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The Persistence of Warm and Cold Months at Greenwich.

By C.E.P.B. BROOKS.

In the Quarterly Journal of the Royal Meteorological Society for 1934, p.71, Mr.E.L.Hawke gave a brief analysis of the frequency distribution of "runs" of warm and cold months at Greenwich, in which he found "definite evidence of a tendency for the persistence of high and low temperature over considerable periods at Greenwich".

Recently the occasion arose to investigate this tendency in greater detail. The results are shown in tables 1 and 2. Table 1 shows the frequencies of temperature deviations in each month of the same and of opposite signs as in the preceding month, when the latter was itself preceded by 0, 1...6 or more months of the same sign. For example in winter under the heading "Duration 1 month, + " the figures are P (Persistence) 32, R (Reversal) 22. This means that out of 54 cases in which a winter month m. with a positive deviation was preceded by a month m-1 with a negative deviation, the next following month m+1 had a positive deviation in 32 cases and a negative deviation in 22 cases. A duration of 2 months means that the preceding month m-1 had the same sign as mo, but that m-2 had a different sign, and so on. Departures are taken irrespective of amount.

The table shows that on the whole there is a slight tendency for the temperature deviation to be of the same sign as in the preceding month. The tendency is greater for positive than for negative deviations, and greater in winter than at other seasons. The tendency also increases slightly with increasing duration of the period with the same sign in preceding months, the figures (positive and negative combined) being as follows:

Duration, months	1	2	3-5	6 or more.
Persistence, per cent	53	60	59	66

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Table 1. Frequencies of persistence (P) and reversal(R) of monthly temperature departures at Greenwich, 1841-1930, following runs of various durations:

Duration of run mos.		Winter. P.	Winter. R.	Spring. P.	Spring. R.	Summer P.	Summer R.	Autumn. P.	Autumn. R.	Year. P.	Year. R.
1	+	32	22	23	30	31	26	31	30	117	108
	-	28	25	31	28	38	26	26	28	121	106
2	+	27	6	10	12	15	16	20	13	72	47
	-	20	12	11	14	28	11	14	13	73	50
3-5	+	30	17	27	17	10	8	21	11	88	53
	-	23	8	28	16	16	20	12	19	79	63
6 or more.	+	7	5	8	4	15	5	7	4	37	18
	-	2	4	5	4	10	2	5	3	22	13
All cases.	+	96	50	68	63	71	55	79	58	314	226
	-	73	49	75	62	92	59	57	63	295	232

Table 2. Frequencies of persistence (P) and reversal (R) following at least two months each with a departure of at least 1°F. of the same sign average departures:

Frequencies.		Winter. P.	Winter. R.	Spring. P.	Spring. R.	Summer. P.	Summer. R.	Autumn. P.	Autumn. R.	Year. P.	Year. R.
1st month.	+	41	19	29	18	22	10	25	13	117	60
	-	35	25	23	24	18	14	20	18	96	81
2nd month	+	28	16	21	14	20	14	25	13	94	57
	-	30	16	17	17	23	21	13	18	83	72

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An attempt was then made to find out to what extent the figures were changed if only deviations of at least 1°F. in each of at least two successive months were considered, not only over the first following month, but also over the second. The results are shown in table 2; two months of zero departure, one in spring and one in autumn, in the second month following two months of negative departure have been ignored. It will be seen that in both winter and summer there is a considerable tendency for persistence of two abnormally warm months into the following month. For the year as a whole the persistence is 66 per cent for warm months but only 54 per cent for cold months. The persistence extends into the second month with slightly decreased intensity, the annual percentages being: warm months 62; cold months 54.

The average departures of the "preceding months" (exceeding 1°F) are all about 3°F. The average departures of the first and second months following positive departures are respectively +1.0°F and +0.3°F; those following negative departures are -0.7°F. and 0.0°F.

From these figures it seems clear that while there is undoubtedly a real tendency for the persistence of abnormal temperatures, this tendency is not sufficiently marked to be of much practical significance. It is only in winter and summer that a succession of two or more months each of which has a temperature at least 1°F above normal gives more than a 2 to 1 chance that the following month will also be warm; in these seasons there is a good prospect that the third month will itself exceed the average by 1°F. or more. It is unexpected that high temperature should prove more persistent than low even in winter, but both table 1 and table 2 support that conclusion.

