Southeast Strategic Regional Coastal Monitoring Programme

ANNUAL SURVEY REPORT

2010

Dover Harbour to Beachy Head

AR 61
30 September 2010
Cover photograph: View west across Telscombe treatment works, East Sussex, July 2010. Brighton Marina is just visible in the middle ground, Brighton seafront in the sunshine.

U. Dornbusch
Document Title: **Annual Report 2010**

Reference: **AR 61**

Status: **Final**

Date: **September 2010**

Project Name: **Strategic Regional Coastal Monitoring**

Management Units: **4cMU01 – 4cMU30**

Author: **A. Bear**

Checked By: **J. Clarke**

Approved By: **T. Edwards**

<table>
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<td>T. Edwards</td>
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<td>01</td>
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<td>T. Edwards</td>
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Contents

List of Figures ................................................................. iii
List of Tables ................................................................. iii

1.0 Introduction ................................................................................................................................. 1
2.0 Condition of Management Units ................................................................................................. 4
3.0 Profile Change Summary ............................................................................................................. 9
4.0 Hydrodynamic Data ..................................................................................................................... 104
5.0 Topographic Analysis .................................................................................................................. 121
  5.1 Folkestone and Dover .................................................................................................................. 121
  5.1.1 MU02 – Dover Harbour (4c00001 – 4c00060).......................................................... 121
  5.1.2 MU06 – The Warren (4c00097 – 4c00130)............................................................... 122
  5.1.3 MU08 – Folkestone (4c00150 – 4c00264)................................................................ 123
  5.1.4 MU09 – Sandgate (4c00266 – 4c00346) .................................................................... 124
  5.2 Romney Marshes ....................................................................................................................... 125
  5.2.1 MU10 – Hythe Ranges (4c00348 – 4c00402).......................................................... 125
  5.2.2 MU11 – Dymchurch (4c00459 – 4c00625) .............................................................. 125
  5.2.3 MU12 – Romney Sands (4c00628 – 4c00770) .......................................................... 126
  5.2.4 MU13 – Dungeness Power Station (4c00773 – 4c00797)...................................... 127
  5.3 Camber Sands .......................................................................................................................... 128
  5.3.1 MU14 – Lydd Ranges (4c00801 – 4c00948).......................................................... 128
  5.3.2 MU15 – Jury’s Gap (4c00949 – 4c00998).................................................................. 128
  5.3.3 MU16 – Camber Sands (4c01005 – 4c01057)......................................................... 128
  5.4 Pett Levels ................................................................................................................................ 128
  5.4.1 MU18 – Winchelsea Beach (4c01061 – 4c01263) .................................................. 128
  5.5 Fairlight ..................................................................................................................................... 129
  5.5.1 MU19 – Fairlight Cove East ......................................................................................... 129
  5.5.2 MU20 – Fairlight Cove Central (4c01275 – 4c01283)............................................. 129
  5.5.3 MU21 – Fairlight Cove West (4c01288) ..................................................................... 129
  5.5.4 MU23 – Fairlight Glen (4c01302 – 4c01324).......................................................... 129
  5.6 Hastings ..................................................................................................................................... 130
  5.6.1 MU24 – Hastings (4c01349 – 4c01455) ................................................................... 130
  5.6.2 MU25 – Bulverhythe (4c01459 – 4c01522) .............................................................. 130
  5.7 Bexhill ....................................................................................................................................... 132
  5.7.1 MU26 – Bexhill (4c01524 – 4c01667) ....................................................................... 132
  5.8 Pevensey Bay ............................................................................................................................. 133
  5.8.1 MU27 – Pevensey (4c01672 – 4c01722) ...................................................................... 133
  5.9 Eastbourne ............................................................................................................................... 134
  5.9.1 MU28 – Sovereign Harbour (4c01723 – 4c01735) .................................................. 134
  5.9.2 MU29 – Eastbourne (4c01737 – 4c01857) ............................................................... 134
List of Figures

Figure 1.1: Definition of Cross Sectional Area 1
Figure 1.2: Management Unit Overview Map (MU01 – MU30) 2
Figure 2.1: Actual Change Summary – Sandwich to Copt Point 5
Figure 2.2: Actual Change Summary – Folkestone to Romney Sands 6
Figure 2.3: Actual Change Summary – Romney Sands to Fairlight Glen 7
Figure 2.4: Actual Change Summary – Fairlight Glen to Eastbourne 8
Plate 1 (1-94): Profile Change Summary Diagrams 10-103
Figure 4.1: Percentage of occurrence of Direction vs. Hs for April 2009 to March 2010 106
Figure 4.2: Percentage of occurrence of Direction vs. Hs for July 2003 to March 2010 106
Figure 4.3: Percentage of occurrence of Hs, Tp, Tz & Direction (April 2009 - March 2010) 200
Figure 4.4: Hs at Pevensey Bay April 2009 to March 2010 107
Figure 4.5: Storms at Pevensey Bay from April 2009 to March 2010 108
Figure 4.6: Percentage of occurrence of Direction vs. Hs for April 2009 to March 2010 112
Figure 4.7: Percentage of occurrence of Direction vs. Hs for July 2003 to March 2010 112
Figure 4.8: Percentage of occurrence of Hs, Tp, Tz & Direction (April 2009 - March 2010) 113
Figure 4.9: Hs at Folkestone April 2009 to March 2010 114
Figure 4.10: Storms at Folkestone from April 2009 to March 2010 115
Figure 4.11: Percentage of occurrence of Direction vs. Hs for August 2008 to March 2010 117
Figure 4.12: Percentage of occurrence of Hs, Tp, Tz & Direction (April 2009 - March 2010) 118
Figure 4.13: Hs at Rye Bay April 2009 to March 2010 119
Figure 4.14: Storms at Rye Bay from April 2009 to March 2010 120
Figure 5.1: Profile 4c00056 121
Figure 5.2: Profile 4c00099 122
Figure 5.3: Profile 4c00198 124
Figure 5.4: Profile 4c00544 126
Figure 5.5: Profile 4c00734 127
Figure 5.6: Profile 4c01382 130
Figure 5.7: Profile 4c01487 131
Figure 5.8: Profile 4c01591 132
Figure 5.9: Profile 4c01715 133
Figure 5.10: Profile 4c01753 135

