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Supporting Information for

An Application of Passive Samplers to Understand Atmospheric Mercury Concentration and Dry Deposition Spatial Distributions

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Analytical Methods

Clean GcQFFs were stored in new acid-cleaned plastic Petri dishes sealed with parafilm and Teflon tape in double-zipped bags, stored in a freezer at –10°C. All GcQFFs used in this study were new and coated a week before use. After sampling, GcQFFs were returned to new acid-cleaned Petri dishes and frozen until analysis by thermal desorption CVAFS. Before heating, the Hg level in the chamber was verified to be below 0.5 ng m^{-3}. After sampling, all IEMs were immersed into 45 mL DI water, and treated as aqueous samples (EPA method 1631 version E). Hg was quantified using a Tekran 2600 as described by Huang et al. (2011b).

Quality Assurance/Quality Control

The thermal desorption system was calibrated using saturated Hg vapor injections from a Tekran Model 2505 primary calibration standard. The injections were made using a Hamilton Company (Reno, NV) Model 1702RN National Institute of Standards and Technology (NIST) traceable airtight digital syringe. The calibration curve was validated using NIST standard reference materials (SRM) 1633b coal fly ash and diluted NIST1641d (aqueous Hg, $HgCl_2$). The Hg recovery from SRM 1633b and 1641d was 85 ± 12 and 95 ± 6%, respectively. SRM 1641d was also diluted to 0.5, 1, 5, 25, and 100 ppt to calibrate the Tekran 2600 (sample concentrations were 24 ± 31 ppt). Recovery was 99%. The initial and on-going precision and recovery were measured after every twelve samples and ranged from 90 to 110%. Field blanks results were similar with those found in a previous study (Lai et al., 2011).

The relative percent difference of collocated GcQFF samples and the range of standard deviations of collocated IEM samples were 33 ± 30% and 13-32%, respectively (Figure 2). Lai et al. (2011) reported no significant ($\alpha = 0.05$) difference between collocated GcQFF measurements using the same surrogate surface. The Hg mass captured on GcQFFs samples ranged from 1.1-5.2 ng with two ~ 0.75 ng. The average field blank was 0.17 ± 0.08 ng. Therefore, the Hg mass on blanks was 23% of those collected on the lowest two samples. For IEMs, the blanks were less than 10%, 20-30%, and 20-50% of actual samples for the GTC, ROC, and HF sites (Table 2).

Huang J, Liu Y, Holsen TM. Comparison between Knife-edge and Frisbee-shaped Surrogate Surfaces for making Dry Deposition Measurements: Wind Tunnel Experiments and Computational Fluid Dynamics (CFD) Modeling. Atmospheric Environment 2011.

Lai S-O, Huang J, Hopke PK, Holsen TM. An evaluation of direct measurement techniques for mercury dry deposition. Science of The Total Environment 2011; 409: 1320-1327.