Analysis of differences in vertical profiles as a function of RH differences

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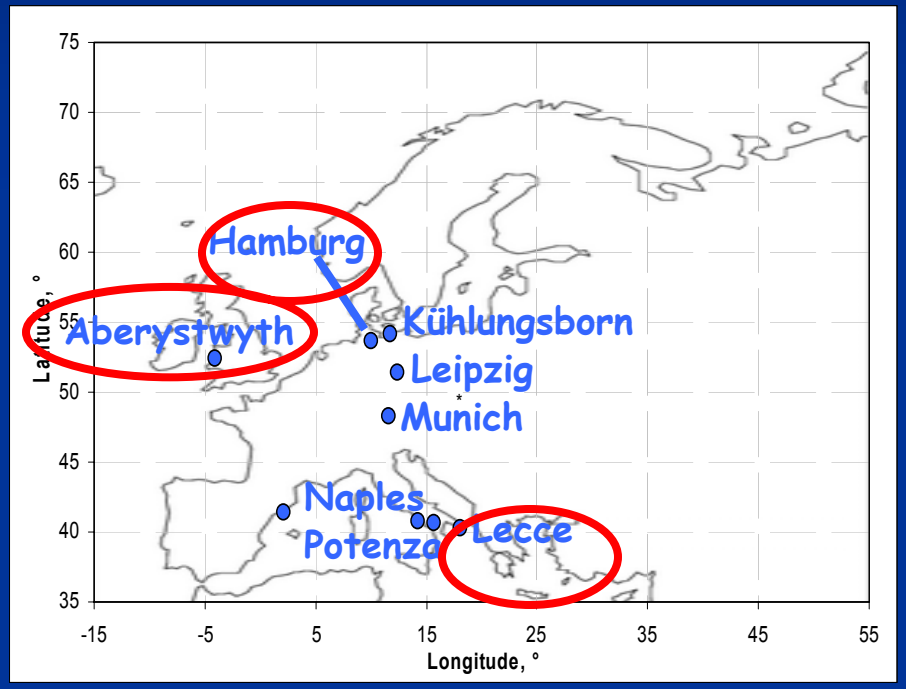
Stations considered

EARLINET stations

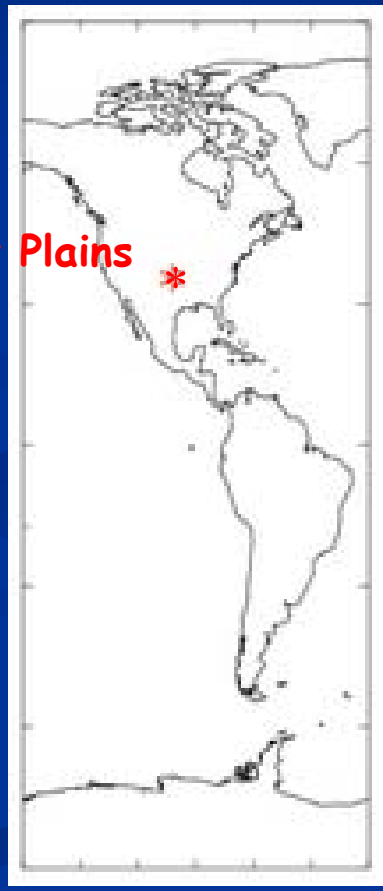


Aberystwyth : coastal/marine
Hamburg : continental (coastal)
Lecce : dusty

ARM program

South Great Plains

SGP : remote



OD = LOAD * MEC

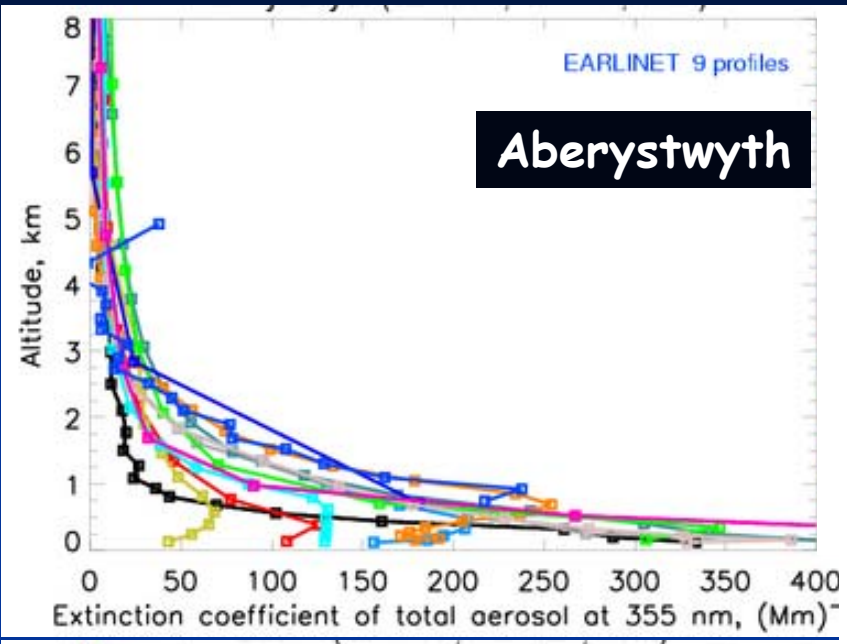
EC = CONC * MEC

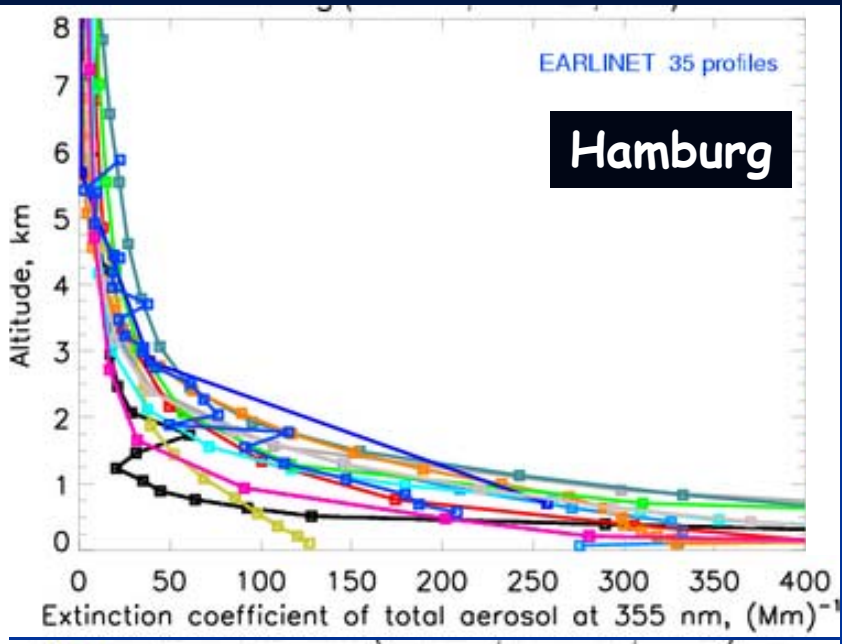
= f(RH)

Could we link the models comportement regarding concentration with the EC profiles ?

