6th AeroSAT workshop

October 18 - 19, 2018, College Park, MD

Minutes

Agenda

All presentation slides will become available at http://www.aero-sat.org/aero-sat-meeting-6.html

AEROCOM / AEROSAT 2018

AEROSAT minutes

SESSION 9 Introduction

rapporteur: ***E. Nowottnick***

Introduction / AEROSAT status + achievements by T. Popp / R. Kahn

- Promote the use of satellite data
- Data users/providers – motivate new activities
- AEROSAT unfunded
- Challenges:
  - Consistent, Global, 3-D Aerosol amount and type
  - Quantitative and credible uncertainty estimates
  - Satellite data to validate/constrain models
  - Models and suborbital data to supplement modeled quantities
  - Constrain aerosol type
- Internal Retrieval Expert Discussions
  - Principles, consistent definitions, strengths/limitations
  - Constraining aerosol type w/satellite data
  - Getting pixel level uncertainties
  - Long-term data records
- Have seen major advances in assigning pixel level uncertainties
- Also, satellite constraints on biomass burning injection height and source strength
- In 2015, put together list of data records – tables need updating
- Also 2015 List of papers that intercompare satellite AOD – needs updating
- Aerosol Typing –
  - 21 aerosol typing procedures included in review
  - 15 classify particles in source classes (i.e., chemical composition) using an interpretive scheme
  - 6 use optical observables, allowing subsequent compositional inferences
  - Nomenclature is very heterogeneous
  - Optical constraints vs. compositional inferences
- Useful validation methods
  - Inverse goodness of fit
  - Compliance w/uncertainty estimates
  - Error stats as f(AOD)
  - Fraction of pixels within error envelope
- Continue presentation and discussion of strengths and limitations
  - AeroSat Experiment Task Groups are devoted activities

    - AEROSAT workshop has focus on discussion rather than formal presentations
- Validation of aerosol type
    - Progress on translation between satellite and modeling worlds
- Air quality – a new topic for many satellite aerosol groups
    - Challenges include the need to derive near-surface from column-integrated or column-effective quantities, such as AOD or aerosol type
    - Also, the air quality community is used to working with detailed, species-specific aerosol properties rather than qualitative aerosol "type."

SESSION 10 Data and modelling

chair: ***N. Schutgens*** */ rapporteur:* ***E. Nowottnick***

Intro from Nick Schutgens

- "Data" and "modeling" changed to "observations O" and "models M" (suggests a fundamental difference between the two)
- What is the fundamental difference between observations and models?
- Parker argued no fundamental difference – Hoffman refuted –mention aerosol data
- Both are approximations of the truth
- M – O
    - Data need collection – What data do we need?
    - Observations have errors: O+e – How best to communicate them?
    - Models need to simulate observations: M+e (mass to optical – species-specific Mass Extinction Efficiencies (MEEs)) – What do we ignore?
    - Spatio-temporal sampling issues – Case dependent
    - Need tools to compare M and O – What is available (operational/exploration)?
    - How to interpret M-O? – Do we have the required techniques?
    - Case studies vs. statistical studies should be included

Pete Colarco: reflections on modeling needs / integration model + satellite

- Satellite observations provide a constraint on AOD - Kinne 2006
- But, how they get there remains unconstrained
    - Fractional contributions from different types
    - And, processes impact this (lifetimes, MEE). Uncertainties in these quantities remain large, so that we have residual uncertainty in forcing
- Loeb and Su – RT calculations where asserted quantities w/perturbation needed to calculate the DARF and uncertainty
    - Biggest error bar was SSA (absorption)

- Randles – MERRA-2 global monthly mean AOD and fractional contributions
    - Showed impact of assimilation on speciation – suppressing other aerosol types during Pinatubo
- Modified the figure to include MERRA-2 GMI – the difference is no data assimilation – can do just about as good as MERRA-2 reanalysis
- ICAP – focused more on NRT predictions
    - Multi-model ensemble is most skilled
- "5 things modelers want":
    - Depends on application
        - forecasts/data assimilation – high frequency, low latency,
        - Reanalysis – consistent, harmonized records
- Instrument simulation as a means to harmonize models and observations
- OSSEs – detailed radiative transfer calculations from model – VLIDORT
- Observation Simulation to Interrogate algorithms
    - Model doesn't have to be perfect, just realistic enough
    - OMAERUV paper
- Observations from remote sensing provide enormous quantities of information to constrain models, but some things remain challenging
- How models hit target AOD is unconstrained
- Development of capabilities help design the next instruments (OSSEs)

