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The influence of tree stands and a noise barrier on near-roadway air quality

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Abstract: (Your abstract must use **Normal style** and must fit in this box. Your abstract should be no longer than 300 words. The box will 'expand' over 2 pages as you add text/diagrams into it.)

Prediction of air pollution exposure levels of people living near or commuting on roadways is still very problematic due to the highly localized nature of traffic intensity, fleet composition, and extremely complex air flow patterns in urban areas. Both modelling and field studies have suggested that noise barriers can lower traffic-related air pollution in near-road areas immediately downwind of the barrier, though very little is known about the effect of barriers under other wind conditions. The effect of trees on near-roadway air quality also remains very uncertain. If both noise and vegetation barriers consistently improve local air quality, this may be a mitigation strategy of interest for urban development. However, the situation may be complicated by the possibility of these barriers trapping some of the pollution under certain wind directions as well as the configuration structure of the barrier. In this study, we have investigated the effect of a sound barrier and trees on ultrafine particle (UFP) concentrations in three near-roadway communities of North Carolina. One site has a sound barrier wall while the other two have a single row of trees along the road. All sites have a nearby open field without the trees/noise barriers which served as a reference. The field measurements were conducted for two weeks at each of the three sites under different meteorological conditions. The measurements were carried out using a mobile laboratory and two stationary sites, one in an open area near the road, the other behind the barrier. We will report the measured UFP and CO concentrations and discuss the effect of the barriers on the near-roadway concentration of these pollutants, and discuss potential ramifications for population exposures and adverse health effects. This study confirmed that a noise barrier led to a consistent reduction of traffic-related UFPs under multiple wind conditions. The thin evergreen and deciduous tree stands yielded variable results, with UFP concentrations behind the trees sometimes lower and sometimes higher relative to the clearing.