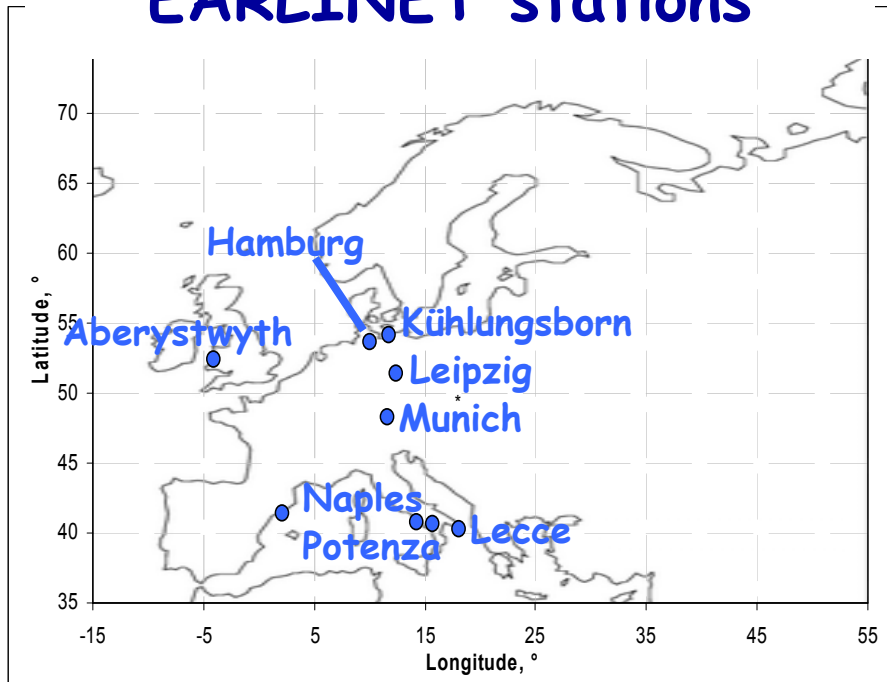


Modeled vertical aerosol  
distribution  
A comparison to EARLINET  
and ARM network

AeroCom meeting, Giss New York, 1-3 December 2004

# Lidar measurements

## EARLINET stations



## ARM program

South Great Plains \*



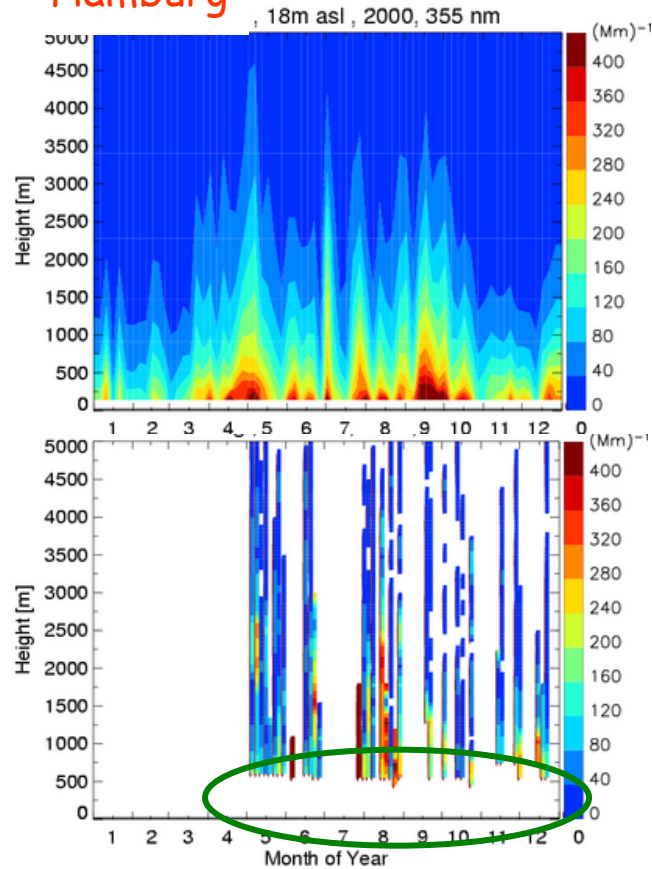
- Use of measurements for 2000 and 2001
- Measurements :  
each day (except specific months)  
each 10 minutes
- Measurements of :  
extinction coefficient, scattering ratio,  
backscatter coefficient, optical depth  
relative humidity, cloud detection

- Use of measurements for 2000 and 2001
- Measurements twice a week :  
Monday and Thursday
- Measurements at sunset
- Raman lidar : extinction coefficient  
without hypothesis on lidar ratio

# Annual evolution

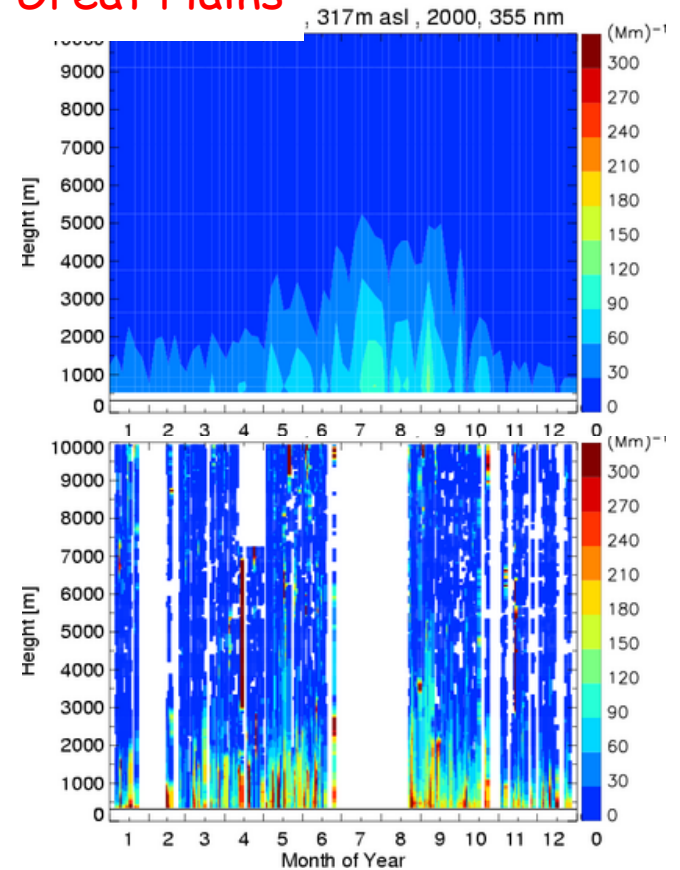
EARLINET

Hamburg



DOE ARM

South Great Plains



INCA  
2000

data  
2000

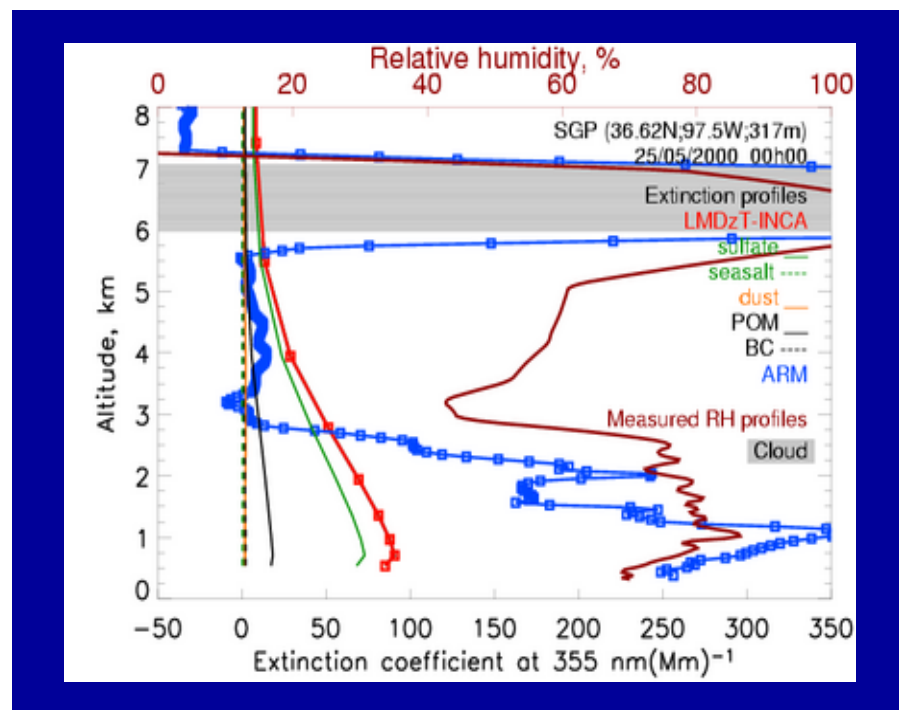
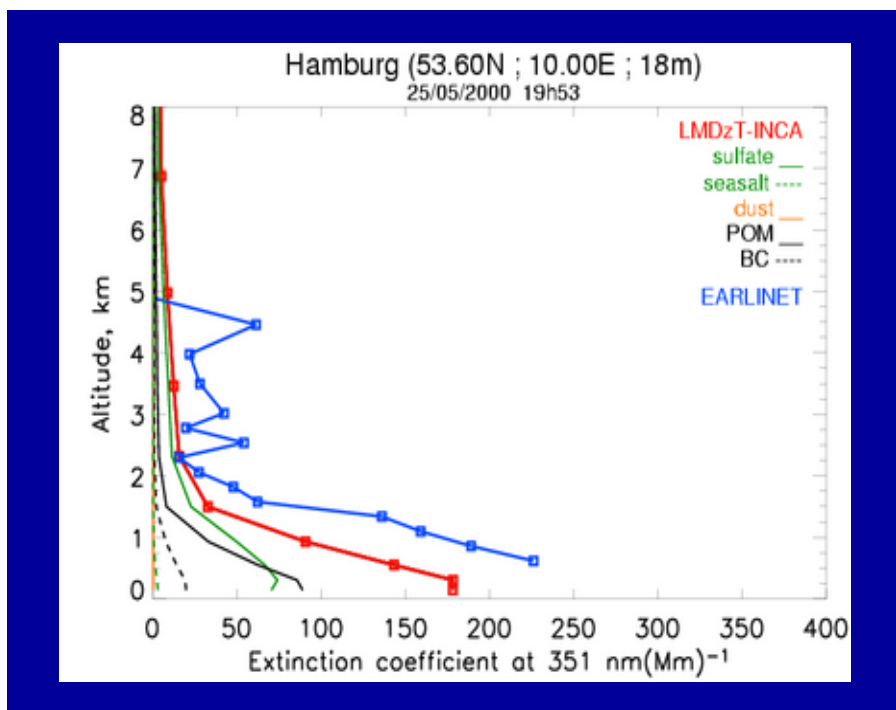
No data at low altitudes  
⇒ difficulty to measure  
below a certain height

# Individual profiles

INCA  
2000

Hamburg

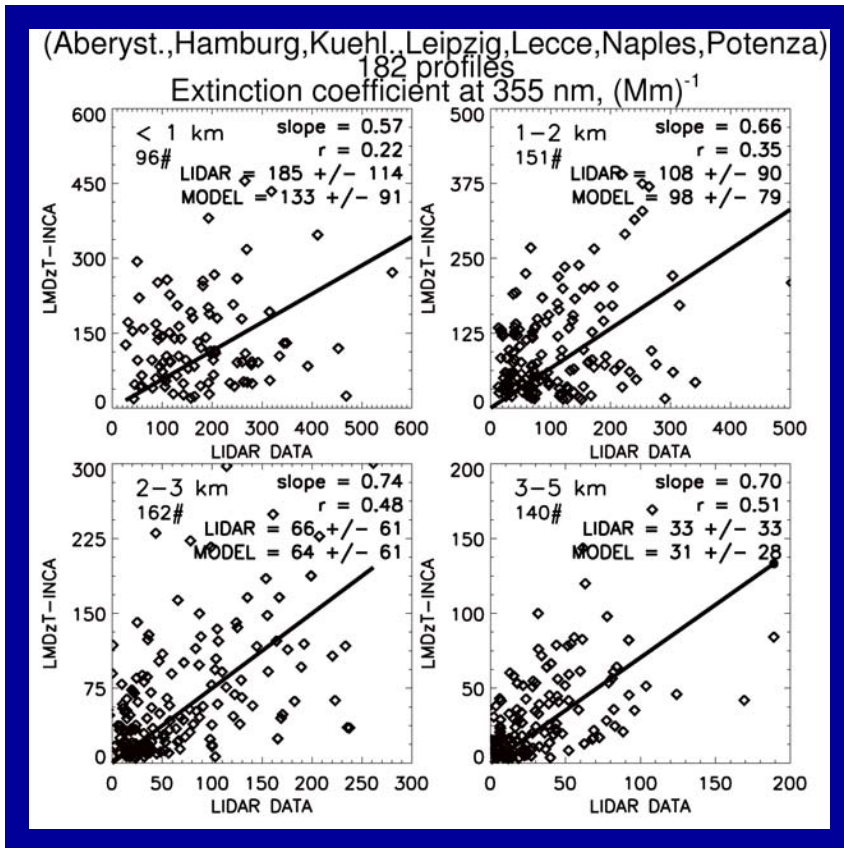
South Great Plains



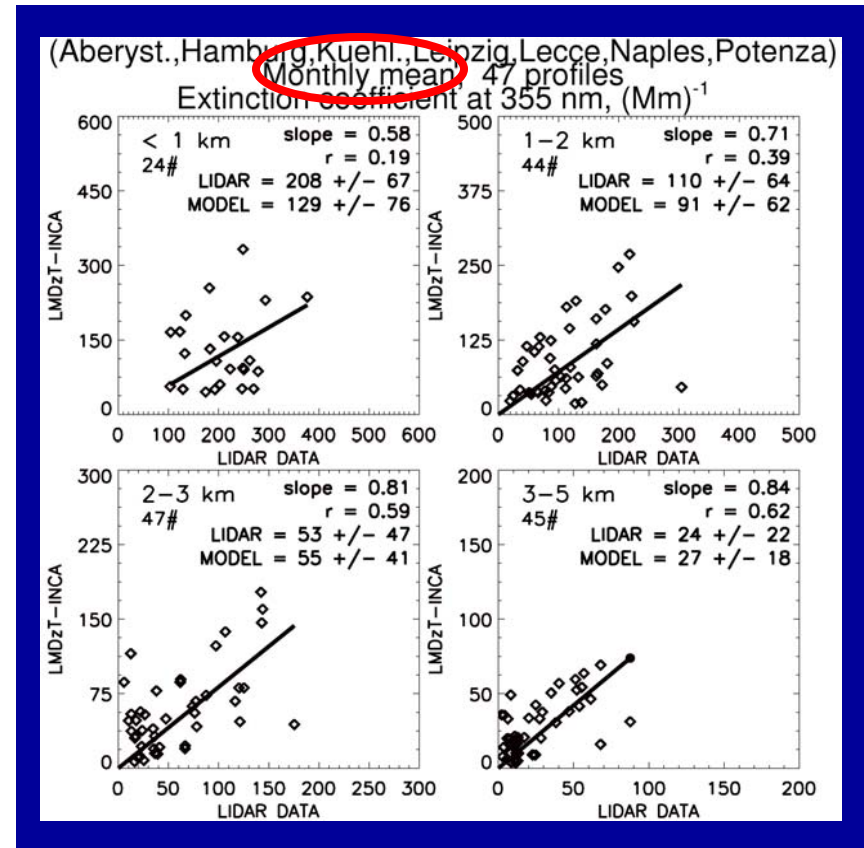
Underestimation by INCA in the PBL

# Individual profiles

Use of all EARLINET and INCA individual profiles in 2000  
 Separation in 4 altitude layers : < 1 km ; 1-2 km ; 2-3 km ; 3-5 km



