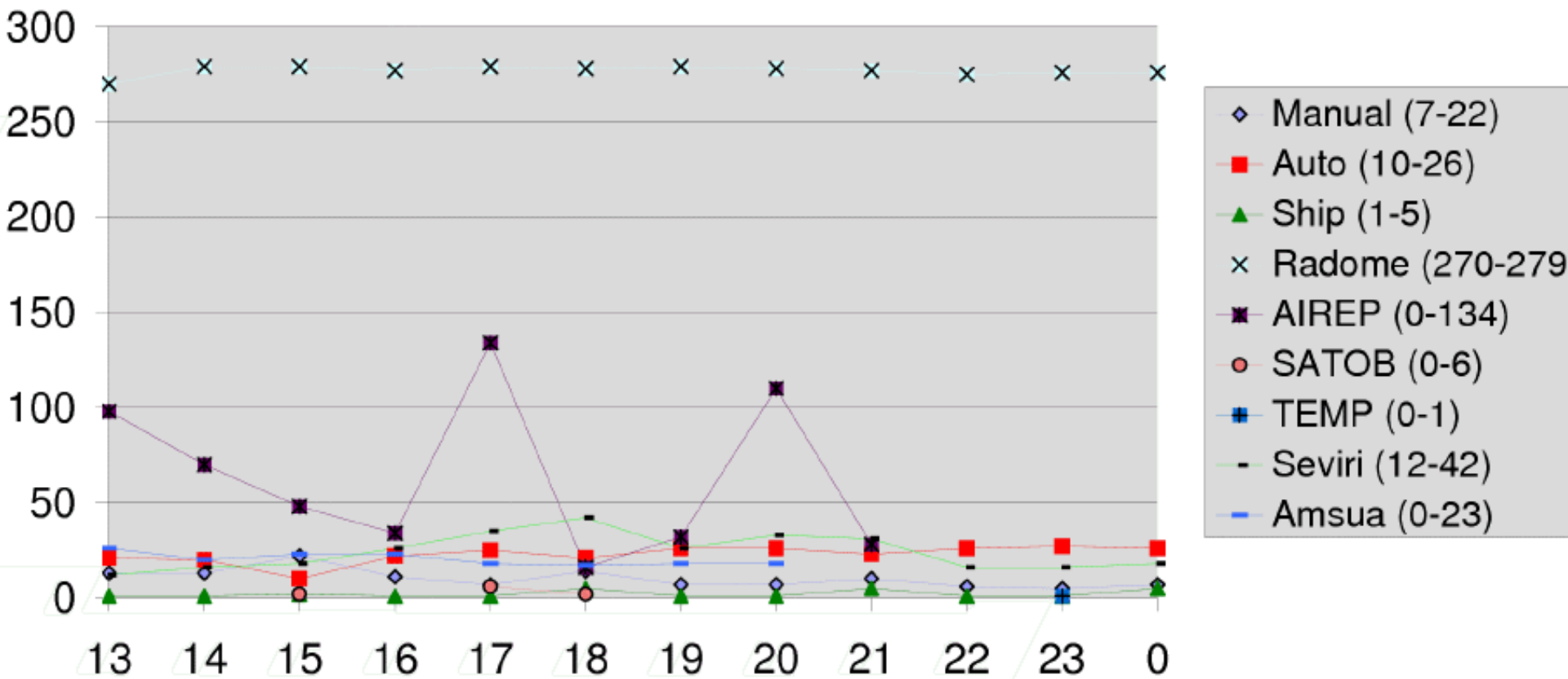
Cost : CPU

- ▶ Domain size 240 *240 points

	1 RUC segment (ana+fct)	Total cycle
RUC 1 hour	2050	25000
RUC 3 hours	4500	19000

AROME 24 H forecast: 30000 s CPU

Distribution of observations along the RUC (12 UTC - 0 UTC)



Analysis increments at 0 UTC (RUC 3h)

