

BEACH MANAGEMENT PLAN REPORT

Swalecliffe

2013

BMP 191 - Annex
January 2015

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Beach Management Plan Site Report 2013

Survey Unit 4aSU11: Swalecliffe

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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.

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

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 modelling 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.

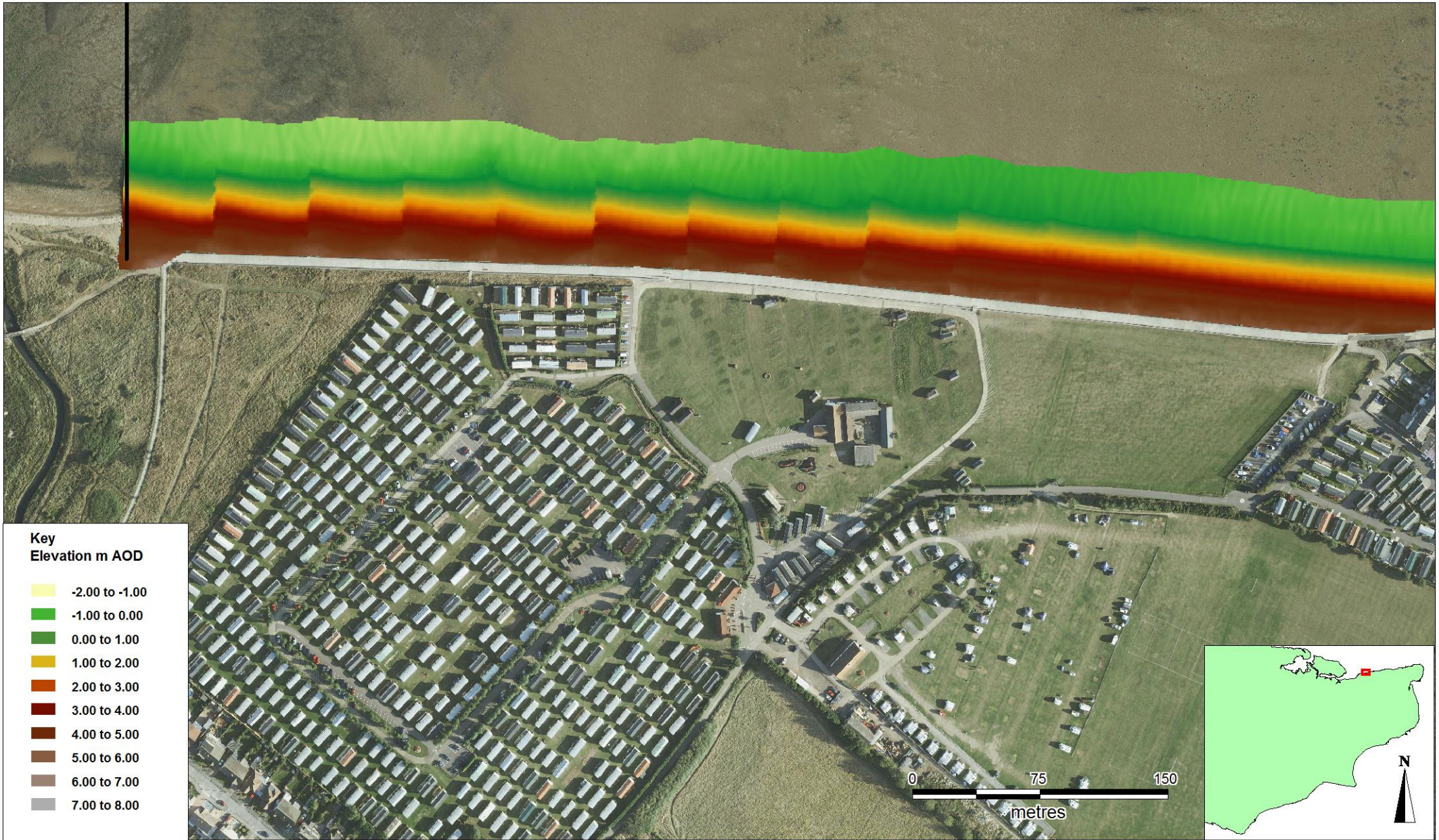
All difference models are created by using a grid calculator within the GIS system. For example the difference model of two baseline surveys is created by subtracting the earlier baseline grid from the most recent baseline grid:

