

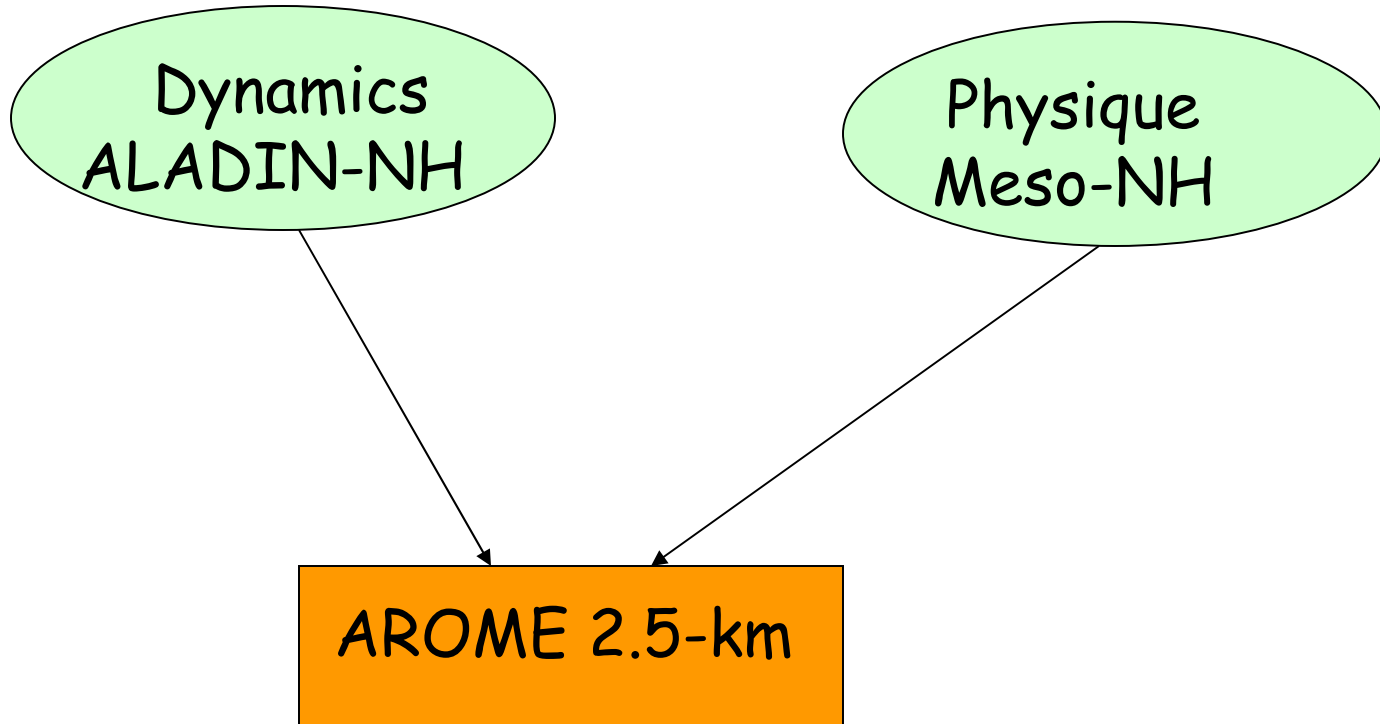
# First results of the AROME prototype

Yann Seity (Météo-France CNRM/GMAP)

*14th ALADIN Workshop Innsbruck June 2004*

# Introduction

(1/1)



# *Plan*

1. Status of the AROME prototype
2. 2D Academic case
3. Real case : GARD 08-09-2002
4. Conclusion

**Physics :**

Full physics interfaced : Microphysics, Turbulence, Radiation and Surface

Only one externalized adjustment

**Dynamics :**

2TL and 3TL schemes

P/C scheme

- Idealised squall line
- initiated by a cold pool produced by a  $0.01 \text{ K.s}^{-1}$  cooling rate applied for 10 min at low level
- Wind, temperature and humidity profiles derived from a RS from COPT81
- 2.5 km resolution, 8 hours run
- Tubulence + Microphysics

# 2D Academic Case

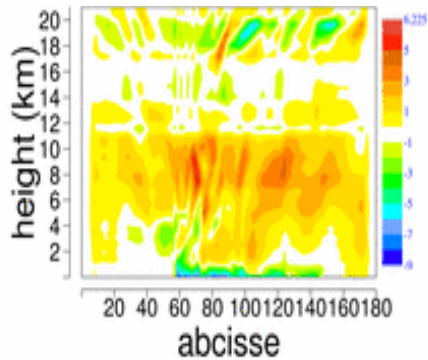
(2/5)

