

Aerosol-2 Exercise: The Impact of Aerosols Effects on Meteorology

Teacher: Roman Nuterman

Assistant: Ekaterina Khoreva

Students:

Yuliya Vystavna

Sergei Artamonov

Svitlana Didkivska

TaraS Belyi



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1. GOAL AND OBJECTIVES

Goal:

Study influence of the anthropogenic emissions on a formation of meteorological/chemical fields in Paris due to inclusion of aerosols feedback mechanisms in **the Enviro-HIRLAM model**

Objectives:

- 1.Modify the Enviro-HIRLAM model
- 2.Perform simulations for selected case study (Paris, 17 July 2009)
- 3.Evaluate diurnal cycle variability
- 4.Summaries findings and results

2. EXERCISE ACTIVITY:

	3 July	4 July	5 July	6 July	7 July	8 July
Introduction	X					
Selection of the date	X					
Oral presentation		X				
Attempt No.1 to run the model		X				
Changing of the computer configuration			X			
Attempt No.2 to run the model			X			
Analysis of faced problems			X			
Running of the model				X	X	X
Preparation of the presentation				X	X	X

3. METHOD

5.1. Model

Enviro-HIRLAM (Environmental High Resolution Limited Area Model)

5.2. Approaches

integrate numerical atmospheric chemical system, originally developed by DMI since 1999 (*Korsholm, 2008*) weather prediction and transport modelling

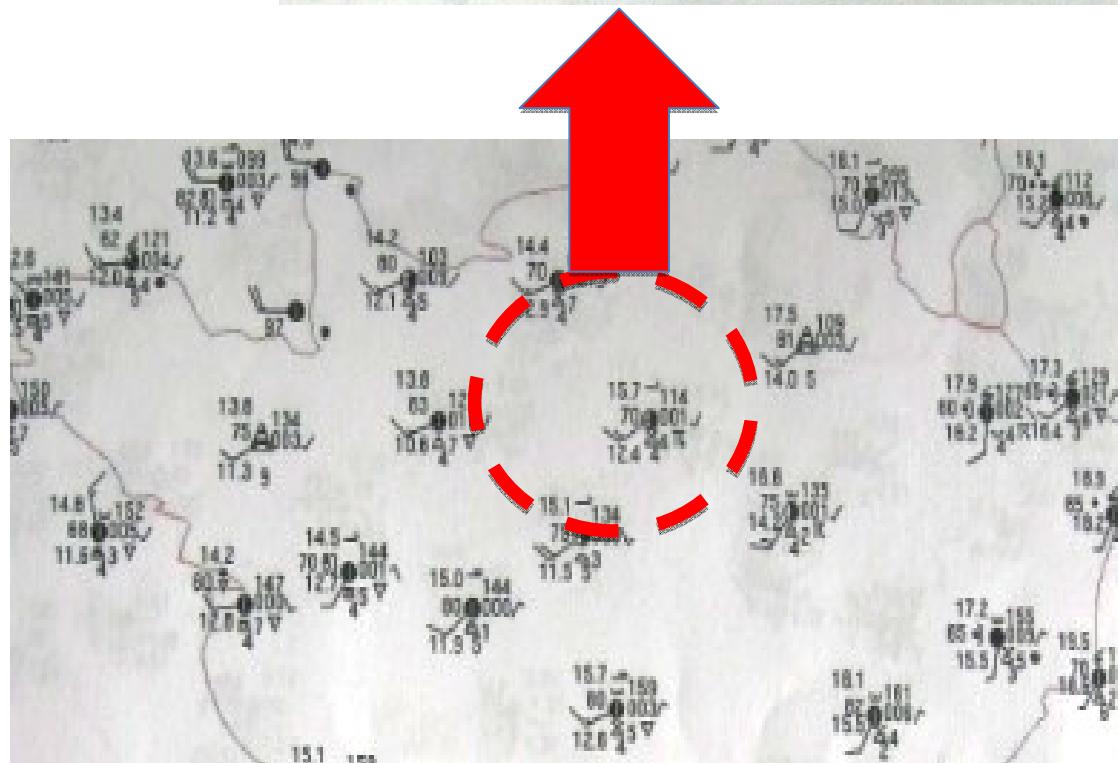
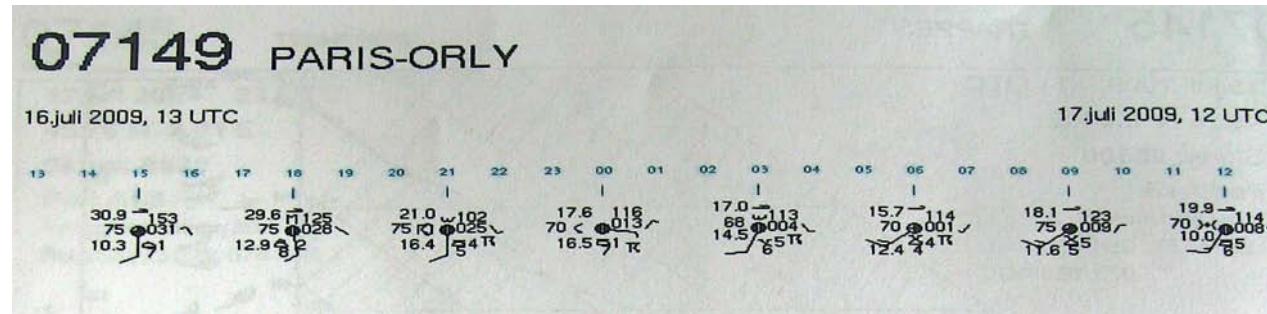
4. Data selection

