ATLAS OF NORTHERN HEMISPHERE EXTRATROPICAL CYCLONE ACTIVITY, 1958 - 1977

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October 1982

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1. Introduction

For more than a century a major topic of meteorological investigation has been the nature and cause of extratropical cyclones. An important aspect of the cyclone investigations has dealt with the location of their formation (cyclogenesis) and their resulting tracks. Although cyclones form in nearly every part of the extratropics, there is a pronounced tendency for cyclogenesis to occur in certain favored locations. Likewise, while cyclones follow paths that carry them over almost every portion of the extratropics, there are preferred tracks. Both the preferred regions of cyclogenesis and tracks change with season and are greatly influenced by the geography of the earth's surface. This is particularly true in the Northern Hemisphere where the geography consists of a complex pattern of land and ocean, major inland lakes and extensive mountain ranges.

Knowledge of the principal cyclogenetic areas and track positions is important to the meteorologist and climatologist in several ways. Not only is this information useful to the operational meteorologist, but it can also provide the theoretical meteorologist with important clues to the physical environment which promotes cyclone formation and movement. In recent years the development of general circulation models has led not only to descriptions of the mean flow but also to simulations of cyclone development and movement. Knowledge of the actual preferred sites of cyclogenesis and cyclone tracks is important in determining the validity of the model simulations. Moreover, climatologists studying climatic variations are concerned with the shifts in the actual location of cyclone formation and tracks from one climatic episode to another.

For the above reasons efforts have been made to identify the principal cyclogenetic regions and tracks. However, an investigation involving the entire extratropics of the Northern Hemisphere has not been undertaken for more than a quarter of a century. The last hemispheric studies were Klein's (1957) comprehensive work on cyclones and anticyclones for each of the twelve months and Petterssen's (1956) study of the same events for the summer and winter seasons. Both studies were based on the Northern Hemisphere Historical Map Series for the period 1899-1939. Since these major studies numerous regional investigations have been conducted with the major emphasis on North America (Reitan, 1974 and 1979, Zishka and Smith, 1980 and Whittaker and Horn, 1981). Others have concentrated on smaller areas such as the North American east coast (Colucci, 1976 and Hayden, 1981a) and mountain regions (Chung et al., 1976). Additionally, Eurasia is discussed in detail in Volumes 5-9 of the World Survey of Climatology (1970, 1977, 1977, 1969, 1981) while ocean areas are covered in the three volumes of the U.S. Navy Marine Climatic Atlas of the World (1974, 1977, 1976). These are only some examples of the many regional studies available. Although valuable, they are limited not only in area but also in that the time periods (years) are not standardized and not all examine each month of the year.

The work presented here overcomes some of these problems. It does a census of cyclogenesis and cyclone tracks for a recent twenty-year period (1958-77) for the Northern Hemisphere extratropics. Additionally it examines each of the twelve months.

2. Basic Data and Methods

Data for this study were gathered from several sources: 1) maps of the tracks of cyclone centers published bimonthly in the Mariners Weather Log; 2) similar maps from the Climatological Data, National Summary published monthly;

3) Daily Series, Synoptic Weather Maps - Northern Hemisphere Sea-Level and 500 mb charts for the period December 1957-June 1971 and 4) Northern Hemisphere Surface Charts (on microfilm) for July 1971-November 1977. The first source provided tracks over the North Atlantic and North Pacific, while the second covered North America. Together these two sources covered approximately three-fourths of the hemisphere. See Fig. 1. The remaining area,[1] which was primarily Eurasia, was studied using the latter two sources.

While all the daily maps needed for the project were prepared by the National Meteorological Center (NMC), the data in the first two sources consisted of individual cyclone tracks determined by NMC personnel. However, Eurasian track data were plotted by Whittaker using individual surface maps, either 24 hourly (December 1957-June 1971) or 6 hourly (July 1971-November 1977). Since some tracks were determined by Whittaker (Eurasian area) while others were determined by NMC personnel, a test was conducted in which cyclones during several individual months were tracked by Whittaker over the oceans and North America. A comparison of her results with the NMC tracks revealed good agreement. Additionally, because several data sources were employed, care was taken to eliminate any duplication of tracks.

In tabulating the data a 5° latitude-longitude grid extending from 20°N to 85°N was used. Separate counts were made for cyclogenesis and cyclone tracks. Cyclogenesis for this study was defined as the point of origin of a track; i.e., where the first closed isobar formed.[2] The closed isobar had to be maintained for 24 hours; however, semi-permanent features were not included in the counting. In cases in which a quasi-stationary occluded cyclone was present and a second center appeared in the near vicinity (i.e., apparently broken off from the old center), the second low was treated as a new cyclone. This phenomenon occurred most often over the subpolar oceanic regions, particularly the Greenland-Iceland area.

Because of the convergence of meridians at high latitudes, the use of a latitude-longitude grid required an area correction for cyclogenesis (i.e., discrete events). Two options are available in correcting this problem. One, used by Klein (1957) involves varying the number of degrees of longitude to maintain equal areas. The second, used here, employs a scale factor to adjust the counts in each box to compensate for areal changes. The scale factor was defined as the ratio of the area of a 5° latitude-longitude box centered at 42.5°N to boxes in other latitude belts. Above 65°N the scale factors for 5° boxes become very large, so the totals in two grid boxes were combined. The scale factor was then calculated for the larger area. See Fig. 1.

Cyclone frequency counts were a tabulation of the number of cyclones which passed through a 5° latitude-longitude grid box. Lows which originated or terminated in a grid box were also included. It should be emphasized that a low center was counted only once in a grid box; re-entry into the same box

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[1] A relatively small portion of extratropial southern Asia was beyond the southern edge of the microfilm data. In Figure 1 this area is labelled "Missing Data". Actually only the period July 1971-November 1977 (i.e., the period read from microfilm) was missing. The remaining years of the twenty year period were read for this area.

[2] The isobar interval was 4 mb except for the period December, 1957 - December, 1963, when the Daily Series, Synoptic Weather Maps employed a 5 mb interval. Recall that these maps were used only for a portion of Eurasia. To determine if this change in interval had any significant influence on determination of cyclogenesis, some of these maps were re-analyzed by Whittaker using a 4 mb interval. No appreciable difference was found between cyclogenesis determined from the 4 and 5 mb intervals.

was not tabulated. The counting was independent of time, so that the time of entrance and length of time in a box was not considered. This differs from Klein's (1957) method which used counts at only specific synoptic times. In the present study scale-factor corrections were not made in determining cyclone tracks. Some experimentation was done using a scale factor, but the results obscured the mean path positions by over-emphasizing the northern latitudes. (See Hayden, 1981b.)

In presenting the census data several avenues were followed. They include figures showing a) isopleths of cyclone frequency, b) cyclone tracks, with major areas of cyclogenesis stippled and c) tables showing counts for individual grid boxes. The latter can be especially useful to investigators who wish to employ some of the basic tabulations in other studies.

3. Discussion of some of the major features of the 1958-1977 census

In this section some of the highlights of the census are discussed. The more detailed features and comparisons with other studies are left to the reader. The primary purpose of the discussion here is to help guide the reader through the Northern Hemisphere cyclone census data for the 1958-1977 period.

The discussion is arranged in chronological order, January through December. For each month two figures were prepared. The first displays isopleths of cyclone frequency, while the second shows cyclone tracks (primary and secondary) and principal areas of cyclogenesis (stippled). Areas with 10 or more cyclogenetic events within the twenty year period (e.g., twenty Januarys) were selected as regions of principal cyclogenesis. The use of 10, although arbitrary, was chosen after examining the hemispheric distribution of cyclogenesis. Figure 2, based on data from the twenty Januarys, provides an example. The isopleths (e.g., the value of 10) shown in this figure quite clearly delineate the principal cyclogenetic areas. Recall that in tabulating cyclogenesis the scale factor described in Section 2 was employed to account for the smaller grid boxes at high latitudes.

In the case of cyclone frequency, as noted previously, a scale factor correction was not employed. The isopleths of frequency (e.g., Fig. 3a) were used to position the primary and secondary tracks (e.g. Fig. 3b). The primary tracks are positioned along the axes of highest frequency and the secondary tracks along axes of lesser maxima. In positioning tracks, the absolute values of frequency are less important than the relative magnitudes of counts in adjacent areas. Generally, the primary tracks for a given month are representative of the usual paths followed by cyclones originating in a major cyclogenetic area. Secondary tracks are less frequently followed, resulting from either cyclones originating in somewhat less active cyclogenetic areas or cyclones originating in major cyclogenetic areas that follow a somewhat different track due to a change in the upper air flow pattern during a few of the years. This situation most often occurs in the interior continental regions of both North America and Eurasia.

In reviewing the tracks, which are shown as relatively narrow lines, it should be kept in mind that the actual width of a track is one grid box. It is also important to note that few cyclones follow the full length of a track. Most dissipate before the end of the track is reached, while others may form along the track and move to the end. Also with regard to tracks based on north-south oriented frequencies in the eastern Pacific and the area around the Ob Gulf, it is not uncommon to find that in the 20 year data set some lows move north and some move south through approximately the same area. In these cases the direction of the track which appears on the mean monthly map was chosen on the basis of which direction was most prevalent.

With the above constraints in mind the discussion can turn to the highlights of the individual mean monthly data for the 1958-1977 period. Although the discussion focuses on the major features of the maps of cyclone frequency and those of tracks and cyclogenetic areas, please note that the data tabulated for each grid box are also available (pages 42 to 65) for detailed investigation.

January

The areas of maximum cyclone frequency during January are found over the North Pacific and North Atlantic Oceans (Fig. 3a). In the Pacific the maxima extend eastward and then northeastward from the western Pacific into the Gulf of Alaska. There is a weak secondary maximum extending westward into Mongolia. On the other hand, the North Atlantic maximum is located closer to the North American continent with a pronounced extension westward into the Great Lakes area.

The cyclogenetic regions and tracks of Fig. 3b show that the main cyclogenetic activity (stippled) in the Pacific extends from the Ryukyu Islands east-northeastward along the southern coast of Japan into the central Pacific. A principal cyclone track extends along this region. In the central Pacific the track turns somewhat northeastward terminating in the Gulf of Alaska as most cyclones fail to penetrate the mountain barriers of Alaska and British Columbia. A secondary track originates in Mongolia, crosses the Sea of Japan, and joins the principal track in the central Pacific near the eastern edge of the major cyclogenetic area. Also near this location, another secondary track originates and extends north-northeastward to the Chukchi Peninsula. Another noteworthy feature in the Pacific is a secondary track that extends from near the termination of the major track in the Gulf of Alaska southward along the British Columbia, Washington and Oregon coasts. Some of these cyclones turn eastward remaining intact across the Rocky Mountains of the northwest United States.

Fig. 3b places the major North American cyclogenetic areas in the lee of the Rocky Mountain regions of northern British Columbia, Alberta and Montana. This is the general area for the formation of the well-known "Alberta Cyclones". A second lee side cyclogenetic area is located in the lee of the Colorado Rockies. While the Alberta cyclones follow a primary track southeastward and then eastward to the Great Lakes, the Colorado cyclones move chiefly northeastward into the Great Lakes region. This confluence of tracks accounts for the frequency maximum over the Great Lakes shown in Fig. 3a. From the Great Lakes region, a major track extends eastward down the St. Lawrence Valley and then northward into the Davis Strait, while another extends nearly due north along the eastern edge of Hudson Bay.

As noted previously the major cyclogenetic area in the western North Atlantic is located closer to the North American coast than its counterpart in the Pacific. Unlike the Asian east coast cyclogenetic area, which is located nearly entirely over the ocean, a portion of the North American east coast cyclogenetic area is positioned over the land area of the southeastern United States. Some cyclogenesis also occurs in the western Gulf of Mexico, near the Texas coast. These storms form a secondary track northeastward across northern Florida into the western Atlantic. The major track in the Atlantic is associated with the cyclogenetic area reaching from the Carolinas to Nova Scotia. In the broad view the cyclone tracks in eastern North America and the western Atlantic show a tendency to rotate about a point in northern Hudson Bay. This, of course, is near the center of the polar vortex at 500 mb in January.

The major oceanic track in the western Atlantic splits with the northern branch lying between Greenland and Iceland, its strength augmented by the cyclogenetic area off the southeast coast of Greenland. The southern branch stays on a more easterly course into the mid-Atlantic where it curves strongly northeast passing east of Iceland. These two major tracks merge northeast of Iceland and follow a path well north of Scandinavia, crossing Novaya Zemlya into the Kara Sea. Here a secondary track continues across the Taymyr Peninsula, with another secondary track extending southwestward from the Barents Sea into the West Siberian Plains.

Atlantic cyclones associated with the major track sometimes follow a secondary easterly course across Scotland into the southern Baltic. Another secondary track continues from the Baltic region eastward deep into the Soviet Union where there is a confluence of several secondary tracks.

Fig. 3a shows a cyclone frequency maximum in the Mediterranean area. The major cyclogenetic area associated with it is located over the Gulf of Genoa and in the adjacent land areas of northern Italy and the French Riveria, regions which more-or-less lie in the lee of the Alps. A major track extends from this cyclogenetic area eastward through southern Greece and coastal Turkey. Some of these cyclones continue northeastward along a secondary track which crosses the Caspian Sea and extends into the Siberian Plains. In examining the individual daily maps from which the tabulations were made it became clear that many of the lows which move toward the Siberian region weaken or dissipate along the way. Also the tracks east of the Ob Gulf are found in latitudes north of 60°N which probably reflects the dominance of the Siberian anticyclone centered between 40 and 50°N during January. Finally, caution should be employed in examining some of the southern Eurasian information, since only 13 years of data were available for the region labelled "Missing Data" in Fig. 1.

February

The general pattern of the frequency map for February (Fig. 4a) is similar to January (Fig. 3a). In the western Pacific the elongated area of cyclogenesis present during January is broken into three segments in February. Also a cyclogenetic area appears in Mongolia with a better defined secondary track extending eastward from it (Fig. 4b). The major cyclone track in the Pacific begins farther west (in the China Sea) in February than in January and follows a somewhat more southerly path through most of the Pacific. In February this major track reaches farther into the eastern Pacific before turning northward into the Gulf of Alaska. Moreover, a secondary track extends eastward and even slightly southward to near 140°W before curving north. This brings cyclones closer to the California coast in February than in January. It is probably these cyclones and their southward extending cold fronts which cause some southern California stations to experience a late winter maximum in their annual rainfall.

In North America some of the Gulf of Alaska cyclones (or their remnants) cross the western mountains (secondary track) into the Alberta cyclogenetic region where a major track commences and extends east-southeastward to Nova Scotia. Cyclogenetic activity in the Alberta region reaches a maximum for the year during this month. The Colorado cyclogenetic area remains active in February, feeding a major track northeastward to the lower Great Lakes, with a second major track branching eastward to the Mid-Atlantic states. The Gulf of Mexico cyclogenetic area continues to send cyclones across northern Florida into the cyclogenetic area adjacent to the East Coast.

The February cyclogenetic area over the western Atlantic is broken into two centers, one from the Carolina coastal region northward to coastal southern New England and a separate major area located well south of Newfoundland. The split in the major Atlantic track that results from cyclones passing both west and east of Iceland occurs slightly farther east than in January. Again the coastal Greenland cyclogenetic area contributes to the western branch of the split track. Unlike January the northernmost major track continues farther eastward and slightly farther north in the Barents Sea and Arctic Ocean. A major track branches southeastward from the Barents Sea into western Siberia.

While there are no tracks across the eastern Atlantic in January, the February data reveals a secondary track extending eastward from a cyclogenetic area in the central Atlantic into western Europe. This track enters the Mediterranean Sea from France, where the Gulf of Genoa cyclogenetic area contributes to it, causing a major track through the northern Mediterranean and Turkey. The track then becomes secondary, continuing on to the Caspian Sea area.

March

March is a transition month, possessing some of the features of both winter and spring. It is characterized by a relatively greater frequency of cyclones over continental areas than either January or February (Fig. 5a). The values over the oceans do not change significantly. Compare Figs. 3a, 4a and 5a. This reflects the decreasing influence of the cold continental anticyclones of winter.

In Asia the Mongolian track commences further inland than in February and follows a more northerly course, passing near the southern tip of Kamchatka and along the Aleutian Islands (Fig. 5b). A major cyclogenetic area remains in the China Sea and south of Japan. As in the previous two months these cyclones follow a track that leads into the Gulf of Alaska, where a rather complex pattern of tracks exists. Some cyclones move northward into the Alaskan coast along a track similar to the previous two months. However, other cyclones follow a more easterly track across the Gulf into British Columbia and Alberta, an indication of a new orientation for the Pacific track in the coming months.

Over North America, the Alberta cyclogenetic area remains with the resulting track in southern Canada, located sightly farther north than in January and February. Farther south in the Colorado and Great Basin areas, cyclogenesis covers a much larger area than in winter, and Colorado activity reaches a peak for the year. The tracks are primarily northeastward into the Great Lakes area where they merge with the Alberta track. This contributes to the high frequency (>80) in this area. The secondary track from the Colorado area is the path followed by the cyclones known as "Panhandle hookers". The results of this census show that this track occurs mainly during March and December.

By March the Gulf of Mexico cyclogenesis has ceased, but the Atlantic East Coast cyclogenetic area remains active, covering much of the Mid-Atlantic states and adjacent western Atlantic. It is possible that the land based cyclogenesis reflects Appalachian lee-side development (see Petterssen, 1941). The major Atlantic track extends northeast across Iceland into the Barents Sea. (The split found in January and February does not occur in March.) A secondary track branches eastward from the major track reaching southern Ireland. Another secondary track begins in the Denmark area and extends east-northeastward into the northern USSR. The break over the British Isles between these two tracks may reflect the frequent blocking which is centered over this area during spring.

In southern Europe the Mediterranean cyclogenetic area remains (although smaller), sending cyclones through Greece and Turkey which then continue northeastward across the Caspian Sea and Siberia to the Arctic coast of the USSR. A second group of Mediterranean cyclones branch from the primary track in eastern Turkey and move southeastward into Iran.

April

April brings a decrease in cyclone frequency over large portions of the hemisphere; however, the decrease is not uniform. For example, while there is a significant drop in frequency over the Pacific Ocean (Fig. 6a), decreases for North America are smaller and it remains as a region of relatively high frequency.

With the demise of the Siberian High, cyclone activity increases in the Mongolian area, with a major track extending eastward into the Pacific along the 50th parallel. The China Sea and the Pacific south of Japan remain cyclogenetically active. The major track to the Gulf of Alaska from this area is now displaced considerably northward from the previous months; however, a secondary track does continue to follow the more southerly path to the Gulf of Alaska.

In April large areas of western North America have become favored regions for cyclogenesis. (Great Basin activity peaks this month.) From the Northwest Territories two secondary tracks extend southeastward and eastward; there is no primary Northwest Territories-Alberta track in April. To the south a major track extends eastward from the Great Basin-Colorado area to southern New England. A major branch of this track reaches from Michigan northward along the east shore of Hudson Bay, somewhat similar to the January situation. East Coast cyclogenesis extends from the Carolinas to Maine. From this area one track lies along the Labrador coast and in the Davis Strait. Another major track follows a course across southern Iceland. It then splits, with a major track continuing mainly eastward to the Taymyr Peninsula. Several secondary tracks spread from this region over northern Siberia and the adjacent Arctic Ocean.

In southern Europe the Mediterranean cyclogenesis has diminished in area and is now found mainly in northern Italy in the lee of the Alps. A small cyclogenetic area is present in the lee of the Atlas Mountains of Africa with a secondary cyclone track extending northeastward from it to Italy. As shown in Fig. 6b several secondary tracks leave the Italian cyclogenetic area, two oriented more north and northeasterly through central and eastern Europe and another following a broad curve over Greece, southern Turkey, the Caspian Sea and north-northeastward into Siberia. Although secondary, the general features of this latter track appear quite common during the first several months of the year.

May

May brings a marked increase in cyclone frequency in the interior of extratropical Asia with somewhat of a decrease in the North Atlantic (Fig. 7a). The frequency over Asia now exceeds that over North America. This increase over the large land mass likely reflects the completion of a seasonal change with the continental area becoming a heat rather than cold source.

Fig. 7b shows a relatively large cyclogenetic area south and west of Lake Baykal with a second smaller area in the Amur Valley. The China Sea and adjacent portions of the Asian mainland as well as a small area south of Japan remain cyclogenetically active. The general cyclone tracks from Central Asia and the western Pacific are similar to the preceding month. The major Pacific track crosses the Gulf of Alaska and extends southeastward to the Pacific Northwest of the United States. A secondary track is located somewhat farther south through most of the central Pacific.

In North America a very extensive area of cyclogenesis reaches from the Arctic Ocean southward through and in the lee of the western Cordillera to extreme northern Texas. The primary tracks from the Northwest Territories-Alberta and Colorado regions converge in Ontario. A major track then extends northward along the eastern Hudson Bay shore, with another major track through the St. Lawrence Valley into the Canadian Maritime Provinces.

In the eastern United States cyclogenesis occurs chiefly in the southeastern Coastal states - from Georgia to the Chesapeake Bay area. It is interesting that the major North Atlantic track from this area follows a somewhat more southerly path in May, passing well south of Iceland, than in the prior, colder months. Also the track in the Davis Strait has disappeared. This possibly reflects the weakening of the polar vortex center which was present over the Hudson Bay area during the colder months. The strong flow about this winter-time center may steer the cyclones on a more northerly track as they move through the western Atlantic. Although in May the Atlantic cyclones follow a more southerly course they do not penetrate western Europe.

Activity in the Mediterranean continues to decrease in May with only two secondary tracks present. A secondary track headed north-northeast from North Africa becomes a major track in the northern Soviet Union. Another track originating more-or-less in the lee of the Alps crosses the Balkans into eastern Turkey. Some cyclones move from north of the Caspian Sea into Siberia, eventually joining tracks that are situated along the Arctic Ocean coast of Eastern Siberia.

June

Cyclone frequency over Asia in June is somewhat less than in May (Fig. 8a). This may result from the northward displacement of the weakening polar front. Most cyclones originating in the Central Asian and Amur Valley cyclogenetic regions move eastward but only manage to reach the coast (Fig. 8b). The cyclogenetic region over the western Pacific remains from the East China Sea to south of Japan. From this region a major track runs eastward through the mid-Pacific toward British Columbia. A more southerly secondary track curves northward in the central Pacific toward the Gulf of Alaska, similar to the May pattern.

In North America the cyclogenetic area along the Rocky Mountains shrinks somewhat from May, with the Great Basin cyclogenetic area no longer maintaining the criteria for stippling. Both the Colorado and Alberta systems take more northerly tracks than in previous months converging on James Bay, with a major track extending north-northeastward into the Canadian Archipelago and Baffin Bay. A branch of this track leads eastward across Labrador to a major convergence point in the North Atlantic northeast of Newfoundland.

In east coastal North America during June the cyclogenetic area is confined to the Gulf of Maine and portions of the adjacent land areas. However, there are sufficient cases of cyclogenesis to the south of this area (but less than 10 per grid box) to cause a major track to exist along the east coast to the convergence point off Newfoundland. The large cyclogenetic area southeast of Greenland feeds additional cyclones to the major track which leads to Iceland. A second major track commences southwest of Iceland extending northeastward into the Barents Sea where it becomes secondary. From the convergence point near Newfoundland a secondary track extends eastward just north of Scotland into Scandinavia where it becomes a major track along the Arctic Ocean coast of the USSR. Other cyclones form in the Ukrainian S.S.R. and move northeastward to a convergence point near the Ob Gulf. Still other cyclones form east of the Urals and follow a primary track into northeastern Siberia.

July

During July, the month generally having the weakest thermal gradient, cyclone frequency values are small. The highest frequency is found in northeastern North America (Fig. 9a). This stands in contrast to the much smaller values present in northeastern Asia.

Cyclogenesis does occur in Asia particularly near the Altay and Yablonovyy Mountain ranges (Fig. 9b). A major track reaches northeastward from these areas to the Kuril Islands. In the Pacific the major track now extends from the Sea of Japan across the northern tip of Japan and on into the Gulf of Alaska. A branching track runs northeastward into the Bering Sea.

In North America the major cyclogenetic area is located farther south than in June. A long secondary track extends across Alaska and southeastward to James Bay. Shorter primary tracks starting in Alberta and Montana extend northeastward to the James Bay area. From the area of cyclone confluence in southern Canada, a major track crosses the Atlantic and Scotland, terminating in Finland.

Along the East Coast of the United States, cyclogenesis is noted in the coastal Mid-Atlantic states region; however, with the greater activity to the north during July, the track along the eastern seaboard is only secondary.

Activity in the Mediterranean Sea has essentially ceased as the Azores High builds northward and eastward. The small area of cyclogenesis in northeast Spain has no identifiable track associated with it. Two secondary tracks in Eurasia extend into northern Siberia. A major track lies across Eastern Siberia to the Bering Sea due to the convergence of secondary tracks and increased cyclogenetic activity.

August

August (Fig. 10a) continues to show greater cyclone frequency in northeastern North America and the adjacent North Atlantic than in other parts of the Northern Hemisphere although the North Pacific shows some relative increase compared with July.

Fig. 10b shows that cyclogenesis continues to occur near the mountain ranges of Central Asia and Manchuria; however, the level of activity decreases from July so that tracks leading from this area are secondary rather than primary. In the western Pacific a long band of cyclogenesis extends from east of Kamchatka to the Kurils. The primary track reaches from east of Japan across the Aleutians into the Gulf of Alaska, with a branch extending southeastward toward Vancouver Island. Farther west another branch extends into northern Alaska. This pattern is relatively similar to that of July.

In North America a large area of cyclogenesis extends from Alaska southeastward across Canada to the Central Plains of the United States. The primary tracks originating in Montana and Alberta are similar to those of July and extend to the James Bay area and beyond. A secondary track branching from the primary track in the Dakotas, lies across the Great Lakes and becomes a primary track in Maine and the Canadian Maritime Provinces. The additional activity from the cyclogenetic area over the Maritime Provinces contributes to this change from a secondary to a primary track. Farther to the south, the cyclogenetic area near Cape Hatteras is the source of a primary track leading northeastward to Newfoundland, with a secondary branch heading eastward to Great Britain and the North Sea.

Mid-Atlantic cyclogenesis off the southeast coast of Greenland contributes to both primary tracks originating in this area. The northern branch crosses Iceland and heads toward Spitzbergen, while the southern branch crosses Scandinavia and the northern coast of Russia to the Ob Gulf. Secondary tracks also converge on the Siberian Plains from the Ukrainian S.S.R. and the Steppes of southern Russia - a pattern similar to July. Activity in northern Siberia has diminished.

September

Between August and September the overall frequency does not greatly change (Fig. 11a). In the Pacific the frequency slightly decreases, but this is balanced by a small increase in northern Siberia and a southward expansion of the frequency along the east coast of North America.

Although this is the least cyclogenetically active month of the year, it is not lacking a variety of tracks. The Mongolian region south of Lake Baykal is again active with the primary track lying through the Amur Valley, although many of the lows do not leave the mainland (Fig. 11b).

The principal Pacific track originates in Korea, although cyclogenesis is diffuse in this area with no box attaining the criterion of 10. The primary track crosses Japan and the Aleutian Islands and terminates in the Gulf of Alaska. Numerous secondary tracks are found both north and south of the primary Pacific track.

Cyclogenesis over North America has greatly diminished in areal coverage from August. Activity in Alaska and the northern plains of the United States has decreased while Colorado activity is increasing. Principal cyclone tracks lie farther south reaching from Alberta and Colorado to James Bay. Lows then move northeastward into the Davis Strait, eastward to south of Greenland or southeastward over New Brunswick. East Coast cyclogenesis is farther south than during August; the secondary track from that area indicates the beginning of a return to a more winter-like position.

Primary tracks skirt both sides of Iceland although only the southern branch continues northeastward past Spitzbergen to the Barents Sea. The track across the Atlantic to Scandinavia is only secondary this month compared to primary in August. A confluence of lows in eastern Russia contributes to the primary track across the Ob Gulf, the Lena River delta and into the East Siberian Sea.

October

October brings a marked increase in cyclone frequency, with the greatest increase over the oceans. As the fall season progresses, the first 80 contour appears in the Pacific and an extension of larger frequency values is found westward into eastern Asia (Fig. 12a).

The Mongolian track lies in approximately the same position as in September but now continues eastward maintaining primary status into the Bering Strait. With the southward displacement of the polar front, the primary Pacific track now originates south of Japan. However, its eastern end continues in a more northerly position (similar to September) over the Aleutians into the Gulf of Alaska (Fig. 12b).

Cyclogenesis continues in Colorado and in the Alberta-Northwest Territories of Canada. An examination of the tabulated data (pages 42 to 65) shows that of these three regions the Northwest Territories is most active, in fact, attaining its highest values of the year. Primary tracks from these areas converge east of James Bay before continuing over Labrador to either the Davis Strait or south of Greenland. Cyclogenesis along the East Coast appears in the same position as September, but now the primary track runs along the entire coast, across the Atlantic south of Iceland and northeast into the Arctic Ocean.