## Squall Line Case:

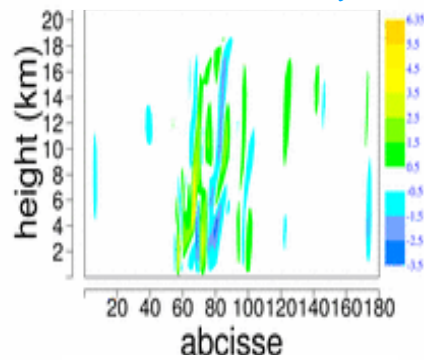
AROME (+3h)

MesoNH (+3h)

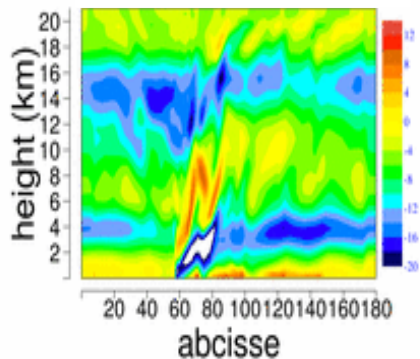
Theta-theta0



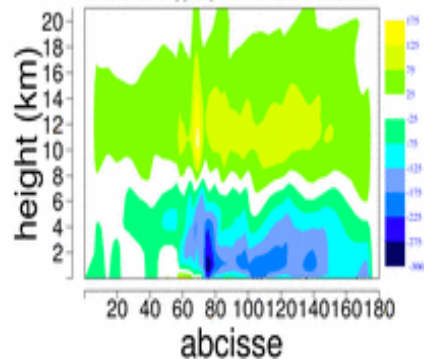
Vertical velocity



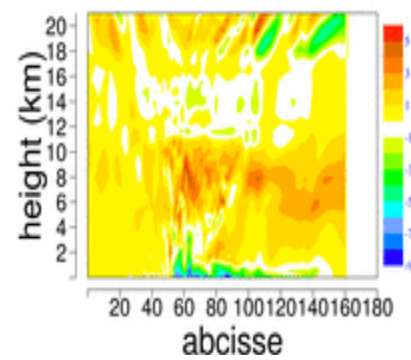
Relatif wind



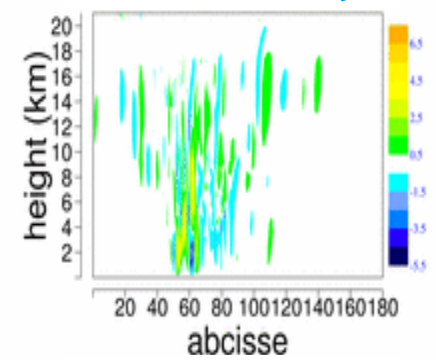
P-P0



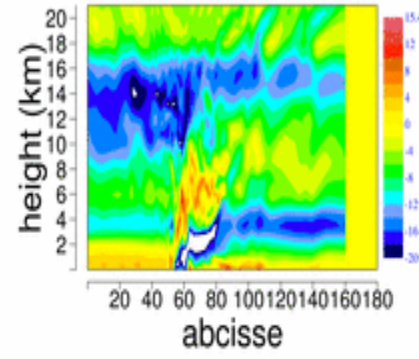
Theta-theta0



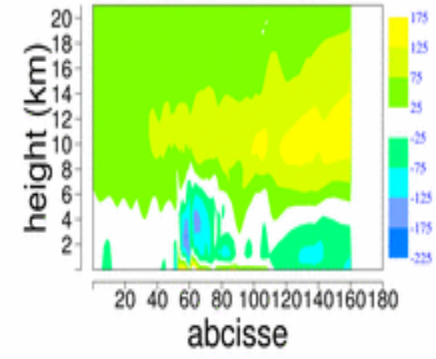
Vertical velocity



