Agenda for today

- Working group aims (Nicole Riemer)
- Project updates (5 min each)
  - Ryan Moffet
  - Cari Dutcher
  - Mary Gilles
  - Gourihar Kulkarni
  - Claudio Mazzoleni
  - Kerri Pratt
  - Joseph Ching
  - Laura Fierce
  - Hailong Wang
  - Rahul Zaveri
  - Matthew West
  - Art Sedlacek
  - Allison Aiken
  - Alla Zelenyuk
- Summary of progress (Nicole Riemer)
- Discussion (everyone)
  - Jian Wang’s request: feedback on aerosol measurement needs/priorities
Aerosol Populations in Current Models

- Smoke (OC/BC)
- Sea salt
- Sulfate
- Dust
How much detail is needed to capture aerosol impacts in large scale models?
How important are these details?

Key question 1:
What is the impact of mixing state on CCN, IN, optical properties?

Key question 2:
How should we include mixing state information in models that quantify aerosol climate impacts?

- What aerosol mixing states exist in different environments?
- How can we connect measurements (lab and field) to each other and to modeled mixing state information?
- What mixing state information should be measured in the field and in the lab?
Two Definitions of “Mixing State”

**Population mixing state:**
Distribution of chemical compounds across the particle population.

**Morphological mixing state:**
Distribution of chemical compounds within and on the surface of each particle.
Fig. 2. Mixing state diagram to illustrate the relationship between per-particle diversity $D_f$, bulk diversity $D$, and mixing state index $I$ for representative aerosol populations, as listed in Table 4. See Section 2 and Table 3 for more details.
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Development of a consistent model hierarchy
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ACME

Global scale

Regional scale

Mesoscale

Microscale

Particle scale

Molecular scale
Development of a consistent model hierarchy

Arriving on the regional scale
- WRF-PartMC
- MOSAIC-Mix
- Moment-based approach
Development of a consistent model hierarchy

Huge amount of activity using innovative measurement platforms
Challenge questions

- Can we compare models from different levels of the model hierarchy to verify the mixing state representations, mechanisms and impacts?
  a) what might this look like?
  b) who is going to do it?
  c) what funding do we need to make this happen?

Common theme: requires people from different groups and backgrounds to come together.
Challenge questions

- How do we compare mixing state information between measurement platforms and models?
  a) population mixing state information
  b) morphology mixing state information

- How do we use measurements (lab and field) and theory to create and validate mechanisms for:
  a) mixing state evolution?
  b) mixing state impacts on IN/CCN/OP?

Common theme: requires people from different groups and backgrounds to come together.
Connections between Different Tools

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<th>RM/ GCM(^3)</th>
<th>SP2(^4)</th>
<th>Microscopy(^5)</th>
<th>SP mass spectroscopy(^6)</th>
<th>Remote sensing(^7)</th>
<th>Bulk measurements(^8)</th>
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</table>

**Bottleneck:**
Lack of comparable mixing state outputs between many tools

**Table 2:** Assessment of current abilities to connect data and outputs amongst different tools. The lack of comparable mixing state outputs between many tools is a key bottleneck in our ability to understand mixing state impacts.