<u>Questions</u>

- Q – Pixel level uncertainties – How would you use? Want to know highest quality data – for data assimilation is used formally, and also useful for screening
- Q – Showed Cynthia & Luke's plots – Not much value of data assimilation – since the model is consistent, why should we bother with assimilation?
    - Need a well-tuned model to begin with
    - Have a pretty good model, assimilation is seasoning for reanalysis – for forecast, data assimilation is important
- Q – what is the role of in situ observations for resolving uncertainties – help to constrain microphysical props (especially spectral SSA, non-spherical particles), mass extinction efficiency (MEE), hygroscopic growth – that's part of making the retrieval algorithm forward model better
    - Significant or marginal? – significant, need the translation from mass of particles (MEE) and their physics to optical properties, also hygroscopicity for aerosol-cloud interactions and interpretation of ambient AOD.
- Q – Data assimilation – when doing AOD assimilation – is there a record of the analysis post-assimilation in the analysis?

- Q – Unknown unknowns – things you know you are not simulating in the model and things we know we are not seeing in the model – is there a hunch of something that we are missing? Have learned a lot when digging into the algorithms - have to do the exercise to hone in
- Q – In MERRA-2 reanalysis – only total AOD was assimilated
    - ECMWF assimilated fine mode fraction and made analysis worse
- C – Data assimilation – numerical weather simulation found it better to assimilate radiances rather than quantities such as temperature. Aerosol Index is better than AOD for this application, because it is closer to the radiances.
    - Aerosol problems are more complex compared to meteorological quantities – computationally expensive
    - Long way from radiance simulations
- The *in situ* measurements – absorption is important, uncertainty in AERONET is larger than what you need to constrain radiative forcing. Also, if you assimilate radiances, you still need to make assumptions to go back to mass (e.g., MEE).
    - Tradeoff – discussion needed – can go either way
- C – ECMWF has a control simulation w/assimilation and are evaluating it – the assimilation model loses 30% of mass in 3 days – would be nice to document control/assimilation impacts within a model – tells you something what goes wrong with model

<u>Discussion</u>

- Beyond these topics – is there something that should be added?
    - "I would like to hear the relationship between case studies looking at mechanisms and statistical studies and how those two different ways plays out"
    - Case studies are a way to get at unknown – unknowns and can provide input to statistical study design and interpretation.
- Similar uncertainties of i*n situ* in remote sensing – would they be included along with radiances/retrievals in assimilation
    - From the perspective of mashing models and observations – *in situ* might be too much detail
    - *In situ* measurements can target different things – fill in gaps from remote sensing (see Session 10 discussion)
    - Given observations have errors, what is the best way to communicate them?
        - Pixel level uncertainties won't be as important for monthly/seasonal means
    - Is there a standard for reporting in situ errors?
        - Getting towards a standard – want modeling community to come back and say "this is what we use and need"

- AtOM was trying to do a survey of background atmosphere – weren't chasing phenomena – an *in situ* experiment systematically sampling the atmosphere –
  - If fly systematically the same track for multiple weeks, would be a more systematic approach
  - ex. CARIBIC on Lufthansa
- Modeler needs output on gridded level – creates difficultly for evaluating case studies – can use satellite L2B gridded products to validate models – matched on a very fine grid and can give pixel uncertainty – pixel level gridded
  - Not regularly available – usually just L2 regular and L3
  - Talking about tools and spatio-temporal sampling
  - Case studies are more useful for constraining model processes and parameterizations
- Pete – for OMI study, sub-sampled model to OMI prior to performing calculation
- *In situ* – how to manage high spatio-temporal resolution
- With sufficient averaging and care, you can minimize sampling biases
- If model is very bad – sampling doesn't matter
- L2B, a difficulty is you end up with a very big, sparse grid. If you do tool-based interpolation, saves disc space
- Like discussion of tools – how do the different tools compare, what are their purposes, and how do they handle uncertainties
  - List on AeroCom wiki for available tools – put in questionnaire
- Uncertainties – people focus on using an error bar, other thing I need is uncertainties on spatial and temporal scales (e.g. vertical structure)
- In Europe there is a tool to evaluate the propagation of errors from L1 to L2 – work in progress on this
- Need tools to compare models and observations that account for different spatio-temporal sampling between models and observations
- Know AOD is sensitive to relative humidity, etc., never are truly cloud free in a model box – what is the best way to compare gridded observations to model? **Models need to simulate observations and how do they do that?**
- How much effort do we really put into an observation to understand what goes into it?
  - L3 uncertainty – how to quantify – need an estimate of spatio-temporal correlation lengths for aerosols at all times
    - Difficulty – need to put ballpark numbers in and hard to get those ballpark numbers
  - Can use high resolution GEOS to estimate those numbers - need to evaluate how realistic these correlation lengths – once have them, trivial to L3

