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AeroCom update

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Recent papers from AeroCom
Examples of validation via AeroCom
Ongoing AeroCom experiments
AerChemMIP
Next workshop in Frascati



Tsigaridis, K. et al., *The AeroCom evaluation and intercomparison of organic aerosol in global models.* ACP, 14 (19), 10845-10895, 2014.

Samset, B. H. et al., *Modelled black carbon radiative forcing and atmospheric lifetime in AeroCom Phase II constrained by aircraft observations,* ACP, 14, 12465-12477, 2014.

Kim, D. et al., *Sources, sinks, and transatlantic transport of North African dust aerosol: A multimodel analysis and comparison with remote sensing data.* JGR-Atm, 119 (10), 6259-6277, 2014.

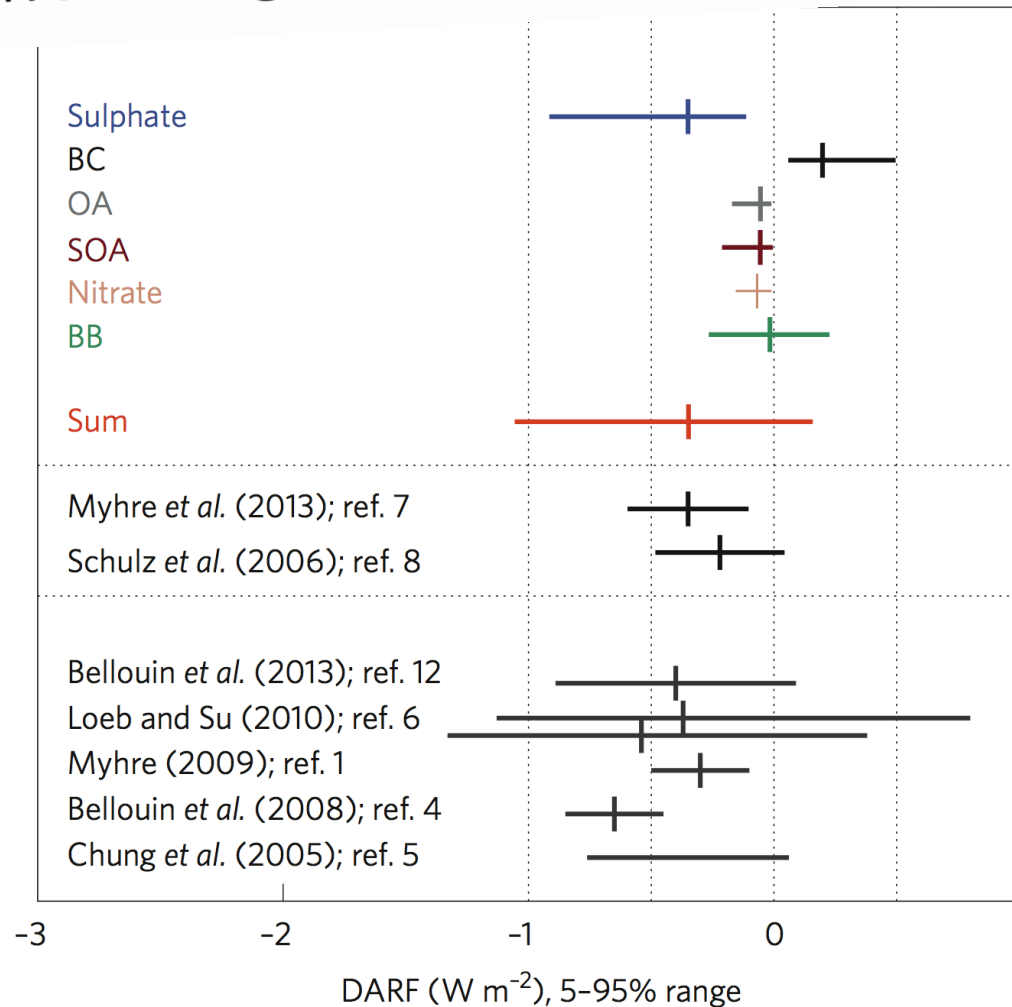
Samset, B. H.; Myhre, G.; Schulz, M., *Upward adjustment needed for aerosol radiative forcing uncertainty.* Nature Climate Change, 4 (4), 230-232, 2014.

Mann, G. W., *Intercomparison and evaluation of global aerosol microphysical properties among AeroCom models of a range of complexity.* ACP, 14 (9), 4679-4713, 2014.

Jiao, C. *An AeroCom assessment of black carbon in Arctic snow and sea ice.* ACP, 14 (5), 2399-2417, 2014

CORRESPONDENCE:

Upward adjustment needed for aerosol radiative forcing uncertainty



Samset, Myhre & Schulz
Nature Climate Change, 2014, 4
(4), 230-232

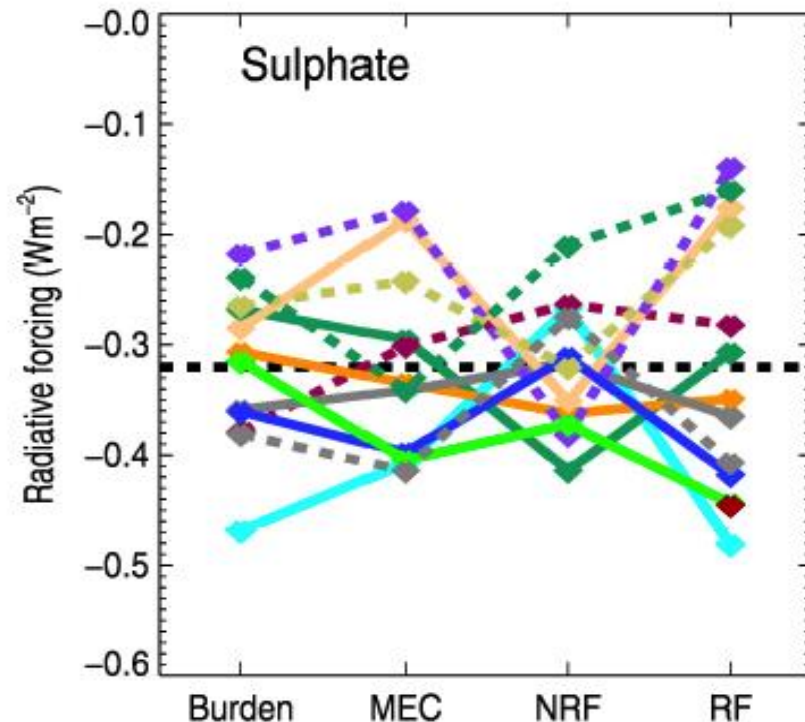
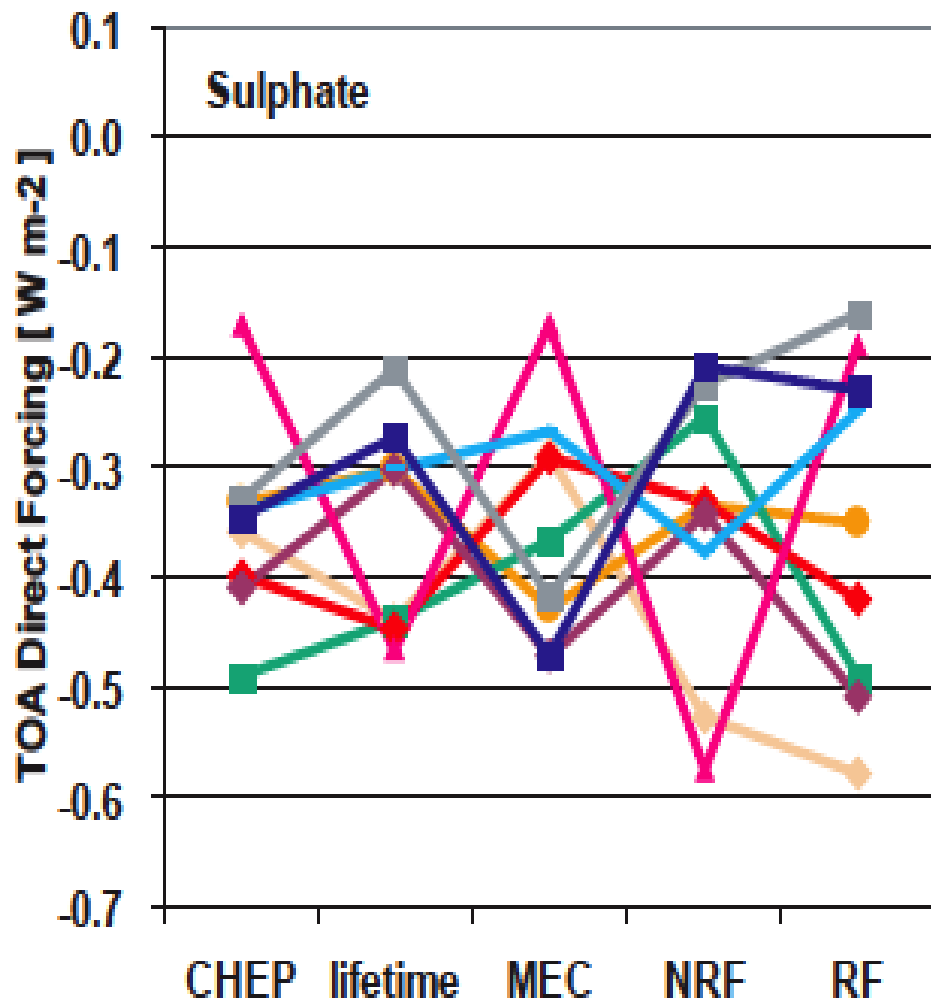
Sulphate burden to forcing

