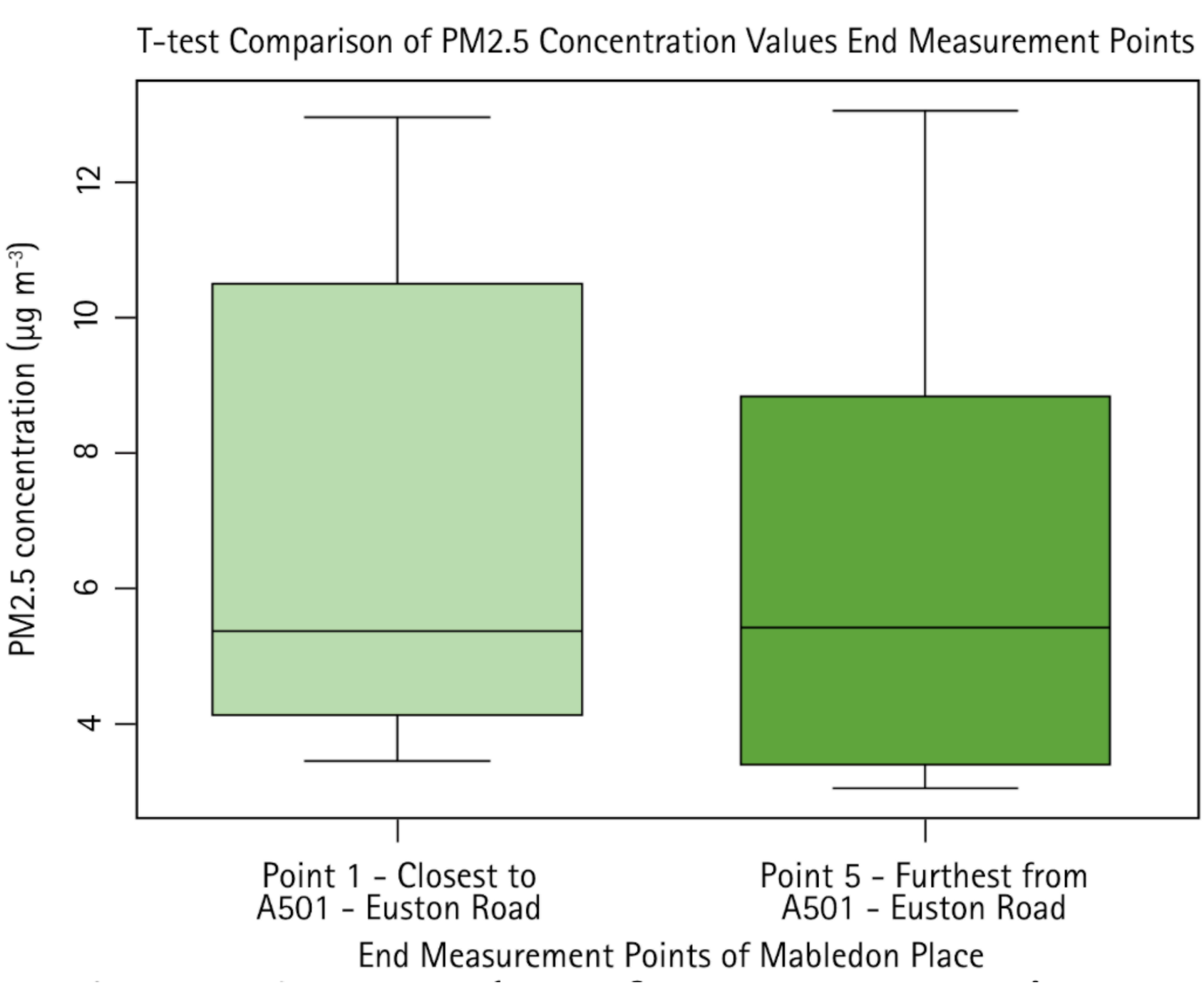
Air pollution, London

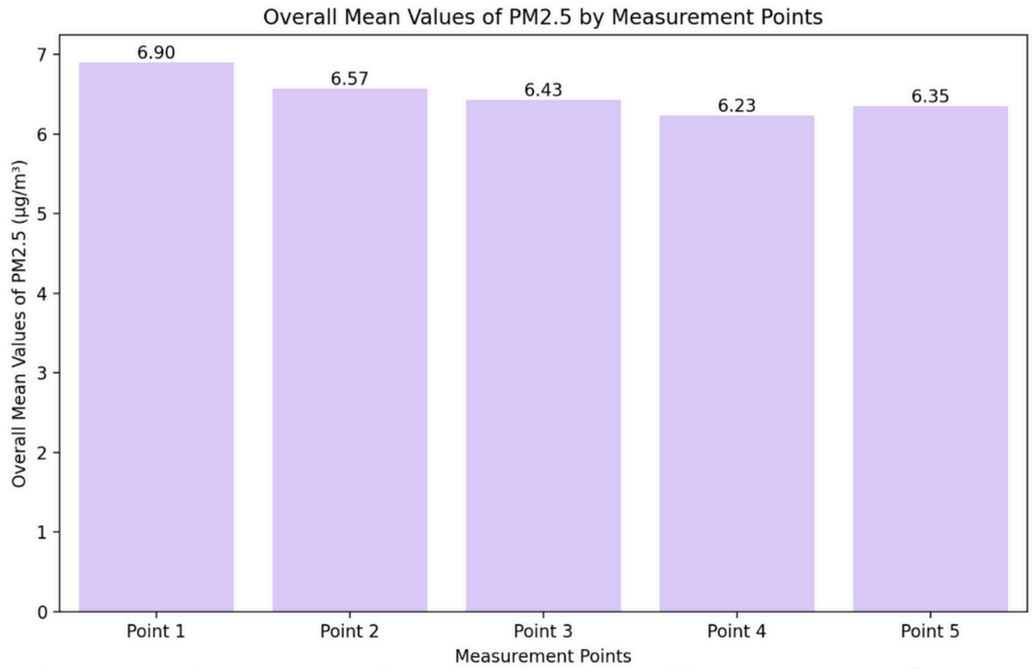
The project combines field-based air pollution monitoring and statistical analysis to investigate spatial and temporal variability in particulate matter ($PM_{2.5}$ and PM_{10}) across central London. Using street-level measurements and long-term monitoring data, the study applies exploratory visualisation and hypothesis testing