EVALUATION of AROME in AMMA

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With contributions of
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- runs AROME during AMMA_2006 (runs were launched on alert on 14 days in August 2006)

- runs performed by C. Kocha/P.Tulet (Phd thesis) on several c studies taken from AMMA (dust parametrization)

AMMA network

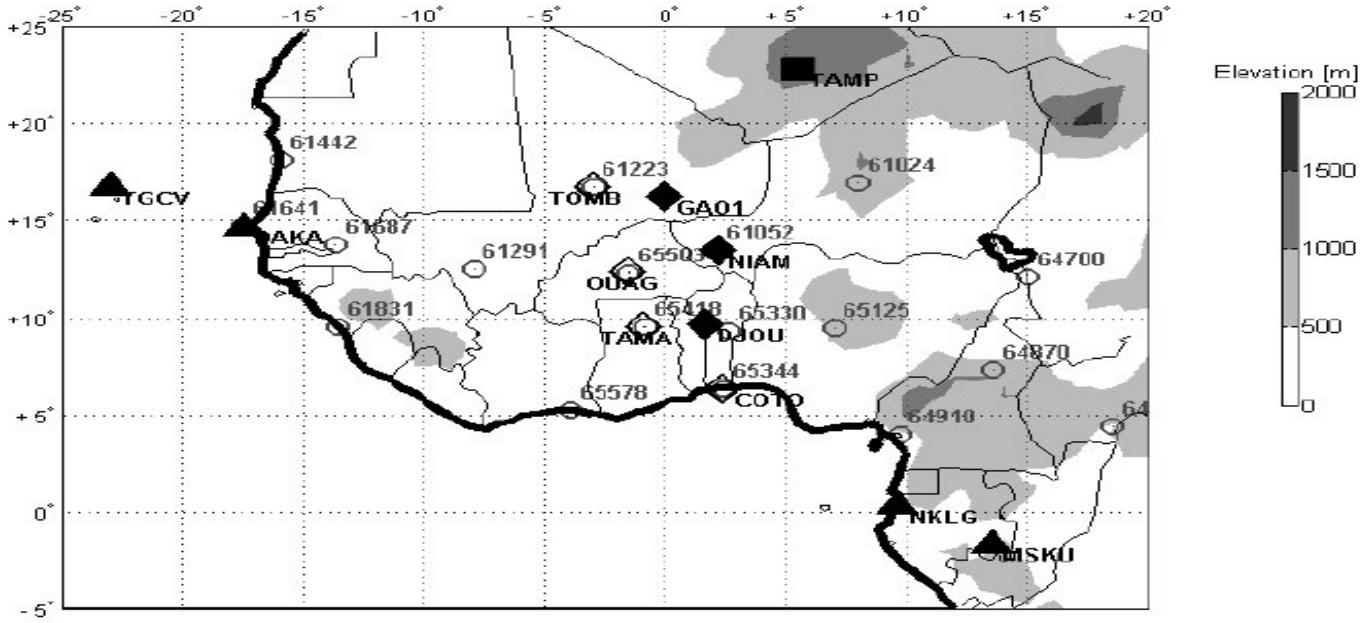
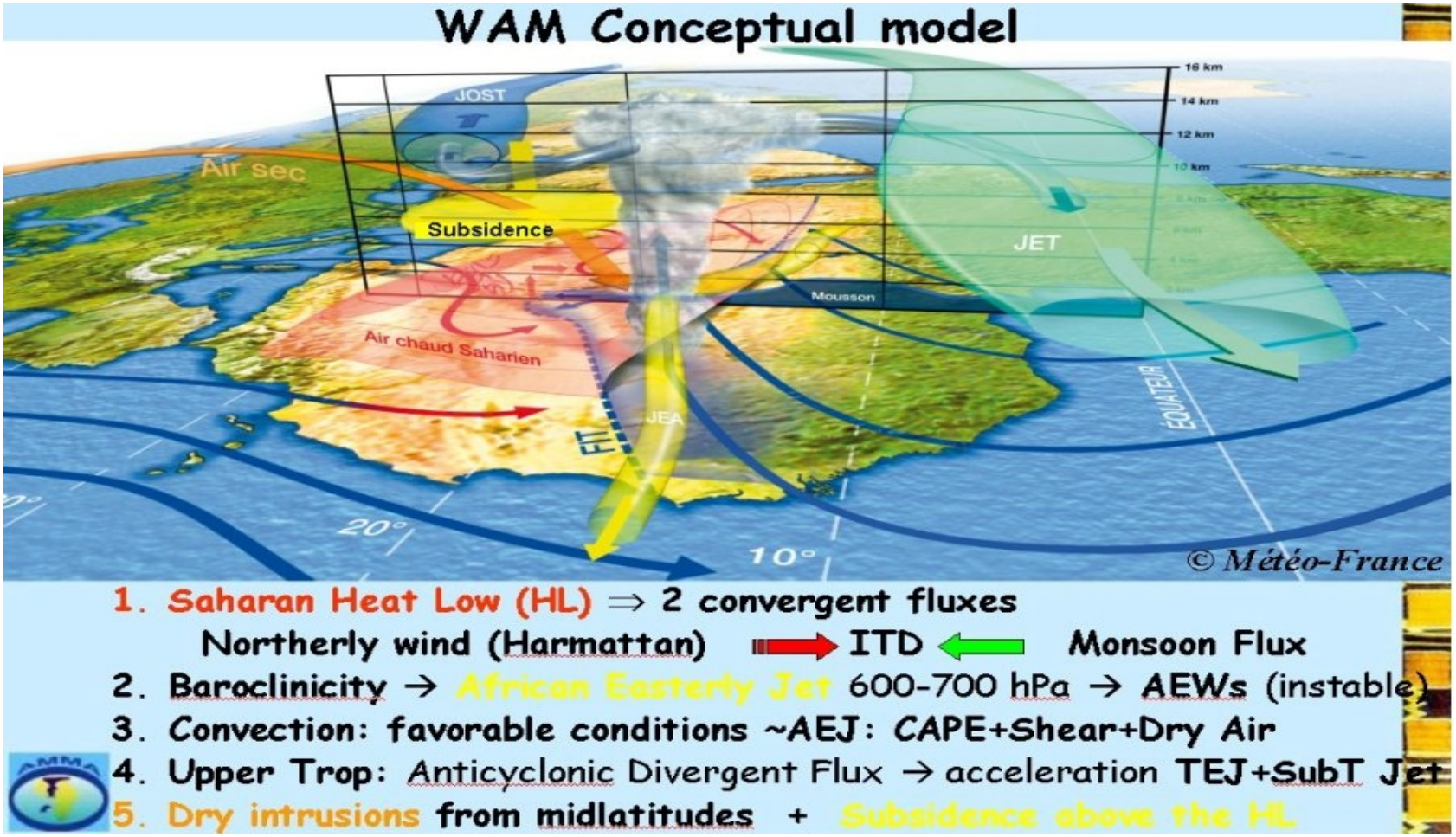


