

Supporting Information for

**Application of Diffusive Gel Type Probes for Assessing Redox Zonation and Mercury
Methylation in Mekong Delta Sediment**

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Sediment coring and analysis

After the DGT and DET deployment in fresh and brackish water sediments, 7 cm diameter and 15 cm length cores of surficial sediments were taken using acid washed PVC pipe to measure water contents and particulate organic matter. One end of PVC pipe was gently pushed to sediments and silicon stopper was used to seal the other end of PVC in overlying water, which produced negative pressure holding sediments inside the core. After sediment coring, the bottom of the core was sealed with vinyl bags. The core was kept on ice during transportation.

In the laboratory, sediment in PVC core was pushed from the bottom to the top using silicon stopper under N₂ gas flowing condition. The sediments were sliced with 1.5 cm resolution and contained in 50 mL polypropylene centrifuge tube and kept at -20 °C until analysis. In the sliced sediment, water content and particulate organic matter were determined by the weight differences after drying the samples at 95 °C and burning at 550 °C. The results are summarized in **Table S2**.

Sulfide DGT analysis

The standard curve that relates S²⁻ accumulated in resin and grey scale intensity was as follows.

$$\text{GSI} = \frac{270 \times C}{C + 0.07}$$

where GSI is grey scale intensity (0-255) and C is S²⁻ accumulated in AgI_(s) resin (μmol cm⁻²)

2), and **Fig. S1** shows the scanned images of $\text{AgI}_{(s)}$ gels deployed in Mekong Delta sediments and used for the standard curve.

Table S1. Surface 10 cm averaged pore water concentrations.

Species	Freshwater sediment	Brackish water sediment
PO_4^{3-} (μM)	0.56 (± 0.20)	0.96 (± 0.44)
Mn (mM)	0.20 (± 0.11)	0.14 (± 0.09)
Fe (mM)	2.24 (± 1.90)	1.60 (± 0.94)
HS^- (μM)	1.82 (± 0.65)	3.15 (± 1.0)
THg (pM)	23.7 (± 13.0)	47.9 (± 13.7)
CH_3Hg^+ (pM)	1.18 (± 0.61)	1.24 (± 0.67)
% CH_3Hg^+ (%)	6.21 (± 3.53)	3.29 (± 1.98)

Table S2. Water content and particulate organic matter (POM) concentration measured by loss on ignition at 550 °C in fresh and brackish water sediment cores.

Sediment depth (cm)	Fresh water sediment core (L1)		Brackish water sediment core (L5)	
	Water content (%)	POM (%)	Water content (%)	POM (%)
1.50	36.03	3.21	60.26	8.04
2.50	37.48	6.56	52.06	7.90
3.50	38.06	6.73	51.34	8.26
4.50	41.85	5.69	50.57	7.99
5.50	37.11	5.83	50.55	8.11
6.50	39.91	6.86	48.67	7.16
7.50	38.95	6.09	47.78	7.19
average	38.48	5.85	51.60	7.81
Standard deviation	1.95	1.25	4.09	0.45

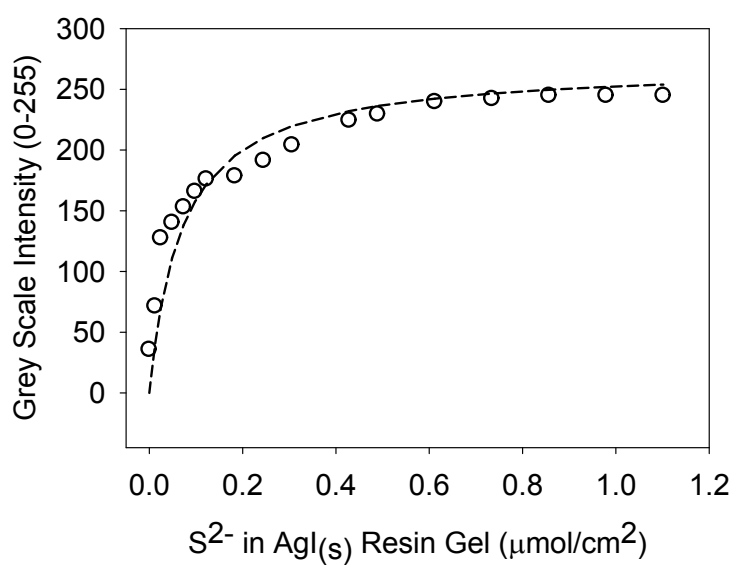
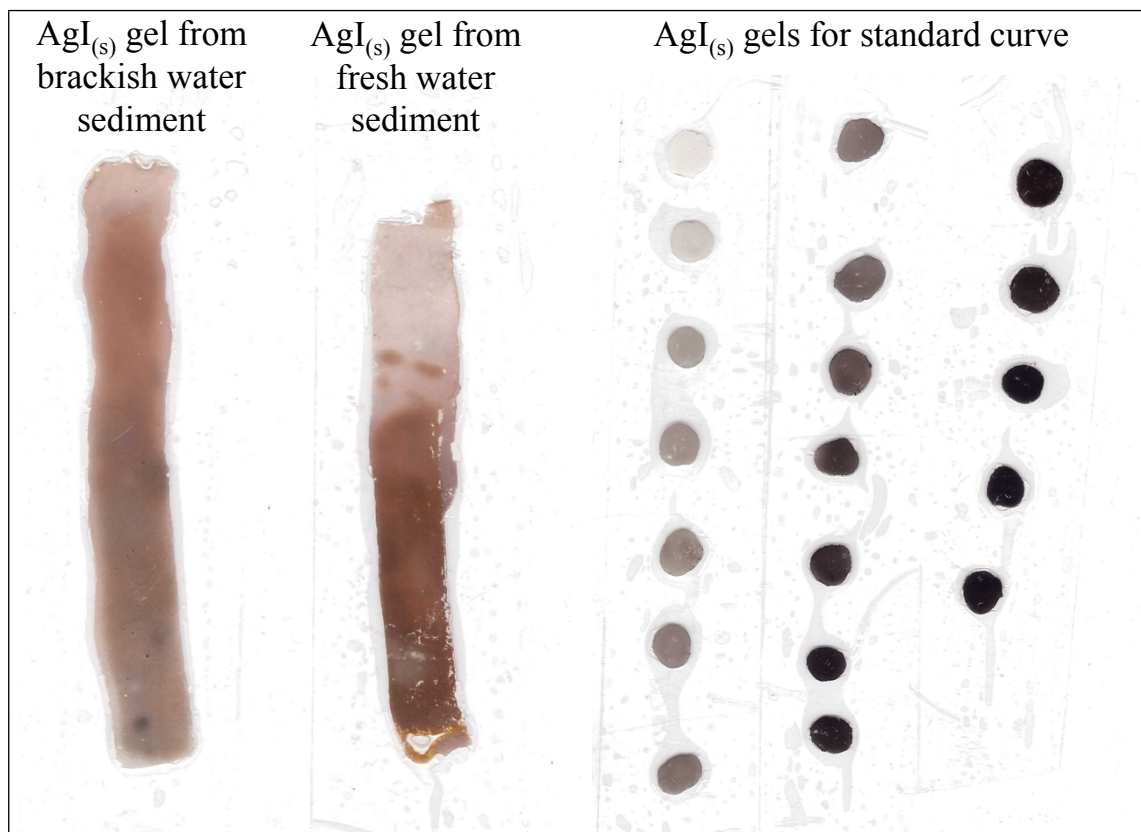


