

BEACH MANAGEMENT PLAN REPORT

Hastings

2014

BMP 202- Annex

May 2016



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01	-	Draft Report for Consultation	J. Clarke
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Beach Management Plan Site Report 2014
4cSU20: Hastings

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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 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:

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

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.

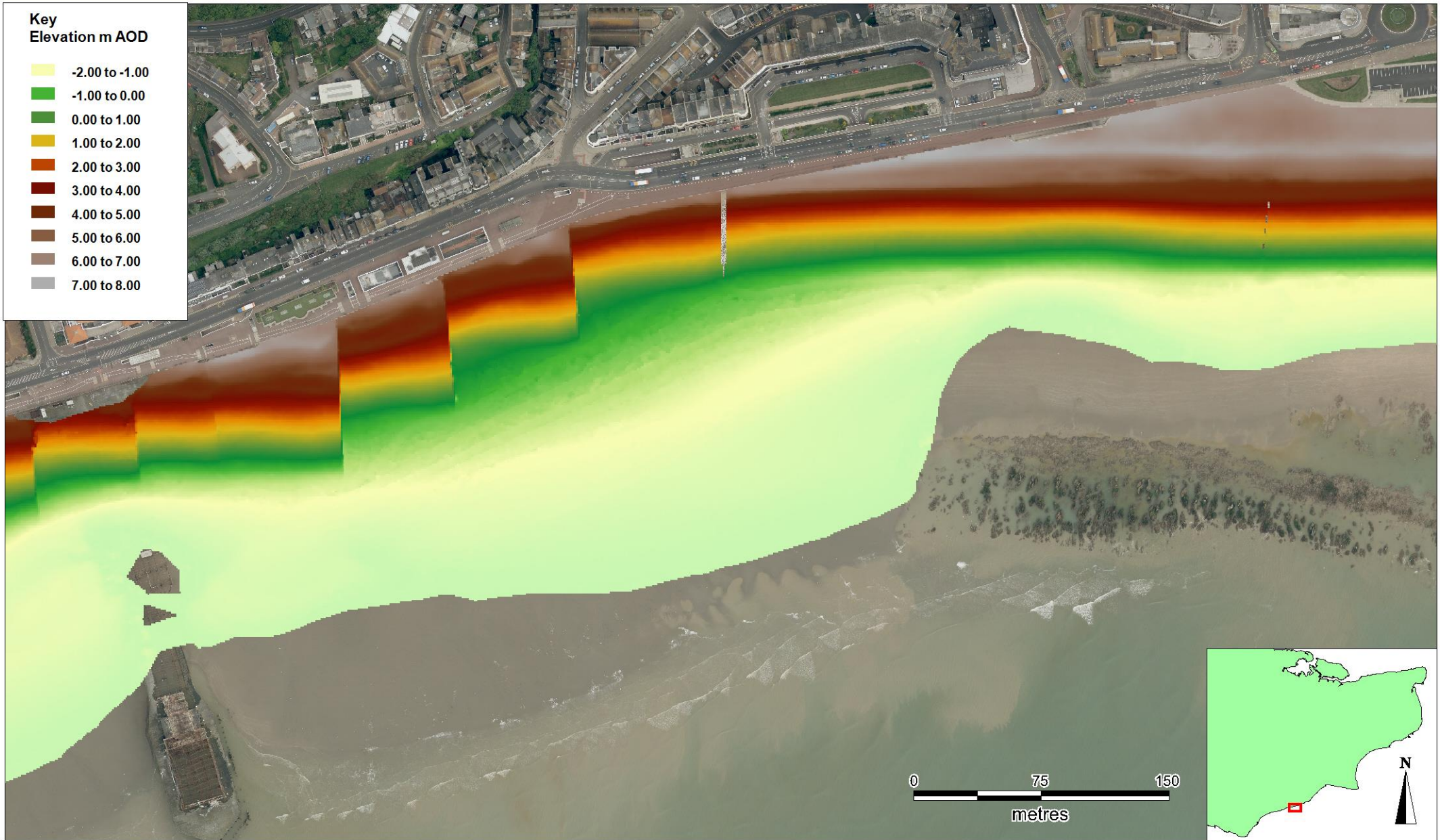
Annex B

Digital Ground Models













Annex C

Recycling Logs



No Recycling was undertaken during this reporting period.

Annex D

Pevensey Bay WaveRider Buoy

September 2011 – August 2012

Pevensey Bay Directional Waverider Buoy – September 2013 to August 2014

Location			
OS	570427 E 100916 N		
WGS84	Latitude: 50° 46.966' N Longitude: 00° 24.975' E		
Instrument type			
Datawell Directional Waverider Mk III			
Water depth	~10m CD	Buoy in situ in Pevensey Bay. Photo courtesy of Fugro EMU Limited	Location of buoy (Google mapping)

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.

Data Quality

Recovery rate (%)	Sample interval
98	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)
24-Dec-2013 03:30	4.79	9.1	7.0	199	2.4	HW +1	4.3	0.16	0.79
28-Oct-2013 06:30	4.44	9.1	6.7	214	1.9	HW +1	2.8	0.72	0.85
15-Feb-2014 02:30	4.26	10.0	7.0	221	0.9	HW +3	5.7	0.84	1.02
05-Feb-2014 04:30	4.00	7.7	6.5	172	2.3	HW +1	5.6	0.42	0.64
12-Feb-2014 16:30	3.74	9.1	6.2	207	-2	HW -5	4	0.48	0.76

Table D1: Highest storms during the reporting period, September 2013 to August 2014

* 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.

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.

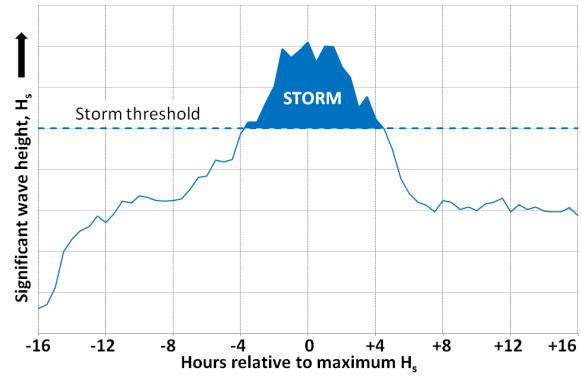


Figure D1: Storm definition

The threshold used for Pevensey Bay is 3.25 m. This value has been determined using extremes analysis of 10 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.

