Deliverable: LP-Sparse Particle Model

Objective: Achieve sparse particle representations of generally-mixed aerosol populations using optimization methods

Lead personnel: R. McGraw (BNL)

Collaborators: R. Samulyak (Stony Brook/BNL)

Funding status: SFA (funded – aerosol mixing state); ASCR (white paper under development with R. Samulyak – particle-based computation)

Challenges or needed resources/collaborators: Single-particle measurements; comparisons with benchmark particle-resolved simulation (Riemer/West).

Summary of progress:

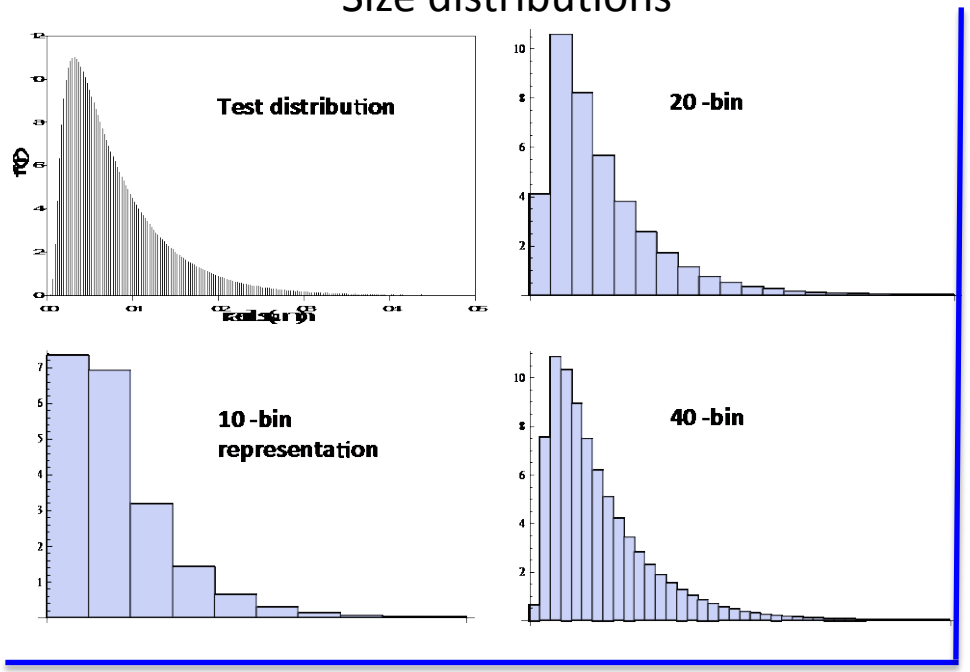
R. McGraw, Sparse aerosol models beyond the quadrature method of moments, AIP Conf. Proc. 1527, 651-654 (2013); doi: 10.1063/1.4803355.

Related signal optimization study:

S. E. Giangrande, R. McGraw and L. Lei, An application of linear programming to polarimetric radar differential phase processing, *J. Atmos. and Oceanic Tech., 30*, 1716-1729 (2013).

Application: bounding model uncertainty
(refining optical extinction with increasing model resolution)

Size distributions



R. McGraw, Proceedings ICNAA (2013)

Linear Program

Min/Max: scattering extinction

Subject to: 10, 20, 40 sectional constraints

+ non-negativity constraints

Repeat for different wavelengths

Nested Bounds on Extinction

dotted curves: 10 bin constraints
dashed curves: 20 bins
solid curves: 40 bins

red curve: Test distribution