Fig. S1. The AgI_(s) gels deployed in Mekong Delta sediments (top left) and gels used to draw standard curve (top right). S²⁻ standard curve estimated from the gels (bottom).

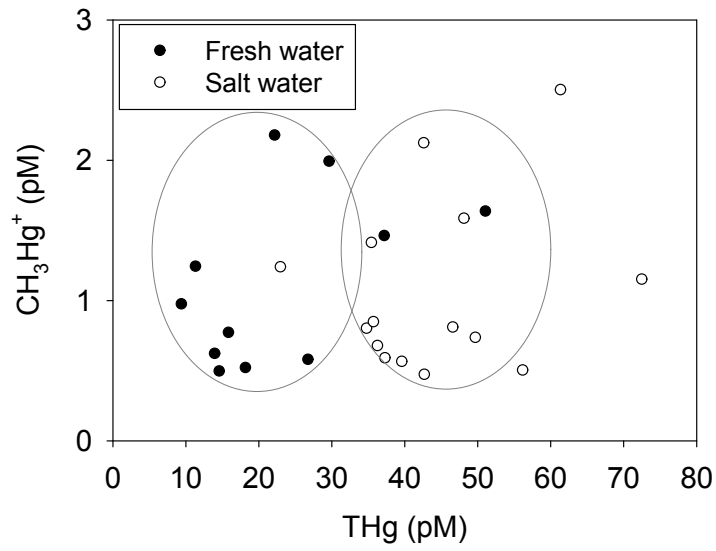


Fig. S2. The relation between of THg and CH₃Hg⁺ concentrations in sediment pore waters of Tien River, Mekong Delta, Vietnam.

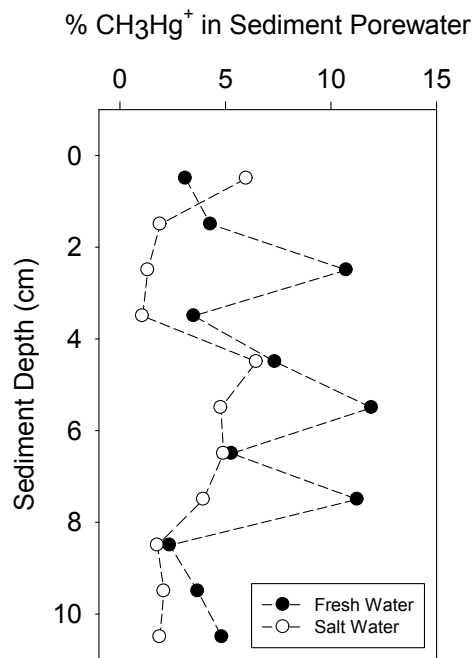


Fig. S3. CH₃Hg⁺ fraction in sediment pore water estimated by DGT measurement.

References

- Reynolds, C. S., & Davies, P. S. (2001). Sources and bioavailability of phosphorus fractions in freshwaters: a British perspective. *Biol Rev Camb Philos Soc*, 76(1), 27-64.
- Wang, F., & Chapman, P. M. (1999). Biological implications of sulfide in sediment—a review focusing on sediment toxicity. *Environmental Toxicology and Chemistry*, 18(11), 2526-2532, doi:10.1002/etc.5620181120.