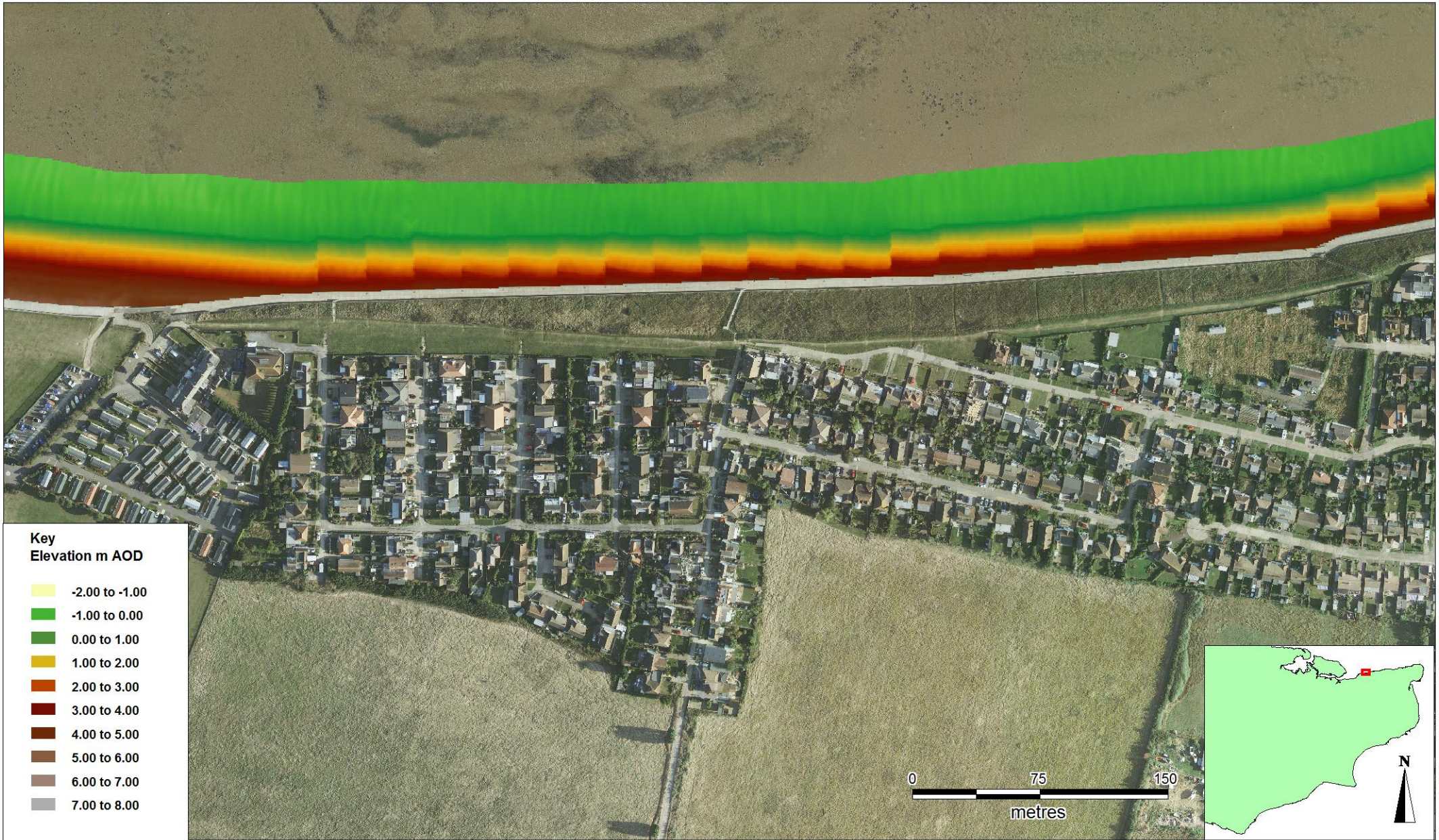
$$Grid_1 - Grid_2 \quad \text{Eqn (2)}$$

