2.1 PROTOCOL FOR CHLOROPHYLL *a* AND PHAEOPIGMENT ANALYSIS OF SEDIMENT USING STANDARD FLUOROMETRY

Sample preparation and storage

1. Freeze-dry sample (light excluded) as soon as possible after collection
2. Store sample at - 80° C until analysis (ideally within one week)

Calibration

Calibrate the fluorometer for a range of <u>known</u> chlorophyll *a* standard concentrations (e.g 0.1 - 5 μg ml^{-1}).

1. Determine absolute chlorophyll-*a* concentrations in a spectrophotometer using the formula:

$$\textbf{Chlorophyll-}a = 11.85(E_{664} - E_{750}) - 1.54(E_{647} - E_{750}) - 0.08(E_{630} - E_{750})$$

[Jeffery, 1975], where E_n is absorbance at wavelength **n**

2. Calculate Fd values, using the formula:

$$F_d = C/R,$$

where **C** = concentration of chlorophyll *a* in standard, **R** = Standard fluorescence value before acidification

Chlorophyll a

1. Using a microbalance, accurately weigh sufficient sample into a centrifuge cuvette, to ensure that resulting fluorometer readings are within calibration range
2. Add 2 drops of 1% (by weight) $MgCO_3$ suspension
3. Add 4 ml of 90% acetone
4. Vortex mix for 10 s, store (light excluded) at 2-4° C for 12 hours
5. Centrifuge at 3500 rpm, for 10 minutes
6. Measure fluorescence of the supernatant

Phaeopigments

1. After Step 6 (above), add two drops 10% HCl
2. Invert cuvette to mix
3. Measure fluorescence

Calculate chlorophyll *a* and phaeopigment content using the equations of Holm-Hansen (1965), modified by Parsons *et al*. (1984).

2.2 PROTOCOL FOR CARBOHYDRATE ANALYSIS OF SEDIMENT

Sample preparation and storage

1. Freeze-dry sample as soon as possible after collection
2. Store sample at - 20° C until analysis (ideally within one week)

Calibration

Calibrate the spectrophotometer by preparing a curve of absorbance at 485 nm for a range of standard glucose concentrations (e.g. 20 - 100 μg l^{-1}). A linear regression should produce an r^2 value of at least 0.995.

Colloidal carbohydrate

1. Using a microbalance, accurately weigh sufficient sample into a centrifuge cuvette, to ensure that resulting spectrophotometer readings are within the calibration range.
2. Add 3 ml of 25 S saline
3. Vortex mix for 10 s, incubate at 20° C for 15 minutes, then centrifuge at 3500 rpm for 10 minutes
4. Remove 1 ml of supernatant fluid to an acid resistant container
5. Add 0.4 ml of 5% (by weight) phenol solution
6. Rapidly add 2 ml concentrated H_2SO_4
7. Allow to cool for 30 minutes, then measure absorbance at 485 nm
8. Repeat Steps 2 to 7

Bulk carbohydrate

1. Using a microbalance, accurately weigh sufficient sample into a centrifuge cuvette, to ensure that resulting spectrophotometer readings are within the calibration range.
2. Remove colloidal carbohydrate, as detailed in steps 2 to 8 (above)
3. Add 1 ml distilled water
4. Vortex mix for 10 s, and incubate at 20° C for 15 minutes
5. Follow Steps 5 and 6 (above)
6. Allow to cool for 30 minutes, then centrifuge for 10 minutes, at 3500 rpm.
7. Measure absorbance at 485 nm
8. Repeat Steps 3 to 7

Calculate carbohydrate content using equation 2.14 (Section 2.7)

Notes

1. The spectrophotometer is blanked with 1 ml saline, to which 0.4 ml phenol and 2 ml H_2SO_4 have been added

2. The same sediment as that used in the colloidal carbohydrate extraction can be used for the total carbohydrate extraction, if the spectrophotometer absorbance values lie within the instrument scale and calibration limits

2.3 PROTOCOL FOR AGGREGATED GRAIN-SIZE ANALYSIS

Sample collection and storage

1. Collect 2-4 g undisturbed sediment sample
2. Store wet sample at - 20° C until analysis

Analysis

1. Dessicate and pre-weigh (using a microbalance) enough GF/A filters(1.6 µm retention), for each sieve size used in the analysis
2. Thaw sample at 20° C, for a minimum of 6 hours
3. Rinse the sample with a wash bottle over nested sieves, using steady, constant, gentle pressure and 1 L of 0.45µm filtered seawater
4. Using distilled water, carefully wash all material retained on each sieve into a beaker
5. Vacuum filter the size fractions from each sieve, onto the pre-weighed filters, ensuring no material is left in the beaker
6. Dry the filters for 24 hours, at 60° C
7. Immediately re-weigh the filters and calculate the mass retained.

3.1 Corrected Eastings, Northings and heights for DGPS survey, June 9-10th 1998 (Heights given relative to OD, Newlyn; Grid: OSGB 1936).

EASTING	NORTHING	HEIGHT	EASTING	NORTHING	HEIGHT
476648.8	100997.1	2.29	476200.3	100997.4	0.69
476500.4	100997.1	1.55	476200.3	100897.4	0.86
476499.4	100897.2	2.36	476200.5	100797.2	0.74
476651.1	100897	2.13	476200.3	100697.4	0.76
476651.3	100797.2	2.04	476200.3	100597.3	0.7
476498.8	100797.2	1.46	476350.3	100597.3	0.74
476651.6	100697.1	0.95	476500.4	100597.4	0.79
476499.3	100697.4	0.92	476650.2	100597.3	0.96
476051.1	100897	0.25	476650.4	100497.2	0.4
476050.7	100797.7	0.48	476499.8	100497	0.16
476050.5	100697.5	0.51	476350.2	100497.3	0.14
476047.4	100597.6	0.46	476200.1	100497.4	0.22
476050.3	100497.8	0.28	475899.9	100397.2	-0.22
475900.1	100496.7	-0.01	476050.2	100397.5	-0.19
475900.5	100597	0.09	476200.4	100397.1	-0.33
475900.9	100697.2	0.14	476350.4	100397.5	-0.5
475900.6	100797.1	0.08	476501.4	100397.4	-0.44
475749.6	100697.4	-0.29	476650.4	100397.3	-0.24
475750.4	100597.2	-0.12	476650.3	100297.4	-0.81
475750.4	100497.1	-0.08	476500	100297.3	-0.85
475749.8	100396.4	-0.31	476350.3	100297.5	-0.96
475749.8	100297.1	-0.49	476200.2	100297.3	-1
475750.2	100196.9	-0.89	476050.3	100297.2	-0.75
475600.7	100197.4	-0.84	475900	100297.3	-0.54
475599.4	100297.1	-0.54	475900.2	100197.1	-0.79
475600.2	100397.3	-0.44	476050.4	100197.2	-1.3
475600.4	100497.2	-0.36	476200.2	100197.3	-1.51
475449.4	100396.7	-0.94	476350.2	100197.3	-1.34
476350.3	100897	1.23	476500.1	100197.4	-1.53
476349.5	100797.4	1.17	476650.2	100197.2	-1.39
476350.6	100697.2	0.79	476358.2	101097.2	0.77
476350.1	100997.4	1.04	476500.1	101092.8	1.35

3.2 Corrected Eastings, Northings and heights for DGPS survey, June 24th 1999 (Heights given relative to OD, Newlyn; Grid: OSGB 1936).

EASTING	NORTHING	HEIGHT	EASTING	NORTHING	HEIGHT
476651.5	101001.6	2.5	476201.5	101001.6	0.75
476501.5	101001.6	1.57	476201.5	100901.6	0.87
476501.5	100901.6	1.97	476201.5	100801.6	0.79
476651.5	100901.6	2.26	476201.5	100701.6	0.83
476651.5	100801.6	2.03	476201.5	100601.6	0.63
476501.5	100801.6	1.49	476351.5	100601.6	0.68
476651.5	100701.6	0.99	476501.5	100601.6	0.77
476501.5	100701.6	0.99	476651.5	100601.6	1.05
476051.5	100901.6	0.21	476651.5	100501.6	0.43
476051.5	100801.6	0.47	476501.5	100501.6	0.23
476051.5	100701.6	0.49	476351.5	100501.6	0.16
476051.5	100601.6	0.46	476201.5	100501.6	0.18
476051.5	100501.6	0.19	475901.5	100401.6	-0.24
475901.5	100501.6	0.26	476051.5	100401.6	-0.14
475901.5	100601.6	0.17	476201.5	100401.6	-0.3
475901.5	100701.6	0.14	476351.5	100401.6	-0.45
475901.5	100801.6	0.08	476501.5	100401.6	-0.39
475751.5	100701.6	-0.29	476651.5	100401.6	-0.2
475751.5	100601.6	-0.15	476651.5	100301.6	-0.8
475751.5	100501.6	0.1	476501.5	100301.6	-0.87
475751.5	100401.6	-0.3	476351.5	100301.6	-0.99
475751.5	100301.6	-0.45	476201.5	100301.6	-0.88
475751.5	100201.6	-0.88	476051.5	100301.6	-0.67
475601.5	100201.6	-0.84	475901.5	100301.6	-0.49
475601.5	100301.6	-0.52	475901.5	100201.6	-0.79
475601.5	100401.6	-0.39	476051.5	100201.6	-1.2
475601.5	100501.6	-0.39	476201.5	100201.6	-1.59
475451.5	100401.6	-0.96	476351.5	100201.6	-1.25
476351.5	100901.6	1.18	476501.5	100201.6	-1.41
476351.5	100801.6	1.13	476651.5	100201.6	-1.28
476351.5	100701.6	0.94	476351.5	101101.6	0.72
476351.5	101001.6	1.06	476501.5	101100.1	1.75

APPENDIX 3.3
EMCM current meter deployment
Pilsey Sands
02/02/00 - 09/02/00

EMCM1 Upper station
Record from 02/02/00 to 09/02/00
EMCM height above bed:0.2m(+/-0.02)

Date	Range(m)	Immersion (mins)(+/-20)	Flood/ebb duration(%)	Max.flood(m/s)	Max.ebb(m/s)
########	2.65	200	50/50	0.13	0.11
########	2.9	198	56/44	0.10	0.11
########	3	154	40/60	0.12	0.20
########	2.95	229	50/50	0.17	0.17
########	3.3	214	45/55	0.15	0.20
########	3.25	212	43/57	0.13	0.10
########	3.6	231	38/62	0.14	0.16
########	3.4	244	43/57	0.17	0.17
########	3.75	243	43/57	0.20	0.21
########	3.6	274	47/53	0.32	0.29
########	3.9	261	33/67	0.31	0.28
########	3.7	260	41/59	0.32	0.29
########	3.9	272	50/50	0.31	0.28
########	3.65	274	44/56	0.31	0.28

