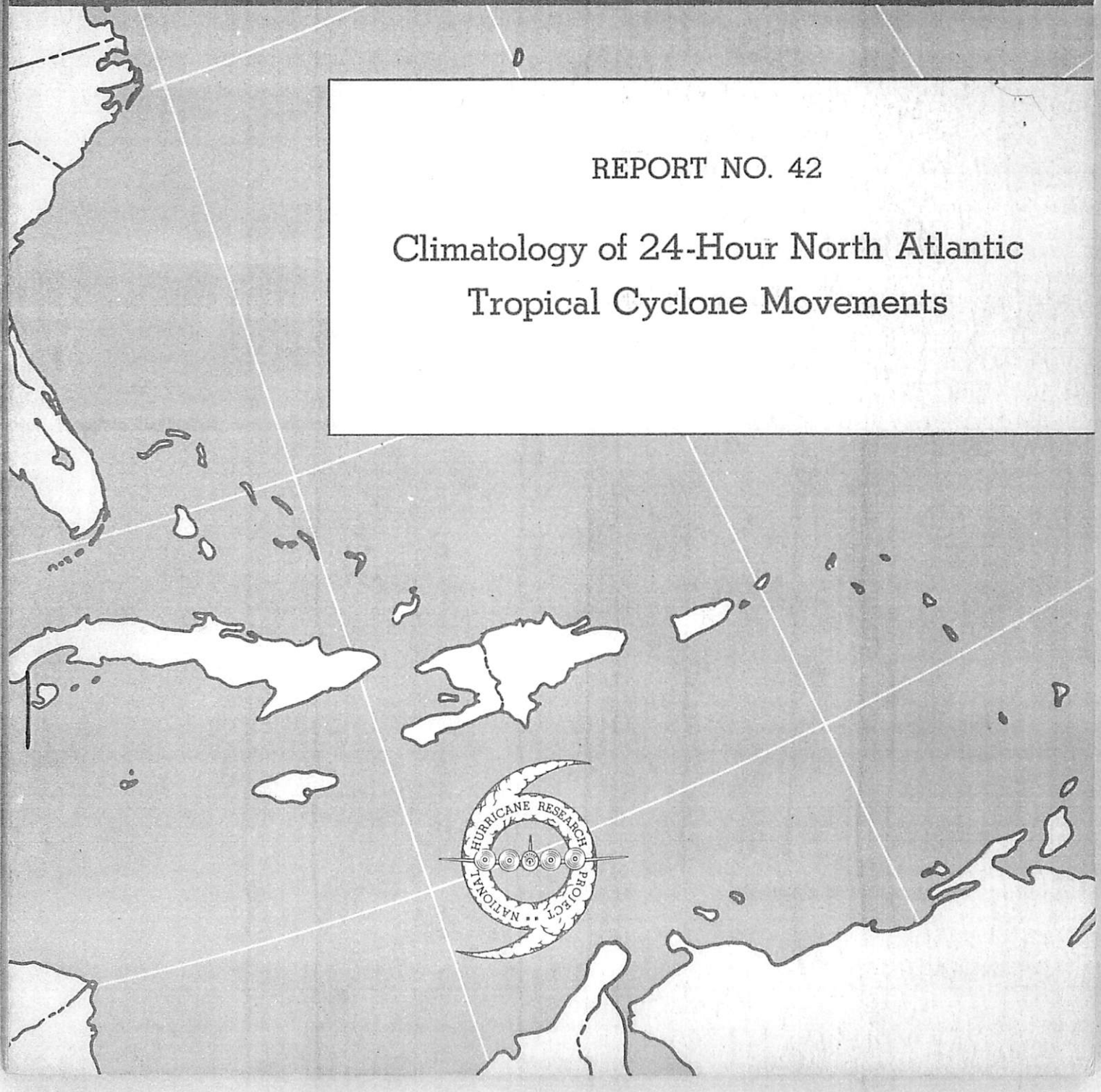
NATIONAL HURRICANE RESEARCH PROJECT

REPORT NO. 42

Climatology of 24-Hour North Atlantic Tropical Cyclone Movements



U. S. DEPARTMENT OF COMMERCE
Luther H. Hodges, Secretary
WEATHER BUREAU
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NATIONAL HURRICANE RESEARCH PROJECT

REPORT NO. 42

Climatology of 24-Hour North Atlantic Tropical Cyclone Movements

by

George W. Cry

Office of Climatology, U. S. Weather Bureau, Washington, D. C.

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NATIONAL HURRICANE RESEARCH PROJECT REPORTS

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CLIMATOLOGY OF 24-HOUR NORTH ATLANTIC TROPICAL CYCLONE MOVEMENT

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[Manuscript received July 22, 1960; revised October 17, 1960]

ABSTRACT

Tropical cyclone movements are an important aspect of hurricane forecasts and warnings. Summaries of 24-hour changes of tropical cyclone (hurricane and tropical storm) center positions in Δ latitude-Δ longitude groupings for 68 selected areas of the North Atlantic region during the period 1886-1958 are presented. The month and year of tropical cyclone origin or detection and the total frequency of individual tropical cyclone passages through each area are included. Points of recurvature, portions of tropical cyclone tracks containing complete loops, and tables of mean speeds in various latitudes are also shown.

1. INTRODUCTION

The variations in tropical cyclone movement, together with other features of these destructive storms, have been of continuing interest to the hurricane forecaster in his problem of predicting areas likely to be affected by a particular storm. Several methods for forecasting tropical cyclone motion, considering various features of the state of the surrounding atmosphere have been developed in recent years [1, 2, 3, 4, 5]. These objective, statistical, and numerical techniques, while employing several directions of attack, all require a more or less complete knowledge of the atmospheric pattern over a considerable area surrounding the storm circulation. Despite a continually improving observational network providing an increased quantity and quality of data, as well as improved aircraft and radar observations, complete information necessary for the utilization of such techniques is not always available over rather extensive areas of the hurricane region. When this situation exists the application of a climatological approach, considering the behavior of past tropical cyclones in certain locations and seasons, may profitably be utilized.

The purpose of this paper is to furnish climatological data on tropical cyclone movement in the North Atlantic region. This type of information, useful primarily to the hurricane forecaster, may also find utility in related studies of hurricane probabilities in various areas. Some previous studies along this line have included Mitchell's[6] which presented average tropical cyclone movements in tabular and graphic forms for 2-1/2° areas in the region 10°N.-40°N., 50°W.-100°W. covering the years 1887-1923, inclusive, and Colón's [7] which gave an abundance of useful information on tropical cyclone motion, including persistence computations and modal recurvature locations, and on

frequency and regions of formation for the years 1887-1950, inclusive. Mook [8] constructed charts of hurricane positions as a function of storm locations within given 5° latitude-longitude areas 24, 48, and 72 hours earlier. His data consisted of published hurricane tracks for the years 1887-1951 and a hurricane position punched card deck prepared in connection with the 1899-1939 Northern Hemisphere maps series.

2. DATA AND METHOD

The data in this paper have been taken from a recent summary [9] of North Atlantic tropical cyclones for the years 1886-1958. The most accurate determination of the track of each hurricane and tropical storm was attempted, after a review of all available information. The 1200 or 1230 GMT positions of all the hurricanes and tropical storms shown in that publication were tabulated to the nearest 0.1° and differences (Δ latitude and Δ longitude) between succeeding 24-hour positions for each storm were calculated and grouped by area and by month. Areas selected are shown on index chart on page 24. The storm movements were tabulated in the area from which the storm moved. When two or more positions were located within a single area, each of the resulting movements was included in that area.

Consolidation of these storm movements was made for each of the 68 areas in 1° class intervals of latitude and longitude. For example, all movements in the range 0° to 0.9° latitude - 1.0° to 1.9° longitude were grouped. These monthly and annual movement summaries were then plotted on a series of charts (pages 25 - 92). The region from which movement originated is shown in the upper left of each chart. The monthly and annual frequency of 24-hour movements is shown immediately below the appropriate title. This total does not always reflect the number of tropical cyclones passing through each area. Differences are noted in most areas because of multiple 24-hour observations for those storms which remained in an area for more than one day, and the movement of other storms over portions of an area between observations. Therefore, the total number of individual tropical cyclone tracks touching each area in each month is shown in the lower right of each chart together with the years of tropical cyclone origin or detection in each area.

A sample monthly movement summary (for the area 15°-20°N., 50°-60°W. during September), with an explanation of the information on these portions of each chart, is shown in figure 1.

3. 24-HOUR MOVEMENT

All movements have been tabulated in degrees of latitude and longitude. Distances (or speeds) represented by a movement through one degree vary considerably at different latitudes. Calculations of mean speeds were made to provide convenient reference tables at various latitudes. The procedure used, adapted from the middle latitude navigation method outlined on pp. 225-227 of Bowditch's [10] "American Practical Navigator," is shown on page 19. The complete range of storm movements, or any portion of the movement distribution in each summary area, may be estimated by using the speed tables. For example, in figure 1 the maximum speed is 19.8 knots (one case at 3.5°N., 7.5°W.); the minimum speed is 5.2 knots (four cases at 1.5°N., 1.5°W.). The speed to the

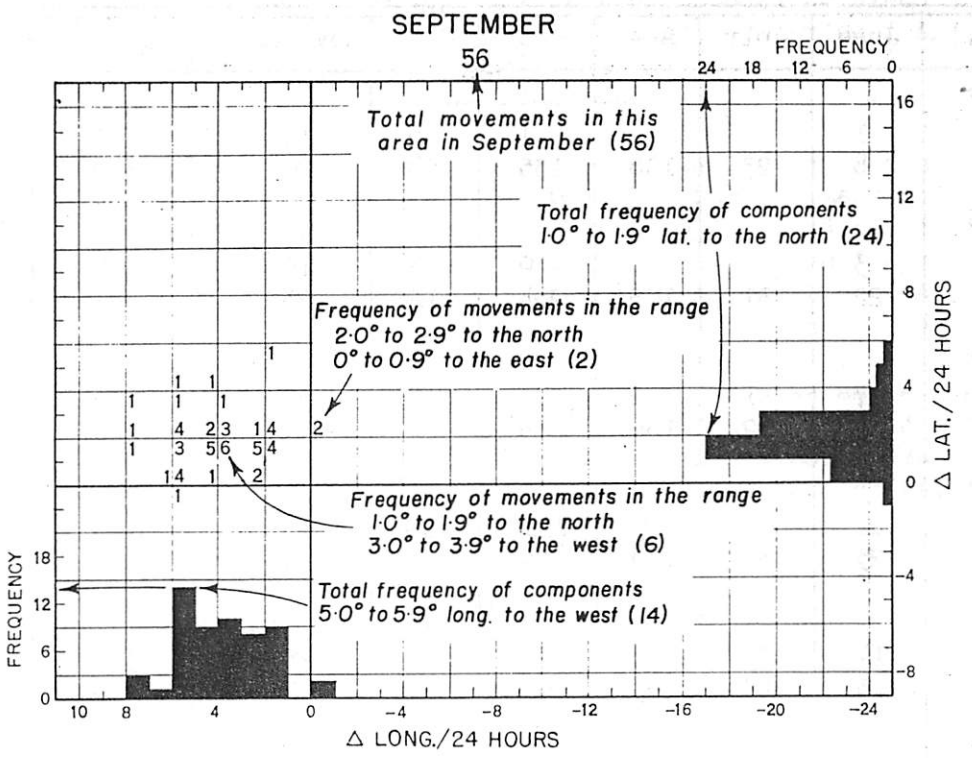

Figure 1. - Example of monthly movement summary charts, area 15°-20°N., 50°-60°W., for September.

most frequent location (six cases at 1.5°N., 3.5°W.) is 9.1 knots. Of the 56 24-hour movements in figure 1, 37 (or 66 percent) fall within the boundary drawn between the mid-points 1.5°N.-2.5°N., 1.5°W.-5.5°W. The range of speeds to these points is from 5.2 knots to 14.4 knots. A close estimation of the rate of movement to any point can be easily obtained, giving a complete picture of the range of speeds of all 24-hour movements. These tables (pages 20 - 23) should be useful for estimating speeds of storm movement in any situation where this information may be desired.

A detailed discussion of movement characteristics in each of the 68 areas will not be attempted since details are shown on the charts. A general summary of the eastward and westward components of 24-hour tropical cyclone motion at various latitudes is given in table 1.

Westward movement, generally with a slight northward component, is strongly predominant below 20°N., with a few movements northeastward from the western Caribbean by storms developed there. The majority of movements between 20°N.

Table 1. - Tropical cyclone movement characteristics by month in specified latitudinal bands for the North Atlantic region for the period 1886-1958. "E" indicates a component of motion toward the east and "W" a component of motion toward the west.

Lat.(N.)	June	July	Aug.	Sept.	Oct.	Nov.-May	Total	Percent
10°-15°								
E	1			1	6	14	22	6
W	8	23	106	135	58	20	350	94
15°-20°								
E	3			9	37	15	64	9
W	22	31	183	284	128	23	671	91
20°-25°								
E	17	1	2	54	85	30	185	23
W	41	32	156	253	91	37	610	77
25°-30°								
E	22	13	29	141	104	36	345	43
W	25	35	140	164	73	25	462	57
30°-35°								
E	14	23	55	137	95	25	349	66
W	5	18	43	56	48	7	177	34
35°-40°								
E	15	9	48	107	49	28	256	87
W		1	8	21	7	1	38	13
40°-45°								
E	8	4	33	58	33	12	148	97
W				2	2	1	5	3
45°-50°								
E	6	2	15	36	27	8	94	96
W					2	2	4	4
50°-60°								
E	4	1	17	31	31	9	93	99
W				1			1	1

and 30°N. is still westward, but a greater northward component is usual, and an increasing number of northeastward motions are noted as a result of recurvatures in or south of the region. North of 30°N. a sharply increasing percentage of northeastward movements is noted as storms come under the influence of stronger steering currents in the higher latitudes. Many tropical cyclones gradually acquire the structure and organization of extratropical cyclones and become major features of the general circulation in the northern portion of

Table 2. - Tropical cyclone origins by month for areas in the North Atlantic region for the period 1886-1958.

Month	East of 50°	50°-60°	60°-70°	70°-80°	80°-90°	90°-100°	Total
			Origins South of 20°N.				
June		1		5	12		18
July	1	10	2	1	2	1	17
Aug.	28	48	8	3	3	2	92
Sept.	28	37	12	14	16	6	113
Oct.	5	13	10	20	32	4	84
Nov.-May	1	2	3	10	7		23
Total	63	111	35	53	72	13	347
			Origins North of 20°N.				
June				2	8	9	19
July			1	7	8	6	22
Aug.	2	3	9	14	10	3	41
Sept.	3	16	10	15	12	14	70
Oct.	8	6	12	14	9	5	54
Nov.-May	2	7	6	2	1		18
Total	15	32	38	54	48	37	224

the ocean [11]. Others, particularly those over the continent, decrease rapidly in intensity due to the effects of increased surface friction and movement away from their main energy source - the warm tropical ocean. Many of these storms dissipate, or become only minor circulations from the standpoint of winds, within a short time after moving inland. The latter portions of a number of storm tracks, usually in the middle latitudes from the central Atlantic eastward, have a southeastward component - indicative of motion partially around large high pressure areas often present in that region.

4. TROPICAL CYCLONE ORIGINS

Table 2 is a general summary of seasonal variation in regions of tropical cyclone origin or detection. The well known seasonal shift of origins [12,13] is readily seen. The progression is from a June concentration in the Gulf of Mexico and western Caribbean to increased origin frequencies in the Bahamas and just east of the Lesser Antilles in July, and in the lower latitudes of the tropical Atlantic in August and September. Slightly greater numbers of origins than in earlier months are noted in the western regions in these two months. In October a pronounced increase occurs in the western Caribbean when almost 40 percent of all storms during the month are first noted south of 20°N. between 70°W and 90°W. Other origins are scattered throughout most of the development region. This general scatter continues in the off-season months.

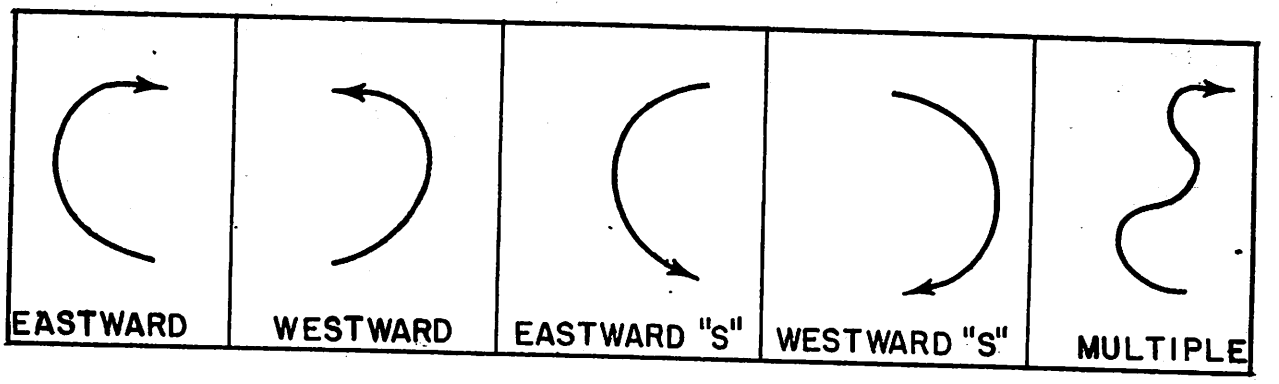

Figure 2. - Schematic diagram of tropical cyclone recurvature types.

5. RECURVATURE AND ERRATIC MOVEMENTS

Tabulations of resultant motion do not reflect all characteristics of most tropical cyclone tracks. Since the storm path is not always a straight line between two points, recurvatures are major features in many tracks and the rarer complete loops in the storm path are also important.

a.) Recurvatures. - Several types of upper-level flow patterns have been associated with tropical cyclone recurvature [14]. Riehl [15] has stressed the major role of planetary waves in affecting recurvature, and several others [16, 17, 18] have demonstrated that events in distant portions of the hemisphere can be important in the development of long wave patterns which, in turn, control tropical cyclone movements in the Atlantic.

If recurvature is considered as a change in the longitudinal direction of motion of a storm center, four types may be differentiated:

1) eastward or regular recurvature - change in the direction of movement from a westward component through north to eastward (clockwise). This is by far the most frequent type.

2) westward recurvature - a change in the direction of movement from an eastward component through north to westward (counterclockwise).

A small number of tropical cyclones have changed the sense of longitudinal direction while also on an equatorward track. Again two types may be distinguished:

3) a change in the direction of movement from a westward component through south to eastward (counterclockwise).

4) a change in the direction of movement from an eastward component through south to westward (clockwise).

Recurvature points have been determined as the most westerly locations (types 1 and 3) or the most easterly locations (types 2 and 4) reached by storm centers during each recurvature. Multiple recurvatures, including two

eastward points with a westward point between, have been noted infrequently. Dates and geographic locations of eastward recurvature points are shown on figures 3-8 and westward recurvatures on figure 9. Multiple recurvatures of the same type for an individual storm are indicated by "A", "B" or "C", and the equatorward types are distinguished by "S". A diagram of each type is shown in figure 2.

Early season eastward recurvatures are confined to the Gulf of Mexico in June, to the Gulf and the extreme western Atlantic off Florida in July. Following the increased area covered by tropical cyclones in August, a primary concentration of recurvatures is from the southeastern United States coast between 27°N. and 35°N. eastward to near 72°W. Lesser concentrations are noted in eastern Texas and southwest of Bermuda. No marked concentration of recurvature locations is found in September as a large expansion of the recurvature area occurs. The most frequent recurvatures are southwest of Bermuda. Most storms recurve between 25°N. and 35°N. but a number are noted both north and south of this band. The wide latitudinal variation continues in October, but the favored location is in the western Caribbean between 17°N. and 20°N., west of 80°W. Off-season eastward recurvatures are widely scattered.

Westward recurvatures are most frequent between 25°N. and 35°N. over a wide longitudinal area, with several occurrences also at high latitudes over the eastern Atlantic and late season occurrences in the western Caribbean.

b.) Loops. - When tropical cyclones move into areas of light and variable ambient winds where an organized steering current is absent, irregular motions of the storm center may occur. In extreme cases complete loops in the storm path have been tracked. Two classes of these loops - clockwise and counterclockwise - have been compiled and are shown on figures 10 and 11.

The counterclockwise group is located in two general areas: over the Atlantic north and east of 25°N., 50°W.; and from the western Caribbean and Gulf of Mexico northeastward to the Carolina coast and near Bermuda. Early and late season occurrences predominate: 6 in May and June, 4 in September, 10 in October, and 3 in November. The slightly less frequent clockwise group is more widely scattered - in the Gulf of Mexico, over the Atlantic between 25°N. and 40°N. from 30°W. to 75°W., and in the south-central Atlantic. These are generally a midseason occurrence: 3 in August-September, 9 in September, 4 in October, and 1 in November.

Each loop contains at least two recurvature points. These are not shown on the recurvature charts.

6. SUMMARY

Seasonal distributions of 24-hour changes of position, origins, recurvatures, and some of the irregular movements of 581 tropical cyclones in the North Atlantic area during a 73-year period were studied.

