



## Weather Front.

### December 2023/1923.

**December 2023.**

#### **Observers Notes.**

**Pitsford<sup>i</sup>:** Generally mild and unsettled, with spells of heavy rain, and strong winds associated with no fewer than four named storms. More than double the usual rainfall was recorded over the month, and the Christmas period was exceptionally mild.

**Middleton:** The fourth warmest December on record despite a chilly first week. The wettest month of any name at this site, and the wettest month since 1965 on a composite local record.

**Coton-in-the-Elms:** An exceptionally mild December. It was the second warmest on a 33-year record, and was only beaten by the remarkably warm December of 2015. After a cold and frosty start to the month, the weather turned unsettled and often stormy. As a result, it was also the wettest December on record.

**Bablake:** This has been the wettest December since 1978 (148.7 mm); the only December wetter since 1892.

**Ely:** Six of the last seven Decembers have been wetter than average. The maximum temperature of 14.0 C, on the 24<sup>th</sup>, is the warmest Christmas Eve on the station record (53 years).

**Mickleover:** The wettest December on the station record (1981), and locally since at least 1952, also the most raindays on the station record.

**Mountsorrel:** The wettest December on the 23-year station record. Severe flooding along the Soar Valley flood plain, and most other water courses. A brief, cold, start on the 2<sup>nd</sup> and a snowfall of 2 cm that night. After this it became mild and very wet.

**Desford:** Very mild and often windy. Only one short cold snap at the beginning of the month, with sleet and wet snow just giving 1 cm of lying snow locally. Some foggy days accompanied the cold spell, with freezing fog depositing rime on the 2<sup>nd</sup>. Local rivers running full, and localised flooding accompanied rain events due to run off and saturated ground.

**Lowdham:** The highest rainfall for December on the station record, and in the Nottingham area since 1868, which was the second wettest on record in the Nottingham area since 1840. The number of raindays (27) was the highest for December on the station record (1991). The total rainfall for the period November/December was 231.3 mm which is the highest in the Nottingham area since 1840. Similarly 391.8 mm for the period October to December is the highest for the Nottingham area, again, since 1840. There was frequent surface water flooding in local villages and on local roads. The last few months resulted in a water logged station. There were 42.8 hours of sunshine recorded at Radcliffe-on-Trent, which is 66% of the 1991-2020 average.

**Saltfleetby:** A hard frost on the 2<sup>nd</sup>, with snow garins overnight. Very raw on the 2<sup>nd</sup> during the day, and wet snow falling during the night, but by the morning of the 3<sup>rd</sup> a very slight thaw was evident.

10 Day Mean Temperatures			
Date	Max	Min	Mean
1-10	7.3	1.1	4.2
11-20	10.4	5.2	7.8
1-20	8.8	3.2	6.0
21-31	11.2	6.3	8.7

### UK overview

The cold snap in late November extended though the first week of December, with some very hard frosts (-4.7° C at Cudrose, Cornwall on 2nd and -12.5°C at Altnaharra, Sutherland on 3rd). Snow caused significant disruption across northern England on 3rd, with parts of the Lake District badly affected (for example the Ambleside area). The cold weather was swept away on 9th to 10th by storms Elin and Fergus which brought very wet, windy, and disruptive weather - but much milder Atlantic air, including some exceptionally mild nights. Thereafter the weather continued very mild through most of the month, except across the far north, dull and wet at times with persistent rain from a succession of Atlantic fronts and mounting rainfall accumulations. The UK recorded its highest daily minimum temperature on record on Christmas Day with 12.4°C at Exeter Airport and East Malling, Kent. The month ended with a spell of very unsettled, turbulent weather. Storm Gerrit on 27th to 29th brought further strong winds and heavy rain, with significant disruptive snow falls across Highland Scotland and winds gusting at over 70Kt (81mph) at a number of stations. The year closed out with yet another Atlantic low-pressure system bringing further very wet and windy weather. Overall, Scotland bore the brunt of the worst of the weather over the course of the month. Temperatures for December were above average across the whole of the UK except northern Scotland, with anomalies mostly around 1.5 to 2.0°C. This was the fifth / equal-fifth warmest December for England and Wales in respective series from 1884. It was a particularly mild December for the southern half of England and Wales with minimum temperature anomalies of over 2.5°C, and very few frosts after the first week of the month. This was the equal-eighth wettest December for the UK in a series from 1836, and fourthwettest for Northern England.