EMCM2 Middle station
Record from 02/02/00 to 09/02/00
EMCM height above bed:0.15m(+/-0.02)

########	2.65	200	49/51	0.20	0.13
########	2.9	228	47/53	0.21	0.15
########	3	185	55/45	0.23	0.17
########	2.95	200	58/42	0.27	0.21
########	3.3	245	45/55	0.27	0.20
########	3.25	295	50/50	0.26	0.16
########	3.6	245	42/58	0.27	0.23
########	3.4	275	53/47	0.26	0.23
########	3.75	275	47/53	0.31	0.28
########	3.6	295	48/52	0.32	0.26
########	3.9	300	39/61	0.38	0.29
########	3.7	305	44/56	0.39	0.42
########	3.9	275	46/54	0.33	0.30
########	3.65	295	47/53	0.35	0.28

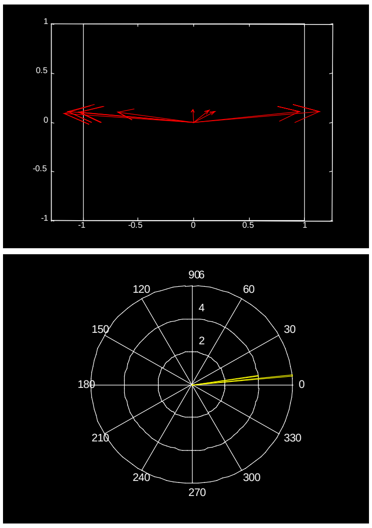
EMCM3 Lower station
Record from 02/02/00 to 06/02/00
EMCM height above bed:0.25m(+/-0.02)

########	2.65	366	50/50	0.23	0.20
########	2.9	395	54/46	0.23	0.20
########	3	350	48/52	0.22	0.19
########	2.95	365	54/46	0.28	0.18
########	3.3	365	49/51	0.30	0.21
########	3.25	380	53/47	0.27	0.23
########	3.6	378	47/53	0.29	0.22
########	3.4	395	51/49	0.30	0.19

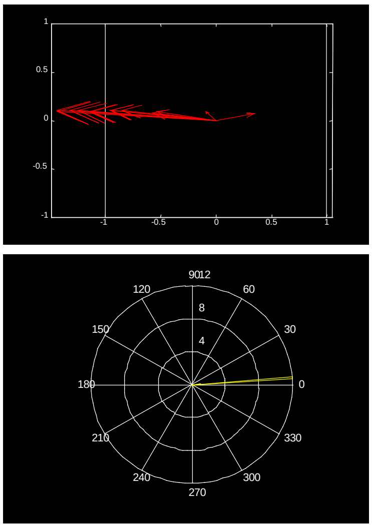
Mean flood(m/s)	Mean ebb(m/s)
0.12	0.10
0.09	0.10
0.12	0.16
0.16	0.16
0.12	0.12
0.12	0.10
0.12	0.13
0.15	0.16
0.18	0.18
0.28	0.26
0.25	0.24
0.28	0.28
0.26	0.25
0.27	0.24
0.17	0.12
0.17	0.14
0.18	0.15
0.23	0.18
0.21	0.16
0.20	0.13
0.23	0.17
0.24	0.18
0.25	0.22
0.27	0.24
0.29	0.25
0.32	0.38
0.28	0.29
0.30	0.24
0.15	0.17
0.16	0.14
0.16	0.13
0.21	0.13
0.21	0.15
0.19	0.16
0.21	0.15
0.22	0.15

3.4 EMCM 1 – UPPER STATION. Vector resultants (upper) and angle histograms (lower) for each tide. Flood vectors to the right, ebb to the left. Tide no., Date, HW height are shown

