Supplement of Biogeosciences, 14, 2929–2953, 2017
https://doi.org/10.5194/bg-14-2929-2017-supplement

Biogeosciences Open Access

Supplement of

Pore water geochemistry along continental slopes north of the East Siberian Sea: inference of low methane concentrations

Clint M. Miller et al.

Correspondence to: Clint M. Miller (clint.m.miller@rice.edu)

Porosity and Sampling Time

Measured porosity values of piston and gravity cores generally decrease with depth from 80% or greater at the mudline to around 60% at eight mbsf (Fig. S1). Over the first 0.1 m, porosity decreases steeply, by an average of 6.8%. From 0.2 to 8.0 m, porosity decreases much more gradually, by an average of 1.3% every meter. The 1σ deviation in porosity between all stations typically ranges between 6 and 10% at any given depth.

Sampling time inversely relates to porosity (Tbl. S2). Multicore Rhizon extraction rates average 12.72 mL/hr while gravity and piston cores average 1.29 mL/hr. This flow rate generally decreases with depth. Across all data from all cores, a first-order relationship between depth (z) and extraction rate (ER) can be expressed as $ER = 4.4911z^{-1.512}$ ($R^2 = 0.789$; Fig. S1). The extraction rate correlated with depth more closely than with porosity. The porosity (ϕ)-extraction rate relationship, expressed as $ER = 21.718(\phi)^{8.161}$ has an $R^2 = 0.631$.

Fidelity of Rhizon Pore Water Measurements – Onboard Experimentation

In order to constrain possible changes in pore water chemistry over time, two experiments were performed onboard *IB Oden*. First, the temperature and pH of a piston core from Station 33 were continuously monitored at five discrete intervals over 24 hours. Probes, inserted into the sediment by drilling holes in the core liner, recorded data at five minute intervals (Fig. S2). Second, for 46 samples, after collection of the first 10 mL of pore water, the syringe was removed, and additional pore water was collected in a second (or third) syringe.

For the five sections from Station 33 examined for changes in physiochemical conditions, temperature rose from ~2°C upon initial measurement to between 16.9 and 18.4 °C within 24 hours (Fig. S2). In general, the shallow sections increased faster than the deeper sections. Initial pH decreased with depth (0.05 mbsf = 7.79 units, 1.86 mbsf = 7.71 units, 4.80 mbsf = 7.39 units, and 6.30 mbsf = 7.19 units). Over the same time interval, pH decreased significantly in all core sections, by an average of 0.25 units, with a range between 0.18 and 0.38 units. Note, however, that pH dropped by 0.3 units at ~20 hrs in one of the pH profiles (Section 2, 1.86 mbsf). This may be due to a temporary crack in the sediment core created by removing pore water through Rhizon sampling, although no crack was observed when the core section was split.

In total, 46 of the 68 Rhizon sampling depths enabled collection of multiple water samples. This included "second generation" samples, where beyond the first ~10 mL, another 1 to 10 mL were obtained, as well as three "third generation" samples, where beyond the first ~20 mL, another 1 to 10 mL were obtained. The sample depths which did not yield enough pore water for a "second generation" tended to be deeper (16 of 22 were in the deepest section). Relative to the initial 10mL of pore water, alkalinity increased in 43 of the second generation samples, and in all three of the third generation samples by an average 0.15 mM (4.1% increase). Interestingly, no statistically significant changes in concentrations of phosphate, ammonia or any dissolved metal were observed.

Fidelity of Rhizon Pore Water Measurements – Discussion

Researchers have employed multiple methods to extract pore waters from marine sediments over the last few decades (Seeberg-Elverfeldt et al., 2005). As the Rhizon technique remains relatively novel, the accuracy and precision of analyses obtained through this approach warrant consideration. This issue arises particularly because of two papers questioning the fidelity of pore water records generated through Rhizon sampling.

Schrum et al. (2012) compared dissolved species collected by whole round squeezing and Rhizons. They observed very subtle but consistent (0.06 to 0.8 mM) offsets to lower alkalinity in Rhizon samples, and hypothesized that this reflected CO_2 degassing during extraction. For example, the release of gas during filtering under vacuum conditions might increase, leading to precipitation of $CaCO_3$, and ultimately a drop in alkalinity. They noted, though, that Rhizons seemed to provide accurate measurements for nutrients and metals.

Miller et al. (2014) compared chloride concentrations, oxygen isotopes, and hydrogen isotopes in pore waters collected from whole round squeezing and Rhizons. The Rhizon samples appeared to have higher [Cl^-] and greater enrichments in heavier isotopes (^{18}O and D). The authors suggested some combination of water absorption onto the hydrophilic membrane, ion exclusion and isotope fractionation due to clay ultrafiltration, and water evaporation during degassing as possible sources for these offsets.

Rather than an issue with Rhizon sampling per se, an alternative explanation for analytical discrepancies lies with collection time. A lengthy time between core retrieval and final pore water collection could allow for changes in physiochemical conditions, which might relate to evaporation and carbonate precipitation. Our experiments show that significant differences in the chemical environment of cores occur during Rhizon sampling. Consider the temperature and pH (Fig. S2) evolution over 24 hours for the five core sections from station S33. Note that the time to recover, to cut, and to transport these sections from the ship deck to the geochemistry laboratory (total 1.71 hrs) was similar to that involved for other samples (Tbl. S2). Thus, we consider results from these cores representative.

Many authors have observed variations in pore water pH, DIC, alkalinity, and Ca^{2+} values over time (e.g., Gieskes, 1974; Paull et al., 1996; Wang et al., 2010; Sauvage, 2013). The changes in sections from S33 clearly indicate that physiochemical conditions within the core change significantly within 24 hours. The ~15 °C increase will alter inorganic solid-liquid equilibrium conditions (de Lange et al., 1992), and should increase microbial respiration (Sander and Kalff, 1993). The nominal ~0.25 drop in pH implies a reduction in alkalinity. Interestingly, though, this appears opposite of results from sequential sampling, where each progressive “generation” of pore water had greater alkalinity.

One issue is location. The pH sondes were always more than 10 cm from the nearest Rhizon. Although it is possible that the Rhizon’s negative pressure in the sediment is compensated by O_2/air increasing respiration, previous experiments on Rhizon flow (Seeberg-Elverfeldt et al., 2005; Dickens et al., 2007) indicate that Rhizons generally pull water from <3 cm along the core. Thus, water masses adjacent to pH meters were likely “out-of communication” with those being sampled by the Rhizons. We suggest that at least two factors effect chemistry: (1) temperature and pH (and pressure) of pore waters change with time after core retrieval; and, (2) pore water chemistry evolves during water removal.

The observed evolution of pore water chemistry may be related to increasing temperature and possible introduction of atmospheric air via the Rhizon drill hole each time the syringe was removed. As temperature increases, greater microbial activity may drive pH down by increasing CO_2 concentration. Additionally, removing the syringe may have provided opportunity for atmospheric air to enter the sediment through the filament. As the pH decreased, carbonate dissolved, increasing HCO_3^- concentration in the pore water. The Rhizons continually applied additional negative pressure. However, as stated previously, the pH sondes were sufficiently far from the Rhizons to be affected by pore water extraction.

As clearly documented here and in other works (Seeberg-Elverfeldt et al., 2005; Dickens et al., 2007; Pohlman et al., 2008), Rhizon sampling can lead to “smooth” concentration profiles for multiple dissolved species, including alkalinity Fig. 4 – 8). The concerns raised about Rhizon sampling may be valid for dissolved components when concentration gradients are low. For example, Schrum et al. stressed alkalinity differences of 0.06 to 0.8 mM, but the total alkalinity range in this study was 1.80 and 14.58 mM. A similar finding occurs in the dissolved Ca^{2+} and Ba^{2+} profiles of this study, where adjacent samples deviate by amount greater than analytical precision. However, when the signal to noise ratio become high, as true with most dissolved components at most stations (Fig. 4 – 8), the Rhizon sampling renders pore water profiles with well defined concentration gradients that can be interpreted in terms of chemical reactions and fluxes.

Most species display “smooth” concentration profiles with respect to sediment depth (Fig. 4 - 8). That is, concentrations of successive samples do not display a high degree of scatter. This is expected for pore water profiles in sediment where diffusion dominates (Froelich et al., 1979; Klump and Martens 1981; Schulz, 2000). However, as best seen for dissolved species whose concentrations do not appreciably change over depth (e.g., Ba^{2+} and Ca^{2+}) scatter exists beyond that predicted from analytical precision (Fig. S3). This scatter has a weak positive correlation with increased sampling time, which can be shown by comparing time to a deviation in concentration (Fig. S2). The latter is defined by:

$$\Delta X = X_{Measured} - X_{Predicted} \, , \qquad \textbf{(S1)}$$

where X is the species of interest, and $X_{Predicted}$ is the concentration of X determined from the linear best fit line of a concentration profile.

Table List

Figure List

Supplemental Material References:

De Lange, G. J., Cranston, R. E., Hydes, D. H. and Boust, D.: Extraction of pore water from marine sediments: A review of possible artifacts with pertinent examples from the North Atlantic. Mar. Geol., 109, 53-76, 1992.

Dickens, G. R.: Rhizon sampling of pore waters on scientific drilling expeditions: an example from the IODP Expedition 302, Arctic Coring Expedition (ACEX). Sci. Drill 4, 22–25, 2007.

Froelich, P., Klinkhammer, G. P., Bender, M. A. A., Luedtke, N. A., Heath, G. R., Cullen, D., Dauphin, P., Hammond, D., Hartman, B., and Maynard, V.: Early oxidation of organic matter in pelagic sediments of the eastern equatorial Atlantic: suboxic diagenesis, Geochim. Cosmochim. Ac., 43, 1075-1090, 1979.

Gieskes J. M.: The alkalinity-total carbon dioxide system in seawater, In The Sea, vol. 5 (ed. E. D. Goldberg). John Wiley and Sons, New York, 123–151, 1974.

Klump, J. V. and Martens, C. S.: Biogeochemical cycling in an organic rich coastal marine basin—II. Nutrient sediment-water exchange processes, Geochim. Cosmochim. Ac., 45, 101-121, 1981.

