Poster Presentations

AeroSAT

AeroCom

AeroCom INSITU Project

Comparison of aerosol optical properties from in-situ surface measurements and model simulations

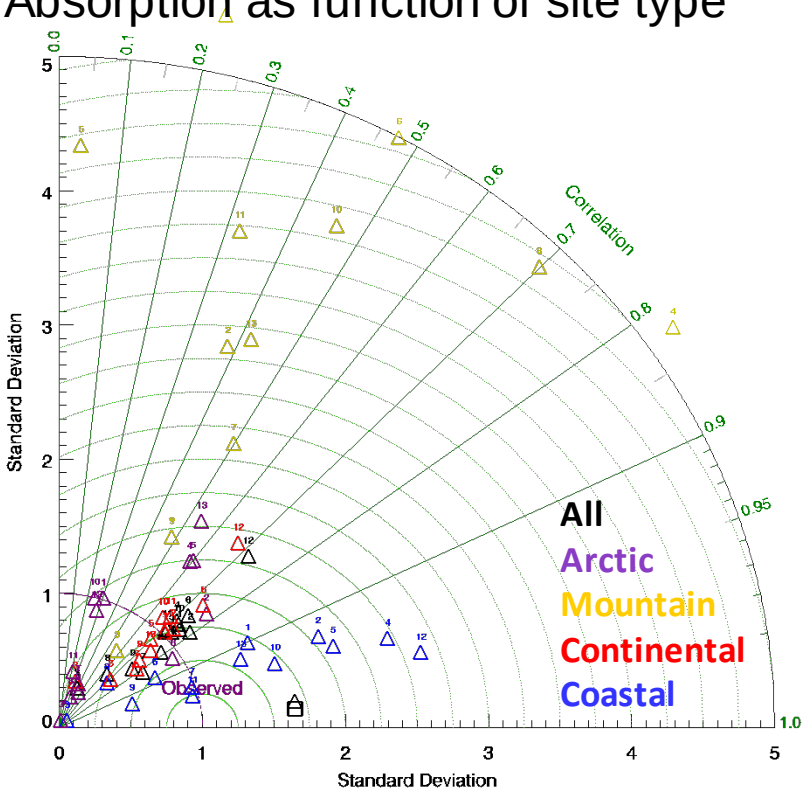
Andrews, Betsy

AeroCom INSITU Project

Evaluation of AeroCom aerosol models simulations of aerosol scattering and absorption with observations from surface sites.

Currently, using Taylor diagrams to look for patterns in how well models and measurements compare.

Absorption as function of site type



- Better agreement at coastal sites, worst at arctic and mountain sites
- Modelled absorption is better correlated with observations in spring and summer seasons.

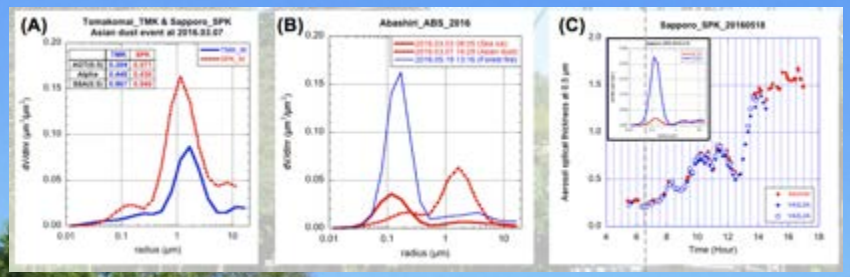
Presenter: Betsy Andrews, P-01

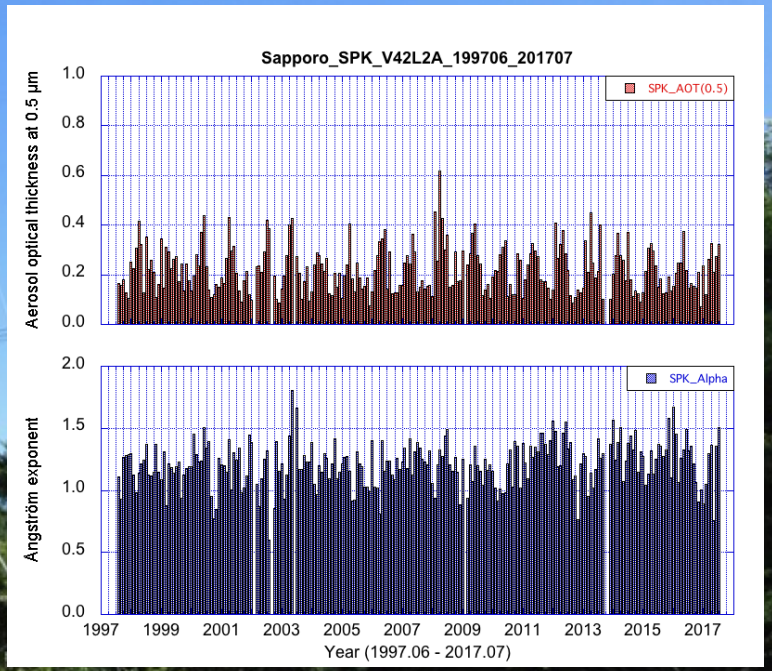
Columnar aerosol optical properties

at Hokkaido site
in North part of Japan

Aoki, Kazuma

Columnar aerosol optical properties at Hokkaido site in North part of Japan





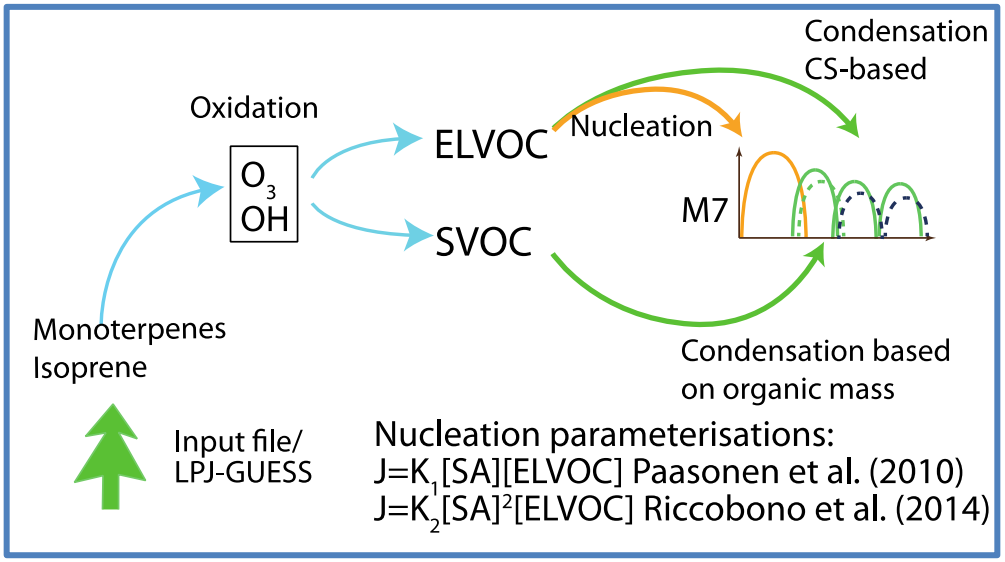
Kazuma Aoki

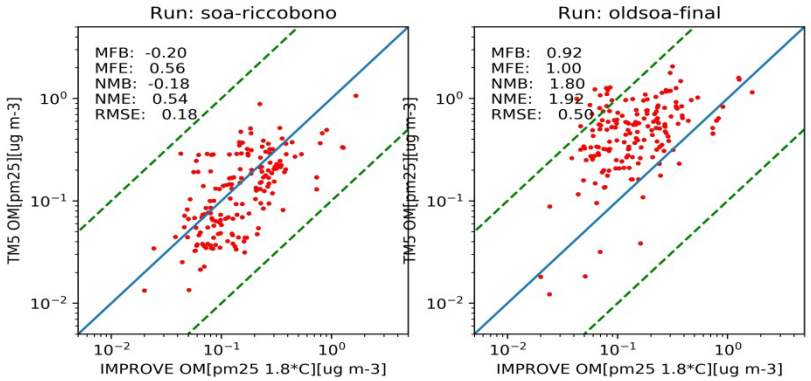
University of Toyama, Japan

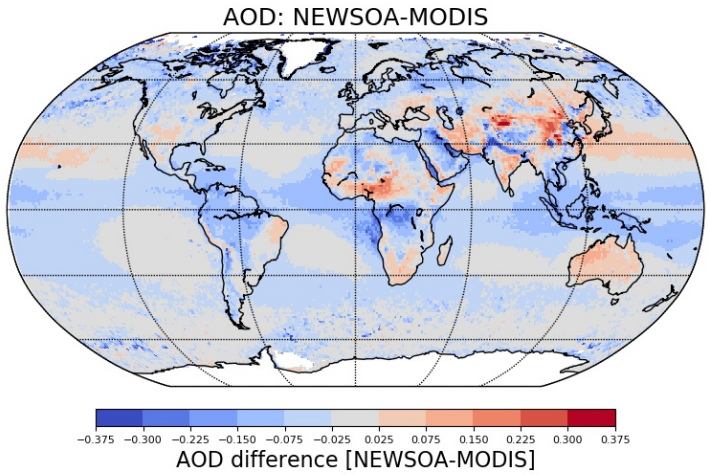
Evaluation of a new secondary organic aerosol formation scheme in TM5

Bergman, Tommi

Evaluation of new Secondary Organic Aerosol Scheme in TM5





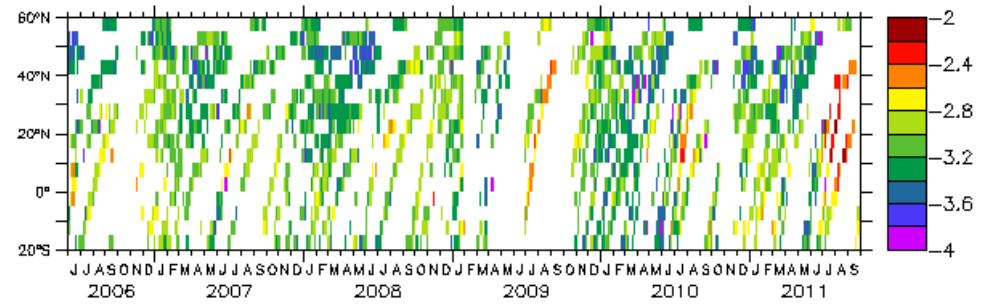


Stratospheric and tropospheric aerosol 2002 to 2012

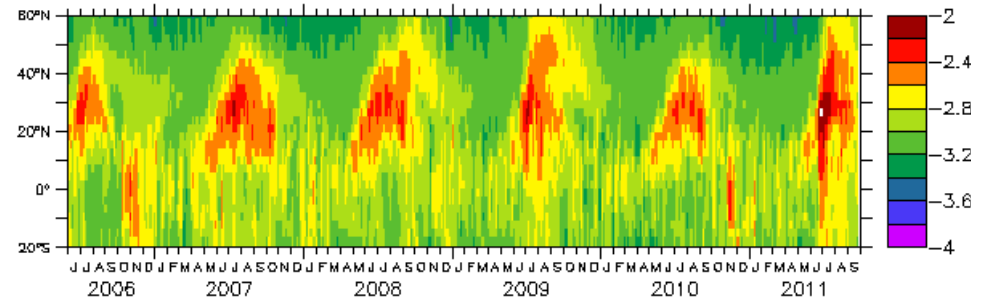
EMAC chemistry climate model simulations and GOMOS, IASI and ATSR satellite observations

Brühl, Christoph

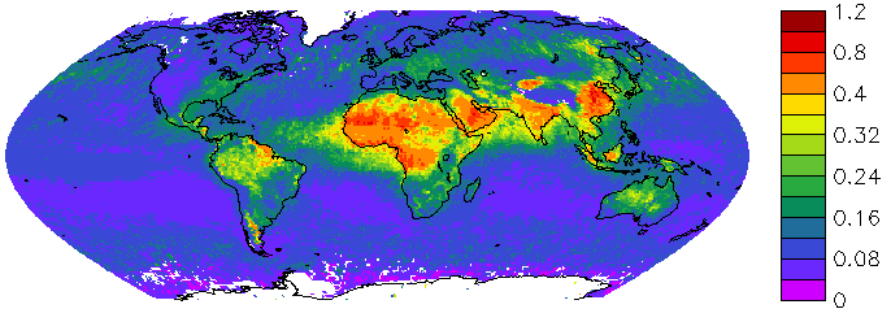
Brühl et al.: Stratospheric and tropospheric aerosol 2002 to 2012, EMAC chemistry climate model simulations and GOMOS, IASI and ATSR satellite observations



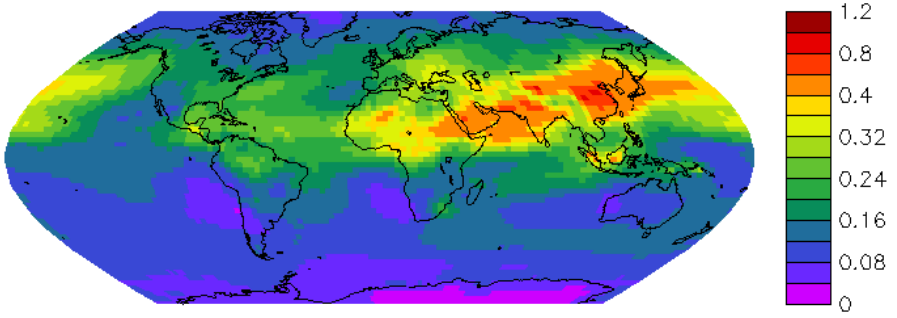
1/km, 550nm, GOMOS 3.00, 17km, 60–120E GOMOS



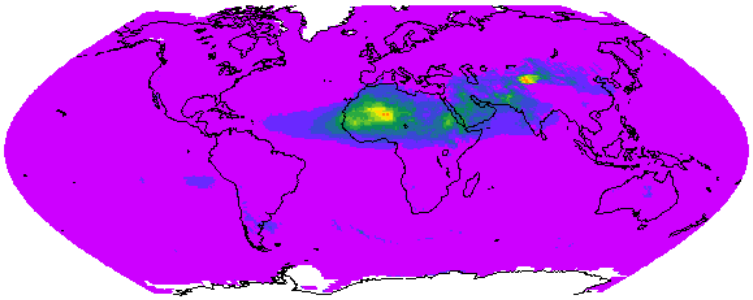
1/km, 17km, EMAC, 60–120E EMAC



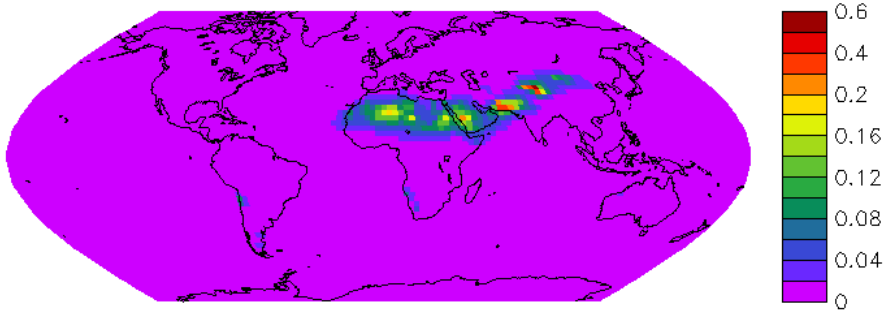
ATSR SU, 550nm, 2011 ATSR



AOD 550nm 2011, SSbu EMAC



IASI ULB, 2011, 10um IASI

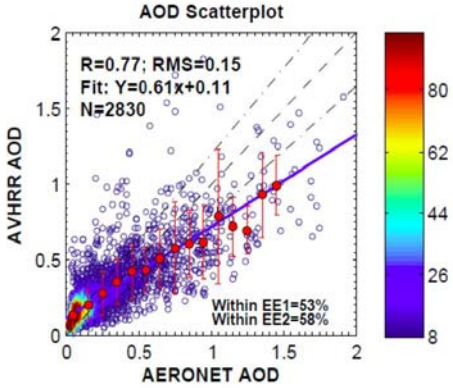


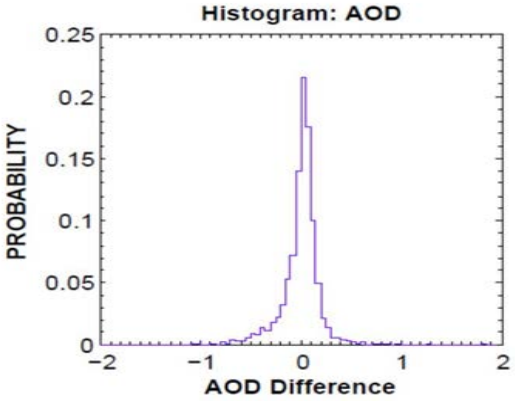
DAOD 10mu 2011 EMAC

Aerosol properties retrieved over land with AVHRR sensor data

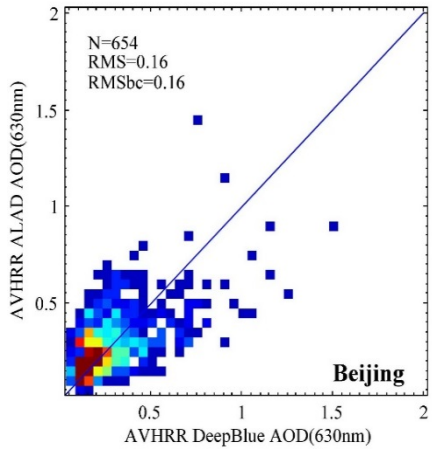
Che, Yahui

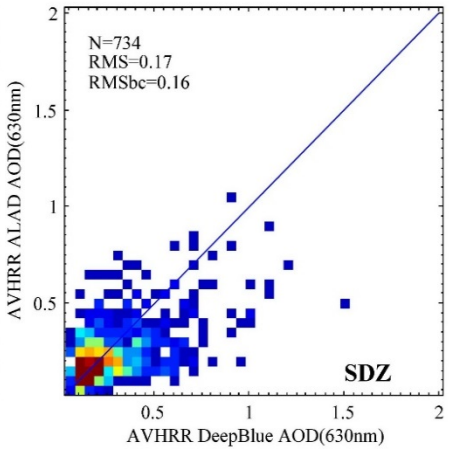
We developed an algorithm for AOD retrievals over Land (**ALAD**). We applied this retrieval to **AVHRR** sensor data over **North China** (**35 years** from 1981 to 2015).

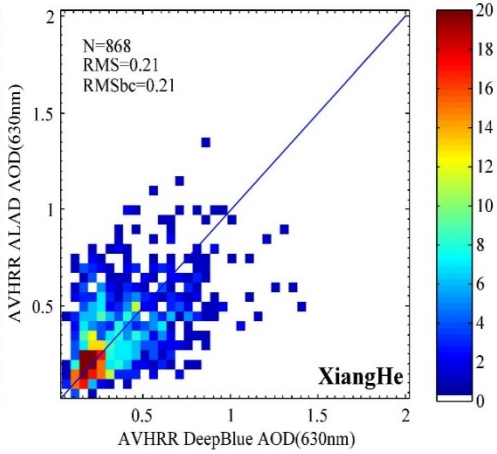


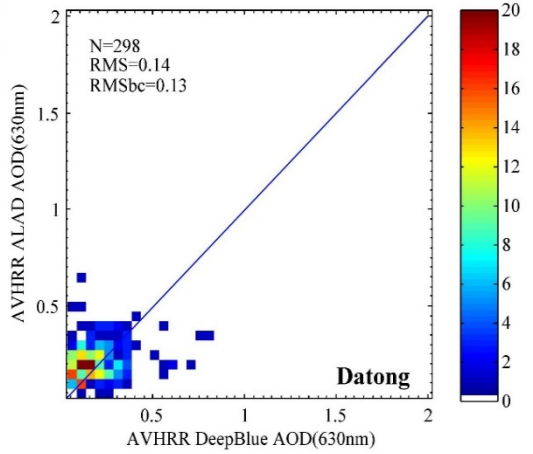


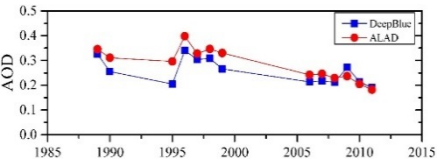
Yahui CHE, from Institute of Remote Sensing and Digital Earth, Chinese Academy of Sciences (RADI/CAS).

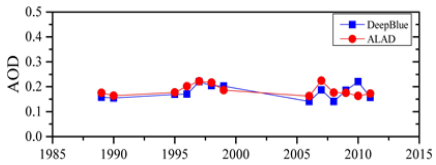


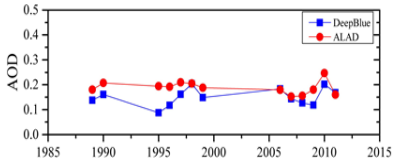


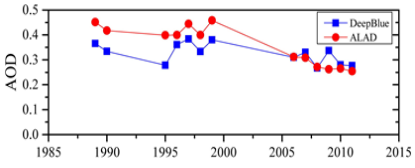






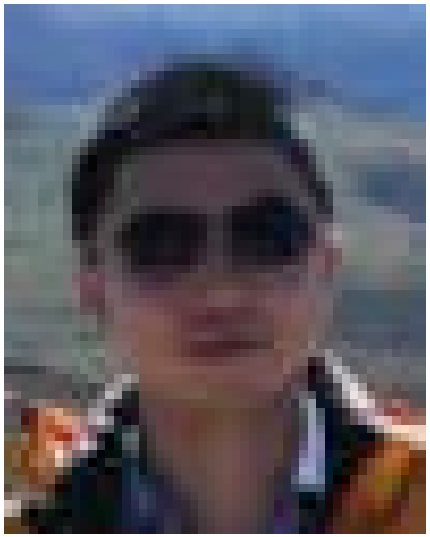






A satellite view of

global desert dust and primary carbonaceous aerosol emission database, 2006-2011



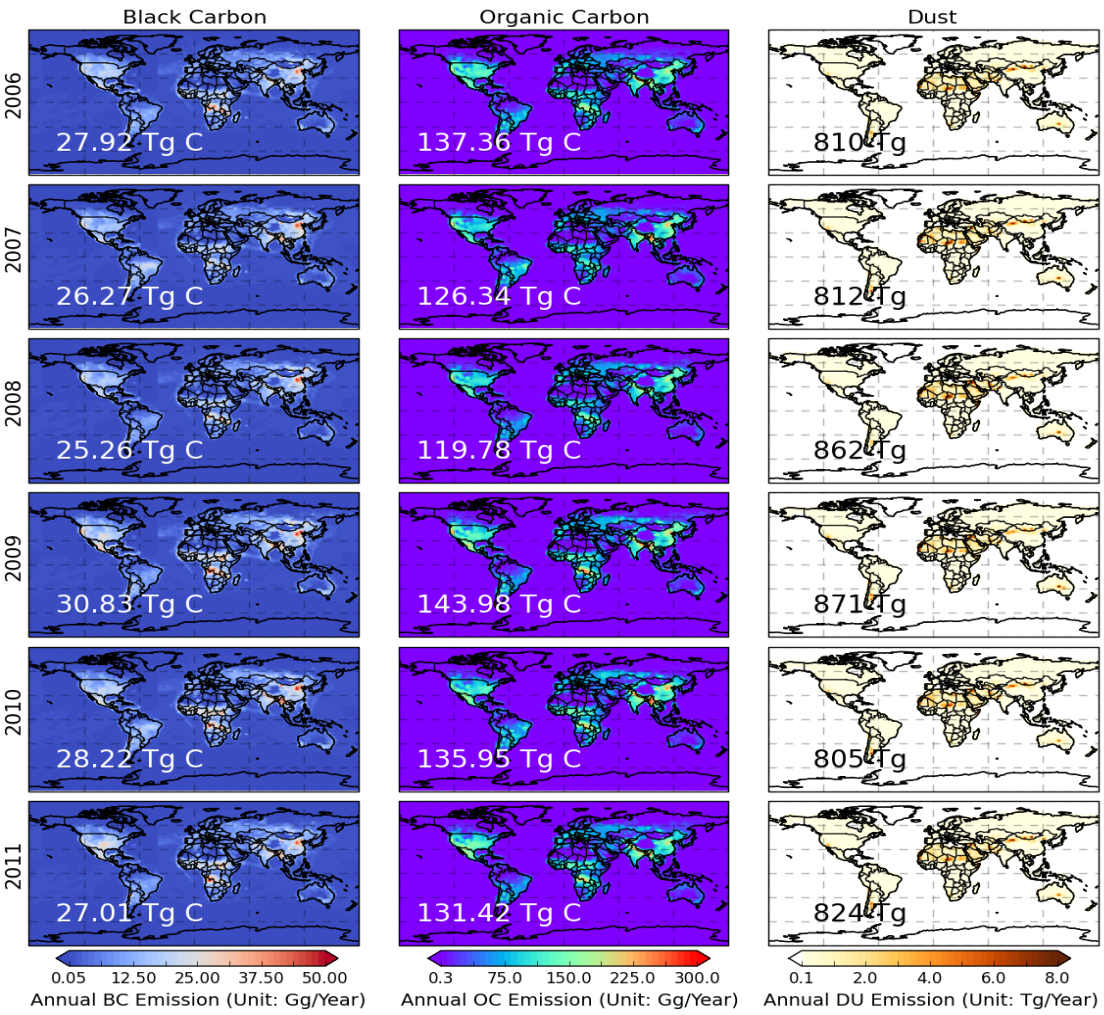
Cheng, Chen

A satellite view of global desert dust and primary carbonaceous aerosol emission database, 2006-2011

Cheng Chen[1], Oleg Dubovik[1], Tatyana Lapyonak[1], Daven K. Henze[2], Mian Chin[3], Fabrice Ducos[1]

[1]LOA, Université de Lille1, France., [2]Department of Mechanical Engineering, University of Colorado, USA.

[3]NASA Goddard Space Flight Center, USA. ***Email: cheng1.chen@ed.univ-lille1.fr***



I. Observations

PARASOL/GRASP

II. Model

GEOS-Chem and its adjoint

III. Inverse modeling

GRASP-based aerosol emission database from 2006-2011.

- Spatial resolution: 2° x2.5°

- Emission Time resolution:

DU – 24 hours constant

BC – 48 hours constant

OC – 48 hours constant

- Dust: 0.1 ~ 6.0 um (exclude super coarse particles)

two proposals for AeroCom model experiment/analysis

1. Aerosols in the upper troposphere and lower stratosphere (UTLS)

2. Aerosol radiative effects through aerosol-cloud-radiation interactions (ACRI) in a changing climate

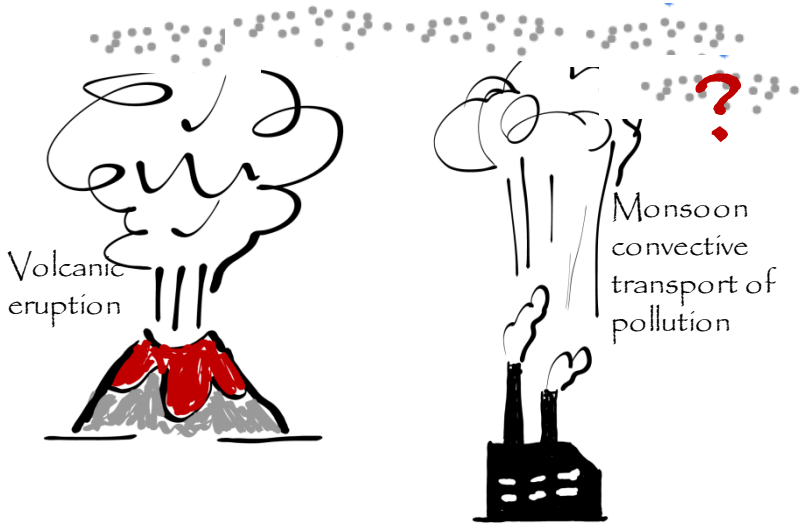
Chin, Mian

Two proposed AeroCom experiments/analysis

UTLS

Aerosols in the upper troposphere and lower stratosphere (UTLS): Natural and anthropogenic sources, monsoon transport, and decadal trends

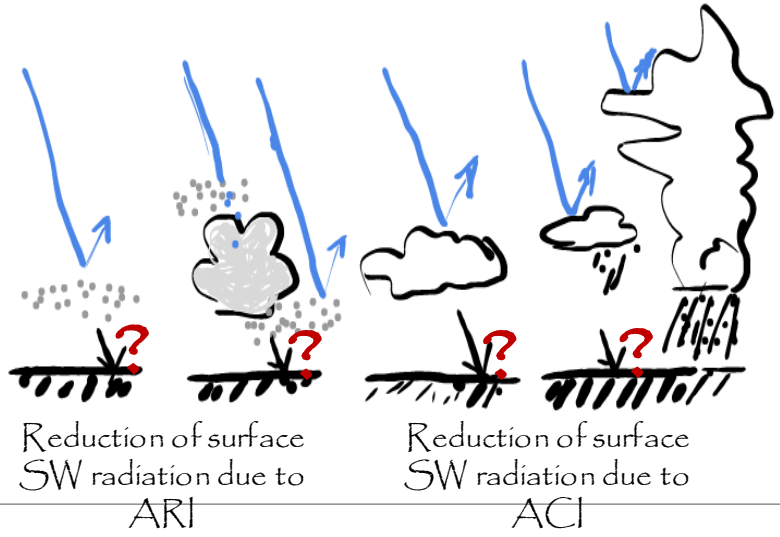
Mian Chin, Huisheng Bian, Qian Tan, Valentina Aquila, Peter Colarco



ACRI

Aerosol-cloud-radiation interactions (ACRI) in a changing climate: Processes, multidecadal variations, and effects on surface radiation trends

Mian Chin, Huisheng Bian, Hongbin Yu, Xiaohua Pan



Mian Chin will introduce these experiments on Tuesday in Session 7
Come to see the poster, discuss the plan, and sign up to do the experiments ☺

Radiative and temperature effects of the application of different aerosol climatologies

in COSMO-RU model and comparisons with the observations

Chubarova, Nathalia

Radiative and temperature effects of the application of different aerosol climatologies in COSMO-RU model and comparisons with the observations

NATALIA CHUBAROVA with support of

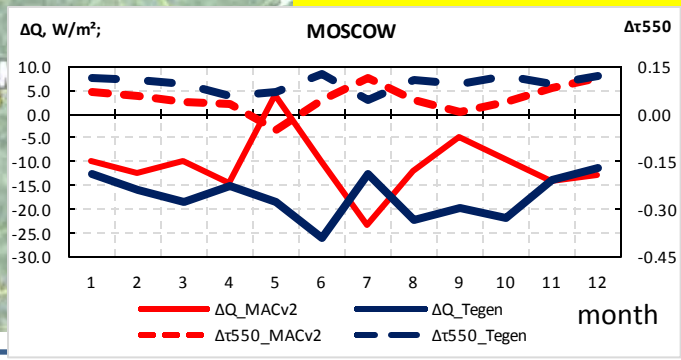
A. POLIUKHOV, S. KINNE, G. RIVIN, M. SHATUNOVA, R. BECKER

Moscow State University Meteorological Observatory (MSU MO, Russia), Russia

Falkenberg/Lindenberg site (Meteorologisches Observatorium Lindenberg, Germany)

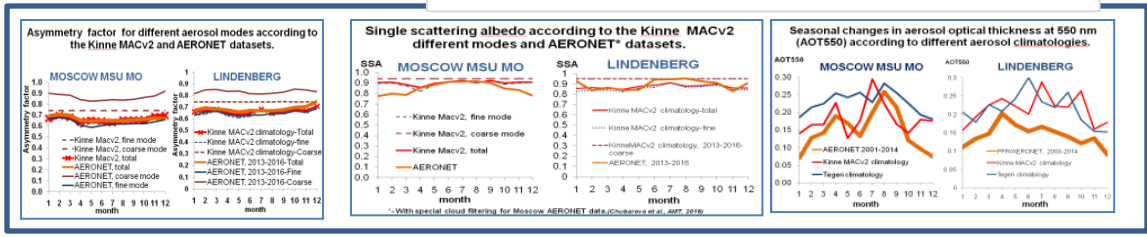
Different aerosol datasets used in the comparisons:

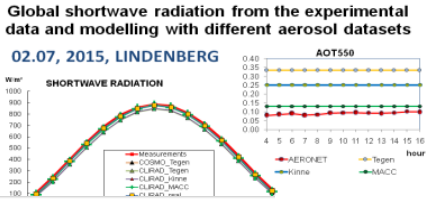
- Macv2 climatology (Kinne et al., 2013)
- Tegen climatology (Tegen et al., 1997)
- Tanre climatology (Tanre et al., 1984)
- CAMS ECMWF aerosol dataset
- AERONET datasets: Moscow since 2001, and Lindenberg (PFR+AERONET) since 2003.

