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A summary of climate averages for Ireland, 1981-2010

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CLIMATOLOGICAL NOTE NO.14

**A SUMMARY
OF
CLIMATE AVERAGES
FOR IRELAND
1981-2010**

BY
SÉAMUS WALSH

MET ÉIREANN INTRODUCES NEW LONG-TERM AVERAGES FOR DAY TO DAY WEATHER AND CLIMATE COMPARISONS

Long-term averages describe the climate of Ireland. It is usual to place current weather events in context by comparing them to long-term averages or 'Normals'. These are defined as 30 year averages of a weather element e.g. rainfall, sunshine etc. The period of 30 years is considered long enough to smooth out year-to-year variations.

Standard Climatological Normals or averages are compiled in 30 year cycles e.g. 1931-1960, 1961-1990 etc., and allow for comparisons of current weather elements with long-term averages. Every country which is a member of the World Meteorological Organisation (WMO) is obliged to calculate these Standard Climatological Normals. However Climate Normals may also be calculated for any 30 year period of complete decades e.g. 1971-2000 or 1981-2010.

Met Éireann has compiled a set of long-term averages for the period 1981 to 2010, covering a range of weather elements. From May 2012 onwards, weather and climate statistics quoted will reference the new long-term average period 1981-2010, unless otherwise stated. These will replace the 1961-1990 long-term averages currently in use. (The 1961-1990 averages will still be referenced occasionally, particularly in climate change studies).

HOW ARE THE AVERAGES CALCULATED?

Averages are calculated from readings taken at weather stations operated by Met Éireann and its voluntary observers. Values are averaged for each month over a 30 year period to obtain the long-term average. Where there are gaps in data, estimates are made using data from neighbouring stations.

WHAT PRODUCTS ARE AVAILABLE?

Rainfall: Long-term averages of monthly, seasonal and annual rainfall totals and days of rainfall greater than 0.2mm, 1mm and 10mm have been calculated at stations with sufficient records. Gridded maps with values at 1 km resolution have also been produced.

Temperature: Long-term averages of monthly, seasonal and annual maxima, minima and mean temperatures have been calculated at stations with sufficient records. Gridded maps with values at 1 km resolution have also been produced.

Sunshine: Long-term averages of monthly, seasonal and annual sunshine duration have been calculated at stations with sufficient records. Gridded maps with values at 1 km resolution have also been produced.

Wind: Monthly mean values have been calculated and 30-year wind roses have also been produced.

WHAT IS THE SIGNIFICANCE OF DIFFERENCES IN THE 1961-1990 AND 1981-2010 LONG-TERM AVERAGES?

Because we are comparing two 30 year periods with an overlap of 10 years, the differences relate to the non-overlap periods i.e. 1961-1980 and 1991-2010.

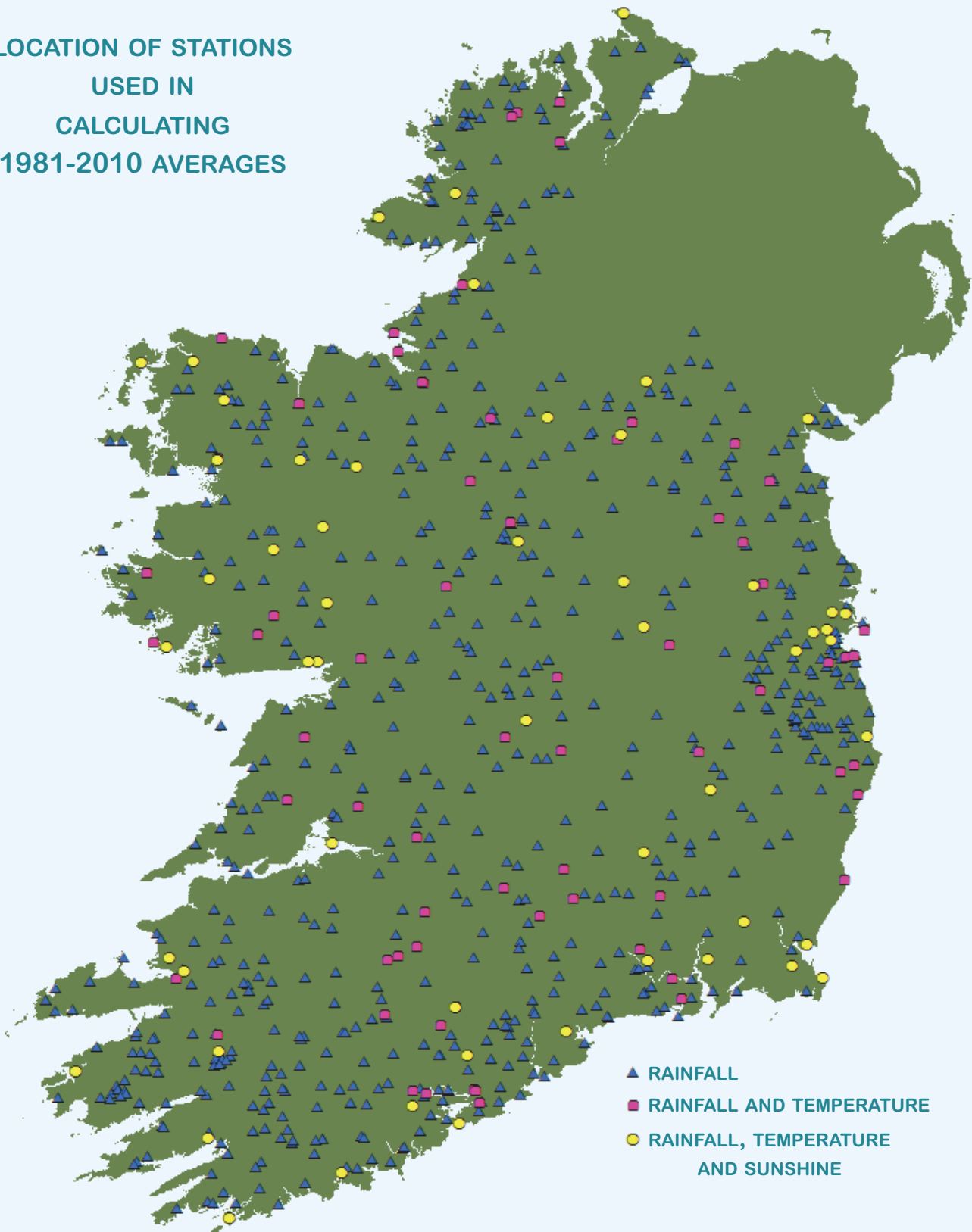
WHAT DOES THIS MEAN IN TERMS OF CLIMATE CHANGE?

Changes in climate are reflected in the long-term averages, however their main use is as a baseline to put current weather in context, it is not possible to detect changes in extreme values from long-term averages.

WHERE CAN I FIND MORE DETAILS OF THE ANALYSIS TECHNIQUES?

Details of the methods used to infill for missing data, and information on how the gridded data was produced are in preparation and will be published in due course.

LOCATION OF STATIONS
USED IN
CALCULATING
1981-2010 AVERAGES



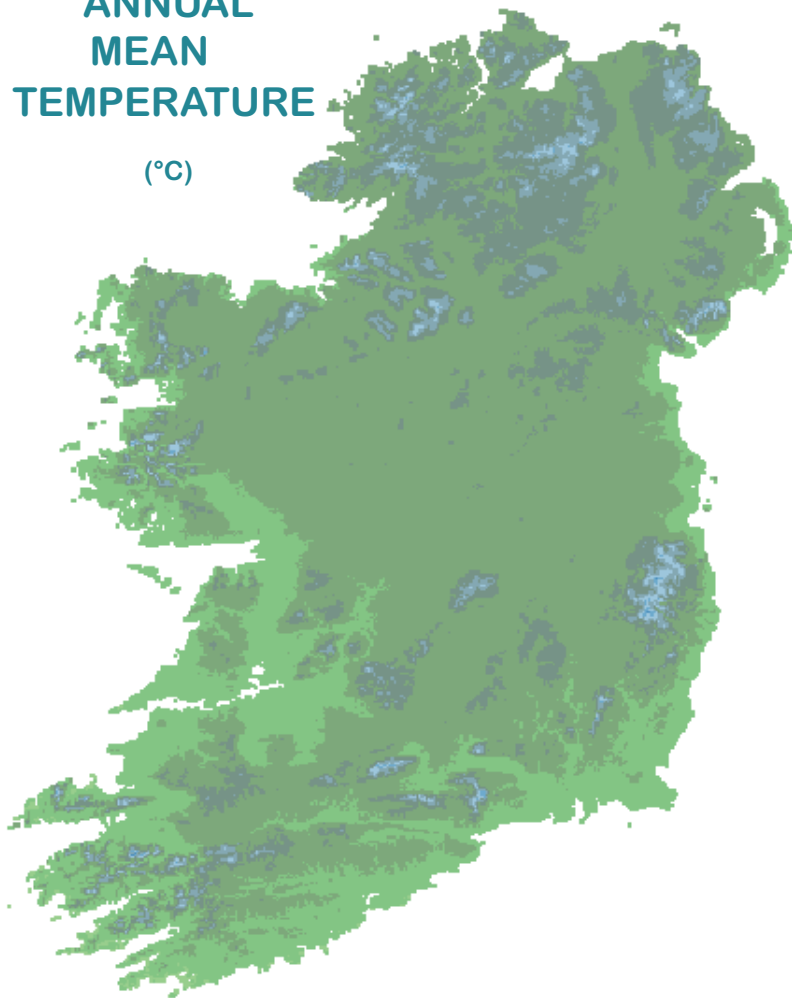
WHERE CAN I GET SOME OF THE DATA?

