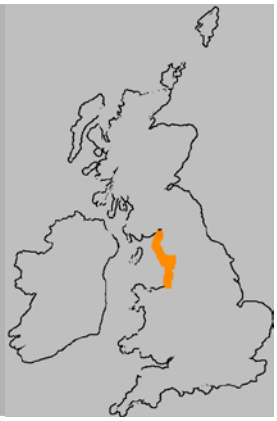
SurgeWatch

STORM EVENT

11th-12th November 1977

Disastrous coastal flooding at Fleetwood, with thousands of properties in Lancashire and Cumbria affected



Severity Ranking

				5	

Social	Loss of life	One person was drowned in their own home
	Residential property	Over 5,000 properties were flooded according to one source
	Evacuation & rescue	Around 3,600 people reportedly evacuated
Economic	Cost	Damages were estimated at £1m (approximately £6 million in 2014 prices)
	Ports	*
	Transport	*
	Energy	*
	Public services	*
	Water & wastewater	*
	Livestock	Around 900 cattle, sheep and pigs, and 6,800 poultry were killed
	Agricultural land	32 km^2 of agricultural land was inundated
Environmental	Coastal erosion	*
	Natural environment	*
	Cultural heritage	*
	Coastal defences	Around 60 breaches

**No known sources of information available*

Source	The storm developed east of Nova Scotia, Canada on 7th November 1977. The storm initially moved southeastwards and then northeast towards Scotland, and was located between Iceland and Scotland during the morning of 11th November, centered about 900 km north of Scotland with a central pressure of about 960 mbar. On 12th November, the storm moved east-southeast across Scandinavia, with strong south-westerly and westerly winds over the UK. According to Met Office (1977), severe gales were recorded over the Irish Sea on 11th February and wind speeds of up to 50 knots [26 m/s] of westerly orientation were reported for the English coast of the Irish Sea (Zong & Tooley, 2003). The storm generated a skew surge of over 0.5 m at 6 sites, from northwest England, northeast Scotland and the southern North Sea. Water levels exceeded the 1 in 5 year return period at 3 sites: Wick in northeast, and Scotland, Immingham and Dover in the North Sea. The highest return period water level was at Wick and was 1 in 13 years. The storm coincided with a spring tide and heavy rain (Met Office, 1977); and as noted below, data (not given here) more local to Fleetwood, northwest England indicates a more extreme event occurred than is represented by this database. For example, the water level return period near Fleetwood was estimated at approximately 1 in 30 years (Wicks et al, 2003). We are unaware of any sources of information describing the wave conditions during this event.
Pathway	There was a serious breach in Fleetwood during this event, which is where the most severe consequences were observed. Elsewhere it has been reported that there were 60 breaches of flood embankments (Fleetwood Weekly News, 2007) although it is not certain if this includes locations of overtopping and/or structural failures.
Receptor & Consequence	The combination of strong winds, high tides and heavy rain brought widespread flooding to north Lancashire, with considerable damage to properties along the coast (Met Office 1977; Zong and Tooley, 2003; Eden, 2008). One person was drowned during this event (*The Canberra Times,* 1977), and 3,600 were evacuated (Wadey, 2013). Although there is a lack of tide gauge data in the most flood-affected region, a 1.2 m surge and wave overtopping was reported at Fleetwood, which flooded 1,800 residential properties upto 1 m deep (Posner, 2004). Over 5,000 properties and 32 km^2 of agricultural land were flooded according to Fleetwood Weekly News (2007), mainly in the towns of Knott End, Pilling, Morecambe, Fleetwood, Lytham, Blackpool, Crossens and Haverigg. In some basement-level flats, the floodwater was ceiling-high. A total of 900 cattle, sheep and pigs and 6,800 poultry were killed by the floodwater. At Morecambe, quickly-rising floodwater which reached 0.5 m deep across agricultural land killed large numbers of livestock. Up to 20 m of sand dune erosion occurred in Sefton, along with damage to promenades, coastal parks and sea walls (Seftoncoast 2002). Damage of £1 million was estimated by Met Office (1977), equivalent to over £6 million today. The Times (1977) report that in Blackpool the sea wall suffered from three big breaches and at least 250 acres of land was flooded. The sea wall at Lytham St Annes suffered from overtopping with subsequent flooding of about 1,000 acres of agricultural land and at least 39 residential properties. Part of the West End pier at Morecambe was swept away, causing an estimated £100,000 in damage.

