The background of the slide features a vintage-style map with a compass rose in the upper left corner. The map shows geographical outlines and some text, including "CAPE SERRA" and "NIGER". The compass rose has directional markers for N, SE, E, and S, along with degree markings.

Dust emission and transport using the Dust module of RegCM3

Ioana Colfescu (Romania)

David Cudjoe Adukpo (Ghana)

Sarr Abdoulaye (Senegal)

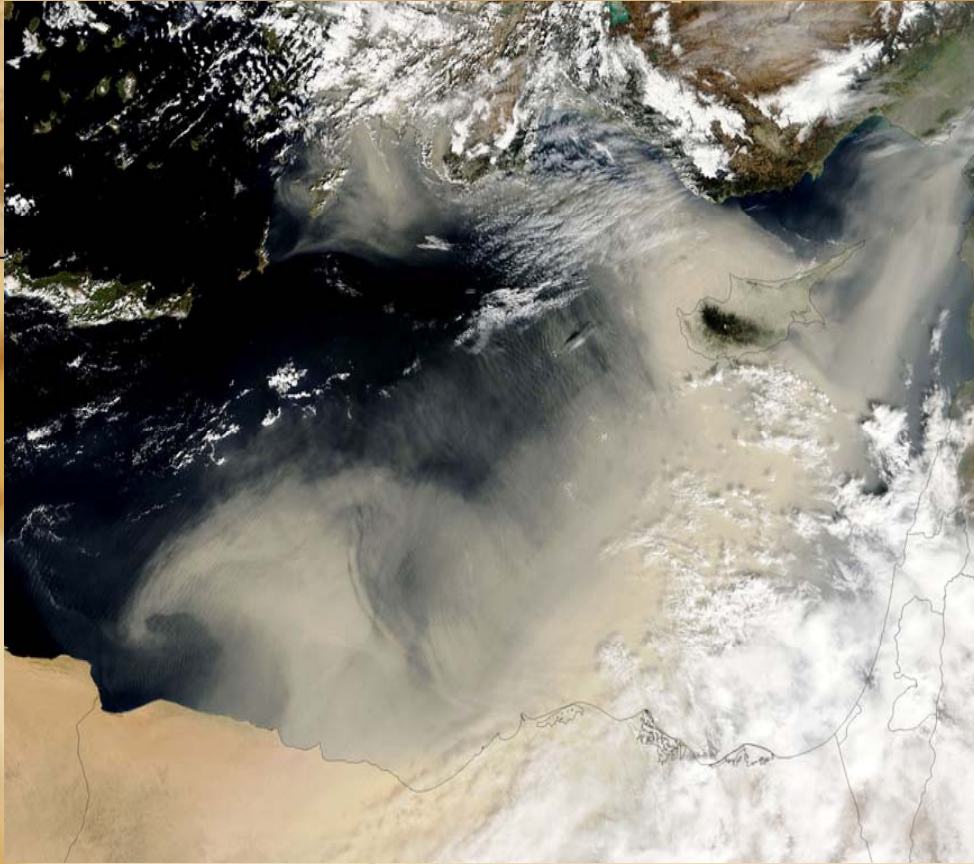
Seidou Sanda Ibrah (Niger)

Outline

- **Motivation**
- **The model settings**
- **Dust transport/different resolutions**
- **Post processing analysing**
- **Future Work**

Motivation

- Saharan dust transported over Europe across the Mediterranean Sea has been studied and documented by various authors in order to reveal both the characteristic components and the extension of these frequently occurring episodes.
- High atmospheric dust loads could play an important role in climatic variations, for instance affecting the concentration and distribution of ozone which is a greenhouse gas. Moreover, as much as 50% of the airborne dust present is thought to be due to anthropogenic activities.
- How RegCm dust module can represent such dust storms episodes that are transporting dust from Sahara to Europe , particularly Romania and how the representation is sensitive to different resolutions



