AeroCom

The Project

Objectives

- ***document*** **and** ***understand differences*** **in aerosol modules of global models**
- ***investigate*** **impact und** ***uncertainty*** **of**
  - **source strength**
  - **chemistry** ***(gas to particle conversion)***
  - **vertical transport and removal**
  - **aerosol properties** ***(size, composition, water uptake)***
  - **radiative transfer simplifications**
- ***combine*** **diverse** ***quality data-sets*** **for the best data references** ***(with uncertainty estim.)*** **for model evaluations**
- **provide a** ***forum for communications*** **among and between modeling-groups and data-groups**

Activities

- ***MODELING*** *(sulfate, dust, sea-salt, b+c carbon, aero-water)*
  - **Experiment A :** **Models as they are**
  - **Experiment B :** **Models with prescribed sources** (in a nudged mode) for the year 2000
- ***EVALUATION***
  - **test models for consistency**
  - **compare models to the best available data** *(see next item)*
- ***DATA-Preparation***
  - **combine different global data-sets**
    - *use the strengths of individual data (MODIS / MISR / TOMS)*
  - **evaluate and identify good ground-sites**
    - *test regional representation with MODIS (+MISR) scaling*
    - *merge good sites, if possible (dense data, field experiments)*

R (1)

Request for common model output

daily

LY OUTPUT	each Species	total Aeroso	Remark	proposed unit
aily (instantaneous, at local noon time, thus varying e time of output depending on longitude, column tegrated values, though all values from all longitudes for one day stored in one record corresponding to 12UTC)			Daily local noon time data are chosen to facilitate the comparison with satellite observations while keeping the output routines simple	
o dry mass for each species	X		column sum	[kg/m2]
o dry mass for radii below 0.50um for each species	X		column sum	[kg/m2]
o dry mass for radii above 1.25um for each species	X		column sum	[kg/m2]
o aerosol water mass		X	column sum	[kg/m2]
o effective dry radius		X	3 * (Sum of Aerosol Volume per column) / (Sum of Aerosol Surface Area per column)	[µm]
o effective dry radius for radii below 0.50um		X	see above	[µm]
o effective dry radius for radii above 0.50um		X	see above	[µm]
Precision: MODELS WHICH COMPUTE OPTICAL PROPERTIES JUST IN CLOUDFREE AREA PROVIDE THOSE VALUES				
o optical depth (at 550 nm wavelength) for each	X		based on wet radius	[]
o optical depth (at 865 nm wavelength) for each	X		based on wet radius	[]
o optical depth at 550 nm for each species fine	X		wet radius <1 um / 2001 only / Modis parameter	[]
o optical depth at 550 nm for each species	X		wet radius >1 um / 2001 only / Modis parameter	[]
o absorption at 550 nm		X	sum of aerosol absorption at 550 nm	[]
o cloud cover fraction			column integrated value of cloud cover, computed as used in radiation code of respective model	[%]
o relative humidity			average achieved by weighting with optical depth at 550 nm from each level; all sky relative humidity computed first at each level RH= f(ave(T),ave(q)). Weighting from l levels: $Sum(RH_l*OD_l)/Sum(OD_l)$	[%]
o pressure			average achieved by weighting with optical depth at 550 nm from each level. Weighting from l levels: $Sum(P_l*OD_l)/Sum(OD_l)$	
Daily (instantaneous everywhere at UTC 12:00)				
o optical depth at 550 nm wavelength for each	X			[]
Daily (daily average from 0 UTC to 24 UTC)				
o optical depth at 550 nm wavelength for each	X			[]

R (2)

Request for common model output

monthly

MONTHLY OUTPUT	each Specie	total	Remark
Monthly (sum over all time steps)			
o column wet deposition for each species	X		sum over month
o surface turbulent dry deposition for each species	X		sum over month, without sedementation
o surface sedimentation for each species	X		sum over month
o source flux for each species	X		surface emissions and possibly production at altitude integrated to 2D field; sum over month / for SEA SALT flux is given just for particles below 20 um at 80 r.H.
Monthly (mean from all time steps, vertical resolved, except surface pressure)			
o dry mass loading for each species	X		3D mean of any grid box in month
o number loading for each species	X		since modal schemes output rather this info and with regard to indirect effect
o dry mass fraction below 0.50um for each	X		dry radii
o dry mass fraction above 1.25um for each	X		dry radii
o aerosol water mass			
o effective dry radius		X	see DAILY OUTPUT for definition
o effective radius for dry radii below 0.50um		X	see DAILY OUTPUT for definition
o effective radius for dry radii above 0.50um		X	see DAILY OUTPUT for definition
o temperature			3D field
o surface pressure			-- 2D field --
o relative humidity			3D field all sky relative humidity; RH=
o precipitation rate			3D field
Monthly (mean fraction from all time steps, vertical resolved for relative humidity)			
o time fraction with relative humidity between			3D field
o time fraction with relative humidity between			3D field
o time fraction with relative humidity between			3D field
o time fraction with relative humidity between			3D field
o time fraction with wind speed >5 m/s (at 10			2D field
o time fraction with wind speed >8 m/s (at 10 m height)			2D field
o time fraction with wind speed >10 m/s (at 10 m height)			2D field
Monthly (mean for cloudfree fraction, data taken at local noon, use cloud cover fraction in each grid box as defined by radiation code to mask data, see also DAILY OUTPUT, vertical resolved)			use LOCAL NOON time below !!

Participating Models

Name	Location	Model
H.Feichter	Hamburg MPI	ECHAM5-M7-GCM
S.Metzger	Mainz MPI	ECHAM5-M7-EQSAM-GCM
T. Takemura	Kyushu Univ.	Sprintars-GCM
B.Collins	Boulder, NCAR	NCAR-CCM-GCM
S.Ghan	Richland PNNL	MIRAGE-GCM
M.Schulz	Paris LSCE	LMDzT-INCA-GCM
O.Boucher	Lille LOA	LMDzT-GCM
G.Myhre	Oslo Univ.	O-CTM2
I Tegen	Jena, MPI	TM3
M Krol	Uetrecht Univ.	TM5
G.Lesins	Dalhousie Univ.	CanGCM
T. Iversen	Dept Geophysik	NCAR CCM3.2
S.Gong	Toronto Met Service	CanGCM –II

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Yves Balkanski, Olivier Boucher, Phil Rasch, Ina Tegen, Julian Wilson, Cyril Moulin, Hans Feichter, Gerrit de Leeuw , Sun-Ling Gong, Mian Chin, Joyce Penner, Cathy Liousse

- **WEBSITE**: *http://nansen.ipsl.jussieu.fr/AEROCOM/*