Dull, settled weather for much of December

Mild, wet and windy from the 17th to the 23rd
High pressure rules o.k.

December was for the most part a settled month. The weather of the first fortnight was dry and dull thanks to the influence of an anticyclone, and high pressure returned to end the month with a further week of similar weather. In between these settled spells, from the 14th to the 23rd, was the wettest, windiest and mildest period of the month. It was during this unsettled period that the only occurrences of hail, snow and thunder were reported. It was quite a blustery period, with gale gales each day at all stations and rough or very rough seas.

A ridge of high pressure moved eastwards on the 1st of the month. By the 2nd we had a high centred to the east. This centre of high pressure moved a little westwards on the 3rd and northwards on the 4th to become centred north of Scotland. It then drifted southwards into Europe during the period from the 5th to the 7th. It remained the dominant feature of our weather until the middle of the month. Winds during that period were predominantly light southeasterly to southerly. While it was hazy and there was no frost inland — mostly between the 9th and 12th — we largely escaped the freezing fog which was persistent over England.

The settled spell broke on the evening of the 14th as pressure fell and some showers developed, including some thundery activity in the extreme southwest. The change to more unsettled conditions continued on the 15th when a trough moved northwards near the east coast in a slack southerly airflow. The Atlantic influence became more prominent on the 16th, as a trough moved eastwards across the country. There was widespread mist and fog and occasional rain on both the 19th and 20th.

A deep depression moved northwards towards Iceland on the 17th. Its trailblazers crossed Ireland giving a blustery day with rain clearing to scattered showers as winds veered from southwesterly to westly. An area of thunderstorm activity to the north occasionally affected Ulster counties during the afternoon and late evening of the 17th. The 18th was a mild day as warm backed southerly ahead of a warm front which crossed the country that evening. An active cold front followed early on the 19th and in the westerly behind it winds gradually increased. Near north and west facing coasts there were some severe squalls in showers, some of which were of hail, sleet and snow and accompanied by thunder during the 19th and early on the 20th.

Later on the 20th and on the 21st a warm front moved northeastwards over Ireland and, in the mild of strong...
Freak Wave

Four crewmen died as a freak wave destroyed the wheelhouse of a Russian fish factory ship between the west coast of Scotland and the north-east coast of Ireland on Wednesday the 18th. The series of very deep depressions that had affected the area during the previous couple of days had brought strong to gale force westerly winds which, with the long fetch over open ocean, had generated waves of between 8 and 10 metres significant height in that area by the 18th.

(Significant wave height is defined as the average height of the highest one-third of the waves. Normally, the highest wave of all would probably be double the significant wave height. However a freak wave is a wave of very considerable height ahead of which there is a deep trough. Thus it is the unusual steepness of the wave that is its outstanding feature and which makes it dangerous to shipping.)

southwesterly which developed, the highest temperatures of the month were recorded. The overcast conditions on the 21st prevented the sun shining through the passage at Newgrange to mark the winter solstice. However, late on the 22nd and early on the 23rd, active cold fronts moved south-eastwards and behind them there was an extremely sharp rise in pressure and some severe gusts as winds veered north-westerly and temperatures dropped sharply. A gust of 74 knots at Valentia Observatory on the 20th was the strongest of the month. Most other stations recorded maximum gusts in excess of 60 knots during that week.

The weather settled down again for the Christmas period. Pressure exceeded 1044hPa near the south coast and winds backed to a south-westerly direction on the 26th at a high pressure area moved eastwards. Its influence determined conditions for the remainder of the month. On Christmas Day the south-westerly winds increased but away from the northwest coast it was essentially dry and fairly mild. During the 26th a weak cold front moved southwards and winds slackened as they turned more to the northwest but it remained cloudy. There was extensive fog on the 27th as a ridge moved eastwards across the south and a slack south-westerly developed.

It remained dull and misty but there was much less fog on the 28th. During the 29th winds became variable in the extreme north as a weak cold front became slow-moving there. The front moved back northwards as winds backed south-westerly and gradually became fresh and breezy on the 30th. A weak cold front moved eastwards during the morning of the 31st causing winds to veer briefly to a westerly direction but, with a deep depression in mid-Atlantic moving quickly north-eastwards, they backed south-westerly later in the day and strengthened, especially near north-westerly coasts.

