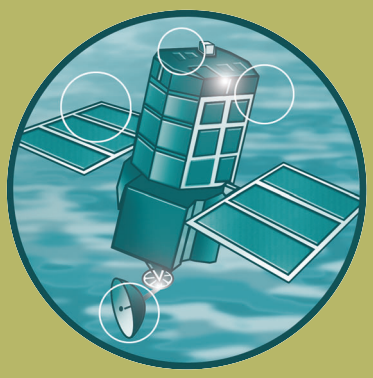
Joint Defra/EA Flood and Coastal Erosion Risk Management R&D Programme

Understanding the lowering of beaches in front of coastal defence structures, Stage 2 Technical Note 1

R&D Project Record FD1927/PR1



Environment Agency

defra
Department for Environment Food and Rural Affairs

Understanding the lowering of beaches in front of coastal defence structures, Phase 2

Beach lowering and recovery at Southbourne (2005)

Technical Note CBS0726/01

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1. Introduction

Toe scour has been blamed for the failure of many coastal structures in the UK (CIRIA, 1986) and design practice has not changed substantially in the intervening period. The results from previous studies of toe scour have been highly varied.

Toe scour has been reproduced in several small-scale laboratory experiments by, for example, Fowler (1992), Xie (1981, 1985), Powell and Lowe (1994) and Powell and Whitehouse (1998) as summarised in Sutherland et al. (2003). In these tests toe scour has been treated as a wave-driven, cross-shore, often bedload transport dominated phenomenon. There have been few laboratory toe scour tests that have generated suspended sediment transport despite the fact that bedload and suspended load scour occur by different mechanisms and occur in different places (Irie and Nadaoka, 1984). It is therefore questionable whether small-scale bedload transport experiments provide reliable design guidance on toe scour depths at full scale (Tørum et al., 2003).

Toe scour holes are infrequently observed in the field (Griggs, et al., 1994). This leads some, such as Wiegel (2002a, 2002b, 2002c) to believe that a beach will go through the same cycle of erosion and accretion, during a storm, whether it has beach control structures or not. However, there are indications that toe scour may be a short-lived phenomenon, with scour holes generated during storms filling in within a few hours as the storm subsides. This would explain why few scour holes are observed or surveyed at low tide.

Toe scour is being measured within the present project, Understanding the Lowering of Beaches in Front of Coastal Defence Structures, Phase 2, (HR Wallingford, 2005, Defra project FD1927) by performing medium scale laboratory flume tests and field measurements of toe scour. The objective of the field experiments was to measure time series of bed elevations in front of coastal defence structures, using HR Wallingford Tell-Tail scour monitors. This technical note describes the field experiments carried out at Southbourne (Bournemouth) during May 2005 and constitutes deliverable 07\01 of project FD 1927. The results from the field experiments will be used in the two objectives below:

- Further screening of scour prediction methods and production of improved method, resulting in less uncertainty and production of a method suitable for use both for design and in a risk-based methodology of asset management.
- Demonstration of new toe-scour assessment method in probabilistic risk-based method of assessing the safety of coastal defence structures within PAMS framework.

The context of the field experiments in the project is shown in Figure 1.

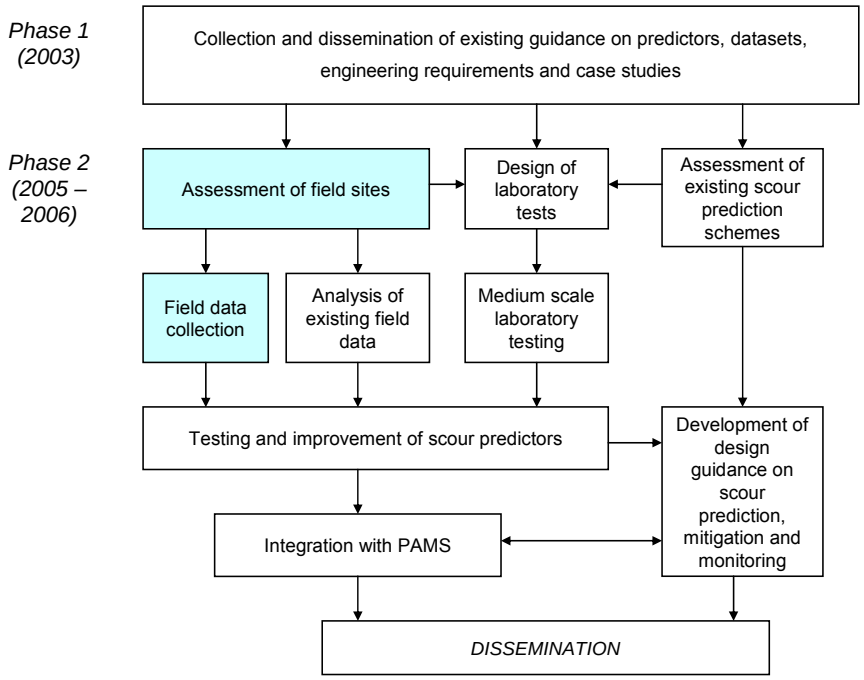

Figure 1 Flow chart of R&D processes for improved scour prediction methodology and translation into engineering framework

The field work was carried out by HR Wallingford and the University of Southampton with the assistance of the Channel Coastal Observatory (who supplied data and expert opinion on site selection) and Bournemouth Borough Council (who supplied expert opinion on site selection and permission for the work).

The Channel Coastal Observatory (CCO, 2005) is the data management and regional coordination centre for the Southeast Regional Coastal Monitoring Programme. The programme provides a consistent regional approach to coastal process monitoring, providing information for development of strategic shoreline management plans, coastal defence strategies and operational management of coastal protection and flood defence. The programme is managed on behalf of the Coastal Groups of the Southeast of England and is funded by Defra, in partnership with local Authorities of the southeast of England and the Environment Agency.

2. Site selection

Site selection was carried out by Andrew Pearce (University of Southampton), David Rycroft (University of Southampton), James Sutherland (HR Wallingford) and Richard Whitehouse (HR Wallingford) with assistance from Andrew Bradbury (New Forest District Council / CCO), David Harlow (Bournemouth Borough Council) and various other local authority staff and personnel at the Channel Coast Observatory. A number of South-coast sites were identified where beach levels have changed significantly in front of seawalls or where scour is believed to have occurred in the past. The merits of each site have been summarised in the following sections, following site visits in 2004.

2.1 MILFORD ON SEA

Positive (+)	Negative (-)
Evidence of beach lowering at foot of seawall, some flattening of profile	Next to large rock revetment
Plant onsite till early December	Unknown 3D effects due to adjacent revetment
Beach profiles shows distortion from equilibrium profile (ch9-16m)	Shingle beach will cause increased noise with scour monitors
Wave and beach profile data available	Not a typical beach-seawall configuration
Beach is not easily accessible by public	

Plate 1 Milford on Sea.

2.2 SOUTHBOURNE (1)

Positive (+)	Negative (-)
Low beach levels have been observed at the foot of seawall in the past	The profile trends shows a sloping sand beach for the majority of years
Minor distortion from equilibrium profile (ch5-20m)	Restricted access due to height of the timber groynes
Wave and beach profile data available	Beach levels are unseasonably high at present, waves will only interact with seawall during spring tides or surge events
Typical sand beach between groynes with sloping (1in1) seawall	Beach is easily accessible by public
Beach slipway located in adjacent groyne bay	Rock toe protection has been installed at approximately 0m (ODN), caution required when excavating.

Plate 2 Southbourne Site 1.

2.3 SOUTHBOURNE (2) – FISHERMAN'S WALK

Positive (+)	Negative (-)
Historic trends of low beach levels in winter, some flattening of profile	Step change in seawall position (3.1m landwards) to west of slipway
Beach levels currently (2004) low level at foot of wall approximately MHWN	Beach is easily accessible by public
Wide groyne bay, with three annual monitoring profiles located within it	Some longshore drift inferred from beach observations
Beach can be accessed via slipway	Rock toe protection has been installed at approximately 0m (ODN), caution required when excavating.
Typical sandy beach with widely spaced timber groynes	Seawall gradient is flatter then Site (1) at 1:2, this may reduce wave reflection & scour
Wave and tide data available	
Good beach observations and photos possible from nearby high ground	

Plate 3 Southbourne Site 2, Fisherman's Walk - looking West.

Plate 4 Southbourne Site 2, Fisherman's Walk - looking East.

2.4 POOLE –BRANKSOME CHINE

Positive (+)	Negative (-)
Beach profiles are very low at foot of seawall (Approximately MLW)	Low beach levels prevent access over groynes to the lowest profiles
Both sections show distortion from equilibrium profile (ch4 to-20m)	Evidence of extreme beach profile change (Oct 02) up to 1.8m at Section 5f00480
Wave and beach profile data available	Evidence of cross shore beach drainage channel existing on aerial photos
Sand beach between groynes with a stepped seawall	Beach is easily accessible to the public

Plate 5 Branksome Chine.

2.5 SUMMARY

Based on the observations above and in consultation with David Harlow of Bournemouth Borough Council, Southbourne (2) –Fisherman's Walk was selected as the preferred site for deployment of scour monitors. This was discussed and agreed with Mike Thom and Jonathan Rogers (of Mouchel Parkman; Project Officers on behalf of Defra) in a meeting at HR Wallingford on 7 March 2005.

3. Fisherman's Walk Field Site

The site is shown in Plate 6. The selected location was at the CCO profile 5f00409. This is in the middle of an approximately 220m long groyne bay, with direct access to the beach via a slipway. Two other profiles are in the same groyne bay. CCO profile 5f00410, referred to by Bournemouth Borough Council (BBC) as profile A8, is located just to the eastern side of the western groyne (G32). BBC hold approximately 30 years of data for profiles A8 and A7. CCO profile 5f00408 is to the eastern side of the groyne bay, between the slipway and the eastern groyne (G33). Chart Datum (CD) is 1.4m below Ordnance Datum Newlyn (ODN) at this site.

Plate 6 Aerial photo of Fisherman's Walk site © CCO.

The cross-shore beach profiles (from the CCO SANDS database) from different times at profiles 5f00409, 5f00410 and 5f00407 are shown in Figures 2, 3 and 4 using ODN datum.

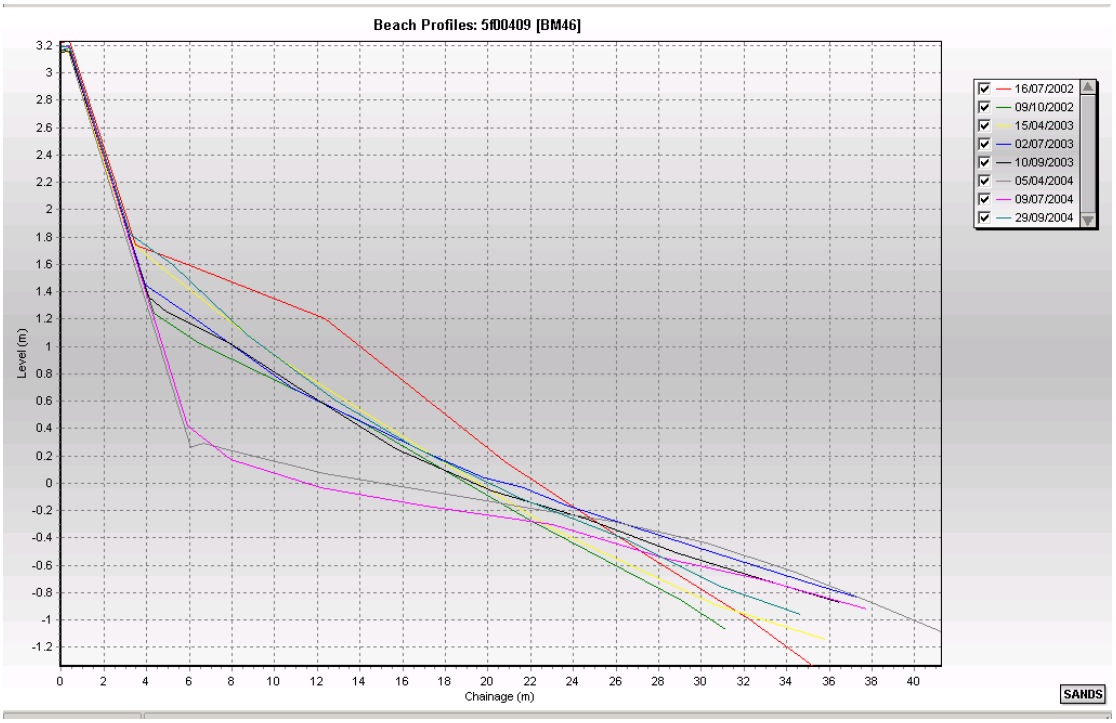

Figure 2 Beach profiles at 5f00409, courtesy of CCO (level datum is ODN).

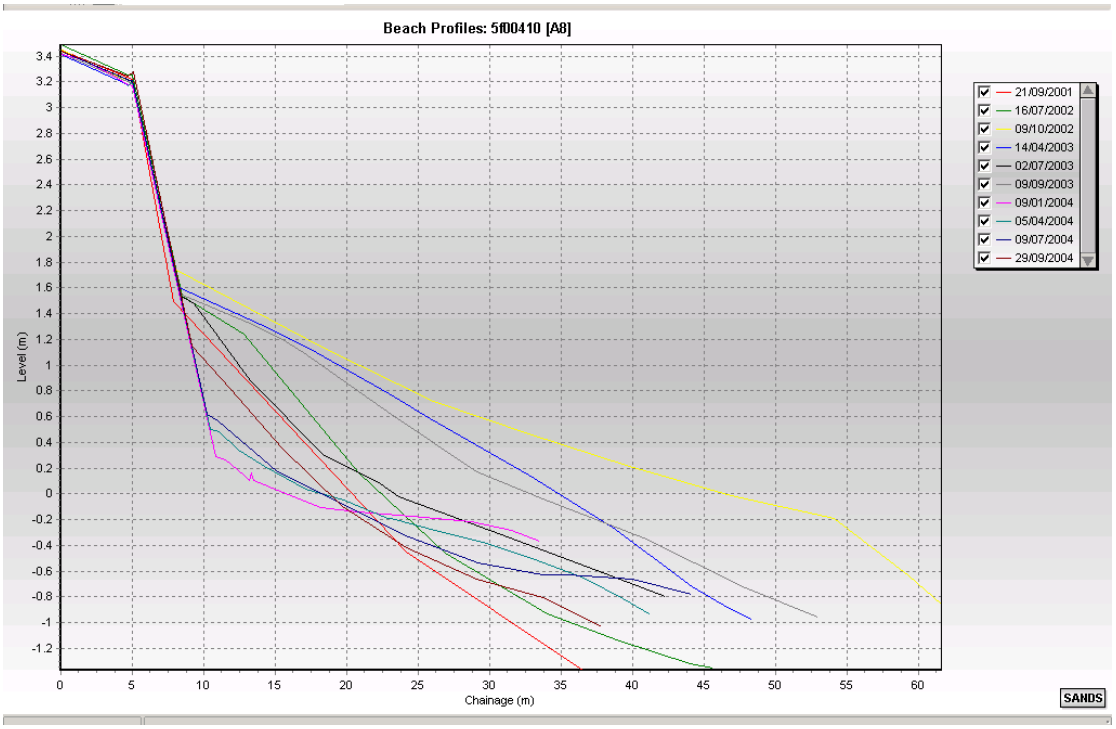

Figure 3 Beach profiles at 5f00410 (BBC profile A8) courtesy of CCO (level datum is ODN).

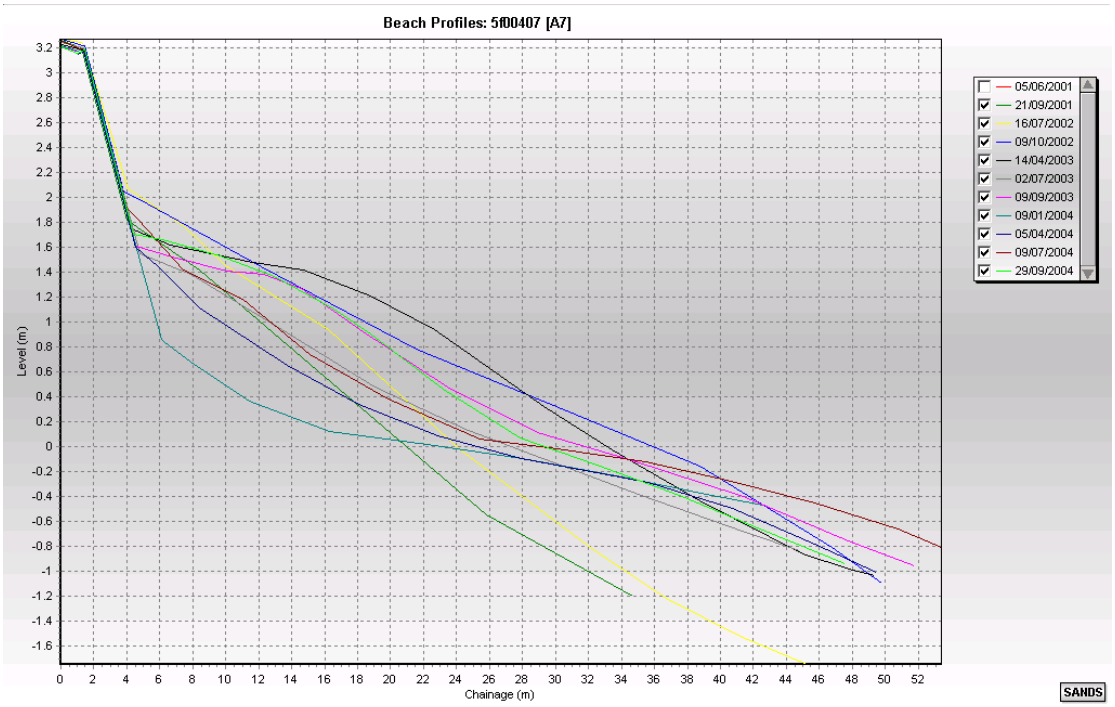

Figure 4 Beach profiles at 5f00407 (BBC profile A7), courtesy of CCO (level datum is ODN).

