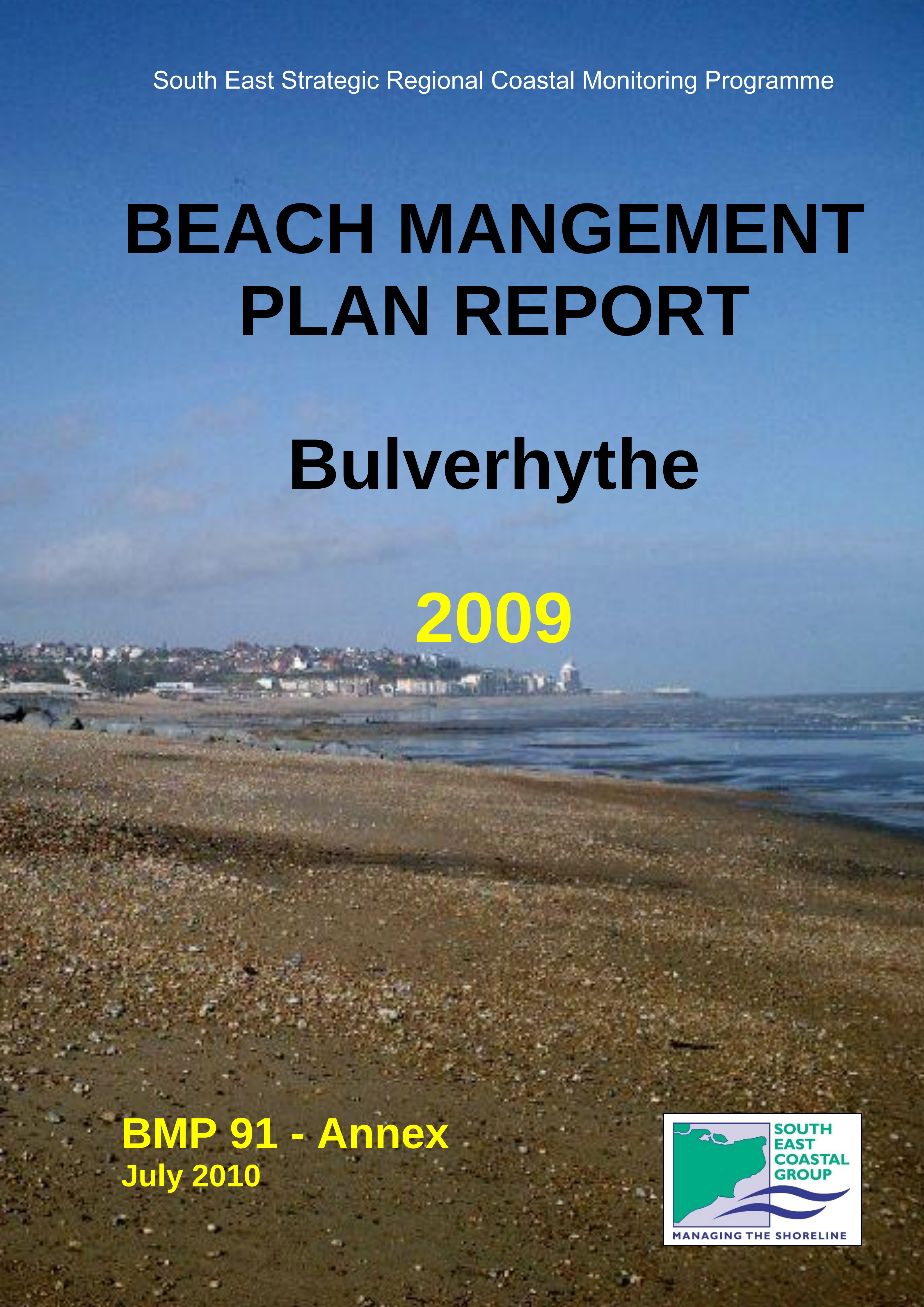

South East Strategic Regional Coastal Monitoring Programme

BEACH MANGEMENT PLAN REPORT

Bulverhythe

2009

BMP 91 - Annex

July 2010

SOUTH EAST COASTAL GROUP

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02	01	Final Report	M. Mills

Beach Management Plan Site Report 2009
Management Unit (MU) 25: Bulverhythe

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Annex A

Explanatory Notes

1. Summary of method of conducting topographic and hydrographic surveys (based on the Environment Agency's National Specification Sections XII and XIII)

Topographic cross-shore (profile) measurements are made at the intercept of the beach and a hard structure, at all changes of beach slope, at changes in surface sediment and at maximum defined intervals (every 5 metres). Each measurement is feature-coded with the type of surface material. Profiles are 100-500m apart, depending on management status. The seaward limit to be achieved is Mean Low Water Springs or 50 metres from the beach toe.

Topographic spot height (baseline) surveys are carried out annually at Beach Management Plan sites. Profiles are measured at 50m intervals, with the addition of spot heights at the toe of hard structures, the beach surface surrounding structures, all beach ridge crests, all other changes in slope and sediment changes, plus contour lines at a maximum spacing of 5m. All measurements are feature-coded with sediment type. Sufficient data points must be measured to generate a reliable Digital Terrain Model.

Hydrographic surveys are conducted with a single beam echo-sounder, with the position fixing requirement relaxed to DGPS. Soundings are taken along cross-shore profile lines 50m apart and extend 1km offshore. A minimum of 4 shore parallel tie lines are required (including one near the landward and seaward boundaries). The landward limit varies slightly across the region, due to the variation in tidal range, but in general is landward of Mean Sea Level, thus providing overlap with the topographic surveys. Tidal control may be by RTK GPS or by correction from tide gauges which are tied to the survey control network

2. Change in Cross-sectional Area (CSA)

The annual change in cross-sectional area is calculated as the difference in CSA between two surveys, expressed as a percentage change compared to the earlier CSA.

$$\frac{CSA_1 - CSA_2}{CSA_2} * 100 \qquad \text{Eqn (1)}$$

where CSA_1 = most recent springtime survey and CSA_2 = spring survey previous year. Therefore an annual change of –14% represents erosion during the last year of 14% of the area of last year's survey.

3. Method of derivation of Digital Ground and difference models

The Digital Ground Model is created by interpolating the points of a topographic baseline survey collected by using RTK GPS system. The interpolation method used to create the SECG DGMs is specified as Triangulation with smoothing and is applied in MapInfo Vertical Mapper to create a 1 metre resolution grid.

