

## MONTHLY WEATHER REPORT OF THE METEOROLOGICAL OFFICE.

(Supplement to Weekly Weather Report.)

SUMMARY OF OBSERVATIONS COMPILED FROM RETURNS OF OFFICIAL STATIONS AND VOLUNTEER OBSERVERS IN THE UNITED KINGDOM, WITH A CHART OF RAINFALL CONTRIBUTED BY THE BRITISH RAINFALL ORGANISATION.

ISSUED BY THE AUTHORITY OF THE METEOROLOGICAL COMMITTEE.

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## RAIN: FLOODS: GALES.

## Previous Records Exceeded: Lowest Pressure since 1876.

The frequent and abundant precipitation was in many parts of England without a December precedent. Its effects were the more marked because it followed a wet November, resembling in that respect the exceptionally wet Decembers of 1876, 1911, which were themselves followed by wet Januaries. It is worthy of comment that the past six Decembers have all been wet and mild in England, with the exception of December 1913, which was mild but not wet, and December 1909, which was wet but not mild. There were many gales during the month; some were of great violence, and that of the 28th was accompanied by very heavy snow in some parts of England. Pressure was lower on the whole than in any December since 1876 when the mean at sea level was everywhere below 1,000 mb. except in the Shetlands and on the coast of Kent.

At the beginning of the month the South to South-West gale of November 30th was subsiding, but another disturbance, marked A on map 2, which arrived off the west of Ireland on the 2nd caused renewed gales. This was followed quickly by a fresh disturbance, track B, which prolonged the rough weather until the 5th, when the wind had become Westerly. These gales were very general, and that of the 4th of unusual severity. The greatest velocity of the wind reported on the 3rd ranged from 30 m/s in a gust at Alnwick Castle and 31 m/s at Weaver Point to 34 m/s at Paisley, but on the 4th a higher velocity was attained over a larger area. At Gorleston and Warlingham there was a gust velocity of 31 m/s, at Holyhead 38 m/s, Southport and Scilly 39 m/s, Pendennis Castle 40 m/s, and at Quilty 41 m/s. At Southport on the 5th a gust velocity of 33 m/s was reported. Another depression, track C, brought the wind in this country back to the Southward very quickly on the 6th, and a gale occurred in most parts of the United Kingdom, from South and South-West in the south and from South-East in the north. It was not, however, of great severity, the extreme gust velocity being 27 m/s at Holyhead on the 6th and 29 m/s at Pendennis Castle on the 7th.

The rain during this period was very general except on the 5th. Many falls exceeding an inch were recorded: on the 1st the largest amounts were 2 in. at Killarney and 1·6 in. at Gruline, and on the 2nd 1·4 in. at Carrick-on-Suir, 2·1 in. at Darleith, 2·3 in. at Balmoral, 3 in. at Kenmore and Killin, and 1·4 in. at Glasgow. On the 3rd 2·9 in. fell at Bethesda (Snowdonia), 1·7 in. at Bettws-y-Coed, 1·5 in. at Newton Rigg, Waterford, and Roche's Point, and between 1 in. and 2 in. at various other stations in the west and north-west. On the 4th and 6th heavy downpours were less common, the chief being 1·7 in. at Eskdalemuir on the former date and 1·4 in. at Princetown on the latter. Isolated thunderstorms were experienced in different districts between the 1st and 7th, and in some parts of Wales and the Midland Counties on the 8th.

A brief interval with light winds occurred on the 9th, but a depression of little depth which moved north-eastward from the Bay of Biscay, marked E on the map, caused further heavy falls of rain in England. Among the heaviest were 2·5 in. at Ventnor and Sandown, 2·4 in. at Aldershot and Midhurst, 2·3 in. at Emsworth, 2·2 in. at Warlingham, 2·1 in. at Haslemere and Heathfield, 1·9 in. at Woking, 1·8 in. at Jersey, Wisley, and Isleworth, and between 1·5 and 1·7 in. at many other stations. The greater part of the rainfall came with the Easterly wind on the northern side of the barometric minimum. Before the rain from this disturbance had ceased on our east and south-east coasts, another system of greater intensity appeared, see track F. The accompanying gale began from the South-East on the 10th on our south-west coasts, continued and became general on the 11th, and was prolonged, mainly from the Eastward, during the 12th and 13th. The extreme wind velocity was 35 m/s at Weaver Point on the 11th, but the gale was more remarkable for its duration than for its violence. Rain was widely distributed, but was only very heavy locally. On the 11th 1·2 in. fell at Dublin and Lisburn and 1·6 in. at Rathmines; on the 12th 1·2 in. at Marchmont and Allan's Green and 1·7 in. at Bellingham; and on the 13th 1·1 in. at Warlingham, 2 in. at Crathes, and 2·4 in. at Lynturk. In the rear of the depression the wind veered to the North-West and West and blew a gale at Scilly, but by the 17th it had backed to South-West again, a gale being experienced on various points of the west and north-west coasts. On the 18th a gale was experienced over the English Channel. With the North-Westerly wind there was little or no rain except in the Western Highlands, but with the return of the South-Westerly wind on the 17th heavy downpours again became general in the south-western and western districts; at Seathwaite there was 3·9 in. At some of the stations in Snowdonia the fall exceeded 4 in.; in many parts of Lancashire, and also at Ashburton, it was more than 1·5 in.; and at numerous stations in the western half of Great Britain, over 1 in.

