

STORM EVENT

9th November 2007

Predictions of a large North Sea storm surge result in closure of the Thames and Rotterdam Flood Barriers



Severity Ranking

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Social	<u>Loss of life</u>	*
	<u>Residential property</u>	*
	<u>Evacuation & rescue</u>	Norfolk police visited residents in 7,500 homes in Great Yarmouth and advised them to leave. 30 people were rescued from sheltered accommodation in Lowestoft, Suffolk by fire crews in Dinghies
Economic	<u>Cost</u>	Norfolk County Council incurred estimated damages of £170,000, and upwards of £53,000 in damages to Great Yarmouth Borough Council
	<u>Ports</u>	Felixstowe docks were closed
	<u>Transport</u>	*
	<u>Energy</u>	*
	<u>Public services</u>	*
	<u>Water & wastewater</u>	*
	<u>Livestock</u>	*
Environmental	<u>Agricultural land</u>	*
	<u>Coastal erosion</u>	*
	<u>Natural environment</u>	Several important coastal bird feeding grounds in England were flooded
	<u>Cultural heritage</u>	*
	<u>Coastal defences</u>	*

**No known sources of information available*

Source

The storm developed along the eastern US seaboard on 5th November 2007, and the low-pressure system moved across the Atlantic from Iceland towards southern Norway during 8th-9th November. While passing over northern Scotland on 8th November 2007, the central low pressure was 971 mbar at 1200 UTC (Parker & Foden, 2009). The steep pressure gradient generated severe gale force winds in northern Scotland with peak gusts of 82 knots [42 m/s] at Fair Isle (Eden, 2008; Horsburgh *et al.*, 2008). The winds over the North Sea were of a north to northwesterly orientation with maximum speeds of 49 to 52 knots [25 to 27 m/s] (Parker & Foden, 2009).

The storm generated a skew surge in excess of 1 m at 4 sites on the east coast of England. Water levels exceeded the 1 in 5 year return period at only one site: Lowestoft, where the high water on 9th November 2007 was of a return period of 1 in 19 years. The largest skew surge (1.56 m) was also at Lowestoft. Other reports also note skew surge values of above 1.5 m in the North Sea (Idier *et al.*, 2012), which decreased as the surge reached the English Channel. The skew surge at Newhaven was in the range of 0.5 to 0.75 m.

Wave heights in Walcott, Norfolk reached 12 ft. [3.7 m]. We are unaware of any further sources describing the wave conditions during this event.

Pathway

Most defences along the east coast experienced overtopping with some minor breaches.

Receptor & Consequence

This surge event, combined with high tides and strong winds had created fears of coastal flooding with the most threatening storm surge on the east coast in 50 years (BBC, 2007a; Flowerdew *et al.*, 2010). Worst case predictions were that the flood would be similar to 1953 (Institution of Civil Engineers, 2014). The sea level at Lowestoft was 0.71 m above the Environment Agency Alert Level (Met Office, 2011). In London, the Thames Barrier, and the Queensborough and Dartford Creek barriers were closed on 8th November (BBC, 2007b; Institution of Civil Engineers, 2014; Williams, 2007). No loss of life occurred but property was damaged (Met Office, 2011). In Norfolk, some defences experienced minor breaches and some coastal roads were flooded (Moore *et al.*, 2007). Residents of care homes and hospitals were evacuated by Norfolk Police, Norfolk County Council, and Great Yarmouth Borough Council (BBC, 2007b). Walcott, a coastal village in Norfolk, was among the worst affected areas where large waves breached the sea wall and damaged conservatories and holiday housing, also displacing caravans and boats across the coastal road (Williams, 2007). 30 people were rescued from sheltered accommodation in Lowestoft, Suffolk by fire crews in dinghies (Williams, 2007). Felixstowe docks were closed, and rail services were suspended between Lowestoft and Norwich due to flooding (BBC, 2007a). Costs of £170,000 to the Norfolk County Council were estimated, and upward of £53,000 to the Great Yarmouth Borough Council (although overall the performance of coastal defences was a success) (Ellis, 2008). Some erosion damage to natural defences was reported e.g. sand dunes at Hemsby, Scratby, and Winterton-on-Sea (Ellis, 2008).

