

## Support Information

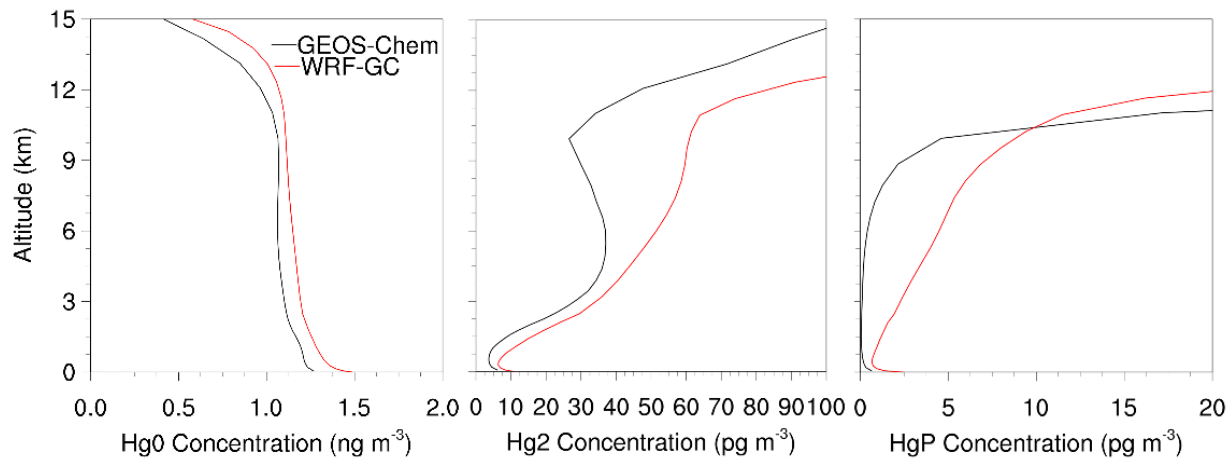
**Table S1.** Detailed Hg Deposition Network (MDN) sites information

Site id	Site Name	County	State	Latitude	Longitude	Elevation
AL19	Birmingham	Jefferson	AL	33.553	-86.8148	200
FL05	Chassahowitzka National Wildlife Refuge	Citrus	FL	28.7486	-82.5551	3
FL11	Everglades National Park-Research Center	Dade	FL	25.39	-80.68	2
FL34	Everglades Nutrient Removal Project	Palm Beach	FL	26.6556	-80.3972	10
FL96	Pensacola	Escambia	FL	30.5499	-87.375	45
FL97	Everglades-Western Broward County	Broward	FL	26.1714	-80.8222	4
GA09	Okefenokee National Wildlife Refuge	Charlton	GA	30.7404	-82.1283	45
GA33	Sapelo Island	McIntosh	GA	31.3961	-81.2811	3
GA40	Yorkville	Paulding	GA	33.9282	-85.0451	395
IL11	Bondville	Champaign	IL	40.0528	-88.3719	212
KS03	Reserve	Brown	KS	39.9792	-95.5681	265
KS05	Coffey County Lake	Coffey	KS	38.1992	-95.6646	337
KS24	Glen Elder State Park	Mitchell	KS	39.5136	-98.3403	456
KS32	Lake Scott State Park	Scott	KS	38.6717	-100.916	863
KS99	Cimarron National Grassland	Morton	KS	37.1336	-101.825	1021
KY10	Mammoth Cave National Park-Houchin Meadow	Edmonson	KY	37.1317	-86.148	236
MD00	Smithsonian Environmental Research Center	Anne Arundel	MD	38.889	-76.5558	20
MD08	Piney Reservoir	Garrett	MD	39.7053	-79.0122	769
MD99	Beltsville	Prince Georges	MD	39.028	-76.8171	46
MN27	Lamberton	Redwood	MN	44.237	-95.3011	367
MO03	Ashland Wildlife Area	Boone	MO	38.754	-92.1994	257
MO46	Mingo National Wildlife Refuge	Stoddard	MO	36.9716	-90.1433	105