Triangulation is a process of grid generation that is usually applied to data that requires no regional averaging, such as elevation readings. The surface created by triangulation passes through all of the original data points while generating some degree of "overshoot" above local high values and "undershoot" below local low values. Elevation is an example of point values that are best "surfaced" with a technique that predicts some degree of over- and under- estimation. In modeling a topographic surface from scattered elevation readings, it is not reasonable to assume that data points were collected at the absolute top or bottom of each local rise or depression in the land surface.

Triangulation involves a process whereby all the original data points are connected in space by a network of triangular faces, drawn as equilaterally as possible. This network of triangular faces is referred to as a Triangular Irregular Network (TIN). Points are connected based on the nearest neighbour relationship (the Delaunay criterion) which states that a circumcircle drawn around any triangle will not enclose the vertices of any other triangle.

To visualise the resulting grid, the same colour scheme is applied, thus enabling comparison between grids of different geographic origin. The colour bands cover a elevation range between -4 to +12 metres OD with elevations lying between -2 and + 5 metres OD are shown in 0.5 metres intervals, the remaining elevation bands shown in 1 metre intervals.

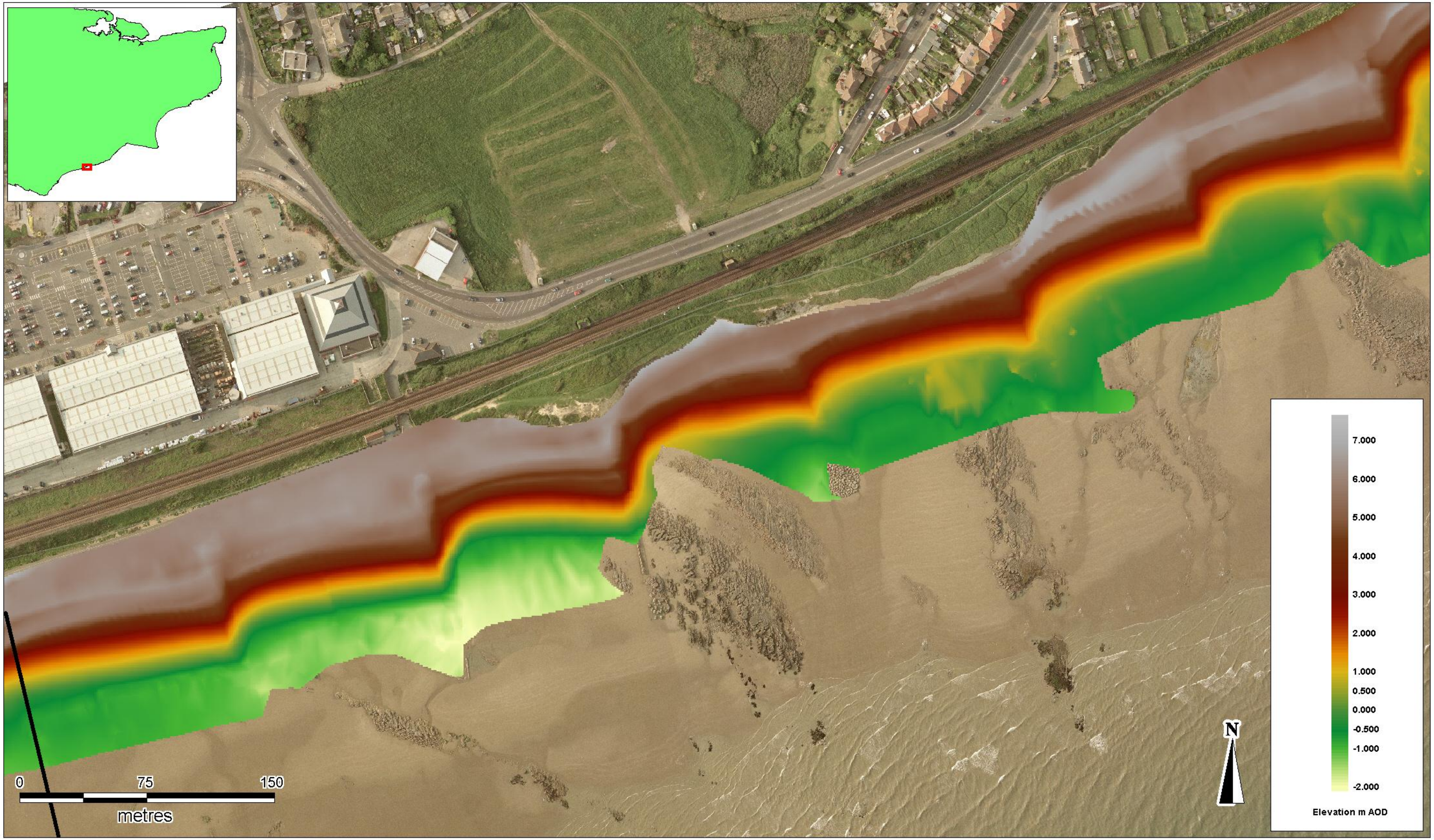
All difference models are created by using a grid calculator within the GIS system. For example the difference model of two baseline surveys is created by subtracting the earlier baseline grid from the most recent baseline grid:

$$Grid_1 - Grid_2 \qquad \text{Eqn (2)}$$

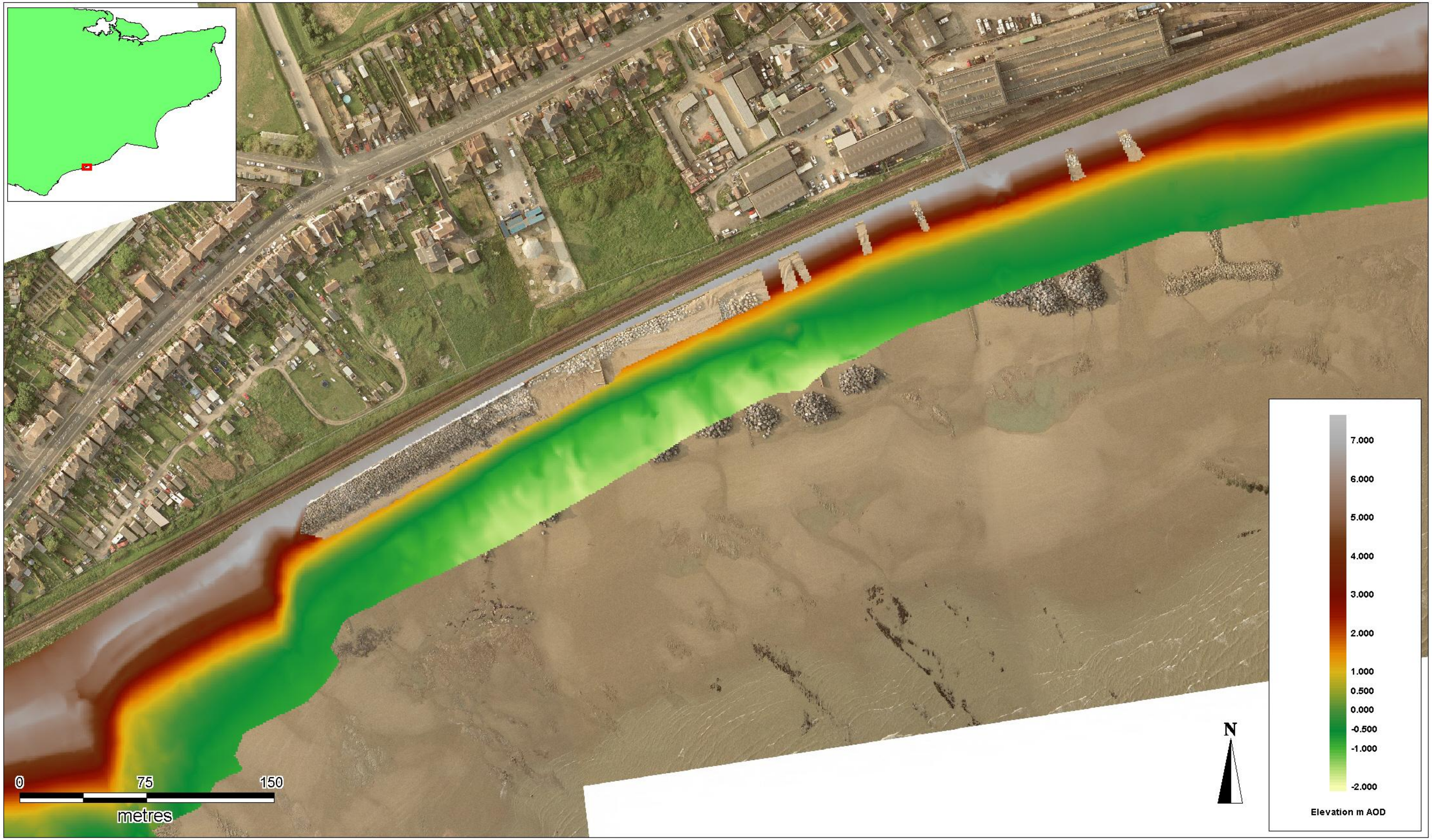
where $Grid_1$ = most recent baseline grid and $Grid_2$ = previous baseline grid. Therefore an annual change of $-14m^2$ represents erosion during the last year of $14m^2$, whilst positive values represent accretion over the period.

Annex B

Digital Ground Models



Beach Management Plan Site - DGM of 2009 Topographic Beach Plan Survey SECG - MU25 Plate 2 - 1 of 3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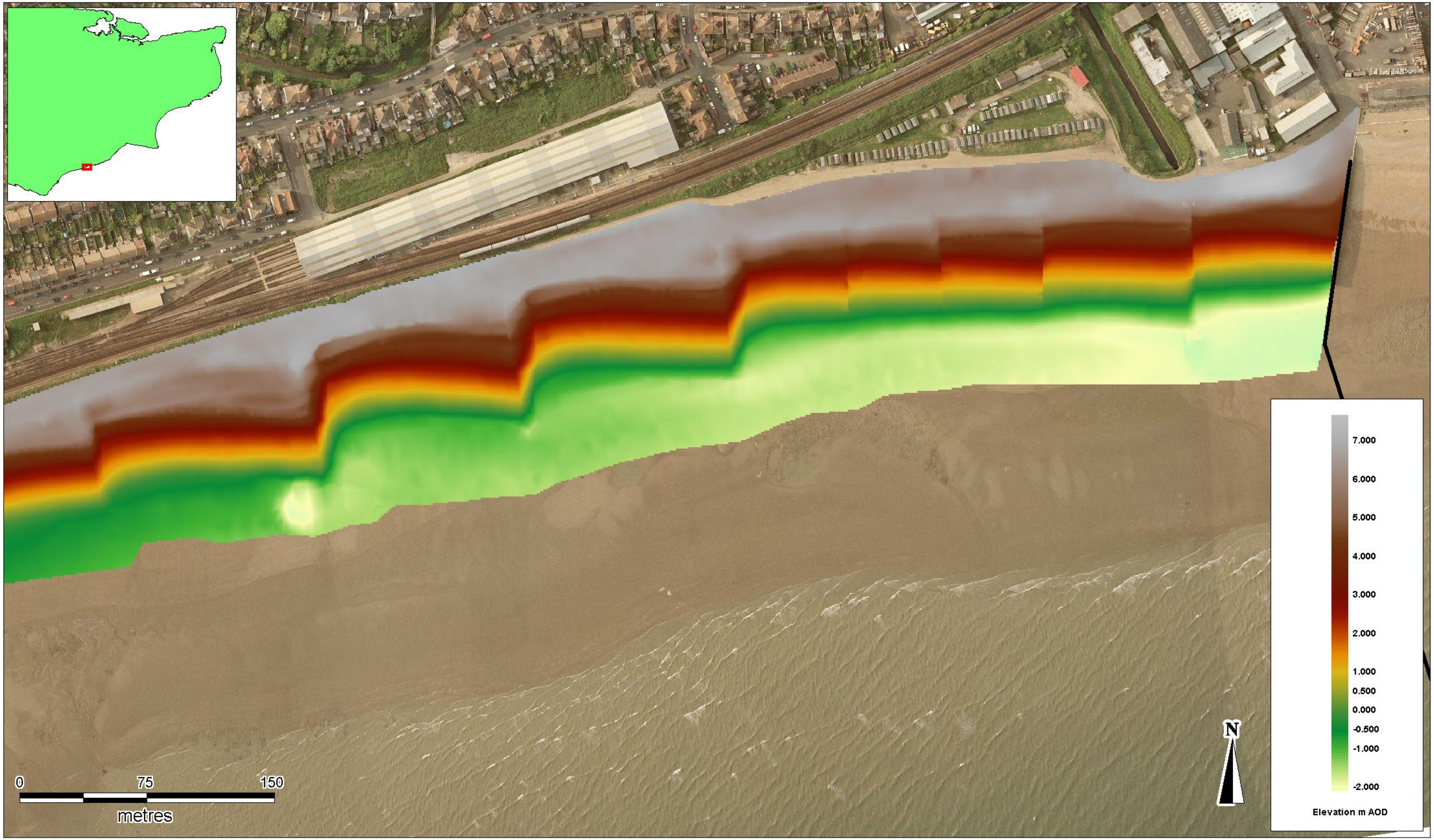
Elevation m AOD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Elevation m AOD

