

eDeposit Ireland

Monthly Weather Bulletin June 1991

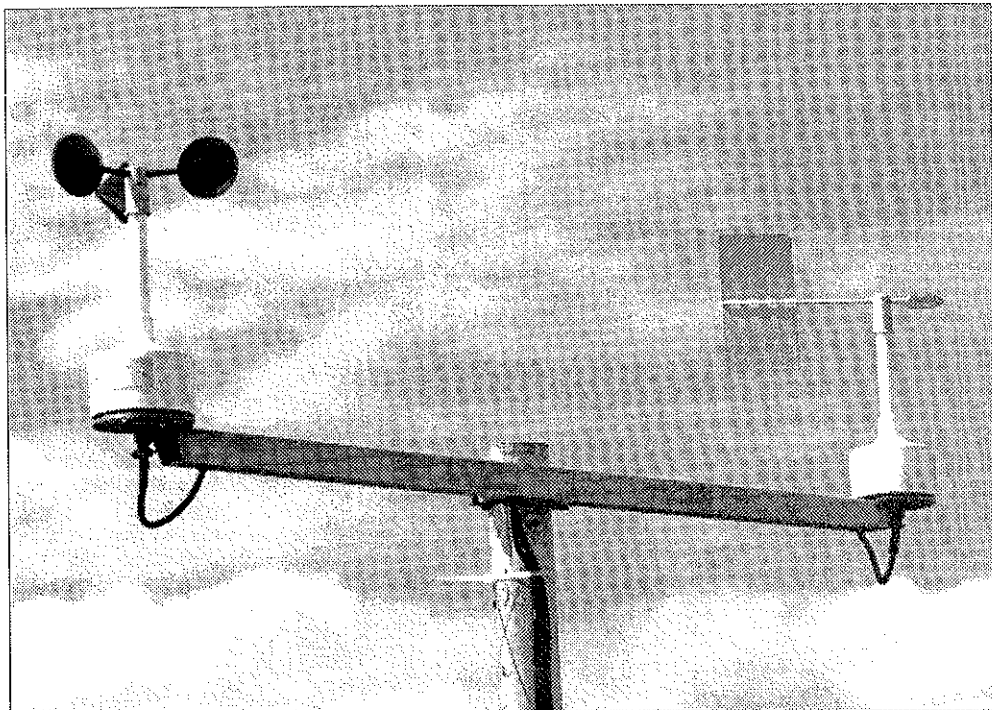
Item Type	report
Publisher	Irish Meteorological Service
Rights	Y
Download date	2026-06-16 08:36:57
Link to Item	https://hdl.handle.net/20.500.14765/69518

Monthly Weather Bulletin

published by the Meteorological Service, Glasnevin Hill, Dublin 9

JUNE
1991

no. 62



CONTENTS

WEATHER.....	2
RAINFALL.....	6
TEMPERATURE.....	8
SUNSHINE.....	9
AGMET.....	10
FEATURE.....	12
DIARY.....	14
TABLES.....	16

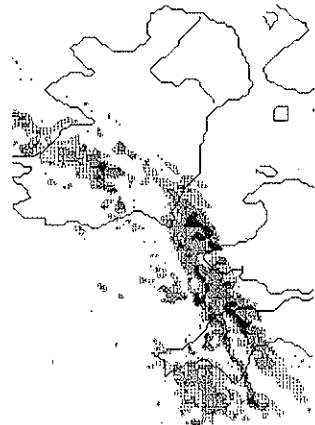
Cool and Wet

June was wet and there was a notable lack of high daytime temperatures, just like the same time last year. It was the wettest June since 1982 in Rosslare and the coldest at some stations since the remarkably cool June of 1972. To cap it all, sunshine values were also well below normal except in a few areas near northern and western coasts.

(The picture above shows equipment used for measuring wind speed and direction.)

Unsettled throughout

Depressions from the Atlantic dominated our weather throughout the month. June began with a slack easterly windflow but a depression moving southeastwards from Iceland towards Scotland amalgamated with a developing depression just to the north of Ireland. The flow became northwesterly during the 2nd and then northerly on the 3rd as the low pressure centre continued its southeasterly movement towards the continent. A ridge of high pressure crossed the country early on the 4th causing the lowest temperatures of the month.



The radar picture above shows the rainfall pattern at 0800 on the morning of the 5th as a depression moved in an easterly direction over the south of the country. This gave the first wet day of the month in the south although the north and northwest stayed dry. Another depression

moved eastwards further south on the 6th and again the north and west fared best. A northeasterly flow developed on the 7th; the day was dry after early rain and drizzle in parts of the east and south. Northern areas definitely got the best of the weather during that first week. Malin Head had just 1mm of rain and a total of 77 hours of sunshine during that period while Cork Airport had 20mm of rain and less than 33 hours of sunshine.

The period from the 8th to the 13th was wet and windy in all areas. The rainfall situation on the afternoon of the 8th is shown on the radar picture across.

Active fronts moved eastwards giving more than 20mm of rain in parts of the west. A showery, blustery southwesterly followed on the 9th as a depression moved eastwards across the north. Ridge conditions on the 10th meant a decrease in shower activity but further rainbelts moved eastwards on the 11th followed on the 12th by another showery and blustery westerly,

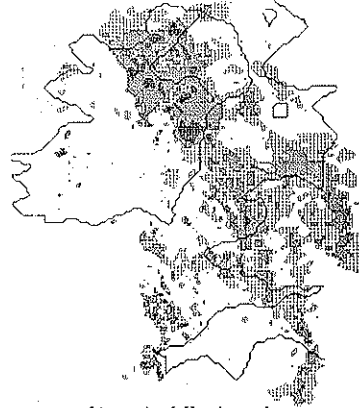
Showery....

in the west on the morning of the 12th.....on the 15th.....and in eastern parts on the 16th

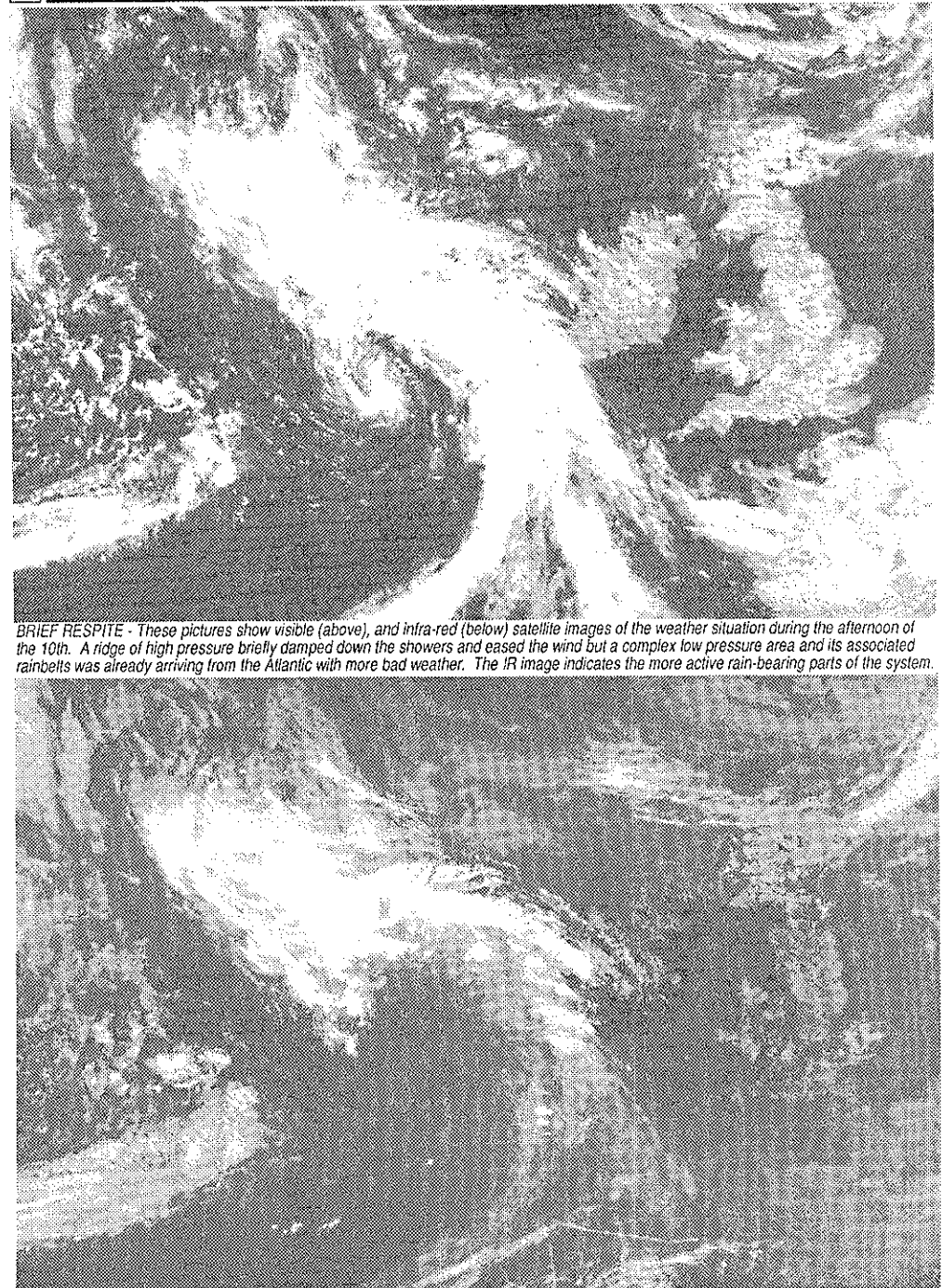


which turned northwesterly on the 13th. That was the windiest spell of the month. All stations experienced gale gusts, with a number in excess of 50 knots on the 12th.