Relative wind



P-P0



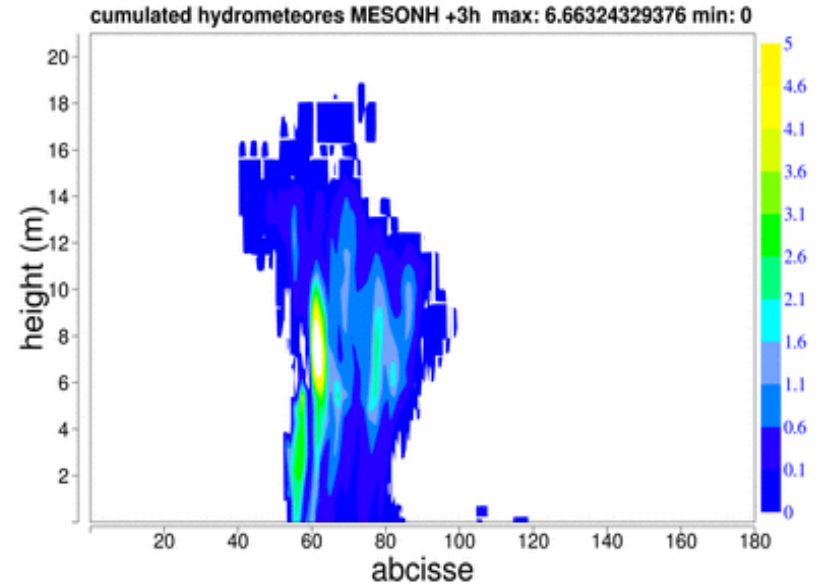
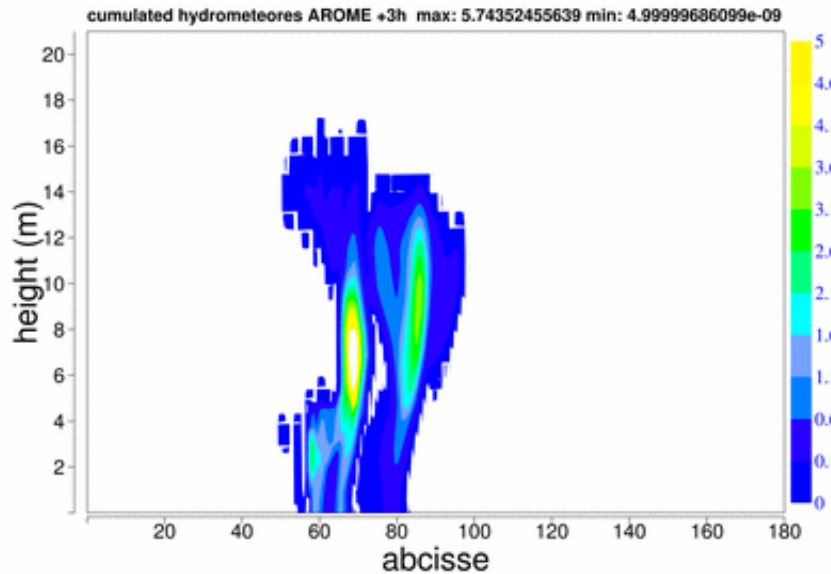
# 2D Academic Case

(3/5)

Squall line case:

AROME (+3h)

MesoNH (+3h)



# 2D Academic Case

(4/5)

A 2D academic squall line case :

AROME (+3h) dt=7.5s

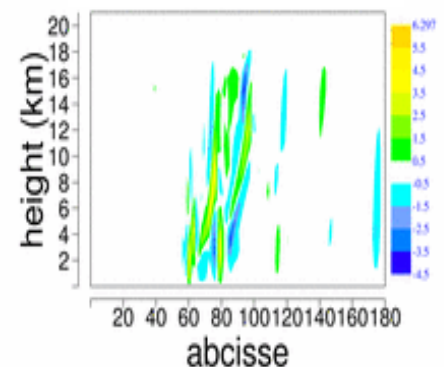
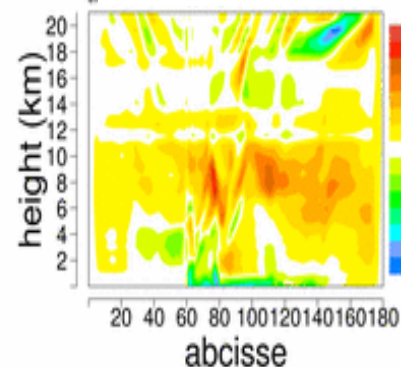
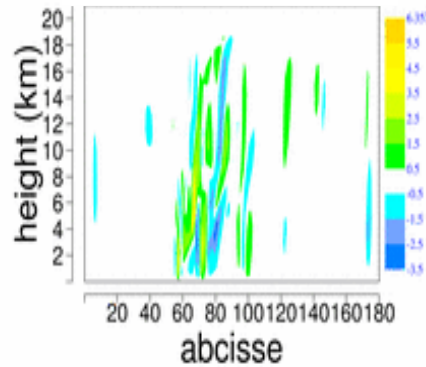
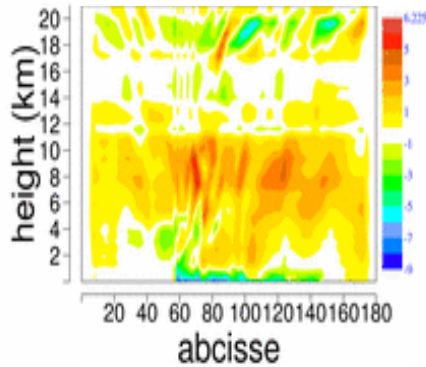
AROME (+3h) dt=30s