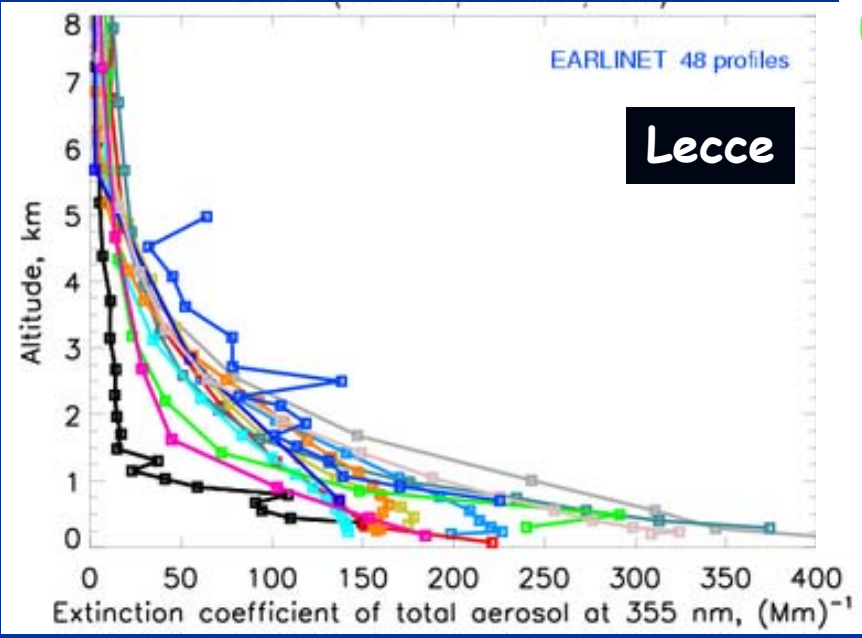
Extinction profiles at 355nm

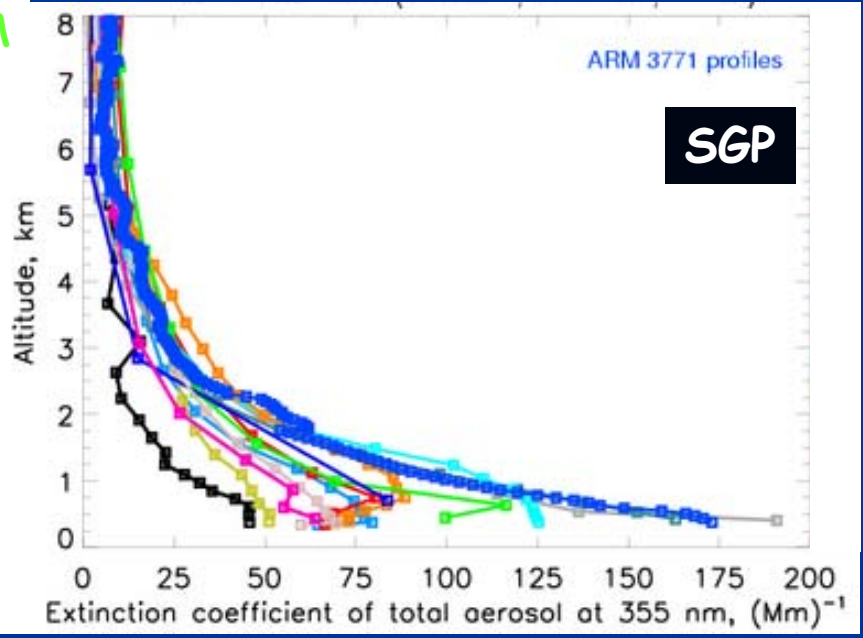
Experiment A





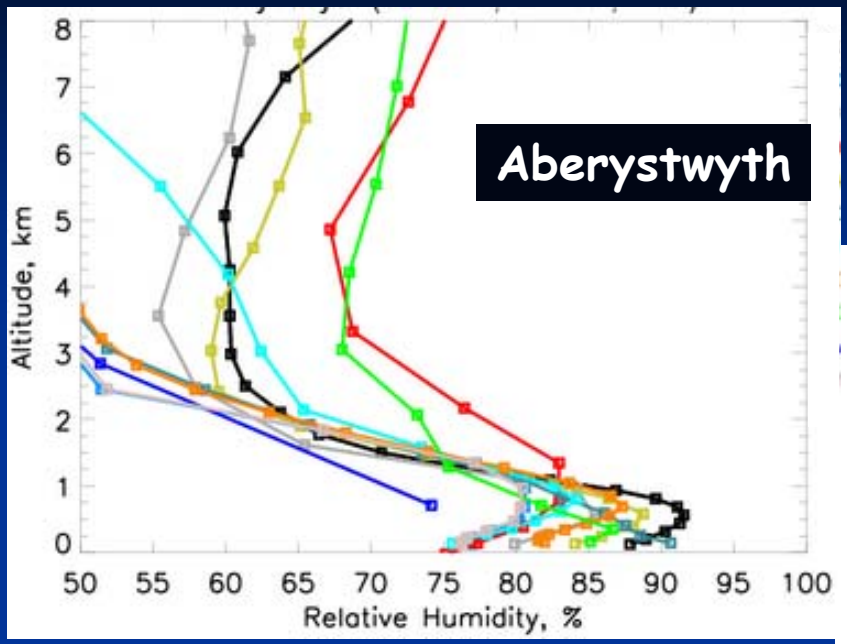
ARQM
GISS
GOCART
KYU
LSCE
MATCH
MOZGN
PNNL
UIO_CTM
UIO_GCM
ULAQ
UMI

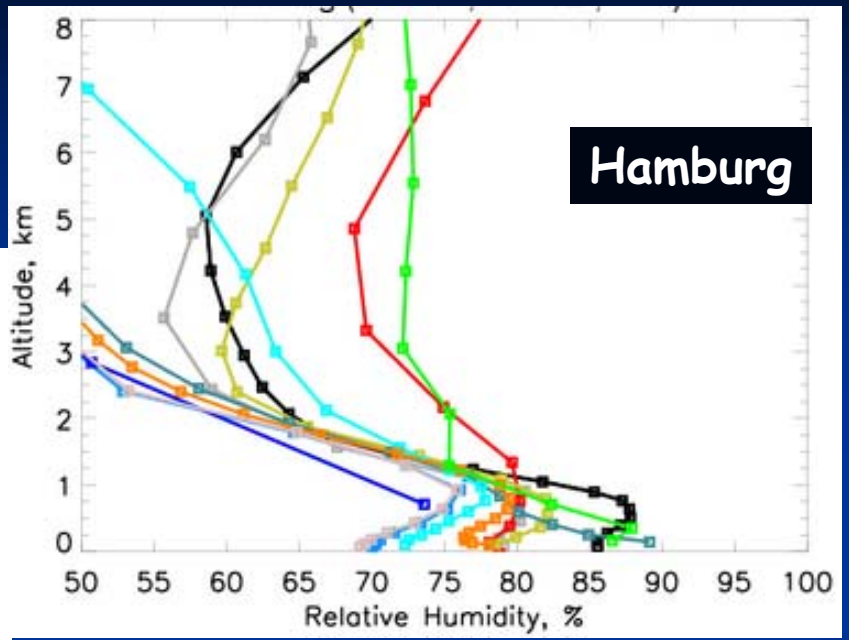




RH profiles

Experiment A





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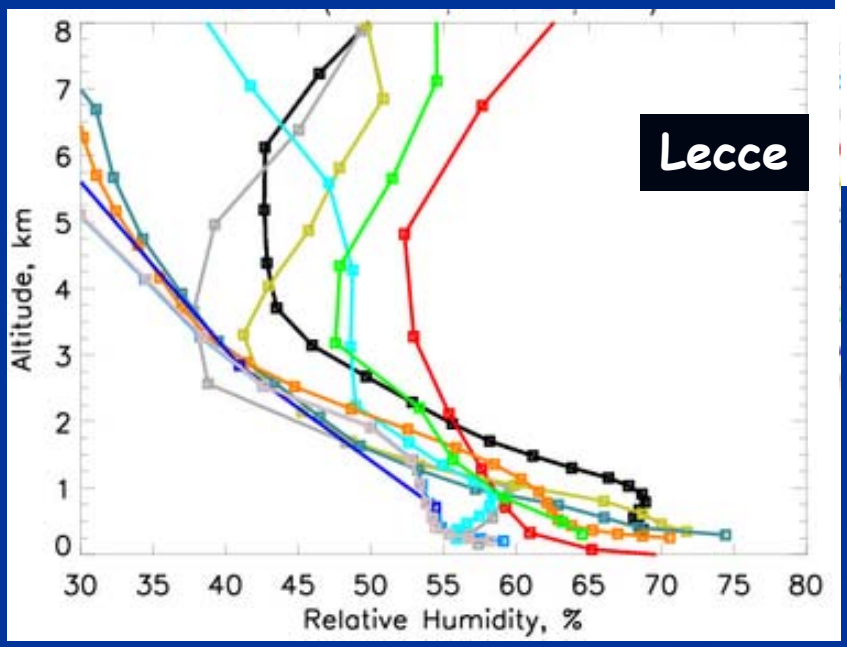
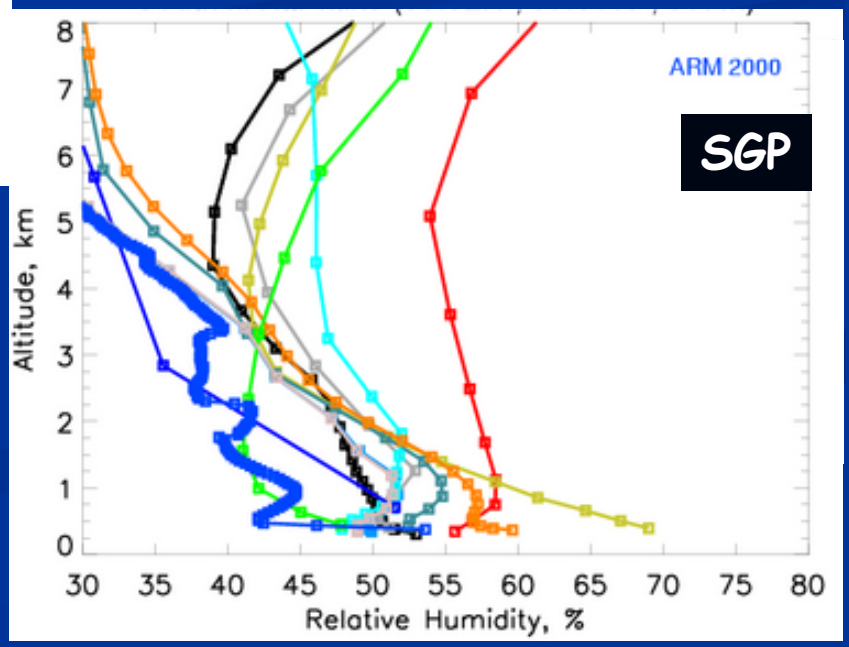