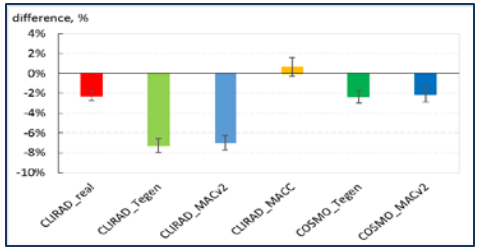


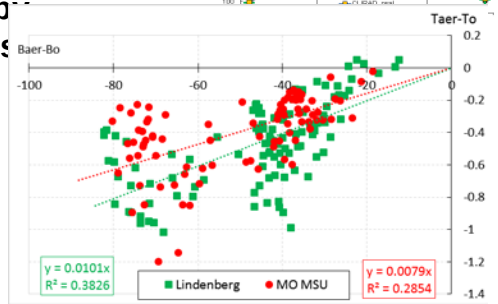
Strategy:

1. Estimation of the uncertainty of aerosol climatologies and its radiative effect against long-term aerosol datasets over two European regions (continental type of aerosol):
2. Aerosol/radiative comparisons with the observations for clear sky conditions for a number of days;
3. Estimation of the temperature effects b... COSMO model runs with different aeros... climatologies and without aerosol .









The sensitivity of the air temperature forecast to the shortwave net radiation changes due to aerosol simulated by COSMO-Ru.

0.8° ±0.2 per 100 W/m² in MO MSU
1.0°±0.3 per 100 W/m² in Lindenberg

Affiliations:
Moscow State University, Faculty of Geography, Russian Hydrometeorological Center, Russia, Max Planck Institute for Meteorology, Hamburg, Germany, Deutscher Wetterdienst, Meteorologisches Observatorium Lindenberg/Mark Am Observatorium 12, D-15848 Tauche, Germany

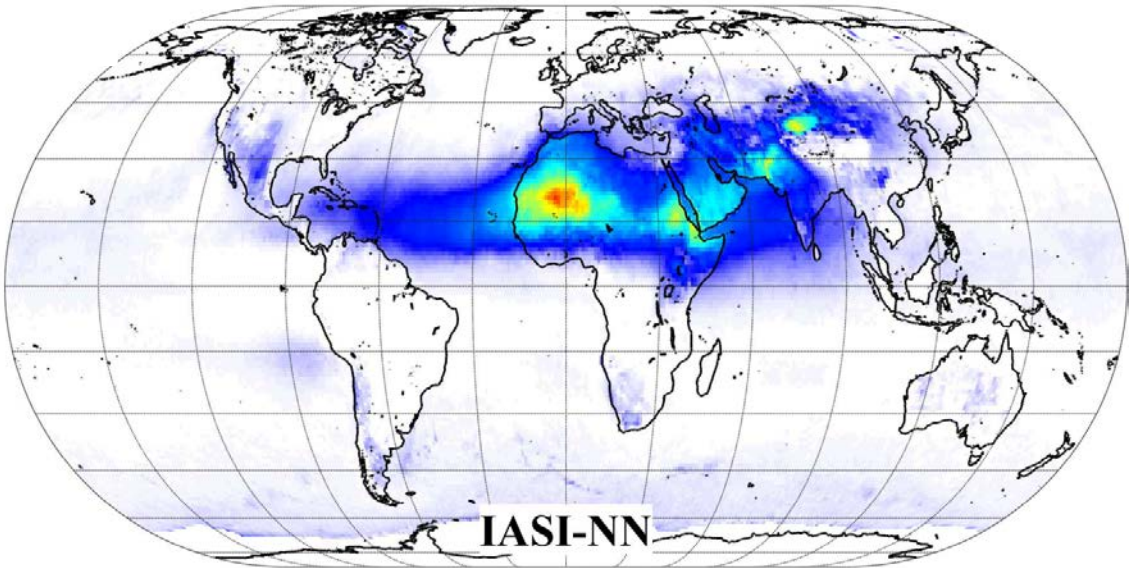
Measuring dust optical depth with IASI

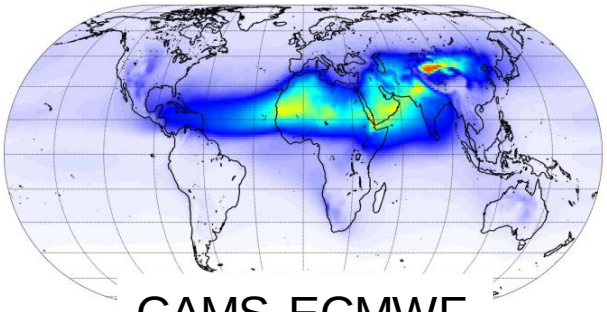
Clarisse, Lieven

Dust optical depth measured with IASI

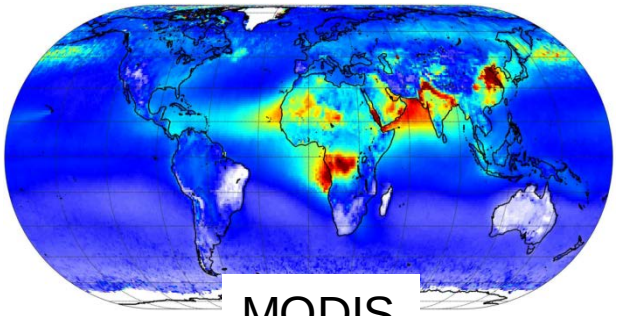
Lieven Clarisse

Université Libre de Bruxelles (ULB)

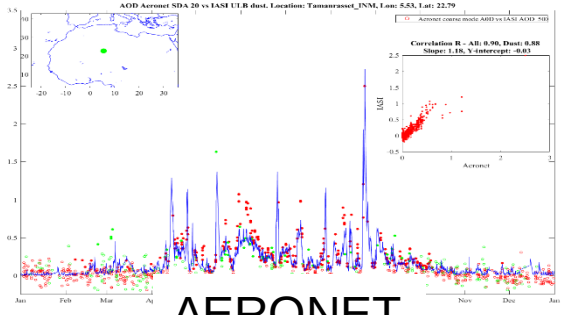




CAMS ECMWF



MODIS



AERONET

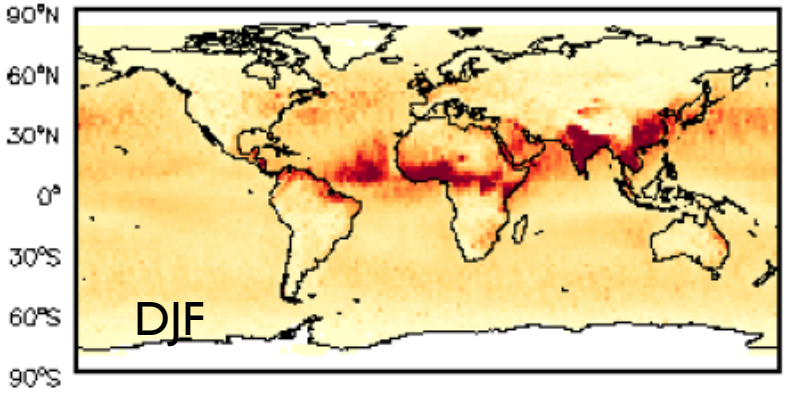
Partitioning aerosol optical depth between the boundary layer and the free troposphere

Ekman, Annica

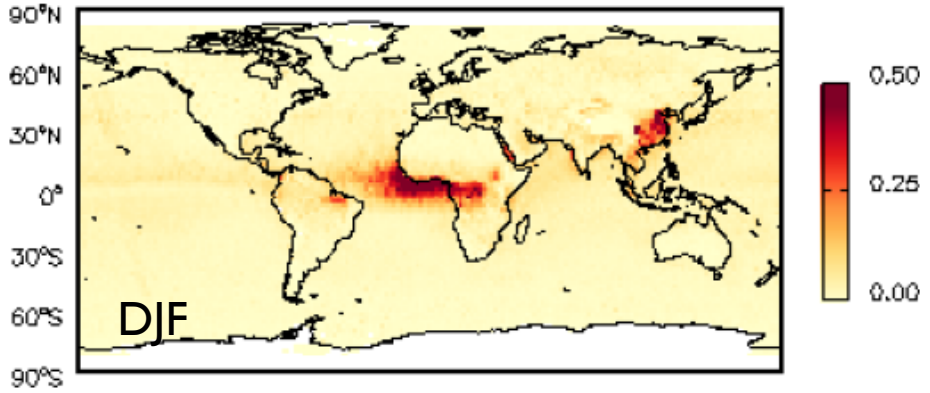
Partitioning AOD between the boundary layer and free troposphere using CALIOP data

Quentin Bourgeois, Annica M. L. Ekman, Jean-Baptiste Renard, Radovan Krejci, Abhay Devasthale, Frida A.-M. Bender, Ilona Riipinen and Gwenaël Berthet

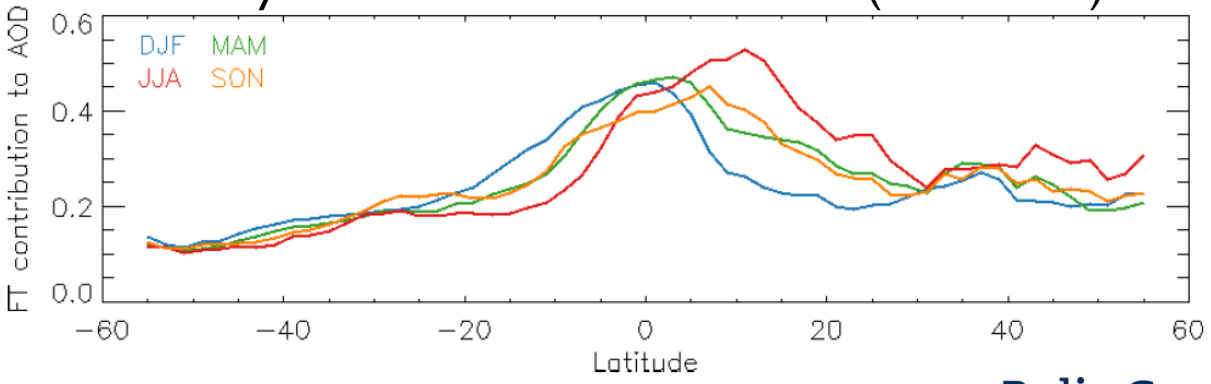
Boundary layer



Free troposphere



Daytime contribution of FT AOD (2007-2015)



RYMDSTYRELSEN
Swedish National Space Board

Bolin Centre for Climate Research

Stockholm University

On the sensitivity of the effective radiative forcing of anthropogenic aerosol

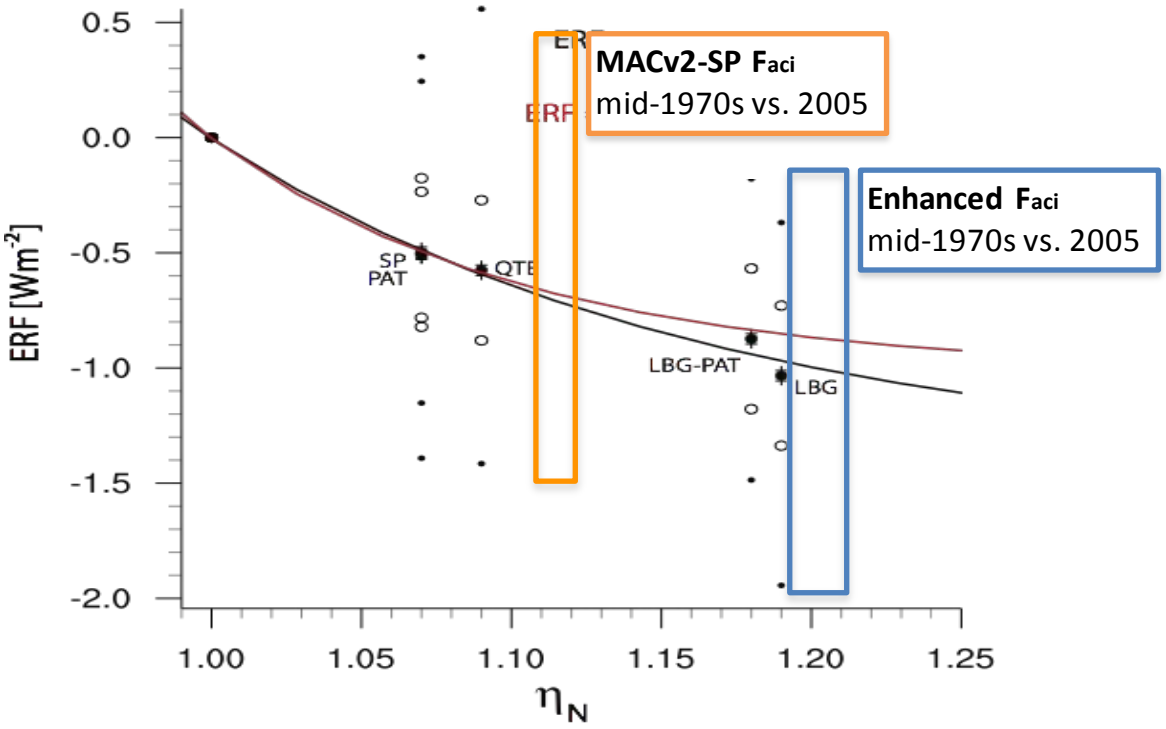
to the spatial shift of pollution between the 1970s and 2000s

Fiedler, Stephanie

Small change in anthropogenic aerosol forcing from spatially shifting emissions

Stephanie Fiedler

ERF ensemble statistics of ECHAM6.3
(SW, TOA, 180 years each)



Fiedler, Stevens, Mauritsen (2017): Sensitivity of forcing in JAMES
Stevens, Fiedler, et al. (2017): Technical description in GMD

Atmospheric **variability** has a **strong impact** on ERF estimate

Substantial spatial shift of anthropogenic emission has **small impact** on global mean all-sky ERF, and moderate impact if we mimic strong F_{aci}

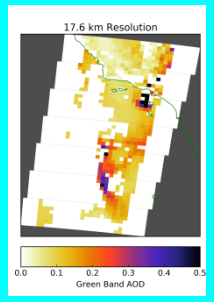
The MISR 4.4 km Aerosol Product

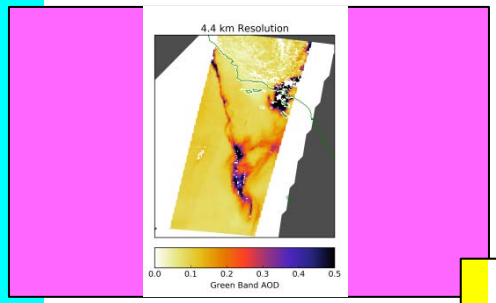
Development and Uses

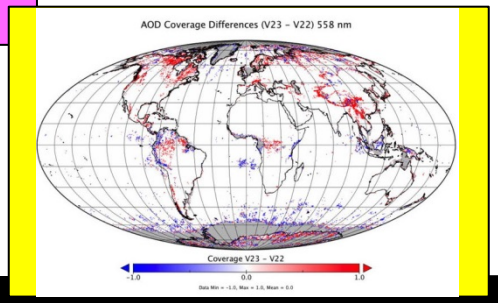
Garay, Mike

Resolution & Content Improvements

MISR Aerosol Product







A Poster Exhibition
by Michael J. Garay

10/10 to 13/10
2017
Helsinki, FI

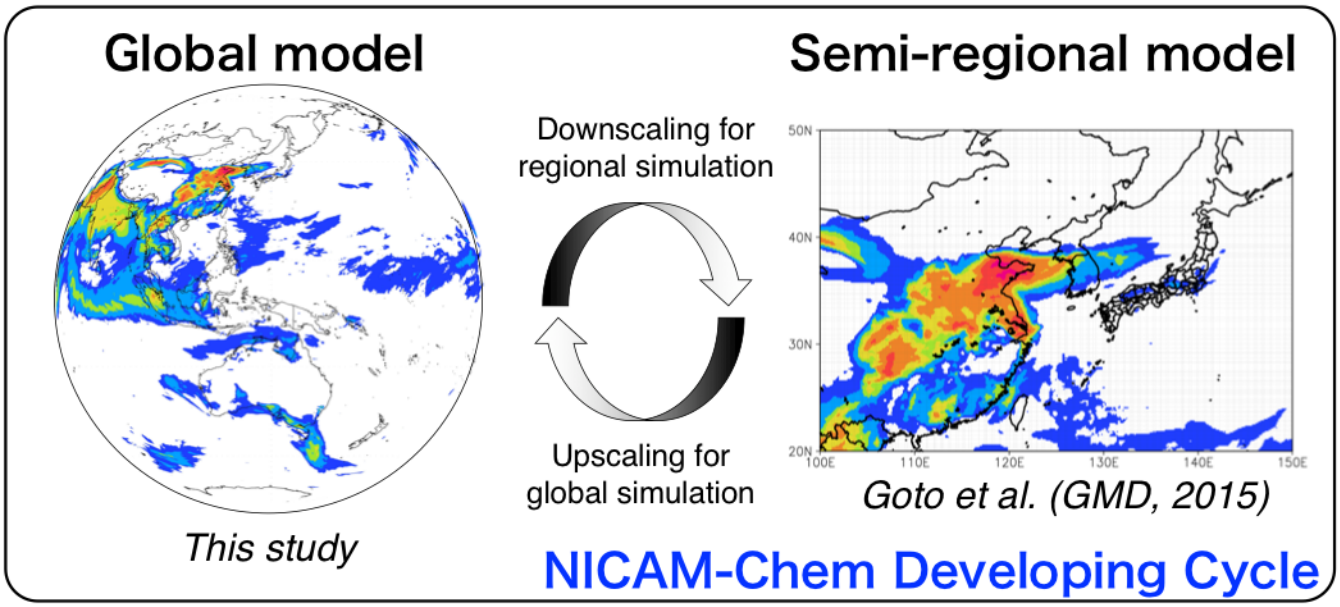
Aerosol climatology with 14km grid spacing

using a non-hydrostatic global atmospheric transport model

Goto, Daisuke

Global aerosol simulation with dx=14 km & 3 yrs

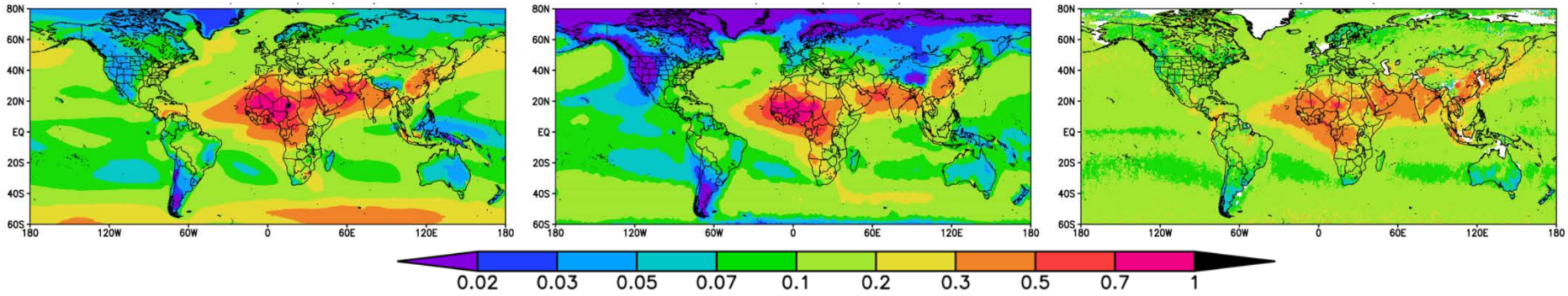
National Institute for Environmental Studies, Japan



Daisuke GOTO

Aerosol Optical Thickness in 3-years average

(a) NICAM (dx=14km) (b) NICAM (dx=220km) (c) MISR/AQUA



Performance of the two-Moment, Multi-Modal, Mixing-state-resolving Aerosol model for Research of Climate (MARC)

Granday, Benjamin

NATIONAL RESEARCH FOUNDATION
PRIME MINISTER'S OFFICE
SINGAPORE

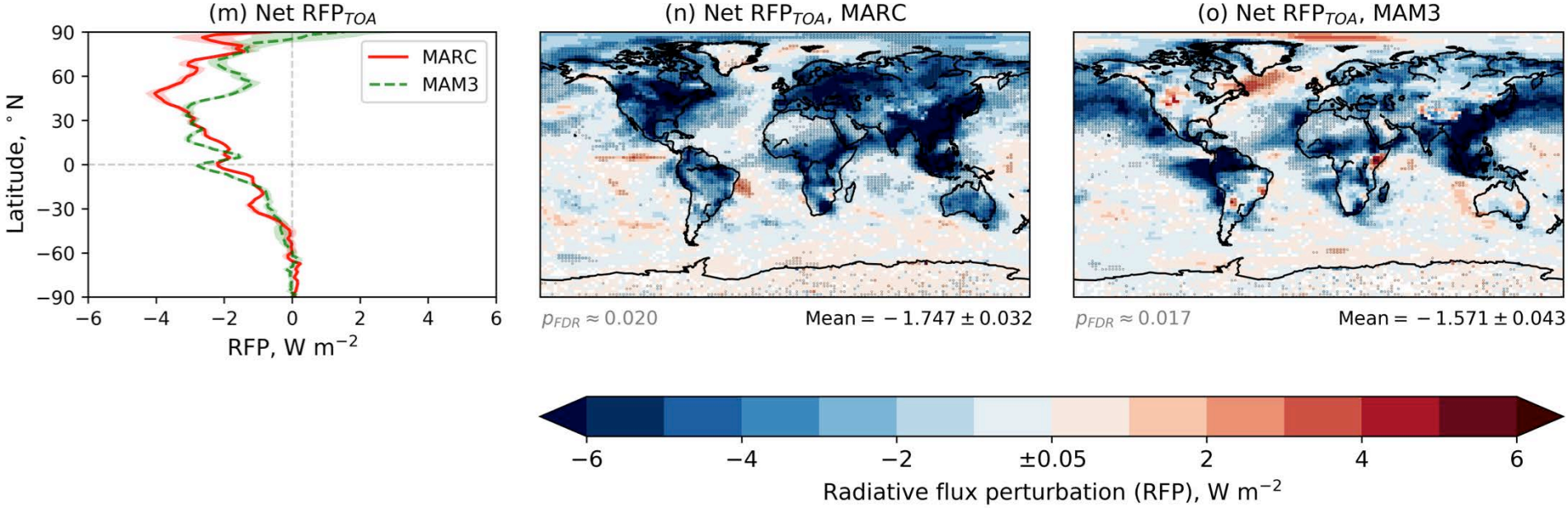
SMART
Singapore-MIT Alliance for Research and Technology

Performance of the two-Moment, Multi-Modal, Mixing-state-resolving Aerosol model for Research of Climate (MARC)

censam

Benjamin Grandey,

Daniel Rothenberg, Qinjian Jin, Hsiang-He Lee, Alexander Avramov, & Chien Wang



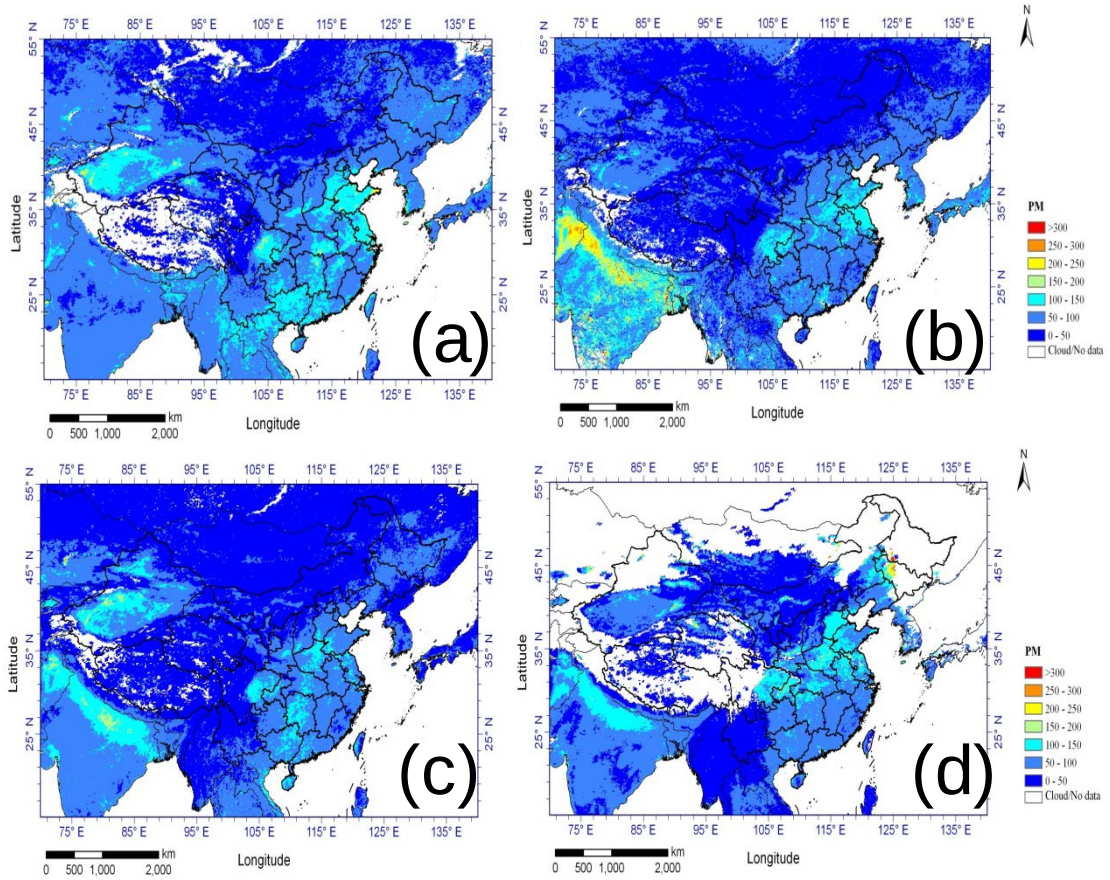
Retrieval of atmospheric particulate matter (PM)

using satellite data

Guang, Jie

Retrieval of atmospheric particulate matter using satellite data

P-04



request for aerosol satellite products:

- ✓ **Larger coverage**
- ✓ **Higher temporal resolution**
- ✓ **Higher spatial resolution**
- ✓ **More aerosol parameters (**aerosol effective radius, **etc)**

PM_{10} maps of (a) Spring (MAM), (b) Summer (JJA), (C) Autumn (SON) and (d) Winter (DJF) retrieved by A-physical based method.

RADI 中国科学院遥感与数字地球研究所 Institute of Remote Sensing and Digital Earth ,CAS

Degrees of freedom

and model-satellite comparisons

Henrikson, Swante

Number of degrees of freedom of global AOD field

Correlation length based:
MODIS: 537, MERRA2: 720, ECHAM-HAM: 840
AATSRADV: 410
EOF based:
MODIS: 1200, MERRA2: 1170, ECHAM-HAM: 1180
AATSRADV: 610
$\sqrt{(\sigma 2/\Sigma \sigma k2)}$ = 1290 for ECHAM-HAM

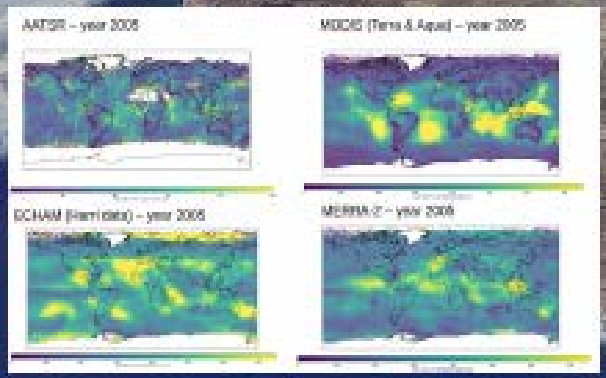
* AOD fields have many more dofs than T fields
* Parameters minus constraints too simplified
* Dependencies between pixels vary with time esp. because of changing wind directions and emissions
* Is 'degrees of freedom' well defined?