Miller, M. D., Adkins, J. F., and Hodell, D. A.: Rhizon sampler alteration of deep ocean sediment interstitial water samples, as indicated by chloride concentration and oxygen and hydrogen isotopes, Geochem. Geophy. Geosy., 15, 2401-2413, 2014.

Paull, C. K., Matsumoto, R., Wallace, P. J., and Shipboard Scientific Party: Proceedings of the IODP, Initial Reports. Volume 164: College Station, TX, USA, 1996.

Pohlman, J. W., Riedel, M., Waite, W., Rose, K., and Lapham, L.: Application of Rhizon samplers to obtain high-resolution pore-fluid records during geo-chemical investigations of gas hydrate systems, Fire in the Ice: Methane Hydrate Newsletter, US Department of Energy/National Energy Technology Laboratory, Fall, 2008.

Sander, B. C. and Kalff, J.: Factors controlling bacterial production in marine and freshwater sediments, Microb. Ecol., 26, 79-99, 1993.

Sauvage, J.: Dissolved Inorganic Carbon and Alkalinity in Marine Sedimentary Interstitial Water, Master Thesis, University of Rhode Island, 2013.

Schrum, H. S., Murray, R. S., and Gribsholt B.: Comparison of rhizon sampling and whole round squeezing for marine sediment porewater, Sci. Drill., 13, 47–50, 2012.

Schulz, H. D.: Quantification of early diagenesis: dissolved constituents in marine pore water, In Mar. Geochem., Springer Berlin Heidelberg, 85-128, 2000.

Seeberg-Elverfeldt, J., Schlüter, M., Feseker, T., and Kölling, M.: Rhizon sampling of pore waters near the sediment/water interface of aquatic systems, Limnol. Oceanogr. Methods, 3, 361-371, 2005.

Wang, G., Spivack, A. J., and D'Hondt, S.: Gibbs energies of reaction and microbial mutualism in anaerobic deep subseafloor sediments of ODP Site 1226, Geochim. Cosmochim. Ac., 74, 3938-3947, 2010.

Supplemental Figures

Figure S1.

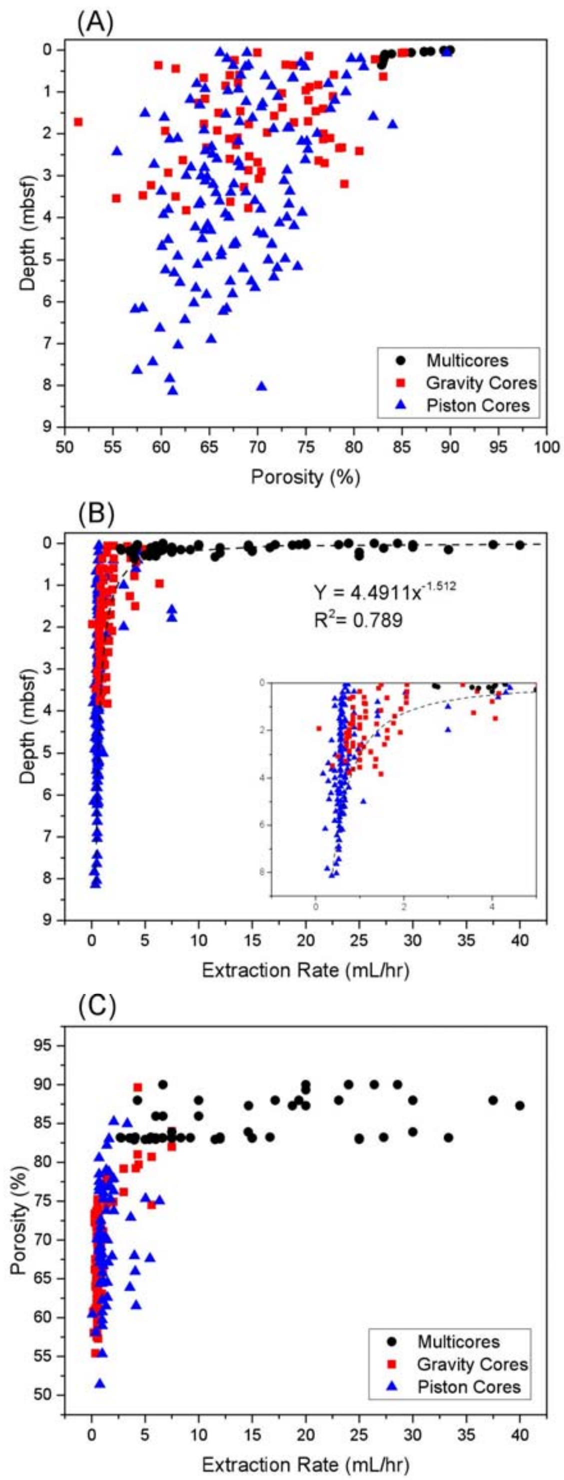
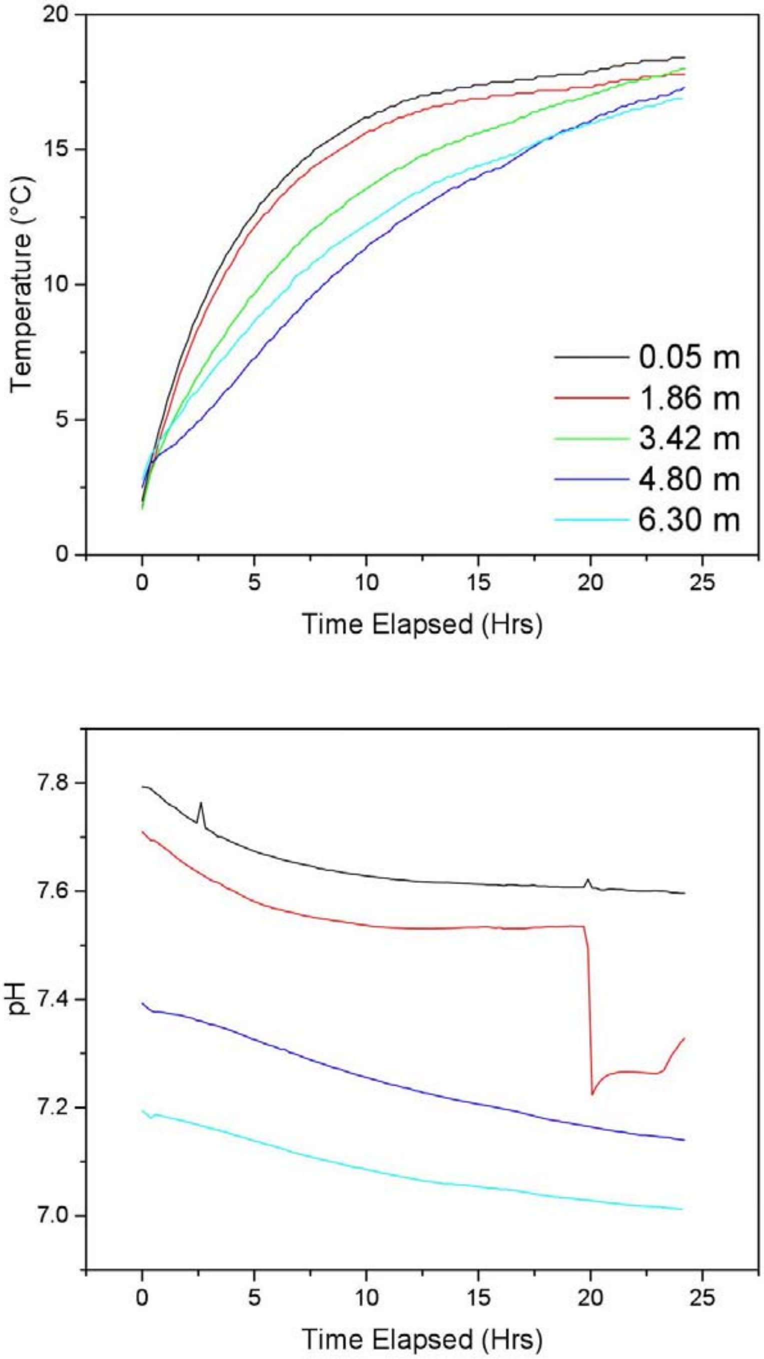


Figure S2



Temperature (°C)
Time Elapsed (Hrs)
0.05 m
1.86 m
3.42 m
4.80 m
6.30 m
pH
Time Elapsed (Hrs)

Figure S3.

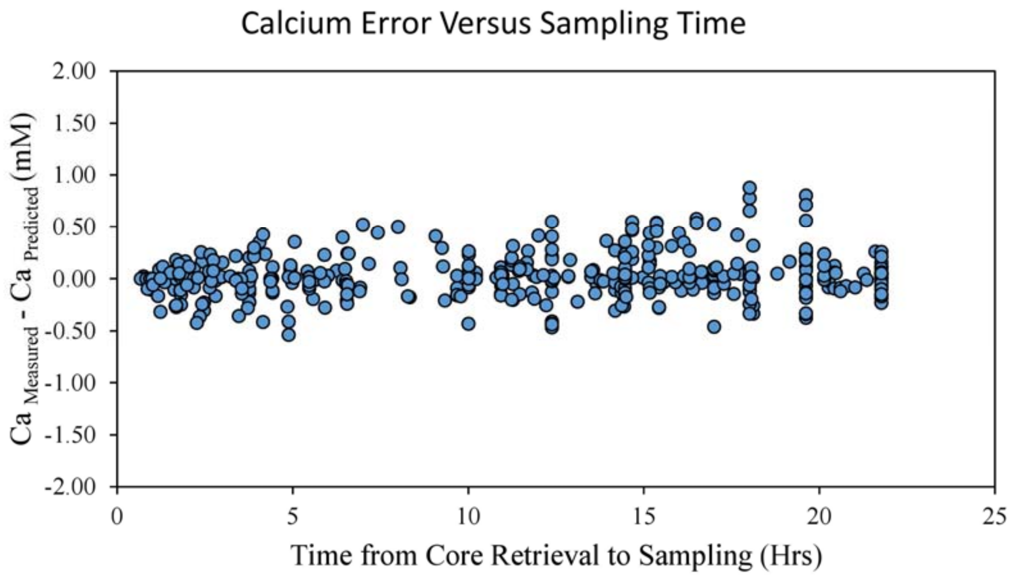

Calcium Error Versus Sampling Time
$Ca_{Measured} - Ca_{Predicted}$ (mM)
2.00
1.50
1.00
0.50
0.00
-0.50
-1.00
-1.50
-2.00
0
5
10
15
20
25
Time from Core Retrieval to Sampling (Hrs)