Annex C

Recycling Logs

No Recycling Logs for 2008-2009 Period

Annex D

Pevensey Bay Waverider Buoy

July 2008 – June 2009

Pevensey Bay Waverider Buoy - July 2008 to June 2009

Location
OS: 570429E 100915N
WGS84: *Latitude:* 50° 46.966' N *Longitude:* 00° 24.974' E

Water Depth
9.8m CD

Instrument Type
Datawell Directional Waverider Mk III

Data Quality

C1(%)	Sample interval
98	30 minutes

Storm Analysis

All times are GMT

Storm events in 2008/9									
Date/Time	H_s (m)	T_p (s)	T_z (s)	Dir. (°)	Water level elevation* (OD)	Tidal stage (hours re. HW)	Tidal range (m)	Tidal surge* (m)	Max. surge* (m)
13-Dec-2008 12:00	3.97	8.3	6.3	166	3.04	HW +1	5.52	-0.43	-0.56
22-Jan-2009 07:00	3.48	7.1	5.7	181	1.89	HW -1	2.75	0.12	0.39
18-Jan-2009 01:00	3.36	7.1	5.6	198	0.83	HW -2	4.30	0.37	0.56
04-Dec-2008 10:30	3.35	8.3	5.7	207	0.37	HW -4	3.08	0.16	0.45
09-Nov-2008 23:30	3.35	8.3	6.2	218	0.41	HW +4	4.11	0.22	0.44

Table F1 Storm events during the reporting period, July 2008 to June 2009

A storm is defined using the Peaks-over-Threshold method (Figure F1). Each storm is then examined in detail, and covers the period 16 hours either side of the storm peak, so as to include both the build-up and decay of the storm. This is the procedure recommended by the CIRIA Beach Management Manual since it covers the build-up and decay typical of mid-latitudes depression.

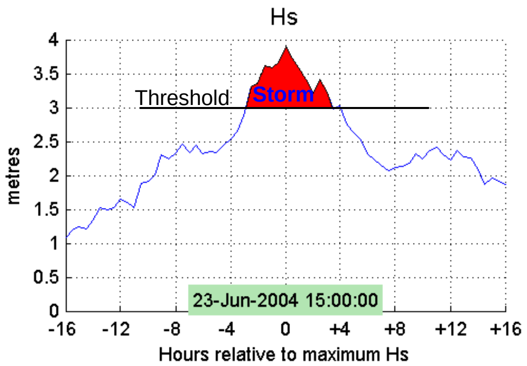

Figure F1 Storm definition

At present, the threshold for an individual site is derived empirically, since the measurements span only 6 years and, therefore, errs on the low side. The threshold used for Pevensey Bay is 3m, but is likely to be increased next year. The aim is to identify 3 or 4 storms in an average year.

* *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 H_s. The maximum tidal surge is the largest positive surge during the storm event.*

Figure F2 shows the monthly time series of H_s, with the threshold shown in red. The occurrence of storm waves in the current reporting period is also compared with similar storm waves in previous years in Figure F3. Subsequent figures show a time series of the wave conditions for each of the storms listed in Table F1, together with the tidal conditions at the nearest tide gauge. Each graph is centred around the highest H_s of the individual storm.

Summary

This reporting year displayed a similar frequency and magnitude of storm events to the previous year. Only one storm exceeded 3.5m, reaching a maximum H_s of 3.97m on 13 December 2008. This was a significant event, not only at this location, but also at other sites further west along the Channel coast including at Hayling Island, Sandown Bay and Boscombe. Storm surges (at Newhaven) were negligible for the most part.

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.