Oil platforms located close to the Norwegian coast were closed, and the surge barrier in Rotterdam, Netherlands was closed for the first time since its construction in the 1990's (BBC, 2007a). In Dunkirk, Northern France, the storm surge was one of the largest since 1953. Fortunately, the peak surge occurred at low tide, reaching 1.2 m during two consecutive high tides (Maspataud *et al.*, 2012). This, in combination with waves, resulted in beach erosion, dune scarping, and flooding of seafront promenades (Maspataud *et al.*, 2012).

Table 1: High water levels (m CD) recorded at the UK National Tide Gauge sites that reached or exceeded a 1 in 5 year return level during the event.

Tide gauge Site	Date and time (GMT)	Return period (years)	Water level (m CD)	Astronomical tide (m CD)	Skew surge (m)
Newhaven	09/11/07 10:30	<1	7.09	6.51	0.58
Portsmouth	09/11/07 10:30	<1	5.02	4.59	0.43
Bournemouth	09/11/07 07:30	<1	2.49	2.09	0.41
Devonport	08/11/07 05:15	<1	4.93	5.19	-0.26
Newlyn	09/11/07 16:00	<1	5.18	5.2	-0.02
St. Mary's	10/11/07 04:30	<1	5.19	5.31	-0.11
Ilfracombe	09/11/07 17:30	<1	8.67	8.69	-0.03
Hinkley Point	09/11/07 18:30	<1	11.14	11.27	-0.14
Avonmouth	09/11/07 19:00	<1	12.6	12.71	-0.12
Newport	09/11/07 18:45	<1	11.47	11.6	-0.13
Mumbles	09/11/07 18:00	<1	8.92	9.35	-0.43
Milford Haven	09/11/07 17:45	<1	6.62	6.6	0.02
Fishguard	09/11/07 19:00	<1	4.47	4.41	0.05
Barmouth	09/11/07 19:45	<1	4.72	4.67	0.05
Holyhead	09/11/07 22:00	<1	5.36	5.25	0.11
Llandudno	09/11/07 22:30	<1	7.25	7.11	0.14
Liverpool	09/11/07 22:45	<1	9.18	8.91	0.27
Heysham	08/11/07 10:15	<1	9.27	8.81	0.46
Workington	08/11/07 10:15	<1	7.89	7.55	0.34
Port Erin	09/11/07 23:00	<1	5.01	4.92	0.08
Portpatrick	09/11/07 23:30	<1	3.75	3.67	0.09
Millport	10/11/07 00:00	<1	3.32	3.25	0.07
Port Ellen	08/11/07 13:30	<1	0.89	0.8	0.08
Tobermory	08/11/07 04:45	<1	4.34	4.05	0.29
Stornoway	08/11/07 05:45	<1	4.75	4.38	0.37
Ullapool	08/11/07 06:15	<1	5.2	4.69	0.51
Kinlochbervie	08/11/07 06:00	<1	4.96	4.42	0.54
Lerwick	08/11/07 09:45	<1	2.35	2.23	0.12
Wick	08/11/07 22:15	<1	3.4	3.25	0.16
Aberdeen	09/11/07 00:45	<1	4.42	4.06	0.36
Leith	09/11/07 01:45	<1	5.61	5.19	0.41
North Shields	09/11/07 02:15	<1	5.45	4.82	0.63
Whitby	09/11/07 03:15	<1	6.35	5.43	0.92
Immingham	09/11/07 04:45	<1	7.88	6.94	0.95
Cromer	09/11/07 05:00	<1	5.45	4.85	0.6
Lowestoft	09/11/07 08:15	19	4.13	2.57	1.56
Sheerness	09/11/07 00:00	<1	6.48	5.74	0.74
Dover	09/11/07 10:30	5	7.69	6.56	1.13