Shallow depressions followed during the next few days, and rain fell in most parts of the Kingdom daily, but the quantity was not generally large, and the wind had little force. After the 18th, although pressure remained low, a very decided decrease of temperature occurred, and sharp frost was experienced in various parts of the north and north-west, where also some of the precipitation came in the form of snow or sleet. This reduction of

temperature was accentuated on the 23rd and 24th, when for the first and only occasion in the month the pressure distribution over the United Kingdom had ceased to be cyclonic.

On the 25th a large depression began to spread over these Islands, and by the evening the wind had returned to the Southward very generally and increased in force, while temperature had risen many degrees. On the 26th a gale was experienced in most parts of the Kingdom, and continued over a more restricted area through the 27th. Further heavy rains accompanied the Southerly wind in the north and west on the 25th, the amount ranging from 1 in. to 1·5 in. in many Irish and Scottish localities, and on the 27th equally heavy falls occurred over a large portion of England and Wales. Early on the 28th a small, secondary depression, track K, appeared off the south-west of England. During its passage precipitation was heavy and general. At first it came as rain, but, as the wind veered to the Westward, snow became general, the flakes being very thick and wet and of unusual size. Over the southern half of England few places measured less than an inch of water in the gauge, while here and there the value reached 1·5 in. The force of the wind was not great, except over the Channel and the south of England, but the gale experienced in that region was very severe, and, in conjunction with the heavy, clinging snow, overthrew many trees and caused much structural damage. At Shoburyness the extreme gust velocity was 34 m/s, and at Dover 36 m/s. By the 29th the wind had veered to North-West and decreased in force, but on the 30th and 31st a large depression on the Atlantic was spreading over these Islands and the wind had again returned to the Southward, accompanied by further downpours of rain measuring more than an inch over a wide area.

**Pressure.**—Pressure was highest on the 24th or 25th except in the English Channel, but the lowest values occurred on more irregular dates—on the 3rd in the north and east of Scotland, the 4th in Ireland, the west of Scotland, and in the north-east of England, on the 13th or 14th over England as a whole, and on the 28th in England East. The greatest range occurred in Scotland North, where the minimum value on the 3rd was 960 millibars, and the maximum on the 24th 1,024 millibars. As will be seen on map 1, page 135, pressure was much below the average, while the barometric gradient was steeper than usual, and the trend of the isobars more South-Westerly. Over the Kingdom generally the mean pressure was even lower than during February 1910.

**Temperature.**—Until the 18th temperature was generally above the normal; subsequently generally below the normal. Frost of considerable severity became common between the 21st and 24th, the lowest minimum temperatures reported being 7° at Balmoral on the 22nd, 14° at Markree Castle on the 24th, and 7° at Braemar on the 25th. A heavy glazed frost occurred at West Witton on the 22nd and 23rd, and a similar phenomenon was reported at Douglas on the 23rd and 24th. The cold snap furnished some low maximum readings over a considerable area. On the 23rd or 24th the thermometer remained below 32° at some places in the Midland Counties, and also at some Irish stations. The cold, calm air of the 24th was accompanied by thick fog in several parts of the Kingdom, and in the evening thick rime was formed in many English and Irish localities. The fog on this occasion extended to various parts of the English and Irish coasts, but during the month few coastal fogs were reported.

**Rainfall.**—In all parts of the Kingdom the rainfall exceeded the average, the excess being abnormal over a large area in England. At many southern stations, and at some further north, the amount was greater than that of any preceding December for which records are available. At Kew Observatory the total fall, 6·37 in., was the highest December value since the record began 59 years ago. At Greenwich Observatory the total of 59·6 in. is the highest December value in the last 100 years. On the other hand, in South Devon and on Dartmoor and near Salisbury the total amount was less than in December 1911. Expressed as a percentage of the average, rainfall for England and Wales was 201, for Ireland 187, and for Scotland 152. At many stations the percentage exceeded 300, the most notable being along the south coast of England and in the Isle of Wight, where the highest values were 331 per cent. at Worthing and 354 per cent. at Totland Bay. At Rothamsted the percentage was 310 and at Hawarden Bridge as high as 415. More rain fell at stations in the Thames Valley than during any December for the past 50 years, and towards the end of the month a very extensive area became flooded. Snow fell at times during the last fortnight, but as a rule, it disappeared quickly. There were, however, some exceptions. At Armagh, on the 21st, the depth of snow on the ground was 8 in., at Rugby on the 29th 4 in.

**Bright Sunshine** was above the normal over the Kingdom generally but the excess was slight. In a few places there was a deficiency, the chief being at Tunbridge Wells and Guernsey, where the percentage of the average was 76 and 78 respectively. At Blackpool and Cullompton the corresponding values were 145 and 158 per cent.

Aurora was observed at Newton Rigg on the 26th.