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Discussion items for AeroCom steps in 2016/17

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Outline

- AeroCom Science topics
- Control Experiment 2016
- AeroCom infrastructure
- BAMS overview paper
- Aerocom-AerChemMIP
- Next AeroCom meetings

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Last years 100% AeroCom papers…

Koffi, B.; Schulz, M.; Breon, F. M.; Dentener, F.; Steensen, B. M.; Griesfeller, J.; Winker, D.; Balkanski, Y.; Bauer, S. E.; Bellouin, N.; Berntsen, T.; Bian, H. S.; Chin, M.; Diehl, T.; Easter, R.; Ghan, S.; Hauglustaine, D. A.; Iversen, T.; Kirkevag, A.; Liu, X. H.; Lohmann, U.; Myhre, G.; Rasch, P.; Seland, O.; Skeie, R. B.; Steenrod, S. D.; Stier, P.; Tackett, J.; Takemura, T.; Tsigaridis, K.; Vuolo, M. R.; Yoon, J.; Zhang, K., Evaluation of the aerosol vertical distribution in global aerosol models through comparison against CALIOP measurements: AeroCom phase II results. Journal of Geophysical Research-Atmospheres 2016, 121 (12), 7254-7283.

Ghan, S.; Wang, M.; Zhang, S.; Ferrachat, S.; Gettelman, A.; Griesfeller, J.; Kipling, Z.; Lohmann, U.; Morrison, H.; Neubauer, D.; Partridge, D. G.; Stier, P.; Takemura, T.; Wang, H.; Zhang, K., Challenges in constraining anthropogenic aerosol effects on cloud radiative forcing using present-day spatiotemporal variability. Proceedings of the National Academy of Sciences 2016.

Kipling, Z.; Stier, P.; Johnson, C. E.; Mann, G. W.; Bellouin, N.; Bauer, S. E.; Bergman, T.; Chin, M.; Diehl, T.; Ghan, S. J.; Iversen, T.; Kirkevag, A.; Kokkola, H.; Liu, X. H.; Luo, G.; van Noije, T.; Pringle, K. J.; von Salzen, K.; Schulz, M.; Seland, O.; Skeie, R. B.; Takemura, T.; Tsigaridis, K.; Zhang, K., What controls the vertical distribution of aerosol? Relationships between process sensitivity in HadGEM3-UKCA and inter-model variation from AeroCom Phase II. Atmos. Chem. Phys. 2016, 16 (4), 2221-2241. **pdf**

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AeroCom Science topics

Summary from the meeting?

- Surface extinction and absorption
- Nitrate
- Biomass burning
- Anthropogenic Dust
- Aerosol size and CCN
- Forcing decomposition
  BC, semidirect, ERF, transient ERF, indirect
- Indirect effect constraints from Bardabunga, Ship emissions, new experiments
- COSP output, backscatter aerosol output
- Aerosol trends
- Current campaigns eg South Atlantic ORACLES, LASIC, CLARIFY
- Feedbacks involving aerosols
- Uncertainty reduction through model evaluation / constraints

AeroCom Control Experiment 2016

- https://wiki.met.no/aerocom/phase3-experiments
- ***Please feedback on specification for***
  AP3-CTRL2016-PD and AP3-CTRL2016-PI
- Use new CMIP6 new emissions 2014 and 1850 ??
- Submit results until End of November
- Use this to check CMIP6 model version
- Results should end up in joint BAMS paper including updated AeroCom median for PD and PI
- Link to current more specialised AeroCom experiments…

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AeroCom/AerChemMIP
New climatology and trend simulation

- Use new CMIP6 emissions 1850-2014
  https://pcmdi.llnl.gov/projects/input4mips/
- Decadal runs 1850-1970 (one year per decade)
- 5 year runs
  (1975-1980-1985-1990-1995-2000-2005-2010-2014)
- 3d monthly fields, aod, aaod, loads, emissions,
  BC, OC, DUST, SO4, NO3, SS, BB (?), CCN (@0.3% SS)
- AeroCom-AerChemMIP climatology product
- Results in by spring/summer 2017 ??
- ***Interest to do that?***

