

1 **Supplementary material**

2 Section 1. Tables

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4 Section 2. Figures

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6 **Table S1.** The concentration (pg m^{-3}) of each size-fractioned particulate mercury (Hg^{P}) in the South China Sea
7 (SCS) during our cruise.

Sampling time (Year/Month/Day)	Size range (μm)									Hg^{P} in PM_{10}
	< 0.4	0.4–0.7	0.7–1.1	1.1–2.1	2.1–3.3	3.3–4.7	4.7–5.8	5.8–9.0	9.0–10	
2015/9/4–6	3.03	1.69	2.90	2.47	2.04	1.72	1.55	1.46	1.39	24.35
2015/9/6–8	0.57	0.39	0.36	0.30	0.24	0.26	1.20	0.51	0.60	5.93
2015/9/8–10	0.67	0.65	0.48	0.88	0.52	1.04	0.89	0.49	0.50	8.15
2015/9/10–12	1.00	1.18	1.59	0.73	0.59	0.82	0.94	0.69	0.74	11.05
2015/9/15–17	0.33	0.21	0.45	0.18	0.41	0.50	0.50	0.74	0.60	5.23
2015/9/17–19	0.96	0.39	1.30	0.38	1.14	0.36	0.84	1.46	0.82	10.2
2015/9/19–21	0.46	0.32	0.13	0.49	0.29	0.34	0.29	1.13	0.41	5.15
2015/9/21–23	0.43	0.28	0.30	0.13	0.14	0.14	0.26	0.47	0.30	3.26
2015/9/23–25	0.97	0.68	1.02	1.15	0.99	0.88	0.89	0.92	0.82	11.09
2015/9/25–27	0.49	0.44	0.64	0.53	0.52	0.47	0.62	0.76	0.59	6.75
Average value	0.89	0.62	0.92	0.72	0.69	0.65	0.80	0.86	0.68	9.12

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10 **Table S2.** The dry deposition flux ($\text{ng m}^{-2} \text{d}^{-1}$) of each size-fractioned Hg^{P} in the SCS during our cruise.

Sampling time (Year/Month/Day)	Size range (μm)									Total dry deposition
	< 0.4	0.4–0.7	0.7–1.1	1.1–2.1	2.1–3.3	3.3–4.7	4.7–5.8	5.8–9.0	9.0–10	
2015/9/4–6	0.0785	0.0146	0.0251	0.1280	0.2644	0.2229	0.2009	0.6938	0.6605	2.2887
2015/9/6–8	0.0148	0.0034	0.0031	0.0156	0.0311	0.0337	0.1555	0.2424	0.2851	0.7846
2015/9/8–10	0.0174	0.0056	0.0041	0.0456	0.0674	0.1348	0.1153	0.2328	0.2376	0.8607
2015/9/10–12	0.0259	0.0102	0.0137	0.0378	0.0765	0.1063	0.1218	0.3279	0.3516	1.0718
2015/9/15–17	0.0086	0.0018	0.0039	0.0093	0.0531	0.0648	0.0648	0.3516	0.2851	0.8431
2015/9/17–19	0.0249	0.0034	0.0112	0.0197	0.1477	0.0467	0.1089	0.6938	0.3897	1.4459
2015/9/19–21	0.0119	0.0028	0.0011	0.0254	0.0376	0.0441	0.0376	0.5370	0.1948	0.8923
2015/9/21–23	0.0111	0.0024	0.0026	0.0067	0.0181	0.0181	0.0337	0.2233	0.1426	0.4588
2015/9/23–25	0.0251	0.0059	0.0088	0.0596	0.1283	0.1140	0.1153	0.4372	0.3897	1.2840
2015/9/25–27	0.0127	0.0038	0.0055	0.0275	0.0674	0.0609	0.0804	0.3612	0.2804	0.8997
Average value	0.0231	0.0054	0.0079	0.0375	0.0892	0.0846	0.1034	0.4101	0.3217	1.0830