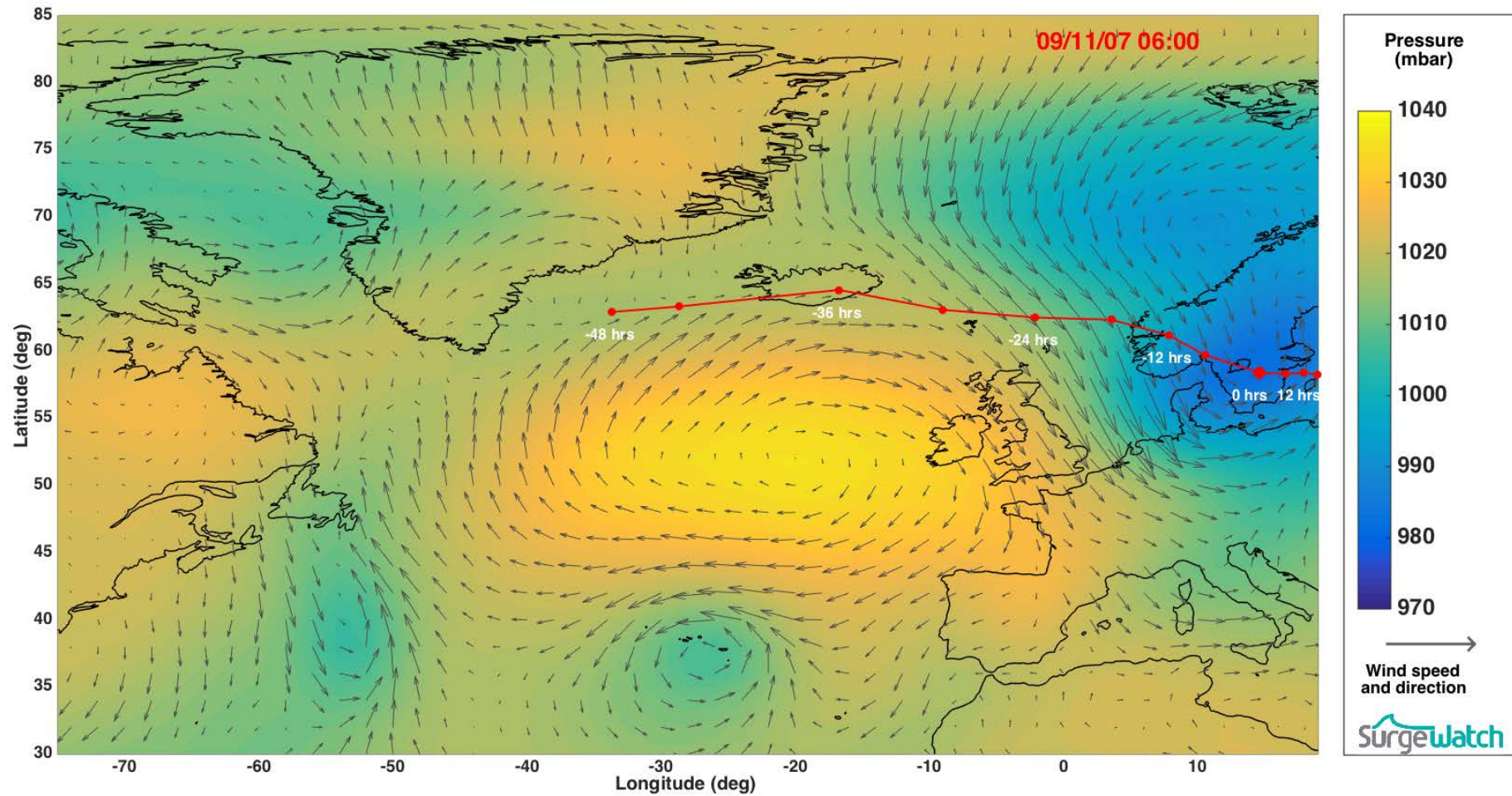


Figure 1: Meteorological conditions at time of maximum water level overlaid by the storm track