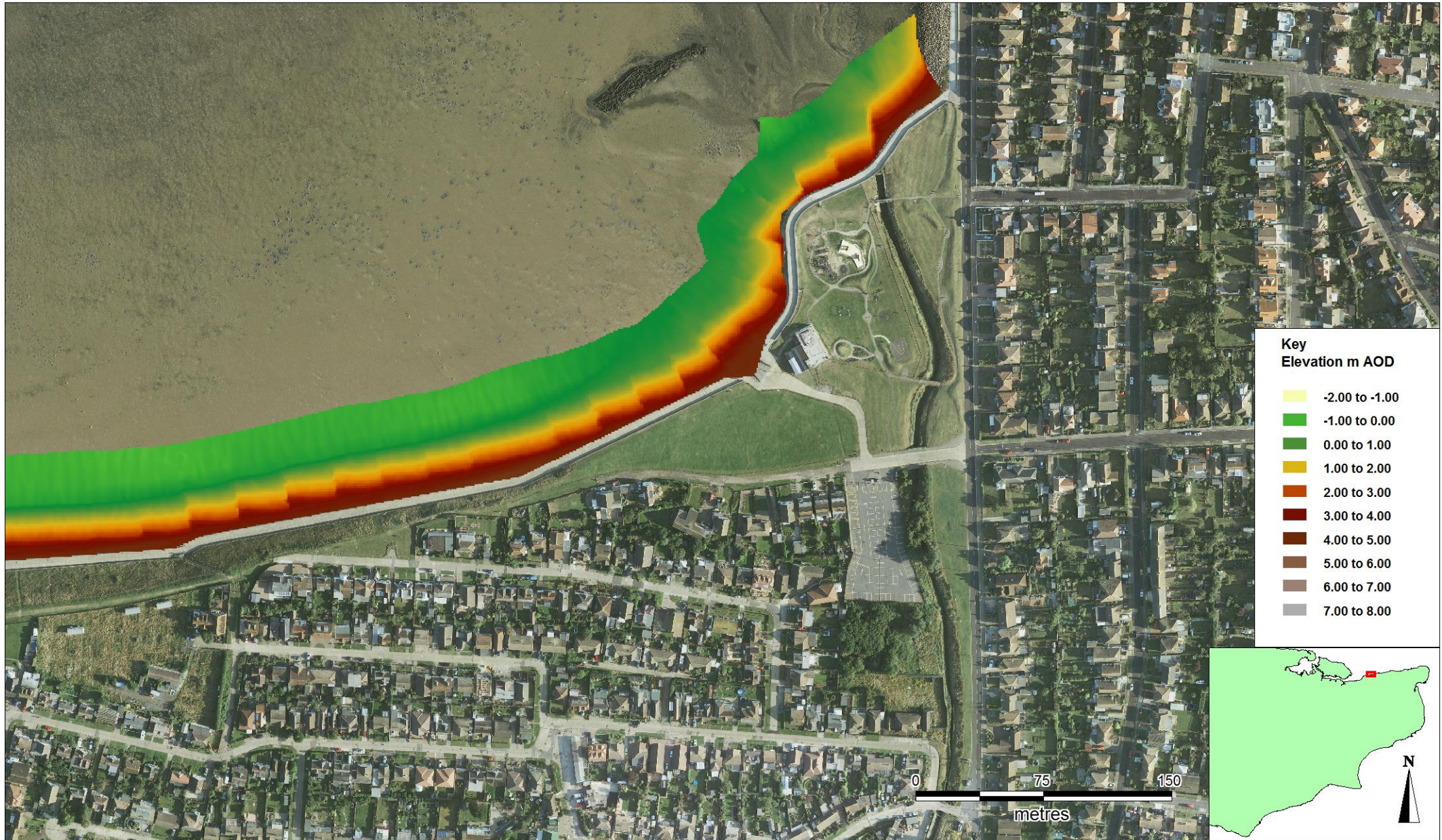
where $Grid_1$ = most recent baseline grid and $Grid_2$ = previous baseline grid. Therefore an annual change of $-14m^2$ represents erosion during the last year of $14m^2$, whilst positive values represent accretion over the period.

