Comparison of two mesoscale LAM-EPS generation methods for the prediction of heavy rains over the Western Mediterranean: the HyMeX IOP8 event.

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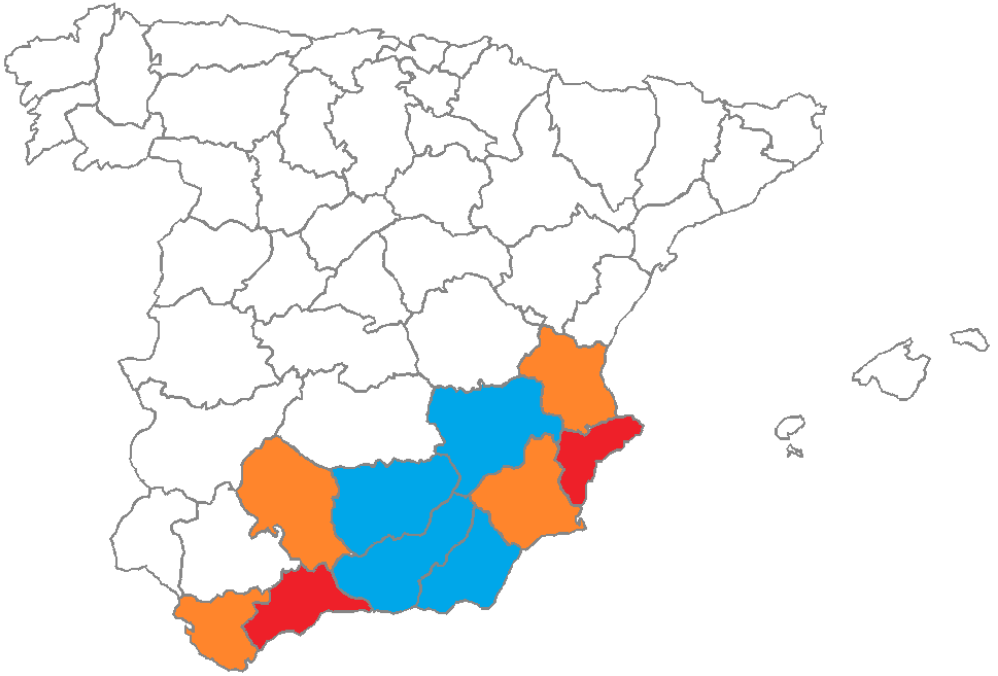
Why the IOP8 event?

28-30 September 2012

- **Heavy precipitation**:
  - 28 - Andalusia and Murcia
  - 29 - Catalonia, Valencia and Balearic Islands
  - 30 - Golf of Lyon
- **Personal losses**: 11 deaths
- **Material losses**: 120M€



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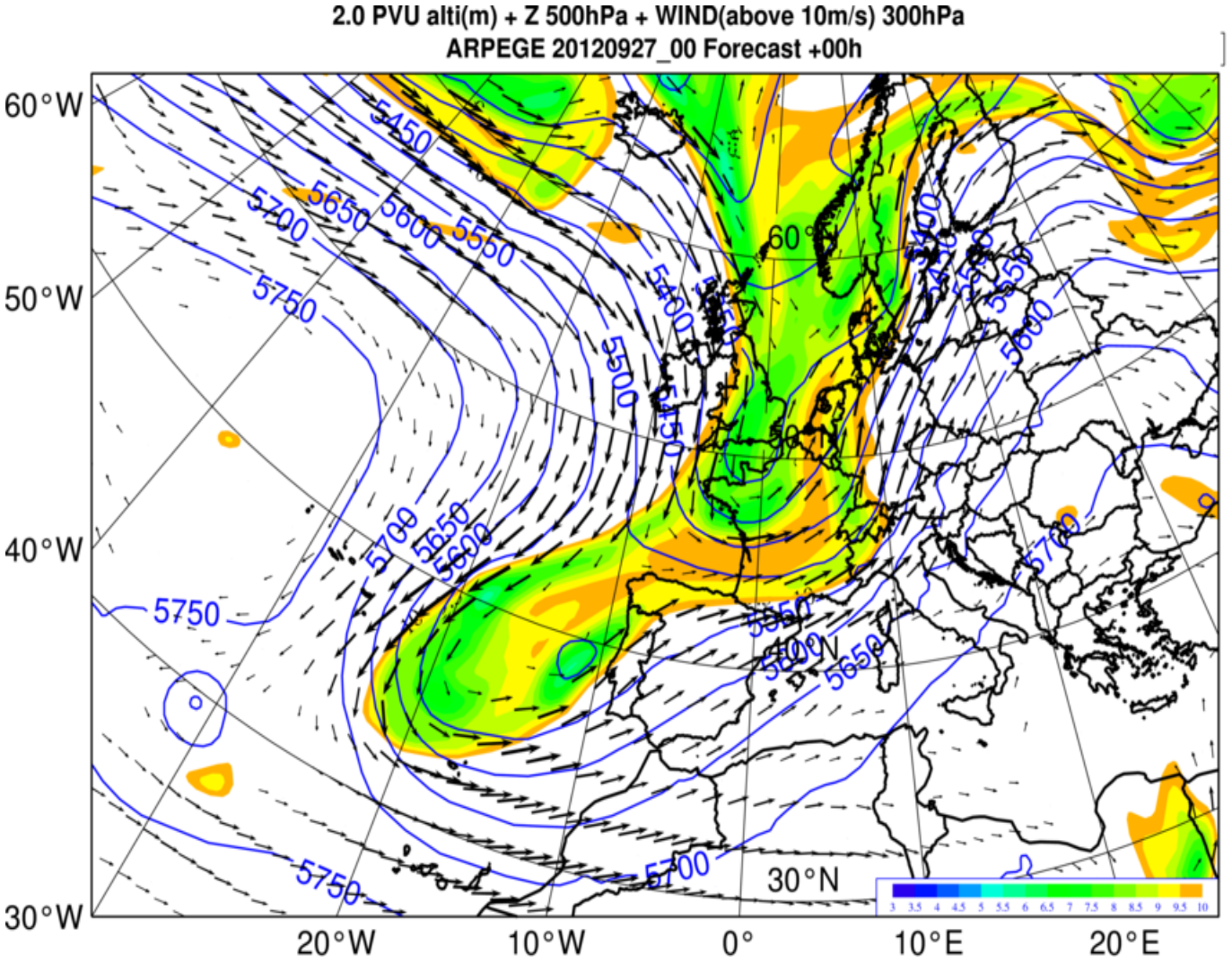
ARPEGE analysis

