

METEOROLOGICAL OFFICE

Geophysical Memoirs No. 116
(SECOND NUMBER, VOLUME XVI)

BRITISH ISLES WEATHER TYPES AND A REGISTER
OF THE DAILY SEQUENCE OF
CIRCULATION PATTERNS
1861 – 1971

BY

H. H. LAMB, M.A.

METEOROLOGICAL
OFFICE
EDINBURGH
- 5 OCT 1972
42/66

LONDON: HER MAJESTY'S STATIONERY OFFICE

£3 NET

METEOROLOGICAL OFFICE

Geophysical Memoirs No. 116
(SECOND NUMBER, VOLUME XVI)

BRITISH ISLES WEATHER TYPES AND A REGISTER
OF THE DAILY SEQUENCE OF
CIRCULATION PATTERNS
1861 – 1971

BY
H. H. LAMB, M.A.

LONDON: HER MAJESTY'S STATIONERY OFFICE

1972

U.D.C. 551.509.334:
551.589.1

Geophys. Mem., London
16, No. 116, 1972

© *Crown copyright 1972*

T A B L E O F C O N T E N T S

	PAGE
SUMMARY	1
SECTION 1. Introduction	1
2. Definitions of the British Isles weather types	3
3. Operating practice and additional criteria used	7
4. Development of the classification	9
5. Presentation of the results	11
6. Singularities	15
BIBLIOGRAPHY	21

A P P E N D I C E S

I. Other circulation- and weather-type classifications	17
II. Daily register of circulation patterns, 1861-1971	50

L I S T O F I L L U S T R A T I O N S

FIGURE 1. Anticyclonic (A) type over the British Isles	24
2. Cyclonic (C) type over the British Isles	25, 26
3. Westerly (W) type over the British Isles	27, 28
4. North-westerly (NW) type over the British Isles	29
5. Northerly (N) type over the British Isles	30
6. Easterly (E) type over the British Isles	31
7. Southerly (S) type over the British Isles	32
8. Frequency of the W type over the British Isles	33
9. Frequency of south-westerly surface winds in south-eastern England since 1340	33

L I S T O F I L L U S T R A T I O N S (*contd*)

	PAGE
FIGURE 10. Frequency of the W type over the British Isles compared with the frequency of gradient wind from the south-west and from any westerly point	34
11(a). Frequency of occurrence of each of the 7 weather types, 1868–1967 ...	35
11(b). Frequency of occurrence of Westerly and Northerly types, 1868–1967 ...	36
12. Frequency of occurrence of each of the 7 weather types, 1861–1874 ...	37
13. Frequency of occurrence of each of the 7 weather types, 1875–1899 ...	39
14. Frequency of occurrence of each of the 7 weather types, 1900–1954 ...	41
15. Frequency of occurrence of each of the 7 weather types, 1955–1969 ...	43
16(a). Histograms giving yearly frequencies of each of the 7 weather types ...	45
16(b). Histograms giving yearly frequencies of each of the 27 pure and hybrid classifications	46
17. Van Bebbber's tracks of barometric pressure minima	48
18. Idealized 500-mb contour defining the Vangengejm types W, C and E over the northern hemisphere	48
19. Idealized 500-mb contour defining the Kac types W, E, C and M	49
20. The 4 main groups of circulation types over the northern hemisphere recognized by Dzerdzevskij	49

BRITISH ISLES WEATHER TYPES AND A REGISTER OF THE DAILY SEQUENCE OF CIRCULATION PATTERNS

1861 – 1971

SUMMARY

The circulation pattern over the British Isles region, taken as approximating to the 'square' 50 to 60°N and 10°W to 2°E, is defined in terms of seven types: Anticyclonic(A), Cyclonic(C), Westerly(W), North-westerly(NW), Northerly(N), Easterly(E) and Southerly(S). The definitions are designed for recognition on *surface* maps of pressure distribution, winds and weather, but are more concerned to indicate the evolution and steering of the circulation systems from day to day and over periods of several successive days, or longer. These characteristics make it possible to give a daily classification from 1861 to date and to use the resulting register for the identification of the character of the general circulation and of similar sequences in different years, seasonal characteristics and spells of various lengths. Not too much weight should be given to the classification of any particular day – it is rather the make-up of any particular group of days which is believed to be reliably indicated and repeatable by different analysts using the same definitions.

The fact that many days are of mixed, or hybrid, type (satisfying the definitions of two or more types) is recognized and is a feature of the daily register, which is printed *in extenso* in Appendix II. Recognizing this fact has made it possible to reduce the number of days which are unclassifiable – because of weak or chaotic patterns, small-scale systems of unlike character or rapid change of the situation over the British Isles region – to about 4 per cent (ranging from 2 to 7 per cent in individual years).

Methods used and problems encountered in making and interpreting the classification are explained.

Presentation of the results is in the form of graphs showing the variations of average frequency of each type day by day throughout the year for the 100 years 1868 – 1967 and for what appear to be natural subdivisions of the over-all period covered into epochs respectively of marked prevalence of the W type (from 1861 or earlier to 1874 and from around 1900 to 1954) and of blocking (1875 to around 1899 and 1955 to date). Other graphs show the secular variation apparent in the frequencies of the different types since 1861, and a longer perspective is given by Figure 9 showing the apparent variations of frequency of surface south-westerly winds (always the most frequent direction) near London since 1670 and by tentative estimates back to 1340. This shows, in particular, that the time of greatest prevalence of the W type seen at the beginning of the 111 years of this register had probably not begun earlier than about 1845 and was preceded by many decades in which blocking seems to have been even more prevalent than between 1875 and 1900 or since 1955 (except that the years 1968 and 1969 may have been comparable).

Average monthly values of the percentage frequencies of the different types in the various epochs recognized since 1861 are given in Table I.

A brief review of weather-type classifications developed by other workers in earlier years and those in use at the present day is given in Appendix I.

1 – INTRODUCTION

It has long been recognized that different distributions of barometric pressure and the winds that go with them could be used to define different characteristic types of weather. Weather types so

defined carry implications about the origins of each airstream, its probable history of heating or cooling from the surface and hence the type of vertical thermal structure in at least the bottom kilometre, as well as about any generally prevalent vertical motion and a whole characteristic pattern of local weather depending upon the geography of hill and dale, land and sea, and exposure to the winds that prevail with each type. The latter points have been demonstrated by Barry^{1*} for a wide region of southern England about Southampton in connection with the weather-type classification which is here published *in extenso* for the first time.

Classification of the sequence of weather patterns as here defined, day by day over many years, facilitates study of the behaviour of the general wind circulation, both as to the occurrence of long spells of this or that type, or group of types, and the normal seasonal changes (compare with Lamb²) in whatever detail or at whatever dates Nature may suggest as well as in the course of climatic changes. Experience has shown that such a classification, registering each day's weather type over many years, may also be useful in routine middle- and long-range weather forecasting simply as a means of identifying other years in the past which ran a similar course to the current year.

In the present state of our knowledge of the mechanisms of climatic change, the variations of frequency of the prevailing W type derived from this classification of each day's circulation pattern from 1861 to 1970 (illustrated later in Figure 8, page 33) have a particular importance. Pressure differences measured on monthly mean maps for each January and each July since 1750 (Lamb and Johnson^{3,4,5}) have indicated a general (probably world-wide) increase of vigour of the main zonal W'ly windstreams (and the North Atlantic trade winds and Asian summer monsoon current) from the earliest years covered, apart from some temporary setbacks around the 1830s and 1880s to early 1890s, to a maximum strength some time around 1925 (± 15 years), followed by a decline. Since the monthly maps on which these studies were based have so far only been constructed for two sample months of each year (and other workers' comparable studies have generally concentrated on the northern-hemisphere winters), it has become urgently necessary to explore how far these results apply to the whole year and to the distribution of W'ly winds over the days, months and seasons of the year.

The classification here presented is for the British Isles and their immediate surroundings, an area not much greater than the latitude and longitude 'square' 50 to 60°N and 10°W to 2°E. In the early years of the register the daily weather maps which it is based on covered little more than the British Isles themselves. Even though this is a small area of the hemisphere, it has certain advantages. For much larger areas it is difficult to find many maps which have such close similarities that they can be classed together as of the same type, and hence many more days would be liable to prove unclassifiable (unless a much greater number of different types were allowed and much greater variations within any one type). Despite these reservations, however, it must be admitted that Russian attempts to classify the circulation patterns over a whole hemisphere or a large part of it (see pages 18–20) have produced some interesting results which stand, moreover, in an intelligible relation to those of studies based on this classification of the British Isles region.

The British Isles lie within the zone of prevailing westerlies, and this region may be looked upon as a fairly representative sample of that zone. There is one regard in which this part of the zone is exceptional, namely that it is in one of the two sectors (the other being Alaska–north-east Asia) where blocking of the westerlies is commonest (Rex⁶). It is probably commonest of all in the sector covering the eastern Atlantic and Europe. For this very reason, however, it is especially useful to concentrate attention on this sector. Moreover, classification of the pattern over the British Isles usually makes it possible to distinguish in such cases which of the principal variants of blocking is occurring, i.e. whether the associated anticyclone is centred over Greenland, the Iceland–Faeroes region, Britain or Scandinavia. The frequency of this

*The index numbers refer to the bibliography on page 21.

phenomenon shows both seasonal (Rex,⁶ Sumner⁷) and secular (Brezowsky, Flohn and Hess⁸) variations. Finally, concentration of the classification upon the British Isles makes possible a daily record of the circulation behaviour over more than 100 years.

Far beyond this time span, the British Isles weather type is indicated by the surface winds and weather observed daily over south-eastern England, mainly near London, back to 1670 and from more various data for some earlier periods back to 1340 (Lamb⁹ – see Figure 9, page 33). Together, this material provides the longest available perspective of one of the processes of climatic variation: the degree of prevalence of the westerlies *vis à vis* the frequency of blocking.

2 – DEFINITIONS OF THE BRITISH ISLES WEATHER TYPES

The following types are recognized in the classification here presented:

A. *Anticyclonic type*

Anticyclones centred over, near, or extending over the British Isles; therewith also cols situated over the country, between two anticyclones.

The weather associated with this type is: *Mainly dry with light winds (though thunder often occurring in cols in summer); usually warm in summer and cold or very cold in winter. Mist and fog are frequent in autumn.*

C. *Cyclonic type*

Depressions stagnating over, or frequently passing across, the British Isles. The further criterion is used that a depression should be centred, or its central isobar on a 4- to 5-mb spacing should extend, over the mainland of Britain or Ireland at some time during the day. Small cyclonic features may be overlooked if they constitute merely details within a col when most parts of the British Isles are under anticyclonic influence. Further, to reduce the fortuitous element in the positions on any one day of the cyclone centres of a single cyclone sequence, individual days between the passing of separate centres over Britain are also counted as cyclonic if the isobars retain cyclonic curvature or if the main (surface) low-pressure axis remains over the country.

The weather associated with this type is: *Mainly wet or disturbed weather, with very variable wind directions and strengths; usually mild in autumn and early winter, cool or cold in spring, summer and (sometimes) in late winter. Both gales and thunderstorms occur.*

W. *Westerly type*

High pressure to the south (also sometimes south-west and south-east) and low pressure to the north of the British Isles. Sequences of depressions and ridges travelling eastwards across the Atlantic. (This general type has been described by some authors as South-westerly because the surface winds blow from about SW for more of the time than from other directions. The steering of pressure systems is generally from about W or WSW. This can be taken as the most mobile, or 'progressive', of all the types.)

The weather associated with this type is: *Generally unsettled or changeable weather, usually with most rain in northern and western districts of the British Isles. Winds shifting rapidly between S and NW, occasionally SE or even E for a short time. Cool in summer, mild in winter with frequent gales.*

NW. North-westerly type

Azores anticyclone displaced north-east towards the British Isles or north over the Atlantic west of our coasts, or with extensions in these directions. Depressions (often forming near Iceland) travel south-east or east-south-east into the North Sea and reach their greatest intensity over Scandinavia or the Baltic.

The weather associated with this type is: *Unsettled or changeable weather, particularly in northern and eastern districts of the British Isles, sometimes with fresh or gale-force winds from between W and N. The warm sectors may contain unstable air, especially in late winter and spring. This type is cooler than the W type and milder than the N type.*

N. Northerly type

High pressure to the west and north-west of the British Isles, particularly over Greenland, and sometimes extending as a continuous belt south over the Atlantic Ocean towards the Azores. Low pressure usual over the Baltic, Scandinavia and the North Sea. Depressions move southwards or south-eastwards from the Norwegian Sea (sometimes having formed in the Iceland – Jan Mayen region, sometimes having come through from farther north, sometimes having entered the Iceland – Jan Mayen region by way of a col near southern Greenland).

The weather associated with this type is: *Cold, disturbed weather at all seasons, especially in eastern and northern districts. Snow and sleet* are common in winter; also associated with late-spring and early-autumn snow on high ground in the north, and with late-spring frosts in all districts. The onset of N-type weather is often accompanied by high winds.*

E. Easterly type

Anticyclones over, or extending over, Scandinavia and towards Iceland. Depressions circulating over the western North Atlantic and in the Azores–Spain–Biscay region.

The weather associated with this type is: *Cold in autumn, winter and spring; sometimes intensely cold in southern districts and suitably exposed localities elsewhere, with occasional snow in the south and snow or sleet showers in eastern and north-eastern districts; fine in the west and north-west. Warm in summer, sometimes thundery. Very dry weather in western districts, relatively dry in many other districts except in the east and south.*

S. Southerly type

High pressure covering central and northern Europe. Atlantic depressions blocked west of the British Isles or travelling north or north-eastwards off our western coasts. (Seems less persistent than the other types, occurring mainly as occasional variations within spells that are predominantly either of W or E type; very rare in summer.)

The weather associated with this type is: *Warm and thundery in spring and summer, mild in autumn. In winter it is mild or cold according as the air mass carried over the British Isles is oceanic or continental in origin.*

The types are illustrated by examples in the mean-sea-level and 500-mb maps printed as Figures 1 to 7 (pages 24 to 32). These maps are based on those published in the *Tagliche Wetterberichte* of the Deutscher Wetterdienst. For the recognition of hybrid types see page 7.

Local diurnal land- and sea-breezes are not allowed to affect the classification of any day.

*The term sleet is commonly used in this country to describe precipitation of snow and rain (or drizzle) together, or of snow melting as it falls, but it has no agreed international meaning.

In some cases also the intrusion of another windstream shown by one or two observations at the edge of the British Isles region on the first or last chart of the day is ignored if the windstream represented by the classification allotted lasted for at least 24 hours and this classification therefore gives the best achievable record of the daily circulation-pattern sequence.

The classification is concerned with the positions of the surface pressure centres and the tracks along which they are steered by the upper winds controlling the character of the weather sequence over the British Isles over several days. This has more to do with the positions and extent of the main anticyclones, depression tracks and the general flow of the surface winds over the British Isles while the given general situation (*Grosswetterlage*) lasts, than with the detail of surface winds on a single day.

This explains the wide range of day-to-day surface wind variations characteristic of the W type and specified in the definition. Hence also, not every isolated day of NW'ly surface winds fulfils the definition of the NW type. The NW type is concerned with steering of surface weather systems from that quarter and differs from the W type (into which some days with NW'ly winds properly fall) in representing a degree of blocking and larger-amplitude waves in the upper westerlies. Generally speaking, the best examples of any type are likely to occur within spells, or runs of several days of it, and not as isolated days. And it is always advisable to classify several preceding and succeeding days before finalizing any entry.

The illustrative maps show that, except in the case of some easterly situations, the upper windstream concerned is generally more strongly marked, and varies less, during a sequence of one type than the surface winds. Despite this relationship between the upper windstream and the (for the time being) most prevalent surface wind direction over the British Isles when the latter is plainly aligned with the steering of the individual disturbances and pressure systems, the axis of the upper windstream does not necessarily lie over these islands and probably only does so in the better examples and longer runs of each type. On some occasions inevitably the weather-type classification gives a wrong impression of the steering of weather systems in the surrounding regions. This happens oftenest with the E type when the main feature of the large-scale situation over this sector of the hemisphere is the low latitude of the jet stream and the individual cyclonic systems either stagnating or passing eastwards on tracks south of the British Isles. It sometimes happens with the NW type over Britain, particularly in summer, that the main depression tracks in this sector are from SE to NW over the North Sea and Scandinavia and only minor disturbances are steered south-eastwards by the NW'ly windstream over Britain. A few examples can even be found of single days necessarily classified as W type over Britain when the associated low-pressure centre was retrogressing, having moved from the SE or E out of the North Sea after some days of Northerly or Cyclonic Northerly type. But these anomalous situations are unusual and are nearly always short-lived. This difficulty must arise with any classification based on such a small region of the hemisphere. The British Isles type registered in such cases still refers to the steering of such disturbances as pass over these islands.

With Anticyclonic and Cyclonic types over the British Isles, the surface map alone supplies the criteria that define the type; the 500-mb situation is not necessarily central anticyclonic or cyclonic, though it is usually more stagnant than with the other types (except E type) or else it is anticyclonogenic or cyclonogenic (as the case may be).

The Anticyclonic type is illustrated by maps in Figure 1 (a, b and c) showing

- (a) an example of a central anticyclonic situation,
- (b) a case, provided for by the definition, where anticyclones merely extend towards, or over part of, the British Isles and a col lies over the country,
- (c) a case with a frontal col or trough in the central anticyclonic region over these islands.

The words 'anticyclones.....extending over the British Isles' in the definition on page 3 are interpreted to include sharp ridges of high pressure with nearly opposite wind directions on either side, and particularly strong anticyclonic curvature of the isobars near the axis, even if the anticyclone centre is not near.

Small, shallow cyclonic centres within the cols between anticyclones are generally disregarded in the classification, since the definition of Anticyclonic type includes even thundery cols between high pressure cells extending from either side over the British Isles region. But in one extreme case, on 10 January 1929, it appeared unavoidable to classify the day as Cyclonic, because the Cyclonic system dominated the British Isles even though its central pressure was not below 1028 mb.

The Cyclonic type is illustrated in Figure 2 (a and b) by

- (a) a mobile cyclonic sequence with successive centres passing across the British Isles, and
- (b) a stagnant situation dominated by one slow-moving depression centred over this region.

The Westerly type is illustrated in Figure 3 (a and b) by

- (a) a vigorous westerly sequence in winter, and
- (b) a weaker westerly which occurred in September.

Some westerly situations, especially in May and June, may be weaker still. Days with small cyclonic centres passing over any part of the British Isles whilst embedded within a broad W'ly current are classified as Cyclonic Westerly hybrids. This same hybrid classification, however, also applies to days when the centre of the main depression touches the north of the Scottish mainland.

The North-westerly type illustrated in Figure 4 is a typical case with warm sectors travelling from NW to SE, occluding as they go, and a north-westerly jet stream.

The Northerly type is illustrated in Figure 5 by a case of northerly flow which strengthens as an Arctic northerly outbreak covers Britain in the rear of an occluding warm sector which 'infiltrated' from the north-west near Iceland into the general N'ly flow in this sector. This type of intrusion is very common in N-type situations, as mentioned in the definition of the type. The second and third days' maps (Figure 5 (ii and iii)) are the most typical of all of the N type: notice that over much of southern England the surface winds, though of northern origin, are liable to blow from about W at some stages.

The Easterly type situations are illustrated by three examples in Figure 6 (a, b and c).

- (a) A general well-defined E'ly windstream of considerable depth. The anticyclonic curvature produces rather different surface winds in different parts of the British Isles; E'ly or NE'ly in East Anglia, SE'ly in the west of Ireland and Scotland and sometimes SSE'ly or S'ly in Shetland.
- (b) An easterly situation with general cyclonic curvature of the isobars and cyclonic activity associated with a sequence of frontal waves. The surface winds ranging from SE to NE in different parts of these islands and at different stages in the sequence make it advisable to call this an E-type rather than a SE-type situation. Some similar cases show a more directly east-to-west steering than this example. (The day used in this example is really Cyclonic as well as E because the central isobars of the low came in over the mainland in the latter half of the day. It was therefore classified as a Cyclonic Easterly hybrid day.)

- (c) A weak situation, typical of the month of May, with much smaller- scale pressure systems than are seen when the atmospheric flow is strong. This case is best described as E because the surface winds over the British Isles, though varying rather widely, have E'ly components everywhere (except during diurnal sea-breezes).

The Southerly type is illustrated in Figure 7 by three days of a sequence which almost went over to W type on the third day but subsequently recovered, producing a more than usually long run of six days of almost pure S'ly steering. The surface winds during that time fluctuated between about ESE and WSW, but were mostly from points near S. The day before this sequence began had been classified as a hybrid type, Cyclonic and Southerly, with the central isobar of a depression skirting western districts of Ireland.

The S type seems especially liable to undergo modification either through cyclonic activity near the west of the British Isles encroaching or through anticyclonic curvature of the isobars developing because of a continental anticyclone thrusting west over England or forming a new centre over the country. These are among the reasons for the common lack of persistence of this type. A not negligible proportion of S-type days might therefore be classified by some analysts as Anticyclonic Southerly or even Anticyclonic; a few might be called either Southerly or Cyclonic Southerly because of uncertainty as to how far out over the ocean the low-pressure centre lies.

3 - OPERATING PRACTICE AND ADDITIONAL CRITERIA USED

The subjective element in the classification is minimized by recognition that

- (i) some days are of hybrid types – i.e. with the definitions of more than one individual type satisfied;
- (ii) some days are unclassifiable;
- (iii) whereas the classification of an individual day may be arguable, and might produce a different verdict from different analysts, the type composition of any run of 3 to 5 days of essentially stationary large-scale pressure pattern (*Grosswetterlage*) should come out the same with different analysts and, hence, be repeatable.

Differences are liable to occur in the classification of borderline cases between W and NW, NW and N, etc., though in any run of several days of some such character the verdicts of different analysts may be expected to reveal that elements of both types were present. This inevitably results, however, in a margin of uncertainty in any counts of the numbers of days of each type; in the case of the (commonest) W type this uncertainty probably amounts to plus or minus three or four days in each year's total.

Hybrids are recognized when two, or occasionally three, types' definitions are satisfied. For statistical purposes such days are counted a half, or a third (as the case may be), to each of the types represented.

Classification of a day by just one simple type is preferred if the situation allows it – i.e. if there is one type definition which clearly fits the situation best.

Unclassifiable days occur chiefly with:

- (i) chaotic patterns representing weak flow and/or small size of the circulation systems affecting the British Isles,

- (ii) incompatible types over the north and south or west and east of the region (i.e. N-S, W-E, A-C hybrids are not admitted).
- (iii) quick changes during the day (e.g. when the situation changes from one which satisfies the Cyclonic-type definition early in the day and becomes Anticyclonic by the end of the day).

For the purpose of identifying years with analogous weather-pattern sequences as a basis for long-range weather forecasting (and to discover whether the sequels were alike), it might have been desirable to replace the 'Unclassifiable' entries in the daily register by some indication of which type or types were most nearly approached. For all other purposes, however, any such specification of type on days when the type definition was not really fulfilled would have meant letting subjectivity in and fouling any statistics derived. So it has been avoided except where a more informative record of the sequence of circulation developments that actually occurred is achieved by allotting some specific classification: e.g. when a well-marked N'y outbreak affected the whole country for about 24 hours but did not last throughout (i.e. did not coincide with) the calendar day nor yet affect enough of the preceding or following day to be indicated at all in the register for those days.

In the earlier years classified, maps for only one to three separate hours of the day could be seen. Hence, an element of subjective judgement entered into the interpolation which decided whether a cyclonic centre passed across the mainland of Britain or Ireland, and some indeterminacy arose with fast-moving or developing systems near the British Isles. Currently, four maps for each day (00, 06, 12 and 18 GMT) are used. It has been found best to use the analyst's experience to strive for a classification which expresses throughout the 110 years the most probable continuity of development during the day as well as from day to day, since the earlier practice (used in preliminary versions of this classification) of classifying only one chart a day (and considering only the positions of features on that chart) betrayed many premature and superficial diagnoses that gave misleading impressions of the sequence of circulation developments.

Apart from the charts published in the *Daily Weather Reports*¹⁰ of the Meteorological Office, which were used in all the years classified, the following chart series were consulted:

1861–1866 and part of 1876	Specially constructed once-daily charts, with isobars drawn to the observation data printed in the (British) <i>Daily Weather Reports</i> of those years.
1867–1872	The original Meteorological Office working charts of the period.
1873–1876, 1880–1898	Danish–German North Atlantic weather maps ^{11,12} (once daily). (This series also covers Europe and parts of North America and the Arctic, and continues to 1912.)
1876–1967	<i>Tägliche Wetterberichte</i> ¹³ of the <i>Deutsche Seewarte</i> and the present-day <i>Deutscher Wetterdienst</i> . (This series began to present twice, and later three-times daily, weather maps many years before the other series used.)
1877–1880	Once-daily northern hemisphere maps given in the <i>Bulletins of International Meteorological Observations</i> published by the U.S. Army Signals Office. ¹⁴ (These maps refer to 13 GMT whereas the British and German charts of the same years were generally for 07 GMT; comparison thus gives a glimpse of the evolution over at least part of the day.)
1899–1961	The <i>Historical Daily Weather Maps</i> ¹⁵ of the northern hemisphere, published by the U.S. Weather Bureau.

Many years before maps for two or more times of the day were printed in the *British Daily Weather Reports* the observations for other times were there to be consulted.

Altogether, about 150 000 charts were examined.

It was found that, in using the various charts covering the early years, care must be taken to allow for readily understandable deficiencies of the isobar drawing; similar care is needed with some chart series in much later years as regards the printing of the isobars in relation to the wind observations shown. On nineteenth century charts it commonly appears that the central isobar of a depression traverses part of Scotland or Ireland, when the strength of the winds reported at the stations nearest the centre makes it clear that one or more isobars still nearer the centre of low pressure over the Atlantic have been omitted; such cases do not qualify for the definition of a Cyclonic day in the British Isles, unless the centre must be presumed to have transgressed the mainland at some other time of the day. Also, many of the hemispheric maps are not accurate in the placing of the crests of sharp ridges of high pressure or trough axes near the Atlantic coasts; these ridge and trough lines are often shown over the British Isles, as printed, although the wind directions reported at the westernmost stations make it clear that the feature referred to actually lay over the ocean.

For the years 1861 to July 1873 no daily charts covering the Atlantic were available. In Britain there were no observations entered on the charts for any point north of Wick (58.4°N 3.1°W) or sometimes even Nairn (57.6°N 3.9°W); and, though there were usually observations for one place on the coast of southern Norway and a few others in the nearest parts of the other lands across the North Sea and English Channel, there were no observations over the seas. These shortcomings were carefully considered in arriving at the classification for each day. Nevertheless, it seems likely that the passage of a few cyclone centres over the fringe of the mainland of Britain and Ireland was missed and that the proximity of the central regions of some northern and western anticyclones was overestimated. Thus, in these earliest years the number of days with a cyclonic element has probably been slightly underestimated and the numbers of days classified as Anticyclonic North-westerly, Anticyclonic Northerly, Anticyclonic North-easterly and Anticyclonic Easterly have probably been slightly overestimated at the expense of the numbers which should appear as pure NW, N, NE and E type respectively. It is not thought that the errors can amount to more than at most a quarter of the days assigned to the rarer types mentioned and, in general, to not more than a few days in any year, because other evidence usually existed and provided some indication of the whereabouts of the anticyclone centre – e.g. pressure levels prevailing and wind directions on the coasts of Norway and the Bay of Biscay.

Before May 1867 no maps could be produced for Sundays and public holidays. Classifications have been tentatively entered, where possible, in brackets, by taking account of continuity and the observations made at the Radcliffe Observatory, Oxford, and at Greenwich on the missing days. (The Radcliffe wind-direction observations had commonly to be disregarded and seem to have been rendered unrepresentative by local effects of buildings or high walls.)

4 – DEVELOPMENT OF THE CLASSIFICATION

The daily weather over the British Isles from 1898 to 1947 was first classified by Captain R.B.M. Levick (R.E. retired) according to six types AC, W, NW, N, E and S, using definitions basically similar to those here employed, save that cyclonic situations were regarded as an aspect of the N type. Just about two-thirds of one per cent of the days were regarded as unclassifiable. This handling of cyclonic and unclassifiable cases obviously involved some forcing of the evidence. Nevertheless, after a separate designation by the present author of those days which must be regarded as cyclonic, Levick's classification permitted an analysis of seasonal structure and the sequence of circulation development in the neighbourhood of the British Isles in the course of the normal year (Lamb²) that has since proved useful in long-range forecasting routines.

Long spells and the more regularly occurring episodes of shorter duration, known as singularities (Lamb^{2,16}), could be recognized. This involved admitting hybrid types or mixtures in the long spells, so long as there were some persistent features in the pressure pattern; many of these spells were associated with well-known droughts or wet summers, long frosts or mild winters and so on. (For example, the long dry summer of 1921 was largely compounded of anticyclonic and westerly days.)

It was a virtue of the classification that the number of types was small, so that reasonably big statistical samples of each could be collected in a fairly short period of years. This virtue has been retained in the subsequent development of the method. It was, however, early recognized that to admit many individual days as of hybrid or dual type would

- (i) make for more objectivity and avoid forcing the evidence, and
- (ii) reduce the number of days which must properly be dismissed as unclassifiable.

Counting all the different recognized hybrids of two or three types (the latter cases showing winds from two neighbouring quadrants combined with anticyclonic or cyclonic characteristics), this plan, now adopted, allows 27 different possible designations (including 'Unclassifiable') of one day. When required, however, the hybrids can all be allocated part to one and part to another of the seven basic types for statistical study.

At the first opportunity, therefore, the classification was done again, treating the Cyclonic type in the same way as the other types and allowing hybrids on individual days. This was done in 1956 by B.C. Lack of the Meteorological Office in close consultation with H.H. Lamb who advised on difficult cases and made sample checks. At the same time the classification was extended back to 1873, and Lamb has continued the work on the same basis from 1948 to 1971. This classification was used in a number of published and unpublished studies and in the selection of analogous cases for long-range forecasting in the last 8–10 years. Secular changes, for example in the frequency of W type from one group of years to another, were found to correspond reasonably with the frequencies of different wind directions observed at London and with other knowledge of climatic variations during the last 90 years. In the effort to avoid distorting evidence, it turned out that a larger proportion of days (averaging 6.3 per cent) were counted unclassifiable than in Levick's original work. There was some variation in the proportion of days considered unclassifiable, from about 9 per cent in the first 25 years – when the chart detail was least complete (and this was a period when blocking and small-scale circulation systems were relatively frequent) – to 4.4 per cent between 1898 and 1937 (years characterized by large-scale systems and great prevalence of W type); in subsequent years (when blocking was again more frequent) the proportion of unclassifiable days rose once more to over 6 per cent.

At the stage when Lack did his classification, however, the only hybrid types recognized on individual days were combinations of Anticyclonic or Cyclonic with each of the seven main types defined. In the final version of the classification, in use over the past ten years, and now applied to the past 111 years, all possible 26 pure and hybrid types have been recognized. This reduces the proportion of unclassifiable days once more to about 4 per cent: the figures averaged 3.4 to 3.6 per cent for the runs of years (1861–1872, 1900–1954) with most frequent W-type situations, and as little as 2.4 per cent in 1921, 1922 and 1923, as against 3.8 to 4.3 per cent in the runs of years with most blocking (1873–1899, 1956 to date) and as many as 5.8 to 6.5 per cent in some individual years.

The first classification of the years before 1873 was performed by P.D. de la Mothe of the Meteorological Office, who collected and analysed the original daily weather maps for the purpose and who also prepared the charts which here illustrate the individual types over the British Isles.

Finally, to ensure the greatest attainable homogeneity of the record, the whole series of charts from 1861 to 1968 was reclassified within the course of a single year's work by one

analyst (Lamb), using practices that were by then firmly established and criteria of judgement which may be presumed constant over the whole period. As a further precaution against marring the usefulness of the classification by any unconscious creeping change of practice during the time taken to do it, the years were classified in a more or less random order.* In addition, several of the extreme years for high and low frequency of the W'ly type were scanned a second time, usually some months after first being done; the extremely unlike years, 1915 and 1920, which occurred so close to each other, were gone over a third time at the end of the entire work. No more than minor amendments of a few days were proposed in any of these cases.

5 - PRESENTATION OF THE RESULTS

The entire daily classification from 1861 is given *in extenso* in the long table in Appendix II.

The diagrams accompanying this memoir show how the frequencies of the various types have varied around the year and from year to year over the period covered by the classification. They replace all previously published diagrams and frequency figures (e.g. in Lamb^{2,17}) which were necessarily based on the preliminary classifications then available.

It is not the purpose of the present memoir to enter into any extensive discussion of the results but rather to provide the best possible figures for reference. When these figures are compared with those derived from the preliminary classifications, it is at once seen that the recognition of hybrids has, of course, led to an over-all reduction in the frequencies assigned to the basic types. This is most noticeable in the case of the W type — the most frequent type. Nevertheless, the general course of the seasonal and secular variations of the W type remains the same.

Figure 8 displays the yearly frequencies (in total number of days and as a percentage of the year) assigned to the W type in the register. The continuous lines indicate the 10-year and 25-year running means while the pecked lines, roughly paralleling the 25-year mean, show the departures from that mean amounting to twice the standard deviation for any 25-year period. On the basis of this diagram the years covered by the classification may be regarded as divided into the following epochs:

1861 — 1874	W type very prevalent.
1875 — 1899 approx.	Blocking prominent, W type less frequent.
1900 approx. — 1954	W type very prevalent.
1955 to date	Blocking prominent.

The long W epoch, 1900 — 1954, could be subdivided as follows:

1903 — 1938	Main W epoch, W type predominant.
1943 — 1954	Secondary peak of the W type, moderately W period.

* The actual order in which the years were classified was as follows: 1873, 1874, 1920, 1967, 1921, 1948, 1949, 1895, 1896, 1936, 1937, 1885, 1906, 1957, 1914, 1928, 1868, 1955, 1942, 1900, 1962, 1880, 1890, 1865, 1910, 1930, 1960, 1903, 1917, 1871, 1881, 1891, 1901, 1911, 1931, 1941, 1951, 1961, 1875, 1965, 1888, 1905, 1912, 1924, 1925, 1945, 1878, 1952, 1861, 1933, 1886, 1864, 1916, 1934, 1939, 1959, 1870, 1879, 1883, 1893, 1898, 1908, 1918, 1938, 1958, 1862, 1867, 1887, 1897, 1907, 1950, 1927, 1902, 1947, 1863, 1923, 1876, 1889, 1963, 1940, 1919, 1926, 1946, 1954, 1872, 1909, 1884, 1943, 1904, 1935, 1922, 1932, 1944, 1956, 1964, 1869, 1929, 1892, 1915, 1913, 1866, 1899, 1877, 1953, 1882, 1894, 1966, 1968.

It may be that 1861 (or rather earlier) to 1874 should be looked upon as a forerunner of the main W epoch; it was the time when the great recession of the European glaciers, which has continued more or less to the present date,* began. This view of the 1860s and early 1870s is also suggested by comparison with the mean-pressure-difference indices of the prevailing westerlies over the North Atlantic given by Lamb and Johnson^{3,4} in various papers. Further light on the matter is shed by comparison with the (so far provisionally homogenized) long record (Figure 9) of variations in the frequency of SW'ly surface winds over south-eastern England derived by Lamb⁹ from sources which include daily observations in and near London from 1669 and a combination of fragmentary diaries and monthly summaries in earlier times. Here it is seen that the frequency of SW'ly surface winds, which roughly parallels the variations of the British Isles W type over the 111 years here classified, increased abruptly between about 1845 and 1860 and had been on the increase from around 1800. Although W has probably been the most frequent individual type in Britain over all the centuries covered by Figure 9 – also probably throughout post-glacial times – it undergoes great variations in the degree of its prevalence. Figure 9 suggests that there have been several periods in recent centuries with even less-frequent W and more-frequent blocking than either 1875-1899 or the years since 1955.

Figure 10 gives some bearings upon how far the frequencies of SW'ly surface winds at or near London can be taken as an indication of the frequency of the W type. By implication, similar lessons probably apply to the varying frequency of this and other surface wind directions in various parts of the country. (There are no altogether satisfactorily homogeneous long series of anemometer records, owing to minor changes of site and changes in the surroundings, buildings, trees, etc., though Kew Observatory appears to give the best available series, and it can be treated as homogeneous at least from 1929 to about 1967; the Kew records were the principal source of the data for these years plotted in Figure 9.) In Figure 10 the 10-year frequencies of isobar (i.e. gradient wind) direction from SW and from all westerly points over London, plotted at 5-year intervals from 1875-84 to 1960-69, are compared with the frequency of the British Isles W type. It was found that gradient winds from W averaging 50.8 days per year from 1880 to 1969 were notably less frequent over London than those from either SW, 88.6 days per year, or NW, 67.3 days per year; presumably this is a remote downstream effect of the mountains in Wales. There is a fairly general parallelism between all the curves in Figure 10 from 1875-84 to 1955-64, but the trend of frequency of the SW'ly and W'ly winds near London parts company with that of the W type over the British Isles in the 1960s, presumably most of all in the late 1960s. Reference to Table II, page 15, indicates that this is probably mainly due to the sharp increase in frequency of Cyclonic type – i.e. cyclones over and passing across the British Isles – in the 1960s and perhaps partly to the marked decrease of Anticyclonic and Anticyclonic Westerly days in this decade.

The correlation between wind-direction frequencies at any individual point and the W (or any other) type over the British Isles should not be expected to be very high, especially in individual years.

Years characterized by particularly high frequency of the Anticyclonic Westerly hybrid type (and correspondingly fine summers) were found to differ among themselves, some having very frequent SW'ly winds at London and others notably few, the latter cases because the central region of the anticyclones repeatedly spread just near enough. It may be also that the changes in frequency here shown for the British Isles W type are amplified, as compared with those of the SW wind, by the method of counting hybrids – a day of Anticyclonic Westerly/Cyclonic Westerly type counting as only half Westerly.

* The rates of recession, and the percentage of all the glaciers that are still receding (43 per cent of those in the Italian Alps in 1969), have however diminished in the 1960s.

Figures 11–15 show the variations of frequency on each day of the year of all the various types used in this classification, i.e.

(i) 100-year averages for 1868–1967.

(ii) Averages for the subdivisions of the period covered by the register as noted on page 11. The course of the running 29-day mean and, on the 100-year frequency graphs, plus or minus two standard deviations are also indicated. This is intended as an aid in picking out the main seasonal variations and any significant shorter-term episodes which tend to recur in the course of the year.

Figure 16 displays the year-by-year total frequencies of each type recognized from 1861 to 1969.

Table 1 gives the average frequencies in each calendar month for each of the seven main types, over the last 100 years and within each of the natural subdivisions or epochs recognized. Table II gives the over-all average frequencies of these types for each decade from the 1860s to the 1960s.

TABLE I - AVERAGE FREQUENCY OF EACH OF THE TYPES

1868-1967

Types	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Year
						<i>per cent</i>							
W	34	27	23	19	15	22	26	28	27	27	27	33	25.7
NW	4	4	4	5	4	5	7	6	4	4	5	5	4.7
N	6	5	8	9	11	9	7	6	7	7	8	6	7.4
E	6	9	11	11	12	7	4	4	5	8	8	6	7.6
S	12	11	10	8	8	6	5	6	8	10	9	10	8.6
A	22	25	25	27	27	29	24	23	29	24	23	21	24.9
C	14	15	16	17	19	18	22	24	15	17	17	16	17.5

1861-1874

						<i>per cent</i>							
W	37	28	20	19	15	23	29	29	30	30	21	30	25.9
NW	2	6	6	7	5	7	4	5	4	4	8	6	5.4
N	4	4	10	6	12	9	7	7	6	5	10	6	7.2
E	6	9	15	9	12	5	4	6	5	6	7	7	7.6
S	11	11	7	7	7	6	5	6	6	10	5	8	7.4
A	18	24	19	32	30	29	28	24	25	23	29	26	25.6
C	18	15	17	16	15	18	19	20	21	19	27	15	17.5

1875-1899

						<i>per cent</i>							
W	28	27	23	14	13	20	23	26	27	20	28	31	23.3
NW	4	5	7	4	5	3	8	7	5	5	3	6	5.2
N	6	5	8	9	10	9	8	6	7	10	7	6	7.6
E	6	9	9	16	10	8	4	5	5	10	7	5	7.8
S	13	12	7	10	7	7	6	8	7	10	10	9	8.8
A	26	25	27	27	29	32	23	22	29	24	24	21	25.7
C	12	14	15	18	21	17	23	21	15	17	16	18	17.3

1900-54

						<i>per cent</i>							
W	38	29	24	21	14	22	28	31	27	28	27	35	27.0
NW	3	4	3	6	3	6	7	5	4	3	4	5	4.4
N	5	6	7	9	11	10	7	6	7	6	8	5	7.3
E	4	7	11	9	13	7	4	3	5	8	7	5	6.9
S	11	11	10	7	9	5	5	5	8	10	9	11	8.4
A	20	25	24	26	27	28	23	23	30	24	22	21	24.4
C	13	15	17	17	18	18	22	24	15	16	19	16	17.5

1955-69

						<i>per cent</i>							
W	20	18	18	20	21	23	20	19	25	27	22	29	21.8
NW	6	4	3	5	4	4	8	6	3	4	5	8	5.0
N	8	10	8	10	10	6	9	8	5	6	9	8	8.1
E	10	14	15	11	10	7	5	6	7	5	9	8	8.9
S	12	11	16	9	7	6	4	5	8	11	10	7	8.8
A	22	26	24	27	20	30	29	21	28	26	25	18	24.7
C	18	14	12	14	23	19	21	29	18	15	18	16	18.1

TABLE II – AVERAGE FREQUENCIES, BY DECADES,
OF BRITISH ISLES WEATHER TYPES

	W	NW	N	E	S	A	C		W	NW	N	E	S	A	C
	<i>per cent</i>								<i>number of days per year</i>						
1861–9	26.8	5.9	6.8	7.5	7.5	26.0	17.1	1861–9	98	21	25	27	27	95	62
1870–9	23.9	4.9	7.5	8.1	8.4	23.6	19.9	1870–9	87	18	27	30	31	86	73
1880–9	23.2	5.1	7.5	8.2	9.8	25.5	17.1	1880–9	85	19	27	30	36	93	62
1890–9	24.2	5.4	7.6	7.1	8.6	27.5	16.0	1890–9	88	20	28	26	31	101	59
1900–9	26.5	4.2	7.7	7.0	9.0	25.5	17.0	1900–9	97	15	28	26	33	93	62
1910–9	27.2	3.6	8.0	7.7	7.7	24.4	18.6	1910–9	99	13	29	28	28	89	68
1920–9	29.8	4.5	6.7	7.0	9.3	21.8	17.9	1920–9	109	16	25	26	34	79	65
1930–9	26.8	6.5	7.4	7.3	8.1	24.6	17.8	1930–9	98	24	27	27	30	90	65
1940–9	26.1	5.1	6.6	8.1	8.4	26.6	15.6	1940–9	95	19	24	30	31	97	57
1950–9	24.7	5.3	8.6	7.2	8.4	25.4	17.1	1950–9	90	19	31	26	31	93	62
1960–9	21.9	5.3	8.1	9.4	8.4	23.1	19.1	1960–9	80	19	30	34	31	84	70

6– SINGULARITIES

The frequency graphs for each of the seven main types in each of the sub-periods or epochs into which the years 1861 to 1971 have here been divided were examined and all periods of >3 days with frequencies conspicuously above or below the smoothed 29-day mean extracted with a view to establishing the occurrence of regular seasonal episodes or singularities (compare with Lamb¹⁶, Appendix 1, also Lamb²). The following episodes featured in every, or virtually every, period:

(i) High frequency of W

around 30 Mar. – 8 Apr.
around 19 June – 24 June
around 4 Dec. – 9 Dec.

Low frequency of W

around 19 Jan. – 21 Jan.
around 17 Nov. – 20 Nov.

(ii) High frequency of A

around 16 Nov. – 22 Nov.
around 22 Dec.
usually around 21 Jan. – 24 Jan.
usually around 13 Sept. – 19 Sept.

Low frequency of A

around 30 Jan. – 1 Feb.
around 26 Oct. – 30 Oct.
around 28 Dec. – 31 Dec.

(iii) High frequency of C

around 30 Mar.
around 4 May – 7 May (or close to these days)
around 4 Aug. – 8 Aug.
around 23 Oct. – 26 Oct. (or a few days after)
usually around 25 Apr. – 27 Apr.
usually around 26 Nov. – 28 Nov.

(iv) High frequency of NW

around 4 Apr. – 6 Apr.

Low frequency of NW

around 27 Sept. – 30 Sept.

- | | |
|---|--------------------------|
| (v) High frequency of N | Low frequency of N |
| around 15 May – 19 May | around 25 Jan. – 30 Jan. |
| around 26 Oct. – 30 Oct. | |
| (vi) | Low frequency of E |
| | around 25 June |
| (vii) High frequency of S | |
| around 25 Jan. (or within 5 days before or after) | |

The main maxima and minima of frequency of the various weather types in the course of the seasonal round, which are most clearly seen in the 29-day mean curves in the figures here presented, are also sometimes regarded as singularities, recurring features though of a different kind from the shorter episodes considered above. These are the broad, and therefore not so precisely dated, climaxes of various seasonal trends. A good number of these also have, however, nearly the same incidence in all the sub-periods, or epochs, into which the years 1861 to 1971 are here divided, e.g. the climaxes of Anticyclonic type in late May–early June and around mid-September and that of Cyclonic type in or around early to mid-August; the climax of N type in May and of NW type in high summer, generally around July but in some periods rather in late June–early July. In other cases, there appear to be differences which may be telling characteristics of periods of great dominance of W types or of blocking types respectively; e.g. the main climax of W type is seen building up through December to early January, or even mid-January, in the very W-type periods 1861–74 and 1900–54 (and this pattern dominated the 100 years 1868–1967), but in the periods with much more blocking 1875–99 and since 1955 the W type falls off after a main climax earlier in December (or even about the end of November in some years) though it rises again more briefly to prominence at the end of January–early February. A subsidiary, or short-term, peak of W-type occurrences in early May may be a characteristic of the climatic periods with most blocking over the year as a whole (especially since the 200-year-long record of atmospheric pressure at Trondheim indicates much less anticyclonic influence in Norway in May in the older periods of cold climate, e.g. 1780 to 1830 – in the so-called Little Ice Age when blocking was in general very prominent – and in the 1880s).

APPENDIX I – OTHER CIRCULATION AND WEATHER-TYPE CLASSIFICATIONS

Recognition of distinct weather types and the circulation patterns that go with them, marked by depressions repeatedly following similar paths, controlling the weather sequence within their domain and leaving characteristically undisturbed regions beyond their reach, can be traced back at least to Van Bebber¹⁸ and Abercromby,¹⁹ also to Teisserenc de Bort's ²⁰ brief list of features of 'isobaric types' over the Atlantic and Eurasia embodying the concept of displaced positions of the 'centres of action'—especially the great quasi-stationary anticyclones—as defining the anomalous weather of certain seasons. According to Teisserenc de Bort²¹ one large-scale pattern other than the normal arrangement of middle-latitudes westerlies, sub-tropical anticyclones and trade winds had been noticed as early as 1825 and 1833 by L.P.Kaemtzt: this was the failure of the trade winds during spells of displaced Azores anticyclone (i.e. blocking of the westerlies).

The aim of the classifications attempted in the nineteenth century was quite simply to provide an aid to weather forecasting.

Van Bebber's map of the most frequent cyclone tracks over Europe (reproduced here for convenience in Figure 17) is still often referred to—especially track Vb, which crosses central Europe and occasionally recurves farther towards Denmark and the North Sea. This map includes all the commonly recognized tracks except those that recurve farther west over the Atlantic (accompanying generally southerly winds over the British Isles), but it fails to indicate the frequency of the stationary low-pressure centres which occur particularly over the various sea areas shown.

Later, this approach was followed up by Van Bebber and Köppen²² defining 20 pressure-pattern types over the North Atlantic and western Europe, who recognized this time that the main anticyclonic areas commonly represent the quasi-stationary element in a large-scale weather situation and who supplied maps of the characteristic cyclonic tracks along the periphery of (and between) the anticyclone cells which accompany each type. These maps covered the area between the great plains of North America and north-west Siberia.