Mean Atmospheric Pressure

Although the range of mean monthly pressures over the country and their orientation during December are both similar to the normal range and pattern, the actual values are a massive 14.5hPa higher than normal, reflecting the predominance of anticyclonic conditions for much of the month, clearly evident in the map above. All stations recorded their maximum pressure values on Christmas Eve. Pressures exceeded 1040hPa everywhere that day, reaching 1045hPa along the south coast. (By comparison, the highest pressure ever recorded in Ireland was 1051.9hPa and the record for the month of December is 1049.5hPa.) Pressure stayed above 1000hPa throughout the month at both Cork Airport and Valentia Observatory.

The month's minimum values occurred at most stations on the 19th, but the lowest values of all were recorded at Malin Head on the 21st, when pressure fell to 988.5hPa.

Sea Temperatures

Mean sea temperatures fell by a further degree or so during December, cooling from around 12°C at the beginning of the month to 10°C by month's end. The mean temperature of the sea off Malin Head also fell by a degree during the month, from 10.2°C in November to 9.1°C, but whereas last month's value was normal for the time of year, December's value is half-a-degree warmer than normal. If sea temperatures follow their normal annual pattern the cooling will continue for another couple of months, with a reversal in the trend only becoming apparent in March.
Driest December ever in the south

It was the driest December for over a century at Cahersiveen and Roche’s Point, the driest on record also at Casement Aerodrome, Cork Airport, and Rosslare, the driest for 28 years at Ballyhaunis, and for 18 years at Dublin Airport. It was only in northern parts that rainfall amounts approached or in some cases exceeded normal December values. Less than half the normal amounts were measured at most stations in the southern half of the country, with Valentia Observatory and Roche’s Point recording just 15% of normal.

The actual rainfall totals for the month ranged from 4mm at Roche’s Point to 24mm in the Cullagh Mountains in Co. Cavan. Almost all of that rain fell between the 14th and the 23rd. 71mm of that total from the upland station in the Cullagh Mountains fell in just one day, the 20th, the greatest daily fall of rain in the month. Falls of between one and two inches (25 to 50mm) were recorded at many northwestern rainfall stations between the 18th and the 22nd, 70mm fell at Malin Head in just three days.

It was dry everywhere from the 1st to the 13th. Many stations had dry spells during the period from the end of November to the middle of December, with absolute droughts at Claremorris, Malin Head, Rosslare and Shannon Airport. A dry spell is a period of 15 or more consecutive days to none of which is credited

1.6mm or more of rain. An absolute drought is a period of 15 or more consecutive days to none of which is credited 0.2mm or more.

The final week of the month was mostly dry, although there was some light rain in parts of the north and west during this period. Overall, while most southern counties had some rain on just seven or eight days during the month, it rained twice as often in the northwest.

The number of wet days in December 1987 in each county.
Mild overall

December was a mild month at all stations. High pressure in winter usually means very cold weather but December's cloudy anticyclones reduced the occurrences of nighttime frosts. Mean temperatures ranged from 5.5°C at Ballinamore in Co. Leitrim to 8.6°C at Valentia Observatory and Sherkin Island, between 0.5°C and 1.4°C above normal.

The wet week before Christmas was also the mildest of the month; all stations recorded their highest temperatures during the period from the 21st to the 23rd, Mooncoin in Co. Kilkenny heading the list with a maximum value of 15.0°C on the 22nd. Daily maximum temperatures exceeded 10°C everywhere during the period from the 17th to the 23rd, with the exception of a few stations on Friday the 20th.

There was some air frost at inland stations in the north and east between the 9th and 12th of the month. The month's minimum value occurred on the night of the 10th/11th at Ardoo in Co. Louth, when the air temperature dropped to -5.4°C. The lowest temperature at ground level was -12.0°C, it occurred at Gowran Grange near Naas on the 11th. Air and ground frost was also reported on the 1st and on the 24th and 25th.