Annex B

Digital Ground Models







Annex C

Recycling Logs

No Recycling Logs for 2012-2013 Period

Annex D

Herne Bay Wave Recorder

September 2012– August 2013

Herne Bay - September 2012 to August 2013

Location

OS: 616895E 169377N
WGS84: Latitude: 51° 22.919' N Longitude: 01° 06.934' E

Water Depth

N/A

Instrument Type

Etrometa Step Gauge

Data Quality

Recovery rate (%)	Sample interval
95	30 minutes

Storm Analysis

All times are GMT

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)
12-Mar-2013 00:00	1.43	-	5.6	-	2.65	HW	4.6	-	-

Table D1: Highest storms during the reporting period, September 2012 to August 2013

A storm is defined using the Peaks-over-Threshold method (Figure D1). 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 (second edition) since it covers the build-up and decay typical of mid-latitude depressions.

The threshold used for Herne Bay is 1.6m. This value has been determined using extremes analysis of 17 years of measured data (based on 3 hourly values). A 0.25 year return period is used to identify 4 storms in an average year.

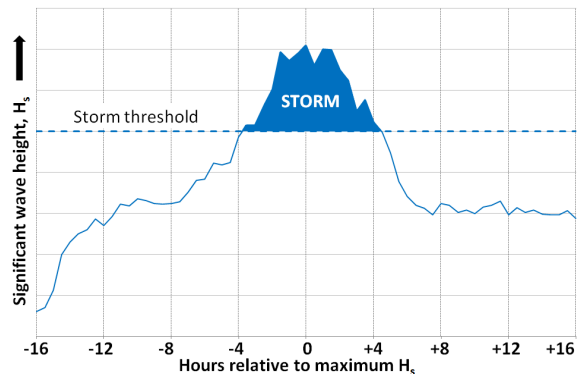


Figure D1: Storm definition

* Tidal information is obtained from the nearest recording tide gauge (the gauge at Herne Bay measures tides also). 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.

Summary

There were no storms exceeding the threshold in this reporting year with only one storm coming close in March.