By October the Gulf of Genoa is becoming active as the Azores High begins to move south. A secondary track from the Mediterranean to the Ukrainian

S.S.R. is joined by a track from the Baltic to form primary tracks from the Barents Sea to Novaya Zemlya and across the Ob Gulf. A primary track also extends from western Russia to the Ob Gulf.

November

November finds a southward expansion of cyclone frequency (Fig. 13a). Notable features include a large increase over the Mediterranean area, and a more modest increase over the coastal region of New England. However in eastern Asia frequency decreases from the previous month.

Cyclogenetic activity in Mongolia diminishes as the Asiatic High begins to establish itself (Fig. 13b). The primary Mongolian track has moved south to just north of Japan, while the Pacific track comes from an area of cyclogenesis in the Sea of Japan. (It is interesting that the primary Pacific track originates somewhat farther north in November than in October. This Sea of Japan cyclogenesis may result from cold outbreaks moving over the warmer water.) The primary tracks converge south of Kamchatka and proceed across the Pacific as a series of northward curving paths - one into the western Bering Sea, one into the eastern Bering Sea along the Alaskan coast, and one across the Aleutians into the Gulf of Alaska. The secondary track along the Alaskan coast, through the Bering Strait and into the East Siberian Sea is not seen in any other month as an identifiable path although individual lows in other months do follow this route. The secondary track which takes a more southerly path across the Pacific is again a precursor to the winter pattern.

Cyclogenetic activity has decreased in the Northwest Territories although Colorado and Alberta are quite active. As a result the primary tracks this month extend from Alberta and Colorado to the western Great Lakes, where they then follow highly divergent paths. The Colorado lows generally move north along Hudson Bay, while the Alberta lows continue southeastward over New England.

The main cyclogenesis region for the East Coast is onshore in the Cape Hatteras area with the primary cyclone track heading to a convergence area off New England. Lows leaving this location move across the Gulf of St. Lawrence to the Davis Strait or swing farther out into the Atlantic before turning northeast. The primary tracks split around Iceland with the southern branch reaching Norway while the northern branch heads toward Spitzbergen and then into the Barents Sea. A secondary track from the mid-Atlantic over Great Britain and Scandinavia joins the primary track in the Pechora Basin.

The West Siberian Plains exhibit a very complex pattern. Lows approach from the Ukrainian and Kazakh S.S.R. to the southwest and the Pechora Basin to the northwest. From the area lows travel northward, east of the Ob Gulf, with some moving along the Arctic coast while others head east toward the middle Lena River basin.

The Mediterranean area begins to have a winter-like pattern as cyclogenesis extends from the Gulf of Genoa to the Adriatic, and the principal cyclone track extends into Turkey.

December

By December the winter pattern of cyclone frequency has become well established (Fig. 14a). There are notable increases in frequency along the east coast of North America and across the entire Pacific. Likewise the 60 contour which appears in eastern Colorado is significant.

The main cyclogenetic activity in December has shifted to the western Pacific with cyclogenesis over northern and southern Japan extending well eastward. The primary track runs from south of Japan to the Gulf of Alaska with a branch leading to east of Kamchatka. A more southerly secondary track indicates that in December the polar vortex may expand further in some years than in others. Some lows do not enter the Gulf of Alaska and instead cross the northern United States to join the Alberta track, a similar situation to January.

Lee-side activity continues in Alberta with the primary track oriented southeastward over the Great Lakes and New England. The Colorado cyclogenetic area stretches up through Nebraska with the primary track extending eastward to New England. The secondary tracks which exist through the Great Lakes in December have positions similar to the primary track in this area in January.

Cyclogenetic activity has increased in area and moved offshore along the North American east coast as the thermal contrast between ocean and continent becomes more pronounced. The primary track along the East Coast heads across the Atlantic to south of Iceland with a northward branch over Newfoundland to the Davis Strait. The secondary tracks in the mid-Atlantic, one through the Denmark Strait and the other south of the primary Atlantic track, correlate well with the positions of primary tracks in January.

Beyond Iceland, the primary track passes north of Scandinavia into the Barents Sea and on to the Pechora Basin where it is joined by a primary track from the Baltic Sea. It then passes over the Ob Gulf into the Siberian Plateau.

Gulf of Genoa cyclogenesis continues in the Mediterranean along with new activity in the Aegean Sea. The primary track runs across the northern Mediterranean into Turkey where a secondary track continues across the Caucasus region and the Caspian Sea to the Siberian Plains.

4. Summary

Although the highlights of each month have been noted, some general comments on the yearly or seasonal characteristics of cyclone frequency, tracks and areas of cyclogenesis are in order. Cyclone frequency is relatively high all year in the western Pacific and the Gulf of Alaska. Along the East Coast of the United States, the passage of cyclones is most frequent in winter and spring. The maximum frequency shifts to southeast of Greenland during summer and fall. Over the United States, a band of high frequency is found across the Great Lakes during the winter which slowly moves northward into Canada as the months progress. By summer, the highest frequency is about 10° latitude north of the winter position. This is a reflection of the more northerly location of cyclone tracks during the summer season over the entire hemisphere. In all seasons most tracks have components toward both the east and north.

Major areas of cyclogenesis are found off the east coasts of the land masses or in the lee of major mountain ranges. Off-shore cyclogenesis is most prevalent both in the western Pacific and along the East Coast of the United States during winter and spring. Lee-side activity in the United States is highest in winter and spring, while activity in the lee of the Canadian mountain ranges peaks in fall and winter. Mainland Asiatic activity apparently is tied to the strength of the Siberian High - cyclogenesis is relatively strong in the summer when the Siberian High no longer influences activity in the area. Mediterranean cyclogenesis is influenced by the semi-permanent Azores High with activity a maximum in the winter when the subtropical high shifts southward. Unlike the Siberian High which builds and weakens with the season, the Azores High exhibits a north-south seasonal displacement along with the major zonal wind belts. However, it also builds eastward over the Mediterranean Sea in summer, which in part can be related to the weakening of the Siberian High. Consequently, the changing areas with season of principal cyclogenesis are influenced by both latitudinal and longitudinal displacements of the major semi-permanent anticyclones.

We again emphasize that the discussion of the individual months and this brief summary touch only some of the major features. We encourage closer examination of the individual monthly maps and variations between them. The investigator who is especially interested in this census should examine and use the tabulated data on pages 42-65.

Acknowledgements

The authors would like to express their appreciation to Dr. Thomas Koehler for his helpful suggestions and thoughtful insight during the course of this study. Special thanks are also due to Dr. Val Mitchell, State Climatologist, for furnishing climatological data, Lans Rothfusz for drafting the figures, Laura Sander and Kathi Marvin for preparing the tables and Mrs. Eva Singer for typing the final manuscript. This study was supported by National Science Foundation Grants ATM76-22200 and ATM-7918761.

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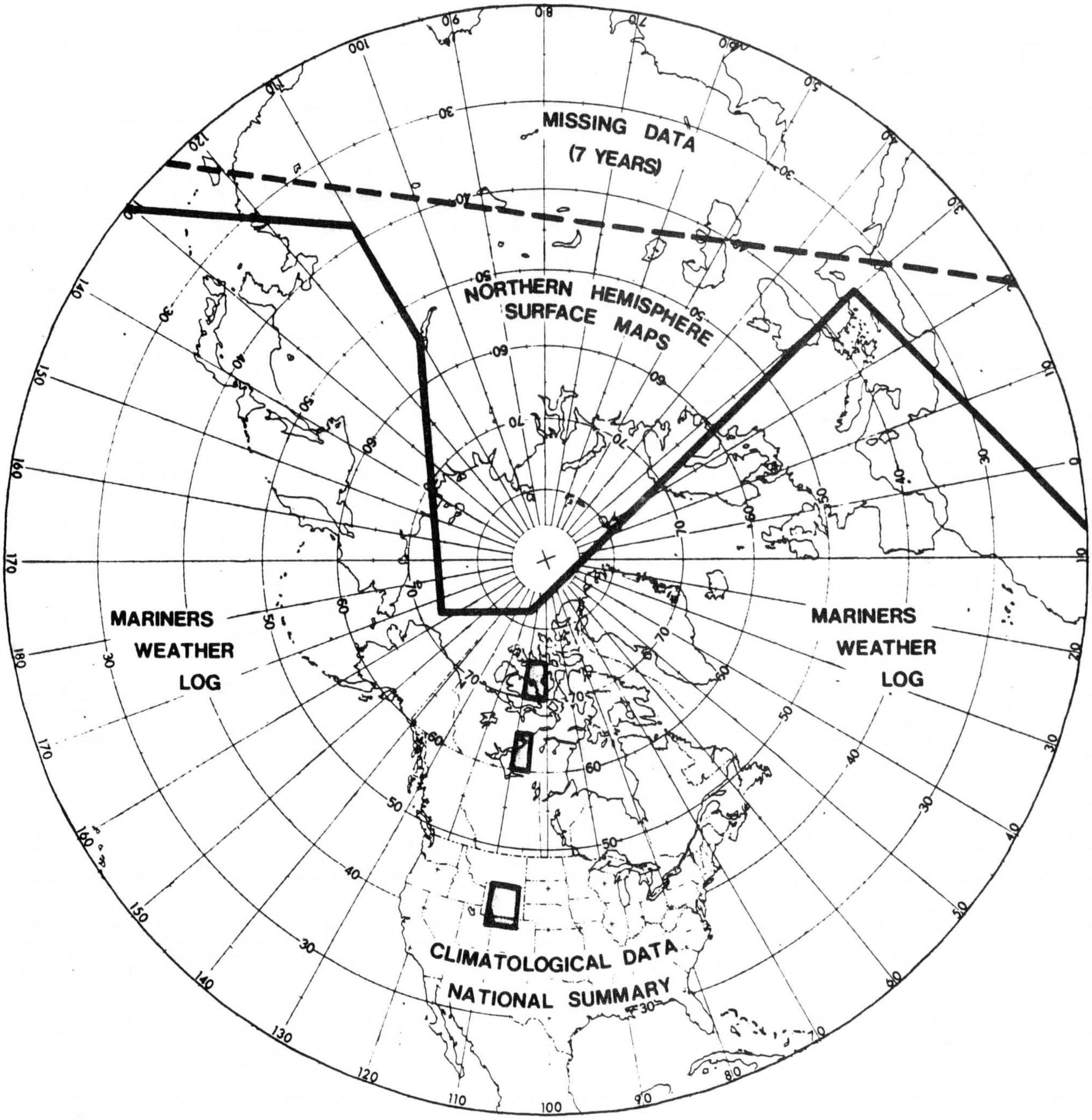
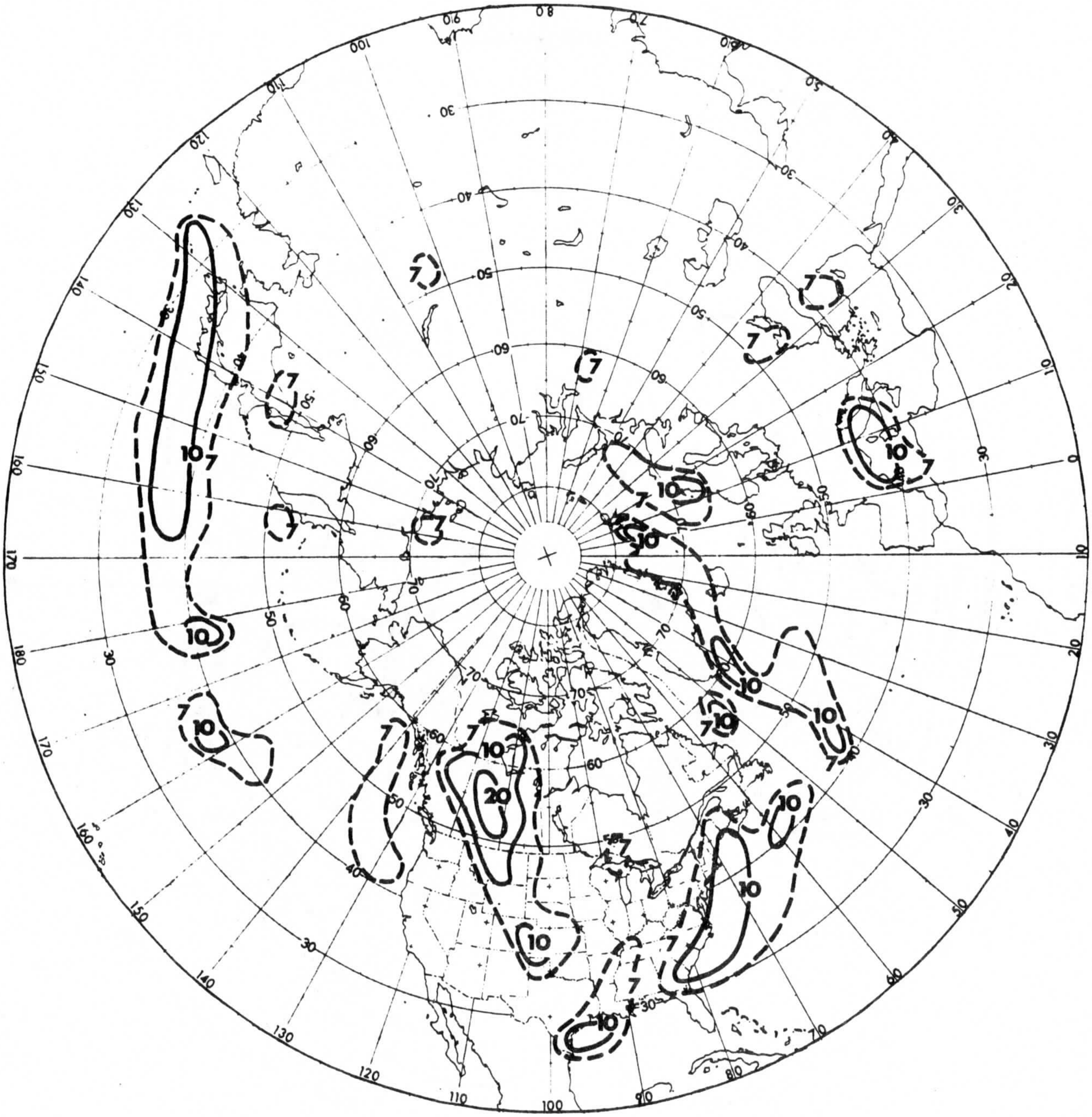
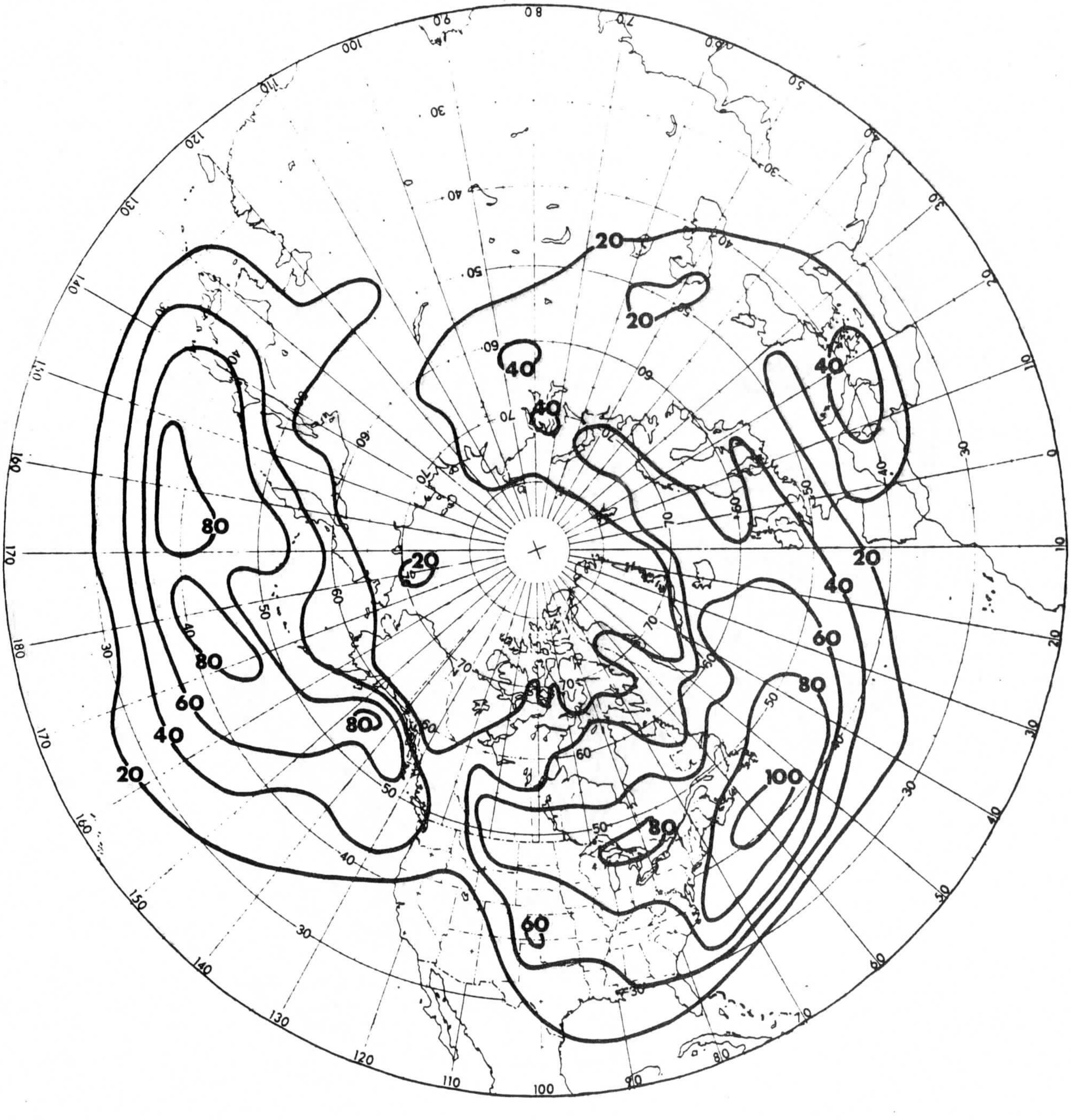

MISSING DATA
(7 YEARS)
NORTHERN HEMISPHERE
SURFACE MAPS
MARINERS
WEATHER
LOG
MARINERS
WEATHER
LOG
CLIMATOLOGICAL DATA
NATIONAL SUMMARY

Figure 1



JANUARY

Figure 2



JANUARY

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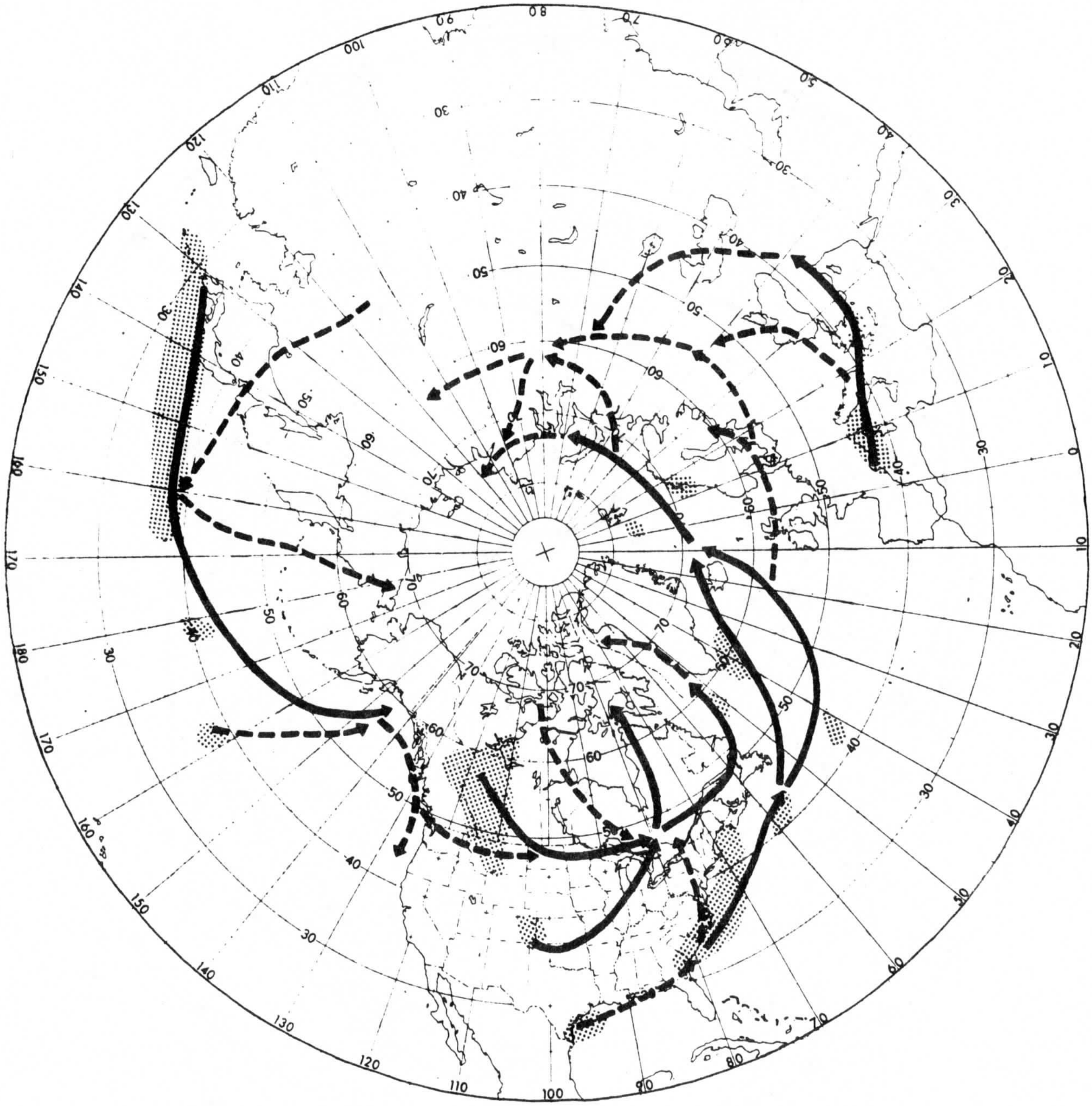
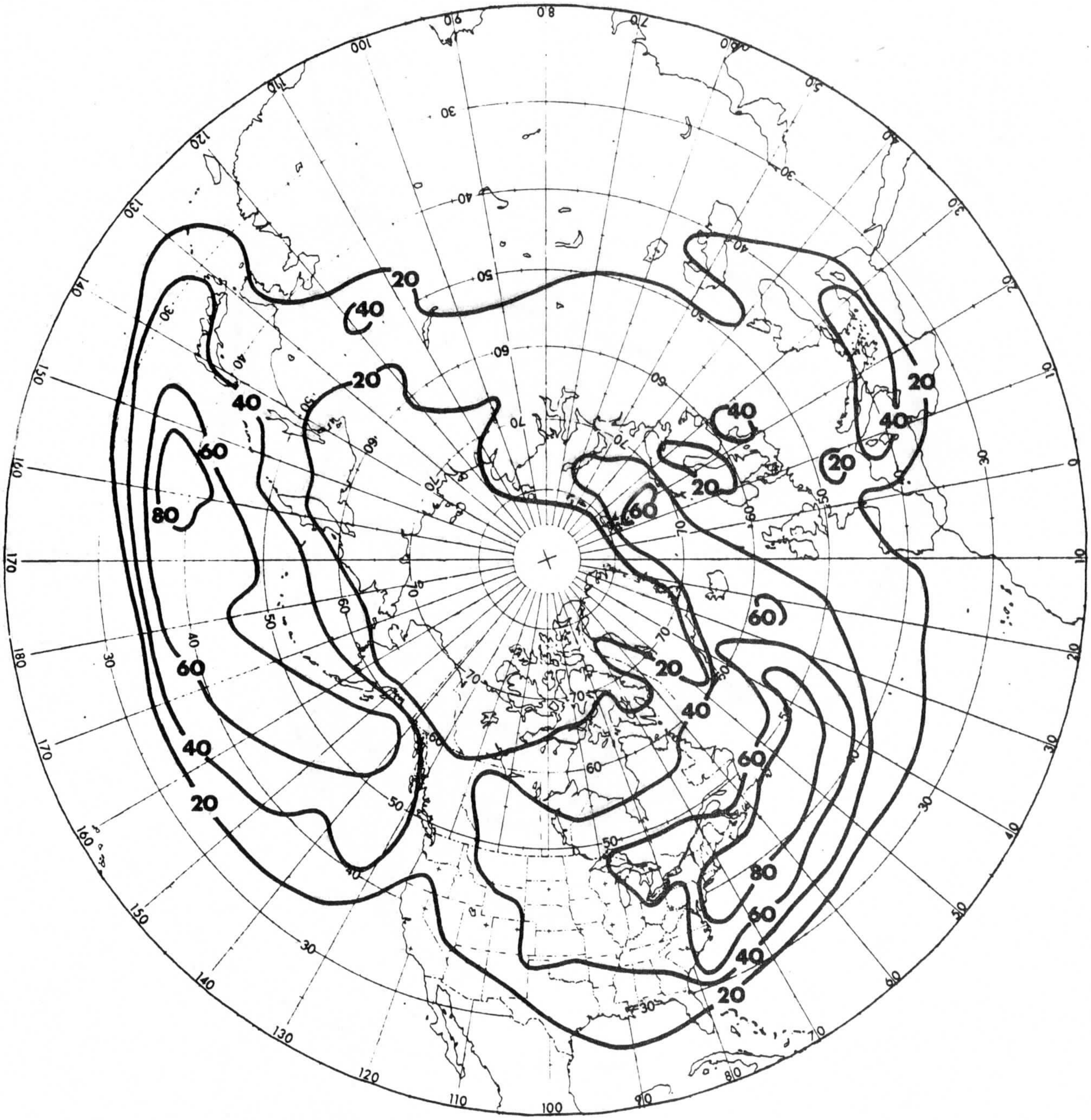


JANUARY

Figure 3b



FEBRUARY

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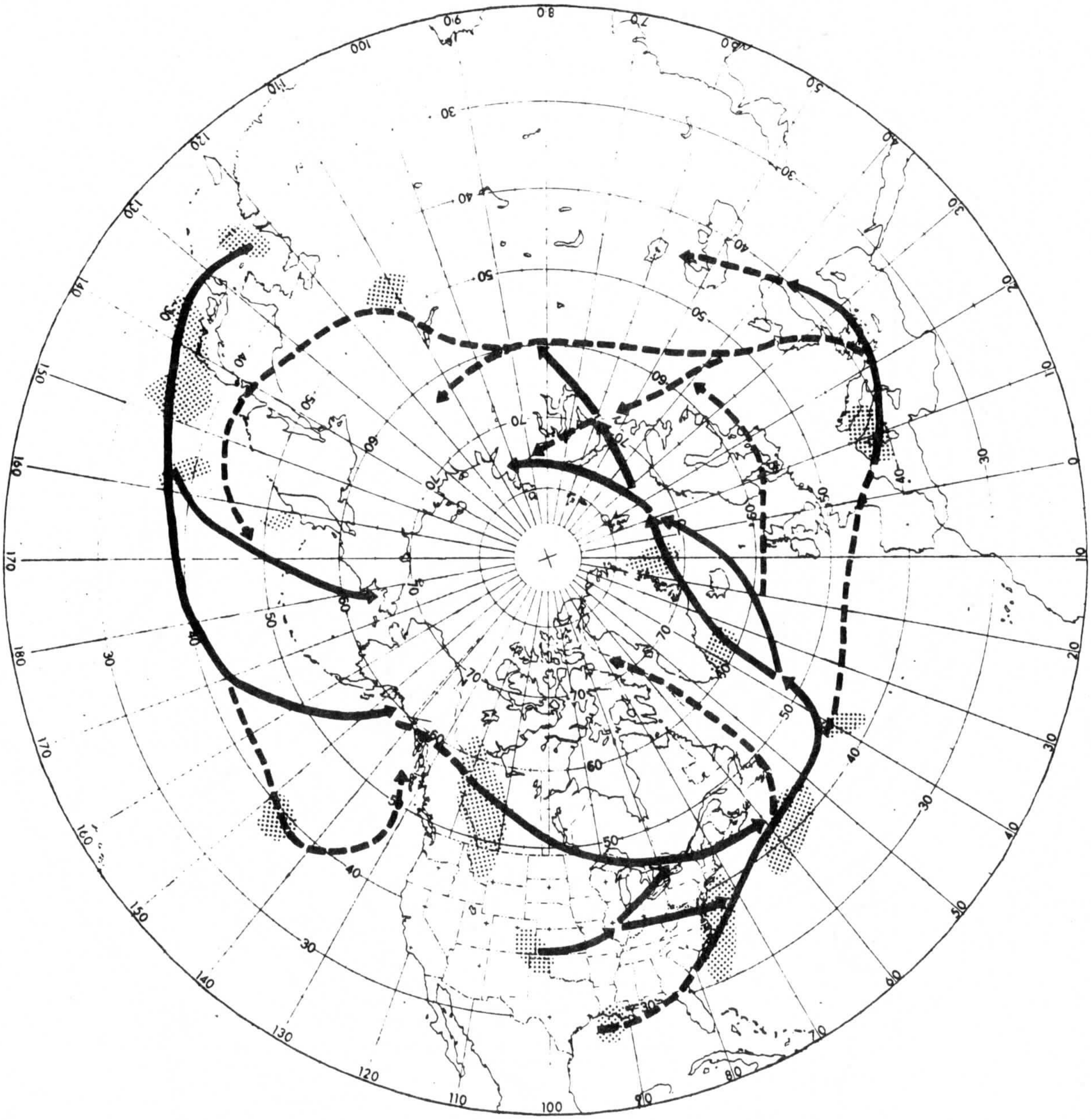