Maps and underlying data for the long-term averages will be made freely available on www.met.ie as will a selection of station averages. For other data requests please e-mail Climate Enquires at enq@met.ie

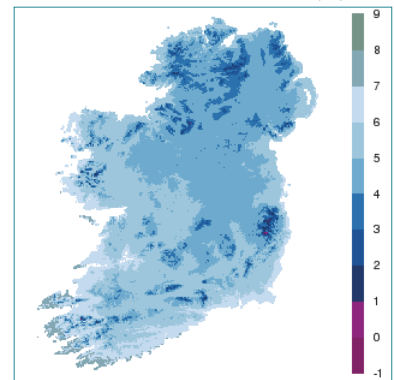
ACKNOWLEDGEMENTS

We are grateful to our voluntary observers at climatological and rainfall stations without whom this work would not be possible. Thanks also to the United Kingdom Meteorological Office for Northern Ireland station data for gridding purposes.

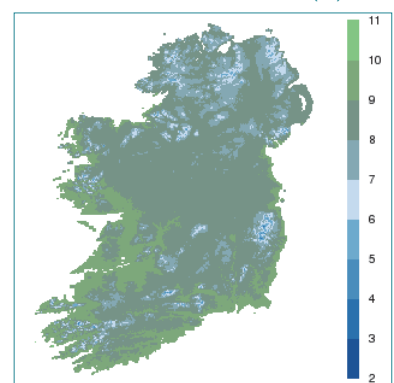
ANNUAL MEAN TEMPERATURE (°C)



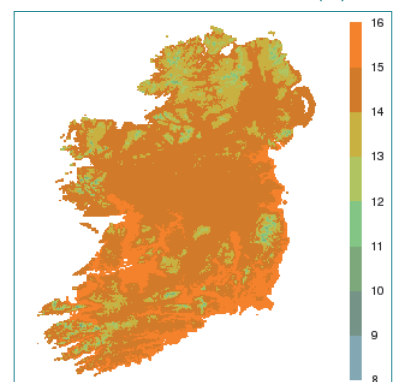
WINTER MEAN TEMPERATURE (°C)



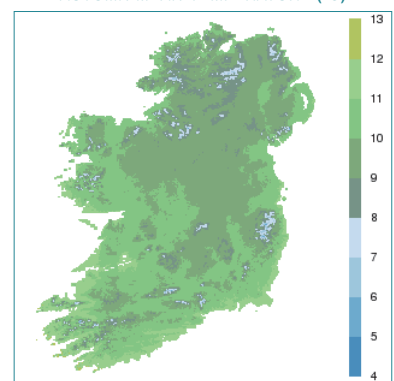
SPRING MEAN TEMPERATURE (°C)



SUMMER MEAN TEMPERATURE (°C)



AUTUMN MEAN TEMPERATURE (°C)



ANNUAL MEAN TEMPERATURE

The temperature regime in Ireland is greatly affected by the moderating effect of the sea, and height above sea level. Mean annual temperatures generally range between 9°C and 10°C with the higher values in coastal regions. Mean annual minima show a stronger coastal effect than mean maxima.

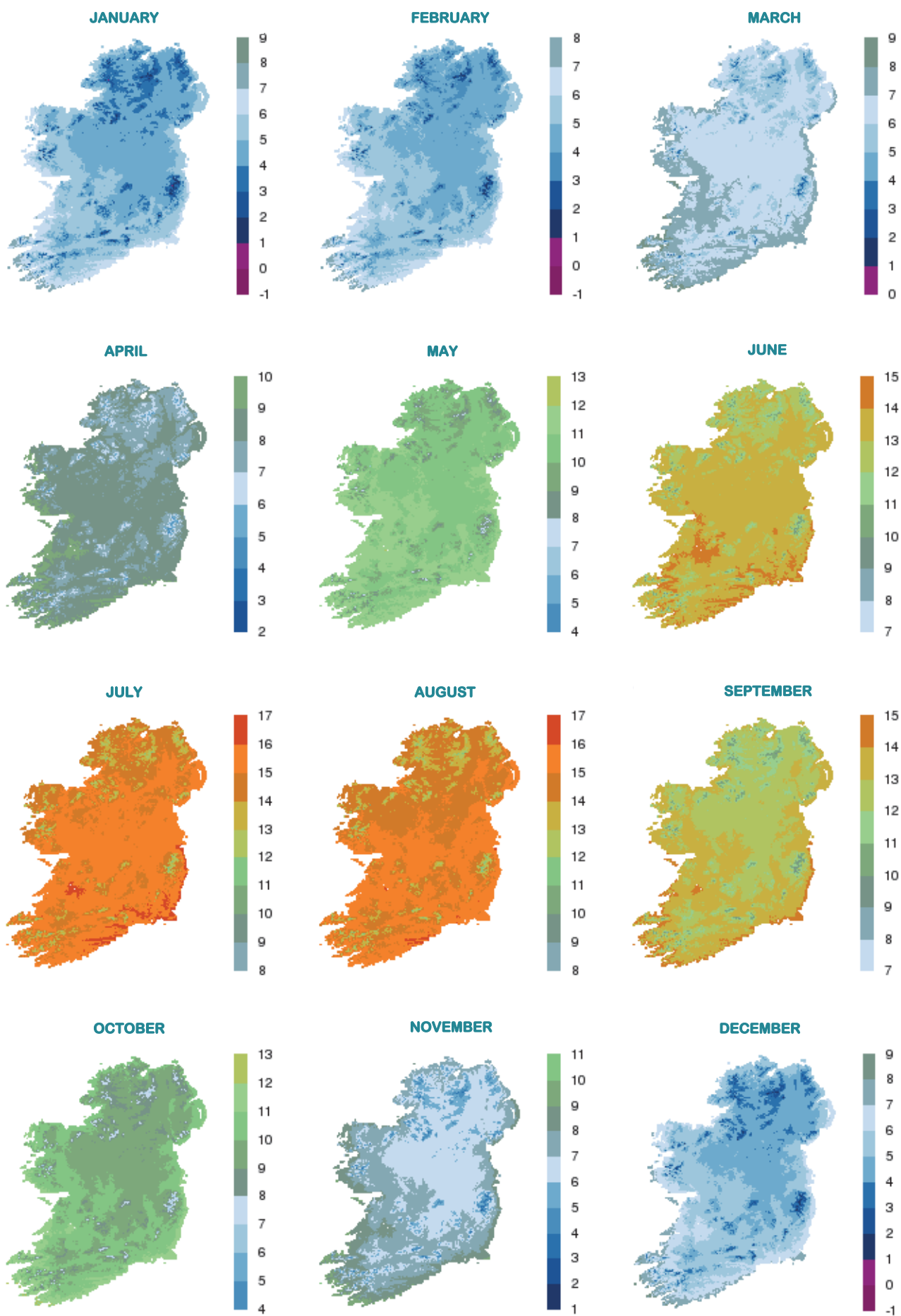
SEASONAL MEAN TEMPERATURE

Summer is the warmest season, followed by Autumn, Spring and Winter. Highest temperatures occur inland during the summer, with mean seasonal maxima between 18°C and 20°C while highest values occur in coastal regions during the Winter.