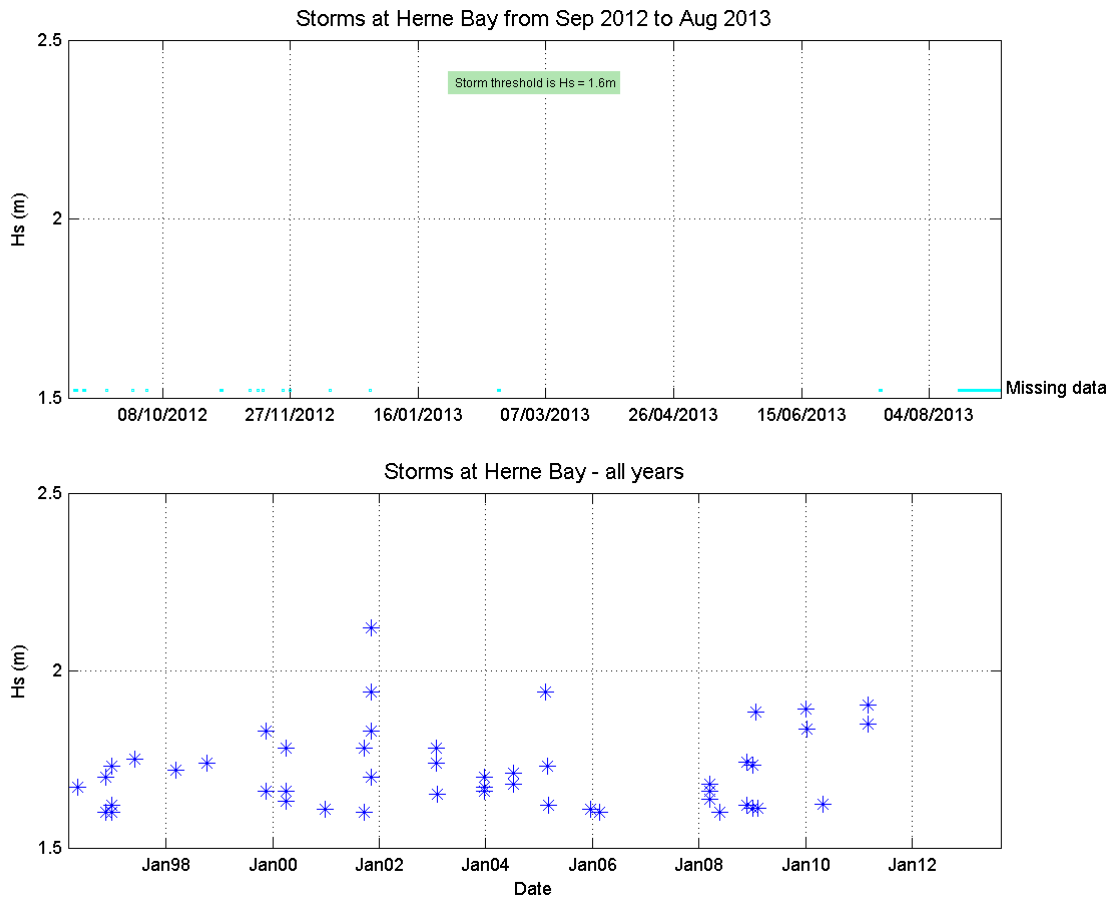


Figure D2: Incidence of storms during reporting period (top) and since deployment (bottom)

Acknowledgements

Tidal predictions were produced using TASK2000 software, kindly provided by the Permanent Service for Mean Sea Level, Proudman Oceanographic Laboratory.

