

# Monthly Weather Bulletin

No. 296

DECEMBER 2010



## COLDEST DECEMBER ON RECORD

Ireland was almost completely covered by snow and ice on Christmas Day, one of the coldest days ever recorded in the country. This natural-colour image was acquired by the Moderate Resolution Imaging Spectroradiometer (MODIS) on NASA's Aqua satellite on the 25th. (image courtesy NASA Earth Observatory)



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*Cold wave over Europe*



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<i>Coldest year since 1986</i>	

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Notes on the tables and map  
showing location of stations  
appear in January issue

## COLDEST DECEMBER ON RECORD; MAINLY DRY AND SUNNY



### Above

The beginning of the month brought heavy wintry showers in eastern and southeastern areas, resulting in the unusual combination of snow and a funnel cloud near Wicklow on the 1st. (pictures courtesy Angus Tyrer)

Spells of exceptionally cold weather during December brought some of the lowest temperatures ever recorded in Ireland, together with heavy snowfalls in places. There were also short periods of milder weather, while overall the month was drier and sunnier than normal. Mean air temperatures for the month were up to six degrees lower than normal in places and it was the coldest December on record almost everywhere. It was also the coldest of any month on record at some stations- see page 12. The lowest December air temperature ever measured in the country,  $-17.5^{\circ}\text{C}$ , was recorded at Straide, Co. Mayo, on the 25th, while Casement Aerodrome's minimum value of  $-15.7^{\circ}\text{C}$  was the lowest temperature of any month ever recorded in the Dublin area. Between 14 and 24 days with air frost were recorded during the month, over twice the normal number for December.

Almost all parts of the country received snowfall at times, with most persistent falls over Leinster. Although there was some thawing of lying snow around mid-month, by Christmas Day there was 27cm of snow lying at Casement Aerodrome. Monthly rainfall totals (including snow melt) were below normal everywhere; heaviest daily falls were on the 26th/27th in the south and southwest, as bands of heavy rain introduced much milder conditions at the end of the month. There were

between 6 and 11 wetdays during the month at most stations (days with 1mm or more rainfall), around half of the December average. Sunshine totals varied widely, but it was a very sunny month in the west and southwest, where both Belmullet and Valentia Observatory had their sunniest December on record.

**1st to 8th:** A north to northeasterly airstream over Ireland brought a continuation of the very cold spell which began in late November. Wintry showers or longer spells of sleet or snow brought further accumulations of snow, particularly in eastern, northern and western areas. Daytime temperatures were close to freezing, while minimum values dropped below  $-15^{\circ}\text{C}$  in parts of Leinster on the 3rd.

**9th to 15th:** Pressure rose over Ireland as an anticyclone to the southwest moved northwards, bringing mostly dry but cloudy conditions with light winds. Daytime temperatures rose above freezing, bringing some thawing of lying snow, but frost remained widespread at night.

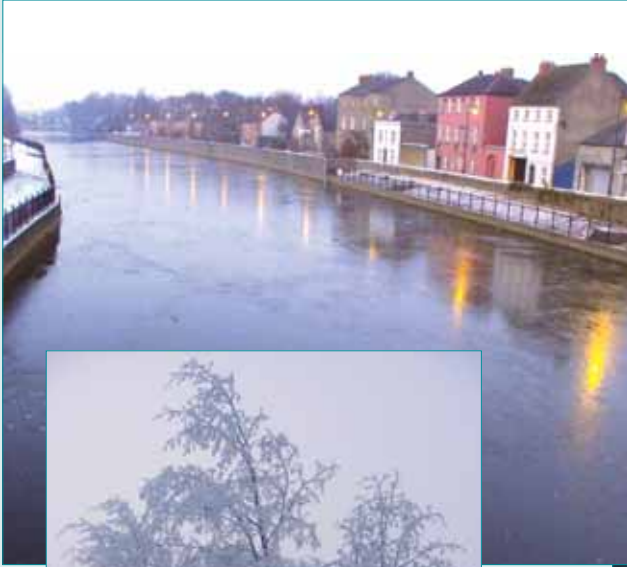
**16th to 25th:** A cold front moving southwards on the 16th re-introduced an Arctic airstream across the country. Bitterly cold northerly winds brought snow showers in many areas, most frequently along Atlantic and Irish Sea coasts, causing considerable disruption of road and air travel. Freezing conditions persisted for long periods, with the temperature remaining below  $0^{\circ}\text{C}$  for nine consecutive days in some inland areas.

**26th to 31st:** Frontal systems brought spells of heavy rain over Munster and Connacht on the 26th and 27th, with much milder Atlantic air across the country, leading to a rapid thaw of lying snow in most areas. Mild, cloudy and damp conditions for the remainder of the period, with widespread mist or fog.

**Wind and elements:** Winds were relatively light for most of the month; mean windspeeds of between 5 and 12 knots ( $9$  and  $22\text{km/h}$ ) were below normal everywhere. The month's highest gust of 51 knots ( $94\text{km/h}$ ) was recorded at Malin Head on the 17th. Hail and snow were frequent in the periods 1st to 8th and 16th to 26th, while most thunder was recorded near eastern and southern coasts between the 19th and 23rd.



### COLDEST WEATHER OVER IRELAND SINCE JANUARY 1963



*Clockwise from top left:*

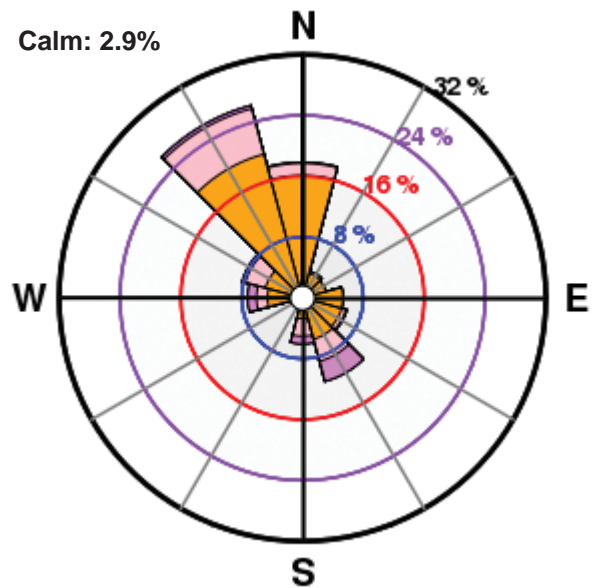
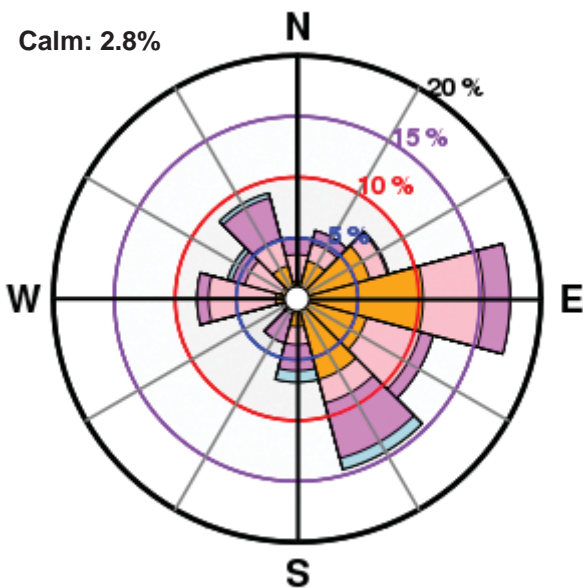
*The frozen river Nore at Kilkenny on Christmas Day, snow covering Sherkin Island on the 21st, a pint among the silage bales near Mallow, Co. Cork, on the 20th, sunrise over Dublin on the 3rd, a snowman at Met Éireann headquarters in Glasnevin on the 23rd, the ice-covered water wheel at Bandon, Co. Cork, on the 5th, and frozen trees near Ratoath, Co Meath, on the 6th. (pictures courtesy Niall Dollard, Susan Murphy, Peter Lennon, Dónal Black, Joe Lyons and Irish Examiner)*



County / Station	WIND (KNOTS)						ELEMENTS							
	Mean speed	Max. dir.	10-min. speed	mean date/hour	Max. dir.	Gust speed date/time	Days with gales	gale gusts	Hours with gale gusts	Snow	Snow Lying	Hail	Thunder	Fog
<b>CO. CARLOW</b> Carlow (Oak Park)	4.5	270°	20	16/06	150°	31 27/0221	0	0	0					
<b>CO. CAVAN</b> Ballyhaise	3.3	310°	16	16/10	280°	30 16/0627	0	0	0					
<b>CO. CLARE</b> Shannon Airport	5.1	270°	23	16/09	330°	34 16/1326	0	1	1	4	1	0	0	12
		150°	23	26/19										
<b>CO. CORK</b> Roche's Point	10.6	160°	33	26/11	320°	43 16/1455	0	3	49					
Cork Airport	8.9	270°	21	16/10	170°	34 26/1528	0	1	3	5	3	0	0	9
		160°	21	26/11										
<b>CO. DONEGAL</b> Malin Head	13.1	340°	41	17/04	330°	53 16/0543	2	7	59	11	10	8	0	0
<b>CO. DUBLIN</b> Dublin Airport	8.4	270°	25	16/07	320°	37 16/1005	0	1	1	12	17	3	3	11
Casement Aerodrome	6.2	180°	33	27/07	190°	45 27/0548	0	1	11	11	18	4	1	11
<b>CO. KERRY</b> Valentia Observatory	6.3	290°	24	16/11	290°	38 16/1112	0	3	10	5	4	3	0	0
<b>CO. MAYO</b> Belmullet	7.0	340°	28	17/02	340°	48 17/0601	0	6	40	11	11	8	0	4
		170°	28	26/08										
Knock Airport	6.7	290°	26	16/06	290°	39 16/0540	0	1	3	8	19	0	0	16
<b>CO. TIPPERARY</b> Gurteen	4.8	170°	22	26/23	170°	33 26/2350	0	0	0					
<b>CO. WESTMEATH</b> Mullingar	3.6	170°	15	26/20	280°	26 16/0842	0	0	0					
		160°	15	27/04	160°	26 27/0452								
<b>CO. WEXFORD</b> Johnstown Castle	6.2	180°	16	26/23	180°	30 26/2336								