Low correlation coefficient,  
 especially below 2 km

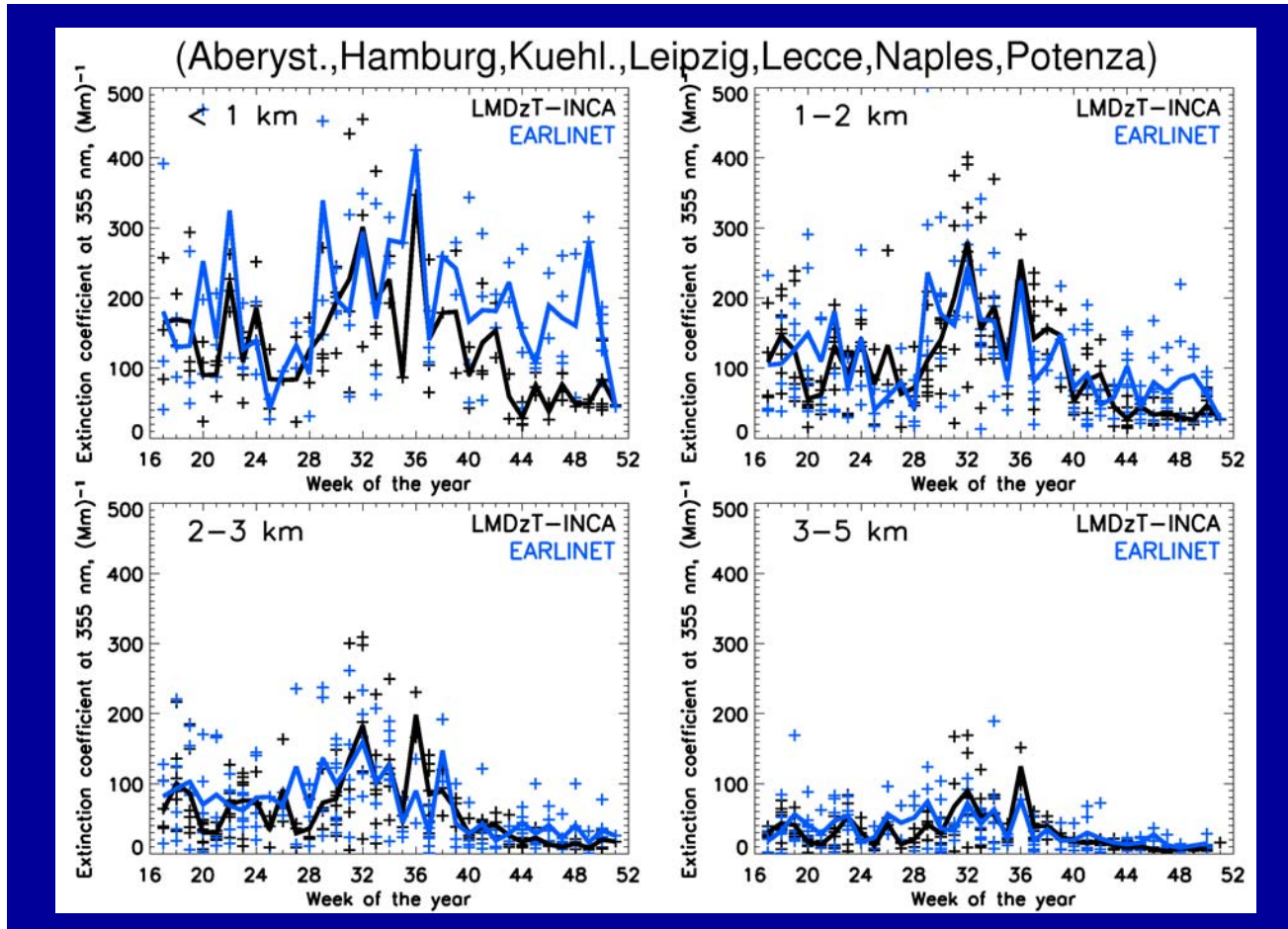


Average in time :  
 => improve the comparison

# Temporal and spatial average

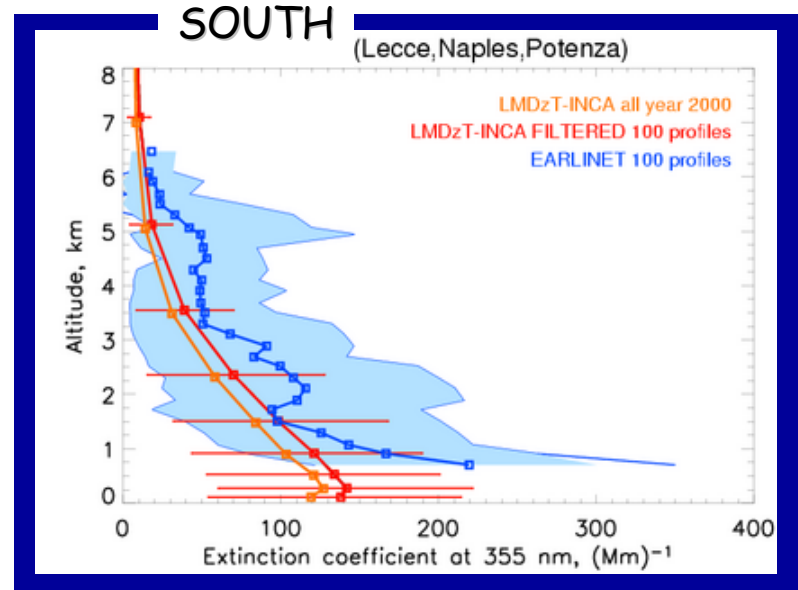
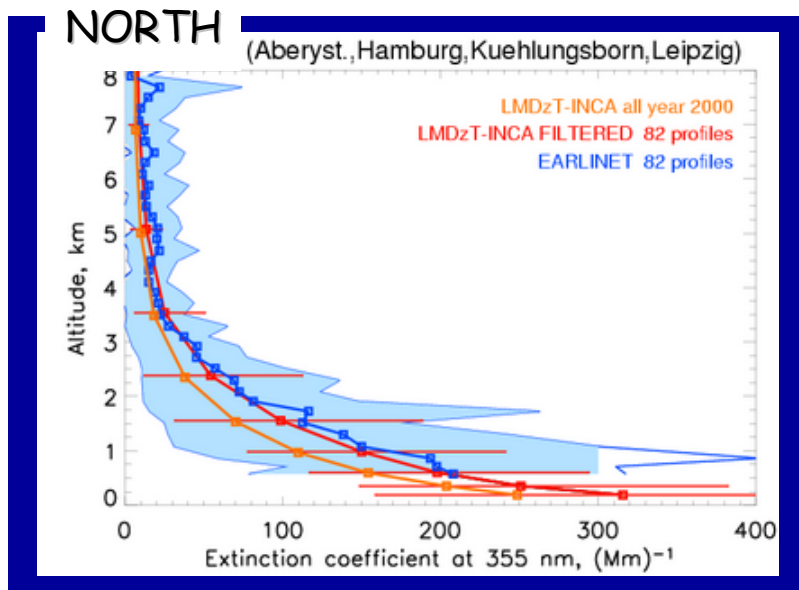
## Mean of seven stations weekly profiles

2000





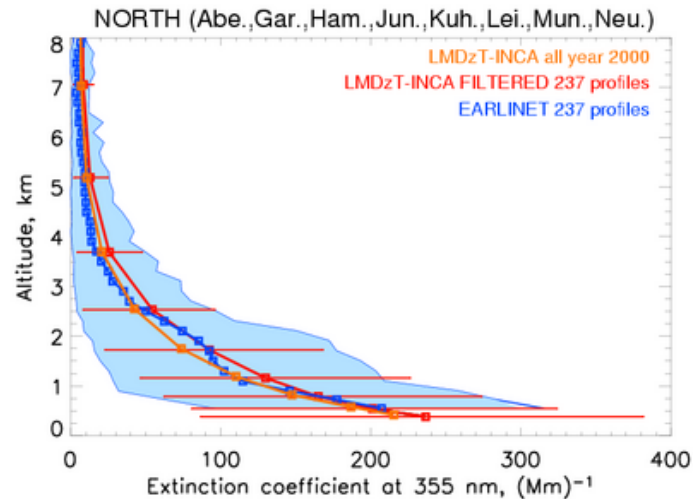
# Mean annual profiles



Good agreement between model and measurements in both regions

Difference between filtered and not filtered modeled profiles due to averaging period : annual cycle of aerosol => higher extinction values at altitudes during summer

2001



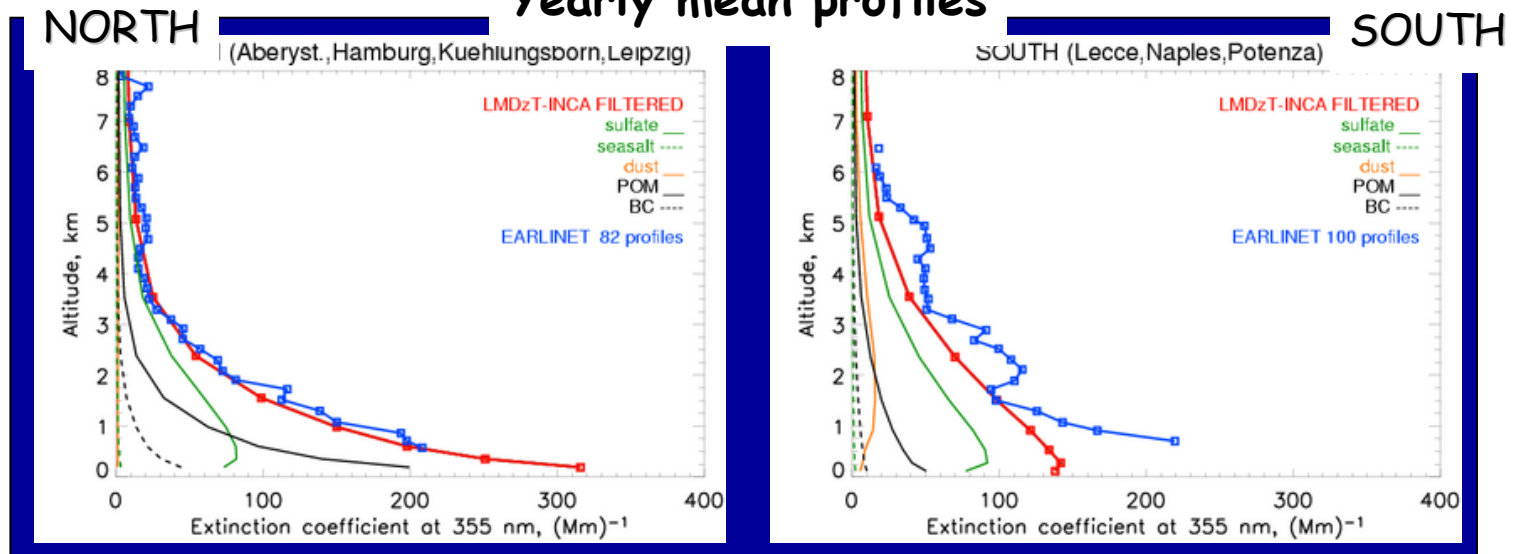
2000

# Contribution of the different aerosol species

INCA

EARLINET

## Yearly mean profiles



### North :

sulfate dominant above 1km  
POM dominant in PBL

### South :

sulfate dominant  
DUST important above 1km  
⇒ Larger extinction coefficient at higher altitude  
POM less important : in agreement with used European emissions



# AeroCom : EC@355nm profiles

$$OD_i = Mass_i + err_{Mass} * MEC_i + err_{MEC}$$

f(RH)