FEBRUARY

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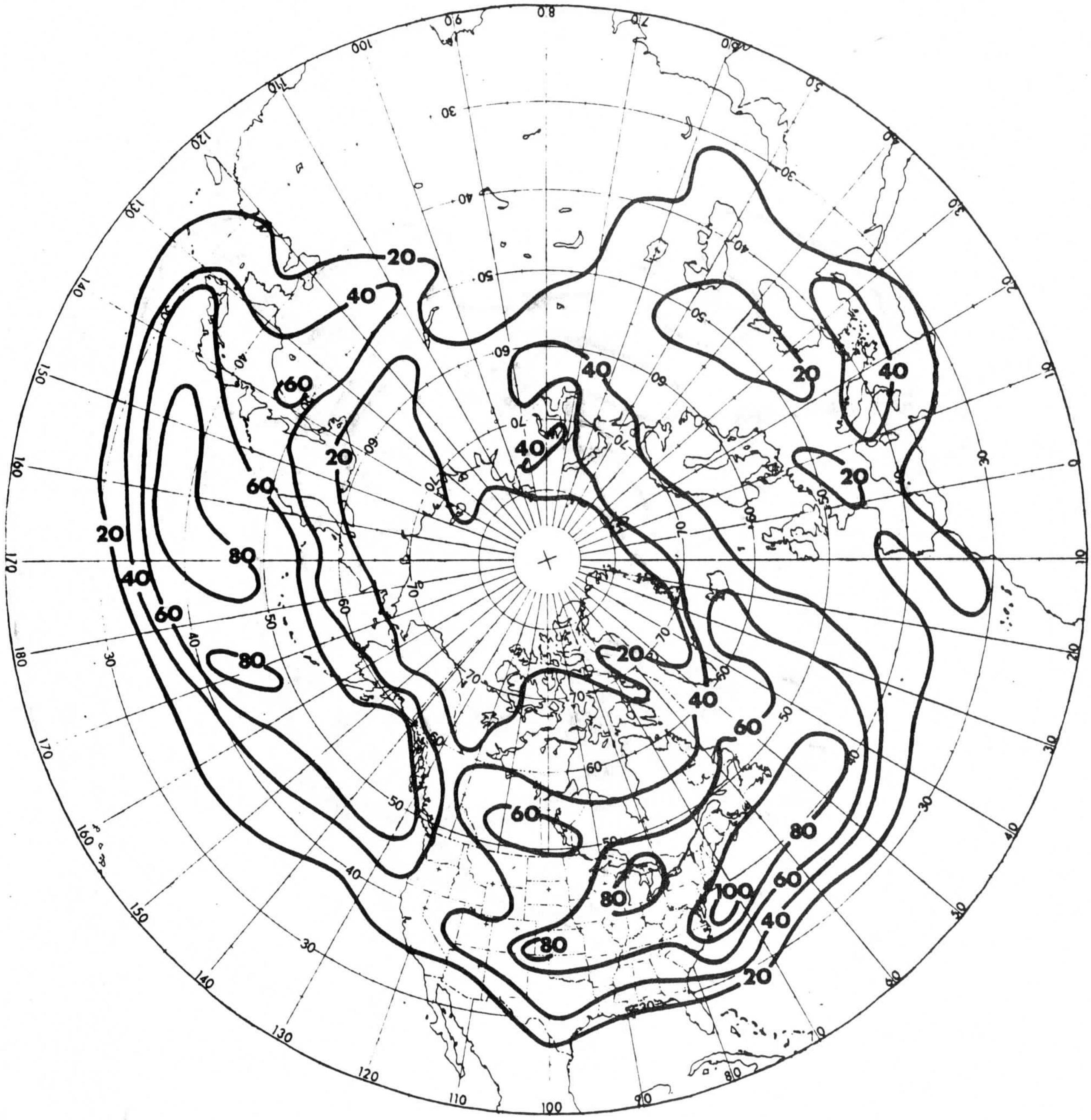
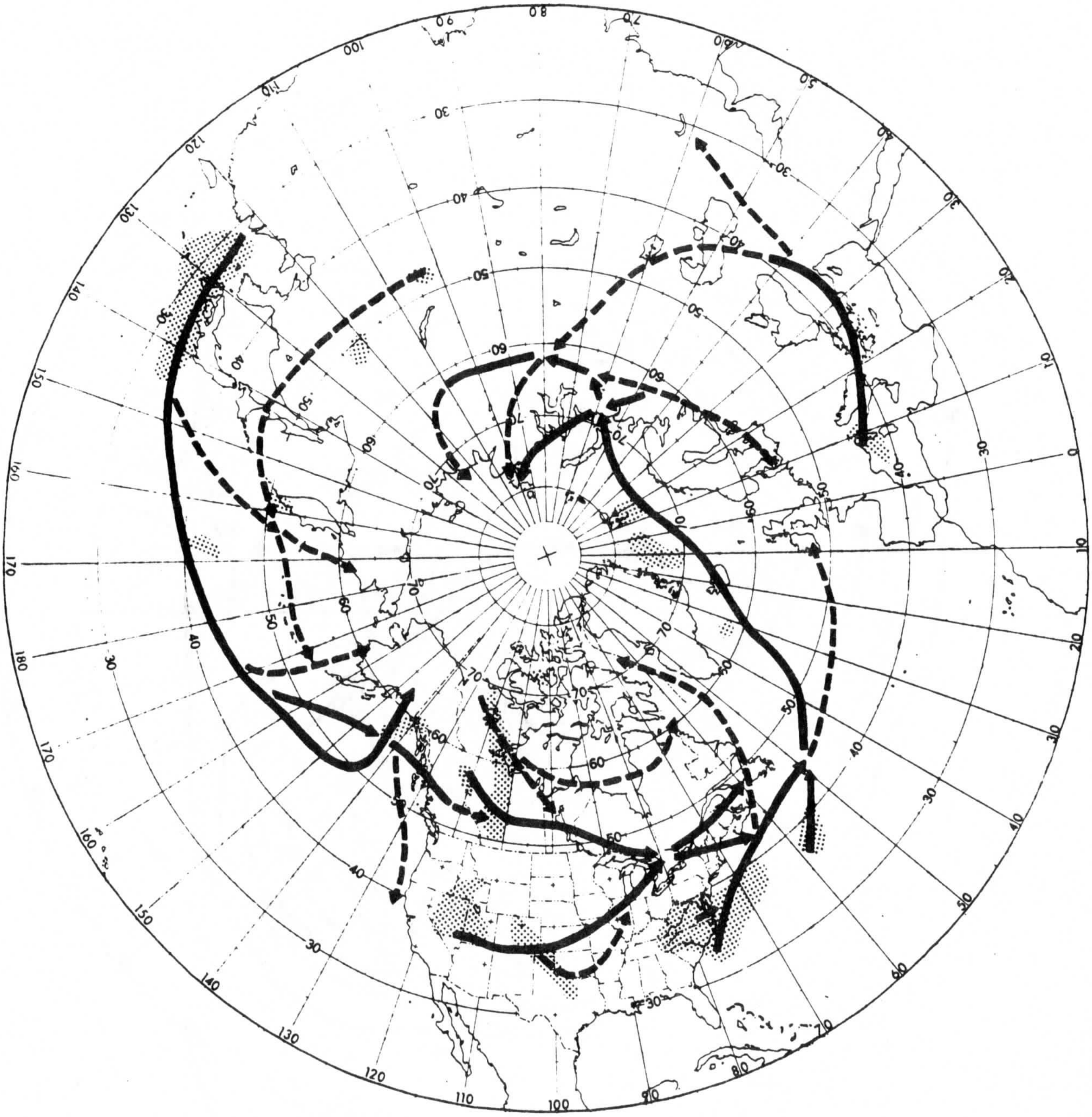


MARCH

Figure 5a



MARCH

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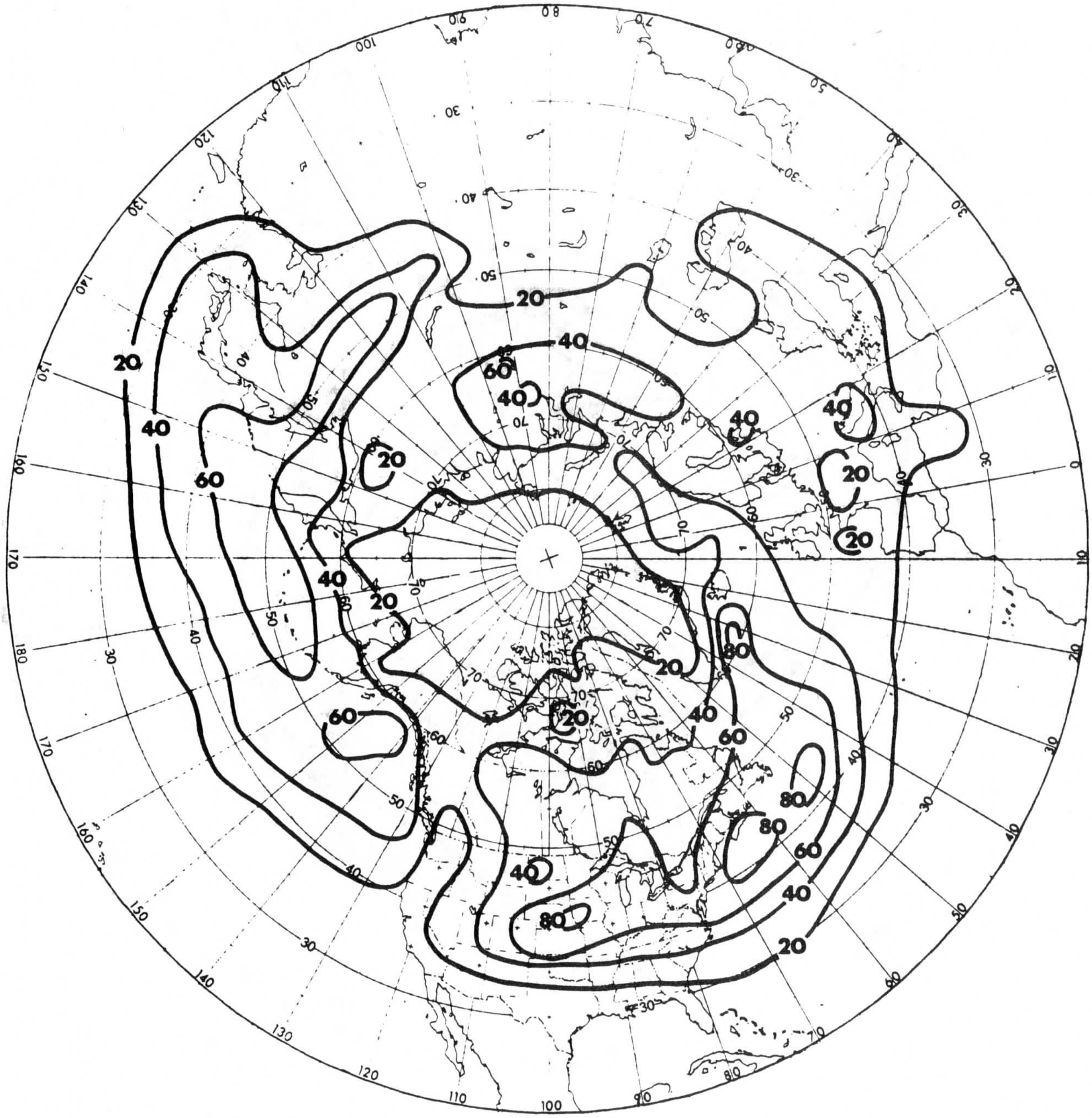
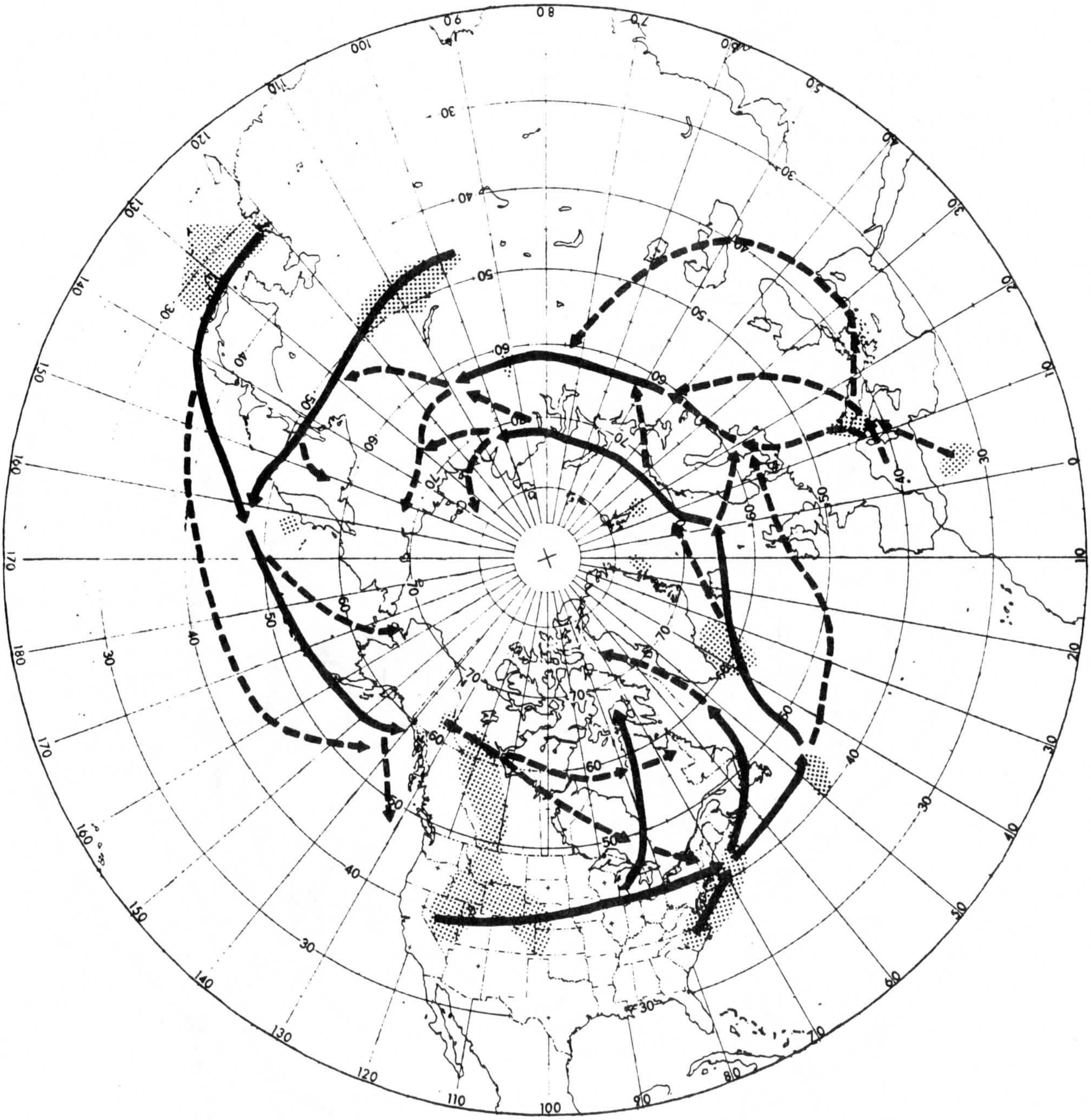


APRIL

Figure 6a



APRIL

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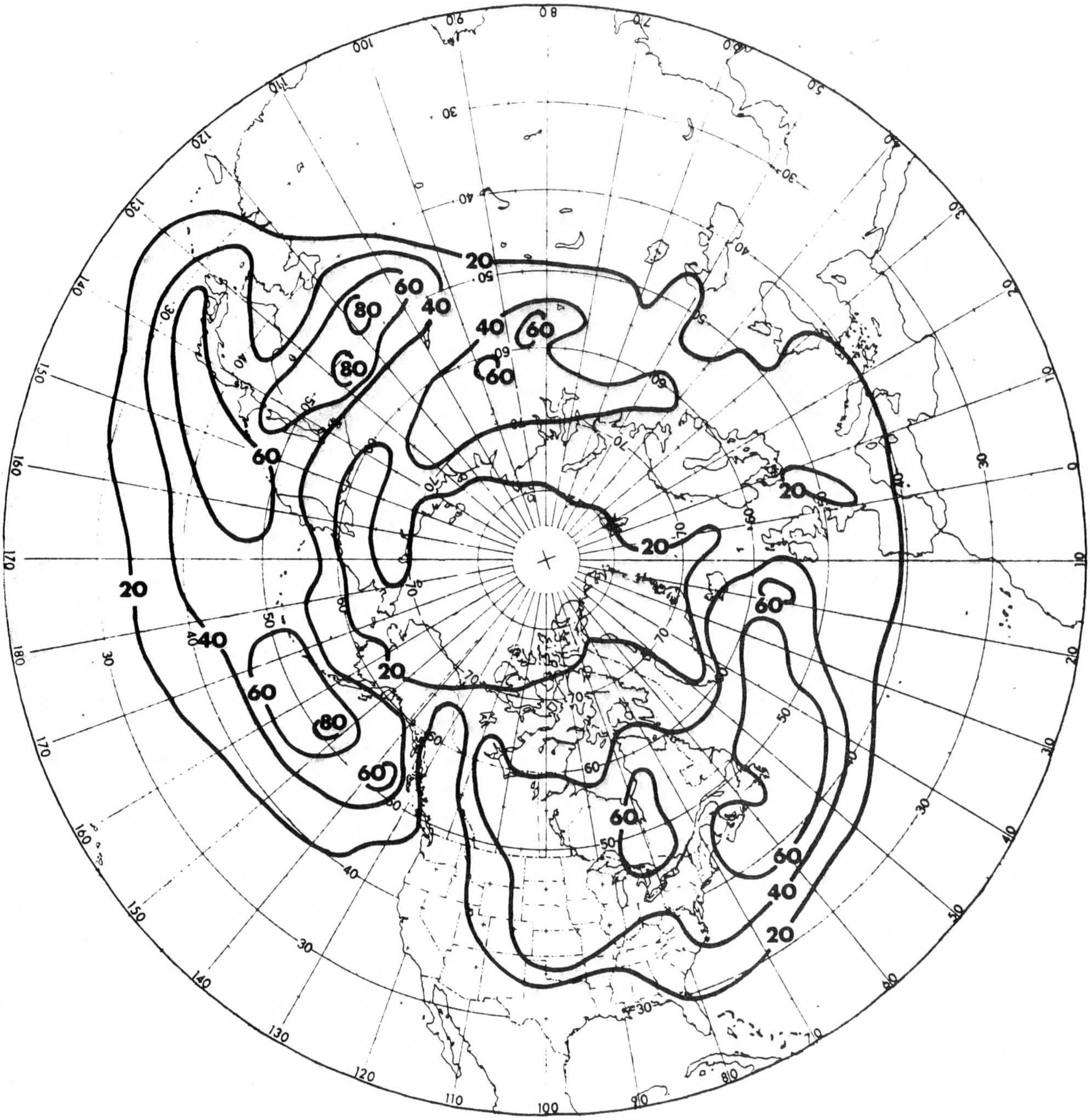

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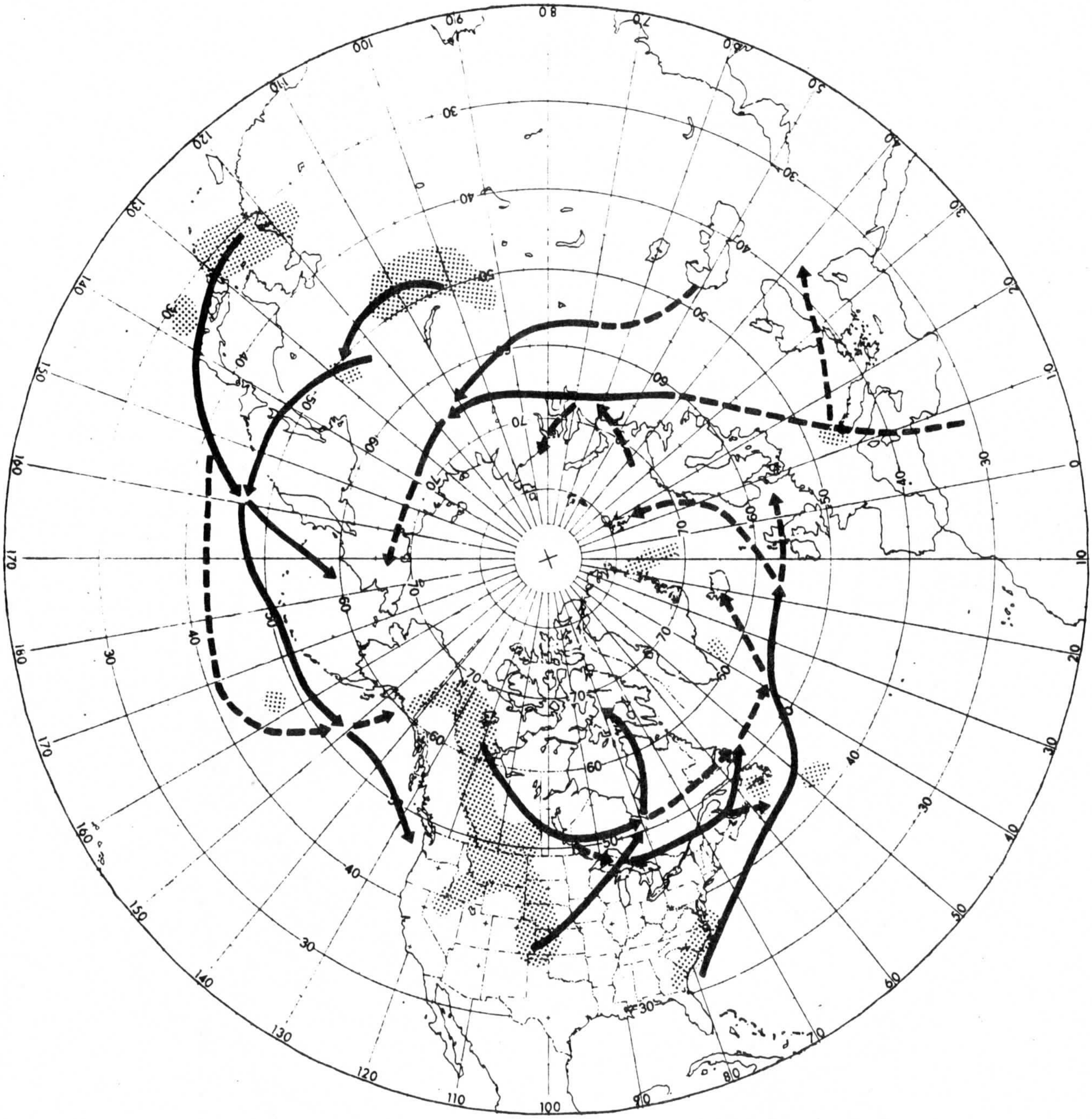
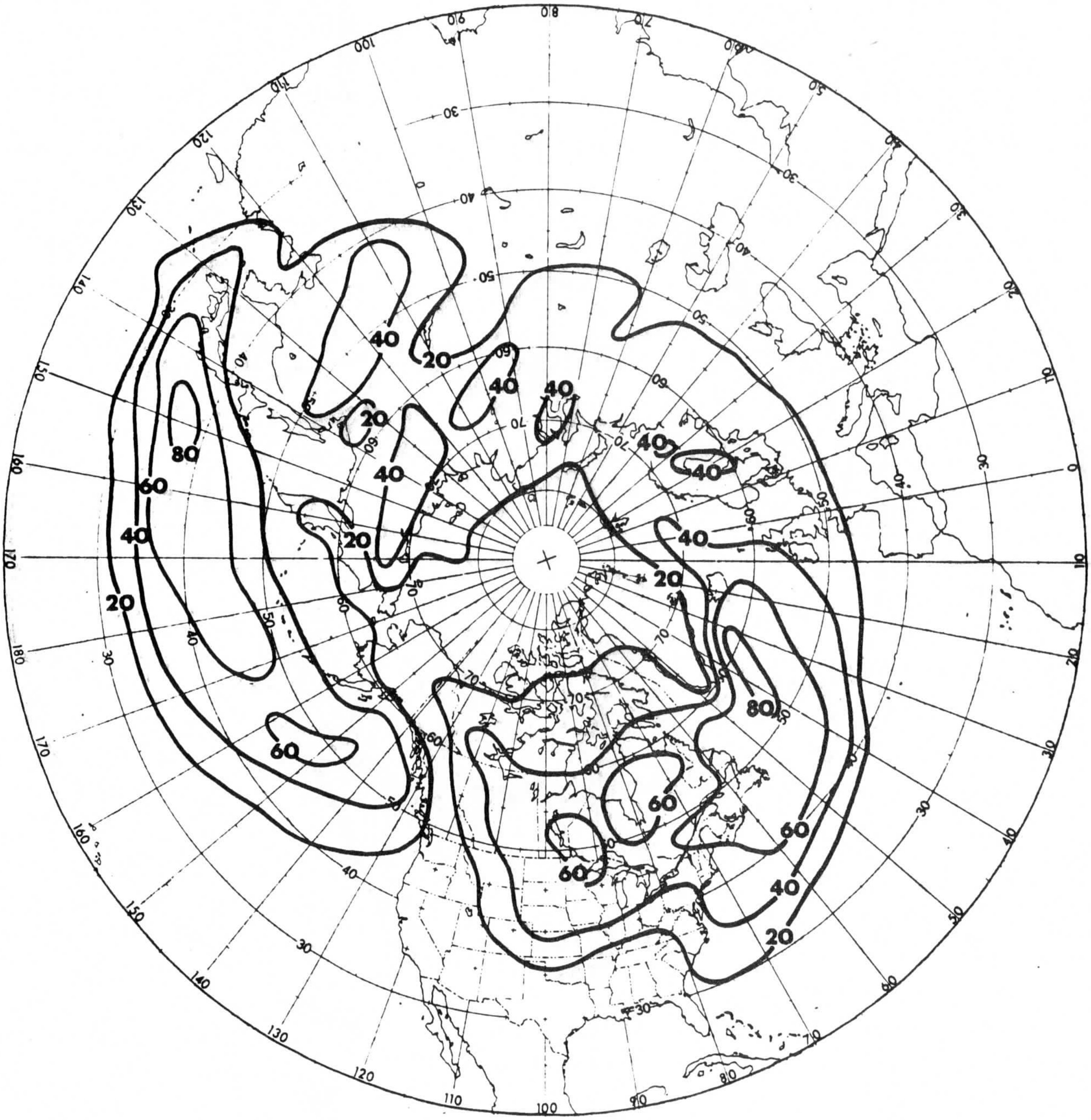


