Measurements of Total Gaseous and Particulate Mercury at T0 and T1 sites during the MILAGRO Campaign

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Abstract

Continuous measurements of total gaseous mercury (TGM) were carried out during the MILAGRO Campaign at two sites in the Mexico City Metropolitan Area. T0 site is in the urban area (Latitude 19.48º and longitude -99.14º, Instituto Mexicano del Petróleo) and T1 site is in the suburban area (Latitude 19.70º and longitude -98.98º, Tecámac University). Data were obtained by using a continuous Ultra-Trace Mercury Vapour Analyzer (Tekran Model 2537A) at each site.

Also, mercury in the particulate phase was determined at these sites during the same period. For this purpose, PM2.5 and PM10 samples were simultaneously collected every other day (one diurnal and one nocturnal sample), using Andersen and Wedding Hivol samplers. Chemical speciation including Hg was performed by ICP-MS, Ion Chromatography and Thermal Optical Reflectance.

The average concentrations of TGM at T0 and T1 were 6.62 ng/m^3 and 4.96 ng/m^3, respectively. TGM concentrations were generally higher at T0 than at T1. Also, at both sites the TGM concentrations show a diurnal tendency. A good correlation of TGM concentrations was obtained during an intercomparison of both equipments at T0, using data with a 5 minute time resolution from two consecutive days (R^2 = 0.88). Other analyses were done at each site between TGM, criteria air pollutants and meteorological parameters to facilitate the future identification of possible sources of mercury.

At T0 the highest Hg concentration during the diurnal period was 0.26 ng/m^3 in PM10, and 0.16 ng/m^3 in PM2.5, meanwhile at T1 the respective concentrations were 0.17 ng/m^3 and 0.10 ng/m^3. During the night period, the maximum concentration at T0 was 1.20 ng/m^3 in PM10 and 0.4 ng/m^3 in PM2.5, whereas at T1 it was 3.6 ng/m^3 and 2.67 ng/m^3, respectively. Statistical analysis was performed, and good correlations were observed between Hg, V, Zn, Ta and Ga at T0 for night periods (R^2 > 0.70).