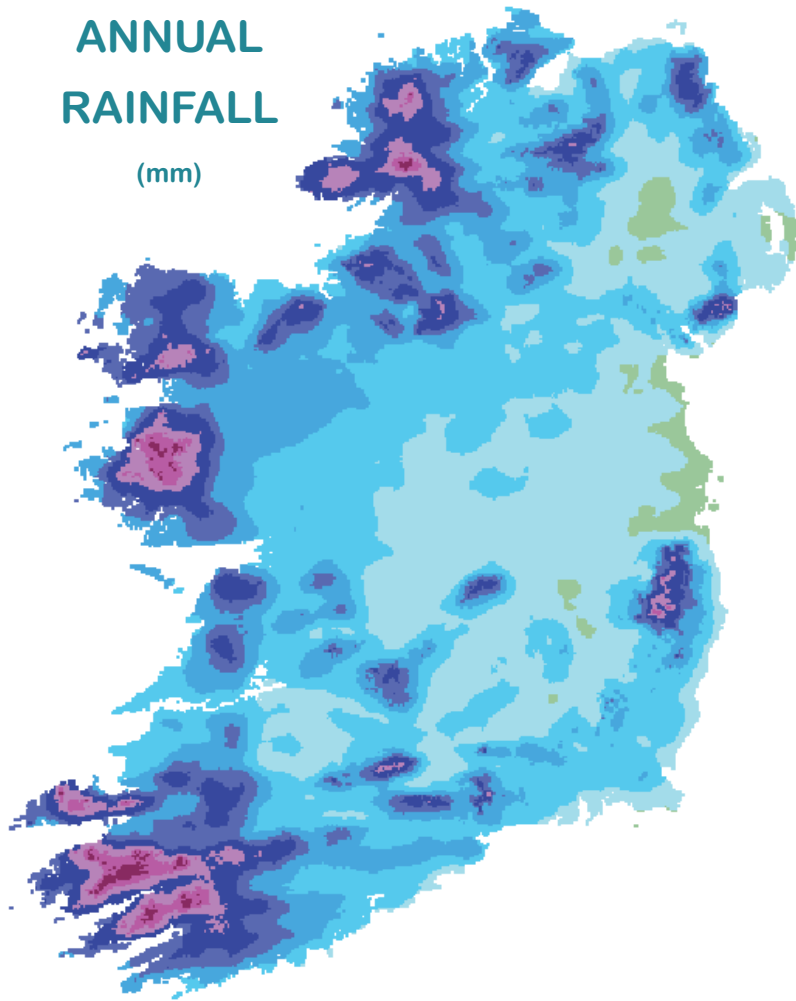
MONTHLY MEAN TEMPERATURE

July is the warmest month, followed by August and June; the coldest month is January followed closely by February and then December.

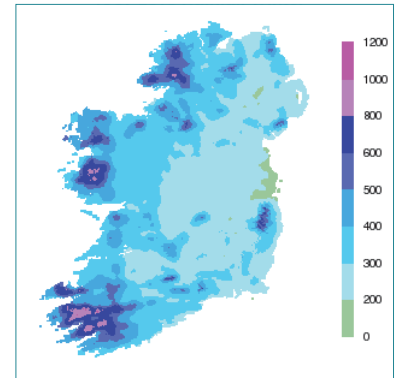
MONTHLY MEAN TEMPERATURE (°C)



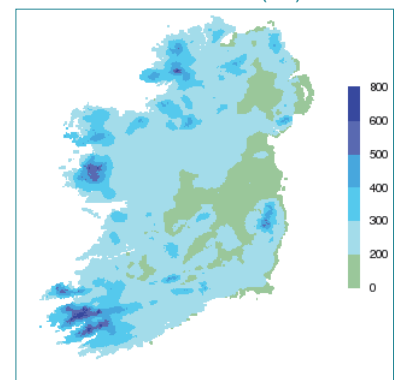
ANNUAL RAINFALL (mm)



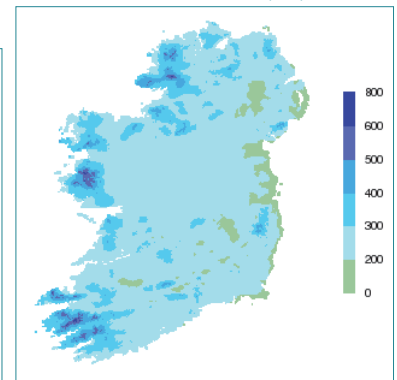
WINTER RAINFALL (mm)



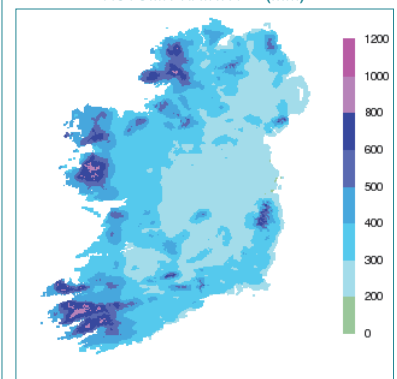
SPRING RAINFALL (mm)



SUMMER RAINFALL (mm)



AUTUMN RAINFALL (mm)



ANNUAL RAINFALL

Highest rainfall occurs in the Western half of the country and on high ground; rainfall generally decreases towards the Northeast. Averaged over all Ireland, the average annual rainfall is approximately 1230 mm.

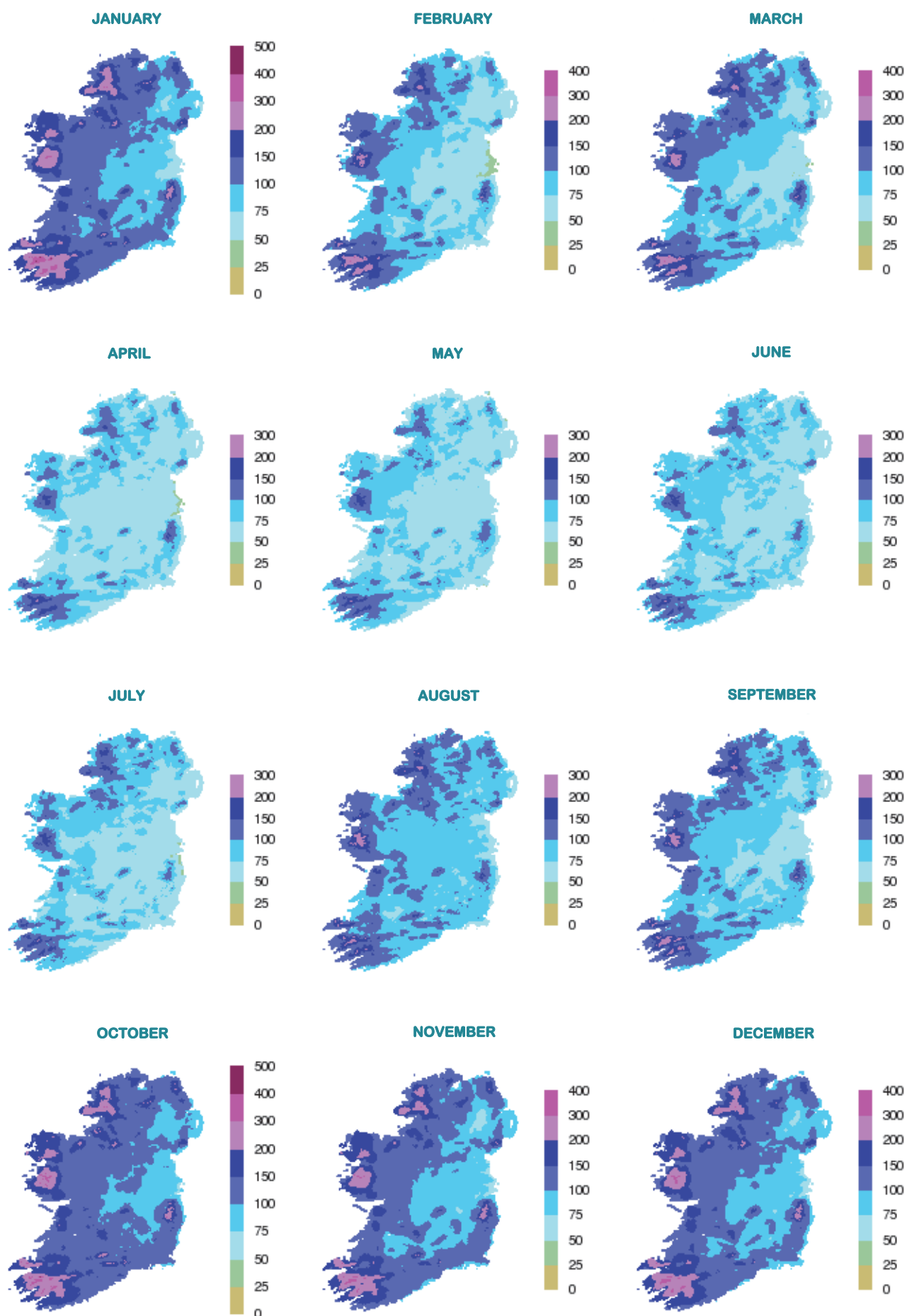
SEASONAL RAINFALL

The driest seasons are Spring and Summer, with an all Ireland average of approximately 260 mm, Autumn and Winter have all Ireland averages of approximately 350 mm.

