Impact of the horizontal resolution and the microphysical parameterization on the QPF over Austria

E. Bazile, F. Wimmer, Y. Seity and Y. Wang

METEO FRANCE
Toujours un temps d'avance

ZAMG

1. •NWP models and experimental setup
2. •Verification dataset
3. •QPF verification results
4. •Discussion and conclusions

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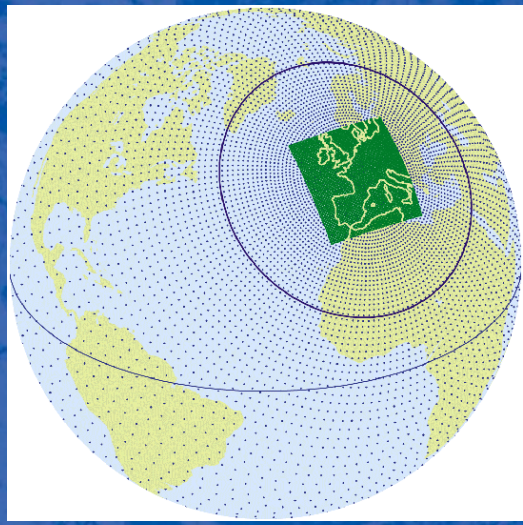
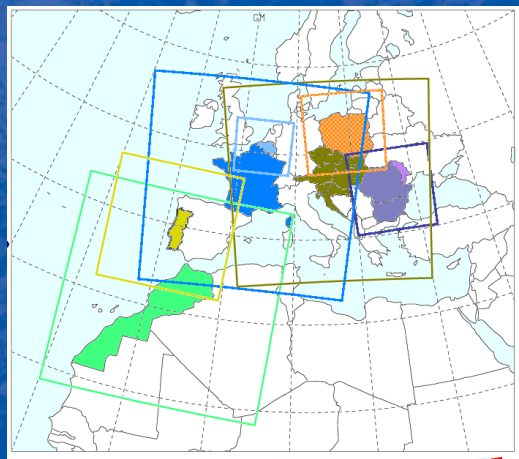
NWP models and experimental setup

- ARPEGE-GM: variable mesh 23km over Europe dt=15mn (L41)
  - oper: diagnostic cloud scheme
  - parallel : Prognostic Cloud Scheme (PCS) ql,qi,qr
- ALADIN-MF: 9.5km, (L41) dt=7mn
  - oper: 3DVAR analysis BC from ARPEGE
  - parallel: oper + PCS
- ALADIN-ZAMG: 9.5km, 45L dt=7mn, BC from ARPEGE
  - oper : dynamical adaptation
  - test : oper + PCS





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NWP models and experimental setup

AROME (Application de la Recherche à l'Opérationnel à Méso-Echelle)

- 2.5km L41 dt=1mn NH . BC from ALADIN 3h
- Dynamics from ALADIN
- Physics from the research NH model: Méso-NH

- Microphysics: ql, qi, qrl, qsn, qg
- Convective parametrization is switched off

METEO FRANCE
Toujours un temps d'avance

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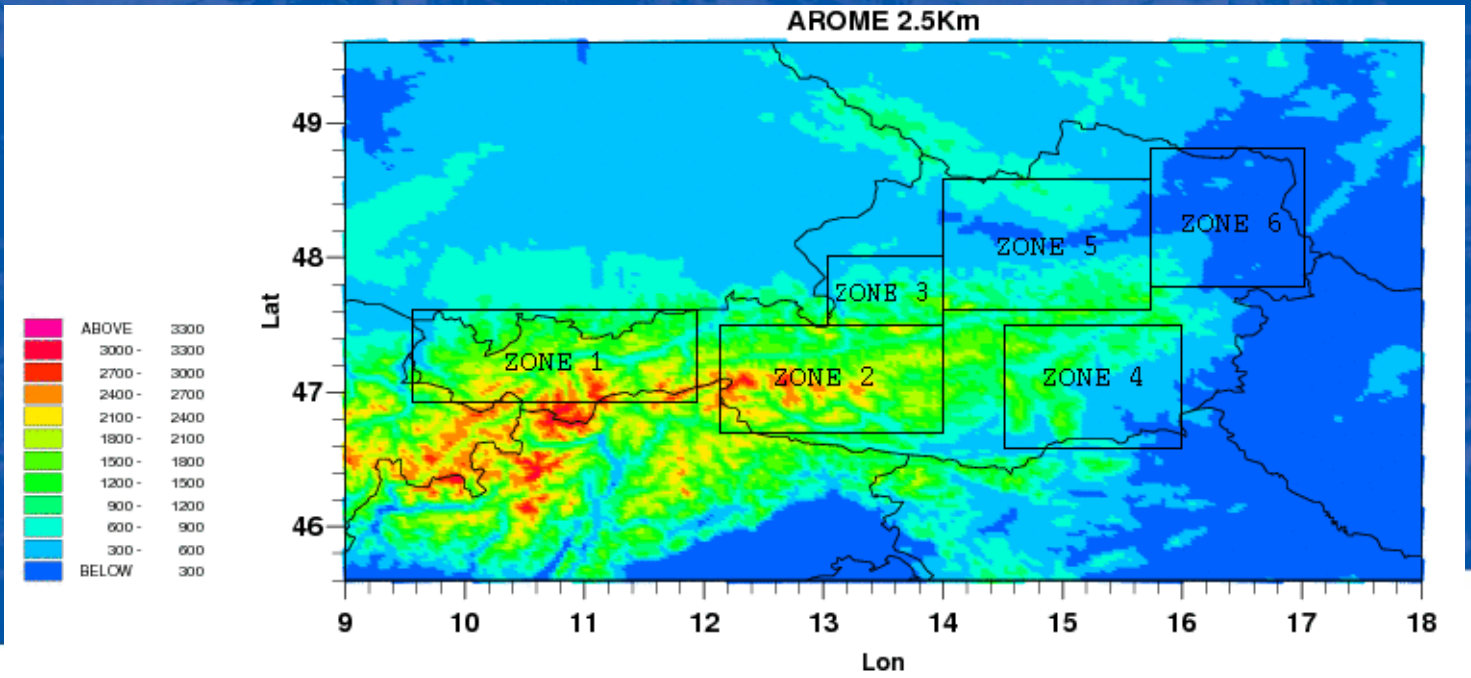
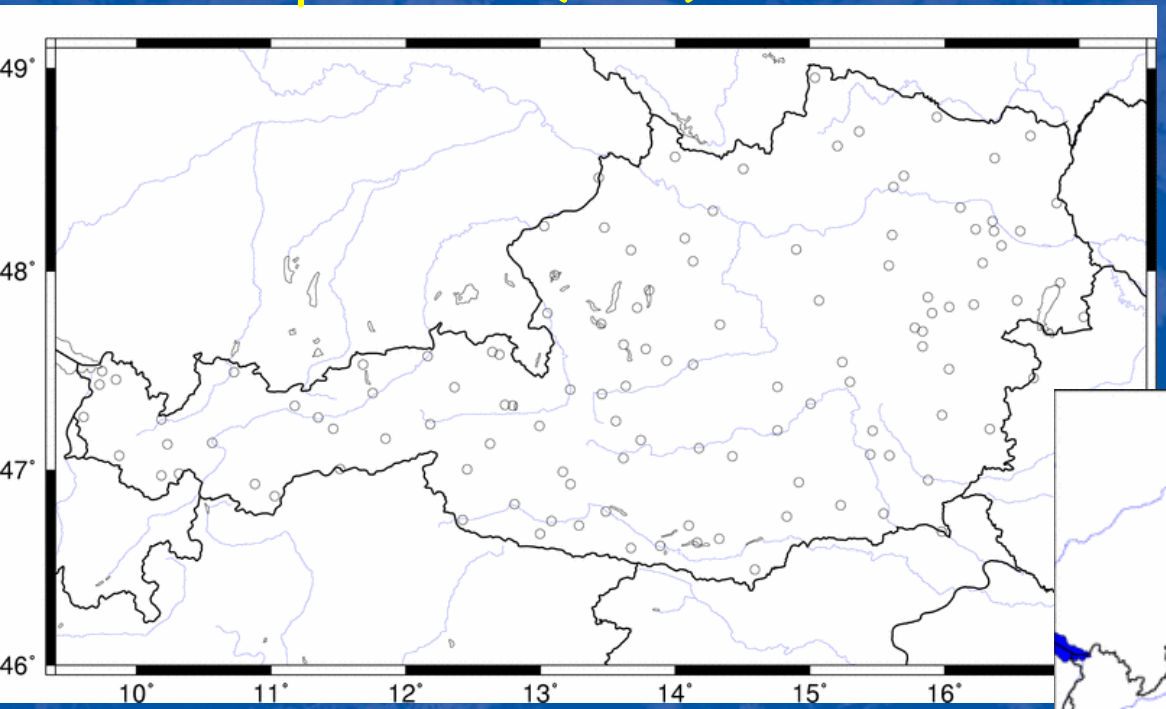
NWP models and experimental setup

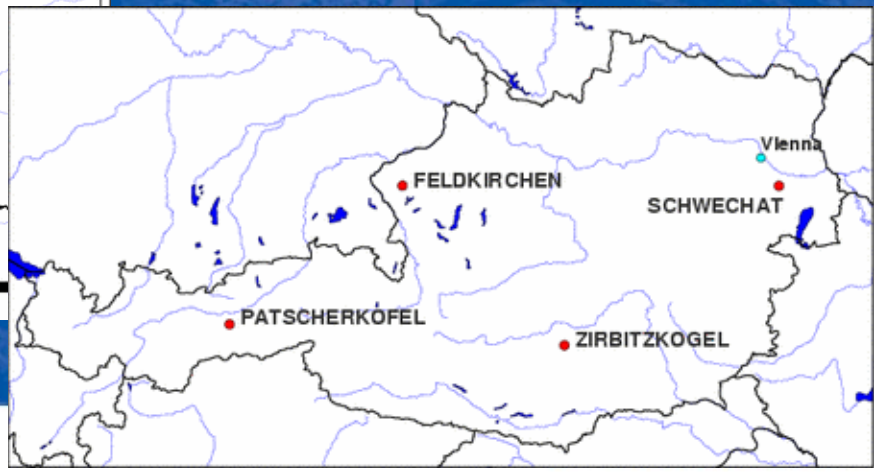
- Two periods: August and October 2005.
- 24h forecasts starting at 00UTC
- Two comparisons:
  - 24h precipitation accumulation (20km grid)
  - 0-6h, 6h-12h, 12h-18h, 18h-24h (10km grid)