AeroCom I => AeroCom II

Schulz ACP 2007 => Myhre ACP 2013



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CHEP= Chemical Production
 MEC= Mass extinction coefficient
 NRF= Forcing efficiency per AOD
 RF = Direct Forcing



EXAMPLES OF VALIDATION VIA AEROCOM

http://aerocom.met.no/cgi-bin/aerocom/surfobs_annualrs.pl



Aerocom Phase II INTERFACE

[aerocom.met.no/cgi-bin/aerocom/surfobs_annualrs.pl](#)

Innblikk FOU.KL WebOfSci Scholar ACP He/NoDE Go/NoDe WikiNO WikiDE AEROCOM oslo work News AeroWarn Maps Google Drive

MACC Project - AEROCOM VALIDATION interface Aerocom Phase II INTERFACE

- Hemispheric Transport of Air Pollution - MODEL evaluation

Project-> Subset/Paper-> 2-Panels



Graph: Dataset: Variable:

Graph: Dataset: Variable:

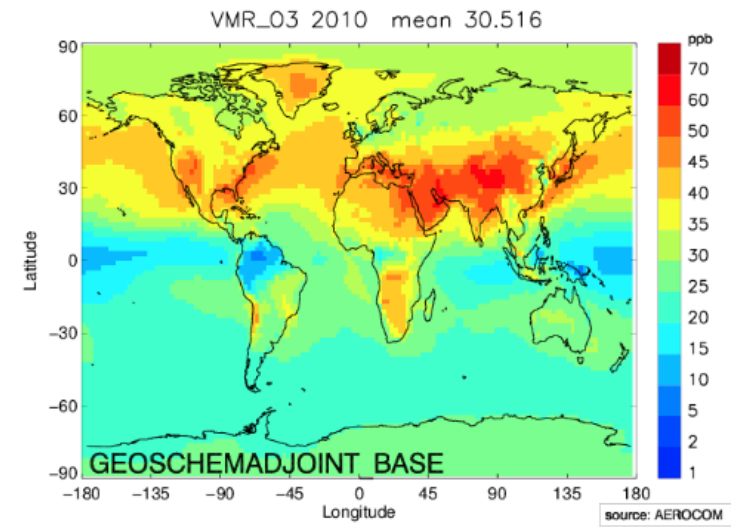
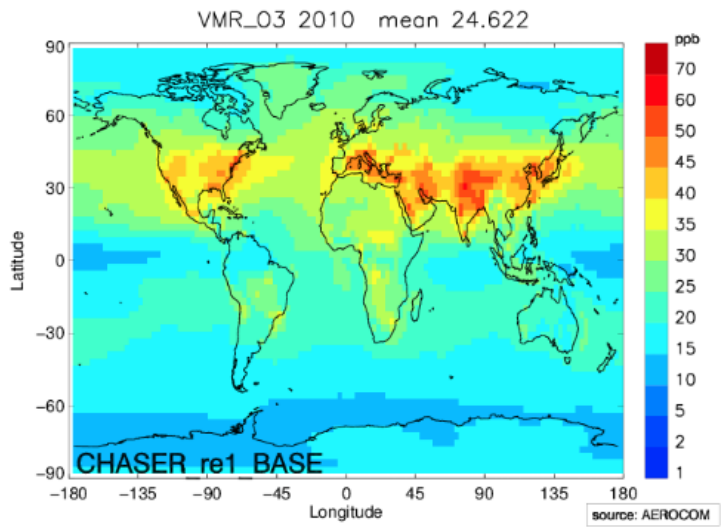


image created 09.03.2015 21:18

image created 13.01.2015 12:36

Filter models w RegExpr: Models/Stations on year: Models on variables:



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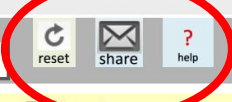
New features of AeroCom webinterface

http://aerocom.met.no/cgi-bin/aerocom/surfobs_annualrs.pl



- AEROCOM phase II INTERFACE - MODEL versus DATA, Model maps & scores

Project-> EMEP Subset/Paper-> MyList 2-Panels SYNCHRONISE PANELS



Graph Dataset Variable
SERIES EMEP_svn2982_150422ST_Trend SCONC_BC
DE-Melpitz an2012 Monthly All Year EBAS

Graph Dataset Variable
SERIES OBSERVATIONS-ONLY SCONC_BC
DE-Melpitz an2012 Monthly All Year EBASMC