Fig. 1: View of GPS receivers and radiosonde stations operating during the AMMA-EOP (2005-2007) and SOP (2006) campaigns. The GPS sites are indicated as symbols with 4-letter IDs and the radiosonde sites are indicated as circles with 5-digit IDs. The GPS sites comprise: 4 IGS sites (filled triangles), 3 AMMA-EOP sites (filled diamonds), 3 AMMA-SOP sites (open diamonds), TAMP (square), an Algerian permanent station, and COTO (open diamond), an AMMA test station installed in 2005. Grey shading shows topography (see axis on the right).

Up to 8 soundings/day during IOPs → budget (Q1,Q2,..)

From Bock et al., 2008, JGR.

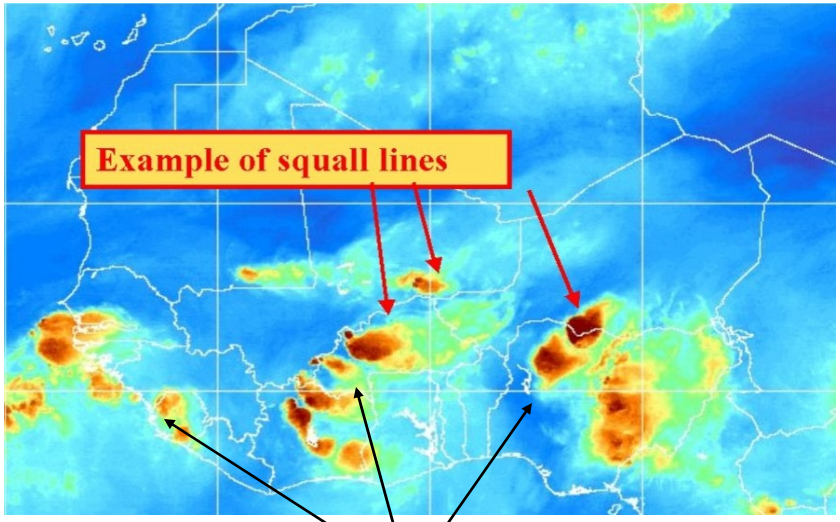
AMMA



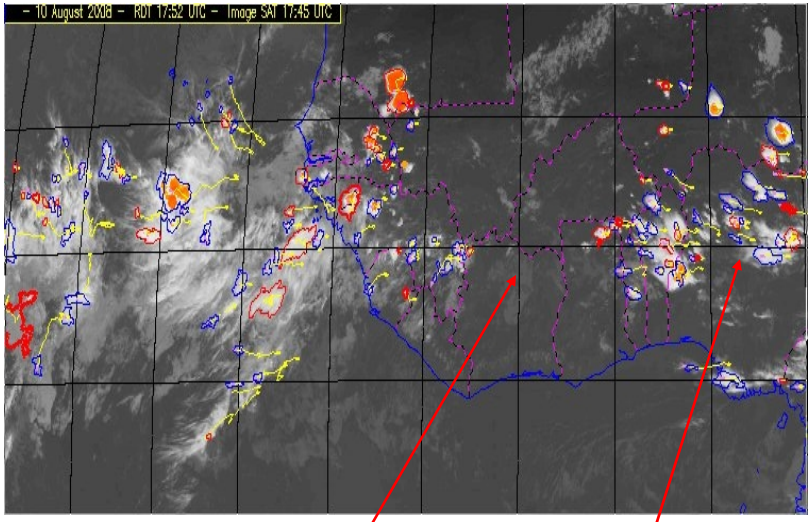
African monsoon period = end of June (onset) – July to September (full monsoon) end of September (retreat)

AMMA: african monsoon

<u>Convection can be</u> ….