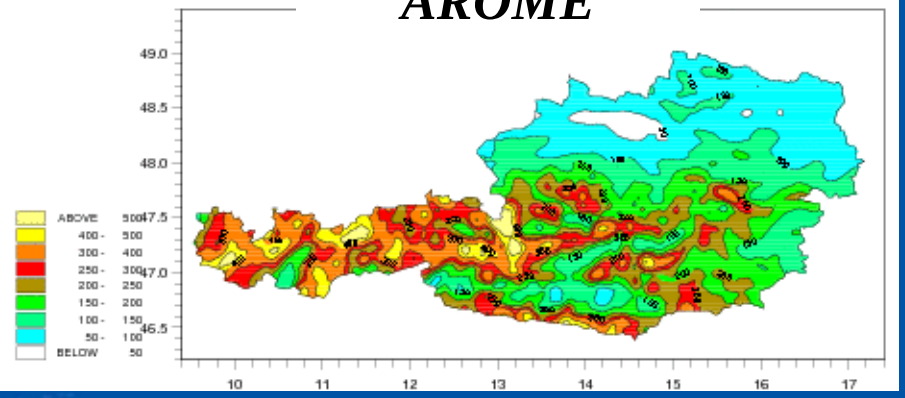
Verification dataset

- INCA analysis (Integrated Nowcasting through Comprehensive Analysis) at 1Km (Haiden et al. 2006)
- The precipitation analysis is a synthesis of station interpolation (1km) and radar data