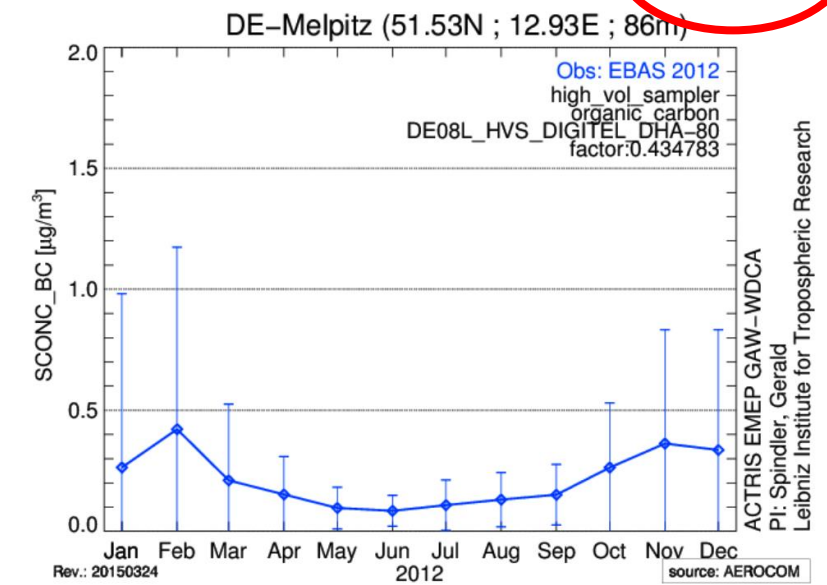
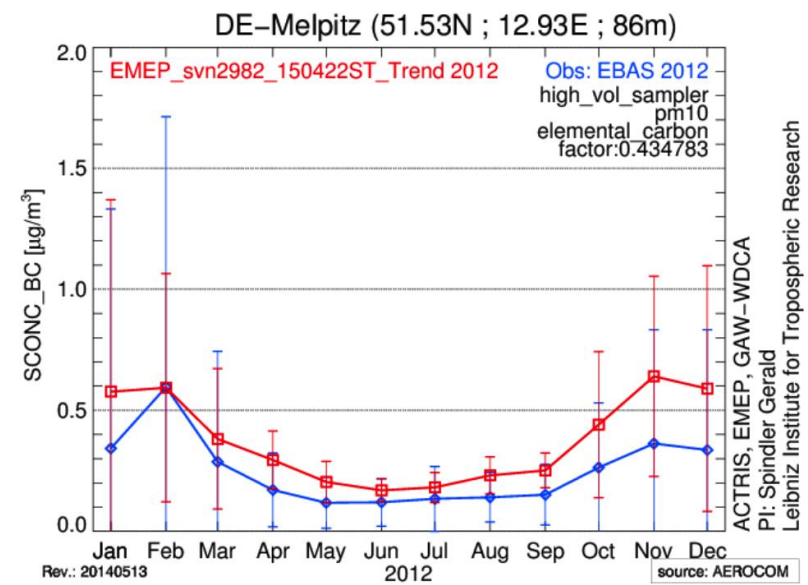