List of Tables

Table 2.1: Management Unit Beach Change Summary (Spring 2009 – Spring 2010) 4
1.0 Introduction

The analysis within this annual report provides an overview of beach performance and wave and tidal measurements for coastal cell 4c (Dover to Beachy Head), using data collected over the last year from the strategic regional coastal monitoring programme. Topographic surveys are conducted at all viable sites using land based RTK GPS in the spring, summer and autumn of each year, covering pre-determined designated profiles at intervals along the coast. This report looks specifically at the difference between the latest survey set, spring 2010, and the comparable data from spring 2009.

All profile data was imported into SANDS® for analysis. This enables beach cross sectional areas (CSA) to be calculated as an indicator of beach quantity above and seaward of a master profile (Figure 1.1). Where available, seawalls are located spatially using a combination of design schematics and a sea defence survey conducted in 2003. The vertical level of master profiles are set close to the beach toe level or mean low water, whichever is deemed most appropriate. In some areas, clay levels have also been established using the results from trial holes dug into the beach. These have been incorporated to produce a more accurate master profile that calculates the actual beach area.

Data is presented at a number of scales, from an overview of the average change in each management unit, to changes and trends for profiles that have exhibited a significant change. The topographic analysis section of the report highlights notable changes, and areas for concern, for each of the management units. While this provides an accurate portrayal of current beach conditions and changes over the preceding year it should be stressed that these are only short-term trends. In order to view the results in a meaningful light, they should be compared to the full data set for each location. To put these into context, total change is also shown from the baseline survey (2003/2004) to the most recent spring survey (2010).

Those areas that are designated beach management plan sites (Figure 1.2) benefit from a high-resolution beach plan survey every summer. These are utilised to produce a much more comprehensive beach analysis report; as such, this report should be viewed as an interim update for those sites.
Figure 1.2: Management Unit Overview Map (MU01–MU30)
2.0 Condition of Management Units

To provide an overview of the annual change in each management unit, the average change in beach profile CSA is calculated for each unit. These averages are expressed in terms of percentage difference and actual change (m²) and are presented in Table 2.1.

Table 2.1: Management Unit Beach Change Summary (Spring 2009 - Spring 2010)

<table>
<thead>
<tr>
<th>Management Unit</th>
<th>No. of Profiles surveyed</th>
<th>Average CSA Change (%)</th>
<th>Average CSA Change (m²)</th>
</tr>
</thead>
<tbody>
<tr>
<td>MU01</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>MU02</td>
<td>13</td>
<td>1.15</td>
<td>1.46</td>
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<tr>
<td>MU03</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>MU04</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>MU05</td>
<td>N/A</td>
<td>N/A</td>
<td>N/A</td>
</tr>
<tr>
<td>MU06</td>
<td>8</td>
<td>18.63</td>
<td>2.25</td>
</tr>
<tr>
<td>MU07</td>
<td>N/A</td>
<td>N/A</td>
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</tr>
<tr>
<td>MU08</td>
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<tr>
<td>MU30</td>
<td>N/A</td>
<td>N/A</td>
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</table>

These results are also illustrated as coloured thematic maps in Figures 2.1, 2.2, 2.3 and 2.4.

Those units that demonstrate an average change of less than 5% CSA are considered to be within the possible effects of natural processes and survey error. It should be noted that the largest changes often result from units with very few profiles, where a single profile can skew the results. Although these figures can highlight a highly erosive unit, or a recent replenishment, they should be viewed with caution as, for example, it is possible to have a small highly erosive area within a unit that accretes material overall.

Caution should be given to detailed coastal examination based on these results alone as they reflect a short-term trend based on the state of the beach at snapshots in time. These figures show overall trends, but individual profiles should be examined in more detail in those areas of interest. Crucially, the significance of any results should be put in context with previous fluctuations in beach CSA since the start of the monitoring programme in 2003.
South East Strategic Regional Coastal Monitoring Programme

Annual Report 2010

Annual Change in Cross-Sectional Area (m$^2$)
(Spring 2009 - Spring 2010)

ACCRETION
> 30%
15 - 30%
5 - 15%
Less Than 5%

NO CHANGE

EROSION
5 - 15%
15 - 30%
> 30%

Management Unit Boundaries

Actual Beach Summary - Spring 2009 to Spring 2010

SECG - Fairlight Glen to Eastbourne

kilometers
3.0 Profile Change Summary

Changes along individual profiles within each management unit are summarised in a series of thematic maps on the following pages. The maps show the location of each beach profile, superimposed on aerial photography (NB the profile lines have been extended for clarity). Where possible, the annual change in Cross-Sectional Area (CSA) has been calculated from spring 2009 to spring 2010.