Gold²³ defined 28 types and sub-types of pressure distribution in the neighbourhood of the British Isles and western Europe and supplied a classification of each day from 1905 to 1918. The types were arranged with the nearest regions of prevailing high and low surface pressure (type I = Biscay high, Scandinavia low) in a more or less counter-clockwise order of positions (type II = France high, Faeroes low), and so on. Sub-types gave different prominence to the intervening ridges and troughs or introduced slight shifts. The last 6 or 7 types were central cyclonic or central anticyclonic over Britain, with single or multiple centres in various configurations.

Newnham²⁴ followed Van Bebber and Köppen's idea with a classification of the whole sector 30 to 80°N and 70°W to 30°E, according to whether high or low pressure dominated each of 10 areas. Each day of the years 1896–1910 was classified. Apart from the element of experience which guided the definition of the 10 areas into which the sector was divided, this was the first purely objective classification. But it admitted over a thousand possible combinations of high- and low-pressure areas. Such a large number of possible types is unwieldy, leading to small samples of individual types; though doubtless some combinations never occurred at all. An awareness of simpler groupings became apparent in Newnham's conclusion that 'over the British Isles westerly types predominate in midwinter and midsummer and north-easterly types are most frequent in late spring and early summer; in autumn there is greater variability and a tendency for European anticyclones extending westwards so as to include the British Isles'.

None of the foregoing classifications seems to have been kept going since.

The concept of large-scale weather situations (*Grosswetterlagen*), associated with particular steering of the moving depressions by the pattern of winds prevailing over periods of several days throughout the great depth of the upper troposphere and lower stratosphere, was developed further in the Research Institute for Long-range Weather Forecasting in Bad Homburg, Germany in the 1930s and 1940s (Baur, Hess and Nagel²⁵; Baur²⁶). The resulting classification scheme has been set forth by Hess and Brezowsky^{27,28} in a work which defines 29 different circulation pattern types and sub-types over the eastern Atlantic, Europe and neighbouring Arctic regions, with maps for the surface and 500-mb levels and classifies each day from 1881 to 1968. This daily classification has been continued since 1968 and may be found in the monthly issues of *Die Grosswetterlagen Mitteleuropas*.²⁹ It has been used to define the seasonal structure of the year, including probably the best-known calendar of singularities affecting European weather (Flohn and Hess³⁰), as well as in many long-range forecasting studies, and formed the basis of an evaluation of the prevailing zonal index at the 500-mb level from 50 to 60°N over the Atlantic–European sector (60°E) for every month in the winter half-year since 1881 (Trenkle³¹).

A classification of the pressure distribution over Scandinavia between about 55 to 65°N and 5 to 25°E on the morning weather charts of each day from 1868 to 1885 and 1922–1939 in just three classes, according to whether most of the area was anticyclonic, cyclonic or neutral, done by Evjen,³² showed some interesting aspects of seasonal and secular variation over northern Europe, but seems neither to have been published nor completed for other years.

Classification of the daily 500-mb patterns over east Asia into six types – (i) high index zonal, (ii) trough, (iii) 'summer flow', (iv) low index zonal, (v) wave, (vi) blocking (Okhotsk Sea high) – is known to have been done and the results published include some relationships to the Atlantic sector (Asakura³³), but the basic data (the register of daily classifications itself) do not seem to have been published so far.

The most used Russian-type classifications not only cover other sectors of the northern hemisphere but attempt to cover most or all of the extratropical zones of the hemisphere.

Vangengejm* (Bolotinskaja and Ryžakov³⁴) using the term 'elementary synoptic processes' (or 'synoptic-process elements') to describe large-scale circulation developments that go on for a few days and mark the natural units of the time-sequence of weather, has listed 26 types of elementary synoptic process over the Atlantic–European sector. These 26 types are, however, regarded as no more than variants upon one or other of just three groups of patterns over the hemisphere at large, defined as follows:

W. Westerly circulation form

Characterized by intensified west–east transport throughout the troposphere. Waves are usually of small amplitude and move rapidly from west to east. Occasional larger-amplitude waves are unstable and also move rapidly east.

E. Easterly circulation form

Characterized by large-amplitude stable waves. Stationary, blocking anticyclones disturb the west–east transport, especially over the continents. Over the oceans substantial zonal components persist.

C. Meridional circulation form

Also characterized by large-amplitude stable waves but in this case there is a large-amplitude warm ridge or anticyclone over the eastern Atlantic and western Europe. The ridges and troughs around the hemisphere are more or less in opposite phase to circulation form E.

*In the older transliteration, Wangenheim

E and C are regarded as promoting an intensified interlatitudinal exchange of air, as is indicated by the lesser south-north temperature contrasts than those which arise with form W. Figure 18 illustrates these patterns each by a typical 500-mb pressure-level contour followed around the hemisphere. Girs³⁵ gives the classification according to group and variant for each day from 1891 to 1962. Classification of each day is believed to be continuing to date.

Girs regards Vangengejm's classification as applying just to the Atlantic-European sector of the hemisphere and similarly defines one zonal (Z) and two meridional types (M_1 and M_2) for the other (i.e. Pacific) sector, allowing all nine possible combinations of types on the opposite sides of the hemisphere: WZ, WM₁, WM₂, EZ, EM₁, EM₂, CZ, CM₁, CM₂. All these combinations have, in any case, to be admitted because change of type does not take place simultaneously all round the hemisphere but more characteristically requires 1 to 16 days to spread from the Pacific to the Atlantic sector or vice versa. Some results of analysis, e.g. frequency of transitions from one type or combination to another, associations with solar variation, and so on, have been published but apparently not (as yet) the actual daily-type register.

On the Vangengejm-Girs classification whole epochs of 20-years duration have been classed as predominantly of one type or another. Study of the transitions from dominance of one type to another has been regarded as a possible approach to forecasting the predominant circulation characteristic of the next climatic epoch (particularly if associations of one type or another with various ranges of solar disturbance be accepted) and thereby foreseeing the trend of the main climatic elements (Girs³⁶, Kac³⁷) over the next 10 to 20 years.

Kac has produced a type classification for the North Atlantic and Eurasia very similar to the Vangengejm-Girs one but recognizing another meridional group of types, M, distinguished by shorter wavelength than C and E (Figure 19). He also distinguishes more and less meridional variants (amplitude differences) in each group of types including W.

Dzerdzevskij³⁸⁻⁴² recognizes 13 types of process or 'elementary circulation mechanism' for the whole northern hemisphere, with 41 sub-types in all. The four principal groups are illustrated in Figure 20 and may be described as

- (a) zonal,
- (b) zonal pattern breached in one sector ('violation of zonality'),
- (c) meridional, and
- (d) mixed, zonal and meridional characteristics in different sectors/regions.

The years 1899 to 1969 have been classified; this classification, and some analysis of it, has been published (Dzerdzevskij⁴¹) and a further instalment of data and analysis.⁴² The classification of each day is believed to be continuing. Seasonal and secular variations, corresponding zonal index values, associations with solar variation, as well as with the effects of predominance of one type or another on lake levels, temperatures, and so on, have been studied. This approach, too, has been used in the U.S.S.R. as a possible basis for forecasting the trend of the climate 10 to 20 years ahead.

Kac believes these approaches to the forecasting of climate to be a serious contribution to a practical problem of the greatest economic importance at the present day. Associations with the 90-year, and still longer-period, variations of solar disturbance are suggested in the case of the Kac, Girs and Dzerdzevskij classifications. Upon the basis of an expected decline of amplitude of the '11-year' solar cycles between the 1957 maximum and the end of the century, a general decrease of circulation vigour (both in the zonal and meridional components), but increased relative frequency of zonal types and of Kac's type C in the summer half year and M in the winter half year (cf. Figure 19), with some cooling of the Arctic and the northern hemisphere continents, is suggested. Willett⁴³ has made a somewhat similar forecast of prevalent coolness and low-latitude zonal

patterns over the remainder of the century, but especially 1965–75 and 1985–95. None of these suggestions seems well founded when only about 60 years of classified circulation data can be considered, but examination of them in relation to the much longer history of circulation variations noted over the British Isles, as in this presentation of the last 100 years (Figures 8, 16) and in the longer perspective seen in Figure 9, may be helpful and seems, at least in some aspects, to strengthen the diagnosis (see also Weiss and Lamb⁴⁴).

Davidova⁴⁵ has put forward a classification of circulation patterns over the southern hemisphere with 6 types for the Atlantic sector 30 to 60°S, 5 types for the Indian Ocean Sector 30 to 60°S and 7 types for the Pacific sector 30 to 70°S. Zonal and meridional types are distinguished, the latter with the centres of cyclonic activity in various positions. The years 1956–58, parts of 1959 and 1962, and the whole of 1963–64 have been classified and a preliminary description of the behaviour as regards correlations between different sectors, zonal and meridional indices, seasonal variations and type-to-type transitions published.

Another type classification which applies to the whole southern hemisphere, with types similar to those of Dzerdzeevskij for the northern, has been devised by Astapenko.⁴⁶ Dzerdzeevskij⁴⁷ has compared Astapenko's classification of the one year 1958 over the southern hemisphere with his own classification of the northern hemisphere circulation patterns for the same year. This sort of study opens a way to observation of any interaction between the circulations over the two hemispheres and of simultaneous changes in both hemispheres, which might suggest reactions of the entire planetary circulation to some external stimulus. The simultaneous occurrences of blocking were considered striking.

It should now be possible by taking advantage of modern high-speed computers to derive a type classification in an entirely empirical, objective fashion. In principle, it would only be necessary to define any chart by the values of mean-sea-level pressure or 500-mb height, etc. at a network of regularly spaced points. If every chart were then compared with all the other charts in the series, groups of charts could be picked out which had generally high (or relatively high) correlation coefficients with each other at the largest possible number of grid points. Not many experiments along these lines appear to have been made so far, and the first results have not been very encouraging, perhaps because the scheme outlined attaches too much importance to pressure level and too little to shape and position of the main circulation entities. Any such scheme should be designed to take most account of the systems in which the greatest momentum and sources of potential energy reside.

BIBLIOGRAPHY

1. BARRY, R.G.; Weather and climate. The British Association for the Advancement of Science. A survey of Southampton and its region, Southampton, Local Executive Committee of the British Association, 1964 pp.73–92.
2. LAMB, H.H.; Types and spells of weather around the year in the British Isles: annual trends, seasonal structure of the year, singularities. *Q J R Met Soc, London*, 76, 1950, pp.393–438.
3. LAMB, H.H. and JOHNSON, A.I.; Climatic variation and observed changes in the general circulation. Parts I and II. *Geogr Ann, Stockholm*, 41, 1959, pp.94–134.
4. LAMB, H.H. and JOHNSON, A.I.; Climatic variation and observed changes in the general circulation. Part III. *Geogr Ann, Stockholm*, 43, 1961, pp.363–400.
5. LAMB, H.H. and JOHNSON, A.I.; Secular variations of the atmospheric circulation since 1750. *Geophys Mem, London*, 14, No. 110, 1966.
6. REX, D.F.; Blocking action in the middle troposphere and its effect upon regional climate, II. The climatology of blocking action. *Tellus, Stockholm*, 2, 1950, pp.275–301.
7. SUMNER, E.J.; A study of blocking in the Atlantic-European sector of the northern hemisphere. *Q J R Met Soc, London*, 80, 1954, pp.402–416.
8. BREZOWSKY, H., FLOHN, H. and HESS, P.; Some remarks on the climatology of blocking action. *Tellus, Stockholm*, 3, 1951, pp.191–194.
9. LAMB, H.H.; Britain's changing climate. *Geogr J, London*, 133, 1967, pp.445–468.
10. London, Meteorological Office. *Daily Weather Report*, * 1861–1971.
11. HOFFMEYER, N.; Cartes synoptiques journalières embrassant l'Europe et le Nord de l'Atlantique. Monthly volumes. Copenhagen, Dänisches Meteorologisches Institut, 1876–80.
12. Dänisches Meteorologisches Institut and Deutsche Seewarte. Tägliche synoptische Wetterkarten für den Nordatlantischen Ozean und die anliegenden Theile der Kontinente. Monthly volumes. Copenhagen and Hamburg. Dänisches Meteorologisches Institut and Deutsche Seewarte, 1884–1931.
13. Hamburg, Deutsche Seewarte. Täglicher Wetterbericht, 1876–1967.†
14. Washington, Office of the Chief Signal-Officer, United States Army. Daily bulletin of weather-reports, 1877–84.
15. Washington, Joint Meteorological Committee (Army, Navy, Weather Bureau). Daily synoptic series: Historical weather maps, northern hemisphere, 1899–1961.
16. LAMB, H.H.; The English climate. New edition. London, English Universities Press Ltd, 1964.
17. LAMB, H.H.; Frequency of weather types. *Weather, London*, 20, 1965, pp.9–12.
18. VAN BEBBER, J.; Typische Witterungs-Erscheinungen. *Aus Arch dt Seew, Hamburg*, 5, No. 3, 1882, pp.1–45
19. ABERCROMBY, R.; Weather. London, Kegan Paul, 1887, pp.334–377.
20. TEISSERENC DE BORT, L.; Etude sur l'hiver de 1879–1880 et recherches sur la position des centres d'action de l'atmosphère dans les hivers anormaux, IV. Paris, Annales du Bureau Central Météorologique de France, 1881, pp.19–60.

*Early handwritten Daily Weather Reports are available in the Meteorological Office Library, Bracknell.

†Published at Bad Kissingen as from 1953 by the Deutscher Wetterdienst. In 1959 the place of publication changed to Offenbach-am-Main. Originally the word Täglicher – meaning daily – did not appear in the title.

21. TEISSERENC DE BORT, L.; Sur l'hiver de 1879-1880. Paris, Comptes rendus des séances de l'Académie des Sciences, 1882.
22. VAN BEBBER, J. and KÖPPEN, W.; Die Isobarentypen des Nordatlantischen Ozeans and Westeuropas. *Aus Arch dt Seew*, Hamburg, 18, No. 5, 1895, pp. 1-27.
23. GOLD, E.; Aids to forecasting: types of pressure distribution with notes and tables for the fourteen years 1905-1918. *Geophys Mem, London*, 2, No. 16, 1920.
24. NEWNHAM, E.V.; Classification of synoptic charts for the North Atlantic for 1896-1910. *Geophys Mem, London*, 3, No. 26, 1925.
25. BAUR, F., HESS, P. and NAGEL, H.; Kalender der Grosswetterlagen Europas. Bad Homburg, 1944.
26. BAUR, F.; Musterbeispiele europäischer Grosswetterlagen. Wiesbaden, Dieterich'sche Verlagsbuchhandlung, 1947.
27. HESS, P. and BREZOWSKY, H.; Katalog der Grosswetterlagen Europas. *Ber dt Wetterd U.S. Zone, Bad Kissingen*, Nr. 33, 1952.
28. HESS, P. and BREZOWSKY, H.; Katalog der Grosswetterlagen Europas. *Ber dt Wetterd, Offenbach*, Nr. 113, 1969.
29. Bad Kissingen,* Deutscher Wetterdienst. *Grosswetterlag Mitteleur*, 4 (et seq.)
(In these yearly books the type classification is given on pp. 4-5 of each issue 1951-53, with mean maps covering the duration of each large-scale weather situation (Grosswetterlage). From 1954 the type classification of each day of the month is indicated in calendar form on p. 1 of each issue.)
30. FLOHN, H. and HESS, P.; Grosswetter-Singularitäten im jährlichen Witterungsverlauf Mitteleuropas. *Met Rdsch, Heidelberg*, 2, 1949, pp. 258-263.
31. TRENKLE, H.; Näherungswerte der Zonalgeschwindigkeit im atlantisch-europäischen Sektor für den Zeitraum 1881-1955. *Met Rdsch, Heidelberg*, 9, 1956, pp. 153-156.
32. EVJEN, S.; Om vaertyper. *Naturen, Oslo*, 3, 1943, pp. 75-82.
33. ASAKURA, T.; Dynamic climatology of atmospheric circulation over East Asia centred in Japan. *Papers in Met and Geophys. Meteorological Research Institute, Tokyo*, 19, 1968, pp. 1-68.
34. BOLOTINSKAJA, M.Š. and RYŽAKOV, L., Jun. (editors). Catalogue of macrosynoptic processes according to G.Ja. Vangengejm's classification 1891-1962. Leningrad, Arkt i Antarkt Nauč-issled Inst, 1964. (In Russian, translation available in the Meteorological Office Library, Bracknell.)
35. GIRS, A.A.; The general distinguishing features of various patterns of atmospheric circulation in the northern hemisphere. Moscow, Akad Nauk, No. 6, 1963, pp. 15-26. (In Russian, translation available in the Meteorological Office Library, Bracknell.)
36. GIRS, A.A.; Principles of long-range weather forecasting. Leningrad, Gidrometeoizdat, 1960.
37. KAC, A.L.; Seasonal changes in the general atmospheric circulation and long-range forecasts. Leningrad, Gidrometeoizdat, 1960.
38. DZERDZEEVSKIJ, B.L., KURGANSKAJA, V. and VITVITSKAJA, Z.; Typification of circulation mechanism in northern hemisphere and characteristics of synoptic seasons. Moscow, Gidrometeoizdat, 1946.
39. DZERDZEEVSKIJ, B.L.; Fluctuations of climate and of general circulation of the atmosphere in extratropical latitudes of the northern hemisphere and some problems of dynamic climatology. *Tellus, Stockholm*, 14, 1962, pp. 328-336.

*Published at Offenbach-am-Main as from 1958. The name of the publication - as from 1967 - is Die Grosswetterlagen Europas.

40. DZERDZEEVSKIJ, B.L.; Long-term variability of the general atmospheric circulation and climate as a basis for a climatic forecast. Moscow, Gidrometeoizdat, 1962, pp. 23-34. (In Russian, translation available in the Meteorological Office Library, Bracknell.)
41. DZERDZEEVSKIJ, B.L.; Circulation of the atmosphere: northern hemisphere circulation mechanisms in the twentieth century. Moscow, Akad Nauk SSSR, Inst Geogr, 1968.
42. DZERDZEEVSKIJ, B.L.; Circulation of the atmosphere: circulation mechanisms in the atmosphere of the northern hemisphere in the twentieth century (statistical data for the entire hemisphere and for its six sectors). Moscow, Akad Nauk SSSR, Inst Geogr, 1970.
43. WILLETT, H.C.; Evidence of solar-climatic relationships. Weather and our food supply. Ames, Iowa State University, 1964, pp. 123-151.
44. WEISS, I. and LAMB, H.H.; Die Zunahme der Wellenhöhen in jüngster Zeit in den Operationsgebieten der Bundesmarine, ihre vermutlichen Ursachen und ihre voraussichtliche weitere Entwicklung. Porz-Wahn, Bundeswehr: Luftwaffenamt, Inspektion geophysikalischer Beratungsdienst. Fachliche Mitteilungen, Nr 160, 1970.
45. DAVIDOVA, N.G.; Types of synoptic processes and associated wind fields in oceanic regions of the southern hemisphere. *Tech Notes, Wld Met Org, Geneva*, No. 87, 1967, pp. 263-291.
46. ASTAPENKO, P.D.; Atmospheric processes in high latitudes of the southern hemisphere. Moscow, Akad Nauk, 1960.
47. DZERDZEEVSKIJ, B.L.; Analysis of the long-period variations in the character of the general circulation of the atmosphere and climatic element indices at the earth's surface. Moscow, Akad Nauk, 1964. (In Russian, translation available in the Meteorological Office Library, Bracknell.)

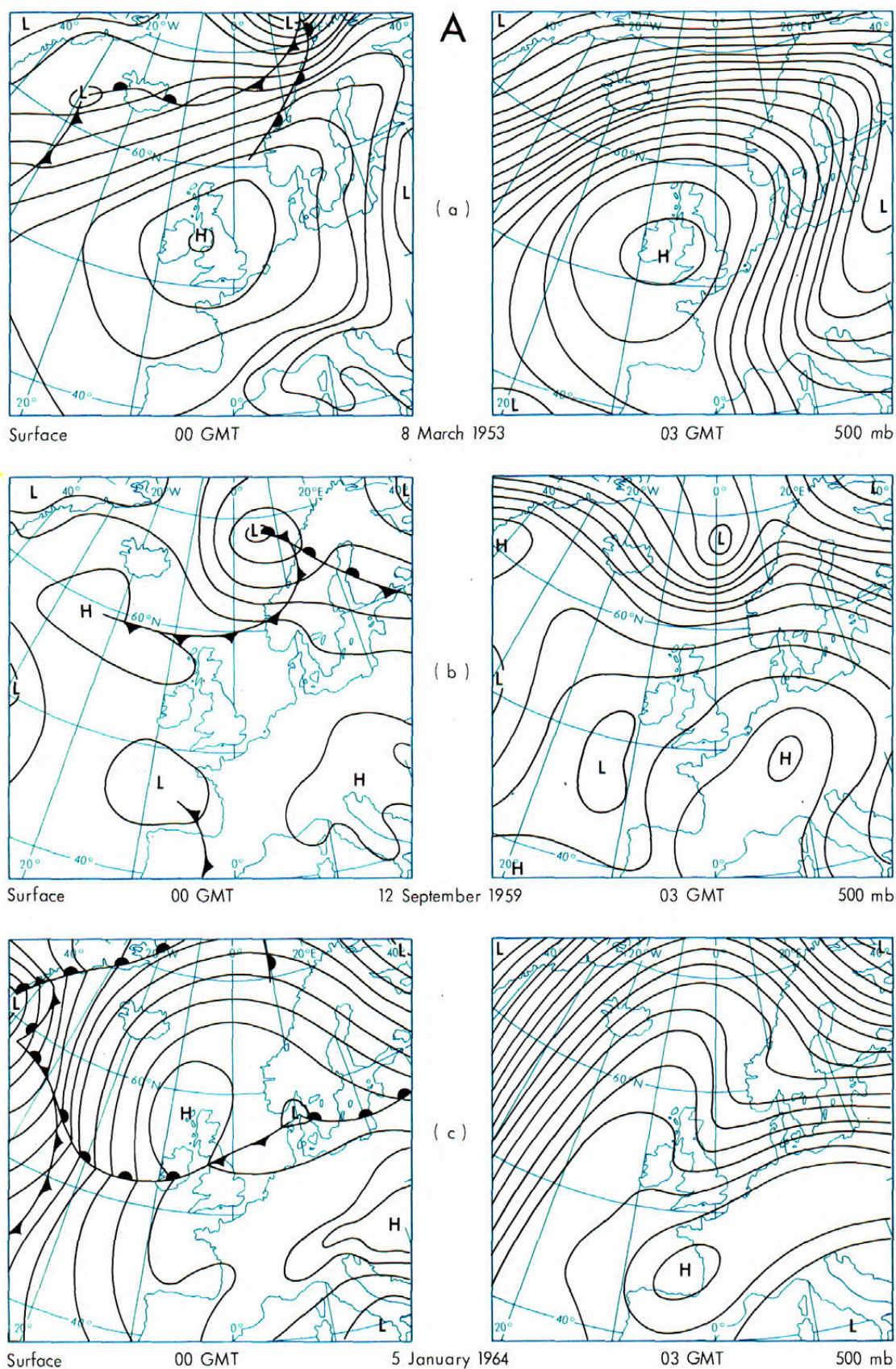


FIGURE 1. ANTICYCLONIC (A) TYPE OVER THE BRITISH ISLES
Mean-sea-level isobars are at 5-mb intervals and 500-mb contours are at intervals of 40 geopotential metres.

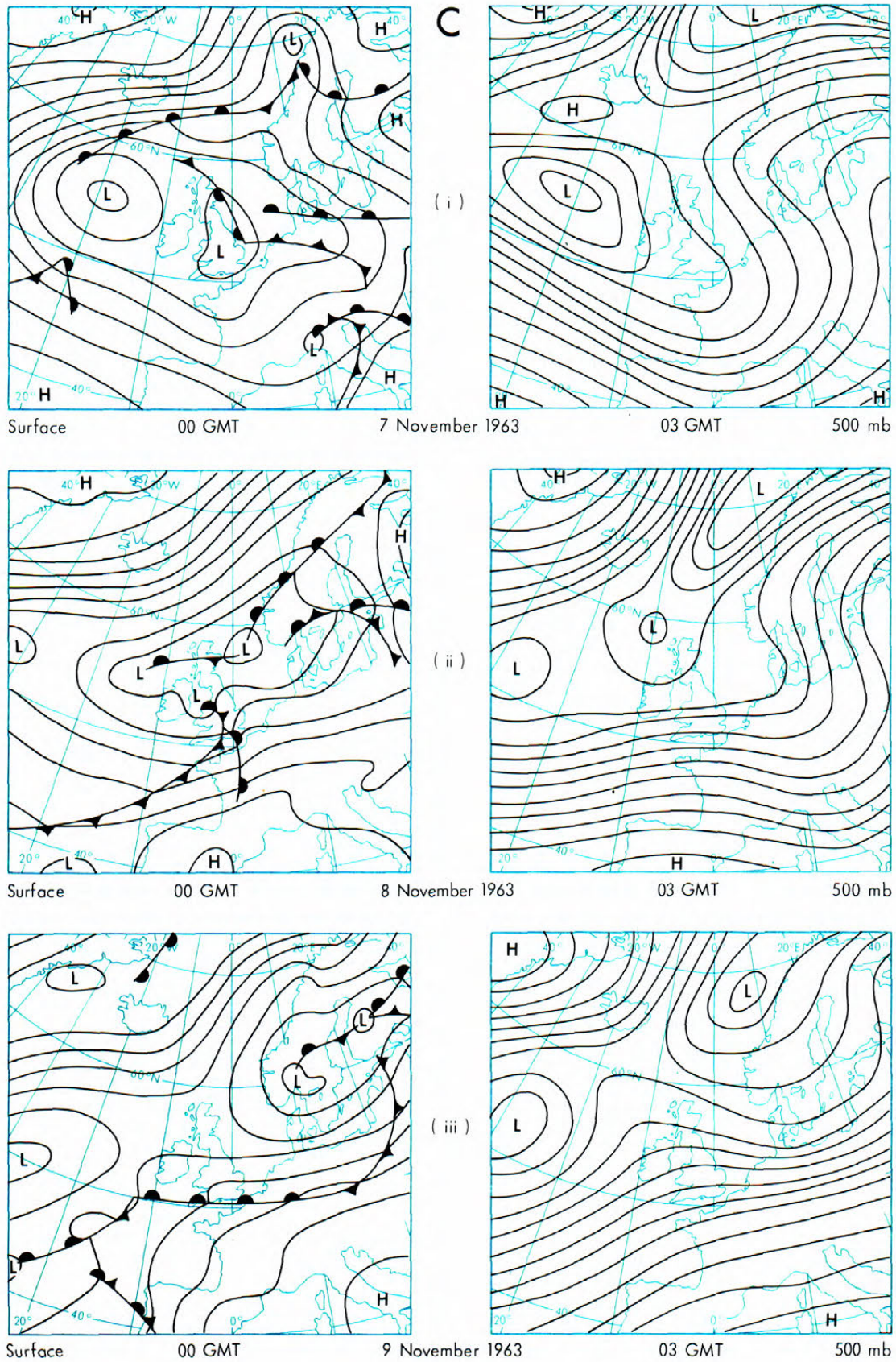


FIGURE 2(a). CYCLONIC (C) TYPE OVER THE BRITISH ISLES
Mean-sea-level isobars are at 5-mb intervals and 500-mb contours are at intervals of 40 geopotential metres.

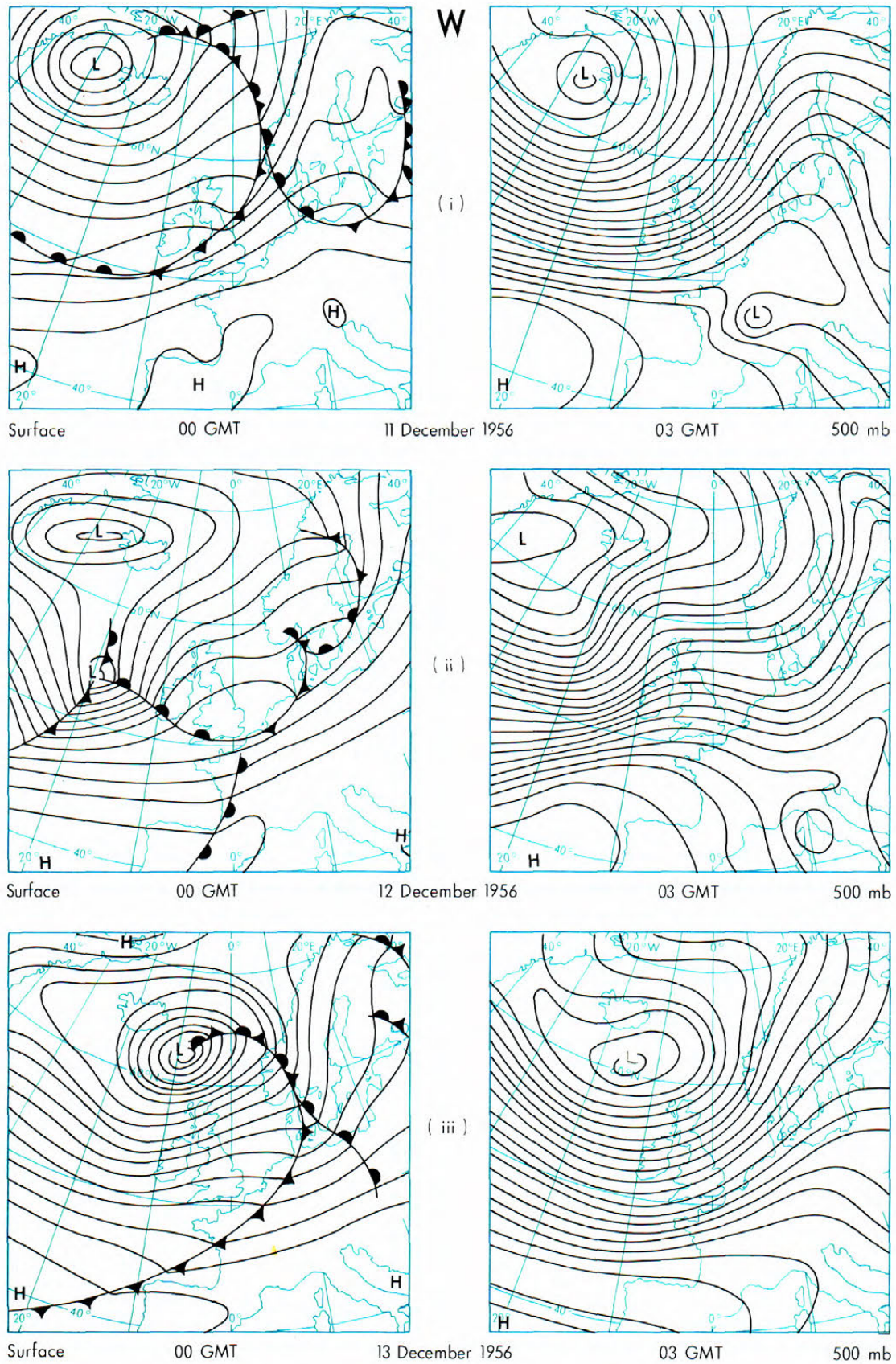


FIGURE 3(a). WESTERLY (W) TYPE OVER THE BRITISH ISLES
Mean-sea-level isobars are at 5-mb intervals and 500-mb contours are at intervals of 40 geopotential metres.

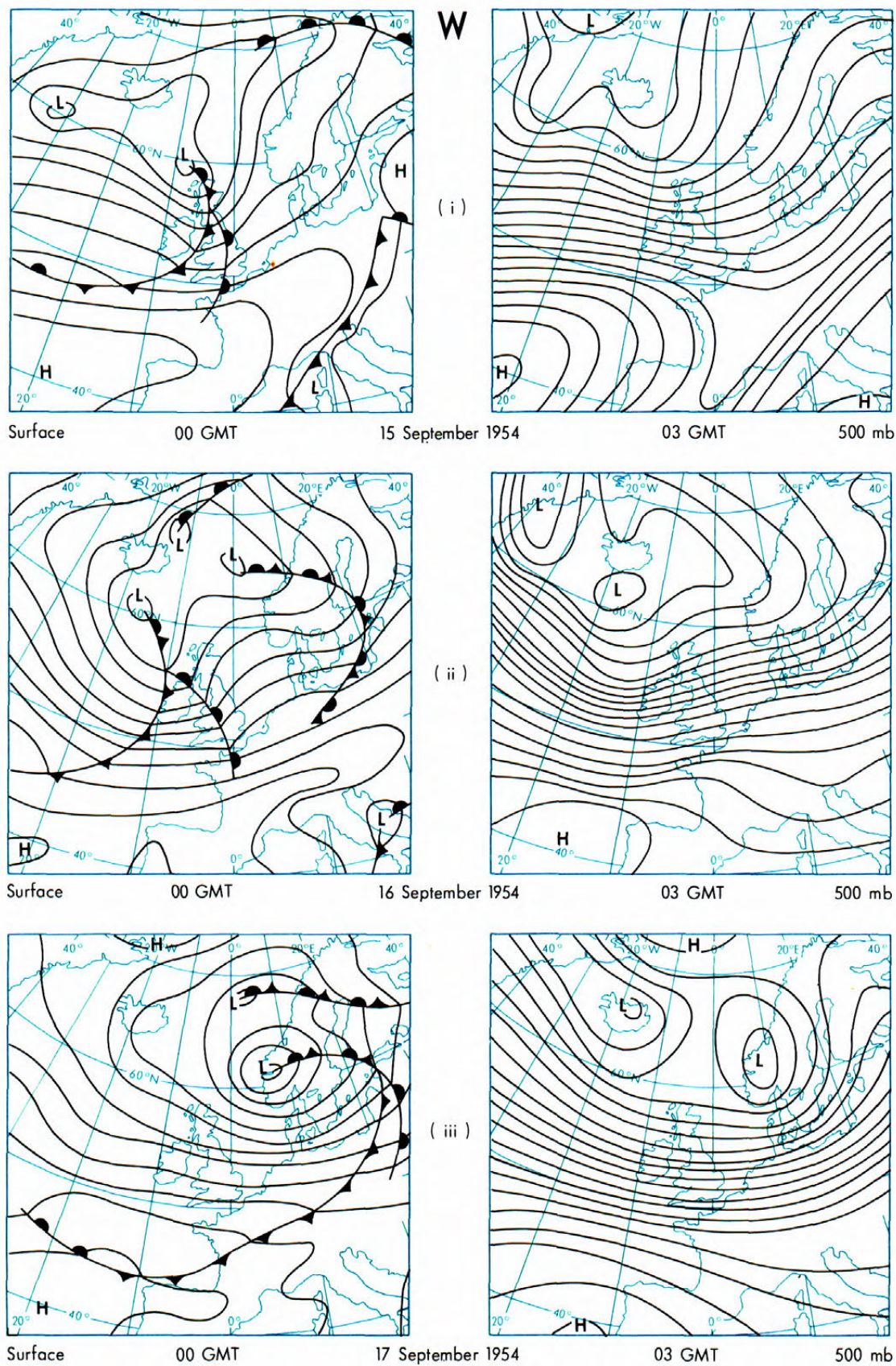


FIGURE 3(b). WESTERLY (W) TYPE OVER THE BRITISH ISLES
Mean-sea-level isobars are at 5-mb intervals and 500-mb contours are at intervals of 40 geopotential metres.

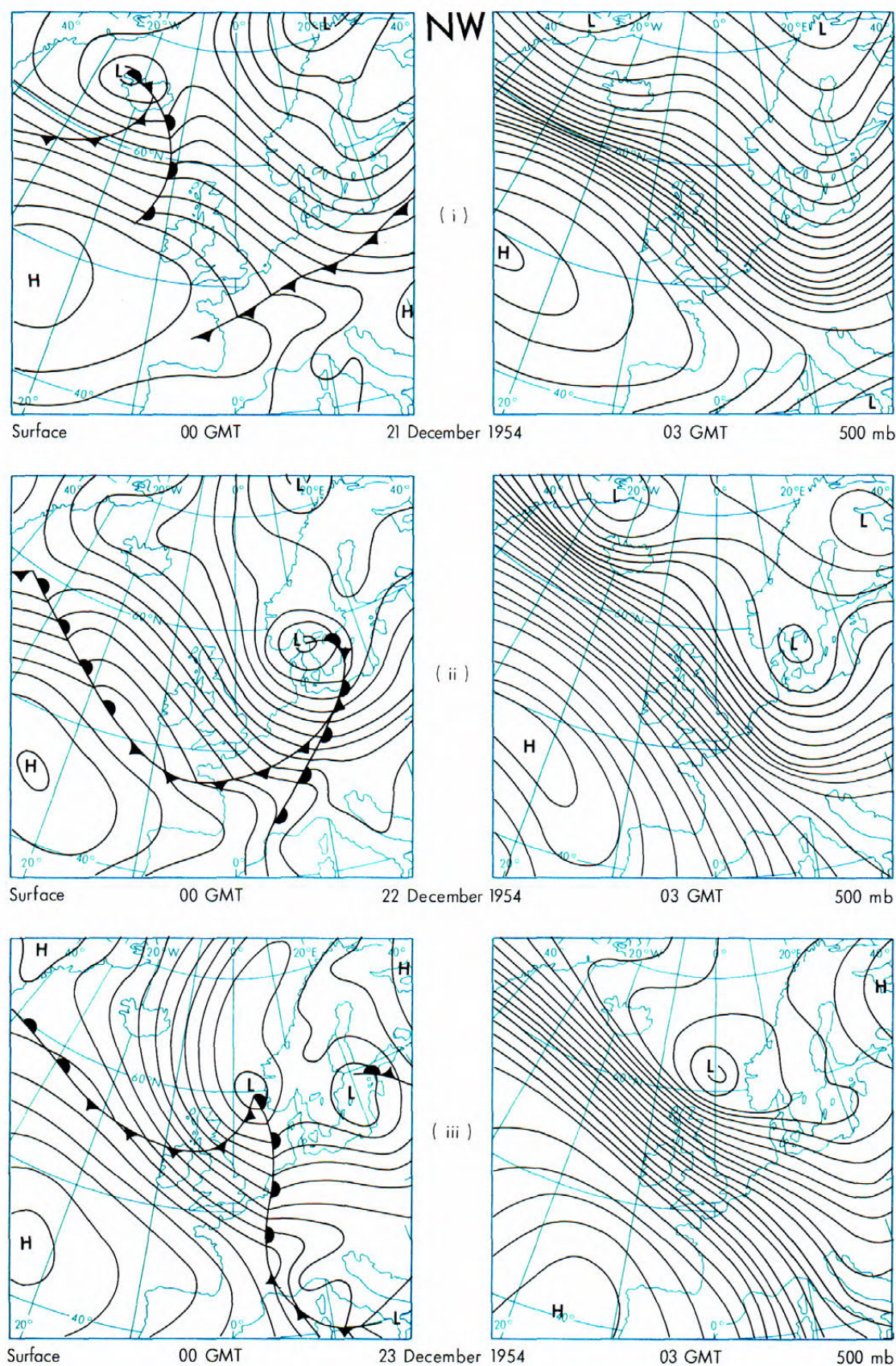


FIGURE 4. NORTH-WESTERLY (NW) TYPE OVER THE BRITISH ISLES
Mean-sea-level isobars are at 5-mb intervals and 500-mb contours are at intervals
of 40 geopotential metres.

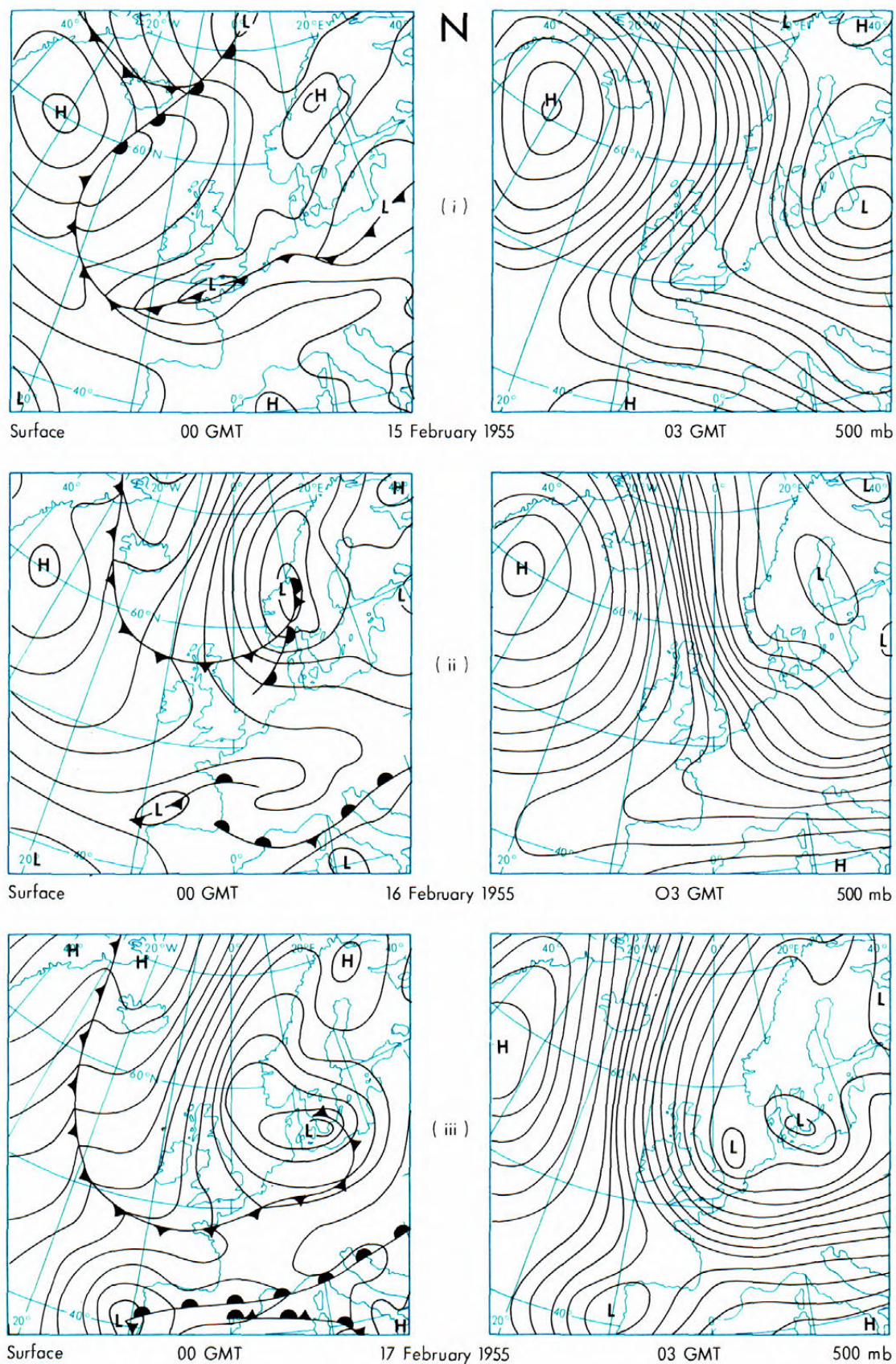


FIGURE 5. NORTHERLY (N) TYPE OVER THE BRITISH ISLES
Mean-sea-level isobars are at 5-mb intervals and 500-mb contours are at intervals of 40 geopotential metres.

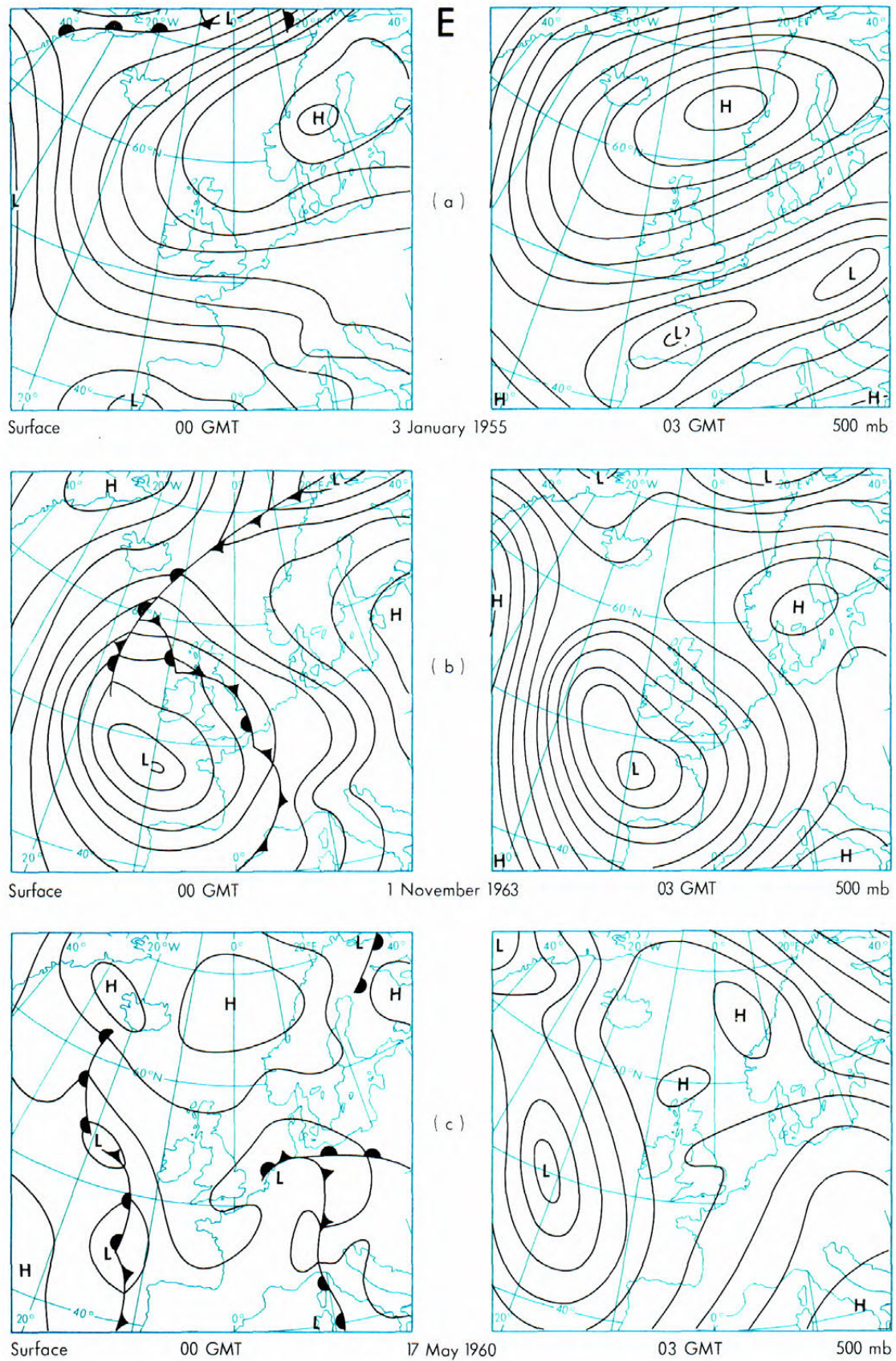


FIGURE 6. EASTERLY (E) TYPE OVER THE BRITISH ISLES

Mean-sea-level isobars are at 5-mb intervals and 500-mb contours are at intervals of 40 geopotential metres.