Summary

This reporting period experienced by far the largest and most frequent storms ever recorded at this site, with more than 10 storms exceeding the 3.25m threshold.

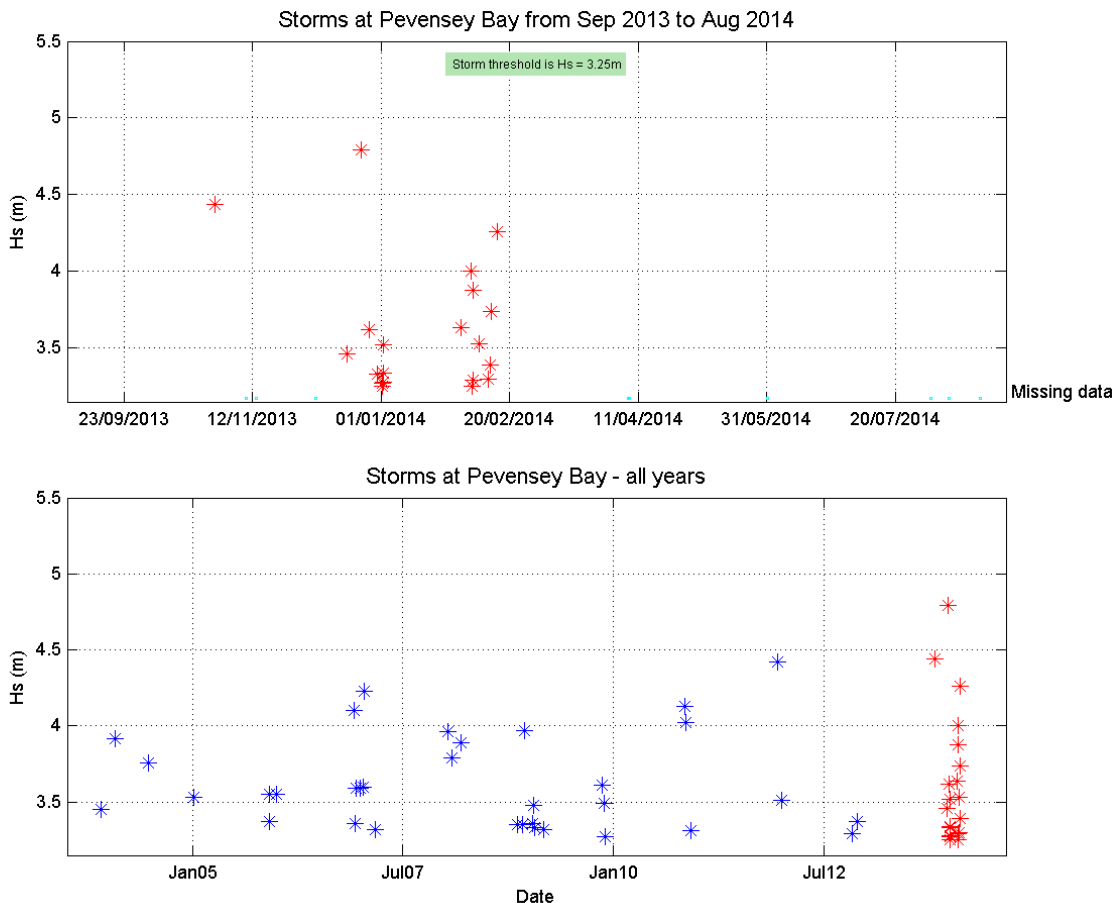


Figure D2: Incidence of storms during reporting period (top) and since deployment (bottom)