In order to put these changes in context, thematic maps are also included illustrating the change from the first spring survey in 2003/2004 and the most recent spring survey (2010). These help to establish whether changes in beach morphology have followed a trend, or are an anomaly that has occurred in the past year.
Annual Change in Cross-Sectional Area ($m^2$)
(Spring 2009 - Spring 2010)

- > 30%
- 15 - 30%
- 5 - 15%
- Less Than 5%
- 5 - 15%
- 15 - 30%
- > 30%

Profile Change Summary for Spring 2009 to Spring 2010 - 1 of 3
SECG - Bexhill
South East Strategic Regional Coastal Monitoring Programme

Annual Report 2010

Profile Change Summary for Spring 2004 to Spring 2010 - 1 of 1

SECG - Camber Sands

Annual Change in Cross-Sectional Area (m²)
(Spring 2004 - Spring 2010)

- > 30 %
- 15 - 30 %
- 5 - 15 %
- Less Than 5 %
- 5 - 15 %
- 15 - 30 %
- > 30 %

CSA Change (m²)
Percentage Change
Profile Name
Annual Change in Cross-Sectional Area
Management Unit Boundaries
Profile Change Summary for Spring 2003 to Spring 2010 - 2 of 5

Annual Change in Cross-Sectional Area (m²)
(Spring 2003 - Spring 2010)

<table>
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<tr>
<th>Change Type</th>
<th>Percentage Change</th>
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<td>Accretion</td>
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<td></td>
<td>15 - 30%</td>
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<td>5 - 15%</td>
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<tr>
<td>No Change</td>
<td>Less Than 5%</td>
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<tr>
<td>Erosion</td>
<td>5 - 15%</td>
</tr>
<tr>
<td></td>
<td>15 - 30%</td>
</tr>
<tr>
<td></td>
<td>&gt; 30%</td>
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</tbody>
</table>

CSA Change (m²): 4e-0001 (-7%)

Annual Change in Cross-Sectional Area

Profile Name

Management Unit Boundaries

SECG - Pevensey Bay
4.0 Hydrodynamic Data

Pevensey Bay Directional Waverider Buoy

Location
OS: 570429E  100915N
WGS84: Latitude: 50° 46.966'N Longitude: 000° 24.974'E

Water Depth
Approx. 9.8m CD

Instrument Type
Datawell Directional Waverider Buoy Mk III

Data Quality

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<th>C1 (%)</th>
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Monthly Means

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<th>Month</th>
<th>Hs</th>
<th>1.1</th>
<th>Tp</th>
<th>Tz</th>
<th>Direction</th>
<th>SST</th>
<th>No. of days</th>
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<td>April</td>
<td>0.47</td>
<td>6.2</td>
<td>3.6</td>
<td>176</td>
<td>10.2</td>
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<tr>
<td>March</td>
<td>0.72</td>
<td>5.6</td>
<td>3.6</td>
<td>180</td>
<td>12.8</td>
<td></td>
<td>31</td>
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<td>June</td>
<td>0.46</td>
<td>4.8</td>
<td>3.2</td>
<td>156</td>
<td>15.5</td>
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<td>July</td>
<td>0.74</td>
<td>5.4</td>
<td>3.5</td>
<td>207</td>
<td>18.0</td>
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<td>August</td>
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<td>3.4</td>
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<td>September</td>
<td>0.63</td>
<td>5.2</td>
<td>3.4</td>
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<td>October</td>
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<td>November</td>
<td>1.62</td>
<td>7.0</td>
<td>4.6</td>
<td>206</td>
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<td>December</td>
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<td>January</td>
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<td>3.8</td>
<td>171</td>
<td>6.4</td>
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<tr>
<td>February</td>
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<td>March</td>
<td>0.75</td>
<td>5.5</td>
<td>3.7</td>
<td>171</td>
<td>6.1</td>
<td></td>
<td>30</td>
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Tables and plots of these values, together with the minimum and maximum values and the standard deviation are available on the website.

Highest events in 2009/10

<table>
<thead>
<tr>
<th>Date/Time</th>
<th>Hs</th>
<th>Tp</th>
<th>Tz</th>
<th>Dir.</th>
<th>Water level elevation (OD)</th>
<th>Tidal stage (hours re. HW)</th>
<th>Tidal range (m)</th>
<th>Tidal surge* (m)</th>
<th>Max. surge* (m)</th>
</tr>
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<tbody>
<tr>
<td>14-Nov-2009</td>
<td>3.61</td>
<td>9.1</td>
<td>6.2</td>
<td>214</td>
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<td>4.80</td>
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<td>23-Nov-2009</td>
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<td>10.0</td>
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<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>31-Mar-2010</td>
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<td>10.0</td>
<td>6.1</td>
<td>214</td>
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<td>HW -2</td>
<td>4.04</td>
<td>0.56</td>
<td>0.64</td>
</tr>
</tbody>
</table>

* Tidal information is obtained from the nearest recording tide gauge (the National Network gauge at Newhaven). The surge shown is the residual at the time of the highest Hs. The maximum tidal surge is the largest positive surge during the storm event.
Distribution plots

The distribution of wave parameters is shown in the accompanying graphs of:

- Wave roses (Direction vs. $H_s$) for this reporting year and all data
- Percentage of occurrence of $H_s$, $T_p$, $T_z$ and Direction for this reporting year
- Monthly time series of significant wave height (the red line is the storm threshold)
- Incidence of storms during the reporting period and all previous years. Storms are defined using the Peaks-over-Threshold method. The highest $H_s$ of each storm is shown.

Summary

This reporting year was characterised by a similar frequency of storms as in previous years, spanning the winter months. However, the storms were not as severe as in the last two years. The largest recorded wave height was 3.61m $H_s$ on 14 November 2009. This particular storm was significant at many sites along the eastern Channel, including Boscombe, Milford, Rustington and Folkestone.

