

Mercury concentrations in Central Amazon Basin

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As part of the GMOS (Global Mercury Observation System), concentration of GEM, PBM and GOM were measured in Central Amazonia from January 2012 to February 2015. The site is located in a very remote site, upwind from the Manaus urban area, inside the campus of the Embrapa Amazonia oriental at 2.89 S, 59.97 W, and 100m altitude. Most of the air masses that reach the site comes from Tropical Atlantic, and travels for about 1,500 Km over pristine forest before reaching the site. Figure 1 shows the yearlong air mass trajectories reaching the site.

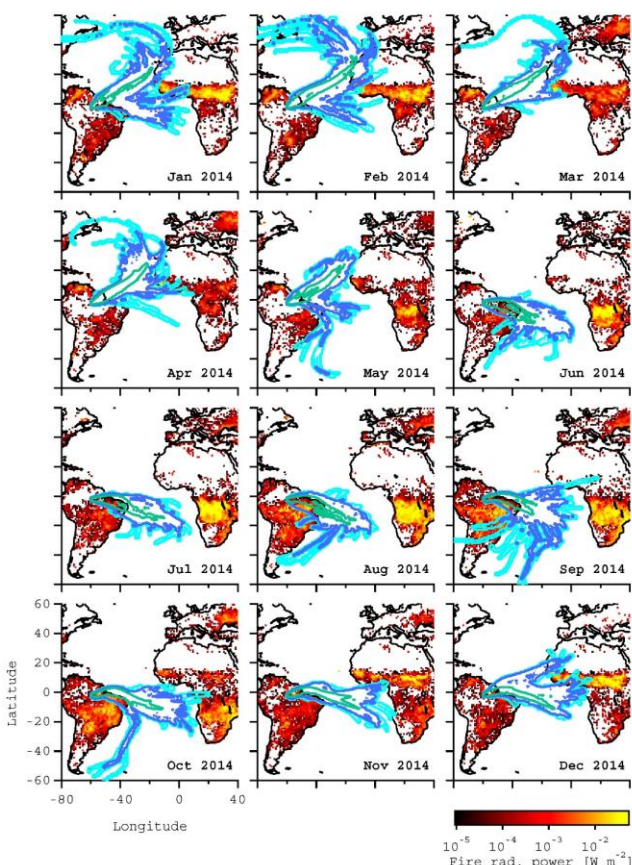


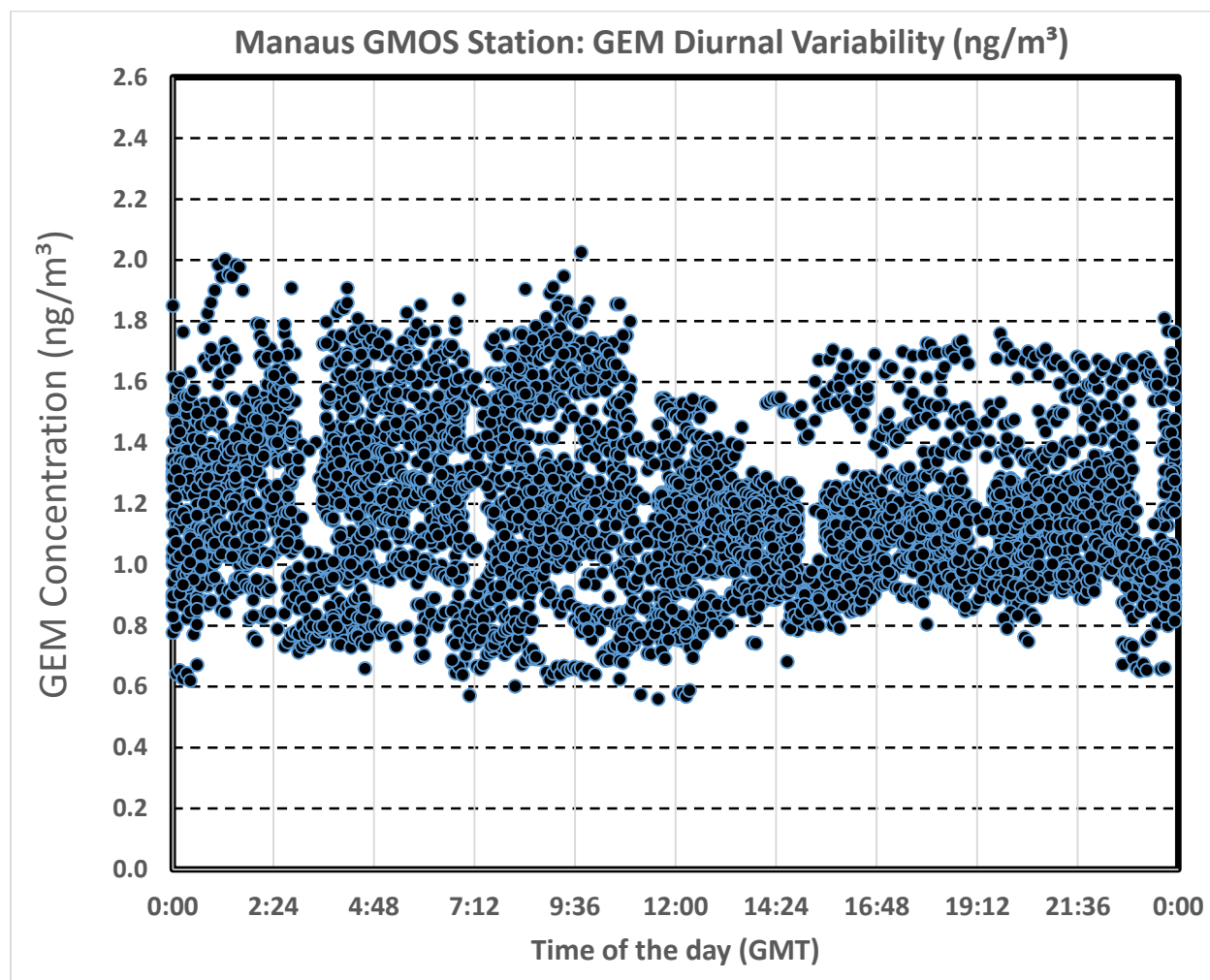
Figure 1 - Location of the GMOS sampling site in Central Amazonia. Also show is the back trajectory frequency plots and satellite fire maps for ATTO site in 2014. Back trajectories (9 days) have been calculated with HYSPLIT (NOAA-ARL, GDAS1, start height 1000 m). Frequency plots are based on monthly trajectory ensembles. Color-coding of frequency plots: >10 % (green), >1 % (blue), >0.1 % (cyan). In addition, it can be observed the monthly fire map derived from GFAS (Global Fire Assimilation System) and averaged to 1 degree grid resolution (Kaiser et al., 2012). Figure adapted from Andreae et al., 2015.

At the same GMOS site, a Raman Lidar operated during the whole period providing the vertical aerosol distribution and an AERONET sunphotometer provides aerosol optical depth. They are useful to show the impact of biomass burning aerosol and Sahara dust episodes over the site. The GMOS site is very close to other two sites where several trace gases, aerosols and