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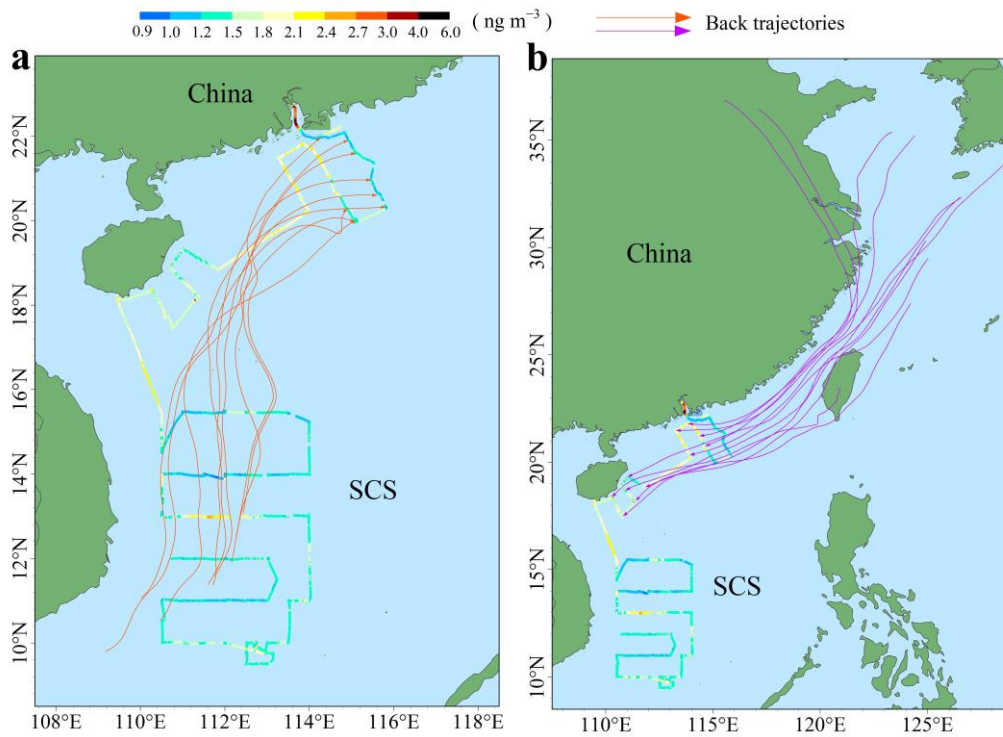
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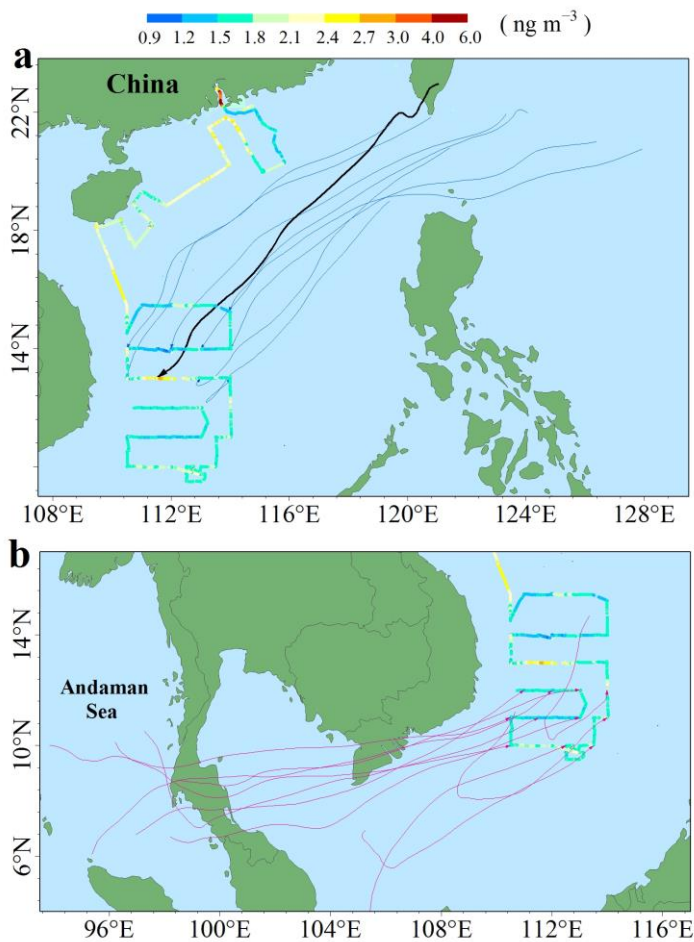
16 **Table S3.** Atmospheric GEM, surface seawater DGM and temperature (T_w), wind speed (u_{10}), saturation and
 17 air-sea flux of Hg^0 during our cruise.