Acknowledgements

Tidal data were supplied by the British Oceanographic Data Centre as part of the function of the National Tidal and Sea Level Facility, hosted by the Proudman Oceanographic Laboratory and funded by DEFRA and the Natural Environment Research Council.
Figure 4.1: Percentage of occurrence of Direction vs. $H_s$ for April 2009 to March 2010 (this reporting year)

Figure 4.2: Percentage of occurrence of Direction vs. $H_s$ for July 2003 to March 2010 (all measured data)
Figure 4.3: Percentage of occurrence of Hs, Tp, Tz & Direction (April 2009 - March 2010)
Figure 4.4: Hs at Pevensey Bay April 2009 to March 2010
Figure 4.5: Storms at Pevensey Bay from April 2009 to March 2010
Folkestone Directional Waverider Buoy

Location
OS: 619265E 133907N
WGS84: Latitude: 51° 03.7563'N  Longitude: 01° 07.6714'E

Water Depth
Approx. 12.7m CD

Instrument Type
Datawell Directional Waverider Buoy Mk III

Data Quality

<table>
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<th>C1(%)</th>
<th>Sample interval</th>
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<td>98</td>
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Monthly Means

<table>
<thead>
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<th>Month</th>
<th>Hs</th>
<th>Tp</th>
<th>Tz</th>
<th>Direction</th>
<th>SST</th>
<th>No. of days</th>
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<td>(s)</td>
<td>(s)</td>
<td>(°)</td>
<td>(°C)</td>
<td></td>
</tr>
<tr>
<td>April</td>
<td>0.36</td>
<td>4.8</td>
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<td>139</td>
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Highest events in 2009/10

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<th>Tz</th>
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* Tidal information is obtained from the nearest recording tide gauge (the National Network gauge at Dover). The surge shown is the residual at the time of the highest Hₚ. The maximum tidal surge is the largest positive surge during the storm event.
Distribution plots

The distribution of wave parameters is shown in the accompanying graphs of:
- Wave roses (Direction vs. $H_s$) from April 2009 to March 2010 and all data
- Percentage of occurrence of $H_s$, $T_p$, $T_s$ and Direction from April 2009 to March 2010
- Monthly time series of significant wave height (the red line is the storm threshold)
- Incidence of storms during the reporting period and all previous years. Storms are defined using the Peaks-over-Threshold method. The highest $H_s$ of each storm is shown.

Summary

Although this reporting year was relatively uneventful compared to previous years, with only one event exceeding the 2.5m threshold, November 2009 experienced a lengthy period of moderate waves (as is reflected in the monthly wave statistics above). The highest storm of the reporting year, on 14 November, was also the largest storm along much of the eastern English Channel, including at Rustington and Boscombe.

Acknowledgements

Tidal data were supplied by the British Oceanographic Data Centre as part of the function of the National Tidal and Sea Level Facility, hosted by the Proudman Oceanographic Laboratory and funded by DEFRA and the Natural Environment Research Council.
Figure 4.6: Percentage of occurrence of direction vs. $H_s$ for April 2009 to March 2010 (this reporting year)

Figure 4.7: Percentage of occurrence of direction vs. $H_s$ for July 2003 to March 2010 (all data)
Figure 4.8: Percentage of occurrence of Hs, Tp, Tz & Direction (April 2009 - March 2010)
Figure 4.9: Hs at Folkestone April 2009 to March 2010
Figure 4.10: Storms at Folkestone from April 2009 to March 2010
Rye Bay Directional Waverider Buoy

Location
OS: 596521E 109474N
WGS84: Latitude: 50° 51.083’N  Longitude: 00° 47.433’E

Water Depth
Approx. 10m CD

Instrument Type
Datawell Directional Waverider Buoy Mk III

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Monthly Means

Rye Bay April 2009 to March 2010

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Tables and plots of these values, together with the minimum and maximum values and the standard deviation are available on the website

Highest events in 2009/10

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* Tidal information is obtained from the nearest recording tide gauge (the National Network gauge at Dover). The surge shown is the residual at the time of the highest $H_s$. The maximum tidal surge is the largest positive surge during the storm event.
Distribution plots

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- Monthly time series of significant wave height (the red line is the storm threshold)
- Incidence of storms during the reporting period and all previous years. Storms are defined using the Peaks-over-Threshold method. The highest Hs of each storm is shown.

Summary

This reporting year was dominated by a series of storms throughout November 2009, which is reflected in the high average wave height statistics (see monthly averages table above). In particular, significant wave height peaked at 4.37m on 14 November, which is the highest recorded since deployment of the buoy. This storm was significant at many sites along the eastern Channel including Folkestone, Pevensey Bay, Hayling Island, Milford and Boscombe.

Acknowledgements

Tidal data were supplied by the British Oceanographic Data Centre as part of the function of the National Tidal and Sea Level Facility, hosted by the Proudman Oceanographic Laboratory and funded by DEFRA and the Natural Environment Research Council.
Figure 4.12: Percentage of occurrence of Hs, Tp, Tz & Direction (April 2009 - March 2010)
Figure 4.13: Hs at Rye Bay April 2009 to March 2010
Figure 4.14: Storms at Rye Bay from April 2009 to March 2010
5.0 Topographic Analysis

This section describes any significant changes that have taken place in each unit, highlighting any areas of concern, and putting the results in context with previous surveys. Where appropriate, different survey plots are super-imposed to illustrate the changes described in the text.