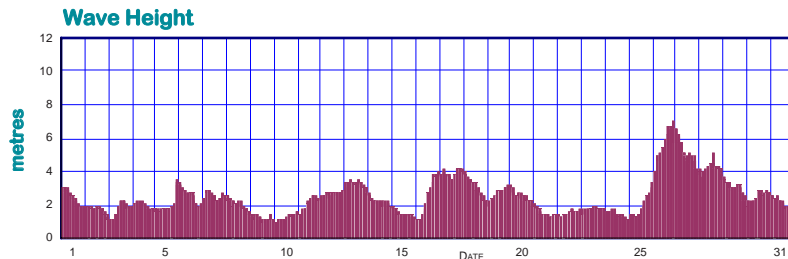
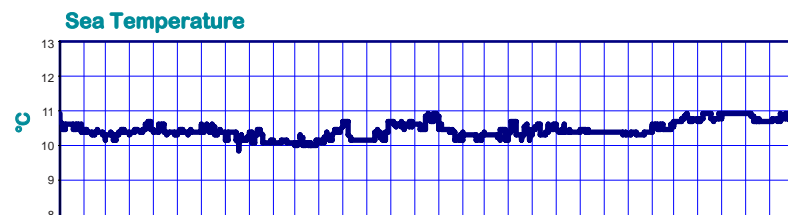
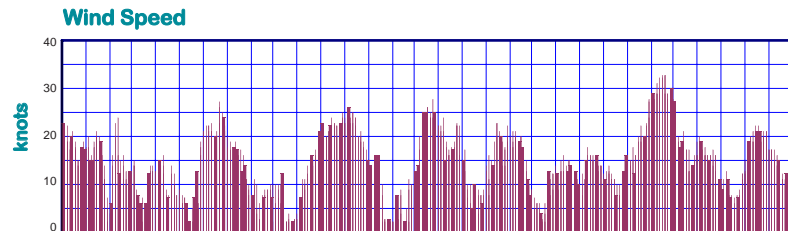
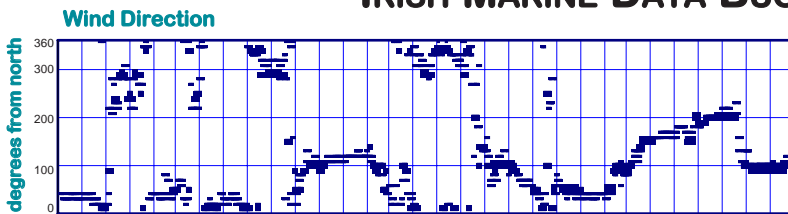
Belmullet

Carlow (Oak Park)



PERCENTAGE FREQUENCY OF WIND DIRECTION

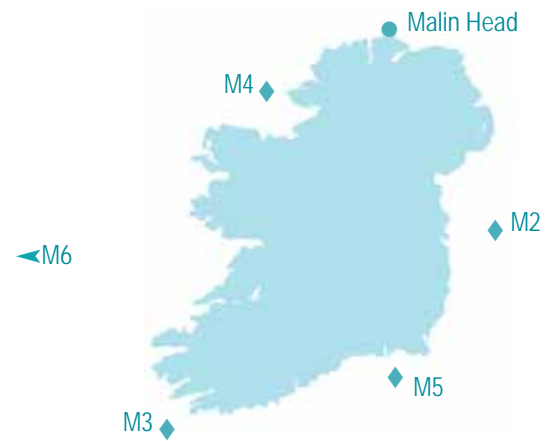
### MARINE OBSERVATIONS FROM IRISH MARINE DATA BUOY NETWORK



Hourly wind and wave conditions at M3 (51.22°N, 10.55°W)

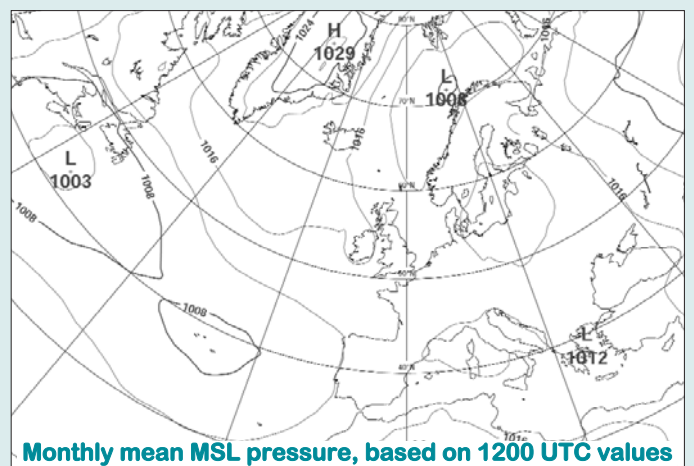
Buoy	Sea surface temp. (°C)	Mean wind speed (knots)	Max. 10-min wind (knots)	Mean wave height (m.)	Max. wave height (m.)
M2		not available			
M3	10.5	14.4	33	2.4	7.1
M4	10.3	15.2	32	n/a	n/a
M5	10.2	13.9	29	1.7	6.1
M6	11.5	15.0	37	3.0	7.5
Malin Head	7.9				

#### Summary of Mean Monthly Values

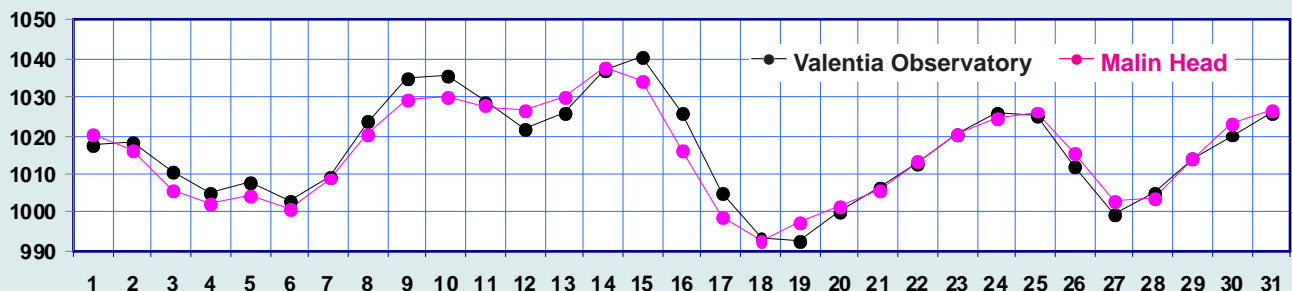


### MEAN ATMOSPHERIC PRESSURE

There was little variation in mean monthly sea level pressure values over the country, which were close to 1016hPa everywhere, between 5 and 7hPa above normal for December. The month's highest pressure values were measured around mid-month; Belmullet's value of 1045.0hPa on the 15th was the fourth highest December pressure at the station since it opened in 1956. The lowest values were recorded on the 18th/19th; the month's lowest pressure of 989.8hPa was recorded at Valentia Observatory on the 19th.



Monthly mean MSL pressure, based on 1200 UTC values

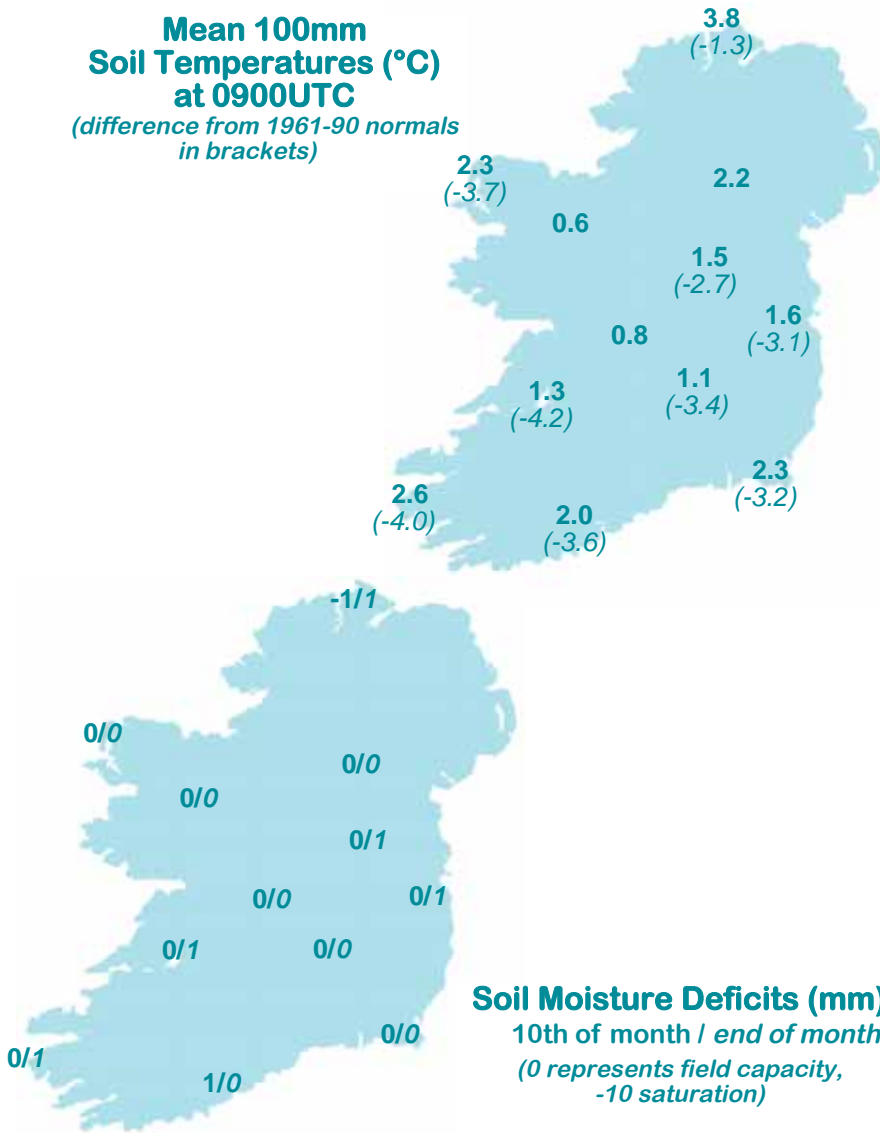


Mean daily Mean Sea Level pressure (hPa)



**Mean 100mm Soil Temperatures (°C) at 0900UTC**

(difference from 1961-90 normals in brackets)

