

# *Shake and Bake Experiments* *An Update*



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# Shake and Bake Experiments

- *Rationale:* To estimate the extent of mercury (Hg) and methylmercury (MeHg) release from sediments during resuspension, and to estimate the impact of resuspension on Hg methylation in the short-term
- *Approach:* Use microcosms containing sediment and water obtained from the site and resuspend the sediment for different lengths of time (20 mins, 1 hr and 5 hrs) for different sediment types and monitor the total and dissolved Hg and MeHg concentrations, as well as TSS and other ancillary parameters, with time during and after the resuspension event to determine the extent of Hg and MeHg release to the dissolved phase. From analysis of sediments before and after the experiment determine if net methylation has occurred in the sediment. To assess the importance of biological activity, DOC was added to some sediments in an effort to stimulate Hg methylation.

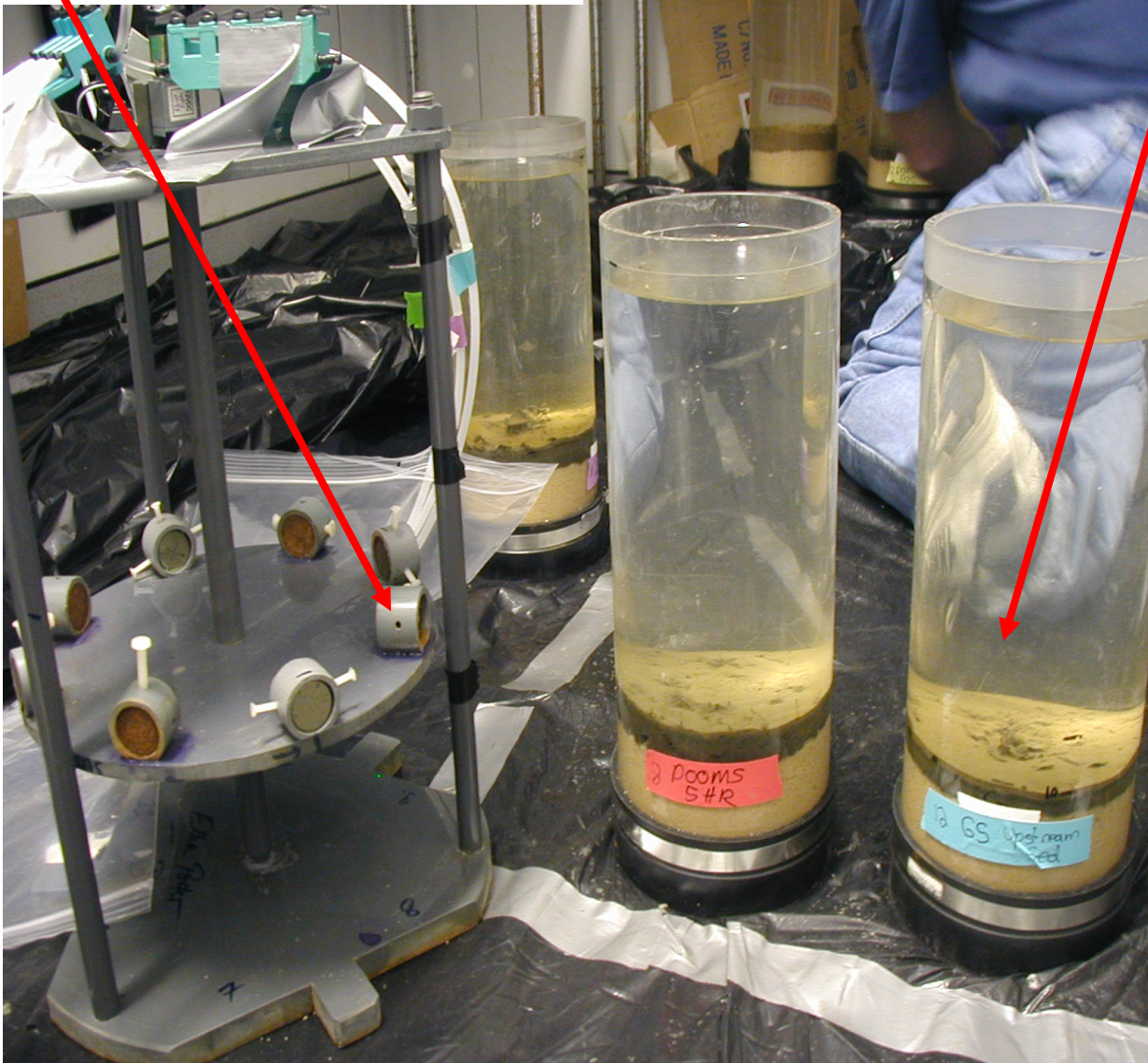
*Progress to Date:* Sample analysis on-going.