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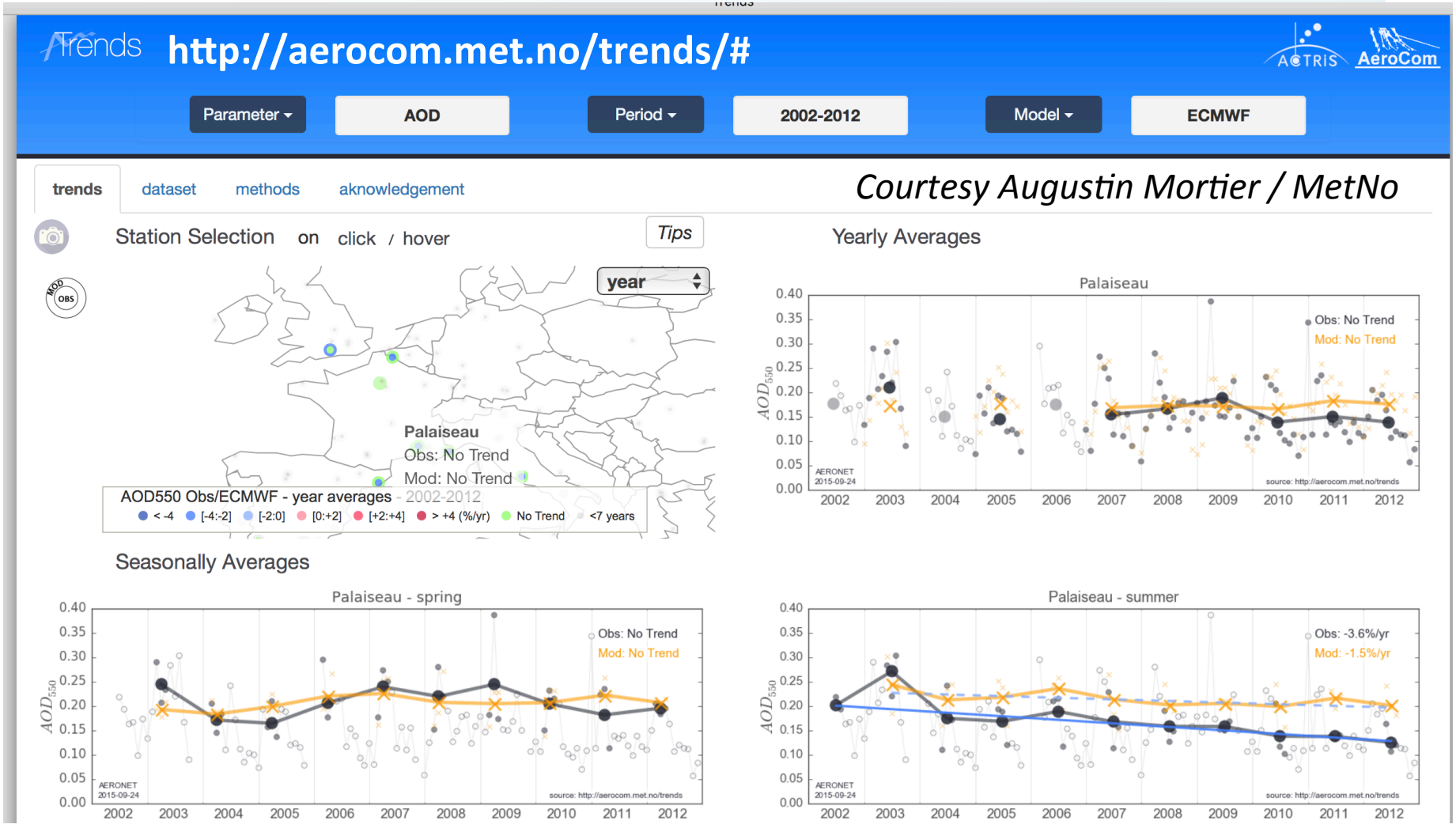
AeroCom infrastructure 1/2

- 175 users have access to AeroCom users server
- AeroCom database new structure per phase and project
  - *0.7 - 2.5 - 1.3* TB AeroCom phases I – II – III
  - *0.04 - 0.03 – 1.1* TB AeroCom Indirect I - II – III
  - 0.11 – 8.2 TB HTAP phase I - II
  - 0.18 TB Satellite Data / 0.13 TB cci-Aerosol
  - 0.2 ACCMIP / 1.3 ECMWF / 0.8 ECLIPSE /
- Data storage system renewed, see Jan Griesfeller poster

AeroCom infrastructure 2/2
New visualization of station&model data



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BAMS overview paper

- Overview of AeroCom science goals, achievements, plans, infrastructure
- Basis – Notes from last years workshop, this years presentations, working group lead contribution
- New AeroCom median model PD and PI,
  base year 2010 and 2014 and 1850
- What is the status of knowledge on
  aerosol impact on forcing and climate evolution?
- What should the AeroCom community pursue
  as experiments and data evaluations?
- ***Timeline: Outline October, Contributions November, Draft January, Final write-up in AeroCom Writing Workshop Feb/Mar 2017 Norway?***

AerChemMIP

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Discussion closed, revision under way, … last chance to comment

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doi:10.5194/gmd-2016-139

Discussion papers

Abstract | Discussion | Metrics

Model experiment description paper

12 Jul 2016

AerChemMIP: Quantifying the effects of chemistry and aerosols in CMIP6

Review status
This discussion paper is under review for the journal Geoscientific Model Development (GMD).