Load  
profiles

RH  
profiles

MEC  
profiles

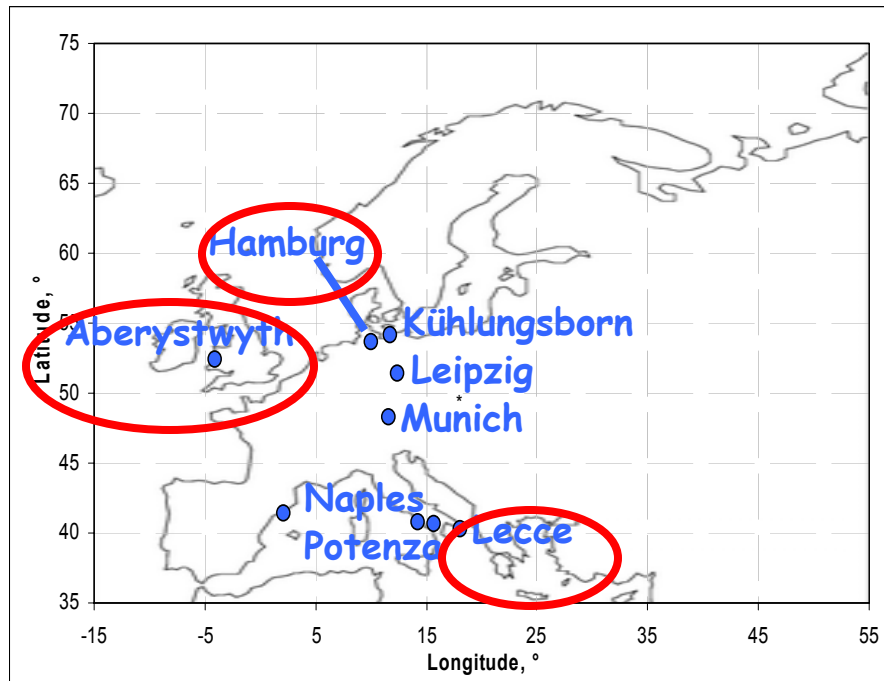
EC  
profiles

At different sites / For different models

Use of yearly mean profiles

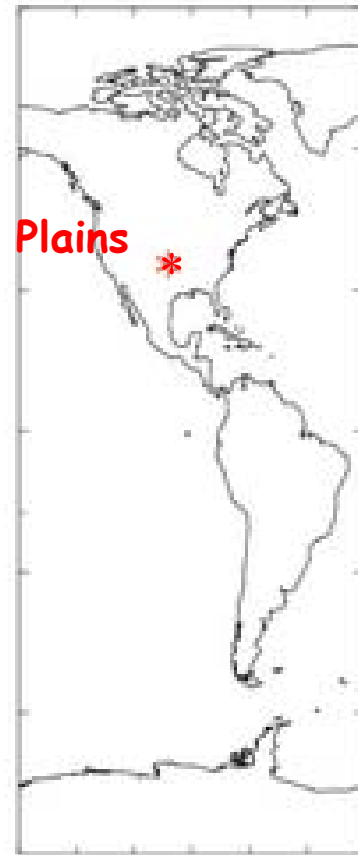
# Stations considered

## EARLINET stations

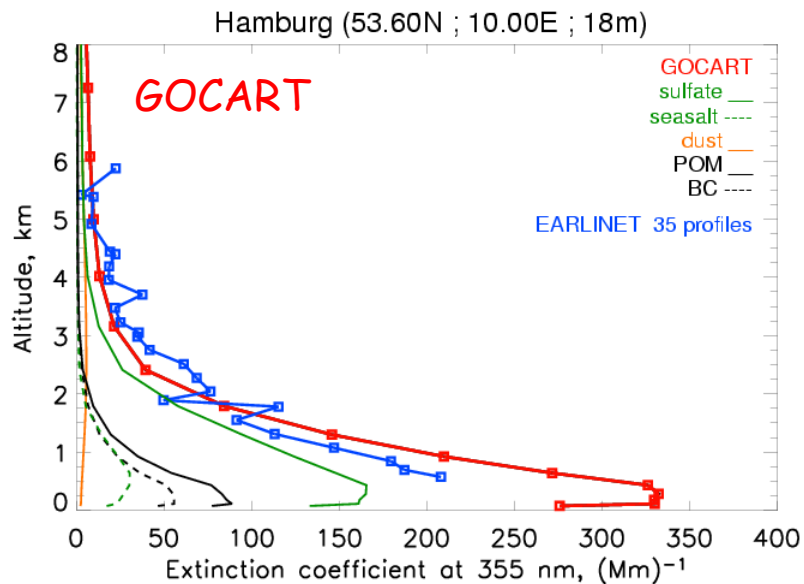


## ARM program

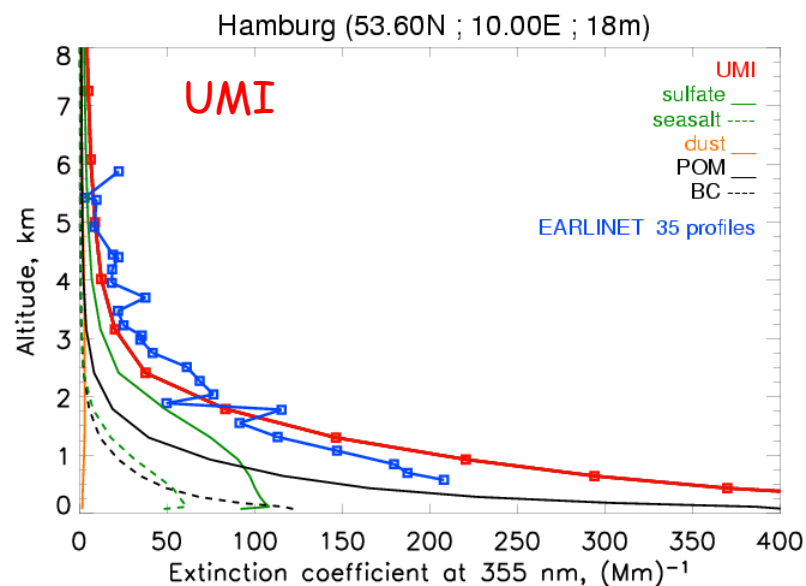
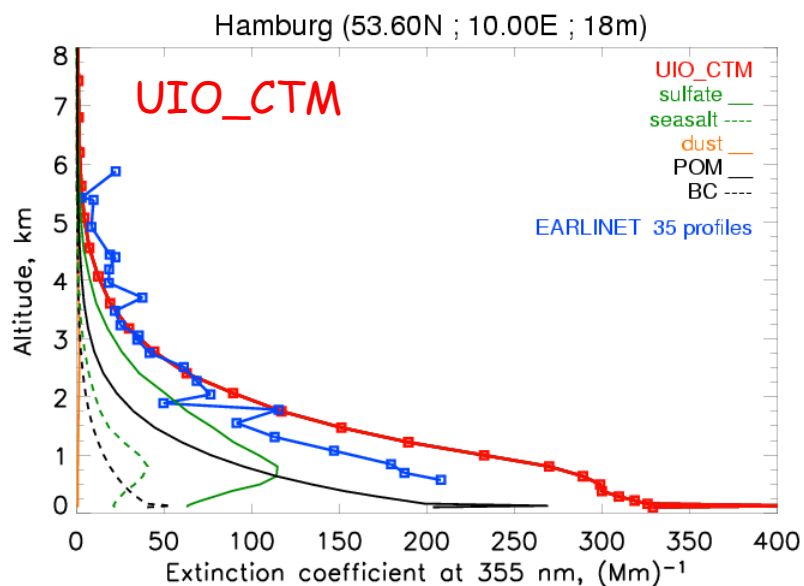
South Great Plains \*



# EC@355nm profiles at Hamburg

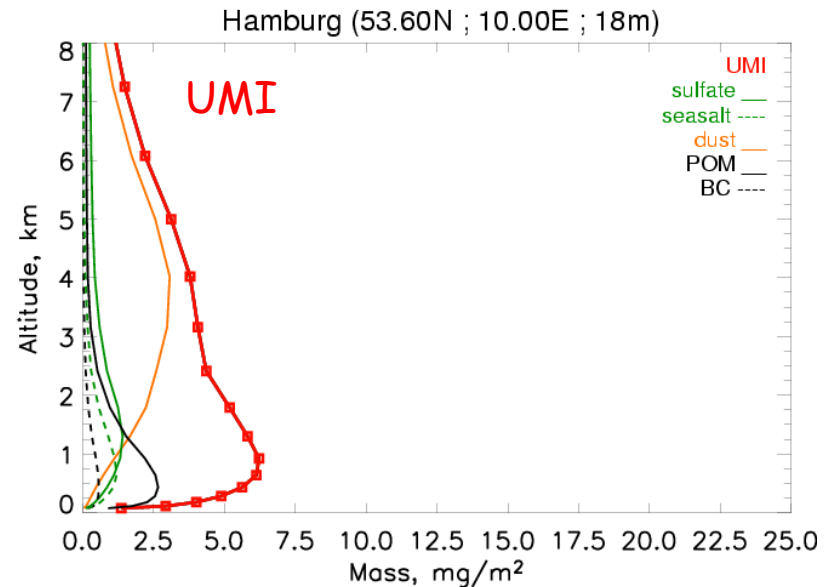
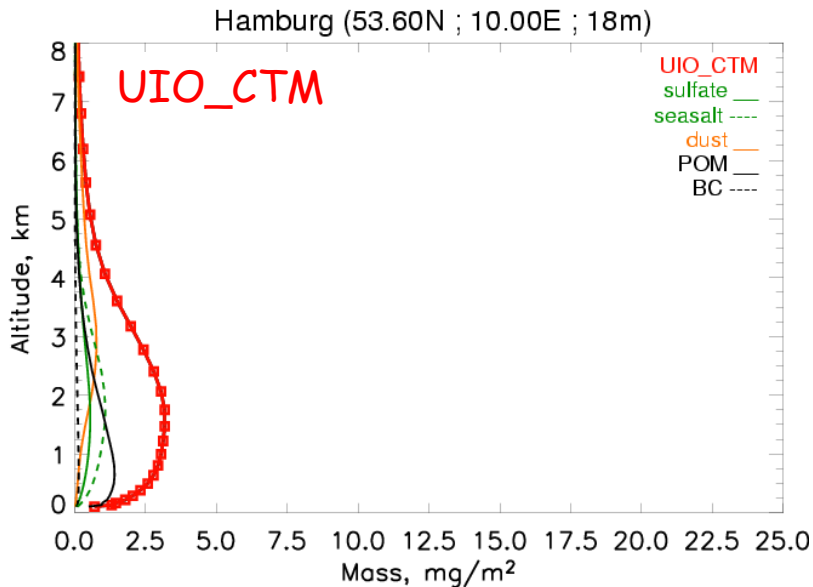
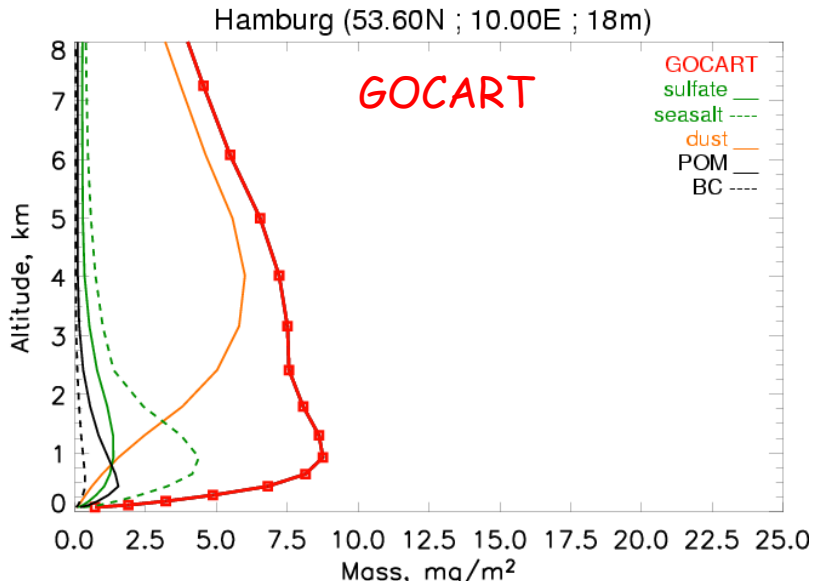


Yearly mean profiles  
for 2000



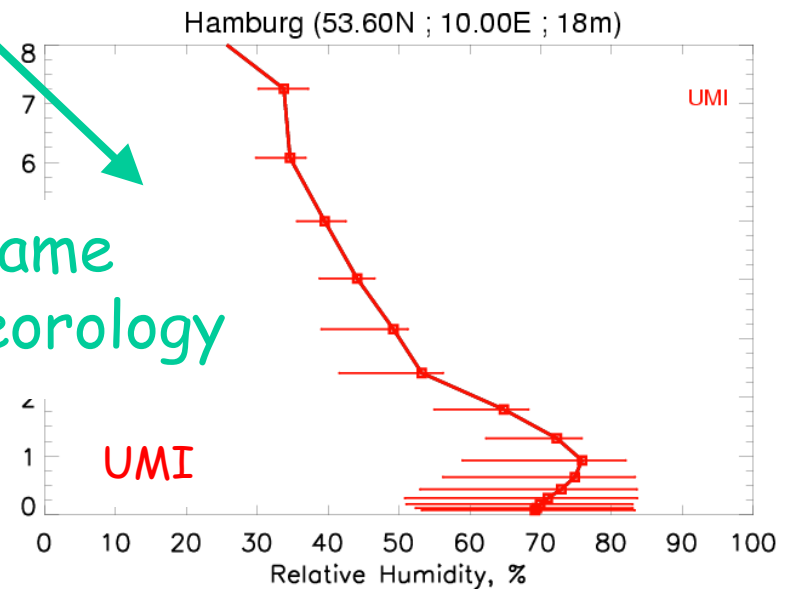
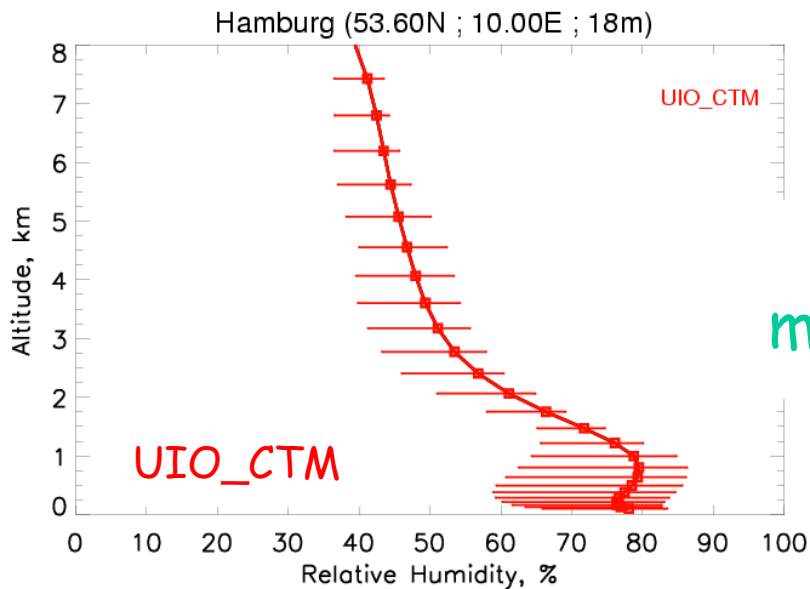
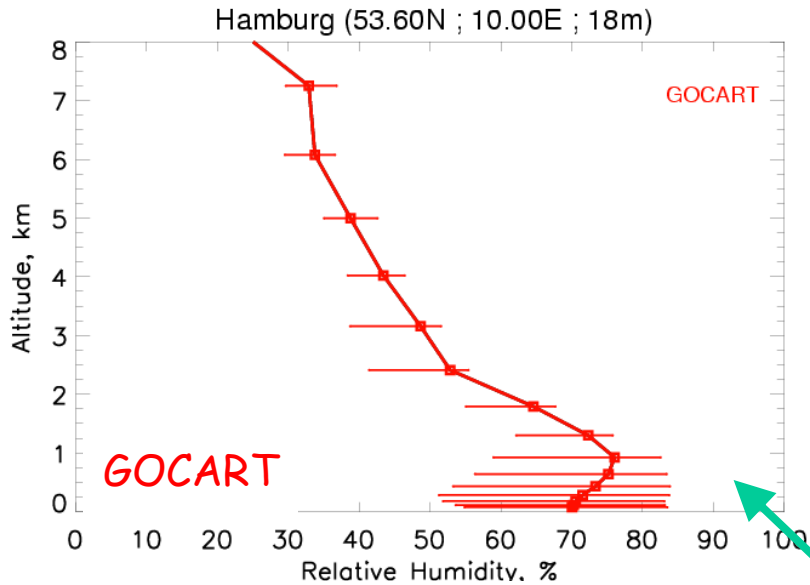
# Load profiles at Hamburg

Yearly mean profiles  
for 2000



# RH profiles at Hamburg

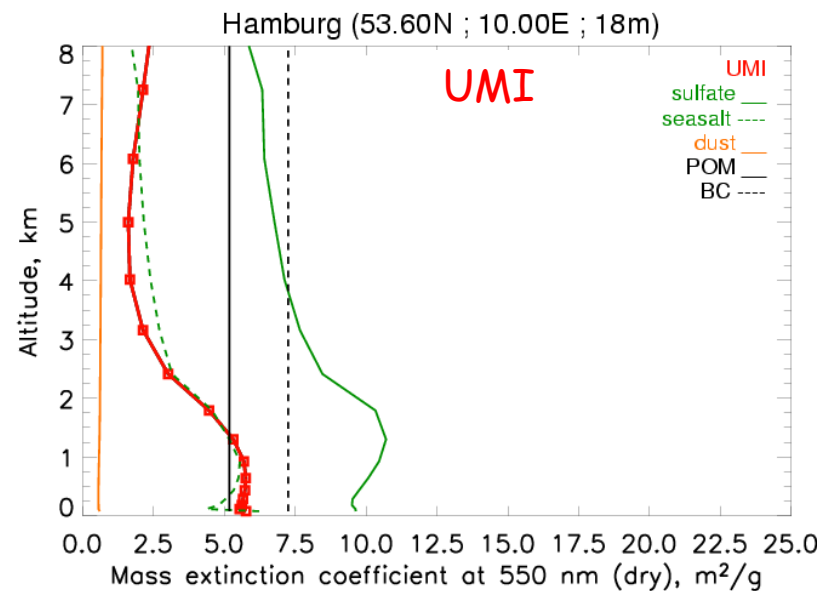
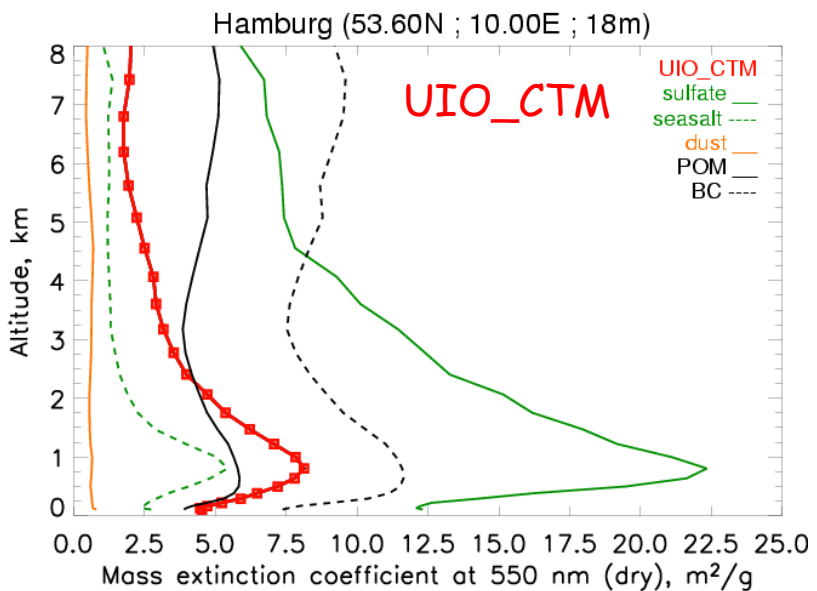
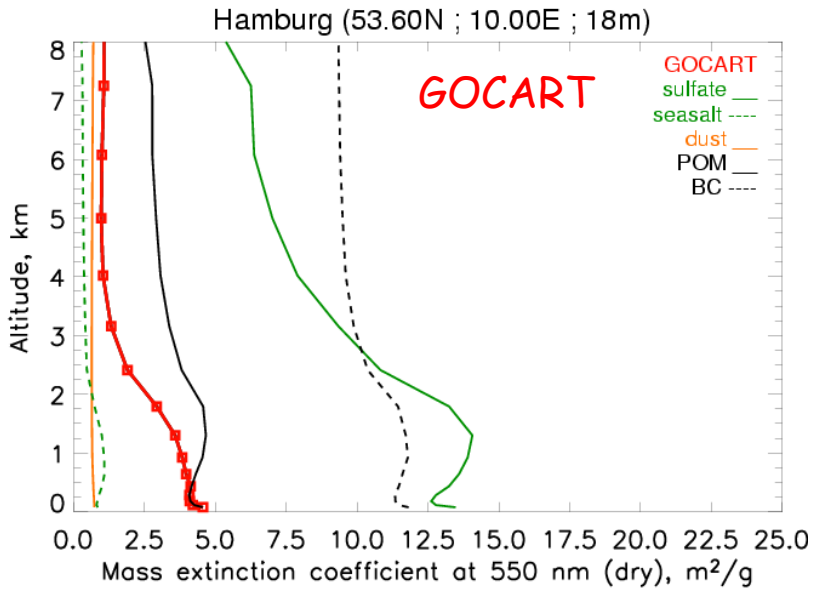
Yearly mean profiles  
for 2000



