Name(s)	Project Number
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Project Title

The Effects of Different Micro-Environments and Activities on Personal Exposure to Black Carbon

Abstract

Objectives/Goals
To attribute trends in black carbon, or BC, concentrations in personal exposure to micro-environments of certain conditions as accurately and reliably as possible, and to better predict BC concentrations based on micro-environments. Include wind, rain, indoors vs outdoors, proximity to vehicles and traffic, riding vs waiting for vehicles, indoor ventilation, and micro-environments of restaurants and other areas of cooking.

Methods/Materials
MicroAeth AE51 for Black Carbon from AethLab and Microsoft Excel. Set up and turn on the air pollution monitor according to provided operation manual. Change white quartz fiber filters in monitor daily. Filters provided by AethLab with monitor. Carry monitor in bag during travel or activities. Log changes in micro-environments change and any abnormal conditions. At end of every sampling, download data from monitor onto a computer as a spreadsheet using software provided with the monitor.

Results
Summer peaks in BC were at Athabasca Glacier in and near a large vehicle with a diesel engine, at restaurants in Canada, OR, and WA, and during a wildfire in OR. Winter Fresno peaks were in restaurants, at a public park close to the road, in traffic at I-5 freeway inside a car, near midnight on New Year#s Eve, and when cooking and riding cars to and from school. BC was exceedingly low at school. Hourly PM2.5 from RAAN for Central Fresno and Clovis was similar to hourly BC from ambient fixed site and to hourly personal exposure BC. Hourly PM2.5 and BC personal exposures all dropped sharply on a windy day and in period of intermittent rain. For all regression graphs and correlations of hourly PM2.5, BC personal exposures, and BC ambient exposures, p values were less than 0.001.

Conclusions/Discussion
Peaks suggest that proximity to the road, traffic or commute by car, cooking in restaurants and at home, wildfires, and fireworks on New Year#s increase BC in personal exposure. My study provides evidence to further support previous studies of PM in that wind, rain, ventilation, and closed windows decrease personal exposure. Regression plots and calculated correlation constants and p values showed strong correlation between PM2.5, BC outside, and BC in personal exposure. Strengthened correlations and causations between micro-environments and BC make predictions of BC more reliable so that actions to reduce BC and its negative effects can be more effective.

Summary Statement

By measuring the BC personal exposure, I attributed conditions of micro-environments to BC personal exposures and ambient concentrations.

Help Received

I received help from my father, who is a professor at the University of the State of California, Fresno. He helped me condense my data when I was making my graphs, and he helped me gain access to and learn how to use the MicroAeth monitors used in my project.