William J. Collins[1], Jean-François Lamarque[2], Michael Schulz[3], Olivier Boucher[4], Veronika Eyring[5], Michaela I. Hegglin[1], Amanda Maycock[6], Gunnar Myhre[7], Michael Prather[8], Drew Shindell[9], and Steven J. Smith[10]
[1]Department of Meteorology, University of Reading, Reading, RG6 6BB, UK
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[8]University of California, Irvine, CA, USA
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[10]Joint Global Change Research Institute, Pacific Northwest National Laboratory, 5825 University Research Court, Suite 3500, College Park, MD 20740, USA

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AerChemMIP…..
What is interesting for AeroCom?

https://wiki.met.no/aerocom/aerchemmip/diagnostics

Unfortunately not yet fully integrated in CMIP6 data request

NTCF Forcing documentation in the coupled CMIP models

Atmospheric composition change documentation / Trend analysis

Aerosol-Climate Feedback analysis

Future Low Air Pollution scenario

AerChemMIP forcing diagnostics
30 year long simulations with fixed SST/Seaice

Experiment ID	Minimum model configuration	CH_4	N_2O	Aerosol Precursors	Ozone Precursors	CFC/ HCFC	Tier
piSSTclim	AGCM-AER	1850	1850	1850	1850	1850	1
*piSSTclim-**NTCF***	AGCM-CHEM	1850	1850	**2014**	**2014**	1850	1
*piSSTclim-**Aer***	AGCM-AER	1850	1850	**2014**	1850	1850	2
*piSSTclim-**BC***	AGCM-AER	1850	1850	1850 (non BC) **2014** (BC)	1850	1850	2
*piSSTclim-**O3***	AGCM-CHEM	1850	1850	1850	**2014**	1850	2
*piSSTclim-**CH4***	AGCM-CHEM	**2014**	1850	1850	1850	1850	2
*piSSTclim-**N2O***	AGCM-CHEM*	1850	**2014**	1850	1850	1850	2
*piSSTclim-**HC***	AGCM-CHEM*	1850	1850	1850	1850	**2014**	2
*piSSTclim-**NOX***	AGCM-CHEM	1850	1850	1850	1850 (non NO_X) **2014** (NO_X)	1850	3
*piSSTclim-**VOC***	AGCM-CHEM	1850	1850	1850	1850 (non CO/VOC) **2014** (CO/VOC)	1850	3

….this could be done first in 2017 once the CMIP6 model versions are fixed And the PI control run has been achieved

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AerChemMIP coupled AOGCM and AGCM simulations
Characterizing transient forcing history and atmospheric composition change in one shot

Experiment ID	Minimum model configuration	CH_4	N_2O	Aerosol Precursors	Ozone precursors	CFC/ HCFC	Tier
hist-piNTCF	AOGCM-CHEM	Hist	Hist	**1850**	**1850**	Hist	1
hist-piAer	AOGCM-AER	Hist	Hist	**1850**	Hist	Hist	2
hist-1950HC	AOGCM-CHEM*	Hist	Hist	Hist	Hist	**1950**	1

Experiment ID	Minimum model configuration	CH_4	N_2O	Aerosol Precursors	Ozone precursors	CFC/ HCFC	Tier
histSST	AGCM-AER	Hist	Hist	Hist	Hist	Hist	1
histSST-piNTCF	AGCM-CHEM	Hist	Hist	**1850**	**1850**	Hist	1
histSST-piAer	AGCM-AER	Hist	Hist	**1850**	Hist	Hist	2
histSST-piO3	AGCM-CHEM	Hist	Hist	Hist	**1850**	Hist	2
histSST-1950HC	AGCM-CHEM*	Hist	Hist	Hist	Hist	**1950**	1
histSST-piCH4	AGCM-CHEM	**1850**	Hist	Hist	Hist	Hist	1
histSST-piN2O	AGCM-CHEM*	Hist	**1850**	Hist	Hist	Hist	2

How good Is the forcing Diagnostic in Transient runs?

Forcing decomposition "triple call"

How many calls to the radiation calculation do we need?
To diagnose direct, indirect, semi-direct, and BC forcing….

[within Preindustrial and Current day, or transient simulation]

2 x [Cloudy/All-sky and clear sky]

2 x [With / without Aerosol scattering and absorption]

2 x [With / without black carbon] ??

======

4-8 calls to radiation and separate storage of TOA fluxes

Is there interest in a webinar how to do that?

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AerChemMIP
Aerosol - Climate feedback analysis

- ***Which framework to choose for analysis ???***
- AerChemMIP analysis of doubling natural emissions?
- Emission and load diagnostics in transient climate simulations ?
- Kernel method to separate forcing and feedbacks

Experiment ID	Minimum model configuration	Flux to be doubled	Tier
*piSSTclim-**2xdust***	AGCM-AER	Dust	2
*piSSTclim-**2xss***	AGCM-AER	Sea salt	2
*piSSTclim-**2xDMS***	AGCM-AER	Oceanic DMS	3
*piSSTclim-**2xfire***	AGCM-AER	Fire (NOx, BC, OC, CO, VOCs…)	3
*piSST-**2xNOX***	AGCM-CHEM	Lightning NO_X	3
*piSST-**2xVOC***	AGCM-CHEM	Biogenic VOCs	3

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Next AeroCom meetings

- Feb/Mar AeroCom paper write-up workshop Norway
  - (scope 20-30 people ?) doodle? ***Who is interested?***
- EGU Vienna ACTRIS-AeroCom session
- Next 16th AeroCom workshop at FMI Helsinki
  9.-13. October 2017 ??

- ***Other ??***