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METEOROLOGICAL OFFICE

BRITISH CLIMATOLOGICAL BRANCH MEMORANDA, No.9.

Selected List of Papers etc. on British Climatology

Index of contents

1. Climatological Atlas of the British Isles (1952). This publication contains not only numerous maps and diagrams, but also references to the more important papers arranged under the ten headings of Pressure, Wind, Temperature, Rainfall, Snow, Thunder, Humidity, Sunshine, Fog and Visibility and Cloud.

1.1. Extremes are given monthly for most of the elements and these can be used as a guide and corrected as further extremes are experienced.

1.2. On pp.54-55 it is explained how the frequency of a monthly rainfall recorded at any station can be assessed from the average and standard deviation.

1.3. The rainfall distributions for abnormal individual days are given on pp.81-82, and many more are given in the annual volumes of British Rainfall.

2. "British Rainfall". Papers on Rainfall in British Rainfall have been listed in British Rainfall 1950, 1925 and 1900. Each article gives details of the main tables of data, includes a brief summary of each paper and references to similar information published in other publications. These are too numerous to quote here but in any investigation on rainfall these lists might well be searched initially. Thus under the main heading of "5 The Rainfall of Particular Days" we find references to articles on the more outstanding rains.

3. M.O.3. Branch Memoranda. So far seven summaries of data have been prepared, including:-

3.1. Distribution of hourly values of dry - and wet-bulb, Croydon, 1945-54
3.2. Maps of standard deviation of monthly mean temperature 1921-50
3.3. A comparison of the winters of 1946-7 and 1954-5
3.4. Monthly and annual maps of average temperature, 1921-50. The maps are similar to those for 1901-30 in M.O.M.451.
3.5. Monthly Averages of accumulated temperature, 1921-50.
3.6. Extreme wind speeds over Great Britain and Northern Ireland. This revises part of M.O.M.370. Tables of Wind Direction and force over the British Isles, giving maximum mean hourly wind speeds and gusts likely to be exceeded at each station only once in 10, 20, 50 and 100 years.
3.7. Summaries of observations of fog duration at British Ports. This gives details of the duration in hours and minutes of periods during which the visibility at the 26 observing points was less than (a) 440 yd. and (b) 1100 yd.
3.8. Reference should also be made to M.O.M.452 Variation of Temperature over the British Isles.
3.9. Similar M.O.M., not prepared by M.O.3, include:
M.O.M.365/9 Met. Report on the English Channel and Northern France.
M.O.M.365/13 Met. Report on Scotland.
M.O.M.365/15 Met. Report on Southern England.
M.O.M.365/26 Met. Report on Northern England.
S.D.T.M. No.58 Sea Breezes and Land Breezes.
M.O.M.358 A selected Bibliography of Met. Literature 1901-1935.
3.10. Similar M.O.19 Branch Memoranda include:-
Frequency of Ground Frost in SW England on Radiation Nights
Spells of dry weather in SW, SE and E England.
Irrigation needs in the S.W. Province.
Frequency of damaging hailstorms - see 13.4
3.11. Papers prepared in M.O.3. include:-
The exceptional summer of 1933, Glasspoole and Andrew, Q.J.R. Met. Soc., 1934, p.29.
The weather of 1954 over the United Kingdom, Glasspoole, Q.J.R.Met.Soc., 1955, p.499.
Pressure distributions associated both with prolonged dry and wet periods are discussed in British Floods and Droughts, see 4.6.

4. Standard Books on British climate include:-

4.1. Climate of the British Isles, Bilham, 1938.

4.2. The English Climate. Brooks, 1954.
Climate in Everyday Life. Brooks, 1950.

4.3. Climate and the British Scene. Manley, 1952.

4.4. A Century of London Weather. Marshall, 1952.

4.5. Buchan's Days. Hawke, 1937. This has a chapter on the outstanding weather experienced in each month.

4.6. British Floods and Droughts. Brooks and Glasspoole, 1934. This book deals especially with the "causes" and with "cycles" of wet and dry weather.