Theta-theta0

Vertical velocity

Theta-theta0

Vertical velocity

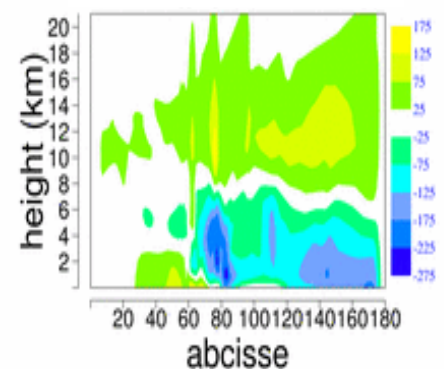
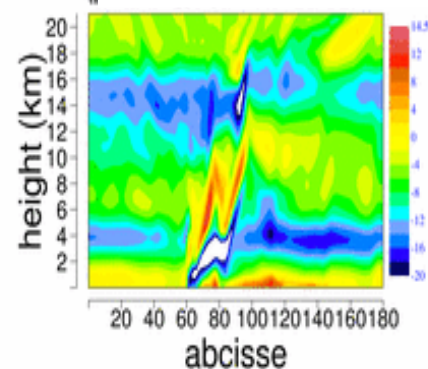
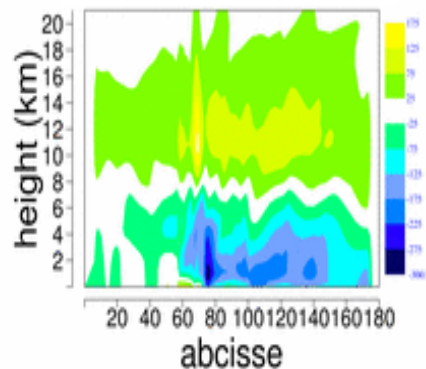
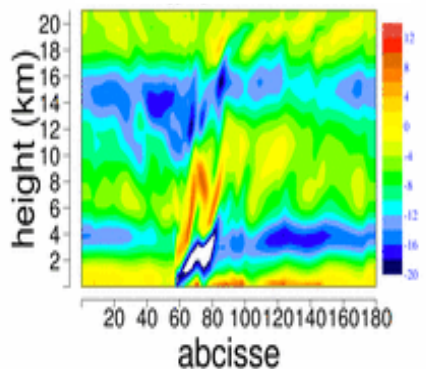