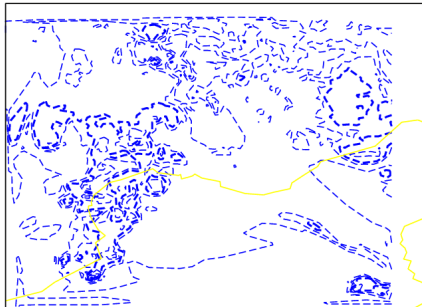
T

Q

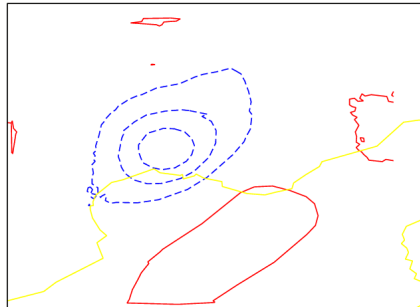
U

V

20050906H00 T : lev = 21 (iso : 0.1)



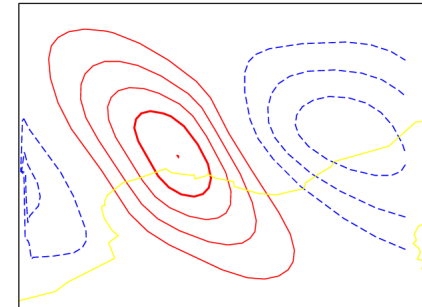
20050906H00 Q : lev = 21 (iso : 0.00005)



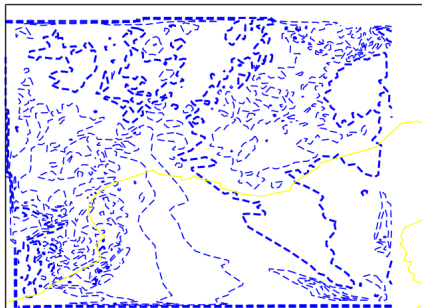
20050906H00 U : lev = 21



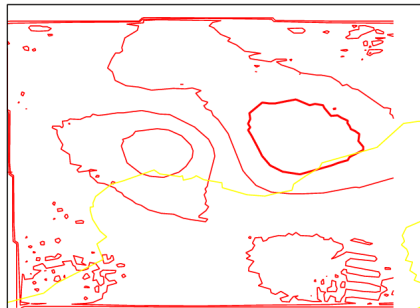
20050906H00 V : lev = 21



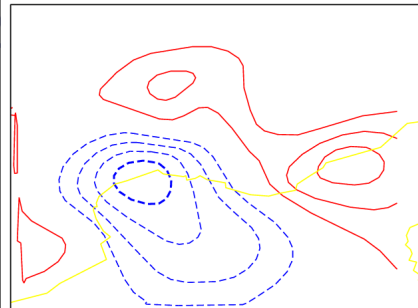
20050906H00 T : lev = 31 (iso : 0.3)



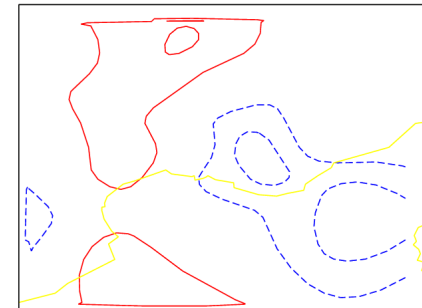
20050906H00 Q : lev = 31 (iso : 0.0002)