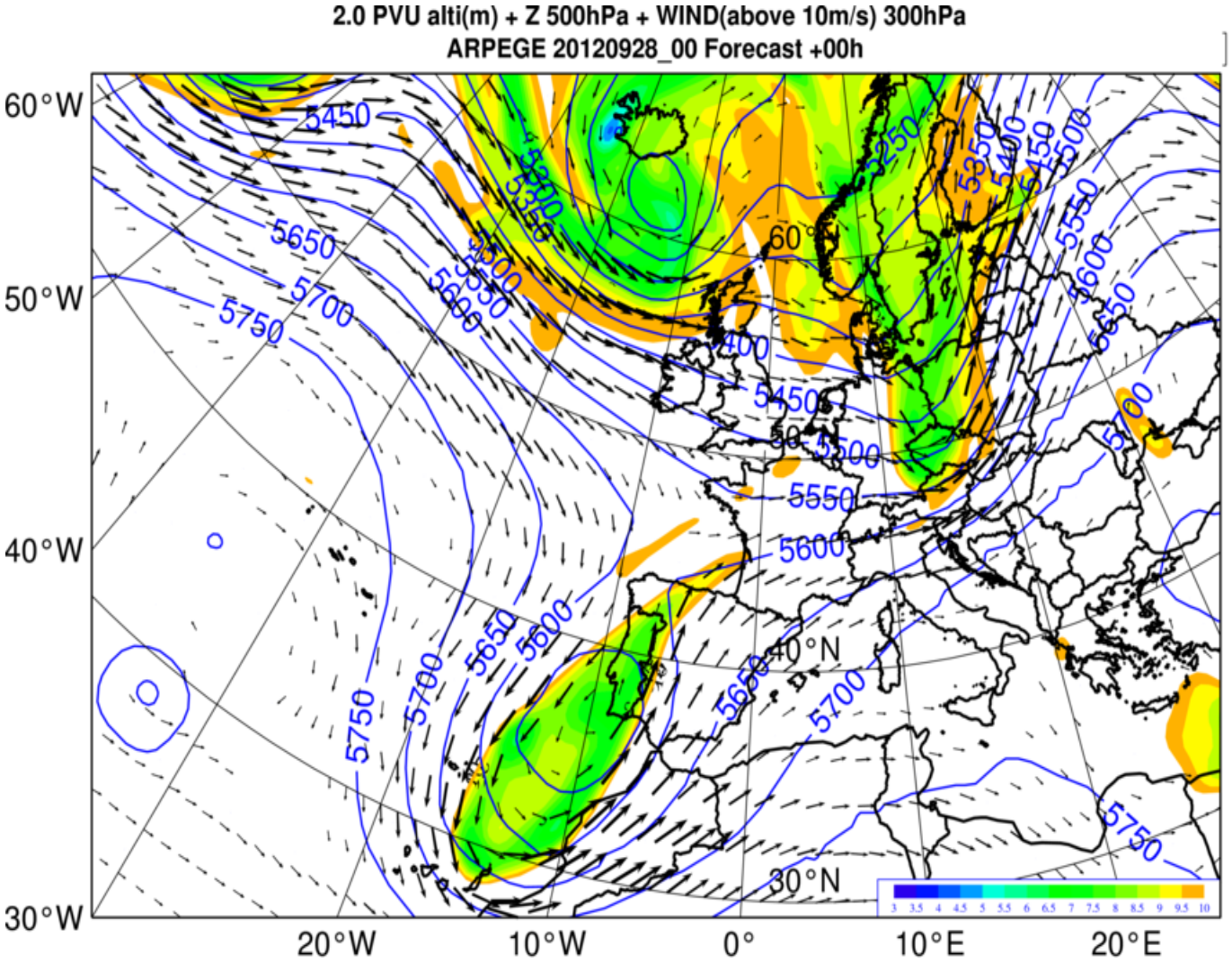
27 September 2012 at 00 UTC



Why the IOP8 event?