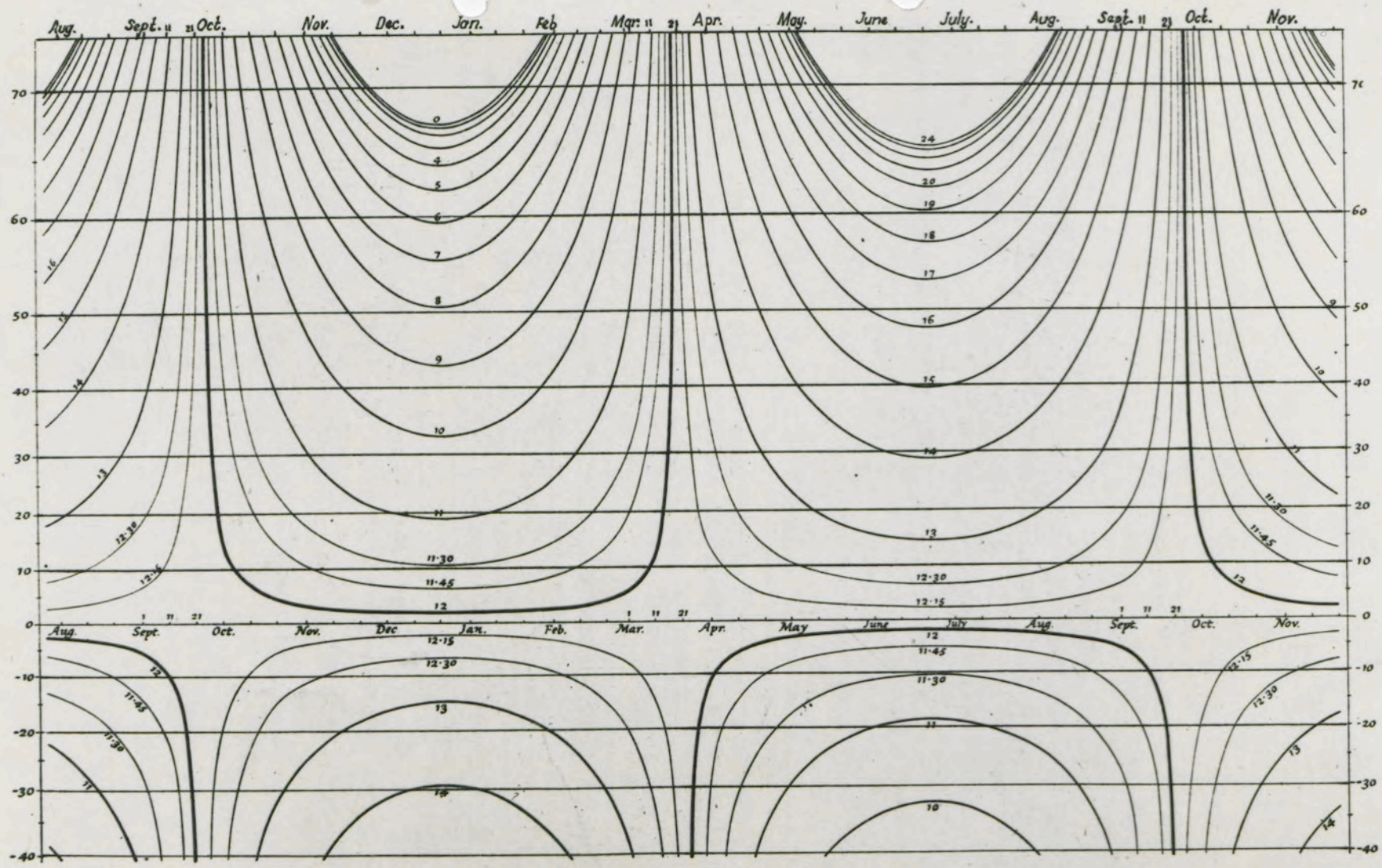
A Sunlight diagram.

The accompanying diagram is reproduced from the Geographical Journal for June 1941 and is based on a diagram prepared a year or two ago by Dr.J.R.Baker of Oxford.

It has been plotted from the data for the year 1941 which are calculated in the Nautical Almanac to the nearest minute, so that the duration of sunlight, being the difference of two such tabulated quantities, may be in error by a minute. Such differences have been largely smoothed out in the plotting. The curves for north and south latitudes are not quite symmetrical, since the summer half of the year is seven days longer than the winter but it was not considered necessary to carry the diagram beyond 40°S.