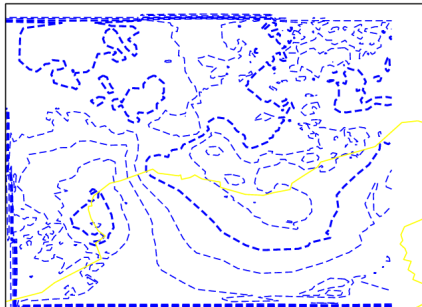
20050906H00 U : lev = 31



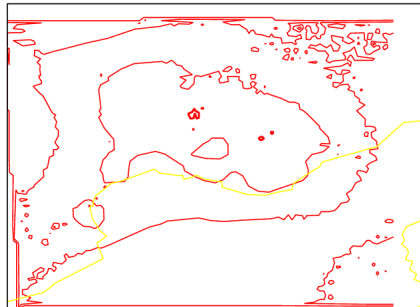
20050906H00 V : lev = 31



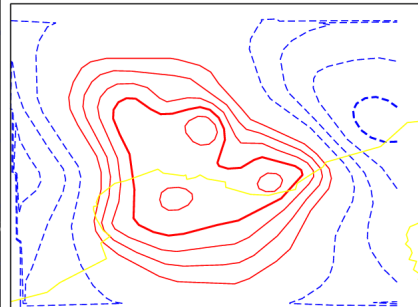
20050906H00 T : lev = 41 (iso : 0.5)



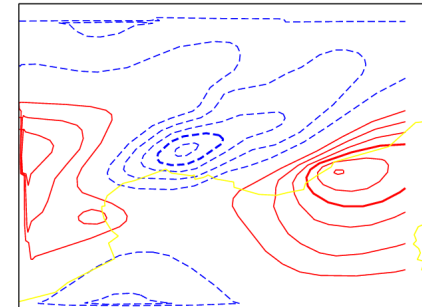
20050906H00 Q : lev = 41 (iso : 0.0005)



