Exceptional weather events

Type of event: Windstorm

Date: January 1991

The Windstorm of 5th January 1991

Weather Situation

From 20th December 1990 until 7th January 1991 winds were from between south and west in direction and strong and blustery for much of the time. Vigorous depressions moved eastwards well to the north of Ireland, generating strong southerly or southwesterly winds ahead of their warm-frontal troughs and cold, very blustery westerlies or southwesterlies behind the cold fronts.

What might be termed 'ordinary' gales occurred in the period 24th to 27th December 1990, on 1st, 2nd January 1991. However, on January 5th a deep depression moved eastnortheastwards close by Ireland (see map). During the afternoon of 5th its central pressure was about 946 hPa (hectoPascals, a unit which is equal to the more familar millibar), it was fully developed and passing by a degree to two degrees of latitude to the north of Malin Head. Thereafter it filled and by midnight it was over the northeast of Scotland with a central pressure of about 959hPa. It then continued to fill and moved into the North Sea.

The Windstorm of 5th - 6th January 1991

Ahead of the depression's a southerly gale or strong gale of a few hours duration developed late on 4th or early on 5th. Winds then veered southwesterly and decreased below gale force, only to increase again, as the depression centre approached, to reach gale to storm force from the southwest. During the afternoon and evening winds turned more westerly. As the depression filled during the evening winds began to decrease gradually, first in the west very late in the evening and then before dawn on 6th in the north and east.

After the Storm

Winds died down gradually on 6th only for another gale to develop in the north and west for a time on 7th. While wintry showers of snow, hail, sleet or rain had occurred in the last week of December 1990, the depression which moved northeastwards across the south of Ireland towards Anglesey on 8th caused more general snow especially over the east and midlands and parts of the south. With a depth of 15 centimetres recorded at Casement Aerodrome and 9cm at Birr there was major disruption of traffic on the evening of 8th. On 9th further troughs affected Ireland and caused outbreaks of snow, sleet or rain with thunderstorms in places in a generally southwesterly flow. During 10th we had a stiff westerly as further troughs caused wintry showers, some of snow. Luckily, temperatures rose enough to prevent snow becoming a major problem on main roads. During 11th a trough moved southwards giving some further wintry showers but with pressure rising the very unsettled spell gave way to predominantly anticyclonic conditions.

Windstrengths on 5th - comparison with storm of 9th February 1988

The enclosed table is to show the severity of the winds on 516th. Maximum 10-minute mean windspeeds ranged 37 to 54 knots (gale to storm force) with gusts 63 to 83 knots. For a similar storm which also moved eastwards to the north of Ireland on 9th February 1988, the corresponding ranges are 35 to 60 knots and 61 to 93 knots. Hence, the 1988 storm was generally a bit more severe.

The mean daily windspeeds for both these storms ranged from strong to strong gale force and this contrasted with the more 'run of the mill' gales of 24th to 27th December which were briefer with mean daily windspeeds ranging fresh to near gale force. However, at some stations the maximum gusts in December and to a lesser extent the maximum 10-minute mean speed were similar; this applies especially to the stations near the south coast where the duration of continuous gales was greater in December at Cork Airport.

Indeed, it was the duration of the gale which was the most notable feature of the storms of 5th January 1991 and of 9th February 1988; in this they were comparable and hence we have had two most unusually prolonged windstorms within 4 years.

For gusts and mean speeds neither of the storms set any records at stations with more than 20 years of wind record. Of the 14 stations recording on 5th, six had ten or more hours of continuous gale force winds and in this it was the equal of the February 1988 storm.

The 54 knot storm force wind has been exceeded 5 times in January at Belmullet since recording began there in 1957 while the 83 knot gust is the 4th highest recorded in January.

However, at Claremorris the 49 knot wind has been exceeded only once in 42 January's and the same holds for the 77 gust recorded there i.e. these January values have a return period of some 20 to 25 years; this is the highest return period associated with gusts and 10-minute mean speeds recorded.

As repeatedly emphasised it was the duration of the gale which made the storm of 5th - 6th January 1991 an unusually severe event over land.

Waves

With a generally southwesterly flow over the Atlantic from late December, the fetch was very long and the waves whipped up by this storm were unusually high. Unfortunately, we have no observations but the prediction of a reliable wave model was of 13 to 15 metres significant height (classified as phenomenal) in deep water off the west coast.

As the significant height is that of the highest one third of the waves we may reasonably expect that to the west of Ireland individual waves reached a height of about 25 metres, perhaps even 30 metres.

Windstorm of 5th-6th January ,1991 with (in brackets) figures for the gales of 24th-27th December 1990 Speeds in Knots; Durations in Hours

