Coldest December since 1981

--storm damage on south and east coasts
--problems with smog in urban areas

During the first 10 days of the month an anticyclone dominated, giving light mostly easterly winds and dry weather. Between 1st and 3rd fog and frost were persistent in many inland areas as was smoke pollution in some urban areas (see article inside). From 4th to 10th there was more cloud and so frost and fog were less widespread and less persistent. Between 11th and 15th low pressure centres to the south and east maintained an easterly flow but conditions were much more unsettled with heavy rain especially near the south coast. On 16th-17th a deep depression (see back page) came in over the south of Ireland and moved northeasterwards towards the south of Scotland. Heavy seas and high tides caused damage near the south and east coasts but the passage of the depression brought in the first westerly windflow of the month on 17th. The westerly soon slackened with fog and frost on 18th and 19th as a ridge moved eastwards across the country.

Christmas Day
Between 20th and 25th a deep low-pressure centre dominated the Atlantic weather picture. Secondary depressions swinging round the main centre caused winds over Ireland to blow from between south and west in direction while troughs crossed Ireland from time to time. Between 23rd and early on 25th we had the most severe winds of the month and some heavy rain. On Christmas Day we were in a southwesterly windflow with sunshine and some showers, mostly early in the day. During 26th and 27th the dominant depression weakened and as pressure fell west of Spain, winds became variable and then easterly or southeasterly over Ireland and a high pressure area developed over Scandinavia. Winds then turned more southerly as troughs slowly approached from the Atlantic.

Wet near south coast - dry in north
Rainfall amounts ranged from 239 millimetres at Cork Airport to 46 mm at Malin Head where it was the driest December for 26 years. Totals exceeded 150% of normal on the south coast but were less than 50% of normal in the extreme north and northwest. Most of the disparity arose between 11th and 15th when Cork Airport recorded over 110 mm of rain while Malin Head had some 4 mm. Areas near the south coast had particularly heavy falls on 11th, 13th, 14th and 16th. Other wet spells occurred between 23rd and 25th and on 20th. The period 1st to 10th was dry and amounts of rain were small between 25th and 30th. Highest daily total was 51 mm recorded at Cork Airport on 16th but it also had 48 mm on 13th and 34 mm on 11th. Thunder was recorded on 16th as a deep depression approached the southwest and also on 24th and early on 25th as an active

(continued on back page)
Meteorological Summary

| Station       | Rainfall | Air Temperature | Sunshine | Wind | Number of days with Gale Force
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<td>Most in a Day</td>
<td>Mean</td>
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<td>2 29.1 5.8 12 41 15 -7 - - 10 4</td>
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NOTES: Rainfall in millimetres. Temperature in Degrees Celsius. Sunshine in hours and wind in knots. Gale force = 33.9 knots. * = days with 0.2mm or more
Weather of 1989

Highest mean max. temperatures for 14 years or more

Most notable features were:
1. The very mild conditions of January
2. The cold unsettled weather of April
3. Warm, sunny conditions from May to July
4. Record 24 to 36 hour rainfall in October
5. Problems with frost, fog and smog in November and December.

Except near coasts in the north and west mean annual temperatures were the highest since the mild 1983 or before; in Munster and east Leinster they were the highest for 30 years or more. At Dublin Airport (10°C), it was by 0.4°C the highest annual mean since recording commenced in 1942. Daily maximum temperatures were between 0°C and 14°C above normal. Only Roché's Point and Galway had absolute maxima higher than those of 1983. Roché's Point had a maximum temperature on July 17th which was 2°C cooler than the 26.5°C recorded in August 1976. Lowest temperature of the year was -7°C, recorded at Kilkenny on November 27th and at Birr on the 1st of December.

Rainfall
Rainfall totals varied between 1374 millimetres at Cahirciveen (Valentia Observatory) and 555 mm at Dublin Airport. At some stations in Leinster it was the driest year since 1975 or 1976 but at Dublin Airport it was the driest on record. Percentage totals ranged from 74% at Dublin Airport to 118% at Belmullet. Highest daily totals were 65 mm, recorded at Belmullet on October 27th; more than 130 mm fell there in a 36-hour period over 27th-28th.

Sunshine
Sunshine duration ranged from 1656 hours at Rosslare to 1228 hours at Birr while percentage totals varied between 122% at Clones and 24% of normal at Belmullet and Birr. Even at Belmullet and Birr it was the sunniest year since 1982 and at Cahirciveen, Casement Aerodrome (Baldore), Clones, Cork Airport, Kilkenny and Roché's Point sunshine totals were the highest for 20 to 30 years.

Winds
Strongest winds were recorded in February, October and December. Highest gusts were 86 knots (99 m.p.h.), recorded at Malin Head on February 13th. Gusts between 70 to 75 knots were recorded at coastal stations of Munster on October 28th. Between 23rd and 25th of December gusts in range 60 to 70 knots were recorded at quite a number of stations with Belmullet recording 78 knots on 24th. Near the south and east coastals damage was caused by high seas and high tides on December 16th - 17th.
Smog in Dublin

How bad was it?