Parts of central and north-east England, and much of northeast Scotland recorded more than twice the normal rainfall; areas that could well have done without further rain after a very wet October (the wettest on record for eastern Scotland). Apart from north-west Scotland, this was a dull month, with less than two-thirds of normal sunshine for the UK overall - representing less than one hour per day on average in most areas. Southern England provisionally recorded a mere 26.6 hours, only 50% of the 1991- 2020 long term average. Reference climatology used for calculating anomalies is the period 1991-2020 unless otherwise stated.

### **Weather impacts**

- Heavy snow affects Cumbria and parts of Derbyshire.
- Strong winds and heavy rain including storm Gerrit cause fallen trees, flooding, travel disruption, and power cuts.
- A mini-tornado hits part of Greater Manchester.

Heavy snow fell across Cumbria and parts of Derbyshire in early December. A major incident was declared in Cumbria with a large number of roads closed including the M6 for a time. Several rest centres were opened to accommodate stranded travellers and residents without power. Storms Elin and Fergus brought wet and windy weather to the UK on 9th and 10th December, but the worst weather impacts occurred across the Republic of Ireland. On the 10th and 11th heavy rain caused disruption to rail services in Yorkshire. On 12th, there were reports of flooded roads and vehicles stranded in floodwater in south London. Heavy rain affected several major roads in Scotland on the 16th. Wet and windy weather brought widespread impacts to the UK on 21st. This system was named storm Pia by the Danish Meteorological Service. In Scotland some bridges were closed to high-sided vehicles, there was some disruption to rail and ferry services, and schools were closed in Shetland. Fallen trees blocked roads in many areas including Northern Ireland, parts of North Wales and north-west England. On the 22nd overnight snow resulted in school closures in Shetland, and disruption to rail services in the north of Scotland. Snow and rain also caused some travel disruption on the A9. On the 27th Storm Gerrit brought widespread impacts across the UK, particularly travel disruption after Christmas. In Scotland the A82 was closed at a number of points due to flooding and fallen trees, and a major incident was declared on the A9 with cars trapped in snow. Flooding also affected roads elsewhere in Scotland. There were delays to rail services due to strong winds and speed restrictions, landslips, flooding, and trees on the line. Thousands of properties experienced loss of power in both Scotland and Wales and lightning damage was sustained to the Pan Dinas monument in Aberystwyth. The M48 Severn Bridge was closed due to high winds. In Greater Manchester, around 100 homes were damaged by a mini tornado, while flooding and landslides affected a number of major roads. In Yorkshire, sections of the M62 and A1M were closed due to flooding and there were huge crowds of stranded passengers at London King's Cross Station after the East Coast Main Line was closed north of Newcastle. In Northern Ireland a landslide closed the A2 coast road and there was flooding on other roads across the country. The M48 Severn Crossing was closed again on 30th December due to high

winds and a number of ferry services in Scotland were cancelled or suspended. There were reports of a waterspout off the Isle of Wight.

## **Gleanings from the Press.**

### **2 December 2023.<sup>ii</sup>**

During the week ending the 2<sup>nd</sup> heavy snowfalls and blizzards were recorded across eastern Europe resulting in many deaths and thousands of towns and villages without electricity. In Moldova four people were reported dead, with two bodies being found in cars buried in snowdrifts. In Ukraine, severe snowstorms left 10 people dead and 1500 towns and villages without power. In Bulgaria a state of emergency was declared as storms had left more than 1000 villages without electricity.

In South Africa several maximum temperatures were broken during a heatwave that had lasted for almost a fortnight. The South African Weather Service noted a temperature of 46.7 C at Augrabies Falls on Monday, which broke the previous November record of 46.2 C. The hot weather was expected to continue for the rest of the week, and was expected to hit Namibia, Botswana, Eswatini, Lesotho, and Mozambique.

In Western India, at least 24 people died and 23 injured during thunderstorms and heavy rain in the state of Gujarat earlier in the week. It is understood that at least 18 deaths were due to lightning strikes.

### **5 December 2023.<sup>iii</sup>**

Temperatures in Russia were expected to fall dramatically during the latter part of the week of the 5<sup>th</sup>. In Perm and Omsk temperatures were not expected to rise above -25 C, which is about 20 C below the seasonal average. In eastern Russia temperatures of -40 C were expected, but closer to -50 C across parts of Yakutia and Chukotka, by the 7<sup>th</sup>.

