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Characterization of on-road vehicle emissions in the Mexico City Metropolitan Area using a mobile laboratory in chase and fleet average measurement modes during the MCMA-2003 field campaign

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Abstract. A mobile laboratory was used to measure on-road vehicle emission ratios during the MCMA-2003 field campaign held during the spring of 2003 in the Mexico City Metropolitan Area (MCMA). The measured emission ratios represent a sample of emissions of in-use vehicles under real world driving conditions for the MCMA. From the relative amounts of NO_x and selected VOC's sampled, the results indicate that the technique is capable of differentiating among vehicle categories and fuel type in real world driving conditions. Emission ratios for NO_x, NO_y, NH_3, H_2CO, CH_3CHO, and other selected volatile organic compounds (VOCs) are presented for chase sampled vehicles in the form of frequency distributions as well as estimates for the fleet averaged emissions. Our measurements of emission ratios for both CNG and gasoline powered "colectivos" (public transportation buses that are intensively used in the MCMA) indicate that – in a mole per mole basis – have significantly larger NO_x and aldehydes emissions ratios as compared to other sampled vehicles in the MCMA. Similarly, ratios of selected VOCs and NO_y showed a strong dependence on traffic mode. These results are compared with the vehicle emissions inventory for the MCMA, other vehicle emissions measurements in the MCMA, and measurements of on-road emissions in U.S. cities. We estimate NO_x emissions as 100 600±29 200 metric tons per year for light duty gasoline vehicles in the MCMA for 2003. According to these results, annual NO_x emissions estimated in the emissions inventory for this category are within the range of our estimated NO_x annual emissions. Our estimates for motor vehicle emissions of benzene, toluene, formaldehyde, and acetaldehyde in the MCMA indicate these species are present in concentrations higher than previously reported. The high motor vehicle

aldehyde emissions may have an impact on the photochemistry of urban areas.

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