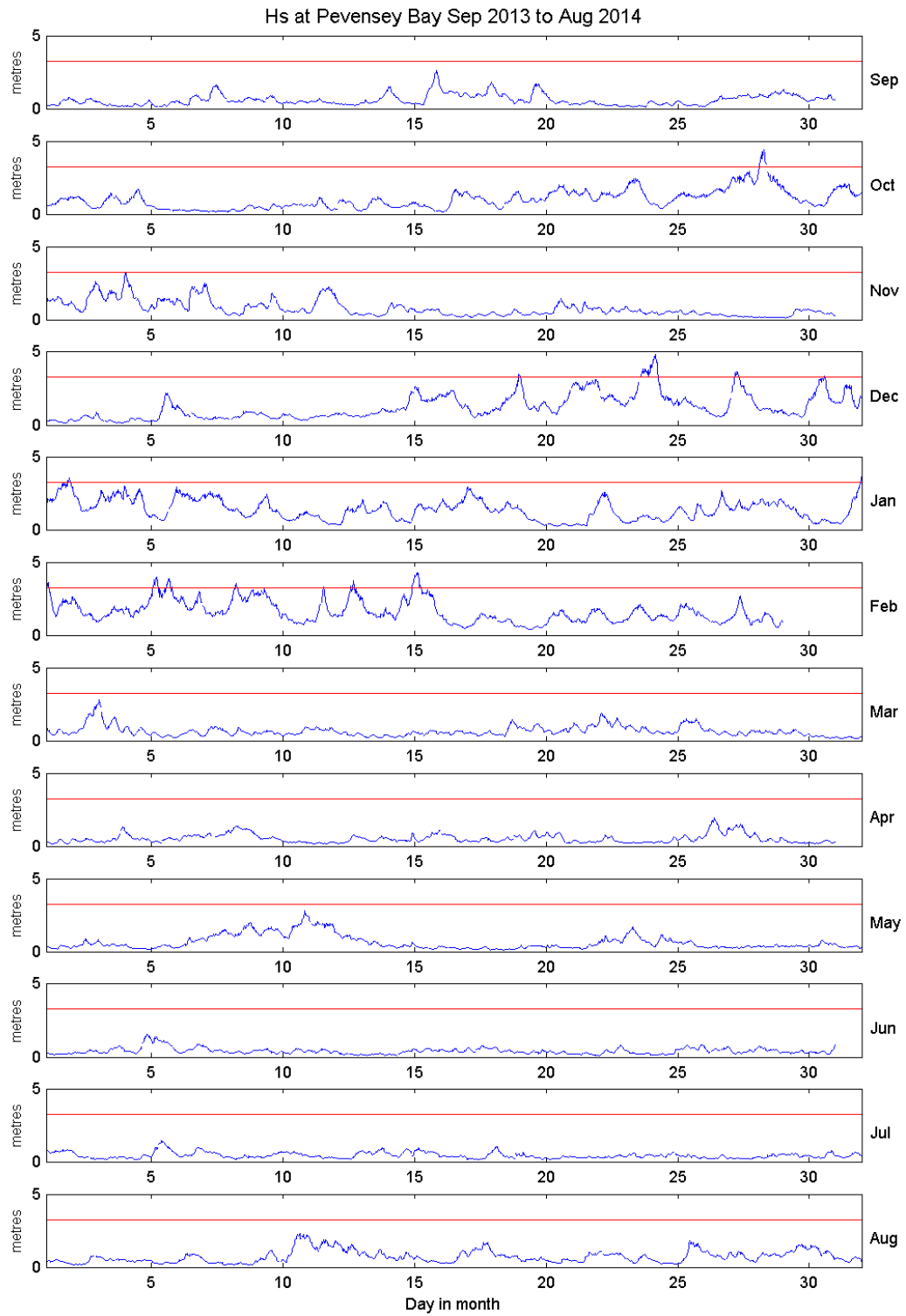


Figure D3: Monthly time series of H_s at Pevensey Bay. Storm threshold, shown in red, is 3.25 m

Highest storm

This storm resulted from an exceptionally deep depression (central pressure ~935 hPa off western Scotland) bringing Force 7 SSE winds. The peak of the storm reached 4.79m significant wave height close to High Water. Wave direction was SSW throughout the storm.