Relative wind

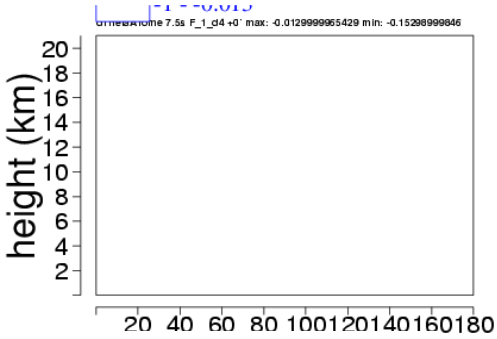
P-P0

Relative wind

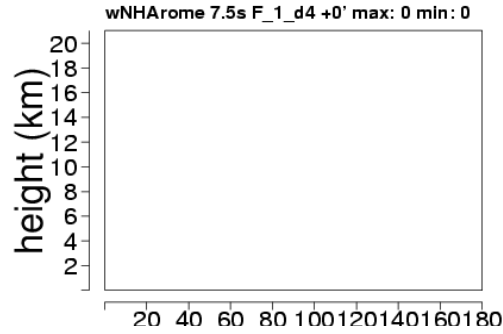
P-P0



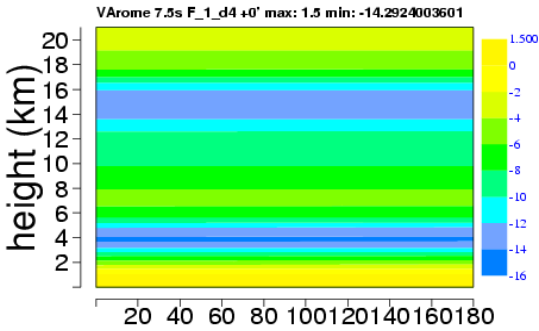




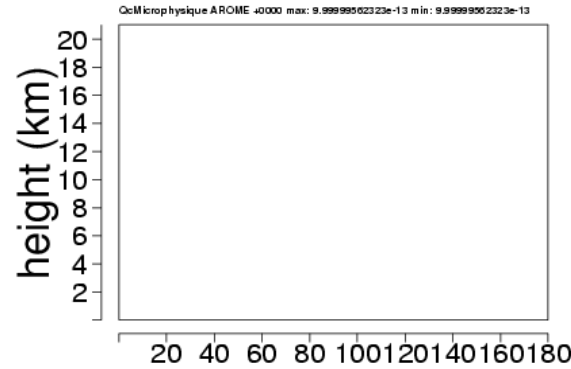
Theta-theta



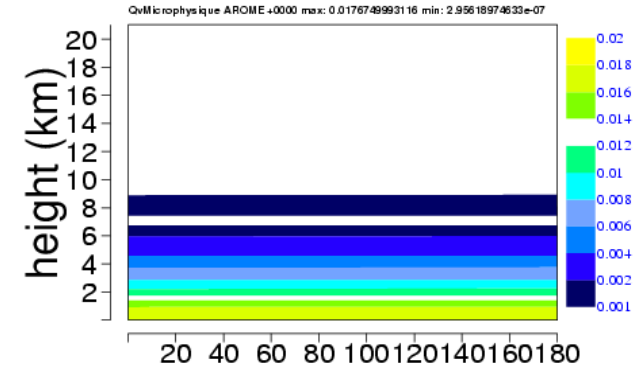
Vertical velocity



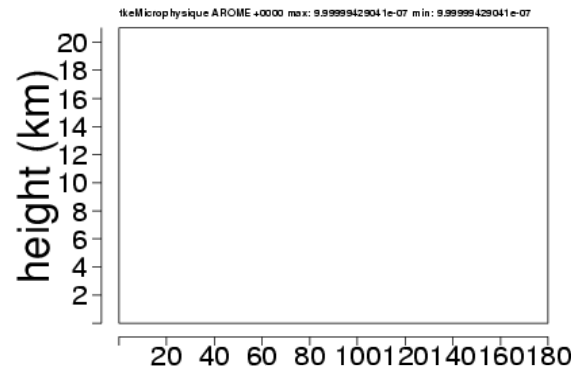
Relative wind



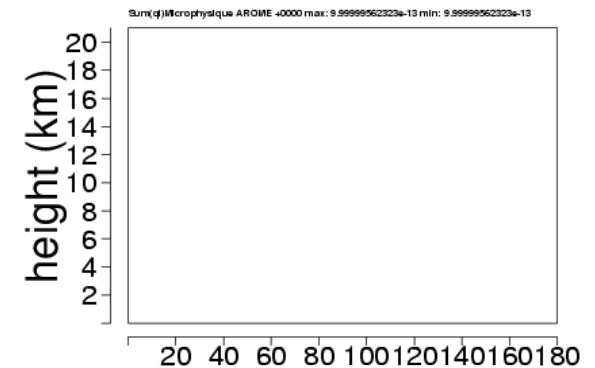
Cloud



humidity



TKE



Sum hydro

## *GARD flood 8-09-2002*

### *Simulation parameters:*

*Size 192x192 points*

*Full Physique*

*Radiation called every 15'*

*Coupling every 3h with Aladin France*

*Begin at 12TU 8 Septembre*

*Time step 7.5s*

*Goal : As good as referenced mesoNH simulation*

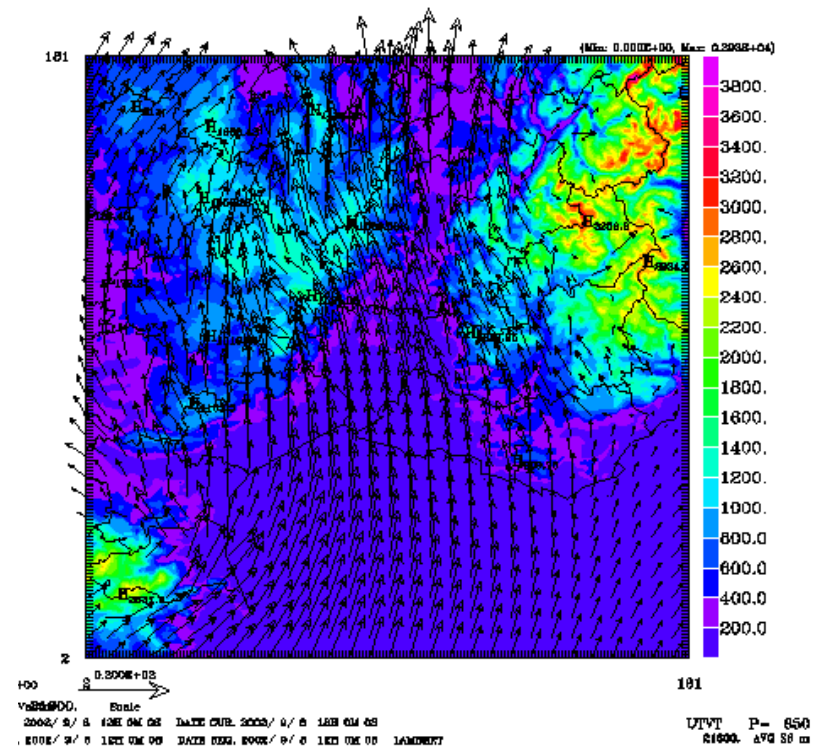
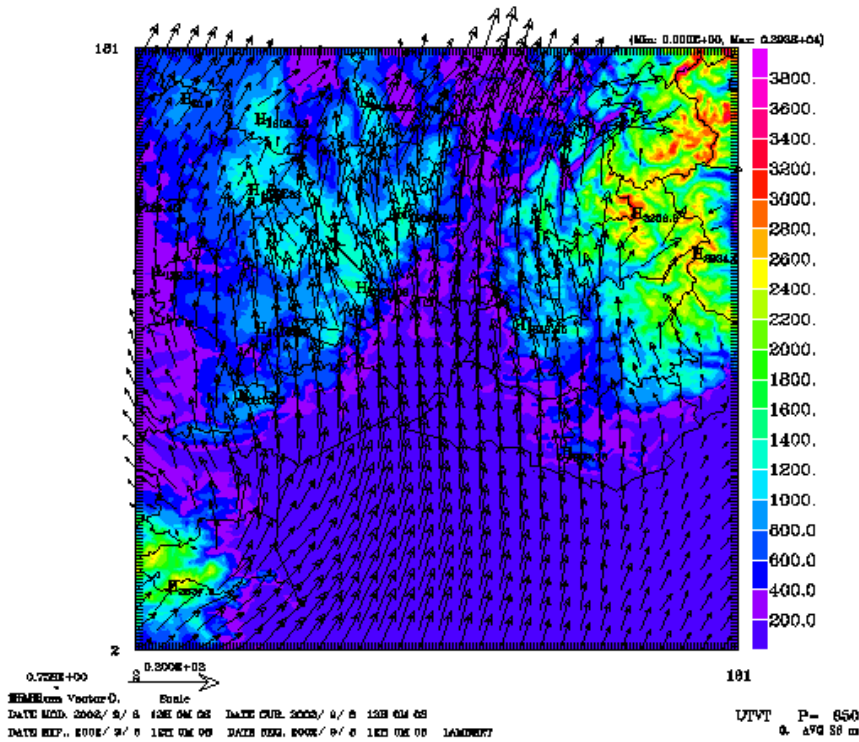
# Real Case