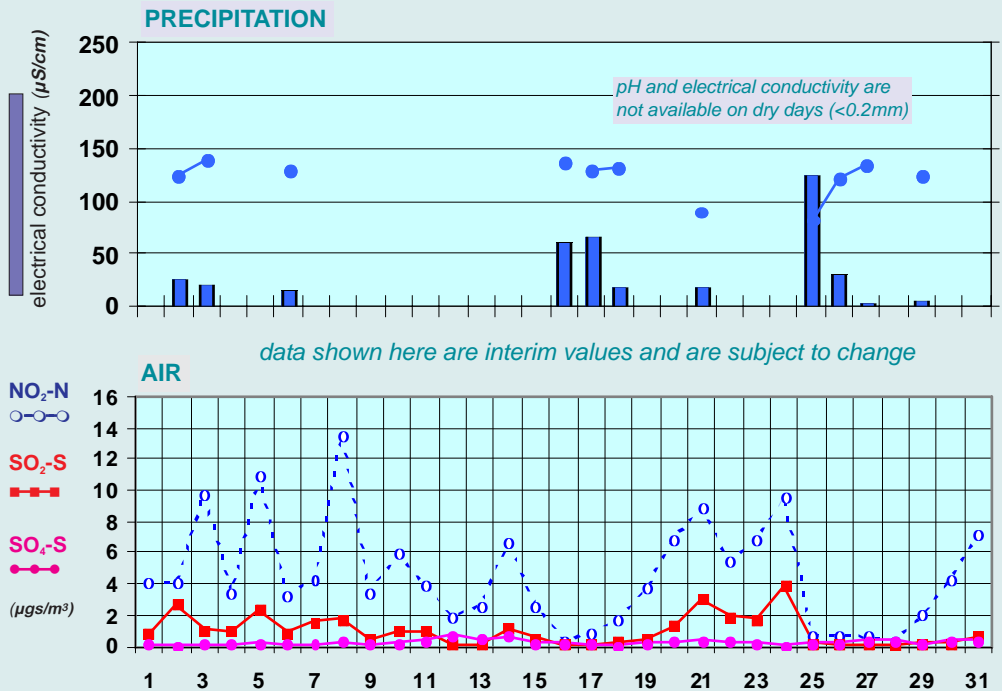


**Soil Temperatures at 0900UTC**

County/ Station	°C		
	100mm	200mm	300mm
<b>CO. CARLOW</b> CARLOW (OAK PARK)	1.1	1.6	1.7
<b>CO. CAVAN</b> BALLYHAISE	2.2	2.8	3.2
<b>CO. CLARE</b> SHANNON AIRPORT CARRON	1.3 2.0	1.9 2.9	3.4 2.9
<b>CO. CORK</b> ROCHE'S POINT FERMOY (MOOREPARK) CORK AIRPORT SHERKIN ISLAND BALLINCURRIG (PEAFIELD)	2.9 1.6 2.0 3.9 1.6	4.1 2.3 2.9 4.8 1.6	4.3 3.1 3.8 5.7 3.4
<b>CO. DONEGAL</b> MALIN HEAD	3.8	5.1	6.1
<b>CO. DUBLIN</b> DUBLIN (PHOENIX PARK) DUBLIN AIRPORT CASEMENT AERODROME	1.4 1.5 1.6	2.3 2.1 2.3	3.0 2.7 3.2
<b>CO. KERRY</b> VALENTIA OBSERVATORY	2.6	3.4	4.8
<b>CO. LIMERICK</b> MOUNT RUSSELL	1.3	2.1	
<b>CO. MAYO</b> BELMULLET STRAIDE CONNACHT AIRPORT	2.3 0.6 1.4	3.3 0.6 2.1	4.5 3.6 3.6
<b>CO. MEATH</b> WARRENSTOWN	0.9	2.1	2.1
<b>CO. TIPPERARY</b> GURTEEN PETHARD (PARSONSHILL)	0.8 1.5	1.2 2.5	2.1 2.1
<b>CO. WATERFORD</b> DUNGARVAN (CARRIGLEA)		1.9	2.5
<b>CO. WESTMEATH</b> MULLINGAR	1.5	2.2	3.0
<b>CO. WEXFORD</b> JOHNSTOWN CASTLE JOHN F. KENNEDY PARK CLONROCHE (KNOXTOWN)	2.3 1.9 2.1	3.0 3.0 2.8	3.3 4.8 3.5
<b>CO. WICKLOW</b> ASHFORD (CRONYKEERY)	2.6	3.3	

**Soil Moisture Deficits (mm) 10th of month / end of month**  
(0 represents field capacity, -10 saturation)

**Chemical Analysis of Precipitation and Air Samples at Valentia Observatory**



Acid rain occurs when pollutants combine with moisture in the air to form sulphuric or nitric acid. pH is the simplest way of measuring the acidity of precipitation. Usually pH of 7.00 is considered neutral but this is not the case in rainfall samples. Pure water in the atmosphere has an equilibrium pH value of 5.65 at 20°C owing to carbon dioxide in the air dissolving to form carbonic acid. Any value below pH 5.65 is considered acid while any value above is considered alkaline.

Sulphur dioxide and sulphate in air contribute to the formation of sulphuric acid; nitrate in air contributes to the formation of nitric acid.

Conductivity measures the total ion activity in the rainfall, i.e. the higher the conductivity the greater the number of ions present.

10-DAY VALUES FOR SELECTED AGROMETEOROLOGICAL STATIONS		RAINFALL (mm)				TEMPERATURE (°C)														SUNSHINE (HOURS)	
Station	period	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 30cm at 0900h	total no. of hours	% of average
Ballincurragh	11-20	5.1	-	4	2	4.6	-0.7	2.0	-	-6.5	19	5	5	0	-9.0	19	5	2.3	3.9	22.8	-
	21-end	51.7	-	4	3	5.0	-0.9	2.1	-	-8.2	21	6	18	0	-10.0	23	6	2.5	3.5	18.2	-
	month	60.3	-	12	6	4.4	-1.9	1.3	-	-8.2	21	21	24	0	-10.0	23	21	1.6	3.4	74.7	-
<b>Co. Donegal</b>	1-10	n/a	-	n/a		3.6	-5.7	-1.0	-	-11.4	2	9	2	0	-13.2	2	10	-	-	-	-
Glenties	11-20	n/a	-	n/a		4.1	-1.5	1.3	-	-8.5	20	7	3	0	-11.7	20	9	-	-	-	-
	21-end	n/a	-	n/a		5.1	-3.1	1.0	-	-11.8	25	6	16	0	-15.5	22	6	-	-	-	-
	month	n/a	-	n/a		4.3	-3.4	0.5	-4.7	-11.8	25	22	21	0	-15.5	22	25	-	-	-	-
<b>Co. Kerry</b>	1-10	10.6	-	5	2	4.2	-4.4	-0.1	-	-7.9	2	10	2	0	-8.9	2	10	-	-	-	-
Ardfert	11-20	16.3	-	4	2	5.0	0.0	2.5	-	-5.4	20	5	7	0	-7.1	20	6	-	-	-	-
	21-end	30.5	-	6	4	5.4	-1.8	1.8	-	-11.8	22	6	24	2	-12.7	22	6	-	-	-	-
	month	57.4	-	15	8	4.9	-2.1	1.4	-5.3	-11.8	22	21	34	2	-12.7	22	22	-	-	-	-
<b>Co. Monaghan</b>	1-10	8.7	-	5	3	1.7	-5.9	-2.1	-	-9.7	8	10	1	0	-9.1	6	10	-	-	-	-
Carrickmacross	11-20	3.5	-	4	1	4.2	-2.4	0.9	-	-10.1	20	8	5	0	-8.0	19	8	-	-	-	-
	21-end	41.4	-	4	4	4.3	-3.4	0.5	-	-11.4	25	7	13	0	-9.6	21	7	-	-	-	-
	month	53.6	60	13	8	3.4	-3.9	-0.2	-	-11.4	25	25	18	0	-9.6	21	25	-	-	-	-
<b>Co. Waterford</b>	1-10	3.3	-	3	1	3.4	-4.4	-0.5	-	-6.0	3	10	1	0	-6.5	3	10	-	1.7	32.1	-
Dungarvan	11-20	2.0	-	2	1	6.0	0.8	3.4	-	-5.0	19	4	9	0	-6.5	19	5	-	3.1	25.0	-
	21-end	69.2	-	4	4	6.4	-1.0	2.7	-	-8.0	26	6	20	1	-9.0	26	7	-	2.6	25.1	-
	month	74.5	-	9	6	5.3	-1.5	1.9	-4.3	-8.0	26	20	30	1	-9.0	26	22	-	2.5	82.2	184
<b>Co. Wexford</b>	1-10	7.1	-	6	3	2.2	-4.9	-1.3	-	-7.4	7	10	0	0	-10.6	7	10	1.2	5.6	17.9	-
J.F.K. Park	11-20	1.3	-	1	1	4.6	0.2	2.4	-	-4.6	19	4	4	0	-7.0	19	9	2.2	4.9	18.1	-
	21-end	57.2	-	5	4	5.7	0.6	3.2	-	-5.2	25	6	19	0	-9.0	25	7	2.3	4.0	14.5	-
	month	65.6	62	12	8	4.2	-1.3	1.5	-4.3	-7.4	7	20	23	0	-10.6	7	26	1.9	4.8	50.5	112
<b>Co. Wicklow</b>	1-10	27.2	-	6	4	4.6	-2.1	1.3	-	-6.8	6	6	3	0	-13.8	6	10	2.5	-	32.1	-
Ashford	11-20	6.3	-	3	2	5.8	-1.2	2.3	-	-6.9	20	7	7	0	-12.0	19	9	2.4	-	37.0	-
	21-end	54.7	-	7	6	6.5	1.2	3.9	-	-6.3	21	6	20	1	-10.6	21	6	2.8	-	18.2	-
	month	88.2	-	16	12	5.7	-0.6	2.6	-	-6.9	20	19	29	1	-13.8	6	25	2.6	-	87.3	-

MEASURED POTENTIAL EVAPOTRANSPIRATION (P.E.) AND SOIL MOISTURE					
Station	Period	P.E. (mm)		Soil Moisture (mm)	
		Amount	Deficit	Accum'd	Deficit Surplus
<b>Co. Kerry</b>	1-10	7.7	-	0	6
Valentia Obs.	11-20	2.3	-	0	11
	21-end	12.4	-	0	69
	month	22.4			

Station	P.E. (Penman)		GLOBAL SOLAR RADIATION (MJ/sq.m.)			
	total(mm)	1st-10th	11th-20th	21st-end	Total	
<b>Co. Carlow</b>						
Carlow (Oak Park)*	4	21.50	20.22	17.91	59.63	
<b>Co. Cavan</b>						
Ballyhaise*	3	27.52	18.16	20.13	65.81	
<b>Co. Clare</b>						
Shannon Airport	5	global solar radiation values for stations marked * are provisional				
<b>Co. Cork</b>						
Cork Airport	7					
Roche's Point*		34.02	20.29	23.63	77.94	
<b>Co. Donegal</b>						
Malin Head	16	18.20	15.65	18.01	51.86	
<b>Co. Dublin</b>						
Dublin Airport	5	n/a	23.49	22.73	n/a	
Casement Aerodrome	4					
<b>Co. Kerry</b>						
Valentia Obs.	12	36.52	24.03	22.81	83.36	
<b>Co. Mayo</b>						
Belmullet	5	25.67	22.07	21.10	68.84	
Knock Airport	3					
<b>Co. Tipperary</b>						
Curteen*	4	26.01	21.42	22.24	69.67	
<b>Co. Westmeath</b>						
Mullingar*	3	26.55	21.10	19.64	67.29	
<b>Co. Wexford</b>						
Johnstown Castle*	8	27.31	23.07	19.05	69.43	

MONTHLY EVAPORATION (MM) FROM CLASS A PAN			
County	Station	Monthly Rainfall (mm)	Monthly Evaporation (mm)
<b>Kerry</b>	Valentia Observatory	107.6	n/a
<b>Kerry</b>	North Kerry Landfill	64.9	0.0
<b>Mayo</b>	Newport (Furnace)	69.8	n/a
<b>Offaly</b>	Derrygreenagh	63.7	0.0
<b>Waterford</b>	Dungarvan (Carriglea)	74.6	2.7
<b>Wexford</b>	J.F.K. Park	65.6	0.0

**Wednesday 1st:** Showers of snow and hail overnight in east Leinster and north and east Ulster, continuing in the north and east throughout the day, while further west it was a cold and sunny day. Cloudy in areas affected by showers, prolonged sunshine elsewhere. Winds were north or northeasterly, moderate near coasts, light inland.

**Rainfall:** nil to 18mm, heaviest at Carlow (Oak Park)

**Temperature:** max. -2°C to 3°C, min. -9°C to 1°C, ground temperatures below zero at all stations, down to -13°C at Gurteen and Ballyhaise

**Sunshine:** nil to 8 hours, sunniest at Knock Airport, nil in the east

**Thursday 2nd:** Wintry showers continued overnight in Leinster, becoming confined to coastal areas from late morning, but persisting there until late evening. Much of the country had a sunny day, while it remained very cold. Winds were light, northeasterly to northwesterly in direction.