Table S1. Results

Sample	Depth (m)	Ca^{2+} (mM)	d13C-DIC (‰ vs PDB)	Mg^{2+} (mM)	Sr^{2+} (mM)	Mn^{2+} (mM)	Ba^{2+} (mM)	Alkalinity (mM)	Fe (mM)	S (mM)	HPO_4^{2-} (uM)	NH_4^+ (uM)
8 MC-4 +2cm	+0.02	10.98	0.6	58.37	0.10	BDL	0.05	2.43	--	29.55	BDL	12.24
8 MC-4 15cm	0.09	10.75	--	57.53	0.10	1.65	0.24	2.48	--	28.24	2.14	5.28
8 MC-4 3cm	0.03	10.88	--	58.51	0.09	BDL	0.15	2.42	--	28.25	BDL	6.88
8 MC-4 9cm	0.06	10.78	--	57.49	0.10	0.98	0.18	2.47	--	29.85	BDL	11.16
8 PC-Sec1 20cm	0.20	10.51	--	55.02	0.09	8.34	0.23	2.66	--	28.08	4.65	8.49
8 PC-Sec1 30cm	0.30	10.66	--	55.76	0.09	7.93	0.22	2.59	--	28.04	4.65	14.38
8 PC-Sec1 40cm	0.40	10.49	--	56.39	0.10	8.95	0.21	2.73	--	27.38	5.65	17.05
8 PC-Sec1 6cm	0.15	10.76	-2.0	55.75	0.09	3.60	0.22	2.61	--	28.24	2.54	14.38
8 PC-Sec2 100cm	1.62	10.50	--	55.31	0.10	47.93	0.22	3.16	--	26.98	--	88.78
8 PC-Sec2 125cm	1.87	10.45	-9.9	56.10	0.10	56.26	0.21	3.04	--	26.67	1.64	90.92
8 PC-Sec2 25cm	0.87	10.53	-6.5	56.38	0.10	31.61	0.20	2.68	--	27.64	6.65	33.65
8 PC-Sec2 50cm	1.12	10.42	--	55.58	0.09	39.44	0.23	2.87	--	27.56	6.16	48.63
8 PC-Sec2 6cm	0.68	10.43	--	53.72	0.10	21.88	0.20	2.72	--	27.24	6.65	36.86
8 PC-Sec2 75cm	1.37	10.37	-8.6	55.63	0.10	46.42	0.22	2.89	--	27.59	3.15	66.83
8 PC-Sec3 100cm	3.13	10.69	--	54.82	0.09	81.86	0.18	3.48	--	24.89	BDL	128.92
8 PC-Sec3 125cm	3.38	10.67	-11.5	54.39	0.10	87.64	0.21	3.61	--	24.66	BDL	--
8 PC-Sec3 25cm	2.38	10.57	-11.1	56.61	0.10	78.22	0.25	3.19	--	25.78	BDL	133.20
8 PC-Sec3 50cm	2.63	10.68	--	54.13	0.09	80.53	0.18	3.47	--	25.32	BDL	112.33
8 PC-Sec3 6cm	2.19	10.49	--	56.14	0.09	70.63	0.19	3.25	--	25.92	BDL	100.02
8 PC-Sec3 75cm	2.88	10.51	-12.1	54.80	0.10	84.49	0.17	3.36	--	25.51	BDL	139.09
8 PC-Sec4 100cm	4.64	10.39	-14.9	54.81	0.09	119.67	0.23	4.18	--	24.04	--	196.90
8 PC-Sec4 25cm	3.89	10.68	-13.7	53.77	0.10	108.91	0.21	3.79	--	24.30	BDL	165.86
8 PC-Sec4 50cm	4.14	10.51	--	54.06	0.10	101.98	0.22	3.83	--	24.51	BDL	--
8 PC-Sec4 5cm	3.69	10.52	--	54.02	0.10	97.37	0.20	3.78	--	24.64	BDL	184.59
8 PC-Sec4 70cm	4.36	10.28	--	54.17	0.09	118.51	0.18	3.88	--	24.76	--	179.77
8 PC-Sec5 125cm	6.17	10.27	-18.5	53.10	0.10	129.47	0.24	5.16	--	22.80	--	279.87
8 PC-Sec5 25cm	5.17	10.31	--	53.87	0.09	122.15	0.23	4.54	--	23.47	--	220.45
8 PC-Sec5 50cm	5.42	10.57	-16.8	53.54	0.09	130.84	0.23	4.55	--	23.13	--	--
8 PC-Sec5 6cm	4.98	10.56	--	53.04	0.09	120.84	0.23	4.01	--	23.23	--	--
8 PC-Sec5 75cm	5.67	10.73	-17.4	53.58	0.09	124.25	0.23	4.62	--	23.17	--	220.99
9 MC-4 +2cm	+0.02	10.32	0.5	54.55	0.09	0.01	0.02	2.32	0.33	28.46	BDL	--
9 MC-4 12cm	0.12	10.07	-1.8	53.89	0.09	0.70	0.18	2.63	0.31	28.46	BDL	--
9 MC-4 17cm	0.17	10.03	-0.9	53.41	0.09	0.73	0.12	2.52	0.19	28.08	0.68	--
9 MC-4 21cm	0.21	9.96	-3.0	53.52	0.09	0.92	0.15	2.75	6.49	28.98	2.54	--
9 MC-4 27cm	0.27	10.07	-0.8	53.00	0.09	1.12	0.13	2.61	19.94	28.57	4.41	--
9 MC-4 6cm	0.06	10.21	-0.8	54.37	0.09	0.67	0.15	2.54	0.43	28.98	BDL	--
10 GC-Sec1 24cm	0.24	10.86	-2.5	54.57	0.09	BDL	--	2.67	0.49	29.23	0.00	BDL
10 GC-Sec1 44cm	0.44	9.96	--	54.20	0.09	0.05	0.01	2.64	1.06	27.75	0.00	2.60
10 GC-Sec1 59cm	0.59	10.46	-4.1	53.60	0.09	8.68	0.12	2.72	3.68	28.21	BDL	--
10 GC-Sec1 78cm	0.78	10.11	--	53.99	0.09	--	--	2.90	--	28.05	BDL	24.01
10 GC-Sec2 100cm	1.97	10.26	--	53.78	0.09	49.85	0.27	3.27	--	27.65	BDL	66.30
10 GC-Sec2 115cm	2.12	10.18	--	53.32	0.09	52.03	0.25	3.31	34.52	27.52	BDL	93.60
10 GC-Sec2 130cm	2.27	10.29	-8.7	53.16	0.09	--	--	3.36	36.33	27.47	BDL	--

10 GC-Sec2 40cm	1.37	9.86	--	53.33	0.09	34.65	0.26	3.04	--	27.52	BDL	44.89
10 GC-Sec2 60cm	1.57	10.28	-7.1	53.63	0.09	40.26	0.26	3.15	13.73	27.72	BDL	50.24
10 GC-Sec2 6cm	1.03	--	--	--	--	--	--	--	--	--	--	--
10 GC-Sec2 80cm	1.77	10.47	--	53.99	0.09	--	--	3.17	17.45	27.94	BDL	46.49
10 GC-Sec3 100cm	3.48	10.06	--	52.94	0.10	--	--	4.09	--	26.74	BDL	--
10 GC-Sec3 115cm	3.63	9.92	-12.5	52.63	0.09	111.63	0.25	4.20	0.66	26.63	BDL	136.95
10 GC-Sec3 130cm	3.78	9.91	-12.4	51.82	0.10	--	--	4.52	--	26.44	0.00	128.92
10 GC-Sec3 20cm	2.68	10.35	--	52.71	0.09	69.56	0.26	3.64	62.13	27.67	BDL	124.11
10 GC-Sec3 40cm	2.88	10.61	--	52.87	0.09	--	--	3.66	58.76	27.57	BDL	116.08
10 GC-Sec3 60cm	3.08	10.31	--	52.82	0.09	79.20	0.25	3.80	5.25	27.08	BDL	122.50
10 GC-Sec3 6cm	2.54	9.85	--	52.96	0.09	61.34	0.25	3.42	--	27.72	BDL	91.99
10 GC-Sec3 80cm	3.28	9.91	--	52.80	0.09	84.76	0.25	4.01	2.47	27.11	BDL	129.46
12 PC-Sec1 20cm	0.20	10.71	--	54.72	0.09	11.16	0.06	2.79	0.26	28.89	0.80	--
12 PC-Sec1 40cm	0.40	10.62	-5.3	54.61	0.09	22.87	0.14	2.77	0.63	29.18	1.95	42.21
12 PC-Sec1 60cm	0.60	10.40	--	54.07	0.09	33.65	0.19	3.02	0.90	28.70	3.15	53.45
12 PC-Sec1 6cm	0.06	10.83	-2.0	55.11	0.09	7.70	0.02	2.62	BDL	29.29	BDL	13.31
12 PC-Sec1 80cm	0.80	10.67	--	54.25	0.09	44.10	0.23	3.14	1.24	28.73	6.76	59.34
12 PC-Sec1 92cm	0.92	10.65	-8.8	54.01	0.09	49.07	0.26	3.22	1.38	28.88	13.68	78.07
12 PC-Sec2 100cm	2.11	10.58	-12.5	53.99	0.09	93.65	0.15	3.94	2.02	28.98	58.70	141.77
12 PC-Sec2 120cm	2.31	10.46	--	52.78	0.09	98.53	0.15	4.14	2.22	28.45	35.05	153.54
12 PC-Sec2 130cm	2.41	10.55	--	53.82	0.09	100.85	0.14	4.14	2.25	28.35	14.28	159.97
12 PC-Sec2 20cm	1.31	10.53	--	54.12	0.09	66.50	0.25	3.42	1.65	28.82	59.73	101.09
12 PC-Sec2 40cm	1.51	10.33	-11.0	54.09	0.10	74.52	0.24	3.58	2.11	28.83	68.70	123.57
12 PC-Sec2 60cm	1.71	10.61	--	54.34	0.09	80.22	0.24	3.66	2.06	28.87	72.41	121.43
12 PC-Sec2 7cm	1.18	10.50	--	54.16	0.09	60.84	0.22	3.28	1.82	28.93	51.91	87.71
12 PC-Sec2 80cm	1.91	10.33	--	54.20	0.09	85.96	0.19	3.89	2.17	28.58	73.61	--
12 PC-Sec3 100cm	3.61	10.65	--	53.22	0.09	119.43	0.24	4.38	1.70	27.94	1.91	208.46
12 PC-Sec3 130cm	3.91	10.47	-14.3	53.10	0.09	126.56	0.25	4.62	1.86	27.56	1.82	--
12 PC-Sec3 20cm	2.81	10.54	--	52.98	0.09	113.17	0.20	4.28	1.89	28.19	10.67	179.77
12 PC-Sec3 40cm	3.01	10.53	--	53.55	0.09	114.50	0.24	4.44	1.98	28.48	9.89	185.13
12 PC-Sec3 60cm	3.21	10.64	-13.7	53.52	0.09	116.09	0.20	4.43	2.07	28.52	8.43	186.73
12 PC-Sec3 6cm	2.67	10.31	-13.7	53.70	0.09	110.08	0.17	4.25	2.38	28.50	13.98	166.93
12 PC-Sec3 80cm	3.41	10.44	--	53.37	0.09	115.33	0.20	4.38	1.75	27.92	1.51	199.04
12 PC-Sec4 100cm	5.11	10.45	--	53.84	0.09	133.13	0.24	4.82	1.63	27.14	BDL	--
12 PC-Sec4 120cm	5.31	10.47	-14.7	52.76	0.09	132.42	0.30	4.86	1.45	27.14	0.00	--
12 PC-Sec4 140cm	5.51	10.52	--	52.70	0.09	133.57	0.30	4.96	2.40	27.14	0.00	--
12 PC-Sec4 20cm	4.31	10.57	--	53.61	0.09	114.97	0.22	4.63	1.50	26.99	1.01	--
12 PC-Sec4 40cm	4.51	10.45	-14.2	52.94	0.09	130.38	0.23	4.73	1.40	27.17	1.09	--
12 PC-Sec4 6cm	4.17	10.44	--	53.08	0.09	121.95	0.24	4.53	1.50	27.54	1.34	--
12 PC-Sec4 80cm	4.91	10.45	--	52.51	0.09	126.52	0.22	4.79	1.32	26.45	--	--
12 PC-Sec5 102cm	6.63	10.60	--	52.24	0.09	118.86	0.26	5.76	2.64	26.25	BDL	--
12 PC-Sec5 22cm	5.83	10.68	-16.1	52.62	0.09	129.96	0.29	5.28	2.18	26.57	BDL	258.96
12 PC-Sec5 42cm	6.03	10.40	--	52.52	0.09	132.06	0.30	5.46	2.76	27.20	BDL	286.29