17 July 2009

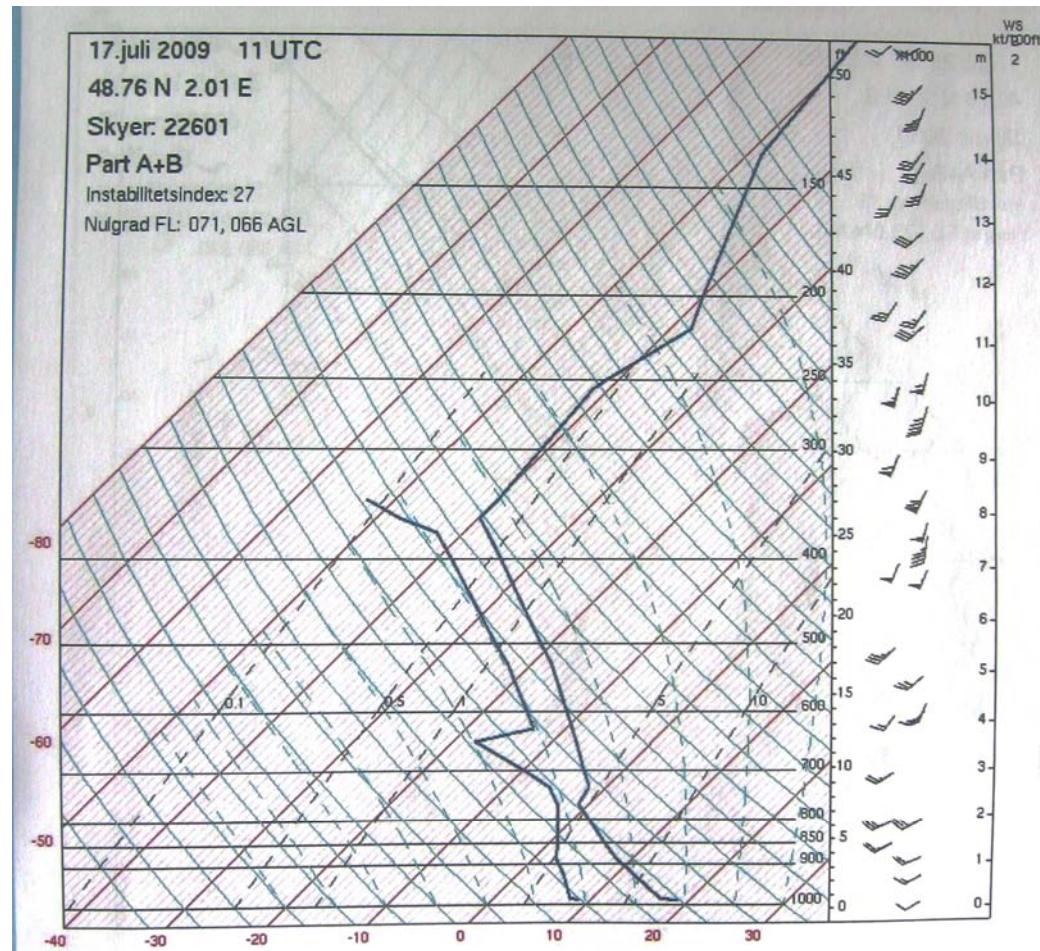


Meteo conditions	4 July 2009	17 July 2009
Humidity	low	growing during the day
Cloudness	present	present
Precipitation	yes	no
Wind direction	wind change rapidly	'steady-state' direction
Wind velocity	'medium'	'medium'

4.1 Meteorological situation, Paris – Orly (Atlas, 2009)



4.2. Meteorological situation, Paris – Orly (Atlas, 2009)



5. MODEL DOMAIN



Metropolitan area	Paris
Domain	P01
Horisonal resolution	2.5 x 2.5 km
grid points in domain	80 x 120