**Rainfall:** nil to 8mm, heaviest at Johnstown Castle

**Temperature:** max. -1°C to 5°C, min. -11°C to 0°C, ground temperatures below zero at all stations, down to -14°C at Gurteen

**Sunshine:** trace to 8 hours, sunniest at Cork Airport, trace at Casement Aerodrome

**Friday 3rd:** Very cold and frosty overnight with rain in western parts, and some freezing fog in eastern areas. Some snow showers during the day, the heaviest of these in the northwest. A few sunny spells also. Temperatures stayed below freezing apart from western coastal areas. Winds were light to moderate, southwesterly in direction.

**Rainfall:** nil to 14mm, heaviest at Belmullet, nil at Casement Aerodrome

**Temperature:** max. 1°C to 9°C, min. -13°C to 3°C, ground temperatures below zero at all stations, down to -15°C at Casement Aerodrome

**Sunshine:** nil to 2 hours, sunniest at Malin Head, nil at Dublin Airport

**Saturday 4th:** Cold and frosty overnight with some snow, mainly in the west and northwest, with rain and sleet elsewhere. The morning was cold and mainly dry with isolated showers. Widespread fog developed during the early afternoon, turning to freezing fog in places. Some sunny spells, mainly in the southwest. Winds were light to moderate northerly.

**Rainfall:** nil to 10mm, heaviest at Belmullet, nil at Mullingar

**Temperature:** max. 1°C to 8°C, min. -7°C to 2°C, ground temperatures down to -9°C at Ballyhaise

**Sunshine:** nil to 6 hours, sunniest at Valentia, nil at Casement Aerodrome

**Sunday 5th:** Some rain showers overnight near western coasts, with widespread severe frost and freezing fog patches elsewhere. The fog persisted in places during the day with sunny spells also, mainly in the southwest. Freezing fog in parts overnight. Winds were light, variable in direction.

**Rainfall:** nil to 3mm, heaviest at Belmullet

**Temperature:** max. -2°C to 7°C, min. -9°C to 0°C, ground temperatures down to -10°C at Shannon Airport

**Sunshine:** 2 to 6 hours, sunniest at Valentia, 2 hours at Shannon Airport

**Monday 6th:** Very cold overnight with widespread freezing fog. A band of rain and sleet moved into the northwest during the morning and spread gradually southeastwards, turning to snow. Some sunshine in the south and east. Dry in the north and west by nightfall. Winds were variable, light to moderate, with occasional gusts in the northwest.

**Rainfall:** nil to 9mm, heaviest at Malin Head, nil at Johnstown Castle

**Temperature:** max. -2°C to 7°C, min. -11°C to 0°C, ground temperatures below zero at all stations, down to -12°C at Casement Aerodrome

**Sunshine:** nil to 6 hours, sunniest at Dublin Airport, nil at Knock Airport

**Tuesday 7th:** Wintry showers developed along the east coast during the morning, while another band of wintry showers moved into north Connacht during the afternoon. Showers in the east spread southwards, while showers continued to affect northern and western coasts into the evening. There were some sunny spells in the west. Winds were light, northwesterly in direction.

**Rainfall:** nil to 11mm, heaviest at Johnstown Castle

**Temperature:** max. -1°C to 5°C, min. -8°C to 1°C, ground temperatures below zero at all stations, down to -12°C at Gurteen

**Sunshine:** nil to 7 hours, sunniest at Knock Airport, nil in the east

**Wednesday 8th:** Showers in the north and west overnight and during the morning. Most of the country stayed dry, however, with spells of sunshine during the afternoon. It continued mostly dry during the evening with just a few showers on northern coasts. Winds were light, northerly.

**Rainfall:** nil to 1mm, heaviest at Belmullet

**Temperature:** max. -4°C to 7°C, min. -10°C to 4°C, ground temperatures down to -12°C at Gurteen

**Sunshine:** 3 to 8 hours, sunniest at Cork Airport, 3 hours at Malin Head

**Thursday 9th:** Very cold overnight away from western coasts, with freezing fog in many places. Temperatures eventually rose above freezing everywhere during the afternoon, with patchy rain or drizzle in places. A few sunny spells in the south. Winds were light, westerly in direction.

**Rainfall:** nil to <2mm, heaviest at Malin Head

**Temperature:** max. 3°C to 9°C, min. -10°C to 6°C, ground temperatures down to -10°C at Shannon Airport

**Sunshine:** nil to 4 hours, sunniest at Cork Airport, nil at Shannon Airport

**Friday 10th:** Cloudy overnight with some patchy rain and mist in places also. The day was generally overcast with virtually no sunshine and some light rain and drizzle in places. Winds were light, westerly in direction.

**Rainfall:** nil to 1mm, heaviest at Malin Head

**Temperature:** max. 5°C to 9°C, min. 1°C to 8°C, ground temperatures down to -1°C at Claremorris

**Sunshine:** nil to <1 hour, sunniest at Knock Airport

**Saturday 11th:** Mostly dry overnight with widespread mist and fog. Patchy rain and drizzle developed during the morning over the midlands and east, clearing the east later in the morning. Generally dry during the afternoon with some sunny spells in the west. Winds were light and variable in direction.

**Rainfall:** nil to 1mm, heaviest at Belmullet

**Temperature:** max. 4°C to 10°C, min. -2°C to 8°C, ground temperatures down to -6°C at Claremorris

**Sunshine:** nil to 5 hours, sunniest at Knock Airport, nil at Cork Airport

**Sunday 12th:** Dry and cold overnight with a widespread frost. The morning was dry and sunny in many places, with frost and fog clearing slowly. Southwestern areas remained cloudy during the afternoon, while there were some sunny spells elsewhere. Winds were light, southeasterly in direction.

**Rainfall:** nil to trace

**Temperature:** max. 1°C to 9°C, min. -4°C to 5°C, ground temperatures down to -8°C at Ballyhaise

**Sunshine:** nil to 6 hours, sunniest at Dublin Airport, nil at Valentia

**Monday 13th:** Dry overnight with widespread ground frost, mist inland. Cold, particularly in Connacht and Ulster. Mist cleared during the morning. Continuing dry everywhere with ground frost developing after dark. Some sunshine in the northwest. Winds were light southerly.

**Rainfall:** nil to trace

**Temperature:** max. 2°C to 10°C, min. -3°C to 8°C, ground temperatures down to -7°C at Ballyhaise

**Sunshine:** nil to 6 hours, sunniest at Belmullet, nil at Dublin Airport

**Tuesday 14th:** Dry overnight with ground frost in many areas. Generally dry during the day with sunny spells. Some drizzle along northwestern coasts. Ground frost returned after dark in many areas with mist also. Winds were light and variable in direction.

**Rainfall:** nil generally, <1mm at Belmullet

**Temperature:** max. 4°C to 9°C, min. -2°C to 2°C, ground temperatures down to -7°C at Shannon Airport

**Sunshine:** trace to 7 hours, sunniest at Shannon Airport, trace at Malin Head

**Wednesday 15th:** Mostly dry and cloudy during the day with some sunny breaks in the south. There was patchy drizzle in places during the day, but rainfall amounts were small. Winds were light, westerly in direction.

**Rainfall:** nil to trace generally, 1mm in the northwest and north

**Temperature:** max. 5°C to 9°C, min. -1°C to 7°C, ground temperatures down to -5°C at Valentia

**Sunshine:** trace to 3 hours, sunniest at Valentia, trace at Malin Head

**Thursday 16th:** Rain and drizzle in the north of the country moved southwards during the night to affect most parts of the country by midday. Wintry showers followed during the afternoon, bringing hail, sleet and snow to parts of Connacht and Ulster. Snow showers continued throughout the night along the west coast. Winds were fresh to strong, northwesterly in direction.

**Rainfall:** 1 to 5mm, heaviest at Knock Airport, 1mm at Carlow (Oak Park)

**Temperature:** max. 7°C to 10°C, min. -3°C to 2°C, ground temperatures down to -8°C at Shannon Airport

**Sunshine:** nil to 1 hour, sunniest in the northwest



**Friday 17th:** Frequent heavy showers of snow and hail continued overnight in Ulster, Connacht and west Munster, producing significant accumulations. This pattern continued throughout the day. Some sunny spells also. Winds were northwesterly, light to moderate, up to gale force in the extreme north.

**Rainfall:** nil to 13mm, heaviest at Malin Head, nil in the east

**Temperature:** max. 0°C to 5° min. -4°C to 1°C, ground temperatures down to -9°C at Shannon Airport

**Sunshine:** nil to 5 hours, sunniest at Cork Airport, nil at Malin Head

**Saturday 18th:** Heavy snow showers overnight in coastal counties of the northwest, west and east Ulster. These cleared most areas during the day, but scattered snow showers persisted near Atlantic coasts and also returned to east Ulster during the evening. Prolonged sunshine in the south. Winds were light and variable in direction.

**Rainfall:** nil to 5mm, heaviest at Malin Head

**Temperature:** max. -3°C to 4°C, min. -11°C to -1°C, ground temperatures below zero at all stations, down to -14°C at Casement Aerodrome

**Sunshine:** nil to 7 hours, sunniest at Cork Airport, nil at Belmullet

**Sunday 19th:** Some light snow showers overnight. Freezing temperatures continued during the morning in many areas, with some freezing fog also. Sunny spells during the day, while remaining very cold with isolated snow showers. Severe frost after dark. Winds were light southeasterly or variable.

**Rainfall:** nil to 3mm, heaviest at Valentia

**Temperature:** max. -3°C to 5°C, min. -13°C to 2°C, ground temperatures below zero at all stations except Roche's Point, down to -15°C at Casement Aerodrome

**Sunshine:** nil to 5 hours, sunniest at Malin Head

**Monday 20th:** After an extremely cold night, the morning was dry at first in many areas, but snow showers developed along the east coast. This pattern continued throughout the day with sunny spells in many parts and temperatures still below freezing. Winds were light southwesterly.

**Rainfall:** nil generally, 3mm at Malin Head, 2mm at Casement Aerodrome

**Temperature:** max. -6°C to 3°C, min. -14°C to -3°C, ground temperatures below zero at all stations, down to -16°C at Gurteen

**Sunshine:** 1 to 7 hours, sunniest at Belmullet, 1 hour at Dublin Airport

**Tuesday 21st:** Very cold overnight with occasional light snow falling in the northern half of the country. Freezing fog in inland parts of the west during the morning, with snow in eastern counties and parts of the southwest, continuing through the afternoon. Snow showers died out in the southwest during the evening but persisted in eastern counties. Light variable winds.

**Rainfall:** nil to 13mm, heaviest in the east

**Temperature:** max. -9°C to 3°C, min. -14°C to -4°C, ground temperatures below zero at all stations, down to -17°C at Gurteen

**Sunshine:** nil to 5 hours, sunniest at Cork Airport

**Wednesday 22nd:** Very cold overnight with freezing fog inland and a few light snow showers in eastern areas. Long sunny spells in some areas. A few snow flurries along the east and west coasts during the afternoon and evening, with temperatures still well below freezing in most places. Winds were light southerly.

**Rainfall:** nil to 1mm, heaviest at Belmullet

**Temperature:** max. -6°C to 2°C, min. -15°C to -3°C, ground temperatures below zero at all stations, down to -15°C at Gurteen

**Sunshine:** nil to 7 hours, sunniest at Knock Airport, nil at Shannon Airport

**Thursday 23rd:** Wintry showers affected the east coast during the night. Apart from eastern coastal counties it was a generally dry day with sunny spells. Snow showers in the east intensified for a time during the afternoon and evening, dying out as the night progressed. Winds were light, mainly northerly.