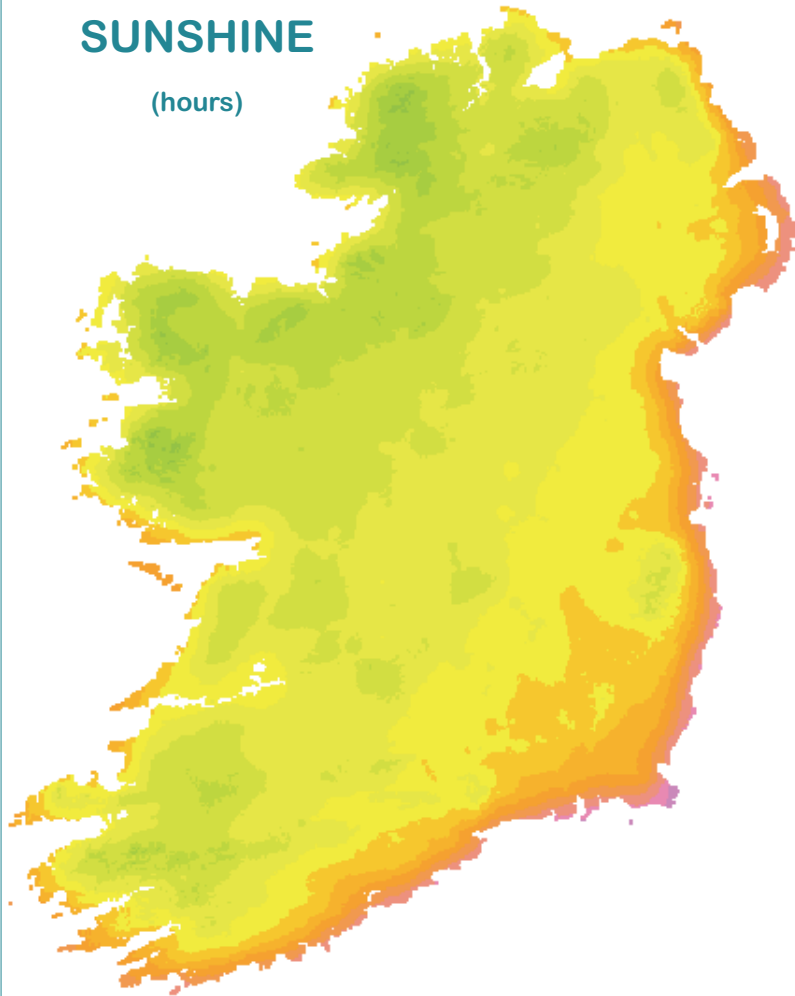
MONTHLY RAINFALL

The driest months are April, May, June and July, with an all Ireland average of approximately 80 mm each month. February, March, August and September have average rainfall totals of approximately 100 mm, while October, November, December and January have all Ireland averages of approximately 130 mm.

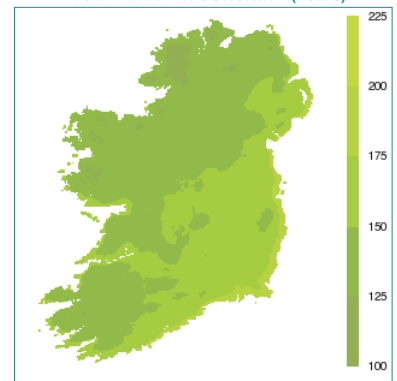
MONTHLY RAINFALL (mm)



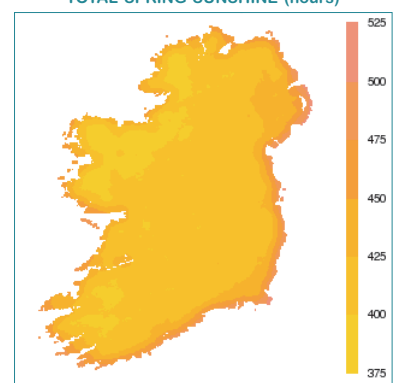
TOTAL ANNUAL SUNSHINE (hours)



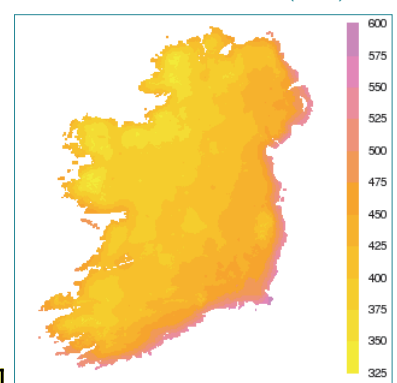
TOTAL WINTER SUNSHINE (hours)



TOTAL SPRING SUNSHINE (hours)



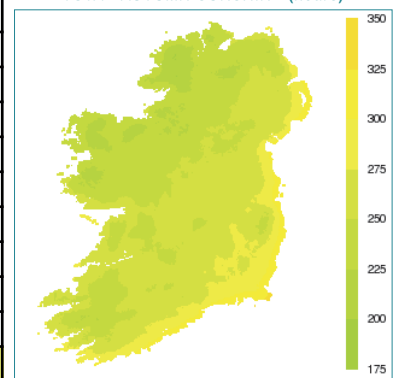
TOTAL SUMMER SUNSHINE (hours)



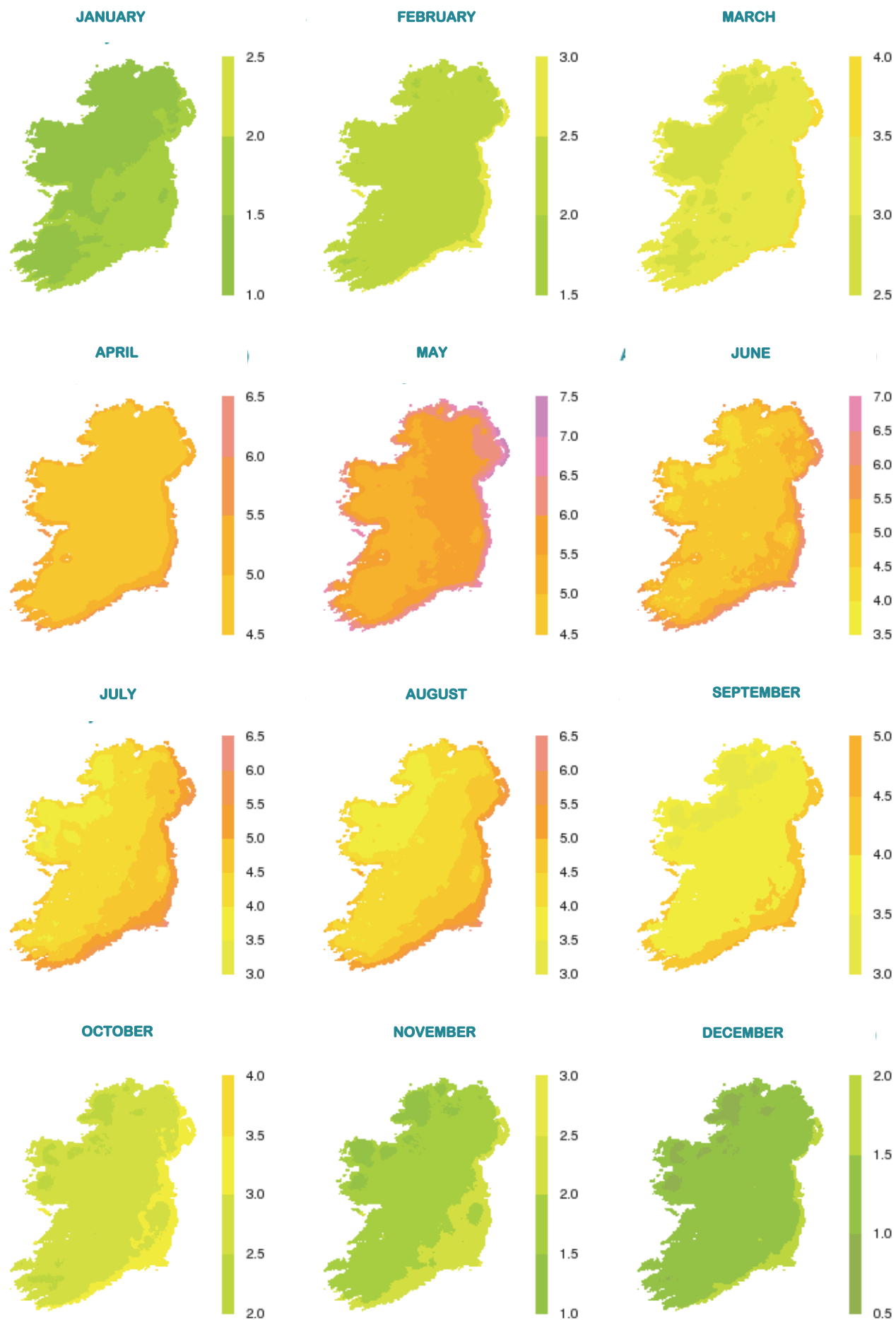
GLOBAL SOLAR RADIATION TABLE (MJ/sq.m.)