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)
Newlyn	11/11/77 17:00	<1	5.81	5.66	0.15
Ilfracombe	11/11/77 18:00	<1	10.06	9.65	0.41
Fishguard	11/11/77 19:00	<1	5.45	5.13	0.32
Holyhead	11/11/77 09:00	<1	6.08	5.8	0.28
Portpatrick	11/11/77 23:00	2	4.65	3.98	0.67
Ullapool	11/11/77 07:00	5	6.1	5.47	0.63
Lerwick	12/11/77 11:00	4	2.84	2.43	0.4
Wick	11/11/77 11:00	13	4.31	3.73	0.59
Immingham	11/11/77 18:00	<1	7.76	7.45	0.31
Lowestoft	12/11/77 10:00	<1	2.86	2.6	0.25
Dover	12/11/77 12:00	<1	7.07	7.13	-0.06

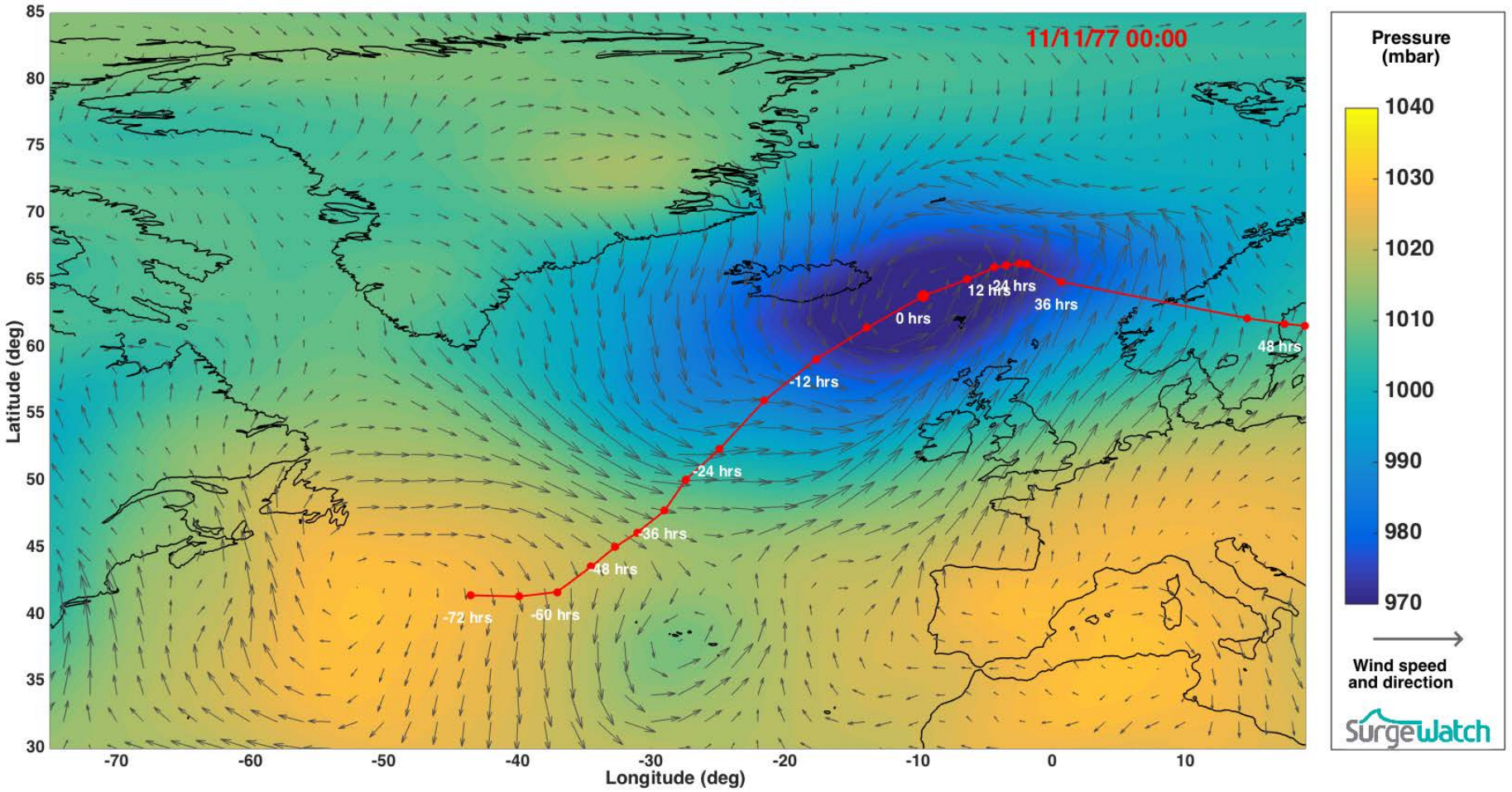


Figure 1: Meteorological conditions at time of maximum water level overlaid by the storm track