ARPEGE analysis

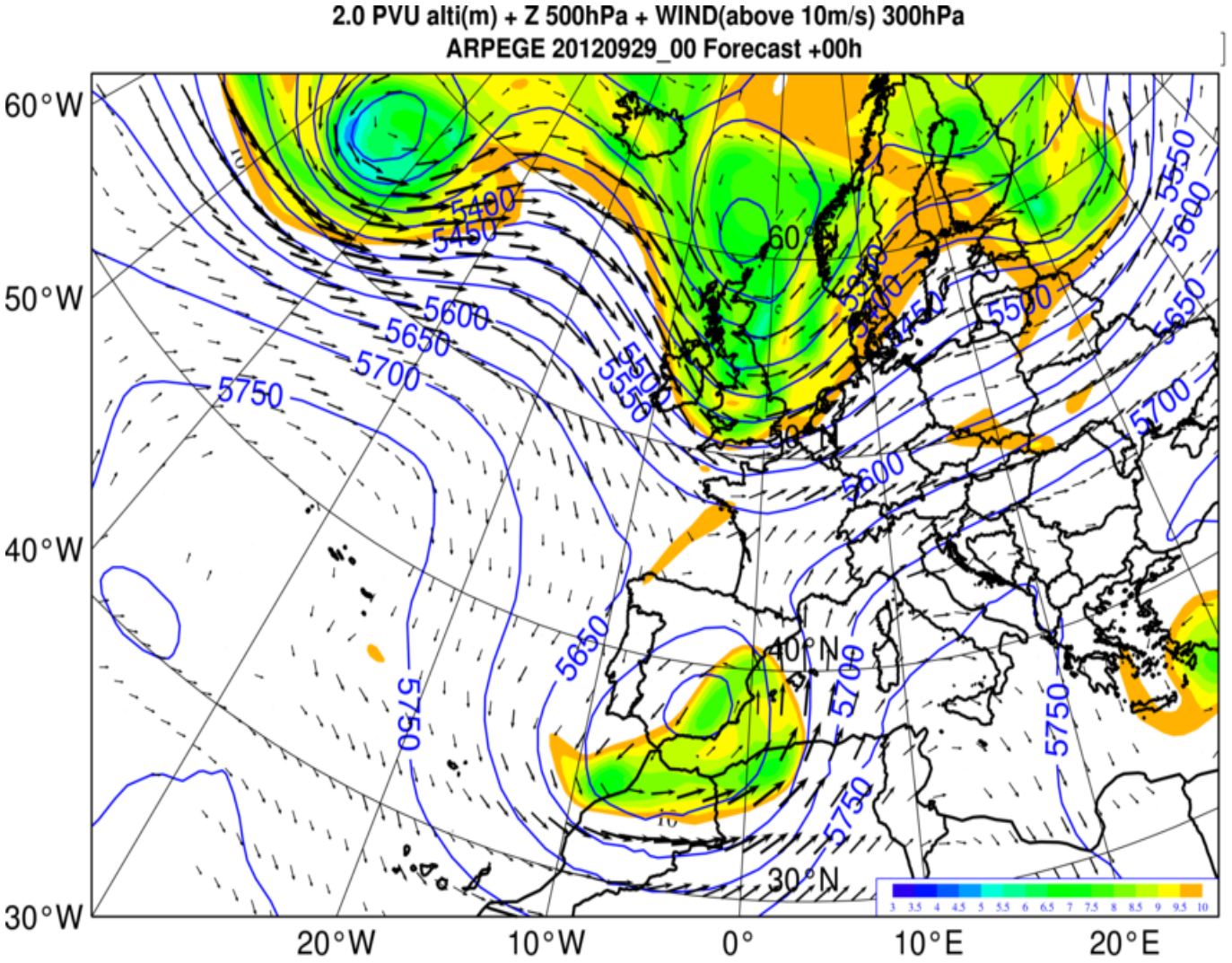
28 September 2012 at 00 UTC



Why the IOP8 event?