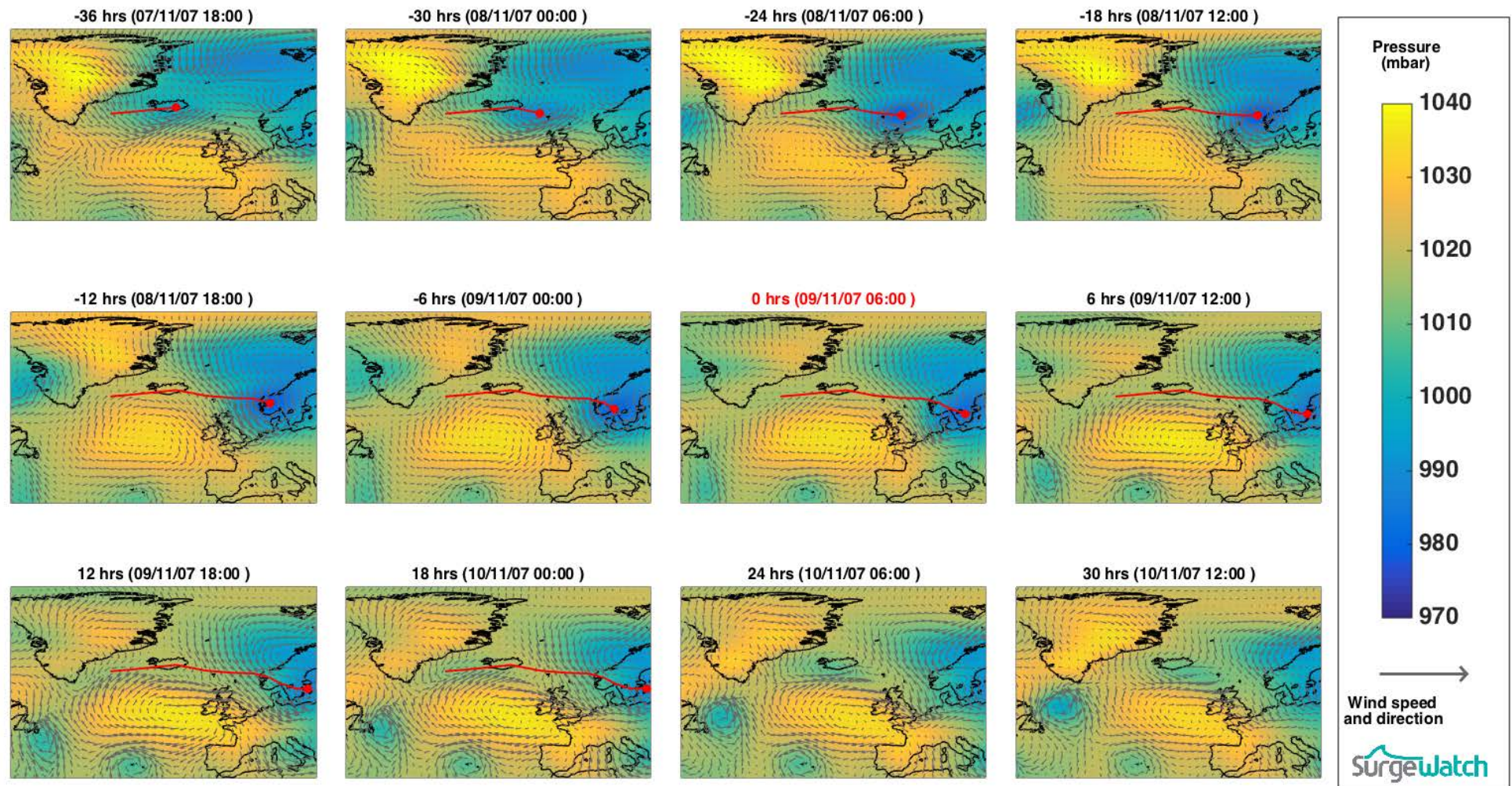


Figure 2: Meteorological conditions during event

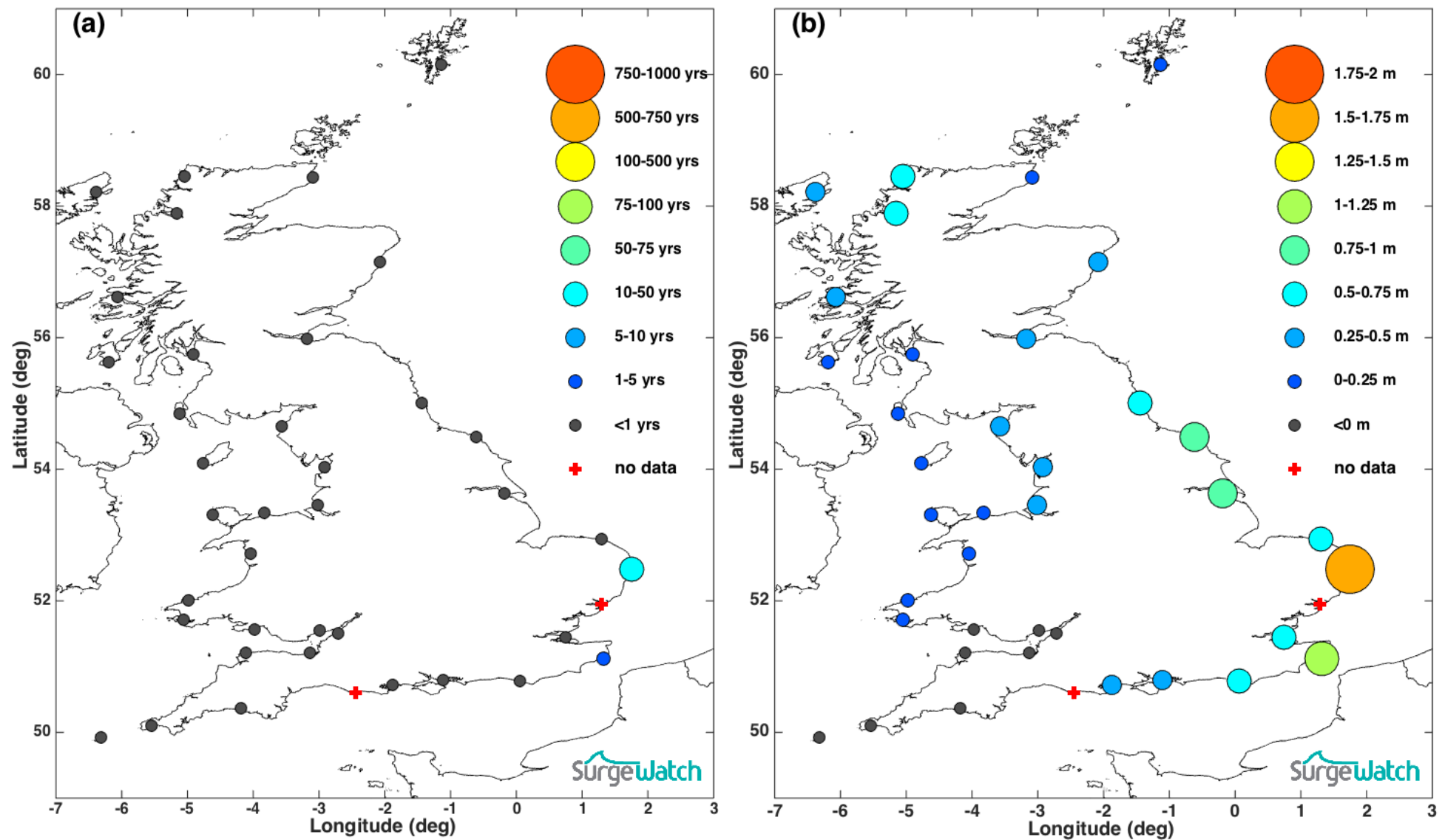


Figure 3: (a) Water level return period; (b) Skew surge levels

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