poster introductions

AeroCom / Aerosat

2018

What is dry?

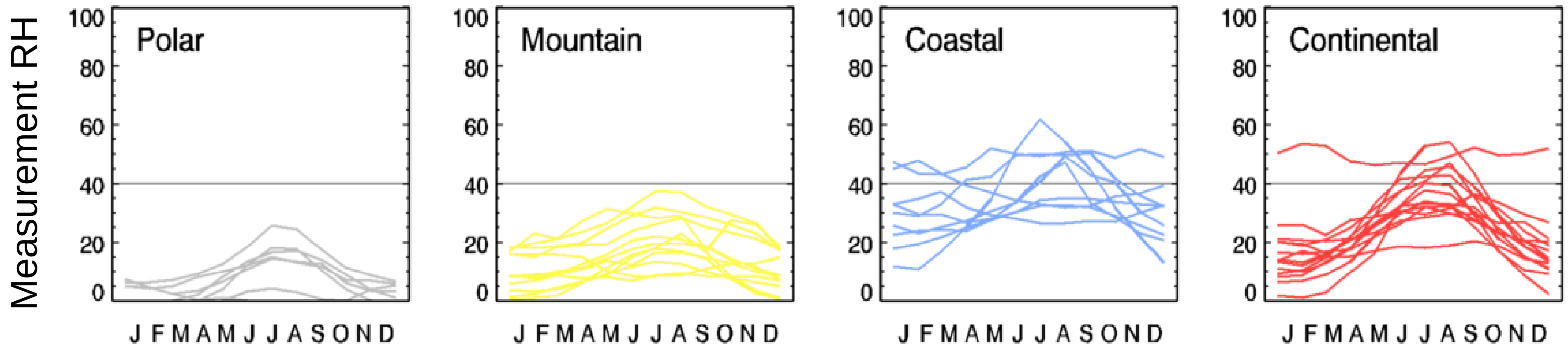
The effect of aerosol water on particle light scattering at low relative humidity

Andrews, Betsy

What is "dry"?: The effect of aerosol water on particle light scattering at low relative humidity

E. Andrews, P. Zieger, G. Titos, M. Burgos, A. Kirkevåg, V. Buchard, C. Randles

Measurements and models have a different definition of what is "dry".



Here we present a comparison of long-term measurements of "dry" aerosol scattering and simulations from the CAM5.3-Oslo model and the GEOS5-MERRAero aerosol reanalysis model.

Hygroscopic growth can increase scattering coefficient even at low RH (RH<40%).

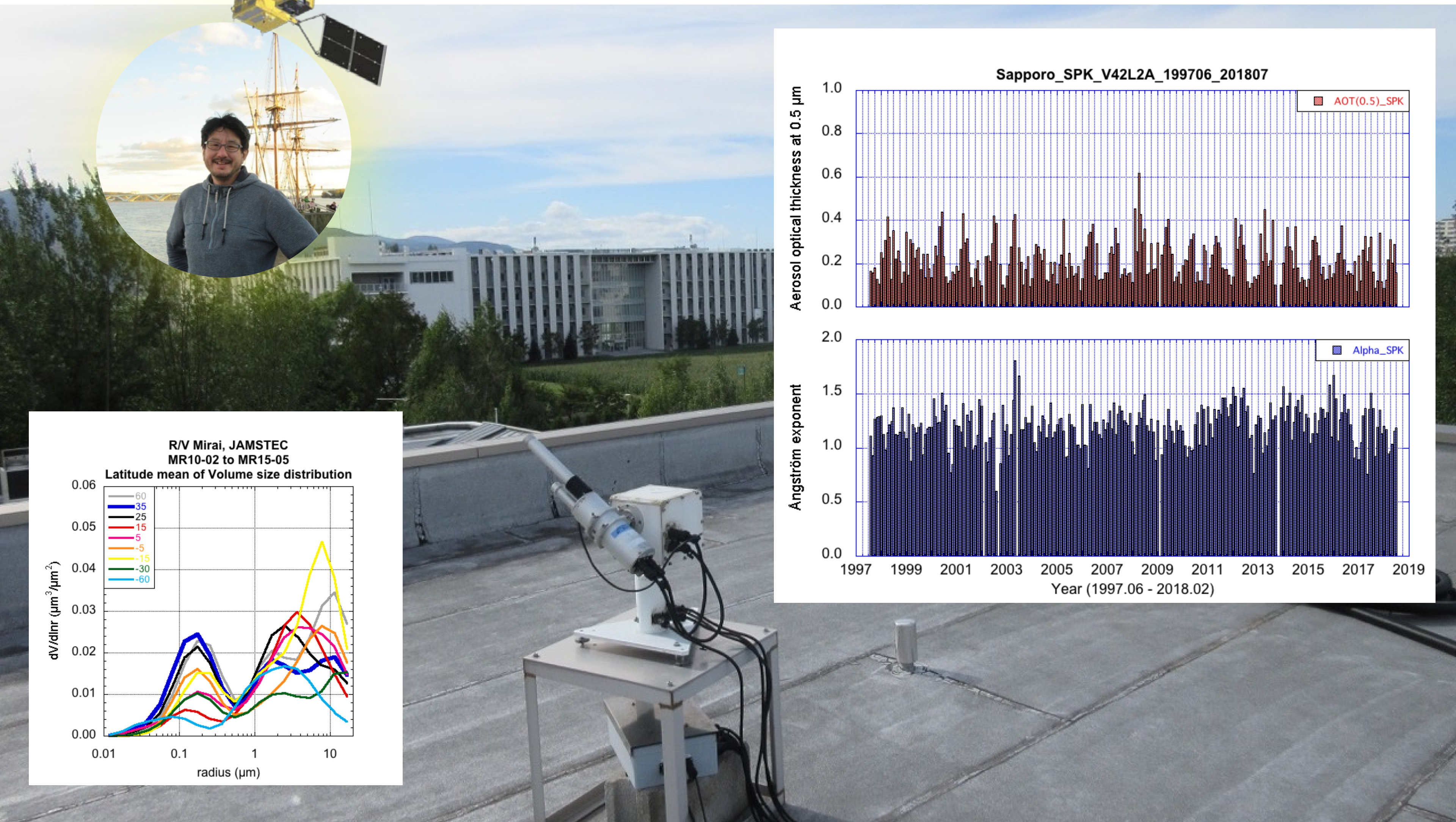
Are differences between measurement RH and simulation RH one possible explanation for model under-prediction of observed scattering coefficients?

Long-term measurements of aerosol optical properties in Japan

Aoki, Kazuma

Long-term measurements of aerosol optical properties in Japan

Kazuma Aoki: University of Toyama



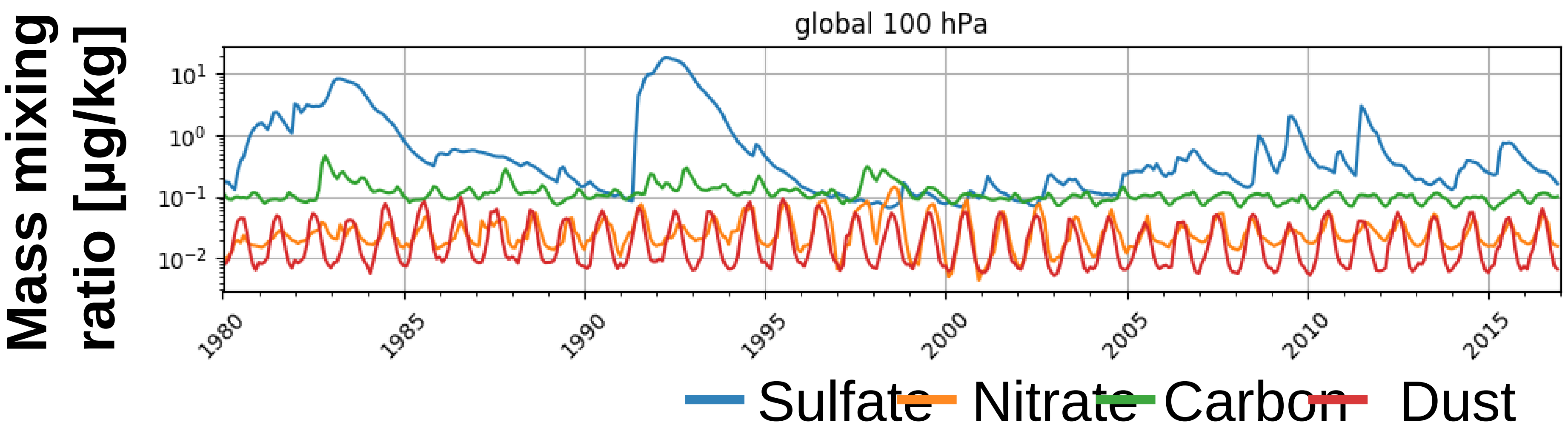
Changes in upper troposphere / lower stratosphere aerosol since 1980 in the Goddard Earth Observing System (GEOS) model

Aquila, Valentina

Changes in UTLS aerosol since 1980 in the GEOS model

V. Aquila[1], P. Colarco[2], M. Chin[2], L. Oman[2]

[1]American University; [2]NASA Goddard Space Flight Center



- In this poster we show the changes in UTLS aerosol composition in the MERRA2-GMI simulation, a 1980-2017 high resolution (~0.5˚) reanalysis simulation with the NASA GEOS model.
- Our simulation shows that during most years volcanic sulfate is globally the dominant aerosol species in the UTLS, and that carbon is as abundant as sulfate in non-volcanic years.
- We also show that the aerosol composition within the Asian Tropopause Aerosol Layer (ATAL) differs substantially from outside the ATAL, with a larger contribution from nitrates.

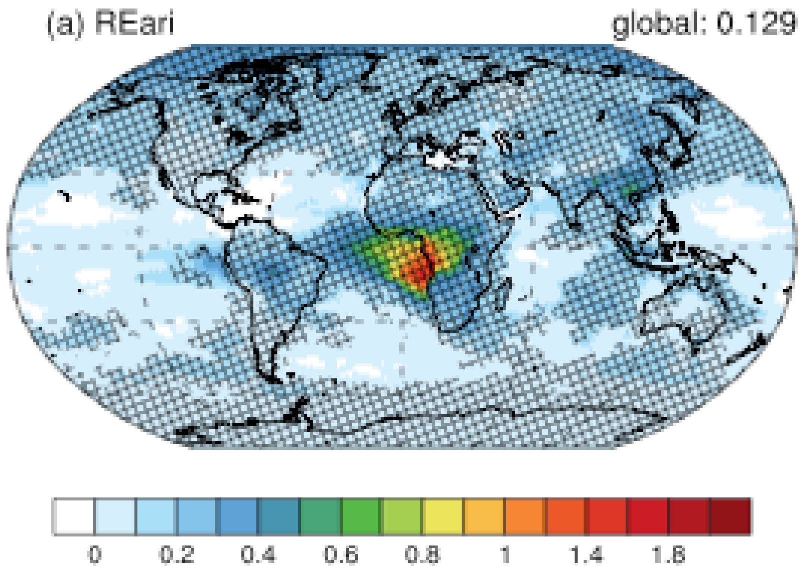
Improvement of Biomass *Burning Aerosol* *Optical Properties in CAM5.4 and*

Comparison of AeroCom Model Optical Properties to Observations

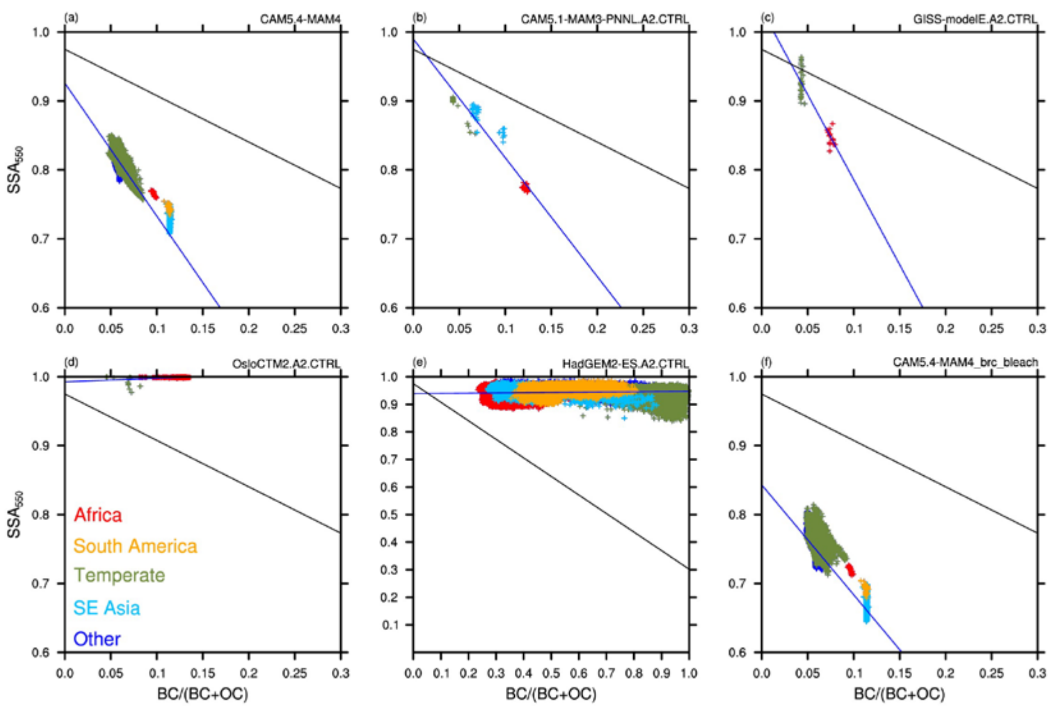
Brown, Hunter

Improvement of biomass burning optical properties in CAM5.4 and comparison of AeroCom model biomass burning optical properties to observations

Hunter Brown



- Improved biomass burning through implementation of absorbing organic aerosol (brown carbon) in the Community Atmosphere Model (CAM)



- Some AeroCom models in biomass burning regions perform better than others when compared to observations
- Why could that be?

NOAA JPSS Enterprise

Aerosol Detection Product

Ciren, Pubu

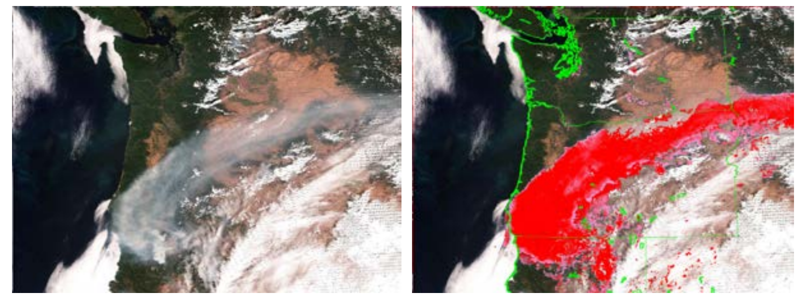
NOAA JPSS Enterprise Aerosol Detection Product

Pubu Ciren [(1)] and Shobha Kondragunta [(2)]

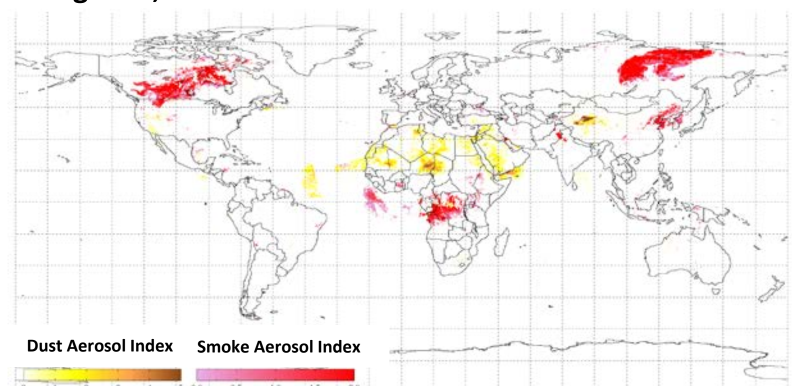
(1). I.M. Systems Group, Inc.

(2). NOAA/NESDIS/STAR

- **NOAA JPSS VIIRS Enterprise Aerosol Detection product (EPS ADP) provides global pixel level smoke/dust flag from both NOAA-20 and Suomi-NPP.**
  - The NOAA Enterprise Processing System Aerosol Detection algorithm is designed to have one set of algorithms working on observations from multi-sensors including both GEO and LEO platforms.
  - Validations against AERONET observations and CALIOP VFM products indicated that accuracy and POCD for dust and smoke detection can be as high as 90% and 80%, respectively.
  - ADP product from S-NPP is available for public on NOAA Comprehensive Large Array-data Stewardship System (*CLASS*). Same product on NOAA-20 will be available for public soon.



VIIRS RGB image (left) and the detected smoke (right) on August 3, 2014 over west coast of U.S.



