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Overview of atmospheric mercury measurement uncertainties

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The Tekran® mercury (Hg) speciation system has been widely applied to measure atmospheric gaseous element Hg (GEM), gaseous oxidized Hg (GOM), and particle-bound Hg (PBM) since 2002, and "Total Gaseous Hg (TGM)" since ~1995. GEM concentrations measured using this system are considered reliable (~90%); however, the uncertainties associated with the GOM and PBM concentrations are high (30-60%). Recent studies have reported the system underestimates GOM concentrations (2-to-3-fold) in ambient air, and the KCl-coated denuder captures GOM compounds with different efficiencies. Ozone and humidity, in limited work, have been suggested to reduce the ability of KCl-coated denuder to capture GOM. It has been demonstrated that filter-based PBM concentrations were ~20% higher than that measured by Tekran® system. Therefore, it is important to investigate potential interferences and limitations associated with data developed using the current method, so that we can calibrate the measurements made over the past ~10 years. In addition, there are concerns and debates as to whether data collected using the Tekran® 2537 alone represent TGM measurements. Passive samplers for measurement of ambient air Hg concentrations and dry deposition have become popular over the last decade; these methods have been successfully applied to understand temporal and spatial patterns. However, there are no current standard methods for calibrating passive samplers, and this is further confounded by the fact that the chemistry and processes forming GOM compounds are not fully understood. Therefore, it is still a challenge to explain the data collected using passive samplers.

Biography

Mae Sexauer Gustin is a Professor in the Department of Natural Resources and Environmental Science and a Foundation Professor at the University of Nevada-Reno, USA. Her primary research focus is the environmental fate and transport of mercury with more recent work on atmospheric ozone. She received her B.S., M. Sc., and PhD degrees in Geology/Geosciences from Guilford College-NC, University of North Carolina-Chapel Hill, and University of Arizona, respectively.

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