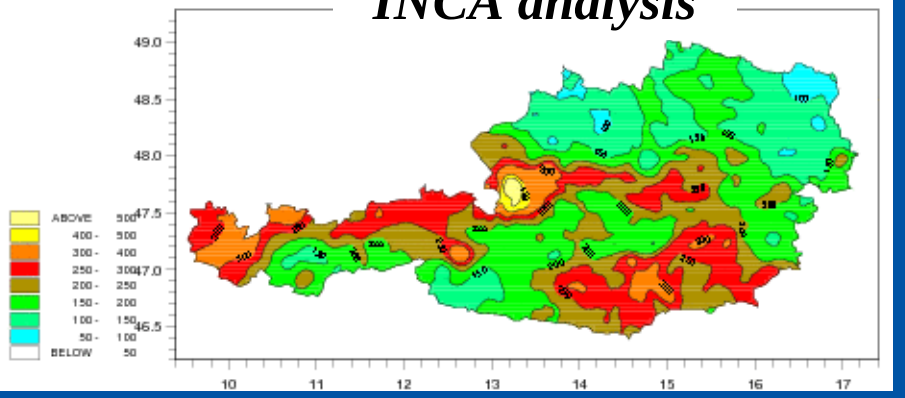




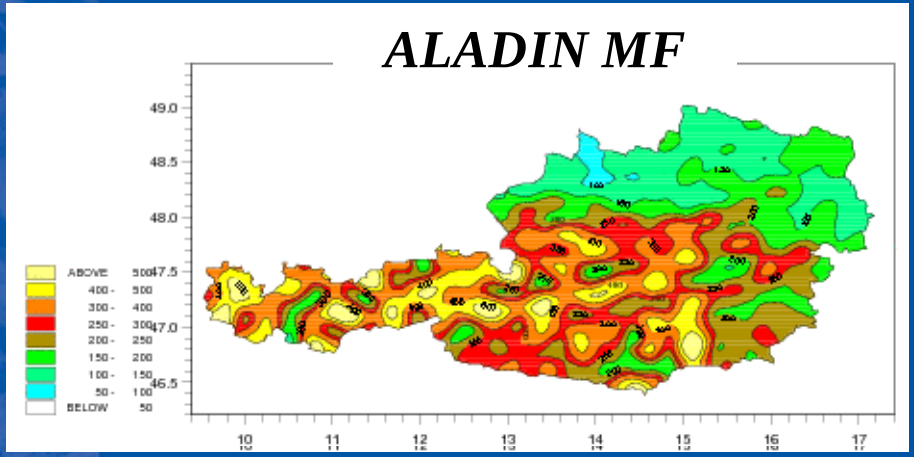
AROME



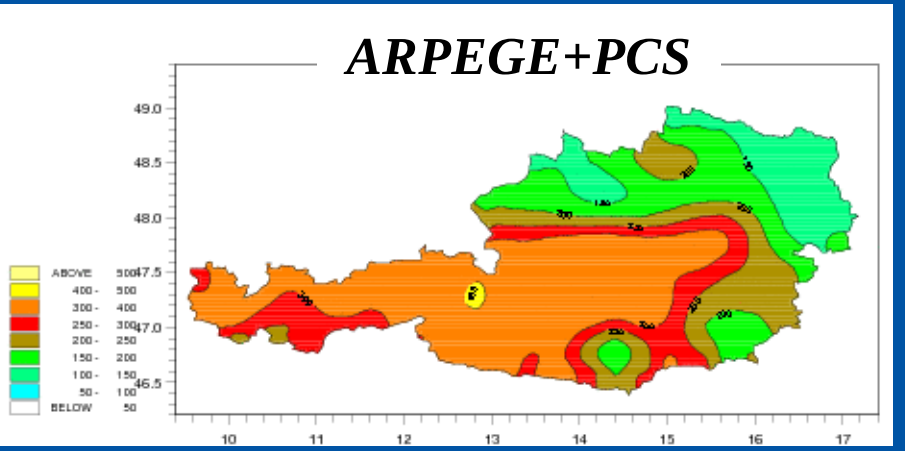
INCA analysis



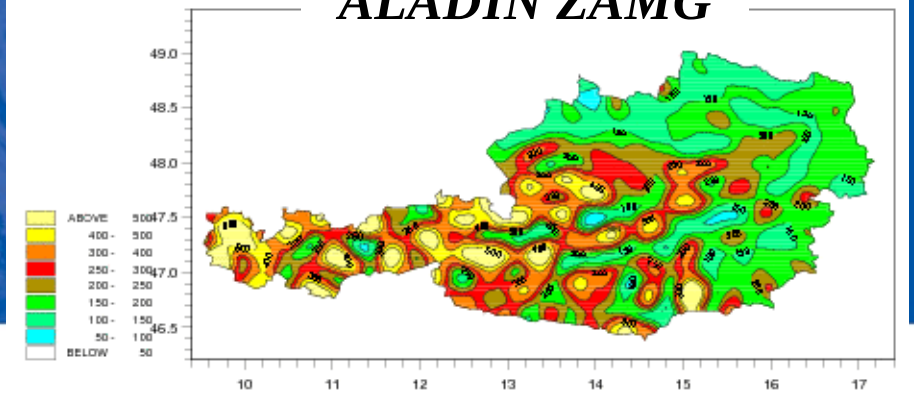
ALADIN MF



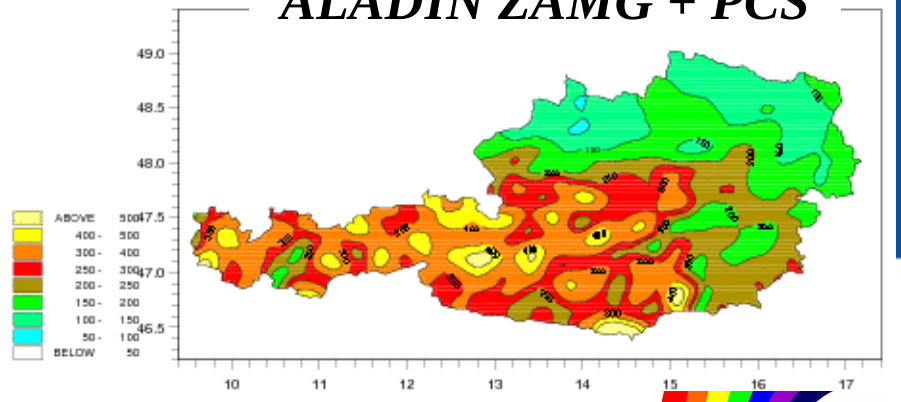
ARPEGE+PCS



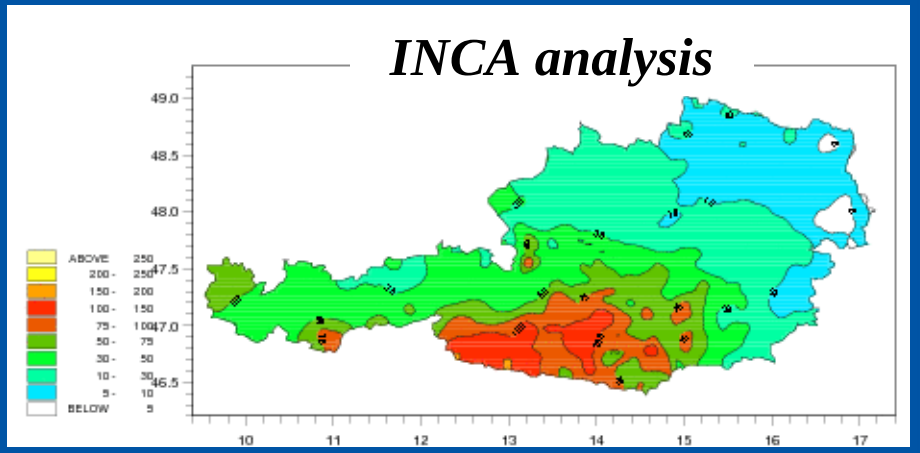
ALADIN ZAMG

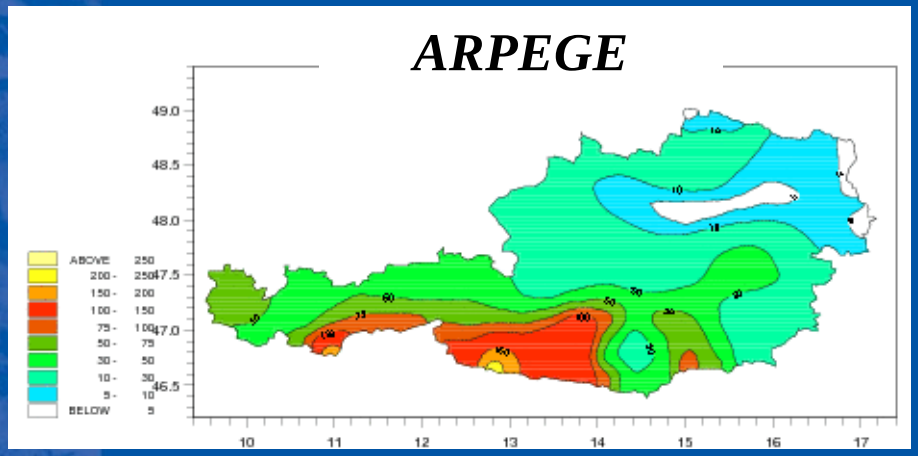


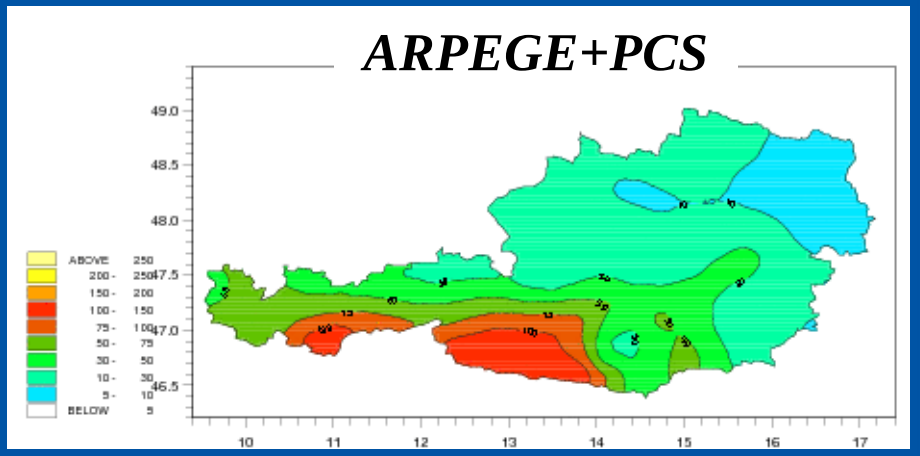
ALADIN ZAMG + PCS

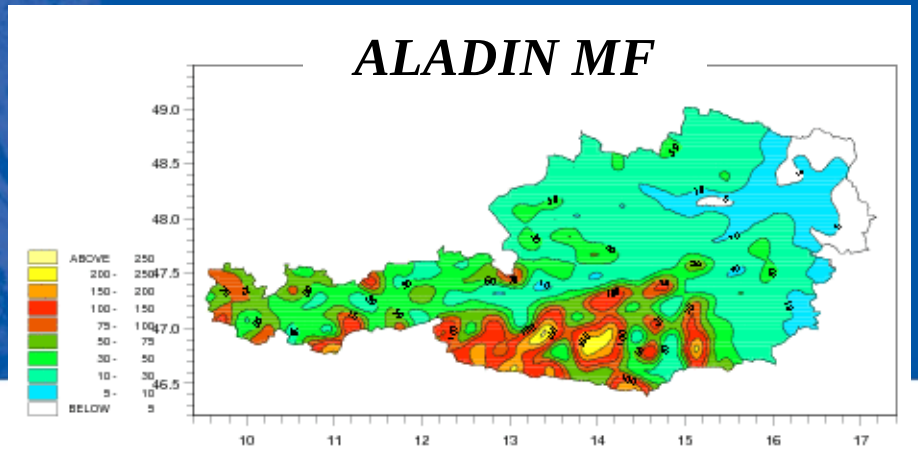


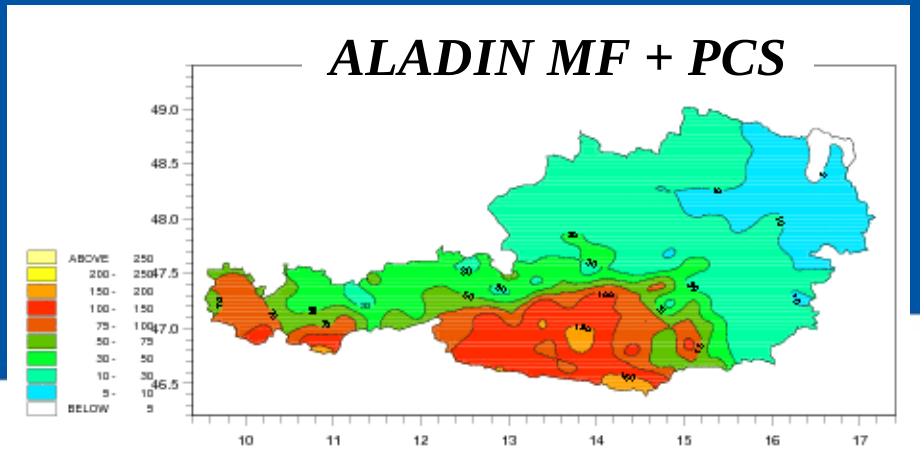
OCTOBER 2005 (mm)