Same  
meteorology

# MEC profiles at Hamburg

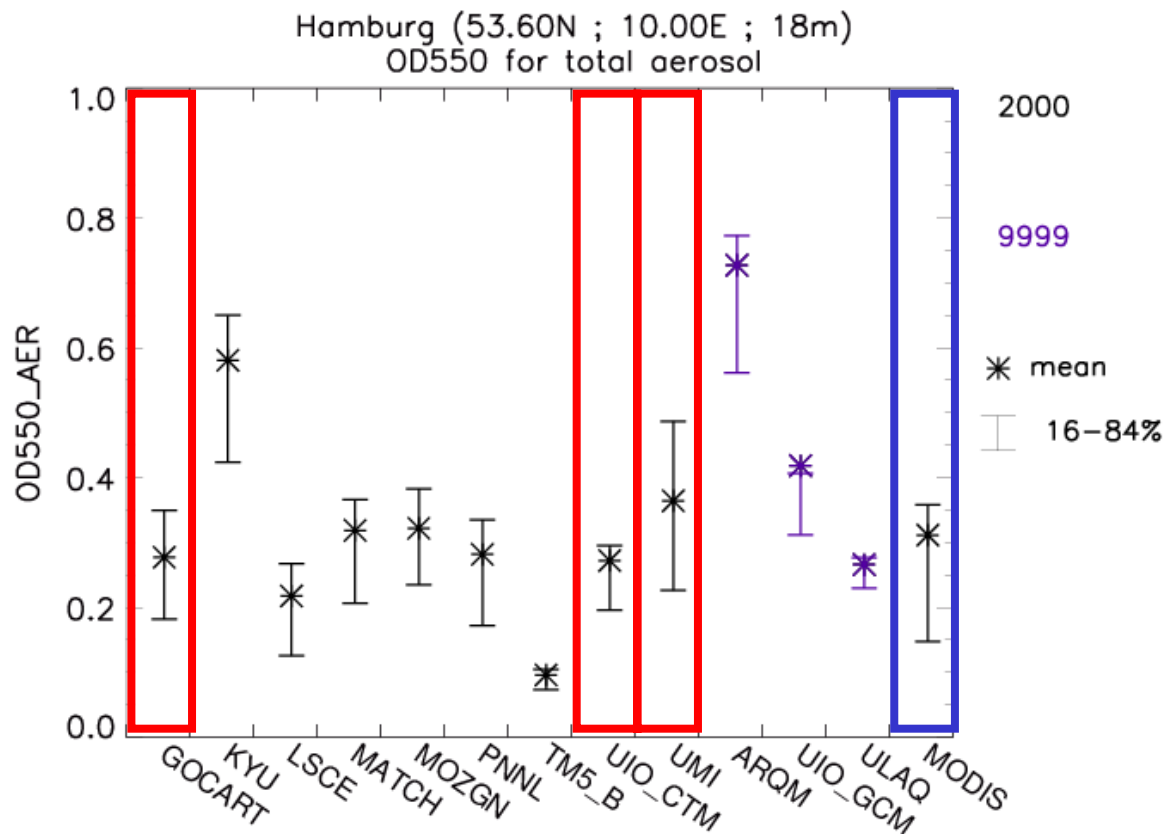
Yearly mean profiles  
for 2000



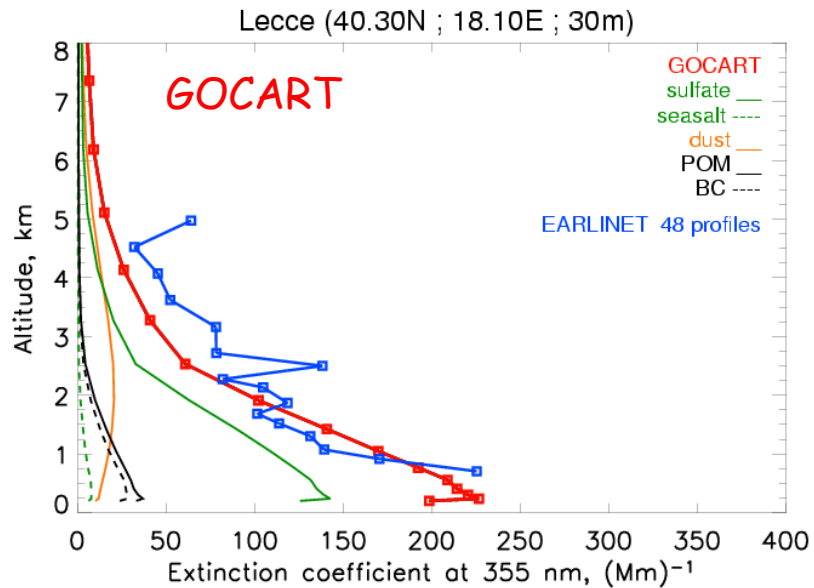


# OD@550nm Hamburg

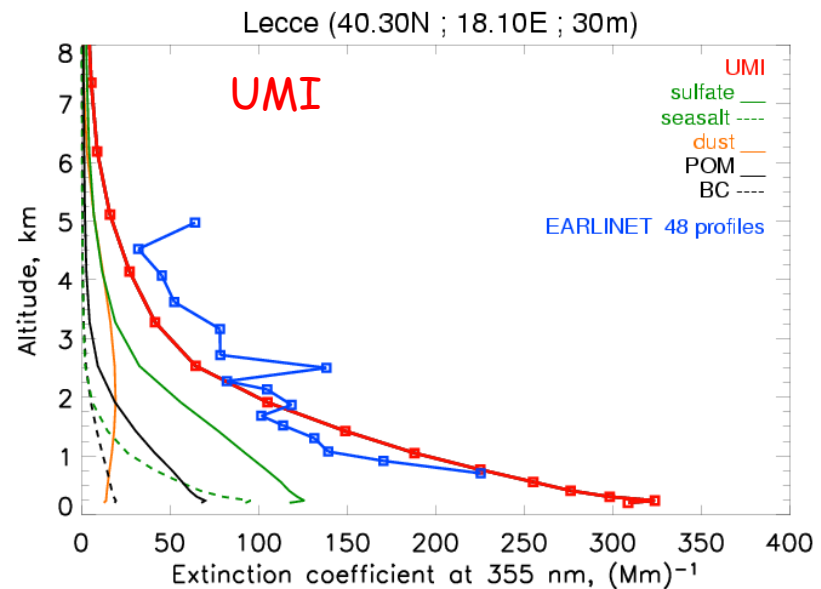
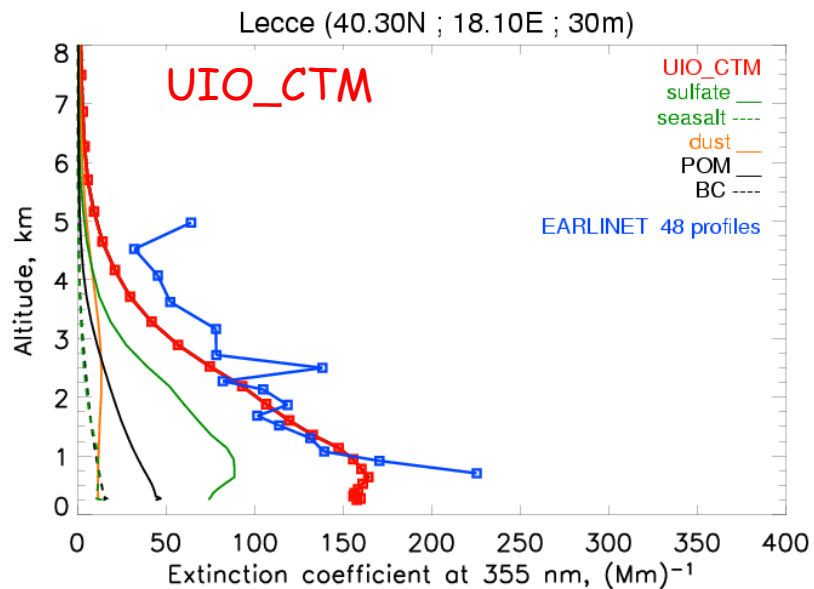
Yearly mean values



# EC@355nm profiles at Lecce

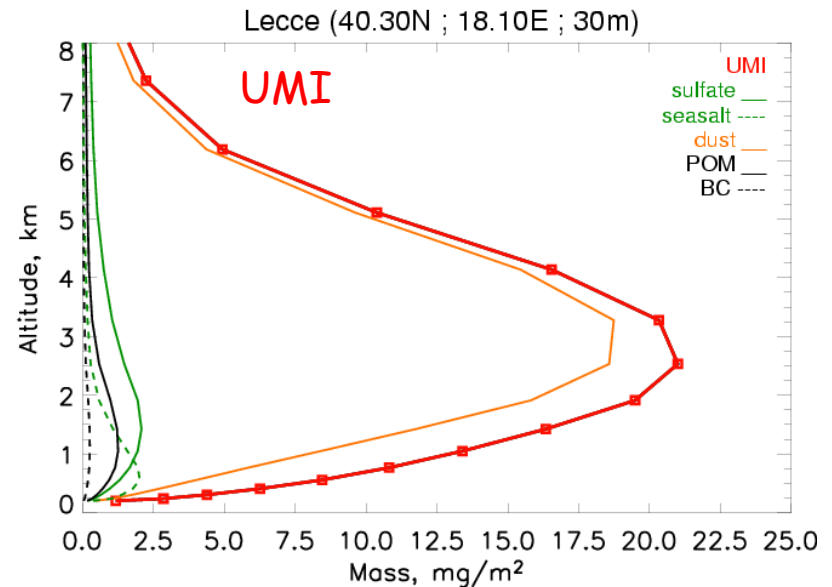
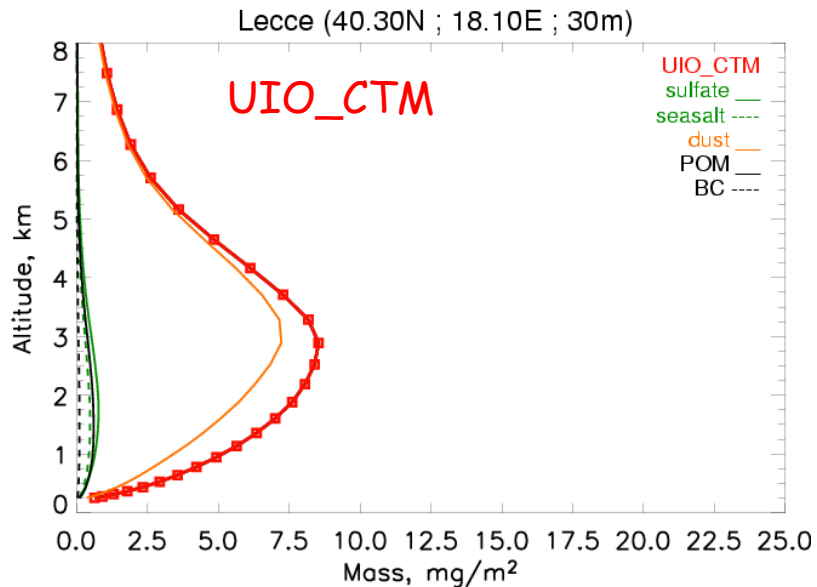
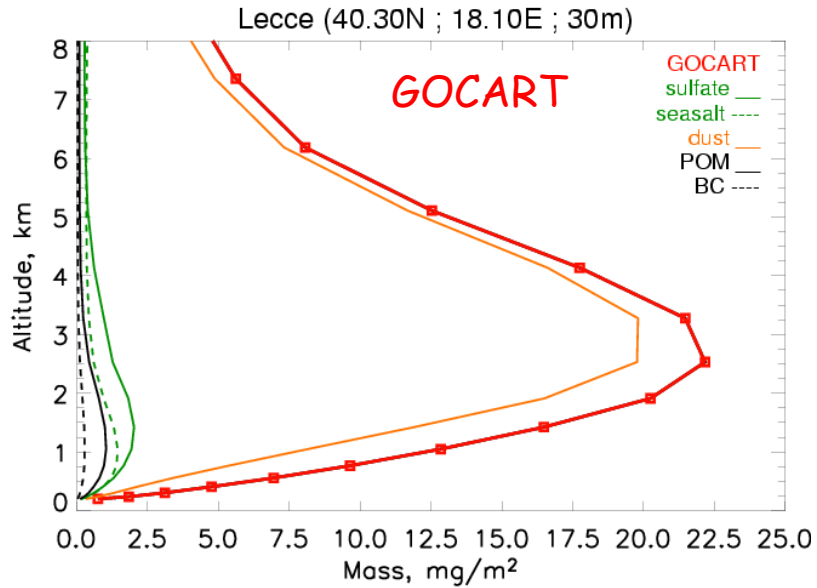


Yearly mean profiles  
for 2000



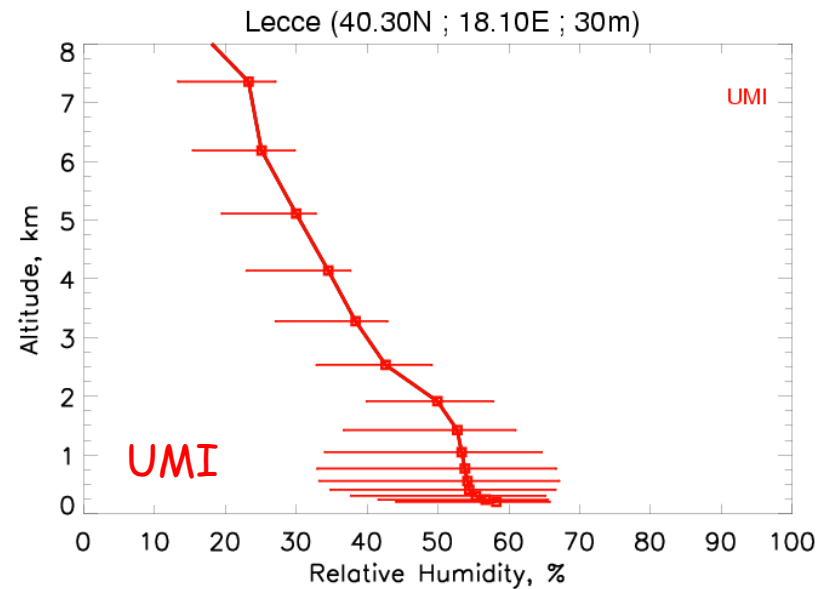
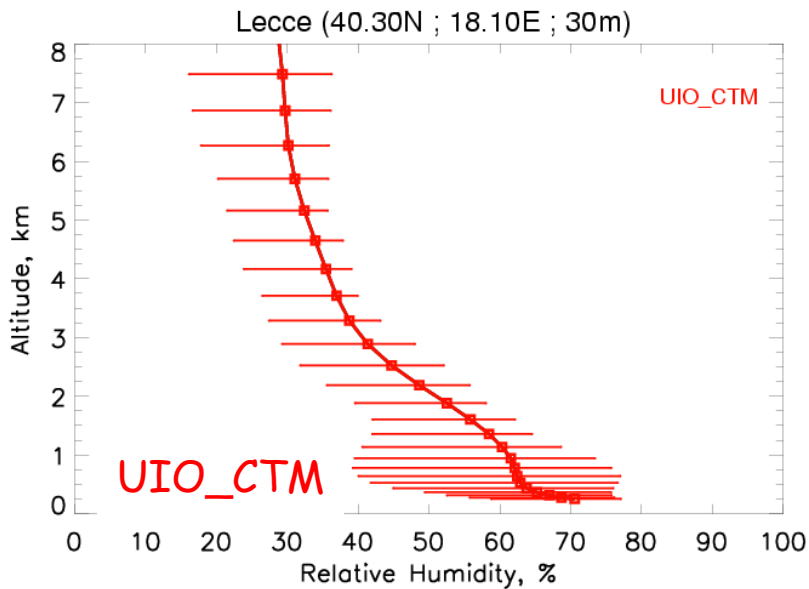
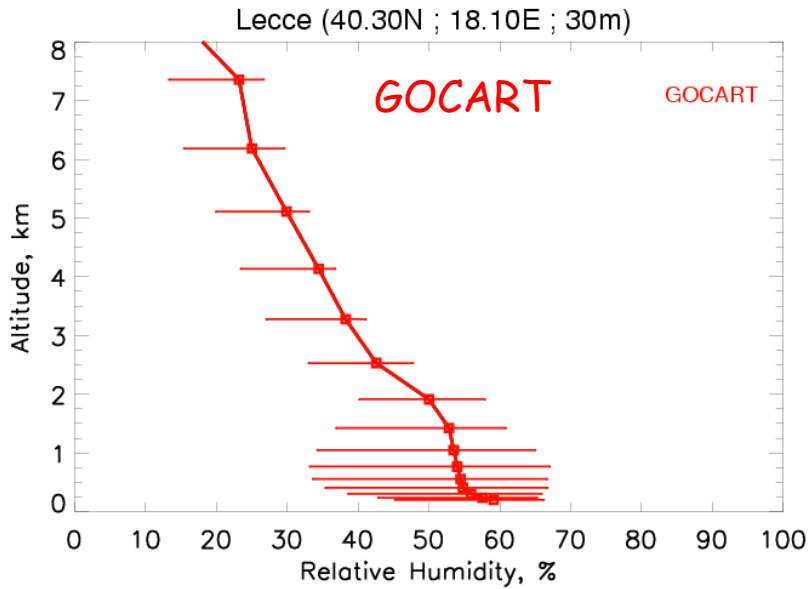
# Load profiles at Lecce