Different methods for 'counting':

* Pixel size / l_{corr} locally
* EOF → 0
* σ_k of pixels vs. global σ (independent Gaussians: $\sigma^2=\Sigma\sigma_k^2$)

Important for:

* rigorous statistical comparisons of
  * model versus measurement or
  * fields at different times
* building of simple models



Correlation length in different datasets

Simulated impacts of volcanic eruptions on tropical cyclogenesis potential

Ji, Duoying

Simulated impacts of volcanic eruptions on tropical cyclogenesis potential

Ji, Duoying

P-41

Genesis Potential Index

$$GPI \equiv |10^5\eta|^{3/2}\left(\frac{H}{50}\right)^3\left(\frac{V_{pot}}{70}\right)^3 \times (1+0.1V_{shear})^{-2}$$

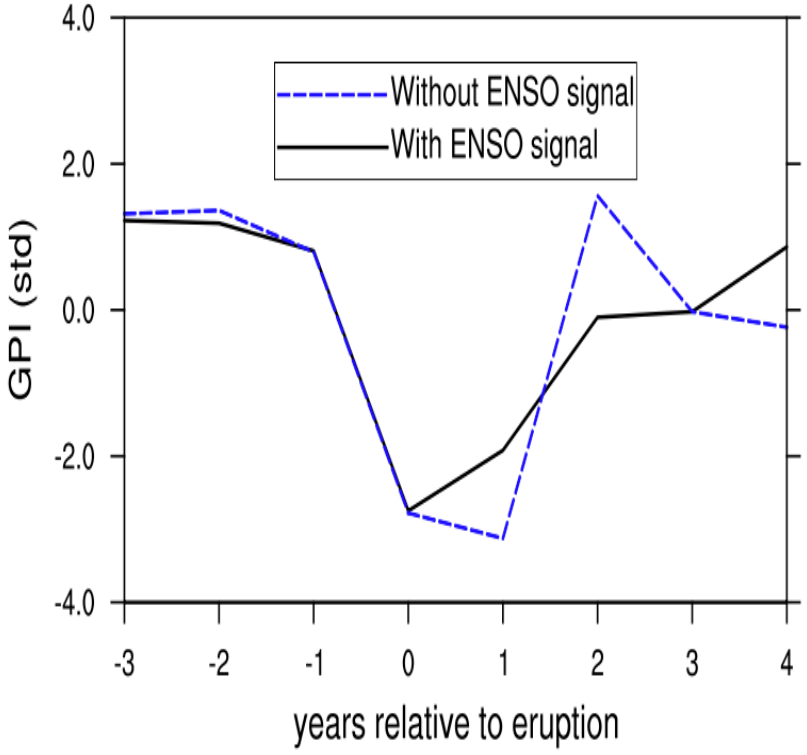
η: absolute vorticity of 850hPa flow

V_{pot}: potential intensity

V_{shear}: magnitude of 850hPa-200hPa wind shear

χ: saturation deficit of the middle troposphere

H: relative humidity at 700hPa



Black carbon impacts on clouds and radiation in HadGEM3

Ben Johnsen

BC impacts on radiation and clouds in HadGEM3

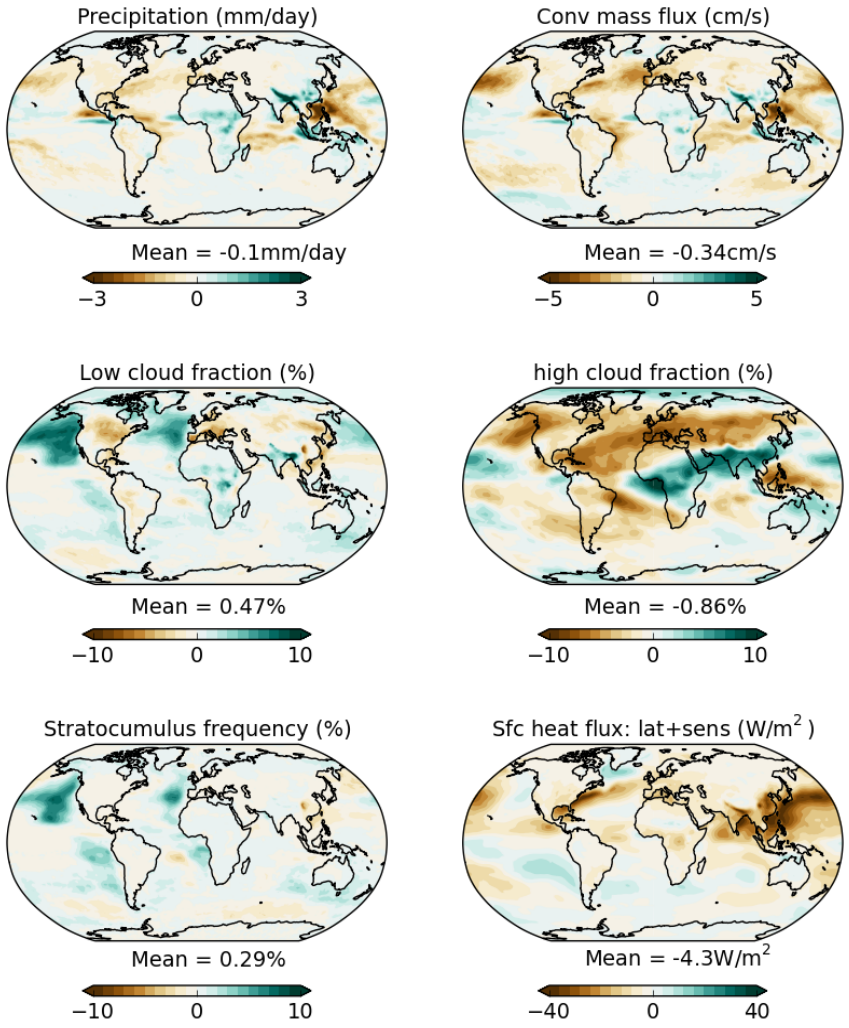
Ben Johnson, Jim Haywood,
James Mollard, Nicolas Bellouin

Impacts from 10xBC

- **Black carbon aerosol strongly absorbs solar radiation, but does it really warm climate?**
- **How does the absorption affect clouds, convection & precipitation?**
- **What is the radiative impact after such "rapid adjustments"?**

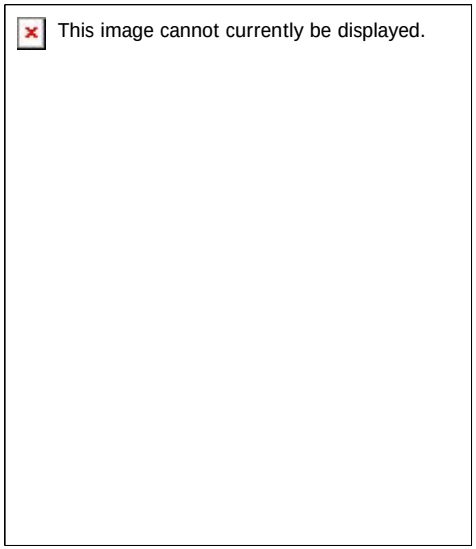
➢ **Deep convection and high cloud decreases**

➢ **Marine stratocumulus and low cloud enhanced**



Size and type characterization of particulate matter (PM)

with MISR multiangle and AirMSPI polarimetric imagery

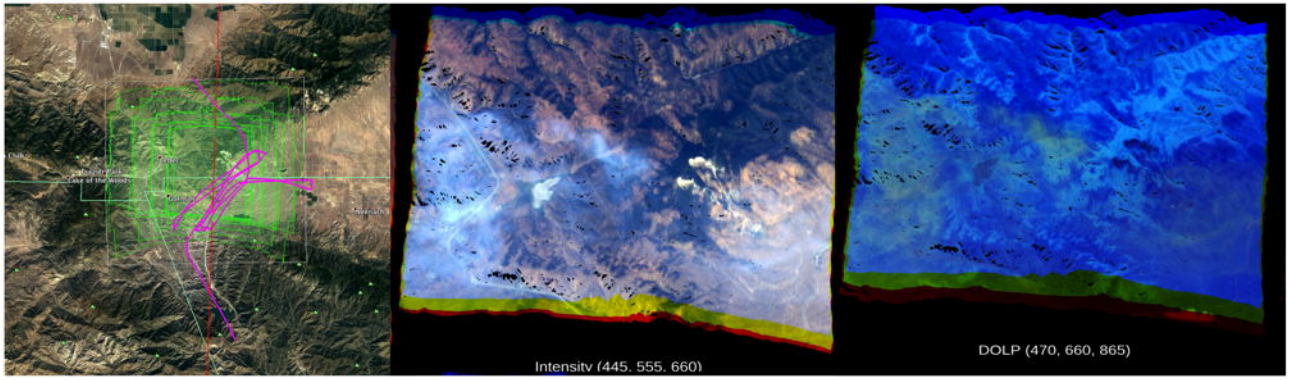


Kalashnikova, Olga

P22: **Photopolarimetric sensitivity to black carbon content of wildfire smoke**

AEROCOM 2016

AEROCOM 2017



Imaging Polarimetric Assessment and Characterization of Tropospheric Particulate Matter (ImPACT-PM) 2016

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Uncertainty quantification for Aerosol type selection and retrieved AOD in the satellite retrieval

Kauppi, Anu

Uncertainty quantification for Aerosol type selection and retrieved AOD in the satellite retrieval The method is based on Bayesian inference and have been studied with the OMI measurements.

Anu Kauppi,
Pekka Kolmonen,
Marko Laine and
Johanna Tamminen
(FMI)

Aim

1) Produce more realistic uncertainty estimate
2) Evaluate the aerosol microphysical model selection procedure
3) Find more robust AOD estimate that is based on the average of the most appropriate aerosol microphysical models instead of on a single model chosen probably by chance

Consider

- approximations in forward modeling
- difficulty in model selection reflects the AOD uncertainty

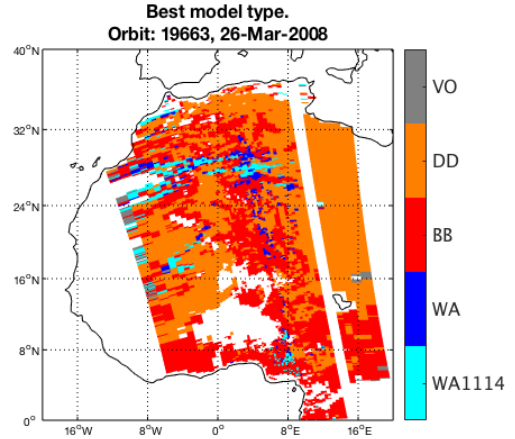


Fig. 1. Main types

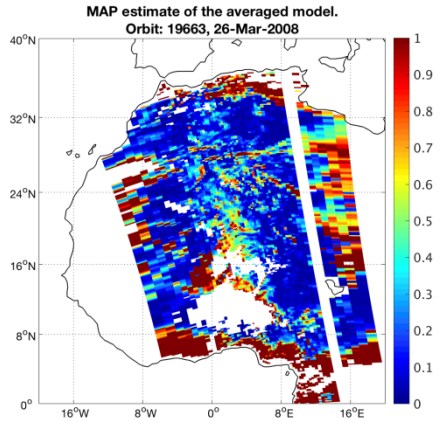


Fig. 2. MAP AOD estimate

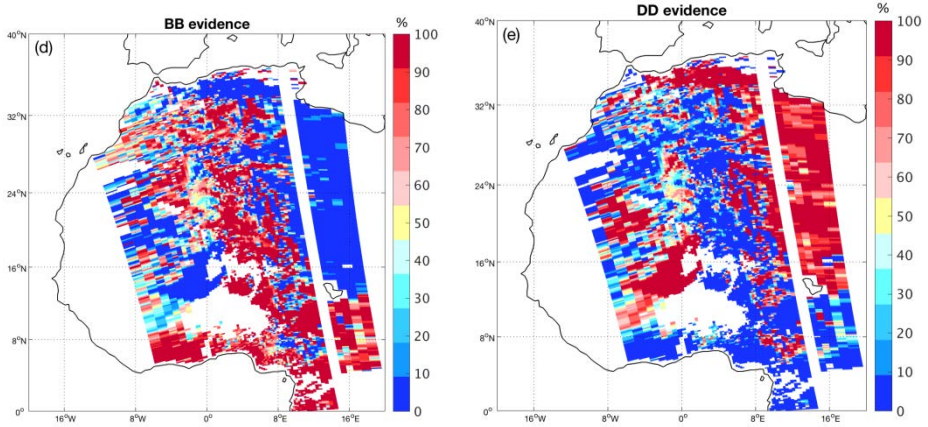


Fig. 3. The combined evidences for BB (left) and DD (right) type of models.

Reference: Aerosol type retrieval and uncertainty quantification from OMI data, A. Kauppi, P. Kolmonen, M. Laine, and J. Tamminen, Atmos. Meas. Tech. Discuss., https://doi.org/10.5194/amt-2017-47, 2017.

Marine Organic Aerosol Sources

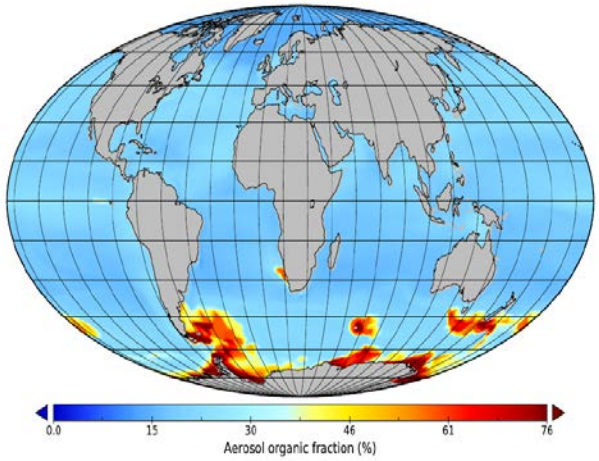
in a Global Chemistry Transport Model

Keskinen, Jukka-Pekka

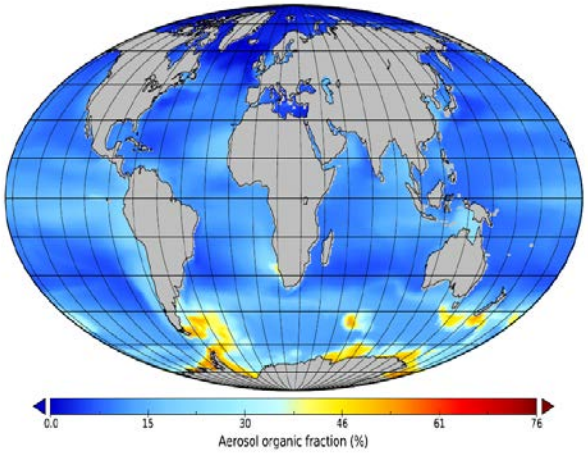
Marine Organic Aerosol Sources in a Global Chemistry Transport Model

- Currently, TM5/EC-Earth emits only sea salt as sea spray aerosol
- Two parametrizations for the calculation of organic fraction sea spray aerosol were implemented
- Vignati et al. utilizes chlorophyl a proxy
- Burrows et al. utilizes five different macromolecule classes as proxies
- Largest effects in the Southern Ocean during DJF

VIGNATI ET AL.



BURROWS ET AL.



A multi-model analysis and comparison with remote-sensing data of Asia and Northern Pacific dust

Kim, Dongchul

A multi-model analysis and comparison with remote-sensing data of Asia and Northern Pacific dust

Dongchul Kim and co-authors (P-47)

This study compares the five AeroCom II models and the updated remote sensing observations from MODIS, CALIOP, MISR and AERONET: [AOD, coarse-mode AOD, DOD, fDOD]

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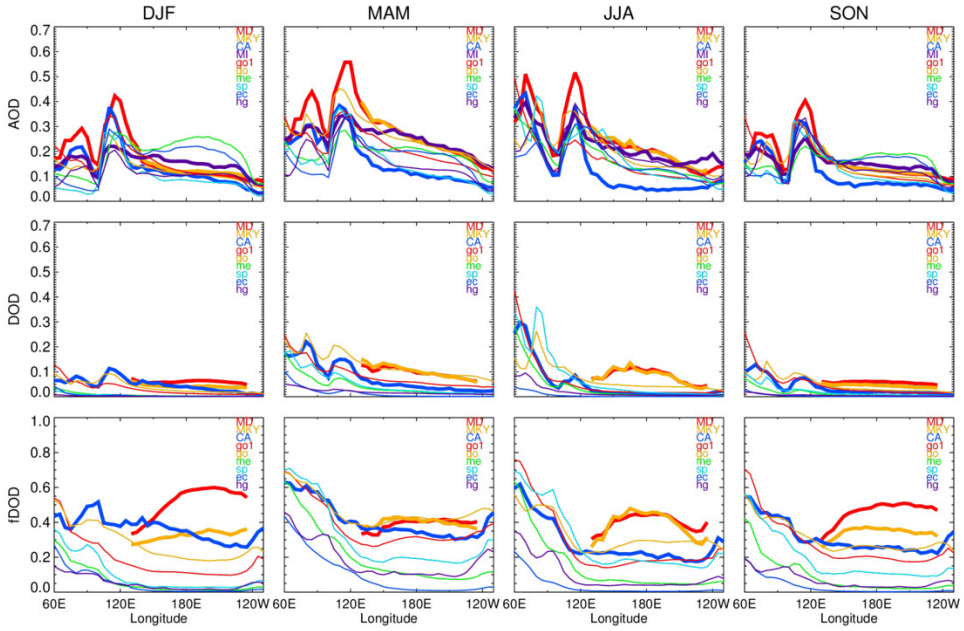
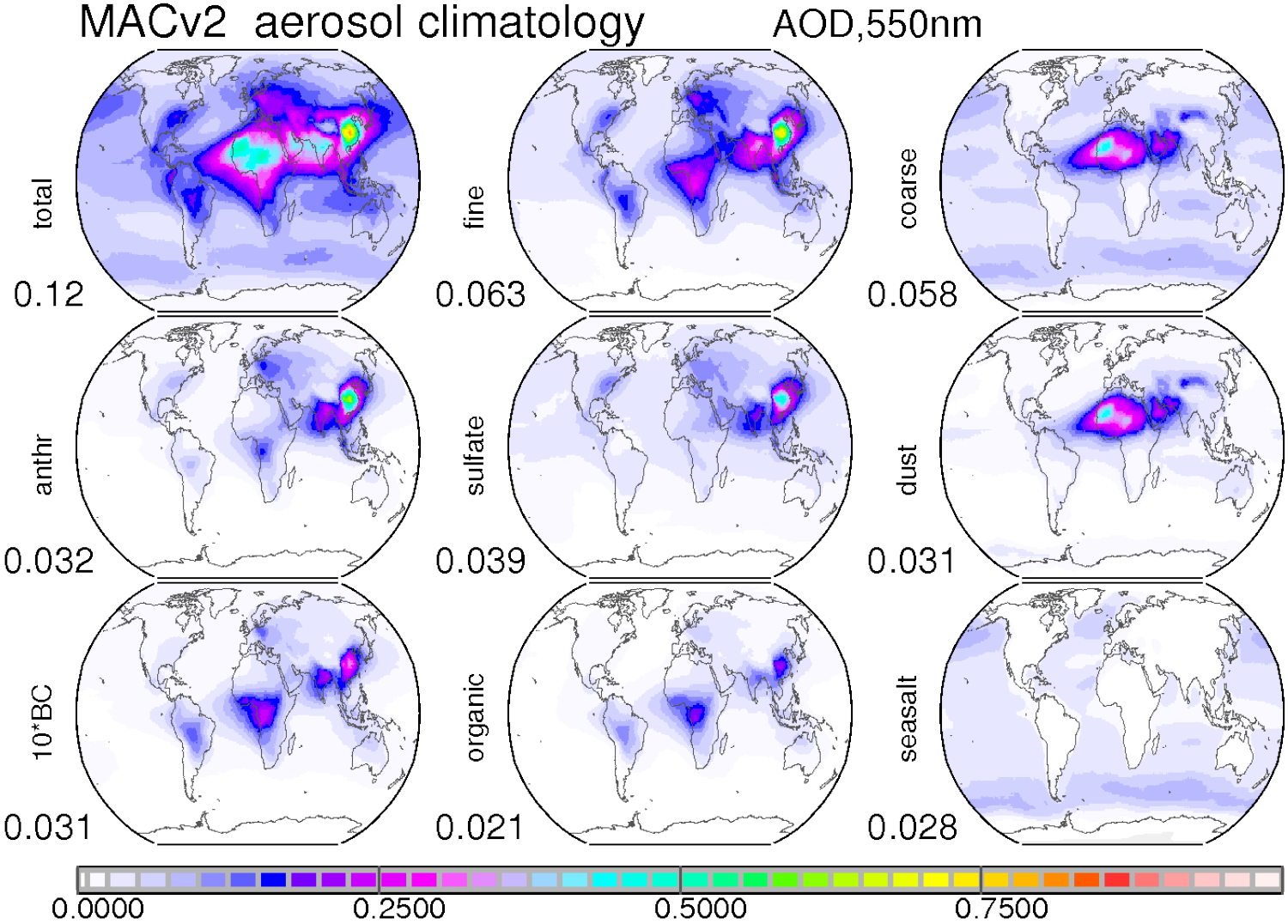


Aerosol climatology – MACv2

Kinne, Stefan

P9



MACv2 **from sunphotometry to aerosol component distributions**

Beyond MACC
Reanalysis and forecasts of atmospheric composition

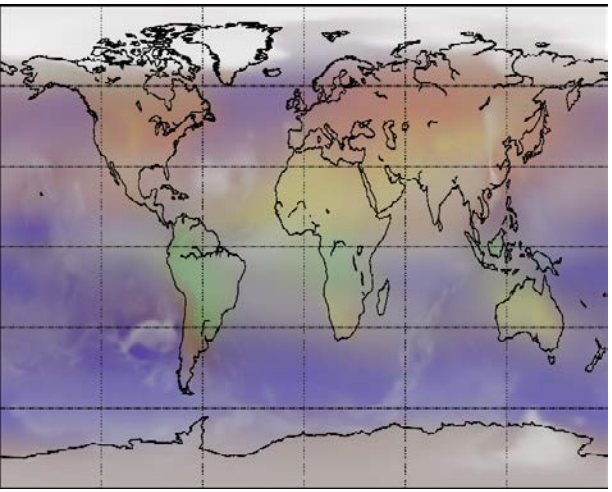
from the Copernicus Atmosphere Monitoring Service

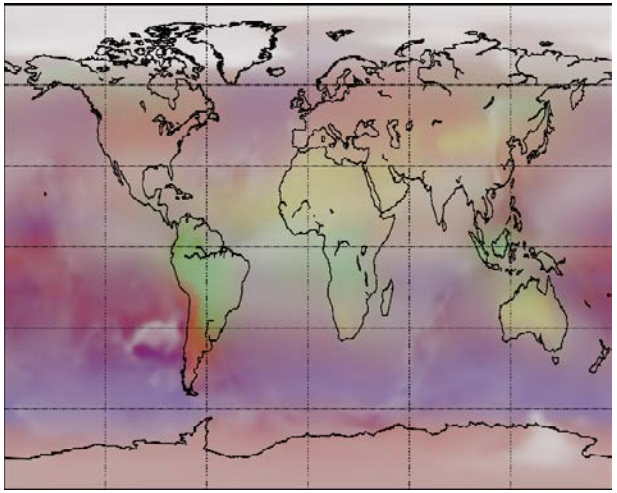
Kipling, Zak

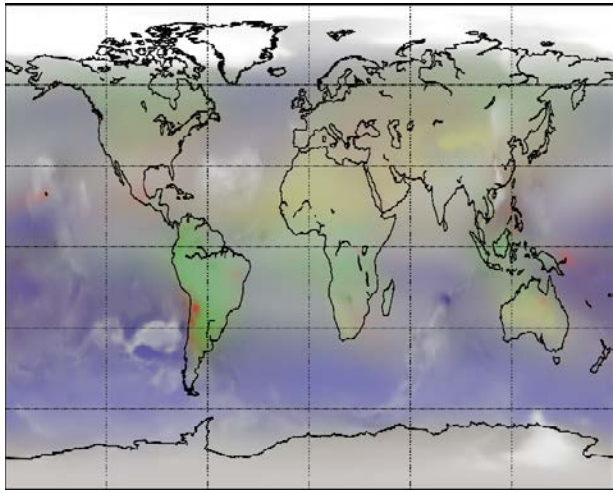
Beyond MACC: reanalysis and forecasts of atmospheric composition from the Copernicus Atmosphere Monitoring Service

Zak Kipling *et al.*

MACC	CAMS interim	CAMS
reanalysis: 2003–	reanalysis: 2003–	reanalysis: 2003–







● *Sea salt* ● *Desert dust* ● *Organic matter* ● *Black carbon* ● *Sulphate*

Aerosol validation and effective radiative forcing estimates

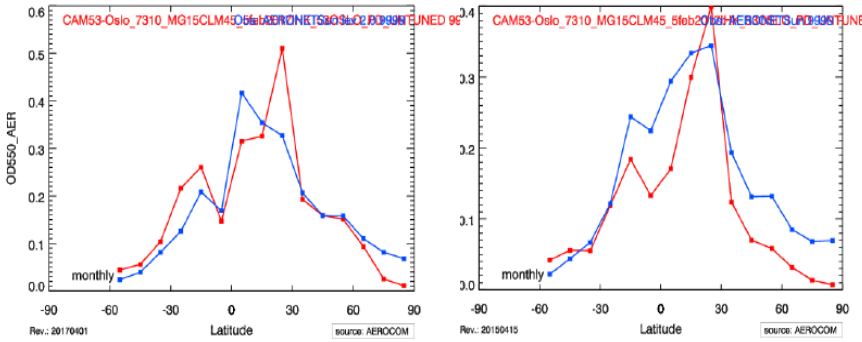
from CAM5.3-Oslo

Kirkevag, Alf

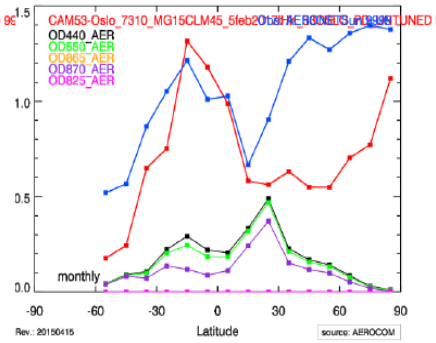
Aerosol validation and effective radiative forcing estimates from CAM5.3-Oslo

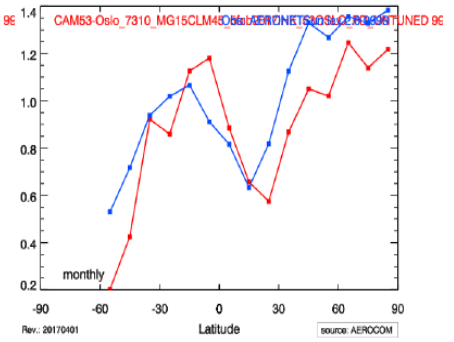
A. Kirkevåg, A. Grini, D. Olivié, Ø. Seland, K. Alterskjær, M. Hummel, I. H. Karset, A. Lewinschal, X. Liu, R. Makkonen, J. Griesfeller, M. Schulz, and T. Iversen

all-sky vs. clear-sky AOD_{550}

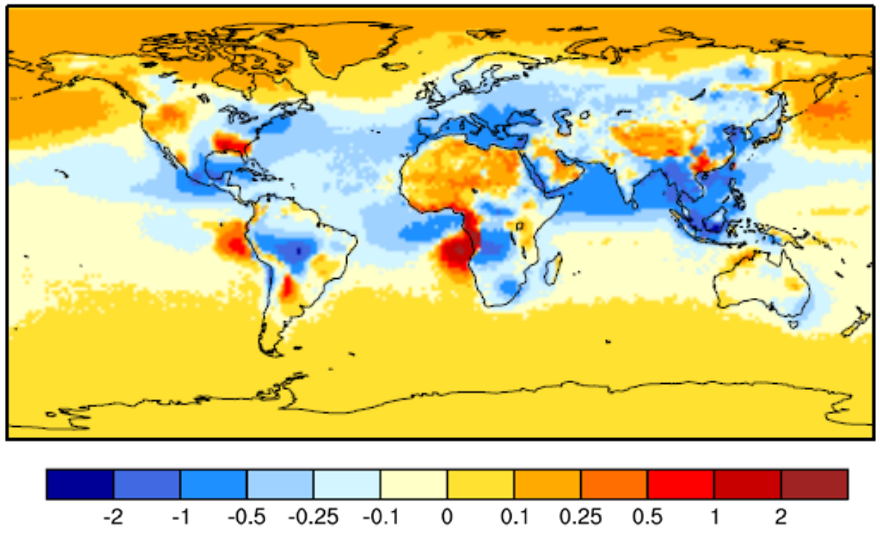


all-sky vs. clear-sky ANG_{4487}

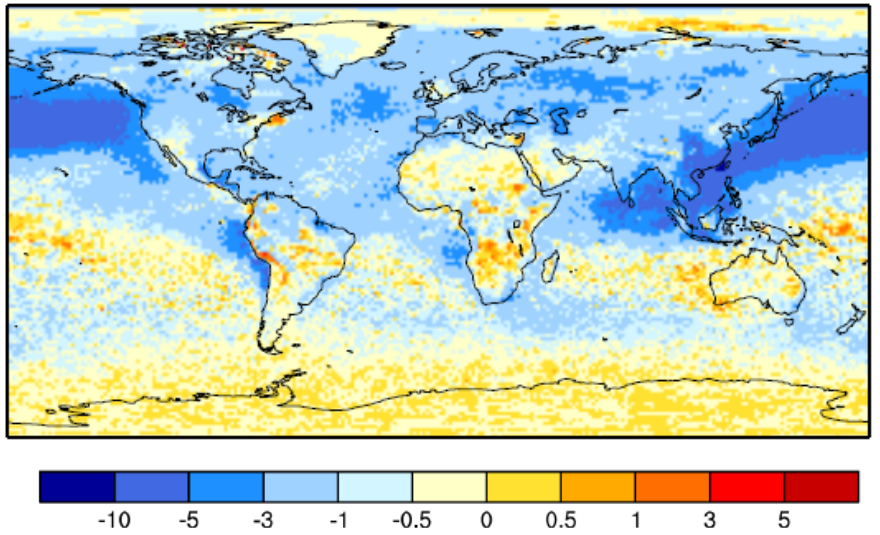




SW Direct radiative forcing at TOA avg = -0.095 W m^{-2}



SW cloud radiative forcing at TOA avg = -1.502 W m^{-2}



Aerosol impacts on ocean heat transport at the Arctic

in Norwegian Earth System Model (NorESM)

Krishnan, Srinath

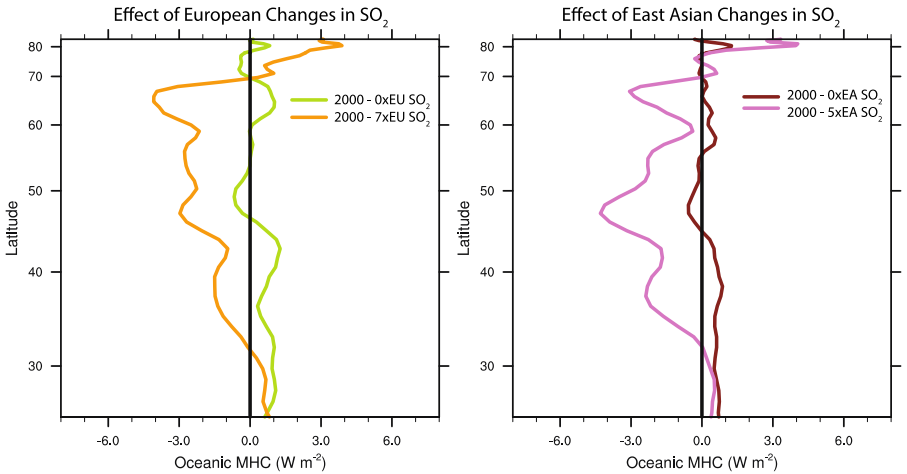
Aerosol impacts on ocean heat transport at the Arctic

Srinath Krishnan[1], *Tanja Dallafior*[2], *Anna Lewinschall*[1], *Annica M. L. Ekman*[1], *Ilona Riipinen*[2], *and Hans-Christen Hansson*[2]