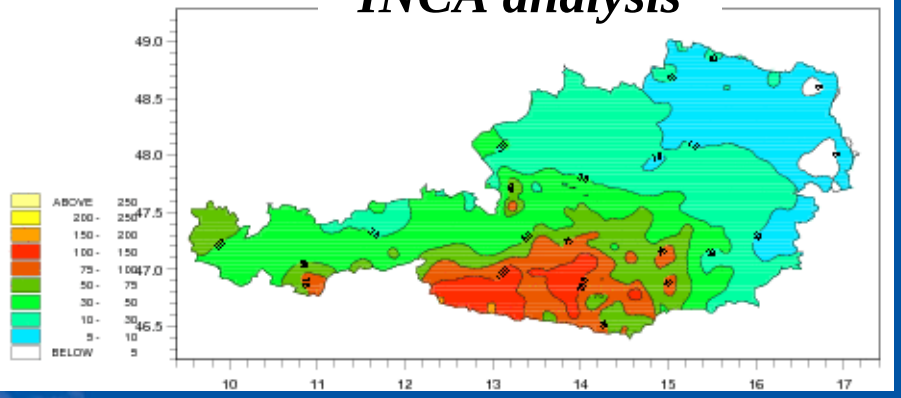




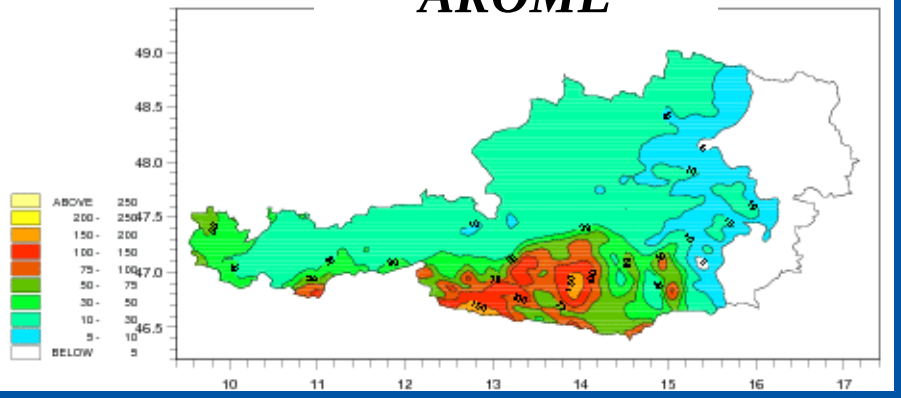




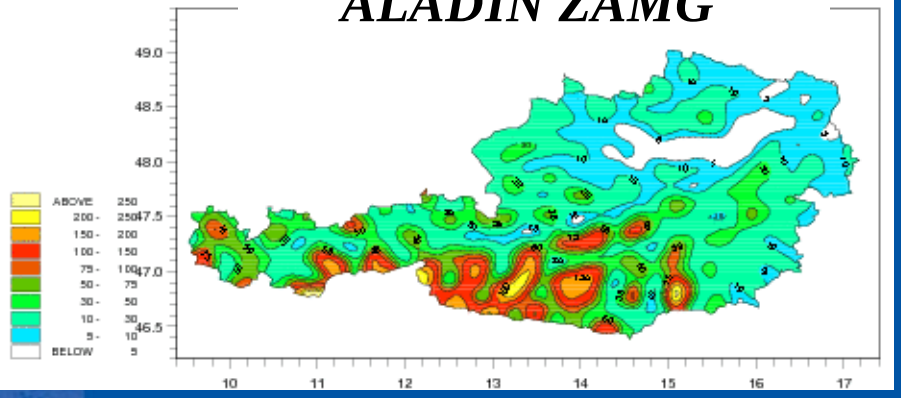
INCA analysis



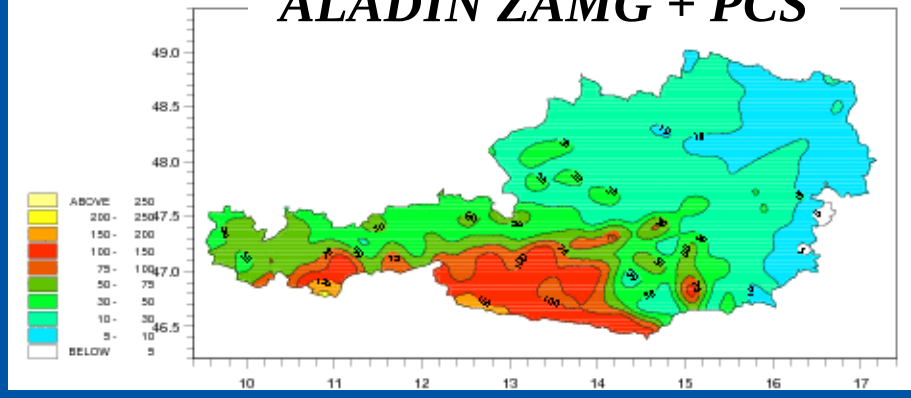
AROME



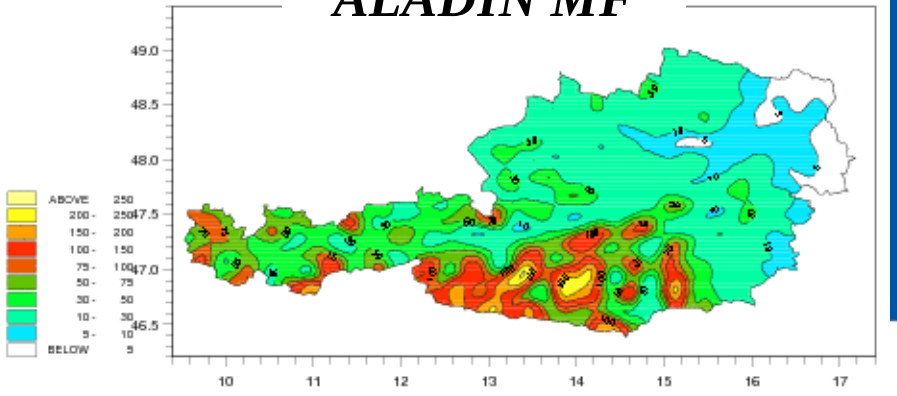
ALADIN ZAMG



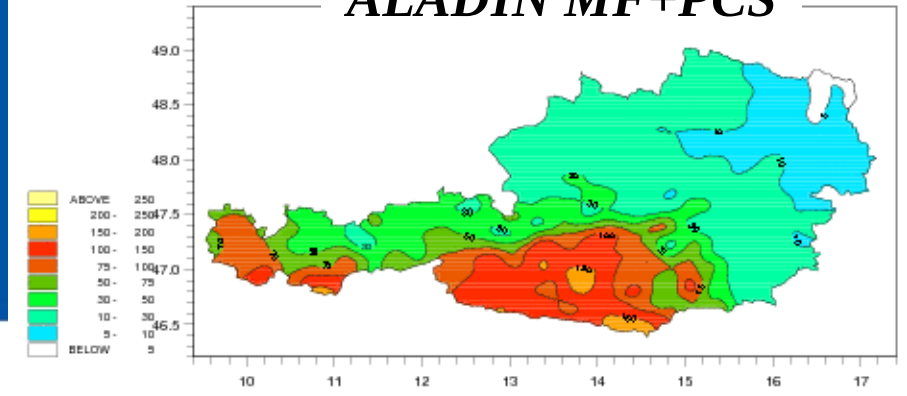
ALADIN ZAMG + PCS



ALADIN MF



ALADIN MF+PCS

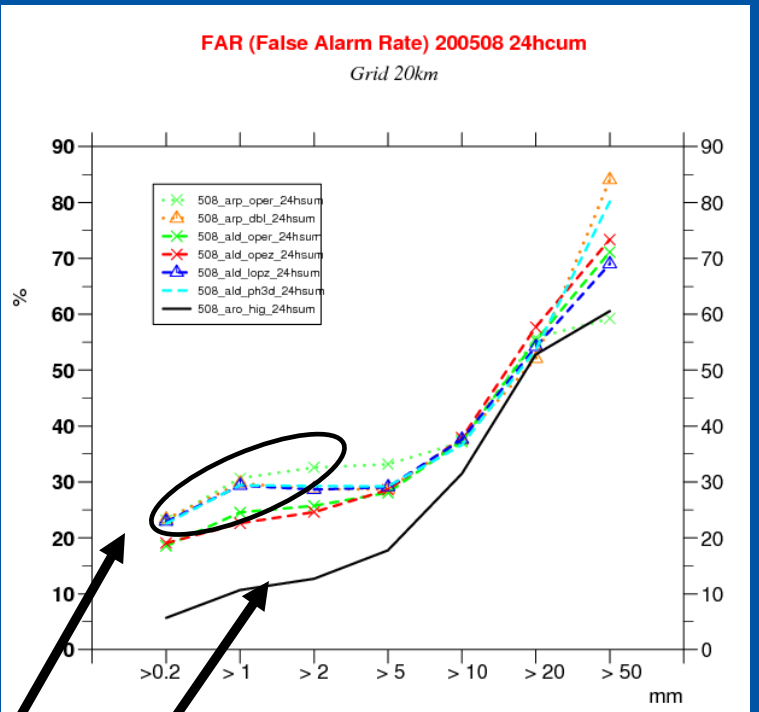


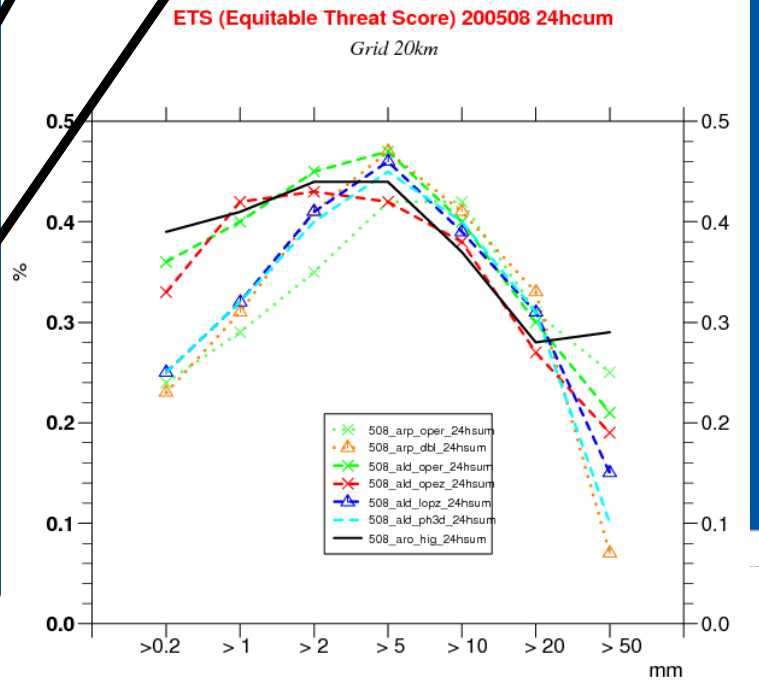
ARP-OP
ARP-PCS
ALD-MF-OP
ALD-MF-PCS
ALD-ZAMG-OP
ALD-ZAMG-PCS
AROME

August 2005
24h accumulated precipitation (20km)

- PCS increases the FAR for RR < 2mm

- AROME has a less FAR for all classes and the ETS is improved

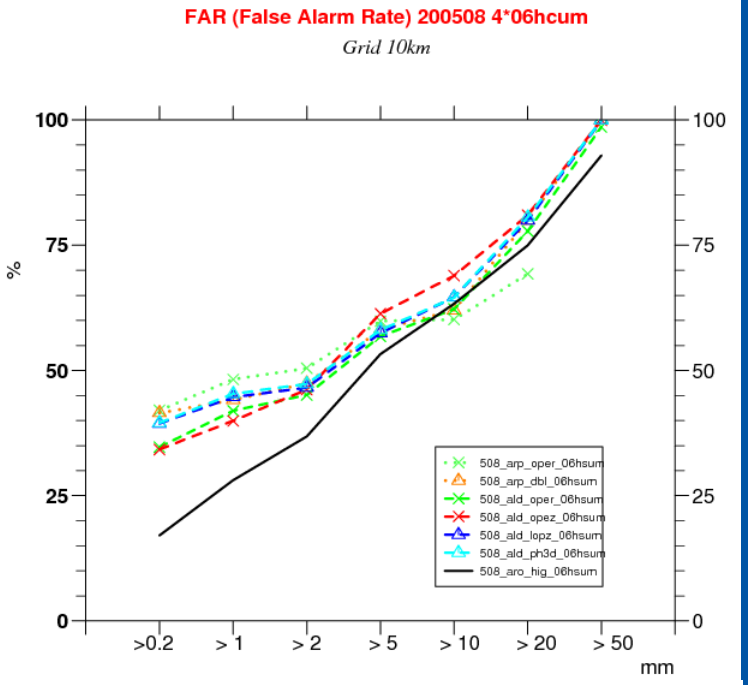


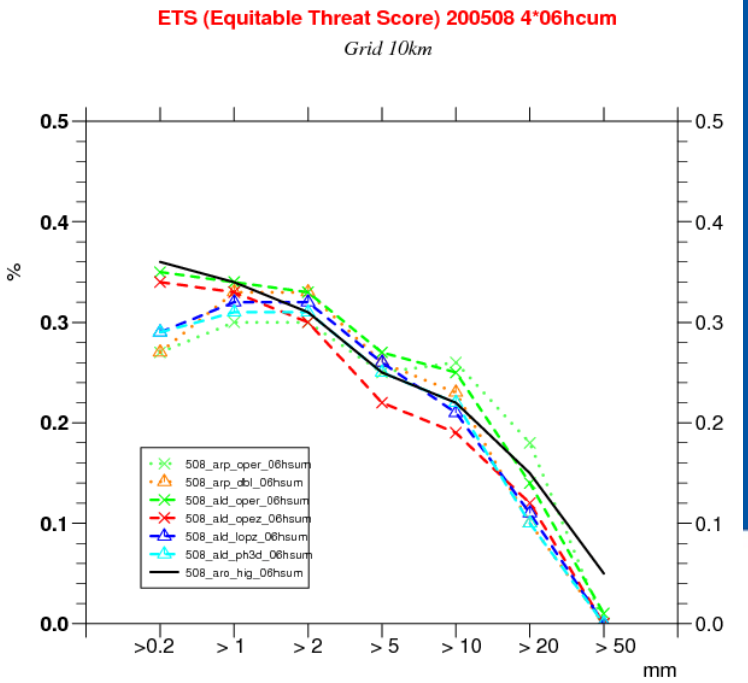


ARP-OP
ARP-PCS
ALD-MF-OP
ALD-MF-PCS
ALD-ZAMG-OP
ALD-ZAMG-PCS

AROME

August 2005
6h accumulated precipitation
(10km)