# The Experimental Setup

**Magnetic stirring apparatus**

**Microcosms are placed around unit and stirred using a magnetic stirrer**

**Microcosms filled with sediment and water**





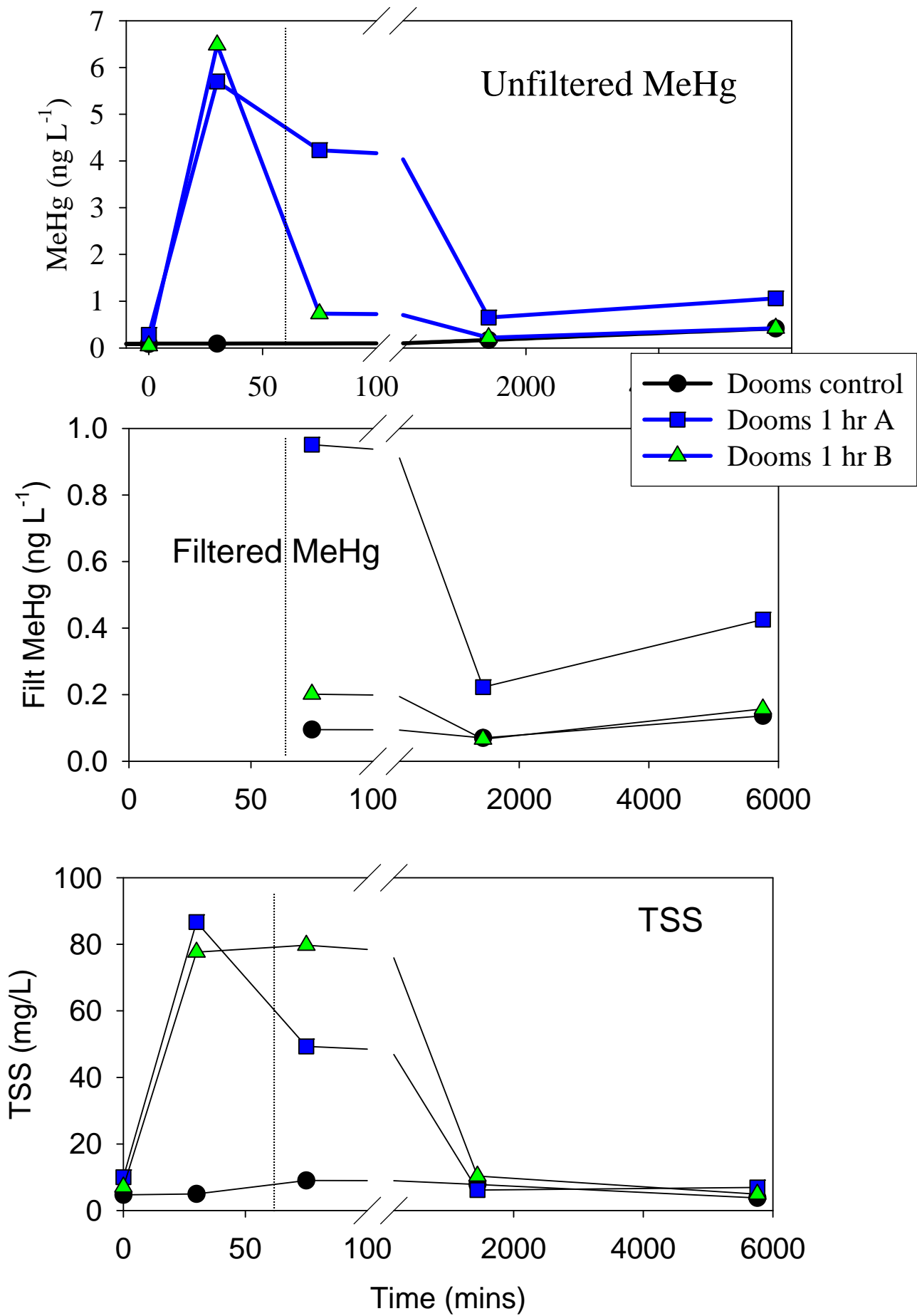
## Microcosms during the resuspension phase