Global VIIRS smoke/dust detection on July 16,2014

AERO-SAT

Oct 15-19, 2018 College Park

AeroCom

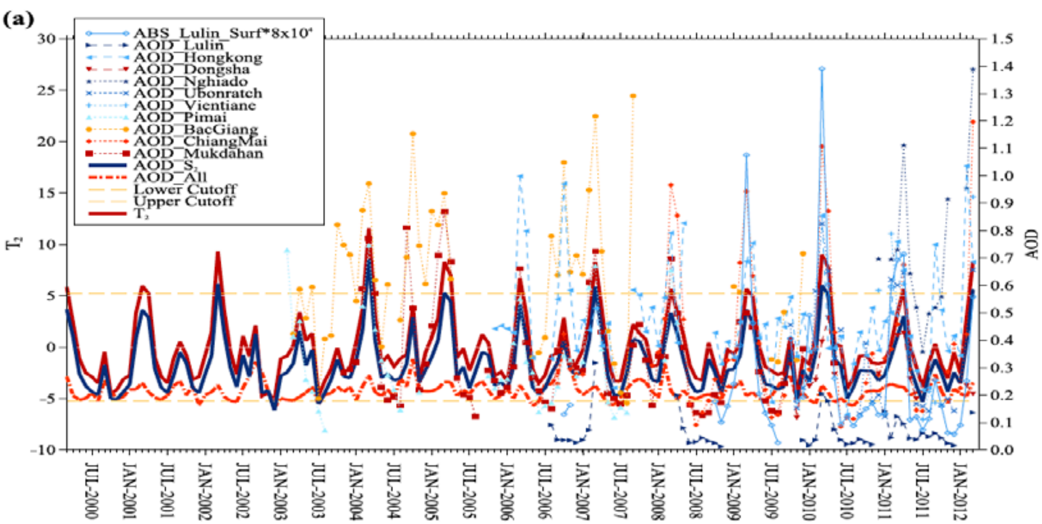
Modeling of Polluted Aerosol Conditions

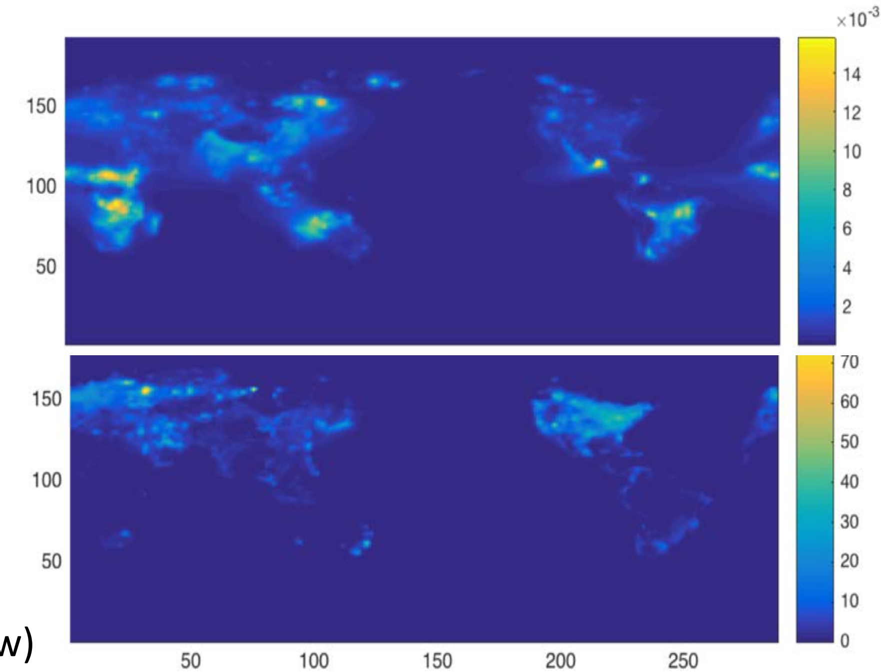
Quantifying Emissions and Improving Physical Understanding using a New Co-Variability Approach across Multiple Satellites, Models, and Measurements

Cohen, Jason

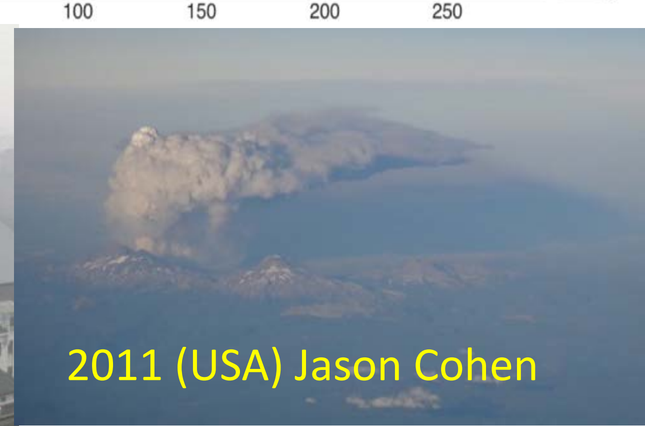
Modeling Polluted Aerosol Conditions: Quantifying Emissions & Improving Understanding using a New Co-Variability Approach across Satellites, Models, and Measurements

Jason Blake Cohen ***jasonbc@alum.mit.edu***





Cohen, et al. 2017, ACP ; Lan and Cohen et al., 2018 (review)

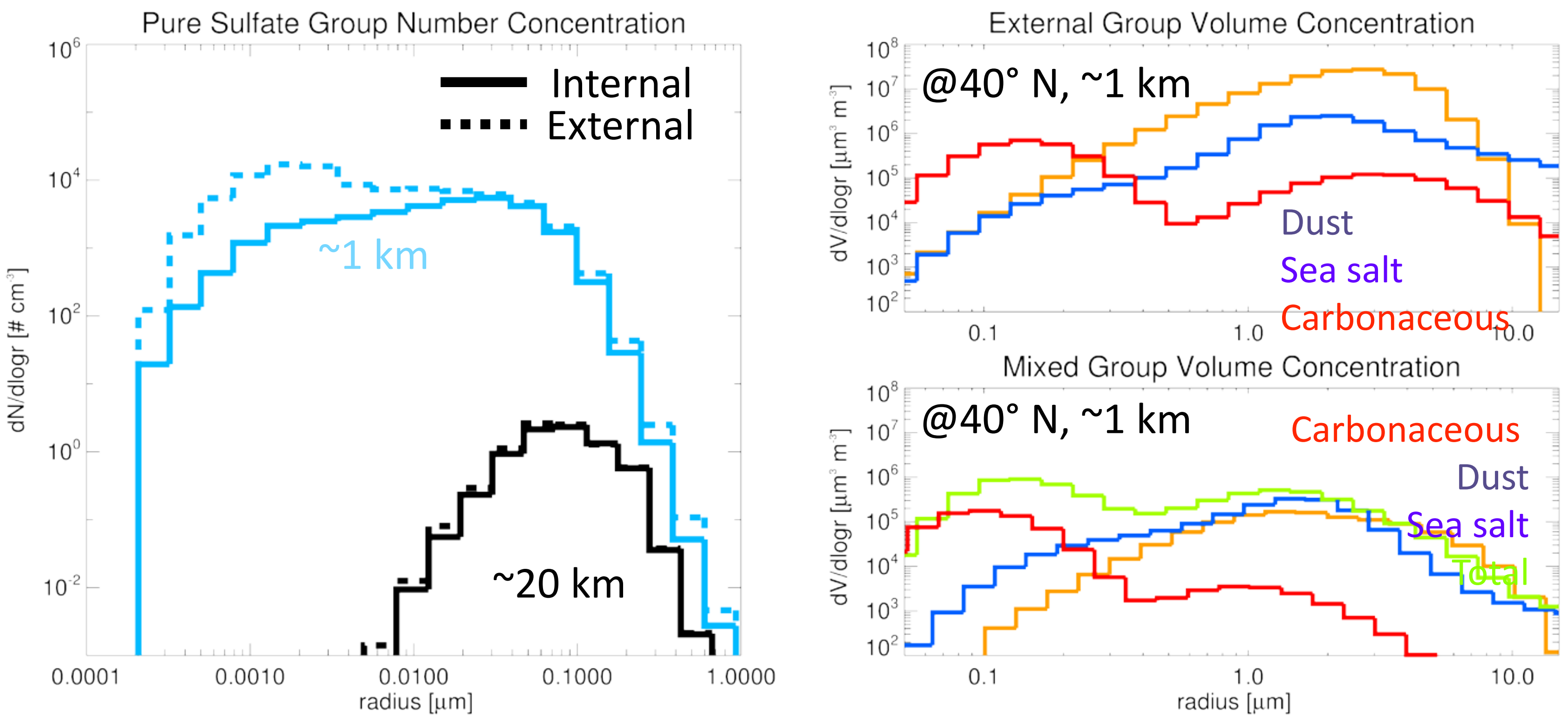


Toward a Sectional Aerosol Representation in the NASA Goddard Earth Observing System (GEOS) Model

Colarco, Pete

Toward a Sectional Aerosol Representation in the NASA Goddard Earth Observing System (GEOS) Model

__Peter Colarco (NASA GSFC)__, Valentina Aquila (American University), Parker Case, Yunqian Zhu, Brian Toon (University of Colorado), Charles Bardeen (NCAR), and Pengfei Yu (NOAA ESRL)



- We've introduced a version of the Community Aerosol and Radiation Model for Atmospheres (CARMA) in the global GEOS Earth system model
- CARMA allows us to simulate evolution of particle size and mixing state using a sectional approach
- The model has been designed initially for stratospheric and sulfate aerosols, and is in the process of being updated for internally mixing with dust, sea salt, and carbonaceous aerosols

Bounding aerosol properties and radiative effects using observations

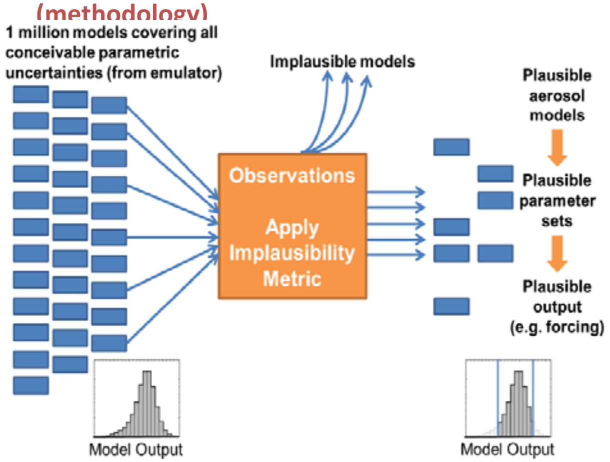
Deaconu, Lucia

Bounding aerosol properties and radiative effects using observations

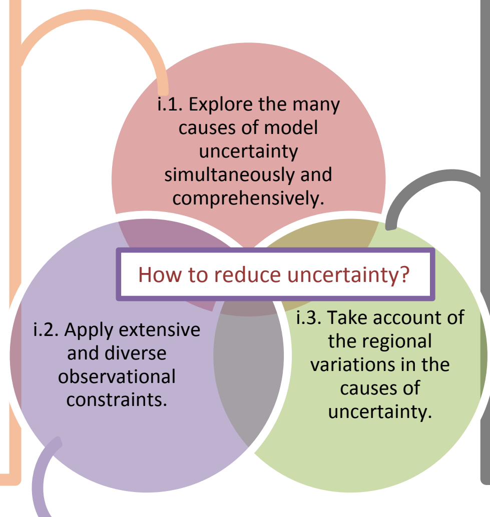
Lucia-Timea Deaconu[1], Duncan Watson-Parris[1], Leighton Regayre[2], Ken Carslaw[2], Philip Stier[1]

[1] Atmospheric, Oceanic and Planetary Physics, Department of Physics, University of Oxford, Oxford, UK[2] School of Earth and Environment, University of Leeds, Leeds, UK.

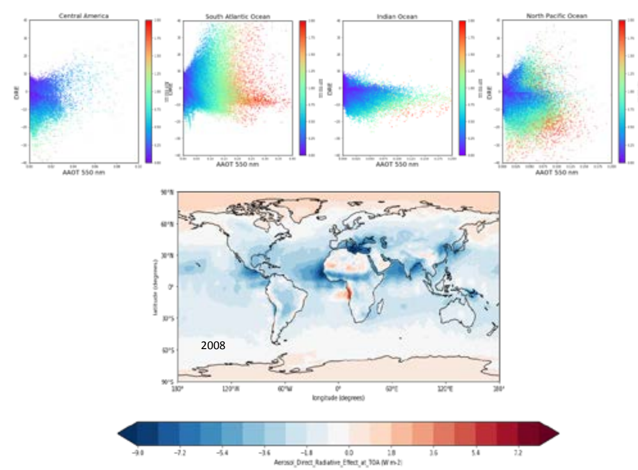
(1) Schematic of the model constraint (methodology)



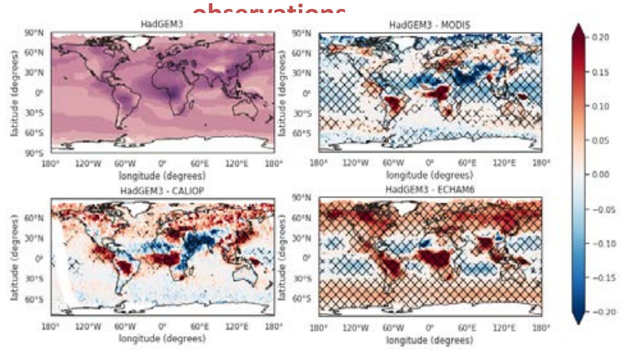
A-CURE project



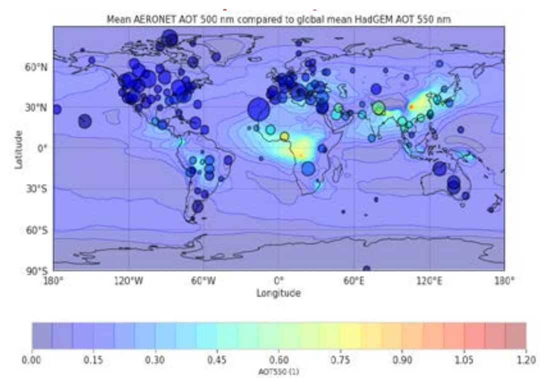
(3) Regional variability of aerosol DRE



(2a) Model evaluation using satellite observations



(2b) Model evaluation using AERONET



A validation tool for satellite aerosol data sets

Descloitres, Jacques

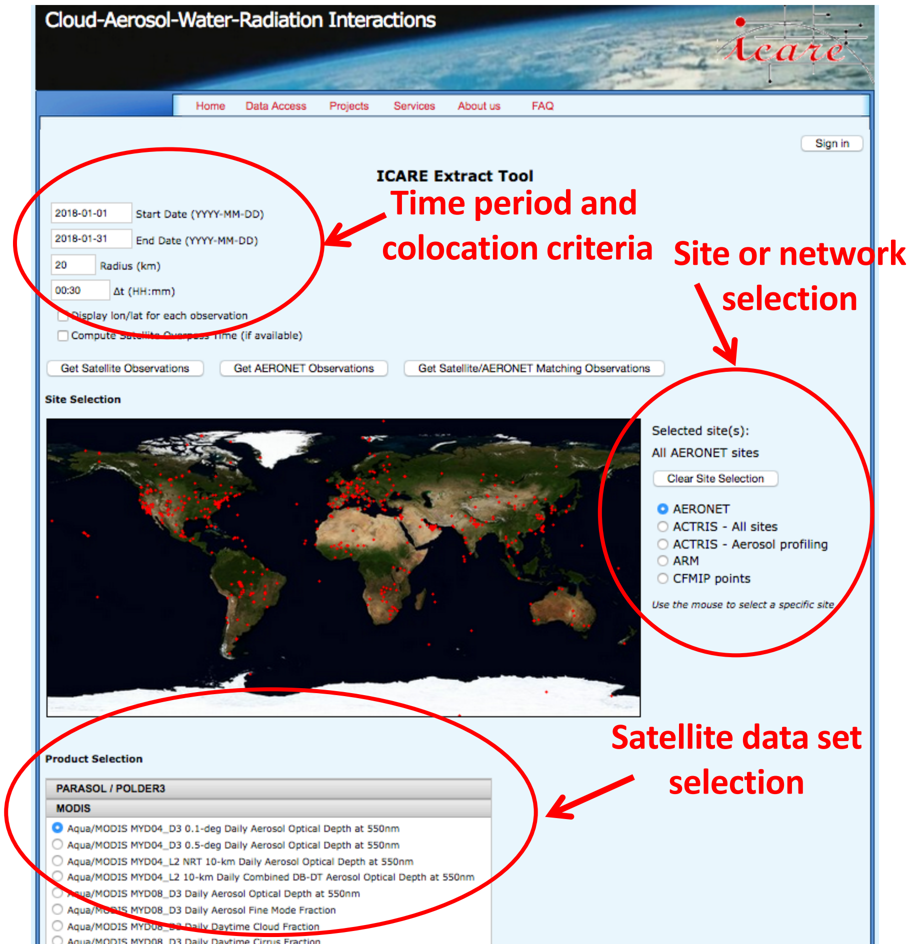
A validation tool for satellite aerosol data sets

ICARE Data and Services Center

http://www.icare.univ-lille1.fr
contact@icare.univ-lille1.fr

Jacques Descloitres and Anne Vermeulen

Univ. Lille, CNRS, CNES, UMS 2877 - ICARE Data and Services Center, F-59000 Lille, France



- Several validation studies conducted at ICARE Data and Services Center in the past
- ICARE archives many commonly-used satellite and ground-based data sets on the same system
- Increasing need for repeatable and traceable evaluations using massive data sets extensively
- We are in the process of consolidating a test bench open to external users
- Web service available for interactive use: **http://www.icare.univ-lille1.fr/extract**
- Off-line scripting is possible to retrieve massive satellite-ground colocation data sets automatically

Airborne classification of aerosols

over the contiguous US

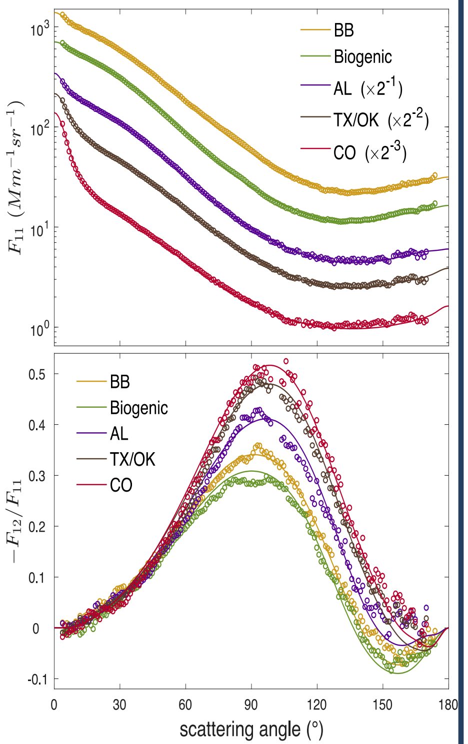
an in situ light scattering perspective

Espinosa, Reed

Airborne classification of aerosols over the contiguous United States: an in situ light scattering perspective

W. Reed Espinosa, J. Vanderlei Martins, Lorraine Remer, Oleg Dubovik, Anin Puthukkudy, Tatyana Lapyonok, David Fuertes , F. Daniel Orozco, Luke Ziemba, K. Lee Thornhill and Rob Levy