ARPEGE analysis

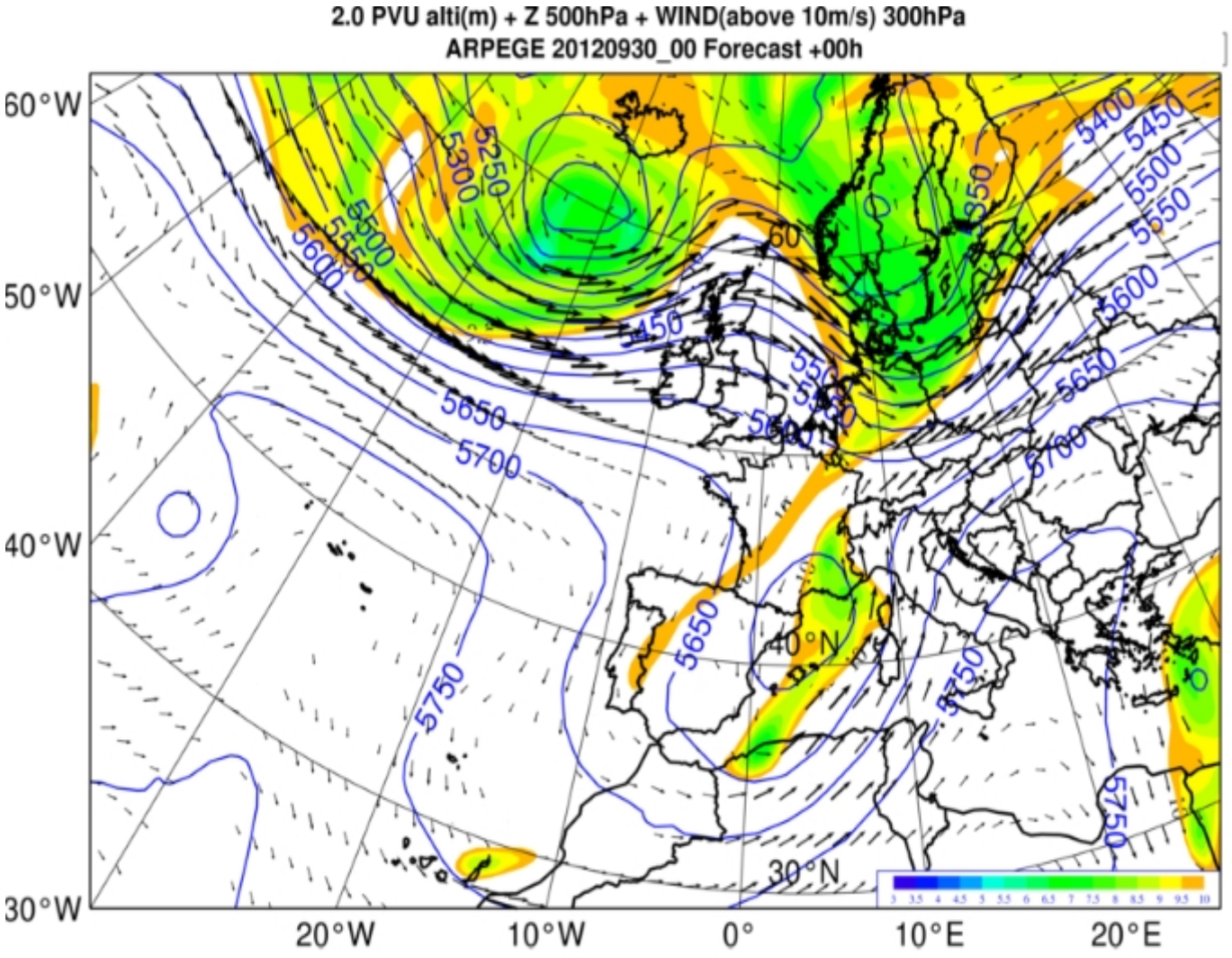
29 September 2012 at 00 UTC



Why the IOP8 event?