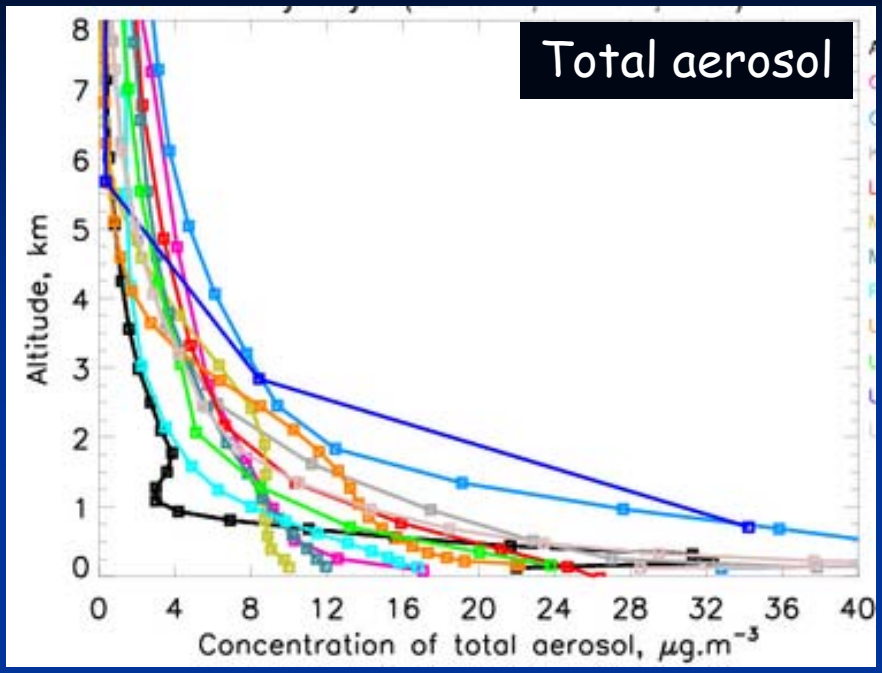




Concentration : Aberystwyth (marine)

Experiment A



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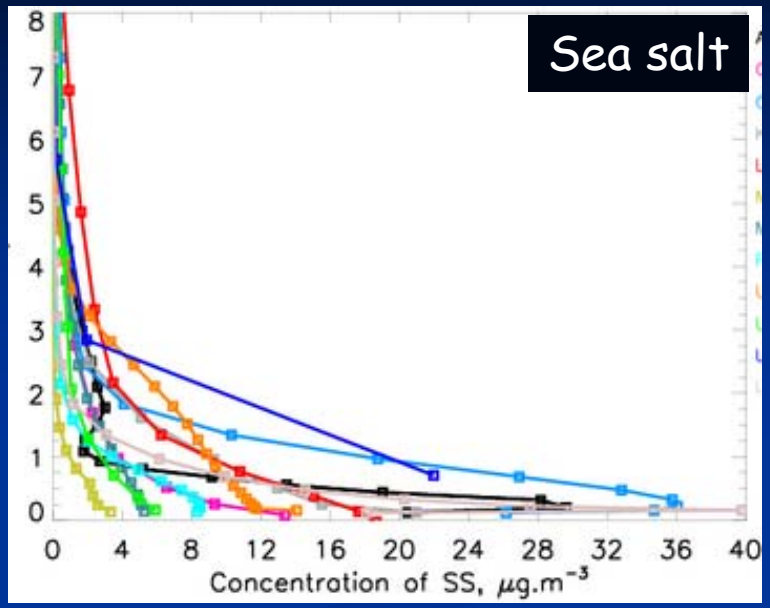
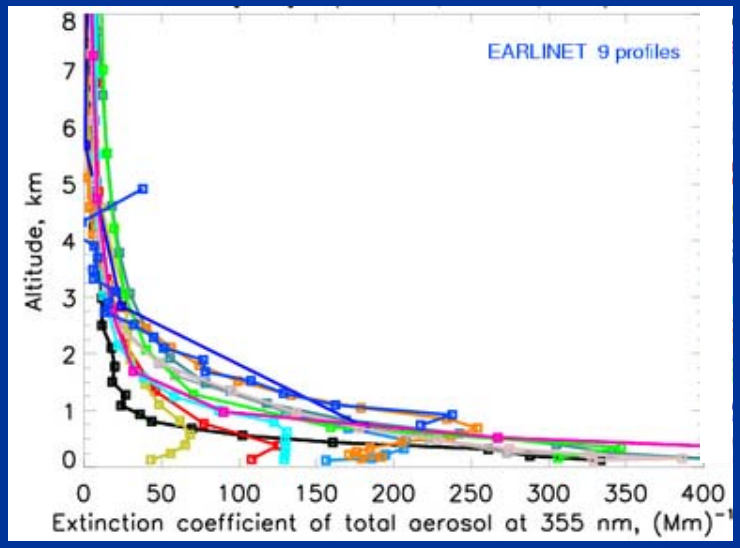




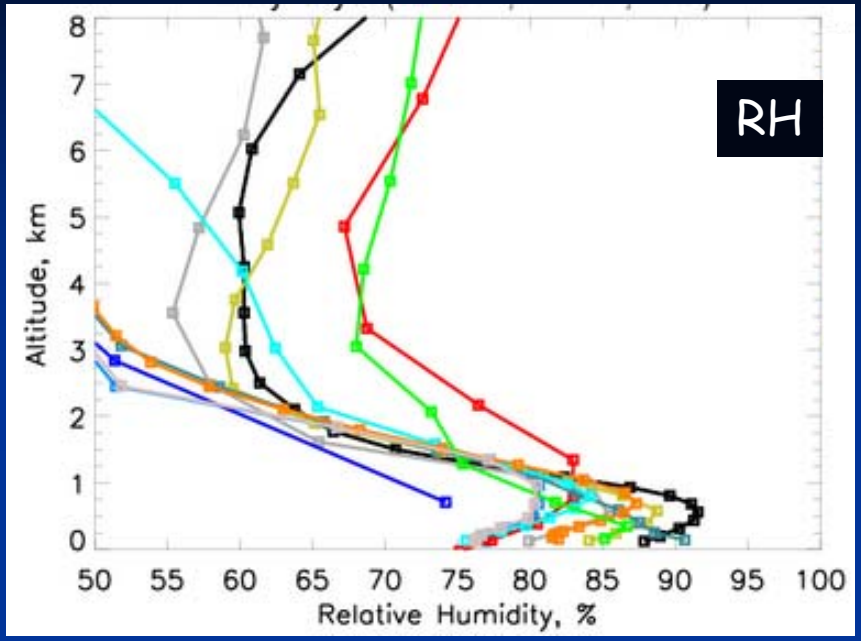
Sea-salt = dominant species

Models with largest concentration : GOCART, KYU, ULAQ, UMI

Models with largest EC values : GISS, KYU, MOZGN, UIO_GCM, UMI

MEC and RH : Aberystwyth (marine)