Pevensey Bay - Storms during Sep 2013 to Aug 2014

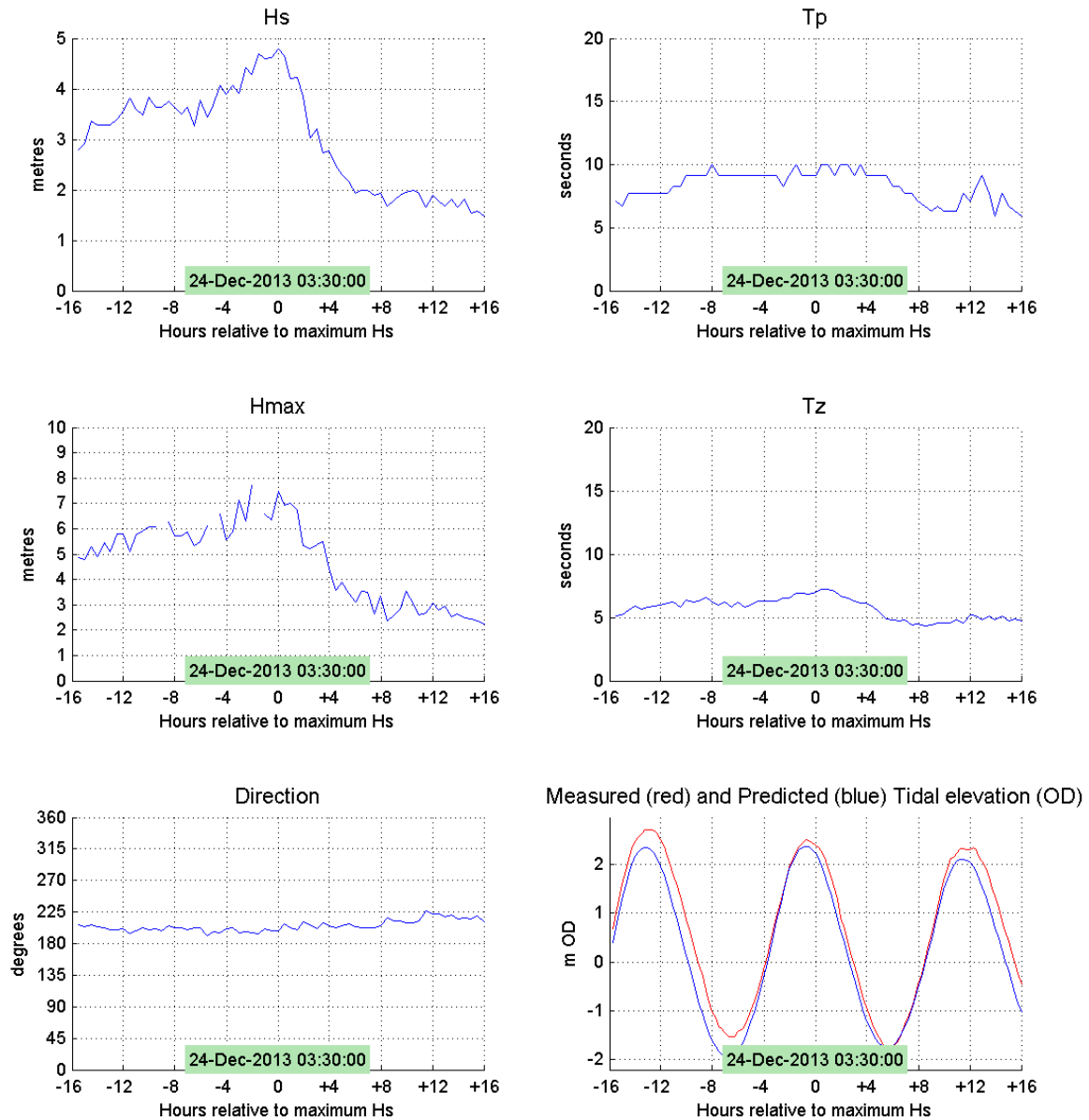


Figure D4: Fourth highest storm of the reporting period

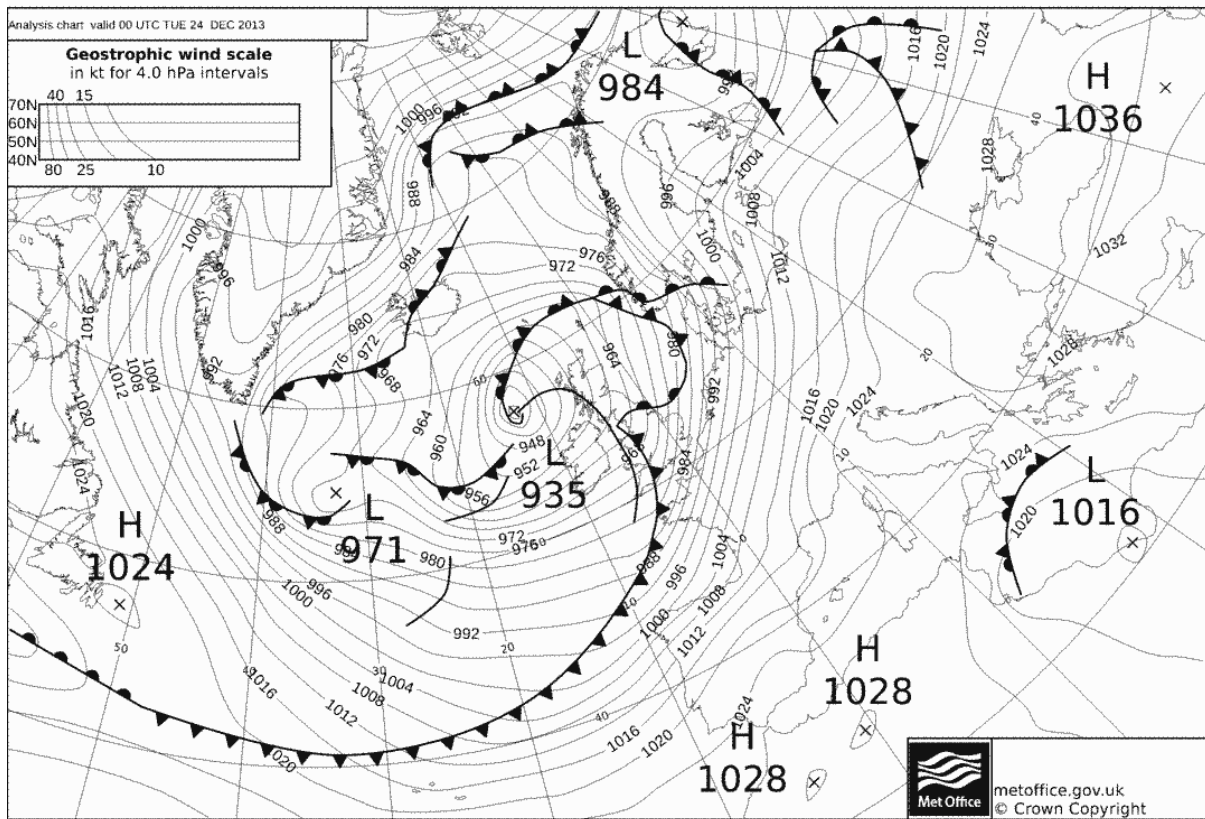


Figure D5: Surface Pressure chart on 24 December 2013 at 00:00Z

Second highest storm

This storm resulted from a deep depression (central pressure ~970 hPa) passing just north of Scotland bringing Gale Force 8 SbW winds in the build up to the peak of the storm, veering WSW as the wind speed reduced and resulting in a reduction in wave height. Wave direction was from SW to SSW just before the storm peak. The peak of the storm reached 4.44 m significant wave height just after High Water on neap tides, with a maximum surge of 85 cm.