Next day yet another depression followed that easterly track near the south coast, which is where



most of its rain fell. A cool, showery northerly airflow followed, some of the showers accompanied by thunder on the 15th and 16th, particularly in the east and southeast. Shower activity decreased on the 17th as



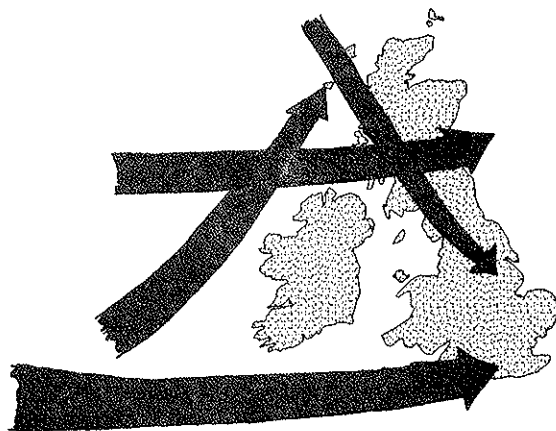
BRIEF RESPIRE - These pictures show visible (above), and infra-red (below) satellite images of the weather situation during the afternoon of the 10th. A ridge of high pressure briefly damped down the showers and eased the wind but a complex low pressure area and its associated rainbelts was already arriving from the Atlantic with more bad weather. The IR image indicates the more active rain-bearing parts of the system.

the flow turned more northwesterly. The northwesterly flow persisted on the 18th as a depression moved slowly southwards near the east coast of Britain. The 19th saw the by now familiar picture of a depression moving eastwards to the south of the country. Although there were a few showers, many areas were dry as winds became light and variable.

Ridge conditions with some fog and ground frost followed early on 20th but as a southeasterly wind developed there was rain in the west and southwest later. During the 21st a mild, humid southerly developed behind a warm-frontal rainbelt which moved northwards over Ireland in the early part of the day. There was a good deal of thundery activity in a showery south to southwest windflow the following day. A further depression passed by to the south of Ireland on the 23rd but again the winds became light and variable and amounts of rain were mostly small.

During the 24th, with the main Atlantic low-pressure area well to the west, a southerly airflow developed and a front came up from the south causing rain in Munster and South Leinster but giving little or none further north. A minor wave depression gave rain in Munster and Leinster early on the 25th. In the southwesterly which developed behind the wave there were occasional showers. During the 26th there were some heavy and thundery showers as a depression moved eastwards over the north of the country. Sunshine and showers followed in the northwesterly which developed behind this depression on the 27th. It was mostly dry on the 28th but there was rain or drizzle on the 29th as a humid

DEPRESSION TRACKS



It has been estimated that between 160 and 180 depressions affect these islands on average each year. About a dozen affected Ireland during June. This map gives a broad indication of the tracks followed by these depressions, the thickness of the arrows reflecting the frequency of depressions along a particular track.

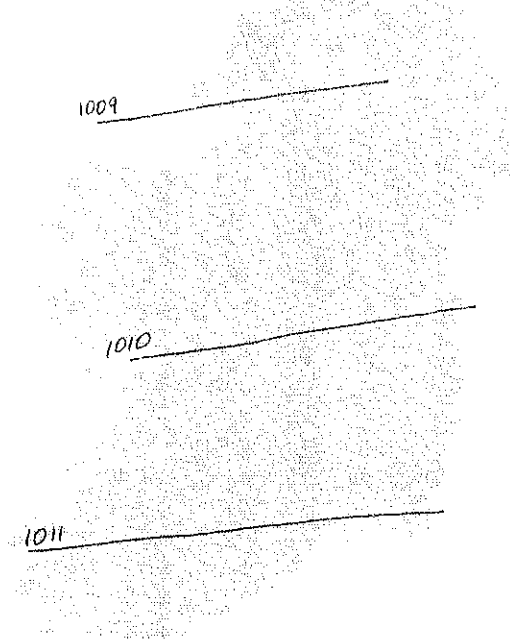
In wintertime, the average path of depressions lies very close to the northwest coast of Ireland. Normally at this time of year however, the depressions are fewer and less active than in winter and they tend to track closer to Iceland than Ireland, pushed up by the northward displacement in summer of the quasi-stationary Azores-Bermuda high.

One of the interesting features of this map therefore, is how close to this country the depressions passed during June. That feature would seem to be consistent with the fact that mean pressure values for the month were substantially below the June averages, and with the fact that the weather overall was wetter and cooler than usual.

southwesterly windflow developed. It was fresher on the 30th but there were showers as a depression approached slowly from the Atlantic.

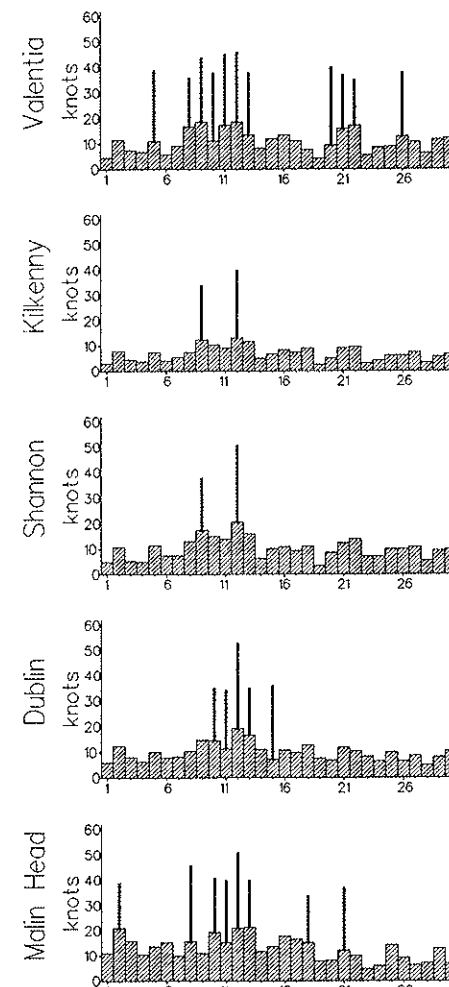
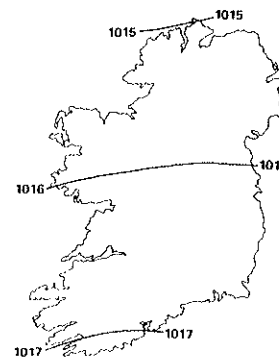
Daily mean wind speeds and maximum significant gusts (34 knots or more)

MEAN ATMOSPHERIC PRESSURE



The unsettled nature of June's weather is reflected in the fact that mean pressure values were 6hPa below normal. A comparison with the smaller map below shows that the pattern of the isobars is similar to normal and the range, although there is a slight tightening of the isobars, is also similar. The highest pressure values of the month - between 1025 and 1028hPa - were recorded everywhere on the 1st of the month. Lowest values occurred in the northwest on the 12th, when pressure dropped to 984hPa.

Average (1951-1980) pressures for the month of June.



SEA TEMPERATURES

The slow summer warming of the sea continued with surface temperatures rising from between 11.5 and 13.5°C at the beginning of the month to 12 to 14°C by the month's end, the warmer seas as usual being those off the south coast. The mean sea surface temperature at Malin Head during June was 11.7°C, which is about half a degree below normal for this time of year. Maximum and minimum values were 12.7°C and 11.1°C respectively.

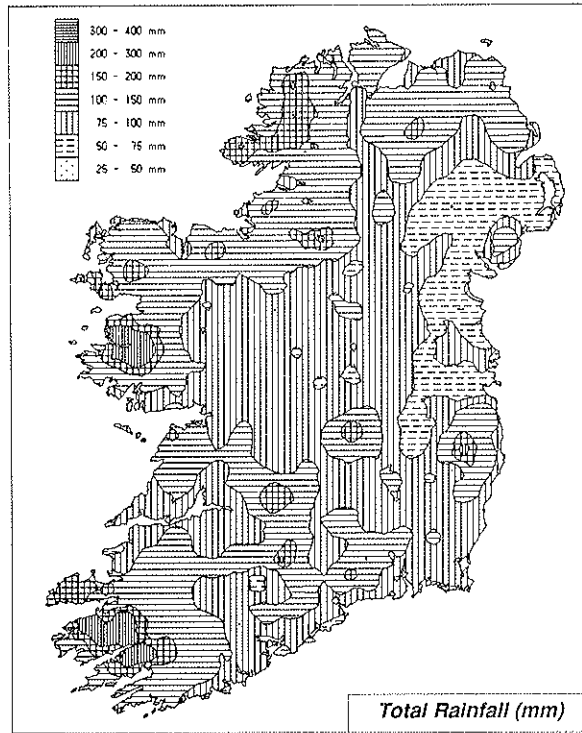
Wet almost everywhere

It was a month in which the Atlantic depressions dominated our weather. While the first four days had only a little rain, the remainder of the month more than compensated, with the result that amounts were above normal everywhere except parts of counties Louth, Armagh and Down.

A total of just 43mm was measured at Castlebellingham in Co. Louth, whereas more than five times that amount - 237mm - was recorded at Maam Valley in Connemara. Compared to the normal rainfall totals to be expected during June, the south midlands was the wettest part of the country, with up to twice the normal amounts at some stations. Bansha in Co. Tipperary topped the list with 213% of normal rainfall, while at the other end of the list Dundalk had just 83% of normal. At Rosslare it was the wettest June since 1982.

The 8th was the wettest day of the month over much of the country. 54.7mm - more than 2 inches of rain and more than some stations totals for the whole month - fell that day in Maam Valley. A number of other stations in the west, northwest and southwest measured falls of between 25 and 50 mm, or 1 - 2 inches, that day. The heaviest falls in eastern areas tended to occur on the 26th, including a fall of 21mm at Dublin Airport, the highest daily fall at the station during the month of June since 1982.

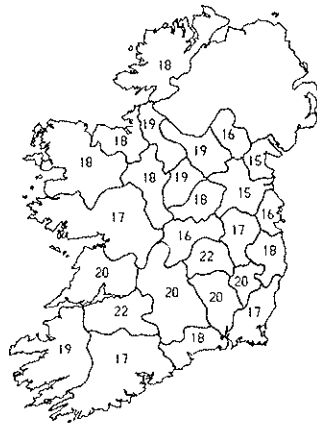
There were only 2 days that were dry everywhere, the 1st and the 28th. The period from the 8th to



Total Rainfall (mm)

the 12th was the wettest of the month, and there was also a fair amount of rain between the 21st and the 26th. Overall the number of wetdays ranged from 13 at Roche's Point in Co. Cork to 26 at

Mount Russell in Co. Limerick. The map across shows that it was the south midlands and the mid-western region that had the most wetdays generally, between 20 and 22.