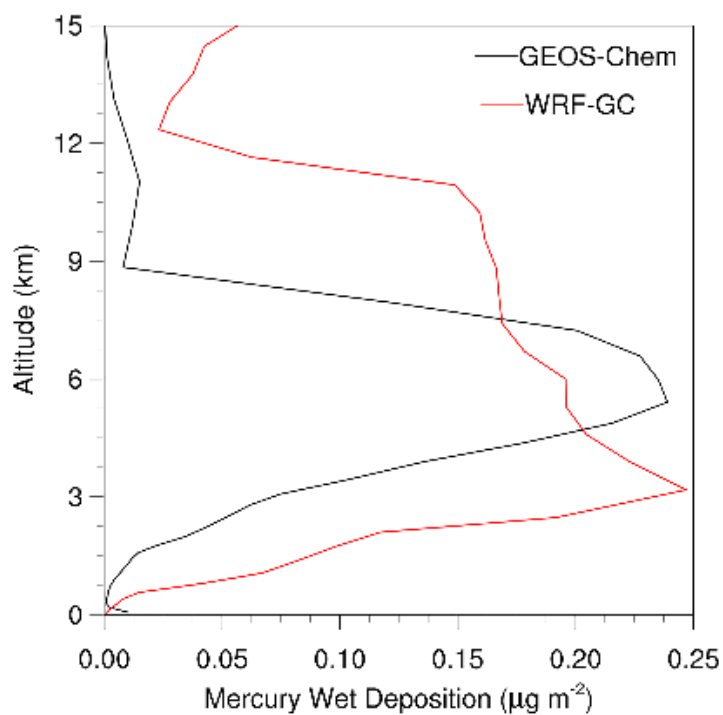
MS22	Oak Grove	Perry	MS	30.9849	-88.9321	100
NC42	Pettigrew State Park	Washington	NC	35.7373	-76.5149	2
NE15	Mead	Saunders	NE	41.1528	-96.4912	352
NJ30	New Brunswick	Middlesex	NJ	40.4728	-74.4226	21
NY06	Bronx	Bronx	NY	40.868	-73.8782	68
NY20	Huntington Wildlife	Essex	NY	43.9731	-74.2231	500
NY68	Biscuit Brook	Ulster	NY	41.9936	-74.5031	634
OK01	McGee Creek	Atoka	OK	34.3154	-95.8893	195
OK22	Miami	Ottawa	OK	36.895	-94.758	258
OK31	Copan	Washington	OK	36.9081	-95.8823	255
ON07	Egbert		ON	44.2339	-79.7917	196
PA13	Allegheny Portage Railroad National Historic Site	Cambria	PA	40.457	-78.56	739
PA21	Goddard State Park	Crawford	PA	41.4271	-80.1451	385
PA29	Kane Experimental Forest	Elk	PA	41.5978	-78.7675	618
PA30	Erie	Erie	PA	42.1558	-80.1134	177
PA37	Waynesburg	Greene	PA	39.8161	-80.285	452
PA42	Leading Ridge	Huntingdon	PA	40.6575	-77.9397	287
PA47	Millersville	Lancaster	PA	39.9909	-76.3856	84
PA52	Little Pine State Park	Lycoming	PA	41.3639	-77.3561	228
PA60	Valley Forge	Montgomery	PA	40.1166	-75.8833	46
PA72	Milford	Pike	PA	41.3273	-74.8199	212
PA90	Hills Creek State Park	Tioga	PA	41.8043	-77.1903	476
SC03	Savannah River	Barnwell	SC	33.245	-81.6505	90
SC05	Cape Romain National Wildlife Refuge	Charleston	SC	32.943	-79.6592	1
SC19	Congaree Swamp	Richland	SC	33.8145	-80.7809	34
TN11	Great Smoky Mountains National Park-Elkmont	Sevier	TN	35.6645	-83.5903	640

VA28	Shenandoah National Park-Big Meadows	Madison	VA	38.5231	-78.4348	1072
VT99	Underhill	Chittenden	VT	44.5283	-72.8684	399
WI09	Popple River	Florence	WI	45.7964	-88.3994	421
WI10	Potawatomi	Forest	WI	45.5648	-88.8083	570
WI22	Milwaukee	Milwaukee	WI	43.0752	-87.8843	206
WI31	Devil's Lake	Sauk	WI	43.4352	-89.6801	389
WI99	Lake Geneva	Walworth	WI	42.5792	-88.5006	288