cloud properties are being monitored. Ozone, CO, CO₂, VOCs, are the main trace gases species, as well as aerosol properties such as aerosol size distribution, optical properties (multi wavelength scattering and absorption), aerosol composition using Aerosol Mass Spectrometers and filters among many others.

The Tekran ambient Hg measurement system consist of a Tekran 2537B automated continuous Mercury vapor analyzer, based on Cold Vapor Atomic Fluorescence CVAFS. This system is coupled with a Tekran 1130 continuous reactive gaseous mercury module with a quartz annular denuder and an integrated zero air generator associated with a Tekran model 1135 continuous particulate mercury module that includes a quartz regenerable filter pack. . The system was setup to measure GEM (Gaseous Elemental Mercury), PBM (Particulate Bound Mercury, HgP), and GOM (gaseous Oxidized Mercury).

Figure 2 shows the diurnal variability of the measured GEM at the Manaus GMOS site. No diurnal variability can be observed and also no seasonal variability was observed. No evidence of increases during the biomass season could be observed. The average GEM concentration was 1.52 ng/m³, and the median value was 1.13 ng/m³.



After about 3 years of continuous measurements, from the total of 34,800 values measured, only 6,616 values (19%) were collected with no flags, meaning validated values for GEM. For PBM and GOM, less than 10% of the values were observed with no instrumental flags. Figure 3 shows the time series of the observed validated values for GEM.

