Supporting Material for

Seasonal Changes in Gaseous Elemental Mercury in Relation to Monsoon Cycling over the Northern South China Sea

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This PDF file includes

Figure S1-S5; Table S1
Fig S1 Schematic of GEMA with two-channel analysis for GEM determination in natural airs. 1. sampling introduction device; 2. six-way injection valves (injection-V1, -V2, -V3); 3. atomic fluorescence spectrometer (AFS, Tekran 2500); 4. personal computer for data acquisition  (Adopted from Tseng et al. 2010, JAAS).

Table S1 Figures of merit of the GEMA

<table>
<thead>
<tr>
<th>Characteristic items</th>
<th>GEMA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Potential Hg speciation</td>
<td>Reactive gaseous, particulate and organo-Hg</td>
</tr>
<tr>
<td>Trap efficiency (%)</td>
<td>~100</td>
</tr>
<tr>
<td>Accuracy (%)</td>
<td>110±10</td>
</tr>
<tr>
<td>Absolute detection limit (pg)</td>
<td>1</td>
</tr>
<tr>
<td>Method detection limit (ng m⁻³)</td>
<td>0.1 (10 L of sample)</td>
</tr>
<tr>
<td>Calibration range</td>
<td>Wide dynamic (pg to ng)</td>
</tr>
<tr>
<td>R. square (n=5)</td>
<td>≥ 0.995</td>
</tr>
<tr>
<td>Reproducibility (%)</td>
<td>≤ 5</td>
</tr>
<tr>
<td>Flow rate (L min⁻¹)</td>
<td>0.5-1</td>
</tr>
<tr>
<td>Sample cycle time</td>
<td>15 min ~ hours</td>
</tr>
<tr>
<td>Memory effect at 3 ng Hg⁰</td>
<td>No</td>
</tr>
<tr>
<td>Interference from water vapor</td>
<td>No</td>
</tr>
<tr>
<td>Versatile/Practical Feasibility</td>
<td>Multi-trap applications, multifunctional Hg speciation analysis</td>
</tr>
</tbody>
</table>
Figure Supplementary 2 (Fig. S2)

(a) Back trajectories Cruise-series GEM Daily average Diurnal average

OR1-682 (May 19~20 '03)

OR1-690 (Aug 5~10 '03)

OR1-696 (Oct. 3~7 '03)
Fig. Supplementary 2 (to be continued)

(b) Back trajectories  
Cruise-series GEM  
Daily average  
Diurnal average

OR1-705  
(Dec. 14~19 '03)

OR1-711  
(Mar 10~18 '04)

OR1-717  
(May 3~8 '04)

Mean = 3.0±0.4 (n=6)
Mean = 3.9±0.4 (n=7)
Mean = 6.8±0.5 (n=6)
Fig. Supplementary 2 (to be continued)

(c) Back trajectories

OR1-726 (Aug 3~8 '04)

OR1-736 (Nov 5~11 '04)

OR1-743 (Jan 20~22 '05)

Cruise-series GEM

Daily average

Diurnal average

Mean = 2.9±0.3; n=5 (days)

Mean = 3.7±0.6; n=6 (days)

Mean = 5.6±0.2; n=3 (days)

Cruise-series GEM

Daily average

Diurnal average

Mean = 2.9±0.3; n=5 (days)

Mean = 3.7±0.6; n=6 (days)

Mean = 5.6±0.2; n=3 (days)
Fig. Supplementary 2 (to be continued)

(d) **Back trajectories**

- **FR1-34** (July 26–Aug 01 ’05)
- **OR1-773** (Nov 7–14 ’05)
- **OR1-780** (Dec 23–30 ’05)

**Cruise-series GEM**

- Mean = 3.1 ± 0.2 (n=7)
- Mean = 3.0 ± 0.5 (n=8)
- Mean = 5.1 ± 0.5 (n=8)

**Daily average**

- Mean = 3.1 ± 0.2 (n=7)
- Mean = 3.0 ± 0.5 (n=8)

**Diurnal average**

- Mean = 5.1 ± 0.5 (n=8)

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**Fig S2** Summary of temporal GEM variations with related information over the northern SCS obtained during the study period from 2003 to 2005. *Blue frame* denotes GEM measurements obtained at the SEATS station.
Fig S3 Summary of seasonally diurnal GEM variations over the northern SCS obtained during the study period from 2003 to 2005. Data points are indicated as averages ±1 standard deviations and red trend lines made by non-linear regression analyses.
Fig Supplementary 4 (S4)

Multiple Comparison Graph

Symbol indicates significant difference.

Fig S4 Seasonal differences in the mean values were statistically significant (p<0.001) estimated by One Way ANOVA-Fisher LSD method for all pairwise multiple comparison procedures.
Fig. S5 A map of the mercury source inventory. (top) Spatial distribution of anthropogenic area/point sources and (bottom) biomass burning/volcano sources. The area sources represent emissions per 0.5 grid per year; the biomass emissions are emissions per 1 grid per 2 months. (Adopted from Li et al. 2006, JGR). Green dot denotes the SEATS station (circle).