**Rainfall:** nil to trace generally, 8mm in the east

**Temperature:** max. -3°C to 4°C, min. -12°C to -3°C, ground temperatures below zero at all stations, down to -15°C at Gurteen and Shannon Airport

**Sunshine:** nil to 7 hours, sunniest at Knock Airport, nil at Casement Aerodrome

**Friday 24th:** After another bitterly cold night, it was a mostly dry day across the country with severe frost and freezing fog in many places. There were some small falls of snow in east Leinster, but amounts were negligible. It remained dry into the afternoon with some sunny spells, but frost and ice persisted throughout the day. Extremely cold again after dark. Winds were light southwesterly.

**Rainfall:** nil to trace

**Temperature:** max. -6°C to 4°C, min. -15°C to -3°C, ground temperatures below zero at all stations, down to -17°C at Gurteen

**Sunshine:** nil to 7 hours, sunniest Knock Airport, nil at Shannon Airport

**Saturday 25th:** Extremely cold again overnight and throughout the day. Freezing fog developed in some inland areas and lingered into the afternoon. It was dry countrywide with sunshine in most places. Winds were light and variable, becoming south to southeasterly, moderate near south and west coasts.

**Rainfall:** nil to trace

**Temperature:** max. -5°C to 7°C, min. -16°C to -2°C, ground temperatures below zero at all stations, down to -17°C at Casement Aerodrome

**Sunshine:** nil to 6 hours, sunniest at Cork Airport, nil at Shannon Airport

**Sunday 26th:** Extremely cold again in the early part of the night, with temperatures rising in all areas by dawn. Rain moved into the west and southwest during the morning, spreading countrywide by late afternoon. The rain was heaviest in the south, west and north. Overcast countrywide. Winds were moderate, south or southeasterly throughout.

**Rainfall:** 3 to 49mm, heaviest at Valentia, 3mm at Dublin Airport

**Temperature:** max. 3°C to 10°C, min. -9°C to 6°C, ground temperatures down to -11°C at Carlow (Oak Park)

**Sunshine:** nil

**Monday 27th:** Rain in many areas overnight. The rain continued in many parts during the morning with some fog also. Heavy showers and dry spells during the afternoon. During the evening a band of very heavy rain moved over the country from the southwest, affecting all areas. Overcast throughout. Winds were strong and gusty, southerly in direction, easing somewhat later.

**Rainfall:** 3 to 38mm, heaviest in the south, 3mm at Casement Aerodrome

**Temperature:** max. 7°C to 12°C, min. 3°C to 9°C, ground temperatures below zero at Dublin Airport

**Sunshine:** nil to trace

**Tuesday 28th:** Rain in Ulster, clearing northeastwards during the early hours of the morning. Rain moved into western areas during the morning, but stalled over Connacht and west Munster for much of the day. Some sunny breaks, but mostly cloudy. Mild. Rain in the northwest became heavy during the evening. Winds were light south to southeasterly, veering southerly through the day.

**Rainfall:** nil to 8mm, heaviest at Belmullet, nil at Casement Aerodrome

**Temperature:** max. 10°C to 13°C, min. 3°C to 11°C, no ground frost

**Sunshine:** nil to 3 hours, sunniest at Shannon Airport

**Wednesday 29th:** Rain in midland and northwestern areas during the morning, with fog affecting southern and eastern coastal areas. The rain eased in inland areas during the afternoon, while the fog persisted along southern and eastern coastal areas and became more widespread during the evening. Heavy rain in the southwest during the evening. Winds were light, southerly in direction.

**Rainfall:** nil to 9mm, heaviest at Ballyhaise, nil in the east

**Temperature:** max. 9°C to 12°C, min. 4°C to 9°C, no ground frost

**Sunshine:** nil to <1 hour generally, 2 hours at Malin Head

**Thursday 30th:** Drizzle, mist and fog overnight and in the morning with the east, south and midlands most affected. Visibility improved only marginally during the afternoon, with drizzle persisting in places. Northwestern coastal fringes had a much clearer day with some sunshine. Winds were light and variable or easterly in direction.

**Rainfall:** nil to <1mm, heaviest at Dublin Airport

**Temperature:** max. 8°C to 12°C, min. 4°C to 8°C, ground temperatures down to -1°C at Shannon Airport

**Sunshine:** nil to trace generally, 6 hours at Belmullet, 2 hours at Valentia

**Friday 31st:** After a relatively mild, dry night, the morning was overcast with some mist and fog. Continuing mainly dry and overcast during the afternoon. A little light rain in the extreme north. Mist and fog returned to some parts during the evening and night. Winds were light, variable or southwesterly.

**Rainfall:** nil generally, <1mm at Malin Head

**Temperature:** max. 7°C to 9°C, min. 3°C to 7°C, no ground frost

**Sunshine:** nil

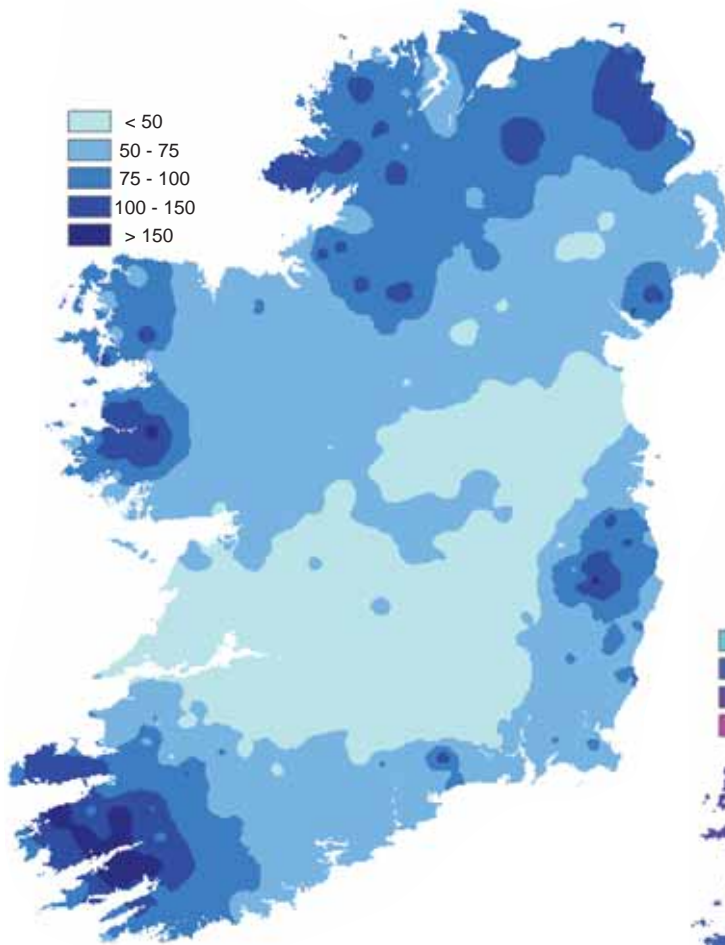
## Drier than normal everywhere

**December rainfall totals (including precipitation falling as hail or snow) were below normal everywhere, with only around half of the December average fall in many places. Totals varied between 25mm at Gurteen and 112mm at Maam Valley, Co. Galway, with percentage of normal values ranging from 26% of normal at Shannon Airport to 87% at Casement Aerodrome. It was the driest December for between eight and 15 years at some western and midland stations and the driest on record at Shannon Airport, where rainfall observations commenced in 1941.**

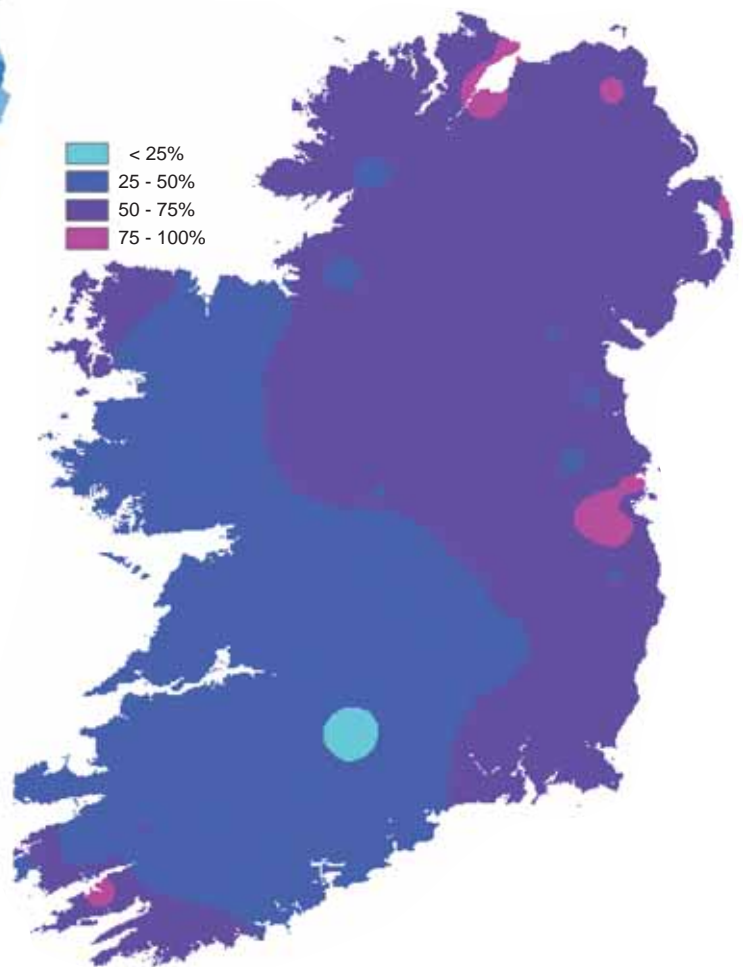
Much of the precipitation which fell during the month was in the form of snow or hail, but the highest daily totals were in the form of rain during the last week of the month, with some very heavy falls in western and southern areas on the 26th and 27th. The highest daily fall of the month, 56.3mm, was recorded at Valentia Observatory on the 26th, the highest such value for December at the station since 1983. Coastal stations of the east, west and north recorded ten or more wetdays during the month (*days with 1mm or more of rainfall*), but there were only between five and nine wetdays at the majority of stations, around half of the normal number for December.