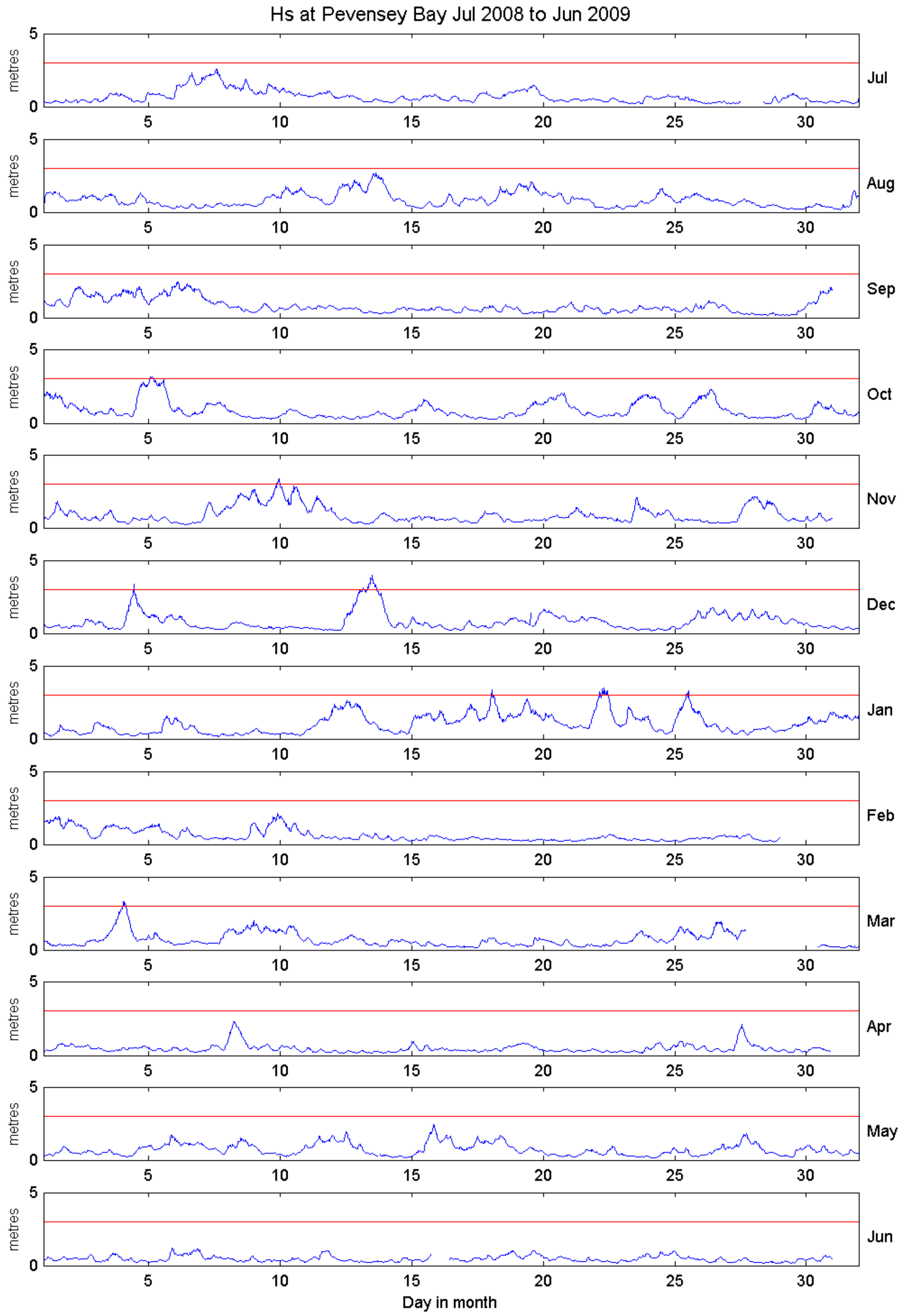

Figure F2 Monthly time series of H_s at Pevensey Bay. Storm threshold, shown in red, is 3m.

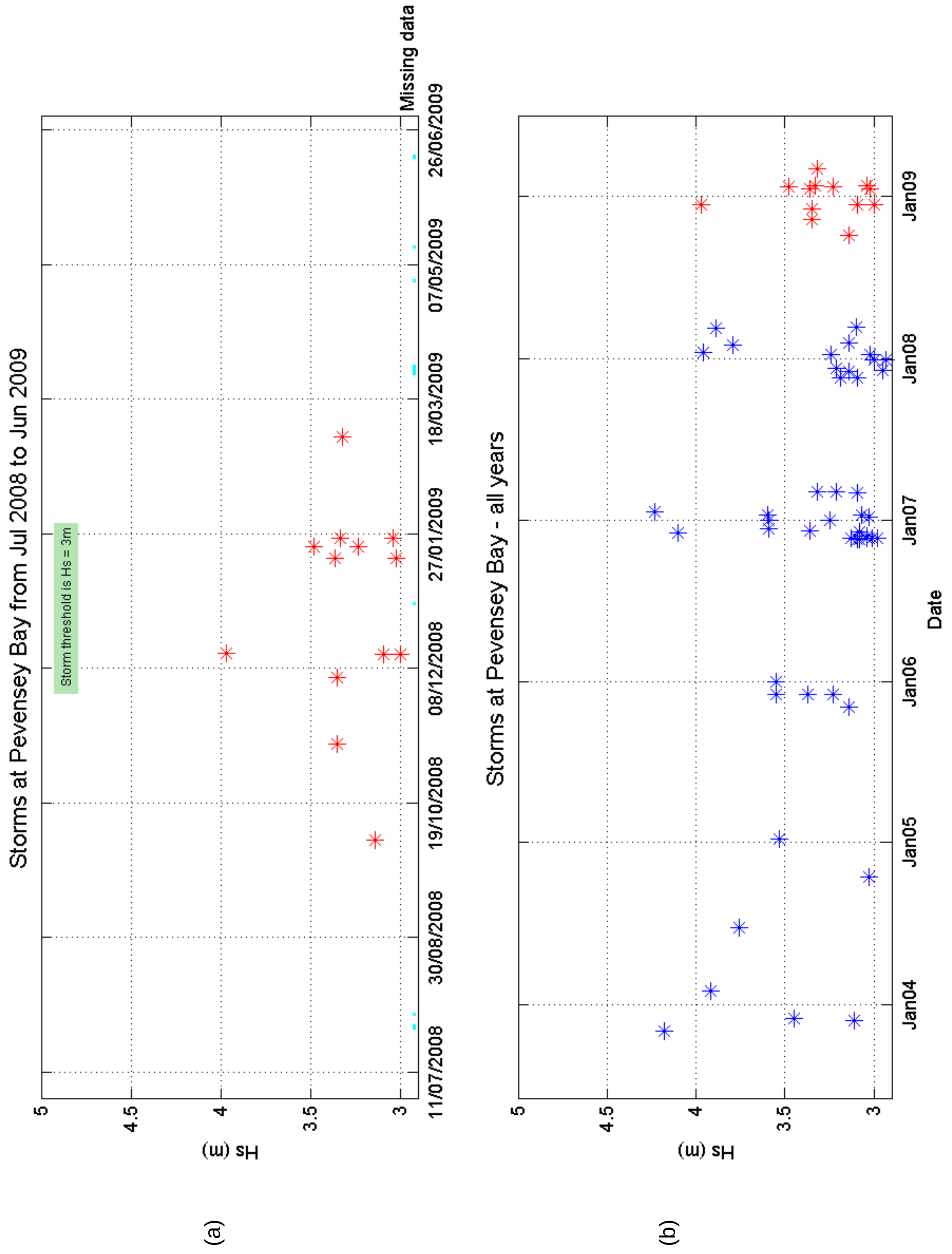

Figure F3 Incidence of storms during (a) reporting period and (b) since deployment

