SurgeWatch

STORM EVENT

13–17th December 1989

Significant coastal flooding along the UK south coast

Severity Ranking

			4		

Social	Loss of life	*
	Residential property	Around 80 properties were flooded in the Solent
	Evacuation & rescue	*
Economic	Cost	*
	Ports	*
	Transport	The Lymington-Brockenhurst railway line was inundated, and a coastal road at Seaview, Isle of Wight was washed away. Roads in Lymington and Old Portsmouth underwater.
	Energy	Electricity substations were flooded in Lymington
	Public services	*
	Water & wastewater	*
	Livestock	*
	Agricultural land	*
Environmental	Coastal erosion	*
	Natural environment	Flood water intruded some grazing marsh areas
	Cultural heritage	*
	Coastal defences	There were multiple breaches around the Solent (notably at Pennington), along with considerable overtopping

**No known sources of information available*

Source	The storm developed off the east cost of the US on 13th December 1989 and moved eastwards towards the UK. Whilst over the central North Atlantic, the storm started moving northeastwards and crossed Scotland on 17th December and continued into the North Sea. The central pressure deepened to approximately 940 mbar. Along the south coast, winds were gusting to over 70 knots [36 m/s] (Davison et al. 1993). The storm generated a skew surge of between 0.5 m and 1.25 in southwest England. Water levels exceeded the 1 in 5 year return level at one site: Newlyn. Here the return period water level was 1 in 5 years. The corresponding skew surge was 0.57 m. In Christchurch Bay, the sea level was reportedly the highest in recorded history (Davison *et al.* 1993). The event occurred a few days after peak spring tides. We know the event created much higher water levels along the south coast of the UK, but unfortunately none of the other UK national tide gauge sites were operational at the time between Newlyn and Dover. Interestingly, the storm may have generated a seiching event in the Channel which would have contributed to extreme water levels at the coast (Wells *et al*. 2001). Wave heights in parts of the south coast were reportedly 20 ft. [6 m] high (Davison *et al.* 1993).
Pathway	Defences around the Solent, Hampshire are known to have suffered from serious overtopping during this event, and some breaches. Hurst Spit was seriously eroded.
Receptor & Consequence	This event, which occurred over several days, is considered to be the worst flood to hit areas of the south coast for the past 50 years (Ruocco *et al.* 2011). The most badly affected areas included Old Portsmouth, Fareham, Emsworth and Cowes. There was flooding of over 50 properties on the 14th – 17th December at Lymington (New Forest, Hampshire). Here, the railway was inundated along with some electricity substations (NRA, 1990; Davison *et al*. 1993). At nearby Pennington, the sea broke through the embankment wall and caused widespread flooding of the grazing marsh and approximately 10 properties (NRA, 1990). In total, this event is estimated to have flooded around 80 properties (Wadey, 2013). There was also flooding in Christchurch Bay, including total inundation of Mudeford Quay. The Hurst Spit shingle barrier at the western entrance of the Solent was flattened by the storm on 16th – 17th December (Stripling *et al.* 2008; West, 2014). Towns were also flooded on the Isle of Wight, including Yarmouth and Cowes, whilst at Seaview a 250 ft. [76 m] section of the sea wall was destroyed and the coastal road washed away (Davison *et al.* 1993). At Portsmouth, coastal floods occurred on 14th and 16th December, impacting the Old Portsmouth and Eastney areas of the city (Met Office, 1989; Davison *et al.* 1993; PCC, 2008; Ruocco *et al*. 2011). Worst affected areas included Old Portsmouth, Fareham, Emsworth and Cowes. Parts of Old Portsmouth experienced flooding to several ft. deep and residential properties were not left unaffected. Local roads and residential properties in and around Fareham were inundated to depths of several inches, and a caravan park near Selsey was flooded once a 25 ft. [7.6 m] gap appeared in a nearby shingle bank. In Hythe, the town centre was flooded to several ft. deep which undoubtedly affected non-residential properties there. Likewise, the central shopping area in Cowes reportedly "disappeared" under the waves. The 16th December also saw severe floods further to the southwest, in the Scilly Isles.