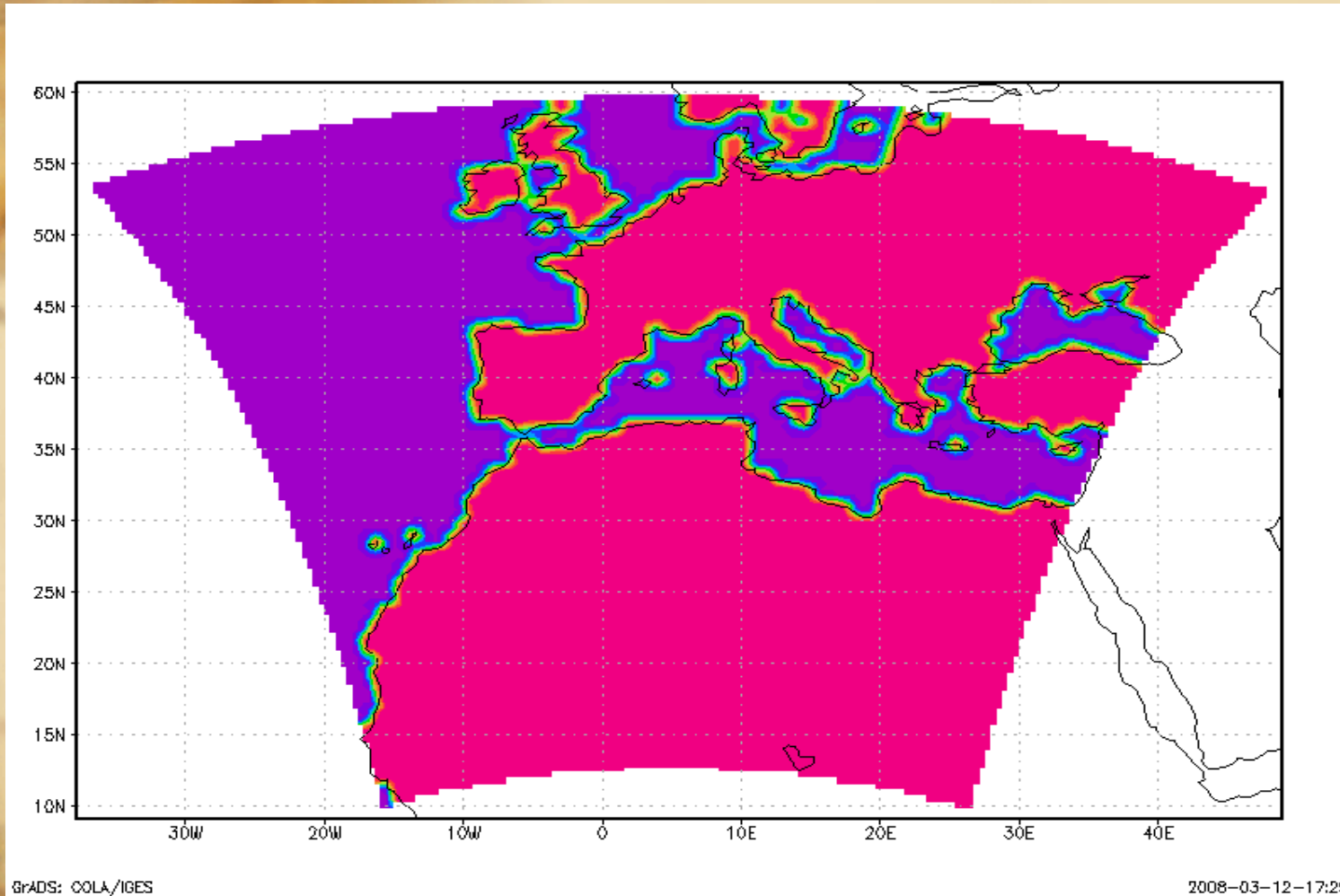
Dust transport episode 05.2006
Source : MODIS