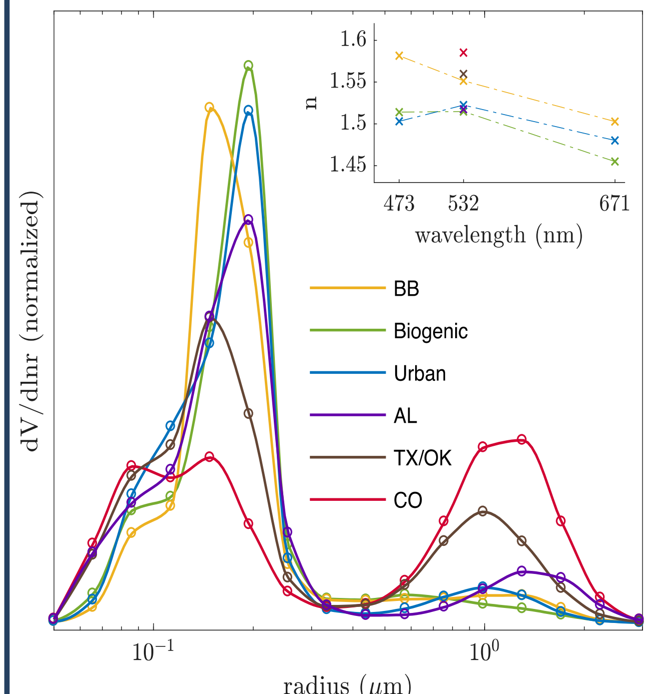
PI-Neph **angular scatter**



absorption coefficient from PSAP (Particle Soot Abs Photometer)

GRASP:
Generalized Retrieval of Aerosol and Surface Properties

Optically consistent speciated models of **aerosol size distribution, complex refractive index and spherical fraction** retrieved from in situ aircraft measurements



The Impact of Organic Aerosol Volatility on Aerosol Microphysics for Global Climate Modeling Applications

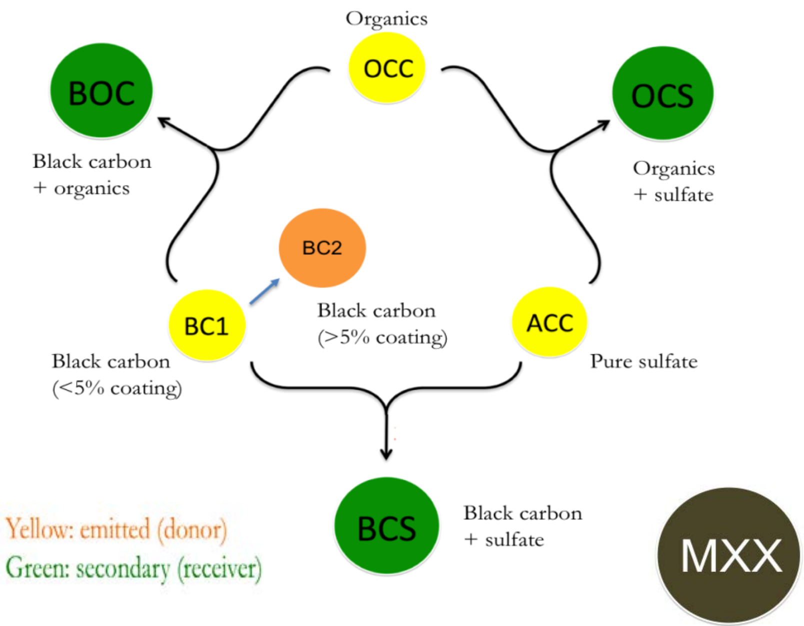
Gao, Chloe

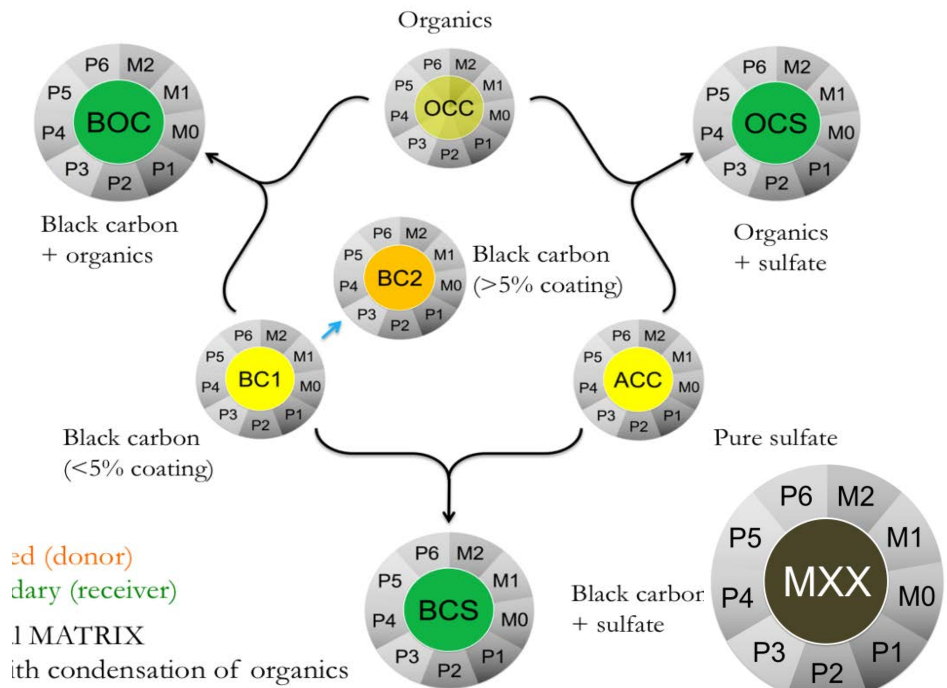
National Aeronautics and Space Administration
Goddard Institute for Space Studies
New York, N.Y.

Columbia University
in the City of New York

The Impact of Organic Aerosol Volatility on Particle Microphysics and Global Climate

Chloe Y. Gao, Susanne E. Bauer, Kostas Tsigaridis





MATRIX [*Bauer et al*. 2008]

- Describes the mixing state of different aerosol populations
- Organics aerosols: traditional, non-volatile
- Aerosol growth: coagulation

MATRIX-VBS [*Gao et al.*, 2017, 2018]

- MATRIX with volatility-basis set that describes the volatility of organics
- Organic aerosols: semi-volatile
- Aerosol growth: coagulation + organic condensation

The MISR version 23 Operational Aerosol Products Over Land and Ocean

Garay, Mike

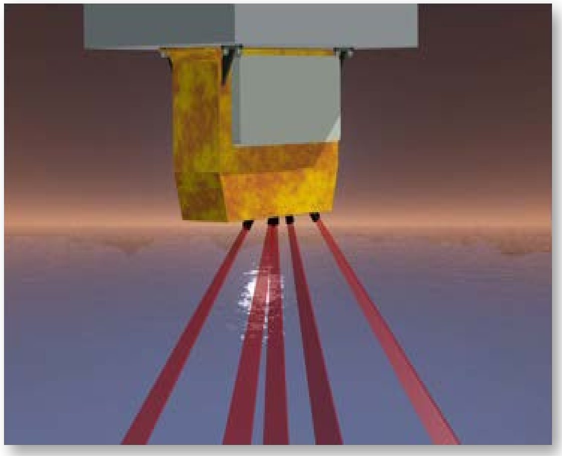
- Available over both land AND ocean!
- Optical depth and type information!
- 4.4 km at Level 2!
- 0.5° at Level 3!
- NetCDF-4 format!
- Mission reprocessing complete!
- Available now from the Langley Atmospheric Sciences Data Center!

The MISR Version 23 operational aerosol products over land and ocean

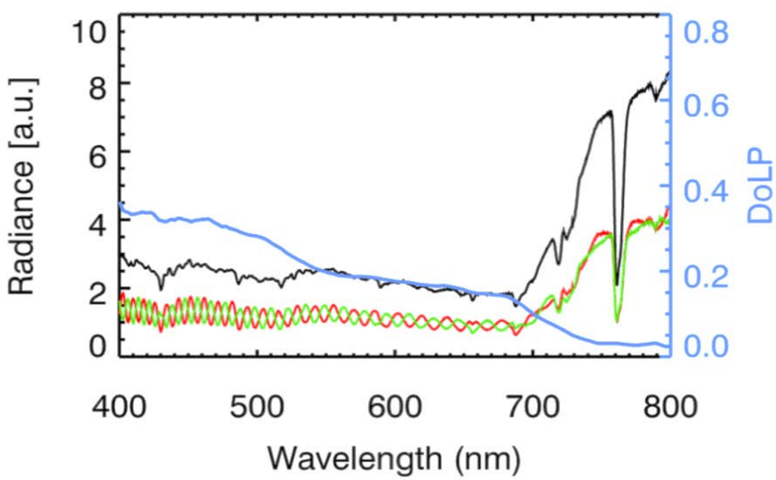
Aerosol Measurements from the NASA PACE mission

Hasekamp, Otto

SPEXone for the NASA PACE Mission



Hyperspectral, multi-angle measurements of radiance and polarization



SPEXone will measure:

- **AOD** with high quality over land and ocean
- Aerosol **absorption** (SSA).
- Aerosol refractive index (**type**).
- Aerosol **size** distribution
- Aerosol **shape**
- Aerosol **Layer Height** (ALH)

What exact products are useful for modelers?

ACEPOL Campaign

Arctic climate responses to mid-latitude aerosol emissions: Investigating the role of meridional heat transport and local cloud characteristics

Ickes, Louisa

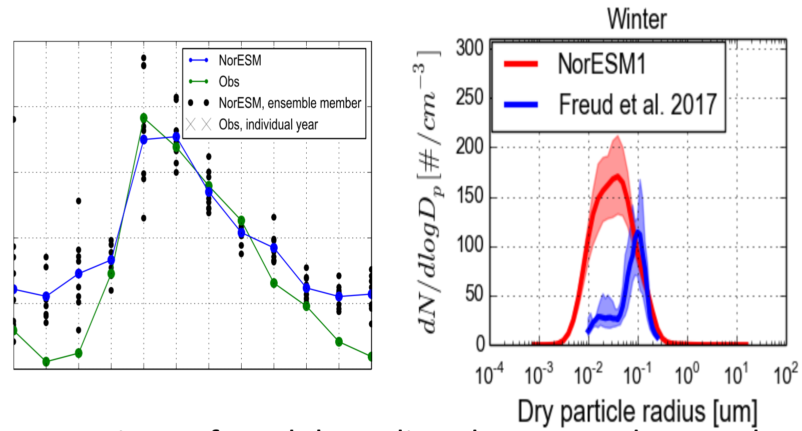
Arctic climate responses to mid-latitude aerosol emissions:

Investigating the role of meridional heat transport and local cloud characteristics

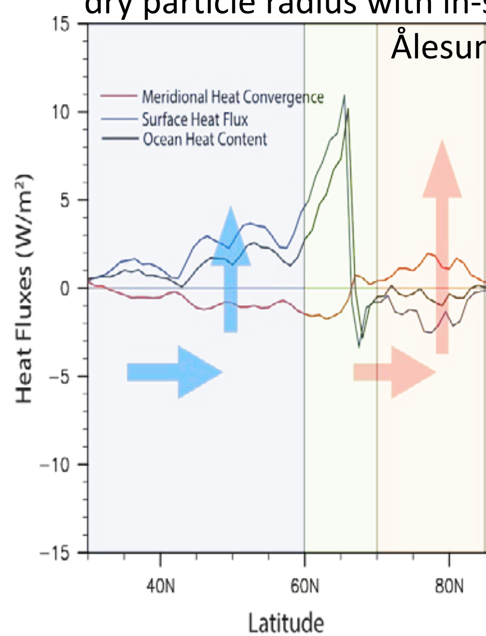
Tanja N. Dallafior, Srinath Krishnan, Anna Lewinschal, Hans-Christen Hansson, Ilona Riipinen, Annica M. L. Ekman
(tanja.dallafior@misu.su.se; srinath.krishnan@misu.su.se) *Presented by Luisa Ickes*

Bolin Centre for Climate Research | Stockholm University

- **objectives:**
  - (1) **Does NorESM adequately represent cloud and aerosol properties in the Arctic**?
    - ***Cloud droplet number concentrations match**, but **modelled aerosol size smaller** -> cloud cover*
    - *Large **uncertainties in** the comparison of **cloud cover fraction** have implications for cloud radiative forcing.*
  - (2) **How does the meridional ocean heat flux change with increased SO_2 emissions from Europe?**
    - ***A reduction in the strength of the Atlantic meridional overturning** (and corresponding changes to the heat flux) **is observed** in the mid-latitudes.*
    - *Changes north of 65ºN is likely driven by **surf, heat flux and sea-ice changes**.*



Comparison of model-predicted CDNC and aerosol dry particle radius with in-situ observations at Ny Ålesund.



Meridional Heat flux convergence difference between 2000 (low-SO_2) and 7xEU (high-SO_2) emission scenarios in NorESM1. Blue arrows indicates decrease and red arrows indicate increase

Characterization of UV-Visible aerosol absorption properties

using combined satellite and ground measurements

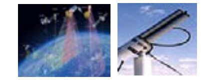
Kayetha, Vinay

Characterization of UV-Visible Aerosol Absorption Properties Using Combined Satellite and Ground Measurements

Vinay Kayetha[1], Omar Torres[2], Hiren Jethva[3]

[1]Science Systems Applications Inc., Lanham, MD; [2]NASA Goddard Space Flight Center, Greenbelt, MD; [3]Universities Space Research Association/GESTAR, Columbia, MD, USA

Email: vinay.k.kayetha@nasa.gov, omar.o.torres@nasa.gov, hiren.t.jethva@nasa.gov



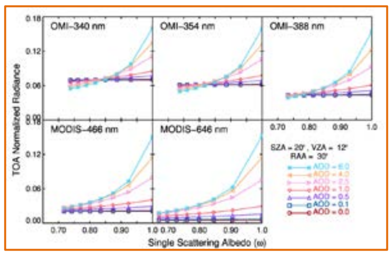
Introduction

- For more than two decades now, Aerosol Robotic Network (AERONET) sites located worldwide are providing spectral measurements of :
  - aerosol extinction optical depth (AOD), and
  - almucantar diffuse sky radiances.
- Aerosol single scattering albedo (SSA) derived from diffuse sky radiances (AERONET Inversion Products) are believed to be more reliable for the local morning-evening measurements due to stronger aerosol signal at larger solar zenith angle.
- Near-noon local A-Train satellite measurements over the sites provide an opportunity to fill this gap.

Our Goals :

- Derive aerosol SSA during A-Train satellite overpasses over the sites.
- Extend the retrieval of aerosol spectral absorption to the near-UV wavelengths where such inversion from AERONET is non-existent.

Physical Basis

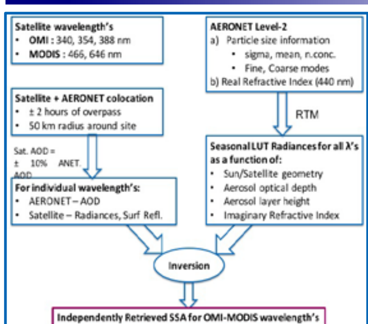


For a given aerosol type and layer height, top-of-the-atmosphere (TOA) radiance is a function of AOD and SSA.

Constraining satellite radiance measurements with AERONET AOD, the wavelength-dependent SSA can be retrieved using a robust inversion algorithm.

Site-specific aerosol models inferred from AERONET are used to create radiance Look-up-tables (LUT).

Data and Methodology



96 AERONET sites with > 7yrs of measurements are selected

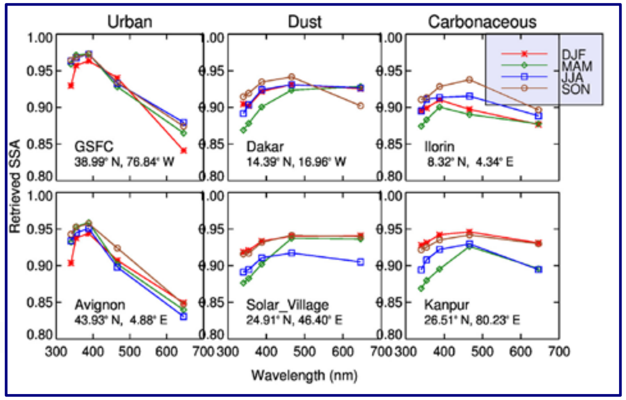
Ancillary data from OMAERUV product:

- Aerosol layer height – monthly climatology of CALIPSO-OMI data set.
- Aerosol type – CO conc. + UVAI

- Satellite measurements :
  - Ozone Monitoring Instrument (OMI)
    - near-UV channels radiances (340, 354, 388 nm)
    - Surface reflectance based on LER (Lambert Equivalent Reflectance)
  - Moderate Resolution Imaging Spectroradiometer (MODIS)
    - Visible channels radiances (466 and 646 nm)
    - Surface reflectance data obtained from MAIAC product.