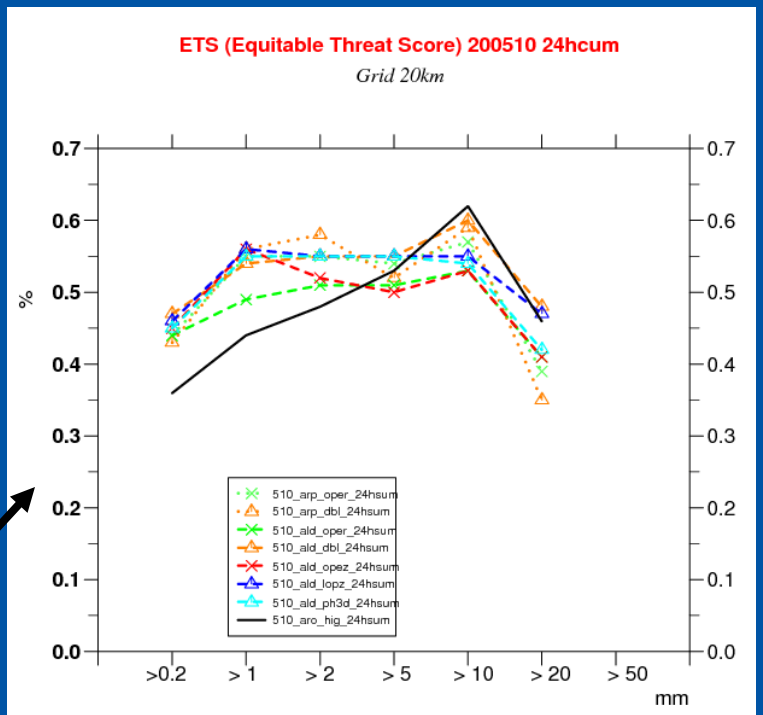




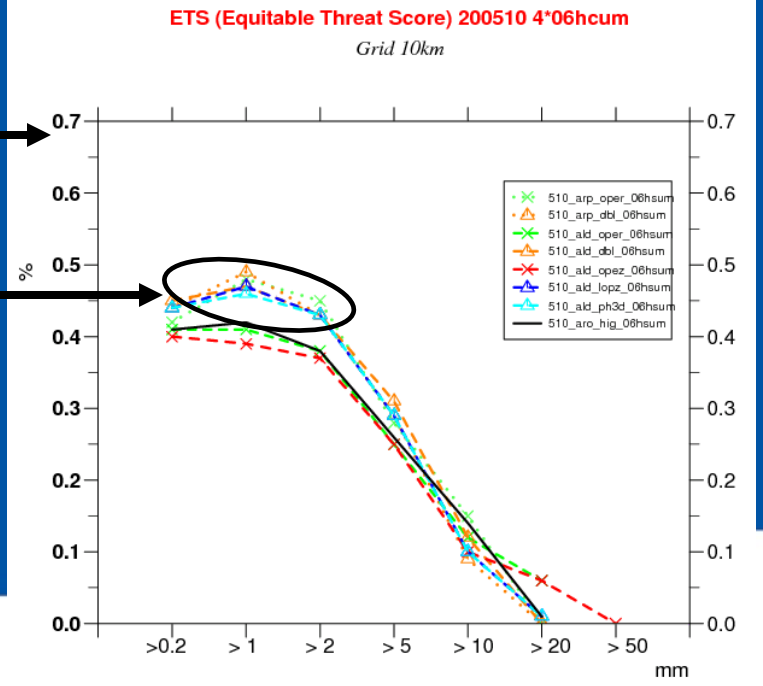
ARP-OP
ARP-PCS
ALD-MF-OP
ALD-MF-PCS
ALD-ZAMG-OP
ALD-ZAMG-PCS
AROME

October 2005

24h accumulated precipitation (20km)



6h accumulated precipitation (10km)

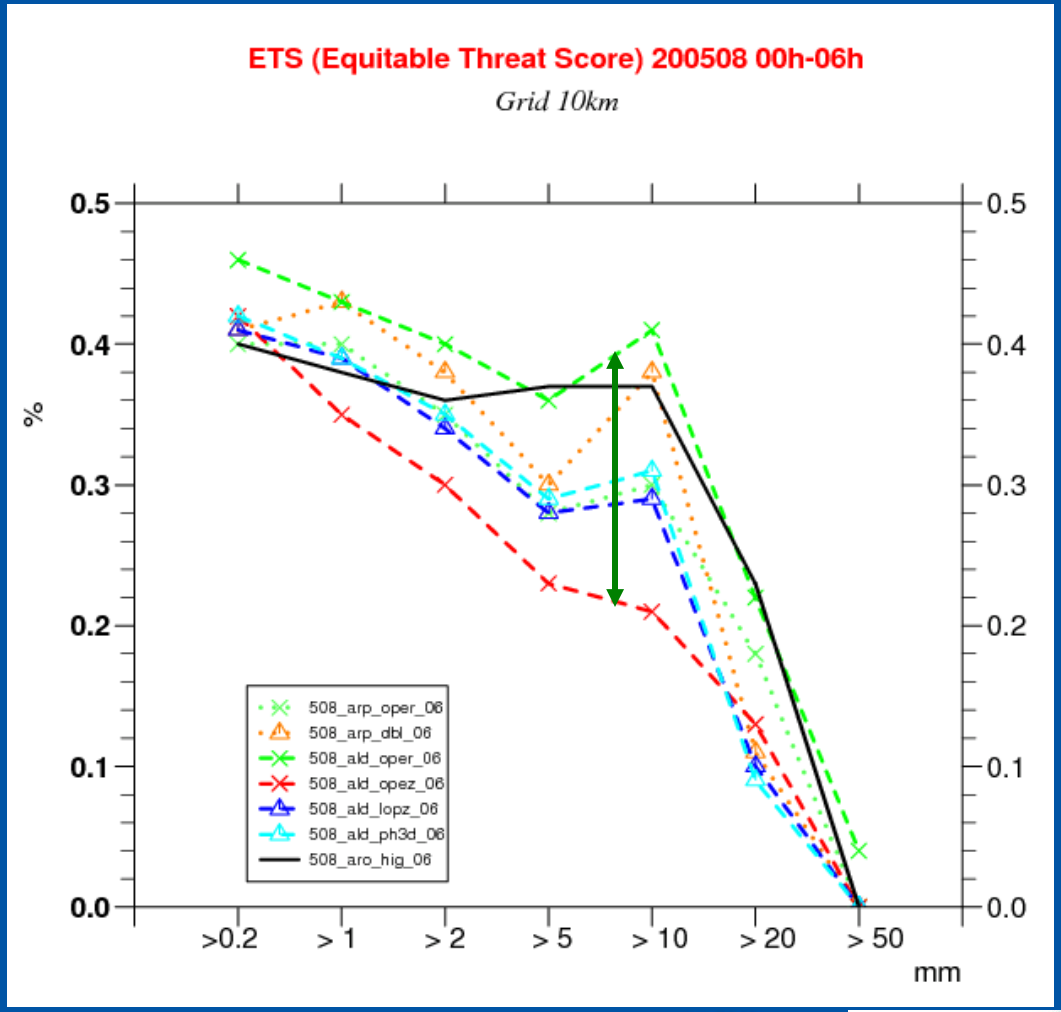


- PCS improves ETS for 1mm< RR < 5mm
- AROME underestimates the precipitation below 2mm

3DVAR impact

- ARP-OP
- ARP-PCS
- ALD-MF-OP
- ALD-MF-PCS
- ALD-ZAMG-OP
- ALD-ZAMG-PCS
- AROME

August 2005
00-06h accumulated precipitation (10km)



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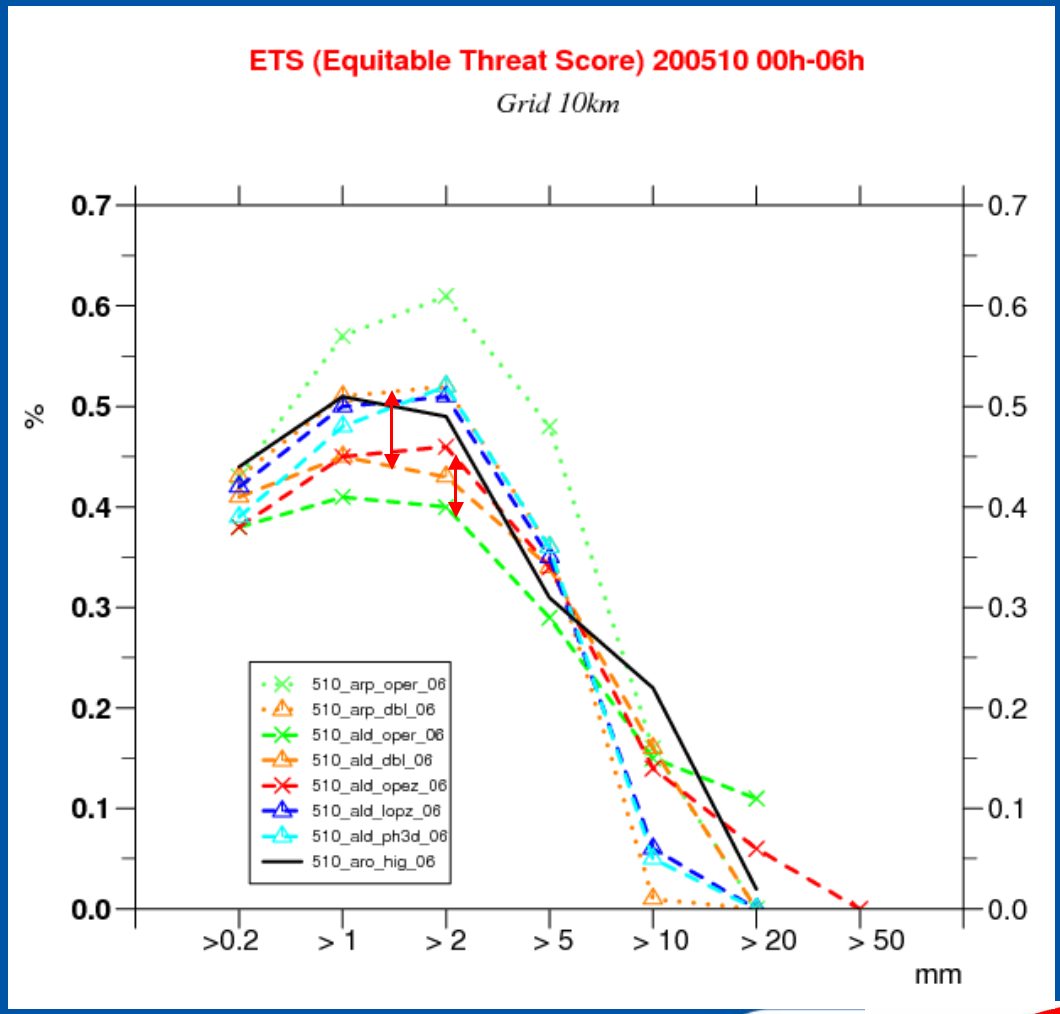
3DVAR impact