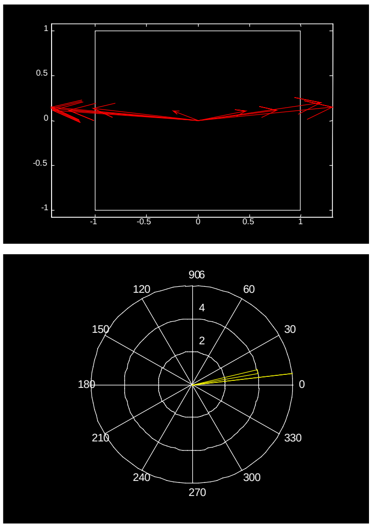
Tide 1 02/02/00 4.2m



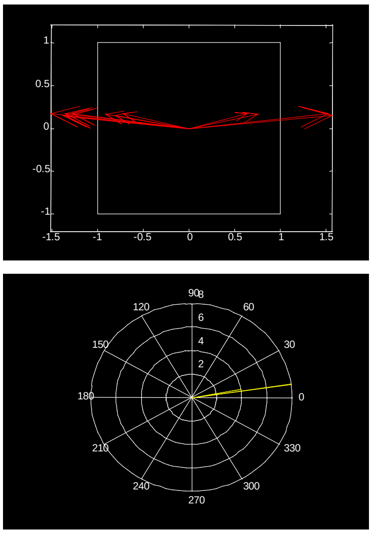
Tide2 03/02/00 4.4m



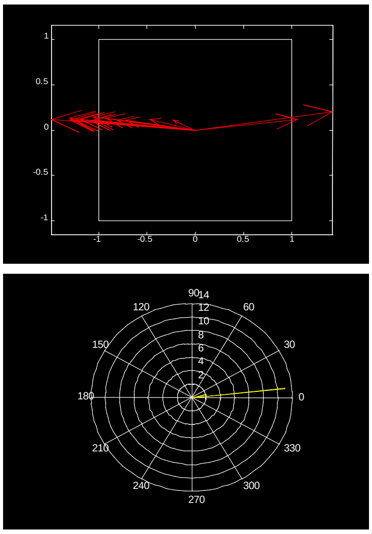
Tide3 03/02/00 4.4m



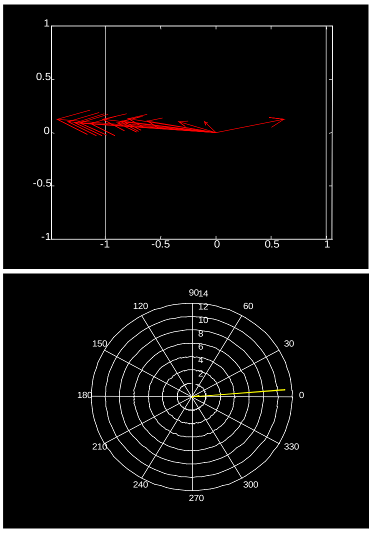
Tide 4 04/02/00 4.5m



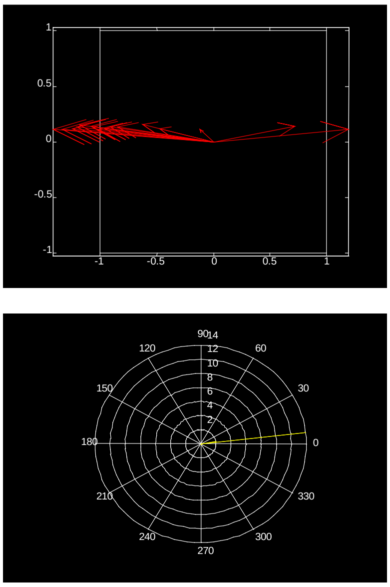
Tide 5 04/02/00 4.5m



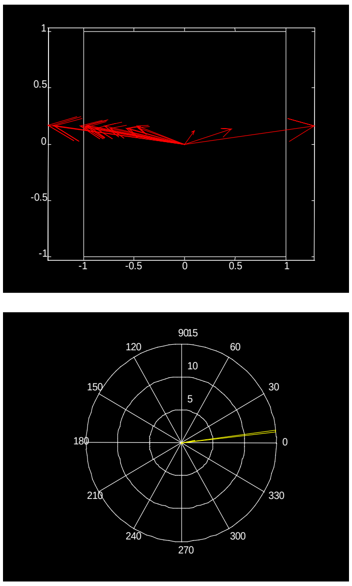
Tide6 05/02/00 4.6m



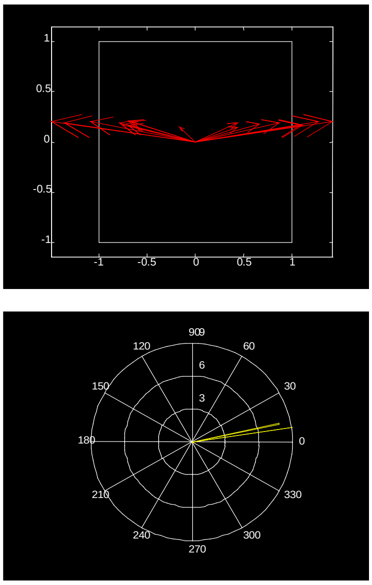
Tide7 06/02/00 4.6m



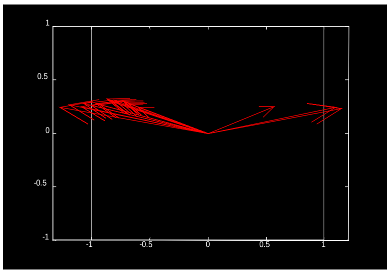
Tide 8 06/02/00 4.6m

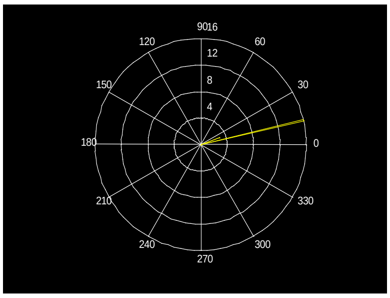


Tide 9 07/02/00 4.7m

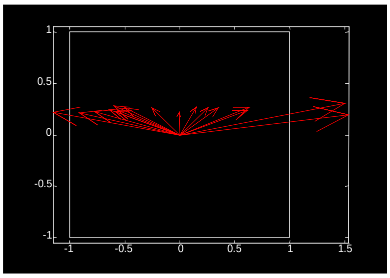


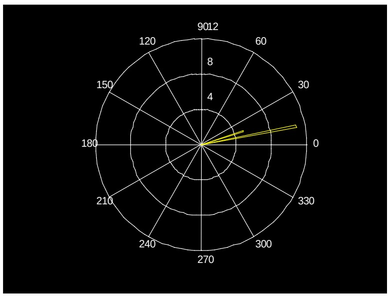
Tide 10 07/02/00 4.7m



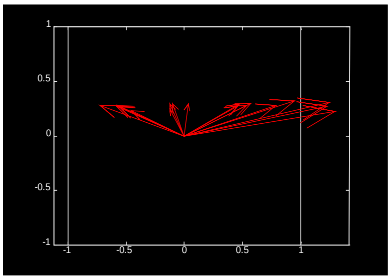


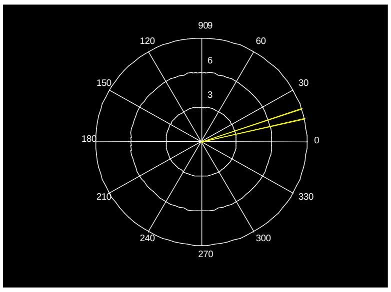
Tide 11 08/02/00 4.7m



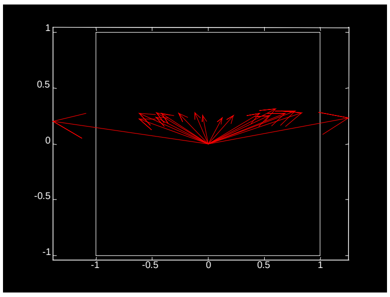


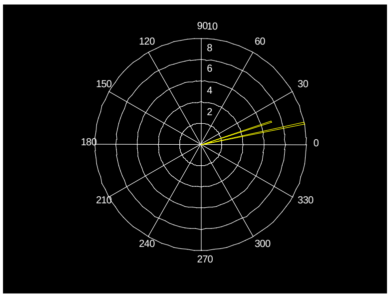
Tide 12 08/02/00 4.7m



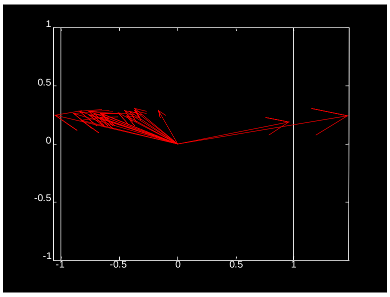


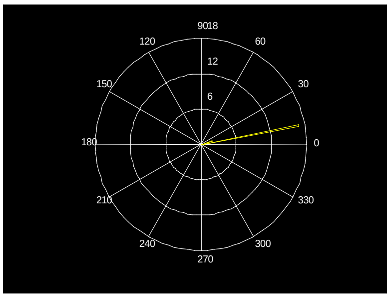
Tide 13 09/02/00 4.7m





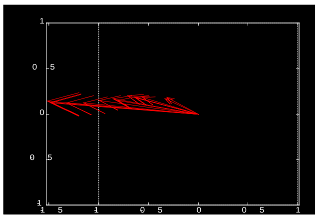
Tide 14 09/02/00 4.6m

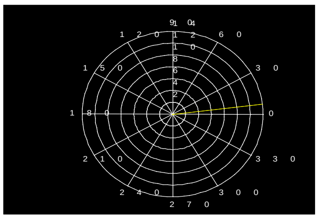




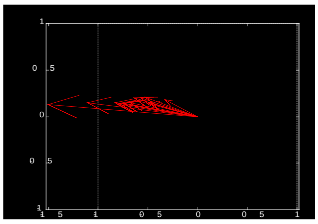
3.5 EMCM 2 – MIDDLE STATION. Vector resultants (upper) and angle histograms (lower) for each tide. Little difference between flood and ebb directions. Dates and heights are same as for EMCM 1 (Appendix 3.4)

