

Measurements of Mercury and Ancillary Species at NOAA's Mauna Loa Observatory

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In January 2011 NOAA's Air Resources Laboratory assumed oversight of speciated atmospheric mercury measurements at the Mauna Loa Observatory (MLO), and the site joined NADP's Atmospheric Mercury Network (AMNet). MLO is one of six NOAA baseline monitoring stations for the study of the background global atmosphere, and is located at an elevation of 3,397 m on the northern slope of the Mauna Loa volcano on the Big Island of Hawaii. A single Tekran speciation system measures gaseous elemental mercury (GEM), gaseous oxidized mercury (GOM), and particulate-bound mercury (PBM) with nominal 1-hr resolution. Since 2011, measurements of ozone (O₃), sulfur dioxide (SO₂), and carbon monoxide (CO) were added, and the collection of aerosols for ⁷Be analysis was instituted.

The site is an ideal high-altitude location from which to monitor the global background atmosphere. Free atmospheric flow at the elevation of MLO is typically from the east and northeast (trade wind circulation), with local upslope (daytime: 0800-2000 HST) flow mainly from the east through northwest and downslope (nighttime: 2000-0800 HST) flow from the southeast through southwest superimposed on the larger-scale flows. Results of the mercury measurement program to date will be presented, and interpreted with respect to atmospheric circulation and dynamics, long range transport, and mesoscale flows. Relationships between and among mercury compounds and other trace gas and aerosol species, as well as physical meteorological parameters, will be examined to infer key aspects of the atmospheric mercury cycle in the lower and middle free troposphere. Finally, mercury measurement challenges at MLO will be presented and discussed.