4.7. A Meteorological Chronology to A.D. 1450. Geophysical Memoir 70. Britton, 1937. This gives historial references to weather of the British Isles.

4.8. Rainfall Atlas of the British Isles. Royal Meteorological Society, 1926. Contains maps of monthly and annual rainfall and for individual years, as percentage of average 1868-1923.

5. Synoptic Climatology and singularities.

5.1. Annual recurrences of weather: singularities, Part I and Part V. Brooks, Weather, 1946, p.107 and p.130.

5.2. The incidence of anticyclonic days and spells over the British Isles, Belasco, Weather, 1948, p.233.

5.3. Types and spells of weather around the year in the British Isles. Annual trends, seasonal structure of the year, singularities. Lamb, Q.J.R.Met.Soc., 1950, p.402.

5.4. British Weather around the Year. Lamb, Weather, 1953, p.131 and p.176. Lamb considers the individual frequencies on each day of the Year of the seven weather types suggested by Levick:- Anticyclone, south-west or west, north-westerly, northerly, easterly, southerly and cyclonic.

5.5. Singularities in the annual variation of air, grass and soil temperatures. Lawrence, Met. Mag. 1954, p.235. It is concluded that soil moisture is of importance in the determination of frost frequency, screen minimum, grass-minimum and soil temperatures and that data of the type considered could be used to forecast grass minimum temperatures.

5.6. The temperature characteristics of different classes of air over the British Isles in winter. Belasco, Q.J.R.Met.Soc., 1945, p.351. The paper uses 12 different classes of air over the British Isles, considers the mean and extreme temperatures at different heights in these different classes of air and the daily maximum and minimum temperature recorded at Kew 1924-25 to 1943-44.

5.7. Characteristics of Air Masses over the British Isles. Belasco, Geophysical Memoir, 87, 1952. In this paper the upper air data are divided into 14 classes and surface data into 19 types of air mass, the anticyclonic types being further subdivided according to the source of the air. The characteristics of the air masses are defined in tables and details are also given of the vapour pressure at Kew for the 19 types, as well as the frequencies of the various air masses at Kew, Scilly and Stornoway.

5.8. The persistence of weather. L. P. Smith, Gardeners Chronicle. 1955, p.553. Evidence from Oxford and Southport suggesting that air and 1 ft. soil temperatures tend to persist, month to month, as above or below average.

6. Local and micro-climatology. See 4.4, 16.6.

6.1. The Land Utilisation Survey of Britain, London, consists of a series of publications county by county and each number includes a chapter on climate, sometimes with details of local variations of climate.

6.2. Thermal characteristics of a Hertfordshire Frost Hollow. Hawke, Q.J.R.Met.Soc.,1944,p.23. Summaries of Rickmansworth Observations 1930-42. Lowest temperature -4°F. largest diurnal range 50.9°F.

6.3. Some factors in micro-climatology. Brunt, Q.J.R.Met.Soc.,1945, p.1. A simple account of some of the more important factors producing local variations.

6.4. Met. Obs. on the Dun Fell, a mountain station in Northern England. Manley, Q.J.R.Met.Soc., 1942, p.151. Met. Obs. 1937-40 at 2,735 ft.,mainly temperature.

6.5. Occurrence of spells in London rainfall and temperature. McIntosh, Met. Mag.,1955,p.366. Considers average variation of monthly mean rainfall associated with wet and dry spells lasting three months and similarly for temperature. With rainfall, persistence lasts 2-4 months and with temperature as long as 8 or 9 months.

6.6. The meteorology of Ben Nevis Observations. Edinburgh Trans.R.Soc., 1890, 1902, 1905, 1910.

6.7. The Climatology of Glasgow. Becker, Geophysical Memoir, No.23.

6.8. The meteorology of Edinburgh. Mossman, Edinburgh Trans.R.Soc., 1896, p.681, 1897, p.63. The non-instrumental meteorology of London 1713-1896. Q.J.R.Met.Soc., 1897,p.287.

6.9. Local rainfall variations in Bath and the surrounding district. Balchin and Pye, Q.J.R.Met.Soc., 1948,p.361. (See also Q.J.R. Met.Soc., 1947, p.297).