6. MODEL RUN AND PROBLEMS

For starting model you need:

Linux OS

More than 50 Gb of HDD

More than 1.5 Gb RAM memory

More than 1.8 MHz of CPU

So we used :

Windows with virtual machine VirBox with Mandriva

4 Gb RAM memory

50 Gb of HDD

1.66 MHz of CPU

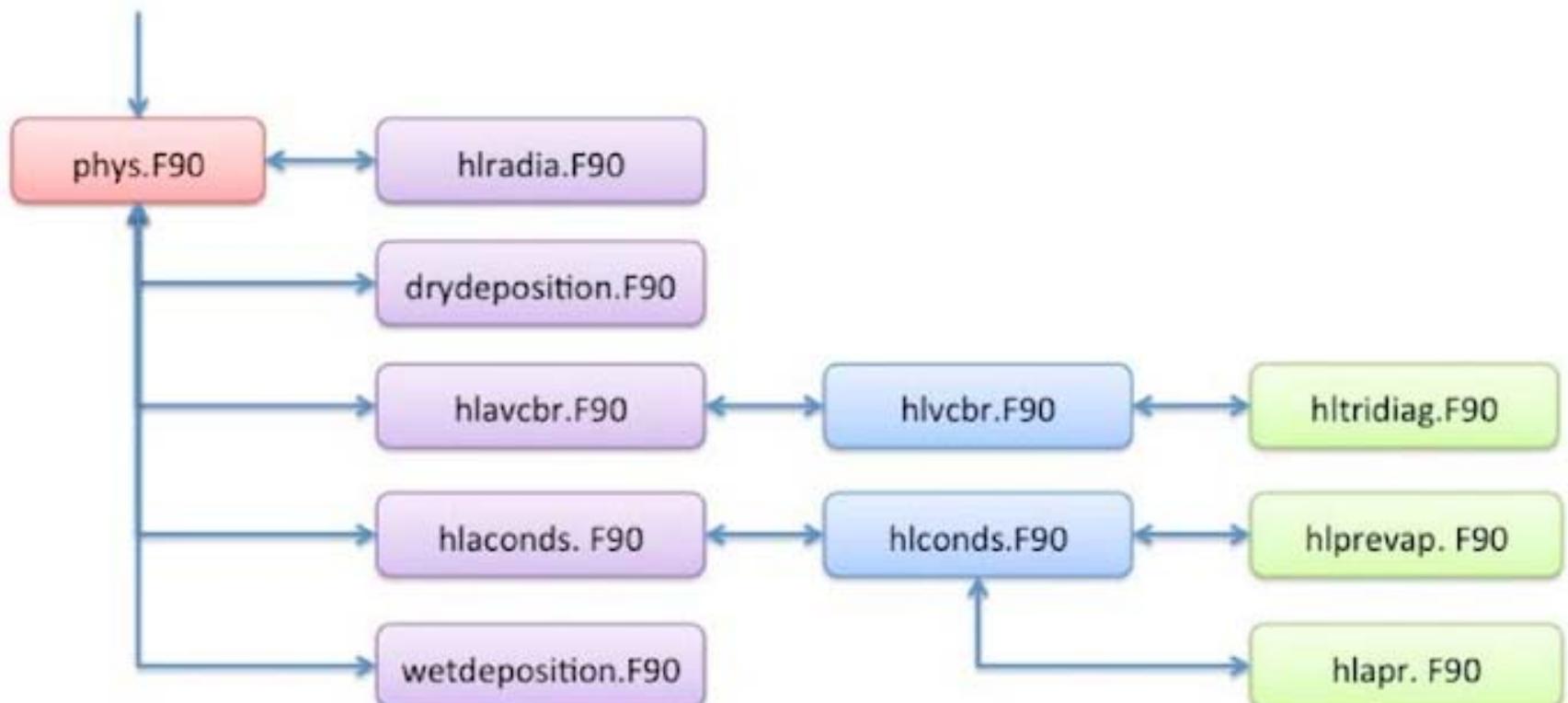
Run time calculating forecast for 24 hours has been 30 hours

7. Modes of run

- First run: Control (reference) run without any aerosol emission
- Second run: Aerosol feedback included – emission file