(2/6)

## 850hPa wind at 18TU

AROME

Meso-NH



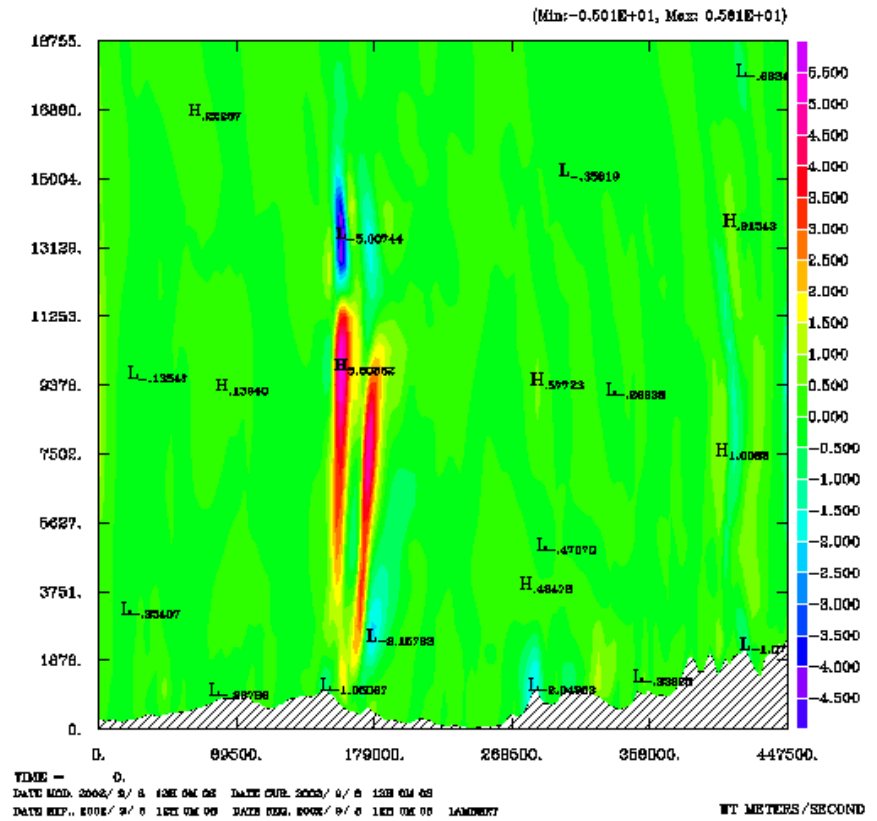
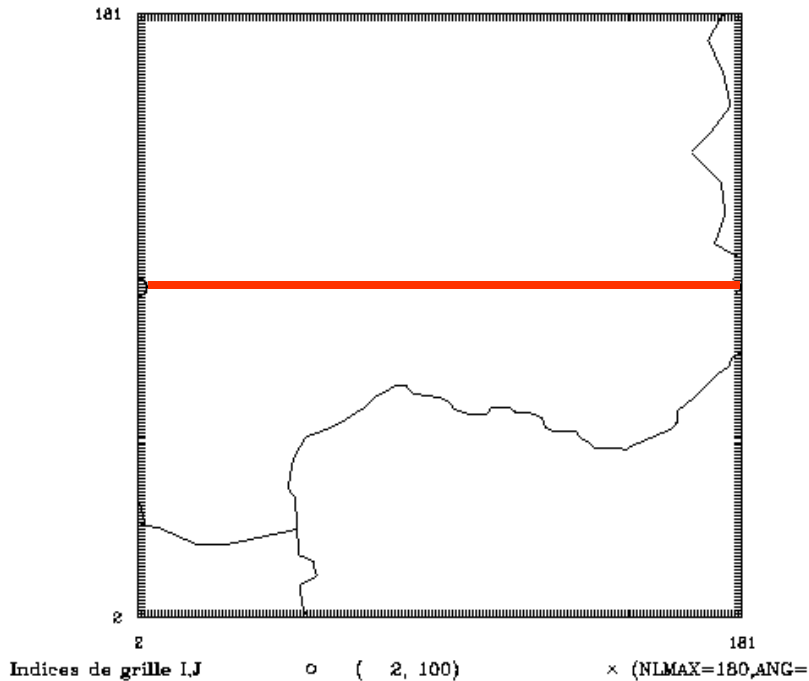