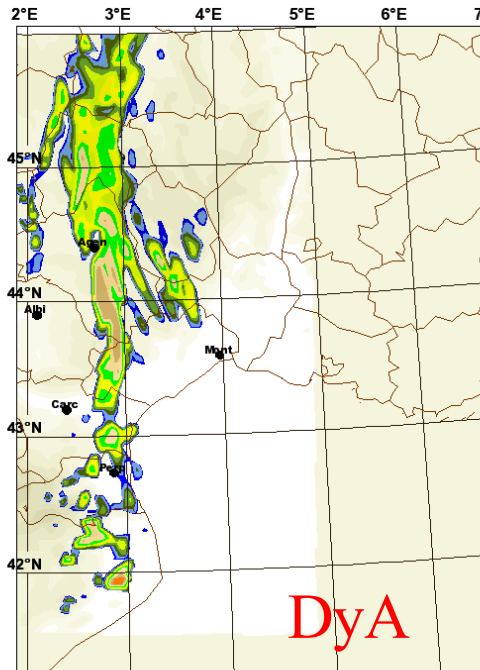
20050906H00 U : lev = 41



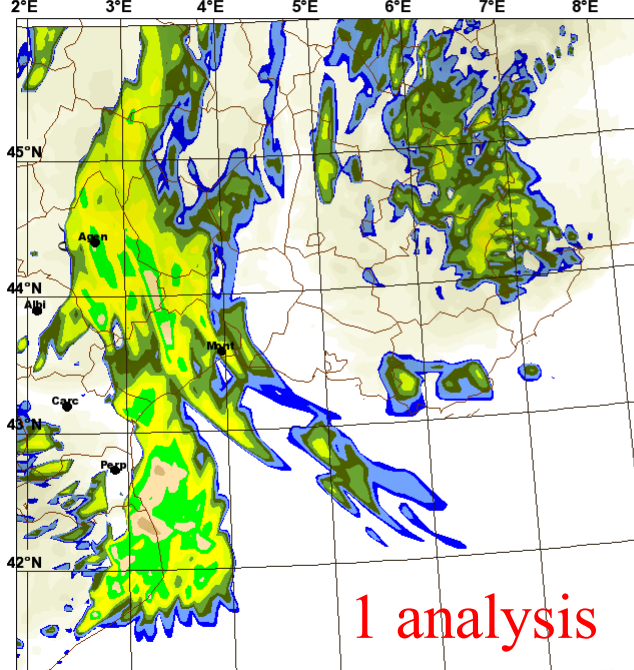
20050906H00 V : lev = 41



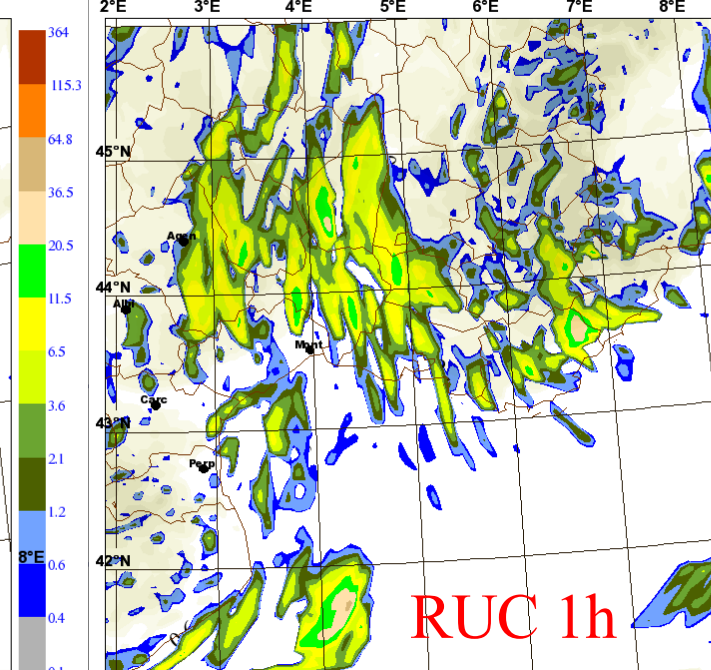
Arome 2005090600+0300 instant surface



Arome 2005090600+0300 averaged rainrate (mm/h) for last 3h

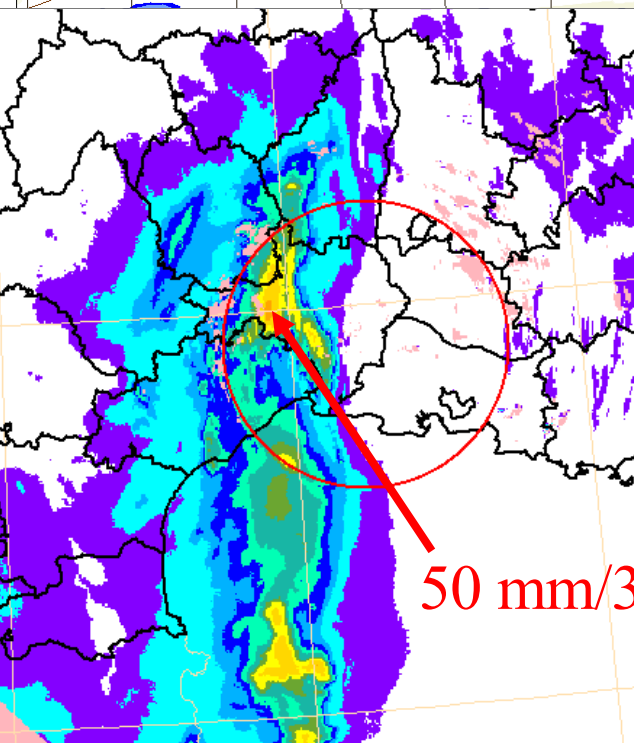


Arome 2005090600+0300 averaged rainrate (mm/h) for last 3h