The general pattern of tropical cyclone motion is predominantly westward at slow to moderate speeds in the region south of 25°N. Between 25°N. and

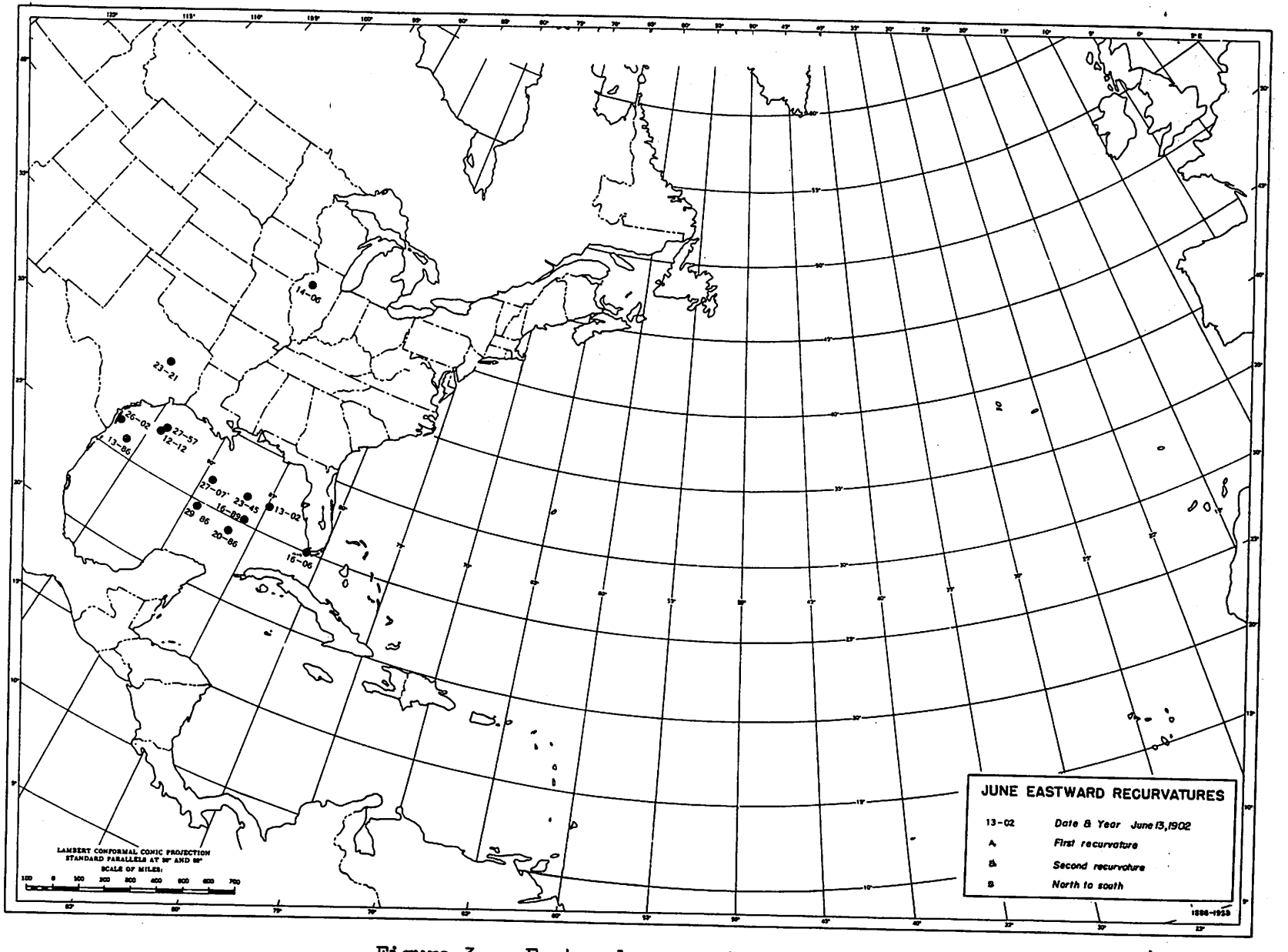

Figure 3. - Eastward recurvatures, June.

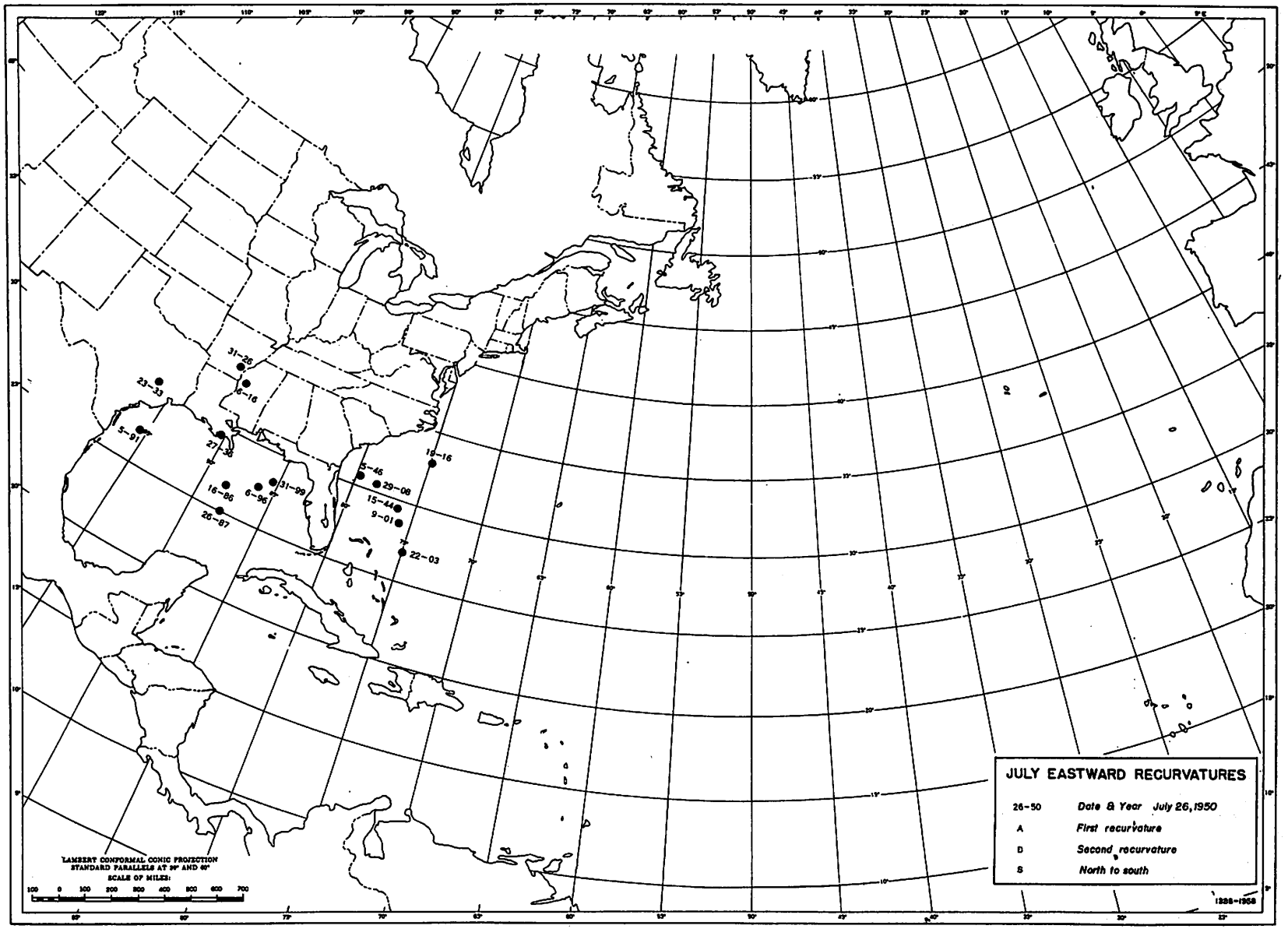

Figure 4. - Eastward recurvatures, July.

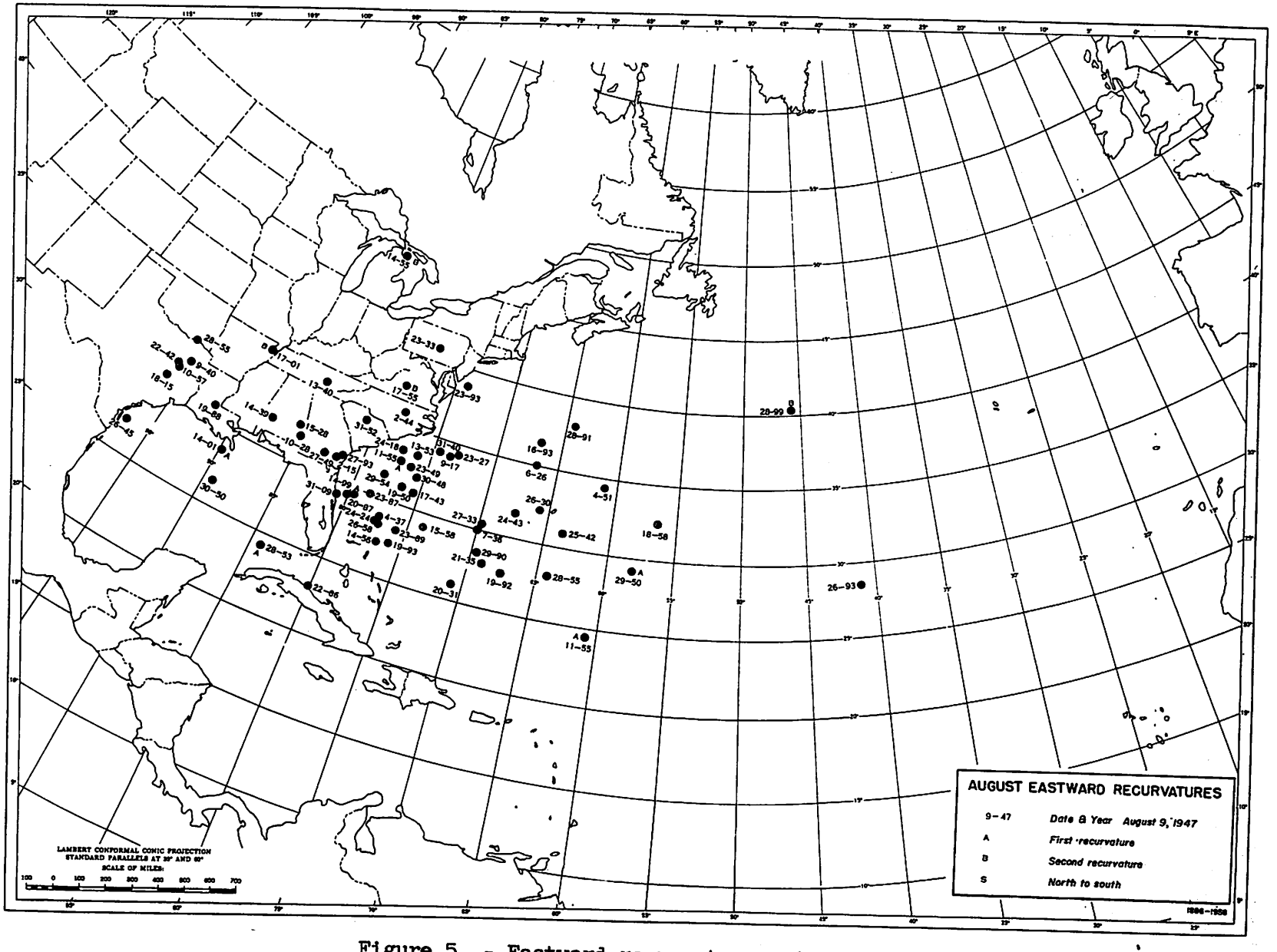

Figure 5. - Eastward recurvatures, August.

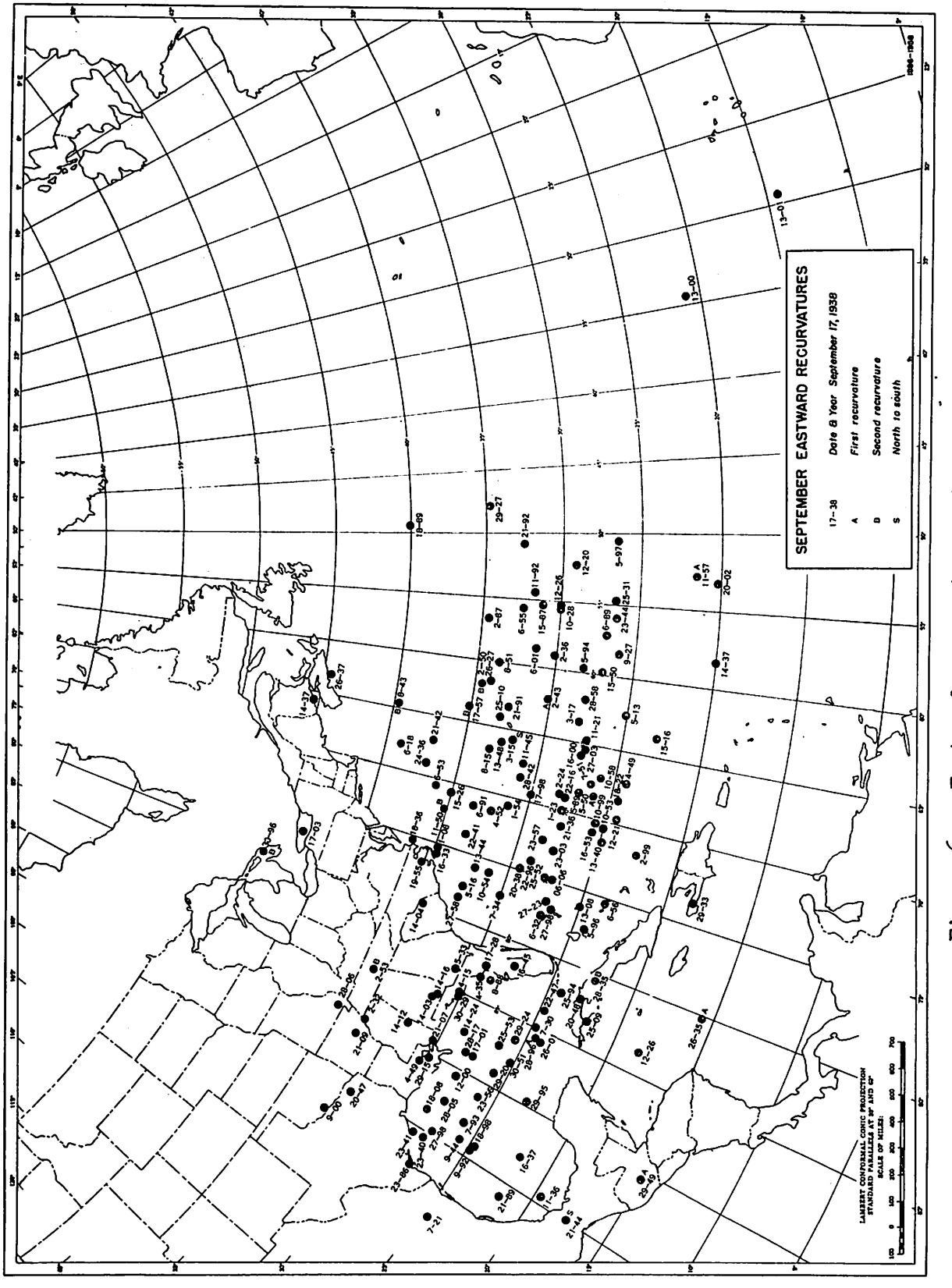

Figure 6. - Eastward recurvatures, September.

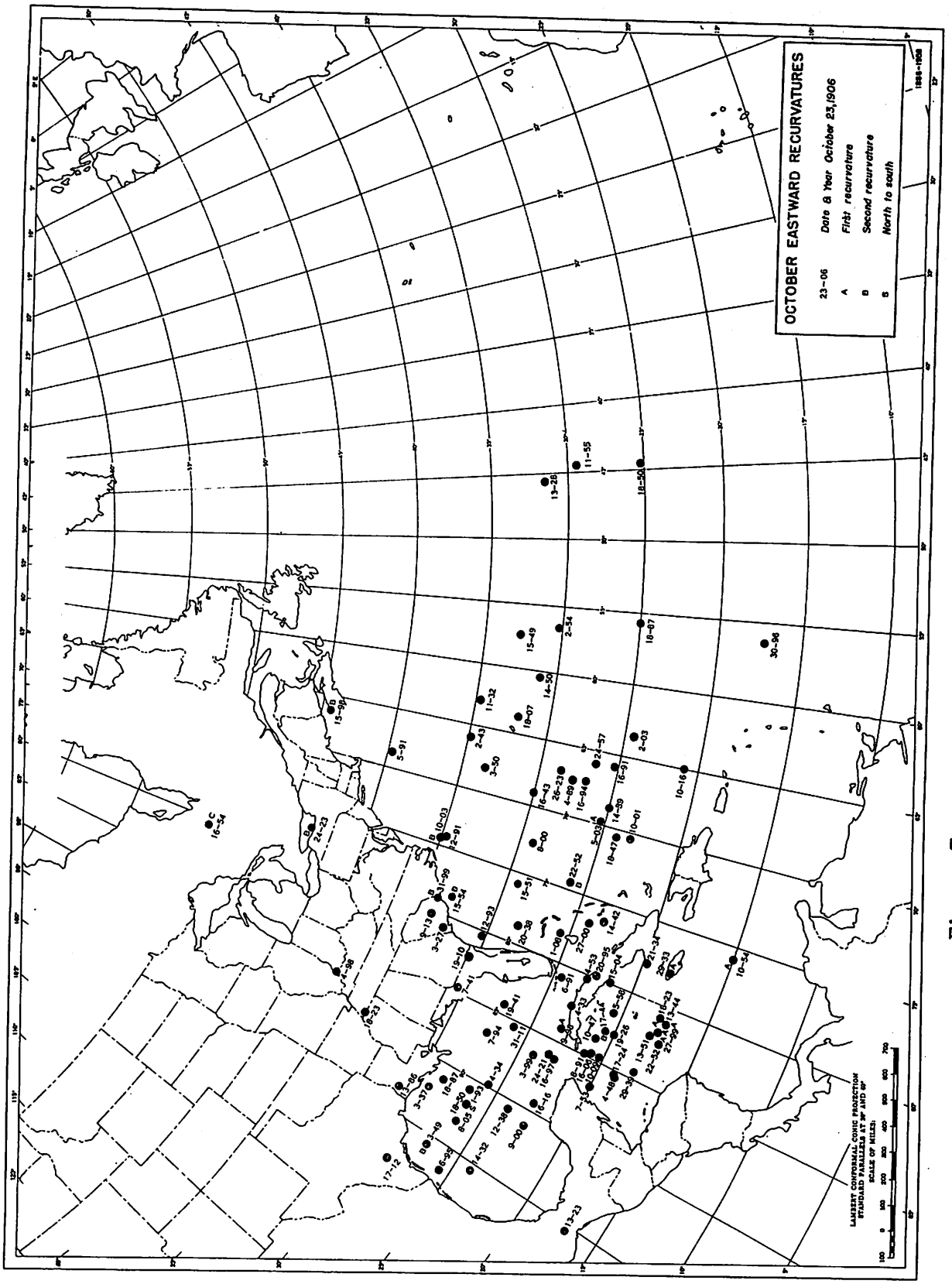

Figure 7. - Eastward recurvatures, October.

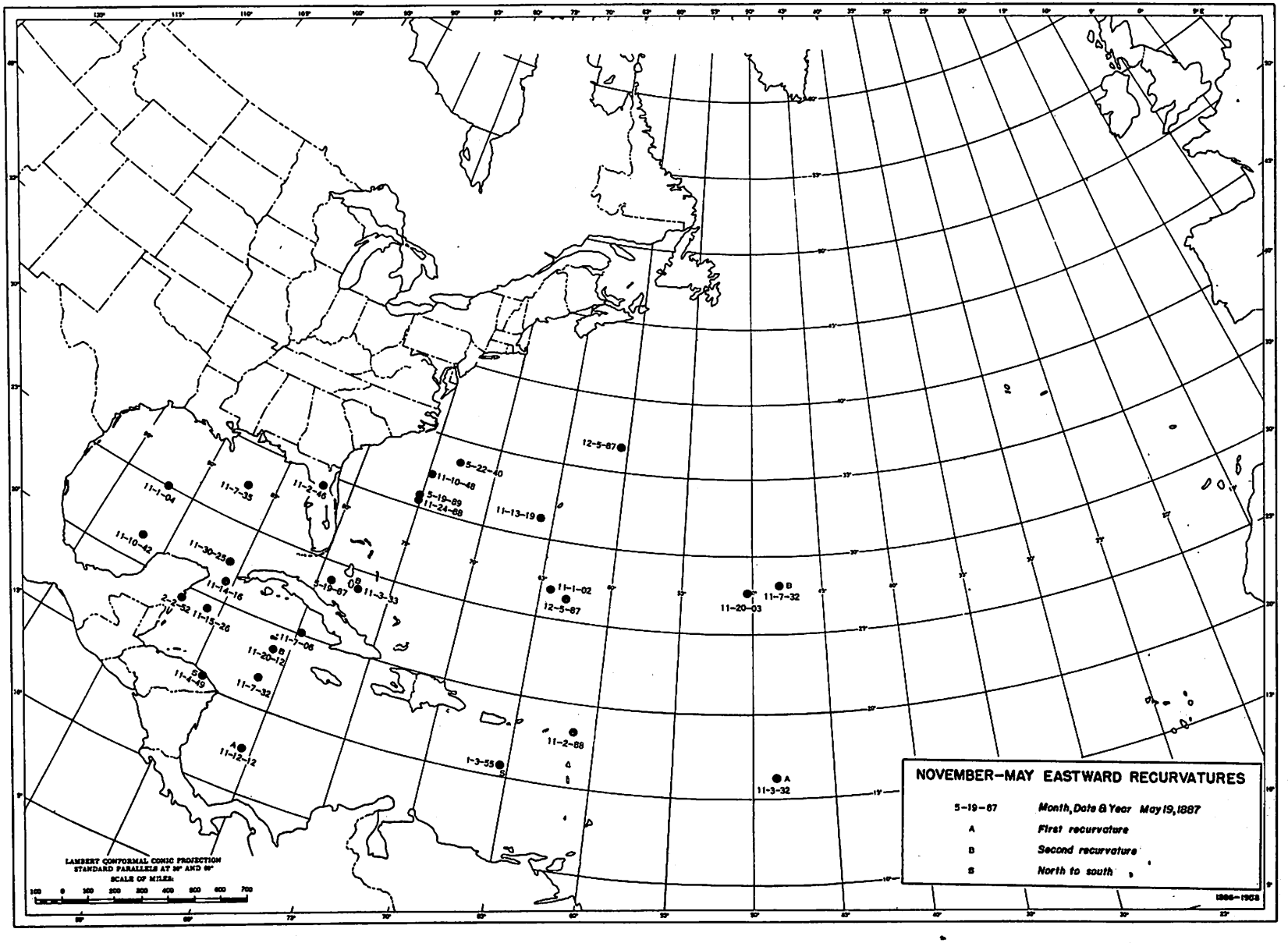

Figure 8. - Eastward recurvatures, November-May.