organized



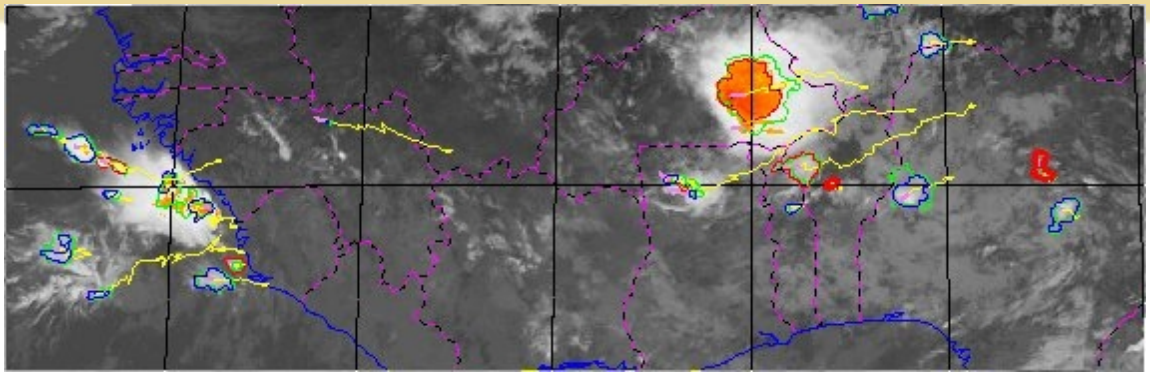
suppressed

scattered

AMMA: case study 25/07/2006

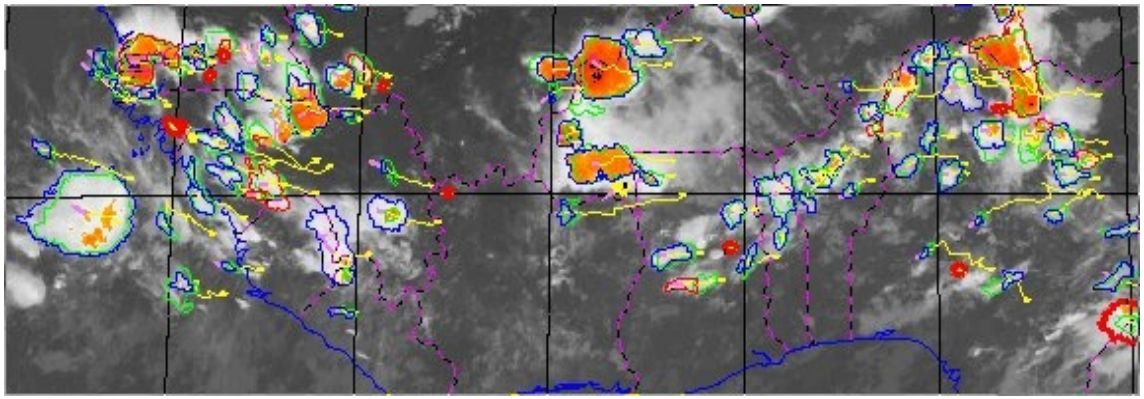
25/07/2006

12UTC



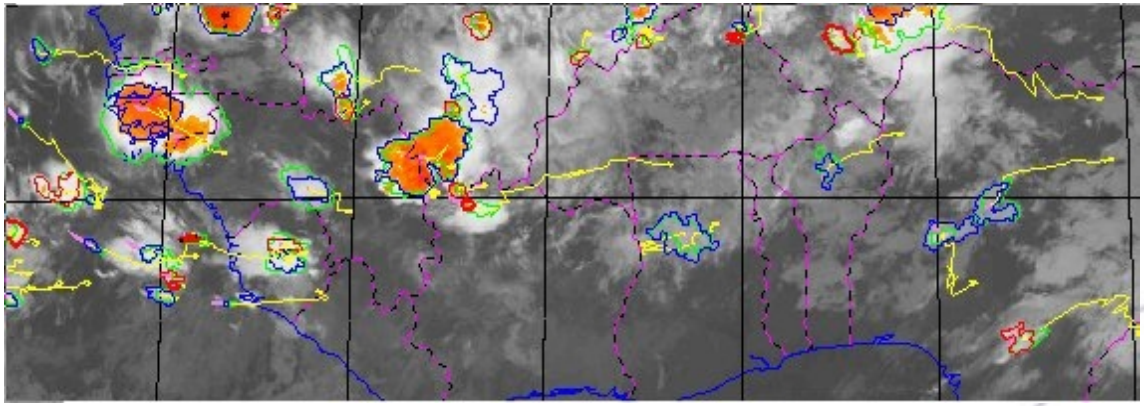
Big MCS on Burkina

18UTC



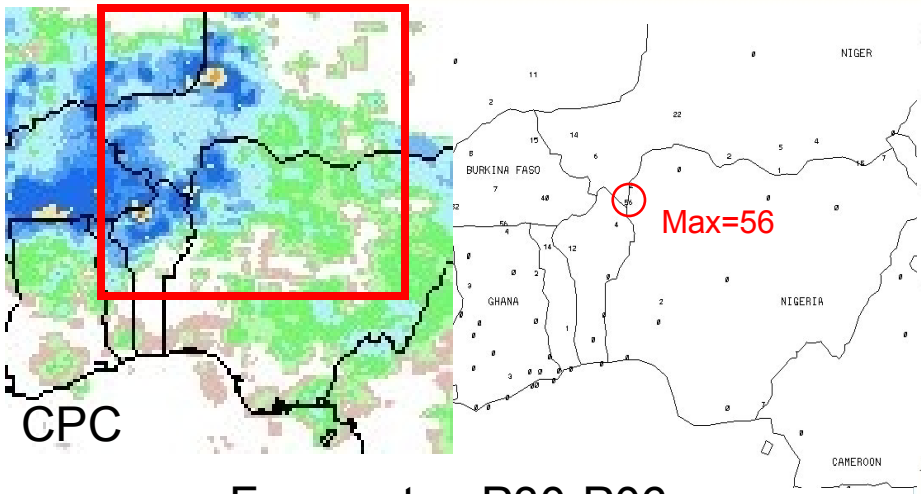
…scattered convection is triggered in late afternoon…