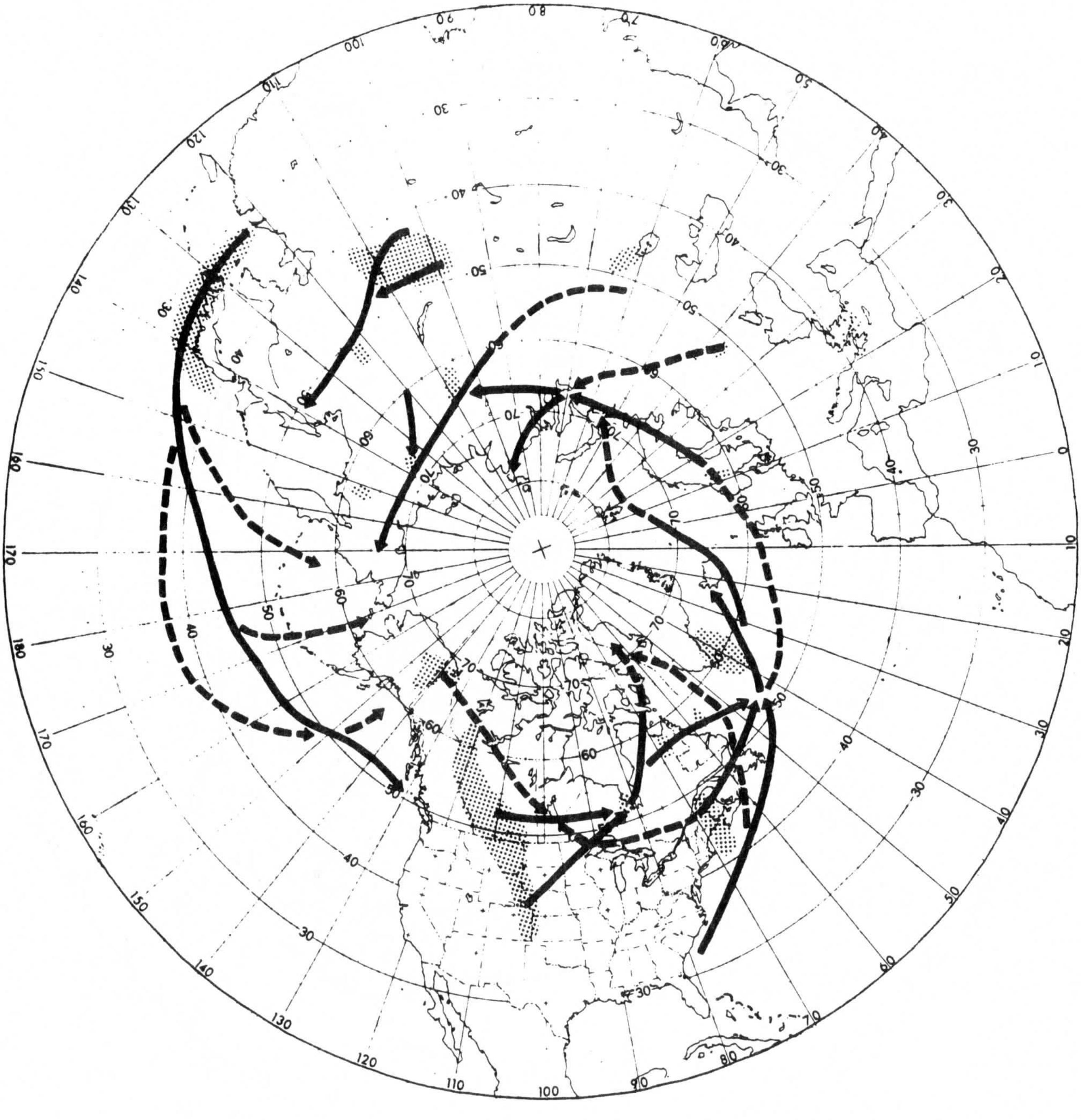
MAY

Figure 7b



JUNE

Figure 8a



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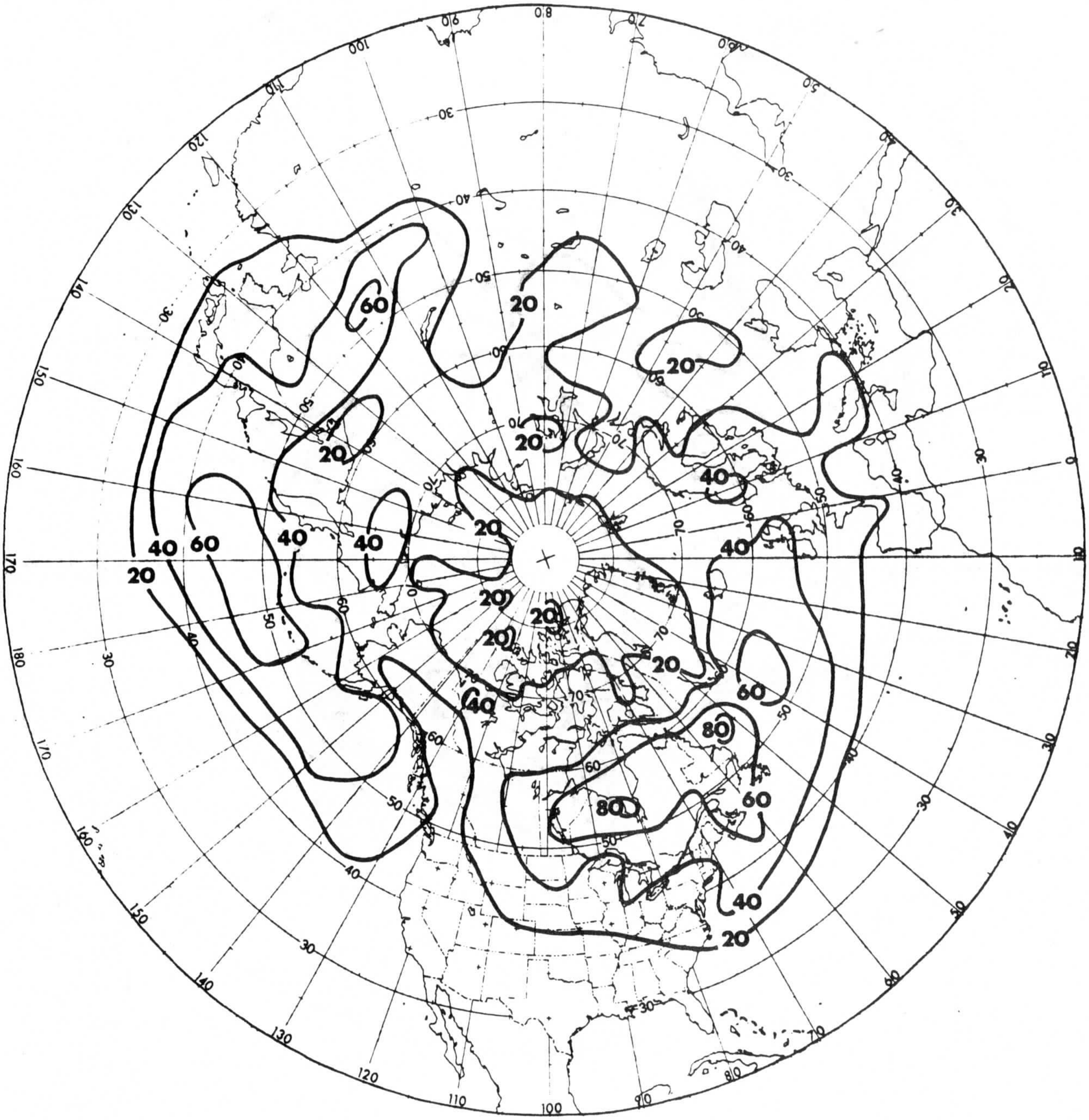

JULY

Figure 9a

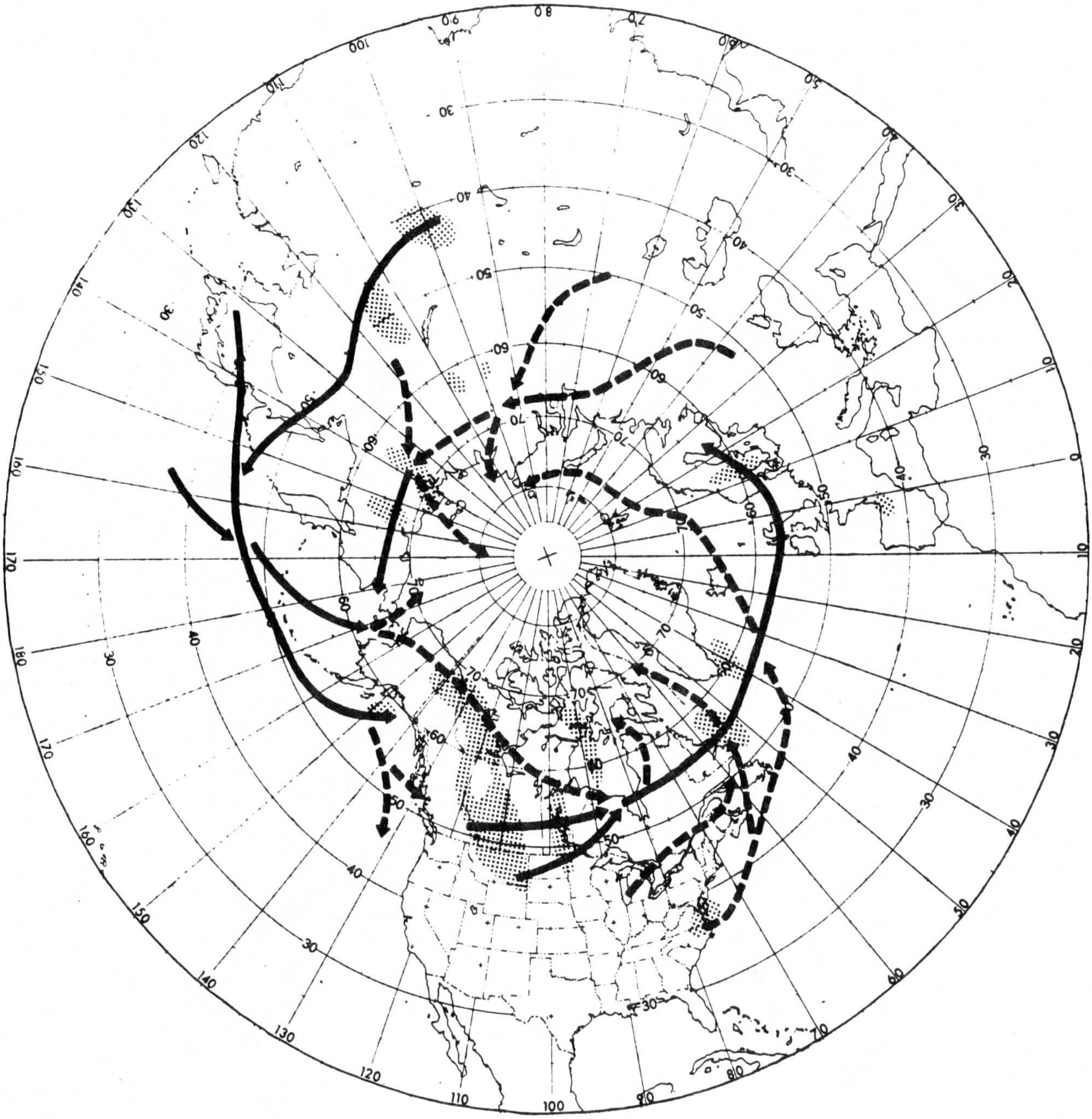

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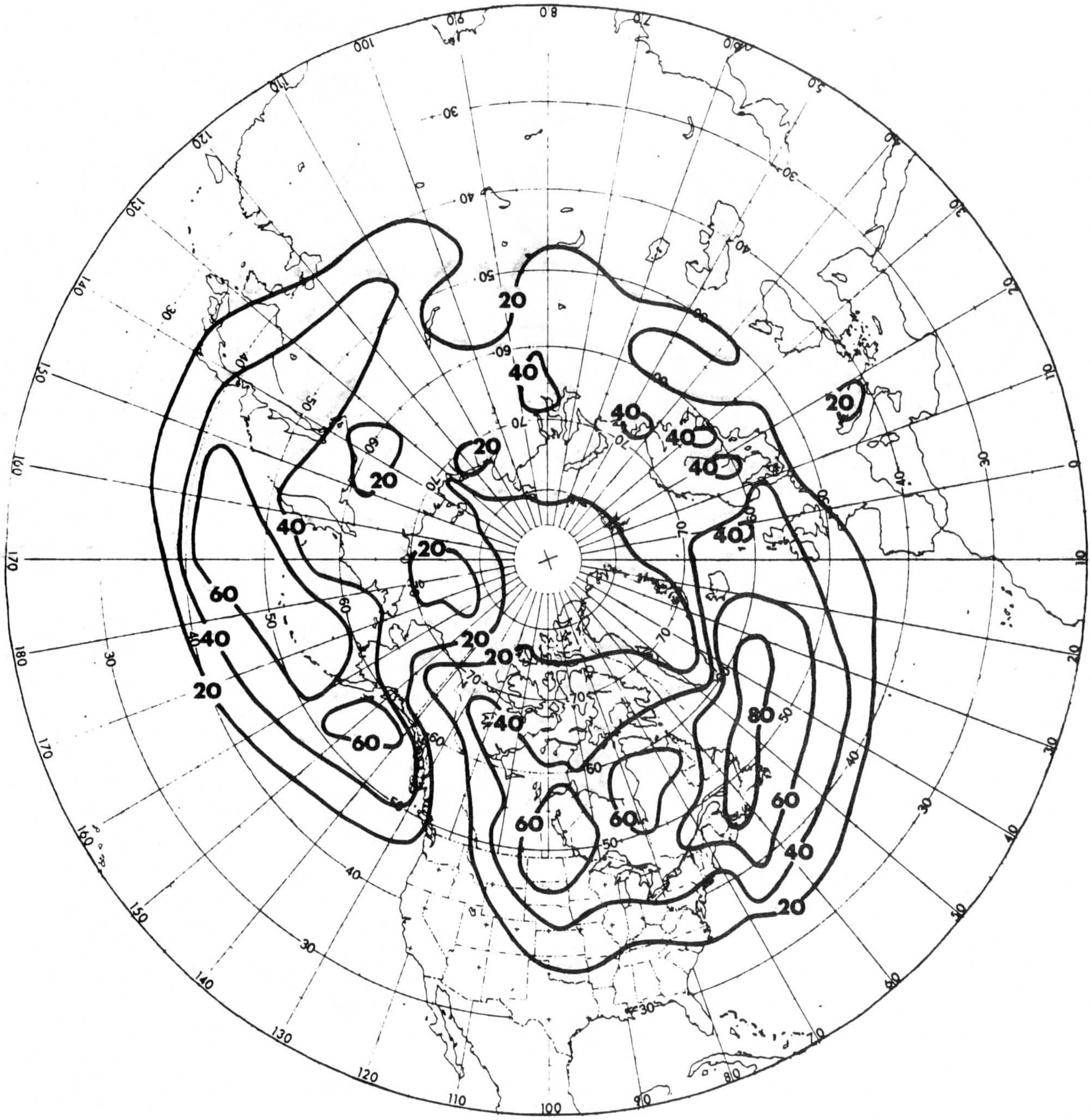
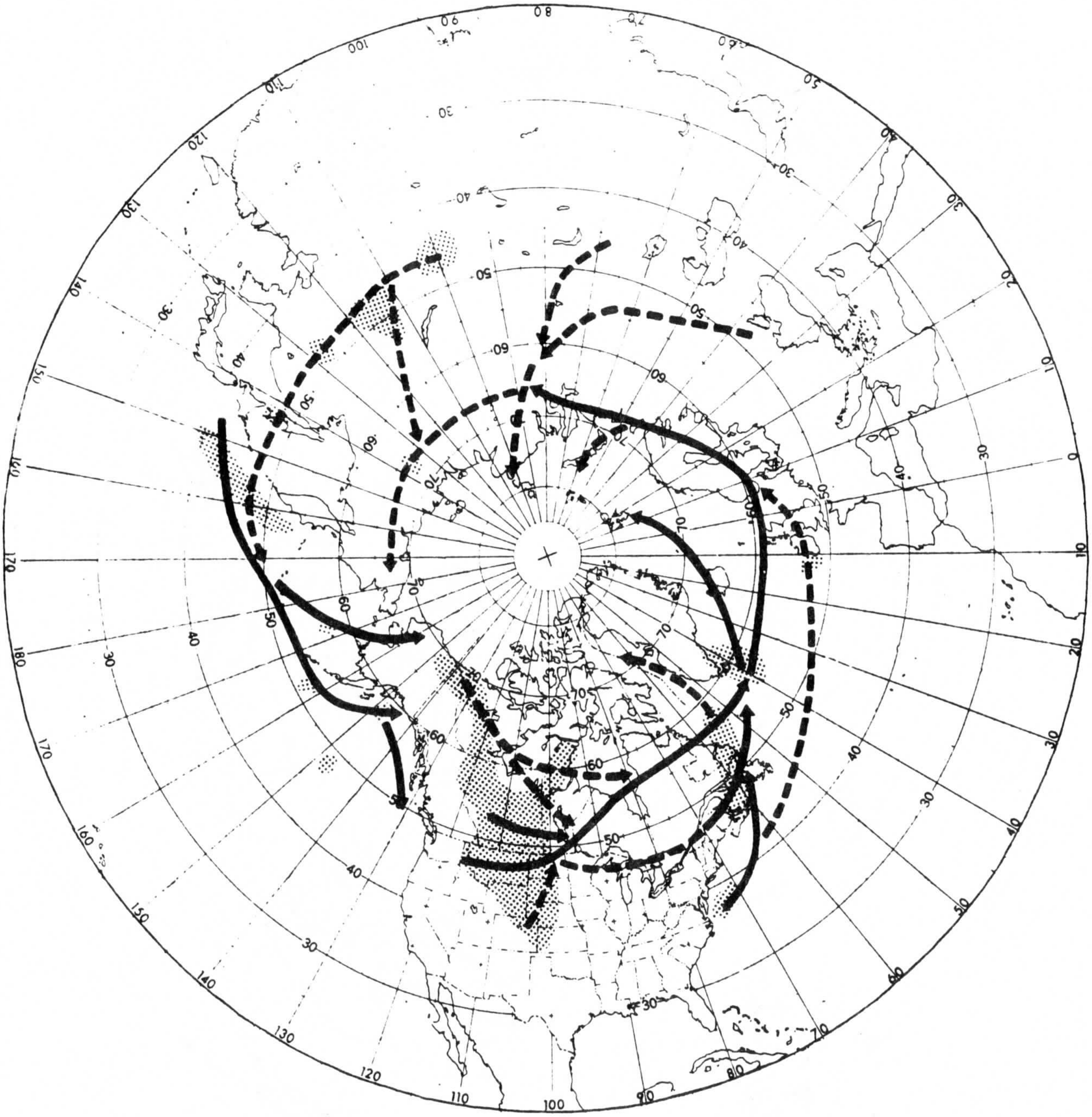
Figure 9b