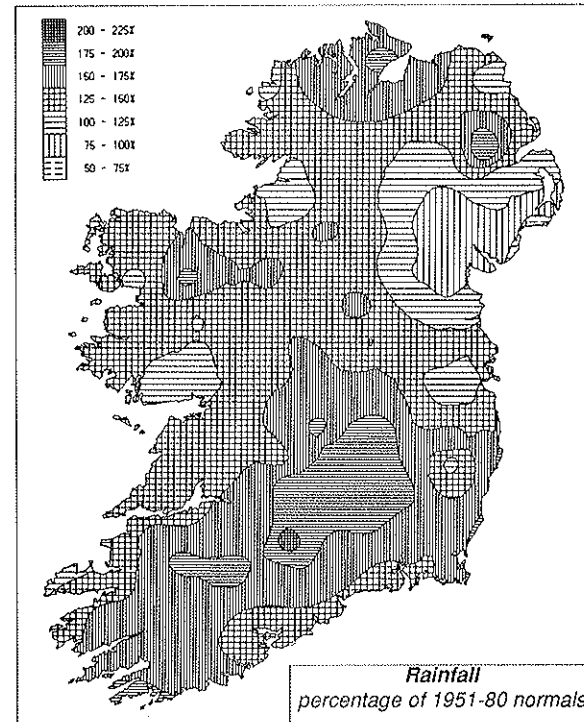


This map shows the number of wetdays in June 1991 in each county.

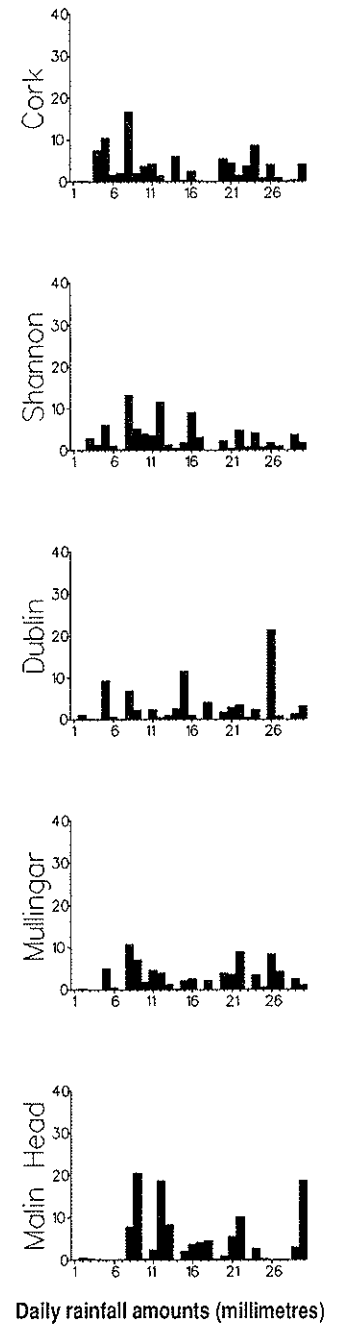
DAILY RAINFALL EXPRESSED AS % OF MONTHLY NORMAL (1951-80)

COUNTY	DAY																															TOTAL	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
Carlow	-	1	4	4	3	-	16	5	10	2	6	1	6	9	13	2	-	-	3	9	7	9	5	10	8	8	1	2	6	-	.....	151
Cavan	1	-	-	3	-	5	25	10	8	10	9	2	1	4	3	1	2	4	4	5	12	5	2	3	3	2	3	10	3	-	.....	140
Clare	-	-	2	5	10	4	3	22	6	8	7	12	1	2	5	10	2	-	-	3	1	9	2	6	1	5	1	5	5	-	.....	142
Cork	-	-	2	15	6	1	8	21	4	14	3	4	1	10	2	5	1	-	11	4	4	15	6	4	5	1	2	2	3	-	.....	155
Donegal	-	1	-	-	-	1	22	13	4	11	16	9	2	5	3	6	6	-	4	9	-	2	1	4	2	1	7	14	-	.....	147	
Dublin	-	2	-	-	15	3	-	9	7	2	2	4	1	4	10	2	1	6	-	3	4	5	1	7	1	28	2	-	3	6	-	128
Galway	-	-	-	10	1	5	19	5	9	6	5	3	2	5	4	1	1	-	5	3	16	1	2	1	2	2	6	10	3	-	.....	127
Kerry	-	-	8	1	10	19	9	14	4	8	4	11	3	4	2	-	1	9	10	4	6	5	9	7	1	2	3	3	-	.....	158	
Kildare	-	-	1	-	13	1	-	8	5	9	3	6	1	6	9	1	-	5	-	1	3	2	13	-	21	2	-	5	9	-	.....	125
Kilkenny	-	-	4	6	5	1	15	9	8	7	10	1	4	5	14	1	-	-	2	17	8	10	11	8	11	6	-	5	18	-	.....	186
Laois	-	3	1	-	19	4	1	9	1	7	3	3	4	2	11	12	2	2	2	1	2	26	3	7	6	9	21	1	11	3	-	176
Leitrim	-	2	-	9	16	7	4	6	10	1	5	5	1	1	4	-	5	2	9	1	-	5	9	5	1	8	4	-	.....	120		
Limerick	1	2	-	9	4	4	3	5	3	10	12	13	8	3	9	5	6	-	-	3	16	7	4	3	6	3	-	2	7	-	.....	151
Longford	1	-	-	8	-	7	17	7	6	3	5	1	6	5	10	1	6	4	5	13	21	-	3	-	119	-	2	2	-	.....	153	
Louth	-	2	-	4	-	-	15	3	3	5	4	-	4	3	1	1	4	7	5	10	10	-	5	1	5	1	-	3	-	.....	96	
Mayo	-	2	-	1	-	3	30	6	7	15	11	2	1	5	6	1	-	6	4	10	-	1	1	7	2	1	8	5	-	.....	135	
Meath	-	-	-	6	-	-	17	4	4	3	9	1	-	6	1	2	6	1	5	14	15	-	8	-	24	-	-	1	3	-	.....	130
Monaghan	-	-	1	-	-	19	11	5	8	7	1	3	4	1	3	3	-	11	5	12	-	-	4	3	-	4	1	-	.....	109		
Offaly	-	1	1	-	20	4	1	23	8	8	4	6	1	-	4	9	-	-	2	8	14	-	16	1	8	6	-	12	4	-	.....	151
Roscommon	-	-	8	-	6	25	7	5	5	8	4	1	6	2	1	1	-	7	4	18	-	1	3	2	16	5	8	2	-	.....	145	
Sligo	3	1	-	-	1	-	3	24	6	8	16	7	-	5	12	5	-	9	-	5	1	8	-	-	2	7	5	2	6	7	-	143
Tipperary	-	1	8	16	10	5	13	8	11	4	11	2	3	10	4	5	-	-	4	7	13	10	9	9	6	1	1	2	5	-	.....	178
Waterford	-	-	9	12	3	1	19	4	10	4	2	1	6	5	3	2	-	-	8	1	3	19	22	1	9	-	-	2	1	-	.....	147
Westmeath	-	-	-	8	1	-	17	11	3	7	6	2	-	3	4	-	3	-	6	14	-	5	1	13	7	-	4	2	-	.....	123	
Wexford	-	1	1	5	13	6	-	17	6	6	4	1	3	8	7	17	3	-	-	8	3	4	18	24	1	2	2	-	1	-	.....	161
Wicklow	-	3	-	1	23	2	-	19	11	7	7	4	1	4	9	10	1	2	-	5	7	3	3	8	5	9	4	-	3	9	-	160
MEAN	-	1	-	3	8	2	3	18	7	7	6	7	2	4	6	6	2	2	1	5	6	11	4	7	3	8	5	1	5	5	-	145

NOTE: In the above table, each value represents the percentage of the monthly normal that fell on each day. Stations within each county are averaged together. For example, 1% of the average monthly rainfall in Co. Carlow fell on 2nd.



Rainfall percentage of 1951-80 normals



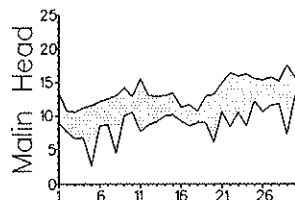
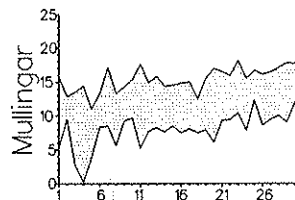
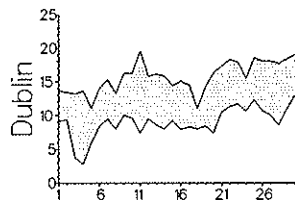
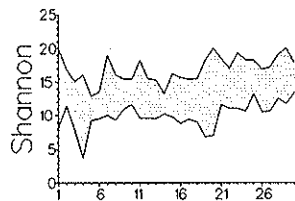
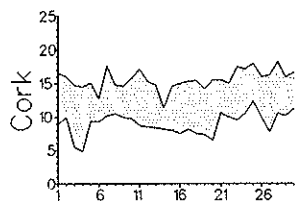
Cool everywhere

June 1991 was similar to last June in that there was a notable lack of high daytime temperatures. The highest temperature of the month was just 20.6°C, which was reached at Fethard in Co. Tipperary on the 11th and at Ardferit in Co. Kerry on the 29th.