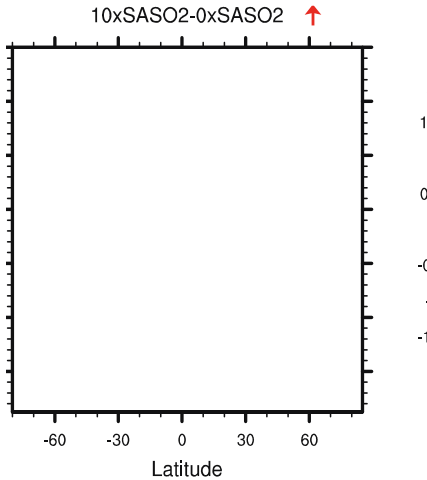
Stockholm University

P-21

Changes in poleward meridional heat convergence



Changes in meridional overturning circulation



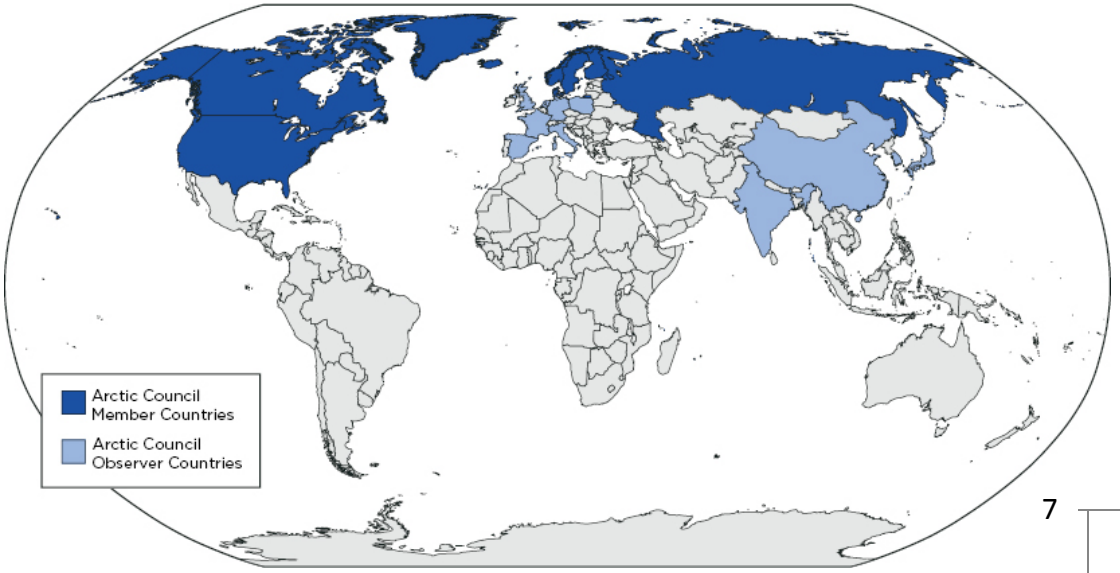
Investigating the efficacy of Black Carbon emission reductions

in slowing Arctic warming

Thomas Kühn

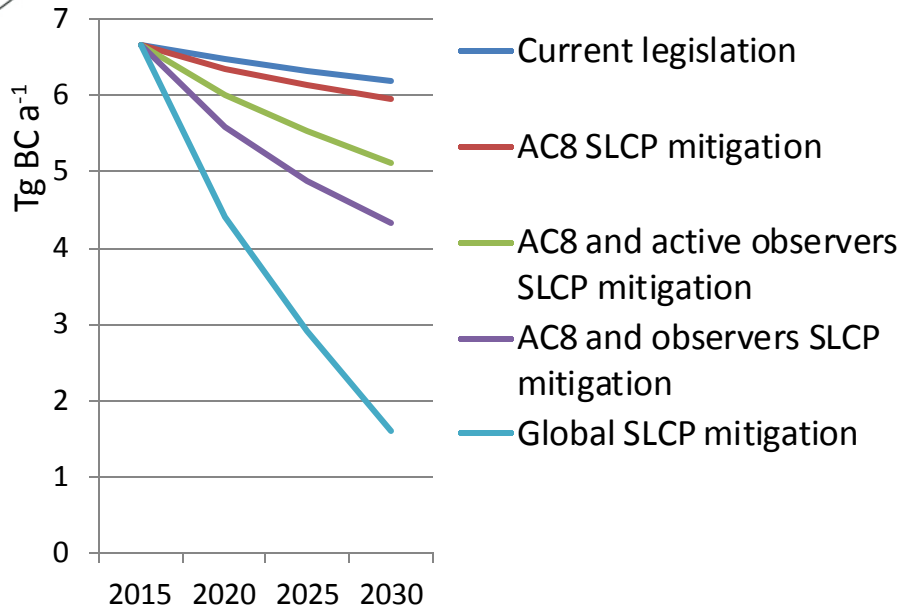
Investigating The Efficacy Of Black Carbon Emission Reductions In Slowing Arctic Warming

T. Kühn, H. Kokkola, K. Kupiainen, K. Kulovesi, and K.E.J. Lehtinen



- the Arctic is the fastest warming region on the globe
- Mitigation of short-lived climate pollutants (SLCP) may slow Arctic warming in short-term

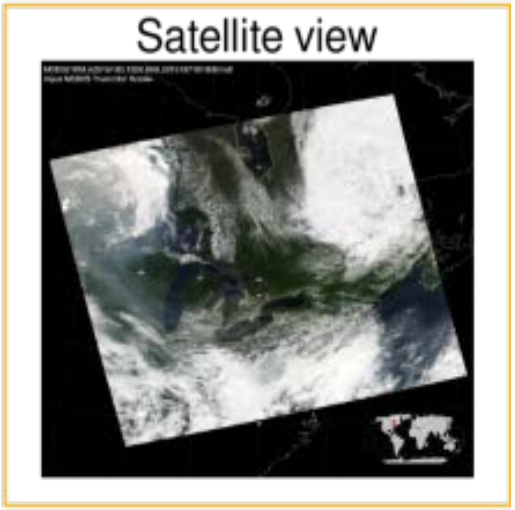
- Here we investigate the efficacy of black carbon (BC) reductions in different regions of the globe
- BC sources close by already emit little, but relative contribution to Arctic is higher
- Come to see my poster, if you want to know more ☺

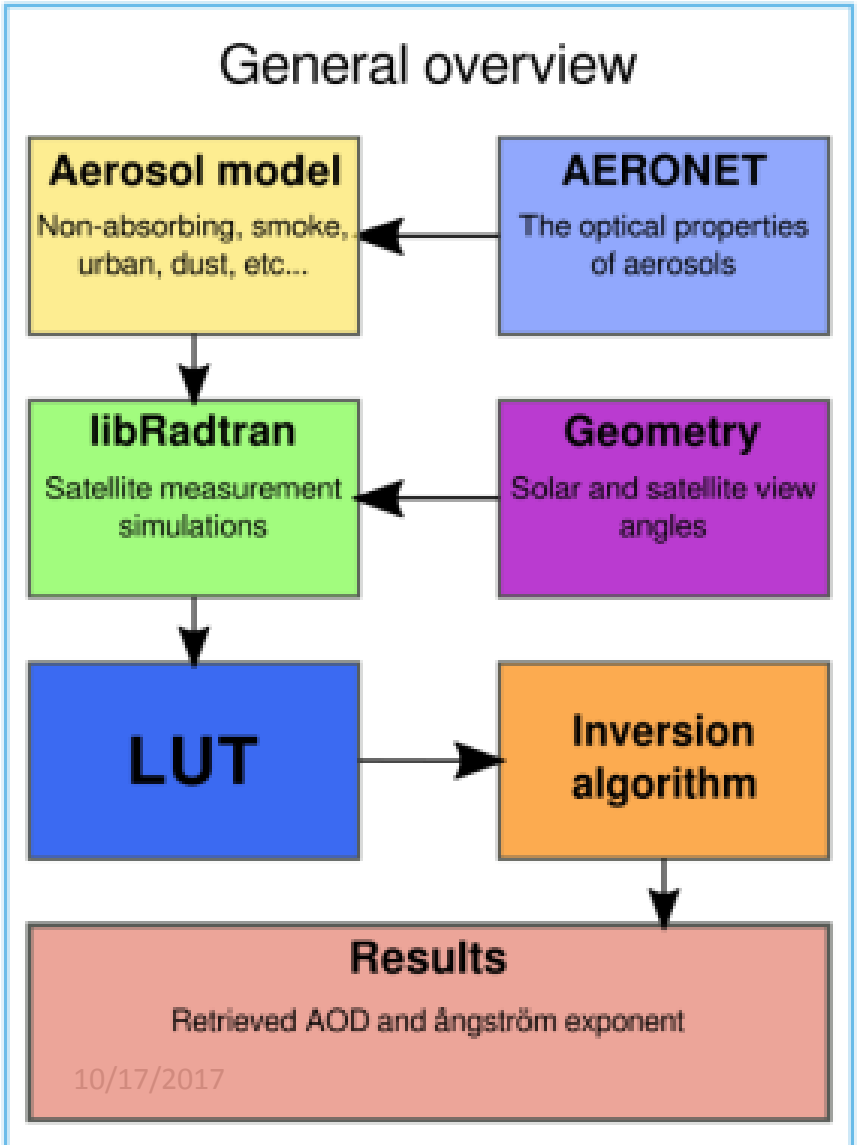


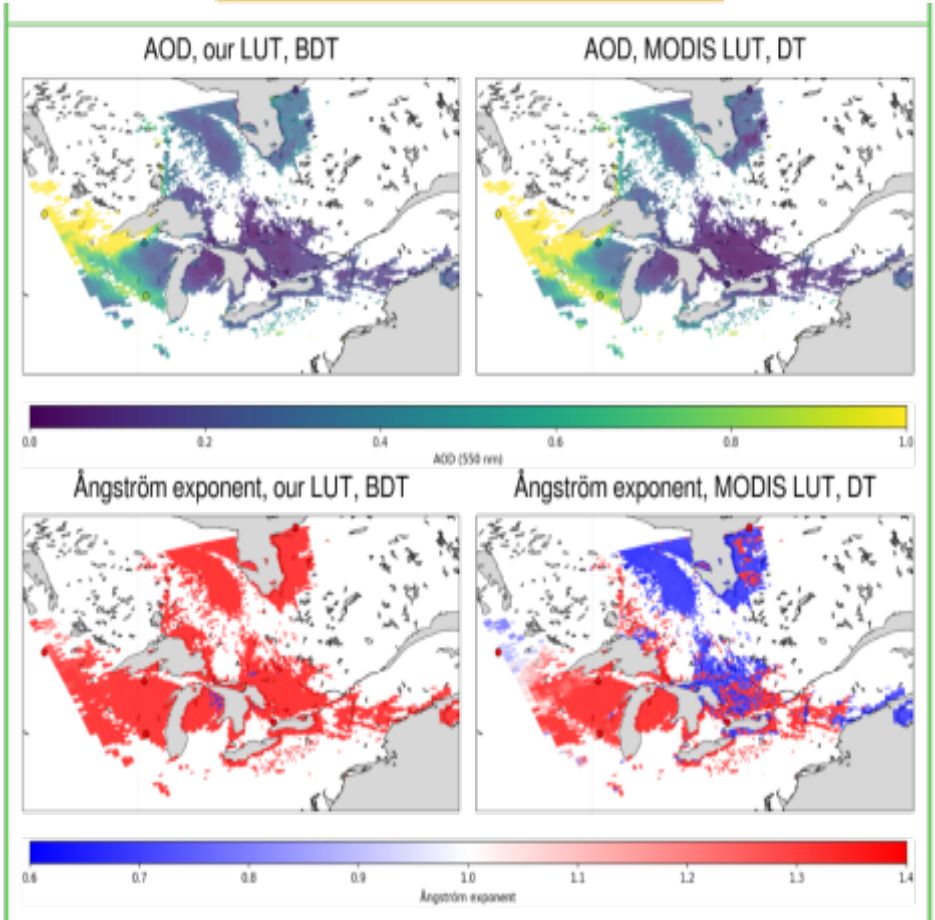
LibRadtran based tool for computing lookup-tables for satellite aerosol retrievals

Kukkurainen, Antti

(Libtran-based) **lookup-tables for satellite aerosol retrieval**







The AeroCom Multi-Model Perturbed Physics Experiment (MMPPE)

Lee, Lindsay

The AeroCom multi-model perturbed physics ensemble (MMPPE)

Lindsay Lee, Duncan Watson-Parris, Andrew Gettelman, P. Stier, K. S. Carslaw, D. Olivie, S. Bauer, K. Tsigaridis, M. Schulz, H. Matsui, T. Takemura, J. Quaas, Y. Lee.

Contact: l.a.lee@leeds.ac.uk

The Leverhulme Trust

Two 3-parameter PPEs across multiple global aerosol models

40 years simulation each

The black carbon experiment

Target: Direct forcing due to anthropogenic BC

Perturbations

1. Aerosol number
2. Wet deposition
3. BC optical properties

The cloud experiment

Target: ACI or ECF_ACI

Perturbations

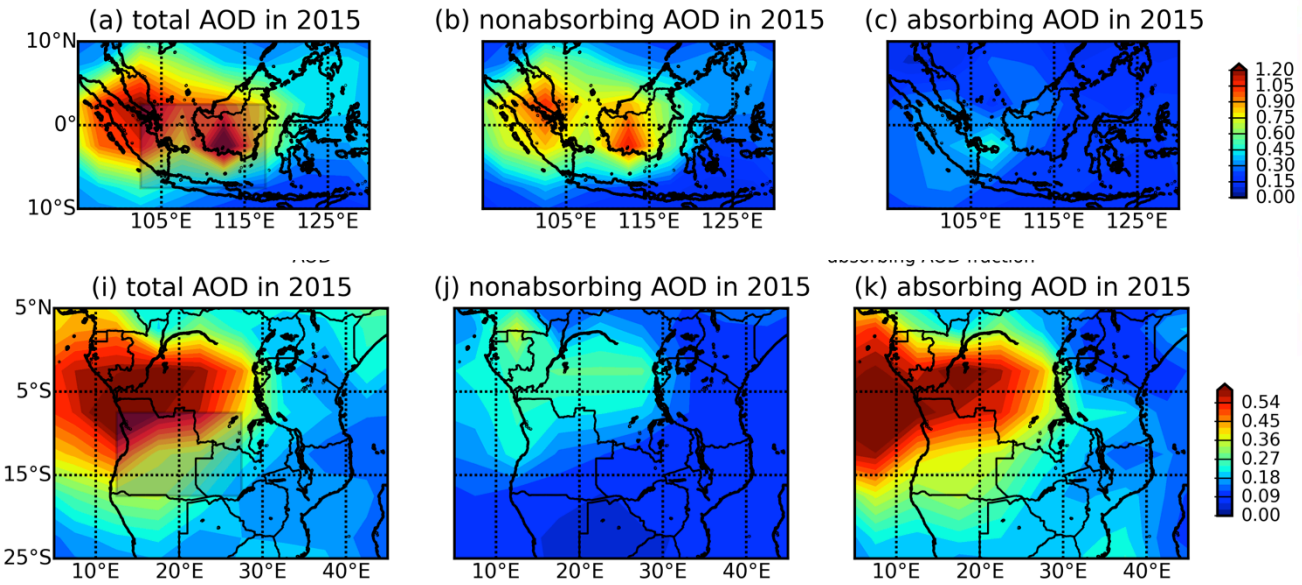
1. CCN number
2. Activation
3. Autoconversion

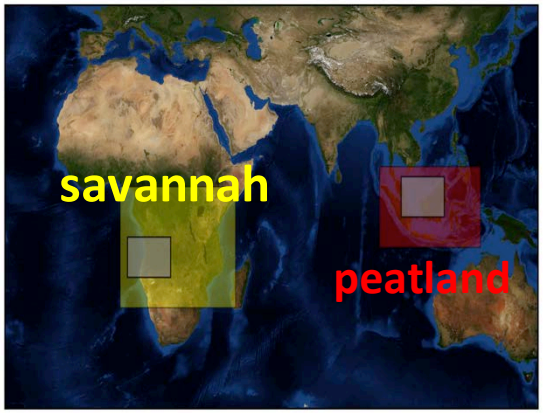
Characterization of wildfire-induced aerosol emissions from the Maritime Continent peatland and Central African dry savannah

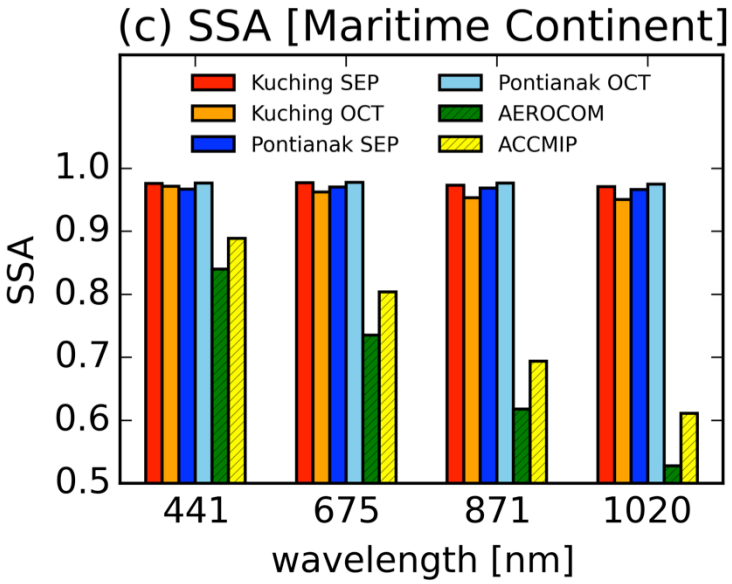
with MISR and CALIPSO aerosol products

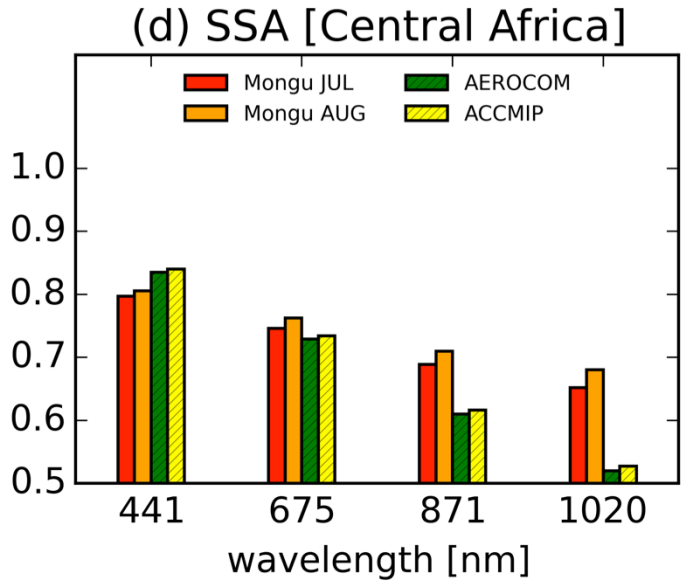
Lee, Huikyo

P31 Characterization of wildfire-induced aerosol emissions with MISR and CALIPSO









The calculated SSA of AEROCOM and ACCMIP BC fractions for Central Africa is comparable to the observations, whereas the observed SSA is much larger than simulated SSA in the Maritime Continent.

COARSEMAP

synthesis of observations and models for coarse-mode aerosols

Lihavainen, Heikki

COARSE-MAP

Synthesis of observations and models for coarse-mode aerosols

Coordinators: Heikki Lihavainen, Natalie Mahowald, Ron Miller, Christine Wiedinmyer

- **coarse aerosols influence Earth's climate and biogeochemistry by**
  - **interacting with long-wave radiation**
  - **promoting ice nucleation**
  - **contributing important elements to biogeochemical cycles during deposition**.

- **COARSE-MAP** is a new project aimed at compiling and synthesizing available information about coarse mode aerosol.

- **we seek more collaborators** who have observational data, especially including elemental or composition data, and/or who are interested in detailed modeling of the coarse mode. The goal will be publications synthesizing data with models, as well as providing synthesized results to the wider community.

- presentation by Paul Ginoux in session 8

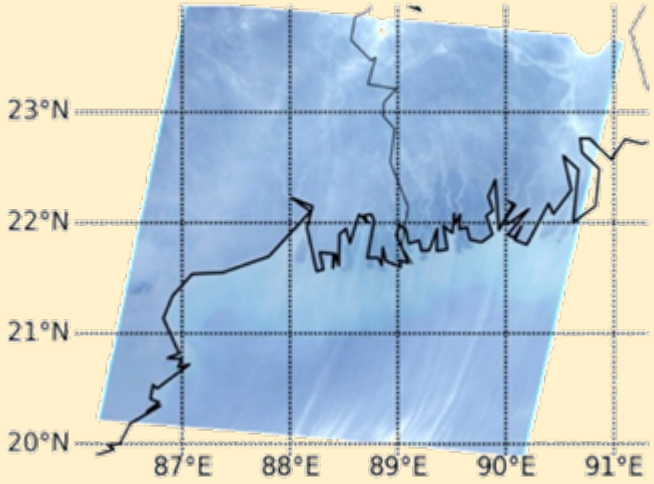
A MISR Pixel-Level Aerosol Retrieval Algorithm

for Turbid, Coastal, and Eutrophic Waters

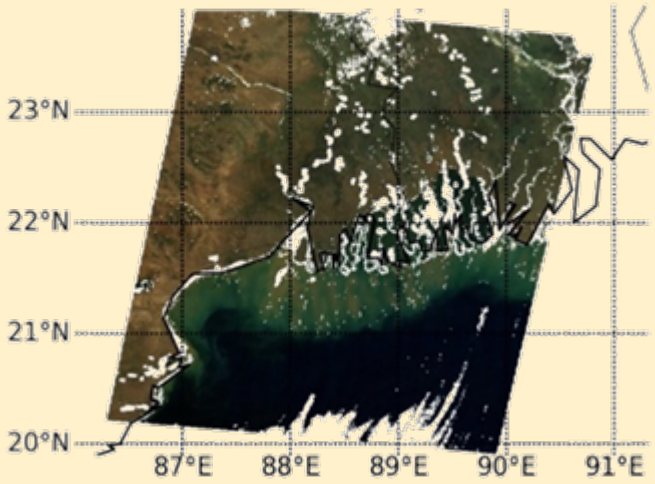
Limbacher, James

MISR RA Turbid Water

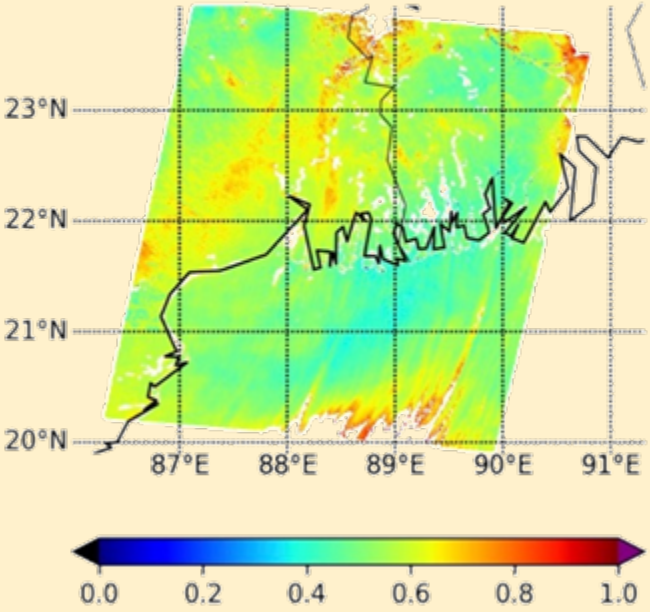
MISR Df RGB Composite



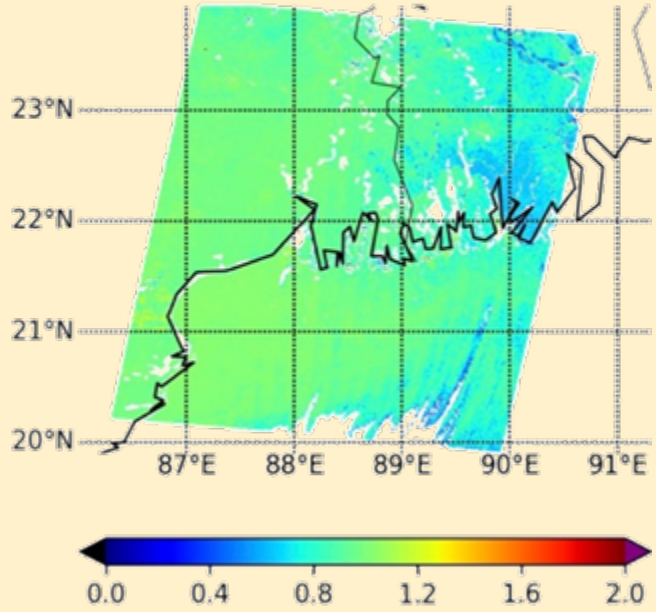
MISR RA Surface Albedo



MISR RA AOD (558 nm)



MISR RA Angstrom Exponent



James Limbacher

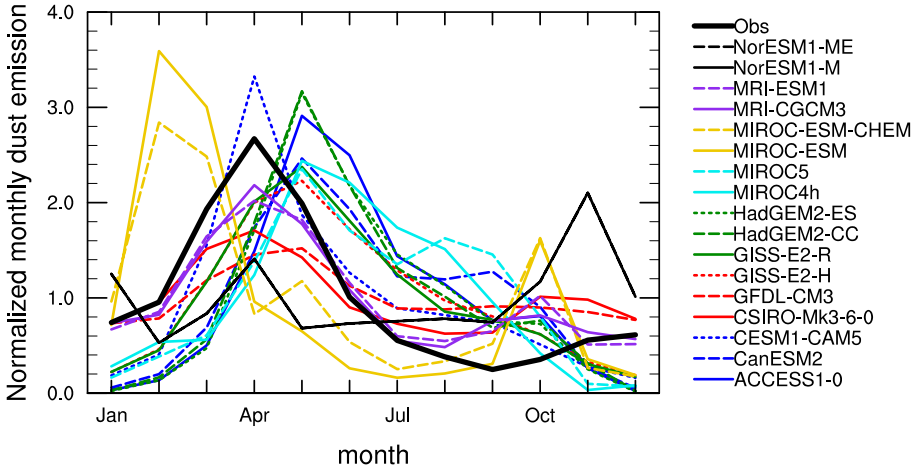
Spatial and temporal variations of East Asian dust

in CMIP5 models

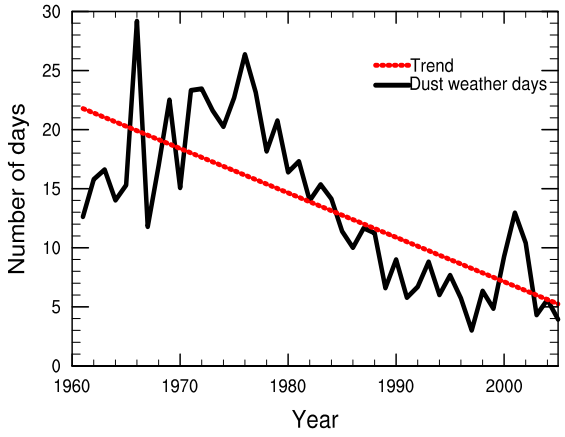
Lin, Zhaohui

Spatial and temporal variations of East Asian dust in CMIP5 models?

