

1.015 Mobile measurements reveal high NO₂ and ammonia concentrations in German inner cities.

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Abstract:

Despite a number of regulatory measures by the European Union, the air quality in Germany is only slowly improving. Especially the concentration of nitrogen dioxide (NO₂) remains hazardously elevated. Although the concentrations of pollutants are monitored by measurement stations, the spatial coverage of the data is poor. Our measurements in German inner cities with MobiLab, the mobile laboratory of Forschungszentrum Jülich, reveal high peak concentrations of nitrogen oxides and other pollutants.

NO₂ is either directly emitted from Diesel engines with oxidation catalysts or produced by titration of NO with the available ozone. The highly time resolved data also enable the determination of emission ratios by normalizing the values to CO₂. As cars have been identified as main NO_x sources in German cities, an increasing number of Diesel engines are equipped with selective reduction catalysts (SCR) to diminish NO_x emissions.

However, tunnel data obtained from MobiLab measurements show that ambient temperature impacts the traffic emission of nitrogen oxides (NO_x) and that the average emission ratio of a car fleet in winter is one and a half times the summer value. NO₂ contributes between 10% to 40% to the total NO_x emission. In addition, efforts to reduce nitrogen oxide emission in Diesel cars by means reduction catalysts (SCR) can result in the release of ammonia (NH₃) which was observed to reach concentrations of up to 1 ppm in inner cities. Taking account the increasing number of cars with SCR catalysts the importance of ammonia as pollutant in German inner cities is expected to increase.