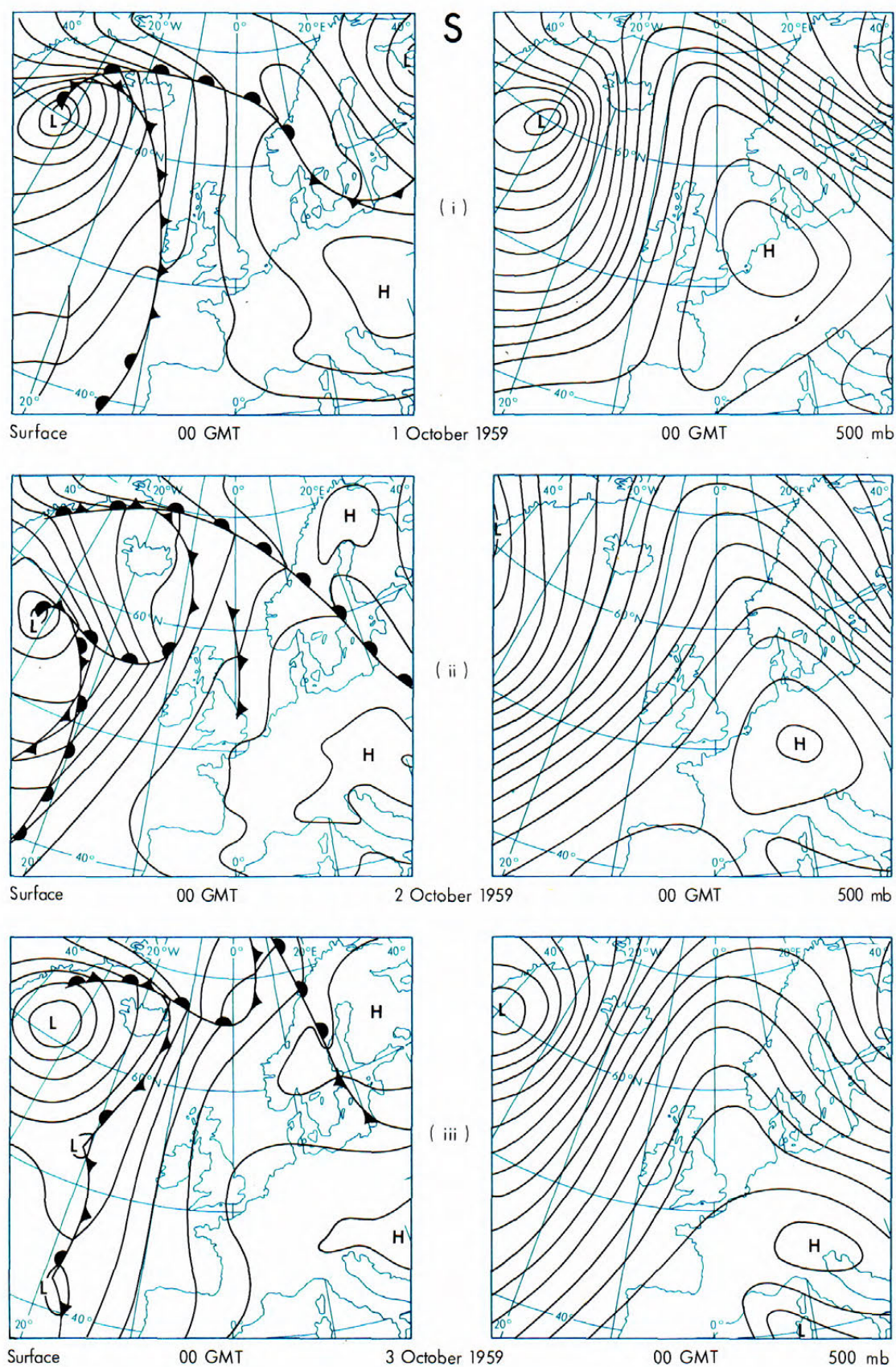


FIGURE 7. SOUTHERLY (S) TYPE OVER THE BRITISH ISLES
Mean-sea-level isobars are at 5-mb intervals and 500-mb contours are at intervals
of 40 geopotential metres.

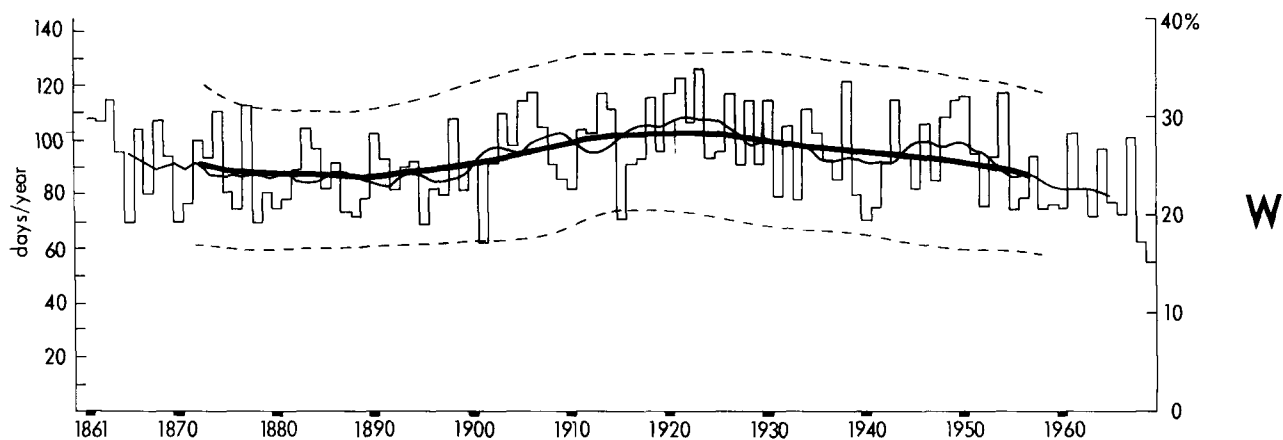


FIGURE 8. FREQUENCY OF THE WESTERLY TYPE OVER THE BRITISH ISLES

┌─┐ yearly frequency — 10-year averages — 25-year averages
 - - - departure from the 25-year mean amounting to twice the standard deviation

An allowance is made for the appropriate share of hybrids involving Southerly, Anticyclonic or Cyclonic.

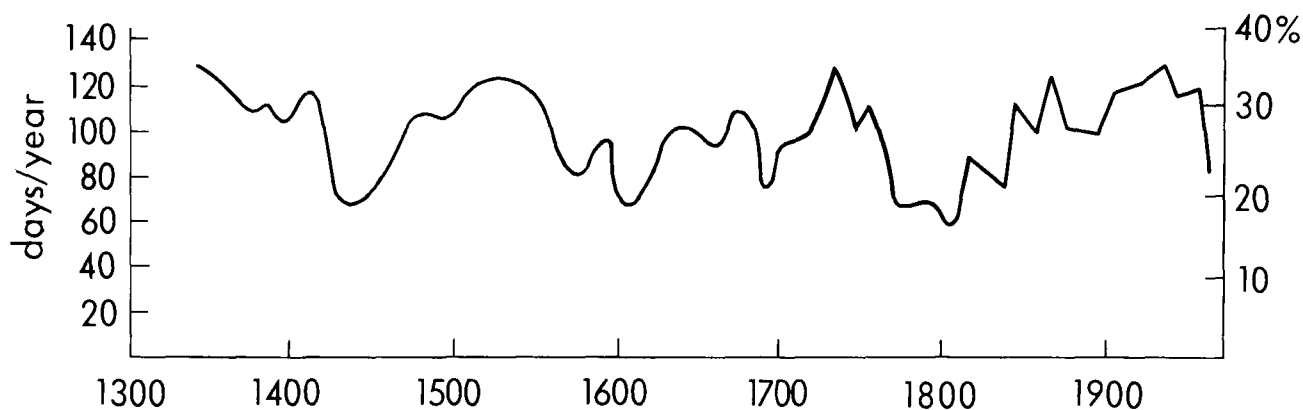


FIGURE 9. FREQUENCY OF SOUTH-WESTERLY SURFACE WINDS IN SOUTH-EASTERN ENGLAND SINCE 1340

— 10-year averages, observed or estimated

This is a composite record based on:

- (i) Daily observations (midday or afternoon observations whenever possible) in or near London since 1670, worked up partly by Professor G. Manley and partly by the Meteorological Office.
- (ii) Provisional estimates for earlier years derived from indirect evidence which includes some weather diaries in other parts of England and western Europe.

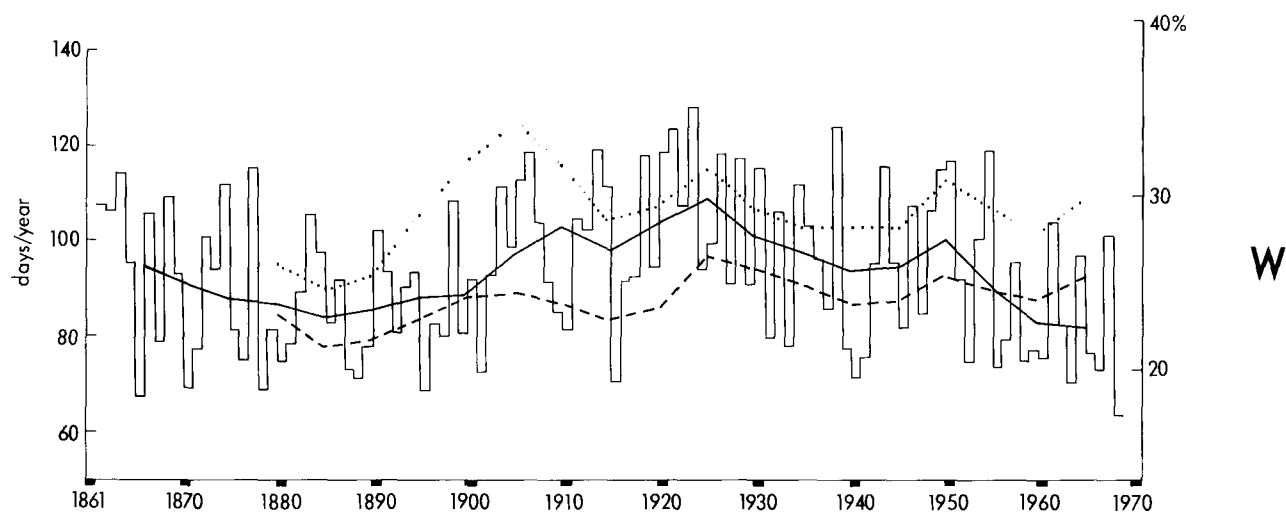


FIGURE 10. FREQUENCY OF THE WESTERLY TYPE OVER THE BRITISH ISLES
COMPARED WITH THE FREQUENCY OF THE GRADIENT WIND FROM THE SOUTH-WEST AND FROM
ANY WESTERLY POINT

- yearly frequency
- 10-year averages plotted at the mid-point of each 10-year period
- - - frequency of the gradient-wind (isobar) direction at 08 GMT from the south-west
- gradient-wind (isobar) direction at 08 GMT from any westerly point

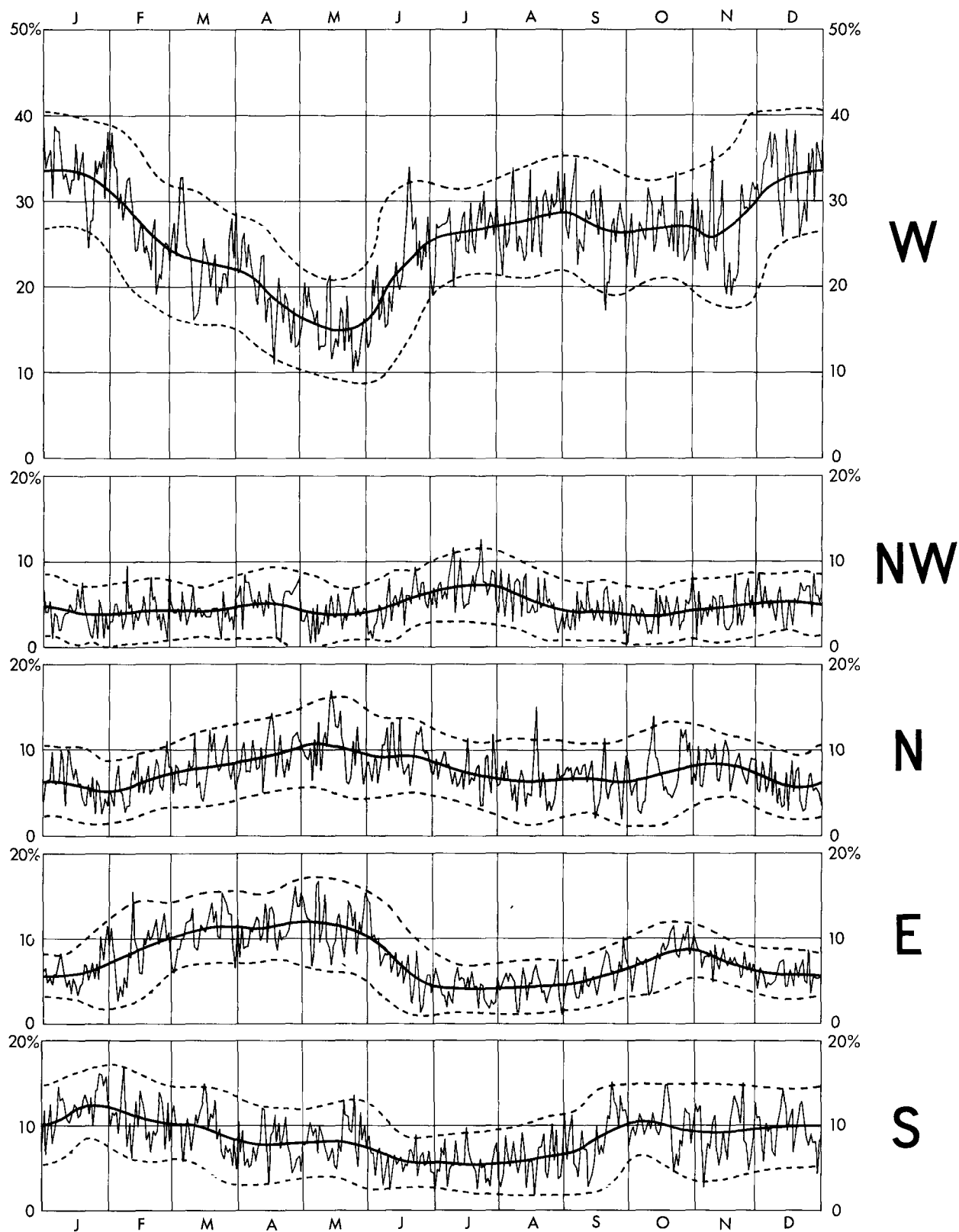


FIGURE 11(a). FREQUENCY OF EACH OF THE 7 BASIC WEATHER TYPES ON EACH DAY OF THE YEAR; 1868-1967

— yearly frequency — 29-day averages
 - - - departure from the 29-day average amounting to twice the standard deviation

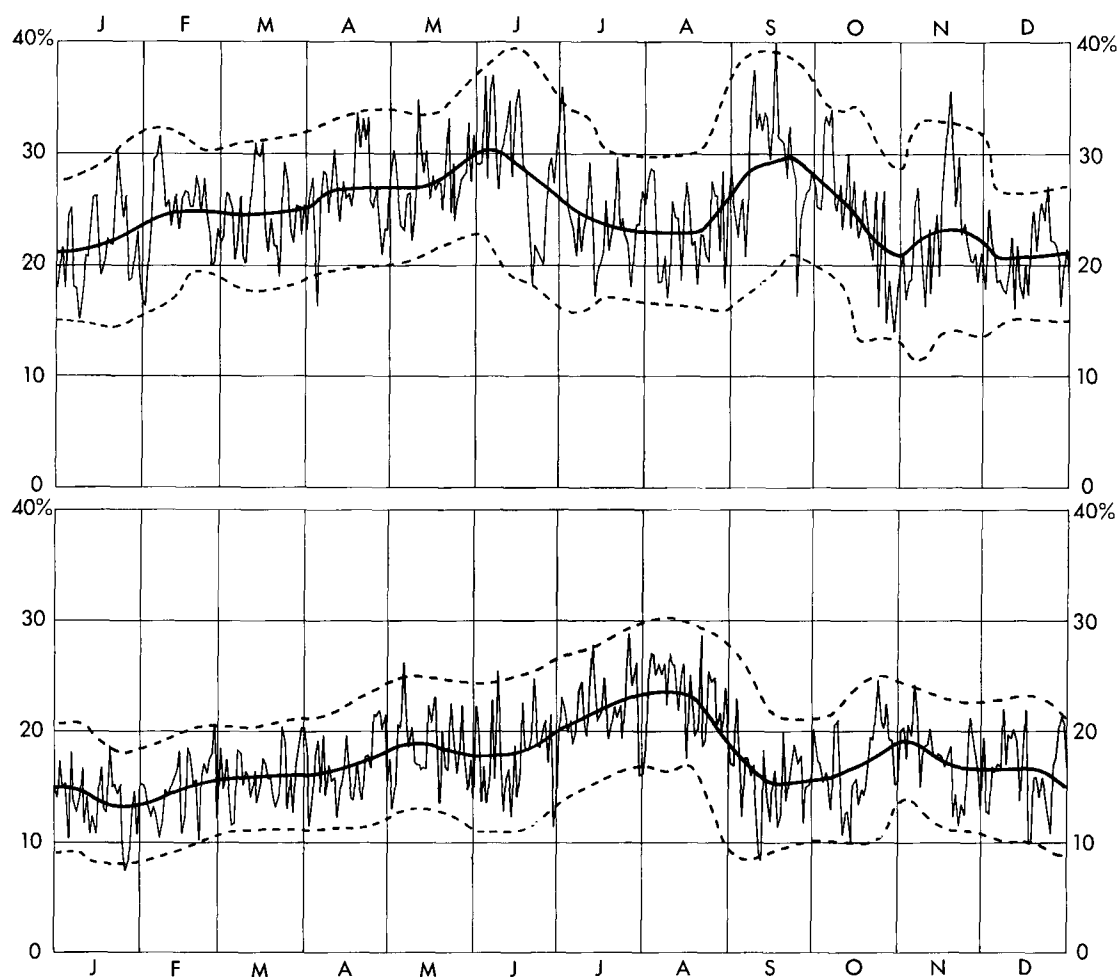
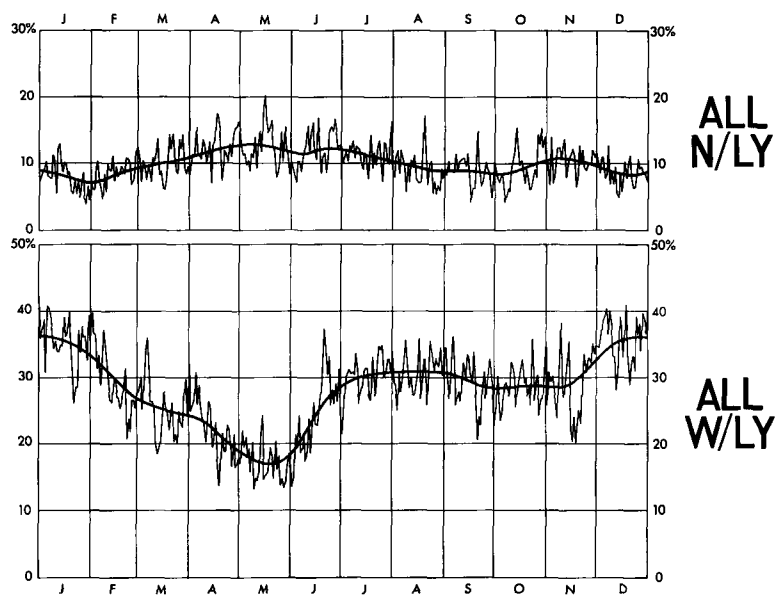
FIGURE 11(a) *contd*

FIGURE 11(b). FREQUENCY OF WESTERLY AND NORTHERLY TYPES ON EACH DAY OF THE YEAR; 1868-1967

— yearly frequency

— 29-day averages

--- departure from the 29-day average amounting to twice the standard deviation

The grand totals include appropriate shares of all classifications that include North-westerly.

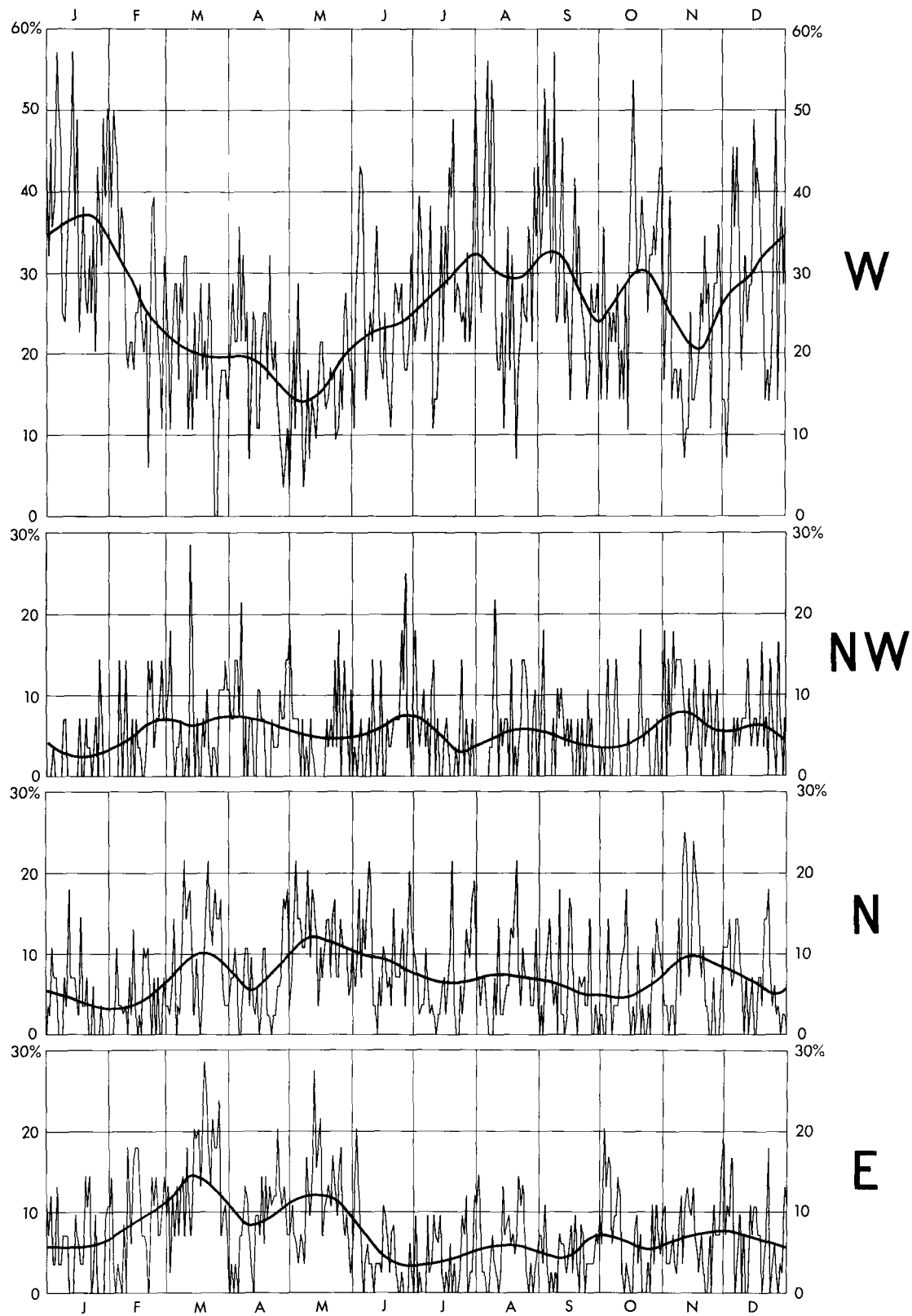
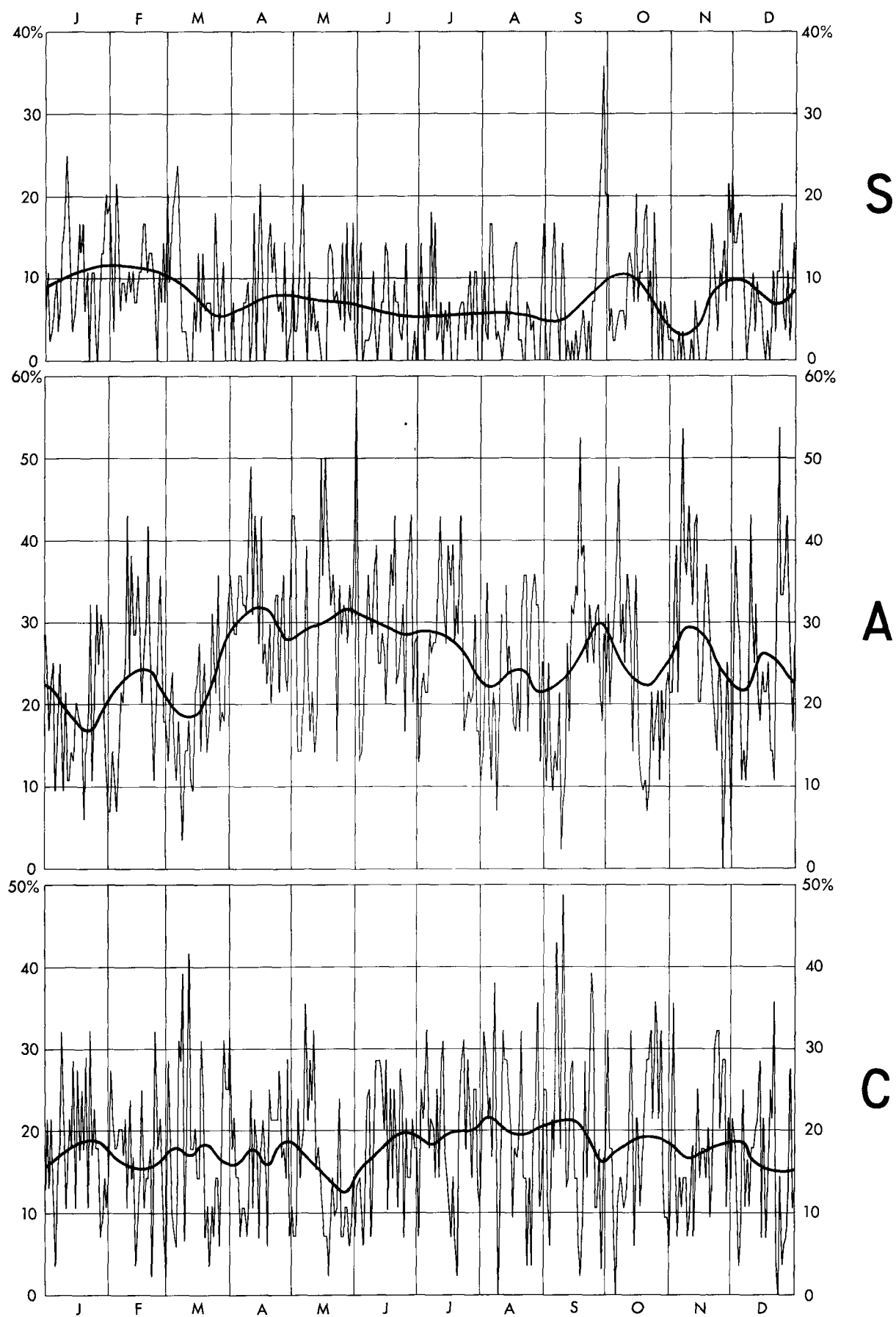


FIGURE 12. FREQUENCY OF EACH OF THE 7 BASIC WEATHER TYPES
ON EACH DAY OF THE YEAR; 1861-1874

—□— yearly frequency — 29-day averages
 - - - departure from the 29-day average amounting to twice the standard deviation
 1861-1874 is considered as a 'Westerly epoch' - see page 11.

FIGURE 12 *contd*

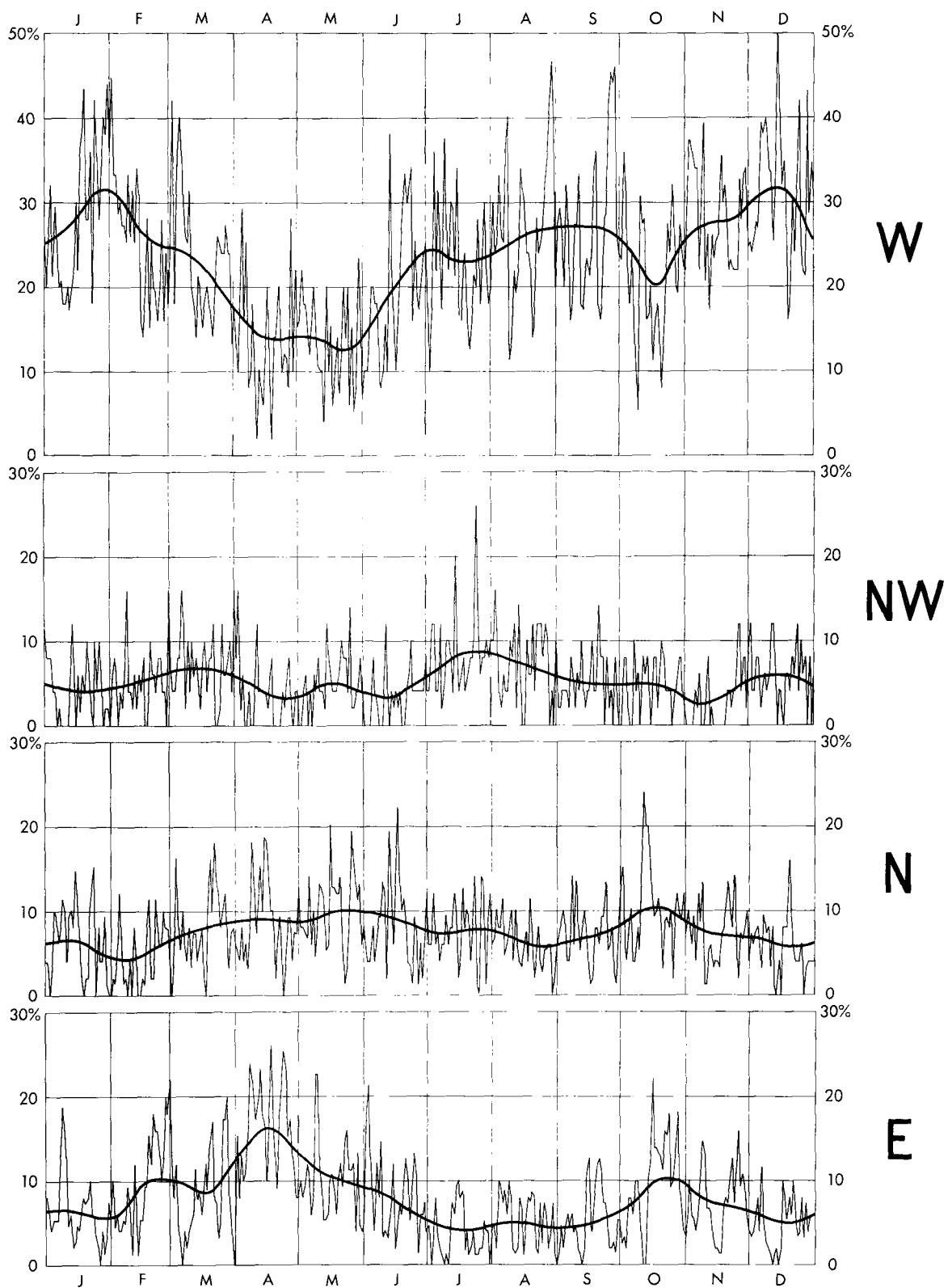
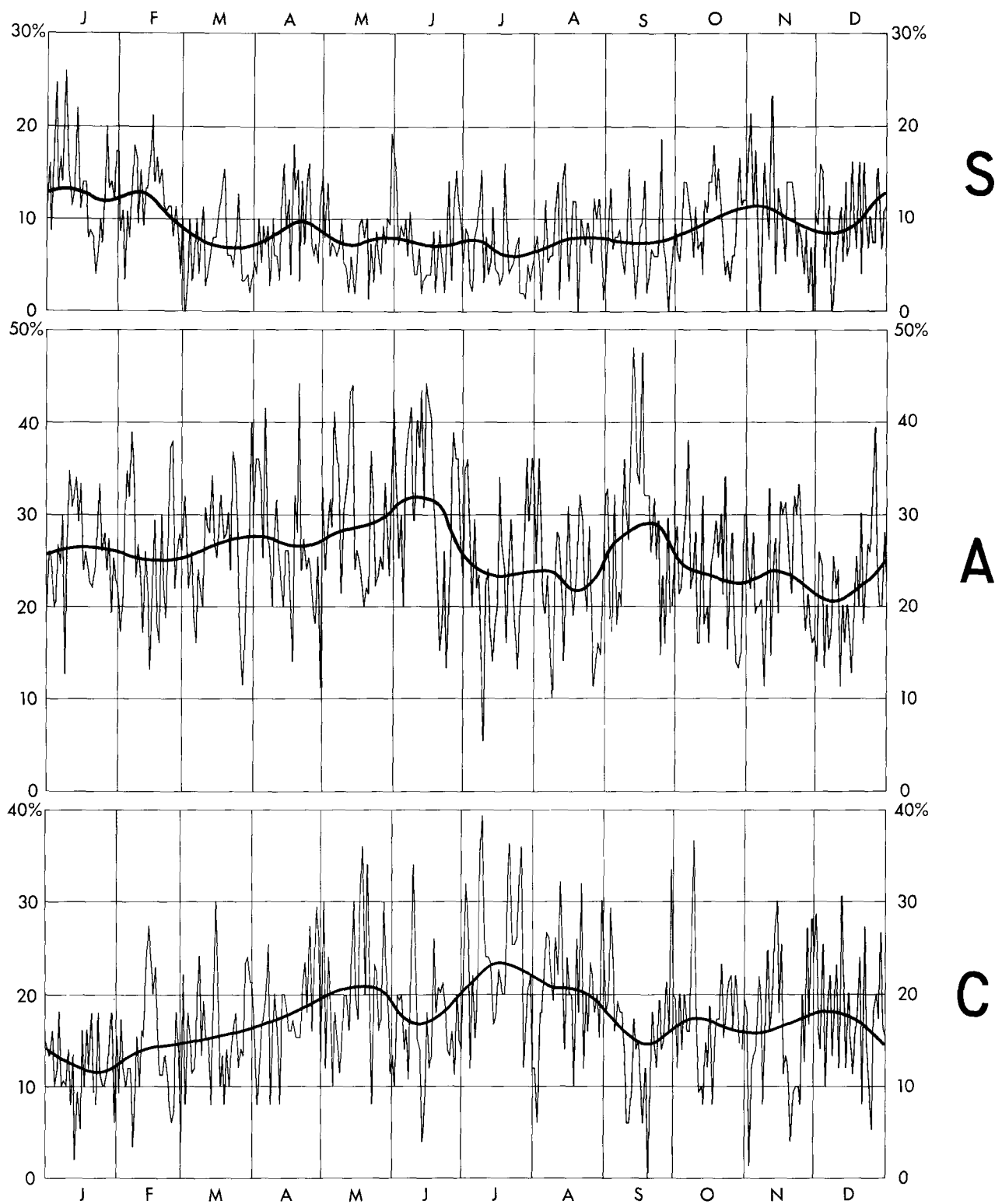


FIGURE 13. FREQUENCY OF EACH OF THE 7 BASIC WEATHER TYPES
ON EACH DAY OF THE YEAR; 1875-1899

— yearly frequency — 29-day averages

— — — departure from the 29-day average amounting to twice the standard deviation

1875-1899 is considered as a 'Blocking epoch' - see page 11.

FIGURE 13 *contd*

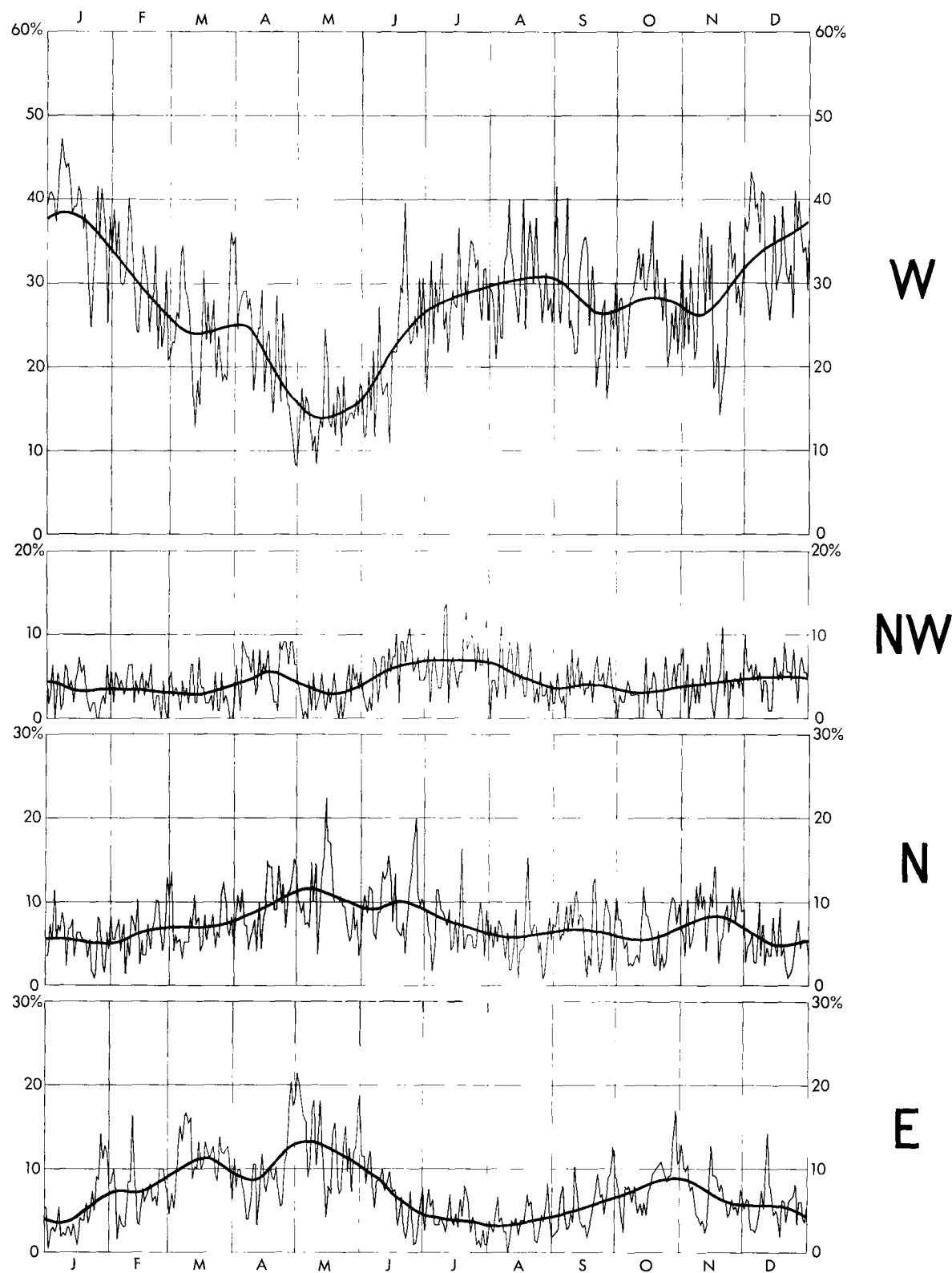


FIGURE 14. FREQUENCY OF EACH OF THE 7 BASIC WEATHER TYPES
ON EACH DAY OF THE YEAR; 1900-1954

— yearly frequency — 29-day averages
— — — departure from the 29-day average amounting to twice the standard deviation
1900-1954 is considered as a 'Blocking epoch' - see page 11.

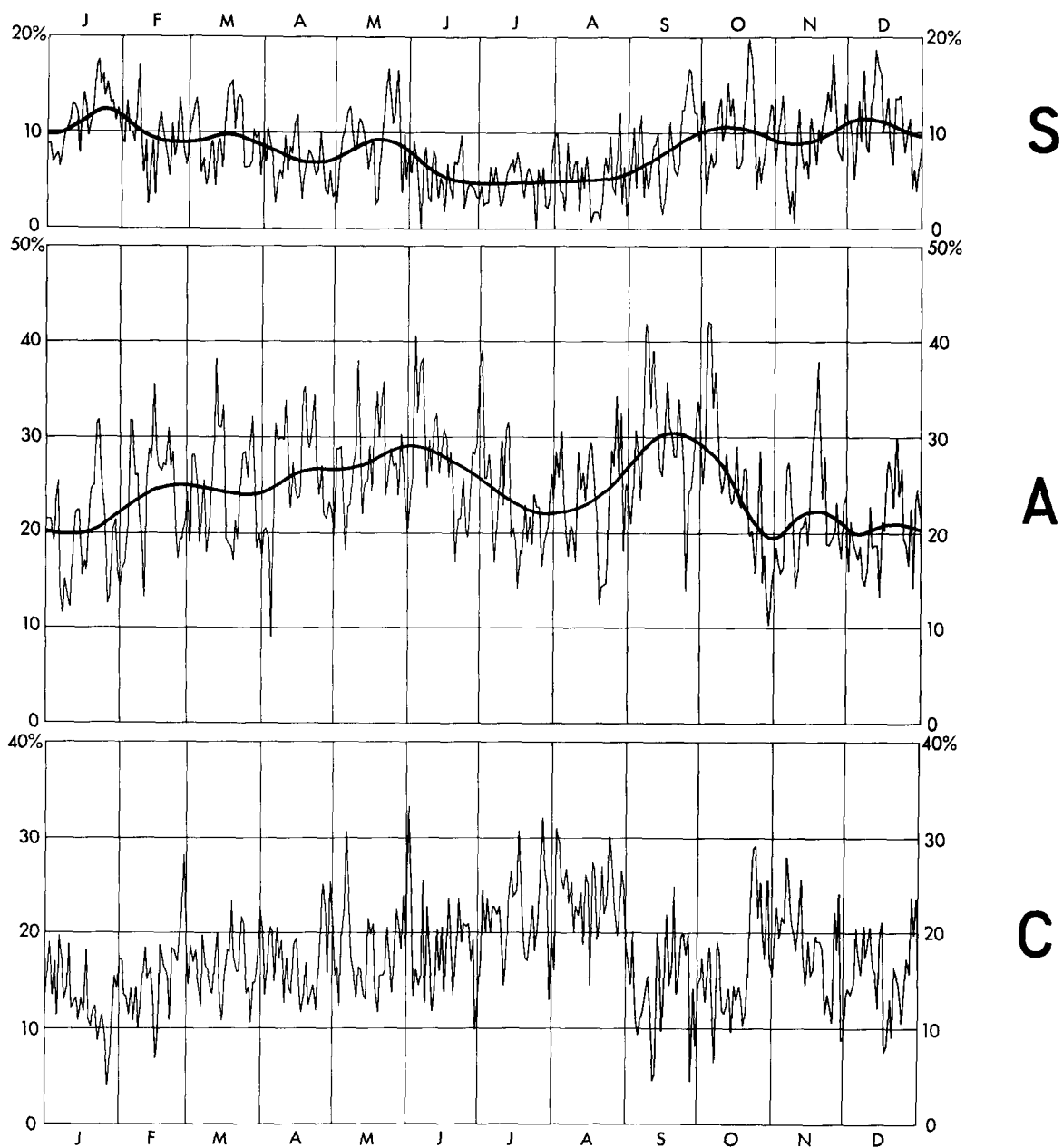


Figure 14 contd

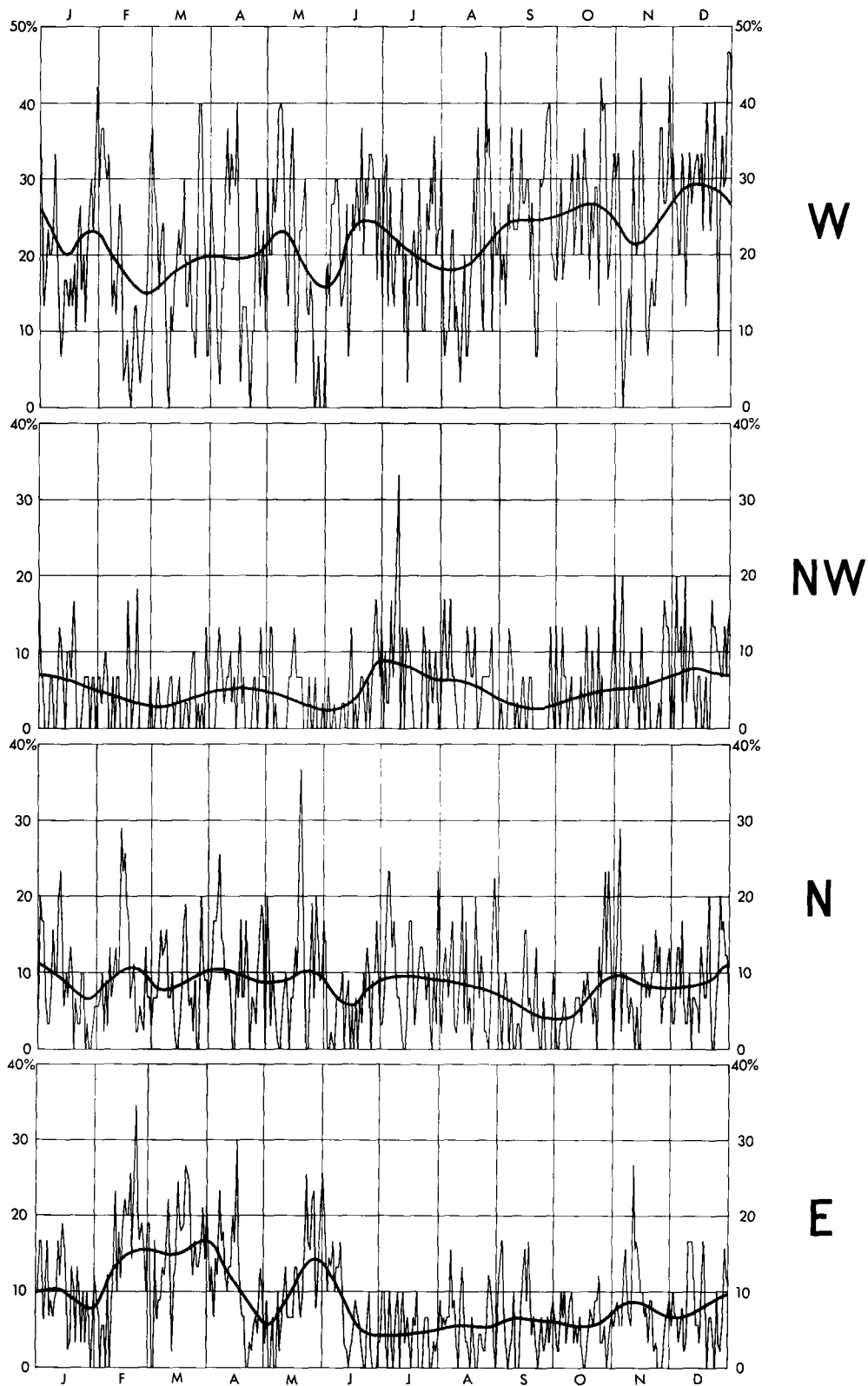


FIGURE 15. FREQUENCY OF EACH OF THE 7 BASIC WEATHER TYPES
ON EACH DAY OF THE YEAR; 1955-1969

—□— yearly frequency — 29-day averages
 - - - departure from the 29-day average amounting to twice the standard deviation
 1955 to date is considered as a 'Blocking epoch' - see page 11.

