

## New York City Community Air Survey

**Overview and Purpose:** The New York City Community Air Survey (NYCCAS) was conducted to measure neighborhood level variation of street-level ambient air quality in New York City and to monitor the relationships between the changes in emissions from major sources and ambient concentrations over time. Raw data is not directly representative of time and place where sampled, and estimating spatial variation of major pollutants required modeling, as described below. Thus, both raw and modeled data will be provided for the years 2008-2015.

**Methodology:** The NYCCAS monitors fine particles (PM<sub>2.5</sub>), Nitrogen Oxides (NO<sub>x</sub>), Sulfur Dioxide (SO<sub>2</sub>), Ozone (O<sub>3</sub>) and black carbon (BC) at 155 locations (100 years 3, 4 and most of 5, 60 fall season year 5 and on) throughout New York City during each season of the year. Data is collected over 2-week intervals at each of 150 distributed locations once per season. Data is collected at five (at three, starting fall of year 5) reference sites year round for temporally adjusting distributed site data. For more information on NYCCAS methods see <http://www.nyc.gov/health/nyccas>. Sampling design requires that raw data be temporally adjusted based on reference site values and modeled to account for nearby emission sources and landscape factors in order to calculate the distribution of constituent across NYC. Monitors were not placed to measure a specific neighborhood's air quality or evaluate emissions from unique facilities but to capture variable influence of sources distributed across the city (for example, traffic or oil burning boilers). Geospatial data on traffic, buildings and other emissions indicators along with indicators of temporal trends are combined in a land-use regression model with a spatial smooth term. Predictions were generated for 83,000 grid points across NYC and a 300m resolution raster was generated using inverse distance weighted interpolation.

**Strengths and Limitations:** NYCCAS raw monitored data are not directly representative of time and place where collected and cannot be compared to monitoring done for regulatory purposes because of differences in sampling techniques. Predicted surfaces are produced by a statistical model for the purposes of comparing neighborhood average values over time, not to measure the impacts of a specific point source or an event. They are not comparable to short term localized monitoring or monitoring done for regulatory purposes.

**Sample Research questions:** Some examples of research questions that can be explored with NYCCAS data include:

- How has the spatial variation in pollution changed over the years? Does it differ by different neighborhood characteristics, such as traffic density, building density, poverty?
- Can the impact of policies that effect emissions be detected?
- How do exposures vary across demographic groups and neighborhoods?
- How is air pollution exposure associated with health outcomes?

**Publications:** Some examples of recent peer reviewed journal articles using NYCCAS data:

- Ross Z, Ito K, Johnson S, Yee M, Pezeshki G, Clougherty JE, et al. 2013. Spatial and temporal estimation of air pollutants in New York City: exposure assignment for use in a birth outcomes study. *Environ Health* 12:51; doi: 10.1186/1476-069X-12-51.
- King KL, Johnson S, Kheirbek I, Lu JWT, Matte T. 2014. [Differences in magnitude and spatial distribution of urban forest pollution deposition rates, air pollution emissions, and ambient neighborhood air quality in New York City](#). *Landscape and Urban Planning*. doi: 10.1016/j.landurbplan.2014.04.009
- Savitz DA, Bobb JF, Carr JL, Clougherty JE, Dominici F, Elston B, et al. 2014. Ambient Fine Particulate Matter, Nitrogen Dioxide, and Term Birth Weight in New York, New York. *Am J Epidemiol* 179: 457-466.
- Savitz DA, Elston B, Bobb JF, Clougherty JE, Dominici F, Ito K, et al. 2015. Ambient fine particulate matter, nitrogen dioxide, and hypertensive disorders of pregnancy in New York City. *Epidemiol.* 26:748-757.

NYCCAS public use data and technical documentation at [nycass@health.nyc.gov](mailto:nycass@health.nyc.gov)