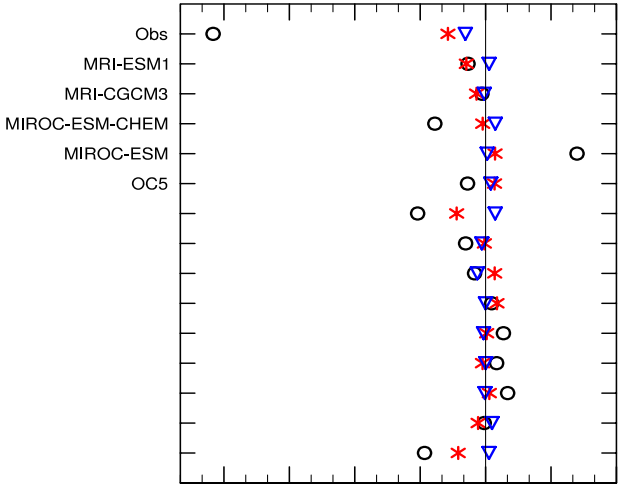
- **Spatial distribution: ok**
- **Seasonal evolution: some ability**
- **Long-term variations: bad**



Observed dust weather days



Model vs observed



More on the poster (P-32)

Zhaohui LIN
IAP/CAS, CHINA

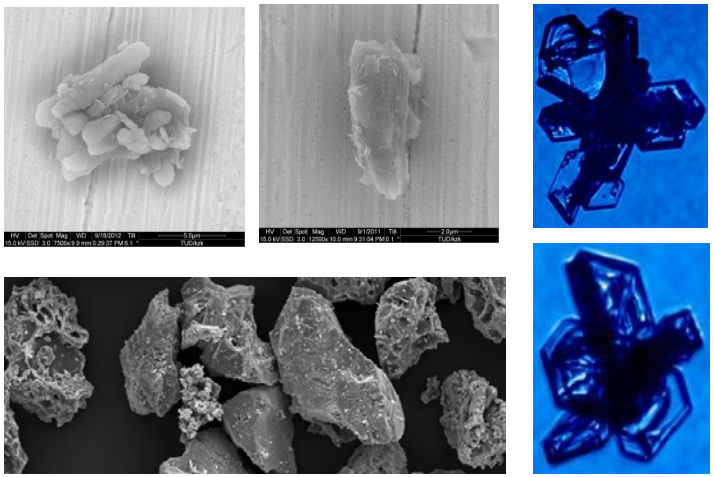
Nonspherical particles in the atmosphere

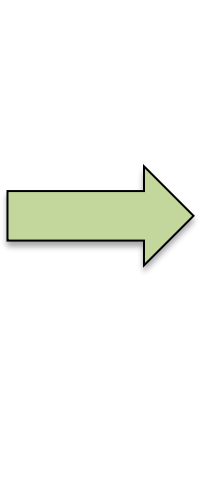
From single particles to global radiation

Lindquist, Hannakaisa

ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE

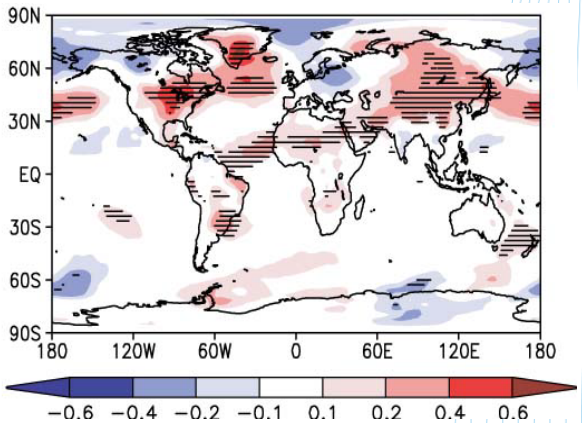
Atmospheric ice and dust: From single particles to global radiation





See you at my poster!

hannakaisa.lindqvist@fmi.fi



Bayesian Dark Target Algorithm for MODIS AOD retrieval over land

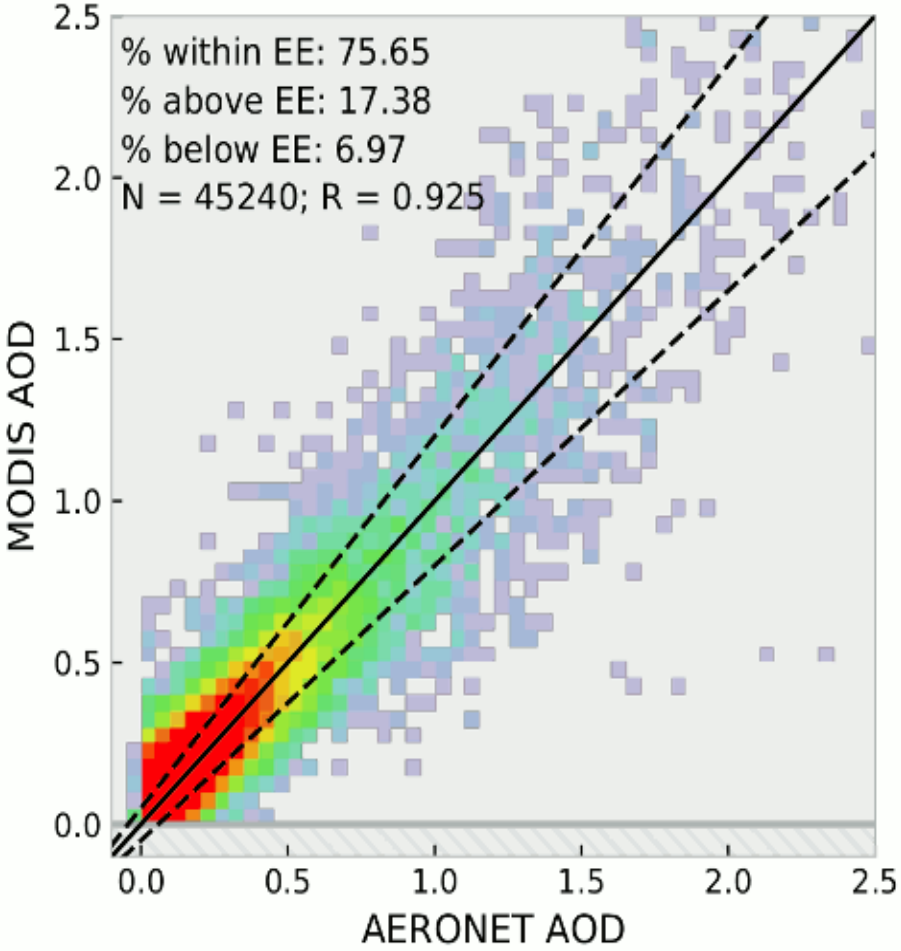
and uncertainy quantification

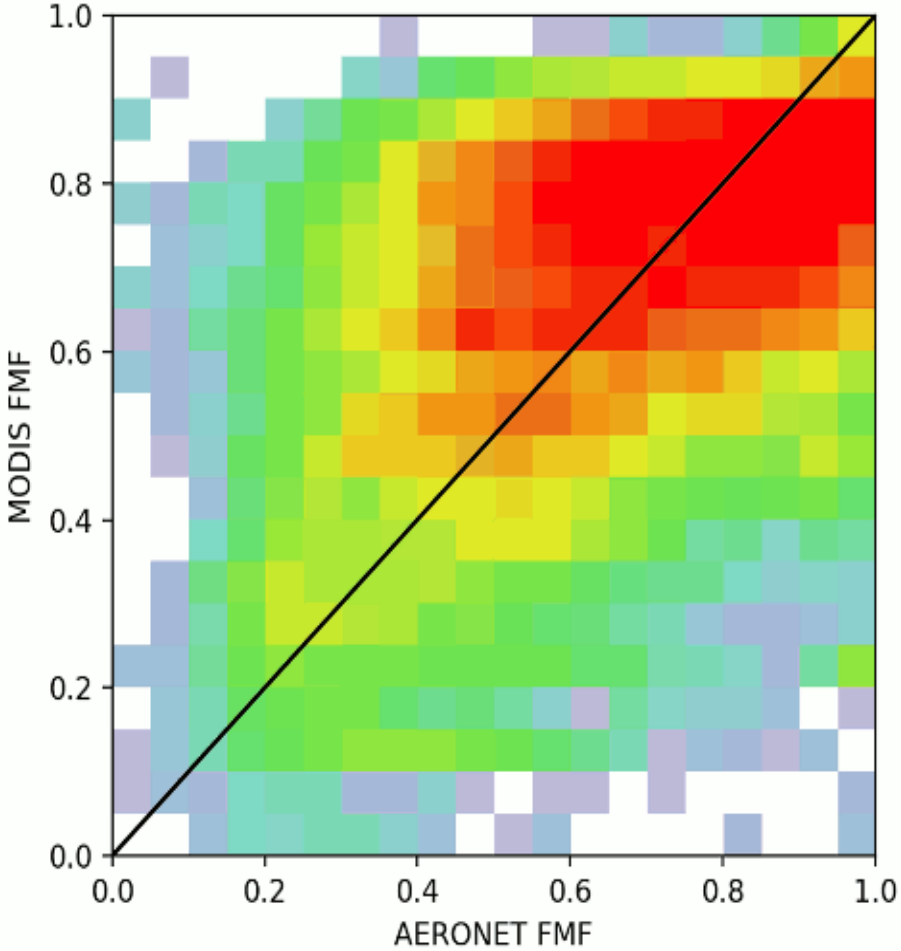
Lipponen, Antti

ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE

Bayesian Dark Target – poster P-60 - Antti Lipponen

MODIS - Bayesian Dark Target over land algorithm





Aerosol Product from Algorithm MAIAC

and its Comparison with DT and DB

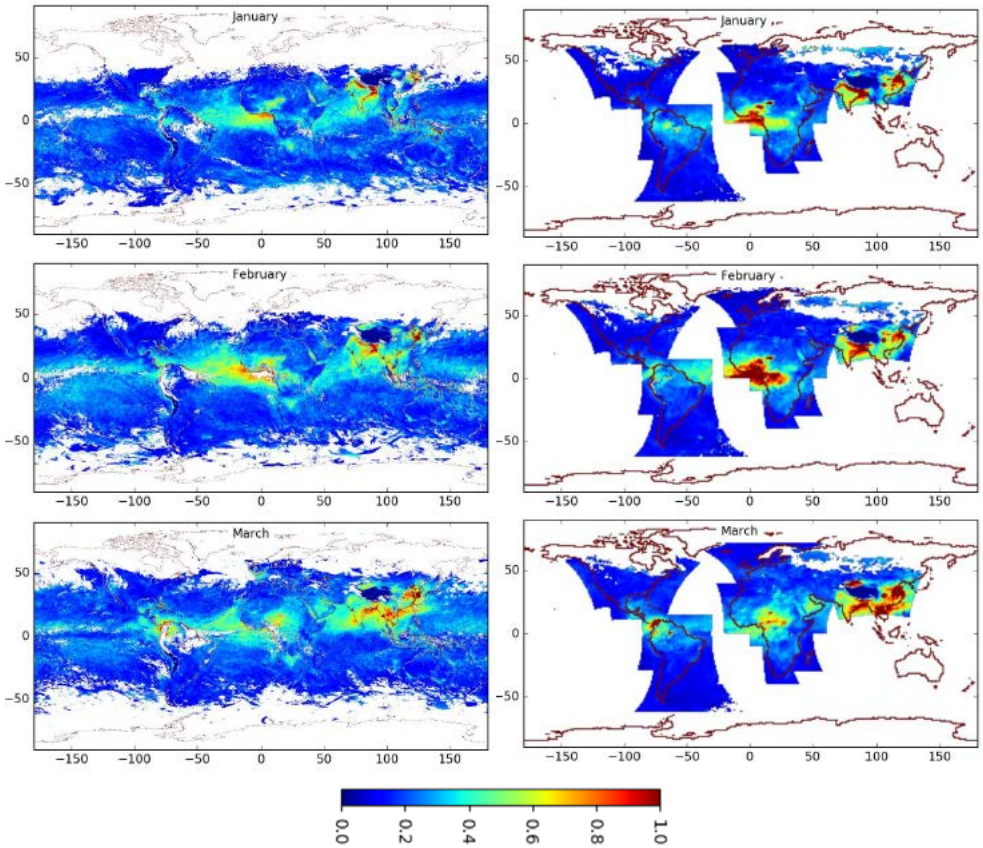
Lyapustin, Alexei

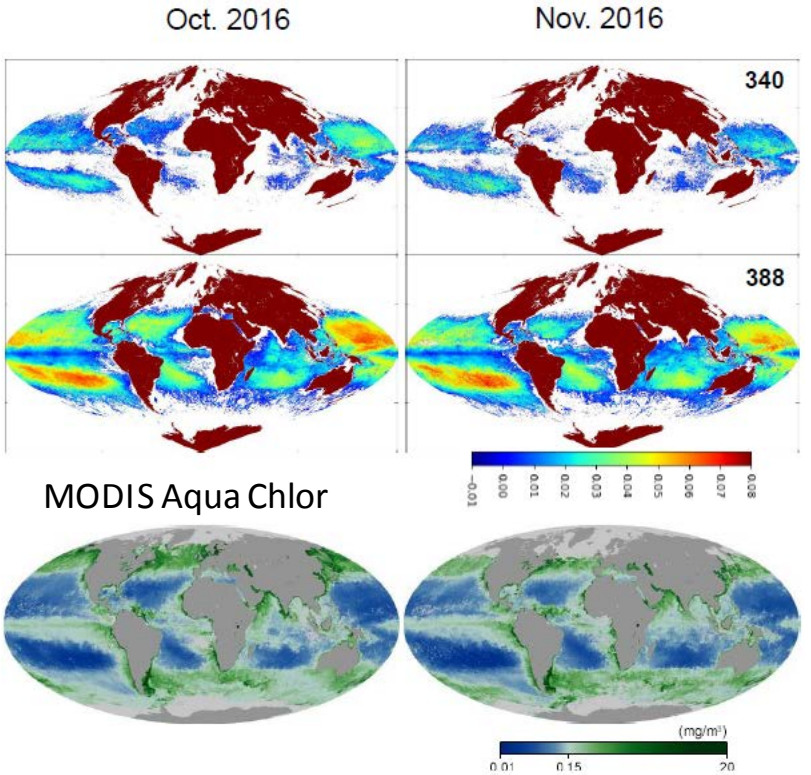
MAIAC Processing of DSCOVR EPIC: Aerosol and Diffuse Ocean Reflectance in UV

Alexei Lyapustin (NASA GSFC), Dong Huang (SSAI), Yujie Wang (UMBC), Sergey Korkin (USRA)

The Deep Space Climate Observatory (DSCOVR) is located at L1 point between Earth and Sun ~1.5 million km from the Earth. The Earth Polychromatic Imaging Camera (EPIC) observes illuminated disk of Earth in the UV, RGB and near-IR (780nm) bands, including A- and B-oxygen bands, taking images 10-15 times per day. Algorithm MAIAC was adapted for EPIC processing providing cloud mask, aerosol retrieval over land and ocean, and atmospheric correction. The poster provides evaluation of global MAIAC aerosol retrieval and reflectance of ocean underlight at 340 and 388nm for 2016.

EPIC $AOD_{0.44}$ MAIAC MODIS $AOD_{0.47}$





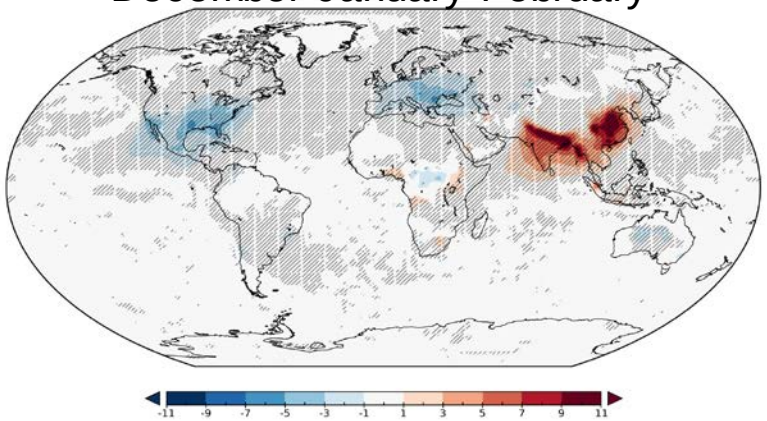
Global variability of

cloud condensation nuclei concentrations

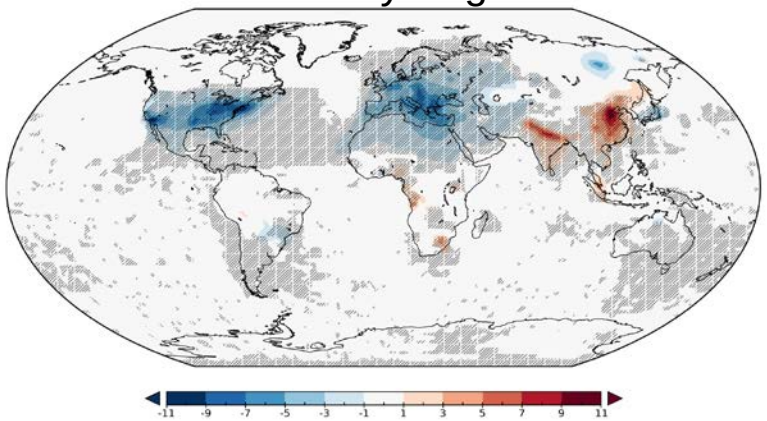
Makkonen, Risto

Simulated global trends of CCN between years 2001 and 2010

December-January-February



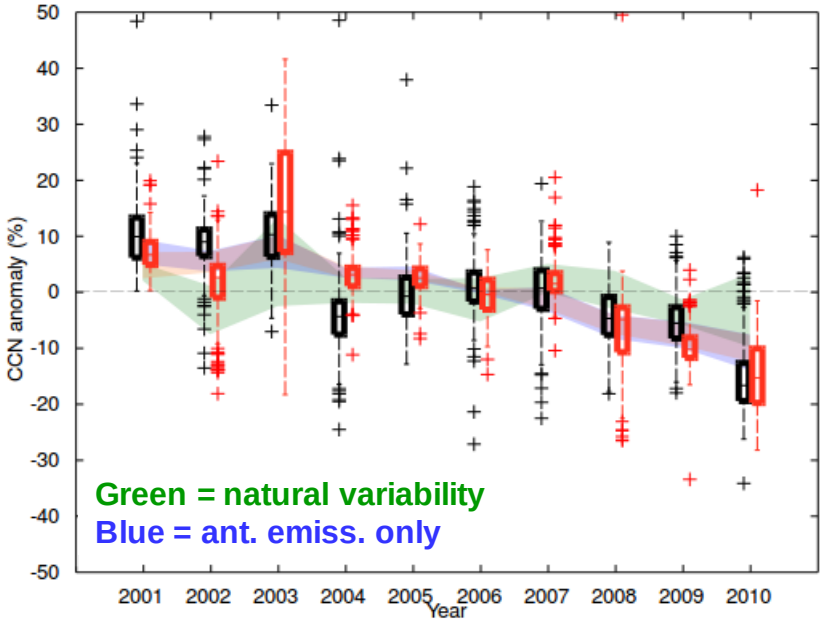
June-July-August



Example: Mediterranean

Black = MODIS PSML003

Red = ECHAM-HAM CCN



See poster P-43 by Risto Makkonen (University of Helsinki)

Direct Radiative effect of smoke aerosols

over the Namibian region

Mallet, Marc

Direct Radiative effect of smoke aerosols over the Namibian region

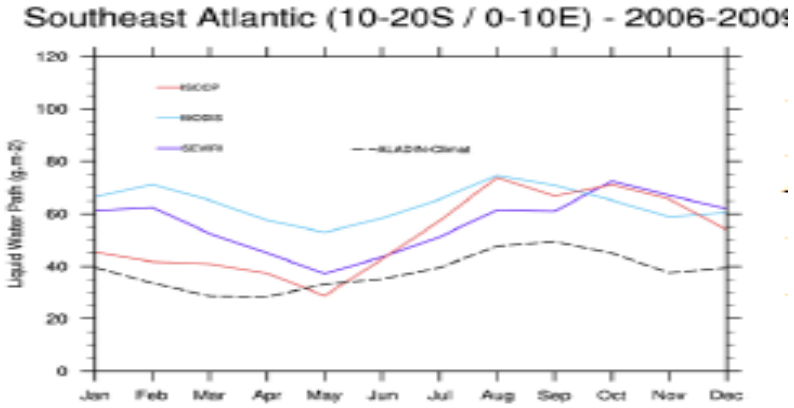
M. Mallet, P. Nabat, A. Alias, M. Michou and S. Somot (CNRM-CNRS, Meteo-France)

The objective is to investigate the simulated (RCM ALADIN-C) microphysical and optical properties of stratocumulus clouds and smoke particles + SW radiative forcing exerted at TOA by smoke in all-sky conditions

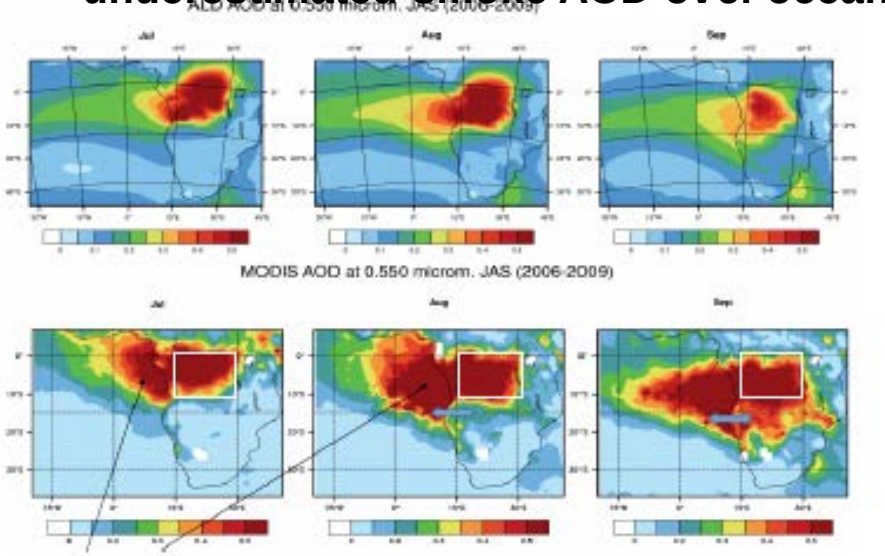
First simulation → period 2003-2009

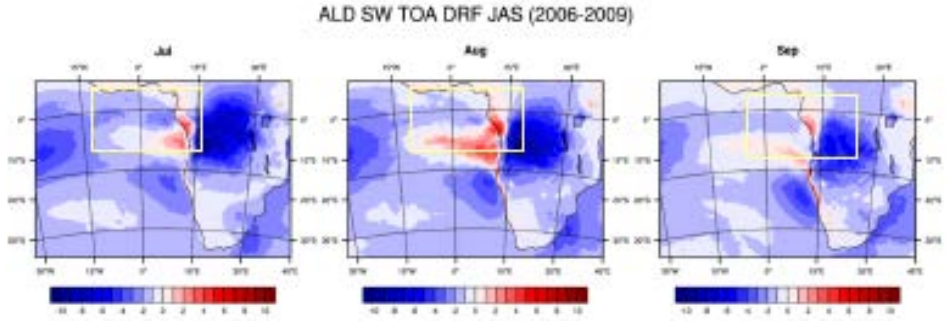
AEROCLO-SA
ORACLES
CLARIFY
LASIC

1) LWP and CF for stratocumulus clouds → realistic CF
BUT understimated LWP



2) comparisons of smoke AOD with MODIS & MISR over sources and during the transport → underestimated smoke AOD over oceans





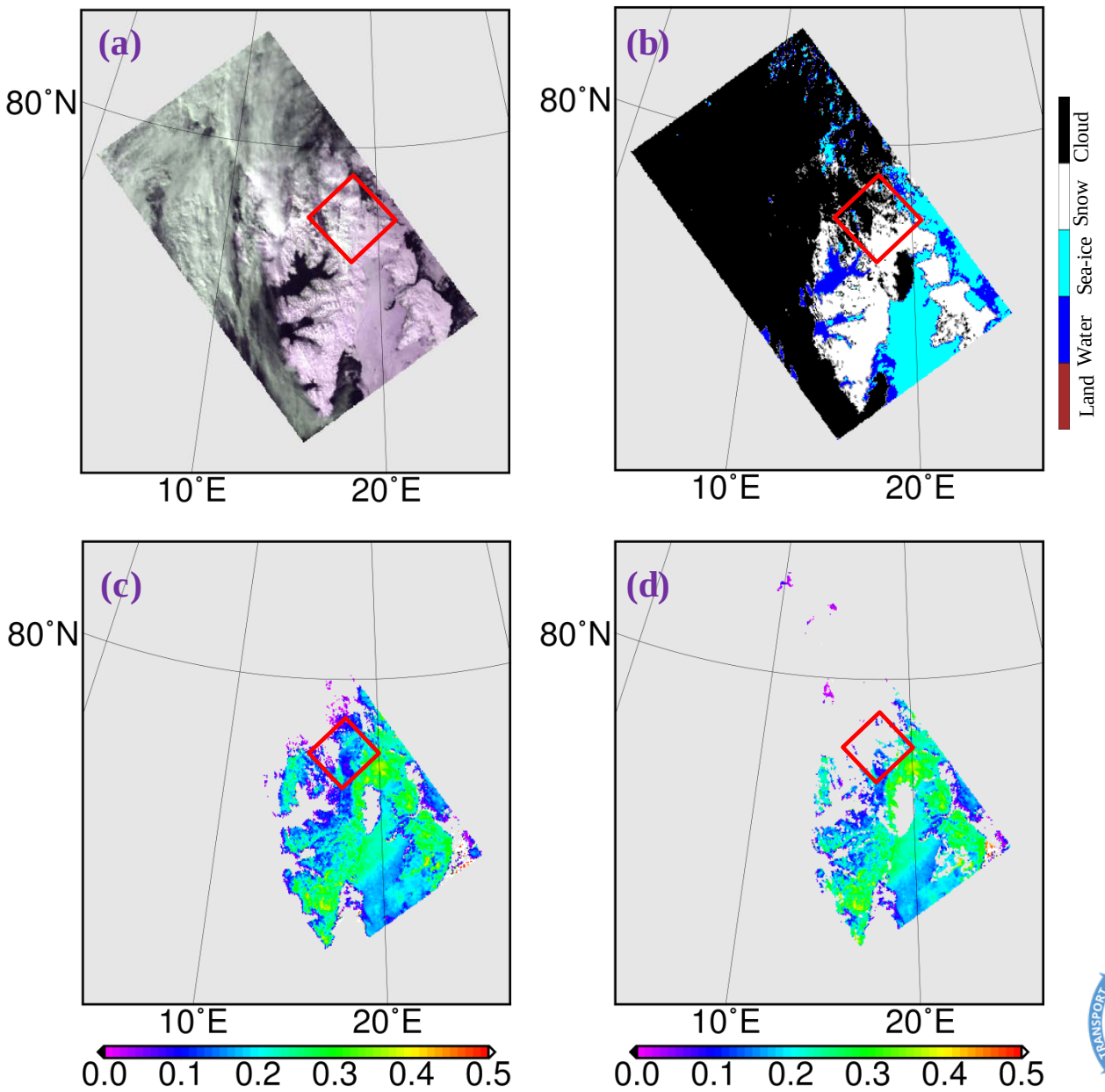
3) the ability at simulating absorbing smoke (SSA ~ 0.88-0.90 at 550 nm) transported above low clouds allows to simulate positive radiative forcing at TOA

Recent progress of aerosol remote sensing over the Arctic

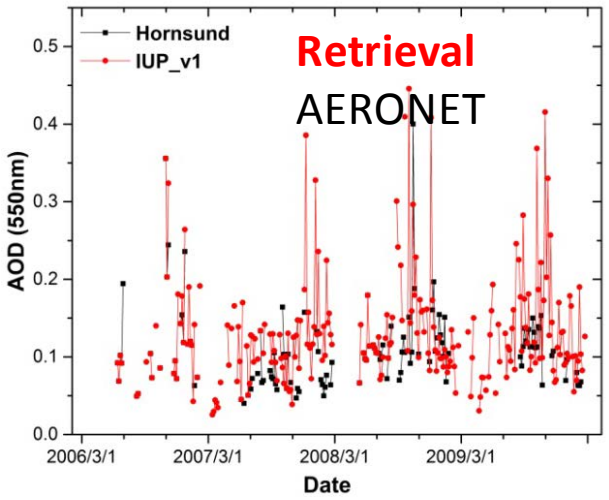
in the AC3 project

Mei, Linlu

Improvements of cloud screening



AOD series



(a) The RGB image of an AATSR scene at Svalbard, 5/3/2006
(b) New cloud screening
(c) AOT based on a new cloud mask based on Istomina et al., (2010)
(d) AOT using time-series cloud masking

Universität Bremen

Regional climate signals of anthropogenic aerosols

using MACv2-SP in ECHAM6 and NorESM

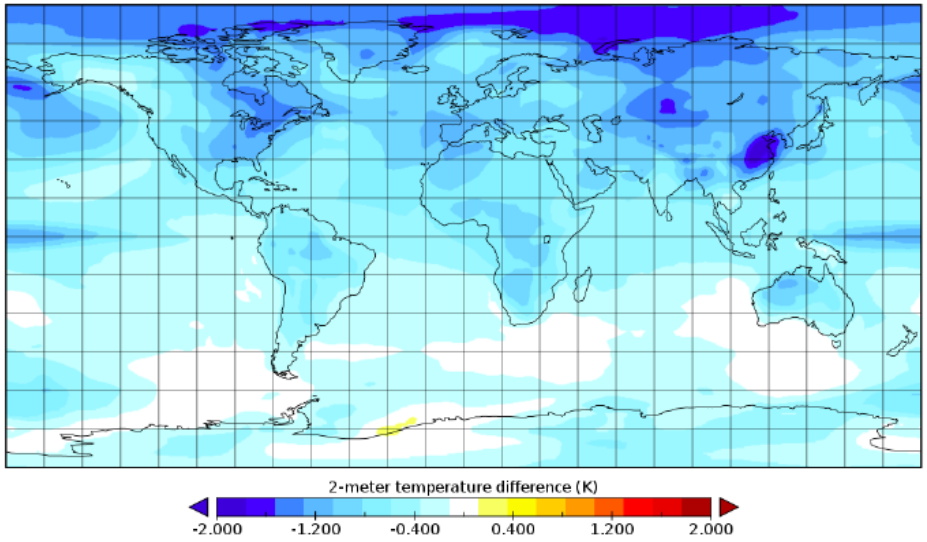
Merikato, Joonas

Regional climate signals of anthropogenic aerosols

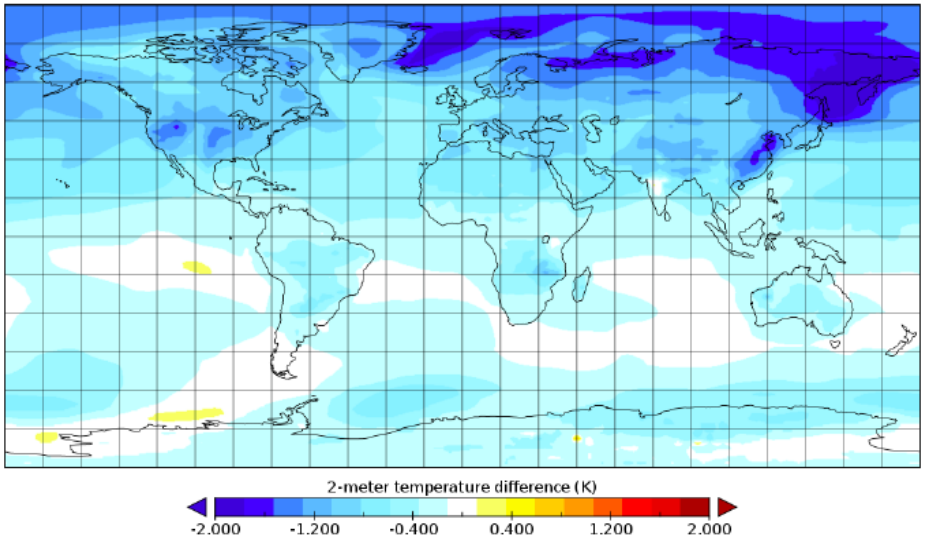
We use standardized aerosol climatology MACv2-SP in ECHAM6 and NorESM

Temperature response due to modern day aerosols:

ECHAM6: global mean ΔT=-0.55 K



NorESM: global mean ΔT=-0.49 K



- **Strong Arctic amplification!**
- for poster see **Joonas Merikanto** & **Kalle Nordling**

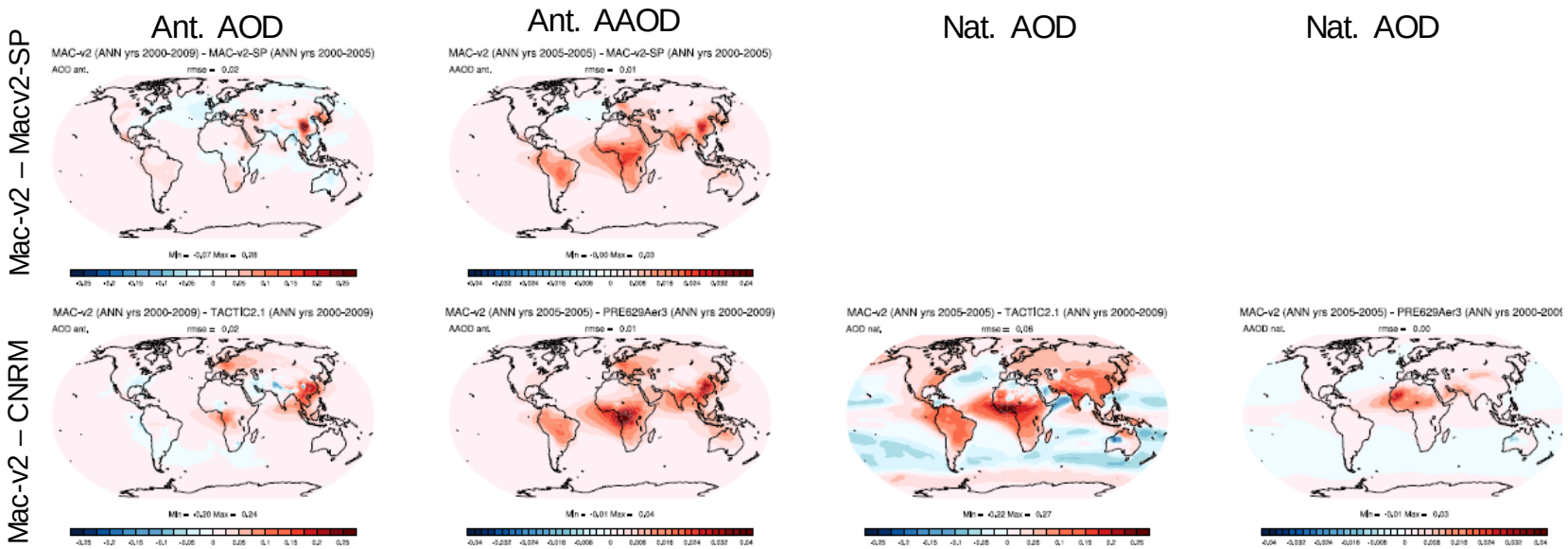
The CNRM climate model

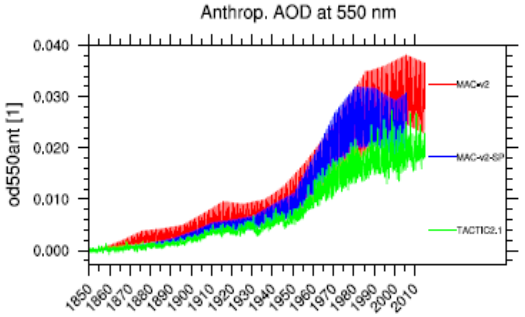
aerosol forcing for the historical CMIP6 simulations