ARPEGE analysis

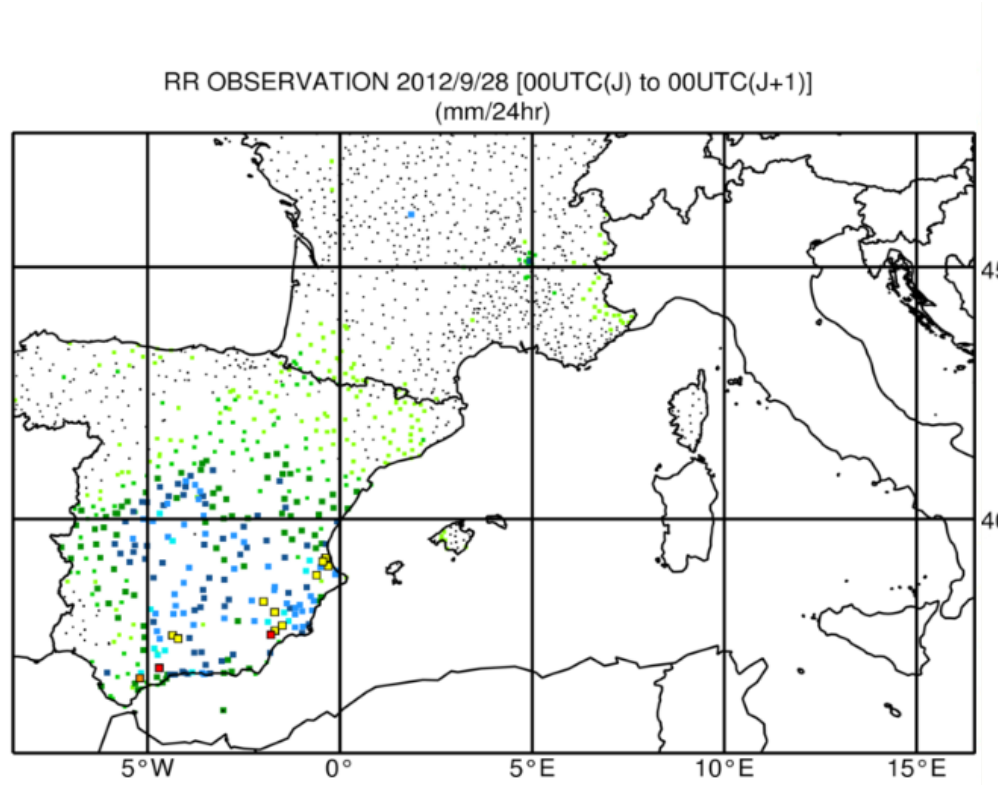
30 September 2012 at 00 UTC



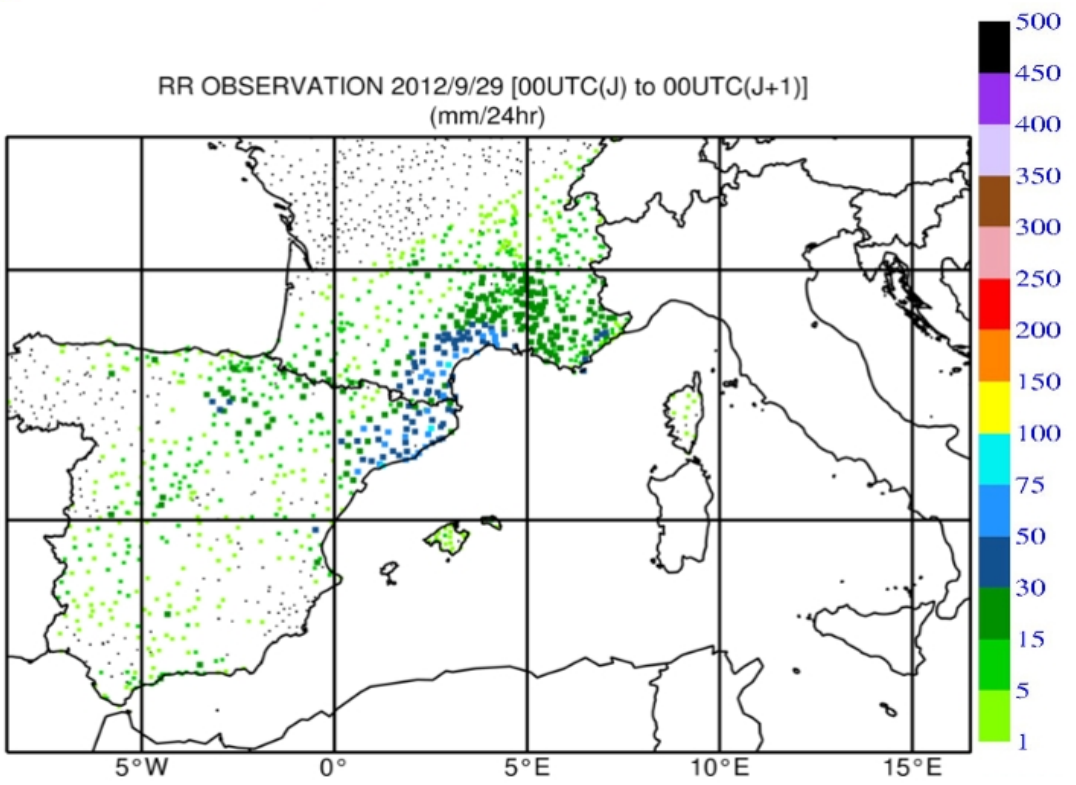
Why the IOP8 event?

24h Accumulated rainfall
from
AEMET stations

28 September 2012



29 September 2012



Which two mesoscale LAM-EPSs?

- **The PV-gradient EPS**
  (Vich *et al.* 2011a,b, *Atmos. Res.)*
- **A dynamical dowscaling of the ECMWF global EPS**

Which two mesoscale LAM-EPSs?