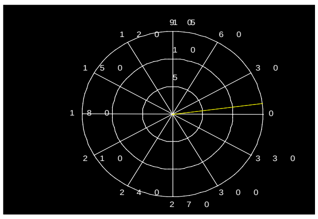
Tide1



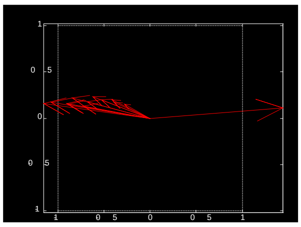


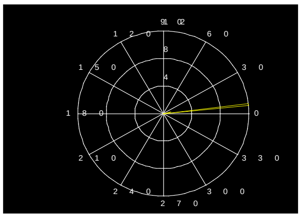
Tide2



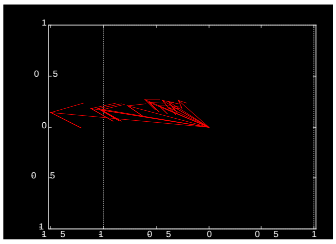


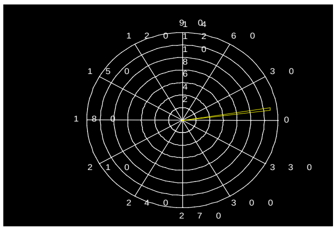
Tide3



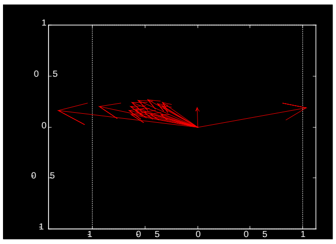


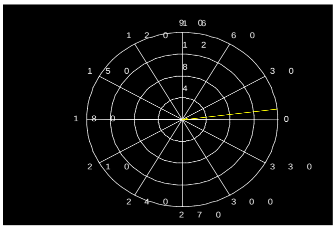
Tide4



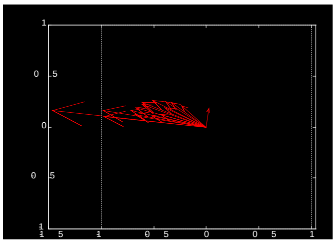


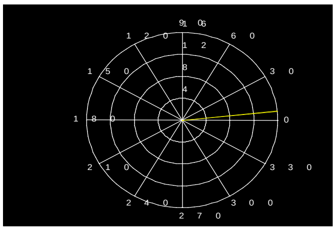
Tide5



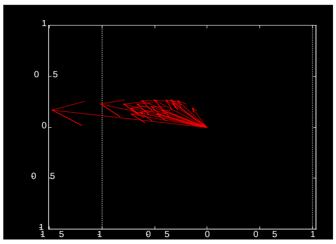


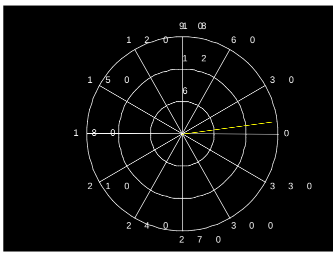
Tide6



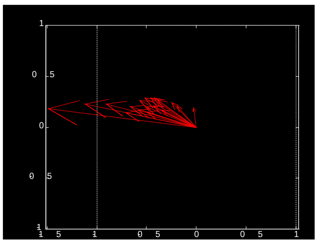


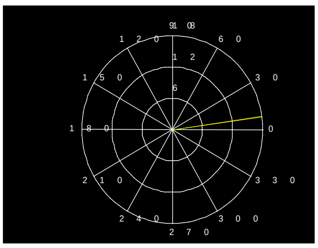
Tide 7



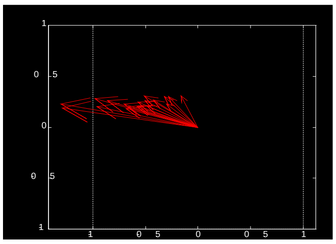


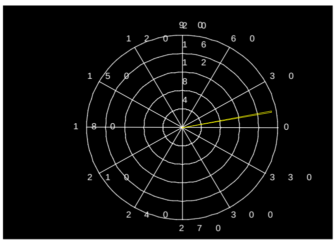
Tide8



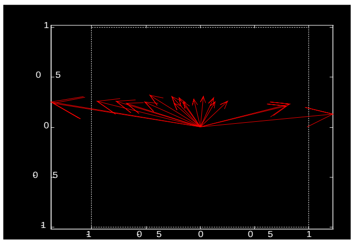


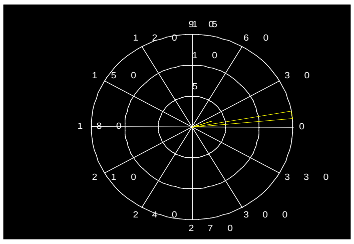
Tide9



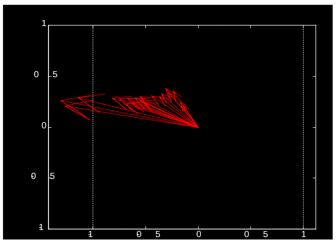


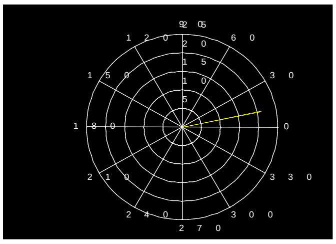
Tide10



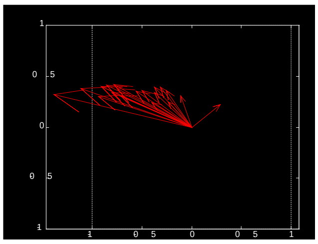


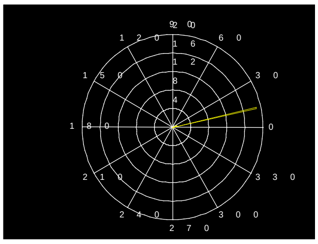
Tide11



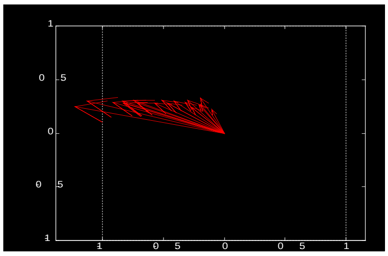


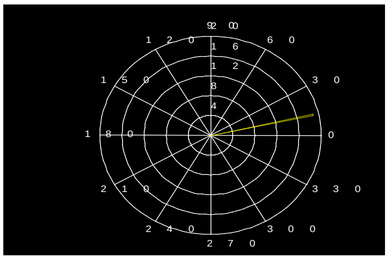
Tide12



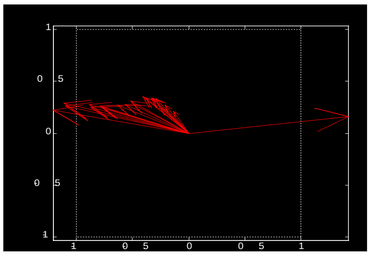


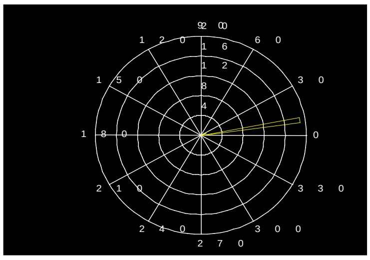
Tide 13





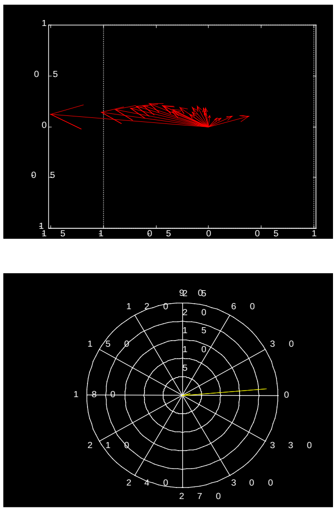
Tide14



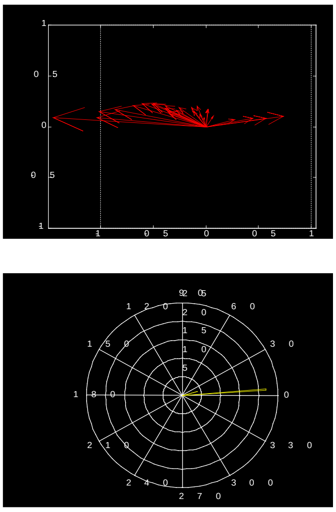


3.6. EMCM 3 – LOWER STATION. Vector resultants (upper) and angle histograms (lower) for each tide. Flood vectors to the right, ebb to the left. Dates and HW heights as for EMCM 1 (Appendix 3.4)

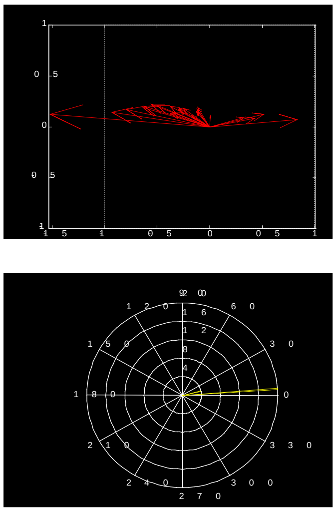
Tide1



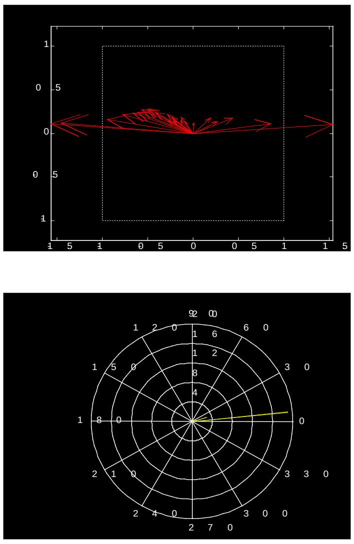
Tide2



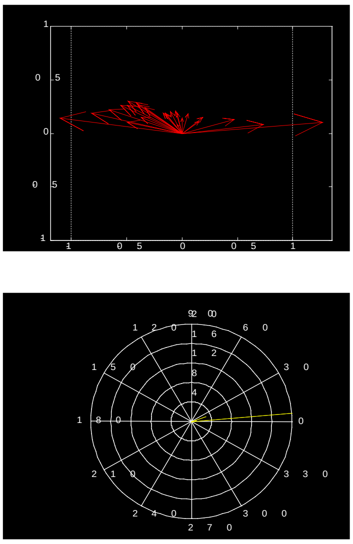
Tide3



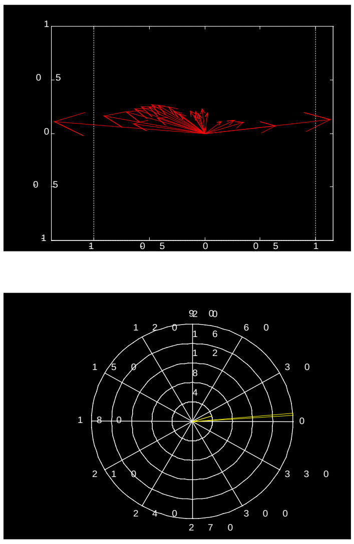
Tide4



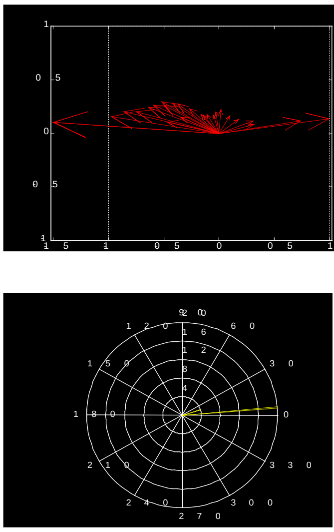
Tide5



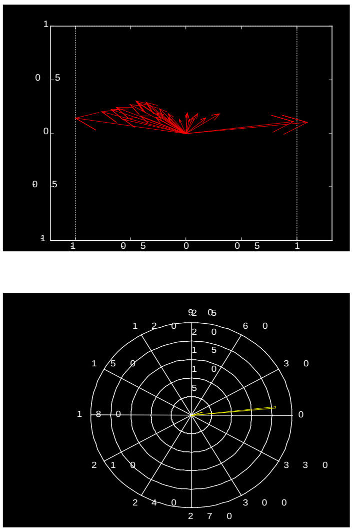
Tide6



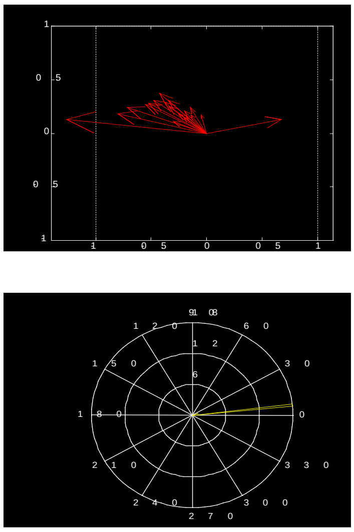
Tide7



Tide8



Tide9



APPENDIX 3.7

Location and grain-size parameters(Folk, 1980) of sediment samples collected on June 9th/10th

Easting	Northing	MEAN(phi)	MEAN(microns)	SORTING	SKEWNESS	KURTOSIS
476649	100997	2.37	193	0.45	-0.12	0.99
476500	100997	2.38	192	0.36		1.03
476499	100897	2.09	235	0.89	0.1	1.74
476651	100897	2.57	168	0.40	-0.15	1.03
476651	100797	2.56	170	0.38	-0.21	1.07
476499	100797	2.44	184	0.35	-0.13	1.01
476652	100697	2.73	151	0.34	-0.1	1.21
476499	100697	2.54	172	0.39	-0.17	1.03
476051	100897	2.51	176	0.42	-0.25	1.02
476051	100698	2.45	183	0.40	-0.3	1.01
476047	100598	2.38	192	0.37	-0.14	1.01
476050	100498	2.67	157	0.34	-0.11	1.17
475900	100497	2.56	170	0.39	-0.11	1.08
475901	100597	2.48	179	0.46	-0.12	1.06
475901	100697	2.35	196	0.52	-0.14	1.05
475901	100797	2.22	215	0.51	-0.16	1.09
475750	100697	2.08	237	0.44	-0.19	1.19
475750	100597	2.38	191	0.42	-0.11	0.99
475750	100497	2.34	198	0.41	0.2	1.00
475750	100396	2.38	192	0.40	0.12	1.00
475750	100297	2.64	160	0.38	-0.13	1.25
475750	100197	2.5	177	0.39	-0.18	1.02
475601	100197	2.47	180	0.43	-0.17	1.02
475599	100297	2.36	195	0.42	-0.12	1.00
475600	100397	2.44	184	0.39	-0.19	1.01
475600	100497	2.17	222	0.35	-0.16	1.11
475449	100397	2.66	158	1.00	-0.2	0.92
476350	100897	2.26	209	0.38	-0.21	1.06
476350	100797	2.34	198	0.35	-0.43	1.01
476351	100697	2.6	165	0.38	-0.16	1.06
476350	100997	2.41	188	0.39	-0.13	1.00
476200	100997	2.42	187	0.40	-0.15	1.00
476200	100897	2.39	191	0.41	-0.18	0.99
476201	100797	2.48	179	0.40	-0.18	1.01
476200	100697	2.37	193	0.41	-0.14	1.00
476200	100597	2.44	184	0.35	-0.11	1.02
476350	100597	2.55	171	0.33	-0.21	1.01
476500	100597	2.59	166	0.33	0.12	1.03
476650	100597	2.6	165	0.33	-0.18	1.04
476650	100497	2.7	154	0.32	-0.11	1.20
476500	100497	2.74	150	0.31	-0.16	1.16
476350	100497	2.71	153	0.33	-0.11	1.18
476200	100497	2.67	157	0.32	0.12	1.15
475900	100397	2.65	159	0.35	-0.22	1.14
476050	100398	2.67	157	0.35	0.21	1.19
476200	100397	2.7	154	0.32	-0.18	1.16
476350	100398	2.76	148	0.32	0.18	1.19
476501	100397	2.74	150	0.32	-0.25	1.22
476650	100397	2.76	148	0.36	-0.13	1.39
476650	100297	2.59	166	0.44	-0.11	1.27
476500	100297	2.64	160	0.36	-0.14	1.13
476350	100298	2.36	195	0.89		0.75
476200	100297	2.76	148	0.30	-0.24	1.18

476050	100297	2.65	159	0.36		1.15
475900	100297	2.51	176	0.63	-0.19	1.02
475900	100197	2.6	165	0.40	-0.16	1.10
476050	100197	2.58	167	0.39	-0.17	1.11
476200	100197	2.66	158	0.39	-0.15	1.49
476350	100197	2.75	149	0.48	-0.14	1.18
476500	100197	2.68	156	0.63	-0.16	1.51
476650	100197	2.55	171	0.52	-0.17	1.10
476358	101097	2.69	155	0.44	-0.15	1.28
476500	101093	2.4	189	0.43	-0.15	1.00

APPENDIX 3.8

Colloidal(coll) and bulk carbohydrate distribution, Pilsey Sands. June 9th/10th 1998

