

# WHY

There are more differences among component models than a comparison of total aots would suggest  
 New aerosol components in global (climate) models distinguish between sulfate, organic carbon, black carbon, dust and sea-salt. The sum of all aerosol types provide the totals. *Are good totals for optical depth skillful or just luck?*



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## Simulated aerosol components global fields of yearly averages and seasonality\*

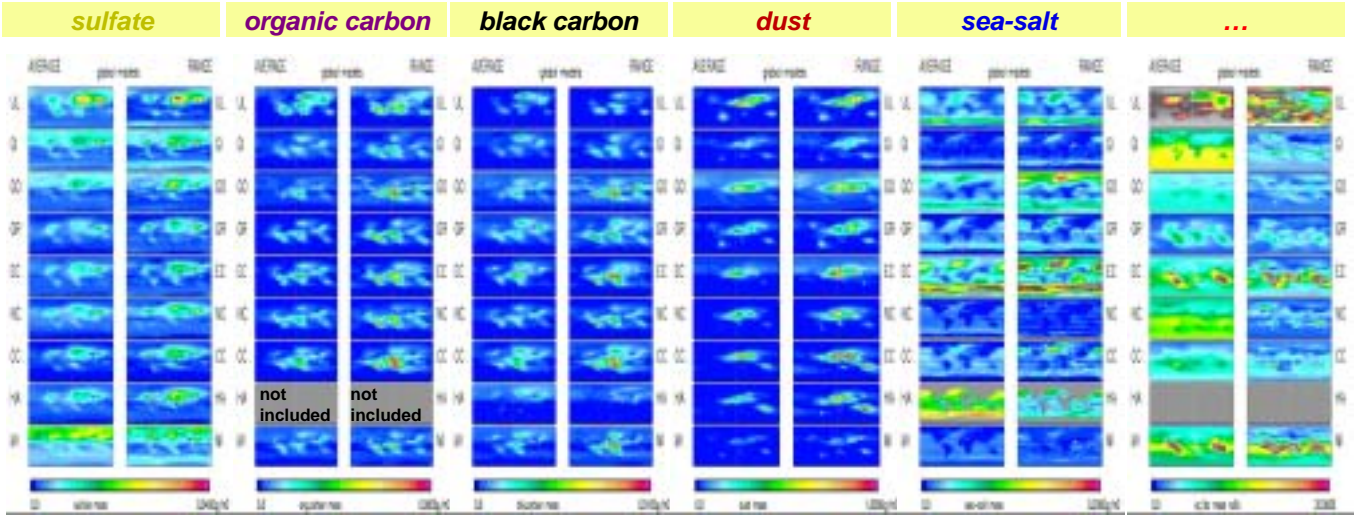
\* seasonality = range of 3 month running means

### Models

Model	Resolution	Simulation	Authors
• ULAQ (GCM)	10/22.5deg	3yr avg	Pitari
• GISS (GCM)	4.0/5.0deg	3yr avg	Koch / Tegen
• GOCART (CTM)	2.0/2.5deg	(90, 96, 97)	Chin / Ginoux
• Grantour (GCM)	5.0/5.0deg	1yr avg	Herzog / Penner
• ECHAM4 (GCM)	3.8/3.8deg	3yr avg	Feichter / Lohmann / Schulz
• NCAR (GCM)	1.9/1.8deg	(95-00)	Collins / Rasch
• CCSR (CTM)	2.8/2.8deg	(90)	Takemura / Nakajima
• HadAM4 (GCM)	2.5/3.8deg	5yr avg	Roberts / Jones
• MIRAGE (GC/TM)	2.8/2.8deg	(6/94-5/95)	Ghan / Easter