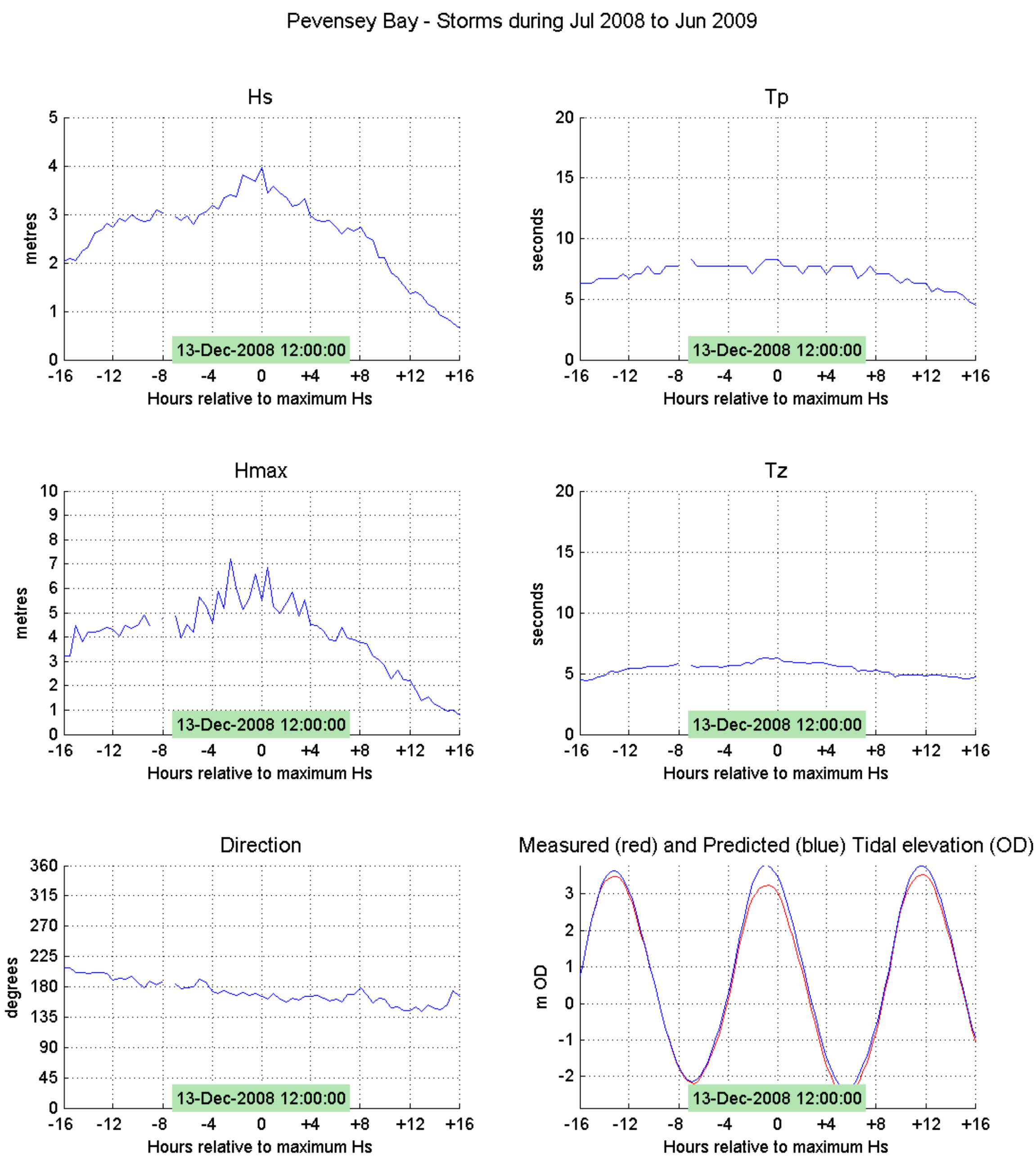

Figure F4 Highest storm of the reporting period

This storm was a significant event, not only at this location but also at many other sites along the Channel coast including at Hayling Island, Sandown Bay and Boscombe. This storm was generated by a deep, complex, low pressure system (973 hPa) centred over the North Atlantic (see F5). The storm peaked at 3.97m with a southerly wave approach. As the storm progressed, wave direction backed to SEbyS. The peak of the storm coincided with a spring tide High Water and was accompanied by a small negative surge (at Newhaven).

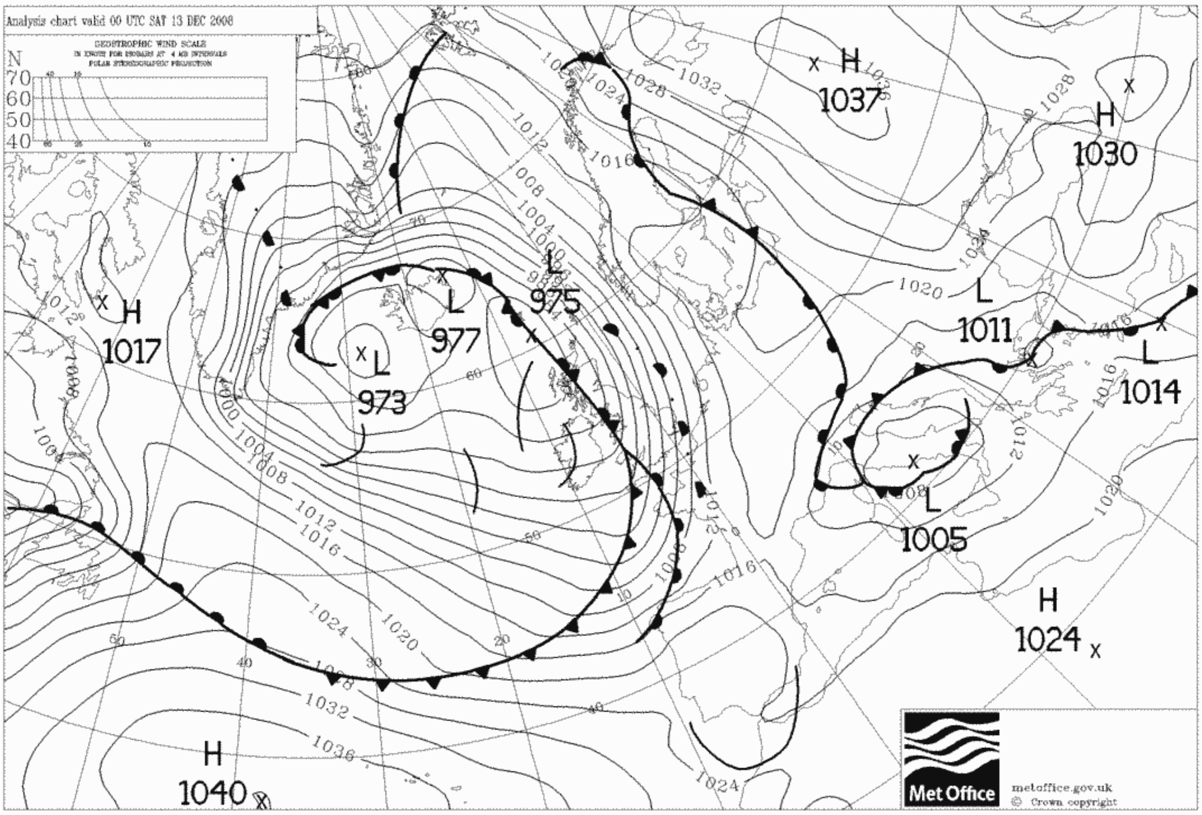

Figure F5 Surface Pressure chart on 13 December 2008 at 0001Z.