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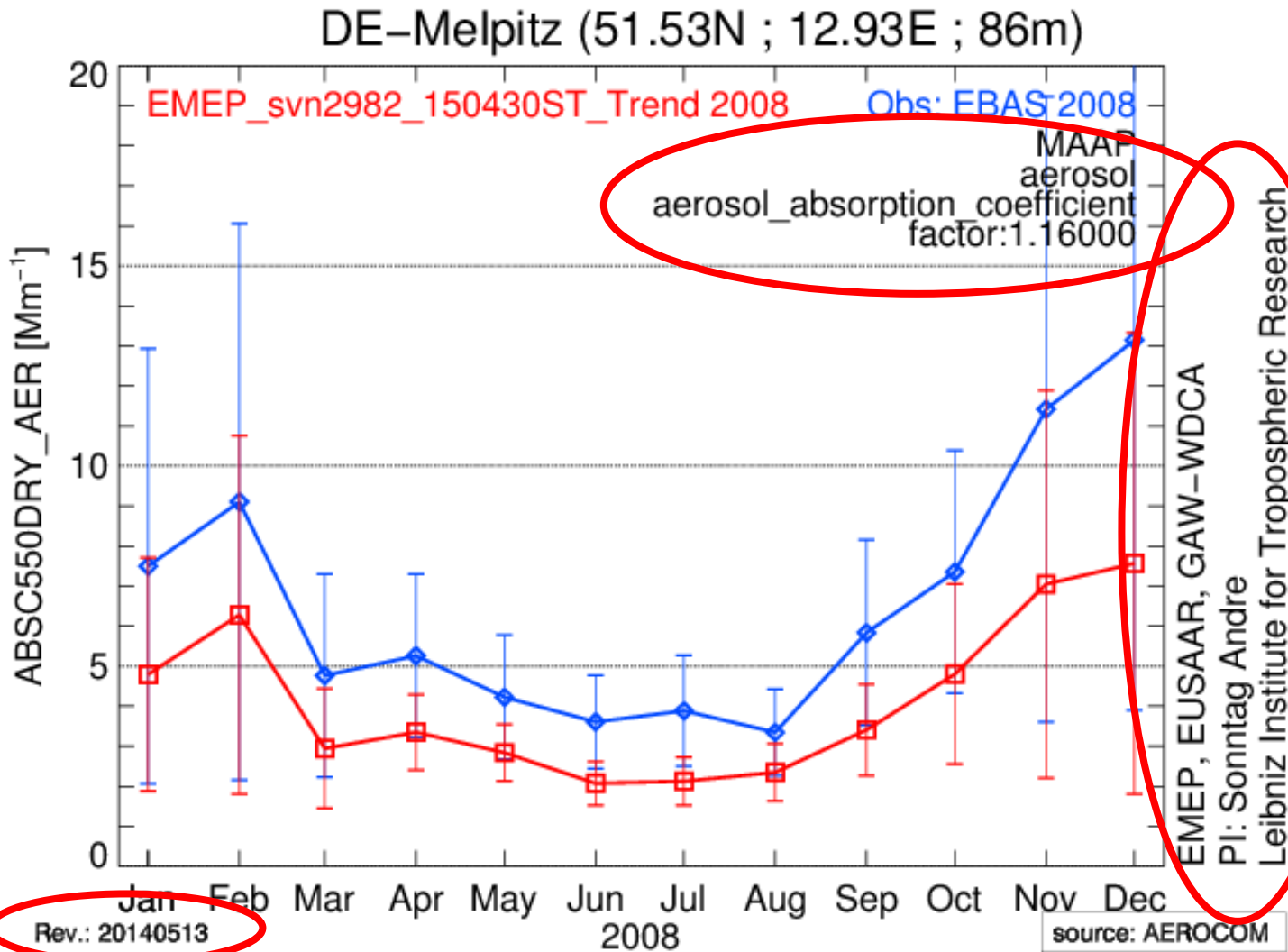
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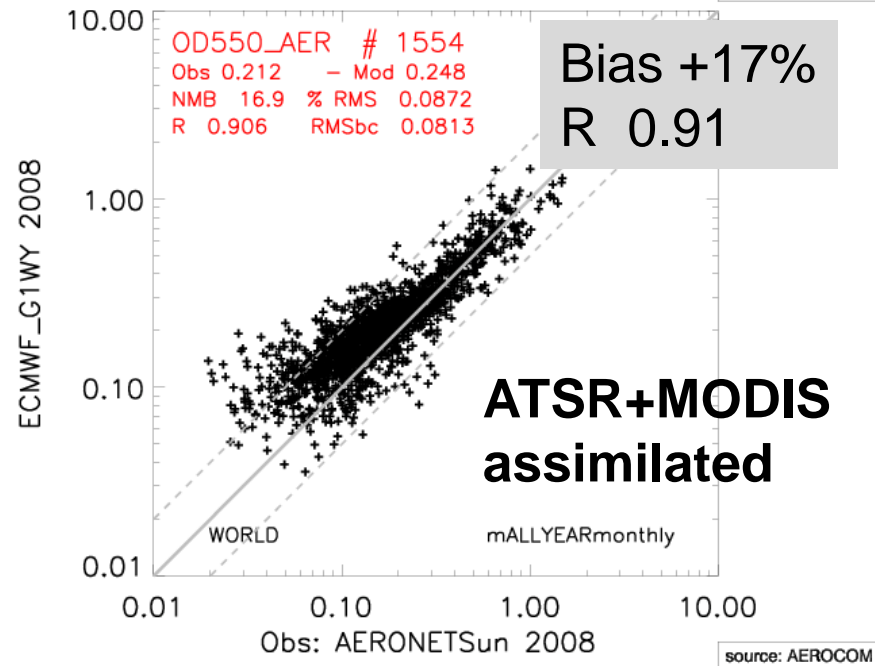
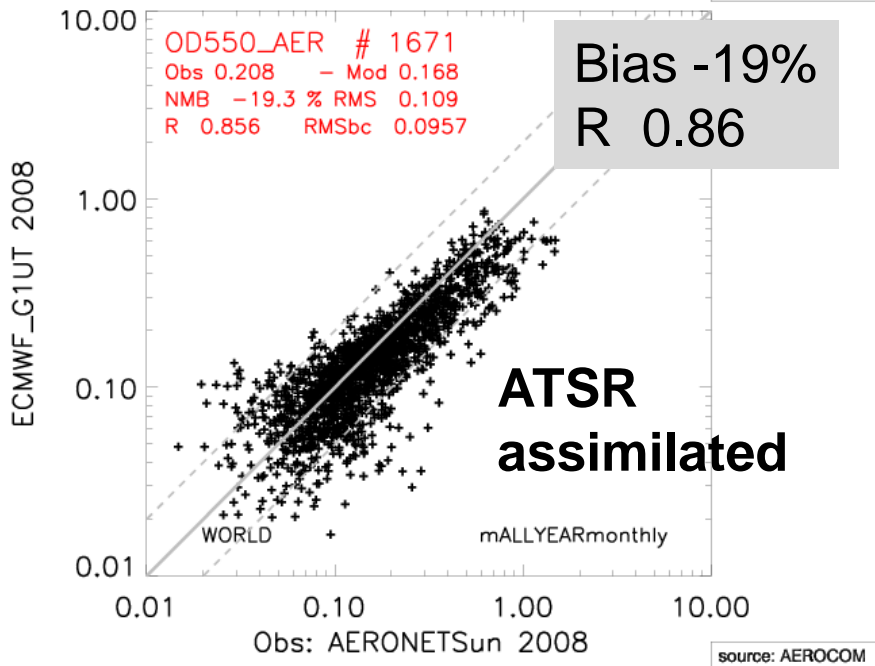
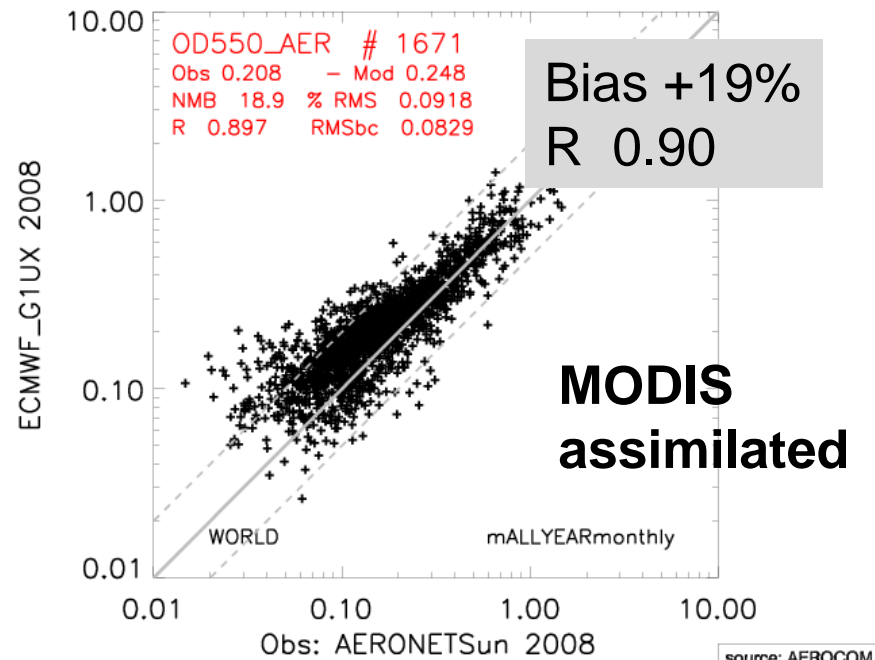
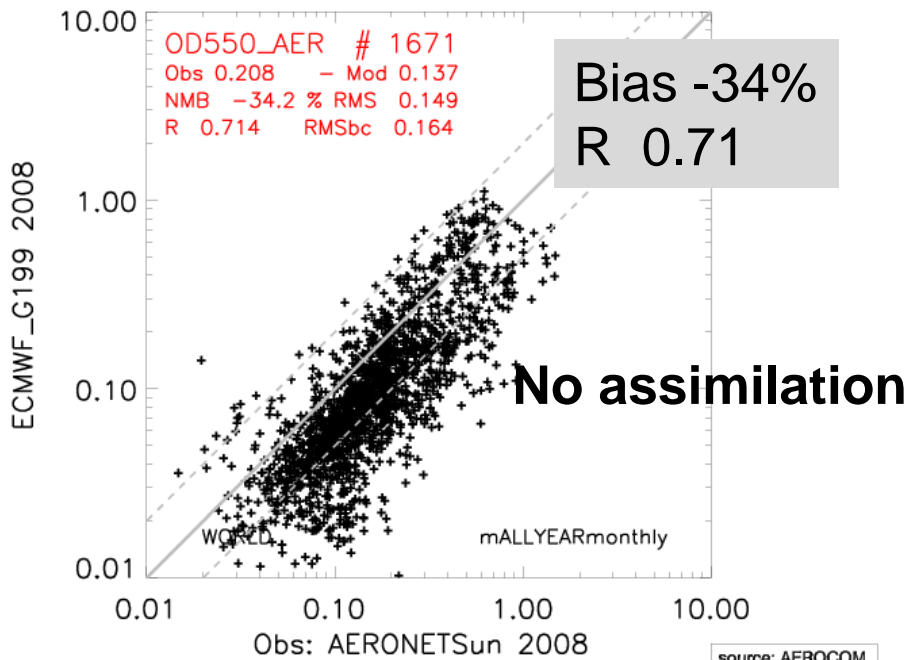
Show info hovering over image Edit Subset "MyList" Show URL to current

Filter models w RegExpr: Models/Stations on year: ALLYEARS Models on variables: ALLVARS