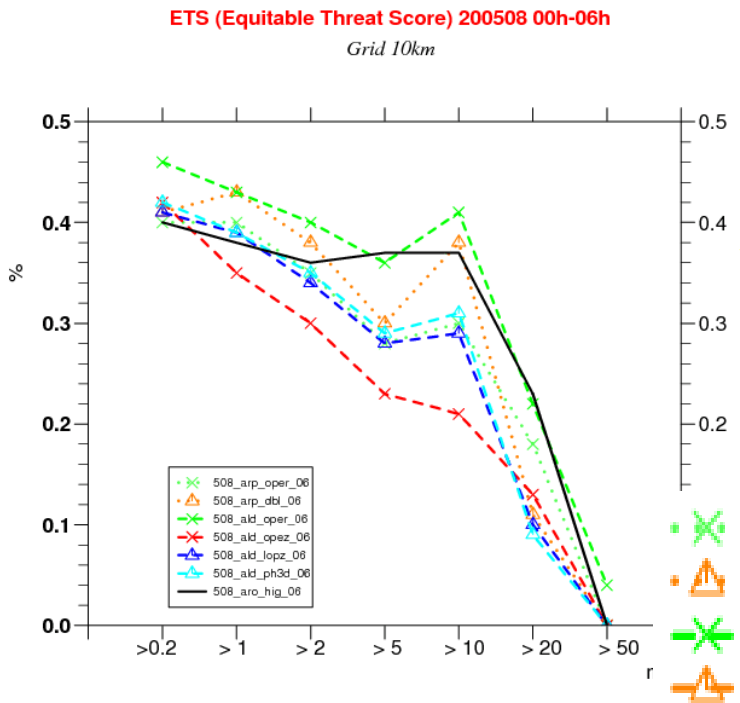
- ARP-OP
- ARP-PCS
- ALD-MF-OP
- ALD-MF-PCS
- ALD-ZAMG-OP
- ALD-ZAMG-PCS
- AROME

October 2005
00-06h accumulated precipitation (10km)



METEO FRANCE
Toujours un temps d'avance

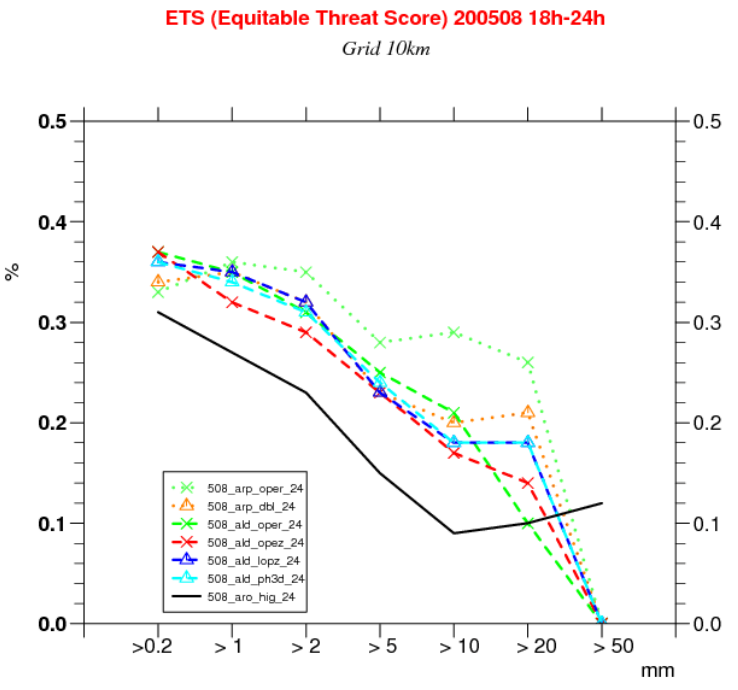
ZAMG



August 2005 accumulated precipitation (10km)

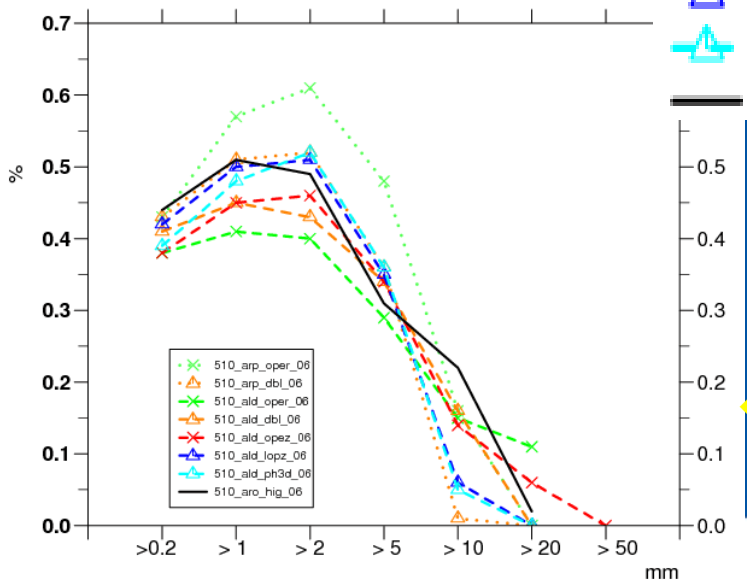
←00-06h

18h-24h →



ARP-OP
ARP-PCS
ALD-MF-OP
ALD-MF-PCS
ALD-ZAMG-OP
ALD-ZAMG-PCS

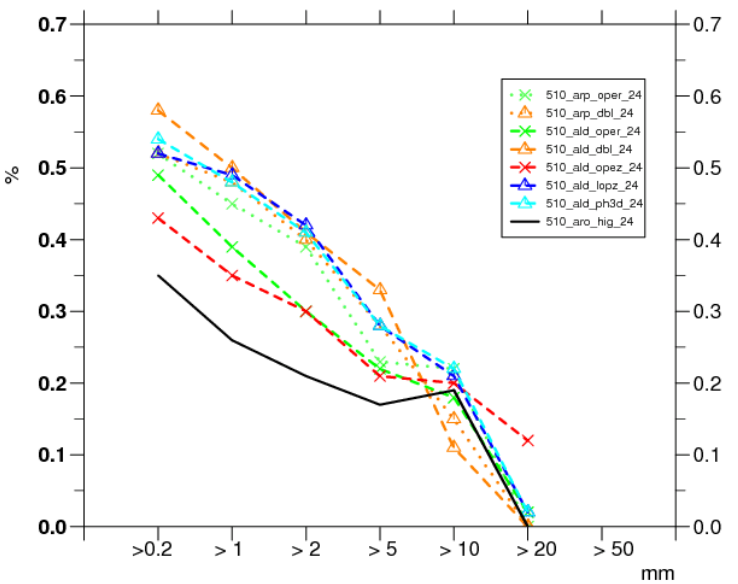
AROME



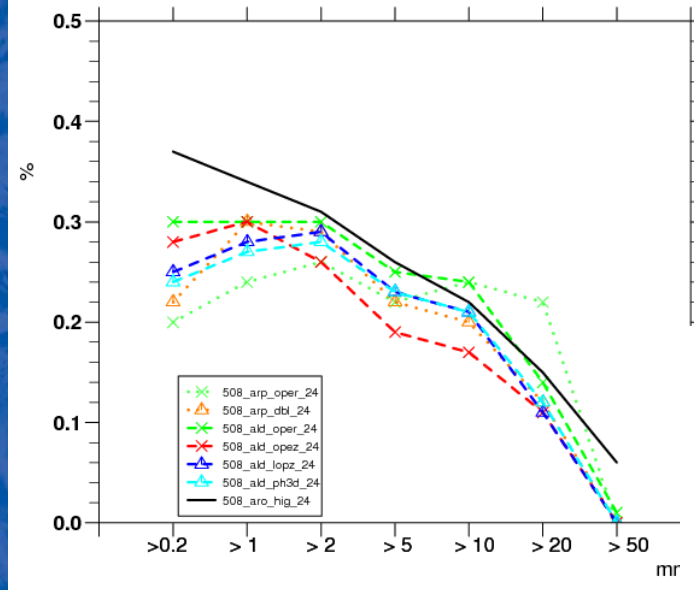
October 2005 accumulated precipitation (10km)

←00-06h

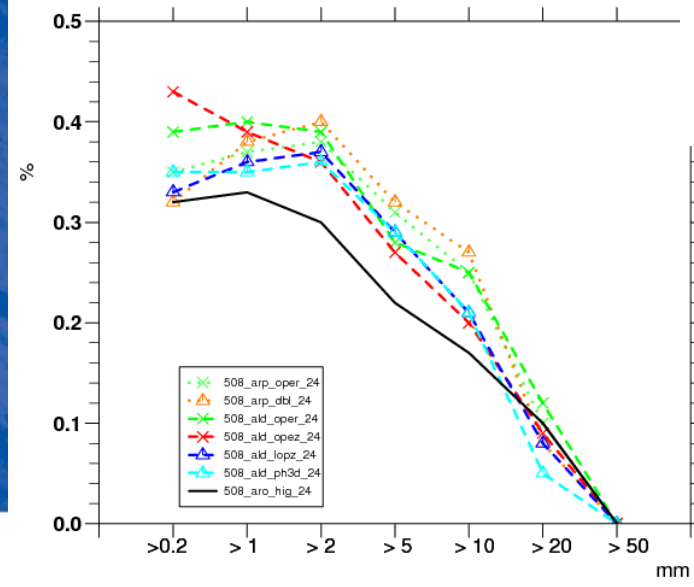
18h-24h →



ETS August 2005
06h accumulated precipitation (10km)



