WHY **Preferred ways to demonstrate (aerosol) forcing skill in global modeling are comparisons in aerosol optical depth to data from ground and space. Comparisons among component models demonstrate strong differences already at the aerosol sub-component level. Thus, agreement in component combined aerosol optical depth may say little about modeling skill.** ***Are 'good' aot totals skillful, just luck (off-setting errors) or a matter of tuning?*** **Investigations of detailed aerosol output of control experiments as proposed in AEROCOM will tell.**

Stefan Kinne and Authors
MPI for Meteorology, Hamburg, Germany

Simulated aerosol components

global fields of yearly averages and monthly range

Models	Resolution	Simulation	Authors
LO LOA	3.75/2.5deg	yr 2000	*Reddy / Boucher*
LS LSCE	3.75/2.5deg	yr 2000	*Hauglustine /Schulz*
UL ULAQ	10/22.5deg	yr 2000	*Pitari / Montenaro*
SP SPRINTARS	1.3/1.3deg	yr 2000	*Takemura*
CA CANADA	2.8/2.8deg	1yr avg	*Gong*
MI MIRAGE	2.5/2.0deg	yr 2000	*Ghan / Easter*
NF NCAR-Match	1.9/1.9deg	yr 2000	*Fillmore / Collins*
NM NCAR-Mozart	2.8/2.8deg	1yr avg	*Tie / Brasseur*
OT OSLO	1.9/1.9deg	yr 1996	*Myhrne /Isaksen*
IM IMPACT	2.5/2.0deg	3yr avg	*Liu/ Penner*
EH ECHAM5	2.8/2.8deg	3yr avg	*Stier / Feichter*
EL ECHAM4	3.8/3.8deg	3yr avg	*Lohmann /Feichter*
IM IMPACT	5.0/5.0deg	1yr avg	*Herzog / Penner*
GO GOCART	2.0/2.5deg	yr 2000	*Chin / Ginoux*
GR GRANTOUR	5.0/5.0deg	1yr avg	*Herzog / Penner*
GI GISS	4.0/5.0deg	3yr avg	*Koch / Tegen*
HA HADAM4	2.5/3.8deg	5yr avg	*Roberts / Jones*
EM ECHAM4	3.8/3.8deg	3yr avg	*Hendricks /Sausen*

Human activity has increased atmospheric concentrations of greenhouse gases and aerosol. Our understanding of assocaited climatic impact is largely based on global modeling. And uncertainties with respect to aerosol have remained large. For an improved representation new aerosol modules in global modeling now distinguish between sulfate, organic carbon, black carbon, dust and sea-salt aerosol types. Here simulations of 18 models are presented. These are (in terms for forcing: intermediate products of) mass and aerosol optical depth and the conversion factor from mass into optical depth; the aerosolmass extinction efficiency.

RESULTS

- **overall agreement for source location, but differences in strength**
- **large differences in simulated transport (and / or removal rates)**
- **large differences in conversion (of mass into optical depth)** ***due to***
  - ***size assumptions***
  - ***humidification assumptions***
  - ***ambient relative humidity used***

⇨ **extra comparisons needed to identify/ remove poor assumptions**

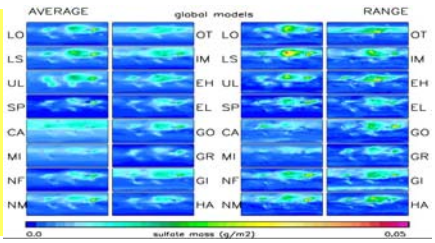
RESULTS

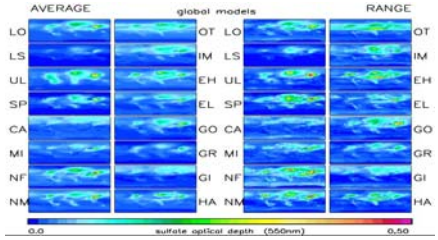
AEROSOL MASS

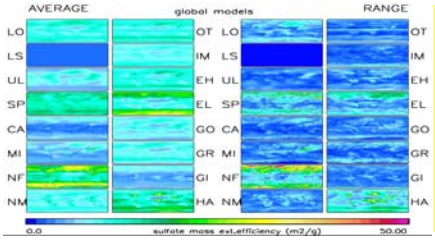
AEROSOL OPTICAL DEPTH

AEROSOL MASS EXT. EFF.