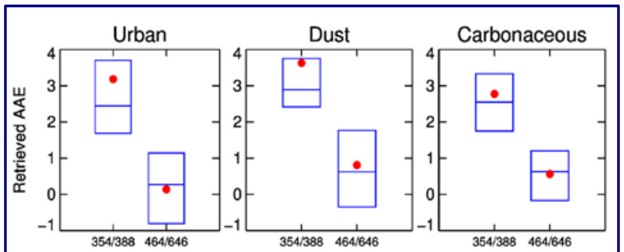
Results : Retrieved SSA

Illustrating derived seasonal climatology of aerosol absorption:



Aerosol Spectral Absorption

Interquartile-range of Absorption AE (all AERONET stations)



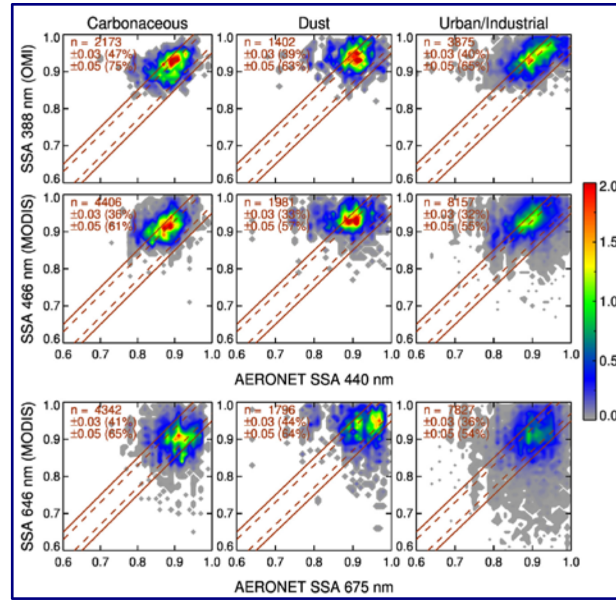
Summary

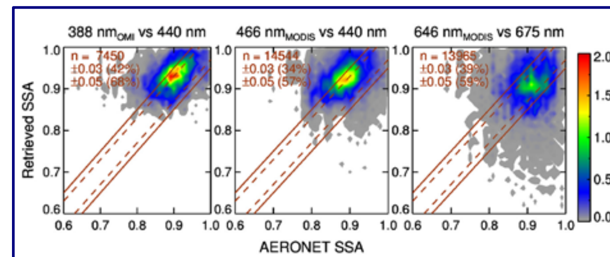
- Derived aerosol SSA at OMI and MODIS wavelengths for near-noon local times over the AERONET sites.
- The spectral dependence of aerosol absorption derived from our application is consistent with previous studies.
- In comparison to the AERONET, our retrieved SSA for 40% (60%) of observations at 388nm and 646 nm agrees within the absolute difference of 0.03 (0.05) at 440 nm and 675 nm respectively.
- The derived spectral aerosol SSA data set provides a valuable addition to the existing aerosol absorption record from AERONET and helps to improve our understanding of aerosol properties.

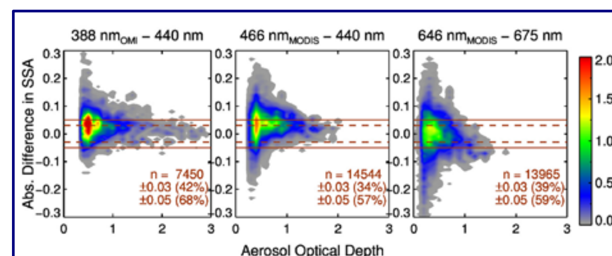
Acknowledgements:

- We thank NASA ROSES-2017 for supporting this work through research grant NNG17HP01C.
- Special thanks to Tom Eck for discussion on the AERONET retrievals.

Aerosol SSA : Retrieved vs AERONET







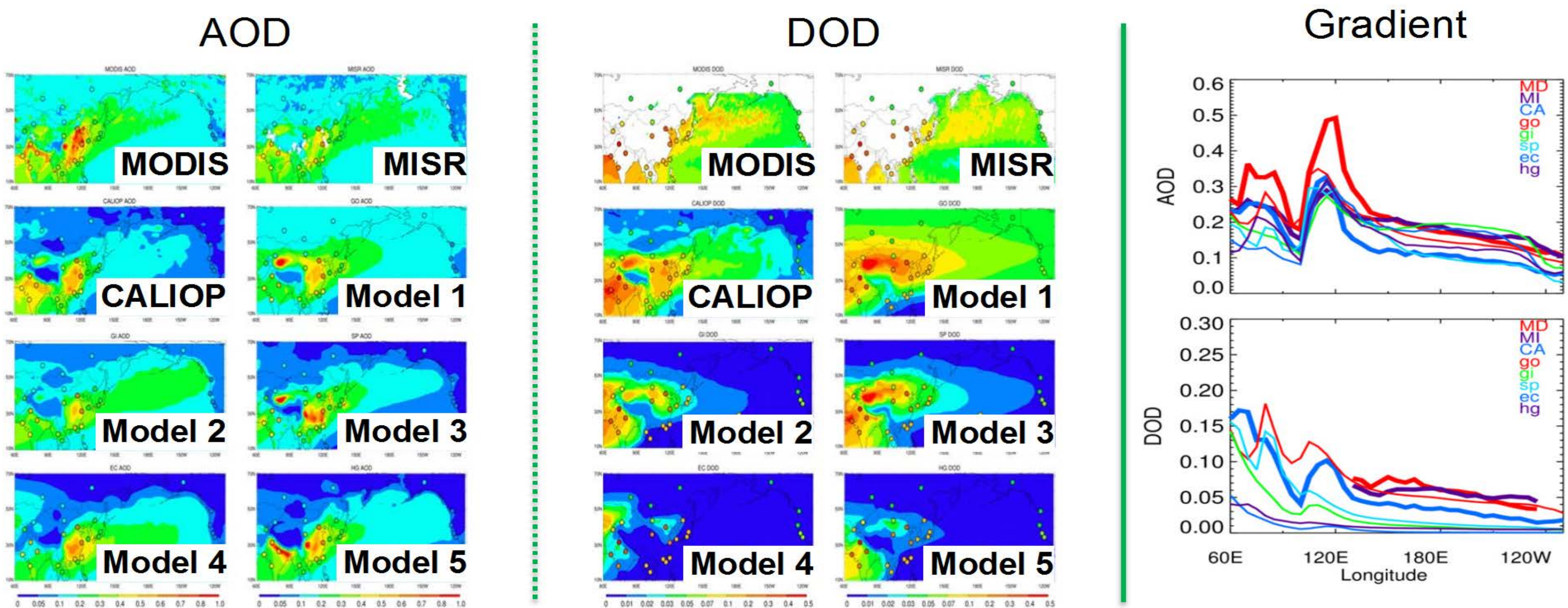
*Observations and Modeling of Asian and Northern Pacific **Dust** Sources and Transports*

Kim, Dongchul

Observations and Modeling of Asian and Northern Pacific Dust Sources and Transports

Dongchul Kim *and co-authors*

This study compares **five AeroCom-II models** and remote sensing observations from **MODIS, MISR, CALIOP, and AERONET** over the challenging Asia-Pacific region.



Cloud activation

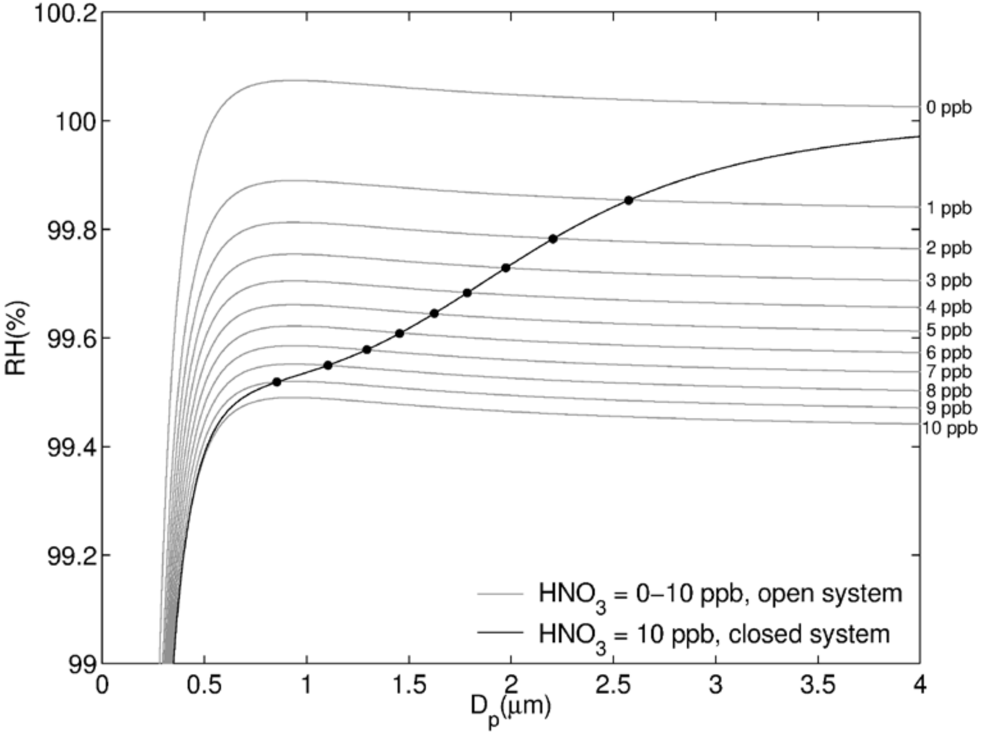
in the presence of semi-volatile compounds

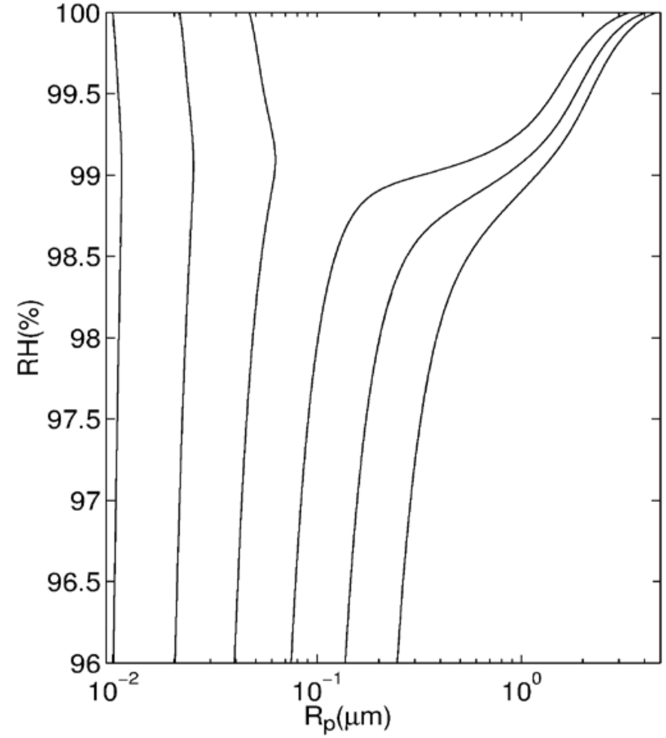
Kokkola, Harri

ILMATIETEEN LAITOS
METEOROLOGISKA INSTITUTET
FINNISH METEOROLOGICAL INSTITUTE
Harri Kokkola

Cloud activation in the presence of semi-volatile compounds

- semi-volatiles
- - **suppress** maximum supersaturation for cloud activation
- - **increase** CDNC
- processes **not** included in global models



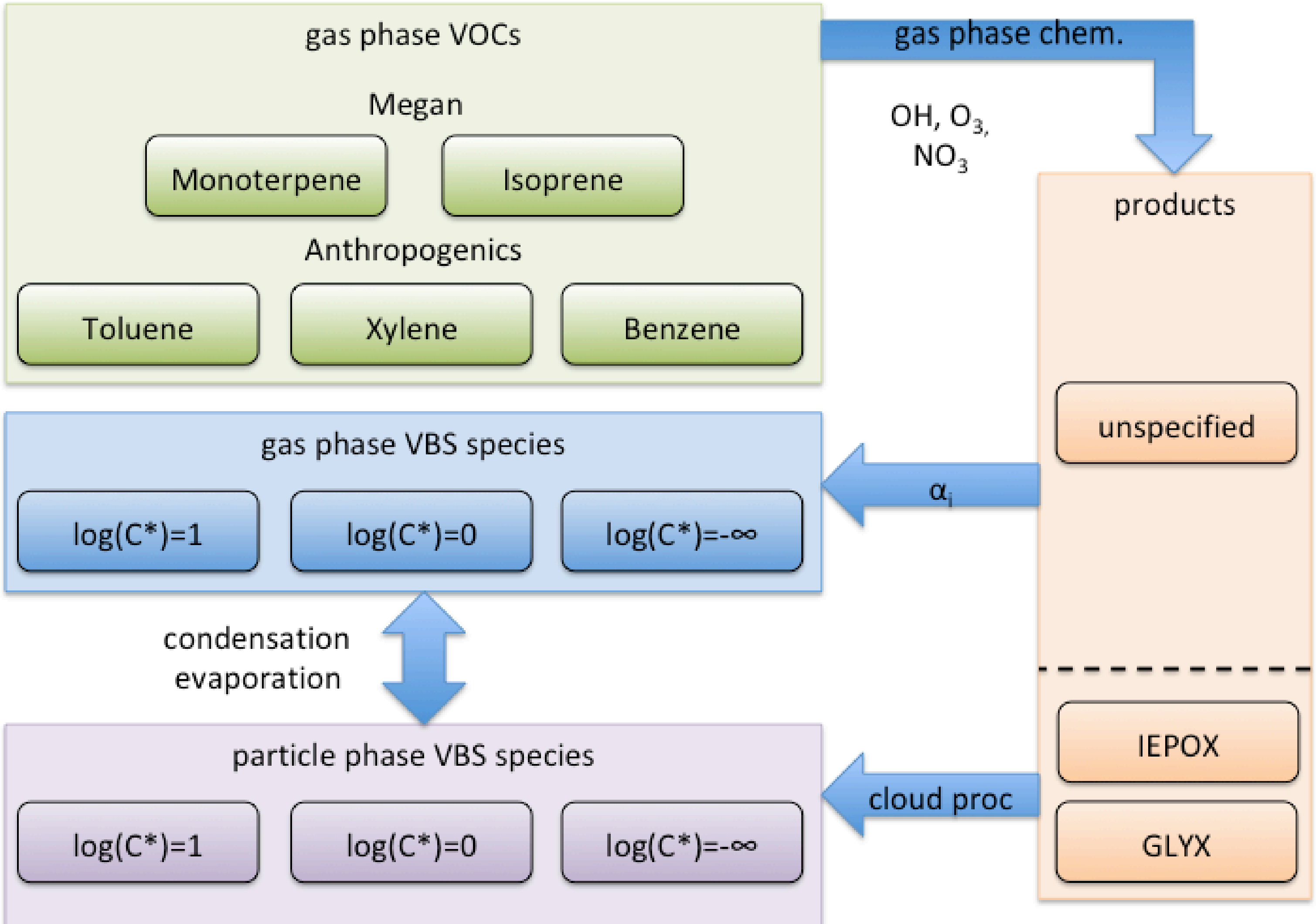


The Volatility Basis Set in ECHAM-HAM-SALSA

Kuehn, Thomas

The Volatility Basis Set in ECHAM-HAM-SALSA

T. Kühn, J. Merikanto, A. Hienola, A. Arola, T. Mielonen, H. Korhonen, and H. Kokkola



How long should the MISR record be when evaluating aerosol optical depth climatology in climate models?

Lee, Huikyo

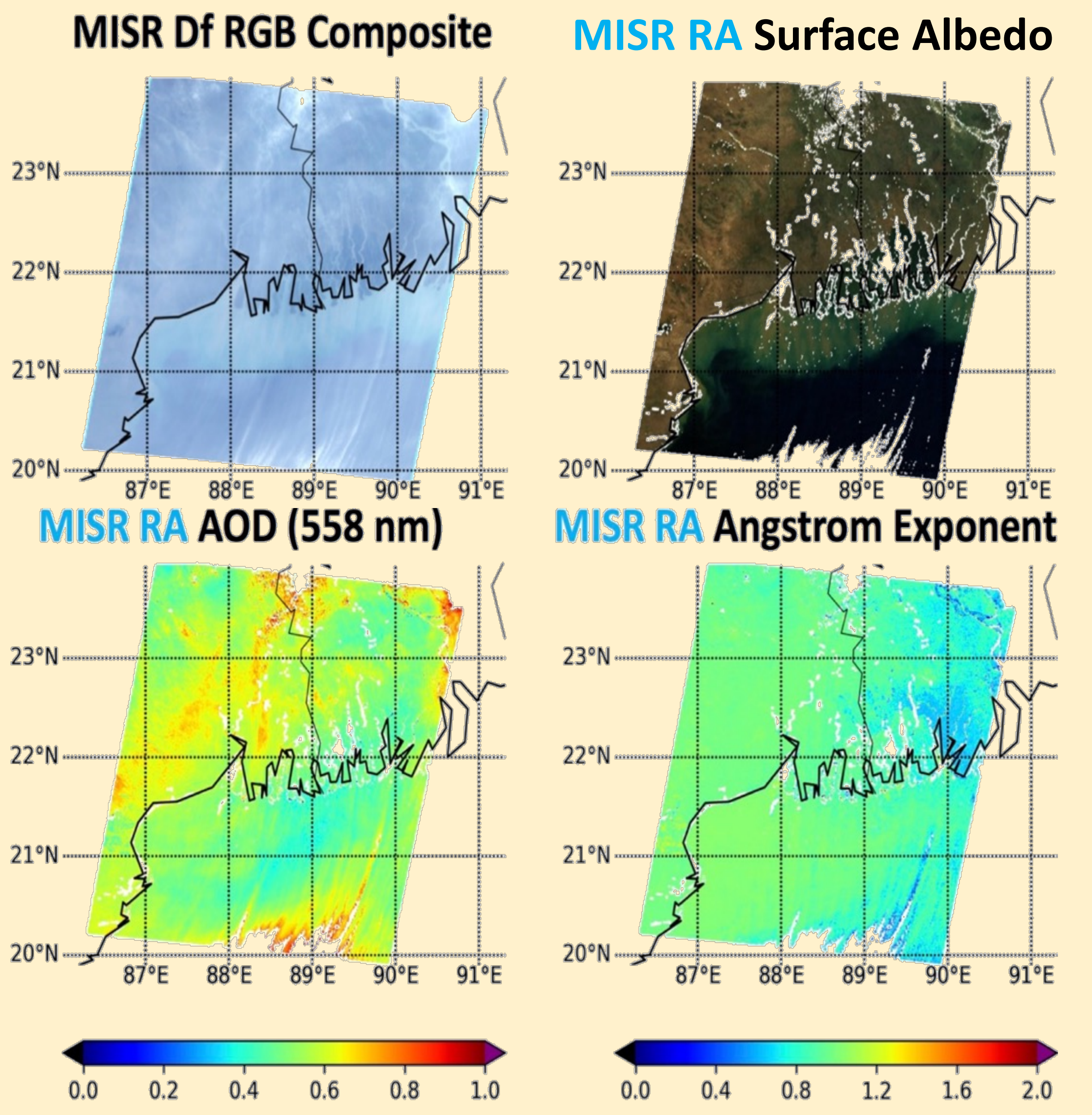
- How do YOU define a satellite-derived aerosol climatology?
- Are you using whatever MODIS data your grad student happens to find on your computer system?
- Have you thought about using MISR?
- Learn more today!