Pevensey Bay - Storms during Sep 2013 to Aug 2014

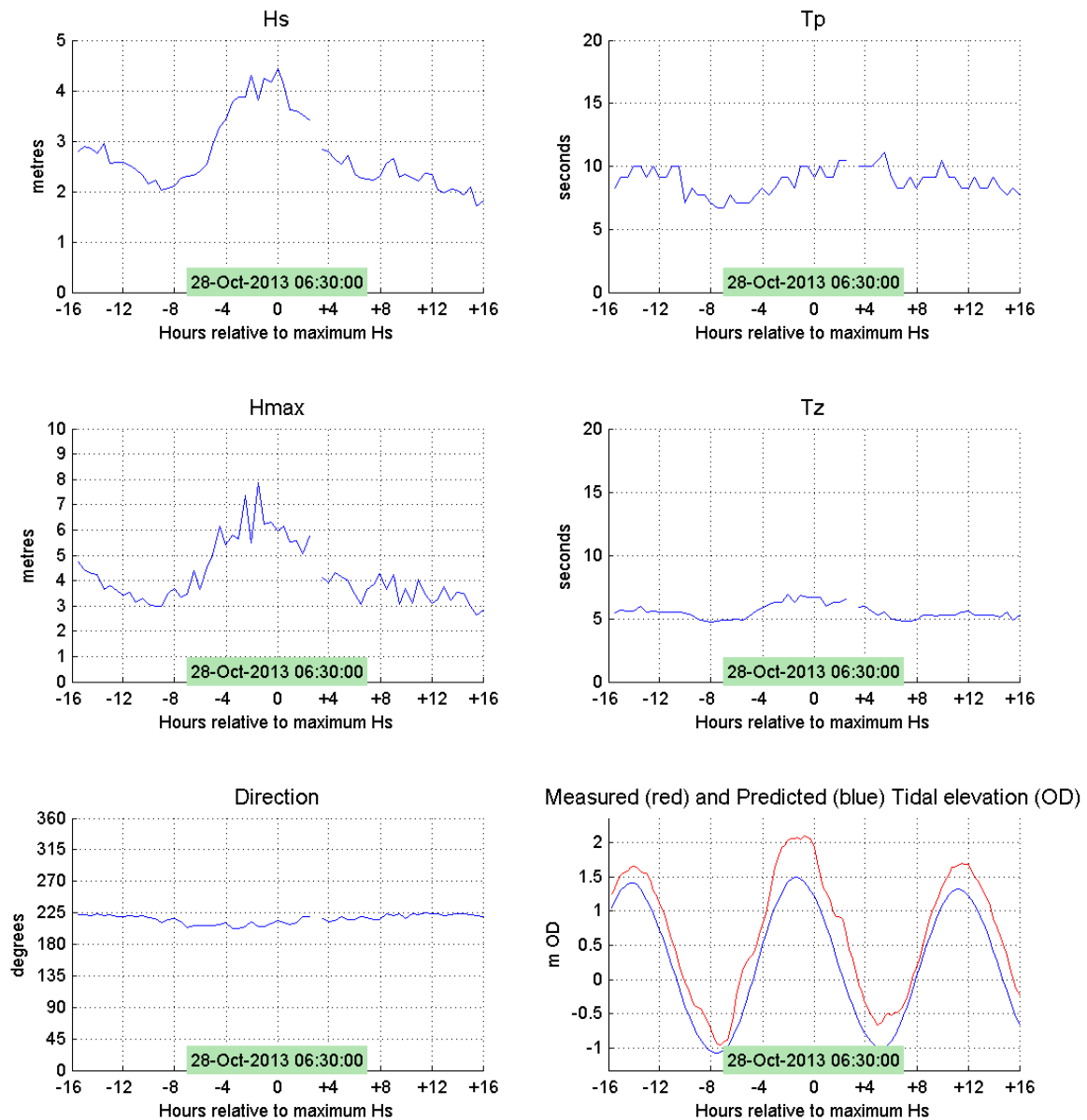
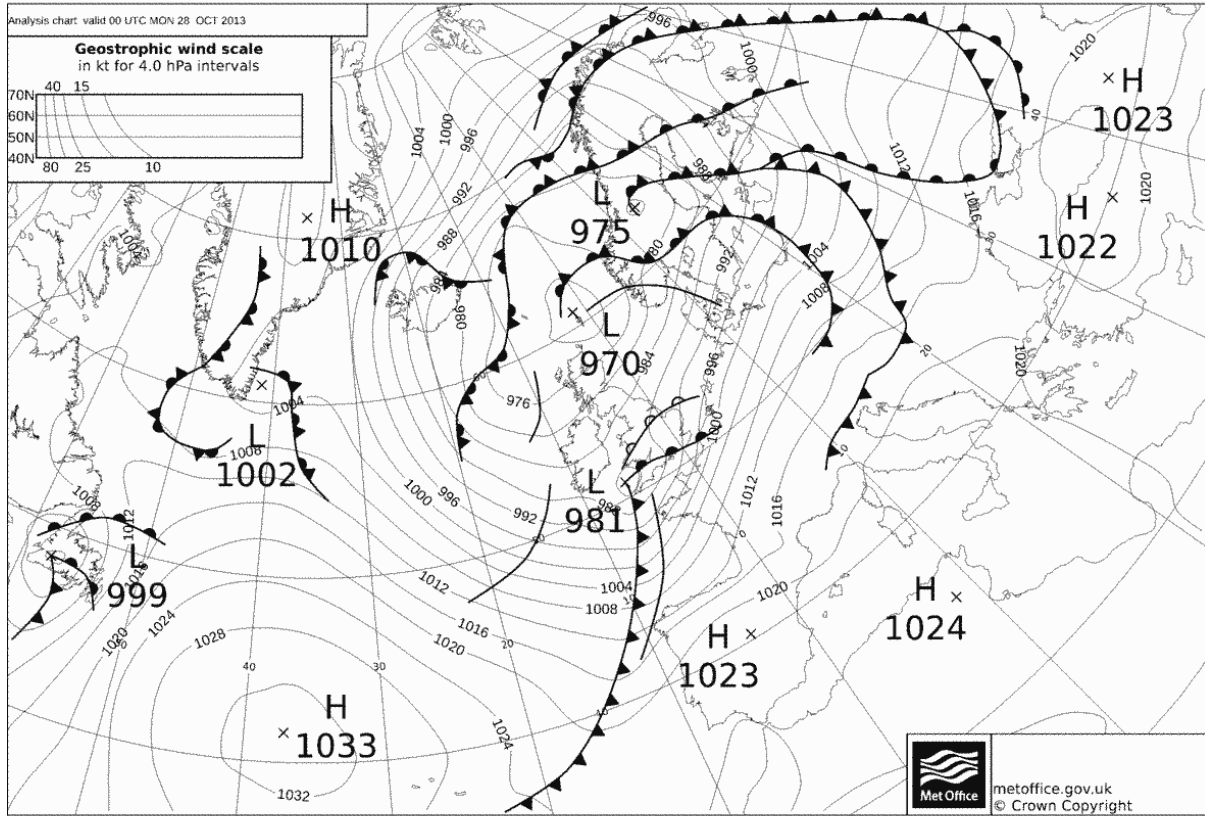


Figure D6: Second highest storm of the reporting period



Third highest storm

This storm resulted from a very deep depression (central pressure ~958 hPa) bringing Force 7 SSW winds. The peak of the storm reached 4.26 m significant wave height at mid-tide, although waves were already high at High Water a few hours earlier. Large surges of over 1 m were measured. Wave direction was from the SW during the height of the storm.