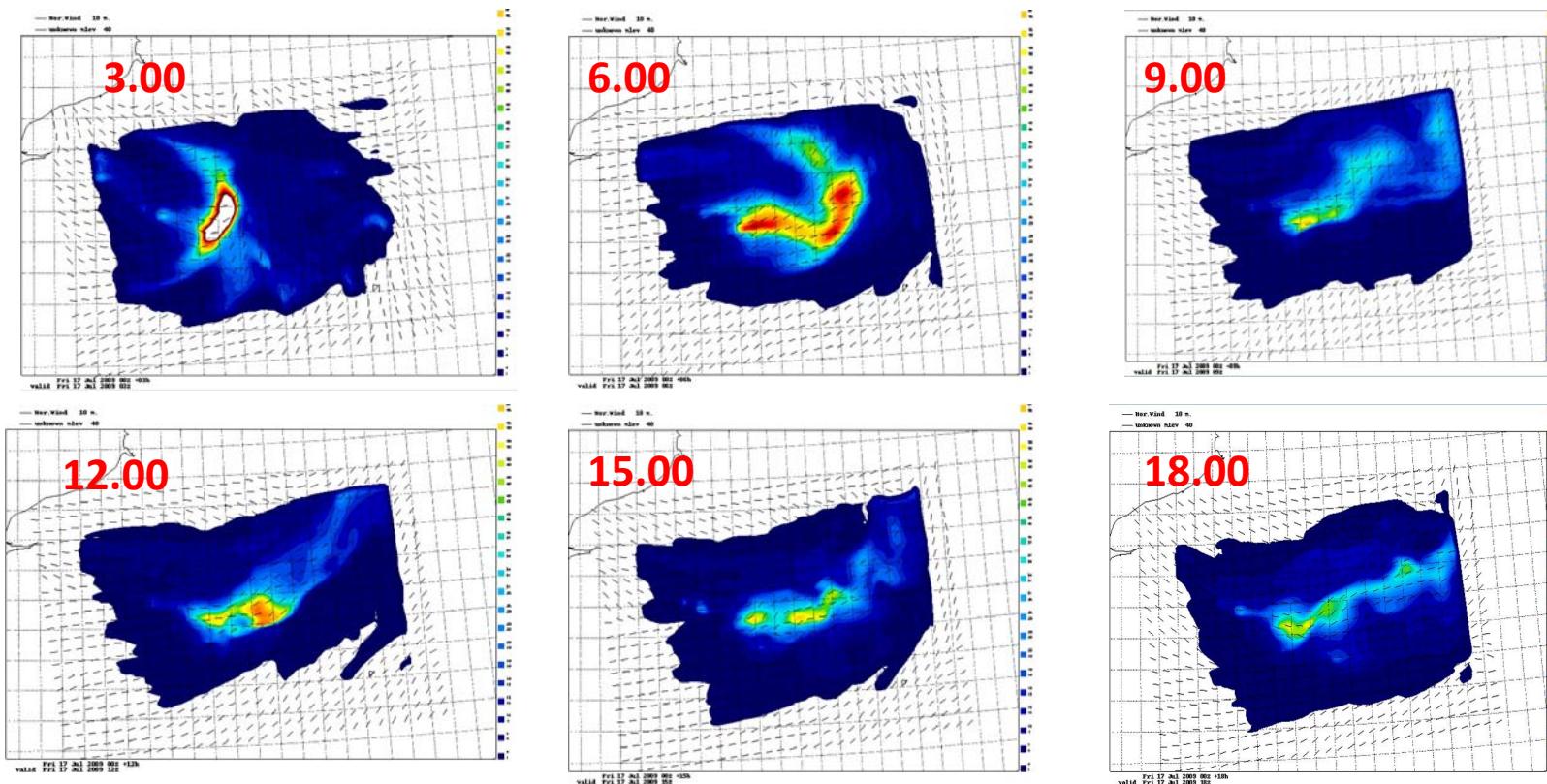
7.1. Modifications – Inclusion of the aerosol effect:

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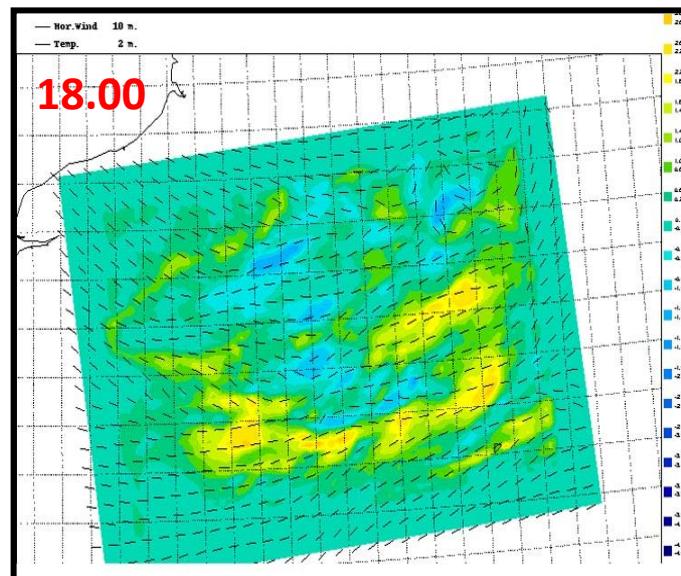
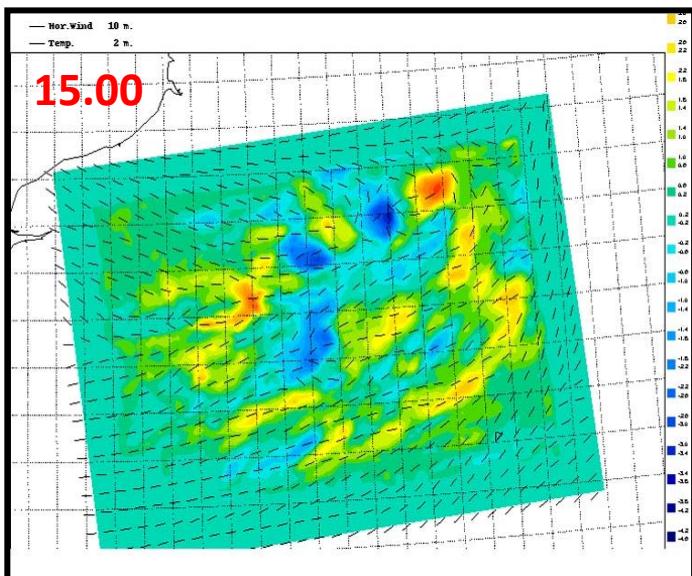
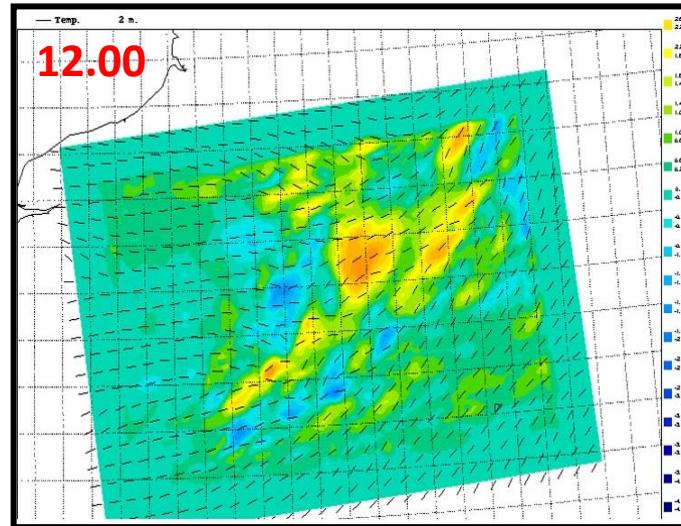
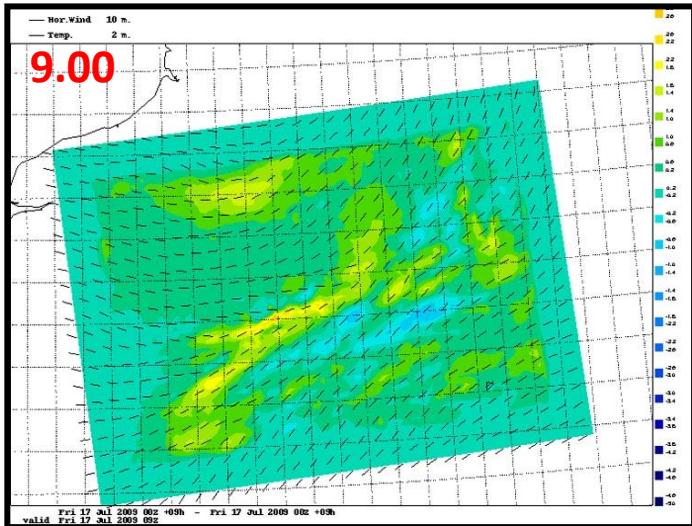