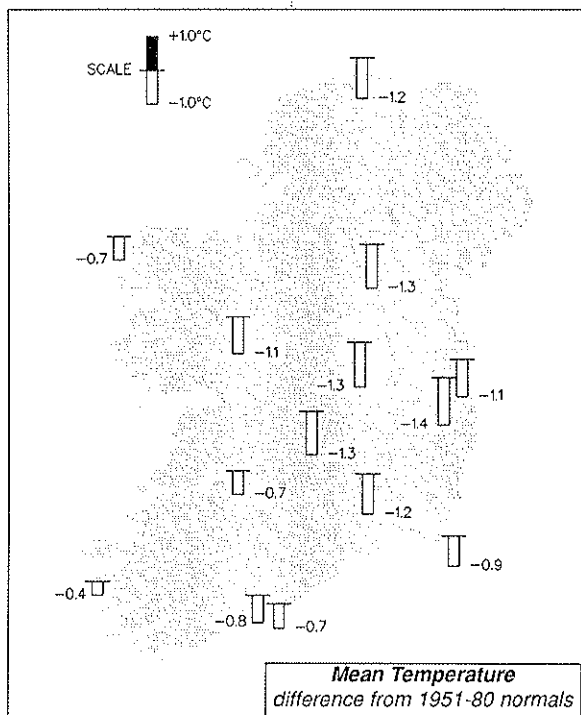
Mean maximum values in most areas were 1 to 2°C below normal. Unlike June 1990, however, mean minimum temperatures were also below normal. Indeed during the period from the 3rd to the 5th air temperatures went a little below freezing point for a time at some inland stations. The lowest air temperature of the month was -

1.5°C, recorded at Ardee on the 4th. Mullingar's minimum that day was 0.2°C, its lowest June temperature since recording began there in 1950. At most stations minimum temperatures were the lowest for 6 years.

Mean temperatures ranged from 11.3°C at Malin Head up to 13.4°C at Shannon Airport. Sherkin Island's mean value of 13°C was closest to normal, just 0.3°C below. At the other end of the scale, Warrenstown's 11.7°C was 1.6°C below the normal June value. Generally mean temperatures were closest to normal in southern and western coastal areas. With low daytime and low nighttime temperatures, mean temperatures at some stations were the lowest since the remarkably cool June of 1972.



Daily maximum and minimum temperatures (degrees Celsius)



Mean Temperature difference from 1951-80 normals

Duller than normal in most places

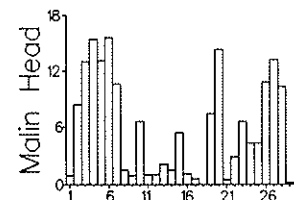
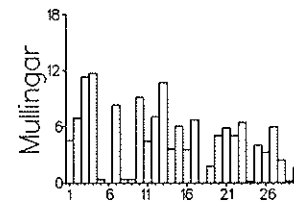
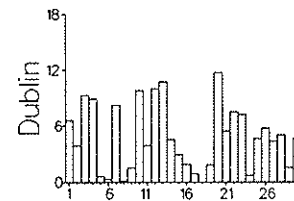
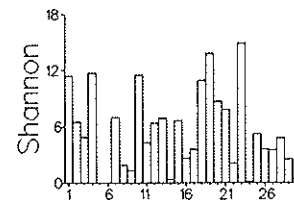
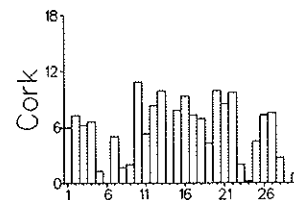
Sunshine values were below normal everywhere except in a few northern and western coastal areas. Mean sunshine values ranged from just over 3 hours a day in Maam Valley to almost twice that in Rosslare, the sunny south-east once again living up to its name.

Compared to normal sunshine amounts for this time of year, Shannon Airport was just 2% below but up in Clones sunshine was more than a third down on normal. At both Clones and Maam Valley the sunshine recorded amounted to just 19% of possible (total daylight hours).

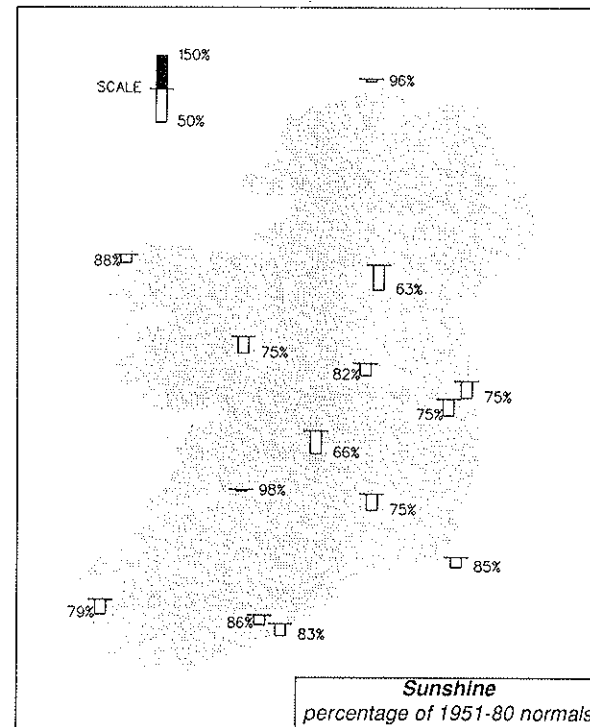
At the other end of the scale both Rosslare and Sherkin Island enjoyed 36% of possible sunshine.

Because of the unsettled weather conditions there were very few days which were sunny at all stations. The sunniest spell occurred at Malin Head, which averaged 13.5 hours of sunshine a day between the 3rd and the 7th while Roche's Point was averaging less than 4. The sunniest day of the month was the 7th at Belmullet, when the sun shone for 15.7 hours, the sunniest June day at the station since 1979.

Casement Aerodrome had some sunshine every day of the month but it was the only station so favoured. Most had between 1 and 3 completely dull days. Some of the duller dates were the 6th, 14th, 18th, 24th and 29th.



Daily sunshine amounts (hours)



Sunshine percentage of 1951-80 normals

Cool and Wet

Spells of wet weather reduced the soil moisture deficit and improved grass growth but they also favoured the spread of some crop diseases.

1st - 4th : Cool and unsettled but not much rain. Lowest temperatures of the month on the 3rd and 4th.

5th - 7th : Dull with spells of rain in the east and south. Brighter and drier in the north and west as depressions pass by to the south of the country.

8th - 12th : Cool, wet and windy.

13th - 16th : Cool with showers, some thunderstorm activity.

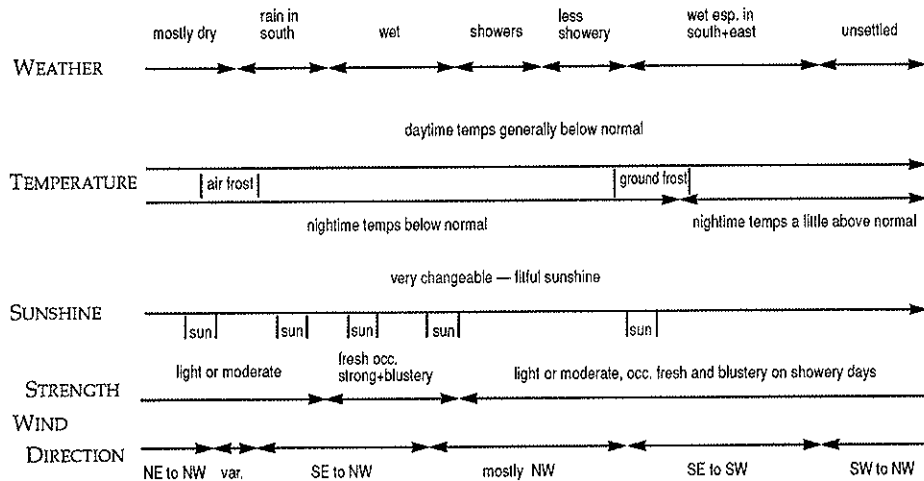
17th - 19th : Shower activity damping down gradually.

20th - 26th : Ridge early on the 20th but becoming very unsettled with some spells of heavy rain, especially in the south and east. Thunderstorms on the 22nd and 26th.

27th - 30th : Northwesterly with occasional showers on the 27th followed by a ridge on the 28th but a return to unsettled conditions in a southwesterly windflow on the 29th and 30th.