STATION	VALENTIA	SHANNON	MALIN HEAD	BELMULLET	CLONES	KILKENNY	BIRR
JAN	73.8	72.3	53.7	63.4	61.6	75.9	71.9
FEB	130.6	127.6	115.0	122.9	116.5	128.2	128.5
MAR	255.0	257.0	234.9	246.4	231.1	254.2	246.8
APR	412.9	394.1	395.3	404.3	370.4	397.7	387.6
MAY	539.1	525.3	551.7	541.3	497.4	520.7	509.0
JUN	536.9	526.5	538.7	529.8	493.9	511.3	502.2
JUL	501.3	508.6	496.0	496.1	474.4	503.7	478.6
AUG	433.2	425.1	406.2	417.4	389.3	417.5	408.4
SEP	307.3	300.4	278.5	295.4	276.9	304.9	296.0
OCT	179.4	181.7	154.2	166.7	162.1	176.2	177.8
NOV	89.8	89.4	67.1	75.3	77.5	93.0	89.5
DEC	58.4	55.5	40.0	47.3	47.5	58.8	57.0
ANNUAL	3517.9	3463.4	3331.4	3406.4	3198.6	3442.1	3353.3

TOTAL AUTUMN SUNSHINE (hours)



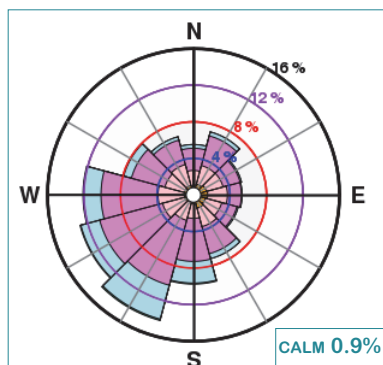
MONTHLY AVERAGE DAILY SUNSHINE (hours)



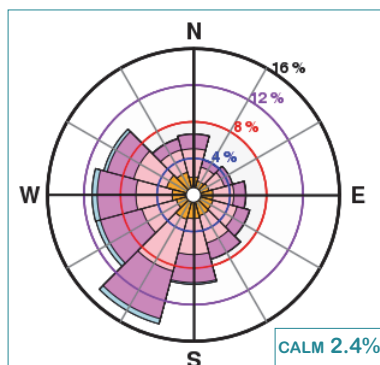
WIND ROSES

(knots)

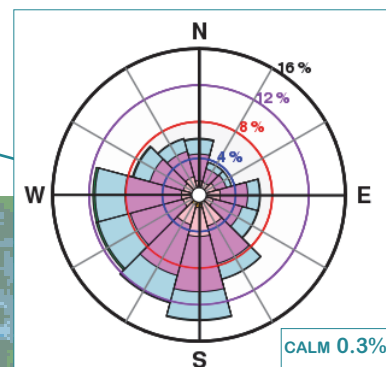
BELMULLET



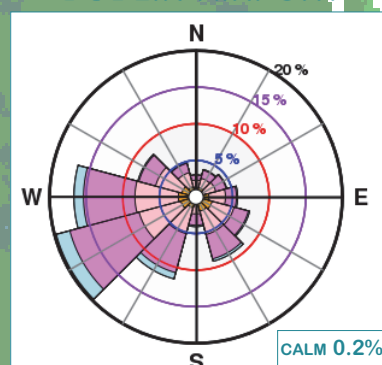
CLAREMORRIS



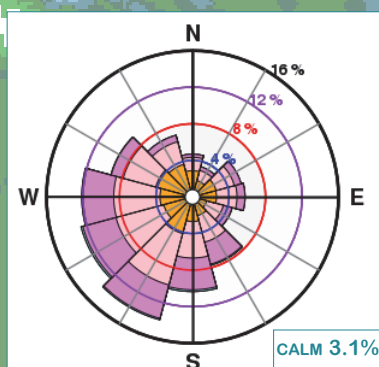
MALIN HEAD



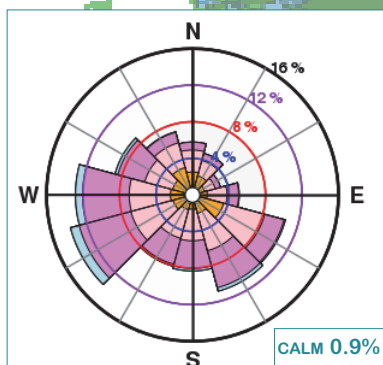
DUBLIN AIRPORT



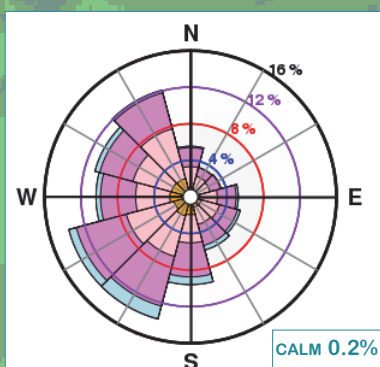
MULLINGAR



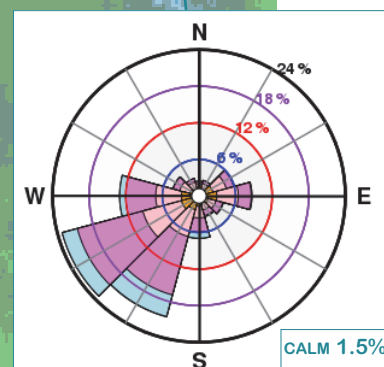
SHANNON AIRPORT



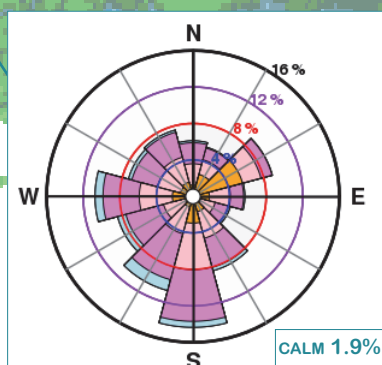
CORK AIRPORT



CASEMENT AERODROME



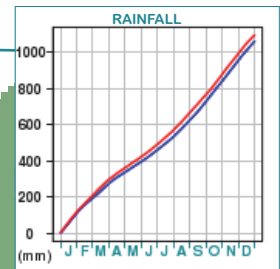
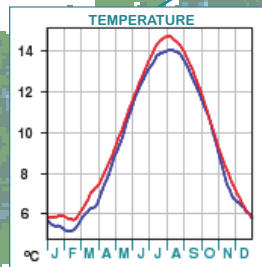
VALENTIA OBSERVATORY

WIND ROSE
KEY

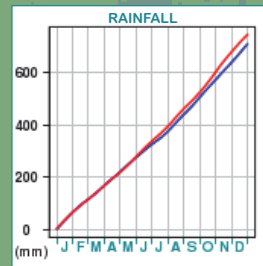
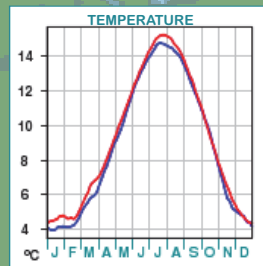
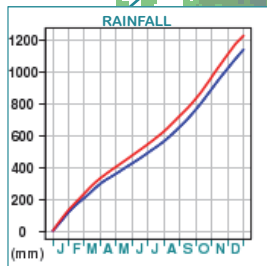
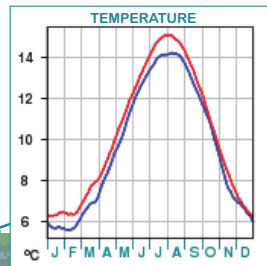
■	< 5 kt
■	5-10 kt
■	10-20 kt
■	20-35 kt
■	> 35 kt