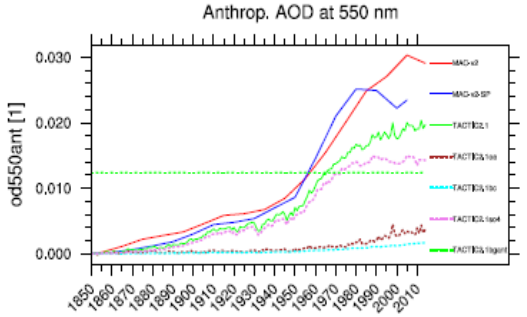
Michou, Martine

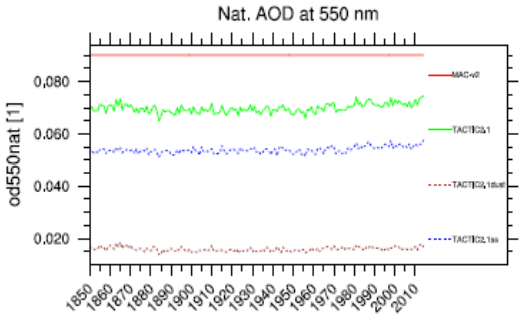
The CNRM climate model aerosol forcing for the historical CMIP6 simulations

Analysis including comparisons to the MAC-v2 and MAC-v2 SP (Simple Plume) climatologies









Nitrate aerosol

in the Norwegian Earth System Model

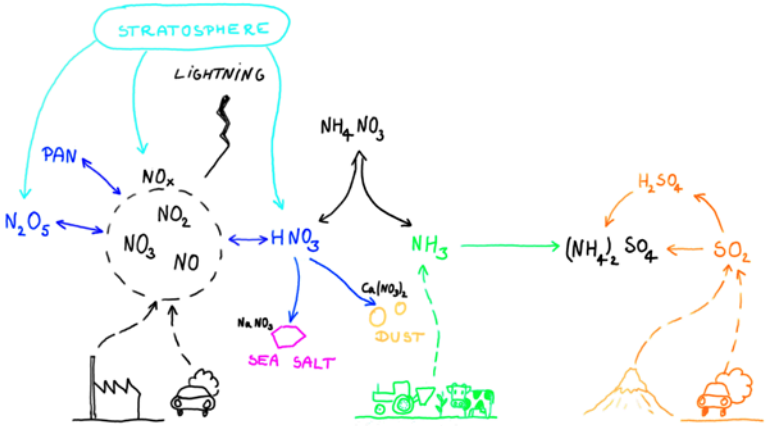
Olivie, Dirk

Implementation of nitrate aerosol in the Norwegian Earth System Model NorESM

D. Olivié, T. Iversen, A. Kirkevåg, M. Schulz and Ø. Seland

Aerosols in NorESM

- Standard : BC, OM, SOA, SO_4, dust, sea-salt
- Extended with NO_3 and NH_4 : tracers 29 increased to 40
- Full-tropospheric version



Comparison with observations (ARCTAS, 2008)

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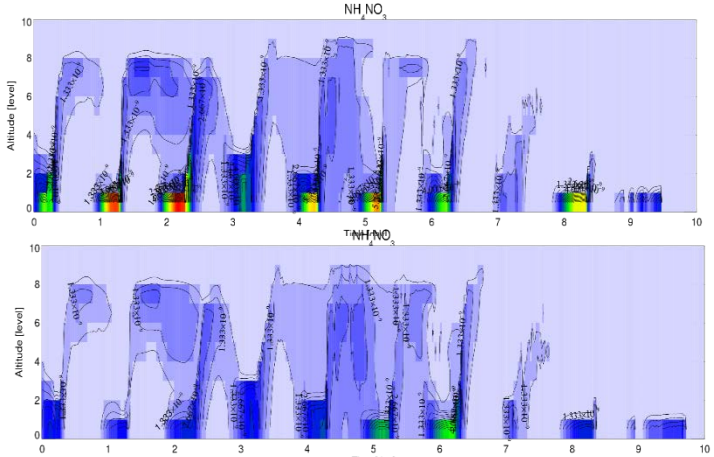
NH_4NO_3 in 10 lowest model layers



Global burdens of NH_4 and NO_3

		NorESM [full chem]	NorESM [red chem]	Hauglustaine et al. [2014]	Bian et al. [2017, avg]	Bian et al. [2017, med]
NH_4	[Tg]	0.35	0.36	0.28	0.32	0.30
NO_3	[Tg]	0.59	0.68	0.80	0.63	0.60
NO_3 [fine]	[Tg]	0.10	0.12	0.22		
NO_3 [dust]	[Tg]	0.38	0.44	0.31		
NO_3 [ss]	[Tg]	0.10	0.13	0.27		

Novel trajectory-based approach for evaluation of climate models against aerosol observations

in a Lagrangian framework

Partridge, Daniel

Novel trajectory-based approach for evaluation of climate models against aerosol observations in a Lagrangian framework

Daniel Partridge[1], Peter Tunved[2], Zak Kipling[3], Hamish Struthers[4], Joao Teixeira[5]

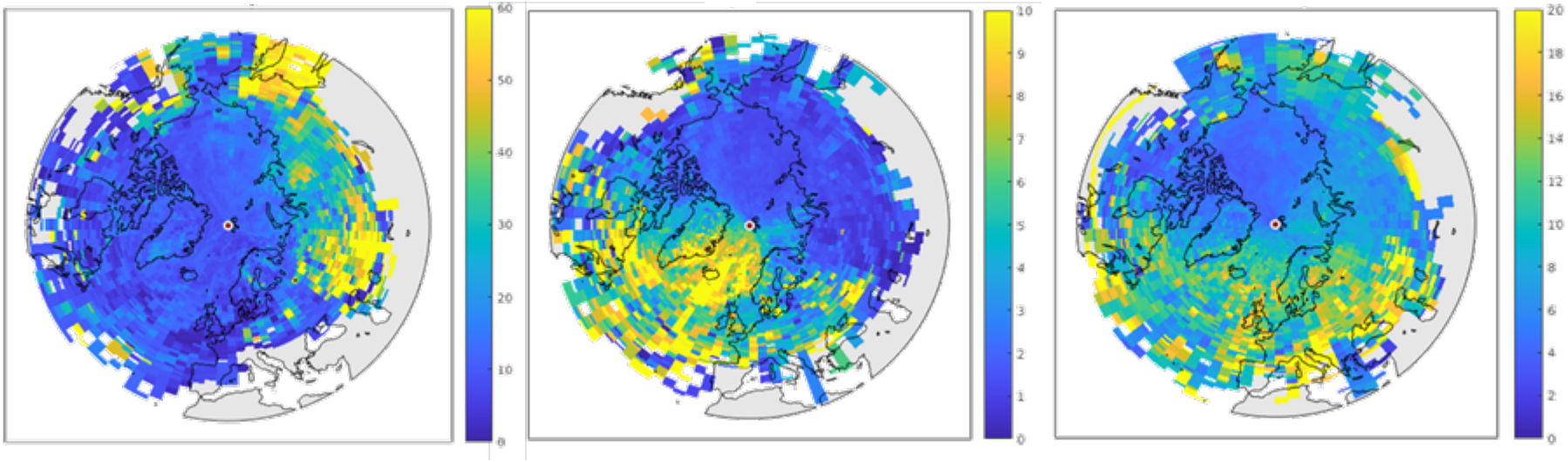
[1]University of Exeter, UK; [2]Stockholm University, Sweden; [3]ECWMF; [4]NSC, Sweden;

[5]Met Office Hadley Centre, UK

ERA-Interim + ZEP Observations

CAM5.3 GCM

ECHAM6.1-HAM2.2 GCM



Relative source contribution of aerosol particle conc.: N(Dp=250:630nm) cm-3 [2006-2009] to Svalbard

UNIVERSITY OF EXETER

College of Engineering, Mathematics and Physical Sciences

What is the uncertainty in MODIS aerosol optical depth

in the vicinity of clouds?

Patadia, Falguni

What is the uncertainty in MODIS aerosol optical depth in the vicinity of clouds ?

Falguni Patadia [1,2] , Rob Levy[2], Shana Mattoo[2,3]

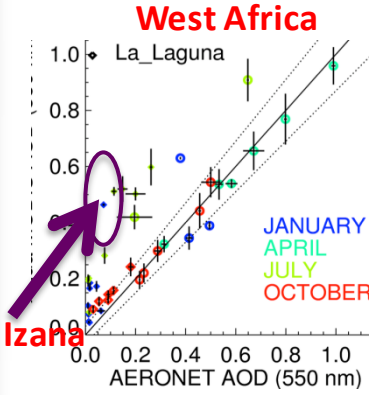
[1]GESTAR-Morgan State University, [2]NASA Goddard Space Flight Center, [3]Science Systems and Applications, Inc.

Jacobian Formulation (sum of partial derivatives) to estimate uncertainty in AOD

$$\Delta\tau_\lambda = \frac{\partial\tau}{\partial\rho 1}\Big|_{\rho 2}\Delta\rho 1 + \frac{\partial\tau}{\partial\rho 2}\Big|_{\rho 1}\Delta\rho 2 + \ldots..$$

Sources : Winds, Atmospheric Corrections, Calibration, Reflectance heterogeneity, Aerosol models

Validating the Uncertainty Estimates (One Example)

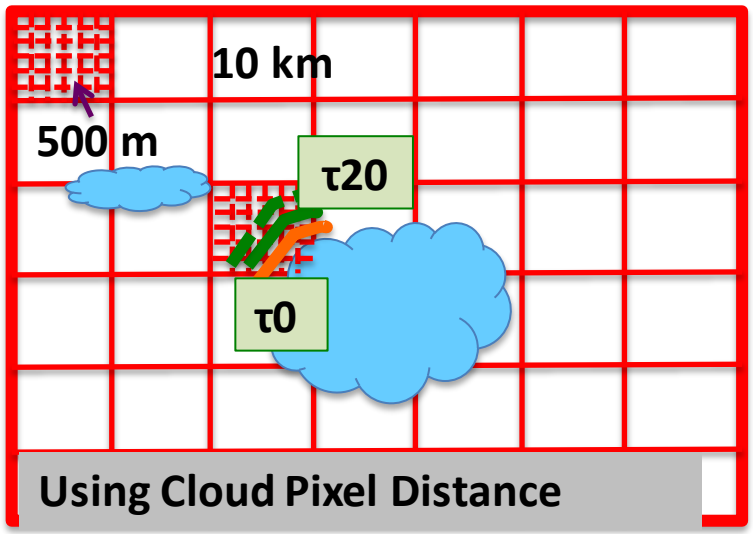


On each data point, the

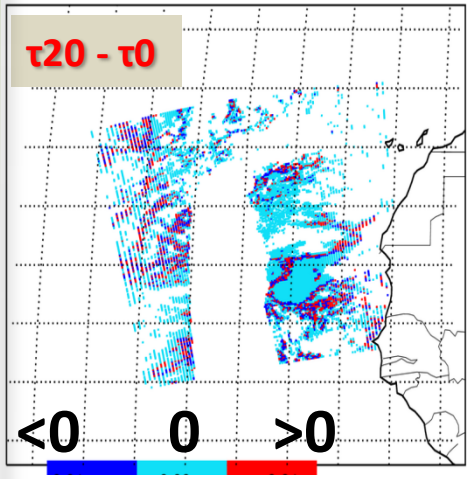
Vertical Lines = ± Jacobian Uncertainty

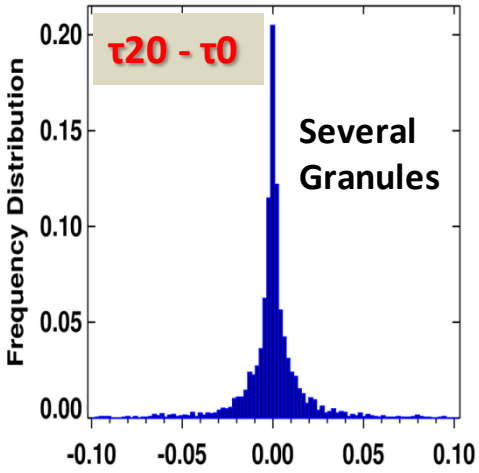
Horizontal lines = ± Aeronet AOD Standard Deviation

Schematic of One MODIS Granule



AOD Differences [τ20 – τ0]



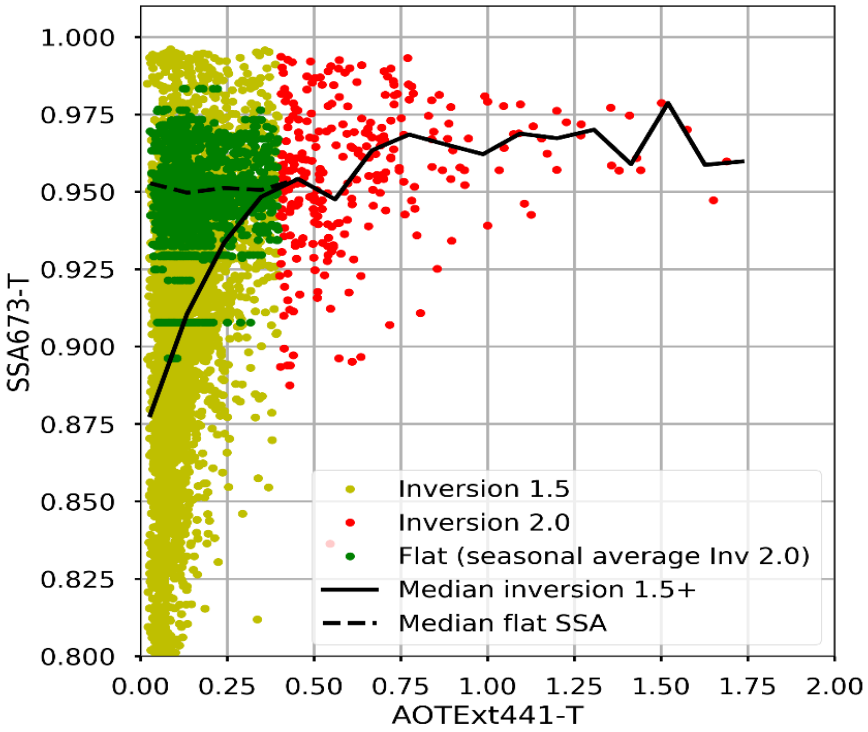


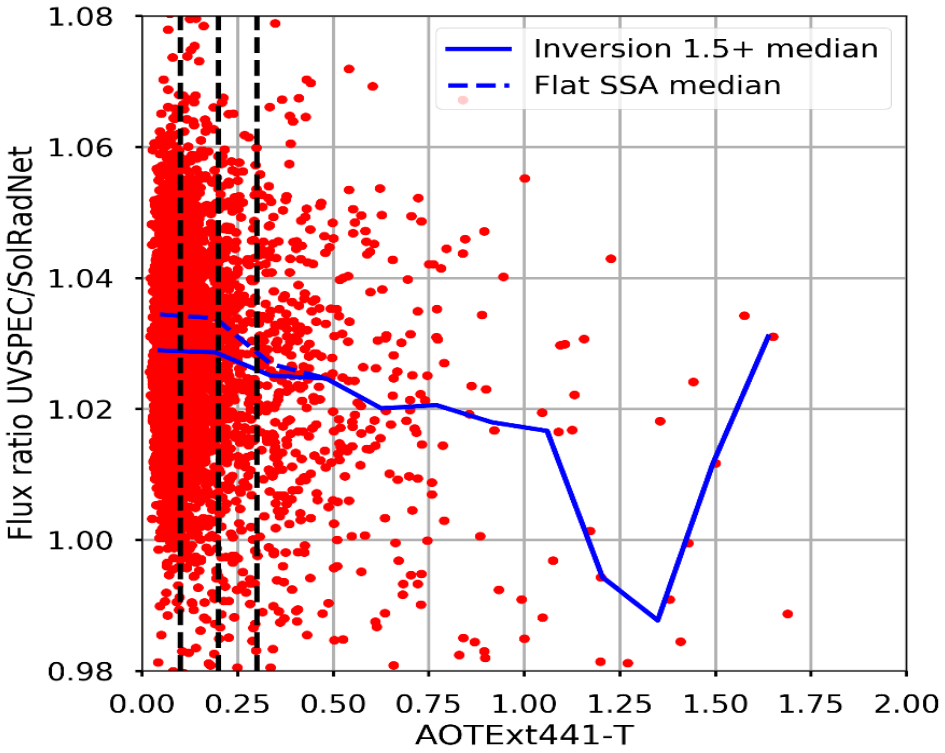
Investigation of AERONET single scattering albedo

in low aerosol optical thickness conditions based on surface solar flux comparison

Pitkanen, Mikko

Poster 47: Investigation of AERONET single scattering albedo in low aerosol optical thickness conditions based on surface solar flux comparison





Cloud-aerosol interactions

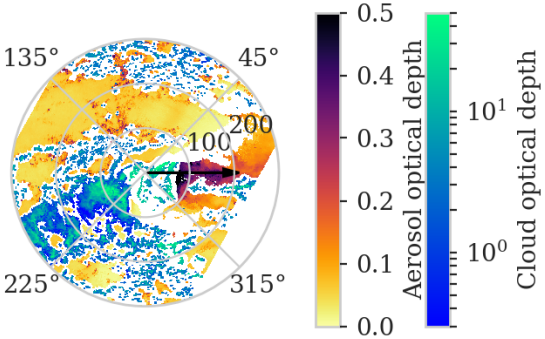
downwind of localized aerosol sources

Povey, Adam

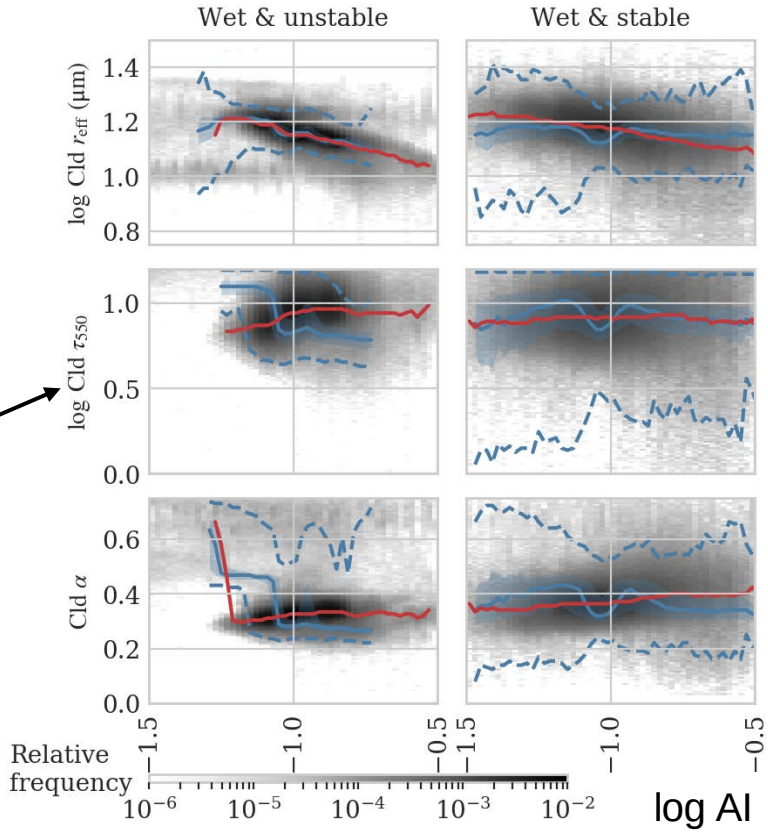
Cloud-aerosol interactions downwind of localised aerosol sources

A.C. Povey, M.W. Christensen, G.M. McGarragh, C.A. Poulsen, S.R. Proud, G.E. Thomas, R.G. Grainger

- Align satellite retrievals around large aerosol sources (e.g. volcanoes) with the wind direction.



- Average all of AATSR.
- Quantify change in cloud effective radius, optical thickness, and albedo as a function of aerosol index.

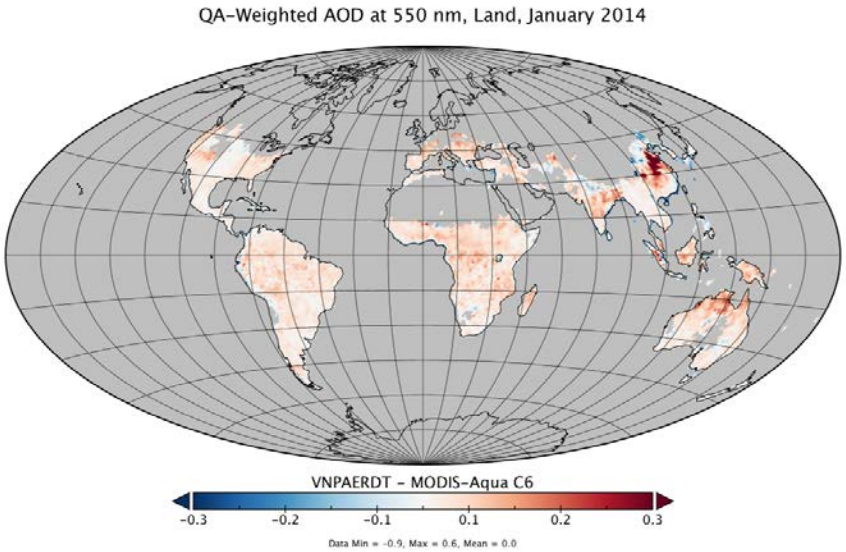


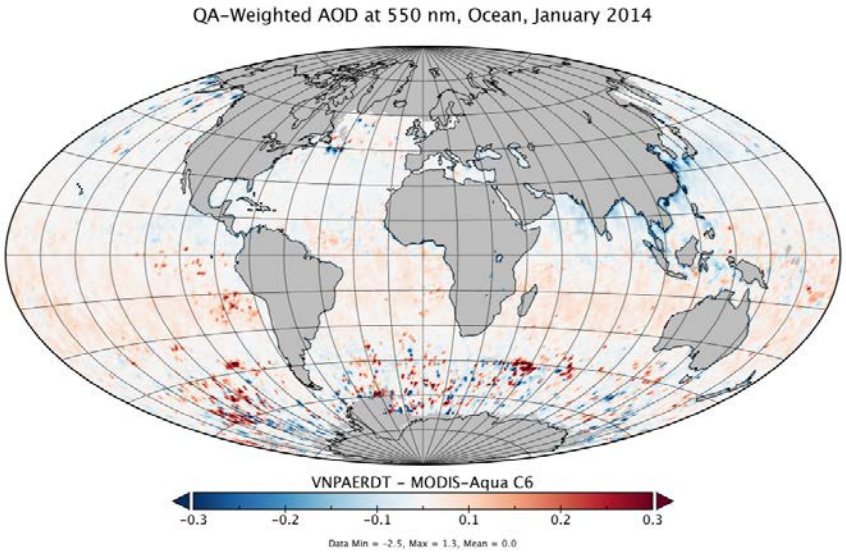
Dark Target Aerosol Retrieval

for VIIRS with MODIS Continuity

Sawyer, Virginia

Dark Target Aerosol Retrieval for VIIRS with MODIS Continuity

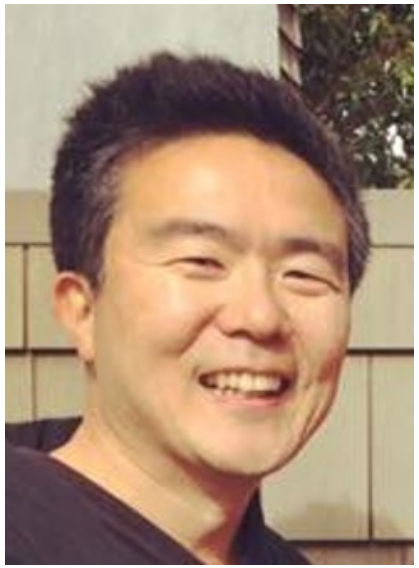




Difference between VNPAERDT and MODIS-Aqua C6 for monthly average 550 nm AOD, January 2014

Virginia Sawyer →

An uncertainty analysis for satellite-based estimates of cloud condensation nuclei



Shinozuka, Yohei

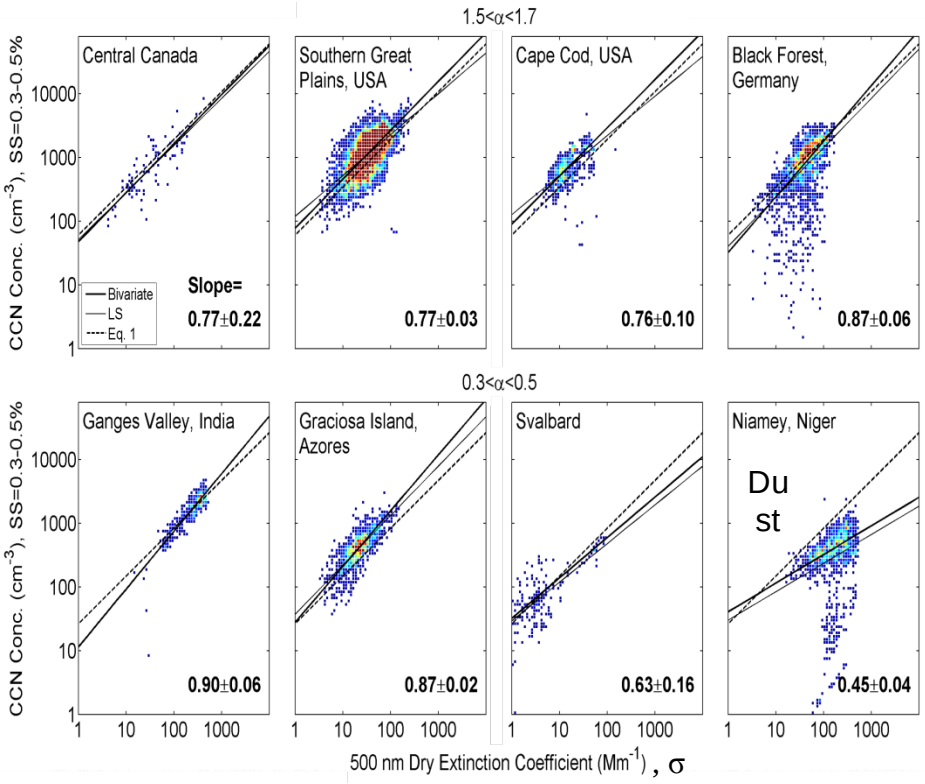
new Satellite-based CCN Estimates

Shinozuka et al.

Observations

the slope is smaller than 1

sorted by Angstrom exponent α

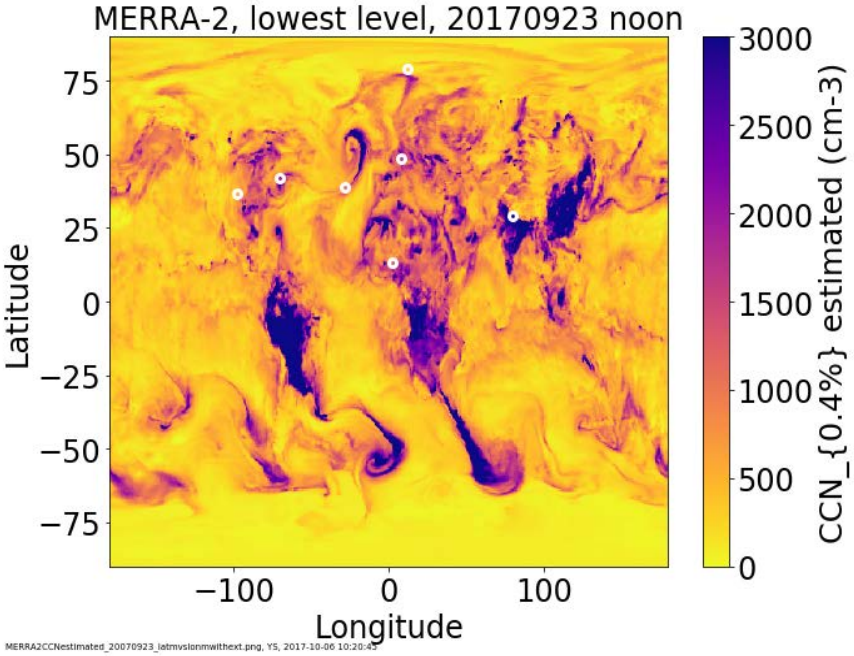


$$CCN_{SS\sim0.4\%} = 10^{0.3\alpha+1.3}\sigma^{0.75}$$

Shinozuka et al. (2015)

Simulations

uncertainty analysis in progress



circles indicate long-term ground-based CCN measurements

(e.g., DOE ARM sites)

Shinozuka, da Silva, Govindaraju

Comparing modeled and observed BC concentrations from flight campaigns

the role of sampling issues

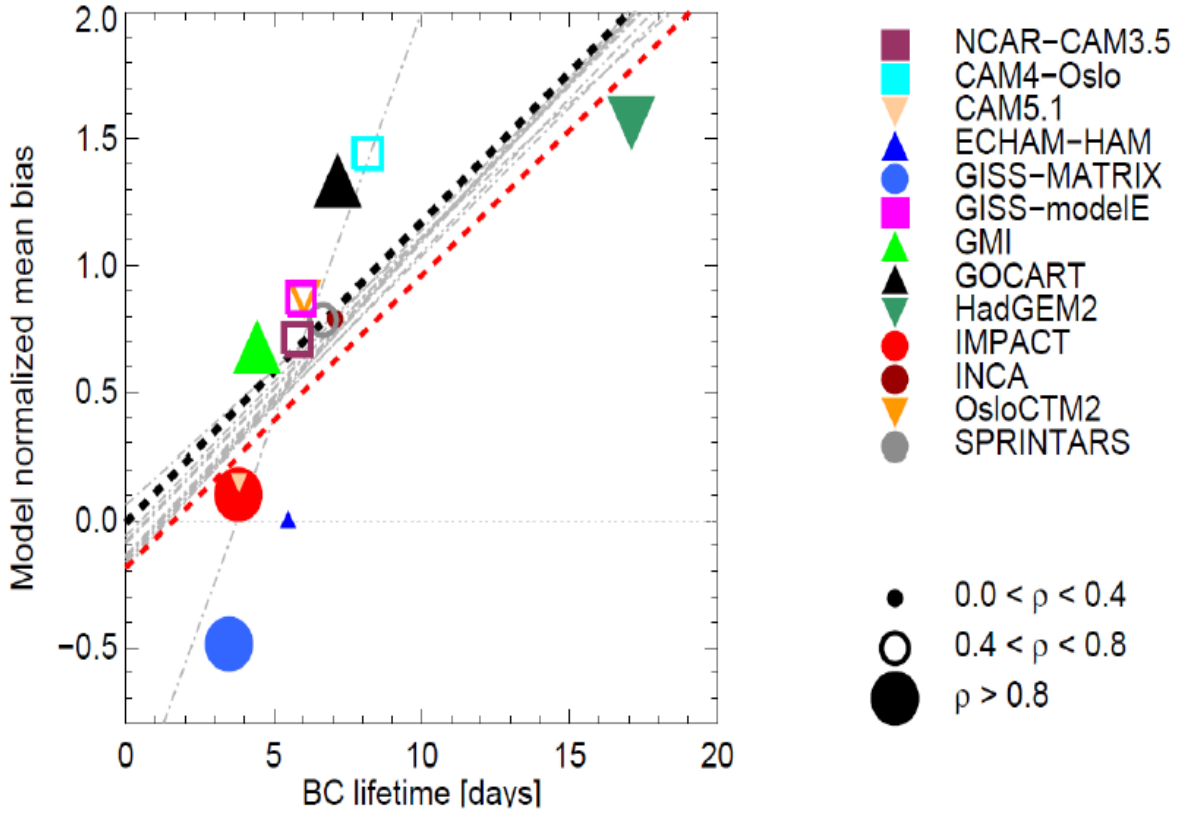
Ragnhild Bieltvedt Skeie

Skeie, Ragnhild

Constraining global BC lifetime – sampling issues in model/flights comparisons

°CICERO

Did Samset screw up the BC lifetime calculations?