to examine differences between roadside and urban background environments, as well as changes with distance from major roads. The results highlight strong temporal variability and site-specific influences, indicating that urban air quality patterns are shaped by multiple interacting factors beyond simple proximity to traffic.

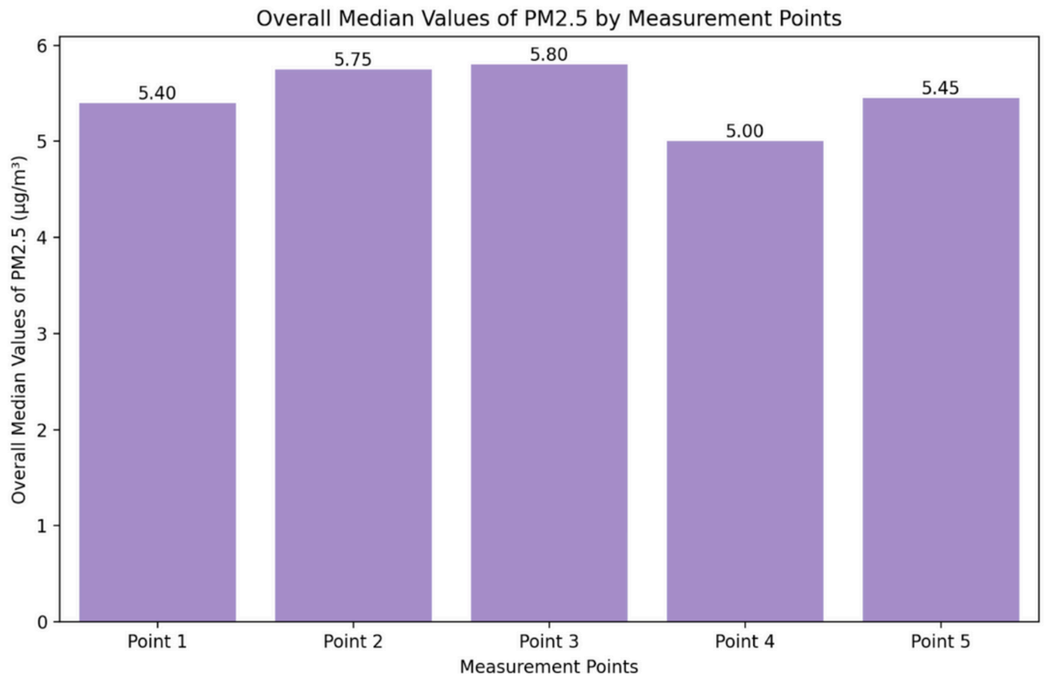
Software:
Python, R/RStudio

Mapping and data visualisation:

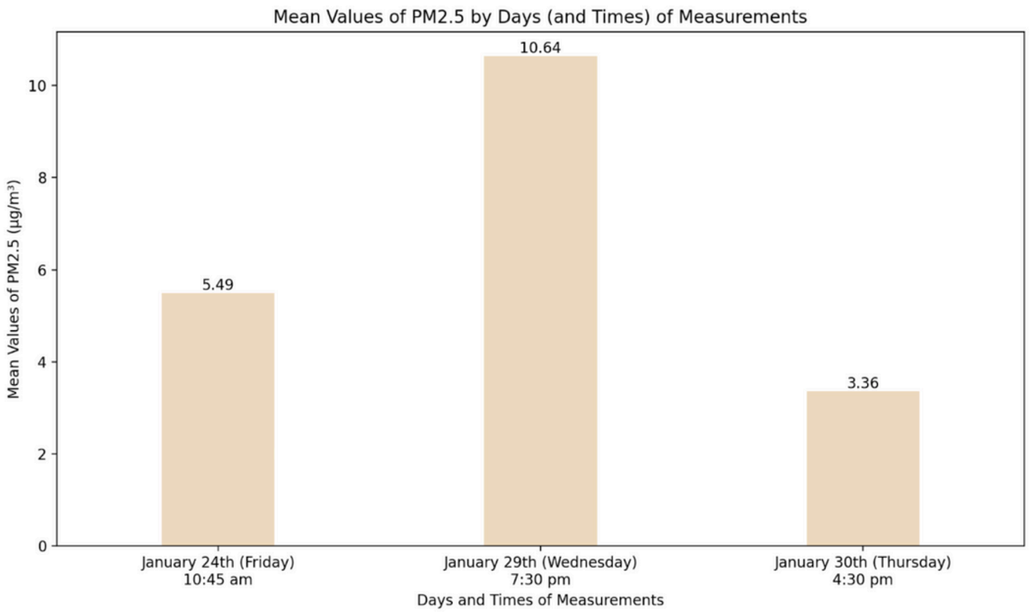


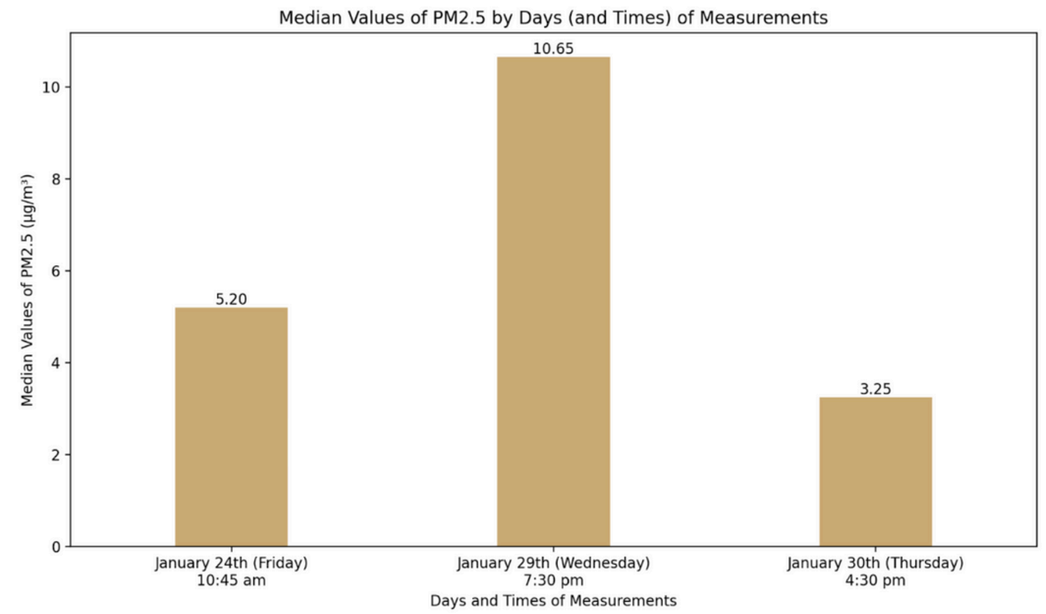
Boxplot comparison of PM2.5 concentrations of the location closest to Euston Road with the furthest point. Distributions show broadly similar median concentrations, with greater variability closer to the major road, indicating localised traffic influence rather than a strong spatial gradient.