Monthly time series of H_s

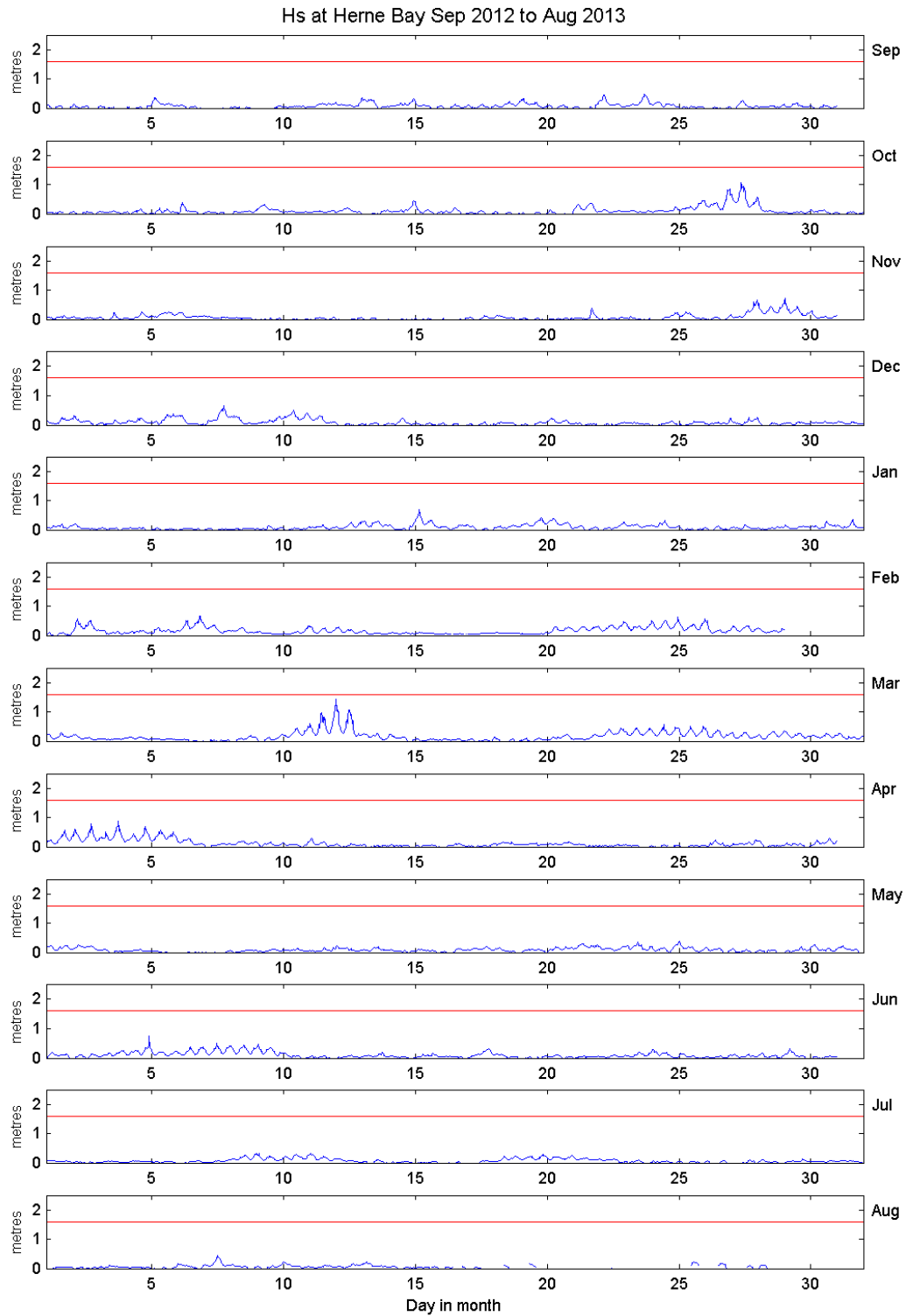


Figure D3: Monthly time series of H_s at Herne Bay. Storm threshold, shown in red, is 1.6 m

Highest storm

This event was the result of a slow moving depression passing just south of England across northern France bringing with it force 6 north easterly winds. The graph of Hs in Figure D4 displays tidal modulation. This effect is primarily due to shallow water effects, where wave height decreases with water depth; this is particularly evident during spring tides (as was the case in this event).