12 PC-Sec5 62cm	6.23	10.33	--	52.92	0.09	129.29	0.30	5.58	2.83	26.98	BDL	287.90
12 PC-Sec5 6cm	5.67	10.29	--	52.65	0.09	131.49	0.28	5.16	1.53	26.89	BDL	253.47
12 PC-Sec5 82cm	6.43	10.70	-17.0	51.34	0.10	123.86	0.27	5.52	2.33	26.98	BDL	291.47
12 PC-Sec6 100cm	7.84	10.28	--	52.36	0.09	98.54	0.19	5.98	2.06	25.69	--	--
12 PC-Sec6 120cm	8.04	10.26	--	51.14	0.09	118.39	0.20	5.69	2.09	26.32	BDL	--
12 PC-Sec6 130cm	8.14	10.25	-16.8	50.83	0.09	118.67	0.20	5.76	2.48	26.08	--	--
12 PC-Sec6 20cm	7.04	10.54	-17.2	51.42	0.09	111.55	0.25	5.71	2.38	25.83	BDL	--
12 PC-Sec6 60cm	7.44	10.31	--	51.37	0.09	105.31	0.25	5.71	2.93	26.41	BDL	--
12 PC-Sec6 6cm	6.90	10.33	--	51.99	0.09	114.41	0.22	5.90	2.74	25.87	BDL	--
12 PC-Sec6 80cm	7.64	10.42	--	51.36	0.09	109.18	0.20	5.94	2.40	25.93	--	--
13 MC-4 +2cm	+0.02	--	0.5	--	--	--	--	--	--	--	--	--
14 GC-Sec1 36cm	0.36	9.67	-2.5	54.98	0.09	BDL	0.16	2.86	BDL	28.96	0.94	--
14 GC-Sec1 60cm	0.6	9.74	-3.4	54.69	0.09	2.60	0.17	2.91	3.82	28.91	--	--
14 GC-Sec1 6cm	0.06	10.50	-1.4	52.45	0.10	BDL	0.12	2.91	3.45	28.74	0.47	5.28
14 GC-Sec2 113cm	1.92	9.86	-5.9	52.15	0.09	46.24	0.16	3.46	BDL	28.01	7.94	25.72
14 GC-Sec2 130cm	2.09	9.79	--	52.33	0.09	40.31	0.16	3.57	BDL	28.06	8.28	29.04
14 GC-Sec2 130cm	2.33	9.89	--	51.56	0.09	51.18	0.16	3.62	BDL	--	--	34.39
14 GC-Sec2 37cm	1.16	9.83	--	54.30	0.09	26.20	0.17	3.18	0.35	28.85	--	18.17
14 GC-Sec2 67cm	1.46	9.88	-5.6	52.26	0.09	37.76	0.16	3.38	BDL	28.17	6.08	19.59
14 GC-Sec2 6cm	0.85	9.76	-4.2	54.17	0.09	14.30	0.17	3.01	0.80	28.93	--	--
14 GC-Sec2 97cm	1.76	9.83	--	51.88	0.09	45.24	0.16	3.46	0.29	28.25	6.55	23.76
14 GC-Sec3 127cm	3.94	10.13	-10.1	52.04	0.09	39.12	0.02	3.84	55.24	27.51	BDL	94.22
14 GC-Sec3 36cm	2.93	10.14	-7.8	51.92	0.09	47.03	0.16	3.64	48.77	27.98	5.87	59.64
14 GC-Sec3 66cm	3.23	10.19	--	52.22	0.09	41.06	0.17	3.71	66.12	27.77	0.47	70.32
14 GC-Sec3 6cm	2.34	10.37	--	52.53	0.09	53.56	0.17	3.63	BDL	28.22	10.55	42.67
14 GC-Sec3 6cm	2.63	10.23	--	52.61	0.09	55.46	0.17	3.71	12.72	28.17	11.70	43.25
14 GC-Sec3 96cm	3.54	10.44	--	53.57	0.09	40.01	0.19	3.83	43.63	27.63	0.47	91.92
14 MC-4 +2cm	+0.02	10.61	--	55.02	0.09	BDL	0.03	2.56	BDL	29.44	--	5.28
14 MC-4 0cm	0.01	10.59	0.1	53.98	0.09	BDL	0.02	2.51	BDL	28.81	--	BDL
14 MC-4 12cm	0.12	10.06		54.33	0.09	BDL	0.06	2.76	1.64	28.32	--	13.84
14 MC-4 18cm	0.18	--	--	--	--	--	--	--	--	--	--	29.58
14 MC-4 6cm	0.06	10.00		54.12	0.09	BDL	0.02	2.60	3.45	28.92	--	5.28
16 MC-4 3cm	0.03	--	-0.4	--	--	--	--	--	--	--	--	--
17 PC-Sec1 37cm	0.37	10.88	--	55.75	0.09	BDL	BDL	2.42	--	28.25	BDL	3.72
17 PC-Sec1 37cm	0.37	10.78	--	55.02	0.10	0.98	BDL	2.47	--	29.85	BDL	18.73
17 PC-Sec1 6cm	0.06	10.98	-1.7	56.39	0.10	BDL	BDL	2.43	--	29.55	BDL	BDL
17 PC-Sec2 130cm	1.86	10.42	--	57.63	0.10	21.88	0.16	2.72	--	27.24	6.65	21.93
17 PC-Sec2 130cm	1.86	10.53	--	57.31	0.10	31.61	0.16	2.68	--	27.64	6.65	--
17 PC-Sec2 37cm	0.93	10.75	--	54.58	0.09	3.60	0.17	2.61	--	28.24	2.54	--
17 PC-Sec2 37cm	0.93	10.51	--	53.72	0.09	8.34	0.16	2.66	--	28.08	4.65	2.45
17 PC-Sec2 67cm	1.23	10.65	-6.3	56.38	0.09	7.93	0.17	2.59	--	28.04	4.65	--
17 PC-Sec2 6cm	0.62	10.74	--	55.76	0.10	1.65	0.09	2.48	--	28.24	2.14	0.56
17 PC-Sec2 97cm	1.53	10.48	--	55.58	0.10	8.95	0.17	2.73	--	27.38	5.65	8.73
17 PC-Sec3 130cm	3.37	10.49		54.80	0.09	70.63	0.17	3.25	--	25.92	BDL	44.55