4. HR Wallingford Tell-Tail Scour Monitors

In response to increasing concern about the threat of scour, engineers at HR Wallingford have developed a system which is able to detect and monitor scour. The "Tell Tail" scour monitoring system can be installed at new or existing structures and gives a clear indication of the depth of scour under all conditions. The system records the onset of scour, the depth of scour reached, and in-filling of scour holes following storm events.

The system is based on omni-directional motion sensors, buried in the sea bed adjacent to the structure. The sensors are mounted on flexible "tails" and are connected via cable through protective conduit to a solid state data recorder. Under normal conditions, the sensors remain buried and do not move. When a scour hole begins to develop, the sensors are progressively exposed and each begins to oscillate in the flow. Each oscillation is logged on a solid state data recorder. Use of an eight level array of sensors provides a more accurate measurement of the depth of scour and also indicates whether scour hole re-fill has occurred. The sensors deployed at Southbourne are shown in Plate 7. The scour monitor on the left can be attached to a seawall and has wire mesh protection to discourage vandalism.

Plate 7 Scour Monitors in the laboratory.

5. Site visits

5.1 21 DECEMBER 2004

The following people visited the Southbourne site and, during the morning, toured the promenade from Boscombe Pier to its eastern limit, towards Hengistbury Head.

- James Sutherland, Richard Whitehouse – HRW
- David Rycroft, Andrew Pearce – University of Southampton
- David Harlow – Bournemouth BC

The following notes were made during the visit:

- JS and RW inspected beach at Fishermans Walk, Southbourne. Low wave activity. Medium sand near 1:2 rough faced sloping seawall and finer sand near low water; scattered shingle (flint?) on beach surface. According to DH sand overlies shingle overlies clay. Offshore is a fine sand bar and then a veneer of sand over seabed in bay. Sloping seawall has vertical sheet pile toe below 0m. Gently undulating topography within groyne bay.
- Groyne bay has concrete slipway from roadway behind seawall which facilitates access to beach. Beach faces 186 degrees magnetic. The beach at the east end of this groyne bay is wider than in centre and at west end, partly due to setback of seawall line. The western half of the groyne bay has experienced low beach levels in the past and rock armour was placed about 1987. DH wondered whether we could monitor scour in middle of bay and at ends to measure longshore "slopping" of sediment. DH noted there is armour at toe of seawall; he has seen this exposed by about 200mm here.
- Benefit of working on profile such as A8 is that there is 30 years worth of survey data. Note, however that profile A8 is very close to Groyne G32 – it is *not* in the middle of the groyne bay at CCO profile 5f00409 and levels at A8 will be affected much more by longshore movement of beach than levels at 5f00409.
- Poole frontage has lower levels than Bournemouth frontage.
- DH provided some information on beach levels along frontage. Profile A8 at western end of groyne bay 32/33 at Fishermans Walk shows lowest spot in beach along frontage. A8 is quite a volatile profile as is A3 to east, while A2 at east end of seawall frontage is less volatile; seawall slope at this end is steeper at 1:1. Shingle mix in these beaches. At profile A2 beach has access via slipway. Crest of groynes at +1.8m. Shingle can move overnight in groyne bay 50. DH has seen armour at toe exposed by 1m.
- DH surveys pattern of drift build up against all the groynes along frontage 2× per week. He has tried in past to correlate drift with waverider data but not found a clear link. Drift direction is variable over periods of a couple of days; net drift is from west to east.
- Replenishment of frontage scheduled for end 2005. 1.2M cubic metres is to be placed in total, with 0.4M cubic metres at Poole. Thus it is important to get data this winter before the replenishment.
- JS and RW outlined principal of operation of scour monitors.

The site is shown in the following plates.

Plate 8 *View of Southbourne's Fisherman's Walk site (21 December 2004), looking east. CCO Profile 5f00409 is near bottom lamppost. Groyne G33 is beyond slipway.*

Plate 9 *Groyne G32, showing wider beach on right (western) side (21 December 2004). CCO profile 5f00410 and Bournemouth Borough Council profile A8 marked by yellow paint to left of steps.*

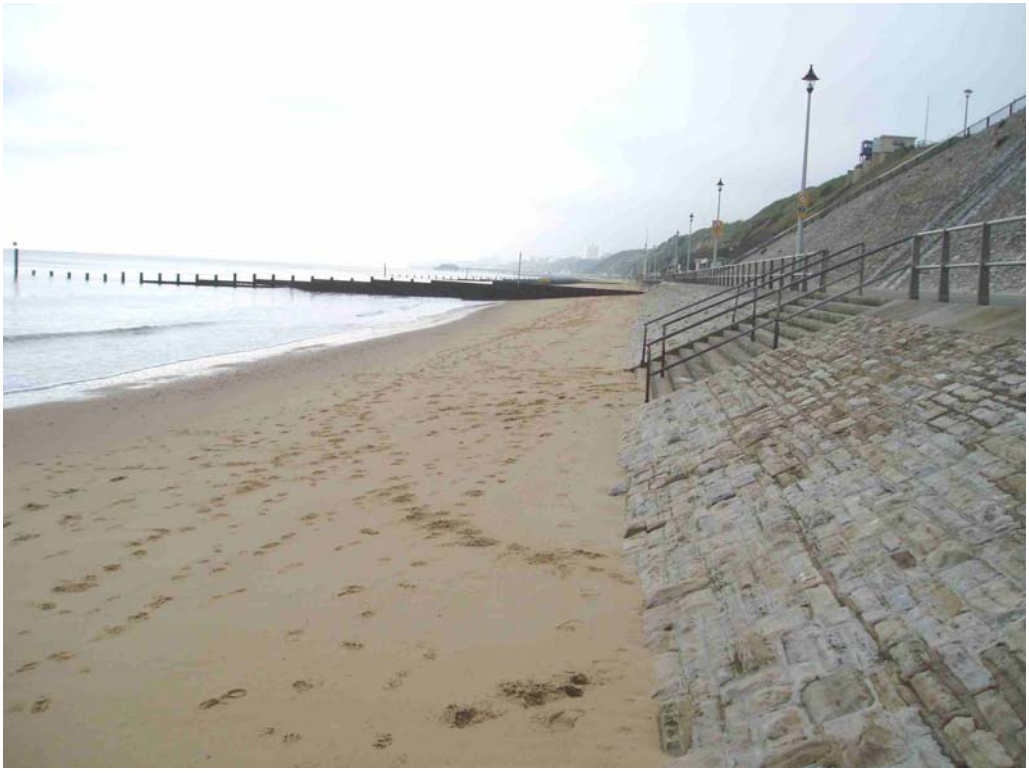

Plate 10 Looking west from profile 5f00409 (21 December 2004). Note beach extends to bottom of hand rail.

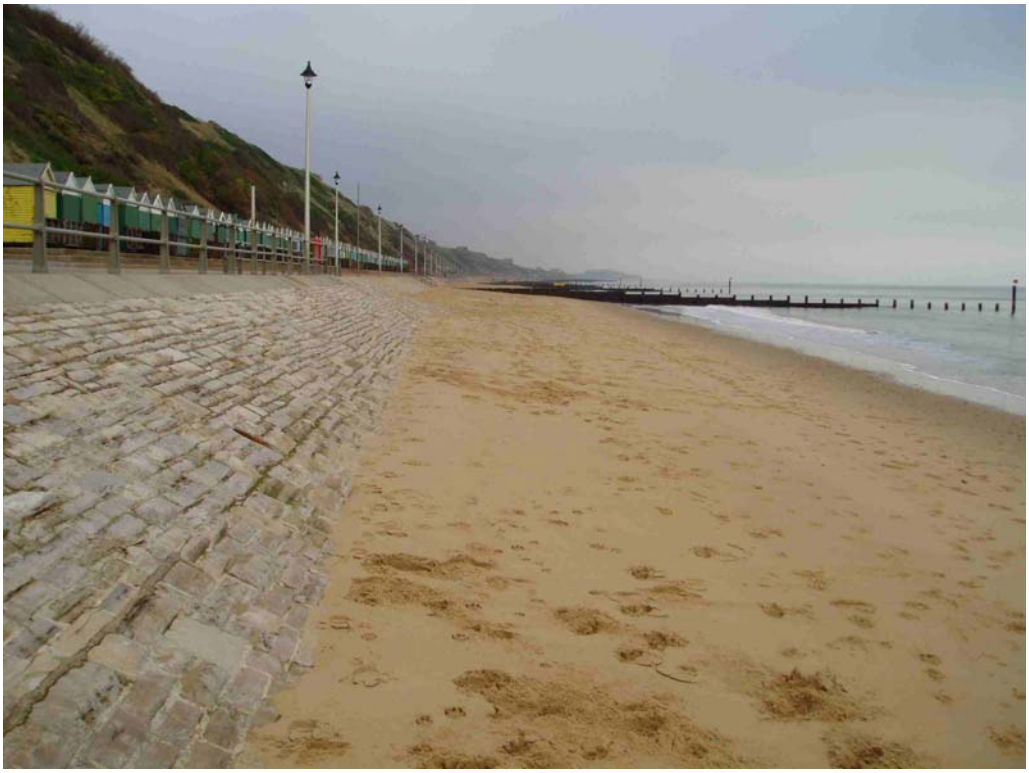

Plate 11 Looking east from profile 5f00409 (21 December 2004).

Plate 12 Location of profile 5f00409 (21 December 2004).

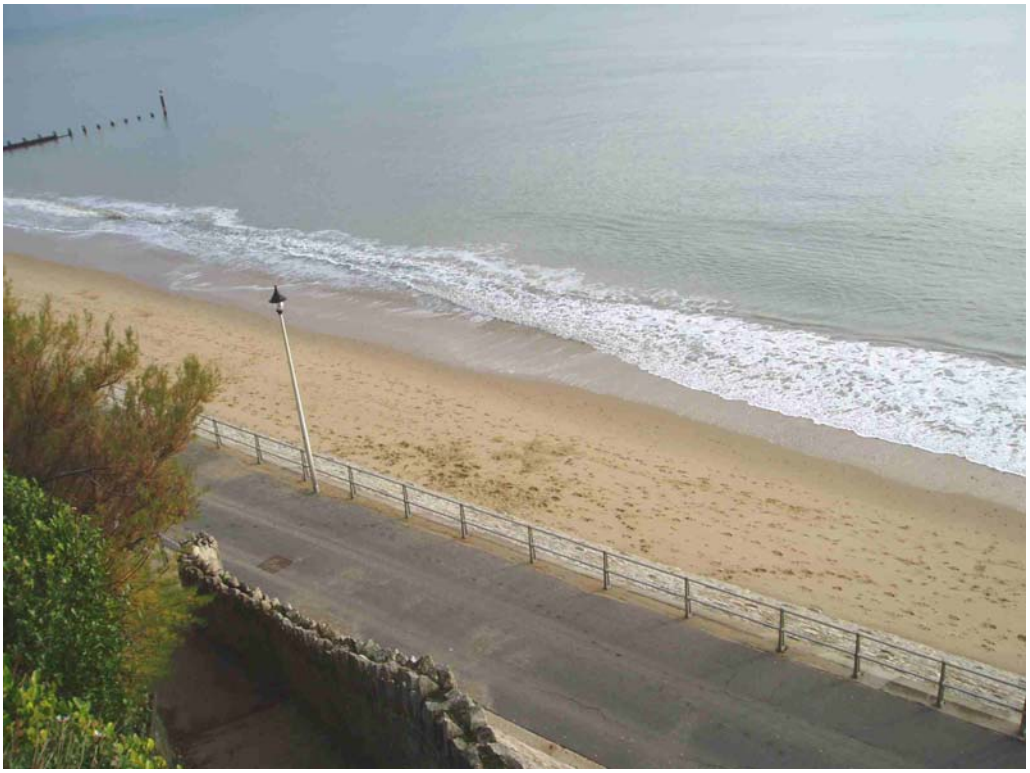

Plate 13 Looking down on beach near profile 5f00409 – situated near lamppost (21 December 2004).

5.2 11 JANUARY 2005

Andrew Pearce visited the beach on 11 January 2005 between 14:30 and 16:02. High water was at 12:30 and low water was at 16:14 with a spring tidal range. The wave conditions were H_s =2.2m, T=5.1s, direction = 191°. The beach level at the seawall was approximately 1.34mCD measured at the east handrail of the set of steps to the west of profile 5f00409 (see Plate 18). This was three days after the Boscombe Wave Buoy (see Section 6.2) measured a significant wave height of 2.33m, which was the highest significant wave height, measured between 1 January and 6 July 2005.

Plate 14 Fisherman's Walk on 11 January 2005 showing low beach level, foam on esplanade and local rip current/ return flow at beach low point.

Waves were breaking beyond the groynes, reforming and breaking again on the beach. At 14:30 waves were observed to run 0.3m to 0.5m up the seawall. Rundown and reflection of wave created a plume of sediment at the toe of the wall.

Plates 15 to 18 show armour stones (possibly 600mm to 700mm limestone) at approximately +0.1 to -0.1 CD.

Plate 15 Fisherman's Walk on 11 January 2005 showing return flow down narrow channel.

Plate 16 Fisherman's Walk on 11 January 2005. Low beach level revealed rocks at toe at approximately 0mODN elevation at toe of wall.

Plate 17 Elliptical beach at Fisherman's Walk on 11 January 2005.

Plate 18 Beach lowering at toe of seawall at Fisherman's Walk on 11 January 2005.

5.3 28 APRIL 2005

Andrew Pearce visited the Fisherman's Walk site again on 28 April 2005 at 12:00 GMT with a water level of 2.1mCD (approximately high tide) during peak wave conditions (H_s = 1.7m, T = 4.8s, direction = 190º). The beach level was approximately 3.4mCD at the seawall measured at the centre of the steps to the west of profile 5f00409, shown in Plate 20.

Plate 19 Looking west towards groyne G32 on 28 April 2005. Note sand on promenade.

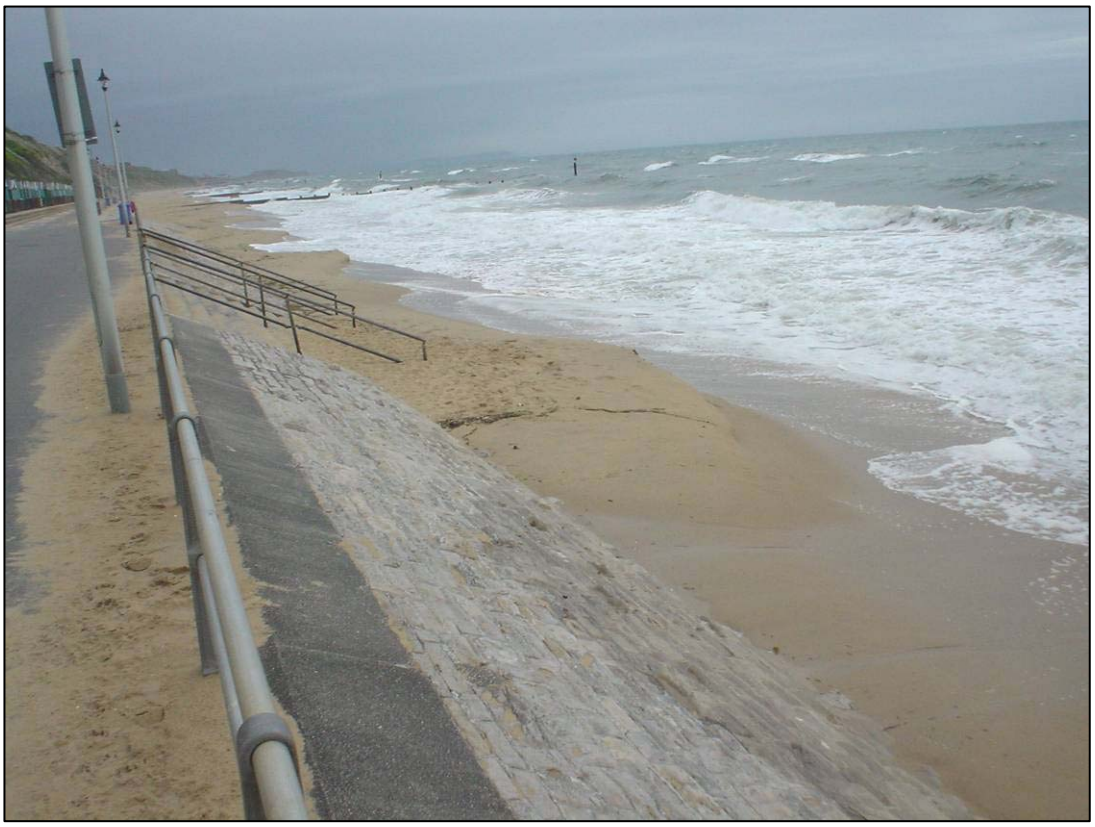

Plate 20 Looking east towards profile 5f00409 on 28 April 2005. Note buried hand railing.