DAILY TEMPERATURE (°C) AND RAINFALL (mm) 31-DAY MOVING AVERAGE

MALIN HEAD

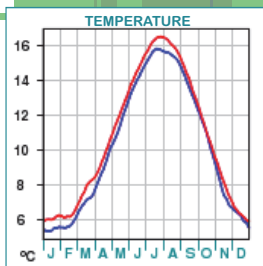


BELMULLET

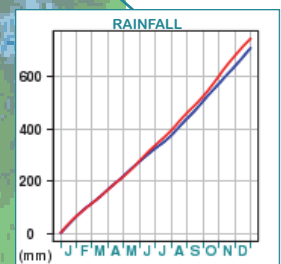
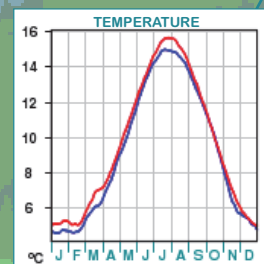


MULLINGAR

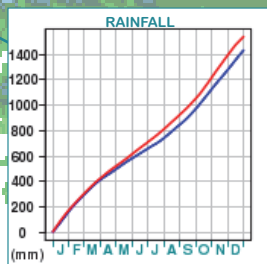
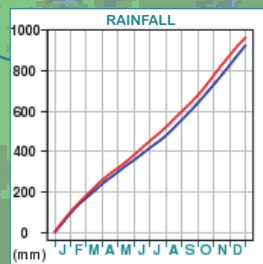
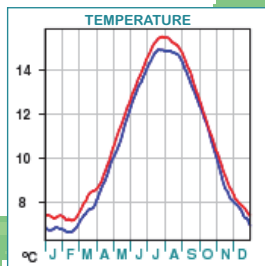
CASEMENT
AERODROME



SHANNON AIRPORT



VALENTIA OBSERVATORY

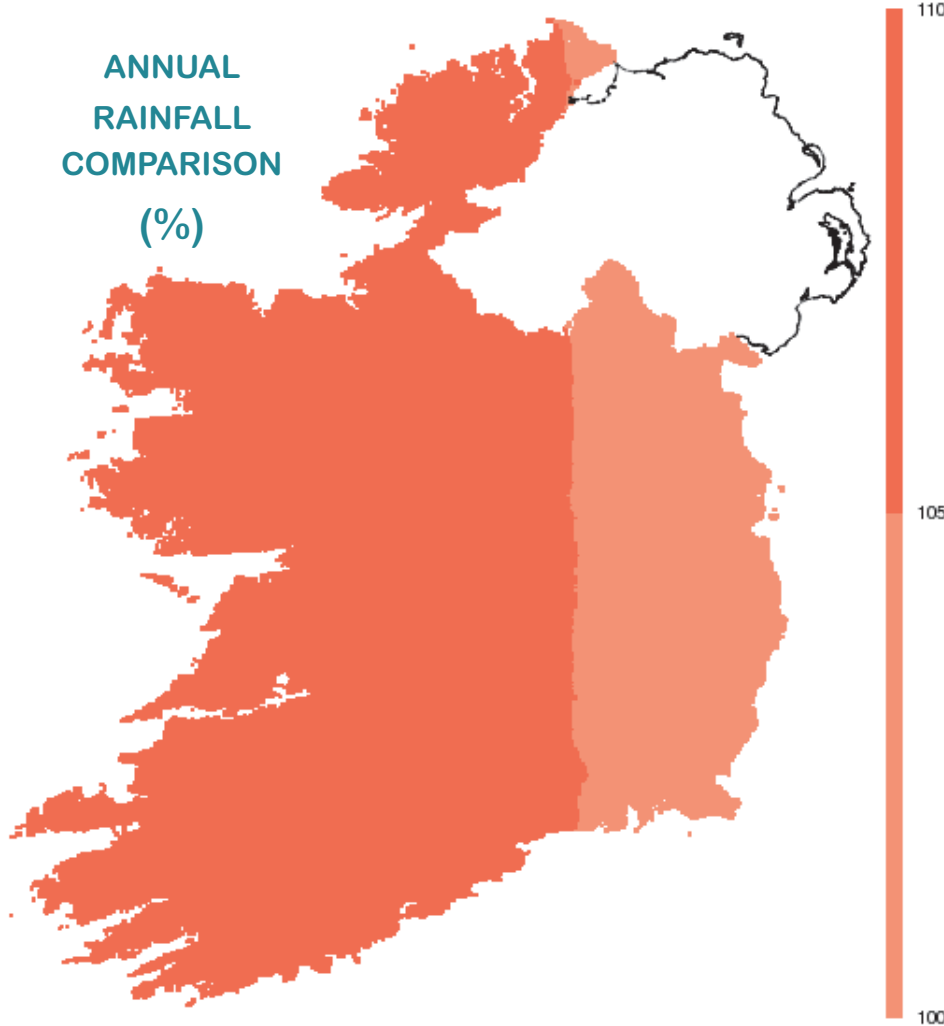


1981-2010
31-DAY MOVING AVERAGE

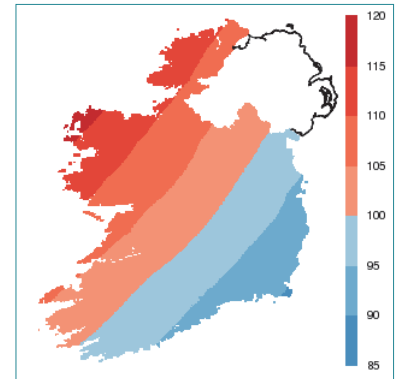
1961-1990
31-DAY MOVING AVERAGE

ANNUAL & SEASONAL COMPARISONS OF LONG-TERM AVERAGE RAINFALL

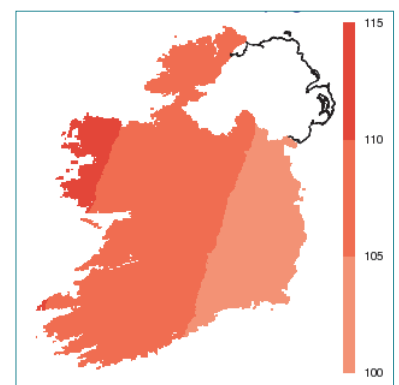
1981-2010 AVERAGES AS A PERCENTAGE OF 1961-1990 AVERAGES (%)

ANNUAL
RAINFALL
COMPARISON
(%)

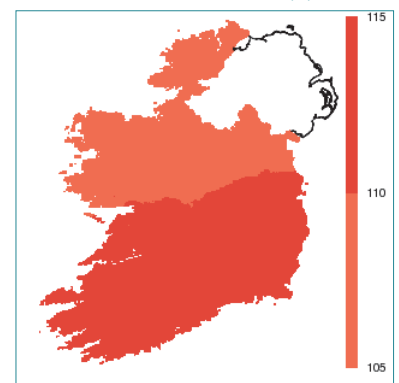
WINTER COMPARISON (%)



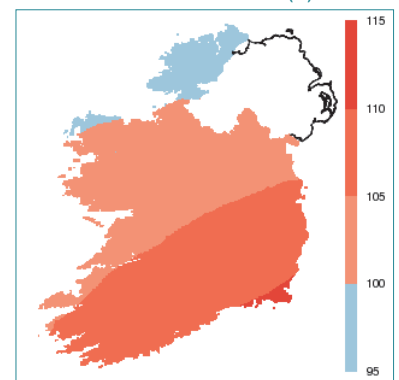
SPRING COMPARISON (%)



SUMMER COMPARISON (%)



AUTUMN COMPARISON (%)



ANNUAL RAINFALL

On an annual basis, averaged over the country, there has been an increase of approximately 5% in rainfall totals between the two normal periods (1961-1990 and 1981-2010), with the higher increases in the Western half of the country.