17 PC-Sec3 36cm	2.43	10.37	--	56.14	0.10	46.42	0.17	2.89	--	27.59	3.15	--
17 PC-Sec3 66cm	2.73	10.50	--	56.61	0.10	47.93	0.17	3.16	--	26.98	--	--
17 PC-Sec3 6cm	2.13	10.42	--	56.10	0.09	39.44	0.17	2.87	--	27.56	6.16	18.79
17 PC-Sec3 96cm	3.03	10.45	-9.7	54.13	0.10	56.26	0.15	3.04	--	26.67	1.64	36.38
17 PC-Sec4 111cm	4.685	10.67	--	54.06	0.10	87.64	0.16	3.61	--	24.66	BDL	78.49
17 PC-Sec4 36cm	3.935	10.68		54.39	0.09	80.53	0.16	3.47	--	25.32	BDL	--
17 PC-Sec4 66cm	4.235	10.51	--	55.02	0.10	84.49	0.17	3.36	--	25.51	BDL	60.89
17 PC-Sec4 6cm	3.635	10.57		54.82	0.10	78.22	0.16	3.19	--	25.78	BDL	--
17 PC-Sec4 96cm	4.535	10.69	-13.7	53.77	0.09	81.86	0.16	3.48	--	24.89	BDL	76.60
17 PC-Sec5 130cm	6.185	10.28	-15.3	54.87	0.09	118.51	0.17	3.88	--	24.76	0.02	95.46
17 PC-Sec5 36cm	5.245	10.68	--	54.81	0.10	97.37	0.16	3.79	--	24.30	BDL	
17 PC-Sec5 66cm	5.545	10.51	--	55.04	0.10	101.98	0.17	3.83	--	24.51	BDL	97.97
17 PC-Sec5 6cm	4.945	10.52	--	56.17	0.10	108.91	0.17	3.78	--	24.64	BDL	92.94
18 GC-CC 10cm	1.89	--	--	--	--	--	--	3.35	--	--	--	--
18 GC-Sec1 14cm	0.32	10.01	-1.0	54.84	0.09	1.61	--	2.42	BDL	28.01	13.85	--
18 GC-Sec2 121cm	1.50	10.44	--	51.47	0.09	41.10	0.17	2.83	2.05	27.18	0.80	17.53
18 GC-Sec2 143cm	1.72	10.27	--	49.98	0.09	58.39	0.17	3.10	0.98	27.98	0.04	20.67
18 GC-Sec2 37cm	0.66	10.02	--	50.49	0.09	13.49	0.15	2.74	--	27.98	1.42	1.19
18 GC-Sec2 67cm	0.96	10.32	--	52.99	0.09	9.74	--	2.67	1.26	28.28	1.83	3.07
18 GC-Sec2 6cm	0.35	10.47	--	51.43	0.09	0.01	0.10	2.60	0.78	28.27	4.26	7.47
18 GC-Sec2 97cm	1.26	10.31	--	52.00	0.09	26.93	0.16	2.76	2.56	28.70	0.72	3.70
18 MC-4 +2cm	+0.02	10.51	0.3	54.03	0.09	BDL	0.05	2.47	0.06	28.81	BDL	BDL
18 MC-4 10cm	0.10	10.20	--	54.78	0.09	BDL	0.09	2.52	2.40	28.60	3.81	2.45
18 MC-4 16cm	0.14	10.01	--	53.88	0.09	0.03	0.09	2.48	0.85	29.06	5.17	--
18 MC-4 18cm	0.16	10.01	--	53.83	0.09	BDL	0.09	2.93	1.32	28.23	7.13	1.19
18 MC-4 32cm	0.18	10.05	-0.3	54.27	0.09	0.17	--	2.58	BDL	28.26	10.01	--
18 MC-4 4cm	0.04	10.53	-1.1	54.03	0.09	BDL	0.06	2.56	1.29	28.97	1.52	2.36
21 MC-4 +2cm	+0.02	10.12	--	52.36	0.09	BDL	0.04	2.62	0.72	27.94	--	BDL
21 MC-4 10cm	0.10	10.04	--	50.26	0.09	BDL	0.12	2.58	2.07	27.85	--	--
21 MC-4 16cm	0.16	10.90	--	54.31	0.10	BDL	0.17	2.57	5.54	29.64	--	--
21 MC-4 22cm	0.22	10.68	--	52.44	0.10	2.99	0.17	2.79	2.27	29.33	--	--
21 MC-4 4cm	0.04	10.31	-1.4	52.43	0.09	BDL	0.12	2.47	5.23	28.80	1.30	BDL
22 MC-4 11cm	0.06	10.41	--	53.17	0.10	BDL	0.10	2.59	0.75	28.69	0.92	17.90
22 MC-4 21cm	0.11	10.27	--	53.36	--	--	--	2.72	--	--	2.34	--
22 MC-4 30cm	0.21	10.12	-0.9	53.56	0.10	--	--	2.83	--	28.31	4.12	--
22 MC-4 3cm	0.03	10.45	-1.1	53.37	0.09	BDL	0.01	2.69	0.37	28.82	BDL	3.70
22 PC-Sec2 132cm	1.62	10.96	-14.5	50.21	0.09	9.73	0.24	4.01	10.81	27.49	14.75	131.11
22 PC-Sec2 36cm	0.66	10.06	-8.6	53.45	0.09	5.20	0.20	3.08	5.87	28.31	18.19	30.96
22 PC-Sec2 67cm	0.97	10.25	--	52.97	0.09	8.23	0.23	3.26	7.42	28.24	17.54	71.60
22 PC-Sec2 6cm	0.36	10.37	-6.2	52.08	0.09	--	--	2.87	--	28.12	10.30	--
22 PC-Sec2 97cm	1.27	10.10	-12.3	52.13	0.09	--	--	3.46		27.49	15.76	104.26
22 PC-Sec3 131cm	3.13	10.22	--	49.81	0.10	--	--	5.29	15.13	25.12	1.74	261.74
22 PC-Sec3 36cm	2.18	10.26	--	50.99	0.10	--	--	4.15		25.58	12.51	202.23
22 PC-Sec3 67cm	2.49	10.85	-18.5	48.78	0.09	7.91	0.25	4.44	18.18	25.99	7.39	200.78
22 PC-Sec3 6cm	1.88	10.32	-16.2	50.47	0.11	9.94	0.26	3.95	14.48	26.45	15.21	142.72
22 PC-Sec3 97cm	2.79	10.93	-19.1	49.21	0.10	10.53	0.25	4.87	26.12	25.97	1.96	221.82

22 PC-Sec4 131cm	4.64	10.02	-22.7	49.25	0.10	42.80	0.27	7.04	0.42	23.30	BDL	366.24
22 PC-Sec4 36cm	3.69	9.69	-21.6	47.84	0.09	30.15	0.28	6.16	3.01	24.13	0.30	303.83
22 PC-Sec4 67cm	4	9.95		49.28	0.10	--	--	6.57		25.20	0.19	385.11
22 PC-Sec4 6cm	3.39	9.80	-21.5	48.22	0.10	23.16	0.26	5.82	5.00	24.82	1.94	315.44
22 PC-Sec4 97cm	4.3	9.86	-23.0	48.33	0.10	37.27	0.28	6.82	1.25	23.52	BDL	329.95
22 PC-Sec5 131cm	6.15	--	--	--	--	--	--	8.42	--	--	--	442.44
22 PC-Sec5 37cm	5.21	9.83	-24.4	47.87	0.10	51.65	0.28	7.73	1.85	22.49	BDL	377.12
22 PC-Sec5 67cm	5.51	9.84		48.20	0.10	48.51	0.27	7.89	1.85	22.33	BDL	417.76
22 PC-Sec5 6cm	4.9	10.04		49.58	0.10	--	--	7.39		22.21	BDL	399.62
22 PC-Sec5 97cm	5.81	10.08	-25.22, -25.24	49.83	0.10	--	--	8.09	--	22.79	BDL	424.30
22 TWC 6cm	0.3	10.40	-1.80, -1.78	53.69	0.08	0.14	0.17	2.92	0.55	28.14	7.33	--
23 MC-4 16cm	0.16	10.35	--	51.55	0.09	BDL	0.34	2.75	2.70	28.48	--	--
23 MC-4 2cm	0.02	10.41	-0.8	53.23	0.09	BDL	0.24	2.61	2.87	29.11	--	1.23
23 MC-4 30cm	0.3	10.36	--	51.69	0.09	0.05	0.33	2.47	5.59	28.34	--	--
24 GC-Sec1 36cm	0.36	10.49	-4.3	53.54	0.09	BDL	0.08	2.88	BDL	28.37	--	18.62
24 GC-Sec1 59cm	0.59	10.14	-6.5	53.30	0.09	BDL	0.16	3.05	2.14	27.89	1.19	20.07
24 GC-Sec1 6cm	0.06	10.55	-1.7	54.02	0.09	BDL	BDL	2.77	BDL	28.75	--	--
24 GC-Sec1 83cm	0.83	10.26	-8.4	52.94	0.09	1.68	0.18	3.16	1.73	27.73	--	2.66
24 GC-Sec2 130cm	2.33	10.18	-15.3	50.77	0.09	54.36	0.26	4.68	4.85	26.01	7.10	81.03
24 GC-Sec2 37cm	1.4	10.24	-11.6	51.37	0.09	28.83	0.23	3.85	1.69	26.98	2.21	33.14
24 GC-Sec2 67cm	1.7	10.24	-13.1	50.86	0.09	42.13	0.26	4.28	2.08	26.66	--	47.65
24 GC-Sec2 7cm	1.1	10.52	-9.9	52.88	0.09	15.83	0.20	3.56	1.72	27.53	--	24.43
24 GC-Sec2 97cm	2	10.40	-14.3	51.09	0.09	48.83	0.26	4.39	3.45	26.67	5.72	62.89
24 GC-Sec3 130cm	3.83	10.27	-18.8	50.36	0.09	30.24	0.24	6.00	26.13	23.62	--	197.87
24 GC-Sec3 37cm	2.9	10.38	-16.4	51.77	0.09	45.98	0.27	5.05	4.11	24.94	1.35	104.98
24 GC-Sec3 67cm	3.2	10.21	-16.4	50.89	0.09	37.20	0.28	5.30	6.25	24.79	--	140.54
24 GC-Sec3 7cm	2.6	10.17	-16.2	50.27	0.09	53.30	0.27	4.87	1.92	25.43	--	104.26
24 GC-Sec3 97cm	3.5	10.15	-18.0	49.80	0.09	40.07	0.28	5.59	25.54	24.32	--	165.94
24 MC-4 16cm	0.06	10.37	-2.6	53.06	0.09	0.01	0.08	2.66	BDL	28.74	--	9.19
24 MC-4 30cm	0.16	10.43	--	53.28	0.09	BDL	BDL	3.01	0.98	28.27	--	--
24 MC-4 3cm	0.03	10.50	-0.6	53.54	0.09	BDL	0.06	2.52	BDL	28.53	--	--
24 MC-4 6cm	0.05	10.25	--	52.20	0.09	BDL	0.08	2.95	BDL	29.86	--	--
25 MC-4 10cm	0.1	11.97	--	49.94	0.11	BDL	0.14	2.67	7.37	29.21	--	0.56
25 MC-4 16cm	0.16	10.34	--	51.58	0.09	BDL	0.15	2.76	3.60	28.65	--	8.78
25 MC-4 19cm	0.19	--	--	--	--	--	--	2.77	--	--	2.43	3.72
25 MC-4 1cm	0.01	10.38	-1.5	52.77	0.09	BDL	0.08	2.44	0.37	28.41	1.44	3.72
25 MC-4 23cm	0.23	9.98	--	49.94	0.09	BDL	--	2.81	--	28.41	3.17	20.15
25 MC-4 4cm	0.04	10.29	--	52.18	0.09	BDL	0.09	2.54	0.33	28.90	2.38	2.43
26 MC-4 10cm	0.1	10.17	--	50.82	0.09	BDL	0.14	2.57	1.54	28.48	6.59	10.64
26 MC-4 15.5cm	0.155	10.16	--	51.28	0.09	BDL	0.14	2.62	4.68	28.34	--	0.53
26 MC-4 21.5cm	0.215	10.21	--	51.23	0.09	BDL	0.15	2.62	3.12	28.10	--	7.48
26 MC-4 28cm	0.28	10.12	--	51.02	0.09	BDL	0.17	2.65	2.28	27.84	--	2.42
26 MC-4 3.5cm	0.04	10.17	-1.5	51.71	0.09	BDL	0.07	2.53	0.46	29.11	3.48	1.79
26 MC-4 36cm	0.36	9.73	--	51.46	0.09	0.05	0.18	2.67	0.40	27.73	--	18.86
27 MC-4 12cm	0.12	10.04	--	53.22	0.10	0.07	0.20	2.61	--	28.09	--	--
27 MC-4 18cm	0.18	9.43	--	52.73	0.09	--	0.19	2.70	--	28.49	2.63	4.95