Dullest December on record in places

Christmas Day was typical of most of the month in that it was sunless virtually everywhere. The sun appeared on just one day in three at Malin Head, and it was the dullest December on record at Cork Airport, Kilkenny, Malin Head, Roche's Point, Rosslare and Shannon Airport, and the dullest since 1977 at a number of other stations.

Actual sunshine amounts ranged from a daily average of just 0.31 of an hour at Malin Head, up to 1.34 hours at Casement Aerodrome. Casement didn't do too badly, with 89% of normal sunshine, but at Malin Head and along the south coast there was just a third of normal.

There were only a few days with significant sunshine during the month. The 1st was sunny in parts of the northwest, including Belmullet, where the sun shone for 6.2 hours, the highest daily total of the month. There was some sunshine during the period from the 6th to the 9th, on the 14th and on the 19th, while the 23rd and 24th were the sunniest days of the month in the southeast. However, all stations spent more than half the month completely clouded over. There were 22 completely dull days at Belmullet, Brr and Rosslare, and 21 at Malin Head.
Very dry overall, especially in the south

High pressure dominated for most of the month. These dry spells were separated by a very wet but mild period. The month overall was mild, dull and very dry, exceptionally so in the south, where just 13 percent of normal rainfall was recorded.

1st - 14th: High pressure centred over Britain gradually receded into Europe. The period was dry, rather calm but mostly cloudy, which raised night-time temperatures a little. A light southeasterly wind mostly prevailed. A small soil moisture deficit developed which is unusual for December.

15th - 23rd: As pressure yielded, rain troughs approached and a strengthening southwest airflow developed. Cold and blustery northwesterly winds developed for a time following the passage of frontal troughs on the 19th, 20th and 23rd.

24th - 31st: Atlantic high pressure dominated until the 30th. Little rain but very cloudy and only small differences between day and night temperatures.

TIME-LINE SEQUENCES OF WEATHER IN DECEMBER

WEATHER

very dry

increasing rainfall

very wet

small nil/nil amounts

calc

mild

cold

TEMPERATURE

dry air at night

cool air, except on the 29th

mild

dry

moist but dull

sunny

STRENGTH

very light

light

very light

light

WIND DIRECTION

variable

ESE - SSE

SW - NW

SSE - SE

MEASURED POTENTIAL EVAPOTRANSPIRATION (P.E.) AND SOIL MOISTURE

<table>
<thead>
<tr>
<th>County</th>
<th>Station</th>
<th>Period</th>
<th>P.E./mm</th>
<th>Soil Moisture/mm</th>
<th>Accumulated Deficit</th>
<th>Surplus Deficit</th>
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<td>4.7</td>
<td>5</td>
<td>0</td>
<td>0</td>
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| Ca. | York | 10-20 | 12 | 120 | 0 | 0 | 0 
| Ca. | North | 1-10 | 9.8 | 0 | 0 | 0 |
| Ca. | Cumbria | 11-20 | 8.8 | 0 | 0 | 0 |
| Ca. | Lancs. | 11-20 | 8.8 | 0 | 0 | 0 |
| Ca. | Cheshire | 1-10 | 9.8 | 0 | 0 | 0 |
| Ca. | Cheshire | 11-20 | 8.8 | 0 | 0 | 0 |

GLOBAL SOLAR RADIATION (kcal/m²)

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See back page for notes on the data.
THE WEATHER OF 1991

- Storms and snow in January and February
- March and April wet
- Disappointing summer, although May warm and dry and 'Indian Summer' in late August and early September
- October and November unsettled, but December mostly quiet and dull

T
he year began with a major storm on the 5th of January during which fourteen people were killed and millions of pounds of damage caused. Winds of gale force and stronger continued unabated for up to twenty hours in places. The widespread snow that followed a few days later brought chaos to the roads, especially in the midlands and east.

More snow fell during a cold spell in early February, during which the temperature at Gowran Grange near Nuns fell in the early hours of the 10th to -13.0°C, the coldest night of the year. March was mild, wet and dull and April was wet at times also. May however was warm and dry, the driest May for almost a century in fact. June was cool and wet whereas July was warm but unsettled.