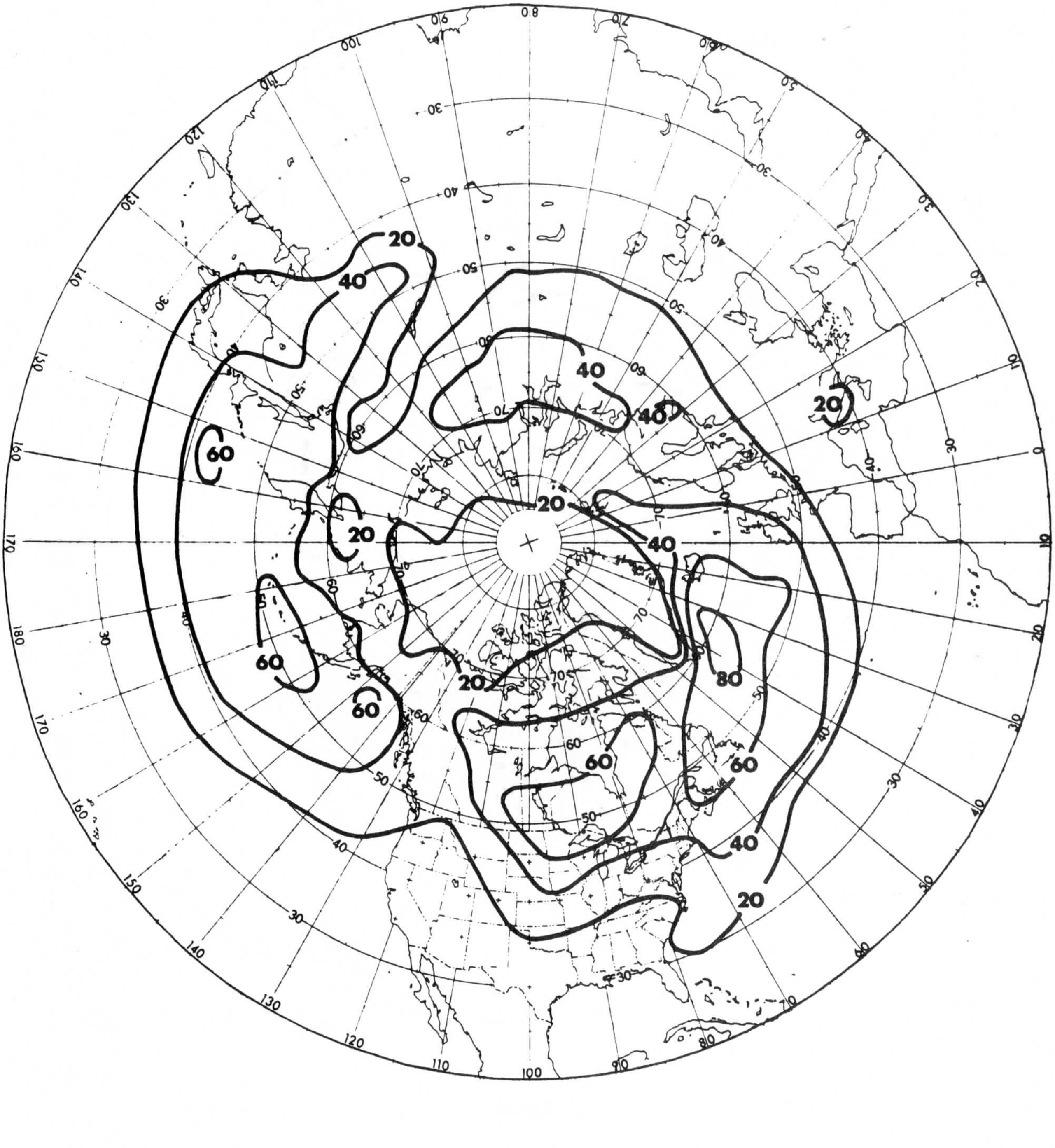
AUGUST

Figure 10a



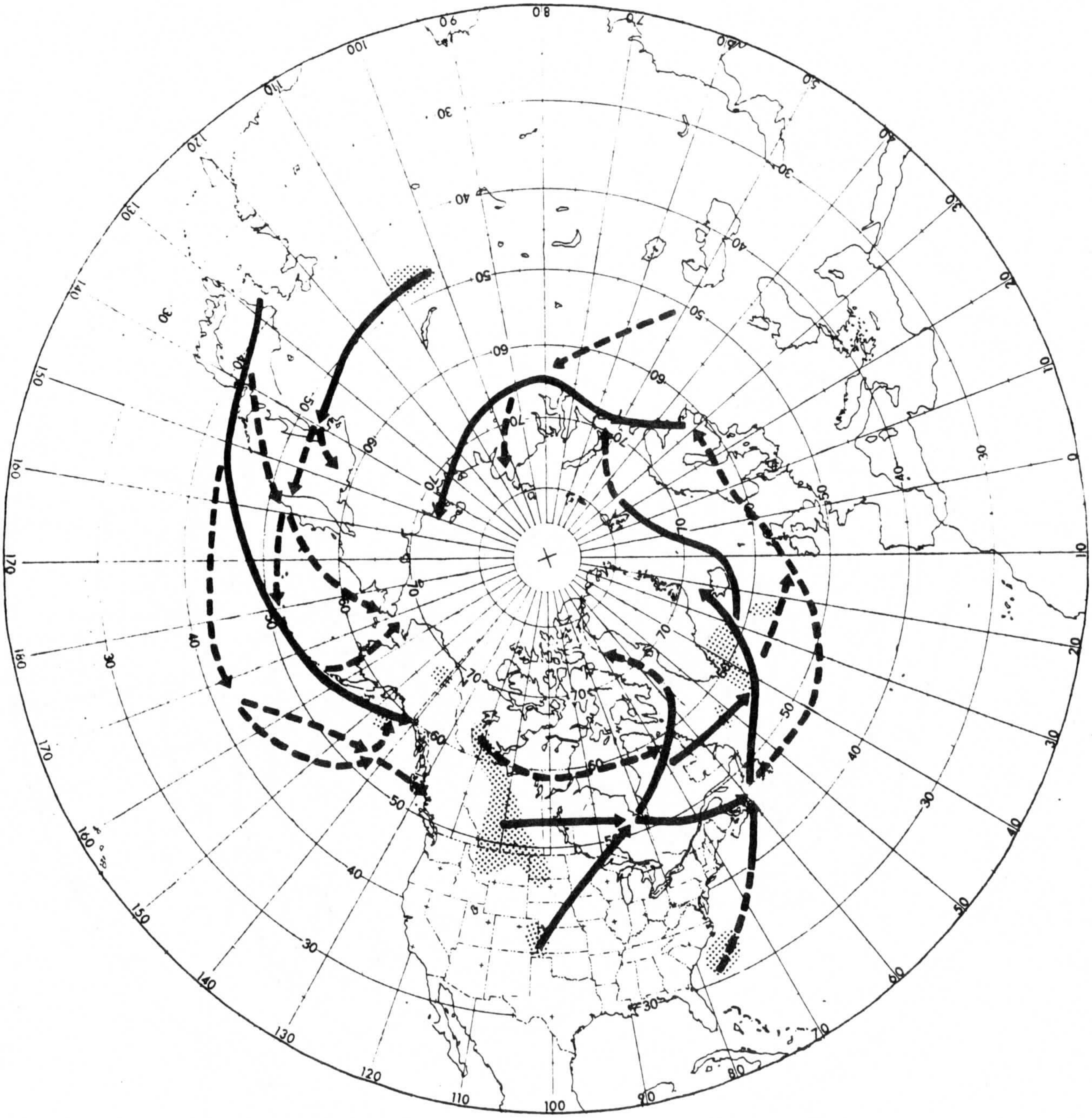
AUGUST

Figure 10b



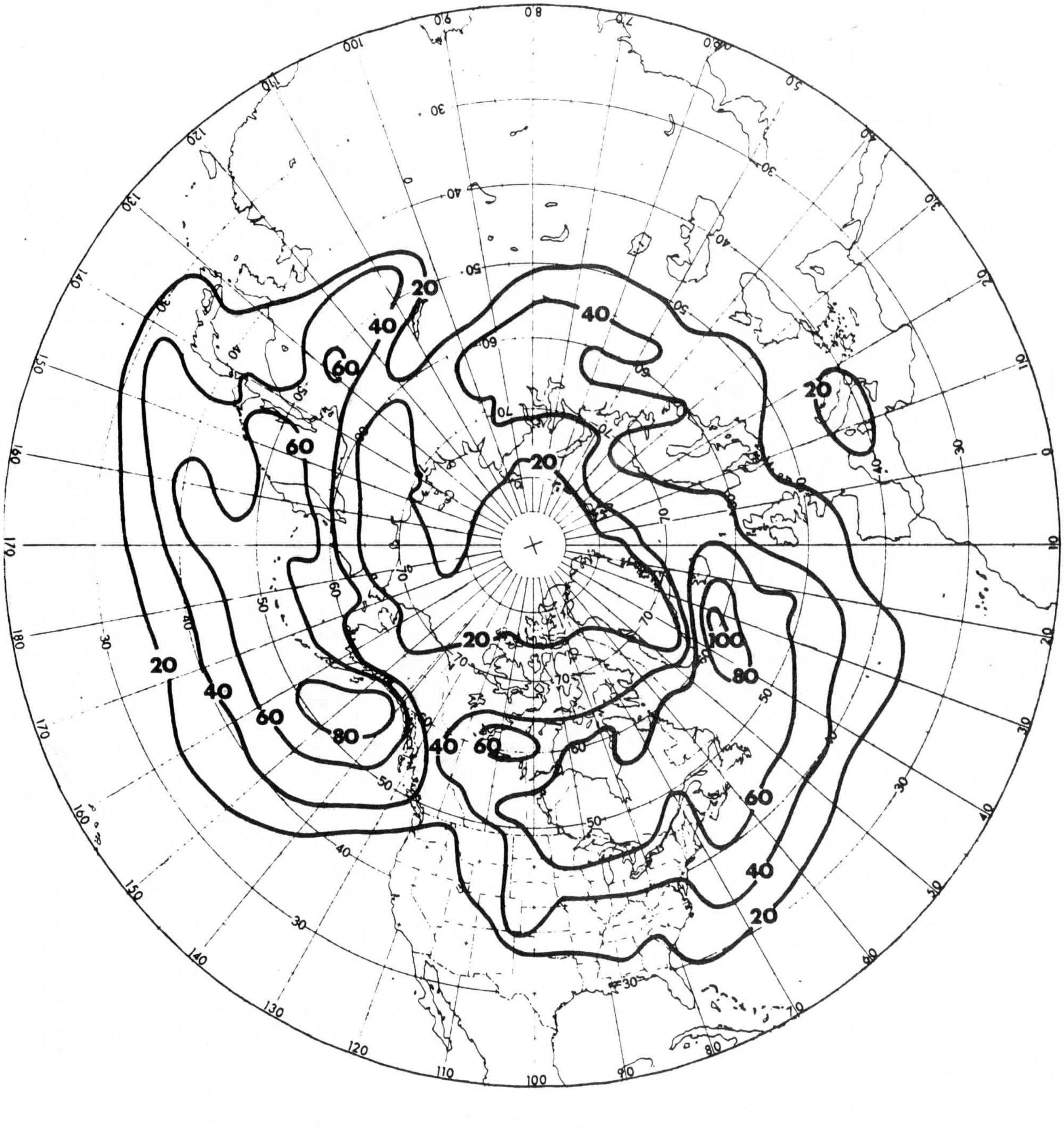
SEPTEMBER

Figure 11a



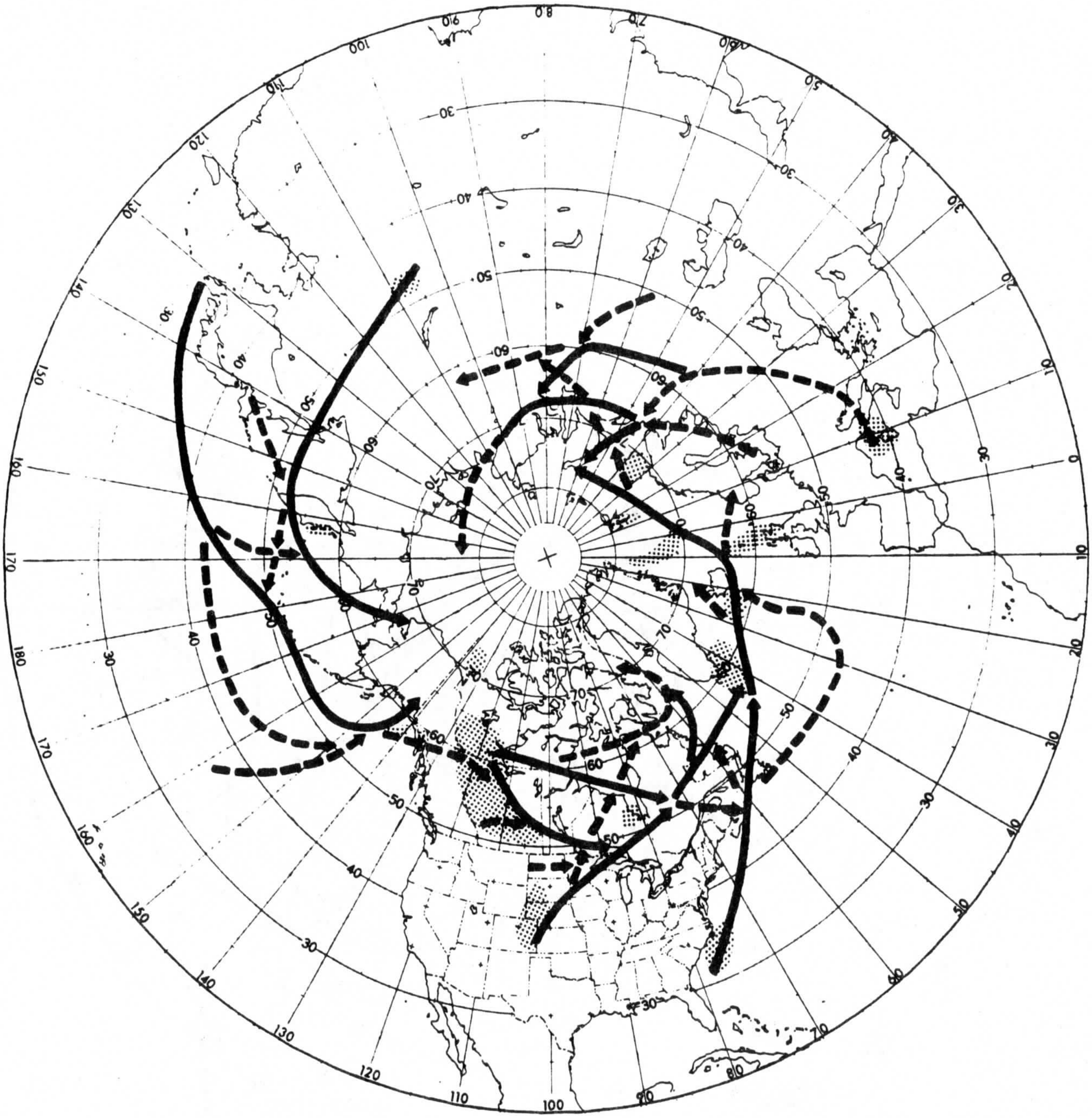
SEPTEMBER

Figure 11b



OCTOBER

Figure 12a



OCTOBER

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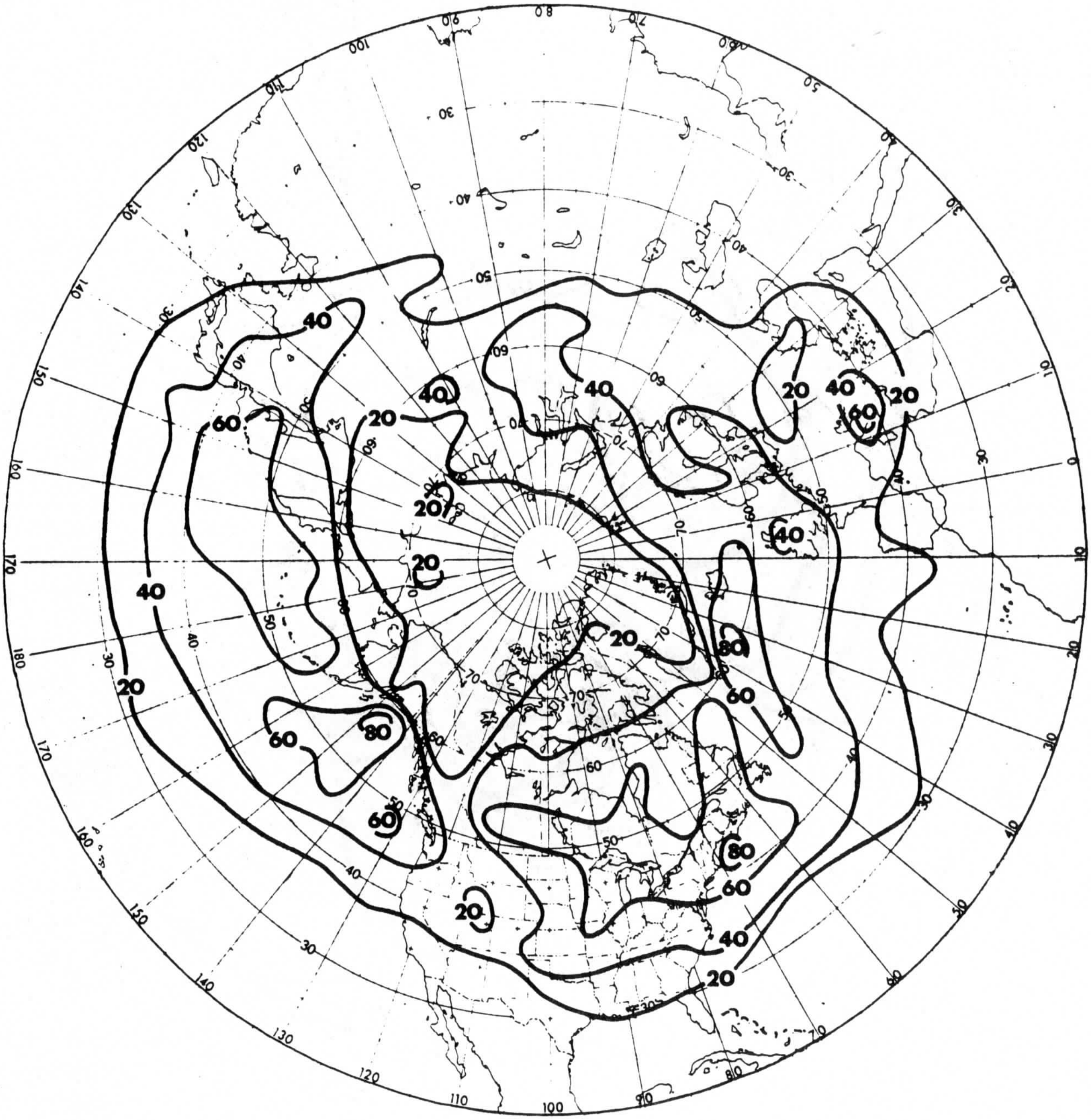

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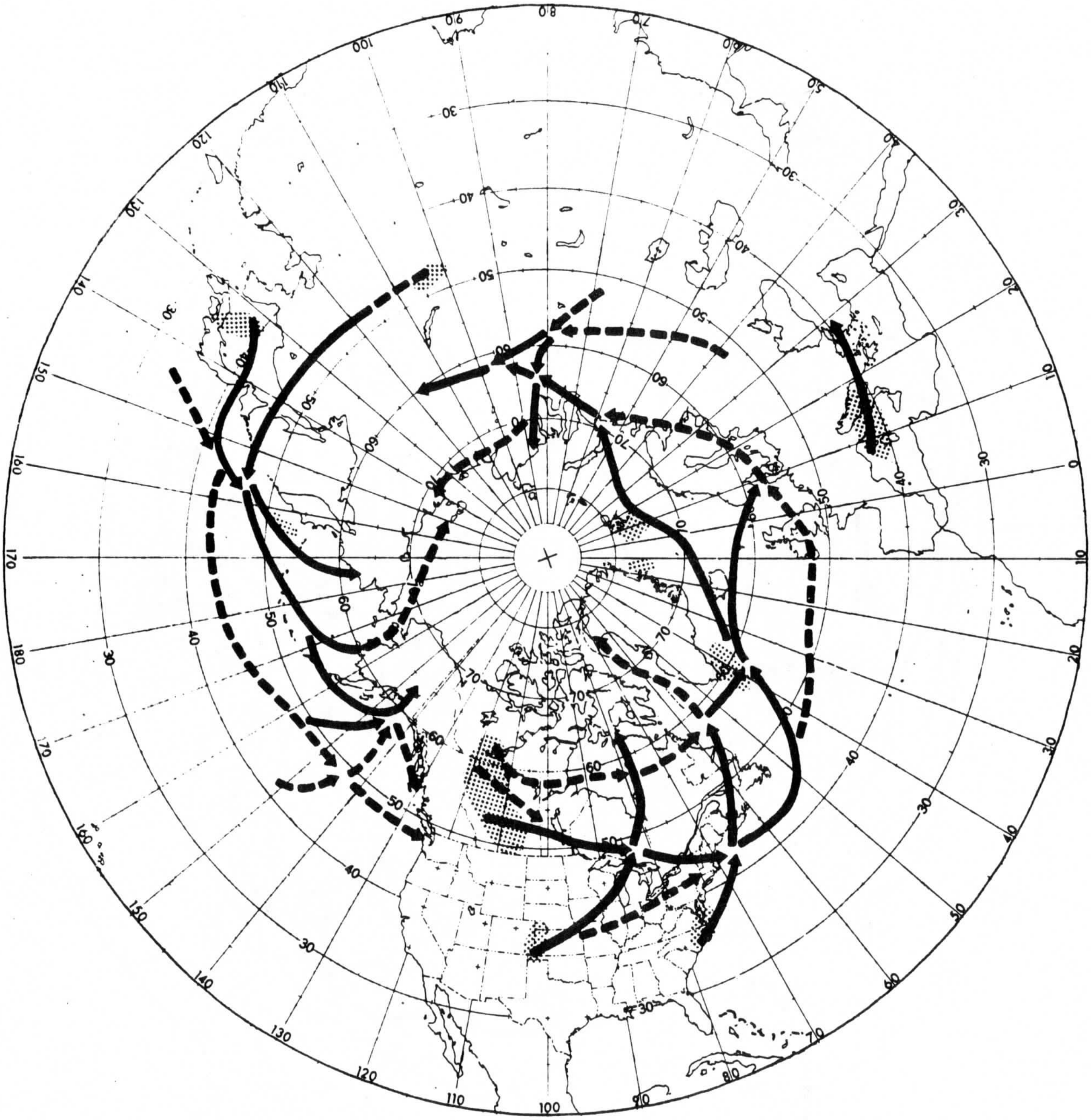
Figure 13a

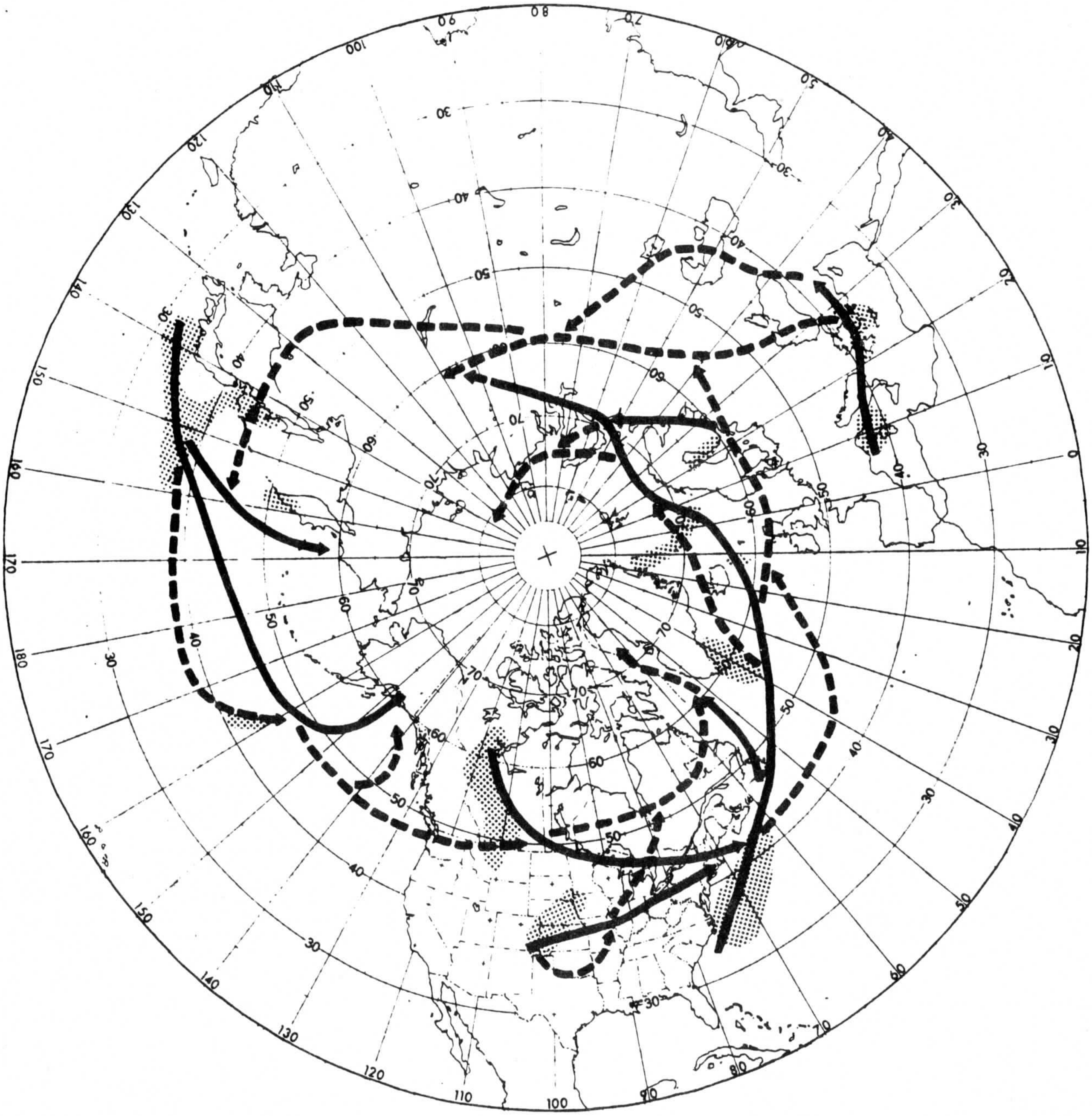


NOVEMBER

Figure 13b

DECEMBER

Figure 14a



DECEMBER

Figure 14b

The following pages contain tables of the actual tabulated data (totals for the 20 year period) for each 5° latitude-longitude grid box for cyclogenesis and cyclone frequency. The data are centered in each grid box; e.g. the number under the column labelled 5E and in the row labelled 75N is centered at 7.5°E and 77.5°N.

JANUARY

CYCLOGENESIS

LONGITUDE

LATITUDE	0	5E	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175
80	0	0	1	1	1	0	0	0	0	1	2	1	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	2	1	1	0
75	2	5	3	1	0	0	1	2	0	0	1	0	2	1	0	2	0	1	1	0	1	0	0	1	0	0	0	0	0	0	0	2	1	0	0	0
70	2	1	2	4	2	4	3	3	4	2	3	2	2	2	0	1	1	1	0	0	3	1	1	0	0	0	0	2	0	0	2	5	3	1	1	0
65	3	4	6	4	3	1	2	1	3	1	0	0	0	1	1	2	3	1	1	1	0	0	0	1	2	0	0	0	0	1	0	3	1	1	0	0
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LONGITUDE

LATITUDE	180	175W	170	165	160	155	150	145	140	135	130	125	120	115	110	105	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5W
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JANUARY

FREQUENCY

LONGITUDE

LATITUDE	0	5E	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175
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70	47	42	41	45	43	44	45	43	43	42	39	41	32	36	43	43	36	33	30	29	28	29	24	24	19	17	14	14	9	10	10	13	11	9	17	22
65	48	46	39	38	28	19	23	26	32	32	38	36	25	27	29	28	34	35	28	22	18	20	22	19	12	5	2	2	0	2	2	7	7	11	10	13
60	29	20	18	23	27	27	20	24	28	21	27	30	31	33	37	39	44	42	34	30	28	30	29	21	16	7	1	1	0	1	2	5	14	25	25	28
55	45	38	44	39	36	27	24	22	18	30	32	30	34	34	39	34	34	33	26	26	23	16	13	11	15	12	8	4	12	23	28	26	40	50	52	46
50	32	23	26	24	26	26	28	29	25	26	18	14	22	21	25	20	14	6	3	4	7	11	15	14	10	13	12	13	15	22	44	45	67	63	61	52
45	19	19	13	11	11	20	32	32	29	18	25	25	23	22	14	8	2	3	1	3	8	15	22	28	28	30	24	29	45	54	66	65	73	72	56	55
40	26	43	58	58	38	29	27	20	24	21	26	19	15	18	8	5	1	1	1	3	4	8	7	14	17	22	33	55	65	73	73	72	90	88	77	85
35	22	28	40	41	47	41	35	28	25	11	8	13	10	6	0	0	1	1	1	2	2	3	3	8	13	26	37	50	79	77	80	90	97	85	72	73
30	5	7	8	3	12	11	13	10	8	7	8	12	6	1	0	0	0	0	0	1	1	3	3	2	9	23	34	51	47	40	46	34	35	30	26	27
25	2	1	0	0	0	0	0	2	2	2	1	1	0	0	0	0	0	0	0	0	0	1	1	1	4	16	16	15	11	11	8	8	6	7	8	9
20	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	2	2	3	2	2	4	4	3	4	3	3

LONGITUDE

LATITUDE	180	175W	170	165	160	155	150	145	140	135	130	125	120	115	110	105	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5W
80	10	10	13	14	14	12	10	9	8	9	8	8	8	10	8	5	5	2	3	3	4	4	4	6	5	5	6	6	6	6	6	6	7	10	11	12
75	14	10	9	8	14	11	9	9	12	10	10	16	17	15	13	12	9	8	8	10	17	18	19	9	1	0	0	0	0	0	0	2	8	12	15	18
70	23	17	9	6	5	4	11	12	10	17	18	18	18	12	19	21	19	23	16	15	14	18	22	25	24	15	1	0	0	0	4	11	13	16	36	47
65	16	13	10	11	9	5	6	6	6	6	9	7	9	14	16	24	17	21	18	16	24	16	17	19	30	25	3	0	19	36	48	48	45	51	49	41
60	22	23	23	20	9	15	13	9	13	7	6	15	21	27	29	25	41	39	43	46	48	38	34	29	35	41	21	46	78	76	63	48	53	50	38	36
55	33	31	38	35	42	54	80	78	64	24	16	21	40	41	38	32	44	45	40	39	50	51	40	35	45	59	46	56	72	62	62	70	53	50	48	40
50	49	51	48	47	59	67	66	56	60	59	47	35	37	67	66	60	57	62	53	57	66	62	55	57	75	68	84	82	71	71	65	60	55	47	42	40
45	68	79	88	76	76	66	61	53	44	50	54	38	32	56	69	73	61	67	84	97	88	69	74	81	82	84	83	87	85	76	58	49	45	30	23	20
40	98	83	75	71	65	53	41	37	40	39	42	25	18	18	33	53	44	63	74	72	66	69	93	101	113	102	92	83	60	42	35	30	20	18	16	13
35	67	59	56	57	51	43	33	34	23	19	19	11	11	19	20	60	52	55	53	46	61	91	93	83	70	55	38	27	31	27	18	14	13	14	12	12
30	23	25	33	33	28	29	27	21	13	6	5	6	6	5	13	25	28	33	42	46	64	53	37	17	10	9	5	8	18	15	9	9	2	4	3	4
25	8	14	20	14	7	8	7	6	2	2	2	2	1	0	5	7	20	31	25	20	13	6	3	1	2	5	3	8	3	4	3	2	3	1	0	1
20	3	3	5	2	3	2	2	1	1	1	0	0	0	0	0	1	3	4	3	3	1	0	0	1	3	1	1	2	2	1	0	0	0	0	0	0

FEBRUARY

CYCLOGENESIS

LONGITUDE

LATITUDE	0	5E	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175
80	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	1	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
75	1	1	1	5	0	1	1	0	1	1	2	1	0	1	1	0	0	1	1	0	0	1	0	0	0	0	1	0	0	0	0	0	1	0	0	1
70	1	3	4	2	3	1	2	1	2	5	6	1	0	0	0	0	0	0	0	2	1	0	0	0	1	1	0	0	0	3	3	0	3	0	1	1
65	4	5	1	0	1	1	1	0	0	1	1	0	1	0	1	3	3	1	0	0	0	1	1	1	0	0	0	0	0	0	0	2	2	1	0	0
60	1	4	0	2	4	3	1	2	0	2	1	0	1	1	0	2	0	2	1	0	0	1	2	0	1	0	0	0	0	0	0	0	0	1	0	1
55	2	3	2	2	1	2	1	1	3	2	1	0	1	2	2	3	0	0	2	2	1	1	2	0	1	0	0	1	0	1	3	1	0	1	1	1
50	3	1	5	2	2	2	2	2	1	1	2	0	2	4	1	2	0	0	1	0	0	3	4	1	4	1	2	3	0	0	3	4	8	1	1	3
45	2	1	6	2	2	4	0	2	1	0	2	2	2	1	1	1	0	0	1	2	0	10	10	5	3	5	3	3	4	1	4	1	6	0	4	2
40	5	20	12	7	4	4	4	4	0	6	2	0	0	2	0	0	0	0	0	1	2	2	1	3	3	2	2	2	5	1	9	3	5	9	6	4
35	2	6	6	5	7	7	2	3	1	0	1	4	1	0	0	0	0	0	0	0	0	1	1	1	4	4	5	2	12	12	5	12	6	9	7	6
30	2	2	4	2	2	2	0	0	1	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	13	7	9	16	4	15	5	1	6	1	3	6
25	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	10	7	7	2	0	2	1	0	0	2	2
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	2	1	0	0	0	0	0	1	0	0	1

LONGITUDE

LATITUDE	180	175W	170	165	160	155	150	145	140	135	130	125	120	115	110	105	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5W
80	0	0	0	0	0	0	1	0	1	0	0	1	0	1	0	1	0	1	0	1	0	0	0	0	0	0	0	0	1	0	2	1	1	0	0	0
75	0	1	1	0	0	1	2	0	0	1	0	1	0	0	1	0	0	1	1	0	0	0	2	1	0	0	0	0	0	0	0	0	2	4	2	1
70	0	0	0	0	1	0	1	0	1	1	4	0	0	1	2	0	1	1	0	0	1	0	2	0	3	3	0	0	0	0	0	7	4	5	4	5
65	1	0	0	0	0	0	0	2	0	1	2	4	1	2	0	3	0	1	1	0	3	1	0	1	3	1	2	0	2	2	5	2	4	3	4	1
60	0	0	0	1	0	0	0	1	2	2	2	6	5	4	0	3	1	5	2	1	1	3	1	1	4	4	0	9	6	6	4	3	4	3	2	4
55	1	2	2	0	2	2	3	5	1	1	2	8	25	8	4	0	4	0	0	0	2	3	3	1	2	4	6	1	3	6	0	5	6	2	1	1
50	3	5	2	6	3	2	2	5	1	0	2	3	8	15	7	2	2	1	1	2	3	1	2	2	3	3	2	3	3	2	3	4	4	4	2	0
45	6	6	4	2	8	6	7	1	1	6	3	3	5	12	6	4	5	4	3	2	2	0	4	3	6	5	4	6	4	3	4	4	2	5	6	0
40	5	4	3	3	6	8	8	5	3	7	1	2	9	2	6	5	7	4	2	5	5	7	7	9	13	10	6	9	12	1	7	4	3	5	0	1
35	8	8	3	5	5	5	13	10	4	3	2	1	5	4	8	14	2	5	5	3	10	19	4	14	9	6	1	0	5	3	3	3	3	3	4	3
30	6	4	2	1	6	2	3	2	0	1	3	0	0	1	1	8	6	7	2	3	15	8	0	2	2	3	1	4	0	2	3	1	2	0	0	0
25	3	2	1	3	1	3	1	0	0	0	0	0	0	0	1	0	9	14	3	3	9	1	1	1	2	0	0	1	1	0	1	0	0	0	0	0
20	1	0	1	2	4	0	0	0	0	0	0	0	0	0	0	0	1	2	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0

FEBRUARY

FREQUENCY

LONGITUDE

LATITUDE	0	5E	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175
80	10	13	11	13	13	17	20	20	19	18	22	21	20	18	19	23	23	19	17	18	20	20	18	15	15	16	12	14	12	11	8	8	7	7	8	8
75	47	50	60	63	49	47	46	44	38	36	43	43	40	38	35	32	29	31	30	30	29	30	23	22	18	18	16	16	15	11	9	7	9	7	11	7
70	58	51	52	54	62	49	46	40	41	38	38	35	36	38	34	33	29	25	23	21	21	21	19	17	18	14	10	9	10	11	10	8	11	6	11	10
65	38	35	26	20	21	15	19	27	30	30	35	35	33	33	28	33	33	31	23	17	18	19	17	13	11	6	4	2	2	2	3	7	8	3	7	9
60	28	26	16	13	19	23	22	26	31	29	17	23	28	32	29	38	34	36	36	26	26	28	31	23	18	5	1	0	1	2	2	1	3	8	14	14
55	27	28	27	34	43	42	30	32	35	27	26	26	23	26	29	36	33	30	32	28	26	21	23	17	19	10	4	5	11	17	18	10	22	32	39	34
50	24	24	26	22	24	26	32	37	31	23	28	22	22	24	24	22	18	14	16	16	15	20	20	21	22	23	18	8	16	20	24	37	51	55	57	45
45	20	15	25	30	26	28	31	23	15	12	18	18	16	16	13	7	3	4	6	10	16	26	34	42	35	37	29	34	33	41	37	48	60	66	62	52
40	24	49	49	39	29	32	37	29	22	25	24	15	12	15	5	1	0	0	1	2	2	9	12	12	18	26	31	37	42	47	57	80	76	79	70	66
35	14	23	32	42	46	53	40	28	19	16	13	13	12	4	0	0	0	0	0	0	0	2	7	8	13	17	22	31	55	73	84	92	85	72	73	65
30	6	7	9	14	9	9	10	5	6	5	4	3	1	1	1	0	0	0	0	0	0	1	2	0	16	26	44	59	54	54	41	29	26	15	13	14
25	1	3	1	0	1	0	0	0	1	2	2	2	0	0	0	0	0	0	0	0	0	0	0	0	6	20	22	21	12	4	8	5	4	4	4	6
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	5	3	4	2	1	1	0	1	0	2	3

LONGITUDE

LATITUDE	180	175W	170	165	160	155	150	145	140	135	130	125	120	115	110	105	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5W
80	8	8	9	9	11	10	10	10	9	11	9	5	6	6	4	3	3	3	1	1	0	1	2	2	1	1	2	1	2	3	3	3	4	5	7	9
75	9	10	10	9	9	10	11	11	8	12	14	13	13	11	11	10	8	8	10	9	14	19	22	13	7	1	0	0	0	0	0	3	15	27	33	40
70	12	7	8	7	7	7	6	7	9	11	10	9	8	10	14	13	13	17	16	16	19	19	30	33	33	17	0	0	0	0	6	22	37	50	55	55
65	10	7	12	6	5	2	3	4	2	5	6	9	12	12	11	14	15	21	16	23	23	15	13	13	32	30	4	3	21	38	56	42	43	37	47	41
60	20	18	24	18	15	13	21	12	15	14	11	16	19	26	20	24	18	25	34	38	32	33	28	24	35	34	12	41	67	56	56	46	54	50	36	29
55	41	39	43	49	51	53	75	68	44	26	21	23	50	56	42	33	27	24	27	35	39	36	35	42	47	52	48	48	75	62	55	65	49	41	28	25
50	45	44	59	67	65	65	62	65	43	41	26	23	29	54	59	50	44	47	48	45	41	42	44	54	49	56	54	64	91	65	57	53	44	31	23	25
45	58	67	64	65	64	61	59	50	41	46	34	27	29	42	51	48	50	56	60	73	71	72	61	58	84	84	88	83	79	57	43	37	37	27	34	28
40	71	64	71	71	59	53	50	33	40	40	26	11	20	21	31	45	41	55	58	71	58	82	89	83	94	91	77	66	60	29	27	31	28	21	19	16
35	60	47	52	47	29	26	34	39	33	23	17	11	18	26	29	53	40	57	57	51	64	89	73	66	58	56	39	27	25	23	20	16	20	19	14	14
30	14	12	17	17	16	17	16	16	10	8	7	5	2	1	7	35	37	34	37	37	62	47	28	20	20	14	7	6	11	13	10	9	15	13	5	6
25	6	9	8	9	8	11	6	4	1	0	2	3	0	0	2	4	14	27	21	18	14	4	3	4	4	2	1	1	5	3	3	3	3	0	1	1
20	1	2	1	2	7	5	1	1	0	0	0	0	0	0	0	1	4	5	3	1	1	1	1	0	1	1	0	1	0	2	0	0	1	0	0	0