27 MC-4 24cm	0.24	9.60	--	52.30	0.10	0.05	0.20	2.72	0.55	28.11	--	9.38
27 MC-4 3cm	0.03	9.43	-1.5	52.55	0.10	BDL	0.14	2.47	0.37	28.56	2.37	1.16
27 MC-4 6cm	0.06	10.23	--	52.09	0.09	BDL	0.14	2.47	0.75	28.58	2.37	4.95
28 GC-Sec1 14 #1cm	0.38	10.48	--	52.19	0.09	21.79	0.39	2.84	39.81	28.82	2.73	21.73
28 GC-Sec1 14 #2cm	0.38	10.37	--	51.30	0.09	22.52	0.37	2.88	36.49	29.08	3.05	20.75
28 GC-Sec1 14 #3cm	0.38	10.23	--	50.66	0.09	22.68	0.40	2.91	72.78	28.95	3.25	24.47
28 GC-Sec1 21 #1cm	0.45	--	--	--	--	--	--	2.60	--	--	3.34	41.75
28 GC-Sec1 21 #2cm	0.45	--	--	--	--	--	--	2.66	--	--	2.76	39.18
28 GC-Sec1 21 #3cm	0.45	--	--	--	--	--	--	2.83	--	--	--	25.81
28 GC-Sec1 28 #1cm	0.52	10.54	--	52.64	0.09	27.82	0.39	2.70	22.11	29.12	2.28	--
28 GC-Sec1 28 #2cm	0.52	10.43	--	51.89	0.09	29.05	0.41	3.01	24.90	29.72	2.33	--
28 GC-Sec1 35 #1cm	0.59	10.21	--	51.31	0.09	30.60	0.33	2.99	40.96	28.29	2.16	23.91
28 GC-Sec1 35 #2cm	0.59		--	--	--	--	--	3.08	--	--	2.11	27.19
28 GC-Sec1 7 #1cm	0.31	10.22	--	51.61	0.09	18.84	0.30	2.74	72.48	28.41	3.83	11.79
28 GC-Sec1 7 #2cm	0.31		--	--	--	--	--	2.83	--	--	3.89	10.75
28 GC-Sec1 7 #3cm	0.31		--	--	--	--	--	2.83	--	--	--	21.73
28 GC-Sec2 106 #1cm	1.77	10.30	--	50.15	0.10	57.74	0.42	3.64	BDL	27.09	0.32	--
28 GC-Sec2 106 #2cm	1.77	10.33	--	49.62	0.10	60.05	0.43	3.70	BDL	27.55	--	--
28 GC-Sec2 113 #1cm	1.84		--	--	--	--	--	3.64	--	--	0.36	53.82
28 GC-Sec2 113 #2cm	1.84		--	--	--	--	--	3.78	--	--	0.43	56.87
28 GC-Sec2 120 #1cm	1.91	10.51	--	52.03	0.10	60.83	0.39	3.72	3.56	27.62	0.14	66.93
28 GC-Sec2 120 #2cm	1.91	10.52	--	51.24	0.10	63.62	0.43	3.94	3.97	27.93	0.11	64.77
28 GC-Sec2 127 #1cm	1.98	--	--	--	--	--	--	3.72	--	--	0.12	70.89
28 GC-Sec2 127 #2cm	1.98	--	--	--	--	--	--	3.91	--	--	--	75.86
28 GC-Sec2 135 #1cm	2.06	10.40	--	50.25	0.10	62.55	0.40	3.78	BDL	27.34	0.20	--
28 GC-Sec2 135 #1cm	2.06	10.47	--	49.99	0.10	65.59	0.44	3.82	1.41	27.95	--	--
28 GC-Sec2 139 #1cm	2.10	10.06	--	49.68	0.09	62.34	0.36	3.76	0.43	27.11	0.81	64.87
28 GC-Sec2 139 #2cm	2.10		--	--	--	--	--	3.94	--	--	--	67.41
28 GC-Sec2 14 #1cm	0.85	--	--	--	--	--	--	3.09	--	--	2.07	42.86
28 GC-Sec2 14 #2cm	0.85	--	--	--	--	--	--	3.33	--	--	--	43.16
28 GC-Sec2 21 #1cm	0.92	10.47	--	51.80	0.09	43.47	0.32	3.15	11.58	29.72	1.68	--
28 GC-Sec2 21 #2cm	0.92	10.36	--	50.87	0.10	44.43	0.37	3.30	13.21	30.13	--	--
28 GC-Sec2 28 #1cm	0.99	10.19	--	50.19	0.09	46.24	0.27	3.26	15.53	28.08	1.38	32.11
28 GC-Sec2 28 #2cm	0.99		--	--	--	--	--	3.40	--	--	1.59	30.93
28 GC-Sec2 35 #1cm	1.06	10.38	--	51.76	0.09	48.46	0.37	3.33	3.62	27.92	1.09	39.31

28 GC-Sec2 35 #2cm	1.06	10.44	--	51.49	0.10	50.07	0.37	3.52	2.93	28.36	--	38.87
28 GC-Sec2 42cm	1.13	--	--	--	--	--	--	3.44	--	--	--	47.79
28 GC-Sec2 50 #1cm	1.21	10.37	--	51.44	0.09	53.80	0.35	3.40	0.66	29.74	0.38	--
28 GC-Sec2 50 #2cm	1.21	10.35	--	51.14	0.10	55.99	0.43	3.50	0.71	30.20	--	--
28 GC-Sec2 56 #1cm	1.27	10.34	--	51.54	0.09	55.03	0.30	3.45	2.38	27.83	0.31	52.22
28 GC-Sec2 56 #2cm	1.27		--	--	--	--	--	3.45	--	--	--	47.86
28 GC-Sec2 64cm	1.35	10.44	--	51.62	0.10	54.95	0.31	3.52	1.33	27.83	0.29	50.83
28 GC-Sec2 7 #1cm	0.78	10.38	--	51.75	0.09	37.33	0.33	3.13	15.35	28.24	2.07	31.02
28 GC-Sec2 7 #2cm	0.78	10.41	--	50.87	0.10	38.73	0.39	3.20	14.96	28.95	--	27.88
28 GC-Sec2 71 #1cm	1.42	--	--	--	--	--	--	3.48	--	--	0.19	42.29
28 GC-Sec2 71 #2cm	1.42	--	--	--	--	--	--	3.60	--	--	0.17	45.39
28 GC-Sec2 78cm	1.35	10.38	--	51.39	0.10	56.35	0.40	3.54	1.33	27.74	0.43	52.95
28 GC-Sec2 78cm	1.84	10.42	--	50.12	0.10	60.05	0.40	3.58	1.41	27.82	--	--
28 GC-Sec2 85 #1cm	1.56	10.16	--	50.26	0.09	56.72	0.30	3.53	1.82	27.29	0.25	49.27
28 GC-Sec2 85 #2cm	1.56		--	--	--	--	--	3.62	--	--	0.24	50.54
28 GC-Sec2 92 #1cm	1.63	10.34	--	50.99	0.09	56.55	0.36	3.64	3.00	27.42	0.52	60.95
28 GC-Sec2 92 #2cm	1.63	10.66	--	51.82	0.10	61.27	0.39	3.69	2.77	28.87	--	57.68
28 GC-Sec2 99 #1cm	1.70	--	--	--	--	--	--	3.63	--	--	0.55	50.39
28 GC-Sec2 99 #2cm	1.70	--	--	--	--	--	--	3.82	--	--	--	72.50
28 GC-Sec3 106cm	3.27	10.52	--	52.94	0.10	61.96	0.23	4.10	1.06	27.07	--	--
28 GC-Sec3 113 #1cm	3.34	10.11	--	49.99	0.09	61.58	0.23	4.03	1.78	26.51	0.23	91.51
28 GC-Sec3 113 #2cm	3.34		--	--	--	--	--	4.14	--	--	--	101.28
28 GC-Sec3 120 #1cm	3.41	10.10	--	49.75	0.09	58.27	0.27	4.09	0.67	26.35	0.23	116.40
28 GC-Sec3 120 #2cm	3.41	10.07	--	49.88	0.09	60.52	0.29	4.16	0.65	26.70	--	131.82
28 GC-Sec3 128 #1cm	3.49	--	--	--	--	--	--	4.10	--	--	0.28	117.11
28 GC-Sec3 128 #2cm	3.49	--	--	--	--	--	--	4.26	--	--	--	119.60
28 GC-Sec3 134cm	3.55	10.17	--	50.33	0.09	57.45	0.22	4.10	2.61	26.42	0.23	--
28 GC-Sec3 139 #1cm	3.60	9.94	--	49.43	0.09	57.71	0.25	4.02	2.95	26.23	0.28	105.56
28 GC-Sec3 139 #2cm	3.60		--	--	--	--	--	4.17	--	--	0.27	108.61
28 GC-Sec3 14 #1cm	2.35	--	--	--	--	--	--	3.71	--	--	0.20	90.67
28 GC-Sec3 14 #2cm	2.35	--	--	--	--	--	--	3.93	--	--	0.19	92.26
28 GC-Sec3 21 #1cm	2.42	10.44	--	51.23	0.10	64.45	0.35	3.80	4.15	26.82	0.16	--
28 GC-Sec3 21 #2cm	2.42	10.77	--	52.67	0.10	69.54	0.39	3.90	4.59	28.06	--	--
28 GC-Sec3 28 #1cm	2.49	9.98	--	49.53	0.09	64.79	0.39	3.84	0.44	26.93	0.22	76.09
28 GC-Sec3 28 #2cm	2.49		--	--	--	--	--	3.94			0.21	86.89