Experiment A



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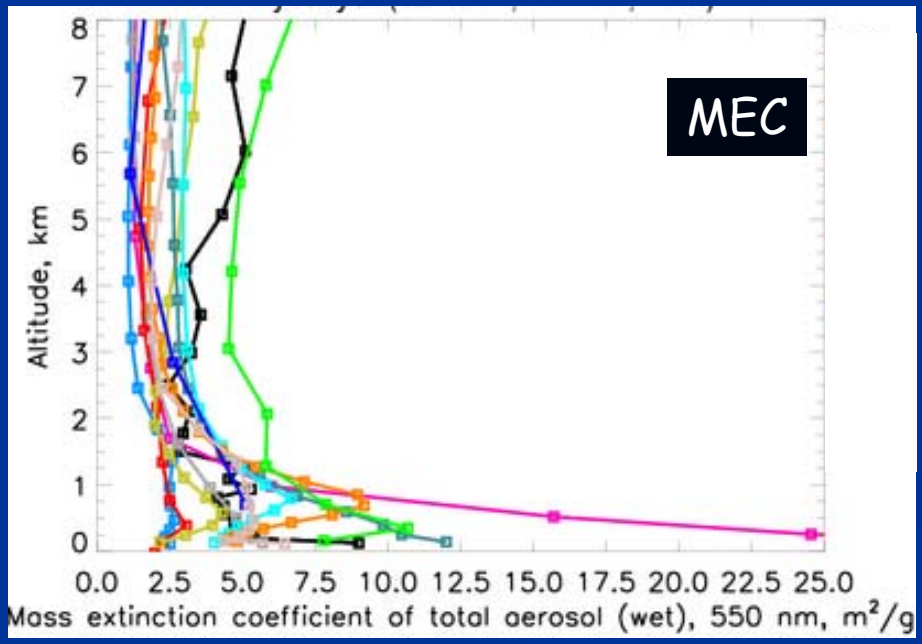
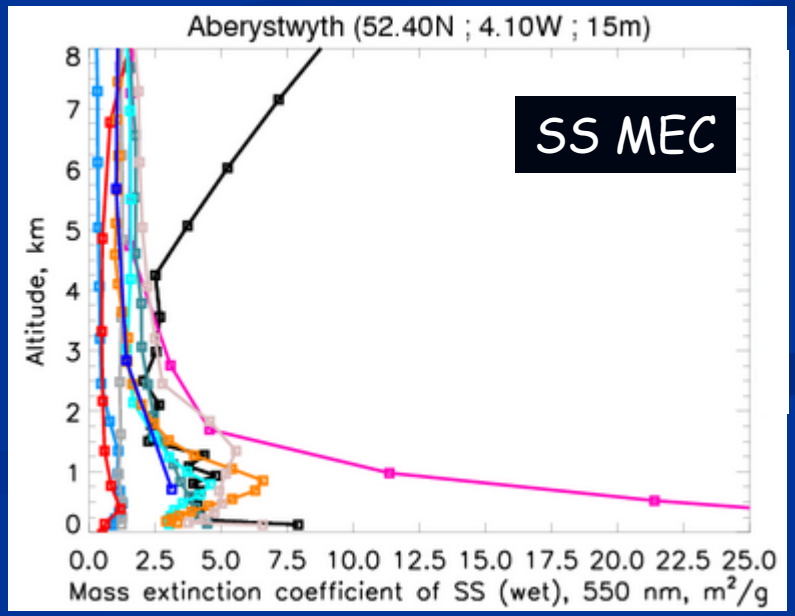
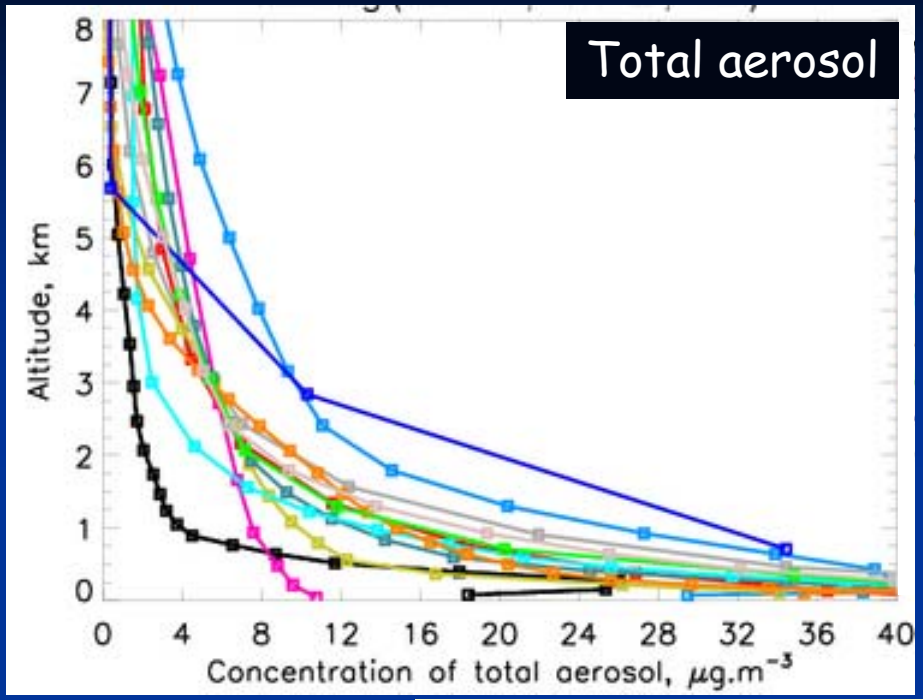
GISS, MOZGN and UIO_GCM don't have really large concentration but they have large MEC => largest EC values





Concentration : Hamburg (continental)

Experiment A



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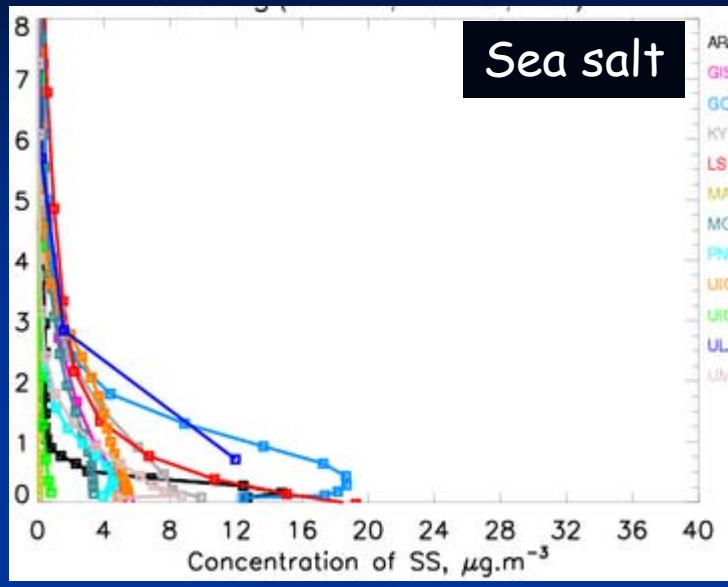
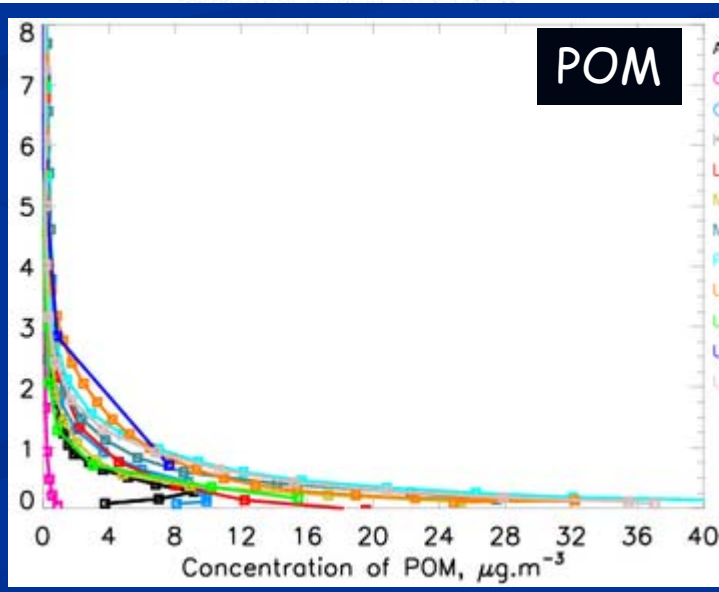