Pevensey Bay - Storms during Sep 2013 to Aug 2014

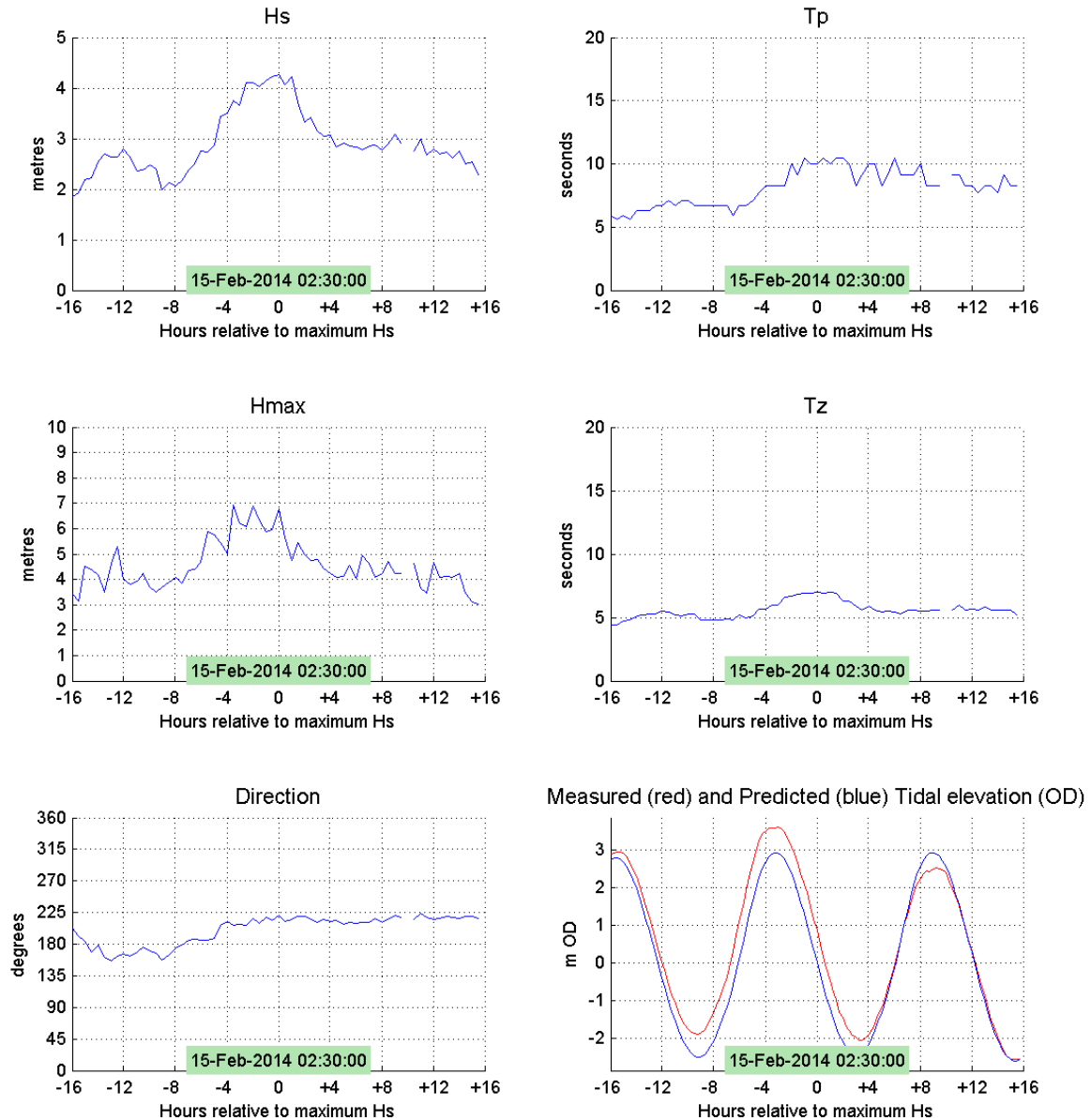


Figure D8: Third highest storm of the reporting period

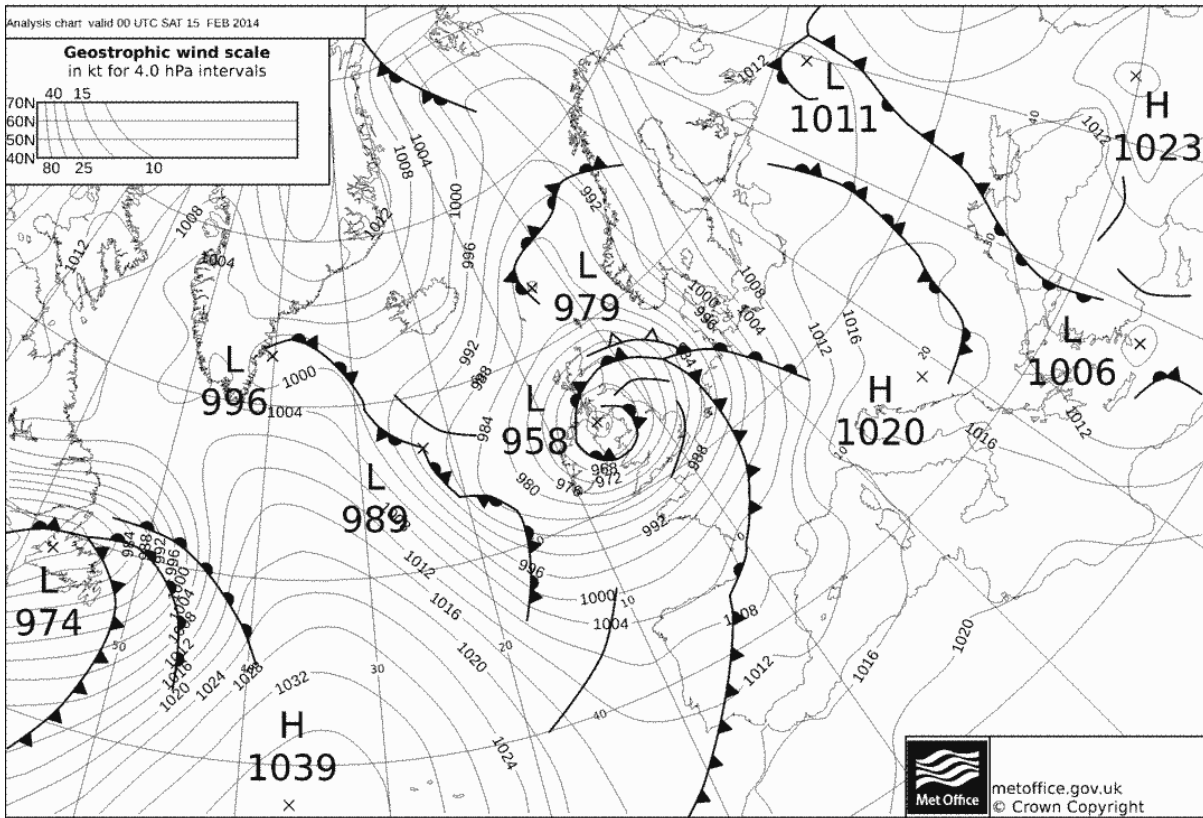


Figure D9: Surface Pressure chart on 28 October 2013 at 00:00Z

Fourth highest storm

This storm resulted from a very deep depression (central pressure ~947 hPa off western Ireland) bringing Force 7 SSE winds. The peak of the storm reached 4.0m significant wave height just after High Water. Wave direction was southerly throughout the height of the storm