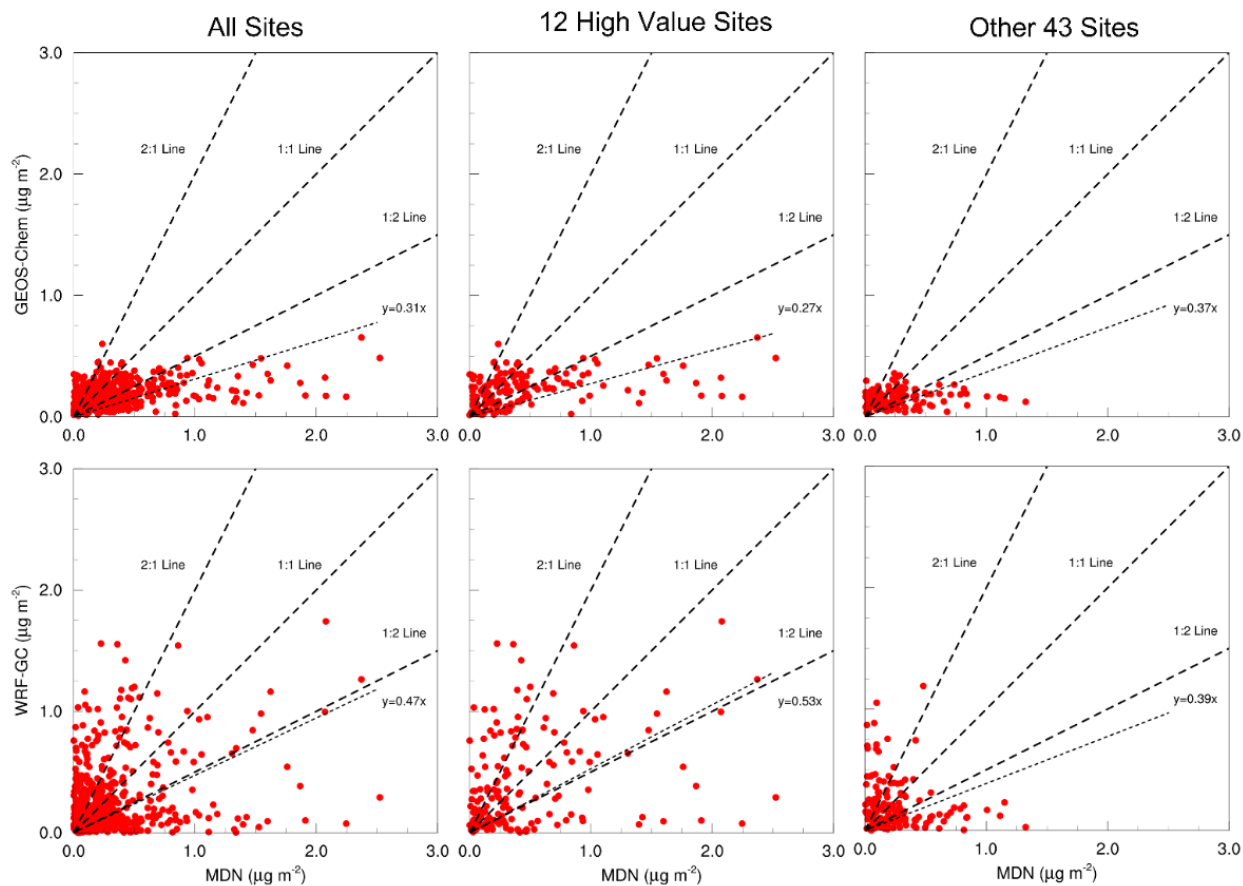
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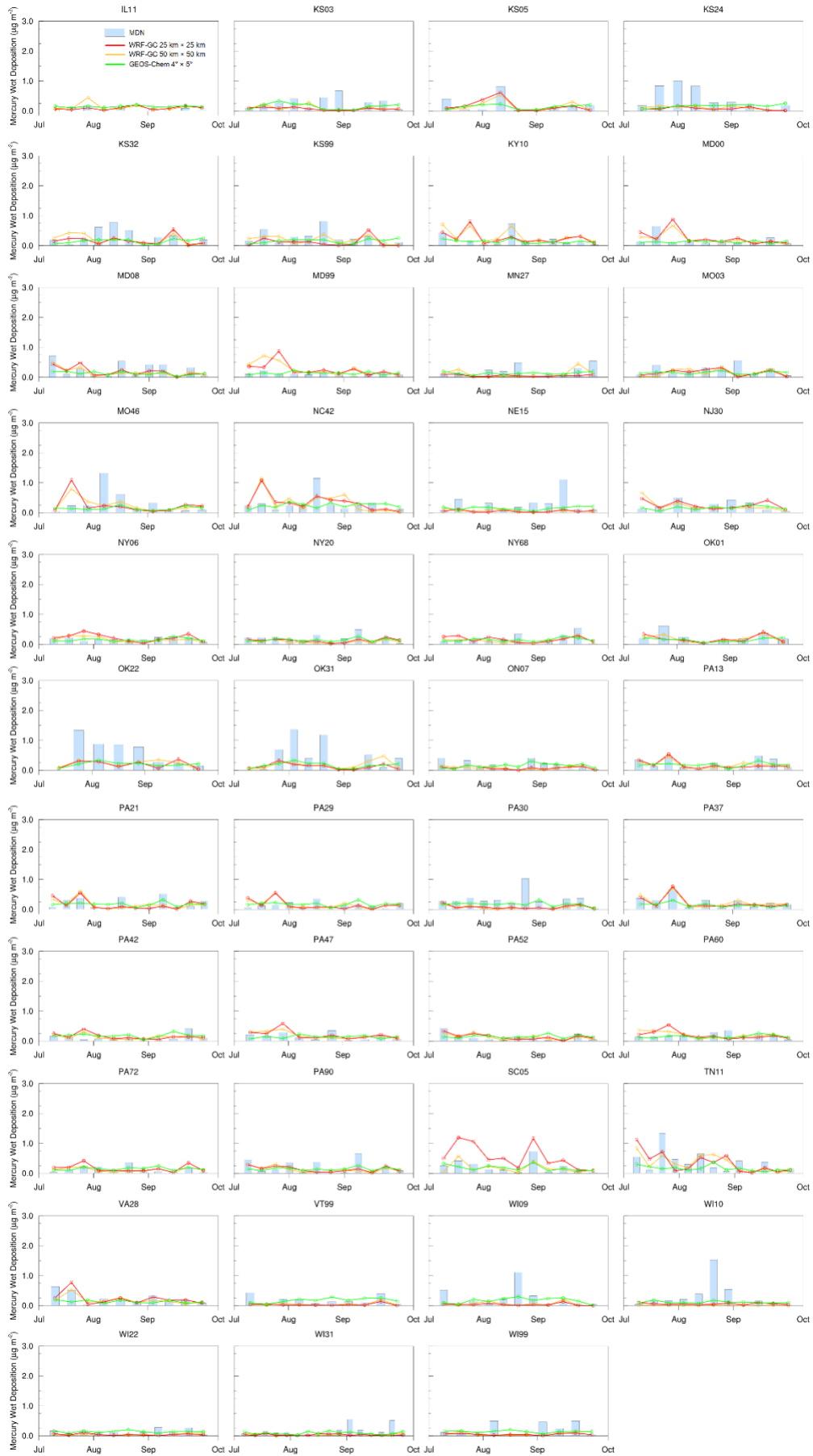
**Fig. S1** Average vertical profile of Hg<sup>0</sup>, Hg<sup>2</sup>, HgP concentration, simulated by WRF-GC in 25 km × 25 km resolution from July to September 2013.



**Fig. S2** Average vertical profile of Hg wet deposition, simulated by WRF-GC in 25 km × 25 km resolution from July to September 2013.



**Fig. S3** Correlation of MDN data with WRF-GC  $25 \text{ km} \times 25 \text{ km}$  and GEOS-Chem  $4^\circ \times 5^\circ$  simulation results. Each dot represents a weekly observation data at a specific MDN site, the top panel shows the GEOS-Chem  $4^\circ \times 5^\circ$  simulation results, and the right panel shows WRF-GC  $25 \text{ km} \times 25 \text{ km}$  simulation results corresponding to same observation period. From left to right corresponding to all sites, 12 high value sites, other 43 sites.



**Fig. S4** Detailed time series plot of comparison of MDN observation, GEOS-Chem  $4^\circ \times 5^\circ$  and WRF-GC  $50 \text{ km} \times 50 \text{ km}$ , WRF-GC  $25 \text{ km} \times 25 \text{ km}$  simulation results