8. EVALUATION OF RESULTS

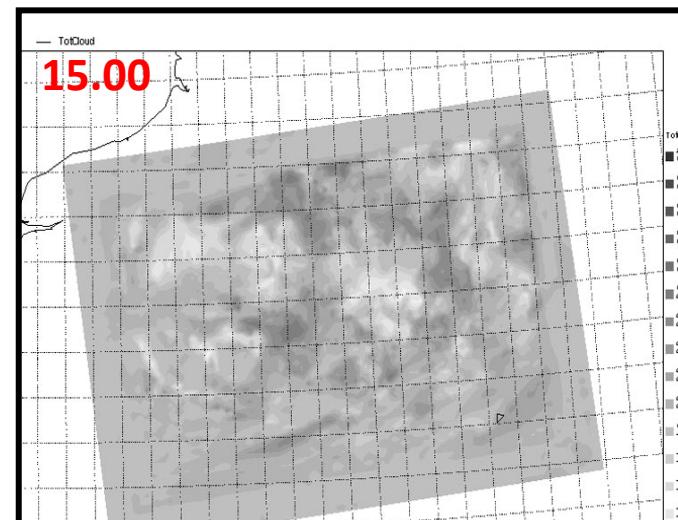
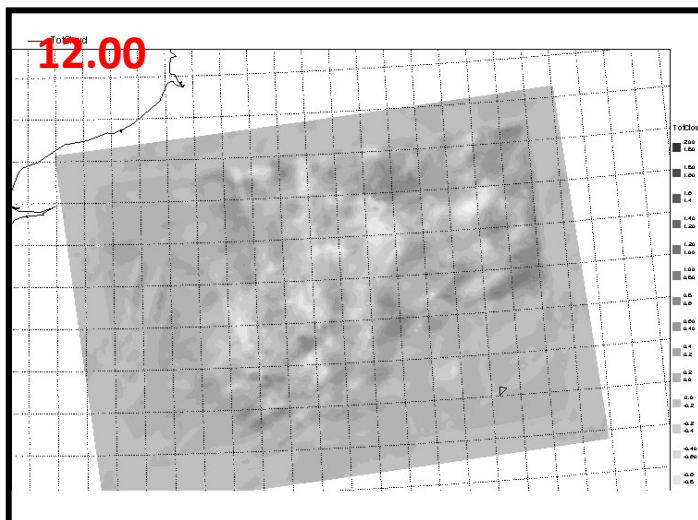
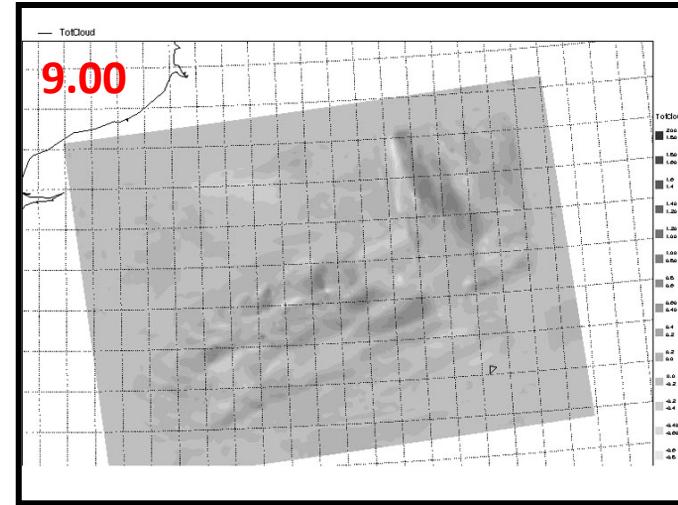
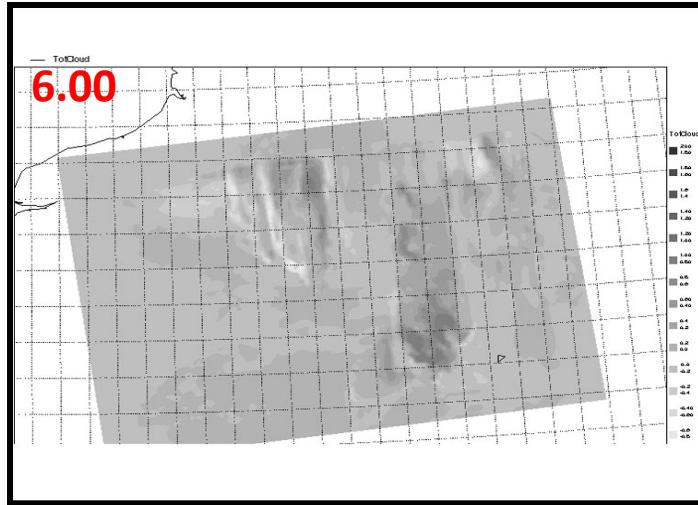
8.1. Concentration of SO₄ ($\mu\text{g}/\text{m}^3$) and wind direction (m/s)