24UTC

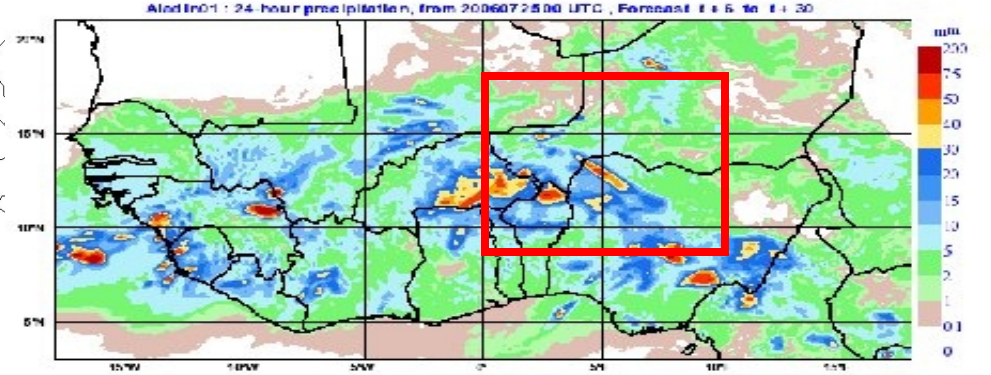


… and vanishes at night

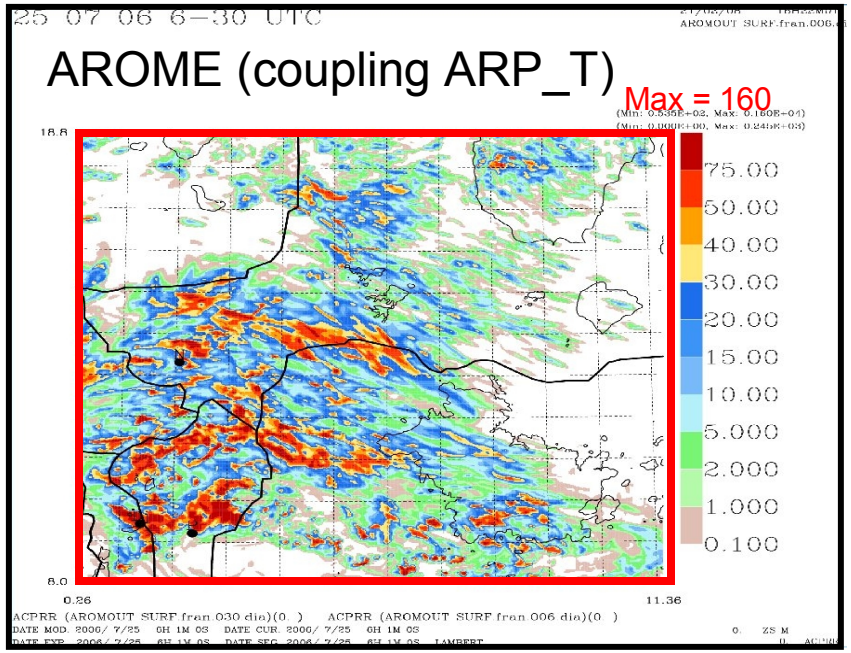
AMMA: case study 25/07/2006



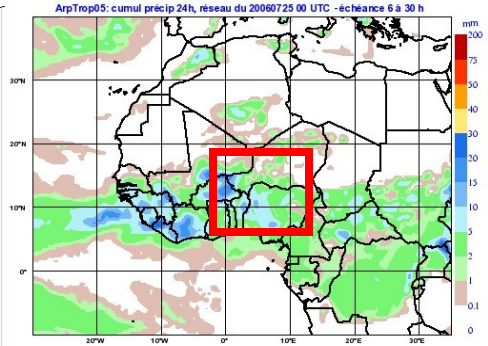
Aladin MF - 10km - boundary conditions from Arpege



