USING SATELLITE AEROSOL OPTICAL DEPTH DATA TO INVESTIGATE THE ASSOCIATION BETWEEN MORTALITY AND LONG AND SHORT TERM EXPOSURE TO PM $_{2.5}$ IN MASSACHUSETTS

Itai Kloog, *Department of Environmental Health - Exposure, Epidemiology and Risk Program, Harvard School of Public Health, Landmark Center 401 Park Dr West, Boston, MA, USA*
Bill Ridgway, *Science Systems and Applications, Inc, 10210 Greenbelt Road, Suite 600, Lanham, MD, USA*
Petros Koutrakis, *Department of Environmental Health - Exposure, Epidemiology and Risk Program, Harvard School of Public Health, Landmark Center 401 Park Dr West, Boston, MA, USA*
Brent A Coull, *Department of Environmental Health - Exposure, Epidemiology and Risk Program, Harvard School of Public Health, Landmark Center 401 Park Dr West, Boston, MA, USA*
Joel Schwartz, *Department of Environmental Health - Exposure, Epidemiology and Risk Program, Harvard School of Public Health, Landmark Center 401 Park Dr West, Boston, MA, USA*

Background and Aims: A large number of studies have reported associations between ambient particulate matter (PM) exposures and adverse health effects, yet all these studies have focused on the effects of either short-term (acute) or long-term (chronic) PM exposures. In this paper we aim to use a novel PM $_{2.5}$ exposure model based on satellite aerosol optical depth data to investigate both the long and short term effects of PM $_{2.5}$ exposures on mortality in Massachusetts, USA.

Methods: Using our novel predictions model for exposure, we preformed a time series analysis where daily death counts in each geographic grid cell were regressed against the long and short term PM$_{2.5}$ exposure, temperature, socio-economic data, lung cancer rates and a spline of time to control for season and trends.

Results: Our results indicated that for every 10-$\mu g/m^3$ increase in short term PM $_{2.5}$ exposure there is a 1.07 percent increase in mortality (CI=0.52 to 1.61), while concurrently for every 10-$\mu g/m^3$ increase in long-term PM $_{2.5}$ exposure there is a 44.2 percent increase in mortality (CI=17.7 to 76.8).

Conclusions: We have developed a novel PM$_{2.5}$ exposure model based on remote sensing data to assess both short- and long-term human exposures. Our approach relies upon gaining spatial resolution in the acute effects and allowing an assessment of long term effects in the entire population, rather than a selective sample from urban locations