The PV-gradient ensemble

To perturb the initial and boundary conditions
by
perturbing the 3-D structure of the PV field

- Why perturbing the PV field?
  1. PV inversion technique → perturb the T and Wind fields
  2. precursor upper-level PV structures → mid-latitude cyclonic situations
- Perturb: *how much* and *where*?

Which two mesoscale LAM-EPSs?

How much?

PV error climatology

Comparing the PV fields of

ECMWF analysis $\longleftrightarrow$ ECMWF 24 h forecast,

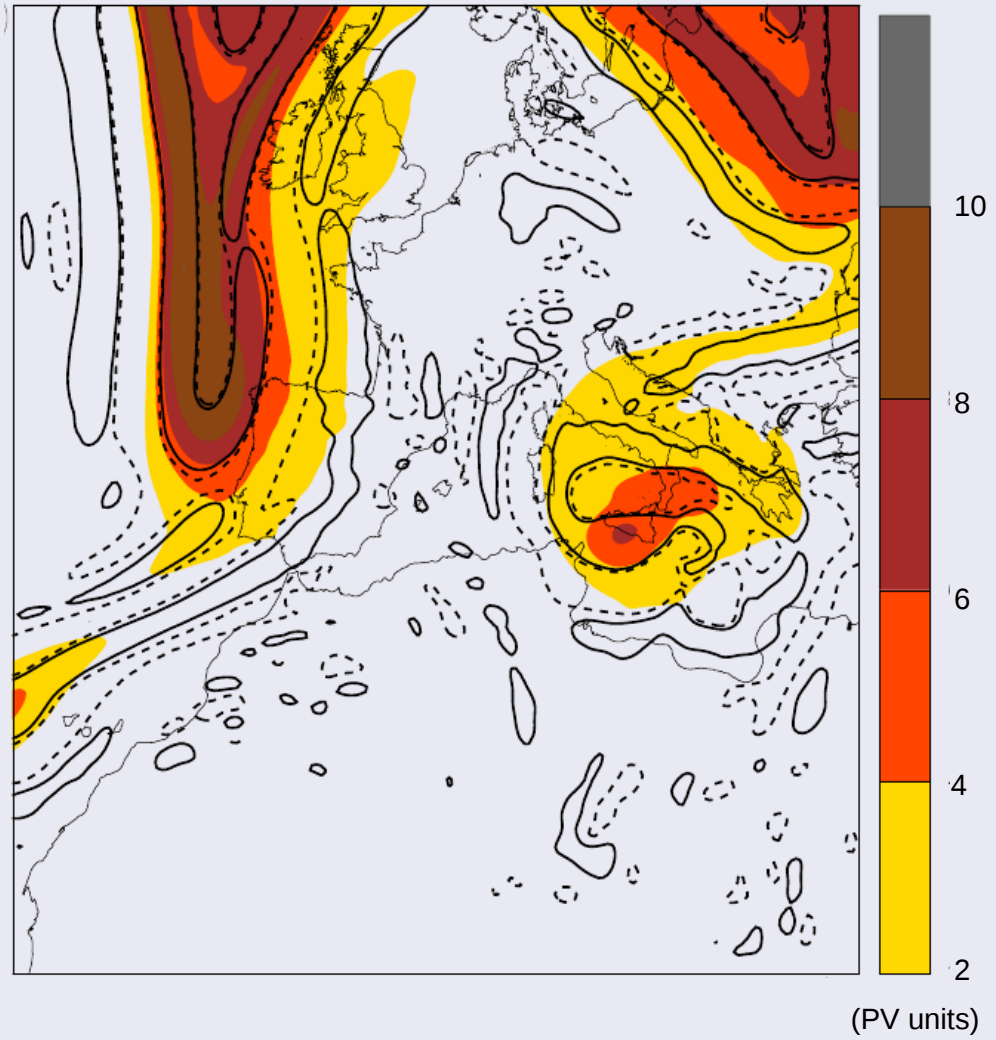
of a large collection of MEDEX cyclones, one can define:

- The displacement error (DE): the minimum displacement of the 24 h forecast PV field showing local maximum correlation with the analysis PV field
- The intensity error (IE): the difference between the displaced 24 h forecast PV field and analysis PV field relative to the analysis PV average

MEDEX: Mediterranean Experiment on Cyclones that produce High Impact Weather in the Mediterranean

Where?