- L2B can provide cloud cover on a pixel level – useful for modelers to weight accordingly
- Is it easier for retrieval people to use different products?
  - Is there a community tool to simulate observations from models?

SESSION 12 Working group on climate records

chair: ***O. Torres*** */ rapporteur:* ***M. Luffarelli***

Larisa Sogacheva: M*erging aerosol optical depth from multiple satellite missions*

showed comparisons of regional AOD monthly mean time records of many satellite datasets (one AEROSAT experiment)

Hiren Jethva: AOD above clouds: 12-year OMI record and others

described what is done to retrieve records of AOD above clouds

Olga Kalashnikova: GCOS aerosol requirements /statement of guidance

informed on her involvement for aerosols in WMO panels to define requirements and strategic priorities

General discussion:

Comparison of datasets from different algorithms and different sensors

It was argued about the validity of comparing monthly mean to evaluate the different algorithms, given the large bias shown in Larissa Sogacheva's presentation. Michael Schulz pointed out that the bias seems to be correlated and might be corrected, facilitating the merging. Ralph Kahn pointed out than when comparing satellite data, the different sampling should be considered. Larissa however stated that the objective is not to validate the algorithm AOD retrieval but rather to validate how well the algorithms can retrieve a global trend. Thomas Popp agrees, insisting that despite the large bias there is agreement in trend among the different satellites.

Giving guidance to the users

Thomas Popp suggested that the retrieval community should give more guidance to the users about how to select the appropriate dataset, depending, for instance, on whether global data are need, or consistency is the key parameter. He insisted that clear definitions (e.g. fine mode definition) should be made available together with the products (technical documentation, metadata, scientific paper).

What parameters are most important to retrieve and deliver to the model community?

Stefan Kinne argued, in response to Olga Kalashnikova's presentation, that essential aerosol properties (e.g. size distribution) are a too high level of details for the observation

communities. Stefan and Mian Chin suggested that fine/coarse mode fraction, fine and coarse absorption, might be considered as the minimum and complete set of retrievals to be delivered to the users. Nick Schutgens suggested to shift the point of view towards the retrieval community: what can be accurately retrieved? A lot of discussion followed these

comments, as reducing the focus to fine/coarse fraction and fine/coarse absorption would largely impact the retrieval community work. However, it is not clear whether this set of

information would actually be sufficient. More detailed particle property products can be *interpreted* in terms of fine/coarse fraction, etc. The discussion will be continued during session 16 (aerosol type).

SESSION 13 Working group on pixel uncertainties

chair: ***A. Povey*** */ rapporteur:* ***L. Mei***

Adam Povey: Characterizing retrieval uncertainties– interim status

- Introduction of pixel uncertainty working group
- How do we propagate uncertainties into L3

Andy Sayer: Update on MODIS-DT and other pixel level uncertainties

- Pixel-level uncertainty experiments for existing products
- Calculation of SATELLITE-AERONET, AERONET uncertainty is generally not taken into account, especially for quantities other than spectral AOD.
- Strict matchup and homogeneity criteria on AERONET
- Global distribution of pixel uncertainty (product based)

Discussion

Mike, Thomas

- Empirical prognostic expression (neutral network similar idea including surface and uncertainty, however each one method catches different features, no one is better than the other)
- Over land, the uncertainty is linked to AOT and surface brightness

Falguni: Update on MODIS DT pixel uncertainty.

Nick: What leads to the large differences between Jacobian and Brute Force Calculations

Falguni:

- Jacobian is free to the checking parameter but Brute is free with others at the same time
- AOT over DT with QA flag does not need uncertainty
- Another possible option beside uncertainty can be the confidence of QA flag

Andy:

- How to describe wavelength-dependent shape of the noise
- Some are wavelength independent, like wind speed, some are not

Discussion

Mike: Sampling impact is large, some are correlated and others may be anti-correlated
Andy: DT/DB show strong geographic features
Mike:

- When uncertainties are correlated or anti-correlated, how about L3 uncertainty
- Sampling is the essential issue causing the uncertainty differences in different instruments

Adam: L3 uncertainty is important since it has large user community
Ralph: How about use the observations and constraints from the model simulations to check the dependence of sampling issue, because you can set all conditions in your scenarios.

