

Shake and Bake Experiments



Chesapeake Biological Laboratory
UMCES, Solomons, MD 20688

Robert Mason – Project Manager
Andrew Heyes – Chief Chef and Analyst
Matt Reardon – Chief Shaker
and others in the cast

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:* Experiments have been completed. Sample analysis is in its early stages.

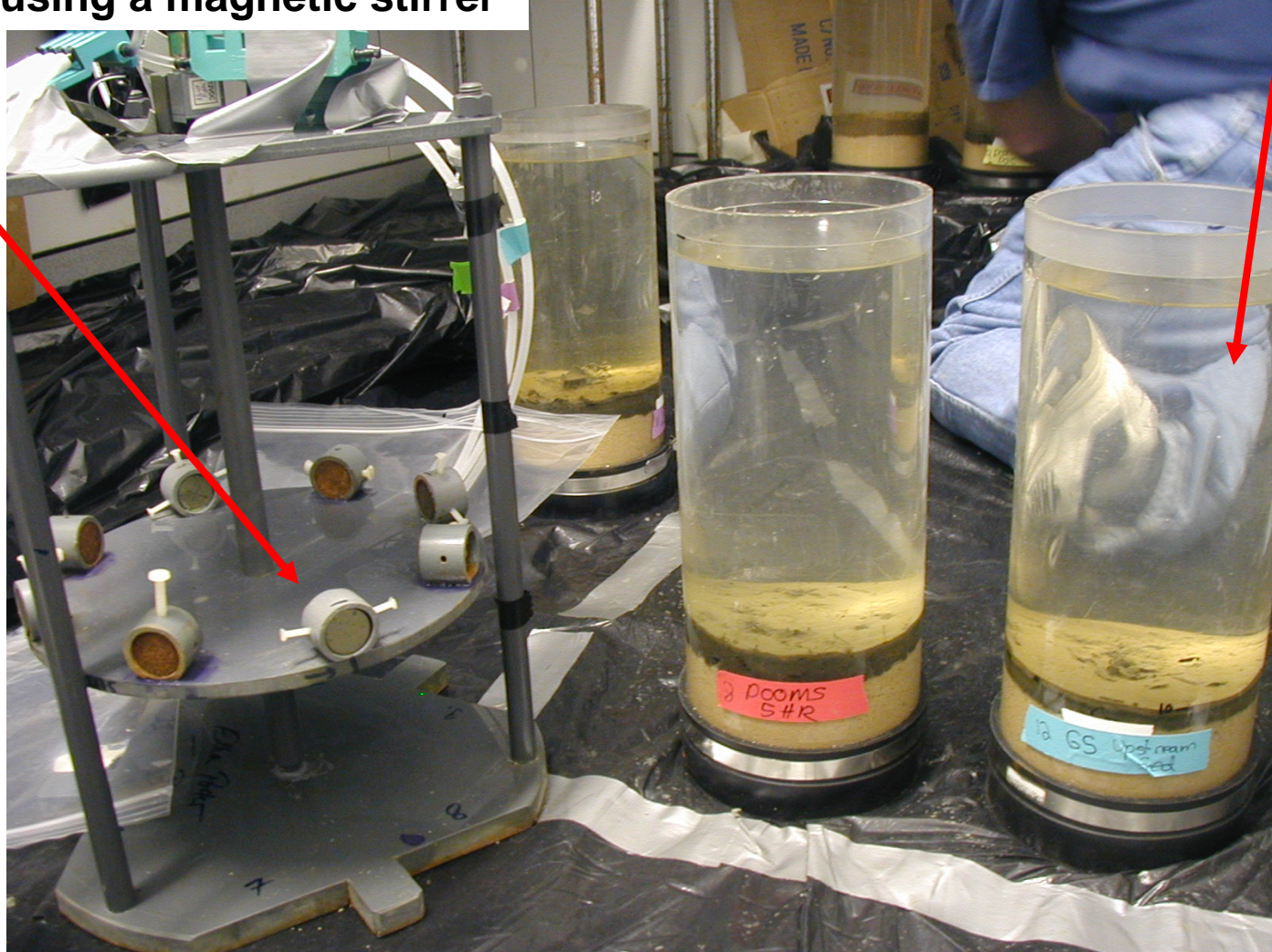
Initial Analysis of Sediment Samples for Total and Methyl Mercury