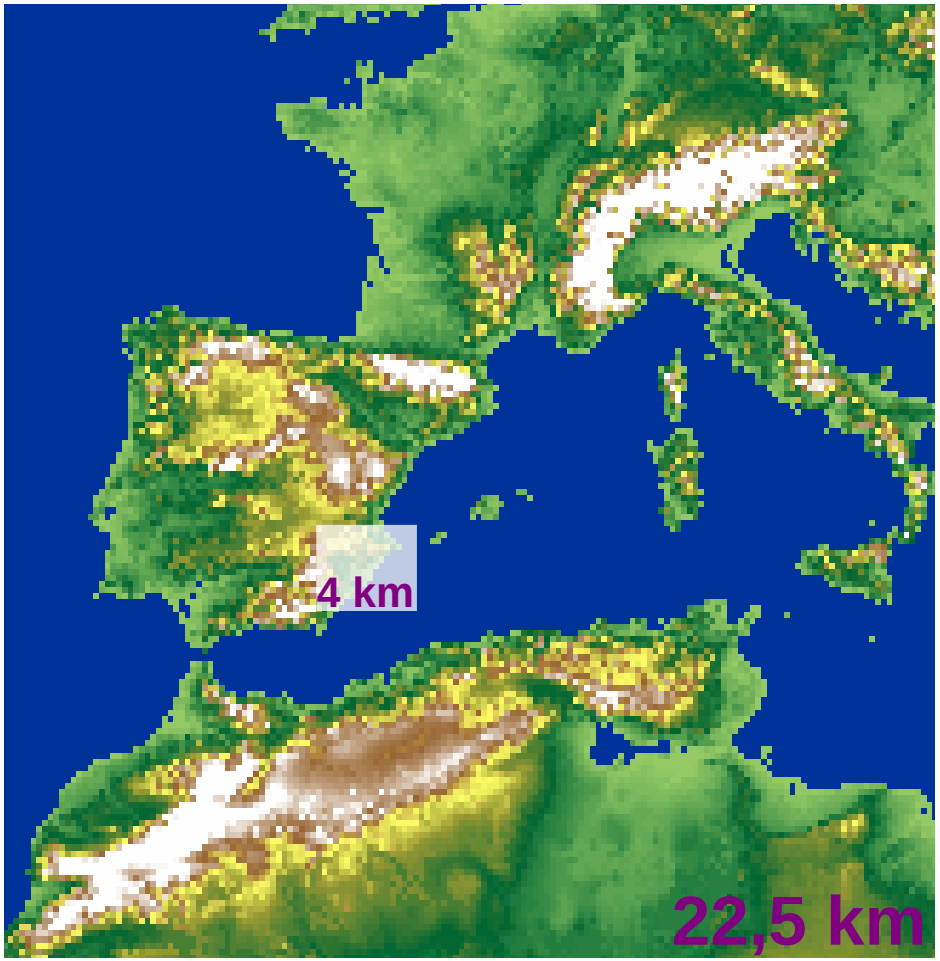
The most intense values and gradients PV zones at 300 hPa



Which two mesoscale LAM-EPSs?

PV-gradient

MM5



Initial and Boundaries conditions

"by"

ECMWF analyses

Which two mesoscale LAM-EPSs?

The ECMWF global EPS

- Perturbs initial and boundary conditions with a combination of singular vectors, computed to optimize total energy growth over a 48h time interval.

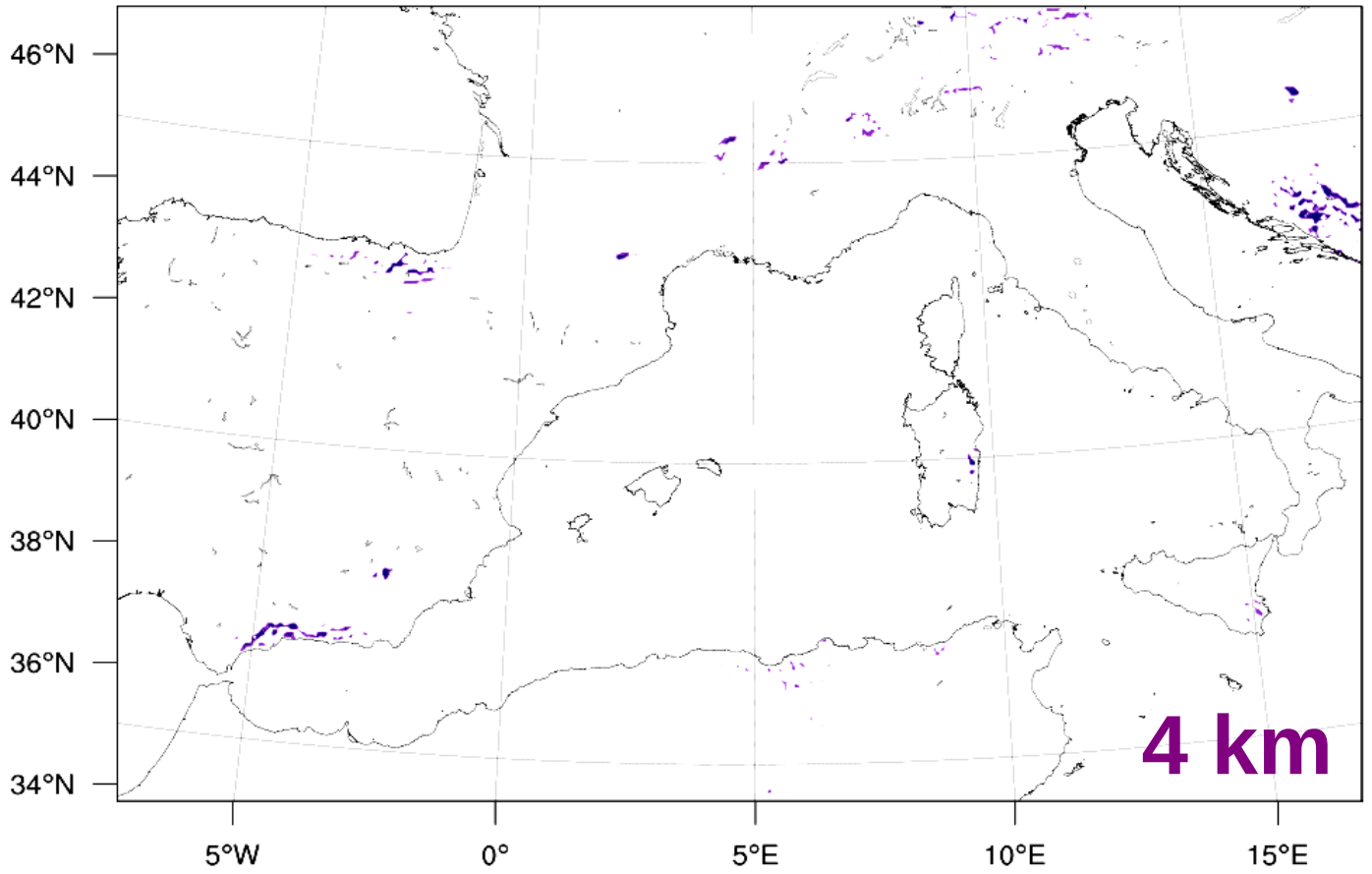
- Runs with a horizontal resolution of 32 km during the first 10 days of the EPS and of 63 km during the extension beyond day 10.