Herne Bay - Storms during Sep 2012 to Aug 2013

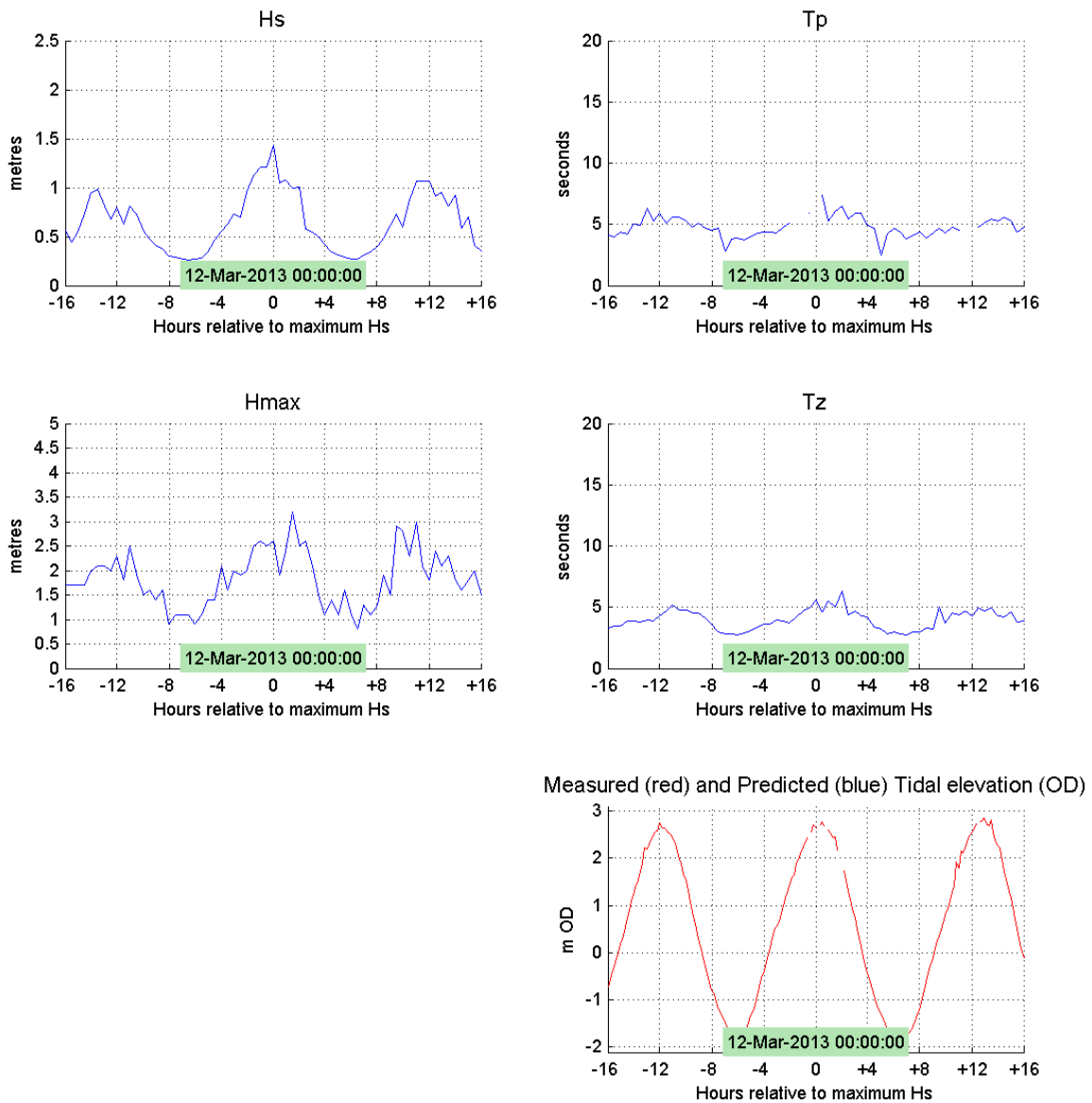


Figure D4: Highest storm of the reporting period

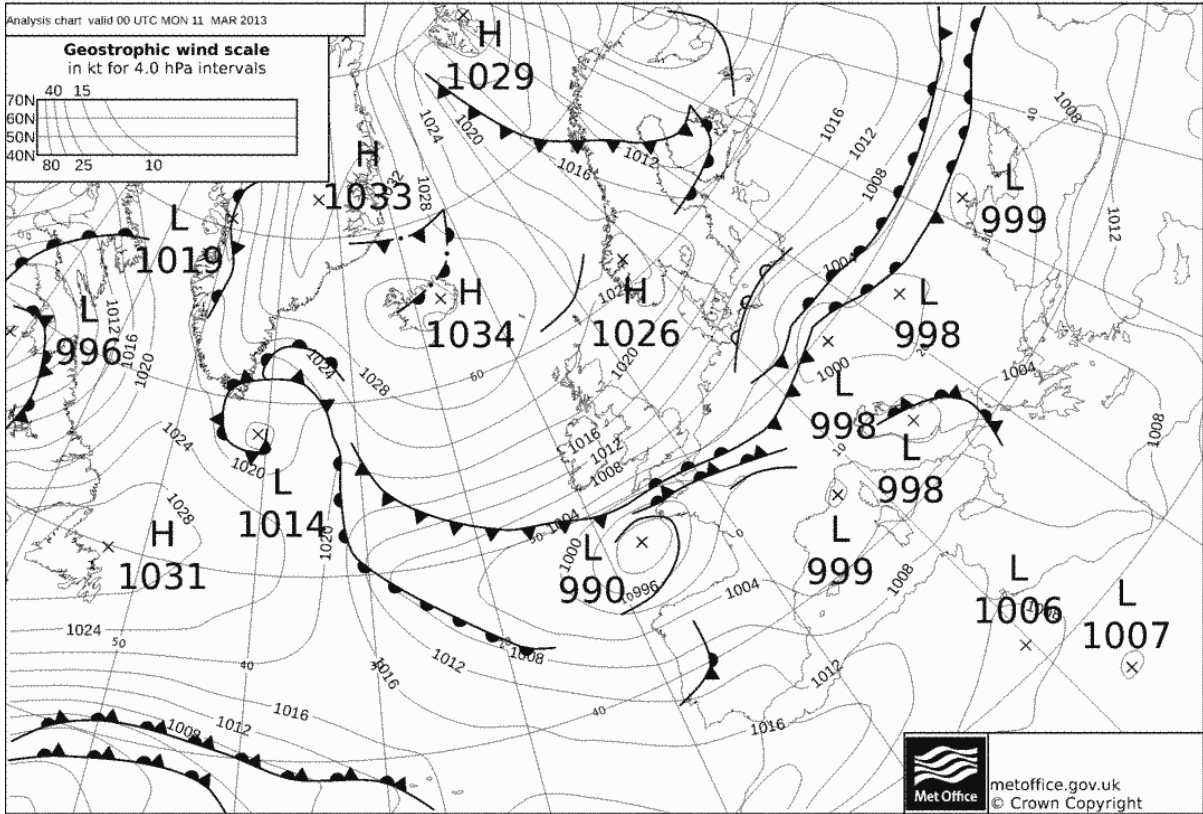