Samset et al. 2014 (ACP)

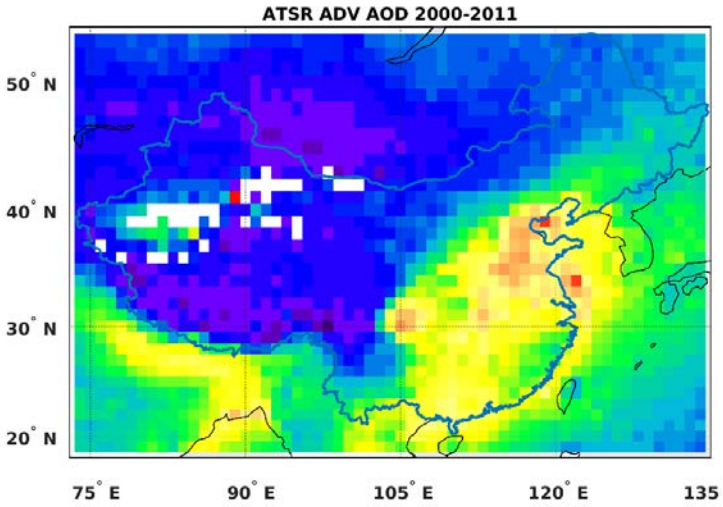
Long-time series (1995-2015) of satellite observations of AOD over China

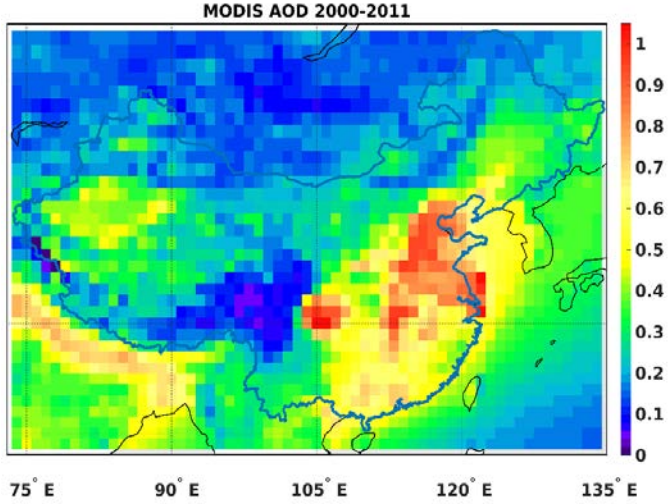
combined from ATSR and MODIS

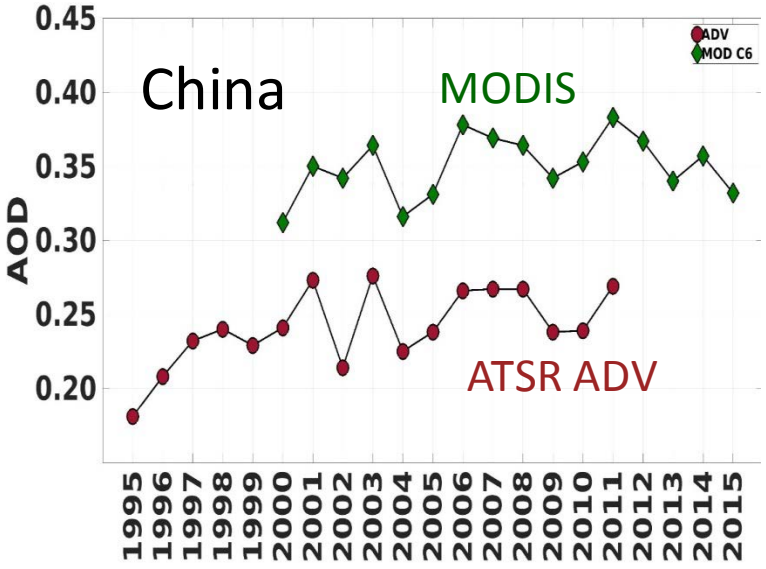
Sogacheva, Larisa

Long-time series (1995-2015) of satellite observations of **AOD** over **China** combined from **ATSR ADV** and **MODIS**.

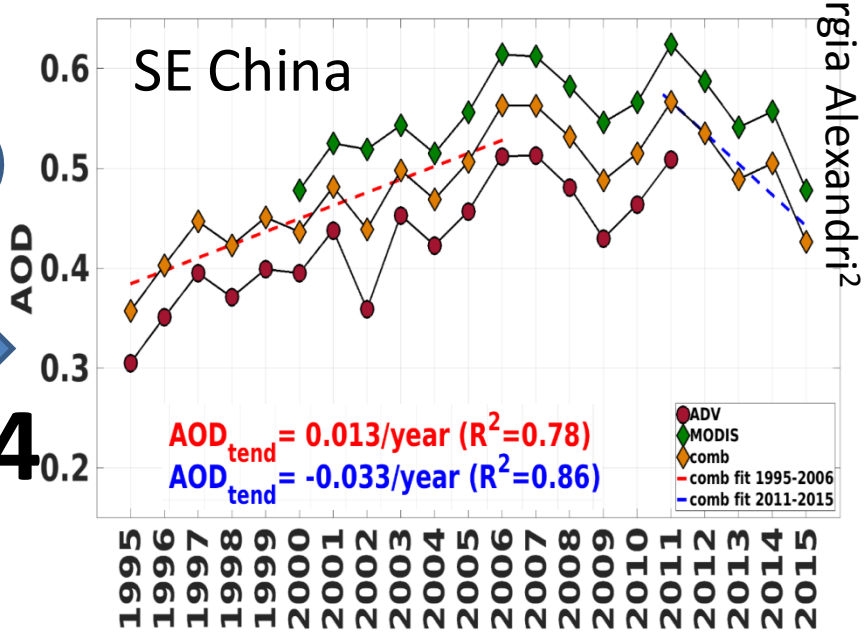
Larisa Sogacheva[1], Gerrit de Leeuw[1], Edith Rodriguez[1], Konstantinos Kourtidis[2], Aristeidis Georgoulias[2], Georgia Alexandri[2]
1-FMI, 2-DUTh, Greece







P-64



On long-term simulations of aerosol and gaseous tracers

in the troposphere and the stratosphere

Sofiev, Mikhail

Long-term simulations of aerosol and gaseous tracers in the troposphere and the stratosphere

M.Sofiev, R.Kouznetsov, J.Vira, M.Prank, V.Tarvanen

Domains

Globe → Europe → Northern Europe

1.44°	0.5°	0.1°
trop.+ stratosphere	trop.	trop.

Time period

1980 – 2016

Meteorology

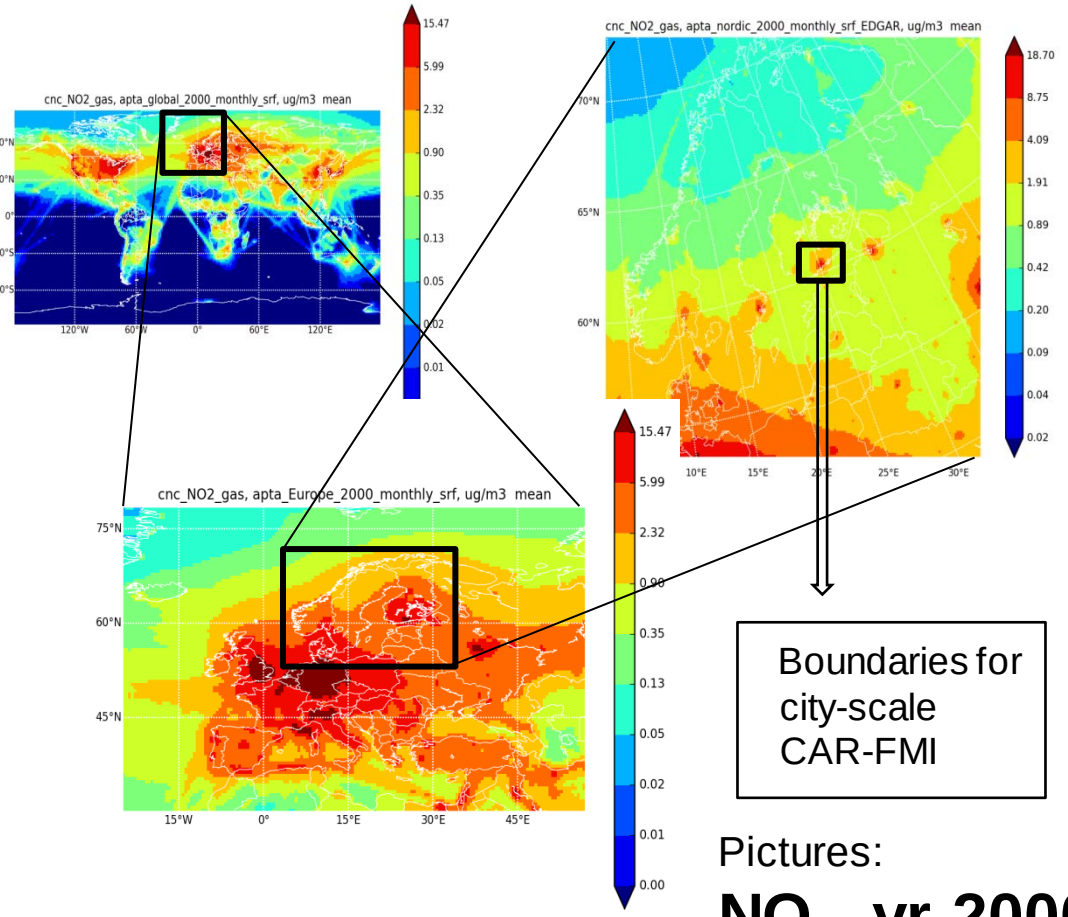
ERA-Interim + BaltAn + IFS

Emission

MACCITY + …

Evaluation (on-going)

In-situ, satellites, Aeronet, …



Pictures:

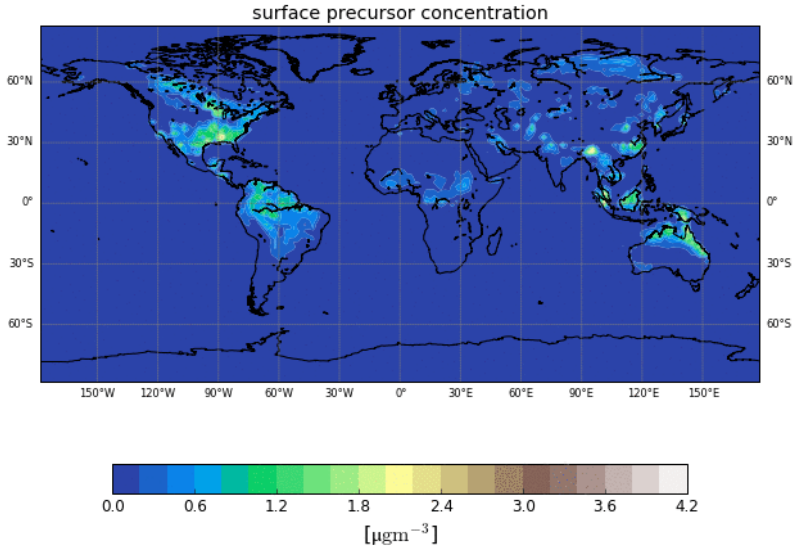
NO_2, yr 2000

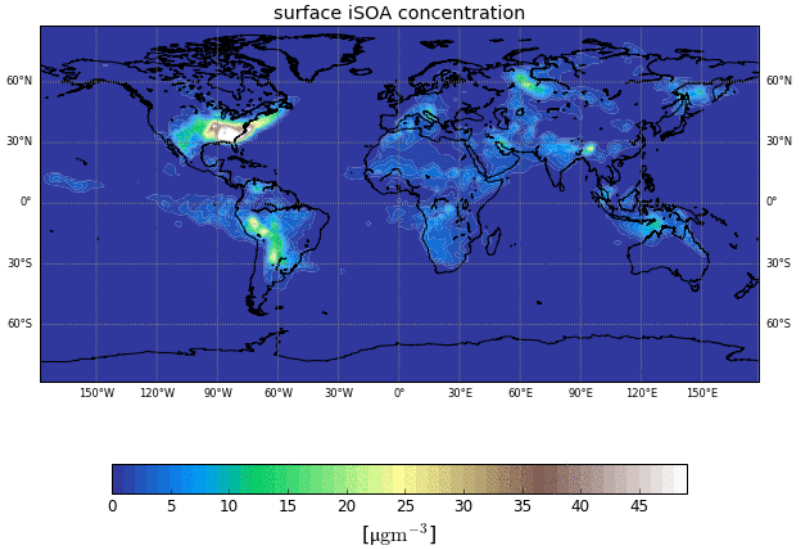
Isoprene derived secondary organic aerosol

in a global chemistry climate model (ECHAM6-HAMMOZ)

Stadler, Scarlet

ISOPRENE SECONDARY ORGANIC AEROSOL





Precursor gases

Isoprene SOA

Discuss with her

Recent developments in the ORAC aerosol processor

Thomas, Gareth

ORAC

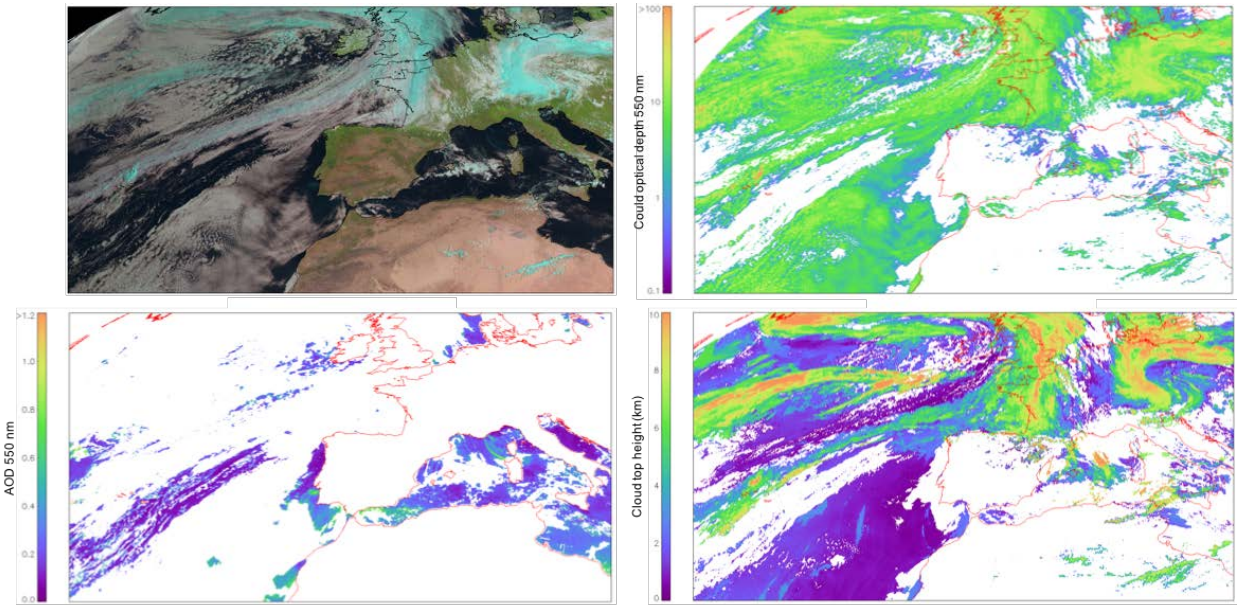
Optimal Retrieval of Aerosol and Cloud

Gareth Thomas

RAL Space,

Rutherford Appleton Lab, UK

- Introduction to, and update on the ORAC algorithm
- A generic retrieval for aerosol and cloud from visble-IR satellite imagers



gareth.thomas@stfc.ac.uk

Temporal and geographical variation of aerosol chemical composition

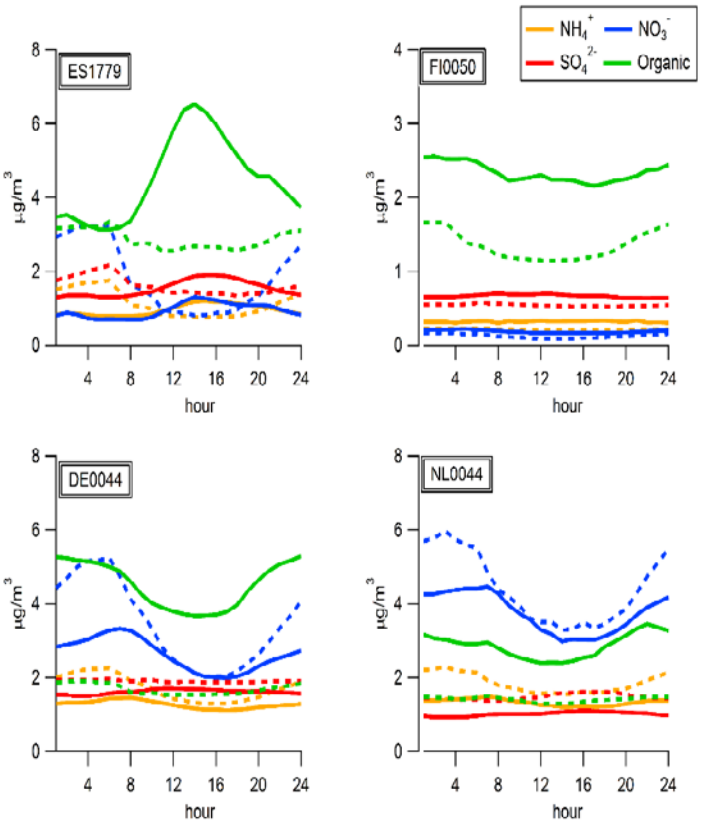
with EMEP model

Tsyro, Sevetlana

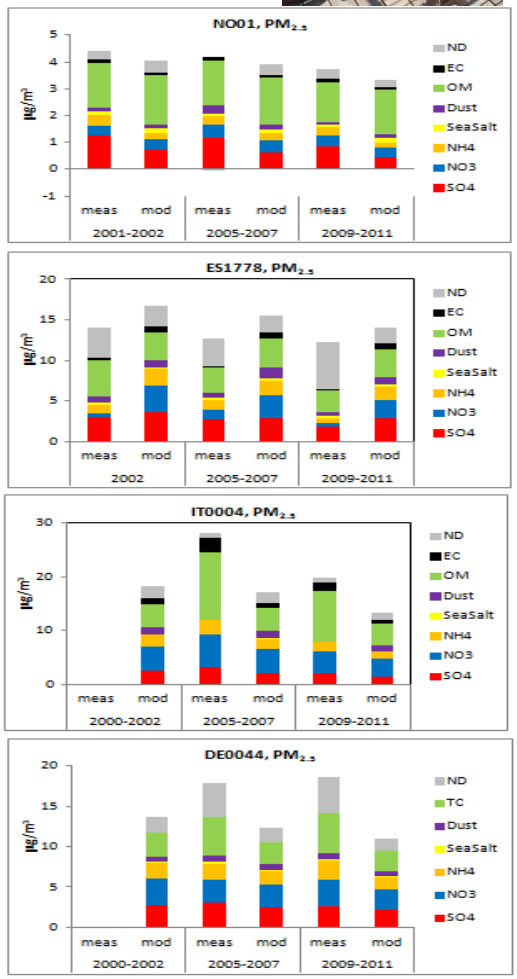
Temporal and geographical variation of aerosol chemical composition in Europe from EMEP MSC-W model and observations

Svetlana Tsyro
Wenche Aas

Highly time-resolved (hourly), ACSM measurements facilitate better understanding of the discrepancies between the model and observations: we discuss the diurnal profiles of non-refractory sub-micron aerosols in different seasons and geographical locations (2012-13).



Using model results and observations, we look at the changes in PM levels and chemical composition in 2000s+ across Europe as a result of emission reduction efforts.



Global scale model simulations of anthropogenic dust

budget assessment and radiative forcing

Tuccella, Paolo

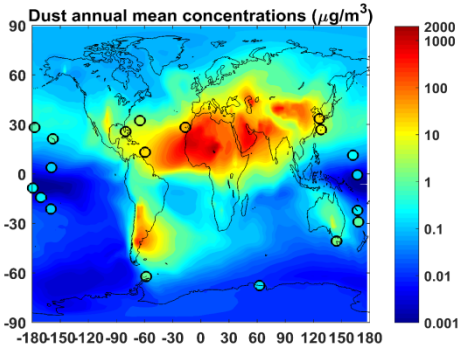
Global scale simulations of anthropogenic dust: a budget assessment

Paolo Tuccella[1,2], Giovanni Pitari[1], Gabriele Curci[1,2], and Daniele Visioni[1,2]

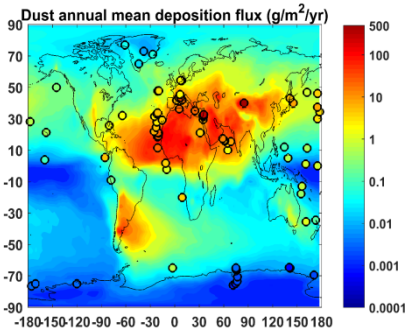
[1]Departement of Physical and Chemical Sciences, Università dell'Aquila, Italy.
[2]Center of Excellence for the Telesensig of Enviroment and Model Prediction of Sever Events (CETEMPS), Università dell'Aquila, Italy.

1. Anthropogenic dust emission occurs on disturbed soils, deforested terrains, and desiccated water bodies. The budget of anthropogenic dust and the associated radiative forcing is still uncertain.
2. Anthropogenic sources (from Ginoux et al., 2012) have been included in GEOS-Chem model.
3. Global budget of anthropogenic dust has been discussed.
4. Modelled surface mass concentration and deposition have been compared to worldwide observations.
5. Contribution of anthropogenic fraction to aerosol dust burden and deposition has been discussed.
6. This is a first step of a more general study aimed to the estimation of direct radiative forcing, indirect radiative forcing (mixed-phase and ice clouds), and perturbation to snow-ice albedo induced by dust from anthropogenic sources.

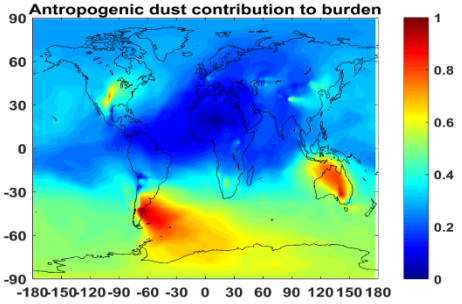
Dust burden



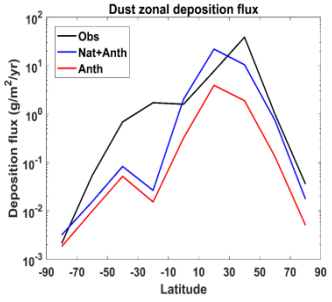
Dust deposit



anthrop dust



zonal deposit



Disentangling fast and slow responses of the East Asian summer monsoon

to reflecting and absorbing aerosol forcings

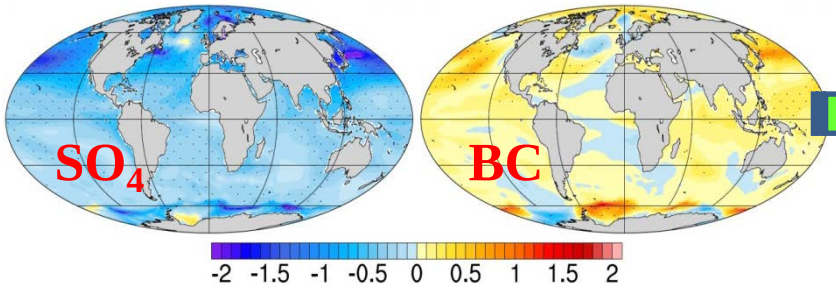
Wang, Zhili

Disentangling fast and slow responses of the East Asian summer monsoon to reflecting and absorbing aerosol forcings

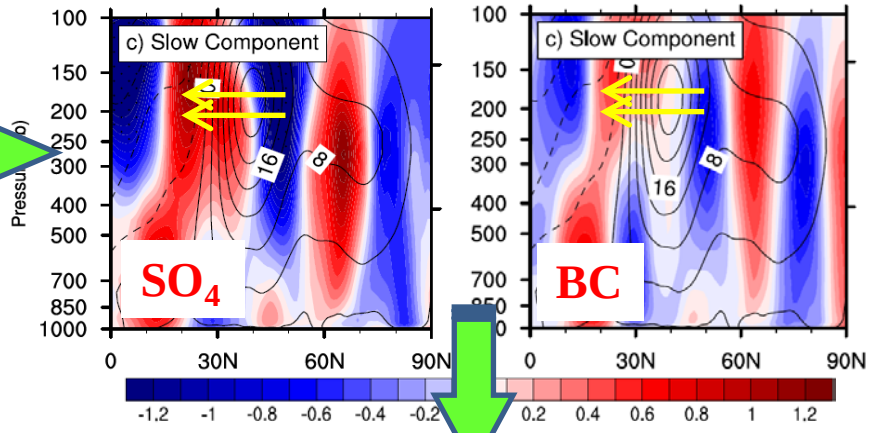
By **Zhili Wang** *et al.* (Chinese Academy of Meteorological Sciences)

We examined the roles of fast and slow responses in shaping the total equilibrium response of the East Asian summer monsoon (EASM) to reflecting (SO_4) and absorbing (BC) aerosols using the fully coupled Earth system model simulations.

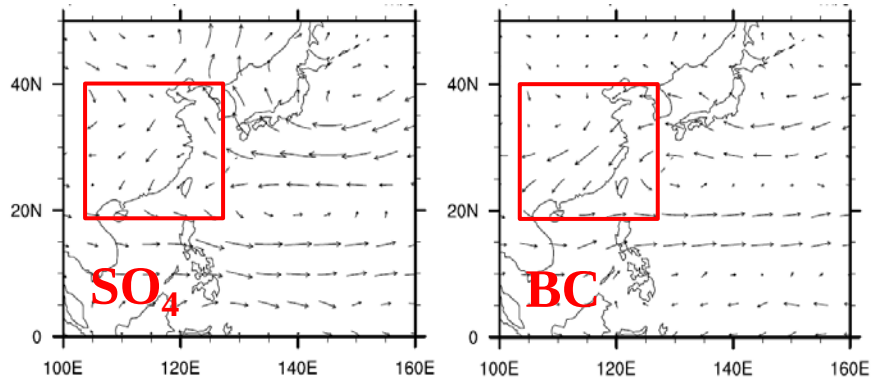
Aerosol forcing leads to an interhemispheric asymmetric adjustment in SST



Slow responses of EASJ to aerosol forcing



Slow responses of winds at 850 hPa to aerosol forcing



- Our results suggest that **one pathway for aerosol forcing to affect the EASM is by changing the land-sea surface thermal contrast**, as shown in previous studies.
- We also emphasize the importance of **ocean response to aerosol forcing (i.e., slow response) through affecting the East Asian subtropical jet (EASJ)** in driving the changes of the EASM.

New approach to the retrieval of AOD and its uncertainty

from MISR observations over dark water

Witek, Marcin

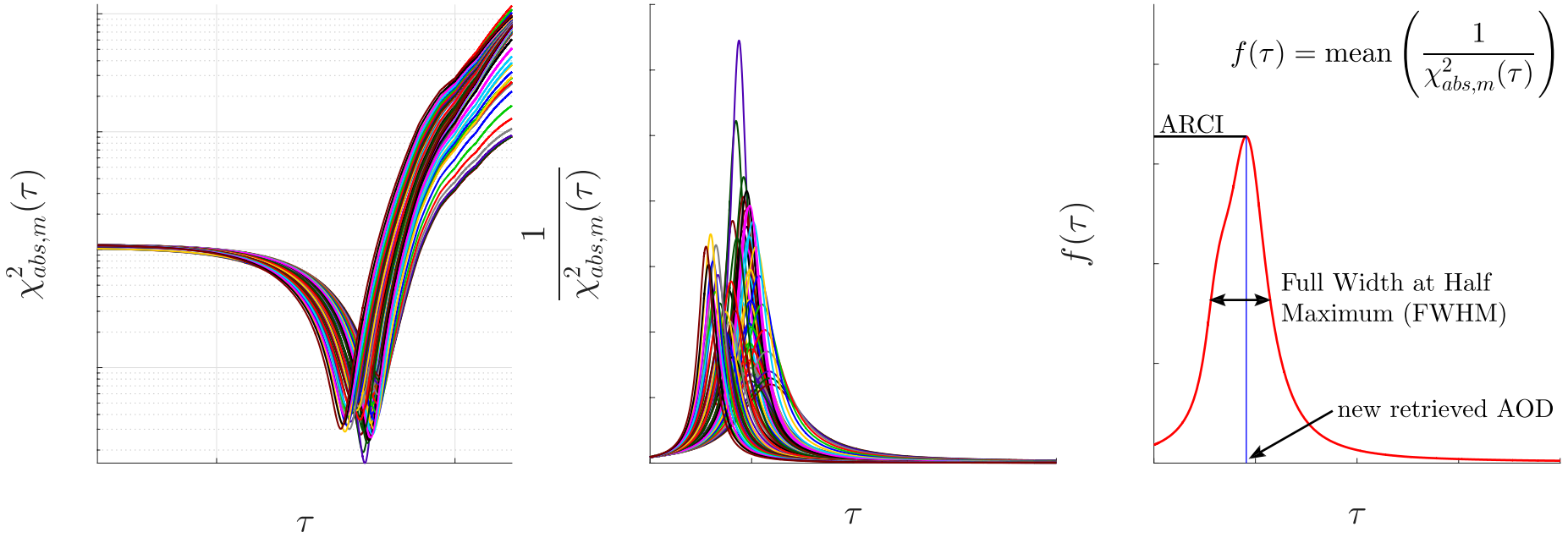
New approach to the retrieval of AOD and its uncertainty from MISR data over dark water

P-52

National Aeronautics and Space Administration

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

New MISR aerosol product (V23) at 4.4 km resolution is coming soon!!!