Our Project

**Dust
monitoring**

**Sensitivity
to different
resolutions**

Model Domain



4th ICTP Workshop on the Theory and Use of REGIONAL Climate Models “Applying RCMs to Developing Nations in Support of Climate Change Assessment and Extended-Range Prediction March 3-14, 2008

Aerosol dust source and deposition parameterization in RegCM

Input parameters

Soil texture (12 types, USDA)

Soil erodible dry aggregates distribution

Land surface properties (BATS)
(roughness, soil humidity, cover fractions)

Regcm atmospheric variables
(surface wind, air temperature, air density)



DUST emission scheme

See talk Dr. A. Zakey



Saltation (Marticorena et al. 1995)
Roughness and humidity correction



Sand-blasting (Alfaro et al., 1997, 2001)



Dust flux distribution

(3 log-normal emission modes)



4 Transport bins

0.01 -1 μm

1 - 2.5 μm

2.5 - 5 μm

5 - 20 μm



AOP / radiation

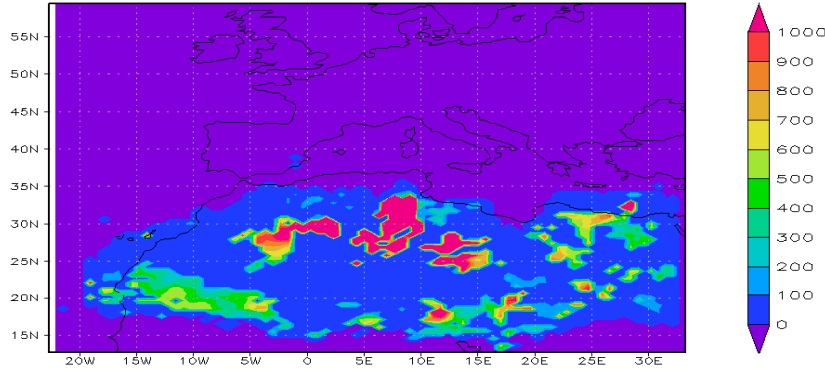
Size dependant settling and surface déposition



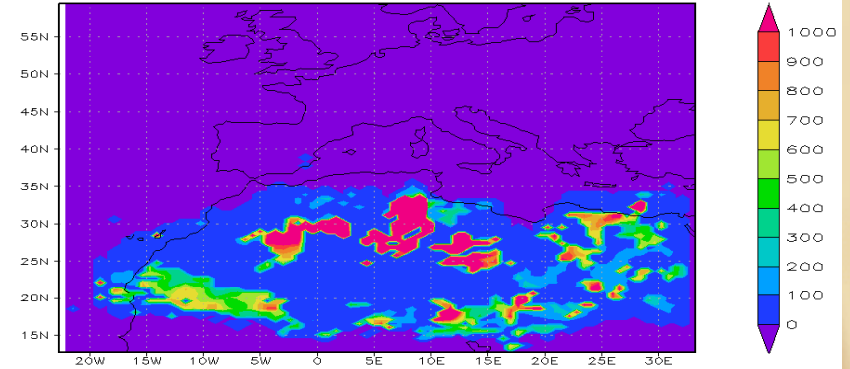
Model settings

Experiment 1	Experiment 2
ly=60	ly=90
Jx=60	Jx=90
Kz=18	Kz=18
Nsg=1	Nsg=1
ds=90	ds=60
Clat=35.00	
Clon=5.00	
Start date =2006 04 01	
End date =2006 06 30	
Aerosol type :Antrophogenic+biomass+SO2+BC+OC+dust	
Global dataset : NNRP2	