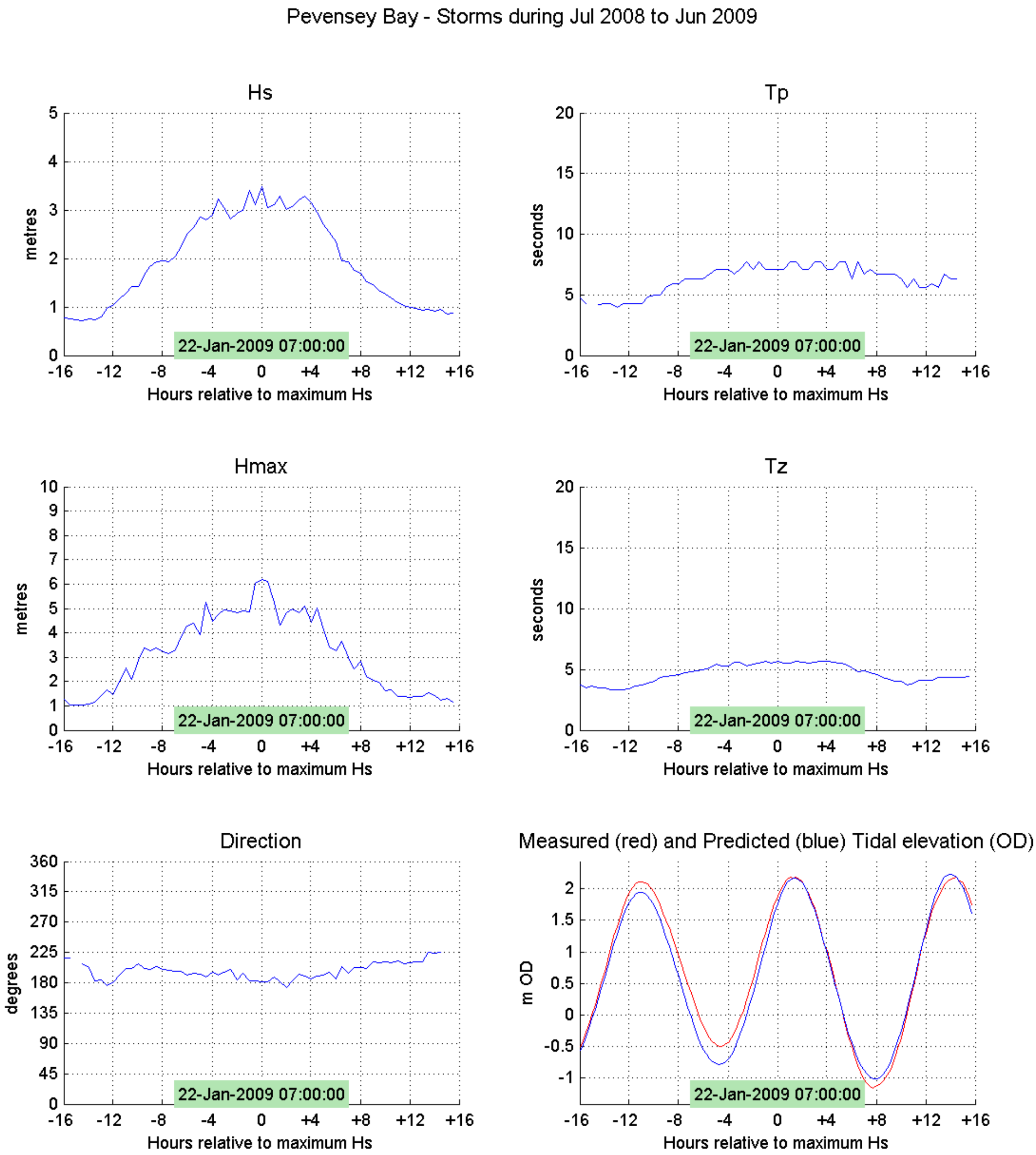

Figure F6 Second highest storm of the reporting period

This storm event lasted 8 hours with waves exceeding the threshold, generally from the south. The peak of the storm occurred around High Water but on a neap tide, with no significant surge present.