The graph presents a clear picture of the severity and duration of the latest smog episode to affect Dublin. On 13 of the 17 days in the period from the 24th of November to the 10th of December, smoke concentrations in excess of the EC limit of 280 microgrammes per cubic metre were measured in the city. Of these days, the amounts measured were more than twice the limit, while on Friday the 1st of December, the monitoring stations at both Ballyfermot and Crumlin measured concentrations four times the European limit. Higher peak values were recorded during the smog of November last year, but that episode only lasted for four days.

What causes smog?

Atmospheric pollution concentrations have risen significantly in the Dublin area since the late 1970s. The oil crises of the 70s led to a substantial increase in the use of coal for domestic heating, which is the main source of smoke in the city. Most of the time the atmosphere does a good job of getting rid of pollution, through dispersal by the wind, dilution by turbulence and cleansing by rain. High pressure situations however, the atmosphere becomes stagnant: there is little or no wind or rain and turbulence is damped by a temperature inversion. In summer that means warm, sunny weather, but in winter it means a settled period of cold weather in which, naturally, people light fires to keep warm. The problem is that the resulting smoke pollution has nowhere to go, and the longer the episode lasts, the more the smoke levels build up.

The meteorological situation

That is exactly what happened late last month, when a high pressure area centred near Iceland slipped southeastwards to cross Ireland on the 26th and 27th of November. By the end of the month the high was centred to the east, and the first two days of December saw the worst conditions of the period, with persistent fog and frost and very high smoke levels. The centre of the high shifted to the northwest during the next couple of days as pressure fell over Scandinavia. There was more cloud and temperatures were higher, especially at night. It remained hazy, but fog was not persistent, except on the 9th. However the meteorological situation remained anticyclonic with light winds and temperature still a bit below normal. Smog remained a problem until the area of high pressure slipped back southeastwards during the 9th and 10th, after which we had much more unsettled and at times quite blustery conditions. A welcome change nonetheless.

A hazy Halpenny Bridge on Saturday, 3rd December 1989 (Irish Times Photo)
cold front moved slowly eastwards across the country and a showery southwestely developed behind it.

Coldest December for 7 or 8 years
The period 1st to 3rd was the coldest of the month with maximum temperatures less than 0°C at some stations on 2nd/3rd because of the persistence of freezing fog. While frost was less widespread between 4th and 9th and daytime temperatures recovered somewhat, mean temperature remained below normal. During 10th to 15th easterly winds dominated and while there were some incursions of mild air over the south, they failed to reach northern areas. Indeed mean temperatures did not exceed normal values in all areas until 16th and 17th only to fall again on 18th and 19th as frost returned. The period 20th - 24th saw the highest temperatures of the month. On Christmas Day temperatures were just about the normal values for December. Frost returned on 25th and 27th but the period 28th to 31st was frost-free with daytime temperatures about or above normal. Except near the south and east coasts both maximum and minimum temperatures were below normal, by more than 1°C in some areas. Indeed mean minimum temperatures were 2.0°C below normal at Belmullet. Highest temperature of the month was 13.7°C recorded at Dublin Airport on Christmas Eve. Lowest was -7.0°C read at Birt on 1st.

Sunshine - west and north coasts fare best
Totals for the month varied between 54 hours at Cahirciveen (Valentia Observatory) and 18 hours at Clones. Much of the disparity arose between 1st and 5th when Cahirciveen had a total of 27 hours while Clones had only 1 hour. Percentage totals ranged from over 125% of normal near west and north-facing coasts to 51% of normal at Clones; in most areas the percentages were between 60% and 85%. Sunniest days were 1st, 2nd, 5th, 12th and 26th. Belmullet and Cahirciveen had their sunniest December for 19 years while Dublin Airport had its dullest December for 18 years.

Winds
Strongest winds occurred between 23rd and early on 25th when gusts of 50 to 70 knots occurred at quite a number of stations and the highest gust of the month (79 knots) was recorded at Belmullet. On 11th, 13th and on 16th-17th gusts of 40 to 55 knots were widely recorded with some gusts of 55 to 65 knots at Cahirciveen. As well as the southerly gale of 24th some southern and eastern coastal areas suffered damage from the storm of the 17th (see below).

Fog and Smog
Freezing fog was persistent inland between 1st and 3rd; it also occurred on 5th and 6th, 18th-19th and 26th-27th but was less persistent. The smog in Dublin during December is described inside. On 26th and early on 27th smog was again a problem in Dublin. Fog was widespread on 12th.

Record low pressures during storm of 17th
A deepening depression which originated in the South Atlantic approached the southwest of the country late on Saturday the 16th. It came in over southwest Munster at about midnight, at which stage pressure at the centre of the depression was about 941 hectoPascals [1 hectoPascal(hPa)=1 millibar].

As it moved northeastwards, crossing Dublin early on Sunday morning and heading out over the Irish Sea towards Scotland, a number of weather stations recorded their lowest pressures since a similar storm crossed the country on the 4th of February, 1951.

The wind speeds associated with the depression were not exceptional. The damage along the south coast and to a lesser extent on the east coast was caused by a combination of high seas, high tides, and heavy rain. The high seas had been generated during the long passage over the Atlantic. The high tides were partly caused by the low pressure - the effect of low pressure is to raise the tide by about half a metre for every 50 hPa below normal values, and for a time that day pressures along the south and east coasts were between 60 and 70 hPa below normal.

Published by the Meteorological Service, Glasnevin Hill, Dublin 9. (Phone 424111).
An annual subscription to the Monthly Weather Bulletin costs £20.