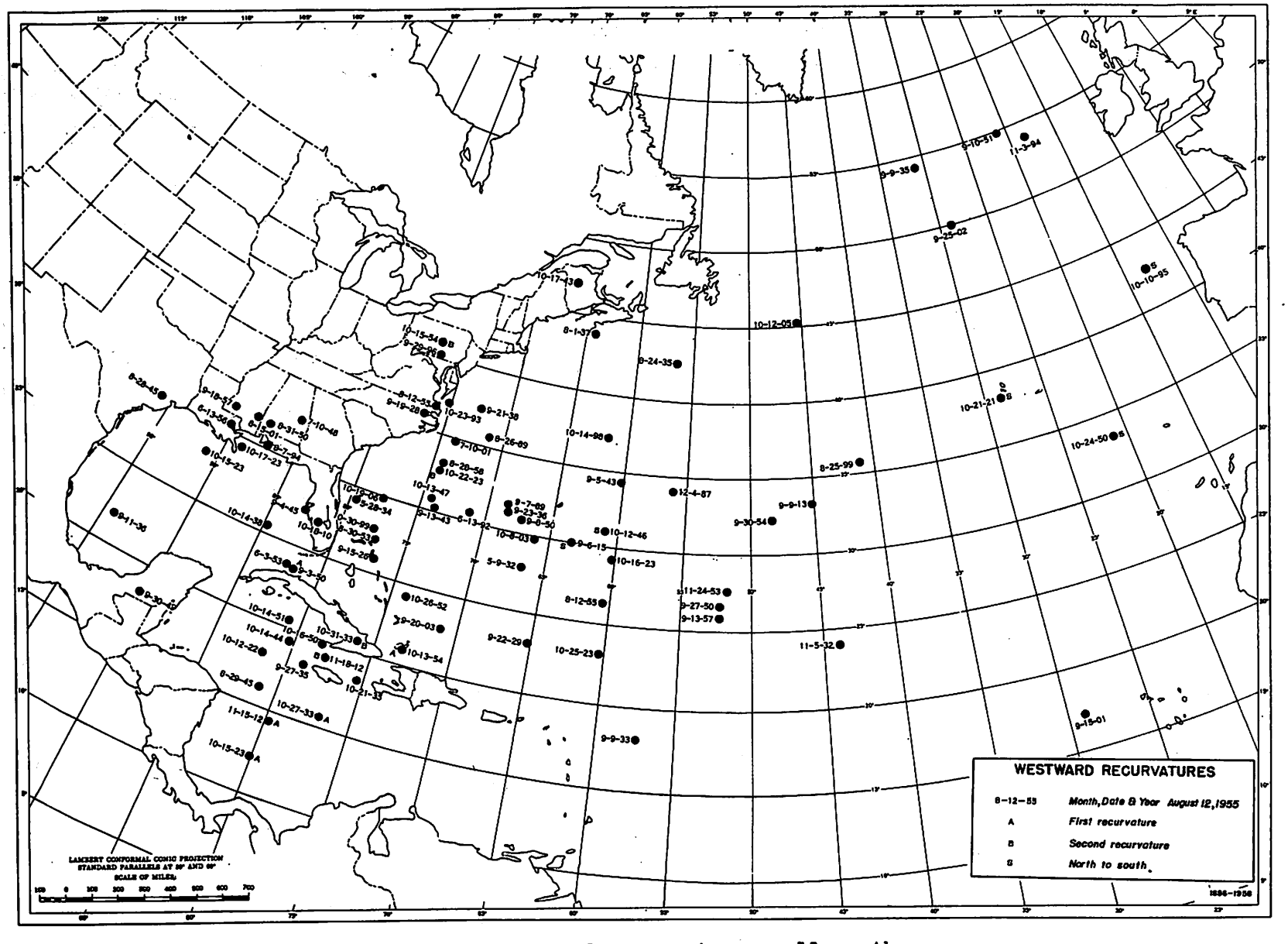

Figure 9. - Westward recurvatures, all months.

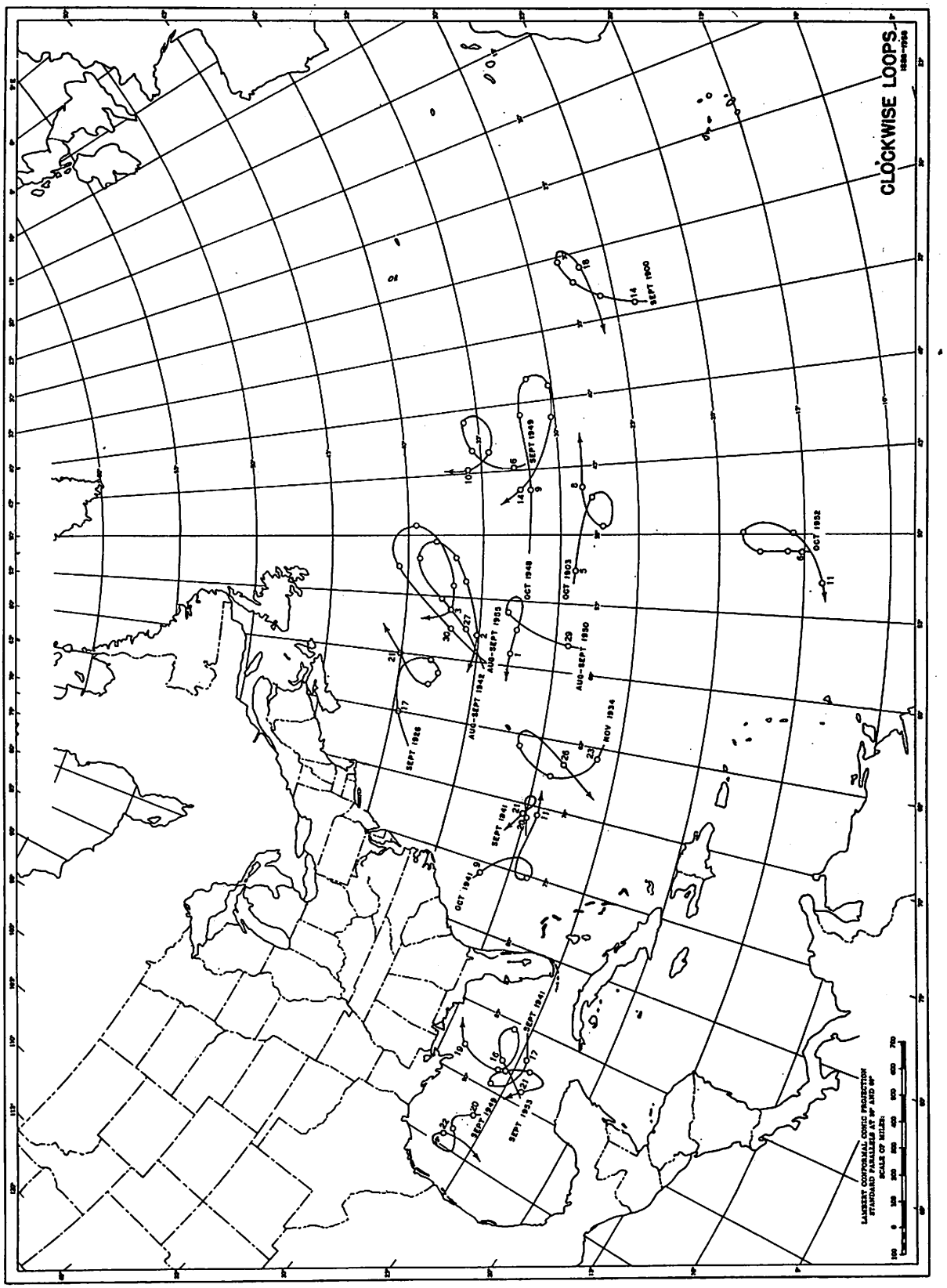

Figure 10. - Clockwise loops in tropical cyclone tracks.

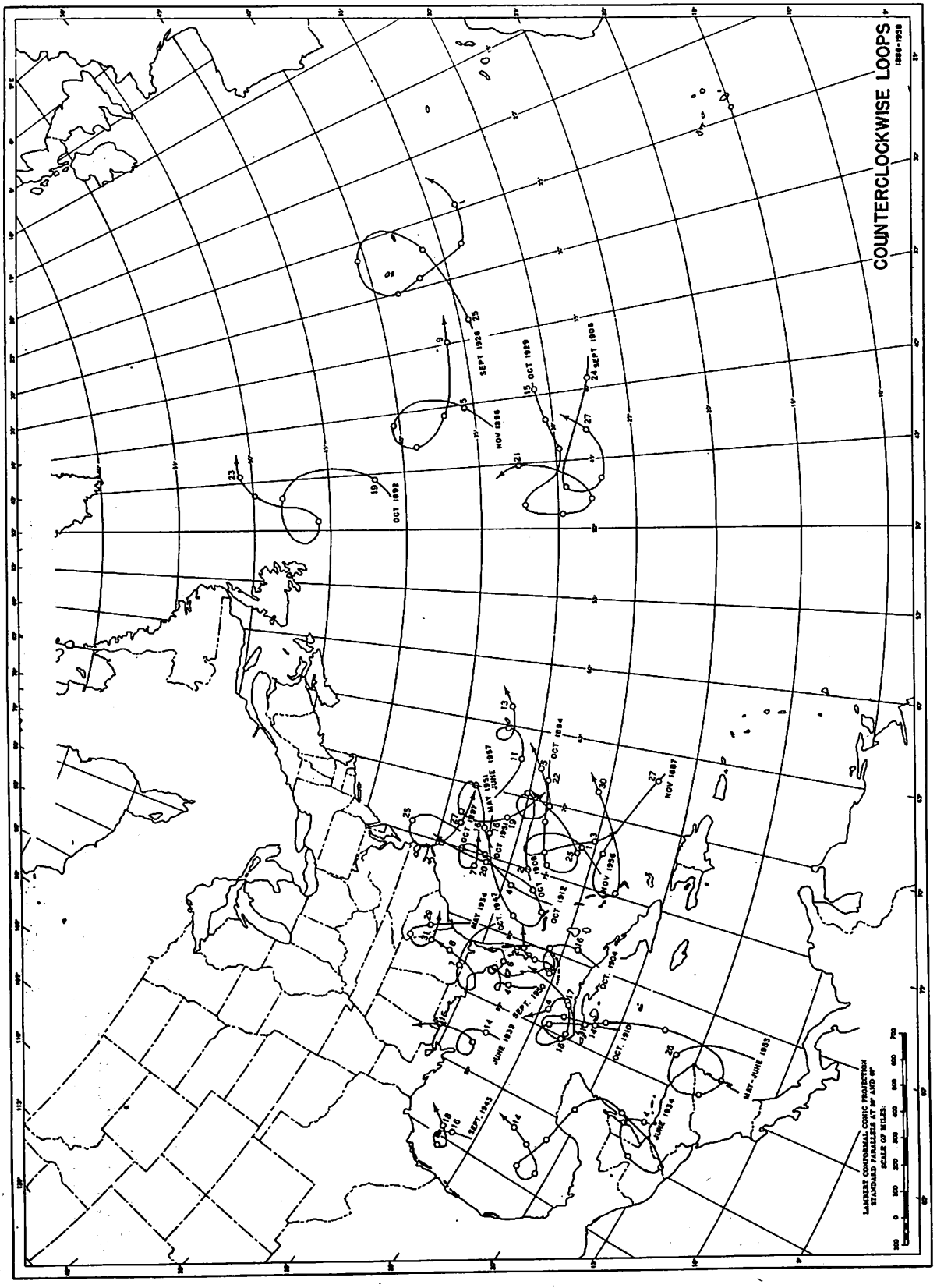

Figure 11. - Counterclockwise loops in tropical cyclone tracks.

30°N. northeastward motions become more frequent, and are progressively more usual, with increasing speeds, in the northern sections of the hurricane region.

The primary tropical cyclone formation areas tend to show a definite longitudinal shift during the year, from the western portion of the ocean early in the season to the southeastern Atlantic in August and September, then back to the Caribbean late in the season.

The variability of areas of recurvature tends to be greatest during September. Two types of extreme short-period changes in the direction of storm movement (loops) were found to be primarily concentrated over rather definite areas within certain portions of the tropical cyclone season.

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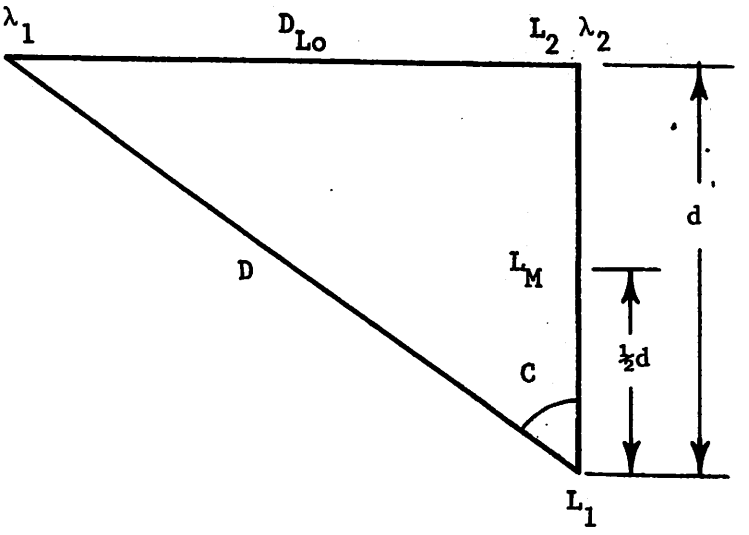
Example of the procedure used to calculate the mean speeds shown in Tables 3-10:

Base Latitude 17°13' (Area 15°-20°N), Longitude 67°30'. To find the distance to the midpoint of the 1° area centered at 21°N, 72°W

$d = L_2 - L_1$ (Minutes)
$= 21°00' - 17°30'$
$= 3°30'$
$d = 210'$
$\text{Log } d = 2.32222$

$L_M = L_1 + \frac{1}{2}d$
$= 17°30' + 1°45'$
$L_M = 19°15'$
$\text{Log Cos } L_M = 9.97501$

$D_{Lo} = \lambda_1 - \lambda_2$ (Minutes)
$= 72°00' - 67°30'$
$= 4°30'$
$= 270'$
$\text{Log } D_{Lo} = 2.43136$



$\log \tan C = \log D_{Lo} + \log \cos L_M - \log d$
$= 2.43136 + 9.97501 - 2.32222$
$\log \tan C = 0.08415 \quad \log \sec C = 0.19664$

$\log D = \log d + \log \sec C$
$= 2.32222 + 0.19664$
$\log D = 2.51886$
$D = 330.26$ Nautical Miles
Mean Speed= 13.76 or 13.8 knots.

[Adapted from the middle-latitude sailing distance computation technique given on pages 225-227 of American Practical Navigator (Bowditch), 1958.]

SPEED IN KNOTS BETWEEN SPECIFIED COORDINATES, BASE LATITUDE 12°30'

Long.	0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5
Lat.											
10.5	26.3	26.5	26.9	27.5	28.4	29.4	30.5	31.8	33.2	34.7	36.2
9.5	23.8	24.0	24.5	25.2	26.1	27.1	28.4	29.8	31.2	32.8	34.5
8.5	21.3	21.5	22.1	22.9	23.8	25.0	26.3	27.8	29.4	31.1	32.9
7.5	18.8	19.1	19.7	20.6	21.6	22.9	24.4	26.0	27.7	29.5	31.4
6.5	16.3	16.6	17.3	18.3	19.5	21.0	22.6	24.3	26.1	28.0	30.0
5.5	13.8	14.2	15.0	16.1	17.5	19.1	20.9	22.7	24.7	26.7	28.8
4.5	11.3	11.8	12.8	14.1	15.6	17.4	19.3	21.3	23.4	25.6	27.8
3.5	8.8	9.5	10.6	12.2	14.0	15.9	18.0	20.2	22.4	24.6	26.9
2.5	6.4	7.2	8.7	10.6	12.6	14.8	17.0	19.3	21.6	23.9	26.3
1.5	3.9	5.2	7.1	9.3	11.6	13.9	16.3	18.6	21.0	23.4	25.8
0.5	1.7	3.9	6.2	8.6	11.0	13.5	15.9	18.3	20.8	23.2	25.6
-0.5	1.7	3.9	6.2	8.6	11.1	13.5	16.0	18.4	20.8	23.2	25.7
-1.5	3.9	5.2	7.2	9.4	11.6	14.0	16.4	18.7	21.1	23.5	26.0
-2.5	6.4	7.3	8.8	10.6	12.7	14.9	17.1	19.4	21.8	24.1	26.5
-3.5	8.8	9.5	10.7	12.3	14.1	16.1	18.2	20.4	22.6	24.9	27.2
-4.5	11.3	11.8	12.8	14.2	15.8	17.6	19.6	21.6	23.7	25.9	28.2
-5.5	13.8	14.2	15.1	16.2	17.7	19.3	21.1	23.0	25.1	27.2	29.3

SPEED IN KNOTS BETWEEN SPECIFIED COORDINATES, BASE LATITUDE 17°30'

Long.	0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5
Lat.											
10.5	26.3	26.5	26.9	27.5	28.2	29.2	30.2	31.4	32.6	34.1	35.7
9.5	23.8	24.0	24.4	25.1	25.9	26.9	28.1	29.4	30.8	32.4	34.0
8.5	21.3	21.5	22.0	22.8	23.7	24.8	26.1	27.5	29.0	30.6	32.3
7.5	18.8	19.1	19.6	20.4	21.5	22.7	24.1	25.6	27.3	29.0	30.8
6.5	16.3	16.6	17.3	18.2	19.4	20.7	22.2	23.9	25.7	27.5	29.4
5.5	13.8	14.2	14.9	16.0	17.3	18.8	20.5	22.3	24.2	26.2	28.2
4.5	11.3	11.8	12.7	13.9	15.5	17.1	19.0	20.9	22.9	25.0	27.1
3.5	8.8	9.4	10.5	12.0	13.8	15.7	17.7	19.8	21.9	24.1	26.3
2.5	6.4	7.2	8.6	10.4	12.4	14.4	16.6	18.8	21.0	23.3	25.6
1.5	3.9	5.2	7.0	9.1	11.3	13.6	15.9	18.2	20.5	22.9	25.2
0.5	1.7	3.8	6.1	8.5	10.8	13.1	15.5	17.9	20.3	22.7	25.0
-0.5	1.7	3.8	6.1	8.5	10.8	13.2	15.6	18.0	20.4	22.7	25.1
-1.5	3.9	5.2	7.1	9.2	11.4	13.7	16.0	18.3	20.7	23.1	25.4
-2.5	6.4	7.2	8.7	10.5	12.5	14.6	16.8	19.1	21.3	23.6	26.0
-3.5	8.8	9.5	10.6	12.1	13.9	15.9	17.9	20.1	22.2	24.5	26.7
-4.5	11.3	11.8	12.8	14.1	15.6	17.4	19.3	21.3	23.4	25.5	27.7
-5.5	13.8	14.2	15.0	16.1	17.5	19.1	20.9	22.8	24.7	26.8	28.9

SPEED IN KNOTS BETWEEN SPECIFIED COORDINATES, BASE LATITUDE 22°30'

Long.	0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5
Lat.																
16.5	41.3	41.4	41.6	41.9	42.4	42.9	43.6	44.3	45.1	46.0	47.0	48.1	49.2	50.4	51.7	53.0
15.5	38.8	38.9	39.1	39.5	40.0	40.5	41.2	42.0	42.9	43.8	44.8	46.0	47.2	48.5	49.8	51.2
14.5	36.3	36.4	36.7	37.0	37.5	38.2	38.9	39.7	40.7	41.7	42.8	44.0	45.3	46.6	48.0	49.5
13.5	33.8	33.9	34.2	34.6	35.2	35.8	36.6	37.5	38.5	39.6	40.8	42.0	43.4	44.8	46.3	47.8
12.5	31.3	31.4	31.7	32.2	32.8	33.5	34.4	35.3	36.4	37.6	38.8	40.2	41.6	43.0	44.6	46.2
11.5	28.8	28.9	29.3	29.8	30.4	31.2	32.1	33.2	34.3	35.6	36.9	38.3	39.8	41.4	43.0	44.6
10.5	26.3	26.5	26.8	27.4	28.1	28.9	29.9	31.1	32.3	33.6	35.1	36.6	38.1	39.8	41.5	43.2
9.5	23.8	24.0	24.4	25.0	25.8	26.7	27.8	29.0	30.4	31.8	33.3	34.9	36.6	38.3	40.1	41.9
8.5	21.3	21.6	22.0	22.6	23.5	24.5	25.7	27.1	28.5	30.1	31.7	33.3	35.1	36.9	38.7	40.6
7.5	18.8	19.1	19.6	20.3	21.3	22.4	23.8	25.2	26.7	28.4	30.1	31.9	33.7	35.6	37.5	39.5
6.5	16.3	16.6	17.2	18.1	19.2	20.4	21.9	23.4	25.1	26.9	28.7	30.6	32.5	34.5	36.5	38.5
5.5	13.8	14.2	14.9	15.9	17.1	18.5	20.1	21.8	23.6	25.5	27.4	29.4	31.4	33.5	35.6	37.6
4.5	11.3	11.8	12.6	13.8	15.2	16.8	18.6	20.4	22.3	24.4	26.4	28.4	30.5	32.7	34.8	36.9
3.5	8.8	9.4	10.4	11.8	13.5	15.3	17.2	19.2	21.3	23.4	25.5	27.6	29.8	32.0	34.2	36.4
2.5	6.4	7.1	8.5	10.2	12.0	14.1	16.1	18.3	20.4	22.6	24.8	27.1	29.3	31.5	33.8	36.0
1.5	3.9	5.1	6.9	8.9	11.0	13.2	15.4	17.6	19.9	22.1	24.4	26.7	29.0	31.2	33.5	35.8
0.5	1.7	3.7	5.9	8.2	10.4	12.7	15.0	17.4	19.6	21.9	24.2	26.5	28.8	31.2	33.5	35.8
-0.5	1.7	3.7	5.9	8.2	10.5	12.8	15.1	17.4	19.7	22.0	24.3	26.6	29.0	31.3	33.6	35.9
-1.5	3.9	5.1	6.9	9.0	11.1	13.3	15.6	17.8	20.1	22.4	24.7	27.0	29.3	31.6	33.9	36.2
-2.5	6.4	7.2	8.5	10.3	12.2	14.3	16.4	18.5	20.8	23.0	25.2	27.5	29.8	32.1	34.4	36.6
-3.5	8.8	9.4	10.5	12.0	13.7	15.6	17.5	19.6	21.7	23.9	26.1	28.3	30.6	32.8	35.0	37.3
-4.5	11.3	11.8	12.7	13.9	15.4	17.1	19.0	20.9	22.9	25.0	27.1	29.2	31.4	33.6	35.8	38.1
-5.5	13.8	14.2	15.0	16.0	17.4	18.9	20.6	22.4	24.3	26.2	28.3	30.4	32.5	34.6	36.8	39.0

SPEED IN KNOTS BETWEEN SPECIFIED COORDINATES, BASE LATITUDE 27°30'