Plate 21 High tide on 28 April 2005 at groyne G32, looking east. Sand cliffs 0.2m to 0.3m high.

5.4 INSTRUMENT DEPLOYMENT ON 9 MAY 2005

Deployment of the scour monitors was performed on Monday 9 May 2005, by a team from

- HR Wallingford: Jonathan Binks and James Sutherland;
- University of Southampton: Andrew Pearce;
- PTC of Southampton (JCB).

Two scour monitors were deployed. Scour Monitor Number 1 (SM1) was attached parallel to the seawall, with a mesh grill protecting it from vandalism, while Scour Monitor Number 2 (SM2) was deployed vertically at the toe of the seawall. A JCB was used to dig a hole against the seawall approximately 2m west of profile 5f00409. Plate 22 shows the hole and SM2 before SM2 was lowered into place. The JCB was used to lower SM2 into the hole. SM1 was then positioned on the seawall and bolted to it. Plate 23 shows the JCB back-filling the hole. The levels of the tops of the scour monitors were then determined by triangulation from a CCO permanent ground mark at profile A8. Since the offset height to the sensors from the tops of the scour monitors is known, the level of each sensor could be determined. The angle of repose of SM1 was measured so that the relative position of gauges below the measured level could be determined. It can be seen the monitors cover a total height range of 1.07m at the two locations. The level of each sensor is shown in Table 1 and taking account of the slope, which was 1:2.

Table 1 Level of each sensor

Date installed	Sensor array ID	Sensor No.	Elevation mODN	Elevation mACD
09/05/2005	SM1 (upper)	1	1.55	2.95
		2	1.50	2.90
		3	1.46	2.86
		4	1.41	2.81
		5	1.37	2.77
		6	1.32	2.72
		7	1.28	2.68
		8	1.23	2.63
09/05/2005	SM2 (lower)	1	1.18	2.58
		2	1.08	2.48
		3	0.98	2.38
		4	0.88	2.28
		5	0.78	2.18
		6	0.68	2.08
		7	0.58	1.98
		8	0.48	1.88

Strips of orange plastic netting were then wrapped round the sensor heads and attached to act as visible markers of the sensors' positions, as shown in Plate 24, which was taken at the end of the deployment.

Four samples of sand were collected from the beach at the location of the scour monitors. Samples 1A and 1B were surface samples, while samples 2A and 2B were collected from 1.5m below the surface in the hole dug by the JCB. Particle size distributions were obtained from these samples using the wet sieve method, following BS1377-2:1990, 9.2 & 9.3 as shown in Appendix 1. The results from sample 1A are to be regarded as indicative only as over 3% of the sample was lost during analysis. Particle size distributions from the other three samples are shown in Figure 5.

Values of d_{16}, d_{50} and d_{84} were calculated for samples 1B, 2A and 2B, where d_n is the sieve size that *n*% of the sediment by weight would pass through. These values are shown in Table 2, which also includes the ratio d_{84}/d_{16} which is a common measure of the width of the sediment grading. Table 2 and Figure 5 show that the sand at Southbourne is a well sorted medium sand with median diameter, d_{50} = 0.31mm.

Table 2 Sediment sizes from Southbourne samples taken on 9 May 2005

Sample	d_{16} [mm]	d_{50} [mm]	d_{84} [mm]	d_{84}/d_{16}
1B	0.18	0.27	0.42	2.36
2A	0.20	0.34	0.49	2.42
2B	0.20	0.33	0.47	2.41
Mean	0.19	0.31	0.46	2.39

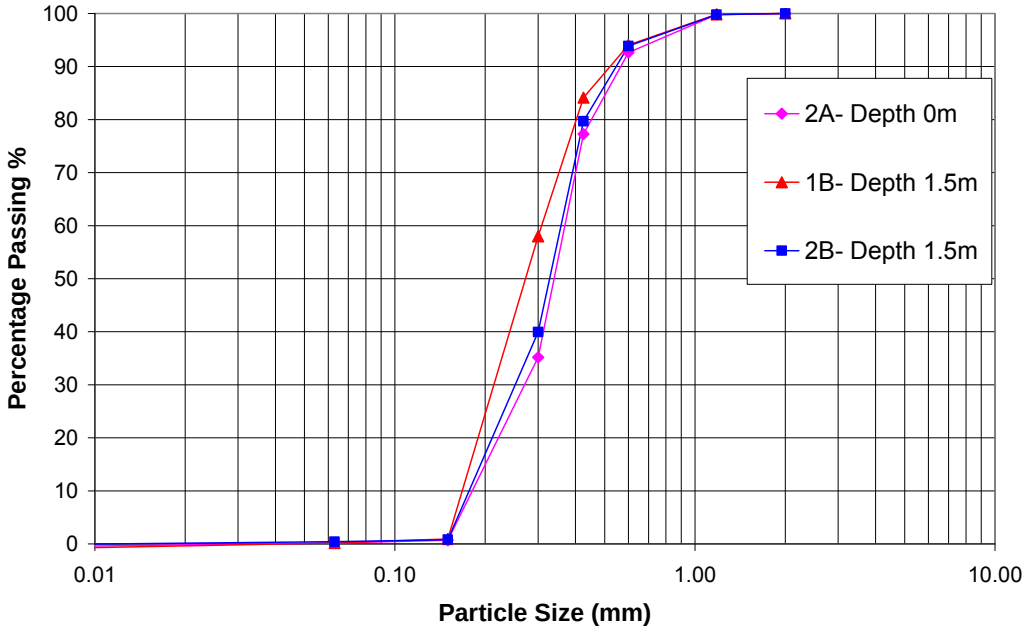

Figure 5 Particle size distributions of sand sample takens from Profile 5f000409 on 9 May 2005.

Plate 22 Scour monitor about to be deployed vertically at toe of sloping seawall by JCB on 9 May 2005.

Plate 23 Backfilling of hole after placement of 2 scour monitors on 9 May 2005.

Plate 24 Scour monitors as initially deployed on 9 May 2005.

5.5 MIDDLE OF EXPERIMENT: 23 MAY 2005

Andrew Pearce visited the field site on 23 May 2005, close to high tide in the afternoon. Water level was about 2.0mCD with Hs ≈ 0.6m. Further details of conditions are provided in Section 7.

Plate 25 Scour monitors photographed near high tide on 23 May 2005.

Plate 26 Upper scour monitor on 23 May 2005.

5.6 RECOVERY ON 7 JUNE 2005

The scour monitors were recovered from the beach on 7 June 2005 by Jonathan Binks and Mike Gradwell of HR Wallingford with a JCB from PTC (Southampton).

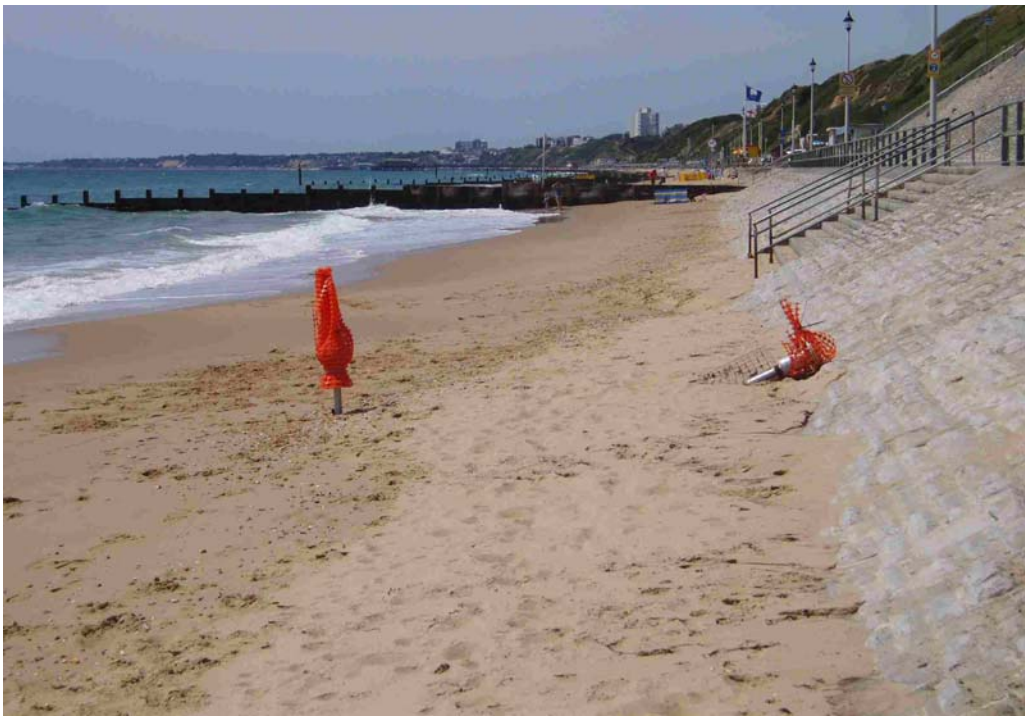

Plate 27 Beach and scour monitors prior to recovery on 7 June 2005.

Plate 28 Upper scour monitor prior to recovery on 7 June 2005.

6. Data collected

6.1 SCOUR MONITOR DATA

The average number of pulses per minute from each tell-tail unit on the scour monitors was logged every 30 minutes between 15:00 GMT on 09 May until 12:00 GMT on 07 June 2005. Figures 6 and 7 show the number of pulses per minute from each tell-tail for the entire deployment. The main activity at sensor SM1 occurred between 21 and 26 May, although the top sensor was activated a few times on 29 May, 3 June and 5 June. All the activity at sensor SM2 was recorded between 19 and 29 May. This is broadly consistent with the observations of beach levels made during the site visits. Plate 24 shows that all sensors were buried at the time of deployment, while plates 25 and 26 (taken on 23 May) show three sensors exposed on SM1 and five sensors exposed on SM2 and Plates 27 and 28 show that one sensor is partially exposed at both SM1 and SM2 on 7 June.

Table 3 shows the total of the average number of pulses per minute recorded during the entire deployment. Relatively low levels of activity were recorded by the top three tell-tail units on SM1 (mounted on the seawall). This indicates that they were relatively infrequently disturbed by wave activity during the deployment. The lowest total number of pulses recorded was by tell-tail 3 of SM1 at 2.86mCD. This recorded lower pulse counts than the tell-tails below and above it during periods of activity (e.g. around 21:00 GMT on 24/05), which indicates a relatively low sensitivity. There was also a low level of activity at tell-tail 8 on SM1 at 2.63mCD, although that may simply be due to it being exposed less than the other units.

There was very little activity at sensor 1 (top) on SM2, the lower scour monitor placed vertically at the toe of the beach, even when there was more activity in higher tell-tail units on SM1, and despite it being exposed in Plates 25 and 27. This appears to indicate a low sensitivity and potentially unreliable results. The scour monitor results indicate that the period between 19 and 29 May should be analysed and that the analysis should concentrate on the period between 21 and 26 May.

Table 3 Total number of pulses per minute recorded by each sensor during the whole deployment period

SM1	Elevation (mCD)	2.95	2.90	2.86	2.81	2.77	2.72	2.68	2.63
(upper)	Total No. pulses	260	574	78	1838	1017	2989	2135	112
SM2	Elevation (mCD)	2.58	2.48	2.38	2.28	2.18	2.08	1.98	1.88
(lower)	Total No. pulses	705	11281	11317	9463	7394	8395	5770	1845

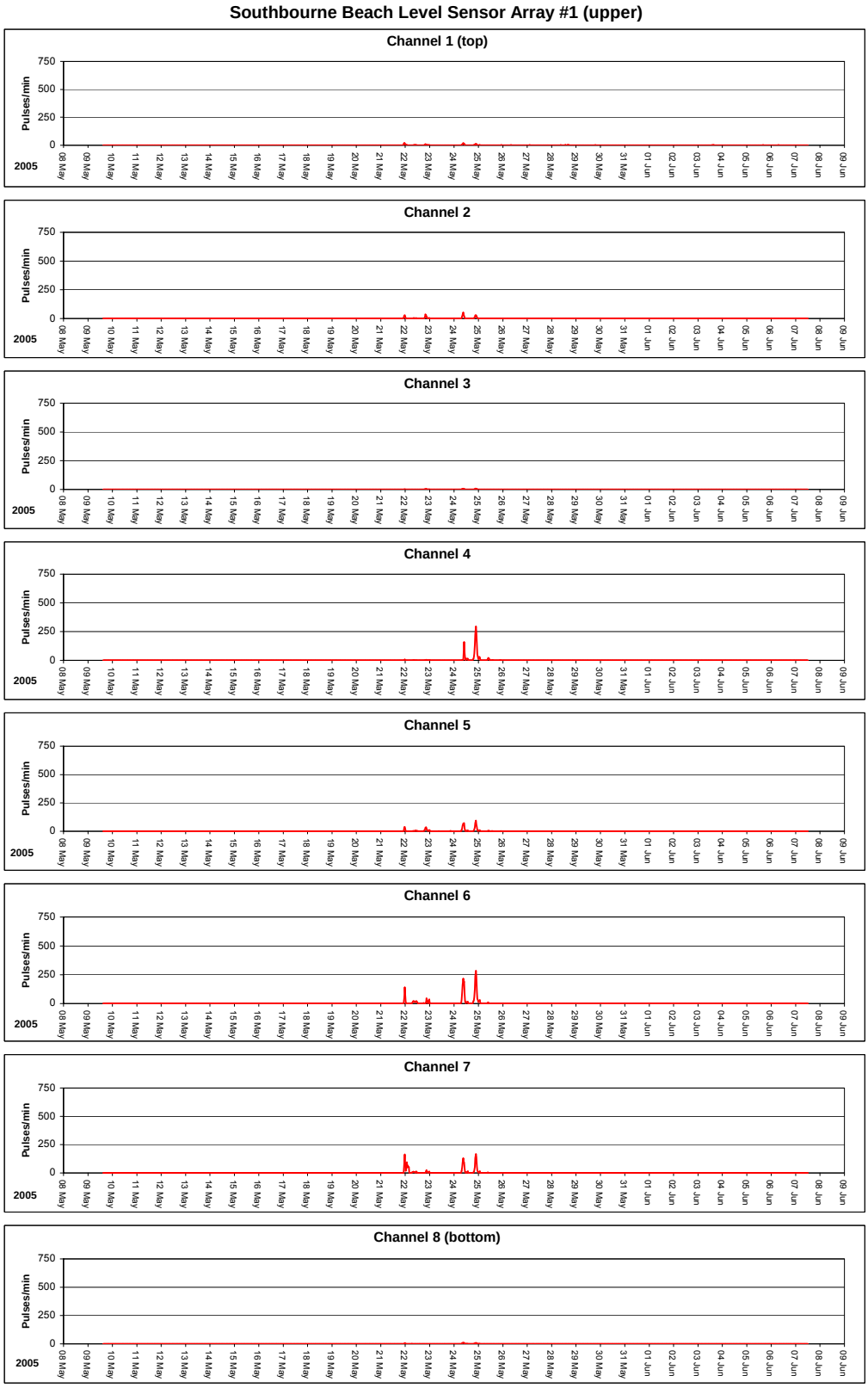

Figure 6 Time series of scour monitor pulse rate from upper monitor SM1 on the seawall (May – June 2005).

