Task 1.1a: Light Scattering Methods Evaluation

Presented by:
Siana Alcorn
Willard Richards
Sonoma Technology, Inc., Petaluma, CA
and
Don Lehrman
T&B Systems, Inc., Santa Rosa, CA

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Geographical and Temporal Resolution

- Light scattering by particles ($b_{sp}$) was measured with 5-min time resolution by Radiance Research nephelometers.
- 56 nephelometers.
- 77 sites.
- Continuous measurements for a year or more at 15 of these sites.
The $b_{sp}$ Data are Precise and Repeatable

- Precision and repeatability demonstrated by intercomparison of four nephelometers and by comparing field data from FREM and FRES.
The $b_{sp}$ Data are Accurate

- The data provide an accurate measure of $b_{sp}$ in the scattering chamber.
- When 24 outliers were removed, the remaining 367 calibrations and audits of 52 nephelometers at 71 sites gave:
  - Average zero of $0.4 \pm 1.4 \text{ Mm}^{-1}$
  - Average span slope of $0.99 \pm 0.05$
• Relation between measured $b_{sp}$ and PM$_{2.5}$ and PM$_{10}$ concentrations:
  – In summer and winter seasons.
  – As a function of the RH measured in the nephelometer scattering chamber.
  – As a function of measured ambient LWC.
• Advice on the use of the $b_{sp}$ data.