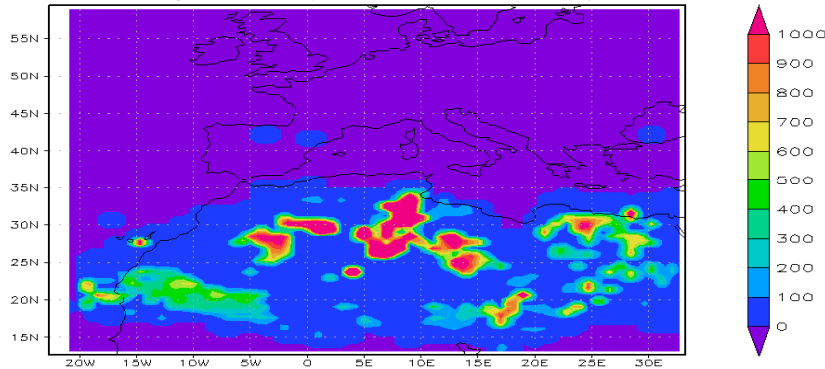
Average dust column burden (mg/m²/d)
May 2006 (bin 1, 60 km res)



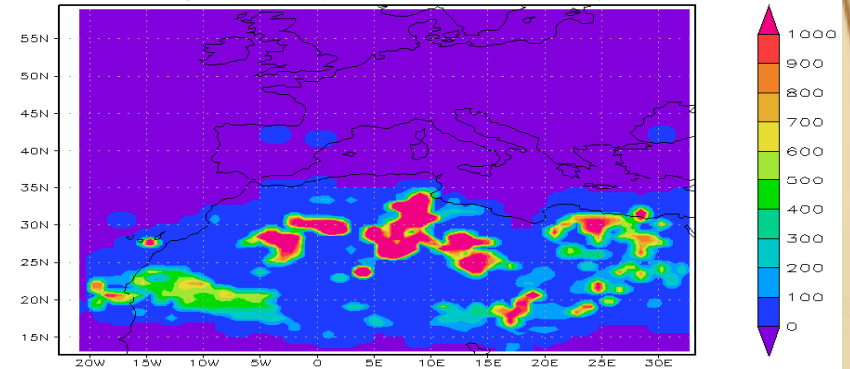
Average dust column burden (mg/m²/d)
May 2006 (bin 2, 60 km res)



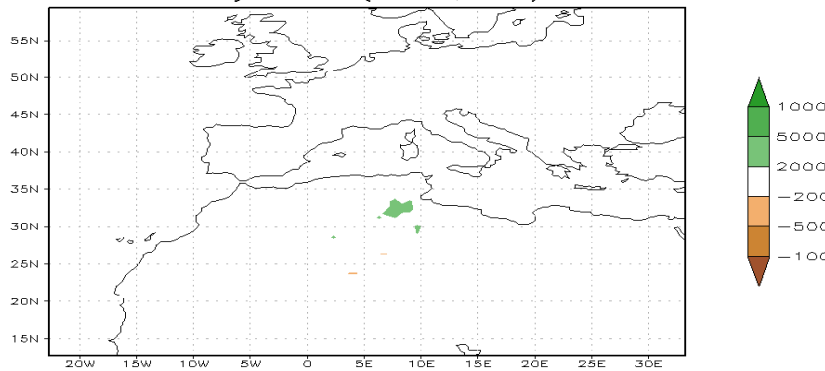
Average dust emission rate (mg/m²/d)
May 2006 (bin 1, 90 km res)



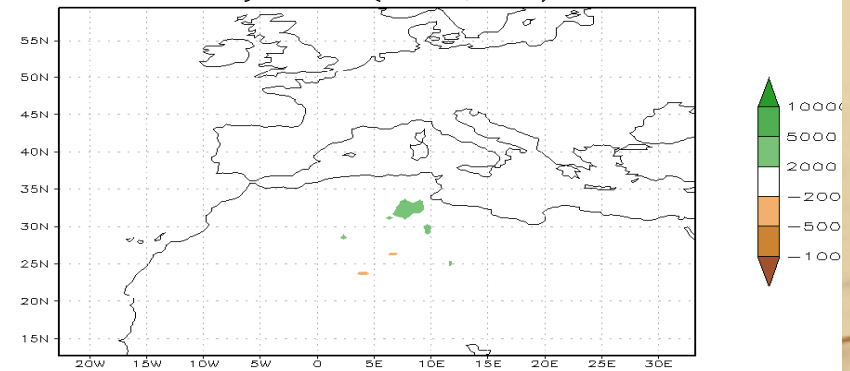
Average dust emission rate (mg/m²/d)
May 2006 (bin 2, 90 km res)



