Measurements of Ambient Mercury and Related Species at the Mauna Loa Observatory 2002-2008

L. Alvarez-Aviles[1], M.S. Landis[1], D. Kuniyuki[2] and A. Colton[1,2]

[1]U.S. Environmental Protection Agency, 109 T.W. Alexander Drive, Research Triangle Park, NC 27711; 919-541-3330, E-mail: Alvarez-Aviles.Laura@epamail.epa.gov
[2]NOAA Earth System Research Laboratory, Mauna Loa Observatory, Hilo, HI 96720

EPA ORD and NOAA ESRL initiated measurements of gaseous elemental mercury (Hg^0), divalent reactive gaseous mercury (RGM), and particulate bound mercury (Hg(p)) in 2002 at the Mauna Loa Observatory (MLO). Collocated elemental carbon, O_3 and SO_2 measurements were subsequently initiated in 2004. NOAA ESRL O_3 data was used to complete our data set from 2002 - 2004. Hg^0 concentrations ranged between 0.3 and 2.9 ng m^{-3}, and average ± standard deviation was 1.6 ± 0.5 ng m^{-3}; Hg(p) concentrations ranged between 1 - 1900 pg m^{-3}, and RGM ranged between 0.6 - 360 pg m^{-3}. Periods when Hg(p) is anti-correlated to Hg^0 are also periods when ozone is anti-correlated to Hg^0 (2002 - 2003), suggesting that air masses sourcing ozone differ from that of Hg^0, possibly of stratospheric origin. The majority of SO_2 impacting Mauna Loa is expected to be of volcanic origin. SO_2 correlation with Hg^0 suggests that we observed significant Hg^0 during periods of volcanic activity, while anti-correlation periods indicate long distance transport influences for Hg^0 in contrast to the more regional volcanic influences for SO_2. Elemental carbon is a good indicator of anthropogenic sources and is mostly correlated to Hg^0, suggesting that most Hg^0 observed at MLO is of anthropogenic origin. This study is still in early stages of data analysis and validation, a complete presentation of the data and detailed analysis will be presented.

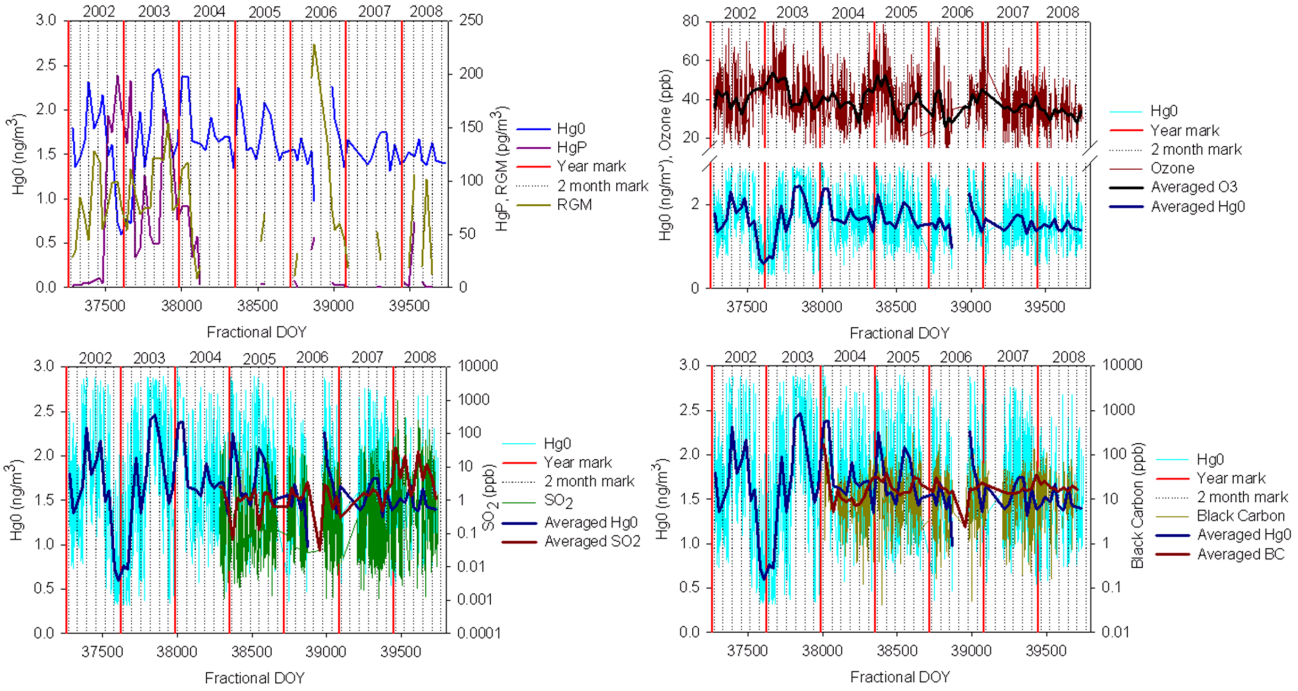

Figure 1. Hg^0, HgP, RGM, ozone, SO_2 and black carbon concentration trends in Mauna Loa, Hawaii in 2002 – 2008. The solid thick lines represent the monthly average and the lighter solid line is the 3 hour resolution measurement for the chemical specie.