How long should the MISR record be when evaluating aerosol optical depth climatology in climate models?

A Pixel-Level Aerosol Retrieval Algorithm for Turbid, Shallow, and Eutrophic Waters

Limbacher, James

MISR RA Turbid Water



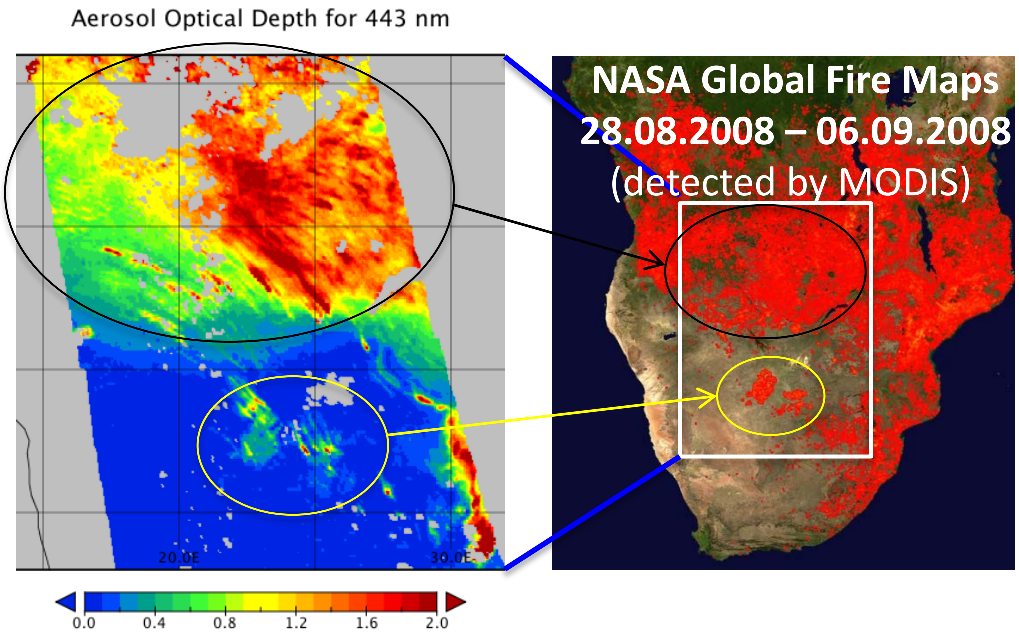
James Limbacher

New possibilities of classification and global aerosol sources identification with GRASP

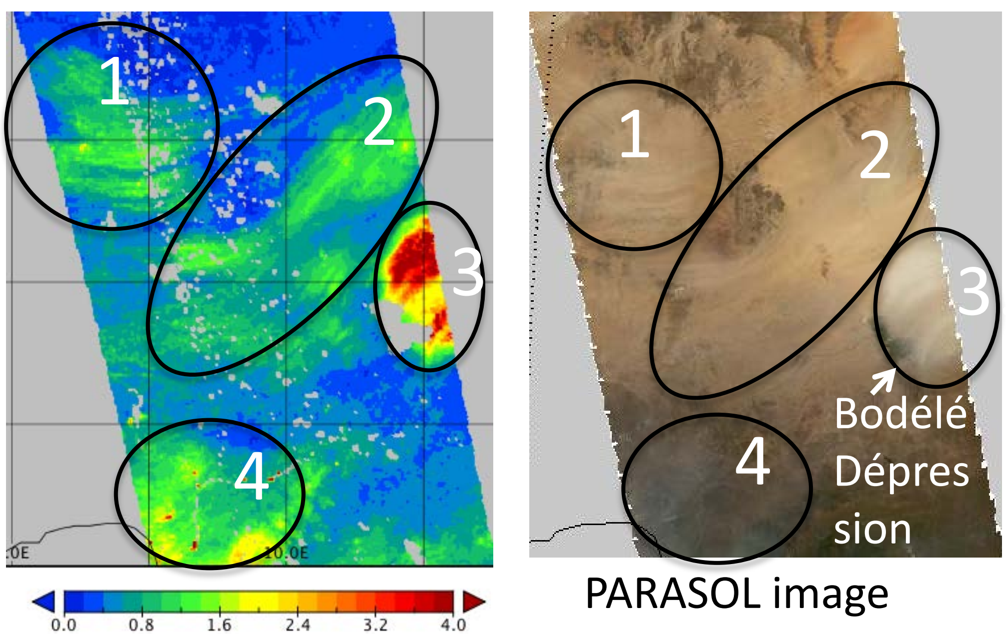
Litvinov, Pavel

Advanced surface characterization with GRASP/PARASOL

Biomass burning, Africa. 01.09.2008



Dust, Sahara, Africa. 18.02.2008



PARASOL image

- What set of aerosol parameters can be used to distinguishing different aerosol types?
- Can we see variability of physical, chemical and morphological properties **within the same aerosol type?**

Answers and discussion near the poster by P. Litvinov et al.

Evaluation of NOAA VIIRS Enterprise Aerosol Optical Depth Product

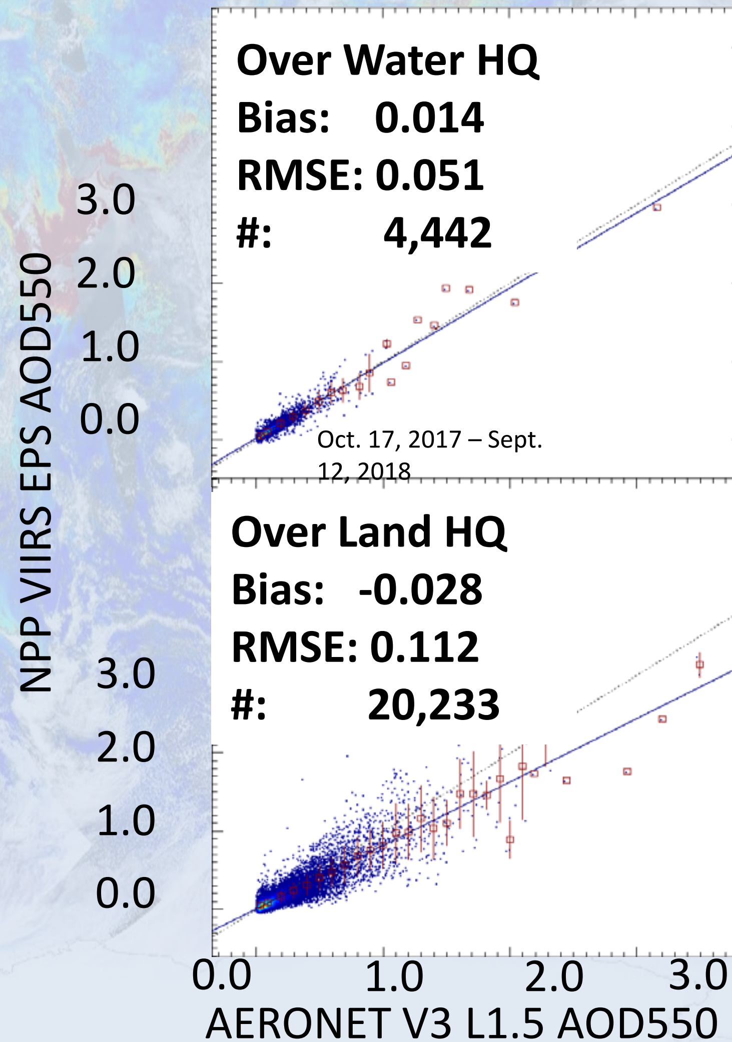
Liu, Hongqing

Evaluation of NOAA VIIRS Enterprise Aerosol Optical Depth Product

Hongqing Liu[1], Istvan Laszlo[2,3], Shobha Kondragunta[2], Lorraine Remer[4], Mi Zhou[1]

[1]I. M. Systems Group, Rockville, MD [2] Center for Satellite Applications and Research, NOAA/NESDIS, College Park, MD [3] Department of Atmospheric and Oceanic Science, University of Maryland, College Park, MD [4] Joint Center for Earth Systems Technology, UMBC, Baltimore, MD

- **NOAA operational NPP VIIRS Enterprise AOD retrieval became operational on 7/6/2017. Data are available from NOAA CLASS.**
- **Validation shows the overall bias and RMSE are 0.01/0.05 and -0.03/0.11 over water and land.**
- **NOAA20 VIIRS AOD retrieval will be operational soon.**



Aerosol properties retrieval with the CISAR algorithm applied to geostationary and polar orbiting satellite observations

Luffarelli, Marta

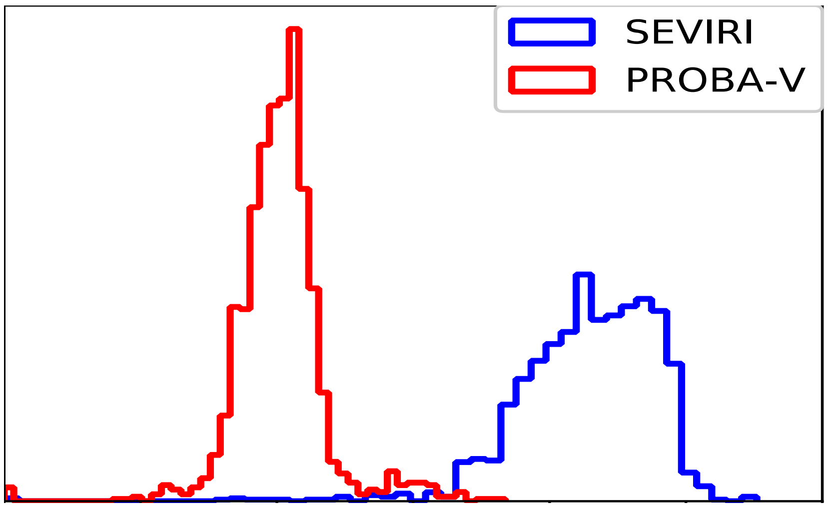
Aerosol properties retrieval with the CISAR algorithm applied to geostationary and polar orbiting satellite observations

M. Luffarelli and Y. Govaerts

- The Combined Inversion of Surface and AeRosols (CISAR) algorithm has been applied to SEVIRI (geostationary) and PROBA-V (polar orbiting) observations over 20 AERONET stations during 2015.
- The information content related to the two sets of observations is analysed through the Jacobians and the **entropy**.
- The CISAR aerosol properties retrieval is evaluated against the AERONET data.

Entropy measures the **uncertainty reduction**.

The higher the entropy, the higher the information coming from observation.



Wide field-of-view observations of aerosol and clouds from Hyper-Angular Rainbow Polarimeter (HARP) measurements

McBride, Brent

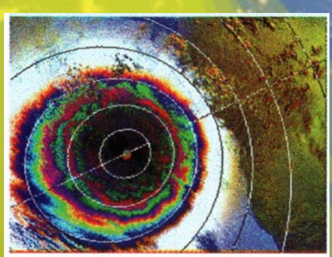
Wide field-of view observations of aerosol and clouds from Hyper-Angular Rainbow Polarimeter (HARP) measurements

B. A. McBride, J. V. Martins, H. M. J. Barbosa, R. F. Borda

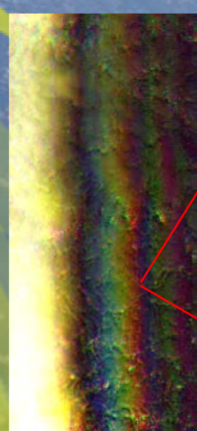
- **Accurately investigate aerosol-cloud processes, microphysics**
- **Better constrain uncertainties in aerosol-cloud climate forcings**
- **Enhance current satellite/aircraft/ground obs.**
- **AirHARP (2017-, data plots below), HARP-2 on PACE (2020s)**

HARP CubeSat Polarimeter Specs

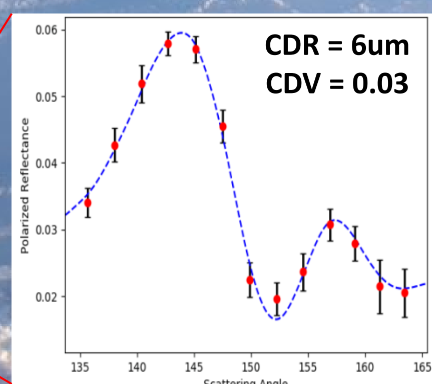
- ISS orbit, Nov. 2018 launch (est.)
- *60 angles* for cloudbows
- 20 angles for aerosols
- 440, 550, 670, 870nm
- Nadir pixel resolution 400m
- Super pixel 3x3km
- [94, 114] deg FOV [X,along]-track



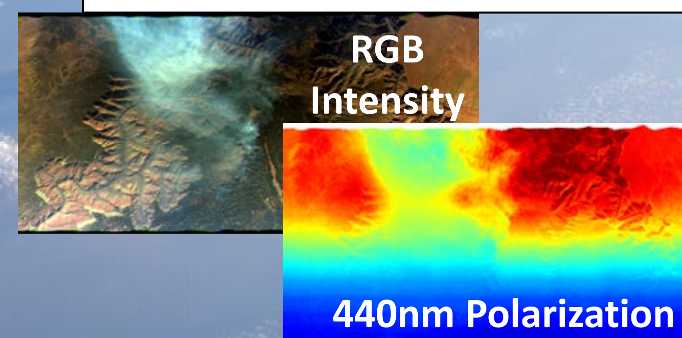
Polarized cloudbow from POLDER



HARP DOLP pushbroom(right)



<u>Single-pixel</u>, multi-angle HARP cloud retrieval



Full FOV aerosol characterization

Sensitivity study of ***mineral dust*** *impacts on global clouds and climate*

McGraw, Zachary

Sensitivity Study of Mineral Dust Impacts on Global Clouds and Climate

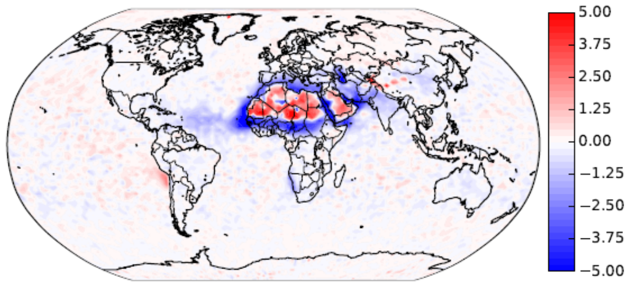
Zachary McGraw & Trude Storelvmo

Department of Geosciences
University of Oslo

UiO

University of Oslo

Total radiative forcing due to dust



Net forcing in W/m^2

- Simulating and quantifying the diverse impacts of airborne mineral dust on clouds and climate

- Focus on the indirect dust effect in cold clouds and its sensitivity to WBF efficiency

Wikimedia Commons

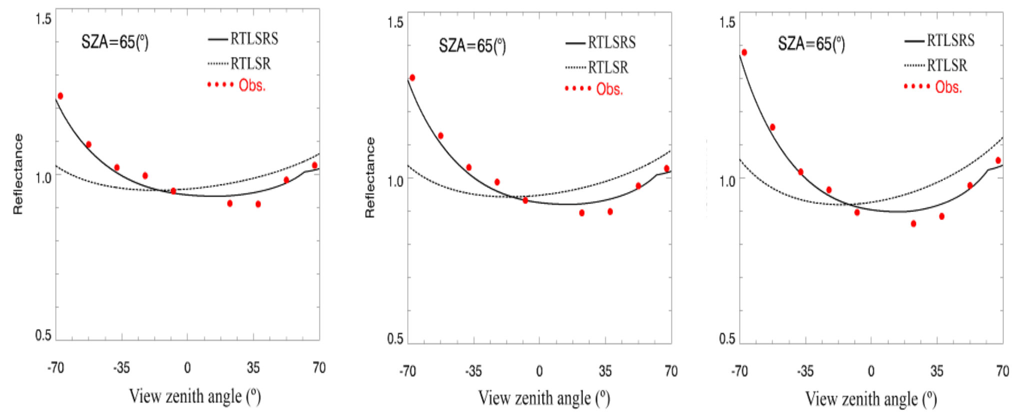
The recent progress of aerosol retrieval over the Arctic regions

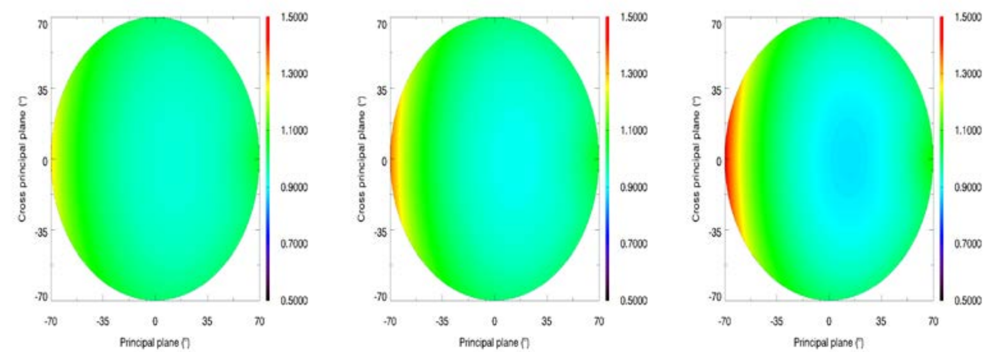
Mei, Linlu

The recent progress of aerosol retrieval over the Arctic regions

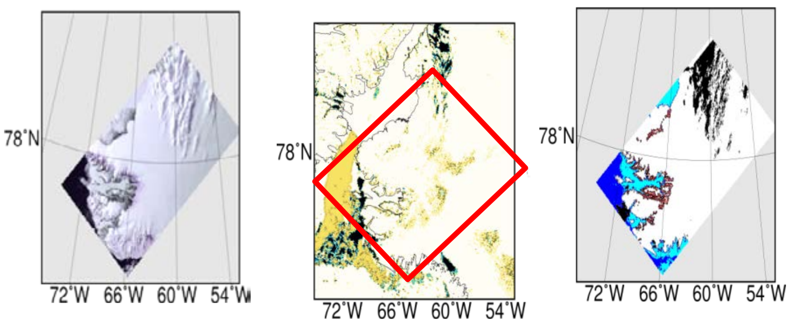
In additional to eXtensible Bremen AErosol Retrieval (XBAER)