New features of AeroCom webinterface II



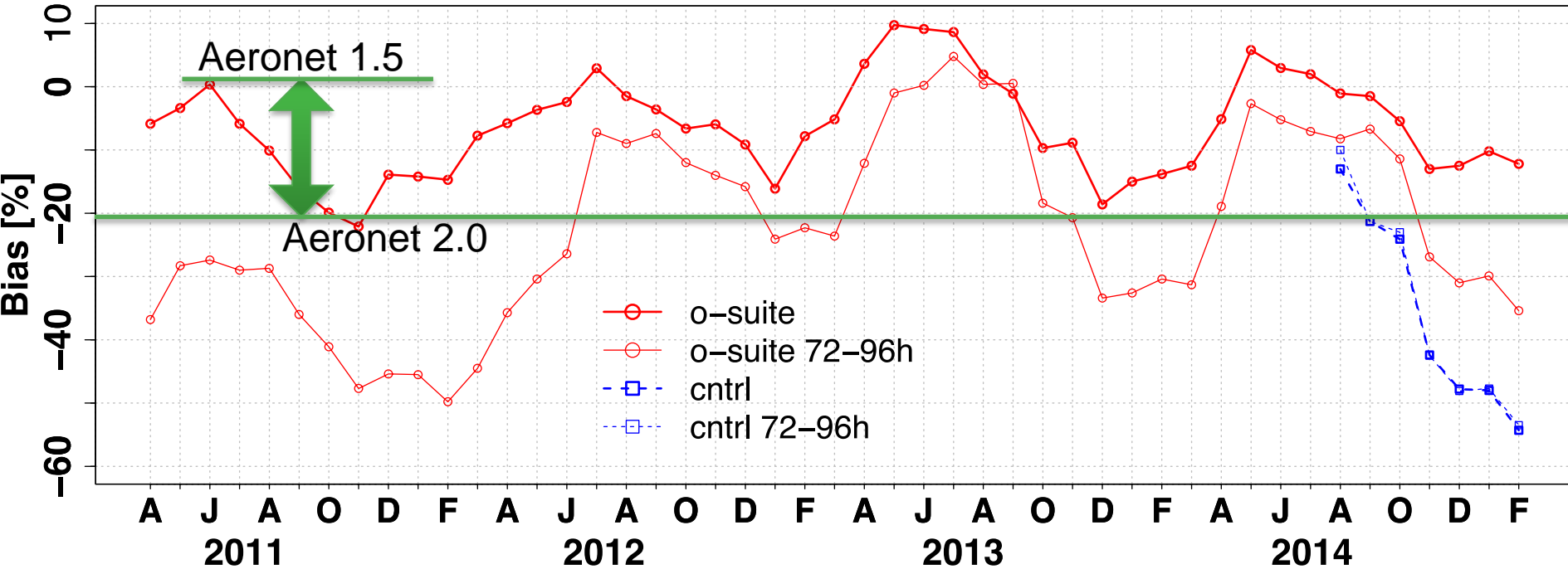




IFS-ECMWF model validation

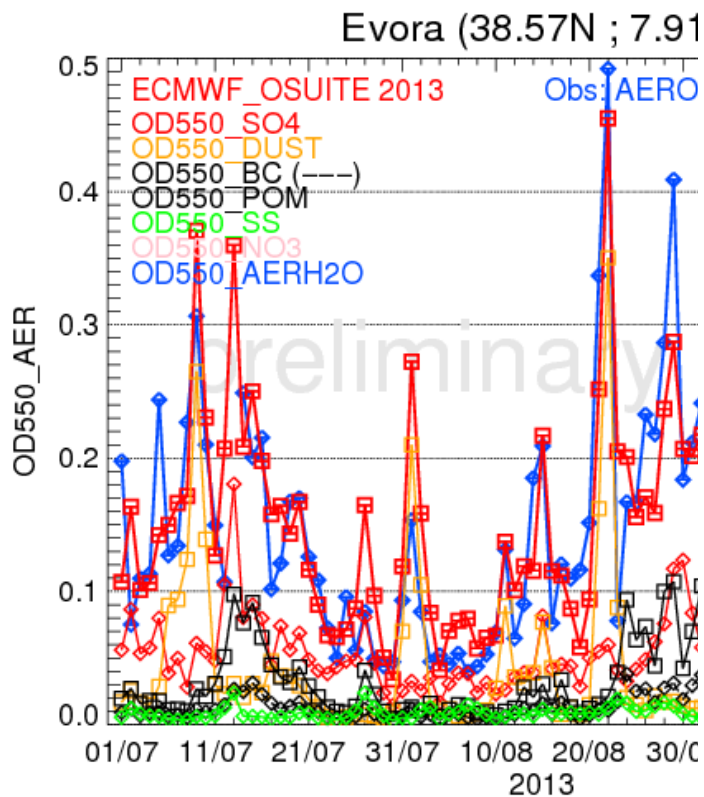


MACC NRT 2011–2015 against Aeronet NRT level 1.5 data AOD@550

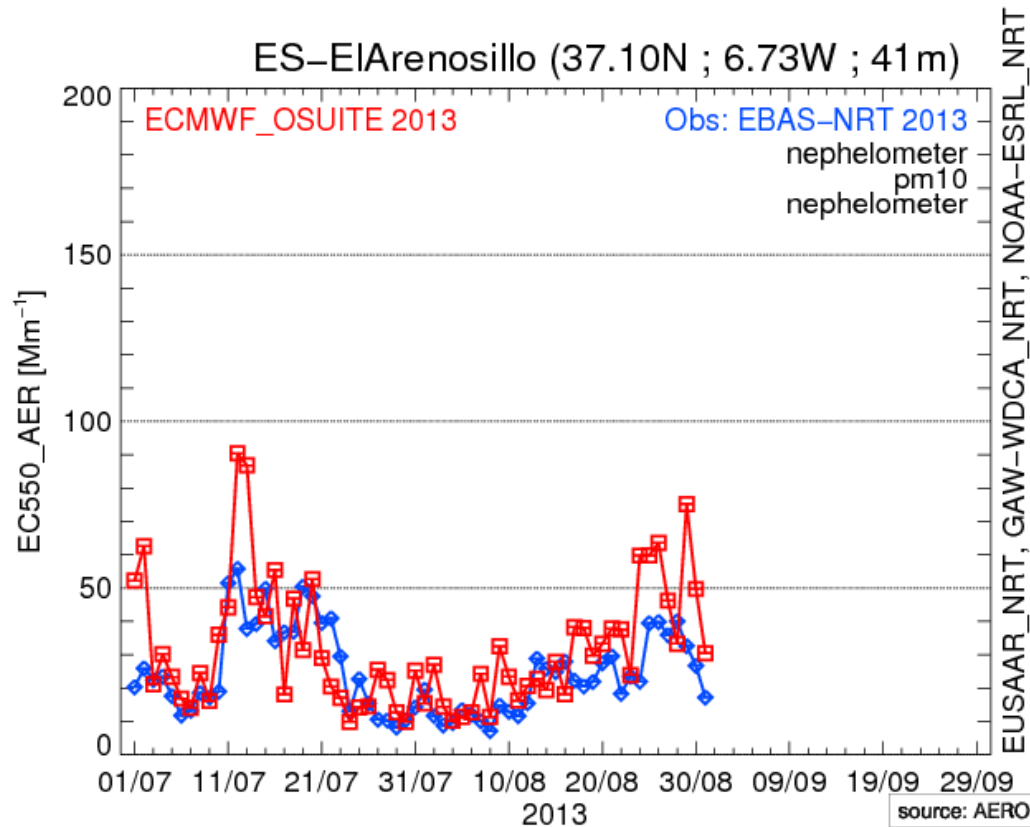