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	16/12/89 07:00	5	6.23	5.66	0.57
Ilfracombe	16/12/89 08:00	<1	9.78	9.1	0.68
Avonmouth	16/12/89 09:00	<1	13.65	12.66	0.99
Mumbles	16/12/89 09:00	<1	9.99	9.02	0.98
Milford Haven	16/12/89 21:00	<1	7.63	6.61	1.03
Fishguard	16/12/89 10:00	<1	5.41	4.86	0.55
Holyhead	16/12/89 13:00	<1	6.23	5.77	0.46
Heysham	17/12/89 14:00	<1	10.01	9.12	0.89
Millport	17/12/89 15:00	2	4.36	3.84	0.52
Stornoway	15/12/89 08:00	<1	5.02	5.01	0
Ullapool	17/12/89 10:00	<1	5.29	5.02	0.27
Lerwick	15/12/89 12:00	<1	2.46	2.4	0.06
Wick	16/12/89 14:00	<1	3.73	3.61	0.12
Aberdeen	16/12/89 16:00	<1	4.56	4.36	0.2
Leith	15/12/89 04:00	<1	5.96	5.68	0.28
North Shields	15/12/89 05:00	<1	5.34	5.07	0.27
Whitby	15/12/89 05:00	<1	5.74	5.38	0.35
Immingham	15/12/89 08:00	<1	7.42	7.02	0.39
Cromer	15/12/89 08:00	<1	5.13	4.86	0.27
Lowestoft	15/12/89 11:00	<1	2.88	2.48	0.4
Sheerness	15/12/89 14:00	<1	6.41	5.77	0.64
Dover	15/12/89 13:00	<1	7.01	6.54	0.47