28 GC-Sec3 35 #1cm	2.56	10.36	--	51.23	0.10	65.49	0.41	3.94	2.69	27.25	0.15	82.30
28 GC-Sec3 35 #2cm	2.56	10.67	--	52.27	0.10	69.86	0.40	4.11	2.25	28.39	--	91.09
28 GC-Sec3 42 #1cm	2.63	--	--	--	--	--	--	3.92	--	--	--	--
28 GC-Sec3 42 #2cm	2.63	--	--	--	--	--	--	3.92	--	--	0.18	80.53
28 GC-Sec3 49 #1cm	2.70	10.48	--	51.34	0.10	66.46	0.32	3.80	2.93	26.91	0.11	--
28 GC-Sec3 49 #2cm	2.70	10.32	--	50.22	0.10	68.37	0.35	3.90	2.16	27.14	--	--
28 GC-Sec3 56 #1cm	2.77	10.13	--	49.81	0.09	65.93	0.31	3.86	7.08	26.70	0.15	85.97
28 GC-Sec3 56 #2cm	2.77		--	--	--	--	--	4.00	--	--	--	85.97
28 GC-Sec3 64 #1cm	2.85	10.38	--	51.08	0.10	64.90	0.38	4.06	1.09	27.12	--	89.45
28 GC-Sec3 64 #2cm	2.85	10.35	--	50.09	0.10	67.50	0.48	4.00	1.29	27.61	--	91.05
28 GC-Sec3 7 #1cm	2.28	10.66	--	53.81	0.10	63.59	0.43	3.80	1.64	27.57	0.54	71.55
28 GC-Sec3 7 #2cm	2.28	10.42	--	51.09	0.10	66.26	0.55	3.73	1.17	27.53	0.53	74.71
28 GC-Sec3 70 #1cm	2.91	--	--	--	--	--	--	3.90	--	--	0.23	104.37
28 GC-Sec3 70 #2cm	2.91	--	--	--	--	--	--	4.38	--	--	--	96.91
28 GC-Sec3 77 #1cm	2.98	10.51	--	51.77	0.10	65.22	0.33	4.00	1.26	27.26	0.25	--
28 GC-Sec3 77 #2cm	2.98	11.01	--	54.37	0.10	71.55	0.35	4.05	1.75	28.59	--	--
28 GC-Sec3 85 #1cm	3.06	10.14	--	49.94	0.09	65.91	0.27	4.02	4.41	26.75	0.20	90.06
28 GC-Sec3 85 #2cm	3.06		--	--	--	--	--	4.08	--	--	0.24	90.67
28 GC-Sec3 92cm	3.13	9.98	--	49.02	0.09	62.27	0.34	4.08	1.05	26.28	--	99.20
28 GC-Sec3 99 #1cm	3.20	--	--	--	--	--	--	4.09	--	--	0.23	105.62
28 GC-Sec3 99 #2cm	3.20	--	--	--	--	--	--	4.30	--	--	--	124.90
28 GC-Sec4 104cm	4.76	9.91	--	49.55	0.09	55.11	0.36	4.44	1.18	25.24	0.02	131.87
28 GC-Sec4 104cm	4.76	9.99	--	49.77	0.09	55.40	0.42	4.49	1.18	25.37	--	130.65
28 GC-Sec4 110cm	4.82	--	--	--	--	--	--	4.55	--	--	0.06	163.45
28 GC-Sec4 116cm	4.88	--	--	--	--	--	--	4.67	--	--	--	144.65
28 GC-Sec4 123 #1cm	4.95	9.85	--	49.09	0.09	55.58	0.53	4.51	5.10	25.13	0.08	132.49
28 GC-Sec4 123 #2cm	4.95	10.51	--	52.29	0.10	59.72	0.61	4.53	5.28	26.69	--	139.85
28 GC-Sec4 123cm	4.95	10.13	--	50.06	0.09	55.45	0.39	4.60	0.85	25.66	--	--
28 GC-Sec4 128cm	5.00	10.01	--	50.22	0.09	56.23	0.43	4.55	0.99	25.49	0.04	141.87
28 GC-Sec4 12cm	3.84	--	--	--	--	--	--	4.25	--	--	0.24	130.83
28 GC-Sec4 135cm	5.07	--	--	--	--	--	--	4.65	--	--	0.06	141.09
28 GC-Sec4 139 #1cm	5.11	10.12	--	50.59	0.09	55.83	0.63	4.52	5.46	25.68	--	--
28 GC-Sec4 139 #2cm	5.11	10.59	--	52.27	0.10	60.61	0.58	4.60	5.86	27.03	--	--
28 GC-Sec4 18cm	3.90	--	--	--	--	--	--	4.25	--	--	--	--
28 GC-Sec4 25cm	3.97	9.84	--	48.97	0.09	55.94	0.26	4.07	2.70	25.93	0.13	108.27

28 GC-Sec4 37cm	4.09	10.12	--	50.63	0.09	55.28	0.31	4.36	13.83	26.15	0.21	115.62
28 GC-Sec4 37cm	4.09	--	--	--	--	--	--	4.38	--	--	0.24	134.91
28 GC-Sec4 43cm	4.15	10.13	--	50.38	0.09	54.78	0.25	4.30	1.12	26.33	0.17	--
28 GC-Sec4 49cm	4.21	10.02	--	49.83	0.09	54.71	0.26	4.25	3.07	25.82	0.18	120.52
28 GC-Sec4 55cm	4.27	10.10	--	51.01	0.09	54.22	0.33	4.38	3.13	26.01	--	125.42
28 GC-Sec4 61cm	4.33	--	--	--	--	--	--	4.40	--	--	--	145.54
28 GC-Sec4 67cm	4.39	10.03	--	49.61	0.09	54.17	0.31	4.44	1.99	26.13	0.04	--
28 GC-Sec4 7 #1cm	3.79	10.08	--	49.37	0.09	55.73	0.38	4.34	0.90	26.22	0.19	103.73
28 GC-Sec4 7 #2cm	3.79	10.00	--	49.35	0.09	57.46	0.38	4.30	0.55	26.45	--	113.50
28 GC-Sec4 79cm	4.51	9.80	--	48.73	0.09	54.23	0.33	4.48	2.26	25.70	0.09	129.09
28 GC-Sec4 80cm	4.52	9.98	--	50.03	0.09	53.64	0.33	4.53	BDL	25.65	0.15	143.79
28 GC-Sec4 85 #1cm	4.57	--	--	--	--	--	--	4.46	--	--	0.05	163.04
28 GC-Sec4 85 #2cm	4.57	--	--	--	--	--	--	4.55	--	--	--	155.54
28 GC-Sec4 92 #1cm	4.64	10.18	--	50.05	0.10	55.15	0.44	4.50	0.72	26.04	0.05	--
28 GC-Sec4 92 #2cm	4.64	10.08	--	50.09	0.10	56.08	0.42	4.65	0.80	26.28	--	--
28 GC-Sec4 98cm	4.70	10.08	--	49.78	0.10	58.28	0.47	4.40	2.24	26.20	--	135.56
28 MC-4 0cm	0.00	--	-0.1	--	--	--	--	--	--	--	--	--
29 GC-Sec2 7cm	0.07	--	-1.4	--	--	--	--	--	--	--	--	--
29 GC-Sec3 7cm	0.07	--	-3.6	--	--	--	--	--	--	--	--	--
29 GC-Sec4 125cm	1.25	--	-5.1	--	--	--	--	--	--	--	--	--
29 GC-Sec4 6cm	0.06	--	-4.6	--	--	--	--	--	--	--	--	--
29 MC-4 3cm	0.03	--	-0.9	--	--	--	--	--	--	--	--	--
31 MC-4 28.5cm	0.23	10.67	--	54.08	0.10	12.74	0.13	3.03	3.15	28.14	2.43	18.22
31 MC-4 37cm	0.285	10.41	--	53.19	0.09	42.92	0.13	3.10	3.35	28.08	6.52	22.09
31 MC-4 3cm	0.03	10.25	-1.8	55.76	0.09	0.00	0.01	2.52	0.64	28.72	1.94	9.50
31 MC-4 6cm	0.06	10.48	--	53.36	0.09	0.00	0.13	2.55	2.68	28.98	1.30	5.63
31 PC-Sec1 23cm	0.23	--	-6.3	--	--	--	--	--	--	--	--	--
31 PC-Sec1 37cm	0.37	10.40	-9.8	54.64	0.09	44.83	0.20	3.48	2.99	27.90	25.74	30.81
31 PC-Sec2 127cm	1.93	10.39	-20.2	54.73	0.10	86.40	0.28	5.06	0.03	26.31	25.07	215.76
31 PC-Sec2 36cm	1.02	10.41	-15.4	53.48	0.10	85.53	0.28	4.28	3.10	26.89	76.58	107.30
31 PC-Sec2 66cm	1.32	10.51	-17.2	55.06	0.10	86.38	0.28	4.50	1.31	26.71	71.55	151.85
31 PC-Sec2 6cm	0.72	10.67	-13.1	54.50	0.10	77.67	0.27	3.86	2.71	27.56	52.79	59.86
31 PC-Sec2 97cm	1.63	10.36	-18.7	53.27	0.10	85.11	0.28	4.77	0.70	26.52	43.48	169.28
31 PC-Sec3 127cm	3.45	10.21	-27.1	51.52	0.10	53.97	0.28	6.24	0.00	24.48	3.65	327.12
31 PC-Sec3 37cm	2.55	10.39	-22.5	52.86	0.10	67.75	0.26	4.71	0.00	26.18	11.94	232.22
31 PC-Sec3 67cm	2.85	10.32	-23.8	52.19	0.10	63.12	0.26	5.10	0.00	25.70	6.98	248.68
31 PC-Sec3 6cm	2.24	10.51	-21.8	53.16	0.10	73.88	0.28	4.79	0.00	26.35	14.07	231.25
31 PC-Sec3 97cm	3.15	9.85	-26.3	51.80	0.10	56.91	0.28	5.96	0.00	23.77	5.85	314.53
31 PC-Sec4 131cm	4.99	9.49	-33.6	50.03	0.10	46.35	0.28	8.44	0.00	21.40	1.08	449.13
31 PC-Sec4 37cm	4.05	9.91	-30.7	51.51	0.10	55.28	0.28	7.16	0.00	23.32	3.00	370.69
31 PC-Sec4 67cm	4.35	9.61	-31.5	50.25	0.10	54.81	0.28	7.72	0.08	22.29	2.22	421.04
31 PC-Sec4 6cm	3.74	9.86	-29.4	51.51	0.10	55.58	0.28	6.84	0.00	23.32	2.51	372.63
31 PC-Sec4 98cm	4.66	9.44	-32.9	51.83	0.10	51.24	0.28	8.02	0.10	21.59	1.50	434.60
31 PC-Sec5 37cm	5.55	9.39	-36.2	49.45	0.10	42.03	0.28	9.56	0.00	20.10	1.00	505.29