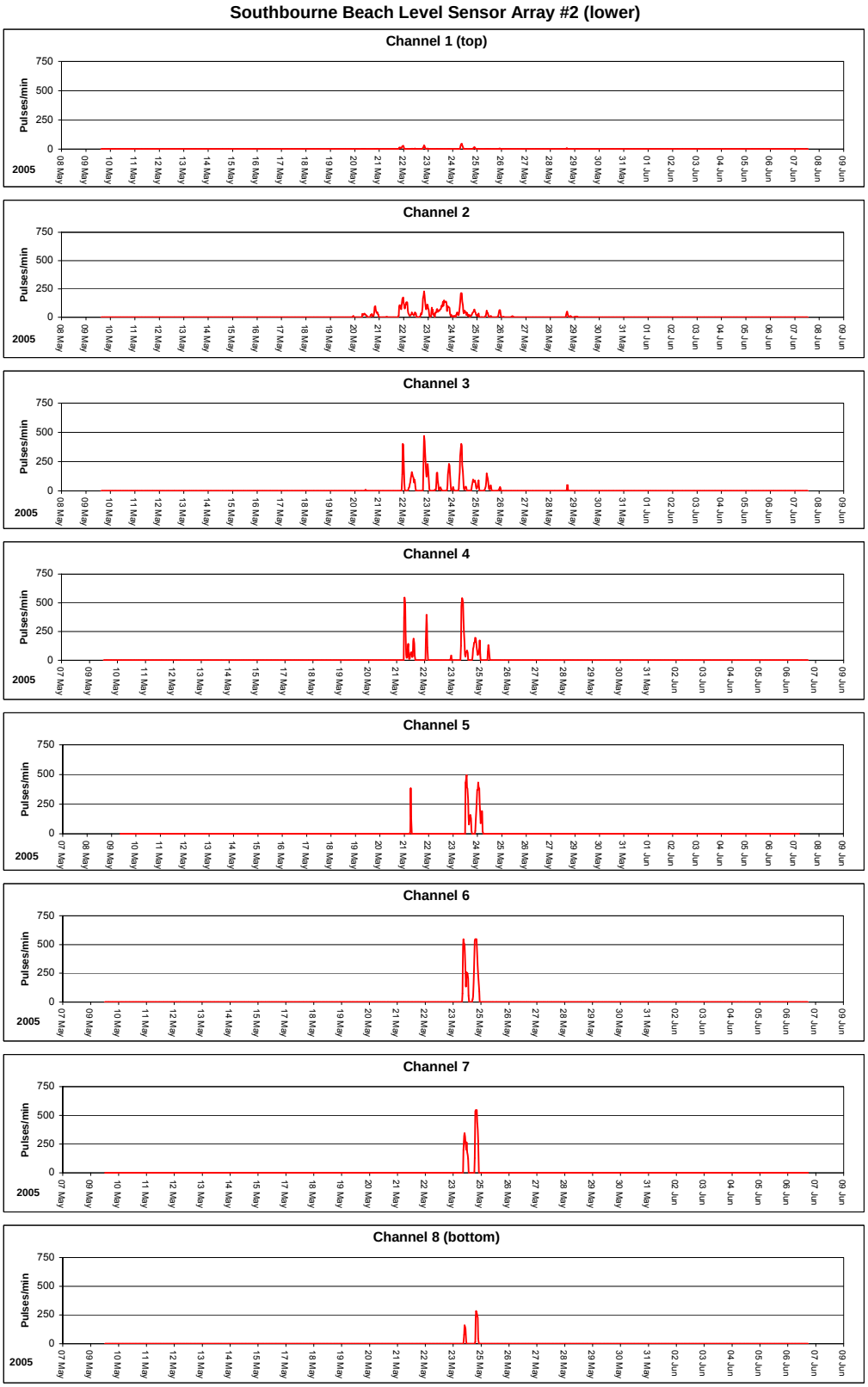

Figure 7 Time series of scour monitor pulse rate from SM2, in the beach (May – June 2005).

6.2 WAVE DATA

Wave data was obtained from the Datawall Directional WaveRider Mark III buoy at 10.4m below CD seabed level in Boscombe Bay, via CCO (2005). The buoy is at 50° 42.6810' N, 001° 50.3712' W (411413mE, 90302mN) which is 1772m west and 960m south of the top of CCO profile 5f00409. The buoy records wave statistics every 30 minutes. The monthly averages of the following parameters, measured at the buoy between 2003 and 2005 are given in Table 4:

- Maximum wave height, Hmax;
- Spectral significant wave height, Hs;
- Spectral peak period, Tp;
- Zero-crossing wave period, Tz;
- Direction of the spectral peak (gives direction waves are coming from) Dirp;
- Sea Temperature, measured near the surface, TSea.

The monthly averages for 2005 are given in Table 5.

Table 4 Monthly averages of Boscombe Buoy wave parameters 2003 – 2005 (CCO, 2005).

Month	Hmax (m)	H_s (m)	T_p (s)	T_z (s)	Dirp (degrees)	TSea (ºC)
January	1.08	0.66	9.1	4.4	180	8.5
February	0.66	0.32	8.3	4.7	165	7.5
March	0.74	0.37	8.6	4.7	182	6.6
April	0.61	0.38	6.8	4.6	186	8.1
May	0.66	0.42	6.4	4	179	11.2
June	0.6	0.39	5.6	3.5	183	15.9
July	0.7	0.45	5.1	3.3	186	17.9
August	0.69	0.44	5.5	3.5	177	19.5
September	0.69	0.45	6.4	3.6	178	18.0
October	1.12	0.72	6.2	4	170	14.4
November	0.85	0.55	7.9	4.3	178	12.0
December	0.91	0.59	8.5	4.2	177	9.3

Table 5 Monthly averages of Boscombe Buoy wave parameters from 2005 (CCO, 2005).

Month	Hmax (m)	H_s (m)	T_p (s)	T_z (s)	Dirp (degrees)	TSea (ºC)
January	1.01	0.67	9.5	4.3	181	8.6
February	0.58	0.38	6.9	4.2	169	7.2
March	0.62	0.41	9.4	4.2	179	6.7
April	0.66	0.43	6.4	3.7	181	9.5
May	0.8	0.51	5.9	3.6	178	12.3
June	0.59	0.38	5.8	3.5	178	15.5

The highest significant wave height of 2005 (from 1 January to 6 July) was 2.33m, measured on 8 January, while the highest storm of 2004 had Hs = 3.62m, with Tp = 8.3s, Tz = 6.3s at a water level of 1.14m above ODN (2.54m above CD) recorded at Bournemouth Pier, which included a tidal surge of 0.46m at the peak of the storm and a maximum surge of 0.55m during the storm. The annual Hs exceedance values for 2003 (July to December only) and 2004 are given in Table 6, where $H_{n\%}$ is the significant wave height exceeded by n% of the records during the year.

Table 6 Maximum wave height and Hs exceedance values for 2003 (partial record) and 2004.

	H_{max}	$H_{0.5\%}$	$H_{1\%}$	$H_{2\%}$	$H_{5\%}$	$H_{10\%}$
2003	2.79	2.17	1.95	1.53	1.19	0.98
2004	3.62	2.28	1.96	1.69	1.3	1.02

Time series of the following parameters were obtained from CCO (2005) between 09:30 GMT on 18 May 2005 and 29 May 2005 to facilitate interpretation of the scour monitor data:

- Date and time;
- Latitude and Longitude;
- Significant wave height;
- Maximum wave height recorded during a measurement period;
- Spectral peak wave period;
- Zero-up-crossing wave period;
- Direction waves are coming from (direction of spectral peak measured clockwise from magnetic North);
- Spread (degrees);
- Sea Temperature.

The data is reproduced in Appendix 2.

The average temperature of the sea at the Boscombe buoy during May was used to calculate the water density and kinematic viscosity of the seawater during the experiment as $\rho = 1026.5 kgm^{-3}$ and $\nu = 1.28 \times 10^{-6} m^2 s^{-1}$, using formulae presented in Soulsby (1997) and assuming a salinity of 35. Soulsby's (1997) formula for sediment fall speed was used to calculate the following fall speeds, w_s, for representative beach sediment sizes as:

- $w_s = 0.040 ms^{-1}$ for 0.31mm sand (mean d_{50});
- $w_s = 0.019 ms^{-1}$ for 0.19mm sand (mean d_{16});
- $w_s = 0.062 ms^{-1}$ for 0.46mm sand (mean d_{84}).

6.3 TIDAL LEVEL

Water levels were obtained from the Bournemouth Pier tide gauge, provided by the National Tidal and Sea Level Facility (http://www.pol.ac.uk/ntslf/). Raw data files of sea surface elevation were obtained to provide immediate access to the data. This raw data comes with the following disclaimer (quoted directly):

"These data are raw data and have not been through quality control. While BODC believes the information to be reliable, human or mechanical error remains a possibility. Therefore [neither] NERC nor any of the sources of the information shall be responsible for any errors or omissions, completeness, timeliness, or correct sequencing of the information. Neither BODC or NERC does not guarantee the accuracy or for the use of or results obtained from the use of this information."

The tidal levels were obtained at intervals of 15 minutes from 12:15 GMT on 24 April until 09:00 on 15 June. A plot of observed and predicted water levels from 19 to 25 May is shown in Figure 8 reproduced from NTSLF web site.

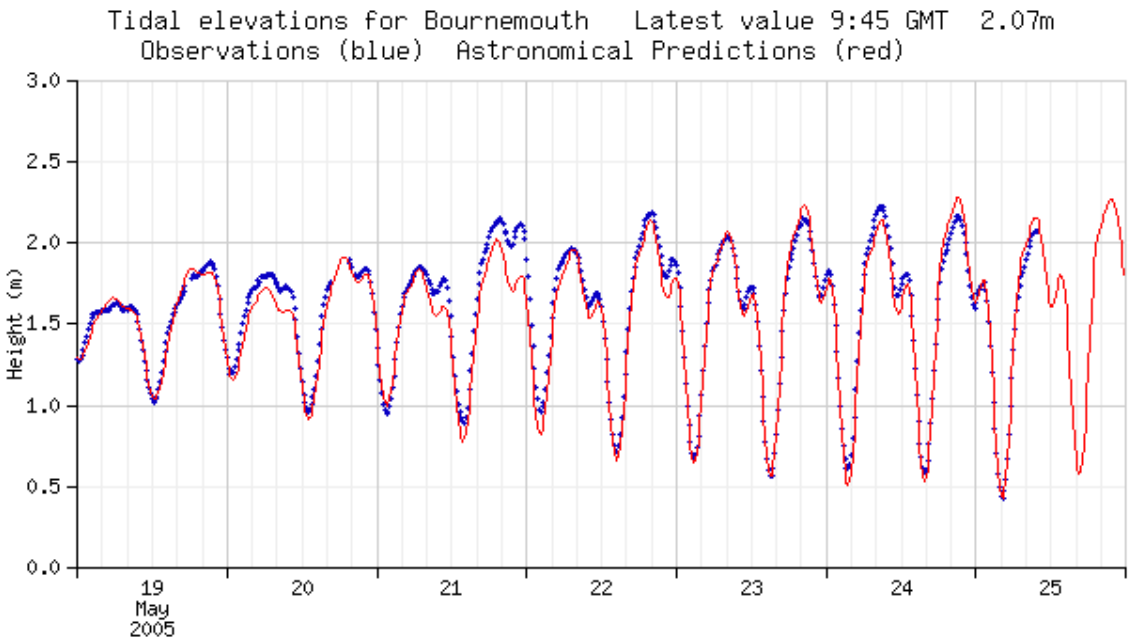

Figure 8 Observed and predicted tidal levels (mCD) from 19 to 25 May 2005 (Source: NTSLF web site).

7. Combined Data

The water level, significant wave height and the elevation of the lowest sensor that was active in each scour monitor are plotted in Figure 9 from 00:00GMT on 19 May until 00:00GMT on 24 May and in Figure 10 from 00:00GMT on 24 May until 00:00GMT on 28 May (all dates in 2005). This shows that high tide levels were lower at both the start and end of the active period, while the highest water levels occurred during the 24th, when the greatest amount of beach lowering and recovery occurred. Significant wave height of over 1.5m occurred twice and also coincided with the greatest beach lowering and recovery.

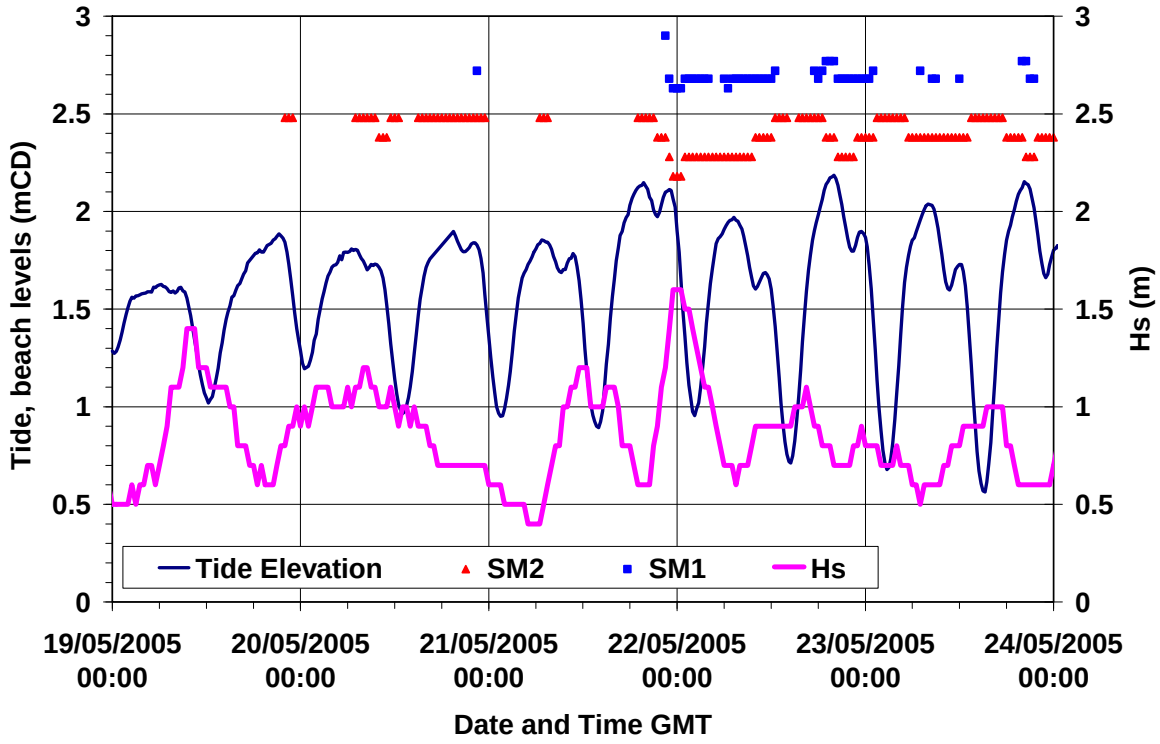

Figure 9 Tidal level, level of lowest active sensor and significant wave height from 19 - 24 May.

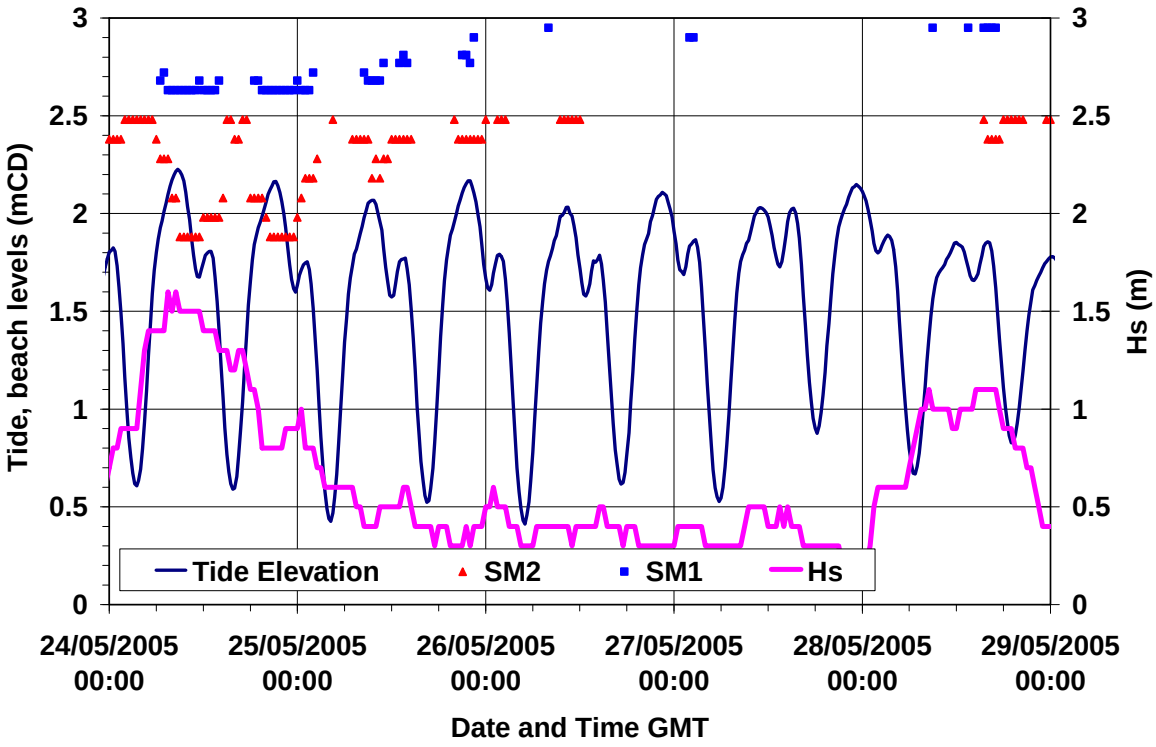

Figure 10 Tidal level, level of lowest active sensor and significant wave height from 24 - 29 May.