Pevensey Bay - Storms during Sep 2013 to Aug 2014

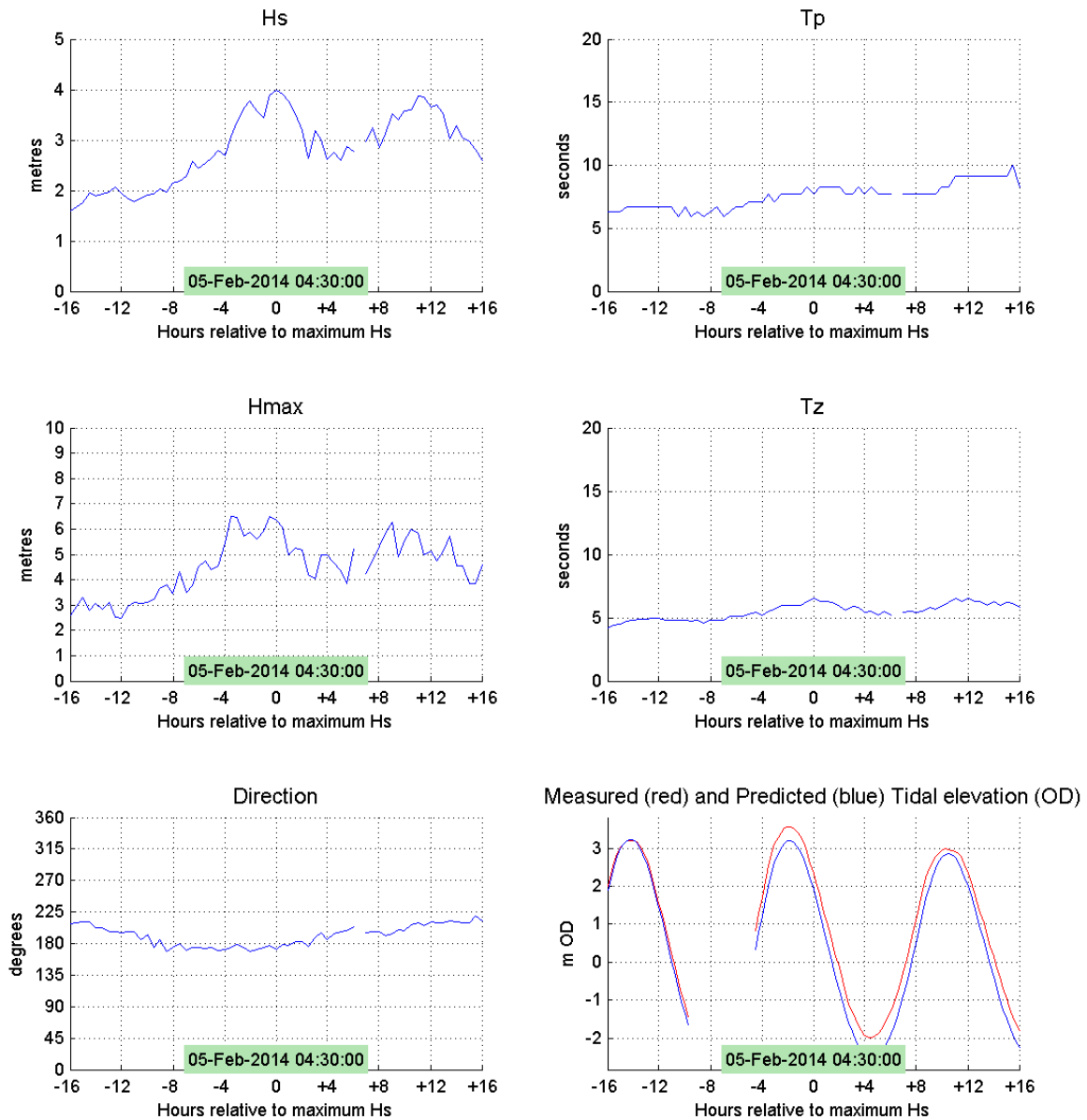


Figure D10: Fourth highest storm of the reporting period

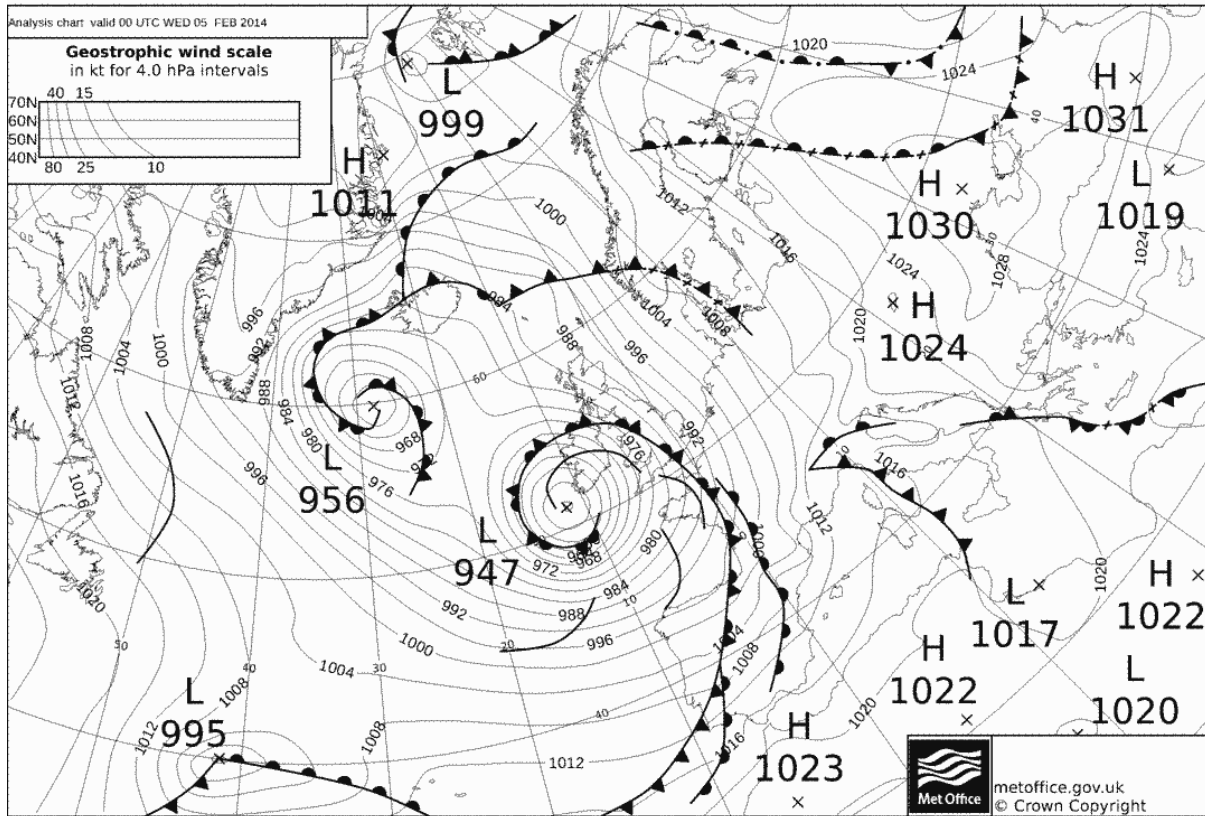


Figure D11: Surface Pressure chart on 05 February 2014 at 00:00Z

Fifth highest storm

This storm resulted from a complex low pressure system (central