

Field-Performance of a new time-resolved sampler for the collection of dry aerosol particles

A. Figuren-Fernandez, G.S. Lewis, S.R. Spielman and S.V. Hering
Aerosol Dynamics Inc., 935 Grayson St., Berkeley, CA

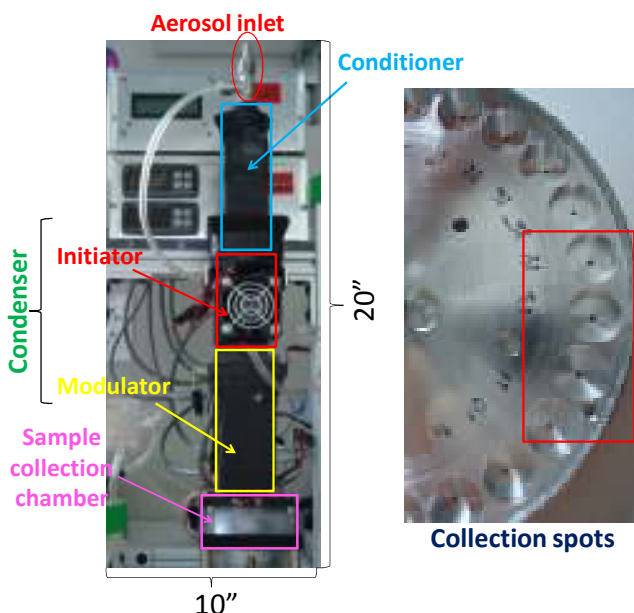
INTRODUCTION

Perfect Sampling System?

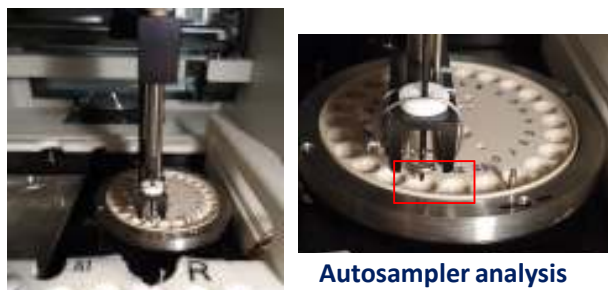
- Small
- Versatile: variable flow, collection matrices
- Reliable and easy to handle
- Artifact free
- Cheap

NEW SAMPLING SYSTEM

1. Uses the same technology as in the water-based condensation particle counters
2. Collects and deposits dry samples of PM_{2.5} and ultrafine particles in small spots (300 μm)
3. Time-resolved collection
4. Increased sample concentration in extraction volume (50-100ul) used for chemical characterization



5. Collection plates designed to couple with autosamplers



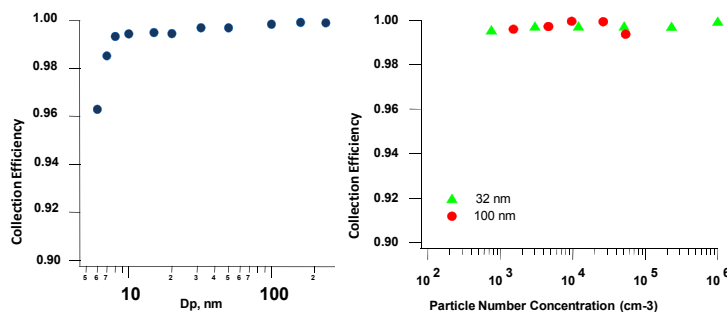
LABORATORY and FIELD PERFORMANCE

1. Particle collection efficiency:
 - Lab generated aerosol: $\text{NH}_4(\text{SO}_4)_2 + \text{NH}_4\text{NO}_3$
 - Ambient PM_{2.5}
2. Reproducibility and Precision
3. Field deployment (unattended for 8 days)
 - Plates: Anions (6hrs), PAHs (12 hrs.)
 - Filters: Anions, PAHs (48 hrs.)
 - PAS2000: real-time p-PAHs

Acknowledgements: Funding: NIH Grant 1 RC3 ES019081-01

RESULTS

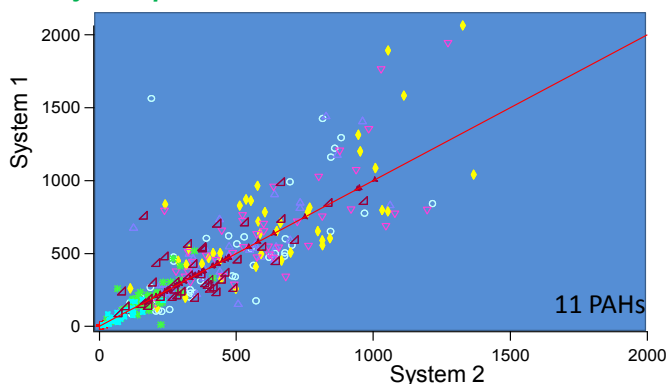
1. Particle collection efficiency >95% down to 6nm



2.1. System reproducibility

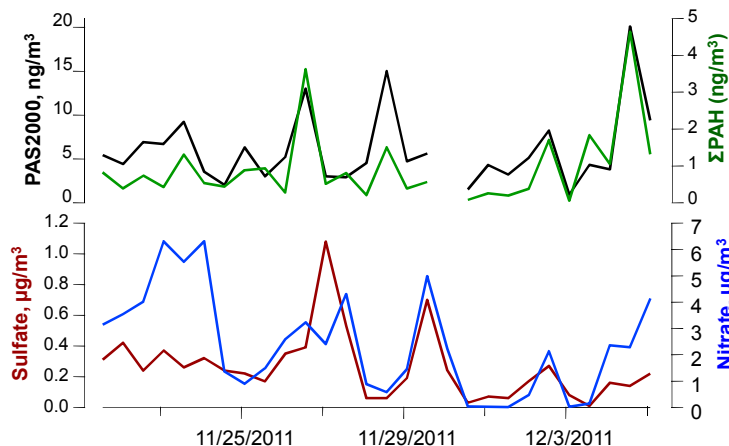
	5 min (n=6)	30 min (n=6)
Sulfate (%STDEV)	4.21	3.52
Nitrate (%STDEV)	5.36	4.25

2.2. System precision



3. PAHs concentrations

- a) ΣPAH concentrations vary between 80-110% of those on filters; better agreement for HMW compounds
- b) Clear day/night pattern, higher evening concentrations



CONCLUSIONS

Pros:

- ✓ Small and portable
- ✓ Versatile
- ✓ RELIABLE and EASY to handle
- ✓ No need for extraction steps prior to analysis
- ✓ Compatible with standard autosamplers

Cons:

- ☒ Low flows
- ☒ Collects only PM