CBL ID	Dupont	T-Hg	MeHg			T-Hg	MeHg
Number	Site	ug/g wet	ng/g wet	% MeHg	wet/dry	ug/g dry	ng/g dry
DP04 0001	Lo-Hg-001	5.58	9.92	0.18	1.3	7.31	13.00
DP04 0002	Lo-Hg-085	5.72	12.47	0.22	1.3	7.38	16.08
DP04 0003	Lo-Hg-005	1.90	1.66	0.09	1.3	2.46	2.16
DP04 0004	HiHg-P11-01	46.00	8.32	0.02	1.2	57.29	10.36
DP04 0005	HiHg-P11-01	25.29	3.95	0.02	1.2	31.36	4.90
DP04 0006	HiHg-P11-01	9.37	1.14	0.01	1.2	11.44	1.39
DP04 0007	Doom's 01	3.78	10.64	0.28	1.5	5.68	16.00
DP04 0008	Doom's 02	20.88	26.22	0.13	1.8	37.38	46.94
DP04 0009	Doom's 03	11.60	12.24	0.11	1.7	19.34	20.41
DP04 0010	GS-01	0.70	1.70	0.24	3.6	2.56	6.19
DP04 0011	GS-02	1.14	1.63	0.14	2.2	2.55	3.67
DP04 0012	Riv-1	2.89	3.53	0.12	1.4	4.02	4.90
DP04 0013	Riv-2	3.36	13.20	0.39	1.5	5.01	19.67
DP04 0014	Levee Erode	8.03	1.88	0.02	1.1	8.87	2.07

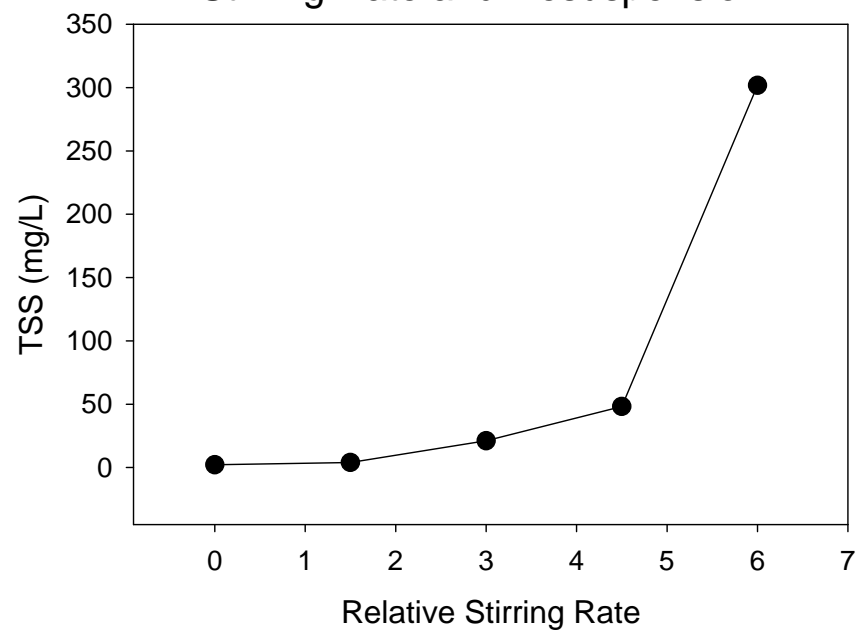
The Experimental Setup

Magnetic stirring apparatus
Microcosms are placed around unit and stirred using a magnetic stirrer