6.10. Local temperature variations in the Reading area, Parry, Q.J.R. Met.Soc., 1956,p.45.

6.11. Variations in Air Temperature and Humidity on the Weather Slope of a Coastal Hill. L.P. Smith, Met.Mag., 1952,p.102.

6.12. Variations in Open Air Temperature and Hours of Sunshine on the Weather Slope of a Hill. L.P. Smith, Met.Mag.,1950,p.231.

The above two papers compare the mean observations from 3 Aberystwyth stations at (approx.) sea level, 500 ft. and 1,000 ft.

6.13. The Climate of York. Bilham, Report Brit.Ass., York, App.p.13.

6.14. The Durham Meteorological record, 1847-1940. Manley, Q.J.R. Met.Soc., 1941,p.363.

6.15. Local temperature variations in Wirral. Reynolds, Weather, 1956, p.15.

6.16. The Climate of Leicestershire. Bilham. Report, Brit.Ass. 1933, App.p.40.

6.17. The Climate of London. 3 vols. Luke Howard, 1818, 1820.

6.18. Minimum temperatures and topography in a Hertfordshire Valley. Lawrence, Met. Mag.,1956, p.

6.19. Climate of Blackpool and Southport. W. Smith. (M.O. Pams.21).

6.20. The Climate of Nottinghamshire. Edwards, Report Brit. Ass. Nottingham, 1937, App.p.56.

7. Climatological trends and changes. See 9.5, 10.4.

7.1. Recent Seasonal Climatic Trends over Great Britain. Glasspoole, Met.Mag., 1955, p.33. This gives running 10 yr-means for England and Wales, and Scotland, separately of Temperature, Rainfall and Sunshine for each of the four seasons.

7.2. Recent Seasonal Trends in the number of rain-days over Great Britain. Glasspoole, Met.Mag., 1957, p - . This considers rain-days and wet-days along lines similar to 8.1 and brings out the recent increase in the amount of rain per rain-day.

7.3. The mean temperature of central England, 1698-1952. Manley, Q.J.R.Met. Soc., 1953, p.242. Includes serial monthly values 1698-1952 and references to the records used.

7.4. Climatic fluctuations and the circulation of the atmosphere. Brooks, Weather, 1950, p.113.

7.5. Temperature Trend in Lancashire, 1753-1945. Manley, Q.J.R.Met. Soc., 1946,p.1. Includes serial monthly values 1753-1946.

7.6. Climatic fluctuations in Bristol. Hannell, Brit.Ass.Adv.Sc., 1956, p.373.

7.7. Rainfall at Bidston, 1867-1951. Reynolds, Q.J.R.Met.Soc., 1953, p.135.

7.8. Winters - Black or White? L.P. Smith, Gardeners Chronicle 139, 1956,p.182. Discussion of days of snow lying and mean monthly temperature. Trend of coldest winter month.

7.9. Our Climate. L.P.Smith, J. Min.Agric. 61, 1954,p.297. Last 60 years discussed. Change in spring rainfall and spring frosts.

7.10. Seasons - Good and Bad. L.P.Smith, J.Min.Agric. 62, 1955, p.438. Check on some weather lore dealing with seasons - mostly negative.

7.11. Some thoughts on climatic change. Veryard. Weather, 1956,p.355. Includes a list of references.

8. Evaporation

8.1. Evaporation over the British Isles. Penman, Q.J.R.Met.Soc., 1950, p.372. Reviews theoretical basis of estimates, given more fully in earlier paper, and proceeds to discuss distribution of average evaporation over British Isles. General increase from south to north indicated.

8.2. The Calculation of Irrigation Need. M.A.F.F. Technical Bulletin No.4. H.M.S.O. 1954. Includes estimates of average potential transpiration county by county covering England and Wales for each of the months April-September.

8.3. Evaporation from tanks in the British Isles. Wadsworth, Weather, 1948, p.322. Gives map of distribution of annual evaporation over British Isles and a tentative formula.

