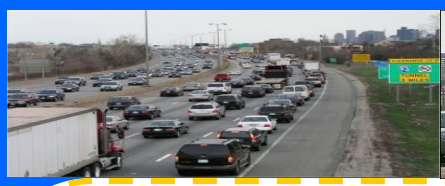

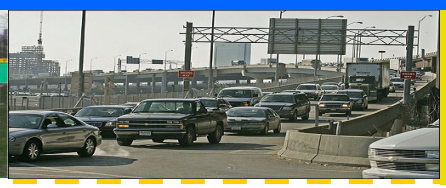

COMMUNITY ASSESSMENT OF FREEWAY EXPOSURE & HEALTH

Model for Ultrafine Particles in Somerville

By Sherry Hou

Background

Air pollution caused by traffic can be harmful to human health. Pollutants from highways have a greater effect on those who live closest (less than 200m) because they are exposed to these pollutants at higher levels for longer times. One of these traffic pollutants is ultrafine particles (UFP). UFP are very small particles; about 1 million UFP can fit in an inch. When people breathe, UFP can easily enter a person's lungs and pass into the blood stream because it is so small. Chronic exposure to UFP may be damaging to one's heart and blood health.

To understand the relationship of UFP with heart and blood disease, we need to know how weather, traffic, and location influence the level of UFP in an area. Before this study, there were few studies done to predict people's exposure to UFP. To estimate people's exposure to UFP, we collected weather and traffic related information in Somerville and used this to predict the UFP level at a given time, location, and weather.

Figure 1: CAFEH research team with the Tufts Air Pollution Monitoring Laboratory (converted from a recreational vehicle).

For more information on how the Tufts Air Pollution Monitoring Laboratory (TAPL) measured all the UFP-related information, refer to [Mobile monitoring of particle number concentration and other traffic-related air pollutants in a near-highway neighborhood over the course of a year.]

How was it done?

Remodeled from a recreational vehicle, the Tufts Air Pollution Monitoring Laboratory (TAPL) can measure the level of UFP and other pollutants. CAFEH researchers drove the TAPL on a route in Somerville, MA (see Figure 2) on 43 days from September 2009 to August 2010 at different times of the day. As it went around neighborhoods near I-93, the TAPL measured and recorded the levels of UFP. These data were then examined. To estimate UFP levels, we tried to understand some of the things that affect UFP levels. The goal was to find a way to estimate UFP levels over time and at different locations.

What did they find?

We found that temperature, distance from the highway, day of week, wind speed and direction of the wind, volume of highway traffic, and distance from I-93 affect UFP levels the most. With this information, we can estimate UFP levels at any location in the study area for every hour of the year. Our findings tell us that UFP levels are the highest near the highway and major roadways, on colder days, and with lower wind speeds (Figure 2).

How does this affect you?

The results of this study will help CAFEH learn about the relationship between UFP and heart and blood health. The next step is to combine the findings from this study with the information from participants' survey answers. By knowing the level of UFP and people's activities, we can estimate people's exposure to UFP.

If you live close to a major roadway or highway, you might consider refraining from exercising outside on cold mornings when the air is still, or choose a location a little farther from busy roads.

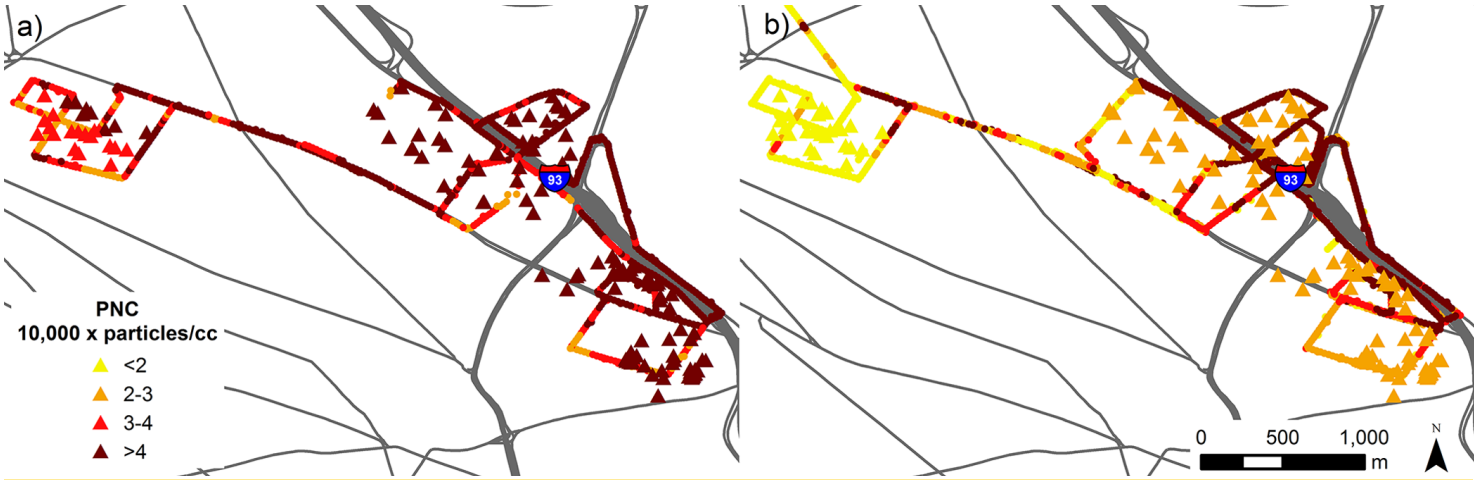

Figure 2: The predicted levels of UFP along the studied route. Yellow means low level; dark red means high level of UFP. A) the UFP levels predicted on a winter morning (Jan. 6th, 2010 from 7-8am). B) UFP levels predicted on a summer morning (July 21st, 2010 from 6-7am). The predicted UFP levels are higher when the weather is colder and closer to I-93. The triangles represent where CAFEH participants live.

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To learn more about this research, please refer to the following source:

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