Mountain area zone 1 and 2

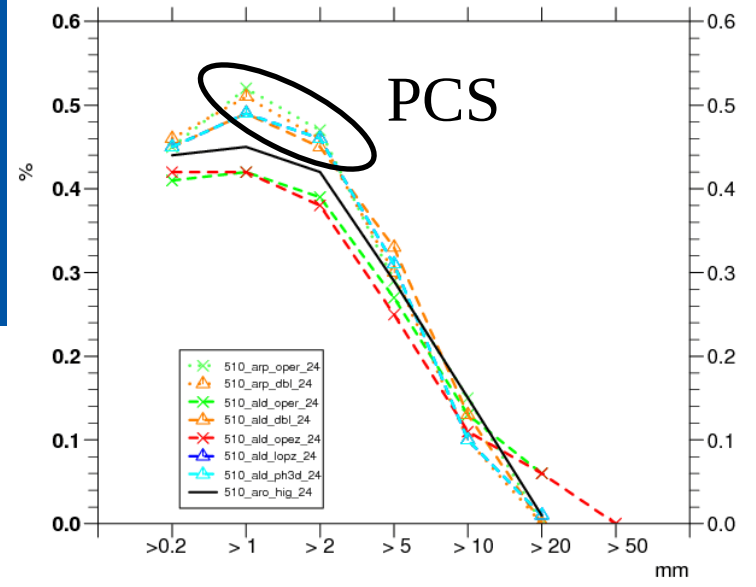


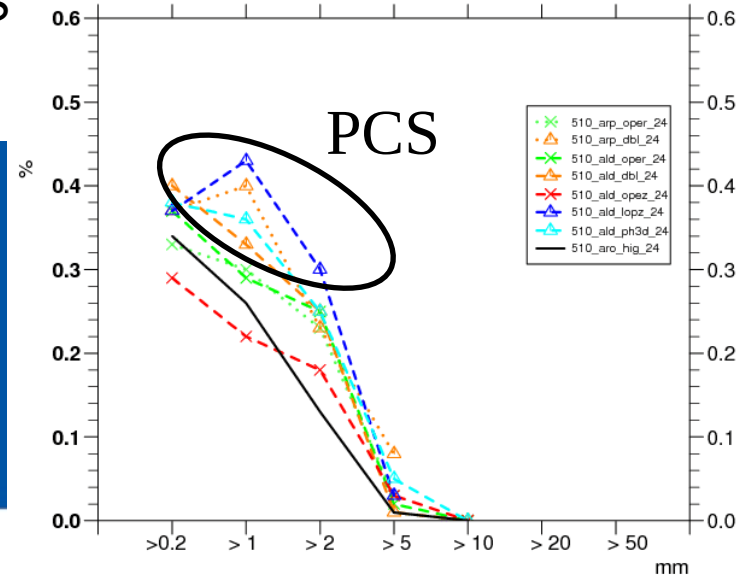
Plain area zone 5 and 6

ARP-OP
ARP-PCS
ALD-MF-OP
ALD-MF-PCS
ALD-ZAMG-OP
ALD-ZAMG-PCS

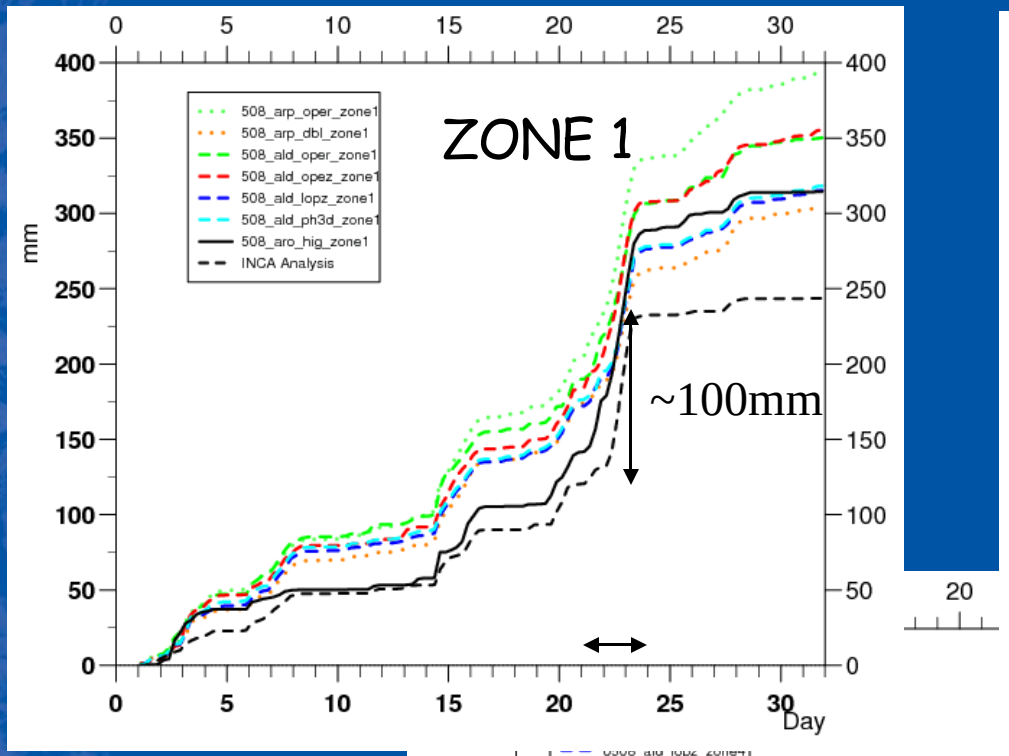
AROME

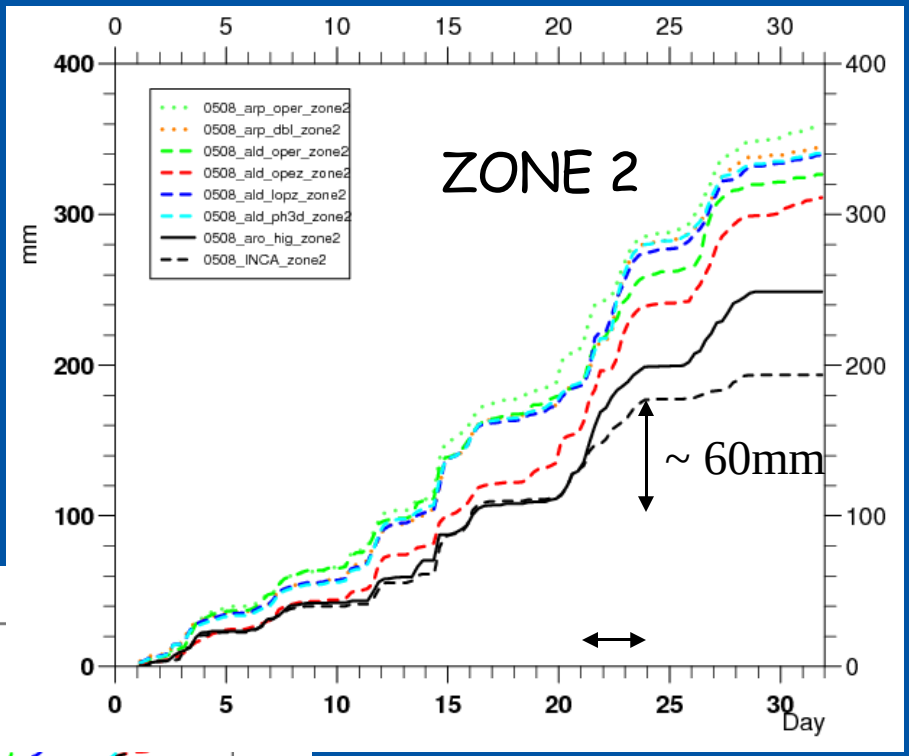
ETS October 2005
06h accumulated precipitation (10km)