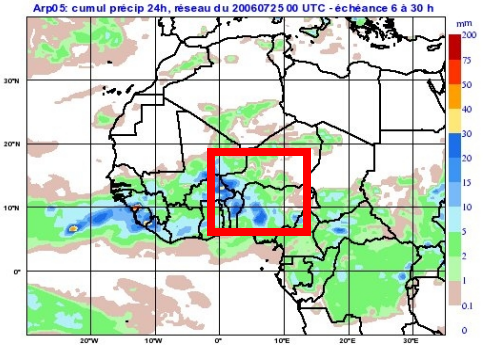
Forecasts= P30-P06



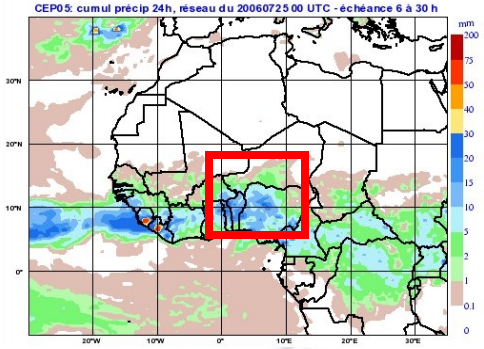
Arpege Tropique



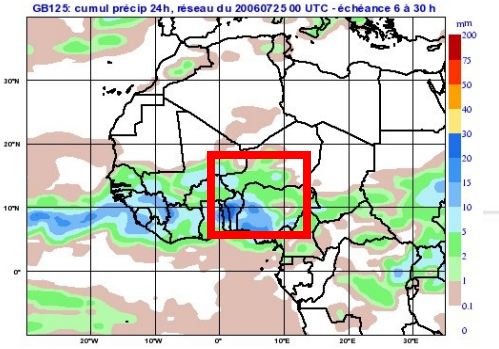
Arpege



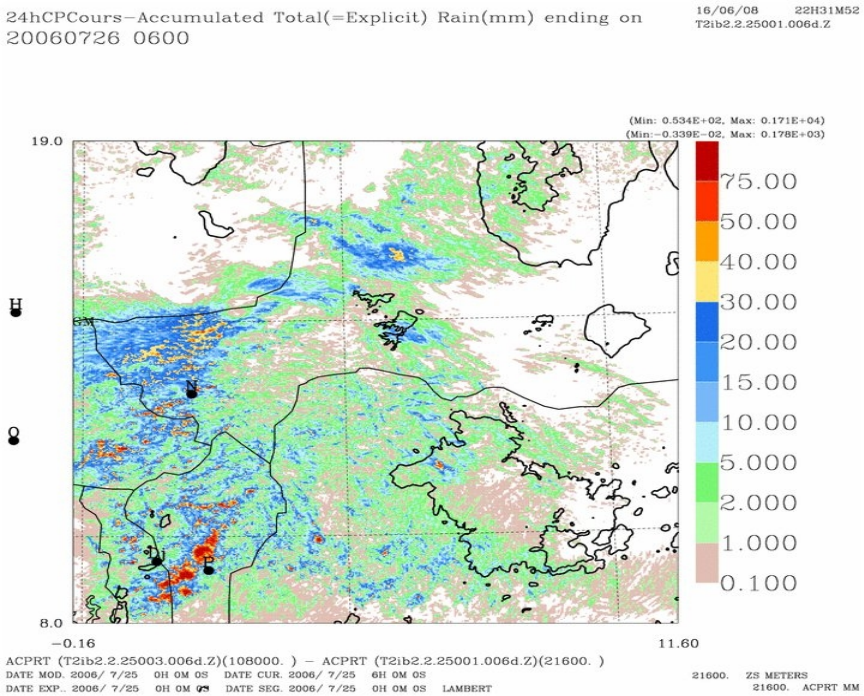
ECMWF



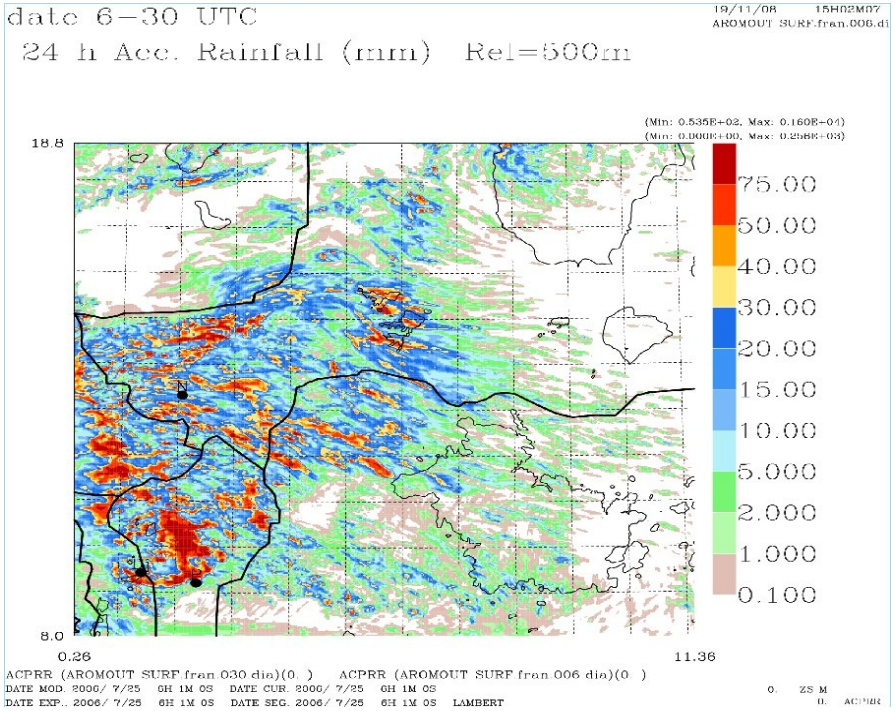
UK



AMMA: case study 25/07/2006



MESO-NH 2.5km (coupling ARP_T)



AROME 2.5km(cy33t0) (coupling ARP_T)

Almost same domain, same initial conditions, same boundary conditions.

AMMA: objective evaluation of precip.