Easting	Northing	coll 0to1mm ug/gDW	SE	coll 1to2 mm ug/gDW	SE	0to1mmSEM ug/gDW	SE	bulk 1to2 mm ug/gDW	SE
476649	100997	58	9	54	7	544	65	625	88
476500	100997	91	9	108	10	691	99	626	75
476499	100897	58	12	56	10	330	50	231	42
476651	100897	97	17	95	15	1228	307	1211	242
476651	100797	120	6	58	4	288	58	563	56
476499	100797	160	51	156	45	1223	245	822	148
476652	100697	108	16	122	17	680	68	742	178
476499	100697	154	21	169	24	1510	121	1470	294
476051	100897	75	7	82	8	547	66	486	44
476051	100798	117	12	129	12	622	112	584	105
476051	100698	83	12	128	19	513	51	539	92
476047	100598	130	23	126	24	1451	145	1359	109
476050	100498	69	4	76	6	437	52	651	91
475900	100497	128	45	132	40	552	166	855	214
475901	100597	167	25	127	15	545	136	541	108
475901	100697	131	24	116	20	1283	154	833	125
475901	100797	169	34	158	30	1295	117	782	94
475750	100697	176	21	189	19	2091	376	1817	254
475750	100597	124	12	120	11	919	147	722	94
475750	100497	95	13	119	17	1540	108	754	75
475750	100396	112	18	106	18	953	276	729	182
475750	100297	92	13	95	14	466	65	591	118
475750	100197	57	7	49	5	419	59	638	96
475601	100197	108	22	106	19	659	66	1085	65
475599	100297	154	12	143	14	783	70	706	99
475600	100397	120	54	125	50	556	83	651	98
475600	100497	129	12	133	13	1092	207	937	150
475449	100397	144	27	130	22	1320	106	1388	139
476350	100897	156	33	170	32	1193	358	1210	290
476350	100797	158	27	156	28	419	50	398	91
476351	100697	125	20	146	26	1190	202	1211	206
476350	100997	73	10	97	12	368	70	312	44
476200	100997	98	12	48	6	331	33	279	33
476200	100897	89	13	52	8	791	71	670	67
476201	100797	47	9	43	7	356	50	99	12
476200	100697	100	24	96	19	394	67	376	56
476200	100597	12	1	36	4	484	73	178	18
476350	100597	41	9	33	6	228	23	255	20
476500	100597	57	4	26	3	354	64	275	36
476650	100597	139	5	212	17	472	47	459	41
476650	100497	116	15	115	11	600	240	453	159
476500	100497	32	5	30	4	98	10	211	32
476350	100497	28	3	25	2	551	94	778	124
476200	100497	118	11	124	12	1089	207	293	18
475900	100397	106	6	131	13	1348	243	1324	238
476050	100398	134	16	119	10	506	91	682	130
476200	100397	96	12	95	14	333	40	597	90
476350	100398	36	4	58	8	349	41	557	45
476501	100397	110	16	101	13	368	55	493	59
476650	100397	142	17	155	15	1131	192	1195	179
476650	100297	142	20	153	22	724	145	731	132
476500	100297	23	4	53	8	394	39	648	97

476350	100298	130	31	110	27	418	79	1075	108
476200	100297	130	16	131	26	927	111	1355	122
476050	100297	125	29	124	25	1296	104	454	45
475900	100297	70	6	64	6	814	81	391	55
475900	100197	108	4	119	10	358	50	612	86
476050	100197	135	17	117	14	997	100	1205	96
476200	100197	12	2	13	2	341	34	593	71
476350	100197	161	13	162	16	1771	177	1468	176
476500	100197	90	12	88	9	535	43	726	73
476650	100197	49	7	120	14	330	50	1186	178
476358	101097	239	76	240	72	1085	152	990	168
476500	101093	306	92	257	64	1810	235	1716	223

APPENDIX 4.1

FULL DATA SET USED FOR ANALYSIS OF COVARIANCE AND MULTIVARIATE ANALYSES:WEE

Julian day	Colloidal carbohydrate (0-1mm) ug GE /gDW			Colloidal carbohydrate (1-2mm) ug GE /gDW			Chlorophyll ug/gDW
	LOWER	MIDDLE	UPPER	LOWER	MIDDLE	UPPER	LOWER
6	69.7	51.3	76.6	61.7	81.0	87.6	6.9
13	54.6	78.6	83.1	32.6	77.2	70.9	7.1
20							
28	81.6	123.1	101.7	57.6	93.3	88.0	12.7
34	107.6	128.0	166.6	81.4	68.0	145.0	23.0
41	64.3	81.4	76.3	48.8	60.6	69.2	8.0
48	71.5	91.3	148.0	45.9	71.3	100.5	4.5
55	103.8	120.4	122.0	58.0	92.1	96.7	6.1
63	54.9	62.8	81.9	37.4	70.4	75.4	3.8
69	118.6	122.9	165.7	47.7	76.4	110.9	7.4
76	260.8	114.7	131.2	102.9	86.6	107.2	6.7
83	115.1	92.5	122.8	60.0	83.0	99.0	5.8
90	87.4	118.2	114.7	59.9	70.8	81.4	3.3
97	52.5	87.5	87.9	34.8	78.0	74.6	2.2
104	52.0	68.0	88.5	43.8	65.3	87.1	1.8
111	63.8	86.1	103.2	45.0	63.6	94.7	1.8
118	76.7	86.8	142.3	65.2	83.4	125.7	1.6
124	71.7	78.7	118.3	52.1	80.0	113.1	1.8
130	85.8	99.8	136.8	64.5	92.2	124.4	0.5
132	92.2	119.2	112.1	77.0	91.4	106.6	0.4
141	87.7	109.4	142.0	72.2	107.6	116.8	0.2
148	92.2	124.6	136.8	80.5	122.8	126.9	0.2
153	103.4	145.6	121.4	79.6	135.3	114.7	0.2
161	96.8	158.8	217.5	83.1	146.4	176.5	0.2
167	82.1	129.0	276.8	68.6	120.7	206.8	0.3
173	107.8	176.0	184.1	97.5	165.0	173.1	0.2
181	98.0	147.8	169.6	83.0	138.2	141.7	0.2
189	128.1	164.4	190.3	72.4	134.3	167.4	2.3
195	63.2	116.7	119.7	70.9	138.7	106.1	1.3
202	77.6	147.1	136.3	63.1	134.1	117.8	1.5
209	47.8	112.9	187.8	33.6	86.8	164.2	1.4
216	93.4	172.2	173.8	67.4	61.9	102.0	2.4
223	112.9	170.3	206.8	86.0	165.4	160.6	2.2
230	43.0	110.5	99.2	30.4	68.6	98.8	1.8
237	114.6	156.5	352.1	115.9	165.9	289.1	2.5
244	110.3	141.8	277.4	117.7	140.2	121.0	13.4
251	120.4	165.1	250.5	134.5	197.7	253.0	2.8
258	103.7	166.8	219.7	92.5	170.7	209.2	3.2
265	42.3	134.5	122.4	41.6	131.4	152.8	10.1
272	73.0	115.2	159.4	64.5	126.4	147.9	12.5
277	126.7	159.2	203.7	91.4	141.5	197.1	15.7
279	74.8	124.4	241.2	57.3	108.7	205.0	20.1
287	48.0	114.3	179.0	48.6	107.2	174.6	12.2
292	23.5	82.8	121.9	27.7	79.8	138.1	11.0
300	14.4	35.7	64.7	21.1	40.1	68.3	6.9
307	33.1	58.9	96.8	27.6	51.3	90.0	7.4
314	23.4	50.5	87.7	15.2	43.9	90.3	8.9
320	35.0	68.2	107.5	18.3	60.0	99.4	12.5
327							
335	29.7	75.2	88.3	25.1	55.0	74.1	15.4
343	11.3	37.7	38.6	12.0	35.4	44.4	9.4

350	48.7	65.6	84.6	19.7	38.5	69.2	27.6
356	20.2	26.3	42.6	21.3	27.0	43.5	9.9

KLY SAMPLING PROGRAM

-a(0-1mm)		Chlorophyll-a(1-2mm)			Phaeopigments(0-1mm)			Phaeopigm
		ug/gDW			ug/gDW			ug/gDW
MIDDLE	UPPER	LOWER	MIDDLE	UPPER	LOWER	MIDDLE	UPPER	LOWER
6.6	8.7	4.8	5.7	8.0	0.5	0.5	0.7	0.4
12.6	10.3	5.3	8.0	8.7	0.5	1.0	0.8	0.4
13.8	12.4	7.1	8.8	10.5	1.0	1.1	1.0	0.5
12.1	17.3	9.6	7.9	12.9	1.8	0.9	1.3	0.7
3.1	4.5	3.3	2.2	3.2		0.2	0.1	0.3
2.9	5.9	2.6	2.2	3.5	0.5	0.2	0.2	0.3
3.4	6.0	2.5	2.3	3.7	0.5	0.2	0.3	0.3
2.3	4.2	2.0	1.9	2.6	0.2	0.3	0.2	0.3
3.1	5.5	2.4	1.7	2.6				
1.4	2.5	2.9	1.2	1.3				
2.2	3.1	2.6	1.6	1.9	0.4	0.1	0.1	0.3
2.0	2.4	1.6	1.6	1.7	0.0	0.2	0.1	0.2
1.9	2.2	1.6	1.5	1.5	0.2	0.1	0.0	0.2
1.3	1.4	1.6	1.3	1.5	0.0	0.2	0.3	0.2
0.9	1.2	1.3	1.0	1.2	0.1	0.1	0.1	0.2
1.1	1.2	1.3	1.0	1.2	0.1	0.1	0.1	0.1
1.0	1.3	1.3	0.9	1.0	0.3	0.1	0.2	0.3
0.3	0.3	0.3	0.2	0.3	0.0	0.0	0.0	0.0
0.2	0.3	0.3	0.2	0.2	0.0	0.0	0.0	0.0
0.2	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0
0.2	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0
0.1	0.2	0.2	0.1	0.2	0.1	0.0	0.0	0.1
0.2	0.3	0.2	0.2	0.3	0.0	0.0	0.0	0.0
0.2	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0
0.2	0.2	0.2	0.1	0.2	0.0	0.0	0.0	0.0
0.2	0.2	0.2	0.2	0.2	0.0	0.0	0.0	0.0
1.8	1.7	1.6	1.5	1.6	0.2	0.1	0.2	0.1
1.5	1.5	1.4	1.5	1.7	0.2	0.1	0.1	0.2
1.3	1.3	1.5	1.5	1.6	0.2	0.1	0.1	0.3
1.2	1.2	1.2	1.2	1.4	0.3	0.1	0.2	0.2
1.7	2.0	2.3	1.9	2.4	0.3		0.0	0.3
1.6	2.1	1.9	1.5	1.9	0.6	0.1	0.0	0.4
1.8	1.9	1.9	1.9	2.1	0.2	0.0	0.0	0.1
1.6	1.6	2.3	1.6	1.7	0.6	0.1	0.0	0.5
8.4	9.2	10.5	8.3	9.8				
1.5	1.6	3.2	1.6	1.8	0.3	0.0	0.1	0.1
2.2	1.9	2.7	2.1	2.0	0.7	0.2	0.5	0.5
9.6	9.2	8.3	8.4	9.2	1.7	1.1	1.0	1.5
10.9	12.7	8.2	11.4	12.8	2.2	1.2	2.8	1.6
18.8	16.2	10.7	12.4	16.0	3.4	1.2	1.9	2.0
14.3	15.1	11.1	11.2	14.4	3.1	1.3	0.9	1.8
16.6	14.1	9.5	13.1	14.5	3.4	1.7	2.2	2.6
11.0	7.9	5.9	9.5	7.5	2.3	3.9	3.1	4.1
7.9	9.6	5.3	6.0	8.2	3.2	1.9	2.5	2.3
9.2	10.5	5.9	7.0	9.7	1.7	1.4	2.1	1.5
13.1	13.2	6.1	8.3	12.1	2.5	1.6	3.0	1.8
12.4	11.9	8.0	9.4	12.2	3.3	1.5	3.7	3.0
25.9	16.1	9.6	13.6	13.7	2.3	2.4	2.4	1.6
18.4	15.2	6.0	9.7	11.3	1.6	1.9	1.6	1.2