TIME-LINE SEQUENCES OF WEATHER IN JUNE

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30



Station	10-day values for selected Agrometeorological Stations	period	RAINFALL		TEMPERATURE										SUNSHINE		mean wind speed (ms) ² /mag. P.E. (Penman) (mm)							
			Amount	% of Average	rain days	wet days	mean max.	mean min.	mean daily	diff. from average	lowest min.	date	days with air frost	degree days > 4.4°C	degree days > 10.0°C	lowest 'grass-min.'		date	days with ground frost	mean 10cm at 0900h	mean 50cm at 0900h	total no. of hours	% of average	
Co. Cork Ferry	1-10		32.7	-	7	6	16.8	8.2	12.5	-	1.9	4	0	82	31	-4.6	4	2	13.7	13.9	48.8	-	5.5	-
	11-20		30.7	-	8	6	15.7	7.4	11.6	-	3.6	19	0	71	22	-3.5	20	2	13.4	13.5	41.6	-	3.6	-
	21-end month		23.6	-	9	7	18.0	10.3	14.2	-	8.8	29	0	97	42	3.7	24	0	14.8	14.9	25.6	-	2.7	-
	month		87.0	158	24	19	16.8	8.6	12.7	-0.8	1.9	4	0	250	95	-4.6	4	4	13.9	14.1	116.0	70	4.0	75
Co. Donegal Letterkenny	1-10		30.4	-	6	4	14.6	5.0	9.8	-	-1.0	5	1	58	16	-	-	-	-	-	-	-	-	-
	11-20		55.6	-	9	8	14.3	7.4	10.9	-	2.5	20	0	65	15	-	-	-	-	-	-	-	-	-
	21-end month		76.0	-	10	7	18.2	9.3	13.8	-	5.3	24	0	93	41	-	-	-	-	-	-	-	-	-
	month		162.0	-	25	19	15.7	7.2	11.5	-	-1.0	5	1	216	72	-	-	-	-	-	-	-	-	-
Co. Kerry Ardfert	1-10		33.7	-	8	5	16.2	9.1	12.7	-	2.9	4	0	83	30	-1.7	4	1	-	-	54.4	-	-	-
	11-20		19.8	-	7	6	15.8	8.6	12.2	-	5.6	19	0	78	25	2.2	19	0	-	-	57.1	-	-	-
	21-end month		22.5	-	10	5	17.7	10.9	14.3	-	8.0	24	0	99	44	4.8	24	0	-	-	43.0	-	-	-
	month		76.0	-	25	16	16.6	9.5	13.1	-	2.9	4	0	259	99	-1.7	4	1	-	-	154.5	-	-	-
Co. Leitrim Ballinamore	1-10		37.3	-	7	5	14.5	6.3	10.4	-	0.4	4	0	62	17	-7.5	4	4	12.1	12.8	45.8	-	2.8	-
	11-20		23.8	-	6	6	14.9	7.4	11.2	-	5.4	20	0	67	18	-2.2	20	2	11.7	12.4	38.3	-	3.4	-
	21-end month		36.7	-	10	7	16.8	9.3	13.1	-	6.6	24	0	86	33	N/A	N/A	N/A	13.9	23.9	-	-	2.0	-
	month		97.8	127	23	18	15.4	7.6	11.5	-1.4	0.4	4	0	215	69	N/A	N/A	N/A	13.0	108.0	72	2.7	61	
Co. Louth Ardee	1-10		16.7	-	6	5	15.0	5.1	10.1	-	-1.5	4	2	60	19	-7.8	4	6	13.7	13.8	-	-	-	-
	11-20		20.9	-	6	6	16.3	6.7	11.5	-	5.0	19	0	71	23	-1.1	11	1	12.8	13.5	-	-	-	-
	21-end month		18.1	-	5	5	10.4	8.5	13.5	-	9.0	29	0	90	39	-3.0	24	3	14.6	15.0	-	-	-	-
	month		55.7	93	17	16	16.5	6.8	11.7	-	-1.5	4	2	221	81	-7.8	4	10	13.7	14.1	-	-	-	-
Co. Waterford Dungarvan	1-10		56.7	-	8	6	16.9	8.4	12.7	-	3.5	4	0	83	31	2.0	4	0	-	14.4	40.1	-	2.3	-
	11-20		34.1	-	8	7	16.6	7.8	12.2	-	4.3	20	0	78	27	3.0	20	0	-	13.9	62.3	-	2.7	-
	21-end month		27.0	-	8	5	18.4	10.8	14.6	-	8.6	29	0	102	46	5.5	26	0	-	15.1	52.5	-	2.3	-
	month		117.8	-	24	18	17.3	9.0	13.2	-	3.5	4	0	262	105	2.0	4	0	-	14.5	154.9	-	2.5	N/A
Co. Wexford Johnstown Castle	1-10		28.5	-	9	6	14.9	7.7	11.3	-	2.2	4	0	70	21	-4.2	5	4	12.7	12.9	N/A	-	1.6	-
	11-20		29.5	-	9	7	16.0	8.0	12.0	-	6.5	18	0	76	25	-0.6	11	1	12.9	13.0	N/A	-	1.8	-
	21-end month		35.0	-	9	4	16.8	11.0	13.9	-	9.6	27	0	95	39	6.2	26	0	14.8	14.4	N/A	-	1.9	-
	month		93.0	160	27	17	15.9	8.9	12.4	-0.8	2.2	4	0	241	85	-4.2	5	5	13.5	13.4	N/A	-	1.7	N/A

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

County/Station	Period	P.E. (mm)		Soil Moisture (mm)	
		Amount	Deficit	Accumulated Deficit	Surplus
Co. Carlow Carlow (Oak Park)	1-10	32.6	-	68	3
	11-20	18.8	-	60	8
	21-end month	23.9	-	33	27
	month	75.3	-	-	-
Co. Dublin Kinsealy	1-10	-	73	5	-
	11-20	25.3	-	67	6
	21-end month	24.2	-	59	8
	month	71.1	-	-	-
Co. Kerry Cahiriveen	1-10	29.6	-	46	9
	11-20	16.0	-	18	28
	21-end month	28.1	-	6	12
	month	65.2	-	-	-
Co. Leitrim Ballinamore	1-10	18.9	-	32	24
	11-20	14.2	-	22	10
	21-end month	9.0	-	-	28
	month	42.1	-	-	-
Co. Wexford Johnstown Castle	1-10	27.3	-	52	11
	11-20	28.5	-	44	8
	21-end month	21.0	-	27	17
	month	76.8	-	-	-

See back page for notes on the data

GLOBAL SOLAR RADIATION (MJ/sq.m.) P.E. (Makkink)

County/Station	10-day totals			total for month	total for month(mm)
	1-10	11-20	21-end		
Co. Donegal Main Head	218.71	152.41	176.27	547.39	83
Co. Dublin Dublin Airport	155.68	161.98	166.52	484.18	75
Co. Kerry Cahiriveen	175.93	177.65	168.48	522.06	82
Co. Kilkenny Kilkenny	148.69	178.69	161.87	489.52	76
Co. Mayo Belmullet	205.93	220.13	159.07	585.13	91
Co. Monaghan Clones	154.33	144.98	154.95	454.26	69
Co. Offaly Birr	146.98	179.68	155.73	482.39	75

Globally, 1990 was the warmest year ever

Global mean-surface-temperatures based on land and marine measurements during 1990 were the highest since comparable records began in the middle of the 19th century. The 1990 global mean-surface-temperature was 0.39°C above the average level during the period 1951-80. This value exceeds that of the previous warmest year, 1988, by at least 0.05°C.

Six of the seven of the previous warmest years of the near 140-year-long record have all occurred since 1980. In descending order the years are 1990, 1988, 1983, 1987, 1944, 1989 and 1981. The 1990 value follows the warmest decade (1980-89) ever recorded when temperatures were 0.20°C above the 1951-80 average.

Warmest areas

The warmth of 1990 was particularly evident over Europe and western Siberia, the Far East and most of the United States and southern Canada. (see map across) Some regions, nevertheless, remained cooler than the 1951-80 reference period, notably north-eastern Canada, Greenland and the central Arctic. The southern hemisphere was relatively less warm than the northern. For the globe, March 1990 was, relative to average, easily the warmest month of this or any other year.

There was also exceptional warmth in the 1.5-10km layer of the lower atmosphere, where 1990 was the warmest year in records that begin in 1958. These data also reveal the 1980s as the warmest decade. Recent satellite-based observations have confirmed the reliability of the surface data and especially the upper-air data, but satellite results are not yet available for the whole of 1990.

The global mean pressure pattern for 1990 was remarkably similar to that of 1989. One aspect of particular note was the fact that the three northern hemisphere anticyclones again extended in a north or northeasterly direction, particularly over Europe. As a result of this tightening of the gradient - pressure rising in the southwest and falling in the northeast - an increased southwesterly wind flow from the Atlantic over Europe could become apparent.

Rainfall in Europe

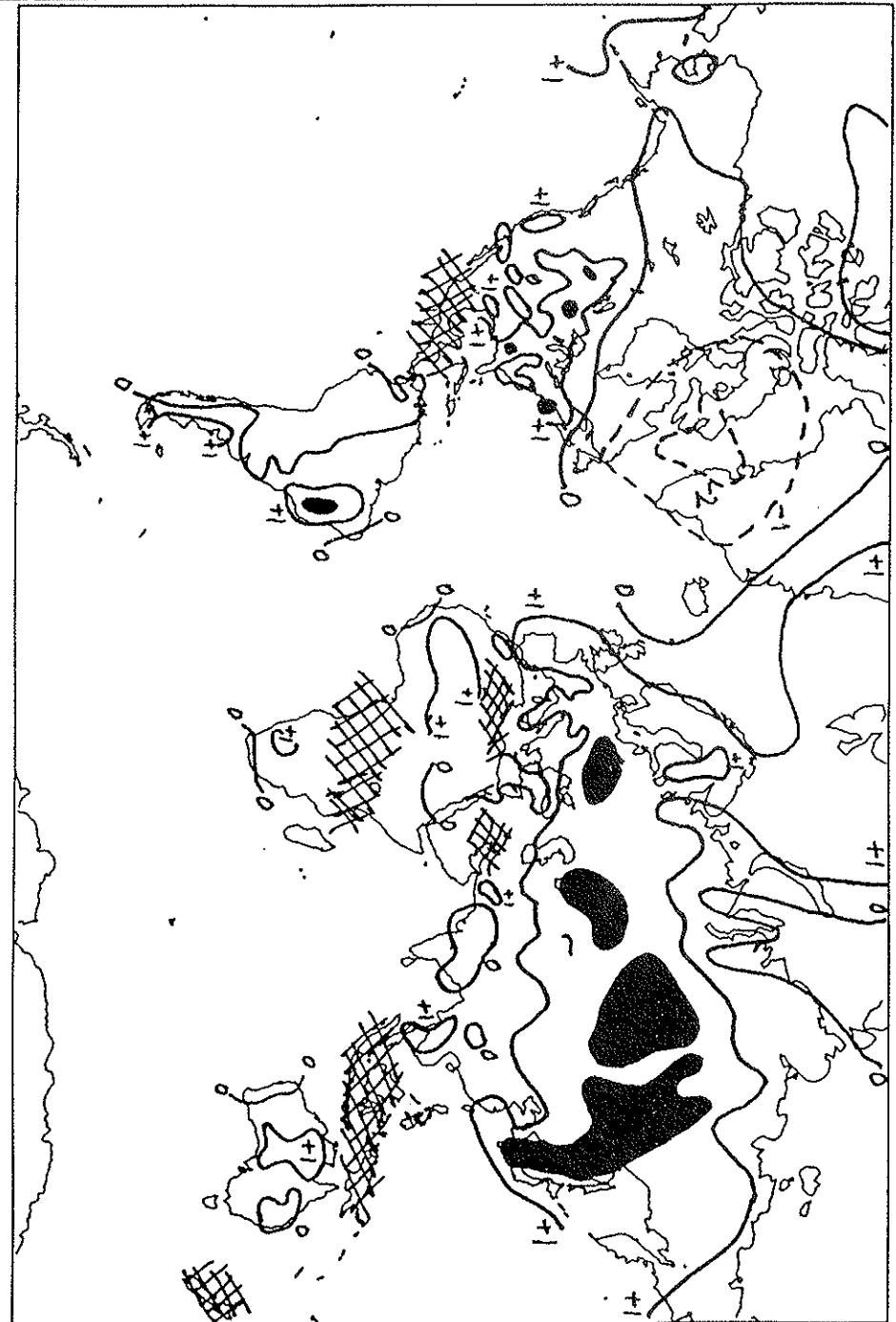
The rainfall pattern followed the mean pressure pattern to some extent. In the southern half of Europe there was a predominance of excessively dry regions whereas a number of very wet areas were to be found in the north and east of Europe. Compared to normal annual rainfall amounts, the wettest area of Europe last year was the East Ukraine, where between 150% and 176% of normal rainfall fell.