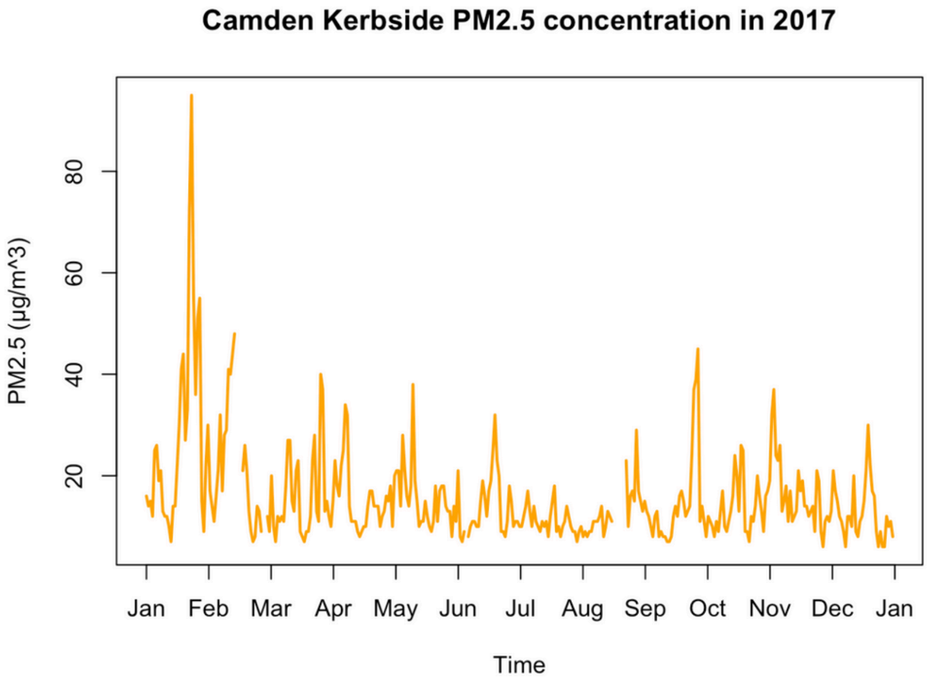


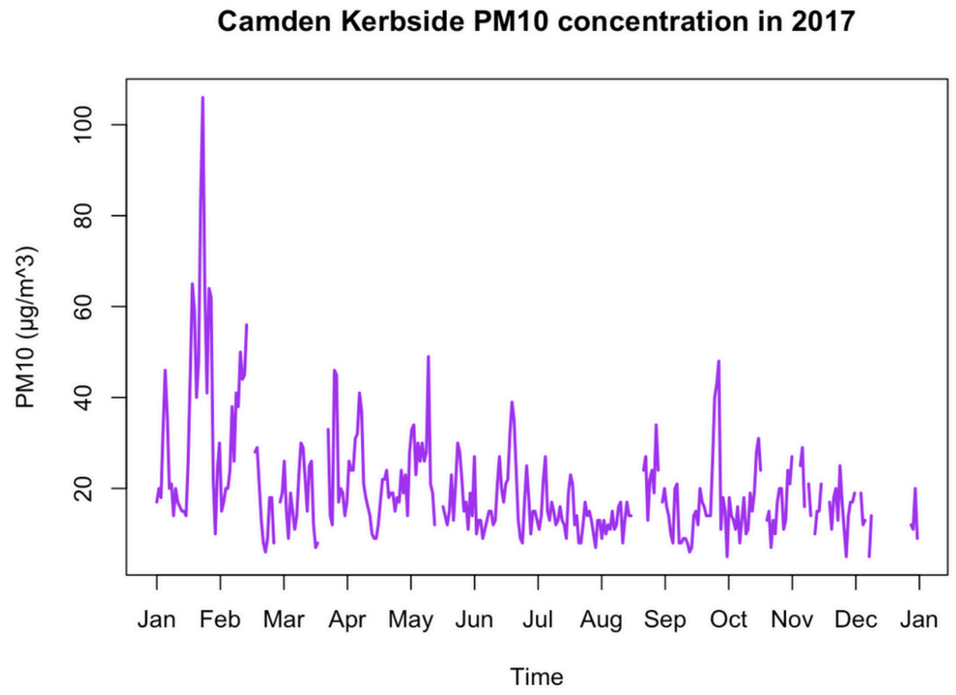
Overall mean (left) and median (right) PM2.5 concentrations across measurement points along Mabledon Place. Values show only minor spatial variation between locations, suggesting relatively uniform background air quality with limited attenuation away from the main road, Euston Road.



