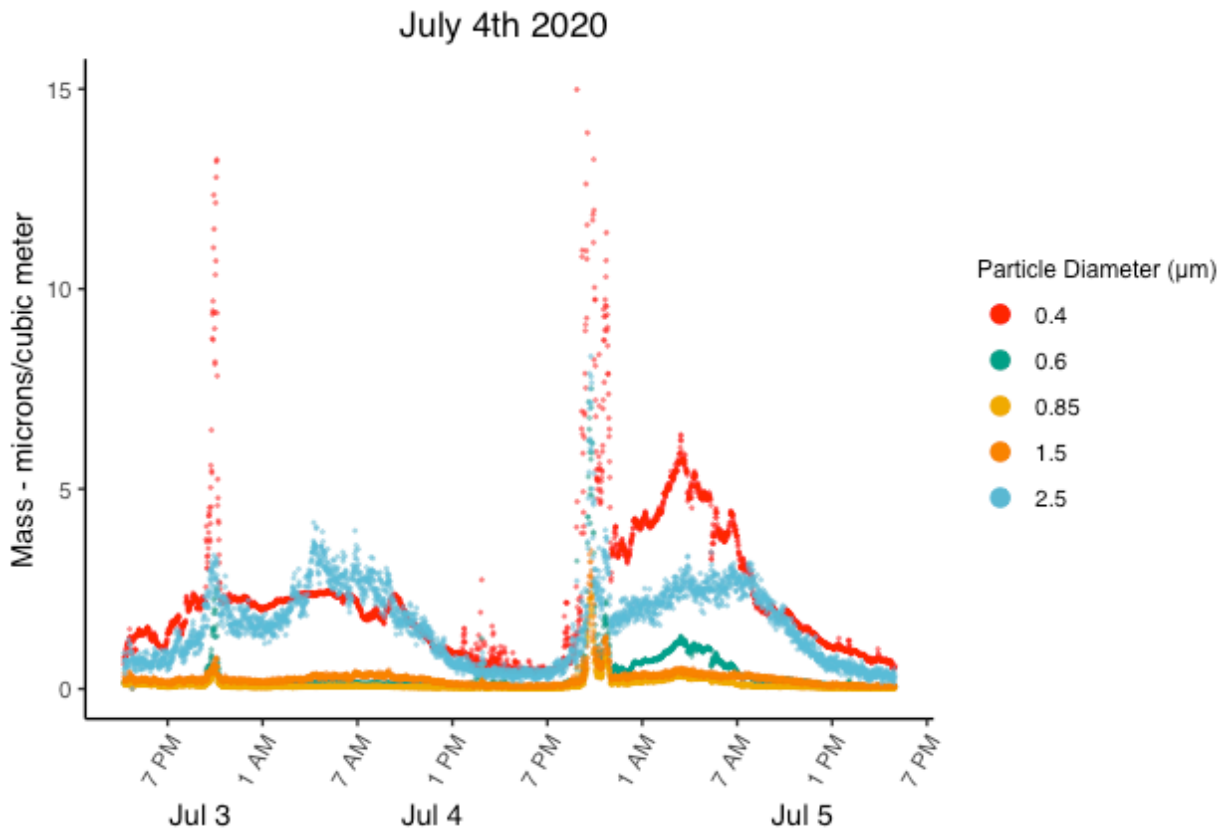
Bard

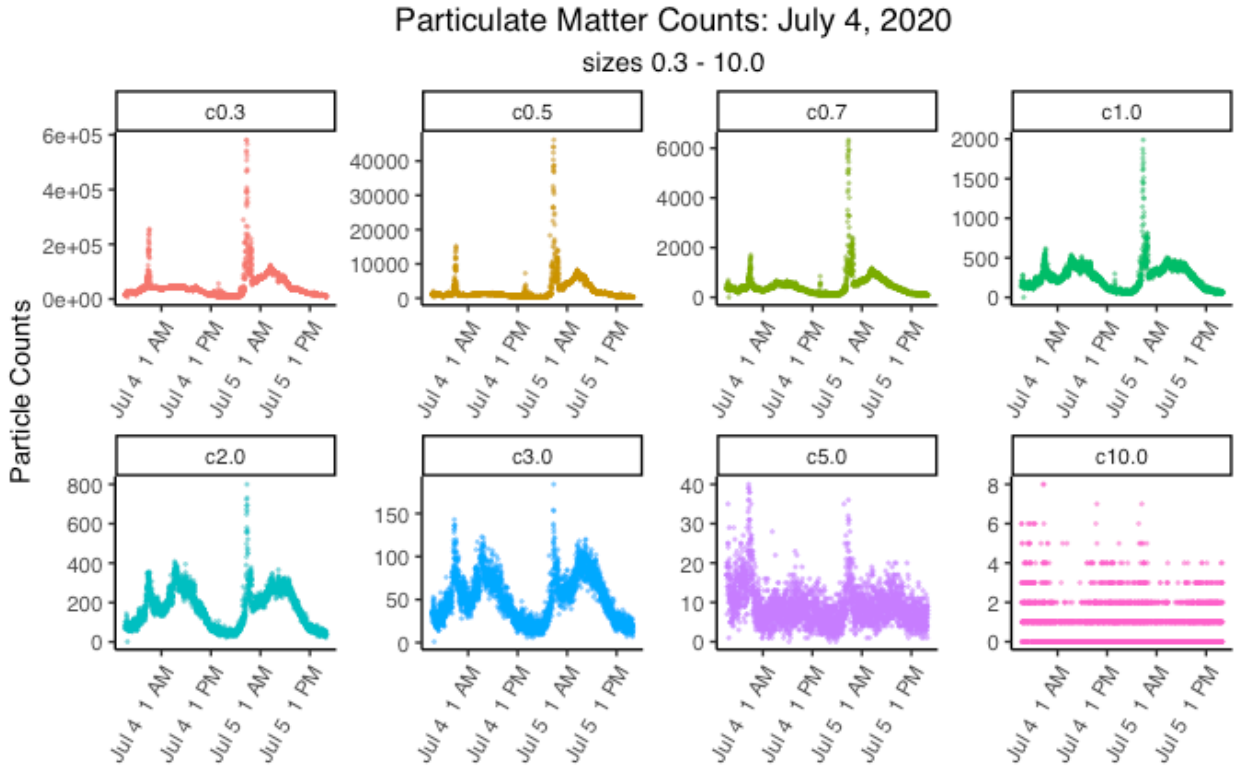
Data from the Center for the Study of Land, Air, and Water at Bard College
Air Quality Research in Kingston, New York
Dataset 3

General Trends: Fireworks



Human activity highly affects presence and circulation of particulates. Activities such as burning wood, oil, or gas, vehicular idling, and construction all contribute to the circulation of particulates in the air. These are all rather regular occurrences and are likely to show up in a cyclical pattern when doing continuous ambient monitoring. For example, if you were to monitor with high resolution equipment at ground level along a busy street, it is likely that you would see peaks and valleys in particulate concentrations as a result of AM/PM commuters. However, when spikes occur in the data outside of any normal pattern, it is important to consider the likelihood of an extraneous circumstance or intervention. The above figure shows mass concentrations for five different particle sizes from July 3-5, 2020. On the evenings of July 3 and 4, we see significant spikes in both PM2.5 and PM0.4. We know that all around Kingston on both of those nights a wide variety of festivities occurred, namely, backyard fireworks. It would not be

unreasonable to ascertain that these spikes in particulates came as a result of the residual exhaust from the launching of these fireworks. A number of studies have shown increases in fine particulate matter during the lighting of fireworks and firecrackers (Seidel & Burnbaum, 2015, Lin 2016, Hoyos et al., 2019). These events will also typically create a decay period of several hours. The smaller, more gradual peaks following the initial spikes in the figure likely represent this decay period. Luckily, the spikes don't appear to surpass the EPA's 24-hour threshold and the period of July 3-5 does not appear particularly significant according to the 24-hour averages for all of 2020. These spikes do, however, serve as a testament to the sensitivity of our monitoring network.



The above figure shows the same period from July 3-5, 2020 but with pre-mass-converted data. There are discernible spikes in counts on the evenings of both July 3 and 4 for all particle sizes 5 µg and under.