<i>County/ Station</i>	Total Amount (mm)	% of 1961-90 average	Most in a day / date		Number of Raindays (>0.2mm)	Wetdays (>1mm)
<b>CO. CARLOW</b>						
CARLOW (OAK PARK)	44.8	53	13.9	26	14	7
<b>CO. CAVAN</b>						
BALLYHAISE	48.4	54	17.3	26	15	9
CAVAN LORETO COLLEGE	40.1		20.3	26	10	7
<b>CO. CLARE</b>						
SHANNON AIRPORT	26.0	26	9.5	27	8	6
CARRON	48.8	30	14.1	3	19	8
<b>CO. CORK</b>						
ROCHE'S POINT	51.2	50	20.2	27	10	7
FERMOY (MOOREPARK)	36.7	34	17.5	26	9	5
CORK AIRPORT	66.9	49	27.1	27	9	7
SHERKIN ISLAND	77.6	61	30.2	27	10	9
BALLINCURRIG (PEAFIELD)	60.3		27.2	27	12	6
<b>CO. DONEGAL</b>						
MALIN HEAD	69.0	67	13.1	17	22	16
GLENTIES HATCHERY			not available			
BALLYSHANNON (CATHLEEN'S FALL)	62.6	59	16.3	26	22	14
<b>CO. DUBLIN</b>						
DUBLIN (PHOENIX PARK)	62.3	76	12.3	21	15	10
DUBLIN AIRPORT	57.6		12.0	21	16	11
CASEMENT AERODROME	64.6	87	13.3	21	14	12
DUBLIN (MERRION SQUARE)	53.8	74	n/a		n/a	n/a
<b>CO. GALWAY</b>						
GALWAY (UNIV. COLL.)	42.5	35	14.1	26	15	7
MAAM VALLEY	111.5		52.2	26	15	12
BALLYGAR	60.7	59	20.9	26	16	9
<b>CO. KERRY</b>						
VALENTIA OBSERVATORY	107.6	68	56.3	26	14	10
ARDFERT (LISCAHANE)	57.4		12.1	26	15	8
<b>CO. LIMERICK</b>						
MOUNT RUSSELL	44.1		16.2	27	16	10
<b>CO. MAYO</b>						
BELMULLET	87.3	73	14.7	3	22	18
STRAIDE	51.0	39	13.2	26	20	9
CONNACHT AIRPORT	54.3		15.2	26	16	9
DELPHI LODGE II	101.4		19.1	28	16	13
<b>CO. MEATH</b>						
WARRENTOWN	39.6	44	13.2	26	13	6
<b>CO. MONAGHAN</b>						
CARRICKMACROSS (DUNOGE)	53.6	58	25.0	26	13	8
<b>CO. OFFALY</b>						
DERRYGREENAGH	63.7	72	22.3	26	14	8
<b>CO. SLIGO</b>						
ARDTARMON	61.2		20.3	26	18	9
<b>CO. TIPPERARY</b>						
GURTEEN	24.6		7.5	26	12	5
FETHARD (PARSONSHILL)	27.9		8.5	26	12	5
<b>CO. WATERFORD</b>						
WATERFORD (TYCOR)	70.0	66	33.6	26	7	5
DUNGARVAN (CARRIGLEA)	74.6		36.1	26	9	6
<b>CO. WESTMEATH</b>						
MULLINGAR	37.2	40	16.6	26	12	8
<b>CO. WEXFORD</b>						
JOHNSTOWN CASTLE	78.0	71	22.5	27	14	13
JOHN F. KENNEDY PARK	65.6	62	29.8	26	12	8
CLONROCHE (KNOXTOWN)	68.3		24.7	26	8	7
<b>CO. WICKLOW</b>						
ASHFORD (CRONYKEERY)	88.2		16.5	21	16	12

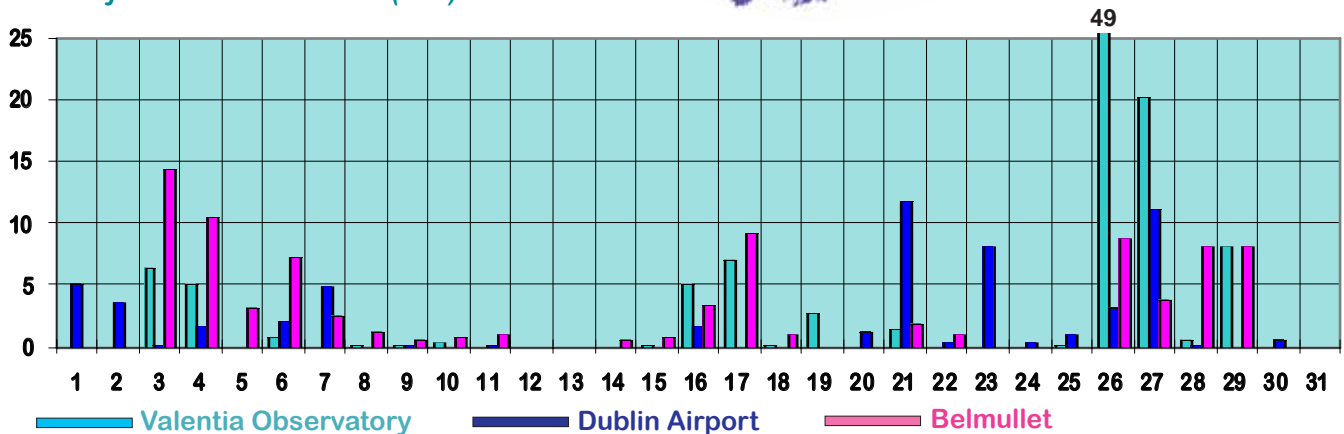
**Total rainfall (mm)**



**Percentage of normal rainfall**



**Daily 0-24h rainfall values (mm)**

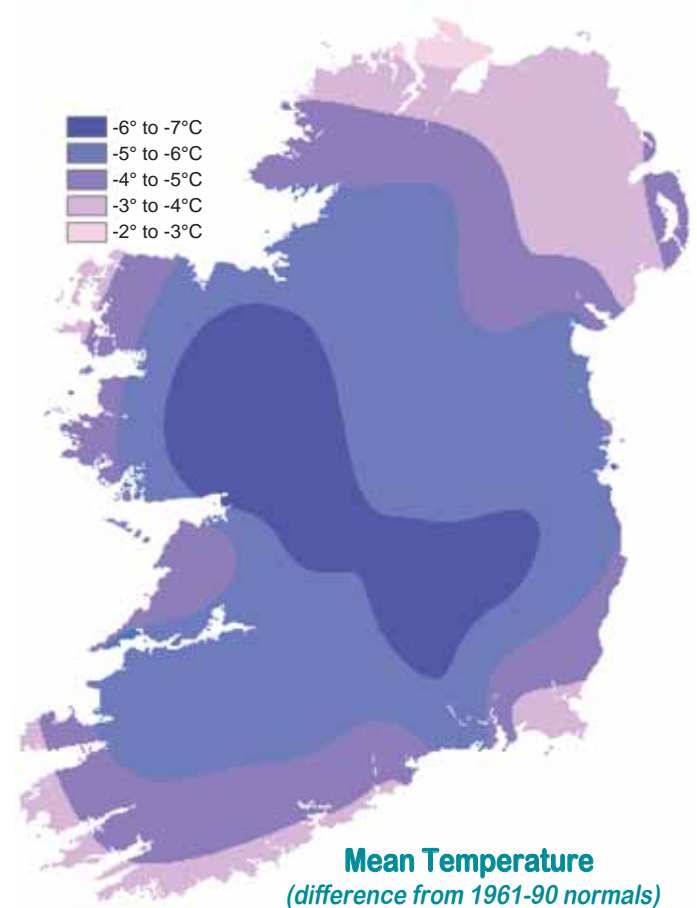




## Coldest December on record

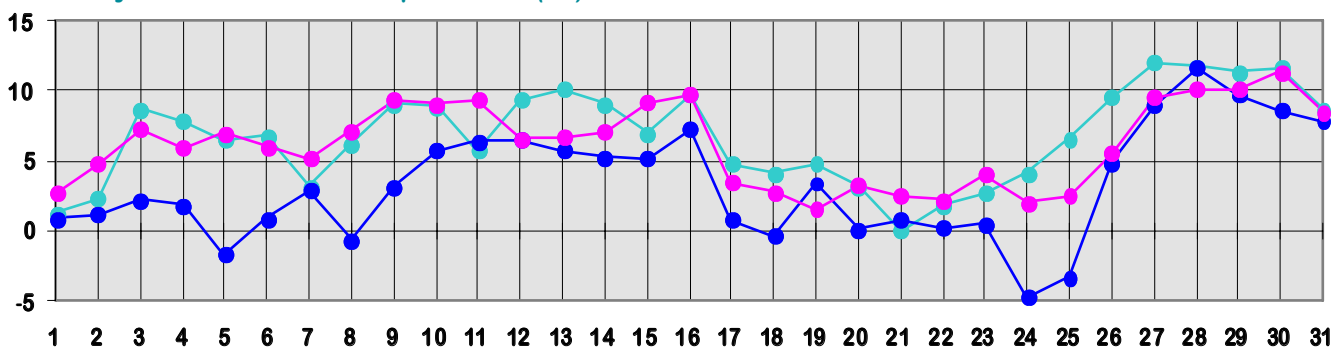
The very cold conditions of late November intensified during December, producing record-breaking low temperatures in many places. Mean monthly air temperatures varied between  $-1.5^{\circ}\text{C}$  at Cavan (Loreto College) and  $4.1^{\circ}\text{C}$  at Malin Head, between four and six degrees below normal for December generally. It was the coldest of any month since January 1963 at many stations and the coldest month on record at both Dublin Airport and Mullingar, each with over 50 years of observations.

There was a small rise in temperature during the second week and the end of the month was mild, but most of December was extremely cold. At some Leinster stations, the lowest temperatures were recorded between the 3rd and 7th, but the lowest maxima and minima were measured between the 21st and 25th. The daily *maximum* value of  $-9.8^{\circ}\text{C}$  at Cavan (Loreto College) on the 21st was the lowest such value for any month ever recorded in Ireland. Straide's minimum of  $-17.5^{\circ}\text{C}$  on the 25th was the lowest December air temperature ever recorded in the Republic of Ireland, while the value of  $-18.7^{\circ}\text{C}$  at Castleterg, County Tyrone, on the 23rd was the lowest for December ever recorded in Ireland. Most

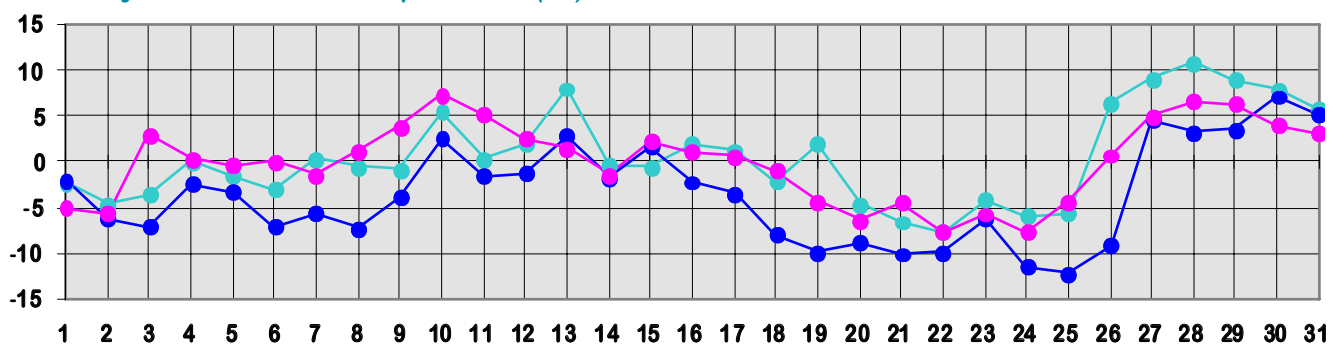


stations recorded between 17 and 24 air frosts, around three times the normal number for December.