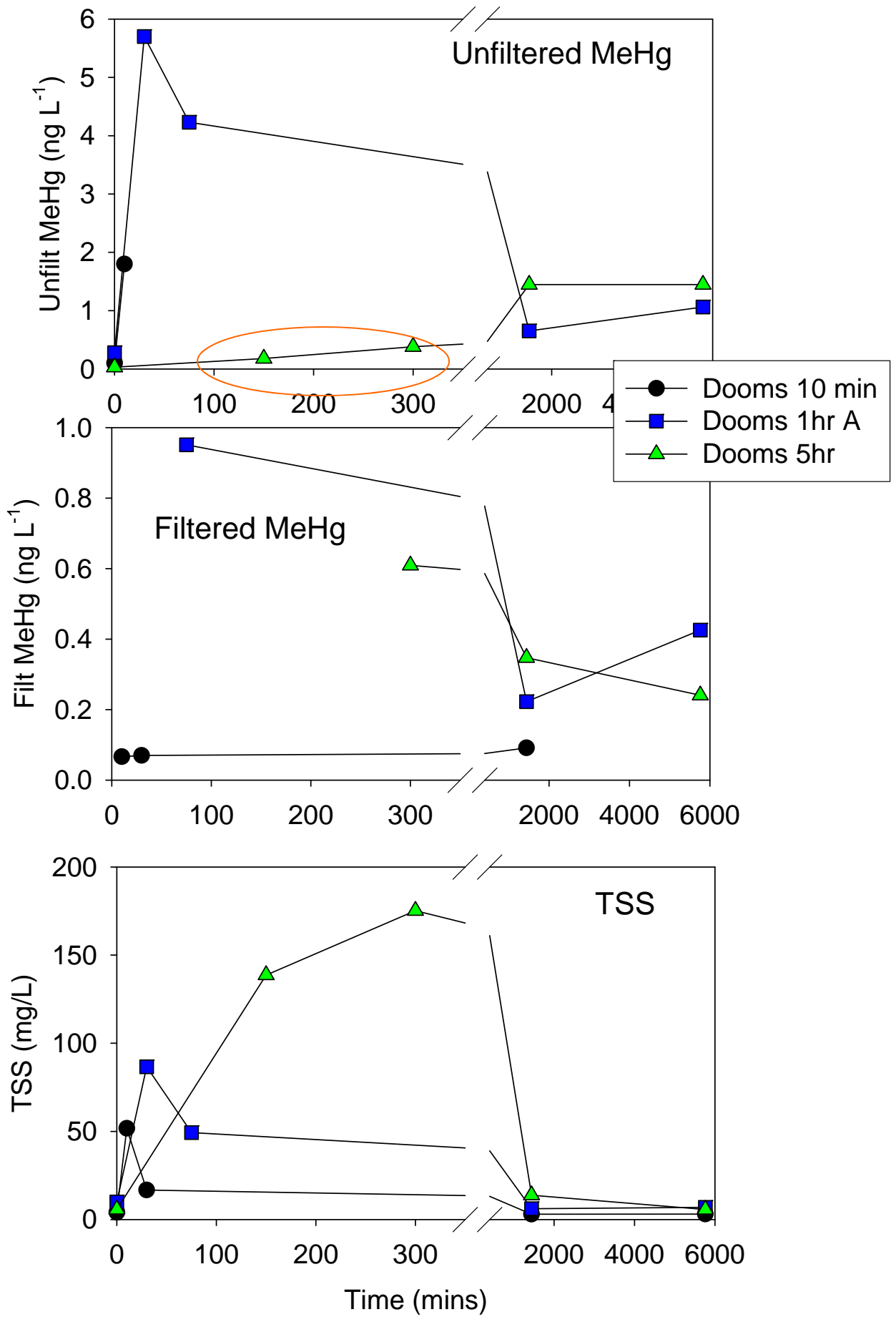


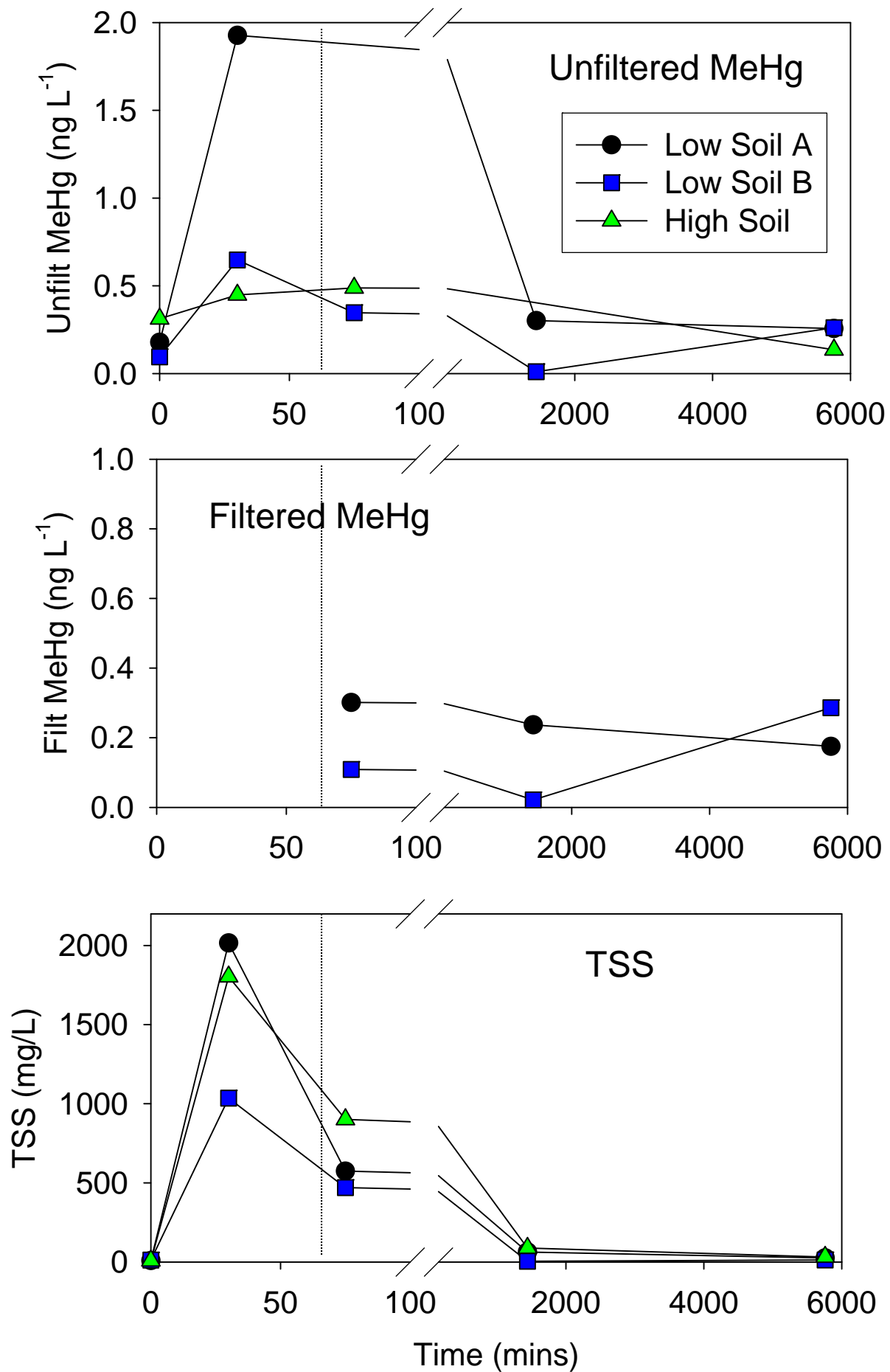
## Concentrations of Mercury and Methylmercury in Sediment Samples from the River

Dupont Site	T-Hg ug/g	MeHg ng/g	%MeHg	MeHg Av	MeHg Stdev
Lo-Hg-001	7.31	13.00	0.18		
Lo-Hg-085	7.38	16.08	0.22		
Lo-Hg-005	2.46	2.16	0.09	10.41	7.3123
HiHg-P11-01	57.29	10.36	0.02		
HiHg-P11-01	31.36	4.90	0.02		
HiHg-P11-01	11.44	1.39	0.01	5.55	4.5238
Doom's 01	5.68	16.00	0.28		
Doom's 02	37.38	46.94	0.13		
Doom's 03	19.34	20.41	0.11	27.78	16.734
GS-01	2.56	6.19	0.24		
GS-02	2.55	3.67	0.14	4.93	
Riv-1	4.02	4.90	0.12		
Riv-2	5.01	19.67	0.39	12.28	
Levee Erode	8.87	2.07	0.02	0.02	

1. Doom's had the highest average MeHg concentrations and a relatively high %MeHg, even though the total Hg was relatively high
2. The soils had both a low MeHg concentration and the high Hg soil had a very low %MeHg.