The story of a lost sunshine sphere.

The observer at a climatological station reported to this Office that the sunshine sphere had been lost, and in the meantime an old sphere was being used. The official action was to see if any record could be found to indicate whether the old sphere had been certified, and if not to arrange for certification, or rejection and replacement by a sphere of correct focal length. This official action now appears somewhat laborious for in the meantime a member of the Office staff (who happened to be "in a local pub") in a distant county noticed the occupants playing with a sunshine sphere and, as it had the M.O. mark thereon, took possession and returned it to the Meteorological Office and subsequently it was identified by the number and returned to the station - good staff work! The writer of the article on "The Meteorologist" in Punch of October 1st last does not know everything that happens in the life of a meteorologist!



Sunlight diagram

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REVIEW.

Visibility in Meteorology. The theory and practice of the measurement of the visual range. 2nd ed. by W.E.Knowles Middleton, M.Sc. Toronto Univ.Press and Oxford Univ. Press. 15/6d net. 1941.
8¼ x 5½ VIII + 164 illus.

The first edition of this book appeared in 1935 and attracted favourable attention as the most complete available account of the theoretical and experimental basis of the observation of visual range. Since then a great deal of new work has been done, especially in some parts of the subject which had been little explored in 1935. The author has taken the opportunity of a second edition to incorporate this new knowledge and at the same time to revise his judgment of some questions which at the time of the first edition were still in a state of flux.

The first few chapters, dealing with the theoretical basis, have been changed comparatively little except for the inclusion, in the section on "The Generalized Extinction Coefficient", of some important new work by Foitzik on the penetration of light of different colours, and in "The Nature of Atmospheric Aerosols", of the work of H.L. Wright on nuclei at Kew. Since 1935 there has been a considerable development of the instrumental side, especially for measuring visibility by night. On the practical value of empirical visibility meters, the author's opinion has become pessimistic, since they are only reliable when the object observed is near the visual range, in which case the meter is superfluous.

The question of "visibility marks" is now bound up with discussions and resolutions at recent International Meteorological Conferences which come in for a good deal of discussion. The author is definitely of the opinion that all visibility objects should stand up darkly against the horizon, and further that the criterion should be that its outline is just perceptible. He criticises the scale of lights for night visibility attached to resolution 51, Warsaw 1935, as being inconsistent, and based on an incorrect emperical relationship obtained by Bennett.

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Methods of summarising briefly Statistics of visibility as a climatological element have improved in recent years, notably as a result of the work of Poulter and Wright (incidently the author "deplores" Gold's introduction of the "nebule" as an "arbitrary" unit of obscuring power), but there is still much room for progress. The problem of "Forecasting the Visual Range", which was barely mentioned in the first edition, is still in its early stages, mainly empirical and scarcely amenable to general rules, but considerable accuracy is now claimed for fog forecasts in the continental United States. Another important addition is a technical appendix on the visual range of coloured objects. It will be seen that the new edition represents a considerable development of the subject. There is however at least one startling gap; the theory and practice of visibility from the air is almost untouched. There is a comprehensive and up-to-date bibliography and good, but not overburdened, indexes.

C.E.P.B.

Standard

Meteorological Stations.

PATCHAM. The climatological station maintained by Mr.G.B. Hamlin for the last few years has been approved and summaries of the record will appear in the Monthly Weather Report for 1942. Mr.G.B. Hamlin formerly maintained climatological stations at Bexley Heath and at Hellingly. He forwarded rainfall observations from Patcham and in spite of his advanced age offered his service as a climatological observer in August 1939. When the health-resort station at Brighton was suspended for the duration of the war Mr.Hamlin again offered his services. The records from Patcham will form a useful addition to the Monthly Weather Report.

ARDINGLY. The climatological station has ceased for the duration of the war as the observer has been seriously ill and unable to find a successor.

LEYLAND. The sunshine recorder has been damaged by fire and the record has ceased for the duration of war. The other observations are being continued.

DOVER. The station has suffered severely from enemy action but observations on a reduced scale are being continued on a new site.

CARDIFF. As staff difficulties are acute, the observations at 21h. have ceased for the war period. Full observations at 9h. are being continued.