MARCH

CYCLOGENESIS

LONGITUDE

LATITUDE	0	5E	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175
80	0	1	0	0	0	0	0	0	0	0	2	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
75	1	4	4	5	5	1	1	0	2	0	0	1	1	0	0	0	1	0	2	0	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1
70	2	3	2	5	1	1	1	1	1	1	2	0	2	0	1	0	0	1	1	0	0	2	1	0	3	0	0	0	0	1	1	1	2	0	2	0
65	2	4	2	4	0	3	1	2	2	3	2	2	0	0	2	0	3	0	0	0	2	1	0	2	1	0	0	0	0	1	0	1	2	0	1	0
60	2	2	4	0	5	2	2	2	2	1	0	1	0	3	2	1	0	2	0	0	2	0	2	1	0	1	2	0	0	0	0	0	0	1	1	0
55	2	1	2	3	0	2	0	3	2	2	1	3	2	1	3	1	4	0	2	0	2	0	1	3	1	1	2	0	2	0	1	1	1	0	2	3
50	1	3	1	5	1	3	1	0	2	2	0	2	1	0	1	2	0	0	2	1	1	1	4	4	9	4	0	2	1	1	1	10	5	4	1	1
45	0	3	6	3	0	1	2	2	0	2	1	1	3	1	1	1	0	0	1	3	14	8	4	7	4	4	3	4	0	2	3	6	3	5	2	2
40	5	21	8	5	4	2	0	2	2	2	2	4	0	0	2	0	0	1	0	1	1	3	3	3	5	2	3	4	3	6	4	4	6	11	5	5
35	3	5	1	6	5	4	8	3	3	4	1	2	0	0	0	0	0	1	0	0	0	1	3	1	3	7	5	5	5	6	9	7	7	7	5	5
30	7	3	2	3	6	4	1	0	2	4	1	1	0	0	0	0	0	0	0	0	0	1	1	5	11	10	13	12	11	9	5	6	3	4	3	1
25	1	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	6	17	8	3	1	1	0	1	1	1	2	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	2	0

LONGITUDE

LATITUDE	180	175W	170	165	160	155	150	145	140	135	130	125	120	115	110	105	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5W
80	1	0	0	1	1	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	1	0	0
75	1	0	1	0	1	2	0	1	0	0	0	1	0	0	0	0	0	1	1	0	0	0	3	2	2	0	0	0	0	0	0	0	3	6	4	5
70	1	1	1	0	0	1	0	0	0	0	4	2	2	2	4	4	2	3	1	2	0	0	1	1	2	0	0	0	0	1	1	0	3	6	4	2
65	1	0	0	2	0	1	2	2	1	3	5	5	2	2	1	1	1	1	0	4	2	0	0	0	3	2	0	0	1	4	1	1	2	3	6	3
60	2	2	0	0	0	0	1	2	5	1	3	3	13	8	3	3	3	1	0	0	0	1	0	0	0	2	0	3	5	8	4	5	3	2	4	3
55	2	2	2	1	3	2	6	12	4	0	3	13	4	7	3	3	1	1	3	2	1	0	0	2	2	3	5	4	3	2	2	5	2	1	1	0
50	6	4	1	4	3	6	7	5	3	3	6	5	6	15	4	3	2	4	1	0	3	0	3	1	1	3	1	2	6	3	5	3	1	4	1	1
45	3	3	4	3	7	3	2	6	5	5	5	2	3	8	6	6	3	5	2	3	3	1	2	4	7	3	3	5	7	1	1	6	8	3	0	3
40	6	7	3	4	8	3	3	4	5	3	3	6	16	7	8	6	5	1	4	3	7	2	9	6	6	9	7	5	5	2	4	4	3	5	0	5
35	4	6	1	3	6	3	2	4	1	4	4	3	17	12	8	35	5	4	5	13	20	16	11	7	13	8	4	4	5	2	3	5	4	3	5	5
30	1	5	2	5	1	4	2	2	1	0	1	2	0	2	5	5	11	4	8	9	20	8	2	6	2	8	1	2	0	0	2	1	0	2	1	4
25	0	1	0	1	1	2	1	0	1	0	0	0	0	0	3	4	5	6	3	2	5	1	0	1	2	2	3	1	0	1	0	0	1	1	0	2
20	2	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0

MARCH

FREQUENCY

LONGITUDE

LATITUDE	0	5E	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175
80	9	11	12	12	15	16	16	16	16	17	21	24	25	25	29	27	21	21	22	18	18	20	17	14	14	15	12	12	11	11	11	12	10	11	10	12
75	34	40	49	51	59	56	53	45	45	36	33	29	29	24	22	26	40	39	40	38	26	23	20	18	20	19	24	21	21	20	16	13	9	11	9	11
70	49	47	54	52	49	40	44	45	48	42	46	44	47	37	40	39	32	28	26	29	30	29	29	24	30	21	23	14	14	15	12	13	9	10	9	7
65	41	41	34	26	25	20	24	28	31	41	47	48	41	32	35	33	36	41	35	31	27	28	29	28	30	18	7	3	2	4	5	7	8	4	4	11
60	33	33	27	25	34	31	27	36	37	40	32	33	39	41	41	42	46	44	34	33	32	32	31	25	21	15	10	5	4	3	3	8	12	19	27	24
55	22	26	32	33	34	34	30	29	27	25	25	28	34	36	31	28	35	28	23	19	18	21	20	17	17	17	9	6	15	20	26	26	36	44	41	38
50	22	21	16	26	23	25	18	21	19	15	16	20	22	28	24	20	17	9	11	14	14	17	22	30	37	45	36	32	29	36	42	54	73	71	62	64
45	16	19	22	23	11	15	17	13	10	16	21	29	26	21	12	8	8	5	4	9	28	36	48	52	54	58	58	63	51	55	57	70	73	77	81	73
40	21	39	46	45	30	28	32	32	30	26	29	28	26	21	10	6	2	3	3	3	9	14	21	28	30	34	40	47	47	62	69	79	77	89	81	76
35	14	27	32	43	43	50	55	36	27	23	21	19	18	6	3	1	1	1	1	1	2	2	6	12	16	30	45	58	69	90	87	85	82	83	65	56
30	17	19	22	23	22	25	16	9	9	17	22	22	11	5	1	0	0	0	0	0	1	2	2	10	23	39	62	76	72	67	49	41	36	26	17	14
25	4	5	5	3	2	3	2	3	5	7	7	6	1	0	0	0	0	0	0	0	0	1	1	2	11	29	30	24	16	11	5	4	1	1	4	2
20	0	0	0	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	2	2	1	0	0	1	1	2	2

LONGITUDE

LATITUDE	180	175W	170	165	160	155	150	145	140	135	130	125	120	115	110	105	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5W
80	13	12	14	14	12	13	12	12	10	8	6	5	8	6	6	4	3	2	3	3	2	4	5	3	2	1	1	1	1	2	3	4	5	6	7	8
75	11	7	8	6	9	12	9	10	10	12	15	14	14	12	11	9	8	7	6	7	14	15	20	12	5	0	0	0	0	0	0	1	9	17	31	34
70	11	14	12	10	11	6	7	9	8	7	13	15	17	22	26	26	23	24	20	19	19	22	25	25	19	12	1	0	0	1	9	13	24	34	43	48
65	11	13	14	19	14	11	10	16	12	11	16	18	18	18	21	26	25	28	29	27	24	20	15	21	22	21	3	3	20	41	54	46	52	51	45	42
60	25	32	33	39	26	23	40	38	27	24	18	19	31	36	35	33	31	28	28	31	28	29	27	30	29	38	31	45	60	68	70	60	55	47	39	36
55	44	44	48	48	51	55	73	76	59	48	32	41	43	45	45	40	37	28	35	37	39	39	34	37	55	58	54	45	46	63	57	45	39	32	29	25
50	72	74	76	69	69	65	72	69	70	70	48	39	42	64	68	63	61	57	52	48	49	42	49	55	68	60	64	59	75	72	56	46	32	30	35	28
45	76	77	81	66	71	63	56	59	68	66	58	25	23	37	45	55	53	58	68	80	77	62	71	79	78	72	80	77	71	63	48	39	39	33	29	24
40	74	81	63	46	48	44	40	39	37	37	44	30	37	33	39	44	52	72	89	86	71	70	93	89	89	96	90	86	63	51	36	30	28	19	18	21
35	48	43	23	24	26	25	23	20	16	19	30	23	38	48	56	88	77	72	71	63	86	103	89	71	75	70	59	48	27	26	21	20	19	18	22	18
30	8	11	11	14	13	15	8	7	10	9	11	14	8	7	20	44	43	40	38	40	60	46	25	20	16	22	21	14	9	10	11	16	19	20	11	3
25	0	3	5	7	4	5	5	5	5	2	2	2	2	2	8	20	18	17	14	12	10	8	8	5	7	8	8	4	1	3	3	2	1	2	0	2
20	3	3	5	2	1	0	1	0	0	1	1	1	0	1	1	7	6	3	1	0	0	0	1	0	1	1	0	1	0	1	1	0	1	0	0	0

APRIL

CYCLOGENESIS

LONGITUDE

LATITUDE	0	5E	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175
80	0	0	0	0	0	2	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75	1	0	5	1	0	1	1	1	2	3	2	2	0	1	0	0	1	1	0	0	1	0	0	0	0	1	2	0	2	0	0	0	0	0	1	1
70	2	1	3	4	3	4	2	1	1	1	1	2	0	0	1	0	1	2	0	2	0	2	1	0	0	1	0	0	0	0	1	2	0	0	0	1
65	2	1	5	1	5	4	1	1	1	1	2	0	2	0	0	2	1	5	2	1	2	3	1	3	1	1	0	1	0	1	1	2	0	0	0	1
60	3	1	2	2	2	5	0	1	3	5	2	2	3	2	3	2	1	3	8	1	2	3	1	0	4	0	0	0	0	0	1	1	0	0	2	0
55	2	1	4	4	4	1	2	2	3	2	1	3	2	4	2	1	0	2	1	2	4	2	1	1	1	1	1	2	2	2	1	2	4	1	2	0
50	2	1	3	0	1	0	3	1	2	1	0	1	1	1	0	3	1	0	2	3	2	8	3	5	8	2	5	7	1	1	4	5	9	3	5	3
45	4	4	9	1	6	4	7	2	3	1	3	1	5	5	1	3	2	0	6	14	9	12	10	9	1	4	1	2	1	5	5	4	2	2	7	3
40	6	7	14	3	1	0	3	1	2	6	3	2	0	0	1	1	0	0	5	1	7	1	3	2	5	4	7	6	2	4	5	2	4	0	8	3
35	6	0	2	2	6	2	8	6	5	0	2	0	0	0	0	4	2	0	0	0	2	1	1	4	3	0	4	5	5	8	4	6	7	3	1	2
30	11	10	4	2	2	4	5	1	3	2	1	2	0	0	0	0	0	0	0	0	1	1	1	9	16	9	17	8	3	2	4	4	1	3	2	0
25	2	1	1	0	2	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	4	16	4	5	2	2	2	1	1	0	1	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0

LONGITUDE

LATITUDE	180	175W	170	165	160	155	150	145	140	135	130	125	120	115	110	105	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5W
80	1	0	0	0	1	0	0	0	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	0
75	1	0	0	0	0	0	0	1	1	2	0	1	1	2	2	1	0	0	0	0	2	0	1	1	0	0	0	0	0	0	1	0	5	1	4	0
70	2	1	0	0	0	0	2	0	1	0	1	1	1	1	2	0	1	1	1	0	0	0	1	2	0	2	0	0	0	0	2	3	2	5	3	4
65	0	0	1	0	0	1	6	0	2	1	4	2	2	1	0	1	2	1	2	0	1	0	0	2	2	1	0	0	2	5	1	0	2	5	4	2
60	1	0	1	0	1	2	4	3	5	6	3	9	9	4	4	4	1	1	1	1	1	2	0	0	0	3	1	8	9	10	5	3	1	4	4	2
55	2	1	1	2	2	3	3	2	3	2	4	9	9	9	3	2	5	4	0	3	3	0	2	0	0	5	2	5	10	5	1	1	3	2	4	4
50	1	2	2	4	4	1	5	3	2	4	4	4	4	16	7	4	1	3	3	4	1	2	5	1	1	4	2	3	4	4	2	4	2	2	2	2
45	4	2	4	5	7	3	7	4	5	7	6	1	4	9	6	3	4	4	1	3	4	5	6	2	3	2	6	4	7	6	4	4	3	2	3	3
40	4	1	4	8	1	6	5	3	2	4	2	3	14	10	12	11	6	5	5	4	2	7	12	4	4	7	13	5	3	4	3	1	3	2	3	4
35	4	2	2	5	5	2	2	1	4	1	1	1	25	9	10	19	3	5	3	6	16	13	6	9	6	7	6	1	3	0	1	1	0	1	4	9
30	2	0	3	2	1	2	4	0	0	0	0	0	1	1	4	7	3	5	3	9	6	3	8	3	2	1	3	1	0	2	0	0	0	1	2	0
25	1	3	3	1	1	1	1	1	0	0	0	0	0	0	0	1	3	3	4	3	6	0	2	2	0	1	0	1	1	1	0	0	0	0	0	1
20	3	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1	0	0	0	0	0	0	0

APRIL

FREQUENCY

LONGITUDE

LATITUDE	0	5E	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175
80	6	4	6	6	7	9	8	10	9	12	14	13	14	14	12	12	12	18	21	22	19	17	16	16	16	18	13	14	14	13	16	14	12	13	11	15
75	28	28	31	31	26	25	22	28	28	33	32	28	28	29	27	32	35	33	29	25	28	27	22	19	18	18	20	19	14	14	14	11	11	11	9	10
70	52	51	43	44	43	47	46	42	44	38	36	42	44	45	47	47	50	45	42	41	42	42	39	33	29	25	22	18	15	16	13	11	7	4	2	4
65	45	42	36	32	35	31	28	26	36	38	39	39	35	37	37	42	41	36	41	44	44	47	37	38	31	37	33	32	26	26	22	20	15	12	12	9
60	39	34	33	30	35	34	32	40	45	49	53	52	43	44	48	49	46	51	62	56	49	50	37	39	36	29	24	13	9	11	20	21	20	16	22	27
55	26	27	32	38	41	37	35	31	25	28	24	23	30	35	34	29	28	27	23	27	26	24	26	27	24	23	24	24	32	49	41	35	35	36	51	53
50	25	25	29	25	23	28	29	27	19	17	16	19	20	19	19	20	19	15	14	19	22	29	37	50	72	67	70	67	64	59	42	47	57	70	77	71
45	17	18	32	26	31	33	25	24	18	18	17	18	21	18	14	14	13	11	16	32	42	58	69	66	67	62	59	56	53	64	70	76	78	73	66	58
40	22	33	49	46	39	28	25	27	20	23	21	17	13	6	6	8	4	3	8	11	24	23	29	30	27	26	38	56	58	69	73	65	53	43	50	39
35	13	26	19	20	22	37	36	31	28	21	20	11	9	2	1	5	7	3	3	3	7	7	5	15	23	35	49	51	55	59	48	43	43	35	30	30
30	17	30	17	17	13	17	19	12	11	13	11	12	7	2	1	0	0	0	0	0	1	5	4	16	36	47	55	58	52	32	23	17	14	13	11	10
25	6	3	3	3	4	3	1	2	3	3	2	1	0	0	0	0	0	0	0	0	1	5	1	2	8	21	20	15	13	9	7	7	4	2	3	2
20	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	2	1	2	1	1	0	0	0	1

LONGITUDE

LATITUDE	180	175W	170	165	160	155	150	145	140	135	130	125	120	115	110	105	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5W
80	14	14	16	14	13	11	7	6	8	7	5	8	6	6	9	8	3	5	6	7	8	7	4	3	3	3	2	3	2	4	5	6	6	4	3	5
75	11	11	9	7	7	7	6	6	7	8	9	7	9	11	14	14	16	16	18	19	22	21	24	15	6	1	0	0	0	0	1	2	8	15	21	23
70	12	8	7	6	6	5	4	3	3	6	9	8	11	10	18	21	22	21	18	21	23	22	27	27	20	8	1	0	0	0	3	19	22	30	39	43
65	14	16	21	27	18	16	18	17	14	15	14	14	16	20	21	21	19	16	24	24	36	33	25	25	29	20	4	3	9	27	48	46	38	38	39	36
60	26	27	31	28	19	23	28	36	33	34	31	31	43	45	45	46	39	35	42	29	40	36	29	27	30	36	21	49	79	85	76	57	48	48	45	50
55	50	53	53	55	46	52	66	72	58	34	24	31	40	43	40	43	46	45	40	45	53	39	44	35	43	56	51	64	67	52	47	46	40	33	34	28
50	71	72	65	59	50	62	65	59	55	52	28	16	21	35	43	44	52	53	50	61	59	46	48	56	55	69	68	67	63	46	48	35	32	31	23	22
45	57	53	45	49	55	52	43	46	41	52	43	17	13	31	42	37	43	55	61	60	58	53	63	79	68	64	79	79	69	49	44	30	27	27	17	22
40	40	39	36	45	38	35	32	33	27	30	25	14	23	37	52	75	80	78	72	69	58	68	84	94	79	82	86	59	42	30	23	19	20	18	20	22
35	25	20	15	21	22	15	15	16	18	13	14	7	37	38	42	71	68	54	46	50	60	71	71	69	56	56	47	22	17	17	12	12	15	17	17	11
30	10	7	10	9	11	11	11	7	7	4	5	3	3	4	8	16	14	15	19	22	34	31	29	21	19	12	13	8	3	9	10	5	6	11	9	5
25	3	4	6	5	2	4	2	2	0	0	2	2	1	0	1	2	5	6	8	7	12	6	5	6	5	2	4	3	2	4	4	2	1	0	1	3
20	3	0	3	4	2	2	1	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	1	2	0	0	1	1	1	1	0	0	0	0

MAY

CYCLOGENESIS

LONGITUDE

LATITUDE	0	5E	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175
80	0	0	1	0	1	0	1	0	0	0	0	0	1	2	0	0	0	0	0	0	2	0	0	0	0	1	0	0	1	0	0	0	0	1	1	0
75	0	0	2	1	0	2	2	0	0	1	0	1	0	0	1	0	1	2	0	2	0	0	1	0	1	0	1	0	1	1	1	0	0	0	0	1
70	0	1	3	0	1	0	1	1	2	1	1	1	1	6	0	2	0	1	0	1	0	1	0	0	1	0	0	2	1	0	0	0	2	2	0	0
65	1	4	1	0	2	2	3	2	1	2	1	3	3	4	0	0	2	2	0	0	3	1	1	3	2	3	2	1	1	5	1	1	1	0	1	1
60	4	5	2	3	4	5	1	3	4	1	4	1	5	3	0	4	1	1	1	0	3	2	0	3	1	2	1	2	0	2	4	1	0	1	2	0
55	1	2	1	4	0	2	2	1	1	2	2	3	4	2	5	4	6	2	2	3	1	1	1	2	0	1	2	0	0	1	3	0	1	5	0	1
50	2	4	1	2	3	1	3	4	5	3	4	1	5	0	3	6	3	1	9	8	4	6	7	3	6	9	2	5	0	2	3	2	6	3	1	2
45	2	4	12	5	3	1	3	4	3	2	6	2	7	3	2	1	0	0	6	14	18	18	12	8	5	3	6	4	4	6	6	4	1	3	3	3
40	3	5	8	1	5	5	3	3	3	3	0	1	0	0	0	0	0	1	2	3	6	8	9	1	4	4	3	7	2	5	5	3	4	4	6	2
35	5	2	0	2	2	2	2	2	0	1	0	0	0	0	0	0	0	0	0	0	0	3	3	3	5	5	2	5	6	4	5	1	1	3	3	3
30	8	7	0	3	4	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	11	21	12	10	12	3	0	3	2	3	1	0	3
25	0	3	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	7	13	4	6	2	3	2	2	1	0	0	1
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	1	4	0	0	0	0	0	0	1	0

LONGITUDE

LATITUDE	180	175W	170	165	160	155	150	145	140	135	130	125	120	115	110	105	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5W
80	2	0	1	0	0	0	0	0	1	0	1	0	1	1	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	1	0	2	1	2	1	2
75	2	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	1	0	2	0	0	0	2	1	0	0	0	0	0	0	0	0	3	9	3	1
70	0	1	1	0	1	2	0	0	1	1	2	1	3	2	2	2	1	1	1	0	0	1	1	1	1	0	0	0	0	0	1	3	1	3	7	3
65	1	0	0	1	0	0	1	1	7	4	6	4	3	3	1	1	1	2	1	2	1	1	0	0	0	4	0	0	0	3	1	2	1	1	0	2
60	0	0	1	1	1	0	4	8	3	2	6	14	7	1	0	1	3	1	3	2	4	1	2	1	1	0	1	5	8	4	2	2	4	3	2	3
55	0	0	1	1	3	3	2	0	1	1	4	9	10	4	1	0	4	2	3	2	3	1	3	2	5	2	3	4	3	3	2	2	4	0	1	3
50	2	3	4	4	1	5	2	3	1	2	2	3	8	16	7	8	2	2	2	8	5	0	4	5	6	2	3	3	5	2	2	3	4	5	2	2
45	3	5	6	11	2	3	5	4	2	2	4	0	3	9	9	8	5	5	5	4	5	6	6	4	9	6	1	3	2	1	3	3	1	2	3	2
40	3	5	5	0	1	3	6	4	5	2	0	1	10	8	9	10	6	6	8	5	4	8	7	6	1	9	10	5	1	2	0	5	2	2	4	6
35	5	5	2	3	2	2	3	2	2	2	1	1	10	6	7	26	9	4	6	1	15	7	10	9	3	5	5	0	0	1	2	3	0	1	2	1
30	2	1	2	3	3	1	1	4	0	0	1	0	0	1	4	5	4	4	1	11	5	3	3	0	4	2	1	2	0	0	0	0	1	0	0	1
25	0	1	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	4	3	4	5	0	2	2	1	2	0	0	0	0	0	0	0	0	0	1
20	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	2	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0

MAY

FREQUENCY

LONGITUDE

LATITUDE	0	5E	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175
80	16	14	16	16	14	13	14	13	17	19	20	18	20	20	17	12	17	18	17	19	19	19	20	18	19	16	16	17	18	18	14	14	15	15	19	20
75	28	31	23	30	31	29	29	25	25	23	21	22	25	25	22	19	25	25	21	20	20	24	21	12	11	13	14	17	18	16	17	19	17	14	12	11
70	23	29	33	31	26	25	30	30	28	33	29	33	32	35	38	42	38	32	26	28	27	29	30	26	22	25	23	21	17	14	17	18	11	15	13	14
65	28	36	34	29	28	26	28	30	32	38	36	42	49	51	49	45	46	49	46	51	52	50	48	48	49	42	42	39	31	34	35	33	20	23	21	20
60	37	36	32	27	32	37	35	37	44	48	45	34	33	36	36	38	42	58	59	60	59	59	56	47	41	36	35	18	9	17	21	18	13	15	19	13
55	35	32	23	30	28	28	28	31	30	24	24	26	32	36	47	51	63	56	44	35	30	31	29	31	33	38	22	22	31	33	31	26	33	42	41	32
50	26	19	25	31	30	23	24	26	15	16	20	16	26	24	32	34	32	25	35	41	39	46	42	57	74	81	62	54	54	45	44	47	53	51	52	53
45	19	22	28	27	23	20	17	12	10	13	22	16	18	13	13	8	3	3	9	33	52	66	72	82	77	68	69	69	61	58	74	75	67	57	58	53
40	24	27	31	22	26	26	18	11	9	10	9	9	7	4	1	0	0	2	4	7	18	40	51	49	32	29	28	53	49	63	75	62	57	48	48	42
35	9	14	9	10	15	13	14	10	11	9	6	4	2	1	0	0	0	0	1	2	5	10	18	22	21	34	44	52	66	64	48	38	32	37	30	26
30	10	15	9	10	11	10	11	8	12	8	3	0	0	0	0	0	0	0	0	0	0	0	2	14	39	49	60	63	52	36	29	23	23	14	14	14
25	0	3	2	2	3	6	5	4	3	1	0	0	0	0	0	0	0	0	0	0	0	0	1	3	11	29	31	24	19	16	11	9	5	2	1	4
20	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	3	2	6	6	2	2	2	1	1	2	1

LONGITUDE

LATITUDE	180	175W	170	165	160	155	150	145	140	135	130	125	120	115	110	105	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5W
80	20	17	16	15	16	13	14	18	20	17	10	9	10	12	8	8	9	9	9	10	8	4	5	5	3	3	4	4	3	4	5	8	13	14	11	15
75	12	9	12	9	10	10	12	11	12	16	15	21	18	11	8	5	5	5	13	13	10	22	19	13	4	0	0	0	0	0	1	4	9	18	19	25
70	16	16	17	9	10	8	7	5	6	7	12	13	14	19	26	25	23	20	21	28	28	26	27	27	22	10	1	0	0	1	4	8	16	18	17	23
65	14	10	12	7	7	8	7	13	20	22	26	25	22	21	27	22	23	27	31	38	30	28	20	20	25	22	1	1	9	21	20	21	21	21	18	18
60	13	14	18	22	16	20	21	30	23	15	18	38	48	39	34	24	27	28	34	35	47	50	41	32	28	28	15	22	48	54	56	47	50	30	30	34
55	38	38	35	36	43	47	48	45	37	17	13	24	45	47	41	41	45	41	36	47	65	58	47	51	58	51	51	58	68	62	68	53	51	42	36	35
50	54	67	66	73	77	85	61	57	60	38	19	14	22	43	55	56	57	58	50	66	61	47	42	58	59	73	60	70	78	59	50	42	47	39	37	27
45	54	63	67	67	69	60	54	41	42	33	27	12	9	20	36	49	53	57	58	68	61	58	60	62	55	67	78	78	64	44	37	31	25	31	32	31
40	37	36	37	30	29	27	33	30	28	18	13	8	13	28	35	49	54	56	56	49	45	50	63	76	72	81	68	49	30	25	18	21	21	21	21	23
35	29	26	24	17	17	15	16	13	12	18	8	4	16	17	20	54	47	39	30	28	43	53	59	56	37	33	26	21	14	7	9	9	9	15	16	9
30	8	8	6	8	10	4	3	5	2	3	7	4	1	1	5	17	15	13	12	27	31	27	21	12	8	10	7	7	4	1	1	2	2	1	1	2
25	4	5	3	3	2	2	0	1	1	1	2	1	0	0	1	0	1	7	10	12	11	11	7	5	7	8	6	4	1	0	0	0	1	0	0	1
20	0	2	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	2	0	1	2	2	2	2	0	1	0	0	0	0	0	0	0	0	0	0

JUNE

CYCLOGENESIS

LONGITUDE

LATITUDE

	0	5E	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175
80	0	0	0	0	2	1	0	0	0	0	1	1	1	1	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	1	1	1	0	0	0
75	2	0	1	1	0	1	1	1	0	1	1	0	0	0	0	1	0	0	1	1	1	0	0	0	1	0	1	0	0	0	0	1	0	1	0	0
70	2	0	0	0	0	1	3	2	2	0	0	1	1	1	1	3	1	0	3	1	0	1	2	0	1	0	1	1	2	1	1	1	2	0	0	0
65	1	3	3	5	3	5	2	1	3	3	0	4	2	2	0	1	0	3	3	1	4	0	4	5	5	1	7	4	2	7	2	4	2	4	3	1
60	0	4	8	4	4	2	2	3	4	4	1	2	3	1	1	0	1	1	5	4	1	6	1	5	4	5	4	2	0	1	6	2	0	2	0	0
55	0	2	5	1	3	1	4	2	2	1	0	2	3	2	3	1	3	4	4	2	2	1	3	4	5	3	1	1	3	0	1	1	2	0	0	0
50	1	2	2	1	1	1	5	8	0	4	2	0	4	7	4	3	3	0	2	1	3	3	4	6	8	7	2	5	3	1	4	3	6	1	1	2
45	3	5	3	6	3	3	5	2	2	7	4	7	9	4	2	1	0	0	6	11	12	10	7	3	7	4	2	3	2	5	6	4	0	1	2	3
40	4	3	2	4	7	1	1	2	1	1	1	3	0	1	0	0	0	1	3	4	10	8	10	1	2	0	2	3	6	9	4	2	2	5	5	2
35	2	1	0	0	1	0	1	1	1	1	0	0	0	0	0	0	0	0	0	0	1	3	4	4	3	4	3	5	13	4	8	6	3	2	5	5
30	3	1	1	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	11	12	11	16	7	6	3	4	5	3	1	3
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	5	6	11	6	4	3	0	0	0	1	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	2	0	1	0	1	0	0	0	0	0