5.1 Folkestone and Dover

5.1.1 MU02 – Dover Harbour (4c00001 – 4c00060)
There are two 1.2km long beaches to the west and east of the Western Docks, Dover. To the west of the docks, beach levels have remained relatively stable during the last reporting year (2009-2010). The greatest profile CSA change is seen at Profile 4c00060, which gained 13% (18m²); the six remaining profiles experienced gains and losses of less than 7%. In the long-term, however, notable losses in beach volume have occurred since monitoring began in 2004, particularly at the far western extent (up to 24%/62m² at Profile 4c00056, Figure 5.1). This can be attributed to the 2006/2007 winter erosion event (Sussex Annual Report, 2008), when the western pocket beach experienced a substantial loss of material, skewing the baseline trend values and leading to major losses between 2004 and 2010.

Figure 5.1: Profile 4c00056
East of the docks, there are no obvious changes in CSA within this pocket beach during the past reporting year; the greatest accretion is 13m² at Profile 4c00008, although this only amounts to 9%. The six-year trend shows a 29% (-27m²) loss at Profile 4c00011, which again has been attributed to the winter erosion event of 2006/2007. It has since remained stable, displaying negligible change (0%/0m²) during the last reporting year. Unfortunately Profile 4c00001 at the eastern extent of Dover Beach was not surveyed in spring 2010 as no beach was visible due to new road construction being completed. Historically, however, this profile has been prone to erosion displaying a marked decrease in CSA of 74% (24m²) between 2008 and 2009 and 76% (27m²) between 2004 and 2009.

5.1.2 MU06 – The Warren (4c00097 – 4c00130)
Some areas of the 3km Warren frontage are characterised by very low beach levels. This means relatively small elevation changes in beach topography can lead to large CSA percentage changes, and consequently these profiles show very dynamic CSA trends over time. To the east of this unit, for example, Profile 4c00099 gained 170% of its CSA in the last year; however, this only amounts to a gain of 1m². Examination of the profile shows that the gain has been largely to the toe of the beach, which has extended seaward by approximately 7.5m (Figure 5.2). Similarly Profile 4c00103 lost 57% of its CSA, accounting to a loss of just 2m². This same trend is apparent in the long term (2004-2010), the best example being Profile 4c00103 where CSA increased by an enormous 257%, corresponding to a gain of only 1m².

![Figure 5.2: Profile 4c00099](image)
To the west of MU06 the beach widens and hence the profiles do not appear to experience such significant CSA changes, in either the long or short term. Profiles 4c00122 and 4c00126, for example, have experienced minor gains over the past year of 7% ($10m^2$) and 6% ($4m^2$), respectively. Historically these profiles have remained relatively stable (5%/8m$^2$ and 8%/5m$^2$ CSA change between 2004-2010).

5.1.3 MU08 – Folkestone (4c00150 – 4c00264)

Due to the completion of a major coastal protection scheme in 2004, the baseline has been re-set to 2005. The frontage is now entirely dependent on the successful implementation of beach management through a sediment recycling programme, which takes place twice each year in spring and autumn. The ongoing recycling operations counter the natural transport of sediment along the Hythe to Folkestone Harbour frontage; as a result the beach levels appear to fluctuate along this section of coastline.

Since 2009, erosion is apparent within the two pocket beaches either side of the harbour arm at the eastern extent of MU08. Only minor losses of between 1% and 6% are observed, some of which can be attributed to shingle extraction for replenishing the beach to the west. In contrast, the seven profiles within the two narrow groyne bays at Mill Point display major accretion over the past monitoring year; the greatest gain was at Profile 4c01838A where it's CSA increased by 31% or 21m$^2$. The remainder of the frontage to the west from Profiles 4c00208-4c00264 changed little over the reporting period, but overall were generally erosive. Small gains shown by the two westernmost profiles (2%/4m$^2$ and 8%/15m$^2$) are due to regular shingle replenishment in that area.

Overall, the CSA change between 2009 and 2010 reflects the net trend between 2005 and 2010; accretion dominates the profiles within the two groyne bays with minor sediment loss across the pocket beaches either side of the harbour. The only significant difference is the strong easterly sediment drift pattern along the western beach that emerges in the long-term data, with CSA gains of up to 23% in the east resulting from natural shingle movement from the west (where erosion presides). The greatest beach change is at Profile 4c00198, which has gained 48%/38m$^2$ in the past 5 years (Figure 5.3).
5.1.4 MU09 – Sandgate (4c00266 – 4c00346)

This frontage has undergone a number of recycling schemes since monitoring began, influencing the natural distribution of beach material by littoral transport. MU09 is split into three sections by large rock groynes. As part of the recycling programme, material is extracted at the eastern end of each groyne bay and deposited at the western end. Over the 2009-2010 reporting period, the two smaller groyne bays to the west display what appears to be a strong westerly littoral drift trend. The observed pattern of erosion in the east and accretion in the west of the bays is a direct result of the regular recycling that takes place here and is not natural sediment movement.

To the east, the largest of the three groyne bays is characterised by low-level erosion with all profiles bar one losing between 1% (2m²) and 13% (50m²) of their CSA’s. The only profile to gain is this section is 4c00315, which displayed an increase in CSA of 9% (19m²) between 2009-2010.