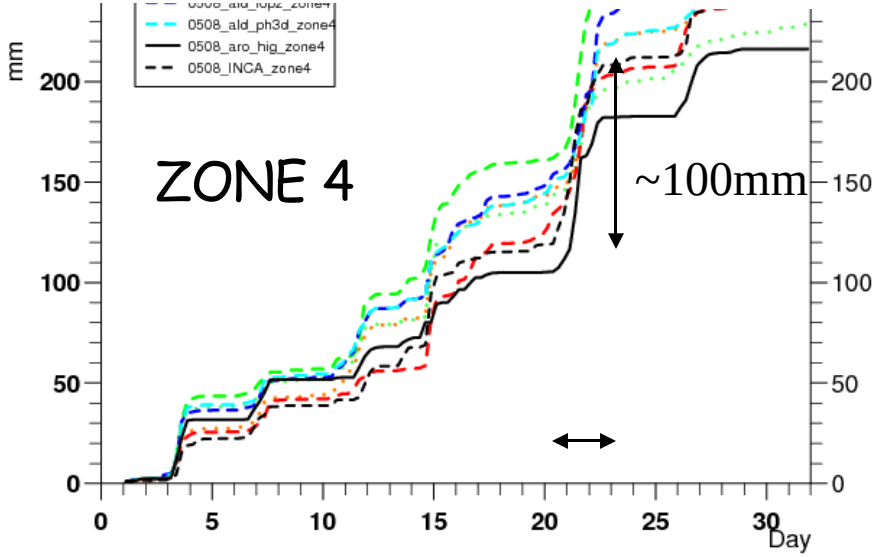




21-23 August 2005







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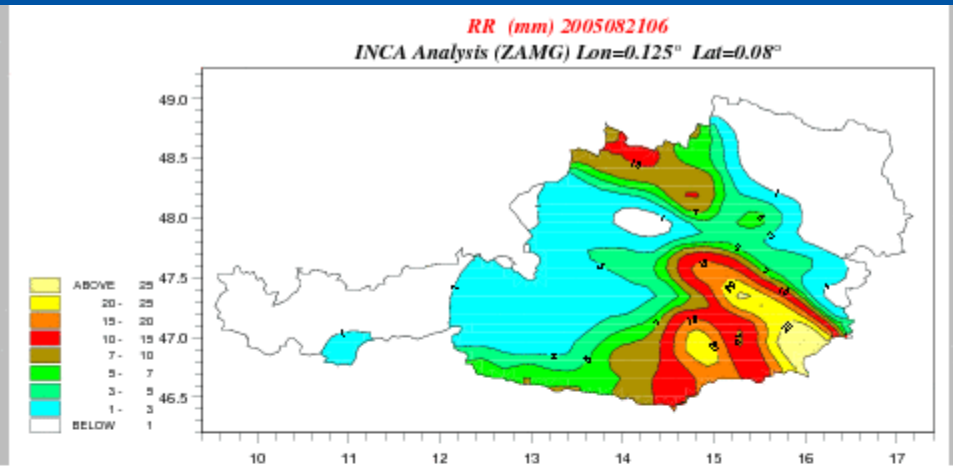
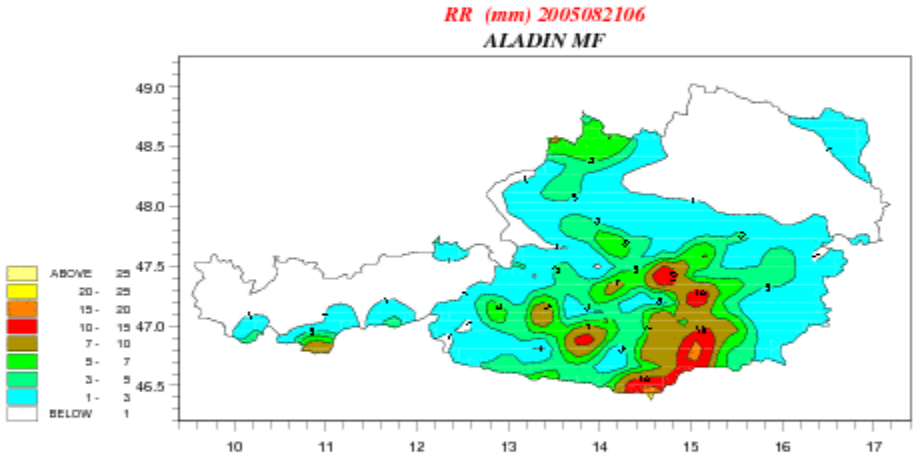
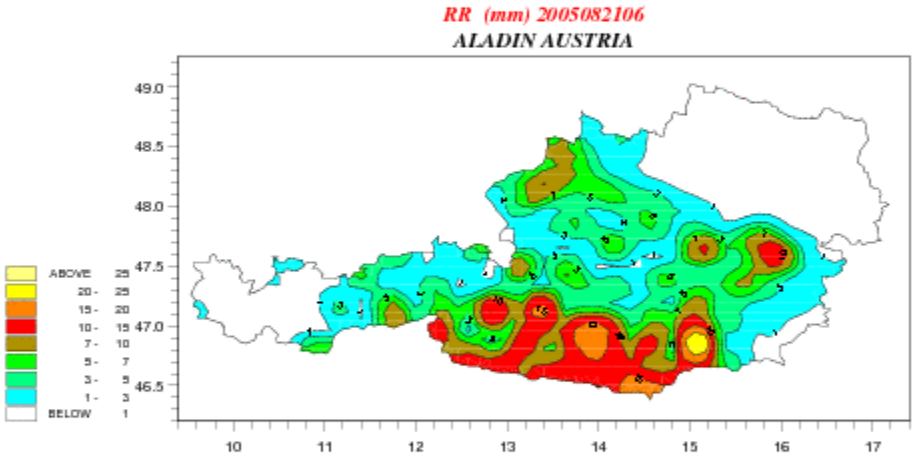
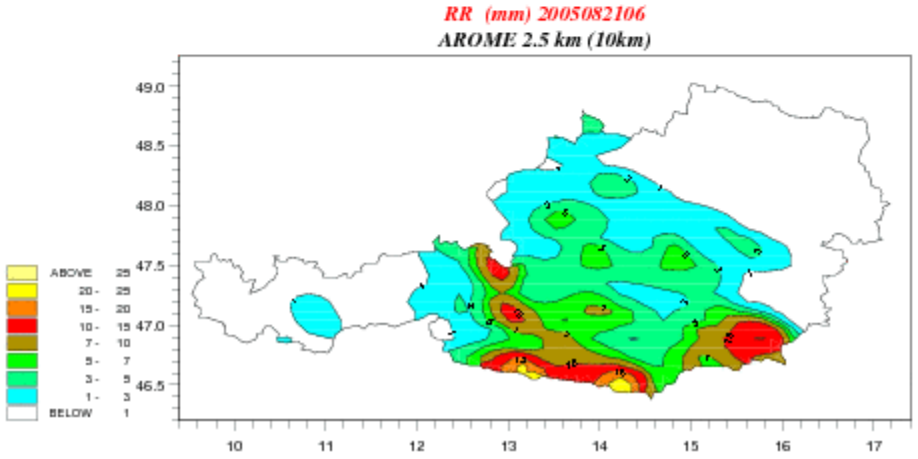
ZAMG

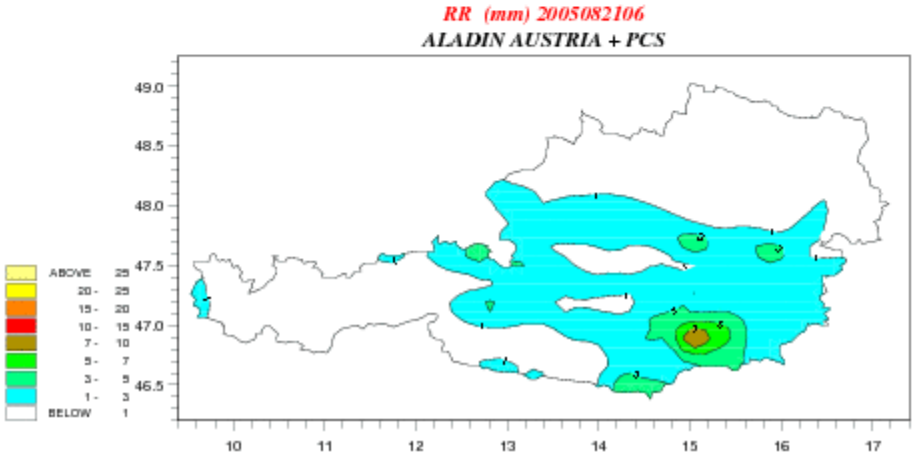
20050821 00UTC
to
20050824 00UTC

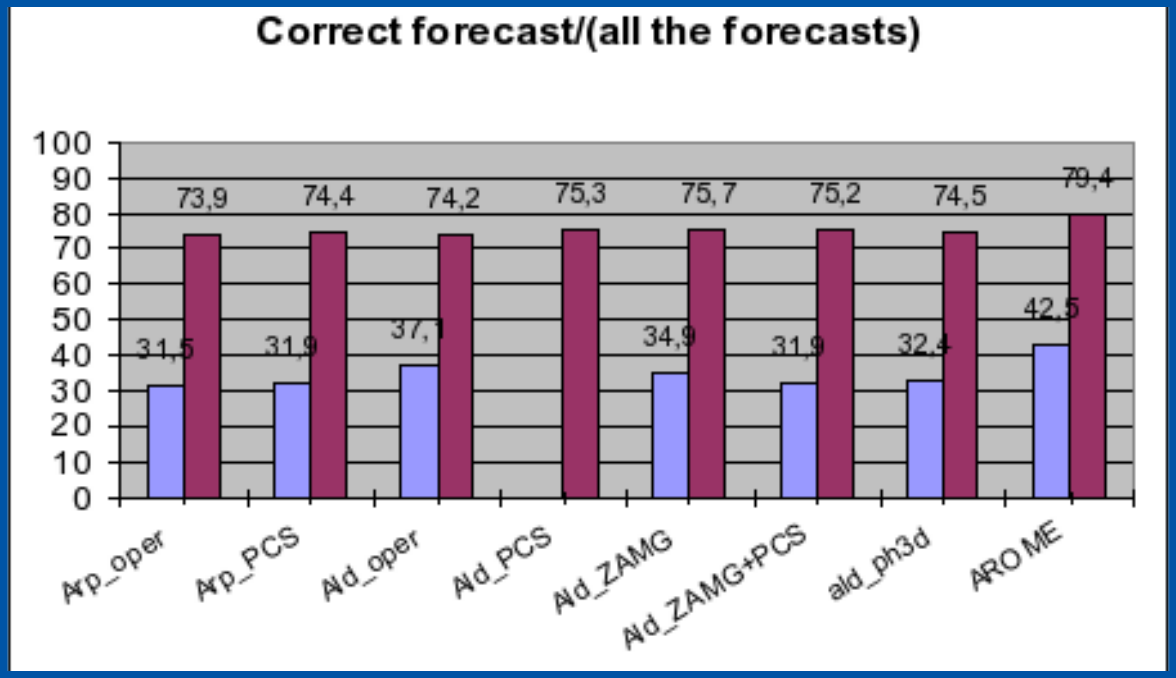












August 2005

October 2005

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Toujours un temps d'avance

ZAMG

- ASCII file for analysis and model : lon lat value
- File name AAAAMMJJ00+HH
- 00UTC forecast: output 06h, 12h, 18h, 24h
- cumulated precipitation on the model grid
- August, October 2005 and April 2006 (in plan)
- HIRLAM will send the data (ST)
- and ALADIN-XX ?

METEO FRANCE
Toujours un temps d'avance

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Conclusions

1. The statistical skill scores confirm the improvement of the first 6h precipitation forecast due to the 3DVAR analysis.
2. The PCS reduces the rainfall overestimation on the mountain area with a better precipitation field on the lee side part.
3. The skill of the AROME "prototype" in predicting the precipitation over Austria is slightly better especially over mountain. Nevertheless, AROME under estimates the smallest precipitation amounts
4. Increase the period → results statistically significant

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Thanks for your attention …

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