Convergence between the ALADIN and AROME projects: opportunity and challenges

I) Motivation

III) Issues

V) Partnerships

VII) New development strategy and its consequences

IX) A tool-box approach

XI) Towards a bit more networking

Opportunity & Challenges: Motivation

- The next major challenge for LAM NWP:
  - Modelling at scales where intense convection becomes explicit => dx~2.5km
  - Still a lot of physics … with some expensive parameterisation (microphysics, 3D-turbulence)
  - Really «moist and ageostrophic» data assimilation
  - Use at shorter ranges (=> nowcasting)
- This goal is shared by other NWP groups (UK, US, HIRLAM). ALADIN is OK for to-day, not for to-morrow …
- An internal project started at Météo-France (Application of Research to Operations at Meso-scalE) => AROME
  - Operational target by 2008 on a domain covering France
  - Continuation of ECMWF, ALADIN, HIRLAM and LA-UPS partnerships

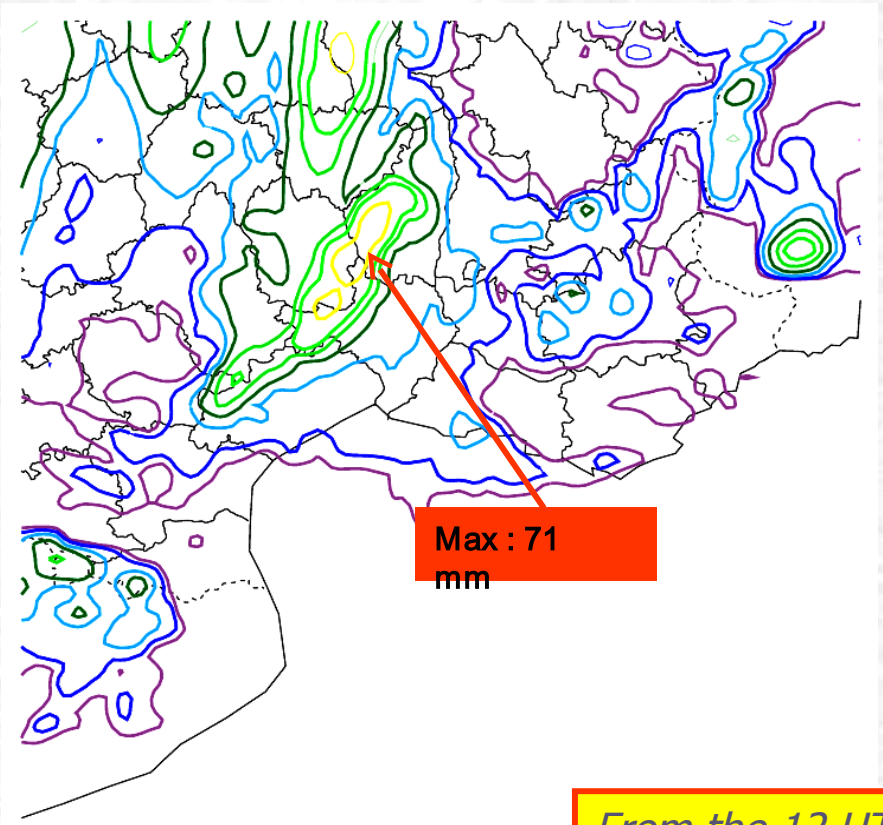
The political case for Arome

- Severe weather prediction →civil security
- Water cycle →aeronautics (visibility, snow ...)
- Explicit turbulence →civil security, aeronautics
- Explicit convection → intense precipitation
- Storm surges (by driving estuary, coastal ocean models)
- Interaction cyclones / steep orography
- Local enhancements of secondary cyclogenesis
- To stay at the forefront of nwp

Impact of a higher resolution and more advanced parameterisation for the extreme Gard flash-flood event in September 2002 :