Figure 10 shows that as the wave height and water level rose during the morning of the 24th, the beach level dropped by at least 0.60m. The bottom monitor became exposed, so nobody knows exactly how far the beach level lowered. However, as water levels fell during the afternoon, the beach recovered to its previous low-tide level.

The beach level fell again as water levels rose during the afternoon of the 24th, even though wave heights were lower. The bottom scour monitor again became exposed so nobody knows exactly how far the beach level fell, but it recovered fully by low tide. There was only a small change in bed level during the next high tide as water levels and wave heights were lower.

The field data collection exercise has provided measurements of beach lowering and recovery of a sand beach fronting a seawall during tidal inundation. Further analysis of the Southbourne dataset will be undertaken as part of the derivation of an improved scour predictor.

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Appendix 1 Particle Size distributions from sediment samples

Particle Size Distribution- Wet Sieve Method BS1377-2:1990 , 9.2 & 9.3

Tray 1 (g)	13.32
Tray 2 (g)	5.8

Location		**Description**	**Test No**	**Depth**	**Tray No**
Southbourne Beach 5f00409		Medium Sand	1A	0m	64

Test	**Description**	**Sieve (mm)**	**Mass (g)**	**Correction**	**Percentage Retained**	**Cumulative Percentage Passing**
1	Initial dry mass (m1)		164.35	151.03		
2	2mm & 63µm wash through (m4)		163.15	149.83		
3	2mm (retained)	2	0	0	0.0	100.0
4	1.18mm (retained)	1.18	6.22	0.42	0.3	99.7
5	600µm (retained)	0.6	16.39	10.59	7.1	92.7
6	425µm (retained)	0.425	23.45	17.65	11.8	80.9
7	300µm (retained)	0.3	49.95	44.15	29.5	51.4
9	150µm (retained)	0.15	74.92	69.12	46.1	5.3
10	63µm (retained)	0.063	6.59	0.79	0.5	4.7
11	Passing 63µm (m1-m4)	0.01		1.2	0.8	3.9
12	Total Sieved mass (>1%?)		157.03	143.71		
13	Sum of sieves			142.72		

Comments - First run with equipment, significant material lost 6.12g this is >1% - indicative results

Operator	AP
Date	09/06/2005
Location	2065 Soil lab

Particle Size Distribution- Wet Sieve Method BS1377-2:1990 , 9.2 & 9.3

Tray 1 (g)	6.11
Tray 2 (g)	5.8

Location		**Description**	**Test No**	**Depth**	**Tray No**
Southbourne Beach 5f00409		Medium Sand	1B	0m	A2

Test	**Description**	**Sieve (mm)**	**Mass (g)**	**Correction**	**Percentage Retained**	**Cumulative Percentage Passing**
1	Initial dry mass (m1)		113.16	107.05		
2	2mm & 63µm wash through (m4)		112.24	106.13		
3	2mm (retained)	2	0	0	0.0	100.0
4	1.18mm (retained)	1.18	5.97	0.17	0.2	99.8
5	600µm (retained)	0.6	11.95	6.15	5.8	94.0
6	425µm (retained)	0.425	16.34	10.54	9.9	84.1
7	300µm (retained)	0.3	33.51	27.71	26.1	58.0
9	150µm (retained)	0.15	66.35	60.55	57.1	1.0
10	63µm (retained)	0.063	6.64	0.84	0.8	0.2
11	Passing 63µm (m1-m4)	0.01	0	0.92	0.9	-0.7
12	Total Sieved mass (>1%?)		111.92	105.81		
13	Sum of sieves			105.96		

Comments

Operator	AP
Date	09/06/2005
Location	2065 Soil lab

Particle Size Distribution- Wet Sieve Method BS1377-2:1990 , 9.2 & 9.3

Tray 1 (g)	14.23
Tray 2 (g)	5.8

Location		**Description**	**Test No**	**Depth**	**Tray No**
Southbourne Beach 5f00409		Medium Sand	2A	1.50m	93

Test	**Description**	**Sieve (mm)**	**Mass (g)**	**Correction**	**Percentage Retained**	**Cumulative Percentage Passing**
1	Initial dry mass (m1)		158.24	144.01		
2	2mm & 63µm wash through (m4)		157.48	143.25		
3	2mm (retained)	2	0	0	0.0	100.0
4	1.18mm (retained)	1.18	6.12	0.32	0.2	99.8
5	600µm (retained)	0.6	16	10.2	7.1	92.7
6	425µm (retained)	0.425	27.84	22.04	15.4	77.3
7	300µm (retained)	0.3	66.12	60.32	42.1	35.2
9	150µm (retained)	0.15	55.15	49.35	34.5	0.7
10	63µm (retained)	0.063	6.59	0.79	0.6	0.2
11	Passing 63µm (m1-m4)	0.01	0	0.76	0.5	-0.4
12	Total Sieved mass (>1%?)		158.82	144.59		
13	Sum of sieves			143.02		

Comments

Operator	AP
Date	09/06/2005
Location	2065 Soil lab

Particle Size Distribution- Wet Sieve Method BS1377-2:1990 , 9.2 & 9.3

Tray 1 (g)	8.9
Tray 2 (g)	5.8

Location		**Description**	**Test No**	**Depth**	**Tray No**
Southbourne Beach 5f00409		Medium Sand	2B	1.50m	I IA2

Test	**Description**	**Sieve (mm)**	**Mass (g)**	**Correction**	**Percentage Retained**	**Cumulative Percentage Passing**
1	Initial dry mass (m1)		175.63	166.73		
2	2mm & 63µm wash through (m4)		174.89	165.99		
3	2mm (retained)	2	0	0	0.0	100.0
4	1.18mm (retained)	1.18	6.15	0.35	0.2	99.8
5	600µm (retained)	0.6	15.65	9.85	5.9	93.9
6	425µm (retained)	0.425	29.34	23.54	14.2	79.7
7	300µm (retained)	0.3	71.73	65.93	39.7	40.0
9	150µm (retained)	0.15	70.76	64.96	39.1	0.8
10	63µm (retained)	0.063	6.46	0.66	0.4	0.4
11	Passing 63µm (m1-m4)	0.01	0	0.74	0.4	0.0
12	Total Sieved mass (>1%?)		174.25	165.35		
13	Sum of sieves			165.29		

Comments

Operator	AP
Date	09/06/2005
Location	2065 Soil lab

Appendix 2 Tabulation of data from Southbourne experiment

Summary

The data in these tables describes information collected from two Scour Monitors on the beach, the directional Waverider Buoy off Boscombe and water levels from the tide gauge on Bournemouth Pier during May 2005.

Date & Time column: 19/05 00:00 is 19 May at 00.00 GMT

Pulses per minute: at the readings from the Scour Monitor sensors with Ch 1 corresponding to the topmost sensor and Ch 8 the bottom sensor in each case. The elevations of the sensors are given on the last page.

Boscombe Buoy: Significant wave height H_s, maximum wave height H_{max}, peak period T_p, zero-up-crossing period T_z, wave direction Dir, directional spreading Spr and water temperature Tmp

B'mth: water level measured at Bournemouth Pier [note: there is some missing data in this column].

The data is presented on 13 sheets following this page.

	SCOUR MONITOR 1 - UPPER								SCOUR MONITOR 2 - LOWER								BOSCOMBE BUOY WAVES							B'mth
	Pulses Per Minute								Pulses Per Minute								Hs	H_{max}	Tp	Tz	Dir	Spr	Tmp	WL
Date & Time	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Ch8	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Ch8	(m)	(m)	(s)	(s)	(°)	(°)	(°C)	(mCD)
19/05 00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.79	4.0	3.2	145	21	12.1	1.29
19/05 00:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.79	4.2	3.3	146	17	12.1	1.28
19/05 01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.82	4.5	3.3	151	14	12.1	1.34
19/05 01:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.75	4.5	3.2	143	18	12.1	1.43
19/05 02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.81	4.3	3.2	152	18	12.2	1.51
19/05 02:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	0.78	4.2	3.1	159	19	12.2	1.56
19/05 03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.94	4.5	3	142	20	12.2	1.57
19/05 03:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	0.93	4.5	2.9	145	18	12.2	1.57
19/05 04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	1.06	2.8	2.9	187	17	12.3	1.58
19/05 04:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	1.08	3.1	3	183	26	12.3	1.59
19/05 05:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	0.85	3.0	2.9	177	19	12.3	1.59
19/05 05:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	1.12	3.6	2.9	167	25	12.3	1.61
19/05 06:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	1.18	3.9	3	165	21	12.3	1.62
19/05 06:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	1.42	3.6	3.1	180	18	12.3	1.62
19/05 07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	1.71	4.0	3.3	179	20	12.3	1.61
19/05 07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	1.82	4.3	3.5	183	25	12.3	1.59
19/05 08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	1.62	4.8	3.7	183	18	12.3	1.58
19/05 08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	1.98	5.3	3.8	187	13	12.3	1.61
19/05 09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.2	2.47	5.3	3.9	191	12	12.3	1.59
19/05 09:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.4	2.2	5.6	4.1	186	13	12.3	1.56
19/05 10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.4	2.11	5.9	4.2	188	13	12.3	1.47
19/05 10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.4	2.04	5.9	4.2	187	11	12.3	1.34
19/05 11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.2	1.7	5.9	4	186	13	12.3	1.21
19/05 11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.2	2.04	5.9	4	190	11	12.3	1.11
19/05 12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.2	1.91	5.9	4	191	12	12.3	1.05
19/05 12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	1.6	5.9	3.9	188	10	12.3	1.04
19/05 13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	1.93	5.6	3.9	193	15	12.3	1.09
19/05 13:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	1.7	5.3	3.8	183	18	12.3	1.20
19/05 14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	1.68	5.3	3.9	187	17	12.3	1.33
19/05 14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	1.55	4.8	3.7	174	25	12.4	1.45
19/05 15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.5	4.8	3.6	183	26	12.6	1.52
19/05 15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.32	5.0	3.6	183	20	12.5	1.57
19/05 16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	1.22	5.0	3.5	176	25	12.5	1.62
19/05 16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	1.12	5.0	3.6	177	25	12.4	1.65
19/05 17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	1.01	4.8	3.5	179	19	12.4	1.70
19/05 17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	1.05	4.8	3.4	176	22	12.4	
19/05 18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	0.99	5.6	3.4	172	24	12.5	

	SCOUR MONITOR 1 - UPPER								SCOUR MONITOR 2 - LOWER								BOSCOMBE BUOY WAVES							B'mth
	Pulses Per Minute								Pulses Per Minute								Hs	H_{max}	Tp	Tz	Dir	Spr	Tmp	WL
Date & Time	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Ch8	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Ch8	(m)	(m)	(s)	(s)	(°)	(°)	(°C)	(mCD)
19/05 18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	1.15	5.0	3.3	169	27	12.5	1.79
19/05 19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	0.95	5.3	3.4	170	28	12.5	1.79
19/05 19:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	0.94	5.3	3.6	179	28	12.5	1.81
19/05 20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	1.06	5.3	3.6	181	24	12.4	1.83
19/05 20:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	1.12	4.8	3.5	173	30	12.4	1.85
19/05 21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	1.32	5.3	3.3	179	22	12.4	1.87
19/05 21:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	1.19	5.0	3.4	173	23	12.4	1.88
19/05 22:00	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0.8	1.66	4.2	3.6	176	28	12.4	1.84
19/05 22:30	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0.9	1.3	4.5	3.6	183	24	12.3	1.73
19/05 23:00	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0.9	1.46	4.2	3.6	176	27	12.3	1.57
19/05 23:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.54	4.8	3.5	190	19	12.3	1.40
20/05 00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	1.46	5.0	3.6	193	13	12.3	1.29
20/05 00:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.31	4.3	3.6	180	17	12.3	1.20
20/05 01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	1.62	5.0	3.4	198	13	12.3	1.21
20/05 01:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.76	4.3	3.6	193	14	12.3	1.28
20/05 02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	1.91	5.0	3.6	193	14	12.3	1.37
20/05 02:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	1.66	4.8	3.8	191	16	12.3	1.50
20/05 03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	1.77	4.5	3.6	196	19	12.3	1.59
20/05 03:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	1.68	5.0	3.7	190	18	12.3	1.67
20/05 04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.54	4.5	3.6	193	17	12.3	1.72
20/05 04:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.52	4.8	3.5	183	22	12.3	1.73
20/05 05:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.72	4.8	3.6	184	17	12.3	1.77
20/05 05:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.93	5.0	3.4	180	22	12.3	1.79
20/05 06:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	1.67	4.5	3.6	186	17	12.3	1.79
20/05 06:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.59	4.0	3.6	183	15	12.3	1.81
20/05 07:00	0	0	0	0	0	0	0	0	1	4	0	0	0	0	0	0	1.1	1.7	5.0	3.5	183	23	12.3	1.81
20/05 07:30	0	0	0	0	0	0	0	0	2	29	0	0	0	0	0	0	1.1	1.68	5.3	3.7	187	18	12.3	1.78
20/05 08:00	0	0	0	0	0	0	0	0	2	25	0	0	0	0	0	0	1.2	2	5.0	3.8	184	17	12.3	1.75
20/05 08:30	0	0	0	0	0	0	0	0	2	20	0	0	0	0	0	0	1.2	1.98	4.8	3.8	186	17	12.3	1.70
20/05 09:00	0	0	0	0	0	0	0	0	1	27	0	0	0	0	0	0	1.1	1.92	5.6	3.9	187	13	12.3	1.73
20/05 09:30	0	0	0	0	0	0	0	0	2	33	0	0	0	0	0	0	1.1	1.62	5.3	4	181	17	12.3	1.73
20/05 10:00	0	0	0	0	0	0	0	0	1	27	3	0	0	0	0	0	1	1.79	5.9	3.9	190	17	12.3	1.71
20/05 10:30	0	0	0	0	0	0	0	0	0	22	8	0	0	0	0	0	1	1.46	5.6	3.8	186	18	12.4	1.66
20/05 11:00	0	0	0	0	0	0	0	0	0	20	3	0	0	0	0	0	1	1.6	5.9	3.8	183	20	12.5	1.52
20/05 11:30	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	1.1	1.62	5.6	3.8	181	13	12.4	1.32
20/05 12:00	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	1	1.61	5.6	3.6	186	19	12.5	1.14
20/05 12:30	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0.9	1.48	5.9	3.6	188	16	12.5	1.01
20/05 13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.42	5.6	3.6	193	17	12.5	0.97

	SCOUR MONITOR 1 - UPPER								SCOUR MONITOR 2 - LOWER								BOSCOMBE BUOY WAVES							B'mth
	Pulses Per Minute								Pulses Per Minute								Hs	H_{max}	Tp	Tz	Dir	Spr	Tmp	WL
Date & Time	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Ch8	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Ch8	(m)	(m)	(s)	(s)	(°)	(°)	(°C)	(mCD)
20/05 13:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.34	5.3	3.6	194	14	12.6	1.01
20/05 14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	1.4	5.6	3.4	196	14	12.6	1.10
20/05 14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.4	4.8	3.4	193	17	12.6	1.27
20/05 15:00	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0.9	1.26	4.8	3.3	190	17	12.5	1.47
20/05 15:30	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0.9	1.47	4.5	3.4	188	17	12.5	1.61
20/05 16:00	0	0	0	0	0	0	0	0	0	20	0	0	0	0	0	0	0.9	1.2	4.3	3.3	186	19	12.5	1.71
20/05 16:30	0	0	0	0	0	0	0	0	0	30	0	0	0	0	0	0	0.8	1.23	4.5	3.3	187	21	12.4	1.76
20/05 17:00	0	0	0	0	0	0	0	0	0	19	0	0	0	0	0	0	0.8	1.41	4.3	3.2	184	22	12.5	
20/05 17:30	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0.7	1.11	4.3	3.1	188	21	12.5	
20/05 18:00	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0.7	0.95	4.5	3.1	176	22	12.4	
20/05 18:30	0	0	0	0	0	0	0	0	0	15	0	0	0	0	0	0	0.7	0.91	4.0	3.1	184	20	12.6	
20/05 19:00	0	0	0	0	0	0	0	0	2	43	0	0	0	0	0	0	0.7	1.03	5.0	3.2	174	29	12.7	
20/05 19:30	0	0	0	0	0	0	0	0	2	92	0	0	0	0	0	0	0.7	0.89	5.0	3.2	179	28	12.7	1.90
20/05 20:00	0	0	0	0	0	0	0	0	1	99	0	0	0	0	0	0	0.7	0.99	5.0	3.2	174	31	12.7	1.85
20/05 20:30	0	0	0	0	0	0	0	0	1	68	0	0	0	0	0	0	0.7	0.93	5.0	3.3	176	27	12.7	1.80
20/05 21:00	0	0	0	0	0	0	0	0	1	49	0	0	0	0	0	0	0.7	1.04	7.1	3.4	187	23	12.7	1.80
20/05 21:30	0	0	0	0	0	0	0	0	2	39	0	0	0	0	0	0	0.7	0.96	9.1	3.8	194	21	12.7	1.82
20/05 22:00	0	0	0	0	0	0	0	0	4	46	0	0	0	0	0	0	0.7	1.14	9.1	3.8	197	18	12.6	1.84
20/05 22:30	0	0	0	0	0	1	0	0	1	28	0	0	0	0	0	0	0.7	1.09	5.3	4	191	21	12.5	1.83
20/05 23:00	0	0	0	0	0	0	0	0	1	25	0	0	0	0	0	0	0.7	1.14	8.3	4	191	18	12.5	1.76
20/05 23:30	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0.7	0.95	7.1	3.9	196	19	12.4	1.58
21/05 00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	1.02	5.9	3.9	190	16	12.5	1.36
21/05 00:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	0.78	5.9	4	186	18	12.6	1.15
21/05 01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	0.75	5.0	3.8	184	20	12.6	1.00
21/05 01:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	0.76	6.3	3.9	193	15	12.5	0.95
21/05 02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.82	6.7	3.9	196	11	12.5	0.99
21/05 02:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.71	5.9	4	193	16	12.5	1.11
21/05 03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.79	5.0	4.2	191	15	12.5	1.28
21/05 03:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.7	4.0	4	184	16	12.4	1.48
21/05 04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.7	4.5	3.6	191	16	12.4	1.61
21/05 04:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.58	3.9	3.5	179	15	12.4	1.68
21/05 05:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.63	10.0	3.5	193	18	12.3	1.73
21/05 05:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.57	10.5	3.4	194	29	12.4	1.77
21/05 06:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.61	3.9	3.1	176	23	12.3	1.81
21/05 06:30	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0.4	0.68	5.9	3.1	187	21	12.3	1.84
21/05 07:00	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0.5	0.84	2.3	2.9	159	22	12.4	1.85
21/05 07:30	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0.6	1.03	9.1	3.1	193	24	12.4	1.84
21/05 08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	1.11	2.9	2.9	173	17	12.3	1.81