Greece and southern Spain were driest with just 60% of normal.

Although it is still too early to confirm whether the recent exceptional warmth is related to the greenhouse effect, international scientific opinion strongly supports the idea, and it is argued that it has played some role in contributing to the recent warmth.

(The map across shows the deviation from normal annual mean temperatures. The hatched areas are those with incomplete data. The black areas show the greatest warming, with mean values of 2°C or more above normal. The map is adapted from a similar map published in the German Global Climate Review.

The text of this article combines an article originally published in the UK Met. Office's 'Meteorological Magazine' with some material from the German Weather Service's 'Global Climate Review'.)



Monday 1st: A slack east to northeast airflow covered the country.

Rainfall: nil

Temperature: max. 13°C to 20°C, min. 4°C to 11°C, ground frost -1°C inland
Sunshine: nil to 1 hour in the north, 2 to 11 hours generally

Tuesday 2nd: A northerly airflow covered the country.

Rainfall: nil to 1mm

Temperature: max. 12°C to 17°C, min. 8°C to 11°C
Sunshine: 3 to 8 hours

Wednesday 3rd: Light to moderate winds between northwest and northeast in direction brought showers and bright periods to all areas. Ground frost in places by night.

Rainfall: nil to 3mm

Temperature: max. 11°C to 16°C, min. -1°C to 5°C, ground frost -5°C inland
Sunshine: 5 to 13 hours

Tuesday 4th: Generally sunny after a cold start. Northeast winds brought the odd shower to exposed coasts. Winds gradually veered southeast ahead of cloud and rain which reached the southwest later on.

Rainfall: nil to 1mm generally, 13mm in the south

Temperature: max. 11°C to 16°C, min. -2°C to 8°C, ground frost -8°C inland
Sunshine: 3 to 15 hours

Wednesday 5th: A frontal depression moved eastwards across the south of Ireland, bringing persistent rain and drizzle to all but Ulster and North Connaught, some of it moderate. Winds light to moderate in strength, varied quite a lot in direction.

Rainfall: nil to 10mm generally, 14 to 17mm in the south and southeast

Temperature: max. 11°C to 17°C, min. -1°C to 10°C, ground frost -2°C inland
Sunshine: nil to 4 hours generally, 13 hours in the north

Thursday 6th: A quasi-stationary low south of the country gave cloudy, wet conditions to all but Ulster, which was in the clear. Light winds, mostly from the northeast.

Rainfall: nil to 5mm

Temperature: max. 12°C to 16°C, min. 8°C to 11°C
Sunshine: nil to 2 hours generally, 10 to 16 hours in the north and northwest.

Friday 7th: Low moving away eastwards. Dry generally, after overnight rain in the east, with only the very odd shower. Good sunshine especially in the southwest. Light to moderate winds, mostly northeasterly.

Rainfall: nil to 3mm

Temperature: max. 13°C to 19°C, min. 7°C to 11°C
Sunshine: 4 to 11 hours

Saturday 8th: Depression to the northwest swept fronts over the country. Rain in all areas with a short-lived clearance late in the day. Winds increased to moderate, later to strong blowing from the southeast then south to southwest.

Rainfall: 5 to 24mm, 55mm in the west

Temperature: max. 13°C to 17°C, min. 4°C to 11°C, ground frost -1°C inland
Sunshine: trace to 4 hours

Sunday 9th: A showery southwest to west airflow.

Widespread rain or showers, heavy in places. Winds south or southwest moderate to fresh at first, later between southwest and northwest, strong in places with gale gusts.

Rainfall: 1 to 10mm generally, 21mm in the north

Temperature: max. 14°C to 16°C, min. 9°C to 12°C
Sunshine: trace to 7 hours

Monday 10th: A slackening west to northwest airflow covered the country. Winds northwest or west moderate to strong with gale gusts, later west or southwest, light to moderate. Widespread showers, mostly light.

Rainfall: nil to 3mm

Temperature: max. 13°C to 17°C, min. 8°C to 12°C
Sunshine: 7 to 12 hours

Tuesday 11th: Troughs moved eastwards during the morning and early afternoon giving widespread rain at first followed by scattered showers. Winds moderate southeast at first, veered southwest with the clearance and freshened.

Rainfall: 2 to 10mm generally, 15 to 17mm in the northwest and southwest

Temperature: max. 15°C to 21°C, min. 5°C to 10°C
Sunshine: 1 to 6 hours

Wednesday 12th: A strong, unstable west to southwest airflow over the country gave cool blustery weather with frequent showers, some squally. The south to southwest winds veered west to southwest during the day and were strong with gale gusts.

Rainfall: trace to 6mm generally, 10 to 18mm in the north, northwest and southwest

Temperature: max. 13°C to 16°C, min. 7°C to 11°C
Sunshine: 1 to 11 hours

Thursday 13th: A northwesterly airflow with showers in many places. Winds moderate to fresh and gusty, decreasing slowly during the late afternoon and evening. Good clear spells between the showers giving a lot of sunshine in all but north and northeast areas.

Rainfall: nil to 4mm generally, 9mm in the north

Temperature: max. 13°C to 17°C, min. 8°C to 11°C
Sunshine: 2 to 12 hours

Friday 14th: A west to northwest airflow over the country slackened during the morning and a shallow depression moved eastwards along the south coast during the evening. Rain reached the southwest before mid-day and spread into Munster and Leinster during the afternoon and evening. Scattered showers continued in northern regions.

Rainfall: nil to 8mm

Temperature: max. 12°C to 16°C, min. 8°C to 10°C
Sunshine: nil to 6 hours

Saturday 15th: Sunny spells and showers, some showers with hail and thunder. Northerly winds were fresh on exposed coasts.

Rainfall: 1 to 8mm generally, 14mm in the east

Temperature: max. 13°C to 16°C, min. 6°C to 10°C
Sunshine: 2 to 9 hours

Sunday 16th: Northwesterly winds, fresh and gusty by day, brought showers, some with hail or thunder.

Rainfall: 1 to 9mm generally, 18mm in the southeast

Temperature: max. 11°C to 16°C, min. 7°C to 10°C
Sunshine: 1 to 9 hours

Monday 17th: Generally cloudy with rain at times.

Showers in western areas. Some places had good sunshine.

Northwest winds were fresh on exposed coasts.

Rainfall: trace to 3mm

Temperature: max. 12°C to 16°C, min. 8°C to 10°C
Sunshine: 1 to 8 hours

Tuesday 18th: A west to northwest airflow covered the country. Persistent rain or drizzle in the north and east. Winds west or northwest moderate to fresh.

Rainfall: nil to 4mm generally, 7mm in the north

Temperature: max. 11°C to 16°C, min. 7°C to 10°C
Sunshine: nil to 11 hours

Wednesday 19th: A weak ridge extended over the country from the north west as a shallow depression drifted eastwards near the south coast. There were showers in the northeast and rain at times in the southwest.

Rainfall: nil to 2mm

Temperature: max. 13°C to 18°C, min. 5°C to 10°C, ground frost -1°C
Sunshine: 1 to 14 hours

Thursday 20th: Pressure was uniform across the country. Light winds. Fog in many areas at first. Later a freshening southeasterly airflow developed, moderate to fresh with gale gusts. Rain spread from the southwest.

Rainfall: nil to 5mm

Temperature: max. 13°C to 20°C, min. 3°C to 9°C, ground frost -2°C inland
Sunshine: 4 to 14 hours

Friday 21st: An unstable southwesterly flow became established during the early hours of the day after a cold front, had crossed the country. Winds became fresh to strong with gale gusts in places. Thunder was also reported.

Rainfall: 1 to 7mm generally, 15mm in the midlands

Temperature: max. 15°C to 19°C, min. 9°C to 12°C
Sunshine: 1 to 9 hours

Saturday 22nd: An unstable southwesterly airflow covered the country. Winds south or southwest moderate to fresh, later strong at times in the west. Widespread showers, some heavy and with thunder.

Rainfall: trace to 8mm generally, 10 to 15mm in the north

Temperature: max. 15°C to 18°C, min. 8°C to 11°C
Sunshine: 1 to 12 hours

Sunday 23rd: The light to moderate southwesterly flow became light and variable in direction as the low off the northwest coast filled and another low moved eastwards to the south of the country.

Rainfall: nil to 3mm generally, 10 to 19mm in the south and southeast

Temperature: max. 15°C to 19°C, min. 9°C to 12°C
Sunshine: trace to 9 hours, 15 hours in the southwest

Monday 24th: A rain belt moving slowly northeastwards brought rain to all parts, heaviest in the south. Only the north had any sunshine before the rain arrived. Light variable east to southeast winds.

Rainfall: nil to 8mm generally, 11 to 20mm in the south and southeast

Temperature: max. 15°C to 19°C, min. 7°C to 12°C
Sunshine: nil to 2 hours, 4 hours in the north

Tuesday 25th: Minor wave disturbance crossed southeast of the country early. Winds then became southwesterly or westerly moderate occasionally fresh. Early rain in Munster and South Leinster cleared and there were sunny spells and scattered showers.

Rainfall: trace to 8mm

Temperature: max. 16°C to 20°C, min. 10°C to 14°C
Sunshine: 2 to 8 hours

Wednesday 26th: Bright spells and showers, some heavy and prolonged. Light variable winds.

Rainfall: trace to 8mm generally, 13 to 21mm in the east

Temperature: max. 15°C to 18°C, min. 7°C to 11°C
Sunshine: 3 to 11 hours

Thursday 27th: Light northwest or variable winds. Showers and bright spells.