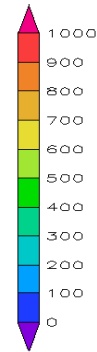
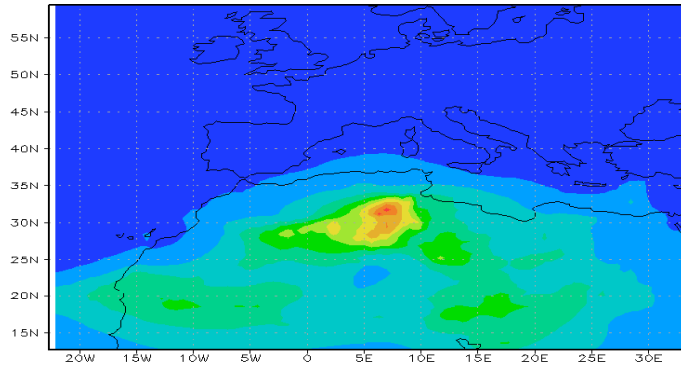
Average diff dust emission rate (mg/m²/d)
May 2006 (bin 1, diff)



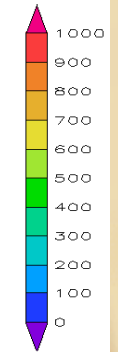
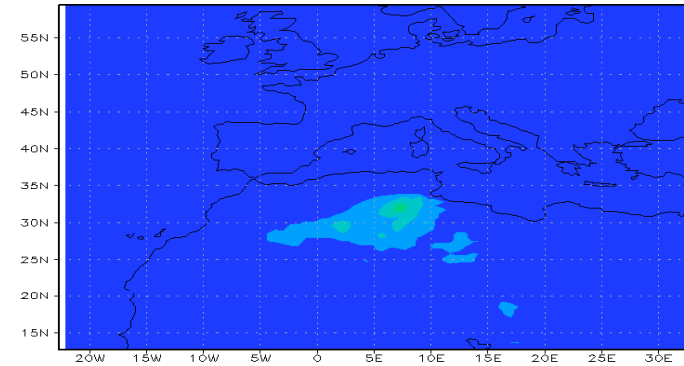
Average diff dust emission rate (mg/m²/d)
May 2006 (bin 2, diff)



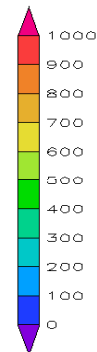
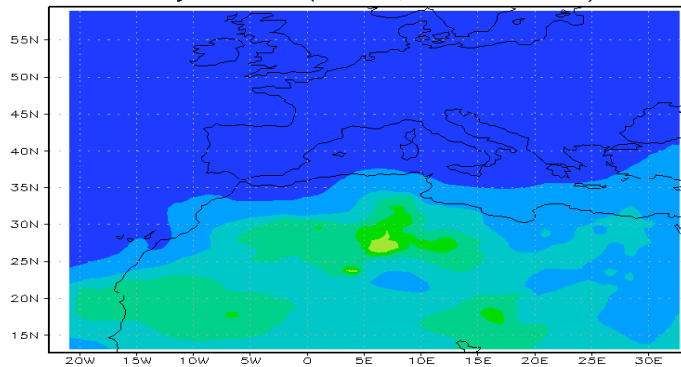
Average dust column burden (mg/m²)
May 2006 (bin 1, 60 km res)



