

the **AeroCom** project

an international collaboration

*diagnostics of aerosol modules
in global models*

Michael Schulz, Christiane Textor, Sarah Guibert

LSCE, Gif-sur Yvette, France

Stefan Kinne

MPI-Meteorology, Hamburg Germany

Outline

- **AeroCom - Structure**
- **AeroCom - Products**
- **AeroCom - Data Questions**
- **AeroCom - IPCC forcing contributions**
- **AeroCom - Aerosol-Cloud Interactions**
- **AeroCom - Next workshops**
- **AeroCom - Planned Publications**

AeroCom Structure

- web-supported access
 - to general information (unprotected)
 - to model evaluations (password protected)
- evaluations volunteers needed (particular topics)
 - 'guest scientist visits' to LSCE or MPI-Met
- publications only with 'OK' from data contributors
 - acknowledgements need to be given
- set policy for using AEROCOM products
 - average model climatology
 - contribution to IPCC

AeroCom Products (1)

- prescribed sources for the year 2000 (at JRC)
- prescribed biomass sources for 1995 to 2001 (at JRC)
- model evaluations to other models and data (at Saclay)
 - Experiment A : your best effort / your climatological mean
 - Experiment B : nudged year 2000 simulations with pre.sources
- global aerosol/cloud data for the year 2000 (at JRC)
 - MODIS (daily quality data!)
 - MISR
 - ISCCP
 - AERONET
- other year 2000 data (*via Sarah/Christiane/Stefan*)
 - aircraft (DOE-CART, CARIBIC-data [upper trop. sulfur and conc.])
 - campaigns (Ace-Asia [2001], Safari[2000],...)
 - lidar-data (DOE-CART, Earlinet, ...)

AeroCom Products (2)

- documentation of model quality
- radiative forcing (direct aerosol)
 - based on all models that do it (→ e-mail)
 - based on off-line calculations with one model for diff. aot fields
 - based on measurements
 - MODIS (regional) [clear-sky]
 - AERONET (local) [clear-sky]
 - MODIS/AERONET/ISCCP [attempt at all sky]
 - MODIS/AERONET/ICCSP/model(anthr.fraction) [attempt at all-sky]
- Aerosol climatology
 - average from the ‘best’ components

Data Questions (1)

- data quality assessment needed (*‘quality assured’?*)
- definition for cloud-free (*e.g. cloudfree vs cloudy aot*)
- clarify need for noon data (*comp. to daily mean aot*)
- investigate lifetime of equal (mode) sized particles
- investigate influence of assumed size and rh on MEE
- investigate transport: model differences / uncertainty
- investigate diff. of nudged vs climatological simulations

Data Questions (2)

- quantify the influence of differences of meteorology (versus aerosol field differences) on forcing?
- what are the contribution of anthropogenic aerosol components to total aerosol opt.depth and forcing?
- distinguish natural and anthropogenic components by fine size mode ($<1\mu\text{m}$) / coarse size mode ($>1\mu\text{m}$)
- investigate where/when: anthropogenic = fine mode
- use models to quantify anthropogenic contributions to accumulation mode (*in support of measurement based forcing estimates*)
- investigate effect of different aerosol mixing assumptions on anthropogenic forcing estimate (e.g. *how important is internal component mixing?*)

IPCC contributions

- aerosol forcing from a data perspective (MODIS)
 - ca -8 W/m² clear-sky over oceans globally averaged
 - aot (*limitations to values smaller than 0.8*)
 - globally 0.17 / ocean cloud-free 0.09 / ocean clear-sky 0.15
- less clouds under heavy biomass burning
 - meteorological effect?
 - indirect effect ? (warming: if albedo effect > aero absorption)
(cloud presence and cloud aerosol relative altitude important !)
- 'data' need help from models for anthropogenic effect
- working group (Boucher, Kaufman,)

Aerosol-Cloud Interactions

- Phase 1: Collect data on correlation,
 - where are signatures, do we understand them
 - use them as tests of aerosol –cloud interac. simulations
- Phase 2: What and where are uncertainties
(for the aerosol indirect effect)
 - we need to break down potential contributions with sensitivities
 - specify aerosol-fields / use individual data
 - specify aerosol/conversion / use individual conversion
 - validate with satellite data, field experiments?
- working group (Penner, Menon, Quass, Feijt, Kinne, ...)

next workshops

- **full workshops**
 - November 2004, New York
 - May 2005, Oslo
- **focused workshops**
 - Aerosol Forcing **TBD**
 - Aerosol-Cloud interactions **TBD**
 - opportunity based (e.g. AGU, EGS ...)
- **needed actions**
 - assure funding
 - invite specialists

Planned Publications

- *try to make the fall special issue « global aerosol », edited by Kaufman and Tanre, JGR*
- **Schulz:** the AEROCOM project
- **Dentener:** the AEROCOM aerosol emission source for year 2000
- **Textor:** an analysis of global aerosol distributions from AEROCOM models
- **Guibert:** evaluation of AEROCOM models against AERONET and surface observations
- **Kinne:** comparison of aerosol products among satellite data and to AERONET and models

other publication topics

- **assess the range of uncertainty of aerosol parameters needed to calculate direct aerosol radiative forcing from AEROCOM model results**
- **assess how uncertainty in aerosol fields and meteorological fields propagates into uncertainties of associated radiative forcing**
 - globally
 - regionally and/or seasonally
- **assess the ability of models to reproduce ‘observed’ aerosol cloud interactions – in efforts to reduce indirect aerosol forcing estimates**