	SCOUR MONITOR 1 - UPPER								SCOUR MONITOR 2 - LOWER								BOSCOMBE BUOY WAVES							B'mth
	Pulses Per Minute								Pulses Per Minute								Hs	H_{max}	Tp	Tz	Dir	Spr	Tmp	WL
Date & Time	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Ch8	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Ch8	(m)	(m)	(s)	(s)	(°)	(°)	(°C)	(mCD)
21/05 08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	1.34	3.2	3.2	187	19	12.3	1.74
21/05 09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	1.63	3.5	3.3	186	18	12.3	1.69
21/05 09:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.41	4.2	3.5	180	17	12.3	1.70
21/05 10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.68	4.3	3.7	183	19	12.3	1.74
21/05 10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	1.86	4.8	3.8	187	19	12.3	1.76
21/05 11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	1.71	5.0	3.9	186	16	12.4	1.77
21/05 11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.2	2.19	5.3	3.9	188	13	12.4	1.65
21/05 12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.2	1.86	5.6	4	190	14	12.4	1.43
21/05 12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.2	1.49	5.9	4	190	12	12.4	1.18
21/05 13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.51	6.3	3.8	194	13	12.5	1.01
21/05 13:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.75	5.6	3.7	188	13	12.6	0.93
21/05 14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.88	4.3	3.6	183	21	12.6	0.89
21/05 14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.78	5.0	3.5	187	18	12.6	0.98
21/05 15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	1.52	5.0	3.4	194	16	12.6	1.22
21/05 15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	1.58	5.0	3.5	198	16	12.6	1.45
21/05 16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	1.42	5.0	3.5	194	16	12.6	1.65
21/05 16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.28	4.2	3.4	190	17	12.6	1.81
21/05 17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	1.28	5.0	3.2	191	20	12.6	1.90
21/05 17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	1.15	4.8	3.3	184	25	12.6	1.97
21/05 18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	0.99	4.8	3.2	183	23	12.6	2.03
21/05 18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	0.84	4.5	3.2	177	27	12.6	2.09
21/05 19:00	0	0	0	0	0	0	0	0	3	17	0	0	0	0	0	0	0.6	0.81	4.8	3.2	174	22	12.6	2.12
21/05 19:30	0	0	0	0	0	0	0	0	13	95	0	0	0	0	0	0	0.6	0.89	4.8	3.3	177	21	12.8	2.13
21/05 20:00	0	0	0	0	0	0	0	0	14	108	0	0	0	0	0	0	0.6	0.94	5.3	3.4	184	25	12.8	2.13
21/05 20:30	0	0	0	0	0	0	0	0	14	106	0	0	0	0	0	0	0.6	1.08	4.8	3.3	167	29	12.8	2.07
21/05 21:00	0	0	0	0	0	0	0	0	8	87	0	0	0	0	0	0	0.8	1.33	3.0	3.3	179	17	12.8	2.01
21/05 21:30	0	0	0	0	0	0	0	0	9	71	1	0	0	0	0	0	0.9	1.47	3.2	3.4	188	23	12.7	1.97
21/05 22:00	0	0	0	0	0	0	0	0	15	103	4	0	0	0	0	0	1.1	2.19	4.0	3.6	181	21	12.6	2.04
21/05 22:30	11	7	0	0	0	0	0	0	24	160	142	0	0	0	0	0	1.2	1.9	4.2	3.7	179	20	12.7	2.10
21/05 23:00	23	27	1	6	35	55	97	0	27	171	403	369	0	0	0	0	1.4	2.8	4.8	3.9	190	17	12.6	2.11
21/05 23:30	18	31	2	8	38	142	165	7	30	176	393	546	21	0	0	0	1.6	2.42	4.5	4.1	193	20	12.6	2.07
22/05 00:00	10	20	1	5	22	83	76	5	19	127	256	485	386	0	0	0	1.6	2.62	4.8	4.2	190	20	12.6	1.90
22/05 00:30	5	3	0	1	2	11	19	1	2	101	65	229	143	0	0	0	1.6	2.37	5.6	4.3	188	15	12.6	1.65
22/05 01:00	1	0	0	0	0	0	35	0	0	77	7	48	0	0	0	0	1.5	2.23	6.7	4.3	200	13	12.5	1.36
22/05 01:30	3	0	0	0	0	0	96	0	0	103	1	21	0	0	0	0	1.5	2.5	7.7	4.3	197	10	12.5	1.11
22/05 02:00	0	0	0	0	0	0	50	0	0	112	0	29	0	0	0	0	1.4	1.96	7.7	4.3	198	9	12.5	0.98
22/05 02:30	0	0	0	0	0	0	68	0	0	131	0	98	0	0	0	0	1.3	1.74	7.1	4.3	200	10	12.5	0.99
22/05 03:00	0	0	0	0	0	0	55	0	0	133	0	144	0	0	0	0	1.2	1.86	5.9	4	194	16	12.5	1.10

HR Wallingford
University of Southampton

	SCOUR MONITOR 1 - UPPER								SCOUR MONITOR 2 - LOWER								BOSCOMBE BUOY WAVES							B'mth
	Pulses Per Minute								Pulses Per Minute								Hs	H_{max}	Tp	Tz	Dir	Spr	Tmp	WL
Date & Time	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Ch8	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Ch8	(m)	(m)	(s)	(s)	(°)	(°)	(°C)	(mCD)
22/05 03:30	0	0	0	0	0	0	51	0	0	131	0	65	0	0	0	0	1.1	2.05	5.6	3.8	196	20	12.5	1.31
22/05 04:00	0	0	0	0	0	0	2	0	0	62	2	11	0	0	0	0	1.1	2.17	5.9	3.8	194	15	12.5	1.53
22/05 04:30	0	0	0	0	0	0	0	0	0	39	9	15	0	0	0	0	1	1.47	5.9	3.9	188	14	12.6	1.71
22/05 05:00	0	0	0	0	0	0	0	0	0	26	30	37	0	0	0	0	0.9	1.26	5.3	3.7	190	20	12.5	1.84
22/05 05:30	0	0	0	0	0	0	0	0	0	14	32	69	0	0	0	0	0.8	1.16	5.6	3.8	186	18	12.5	1.87
22/05 06:00	0	1	0	0	0	1	1	0	0	14	57	67	0	0	0	0	0.7	0.98	4.8	3.8	179	17	12.6	1.91
22/05 06:30	0	1	0	0	0	3	1	1	1	14	74	71	0	0	0	0	0.7	0.97	5.0	3.9	176	19	12.6	1.95
22/05 07:00	0	1	0	0	0	6	8	0	1	18	105	27	0	0	0	0	0.7	0.97	5.9	4.4	190	20	12.4	1.96
22/05 07:30	0	1	0	1	1	15	8	0	1	28	137	36	0	0	0	0	0.6	1.03	7.1	4.5	190	14	12.4	1.96
22/05 08:00	0	4	0	2	1	23	12	0	3	43	162	168	0	0	0	0	0.7	1.19	10.0	4.7	194	20	12.4	1.93
22/05 08:30	1	4	0	3	2	23	9	0	3	34	141	189	0	0	0	0	0.7	1	6.3	4.4	187	19	12.4	1.87
22/05 09:00	1	3	0	2	1	14	9	0	2	25	125	146	0	0	0	0	0.7	1.22	9.1	4.3	188	14	12.6	1.77
22/05 09:30	1	2	0	0	4	10	7	0	2	22	114	42	0	0	0	0	0.8	1.16	10.0	4.3	196	12	12.6	1.66
22/05 10:00	1	2	0	0	3	11	2	0	2	14	72	0	0	0	0	0	0.9	1.3	10.0	4.4	191	11	12.6	1.60
22/05 10:30	1	3	0	1	5	20	11	0	4	27	96	0	0	0	0	0	0.9	1.4	11.1	4.5	194	12	12.6	1.64
22/05 11:00	1	4	0	1	4	23	13	0	5	44	74	0	0	0	0	0	0.9	1.27	11.1	4.3	194	13	12.7	1.68
22/05 11:30	0	1	0	0	1	16	5	0	3	38	32	0	0	0	0	0	0.9	1.24	10.5	4.1	194	14	12.8	1.68
22/05 12:00	0	1	0	0	1	9	1	0	1	32	1	0	0	0	0	0	0.9	1.6	11.8	3.9	190	22	12.8	1.60
22/05 12:30	0	1	0	0	1	2	0	0	0	6	0	0	0	0	0	0	0.9	1.43	8.3	3.8	196	15	12.8	1.41
22/05 13:00	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0.9	1.32	6.7	3.6	196	16	12.8	1.15
22/05 13:30	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0.9	1.17	3.7	3.6	172	19	12.8	0.91
22/05 14:00	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.9	1.51	4.8	3.5	184	19	12.8	0.76
22/05 14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	1.6	4.8	3.5	183	17	12.8	0.71
22/05 15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.6	5.0	3.6	190	16	12.8	0.82
22/05 15:30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1.78	4.5	3.5	188	20	12.8	1.05
22/05 16:00	0	0	0	0	0	0	0	0	0	8	0	0	0	0	0	0	1	1.6	4.3	3.4	197	23	12.8	1.33
22/05 16:30	0	0	0	0	0	0	0	0	0	14	0	0	0	0	0	0	1.1	1.74	4.3	3.5	197	16	12.8	1.59
22/05 17:00	0	0	0	0	0	0	0	0	0	34	0	0	0	0	0	0	1	1.35	4.2	3.3	191	15	12.9	1.78
22/05 17:30	0	0	0	0	0	2	0	0	0	28	0	0	0	0	0	0	0.9	1.32	4.3	3.2	190	13	12.8	1.90
22/05 18:00	0	0	0	0	1	5	1	0	1	45	0	0	0	0	0	0	0.9	1.41	3.5	3.1	194	18	12.8	1.98
22/05 18:30	0	0	0	0	1	1	0	0	4	89	0	0	0	0	0	0	0.8	1.13	3.1	3.1	197	21	12.8	2.06
22/05 19:00	1	6	1	1	7	0	0	0	10	166	9	0	0	0	0	0	0.8	1.06	3.0	3.1	201	17	12.8	2.14
22/05 19:30	5	15	2	2	16	0	0	0	21	196	313	0	0	0	0	0	0.8	1.11	10.0	3.1	200	36	12.8	2.17
22/05 20:00	9	37	4	2	32	0	0	0	33	228	470	0	0	0	0	0	0.7	1.03	2.6	3.1	215	29	12.8	2.19
22/05 20:30	6	26	3	5	37	10	17	0	24	189	423	181	0	0	0	0	0.7	1.04	10.5	3.3	194	35	12.7	2.13
22/05 21:00	7	19	3	4	25	46	26	0	13	144	338	397	0	0	0	0	0.7	1.04	10.5	3.3	190	31	12.8	2.04
22/05 21:30	2	6	1	3	11	27	13	0	5	87	223	311	0	0	0	0	0.7	1.09	10.0	3.7	188	24	12.8	1.92
22/05 22:00	1	4	0	1	5	12	6	0	2	69	154	111	0	0	0	0	0.7	1.34	10.5	4	188	18	12.8	1.82

	SCOUR MONITOR 1 - UPPER								SCOUR MONITOR 2 - LOWER								BOSCOMBE BUOY WAVES							B'mth
	Pulses Per Minute								Pulses Per Minute								Hs	H_{max}	Tp	Tz	Dir	Spr	Tmp	WL
Date & Time	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Ch8	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Ch8	(m)	(m)	(s)	(s)	(°)	(°)	(°C)	(mCD)
22/05 22:30	0	1	0	0	2	2	2	0	1	83	120	2	0	0	0	0	0.8	1.2	10.0	4.1	191	17	12.7	1.80
22/05 23:00	2	3	1	1	6	26	9	0	4	114	163	0	0	0	0	0	0.8	1.15	5.9	4	191	16	12.7	1.87
22/05 23:30	1	5	1	3	11	38	13	0	6	109	231	0	0	0	0	0	0.9	1.17	5.9	4.1	193	19	12.7	1.90
23/05 00:00	0	1	0	1	3	7	4	0	3	78	175	0	0	0	0	0	0.8	1.3	6.7	4.3	190	15	12.7	1.87
23/05 00:30	0	2	0	1	4	2	1	0	2	72	122	0	0	0	0	0	0.8	1.1	5.9	4.2	190	19	12.8	1.72
23/05 01:00	0	0	0	0	1	1	0	0	0	18	21	0	0	0	0	0	0.8	0.98	6.3	4.2	190	14	12.7	1.45
23/05 01:30	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0.8	1	7.1	4.3	191	11	12.8	1.14
23/05 02:00	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0.7	0.95	6.7	4	197	12	12.7	0.88
23/05 02:30	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0.7	0.98	7.1	3.9	196	10	12.7	0.71
23/05 03:00	0	0	0	0	0	0	0	0	0	13	0	0	0	0	0	0	0.7	0.94	5.9	3.7	187	12	12.7	0.69
23/05 03:30	0	0	0	0	0	0	0	0	0	86	0	0	0	0	0	0	0.7	1.26	6.3	3.5	197	12	12.7	0.81
23/05 04:00	0	0	0	0	0	0	0	0	0	62	0	0	0	0	0	0	0.8	1.06	5.6	3.4	197	13	12.6	1.07
23/05 04:30	0	0	0	0	0	0	0	0	0	67	0	0	0	0	0	0	0.7	1.27	4.8	3.4	194	18	12.7	1.37
23/05 05:00	0	0	0	0	0	0	0	0	0	22	0	0	0	0	0	0	0.7	1.13	5.3	3.4	194	15	12.7	1.64
23/05 05:30	0	0	0	0	0	0	0	0	0	29	2	0	0	0	0	0	0.7	0.96	5.3	3.2	191	16	12.7	1.78
23/05 06:00	0	0	0	0	0	0	0	0	0	19	3	0	0	0	0	0	0.6	0.8	5.0	3.1	180	16	12.7	1.85
23/05 06:30	0	0	0	0	0	0	0	0	0	6	5	0	0	0	0	0	0.6	0.75	4.5	3.1	186	24	12.7	1.90
23/05 07:00	0	0	0	0	0	1	0	0	0	41	11	0	0	0	0	0	0.5	0.8	4.8	3.1	186	20	12.7	1.96
23/05 07:30	0	0	0	0	0	0	0	0	0	41	9	0	0	0	0	0	0.6	0.84	5.3	3	193	19	12.6	2.01
23/05 08:00	0	0	0	0	0	0	0	0	0	44	68	0	0	0	0	0	0.6	0.76	5.0	3	193	21	12.6	2.04
23/05 08:30	0	0	0	0	0	0	1	0	1	71	155	0	0	0	0	0	0.6	0.85	5.6	3.1	196	18	12.6	2.03
23/05 09:00	0	1	0	0	1	0	1	0	1	74	156	0	0	0	0	0	0.6	1.07	5.9	3.1	187	21	12.6	1.97
23/05 09:30	0	0	0	0	0	0	0	0	0	48	93	0	0	0	0	0	0.6	1.05	7.1	3.3	197	19	12.6	1.85
23/05 10:00	0	0	0	0	0	0	0	0	0	60	47	0	0	0	0	0	0.7	1.03	5.9	3.5	187	18	12.7	1.70
23/05 10:30	0	0	0	0	0	0	0	0	0	57	9	0	0	0	0	0	0.7	1.25	7.7	3.5	188	15	12.7	1.61
23/05 11:00	0	0	0	0	0	0	0	0	0	57	7	0	0	0	0	0	0.8	1.28	6.3	3.6	184	18	12.7	1.62
23/05 11:30	0	0	0	0	0	0	0	0	0	68	19	0	0	0	0	0	0.8	1.4	3.3	3.5	198	18	12.7	1.70
23/05 12:00	0	0	0	0	0	0	1	0	1	72	32	0	0	0	0	0	0.8	1.4	6.3	3.7	194	15	12.8	1.73
23/05 12:30	0	0	0	0	0	0	0	0	0	74	22	0	0	0	0	0	0.9	1.42	3.6	3.7	201	24	12.8	1.69
23/05 13:00	0	0	0	0	0	0	0	0	0	102	9	0	0	0	0	0	0.9	1.3	4.0	3.7	196	28	12.8	1.51
23/05 13:30	0	0	0	0	0	0	0	0	0	94	0	0	0	0	0	0	0.9	1.47	3.5	3.6	208	29	12.8	1.21
23/05 14:00	0	0	0	0	0	0	0	0	0	104	0	0	0	0	0	0	0.9	1.41	4.0	3.6	197	23	12.9	0.90
23/05 14:30	0	0	0	0	0	0	0	0	0	138	0	0	0	0	0	0	0.9	1.56	3.9	3.4	205	23	12.9	0.67
23/05 15:00	0	0	0	0	0	0	0	0	0	101	0	0	0	0	0	0	0.9	1.55	4.3	3.4	188	17	12.9	0.57
23/05 15:30	0	0	0	0	0	0	0	0	0	150	0	0	0	0	0	0	1	1.45	3.7	3.4	205	19	12.9	0.62
23/05 16:00	0	0	0	0	0	0	0	0	0	131	0	0	0	0	0	0	1	1.65	5.0	3.5	198	13	12.9	0.82
23/05 16:30	0	0	0	0	0	0	0	0	0	134	0	0	0	0	0	0	1	1.55	5.0	3.4	201	15	12.9	1.13
23/05 17:00	0	0	0	0	0	0	0	0	0	138	0	0	0	0	0	0	1	1.35	4.8	3.3	203	17	12.8	1.45