August was warm and dry but the best weather of the year occurred during the 'Indian Summer' of the first half of September. The warmest day of the year occurred at Cahercreven on the 5th when the mercury rose to 28.4°C. It was also the warmest day at the station since the summer of 1976. The weather became more unsettled after the middle of September however. Between 50 and 75 mm (2 to 3 inches) of rain fell over much of the south on the 27th/28th. October was cool and wet, November very unsettled and windy. December was mild and mostly settled, but there was a wet and windy spell around the third week of the month.

Annual rainfall totals ranged from 672mm at Casement Aerodrome to more than twice that - 1582mm - at Cahercreven. Overall, rainfall totals for the year were normal or slightly above in the west and a little below normal elsewhere, down to 90% of normal at Dublin Airport. Clesares had its driest year since 1976. Mean temperatures varied between 5°C and 7°C, a bit above normal, but sunshine amounts were generally somewhat down on the average values.

As the sun sets on Christmas Day a hardy soul takes the plunge at the Forty Foot in Dublin, one of many who braved the cold to raise funds in the traditional event. (Photo: Iain Thomson)

<p>| County/| RAINFALL (mm) | TEMPERATURE (°C) | SUNSHINE (hours) | NO. OF DAYS WITH |</p>
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<tr>
<th>Station</th>
<th>Total</th>
<th>most in a day</th>
<th>amount dated</th>
<th>mean max</th>
<th>min</th>
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<td>-8.0</td>
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<td>9.0</td>
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<td>WESTMORLAND AIRPORT</td>
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<td>22 Dec</td>
<td>12.9</td>
<td>3.1</td>
<td>9.4</td>
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<td>12.9</td>
<td>3.1</td>
<td>9.4</td>
<td>25.8</td>
<td>-8.0</td>
</tr>
</tbody>
</table>

Temperature: max. 1°C to 3°C, min. -4°C to 0°C inland. 1°C to 0°C coastal. Ground frost. Wind: NE.

Sunshine: nil to 6 hours. Weather: nil.


Temperature: max. 8°C to 10°C, min. 5°C to 8°C inland. 7°C to 9°C coastal. Ground frost. Wind: NW.

Sunshine: nil to 0 hours. Weather: nil.

Tuesday 3rd: High pressure still dominates the weather. Cloudy and misty with a few patches of drizzle. Mild with light south-easterly or variable winds. Rainfall: trace.

Temperature: max. 9°C to 10°C, min. 6°C to 8°C. Ground frost. Wind: NE.


Temperature: max. 10°C to 12°C, min. 6°C to 8°C. Ground frost. Wind: NE.


Temperature: max. 10°C to 12°C, min. 7°C to 9°C. Ground frost. Wind: W.


Friday 6th: The anticyclone over Britain was moving only very slowly. Winds light to moderate southeasterly. Dry.

Rainfall: trace.

Temperature: max. 10°C to 12°C, min. 7°C to 9°C inland. 8°C to 9°C coastal. Ground frost. Wind: SE.


Saturday 7th: High pressure persisted over Britain. Winds light to moderate southeasterly or south-easterly. Mostly dry, a few spots of rain in the extreme west and north. Rainfall: trace.

Temperature: max. 8°C to 10°C, min. 6°C to 8°C inland. 7°C to 9°C coastal. Ground frost. Wind: W.

Sunshine: nil to 4 hours. Weather: nil.

Sunday 8th: The anticyclone continued to dominate giving light to moderate south-south-easterly winds, with dry conditions and ground frost, mostly in the midlands. Rainfall: trace.

Temperature: max. 7°C to 9°C, min. -1°C to 0°C inland. 3°C to 5°C coastal. Ground frost. Wind: SE.

Sunshine: nil to 6 hours. Weather: nil.

Monday 9th: High pressure to the east continues to maintain a light to moderate east-south-east flow. Weather remained dry and misty with variable cloud amounts. Rainfall: trace.

Temperature: max. 8°C to 10°C, min. -4°C to 0°C inland. 3°C to 6°C coastal, ground frost: 0°C to -1°C inland. Wind: SE.

Sunshine: nil to 5 hours. Weather: nil.