SEASONAL RAINFALL

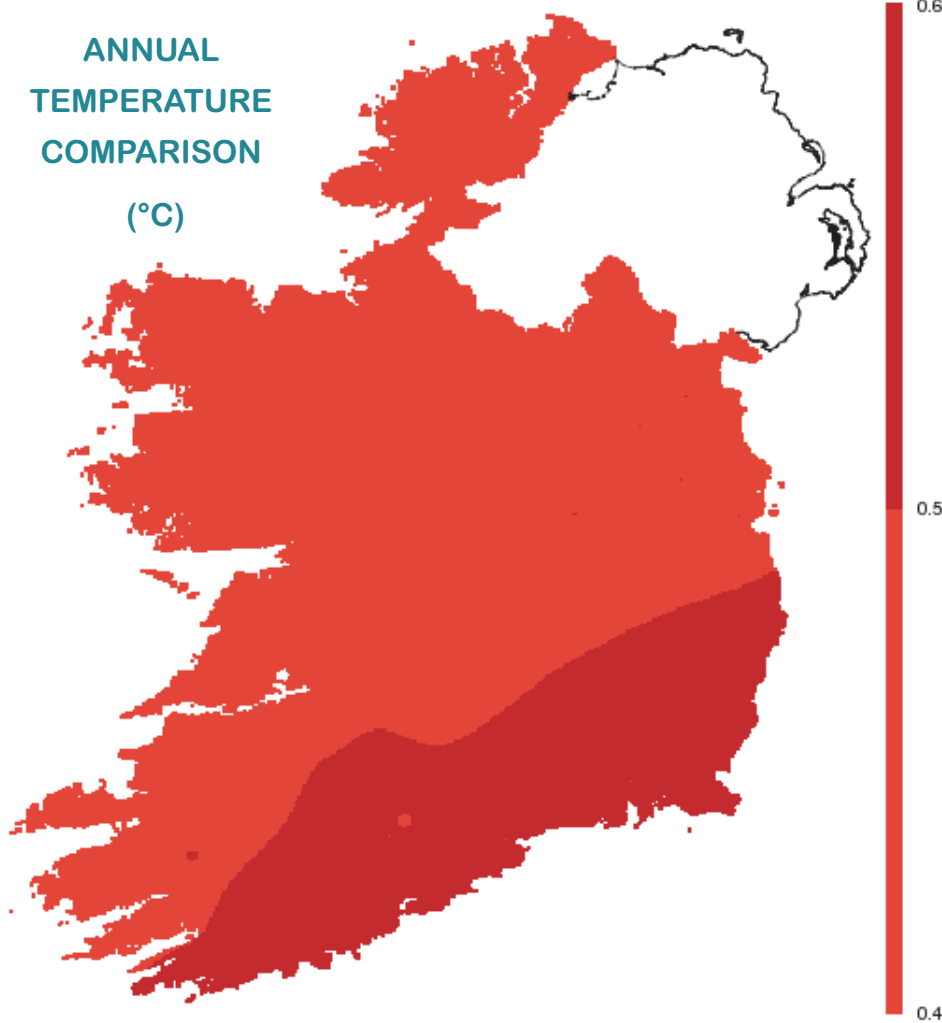
All seasons show an overall increase in rainfall but there are regional differences. There are decreases of up to 10% in rainfall in the South and East in Winter, with corresponding increases in the West and Northwest. Spring and Summer show increases of 5-10%.

MONTHLY RAINFALL

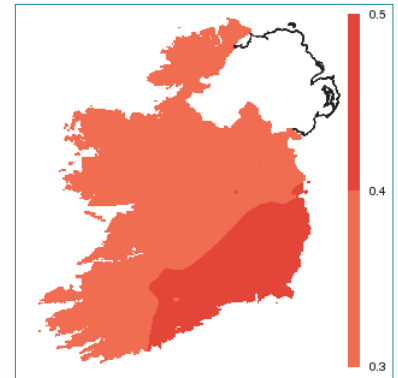
While most months show an increase in rainfall of 5-10%, January and February had decreases of 5-10% in the South and East while September had a general decrease of up to 10%. In July the average increase in rainfall was in the order of 15%.

ANNUAL & SEASONAL COMPARISONS OF LONG-TERM AVERAGE TEMPERATURES

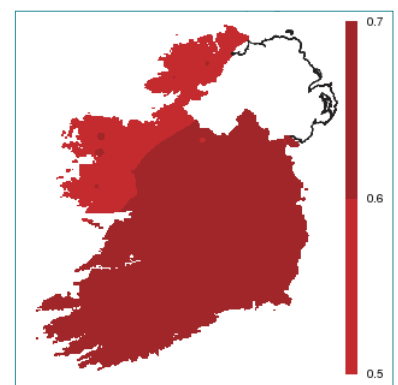
DIFFERENCE BETWEEN 1981-2010 AVERAGES AND 1961-1990 AVERAGES (°C)

ANNUAL
TEMPERATURE
COMPARISON
(°C)

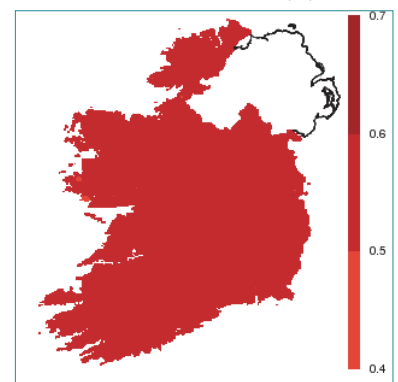
WINTER COMPARISON (°C)



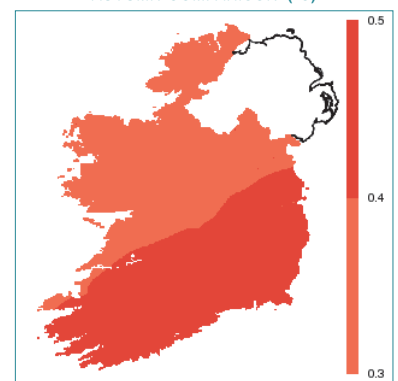
SPRING COMPARISON (°C)



SUMMER COMPARISON (°C)



AUTUMN COMPARISON (°C)



ANNUAL MEAN TEMPERATURE

Generally, there has been an increase of approximately $+0.5^{\circ}\text{C}$ in mean temperature between the 1961-1990 and the 1981-2010 periods, with the highest increases in the Southeast. Maximum and minimum temperatures have also increased by approximately $+0.5^{\circ}\text{C}$.

SEASONAL MEAN TEMPERATURE

All seasons show a rise in mean temperature with the Spring and Summer seasons displaying the largest differences between the two periods of approximately $+0.7^{\circ}\text{C}$.

MONTHLY MEAN TEMPERATURE

Almost all mean monthly temperatures show an increase except October and December which show small decreases of up to -0.2°C in the West and Northwest.