Daily 0-24h maximum temperatures ( $^{\circ}\text{C}$ )



Daily 0-24h minimum temperatures ( $^{\circ}\text{C}$ )



● Valentia Observatory      ● Dublin Airport      ● Belmullet

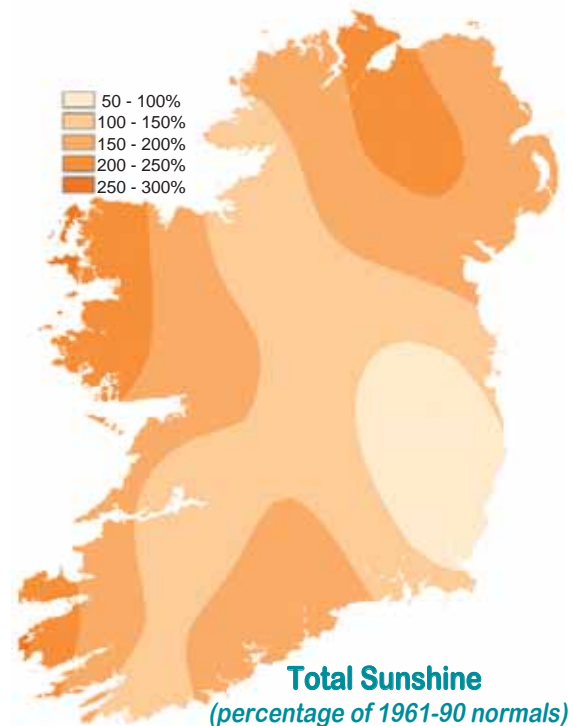
County/ Station	°C										
	Mean max.	Mean min.	Mean/ deviation from 1961-90 average		Highest max./date	Lowest min./date	Lowest grass min./date		Days with air frost ground frost		
<b>CO. CARLOW</b> CARLOW (OAK PARK)	2.8	-4.3	-0.7	-6.2	10.7 28	-12.9 3	n/a		24	25	
<b>CO. CAVAN</b> BALLYHAISE	2.4	-5.2	-1.4		10.5 28	-15.2 25	n/a		24	25	
CAVAN LORETO COLLEGE	2.6	-5.6	-1.5		11.6 30	-15.4 25	-14.7	25	24	25	
<b>CO. CLARE</b> SHANNON AIRPORT	4.3	-3.1	0.6	-5.7	12.9 28	-11.4 25	-15.0	25 23	24	26	
CARRON	4.0	-2.0	1.0	-4.2	10.5 28	-9.6 25	-14.7	22	19	24	
<b>CO. CORK</b> ROCHE'S POINT	5.4	1.1	3.3	-3.9	10.0 28	-4.4 21	-5.7	21	17	19	
FERMOY (MOOREPARK)	4.3	-3.0	0.7	-5.1	11.9 29	-12.3 25	-14.6	25	22	23	
CORK AIRPORT	4.2	-0.6	1.8	-4.2	10.4 28	-7.2 23 21	-9.8	22	19	20	
SHERKIN ISLAND	6.7	1.1	3.9	-3.7	11.0 29	-6.2 22	-8.5	21	17	20	
BALLINCURRIG (PEAFIELD)	4.4	-1.9	1.3		10.6 28	-8.2 21	-10.0	23	21	21	
<b>CO. DONEGAL</b> MALIN HEAD	6.2	2.0	4.1	-2.2	11.8 29	-3.5 22	-6.5	22	11	17	
GLENTIES HATCHERY	4.3	-3.4	0.5	-4.7	10.2 28	-11.8 25	-15.5	22	22	25	
BALLYSHANNON (CATHLEEN'S FALL)	4.2	-3.2	0.5	-5.2	11.0 28	-12.0 20			23		
<b>CO. DUBLIN</b> DUBLIN (PHOENIX PARK)	3.7	-3.4	0.2	-5.1	11.7 28	-10.8 26	n/a		23	28	
DUBLIN AIRPORT	3.6	-3.7	0.0		11.7 28	-12.2 26	n/a		24	25	
CASEMENT AERODROME	3.4	-4.3	-0.4	-5.7	12.3 28	-15.7 26	-17.1	25	23	24	
DUBLIN (MERRION SQUARE)	4.1	-1.3	1.4	-5.3	10.9 30	-7.6 26			19		
<b>CO. GALWAY</b> GALWAY (UNIV.COLL.)	4.4	-4.7	-0.1	-6.4	11.0 28	-15.0 25	-15.6	25	24	24	
MAAM VALLEY	6.0	-0.9	2.6		12.6 28	-12.2 25	-17.9	25	21	24	
BALLYGAR	3.2	-4.1	-0.4		11.0 28	-15.5 25	-17.0	21 24	22	22	
<b>CO. KERRY</b> VALENTIA OBSERVATORY	7.1	0.6	3.9	-3.7	12.1 27	-7.7 22	-14.0	22	17	21	
ARDFERT (LISCAHANE)	4.9	-2.1	1.4	-5.3	12.4 28	-11.8 22	-12.7	22	21	22	
<b>CO. LIMERICK</b> MOUNT RUSSELL	4.0	-1.7	1.2		11.6 28	-11.8 21	-16.3	21	21	23	
<b>CO. MAYO</b> BELMULLET	6.3	-0.3	3.0	-3.6	11.4 30	-7.6 24 22	-13.2	24	16	23	
STRAIDE	3.7	-4.8	-0.5	-6.2	11.0 28	-17.5 25	-17.0	20	23	23	
CONNACHT AIRPORT	3.0	-1.4	0.8		9.8 28	-7.4 22	-13.6	24	21	23	
DELPHI LODGE II	6.3	-0.4	3.0		11.8 29 30	-9.4 24	-14.0	25	17	24	
<b>CO. MEATH</b> WARRENTOWN	3.2	-4.1	-0.4	-5.4	12.0 28	-14.6 3	-17.9	25	21	24	
<b>CO. MONAGHAN</b> CARRICKMACROSS (DUNOGE)	3.4	-3.9	-0.2		10.0 28	-11.4 25	-9.6	21	25	25	
<b>CO. OFFALY</b> DERRYGREENAGH	2.9	-4.9	-1.0	-5.6	11.0 28	-13.1 24	-13.2	20	23	26	
<b>CO. SLIGO</b> ARDTARMON	4.8	-0.3	2.3		10.5 29	-6.2 22	-8.8	24	19	25	
<b>CO. TIPPERARY</b> GURTEEN	3.4	-3.9	-0.2		11.9 28	-13.4 25	-17.3	21	22	24	
FETHARD (PARSONSHILL)	3.1	-2.5	0.3		10.4 28	-9.7 21	-11.7	21	23	24	
<b>CO. WATERFORD</b> WATERFORD (TYCOR)	5.3	-4.4	0.5	-5.6	10.9 27	-11.6 3			23		
DUNGARVAN (CARRIGLEA)	5.3	-1.5	1.9	-4.3	11.3 28	-8.0 26	-9.0	26	20	22	
<b>CO. WESTMEATH</b> MULLINGAR	2.9	-4.6	-0.8	-5.6	10.6 28	-14.1 25	-16.6	25	23	25	
<b>CO. WEXFORD</b> JOHNSTOWN CASTLE	4.7	-0.2	2.3	-3.8	10.7 28	-4.5 5	-6.9	24	20	17	
JOHN F. KENNEDY PARK	4.2	-1.3	1.5	-4.3	10.6 28	-7.4 7	-10.6	7	20	26	
CLONROCHE (KNOXTOWN)	4.2	-2.7	0.8		11.0 28	-9.5 6	-12.5	6	24	25	
<b>CO. WICKLOW</b> ASHFORD (CRONYKEERY)	5.7	-0.6	2.6		11.9 28	-6.9 20	-13.8	6	19	18	

County/ Station	Daily mean (hours/day)	% of average	% of possible	Most in a day/date	
<b>CO. CLARE</b>					
SHANNON AIRPORT	1.77	125	23	7.0	1
<b>CO. CORK</b>					
CORK AIRPORT	2.70	173	34	7.5	2 8
SHERKIN ISLAND	2.12	128	27	6.6	2
BALLINCURRIG (PEAFIELD)	2.41			6.6	1 8
<b>CO. DONEGAL</b>					
MALIN HEAD	1.85	206	26	5.7	24
BALLYSHANNON (CATHLEEN'S FALL)	1.29	130	17	5.5	5
<b>CO. DUBLIN</b>					
DUBLIN AIRPORT	1.95	118	26	7.1	8
CASEMENT AERODROME	1.21	81	16	5.8	12
<b>CO. GALWAY</b>					
GALWAY (UNIV. COLL.)	2.12	181	28	7.1	1
<b>CO. KERRY</b>					
VALENTIA OBSERVATORY	2.90	248	37	6.5	2
<b>CO. MAYO</b>					
BELMULLET	2.74	254	37	7.2	1
STRAIDE	2.32			6.4	1
CONNACHT AIRPORT	2.88			7.5	1
<b>CO. WATERFORD</b>					
DUNGARVAN (CARRIGLEA)	2.65	184	34	6.8	8
<b>CO. WEXFORD</b>					
JOHN F. KENNEDY PARK	1.63	112	21	5.3	14
CLONROCHE (KNOXTOWN)	2.10			7.2	8
<b>CO. WICKLOW</b>					
ASHFORD (CRONYKEERY)	2.82		33	7.2	5

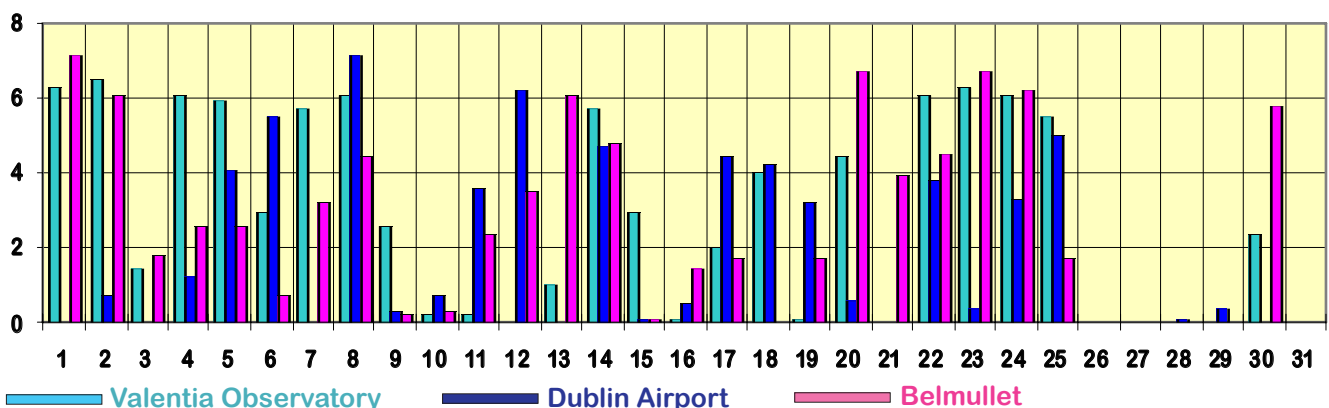
## Very sunny generally, especially in west

Sunshine totals for December were above normal almost everywhere and were well above normal in the west and north. Totals ranged from 35 hours at Casement Aerodrome to 90 hours at Valentia Observatory, with percentage of normal values between 81% of normal at Casement and 254% at Belmullet, where it was the sunniest December since the station opened in 1956. It was also the sunniest on record at Valentia, where sunshine records commenced in 1892.

The highest December daily values for between seven and 13 years were recorded at many stations, including Knock and Cork Airports, both of which measured 7.5 hours on different days. Global solar radiation totals were also above normal, up to 153% of normal at Belmullet.