More than 40 cm of snow fell on Munich on the 1<sup>st</sup> and 2<sup>nd</sup>. Over 700 flights were grounded, the main railway station was closed, and more than 350 incidents were reported to the police. Similar incidents were observed across Switzerland, Austria, and the Czech Republic.

### **9 December 2023.<sup>iv</sup>**

Drought and a warm autumn have resulted in the Mississippi river being exceptionally low for the time of year. This has caused problems for farmers, who rely on the river as a route to export their crops; 60% of US grain exports use the river to reach the Gulf coast. The total loss in trade is estimated to be about \$20 bn (£16 bn),

A depression in the Bay of Bengal deepened into Tropical Cyclone Michuang, which resulted in 19 deaths, during the week ending the 9<sup>th</sup>. A combination of storm surges and heavy rain led to significant flooding, and a cost to the country of £478 m.

Significant flooding was also reported from Tanzania during the previous weekend when the town of Katesh was engulfed in torrential rain, on the 2<sup>nd</sup>, killing 69 people. Many more sustained serious injuries after the rain triggered landslides that damaged homes, roads, and farmland.

### **12 December 2023.<sup>v</sup>**

Parts of south-east Australia reported extremely high temperatures over the weekend of the 8<sup>th</sup>/9<sup>th</sup>. At Sydney Airport the maximum temperature of 43.5 C was recorded on the 9<sup>th</sup> which was the highest recorded, at Sydney Airport, since records began in 1929, and is about 15 C above the December average. Warnings of bushfires were issued for many parts of New South Wales. Temperatures were expected to ease across south and south-east Australia during the early part of the week, but intensify across northern, western, and central areas later in the week, with temperatures rising to 40+ C by the 16<sup>th</sup>.

### **16 December 2023.<sup>vi</sup>**

Heavy snowfalls affected China, during the week ending the 16<sup>th</sup>, north of the Yangtze River. Over 180 bus routes were suspended in Beijing on the 11<sup>th</sup>. Henan, south of Beijing, had large falls of snow on the 9<sup>th</sup> and 10<sup>th</sup>, many areas recording depths of 10 cm, and up to 15 cm in some places. In Shanxi province, south-west of Beijing, icy roads, on the 10<sup>th</sup>, led to more than 40 cars being involved in a pile up, with one death and six injuries being reported. A second, more intense, cold spell was expected to become more widespread.

In Europe, a warm air mass spread across the Iberian Peninsula. Malaga reported a maximum temperature of 29.9 C on the 12<sup>th</sup>. This is the highest December temperature ever recorded in Spain.

South Australia was hit by heavy rain during the 9<sup>th</sup> and 10<sup>th</sup>. This resulted in around 30,000 homes being left without power. More than 20,000 reports of lightning were recorded in Adelaide. Tropical Cyclone Jasper made landfall in Queensland on the 13<sup>th</sup> with more than 400mm of rain being recorded in some places; windspeeds of 75 mph [65 kt] were also recorded.

### **19 December 2023.<sup>vii</sup>**

Water levels on the Rhine were critically high between the 11<sup>th</sup> and 16<sup>th</sup> after heavy rain fell over the catchment area was followed by snow melt. Parts of the lower Rhine, in southern Germany, were closed to shipping on the 15<sup>th</sup>, near Maxau and Speyer. Water levels continued to rise across the middle, and lower parts, of the river during the 16<sup>th</sup> and 17<sup>th</sup>, but no problems were reported away from the south.

### **20 December 2023.<sup>viii</sup>**

On the 20<sup>th</sup> The Guardian reported that cold weather in the Gansu and Qinghai provinces of China was hindering rescue efforts after , at least, 126 people had been killed, and more than 500 had been injured from an earthquake. The earthquake had struck shortly before midnight on the 18<sup>th</sup>. State media said that the rescue effort was a “race against time” because of the cold weather affecting much of China. Observations in the high-altitude area reported temperatures of -14 C on the morning of the 19<sup>th</sup>. Reports also showed rescuers working to recover victims in an area covered with light snow, and working by torchlight.