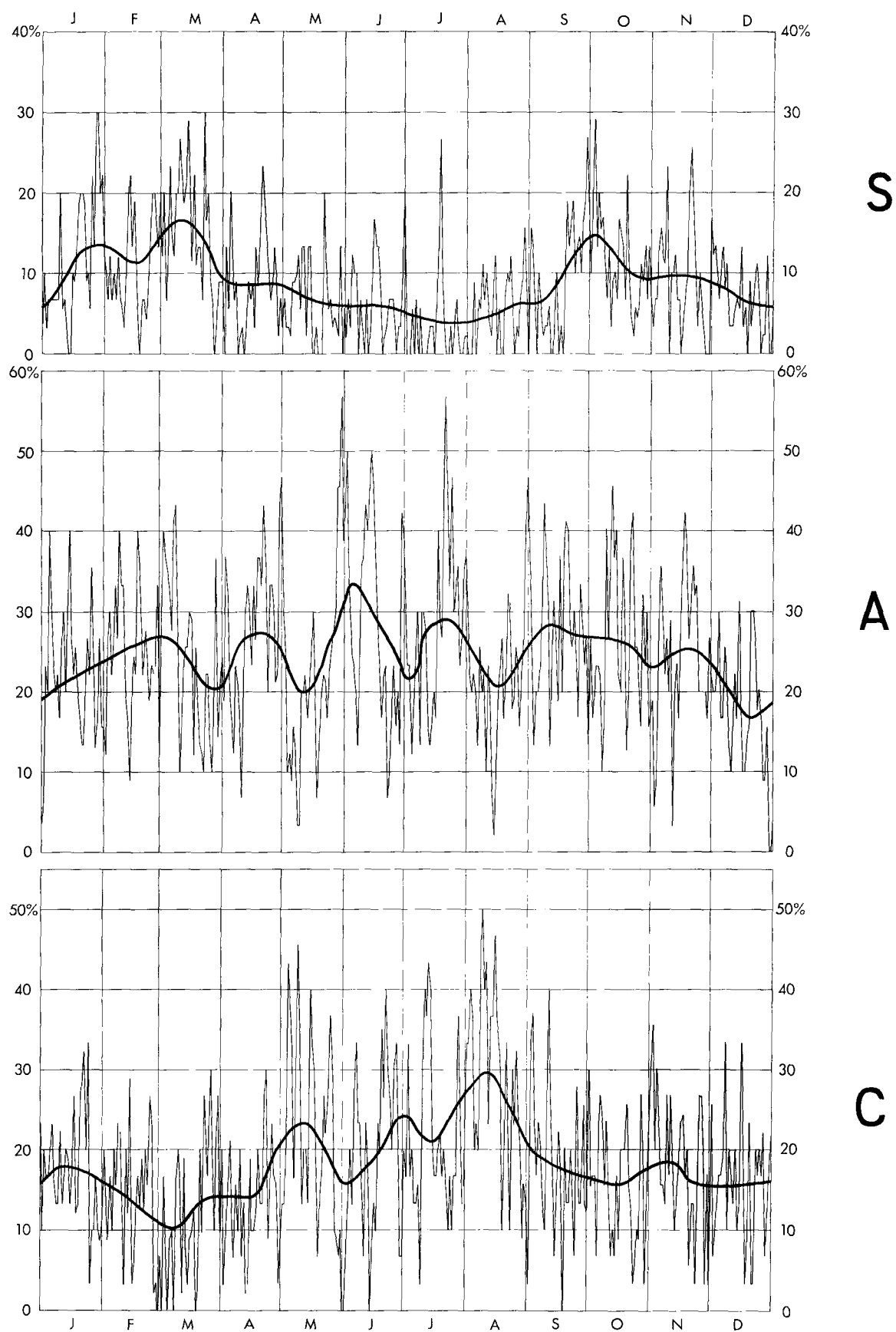


Figure 15 contd

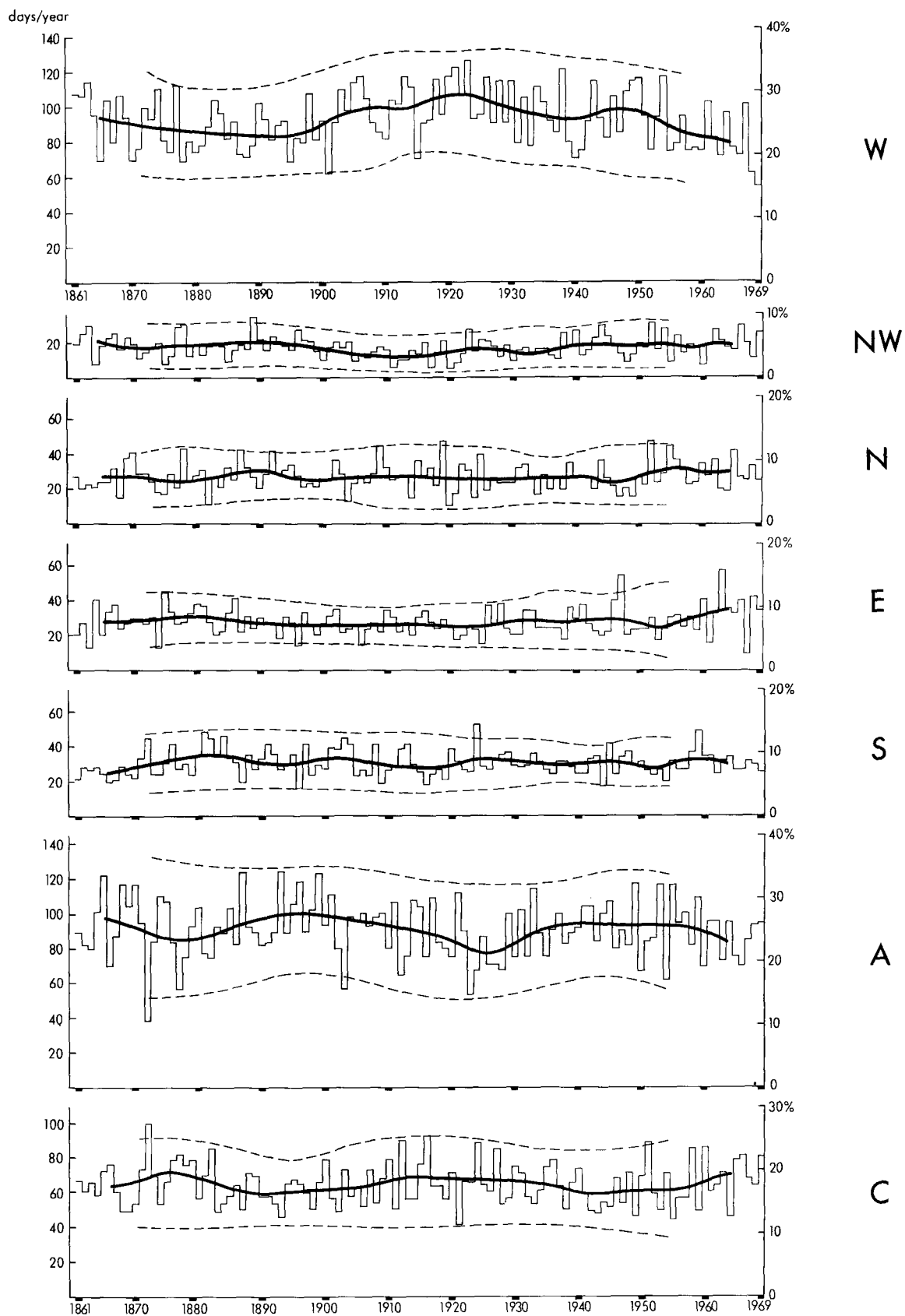


FIGURE 16(a). HISTOGRAMS GIVING YEARLY FREQUENCIES OF EACH OF THE 7 BASIC WEATHER TYPES

yearly frequency ——— mean of the yearly frequency
 - - - departure from the yearly mean amounting to twice the standard deviation

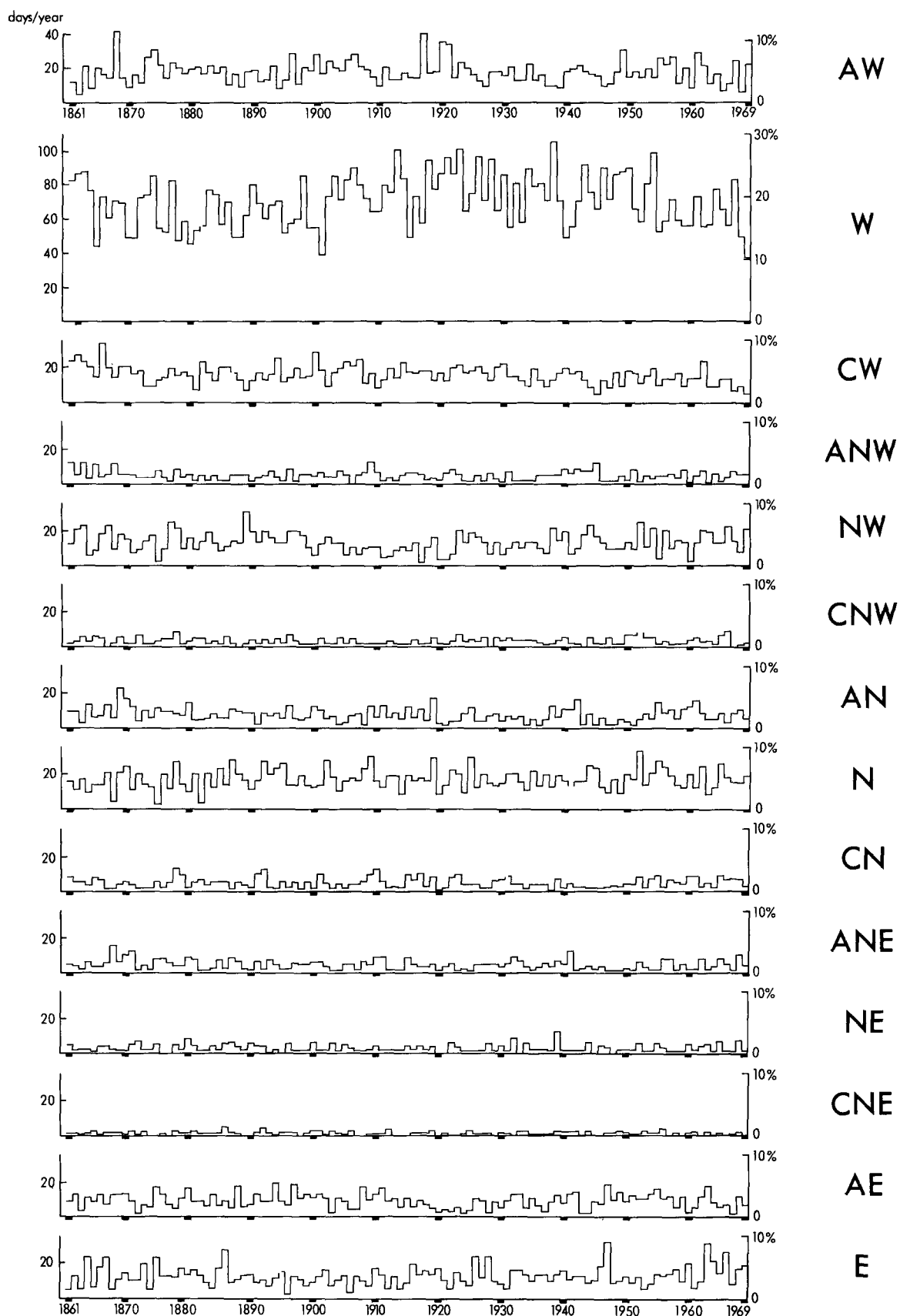


FIGURE 16(b). HISTOGRAMS GIVING YEARLY FREQUENCIES OF EACH OF THE 27 PURE AND HYBRID CLASSIFICATIONS

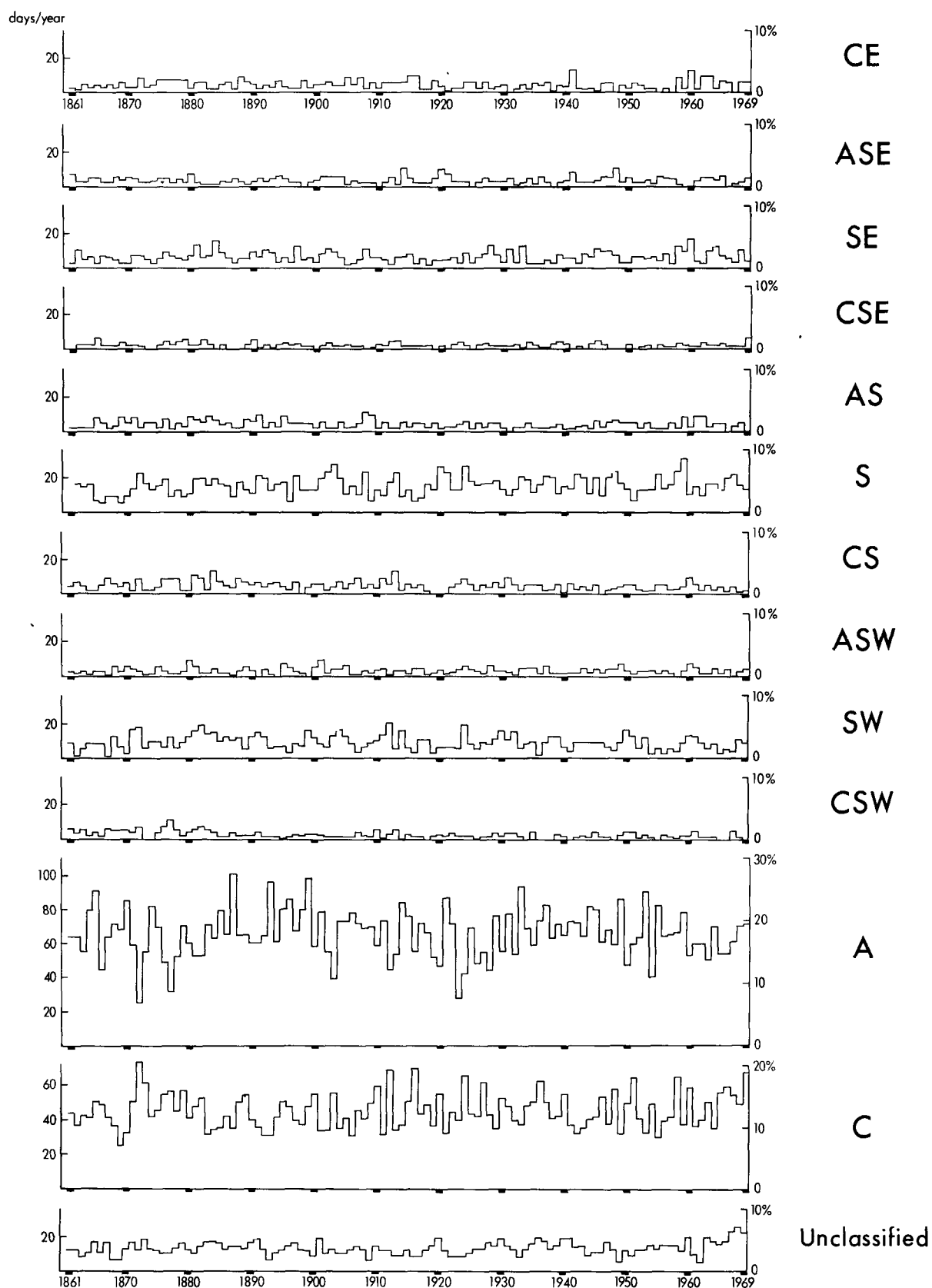


FIGURE 16(b) *contd*

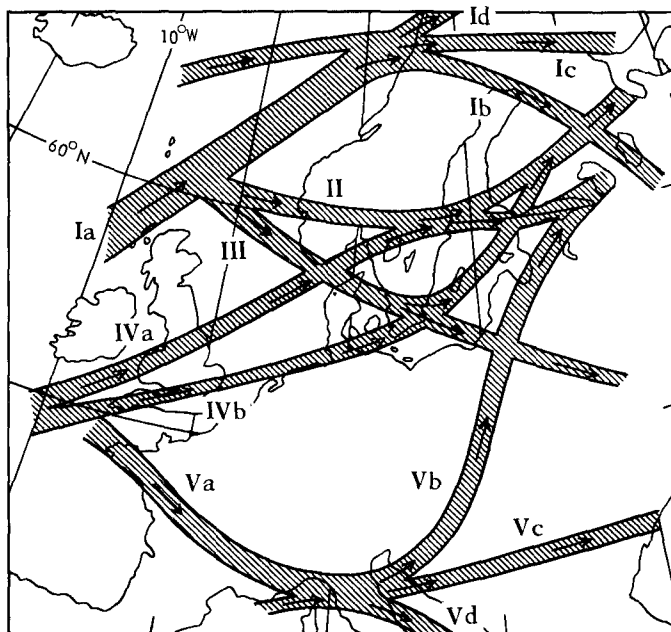


FIGURE 17. VAN BEBBER'S¹⁸ TRACKS OF BAROMETRIC PRESSURE MINIMA
These tracks are based on daily isobaric analyses of the years 1876–1880.

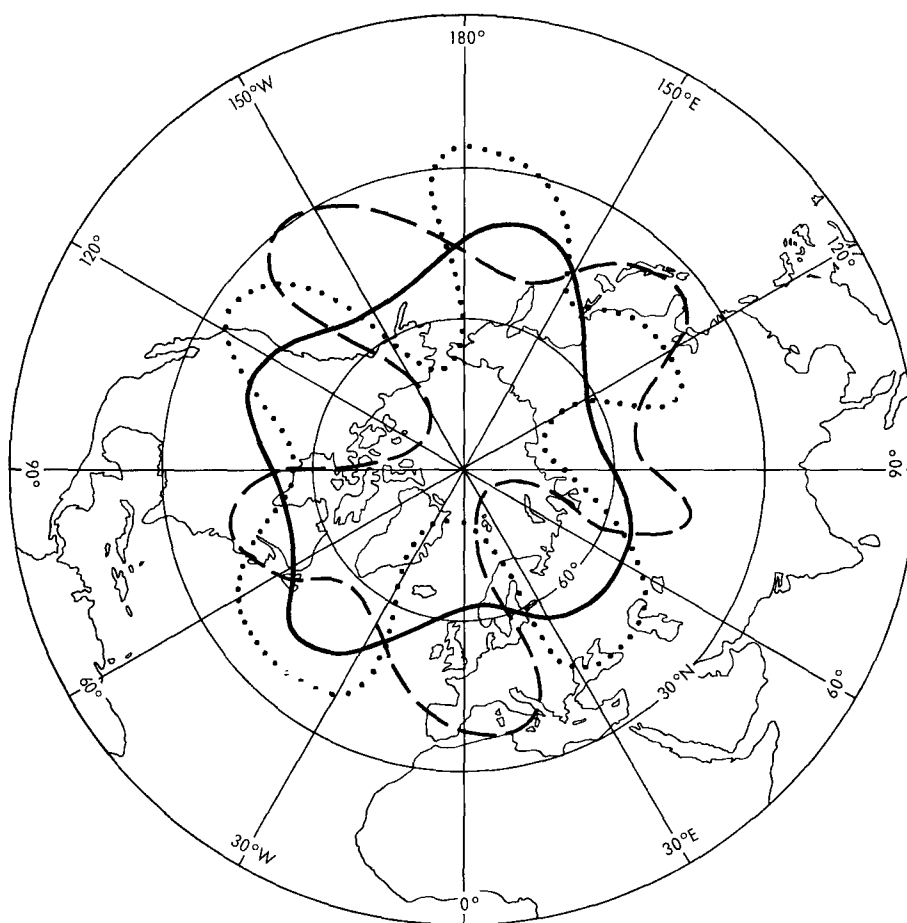


FIGURE 18. IDEALIZED 500-mb CONTOUR DEFINING THE VANGENGEJM TYPES
W, C AND E OVER THE NORTHERN HEMISPHERE

—— type W - - - type E type C

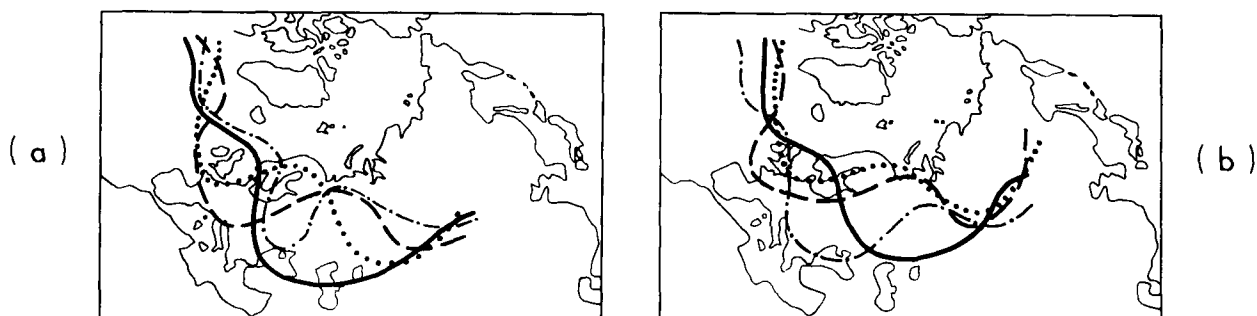


FIGURE 19. IDEALIZED 500-mb CONTOUR DEFINING THE KAC TYPES W, E, C AND M

(a) Winter half year (b) Summer half year
 ——— type W - - - type E . - . - . type M type C

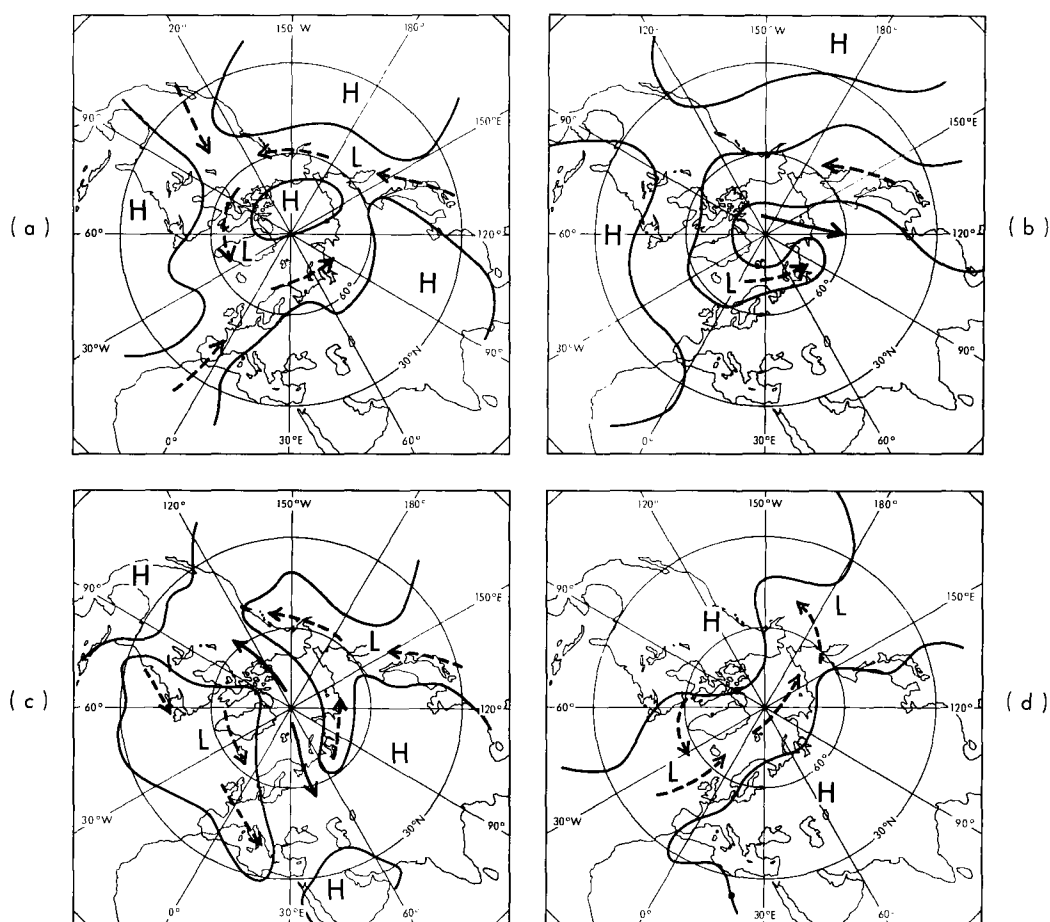


FIGURE 20. THE 4 MAIN GROUPS OF CIRCULATION TYPES OVER THE NORTHERN HEMISPHERE RECOGNIZED BY DZERDZEEVSKIJ

(a) Zonal (b) Violation of zonality (c) Meridional (d) Mixed
 ———→ anticyclonic tracks - - -→ cyclonic tracks

JANUARY

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
1861	C	AE	A	A	ASE	(-)	A	AS	ASW	A	W	W	(C)	E	E	AE	AE	A	ASW	(AW)	W	AW	SW	CSW	C	W	(W)	W	S	SW	SW		
1862	A	A	AN	N	(N)	W	W	W	CE	W	CW	CW	C	A	A	AS	S	S	(S)	SE	E	C	CS	C	(AW)	SW	W	W	CW	W	W		
1863	W	W	CW	(W)	CS	C	C	C	CE	(A)	SW	W	W	A	A	A	A	(SW)	NW	CNW	W	W	CW	W	(W)	AW	W	CW	AW	W	(W)		
1864	E	ASE	(A)	A	A	A	A	A	S	(S)	A	-	A	ASE	S	S	(S)		SW	SW	W	W	W	(W)	AW	W	CW	A	W				
1865	(A)	CW	CNW	W	W	W	AW	(W)	W	W	W	C	W	CW	(W)	NW	N	CN	CN	N	-	(A)	-	CSE	-	C	CN	AW	(C)	C	C		
1866	CW	W	W	CW	W	-	(W)	CW	NW	C	CN	W	W	(CW)	W	CW	W	W	W	W	(W)	W	ANW	A	AW	A	A	(W)	W	W	CS		
1867	CN	CNE	N	A	SE	CS	C	C	CE	CN	N	N	N	N	AN	ANE	W	CE	E	E	S	S	-	-	-	CW	NW	W	W	W	W		
1868	A	AE	AE	AE	E	AE	AE	E	SE	S	C	C	C	CW	W	W	W	CW	CW	C	C	-	-	-	CW	NW	W	W	AW	W	W		
1869	W	W	CW	W	W	W	W	AW	A	S	S	AS	AS	CS	C	CSW	C	ASW	AS	AS	A	A	AS	A	W	W	SW	CSW	W	W	CSW		
1870	C	C	CW	CW	W	W	CW	C	N	W	W	W	W	C	W	ASW	A	A	E	A	A	AN	A	A	A	A	A	A	AS	S	S	CSW	
1871	S	-	SW	-	W	W	W	CNW	C	A	W	A	W	W	W	W	C	C	C	C	-	C	CNE	E	A	A	A	A	A	ASE	SE	SE	
1872	SW	W	W	CW	W	W	W	SW	-	A	N	W	W	W	W	ASW	W	CSW	CW	-	-	CS	C	C	C	C	-	W	W	SW	SW	SE	
1873	W	W	W	W	W	W	SW	SW	CS	SW	SW	W	W	W	W	CW	C	W	W	CW	CNW	C	W	-	A	S	S	S	S	E	E	E	
1874	AW	W	W	C	W	W	AS	S	W	A	AW	W	AW	AW	W	C	W	W	W	W	AW	A	W	NW	AW	NW	W	A	AW	A	A	A	
1875	S	W	W	W	W	S	CS	S	S	S	S	S	S	S	S	W	W	W	W	C	C	W	C	C	C	C	A	ASW	W	A	A	ASW	
1876	CW	AS	W	AS	AS	ASE	AE	E	A	S	-	W	A	A	A	AW	W	W	W	C	-	A	W	W	AS	S	S	W	S	AS	S	S	
1877	C	-	SE	C	C	S	CS	CSW	C	E	C	C	S	W	W	SW	SW	S	CW	AW	A	S	W	W	W	W	W	W	W	W	CNW	W	A
1878	AW	AW	CW	-	W	W	CNW	N	AN	A	A	AW	W	NW	W	NW	ANW	AW	ASW	W	W	W	CW	NW	N	N	W	W	CW	ANW	A	W	A
1879	CN	-	C	AN	A	A	SE	E	E	CSE	-	AW	W	W	CW	-	AS	C	ASE	SE	E	AE	A	A	W	A	A	A	A	AE	AE	AE	AE
1880	W	W	AW	ASW	ASW	ASW	A	AS	AS	A	ASE	AS	A	AN	AN	CN		A	A	A	A	AN	A	A	A	AS	AS	A	A	SW	SW	ASW	
1881	AW	AW	AS	A	A	A	AE	A	A	A	ANE	N	C	CNE	N	-	C	CE	CE	CN	ANE	AN	AN	A	A	A	S	C	C	CS	SW	CSW	
1882	CW	W	NW	W	W	W	W	CW	W	W	W	AS	S	S	AS	A	AW	A	A	A	AW	A	A	A	A	AS	AS	SW	CW	C	E	ASE	
1883	W	W	AW	AS	W	A	A	A	ASE	E	SE	SE	SE	W	W	W	SW	SW	SW	AW	AS	AS	S	SW	W	C	CW	W	CW	W	W	-	
1884	AE	SE	CS	S	SW	CW	W	W	W	W	W	ANW	W	W	A	A	AW	AW	AW	W	W	W	C	W	W	W	W	CW	W	W	S	S	
1885	SE	SE	CS	SW	W	W	W	W	W	CW	CN	N	AN	ANE	AE	A	AE	E	E	SE	S	SE	SE	CSE	S	S	C	C	S	S	S	S	
1886	W	W	W	W	N	CN	A	N	N	CW	-	ANW	NW	A	W	W	W	CNW	CN	CE	CNE	E	CE	CE	S	S	SW	W	CW	W	CW	CW	
1887	A	CSW	CW	C	C	C	C	C	C	-	CW	A	A	A	A	S	SW	W	W	W	ANW	AW	A	S	S	SW	SW	W	AW	SW	W	W	
1888	S	C	W	S	C	W	W	W	AW	A	A	A	A	A	A	AE	AE	A	A	A	W	W	AW	W	W	W	W	ANW	ANE	A	AW	C	C
1889	A	A	A	A	A	A	AW	S	CW	C	-	E	A	A	AS	C	AW	W	NW	NW	AN	A	A	ANW	AW	ANW	A	W	W	W	W	W	
1890	A	A	S	CS	S	SW	SW	CSW	SW	W	W	AW	W	SW	W	S	S	CW	W	W	W	CW	C	W	W	W	NW	C	A	AW	AW	AW	
1891	S	-	W	N	ANE	A	A	W	-	A	A	A	A	N	N	N	A	A	W	W	NW	W	CW	W	W	SW	W	W	SW	W	W	W	
1892	NW	NW	CN	NW	NW	N	N	CN	N	CNE	AN	N	A	W	-	SE	SE	SE	CS	-	-	W	W	W	W	W	W	W	W	W	W	W	
1893	E	A	CN	A	A	SE	SE	SE	E	ANE	ANE	AN	NW	N	A	CNW	-	-	AW	NW	ANW	W	W	W	W	W	W	W	W	W	W	W	
1894	AN	AE	AE	E	E	C	-	S	S	S	S	CSW	S	C	SW	SW	CW	CW	W	CW	W	N	W	W	W	W	W	W	W	W	W	CW	
1895	NW	NW	CN	N	N	C	N	A	A	A	A	CS	S	CS	CSE	C	C	C	C	C	N	N	C	N	N	N	N	C	N	C	ASE	AE	
1896	AS	AS	A	A	ASE	A	A	ANE	A	A	A	AW	NW	CNW	CW	W	W	W	W	AW	A	A	W	C	-	-	-	SW	AW	A	A	A	AE
1897	A	ASW	A	S	S	SE	E	E	E	CSE	A	A	N	AN	ANE	A	A	A	AE	E	ANE	ANE	NW	NW	NW	NW	NW	N	N	W	C	C	C
1898	-	C	A	W	W	CW	AW	S	A	A	AW	W	A	A	A	A	AW	W	W	W	W	AW	AW	A	A	A	A	A	A	W	W	W	C
1899	C	C	W	W	AW	-	S	S	S	CW	W	CW	W	W	W	C	W	W	W	SW	C	C	N	A	A	A	A	A	A	ANE	A	A	A

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

JANUARY

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
1900	C	C	C	CNE	A	CW	CW	W	W	ANW	AW	AW	W	CW	W	W	W	W	W	AW	W	W	W	W	AW	W	W	W	CNE	NE	E	E
1901	CW	W	A	AS	AS	SE	SE	SE	CS	C	-	ASE	S	S	S	S	SW	SW	C	W	W	W	W	W	W	W	W	CNE	NE	N	N	
1902	W	C	W	W	NW	ANW	AW	AW	W	W	A	A	A	A	AW	A	A	A	A	AW	W	W	W	W	W	W	W	C	ANW	A	A	
1903	W	W	C	W	C	A	C	-	C	N	A	A	A	A	SE	S	S	S	S	SE	S	W	W	W	W	W	W	W	W	W	W	
1904	SE	S	S	CS	SE	A	SW	W	W	W	CW	W	CW	CNW	NW	NW	AW	ANW	A	A	A	A	A	A	S	S	SW	W	W	SW	C	
1905	A	AW	AW	W	CW	W	W	W	W	W	W	W	A	S	S	CS	C	C	W	A	SE	A	AW	W	A	A	AW	AW	AW	W	W	
1906	S	S	CS	CW	CW	C	CW	CW	W	W	W	W	W	W	W	W	W	W	C	N	N	A	A	AW	W	W	W	W	W	W	AW	
1907	W	CW	NW	AW	W	W	AW	AW	W	W	AW	W	W	W	AW	A	A	A	AS	A	A	-	A	AW	AN	W	W	W	NW	N	AN	
1908	E	A	A	A	A	CW	C	C	ANE	A	A	S	S	S	W	W	W	W	AW	A	A	AS	AS	AS	AS	W	W	W	N	NW	NW	
1909	ASW	AW	AW	A	A	AW	W	N	ANW	W	W	W	CW	W	W	W	W	W	AW	A	A	A	A	AS	A	A	A	A	NW	AN	ANW	
1910	AW	W	AW	A	A	A	ASW	SW	W	W	W	NW	W	W	W	W	W	W	CNW	N	CN	A	W	C	CN	-	C	C	N	W	W	
1911	AN	AN	AE	A	A	CW	W	W	W	AW	C	N	A	A	A	AW	AW	AW	A	AW	A	A	SW	A	CE	C	ANE	W	A	AS	A	AN
1912	AW	W	W	W	CW	C	-	W	C	S	SW	SW	S	W	S	S	SE	CSE	S	E	A	A	AE	CE	C	AN	A	CS	S	W	W	
1913	W	SW	W	SW	CW	SW	SW	S	S	SE	CSW	C	CSE	CS	S	CS	C	C	W	C	C	W	C	C	C	AN	A	W	W	W	SW	
1914	A	ANW	ANW	W	W	W	W	W	W	SW	SE	ASE	A	AE	A	A	AE	A	A	ASE	A	A	S	SW	SW	W	W	W	W	W	W	SW
1915	CS	SW	C	C	W	W	CW	CW	CN	W	CW	W	W	W	W	N	N	W	ANW	W	CNW	CN	NE	A	A	-	E	A	A	A	CW	
1916	CW	W	W	W	W	W	W	NW	AW	W	NW	W	N	AW	AE	W	AE	AE	AE	W	W	W	ASW	AE	W	W	A	SW	ASW	AS	AS	
1917	AW	W	W	N	AW	NW	CW	C	N	-	CW	CN	CN	NE	AE	A	AE	AE	AE	ASE	AE	AE	AE	AE	AE	AE	SE	E	E	E	N	
1918	A	AN	AN	A	A	W	N	N	W	NW	W	CNW	CN	W	C	W	CW	C	A	ANW	W	NW	A	W	SW	SW	SW	SW	S	AS	AS	
1919	W	C	C	C	CNE	C	C	C	C	CW	CSW	W	-	SW	W	W	NW	A	AW	C	-	A	A	A	A	W	W	CW	NE	E	AE	
1920	-	W	C	E	A	A	W	W	W	C	CW	W	CW	AW	W	W	W	W	W	W	AW	AW	W	W	W	W	W	W	W	C	C	W
1921	W	C	W	W	W	W	CW	W	W	W	CW	C	C	W	W	W	W	W	W	W	W	W	W	C	W	W	W	W	W	W	W	C
1922	W	NW	N	N	N	W	W	W	W	W	NW	A	-	-	CW	C	CW	W	CS	S	S	SE	SE	SE	SE	SE	CSE	CS	S	CS	W	
1923	W	W	W	W	W	W	W	W	W	CW	N	AN	AW	W	NW	A	A	ANW	W	W	W	W	SW	S	W	W	AW	AW	W	W	W	W
1924	W	W	W	AS	AS	S	S	CSE	E	C	SW	S	C	S	S	SE	SE	S	CW	W	S	SW	S	W	W	W	ASW	AW	AW	AW	AW	
1925	W	CW	W	CW	W	AW	AW	W	W	AW	A	S	S	SW	W	ASW	W	W	A	S	S	SW	CW	A	SE	E	SE	W	W	W	W	
1926	W	C	CW	CW	W	W	W	W	S	S	S	SE	AE	AE	C	C	C	C	W	W	-	W	C	W	W	W	W	W	W	C	S	
1927	W	W	W	N	W	W	CNW	W	W	W	W	W	C	C	C	W	C	N	A	CW	W	W	W	SW	SW	C	W	W	CW	W	CW	
1928	S	W	W	W	W	W	W	W	W	CW	W	W	CW	W	C	C	-	S	W	SW	SW	W	W	W	W	W	W	W	W	W	W	
1929	A	A	A	A	A	E	AE	A	AS	C	AE	A	ANE	N	N	AN	W	W	SW	S	SE	AE	NE	N	N	N	N	-	CS	S	S	
1930	W	W	W	SW	CW	W	W	W	W	W	W	C	W	C	-	AS	S	SW	W	W	W	W	S	SW	S	-	NE	-	SW	SW	CS	
1931	C	C	C	N	A	A	A	A	A	ANW	W	CN	N	NW	NW	W	N	NW	W	W	W	W	S	SW	W	NW	W	W	C	-	C	C
1932	W	W	W	W	W	W	W	W	SW	CSW	W	SW	W	SW	SW	W	SW	SW	W	AS	SW	AW	A	AS	W	A	A	A	A	AW	A	A
1933	S	SW	SW	SW	W	W	W	W	W	AW	A	AW	A	W	C	W	C	W	-	ASE	A	A	A	A	A	A	A	A	A	C	W	W
1934	AW	W	W	W	W	W	W	W	W	ASW	S	W	W	C	W	W	W	W	ASW	A	A	A	ASW	AS	S	W	-	A	A	A	AN	
1935	W	ANW	W	N	N	N	E	A	ASW	SW	W	NW	NW	NW	A	A	A	A	A	A	A	A	ANW	W	W	N	AN	A	A	A	W	NW
1936	C	C	-	W	C	C	C	S	C	W	-	A	A	A	A	-	CN	N	-	-	C	W	-	W	C	CS	S	CS	C	C	C	CW
1937	W	W	W	W	W	W	W	W	AW	ASW	S	S	W	W	W	W	W	W	W	SW	S	S	S	SW	-	S	SE	E	E	S	S	S
1938	AN	AN	A	A	A	W	W	W	W	C	W	W	W	W	C	CW	W	W	W	W	AW	SW	SW	SW	W	W	W	W	NW	NW	CW	W
1939	C	CN	C	C	-	AW	W	W	W	CW	C	CN	-	SW	CSW	SW	C	C	-	-	SW	C	CNW	W	W	C	CNE	NE	AE	AE	E	E

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

JANUARY

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
1940	A	A	AE	ASE	S	S	SW	A	A	ASE	A	A	A	A	N	N	AN	-	C	-	NE	AN	AW	C	-	S	-	SE	SE	SE	E	
1941	E	A	A	A	A	A	A	ANE	A	ANE	ANE	A	A	A	N	N	-	CSE	A	-	CE	C	-	CSE	C	SE	SE	SE	SE	SE	-	
1942	AW	AW	W	C	C	C	ANE	AN	A	A	A	W	W	W	S	C	A	A	S	-	S	SW	W	W	W	W	W	W	W	W	C	
1943	C	N	-	C	C	C	CSE	E	S	S	CS	C	W	-	A	AS	CS	S	SE	S	CSW	C	W	ASW	SW	W	W	SW	W	W	C	
1944	NW	W	NW	A	AW	W	W	C	C	A	S	SW	W	W	A	AS	SW	W	CW	W	W	W	W	W	CW	W	W	W	W	W	W	
1945	A	AW	W	N	NW	NW	N	N	N	N	ANE	AE	A	A	AN	NW	NW	C	N	N	N	-	C	C	E	-	E	AE	A	CW	C	
1946	SE	ASE	A	W	W	W	SW	W	W	W	W	A	A	ASE	A	A	ASE	E	A	ASE	A	AE	CW	W	W	CSW	W	W	W	W	CW	C
1947	W	W	S	S	SE	S	S	S	W	W	W	CW	C	W	SW	W	W	AW	A	ASE	A	AE	W	AE	SE	AE	AE	E	E	CE	-	
1948	W	W	W	C	C	C	C	C	C	C	C	W	W	C	-	-	CW	W	W	W	C	C	SE	S	SE	S	S	S	C	W	W	
1949	C	N	W	C	CW	W	W	N	NW	W	W	W	W	W	W	NW	W	W	W	W	AW	AW	W	A	A	ASW	SW	ASW	A	A	ANW	
1950	A	W	NW	W	W	CW	SW	S	-	W	W	A	W	W	W	NW	AN	A	A	ASE	A	A	A	A	A	SE	S	SE	S	CS	C	
1951	C	C	-	W	SW	C	C	W	SW	C	W	CW	W	W	W	AW	W	NW	NW	AW	W	W	-	A	A	-	W	-	A	W	CW	
1952	CW	C	N	W	W	W	W	W	W	W	N	N	W	W	W	W	C	N	A	AE	A	-	C	NE	N	N	-	CW	C	W	W	
1953	N	A	AE	A	NW	CN	AN	A	NW	AW	ASW	W	A	AW	AW	AW	AW	A	A	A	A	A	AW	A	W	W	W	W	W	W	N	
1954	A	A	AN	A	A	N	AN	A	NW	NW	AW	W	W	W	W	W	NW	AW	W	-	A	ASE	SE	S	S	W	-	E	CSE	E	E	
1955	SE	E	E	E	E	E	-	A	S	C	N	CN	A	CNE	S	C	N	N	AN	A	S	SW	C	A	AW	ASW	W	S	SW	S	CS	
1956	NW	A	AW	A	A	A	AN	N	-	C	C	C	-	C	CNW	NW	AW	N	NW	CW	C	-	C	N	N	A	CW	-	S	W	C	
1957	S	W	CW	W	CW	W	AW	W	W	AN	A	NW	AN	A	ANE	A	A	A	A	AW	W	CW	C	C	W	W	W	W	W	W	W	
1958	-	AE	SE	S	W	CW	NW	W	CW	CW	NW	N	A	A	A	ANW	NW	NW	NW	N	CN	CN	CN	C	S	S	S	SW	W	A	A	
1959	CW	N	N	CN	-	C	CN	N	N	AN	N	N	N	A	ANE	A	W	SW	S	C	C	C	N	AN	A	A	A	S	AS	A	A	
1960	-	C	W	CW	A	A	A	AE	AE	A	N	N	C	E	NE	N	N	CNW	C	W	SW	SW	SW	C	W	-	CE	C	C	S	S	
1961	W	CW	C	CN	CW	CN	W	C	C	-	A	AW	AW	A	A	ASE	N	S	CS	C	W	SE	SE	SE	SE	A	W	CW	CW	W	CW	
1962	N	A	A	A	AW	W	W	W	W	CW	C	W	W	W	SW	W	C	W	CW	W	W	CW	W	C	CW	W	A	A	A	ASW	W	
1963	E	E	E	C	E	E	E	AE	AE	AE	AE	AE	ANE	ANE	AN	NW	-	A	AE	E	SE	A	A	A	A	AN	A	A	AN	CNE	NE	
1964	W	SW	SW	A	A	A	A	A	A	A	A	AE	E	E	E	SE	ASE	S	SW	AW	A	A	A	ANW	A	AW	W	W	W	W	W	
1965	N	N	N	A	AW	AW	W	W	W	W	W	C	CW	CW	W	W	CW	NW	-	C	-	C	W	-	A	AE	E	E	A	NE	ANE	
1966	W	C	-	A	S	S	S	S	S	SE	E	E	AE	AE	ANE	E	A	A	A	CE	C	E	E	-	C	AE	C	C	S	W	-	
1967	N	AN	AN	A	AN	NW	C	ANE	AN	NW	NW	ANW	ANW	A	A	AS	CS	CSW	S	S	CSW	CS	C	C	S	-	S	S	S	S	CSW	
1968	C	CNW	C	W	C	C	-	W	-	AN	A	A	W	W	CW	CW	C	W	AW	A	A	ANW	ANW	ANW	NW	NW	W	W	AW	W	CW	
1969	A	ANW	A	W	C	CE	C	C	C	S	CSE	S	SE	C	C	C	C	C	-	-	S	SW	SW	AW	ASW	SW	S	SW	C	NW	W	
1970	N	N	N	N	CN	CN	A	SE	C	S	C	C	CSE	CS	C	C	SE	S	S	S	SW	S	C	C	C	W	A	AS	SE	-	NE	
1971	AN	ANW	A	A	-	S	SW	SW	SW	AS	SE	S	S	S	C	W	S	W	CW	-	CE	C	W	CW	C	C	W	C	C	C	C	

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

FEBRUARY

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
1861 W	AW	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
1862 CW	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
1863 W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
1864 CW	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
1865 C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
1866 CSW	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
1867 W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
1868 CW	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
1869 C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1870 S	CS	CS	S	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS
1871 E	A	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
1872 SW	CW	CW	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S	S
1873 E	CE	CE	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN
1874 A	AW	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
1875 AW	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
1876 SW	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
1877 W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
1878 A	ANW	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
1879 SE	CSE	CSE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE	CE
1880 ASW	ASW	ASW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW
1881 CSW	S	S	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS	CS
1882 A	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW	AW
1883 -	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C	C
1884 C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1885 SW	CS	CS	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
1886 NW	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
1887 W	SW	SW	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
1888 AN	A	A	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
1889 W	NW	NW	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN	CN
1890 W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
1891 W	AW	AW	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
1892 W	CNW	CNW	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
1893 W	CW	CW	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
1894 W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
1895 E	CE	CE	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E
1896 A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A
1897 C	C	C	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
1898 W	W	W	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW	NW
1899 E	ANE	ANE	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

