

## Prescribed and Other Fire Emissions: Particulate Matter Deterministic & Empirical Tagging & Assessment of Impacts on Levels (PMDetail)

### Results from the Test Analysis of IMPROVE Archived Filters for the Creation of a Smoke Marker Database for Model Evaluation

At the request of the IMPROVE Steering Committee a plan was put in motion to test a set of archived duplicate Teflon filters from an IMPROVE site in the western U.S. for the analysis of smoke markers. The test was planned as a proof of concept to use archived IMPROVE Teflon filters to create a smoke marker data set for the PMDetail (Particulate Matter Deterministic & Empirical Tagging & Assessment of Impacts on Levels) project since ultimately the analysis will be destructive to the archived filter samples used to create the data set.

Duplicate Teflon filters from the OLYM IMPROVE site from June 23, 2008 to Aug. 18, 2008 were shipped from the University of California - Davis to Colorado State University for analysis. Each filter was extracted in 15 ml deionized water (DI Water) in a Nalgene Amber HDPE bottle, sonicated without heat for 40 minutes, and then filtered using a 0.2  $\mu\text{m}$  PTFE syringe filter to ensure that only the water-soluble fraction of the aerosol particles is measured. The liquid extracts were analyzed for levoglucosan and other carbohydrates using high-performance anion-exchange chromatography with pulsed amperometric detection (HPAEC-PAD), water-soluble ions using ion chromatography (IC), and WSOC using a Total Organic Carbon Analyzer following the methods of *Sullivan et al.* [2011a,b].

The data for all species measured can be found in the enclosed excel file. Levoglucosan was able to be determined on each filter sample. The concentrations were quite low, but above the detection limit of less than  $0.1 \text{ ng/m}^3$ . A quick modeling exercise was performed by Ralph Morris to examine the 2008 fire source apportionment modeling results from the OLYM site. This showed that the three days with the highest levoglucosan measured on the filters (Aug. 4, Aug. 7, and Aug. 19) were the ones that the model suggested as having fire contribution (i.e., defined here as greater than  $0.01 \mu\text{g/m}^3 \text{ PM}_{2.5}$  contribution due to wildfires, prescribed burning, and agricultural burning). Overall, we believe this illustrates that archived IMPROVE Teflon filter samples can be used to create a smoke marker data set.

Sullivan, A.P., N. Frank, D.M. Kenski, and J.L. Collett Jr., Application of High-Performance Anion-Exchange Chromatography – Pulsed Amperometric Detection for Measuring Carbohydrates in Routine Daily Filter Samples Collected by a National Network: 2. Examination of Sugar Alcohols/Polyols, Sugars, and Anhydrosugars in the Upper Midwest, *J. Geophys. Res.*, 116, D08303, doi:10.1029/2010JD014169, 2011b.

Sullivan, A.P., N. Frank, G. Onstad, C.D. Simpson, and J.L. Collett, Jr., Application of High-Performance Anion-Exchange Chromatography – Pulsed Amperometric Detection for Measuring Carbohydrates in Routine Daily Filter Samples Collected by a National Network: 1. Determination of the Impact of Biomass Burning in the Upper Midwest, *J. Geophys. Res.*, 116, D08302, doi:10.1029/2010JD014166, 2011a.