Temperature: max. 6°C to 8°C, min. -4°C to 0°C inland. 0°C to 2°C coastal. Ground frost. Rain: NE.

Sunshine: nil to 4 hours. Wind: NE.

Thursday 14th: High pressure continues. Dull and cold. Overnight ground frost, severe in some inland locations, down to -12°C at Nairn. Fog inland and in the east.

Rainfall: trace.

Temperature: max. 7°C to 9°C, min. -4°C to 0°C inland. 3°C to 5°C coastal. Ground frost: 0°C to 2°C inland. Rain: NE.

Sunshine: nil to 4 hours. Weather: nil.

Friday 15th: A cold night with widespread mist and fog inland. Frost in the east and southeast. Fog persisted in the west. A thundery trough moved southwards up the east coast giving some heavy rain in southern areas. Winds light south-south-easterly or variable.

Rainfall: trace.

Temperature: max. 7°C to 11°C, min. -2°C to 0°C inland. 0°C to 2°C coastal. Ground frost: 0°C to -3°C inland. Rainfall: nil to 4 hours.

Sunshine: nil to 2 hours. Weather: nil.

Monday 16th: A weak frontal trough crossed the country. Misty with widespread fog at night, rain or drizzle by day. Wind light to moderate, south or southeast at first, later southwest.

Rainfall: trace.

Temperature: max. 6°C to 8°C, min. -2°C to 0°C inland. 0°C to 2°C coastal. Ground frost. Rainfall: nil to 6 hours.

Sunshine: nil to 2 hours. Weather: nil.

Tuesday 17th: Fronts crossed the country in a strong to gale force southeasterly, later west-northwest flow. Gusts of over 40mph were recorded. Rain cleared the northwest early but did not clear the southeast until evening and was followed by showers, some heavy with hail and thunder.

Rainfall: trace.

Temperature: max. 11°C to 13°C, min. 2°C to 6°C, ground frost: 0°C to -3°C inland. Rainfall: nil to 6 hours.

Sunshine: nil to 2 hours. Weather: nil.

Wednesday 18th: A strong westerly airflow backed southwestwesterly as a warm front crossed the country. Strong to gale force winds with gusts reaching 60mph at Melford Heath. Widespread rain and showers, some hail in the north.

Rainfall: trace.

Temperature: max. 11°C to 12°C, min. 7°C to 9°C inland. 3°C to 6°C coastal. Ground frost: 0°C to -3°C inland. Rainfall: nil to 6 hours.

Sunshine: nil to 2 hours. Weather: nil.

Thursday 19th: A strong to gale force southwest flow in the north with widespread rain gave way to cooler westerly as a cold front crossed the country from the north-west. Strong to gale force north-westerly winds after the front brought showers, some snow. Thunder reported in the southwest.

Rainfall: trace.

Temperature: max. 6°C to 8°C inland, 0°C to 1°C coastal. Ground frost. Rainfall: nil.

Sunshine: nil to 6 hours. Weather: nil.

Friday 20th: A strong and cold gusty northwest airflow gave way to milder conditions with winds back west-southwest as a warm front moved northwards. Equally showers, much of hail or snow, followed by widespread rain in the evening. Thunder was reported in the north. Rainfall: trace.

Temperature: max. 8°C to 10°C, min. 7°C to 9°C, ground frost: 0°C to -3°C.

Sunshine: nil to 2 hours. Weather: nil.

Saturday 21st: A mild and moist strong to gale force west-southwest airflow became established. Rain and drizzle in all areas, lightest in the south and southwest, heaviest in Ulster. Winds up to gale force, strong gale force at sea.

Rainfall: trace.

Temperature: max. 8°C to 10°C, min. 7°C to 9°C inland. 3°C to 5°C coastal. Ground frost: 0°C to -3°C.

Sunshine: nil to 2 hours. Weather: nil.

Sunday 22nd: Fresh to strong, blustery southwest airflow. Mild. Clouds disappeared mid-day and the north-west later in the day.

Rainfall: nil to 4 hours. Temperature: max. 6°C to 8°C inland. 0°C to 2°C coastal. Ground frost. Rainfall: nil.

Sunshine: nil to 6 hours. Weather: nil.