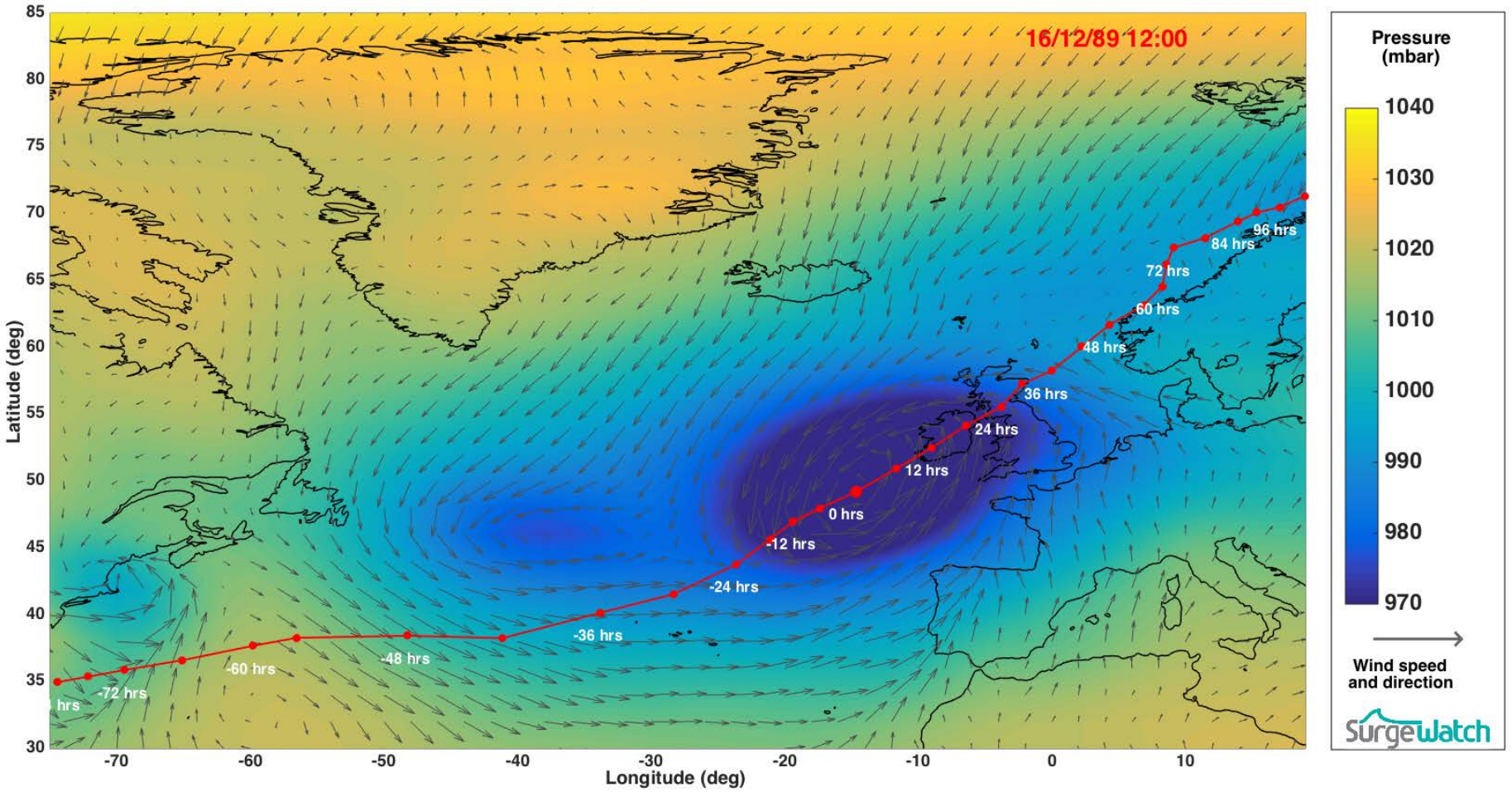

Figure 1: Meteorological conditions at time of maximum water level overlaid by the storm track