Dominant species = POM and SS

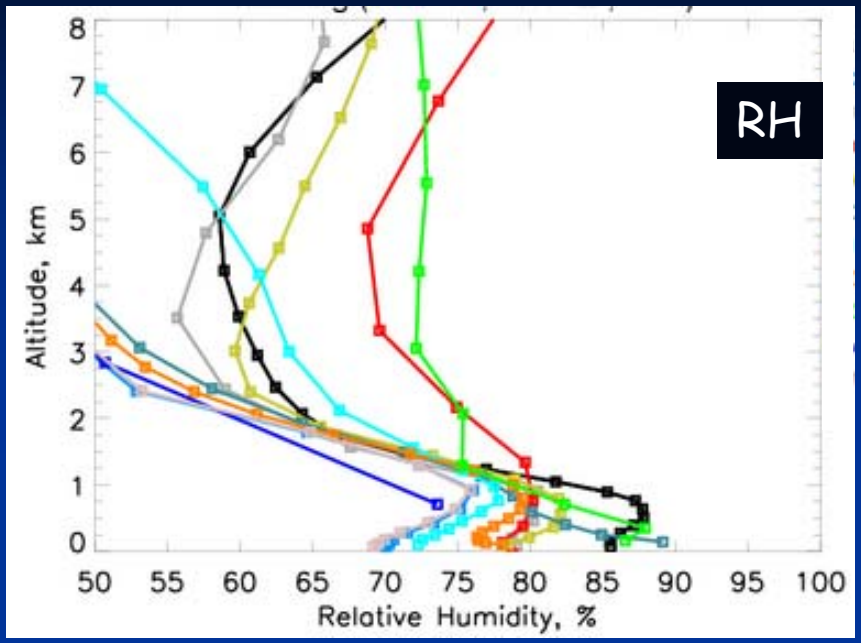


Very large concentration for all models except GISS, MATCH

Large values of EC : GISS, KYU, MOZGN, UIO_GCM, UMI, LSCE, PNNL

RH and MEC : Hamburg (continental)

Experiment A



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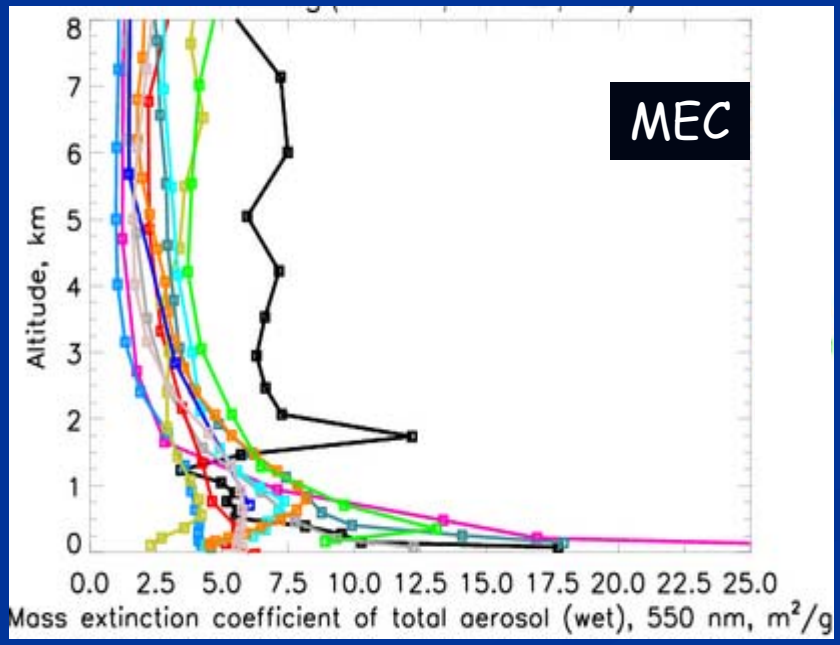
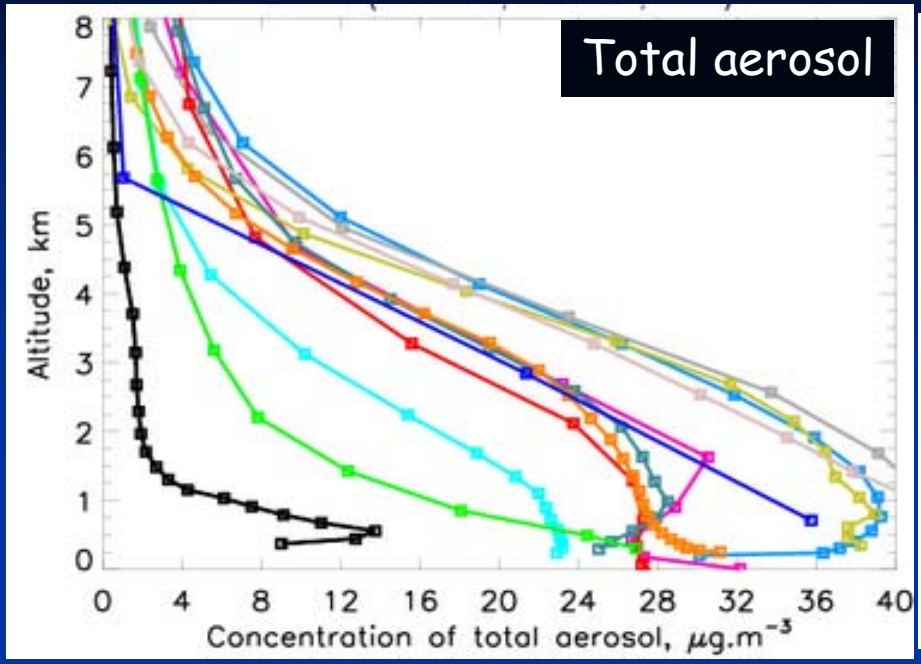


As for Aberystwyth, GISS, MOZGN and UIO_GCM have really large MEC

Concentration : Lecce (dusty)

Experiment A



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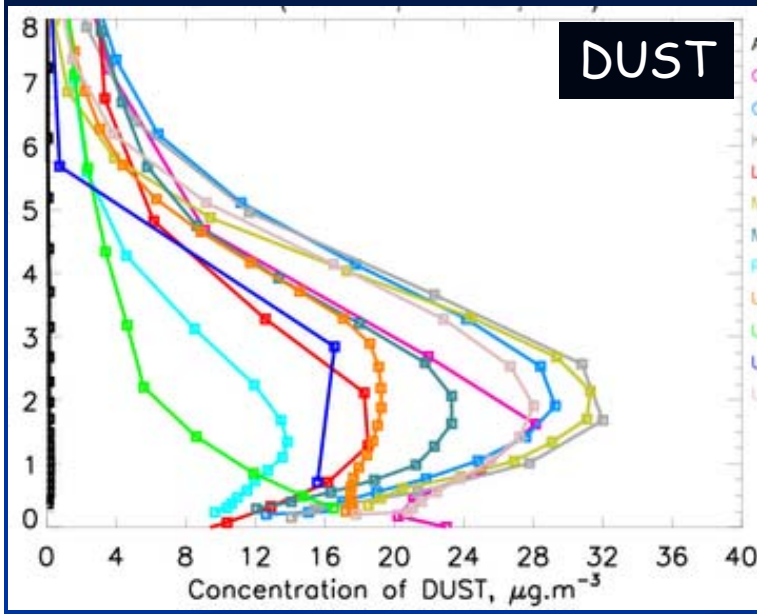
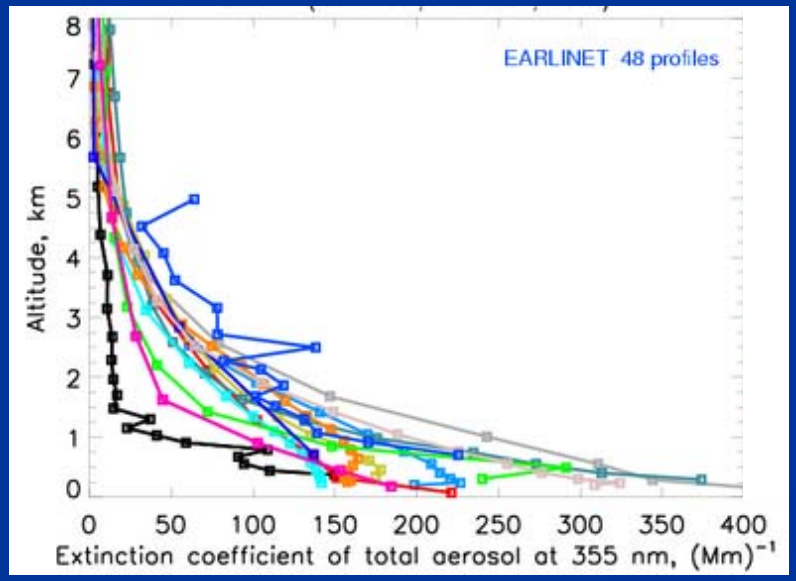