In the long-term the Sandgate frontage is eroding, with profiles losing as much as 24%/72m² (Profile 4c00319) since monitoring began in 2003. Gains in the east (2%/6m² – 11%/29m²) can be attributed to that area being a deposition site for regular recycling. Overall net transport of beach material from 2003-2010 is dominantly west to east despite recycling events.
5.2 Romney Marshes

5.2.1 MU10 – Hythe Ranges (4c00348 – 4c00402)
This section of coastline is managed by the Ministry of Defence. Overall, there has generally only been very minor beach level change along this frontage over both the 2009-2010 reporting period and in the long-term (2003-2010). Between 2009 and 2010 there is a trend of accretion towards the east of this section, and minor erosion in the west. The only beach volume changes of any significance were at Profiles 4c00354 and 4c00348 at the eastern extent of MU10, where CSA gains of 8% (5m²) and 11% (15m²) were experienced, respectively. Other than this, profile gains and losses are restricted to less than 6% during the past monitoring year.

The CSA changes for 2009-2010 are generally in line with the 2003-2010 CSA changes, with no significant long-term trends emerging. The greatest loss is reported at Profile 4c00359 located at the eastern end of MU10, which has lost 6% (9m²) of its CSA since monitoring began in 2003.

5.2.2 MU11 – Dymchurch (4c00459 – 4c00625)
Since 2007, MU11 has been subject to a major coastal protection scheme which is still in progress. This includes the construction of a large rock revetment at the eastern end of the management unit and the replacement of concrete elements within the central sections. At the time of the spring 2010 survey the Environment Agency were carrying out renewal of their seawalls along the Dymchurch frontage. The extent of their works meant that Profiles 4c00409 to 4c00508 at the northern end of MU11 were unable to be surveyed.

The remainder of the management unit shows very small fluctuations since 2009, with only 6 profiles showing more than ±5% profile CSA change. The only profile experiencing erosion over the past year was 4c00605 in the south, which lost 6%/10m². The greatest relative change in 2009-2010 is near the centre of the unit at Profiles 4c00516 (13%, 4m²) and 4c00520 (12%, 4m²).

When looking at the CSA changes between 2003 and 2010, the southern half of this section displays a trend of accretion in the long-term. Since 2003, the central section of MU11 has had the highest levels of accretion, especially Profile 4c00544 where the beach levels have increased by 39% (55m²) (Figure 5.4).
5.2.3 MU12 – Romney Sands (4c00628 – 4c00770)

Romney Sands is one of the highest naturally accreting sections of the Kent coastline; the section around the peninsula is particularly accretive and is subject to regular extraction of material. A number of recycling schemes have influenced the 8.5km frontage since monitoring began. The first scheme removed 21,560m$^3$ of shingle from Dungeness between 2003 and 2004, which was placed along the Jury’s Gap frontage (MU15). Further recycling in 2006 and in 2007 saw 38,000m$^3$ and 21,560m$^3$, respectively, of beach material extracted between Profiles 4c00730 and 4c00763, which was used for the Lydd Ranges recharge (MU14).

The profile displaying the greatest loss between 2009-2010 is 4c00631 (22%/34m$^2$) at the northern extent of the management unit. This loss can be attributed to 7,000m$^3$ of shingle being extracted from this area during a Capital Scheme in spring 2009. The remainder of the northern half of MU12 (north of Profile 4c00668) has remained stable over the past year, displaying less than 5% changes in profile CSA.

South of Profile 4c00668, accretion has occurred at nearly all of the profiles, particularly around the peninsula where there is ongoing natural accretion of the shingle shoreline. The only two exceptions are Profiles 4c00731 and 4c00740, which experienced a loss this year of 51m$^2$ (12%) and 73m$^2$ (10%) via natural erosion, respectively. Areas of particularly significant accretion during the past reporting year are located at Profiles 4c00746 (96m$^2$/28%) and 4c00734 (189m$^2$/71%) (Figure 5.5).
A comparison of the profiles within MU12 between 2004 and 2010 indicates that the long-term trend is one of accretion with every single profile experiencing gains in CSA of between 3% (4m²) and 136% (385m²).

5.2.4 MU13 – Dungeness Power Station (4c00773 – 4c00797)
An annual recycling scheme conducted by the Environment Agency & Halcrow moves shingle from the eastern side of the Ness Peninsula to Jury’s Gap (MU15) west of MU13. With net littoral sediment transport being west to east along this section of coastline, these recycling works influence the beach dynamics at Dungeness by providing an anthropogenic source of shingle from the west.

Erosion affected all the profiles at MU13 over the past reporting year, although only one - Profile 4c00779 - exceeds a 5% CSA change (6%/36m²). This trend of only minor CSA fluctuations is not reflected in the overall net changes since the baseline survey in 2003, however, where a much greater beach volume change is indicated. A strong easterly littoral drift direction is apparent in the long-term; profiles in the west of the unit are subject to erosion (up to 14%/66m²), with accretion becoming more prominent towards the east ranging from 4% (20m²) to 7% (38m²). This pattern results from the recycled material west of MU13 being transported back towards its original source at Ness Point.
5.3 Camber Sands

5.3.1 MU14 – Lydd Ranges (4c00801 – 4c00948)
Although beach management surveys were carried out in MU14 in the summers of 2004 and 2009, regular spring profile surveys are not conducted along this section of coastline. Hence, short-term (2009-2010) and long-term (2003/4-2010) CSA changes cannot be assessed at this time.

5.3.2 MU15 – Jury’s Gap (4c00949 – 4c00998)
Overall, MU15 is characterised by accretion over the past monitoring year, with only 2 of the 12 profiles showing a loss in CSA. The profiles subject to erosion are 4c00960 (8%/29m²) and 4c00957 (7%/22m²) in the east of MU15. Beach material gains in the far eastern extent were 6% (20m²) and 3% (9m²) (Profiles 4c00952 and 4c00949 respectively). The remainder of the unit has experienced CSA percentage gains of up to 1% and 13% in 2009-2010, so MU15 appears relatively stable.