FEBRUARY

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29
1900	E	E	CE	CNE	NE	N	AN	A	-	C	C	C	S	A	CS	C	CW	C	C	C	W	C	CS	CS	CS	C	CE	CE	NE
1901	-	C	C	CN	CN	AN	ANW	ANW	ANW	ANW	ANE	ANE	AE	A	A	C	AN	A	A	C	A	A	AN	-	CS	CS	C	CE	CS
1902	AE	AE	E	A	A	-	C	C	N	N	N	A	AN	A	A	S	A	A	A	SE	SE	S	S	S	SE	SE	CS	CS	S
1903	CW	W	W	W	W	W	W	W	W	W	W	W	A	ANW	AW	A	ASW	ASW	W	W	W	W	W	W	W	W	W	CS	
1904	C	CE	C	C	C	C	C	C	C	C	C	S	CW	CW	W	CW	C	N	W	W	CW	A	A	ASE	A	C	A	A	
1905	W	NW	W	W	W	W	AW	A	AW	W	AN	A	AW	AW	W	W	W	W	N	N	A	A	-	-	W	CW	C	C	
1906	W	W	N	AN	A	A	AW	W	W	C	C	CNW	CW	W	W	W	C	A	C	W	A	-	W	CW	W	C	W		
1907	A	A	A	AN	A	A	SW	W	W	W	W	C	N	N	AW	W	W	W	N	N	N	N	AN	AN	ANW	A	A	A	
1908	N	A	NW	A	A	ANW	ANW	NW	ANW	AW	AW	A	S	W	W	W	CW	NW	NW	W	W	W	NW	N	NW	W	W	CNW	
1909	ANW	W	W	W	NW	A	AS	AS	CW	C	E	AE	A	A	AN	A	A	AS	AS	AS	AS	A	A	AE	AE	AE	N	CE	
1910	W	W	CW	NW	W	W	C	N	A	W	W	W	W	W	W	W	W	CSW	CSW	SW	CW	CSW	W	W	CW	C	-	W	
1911	A	A	A	A	A	A	A	A	AS	W	A	AW	ASW	AW	AW	W	W	W	NW	AW	W	W	W	W	W	W	W	W	
1912	N	CNE	CNE	A	ASE	CS	S	S	CS	S	CSE	C	C	-	S	S	SW	-	C	C	W	SW	W	S	CS	C	N	ASW	
1913	W	W	W	W	W	W	SW	W	W	S	AS	A	A	A	A	AE	AE	AE	AE	A	A	A	S	S	CS	C	N	A	
1914	SW	SW	SW	SW	S	CS	CS	CW	-	SW	W	W	W	W	W	W	W	CW	CW	W	W	C	CW	-	A	AW	ASW	ASW	
1915	W	W	S	S	S	C	W	W	C	C	C	C	C	C	N	A	CSW	CSW	CW	C	CW	C	CN	A	A	W	W	W	
1916	AS	W	W	W	W	W	W	W	NW	W	C	W	W	W	W	CW	W	C	ANW	A	A	ANE	E	E	CE	CE	CE	CE	
1917	-	N	CW	N	A	A	A	A	A	A	ANE	AN	ANE	A	A	A	SE	S	S	C	-	A	W	W	W	AW	AW	AW	CE
1918	S	S	S	S	SW	W	W	W	W	W	W	W	C	A	AS	-	A	W	-	W	W	W	W	W	A	W	W	CN	
1919	AE	AE	A	A	C	-	A	ASE	A	A	AE	A	A	-	SE	CE	CE	-	S	C	C	C	CNW	-	CE	CE	CNE	-	
1920	W	W	W	AW	A	S	S	W	W	W	W	W	W	-	SW	S	S	-	-	E	A	A	A	S	-	W	AW	AW	W
1921	C	SE	AS	S	ASE	ASE	A	A	A	A	A	A	A	ANW	AW	AW	A	A	A	A	S	S	S	W	W	A	A	AW	W
1922	W	SW	C	C	A	A	S	AS	A	AS	A	-	W	AW	W	W	CW	C	W	W	SW	W	SW	SW	W	W	W	W	W
1923	W	W	W	AW	ASW	W	S	CS	S	S	C	CSW	S	-	S	S	C	CS	C	-	W	C	C	CSE	C	CS	C	C	C
1924	AW	AW	ANW	ANW	NW	NW	AW	S	CS	CSE	E	SE	E	A	NW	A	A	N	A	A	AN	AN	AN	N	N	A	N	NW	NW
1925	W	W	W	W	W	W	W	W	W	W	CW	W	C	C	C	C	C	CN	N	A	C	-	C	C	C	C	C	C	C
1926	S	S	E	-	S	CS	CSE	SE	E	E	E	AE	A	S	W	W	CW	W	W	W	SW	W	W	W	SW	W	CW	A	A
1927	C	-	W	AW	W	A	A	A	A	ASE	A	ASE	A	AW	W	A	AW	A	A	W	W	S	CS	C	CS	C	C	C	C
1928	W	CW	W	W	W	W	W	W	W	CW	C	CW	W	W	W	W	W	AW	A	A	AS	A	ASE	SE	SE	SE	SE	SE	SE
1929	CS	S	S	A	AW	A	S	W	W	-	SE	-	ASE	A	CSE	A	A	SE	SE	SE	AS	A	SE	E	E	E	AE	A	A
1930	CE	CE	C	C	CNE	NE	ANE	A	A	A	A	A	A	W	N	AN	A	A	A	A	A	A	ASE	SE	SE	-	A	A	A
1931	CW	C	A	A	A	C	W	SW	W	W	CW	CNW	N	NW	W	CNW	CN	A	A	W	W	W	W	AW	W	N	C	CN	
1932	A	A	A	A	A	A	A	AN	E	E	NE	ANE	ANE	A	A	A	A	A	A	A	A	AN	N	NE	ANE	AE	E	E	E
1933	W	W	W	W	W	W	CW	W	W	-	A	A	A	AN	AN	A	N	N	N	A	N	N	-	C	C	CSE	CSE	CSE	S
1934	A	A	A	A	A	A	AW	NW	W	W	A	A	A	A	A	A	A	A	A	ANW	AW	A	A	W	W	-	N	N	N
1935	W	NW	W	CNW	CNW	-	A	A	A	AW	W	W	W	CW	W	W	W	SW	W	W	W	C	N	C	C	W	S	CSW	CSW
1936	C	N	N	A	-	AS	AS	A	E	ASE	AE	A	-	CS	C	-	S	C	C	C	C	C	C	C	A	W	C	CE	CN
1937	C	SW	SW	W	CW	W	C	C	C	NW	W	W	CW	W	W	W	CW	W	W	NW	W	N	-	-	CS	C	C	CE	CN
1938	W	NW	W	W	W	A	AS	-	W	N	N	N	N	AE	A	AE	E	AE	AE	W	W	ANE	A	S	S	CW	W	W	W
1939	SE	AS	A	SW	SW	SW	SW	SW	W	W	W	W	NW	AW	W	W	NW	W	W	AW	CS	C	C	C	W	W	W	W	C

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

		FEBRUARY																														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29		
1940	E	SE	SE	SE	S	C	S	C	-	ASE	A	E	AE	ANE	N	-	-	C	C	C	S	S	CSW	CW	-	S	S	C	C	ANE		
1941	CN	CNE	AN	A	W	W	W	CW	W	W	W	AW	S	CS	A	S	CE	C	CE	CN	CN	S	CSW	C	CN	A	A	SW	C	W		
1942	CNW	C	CW	-	A	AN	AN	-	AN	AN	N	ANW	NW	N	W	NW	ASE	A	AE	AE	A	E	E	NE	NE	A	A	AW	-			
1943	W	W	W	W	W	CW	CN	A	W	CW	NW	W	W	W	W	W	N	AW	A	AW	A	A	AW	AW	W	W	A	A	A			
1944	W	W	W	NW	N	A	AW	W	NW	NW	N	A	A	A	A	-	W	A	A	A	A	AE	ANE	NE	NE	ANE	N	N	CNE	A	NW	
1945	C	C	W	W	W	W	W	W	W	W	W	W	C	W	AW	A	S	SW	ASW	ASW	AW	AW	AW	W	A	W	W	W	AW			
1946	W	C	W	W	W	W	W	W	CW	NW	NW	AW	A	A	A	A	AW	ANW	NW	NW	N	N	NW	C	-	C	NE	N	N			
1947	SE	SE	CE	CE	E	E	E	E	E	E	E	E	E	E	E	E	AE	E	E	E	E	E	NE	E	A	-	C	C	C	N		
1948	W	W	W	W	W	W	W	CW	W	W	CW	W	W	W	CW	-	AE	ASE	ASE	AE	AE	E	E	AN	A	ASE	ASE	SE	S	ASE		
1949	A	A	A	A	A	A	AS	SW	W	CW	AW	AW	W	W	W	W	AW	ASW	W	W	W	W	W	W	AW	AW	W	N	NW			
1950	CSW	SW	SW	CS	C	C	C	W	W	W	W	CW	C	C	W	W	W	SW	W	W	C	A	A	-	-	C	E	A	A	W		
1951	W	CSW	CW	C	W	C	W	W	C	C	-	CE	CE	CE	C	C	CS	CW	CW	CW	W	C	CNW	CNW	W	C	NW	CNW	A	A	A	
1952	W	W	N	A	A	W	W	NW	N	AN	CNW	C	N	CNW	C	NW	NW	NW	AN	A	A	A	AW	A	A	A	A	A	A	A	A	A
1953	AN	ANE	A	AN	A	N	N	A	W	W	C	CNE	NE	AN	C	A	A	W	W	W	W	W	W	W	W	SW	SW	ASW	A	A	A	A
1954	A	A	A	A	A	A	-	CW	W	C	C	CE	-	C	CE	A	A	W	C	C	W	W	W	W	W	W	W	C	CN	N		
1955	C	CS	C	C	C	CN	A	W	CW	CN	N	N	CN	N	CN	N	N	N	C	NE	C	E	E	E	E	E	E	SE	A	ASE		
1956	AE	AE	A	AW	AW	AW	A	A	A	AE	AE	E	N	N	CNE	NE	AN	AE	AE	AE	CNE	E	E	ANE	ANE	AE	A	A	A	W	W	
1957	W	W	S	S	SW	CW	S	W	W	CSW	W	W	C	C	C	N	CN	CN	CN	C	-	A	E	-	-	C	C	A	A	AS		
1958	W	AW	A	AW	AW	NW	-	E	C	C	CS	SW	W	S	C	CW	NW	N	AN	ANW	NW	CNW	-	C	C	CE	N	W	W	W		
1959	A	A	A	AE	AE	AE	AS	SE	A	-	A	A	S	S	S	ASW	A	AW	A	A	A	W	ANW	AW	W	AW	W	W	SW	SW		
1960	SW	SW	SW	W	W	W	A	A	A	A	N	CN	CE	CE	N	N	N	CNW	C	C	CW	-	E	-	CS	C	-	W	SW	SW		
1961	C	C	NW	C	W	W	CW	W	W	W	W	W	SW	SW	CW	ASW	AS	AS	AW	AW	A	A	ASE	SE	CS	S	CSW	W	W	W		
1962	NW	AW	W	CW	W	W	W	C	NW	AW	W	AW	W	N	N	AW	NW	ANW	AW	AW	A	A	A	AE	AE	E	E	E	E	E		
1963	NE	AE	N	-	S	S	CS	CSE	S	SE	E	E	A	A	A	SE	E	AE	AE	AE	E	N	NW	A	A	A	AS	AS	SE	SE		
1964	W	W	W	NW	AN	AN	A	A	A	A	A	AW	A	SE	CSE	SE	E	E	E	E	AE	A	ASE	S	S	S	S	S	S	SW	-	
1965	ANE	A	A	ANE	ANE	ANE	AN	AN	A	A	ANW	AW	W	N	AN	A	A	A	A	NE	E	ANE	ANE	NE	NE	NE	ANE	N	N	N	N	
1966	S	W	SW	W	W	W	CW	-	C	C	C	E	E	E	AE	SE	E	E	E	S	S	CSE	C	C	W	W	SW	W	CW	NW		
1967	W	W	W	ANW	A	A	-	AN	A	A	A	AS	AS	ASE	ASE	S	S	C	-	W	CW	W	C	-	S	SW	W	W	W	W		
1968	W	CNW	W	W	W	C	C	C	C	CE	AE	SE	S	-	A	ANE	A	A	A	A	ANE	E	E	A	A	A	A	A	A	A	A	
1969	C	N	AN	A	A	A	W	N	N	N	ANW	NW	C	N	C	E	ANE	A	-	E	E	CE	C	CSE	C	C	C	E	AE	E		
1970	W	CW	W	C	CNE	A	A	W	W	CNW	CNW	-	CE	NE	CN	CN	-	C	W	CW	W	CW	CW	CW	NW	N	AN	AN	AE	A		
1971	A	A	ANW	A	A	A	A	A	A	ASW	AS	-	W	W	W	CW	C	C	C	W	W	W	A	AW	A	A	A	A	-	A	A	

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

MARCH

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
1940	A	A	A	AN	AN	A	A	AW	W	SW	W	C	CN	NW	W	SW	SW	SW	CW	CW	CW	-	C	C	C	CNE	N	A	W	W	SW	
1941	W	SE	CW	C	C	C	CNE	A	E	E	ASE	ASE	ASE	CN	A	ASE	ASE	A	A	A	A	CNW	-	-	C	C	CE	CE	N	-	W	
1942	-	W	A	-	E	A	A	C	-	AE	-	ASE	S	S	S	S	S	CS	C	A	A	A	A	A	ANE	AS	AE	AS	W	-	W	
1943	A	ANW	AE	A	A	A	A	W	W	W	NW	A	A	AW	AW	W	AS	SE	E	SE	SE	E	E	E	C	W	W	W	W	W	W	
1944	NW	N	N	AN	A	A	A	A	A	NW	NW	NW	N	NW	AW	W	AW	W	NW	NW	ANW	A	A	A	A	A	A	NE	N	A	A	
1945	-	A	A	ANW	ANW	ANW	ANW	A	A	A	A	A	A	AW	W	AW	AW	SW	AW	AW	AW	AS	S	A	W	W	W	W	W	W	W	
1946	-	A	CE	E	E	E	NE	C	A	ASE	SE	CSE	E	E	E	ASE	ASW	SW	SW	SW	CW	W	-	W	A	A	A	AS	A	C	C	
1947	N	A	A	-	CE	CNE	C	-	A	CSE	E	ASE	C	N	A	C	-	CS	C	C	C	S	W	W	S	S	CE	CE	C	C	C	
1948	SE	S	A	A	A	AS	SW	W	W	A	A	A	AS	W	W	CW	W	W	W	W	AW	A	A	A	AS	ASE	S	-	C	C	W	
1949	N	A	AW	C	-	W	C	CE	E	A	-	W	W	NW	A	NW	NW	N	A	AW	W	A	A	A	AE	AE	E	E	A	A	AE	
1950	AS	SW	W	AW	A	A	A	AW	-	AN	ANW	N	A	-	S	SW	SW	CSW	C	CS	C	CSW	W	AW	AS	A	A	A	AN	A	W	
1951	AW	A	A	A	AW	C	C	E	E	CE	E	C	C	-	W	CS	C	C	-	A	A	CW	W	N	CNW	C	N	NW	C	N	W	
1952	AS	SW	SW	S	S	S	S	SW	CW	W	A	AE	AS	SE	C	S	S	S	-	W	W	W	A	C	N	AE	AE	E	E	E	N	
1953	A	A	A	A	A	A	A	A	A	A	A	A	A	SE	AE	ASE	AE	AE	ASE	A	A	A	A	A	-	AW	W	W	W	W	W	
1954	CN	C	C	C	N	W	CW	-	S	S	SE	SE	E	E	AE	AE	AE	AE	CSE	C	-	CS	C	-	W	NW	A	W	W	W	W	
1955	A	A	A	AN	AN	AN	NE	NE	AN	A	A	A	A	A	A	AN	N	N	N	-	C	S	C	C	S	C	N	AE	ANE	A	A	A
1956	W	W	W	NW	AW	W	A	A	AS	S	ASE	A	ASE	ASE	SE	CSE	S	SE	SE	SE	SE	CS	SE	SE	CS	S	AE	E	E	ANE	ANE	
1957	S	S	A	AE	S	S	W	S	S	S	S	S	CSW	W	AW	W	W	W	W	W	W	S	C	W	W	CW	C	A	ASE	ASE	SE	
1958	C	A	A	AW	W	N	N	N	N	N	CN	W	C	AE	SE	SE	E	E	E	E	AE	E	SE	SE	E	CE	E	C	C	S	SE	
1959	AS	S	C	CS	S	C	C	AE	SE	S	C	W	A	S	AW	A	A	A	AE	E	E	S	S	S	W	W	W	W	S	C	W	W
1960	W	W	CW	A	AS	SE	SE	SE	E	SE	SE	CSE	CS	E	CE	E	SE	ASE	SE	SE	SE	SE	SE	SE	E	E	NE	E	E	CE	CE	
1961	AW	AW	AW	ASW	AS	ASW	A	A	AS	W	AW	AW	AW	AW	AW	A	W	N	AN	N	AN	ANW	A	A	AW	W	AN	A	W	CNW	W	W
1962	AN	N	N	NE	AN	A	AS	SE	C	C	E	NE	AN	A	ASE	A	ASE	ASE	AN	NE	NE	NE	NE	A	W	C	N	W	C	C	W	W
1963	ASE	AS	S	S	SW	CSW	CW	S	CS	C	CE	-	-	S	S	C	CS	C	-	CE	-	AE	A	AW	W	CW	W	W	C	C	A	A
1964	A	A	-	E	AE	AE	A	A	ANE	E	SE	SE	S	S	-	SE	S	SE	S	C	C	C	C	C	CNW	A	A	SE	AE	-	E	E
1965	E	-	C	CE	NE	A	A	A	A	AS	S	S	S	S	SW	W	C	CN	N	-	SE	C	C	C	C	C	W	A	A	AE	ASE	ASE
1966	W	SW	W	W	W	W	ASW	AW	ANW	W	NW	N	ANW	ANW	A	A	AW	A	AW	NW	NW	NW	NW	N	A	C	W	N	A	AE	ASE	ASE
1967	W	W	AW	AW	W	W	SW	-	C	C	W	-	W	W	W	AW	ANW	ANW	AW	AW	AW	AW	ANW	AW	W	W	CNW	CN	N	N	AN	W
1968	AE	A	ANW	A	ANW	N	ANE	AN	AN	NW	AN	A	W	W	NW	W	W	W	W	W	W	W	SW	CW	W	W	A	-	A	AW	AW	
1969	E	A	A	A	A	A	A	A	A	E	CE	-	C	C	SE	E	E	CSE	-	A	E	E	E	AE	ANE	AE	A	A	NW	W	C	N
1970	ANW	N	N	C	N	N	N	CN	N	NW	C	C	AE	AE	A	A	W	NW	W	CW	W	-	E	A	A	NW	N	N	NW	C	N	W
1971	A	-	A	A	A	A	AE	ANE	A	AN	AW	AW	AW	AW	C	CW	C	C	C	CNE	ANE	A	AW	W	W	W	W	A	SW	S	AE	AE

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

APRIL

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
1861	CE	C	C	C	A	A	(AE)	ASE	A	A	A	A	ANE	(ANE)	AE	A	ASE	ASE	A	A	(A)	A	A	ANW	ANW	N	ANE	(AN)	A	A		
1862	SW	CW	W	A	CW	(C)	A	A	A	NE	ANE	AN	(A)	ANW	A	W	W	W	(W)	C	C	CNW	ANW	AW	CW	C	(-)	A	A	SE		
1863	AS	A	(A)	W	(W)	CW	CW	W	CW	C	-	(C)	E	-	S	-	A	A	(ASW)	W	CW	C	ANW	ANW	NW	NW	NW	N	AN	AN		
1864	W	W	(C)	-	-	S	S	AS	A	(A)	AW	AW	A	A	C	C	(W)	W	W	S	S	ASE	ASE	(E)	E	AE	AE	ANE	AN	A		
1865	ANW	(-)	A	A	W	W	AW	AS	(AW)	A	A	A	W	(A)	A	(E)	-	CN	AE	ANE	AE	(AE)	AE	AE	A	A	A	ANE	SE	(S)		
1866	(N)	(N)	-	C	E	E	E	(E)	E	C	CS	C	SW	W	(W)	W	W	W	C	W	AW	(A)	AE	AE	AE	AE	-	C	(N)	A		
1867	W	W	NW	NW	A	NW	(W)	CW	W	C	NW	AW	CW	(CW)	NW	W	AW	-	(C)	CW	NW	W	C	C	-	CS	C	-	W	C		
1868	A	A	A	A	A	A	AW	C	NE	N	A	A	A	A	A	A	ANW	A	S	CS	C	W	W	C	CNE	A	AW	W	W	AE		
1869	A	CW	NW	NW	W	W	A	A	A	A	AS	W	ASW	CS	CW	C	CN	A	AW	W	AS	AW	A	A	A	A	A	AE	AE	AE		
1870	A	A	A	A	A	A	A	CW	C	NW	W	W	W	NW	ANW	A	A	A	ASE	SE	CS	AW	W	AW	W	W	N	N	NW	CNW		
1871	ANW	NW	N	A	A	A	A	A	AE	ASE	S	C	C	S	C	C	C	C	CSE	C	C	C	C	CNE	C	C	C	C	C	NW		
1872	C	C	NE	N	A	A	AW	NW	AW	AW	SW	W	A	A	A	AN	C	N	ANE	E	E	CE	C	C	SW	S	-	C	AW	A		
1873	C	A	W	W	NW	NW	N	W	AN	A	N	A	AS	SE	SE	SE	E	CE	E	A	ANE	ANE	NE	NE	AN	A	N	NW	NW	NW		
1874	W	W	W	W	CW	NW	W	W	W	CW	C	-	C	NE	A	ANW	NW	AW	AW	A	S	A	AS	S	A	SE	E	ASE	A	A		
1875	A	A	CW	C	C	CSW	C	NE	ANE	ANE	ANE	ANE	A	A	A	A	AS	A	A	A	A	ANE	A	A	A	A	A	W	AW	AW	A	
1876	A	A	A	ASW	AW	A	A	-	CW	C	NW	N	C	ANE	A	A	SE	CSE	C	C	C	A	A	S	S	CW	W	S	C	CSE	CNE	
1877	W	W	C	C	CS	C	CSE	SE	C	C	-	A	SE	ASE	S	SE	E	E	AE	A	CS	C	C	E	E	E	E	E	E	CE	ANE	
1878	CNW	CNW	CW	W	A	A	ASE	SE	E	E	CE	E	E	S	SW	W	C	C	CS	CSE	C	CE	E	E	NE	ANE	A	A	A	S	CSE	
1879	CW	-	W	W	W	C	C	C	CE	E	ANE	CN	E	E	E	CN	CN	A	S	C	C	C	C	C	CSW	C	E	ANE	AN	AN		
1880	C	CW	CW	W	W	W	C	N	A	A	E	E	E	E	N	NE	C	S	S	CW	SW	W	AW	AW	ANW	AN	AN	AN	AE	A	A	
1881	E	AE	A	A	E	AE	AE	SE	SE	SE	CS	S	CS	C	C	E	E	NE	NE	N	N	N	NW	W	W	NW	W	A	SW	CS		
1882	E	E	E	SE	AE	E	AE	AE	AE	-	-	S	CS	C	N	-	C	NW	W	AW	AS	CSE	CN	CN	-	W	C	C	C	W	CS	
1883	A	-	A	AW	A	A	A	A	A	A	A	A	W	A	W	W	SW	S	-	A	E	E	E	E	C	SE	CSE	C	C	C	W	
1884	CS	S	SE	SE	C	S	C	-	AE	A	AE	NE	NE	N	N	NE	E	A	-	NE	E	A	A	E	A	-	C	CE	-	-	W	
1885	CW	A	A	A	SE	C	E	E	N	C	C	NE	AE	AE	A	E	A	A	A	AW	W	CW	CW	S	CS	-	AW	S	-	A	A	
1886	W	S	W	W	W	W	W	CW	CW	C	CNE	A	AW	ANW	AN	AN	E	E	E	E	CE	E	AE	AE	AE	SE	-	NE	ANE	ANE	A	
1887	N	NW	A	W	N	ANE	ANE	AN	A	A	A	NE	NE	ANE	A	A	A	A	AW	-	SW	CW	C	CW	CW	C	C	C	C	C	AN	
1888	A	N	N	CN	AN	AN	AN	A	N	NW	NW	CW	CW	SW	CS	SW	CS	C	C	CNE	CE	E	AE	AE	NE	A	W	W	W	W	AN	
1889	NW	NW	-	C	C	CE	E	CE	CE	E	CE	E	NE	N	N	AN	ANW	A	W	W	W	W	C	C	-	-	SW	C	S	SE	SE	
1890	A	A	A	A	A	W	NW	N	N	N	AN	-	A	E	CE	E	E	E	AE	A	SW	CW	W	CW	C	N	AN	-	CSE	SE	SE	
1891	SE	C	SE	CS	C	CE	CE	NE	A	A	ASE	AE	-	A	NW	CNW	N	AE	AE	AE	E	E	ANE	ANE	A	A	A	-	-	CW	SW	
1892	A	A	A	SW	A	A	AE	AE	E	AE	E	NE	N	N	CN	CN	CN	N	A	W	W	AW	ANW	NW	NW	C	CN	C	N	W	SW	
1893	A	A	A	A	A	ASE	A	A	A	A	A	A	A	A	AW	A	AS	S	-	A	W	SE	AE	AE	A	A	A	A	W	NW	NW	
1894	-	SE	E	AE	AE	E	E	SE	S	S	C	C	C	CS	S	C	C	N	A	A	A	A	CSE	CS	S	CS	C	A	W	AN	AN	
1895	E	A	N	AN	A	CW	N	W	W	CW	AN	A	A	AE	AE	E	E	C	S	AS	SW	S	S	S	C	C	CNW	A	A	ASW	ASW	
1896	ANW	ANW	ANW	ANW	A	AW	AW	AW	AW	W	NW	NW	NW	CNW	A	CW	W	AW	A	A	A	A	A	A	AW	W	W	W	W	NW	N	N
1897	CNE	A	CSE	E	A	S	-	CW	C	A	A	S	CS	W	W	W	W	NW	W	-	SE	AE	AE	AE	E	E	E	CE	-	W	W	
1898	A	NW	W	NW	A	W	AW	SW	W	W	CW	W	S	C	C	W	S	C	CSE	A	A	A	A	A	A	A	E	CE	C	C	C	A
1899	AW	W	W	W	W	W	W	N	CW	CN	N	W	C	C	C	C	N	NW	A	C	N	A	S	SW	C	CN	W	C	C	C	C	A

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

APRIL

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
1900	ASE	A	-	C	C	C	C	-	CW	CW	CW	W	W	W	CW	NW	W	AW	A	A	A	A	A	A	A	ANE	A	A	A	N	CW	
1901	W	SW	CW	NW	AW	W	W	CW	W	C	E	-	W	CW	CNW	N	A	W	AW	S	S	-	A	SE	SE	AE	E	E	N	CSE		
1902	NW	A	W	W	W	W	W	AN	A	E	C	C	W	S	N	W	AN	S	S	S	S	S	C	-	SE	E	AE	AE	C	NW		
1903	W	ANW	AW	NW	AW	W	NW	W	W	CNW	A	N	N	AN	C	W	AN	A	A	A	NE	N	C	-	NW	NW	AW	W	CS	W		
1904	W	W	W	W	W	W	W	W	W	W	S	S	S	CS	CSW	W	CW	A	A	-	A	C	-	NW	NW	AW	NW	W	W	W		
1905	AW	-	A	CW	N	A	CN	A	-	CS	C	-	S	S	S	CSE	E	E	E	N	N	ANW	N	NW	CW	W	SW	C	C	C		
1906	A	A	ASE	S	C	A	A	A	A	A	S	S	W	A	A	AW	A	NE	A	A	W	NW	NW	N	-	C	NW	CNW	C	CN		
1907	A	S	C	CE	-	CW	C	C	C	C	E	CE	W	E	E	A	N	A	A	SW	W	W	W	ANW	ANW	N	N	NW	NW	CNW		
1908	W	W	CNW	N	N	A	A	A	A	AW	C	A	AE	AE	AE	AE	AN	N	N	N	N	N	CN	C	C	C	CS	S	A	S		
1909	ANE	A	AS	S	A	A	A	A	A	A	W	W	CW	C	AW	C	SW	W	S	W	ASE	S	SW	C	C	C	C	C	C	N		
1910	A	A	CNE	CNE	C	E	E	ANE	ANW	AW	ASW	C	C	C	C	C	W	W	W	W	W	ANW	W	C	NW	W	SW	W	NW	NW		
1911	AE	N	AN	ANE	AE	ANE	AE	A	AN	ANE	A	AN	A	A	W	-	SW	CS	C	C	SW	ASW	W	C	W	W	C	CW	C	N		
1912	AN	W	AW	W	W	W	CW	CW	NW	N	-	A	A	A	A	AS	CS	CS	A	E	E	AE	AE	AE	AE	E	E	NE	ANE	A	A	
1913	CS	E	AE	E	AE	NE	N	AN	AN	N	C	N	AW	W	W	W	W	W	W	W	C	A	A	A	CW	CSW	CS	S	CS	C		
1914	W	W	W	W	W	W	CW	W	W	W	W	W	W	W	A	A	ASE	ASE	A	A	AW	A	AW	AW	A	A	A	A	A	A	NE	
1915	AW	W	W	W	W	W	W	CW	NW	NW	AW	W	A	A	AW	W	A	A	W	W	AW	A	A	A	A	ANE	AE	AE	A	-	-	
1916	A	A	AW	N	AN	A	A	AW	ANW	AW	NW	W	CW	NW	W	W	W	CNW	C	C	C	NW	S	A	A	AS	A	A	AE	AE	AE	
1917	C	C	C	CN	C	C	NW	AW	C	NW	C	CN	W	C	N	C	ANW	NW	ANW	AN	AN	A	A	AN	A	A	A	ANW	AW	AW	A	
1918	C	W	-	E	A	CW	CNW	A	C	E	AE	A	NE	ANE	A	ANE	N	N	N	C	E	A	E	A	AE	AE	AE	AE	AE	E	E	
1919	N	A	A	A	ANW	A	W	W	W	W	W	W	W	C	C	C	W	AW	AN	A	A	A	AN	N	NW	N	CN	N	N	N	NW	
1920	C	C	C	N	NW	AW	W	-	C	-	S	CSE	C	C	C	C	C	-	C	C	W	C	W	W	W	W	NW	N	N	N	-	
1921	AW	A	AW	AW	AW	A	A	A	E	E	A	A	AW	A	N	W	W	C	N	A	AW	AW	W	A	A	A	A	E	E	E	ANE	
1922	NE	-	CE	CN	C	W	C	C	C	-	C	C	C	C	C	CN	AN	A	A	A	CW	CW	W	CNW	C	C	C	N	N	N	N	
1923	-	ASE	ASE	C	CE	C	CSE	E	E	E	CSE	C	CS	C	C	C	CE	AE	SE	E	E	NE	N	-	CW	CNW	W	W	W	CW	CW	
1924	AE	A	AE	ANE	A	W	W	W	C	C	C	C	C	C	C	CW	A	AW	AW	AN	AN	N	-	CS	S	CS	C	C	C	C	C	
1925	W	CW	A	S	S	C	C	-	CS	-	A	W	W	W	CW	CNW	W	C	ANE	A	ASW	W	W	W	NW	N	C	CNE	C	C	C	
1926	AS	S	S	W	AW	AS	W	W	AW	A	ASE	A	A	SW	W	W	W	CW	C	C	CN	N	W	W	W	N	C	C	CE	E	E	
1927	W	C	W	W	W	W	W	C	C	CN	N	NW	W	W	NW	A	AW	AW	A	AW	W	W	NW	CNW	CNW	NW	C	C	CE	E	E	
1928	N	W	W	W	W	W	W	SE	S	CS	C	-	SE	E	E	A	N	N	-	N	AN	A	ASW	S	E	E	E	A	N	A	A	
1929	NW	N	N	NW	-	A	AW	-	N	AN	AE	AE	E	E	E	A	A	AW	-	AN	A	A	AN	N	CN	C	C	CE	CE	N	-	
1930	S	S	SE	CE	E	N	A	ASW	W	A	A	W	CW	N	N	N	N	N	CNE	NE	AN	A	-	C	C	-	E	E	E	AE	AE	
1931	SE	C	-	ANW	W	W	S	S	A	A	AW	W	ANW	ANW	W	ANW	CN	N	NE	NE	AN	C	SW	CS	C	C	CNW	NW	A	-	-	
1932	C	CN	C	C	NW	NW	NW	W	W	CW	N	NW	AW	CW	C	E	NE	A	W	W	C	W	CNW	NW	W	C	-	C	CSE	E	E	
1933	ANW	W	W	AW	AW	A	A	W	W	AW	W	NW	A	A	AW	A	E	E	E	E	ANE	A	S	C	S	W	W	CSW	C	C	C	
1934	E	E	E	E	E	CNE	C	C	NE	CE	E	C	S	S	S	SW	S	C	C	W	W	CNW	C	CNW	C	C	C	NE	A	A	A	
1935	N	N	N	N	N	-	C	C	C	CW	W	N	-	C	CSW	C	C	C	C	CSE	C	C	N	AN	AN	ANE	AN	A	A	A	A	
1936	C	-	AE	ANE	A	AN	A	A	A	A	ANE	NE	CE	NE	NE	NE	N	ANW	-	C	C	N	W	W	W	W	AW	AW	AW	AW	A	
1937	SE	E	CE	-	SE	S	SW	W	S	W	W	A	AE	E	-	C	NW	W	W	C	W	W	A	ANE	A	A	AW	A	A	A	A	
1938	AW	W	NW	NW	NW	ANW	ANW	ANE	A	A	A	A	A	A	A	AN	AN	AN	AN	A	A	A	A	A	A	A	A	A	A	AN	AN	AE
1939	SE	C	SE	C	C	NE	A	A	-	SE	SE	S	SW	W	W	W	NW	A	A	A	-	CNW	CW	C	N	N	AN	AN	ANE	AE	NE	

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

APRIL

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
1940	C	W	C	CNW	A	A	W	N	AN	A	A	NW	NW	NW	NW	NW	C	CE	C	C	SE	E	C	C	W	S	C	A	-	C		
1941	CE	CE	C	C	-	ANE	ANE	CW	C	A	AW	AW	W	-	W	W	CW	CE	C	C	A	ASE	AE	AE	AE	AE	E	E	E	E		
1942	W	W	W	SW	W	CSW	NW	CW	C	W	AS	S	SE	W	A	A	A	E	C	C	NW	ANW	C	W	W	W	E	E	W	W		
1943	NW	ANW	A	A	W	NW	NW	NW	NW	AW	AW	W	W	AW	E	CNE	A	A	W	W	W	AS	W	W	W	W	-	W	W	W		
1944	A	S	S	C	-	A	A	S	SW	SW	SW	A	S	SE	E	CNE	A	A	A	W	W	W	AW	AW	W	AN	A	ANW	ANW	AW		
1945	W	W	W	W	W	A	A	A	A	AE	CSE	-	A	S	AS	ASW	A	A	A	A	N	AN	A	A	A	E	C	N	N	N		
1946	A	A	A	W	AN	A	A	NW	AN	A	A	AW	A	A	-	W	W	AN	A	AW	AN	A	W	W	W	C	NE	E	CE	E		
1947	C	NE	-	W	W	W	CW	C	A	ASW	A	A	A	W	W	W	A	S	SW	W	W	W	C	C	W	W	W	W	C	CN		
1948	C	CW	CW	C	C	C	W	CW	AW	A	A	A	A	A	A	CS	A	E	-	E	E	C	C	A	A	A	A	C	C	C		
1949	E	S	SW	CW	CW	C	CN	AN	A	AW	W	W	AW	ASW	AS	CS	A	W	W	W	AW	C	W	AW	W	W	W	W	W	ANW	A	
1950	W	NW	N	W	W	AS	SW	W	W	W	NW	N	N	N	A	A	C	CNE	-	A	AW	ANW	NW	N	CN	CN	CNW	NW	W	SW		
1951	C	N	N	W	W	W	C	C	C	N	W	W	W	AW	W	A	A	A	ANE	W	W	C	A	W	A	A	N	N	N	E	E	
1952	CN	N	AW	W	W	W	W	-	S	S	CSW	-	A	A	A	AE	A	A	W	W	C	CNW	NW	AW	A	A	A	A	AE	SE	SE	
1953	W	CW	CW	CS	C	C	W	A	E	A	SW	CW	CW	CNW	CNW	CNW	C	A	AE	A	A	AE	A	N	AN	-	CE	C	C	CW		
1954	CW	W	W	NW	NW	A	A	AW	ASW	A	A	ANW	ANW	ANW	AN	AN	A	A	A	ASE	AE	AE	AE	AE	AE	AE	A	A	A	N	CN	
1955	A	SW	W	W	S	W	W	W	W	W	ANW	AW	A	A	A	AE	AE	A	A	AN	AN	A	CN	A	A	W	W	W	W	S	SW	
1956	ANE	A	N	N	CN	ANW	AW	W	W	-	A	A	-	E	CN	N	AN	A	A	A	A	A	C	CNE	A	C	NE	N	N	N	A	W
1957	-	A	ASW	AS	A	ANE	ANE	ANE	ANE	ANE	ANE	AN	A	AW	W	AW	W	AW	AW	AW	AW	A	A	A	AE	AE	AE	AN	AN	A	A	
1958	E	AE	E	C	CNE	NE	NE	NE	AN	-	A	A	A	A	N	ANW	W	W	W	W	W	A	-	W	W	W	W	NW	NW	AW	A	
1959	AW	AS	A	A	ANW	NW	NW	CN	CN	CN	-	C	S	S	S	E	N	N	A	A	A	AW	A	W	C	C	C	C	N	A	A	
1960	-	S	CS	CS	SW	SW	S	W	W	C	W	W	W	W	C	A	A	A	A	A	A	A	AN	AN	AN	AN	AN	ANE	A	A	A	
1961	C	CN	-	S	C	C	C	AN	ANE	ASE	W	SW	CSW	W	A	A	A	AE	S	S	S	C	C	SW	SW	CSE	C	C	C	A	W	
1962	W	W	C	C	CNW	W	CW	C	NW	NW	NW	AN	AE	AE	AE	E	CE	CE	CE	CE	S	-	AS	A	A	AN	ANE	ANE	AE	A		
1963	W	AW	AN	N	E	E	E	E	E	CE	C	W	W	CW	C	CS	S	-	S	CS	S	SE	SE	-	A	A	AW	W	NW	W		
1964	E	E	E	NE	N	N	N	A	AW	W	W	W	W	W	W	CSW	CS	CS	CSE	C	C	C	C	A	AS	AS	SW	W	W	W	W	
1965	A	A	A	S	CE	-	CW	W	W	W	W	CW	W	W	W	NW	CNW	NW	N	AN	A	-	NW	NW	W	CNW	CN	E	E	E	E	
1966	C	-	A	AE	CSE	CS	E	CE	C	SE	E	E	E	E	E	E	E	C	C	CN	-	SW	SW	C	W	S	W	W	W	A	A	
1967	W	W	W	NW	NW	N	NE	CNE	E	E	NE	E	A	A	A	N	A	N	A	AW	N	C	-	W	-	A	A	A	A	A	NW	
1968	C	N	N	-	N	N	N	AN	A	A	A	A	AE	AE	E	E	SE	S	CS	S	S	SW	W	AW	A	AS	S	CSE	CE	C	C	
1969	N	A	A	A	A	A	ASE	A	AW	W	W	CNW	NW	W	NW	ANW	A	A	AE	E	C	C	C	SW	CW	C	NW	N	AN	A	A	
1970	N	ANW	NW	ANW	C	C	N	CN	CN	C	C	C	-	AW	SW	SW	W	W	W	W	W	CW	W	C	C	CN	NW	NW	AN	AN	AW	
1971	SE	CE	E	E	E	E	E	A	A	A	A	A	AE	A	A	N	W	W	A	A	A	C	C	C	C	-	E	N	A	A	A	

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

MAY																																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31			
1861	A	ANW	N	AN	(AN)	N	N	NE	CN	-	E	(-)	A	A	A	A	AN	A	A	(A)	ANW	ANW	NW	W	A	W	(CW)	ANW	A	A	A	A		
1862	C	AN	A	(S)	S	SE	C	CW	(W)	NW	(CNW)	N	A	A	AE	-	W	(W)	A	W	W	CW	W	C	W	W	(W)	W	-	A	C	CN		
1863	A	(AN)	C	NW	-	A	A	A	(CE)	E	E	W	-	W	(A)	W	(C)	N	AE	AE	E	AE	ANE	A	(N)	N	N	NW	ANW	(A)	NW	(A)		
1864	(W)	CNW	C	C	-	-	C	C		E	E	W	C	A	A	A	A	A	A	A	N	(N)	AN	AN	A	AN	NE	AN	A	A	A	A		
1865	SW	SW	SW	SW	CS	C	(-)	A	C	CNE	CN	C	C	(C)	W	W	W	AW	AW	A	(AS)	S	A	(A)	A	AS	W	(W)	CSW	CNW	A	A		
1866	E	CN	C	W	W	(AW)	A	W	W	CW	C	CN	(N)	A	AE	A	AS	A	SE	(SE)	ASE	AE	A	E	AE	A	(AW)	CNW	-	A	E	E		
1867	-	A	AS	S	S	-	AW	SE	CS	CS	C	E	E	E	E	A	AS	S	CSE	C	E	NE	NE	AE	E	CS	CS	CSW	C	-	A	A		
1868	AW	A	-	A	AE	A	A	S	C	C	CS	CSW	ASW	AW	A	A	A	ASE	SE	SE	SW	CSW	CSW	SW	SW	SE	ASW	ASW	AE	AW	A	A		
1869	A	AE	CSE	CE	SE	CSE	CE	CE	CE	C	N	AN	A	AE	A	E	SE	CSE	C	C	N	N	-	SE	E	E	E	AE	ANE	AN	N	N		
1870	N	N	N	AN	AN	AN	A	A	A	AS	C	CSW	W	CW	W	W	ASW	ASW	SW	W	A	-	A	ANW	AN	A	A	ASE	S	CS	CW	CW		
1871	A	AW	C	W	AW	A	A	ANE	ANE	A	A	ANE	ANE	A	NE	N	AN	NW	ANW	ANW	A	A	ASE	S	C	CNW	N	NE	ANE	A	A	A		
1872	A	W	W	CW	W	CW	C	C	CNW	N	N	E	CE	CE	C	C	NE	N	N	C	CW	NW	CNW	NW	A	A	ANW	ANW	AW	W	W	W		
1873	NW	W	NW	W	W	C	C	C	C	CW	AW	W	A	ANE	A	A	AE	E	N	A	W	W	C	NW	A	S	A	C	N	A	ANE	A		
1874	AE	AE	NE	N	N	NW	CN	N	N	N	A	A	AE	A	A	A	A	A	A	A	A	AE	CE	CE	C	-	A	AW	W	SW	W	W		
1875	C	C	C	-	A	CS	C	SW	W	AW	AW	AW	A	A	A	A	A	CW	W	W	SW	W	W	AW	ANW	AN	AN	CN	AN	A	A	A		
1876	AN	A	A	A	A	A	AE	AE	AE	AE	AE	AE	C	AN	AN	ANE	ANE	ANE	A	A	AW	CW	C	CN	AN	N	N	ANW	AW	AW	AW	ANW		
1877	A	A	ANE	ANE	A	-	A	E	CE	C	CE	C	C	C	C	W	C	C	N	N	AN	ANE	ANE	ANE	AN	A	AW	SW	CW	W	W	C	A	
1878	C	SW	W	W	A	SE	C	C	E	SE	SE	S	CS	CS	C	CSW	CW	C	CW	NW	NW	W	C	C	C	NW	CW	C	E	AN	AN	A		
1879	AE	A	A	A	A	A	N	N	NW	N	ANW	W	W	C	C	N	AW	C	A	CW	A	CW	A	A	W	NW	CW	CN	NE	C	C	-	-	
1880	A	A	AN	NE	AN	AN	AN	NE	NE	NE	E	AE	E	E	E	AE	ANE	ANE	ANE	A	AN	NW	W	W	W	W	CSW	C	AW	AW	AS	CS	CS	
1881	C	CN	A	W	AW	W	A	A	ANE	A	A	A	AW	W	C	C	C	SW	C	A	AN	ASW	ASE	ASE	AE	AE	E	CE	-	A	CNE	A	A	
1882	CS	S	C	C	-	C	C	C	-	AW	AW	AW	A	A	AE	AE	ANE	A	A	SE	E	E	E	CSE	CS	CS	S	S	SW	AW	A	A	A	
1883	E	NE	N	ANE	AE	A	-	CNE	CNE	N	CW	SW	SW	W	A	A	A	A	NW	A	A	A	A	AW	W	-	C	AW	SW	W	AW	ASW	AS	
1884	W	W	W	CNW	N	-	SW	W	C	ASW	-	A	A	A	CW	W	W	C	CW	A	A	A	A	A	AE	AE	AE	AE	ANE	ANE	AN	A	A	
1885	C	S	CE	CE	N	C	N	CNW	C	N	AN	A	-	NW	NW	CN	N	A	-	C	C	C	C	C	W	A	W	ASW	S	SW	W	AW	AW	
1886	AE	A	AS	AS	AS	A	A	ANE	SE	C	-	C	CNE	CN	CN	C	S	CW	C	-	C	C	A	AE	-	CW	CW	C	C	A	A	A	A	
1887	A	-	C	C	SE	-	A	AW	AW	ANW	NW	N	N	AN	A	A	-	NW	W	W	CNW	W	NW	NW	A	AN	E	NE	NE	NE	NE	AE	AE	
1888	C	W	CW	W	W	W	W	AW	A	A	AN	A	A	A	NW	S	S	S	C	C	ASW	A	AE	AE	ANE	ANE	A	A	E	-	CSW	CW	CW	
1889	C	CS	S	CS	C	C	CS	S	CSE	C	C	C	C	C	C	-	C	C	-	C	A	A	-	CW	C	-	-	C	CS	CSW	CS	SW	SW	
1890	SE	-	C	CSE	CE	C	CSE	E	CE	C	C	-	-	W	SW	CS	C	CS	SE	C	S	AS	AE	AE	AE	E	E	AN	AN	W	NW	ANW	ANW	
1891	C	W	W	A	ASE	A	-	C	ANE	ANE	A	A	ANW	ANW	ANW	N	CN	CN	CN	C	CN	-	C	C	CE	C	CN	CN	C	CS	S	SE	SE	
1892	A	E	E	NE	N	A	AW	A	A	AE	A	A	A	A	W	W	CW	NW	W	CW	AW	A	S	S	S	CS	S	C	C	SW	SW	S	S	
1893	W	C	A	AS	ASE	SE	AE	AE	A	A	A	A	AW	A	AE	A	SE	SE	CS	CS	C	W	W	NW	NW	ANW	A	A	AN	AN	N	N	C	
1894	N	W	NW	NW	W	W	W	SW	SW	CW	C	NW	-	C	E	E	AE	NE	NE	N	AN	A	A	A	A	AN	N	N	CN	C	C	C	C	
1895	W	A	A	A	A	A	ASE	SE	A	ASW	A	A	A	A	NW	N	N	N	N	N	CN	CE	-	C	C	C	A	A	A	A	A	S	S	S
1896	AN	A	A	A	A	A	A	AE	A	A	A	ANE	A	ANW	AN	ANW	A	-	AW	N	ANW	NW	NW	NW	A	A	A	A	A	AN	A	A	A	
1897	W	W	W	W	W	NW	W	W	NW	NW	N	AN	A	AW	A	A	AE	ANE	ANE	AE	AE	AE	NE	NE	N	C	CW	C	C	CS	S	CS	CS	
1898	S	SE	C	CW	C	A	A	W	W	W	CW	C	N	C	N	NW	C	A	AE	E	E	E	E	E	E	N	N	A	ANW	NW	NW	N	N	A
1899	-	N	AE	AE	AE	AE	AE	AE	E	NE	N	C	C	C	C	C	CW	CW	C	S	C	A	-	CS	C	N	N	A	A	A	A	A	A	A