MACC NRT evaluation w AeroCom tools adding more observables



AOD



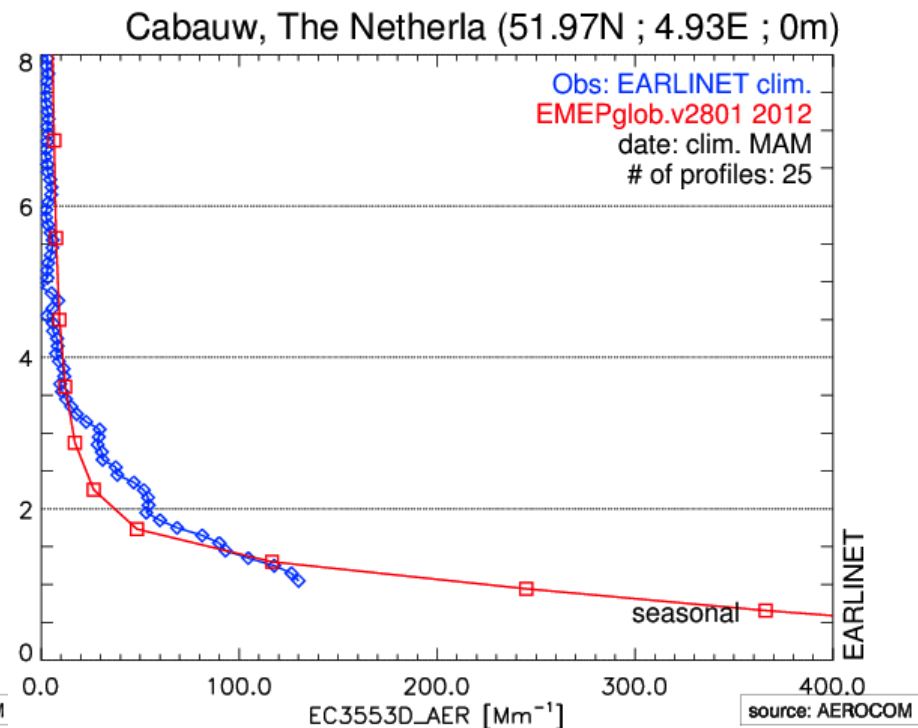
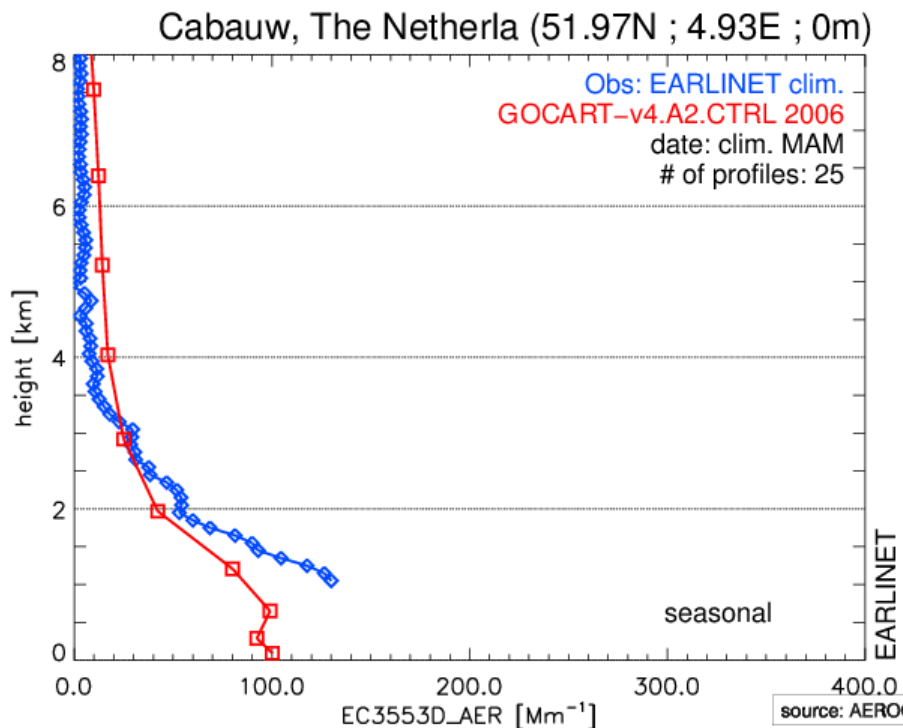
Surface Extinction



Other ongoing validation work

Comparison to Earlinet lidar climatology

Upper tropospheric aerosol background?