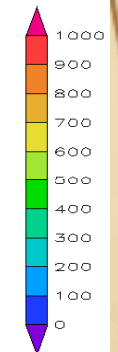
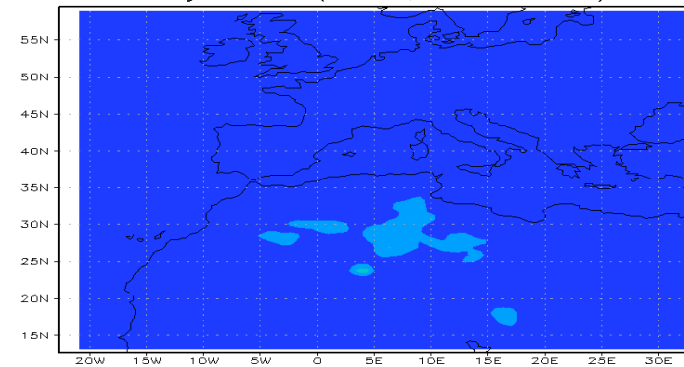
Average dust column burden (mg/m²)
May 2006 (bin 2, 60 km res)



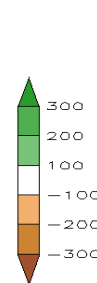
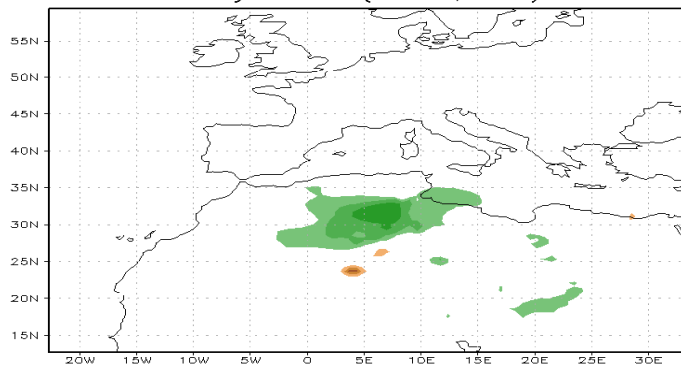
Average dust column burden (mg/m²)
May 2006 (bin 1, 90 km res)



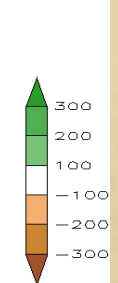
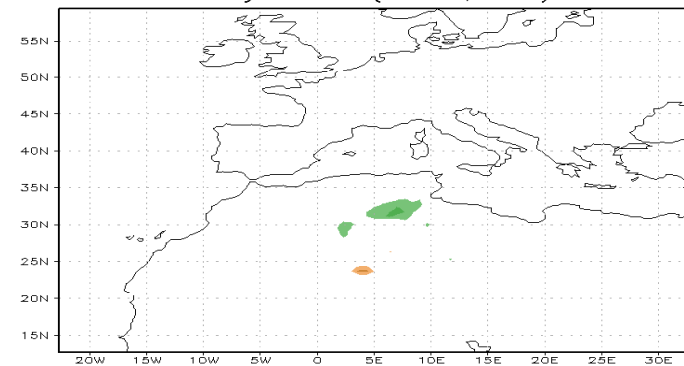
Average dust column burden (mg/m²)
May 2006 (bin 2, 90 km res)