Microcosms filled with sediment and water



Stirring Rate and Resuspension



Closeup View

Stirrer →

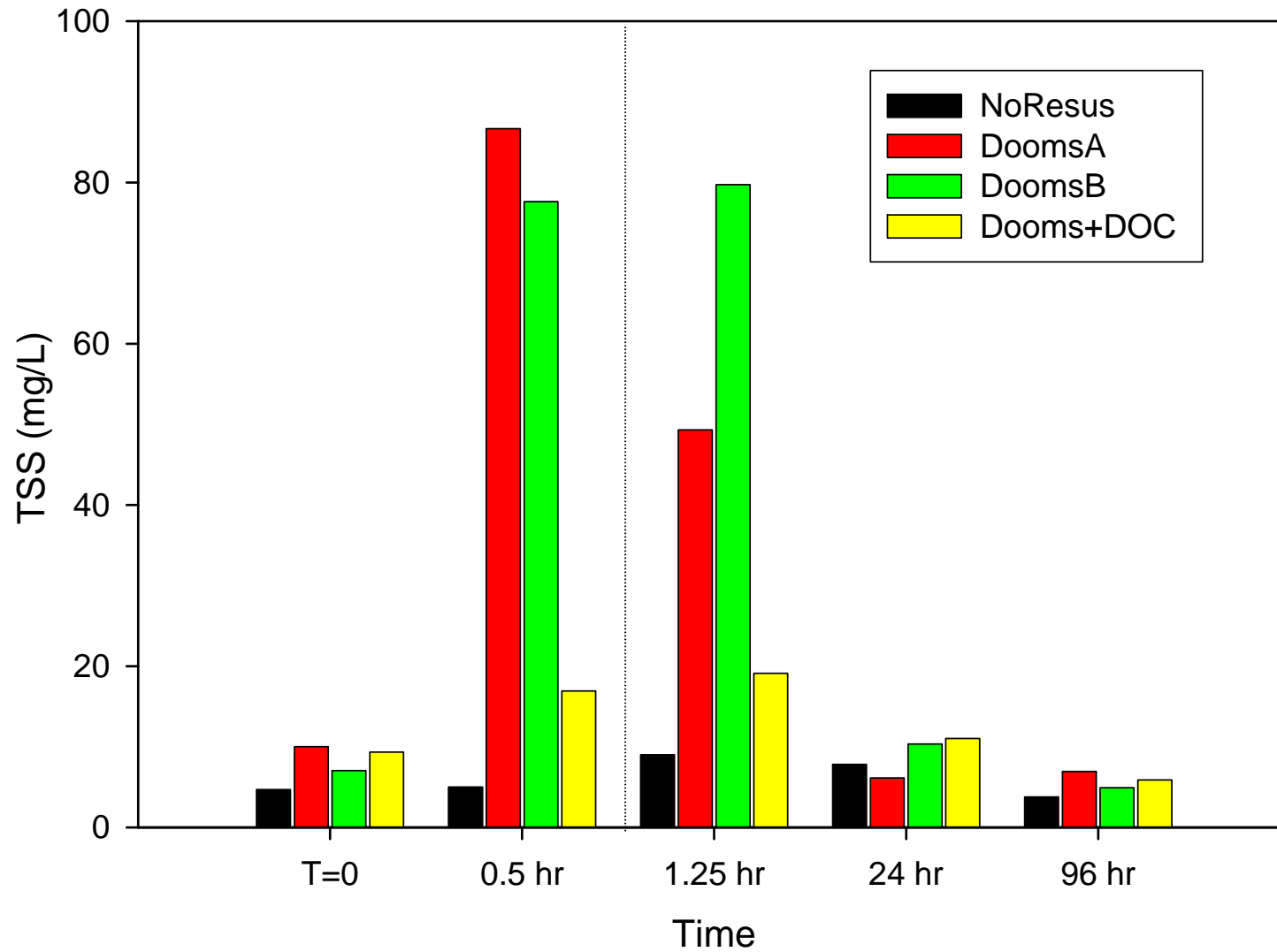
Sediment Layer →

Sand Underlayer →



Sediments were stirred at the same rate for one hour and then sampled for a further 4 days

Dooms Sediment. 1 hr Resuspension



Overall Results from Various Resuspension Treatments

Treatment	Max TSS (mg/L)	Treatment	Max TSS (mg/L)
Dooms, NoRes	<10	Low Hg soil, 1 hr	~2000
Dooms, 20 min	52	Low Hg soil, 1 hr+DOC	254
Dooms, 1 hr	87	High Hg soil, 1 hr	~1800
Dooms, 1 hr + DOC	17	GS, 1 hr	218
Dooms, 5 hr	175	GS, 1 hr+DOC	204

Microcosms during the resuspension phase



Water Sampling



Microcosms at 96 Hours after Resuspension