# Real Case

(4/6)

## Vertical cross section of $w$ at 15 TU

### AROME



# Real Case

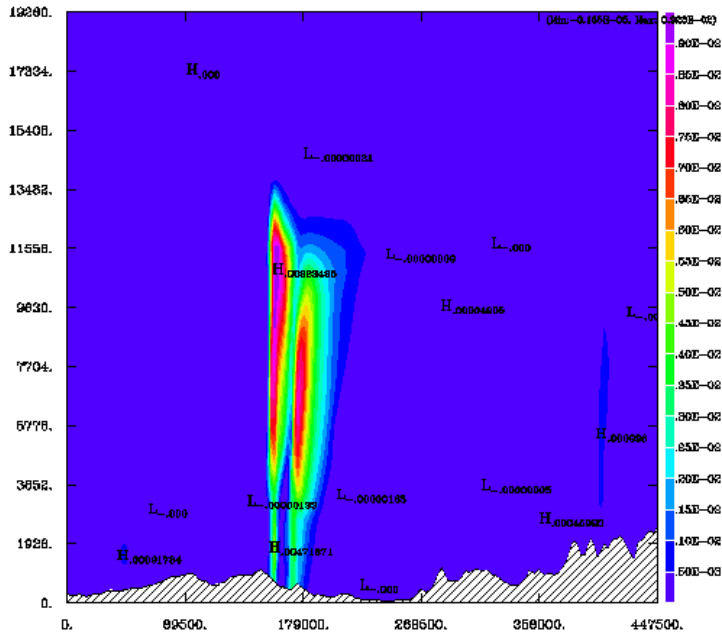
(5/6)

## Hydrométéores

## Radar Reflectivity

Vertical section IDEB= 2 JDEB=100 ANG.= 0 NBPTS=180

05/05/04 13H32M35  
GaRD+1440.dta

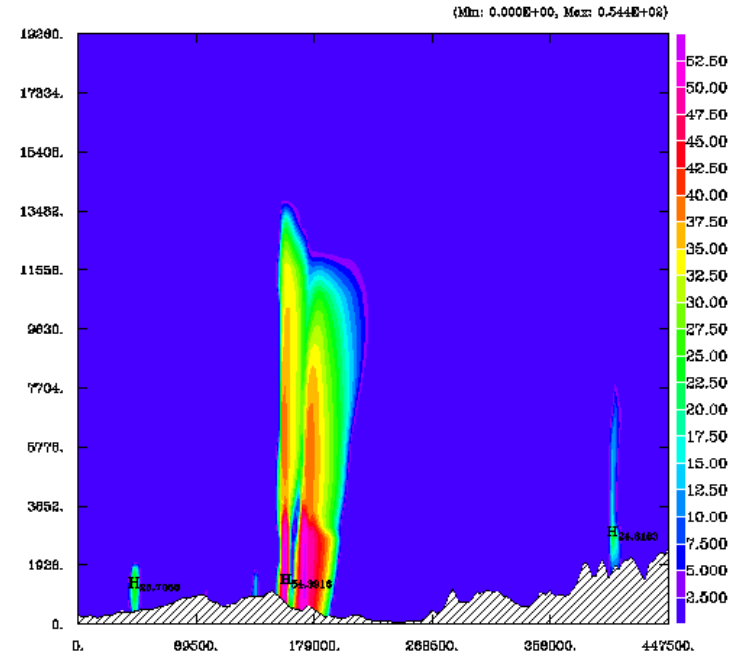


RCT (0.) + RHT (0.) + RHT (0.) + RHT (0.) + RGT (0.)  
DATE MID. 2002/ 2/ 8 12H 04M 02 DATE CUR. 2003/ 4/ 8 12H 04M 02  
DATE REP. 2002/ 2/ 8 12H 04M 02 DATE CUR. 2003/ 4/ 8 12H 04M 02  
DATE REP. 2002/ 2/ 8 12H 04M 02 DATE CUR. 2003/ 4/ 8 12H 04M 02