V22: τ = 0.174 ± 0.003 **V23**: τ = 0.182 ± 0.049

Satellite assessment of sea spray aerosol productivity

Southern Ocean case study

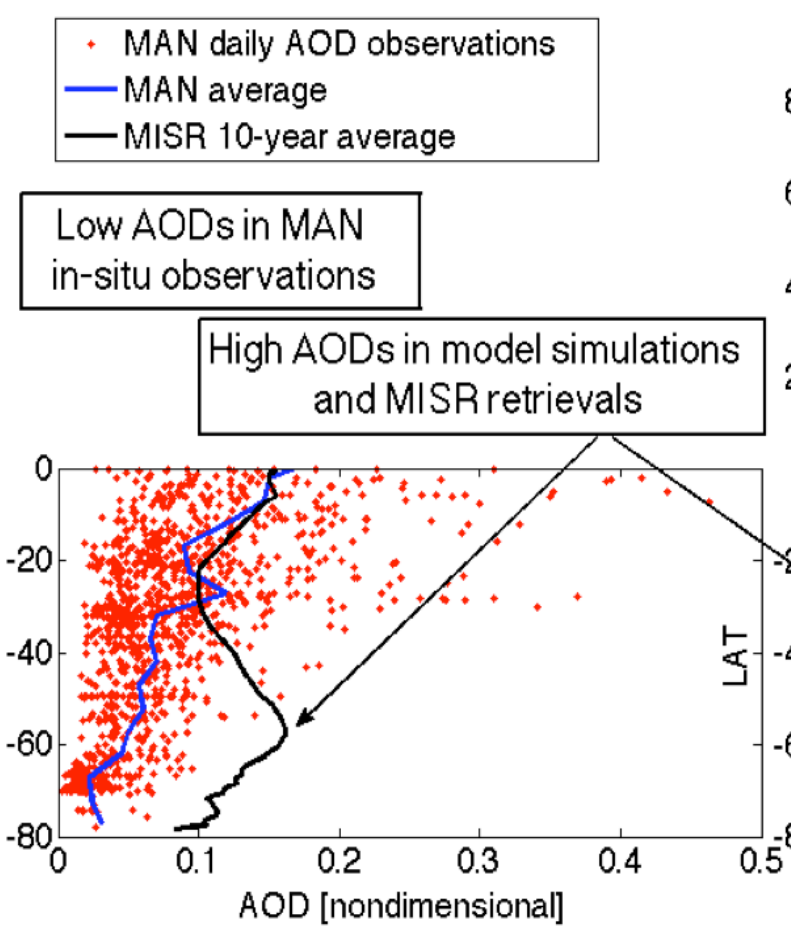
Witek, Marcin

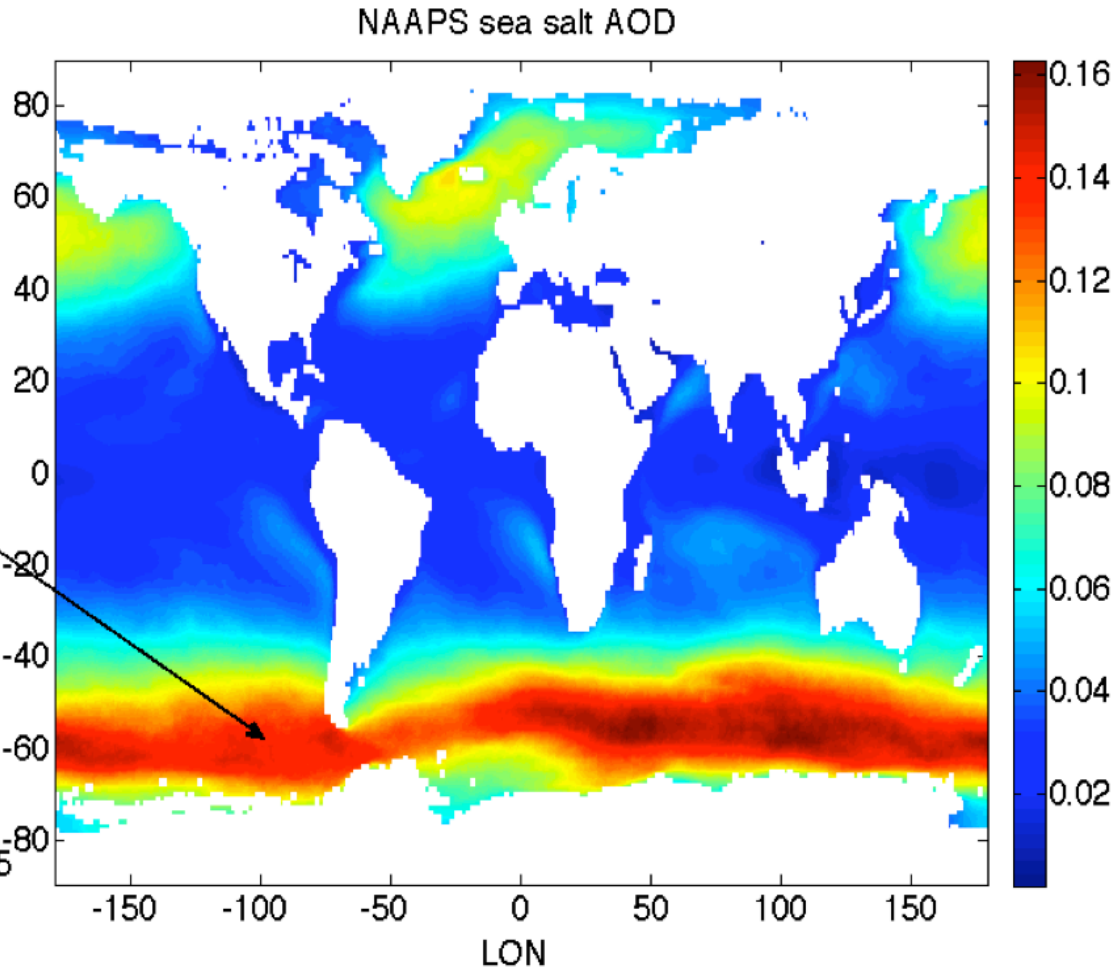
Satellite assessment of sea spray aerosol productivity: Southern Ocean case study

National Aeronautics and Space Administration

Jet Propulsion Laboratory
California Institute of Technology
Pasadena, California

Satellite observations can be successfully used to validate sea spray emission parameterizations.



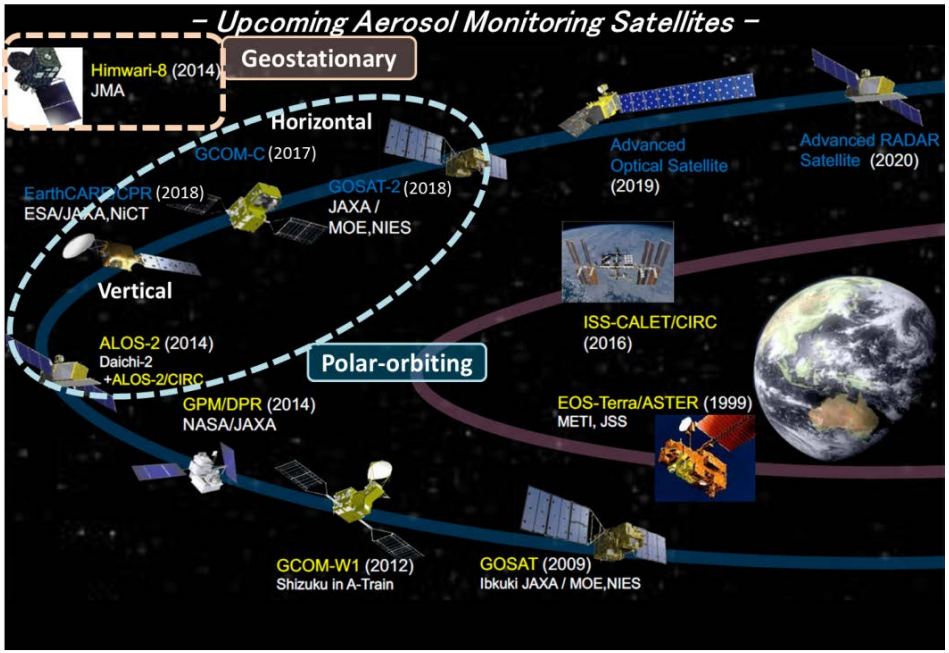


Common Retrieval of Aerosol Optical Properties

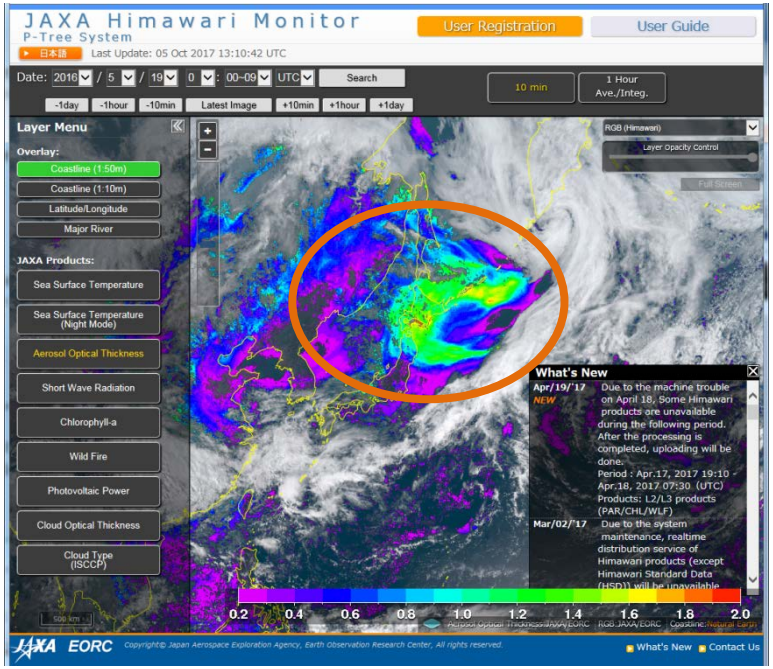
using Satellite Imaging Sensors for JAXA Earth Observation Products

Yoshida, Mayumi

Common Aerosol Retrieval using satellite imaging sensors



Himawari-8/AHI
Aerosol optical thickness at 500nm
(JAXA Himawari Monitor)



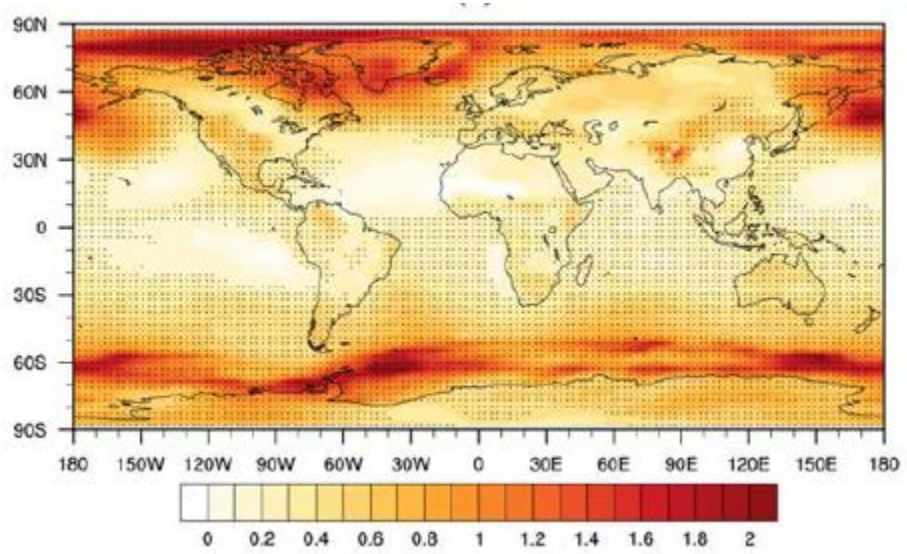
aerosol originated from wildfires

The effective radiative forcing

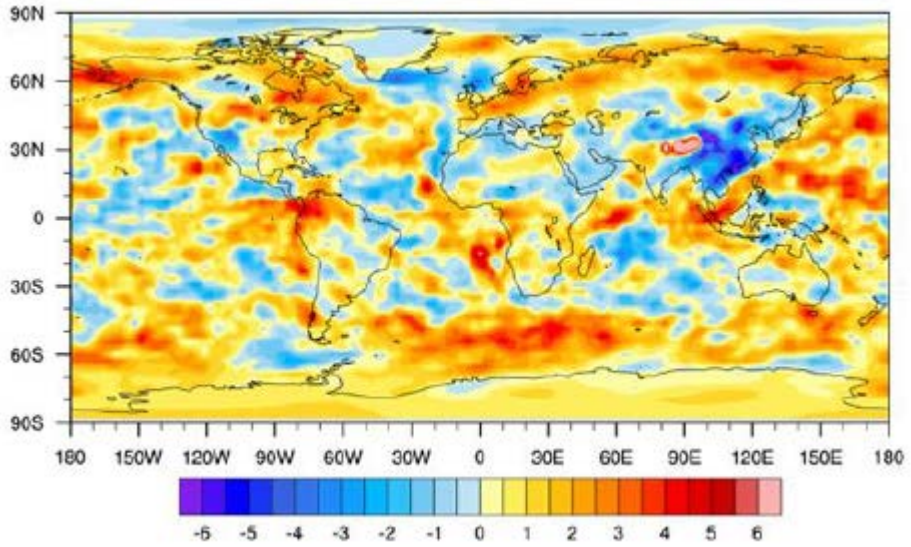
of partial internally and externally mixed aerosols and their effects on global climate

Zhang, Hua

Differences between PIM and EM since 1850



The changes in surface temperature (K)



The ERF of anthropogenic aerosols (W m^{-2})

ΔTS_EM: –1.74 K **ΔTS_PIM: –1.28 K**

EM_ERF: –1.87 W m^{-2} **PIM_ERF: –1.23 W m^{-2}**

Discuss with her

Linking recent findings from the Stockholm sea spray chamber

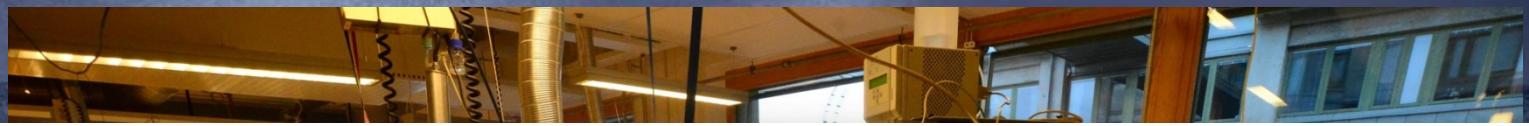
to global climate models

Zieger, Paul

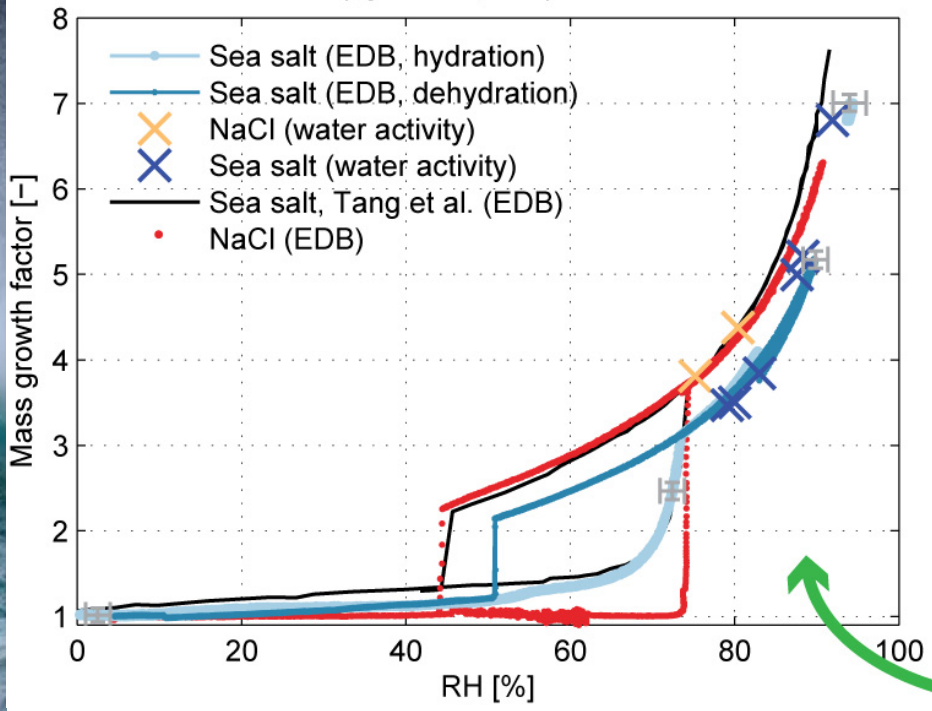
Linking recent findings from the Stockholm sea spray chamber to global climate models

Paul Zieger

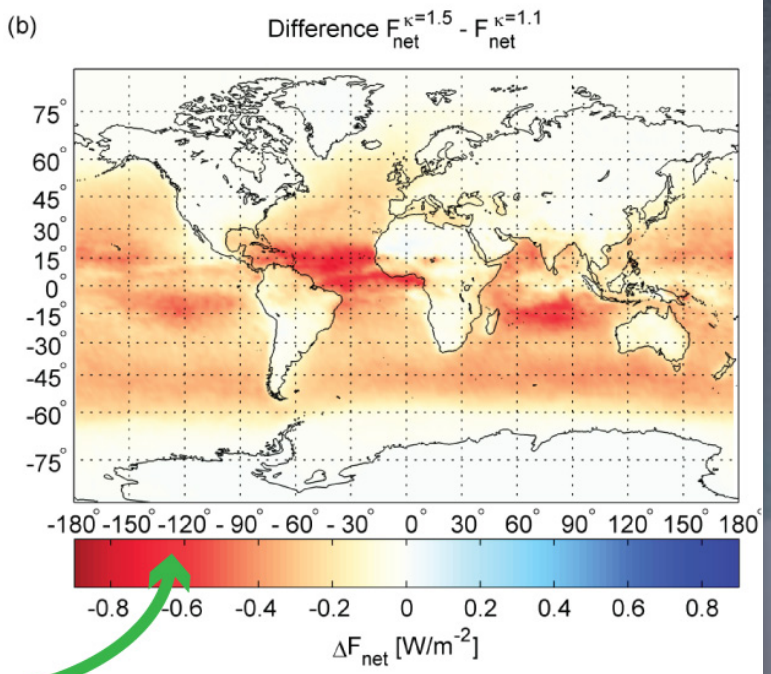
Stockholm University



Sea salt hygroscopicity measurements



Global climate model simulation



Zieger, P.; Väisänen, O.; Corbin, J.; Partridge, D. G.; Bastelberger, S.; Mousavi-Fard, M.; Rosati, B.; Gysel, M.; Krieger, U.; Leck, C.; Nenes, A.; Riipinen, I.; Virtanen, A. & Salter, M.: Revising the hygroscopicity of inorganic sea salt particles, *Nature Communications,* **2017**, *8*

Source: colostate.edu

Modeling comparisons to new observations from the southeast Atlantic

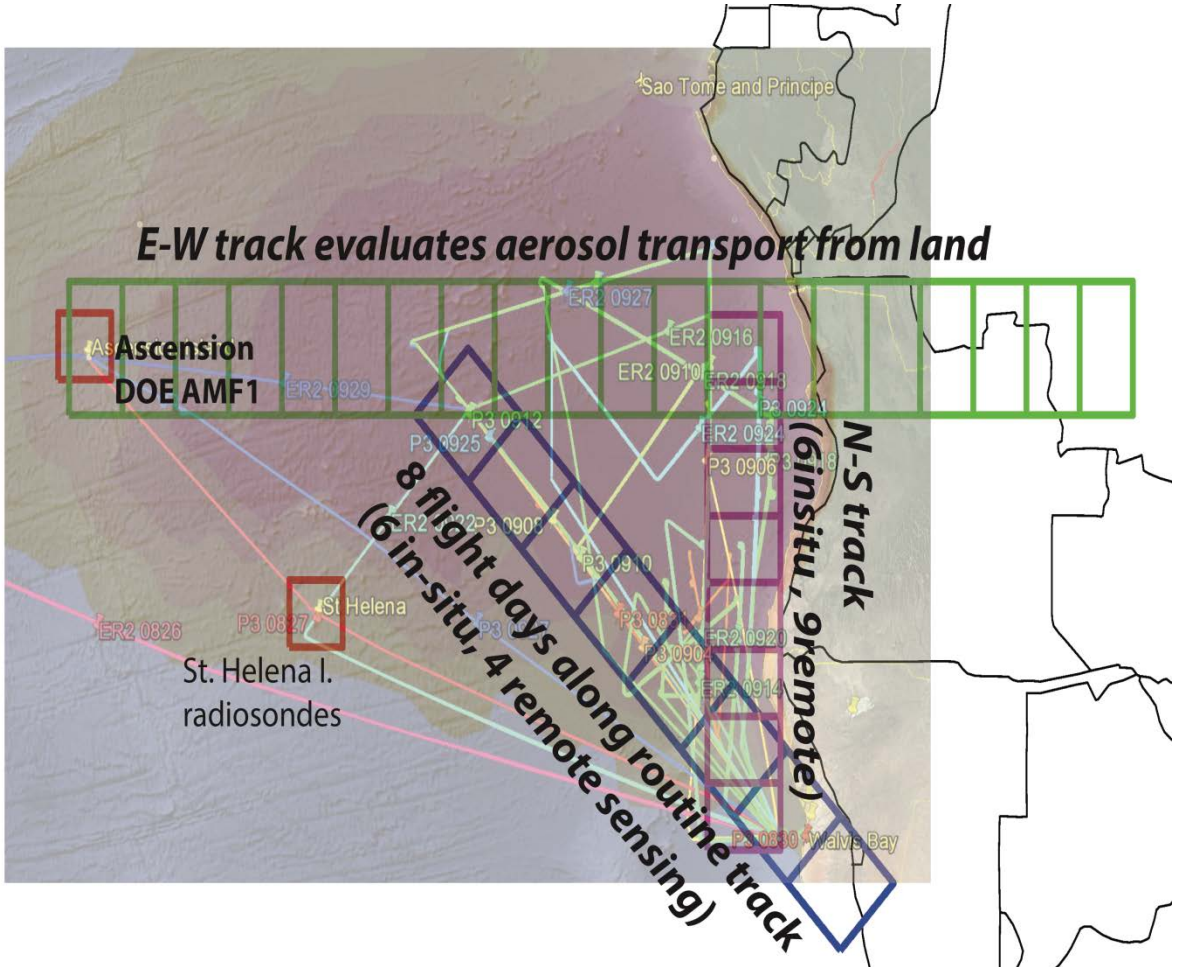
Part 1: Methodology and Ascension Island comparisons

Zuidema, Paquita

Model comparisons to new observations from the southeast Atlantic, Part 1: Methodology

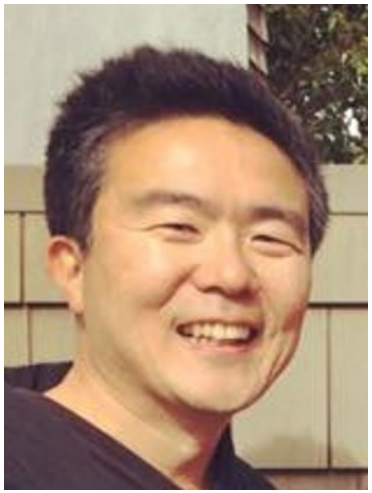
Paquita Zuidema, Pablo Saide, Yohei Shinozuka, Greg Carmichael, Arlindo da Silva, Lenny Pfister, Yemi Adebiyi, Sarah Doherty, Robert Wood, Jens Redemann, the ORACLES science team, Marc Mallet and others

- we compare models to observations from two field campaigns conducted in September 2016 (a nascent project)
- this poster describes our approach
- would others like to join?



Modeling comparisons to new observations from the southeast Atlantic

Part 2: ORACLES Spatial distributions and sampling considerations

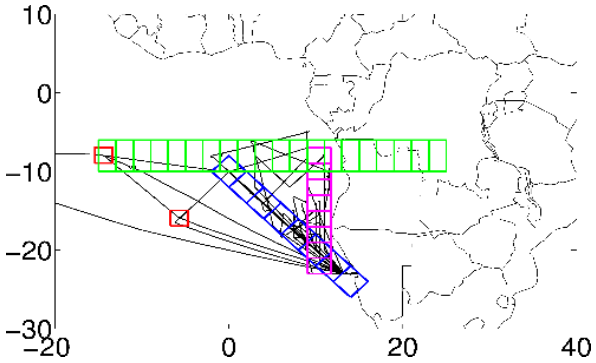


Shinozuka, Yohei

Model comparisons to new observations from the southeast Atlantic, Part 2: ORACLES Spatial distributions and sampling considerations

Yohei Shinozuka, Pablo Saide, Steve Howell, Steffen Freitag, Amie Dobracki, Samuel LeBlanc, Jim Podolske, Greg Carmichael, Yang Zhang, Arlindo da Silva, Paquita Zuidema, Lenny Pfister, Ju-mee Ryoo, Mike Poellot, David Delene, Robert Wood, Jens Redemann, Adeyemi Adebiyi, Sarah Doherty, Karla Longo and the ORACLES science team

Comparison Gridboxes

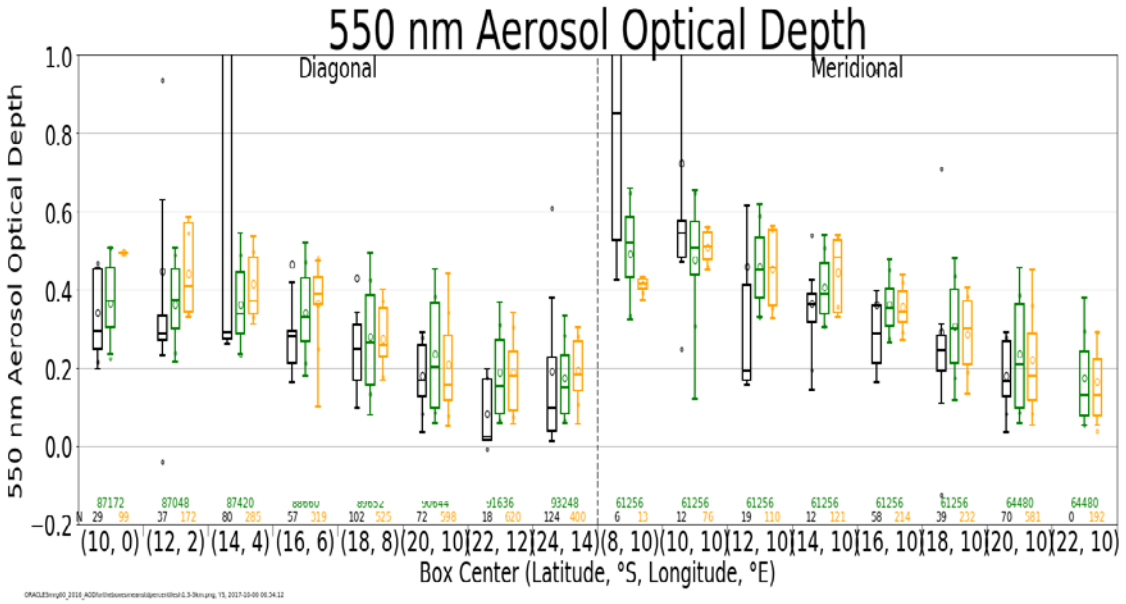


longitudinal

diogonal

meridional

AOD above clouds



OBSERVED vs. **WRF-CAM5**

… & other parameters

Modeling comparisons to new observations from the southeast Atlantic

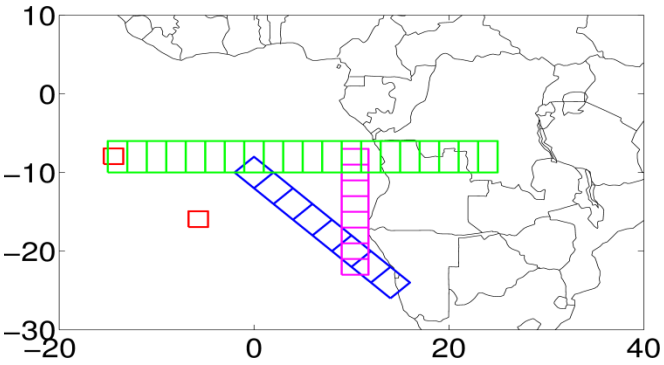
Part 3: Vertical structure

Doherty, Sarah

Model comparisons to new observations from the southeast Atlantic, Part 3: Aerosol Vertical Distributions

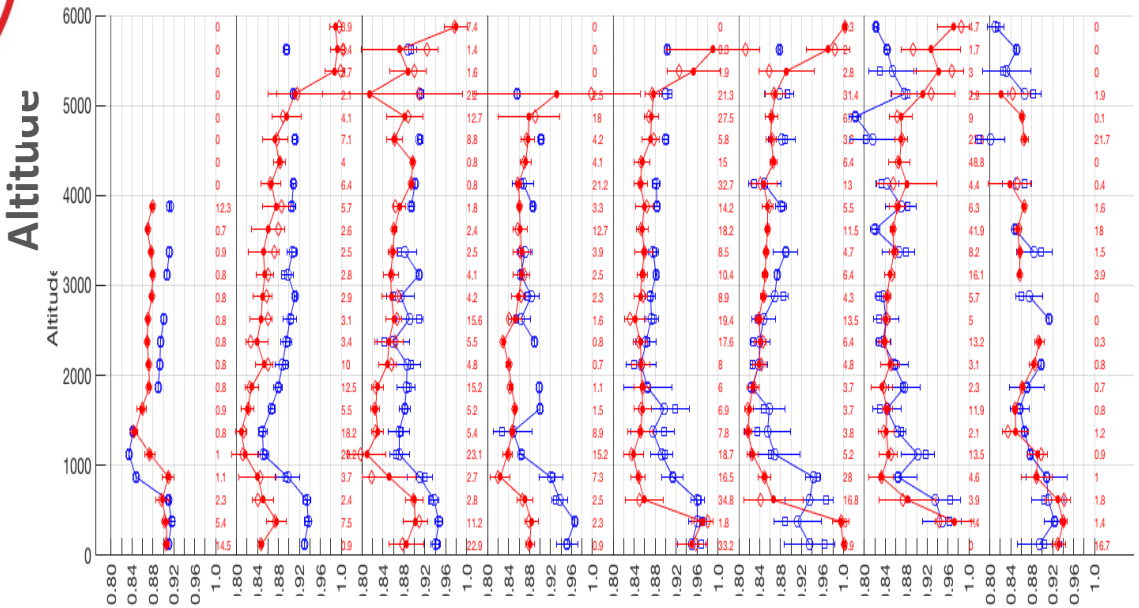
Sarah Doherty, Pablo Saide, Steven Howell, Steffen Freitag, Amie Dobracki, James Podolske, Yohei Shinozuka, Yang Zhang, Greg Carmichael, Arlindo da Silva, Lenny Pfister, Robert Wood, Paquita Zuidema, Jens Redemann and the ORACLES science team

Comparison Gridboxes



Single Scattering Albedo

OBSERVED IN-SITU vs. WRF-CAM5



←more absorbing less absorbing→

… & other aerosol parameters