sulfate

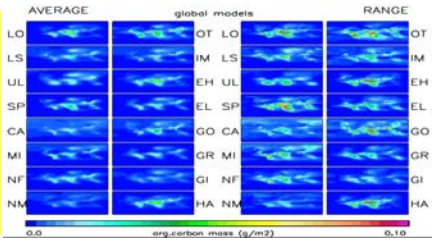


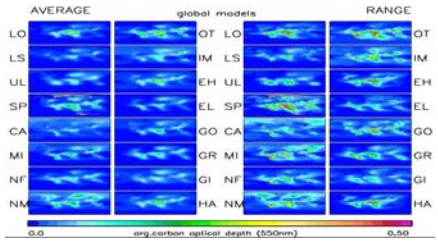


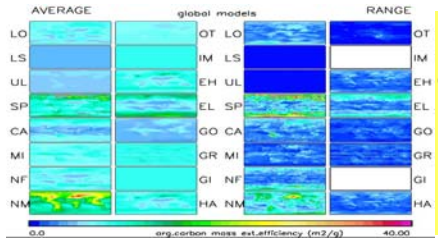


sulfate

org. carbon

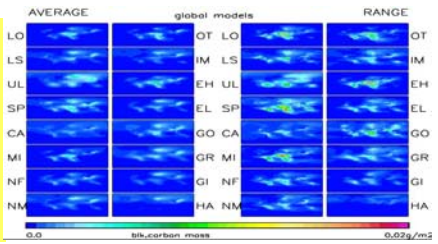


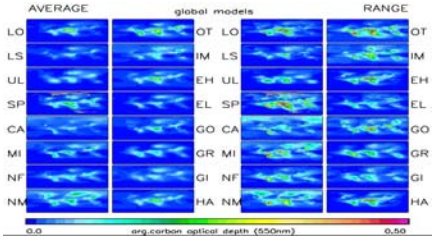


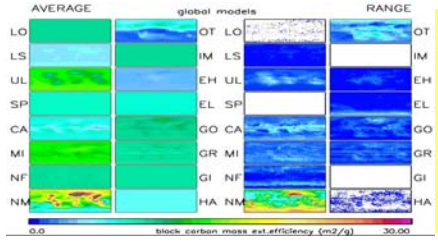


org. carbon

black carbon

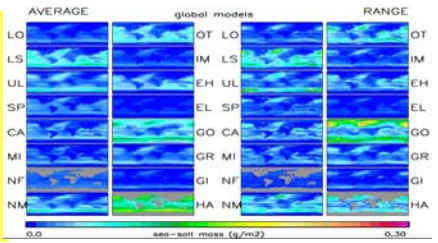


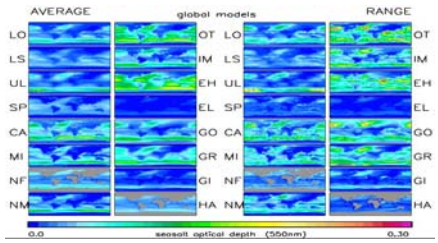


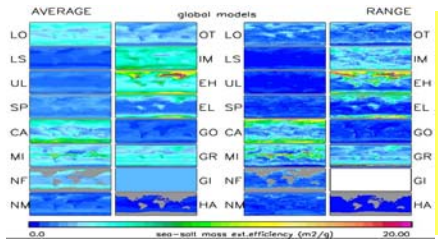


black carbon

sea-salt

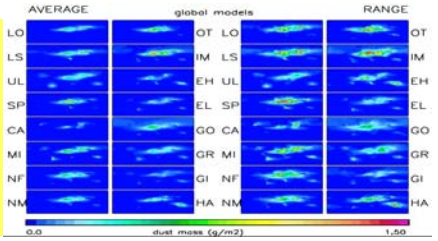


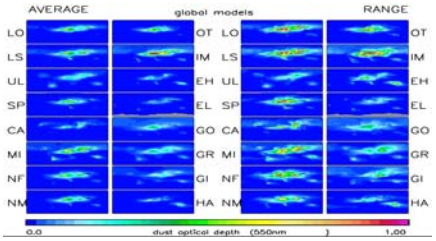


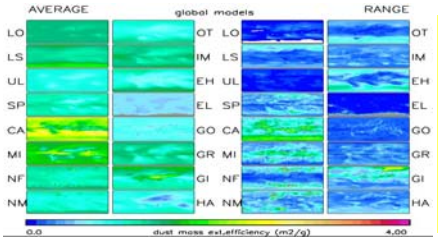


sea-salt

dust

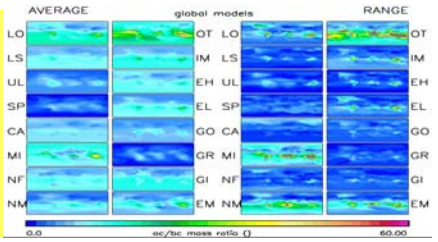


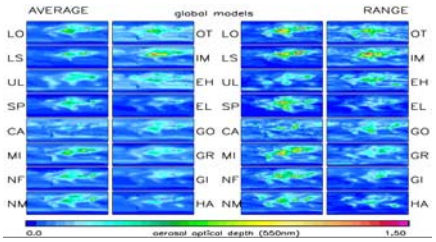




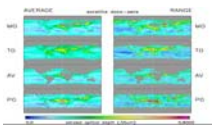
dust

oc/bc ratio





total aot



Satellite-Data

MO	MODIS	(2001)	*Chu / Kaufman (NASA)*
AV	AVHRR	(1985-1988)	*Mishchenko / Geo. (NASA)*
TO	TOMS	(1979-2001)	*Torres / Herman (NASA)*
PO	POLDER	(1986-1987)	*Goulomb / Tanre (LOA)*

satellite aot

next **AEROCOM project**
⇨ **detailed evaluations**

- to understand reasons for differences in mass to optical depth conversions among models: ***identical year, identical water uptake***
- to identify major causes for differences in mass distribution, including transport: ***identical inventories (sources), identical meteorology***
- to understand observed seasonal and regional patterns of aerosol/chemistry: ***satellite data, field studies, long-term monitoring***