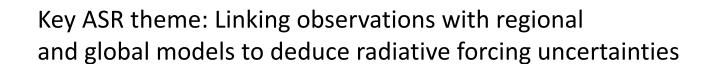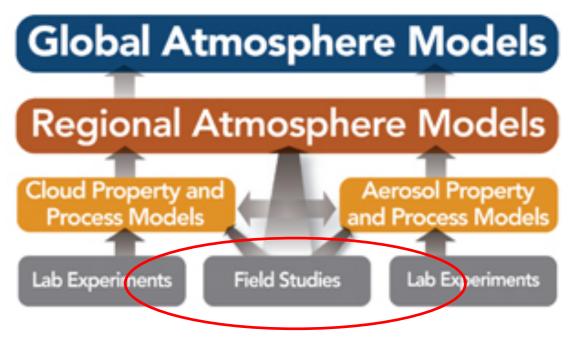# ASR aerosol science and ARM aerosol measurements

Jim Smith
Department of Chemistry, University of California @ Irvine

Where do aerosol observations fit into the BIG PICTURE?

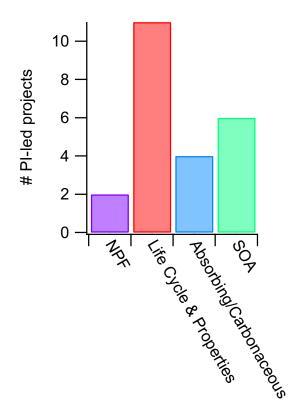Key ASR theme: Linking observations with regional
and global models to deduce radiative forcing uncertainties

Field studies and long-term observations

Are we getting the observations that we need?

Aerosol Life Cycle Working Group research areas include:
1) new particle formation
2) effects of aerosol composition, mixing state, and physical properties on growth, aging, and removal processes
3) direct and indirect radiative effects of optically absorbing aerosols; and
4) understanding and predicting secondary organic aerosol concentrations and properties.
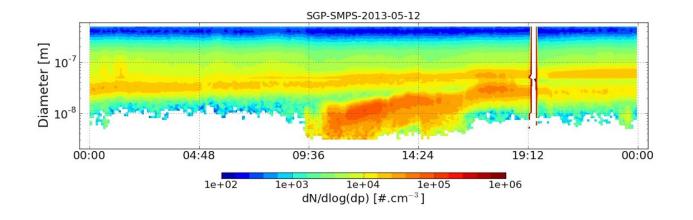
Current # of PI-led projects by research area

What long-term observations are required?

new particle formation

- Continuous particle size distributions down to 1 nm diameter
- Key precursor trace gases (e.g., SO2)
- Vertically resolved measurements of size distributions
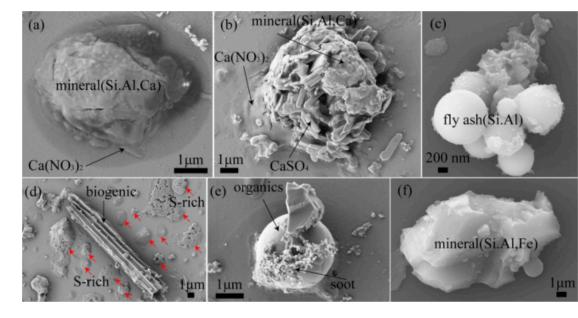

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What long-term observations are required?

effects of aerosol composition, mixing state, and physical properties on growth, aging, and removal processes

- Aerosol particle …
    - Phase state
    - Liquid water content
    - Composition
- Size-resolved aerosol particle fluxes/gradients
- Indirect measurements of aerosol composition (volatility, hygroscopicity)

What long-term observations are required?

direct and indirect radiative effects of optically absorbing aerosols

- Absorption measurement, vertically resolved and as a function of RH
- Replacement of filter-based measurements and determination of historical measurement biases from PSAP.
- Extension of wavelength range to UV.
- Aerosol chemistry and morphology (for attribution/modeling)

Source: Absorbing aerosols workshop report, Jan 2016

What long-term observations are required?

understanding and predicting secondary organic aerosol concentrations and properties.

- Continuous measurements of aerosol particle composition
- Continuous measurements of gas phase precursors (e.g., Highly Oxidized Multifunctional) HOM species
- Indirect measurements of aerosol composition (volatility, hygroscopicity)