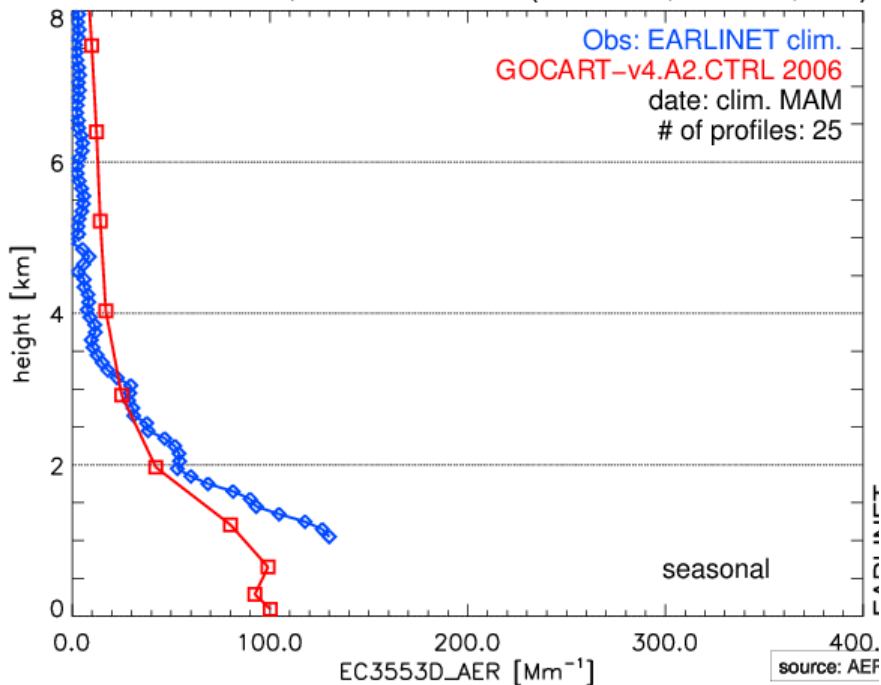




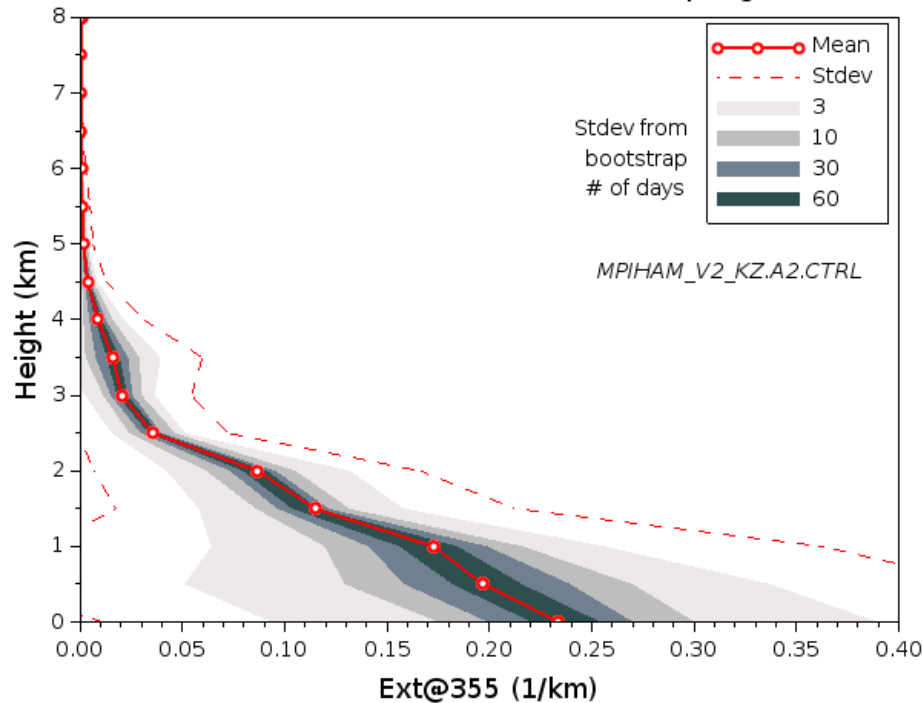
Sampling error? Bootstrapping model data for # profiles



Cabauw, The Netherla (51.97N ; 4.93E ; 0m)



CabauwTheNetherlands - 2006 - spring





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Aerocom Plans





Task: Reflect on and Recommend an AeroCom work plan
Produce a written recommendation at each AeroCom workshop on how to go on, Track and review progress in AeroCom working groups

Members – Appointed each year anew at AeroCom workshop

Proposed members

Working group leaders, Model representatives, Co-Chairs

*Nitrate *Bian* / BB *Petrenko* / Dust *Balkanski* / Microphysics *Mann**

*Aerosol Cloud Interactions *Ghan, Liu**

*Direct radiative forcing *Myhre, Samset**

*GCMs *Takemura* CTMs *Chin**

*COSP simulator *Stier* / Satellite data *Kahn, Holzer-Popp**

*Aircraft simulator *Schwarz, Stier, Chen**

*Surface data *Ogren, Schulz* / Co-chairs *Schulz, Kinne, Chin**



AeroCom phase III experiments


<https://wiki.met.no/aerocom/phase3-experiments>




In-situ Measurement Comparison

Contact: Betsy Andrews (NOAA/ESRL/GMD), Betsy.Andrews@noaa.gov

Experiment Description  [INSITU_AeroComPIII_description.pdf](#)


List of stations with in-situ measurements to be used in comparison project  [INSITU_Station_Inventory.xlsx](#)


Modeller commitments (updated as commitments are made):  <https://docs.google.com/spreadsheets/d/1NL-15WQ0kUFQkq8SPEvAq2fmtCzHjFWnoTmKsthUhU/edit?usp=sharing>

Follow project progress here:  <https://docs.google.com/document/d/1buqxPbj7DhWrwBUgTGV8b47HWAzaeyTTeSzViq8Fo4M/edit?usp=sharing>


Nitrate comparison

Contact: Huisheng Bian (GSFC/NASA, JCET/UMBC), Huisheng.Bian@nasa.gov

Experiment Description  [File](#)


NH3 Emissions from Geia  [file](#)


File name convention  [Nitrate Filename Protocol File](#)


Essential nitrate variables  [file](#)

Biomass Burning emissions experiments

Contact: Mariya Petrenko (NASA GSFC, USA; ORAU, USA), mariya.m.petrenko@nasa.gov


Experiment Description (updated November 26, 2014)  [File](#)


Model output file naming convention (September 11, 2014)  [File](#)

Variable names for model output (highlighted in blue/cyan; October 16, 2014)  [File](#)

HTAP 2 experiments

Contact: Mian Chin (NASA) mian.chin@nasa.gov; Michael Schulz (MetNo) michael.schulz@met.no

AeroCom specific experiment description for HTAP2  [File](#)

HTAP2 experiment description  [HTAP website](#)

Aerosol Lifetime experiments, Fukushima tracers

Model output  [Specifications](#)

Modelling: Where do we stand?

AeroCom yearly control run



Motivation

Comparable output data set of the latest model version simulations

Would allow additional interpretation for special experiments.

Document model progress, provide feedback on model development

Procedure (if the model changed from lately)

AeroCom models should produce each year one Control simulation year 2008, with standard diagnostics, Strict format requirements

Model Submission before July 31 to AeroCom server at MetNo

Standard plots available during August; MetNo AeroCom webinterface

Validated against standard datasets,


Feedback from modellers to MetNo until Mid September

Summary and overview presentation at AeroCom workshop Sep/Oct




Check format <http://aerocom-test.met.no/upload>





Task Force on Hemispheric Transport of Air Pollution



File upload facility for TFHTAP model data

Help

File and CF-Version

Select File(s) to Upload Browse..

Select CF-version to validate cf-1.1 ▾


Test Results

File Name	File size	Upload Status
UM-CAM-v01_SR6NA_tracerm_2001_0003.nc 🗑	741 kByte	🚫 failure

CF-Convention Test

- ✘ global Conventions attribute should be set to "CF-1.1", not "CF-1.0" (2.6.1)
- ✘ lev: missing formula variable in file: p0 (4.3.2)
- ✘ lon: a coordinate variable must have values that are strictly monotonic (5)
- ✘ lat: bounds variable "lat_bnds" not found in file (7.1)
- ✘ lon: bounds variable "lon_bnds" not found in file (7.1)
- ✘ lev: bounds variable "lev_bnds" not found in file (7.1)
- ✘ time: bounds variable "time_bnds" not found in file (7.1)
- 📘 running CFchecker version 1.5.11 (INIT)

... click here ⚙ to list all errors!

This tool is developed and maintained by  JÜLICH



AerChemMIP Proposal to CMIP6

Joint initiative from CCMI and AeroCom



Co-chairs:

Bill Collins(UK)

Jean-François Lamarque (USA)

Michael Schulz (Norway)



AerChemMIP will quantify **forcings**, **feedbacks** and global-to-regional climate **response** ($\Delta T, \Delta P$) from changes to:

- NTCF emissions (aerosols, O_3 precursors)
- Reactive GHGs concentrations (N_2O , CH_4 , ODSs)

→ It will provide essential new data to answer CMIP6 Q1 “How does the Earth system respond to forcing?”. AerChemMIP will provide data on past and future changes in the chemical composition of the atmosphere and estimate the associated forcings

→ It will provide significant contributions to WCRP theme “Biogeochemical forcings and feedbacks” (Chemistry-climate feedbacks, uncertainty associated with natural emissions,...)