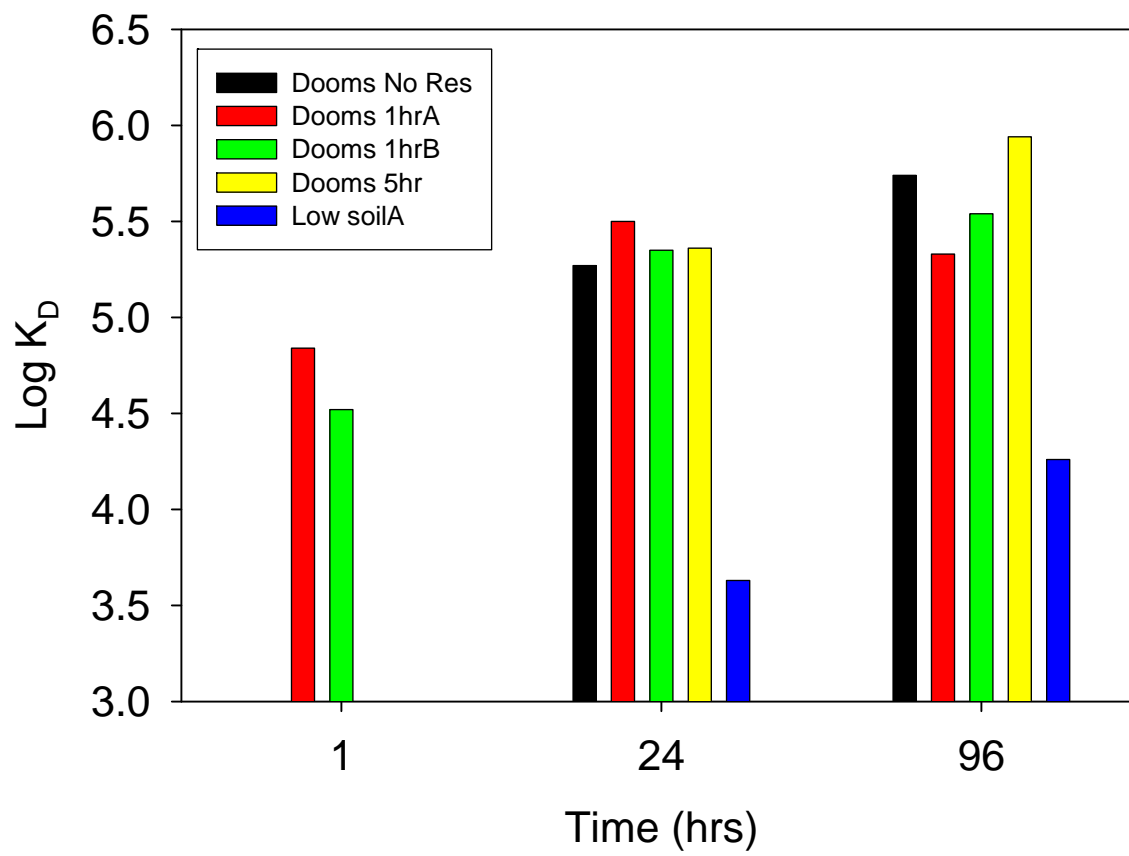
## Comparison of MeHg in TSS and in Bulk Sediment

Site	Sed MeHg	TSS MeHg
Doom's	27.8 ± 16.7	65.3 ± 57.4
Low Hg	10.4 ± 7.3	1-3
High Hg	5.6 ± 4.5	
GS	4.9	
River	12.3	

### Comments

1. For the Doom's site, the concentration of MeHg per gram of particulate is higher than that of the sediment sample, suggesting resuspension of fines with higher MeHg content. This is the case often in environmental settings (true of contaminated and uncontaminated estuarine environments)
2. For the soils, the opposite appears to be true suggesting that the fines are not the high MeHg containing particles. POC data, when available, should be able to support this contention

## Change in Distribution Coefficient Over Time



## Summary

1. Concentrations of total MeHg track those of TSS in the water column overall, and there is no indication of a significant release of MeHg upon resuspension although  $K_D$ 'd over time do increase suggesting a stronger partitioning as TSS decreases. (An inverse relationship between  $K_D$  and TSS has been observed in other high TSS environments. Data for POC will allow an clearly assessment of the degree to which TSS organic content influences this trend).
2. After 96 hours, dissolved MeHg concentrations were 0.4 ng/L or less, but were somewhat higher in the resuspended systems compared to the control. Resuspension time did not appear to have a large impact on the result.