Michael: We need good reference dataset
Andy/Mike: AERONET is also limited, Dragon is a good setup for the validation

Adam: Can we use geostationary satellite observations to check the temporal correlation of polar orbit satellites.

Mike: Temporal correlation is large, we can use model to check the spatial and temporal correlation

Ralph: Geostationary satellite can be helpful to understand the spatial and the temporal correlation of polar orbit observations.

Mike:

- Use model/ airborne measurements to get the idea of spatial and temporal correlation
- How to characterize model errors
- Do different runs with different settings and check with AERONET by considering the temporal correlation

Ralph: How about validate particle size rather than just AOT?

Mike:

- How to check one retrieved parameter has a better uncertainty compared to another from the same product
- The retrieval constrains are different and also the data coverage matters

Andy: we can aggregate AOT to different wavelength, then get Angstrom

James: Issue of Angstrom, especially when AOT is small, Angström exponent can be unphysical, but Fine Mode AOT is more robust physical constraint

Mike/Adam: Fine Mode AOT can be retrieved and helpful.

SESSION 15 Working group on inter-comparisons

chair: ***R. Levy*** */ rapporteur:* ***J. Limbacher***

Stefan Kinne: GEWEX-GDAP inter-comparisons

- Where do you get your comparison dataset from?
  - Combination of AERONET and spatial patterns from the satellite remote-sensing.

Antti Lipponen: Can we improve satellite retrievals of Angström exponent over land?

- Random forest allows you to run all of the parameters, do you have the table?
  - Yes
  - But you also have geometry and retrieved AOD, can you produce the total table?
    - Yes
  - MAIAC Doesn't provide Angström exponent
    - Used two spectral bands
- Did you give anything retrieval doesn't use?
  - No
- Can you use this instead of MODIS?
  - Prefer to use this as a tool to improve the retrieval.
- Horizontal lines are points where DB Angström exponent was prescribed.
- Angström exponent in most algorithms is not retrieved but derived, use AODs instead?
  - Took data as a typical user.

- Do you know what limitations in training dataset can do to limit your results?
    - If you use eastern hemisphere data for eastern hemisphere sites, might work a little better.
- In DT we don't retrieve AOD if it is too low, echoes Andy's comments.
- Dynamic range in aerosol retrieval algorithms is too low.
- AERONET inherently will report a larger range as AERONET noise increases dramatically at low AODs, whereas Angström exponent from models does not depend on AOD.
- Ralph: Any reason no multiplicative factor in the scaling?
    - Tried it and it didn't work any better.

Discussion

- Clearly identify your assumptions in retrievals, even though it increases size of the product.
- ESA can help support (1 month a year) GEWEX assessment.
- Can we help with GEWEX?
    - Adam can help with comparisons, but is there anything wrong with having multiple files (user + diagnostic).
    - Stefan: I don't want all datasets for all years, but we could pick a new year. He would appreciate the help with comparisons.
- 2008 as the standard year and 2018 as new year?
    - Lorraine: We don't have 2018 yet
- NOAA has 2015 and everything after 2017
- Adam believes that 2018 or 2019 would be better.
- Hopefully another sentinel for 2018 or 2019
- Results for MISR were very different (different talk).
    - Footprint discrepancies?
    - MISR had huge positive biases over ocean, which were corrected in the new version (Version 23) of the algorithm.
- Can we understand why there are differences between the different algorithms? Sometimes the differences are due to actually retrieving different quantities, or different sampling.
- Alexei prefers something before 2018, as he has to process everything on NASA supercomputers
    - Rob clarifies that we can start in 2019 doing this.
- NOAA VIIRS does not report Angström exponent, but uses fill values.

- Ralph: Particle properties matter a lot even in retrieving correct AOD.
- Ralph: Use models to fill in the gaps when we don't have confidence in retrieved or prescribed aerosol properties. Also, if we had systematic in-situ data, we could use that.
- Instead of comparing AOD_550 and Angström exponent, why not just compare spectral AOD?