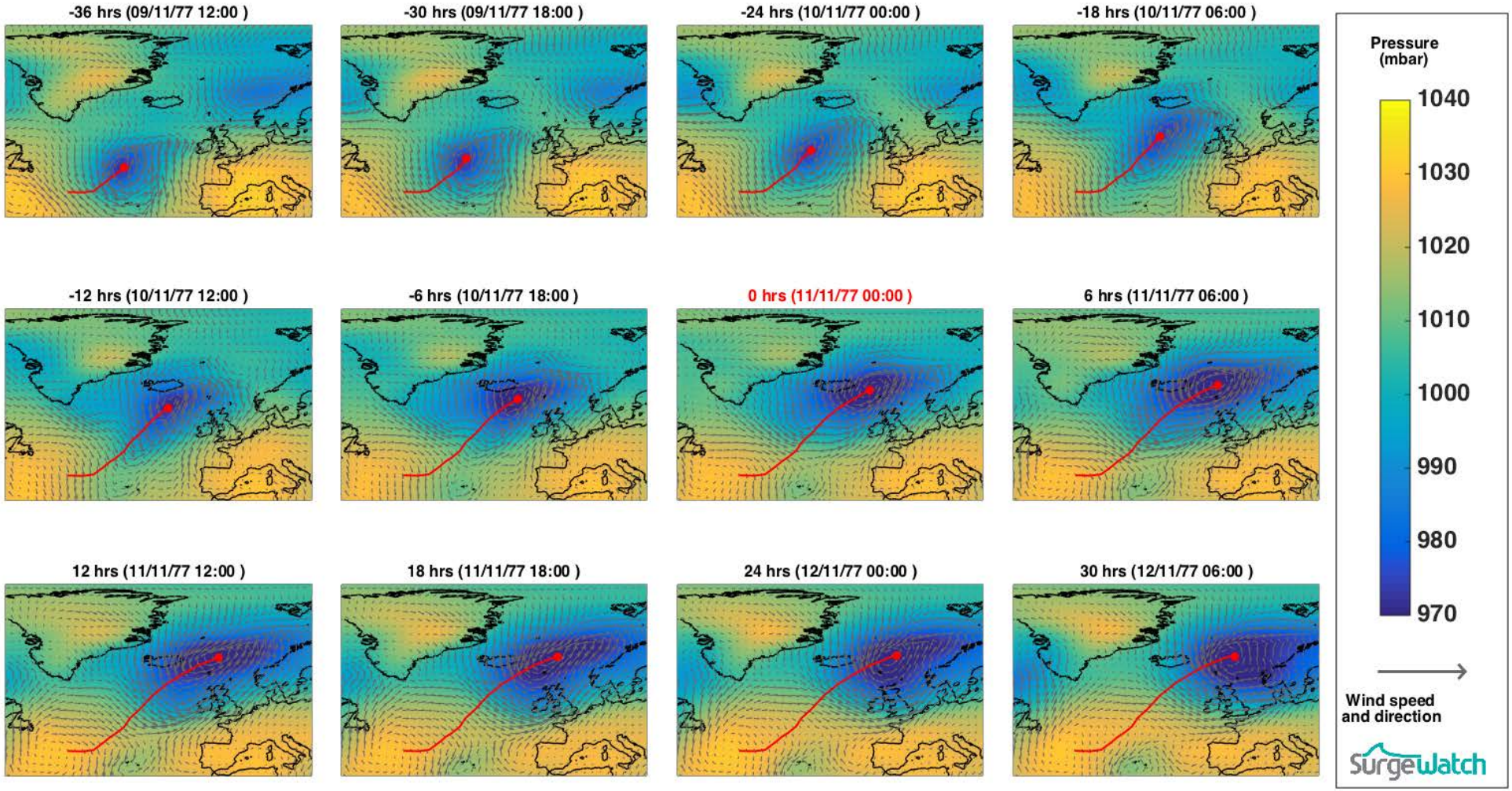


Figure 2: Meteorological conditions during event

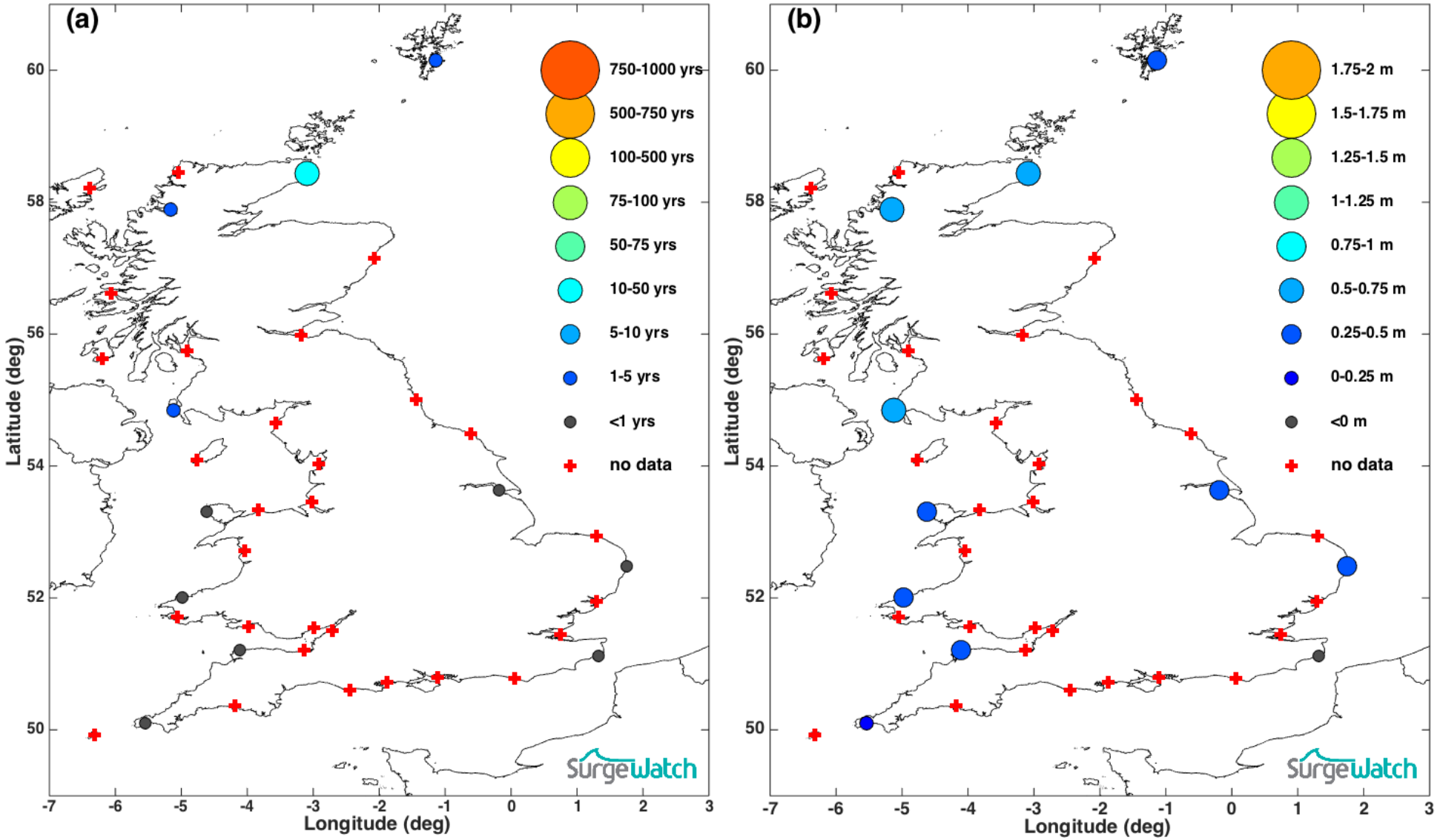


Figure 3: (a) Water level return period; (b) Skew surge levels

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Additional sources of information

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