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Greenhouse gases measurements in road tunnel in São Paulo Megacity, Brazil

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The Metropolitan Area of São Paulo (MASP) is the richest area in Brazil and is one of the largest megacities in the world, with more than 20 million inhabitants. The fleet, with more than 7 million vehicles, is unique in that most are fueled by ethanol or by a gasoline-ethanol (flex-fuel vehicles) mixture containing 75-78% gasoline (by volume) and 22-25% ethanol (a blend referred to as gasohol). Nowadays, approximately 50% of the fuel burned by the fleet is ethanol. The vehicular emissions are responsible for approximately 98, 97, and 96%, respectively, of all emissions of carbon monoxide (CO), hydrocarbons (HCs) and nitrogen oxides (NO_x). In addition, the fleet is the largest source of CO_2 emissions in the MASP. The goal is to evaluate of the vehicles emissions of the pollutants and greenhouse gases (CH4 and CO_2) in the MASP. The gases carbon dioxide and methane were carried out by Picarro G2301 Analyzer for CO_2/CH4/H_2O in air. Field measurements were carried out in two road tunnels within the MASP: May 2 to 13, 2011 in the Janio Quadros (JQ) tunnel and from July 04 to 19, 2011 in the Rodoanel (RA) tunnel. The JQ tunnel is located in the southwest portion of São Paulo. It is a two-lane tunnel that is 1900 m in length, and the traffic in both lanes flows in the same directions. The in-tunnel emissions are mainly from gasohol- and ethanol-powered vehicles. The RA tunnel is located in the West portion of the city and different from JQ tunnel. It is 1700m in length and carries gasohol, ethanol and diesel powered vehicles, being that approximately 40% of the heavy-duty (burning diesel) in its four-lane. The results showed that the effects of the number and velocity of the vehicles in the variability of greenhouse gases and pollutants. The carbon dioxide reaching the hourly maximum value of 550 ppm in-inside the JQ tunnel, and 900 ppm in-side the RA tunnel.