Yearly mean profiles  
for 2000



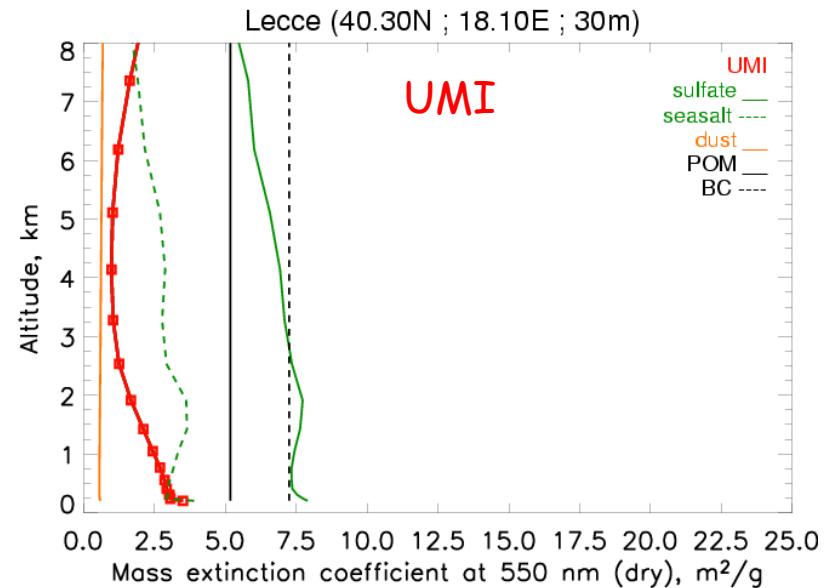
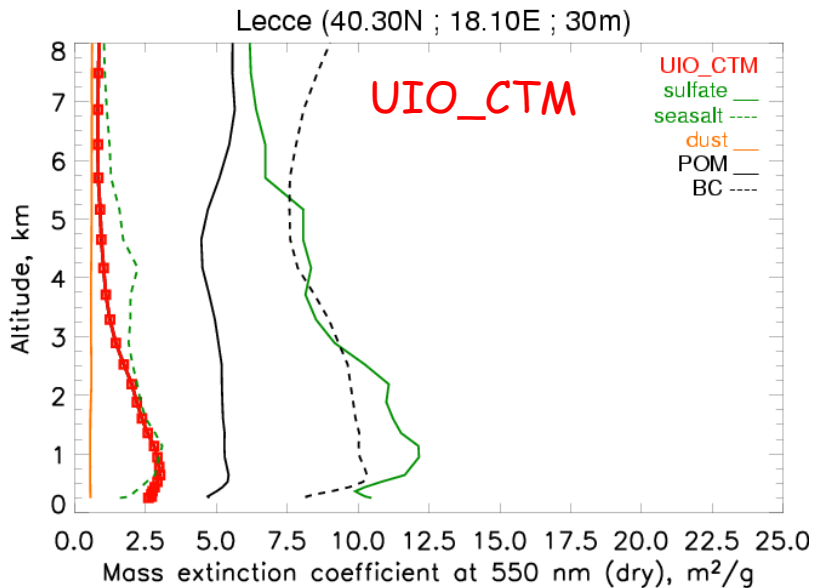
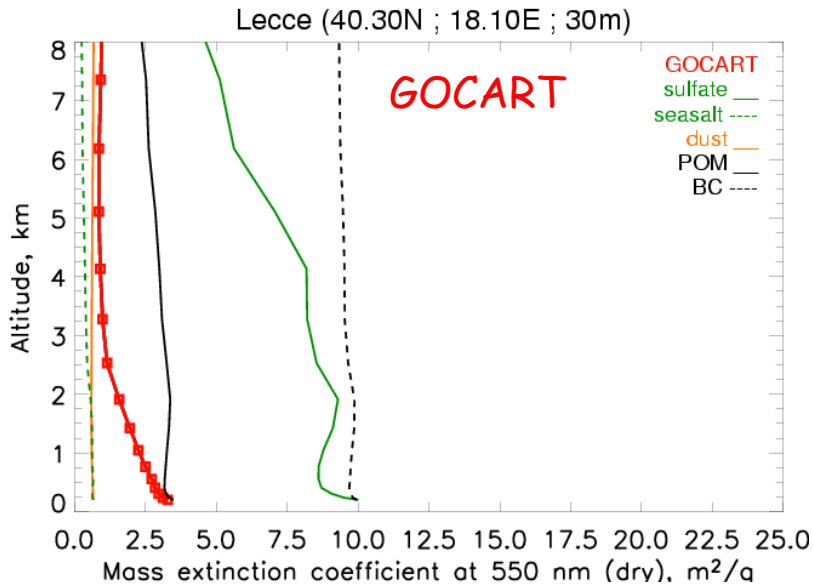
# RH profiles at Lecce

Yearly mean profiles  
for 2000



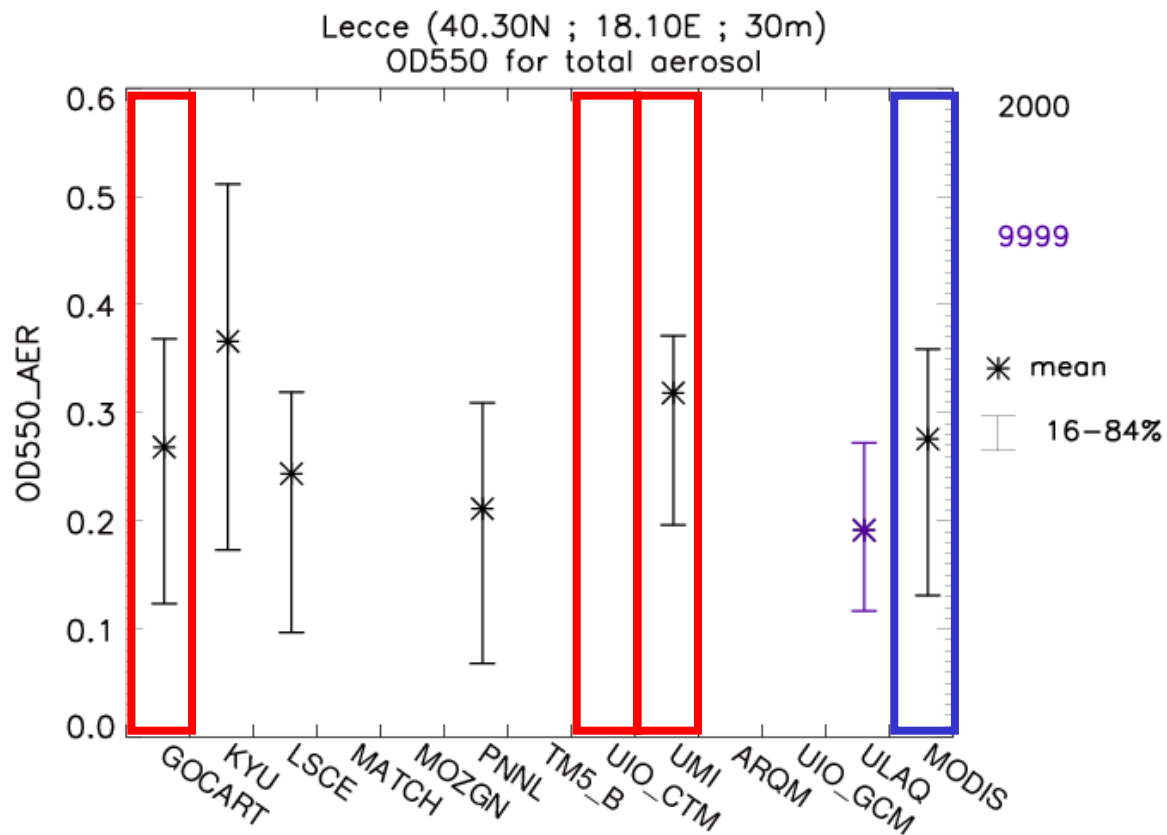
# MEC profiles at Lecce

Yearly mean profiles  
for 2000



# OD@550nm at Lecce

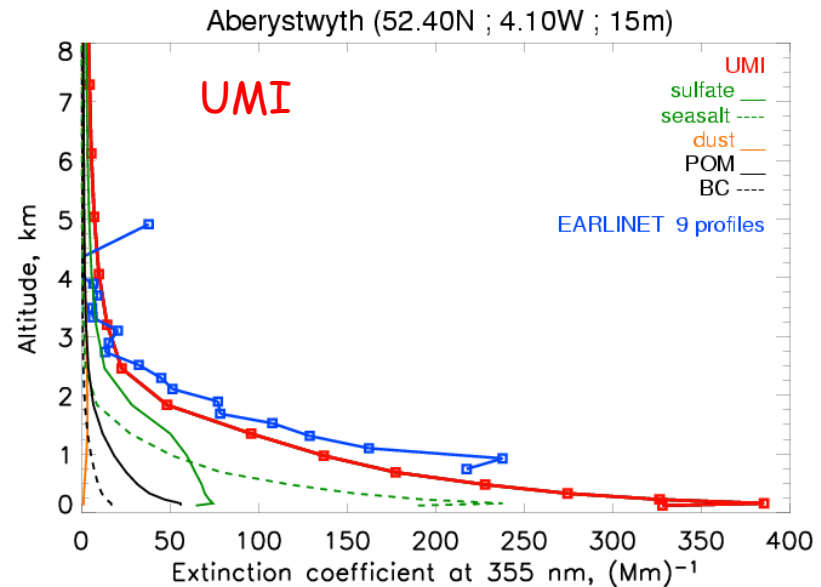
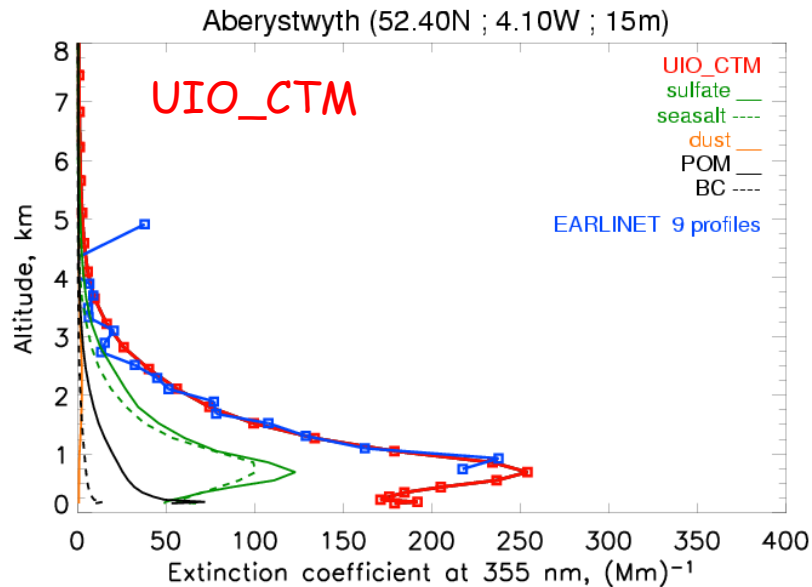
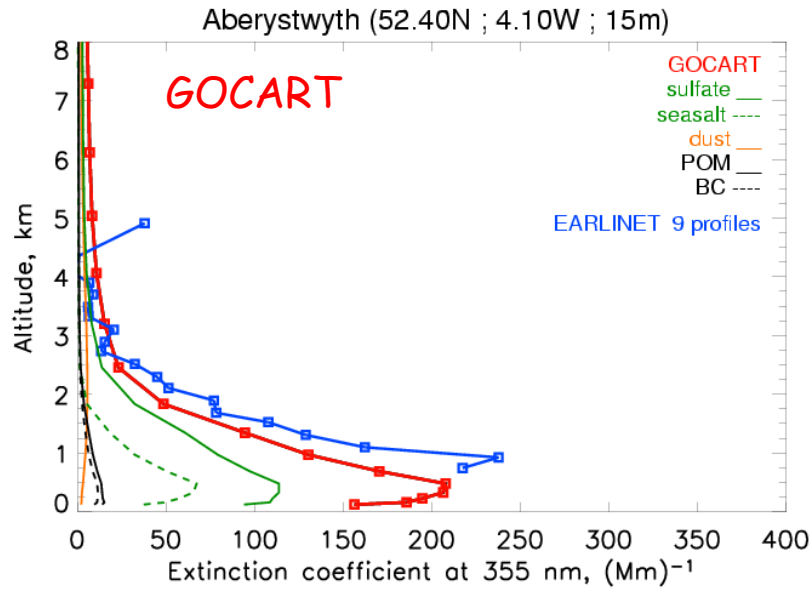
Yearly mean values