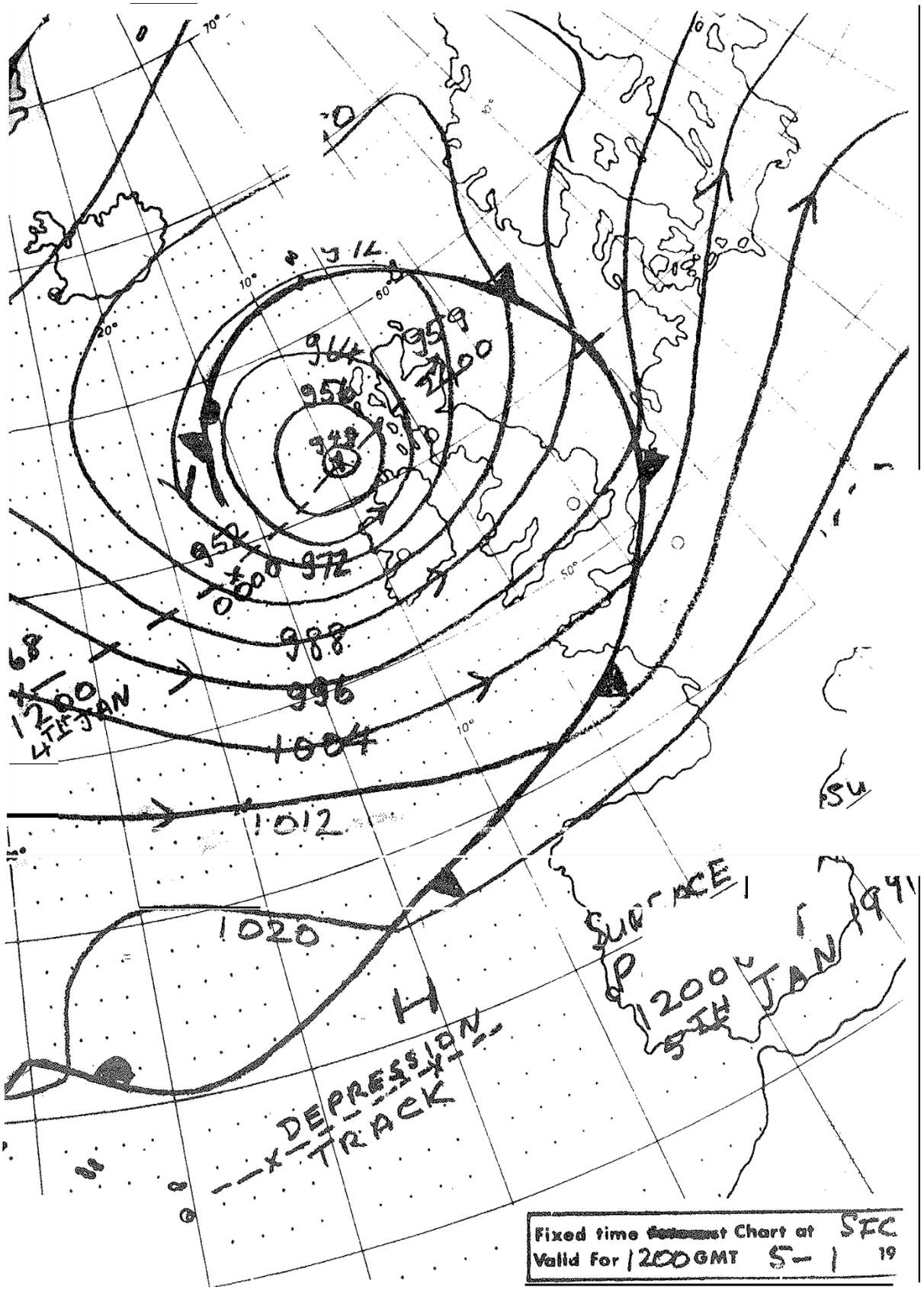
	Maximum 10-minute mean speed	Maximum Gust	Mean Wind Speed on 5-J-ql l	Mean Wind Speed on l¾-2- 'l *	Duration of continuous gale 5 - 6 January '91	Duration of continuous gale on 9 February '88
Belmullet	54 (47)	83 (64)	41 (29)	45	21 (6)	22
Birr	37 (29)	64 (56)	25 (17)	26	1-(0)	1-
Casement Aerodrome	47 (45)	72 (73)	38 (30)	39	20 (8)	16
Claremorris	49 (40)	77 (71)	35 (22)	38	14 (1)	18
Clones	37 (42)	65 (62)	25 (19)	31	1(1-)	6
Cork Airport	44 (40)	67 (62)	31 (25)	30	Z (4)	2
Dublin Airport	46 (42)	66 (57)	34 (25)	36	18 (1)	17
Kilkenny	44 (35)	64 (62)	28 (20)	28	6 (0)	1-
Malin Head	51 (47)	68 (69)	34 (32)	42	10 (8)	16
Mullingar	37 (31)	63 (56)	26 (17)	28	2 (0)	1
Roches Point	50 (50)	73 (68)	33 (26)	36	6 (6)	5
Rosslare	39 (40)	67 (64)	30 (25)	25	Z (0)	1-
Shannon Airport	45 (36)	75 (59)	31 (23)	34	12 (1)	12
Valentia Observatory	40 (35)	72 (64)	31 (25)	33	6 (0)	11

* Storm of 9/2/'88 similar to but a bit more severe than storm of 5/1/'91

** Speeds in knots, 1 knot= 1.15 miles per hour= 0.515 metres per second

*** Bracketed figures refer to gales of 24th - 27th December - the extreme values for the period are used

The Mace Head Station run by U.C.G. had 10m means of 60 knots and gusts to 90 knots on morning of 5th.


964
952
940
952
960
972
988
996
1004
1012
1020
H
DEPRESSION
TRACK
1200 4TH JAN
1200 5TH JAN
SURFACE
Fixed time forecast Chart at SFC
Valid For 1200 GMT 5— 1 19