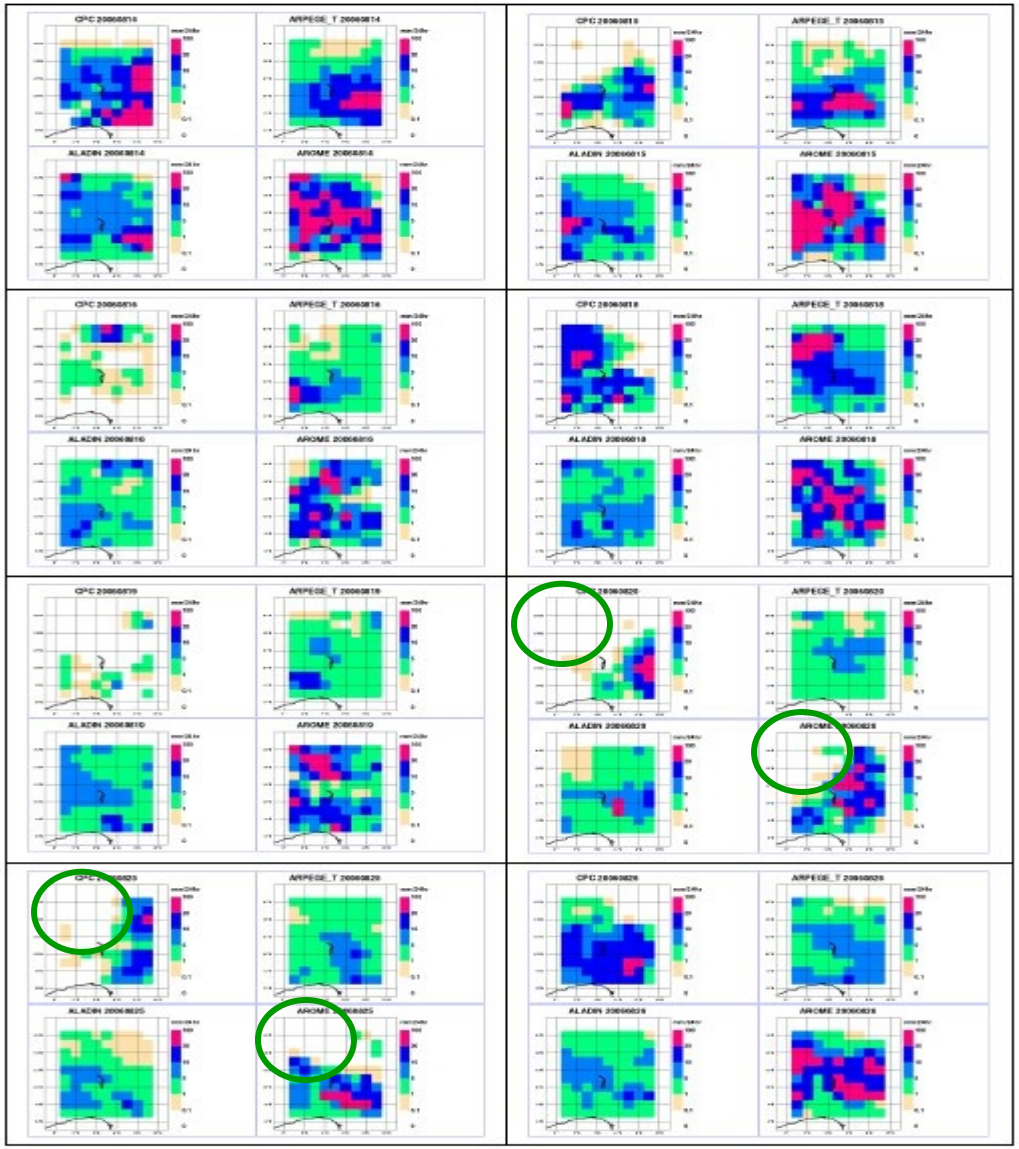


Figure 22: *24 hour cumulated precipitation for 14 days of August 2006 (1st, 2nd, 10th, 11th, 12th,13th,14th,15th,16th,18th,19th,20th,25th,26th) estimated by NOAA/CPC (upper left).*

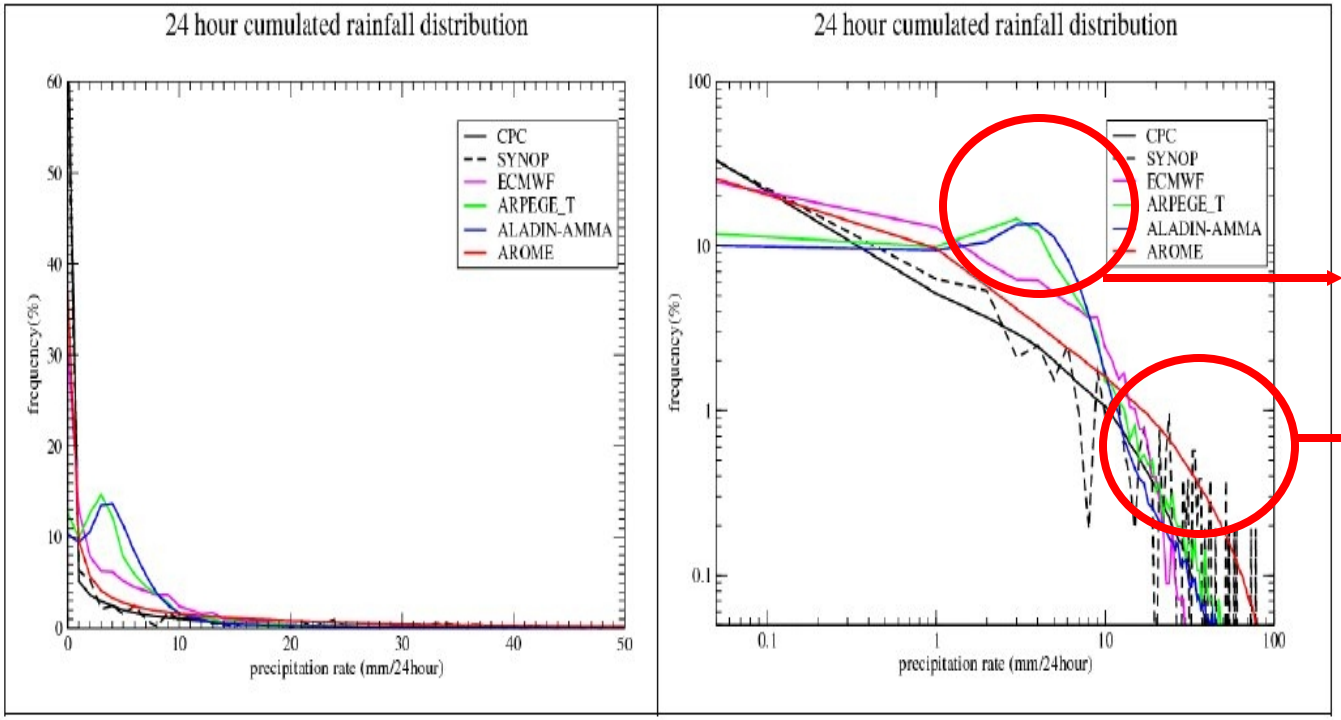
CPC	ARPEGE_T
ALADIN	AROME

Precip. averaged on a 100kmx100km box (CPC, ALADIN, ARP_T, AROME).
AROME has been run for 14 days (alert mode).

AROME is able to simulate "suppressed" convection (unlike ALADIN-AMMA, ARP)

BUT generally AROME produces too much precip.