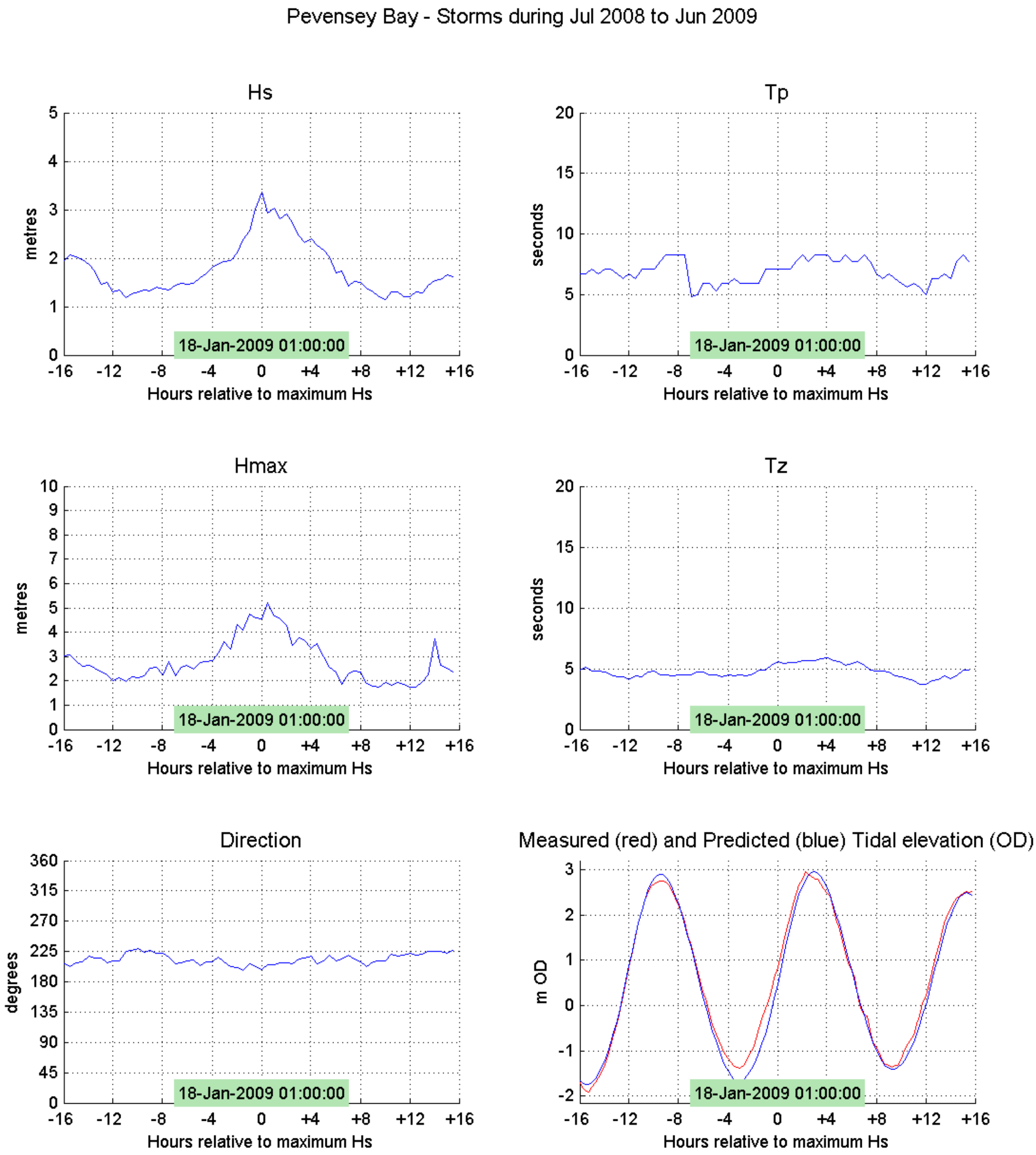

Figure F7 Third highest storm of the reporting period

This storm was relatively insignificant compared to the previous two and the storm threshold was exceeded only for approximately 1 hour.

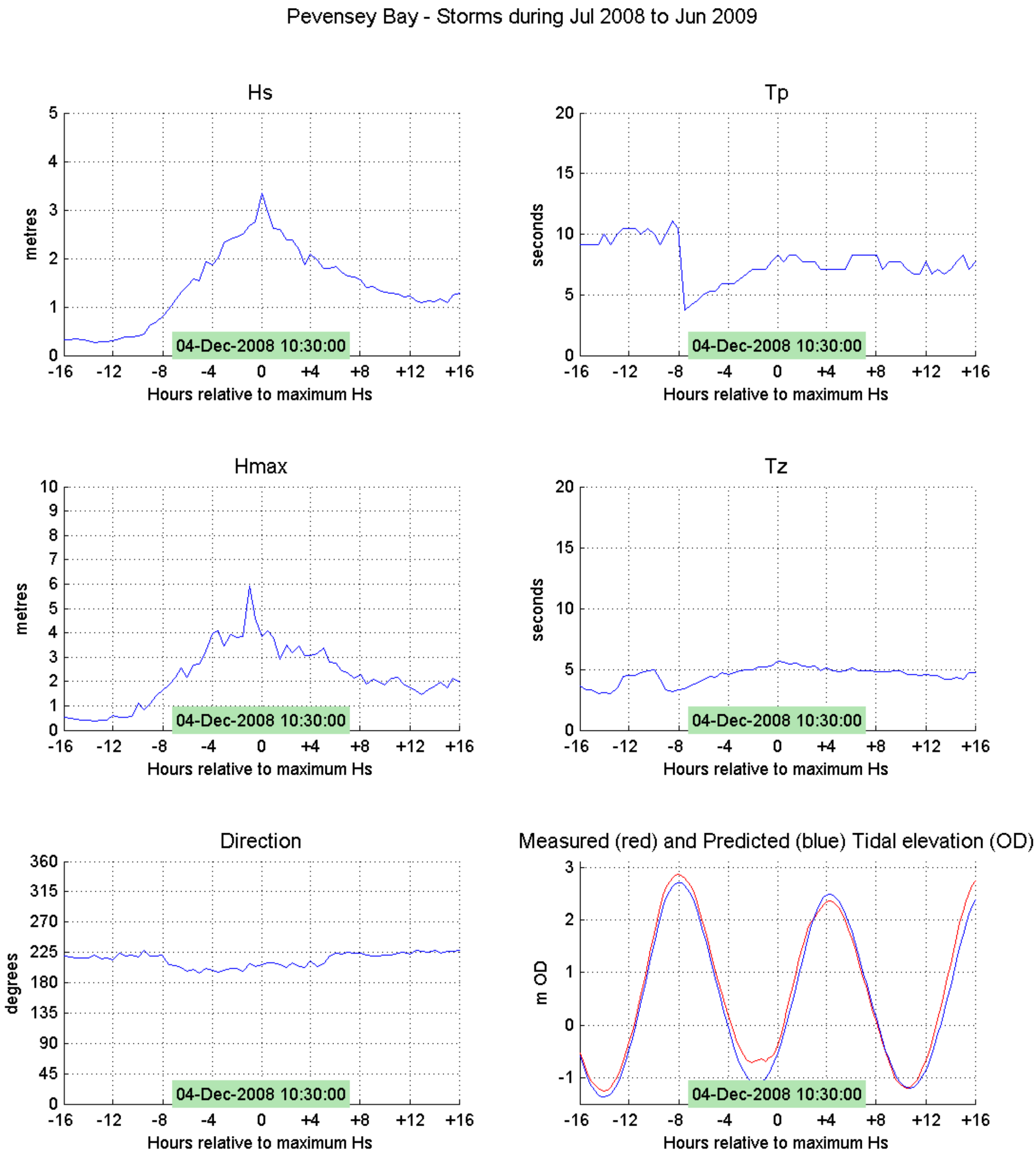

Figure F7 Fourth highest storm of the reporting period

Although this particular storm exceeded the threshold for only a short period of time, it was preceded by a pulse of longer period swell waves from the SW, whilst the peak of the storm experienced wind waves from the SbyW.