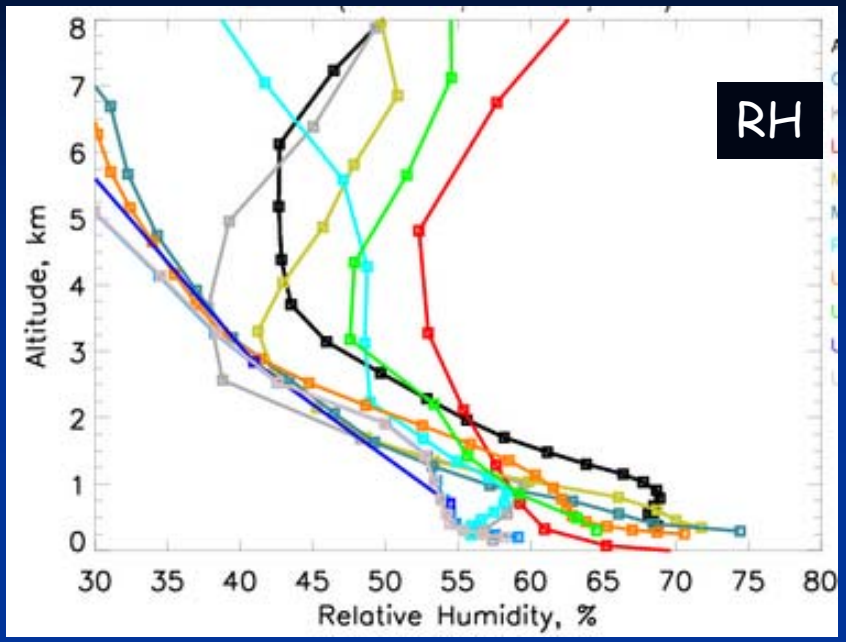


Larger concentration for KYU and UMI

Larger EC values for KYU and MOZGN

RH and MEC : Lecce (dusty)

Experiment A



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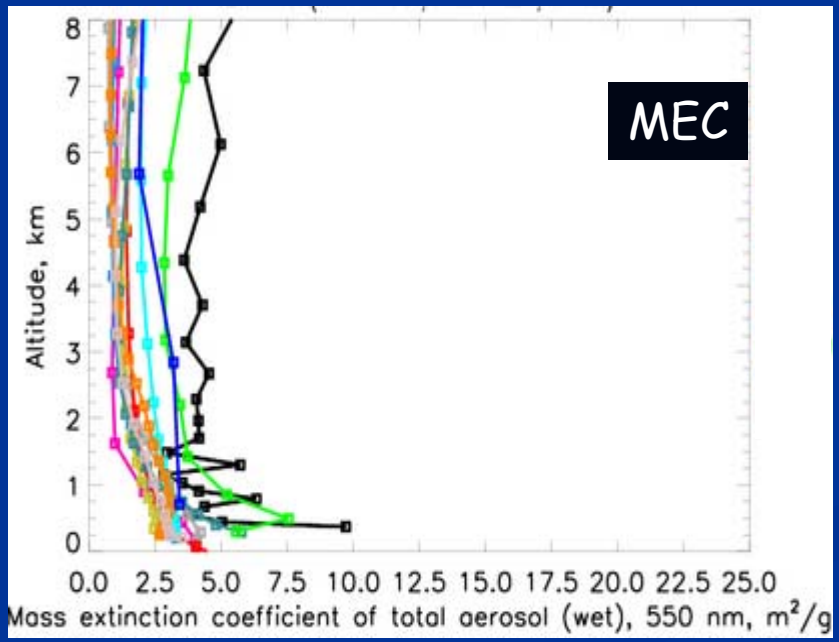
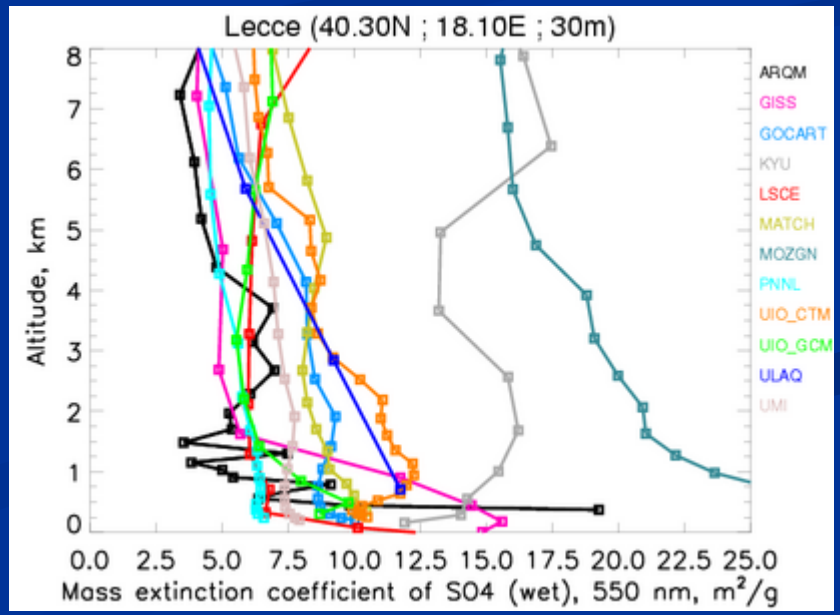
Smaller RH values

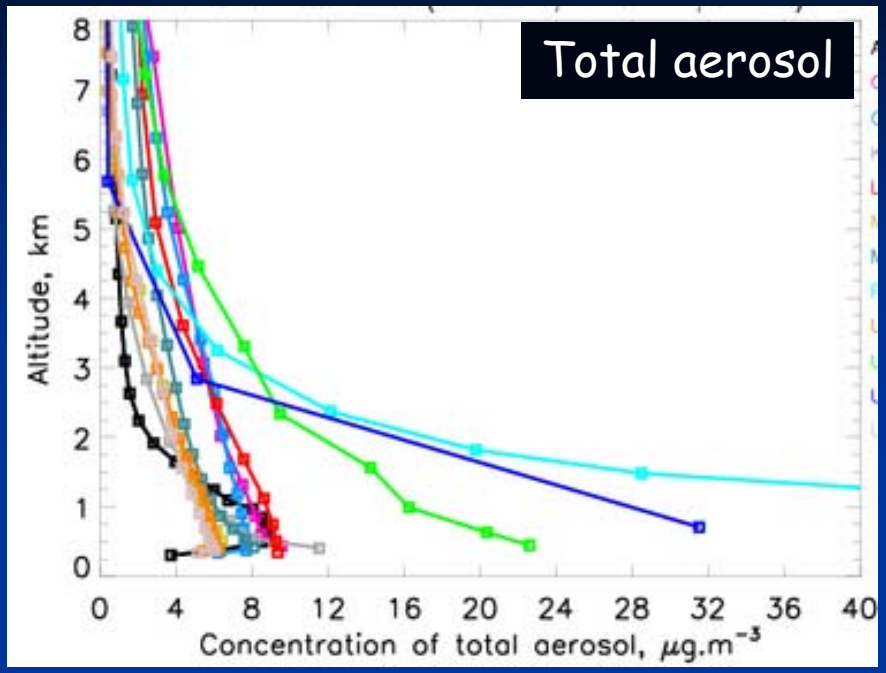
Also smaller MEC values and smaller range of MEC values





Concentration : SGP (remote)