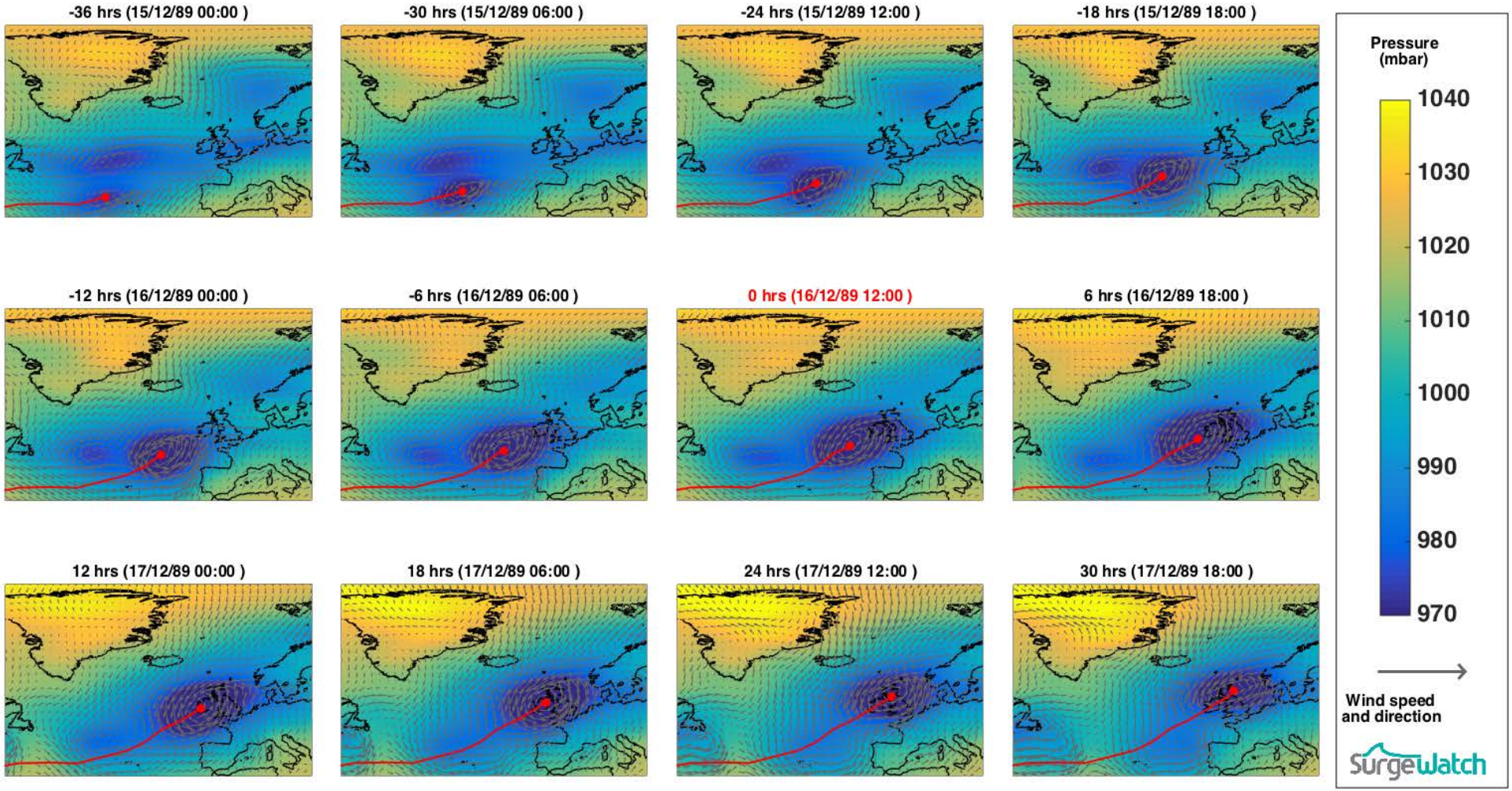

Figure 2: Meteorological conditions during event

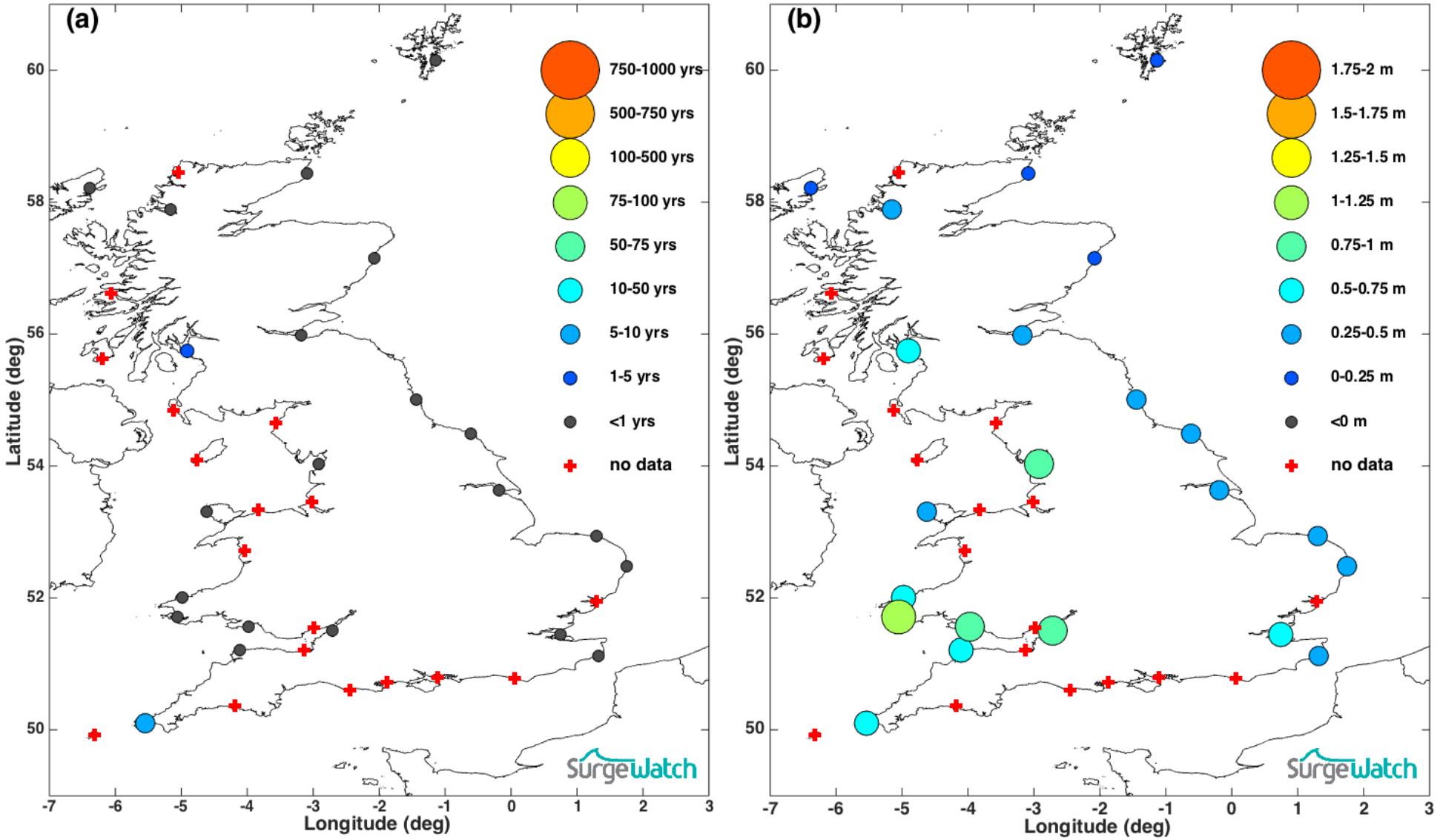

Figure 3: (a) Water level return period; (b) Skew surge levels

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Additional sources of information