	SCOUR MONITOR 1 - UPPER								SCOUR MONITOR 2 - LOWER								BOSCOMBE BUOY WAVES							B'mth
	Pulses Per Minute								Pulses Per Minute								Hs	H_{max}	Tp	Tz	Dir	Spr	Tmp	WL
Date & Time	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Ch8	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Ch8	(m)	(m)	(s)	(s)	(°)	(°)	(°C)	(mCD)
23/05 17:30	0	0	0	0	0	0	0	0	0	139	0	0	0	0	0	0	1	1.25	4.2	3.2	197	12	12.8	1.69
23/05 18:00	0	0	0	0	0	0	0	0	0	124	2	0	0	0	0	0	0.8	1.25	4.0	3	193	17	12.8	1.85
23/05 18:30	0	0	0	0	0	0	0	0	0	54	8	0	0	0	0	0	0.8	1.05	4.0	3	187	19	12.8	1.93
23/05 19:00	0	0	0	0	0	0	0	0	0	100	44	0	0	0	0	0	0.7	0.87	2.9	2.9	200	18	12.8	2.01
23/05 19:30	0	0	0	0	0	0	0	0	0	97	138	0	0	0	0	0	0.6	1.05	2.7	2.9	205	20	12.7	2.09
23/05 20:00	0	1	0	0	1	0	0	0	1	90	194	0	0	0	0	0	0.6	0.97	5.0	2.9	191	22	12.7	2.12
23/05 20:30	0	0	0	0	1	0	0	0	1	89	232	6	0	0	0	0	0.6	0.96	4.8	3	188	19	12.7	2.14
23/05 21:00	0	1	0	0	2	0	2	0	1	83	217	22	0	0	0	0	0.6	0.82	5.0	3.1	188	19	12.8	2.12
23/05 21:30	0	0	0	0	0	0	1	0	0	34	145	42	0	0	0	0	0.6	0.96	5.6	3.1	193	17	12.7	2.02
23/05 22:00	0	0	0	0	0	0	0	0	0	13	52	0	0	0	0	0	0.6	0.85	4.3	3.3	184	18	12.8	1.88
23/05 22:30	0	0	0	0	0	0	0	0	0	23	11	0	0	0	0	0	0.6	0.99	7.1	3.4	190	16	12.8	1.73
23/05 23:00	0	0	0	0	0	0	0	0	0	17	6	0	0	0	0	0	0.6	0.95	5.9	3.5	186	13	12.8	1.66
23/05 23:30	0	0	0	0	0	0	0	0	0	6	7	0	0	0	0	0	0.6	1.18	5.9	3.4	187	18	12.8	1.73
24/05 00:00	0	0	0	0	0	0	0	0	0	4	21	0	0	0	0	0	0.7	1.58	6.3	3.5	186	17	12.7	1.80
24/05 00:30	0	0	0	0	0	0	0	0	0	7	34	0	0	0	0	0	0.8	1.37	3.3	3.4	184	22	12.7	1.83
24/05 01:00	0	0	0	0	0	0	0	0	0	13	17	0	0	0	0	0	0.8	1.61	3.9	3.5	186	26	12.7	1.73
24/05 01:30	0	0	0	0	0	0	0	0	0	10	2	0	0	0	0	0	0.9	1.43	4.0	3.5	187	20	12.7	1.49
24/05 02:00	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0.9	1.76	4.3	3.6	183	17	12.7	1.16
24/05 02:30	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0.9	1.44	4.5	3.5	179	18	12.7	0.85
24/05 03:00	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0.9	1.64	4.3	3.4	176	17	12.8	0.67
24/05 03:30	0	0	0	0	0	0	0	0	0	22	0	0	0	0	0	0	0.9	1.7	4.2	3.4	180	17	12.8	0.61
24/05 04:00	0	0	0	0	0	0	0	0	0	32	0	0	0	0	0	0	1.1	2.35	4.5	3.6	183	16	12.8	0.69
24/05 04:30	0	0	0	0	0	0	0	0	0	43	0	0	0	0	0	0	1.3	2.11	4.8	3.7	190	17	12.8	0.93
24/05 05:00	0	0	0	0	0	0	0	0	0	31	0	0	0	0	0	0	1.4	2.02	4.8	3.8	194	11	12.8	1.28
24/05 05:30	0	0	0	0	0	0	0	0	0	18	0	0	0	0	0	0	1.4	2.47	4.8	3.9	197	15	12.7	1.59
24/05 06:00	0	0	0	0	0	0	0	0	0	20	14	0	0	0	0	0	1.4	2.1	4.8	3.8	193	14	12.7	1.80
24/05 06:30	0	1	0	0	1	0	1	0	1	48	95	4	0	0	0	0	1.4	2.49	5.0	3.9	194	13	12.7	1.93
24/05 07:00	0	1	0	0	2	7	0	0	3	90	160	127	0	0	0	0	1.4	2.74	4.8	3.9	186	18	12.7	2.01
24/05 07:30	3	5	1	1	10	32	19	1	13	129	296	471	0	0	0	0	1.6	2.15	5.3	4	188	13	12.7	2.10
24/05 08:00	7	20	3	3	27	100	52	7	37	210	366	541	430	74	0	0	1.5	2.64	5.6	4	190	13	12.6	2.17
24/05 08:30	12	34	6	5	49	162	92	9	44	214	402	531	450	484	0	0	1.6	2.56	5.0	4.1	191	14	12.6	2.22
24/05 09:00	20	54	8	5	70	218	131	13	47	210	386	501	495	546	198	1	1.5	2.68	5.9	4.1	193	14	12.5	2.22
24/05 09:30	17	35	6	75	68	183	99	10	33	143	224	358	389	516	321	78	1.5	2.47	5.6	4.2	190	17	12.4	2.17
24/05 10:00	14	24	5	161	73	193	95	9	20	106	164	258	383	502	347	162	1.5	2.39	6.3	4.2	191	14	12.4	2.04
24/05 10:30	3	8	1	62	23	78	37	3	7	52	96	147	285	407	314	147	1.5	2.4	5.9	4.2	186	14	12.4	1.87
24/05 11:00	1	2	0	22	8	22	8	1	2	34	27	47	136	244	266	129	1.5	2.46	6.3	4.3	184	15	12.5	1.72
24/05 11:30	0	0	0	2	0	4	1	0	0	44	9	30	79	133	200	14	1.5	2.41	6.7	4.4	183	11	12.5	1.68
24/05 12:00	0	1	0	15	3	11	7	1	1	61	24	66	119	260	266	0	1.4	2.27	6.7	4.2	187	14	12.5	1.75

	SCOUR MONITOR 1 - UPPER								SCOUR MONITOR 2 - LOWER								BOSCOMBE BUOY WAVES							B'mth
	Pulses Per Minute								Pulses Per Minute								Hs	H_{max}	Tp	Tz	Dir	Spr	Tmp	WL
Date & Time	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Ch8	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Ch8	(m)	(m)	(s)	(s)	(°)	(°)	(°C)	(mCD)
24/05 12:30	0	1	0	12	3	12	4	1	1	43	31	75	138	232	180	0	1.4	2.05	6.3	4.3	186	20	12.5	1.80
24/05 13:00	0	2	0	14	3	16	4	1	1	44	37	87	160	253	155	0	1.4	2.22	6.3	4.4	184	13	12.6	1.81
24/05 13:30	0	1	0	14	7	17	14	1	1	20	27	65	130	203	122	0	1.4	1.9	6.7	4.4	187	13	12.7	1.68
24/05 14:00	0	0	0	2	0	1	1	0	0	42	4	10	30	55	2	0	1.3	1.95	5.9	4.3	181	15	12.7	1.40
24/05 14:30	0	0	0	0	0	0	0	0	0	31	1	0	1	2	0	0	1.3	1.84	7.1	4.2	193	12	12.7	1.06
24/05 15:00	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	1.3	1.87	5.9	4	181	14	12.8	0.77
24/05 15:30	0	0	0	0	0	0	0	0	0	17	0	0	0	0	0	0	1.2	2.05	6.7	4	188	13	12.8	0.62
24/05 16:00	0	0	0	0	0	0	0	0	0	22	1	0	0	0	0	0	1.2	1.66	6.3	4	190	16	12.8	0.60
24/05 16:30	0	0	0	0	0	0	0	0	0	8	1	0	0	0	0	0	1.3	1.88	6.3	3.9	193	12	12.8	0.76
24/05 17:00	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	1.3	1.93	5.9	3.9	191	14	12.8	1.04
24/05 17:30	0	0	0	0	0	0	0	0	0	17	0	0	0	0	0	0	1.2	1.63	5.3	3.7	184	21	12.8	1.38
24/05 18:00	0	0	0	0	0	0	0	0	0	14	2	8	24	25	0	0	1.1	1.47	5.0	3.7	180	24	12.8	1.66
24/05 18:30	0	0	0	3	0	4	1	0	0	15	15	43	106	46	0	0	1.1	1.27	5.0	3.6	186	19	12.8	1.84
24/05 19:00	0	2	0	15	4	21	5	0	1	27	50	100	212	169	0	0	1	1.4	4.5	3.4	177	19	12.7	1.93
24/05 19:30	2	2	0	29	7	29	9	2	2	38	63	119	290	294	0	0	0.8	1.14	5.3	3.4	177	23	12.7	1.99
24/05 20:00	2	7	2	58	17	58	24	2	4	44	97	154	373	532	128	0	0.8	1.06	4.8	3.5	174	24	12.7	2.06
24/05 20:30	5	12	2	136	34	126	53	4	9	50	82	159	371	546	536	17	0.8	1.25	5.0	3.5	179	21	12.7	2.12
24/05 21:00	10	28	7	228	73	235	132	7	16	65	80	196	433	546	546	233	0.8	1.29	14.3	3.8	191	28	12.7	2.16
24/05 21:30	13	31	7	296	96	286	168	9	17	69	76	192	397	546	546	284	0.8	1.08	14.3	3.8	187	29	12.7	2.14
24/05 22:00	12	26	6	247	61	233	142	8	12	52	88	160	383	546	546	265	0.8	1.19	14.3	4.1	190	31	12.7	2.06
24/05 22:30	4	12	3	137	34	105	58	4	6	42	63	105	250	408	441	249	0.9	1.28	10.0	4.4	197	17	12.7	1.93
24/05 23:00	2	4	1	52	11	43	23	1	2	23	34	76	163	320	376	223	0.9	1.35	11.1	4.3	193	17	12.7	1.74
24/05 23:30	0	1	0	26	4	27	10	1	1	15	17	45	89	232	277	43	0.9	1.21	13.3	4.3	193	17	12.7	1.62
25/05 00:00	0	1	0	9	2	13	4	0	1	21	23	52	120	182	3	0	0.9	1.3	10.0	4.5	194	12	12.7	1.63
25/05 00:30	0	2	0	16	5	25	6	1	2	10	41	64	193	92	0	0	1	1.17	6.7	4.7	187	14	12.7	1.71
25/05 01:00	1	2	0	30	10	27	11	1	2	20	67	108	190	0	0	0	0.8	1.44	14.3	4.7	196	31	12.7	1.75
25/05 01:30	1	2	0	23	7	31	14	1	3	34	90	173	22	0	0	0	0.8	1.19	7.1	4.7	191	15	12.7	1.71
25/05 02:00	0	0	0	2	1	2	0	0	0	8	30	49	1	0	0	0	0.8	1.02	9.1	4.6	196	14	12.7	1.52
25/05 02:30	0	0	0	0	0	0	0	0	0	0	1	2	0	0	0	0	0.7	1.01	15.4	4.3	196	22	12.7	1.20
25/05 03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	0.91	6.7	3.8	188	17	12.7	0.86
25/05 03:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	1.02	8.3	3.7	198	11	12.7	0.58
25/05 04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	0.91	8.3	3.3	188	16	12.7	0.44
25/05 04:30	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0.6	0.78	4.3	3.2	172	17	12.7	0.47
25/05 05:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	0.93	5.0	3.3	183	19	12.7	0.67
25/05 05:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	0.94	4.3	3.4	188	15	12.7	0.99
25/05 06:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	0.83	3.9	3.3	184	19	12.7	1.34
25/05 06:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	0.89	3.9	3.2	188	17	12.7	1.59
25/05 07:00	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.6	0.76	10.5	3.2	193	23	12.7	1.73