pressure ~955 hPa) bringing Gale Force 8 SSW winds. The peak of the storm reached 3.74m significant wave height close to Low Water. Wave direction was SSW throughout the height of the storm.

Pevensey Bay - Storms during Sep 2013 to Aug 2014

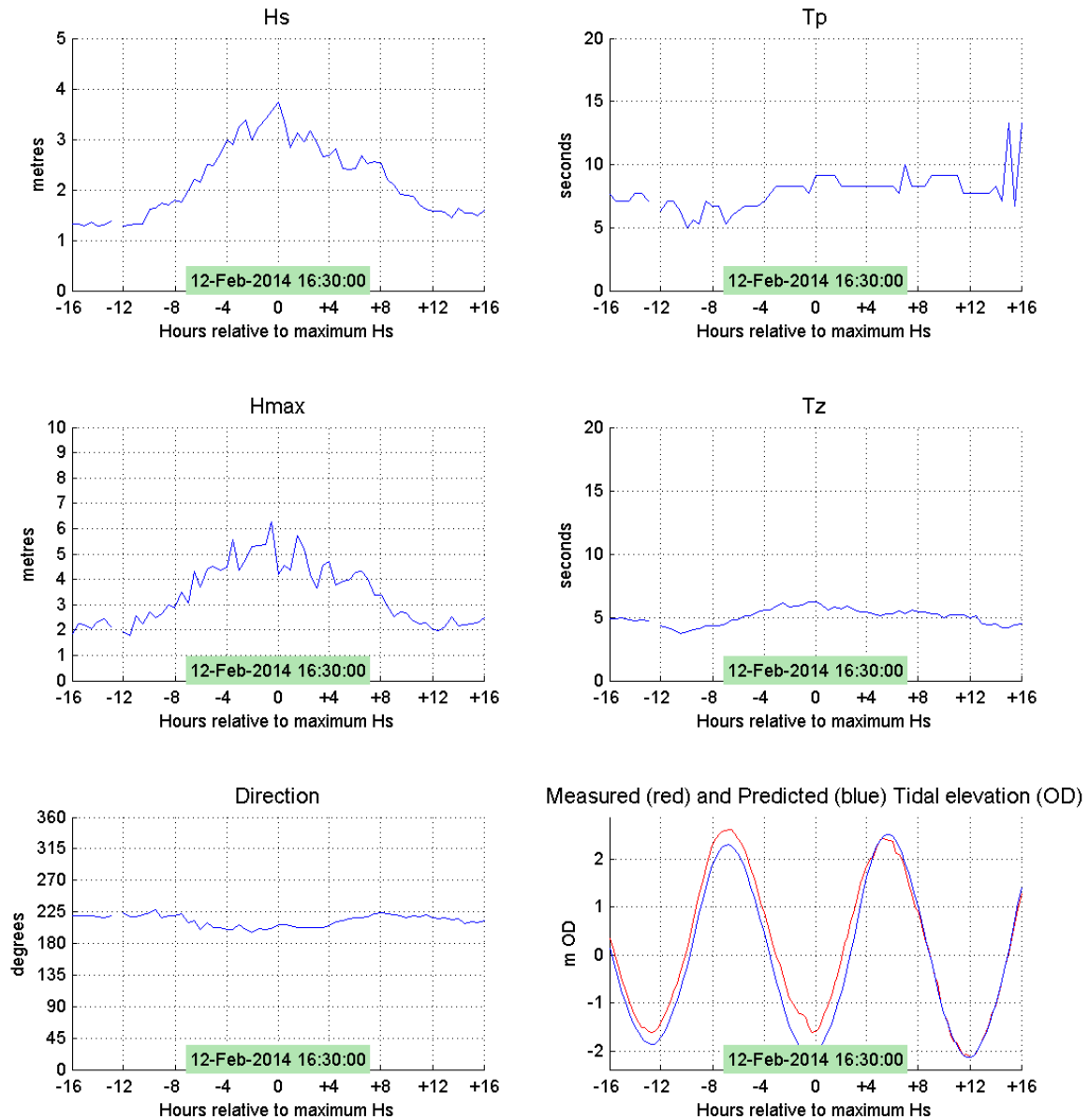


Figure D12: Fifth highest storm of the reporting period