31 PC-Sec5 67cm	5.85	9.25	-37.4	48.44	0.10	42.09	0.28	10.36	1.52	19.02	1.59	558.55
31 PC-Sec5 6cm	5.24	9.27	-35.3	49.48	0.10	43.71	0.28	8.94	0.22	20.51	1.07	460.75
31 PC-Sec5 97cm	6.15	8.96	-38.8	48.70	0.10	49.60	0.27	11.36	1.62	17.30	0.00	583.72
31 PC-Sec6 131cm	7.77	8.58	-43.5	46.47	0.09	46.40	0.28	14.58	--	13.38	--	715.42
31 PC-Sec6 36cm	6.82	8.65	-41.1	46.87	0.10	46.50	0.27	13.19	--	15.30	0.00	660.22
31 PC-Sec6 67cm	7.13	8.86	-42.0	47.35	0.09	52.13	0.28	13.48	--	14.73	--	690.24
31 PC-Sec6 6cm	6.52	8.90	-40.7	48.05	0.10	55.83	0.27	12.61	0.61	15.95	0.00	609.87
31 PC-Sec6 97cm	7.43	8.53	-42.9	47.46	0.09	48.69	0.28	14.04	--	13.65	--	697.02

BDL = Below Detection Limit

Table S2 Rhizon Efficacy

Station	Location		Water Depth	Core Type	Core Length	Total Time from Coring to Sampling		Rhizon Extraction Time	
	Lattitude	Longitude	(m)		(m)	Average (hrs)	Range (hrs)	Average (hrs)	Range (hrs)
8	75° 09' 11.4912" N	179° 52' 23.0952" E	524	MC	0.16	0.92	(0.57 - 1.15)	0.47	(0.08 - 1.21)
9	75° 03' 24.2166" N	179° 49' 13.497" W	446	MC	0.29	1.13	(0.87 - 1.26)	0.91	(0.19 - 1.47)
13	76° 11' 10.7772" N	179° 16' 42.102" W	1118	MC	0.17	1.40	(1.20 - 1.68)	0.40	(0.20 - 0.68)
14	76° 21' 10.3926" N	176° 27' 39.9954" E	733	MC	0.20	2.51	(0.83 - 4.42)	1.76	(0.08 - 3.67)
16	76° 30' 43.2540" N	176° 37' 55.1670" E	1023	MC	0.21	2.81	(1.87 - 3.70)	1.44	(0.51 - 2.33)
18	76° 24' 32.8680" N	173° 52' 44.9178" E	349	MC	0.33	2.11	(1.32 - 2.68)	1.21	(0.42 - 1.78)
21	77° 34' 56.4918" N	163° 17' 36.7326" E	159	MC	0.24	4.02	(3.45 - 4.37)	0.73	(0.17 - 1.08)
22	78° 13' 25.9572" N	164° 25' 36.3612" E	367	MC	0.32	0.73	(0.68 - 0.75)	0.38	(0.33 - 0.41)
23	78° 39' 51.7206" N	165° 01' 57.8352" E	522	MC	0.32	1.48	(0.67 - 1.93)	1.24	(0.35 - 1.85)
24	78° 48' 00.1080" N	165° 22' 55.8552" E	964	MC	0.32	1.79	(0.85 - 2.18)	1.34	(0.52 - 1.67)
25	79° 13' 34.6362" N	152° 40' 32.2284" E	101	MC	0.25	0.97	(0.83 - 1.17)	0.63	(0.51 - 0.83)
26	79° 44' 31.6782" N	154° 23' 20.3244" E	378	MC	0.37	1.83	(0.80 - 2.80)	1.53	(0.50 - 2.51)
27	79° 39' 52.6824" N	154° 07' 34.5324" E	276	MC	0.26	1.65	(1.35 - 2.18)	1.30	(1.01 - 1.83)
28	79° 55' 10.3584" N	154° 21' 12.7578" E	1143	MC	0.27	1.53	(0.85 - 2.27)	1.10	(0.42 - 1.83)
29	81° 20' 33.9750" N	141° 46' 31.6668" E	899	MC	0.23	1.55	(1.05 - 2.05)	1.17	(0.67 - 1.67)
31	79° 55' 13.4070" N	143° 09' 53.0994" E	1120	MC	0.39	2.38	(1.80 - 3.38)	2.08	(1.50 - 3.08)
32	85° 08' 28.2582" N	151° 35' 24.5220" E	837	MC	0.33	4.38	(2.38 - 5.05)	3.33	(1.33 - 4.01)
Multicore Average and Range					0.27	1.95	(0.57 - 5.05)	1.24	(0.08 - 4.01)
8	75° 08' 06.3342" N	179° 51' 05.9004" E	524	PC	6.42	18.56	(4.81 - 20.85)	15.22	(1.78 - 17.5)
10	75° 30' 12.6462" N	179° 05' 59.265" W	1000	GC	3.99	11.01	(3.38 - 12.38)	10.31	(1.83 - 11.83)
12	75° 00' 57.3114" N	179° 45' 09.9900" E	384	PC	8.43	21.44	(20.27 - 21.77)	17.95	(16.42 - 19.15)
14	76° 22' 04.9146" N	176° 25' 56.9670" E	733	GC	2.75	14.58	(6.55 - 17.11)	9.00	(5.22 - 10.01)
17	76° 27' 52.6248" N	176° 43' 25.7628" E	977	PC	6.37	19.62	(18.12 - 19.62)	16.58	(15.08 - 16.58)
18	76° 24' 41.7240" N	173° 47' 17.6454" E	349	GC	1.95	7.72	(3.02 - 14.37)	6.40	(1.73 - 12.92)
22	78° 13' 22.5336" N	164° 27' 42.6306" E	367	PC	6.45	19.79	(13.5 - 25.17)	17.71	(11.42 - 23.08)
24	78° 47' 48.9186" N	165° 21' 59.5080" E	964	GC	4.05	12.25	(10.94 - 14.19)	5.89	(4.83 - 7.42)
28	79° 55' 28.0302" N	154° 23' 44.7180" E	1143	GC	5.23	12.78	(3.33 - 14.33)	6.98	(5.58 - 16.63)
29	81° 17' 57.6816" N	141° 46' 57.1794" E	824	GC	4.66	17.43	(9.25 - 18.02)	13.38	(4.72 - 14.12)
31	79° 54' 53.4270" N	143° 14' 00.4488" E	1120	PC	8.07	11.95	(3.90 - 18.07)	9.25	(1.33 - 15.50)
33	84° 16' 29.5422" N	148° 44' 07.1484" E	886	GC	3.59	12.20	(9.57 - 19.07)	8.55	(5.92 - 15.42)
33	84° 16' 55.3368" N	148° 38' 48.3102" E	888	PC	6.24	11.06	(7.55 - 17.88)	9.48	(5.82 - 16.25)
Gravity/Piston Core Average and Range					5.25	14.65	(3.02 - 25.17)	11.28	(1.33 - 23.08)

Table S3 Rhizon Flow Rates

Station	Flow Rate (mL/hr)			Flow Rate Decrease per meter
	Average	Min	Max	(mL/hr/m)
8	25.28	8.33	37.50	243.06
9	11.36	5.16	26.82	59.21
13	23.68	14.63	33.33	70.36
14	8.31	0.55	24.00	130.30
16	8.31	0.55	24.00	79.37
18	10.77	3.93	26.40	70.23
21	13.00	2.77	40.00	201.71
22	26.82	25.00	30.00	18.52
23	13.52	5.41	28.57	77.22
24	9.51	6.00	19.35	49.46
25	16.24	12.00	20.00	36.36
26	8.85	4.00	20.00	49.23
27	8.09	5.45	10.00	21.65
28	11.80	5.45	24.00	74.18
29	10.36	6.00	16.50	58.33
31	5.16	3.24	6.67	10.07
32	5.21	3.75	11.25	23.44
Multicore Average	12.72	6.60	23.43	74.86
8	1.13	0.29	5.61	0.84
10	1.35	0.38	5.45	1.33
12	0.53	0.17	0.67	0.04
14	1.19	1.00	1.92	0.14
17	0.61	0.36	0.73	0.02
18	2.76	0.08	6.35	2.83
22	0.59	0.22	0.88	0.11
24	1.71	1.25	2.07	0.20
28	1.74	0.70	3.00	0.70
29	0.80	0.64	2.12	0.35
31	2.03	0.65	7.50	0.19
33	1.26	0.65	1.69	0.14
33	1.11	0.62	1.69	0.13
Gravity/Piston Core Average	1.29	0.54	3.05	0.54