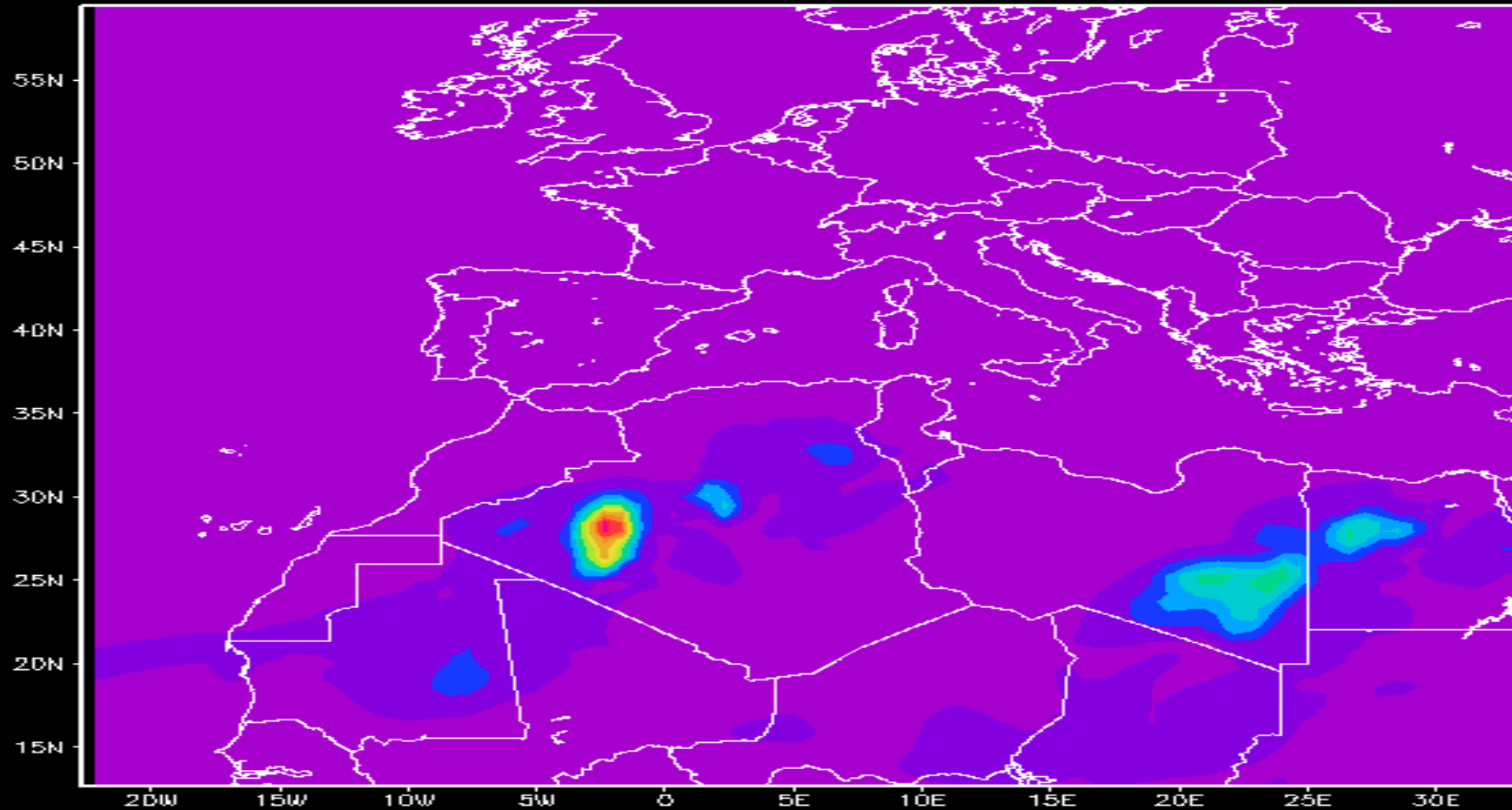
Average diff dust column burden (mg/m²)
May 2006 (bin 1, diff)



Average diff dust column burden (mg/m²)
May 2006 (bin 2, diff)



dust bin 1 (mg/m²) at t=2



GrADS: COLA/IGES

2008-03-13-21:53

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SUMMARY

- 1. This study has revealed that the dust burden is sensitive to resolution
- 2. By increasing the resolution from 90 to 60 we have been able to capture much more details of the dust burden
- 3. The May 2006 dust transport from Africa to Europe (in particular Romania) was captured by RegCM

FUTURE

- Comparison with satellite data, MODIS
- Look at Aerosol Optical Depth (AOD)
- Vertical Profile of the Dust Transported compared to the rate at which RegCM is projecting it

Thanks

- **And The HYPER MATRIX Begins,
Follow us through with Comments,
Suggestions, Criticisms, Additions,
Subtractions, And “what have you... ?!?”
“ ... !!!!!!!!!!!!!!!”**
- **Grazie**