### **21 December 2023.<sup>ix</sup>**

A further report suggested that the earthquake had triggered landslides, damaged power lines, and had damaged other infrastructure. The report also noted that temperatures in the north-west of China had fallen to -16 C, and was seriously hampering rescue efforts.

### **23 December 2023.<sup>x</sup>**

On the 23<sup>rd</sup> The Yuardian noted that, over the last year there had been a deficit of rainfall in the area of the Panama Canal. This deficit had been exacerbated by the El Nino event, and had led to the fall in water levels in Lake Gatun. The demands of both the canal and the local population has left the lake facing a deficit of 3 bn litres a day. Lake Gatun’s level is now at the lowest ever recorded during the rainy season and has forced the authorities to restrict the number of vessels moving through the canal. This would normaly be 36 ships per day, but has been reduced to 22, and by February will be reduced still further to 18. Ships relying on the canal route can wait weeks to be allowed passage, pay £3m to jump the queue, or make passage around Cape Horn, which can add day, or weeks to the journey time. This also adds financial cost to both the operator and customer. The forth coming season is a further challenge, as the minimum water reserve must guarantee a supply fpr more than 50% of the population and also maintain canal operations.

### **22 December 2023.<sup>xi</sup>**

British vineyards have recorded their greatest ever grape harvest after a year of “near perfect” waether. The industry is expected to produce up to 22 m bottles of wine. The record haul follows a grape harvest that was 50% bigger than the last record breaking season in 2018. While wet weather delayed some new planting, the lack of frost at key times across the country, a warm June, a wet August, and a hot September, all contributed to a heavy crop of grapes. There are 943 vineyards across Graet Britain.

## December 1923.

### Observers Notes.

**Copdock (Suffolk):** With the exception of 1906 and 1917 the coldest December in 23 years; sunshine and rainfall normal.

**Malvern:** Night temperatures very variable.

**Morwenstow (Cornwall):** A mild month without big rains. A good deal of fog.

**Paignton:** Fair weather generally, good sunshine, rainfall small, frosty nights, no snow.

**Newquay:** Temperatures about normal, sunshine good, rainfall below average.

**Skegness:** On the whole an average December; the first part of the month notably dry. Very little wind.

**Arisaig (Inverness):** Very variable; some frost and snow and a good deal of mist and darkness.

**Dublin City:** The outstanding feature was the high mean relative humidity, 88%. An open month of westerly and south-westerly winds with rainfall considerably below the average. Kaleidoscopic changes during the second half of the month.

### December 1923, An Overview.<sup>xii</sup>

The beginning of December was quieter than November, but snow still lay in many parts of the country. The mean temperature of the first week was below average, except in Scotland, while mist and fog occurred generally throughout this period. A more southerly airstream predominated during the second week which produced warmer weather and, from the 11<sup>th</sup> to 13<sup>th</sup>, there was no frost reported at night. Maximum temperatures occurred around the middle of the month. The milder weather was accompanied, in the north and west, by rain but no very large daily falls were reported. Cold northerlies returned between the 19<sup>th</sup> and 22<sup>nd</sup> accompanied by snow. For the rest of the month a succession of depressions moved south-east from Iceland and produced a series of mild periods which alternated with cold ones. Generally cold weather dominated eastern parts of the country, but during the last ten days severe ground frosts were observed in all parts of the country. From the 19<sup>th</sup> to the 28<sup>th</sup> precipitation was of snow or sleet and occurred daily in some parts. A sharp frost was recorded generally on Christmas Day and, in some places, the lowest temperatures of the month were noted. Strong winds and gales were noted in coastal areas early in the month, while westerly and northerly strong winds were a feature of the latter part of the month.

The mean temperature for the month was 40 F [4 C], and was below the average, except for parts of Ireland, the Channel Islands, and the Isles of Scilly. The largest departure from average was +1.1 F [+0.5 C] in Northern Ireland. The week ending the 29<sup>th</sup> was the coldest of the month, but the week of the 2<sup>nd</sup> to 8<sup>th</sup> was also comparatively cold. In Scotland the period

23<sup>rd</sup> to 29<sup>th</sup> was the coldest of the year; at Nairn, on the 26<sup>th</sup>, the temperature did not rise above 29 F [-2 C]. Maxima of 50 F [10 C] were observed on the 7<sup>th</sup> and 8<sup>th</sup>, but the warmest period was the 16<sup>th</sup> to 22<sup>nd</sup>.