LONGITUDE

LATITUDE

	180	175W	170	165	160	155	150	145	140	135	130	125	120	115	110	105	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5W
80	1	1	0	0	0	0	0	0	2	1	1	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2	0	0	1
75	0	1	0	0	3	0	1	0	0	0	0	0	0	0	1	0	0	2	0	1	1	0	0	1	0	0	0	0	0	0	0	0	3	1	1	0
70	0	0	2	0	1	1	0	1	0	0	2	4	1	1	2	0	0	0	0	0	0	2	1	2	1	0	0	0	0	0	1	1	3	1	2	0
65	0	0	0	0	2	3	4	10	5	5	5	2	1	5	1	1	0	1	0	0	1	5	3	1	2	2	0	0	1	3	1	2	1	4	3	0
60	0	0	0	2	4	1	2	8	4	4	4	10	4	4	2	3	1	1	3	0	2	1	4	2	1	2	1	10	9	3	1	1	2	1	1	0
55	3	0	1	0	1	3	3	1	2	1	1	11	12	2	2	2	2	4	3	3	3	2	7	3	7	2	3	10	7	3	0	5	3	4	4	4
50	2	0	1	2	2	4	4	2	2	0	4	5	11	15	12	4	5	4	3	8	2	2	1	4	5	3	2	5	3	2	3	4	3	2	4	3
45	5	2	2	2	4	5	7	1	3	1	1	0	5	7	14	8	8	5	4	1	3	6	11	5	2	5	7	6	1	5	1	4	3	2	1	1
40	5	5	4	2	1	3	3	1	1	0	0	0	3	8	7	13	9	4	6	0	3	6	11	4	7	8	3	5	2	0	2	1	3	0	1	4
35	6	5	6	2	5	1	4	3	1	1	2	1	4	8	4	15	2	4	5	1	6	4	10	7	3	7	4	3	0	1	1	0	1	0	0	3
30	0	0	1	2	1	0	0	0	0	0	0	0	0	1	1	4	2	1	4	9	10	6	2	1	0	3	0	3	1	0	0	0	1	0	0	1
25	0	0	0	1	0	1	0	0	0	2	0	0	0	0	1	1	1	2	1	1	2	6	1	2	0	1	0	0	0	0	0	0	0	0	0	1
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

JUNE

FREQUENCY

LONGITUDE

LATITUDE	0	5E	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175
80	11	10	13	12	16	15	18	16	17	18	19	19	21	19	15	16	13	14	16	15	16	16	16	18	21	19	18	18	17	21	24	20	23	18	18	17
75	34	29	29	27	27	25	30	25	24	27	23	18	14	13	21	22	30	31	35	35	32	28	28	25	25	23	20	22	26	27	29	17	20	23	23	16
70	40	40	33	31	26	24	29	26	26	26	27	25	25	31	40	44	43	31	31	35	34	32	36	31	24	25	29	28	21	22	22	23	29	23	10	9
65	31	36	30	34	40	38	42	34	35	38	38	37	36	35	40	41	37	39	34	39	47	42	43	39	47	48	51	54	57	59	54	57	43	44	40	30
60	37	31	35	45	36	36	29	26	29	35	31	34	32	31	36	37	32	39	44	40	36	38	31	30	42	37	38	39	26	23	24	25	17	15	14	14
55	27	22	23	22	18	20	20	20	22	27	24	24	18	20	30	33	36	28	19	16	16	14	17	22	24	21	17	15	25	24	24	13	18	24	29	25
50	23	25	21	24	24	21	18	25	19	21	16	16	25	37	36	32	25	15	11	11	17	18	28	42	53	57	50	41	35	26	27	24	34	36	39	40
45	13	19	19	19	17	16	19	12	7	18	16	18	18	19	13	3	2	2	13	28	37	40	58	57	50	36	34	32	31	36	44	43	50	50	53	62
40	11	15	13	12	14	14	13	10	10	11	6	7	1	2	2	2	1	1	4	9	25	41	46	30	27	22	22	32	33	52	69	74	62	79	77	75
35	6	5	2	6	10	7	6	5	4	6	2	0	0	0	0	0	0	0	0	1	6	11	16	21	19	27	35	41	64	81	84	76	61	66	57	52
30	6	5	4	3	4	3	2	1	1	0	0	0	0	0	0	0	0	0	0	0	1	2	6	14	24	42	50	69	65	52	32	25	21	25	17	17
25	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	6	10	17	20	14	10	5	2	3	4	3	2	1
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	3	3	1	1	1	1	0	0	0	0	0

LONGITUDE

LATITUDE	180	175W	170	165	160	155	150	145	140	135	130	125	120	115	110	105	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5W
80	19	22	19	14	13	14	16	15	16	18	16	18	17	18	14	12	12	13	10	12	13	9	8	5	1	0	0	1	1	1	2	2	4	6	7	9
75	13	11	12	9	10	10	9	6	8	9	8	10	14	13	13	13	12	10	9	10	18	18	18	19	9	1	0	0	0	0	0	1	7	14	19	27
70	11	8	11	7	8	9	6	5	6	4	6	12	16	15	16	22	21	20	23	21	19	22	20	27	27	14	2	0	0	0	2	11	17	27	36	42
65	15	9	13	7	9	13	15	27	33	35	36	30	23	26	22	26	24	29	23	30	28	25	28	26	25	22	4	0	9	30	33	39	36	41	45	26
60	15	23	21	20	17	10	11	14	13	12	21	44	47	45	33	36	30	35	34	37	43	50	52	40	36	39	11	30	65	85	70	70	62	54	43	33
55	26	28	28	24	24	28	45	44	35	23	6	22	35	44	40	44	51	51	59	69	70	63	68	55	63	68	54	76	89	76	63	61	56	45	41	37
50	47	51	52	46	48	57	62	55	55	40	23	15	26	42	55	58	66	60	59	71	61	52	53	58	70	70	72	80	77	60	52	43	47	30	32	29
45	76	70	57	58	65	63	51	43	37	31	20	8	10	20	38	50	56	64	59	59	55	61	74	67	70	75	73	78	62	53	40	26	27	20	18	18
40	70	58	58	53	46	35	30	33	26	15	8	3	7	18	29	53	49	52	50	37	32	45	55	63	68	65	57	49	29	18	16	13	11	12	11	13
35	51	41	39	25	22	11	14	14	10	6	5	3	4	13	12	33	25	18	17	14	34	43	49	45	30	23	16	10	6	6	7	2	5	7	5	9
30	9	5	5	3	2	1	1	1	3	2	3	1	1	2	3	10	9	9	7	17	25	25	22	14	4	3	3	4	3	2	1	2	3	3	0	1
25	0	1	2	0	0	1	1	0	1	1	1	0	0	0	1	2	4	2	5	8	5	5	3	2	0	1	1	1	0	0	0	0	0	0	0	1
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	2	1	3	1	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0

JULY

CYCLOGENESIS

LONGITUDE

LATITUDE	0	5E	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175
80	0	0	0	0	0	1	1	0	0	0	0	0	0	1	0	0	2	1	1	0	1	0	0	0	0	0	0	0	0	1	0	0	2	0	0	0
75	0	0	3	2	2	3	1	0	0	0	0	1	0	1	1	0	1	1	2	2	2	1	0	1	2	0	1	0	1	0	1	1	1	0	0	0
70	1	5	1	1	0	0	1	0	0	1	0	1	1	0	2	0	3	3	3	1	2	2	0	1	1	2	1	1	4	5	0	0	0	1	0	0
65	5	3	3	0	0	0	2	2	1	1	3	5	2	2	2	0	6	3	3	2	2	2	3	3	0	5	4	6	5	3	5	7	5	3	1	2
60	1	2	6	3	2	2	1	3	0	1	2	1	1	1	5	0	5	1	1	6	1	6	1	4	5	2	5	6	0	2	7	3	4	0	3	1
55	3	3	8	0	2	3	2	3	3	5	3	3	2	0	3	3	4	2	1	3	0	5	3	1	2	0	2	0	1	1	1	4	3	2	2	4
50	4	3	1	2	0	0	4	4	6	3	1	1	5	2	7	1	2	1	2	4	6	5	9	7	5	4	4	5	2	3	1	4	3	2	0	4
45	4	3	7	2	1	3	4	3	2	1	3	1	4	5	6	4	0	1	3	8	5	5	15	7	2	8	8	6	3	3	3	6	3	0	7	8
40	4	5	5	4	5	2	1	1	2	5	0	0	2	1	1	1	1	3	4	12	12	8	9	6	5	3	0	2	7	7	6	8	3	6	3	4
35	0	1	0	1	2	3	5	0	0	1	1	0	0	0	0	2	1	3	1	2	8	0	4	5	9	4	8	6	7	9	9	7	4	5	1	1
30	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	6	5	4	3	4	1	4	4	2	2	2	2	1
25	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	1	0	1	1	0	0	0	2	0	0	1	0	1
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0

LONGITUDE

LATITUDE	180	175W	170	165	160	155	150	145	140	135	130	125	120	115	110	105	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5W
80	1	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	1	0	0	0	0	1	1	0	0	0	0	0	0	0	0	1	1	0	1	0
75	1	0	0	1	1	0	0	0	1	2	2	0	3	0	2	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	1	0	2	1	1	0
70	0	2	1	0	0	0	1	1	1	1	2	1	1	0	3	2	2	4	1	2	1	0	2	1	1	0	0	0	0	0	0	1	2	2	0	0
65	1	2	0	2	3	3	8	6	8	2	10	1	2	0	1	5	5	5	3	3	1	2	0	1	2	0	0	0	2	1	4	1	1	2	3	3
60	0	0	0	2	0	1	3	2	0	5	4	11	6	3	2	5	2	1	6	1	2	2	3	0	1	1	3	5	12	2	2	5	1	1	1	2
55	2	4	0	4	4	5	7	3	1	0	2	7	5	11	4	1	7	5	7	4	2	3	6	3	11	6	4	8	4	6	1	3	4	5	1	3
50	4	5	3	2	5	7	4	2	0	0	1	7	10	12	19	5	10	3	3	5	1	2	3	4	6	11	3	4	5	2	0	2	2	1	2	1
45	4	2	7	3	4	2	5	3	1	1	0	1	5	9	16	4	12	0	5	3	2	5	7	2	4	0	4	5	6	2	1	5	0	5	1	2
40	2	2	3	1	1	5	4	3	4	4	2	0	7	3	8	9	4	6	7	4	3	5	5	9	4	5	7	3	3	2	2	2	1	3	4	11
35	2	1	0	1	0	3	1	0	4	2	1	0	1	1	1	4	2	4	4	4	14	6	7	7	3	3	3	1	2	0	0	0	1	2	1	2
30	0	2	0	0	0	1	0	1	1	0	0	1	0	0	0	0	1	2	1	2	6	3	2	2	0	0	0	0	0	0	0	0	0	0	0	0
25	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	1	5	0	3	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

JULY

FREQUENCY

LONGITUDE

LATITUDE	0	5E	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175
80	16	15	15	13	9	7	10	8	14	14	18	23	20	16	18	17	18	23	25	24	21	17	15	16	16	15	15	15	17	23	23	24	25	26	26	25
75	25	26	30	28	29	25	28	21	22	22	23	23	22	21	24	23	21	20	20	20	24	26	20	15	18	18	16	14	20	24	22	20	22	24	21	20
70	28	33	31	26	27	26	22	18	17	17	16	15	16	21	19	14	16	18	22	26	26	28	23	22	10	20	20	22	24	24	20	24	25	18	20	18
65	36	38	31	25	26	17	24	20	22	16	15	22	22	25	26	23	24	25	26	29	26	28	25	24	24	34	39	39	36	41	46	52	55	51	46	40
60	36	41	43	37	34	26	16	17	16	18	18	19	17	17	13	18	26	21	22	19	13	17	24	25	32	33	27	23	20	23	32	32	30	29	33	34
55	38	37	39	32	29	22	19	17	18	22	20	17	15	17	24	23	23	17	12	6	12	19	23	25	23	16	15	15	16	21	27	32	32	29	29	29
50	29	31	22	13	18	17	15	25	25	21	13	16	25	27	38	37	25	9	9	11	21	27	37	42	53	50	46	43	31	37	33	33	48	59	61	57
45	17	15	21	15	16	16	11	13	12	12	13	13	14	19	26	18	8	5	6	23	23	37	61	60	50	47	39	41	41	45	53	60	68	58	64	64
40	17	18	22	21	23	15	8	8	8	9	5	5	6	7	5	3	4	6	13	33	44	51	40	35	34	29	23	44	46	53	55	62	56	59	48	47
35	3	1	2	5	14	13	10	4	4	6	1	0	0	1	1	2	3	5	4	10	17	10	13	22	31	25	36	39	30	40	49	57	44	41	29	13
30	3	2	1	1	1	0	1	0	0	3	0	0	0	0	1	0	0	0	0	0	0	5	5	13	14	16	14	15	12	12	9	10	8	8	8	3
25	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	2	1	1	1	2	2	0	0	3	2	3	2	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

LONGITUDE

LATITUDE	180	175W	170	165	160	155	150	145	140	135	130	125	120	115	110	105	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5W
80	24	22	17	18	18	20	21	21	19	19	19	19	19	17	17	18	22	23	17	14	13	12	10	1	0	0	0	0	0	0	1	5	8	7	11	13
75	18	17	18	18	17	17	17	15	11	15	21	19	15	17	19	12	12	12	11	12	18	21	17	13	7	1	1	1	1	1	2	2	8	13	21	25
70	17	26	19	20	15	13	13	17	19	16	19	17	15	16	22	19	23	22	27	26	25	20	17	24	18	11	1	0	0	0	1	12	16	25	24	25
65	23	34	27	27	27	23	21	28	33	34	41	29	24	20	18	22	26	20	21	26	25	18	15	20	25	24	4	0	9	15	26	38	38	40	38	37
60	32	30	35	28	13	15	14	16	10	11	17	32	36	37	35	30	35	34	42	46	53	58	49	35	33	42	16	28	59	56	57	59	51	47	36	34
55	47	56	50	37	35	46	52	46	27	9	5	15	24	38	45	47	57	67	70	70	64	65	69	68	77	80	59	63	62	61	51	56	45	42	44	43
50	63	62	55	56	54	59	53	47	38	35	29	18	24	31	50	53	64	66	68	80	71	64	57	60	79	72	57	61	60	58	51	43	38	34	32	33
45	64	61	56	56	44	38	51	34	34	37	17	7	13	20	38	40	42	33	38	44	50	55	60	61	58	53	55	54	52	45	32	27	25	24	20	21
40	36	34	23	15	13	14	19	20	21	25	14	5	11	13	23	36	38	38	41	36	37	36	47	61	55	49	36	29	23	18	15	14	10	7	12	22
35	6	7	3	4	3	6	8	8	8	6	5	1	1	4	4	12	17	14	17	20	32	41	47	34	21	19	15	14	8	4	2	2	2	2	6	6
30	3	3	1	1	1	2	1	4	2	1	2	0	0	0	0	0	3	2	4	7	15	18	8	4	2	0	1	0	1	0	0	0	0	0	0	1
25	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	2	3	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AUGUST

CYCLOGENESIS

LONGITUDE

LATITUDE	0	5E	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175
80	1	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0
75	0	1	1	0	1	3	0	0	0	1	1	2	2	0	2	0	0	0	0	0	1	0	1	1	0	0	0	0	0	2	2	1	0	0	0	1
70	0	1	0	2	2	2	2	0	2	0	4	0	2	0	0	1	0	2	2	2	1	1	1	1	2	0	0	0	3	2	0	1	2	0	1	1
65	2	4	5	1	2	6	1	1	4	4	2	1	2	2	1	0	2	3	1	3	2	2	4	2	1	4	3	7	4	4	2	1	3	3	4	4
60	4	1	3	4	5	4	2	2	0	2	2	4	2	5	3	2	1	3	1	1	2	4	1	1	2	2	1	1	2	3	2	2	2	2	4	2
55	1	7	3	3	2	0	2	1	2	1	4	0	2	4	2	6	4	2	2	2	2	0	1	6	2	0	3	3	3	2	2	1	6	4	1	2
50	2	1	3	2	3	2	3	3	6	1	0	3	3	3	1	3	1	0	1	1	4	2	9	4	6	6	5	6	2	2	3	3	8	6	6	1
45	3	5	2	2	0	3	3	3	3	3	5	3	4	3	0	4	2	0	5	11	9	8	9	11	6	11	5	5	11	3	2	12	6	6	3	4
40	0	3	3	4	2	3	0	2	1	1	0	0	0	0	0	0	0	0	4	8	6	8	4	4	5	5	3	9	3	7	13	9	8	5	3	0
35	2	1	1	2	0	2	0	0	0	0	0	0	0	0	0	0	0	0	2	0	3	0	2	7	3	8	4	6	5	10	8	3	3	1	3	1
30	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	7	3	2	3	3	1	0	1	2	2	1	0	2
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	0	1	1	0	0	1	0	1	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	2	1	0	0	0	0

LONGITUDE

LATITUDE	180	175W	170	165	160	155	150	145	140	135	130	125	120	115	110	105	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5W
80	0	0	0	0	0	0	0	0	1	0	0	1	1	0	1	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0
75	1	2	0	0	0	3	1	1	0	2	1	2	1	0	0	0	0	0	1	3	1	1	1	0	0	0	0	0	0	0	1	0	1	3	1	2
70	2	2	2	1	4	0	2	0	1	3	2	2	1	1	4	2	4	2	0	1	1	0	0	2	1	0	0	0	0	0	0	3	1	0	2	1
65	1	1	3	4	1	1	5	5	10	7	5	6	2	1	3	3	1	0	2	1	2	3	0	2	1	1	0	0	1	0	2	5	2	4	3	1
60	2	0	4	3	3	1	2	3	2	2	2	12	8	4	2	1	6	8	3	1	3	4	4	2	2	2	1	9	5	3	1	4	2	1	0	2
55	2	9	2	1	0	4	10	5	2	0	2	10	7	6	6	6	9	2	2	1	3	4	4	5	7	8	3	13	7	8	1	2	4	4	4	2
50	3	7	1	8	7	4	4	1	1	3	1	7	5	21	13	15	5	2	4	4	5	2	1	7	9	5	3	5	7	4	3	4	3	8	5	2
45	4	5	1	0	6	1	10	3	5	2	1	4	10	14	19	13	7	3	4	6	5	8	6	12	7	6	5	2	2	2	3	0	0	0	1	2
40	3	6	5	3	2	1	1	5	0	1	0	0	3	7	12	13	7	3	8	5	6	3	8	3	4	4	4	6	3	2	2	3	3	2	2	8
35	4	2	3	0	1	0	1	0	3	1	0	0	1	1	4	13	3	3	2	2	6	14	8	7	3	1	1	1	2	1	0	2	0	0	3	0
30	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	2	2	0	7	7	4	2	1	2	2	0	0	1	0	1	0	0	0	0	1
25	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	4	3	4	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

AUGUST

FREQUENCY

LONGITUDE

LATITUDE	0	5E	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175
80	11	9	14	14	12	13	12	14	15	19	19	18	25	25	23	21	23	23	20	16	17	18	16	15	11	13	10	11	12	16	18	20	21	19	23	23
75	26	29	27	21	19	25	22	19	21	24	27	25	26	28	27	27	26	30	26	22	26	23	25	29	25	21	19	26	22	25	23	22	22	17	18	16
70	33	32	29	23	25	20	29	26	27	22	32	27	24	27	24	24	25	24	25	26	27	22	18	16	18	22	19	22	23	23	18	21	22	18	12	14
65	36	30	30	23	23	28	32	34	41	41	38	34	32	33	38	43	40	40	35	25	24	28	29	26	32	36	35	37	36	34	37	39	38	35	31	28
60	40	36	38	40	35	40	27	25	21	20	21	25	29	33	35	36	40	35	24	24	22	24	22	23	27	25	19	15	16	19	26	26	22	25	32	40
55	42	42	37	30	23	21	18	18	16	14	18	19	27	29	32	31	35	21	15	14	13	24	28	28	31	22	21	19	22	35	33	31	24	31	35	52
50	22	18	17	15	21	17	15	20	20	20	23	21	19	22	25	29	28	20	14	14	19	19	25	35	46	49	43	49	46	41	32	35	55	66	78	75
45	14	13	16	13	13	13	14	14	16	13	16	16	17	19	18	20	13	9	11	22	33	31	50	54	55	52	44	44	47	42	44	58	70	72	71	62
40	11	12	17	20	11	9	5	4	5	2	5	5	6	4	3	1	1	1	7	16	24	27	25	21	27	30	28	44	45	50	66	74	56	65	62	44
35	6	4	3	4	2	4	4	0	1	1	1	0	0	0	0	0	0	0	2	4	6	2	2	10	17	16	21	27	21	32	33	27	27	19	17	13
30	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	9	7	6	10	8	8	9	10	9	7	5	5	3
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	1	1	2	6	2	2	3	2	2	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	1	0	0	0	0	0

LONGITUDE

LATITUDE	180	175W	170	165	160	155	150	145	140	135	130	125	120	115	110	105	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5W
80	21	21	21	22	21	19	17	15	17	17	18	19	22	18	16	17	14	12	13	15	10	8	9	4	2	1	1	2	2	3	3	4	8	10	12	9
75	15	16	15	13	13	20	21	21	19	16	15	19	21	20	18	16	20	14	19	21	19	19	21	15	3	1	1	0	0	0	3	3	9	16	22	23
70	18	19	21	22	27	21	18	16	18	21	24	28	28	26	34	34	30	26	24	29	26	21	25	28	23	13	4	0	0	1	3	8	17	31	39	38
65	25	25	30	38	28	17	21	25	34	37	45	41	39	31	31	38	36	33	29	29	31	28	18	23	28	27	7	2	10	26	33	42	44	46	44	40
60	45	47	45	43	30	22	22	17	15	12	16	36	46	48	46	38	42	30	45	52	59	50	44	40	46	50	25	36	61	74	70	62	53	48	43	35
55	67	68	62	56	55	65	70	64	50	22	7	16	28	38	43	45	63	59	52	64	70	77	74	58	65	79	68	83	85	90	73	62	50	50	50	45
50	62	67	78	64	59	60	59	57	48	44	21	13	18	42	55	63	75	62	55	62	63	50	48	74	84	88	80	79	69	75	64	59	49	39	27	32
45	59	58	52	43	43	38	38	31	24	26	20	12	15	31	56	71	70	57	47	48	55	65	72	85	72	72	67	62	57	50	38	34	30	31	16	14
40	36	31	32	23	18	14	7	12	11	11	12	3	7	14	23	42	47	31	38	41	40	38	59	65	59	53	45	41	25	22	16	18	18	14	8	15
35	9	10	12	5	4	6	5	6	11	9	7	2	2	4	7	27	25	23	15	21	29	21	47	30	27	21	15	8	6	7	6	8	6	4	2	4
30	2	1	1	0	0	1	1	1	1	0	0	0	1	0	0	4	10	8	5	15	19	12	8	7	7	4	2	2	1	1	3	4	3	1	0	1
25	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2	2	4	5	3	3	0	1	1	0	0	1	0	0	0	1	1	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

SEPTEMBER

CYCLOGENESIS

LONGITUDE

LATITUDE

	0	5E	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175
80	0	0	0	0	0	0	0	1	1	0	0	1	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75	6	6	1	2	1	0	1	2	1	0	1	0	1	0	0	1	2	0	0	1	0	0	0	0	0	0	0	1	0	1	0	0	1	2	0	0
70	0	0	0	2	0	1	1	1	1	4	2	1	2	0	1	1	1	1	2	1	2	2	1	1	2	0	1	0	1	0	1	2	1	0	0	1
65	5	2	2	2	2	1	3	1	1	3	3	0	3	3	2	0	0	1	1	2	3	1	1	1	1	2	0	3	0	3	2	3	2	0	2	1
60	1	1	2	3	3	4	2	0	2	2	1	1	3	2	1	3	2	5	2	0	5	4	1	2	0	0	3	1	2	0	0	2	0	1	2	2
55	2	1	3	5	3	6	5	0	2	2	4	3	3	6	2	3	1	3	1	3	1	2	0	1	3	1	1	2	3	5	3	1	2	1	4	2
50	2	0	2	1	1	0	3	2	2	5	2	1	2	2	3	2	2	2	0	5	4	5	0	7	4	5	7	4	1	3	2	3	3	3	3	4
45	0	2	1	1	2	1	4	3	1	2	3	1	2	2	3	1	3	0	5	6	11	9	6	3	3	4	3	1	5	5	3	4	5	4	3	1
40	2	6	9	2	1	1	4	2	0	1	3	3	0	0	1	1	0	0	1	3	6	7	2	5	3	2	6	3	6	4	6	3	5	3	4	2
35	0	0	1	2	0	0	0	0	3	0	0	0	0	0	0	0	0	1	0	0	0	0	0	4	5	5	4	6	4	3	8	3	3	1	2	1
30	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	6	8	1	5	5	2	4	2	2	2	2	1	2
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	3	0	1	0	0	0	0	1	0	2
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0

LONGITUDE

LATITUDE

	180	175W	170	165	160	155	150	145	140	135	130	125	120	115	110	105	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5W
80	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
75	0	2	0	0	0	0	0	1	0	1	2	0	0	0	1	0	1	1	0	0	0	3	1	0	1	1	0	0	0	0	0	2	5	0	2	1
70	2	0	0	1	1	1	1	0	3	0	2	2	2	0	1	1	2	1	1	0	0	0	0	2	3	0	0	0	0	0	0	0	2	4	2	0
65	0	2	1	1	1	0	4	6	4	4	4	2	2	2	1	3	2	1	0	1	1	0	1	1	2	0	0	0	2	2	3	2	3	5	6	3
60	1	1	0	0	0	1	1	0	3	1	4	13	6	2	2	5	1	3	2	1	0	1	2	0	1	3	3	12	8	6	4	2	3	2	2	3
55	3	0	1	2	3	3	8	5	1	3	2	5	6	8	3	6	3	1	1	5	2	2	3	4	3	7	6	12	6	1	3	7	3	1	0	0
50	4	0	5	3	3	3	4	1	0	2	4	1	5	16	13	5	3	5	1	4	3	2	3	4	4	6	1	5	4	5	4	5	3	4	2	1
45	2	3	1	6	6	5	2	4	3	1	1	2	7	9	8	12	6	1	6	3	3	2	6	8	3	2	3	3	2	4	3	1	2	0	4	1
40	1	8	5	4	3	0	2	3	1	3	0	1	3	5	9	8	6	4	3	4	3	2	6	3	4	5	1	6	5	2	2	4	4	0	1	3
35	3	6	4	2	4	6	3	3	2	1	3	0	3	4	4	15	2	6	4	1	2	7	5	3	2	3	3	3	1	2	5	2	3	1	1	1
30	2	1	2	3	2	1	2	0	0	0	1	1	0	1	0	1	4	4	4	4	13	8	3	6	1	0	1	0	0	0	0	0	1	0	0	0
25	1	2	0	0	2	0	0	0	0	0	0	0	0	0	0	0	1	1	3	0	3	1	1	0	1	1	1	0	0	0	0	0	0	0	0	0
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0

SEPTEMBER

FREQUENCY

LONGITUDE

LATITUDE	0	5E	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175
80	9	8	9	13	13	10	10	16	21	22	22	26	24	23	25	23	25	23	22	22	23	24	20	13	12	12	10	10	8	8	12	14	16	19	18	13
75	27	43	42	48	40	37	40	37	32	24	27	25	27	29	23	21	23	21	24	26	28	30	33	29	29	34	31	29	24	26	24	21	21	21	17	16
70	48	43	34	39	30	25	29	28	27	31	37	33	32	36	30	36	30	36	44	38	41	38	38	36	33	33	26	32	25	20	21	21	18	16	11	16
65	45	37	41	36	24	22	28	35	46	52	49	42	45	46	45	44	45	44	45	45	45	41	40	41	37	28	21	25	21	25	27	22	20	20	20	24
60	38	35	32	32	34	38	42	39	31	29	27	30	40	47	48	45	48	45	41	37	30	26	20	19	14	18	18	15	14	22	25	19	13	16	18	25
55	38	31	25	30	24	25	24	25	28	30	24	31	32	34	27	29	27	29	24	18	13	14	13	18	26	24	17	22	42	53	43	36	43	39	36	39
50	24	16	16	11	8	11	12	19	18	20	22	19	21	22	21	16	21	16	12	14	17	20	29	38	47	50	48	52	48	40	43	47	50	45	54	61
45	14	11	13	10	11	12	12	15	12	11	15	13	10	9	6	6	6	6	11	19	33	51	56	54	47	42	32	42	50	47	50	56	56	53	58	54
40	9	14	21	18	12	9	4	4	3	5	8	9	4	1	1	2	1	2	3	5	10	22	15	16	20	21	35	46	43	53	63	62	49	52	51	54
35	2	4	7	8	5	5	3	1	2	4	1	0	0	0	0	1	0	1	1	1	2	1	0	10	16	27	32	27	32	34	30	28	28	31	28	20
30	1	4	2	0	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	6	14	15	17	19	19	16	8	8	7	7	9	6
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	4	6	4	1	3	1	0	0	1	1	2
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	1	1	1	0	0	0	1	0	0	0	0