9. Wind. See 3.6,3.9.

9.1. Variations in Wind Velocity near the Ground. Carruthers, Q.J.R. Met.Soc., 1943,p.293. Summary of information available and formulae for increase of mean wind speed and gusts with height.

9.2. Gust variation with height up to 150m. Deacon, Q.J.R.Met.Soc., 1955, p.562. A statistical study of the variation of mean wind speed and gust maxima with height and of vertical gust velocities.

9.3. Gale of January 31, 1953. Douglas,Met.Mag.,1953,p.97 and Hay, Marine Observer, 1954. 125 m.p.h. recorded at Costa in Orkney and floods on east coast.

See also North Sea Floods Conference. Published by Institution of Civil Engineers, 1953.

9.4. Tornadoes in England, May 21, 1950. Lamb, Geophysical Memoirs, No.99, 1957. Includes details of some 50 distinctive tornadoes in British Isles, 1868 to 1950. (A preliminary account is given in Met. Mag., 1950, p.245.).

West London tornado, December 8, 1954. Bull, Met. Mag., 1955, p.320.

9.5. Variations of wind direction in the British Isles since 1341. Brooks and Hunt, Q.J.R.Met.Soc., 1933,p.375. Winter, summer and year resultant direction and constancy Edinburgh 1731-1930, Dublin 1725-1930, London 1667-1930 and discussions of earlier variations.

9.6. Wind in Britain. Gold, Q.J.R.Met.Soc., 1939,p.66.

9.7. Whirlwind at Southend-on-Sea, Aug.10, 1953. Lawrence, Met.Mag., 1954,p.4. Describes synoptic situation leading to a local whirlwind.

10. Temperature. See 3.2, 3.4, 3.5, 3.8, 6.2, 6.4, 8.3.

10.1. Serial monthly values of mean temperature over the British Isles, 1881-1940, and annual values, 1866-1940. Glasspoole and Hogg, Q.J.R.Met.Soc., 1942,p.45. It has not been practicable to continue the values for the British Isles but the serial values for England and Wales, and for Scotland have been kept up to date using the values given in the Monthly Weather Report and Annual Summary.

10.2. Cold winters at Kew 1783-1942. Drummond, Q.J.R.Met.Soc., 1943,p.17 and discussion p.147. Includes monthly mean temperatures 1783-1942 based mainly on Kew.

10.3. The Ice Storm (glazed frost) Jan.27-29, 1940. Cave, Q.J.R.Met. Soc., 1940,p.12 and 21.

10.4. Variations of temperature in London, 1764-1939. Lewis,Met.Mag., 1947,p.135. Summer, winter and year,20 yr. moving averages at Greenwich.

10.5. The diurnal range of temperature and the geographical distribution of its annual variation. Ashmore, Q.J.R.Met.Soc.,p.554. Investigates causes underlying the monthly variations by Fourier analysis.

10.6. Length of a Frost Free Period. L.P.Smith, Met.Mag.,1954, p.81. Variations in length over a period of years seem linearly related to chance of occurrence.

10.7. The severe winter of 1946-47. Douglas,Met.Mag.,1947,p.51. Details of the situation which gave rise to the conditions.

10.8. Daily maximum temperature of the surface of the ground. Gloyne, Met.Mag.,1952, p.203. Daily max. temperature (°F) of a layer, a few mm. thick,.at surface = 2t - 50 where t is daily max. screen temperature and "skin temperature" is (2t-50) + 15. (where t. is greater than 59°F).

10.9. Fohn temperature in Scotland. Lawrence. Met.Mag., 1953,p.74.

11. Rainfall. See 4.6, 4.8, 7.7, 18.3.

11.1. The distribution of average annual rainfall, 1881-1915, has been published by the Ordnance Survey, 1949, in the Ministry of Town and Country Planning Series, on a scale of 10 miles to 1 inch. Sheet 1 covers Scotland and Northern England as far south as about Kendal to Scarborough and Sheet 2 the remainder of England and Wales.

