

Time-Resolved Chemical Characterization of Ambient PM_{2.5} in Stockton, CA

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INTRODUCTION

- Need for time-resolved measurements
- Chemical characterization is important for:
 - a) source apportionment
 - b) exposure and risk assessment studies

SAMPLING AND ANALYTICAL METHODS

- Location: ARB- station in Stockton, CA
- Collection: Nov. 2011 – Feb. 2012
- New 3-stage Growth Tube Sampler used for dry PM_{2.5} collection (Figure 1)
- Particle growth is achieved at ambient temps.
- 12hr samples @ 1.5 lpm for PAHs
- 6hr @ 1.0 lpm samples for trace elements
- Samplers run unattended for weeks
- Parallel 48-hr filter collection
- Analyses: PAHs (HPLC-FL); anions (IC-ED); trace elements (LIBS)
- PAH Source apportionment: EPA-CMB82 model

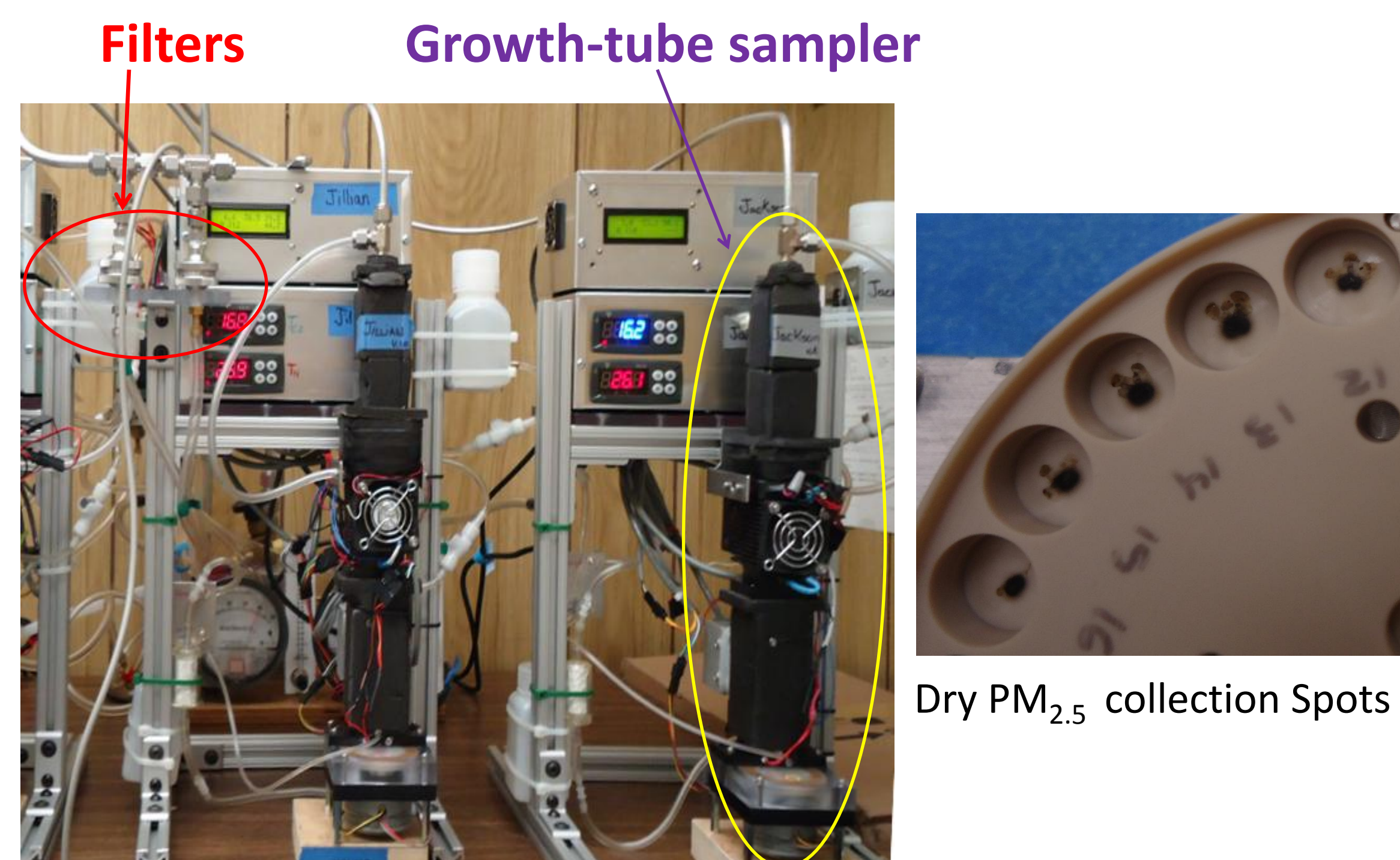
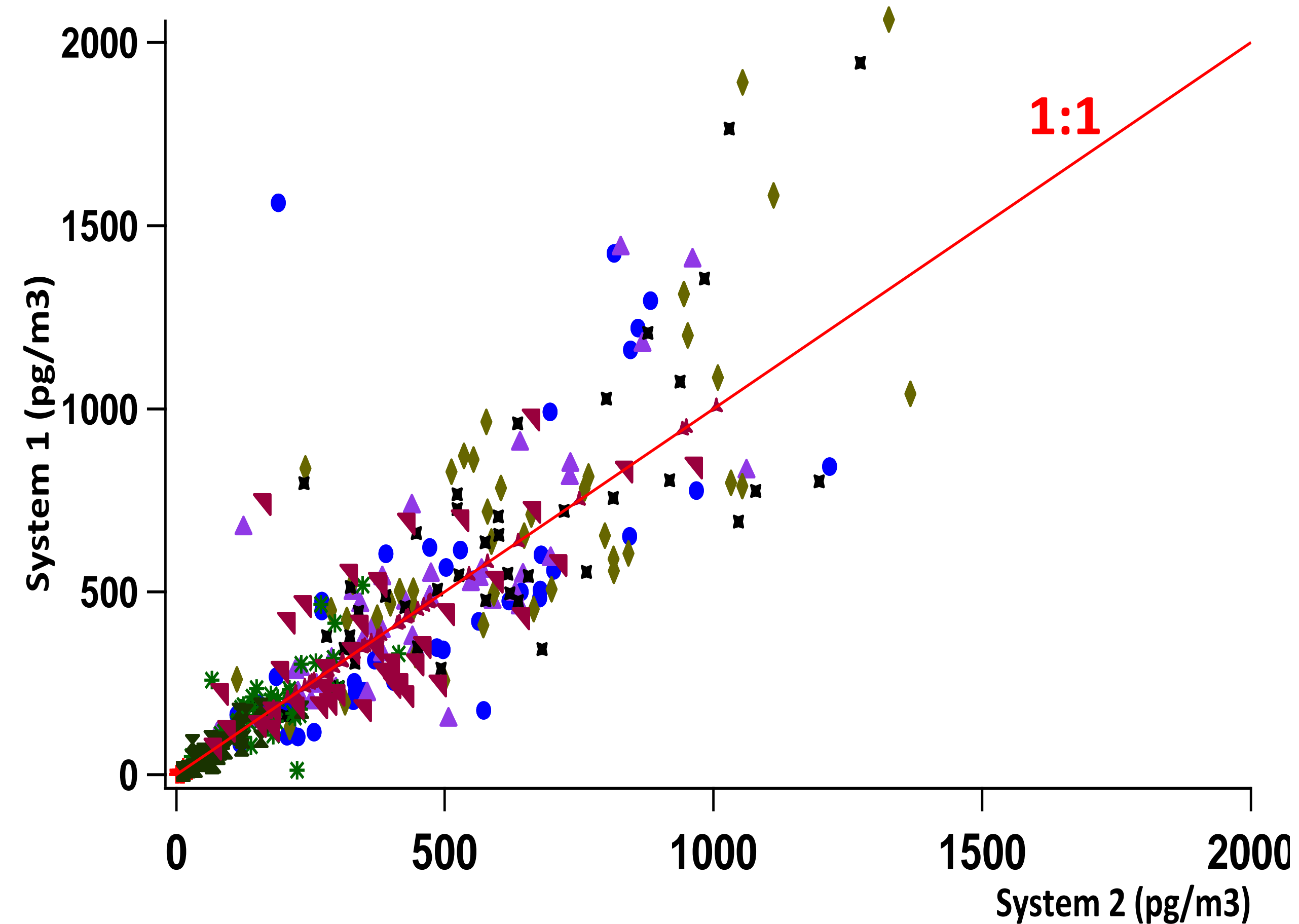