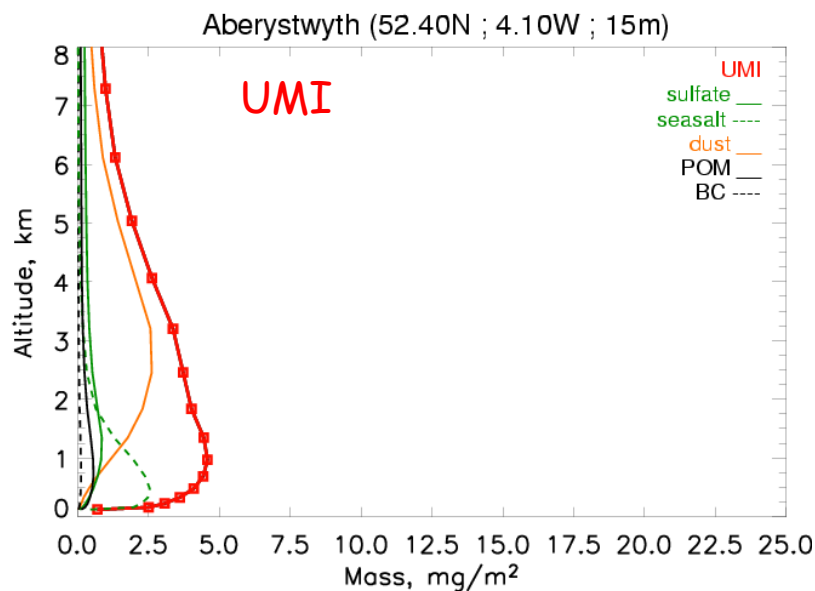
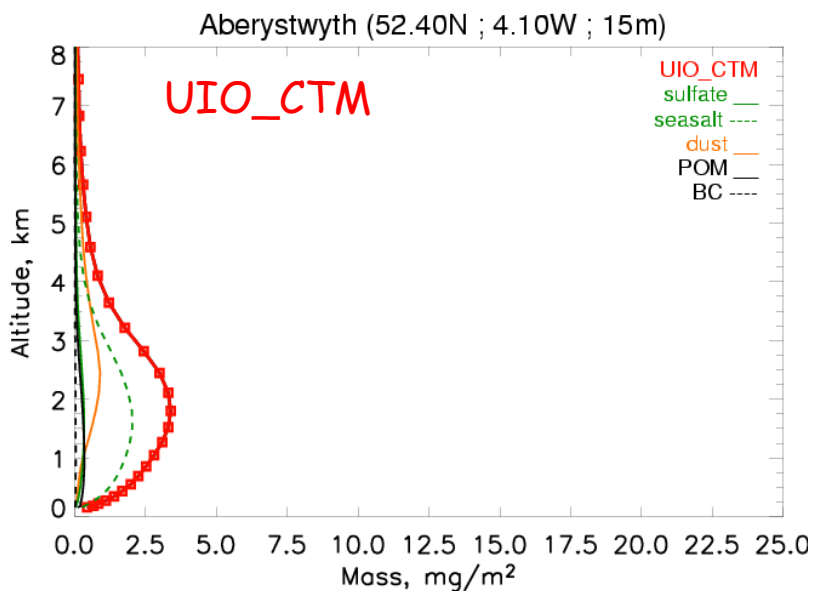
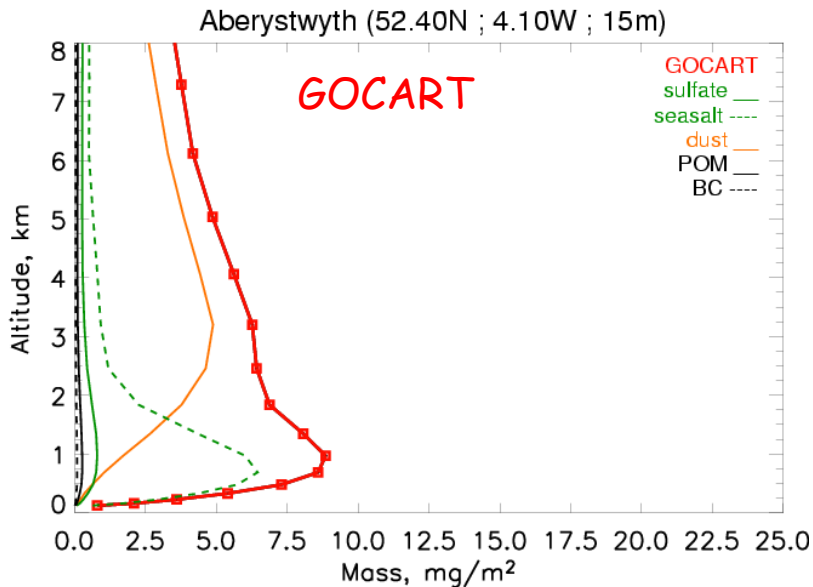
# EC@355nm profiles at Aberystwyth

Yearly mean profiles  
for 2000



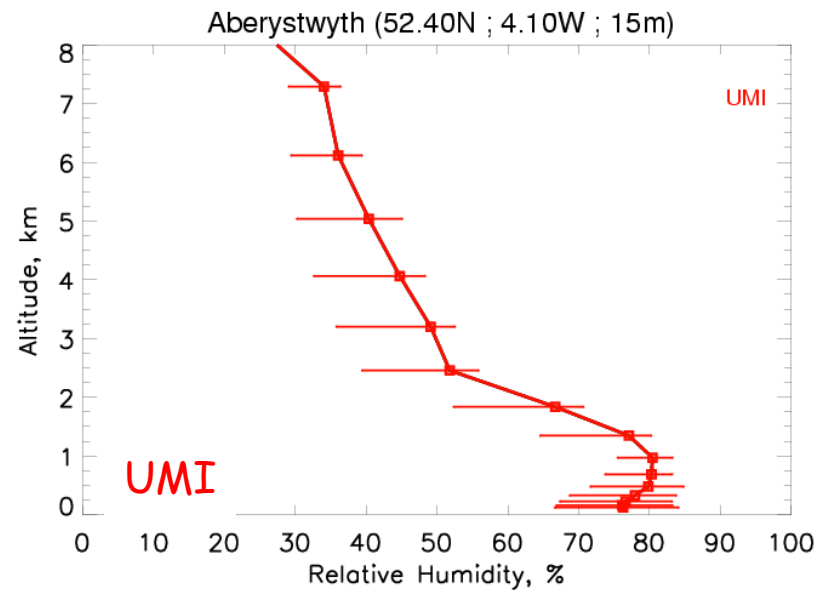
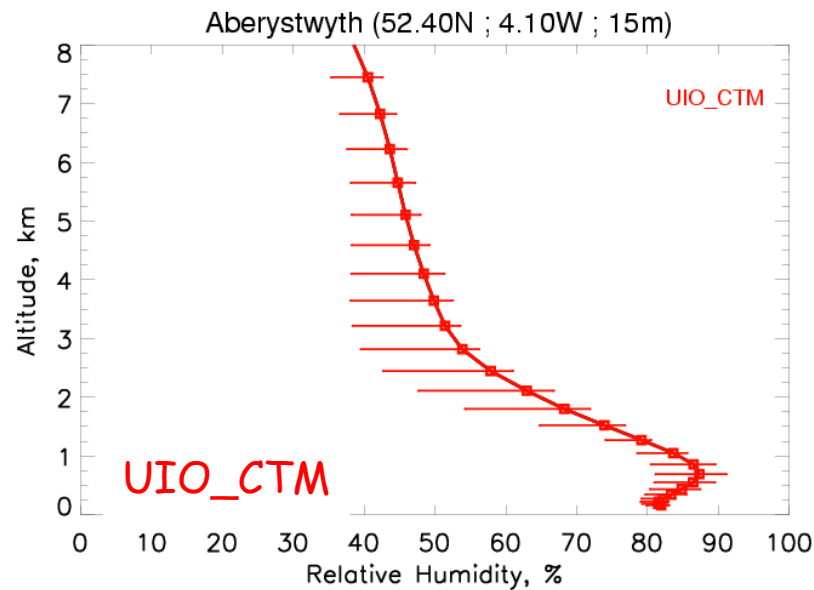
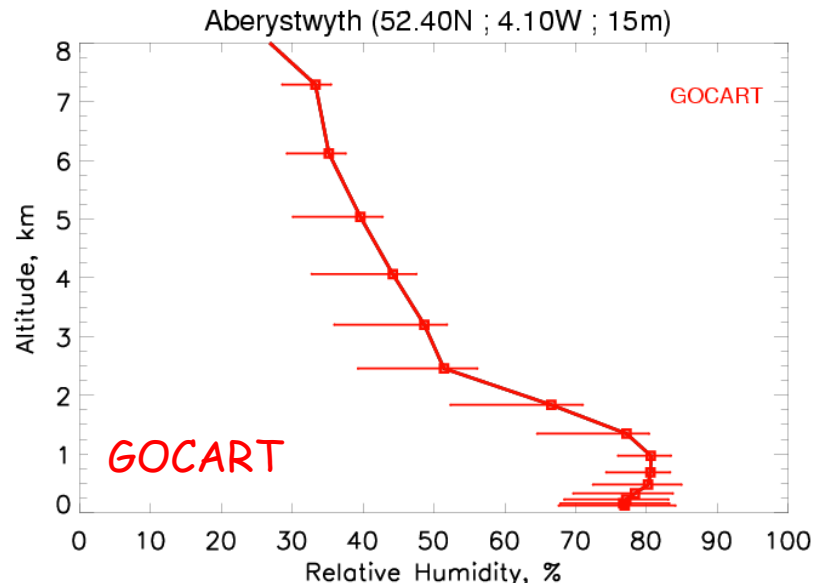
# Load profiles at Aberystwyth

Yearly mean profiles  
for 2000



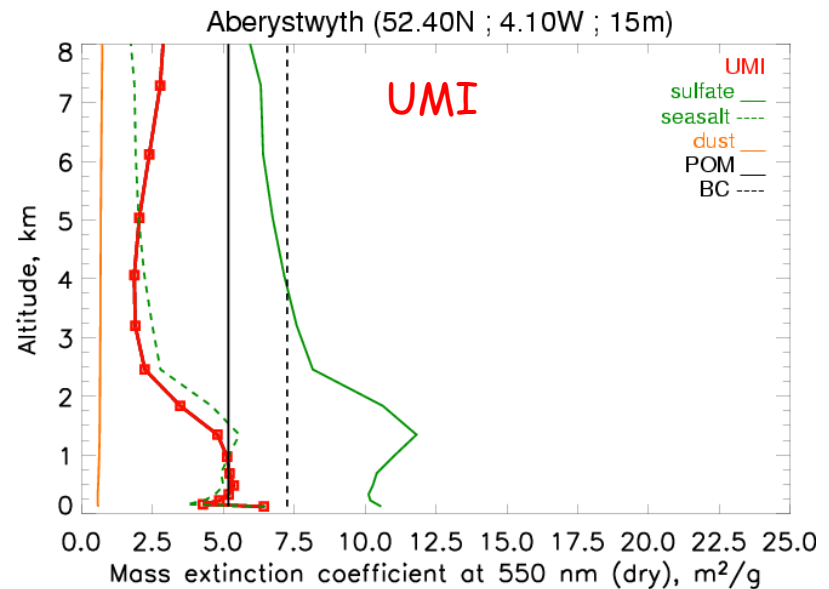
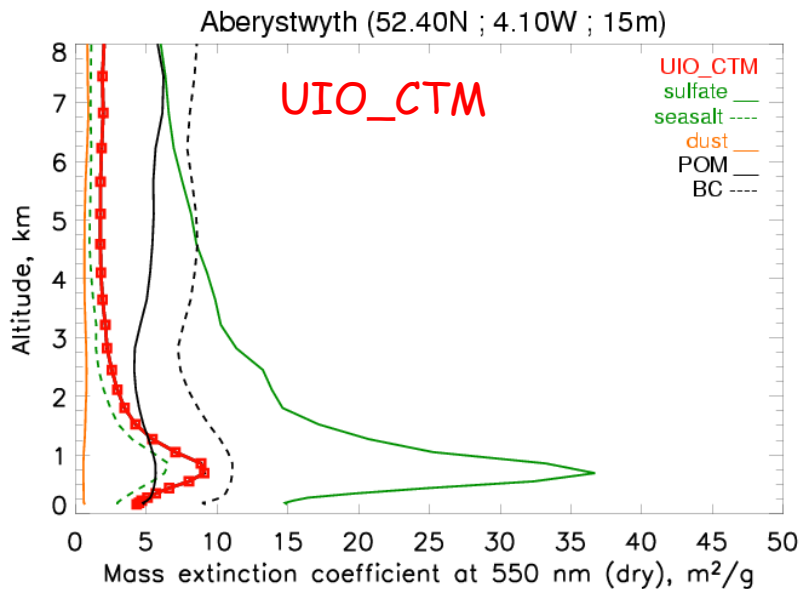
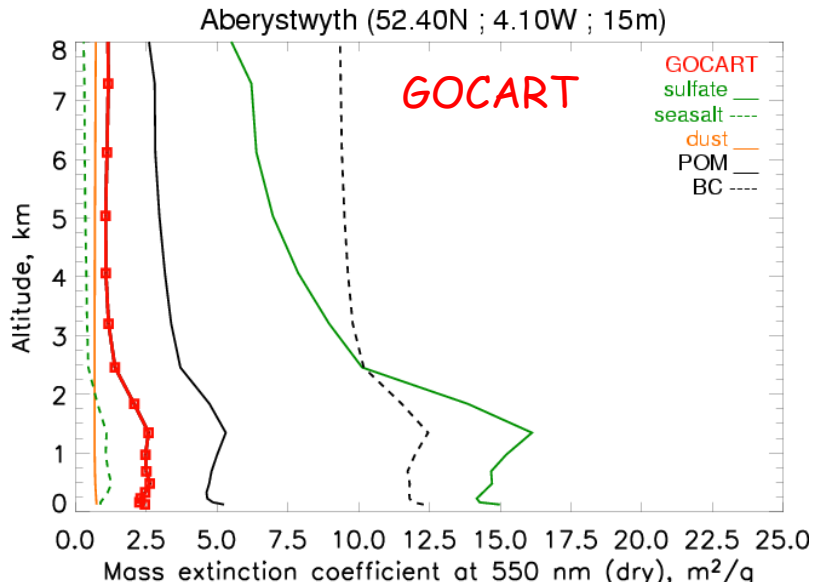
# RH profiles at Aberystwyth