Rainfall: nil to 4mm

Temperature: max. 15°C to 19°C, min. 7°C to 12°C
Sunshine: 1 to 8 hours generally, 13 hours in the north

Friday 28th: Sunny in coastal areas, fairly cloudy inland, with just the odd shower. Light variable winds.

Rainfall: nil to trace

Temperature: max. 15°C to 19°C, min. 9°C to 13°C
Sunshine: 1 to 10 hours

Saturday 29th: A weak ridge crossed eastwards during the night. A warm front moved in from the west during the morning bringing rain and drizzle to some areas, mostly light. A cold front followed in the afternoon with further spells of light rain and drizzle. Winds light to moderate south to southeasterly veered south to southwesterly in the afternoon still light to moderate, but fresh and gusty in the north and northwest.

Rainfall: nil to 7mm

Temperature: max. 15°C to 21°C, min. 7°C to 13°C
Sunshine: nil to 3 hours

Sunday 30th: Southwest flow brought showers to some areas. Winds moderate in strength, gusty in places.

Rainfall: nil to 4mm, 8mm in the north

Temperature: max. 16°C to 19°C, min. 10°C to 14°C
Sunshine: trace to 5 hours

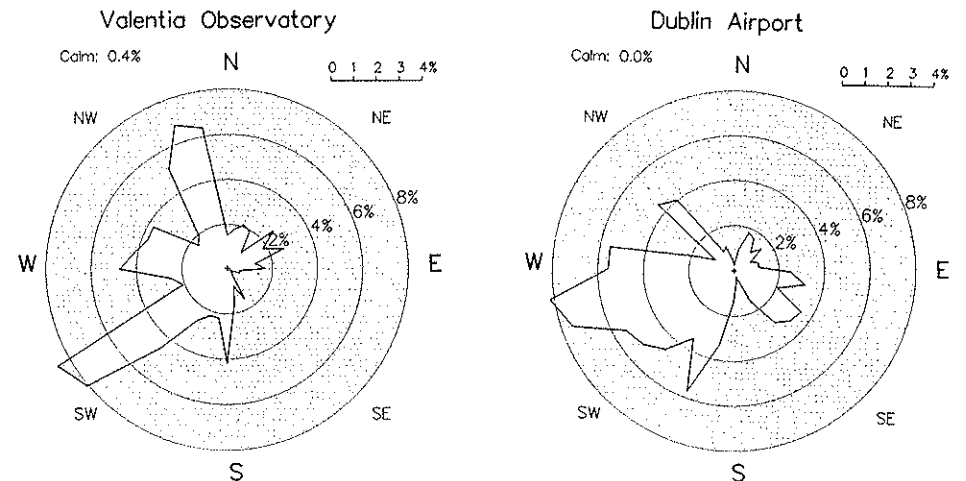
County / Station	TEMPERATURE (°C)					
	Mean max.	Mean min.	Mean/ deviation from average	Highest max./date	Lowest min./date	Lowest grass min./date
CO. CARLOW CARLOW (OAK PARK)	16.2	8.3	12.3 -1.5	19.3 11	2.0 03	-2.5 03
CO. CLARE CARRON	15.1	8.4	11.8	18.7 29	3.3 04	-2.2 04
SHANNON AIRPORT	16.9	9.9	13.4 -0.7	20.1 01	3.7 04	-1.1 19
CO. CORK CORK AIRPORT	15.6	9.0	12.3 -0.8	18.2 28	4.8 04	2.5 03
FERRMOY (MOORE PARK)	16.8	8.6	12.7 -0.8	20.0 11 24	1.9 04	-4.6 04
ROCHE'S POINT	15.7	10.0	12.9 -0.7	18.6 25	7.5 03 20	1.1 20
SHERKIN ISLAND	15.5	10.4	13.0 -0.3	18.7 07	6.6 04	
CO. DONEGAL CATHALEEN'S FALL	15.1	8.2	11.7 -1.5	19.8 20	2.0 04	
LETTERKENNY (MAGHERENAN)	15.7	7.2	11.5	19.2 24 25	-1.0 05	
MALIN HEAD	13.6	8.9	11.3 -1.2	17.5 29	2.7 05	
CO. DUBLIN CASEMENT AERODROME	15.6	8.2	11.9 -1.4	19.2 11	0.4 04	-0.6 03
DUBLIN AIRPORT	15.7	9.0	12.4 -1.1	19.6 11	2.8 04	-0.5 04
DUBLIN (MERRION SQUARE)	16.5	10.0	13.3 -1.4	20.1 11	5.1 03	
CO. GALWAY GALWAY (UNIV. COLLEGE)	16.1	9.6	12.9 -0.7	20.1 01	3.9 04	
MAAM VALLEY	15.1	9.3e	12.2	19.2 01	3.9 04	-3.8 04
CO. KERRY ARDFERT (LISCAHANE)	16.6	9.5	13.1	20.6 29	2.9 04	-1.7 04
VALENTIA OBSERVATORY	15.7	10.4	13.1 -0.4	19.2 20	4.6 04	1.2 04
CO. KILDARE NAAS (GOWRAN GRANGE)	15.5	8.0	11.8	18.9 11	0.4 03	-5.0 04
CO. KILKENNY KILKENNY	16.5	8.0	12.3 -1.2	19.8 11	2.0 03	-4.5 03 04
CO. LEITRIM BALLINAMORE	15.4	7.6e	11.5 -1.4	20.0 20	0.4 04	
CO. LIMERICK MOUNT RUSSELL	15.6e	8.3	12.0	19.3 24	2.5 04	-1.9 03
CO. LOUTH ARDEE (BOHARNAMOE)	16.5	6.8	11.7	19.9 30	-1.5 04	-7.8 04
CO. MAYO BELMULLET	15.2	9.3	12.3 -0.7	19.0 20	3.5 04	-0.3 04
CLAREMORRIS	15.7	7.7	11.7 -1.1	19.5 01	0.7 04	-1.2 04
NEWPORT (FURNACE)						1.0 04 06
CO. MEATH WARRENTOWN (AGR. COLL.)	15.5	7.9	11.7 -1.6	19.1 30	1.3 04	-2.4 04
CO. MONAGHAN CLONES	15.4	8.0	11.7 -1.3	18.7 28	2.3 04	-3.8 04
CO. OFFALY BIRR	16.2	8.0	12.1 -1.3	19.5 01	0.2 04	-4.8 04
DERRYGREENAGH	15.9	7.7	11.8 -1.3	18.6 23	-0.5 04	-7.9 04
CO. SLIGO MARKREE CASTLE	15.7			19.4 20		
CO. TIPPERARY DUNDRUM (KNOCKAVILLA)	16.6	8.0	12.3	19.3 29	3.5 20	-0.4 03
FETHARD (PARSONSHILL)	16.3	7.7	12.0	20.6 11	2.4 04	-0.8 04
CO. WATERFORD DUNGARVAN (CARRIGLEA)	17.3	9.0	13.2	19.9 25	3.5 04	2.0 04
CO. WESTMEATH MULLINGAR II	15.4	7.8	11.6 -1.3	18.1 23	0.2 04	-3.0 04
CO. WEXFORD CLONROCHE	15.8	8.0	11.9 -1.3	18.8 28	1.3 04	-5.4 04
JOHN F. KENNEDY PARK	15.8	8.4e	12.1 -1.3	18.9 28	-0.5 03	-2.9 03
JOHNSTOWN CASTLE	15.9	8.9	12.4 -0.8	17.7 27	2.2 04	-4.2 05
ROSSLARE	15.1	9.7	12.4 -0.9	17.7 27	5.4 04	-0.6 04

County / Station	RAINFALL (MM)			SUNSHINE (HRS)			
	Total amount	% of average	Most in a day/date	Daily mean (hrs./day)	% of average	% of possible	Most in a day/date
CO. CARLOW CARLOW (OAK PARK)	81.9	167	9.5 21	4.31	76	26	10.4 13
CO. CLARE CARRON	127.1	135	20.7 08				
SHANNON AIRPORT	86.4	146	13.2 08	5.51	98	33	14.9 23
CO. CORK CORK AIRPORT	92.9	145	16.7 08	5.31	86	32	10.8 10
FERRMOY (MOORE PARK)	87.0	158	9.7 23	3.87	70	23	12.8 10
ROCHE'S POINT	70.8	142	14.5 23	5.32	83	32	11.9 22
SHERKIN ISLAND	100.7	180	13.2 04	5.90	93	36	13.4 10
CO. DONEGAL CATHALEEN'S FALL	90.3	119	13.5 08	4.04	75	24	15.0 07
LETTERKENNY (MAGHERENAN)	162.0		25.9 12				
MALIN HEAD	114.4	161	20.4 09	5.79	96	33	15.6 06
CO. DUBLIN CASEMENT AERODROME	59.7	122	13.4 26	4.66	75	28	11.3 20
DUBLIN AIRPORT	79.8	151	21.4 26	4.80	75	28	11.7 20
DUBLIN (MERRION SQUARE)	65.0	127	10.3 05 26				
CO. GALWAY GALWAY (UNIV. COLLEGE)	87.3	120	12.3 08	4.87	86	29	12.6 19
MAAM VALLEY	237.0		54.7 08	3.19		19	13.9 07
CO. KERRY ARDFERT (LISCAHANE)	76.0		11.4 08	5.15		31	13.1 23
VALENTIA OBSERVATORY	107.0	141	18.2 08	4.33	79	26	10.7 10
CO. KILDARE NAAS (GOWRAN GRANGE)	77.0		12.8 26				
CO. KILKENNY KILKENNY	91.0	194	11.7 21	4.31	75	26	11.0 13
CO. LEITRIM BALLINAMORE	97.8	127	18.8 08	3.60	72	21	11.5 07
CO. LIMERICK MOUNT RUSSELL	132.2		13.6 05				
CO. LOUTH ARDEE (BOHARNAMOE)	55.7	93	9.7 08				
CO. MAYO BELMULLET	84.8	121	24.4 08	5.25	88	31	15.7 07
CLAREMORRIS	92.7	125	24.0 08	3.86	75	23	14.1 07
NEWPORT (FURNACE)	116.1	121	20.0 08	4.02	75	24	11.2 01
CO. MEATH WARRENTOWN (AGR. COLL.)	84.2	138	16.7 26				
CO. MONAGHAN CLONES	88.9	129	14.7 22	3.30	63	19	12.8 03
CO. OFFALY BIRR	91.6	176	13.4 08	3.57	66	21	8.8 10
DERRYGREENAGH	84.5	151	10.9 08	4.72	90	28	11.0 13
CO. SLIGO MARKREE CASTLE	107.6	135	15.9 08				
CO. TIPPERARY DUNDRUM (KNOCKAVILLA)	114.3		18.9 24				
FETHARD (PARSONSHILL)	103.1		15.4 21				
CO. WATERFORD DUNGARVAN (CARRIGLEA)	117.8		15.6 05	5.16		31	11.2 22
CO. WESTMEATH MULLINGAR II	78.9	125	10.7 08	4.55	82	27	11.7 04
CO. WEXFORD CLONROCHE	101.8	162	18.9 23	5.13	90	31	11.4 22
JOHN F. KENNEDY PARK	86.7	155	13.2 24	4.83	84	29	10.7 19
JOHNSTOWN CASTLE	93.0	160	14.1 24				
ROSSLARE	91.3	186	19.5 24	6.01	85	36	13.3 20