A new snow BRDF model

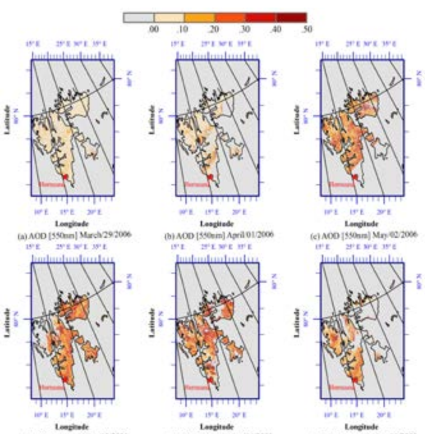


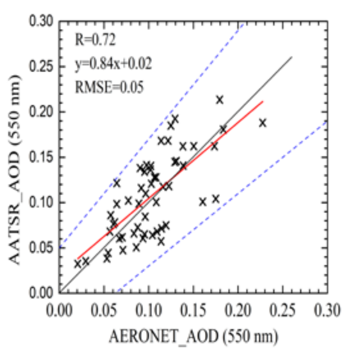


A new cloud screening algorithm over the Arctic



Arctic haze seen from satellite





Universität Bremen

Impact of natural aerosol emissions on the aerosol ERF in UK CMIP6 models

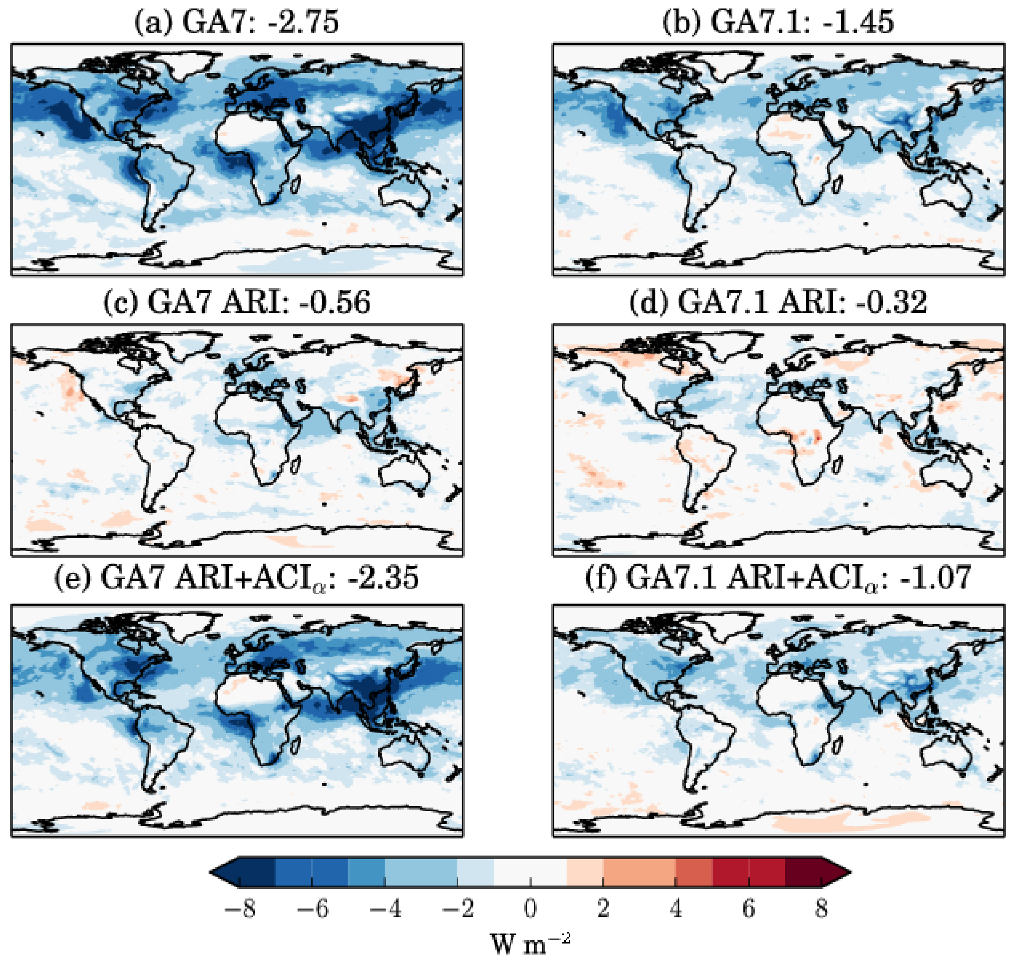
Mulcahy, Jane

Aerosol processes and effective radiative forcing in UKESM1 and HadGEM3

Jane Mulcahy et al.
Met Office Hadley Centre

- Developing UK models for CMIP6
- **Large, negative aerosol ERF**
- Unrealistic total anthropogenic forcing.
- Come visit poster to see what model developments we implemented to reduce the aerosol forcing in the UK CMIP6 models, **HadGEM3 and UKESM1**

Original aerosol ERF | **Updated aerosol ERF**



MPI-ESM1.2-HAM: Evaluation of preliminary CMIP6 simulations

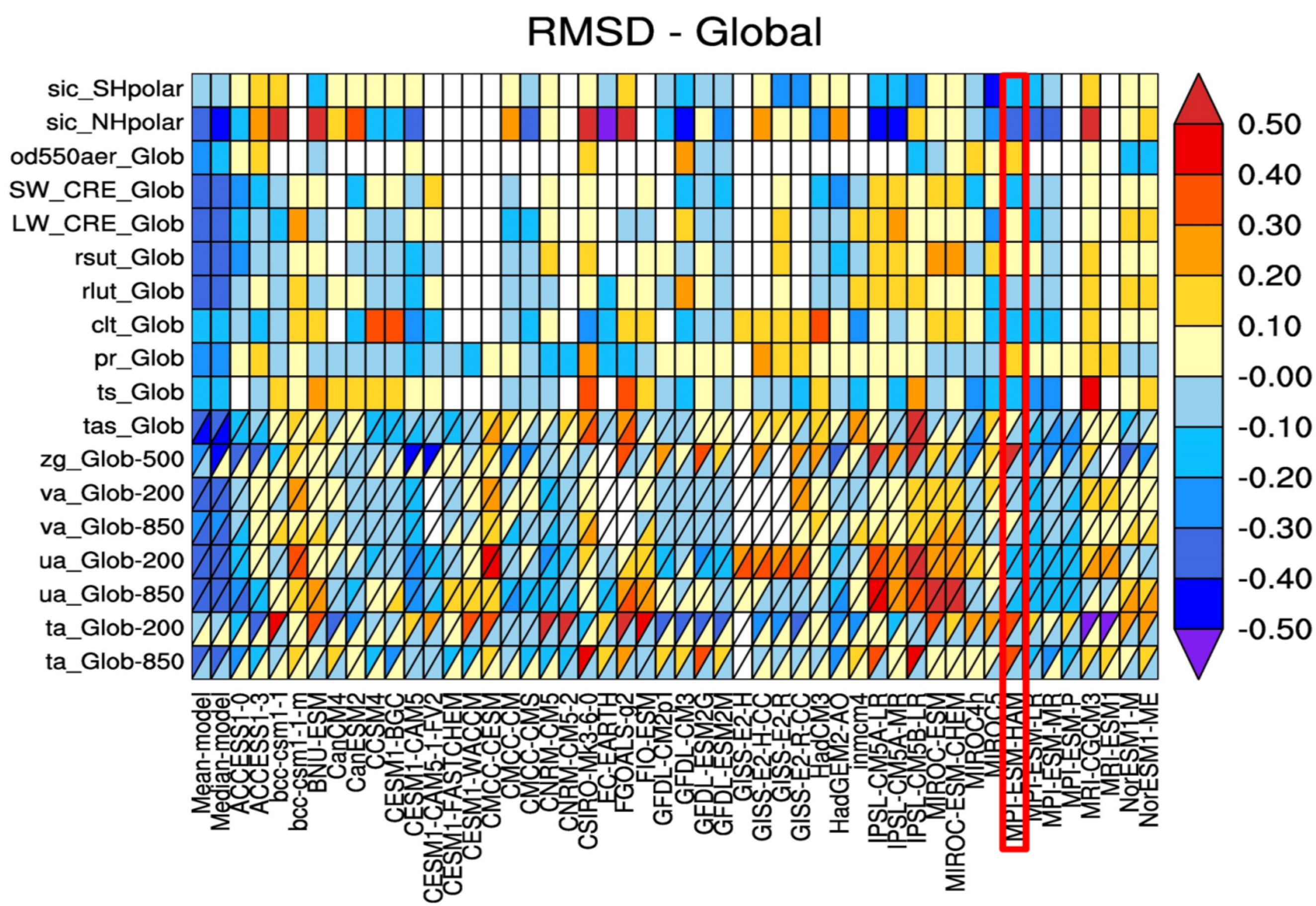
Neubauer, David

MPI-ESM1.2-HAM

Preliminary CMIP6 simulations

David Neubauer, S. Ferrachat, C. Siegenthaler-Le Drian, D. Folini, J. Stoll, U. Lohmann, I. Tegen, K.-H. Wieners, M. Bittner, H. Schmidt, S. Rast, T. Mauritsen and many more

- piControl simulation
- historical simulation
- Evaluation in terms of:
  - Temperature
  - Aerosol
  - Sea ice
  - Precipitation
  - etc.



CATS Version 3 Aerosol Products and Retrievals of Aerosol Extinction and Surface Air Quality using the NASA GEOS AGCM

Nowottnick, Ed

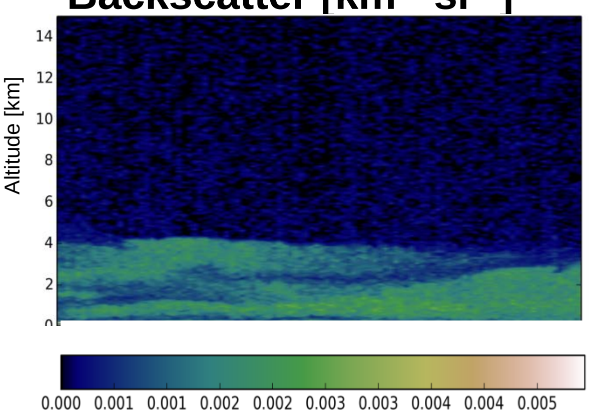
CATS Version 3 Aerosol Products and Retrievals of Aerosol Extinction and Surface Air Quality using the NASA GEOS AGCM

***E. P. Nowottnick*[1,2], *A. da Silva*[3], *J. E. Yorks*[4], *M. J. McGill*[4]**
[1]Universities Space Research Association [2]NASA GSFC Code 614
[3]NASA GSFC Code 610.1 [4]NASA GSFC Code 612

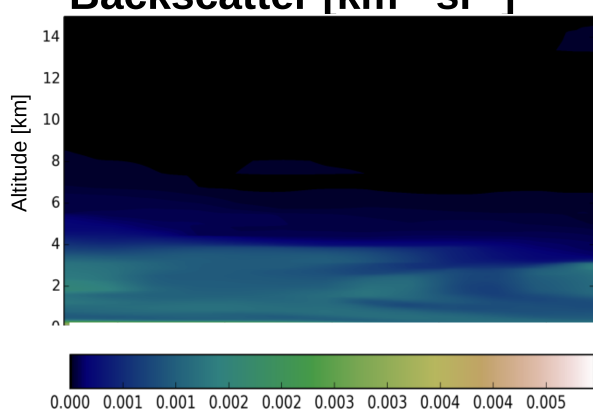
Highlights:

- The Cloud Aerosol Transport System (CATS) is a lidar that measured the vertical profiles of aerosols and clouds from the International Space Station (ISS) from February15 – October17:
  - CATS data products are similar to CALIOP, including measurements of total attenuated backscatter, depolarization ratio, aerosol/cloud discrimination, and extinction products
  - CATS final version 3 data includes improved aerosol-cloud discrimination, particularly for daytime profiles, and will be released later this year
- Using vertical profiles of total attenuated backscatter observed by CATS and simulated by the NASA Goddard Earth Observing System (GEOS) AGCM, we have developed a 1-D ensemble-based approach to retrieve speciated extinction, mass concentration, and surface $PM_{2.5}$

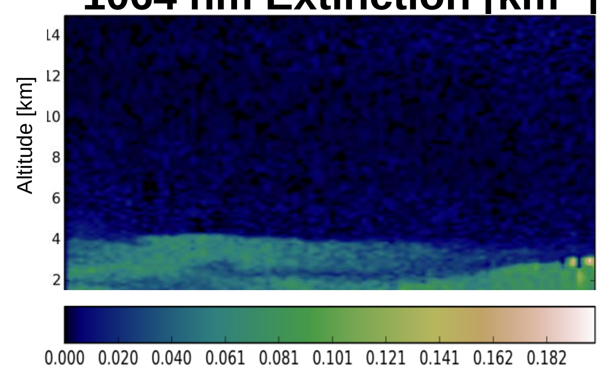
CATS
1064 nm Total Attenuated Backscatter [km^{-1} sr^{-1}]



GEOS Background
1064 nm Total Attenuated Backscatter [km^{-1} sr^{-1}]



GEOS Analysis
1064 nm Extinction [km^{-1}]



Remote sensing climatology of cirrus cloud distribution within the United States

Olayinka, Kafayat

Summary

- **Cirrus clouds** play an important role in the atmospheric energy balance and hence in the earth's climate system. The **properties** of these optically thin clouds can be determined using both active and passive instruments. In this study, a statistical study was performed on cirrus clouds properties based on multi-years cirrus **cloud measurements from both (passive and active) instrument and satellites at few ARM sites** in the tropics, mid-latitude, and polar region. Our result from MFRSR analysis shows over **40% of cirrus cloud** occurrence in observed region is within **optical depth between (1-2**). The average seasonal variation of thin COD during summer was found to have about 2 optical depths.

Multiple Global **Biomass** *Burning Emission* **Datasets**: *comparison and application in one global aerosol model*

Pan, Xiaohua

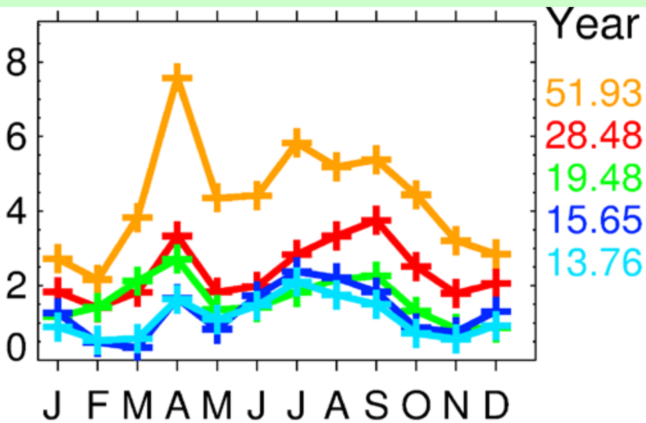
Multiple Global Biomass Burning Emission Datasets

comparison and application in one global aerosol model

Xiaohua Pan [*,1,2], Charles Ichoku [2], Mian Chin [2], Huisheng Bian [3,2], Anton Darmenov [2,], Luke Ellison [4,2], Tom Kucsera [5,2], Arlindo da Silva [2], Mariya Petrenko [1,2], Jun Wang [6], Christine Wiedinmyer [7], Tomohiro Oda[5], Ge Cui[6]

global mon OC BB Emission 2008

(unit: Tg/month)

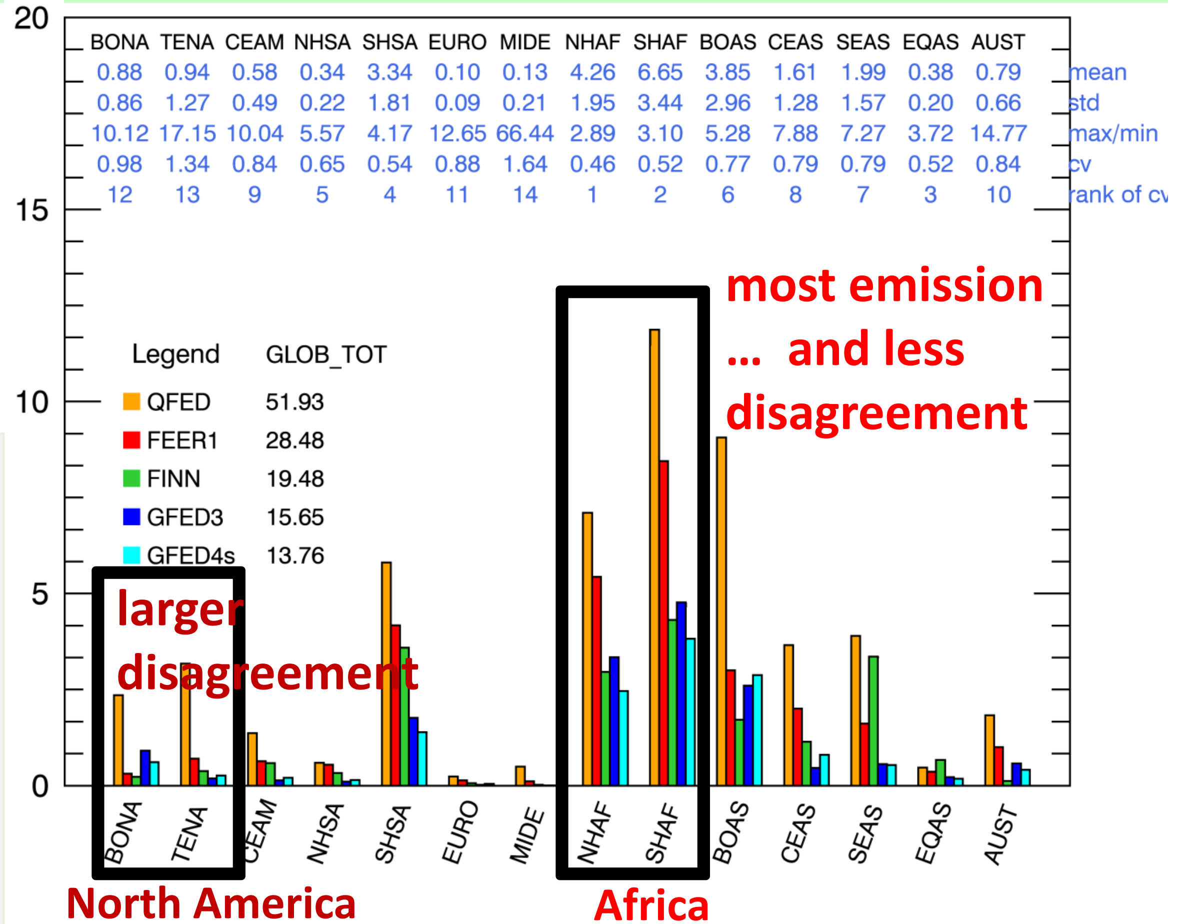


Take home messages

1. GLOB_TOT: QFED/GFED4s=3.8
2. Hot spots (SHAF, NHAF, BOAS, SHSA)
3. Top-down > bottom-up
4. Disagreement: largest in less burning regions MIDE, TENA, BONA, EURO, least in NHAF, SHAF

regional OC BB Emission 2008 – annual

(unit: Tg/year)