AMMA: precipitation evaluation



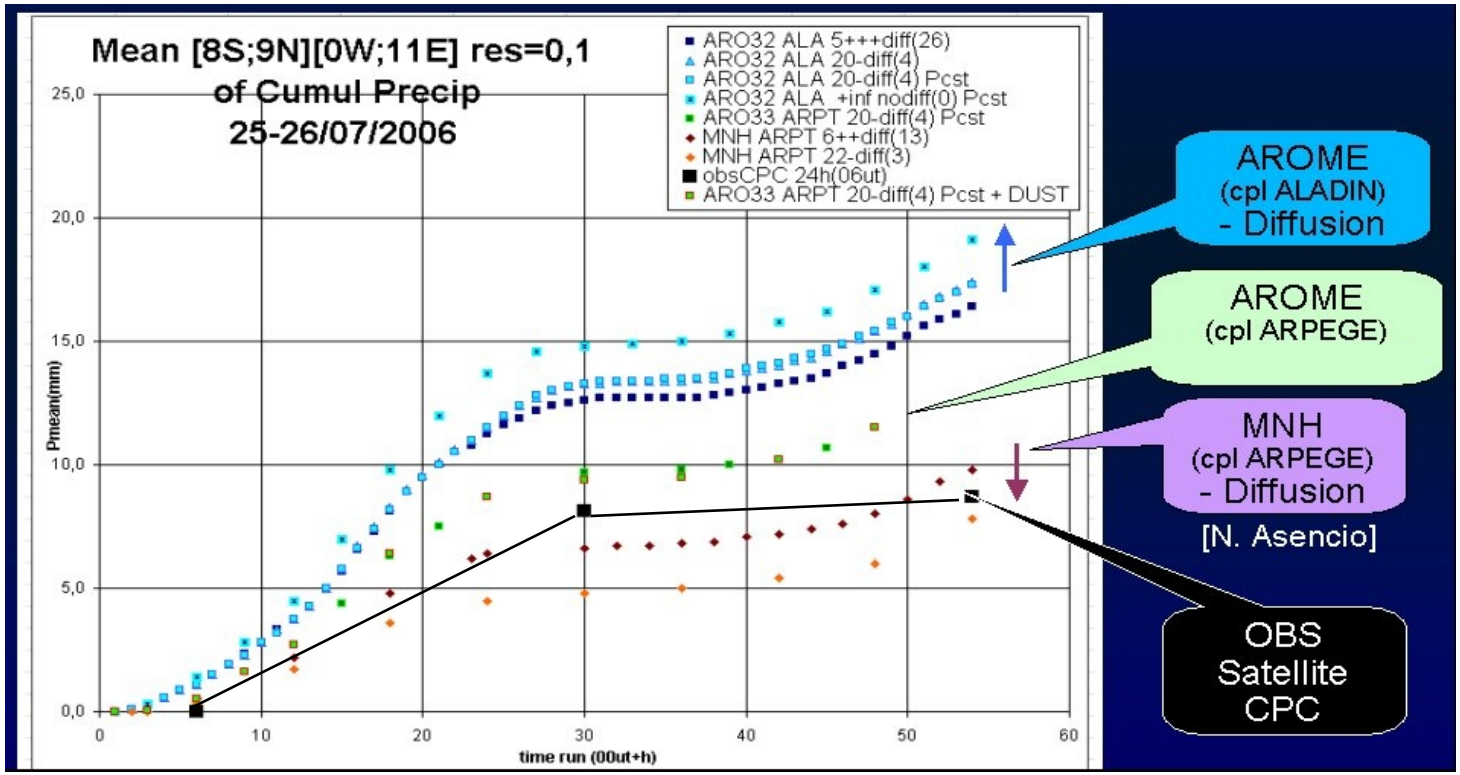
Too much activity in 1-10mm/day for parameterized models

Too much activity in 10-100mm/day for AROME (explicit)

24hour cumulated rainfall distribution

From Nuret et al., deliverable AMMA-EU project (WP5.1)

AMMA: precipitation evaluation



AROME : diffusion ↘ precipitation ↗

MESONH : diffusion ↘ precipitation ↘

From C. Kocha

AMMA Général

	CPC	ARPEGE_T	ALADIN-AMMA	AROME
Mean precipitation	6.0 mm/24hour	5.6 mm/24hour	5.6 mm/24hour	10.6 mm/24hour
Bias		-7%	-7%	+77%
Correlation		0.21	0.19	0.16