Station	Position		Date and time (Year/Month/Day and Local Time)	Depth m	DGM $pg\ l^{-1}$	PAR $W\ m^{-2}$	GEM $ng\ m^{-3}$	T_w $^{\circ}C$	Wind speed u_{10} $m\ s^{-1}$	Saturation %	Flux $ng\ m^{-2}\ h^{-1}$
	Longitude $(^{\circ}E)$	Latitude $(^{\circ}N)$									
1	114.73	22.22	2015/09/05/10:15	44	57.8	152.19	1.86	27.3	7.3	1053	7.36
3	115.09	21.59	2015/09/06/04:15	94	41.4	0	1.16	29.2	7.8	1268	6.18
5	115.44	21.06	2015/09/06/08:10	123	37.0	86.76	1.33	29.2	7.3	993	4.73
8	115.63	20.64	2015/09/06/14:50	389	34.9	111.08	1.24	30.0	7.1	1021	4.26
10	115.81	20.33	2015/09/06/19:50	657	32.0	0	1.19	29.9	6.2	976	2.96
11	115.08	19.96	2015/09/07/14:50	960	30.4	88.62	1.26	30.2	5.4	881	2.11
13	114.90	20.28	2015/09/08/07:00	151	37.8	39.76	1.44	29.7	4.6	949	1.91
16	114.63	20.75	2015/09/08/15:30	85	33.0	21.35	2.37	29.7	7.5	501	3.97
18	114.36	21.23	2015/09/08/17:55	91	36.8	10.09	2.27	29.0	11.5	576	10.72
20	114.00	21.86	2015/09/08/23:25	33	66.8	0	2.39	26.4	5.0	927	3.91
21	113.28	21.49	2015/09/09/04:10	41	44.5	0	1.72	25.5	9.4	835	9.04
23	113.64	20.86	2015/09/09/08:50	91	37.5	76.89	2.09	28.8	10.6	630	9.42
26	113.93	20.33	2015/09/09/14:10	178	30.0	183.39	1.82	29.9	9.7	598	6.29
31	111.85	18.85	2015/09/10/06:40	343	33.8	7.02	1.86	30.0	6.2	661	2.96
34	111.49	19.06	2015/09/10/12:48	178	37.9	189.97	1.52	30.1	7.0	910	4.43
36	111.26	19.19	2015/09/10/16:10	108	40.4	110.82	1.46	30.2	7.3	1015	5.21
38	111.02	19.33	2015/09/10/19:50	25	55.9	0	1.49	30.1	8.2	1372	9.34
39	110.70	18.90	2015/09/10/22:50	14	65.9	0	1.64	30.2	3.7	1468	2.26
41	110.90	18.70	2015/09/11/03:10	20	41.0	0	1.58	30.1	6.8	947	4.54
44	111.20	18.40	2015/09/11/08:10	97	32.9	32.95	1.73	30.2	7.8	697	4.60
46	111.40	18.20	2015/09/11/13:00	1546	35.0	197.57	1.62	30.2	9.8	792	7.88
47	110.80	17.50	2015/09/11/20:00	1013	33.8	0	1.63	30.1	8.7	757	5.96
49	110.65	17.75	2015/09/12/02:20	664	35.6	0	1.80	30.1	5.7	723	2.67
52	110.43	18.13	2015/09/12/10:35	95	41.2	169.76	1.69	30.0	7.8	891	5.97
54	110.28	18.38	2015/09/12/14:10	15	58.9	183.59	1.57	30.3	8.9	1373	11.61
62	110.50	15.45	2015/09/17/00:10	613	46.6	0	1.82	27.9	6.6	882	4.77
60	111.50	15.45	2015/09/17/18:40	1281	29.7	0	1.12	28.9	6.3	940	2.80
57	113.00	15.45	2015/09/18/08:10	2847	24.1	41.78	1.49	29.9	4.0	587	0.86
55	113.95	15.25	2015/09/18/15:55	1073	27.9	139.61	1.38	30.3	4.4	741	1.25
73	114.00	14.00	2015/09/18/22:30	4356	34.9	0	1.37	29.9	8.5	926	6.02
71	113.00	14.00	2015/09/19/06:00	2513	30.3	3.87	1.22	29.9	6.1	904	2.68
69	112.00	14.00	2015/09/19/13:00	1803	36.7	195.05	1.12	29.7	5.4	1182	2.62
68	111.50	14.00	2015/09/19/19:10	2773	32.1	0	1.08	29.9	6.3	1082	3.10
65	110.50	14.00	2015/09/20/06:00	1951	23.0	0	1.52	29.2	3.4	537	0.58
81	110.50	13.00	2015/09/20/13:45	2546	30.5	200.23	1.40	29.8	5.5	791	2.16
79	111.50	13.00	2015/09/21/01:30	2333	38.0	0	1.98	29.9	4.2	696	1.54
76	113.00	13.00	2015/09/21/13:50	4033	34.9	165.63	1.37	29.4	3.5	916	1.02
74	114.00	13.00	2015/09/21/21:30	4243	32.1	0	1.31	29.9	2.3	892	0.40
90	114.00	12.00	2015/09/22/08:50	4349	34.7	77.65	1.60	29.9	4.4	789	1.57
107	114.00	11.00	2015/09/22/15:55	3387	36.1	115.95	1.58	29.4	5.1	819	2.20
109	113.50	10.00	2015/09/23/00:30	3050	38.6	0	1.28	29.5	6.9	1085	4.46
111	112.50	10.00	2015/09/23/18:30	1814	29.6	5.12	1.36	29.7	7.2	785	3.58
112	112.00	10.00	2015/09/24/16:40	2357	37.0	33.50	1.48	29.7	10.2	899	9.15
113	111.50	10.00	2015/09/24/20:20	3347	29.2	0	1.44	29.6	9.9	733	6.61
114	111.00	10.00	2015/09/25/00:30	3372	34.8	0	1.46	29.4	10.6	852	9.22
115	110.50	10.00	2015/09/25/05:30	2533	31.5	0	1.46	29.3	11.2	771	9.19
100	110.50	10.50	2015/09/25/08:00	1791	37.1	77.25	1.37	29.3	11.5	966	11.75
99	110.50	11.00	2015/09/25/14:15	1721	38.1	139.76	1.20	29.7	11.7	1140	12.71
102	111.50	11.00	2015/09/25/21:15	3853	35.7	0	1.24	29.7	11.7	1043	11.83
104	112.50	11.00	2015/09/26/05:40	4182	27.0	0	1.22	29.5	11.3	794	8.06
105	113.00	11.00	2015/09/26/08:20	4227	30.4	51.68	1.23	29.6	4.7	888	1.59
92	113.00	12.00	2015/09/26/14:20	4277	38.5	159.27	1.24	30.0	7.3	1134	5.01
94	112.00	12.00	2015/09/27/00:25	4281	31.3	0	1.26	30.1	7.5	908	4.20
96	111.00	12.00	2015/09/27/07:00	2256	34.6	11.87	1.25	29.9	5.8	1002	2.81
97	110.50	12.00	2015/09/27/11:00	2404	40.8	181.18	1.27	30.0	2.2	1171	0.48