Figure 1. Sampler Deployment

RESULTS

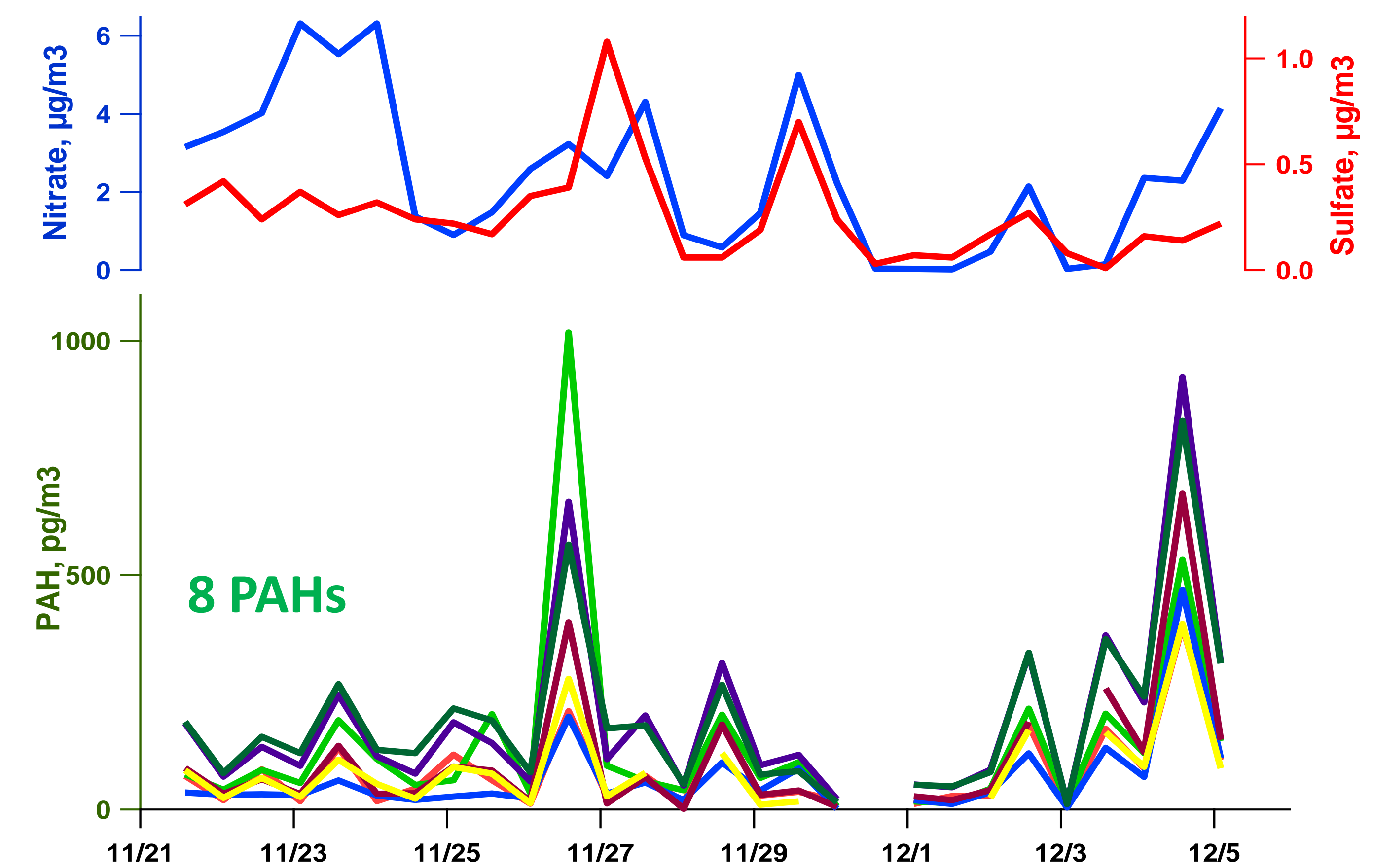
- Automated quantification of p-PAHs is possible with the new 3-stage collector
- ΣPAH concentrations vary between 80-110% of those on 48 hr filters; better agreement for HMW compounds
- Sonication (10 sec.) is needed at high concentrations
- Good correlation with real-time EcoChem measurements