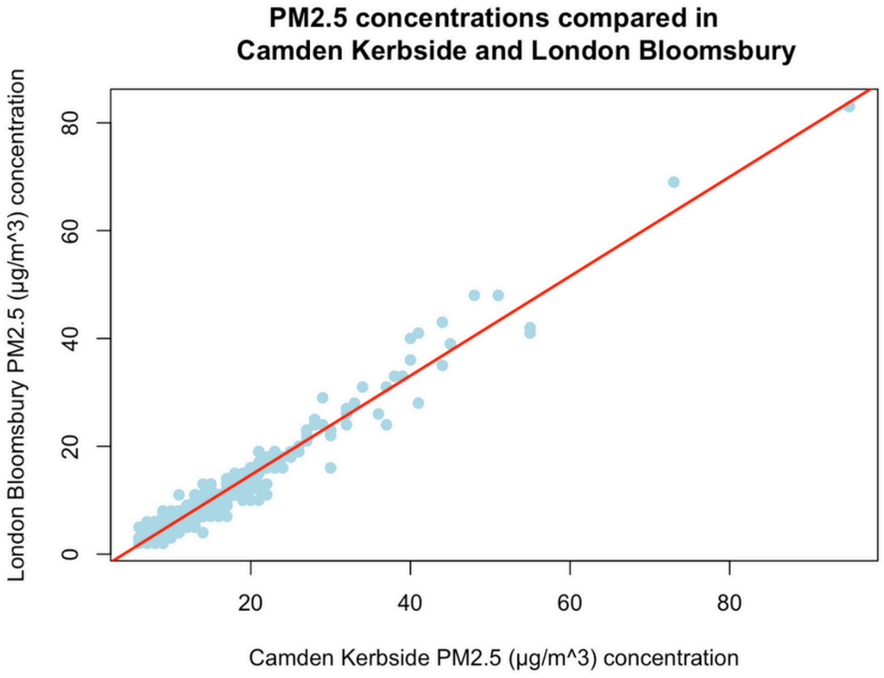


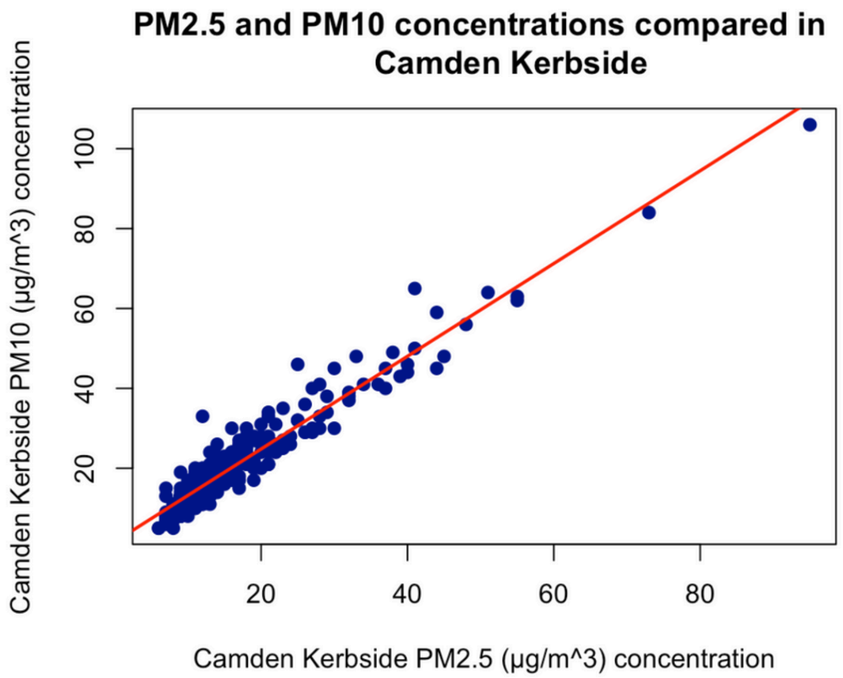
Mean (left) and median (right) PM2.5 concentrations by sampling day and time along Mabledon Place. Concentrations vary more strongly between measurement periods than between locations, with the highest values recorded during the evening sampling, indicating a temporal influence likely related to traffic intensity and atmospheric conditions.





Time series of kerbside PM2.5 (left) and PM10 (right) concentrations in Camden during 2017. Both pollutants show pronounced short-term peaks, particularly in winter, indicating episodic pollution events.





Scatter plot comparing PM2.5 concentrations at Camden Kerbside and London Bloomsbury (left), showing a strong positive linear relationship, and the relationship between PM2.5 and PM10 at Camden Kerbside (right).