Long.	0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5
Lat.																
16.5	41.3	41.4	41.6	41.9	42.3	42.7	43.3	44.0	44.7	45.5	46.4	47.4	48.4	49.5	50.7	51.9
15.5	38.8	38.9	39.1	39.4	39.8	40.3	41.0	41.7	42.5	43.3	44.3	45.3	46.4	47.6	48.8	50.0
14.5	36.3	36.4	36.6	37.0	37.4	38.0	38.6	39.4	40.2	41.2	42.2	43.3	44.5	45.6	46.9	48.2
13.5	33.8	33.9	34.1	34.5	35.0	35.6	36.3	37.1	38.0	39.0	40.1	41.3	42.5	43.8	45.1	46.5
12.5	31.3	31.4	31.7	32.1	32.6	33.3	34.0	34.9	35.9	37.0	38.1	39.3	40.6	42.0	43.4	44.9
11.5	28.8	28.9	29.2	29.7	30.3	30.9	31.8	32.7	33.8	34.9	36.2	37.5	38.9	40.3	41.8	43.3
10.5	26.3	26.4	26.8	27.3	27.9	28.7	29.6	30.6	31.7	33.0	34.3	35.6	37.1	38.6	40.2	41.8
9.5	23.8	24.0	24.3	24.9	25.6	26.4	27.4	28.6	29.8	31.1	32.5	34.0	35.5	37.1	38.8	40.5
8.5	21.3	21.5	21.9	22.5	23.3	24.3	25.3	26.6	27.9	29.3	30.8	32.4	34.0	35.7	37.4	39.2
7.5	18.8	19.0	19.5	20.2	21.1	22.1	23.3	24.7	26.1	27.6	29.2	30.9	32.6	34.4	36.2	38.1
6.5	16.3	16.6	17.1	17.9	18.9	20.1	21.4	22.9	24.4	26.1	27.8	29.6	31.4	33.2	35.1	37.1
5.5	13.8	14.1	14.8	15.7	16.8	18.2	19.7	21.2	22.9	24.7	26.5	28.4	30.3	32.3	34.2	36.2
4.5	11.3	11.7	12.5	13.6	14.9	16.4	18.0	19.8	21.6	23.5	25.4	27.4	29.4	31.4	33.4	35.5
3.5	8.8	9.3	10.3	11.6	13.1	14.9	16.7	18.6	20.5	22.5	24.5	26.6	28.6	30.7	32.8	34.9
2.5	6.4	7.1	8.3	9.9	11.7	13.6	15.6	17.6	19.7	21.7	23.8	26.0	28.1	30.2	32.4	34.5
1.5	3.9	5.0	6.7	8.6	10.6	12.7	14.8	16.9	19.1	21.3	23.4	25.6	27.8	30.0	32.2	34.3
0.5	1.7	3.5	5.7	7.8	10.0	12.2	14.4	16.6	18.8	21.0	23.3	25.5	27.7	29.9	32.1	34.3
-0.5	1.7	3.5	5.7	7.9	10.1	12.3	14.5	16.7	18.9	21.2	23.4	25.6	27.8	30.0	32.3	34.5
-1.5	3.9	5.0	6.7	8.7	10.7	12.8	15.0	17.2	19.3	21.5	23.7	26.0	28.2	30.4	32.6	34.8
-2.5	6.4	7.1	8.4	10.0	11.9	13.8	15.8	17.9	20.1	22.2	24.4	26.5	28.7	30.9	33.1	35.3
-3.5	8.8	9.4	10.4	11.8	13.4	15.2	17.1	19.0	21.1	23.2	25.2	27.3	29.5	31.6	33.8	36.0
-4.5	11.3	11.8	12.6	13.8	15.2	16.8	18.5	20.4	22.3	24.3	26.3	28.3	30.4	32.5	34.7	36.8
-5.5	13.8	14.2	14.9	15.9	17.1	18.6	20.2	21.9	23.7	25.6	27.5	29.5	31.5	33.6	35.7	37.7
-6.5	16.3	16.6	17.2	18.1	19.2	20.5	22.0	23.6	25.3	27.1	28.9	30.8	32.8	34.8	36.8	38.9

SPEED IN KNOTS BETWEEN SPECIFIED COORDINATES, BASE LATITUDE 32°30'

Long.	0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5
Lat.																
16.5	41.3	41.3	41.5	41.8	42.1	42.5	43.1	43.6	44.3	45.0	45.8	46.7	47.6	48.5	49.6	50.6
15.5	38.8	38.9	39.0	39.3	39.7	40.1	40.7	41.3	42.0	42.8	43.6	44.5	45.5	46.5	47.6	48.7
14.5	36.3	36.4	36.6	36.9	37.3	37.8	38.3	39.0	39.8	40.6	41.5	42.5	43.5	44.6	45.7	46.9
13.5	33.8	33.9	34.1	34.4	34.9	35.4	36.0	36.7	37.6	38.4	39.4	40.4	41.6	42.7	43.9	45.2
12.5	31.3	31.4	31.6	32.0	32.5	33.1	33.7	34.5	35.4	36.3	37.4	38.5	39.6	40.9	42.1	43.5
11.5	28.8	28.9	29.2	29.6	30.1	30.7	31.5	32.3	33.3	34.3	35.4	36.6	37.8	39.1	40.5	41.9
10.5	26.3	26.4	26.7	27.1	27.7	28.4	29.2	30.1	31.2	32.3	33.5	34.7	36.1	37.4	38.9	40.3
9.5	23.8	23.9	24.2	24.8	25.4	26.2	27.0	28.1	29.2	30.4	31.6	33.0	34.4	35.9	37.4	38.9
8.5	21.3	21.5	21.8	22.4	23.1	23.9	24.9	26.0	27.2	28.5	29.9	31.3	32.8	34.4	36.0	37.6
7.5	18.8	19.0	19.4	20.0	20.8	21.8	22.9	24.1	25.4	26.8	28.3	29.8	31.4	33.1	34.7	36.4
6.5	16.3	16.5	17.0	17.7	18.6	19.7	20.9	22.3	23.7	25.2	26.8	28.4	30.1	31.9	33.6	35.4
5.5	13.8	14.1	14.7	15.5	16.5	17.8	19.1	20.6	22.1	23.8	25.5	27.2	29.0	30.8	32.6	34.5
4.5	11.3	11.7	12.4	13.4	14.6	15.9	17.5	19.1	20.8	22.5	24.3	26.2	28.0	29.9	31.8	33.8
3.5	8.8	9.3	10.2	11.4	12.8	14.3	16.0	17.8	19.6	21.5	23.4	25.3	27.3	29.2	31.2	33.2
2.5	6.3	7.0	8.1	9.6	11.3	13.0	14.9	16.8	18.7	20.7	22.7	24.7	26.7	28.8	30.8	32.8
1.5	3.9	4.9	6.4	8.2	10.1	12.1	14.1	16.1	18.2	20.2	22.3	24.3	26.4	28.5	30.5	32.6
0.5	1.6	3.4	5.4	7.5	9.5	11.6	13.7	15.8	17.9	20.0	22.1	24.2	26.3	28.4	30.5	32.6
-0.5	1.6	3.4	5.4	7.5	9.6	11.7	13.8	15.9	18.0	20.1	22.2	24.3	26.5	28.6	30.7	32.8
-1.5	3.9	4.9	6.5	8.3	10.3	12.3	14.3	16.4	18.5	20.5	22.6	24.7	26.8	28.9	31.1	33.2
-2.5	6.3	7.0	8.2	9.7	11.4	13.3	15.2	17.1	19.1	21.1	23.2	25.2	27.3	29.4	31.5	33.5
-3.5	8.8	9.3	10.3	11.5	13.0	14.7	16.5	18.3	20.3	22.2	24.2	26.2	28.2	30.3	32.4	34.4
-4.5	11.3	11.7	12.5	13.6	14.9	16.4	18.0	19.7	21.5	23.4	25.3	27.3	29.2	31.2	33.3	35.3
-5.5	13.8	14.1	14.8	15.7	16.9	18.2	19.7	21.3	23.0	24.8	26.6	28.5	30.4	32.4	34.3	36.3
-6.5	16.3	16.5	17.1	18.0	19.0	20.2	21.6	23.1	24.7	26.3	28.1	29.9	31.7	33.6	35.6	37.5
-7.5	18.8	19.0	19.5	20.3	21.2	22.3	23.6	25.0	26.5	28.1	29.8	31.5	33.3	35.2	37.0	38.9

SPEED IN KNOTS BETWEEN SPECIFIED COORDINATES, BASE LATITUDE 37°30'

Long.	0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	18.5	19.5	20.5	21.5	22.5	23.5	24.5
Lat.																									
16.5	41.3	41.3	41.5	41.7	42.0	42.4	42.8	43.3	43.8	44.5	45.1	45.9	46.7	47.5	48.4	49.3	50.3	51.3	52.4	53.5	54.6	55.8	56.9	58.2	59.4
15.5	38.8	38.8	39.0	39.2	39.6	40.0	40.4	41.0	41.5	42.3	42.9	43.7	44.6	45.5	46.4	47.4	48.4	49.5	50.6	51.8	53.0	54.2	55.4	56.8	58.0
14.5	36.3	36.4	36.6	36.8	37.1	37.5	38.0	38.7	39.2	40.0	40.7	41.6	42.5	43.5	44.5	45.5	46.6	47.7	48.9	50.1	51.4	52.7	53.9	55.3	56.6
13.5	33.8	33.9	34.1	34.3	34.7	35.0	35.6	36.4	37.0	37.9	38.6	39.5	40.5	41.5	42.6	43.7	44.8	46.0	47.3	48.6	49.9	51.2	52.5	54.0	55.3
12.5	31.3	31.4	31.6	31.9	32.3	32.7	33.3	34.1	34.8	35.7	36.5	37.5	38.6	39.7	40.8	42.0	43.1	44.4	45.7	47.1	48.5	49.9	51.2	52.8	54.2
11.5	28.8	28.9	29.1	29.5	29.9	30.4	31.0	31.9	32.6	33.6	34.5	35.6	36.7	37.9	39.0	40.3	41.6	42.9	44.3	45.7	47.2	48.6	50.1	51.6	53.1
10.5	26.3	26.4	26.7	27.0	27.5	28.1	28.8	29.7	30.5	31.6	32.6	33.7	34.9	36.1	37.3	38.7	40.1	41.5	42.9	44.4	45.9	47.4	48.9	50.6	52.1
9.5	23.8	23.9	24.2	24.6	25.2	25.8	26.6	27.5	28.5	29.6	30.7	31.9	33.2	34.5	35.8	37.3	38.7	40.2	41.7	43.2	44.8	46.3	47.9	49.6	51.2
8.5	21.3	21.4	21.8	22.2	22.9	23.5	24.4	25.4	26.5	27.8	28.9	30.2	31.6	33.0	34.4	36.0	37.4	39.0	40.6	42.2	43.8	45.4	47.0	48.8	50.4
7.5	18.8	19.0	19.3	19.9	20.6	21.4	22.3	23.4	24.6	25.9	27.2	28.6	30.1	31.6	33.1	34.7	36.2	37.9	39.5	41.2	42.9	44.5	46.3	48.1	49.7
6.5	16.3	16.5	17.0	17.6	18.4	19.3	20.4	21.6	22.9	24.3	25.7	27.2	28.7	30.4	31.9	33.6	35.2	36.9	38.7	40.4	42.2	43.8	45.6	47.5	49.1
5.5	13.8	14.1	14.6	15.3	16.2	17.3	18.5	19.9	21.3	22.8	24.3	25.9	27.5	29.3	30.9	32.7	34.4	36.1	37.9	39.7	41.5	43.3	45.1	47.0	48.7
4.5	11.3	11.6	12.2	13.1	14.2	15.5	16.8	18.4	19.8	21.5	23.0	24.7	26.5	28.4	30.0	31.9	33.7	35.5	37.3	39.2	41.0	42.8	44.7	46.6	48.4
3.5	8.8	9.2	10.0	11.1	12.3	13.8	15.3	17.0	18.6	20.4	22.1	23.9	25.7	27.6	29.4	31.3	33.1	35.0	36.9	38.8	40.6	42.5	44.4	46.3	48.2
2.5	6.3	6.9	7.9	9.3	10.8	12.4	14.1	15.9	17.7	19.6	21.4	23.3	25.2	27.1	29.0	30.9	32.8	34.7	36.6	38.5	40.5	42.4	44.3	46.2	48.2
1.5	3.9	4.8	6.2	7.8	9.6	11.4	13.3	15.2	17.1	19.0	21.0	22.9	24.8	26.8	28.7	30.7	32.6	34.6	36.5	38.5	40.4	42.4	44.3	46.3	48.2
0.5	1.6	3.2	5.1	7.0	9.0	10.9	12.9	14.9	16.9	18.8	20.8	22.8	24.7	26.7	28.7	30.7	32.6	34.6	36.6	38.6	40.5	42.5	44.5	46.5	48.4
-0.5	1.6	3.2	5.1	7.1	9.0	11.0	13.0	15.0	17.0	18.9	20.9	22.9	24.9	26.9	28.9	30.9	32.9	34.9	36.8	38.8	40.8	42.8	44.8	46.8	48.8
-1.5	3.9	4.8	6.3	8.0	9.8	11.6	13.6	15.5	17.4	19.4	21.4	23.3	25.3	27.3	29.3	31.3	33.3	35.3	37.2	39.2	41.2	43.2	45.2	47.2	49.2
-2.5	6.3	6.9	8.0	9.4	11.0	12.7	14.5	16.3	18.2	20.1	22.1	24.0	26.0	27.9	29.9	31.9	33.8	35.8	37.8	39.8	41.8	43.8	45.8	47.8	49.8
-3.5	8.8	9.3	10.1	11.3	12.6	14.2	15.8	17.6	19.3	21.2	23.0	24.8	26.8	28.8	30.7	32.6	34.6	36.6	38.5	40.5	42.5	44.5	46.5	48.5	50.5
-4.5	11.3	11.7	12.4	13.3	14.5	15.9	17.4	19.0	20.7	22.4	24.2	26.0	27.9	29.8	31.7	33.6	35.5	37.5	39.4	41.4	43.3	45.3	47.3	49.3	51.3
-5.5	13.8	14.1	14.7	15.5	16.6	17.8	19.3	20.6	22.2	23.9	25.6	27.3	29.1	31.0	32.8	34.7	36.6	38.5	40.4	42.4	44.3	46.3	48.2	50.2	52.2

SPEED IN KNOTS BETWEEN SPECIFIED COORDINATES, BASE LATITUDE 42°30'

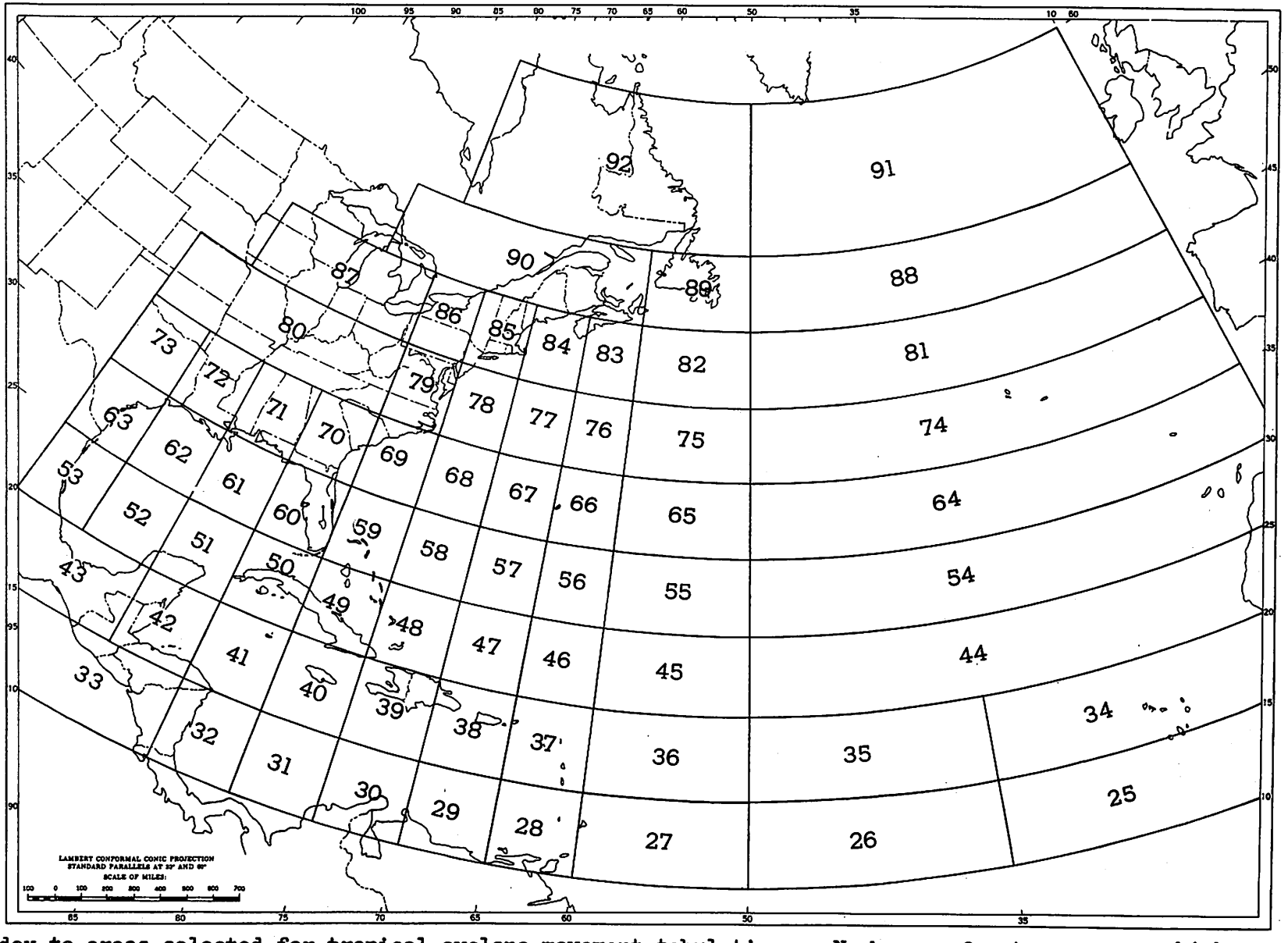
Long.	0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	18.5	19.5	20.5	21.5	22.5	23.5	24.5
Lat.																									
16.5	41.3	41.3	41.4	41.6	41.9	42.2	42.5	42.9	43.4	43.9	44.5	45.1	45.8	46.5	47.2	48.0	48.8	49.7	50.6	51.5	52.5	53.5	54.5	55.5	56.6
15.5	38.8	38.9	39.0	39.2	39.4	39.7	40.1	40.6	41.1	41.6	42.2	42.9	43.6	44.4	45.2	46.0	46.9	47.8	48.7	49.7	50.8	51.8	52.9	54.0	55.1
14.5	36.3	36.3	36.5	36.7	37.0	37.3	37.7	38.2	38.8	39.4	40.0	40.7	41.5	42.3	43.2	44.1	45.0	46.0	47.0	48.0	49.1	50.2	51.3	52.5	53.7
13.5	33.8	33.8	34.0	34.2	34.5	34.9	35.4	35.9	36.5	37.1	37.8	38.6	39.4	40.3	41.2	42.2	43.2	44.2	45.3	46.4	47.5	48.7	49.9	51.1	52.3
12.5	31.3	31.4	31.5	31.8	32.1	32.5	33.0	33.6	34.2	35.0	35.7	36.6	37.4	38.4	39.4	40.4	41.4	42.5	43.6	44.8	46.1	47.3	48.5	49.8	51.1
11.5	28.8	28.9	29.1	29.3	29.7	30.2	30.7	31.3	32.0	32.8	33.6	34.5	35.5	36.5	37.5	38.6	39.7	40.9	42.1	43.4	44.6	45.9	47.2	48.6	49.9
10.5	26.3	26.4	26.6	26.9	27.3	27.8	28.4	29.1	29.9	30.7	31.6	32.6	33.6	34.7	35.8	37.0	38.2	39.4	40.7	42.0	43.3	44.7	46.0	47.4	48.8
9.5	23.8	23.9	24.1	24.5	24.9	25.5	26.2	26.9	27.8	28.7	29.7	30.7	31.8	33.0	34.2	35.4	36.7	38.0	39.4	40.7	42.1	43.5	45.0	46.4	47.9
8.5	21.3	21.4	21.7	22.1	22.6	23.2	24.0	24.8	25.8	26.8	27.8	29.0	30.2	31.4	32.7	34.0	35.4	36.8	38.2	39.6	41.0	42.5	44.0	45.5	47.0
7.5	18.8	18.9	19.2	19.7	20.3	21.0	21.9	22.8	23.8	24.9	26.1	27.3	28.6	29.9	31.3	32.7	34.1	35.6	37.1	38.6	40.1	41.6	43.2	44.7	46.3
6.5	16.3	16.5	16.8	17.4	18.0	18.9	19.8	20.9	22.0	23.2	24.5	25.8	27.2	28.6	30.1	31.5	33.1	34.6	36.1	37.7	39.3	40.9	42.5	44.1	45.7
5.5	13.8	14.0	14.4	15.1	15.9	16.8	17.9	19.1	20.3	21.6	23.0	24.5	25.9	27.5	29.0	30.6	32.1	33.7	35.4	37.0	38.6	40.3	41.9	43.6	45.3
4.5	11.3	11.6	12.1	12.9	13.8	14.9	16.1	17.4	18.8	20.3	21.8	23.3	24.9	26.5	28.1	29.7	31.4	33.0	34.7	36.4	38.1	39.8	41.5	43.2	44.9
3.5	8.8	9.2	9.8	10.8	11.9	13.2	14.6	16.0	17.6	19.1	20.7	22.4	24.0	25.7	27.4	29.1	30.8	32.5	34.3	36.0	37.7	39.5	41.2	43.0	44.7
2.5	6.3	6.8	7.7	8.9	10.3	11.7	13.3	14.9	16.6	18.3	20.0	21.7	23.4	25.2	26.9	28.7	30.4	32.2	34.0	35.8	37.5	39.3	41.1	42.9	44.7
1.5	3.9	4.6	5.9	7.4	9.0	10.7	12.4	14.2	15.9	17.7	19.5	21.3	23.1	24.9	26.7	28.5	30.3	32.1	33.9	35.7	37.5	39.3	41.1	43.0	44.8
0.5	1.6	3.0	4.8	6.6	8.4	10.2	12.0	13.8	15.7	17.5	19.3	21.2	23.0	24.8	26.7	28.5	30.3	32.2	34.0	35.8	37.7	39.5	41.3	43.1	45.0
-0.5	1.6	3.0	4.8	6.6	8.4	10.3	12.1	13.9	15.8	17.6	19.5	21.3	23.2	25.0	26.9	28.7	30.6	32.4	34.3	36.1	38.0	39.8	41.7	43.5	45.4
-1.5	3.9	4.7	6.0	7.5	9.2	10.9	12.7	14.5	16.3	18.1	19.9	21.8	23.6	25.5	27.3	29.2	31.0	32.9	34.7	36.6	38.4	40.3	42.1	44.0	45.9
-2.5	6.3	6.9	7.8	9.1	10.5	12.1	13.7	15.4	17.2	18.9	20.7	22.5	24.3	26.1	28.0	29.8	31.6	33.5	35.3	37.2	39.0	40.9	42.8	44.6	46.5
-3.5	8.8	9.2	10.0	11.0	12.2	13.6	15.1	16.7	18.3	20.0	21.7	23.5	25.2	27.0	28.8	30.6	32.4	34.3	36.1	38.0	39.8	41.7	43.5	45.4	47.2
-4.5	11.3	11.6	12.2	13.1	14.2	15.4	16.7	18.2	19.7	21.3	23.0	24.7	26.4	28.1	29.9	31.6	33.4	35.2	37.1	38.9	40.7	42.5	44.4	46.2	48.1
-5.5	13.8	14.1	14.6	15.3	16.2	17.3	18.6	19.9	21.4	22.9	24.4	26.0	27.7	29.4	31.1	32.8	34.6	36.3	38.1	39.9	41.7	43.6	45.4	47.2	49.1
-6.5	16.3	16.5	17.0	17.6	18.4	19.4	20.6	21.8	23.1	24.5	26.0	27.6	29.2	30.8	32.4	34.1	35.8	37.6	39.3	41.1	42.9	44.7	46.5	48.3	50.1
-7.5	18.8	19.0	19.4	20.0	20.7	21.6	22.6	23.8	25.0	26.4	27.8	29.2	30.8	32.3	33.9	35.6	37.2	38.9	40.7	42.4	44.1	45.9	47.7	49.5	51.3
-8.5	21.3	21.5	21.8	22.3	23.0	23.8	24.8	25.9	27.0	28.3	29.6	31.0	32.5	34.0	35.5	37.1	38.7	40.4	42.1	43.8	45.5	47.3	49.0	50.8	52.6

