

# The **Aerosol Life Cycle Working Group** and its Role in ASR

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Steering Committee: Jerome Fast (modeling translator),  
Connor Flynn (measurements translator), Rich Ferrare,  
Larry Kleinman, Paul Ziemann



# ALWG Mission Statement

The primary objective of ASR's Aerosol Life Cycle Working Group research is to **understand and quantify the processes** associated with the aerosol life cycle and the **direct impact of aerosols on the radiative balance** of Earth's climate system, with the goal of **improving their representations** and thereby reducing the uncertainty in global and regional climate simulations and projections.

To this end, the working group addresses **integrated chemical, physical and radiative processes** from emissions, nucleation, transport, and ageing to removal. We seek an understanding of the impact of these processes on the **spatial and temporal distributions** of global aerosol, the **natural versus anthropogenic attribution** of aerosol, and the **relationship among physicochemical, cloud activating, and optical properties** of aerosol. To understand and efficiently represent these processes at all pertinent scales, the ALWG will employ *in situ* and remote sensing observations from surface-based, airborne, and satellite platforms from the **process-level to the global scale**, together with laboratory studies and modeling efforts.

<http://asr.science.energy.gov/science/working-groups/alc/>



# ALWG Themes

To promote integrated information that is readily useable in climate prediction, questions are formulated to consider these themes concurrently with particular science focus:

- *Geographical Distribution of Aerosol*  
define horizontal, vertical, and temporal variability of aerosol properties and their radiative climate forcings
- *Natural vs. Anthropogenic Aerosol*  
understand the contribution of anthropogenic aerosol to the total aerosol
- *Scale in Observations and Representation of Aerosol*  
understand the relationship of scale to physical processes to further parameterizations that are less sensitive to scale



# Mechanisms for Progress

- *PI projects*
- *ALWG collaborations/Research Area Groups*
  - *Potential Participation in Focus Groups*
- *Field Campaigns and Modeling Initiatives*
- *New Instrumentation and VAP development*



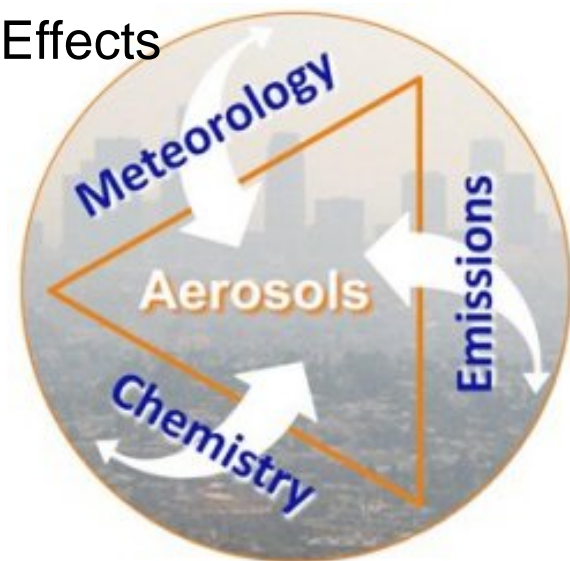
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  - **ABE: Aerosol Best Estimate**
    - continuous time series of aerosol optical properties
  - **CIP: Column Intensive Properties (MFRSR)**
    - SSA, asymmetry, size distributions
  - **Organic Aerosol Component Analysis (ASCM)**
    - concentrations, mass spectra of organic aerosol components
      - **ALWG Breakout Thursday 1:00**