SESSION 16 Working group on aerosol typing
chair: ***G. Schuster*** */ rapporteur:* ***A. Lipponen***

Lucia Mona: *connecting model – satellite aerosol type (remotely connected)*
reported on the aerosol typing activities to connect model and observations, a planned database / case study collection and overview paper
Stefan Kinne: *components derived from MAC v2 optics (modal AOD, AAOD, re)*
summarized the climatology of aerosol component information
Nicholas Meskhidze: *global aerosol types for assessment of direct radiative effects*
presented an example approach to link model and satellite infromation

Listed discussion points and related discussion:

- How to link aerosol type definitions in models and retrievals
  - CATCH approach (presented by Meskhidze) was given as a good example to link models & retrievals

- How to best use satellite constraints

- What to use as "ground truth" (or how to assess uncertainty and then validate?)

- How can in situ help?
  Kahn: Systematic in-situ measurements are needed. There is high variability in AOD; Microphysical properties are more repeatable.
  Remer: Systematic in-situ measurements are needed, see poster by Espinoza.

- Should we use model emissions to aid retrievals?
  Kahn: Yes it may be a good idea, especially in low-AOD cases in which retrieval cannot provide type information but it can be taken from a model, which has specified emission sources

Povey: Sometimes it is a good idea, ORAC has multiple models and in the retrieval it tries different models. Finally Bayesian approach is used to decide which were the best models for the retrievals.
Question from Povey: How do I go from emissions to optical properties?
Schuster: Are the proportions of different aerosol types correct in model emissions, do we have confidence? In low-AOD situations, model types might still be the best available.

Other discussion points:

* Chin: Type/composition discussion, who is helping who? Models to help observations or the other way around?

* Meskhidze: Model can help in PM2.5 estimates.

* Kahn: In type/composition models can help observations and also other way. Win-win

* Hasenkamp: If aerosol type is taken from satellite retrievals you cannot validate models with satellite observations.

* New instrumentation will help the aerosol typing (polarimeters)

* MOPITT gives information about mid-level / surface CO

SESSION 17 Focus: aerosol cloud interactions

chair: ***B. Lefer*** */ rapporteur:* ***Z. Zhang***

The chair gave a brief overview of the importance of Aerosol-cloud interactions, the difficulty for observing the interaction and then introduced the speakers.

Yohei Shinozuka: *Satellite-based ACI estimates with refined CCN approximations*

illustrated that satellite-based aerosol-cloud interaction estimates may have been underestimated, because of exaggerated CCN variability andthe use of standard least-squares regression.

Gan Luo: *Droplet number concentrations: GEOS-Chem/CAM vs MODIS retrievals*

demonstrated that retrieved and simulated cloud droplet number concentrations have similar signal of seasonal variation, so that models can fill the missing parts in satellite products but need additional validation.

Discussion:

What is the strategy for temporal-spatial collocating and combing the airborne in situ and satellite observation.

Questions are raised on the quality and sampling rate of satellite-based CCN retrievals from MODIS. At least part of the CCN size spectrum is too small to be retrieved by remote-sensing.

Whether to use GCM-to-Satellite simulator, i.e., COSP simulator, for model evaluation are discussed briefly.

The importance of cloud observations is acknowledged.

In-depth discussions are made on how to advance the observation-based aerosol-cloud interactions studies.

SESSION 18 AEROSAT *wrap-up and outlook*

- ~70 participants (varying over sessions)
- Again very good representation of modelling teams
- Very well prepared introductions by chairs
- Good discussion and exchange of ideas, even some brainstorming
- preliminary results of some experiments were presented; unfunded work needs patience
- Suggestions for next year AEROSAT: experiment on vertical distribution including limb and occultation instruments, aerosols near clouds / aerosol cloud interaction session jointly with AEROCOM

Thanks to

Mian Chin, Lorraine Remer, Shubbha Kondragunta and their NOAA colleagues

Chairs (Nick, Lorraine, Omar, Adam, Felix, Rob, Greg, Barry)

Rapporteurs (Ed, Martha, Linlu, Jim, Antti, Zhibo)