SPEED IN KNOTS BETWEEN SPECIFIED COORDINATES, BASE LATITUDE 47°30'

Long.	0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	18.5	19.5	20.5	21.5	22.5	23.5	24.5
Lat.																									
16.5	41.3	41.3	41.4	41.6	41.8	42.0	42.3	42.6	43.0	43.4	43.8	44.3	44.8	45.4	46.0	46.7	47.3	48.0	48.8	49.5	50.3	51.2	52.0	52.9	53.8
15.5	38.8	38.8	38.9	39.1	39.3	39.5	39.8	40.2	40.6	41.0	41.5	42.1	42.6	43.3	43.9	44.6	45.3	46.0	46.9	47.7	48.5	49.4	50.3	51.2	52.2
14.5	36.3	36.3	36.4	36.6	36.8	37.1	37.4	37.8	38.3	38.8	39.3	39.9	40.5	41.2	41.9	42.6	43.4	44.2	45.0	45.9	46.8	47.7	48.7	49.6	50.6
13.5	33.8	33.8	33.9	34.1	34.4	34.7	35.1	35.5	36.0	36.5	37.1	37.7	38.4	39.1	39.8	40.6	41.4	42.3	43.2	44.2	45.1	46.1	47.1	48.1	49.2
12.5	31.3	31.3	31.5	31.7	32.0	32.3	32.7	33.2	33.7	34.3	34.9	35.6	36.3	37.1	37.9	38.7	39.6	40.6	41.5	42.5	43.5	44.6	45.6	46.7	47.8
11.5	28.8	28.8	29.0	29.2	29.5	29.9	30.3	30.8	31.4	32.1	32.8	33.5	34.3	35.1	36.0	36.9	37.9	38.9	39.9	41.0	42.0	43.1	44.3	45.4	46.6
10.5	26.3	26.4	26.6	26.8	27.1	27.5	28.0	28.6	29.2	29.9	30.7	31.5	32.4	33.3	34.2	35.2	36.2	37.3	38.4	39.5	40.6	41.8	43.0	44.2	45.4
9.5	23.8	23.9	24.1	24.3	24.7	25.2	25.8	26.4	27.1	27.8	28.7	29.6	30.5	31.5	32.5	33.6	34.7	35.8	37.0	38.2	39.4	40.6	41.8	43.1	44.4
8.5	21.3	21.4	21.6	21.9	22.4	22.9	23.5	24.2	25.0	25.8	26.7	27.7	28.7	29.8	30.9	32.1	33.2	34.4	35.7	36.9	38.2	39.5	40.8	42.1	43.5
7.5	18.8	18.9	19.2	19.5	20.0	20.6	21.3	22.1	23.0	23.9	24.9	26.0	27.1	28.2	29.4	30.7	31.9	33.2	34.5	35.8	37.2	38.5	39.9	41.4	42.7
6.5	16.3	16.4	16.7	17.2	17.7	18.4	19.2	20.1	21.1	22.1	23.2	24.4	25.6	26.8	28.1	29.4	30.7	32.1	33.5	34.9	36.3	37.7	39.1	40.6	42.0
5.5	13.8	14.0	14.3	14.8	15.5	16.3	17.2	18.2	19.3	20.5	21.7	23.0	24.3	25.6	27.0	28.3	29.7	31.2	32.6	34.1	35.5	37.0	38.5	40.0	41.5
4.5	11.3	11.5	12.0	12.6	13.4	14.3	15.4	16.5	17.8	19.0	20.4	21.7	23.1	24.5	26.0	27.4	28.9	30.4	31.9	33.5	35.0	36.5	38.0	39.6	41.1
3.5	8.8	9.1	9.7	10.5	11.4	12.5	13.8	15.0	16.4	17.8	19.2	20.7	22.2	23.7	25.2	26.8	28.3	29.9	31.4	33.0	34.6	36.2	37.7	39.3	40.9
2.5	6.3	6.7	7.5	8.5	9.7	11.0	12.4	13.9	15.3	16.9	18.4	20.0	21.5	23.1	24.7	26.3	27.9	29.5	31.1	32.7	34.4	36.0	37.6	39.3	40.9
1.5	3.8	4.5	5.6	6.9	8.4	9.9	11.5	13.0	14.6	16.3	17.9	19.5	21.1	22.8	24.4	26.1	27.7	29.4	31.0	32.7	34.3	36.0	37.6	39.3	41.0
0.5	1.5	2.8	4.4	6.0	7.7	9.3	11.0	12.7	14.3	16.0	17.7	19.3	21.0	22.7	24.4	26.1	27.8	29.4	31.1	32.8	34.5	36.2	37.8	39.5	41.2
-0.5	1.5	2.9	4.4	6.1	7.7	9.4	11.1	12.8	14.4	16.2	17.9	19.6	21.3	22.9	24.6	26.3	28.0	29.7	31.4	33.1	34.8	36.5	38.2	39.9	41.6
-1.5	3.8	4.5	5.7	7.1	8.6	10.1	11.7	13.4	15.0	16.7	18.4	20.1	21.7	23.4	25.1	26.8	28.5	30.2	31.9	33.6	35.3	37.0	38.7	40.4	42.1
-2.5	6.3	6.8	7.6	8.7	10.0	11.4	12.9	14.4	16.0	17.6	19.2	20.9	22.5	24.2	25.9	27.6	29.3	31.0	32.7	34.4	36.1	37.8	39.5	41.2	42.9
-3.5	8.8	9.1	9.8	10.7	11.8	13.0	14.3	15.7	17.2	18.7	20.3	21.9	23.5	25.1	26.8	28.4	30.1	31.8	33.4	35.1	36.8	38.5	40.2	41.9	43.6
-4.5	11.3	11.6	12.1	12.8	13.8	14.8	16.0	17.3	18.7	20.2	21.6	23.2	24.7	26.3	27.9	29.5	31.1	32.8	34.5	36.1	37.8	39.5	41.2	42.9	44.6
-5.5	13.8	14.0	14.5	15.1	15.9	16.9	18.0	19.1	20.4	21.8	23.2	24.6	26.1	27.6	29.1	30.7	32.4	34.0	35.6	37.3	38.9	40.6	42.2	43.9	45.6
-6.5	16.3	16.5	16.9	17.4	18.1	19.0	20.0	21.1	22.3	23.5	24.8	26.2	27.7	29.1	30.6	32.2	33.7	35.3	36.9	38.5	40.2	41.8	43.4	45.1	46.8
-7.5	18.8	18.9	19.3	19.8	20.4	21.2	22.1	23.1	24.2	25.4	26.7	28.0	29.3	30.8	32.2	33.7	35.2	36.7	38.3	39.9	41.5	43.1	44.8	46.4	48.1

SPEED IN KNOTS BETWEEN SPECIFIED COORDINATES, BASE LATITUDE-55°00'

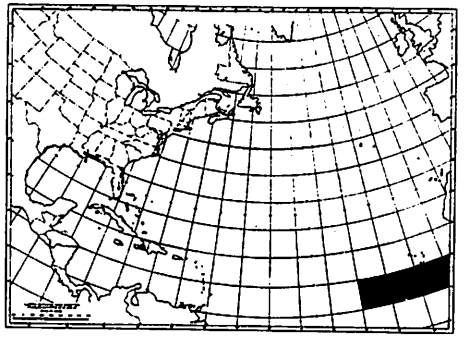
Long.	0.5	1.5	2.5	3.5	4.5	5.5	6.5	7.5	8.5	9.5	10.5	11.5	12.5	13.5	14.5	15.5	16.5	17.5	18.5	19.5	20.5	21.5	22.5	23.5	24.5
Lat.																									
12.5	31.3	31.3	31.4	31.5	31.7	31.9	32.2	32.5	32.9	33.3	33.7	34.2	34.7	35.2	35.8	36.4	37.0	37.7	38.4	39.1	39.8	40.6	41.3	42.1	42.9
11.5	28.8	28.8	28.9	29.1	29.3	29.5	29.8	30.2	30.6	31.0	31.5	32.0	32.5	33.1	33.8	34.4	35.1	35.8	36.6	37.3	38.1	38.9	39.8	40.6	41.5
10.5	26.3	26.3	26.4	26.6	26.8	27.1	27.4	27.8	28.3	28.8	29.3	29.9	30.5	31.1	31.8	32.5	33.3	34.1	34.9	35.7	36.6	37.4	38.3	39.2	40.2
9.5	23.8	23.8	24.0	24.2	24.4	24.7	25.1	25.6	26.1	26.6	27.2	27.8	28.5	29.2	30.0	30.8	31.6	32.4	33.3	34.2	35.1	36.0	37.0	38.0	38.9
8.5	21.3	21.3	21.5	21.7	22.0	22.4	22.8	23.3	23.9	24.5	25.1	25.8	26.6	27.4	28.2	29.1	30.0	30.9	31.8	32.8	33.7	34.7	35.8	36.8	37.8
7.5	18.8	18.8	19.0	19.3	19.6	20.1	20.6	21.1	21.8	22.4	23.2	24.0	24.8	25.7	26.6	27.5	28.4	29.4	30.4	31.5	32.5	33.6	34.7	35.8	36.9
6.5	16.3	16.4	16.6	16.9	17.3	17.8	18.4	19.0	19.7	20.5	21.3	22.2	23.1	24.1	25.1	26.1	27.1	28.2	29.3	30.4	31.5	32.6	33.8	34.9	36.1
5.5	13.8	13.9	14.2	14.5	15.0	15.6	16.3	17.0	17.8	18.7	19.6	20.6	21.6	22.7	23.7	24.8	26.0	27.1	28.2	29.4	30.6	31.8	33.0	34.2	35.5
4.5	11.3	11.5	11.8	12.2	12.8	13.5	14.3	15.2	16.1	17.1	18.1	19.2	20.3	21.4	22.6	23.8	25.0	26.2	27.4	28.7	29.9	31.2	32.4	33.7	35.0
3.5	8.8	9.0	9.4	10.0	10.7	11.6	12.5	13.5	14.6	15.7	16.8	18.0	19.2	20.5	21.7	23.0	24.2	25.5	26.8	28.1	29.4	30.7	32.1	33.4	34.7
2.5	6.3	6.6	7.2	7.9	8.8	9.9	11.0	12.2	13.4	14.6	15.9	17.2	18.5	19.8	21.1	22.4	23.8	25.1	26.4	27.8	29.2	30.5	31.9	33.3	34.6
1.5	3.8	4.3	5.1	6.2	7.4	8.6	9.9	11.2	12.5	13.9	15.2	16.6	18.0	19.4	20.8	22.1	23.5	24.9	26.3	27.7	29.1	30.5	31.9	33.3	34.7
0.5	1.4	2.5	3.8	5.1	6.5	7.9	9.4	10.8	12.2	13.6	15.0	16.4	17.9	19.3	20.7	22.1	23.6	25.0	26.4	27.8	29.2	30.7	32.1	33.5	34.9
-0.5	1.4	2.5	3.8	5.2	6.6	8.0	9.5	10.9	12.3	13.8	15.2	16.6	18.1	19.5	21.0	22.4	23.8	25.3	26.7	28.2	29.6	31.0	32.4	33.9	35.4
-1.5	3.8	4.4	5.2	6.3	7.6	8.9	10.2	11.6	13.0	14.4	15.8	17.2	18.6	20.1	21.5	23.0	24.4	25.8	27.3	28.7	30.2	31.6	33.1	34.5	36.0
-2.5	6.3	6.6	7.3	8.1	9.1	10.3	11.5	12.7	14.0	15.4	16.7	18.1	19.5	20.9	22.3	23.8	25.2	26.6	28.0	29.5	31.0	32.4	33.8	35.3	36.7
-3.5	8.8	9.0	9.5	10.2	11.0	12.0	13.1	14.2	15.4	16.7	18.0	19.3	20.6	22.0	23.4	24.8	26.2	27.6	29.0	30.5	31.9	33.3	34.8	36.2	37.7
-4.5	11.3	11.5	11.9	12.4	13.1	14.0	14.9	16.0	17.1	18.3	19.5	20.7	22.0	23.3	24.7	26.0	27.4	28.8	30.2	31.6	33.0	34.4	35.9	37.3	38.8
-5.5	13.8	13.9	14.3	14.8	15.4	16.1	17.0	17.9	18.9	20.0	21.2	22.4	23.6	24.8	26.1	27.4	28.8	30.1	31.5	32.9	34.3	35.7	37.1	38.5	39.9
-6.5	16.3	16.4	16.7	17.1	17.7	18.4	19.1	20.0	20.9	21.9	23.0	24.1	25.3	26.5	27.7	29.0	30.3	31.6	32.9	34.3	35.6	37.0	38.4	39.8	41.3
-7.5	18.8	18.9	19.2	19.5	20.0	20.6	21.3	22.1	23.0	23.9	24.9	26.0	27.1	28.2	29.4	30.6	31.9	33.2	34.5	35.8	37.2	38.5	39.9	41.3	42.7
-8.5	21.3	21.4	21.6	22.0	22.4	23.0	23.6	24.3	25.1	26.0	27.0	28.0	29.1	30.2	31.3	32.4	33.6	34.9	36.2	37.5	38.8	40.1	41.4	42.8	44.2



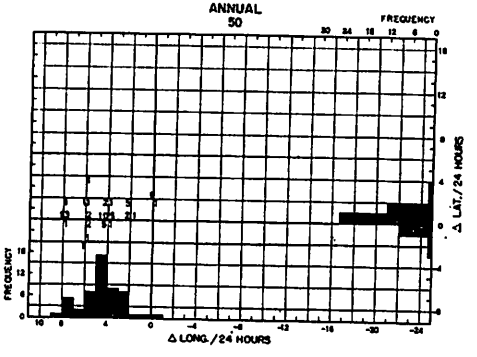
Index to areas selected for tropical cyclone movement tabulations. Numbers refer to pages on which summary for each area may be found.

24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

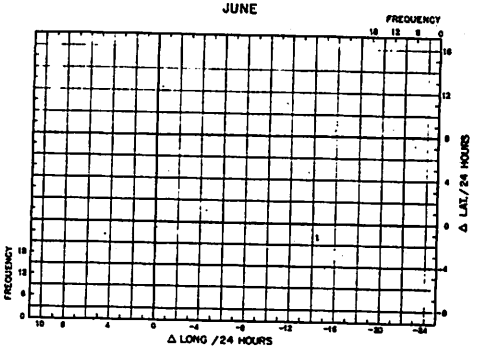
10°-15°N.
15°-35°W.



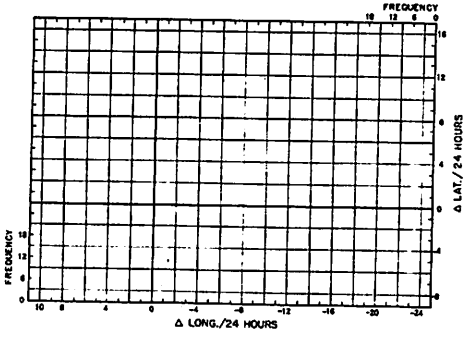
ANNUAL
50



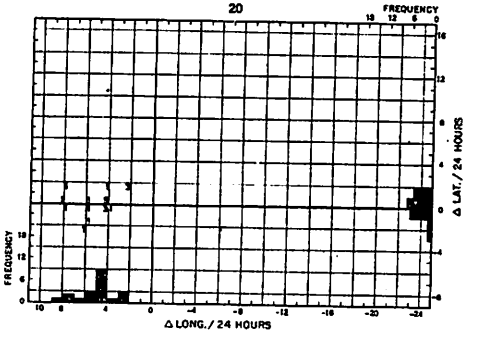
JUNE



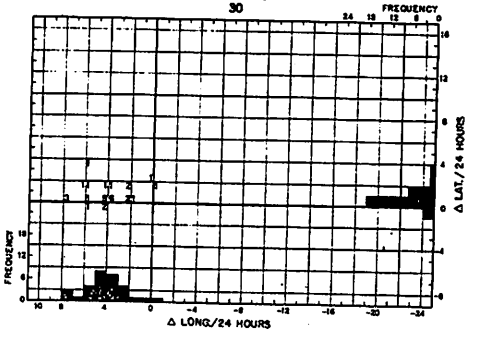
JULY



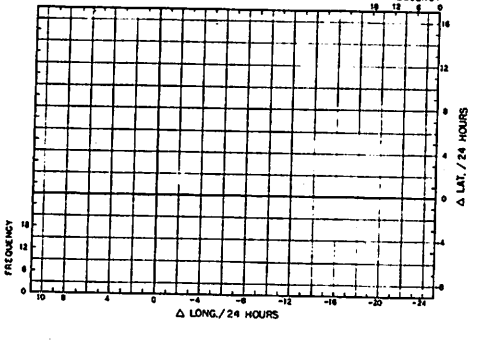
AUGUST
20



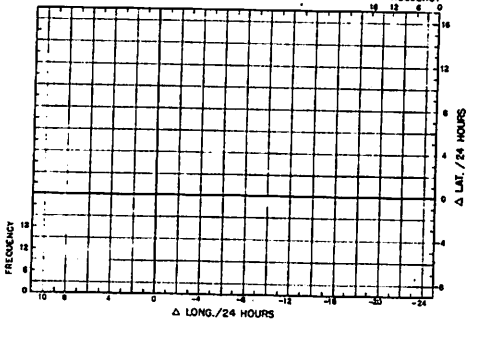
SEPTEMBER
30



OCTOBER



NOVEMBER-MAY

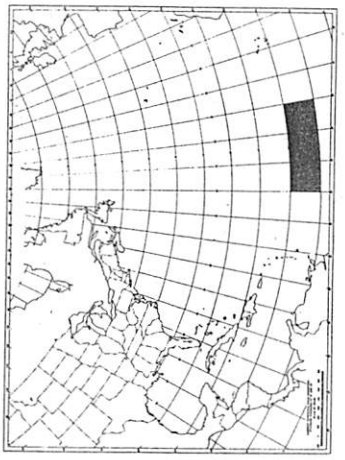


NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

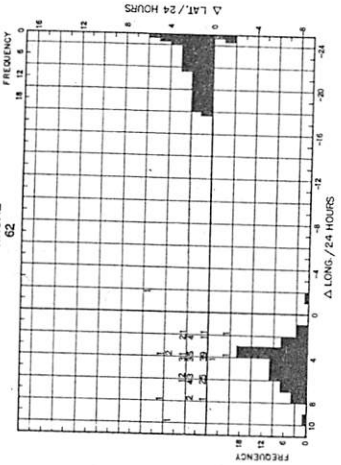
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	0	0	11	16	1	0
STORM ORIGINS			1891	1889	1953	
			1893	1892		
			1894	1893		
			1897	1898		
			1899	1900		
			1906	1901		
			1950	1902*		
			1951	1904*		
			1953	1927*		
			1958	1928		
				1933		
				1947		
				1948		
				1951		
				1957		

24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

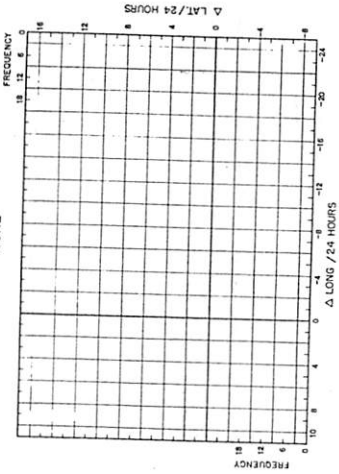
10°-15°N.
35°-50°W.



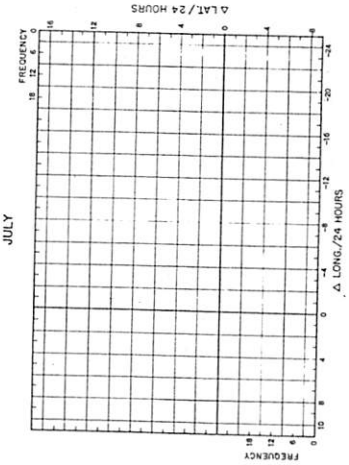
ANNUAL
62



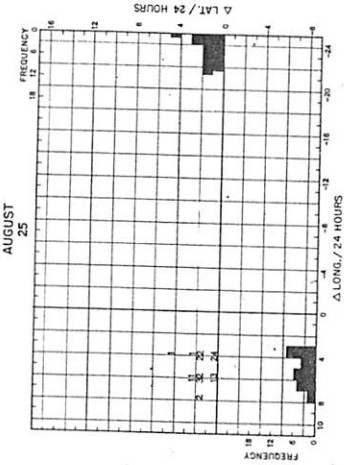
JUNE



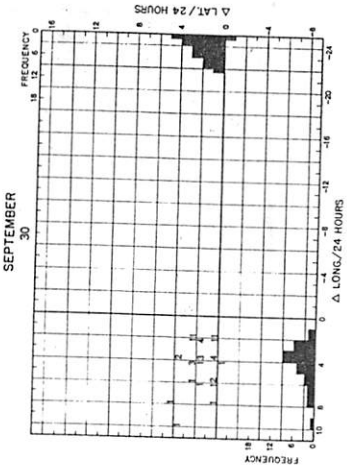
JULY



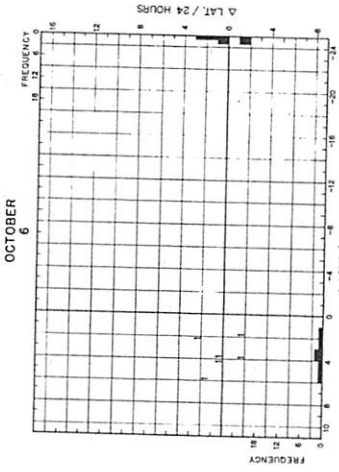
AUGUST
25



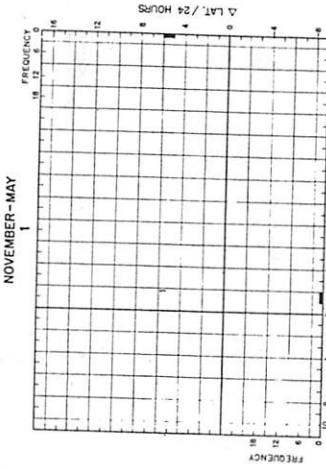
SEPTEMBER
30



OCTOBER
6



NOVEMBER–MAY
1

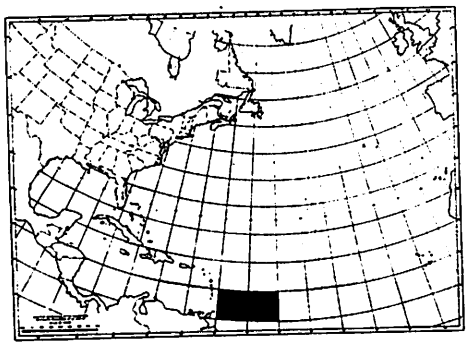


NUMBER OF CYCLONE CENTRES PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

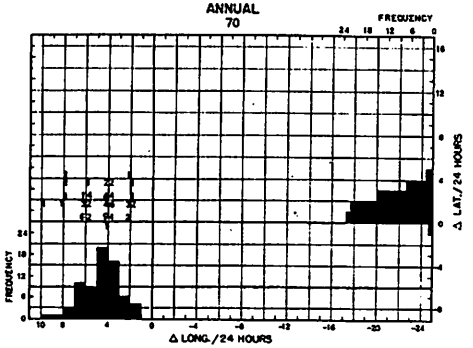
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	0	1	15	20	4	1
STORM ORIGINS		1887*	1893	1894	1895	1932
			1901	1898	1896*	
			1903	1908		
			1916	1918		
			1921	1920		
			1935	1923		
			1956	1946		
				1950		
				1951		
				1958		

24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

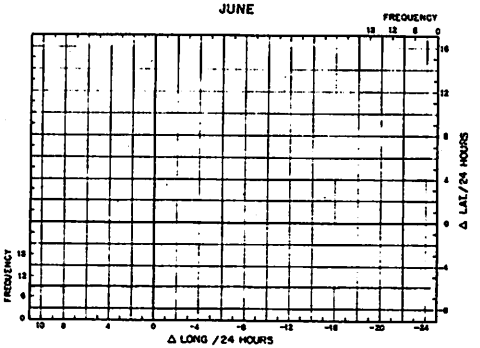
10°-15°N.
50°-60°W.