22.3	22.0	10.1	12.3	14.3	4.9	2.9	5.0	1.9
12.1	13.1	6.2	9.8	11.7	1.8	1.9	2.3	1.3

ıents(1-2mm)		Dry mass concentration g/cm3			Relative bed elevation cm			Faecal cas Number/0.3
MIDDLE	UPPER	LOWER	MIDDLE	UPPER	LOWER	MIDDLE	UPPER	LOWER
0.4	0.6				9.5	9.3	12.0	1.3
0.6	0.7	1.47	1.49	1.66	9.1	9.3	12.3	
0.7	0.8	1.81	1.33	1.45	8.6	9.7	12.3	0.3
0.6	1.0	1.52	1.41	1.46	7.9	9.6	12.7	1.0
0.2	0.1	1.50	1.63	1.47	9.1	9.6	12.1	1.3
0.3	0.2	1.45	1.35	1.40	9.9	9.7	12.1	
0.2	0.2	1.49	1.61	1.55	8.2	9.3	12.0	0.7
0.3	0.3	1.55	1.66	1.52	9.1	10.1	11.6	1.0
		1.46	1.44	1.60	9.6	9.3	11.8	1.0
		1.54	1.47	1.57	9.0	9.6	11.5	1.3
0.2	0.2	1.57	1.52	1.36	8.9	9.7	11.8	0.7
0.1	0.2	1.59	1.53	1.48	9.0	9.7	11.7	1.3
0.2	0.2	1.64	1.23	1.46	8.9	9.5	11.9	1.0
0.3	0.2	1.51	1.54	1.43	8.4	8.8	11.8	1.0
0.1	0.1	1.62	1.42	1.51	7.7	9.1	10.9	1.7
0.1	0.1	1.60	1.46	1.59	7.4	9.2	11.9	1.7
0.0	0.2	1.60	1.52	1.62	7.6	9.0	11.5	1.7
0.0	0.0							
0.0	0.0	1.62	1.67	1.60	7.7	9.3	11.6	1.0
0.0	0.0	1.64	1.61	1.71	7.9	9.8	11.4	3.3
0.0	0.0	1.52	1.62	1.58	8.4	9.6	11.5	0.3
0.0	0.0	1.64	1.75	1.69	7.9	9.5	11.7	
0.0	0.0	1.55	1.57	1.66	8.6	9.9	11.4	0.7
0.0	0.0	1.60	1.70	1.45	7.7	9.3	11.0	1.3
0.0	0.0	1.65	1.62	1.78	8.1	9.8	11.4	0.7
0.0	0.0	1.67	1.63	1.68	7.9	9.4	11.4	1.0
0.1	0.2	1.54	1.72	1.60	8.4	9.7	11.7	0.3
0.2	0.1	1.72	1.56	1.61	5.8	9.6	11.7	0.3
0.1	0.1	1.57	1.63	1.73	6.3	9.5	11.6	0.3
0.1	0.1	1.61	1.61	1.55	6.9	9.5	11.6	0.3
0.0	0.1	1.50	1.65	1.63	6.3	9.8	11.7	1.0
0.1	0.0	1.47	1.66	1.72	5.1	10.0	12.0	0.3
0.0	0.0	1.60	1.58	1.59	6.5	10.1	11.7	
0.1	0.1	1.36	1.57	1.36	6.7	10.2	11.7	0.3
		1.41	1.47	1.52	5.9	10.2	11.8	1.0
0.1	0.1	1.47	1.61	1.60	5.0	10.2	11.8	
0.1	0.3	1.59	1.57	1.51	5.2	10.5	11.9	0.3
1.0	1.0	1.55	1.46	1.53	7.2	9.8	12.0	
0.7	2.1	1.51	1.69	1.64	6.7	9.7	11.4	
1.1	0.9							
1.2	1.4	1.59	1.75	1.53	7.3	10.3	11.6	3.0
1.7	2.2	1.44	1.43	1.72	7.0	10.9	11.7	0.7
2.3	3.4	1.52	1.66	1.55	7.0	10.6	11.6	
2.0	2.8	1.46	1.49	1.63	6.8	10.7	11.0	0.7
1.2	2.1	1.62	1.62	1.48	7.0	10.5	11.4	2.7
1.4	2.7			1.62	7.2	10.6	11.4	2.3
1.8	3.2	1.51	1.76	1.60	7.0	10.4	11.5	2.3
1.8	2.0	1.55	1.60	1.63	7.1	10.6	11.6	2.7
1.3	1.7	1.63	1.58	1.67				

1.5	2.6	1.60	1.53	1.68	6.6	10.3	11.7	2.7
1.9	2.1	1.68	1.56	1.65	6.5	10.3	11.3	

t density		Faecal cast production rate			Bedform height			Mean predi
3m2		g/0.3m2/hr			cm			m
MIDDLE	UPPER	LOWER	MIDDLE	UPPER	LOWER	MIDDLE	UPPER	12 HOUR
3.7	8.0	0.7	2.8	7.8	0.5	2.0	0.8	3.6
					0.5	1.0	0.3	2.3
								3.7
3.0	7.3	0.1	2.2	5.1	0.0	1.0	0.8	2.8
5.3	7.7	2.9	8.1	6.9	0.5	2.5	2.0	4.0
1.0	4.7	16.6	0.9	5.3	1.0	1.0	1.0	1.9
					1.2	1.0	1.2	4.1
1.7	8.0	1.7	1.7	6.9	1.7	1.7	1.5	3.0
4.7	9.3	8.9	9.2	13.4	1.3	1.5	0.9	4.2
3.7	9.0	28.3	9.1	29.3	1.0	1.3	1.2	2.3
3.7	9.3	28.2	9.1	27.6	0.7	1.9	1.2	3.8
4.7	10.7	2.8	10.8	27.0	1.5	1.2	0.8	3.8
3.3	9.7	9.3	6.4	15.6	1.8	1.8	2.2	3.7
5.7	8.3	1.2	12.7	16.0	1.3	1.7	0.6	2.8
4.3	7.3	3.0	13.0	15.3	0.9	1.7	1.5	3.8
3.3	13.0	2.2	11.4	19.7	1.0	0.6	0.8	3.8
3.3	10.3	2.3	15.1	44.9	0.6	0.7	1.8	3.3
3.7	10.3	3.7	41.4	55.4	1.7	2.5	2.0	3.5
4.3	9.3	2.2	25.9	88.6	0.8	1.1	0.5	3.2
6.3	8.3	9.0	50.1	44.5	1.3	1.5	1.3	3.2
4.3	5.3	9.6	40.4	33.9	0.7	1.4	0.9	3.1
					0.6	1.1	1.0	3.4
5.7	8.3	9.7	73.9	67.9	0.6	1.4	0.6	3.1
4.7	7.7	7.4	49.7	60.4	2.7	2.8	3.1	4.0
5.7	6.0	6.3	49.0	22.5	1.4	1.7	0.5	2.2
4.7	7.3	4.1	24.6	26.2	0.8	1.2	0.7	3.2
4.3	7.7	13.2	51.0	53.5	0.5	0.7	0.4	2.8
5.0	6.3	1.2	10.2	11.2	0.9	0.9	0.7	3.9
5.0	9.0	1.2	6.3	8.3	0.9	0.9	0.7	2.3
4.0	7.7	5.7	35.2	51.3	0.6	1.5	0.2	3.1
6.0	8.0	2.5	20.5	18.3	1.0	2.0	0.7	3.2
3.3	6.3	3.8	18.3	122.5	2.0	1.1	1.6	3.9
					0.7	1.3	0.5	2.7
4.0	8.3	6.0	10.1	75.1	1.6	1.4	0.7	3.1
4.3	10.0	4.3	26.9	49.6	1.9	1.6	0.5	3.7
4.7	7.3		7.3	13.0	0.8	0.9	0.5	3.6
2.7	9.3	1.4	13.4	33.5	1.3	2.2	0.9	3.3
					0.5	0.4	0.3	2.7
					1.4	1.6	0.6	4.3
2.3	2.7	18.6	14.0	13.7	1.1	1.8	0.8	3.0
2.7	6.7	5.0	10.5	21.0	1.5	1.6	1.9	3.3
					0.9	1.6	1.2	1.7
5.3	7.0	0.5	8.0	7.6	2.7	1.6	2.0	4.4
3.0	3.7	4.7	2.1	1.3	1.7	2.4	1.2	2.5
5.3	6.3	10.1	6.9	2.4	2.9	2.2	1.4	3.8
4.0	5.0	5.7	5.0	7.3	1.5	2.0	1.2	1.9
								4.6
1.7	4.3	1.5	1.0	3.4	1.2	1.5	1.1	2.5
								3.5