Figure D5: Surface Pressure chart on 11 March 2013 at 00:00Z

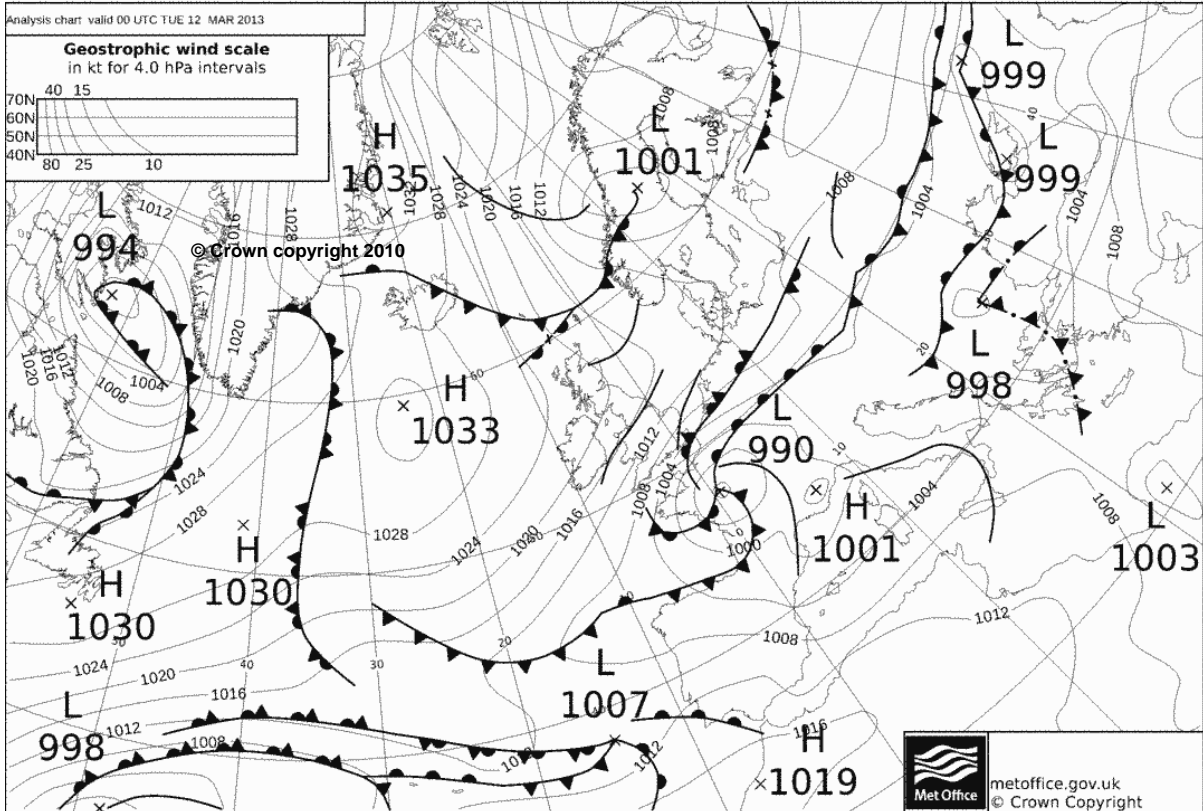


Figure D6: Surface Pressure chart on 12 March 2013 at 00:00Z