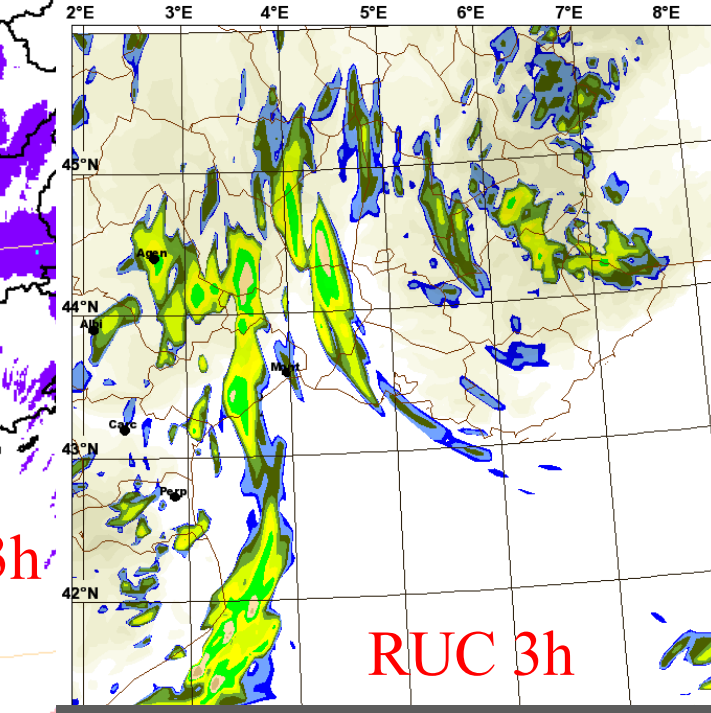


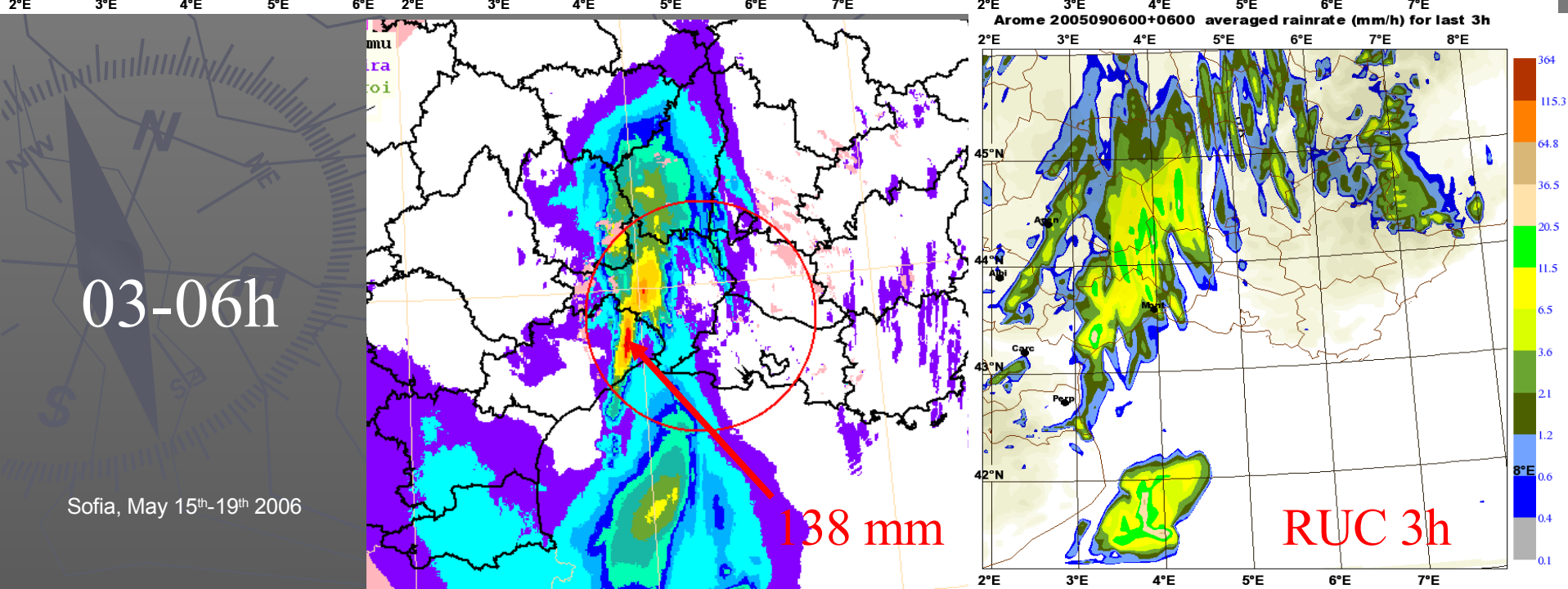
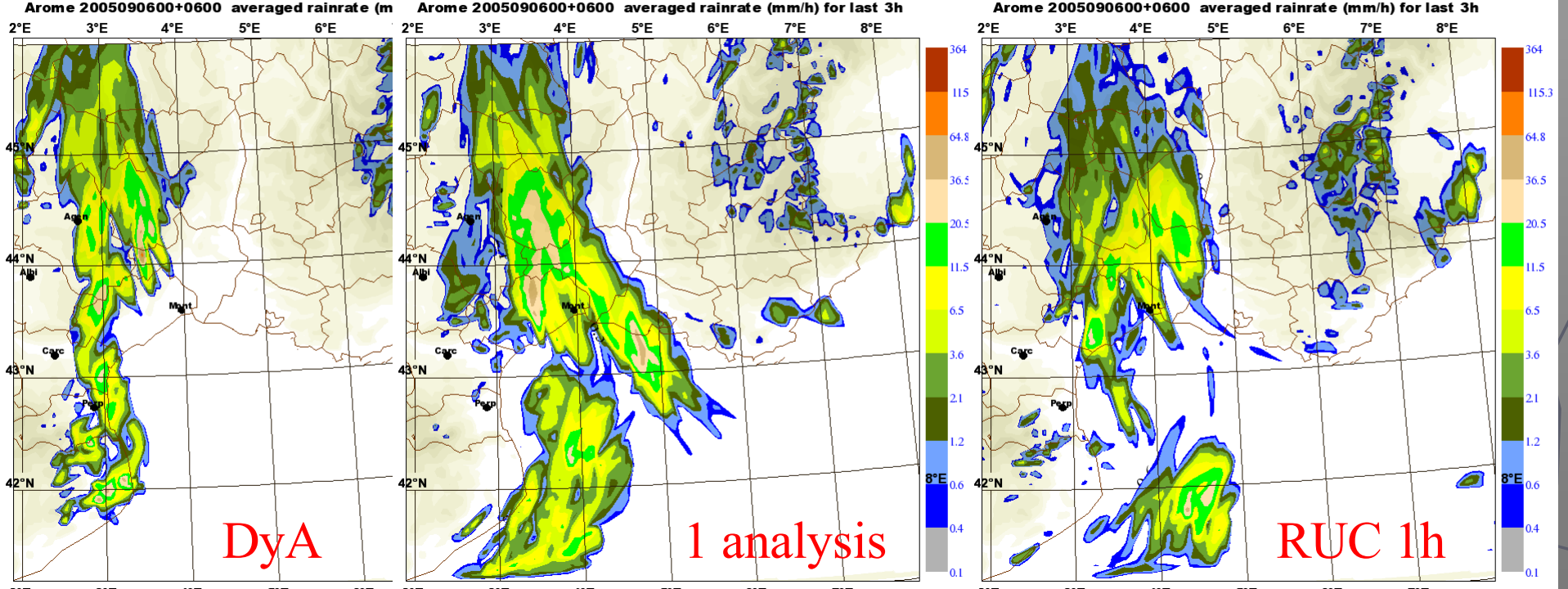
00-03h

Sofia, May 15th-19th 2006



Arome 2005090600+0300 averaged rainrate (mm/h) for last 3h





03-06h

Sofia, May 15th-19th 2006

Plans over 2006-early 2007

- ▶ B matrix and background std dev.:
 - Errors of the day for screening
 - Filtering of the ensemble bg errors (low-pass)
 - Native Aladin ensemble of analyses
 - Derive from those an Arome ensemble forecast
- ▶ Algorithms:
 - Adapt and evaluate Jk coupling term
 - FGAT (with HMS)
 - Supervision, teaching for SL TL/AD (F. Vaňa)
- ▶ Observations:
 - Switch SEVIRI from MS-8 to MS-9 (September)
 - Quikscat in operations (presently in E-suite)
 - Work on radial radar wind obs. operator

**Thank you for your
attention**