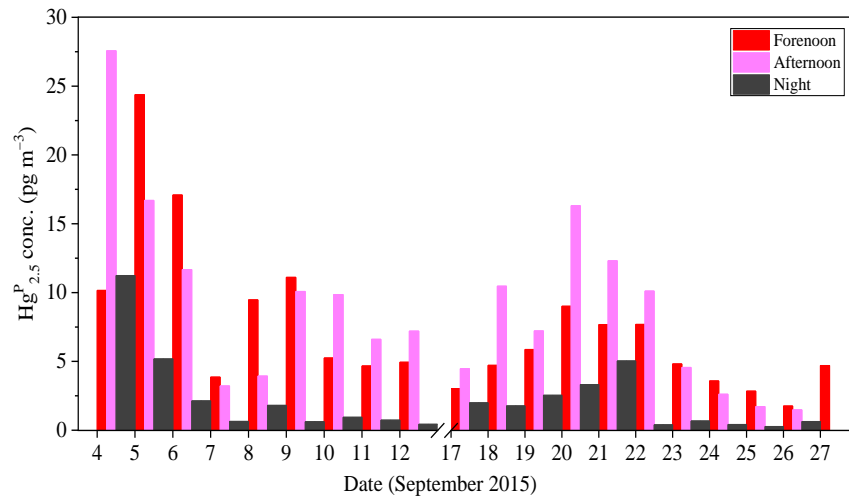
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Figure S1. GEM concentrations over the northern SCS and 72-h back-trajectories arriving at some stations.



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Figure S2. GEM concentrations over the western SCS and 72-h back-trajectories arriving at some stations.



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24 **Figure S3.** RGM concentrations in the forenoon, afternoon and night.

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