of GOM exist in the atmosphere. Each has unique chemical and physical properties. Understanding the relative abundances and properties of GOM in the atmosphere is critical for assessing the potential impacts on human and ecological health. A newly developed active system that determines the chemical compounds and concentrations of GOM was deployed with triplicate nylon and cation exchange membranes, respectively. Membranes were deployed and collected at highway, free-troposphere, and agricultural impacted sites. Nylon membranes are used to estimate potential GOM compounds using thermodesorption, and cation-exchange membranes assumed to be a surrogate for GOM compounds. The objective of this study was to understand the chemistry, concentrations, and spatial and temporal distribution of GOM in the atmosphere at these three locations. Thermodesorption profiles for specific GOM compounds were generated using a laboratory system consisting of a custom-built eight-port manifold system. GOM profiles developed in the laboratory were created from permeation of GOM from solid compounds: HgCl2, HgBr2, HgO, Hg(NO3)2, and HgSO4. Specific compound profiles were compared to those developed from samples collected from the field. Results indicate different compounds of GOM vary across space and time, and that different Hg reactions are occurring at different sites. GOM concentrations were observed to be 33% higher at the free-troposphere site compared to the highway-impacted site. In addition, at the highway-impacted site, concentrations of GOM from the cation-exchange membranes were higher than those obtained using a Tekran® 1130 unit, adjacent to the active system. Accurate atmospheric concentration and chemistry measurements of this global contaminant are necessary to assess environmental impacts.

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POLE-TO-POLE OBSERVATIONS OF ATMOSPHERIC MERCURY IN THE MARINE BOUNDARY LAYER OVER THE PACIFIC AND THE SOUTHERN OCEAN

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Pole-to-Pole observations of atmospheric mercury in the marine boundary layer over the Pacific and the Southern Ocean

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Anthropogenic emission is the major source of the atmospheric mercury (Hg) which ends up being deposited on the surface and converted to toxic methylated Hg. In the food chain of the marine ecosystem this accumulates gradually and may critically affect final consumer, human beings. Covering 70% of the Earth surface, Hg concentration and species in the marine boundary layer (MBL) give us an idea of how much Hg ends up being deposited on the ocean surface. Automated analyzing system for Hg species were mounted onboard Araon, the first Korean Ice-breaking research vessel, and surveyed from the Arctic Ocean to the Ross Sea and the Amundsen Sea in the Southern Ocean along the meridional cruise transect, starting from 2011. Although the instrument can measure 3 different species of gaseous elemental Hg (GEM), reactive gaseous Hg (RGM), and particle bounded Hg (PBM), we mainly focus here on total gaseous Hg (TGM) which is composed of primarily GEM with trace amount of RGM. TGM in the MBL shows strong north-south gradient along the meridional cruise transect with higher concentrations in the Northern Hemisphere indicating the strong impact of anthropogenic emission. Zonal separation of the TGM distribution is clearly visible in the northern hemisphere (NH) and gradual decrease in the southern hemisphere (SH), supporting significant emission by human activities. To our surprise, TGM in the Amundsen Sea and the Ross Sea which are located in the far southern latitudes was approximately 0.4 ng/m3 larger than that in the mid-latitudes of the SH. In case of the Arctic Ocean, TGM was relative lower than that in the mid-latitudes of the NH, which is opposite to the meridional distribution in the SH.

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FIELD INVESTIGATIONS OF RGM AND FINE PARTICULATE HG MEASUREMENT BIAS USING DUAL TEKRAN ANALYZERS

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The Southeastern Aerosol Research and Characterization (SEARCH) network operates Tekran Hg speciation analyzers at 3 sites in the southeastern U.S.: Yorkville, GA; Birmingham, AL and near Pensacola, FL. Each site routinely measures elemental Hg (Hg0), fine particulate Hg (HgPM2.5) and reactive gaseous mercury (RGM) every other hour. In addition to the routine analyzer, the FL site has a second Hg analyzer that has been used, over time, to: 1) assess analyzer precision; 2) obtain continuous hourly measurements; 3) estimate coarse particulate Hg concentrations; and 4) evaluate interferences with speciation measurements due to ozone and other trace gases. For interference testing, the two Hg analyzers were operated synchronously and the inlet to the collocated analyzer was modified with a side tap to permit addition of a relatively small (50 sccm) drip of potentially interfering gases into the sample stream. In the first set of tests, the gases used were O3, SO2, NO and NO2, singly and in combination. Concentrations of each gas were such as to raise the total concentration in the sample stream by 25