	SCOUR MONITOR 1 - UPPER								SCOUR MONITOR 2 - LOWER								BOSCOMBE BUOY WAVES							B'mth
	Pulses Per Minute								Pulses Per Minute								Hs	H_{max}	Tp	Tz	Dir	Spr	Tmp	WL
Date & Time	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Ch8	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Ch8	(m)	(m)	(s)	(s)	(°)	(°)	(°C)	(mCD)
25/05 07:30	0	0	0	0	0	0	0	0	0	1	8	0	0	0	0	0	0.5	0.6	11.1	3.1	196	26	12.7	1.82
25/05 08:00	0	0	0	0	0	0	0	0	0	3	19	0	0	0	0	0	0.5	0.57	10.5	3.3	196	30	12.7	1.90
25/05 08:30	0	0	0	0	0	1	0	0	0	15	39	0	0	0	0	0	0.4	0.56	10.0	3.3	197	22	12.6	1.98
25/05 09:00	0	0	0	7	1	6	4	0	1	31	73	0	0	0	0	0	0.4	0.65	10.0	3.4	190	36	12.7	2.05
25/05 09:30	0	1	0	21	4	11	3	0	2	60	151	74	1	0	0	0	0.4	0.69	9.1	3.7	194	21	12.7	2.07
25/05 10:00	0	1	0	22	4	1	2	0	2	44	128	134	0	0	0	0	0.4	0.71	11.1	3.7	188	32	12.8	2.05
25/05 10:30	0	1	0	15	3	1	2	0	1	38	103	108	1	0	0	0	0.5	0.75	10.5	4.1	188	26	12.9	1.96
25/05 11:00	0	0	0	5	1	0	0	0	1	20	74	35	0	0	0	0	0.5	0.77	11.1	4.6	188	26	13	1.82
25/05 11:30	0	0	0	0	0	0	0	0	0	5	25	5	0	0	0	0	0.5	0.77	10.0	4.7	190	15	13.2	1.65
25/05 12:00	0	0	0	0	0	0	0	0	0	1	12	0	0	0	0	0	0.5	0.75	11.8	4.9	193	18	13.3	1.57
25/05 12:30	0	0	0	0	0	0	0	0	0	2	14	0	0	0	0	0	0.5	0.82	11.8	5	193	14	13.3	1.64
25/05 13:00	0	0	0	2	1	0	0	0	1	6	33	0	0	0	0	0	0.5	0.76	11.8	5	193	14	13.3	1.75
25/05 13:30	0	0	0	2	0	0	0	0	0	11	47	0	0	0	0	0	0.6	0.8	8.3	5.1	193	15	13.3	1.77
25/05 14:00	0	0	0	4	1	0	0	0	0	8	23	0	0	0	0	0	0.6	0.78	8.3	4.9	197	12	13.3	1.72
25/05 14:30	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0.5	0.66	9.1	4.9	191	14	13.2	1.51
25/05 15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.63	7.7	4.9	196	18	13.1	1.20
25/05 15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.46	7.7	4.8	197	11	13.1	0.86
25/05 16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.57	8.3	4.6	191	12	13.3	0.64
25/05 16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.53	8.3	3.8	194	12	12.9	0.52
25/05 17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.44	5.3	3.8	188	18	12.8	0.59
25/05 17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.54	7.1	3.7	194	15	12.8	0.83
25/05 18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.54	5.9	3.4	190	18	12.8	1.18
25/05 18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.5	4.8	3.3	186	19	12.9	1.53
25/05 19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.49	10.0	3.3	193	19	12.9	1.76
25/05 19:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.46	10.5	3.3	197	30	12.9	1.89
25/05 20:00	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0.3	0.54	10.0	3	198	34	12.9	1.96
25/05 20:30	0	0	0	0	0	0	0	0	0	10	1	0	0	0	0	0	0.3	0.59	10.0	3	193	31	12.9	2.04
25/05 21:00	0	0	0	1	0	0	0	0	1	20	2	0	0	0	0	0	0.3	0.46	9.1	3.1	193	27	13.2	2.11
25/05 21:30	0	1	0	4	0	0	0	0	3	47	9	0	0	0	0	0	0.4	0.52	8.3	3.3	193	23	13.1	2.15
25/05 22:00	0	0	0	1	1	0	0	0	6	64	20	0	0	0	0	0	0.3	0.62	7.1	3.4	190	19	13.1	2.17
25/05 22:30	1	2	0	0	0	0	0	0	6	64	34	0	0	0	0	0	0.4	0.51	9.1	3.7	188	32	13.1	2.11
25/05 23:00	0	0	0	0	0	0	0	0	2	38	21	0	0	0	0	0	0.4	0.61	9.1	3.7	188	33	13	2.00
25/05 23:30	0	0	0	0	0	0	0	0	0	16	4	0	0	0	0	0	0.4	0.65	7.7	3.5	188	21	13.1	1.84
26/05 00:00	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0.5	0.79	10.0	3.6	191	21	13.2	1.67
26/05 00:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.79	9.1	3.6	188	18	12.9	1.61
26/05 01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	0.67	10.0	3.3	194	19	12.9	1.70
26/05 01:30	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0.5	0.69	10.5	3.3	198	20	13.1	1.79
26/05 02:00	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0.5	0.63	7.7	3.5	193	22	13.1	1.78

	SCOUR MONITOR 1 - UPPER								SCOUR MONITOR 2 - LOWER								BOSCOMBE BUOY WAVES							B'mth
	Pulses Per Minute								Pulses Per Minute								Hs	H_{max}	Tp	Tz	Dir	Spr	Tmp	WL
Date & Time	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Ch8	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Ch8	(m)	(m)	(s)	(s)	(°)	(°)	(°C)	(mCD)
26/05 02:30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.5	0.61	7.7	3.6	196	14	13	1.66
26/05 03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.57	8.3	3.5	194	14	12.8	1.39
26/05 03:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.57	9.1	3.5	194	12	12.8	1.02
26/05 04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.47	8.3	3.4	196	11	12.8	0.70
26/05 04:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.47	8.3	3.5	196	11	12.8	0.49
26/05 05:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.45	7.7	3.6	188	15	12.8	0.41
26/05 05:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.44	7.7	3.5	193	15	12.8	0.53
26/05 06:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.52	7.1	3.3	190	14	12.8	0.78
26/05 06:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.51	10.5	2.9	193	19	12.8	1.12
26/05 07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.59	3.1	2.8	163	20	12.9	1.44
26/05 07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.53	2.7	2.7	181	15	13	1.64
26/05 08:00	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.49	3.2	2.7	163	16	12.9	1.76
26/05 08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.5	3.2	2.7	159	16	12.9	1.82
26/05 09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.53	2.1	2.6	184	17	13.1	1.89
26/05 09:30	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0.4	0.5	8.3	2.8	194	21	13.3	1.99
26/05 10:00	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0.4	0.47	7.7	2.7	194	17	13.2	2.01
26/05 10:30	0	0	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0.4	0.47	7.7	2.9	193	17	13.2	2.03
26/05 11:00	0	0	0	0	0	0	0	0	0	10	0	0	0	0	0	0	0.3	0.54	8.3	3.1	193	24	13.2	1.99
26/05 11:30	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0.4	0.55	8.3	3	188	25	13.1	1.88
26/05 12:00	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.4	0.61	9.1	3.1	186	23	13.1	1.72
26/05 12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.56	8.3	3.5	187	18	13.2	1.59
26/05 13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.6	9.1	4.2	190	12	13.2	1.60
26/05 13:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.6	8.3	4.1	188	14	13.2	1.71
26/05 14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.67	9.1	3.9	193	18	13.3	1.75
26/05 14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.66	8.3	3.9	191	13	13.4	1.79
26/05 15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.56	8.3	3.7	193	19	13.7	1.66
26/05 15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.62	8.3	3.5	196	14	13.6	1.39
26/05 16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.58	8.3	3.4	197	10	13.6	1.08
26/05 16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.49	8.3	3.1	191	13	13.6	0.79
26/05 17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.51	7.7	3.2	193	13	13.5	0.64
26/05 17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.46	8.3	3	194	17	13.3	0.62
26/05 18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.6	6.7	2.9	193	15	13.1	0.77
26/05 18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.56	10.5	2.9	193	15	13	1.04
26/05 19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.51	10.0	2.8	197	20	13	1.36
26/05 19:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.43	10.0	2.9	193	16	12.9	1.64
26/05 20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.38	9.1	3	197	18	12.9	1.79
26/05 20:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.44	10.0	3	200	29	13.1	1.87
26/05 21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.35	9.1	3.2	194	22	13	1.96

	SCOUR MONITOR 1 - UPPER								SCOUR MONITOR 2 - LOWER								BOSCOMBE BUOY WAVES							B'mth
	Pulses Per Minute								Pulses Per Minute								Hs	H_{max}	Tp	Tz	Dir	Spr	Tmp	WL
Date & Time	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Ch8	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Ch8	(m)	(m)	(s)	(s)	(°)	(°)	(°C)	(mCD)
26/05 21:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.43	9.1	3.4	193	27	13.1	2.03
26/05 22:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.47	8.3	3.9	196	18	13	2.09
26/05 22:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.38	7.7	4.4	194	15	12.9	2.11
26/05 23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.42	7.1	4.5	193	16	13.4	2.09
26/05 23:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.53	8.3	4.8	193	19	13.3	2.02
27/05 00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.53	10.0	5.1	188	28	13.6	1.91
27/05 00:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.58	9.1	5.6	193	23	13.6	1.76
27/05 01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.62	8.3	5.9	190	15	13.6	1.70
27/05 01:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.55	9.1	5.7	193	19	13.6	1.73
27/05 02:00	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.66	10.0	5.9	196	25	13.3	1.83
27/05 02:30	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.68	10.5	5.8	193	19	13.3	1.86
27/05 03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.55	9.1	5.7	194	19	13.2	1.83
27/05 03:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.5	6.7	5.5	187	15	13	1.62
27/05 04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.5	9.1	5.6	193	14	12.9	1.30
27/05 04:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.45	8.3	5.4	193	13	12.9	0.97
27/05 05:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.46	7.1	5.1	194	13	12.9	0.69
27/05 05:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.46	7.7	3.4	191	15	13	0.55
27/05 06:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.38	8.3	3	194	13	13	0.55
27/05 06:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.43	2.6	2.9	125	14	13.1	0.70
27/05 07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.5	2.6	2.9	128	14	13	0.97
27/05 07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.41	10.0	2.9	196	19	13	1.31
27/05 08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.38	8.3	2.9	190	16	13.1	1.59
27/05 08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.62	9.1	2.9	193	22	13.2	1.75
27/05 09:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.85	3.5	3.1	141	21	13.4	1.81
27/05 09:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.8	4.2	3.3	136	15	13.4	1.86
27/05 10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.79	4.3	3.3	127	17	13.3	1.95
27/05 10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.74	4.3	3.2	132	19	13.3	2.01
27/05 11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.65	4.2	3.2	136	23	13.4	2.03
27/05 11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.7	4.2	3.3	134	24	13.4	2.02
27/05 12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.63	4.5	3.4	129	21	13.5	1.98
27/05 12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.58	4.2	3.5	148	20	13.7	1.89
27/05 13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.7	4.2	3.7	152	27	13.9	1.78
27/05 13:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.59	9.1	3.9	194	15	14	1.73
27/05 14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.75	9.1	3.8	196	14	14.2	1.81
27/05 14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.56	10.0	3.9	188	21	14.2	1.96
27/05 15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.59	8.3	3.8	197	16	14.5	2.02
27/05 15:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.55	11.1	3.6	198	34	14.8	2.00
27/05 16:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.41	11.1	3.6	198	34	14.8	1.87

	SCOUR MONITOR 1 - UPPER								SCOUR MONITOR 2 - LOWER								BOSCOMBE BUOY WAVES							B'mth
	Pulses Per Minute								Pulses Per Minute								Hs	H_{max}	Tp	Tz	Dir	Spr	Tmp	WL
Date & Time	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Ch8	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Ch8	(m)	(m)	(s)	(s)	(°)	(°)	(°C)	(mCD)
27/05 16:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	7.7	4.3	194	13	14.6	1.58
27/05 17:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.41	7.7	4	194	13	13.6	1.28
27/05 17:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.38	8.3	3.8	198	10	13.8	1.04
27/05 18:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.4	10.5	3.6	190	15	14.2	0.90
27/05 18:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.37	6.7	3.6	186	17	14	0.91
27/05 19:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.42	7.1	3.5	193	14	13.8	1.07
27/05 19:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.4	3.5	3.3	166	21	13.6	1.32
27/05 20:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.41	3.3	3.3	166	18	13.3	1.57
27/05 20:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.39	3.1	3.3	169	21	13.9	1.79
27/05 21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.42	3.6	3.1	167	23	14.1	1.93
27/05 21:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.36	3.5	3.3	162	21	14	2.00
27/05 22:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.35	3.5	3.4	174	17	14.2	2.05
27/05 22:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.35	8.3	3.5	190	27	14.2	2.11
27/05 23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.34	7.7	4	193	26	14	2.14
27/05 23:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.31	6.3	4.1	181	29	13.9	2.14
28/05 00:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.36	8.3	4	191	37	14.2	2.11
28/05 00:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.2	0.43	8.3	3.8	191	38	14.2	2.07
28/05 01:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.3	0.6	9.1	2.9	186	41	14	1.97
28/05 01:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.83	2.6	2.5	225	17	13.7	1.85
28/05 02:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	0.89	2.9	2.8	221	17	13.6	1.80
28/05 02:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	1.1	3.2	2.9	218	14	13.5	1.84
28/05 03:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	0.93	3.3	3	208	16	13.5	1.88
28/05 03:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	0.9	3.6	3.1	201	15	13.4	1.88
28/05 04:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	0.91	3.5	3.2	203	24	13.4	1.82
28/05 04:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	1.02	4.8	3.3	197	15	13.3	1.60
28/05 05:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	0.94	4.8	3.2	193	16	13.3	1.29
28/05 05:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	1.16	4.8	3.1	188	18	13.3	1.01
28/05 06:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	1.21	3.7	3.1	186	20	13.3	0.80
28/05 06:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.8	1.3	4.3	3.3	193	17	13.3	0.67
28/05 07:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	1.4	5.6	3.4	198	13	13.3	0.71
28/05 07:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.44	5.6	3.6	198	10	13.3	0.87
28/05 08:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.79	5.3	3.5	201	11	13.3	1.10
28/05 08:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	1.53	5.0	3.5	201	12	13.3	1.37
28/05 09:00	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.75	4.3	3.4	198	15	13.3	1.56
28/05 09:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.4	4.5	3.4	196	16	13.4	1.67
28/05 10:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.88	3.3	3.1	203	19	13.5	1.71
28/05 10:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.41	3.6	3.2	197	15	13.4	1.74
28/05 11:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.34	3.3	3.1	203	17	13.4	1.78

	SCOUR MONITOR 1 - UPPER								SCOUR MONITOR 2 - LOWER								BOSCOMBE BUOY WAVES							B'mth
	Pulses Per Minute								Pulses Per Minute								Hs	H_{max}	Tp	Tz	Dir	Spr	Tmp	WL
Date & Time	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Ch8	Ch1	Ch2	Ch3	Ch4	Ch5	Ch6	Ch7	Ch8	(m)	(m)	(s)	(s)	(°)	(°)	(°C)	(mCD)
28/05 11:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	1.31	3.6	3.1	194	15	13.4	1.82
28/05 12:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.9	1.44	3.2	3	207	21	13.4	1.85
28/05 12:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.53	3.0	3.2	217	31	13.5	1.84
28/05 13:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.46	3.5	3.2	208	23	13.6	1.80
28/05 13:30	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.57	3.7	3.4	197	20	13.6	1.72
28/05 14:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1.76	3.5	3.5	210	17	13.6	1.66
28/05 14:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	1.69	3.6	3.6	201	21	13.6	1.67
28/05 15:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1.1	1.54	6.7	3.7	193	12	13.6	1.74
28/05 15:30	2	0	0	0	0	0	0	0	4	19	0	0	0	0	0	0	1.1	1.7	4.0	3.8	200	15	13.7	1.83
28/05 16:00	3	0	0	0	0	0	0	0	7	43	4	0	0	0	0	0	1.1	1.84	7.1	3.8	188	13	13.7	1.86
28/05 16:30	1	0	0	0	0	0	0	0	5	52	49	0	0	0	0	0	1.1	1.42	5.9	3.9	190	16	13.7	1.81
28/05 17:00	1	0	0	0	0	0	0	0	3	30	48	0	0	0	0	0	1.1	1.48	7.1	4	196	15	13.7	1.62
28/05 17:30	0	0	0	0	0	0	0	0	0	15	2	0	0	0	0	0	1	1.61	6.7	4	196	13	13.7	1.36
28/05 18:00	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0.9	1.5	6.3	3.8	194	15	13.8	1.11
28/05 18:30	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0.9	1.37	5.9	3.7	193	13	13.8	0.93
28/05 19:00	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.9	1.13	6.3	3.8	200	11	13.8	0.83
28/05 19:30	0	0	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0.8	1	5.9	3.7	198	9	13.8	0.87
28/05 20:00	0	0	0	0	0	0	0	0	0	11	0	0	0	0	0	0	0.8	1.21	5.3	3.5	196	16	13.9	1.00
28/05 20:30	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0.8	1.27	5.0	3.6	196	18	13.8	1.19
28/05 21:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	1.07	4.8	3.6	188	15	13.8	1.40
28/05 21:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.7	0.96	4.2	3.4	190	20	13.9	1.55
28/05 22:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.6	0.72	4.3	3.5	184	18	13.9	1.63
28/05 22:30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0.67	8.3	3.5	197	14	13.8	1.68
28/05 23:00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.4	0.61	9.1	3.9	193	14	13.8	1.72
28/05 23:30	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.4	0.66	8.3	4.3	194	10	13.7	1.75
29/05 00:00	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0.4	0.66	8.3	4.5	194	13	13.7	1.78
29/05 00:30	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0.4	0.67	8.3	4.5	194	17	13.7	1.77
29/05 01:00	0	0	0	0	0	0	0	0	0	4	0	0	0	0	0	0	0.4	0.58	5.3	4.8	183	19	13.6	1.75
29/05 01:30	0	0	0	0	0	0	0	0	1	7	0	0	0	0	0	0	0.4	0.75	8.3	5	191	16	13.6	1.71
29/05 02:00	0	0	0	0	0	0	0	0	1	6	0	0	0	0	0	0	0.5	0.85	8.3	5.2	187	15	13.7	1.64
29/05 02:30	0	0	0	0	0	0	0	0	1	5	0	0	0	0	0	0	0.5	0.84	10.0	5.5	190	14	13.7	1.58
29/05 03:00	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0.5	0.8	9.1	5.6	191	15	13.6	1.54
Elevation (mACD)	2.95	2.90	2.86	2.81	2.77	2.72	2.68	2.63	2.58	2.48	2.38	2.28	2.18	2.08	1.98	1.88								
Total No. pulses	254	574	78	1838	1017	2989	2135	112	704	11281	11317	9463	7394	8395	5770	1845								