11.2. The Reliability of Rainfall over the British Isles, Glasspoole, 2nd paper, J.I.Water Engineers, 1947, p.441; 3rd paper 1951, p.17. These papers deal with the rainfall of consecutive months 1 to 36, expressed as a percentage of the average annual station values, and show that when rainfall is expressed in this manner the limits at all stations are similar, and also the frequencies, the small differences being accounted for by differences in seasonal trend and in the standard deviation of the annual values.

11.3. The areas covered by intense and widespread falls of rain. Glasspoole, Min.Proc.I.Civil Engineers, 1929-30, p.137. Considers the areas covered by outstanding rains since 1860 of from 3 days to 2½ hours duration.

11.4. Storm over Exmoor on August 15, 1952. Bleasdale and Douglas, Met. Mag.,1952,p.353.

11.5. Tweed Valley Floods, August 11-12, 1948. Glasspoole and Douglas, Met. Mag.,1949,p.3.

11.6. Meteorological conditions in heavy orographic rainfall in the British Isles. Douglas and Glasspoole. Q.J.R.Met.Soc., 1947, p.11.

11.7. Heavy falls of rain in short periods (two hours or less). Glasspoole, Q.J.R.Met.Soc., 1931,p.57.

11.8. Classification of heavy falls in short periods. Bilham, British Rainfall, 1935,p.262. Inclues constant frequency graph for amounts in different times.

11.9. Notable falls of rain during intervals of a few days in Great Britain. Hawke, Q.J.R.Met.Soc.,1942,. p.279.

11.10. St. Swithin's Day. Mirrlees, Met.Mag.,1929,p.143. (See also 4.4. p.34).

12. Snow and Hail.

12.1. Summaries of outstanding snowstorms since 1875 are given in articles by Bonacina in British Rainfall, 1927, 1936, 1948 and 1955.

12.2. Annual reports, known as Snow Surveys of Great Britain, were published for seven years in the Journal of Glaciology and from 1953-54 were prepared by M.O.3. and published in the Meteorological Magazine.

12.3. On the occurrence of snow-cover in Great Britain. Manley, Q.J.R. Met.Soc., 1939,p.2.

12.4. Damaging hailstorms M.O.19 Branch Memorandum No.XI. Lists monthly frequency and frequency county by county. M.O.19 have separately a list of dates. The most striking hailstorms include those of 2 August 1879 one of London's outstanding hailstorms; 4 July 1915 south-west England; 16 July 1918 south-east England; 18 July 1926 west of England and Wales; 27 September 1935 Northamptonshire; 17 July 1947 East Anglia; 22 July 1955 Kent and 6 August 1956 Tunbridge Wells.

12.5. Snowfall probabilities on Merseyside. Reynolds, Q.J.R.Met.Soc. 1954 p.444. Concludes 6-9 in. snow would fall once in 10 years and as much as 2 ft. once in a thousand years.

13. Thunder and lightning.

13.1. Thunderstorm observations (in addition to those received in M.O.3. on climatological returns) have been collected by the Thunderstorm Census Organization since 1924 and there are published annual reports from 1931, and they have also been collected since about 1949 in a somewhat different form by the Electrical Research Association (Dr. Golde) where the emphasis is on the frequency of discharges to earth and the general severity of the storm (see Met.Mag.,1948, p.207). Dr. Golde prepares an annual map of the distribution of thunderstorms.

13.2. The Frequency of Thunderstorms at Kew Observatory. Bishop, Met.Mag., 1947, p.108. Reviews secular variation 1887-1945 and diurnal and seasonal variation 1910-35.

13.3. Diurnal variation of Thunderstorms. Morris Bower, Met.Mag., 1947,p.255. Considers the variation over the country of hours of thunderstorm, max. and min., based on two winters and two summers.

13.4. Local distribution of thunder rains round Nottingham. Tinn, Q.J.R.Met.Soc., 1940,p.47. Tests whether there is any relationship between paths of thunderstorms and valley of the River Trent, but finds little relation.

14. Humidity. See 3.1.

14.1. Duration of high relative humidities. L.P.Smith, Met.Mag.,1956, p.229. Map of England and Wales of mean number of hours (June - September) of relative humidity 90 per cent or more and annual values for each June - September 1950-54 at synoptic stations.