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

MAY																																	
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
1900	AW	W	W	SW	S	SE	CS	-	C	AE	AE	NE	ANE	A	AN	AN	AN	AN	A	AW	S	CSW	CW	C	A	A	ASW	W	AN	ANE	AE		
1901	E	AE	AN	A	A	CW	C	C	CNE	-	A	A	A	A	ANE	ANE	ANE	A	A	A	A	ASE	AE	AE	AE	AE	-	A	S	S	S		
1902	NW	CW	CN	N	N	AN	C	AN	N	CNE	N	NW	W	W	W	W	C	C	N	N	N	W	AW	AW	AW	AW	W	W	C	CE	CE		
1903	C	S	CSE	CE	C	C	C	C	CSE	CE	CNE	N	W	W	W	W	W	W	A	W	ASW	W	W	W	ASE	A	E	E	CE	CE	NW		
1904	SW	C	W	A	W	C	C	CN	C	C	A	ASW	SW	W	AW	S	W	W	ANW	ASE	C	-	SW	CW	S	CS	-	A	A	E	CSE		
1905	C	C	N	A	A	A	NW	ANW	A	AW	AW	AN	A	A	A	A	AE	AE	ANE	NE	ANE	N	A	AW	CW	S	SW	ASW	SW	W	A		
1906	C	CS	W	CW	SW	SW	A	A	A	-	S	E	AE	ANE	N	N	CN	CNE	CNE	NE	N	E	CE	C	C	S	SW	SW	W	W	W		
1907	W	W	CW	CW	-	CE	CS	CS	S	S	CS	C	W	A	N	N	N	ANE	ANE	A	AE	NE	C	E	CE	A	E	E	E	SE	CS		
1908	A	A	-	CS	CS	CS	CW	SW	CW	W	S	C	C	C	C	W	W	AW	AW	A	CW	CW	A	W	W	AW	A	AE	A	AE	E		
1909	AN	A	AS	SE	SE	E	AE	AE	ANE	A	NW	N	N	N	A	A	C	W	A	S	S	-	W	A	C	C	C	W	W	AW	-		
1910	A	NW	W	W	W	W	W	NW	CNW	-	A	E	CE	E	E	E	E	E	CSE	SE	C	A	ANE	ANE	A	A	ANW	W	W	W	CW		
1911	W	W	W	A	A	A	A	A	A	AE	E	E	CE	C	C	-	A	A	AN	A	A	AW	W	W	-	E	A	AE	AE	-	-		
1912	W	CW	A	AE	ASE	SW	SW	AW	AW	A	CW	-	A	A	C	C	C	W	-	C	C	N	N	N	AN	A	A	AW	C	C	AE		
1913	W	W	CW	C	-	C	S	CS	SE	S	C	CE	E	NE	A	A	CNW	NW	W	W	W	W	W	AW	AW	A	-	W	CSW	C	W		
1914	A	AS	S	W	CW	W	C	C	C	N	W	CNW	ANW	AW	A	A	A	A	A	A	AW	A	CN	AN	A	A	A	A	A	NW	NW	NW	
1915	C	AN	A	AE	-	A	AN	ANE	AE	A	A	NE	CE	AN	A	A	-	CE	E	SE	S	SE	A	AE	AE	E	E	ANE	N	AN	A	A	
1916	ANE	E	C	-	CE	C	C	C	C	W	CS	C	CW	CW	NW	AW	AW	A	A	ASE	A	W	AW	C	A	-	E	C	-	A	W	W	
1917	A	A	A	A	ANE	A	NE	E	E	E	E	CE	CS	C	AN	AE	AE	CE	CSE	E	-	S	S	SW	AS	A	C	-	A	W	SW	A	
1918	E	E	E	C	CE	C	-	A	-	-	C	C	C	W	S	-	A	AW	A	A	A	S	C	W	W	NW	A	A	A	A	A	W	
1919	W	W	W	S	S	A	E	E	E	SE	S	S	AS	SE	-	C	-	-	ASE	ASE	SE	A	AS	A	A	A	A	A	A	ASE	AE	ANE	
1920	-	C	C	AW	W	W	W	W	AW	A	S	CW	W	A	A	A	-	C	CW	CW	AW	AW	A	E	-	C	C	C	C	C	W	W	
1921	N	N	N	CN	A	S	SW	C	C	C	CSW	C	W	W	AW	W	W	W	AW	W	W	AW	A	A	-	W	N	C	C	C	CW	CW	
1922	N	W	W	W	W	W	A	AW	A	A	NE	N	A	AW	W	W	C	CW	W	ASW	S	W	S	-	A	W	A	A	A	A	A	A	
1923	C	A	W	W	W	A	A	A	A	N	CNW	CN	CN	CN	C	C	CN	NW	NW	W	W	NW	CN	N	A	CNW	N	NE	N	E	ANE	ANE	
1924	C	C	CN	CNW	C	C	C	C	CN	-	S	CW	CSW	SW	SW	SW	W	A	-	SE	S	S	CSW	C	C	W	SW	A	E	C	C	C	
1925	NW	AW	S	CS	C	C	C	C	C	C	W	W	AW	A	A	N	A	C	C	C	-	SE	CE	CE	CE	C	W	W	CW	CW	W	W	
1926	E	E	E	NE	N	ANE	CN	CN	C	W	CW	C	CN	CN	N	A	AN	A	A	SE	A	AN	A	S	AS	S	W	W	CW	C	C	W	
1927	A	S	CS	E	E	ASE	AE	E	E	E	ANE	A	N	A	CW	CW	C	AN	A	W	CNW	AN	AW	ANW	ANW	A	ANE	S	N	-	CNE	CE	
1928	A	E	E	E	E	E	NE	N	N	AN	AN	A	A	AN	N	N	C	CN	N	CN	NE	AN	-	A	A	AS	ASE	-	SE	E	E	CE	
1929	-	E	A	SW	C	C	C	C	W	A	W	W	W	W	C	CNW	A	AE	A	A	AS	S	S	-	AW	-	E	ANE	ANE	AE	AE	AE	
1930	A	A	A	A	-	CE	N	NW	W	CW	C	W	W	W	W	W	W	W	W	AW	A	AE	ANE	NE	N	C	-	W	A	AE	E	C	
1931	CW	CN	CN	C	CSW	CS	C	-	A	S	W	ASW	SW	SW	CW	CW	C	CN	CNE	N	AE	E	-	SE	CS	SW	A	E	A	AE	E	C	
1932	E	C	N	N	N	N	N	C	C	-	W	S	SW	S	C	C	-	S	S	CS	C	C	CN	CN	N	N	NE	CN	C	-	-	-	
1933	E	AE	E	S	S	S	CS	C	C	C	CN	-	NW	C	N	A	A	A	A	S	A	ANE	A	AW	A	-	A	A	A	A	A	S	S
1934	A	A	A	-	W	W	W	W	AW	A	A	A	NW	N	C	C	CW	-	W	W	W	W	AW	ANW	A	-	A	A	A	A	A	AE	
1935	AS	S	SE	CE	-	A	AN	A	A	AE	AE	NE	NE	N	N	CN	C	NW	C	C	A	A	AE	AE	ANE	E	E	E	E	-	-	A	A
1936	A	A	A	E	E	C	E	E	E	A	A	AW	AW	AW	AW	S	CSE	-	E	A	N	N	C	CE	E	ANE	N	A	NW	N	N	A	A
1937	A	A	-	W	A	A	-	AE	-	C	E	E	E	A	A	C	A	A	A	C	C	S	S	C	NW	W	C	W	AS	SW	W	W	W
1938	AE	E	E	E	ANE	ANE	N	N	A	N	A	AS	S	SW	CS	C	-	-	-	N	A	A	A	C	NW	W	C	C	C	C	C	W	W
1939	NE	ANE	A	S	S	CSE	-	W	AW	ANW	N	NE	A	N	N	CN	CN	CN	N	A	AW	W	W	ASW	A	A	ANW	A	A	A	A	A	ANE

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

MAY																																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31			
1940	E	E	E	A	A	ANW	A	A	A	A	AN	A	AW	CW	C	E	A	A	AE	AE	CE	E	C	S	S	S	S	SW	C	-	W	AW		
1941	E	AE	AE	A	A	ANE	ANE	ANE	AN	A	A	ANW	AN	AN	A	AE	W	C	CE	A	W	W	C	CW	C	C	C	C	E	NE	C	AE		
1942	AE	AN	A	A	AW	A	A	AE	AE	AE	E	E	E	A	S	A	CNW	W	C	CE	A	A	CW	W	CW	W	W	C	C	CW	W	N		
1943	AN	A	A	A	A	NW	C	C	C	C	W	SW	SW	W	A	A	A	ASE	-	AW	A	-	C	C	W	W	W	AW	A	A	-	S		
1944	W	W	-	CW	C	A	A	A	A	AW	AW	A	N	N	N	CN	NE	NE	CNE	NE	N	N	ANW	AW	W	SW	ASW	A	A	AE	E			
1945	N	N	C	C	C	C	S	SE	S	AS	A	S	W	W	W	W	A	A	SE	SE	S	C	CN	NW	NW	C	C	C	C	CW	CSW			
1946	AE	A	A	AN	NE	A	ANE	ANE	A	A	AE	NE	N	N	N	CN	C	E	E	CE	C	S	A	E	E	E	E	C	CSE	S	S	C		
1947	NE	E	E	CSE	SE	S	SE	S	SE	C	-	A	SE	-	W	W	W	W	AW	A	A	AE	E	E	SE	S	ASW	AS	AS	A	E	E		
1948	C	N	-	C	AW	A	A	A	A	A	C	W	AW	A	ASE	ASE	AE	AE	E	AE	AN	N	N	CN	-	C	C	C	CNE	-	C	C		
1949	A	A	A	-	C	C	ANW	ANW	A	A	A	A	A	A	CNE	CNE	C	C	W	A	A	S	C	C	W	C	W	CW	CSW	CSW	C	C		
1950	SW	W	AW	A	AE	CE	-	E	E	AE	AE	AE	AE	AE	ANE	NE	N	NE	CE	C	C	C	E	E	A	N	CNW	NW	W	AW	A	A		
1951	E	C	SE	E	E	NE	NE	N	ANE	A	A	A	N	N	ANW	AN	A	AE	C	A	C	C	S	S	S	S	CSE	C	CE	AE	A	A		
1952	E	E	E	CE	C	CS	S	SE	S	S	CS	CW	AW	AW	A	ASE	ASE	A	A	A	A	A	A	A	A	A	A	NW	N	N	C	C		
1953	A	A	A	A	A	A	AE	AE	AE	AE	E	E	E	SE	S	S	W	A	C	-	S	S	SW	A	-	W	W	NW	NW	NW	NW	N		
1954	C	C	CN	CN	C	CNW	AW	AS	SE	A	A	A	A	A	ANE	N	N	AN	ANW	N	N	CN	C	S	S	S	S	S	-	C	E	NE		
1955	C	C	W	W	CW	C	AW	SW	C	N	A	W	C	N	N	N	C	CN	N	CN	AN	AW	-	A	AE	ASE	-	-	AE	AE	A	ASE		
1956	CW	W	W	A	SW	AW	W	AW	W	W	W	NW	AW	AW	AW	NW	N	AN	A	AW	CS	-	W	CW	N	A	A	AE	AE	A	W	A		
1957	A	AN	AN	N	N	AN	-	C	C	S	CS	C	C	W	C	C	CW	C	N	-	A	AE	E	AE	AE	AE	AE	ANE	ANE	A	A	A		
1958	A	A	A	-	C	C	SW	CSW	C	C	C	C	W	C	C	C	W	CW	W	CW	W	CW	C	C	C	C	C	CW	-	S	C	SE		
1959	W	NW	NW	AN	A	A	AS	W	CSE	SE	SE	A	AE	A	AE	AE	AE	NE	E	AE	E	AE	AE	AE	ANE	ANE	ANE	AN	A	ANW	W	W		
1960	AN	A	W	ASW	ASW	ASW	A	SE	CS	SE	E	E	SE	S	-	A	E	E	NE	NE	-	ASW	CW	AW	A	ASW	AW	A	A	A	A	A		
1961	SW	W	SW	C	C	C	W	W	AN	A	A	A	A	A	AE	AE	AE	AN	AN	AN	AN	A	A	A	A	N	ANE	AN	A	S	E	E		
1962	A	ANE	-	C	W	W	C	SW	C	C	N	N	NW	NW	NW	NW	CW	W	C	CW	C	CW	NW	N	N	AN	ANE	N	N	N	N	AN		
1963	N	NW	NW	W	W	W	W	W	W	W	-	W	W	W	W	W	NW	NW	NW	NW	CN	-	A	-	A	A	A	A	AE	AE	E	E		
1964	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	A	AS	-	W	AW	SW	C	E	E	CE	E	-	-	E	E	E		
1965	SE	SE	C	C	CNW	W	W	CW	W	A	A	A	AS	S	C	C	C	N	N	A	S	S	CS	C	CS	CNW	CNW	N	AN	ANE	AN	N	N	
1966	A	A	-	CW	C	C	-	C	C	W	S	C	W	W	A	A	W	W	W	W	W	CW	C	W	W	C	CNW	ANE	A	A	A	A	A	
1967	N	N	-	C	CS	S	CS	C	-	A	-	E	C	E	C	C	C	W	W	W	S	C	C	C	C	C	C	C	C	-	-	A	A	A
1968	CN	CN	C	C	C	C	-	E	-	C	CN	W	W	W	W	W	AN	NE	N	N	ANE	AE	E	SE	E	E	E	E	A	A	A	A	A	
1969	-	CE	C	C	C	E	C	C	C	C	-	ASW	S	C	C	CN	C	N	AN	-	A	ASE	CSE	CS	C	C	C	SE	CSE	C	CE	N	N	
1970	W	AW	AW	AW	S	-	C	CE	E	E	E	E	E	E	E	CE	-	A	A	ANW	W	N	ANW	A	SW	AW	AW	A	-	-	NW	W	W	
1971	A	A	A	A	ASE	ASE	SE	S	SW	ASW	A	A	A	A	CNW	C	C	CNW	A	A	A	C	C	CE	E	-	-	CNW	C	CSW	SW	A	A	

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

JUNE

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
1861	CNW	(N)	N	CN	CN	NE	NE	NE	(N)	C	W	W	AS	ASE	E	(E)	AE	ASE	A	SE	-	C	(CW)	CW	C	C	CN	NW	N	(N)	
1862	(-)	W	W	W	W	CSW	CSW	(W)	W	A	CS	S	C	C	(CN)	A	W	ANW	ANW	NW	NW	NW	NW	NW	AN	NW	CN	N	W	NW	
1863	A	S	CW	W	(W)	W	(C)	C	CW	C	C	(C)	N	(NW)	W	W	CW	-	CE	CN	(W)	W	W	W	AW	W	W	(W)	CW	AW	
1864	A	E	-	A	(W)	W	W	W	W	C	C	(C)	W	CSW	C	W	CW	W	(W)	W	W	CW	C	W	W	(NW)	ANW	W	W	AW	
1865	SE	C	CW	(AW)	AW	AW	A	A	A	ANW	(AN)	A	A	A	A	A	A	(A)	A	A	A	A	A	ANW	ANW	ANW	A	AS	C	C	
1866	E	E	E	CSE	C	C	SW	AS	AS	(AW)	W	C	CNW	W	CW	(CW)	C	C	C	SW	W	W	A	(A)	A	A	A	AE	A	CW	
1867	SW	C	N	W	CSW	C	C	W	AW	A	A	AW	A	AW	N	AN	AN	A	AE	ANE	AE	SW	N	N	AN	AN	A	AN	A	A	
1868	A	AW	AW	W	AW	AW	ANW	ANW	AW	AW	ANW	AW	AW	AW	A	A	A	A	-	CS	CSW	CSW	SW	W	AW	A	A	AN	A	A	
1869	A	W	W	W	A	A	A	AN	A	AN	A	W	C	CN	C	AN	NW	N	AN	ANE	N	N	AN	AN	A	A	A	ANE	ANE	A	
1870	C	AW	A	A	A	A	ANE	N	N	NW	W	W	W	AW	ASW	CW	C	W	AW	AW	A	A	AN	NW	ANW	NW	N	AN	AN	AN	
1871	AN	ANE	AN	NE	AN	AN	N	N	NE	A	AE	AE	SE	S	SE	C	C	C	C	CN	-	C	C	ANE	AN	AN	-	C	W	SW	
1872	AW	W	CNW	NW	W	W	W	C	S	C	C	W	W	ASW	S	-	A	S	C	C	C	C	AW	S	C	W	W	C	W	W	
1873	CNE	AE	E	-	N	AN	AN	ANW	AW	W	W	C	C	C	C	-	A	-	S	AW	W	W	CW	W	W	AW	AW	W	-	C	
1874	SW	S	W	AW	AW	A	A	A	A	ANW	CNW	A	A	A	A	ANE	ANE	ANE	A	AN	A	A	CS	S	C	C	C	C	C	W	
1875	A	AE	C	-	AW	CW	W	AW	C	CW	CW	CW	W	C	C	C	CNW	A	W	W	W	W	W	A	AW	W	-	C	-	C	
1876	A	A	SW	W	W	W	W	C	CN	AN	A	A	W	W	CW	W	W	W	AS	SE	SE	-	C	CE	ANE	ANE	AN	AN	CNW	W	
1877	C	SW	S	CS	SW	SW	A	W	CSW	W	AW	A	A	AE	AE	AE	AE	AE	ANE	E	CE	C	NW	NW	AW	W	AW	AW	W	AW	
1878	ANE	E	-	C	-	A	W	A	CS	CW	C	C	C	C	AE	-	N	CN	W	AS	SW	AS	SW	S	AS	AS	E	CE	E	NE	
1879	-	C	CN	A	A	E	CSE	C	C	-	CSE	-	A	A	S	C	C	C	W	S	SW	W	SW	C	C	S	S	SW	SW	W	
1880	AE	AE	AN	N	NW	NW	CNW	CW	C	CE	-	A	W	AN	N	NE	AE	E	E	CSE	C	C	C	-	A	ANW	AW	W	AW	CW	
1881	A	A	A	W	W	N	N	N	A	C	-	N	A	E	S	S	SE	CS	C	CSW	CS	W	W	AS	W	AW	CW	W	AW	ASW	
1882	A	AE	CSE	C	SW	W	CW	CW	C	CN	NW	N	W	CW	AN	A	S	C	CN	W	C	CS	S	-	W	C	A	A	A	AN	
1883	-	A	A	AE	AE	AE	A	A	A	AN	A	A	A	AW	ANW	N	N	N	C	W	-	CW	SW	S	C	C	CSW	SW	S	-	
1884	W	C	E	CN	CN	NW	CN	N	-	A	W	A	W	A	ANW	AN	AN	AN	A	AN	A	ANW	W	W	W	AW	A	A	A	-	
1885	A	AW	AS	-	CW	A	CE	E	N	A	A	A	A	A	A	A	A	AW	W	CW	W	W	CW	C	N	A	A	A	N	NW	
1886	E	-	A	A	A	A	A	A	-	C	SW	CW	W	W	W	NW	AN	N	N	AN	NW	W	W	C	W	AW	A	A	A	A	
1887	E	E	C	-	A	SW	W	W	AW	A	AW	AW	AW	A	A	A	ASE	A	ANE	ANE	A	A	ANE	ANE	W	AW	A	AW	ANW	A	A
1888	A	ASE	C	-	AE	SE	S	C	C	W	SW	CS	W	W	C	AN	AN	AN	ANE	AE	E	AE	AE	E	E	-	-	CS	C	CN	
1889	S	CS	-	AW	A	A	A	A	A	AN	A	W	SW	W	AW	A	A	A	ANE	AE	A	AN	AE	AE	A	A	A	A	A	ANW	
1890	W	W	W	SW	SW	CW	A	AS	SW	S	C	C	N	A	AW	W	W	W	W	W	W	W	AW	W	W	C	C	CNW	W	C	
1891	SE	-	E	E	A	AE	NE	E	ANE	N	AN	A	W	AW	C	A	AW	AW	A	A	AE	E	E	E	E	S	S	S	S	CS	
1892	SW	C	W	SW	C	AW	A	A	A	A	C	N	N	N	AN	CN	CN	CN	C	-	C	-	-	CSW	W	W	W	A	CNE	AW	
1893	A	A	A	W	AW	A	A	AE	A	A	A	AE	E	E	A	A	A	A	A	N	N	C	C	C	N	NW	-	CS	C	W	A
1894	C	C	-	C	C	NE	A	-	C	C	NW	N	N	N	AW	W	CW	C	AW	W	AW	W	W	W	W	AW	A	AE	AE	AE	
1895	CS	-	A	A	A	A	A	A	A	A	NW	NW	A	A	A	N	A	C	-	W	AW	AW	A	A	A	ASW	W	SW	C	SW	
1896	-	SE	C	C	C	C	CSE	CE	CE	C	A	A	A	ASE	A	-	CSW	W	W	W	W	A	A	A	AN	A	AW	AW	ANW	CNW	
1897	E	E	AE	NE	N	A	A	ASE	C	A	ASW	A	-	CNW	AW	C	W	W	W	W	W	-	N	A	A	A	SE	SE	C	N	
1898	N	N	W	SW	S	C	S	A	ANE	A	AE	ANE	ANE	A	A	A	A	W	W	W	W	W	C	C	C	C	C	N	AW	W	W
1899	S	CW	A	A	A	A	ANE	ANE	AN	A	A	AN	A	A	A	A	-	C	C	C	C	CNE	NW	AW	AW	ANW	A	C	CW	W	

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

JUNE																																
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30		
1940	AW	A	A	ASE	A	AE	AE	A	A	W	W	W	NW	A	W	AN	A	A	A	ANE	A	CNW	N	-	NW	NW	AW	S	ASW	A		
1941	ANE	ANE	AE	AE	E	-	C	-	CE	N	ANE	AN	AW	W	ANW	AW	AW	A	A	A	S	S	W	ASW	W	W	AW	A	A	A		
1942	W	AW	A	A	A	A	NW	N	N	N	AN	CNE	CN	-	N	CW	N	ANW	A	A	ASW	NW	NW	AN	AN	A	ANW	AW	ANW	A		
1943	C	C	N	CW	W	A	ASW	W	A	S	-	W	W	W	W	CW	-	CW	CW	W	W	ASW	W	AW	ANW	A	A	A	ANE	AE		
1944	C	W	W	CW	W	NW	N	CW	CNW	W	W	W	W	NW	W	CNW	A	A	A	ANE	ANE	N	AN	NW	C	C	C	C	C	C		
1945	CSW	SW	C	C	-	SW	CSW	W	W	W	W	NW	NW	W	W	ANW	AW	A	A	SE	S	S	C	NW	A	NW	N	C	CW	C		
1946	C	C	W	W	CW	W	A	-	C	C	W	N	A	C	C	C	W	W	NW	NW	A	AW	W	CW	W	C	W	W	W	W		
1947	C	C	CSE	C	CW	CW	CW	CW	AW	A	AE	AE	E	CE	C	W	S	W	SW	C	NW	A	A	S	W	S	CSW	-	W	AW		
1948	C	C	C	W	W	C	C	-	A	AE	AE	E	A	W	W	W	C	C	CN	W	W	C	-	A	AW	W	CW	N	N	N		
1949	CS	S	S	C	W	W	C	-	A	A	NW	AW	A	AN	A	AE	AE	AE	AE	AE	A	A	AE	AE	A	A	AW	A	A	AW		
1950	A	ASE	A	A	A	A	W	NW	ANW	A	A	ASE	C	N	CNW	CNW	CW	C	-	CW	C	CNW	NW	W	W	W	W	W	W	W		
1951	A	AE	AE	AE	AE	AE	AE	AE	C	C	S	C	SW	W	W	SW	C	W	W	ASW	A	-	N	N	N	CN	N	-	NE	A		
1952	C	C	AW	ASW	W	C	W	C	-	AW	A	A	CN	N	N	N	A	CW	C	NW	CNW	W	C	ANW	AW	AW	A	AW	A	W	A	
1953	N	N	CN	N	N	A	A	A	A	N	N	-	C	C	C	C	C	W	W	SW	W	C	-	AE	NE	N	CNW	N	ANE	AE	AE	
1954	NE	AE	AE	AE	CE	C	C	SE	C	CW	N	-	CNE	W	C	C	W	W	SW	W	CW	W	NW	W	W	W	W	N	A	A	A	
1955	AE	S	SE	C	SE	E	-	E	NE	AN	W	C	AW	W	A	AE	A	ASE	-	C	AW	W	W	CW	AW	AW	AW	W	W	W	W	
1956	W	W	W	CW	CW	C	C	N	A	A	-	N	NW	NW	A	A	C	-	W	NW	NW	ANW	A	AN	A	N	NW	CNW	W	W	S	
1957	AW	A	W	C	ANW	A	-	C	C	N	A	A	A	A	A	A	A	E	E	AE	AE	N	N	N	A	AW	SW	SW	ASW	A	A	
1958	E	CE	C	A	AE	SE	C	-	A	-	A	A	A	AS	A	A	N	A	C	C	C	C	CN	C	C	C	C	C	S	SE	A	
1959	W	AW	AW	A	-	CW	W	W	W	W	AW	A	A	A	AN	ANW	AW	ANW	A	ASE	SE	S	S	SE	-	C	C	C	N	A	A	
1960	ASW	A	A	SE	C	W	W	C	C	CW	W	C	W	NW	AW	W	AW	A	A	A	A	-	C	A	E	ANE	AN	N	AN	AN	AN	
1961	N	NW	W	W	W	W	CW	C	C	C	C	C	N	A	W	W	W	AW	A	A	A	W	W	W	W	NW	ANW	AW	A	A	S	
1962	AN	A	A	ASE	A	A	A	A	A	W	ANW	W	SW	W	SW	AW	AS	S	W	CW	W	W	W	CW	NW	NW	ANW	NW	ANW	ANW	ANW	
1963	E	AE	E	E	E	E	E	AE	E	E	A	-	CNE	A	AW	W	W	C	W	W	W	W	W	W	C	C	N	CN	C	C	C	
1964	E	CE	-	S	S	S	C	W	ASW	W	W	-	C	W	W	W	C	-	N	AN	N	-	NW	A	A	A	W	W	W	ANW	NW	NW
1965	A	A	A	W	W	C	CE	CE	AN	A	S	-	-	W	C	C	W	CW	W	W	C	C	W	W	W	W	CW	ANW	A	A	A	A
1966	A	A	A	CW	CW	C	C	S	CE	E	E	CE	C	S	S	S	S	CW	C	C	C	C	C	C	C	CW	W	C	N	A	ANW	ANW
1967	A	A	AW	AW	AW	W	N	A	ANW	A	AE	A	A	A	A	A	A	A	W	CW	W	C	A	SE	SE	C	C	C	W	W	W	AW
1968	A	E	-	W	W	W	W	-	A	A	A	A	A	A	ANE	A	A	CW	W	W	C	W	C	C	CW	W	C	C	C	AW	AS	AS
1969	AN	AW	C	ANE	A	A	A	A	A	AE	A	A	A	A	S	S	CS	C	C	C	C	C	C	C	C	W	W	AW	AW	A	AW	AW
1970	AW	A	A	ASE	AE	AE	E	E	E	A	A	A	AE	AE	ANE	AE	E	E	A	A	AS	SW	W	W	AW	-	C	CW	CNW	W	A	
1971	A	AE	AE	ANE	NE	NE	N	CN	CNE	CNE	C	C	-	CNE	N	NW	N	C	C	W	W	CN	A	-	C	-	W	-	-	-	-	-

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

JULY

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
1861	ANW	NW	(W)	(CW)	(C)	C	(C)	C	NW	NW	CW	C	CE	(C)	C	W	W	W	W	W	W	(W)	C	C	C	C	CNW	W	W	CW	W	
1862	NW	W	W	W	C	C	C	W	W	NW	CW	C	(W)	W	W	W	W	W	W	W	(W)	ANW	A	CW	W	W	A	A	A	A	CW	
1863	S	C	ANW	A	(A)	S	W	AW	A	A	(A)	A	A	A	A	A	N	N	(N)	NE	C	C	NW	NW	CN	(ANE)	A	A	N	ANE	AE	
1864	W	C	(CW)	NW	ANW	AN	AN	ANE	NE	(E)	E	AE	AE	ANE	A	A	(A)	A	A	W	W	W	W	(W)	W	W	W	W	W	W	(W)	
1865	N	(A)	A	S	SW	S	C	CW	(W)	CW	C	W	CW	W	S	(W)	-	C	C	CSW	A	-	(-)	A	A	ANW	ANW	A	NW	(N)	C	
1866	(CW)	CW	C	C	C	N	NW	(W)	CNW	AW	A	A	A	AW	(A)	ANE	A	ANE	A	A	A	(A)	ANE	ANE	AN	AW	C	C	(CN)	N	-	
1867	E	C	C	CW	NW	A	ANE	A	A	A	A	-	C	C	C	C	C	C	N	-	C	C	C	C	C	NE	N	N	AN	A	A	
1868	ANE	A	ANE	AN	AN	ANW	AW	AW	AW	ANE	A	ANE	ANE	A	A	-	ANW	W	W	AW	W	AW	A	A	A	AE	-	CS	C	W	W	
1869	A	A	A	A	W	CW	W	SW	AW	A	A	A	A	A	ANW	A	A	A	A	A	A	W	AW	ASW	AS	CW	W	A	AW	W	W	
1870	NW	N	-	CW	W	W	AW	S	C	C	-	NW	W	W	-	CW	W	W	AW	AW	A	A	A	E	CE	N	AN	ANE	ANE	E	E	
1871	S	-	C	AW	AW	SW	ASW	CSW	W	C	-	W	CSW	SW	W	AW	A	A	W	W	W	CW	CW	CS	CSE	C	W	C	C	C	CNE	
1872	CW	W	W	W	C	W	AS	AS	W	C	W	C	C	W	W	W	W	W	AW	AW	A	S	C	-	S	C	C	W	-	W	W	
1873	-	S	W	W	W	W	AS	A	ASW	A	A	A	AS	-	A	A	A	A	AE	A	AW	C	W	NW	W	W	SW	C	W	W	W	
1874	W	W	W	W	A	A	A	A	A	A	A	AW	A	W	CSE	CE	NE	CE	C	C	C	CN	CN	C	NW	W	A	W	-	CW	C	
1875	C	C	ANW	A	A	A	A	-	C	C	CN	AW	W	W	CSE	AE	NE	CE	C	C	C	CN	CN	C	NW	AW	A	ASE	A	NW	AN	
1876	W	AW	ASW	W	W	CW	C	C	W	W	W	AW	A	A	A	A	A	A	AN	A	A	-	N	NW	A	AW	A	W	W	W	CW	
1877	W	W	CW	NW	C	N	AN	AW	W	W	W	AW	CSW	C	C	C	C	W	CW	W	W	SW	CS	SW	W	W	W	W	W	AW	W	
1878	NE	N	N	AW	W	W	NW	ANW	W	W	NW	CNW	N	NW	NW	AW	AW	A	A	A	A	A	ASE	-	C	CNW	NW	ANE	N	AN	A	
1879	C	C	CW	CNW	NW	W	W	C	CN	N	A	C	C	CN	-	-	CE	A	CS	C	N	N	W	W	W	W	C	W	-	CW	C	
1880	C	C	C	N	AW	W	CW	C	C	C	NW	C	C	C	E	CE	AE	ANE	C	-	NW	A	A	A	AS	SW	C	-	C	CW	W	
1881	W	A	W	AW	-	C	W	-	W	AW	SW	W	W	AW	W	A	A	W	A	CW	CNW	A	C	W	C	CN	AW	AW	CW	SW	C	
1882	A	-	AW	W	C	CSW	C	CSW	W	SW	C	W	S	CSW	CS	CSW	SW	SW	SW	W	CSW	CSW	CSW	CW	-	A	ASW	AW	A	NW	AW	
1883	S	AS	CS	C	CS	S	S	S	C	W	CW	C	N	NW	NW	NW	NW	N	N	C	C	C	CN	NW	NW	N	C	AN	A	CW	W	
1884	A	A	A	CS	C	CS	S	CS	CS	CS	CS	S	CS	SW	SW	CSW	W	W	ANW	A	C	C	C	C	NW	C	C	AW	A	A	A	
1885	A	A	A	A	A	AW	SW	W	A	AS	C	W	W	A	W	CW	W	CW	W	N	A	A	A	A	A	A	A	A	A	A	A	A
1886	A	A	A	AW	A	W	AW	CN	NW	AW	W	W	CW	C	CW	W	SW	S	S	S	CS	CS	C	C	C	C	C	N	AW	CS	C	CNW
1887	A	A	A	NW	N	A	AW	S	CSW	CW	W	W	SW	W	W	AN	N	AN	A	A	A	A	AW	W	W	CS	W	SW	W	W	A	A
1888	A	CS	C	C	C	-	ANW	A	CW	NW	N	ANW	AW	A	CE	C	CE	C	-	C	-	-	CS	C	C	C	C	C	C	C	C	NW
1889	A	A	AE	E	ANE	NW	N	C	C	C	-	NE	C	NW	C	C	N	NW	W	W	C	W	C	W	C	C	N	AN	W	AW	A	S
1890	CN	C	CNW	-	CN	-	W	C	CN	NW	AN	W	W	W	W	A	-	C	N	A	A	NW	NW	NW	AW	W	W	W	W	ASW	SW	SW
1891	CS	C	C	W	S	C	C	CN	N	ANW	AW	A	A	AE	AE	-	C	S	SW	W	CW	C	CN	CN	AW	A	N	NW	CN	CN	-	
1892	AW	S	C	W	W	W	CW	W	CW	W	A	AE	CE	N	A	E	CNE	NW	C	N	ANW	A	A	A	A	AE	ANE	A	A	A	NW	NW
1893	ASE	A	A	E	CE	AE	ASE	CS	C	CS	CE	CN	C	N	N	AW	CW	CN	W	W	CW	W	W	W	W	N	A	A	NW	N	N	
1894	ASE	C	W	AW	AS	CS	CW	CW	C	C	C	C	C	C	W	CW	CW	CN	W	W	CW	C	N	ANE	CE	C	E	ASE	E	N	-	
1895	C	C	N	ANW	A	A	A	AS	W	W	W	N	W	NW	AW	C	C	S	C	C	C	W	-	C	C	C	C	C	C	NW	A	A
1896	NW	W	W	W	AW	-	C	C	C	A	A	A	A	W	AN	AN	A	A	AW	-	CNW	NW	W	W	C	C	C	W	A	C	E	E
1897	AN	A	NW	W	W	W	NW	W	W	A	A	A	ASE	AE	AE	A	A	A	E	C	C	-	AW	S	CW	CW	NW	NW	AW	A	A	AW
1898	W	NW	N	AN	A	AW	ANW	AN	ANE	AN	A	NW	NW	NW	AW	A	A	CW	ANW	A	ASW	C	N	NW	NW	A	A	-	C	AN	A	AW
1899	C	CN	N	W	AW	A	A	A	W	C	C	C	SW	W	W	A	A	A	AS	-	ANE	AE	E	C	ANW	W	NW	A	A	ANW	A	A

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

JULY

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
1900	CW	C	N	AW	CW	N	AN	A	AW	ASW	S	C	SW	CW	AS	CW	AW	A	A	E	-	AW	AW	AW	CW	ANW	ASE	C	C	NW	AW	
1901	-	E	E	A	ANW	A	A	A	A	A	A	A	A	A	AW	ASW	ASW	A	N	ASE	CN	CW	AW	C	C	-	N	C	A	A	AW	
1902	N	A	AW	W	A	A	AW	CW	N	AW	AW	A	W	W	A	NW	N	N	N	N	NW	N	-	-	C	CW	NW	C	W	NW	AN	
1903	AW	AS	W	AW	C	N	N	AW	AW	A	N	NW	AW	S	CS	CS	C	C	-	SW	CSW	C	C	S	C	C	C	C	C	N	AN	
1904	W	W	W	AW	W	W	AW	A	A	A	SE	S	S	SW	AW	A	A	SE	CS	CS	S	C	C	E	C	C	A	S	S	SW		
1905	C	CW	W	A	NW	ANW	A	A	-	A	AW	A	W	W	W	W	ANW	A	A	AW	CW	W	W	W	AW	A	A	CW	W	W		
1906	-	A	A	C	A	AW	AW	A	A	NW	A	W	W	W	W	AW	CW	W	W	W	W	W	AW	A	S	A	W	-	SE	-		
1907	AN	W	A	C	CW	CW	W	C	W	ANW	A	AW	W	A	ANE	AN	AN	A	A	A	E	A	-	A	C	CW	CW	C	C	N	N	
1908	AE	ANE	ANE	W	N	N	-	C	C	C	C	CN	-	W	W	C	N	A	A	A	AW	AW	AS	W	AW	AW	A	A	AW	ANW	ANW	
1909	A	A	W	W	W	CW	N	NW	W	N	ANW	W	W	W	W	W	W	ANW	AW	W	W	CW	CW	C	C	C	W	W	W	C	C	
1910	CW	C	CN	ANW	W	CN	AN	ANE	ANE	AE	AE	ANE	ANE	NE	E	E	NE	-	W	CW	C	W	C	C	-	SW	CS	C	CSW	C		
1911	NW	NW	AW	AW	AW	A	A	A	A	SW	SW	A	-	A	ANW	CW	CW	W	W	N	CE	CE	CSE	A	CS	CS	-	CE	CS	S	S	
1912	N	N	ANE	A	AE	C	W	A	A	NW	NW	CW	C	N	W	W	W	C	C	N	N	AN	AE	AE	AE	A	C	CW	C	A	C	
1913	AN	AN	AN	AN	N	N	N	W	W	NW	NW	C	C	C	C	C	W	W	NW	ANW	C	N	AN	AN	NW	N	N	A	A	A	A	
1914	-	C	W	-	C	C	W	A	ASE	SE	AS	SW	C	C	C	C	W	CSE	CE	NW	CNW	NW	CNW	CNW	NW	N	N	AN	A	S	S	
1915	A	W	AW	C	W	-	C	N	ANW	NW	NW	W	CW	CN	C	CN	AW	W	W	CW	W	CW	W	CW	C	C	W	AW	AW	-	-	
1916	C	C	C	C	-	C	C	CN	CW	W	C	NW	W	W	W	W	A	A	A	A	A	ANE	AE	A	A	C	A	A	AW	AW	A	
1917	A	A	AE	A	A	E	C	NE	A	A	AS	S	SW	C	W	AW	A	C	AW	A	AW	AW	AW	AW	AW	AW	W	W	C	N	AN	
1918	A	A	A	A	A	AW	W	W	C	C	CW	CW	S	S	C	-	C	W	C	C	C	C	CW	CW	C	C	N	AW	A	A	SE	
1919	CN	CN	C	C	NE	ANE	ANE	AN	ANW	NW	N	NW	NW	NW	W	W	W	CW	NW	W	NW	N	AN	AN	AN	AN	AN	AN	A	A	W	
1920	C	C	C	-	-	C	C	C	C	C	W	CW	W	W	W	CW	W	AW	W	W	W	CW	NW	C	C	C	W	W	W	W	W	
1921	N	AN	AN	A	A	AW	A	A	A	A	A	AE	AE	SE	S	A	A	A	ANW	A	W	W	W	W	W	-	C	C	W	W	SW	
1922	CSW	CW	W	C	C	W	C	C	W	A	W	SW	CW	C	CN	N	N	W	CW	W	W	C	N	A	W	W	W	C	-	W	SW	
1923	AW	W	W	SW	C	S	AW	AS	E	A	A	-	A	W	W	W	W	W	W	W	W	W	W	W	CNW	W	W	W	W	W	CW	
1924	AW	CW	C	CW	C	W	W	AW	-	ASW	AS	S	W	AW	W	C	NW	CW	-	CE	C	CNW	NW	NW	NW	NW	W	C	CE	C	W	
1925	A	E	E	E	-	W	NW	NW	W	NW	AW	A	A	ASW	AW	SW	CS	CS	E	AE	E	CE	E	C	C	C	CW	W	W	CW		
1926	A	AE	AE	AE	E	C	C	-	CW	W	W	AS	A	ANE	A	A	SE	C	W	W	W	W	C	NW	NW	ANW	NW	W	ANW	A	AW	
1927	CE	C	-	S	CS	CS	C	E	NE	N	N	A	A	A	ANE	AN	AN	A	S	C	C	NW	W	W	S	C	CW	W	S	SW	SW	
1928	W	W	A	W	C	W	AW	W	W	AW	AW	AW	AW	ASW	A	A	AW	AW	ANW	ANW	AW	W	W	W	W	A	C	N	W	-	C	
1929	CN	C	C	C	C	CN	AN	W	AW	SW	AW	A	A	A	SE	C	AW	ASW	ASW	W	C	NW	NW	N	ANW	A	C	C	CW	C	C	
1930	S	CS	C	-	AW	W	W	W	ANW	AN	N	C	C	C	C	C	C	CN	C	CN	NW	CN	A	AW	W	W	C	C	C	N	AW	
1931	AW	CW	W	SW	W	C	C	N	CN	C	CS	CW	C	CN	W	CW	CW	NW	NW	AW	W	W	CS	C	C	CNW	W	C	C	W	-	
1932	CW	W	SW	W	A	W	W	W	W	AW	-	NE	CE	-	N	N	C	NW	NW	NW	CNW	W	W	CW	C	C	CW	C	C	CSW	C	
1933	A	A	A	A	A	SE	S	SW	SW	W	W	C	C	C	W	W	AW	W	C	A	A	A	W	W	-	C	W	W	W	W	C	C
1934	A	ANW	A	A	AS	A	A	AE	AE	ASE	ASE	-	C	CNW	W	ASW	AS	W	C	E	NE	NW	W	W	NW	NW	W	W	SW	W	W	
1935	-	CW	W	W	W	A	A	ASE	A	W	A	A	ANE	A	W	W	W	CW	C	W	AW	A	A	A	A	A	W	NW	N	A	A	AW
1936	C	C	W	W	W	SW	C	CW	C	CNW	NW	CW	C	C	C	C	C	C	CN	N	A	C	C	CW	W	W	C	-	W	W	W	-
1937	W	W	C	C	W	W	W	W	W	-	W	W	W	W	W	W	ASW	AW	AW	AW	W	C	N	N	ANW	ANW	A	A	A	A	A	W
1938	W	NW	W	W	C	-	C	CNW	W	W	W	W	W	-	-	W	W	W	NW	A	A	A	S	SW	CW	C	C	SW	C	W	W	W
1939	NW	CW	SW	CS	CS	SW	C	CW	CN	NW	ANW	AW	C	C	C	CW	C	C	C	C	W	CW	CNW	CNW	W	W	W	CSW	CW	C	C	CW

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

JULY

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
1940	A	CW	CNW	NW	C	C	C	CW	C	C	C	C	C	C	-	C	CNW	C	C	C	CW	CNW	W	C	CW	CW	N	N	ANW	A	ANW	A	
1941	A	AW	W	AW	AW	AW	SW	W	AW	-	-	CE	CE	CE	C	CW	W	CW	C	CW	W	W	C	AW	AS	-	W	W	CNW	N	ANW	A	
1942	A	AS	SW	SW	CS	W	W	CW	NW	CN	N	AW	W	W	W	CW	N	N	NW	NW	NW	CW	W	CW	W	W	C	A	W	A	N	A	
1943	AE	ANE	A	W	W	C	N	W	W	W	CW	W	W	W	W	A	ASE	E	E	NE	NE	ANE	A	A	A	A	W	W	A	A	A	S	
1944	C	C	C	C	SW	S	CE	C	C	CNW	NW	W	W	W	W	AW	ASE	E	SE	E	E	N	A	A	A	SE	C	C	C	-	-	A	
1945	C	-	AW	SW	W	-	W	A	SE	C	C	C	E	C	C	-	AS	SE	CS	CW	W	W	W	W	ANW	A	N	NW	ANW	NW	ANW		
1946	A	W	-	C	W	ANW	A	A	A	A	A	A	C	C	C	C	C	C	C	CW	CNW	W	W	W	W	A	C	W	W	CW	W	W	
1947	A	AW	CNW	W	W	CNW	A	C	C	W	W	AW	AW	A	A	-	C	-	C	S	S	AS	A	A	W	-	A	AE	-	W	A	A	
1948	NW	AW	W	C	NW	NW	NW	N	N	NW	NW	CNW	N	N	N	NW	C	C	W	W	C	W	AW	AS	AS	A	A	A	ASE	SE	-	C	
1949	A	A	A	NW	ANW	AN	AN	AN	A	A	A	A	E	C	CE	C	C	C	N	AW	AW	A	A	A	A	A	W	W	W	AW	W	W	
1950	AW	A	AE	E	E	C	-	AS	W	W	C	W	C	C	SW	C	C	CW	W	AW	SW	CS	C	W	W	W	W	AW	A	A	ASW	W	
1951	A	AW	AW	AN	A	W	W	CW	C	C	C	CN	AN	A	A	AW	AW	ANW	A	A	A	C	NW	ANW	AW	AW	AW	AW	A	A	A	CSW	
1952	A	NW	A	A	AE	-	C	C	W	W	W	W	CNW	NW	NW	CNW	NW	NW	W	W	A	A	A	A	A	A	AN	N	N	NW	NW	W	W
1953	A	AN	ANW	A	W	W	W	W	N	W	W	C	C	CW	W	SW	C	C	W	W	SW	CW	W	W	W	W	W	CW	W	CW	W	C	
1954	W	NW	C	C	CNW	CN	W	W	W	W	W	C	N	W	NW	W	CW	N	AW	W	NW	NW	W	W	W	W	W	C	C	NW	NW	W	
1955	CW	W	C	CNW	ANW	A	A	A	AE	AE	A	A	A	A	ANW	A	A	A	A	A	A	A	A	A	AE	AE	AE	A	AN	A	A	A	A
1956	C	C	CW	SW	C	W	W	CSW	W	A	A	ASE	E	CE	C	-	CS	E	CE	NE	A	W	W	W	AW	AW	AW	-	C	C	N	W	
1957	-	A	E	C	A	E	C	W	N	C	C	C	C	C	CN	NW	C	C	C	C	C	N	N	N	A	CS	C	C	C	ANW	A	A	
1958	CE	E	CE	NE	N	AN	A	AW	AW	AW	AW	-	C	W	C	-	A	S	S	C	C	C	N	N	A	A	C	C	C	C	C	W	W
1959	W	W	W	ASW	W	AW	A	-	A	A	C	C	NW	A	A	A	W	SW	SW	AW	AW	A	A	A	A	A	S	C	C	C	N	AN	
1960	AN	A	A	-	C	C	C	CN	CW	C	C	W	SW	C	CW	CW	C	C	CN	W	W	CNW	W	W	W	W	W	W	W	W	W	C	
1961	AW	A	CNW	N	AN	AW	ANW	NW	NW	W	-	CE	C	C	CN	CNW	W	AN	AN	AN	AN	AN	A	A	A	W	W	NW	ANW	AW	AW	AW	
1962	A	NW	N	N	N	N	ANW	AS	AE	CE	C	C	-	C	NE	N	A	S	W	SW	C	C	A	AE	CE	NE	A	A	A	AW	CW	W	
1963	C	CE	C	C	C	C	C	N	NW	N	CNW	C	C	W	W	W	W	W	W	A	A	A	CS	C	C	NW	A	A	A	A	ASE	A	
1964	A	ANW	AN	AN	AN	N	ANW	W	CW	NW	W	W	-	SW	W	A	A	C	C	A	A	A	ANW	AW	AW	AW	A	W	W	W	AW	W	W
1965	A	N	N	AN	NW	-	-	N	NW	W	C	C	C	-	NE	AE	A	AS	CSE	CE	C	C	C	C	C	N	NW	W	C	C	N	CNW	
1966	AW	W	A	W	NW	NW	NW	NW	AW	CW	NW	W	NW	NW	CNW	N	AN	A	A	NE	AN	AN	W	C	CN	CN	C	CNW	CN	CN	CN	CNW	
1967	W	W	CW	AW	AW	S	W	W	AW	A	A	-	C	C	-	S	S	S	W	AW	A	A	-	W	W	W	W	W	W	W	W	W	CSW
1968	-	C	C	W	-	NE	NE	C	A	CE	CN	-	CE	C	A	N	CN	N	A	A	A	ANW	AN	AN	AN	AN	A	A	A	AE	A	A	A
1969	W	W	A	W	W	-	-	NW	NW	NW	ANW	A	A	A	A	W	AW	AW	W	AW	AW	AW	W	W	A	A	A	ASW	C	-	A	AE	A
1970	CNW	NW	W	W	AW	-	A	C	W	W	W	AW	W	NW	AN	ANW	A	AW	NW	N	NW	W	CSW	C	CN	C	C	C	W	W	W	AW	W
1971	A	A	A	C	A	A	A	A	A	A	A	AN	A	A	N	AN	AN	AN	A	ANW	AW	-	CSE	C	C	C	C	C	-	A	-	C	C