CASEMENT AERODROME

MONTHLY AND ANNUAL MEAN AND EXTREME VALUES 1981-2010

TEMPERATURE (°C)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
MEAN DAILY MAX	8.0	8.2	10.2	12.4	15.2	17.9	19.8	19.5	17.1	13.6	10.2	8.3	13.4
MEAN DAILY MIN	2.1	2.0	3.3	4.1	6.6	9.4	11.5	11.3	9.5	7.0	4.2	2.4	6.1
MEAN TEMPERATURE	5.1	5.1	6.8	8.2	10.9	13.6	15.7	15.4	13.3	10.3	7.2	5.4	9.7
HIGHEST MAXIMUM	15.2	15.9	17.3	22.7	24.9	27.6	31.0	29.5	25.4	21.3	17.7	14.8	31.0
LOWEST MAXIMUM	-3.0	-0.7	2.3	4.5	7.1	10.2	10.6	11.7	10.8	5.2	-3.1	-4.7	-4.7
HIGHEST MINIMUM	11.3	13.0	11.5	12.6	13.8	17.2	18.1	18.3	17.8	16.4	13.8	12.7	18.3
LOWEST MINIMUM	-12.4	-8.0	-9.0	-5.5	-2.4	0.4	4.6	2.2	0.2	-4.1	-9.1	-15.7	-15.7
MEAN NO. OF DAYS WITH AIR FROST	7.5	7.7	4.6	3.4	0.8	0.0	0.0	0.0	0.0	1.3	4.3	7.6	37.2
MEAN NO. OF DAYS WITH GROUND FROST	14.0	14.0	11.0	11.0	4.0	0.0	0.0	0.0	1.0	4.0	9.0	14.0	82.0
MEAN 5 CM SOIL	3.7	3.6	5.3	8.4	12.6	15.7	17.1	16.0	12.8	9.2	6.0	4.2	9.6
MEAN 10 CM SOIL	3.9	3.8	5.2	7.6	11.4	14.6	16.2	15.3	12.6	9.2	6.2	4.4	9.2
MEAN 20 CM SOIL	4.6	4.5	5.9	8.1	11.5	14.5	16.3	15.8	13.4	10.1	7.1	5.1	9.7
RELATIVE HUMIDITY (%)													
MEAN AT 0900 UTC	87.2	86.7	84.5	80.1	77.4	77.7	79.7	82.2	84.5	86.3	88.9	88.4	83.6
MEAN AT 1500 UTC	82.2	76.7	71.8	67.7	67.3	67.9	68.9	69.0	71.8	76.6	81.6	84.1	73.8
SUNSHINE (hours)													
MEAN DAILY DURATION	1.7	2.5	3.3	5.1	6.0	5.3	4.9	4.8	4.1	3.3	2.2	1.5	3.7
GREATEST DAILY DURATION	8.1	9.2	10.9	13.2	15.4	16.0	15.5	14.4	12.3	10.1	8.5	6.9	16.0
MEAN NO. OF DAYS WITH NO SUN	8.9	5.8	4.4	2.5	1.8	2.1	1.6	1.1	2.4	4.5	7.0	9.9	52.0
RAINFALL (mm)													
MEAN MONTHLY TOTAL	63.8	48.5	50.7	51.9	59.1	62.5	54.2	72.3	60.3	81.6	73.7	75.7	754.2
GREATEST DAILY TOTAL	30.0	32.2	31.1	38.7	29.8	97.5	33.7	89.3	51.1	50.1	82.0	46.8	97.5
MEAN NO. OF DAYS WITH >= 0.2 mm	17	14	16	14	15	14	15	16	14	16	16	16	183
MEAN NO. OF DAYS WITH >= 1.0 mm	12	10	11	10	11	10	10	11	10	12	11	12	130
MEAN NO. OF DAYS WITH >= 5.0 mm	4	3	3	3	3	3	3	4	4	4	4	5	43
WIND (knots)													
MEAN MONTHLY SPEED	13.6	12.9	12.4	9.8	9.1	8.6	8.8	9.0	9.6	11.1	11.6	12.3	10.7
MAX. GUST	80	78	71	59	63	51	58	55	59	65	66	82	82
MAX. MEAN 10-MINUTE SPEED	57	54	47	43	43	36	39	36	38	44	46	57	57
MEAN NO. OF DAYS WITH GALES	4.5	3.2	2.1	0.6	0.4	0.1	0.1	0.2	0.3	1.2	1.9	3.5	18.1
WEATHER (MEAN NO. OF DAYS WITH...)													
SNOW OR SLEET	4.1	3.9	2.5	1.1	0.1	0.0	0.0	0.0	0.0	0.0	0.5	2.3	14.6
SNOW LYING AT 0900 UTC	1.8	1.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.0	4.1
HAIL	1.0	1.5	2.7	2.4	1.5	0.2	0.2	0.1	0.2	0.2	0.7	0.6	11.3
THUNDER	0.1	0.1	0.3	0.4	1.1	1.0	1.0	1.2	0.6	0.4	0.1	0.1	6.3
FOG	1.8	1.9	1.6	1.6	1.5	1.2	1.1	2.0	2.8	2.0	2.1	2.4	22.1

VALENTIA OBSERVATORY

MONTHLY AND ANNUAL MEAN AND EXTREME VALUES 1981-2010

TEMPERATURE (°C)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YEAR
MEAN DAILY MAX	9.8	9.8	11.0	12.5	14.9	16.7	18.1	18.2	17.0	14.3	11.8	10.3	13.7
MEAN DAILY MIN	4.7	4.6	5.4	6.3	8.4	10.8	12.7	12.6	11.2	9.0	6.8	5.3	8.2
MEAN TEMPERATURE	7.3	7.2	8.2	9.4	11.6	13.7	15.4	15.4	14.1	11.7	9.3	7.8	10.9
HIGHEST MAXIMUM	14.8	15.6	20.7	24.0	27.2	28.1	27.7	28.3	28.4	22.0	19.8	15.5	28.4
LOWEST MAXIMUM	-1.5	1.8	3.4	6.3	7.8	11.8	13.9	13.8	12.6	7.2	2.4	0.0	-1.5
HIGHEST MINIMUM	11.8	11.7	13.1	13.8	15.6	19.1	19.0	19.5	17.9	17.3	14.4	13.0	19.5
LOWEST MINIMUM	-6.8	-5.2	-4.0	-2.3	0.6	3.6	6.5	3.3	2.4	-1.4	-4.0	-7.7	-7.7
MEAN NO. OF DAYS WITH AIR FROST	2.6	3.0	1.3	0.4	0.0	0.0	0.0	0.0	0.0	0.2	0.8	2.8	11.0
MEAN NO. OF DAYS WITH GROUND FROST	7.4	7.4	5.7	4.5	1.2	0.1	0.0	0.0	0.3	1.8	4.4	7.2	39.9
MEAN 5 CM SOIL	5.8	5.7	7.0	9.3	12.8	15.6	16.8	16.2	13.8	10.6	7.9	6.4	10.6
MEAN 10 CM SOIL	6.1	6.0	7.2	9.0	12.2	15.0	16.4	15.9	13.9	10.9	8.4	6.7	10.6
MEAN 20 CM SOIL	6.7	6.7	7.8	9.6	12.6	15.2	16.6	16.4	14.7	11.8	9.2	7.4	11.2
RELATIVE HUMIDITY (%)													
MEAN AT 0900 UTC	83.8	83.3	82.7	78.9	77.6	81.0	84.1	84.3	84.1	84.7	84.8	84.0	82.8
MEAN AT 1500 UTC	79.2	76.2	75.0	72.4	72.9	76.7	80.0	78.5	77.2	78.4	79.6	79.9	77.2
SUNSHINE (hours)													
MEAN DAILY DURATION	1.4	2.2	3.0	5.2	5.9	5.3	4.5	4.4	3.9	2.7	1.8	1.3	3.5
GREATEST DAILY DURATION	7.6	9.0	10.9	13.4	15.3	15.9	15.1	13.9	11.8	9.5	8.1	6.5	15.9
MEAN NO. OF DAYS WITH NO SUN	10.9	7.4	6.9	3.3	2.8	3.4	4.0	3.2	3.8	6.4	8.5	11.2	71.8
RAINFALL (mm)													
MEAN MONTHLY TOTAL	173.8	123.7	123.8	96.7	93.5	95.3	99.0	114.9	125.4	177.1	169.3	164.9	1557.4
GREATEST DAILY TOTAL	48.5	51.6	48.6	55.1	38.2	51.8	45.5	88.8	94.3	51.7	80.9	69.9	94.3
MEAN NO. OF DAYS WITH ≥ 0.2 mm	22	19	21	17	17	17	19	19	19	22	22	22	236
MEAN NO. OF DAYS WITH ≥ 1.0 mm	19	15	17	13	13	12	14	14	15	18	19	18	187
MEAN NO. OF DAYS WITH ≥ 5.0 mm	11	8	8	6	6	5	6	7	7	11	10	10	95
WIND (knots)													
MEAN MONTHLY SPEED	12.2	11.6	10.9	9.4	9.0	8.4	8.0	8.0	8.6	10.1	10.6	11.3	9.8
MAX. GUST	82	79	73	65	63	58	53	60	67	75	70	88	88
MAX. MEAN 10-MINUTE SPEED	49	49	47	38	39	32	31	36	40	47	49	60	60
MEAN NO. OF DAYS WITH GALES	2.4	1.5	0.9	0.2	0.3	0.0	0.0	0.1	0.1	0.8	1.0	1.5	8.8
WEATHER (MEAN NO. OF DAYS WITH...)													
SNOW OR SLEET	1.0	0.8	0.7	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.7	3.7
SNOW LYING AT 0900 UTC	0.2	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.5
HAIL	4.9	3.5	3.8	2.7	0.7	0.0	0.0	0.1	0.1	0.9	2.3	3.7	22.8
THUNDER	1.3	0.6	0.5	0.2	0.3	0.2	0.5	0.5	0.3	0.7	0.9	0.5	6.6
FOG	0.5	0.3	0.4	0.9	1.2	1.7	1.7	1.3	0.8	0.6	0.5	0.4	10.2

TABLES OF MONTHLY AND ANNUAL MEAN EXTREME VALUES FOR OTHER SYNOPTIC STATIONS ARE AVAILBLE AT [HTTP://WWW.MET.IE/CLIMATE-IRELAND/30YEAR-AVERAGES.ASP](http://www.met.ie/climate-ireland/30year-averages.asp)

