# A Comparison of $PM_{2.5}$, Levoglucosan, BC, and UVPM Levels for the 2014-2015 Winter Season in Santa Cruz County

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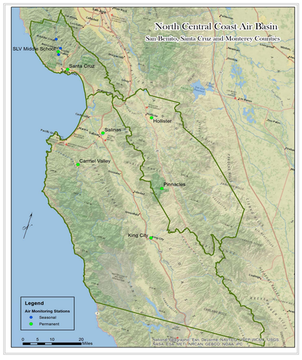
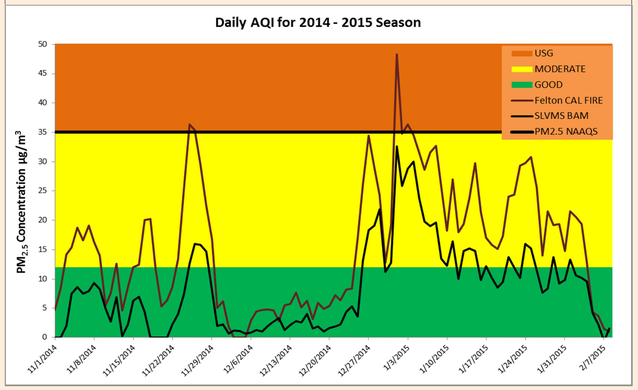
## Introduction

The San Lorenzo Valley which lies just north of Santa Cruz, California, has a seasonal problem with wood smoke from home heating and yard waste burning which often lingers in a patchwork pattern throughout the area. The topography of the valley and lack of gas lines in many residential areas play a large role in this situation. Seasonal monitoring is currently conducted at several locations in this area and will continue indefinitely.





This area has become a setting for a significant amount of activity aimed at reducing the presence of wintertime residential wood smoke. A levoglucosan study in combination with aethelometer monitoring was conducted at both the Cal-Fire Site (Blue dot labelled Felton)and San Lorenzo Valley Middle School Sites in Felton (Green dot just above the Cal-Fire Site).




## Methods

The Monterey Bay Air Resources District tested the viability of using an aethelometer as a field tool for identifying and specifically measuring wood burning as a $PM_{2.5}$ component. The two monitoring sites selected have been used for several years in the District's ongoing seasonal woodsmoke monitoring program and were picked due to their differing characteristics. The San Lorenzo Valley Middle School monitoring station (SLV MS) had a Met One BAM-1020 for $PM_{2.5}$, a Teledyne-API (TAPI) Model 633 aethelometer for black carbon (BC) and UVPM data, and a R&P FRM-2000 monitor to collect the filter samples. This site is in an open area close to several housing communities.

The Felton Cal-Fire monitoring station had a Met One EBAM for $PM_{2.5}$, a Teledyne-API (TAPI) Model 633 aethelometer for black carbon (BC) and UVPM data, and a R&P FRM-2000 monitor to collect the filter samples. This site is adjacent to a community with numerous woodburning homes. Levoglucosan measurements were collected on 47mm PTFE filters at intervals of approximately three days and were used for comparison with the aethelometer results. Filters were then sent for chemical analysis to the CA Air Resources Board using preset handling and shipping protocols. Continuous monitoring data was collected remotely through cellular modem using Envista* software. Breaks in the data were caused by equipment failure due to power outages and other weather related events.

*Acknowledgements*

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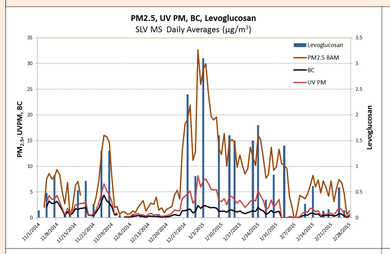
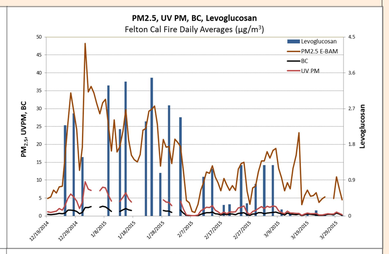
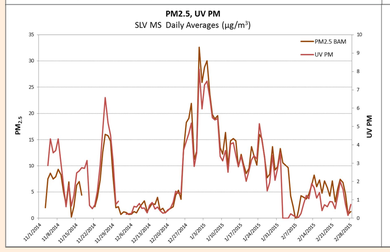
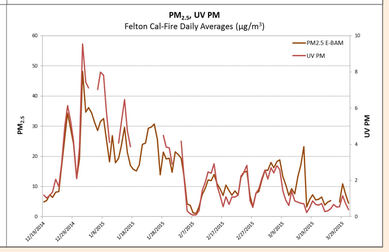
## Results

The graphs showing the levoglucosan study results contain data points representing 24-hour filter results with a corresponding 24-hour average for $PM_{2.5}$ on that collection day. The aethelometer and EBAM data are continuous data except where missing due to instrument problems.
Both levoglucosan and UVPM are indicators of wood burning. The data collected and depicted show a strong correlation between these two components and overall $PM_{2.5}$ concentrations. This indicates wood burning as the local particulate source. With all environmental precautions taken, the aethelometer performed consistently and reliably. We will continue to use this instrument in the San Lorenzo Valley.




## Conclusions

The aethelometer can be very useful as a fingerprinting tool to determine the type of emmission source present in an area where particulate pollution is being detected. This study was conducted in an environment where the source of particulates was dominated by woodsmoke. The TAPI-633 performed well in that role. Some environments may be complicated by multiple types of emissions, such as sites that may be adjacent to residential, commercial, industrial, or heavy traffic areas. An aethelometer may be useful to help identify which source or sources of these particulates are responsible.