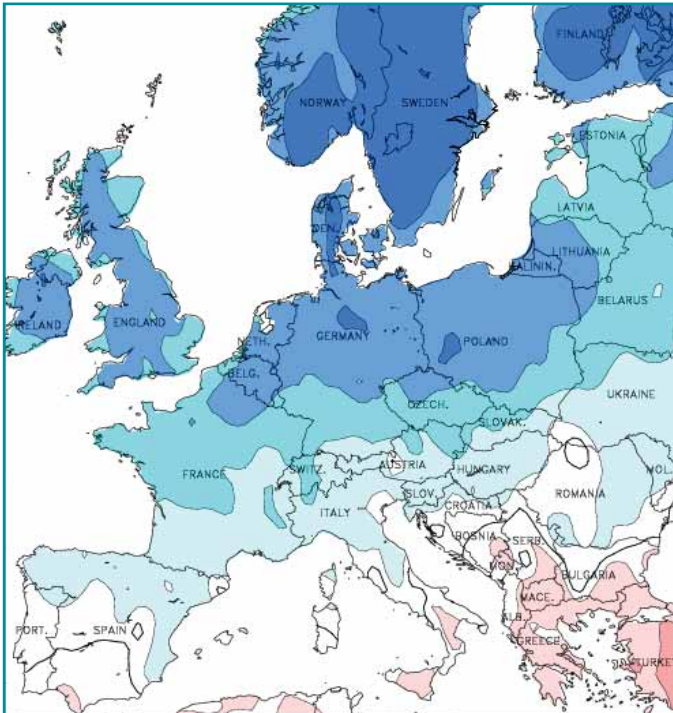
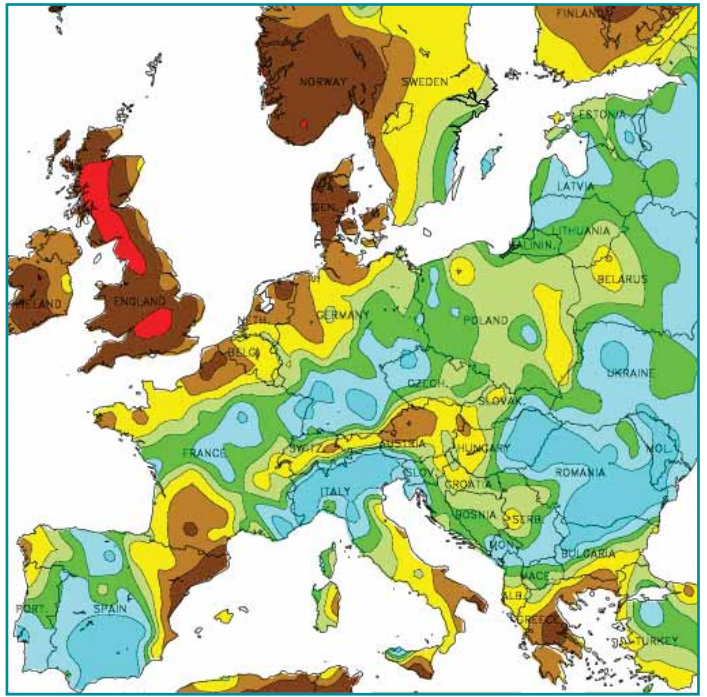
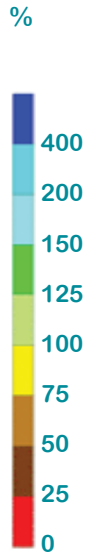


Daily sunshine values (hours)

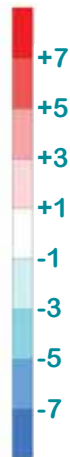




**DECEMBER RAINFALL**  
(percentage of 1961-1990 normal)



°C



**DECEMBER MEAN TEMPERATURE**  
(difference from 1961-1990 normal)

Data supplied by NOAA  
Climate Prediction Centre,  
US Department of Commerce

A large snowstorm affected much of the midwest U.S.A. between the 10th and 13th. The storm brought 43cm of snow to the Minneapolis/St. Paul region, its largest December fall on record. The inflatable roof of the Minneapolis Metrodome's stadium collapsed under the heavy weight of the frozen precipitation on the 12th. At Eau Claire, Wisconsin, 56cm of snow fell on the 11th, its highest single day's snowfall total in history. The storm also wreaked havoc across Indiana and Michigan, where at least 16 people were killed in weather-related accidents.

The Arctic conditions over Ireland during December affected most of Europe also. Snowstorms and icy conditions early in the month forced the closure of airports in several countries, stranding tens of thousands of passengers, while road and rail links were also severely disrupted. Scotland had its heaviest snowfall since 1963 on the 8th, with 75cm of snow in parts of Edinburgh, while Denmark mobilised its army to assist emergency vehicles in the southeast of the country. Italy's island of Capri recorded its first snowfall in 25 years. Another round of heavy snow fell across Europe between the 17th and 20th, forcing thousands more flight cancellations. Over the past month, there were 114 cold-related deaths in Poland, while dozens more were killed in weather-related accidents across Europe. The severe weather was attributed to a negative Arctic Oscillation, which is a climate pattern that influences weather in the Northern Hemisphere; a very persistent area of high pressure, or 'blocking system', near Greenland allowed cold Arctic air to slide south into Europe.

**Global weather highlights of the month**

Weeks of torrential rainfall over Central and South America caused flooding and landslides that killed at least 34 people in Venezuela and forced 100,000 people to flee their homes. In Colombia, a landslide on the 5th killed over 100 people in the city of Medellin, following the country's heaviest rain since records began in 1969. Heavy rainfall and flooding in Panama killed 10 people and forced the closure of the Panama Canal for the first time since its opening in 1914. The extreme conditions were attributed to the La Niña climatic phenomenon, where lower than normal temperatures in the equatorial and central Pacific Ocean affect weather conditions in many parts of the world.

After weeks of heavy rainfall, disaster areas were declared in 45 communities of eastern Australia on the 9th. Four people were killed and thousands were forced to evacuate their homes as rivers overflowed. Adelaide had its wettest December day on record on the 7th, while on the 20th, 245mm of rain fell over Carnarvon, 900km north of Perth in Western Australia. Local media reported that the area experienced its worst flooding in 50 years.

## COLDER, DRIER AND MUCH SUNNIER THAN NORMAL

The year began and ended with spells of exceptionally cold weather, but the months between April and September were warmer than normal. Mean annual air temperatures were below normal everywhere, by around half a degree generally, and it was the coldest year since 1986 at most stations. The months of January, February and November were the coldest for at least 25 years, while December was the coldest on record. The year's lowest temperatures were measured during November and December, setting new records for both months; air temperatures fell below  $-15^{\circ}\text{C}$  in inland areas at times during December. There was a total of between 75 and 100 air frosts at most inland stations during the year, twice the average amount. The warmest months of 2010 relative to normal were June and September, but many stations recorded their highest daily values unusually early in the year, on either May 22nd or 23rd. Despite the relatively low annual air temperatures in Ireland, global temperatures were again above the 1961-1990 annual average, as they have been for each year since 1983. According to data compiled by the World Meteorological Organisation, the year 2010 ranked as the joint warmest year on record, together with 2005 and 1998, since the beginning of instrumental climate records in 1850. Global combined sea surface and land surface air temperature was  $0.53^{\circ}\text{C}$  above normal.

Rainfall totals for the year in Ireland were below normal almost everywhere. Around 95% of the normal annual amounts were recorded at most stations, but Cork Airport's total of 905mm, representing just 76% of average, was the lowest on record at the station. The months of January, February, May, October and December were all drier than normal, while only July and November were relatively wet. The heaviest daily falls of the year in most areas were in the period September 6th/7th, when two-day falls of between 50 and 80mm were widely recorded; Knock Airport's fall of 86.5mm on September 6th was its highest daily value for any month since rainfall records began there in 1988. Most stations recorded between 130 and 150 wetdays (*days with 1mm or more rainfall*) during the year, slightly fewer than normal.

Annual sunshine totals were above normal everywhere and it was a particularly sunny year in the south and southwest. Totals of between 1530 and 1770 hours were the highest on record at most stations, including Valentia Observatory, where records extend back to 1892. The sunniest months relative to normal were between January and March, also August and October; July was the only relatively dull month. Almost all stations measured their sunniest days in the period around midsummer, between June 19th and 21st.

Mean windspeeds for the year of between 6 and 10 knots generally (*11 and 19km/h*) were below normal everywhere and were the lowest annual values on record in many places. Although most stations recorded their strongest winds of the year during mid-November, Belmullet observed the highest gust of the year, 75 knots (*139km/h*), on April 5th.

County/ Station	RAINFALL (mm)				TEMPERATURE ( $^{\circ}\text{C}$ )				SUNSHINE (HOURS)			NO. OF DAYS WITH:							
	Total	% of average	Most in a day amount	date(s)	Mean	diff. from average	Extremes Highest	Lowest	Daily mean	% of average	Most in a day amount	date(s)	Rain	Snow	Air frost	Hail	Thunder	Fog	Gale gusts
<b>CO. CARLOW</b> Carlow (Oak Park)	774.9	99	47.1	6 Sep	8.9	-0.5	25.6	-12.9					182		87				12
<b>CO. CAVAN</b> Ballyhaise	835.8	80	56.2	6 Sep	8.2		24.9	-15.2					196		91				18
<b>CO. CLARE</b> Shannon Airport	845.1	92	42.4	7 Sep	9.4	-0.7	25.2	-11.4	4.46	123	15.8	20 Jun	199	19	78	4	1	49	28
<b>CO. CORK</b> Cork Airport	904.7	76	36.4	27 Dec	9.0	-0.5	23.1	-7.2	4.85	124	15.8	20 Jun	200	19	60	1	1	96	36
<b>CO. DONEGAL</b> Roche's Point	805.1	86	31.4	29 Oct	9.8	-0.5	22.7	-4.4					178		40				47
<b>CO. DUBLIN</b> Malin Head	962.4	91	37.7	6 Sep	9.4	+0.1	22.5	-3.5	4.01	118	13.7	10 Jun	224	23	29	33	2		9 124
<b>CO. DUBLIN</b> Dublin Airport	668.8		20.5	6 Sep	8.5		24.0	-12.2	4.70	117	15.8	21 Jun	179	32	98	17	8	43	32
<b>CO. KERRY</b> Casement Aerodrome	713.5	98	29.8	22 Sep	8.6	-0.7	24.9	-15.7	4.24	110	16.0	20 Jun	176	33	92	20	8	39	37
<b>CO. MAYO</b> Valentia Observatory	1331.7	95	58.5	12 Jan	10.3	-0.3	23.6	-7.7	4.64	130	15.9	20 Jun	230	10	49	14	5	9	54
<b>CO. MAYO</b> Belmullet	1106.9	101	42.1	7 Sep	9.7	-0.3	22.4	-7.6	4.45	120	14.0	8 May	256	33	49	38	4	17	94
<b>CO. TIPPERRARY</b> Knock Airport	1093.3		86.5	6 Sep	8.1		23.6	-7.4	4.18		15.3	23 May	234	33	76	10	1	115	42
<b>CO. WESTMEATH</b> Gurteen	735.2		23.4	29 Mar	8.5		25.1	-13.4					195		92				16
<b>CO. WESTMEATH</b> Mullingar	896.1	96	59.4	6 Sep	8.3	-0.5	24.9	-14.1					194		91				7
<b>CO. WEXFORD</b> Johnstown Castle	966.6	96	60.5	6 Sep	9.1	-0.5	23.9	-4.6					184		43				12