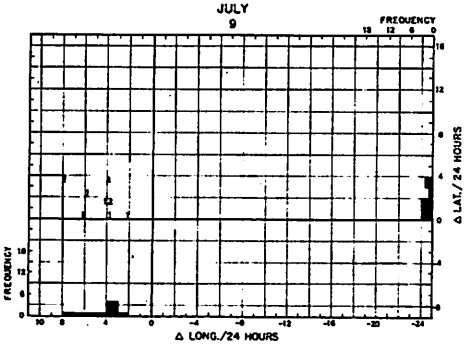
ANNUAL
70



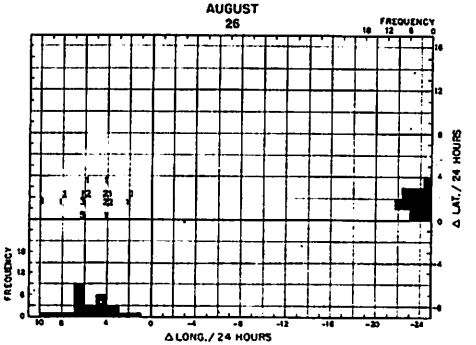
JUNE



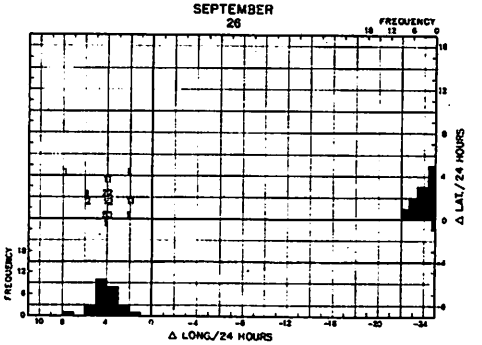
JULY
9



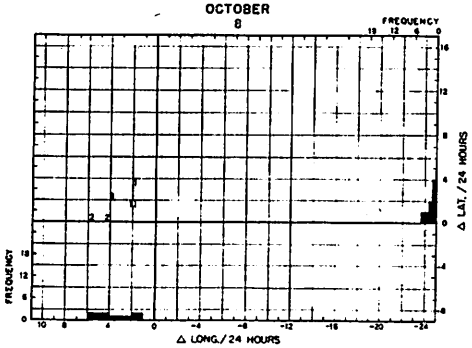
AUGUST
26



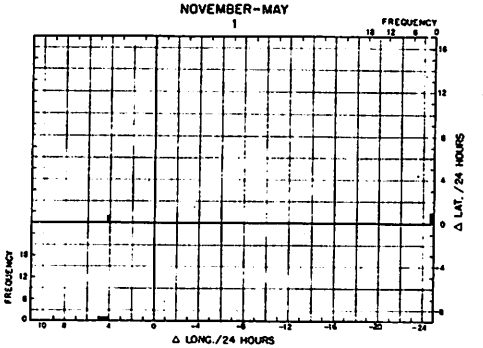
SEPTEMBER
26



OCTOBER
8



NOVEMBER-MAY
1

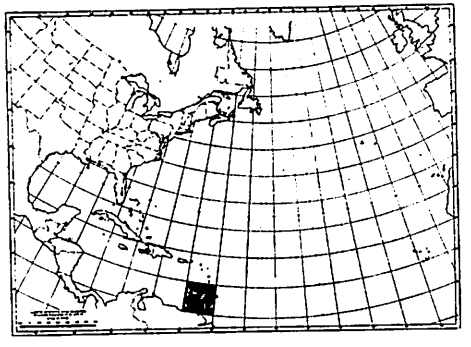


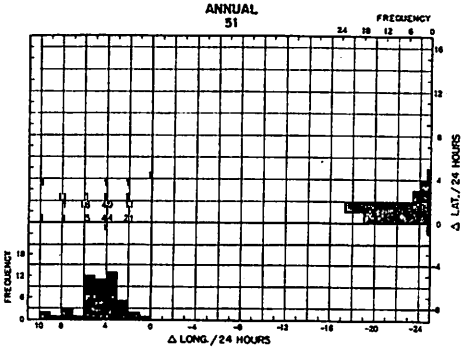
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

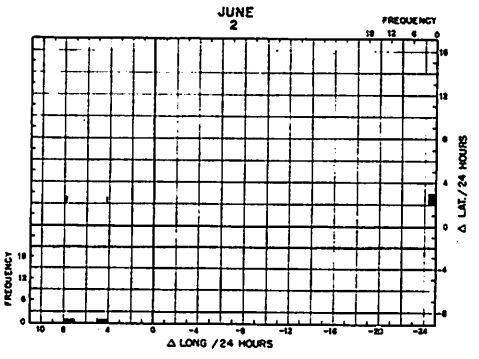
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	1	8	36	26	11	1
STORM ORIGINS	1933*	1887 1901-S 1909 1916 1926 1944	1886-S 1891 1893* 1895 1896 1910 1916 1918-S 1924-S 1928 1931-S 1933-S 1934 1938 1943 1943 1944 1945 1946 1949 1950 1958	1887 1889-S 1902 1911 1918 1921 1931 1932 1934 1941 1943 1952 1954 1955	1892 1894 1898 1901 1916 1943 1952 1954	1887

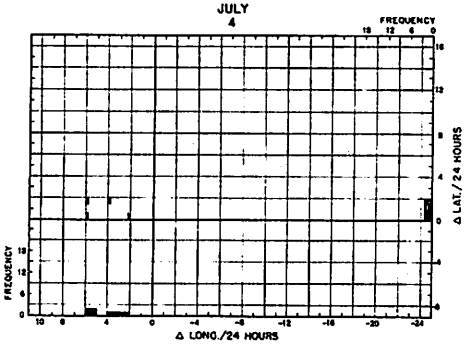
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

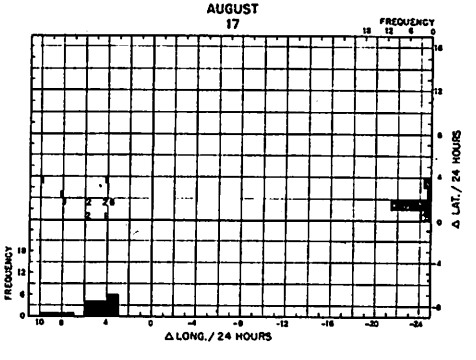
10°-15°N.
60°-65°W.

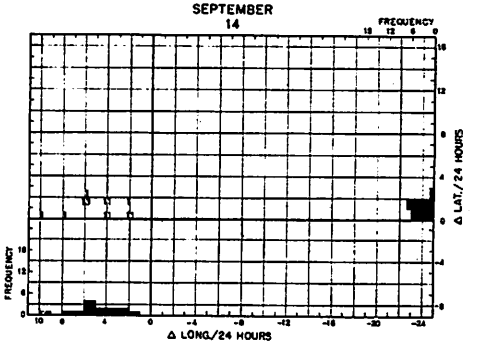


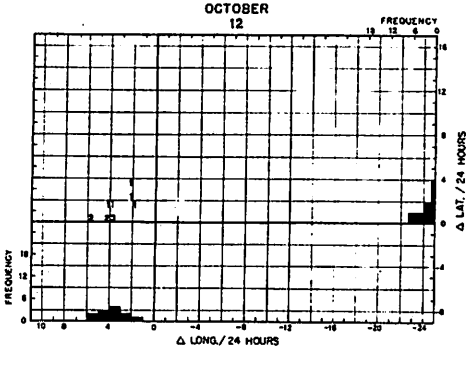


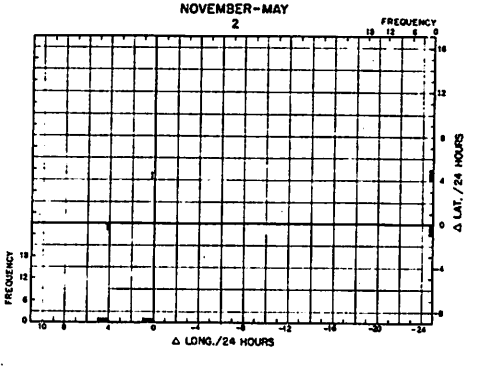










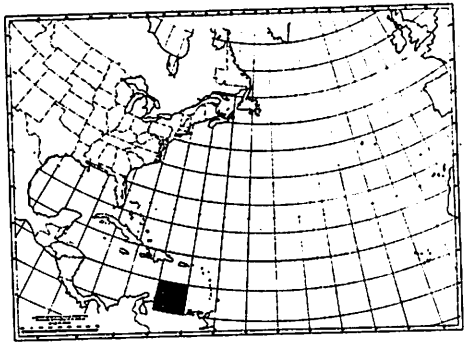


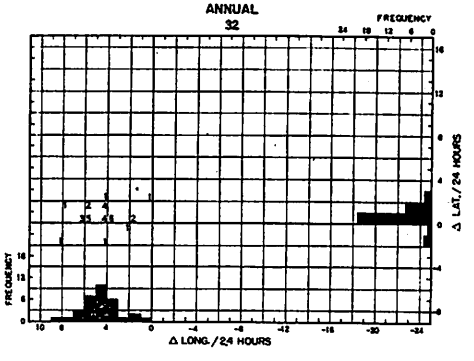
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

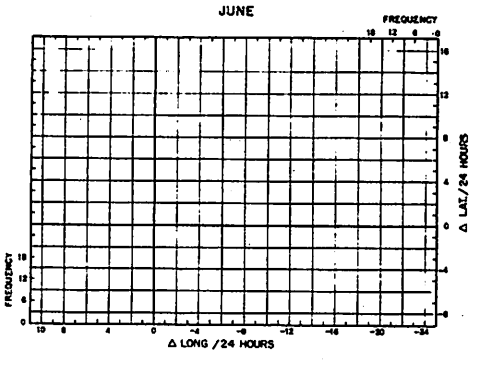
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	1	4	20	19	13	4
STORM ORIGINS		1909	1928	1836 1915 1919 1933	1891 1897 1900 1906	1888

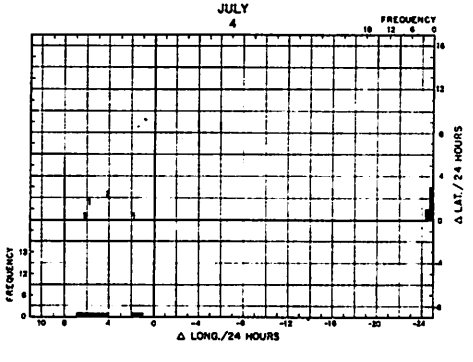
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

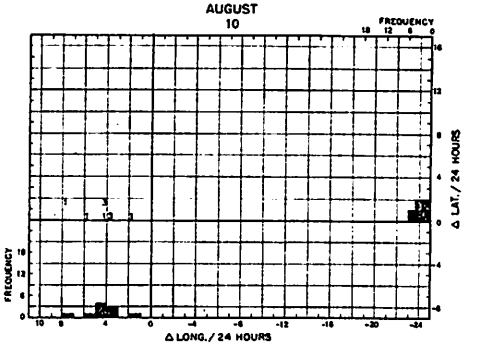
10 -15°N.
65°-70°W.

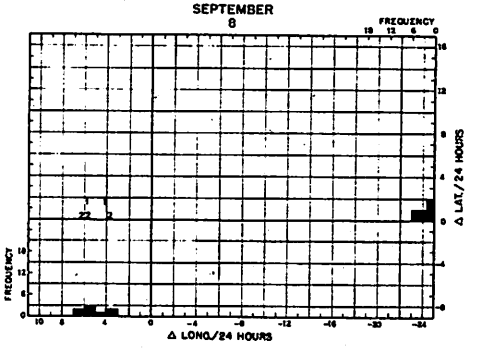


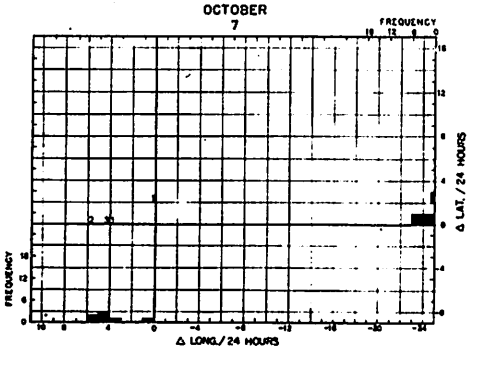


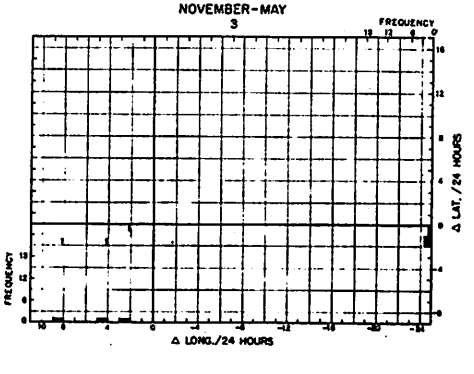








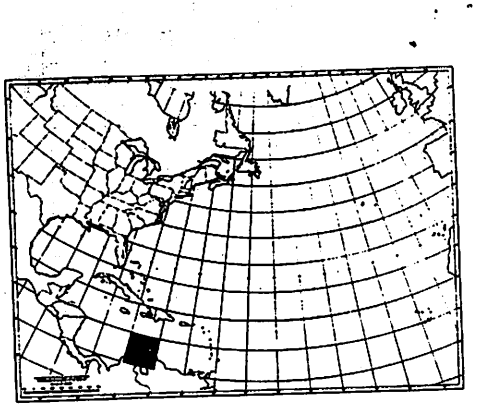


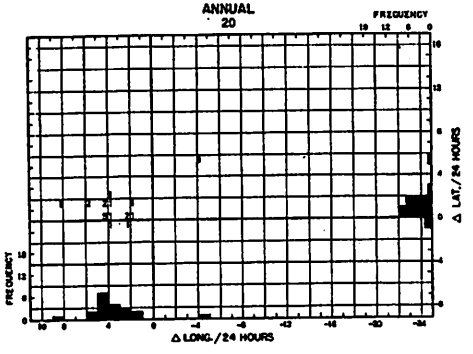


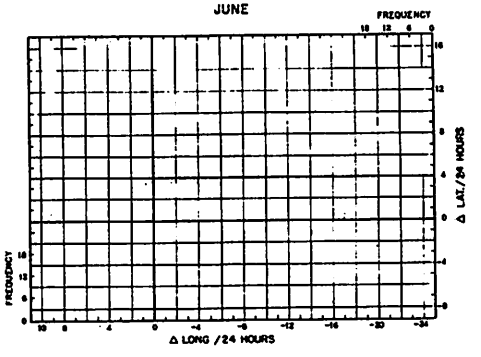
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

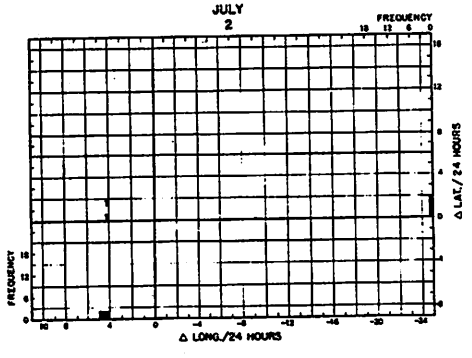
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	1	5	13	12	7	3
STORM ORIGINS	NONE					

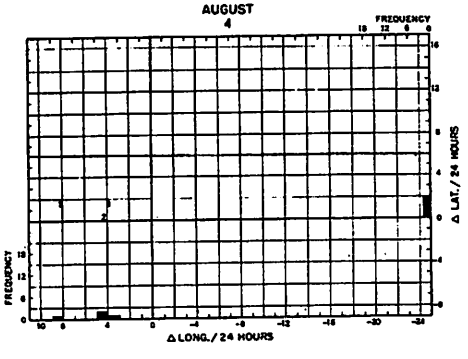
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

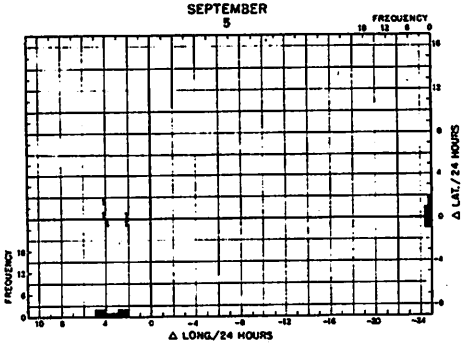


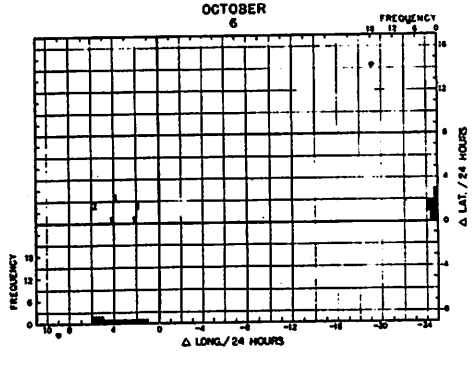


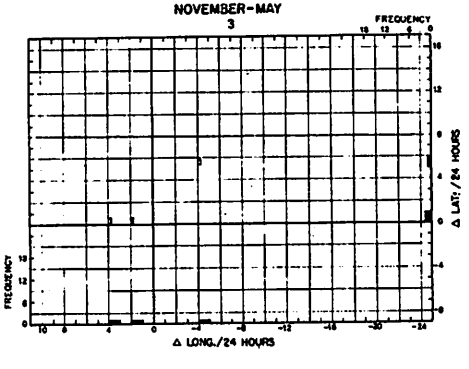










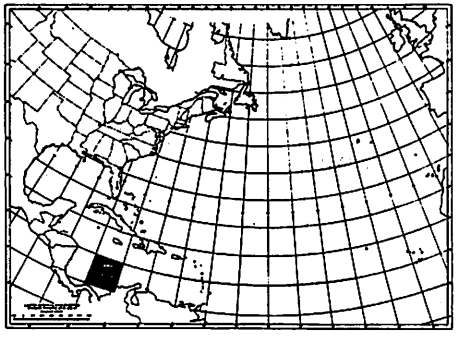


NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

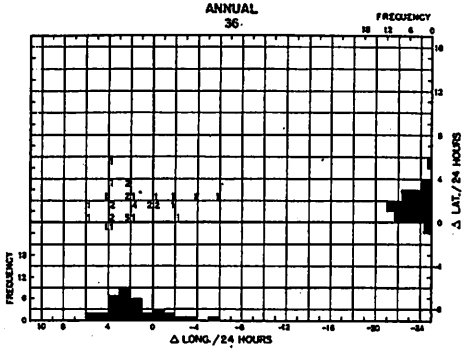
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	1	3	9	10	5	4
STORM ORIGINS			1926 1947	1909 1933		1916

24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

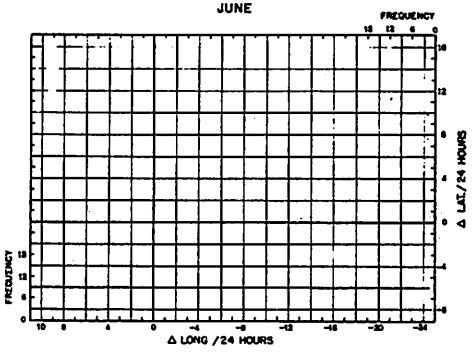
10°-15°N.
75°-80°W.