3.7	5.0	2.8	2.9	5.7	1.2	1.7	0.8	2.3
					1.2	0.8	0.8	4.3

cted tidal range		Mean sea level pressure			Sample day exposure duration			3 day expos
		mb			mins			mins
3 DAY	7 DAY	12 HOUR	3 DAY	7 DAY	LOWER	MIDDLE	UPPER	LOWER
3.9	3.9	1011	1007	1004	248	319	362	2381
2.1	2.5	1010	1012	1010	138	241	265	1868
3.7	3.3	1010	1011	1007				2073
2.8	3.2	1011	1012	1017	137	219	260	2025
4.0	3.8	1040	1041	1037	218	312	362	2352
2.6	3.1	1012	1008	1016	155	321	359	2064
3.4	2.8	1018	1020	1024	161	214	260	2135
3.7	3.9	1018	1009	1014	136	241	282	2262
3.9	3.3	986	995	1006	39	76	115	2144
3.0	3.4	1011	1004	1001	70	234	305	2076
2.9	2.4	1029	1030	1020	162	270	331	2002
4.4	4.4	1012	1012	1019	168	272	320	2361
3.1	2.9	1016	1015	1008	53	124	169	1944
3.2	3.6	1018	1023	1018	205	329	391	2213
2.9	2.5	996	1002	1014	76	135	164	1916
4.2	4.3	995	1008	1006	161	222	272	2327
2.8	2.7	1025	1019	1012	160	254	304	2001
3.6	3.6	1017	1019	1018	153	247	285	2221
2.6	2.7	1011	1010	1011	83	88	54	1863
3.8	4.0	1010	1014	1014	111	230	260	
2.7	2.6	1019	1017	1018	5	91	133	1839
3.4	3.3	1010	1019	1018	191	265	296	2203
2.8	2.9	1027	1022	1012	117	217	261	1967
4.1	4.0	1025	1025	1025	196	267	305	2350
2.7	2.9	1024	1019	1022	136	278	311	2057
3.0	2.7	1020	1012	1012	86	161	198	2015
2.9	3.1	1029	1021	1015	18	140	174	1942
3.8	3.6	1009	1014	1019	258	335	394	2348
2.9	3.3	1014	1011	1014	120	243	283	2072
2.7	2.4	1021	1022	1022	20	114	141	1862
3.6	3.5	1011	1012	1013	155	225	266	2239
3.4	3.1	1021	1009	1007	45	135	76	2036
3.4	3.7	996	1005	1009	133	198	229	2198
2.4	2.2	1010	1015	1016	31	113	143	1773
4.0	3.9	1021	1020	1019	174	268	314	2329
2.9	2.9	1017	1013	1017	92	163	196	1954
3.8	3.9	1014	1014	1017	170	240	277	2297
2.0	2.1	1000	994	1000	189	271	294	1853
4.4	4.1	1001	1001	1003	222	263	300	2407
2.6	2.9	1030	1022	1008	114	204	240	1910
3.7	3.8	1028	1029	1027	194	282	327	2301
1.9	2.1	1013	1017	1019	82	244	273	1809
4.5	3.7	1023	1001	998	242	313	360	2428
2.6	3.1	1030	1018	1018	109	233	262	1957
3.8	3.5	1039	1034	1026	265	345	394	2358
2.4	2.8	1019	1022	1027	212	370	394	2058
4.0	3.3	1022	1019	1018				2093
2.9	3.6	1021	1022	1022	154	263	294	2112
3.5	3.1	997	1009	1015	23	81	105	2063

2.5	2.8	1025	1009	1002	206	327	350	2055
3.8	3.4				34			

sure duration		7day exposure duration mins			Sample day irradiance W.hr/m2			3 day irradi W.hr/m2
MIDDLE	UPPER	LOWER	MIDDLE	UPPER	LOWER	MIDDLE	UPPER	LOWER
2828	2941	3802	4435	4580	17	125	125	231
3448	3497	3769	6132	6171	150	258	305	2485
2590	2640	3974	5181	5207				505
3011	3068	4103	5807	5946	272	622	622	3556
3426	3596	3690	5304	5512	47	47	47	591
3067	3170	4161	5988	6200	1407	1505	1903	4392
3221	3321	3824	6721	6825	456	687	687	2407
2830	2968	4429	5497	5739				
2679	2798	4624			92	242	261	1639
2709	2831	3506	4203	4343	325	325	709	2395
3380	3449	3671	6798	6847	2007	2797	2878	10485
2889	3068	4542	5700	6014	292	628	628	4244
2906	2946	3790	5577	5581	1012	1954	1954	6182
3186	3329	5049	6721	6972	1100	1406	1709	3025
2956	2981	3623	6394	6425	535	619	1062	10636
2758	2909	4508	5172	5399	1335	1335	2108	5411
3198	3250	3855	5970	6003	2515	3350	3600	12115
3002	3117	3601	4809	4969	333	814	814	8032
3063	3022	4360	6782	6730	1279	1365	1365	12563
		5837						
3063	3119	3639			828	2526	2526	14767
3035	3131	2861	3951	4057	539	684	684	5627
3161	3216	4518	6615	6645	1135	2016	2658	12018
3116	3256	4457	5930	6168	883	883	1464	10615
3148	3238	2744	4104	4222	2535	4447	4767	13197
2764	2801	4379			1379	1980	1980	8130
2953	3015	4619	6489	6593	578	1765	2277	11466
3022	3150	3647	4928	5082	570	795	1079	10047
2942	3033	4185	5651	5827	1768	1946	2588	10675
3132	3183	3554	6612	6668				15950
2850	2967	4277			1662	1790	1790	7503
2670	2609	3882	5402	5313	578	1148	706	9062
2716	2822	4338	5332	5521	650	708	750	5784
3403	3454	3450	6931	6983	150	381	584	7507
3019	3170	4412	5757	5983	1157	1163	1616	6718
2994	3024	3847	5891	5939	1674	2350	2350	11226
2876	3005	4437	5636	5868	58	58	178	2651
3524	3533	3627	6473	6449	490	904	904	6815
2646	2757	4480			233	528	528	2719
3200	3229	3911	5643	5668	1362	1804	2277	10053
3197	3356	5124	6965	7261	258	261	620	2993
3650	3748	2443	4615	4721	881	1401	1943	7015
2621	2707	4974	6029	6076	186	186	472	2225
3140	3183	4057	5842	5964	740	1091	1091	4115
3191	3314	3658	5017	5152	8	8	8	823
3438	3530	4075	6469	6652	534	534	534	2409
2745	2827	3850	5890	5961				1878
3118	3215	4990	6811	7062	511	511	511	1759
2700	2786	4559						

3066	3090	4028	5436	5434	334	584	584	1868

ance		7 day irradiance W.hr/m2			Mean windspeed m/s			Mean temp C
MIDDLE	UPPER	LOWER	MIDDLE	UPPER	12 HOUR	3 DAY	7 DAY	12 HOUR
781	781	442	1055	1055	7.8	8.8	8.9	10.6
2802	2849	4656	5857	5904	6.1	5.2	5.2	4.9
953	953	1594	2401	2401	9.4	9.3	8.8	10.5
4159	4159	5385	7020	7020	7.6	6.4	5.6	10.9
908	908	1759	2057	2057	2.2	1.9	2.5	5.8
5322	5720				4.2	4.3	5.5	-0.3
3833	3833	7288	9665	9665	5.9	5	3.3	7.5
						8.6	6.8	
2534	2553				3.5	8.4	8	6.7
3117	3501				2.1	2.7	3.5	1.6
12940	13021	14983	18367	18064	2.1	1.4	2.6	10.3
6576	6576	9385	14543	14462	5.5	6.4	5	9.2
8609	8609	13999	17258	17258	3.9	4.6	3.7	13.4
5088	5391	7718	11571	11874	5.5	5.5	4.4	9.3
12512	12955	16294	20100	20240	4.6	7.3	5.6	4
7847	8620	13190	18875	19648	9.7	6.4	4.4	10.8
15189	15439	20209	25512	25762	8.4	6.2	6.4	14.5
12129	12129	14740	21126	20874	5.1	2.6	3.8	12.8
14990	14990	20309	25530	25530	8	7.2	6	13.9
						3.4	4.7	
19830	19830				7.4	4.9	4.8	16.8
7873	7873	11870	14624	14624	4.6	3.4	3.5	16.5
15344	15986	23598	31420	32062	2.8	3.8	5.6	12.7
14892	15473	14812	22090	22671	0.5	2.1	2.1	13.4
17873	18193	22389	31028	30767	1.8	4.9	3.9	11.6
11153	11153				6.1	6.9	5.9	17.1
14001	14513	19967	26543	27055	2.1	2.9	4	20.1
13791	14075	20732	25797	26081	5	5.4	4.4	17.2
14443	15085	17322	24282	24405	7.7	6.1	4.7	16.4
20733	20733	28213	35907	35343	8	6.7	4.7	19.3
10676	10676				1.4	2.7	2.4	15.6
11473	11031	21547	26170	25728	3.7	3.8	4	16.7
8297	8339	12024	17448	17932	5.6	4	4.3	15.7
9252	9455	20854	25836	26039	2.4	3.7	4.3	19.8
9679	10132	13929	20228	20478	0.9	1.9	2.7	14.8
13834	13834	22491	28130	27677	5.4	3.6	3	19.2
4282	4402	8681	12903	13023	2.7	2.9	3.2	13.5
8034	8034	11488	14402	14282	4.1	2.6	5.2	16.6
5049	5049	7511	11141	10927	8.5	7.5	7.9	16.4
11646	12119	14895	18206	18384	0.8	2.4	6.1	8.8
5264	5623	5523	8963	9322	2.4	2.4	3.5	7.3
8830	9372	8800	11912	12095	6.6	5.8	5.2	7.2
3559	3845	5469	7364	7169	0.3	3.4	5.4	6.6
4969	4969	5510	7483	7197	1.4	6	4.6	9.4
1779	1779	4604	5705	5705	3.1	2.4	3.9	7.6
3215	3215	3344	5317	5317	1.3	3.5	4.3	5.8
2515	2515	6747	7946	7946	0.9	2.1	4	7
2027	2027	2568	3796	3796	8.9	6.9	7	11.9
						8.5	8.1	