- Has 50 perturbed members plus the non-perturbed one. Total: 51 members.

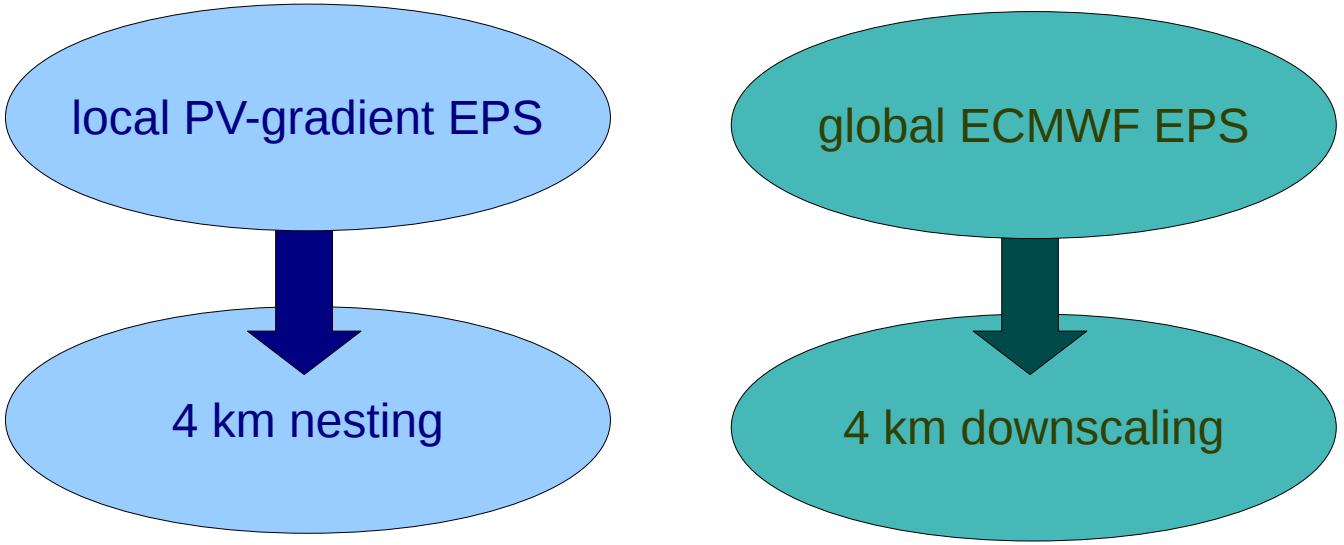
Dynamical downscaling of the ECMWF global EPS

with

WRF ARW 3.3



Which two mesoscale LAM-EPSs?



Numerical Model	MM5	WRF
Number of members	51	51
IC generation method	Perturb over the most intense values and gradients PV zones	Perturbing with a combination of singular vectors, computed to optimize total energy growth over a 48h time interval

Already tested
BASELINE

And the “winner” is?

And the “winner” is?

I will let you know!!