Monday 23rd: Some severe gales and heavy rain as a cold front moved south. Winds turned north-westerly behind the front and decreased later in the afternoon and evening. Mild becoming cold with wintry showers, some ice in the north.

Rainfall: trace.

Temperature: max. 6°C to 8°C, min. 5°C to 7°C coastal. Ground frost: 0°C to -3°C inland. Rainfall: nil.

Sunshine: nil to 6 hours. Weather: nil.

Tuesday 24th: Strong south-west winds, strong on exposed coasts, full gale and variable later. Dry with good sunny spells away from the west which had scattered showers.

Rainfall: nil.

Temperature: max. 8°C to 10°C, mm. -2°C to 0°C inland. 3°C to 6°C coastal, ground frost: 0°C to -3°C inland.

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<tr>
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<th>TEMPERATURE (°C)</th>
<th>RAINFALL (mm)</th>
<th>SUNSHINE (hrs)</th>
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<tr>
<td></td>
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<td>Mean min.</td>
<td>Mean/ deviation from average</td>
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### TABLES

#### Weather

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#### Mean 2000 Soil Temperatures (°C)

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- 6.6
- 7.6
- 7.8
- 4.7
- 7.2
- 7.9
- 7.1
- 7.0
- 7.5
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#### Wind

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#### Frequency of Wind Direction

- Dublin Airport
- Valentia Observatory

![Wind Direction Diagram](image)
Notes on the tables

A. General
1. Rainfall amounts are given in millimetres, temperature in degrees Celsius, sunshine duration in hours and wind speed in knots. (1 knot = 1.86 m.p.h.)
2. Rainfall amounts are measured on climatological stations at 0900GMT and credited to the previous day. At synoptic stations daily totals refer to the 24-hour period ending at 0900GMT the following day. The term rainfall includes all forms of precipitation, such as snow and hail, and snowfall (from snow or ice), expressed as its equivalent rain.
3. "Record" and "extreme" stations during which the total rainfall is not less than 0.2 mm and 1.0 mm respectively.
4. A 'day' for the purposes of this publication refers to the period from 0900GMT on a particular day to 0900GMT on the following day. (This is because Climatological Gravities make their dayly observations at 0900GMT.)
5. The mean daily air temperature over a period is taken as the mean of the daily maxima and daily minima (averaged separately over the period).
6. Days will, at least see 3 days during which the minimum air temperature was below 0°C. Similarly days with ground frost on the 1st day will be considered days when the grass minimum temperature was below 0°C. (Grass minimum temperatures are assessed on the initial or first day that the grass is yellow or dead.)
7. Mean soil and earth temperatures are based on readings taken at 0900GMT.
8. A 'day' is a mean wind of over 10 minutes period between 94 knots or more. A 'gale' is a gust of 44 knots or more. All wind speeds refer to the wind at an effective height of 10 metres above the ground.
9. 'O' denotes that the value is calculated using one or more estimated readings.
10. Data from Northern Ireland is kindly provided by the Met Office, Belfast.

B. Agmet
11. Calculated Potential Evapotranspiration (P.E.) values are based on values of temperature, sunshine, wind speed and vapour pressure using the Penman formula. Because of Penman's limitations, negative values do occur in winter, these are replaced in the table by zero. Measured P.E. values are those measured by means of standard tanks such as the one at the airport with wind speed and surface run-off and are therefore carried forward from one period to the next. Soil moisture deficits are regarded as being corrective. Where heavy rain occurs after the end of the observed period the days of rainfall may be adjusted to avoid surplus to insufficient run-off time.
12. Degree-day totals are calculated using the method set out by McVicker in the Journal of Hydroling and Ventilation Engineers (Vol. 14, No. 10, New-Delhi 1966).
13. Global solar radiation values are given in MJ/m², converted to two decimal places (2.56MJ to 2.55MJ).

The Monthly Weather Bulletin is produced by the Climatology and Applications Division of the Meteorological Service. An annual subscription to the bulletin costs £25. Further climatological information is available from the Climate Enquiries Office, Glasnevin Hill, Dublin 9, telephone 01-375436, fax 01-369115.