

# Influence of the traffic on the black carbon particle mass concentration and particle number size distribution in La Paz, Bolivia

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Results from an intensive campaign carried in La Paz (16°30'13.83"S; 68° 7'45.56"W; 3580 m a.s.l.) Bolivia are presented on this work. Particle size distribution was measured using a Mobility Particle Size Spectrometer (following Wiedensohler et al.; 2012), whereas the particle mass concentration of black carbon (BC) was measured using a Multi Angle Absorption Photometer (MAAP). In addition meteorological parameters as well as CO concentration were collected. The instruments were set up at the Planetarium of University Mayor de San Andres, La Paz, Bolivia. The building is located beside a road with heavy traffic. Since La Paz is located in a valley reaching from approximately 3200 to 4000 m a.s.l., cars and trucks are operated on a high load when driving uphill.

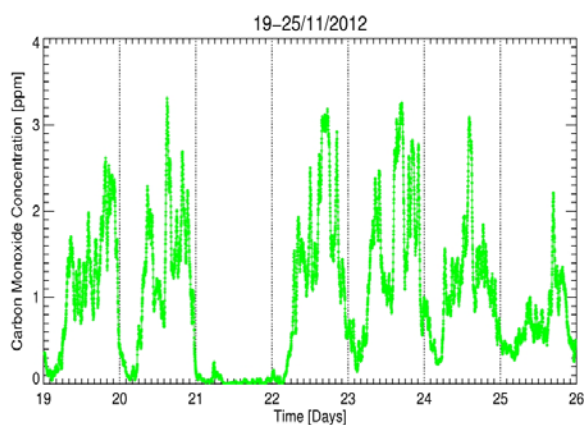


Figure 1: Carbon monoxide gas concentration for the week November 19 to 25, 2012.

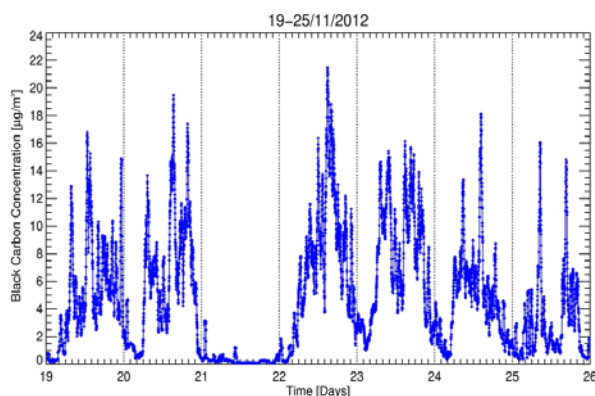


Figure 2: Black carbon particle mass concentration for the week November 19 to 25, 2012.

La Paz and El Alto (located at approximately 4000 m a.s.l.) are two of the major cities in the region. There are no other larger settlements in the surrounding. During November 21, 2012, the whole traffic was banned because of a national census in both cities, giving us the opportunity to study the influence of the traffic on the black carbon particle mass concentration, the particle number size distribution as well as the carbon monoxide gas concentration.

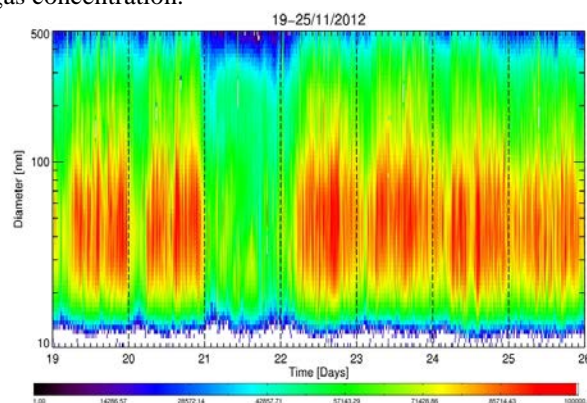


Figure 3: Particle number size distribution for the week November 19 to 25, 2012.

As seen from Figure 1, on November 21, 2012, the carbon monoxide gas concentration dropped to a value near Zero ppm from around 2ppm, during workdays November 19 -20 and 22-23, 2012. This indicated that due to the traffic ban, almost all sources of incomplete combustion have been switched-off. Figure 2 illustrates the same behavior for the BC particle mass concentration, meaning that BC was almost exclusively produced by the traffic. During regular working days, peaks of BC particle mass concentration were around  $15 \mu\text{g}/\text{m}^3$ , whereas on November 21, 2012, the values were clearly below  $1 \mu\text{g}/\text{m}^3$ . In Figure 3, a contour plot of the particle number size distribution of the week November 19 to 25, 2012 is shown. The red color illustrates high, whereas green and blues describe low particle number concentrations. Again, on November 21, the concentrations drop drastically, demonstration that the major fraction of the aerosol in the city of La Paz is produced by traffic.

Wiedensohler, A. et al. (2012). Mobility Particle Size Spectrometers: Harmonization of Technical Standards and Data Structure to Facilitate High Quality Long-term Observations of Atmospheric Particle Number Size Distributions. *AMT* 5, 657–685.