14.2. A remarkable low humidity. Green, Weather, 1953,p.182. Probably 8 per cent. on March 5th, 1953.

14.3. An analysis of warm spells in London from 1900-33, with special reference to the prevailing conditions of humidity. Dight, Met. Mag.,1934,p.109. Water contents of less than 10 gm/m^3.

14.4. Example of change from cold to warm humid conditions resulting in water streaming down inside walls of buildings. Temperature rose 15° to 25°F. or more in 24 hours on November 20, 1947 - see Monthly Weather Report, November, 1947.

14.5. Humidities in the lee of hill masses. L.P. Smith, Met.Mag.,1954. p.1. Absence of high humidities around Speke, Shawbury and Finningley. (See also Met.Mag.,1956,p.229.).

15. Sunshine and cloud.

15.1. Frequency of days with specified duration of sunshine. Bilham and Lewis, Prof. Notes, 69, 1935.

15.2. Effects of obstacles on sunshine records. Bilham, Prof. Notes, 76, 1937.

15.3. General values of sunshine, England and Wales, Scotland, Ireland and British Isles. Hancock, Q.J.R.Met.Soc.,1935, p.45 and 1951,p.127. Similar values have been published in the Monthly Weather Report since 1941.

15.4. Frequency of cloud at mountain stations. Glasspoole, Met.Mag. 1953, p.156. Considers Great Dun Fell, Lowther Hill and Ben Nevis.

16. Fog and visibility. See 3.7.

16.1. London Fog of December 5-8, 1952. Douglas and Stewart, Met.Mag., 1953, p.67. The most notable fog occurred in the London area from the 5th to the 9th, at Kingsway it lasted from 0h. on the 5th to 18h. on the 9th and was thick from 9h. on the 6th to 9h. on the 8th. Other examples of prolonged fog occurred in November 1948, December 1944, December 1941, November 1936, December 1935, November 1934, December 1930, February 1927, November 1925, December 1924, November 1921 and January 1918 - see Monthly Weather Report.

16.2. Meteorological aspects of smog. Absalom, Q.J.R.Met.Soc., 1954, p.261. Concerned with visitation of 5-9 December 1952.

16.3. Air Pollution and the London Fog of December, 1952. Wilkins, Royal Sanitary Institute, 1953.

16.4. Winter Fog and Mist Investigation in the British Isles, 1936-7. Durst, M.O.M.372.

16.5. Fog on the Mainland and coasts of Scotland. Dixon, Prof.Notes No.88.

16.6. Atmospheric Pollution in Leicester. D.S.I.R.Tech.Paper No.1, 1945.

16.7. Summer visibility across London from Hanpstead. Bonacina, Weather, 1955, p.120.

16.8. Overhead smoke falls from the continent. Douglas, Met.Mag., 1947, p.17. Produced a reduction of light "like a shutter".

17. Reports* etc. on application of climatological data to various problems:-

17.1. Space-Heating Installations: choice of Basic Design Temperatures. Printed as Post-War Building Study No.33 H.M.S.O. Single-storey buildings can be regarded as having a thermal-time lag of 1 day and multi-storey buildings of 2 days and external temperatures giving a mean for the day of below 26°F. are significant for single-storey buildings and of below 29°F. for 2 days for multi-storey buildings.

17.2. Weather and the Land. Bulletin No.165 of Ministry of Agriculture, Fisheries and Food. 1955, H.M.S.O. Prepared by M.O.19.

17.3. The calculation of Irrigation Need. Bulletin No.4 of Ministry of Agriculture, Fisheries and Food, H.M.S.O. Prepared by M.O.19.

17.4. Rainfall in relation to Water Supply. Glasspoole, Q.J.R.Met.Soc., 1955, p.268. See also Hydrological Symposium J.Inst. Water Engineers, 1953, p.175.