AEROSAT program

Thursday, October 18, 2018 ***AeroCom / AeroSAT***

	SESSION 9	**AeroCom tasks**
9:00 – 10:00	**M. Schulz**	*AeroCom wrap-up and outlook* *Questions / issues for AEROSAT* *Experiments: lessons from AEROCOM for AEROSAT*
10:00 – 10:15	**M. Chin**	AeroCom and ACAM – common interests
10:15 – 10:30	**Kahn/Popp**	Introduction to AeroSat 2018
10:30 – 11:00	coffee-break	
		chair: N. Schutgens*; rapporteur:* E. Nowottnick
	SESSION 10	**data and modeling**
11:00 – 11:15	**P. Colarco**	*reflections on modeling needs / integration model + satellite*
11:15 – 12:00	**all**	*AeroCom-AeroSat joint discussion*
12:00 – 12:30	**poster introductions (part 2)**	
		max 1 ppt slides / 1 minute poster introduction
12:30 – 13:30	lunch	
		chair: L. Remer
	SESSION 11	**challenges in remote sensing**
13:30 – 14:00	**H. Liu**	Consistent Algorithm Science Across Multiple Satellite Sensors for AOD Retrieval ***(keynote** - day 4)*
		chair: O. Torres; *rapporteur: M. Lufarelli*
	SESSION 12	**working group on climate records** (high-quality, long-term, consistent)
14:00 – 14:05	**chair**	*introduction, questions*
14:05 – 14:20	**L. Sogacheva**	*merging aerosol optical depth from multiple satellite missions*
14:20 – 14:35	**H. Jethva**	AOD above clouds: 12-year OMI record and others
14:35 – 14:45	**O. Kalashnikova**	GCOS aerosol requirements /statement of guidance
14:45 – 15:30	**all**	*discussions* ○ *Feedback on GCOS requirements and statement of guidance* ○ *Suitable merging methods* ○ *Quality assessment*
15:30 – 16:15	extended coffee-break with poster viewing	
		chair: A. Povey*; rapporteur: L. Mei*
	SESSION 13	**working group on pixel uncertainties**
16:15 – 16:20	**chair**	*introduction, questions*
16:20 – 16:35	**A. Sayer**	Characterizing retrieval uncertainties– interim status
16:35 – 16:50	**F. Patadia**	Update on MODIS-DT and other pixel level uncertainties
16:50 - 17:30	**all**	*discussions*

Friday, October 19, 2018 ***AeroSAT***

Chair: F. Seidel

	SESSION 14	**new opportunities**
9:00 – 9:15	**F. Seidel**	introduction, NASA response to Aerosol 'Designated Observable' in 2017 Earth Science Decadal Survey
9:15 – 9:45	**C. Williamsen**	NASA's *Atmospheric Tomography Mission (**keynote** - day 5)*
9:45 – 10:00	**K. Knobelspiesse**	*Aerosol remote sensing with the upcoming NASA PACE mission*

chair: R. Levy*; rapporteur: J. Limbacher*

	SESSION 15	**working group on inter-comparisons**
10:00 – 10:05	**chair**	*introduction, questions*
10:05 – 10:10	**S. Kinne**	GEWEX-GDAP inter-comparisons
10:10 – 10:25	**A. Lipponen**	Can we improve satellite retrievals of Angström exponent over land?
10:25 – 10:55	**all**	*discussions*
10:55 – 11:15	coffee-break	

chair: G. Schuster; rapporteur: A. Lipponen

	SESSION 16	**working group on aerosol typing**
11:00 – 11:05	**chair**	*introduction, questions*
11:05 – 11:20	**L. Mona**	*connecting model – satellite aerosol type (via remotely connected)*
11:20 – 11:35	**S. Kinne**	*components derived from MAC v2 optics (modal AOD, AAOD, re)*
11:35 – 11.50	**N. Meskhidze**	*global aerosol types for assessment of direct radiative effects*
11:50 – 12:30	**all**	*discussions* ○ *How link aerosol type definitions in models and retrievals* ○ *How best use satellite constraints* ○ *What to use as "ground truth"*
12:30 – 13:30	lunch	

chair: B. Lefer*; rapporteur: Z. Zhang*

	SESSION 17	**focus: aerosol cloud interactions**
13:30 – 13:35	**chair**	*introduction, questions*
13:35 – 13:50	**Y. Shinozuka**	*Satellite-based ACI estimates with refined CCN approximations*
13:50 – 14.05	**G. Luo**	*Droplet number concentrations: GEOS-Chem/CAM vs MODIS retrievals*
14:05 – 15:00	**all**	*discussions* ○ *How best use satellite constraints* ○ *What to use as "ground truth"*

	SESSION 18	**AeroSAT tasks**
15:00 – 16:00	**T. Popp / R. Kahn**	*AeroSAT wrap-up and outlook* *Way forward with AEROSAT experiments*
	all	*Final discussion*