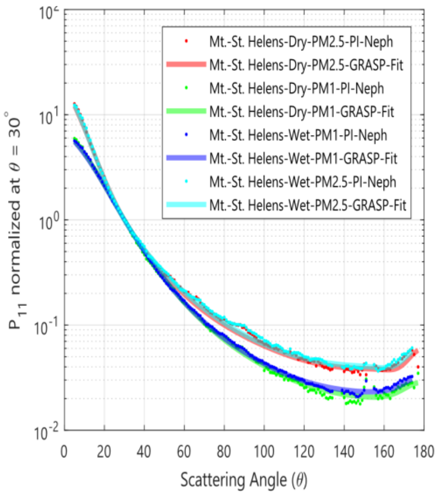
	BONA	TENA	CEAM	NHSA	SHSA	EURO	MIDE	NHAF	SHAF	BOAS	CEAS	SEAS	EQAS	AUST
mean	0.88	0.94	0.58	0.34	3.34	0.10	0.13	4.26	6.65	3.85	1.61	1.99	0.38	0.79
std	0.86	1.27	0.49	0.22	1.81	0.09	0.21	1.95	3.44	2.96	1.28	1.57	0.20	0.66
max/min	10.12	17.15	10.04	5.57	4.17	12.65	66.44	2.89	3.10	5.28	7.88	7.27	3.72	14.77
cv	0.98	1.34	0.84	0.65	0.54	0.88	1.64	0.46	0.52	0.77	0.79	0.79	0.52	0.84
rank of cv	12	13	9	5	4	11	14	1	2	6	8	7	3	10

Measurements of Microphysical and Optical Properties of ***Volcanic Ash***

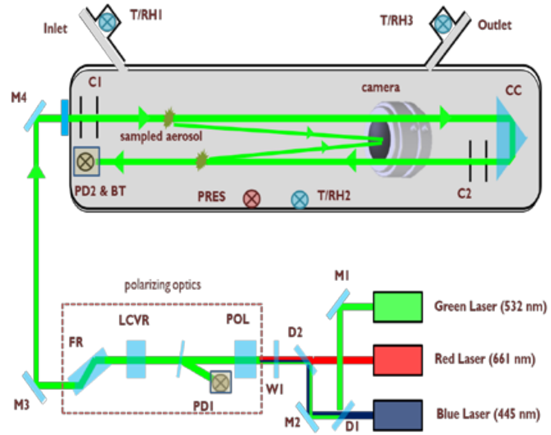
Puthukkudy, Anin

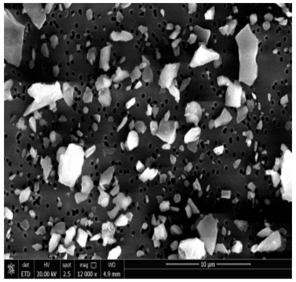
Measurements of Microphysical and Optical Properties of Volcanic Ash

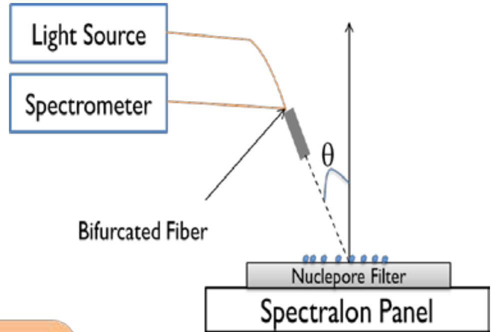
Anin Puthukkudy[a,b],
Adriana Rocha-Lima[b,c], W. Reed Espinosa[c], J. Vanderlei Martins[a,b], Lorraine A. Remer[b], Oleg Dubovik[d] and Peter Colarco[c]
a- UMBC, b- JCET, c- NASA GSFC, d- LOA

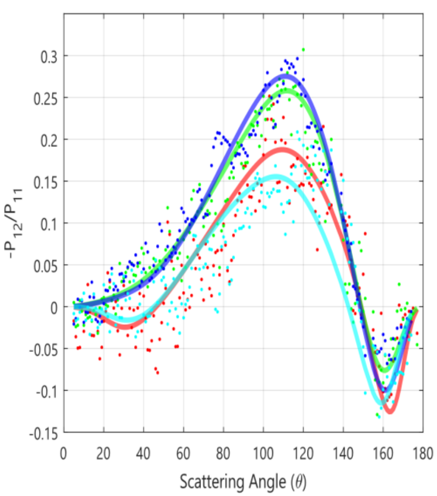


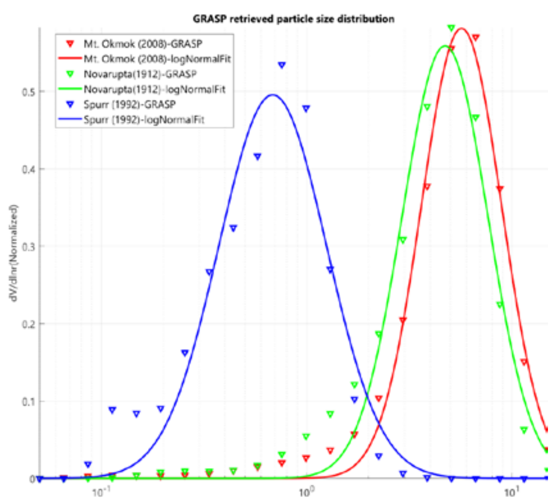
- **Polarized Imaging Nephelometer measures P_{11}, $-P_{12}/P_{11}$**
- Particle Size Distribution, Complex Refractive Index, Sphere Fraction are retrieved using GRASP
- **Mass absorption efficiency is measured using a reflectance measurement on filter(350-2500nm)**
- SEM Images are used to
- derive the shape distribution

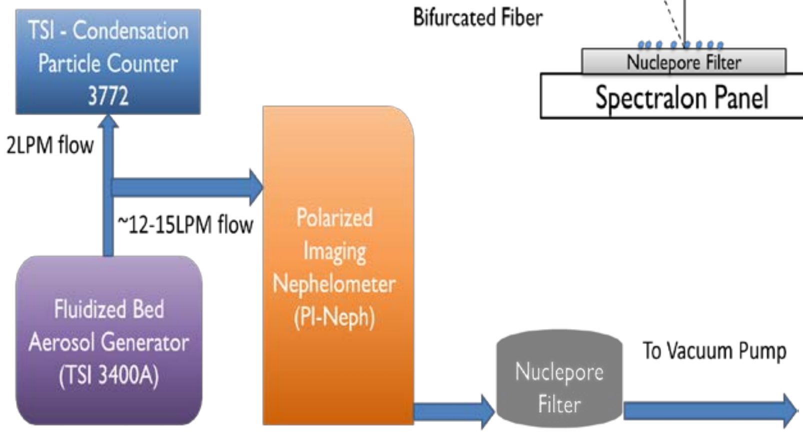












*The **PACE** mission: Focus on aerosols and clouds*

Remer, Lorraine

Plankton, AEROSOL, CLOUD, ocean Ecosystem

Ocean Color Instrument (OCI) UV to SWIR

SPEXone (hyperspectral polarimeter)

HARP2 (broad swath hyperangle polarimeter)

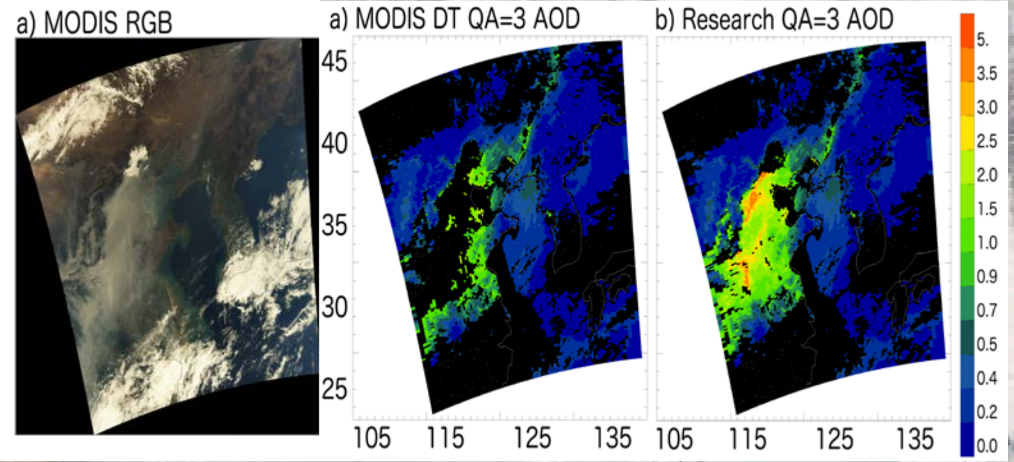
Quantifying the Haze Aerosol Optical Depth Over East Asia Using Modified Modis Dark Target Algorithm

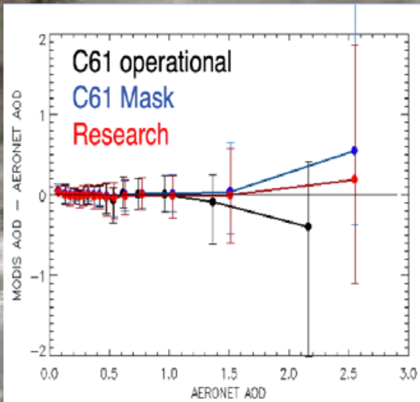
Shi, Yingxi

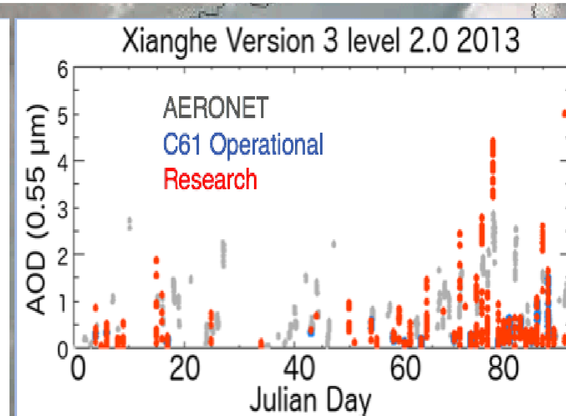
Quantifying the Haze Aerosol Optical Depth Over East Asia Using Modified MODIS Dark Target Algorithm

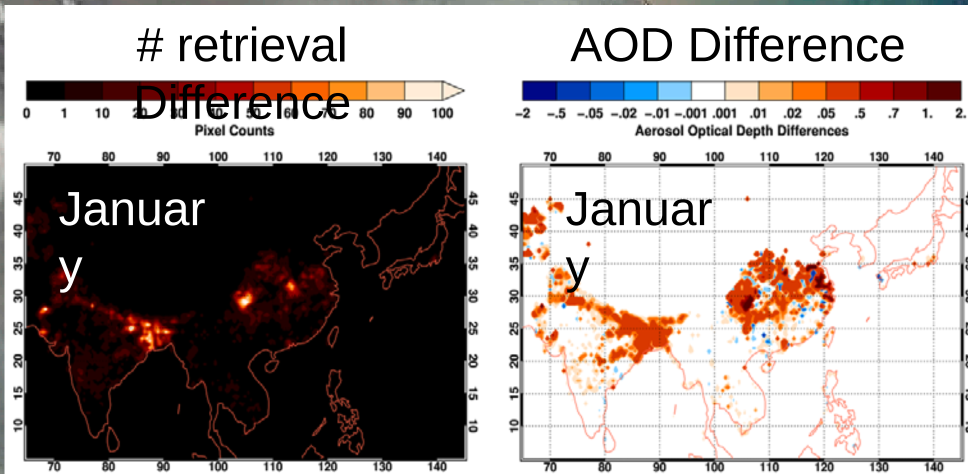
Yingxi Shi, Robert Levy, Leiku Yang, Lorraine Remer, and Shana Mattoo

- Problem of missing AOD retrievals in MODIS DT product over East Asia, particularly over **Northeastern China during winter to spring** time, is identified and analyzed.
- Sensitivity study has been done on **the inland water mask,** which is the main cause of missing retrievals over this region. Combined with reflectance at 2.1 micron, a relaxed inland water mask brings back many retrievals, especially during high aerosol loading.
- A regional aerosol model is created over China, which shows **stronger AOD dependency** when compared **with the non-absorbing model** used in the operational algorithm. The regional model helps reducing the high bias when AOD > 1.5.
- Preliminary research AOD product targeting East Asia is developed for 2013. These extra high AOD retrievals change the aerosol regional climatology and influence the downstream aerosol studies.





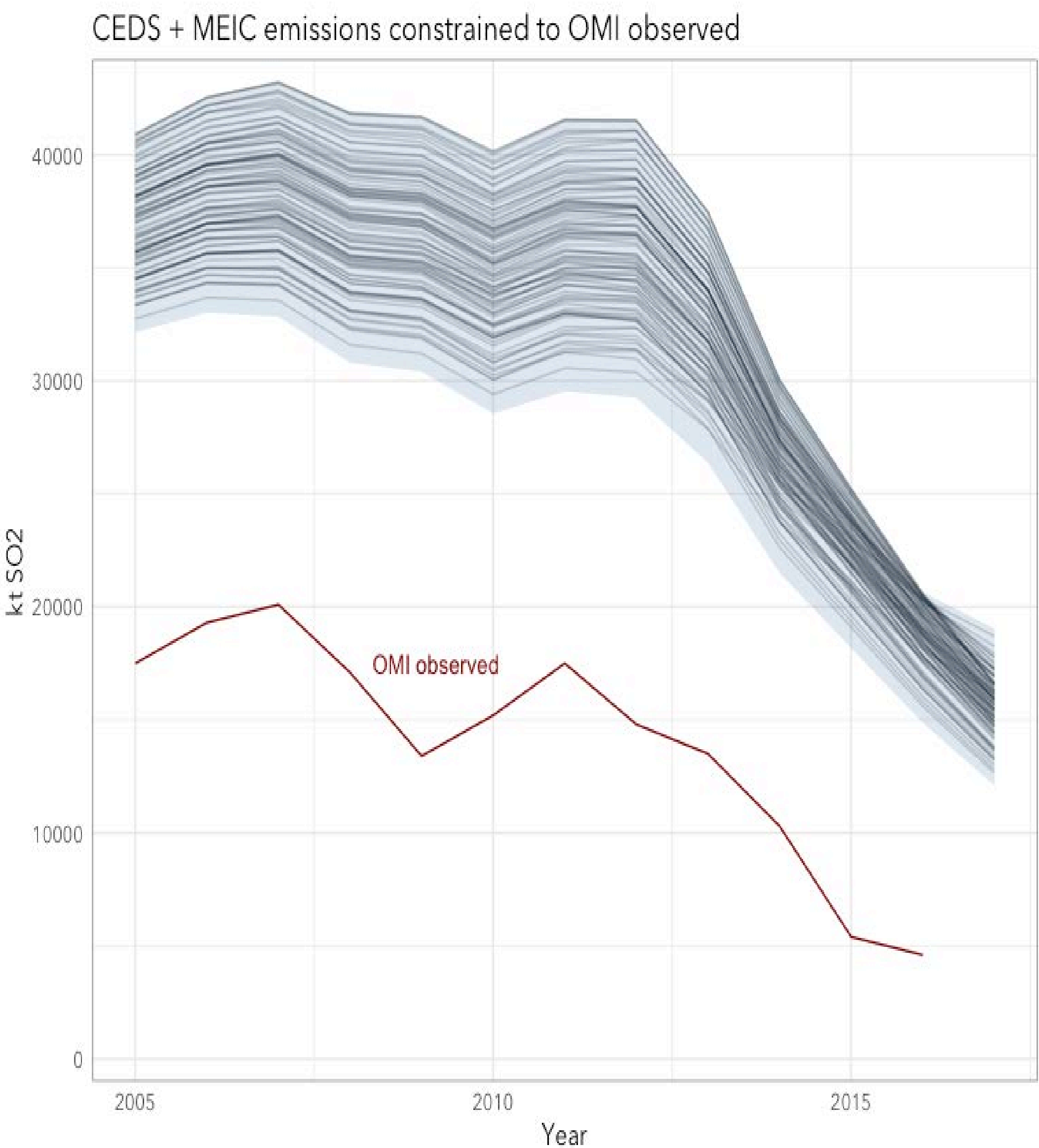




Impact of SO2 Injection Height On Satellite Inferences of Emission Trends

Smith, Steve

Impact of Uncertainty Satellite Detection Rates for Emission Trend Inferences



Satellite retrievals only see a uncertain fraction of atmospheric concentrations.

Using China SO_2 emissions as an example, **we examine how sector-based uncertainty in the detection fraction interacts with changing sectoral composition.** We find:

- **Satellite retrievals can, indeed, constrain total emission trends.**
- However, **total SO_2 emission trends in China do not follow OMI trends**

  OMI 2011-2016: 75% decline

  Total SO2 2011-2016: 30-50% decline

- This effect is likely to also impact other species.