17.5. Weather and Apple Scab. L.P.Smith, Gardeners Chronicle, 1956, p.485.

17.6. Gentle Art of Watering. L.P. Smith, Gardeners Chronicle, 1956. p.332-3.

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*Weather and the Builder. Ministry of Works Advisory Leaflet No.40, 1956. How the weather man can save you money. This gives details of forecast services available.

17.7. Forecasting outbreaks of Potato Blight. L.P.Smith, Met.Mag., 1953,p.113.

18. Manuscript summaries in M.O.3.

18.1. Summaries are mainly prepared and kept up to date for the purpose of preparing averages and references to the various Books of Averages series as an index of the stations for which data are available, of the observing hour and of whether the records have been accepted. The most recent Books of Averages are:-

M.O.572, 1953, Averages of Bright Sunshine, 1921-50.

M.O.571, 1953, Averages of Temperature, 1921-50.

M.O.421, 1938, Averages of Humidity, 1921-35. This cannot be brought up to date because of the changes in the observing hour, these averages being based mainly on observations at 13h. and then at 7h.

M.O.236 (Section V), 1924, Averages of Rainfall, 1881-1915. (A new book of averages for 1916-50 has been prepared, but publication ought to be delayed until station averages for D.W.R. and M.W.R. stations have been computed and also estimates of general rainfall over certain areas for the new period, otherwise we shall be using averages for two different periods.)

18.2. The following data are therefore available on lustrum sheets, filed station by station, in the sequence of the Monthly Weather Report, or of British Rainfall in the case of rainfall:-

Monthly totals of rainfall are available on 10 year sheets for all stations (some back to 1677), arranged decade by decade.

Monthly totals of mean max. and mean min. temperature are available for each station on separate sheets back to 1931 (when it was then decided to revise averages every 5 years). Prior to that a different form was used in preparing averages and all the data for each station have not yet been brought together.

Monthly totals of bright sunshine are available for each station back to 1931 and similar values on earlier sheets as for temperature.

Monthly values of the extreme max. and extreme min. temperature are available (without dates) back to about 1901 as used in Climatological Atlas of the British Isles.

Monthly wind summary, as Table II, Monthly Weather Report, back to commencment of each record from P.T. anemograph.

18.3. Maps of annual and monthly rainfall are available on scale of 16 mi. to 1 inch back to 1938 and to about 1905 on a scale of 19 mi. to 1 inch.

Maps on a similar scale are available for many of the outstanding rains on individual days each year, and some of the more striking are published in the annual volumes of British Rainfall.

18.4. Data from synoptic stations (about 60) are being punched on Hollerith Cards commencing with January 1957, including the daily observations formerly on F.3207 and the observations for 8 hours per day for about 45 stations and the hourly values including wind and rain for about 15 stations. The plan is to extend this to climatological and crop weather stations.

A back-log is being prepared on Hollerith cards since 1949 for 5 stations (London Airport, Manchester Airport, Mildenhall, Renfrew, Aldergrove; Valley may be added later) both hourly and daily values.

18.5. The values in Table III M.W.R. are available (on F.1040) month by month for some 56 stations and those for Table IV (on F.1041) for 19 stations up to 1950. In view of changes in the M.W.R. a new set of forms was introduced in 1951 and the summary limited to the District Value Stations (see M.W.R.) on F.1040. This enables the changes month by month over a series of years to be examined for one station at a time.

18.6. Relative Humidity grouped according to temperature. For a number of stations covering 10 years, mainly 1930-39, the relative humidities at 13h. have been grouped in zones 100-95, 94-90, 89-80, 79-70, 69-60, 59-50, 49-40, 39-30, 29-20, 19 or below for 2°F. ranges of the dry bulb for each month. Stations include Kew, Tynemouth, Edgbaston, Bristol, Manchester, Dunstable, Cranwell, Calshot, Renfrew, Aldergrove, Bidston, Holyhead, Plymouth, Scilly, Guernsey, Church Fenton and Exeter.

18.7. Station Index. An index is available of the returns on Form 3206 and 3207, with the hours of observation, contributed to M.O.3. by stations up to 1954.

J. GLASSPOOLE.

M.O.3.

2/8/57.

G.345746/AB/8/57/100.