Experiment A



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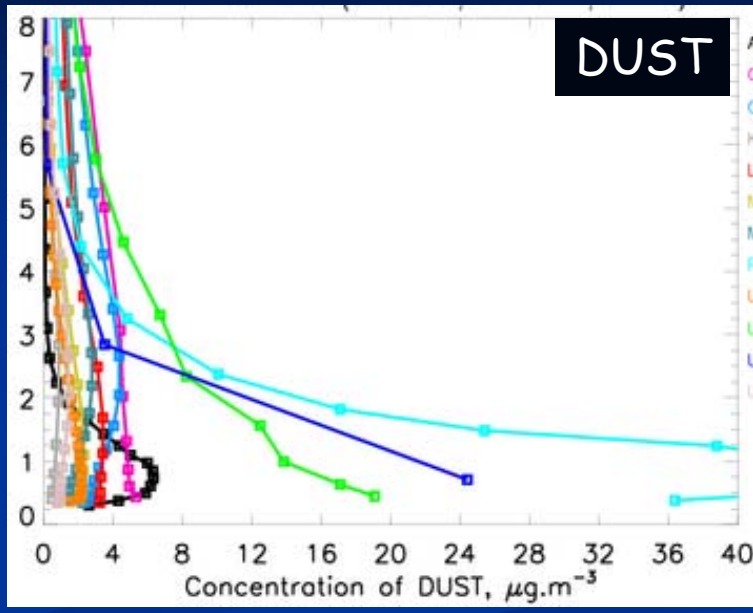
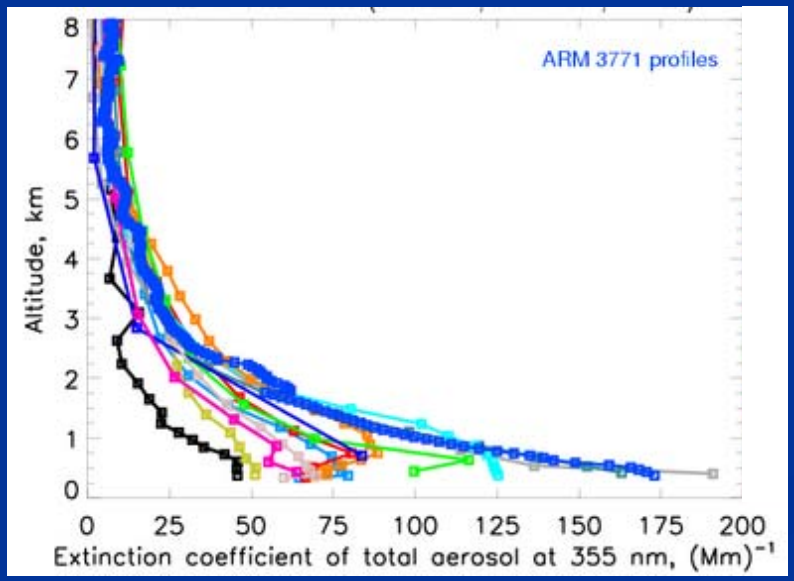




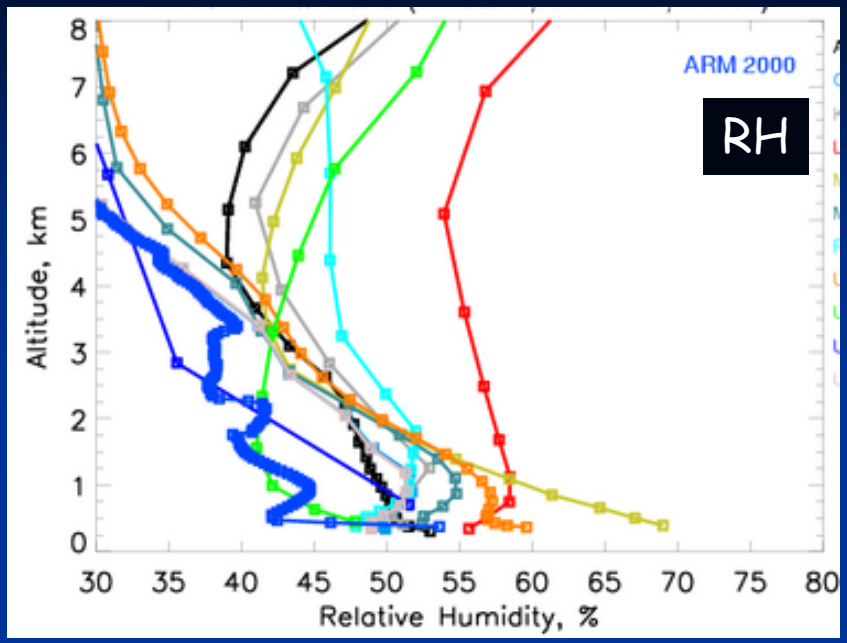
All models give dust as the dominant species except KYU (BCPOM)

Larger concentration for PNNL, ULAQ and UIO_GCM

Larger EC values for KYU and MOZGN

RH and MEC : SGP (remote)

Experiment A



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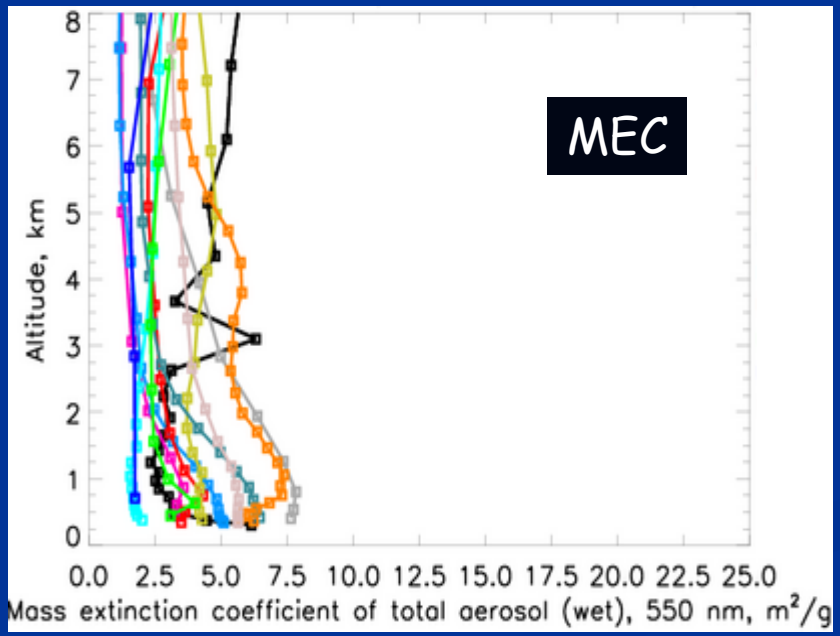


Smaller RH values but larger range of RH values

Also smaller MEC values and smaller range of MEC values (as for Lecce)

Models with the largest values of different parameters

	CONC_AER	RH	MEC550_AER	EC355_AER
Aberystwyth	GOCART, KYU, ULAQ, UMI	MATCH, MOZGN, UIO_CTM, UIO_GCM	GISS, MOZGN, UIO_GCM	GISS, KYU, MOZGN, UIO_GCM, UMI
Hamburg	all except MATCH	MOZGN, UIO_GCM	GISS, MOZGN, UIO_GCM	all except GOCART, MATCH, ULAQ, UIO_CTM
Lecce	GOCART, KYU, MATCH, UMI	MATCH, MOZGN, UIO_CTM	MOZGN, UIO_GCM	KYU, MOZGN
SGP	GOCART, ULAQ, UIO_GCM	LSCE, MATCH, UIO_CTM	KYU, MOZGN, UIO_CTM	KYU, MOZGN (agreement)

Outlook

1st idea :

1. Mean value of CONC, range of MEC => what is the variability of EC550 ?
2. Mean value of MEC, range of CONC => what is the variability of EC550 ?