Motivation 1: Quantification of the transient Effective Radiative Forcing of Near-Term Climate Forcers

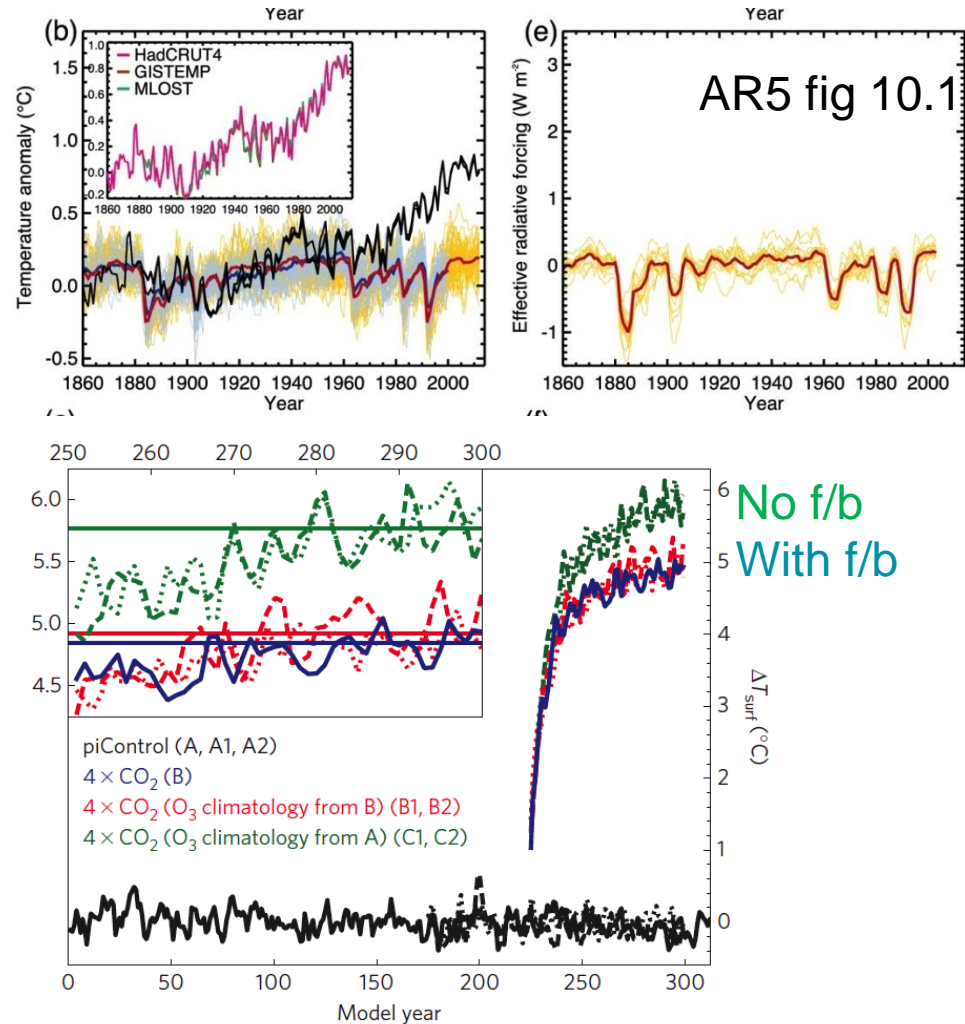


Quantification of Effective Radiative Forcing of NTCFs for historical runs with interactive aerosol (+chemistry)

- Needed for D&A
- Improves on AR5 and Forster 2013
- Includes tropospheric O₃

Quantification of biogeochemical feedbacks

- E.g., chemistry-climate feedback under a 4xCO₂ with (AerChemMIP) vs without (RFMIP) interactive aerosols and chemistry changes the climate sensitivity



Nowack et al., *Nature*, 2015



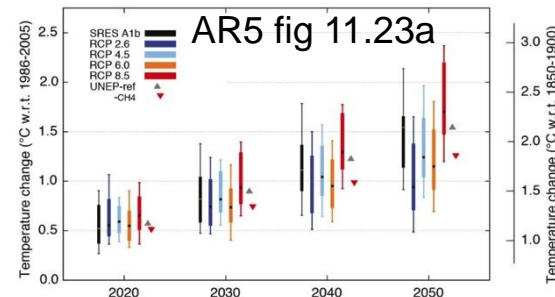
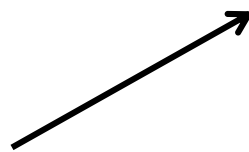
Motivation 2: Quantifying the climate impacts of Near-Term Climate Forcers



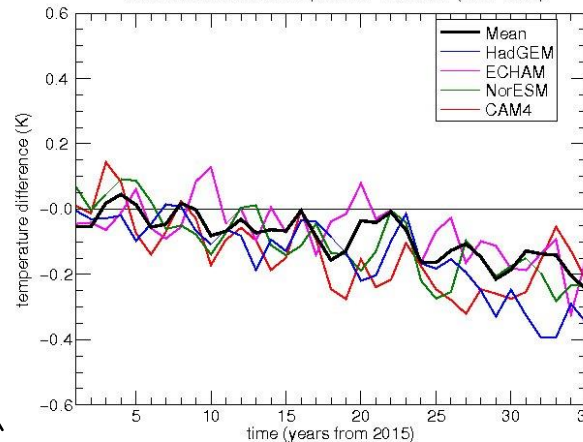
Importance of NTCFs in climate prediction scenarios

- AR5: near term ΔT spread was due to Near-Term Climate Forcers
- ECLIPSE (FP7): Mitigation of CH₄, BC compared to business as usual

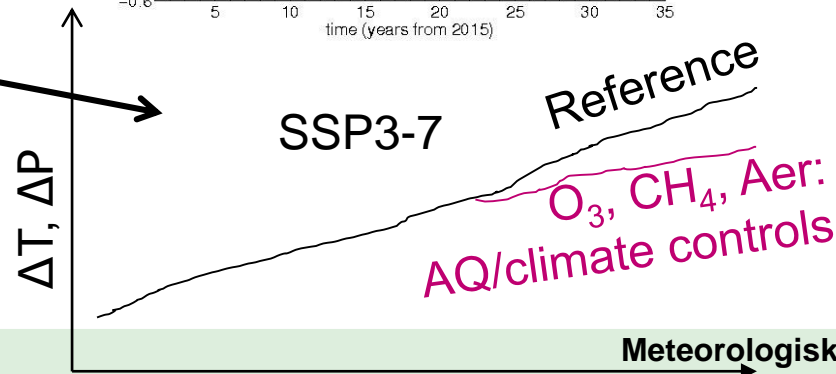
➤ AerChemMIP will quantify the climate effects of NTCF mitigation based on a variant to ScenarioMIP Tier 1 SSP3-7



Global mean surface temperature difference (RED-CLE)



Stohl et al. 2015



14th AeroCom workshop 2015

AerChemMIP/CCMI/AeroCom/AeroSat joint meeting



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5.10. – 9.10.
Frascati, Italy



Monday

Tuesday

Wednesday

Thursday

Friday

AeroCom

AeroCom

AerChemMIP

AeroCom.....AEROSAT

CCMI

CCMI

Host ESA, Simon Pinnock (AeroCom, AerChemMIP, Aerosat)

Host CNR, Federico Fierli (CCMI)



Thanks for your attention !