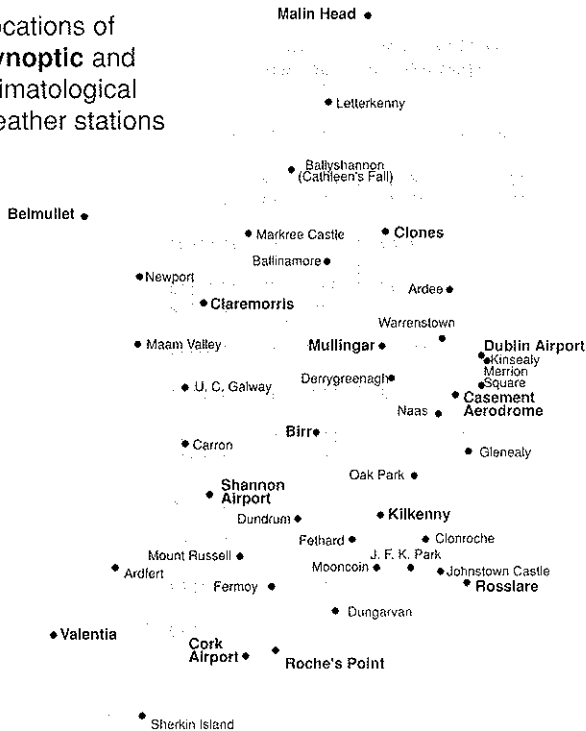
County / Station	WEATHER — No. OF DAYS WITH									MEAN 0900 SOIL TEMPERATURES (°C)		
	Rain days	Wet days	Air frost	Ground frost	Snow	Snow lying	Hail	Thunder	Fog	10cm	20cm	30cm
CO. CARLOW												
CARLOW (OAK PARK)	23	21	0	4						13.8	13.2	14.0
CO. CLARE												
CARRON	27	21	0	1						12.8		13.9
SHANNON AIRPORT	25	20	0	1	0	0	0	0	2	14.0	14.6	15.5
CO. CORK												
CORK AIRPORT	23	18	0	0	0	0	1	0	6	13.2	13.6	14.9
FERMOY (MOORE PARK)	24	19	0	4						13.9		14.1
ROCHE'S POINT	20	13	0	0						13.5	13.4	13.8
SHERKIN ISLAND	23	19	0									
CO. DONEGAL												
CATHALEEN'S FALL	23	16	0									
LETTERKENNY (MAGHERENAN)	25	19	1									
MALIN HEAD	21	15	0	0	0	0	1	2	0	13.1	13.3	13.2
CO. DUBLIN												
CASEMENT AERODROME	22	15	0	2	0	0	0	1	1	12.8	13.1	13.9
DUBLIN AIRPORT	22	15	0	1	0	0	0	2	2	13.0	13.5	14.1
DUBLIN (MERRION SQUARE)	22	17	0									12.6e
CO. GALWAY												
GALWAY (UNIV. COLLEGE)	24	17	0									
MAMM VALLEY	23	17	0	2								
CO. KERRY												
ARDFERT (LISCAHANE)	25	16	0	1								
VALENTIA OBSERVATORY	25	22	0	0	0	0	0	0	0	13.7	14.1	14.8
CO. KILDARE												
NAAS (GOWRAN GRANGE)	24	16	0	4								
CO. KILKENNY												
KILKENNY	23	20	0	7	0	0	0	2	1	13.2	13.6	14.2
CO. LEITRIM												
BALLINAMORE	23	18	0								12.7	13.0
CO. LIMERICK												
MOUNT RUSSELL	27	26	0	2								
CO. LOUTH												
ARDEE (BOHARNAMOE)	17	16	2	10						13.7	13.8	14.1
CO. MAYO												
BELMULLET	22	14	0	1	0	0	0	0	1	14.2	14.6	14.9
CLAREMORRIS	19	15	0	1	0	0	0	0	4	12.9	13.6	14.7
NEWPORT (FURNACE)	22	19	0									
CO. MEATH												
WARRENTOWN (AGR. COLL.)	21	14	0	2						13.2	13.6	13.9
CO. MONAGHAN												
CLONES	23	16	0	4	0	0	0	1	2	12.7	13.1	14.0
CO. OFFALY												
BIRR	24	17	0	3	0	0	0	0	2	13.2	13.5	14.3
DERRYGREENAGH	23	17	1	4								
CO. SLIGO												
MARKREE CASTLE	22	17										
CO. TIPPERARY												
DUNDRUM (KNOCKAVILLA)	28	20	0	1						14.1	14.1	
FETHARD (PARSONSHILL)	23	21	0	1						12.7	13.4	
CO. WATERFORD												
DUNGARVAN (CARRIGLEA)	24	18	0	0								14.5
CO. WESTMEATH												
MULLINGAR II	21	18	0	1	0	0	0	0	0	12.0	12.4	14.4
CO. WEXFORD												
CLONROCHE	22	17	0	9						12.8	12.8	13.3
JOHN F. KENNEDY PARK	23	19	1	3						13.3	13.4	13.9
JOHNSTOWN CASTLE	27	17	0	5						13.5	13.2	13.4

County / Station	WIND (KTS)							
	Mean speed	Max. 10-min. dir. speed	mean date/hour	Max. Gust dir. speed	date/time	Days with gales	Hours with gale gusts	Hours with gale gusts
CO. CLARE								
SHANNON APT.	9.7	230°	37 12/15	240°	51 12/0858	1	2	19
CO. CORK								
CORK APT.	9.6	190°	27 08/15	190°	38 08/1338	0	4	13
ROCHES POINT	11.0	180°	30 08/10	210°	51 12/0134	0	9	48
CO. DONEGAL								
MALIN HEAD	12.2	240°	37 12/01	240°	51 12/1401	2	8	55
CO. DUBLIN								
CASEMENT AERO.	10.5	250°	36 12/10	250°	50 12/1518	1	9	42
DUBLIN APT.	9.5	240°	38 12/07	240°	53 12/1242	1	5	25
CO. KERRY								
VALENTIA OBSY.	10.5	240°	27 12/05	240°	46 12/0659	0	11	69
CO. KILKENNY								
KILKENNY	6.6	250°	24 12/12	250°	40 12/1030	0	2	8
CO. MAYO								
BELMULLET	12.5	280°	33 12/12	280°	50 12/1037	0	6	31
CLAREMORRIS	7.3	280°	30 12/12	280°	49 12/1025	0	2	14
CO. MONAGHAN								
CLONES	7.1	270°	31 12/12	280°	50 12/1404	0	4	25
CO. OFFALY								
BIRR	6.7	260°	23 12/14	260°	41 12/1057	0	2	9
CO. WESTMEATH								
MULLINGAR II	7.8	250°	24 12/13	250°	47 12/1125	0	3	12
CO. WEXFORD								
ROSSLARE	10.4	230°	27 12/14	230°	45 12/1030	0	7	35

FREQUENCY OF WIND DIRECTION



Locations of Synoptic and Climatological weather stations



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.

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=1.15 m.p.h.)
2. Rainfall amounts are measured at climatological stations at 0900GMT and credited to the previous day. At synoptic stations daily totals refer to the 24-hour period ending at 0600GMT the following day. The term rainfall includes all forms of precipitation, such as snow and hail, and deposition from dew or frost, measured as equivalent rain.
3. 'Raindays' and 'wetdays' are days during which the total rainfall is not less than 0.2mm and 1.0mm 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 stations make their daily 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 with air frost are those during which the minimum air temperature was below 0°C. Similarly days with ground frost indicate days when the grass minimum temperature was below 0°C. (Grass minimum temperatures are measured by a thermometer placed horizontally on pegs just above the tips of short grass.)
7. Mean soil and earth temperatures are based on readings taken at 0900GMT.
8. A gale is a mean wind over a 10 minute period of 34 knots or more. A gale gust is a gust of 34 knots or more. All wind speeds refer to the wind at an effective height of 10 metres above the ground.
9. 'e' denotes that the value is calculated using one or more estimated readings.
10. Data from Northern Ireland is kindly provided by the Belfast Weather Centre.

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 formula limitations, negative values can occur in winter; these are replaced in the table by zero. Measured P.E. values are those measured by means of soil-filled tanks sunk into the ground with their upper grass-covered ends at surface level.
12. Soil moisture deficits and surpluses are computed from the differences between rainfall and actual evapotranspiration (A.E.). Estimates of A.E. are derived from measured values of P.E. (See Agmet Memo No. 1, 1968). Soil moisture surpluses are assumed to be removed by drainage and surface runoff and are not therefore carried forward from one period to the next. Soil moisture deficits are regarded as being cumulative. Where heavy rain occurs near the end of the fixed period, the date of cut-off may be adjusted to avoid error due to insufficient run-off time.
13. Degree day totals are calculated using the method set out by McVicker in the *Journal of Heating and Ventilating Engineers* (Vol. 14 No. 18, Nov-Dec 1946).
14. Global solar radiation values are given in MJ/sq.m. correct to two decimal places (3.6MJ=1kWh).