⇒ link MEC with RH (regression)

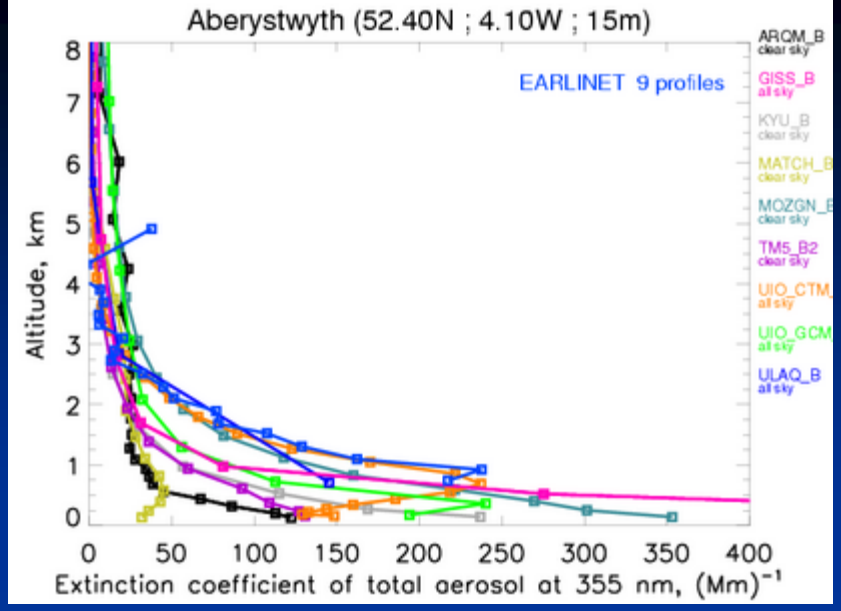
Which variability is the most important ?

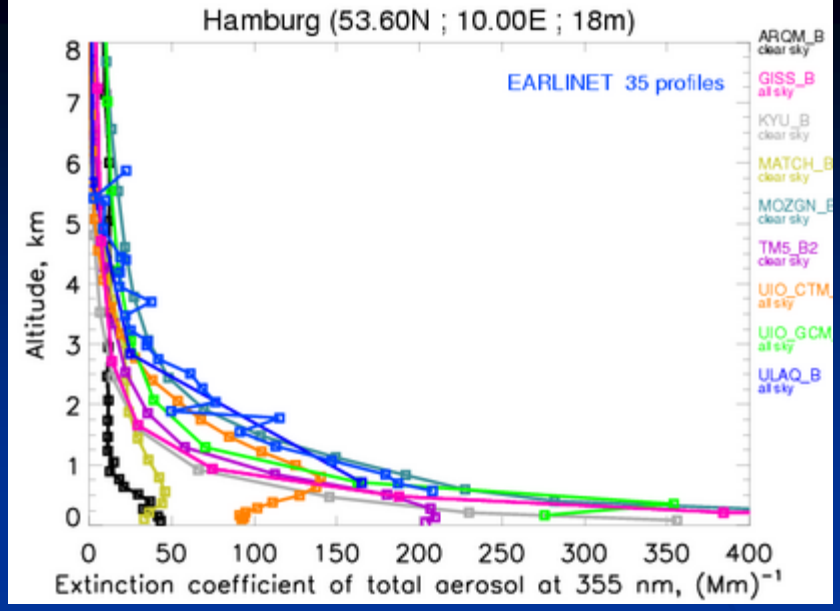
NB : study at 550 nm to eliminate impact of angstrom component

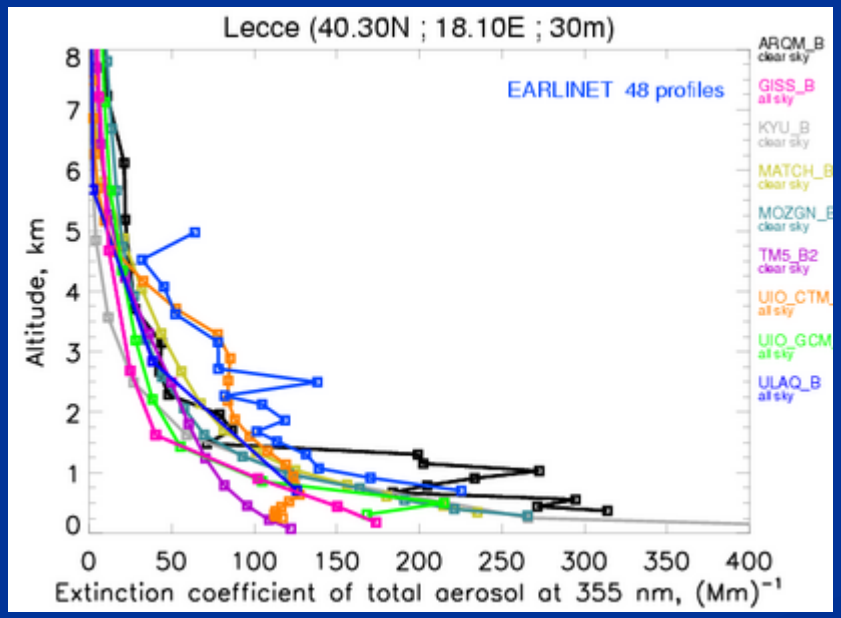
2d idea :

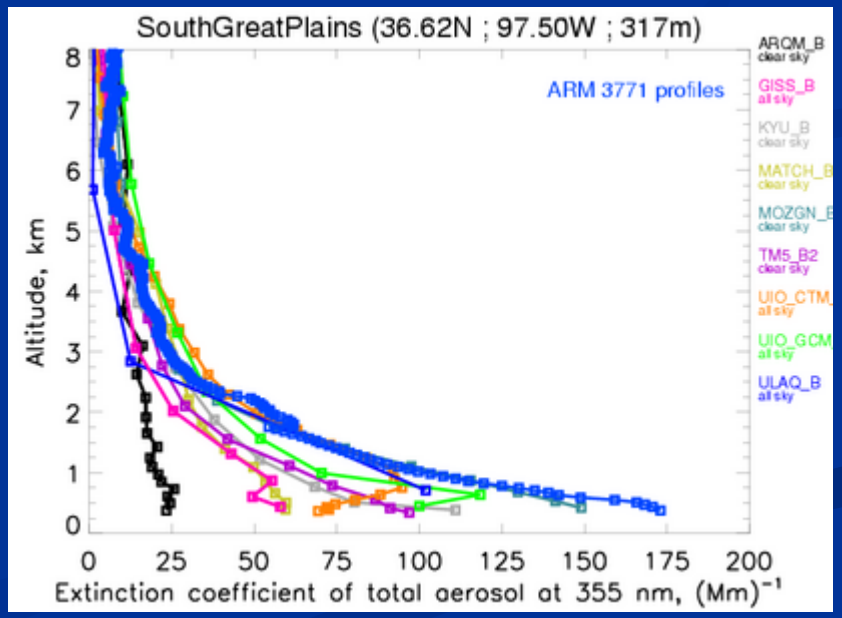
OD550 CONC (5 species) RH MEC550 (5 species)

Applying multi-regression calculation to determine best profile of each parameter
to obtain the measured profile of OD550


Aberystwyth (52.40N ; 4.10W ; 15m)
EARLINET 9 profiles
Altitude, km
Extinction coefficient of total aerosol at 355 nm, (Mm)$^{-1}$
ARQM_B clear sky
GISS_B all sky
KYU_B clear sky
MATCH_B clear sky
MOZGN_B clear sky
TM5_B2 clear sky
UIO_CTM all sky
UIO_GCM all sky
ULAQ_B all sky


Hamburg (53.60N ; 10.00E ; 18m)
EARLINET 35 profiles
Altitude, km
Extinction coefficient of total aerosol at 355 nm, (Mm)$^{-1}$
ARQM_B clear sky
GISS_B all sky
KYU_B clear sky
MATCH_B clear sky
MOZGN_B clear sky
TM5_B2 clear sky
UIO_CTM all sky
UIO_GCM all sky
ULAQ_B all sky


Lecce (40.30N ; 18.10E ; 30m)
EARLINET 48 profiles
Altitude, km
Extinction coefficient of total aerosol at 355 nm, (Mm)$^{-1}$
ARQM_B clear sky
GISS_B all sky
KYU_B clear sky
MATCH_B clear sky
MOZGN_B clear sky
TM5_B2 clear sky
UIO_CTM all sky
UIO_GCM all sky
ULAQ_B all sky


SouthGreatPlains (36.62N ; 97.50W ; 317m)
ARM 3771 profiles
Altitude, km
Extinction coefficient of total aerosol at 355 nm, (Mm)$^{-1}$
ARQM_B clear sky
GISS_B all sky
KYU_B clear sky
MATCH_B clear sky
MOZGN_B clear sky
TM5_B2 clear sky
UIO_CTM all sky
UIO_GCM all sky
ULAQ_B all sky