8.2. Temperature difference at 2m and wind direction at 10m (m/s)

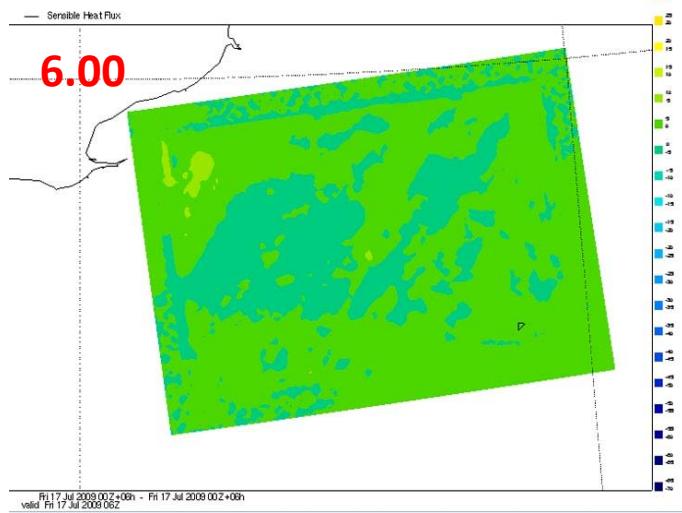


8.3. Total cloud cover (difference)

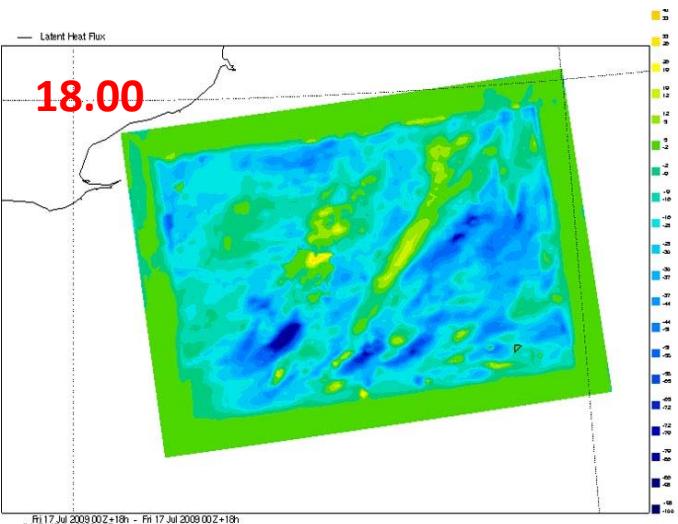
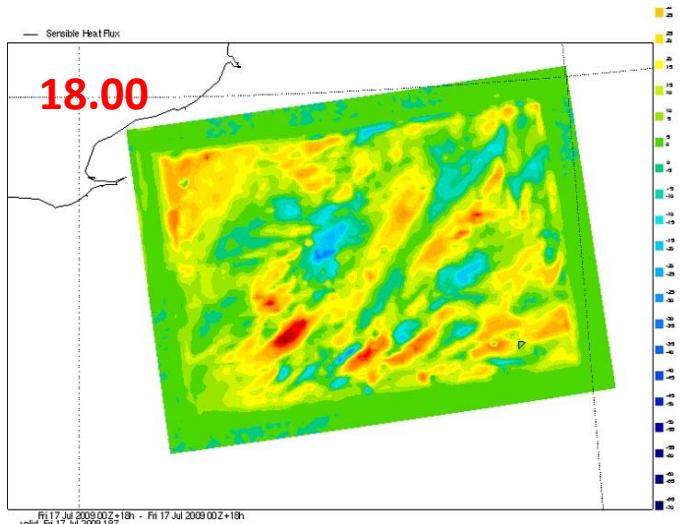
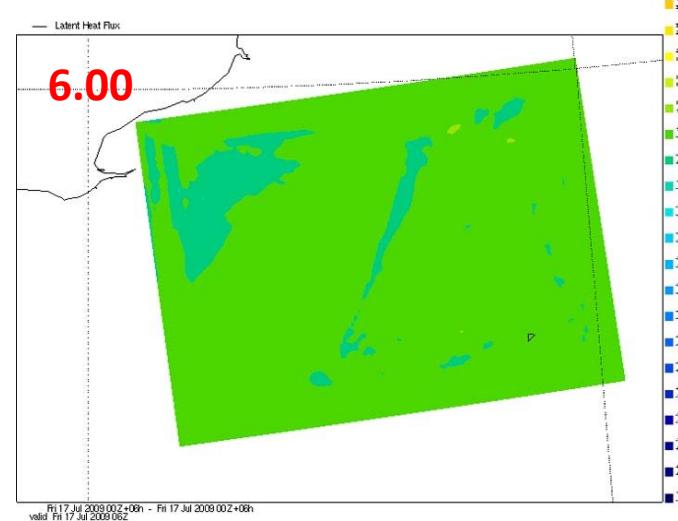