Yearly mean profiles  
for 2000



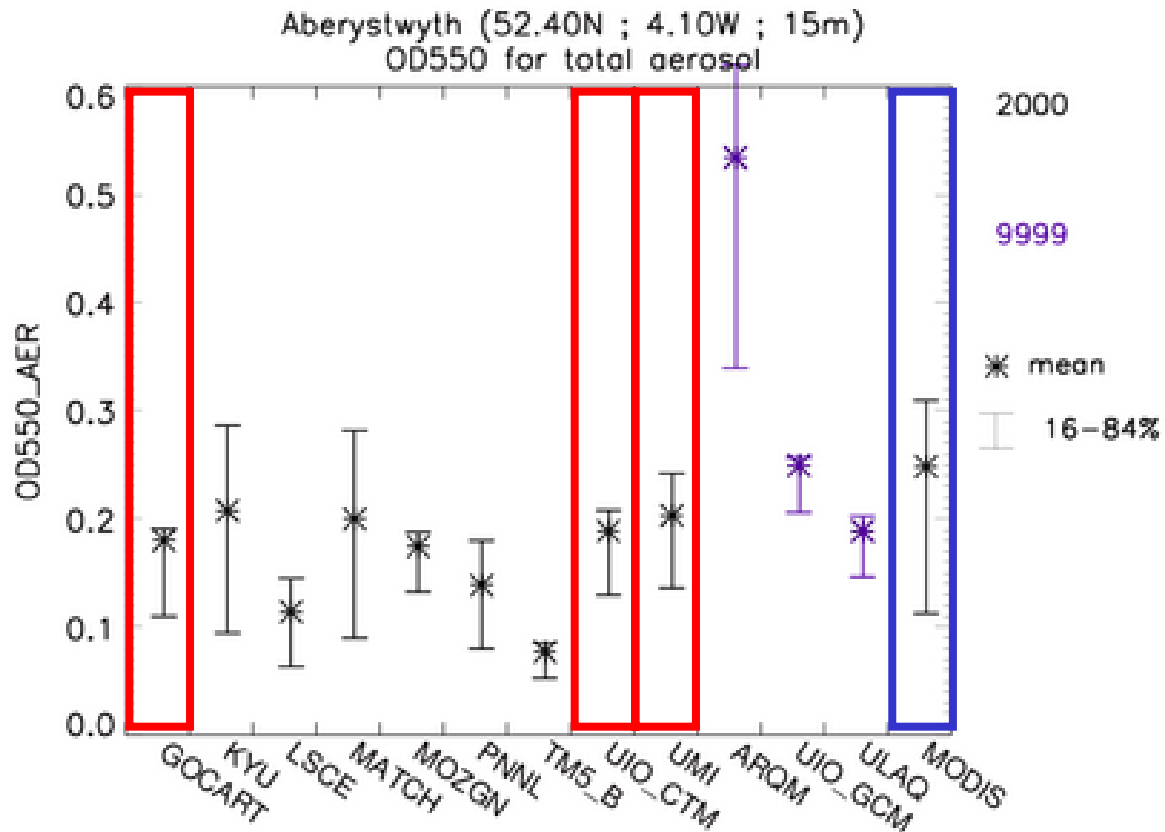
# MEC profiles at Aberystwyth

Yearly mean profiles  
for 2000



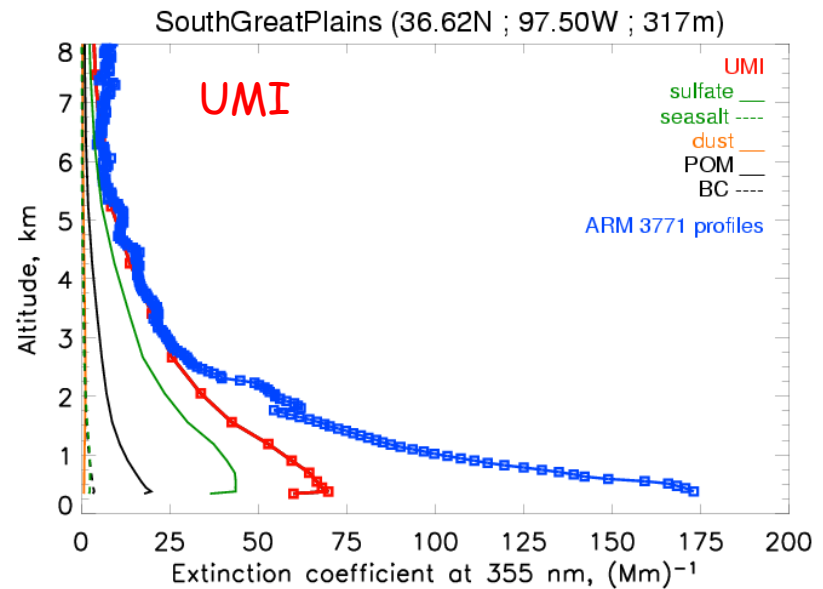
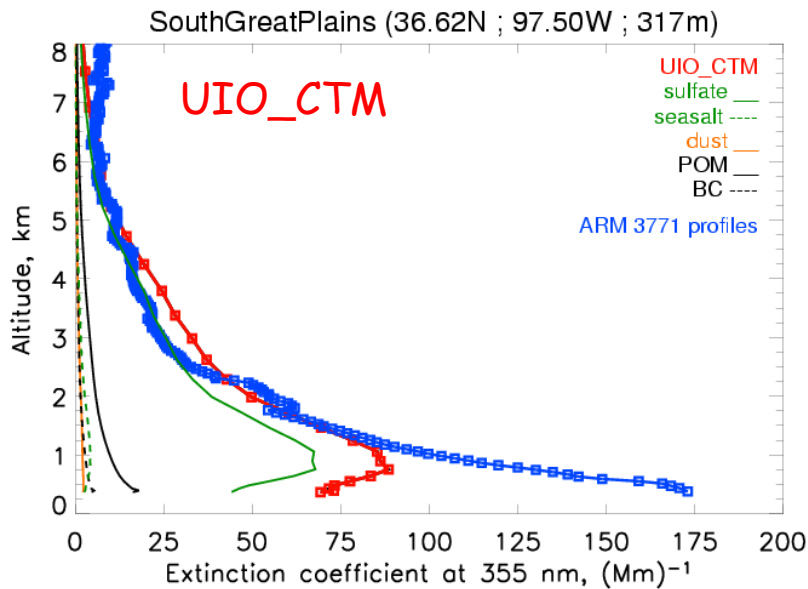
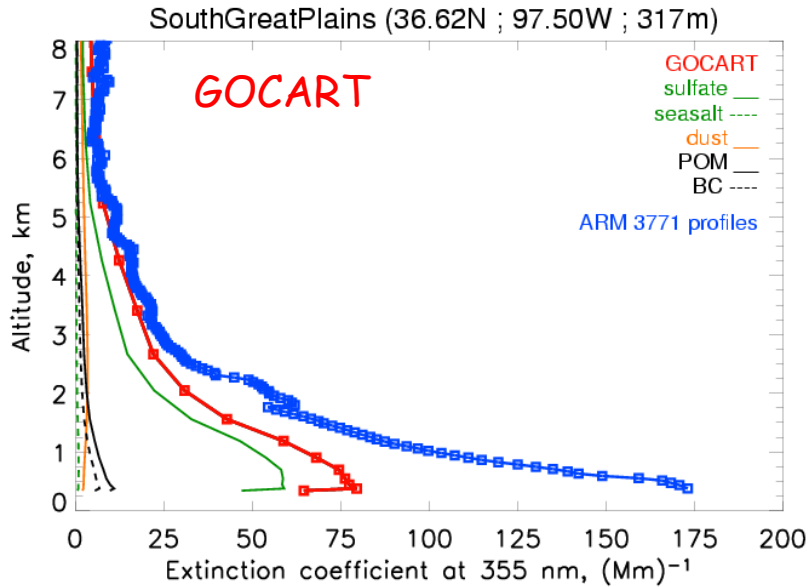
# OD@550nm at Aberystwyth

Yearly mean values



# EC@355nm profiles at SGP

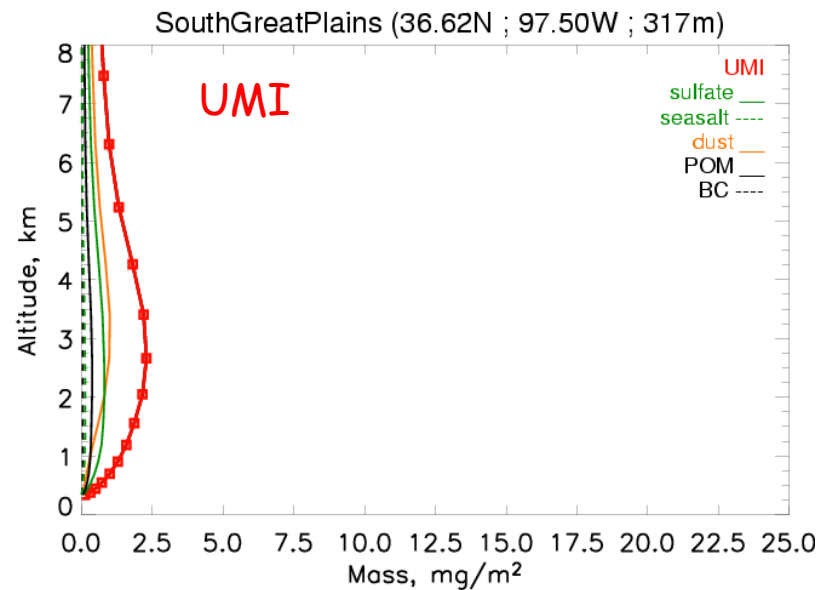
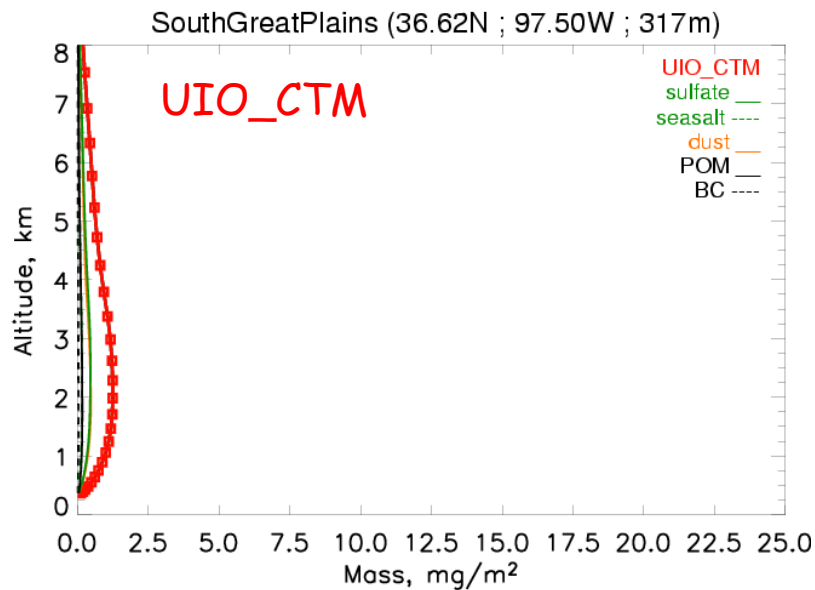
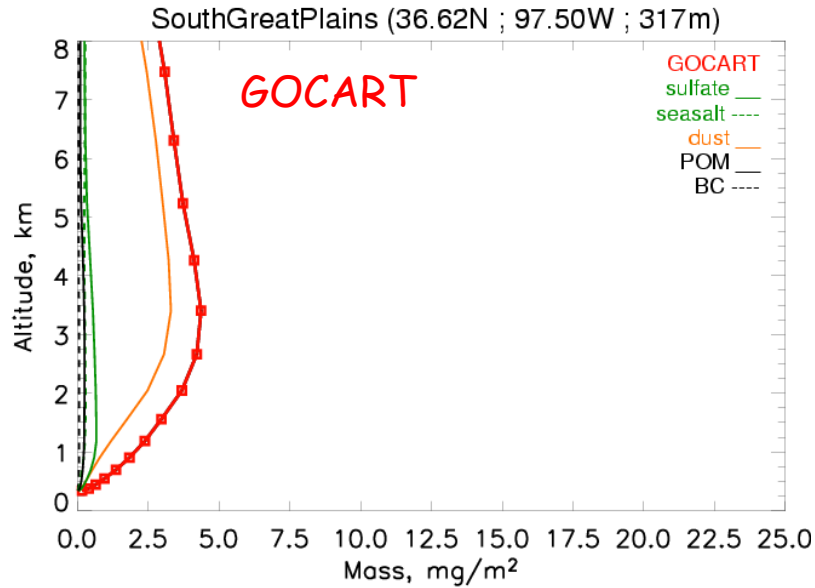
Yearly mean profiles  
for 2000





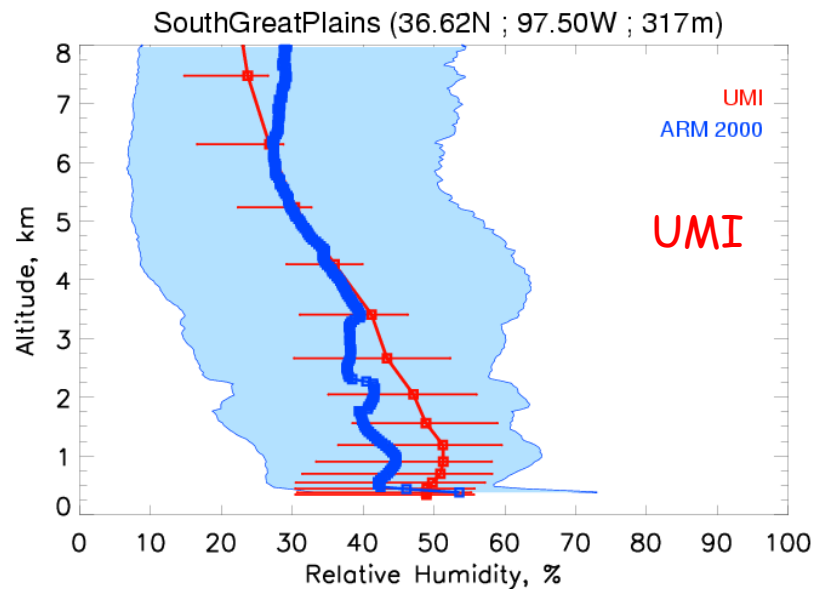
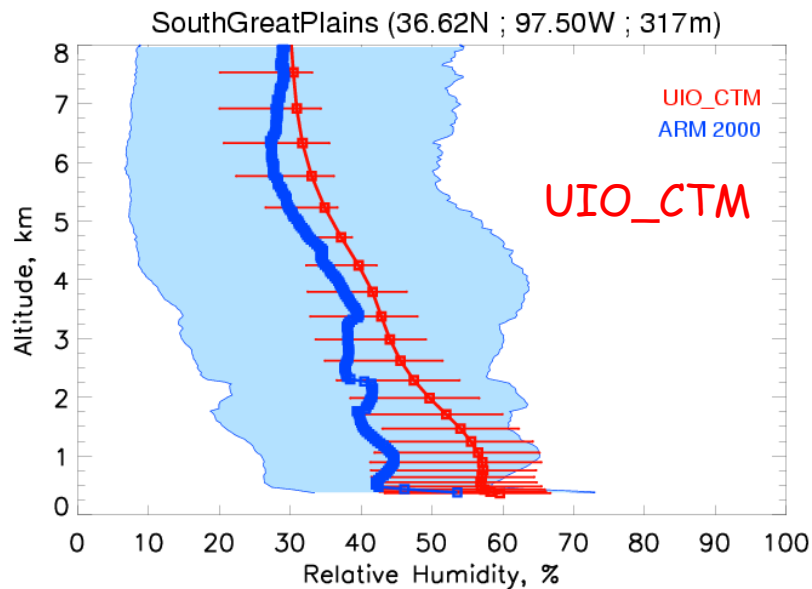
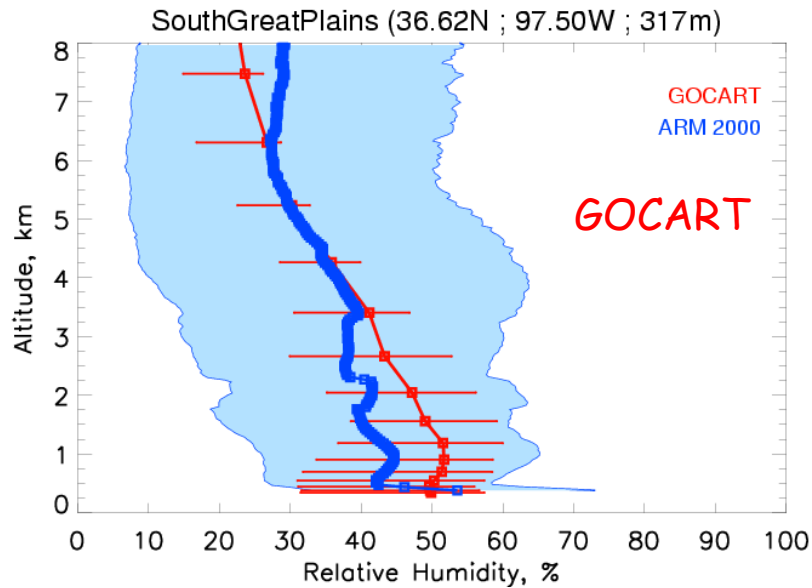
# Load profiles at SGP