Despite regular recycling schemes at MU15, the net long-term trend over the last six years continues to be one of erosion, with only a handful of profiles in the east gaining material since 2004. Beach material appears to move west to east with the net littoral drift.

5.3.3 MU16 – Camber Sands (4c01005 – 4c01057)
During the past year, there appears to have been a relatively constant rate of accretion across the MU16 frontage. Only two profiles located at either end of MU16 lost beach material between 2009-2010, although both profiles experienced relatively minor erosion of less than 3%. The profile with the largest relative change between 2009-2010 was Profile 4c01015, which experienced a 20% (11m²) increase in CSA. The remainder of the profiles gained between 1-8% of their CSA over the past reporting year.

The entire MU16 frontage appears to be accreting in the long-term, with only one eroding profile, 4c01010, which has lost just 1% or 1m² of its CSA since 2004. The remaining profiles have experienced CSA gains of between 1m² (1%) and 144m² (10%). This is a direct result of the protection provided by the harbour arm from the dominant southwesterly wave climate. The profile subject to the greatest long-term beach change is Profile 4c01047, which has gained 28% (97m²) of its CSA since 2004.

Overall, the CSA change between 2009 and 2010 reflects the net trend between 2004 and 2010.

5.4 Pett Levels

5.4.1 MU18 – Winchelsea Beach (4c01061 – 4c01263)
MU18 extends from Winchelsea Beach in the west to Rye Harbour in the east. The terminal groyne that protects the entrance to Rye Harbour acts as a sediment sink, although a recycling scheme returns much of this material to the western end of MU18. Works began in 2006 on a Capital Coastal Defence Scheme in this area.

Since the baseline survey, there has been alternating areas of erosion and accretion with no clear trend emerging. In general, CSA changes at the eastern extent of MU18
appear to be only very minor in the long term, erosion dominates the western extent of the management unit, and the major accreting profiles tend to be interspersed across the central third of the unit.

In the east of MU18, there is no significant difference between the long term CSA changes and the CSA changes in the short term, with only minor gains and losses between 1-4% observed since 2009. On the contrary, at the western end of the management unit, profile changes over the past year now show slower rates of erosion and often minor accretion compared to the long-term trends. This apparent stability is due to a combination of beach replenishment and the installation of new groynes at the western extent.

To an extent the CSA change between 2009 and 2010 reflects the net trend between 2004 and 2010, with both timescales supporting 21 accreting profiles out of a total of 44.

5.5 Fairlight

5.5.1 MU19 – Fairlight Cove East
This management unit is not part of the current topographic survey programme. With the introduction of the new management boundaries in 2007, MU19 has no designated profiles and only one intermediate profile, 4c01272.

5.5.2 MU20 – Fairlight Cove Central (4c01275 – 4c01283)
This management unit is 500m long and consists of only three designated profiles. In the long term, the two north-eastern profiles are characterised by accretion, gaining between 6% (13m²) and 5% (9m²) of their CSA since 2004. In the southwest, however, Profile 4c01283 has suffered an overall net loss of 9% (21m²), inferring a net north-easterly littoral drift. During the most recent reporting year, accretion dominates the management unit with CSA gains increasing between Profile 4c01283 (1%/2m²) and 4c01275 (19%/36m²), further supporting a north-easterly littoral drift.

5.5.3 MU21 – Fairlight Cove West (4c01288)
There is only one designated profile in this management unit, 4c01288. This profile has eroded 18% (25m²) over the past year, which can be attributed to erosion on the foreshore and lower beach face. Since 2004 Profile 4c01288 has experienced an overall net loss of 4% (4m²).

5.5.4 MU23 – Fairlight Glen (4c01302 – 4c01324)
There are only three designated profiles in this management unit. These profiles are characterised by erosion in both the short term (2009-2010) and long term (2004-2010). The profile subject to the greatest erosion was 4c01324, which lost 9% (8m²) of its CSA over the past monitoring year, and 17% (15m²) since 2004.
5.6 Hastings

5.6.1 MU24 – Hastings (4c01349 – 4c01455)
In general, profiles to the west of the Hastings Pier alternate between erosion and accretion, with an equivalent number of each and no obvious pattern emerging. Directly east of the pier, Profile 4c01382 accreted by 36% (42m²) (Figure 5.6) in the past year, representing the highest gain along the Hastings frontage. This is likely to be a result of beach replenishment in that locality following the 2009 spring survey. The gain at Profile 4c01376 (26%/40m³) can also be attributed to this reason. The CSA changes for 2009-2010 for the remaining profiles to the east of the pier are relatively small, ranging between 0% and 5%.

Overall, the long-term CSA changes between 2004 and 2010 follow these erosion and accretion trends from the last year of monitoring (2009-2010).

5.6.2 MU25 – Bulverhythe (4c01459 – 4c01522)
In the spring of 2006, a new rock revetment and beach replenishment scheme at Bulverhythe was completed. As part of the scheme, profile positions and names have changed due to the repositioning of groynes and revetment construction. Because of this the baseline has been re-set to 2006 for long-term profile analysis.

In general, accretion tends to occur in the east, with areas of both major accretion and erosion in the centre of the unit (in front of the rock groyne), and little relative CSA change to the west for the most recent reporting year (2009-2010). The introduction of the rock revetment has reduced the beach width. As a result, small changes in absolute CSA appear as large percentage changes. For example, Profile 4c01495 accreted by
50% during the last year, and Profile 4c01483 eroded by 53%; yet these only equate to 11m² and 19m², respectively, in absolute terms.