OMPS LP observations of the Asian tropopause aerosol layer

Taha, Ghassan

Stratospheric Injection of Massive Smoke Plume from Canadian Boreal Fires in 2017 as seen by DSCOVR-EPIC, CALIOP and OMPS-LP Observations

Torres, Omar

Satellite Observations of Stratospheric Injection of Carbonaceous Aerosols from Boreal Forest Fires

O. Torres, P.K. Bhartia, G. Taha, C. Ahn, and H. Jethva
NASA Goddard Space Flight Center

Unprecendented amounts of carbon-containing aerosols from wild fires in Canada were injected to the stratosphere on August 13, 2017.

This poster documents observations of this event by the DSCOVR-EPIC, CALIPSO-CALIOP and MPS Limb Profiler.

Aerosol optical depth as large as 6 were simultaneously measured by EPIC and AERONET sun-photometers over a few days after the aerosol intrusion.

The aerosol plume dilution and spread in the stratosphere was observed by the OMPS LP Instrument.

The resulting stratospheric aerosol layer covered the NH poleward of about 25°N.

The stratospheric carbonaceous aerosol layer spread vertically up to about 24 km.

***MAPIR** version 4 dust 3D retrievals from IASI: improved algorithm, validation and applications*

Vandenbussche, Sophie

MAPIR version 4 dust 3D retrievals from IASI

Improved algorithm, validation, applications

S. Vandenbussche, S. Callewaert, N. Kumps, M. De Mazière

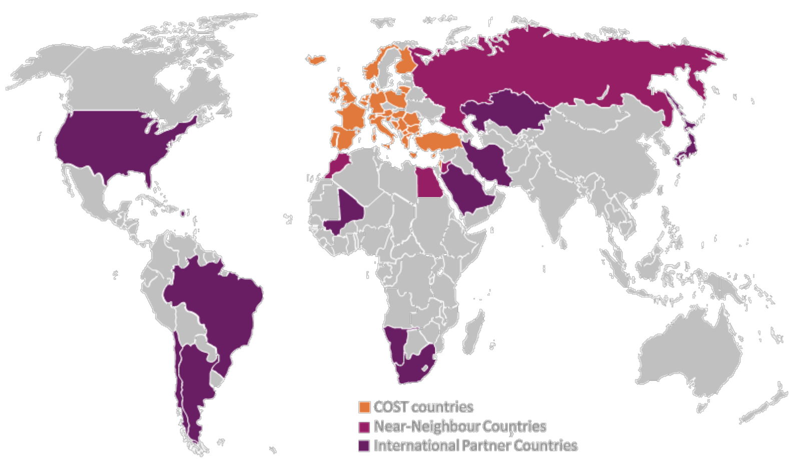
Royal Belgian Institute for Space Aeronomy

MAPIR version 3.5		MAPIR version 4.1
Lidort v2.7	RT	RTTOV v12
Optimal Estimation	Retrieval	OE + Levenberg Marquardt, log([aer])
6 levels 1:1:6km (+ Ts)	State vector	7 layers centered at 0.5:1:6.5km (+ Ts)
AOD overestimation, "noisy", bad Jacobians if low surface emissivity	Known issues	Dependence with T and H2O profiles quality (EUMETSAT IASI l2 data)

inDust
COST Action CA16202

International Network to Encourage the Use of Monitoring and Forecasting **Dust** Products

- Sand and Dust Storms (SDS) play a significant role in different aspects of weather, climate and atmospheric chemistry and represent a serious hazard for life, health, property, environment and economy.
- **InDust** searches to establish a network (involving research institutions, service providers and potential end users) that promote the development of dust services.



- WG1 Dust observations
- WG2 Dust modelling and forecast
- WG3 Assessment of user and societal benefits
- WG4 Transfer of dust products to user-oriented application and service value

www.cost-indust.eu

cost
EUROPEAN COOPERATION IN SCIENCE & TECHNOLOGY

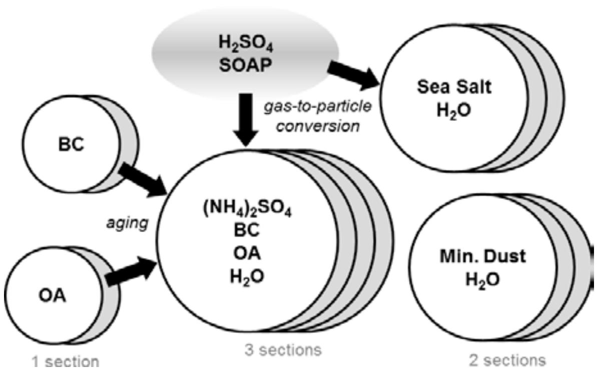
Validation of PAM on Regional and Global Scales

Von Salzen, Knut

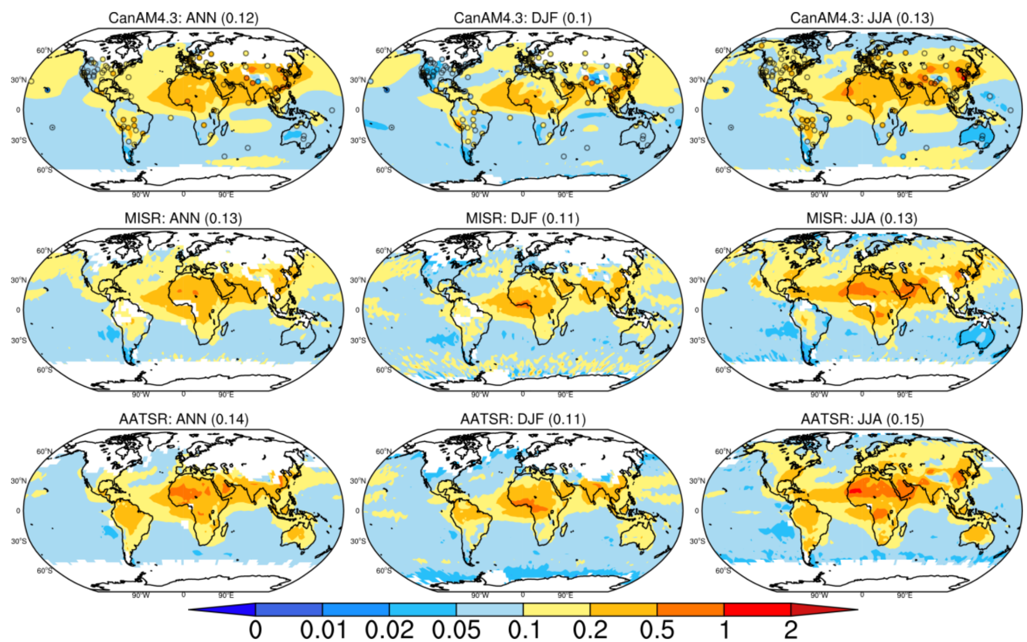
Validation of PAM on Regional and Global Scales

K. von Salzen[1,2], R. Mahmood[2], C. Whaley[1], Y. Peng[3], M. Wang[3], W. R. Leaitch[1], L. Huang[1], S. Sharma[1]
[1]Climate Research Division, Science & Technology Branch, Environment and Climate Change Canada, Canada
[2]School of Earth and Ocean Sciences, University of Victoria, Victoria, Canada
[3]Department of Earth System Science, Tsinghua University, Beijing, China

Aerosol species in the PLA aerosol model (PAM)



Mean Aerosol Optical Depth (AOD) in PAM (top panel) and satellite retrievals (MISR, middle; AATSR, bottom)



Environment and Climate Change Canada

Environnement et Changement climatique Canada

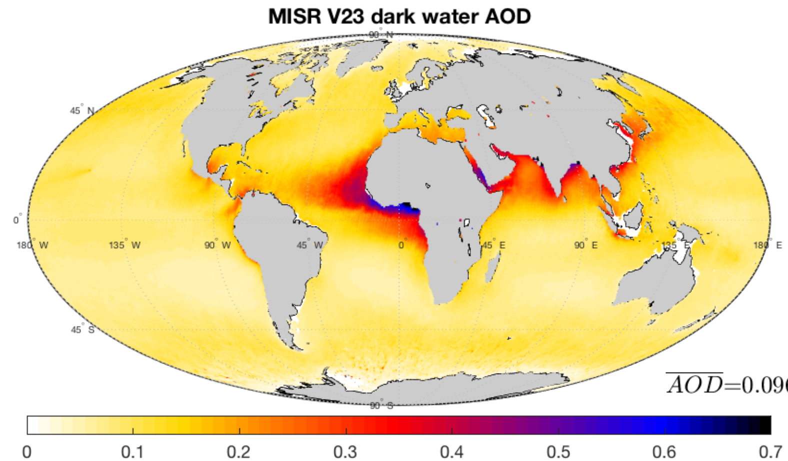
NETCARE

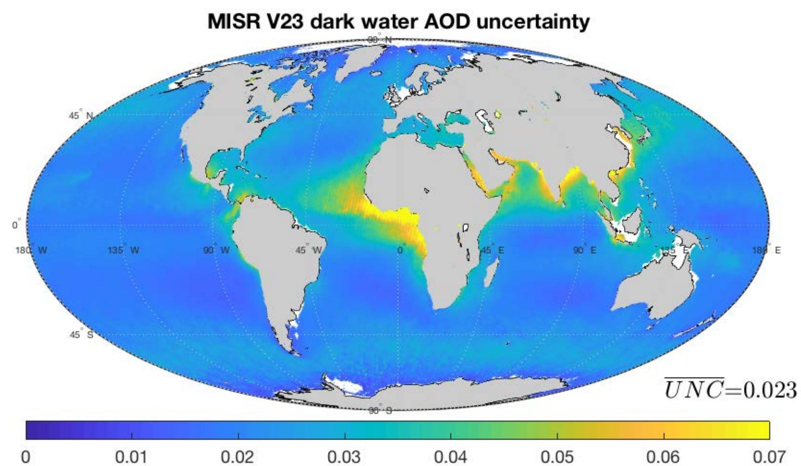
how to get pixel-level uncertainties from satellite aerosol retrievals with

MISR v23

Witek, Marcin

Let's figure out how to get pixel-level uncertainties from satellite aerosol retrievals!





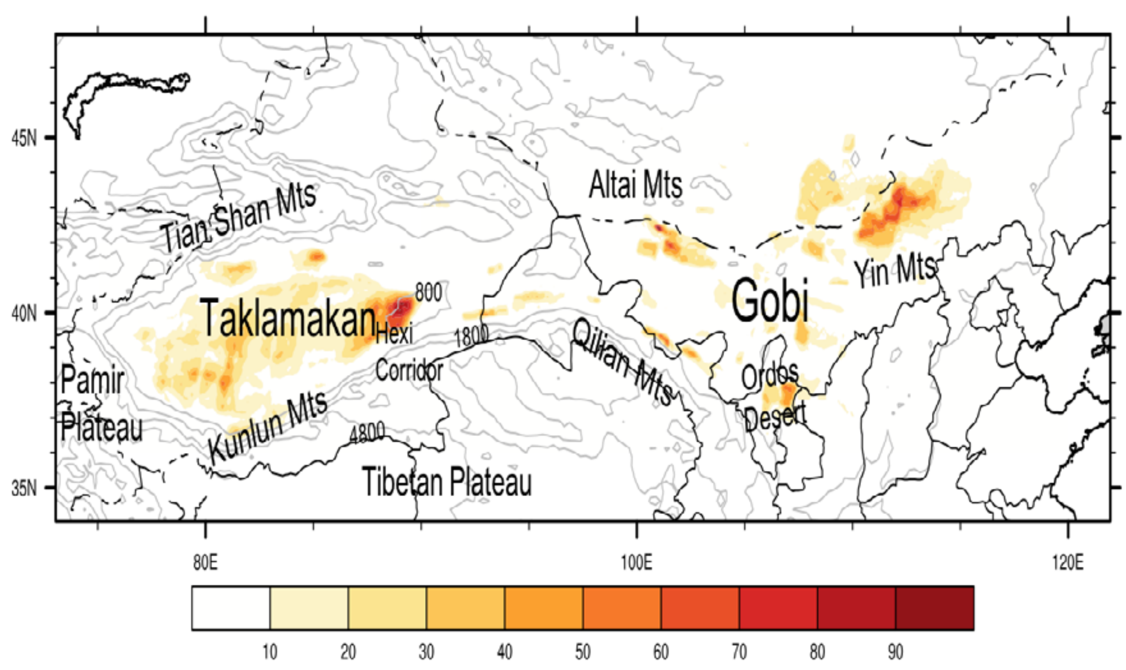
*Is **Bodélé** depression the dominant source of North African dust transported to the Americas? Insights from **MISR** observations and trajectory modeling*

Yu, Yan

Climatology in Asian dust activation and transport based on MISR satellite observations and trajectory analysis

Yan Yu *(UCLA), O Kalashnikova (JPL), M. Garay (JPL), and M. Notaro (UW-Madison)*

Asian dust has been reported to reach remote destinations through trans-Pacific transport. However, the relative contribution of different sources remains unaddressed in observations. Here, the climatology of Asian dust activation and transport is investigated using stereo observations of dust sources from MISR combined with observation-initiated trajectory modeling.



Spatial distribution of dust plume detection frequency (%sample maximum) according to MISR MINX. Grey contours indicate surface elevation (m) from the MISR Digital Elevation Model.

Towards satellite inference of the decoupling degree and cloud-base ***updrafts*** *of marine* ***stratocumulus*** *and application to aerosol-cloud interactions*

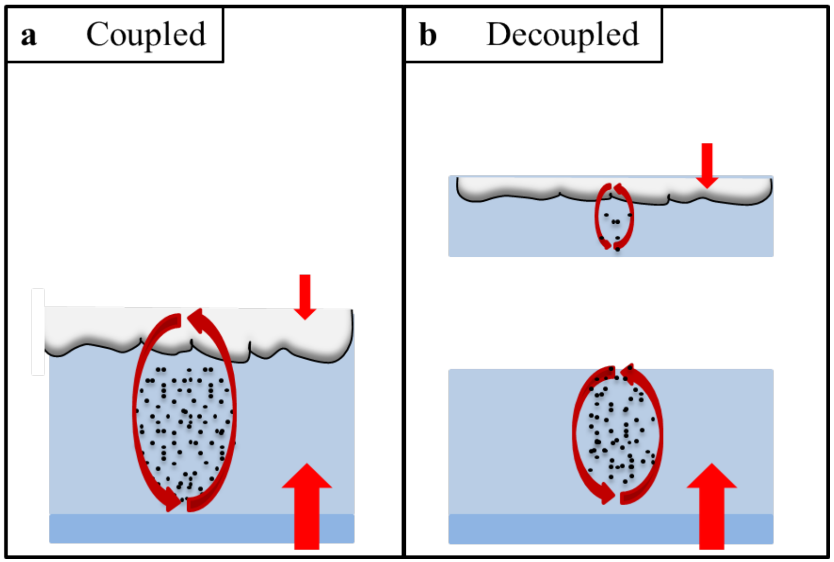
Zheng, Youtong

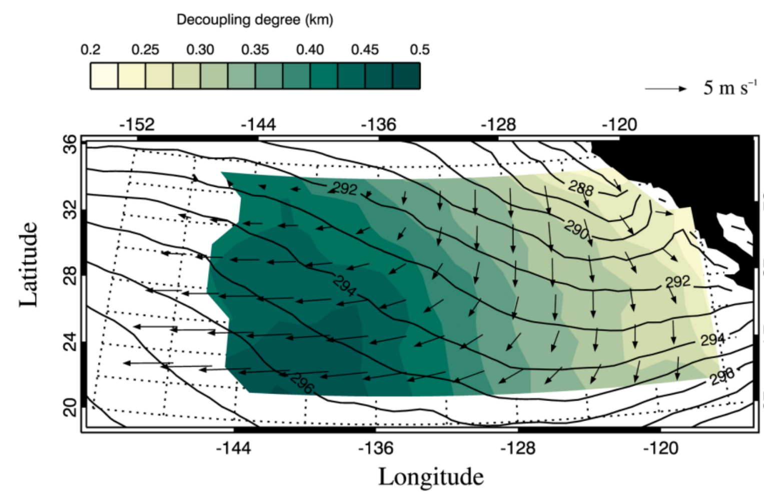
Satellite inference of the decoupling degree of marine stratocumulus

Y. Zheng, **D. Rosenfeld, and Z. Li,** **University of Maryland**

Motivation: ***cloud-surface coupling*** modulates aerosol-cloud interactions

Results: a novel method of satellite retrieval of decoupling degree of stratocumulus are developed





Climatology of GOES-retrieved decoupling degree over Northeast Pacific

Zheng, Y., Rosenfeld, D., & Li, Z. (2018). Estimating the decoupling degree of subtropical marine stratocumulus decks from satellite. *Geophysical Research Letters*.

*Implementing **Non-Spherical** Dust Aerosol Model in the MODIS Dark Target Aerosol Retrieval Algorithm Over Ocean*

Zhou, Yaping

Retrieving dust aerosols within the Dark-Target algorithm over ocean

Yaping Zhou[1,2], Robert Levy[1] Shana Mattoo[1,3], Lorraine Remer, W. Reed Espinsa[1]
[1]NASA Goddard Space Flight Center, [2]GESTAR/Morgan State Univ, [3]SSAI

MODIS Dark Target (DT) aerosol retrieval assumes *spherical* aerosol models, which leads to bias in retrievals of AOD and AE.

Our strategy is to first identify dust and then apply non-spherical dust models for identified dusty pixels.

Dust detection uses deep blue (R0.41um), NIR (2.1um) and TIR (8.7um, 11um) channels.

Optical properties of non-spherical dust models are computed and compared from Texas A&M scattering database and GRASP model. A spheroid dust model is chosen to represent dust ensembles and LUT entries are computed with the Ahmad and Fraser (AF82) RT under DT framework.

Dust detection and retrievals are evaluated with MODIS granules and MODIS-AERONET/MAN collocated dusty pixels. Results show major improvement of AE and slight improvement of AOD.