Yearly mean profiles  
for 2000

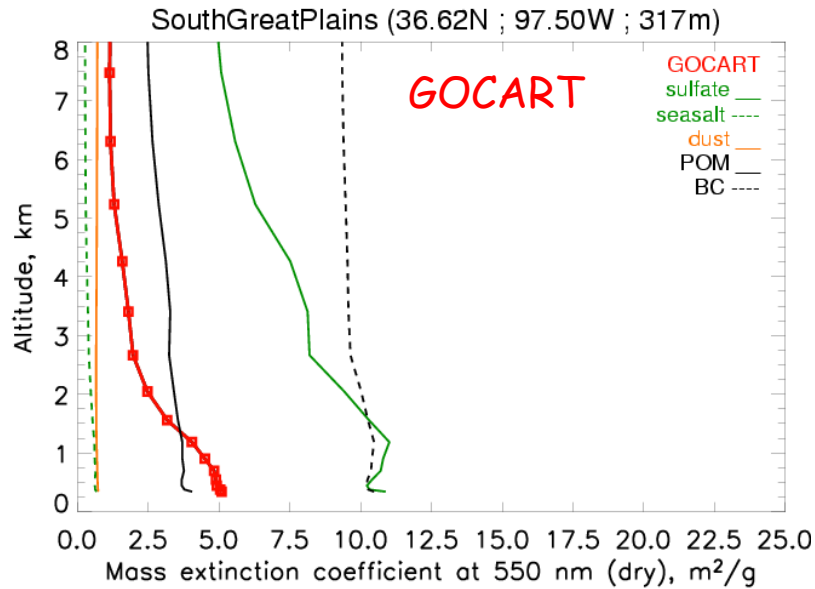


# RH profiles at SGP

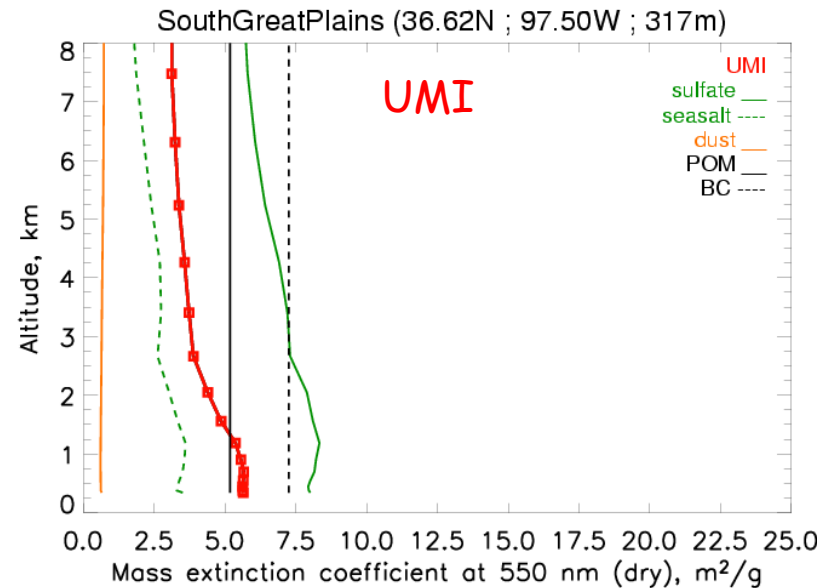
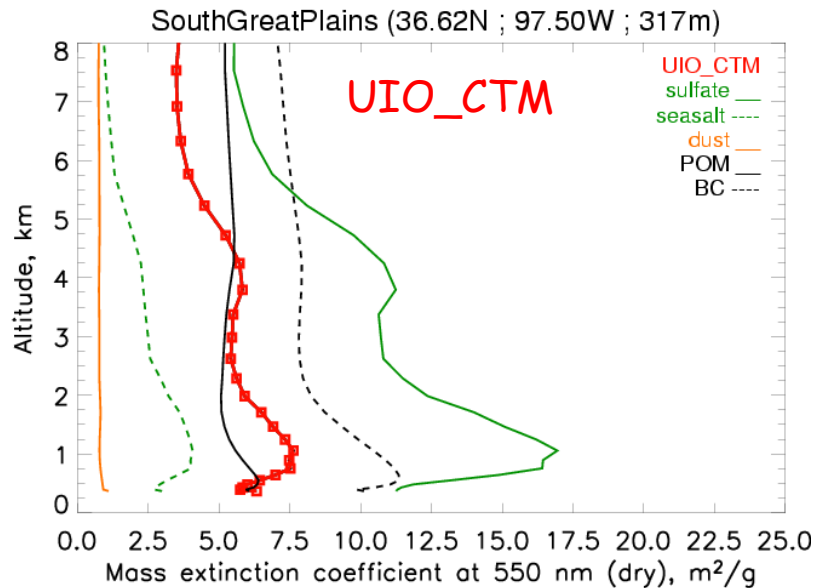
Yearly mean profiles  
for 2000



# MEC profiles at SGP

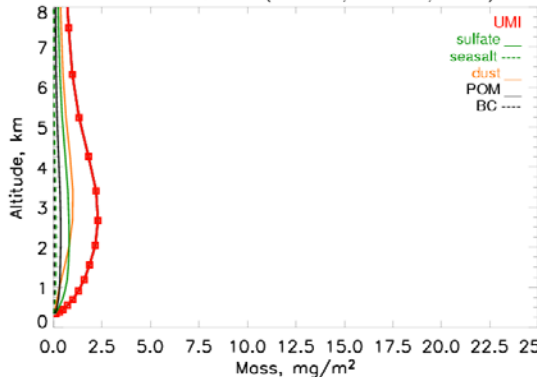


Yearly mean profiles  
for 2000

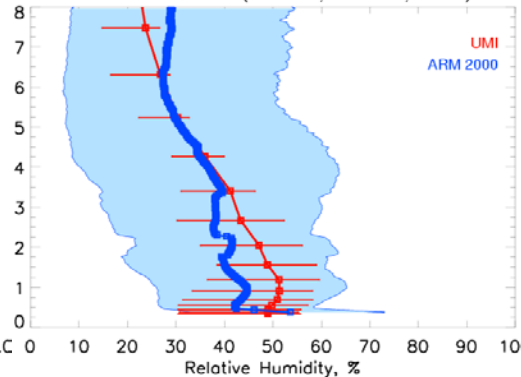


# SGP

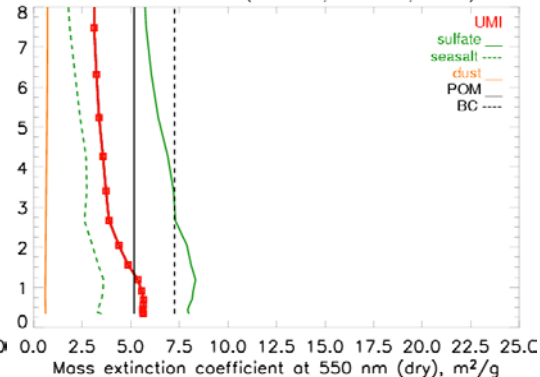
SouthGreatPlains (36.62N ; 97.50W ; 317m)



SouthGreatPlains (36.62N ; 97.50W ; 317m)

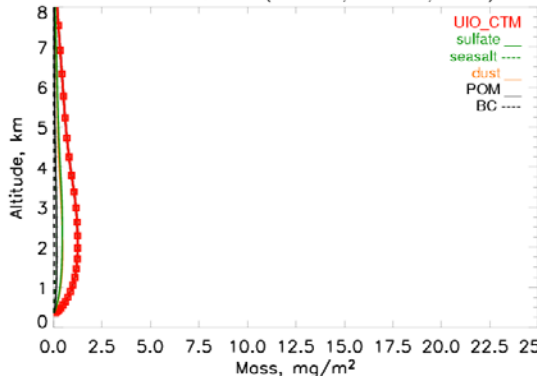


SouthGreatPlains (36.62N ; 97.50W ; 317m)

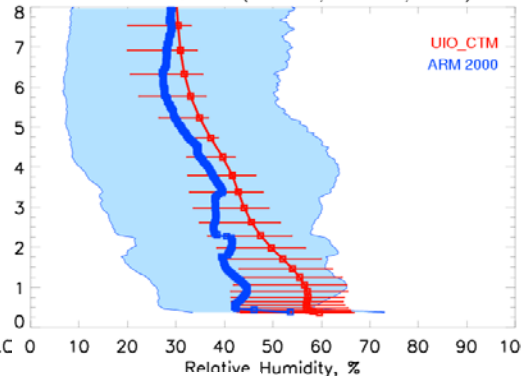


UMI

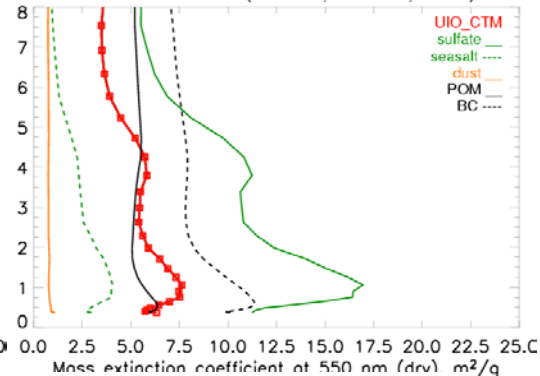
SouthGreatPlains (36.62N ; 97.50W ; 317m)



SouthGreatPlains (36.62N ; 97.50W ; 317m)

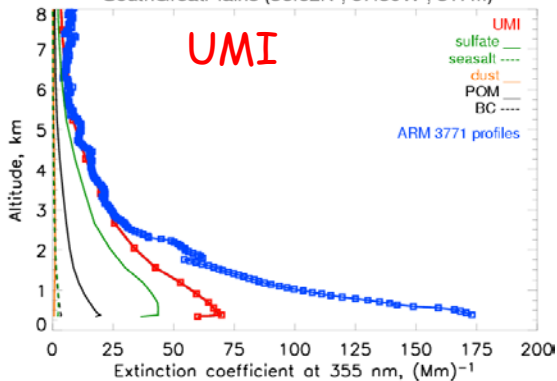


SouthGreatPlains (36.62N ; 97.50W ; 317m)

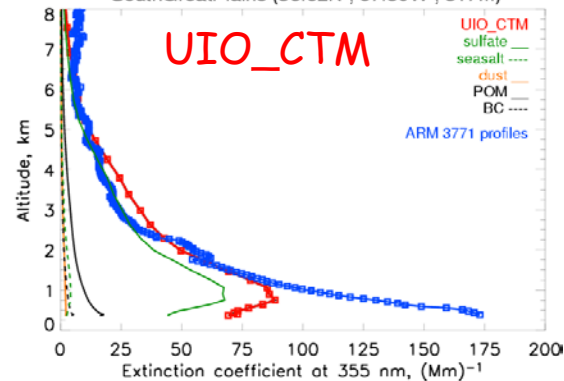


UIO\_CTM

SouthGreatPlains (36.62N ; 97.50W ; 317m)

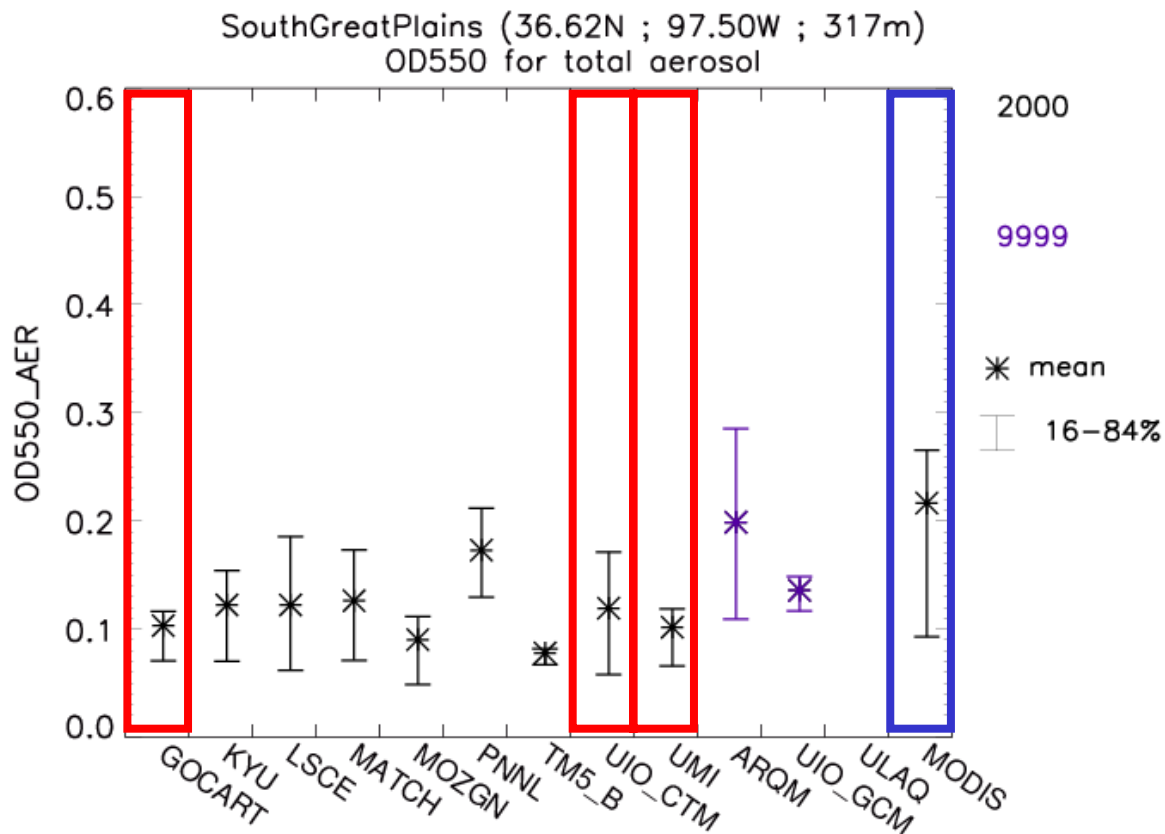


SouthGreatPlains (36.62N ; 97.50W ; 317m)



# OD@550nm at SGP

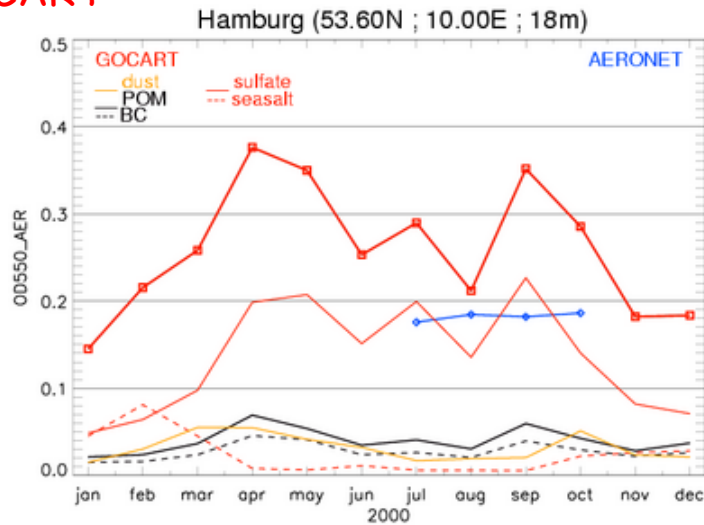
Yearly mean values



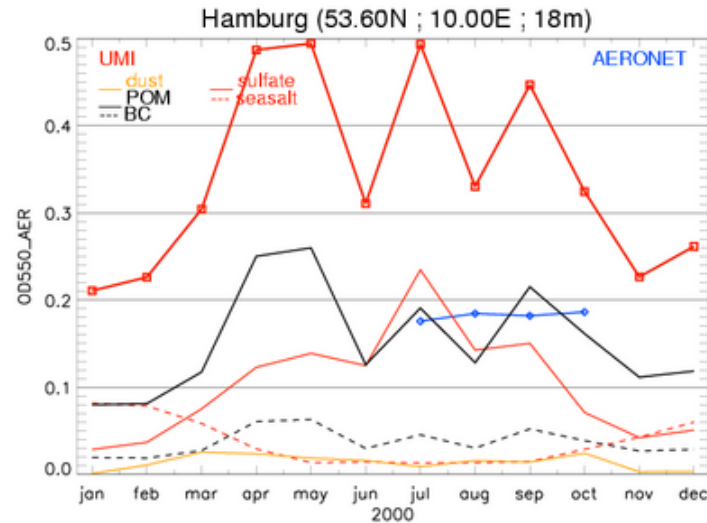
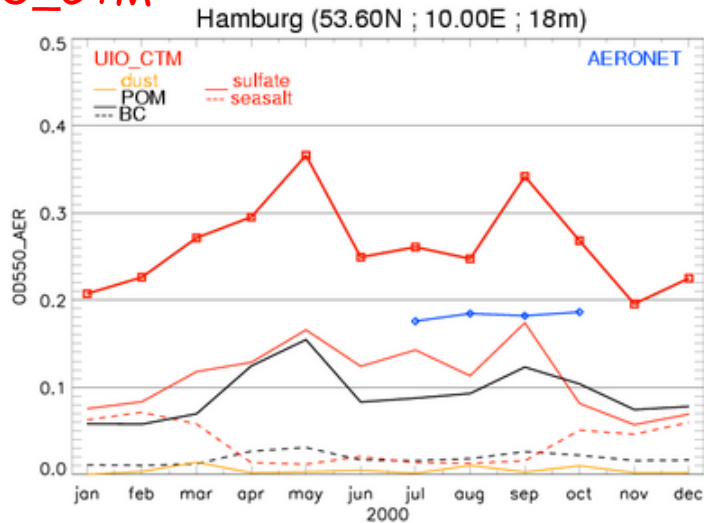


# AeroCom : OD comparison

GOCART



UIO\_CTM



UMI