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

AUGUST

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
1861	W	C	CW	(W)	W	W	W	CW	W	W	(SW)	C	W	SW	W	W	W	(W)	W	W	AW	W	W	W	NW	(NW)	AW	AW	A	W	AW	A
1862	W	W	(AW)	S	CSW	CW	C	C	N	(A)	A	W	CW	C	C	CNE	(CN)	-	W	A	NW	W	W	W	(A)	ASE	A	AN	ANE	AE	(E)	
1863	S	(SW)	C	W	W	W	W	W	(W)	W	CN	A	E	SE	CSW	(W)	NW	N	CNW	N	ANW	W	(W)	W	CW	C	C	C	C	(C)	W	
1864	W	AW	A	W	AW	A	(AW)	W	W	ANW	A	A	A	(A)	A	A	ANE	A	CNE	N	(N)	A	NE	N	N	A	A	(W)	SW	SW	W	
1865	N	C	CN	N	AW	(W)	CNW	ANW	AW	C	C	S	(SW)	CW	C	CW	C	W	-	(C)	C	C	CE	C	A	A	(W)	C	ANW	A	W	
1866	C	C	CW	CW	(W)	CW	C	CW	NW	NW	W	(C)	C	NW	NW	W	NW	AW	(-)	CE	E	E	ASE	CS	ASW	(W)	CW	C	CN	W	W	
1867	E	AN	A	A	S	W	W	W	AW	A	A	A	A	-	-	CW	W	W	C	C	W	C	-	AW	W	W	W	W	W	CSW	C	
1868	A	A	ASE	ASE	CS	CSW	CSW	W	ASW	A	C	C	C	C	CE	E	NE	CNE	N	A	W	C	NW	W	AW	W	W	NW	AW	AW	AW	
1869	CW	CW	C	C	AN	A	AW	W	NW	NW	N	AW	CW	AN	A	AN	AN	A	A	A	A	A	AW	AW	A	A	AE	A	ANE	A	A	
1870	E	E	A	S	CS	SW	C	E	AE	ANE	AN	ANE	AE	AE	ANE	A	A	ANE	N	N	A	W	NW	NW	ANW	N	-	C	N	N	W	
1871	AS	A	CW	CW	W	A	A	AS	A	A	A	A	A	ANE	AN	-	C	C	W	C	-	A	W	CW	W	W	A	A	AS	S	SW	
1872	C	C	AN	A	C	C	CE	-	W	C	C	NW	ANW	A	ASE	S	S	ASE	ASE	AE	E	NE	N	A	-	C	AN	A	W	CW	CNW	
1873	AW	AW	AW	W	W	W	W	AW	W	W	W	W	W	AW	S	S	S	C	C	C	S	SE	E	-	C	C	C	C	C	W	C	
1874	W	W	W	C	C	W	C	CW	W	C	C	C	C	C	W	W	AW	W	A	A	A	A	A	A	A	A	AW	CW	W	W	SW	W
1875	A	A	AN	AN	ANE	ANE	AE	E	C	C	C	C	C	W	ASW	S	W	W	A	A	W	AW	AW	W	W	W	W	AW	A	W	CW	A
1876	W	S	C	W	W	AW	W	AW	A	A	A	A	SE	CS	AS	AE	E	E	C	C	C	NW	NW	NW	N	W	CNW	C	C	CW	C	
1877	NW	NW	NW	AW	A	SE	SE	CS	C	C	W	N	A	E	E	C	C	-	C	C	C	C	NW	A	CE	C	C	C	W	CW	NW	
1878	A	AE	E	CE	CE	C	C	W	-	C	W	C	C	CN	C	C	CW	A	ANE	AE	-	ASE	E	C	C	C	C	C	CE	C	CN	
1879	NW	A	CE	C	C	C	C	W	AN	A	ASE	S	SW	AW	-	C	C	C	C	S	S	CW	CW	W	CW	CW	SW	SW	W	W	W	W
1880	C	NW	AW	SW	S	CW	C	NW	A	A	A	AE	AE	ANE	ANE	AE	ANE	ANE	A	A	A	C	A	ANE	AE	SE	A	A	ASE	ASE	-	AN
1881	CW	AW	W	ASW	W	W	W	CW	CNW	W	NW	C	NW	NW	W	C	C	N	C	NW	C	C	C	C	C	C	NW	W	W	C	C	AN
1882	W	NW	NW	NW	ANW	ANW	AN	A	A	A	A	-	CS	SW	C	CN	-	W	W	W	CW	CW	C	W	C	C	NW	W	W	CW	-	A
1883	W	AW	A	W	W	W	W	W	CW	CW	NW	W	AW	S	C	W	W	AW	A	-	A	A	A	A	A	A	AW	W	W	CW	W	W
1884	AS	SW	W	AW	A	AS	A	SE	SE	S	C	CS	SW	W	AW	ASW	SW	SW	W	A	A	AS	AS	-	ANW	NW	-	CW	W	W	CW	
1885	ANE	AN	N	CN	C	CNE	C	C	S	CS	W	C	NW	A	A	A	A	AN	ANE	E	NE	N	N	N	A	ANE	ANE	AE	E	E	A	A
1886	C	N	A	A	SW	W	W	W	CW	C	W	W	C	W	W	CW	NW	A	ANW	A	A	A	A	A	A	W	W	AW	AS	A	A	W
1887	ANW	A	A	ASE	A	A	A	W	NW	N	N	CN	N	A	A	A	C	N	AN	A	A	SW	AS	AS	S	S	W	S	CSW	W	C	W
1888	-	A	ASW	W	N	AW	AW	W	SW	-	A	CS	CW	A	A	ANE	ANE	A	A	S	C	C	NW	NW	NW	NW	W	W	W	W	W	NW
1889	SW	W	CW	W	C	C	NW	W	W	CSW	C	CN	N	W	W	W	W	W	C	C	C	NW	NW	NW	NW	NW	AW	W	W	ASW	A	A
1890	CW	NW	AW	AW	AW	A	A	AE	AE	CE	C	CNW	CNW	CW	C	W	W	-	W	W	W	W	W	NW	W	C	C	N	NW	AN	A	
1891	W	CW	C	C	N	NW	AW	W	CW	W	W	CW	W	W	CW	W	S	CS	C	CN	CN	N	-	W	CSW	CW	CW	W	W	W	S	
1892	N	N	NW	ANW	W	W	W	C	N	A	AW	ASW	SW	W	-	-	-	C	NW	A	ASW	AS	C	C	W	W	W	W	W	W	C	W
1893	W	W	NW	CW	AW	A	S	S	SE	S	A	AW	A	AS	A	AW	S	S	W	SW	W	W	W	W	ANW	A	AN	A	A	A	AN	A
1894	SW	C	CNW	W	W	W	W	CW	W	NW	NW	CW	NW	CW	C	N	NW	NW	CW	NW	C	-	CE	ANE	AE	CE	N	A	A	A	A	AN
1895	AS	W	W	C	C	C	W	W	-	S	C	C	C	-	A	AS	AS	S	W	AW	SW	W	C	AW	AW	W	W	W	W	W	W	AW
1896	ANE	A	AN	N	AN	AN	N	N	AN	A	NW	AW	W	CNW	N	A	AW	W	C	NW	NW	NW	W	C	AW	W	W	W	W	W	C	W
1897	AE	A	A	SE	S	CSW	C	C	C	C	W	SW	SW	SW	CW	W	CW	W	W	CW	C	-	W	W	W	W	CS	SW	S	C	CW	C
1898	AW	W	W	W	W	C	CW	C	N	AW	CW	-	S	A	A	A	ANE	AE	AE	AE	A	-	W	A	A	A	SW	W	W	W	W	ANW
1899	A	A	E	E	AE	E	E	AE	AE	A	A	A	A	ASE	W	W	ANW	ANW	A	A	A	A	ASE	AS	-	A	A	SW	W	W	W	CW

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

AUGUST																																		
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31			
1900	CW	CW	C	W	CW	C	C	NW	C	ANW	AW	AW	AW	A	A	A	A	A	-	C	CW	C	C	C	C	ANE	AE	NE	AE	A	A	W		
1901	A	A	CNW	A	W	AW	W	W	S	C	C	C	S	S	CW	AW	AS	A	A	AN	A	AW	A	A	A	CS	CN	CW	NW	W	W	-		
1902	W	W	W	CW	W	CSE	C	N	NW	NW	NW	N	CW	C	A	-	C	C	W	W	W	W	W	W	W	W	SE	A	-	W	NE	C		
1903	W	W	W	CW	W	AW	A	S	CW	W	CNW	AW	SW	SW	C	C	C	C	W	C	W	W	W	W	W	W	ASW	W	W	W	W	W		
1904	ASW	ASW	AS	SW	CW	C	NW	ANW	NW	NW	CNW	AW	SW	CW	AW	C	C	CNW	N	AN	-	C	N	AN	W	W	AW	AS	S	C	CNW			
1905	CW	C	C	C	CW	W	CW	CW	C	C	W	W	W	A	A	AE	A	W	W	CW	SW	CW	C	C	CE	C	C	C	CN	N	A	A		
1906	S	CS	W	W	W	A	AS	-	C	-	W	-	S	CSW	CW	CW	CNW	N	AW	W	W	W	A	A	C	W	C	A	A	AS	S	N		
1907	-	AW	C	C	W	CW	W	W	W	CW	W	C	W	CW	W	CW	CW	CW	CNW	NW	AW	C	NW	AW	W	W	-	W	W	W	W	A	S	
1908	A	A	A	A	N	A	A	A	W	W	ANW	A	N	AN	AE	AE	ANE	ANE	ANE	E	C	CW	C	C	C	W	W	W	W	W	W	C	C	
1909	-	AN	A	AW	A	A	A	A	A	A	A	A	ANW	AW	A	CW	-	C	W	W	CNW	W	CW	C	N	ANW	ANW	AW	W	NW	N	N		
1910	C	C	C	C	C	-	-	E	E	A	S	C	-	S	C	SW	C	SW	C	C	C	-	C	C	C	C	C	CW	C	C	C	W	W	
1911	S	S	SW	SW	CW	W	AW	AS	A	A	AE	E	AE	AE	ANE	A	A	A	E	C	C	N	A	CS	CW	W	W	SW	W	CW	AW	AW	W	
1912	CN	NW	-	C	C	C	C	C	CW	C	AW	CNE	N	C	CW	W	C	C	C	C	CW	W	W	C	C	C	-	W	W	C	C	W	W	
1913	A	A	A	AN	N	N	N	N	N	NW	CW	-	A	W	A	A	ANE	ANE	ANE	A	A	W	W	W	W	W	W	W	A	A	CE	CN	N	N
1914	CS	C	CW	CW	CW	CW	W	SW	SW	AW	A	A	A	ASE	ASE	-	AE	A	AN	A	W	ASW	SW	W	W	W	CW	W	AW	A	A	A	A	A
1915	CE	C	C	-	CE	C	C	-	CS	SW	W	W	W	CW	C	CN	N	N	AN	AN	ANW	NW	ANW	AW	A	A	A	A	N	N	ANW	AW	W	
1916	A	AW	AN	AN	A	ANE	A	A	A	A	A	S	CSW	C	C	C	C	CN	NW	NW	A	A	S	C	C	W	C	C	C	-	W	W	W	
1917	NE	CN	CN	C	CNE	A	CSW	C	C	C	C	C	CS	C	C	W	CW	CW	W	W	W	W	W	CW	C	W	C	C	C	C	C	W	W	
1918	CSE	C	C	C	C	C	W	CW	AW	A	A	W	AW	W	W	AW	W	W	W	W	W	W	W	W	C	W	C	C	C	N	W	W	W	
1919	W	W	NW	W	NW	NW	ANW	A	AW	AW	AW	AW	AW	A	A	W	W	W	W	W	W	W	W	A	C	C	C	C	C	N	W	W	-	
1920	W	CW	CW	C	C	NW	AW	C	C	ANW	A	A	A	A	AW	AW	-	C	N	N	N	ANW	AW	AW	AW	ANW	A	A	AE	AE	A	A	A	
1921	SW	CW	W	W	CW	CW	W	W	W	C	C	C	NW	NW	W	C	-	A	A	-	CNE	C	-	A	A	W	W	W	-	C	AW	AW	W	
1922	W	W	W	W	W	C	C	C	CN	N	A	W	W	W	W	W	W	W	AW	AW	A	W	CNW	CW	CW	NW	W	W	CSW	C	C	C	C	
1923	W	C	C	AW	AS	ASW	W	W	W	AW	A	A	W	A	NW	W	CW	C	W	W	CW	C	CN	CNW	CW	W	W	W	CW	C	C	C	C	
1924	W	CW	W	W	W	W	W	A	A	A	SW	C	C	C	W	W	C	C	C	C	C	C	C	CN	CNW	CW	CW	W	W	W	W	W	W	
1925	N	NW	W	W	-	W	SW	SW	SW	W	W	SW	W	A	A	A	A	NE	NE	-	CE	C	C	C	C	W	W	W	W	W	W	W	W	
1926	A	ANW	AN	A	A	CW	NW	W	W	C	CW	W	CW	CW	W	SW	W	W	W	CW	W	W	W	C	W	W	W	W	W	SE	C	AW	W	
1927	W	W	A	AE	-	CSE	CSE	CSE	C	C	C	C	-	C	C	C	-	C	C	W	W	W	W	W	C	ANW	W	W	W	A	A	SE	W	
1928	-	A	A	A	A	AS	W	W	W	W	S	CS	C	C	W	NW	A	A	C	C	C	C	S	S	C	C	C	C	C	C	C	ANW	A	
1929	CN	W	CW	C	W	C	CNW	W	W	W	W	W	W	W	W	C	C	NW	W	W	W	W	W	W	W	A	A	S	CSW	SW	-	CS	W	
1930	SE	C	C	C	C	W	W	W	W	W	W	CW	CNW	W	CNW	NW	-	C	CW	W	C	W	W	W	W	ASW	S	SW	A	E	-	A	A	
1931	A	AE	A	A	AE	N	N	C	N	CNW	ANW	AW	W	W	C	C	C	W	C	C	CN	W	W	W	W	AN	A	A	AE	AE	AE	A	A	
1932	N	W	W	W	W	W	W	AW	AW	AS	CS	C	C	E	A	A	W	A	-	C	CE	E	A	A	A	ASE	E	ANW	W	SE	W	W	W	
1933	AW	AW	A	W	W	A	W	W	W	A	A	A	A	A	C	CW	W	W	W	W	CNW	CW	CNW	AW	AW	AS	AS	A	S	CW	W	W	W	
1934	C	C	C	W	C	C	E	A	W	CW	W	W	W	N	AW	W	AW	AW	AW	W	C	W	W	W	W	A	A	S	W	W	W	W	W	
1935	A	A	A	AW	AW	A	A	-	AW	W	CW	N	NW	NW	W	W	A	W	W	W	W	SW	S	C	-	CW	C	C	CN	C	C	C	C	
1936	W	CW	CW	NW	W	C	A	AW	AW	A	C	W	W	W	C	W	W	W	W	C	W	W	AW	A	A	-	C	C	C	A	A	AW	ANW	
1937	A	A	A	A	A	W	A	A	A	A	SW	ASE	C	C	W	C	CW	CW	W	NW	ANW	A	AW	A	A	A	A	A	A	A	A	A	AS	W
1938	A	A	AE	E	E	C	E	C	-	A	-	NW	A	A	A	A	CW	NW	W	W	W	W	-	A	A	A	A	W	-	A	N	N	N	AS
1939	W	CW	C	NE	NE	-	C	W	W	W	W	W	W	A	A	A	A	A	A	E	C	-	-	A	A	A	A	SE	S	ASE	AE	AE	-	-

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

AUGUST

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
1940	A	A	A	A	W	NW	W	W	W	CW	NW	AW	W	W	ANW	ANW	A	AW	N	NW	N	N	N	ANW	AW	AW	ANW	A	N	A	AW		
1941	AN	A	ANW	CW	N	NW	W	C	W	W	W	C	W	W	C	C	W	CW	CW	CW	CW	C	C	W	C	CW	W	CW	CW	-	A	AW	
1942	S	C	C	N	ANW	AW	W	W	W	CW	CW	CNW	W	W	W	W	AW	SW	W	W	W	W	A	S	C	CS	A	A	CE	CE	A	AW	
1943	C	C	NE	-	C	CN	W	W	W	C	N	W	C	NW	AW	A	SE	W	CS	SW	SW	CW	S	C	C	C	C	C	W	CW	CW	AW	
1944	ASE	E	A	A	A	A	A	A	W	W	W	AW	A	A	A	W	W	CW	C	NE	AN	A	SE	W	A	A	A	W	C	W	W	CW	
1945	A	A	AW	W	CNW	N	N	C	A	A	AE	AE	E	A	W	W	-	N	N	A	CS	C	W	W	W	A	AS	E	C	A	A	A	
1946	W	W	W	W	SW	W	W	W	C	C	W	A	CNW	NW	A	N	N	W	W	NW	-	W	W	W	-	W	W	C	C	C	C	C	
1947	A	ASE	CS	C	CNW	NW	W	A	ASE	A	A	A	A	A	ASE	A	AE	AE	AE	AE	E	A	A	ANE	A	A	AE	A	A	AE	AE	AE	
1948	C	N	ANE	A	S	CS	C	C	C	W	W	C	N	-	C	C	C	N	N	W	S	W	CW	W	C	W	A	A	AW	ASW	W	W	
1949	W	C	N	AW	S	SW	C	C	W	W	NW	A	A	A	A	ANW	A	A	A	A	A	A	A	A	A	ASE	AE	NE	A	AW	W	W	
1950	CW	C	N	AW	AS	SW	S	S	S	W	W	W	AW	W	W	W	C	C	CW	S	S	S	S	C	C	C	CW	W	C	C	-	C	
1951	W	W	SW	CW	C	C	C	C	C	NW	C	CN	N	ANW	A	A	W	W	W	W	W	W	W	C	W	SW	CSW	C	C	C	C	CW	
1952	C	C	C	C	C	-	C	C	C	C	C	C	-	C	C	NE	AE	CE	NE	N	NW	A	AW	A	A	A	W	AW	-	-	-	W	W
1953	A	AN	A	W	A	AW	A	A	A	AW	A	-	C	W	W	W	CW	W	W	C	C	-	W	CW	NW	ANW	AW	AW	W	W	C	C	
1954	W	W	CW	-	S	C	C	CW	C	CNW	W	W	C	C	N	A	C	C	C	N	E	N	N	N	N	N	A	AW	AW	W	W	W	AW
1955	A	A	AN	A	ANW	NW	AN	A	A	AE	A	AE	NE	-	AW	ASW	W	W	AW	A	A	ASE	ASE	A	A	A	ANE	A	A	A	AW	W	W
1956	C	C	N	C	C	NE	A	W	A	-	CW	W	C	CN	C	C	C	C	C	N	N	A	A	W	C	C	C	C	N	CNE	AN	AN	
1957	A	A	A	ASE	-	C	E	CSE	C	C	C	CN	-	C	CN	AW	W	AW	W	AW	ANW	A	CW	W	CW	CW	CN	AW	A	AW	AW	AW	AW
1958	C	CNW	W	CW	W	W	W	W	C	S	W	W	C	W	C	CW	A	CE	C	C	C	C	W	C	C	W	S	S	S	S	-	-	
1959	ANW	ANW	NW	ANW	ANW	A	A	A	A	E	-	C	AN	CS	W	AW	A	A	AS	S	C	-	W	W	W	AW	A	-	AN	AN	AN	A	A
1960	C	N	CN	N	NE	N	N	C	C	C	C	N	N	-	C	CNW	W	-	CN	W	CW	S	SW	C	C	C	C	C	C	N	A	A	A
1961	A	ANW	W	CW	W	W	A	C	C	CN	-	W	W	W	NW	NW	NW	CNW	N	CW	SW	NW	W	W	W	W	W	AW	SW	A	A	A	A
1962	AW	W	C	CW	C	CN	C	W	CW	CW	CW	W	A	ASE	C	C	C	A	AS	SW	W	W	W	W	W	CW	W	W	AW	A	A	A	A
1963	E	CE	CE	C	CN	-	CW	CNW	W	C	CN	N	NW	C	C	C	C	CNW	C	N	C	C	C	C	C	W	C	NW	W	SE	C	C	C
1964	NW	NW	ANW	ANW	A	AW	C	C	C	-	A	AE	E	NE	-	SE	C	C	N	A	A	W	W	CW	SW	CSW	C	C	N	A	A	A	A
1965	W	C	C	C	C	W	NW	A	A	AS	AS	ASE	SE	S	-	A	AW	W	W	W	CW	CN	NW	W	W	W	C	-	W	W	N	N	N
1966	C	-	C	CNW	C	C	C	C	C	C	C	C	C	C	A	AW	AW	A	A	-	C	ANE	ANE	A	A	A	AE	E	E	CSE	C	C	C
1967	C	C	C	CN	AW	S	SE	CSE	C	C	C	C	-	C	C	C	W	C	-	A	A	AS	A	-	A	AW	A	A	W	W	W	W	W
1968	ANE	ANE	ANE	AE	AE	NE	NE	NE	ANE	AN	A	-	C	N	CW	C	C	NW	W	W	ASW	AS	N	ANE	ANE	ANE	AE	AE	NE	ANE	A	W	W
1969	-	C	C	S	AW	A	ASE	S	C	-	C	C	C	C	CE	N	AW	AW	W	C	N	N	N	NW	NW	NW	NW	N	AN	AN	AN	A	A
1970	A	A	C	E	A	E	A	AW	W	NW	A	SW	W	W	SW	C	N	-	CNE	C	C	CE	ANE	AE	AE	AE	A	A	A	A	-	W	W
1971	C	C	C	C	C	C	W	W	W	C	CW	C	C	C	A	A	A	-	A	-	-	NE	ANE	A	A	A	W	W	W	CW	W	W	W

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

SEPTEMBER

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
1861 (AW)	W	W	W	W	W	W	C	NW	NW	AN	A	W	CSW	CW	(N)	N	A	A	-	CW	CSW	(C)	C	C	C	W	S	SW	(SW)	S	
1862 E	C	CW	CW	CN	N	W	(W)	W	CNW	N	NW	W	CW	(C)	AE	AE	A	A	A	A	(A)	A	A	SE	S	CS	S	(S)	SW	S	
1863 W	W	W	W	(W)	CW	(CW)	C	W	CW	N	ANW	AW	(ANW)	AW	AW	C	AW	AW	CW	(CW)	CW	C	C	C	CN	NW	(W)	W	W	CSW	
1864 W	W	W	W	W	W	W	W	W	W	W	(W)	W	CW	CW	C	C	C	(W)	W	W	W	W	W	W	(ASW)	AS	A	A	A	ANE	
1865 NW	NW	(AW)	A	AW	AW	ASW	A	SW	W	(W)	AW	A	A	A	AS	AW	(A)	A	A	A	AN	A	A	(A)	A	A	A	AE	A	A	
1866 CW	(CNW)	W	W	C	C	C	CN	CN	(C)	C	CW	W	CW	C	W	(C)	W	SW	CW	W	W	CW	(C)	C	SW	SW	CS	SE	C	(E)	
1867 -	-	AE	E	CS	W	W	W	S	CSW	C	CSW	C	CW	W	N	AN	AN	A	A	-	W	W	W	NW	ANW	AW	AW	W	W	(E)	
1868 AW	A	AS	AS	ASW	A	ASE	A	ANE	A	A	ANE	AE	AE	ANE	ANE	ANE	A	E	CE	C	CSE	E	CN	CN	-	CS	C	S	CS	C	
1869 AN	A	A	A	S	CSW	CW	W	SW	S	CW	C	C	C	W	W	W	CSW	CSW	W	W	W	W	W	W	W	W	W	S	CSE	CS	
1870 W	W	W	W	W	W	C	C	W	C	NW	A	W	CW	ANW	A	A	A	A	A	A	A	A	A	AS	A	A	AE	A	A	A	
1871 -	A	W	W	W	AW	A	CW	C	C	E	AE	ANE	A	A	A	ANE	ANE	ANE	A	C	CNE	CN	C	CN	NE	CE	C	CN	CE	-	
1872 C	-	SE	SE	SE	CS	C	C	W	CW	W	W	W	AW	ANW	ANW	AW	W	W	NW	N	NW	AN	C	C	N	W	W	W	W	W	
1873 C	NW	N	N	N	N	C	C	C	C	C	W	-	-	C	C	-	W	W	AW	W	A	A	A	A	A	AS	S	-	A	A	
1874 C	W	W	W	CW	W	C	A	W	W	C	W	NW	A	AW	AW	A	A	W	SW	W	CE	C	S	A	AW	A	-	S	SW	SW	
1875 A	SW	CSW	W	AW	AW	AS	-	C	C	-	A	A	A	AE	AE	AE	E	AE	A	-	A	-	AE	S	SW	CSW	CW	W	CNW	AW	
1876 N	N	N	W	C	C	CW	W	CNW	N	N	N	N	N	CN	CSE	C	C	W	A	A	AS	S	CS	C	C	C	CNE	C	CN	CE	
1877 AW	-	CN	AW	AW	AW	-	AN	A	AE	SE	S	SW	CSW	CW	NW	AW	AN	AN	AN	N	N	AN	N	N	ANW	A	A	A	A	A	ASE
1878 -	A	AW	A	A	S	W	A	A	A	AW	A	ANW	AW	W	CW	W	W	W	W	W	AW	CS	C	C	CW	NW	W	W	W	CSE	C
1879 A	W	W	A	A	E	CSE	C	C	C	W	W	W	CW	A	A	A	A	A	A	W	W	CW	C	CW	W	AW	W	W	A	AS	
1880 W	A	ASW	S	S	W	W	W	A	CSE	S	SW	C	CW	C	CN	CNE	W	W	W	W	W	W	W	AW	ASW	AS	A	A	A	A	
1881 ANE	ANE	AE	AE	E	CE	C	C	C	C	N	ANE	N	NW	ANW	A	A	S	C	-	S	C	C	SE	S	W	W	AW	A	A	AS	AS
1882 S	C	C	C	CW	NW	W	A	W	A	W	W	C	CN	CN	C	AW	CNW	N	NE	CE	ANE	A	AW	CS	C	C	C	C	CW	C	SW
1883 C	C	C	C	CW	NW	W	NW	W	AW	C	-	A	A	E	E	A	A	AS	SE	CSE	C	-	A	CSW	W	W	W	W	W	W	CN
1884 C	CSW	C	CSW	CN	-	C	C	W	AW	A	A	A	AE	AE	E	SE	A	A	A	A	W	W	W	W	W	W	W	W	W	W	AW
1885 A	S	CS	C	C	C	-	C	W	W	CW	W	AW	W	SW	CSW	ASW	-	A	W	AW	A	AW	AW	NW	N	N	A	A	AW	CW	W
1886 W	A	A	A	A	A	CS	SW	SW	SW	W	W	W	C	-	ANE	A	A	E	E	E	E	NE	AN	A	W	W	W	W	W	W	SW
1887 CS	C	C	C	C	C	C	C	N	A	W	NW	CNW	N	CN	C	C	-	A	A	AN	A	ANE	A	A	A	W	CW	C	C	CE	NE
1888 W	W	W	W	W	W	W	CW	N	AN	A	-	AW	A	A	ASE	W	A	A	A	A	A	A	A	ANE	AE	A	A	A	-	C	N
1889 A	SE	C	A	A	A	ASE	E	A	ASW	ASW	ASW	A	A	ANE	A	A	AS	A	W	NW	NW	W	W	C	AN	W	W	W	NW	N	N
1890 AW	W	W	W	AW	AW	A	A	A	A	A	ANW	A	A	AS	S	S	S	W	SE	CSE	CS	C	W	W	W	AW	AW	W	W	W	W
1891 CW	W	W	W	C	W	W	A	AS	AS	AS	A	A	-	CW	W	W	W	W	W	C	N	-	S	SW	W	W	W	W	SW	W	W
1892 W	W	W	W	AN	AW	AW	W	W	W	W	W	SW	CW	W	SW	CW	A	W	W	AE	E	A	A	W	W	W	W	W	W	W	C
1893 ANW	ANW	ANW	A	A	A	A	CW	C	AN	A	A	A	A	AW	AW	A	NW	W	W	W	C	N	N	NW	AW	-	CW	W	W	W	C
1894 A	ANE	ANE	N	N	N	AN	N	N	AN	A	A	A	A	A	A	A	A	AE	AE	AE	E	E	CE	CE	-	N	ANE	ANE	AE	A	A
1895 ASW	S	-	AW	W	W	A	-	A	AS	SW	CW	NW	A	A	A	A	W	CW	A	A	A	AS	AS	AS	AS	AS	AS	A	A	A	A
1896 CN	C	C	C	C	-	NE	AE	E	C	S	CS	CS	C	W	W	W	W	W	W	-	CS	C	CN	W	C	W	CW	NW	W	A	A
1897 C	CN	N	N	W	W	CNW	NW	-	ANE	A	A	A	A	A	A	A	W	CN	N	NW	NW	W	W	W	AW	W	A	S	C	C	A
1898 A	AW	AW	AW	A	AS	AS	S	-	W	W	W	W	W	AW	A	AS	S	C	W	W	A	ANE	A	AE	A	AE	A	AE	CW	C	-
1899 W	W	W	W	AW	S	-	-	NW	ANW	ANW	AW	A	A	A	A	W	NW	NW	NW	NW	CW	NW	W	W	W	W	CW	CW	W	C	C

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

SEPTEMBER

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
1900	W	N	A	A	A	AW	A	AW	AW	NW	A	A	A	A	ASE	AS	S	W	AW	AW	AW	AW	ASW	W	W	W	CW	CNW	W	CW	
1901	AN	AE	AE	E	SE	SE	S	S	SW	W	A	A	A	E	E	C	C	W	W	SW	CSW	S	CS	CE	C	-	ASW	ASW	SW	W	
1902	S	C	SW	W	W	AW	A	A	A	ANE	E	N	NW	NW	W	W	N	A	A	AS	S	CS	W	A	A	A	A	A	ANE	E	
1903	C	C	SW	W	AW	W	W	W	NW	C	NW	N	AN	A	AE	A	SE	SE	E	E	ASE	SE	S	S	C	S	S	S	S	S	
1904	W	W	CW	A	S	W	W	CW	W	NW	A	CS	C	C	-	AS	S	S	A	SE	ASE	AE	AE	AE	CNE	C	A	A	A	W	
1905	AW	NW	W	W	SW	SW	W	W	W	W	W	W	W	A	A	A	A	A	-	A	A	E	E	E	CNE	C	CE	E	NE	N	
1906	S	S	-	A	AW	AW	AW	AW	A	A	A	A	A	W	CW	NW	-	A	AE	AE	AE	A	A	ASE	A	A	A	A	A	A	
1907	AW	C	-	W	W	W	A	A	A	A	A	A	AW	ANW	W	AW	A	A	A	A	A	A	A	AS	S	CS	E	A	E	ASE	
1908	C	N	-	-	AW	W	C	C	C	N	N	A	AW	W	W	W	SW	S	S	C	C	SE	C	-	S	C	W	S	S	AS	
1909	NW	ANW	AW	W	W	CW	N	N	A	A	AE	N	ANE	A	A	ASE	A	A	A	AN	-	SE	C	C	-	AE	A	SE	E	A	
1910	AW	AW	ANW	A	A	AN	A	A	A	A	ANE	A	AN	A	A	AN	A	A	AN	A	A	A	W	W	AS	C	W	SW	W	A	
1911	W	W	A	A	A	A	A	A	A	AS	-	-	N	AN	AN	AN	A	A	W	CW	CN	W	A	AW	AS	C	W	AW	W	CN	
1912	CW	-	W	W	NW	N	ANW	ANW	AN	AN	N	A	A	A	ANW	AN	A	A	A	A	A	ASE	ASE	ASE	ASE	SE	SE	E	CE	C	
1913	N	AE	E	E	E	AE	A	A	N	A	AW	W	C	C	C	CE	CE	A	C	C	AW	-	S	S	S	S	CSE	E	E	E	
1914	A	A	A	AE	A	A	A	CSE	CE	C	W	W	W	CW	W	W	CW	NW	N	AN	A	A	AS	AS	AS	A	A	ANW	A	A	
1915	C	N	N	A	A	A	A	AS	ASE	ASE	ASE	S	W	W	W	AW	A	A	SE	SE	SE	S	CSW	CS	C	C	N	C	N	N	
1916	W	-	C	CNW	ANW	A	A	A	A	A	W	NW	N	AN	ANW	A	A	CNW	N	AN	A	AS	AS	SE	SE	SE	E	E	E	AE	
1917	CW	W	W	C	C	W	A	W	A	A	A	A	W	W	AW	W	W	SW	CW	AW	AW	AW	AW	AW	AW	AW	AW	AW	A	A	
1918	N	N	N	N	N	N	S	CW	W	C	W	CNW	W	C	-	C	C	CW	CW	W	W	CW	C	W	W	W	W	W	C	N	
1919	W	W	CW	S	S	W	AW	AW	AW	A	-	A	A	A	A	A	A	W	N	N	W	CW	CNW	W	W	W	CW	N	A	AW	AS
1920	AW	W	W	CW	W	W	AW	AW	AW	W	A	ASW	W	W	W	C	C	C	C	N	A	A	A	A	A	ASW	AS	S	S	-	-
1921	C	W	AW	A	A	A	A	A	A	S	CW	W	C	C	W	A	AE	ASE	A	A	AW	AW	AW	A	A	A	A	A	A	A	AS
1922	C	N	A	A	A	A	A	N	ANE	A	A	CSW	C	CN	N	W	CW	W	W	A	A	A	A	A	S	CSE	CE	C	AW	A	A
1923	N	ANW	AW	W	W	W	NW	A	W	A	AW	W	W	W	CW	CW	W	W	CW	C	CW	C	CW	C	W	W	ASW	AW	AW	ASW	
1924	W	A	A	AE	E	E	E	C	C	W	W	SW	W	W	W	W	W	W	SW	C	C	CW	C	C	CE	E	A	ASW	SW	W	
1925	W	NW	N	N	N	N	N	N	CN	CN	AN	A	A	ASW	S	W	W	W	C	C	CW	C	NW	NW	CW	CNW	AW	W	W	A	
1926	ANE	A	-	W	W	W	W	AW	W	W	W	CW	W	W	W	AW	ASW	S	C	AN	A	A	A	CW	CNW	C	N	ANW	AW	ASW	
1927	W	A	A	A	E	C	W	CW	C	C	N	NW	C	C	-	CNW	NW	W	W	W	C	C	C	CN	N	N	AW	W	W	W	
1928	A	A	ASW	SW	C	W	AS	SW	W	W	AW	A	A	A	A	A	ASW	W	ANW	A	C	ANE	AN	AN	N	A	-	E	ANE	AN	
1929	CW	A	A	-	A	A	A	A	A	ANW	A	W	A	AW	A	A	A	-	W	NW	NW	W	AW	A	A	AS	SW	W	W	CW	
1930	A	A	A	ASE	SW	W	C	C	C	C	E	E	C	CN	AW	C	C	C	C	W	W	W	SW	CW	CNW	CN	NE	A	ANE	ANE	
1931	-	C	C	C	N	AN	AN	A	AN	AN	A	C	A	AW	A	A	W	A	AN	AN	AN	A	ANE	A	A	A	A	A	A	W	W
1932	W	W	W	W	CW	CW	C	C	C	C	W	W	W	AW	A	A	W	-	N	N	A	-	N	W	C	CN	AN	A	A	C	C
1933	AW	A	A	A	SE	A	AE	AE	A	A	AE	ANE	N	A	A	AS	S	W	-	C	CE	A	C	C	CE	AE	A	A	A	AE	A
1934	W	-	SW	W	W	AW	ASE	CS	C	W	ASW	A	A	A	-	S	SW	W	W	W	W	CW	W	W	W	W	W	S	S	SW	W
1935	C	C	CW	W	-	N	A	A	AE	AS	S	S	SW	W	W	W	CSW	C	W	W	-	C	W	C	N	AW	W	CSW	W	W	W
1936	A	S	C	C	CW	W	C	W	W	S	S	W	W	C	-	A	A	-	A	ASE	-	A	A	E	-	AN	CN	A	A	A	ANE
1937	W	W	W	W	W	W	W	AW	-	AN	A	W	C	W	W	C	A	C	N	W	W	-	SW	S	S	S	-	AW	A	W	W
1938	A	AN	-	ANW	AW	C	C	C	ANE	AN	NW	NW	AW	AN	A	ASW	C	C	C	C	W	SW	S	S	S	S	CS	SE	C	C	C
1939	S	S	C	W	A	AS	AS	AW	A	CW	N	A	NW	N	AN	A	A	ANE	A	A	ANE	NE	NE	ANE	A	AE	AE	A	A	A	NE

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

SEPTEMBER

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
1940	AW	AW	A	W	W	A	NW	NW	NW	N	ANW	W	W	NW	W	CW	W	CW	C	W	W	CW	W	N	AN	ANW	NW	N	A	A	
1941	AW	AW	A	A	-	ANE	A	A	A	A	AN	ANW	A	AN	A	A	A	A	A	A	A	A	ASE	S	S	CS	CS	-	W	W	
1942	W	SW	W	W	W	AW	AW	A	A	A	A	A	AE	-	W	AW	ANW	CW	C	C	C	W	W	C	CN	A	-	C	C	C	
1943	W	W	A	AS	S	W	W	A	SE	E	E	E	C	CW	W	CW	ANW	W	NW	N	ANW	AW	NW	N	N	N	C	W	W	W	
1944	-	C	C	C	C	C	N	N	AN	A	A	A	ASE	SE	-	C	AW	A	A	A	A	W	W	C	NW	NW	W	W	NW		
1945	ASE	ASE	A	A	ANE	A	A	A	A	S	S	S	W	W	W	W	CS	C	W	SW	SW	C	W	N	A	ANW	NW	ANW	A	A	
1946	C	C	C	C	C	C	C	C	NW	W	C	W	C	W	W	W	CW	W	A	ASE	C	W	W	W	SW	S	S	ASE	E	SE	
1947	AE	A	A	W	W	W	W	W	W	W	W	W	CW	W	SW	CW	A	A	ASE	C	W	W	NW	NW	A	A	A	W	NW	A	
1948	W	C	C	N	W	W	W	W	S	W	W	W	CW	W	W	AW	AW	AW	AN	AN	A	A	A	W	W	S	SW	W	W	AW	
1949	W	S	S	S	SW	W	AW	AW	W	-	ANE	AE	E	C	C	A	A	AE	A	AE	E	E	CE	CS	-	A	A	A	A	A	
1950	A	W	CW	W	W	C	CW	W	CW	W	C	W	SW	W	CW	W	C	W	CW	C	NW	NW	W	CW	C	N	W	W	W	C	
1951	CW	CW	W	SW	W	A	A	AE	AE	A	S	SW	C	W	CW	W	ANW	ANW	ANW	A	A	S	CS	C	CS	W	W	W	A	S	
1952	W	W	W	N	N	N	N	N	C	ANE	NE	NE	ANE	ANE	A	A	N	N	N	NW	NW	NW	W	W	CW	CN	W	C	C	CN	
1953	W	CW	NW	A	AS	A	A	A	NW	N	ANW	W	A	W	CSE	CE	C	C	SW	CSW	C	C	-	-	A	W	W	W	W	C	
1954	ASW	W	C	W	AS	W	W	W	C	CW	W	W	W	W	W	W	W	W	W	CW	NW	A	W	W	W	CW	W	CNW	W	C	
1955	W	CW	W	W	W	AW	A	-	W	AW	W	W	CW	N	N	W	W	AW	A	C	SW	S	W	W	W	W	W	ANW	AW	AW	
1956	ANE	E	CE	C	CS	C	C	-	E	A	W	W	AW	A	A	A	A	ASE	S	S	S	S	SE	E	E	CSE	W	W	W	SW	
1957	ANW	W	-	W	W	W	W	W	W	W	CW	NW	NW	N	N	AW	W	-	A	E	SE	-	C	-	C	A	A	ANW	N	AN	
1958	SE	SE	E	E	SE	S	C	C	A	A	A	A	ASE	AS	C	A	A	S	SW	W	W	CW	W	W	C	A	A	S	S	C	
1959	A	A	A	A	A	A	A	A	A	A	A	A	ANE	ANE	ANE	NE	AE	A	A	A	W	W	AW	AW	W	A	A	A	AS	S	
1960	A	W	C	N	A	W	-	A	AW	ASW	W	-	AW	CW	C	C	CE	-	C	N	-	CW	A	A	A	AE	SE	-	E	E	
1961	AS	C	NE	-	NW	CNW	N	A	A	SW	W	W	W	W	W	CS	W	A	S	-	SW	AS	-	AW	AW	AW	W	C	SW	CS	
1962	AS	S	CS	C	CN	C	NW	AW	C	C	C	C	A	S	W	NW	AN	AN	ANE	A	A	A	AW	AW	CS	C	C	CSW	S	SW	
1963	CE	C	CN	C	NW	W	W	W	W	-	-	A	AW	A	A	A	W	A	ASE	A	A	A	A	W	W	W	NW	AW	CW	NW	
1964	ASE	SE	SE	A	-	NW	W	W	-	C	C	A	AS	W	W	C	NW	W	C	N	AW	ASW	S	CS	SW	W	W	AW	A	A	
1965	AN	A	C	CN	CN	C	C	C	CNW	CN	CN	C	C	W	W	W	C	-	AW	A	AW	W	W	CS	C	C	CS	C	CN	CNE	
1966	-	C	W	W	W	W	A	A	A	A	W	W	W	W	N	A	-	A	A	A	A	A	A	A	A	A	AE	SE	A	-	
1967	W	CW	C	W	C	W	AW	A	A	AW	C	-	A	A	-	A	C	W	C	C	CN	C	-	S	SW	S	S	S	S	W	
1968	SW	C	C	-	SW	A	ASE	SE	SE	-	C	C	CE	E	E	CNE	NE	AE	-	C	C	C	-	N	CSW	SW	SW	CW	C	NW	
1969	A	A	A	A	A	A	A	A	-	C	C	C	NE	E	E	CE	E	E	A	A	A	CW	W	AW	W	W	AW	CW	A	-	
1970	W	C	W	W	AW	A	S	C	C	C	W	C	C	C	C	W	W	A	A	A	A	ASE	ASE	A	AS	S	AS	S	W	W	
1971	W	AW	AW	A	A	A	A	ASE	SE	E	E	A	A	A	A	A	A	A	A	A	A	A	C	C	AE	C	C	-	-	ASW	ASW

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

OCTOBER

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
1861	C	W	A	A	-	(A)	A	SW	-	A	CSW	CW	(W)	-	A	AN	A	A	SE	(SE)	CS	C	S	W	A	AE	(AE)	AE	AN	A	W		
1862	W	W	W	A	(A)	-	AN	A	A	E	CS	(CW)	W	CW	CW	W	W	CW	(CW)	CNW	NW	CW	C	NW	AW	(W)	W	W	A	A	CSE		
1863	C	W	W	E	W	AE	CE	AE	E	SE	CSE	(CS)	CS	S	SW	W	W	(W)	CW	AW	A	A	A	A	(A)	C	E	CSW	W	W	CSE		
1864	A	A	AE	E	E	AE	AE	AE	E	A	ANE	AN	AN	AN	AN	W	W	CW	CW	C	C	C	C	C	-	CE	C	E	E	ANE	A		
1865	(A)	E	ASE	ASE	ASE	A	ASE	(CSE)	C	CSE	C	C	NE	-	(A)	-	C	CNE	CN	NW	CW	(C)	-	CW	C	C	C	N	(W)	CW	N		
1866	AE	AE	E	E	AE	A	(A)	A	AE	A	A	A	A	(A)	A	A	S	S	S	SE	(S)	CW	SW	CE	-	-	CW	(NW)	AW	W	AW		
1867	ANW	W	NW	N	N	CW	NW	NW	NW	-	A	-	C	CSE	C	S	W	W	W	W	W	AW	S	CE	-	CW	W	W	W	W	W		
1868	ANE	A	A	NW	A	SW	W	W	W	A	A	AS	W	A	W	W	W	W	ANW	W	W	W	W	CW	W	W	AW	W	W	W	W		
1869	CS	CE	-	A	ASE	ASE	AS	A	A	S	SW	W	W	ANW	CW	C	-	C	N	ANW	AN	A	NW	AN	A	N	N	N	N	N	ANW		
1870	A	ASE	A	C	A	A	-	C	CN	N	-	C	CN	ANW	W	CW	CW	ASW	CSW	C	W	W	C	C	W	W	W	W	CW	W	NW		
1871	C	C	C	C	W	W	W	AN	A	A	A	AS	AS	W	W	SW	SW	S	CSW	W	W	AW	AW	AW	W	W	W	S	CS	CSE	E		
1872	W	W	W	NW	A	A	W	W	W	A	N	N	N	A	-	C	E	E	S	CS	C	CNW	W	SW	C	C	C	C	W	W	W		
1873	-	SE	C	N	AW	C	C	NW	W	W	W	C	C	W	AW	AW	W	W	W	A	CNW	W	W	C	C	NE	A	A	A	-	W		
1874	C	C	CW	W	W	W	CW	AW	W	W	W	A	-	S	C	W	W	W	W	W	C	-	AW	AS	W	S	C	C	-	A	A		
1875	W	W	W	W	W	W	W	W	C	C	W	CW	CNW	C	E	C	SE	E	SE	CE	CS	CS	CE	CE	A	AS	SE	CE	E	E	SE		
1876	ANE	ASE	CS	S	S	S	SW	-	CSW	CSW	CSW	SW	CS	CSW	SW	S	SE	CE	C	AE	AE	AE	AE	E	A	A	A	A	A	AN	AN		
1877	A	A	A	A	A	A	ANW	N	A	W	W	W	CW	CSW	CW	NW	A	A	S	-	CSW	W	C	C	C	C	W	CW	W	CSW	W	W	
1878	A	A	-	S	S	S	CS	C	CS	C	A	W	AW	SW	S	SE	ASE	S	SE	CSE	CS	W	W	CW	CW	C	N	CNW	NW	N	N		
1879	W	W	W	W	AW	A	A	A	A	A	A	A	A	N	AN	A	NW	W	W	NW	NW	NW	W	W	W	AE	A	A	A	A	A	A	
1880	-	NW	AN	NE	C	C	NE	E	E	E	A	A	A	A	A	A	A	ANW	N	CNE	ANE	AE	-	A	W	-	C	C	N	A	ANW		
1881	ASE	SE	SE	SE	E	A	A	-	CNW	W	W	W	W	C	N	A	AS	S	SE	E	E	E	CE	CSE	E	AE	AE	AN	ANE	A	A	A	
1882	S	SW	W	ANW	A	AE	E	E	SE	S	CS	C	E	SE	C	CSE	E	SE	S	SW	C	CW	W	W	W	C	E	NE	-	CW	SW		
1883	N	NW	CN	CN	N	A	AW	A	AW	A	-	A	S	W	SW	W	W	AW	NW	W	NW	W	W	W	W	W	W	W	AS	A	A	A	
1884	W	W	NW	A	A	A	-	C	C	N	N	N	NW	NW	NW	W	W	W	NW	AW	AW	ASW	AS	CS	-	AW	NW	C	CNW	W	SW	SW	
1885	W	W	W	W	CW	W	W	CW	N	C	N	N	N	N	N	E	E	E	ANE	ANE	-	C	E	CE	C	CW	W	CN	-	S	C	C	
1886	CSW	W	S	SE	CS	C	C	C	-	S	W	W	W	W	C	C	CN	NE	NE	NE	C	C	E	CE	AE	AE	E	SE	S	S	S	S	
1887	AN	W	AN	A	A	A	NW	N	CNE	N	N	N	N	N	N	AN	A	A	AW	ANW	A	A	W	N	AE	A	W	W	CW	CW	CW	CW	
1888	N	CN	C	N	N	N	NW	A	N	N	ANW	NW	N	ANW	A	A	A	S	AS	A	ASE	A	ASW	SW	SW	SW	SW	SW	W	W	CW	CW	
1889	N	-	C	C	C	W	C	W	C	C	C	C	NW	A	S	CW	C	C	C	C	E	CE	CE	A	AE	E	E	C	W	W	W	W	
1890	C	AW	AW	W	W	W	-	A	A	A	A	A	A	W	W	NW	NW	N	AN	AN	A	A	W	W	W	N	N	NW	W	W	W	C	
1891	CW	W	AW	AS	S	S	S	S	SW	CSW	S	SW	S	CW	SW	C	W	W	W	S	CS	C	C	C	NW	A	ANE	ASE	A	A	A	A	
1892	C	C	C	C	C	C	C	C	CN	NW	N	N	AN	CE	E	N	N	W	A	ANW	CN	N	N	AN	A	A	S	S	CW	A	A	A	
1893	W	W	W	C	C	C	C	C	C	C	CW	W	AW	AW	C	W	W	A	A	W	A	W	A	AW	W	W	NW	W	W	N	A	A	
1894	A	A	A	AE	AE	AE	AE	AE	A	A	W	-	A	-	N	N	AN	A	N	E	CE	C	A	SE	C	C	C	-	-	CW	C	S	S
1895	C	C	CW	W	W	W	W	C	C	C	N	ANW	W	AW	A	E	ANE	A	A	A	ANE	CNE	N	N	CN	N	C	N	N	CN	NW	C	C
1896	A	W	W	W	W	W	-	C	C	C	N	N	N	AN	AE	-	NE	N	C	CN	N	N	NW	CW	C	C	C	C	CNE	NE	CNE	CNE	
1897	A	-	NW	A	A	A	A	W	ANW	W	NW	AN	-	-	CS	S	S	W	A	A	A	A	AE	AE	SE	SE	S	S	S	S	A	AE	AE
1898	A	CN	W	A	A	AE	AE	SE	SE	C	-	N	A	E	SE	E	CE	CE	C	C	S	W	W	W	W	W	W	CSW	C	C	C	W	CW
1899	C	A	W	-	AN	A	A	A	A	A	A	W	N	A	A	SE	S	A	A	A	AE	A	AW	A	A	A	V	AW	W	W	W	W	W