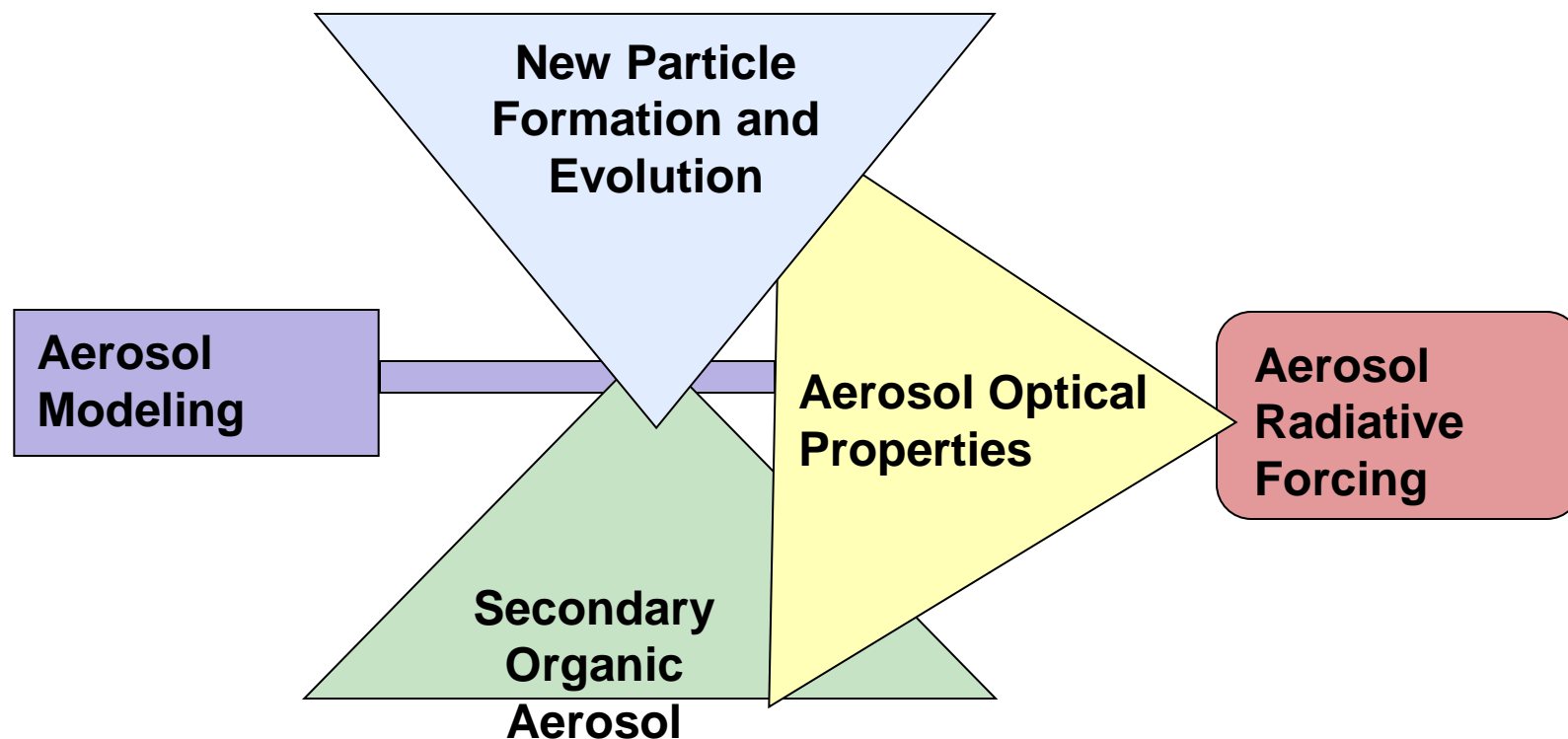
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- *PI projects*
- *ALWG collaborations/Research Area Groups*
  - *Potential Participation in Focus Groups*
- **Field Campaigns and Modeling Initiatives**
  - Aerosol Modeling Testbed
    - **Aerosol Modeling Breakout, Wednesday 1:30-3:30**
  - CARES: Carbonaceous Aerosols and Radiative Effects
    - **Data Workshop, Monday**
  - GVAX: Ganges Valley Aerosol Experiment
    - **Breakout Wednesday 1:30-3:30**
  - TCAP: Two-Column Aerosol Project
    - **Breakout Wednesday 1:30-3:30**
  - Amazon Basin
    - **Breakout Tuesday 1:30-3:30**
  - 4-Corners Proposal: Southwest Region Climate
    - **Breakout Wednesday 6-7**
- *New Instrumentation and VAP development*



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- *PI projects*
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- ***Potential Participation in Focus Groups***
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# Mechanisms for Progress

- *PI projects*
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  - ***Potential Participation in Focus Groups***
    - Nucleation and growth of atmospheric aerosols
    - Thermodynamic and microphysical properties of organic and mixed organic-inorganic aerosol
    - Chemical and physical interactions between anthropogenic and biogenic SOA precursors
    - Aerosol water uptake
    - Aerosol absorption profiles
      - **ALWG Breakout Thursday 1:00**
- *Field Campaigns and Modeling Initiatives*
- *New Instrumentation and VAP development*





# Mechanisms for Progress

## ▪ *PI projects - Highlights*

J. J. Michalsky et al., Climatology of Aerosol Optical Depth in North-Central Oklahoma: 1992-2008

P. J. DeMott et al., Ice Nucleation Link to Aerosol for Global Models

J. Jimenez et al., New Characterization of Organic Aerosol Evolution Will Help Improve Models

Submit your research highlights on-line early and often:

<http://asr.science.energy.gov/science/research-highlights/submit>

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# Mechanisms for Progress

## ▪ *PI projects*

### *Today's Speakers*

- Jose-Luis Jimenez, *Aerosol Mass Spectrometer Constraint on the Global Secondary Organic Aerosol Budget*
- Markus Petters, *A General Framework for Predicting CCN Activity of Organic Molecules from Functional Group Data*
- Timothy Onasch, *Laboratory Studies of Black Carbon Particles: Characterization and Atmospheric Processing*
- Chongai Kuang, *Enhanced Detection of 1-nm Condensation Nuclei Using Diethylene Glycol and Butanol Condensation Particle Counters*
- Alla Zelenyuk, *Evaporation Kinetics and Phase of Laboratory and Ambient Secondary Organic Aerosol and the Effect of Adsorbed Spectator Gases*
- Evgueni Kassianov, *Aerosol Optical and Microphysical Properties from Passive Remote Sensing During CARES: Temporal and Spatial Changes*
- Catherine Chuang, *A Review of Chemistry-Aerosol Treatments in CAM5 and Implementation of a Sectional Aerosol Package with Comprehensive SOA Formation*