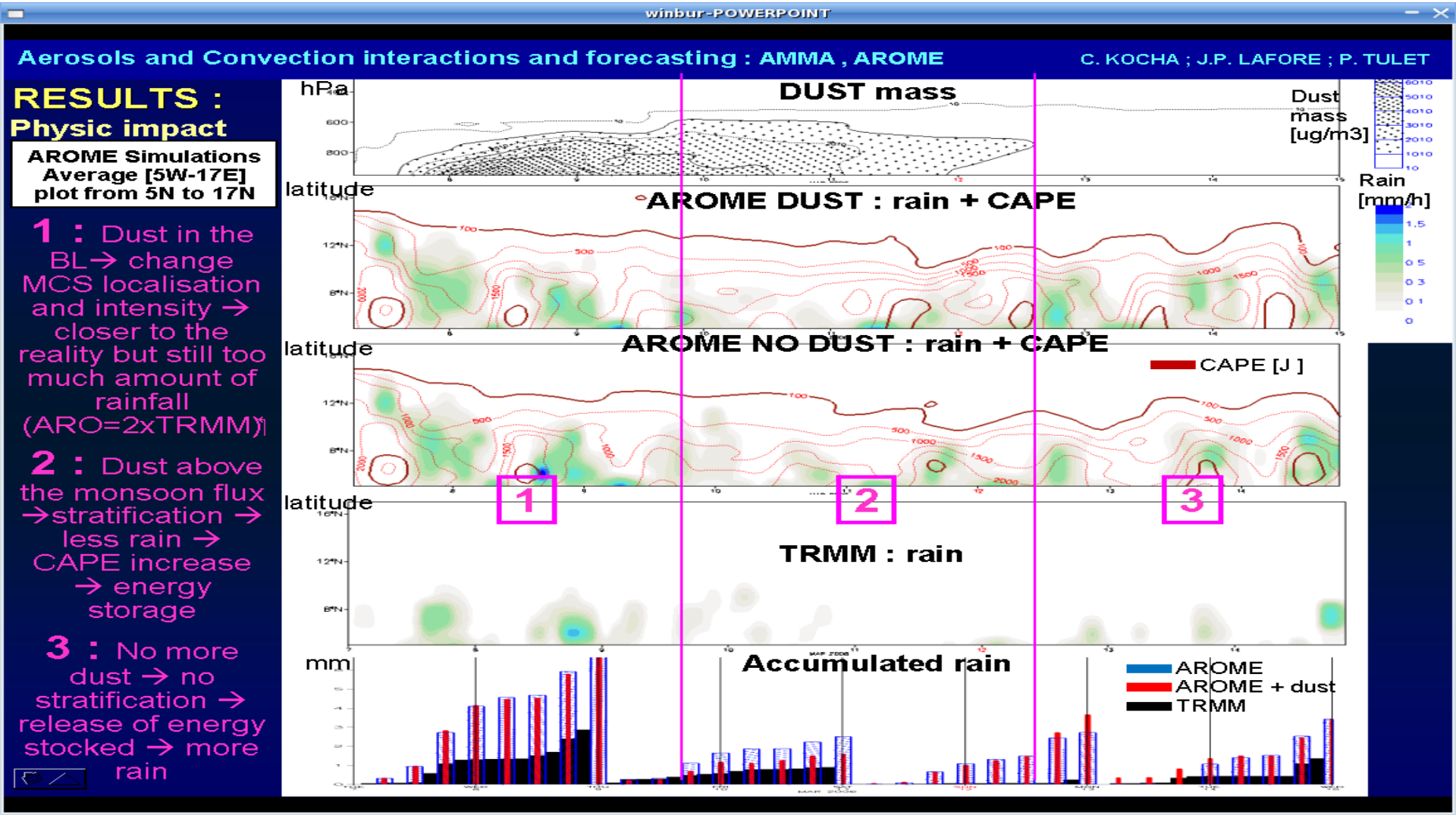
Table 2: *Mean precipitation, bias and correlation over the period (14 days of August 2006).*

Models output and CPC interpolated onto a 100kmx100km grid

- scores are very low (convection is not an easy task to predict …)
- best score is achieved by the “large-scale” model

AMMA: prognostic dust in AROME

Prognostic dust in AROME: dry season case study (sand storm) – March 2006



CONCLUSION

- **AMMA** is a field campaign well-suited to study **convection**

- **AROME:**
- improvement for weak to moderate precips.
- produces too much precipitation for strong events
- able to simulate “suppressed” convection

- Prognostic dust in AROME reduces precip.

… and better propagation / life cycle of convection

AMMA

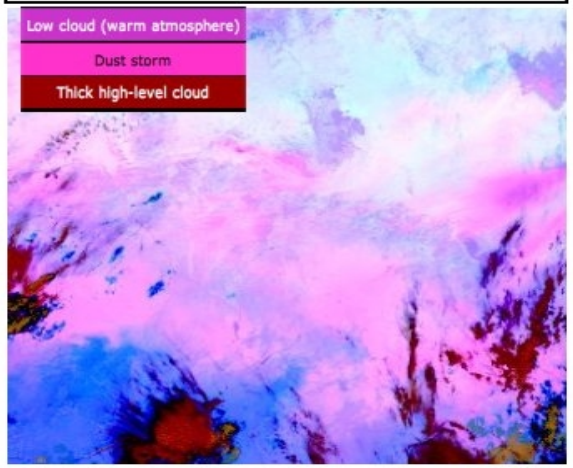
[Thèse C. Kocha/CNRM] Aerosols and Convection interactions and forecasting : AMMA , AROME

Dust storm
2006/03/10 12UTC (84h run)

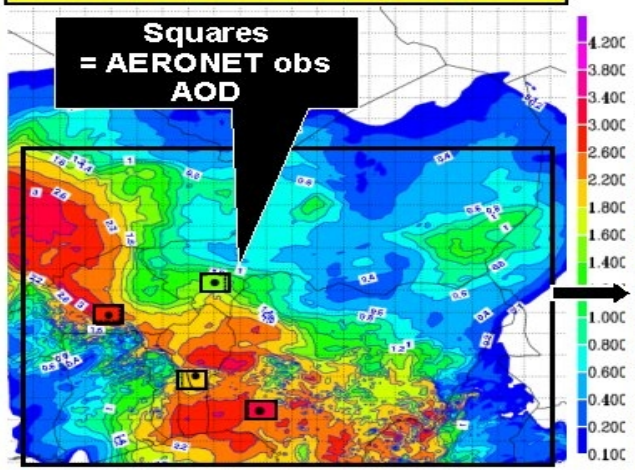
MINERAL DUST AEROSOLS

Through absorption and scattering of long and short wave radiation *[Houghton & al. 2001]*, mineral dusts impact the thermodynamic vertical structure of the atmosphere thereby **modifying convection development** *[Lohmann & Diehl 2006]*, and **local energy budgets** *[Grini & al. 2006]*.

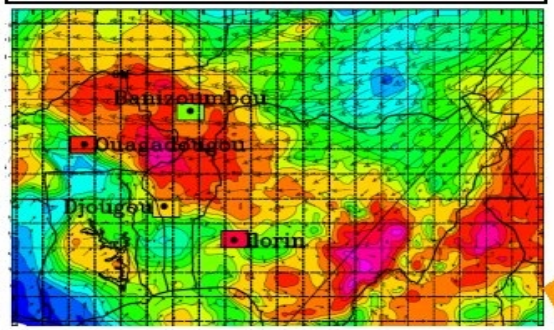
MSG-SEVIRI



AROME Simulation : AOD*



Meso-NH Simulation : AOD*



[P. Tulet]

AROME Simulation Avg [5W-17E]