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

OCTOBER

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
1900	W	W	W	S	CW	W	ASW	SW	W	ANW	AW	A	W	N	AW	W	C	N	A	ANE	AN	A	ANW	W	CW	CW	CN	W	CW	W	S		
1901	S	C	W	W	NW	N	NW	SW	W	ANW	AW	A	-	A	S	-	CS	CSW	CW	W	C	C	W	CW	W	A	AW	-	ANE	W	AE		
1902	E	AE	AE	W	E	E	E	E	E	CE	-	W	W	W	W	CW	N	W	C	W	W	W	AW	AW	AW	CW	AW	C	W	W	ANW		
1903	CS	CW	C	-	CW	C	-	C	C	-	S	C	CW	SW	CW	CW	N	A	SW	S	W	CW	-	-	CS	C	C	C	C	CW	W		
1904	W	-	A	A	CW	NW	CN	CN	W	W	AW	A	A	A	-	W	W	AW	A	AS	SW	SW	CS	ANW	A	ANW	A	A	AE	A	AE		
1905	N	N	W	CNW	N	ANW	AW	A	A	A	A	A	N	NW	N	N	A	A	ANE	A	A	AE	ANE	AN	A	W	W	W	CSW	C	C		
1906	S	C	A	CS	CW	W	SW	CS	C	SE	C	W	W	NW	W	W	W	C	C	C	S	SW	W	W	A	W	W	W	CW	C	CE		
1907	CS	C	C	-	W	W	CN	C	CE	C	W	W	W	C	C	C	C	CS	CS	C	CSW	CSW	C	CW	C	C	-	C	CE	C	CE		
1908	AS	AS	A	A	AE	SE	S	S	SW	W	ASW	AS	S	A	A	AE	SE	SE	SE	S	A	A	A	A	A	E	SE	S	S	S	AS		
1909	C	SW	CSW	W	CW	W	SW	W	AW	SW	SW	SW	CW	W	W	W	C	C	W	W	W	C	NW	W	W	CE	NE	N	N	N	A		
1910	S	W	W	AW	A	A	A	A	A	ASW	W	CN	ANE	AE	AE	CSE	C	C	CN	CN	CE	E	E	E	SE	E	E	E	E	W	W		
1911	AN	N	N	CNE	N	ANE	A	-	ANE	A	A	AS	SE	E	ASE	ASE	SE	SE	CSE	S	CS	C	C	C	C	C	-	A	W	W	W		
1912	C	NE	A	A	A	AW	A	AS	A	A	A	AS	SW	W	AW	W	W	W	W	W	CS	C	C	C	C	S	CSW	A	W	C	N		
1913	E	E	E	CSE	C	E	CE	C	-	SE	-	S	AS	W	AW	A	ASW	ASW	S	CSW	CW	-	AN	A	A	A	CS	S	SE	CS	W		
1914	A	A	AW	A	A	A	A	A	A	A	ASE	C	C	-	A	A	A	A	A	ASE	SE	C	C	C	C	-	W	W	C	E	E	CE	
1915	A	C	A	A	A	A	AS	C	SE	SE	CSE	W	SW	W	A	A	A	A	AE	SE	S	S	C	C	C	ANE	A	A	CW	C	C	CE	
1916	A	A	S	CW	C	C	W	W	W	W	N	W	CW	N	N	A	CW	W	A	A	S	C	C	CS	C	C	C	C	C	C	C	CE	
1917	SW	W	W	CW	N	W	C	C	C	W	W	W	CN	W	W	CW	CW	W	AW	SW	W	W	W	CW	W	CW	N	W	SW	CW	W	W	
1918	W	W	W	W	W	W	W	W	W	W	N	N	-	W	W	N	CN	CNE	E	ANE	AE	A	A	C	NW	W	W	W	SW	SW	W	W	
1919	W	W	A	A	A	A	A	A	AN	AN	N	N	N	N	N	N	ANW	AW	A	ASW	AS	ASW	C	C	C	N	N	N	N	CNE	E	E	
1920	C	C	S	S	S	CSE	C	-	A	A	ASE	E	E	SE	S	C	E	E	ASE	S	S	ASW	S	ASE	ASE	ASE	ASE	SE	SE	S	C	C	
1921	S	C	AS	W	S	SW	W	W	S	C	-	A	-	AW	A	AW	ASW	S	W	A	W	C	CNW	A	A	A	A	A	A	ANW	A	AW	
1922	W	AW	AW	W	C	ANE	A	A	A	A	S	S	S	S	AS	ASE	SE	E	AE	E	NE	NE	ANE	ANE	ANE	AE	A	NE	NE	AE	NE	W	
1923	W	NW	CN	A	W	W	W	W	W	W	W	W	C	CN	NW	AW	CNW	AW	S	W	W	CW	W	W	CW	W	SW	C	W	W	W	AW	
1924	CW	W	CNE	C	C	CW	CW	C	W	W	SW	S	AS	ASE	ASE	A	A	A	CW	C	E	A	A	S	SE	CE	C	C	W	W	W	W	
1925	A	A	AW	A	A	A	AN	A	A	A	AN	N	N	AN	A	A	A	CW	-	AE	S	SW	CS	C	CW	W	W	W	S	S	S	S	
1926	A	AW	A	A	AE	S	W	W	W	C	NW	CW	W	C	C	-	N	A	A	ANE	C	E	E	C	C	-	SE	E	CNE	N	A	A	
1927	W	C	A	A	A	A	A	A	A	SE	AE	A	A	AN	ANE	A	NW	W	W	-	A	C	C	C	W	W	C	W	CSW	SW	W	W	
1928	A	A	A	AS	S	SW	ASW	SW	C	-	C	E	A	-	C	C	W	W	CSW	W	W	CW	W	SW	W	C	CE	NW	W	C	C	C	
1929	W	W	W	CW	C	C	CW	C	NW	W	W	W	W	AW	A	A	CW	W	W	CSW	A	W	W	W	CW	CN	-	W	CNW	N	A	A	
1930	AE	A	ASE	CW	W	W	W	C	W	W	SW	W	SW	S	S	SW	CS	W	W	W	CW	W	NW	NW	NW	W	W	W	CW	W	W	W	
1931	W	W	W	W	W	SW	W	W	W	A	A	W	A	A	A	A	A	ANE	A	N	A	A	-	N	A	A	A	A	W	C	-	A	A
1932	N	CN	N	A	W	W	S	C	C	C	C	W	W	CW	NW	W	W	W	W	E	CW	C	C	CNW	W	C	C	CN	W	CN	NW	NW	
1933	ANE	A	A	A	A	A	A	E	C	W	CW	W	W	W	N	N	NW	S	CS	E	E	E	E	CE	N	N	N	CN	CN	CN	NW	NW	
1934	W	W	W	C	W	W	W	W	W	W	AW	AW	AW	AW	NW	N	N	NW	W	W	W	W	W	-	CSW	W	W	W	NW	CN	N	N	
1935	C	CW	C	CE	C	-	W	W	W	W	W	W	W	W	W	W	W	W	CN	N	CNW	-	C	A	A	W	W	W	NW	W	W	W	W
1936	A	A	ASE	A	E	AE	A	A	A	AE	A	A	A	W	CW	W	W	W	ANW	ANW	AW	AW	W	W	W	W	W	W	W	AW	W	NW	
1937	-	-	A	A	A	A	E	AE	A	A	A	ANE	A	AW	AW	AW	AW	A	A	A	-	C	C	C	C	C	A	ASE	-	A	C	C	
1938	C	C	C	C	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	A	A	AS	S	A	A	A	N	N	NW	A	W	W	W
1939	E	AE	A	A	A	CSE	C	-	SE	C	CS	C	C	CE	CN	-	AE	AE	A	A	A	A	W	NW	N	N	AN	ANE	NE	E	E	E	

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

OCTOBER

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
1940	A	A	-	C	CW	C	W	W	C	W	W	A	A	S	CSE	C	CSE	C	E	CSE	C	E	E	E	E	E	ANE	ANE	A	AS	SW	CW	
1941	AW	A	A	A	ASE	SE	S	S	-	C	-	A	A	A	W	W	W	CW	W	W	A	AN	AE	AE	AE	AN	NW	N	N	N	NE		
1942	W	A	A	W	A	A	AW	W	W	W	AW	W	AW	W	W	AW	W	W	W	W	W	W	W	CW	C	C	C	E	E	CNE	NE		
1943	CSW	W	W	W	W	W	A	A	AS	-	A	ASW	A	A	S	CS	-	S	S	S	S	S	C	W	A	SW	SW	S	S	S	S		
1944	N	ANW	N	N	AN	A	A	AN	A	SW	C	CW	C	C	W	C	W	W	W	W	-	A	NW	A	A	W	NW	C	CE	A	N		
1945	A	A	A	A	A	A	A	AW	W	C	A	A	A	A	A	A	A	A	A	ASE	S	S	CSW	C	C	C	C	CSE	C	W	-		
1946	SE	SE	W	W	NW	A	AE	SE	E	AE	AE	ANE	ANE	A	A	A	A	SE	SE	SE	CSE	CE	E	AE	SE	CSE	C	ANW	A	A	AE		
1947	A	A	A	A	A	A	A	W	W	W	ASW	AW	AW	A	W	AW	A	A	A	AS	S	C	C	E	E	E	E	E	E	E	E	-	
1948	AW	AW	NW	ANW	A	A	A	SE	S	S	SW	W	W	CW	W	CW	W	C	NW	W	W	W	W	CW	CN	A	A	AE	ASE	A	ASW		
1949	A	AW	A	A	A	ASE	S	S	CS	S	S	ASW	AS	S	SW	W	W	W	W	W	W	W	C	C	C	C	A	A	AS	A	A		
1950	C	W	W	SW	SW	W	W	W	W	W	W	ASW	W	W	CW	AW	W	W	AW	A	ASE	A	AE	ASE	A	-	-	-	A	E	-	W	
1951	SE	AE	A	A	A	A	ASE	AS	AS	A	AS	SE	SE	A	A	AW	A	A	A	A	W	C	N	ANW	A	A	AS	SE	CSE	C	CNW	CNW	
1952	CN	N	A	-	-	NW	ANW	AW	N	AN	AE	-	C	A	A	E	SE	SE	SE	E	S	S	SW	SW	SW	CW	SW	SW	W	W	NW	NW	
1953	W	AW	W	W	A	A	A	A	A	AW	S	C	CNE	ANE	AE	-	A	A	A	A	W	W	W	C	-	W	W	W	SW	CW	W	C	
1954	W	SW	W	W	CW	A	A	W	W	W	W	W	W	-	C	C	S	CW	CW	W	W	W	CW	C	-	W	W	W	SW	CW	W	C	
1955	A	W	NW	W	CW	C	W	W	A	S	-	A	AW	AW	N	N	N	AW	C	C	N	A	A	A	A	AW	N	N	AN	N	A	A	
1956	W	C	NW	NW	N	AN	ANW	A	A	A	A	A	A	A	A	S	CSW	W	CW	W	CW	AW	W	W	W	N	AN	A	W	N	ANE	AE	
1957	A	A	AN	A	AW	AW	AS	A	A	A	A	A	A	A	AS	W	W	CW	CW	W	W	NW	W	W	W	SW	W	A	W	W	C	W	
1958	C	S	C	CW	W	W	W	W	W	W	W	CW	CW	W	W	NW	AN	A	NW	ANW	A	A	A	A	A	A	A	A	A	AW	W	W	
1959	S	S	S	SE	SE	S	S	S	SE	C	C	W	-	AS	AS	S	C	CW	C	W	W	AW	W	W	W	W	C	N	NW	NW	NW	NW	
1960	E	CSE	S	C	CE	CE	C	C	CNE	CN	N	AN	N	AN	ANE	A	A	CS	S	CE	CE	E	E	CE	C	C	C	C	CE	C	C	C	
1961	C	S	S	CS	S	C	C	W	SW	SW	W	A	A	A	AW	W	W	N	CN	CN	CSW	C	CW	CSW	C	CSW	C	C	CN	-	W	W	
1962	SW	W	A	AW	AW	A	AS	SE	A	E	AE	AE	A	A	A	A	A	A	ANW	A	A	A	AW	AW	CW	N	AW	N	W	W	W	NW	
1963	CNW	-	CW	W	NW	C	-	W	AW	AW	AW	AW	NW	AW	W	W	W	W	SW	SW	W	A	SW	A	A	SE	ASE	S	S	SE	SE	SE	
1964	A	A	ASE	SE	-	W	CW	NW	C	C	C	CN	C	C	C	NW	A	AW	ASW	A	A	NW	N	NW	AW	AW	A	A	A	A	AS	AS	
1965	C	C	S	SE	A	E	CE	AE	AE	AE	A	A	A	W	ANW	A	A	A	A	A	ASE	ASE	ASE	ASE	SE	SW	SW	W	CW	W	W	W	
1966	C	-	C	-	A	S	C	C	-	C	W	S	SE	E	C	-	S	C	C	C	C	CW	C	N	N	N	N	NE	A	A	A	NW	
1967	W	W	W	CN	W	W	W	CW	W	W	W	W	W	W	CW	C	C	AW	SW	W	C	AW	W	W	W	W	C	C	N	W	C	C	
1968	W	W	AW	A	AS	A	-	C	C	SW	SW	W	W	W	W	W	A	-	S	ASW	A	A	E	E	-	-	-	S	S	W	S	C	C
1969	A	AW	AW	A	A	S	ASW	SW	SW	A	A	ASE	S	SW	SW	S	S	SE	E	CSE	A	-	W	W	W	AW	A	AW	A	ANW	AW	AW	
1970	NW	NW	NW	W	W	CW	C	-	A	A	ASE	S	A	A	ASE	A	A	AW	NW	N	AN	A	AW	AW	W	W	W	C	-	W	W	W	W
1971	A	A	-	A	A	A	AW	-	W	W	W	-	ANE	A	-	SW	W	W	W	W	W	W	ASW	-	A	A	ASE	ASE	ASE	ASW	SW	AW	AW

NOVEMBER

[illegible]

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

NOVEMBER

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
1900	CSW	A	A	C	CS	C	C	W	W	CW	W	SW	CW	NW	C	C	NE	A	A	ASE	E	C	C	S	C	C	CSW	C	CE	E	
1901	ASE	ASE	ASE	AS	A	A	A	AW	AW	CW	-	C	C	N	CN	A	ANW	AW	A	ASE	-	W	A	A	A	A	AN	CSW	CE	ANW	
1902	ANW	A	A	SE	S	CSE	C	C	CW	SW	C	W	SW	W	ASE	S	SE	SE	E	AE	ASE	SW	W	S	CE	C	-	CSW	CSE		
1903	CW	W	AW	A	A	A	A	W	AW	AW	AW	W	SW	W	CNW	N	A	A	A	NW	N	NW	W	NW	NW	AW	C	C	N	N	
1904	A	A	ANW	A	AW	W	C	NW	CW	W	CW	AW	A	AS	AW	A	A	A	W	NW	C	N	N	N	-	A	A	N	ANW	W	
1905	CE	C	C	C	C	CW	CW	-	A	CS	C	C	CE	E	E	N	N	A	A	A	AW	W	W	W	SW	C	W	C	A	SW	
1906	C	C	CS	CSE	C	CE	CE	CNE	NE	A	A	A	A	W	C	CW	CW	C	CN	W	SW	SW	SW	AW	AW	AW	W	W	W	W	
1907	E	SE	CSE	-	A	A	A	-	C	A	W	W	W	W	A	AW	W	A	A	A	W	W	CW	C	C	C	C	A	A	A	
1908	AS	ASE	SE	AE	AE	E	E	E	E	S	SW	W	CSW	C	A	A	AW	W	N	NW	N	NW	W	W	W	AW	SW	W	AW	A	
1909	A	AW	A	A	W	A	A	A	W	NW	ANW	CNW	N	CN	AN	A	A	A	A	AN	N	ANE	A	ANW	AW	W	W	W	W	CW	
1910	NW	NW	C	CN	N	C	C	CN	N	W	CN	-	C	C	CN	N	CN	A	A	ANE	A	AE	-	S	-	C	C	CN	N	NE	
1911	AW	W	W	W	W	W	W	CW	W	C	CS	C	C	SW	CS	C	C	C	NW	NW	N	NE	AE	AE	AE	AE	-	S	SW	SW	
1912	A	A	A	A	W	CNW	AW	AW	W	CW	N	N	N	N	ANW	W	W	NW	W	NW	W	W	W	W	W	W	W	C	C	N	
1913	W	W	W	W	W	C	C	C	S	S	CS	CW	CW	W	W	W	W	W	W	W	W	AW	W	W	W	W	W	W	W	W	
1914	CE	C	S	SE	E	C	AW	AW	AW	AW	W	W	CW	-	C	N	A	A	A	A	E	A	A	W	W	W	W	W	W	W	
1915	CE	NE	E	NE	A	A	A	W	C	CN	-	CE	N	N	CN	AN	A	A	A	ASE	A	A	AN	ANE	AN	A	A	AS	S	CS	
1916	SW	SW	CS	C	C	CW	C	CW	C	W	W	AW	A	AE	ASE	SE	CSE	CE	C	C	CW	W	W	W	W	N	A	AW	W	ASW	
1917	C	-	SE	A	W	W	CW	W	C	N	W	AW	AW	AW	A	A	AW	A	AW	AW	ANW	AW	AW	W	N	AW	W	AW	AW	AW	
1918	C	C	CW	W	CW	A	A	W	W	W	A	A	A	A	ASE	A	A	A	A	A	S	S	W	W	W	W	W	W	W	W	
1919	ANE	E	E	E	E	E	CE	C	C	CE	N	C	CN	E	ANE	AW	W	W	W	NW	W	W	W	W	CW	CN	CNE	CE	C	W	
1920	C	A	A	ASE	A	A	AW	AW	AW	AW	AW	W	W	W	W	W	AW	S	S	S	S	AS	ASE	SE	S	S	C	C	S	SW	
1921	N	-	C	W	W	C	N	A	A	ASE	ASE	A	A	S	S	-	A	ASE	E	E	E	S	S	S	S	SE	S	SE	S	S	
1922	CW	W	C	N	W	C	CNW	CW	W	W	A	A	A	A	A	A	CW	AN	AN	ANW	A	A	AW	AN	A	N	ANW	NW	ANW	W	
1923	A	W	W	W	CN	N	W	CW	C	A	A	W	CW	W	C	W	CW	NW	N	N	N	CN	E	A	AW	CS	CSE	E	NE	A	
1924	CW	C	N	A	A	AN	A	A	SE	S	S	A	A	S	SE	A	A	A	A	AW	W	W	W	SW	S	CSE	C	CS	S	S	
1925	S	S	C	W	W	A	C	CNE	N	N	A	A	A	A	S	A	A	A	A	A	AW	W	AN	N	N	A	N	N	CNW	C	
1926	-	CS	-	W	CW	W	W	C	C	CS	C	SW	W	W	W	W	CW	C	C	C	C	CN	-	AW	W	C	A	C	E	AE	
1927	SW	SW	W	W	W	C	C	N	N	N	N	ANE	A	NW	W	SW	S	SE	SE	CE	CE	-	-	W	AW	ASW	W	W	-	A	
1928	NE	NE	CNE	W	E	E	E	ANE	A	W	W	W	W	W	C	C	CW	W	W	W	S	S	C	W	CW	NW	NW	AW	W	ANW	
1929	A	W	NW	W	W	W	CW	W	W	W	CW	W	CNW	C	-	CE	N	A	S	S	S	S	S	SW	CSW	W	SW	C	CS	C	
1930	C	C	N	-	C	-	W	W	W	W	ANW	AW	W	W	-	N	A	-	C	C	CW	C	W	C	CW	CW	-	-	-	A	
1931	SW	SW	SW	CW	SW	CS	C	C	C	CS	C	W	W	CW	A	ASE	ASE	CSW	S	SW	W	S	CS	CW	S	CSW	C	-	A	A	
1932	W	W	W	C	A	A	A	A	A	A	SE	SE	E	AE	ANE	AE	AE	S	A	W	W	A	W	W	W	W	NW	W	W	W	
1933	NW	N	N	AN	A	NW	AN	N	W	NW	CNE	C	W	W	C	E	E	E	CE	A	AW	AW	A	A	AW	W	AW	SE	SE	SE	
1934	NW	W	S	-	NE	N	N	N	W	C	CNE	C	C	NE	E	AE	A	A	AW	AW	AW	AW	A	A	AW	W	AW	A	A	AS	
1935	SW	S	S	CSE	C	W	C	C	C	C	W	CW	CW	SW	SW	S	C	C	CS	CE	CE	E	AE	A	AW	W	W	W	W	CW	
1936	W	W	W	W	CW	C	C	C	C	W	C	C	-	W	W	W	C	A	A	A	A	A	S	S	AE	A	A	A	W	NW	
1937	-	A	A	S	A	A	ASE	A	N	AN	AN	N	N	A	A	A	SE	C	C	CN	C	C	-	A	A	A	A	ANE	A	ASW	W
1938	W	W	W	W	W	W	W	-	S	S	S	SW	SW	W	A	S	W	W	W	W	CW	W	W	W	CW	CW	W	W	W	W	
1939	CE	E	CS	C	C	W	W	CSW	W	-	C	A	SW	W	W	C	A	W	NW	A	A	W	W	N	W	W	W	W	W	W	W

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

NOVEMBER

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
1940	W	C	CW	C	C	C	AN	-	CW	CNW	C	C	-	CN	W	C	C	C	W	W	C	-	W	W	W	CW	N	AN	A	A	
1941	AE	AE	ANE	A	A	NW	N	W	S	C	CS	C	C	ASE	ASE	C	C	C	-	S	S	CS	W	SW	W	SW	W	A	AE	A	
1942	N	C	N	A	-	CW	W	AW	AW	-	A	W	A	A	A	AN	AN	ANW	A	ANW	ANW	ANW	A	A	A	-	A	AN	AE	SE	
1943	CE	C	C	ASE	A	N	W	W	W	W	NW	NW	N	N	N	CN	N	N	A	ANW	A	W	W	C	NW	-	W	W	NW	N	
1944	AN	-	NW	W	W	W	CNW	CN	CN	A	A	W	NW	C	E	E	CS	C	C	C	AW	W	W	C	N	CNW	A	W	W	W	
1945	A	E	E	SE	AE	A	A	NW	ANE	AE	AE	A	AE	AE	SE	ASE	E	E	SE	SE	A	AS	S	S	A	AN	A	A	AW	A	
1946	E	S	S	S	AS	A	AN	N	N	N	AN	W	W	C	CE	-	CW	C	C	C	C	CW	SW	SW	C	CW	SW	C	C	W	
1947	SW	W	W	W	A	A	ASW	W	W	W	C	C	NW	CN	N	N	-	A	-	SW	SW	W	W	NW	N	N	N	NE	N	W	
1948	W	W	W	CW	N	-	-	A	A	A	AE	S	SW	W	C	W	W	CW	W	W	A	A	A	AS	S	S	AS	A	A	ASW	
1949	A	AW	AW	W	W	W	W	W	W	CW	W	CNW	NW	W	A	AS	W	S	S	C	SW	SW	C	E	E	CE	NE	N	A	W	
1950	CSW	C	N	E	AE	AE	A	W	W	CW	W	W	W	NW	CW	C	W	SW	C	C	C	C	CN	CN	AN	A	AS	C	N	W	
1951	W	C	C	C	C	C	CS	CE	E	SE	C	C	-	W	SW	SW	SW	CS	AE	CW	CNW	W	C	C	N	A	W	NW	AW	W	
1952	NW	CW	AW	AW	C	CNW	N	N	NW	NW	N	A	A	ANW	NE	ANE	ANE	E	AE	C	C	C	N	N	A	E	CE	NE	ANE	A	
1953	C	CW	W	CW	W	AW	W	W	W	W	W	CW	W	W	SW	AW	A	A	AW	AW	A	AS	S	S	SW	W	C	-	AW	W	
1954	E	A	NW	W	-	C	-	W	W	W	W	W	NW	A	A	A	A	A	-	S	-	CSW	C	C	W	C	C	C	S	C	
1955	A	S	S	S	S	S	S	S	C	CS	C	AN	A	A	A	A	A	A	A	AN	A	A	N	N	A	ANW	AW	W	-	W	W
1956	ANE	N	N	NW	ANW	A	ASW	S	W	W	NW	ANW	AW	NW	ANW	ANW	A	A	S	CSE	ASE	A	A	A	NW	W	W	NW	N	W	
1957	CW	W	W	C	C	N	N	AN	A	ANE	E	AE	AE	AE	AE	E	ASE	S	SW	A	AW	N	A	A	AW	AW	AW	AW	A	A	
1958	W	W	NW	A	CW	W	W	NW	NW	AN	-	W	W	W	AW	A	A	ASE	S	AS	A	A	A	A	A	A	A	A	A	ANE	
1959	AW	W	NW	NW	A	A	A	AW	W	W	CW	-	C	C	C	C	CSE	CE	CS	S	S	SW	SW	SW	SW	W	CW	W	W	S	
1960	CS	C	C	C	N	AN	A	A	W	S	CS	CSW	SW	SW	W	W	C	W	C	S	CS	C	W	C	C	C	CN	-	W	SW	
1961	W	CW	N	A	AW	W	W	CW	W	C	E	ANE	AE	A	A	A	A	A	A	A	A	S	W	W	W	C	NE	W	W	CW	
1962	W	C	C	S	CS	CE	CSE	SE	E	AE	E	AE	A	NW	N	C	C	N	N	CW	CE	W	W	C	-	A	A	A	A	A	
1963	CE	C	E	CE	CS	CSE	C	C	C	C	C	CW	W	W	W	-	W	W	N	N	W	W	-	S	-	C	-	W	A	S	
1964	A	ANE	ANE	ANE	A	A	A	A	A	A	W	W	W	W	W	CW	W	W	W	AW	AW	AW	AW	W	AW	W	NW	CN	C	W	
1965	C	N	N	A	A	A	-	S	C	A	E	E	E	E	A	SE	CSE	C	CE	E	NE	N	CNW	W	C	C	C	W	C	N	
1966	N	AE	A	C	CN	CE	E	-	N	ANW	AW	SW	W	W	W	N	N	ANE	A	-	N	ANE	A	W	CNW	NW	NW	NW	CW	NW	
1967	C	C	C	C	C	CN	C	A	W	AW	W	AW	W	W	N	AN	A	A	A	A	A	A	A	-	W	NW	W	W	W	W	
1968	C	CNE	N	A	A	ASE	E	E	E	-	S	S	SE	SE	E	A	A	A	-	S	S	SW	W	W	SW	SW	C	E	E	E	
1969	W	CW	W	NW	A	-	-	CNW	C	W	C	C	W	C	C	C	NW	NW	W	W	C	C	NE	N	CN	N	NW	N	N	A	
1970	CW	W	CW	W	NW	C	-	-	NW	W	W	CW	W	C	-	W	C	C	C	C	C	SW	C	C	SE	-	ASE	CS	C	C	
1971	AW	AW	AW	W	C	N	NW	N	N	A	A	A	NW	A	AW	NW	C	N	N	-	C	N	CN	A	ANW	W	W	CW	C	C	

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

DECEMBER																																
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31		
1861 (A)	A	A	S	CW	C	CW	(W)	CW	C	W	CSW	C	W	(NW)	ANW	ANW	N	AN	A	A	(A)	A	ASE	(A)	A	A	A	(A)	(A)	ANE	A	
1862 SE	SE	SE	SE	S	CW	(NW)	W	W	CW	W	W	W	(AW)	ASW	W	W	W	NW	N	(N)	AN	NW	NW	W	(ANW)	AW	W	(W)	NW	W		
1863 C	C	C	W	W	(W)	W	W	W	W	W	NW	(AW)	AW	AW	CNW	E	A	A	ANW	(ANW)	NW	NW	NW	W	(W)	(A)	-	C	-	SE		
1864 W	AW	SW	SW	W	W	W	-	S	S	SW	S	SE	E	E	E	E	E	E	C	C	E	E	A	A	A	A	A	A	AW	AW	A	
1865 A	CS	(CSE)	E	CS	S	W	ASW	A	(A)	A	A	A	ANW	A	A	A	A	AS	W	SW	AS	AS	(A)	(ASW)	W	AW	W	CSW	W	(CW)		
1866 SE	(C)	CW	W	W	CW	C	ANW	(NW)	A	A	W	W	C	W	(W)	W	W	W	ANW	-	C	W	A	ASW	(W)	W	NW	NW	W	(CW)	C	
1867 C	N	A	A	NW	N	N	N	N	NW	NW	NW	NW	CW	W	W	W	C	ANW	-	C	W	A	S	A	A	A	A	A	ANE	AE	A	
1868 S	S	S	SW	SW	W	W	C	A	SW	C	A	SE	S	W	W	W	C	C	S	C	CW	W	C	CW	W	C	W	W	CW	C	W	
1869 A	A	AE	CE	E	A	AE	E	A	W	CW	CW	CW	CW	CW	C	W	W	W	CW	C	N	N	AN	NE	CNE	AN	W	W	SW	W	W	
1870 A	A	AN	AN	N	CN	N	CNE	-	E	-	C	C	C	W	A	-	W	CW	C	E	AE	A	A	ANE	A	A	AE	A	A	A	A	
1871 AN	A	AN	ANE	A	AN	A	A	A	AW	AW	AW	AW	W	AW	AW	SW	W	W	CW	-	A	A	W	W	SW	SW	SW	CSW	W	W	W	
1872 C	E	N	A	W	C	W	W	C	C	N	A	CW	C	CE	C	C	C	C	SE	C	S	S	S	SW	W	S	CW	C	W	SW	CSW	
1873 W	AW	AW	A	AW	ANW	A	AW	A	A	A	A	A	A	W	W	AW	AW	W	W	W	W	W	AW	AW	AW	NW	A	AS	S	W	W	
1874 N	AN	AW	W	W	W	W	C	N	A	C	C	NE	N	A	CE	A	A	A	NW	N	E	A	C	-	CW	NW	C	C	E	E	E	
1875 AE	NE	N	NE	A	E	ANE	A	A	ANW	ANW	AW	A	A	ASW	ASW	SW	W	CW	W	W	W	W	W	W	W	AW	AW	AW	W	W	W	
1876 CS	C	CS	C	C	C	C	NW	AW	AW	ASW	CSW	S	CS	SE	SE	CSE	C	CE	C	C	C	C	C	E	ASE	S	W	C	C	C	C	
1877 C	-	A	A	-	-	CSW	W	W	SW	CS	W	CW	W	W	CW	W	AW	AW	AW	AW	W	NW	NW	NW	NW	CNW	NW	W	W	W	W	
1878 CNW	AN	ANE	A	N	ANW	A	N	CN	CNE	N	C	C	C	N	NW	CN	-	C	CN	N	NW	NW	N	A	-	C	CSW	CSW	CSW	CW	CW	
1879 CNE	CE	-	A	NW	A	A	AW	AW	A	A	A	AW	W	AW	ASW	A	A	A	A	S	W	AW	W	A	AS	S	W	W	W	W	W	
1880 CW	AW	W	W	W	W	W	AW	NW	NW	W	NW	NW	W	C	C	-	C	CW	CW	W	C	C	C	NW	-	-	C	C	C	CW	NW	
1881 CW	S	C	ASW	W	W	W	W	C	CN	C	CNE	A	W	C	CSW	C	W	CSE	A	SW	CW	A	AS	AW	AW	AW	AW	SW	W	W	W	CSW
1882 C	S	CW	C	C	CE	CE	CNE	C	C	-	A	CE	-	S	SE	CS	CSE	A	SW	W	CW	NW	W	CW	C	CW	W	C	W	SW	SW	
1883 ANW	NW	NW	N	AN	A	A	AW	W	W	W	NW	W	W	W	N	N	ANW	NW	W	W	W	W	W	AW	A	A	AS	AS	A	A	A	A
1884 C	CW	C	C	W	W	W	W	W	W	W	W	W	W	W	W	W	W	C	CN	AN	A	A	A	AN	A	A	A	A	SE	SE	S	S
1885 AW	W	W	CW	-	-	ANE	A	AN	A	AW	W	W	AW	A	AW	AW	A	S	C	C	N	A	A	A	A	ANW	W	W	W	W	NW	NW
1886 NW	AW	A	W	W	W	W	C	N	W	C	C	-	C	C	NE	N	N	N	A	-	C	W	W	A	A	C	NW	CW	NW	A	A	A
1887 W	W	W	C	W	W	CW	W	W	W	-	A	CW	CW	CW	CW	W	W	NW	N	N	A	NW	N	N	A	ANE	N	N	A	A	A	A
1888 W	SW	SW	S	CSW	S	A	-	A	A	AS	AS	S	W	A	A	A	ASW	S	CS	S	C	C	CW	CSW	W	A	A	C	C	N	A	A
1889 AS	AS	AS	AS	SE	A	A	W	W	W	NW	W	W	W	AW	W	W	W	W	W	W	CW	W	W	W	AW	A	A	A	SW	A	W	W
1890 SW	C	NE	NE	E	E	AE	ASE	SE	A	S	A	AS	A	-	E	A	-	C	-	A	A	CW	A	A	A	A	E	SE	E	E	E	E
1891 CSW	C	SW	W	W	W	C	W	CW	W	W	-	C	W	W	-	A	A	AS	A	AS	A	ASE	A	AS	SW	W	W	W	W	W	W	W
1892 C	A	CW	NW	NW	CN	N	ANW	CN	A	CW	NW	W	W	W	W	W	W	AW	A	S	SE	ASE	SE	A	A	A	A	A	A	A	S	SE
1893 N	A	A	NW	A	W	W	W	W	C	CW	C	C	W	W	W	ASW	S	CS	C	W	W	W	W	W	W	AW	AS	A	A	A	A	SE
1894 A	A	ASE	CE	-	W	W	CW	A	AS	S	SW	W	W	W	A	W	CW	N	ANW	W	CNW	W	W	W	A	ANW	AN	W	NW	N	N	N
1895 W	W	W	W	W	W	W	NW	AW	W	W	CW	CNW	W	C	C	E	E	E	A	F	SE	SE	SE	E	E	AE	AE	S	C	C	-	-
1896 AS	S	S	C	C	C	C	C	C	C	C	CW	C	-	-	CNW	C	N	NE	AE	SE	C	A	W	W	W	W	C	AW	W	W	W	W
1897 CN	AN	A	-	-	W	W	W	W	W	C	CNW	S	W	CW	S	ASW	A	AE	AE	AE	ASE	ASE	AS	AS	AS	SW	SW	CSW	CSW	CW	CW	CW
1898 W	W	W	W	W	W	W	W	W	W	W	W	A	A	W	W	W	W	W	ANW	ANW	A	ASW	SW	SW	W	W	CW	W	C	A	CW	CW
1899 NW	A	A	A	W	A	CS	-	A	A	CS	-	C	-	A	S	SE	A	A	S	CE	SE	CSE	W	W	CNW	C	C	CE	C	C	C	C

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

DECEMBER

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	
1900	SE	SE	SW	W	C	C	AW	SW	W	AW	W	W	W	W	W	AW	ASW	W	W	SW	W	AW	-	SW	SW	SW	C	C	W	W	-	
1901	AW	AW	A	A	A	W	W	W	NW	NW	N	CE	CE	CNE	C	W	AW	CN	CN	-	C	SE	C	C	C	CN	W	S	CW	C	CW	
1902	C	C	-	A	SE	ASE	A	A	E	AE	E	C	SW	W	W	W	W	NW	NW	NW	A	A	A	AW	W	W	W	W	C	CN	CN	
1903	NE	A	W	W	C	W	W	CW	SW	SW	C	C	S	S	SE	SE	C	-	SE	S	S	SW	-	N	ANE	A	ASE	ASE	A	SE	SE	
1904	W	W	W	W	W	W	N	W	CE	CNE	W	C	-	W	W	SW	W	AW	A	AS	A	A	A	A	ASE	A	A	W	W	N	A	
1905	SW	ASW	ASW	W	W	W	W	W	W	A	AW	A	A	A	A	A	AS	SW	SW	W	W	ASW	AS	ASW	SW	S	SE	CE	CE	AE	S	
1906	NW	W	W	W	W	W	AN	A	W	NW	W	CW	C	CN	AW	W	AW	AW	A	A	A	A	W	W	NW	C	N	-	W	W	CW	
1907	-	SW	W	W	W	W	W	W	W	W	CW	C	C	CN	A	S	S	W	-	CS	C	W	A	AS	SE	SE	E	E	AE	AE	E	
1908	A	A	AS	W	W	W	W	W	W	C	CN	C	W	S	C	-	W	W	W	W	W	ASW	SW	S	SE	E	-	SE	C	A	SW	
1909	CW	C	NW	C	C	C	CN	NW	W	SW	CS	SE	E	AE	AE	E	CNE	CN	C	NW	A	CS	CW	W	W	CW	W	C	A	AW	W	
1910	AE	AE	SE	SE	CS	CSW	S	CSE	CS	C	C	S	S	S	CW	C	N	W	W	SW	W	W	W	W	NW	N	AN	AW	A	AW	AW	
1911	S	SW	W	W	CW	SW	W	CW	W	C	C	S	CS	S	C	SW	S	W	SW	W	C	C	W	W	W	W	-	W	W	W	AS	
1912	C	CNW	AW	SW	S	SW	S	SW	W	W	W	W	W	W	W	W	W	A	A	A	A	A	-	NW	W	W	W	W	N	A	A	A
1913	W	W	W	W	A	-	A	W	W	W	W	W	AW	AW	W	NW	A	A	A	A	A	A	-	NW	W	W	W	W	W	W	W	W
1914	W	W	W	W	CW	CW	CW	CW	C	-	SE	E	C	C	C	W	W	W	W	W	CW	C	E	A	S	SW	W	W	W	W	SW	W
1915	C	-	C	C	CS	C	CW	-	-	C	C	N	AW	CW	C	C	C	AN	A	A	CW	W	C	C	C	W	C	C	CE	S	SW	SW
1916	AS	A	N	AN	A	A	W	C	C	CE	C	CE	C	CNE	C	C	NE	C	C	C	C	CW	C	W	C	-	A	W	W	W	W	W
1917	W	AN	AW	AW	SW	W	W	W	CN	A	A	A	AW	AW	-	C	ANE	A	A	A	A	A	A	ANW	N	W	AN	AN	A	A	A	A
1918	W	W	W	W	S	W	SW	W	W	W	W	C	W	W	CW	CW	W	W	C	W	W	C	C	CN	NW	W	W	W	W	W	W	W
1919	W	W	W	W	W	W	W	AN	A	S	S	SW	SW	S	S	W	W	W	W	W	W	W	CW	W	W	W	W	W	W	W	W	C
1920	SW	C	C	C	A	A	ASE	A	A	ASE	E	E	E	E	A	A	A	A	A	W	W	CW	-	CSW	SW	S	SW	C	CSW	C	CW	CW
1921	E	E	AE	S	AW	W	W	W	AW	W	W	W	AW	W	N	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W	W
1922	NW	ANW	A	AW	W	W	ANW	A	A	A	A	SW	SW	W	C	C	-	S	CSW	C	C	CS	CW	CW	W	W	W	W	CW	CW	CN	CN
1923	W	CW	CW	C	CE	A	S	CW	W	W	SW	SW	AW	AW	NW	NW	W	NW	N	AN	NW	CNW	CNW	N	W	C	C	CN	AW	-	AW	AW
1924	CS	C	C	SW	W	W	W	SW	AW	AW	AW	SW	SW	W	C	C	W	W	W	SW	SW	S	SW	SW	SW	C	W	W	W	W	W	W
1925	N	AN	A	A	S	S	S	W	CW	W	N	N	N	N	NW	NW	NW	W	-	CE	C	CNE	CNW	-	A	W	CW	CW	W	W	W	W
1926	A	W	NW	NW	W	W	AW	AW	W	AW	AW	AW	A	-	N	A	W	NW	NW	NW	AN	AE	A	AE	ANE	A	A	W	W	W	W	W
1927	A	A	AS	SE	S	S	A	A	S	SE	E	E	A	C	-	E	AE	AE	E	SE	S	CS	C	C	CE	NE	AE	AE	AE	SE	C	C
1928	ANW	AW	A	AW	W	CW	N	NW	W	W	CSE	E	E	E	A	W	AW	A	E	W	AW	W	W	W	W	W	W	W	W	W	W	W
1929	CW	W	SW	SW	CSW	CSW	C	W	CW	W	CW	W	W	W	ANW	A	A	AW	SW	S	CS	CS	S	C	C	CW	W	W	CW	W	W	W
1930	AS	A	A	A	A	W	W	W	W	W	CW	CW	W	W	W	C	AW	W	AW	W	A	A	W	CW	C	W	W	W	W	W	W	W
1931	A	ASW	W	W	W	W	CW	AW	W	AW	A	A	AW	AW	A	A	A	A	A	A	A	A	AW	W	W	W	W	W	W	W	N	AW
1932	W	W	W	NW	A	AE	AE	AE	AE	AE	E	E	S	SW	W	SW	SW	SW	C	-	S	SW	SW	W	AW	AW	AW	W	W	W	W	W
1933	CSE	SE	AE	AE	AE	AE	E	AE	AE	A	A	C	E	ANE	A	A	A	A	A	-	ASW	ASW	A	ASW	W	CW	C	C	C	W	A	S
1934	SW	CW	C	C	C	-	S	S	C	SW	S	S	S	CS	C	C	CW	CS	C	W	W	CS	S	SE	SE	CS	SW	C	C	W	W	W
1935	CW	NW	NW	W	NW	CW	W	CW	N	A	AE	AE	A	W	CW	CNW	CN	-	NE	N	A	-	A	SE	CS	CS	C	C	SW	C	C	C
1936	NW	NW	W	W	W	C	W	W	A	A	W	W	W	W	W	W	W	W	W	W	W	W	W	AW	A	A	AS	S	W	W	W	W
1937	W	CE	NE	W	W	C	C	CE	E	C	C	C	C	C	CN	N	AN	A	-	ASE	SW	SW	ASW	AW	A	A	A	A	A	A	A	A
1938	W	W	W	W	W	W	W	SW	C	S	S	CS	S	-	S	C	SE	SE	E	E	AE	NE	E	A	A	W	NW	NW	NW	W	W	W
1939	CW	W	W	W	C	CN	A	SW	C	W	-	ASE	A	-	E	A	A	A	NE	AE	AE	A	A	A	A	N	AN	N	A	A	A	A

APPENDIX II: DAILY REGISTER OF CIRCULATION PATTERNS, 1861-1971

DECEMBER

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
1940	AW	AW	AW	W	W	CW	N	W	W	W	NW	A	-	W	W	AW	A	AW	A	AE	E	E	AE	ANE	A	AN	A	AW	W	C	CE
1941	-	AW	AW	AW	AW	W	NW	W	NW	W	W	W	W	W	W	W	ANW	A	A	A	AW	ANW	ANW	AN	AN	NW	A	-	W	A	CE
1942	NW	A	A	ASW	CW	W	W	W	SW	SW	CW	SW	S	S	S	S	C	C	W	W	SW	W	AW	W	AW	AW	A	N	N	A	ANW
1943	W	C	E	A	A	A	A	C	SE	SE	SE	A	A	A	A	A	SW	SW	W	W	C	CW	-	AW	W	AW	A	A	AW	ANW	NW
1944	W	W	W	CNW	W	W	C	N	N	CW	C	-	AW	CS	S	S	CSW	CW	SW	ASW	W	A	A	A	A	A	ANW	A	A	ANW	AW
1945	S	W	W	W	NW	W	A	ASW	S	A	ANW	ANW	ANW	AW	W	SW	S	CS	W	S	SE	CS	CS	C	C	C	W	C	-	A	AS
1946	W	CW	W	N	W	W	C	C	C	C	-	AW	ASW	A	SE	A	A	A	A	A	AW	W	W	C	W	W	NW	W	AW	W	W
1947	-	SE	C	C	C	C	C	C	C	A	A	AW	AN	A	A	A	AN	AN	ANW	NW	NW	W	W	W	W	W	C	W	CNW	CW	W
1948	ASW	S	W	W	S	C	CS	CS	C	S	S	S	SW	W	W	AW	W	A	A	A	A	A	A	ASE	ASE	S	-	W	W	W	W
1949	W	W	W	W	W	W	CW	CN	CN	N	A	AW	W	W	CW	W	W	W	C	W	ASW	AW	ASW	A	W	W	W	AW	S	SE	A
1950	CW	N	N	N	N	NW	CNW	A	W	W	NW	CNW	C	C	N	N	N	W	W	CS	S	SE	E	E	NE	NE	E	A	A	C	W
1951	NW	ANW	AW	W	W	NW	W	W	W	CW	A	AS	AS	SW	W	W	SW	W	CSW	-	A	AW	W	W	W	W	C	C	C	CW	CW
1952	A	AN	ANE	A	A	AS	ASW	A	W	CW	W	C	CN	N	NW	CW	CN	W	W	W	W	W	W	W	W	C	C	CE	A	AN	CN
1953	AW	CSW	W	-	A	AS	AS	SE	ASW	SW	W	S	S	S	AS	ASE	ASE	-	AW	W	NW	NW	NW	W	W	W	W	NW	W	ANW	AN
1954	W	W	CW	CNW	CNW	NW	N	C	C	C	W	CW	C	W	AW	ASW	AW	AW	W	NW	NW	NW	NW	NW	W	W	W	W	AW	S	SE
1955	C	AW	W	AW	AW	W	NW	A	-	C	E	AE	S	CS	CS	C	-	NE	E	C	NE	W	CW	CW	W	W	W	W	W	CN	NW
1956	W	NW	AW	W	CW	AW	AW	ASW	W	W	W	W	W	W	W	W	CSW	W	ASW	A	A	A	S	-	C	C	-	S	-	C	C
1957	AS	A	A	A	AW	W	CW	C	-	CS	C	E	E	NE	A	-	SW	W	W	W	W	W	C	-	ANW	W	C	NW	NW	W	W
1958	A	A	A	A	AN	A	A	W	A	C	C	W	C	C	CE	C	CE	E	E	CS	S	S	-	A	-	W	C	W	W	W	CW
1959	-	W	CW	CNW	W	S	CSE	C	SE	E	E	A	W	W	W	C	CW	W	W	C	W	W	W	CW	W	C	C	NW	W	W	SW
1960	W	W	W	W	CW	C	C	C	-	E	A	A	A	A	A	AW	W	W	CN	CN	NW	NW	CW	-	W	W	W	W	W	W	W
1961	CN	W	-	C	CN	N	A	S	W	W	W	SW	W	A	AS	AS	AS	A	A	A	A	AE	ASE	A	E	E	-	W	C	CNE	CN
1962	AS	S	S	A	AS	AS	SW	W	NW	CW	N	N	N	NW	CNW	N	CW	NW	W	W	ANW	AE	ASE	A	A	N	CNE	NE	CE	CE	CN
1963	CSE	E	E	E	AE	AE	AE	AE	AE	A	SE	E	AE	ANE	ANE	NE	NE	NE	AN	AN	AN	A	A	S	W	A	ASW	SW	W	W	CW
1964	C	NW	N	N	W	W	C	CW	C	W	W	CW	-	-	-	C	N	A	A	AN	AE	AE	A	A	N	W	C	A	W	W	W
1965	W	CW	C	CW	C	CN	NW	CW	C	N	NW	W	CW	ASW	S	W	W	W	AN	AN	AE	SW	C	C	NE	N	A	A	W	W	W
1966	C	CN	N	NW	W	W	AW	W	W	NW	W	C	C	W	W	W	W	W	C	N	NW	NW	CNW	A	ASW	W	W	W	W	W	CW
1967	A	ANW	A	ANW	A	NW	N	CN	CN	AN	ANW	ANW	A	A	W	AN	A	-	-	A	W	NW	NW	NW	NW	NW	NW	N	N	NW	NW
1968	SE	SE	AS	S	S	SE	ASE	A	-	CE	A	ASW	-	A	W	C	C	CE	-	-	-	CW	CW	-	C	C	AN	N	N	CN	N
1969	W	NW	NW	N	NW	C	NW	ANW	A	W	-	C	W	W	CNW	-	CSE	-	-	-	W	W	W	W	-	-	A	ASE	E	E	E
1970	NW	C	-	W	W	W	AN	A	A	A	S	W	-	A	ASW	ASW	W	W	W	A	AN	CN	E	E	ANE	E	E	E	CE	NE	N
1971	CNW	C	A	AW	A	A	A	A	AW	ANW	AW	AW	W	SW	W	AW	SW	SW	W	W	W	-	A	AW	SW	S	-	ANE	AE	AE	AE

HER MAJESTY'S STATIONERY OFFICE

Government Bookshops

49 High Holborn, London WC1V 6HB
13a Castle Street, Edinburgh EH2 3AR
109 St Mary Street, Cardiff CF1 1JW
Brazennose Street, Manchester M60 8AS
50 Fairfax Street, Bristol BS1 3DE
258 Broad Street, Birmingham B1 2HE
80 Chichester Street, Belfast BT1 4JY

*Government publications are also available
through booksellers*