There were rapid changes of temperature throughout the month. During the day temperatures were high for the time of year, one or two days being very mild and humid. At night however, temperatures were very variable, with cold nights often alternating with mild ones. In general temperatures were not as low as those at the end of November.

At Christmas there was a sharp contrast between the south-west and parts of northern Britain; the south-west was mild with rain and temperatures above 50 F [10 C], while the north was cold with heavy snow. At Ross-on-Wye, on the 25<sup>th</sup>, a rise of temperature of 29 F [15 C] in 14 hours was recorded, temperatures being 22 F [-5.5 C] at 0830 and 51 F [10 C] at 2230.

Ground frosts were numerous, many stations reporting 20 days and above; Chopwellwood and Hampstead reported 27 days. Temperatures of 10 F [-12 C] and below were noted over grass and snow, Eskdalemuir noting 8 F [-13 C] on the 25<sup>th</sup>.

The variation in precipitation throughout the country was between 50% and 150% of average. The areas below average were from Inverness and the Isle of Skye to Dumfries, south-west England, south Wales, and Ireland, apart from the extreme north. A small area in the extreme south of Cork and Waterford had less than 50%. The largest falls were; 534 mm at Ben More (Isle of Mull), and 382 mm to 510 mm in Snowdonia. Over much of the country precipitation was below average for the first three weeks but, between the 23<sup>rd</sup> and 29<sup>th</sup>, precipitation was above average, except for northern Scotland. Some of the largest daily reports were; 62 mm at Llyn Faer and 57 mm at Treherbert (both in Glamorgan) on the 1<sup>st</sup>, 55 mm at Trecastle (Breconshire) on the 2<sup>nd</sup>, 31 mm at Arrochar (Dumbarton) and Ford (Argyll) on the 9<sup>th</sup>. There was extensive flooding in southern Lincolnshire on the 29<sup>th</sup>.

A significant amount of the precipitation was in the form of snow, the number of days of snow varying in different parts of the country; Deerness had 17 and York 11, while a few Scottish stations had only 2 or 3, and most stations in south-west England and Ireland had none. Snow fell at higher levels in Scotland early in the month, but was not generally reported until after the 9<sup>th</sup>. Snow was also reported in the London area on the 19<sup>th</sup>, 21<sup>st</sup>, and 26<sup>th</sup>. A heavy fall occurred on the evening of Christmas Day in the north, 4 to 6 inches [10 to 15 cm] falling on the Yorkshire Wolds, and 8 inches [20 cm] at Galashiels and parts of Glasgow. The Glasgow snowfall was said to be the heaviest for 32 years.

A thunderstorm occurred in Sutherland on the 19<sup>th</sup> and at one or two stations on the east coast of England with Cromer reporting vivid lightning flashes in the evening. Thunder was reported at Brocklesby on the 20<sup>th</sup> during the early morning together with snow squalls. Some isolated hail showers also occurred during the month.



Fog was prevalent, although some stations reported none at the morning observation. Brocklesby reported “fog all day” on the 5<sup>th</sup>, and “foggy at times” on the 6<sup>th</sup>. Geldeston and Coventry recorded 19 days, and Cullompton 15, but the average number was less. Between the 2<sup>nd</sup> and 8<sup>th</sup> it was very foggy in England, with dense fog in Birmingham on the evening of the 6<sup>th</sup>, dense fog was also recorded in London on the following evening. There was much fog in Scotland from the 25<sup>th</sup> onward.

In summary; a variable month with considerable snowfall throughout the country.

### **The Rest of the World.<sup>xiii</sup>**

December 1923 in Europe could well be summarised as “one of rain and snow”. In Italy rain, combined with a thaw, caused the dam of Lake Gleno to burst on the 1<sup>st</sup>. This flooding continued for a week, together with the rivers Tiber, Arno, and others. On the 23<sup>rd</sup> a “heavy gale” was blowing down the Adriatic, and very low temperatures were recorded over the whole of Italy, snow was also reported in the south. Heavy snow occurred in Rome on the night of the 30<sup>th</sup>. It is understood that snow was rare in southern Italy.