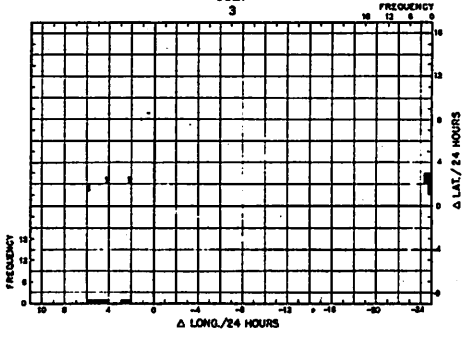
ANNUAL
36



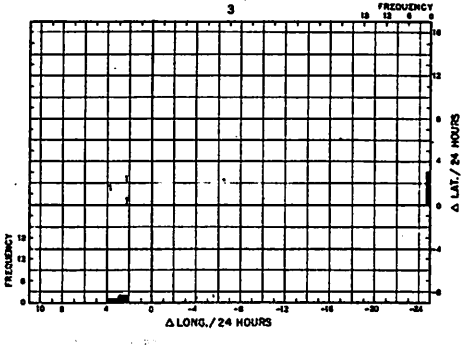
JUNE



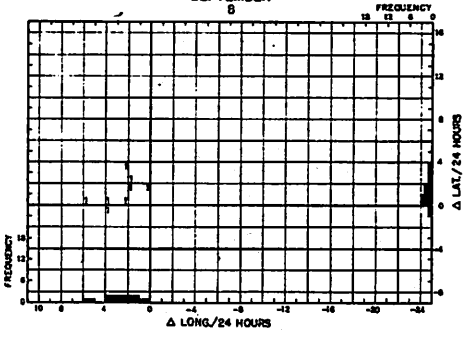
JULY
3



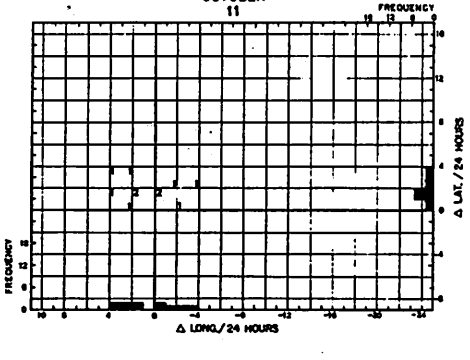
AUGUST
3



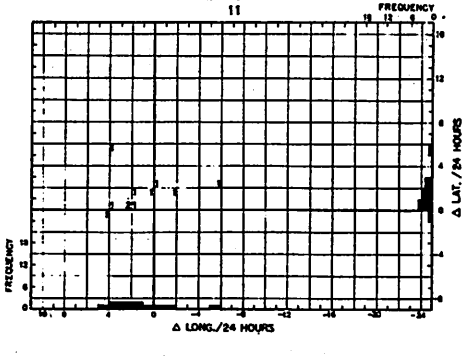
SEPTEMBER
8



OCTOBER
11



NOVEMBER-MAY
11

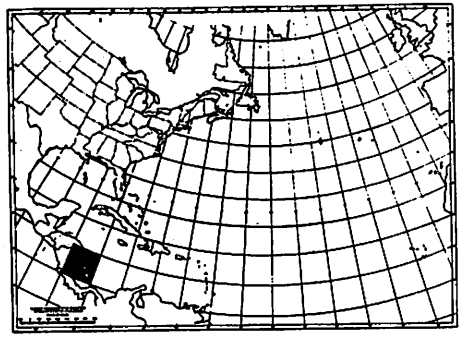


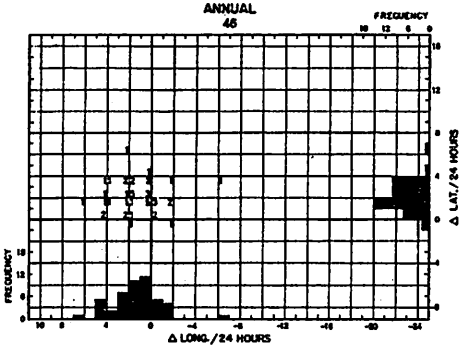
NUMBER OF CYCLONE CENTRES PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

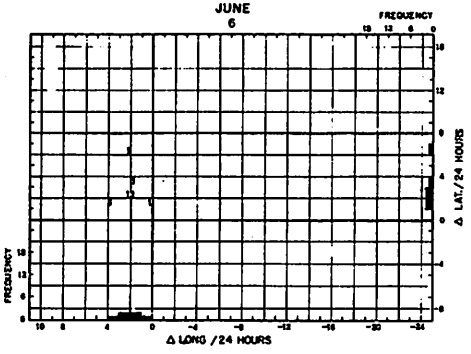
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	2	2	3	10	16	11
STORM ORIGINS	1915 1921	1882		1886-8 1900 1920 1924	1894 1903 1908 1908 1909 1910 1933 1940 1944 1951 1952 1953	1906 1912 1926 1932-8

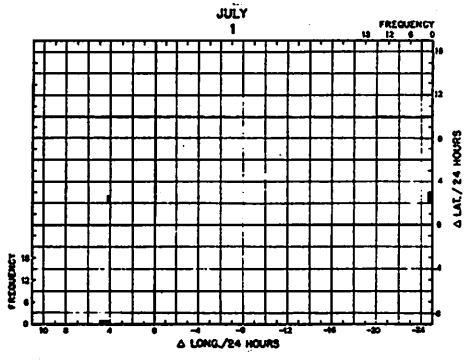
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

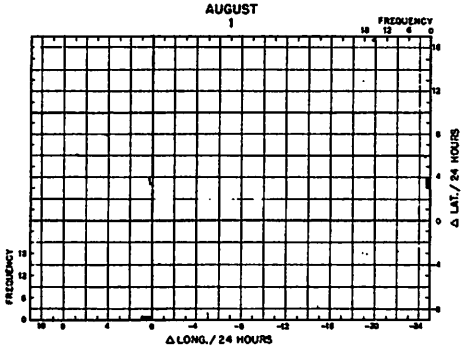
10°-15°N.
80°-85°W.

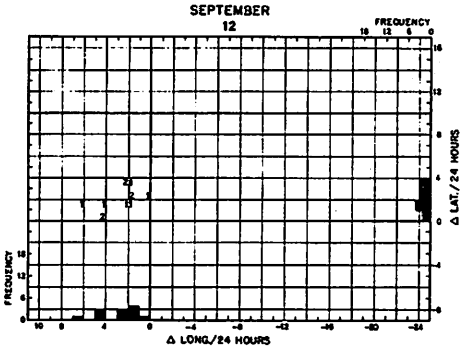


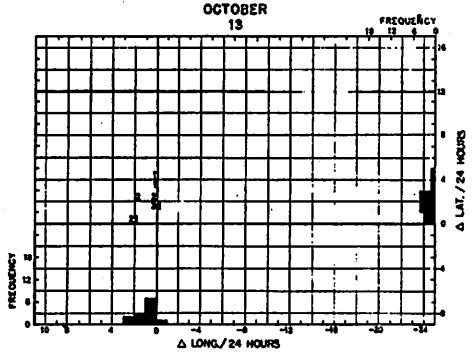


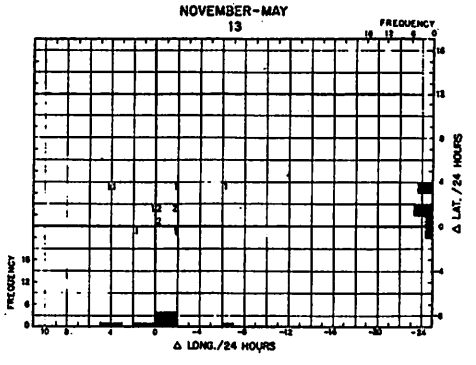










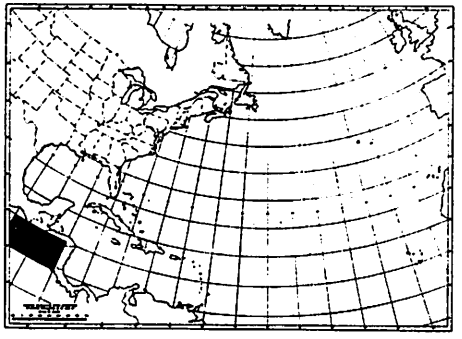


NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

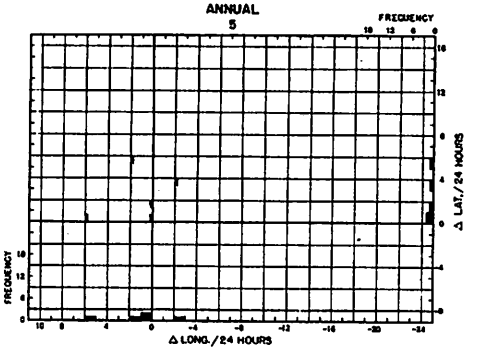
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	6	1	2	10	13	13
STORM ORIGINS	1908 1915 1922		1943	1901 1933 1940	1899 1921 1923 1928* 1933-S 1947	1909* 1914 1938 1953

24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

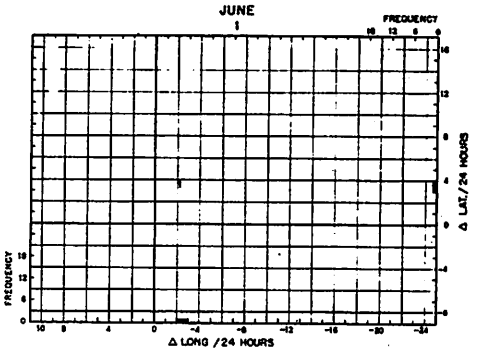
10°-15°N.
85°-95°W.



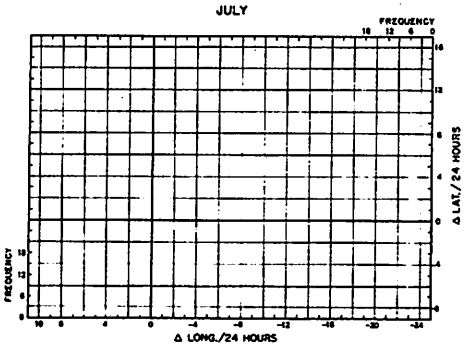
ANNUAL
5



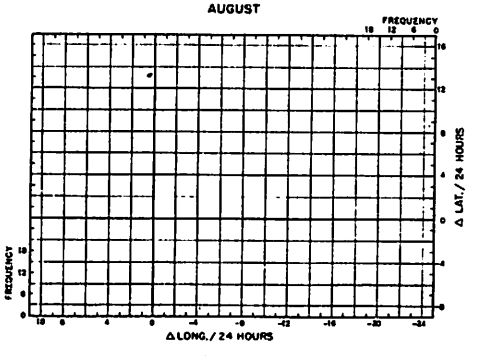
JUNE
1



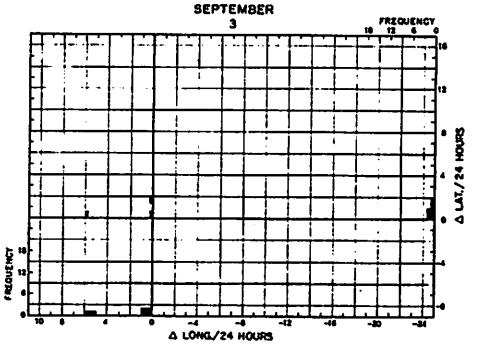
JULY



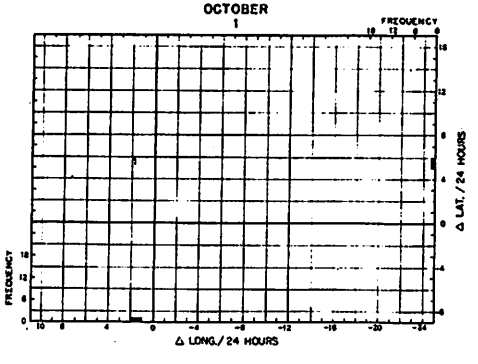
AUGUST



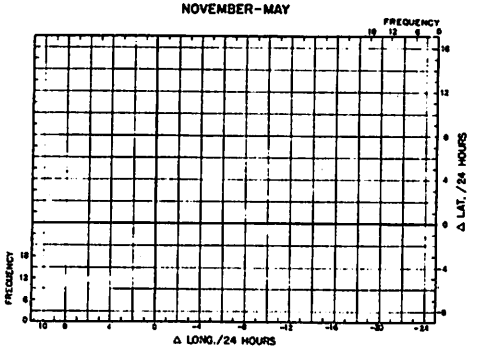
SEPTEMBER
3



OCTOBER
1



NOVEMBER-MAY

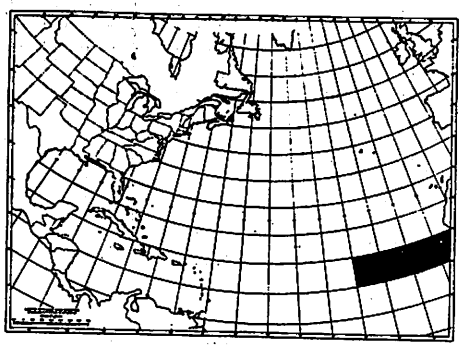


NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

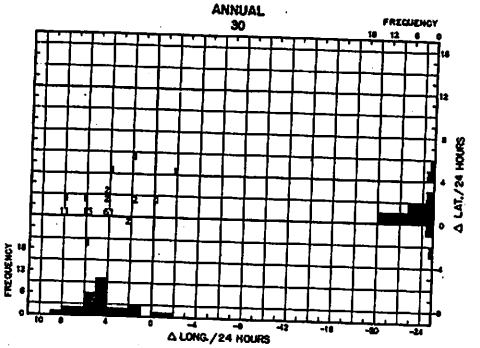
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	1	0	0	3	5	3
STORM ORIGINS				1949	1902 1933	

24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

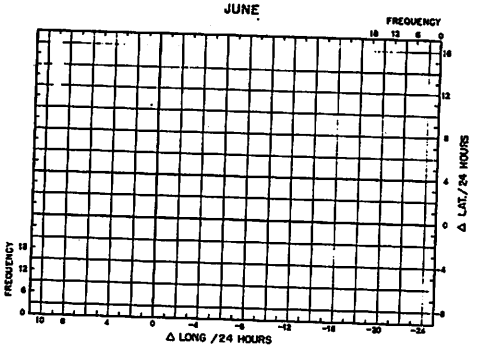
15°-20°N.
15°-35°W.



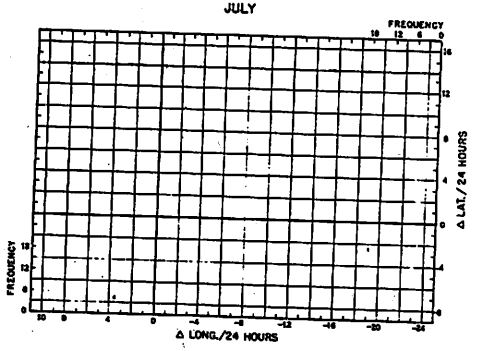
ANNUAL
30



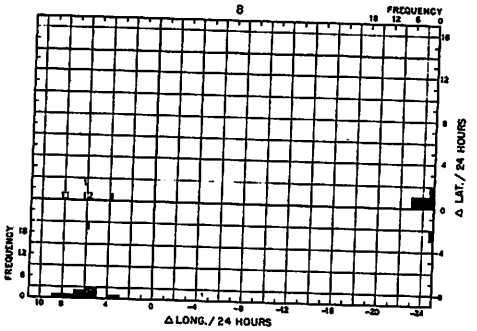
JUNE



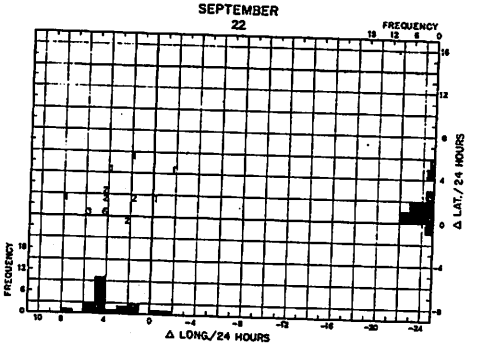
JULY



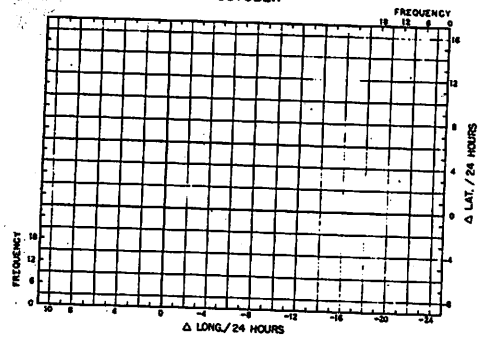
AUGUST
8



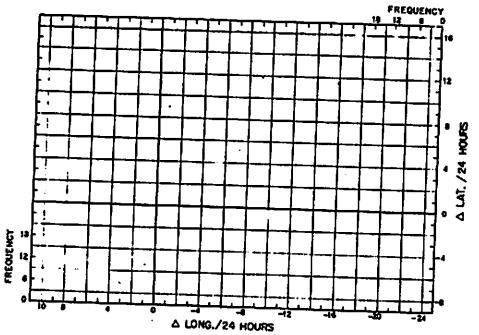
SEPTEMBER
22



OCTOBER



NOVEMBER-MAY

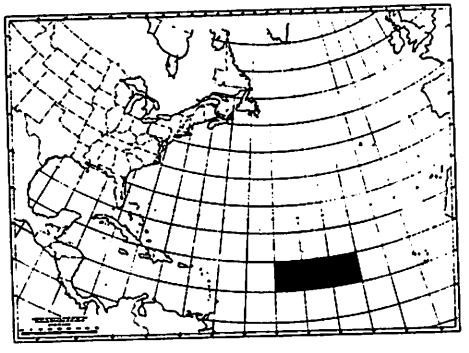


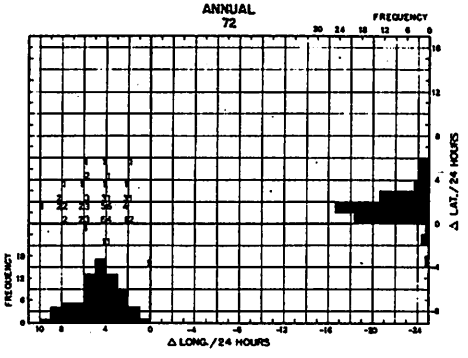
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

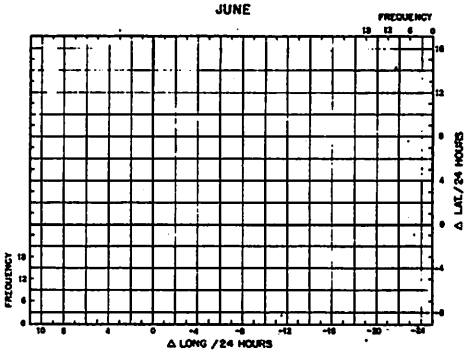
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	0	0	7	10	0	0
STORM ORIGINS			1893 1915 1933 1935 1938	1892 1897 1949 1955		

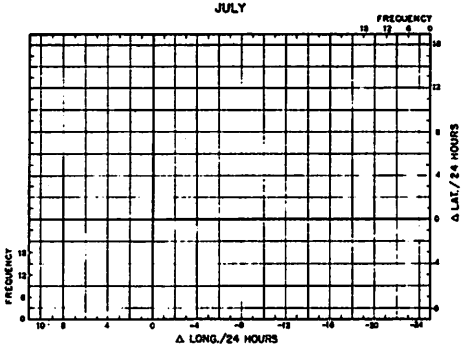
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

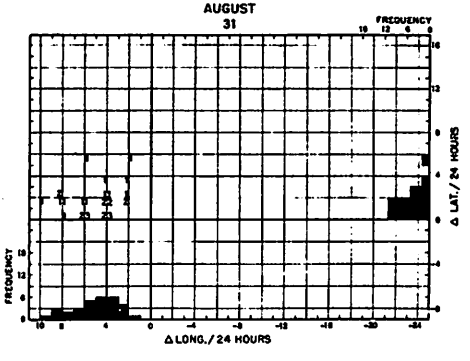
15°-20°N.
35°-50°W.

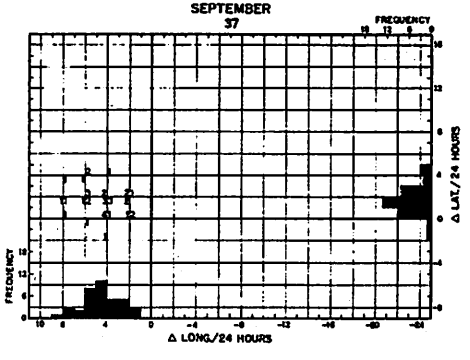


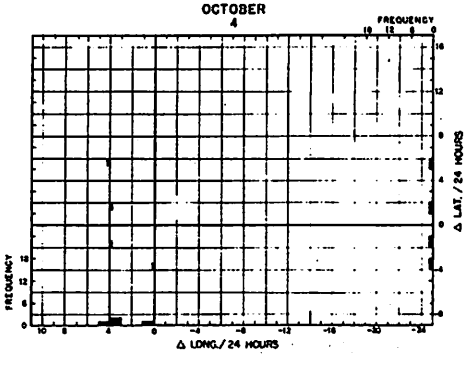


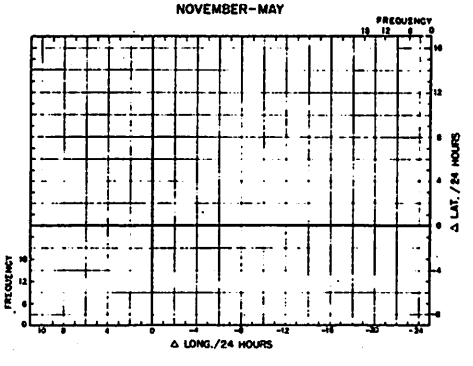










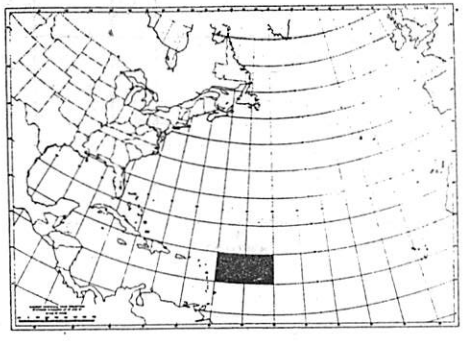


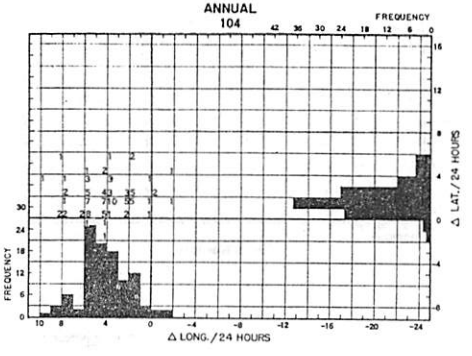
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

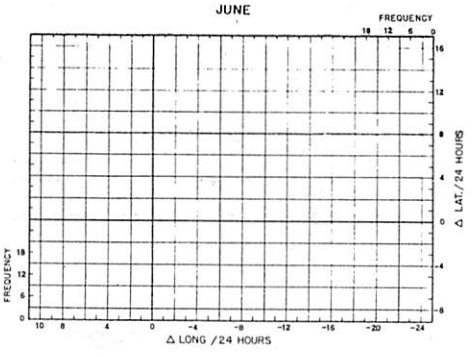
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	0	0	17	37	3	1
STORM ORIGINS			1900	1898	1928	
			1917	1901	1933	
			1927	1902		
			1929	1926		
			1936	1927		
			1935	1927		
				1944		
				1950		
				1955		

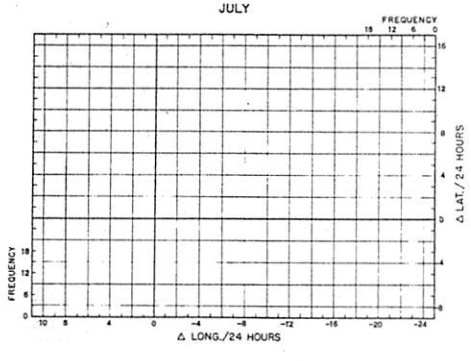
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

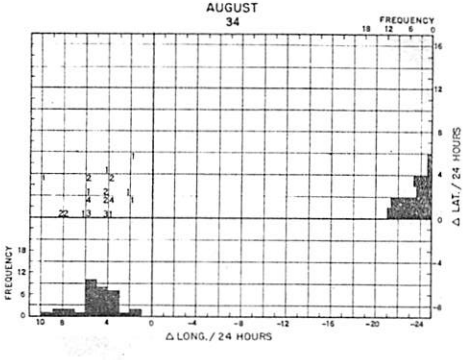
15°-20°N.
50°-60°W.