Due to the nature of the capital works, it is not yet possible to make any valid comment on long-term trends. At this stage, only one of the profiles (4c01495) fronting the rock revetment in the centre of the unit has experienced net accretion since 2006. The most notable losses are at Profiles 4c01487 (Figure 5.7) and 4c01483, which have suffered losses of 75% (66m²) and 78% (61m²) respectively. The majority of the remaining profiles located within the groyned sections to the east and the west of the revetment have gained material in the long-term. This suggests that the groynes are successfully keeping beach material in place, and are perhaps creating a sediment trap for material lost from the three eroding profiles in the centre of the unit. New trends will develop as local littoral transport adjusts to the new coastal morphology.
5.7 Bexhill

5.7.1 MU26 – Bexhill (4c01524 – 4c01667)
Between 2009 and 2010, the profiles along the Bexhill frontage appear to alternate between erosion and accretion. The largest losses are at Profiles 4c01599 (9%/26m²) and 4c01641 (14%/49m²), in the western half of the management unit. The three profiles surrounding the protruding headland in the east of MU26 show the greatest CSA gain in the past reporting year, increasing by 15-18% (21-42m²); although at the very eastern extent erosion dominates.

The long-term trends (2004-2010) show MU26 experiencing erosion at the eastern end and accretion in the centre and west. There are a few areas of considerably greater rates of accretion; most notably Profiles 4c01586 (30%, 66m²), 4c01632 (30%/57m²), and 4c01591 (42%, 96m²), the latter of which has seen an increase in berm height of 2.8m over the past six years (Figure 5.8).

Figure 5.8: Profile 4c01591
5.8 **Pevensy Bay**

5.8.1 **MU27 – Pevensy (4c01672 – 4c01722)**

The Environment Agency’s Pevensy PFI Contractor actively manages this section of beach. Between 2009-2010, erosion is the dominant coastal process along the Pevensy frontage. The region suffering the greatest sediment loss over the past reporting year was in the centre of the unit between Profiles 4c01696 and 4c01703, where CSA losses peaked at 16% (31m²). Aside from two profiles, 4c01707 and 4c01705 which gained 6%/12m² and 10%/22m² respectively, the remaining accreting profiles experienced CSA gains of just 2-3%.

In general, there is no significant difference between the long term CSA changes and those over the previous year (2009-2010). In the long-term (2003-2010), the erosion/accretion patterns observed along MU27 are exacerbated, showing greater percentage gains and losses in some areas where in the short term relatively minor changes had occurred. The profile with the most pronounced long-term change is profile 4c01715 (Figure 5.9), which gained 20% (24m²) of its CSA since 2003.
5.9 Eastbourne

5.9.1 MU28 – Sovereign Harbour (4c01723 – 4c01735)
The entrance to Sovereign Harbour separates the beaches contained within MU28. The beach to the southwest, between Langney Point and the Sovereign Harbour arm, has previously been the extraction site for a recycling scheme carried out by the Environment Agency’s Pevensey PFI Contractor. Beach material was transferred by road from Langney Point to the eastern side of the entrance of the harbour to Pevensey Bay.

Since 2009, both beaches in MU28 display relatively minor CSA changes, with equal numbers of eroding and accreting profiles across the management unit. The most significant beach change was observed at Profile 4c01732 on the south-western beach, which lost 20% of its CSA, equating to a loss of 37m².

In the long-term, however, these two beaches behave quite differently. Due to the absence of active management, the north-eastern beach has been eroding since monitoring began in 2003, with decreases in CSA of between 13-22% (8-44m²). In comparison, the four groyne bays immediately west of the harbour entrance are predominantly accretive in the long-term. This trend of accretion is probably a result of the protection provided by the harbour arm, and also the rock groyne at the western extent of the unit. Because the south-western beach is quite narrow, changes in absolute CSA show as excessively large percentage differences. For example, Profile 4c01735 gained 222% of its CSA since 2003, which amounts to 65m². The only exception to this trend is Profile 4c01732B, which displays a long-term gain in CSA of 129%, equating to a gain of 352m²; a result of steady build up since 2003. In the past this has been the location for material extraction used to regularly nourish the beach north of the Sovereign Harbour entrance.

5.9.2 MU29 – Eastbourne (4c01737 – 4c01857)
Over the 2009-2010 reporting year, profiles along MU29 are generally characterised by minor erosion or accretion, providing an average CSA gain of 0.77% (1.94m²) (Table 2.1). Profiles 4c01797 (10%/21m²) and 4c01805 (8%/22m²) in the vicinity of the pier experienced the greatest accretion during the past reporting year. This is likely to be associated with a recycling scheme which was undertaken in spring 2009, which saw the deposition of material either side of the Eastbourne pier that have been extracted from groyne bays in the north of the unit and MU28. The greatest loss occurred at Profile 4c01779 (5%/22m²) in the north east. The remaining eroding profiles along the Eastbourne frontage experienced losses of less than 4%.

The percentage of beach change over the past six years of monitoring in this area ranges from -10% (-53m²) to 13% (35m²). The total number of eroding profiles greatly outnumbers the number of accreting profiles, and the percentage gains for all but one of the accreting profiles are only between 1-3%. Both of these factors contribute towards a net erosion at MU29 between 2004-2010.

Profile 4c01753 is located in the east of MU29, and although this profile had the greatest net loss between 2004-2010, Figure 5.10 illustrates that the effect it has is marginal as the entire length of the profile remains well above the design profile set for this management unit.
Figure 5.10: Profile 4c01753