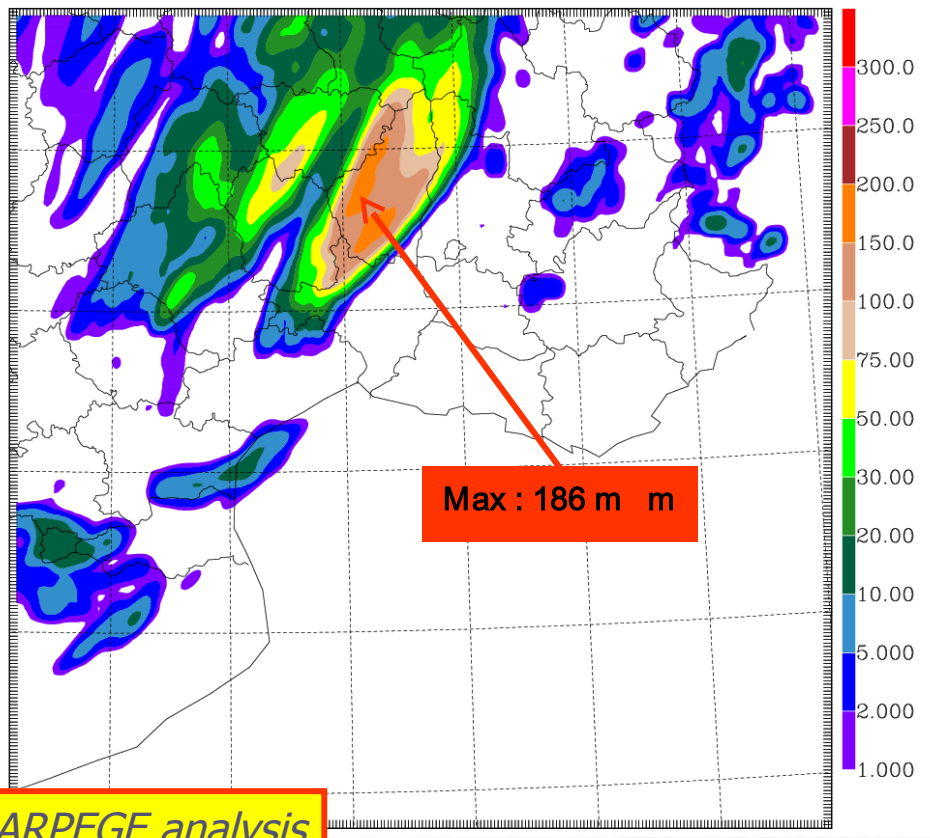
ALADIN-France

(parameterised and explicit precipitation)



2.4 km MESO-NH MODEL

(explicit precipitation averaged over the ALADIN grid-mesh)