Precision and reproducibility for 11 p-PAHs

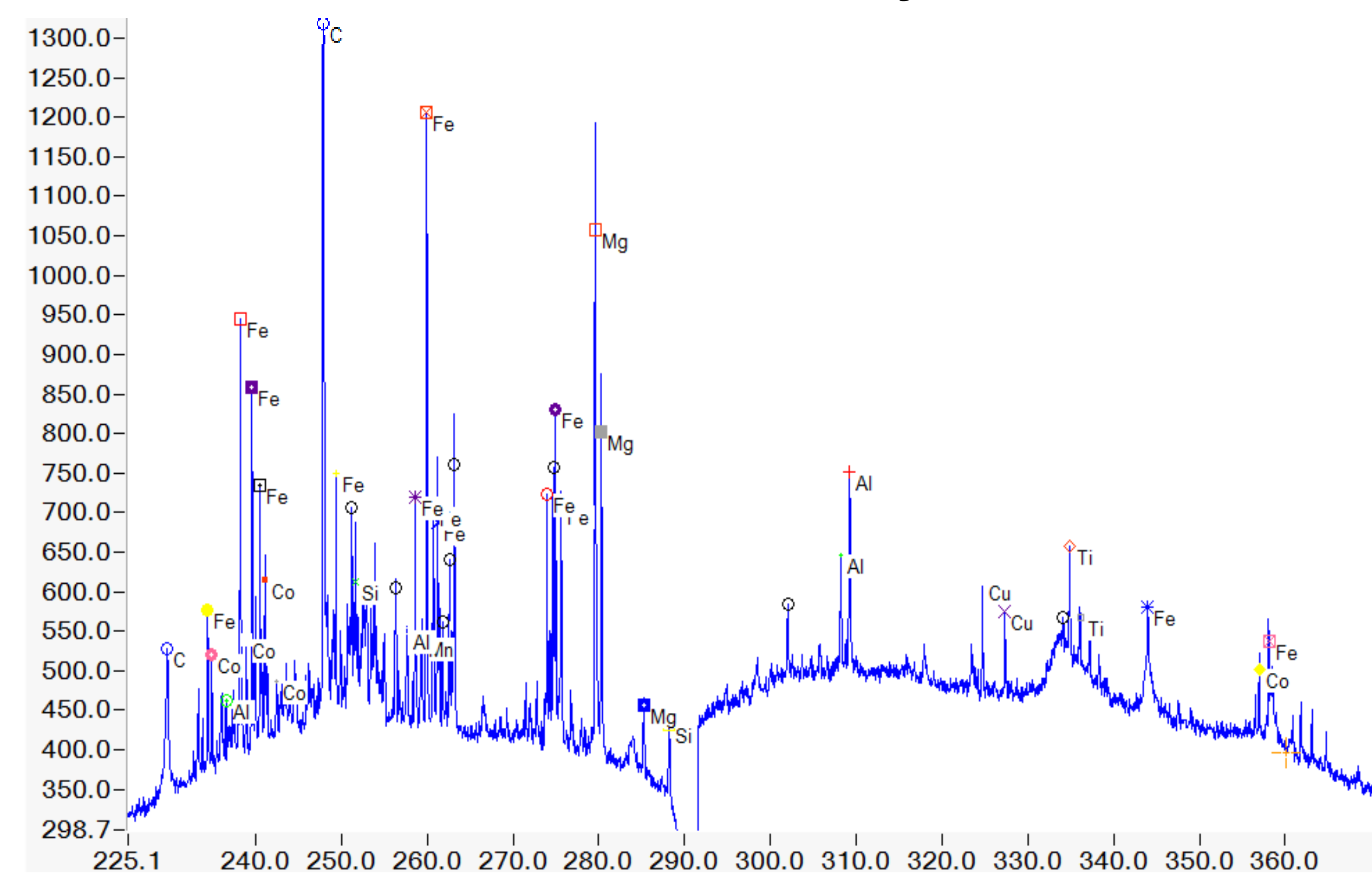


Good precision between parallel systems

Time resolved chemical speciation

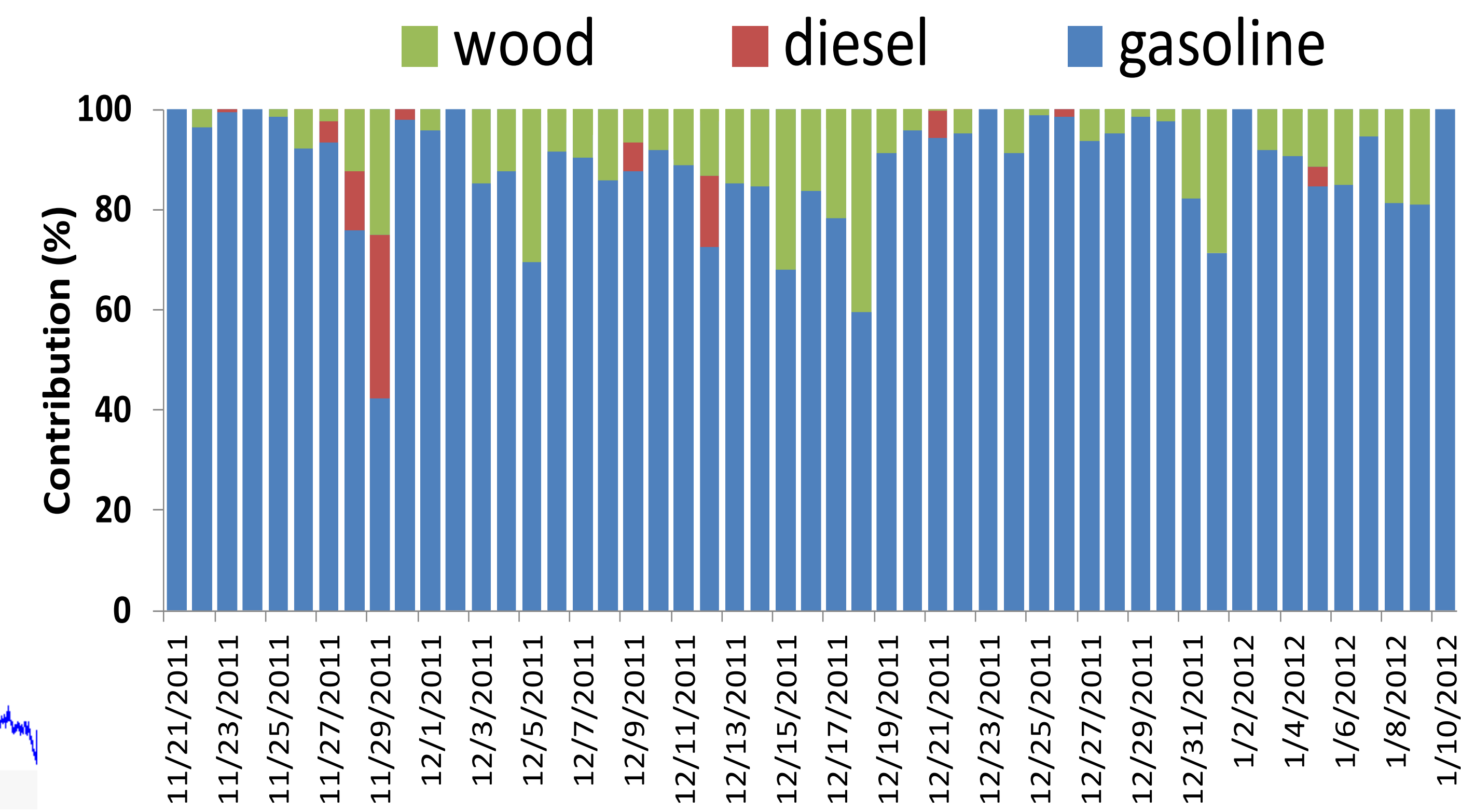


Trace elements by LIBS



Redox-active elements (Fe and Cu) can be quantified in short-time bases

Source apportionment for measured PAHs



Significant Contribution of biomass burning to ambient PM_{2.5} during winter.

CONCLUSIONS

1. Unattended, time-resolved collection of dry PM_{2.5} for PAH analysis achieved with a 3-stage Growth Tube Sampler
2. No extraction steps are needed prior to PAH analysis
3. Collection spots (1-hr samples) can be analyzed using LIBS for elemental composition
4. Time-resolved chemical composition information can be used for a more accurate assessment of the contribution of different sources to ambient pollutants

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