8.4. Latent and Sensible heat flux (difference)

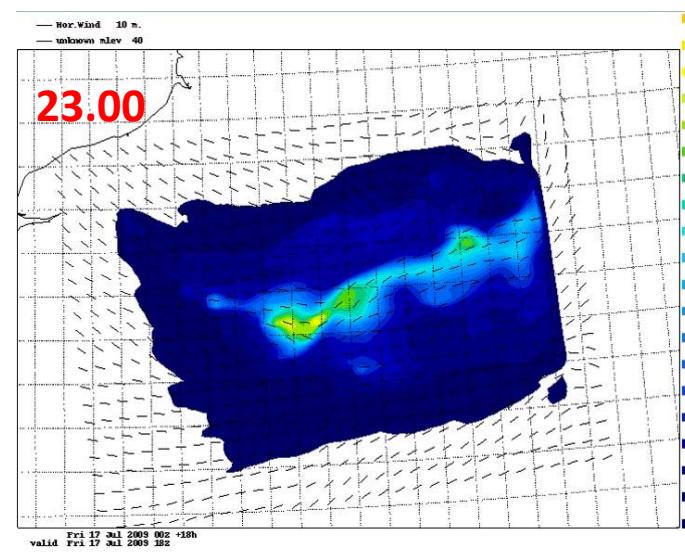
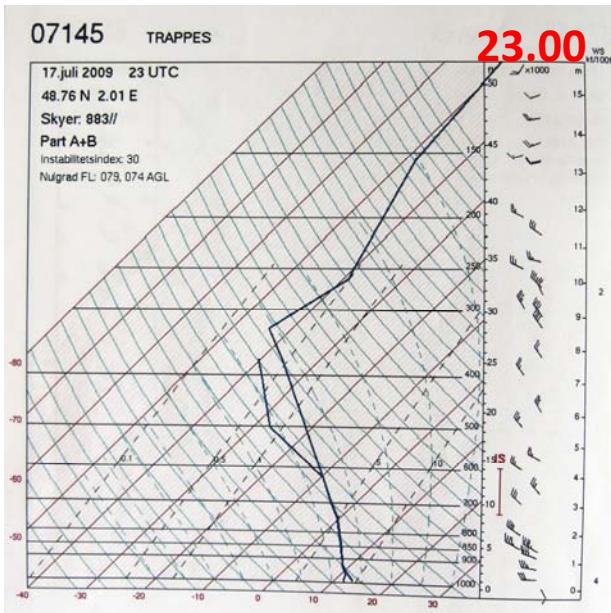
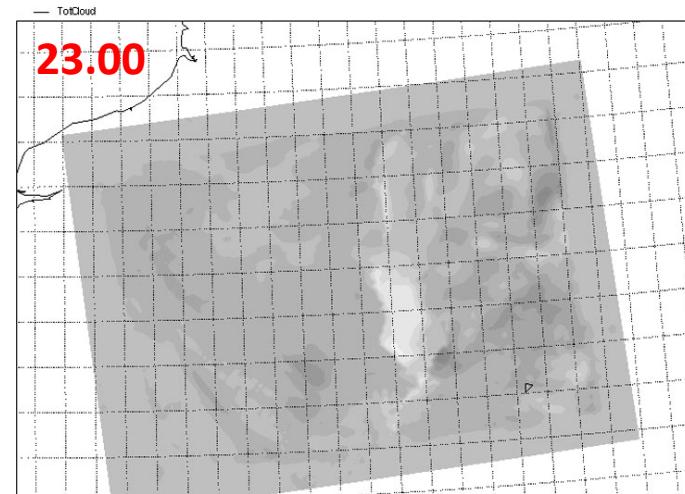
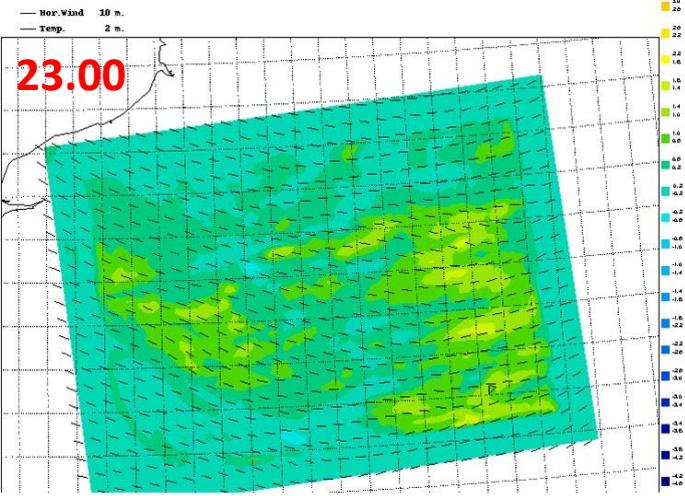
Latent flux



Sensible heat flux



The end of the aerosols effect



Thank you very much to sponsors, organizers,
lecturers, teachers, assistants and participants!