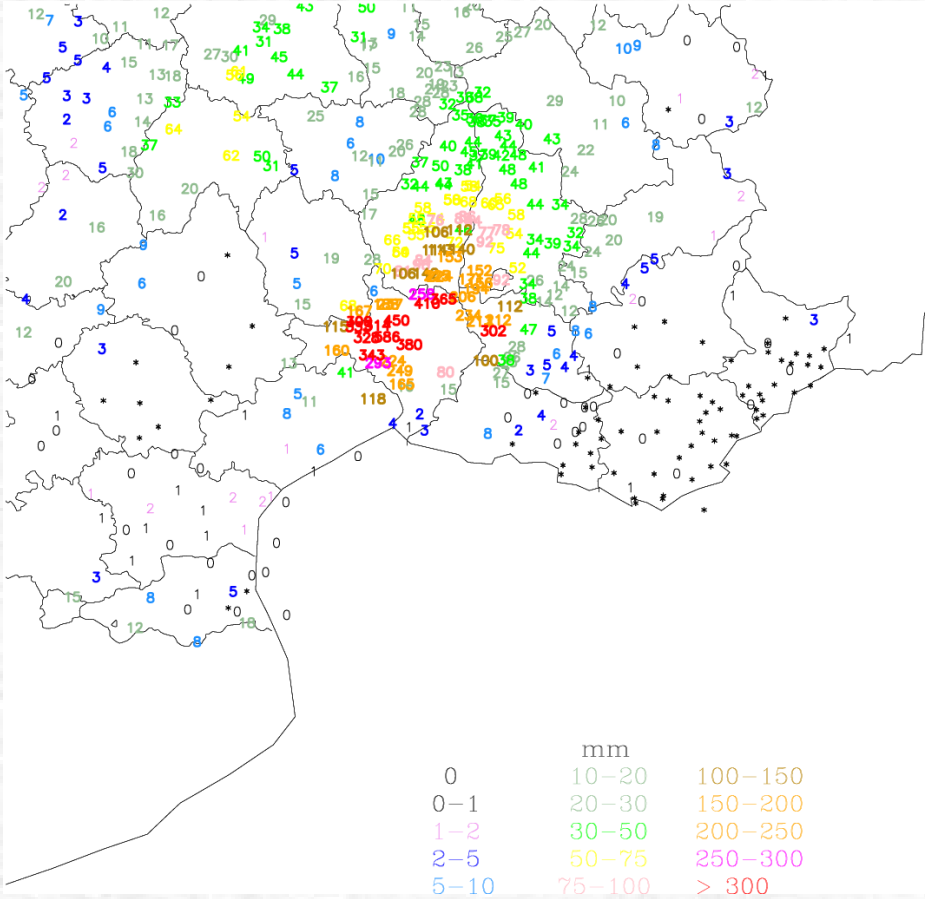


From the 12 UTC ARPEGE analysis

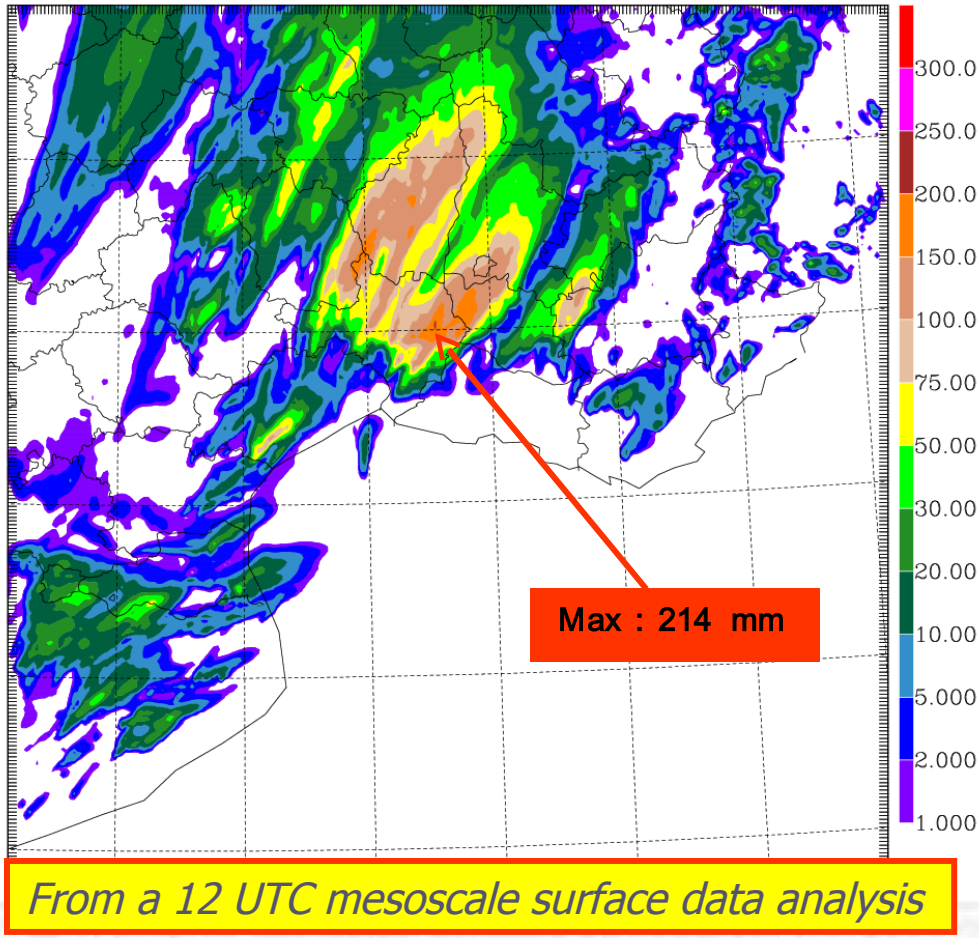
18-h accumulated precipitation from 12 UTC, 8 Sept. to 06 UTC, 9 Sept.

Impact of a mesoscale analysis for the extreme Gard flash-flood event :

OBSERVATIONS



2.4 km MESO-NH MODEL



From a 12 UTC mesoscale surface data analysis

18-h accumulated precipitation from 12 UTC, 8 Sept. to 06 UTC, 9 Sept.

Opportunity & Challenges: Partnerships

- Interactions with ECMWF is unavoidable and crucial, but the nature of the link with IFS changes (no more global considerations for AROME details)
- ***We are here to deal with the specific ALADIN case***
- Interaction with HIRLAM (at least sharing environment constraints; or more ?)
- Via Meso-NH (that will keep the key role of physics' test-bed and of anticipation of problems for even finer scales), the partnership with LA-UPS, via GMME, will grow in importance

New (12/02-1/03) development strategy and its consequences

- Stronger separation between the global and LAM issues, especially at the level of physics packages
- Reliance on flexible and efficient interfacing to avoid falling into the dilemma of killing innovation vs. being paralysed by maintenance
- This new emphasis on flexibility and on more 'LAM-identity' for AROME gives ALADIN Partners a chance to converge with AROME on a far shorter time-scale than anticipated earlier
- This might however require some reordering of priorities and some additional effort in the short-term
- On its side, Météo-France is ready to play its part in order to secure the mutually beneficial aspect of the collaboration

A tool-box approach

- Tools:
  - **F**ields' spectral representation: global or LAM
  - **G**rid point dynamics: HPE or compressible (**both** in mass coordinate)
  - **P**hysics: large scale (climate oriented) or fine scale (microphysics & turbulence oriented) or some partial mix (for economy)
- Météo-France operational choices:
  - ARPEGE : **FGP** / '*ALARO*' : **FGP** / AROME : **FGP**
- Absolutely needed compatibilities:
  - The NH dynamics must remain a switch of the HPE one
  - Some part of the Meso-NH physics must share a common interface with the current ARPEGE/ALADIN parameterisations
  - Same idea for the AROME and ARPEGE observation operators
- ALADIN Partners' operational choices:
  - Yours, of course (**FGP**, **FGP**, **FGP**, **FGP**, **FGP**, … ?)

Towards a bit more networking

- The kind of proposed early convergence has a lot of implications that raise important questions
- None of them can be solved by a separate action on either side, if we want to keep high ambitions for everyone
- Such an early effort for longer-term common perspectives (analogy with IFS/ARPEGE in 1987) will require some effort of each side to 'project' the other one's interests onto its own ones => networking ↑