

# Quantifying the NYC Carbon Budget: Using a Particle Dispersion Model to Calculate Atmospheric Enhancement

Bronte Dalton<sup>1</sup>, Róisín Commane<sup>2</sup>, Arlene Fiore<sup>2</sup>, Martin Stute<sup>2</sup>

*<sup>1</sup>Columbia College, Columbia University, <sup>2</sup>Lamont-Doherty Earth Observatory*

Across the United States and in other countries, a growing number of cities are taking it upon themselves to set goals for emission reduction within a set number of years. Much of this is inspired by the Paris Climate Accord, which emphasizes careful monitoring in order to judge progress. Although the United States is potentially pulling out of the agreement, cities including New York City are choosing to make their own reduction goals. NYC is planning on reducing its emission to 80% of their 2005 levels by 2050. Other cities such as LA, Boston, and many others are already working on their own monitoring systems. In this research, the foundations for a future emissions monitoring framework are laid through site visits to potential monitoring sites and using the Stochastic Time Inverted Lagrangian Transport (STILT) model. STILT sends particles backwards in time to see where they were and thus show what areas will influence the chosen site's measurements. STILT was combined with North American Mesoscale Forecast System (NAM) sigmoidal wind files to create a NAM-STILT model which quantifies the influence for each potential site. In making the final monitoring system, it is crucial to accurately understand what each site is reading in its observations, thus the NAM-STILT model provides an important insight into what future observations will read. The research found some sites to be more suitable than others, important areas of influence for each site, and opened up more questions and information for continuing this research and the long-term goal of creating a full greenhouse gas emissions monitoring network for New York City.