RGT KG/KG

Vertical section IDEB= 2 JDEB=100 ANG.= 0 NBPTS=180

05/05/04 13H32M37  
GaRD+1440.dta



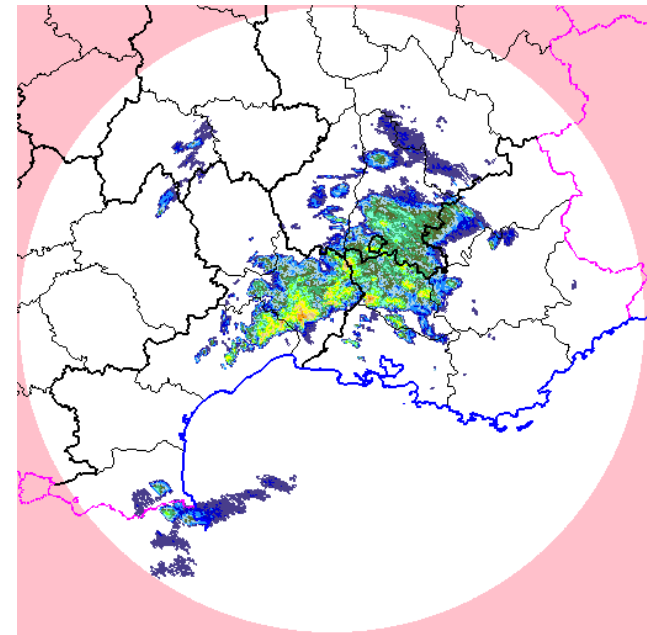
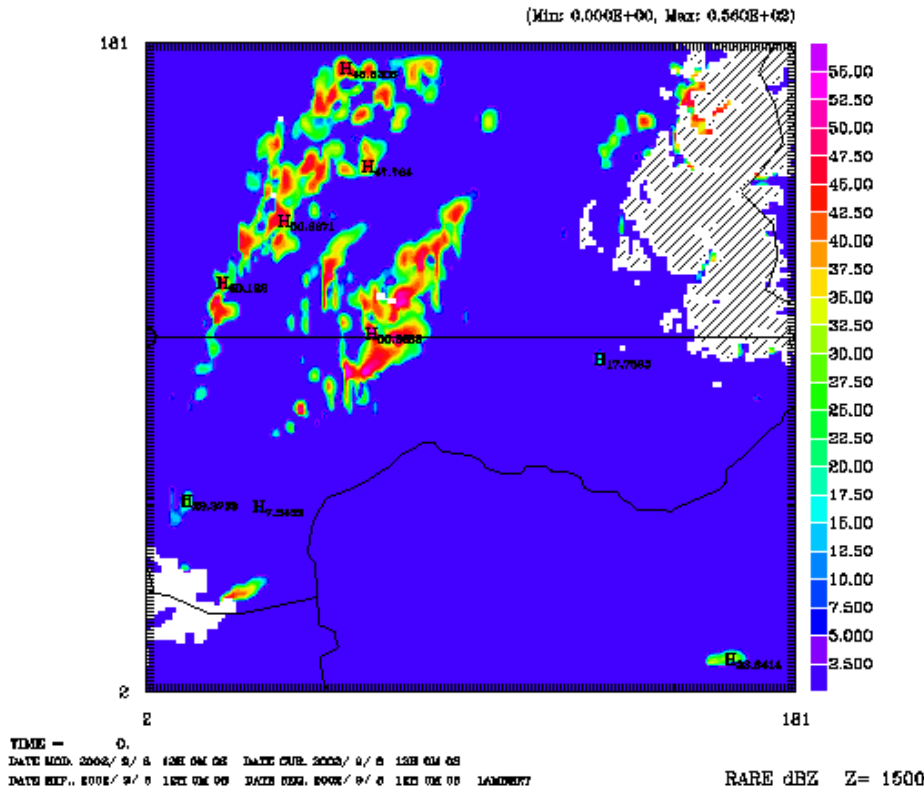
TIME = 0.  
DATE MID. 2002/ 2/ 8 12H 04M 02 DATE CUR. 2003/ 4/ 8 12H 04M 02  
DATE REP. 2002/ 2/ 8 12H 04M 02 DATE CUR. 2003/ 4/ 8 12H 04M 02  
DATE REP. 2002/ 2/ 8 12H 04M 02 DATE CUR. 2003/ 4/ 8 12H 04M 02

RARE dBZ

## Radar Reflectivity at 15 TU

AROME

Nîmes Radar



*Time step increasment :*

*Without P/C : 15s OK but 30s not*

*With P/C : 30s OK but 45s not*



# Conclusion

(1/1)

✓ First comparative tests between mesoNH and AROME in 2D or 3D cases show quite similar results

✓ Fine analysis of AROME and MésoNH simulations : need of diagnostics (surface, cumulated rainfalls, etc...)

✓ 2D tests of increasing time step are encouraging.  
Remaining problems in 3D case. (which configuration of P/C for AROME ?)

✓ Code optimisation for benchmark

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