2665	2665	2056	3186	3186	3.2	4.7	6.2	1.8

		Rainfall mm		
3 DAY	7 DAY	12 HOUR	3 DAY	7 DAY
10.6	9.7	0	22.6	26.6
2.9	4.6	4.2	15.6	20.6
9.1	8.4	1.6	17.4	34.4
7.6	7.4	1	7	10.2
6.8	6.3	0	0	2.6
0.9	4.3	0	5.2	5.2
7.1	4.3	0.8	3	3.6
6	8	0	2.4	4.6
8.7	8.7	0.2	14.8	24.4
4.1	4.1	0	1	1.6
7.4	6.8	0	0	3.4
9.6	8.8	0	2.6	2.6
10.7	8.6	0	6.6	14.6
11.4	11.3	0	1	2.2
7.4	9.4	0	10	10
8.6	6.9	0	18.6	19.8
13.5	11.9	0	2.4	12.4
12.8	11.8	0	0.2	0.2
13.9	13.4	0	2.4	7.6
14.2	12.6			
14.9	14.5	0	0	
14.9	15.2	13.2	13.2	13.2
13	13.4	0	0.4	13
16.1	14.9	0	0	0.6
15	15.7	0	1.8	1.8
15.4	16	0	19.6	19.6
19.4	18.1	0	0	2
20.1	19.9	0	0	0
18.3	17.4	0	1.6	2
18.4	17.6	0	0	0.2
19.7	20	0	15	15
17.2	18.5	0	15.2	53.6
15.2	16.2	1	7.4	12.4
17.5	16.5	0.4	1	7.4
17.3	17.2	0	0.2	5.6
18.5	18.7	0	0.4	0.4
14.7	16.7	0	1.6	1.6
16	16.2	0.2	3	3
15.8	16.4	0.4	7	11.4
8.8	12.3	0	0.2	0.8
9.6	12	0	0.2	0.6
9.8	10.8	2.2	4	4
11.1	11.3	0.2	15.2	48.4
12.5	12.6	0	2.2	2.8
10	10	0	0	5.8
8.1	8.2	1.8	1.8	2
5.4	5.1	0	1.2	7.4
9.9	10.5	0	4.6	9.8
9.9	9.2		12	14.4

3	5.9	1.2	5.6	22.6

APPENDIX 6.1

EROSION THRESHOLDS AND COUPLED DATA MEASURED DURING THE CSM DEPLOYMENT:Mar

Julian day	Measured			Grain-size			Colloidal carbohydrate	
	Tau crit (N/m2)			um			ug GE /Gdw (0-1mm)	
	LOWER	MIDDLE	UPPER	LOWER	MIDDLE	UPPER	LOWER	MIDDLE
69	1.7	0.4	0.5	159	183	157	136.6	118.4
76	1.4	0.8	0.7	164	171	160	337.6	113.0
83	1.2	1.6	1.8	157	189	162	141.0	96.8
90	1.4	2.0	0.5	156	179	159	79.5	126.9
97	0.9	1.3	1.8	155	180	160	50.1	99.9
104	1.3	1.0	1.1	151	177	162	46.1	74.8
111	0.9	0.7	1.4	152	178	155	61.0	86.5
118			0.7	157		160	67.7	77.5
124	0.8	2.0	0.7	163	180	163	79.4	83.0
130	0.8	1.4	1.2	156	183	159		
132	1.1		1.1	156		164	103.6	129.9
141	1.0	1.3	1.0	157	188	163	81.0	113.3
148	0.8	0.8	1.5	159	179	159	98.7	120.7

ch to May 1999

(0-1mm)	Chlorophyll-a(0-1mm)			Dry mass conc			Relative bed elevation	
	ug/gDW			g/cm3			cm	
UPPER	LOWER	MIDDLE	UPPER	DMCL	DMCM	DMCU	REL	REM
169.0	8.8	3.2	5.6	1.57	1.48	1.60	8.9	9.0
145.1	8.0	1.3	3.0	1.51	1.42	1.53	8.6	8.4
123.6	6.4	2.3	3.0	1.71	1.56	1.32	8.8	8.4
105.1	3.0	2.1	2.1	1.55	1.50	1.57	8.7	8.2
84.7	2.2	2.0	2.1	1.66	1.34	1.46	8.7	8.5
84.9	1.6	1.2	1.5	1.34	1.62	1.63	9.8	9.2
86.5	1.5	0.9	1.1	1.53	1.38	1.44	10.4	8.9
129.0	1.4	1.2	1.2	1.73	1.48	1.66	10.7	8.8
110.1	1.7	1.0	1.4	1.57	1.47	1.52	10.7	8.8
98.1	0.4	0.3	0.3	1.51	1.81	1.60	10.5	8.5
129.0	0.2	0.2	0.2	1.68	1.82	1.70	10.3	8.4
124.6	0.2	0.2	0.2	1.56	1.66	1.64	9.7	8.2

	Bedform height			Salinity	Seawater
	cm			S	temp
REU	BHL	BHM	BHU	S	C
12.5	1.0	1.3	1.2	34.7	4
12.4	0.6	2.0	1.4	35.2	11
12.1	1.8	1.2	0.8	34.8	8
12.3	1.6	2.1	2.2	34.9	13
12.0	1.1	1.7	0.7	34.6	10
12.4	0.9	2.3	1.4	34.6	6
13.0	1.1	0.7	0.9	33.7	10
12.0	0.5	0.9	1.6	35.1	16
12.1	1.5	2.6	2.0	34.9	11
				34.0	14
12.5	0.7	1.2	0.3	34.9	15
12.7	1.3	1.4	1.2	34.8	12
12.5	0.5	1.2	0.9	35.2	17

APPENDIX 6.2

MEASURED, COLLATED AND CALCULATED DATA DURING THE CSM DEPLOYMENT:March 24th

		Tau crit (N/m2)			Colloidal carbohydrate(ug GE /g	
Date	Tide No.	L	M	U	L	M
########	1	1.15	1.62	1.75	115.1	92.5
########	2	1.36	0.94	1.26	81.0	103.7
########	3	1.06	0.75	0.65	124.1	131.2
########	4	1.76	0.65	1.25	88.4	99.7
########	5	1.06	1.84	1.36	110.5	105.1
########	6	1.37	1.16	1.46	81.5	68.6

to March 26th 1999

DW)	Chlorophyll *a* (ug/gDW)			Phaeopigments(ug/gDW)			AEP(cm)
U	L	M	U	L	M	U	L
91.9	5.8	2.2	3.1	0.35	0.14	0.07	-0.21375
134.3	3.9	2.1	2.3	0.24	0.23	0.21	-0.25375
134.5	5.4	2.0	2.1	0.48	0.17	0.13	-0.2775
85.0	3.5	2.2	1.9	0.32	0.31	0.22	-0.28
120.5	4.8	1.8	2.2	0.41	0.12	0.18	-0.2725
109.6	3.4	1.2	1.8	0.38	0.25	0.28	-0.33375

		Grain-size(um)			Settling velocity			
M	U	L	M	U	L	M	U	
0.2725	-0.23	157	189	162	0.0131	0.0170	0.0131	
0.3725	-0.19375	150	184	158	0.0110	0.0150	0.0122	
0.1475	-0.44125	153	183	157	0.0125	0.0165	0.0132	
0.36375	-0.51	153	177	159	0.0125	0.0152	0.0132	
0.17375	-0.53375	155	178	157	0.0130	0.0160	0.0133	
0.40625	-0.6275	153	176	159	0.0120	0.0147	0.0128	

Seawater temperature (C)	Salinity (S)	Predicted tidal range (m)	Mean wind speed during preceding immersior L	M	U
8	34.8	4.4	5.4	5.5	5.5
4	34.5	4.2	4.7	4.6	4.6
9	34.1	4.1	2.1	2.5	2.5
8	34.6	4	5.3	5.3	5.2
9	33.9	3.9	3.2	3.3	3.3
6	34.5	3.9	3.9	4.2	4.1

ı (m/s)

6.3 Interpretation of Plate 6.1

6.1a. 24th February 1999

Seven quasi-parallel, slightly bifurcated, symmetrical, wave ripples (*a* to *h*) are identifiable. Ripple crests are smoothed, but remain distinct from the troughs. Two *Arenicola* feeding pits, *h1* (lower right) and the prominent *h2* (top left) are visible. Note the positions of the two bifurcation points, *k1* and *k2*, and troughs *t1* and *t2*. Sediment microalgal content across the quadrat area is low, evident from the darker colouration of the sediment in the middle to lower central section, assumed to derive from benthic microalgae Ripple wavelength, λ = 8 - 12 cm; bedform height, h = 1.7 cm; ripple index (λ/h) = 5 - 7; mud% = 1.1; tidal range: neap.

6.1b. 3rd March 1999

Ripples *a* to *h* have well-defined crests and troughs; they show only slight lateral displacement since the previous week (note the relative positions of *h1* and *h2*). A further *Arenicola* feeding pit, *h3*, is visible. *k1* has maintained its position since the previous week, relative to *h1* and *h2*; whilst *k2* has moved slightly towards the south. Troughs *t1* and *t2* are prominent, as are several other troughs, *t3* to *t8*. Microalgal activity is more widespread across the central section of the quadrat, where a light brown colouration is now evident. λ = 8 - 12 cm; bedform height = 1.3 cm; ripple index = 6 – 9; mud% = 1.5; net deposition since 24th February 1999 = 0.9 cm; tidal range: spring.

6.1c. 10th March 1999

Microalgal activity has spread across the entire quadrat area, as evidenced from the homogeneous, dark brown appearance of the sediment surface. Ripples and troughs have become poorly-defined, but remain identifiable and in fixed positions relative to *h1* and *h2* (e.g. compare the positions of ripple *c* and trough *t3*, with their positions in Plate 6.1b). A fourth *Arenicola* feeding pit, *h4*, is active. λ = 8-12 cm; bedform height = 1.0 cm; ripple index = 8-12; mud% = 0.8; net deposition since 24th February 1999 = 1.4 cm; tidal range: neap; CSM-derived τ_c= 1.67 N m^{-2}.

6.1d. 16th March 1999

Troughs *t1* to *t4* and *t5* to *t8* have merged, their outlines remaining only barely visible. Likewise, the crests are difficult to distinguish, their topographic expression being strongly reduced. *Arenicola* feeding pits remain in fixed positions, whilst a further pit, *h5*, is evident.

Gas escape structures are present (e.g. top right). Macroalgae, trapped in *h1*, have swept clear an area approximately 10 cm in diameter around the feeding funnel. λ = 8 – 12 cm; bedform height = 0.7 cm; ripple index = 11 - 17; mud% = 1.4; net deposition since 24th February 1999 = 0.8 cm; tidal range: spring; CSM-derived τ_c= 1.36 N m^{-2}.

6.1e. 24th March 1999

The sediment surface appears to be mobile once again, with clearly defined ripples. *Arenicola* pits remain in fixed positions, relative to each other. Patchy erosion, *pe*, is evident in several areas. It is unclear whether some features, e.g. *k1* and *t3*, and the planar area to the north of *h5*, are remnant. Likewise, it is not clear whether the microalgal patch in the central lower section is remnant, or the of a new microalgal bloom. λ = 5 - 8 cm; bedform height = 1.5 cm; ripple index = 3 – 5; mud% (not available); net deposition since 24th February 1999 = 0.7 cm; tidal range: neap.