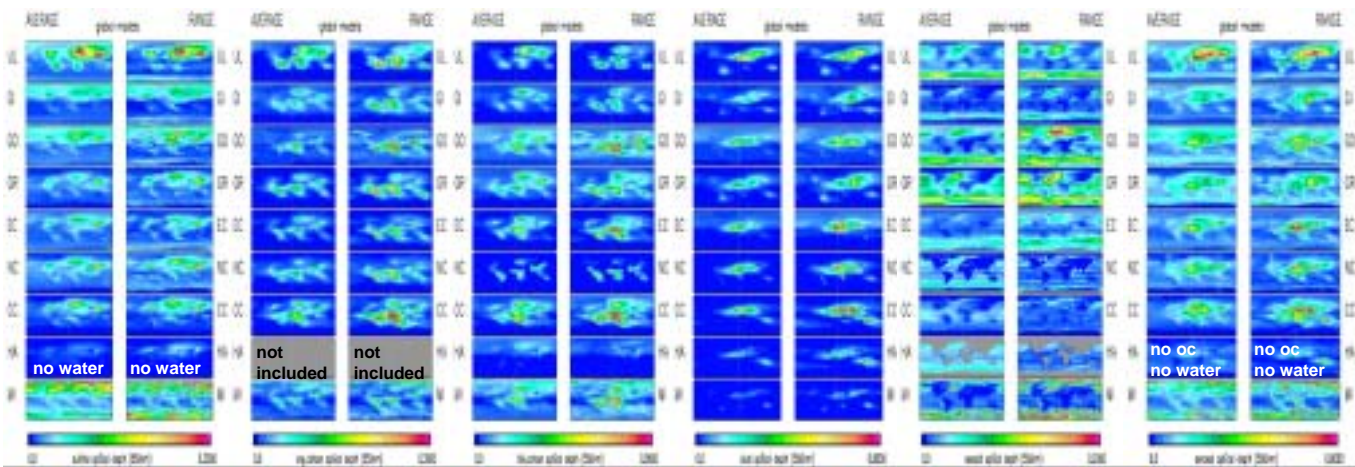
### Message

- overall agreement for source location, but difference 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



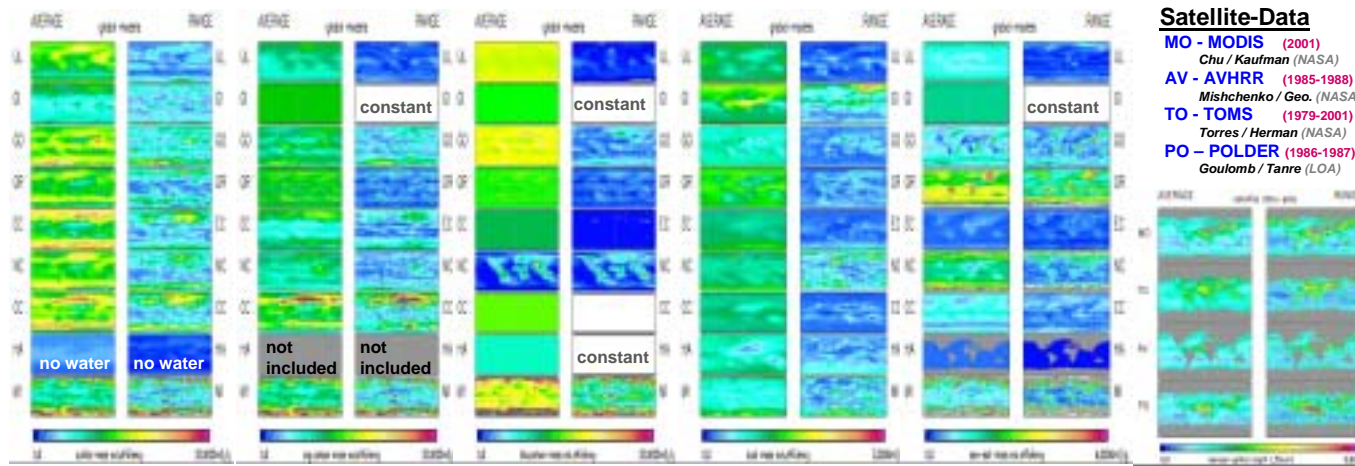
AEROSOL MASS

oc / bc ratio



AEROSOL mid-visible OPTICAL DEPTH

total aot



AEROSOL mid-visible MASS EXTINCTION EFFICIENCY

satellite 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)

### next

- Add. Comparisons: - to understand reasons for differences in mass to optical depth conversions among models: *identical year, identical water uptake*  
 AEROCOM project - 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*