LONGITUDE

LATITUDE	180	175W	170	165	160	155	150	145	140	135	130	125	120	115	110	105	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5W
80	16	15	17	16	17	15	13	11	8	8	11	8	9	8	8	8	6	7	6	6	7	5	3	4	3	3	3	1	2	2	3	3	5	4	6	7
75	17	14	15	15	16	11	8	9	11	13	15	17	16	12	11	9	10	11	13	12	15	19	18	18	9	2	0	0	0	0	0	3	10	13	15	17
70	17	16	15	16	16	19	18	18	17	15	19	16	17	19	21	22	25	20	25	30	30	32	30	31	27	14	3	0	0	0	5	14	23	36	43	43
65	22	24	23	23	23	16	13	25	22	23	23	19	17	20	25	32	30	32	27	28	24	21	23	24	32	28	7	3	18	38	48	51	39	40	54	47
60	25	32	37	44	30	21	34	37	29	22	24	40	47	42	36	40	45	51	44	49	47	53	61	52	47	46	19	42	77	83	75	66	70	53	52	46
55	46	45	45	46	53	53	65	56	42	23	20	27	37	42	40	49	50	49	45	56	62	68	61	52	59	69	69	94	98	79	70	72	55	48	47	40
50	63	62	64	63	60	50	54	54	43	34	30	22	23	46	58	64	73	76	73	76	70	55	53	60	72	71	69	70	62	55	57	67	53	47	41	28
45	48	52	50	61	51	58	52	42	27	18	23	21	18	22	29	47	64	64	67	59	54	47	60	62	60	63	54	55	57	54	51	40	36	25	17	16
40	43	42	48	44	34	31	21	21	20	20	17	7	11	16	23	36	44	38	38	34	33	35	53	56	55	52	43	52	35	30	25	18	19	14	11	13
35	21	23	22	20	19	19	13	11	11	7	7	2	5	11	11	24	21	22	17	13	19	32	38	26	20	17	16	11	4	8	10	10	10	8	4	4
30	8	8	8	10	6	3	3	2	1	1	1	2	1	1	3	4	10	11	13	16	26	28	18	14	7	4	3	2	2	2	2	1	4	1	0	0
25	2	3	3	1	1	0	0	0	0	0	0	0	0	0	0	1	2	4	6	4	5	6	1	1	0	3	1	0	0	0	0	0	0	0	0	0
20	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	1	2	3	3	1	2	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0

OCTOBER

CYCLOGENESIS

LONGITUDE

LATITUDE	0	5E	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175
80	0	0	0	1	0	1	1	0	1	0	0	1	2	1	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	1	0
75	2	1	3	4	0	0	1	0	0	0	0	0	0	2	0	0	3	0	0	1	0	2	1	0	1	0	2	0	0	0	0	1	0	1	0	1
70	3	2	2	2	3	1	4	6	2	3	0	1	1	0	0	3	0	0	1	0	1	0	0	4	0	0	1	0	1	3	0	0	0	0	1	2
65	5	4	0	1	2	3	2	4	4	2	2	1	2	2	3	0	0	3	1	1	1	0	0	2	1	2	0	0	2	0	1	1	1	0	0	0
60	0	2	4	1	3	4	2	1	1	2	1	3	1	4	3	2	0	1	2	1	1	1	1	0	3	2	0	0	0	2	0	2	0	3	2	1
55	1	1	5	5	0	0	2	2	1	4	4	2	1	1	3	4	4	2	0	0	1	0	1	1	0	0	1	1	3	2	6	2	9	2	3	2
50	2	2	0	3	1	3	1	1	1	1	2	3	1	5	2	2	0	0	1	0	2	4	4	7	4	3	0	7	7	5	3	4	7	1	3	7
45	0	2	3	3	2	5	2	5	1	0	3	3	1	3	3	0	1	1	2	6	8	15	8	5	1	2	1	2	8	5	3	2	2	2	1	3
40	3	13	10	6	0	1	1	0	3	1	0	1	1	0	0	0	0	0	0	0	2	1	2	1	3	4	4	5	7	2	3	6	8	4	3	3
35	0	7	3	3	0	3	2	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	1	4	4	7	0	6	10	6	9	3	5	3	1
30	4	0	1	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	3	3	7	4	10	5	5	4	4	3	1	4
25	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	3	7	5	4	0	1	1	0	0	1	1
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0

LONGITUDE

LATITUDE	180	175W	170	165	160	155	150	145	140	135	130	125	120	115	110	105	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5W
80	0	0	0	0	0	0	1	0	0	0	0	1	0	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0
75	1	0	1	0	0	0	0	0	0	1	0	0	2	0	4	1	0	1	0	0	0	1	1	0	0	0	0	0	0	0	0	0	5	3	0	0
70	1	4	2	1	1	2	0	0	4	4	0	1	2	2	1	1	0	2	0	0	0	1	2	3	0	0	0	0	0	0	0	2	2	3	6	3
65	2	0	2	0	0	0	1	5	5	3	4	2	1	3	0	1	1	0	0	4	1	1	0	0	1	2	0	0	0	4	4	1	4	4	0	5
60	3	1	0	1	1	1	0	2	2	2	6	19	14	11	4	2	1	1	2	0	2	0	0	3	1	1	1	8	8	5	7	9	1	4	7	1
55	3	2	2	3	2	5	4	8	6	3	3	7	11	9	3	3	2	0	1	2	0	0	3	5	4	4	6	8	6	3	1	0	2	6	2	7
50	3	1	2	3	4	5	6	1	1	5	2	4	8	12	16	10	4	3	3	9	0	1	0	2	5	2	2	3	6	1	0	3	2	5	1	1
45	8	3	0	3	5	7	3	2	8	1	3	5	4	5	5	8	5	6	2	5	4	3	7	5	7	3	4	5	3	3	1	3	7	3	2	4
40	3	4	4	1	0	5	8	6	2	3	0	2	9	0	8	11	6	5	7	1	1	8	5	4	1	8	1	2	2	5	4	1	3	3	0	1
35	0	4	3	2	5	6	4	3	4	1	4	1	9	2	5	12	4	8	0	4	8	10	4	8	4	4	2	0	3	4	2	2	3	1	0	4
30	1	2	5	6	3	5	6	0	3	1	2	0	1	1	1	2	2	3	9	5	14	7	3	3	3	5	6	1	2	2	0	0	2	3	1	0
25	1	1	2	2	0	0	0	0	1	1	0	0	0	0	0	0	2	5	1	4	6	3	1	3	1	1	0	1	1	0	0	0	0	0	0	1
20	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	2	0	1	3	2	1	0	0	0	0	0	0	0	0	0	0	0	0

OCTOBER

FREQUENCY

LONGITUDE

LATITUDE	0	5E	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175
80	5	6	6	6	5	5	7	7	9	13	12	17	19	18	17	16	14	14	15	13	12	14	17	14	16	16	18	19	21	17	12	11	17	16	18	20
75	32	34	44	49	46	45	47	45	41	38	34	31	23	23	17	20	25	19	26	29	28	31	34	29	33	36	40	39	31	29	26	21	21	20	21	20
70	59	57	62	50	42	34	39	39	42	38	31	35	33	39	35	45	42	39	44	42	38	33	31	35	32	32	31	22	16	24	20	16	19	18	14	17
65	43	43	39	32	30	23	31	41	44	53	55	54	50	46	43	50	46	46	42	37	43	37	38	37	28	24	19	14	13	12	14	19	15	13	11	15
60	41	39	32	35	34	39	43	41	37	31	38	36	37	47	54	57	54	58	55	51	42	27	23	20	19	17	14	14	15	22	21	25	21	26	34	35
55	28	34	30	37	34	32	31	32	38	47	47	39	40	46	50	49	45	36	21	16	20	15	14	17	22	23	25	27	42	54	59	56	52	70	62	51
50	24	15	15	20	20	25	26	20	17	21	22	29	26	31	23	21	21	18	14	11	15	21	28	44	53	60	50	52	59	67	62	75	55	52	59	65
45	13	11	13	12	18	20	17	12	9	8	9	17	14	13	9	8	5	5	8	15	23	42	51	54	46	42	33	38	54	65	56	53	57	63	67	60
40	10	28	34	31	18	9	7	4	4	4	4	5	2	1	0	0	0	0	0	2	5	8	12	12	16	25	30	37	30	44	55	65	74	72	58	51
35	7	14	13	17	17	16	8	4	5	2	2	0	0	0	0	0	0	0	0	0	1	3	4	6	10	11	18	22	34	52	50	51	42	49	29	29
30	6	6	3	3	3	4	2	0	3	1	2	0	0	0	0	0	0	0	0	0	0	1	0	4	9	14	25	33	41	36	25	20	16	15	7	12
25	2	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	8	12	11	7	3	1	1	1	3	2	2
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	1	1	0	0	1	0	0	0	0	0	1	1

LONGITUDE

LATITUDE	180	175W	170	165	160	155	150	145	140	135	130	125	120	115	110	105	100	95	90	89	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5W
80	18	19	19	17	14	13	13	12	15	11	9	12	10	10	9	9	8	4	4	4	2	5	4	2	2	3	2	2	2	1	1	1	3	4	6	8
75	19	22	16	16	14	13	11	10	8	11	12	19	27	23	18	18	16	17	17	18	19	21	19	12	5	0	0	0	0	0	0	0	6	10	17	24
70	15	17	15	14	13	13	16	13	20	19	20	27	31	31	26	28	23	24	21	20	27	29	32	29	27	12	3	1	0	0	4	12	23	37	52	56
65	18	19	25	22	15	13	16	20	25	23	29	27	23	36	34	30	31	32	36	34	32	31	32	30	34	28	4	0	9	32	46	52	48	59	56	48
60	43	40	35	27	23	26	45	41	34	33	23	42	59	77	65	64	58	56	61	56	61	59	56	53	62	54	30	41	82	100	93	80	77	53	48	44
55	58	56	53	53	53	76	96	97	71	41	39	45	49	58	52	48	56	60	60	61	57	57	52	64	67	65	76	95	98	78	62	62	55	44	33	30
50	69	65	73	77	81	83	86	83	70	55	43	27	32	43	61	68	70	71	65	67	67	64	54	65	67	76	74	75	68	64	58	60	42	37	38	30
45	68	66	64	60	62	62	61	48	52	41	32	19	17	22	32	53	67	77	73	70	66	54	71	75	73	70	69	63	56	52	47	45	39	24	32	21
40	46	40	43	45	38	42	42	43	33	19	17	11	16	20	30	47	41	51	49	45	43	43	55	61	49	51	43	43	36	37	34	25	12	18	13	4
35	25	23	25	28	26	25	26	20	16	12	9	1	11	12	13	40	33	30	24	23	37	48	43	41	38	33	25	16	19	24	22	19	14	17	9	8
30	9	8	13	16	13	10	12	3	4	9	6	2	1	3	6	10	15	14	21	17	36	30	21	21	13	12	11	8	8	6	5	5	5	6	4	2
25	5	5	7	5	1	0	1	1	3	4	0	0	0	1	2	2	3	9	11	10	13	3	8	9	3	4	2	1	3	3	1	1	2	0	0	2
20	1	2	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	2	1	0	3	5	1	1	0	0	0	0	0	0	0	0	0	0	0

NOVEMBER

CYCLOGENESIS

LONGITUDE

LATITUDE	0	5E	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175
80	1	2	0	0	1	1	0	0	0	0	1	1	2	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	0	0	0
75	8	4	5	4	3	1	1	1	0	1	0	2	0	0	0	1	1	0	0	2	0	0	0	0	1	0	2	0	1	1	4	1	0	0	1	0
70	2	3	2	2	5	0	2	0	3	2	3	2	2	0	2	1	2	0	1	0	0	1	0	0	0	0	0	2	2	1	2	2	3	0	1	1
65	5	1	2	0	1	1	2	2	1	1	1	3	3	1	3	3	1	0	0	0	1	0	1	1	0	0	0	0	1	0	0	1	2	0	1	1
60	2	2	4	3	3	1	4	2	2	0	1	2	1	0	5	4	2	1	0	2	2	0	2	0	1	1	0	0	0	0	0	1	1	0	1	0
55	3	2	1	3	3	0	4	2	0	1	2	2	1	2	2	4	4	0	1	1	2	1	3	0	2	1	2	0	1	2	6	3	1	5	1	1
50	0	1	2	1	1	1	1	3	4	1	0	0	2	2	1	0	3	0	1	0	5	3	2	5	1	1	1	2	3	2	4	4	9	3	2	2
45	0	0	3	1	3	1	0	3	3	2	3	0	3	2	0	0	1	0	2	7	12	7	6	6	3	3	1	3	3	3	4	6	1	5	2	3
40	5	17	15	10	2	1	4	2	1	2	1	3	0	1	0	0	0	0	0	0	0	3	0	0	4	3	8	3	6	5	7	9	6	5	3	0
35	3	2	2	3	3	2	3	0	2	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	4	5	12	3	7	8	8	9	5	4	4	3
30	2	3	4	2	2	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	7	6	6	9	7	8	6	3	5	4	4	1
25	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	4	1	3	4	2	3	2	0	2	0	1
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1

LONGITUDE

LATITUDE	180	175W	170	165	160	155	150	145	140	135	130	125	120	115	110	105	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5W
80	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0
75	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	2	0	0	0	0	1	1	1	0	0	0	0	0	0	0	0	0	2	4	0	2
70	1	1	0	1	1	0	0	1	3	1	4	2	3	2	2	2	1	2	1	1	0	0	0	0	0	0	1	0	0	0	1	1	1	6	3	3
65	2	1	1	1	0	0	3	1	1	2	3	3	2	3	1	1	3	1	0	2	2	1	0	1	2	0	2	0	1	1	6	3	4	5	0	4
60	3	1	1	0	0	0	4	0	3	3	0	5	14	8	2	2	2	3	1	1	1	1	1	0	1	3	0	9	8	4	4	6	3	3	3	1
55	1	3	0	1	2	3	2	5	2	0	0	9	22	8	2	2	3	1	2	0	3	0	2	1	2	5	4	7	6	4	0	2	5	3	1	2
50	1	2	4	3	4	2	2	2	1	1	5	4	7	22	9	6	4	2	0	4	0	0	1	1	1	2	2	4	3	4	4	5	3	0	4	4
45	1	3	2	4	2	2	8	5	3	4	3	2	1	4	7	2	5	4	1	2	4	3	8	2	3	2	0	3	3	0	2	6	2	8	4	2
40	7	4	1	5	4	8	4	3	5	6	3	3	6	2	6	7	6	3	1	2	1	8	9	9	7	5	4	7	5	1	0	2	2	1	0	1
35	4	4	3	2	4	2	5	4	4	3	5	4	9	4	5	28	3	4	5	4	12	10	10	1	4	5	3	5	1	2	1	2	1	3	1	2
30	2	3	4	2	6	5	5	3	1	0	2	0	0	0	2	2	6	2	10	4	10	3	5	2	4	3	4	2	2	0	2	1	1	1	0	2
25	2	1	1	1	2	1	1	1	2	0	0	1	0	0	3	1	2	7	3	5	3	1	2	2	2	3	5	1	2	2	1	1	0	1	0	0
20	0	2	0	1	0	0	1	0	0	0	0	0	0	0	0	0	0	1	2	0	1	2	0	1	2	0	2	0	1	0	1	0	0	1	0	0

NOVEMBER

FREQUENCY

LONGITUDE

LATITUDE	0	5E	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175
80	4	7	9	10	12	15	19	16	19	19	18	21	20	20	19	17	18	17	19	18	18	16	16	15	13	13	9	9	9	8	11	10	9	11	8	7
75	38	45	48	47	50	49	47	39	36	32	30	32	30	27	26	26	23	24	23	21	18	18	16	13	14	16	17	16	15	14	18	20	12	13	13	14
70	53	47	51	51	47	39	42	43	50	55	44	42	38	34	37	40	41	42	34	30	25	26	25	28	24	24	18	21	21	21	19	19	18	16	17	24
65	54	43	40	31	29	22	26	34	37	41	46	47	47	42	44	52	47	43	33	28	21	21	18	13	14	13	5	4	4	6	9	10	8	12	14	15
60	50	42	30	40	49	40	44	42	31	27	25	25	26	33	38	47	51	53	43	40	38	39	42	36	23	16	3	2	1	5	11	10	16	29	37	32
55	43	50	46	45	41	37	37	29	23	26	27	31	31	39	45	51	46	37	36	34	32	27	28	28	23	20	19	20	34	44	55	42	44	57	64	55
50	36	26	20	16	18	13	20	28	26	29	26	24	18	22	23	16	19	13	10	8	15	13	23	33	27	30	34	37	45	46	45	55	66	61	74	72
45	20	12	24	23	21	19	20	19	15	15	15	13	14	15	6	3	4	1	4	13	29	33	37	47	55	48	47	53	60	70	68	71	61	70	71	59
40	21	37	60	46	33	26	18	20	11	13	15	15	11	5	3	1	0	0	0	1	4	12	18	18	25	24	40	53	54	63	73	78	71	65	55	47
35	10	16	20	23	27	24	20	11	9	6	3	5	2	0	0	0	0	0	0	0	0	0	2	6	13	20	36	32	37	47	41	39	42	43	40	40
30	5	6	6	2	4	7	6	4	3	4	4	2	0	0	0	0	0	0	0	0	0	0	0	1	8	18	18	20	27	27	24	23	25	25	25	22
25	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	2	5	1	4	9	7	7	8	3	4	6	5
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0

LONGITUDE

LATITUDE	180	175W	170	165	160	155	150	145	140	135	130	125	120	115	110	105	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5W
80	7	7	7	4	2	2	5	4	5	6	6	8	7	6	7	6	4	5	5	6	6	7	6	4	3	1	0	0	0	0	1	2	3	3	3	2
75	15	13	9	8	6	3	7	9	8	10	11	12	10	9	8	13	13	9	11	18	26	29	30	21	10	3	0	0	0	0	0	0	6	12	16	22
70	17	14	11	13	13	15	15	12	13	15	18	18	13	14	19	28	28	25	22	26	25	24	30	36	28	16	2	0	0	0	3	9	17	29	39	43
65	18	19	20	20	18	10	10	9	9	9	14	16	17	21	21	24	34	33	31	29	24	25	22	29	37	29	3	1	19	36	49	52	49	52	52	51
60	32	28	26	29	21	16	30	21	16	11	9	17	33	48	44	36	42	45	48	48	56	53	46	49	46	54	30	34	73	81	68	69	68	65	60	54
55	53	61	62	53	49	53	82	75	51	21	14	20	45	54	42	43	43	44	52	59	69	58	52	58	69	68	59	65	74	58	44	47	52	49	39	36
50	67	71	64	57	58	62	65	60	49	50	48	36	38	65	69	71	67	65	50	60	55	47	54	62	62	58	57	60	49	43	44	44	48	44	43	43
45	58	51	55	61	67	56	64	63	54	60	54	40	28	35	41	47	55	68	70	78	68	53	72	67	59	57	60	59	43	32	36	30	25	33	37	30
40	50	48	46	48	47	51	52	36	37	39	37	23	22	18	25	38	49	61	57	71	68	77	81	75	73	57	48	48	39	33	20	18	20	23	14	14
35	36	34	34	33	28	24	20	18	16	15	20	13	20	22	22	57	58	49	41	44	52	59	50	43	45	42	37	30	25	21	17	18	17	22	14	9
30	18	21	20	15	13	12	9	6	8	7	9	5	5	3	6	16	22	23	31	26	36	22	16	11	16	18	23	20	15	8	8	8	8	9	6	4
25	3	5	2	4	1	1	3	1	3	4	3	3	0	0	4	6	5	12	14	13	13	7	7	9	7	9	17	8	5	3	1	2	4	4	2	0
20	0	2	2	1	0	0	1	0	1	0	0	0	0	0	0	3	3	2	2	3	2	2	0	0	2	3	1	0	0	0	1	2	2	1	0	0

DECEMBER

CYCLOGENESIS

LONGITUDE

LATITUDE	0	5E	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175
80	1	0	0	0	0	1	0	0	0	0	0	1	0	0	2	0	0	1	2	0	0	0	0	0	0	0	0	0	1	1	1	0	0	1	0	1
75	2	1	2	2	0	0	0	2	1	1	0	2	3	1	2	3	2	0	1	0	1	0	0	1	1	0	0	0	1	0	0	0	0	0	0	0
70	1	0	0	2	4	3	4	2	1	3	1	1	1	1	0	2	2	1	0	1	0	0	1	2	0	0	0	0	2	2	0	1	4	0	1	0
65	10	2	4	4	1	0	0	2	2	1	1	1	0	1	4	2	2	1	1	1	0	1	1	0	2	1	0	0	0	0	1	1	1	0	0	1
60	4	1	1	2	12	0	2	1	0	1	1	2	0	5	1	1	0	1	0	1	1	1	1	0	0	0	0	0	1	0	0	1	1	1	0	0
55	1	2	5	4	1	3	6	2	1	0	3	0	0	2	5	1	2	0	1	0	1	1	2	0	0	0	0	0	1	2	4	1	0	1	1	0
50	4	3	3	0	0	1	2	2	1	2	1	2	1	0	1	3	2	1	0	0	3	4	2	4	0	0	1	0	1	2	1	10	4	4	1	5
45	2	2	3	0	0	3	5	0	0	0	1	1	0	0	1	0	0	0	0	1	0	4	7	6	4	4	0	4	9	6	3	6	5	5	4	5
40	5	15	14	5	3	2	4	5	1	2	4	2	2	1	0	0	0	0	0	0	0	0	0	3	3	1	9	5	10	6	6	5	4	3	6	9
35	2	7	6	6	5	12	3	1	0	0	1	2	1	0	0	0	0	0	0	0	0	0	1	4	3	6	9	10	6	17	18	12	8	7	2	6
30	1	2	1	4	1	2	0	3	1	0	1	0	2	0	0	0	0	0	0	0	0	0	0	2	6	9	1	11	12	8	5	3	4	2	3	2
25	3	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	7	4	3	3	1	0	0	1	1	1
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2	0	0	0	0	0	0	0

LONGITUDE

LATITUDE	180	175W	170	165	160	155	150	145	140	135	130	125	120	115	110	105	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5W
80	0	0	1	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	0	1	0	2	2	0	0
75	1	1	0	0	1	2	0	0	0	2	1	2	1	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	3	4	2	1
70	1	1	1	2	0	2	0	1	3	3	0	1	3	2	2	1	0	0	0	0	0	1	3	2	0	2	0	0	0	0	0	1	2	5	4	4
65	0	2	1	0	1	1	4	0	1	5	2	3	1	3	1	1	2	1	0	1	1	1	0	2	2	1	0	0	2	3	6	3	2	4	2	2
60	1	0	0	1	0	1	1	1	1	0	2	5	12	5	0	0	3	1	1	1	1	1	1	0	1	2	3	6	16	4	3	2	3	6	3	1
55	0	1	3	3	0	2	3	5	3	2	3	8	19	3	2	4	2	1	1	1	0	1	3	1	2	2	3	8	7	1	3	1	4	1	0	1
50	5	2	2	2	3	2	1	3	0	2	3	3	4	21	13	5	4	2	3	1	1	0	2	2	5	3	3	5	5	1	1	2	2	0	3	2
45	7	7	5	4	6	5	8	5	2	5	7	4	2	11	4	5	5	2	4	6	4	1	3	4	2	3	3	7	3	3	3	2	2	4	3	2
40	8	7	5	10	4	3	6	4	2	4	2	3	5	2	6	8	10	8	3	5	4	4	8	10	3	2	6	6	3	2	2	5	1	2	2	1
35	6	4	8	4	5	4	4	2	4	0	4	3	7	1	6	26	7	6	4	8	10	18	12	6	5	3	8	1	6	2	3	2	3	2	4	1
30	3	6	2	6	3	5	5	4	0	2	3	1	0	0	1	1	8	6	2	6	9	11	2	2	3	1	2	0	4	1	1	1	2	4	0	0
25	2	2	3	3	2	1	3	0	0	1	0	0	1	0	2	1	8	9	6	4	4	3	3	0	3	1	4	3	1	0	0	0	0	0	0	1
20	1	0	0	2	1	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	1	3	0	1	2	4	0	2	1	0	0	0	0	0	0	0

DECEMBER

FREQUENCY

LONGITUDE

LATITUDE	0	5E	10	15	20	25	30	35	40	45	50	55	60	65	70	75	80	85	90	95	100	105	110	115	120	125	130	135	140	145	150	155	160	165	170	175
80	12	10	14	14	16	17	19	17	19	23	26	29	30	30	28	27	29	27	29	28	34	30	27	23	26	24	25	26	21	22	20	20	18	19	15	18
75	31	36	44	45	43	38	40	36	29	31	25	23	27	25	32	34	38	36	38	37	34	27	25	22	26	26	24	25	13	15	16	12	9	7	6	7
70	58	56	66	67	60	52	55	52	46	47	39	34	35	31	31	26	23	19	18	21	26	25	22	22	16	15	8	9	9	8	9	10	11	10	7	9
65	73	68	62	36	18	26	29	38	57	56	45	41	35	35	43	38	40	42	25	21	15	17	19	16	12	13	7	3	2	2	4	5	5	5	5	10
60	41	35	36	39	50	44	39	37	27	26	23	31	29	37	35	38	38	37	27	26	28	29	26	19	15	6	2	1	2	2	2	9	11	13	10	21
55	30	35	45	40	35	41	41	33	30	34	36	31	30	34	35	35	39	37	36	26	24	23	26	21	8	5	3	5	14	26	36	26	33	45	49	38
50	27	25	27	24	22	22	31	34	21	19	18	17	26	20	18	14	11	16	20	20	22	22	26	18	15	13	12	13	21	39	48	61	63	64	65	60
45	17	12	17	14	22	27	38	25	12	11	13	20	20	16	10	5	3	1	0	5	11	20	29	43	49	45	33	41	58	64	70	70	74	78	78	80
40	27	48	53	50	35	25	29	31	28	21	20	21	15	11	5	3	1	0	0	0	0	1	3	10	20	30	45	56	63	70	81	89	90	84	77	76
35	20	25	41	52	52	56	50	26	20	12	9	9	7	2	0	0	0	0	0	0	0	0	1	6	12	23	29	38	54	75	92	89	74	61	50	54
30	7	7	9	13	16	9	9	8	4	1	4	4	2	1	1	0	0	0	0	0	0	0	0	3	9	18	20	34	46	44	33	30	22	17	19	19
25	5	3	2	1	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	3	5	11	11	11	10	7	10	5	3	2	3
20	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	1	4	3	2	1	1	0	0	0

LONGITUDE

LATITUDE	180	175W	170	165	160	155	150	145	140	135	130	125	120	115	110	105	100	95	90	85	80	75	70	65	60	55	50	45	40	35	30	25	20	15	10	5W
80	13	12	14	13	10	10	9	7	9	10	10	6	7	1	5	4	4	4	5	7	6	3	3	3	4	2	2	4	3	2	2	3	5	8	8	9
75	8	9	14	13	11	12	8	8	8	8	12	16	21	19	14	18	15	16	11	17	20	27	23	18	6	1	1	1	1	0	1	3	7	18	25	24
70	11	14	12	9	8	6	7	8	9	15	17	18	20	20	21	24	32	27	22	20	18	19	27	33	32	22	1	0	0	2	7	13	19	31	44	51
65	11	11	8	10	12	6	10	7	10	13	8	9	10	12	23	25	24	22	20	12	18	13	17	22	35	39	7	2	23	51	55	59	56	59	55	58
60	19	24	27	21	17	21	30	24	17	12	11	15	31	34	30	21	27	32	39	38	40	44	44	42	51	50	27	42	83	81	73	72	75	66	55	51
55	34	40	33	48	51	72	87	83	62	33	19	24	46	45	39	39	29	38	38	42	48	50	42	44	56	64	57	68	86	81	66	65	60	59	43	33
50	62	63	62	65	74	79	78	72	68	61	50	29	34	55	66	68	66	53	60	56	52	48	55	56	65	66	70	77	67	59	48	49	37	36	24	21
45	84	77	75	81	90	86	84	71	63	55	55	37	34	46	44	55	66	77	82	85	73	60	74	84	86	77	60	63	56	47	36	27	24	28	27	21
40	65	65	75	79	75	60	55	53	40	30	29	18	23	19	28	38	46	64	75	73	83	89	98	101	83	62	56	45	39	24	18	17	18	17	18	14
35	54	53	56	49	43	40	40	31	24	10	17	13	19	21	28	63	53	59	53	46	58	83	74	61	44	41	36	28	26	19	15	17	17	17	20	16
30	13	16	20	25	23	23	19	11	8	7	9	12	12	5	5	23	35	38	30	31	45	38	21	16	16	17	13	11	11	10	9	8	10	9	5	2
25	7	7	6	6	3	4	6	3	4	4	1	4	6	1	3	6	12	21	19	13	9	8	11	7	9	10	13	8	9	9	3	2	2	1	0	1
20	1	1	1	3	3	1	1	1	0	0	1	1	0	0	0	3	2	2	2	0	1	3	3	2	3	9	8	7	4	2	0	1	1	1	0	0