In Austria heavy snow was reported from the 21<sup>st</sup> to the 27<sup>th</sup>, rail traffic being interrupted. Switzerland experienced alternate thaw and frost, very mild until the 20<sup>th</sup>, followed by two days of heavy snow and low temperatures, some of which were “records” for the time of year. On the 23<sup>rd</sup> a thaw set in, followed by frost and very heavy snow from the 23<sup>rd</sup> to 26<sup>th</sup>. On the 26<sup>th</sup> a gale set in, followed by a thaw and heavy rain up to 3,000 feet. In many mountain areas 10 feet [304 cm] of snow fell between the 23<sup>rd</sup> and 27<sup>th</sup>. On the 28<sup>th</sup>, with a westerly gale, rain and thaw conditions extended to near 5,000 feet, and not until the 31<sup>st</sup> were normal cold fine conditions established. Avalanches were exceptionally frequent causing loss of life, much damage to buildings, and interruption to rail traffic.

Over NE France the month was very wet, as were the first two days of January 1924. The total rainfall for Paris during December 1923, and the first two days of January 1924, was 124 mm, the average for the whole winter was about 100 mm. It came as no surprise that flooding occurred, as the previous two months were also wet. At the end of December the Seine was 18.5 feet [over 5.5 meters] above normal at Paris, and a further rise was feared, repeating the disaster of 1910. Towards the end of the month the Rhine began to rise flooding parts of Cologne. In Denmark Christmas was “stormy and snowy”.

In eastern Australia drought conditions prevailed until the 26<sup>th</sup>, when general rain fell in northern and western New South Wales, and more scattered rain fell in central and western Queensland.

A violent hailstorm swept over Pretoria on the 25<sup>th</sup>. It was reported that many of the hailstones weighed more than 16 ounces [500 grams]. Much damage was done!

In Brazil, rainfall was below average in all areas, the centre in particular being 100 mm below normal. The temperature was one or two degrees above average, the cane and sugar crop suffering from the hot, dry weather.

Argentina suffered a “cold snap” on the 7<sup>th</sup> and 8<sup>th</sup>. This was associated with a rise of pressure of 28 mbin two days at Cordoba. The temperature fell to 28 F[-2 C] at Chubut on the 7<sup>th</sup>, and to 39 F[4 C] at Cordoba on the 8<sup>th</sup>. These temperatures were between 20 F and 25 F [about 10 C and 12 C] below the average for the time of year.

### **Central England Data.<sup>xiv</sup> (Averaging period is 1891 to 1920.)**

Mean Maximum Temperature: 6.6 C. Average: 7.0 C.

Mean Minimum Temperature: 1.1 C. Average: 2.1 C.

Mean Temperature: 3.8 C. Average: 4.5 C.

England and Wales Rainfall: 100.0 mm. Average: 104.2 mm. 100%.

### **Midlands Data. (Averaging period is 1911 to 1920).**

Midlands Mean Maximum Temperature: 6.0 C. Average: 7.0 C.

Midlands Mean Minimum Temperature: 0.1 C. Average: 1.4 C.

Midlands Mean Temperature: 3.0 C. Average: 4.2 C.

Midlands Rainfall: 82.4 mm. Average: 97.9 mm. 84%.

### **2023 (Provisional)**

#### **Central England (Averaging period is 1991-2020).**

Mean Maximum Temperature: 9.5 C. Average: 7.9 C.

Mean Minimum Temperature: 4.5 C. Average: 2.2 C.

Mean Temperature: 7.0 C. Average: 5.0 C.

England and Wales Rainfall: 161.3 mm. Average: 103.6 mm. 156%.

---

<sup>i</sup> Pitsford Monthly Weather Report, December 2023, Headline.

<sup>ii</sup> The Guardian, 2 December 2023.

<sup>iii</sup> The Guardian, 5 December 2023.

<sup>iv</sup> The Guardian, 9 December 2023.

<sup>v</sup> The Guardian, 12 December 2023.

<sup>vi</sup> The Guardian, 16 December 2023.

<sup>vii</sup> The Guardian, 19 December 2023.

---

viii The Guardian, 20 December 2023.

ix The Guardian, 21 December 2023.

x The Guardian, 23 December 2023.

xi The Guardian, 22 December 2023.

xii Monthly Weather Report, December 1923, Meteorological Office, HMSO, February 1924, p. 155.

xiii Meteorological Magazine, January 1924, Meteorological Office, HMSO, 1924, pp. 292-293.

xiv Hadley Centre, Central England and Midlands, Meteorological Office.