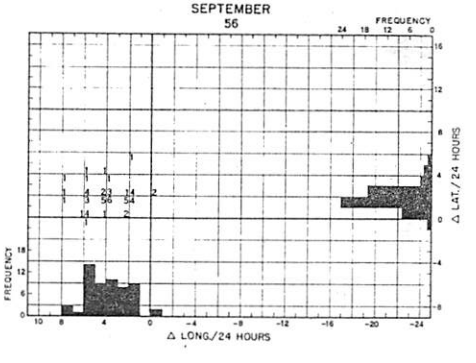


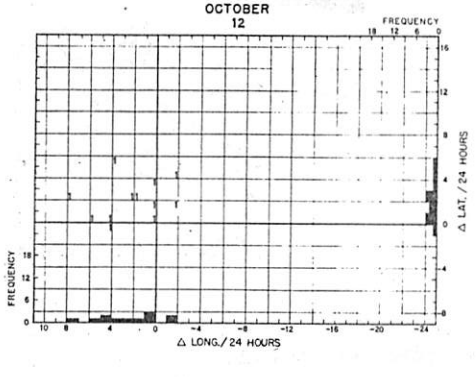


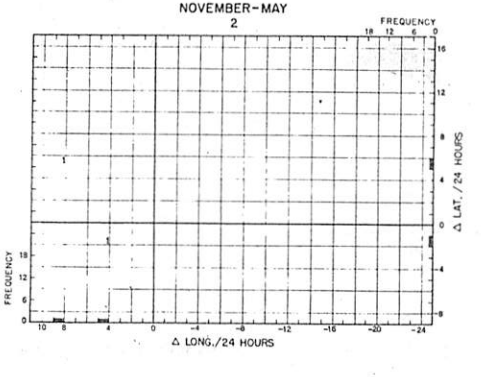










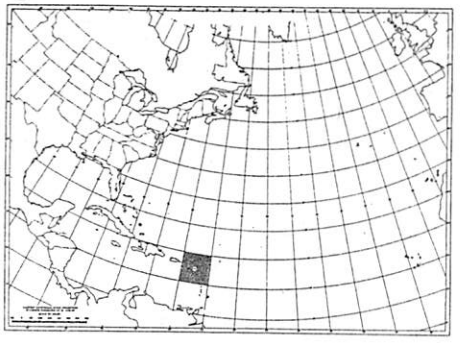


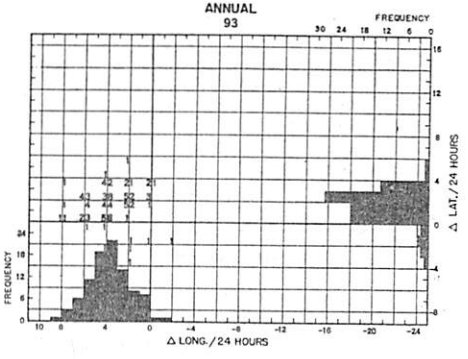
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

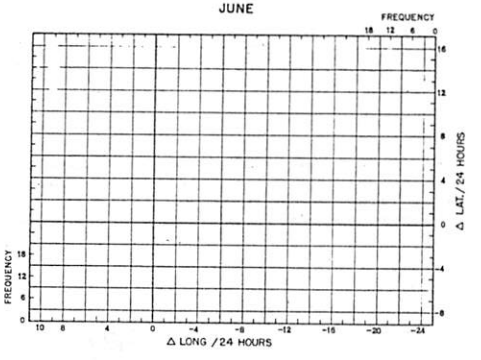
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	0	2	49	52	7	2
STORM ORIGINS		1933-2	1887 1888 1890 1892 1899 1909 1926 1930-2 1933-2 1935 1936 1937 1943 1945 1948 1949 1950-3	1889 1891 1896 1898-2 1900 1904 1905 1908 1910 1913 1916 1931 1932 1933-2 1937-2 1940 1945 1958-2	1887-2 1891 1932 1944	1887

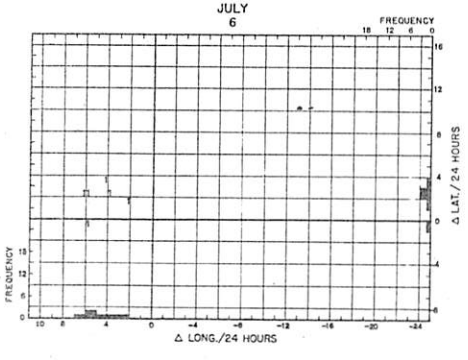
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

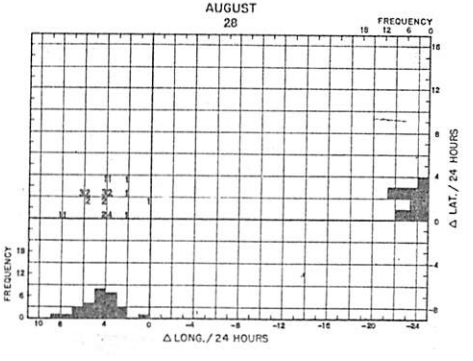
15°-20°N.
60°-65°W.

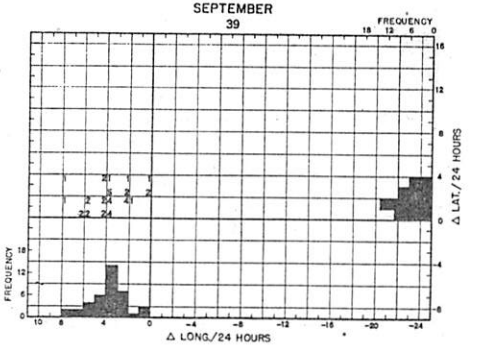


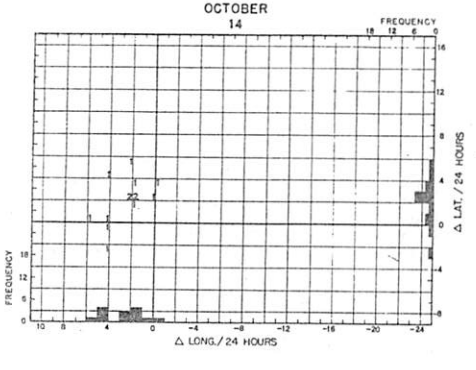


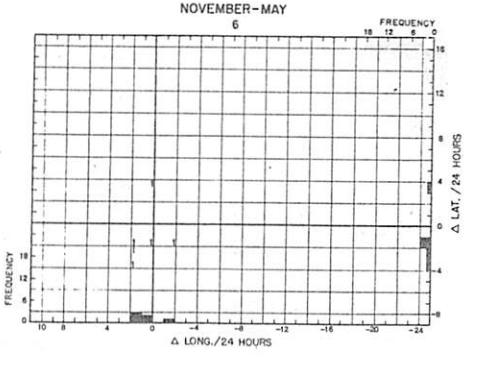










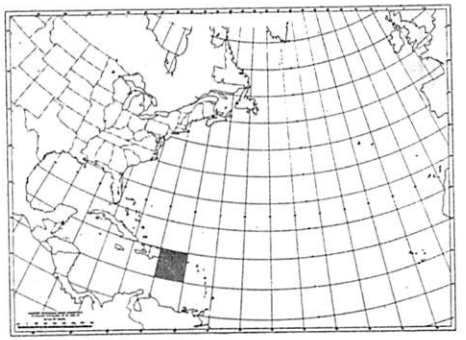


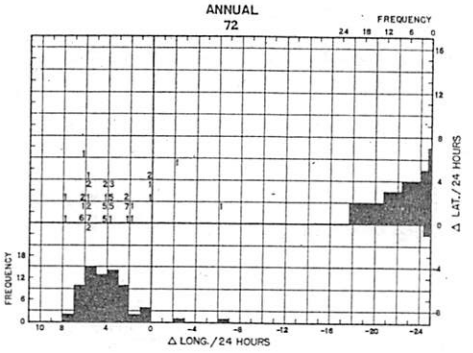
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

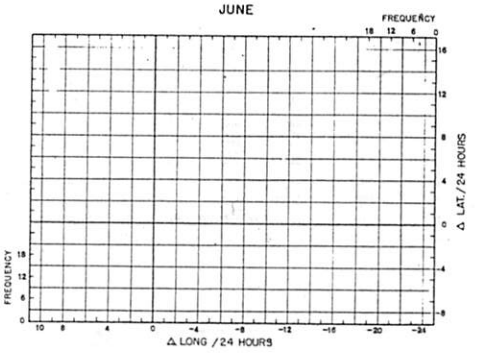
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	0	6	41	45	13	5
STORM ORIGINS		1903	1916 1932 1938 1939 1940	1896 1917 1945 1949 1953 1955 1958	1898 1923 1939 1947	1931

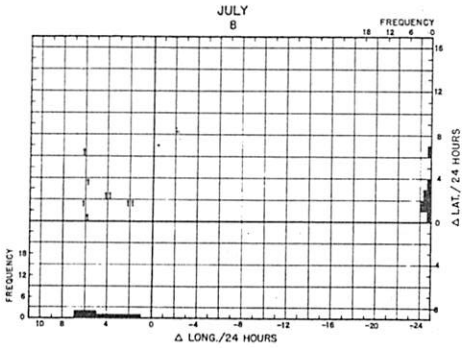
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

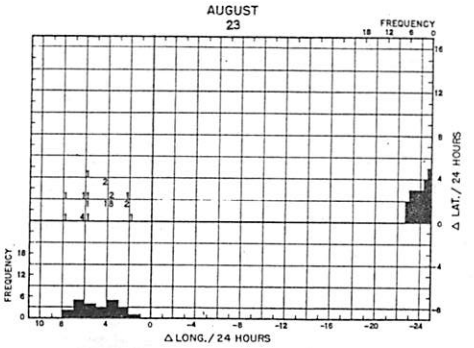
15°-20°N.
65°-70°W.

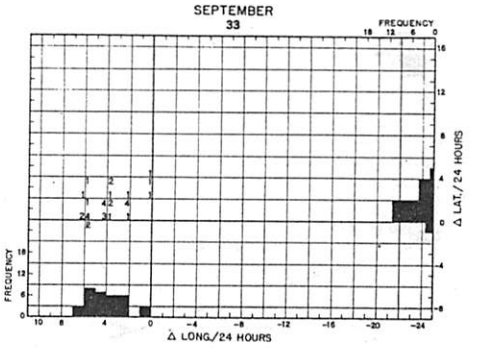


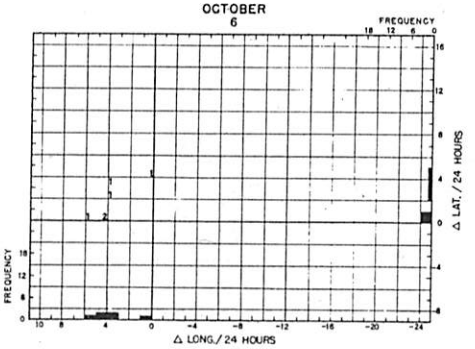


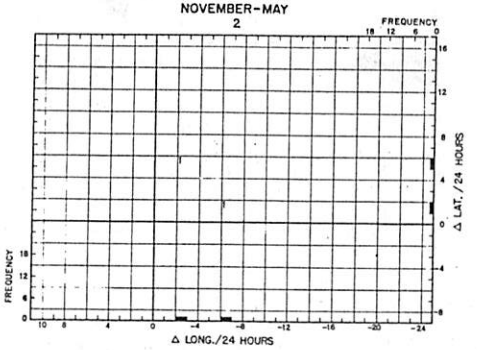










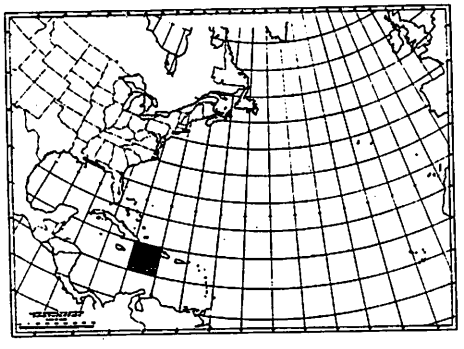


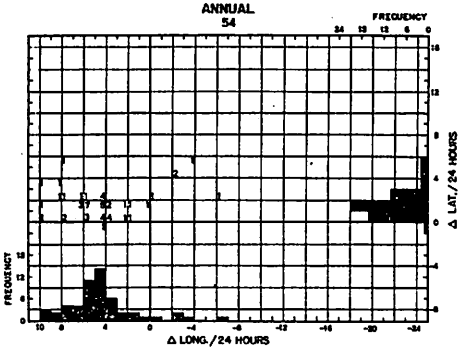
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

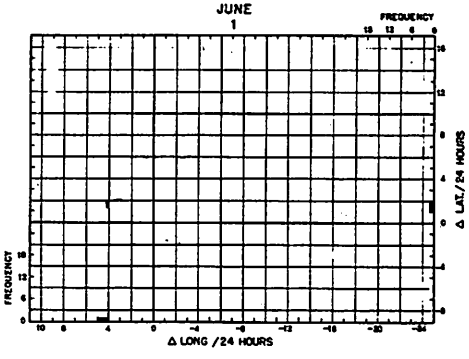
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	0	8	34	36	12	4
STORM ORIGINS		1944	1889 1954	1949	1886 1911	1942

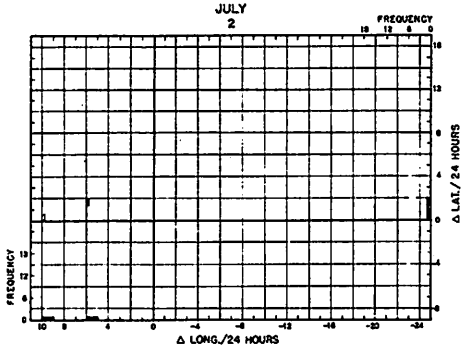
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

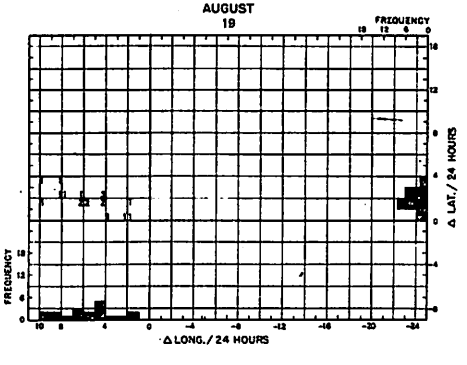
15°-20°N.
70°-75°W.

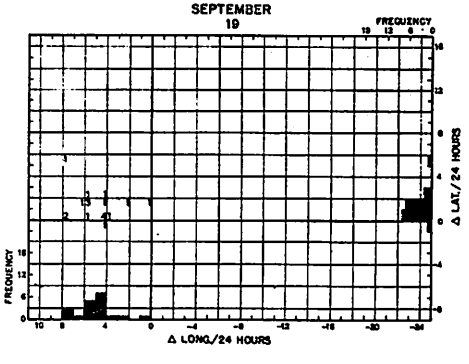


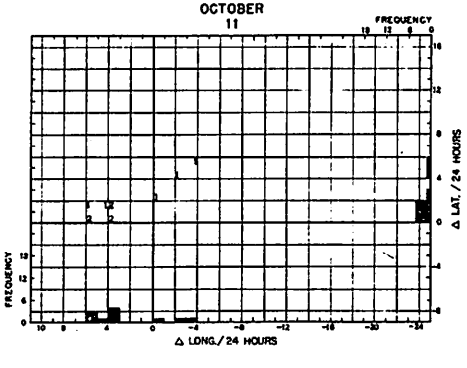


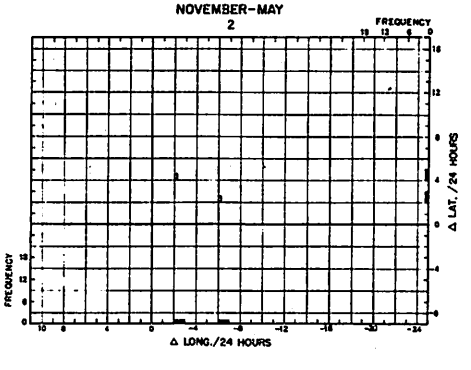










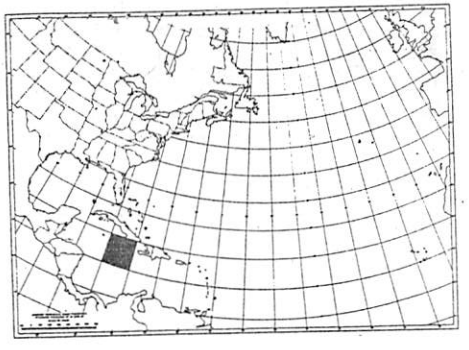


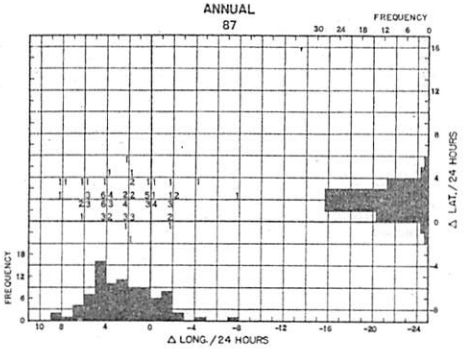
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

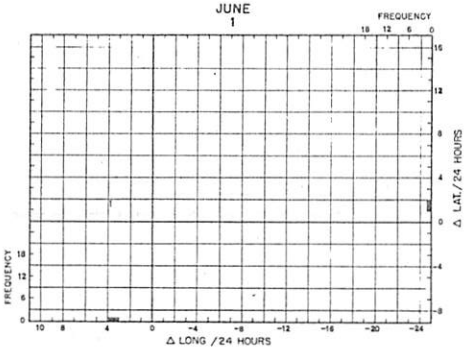
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	1	2	20	20	11	2
STORM ORIGINS				1906 1929 1953	1904 1916	1933 1948

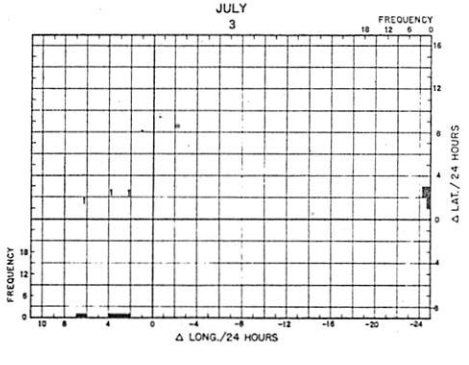
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

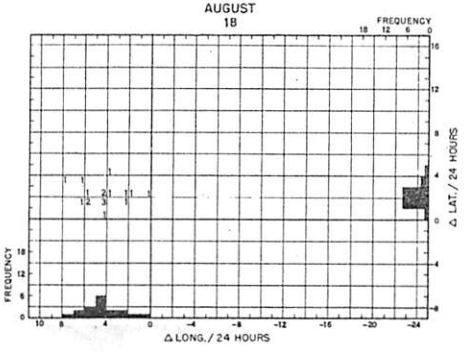
15°-20°N.
75°-80°W.

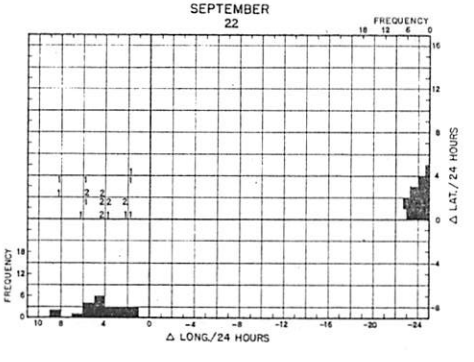


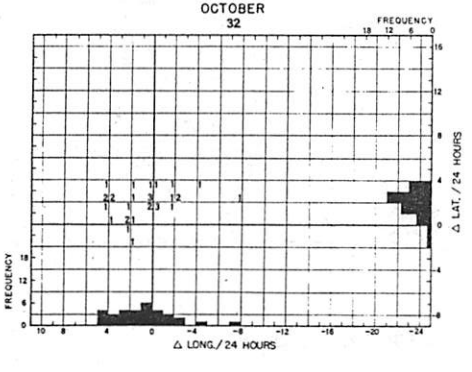


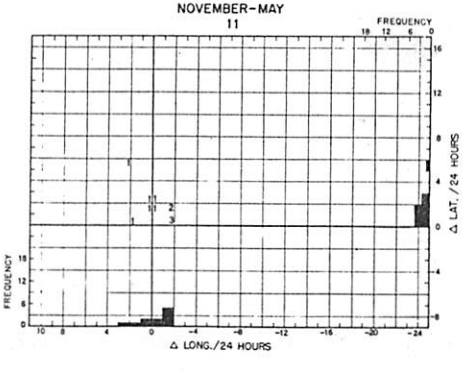










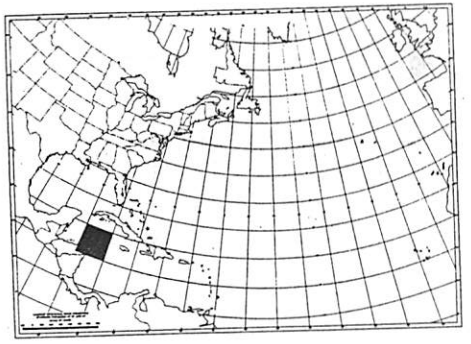


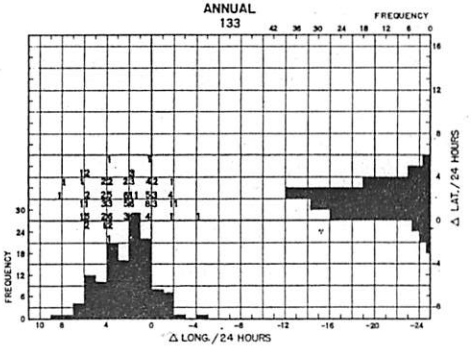
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

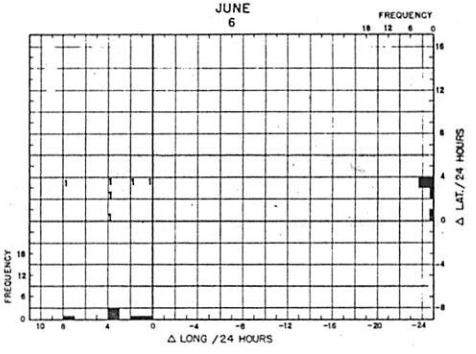
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	3	6	22	30	24	8
STORM ORIGINS	1886 1904 1907		1955	1915 1926 1947 1948	1912 1934 1942 1949 1953 1956	1887 1893

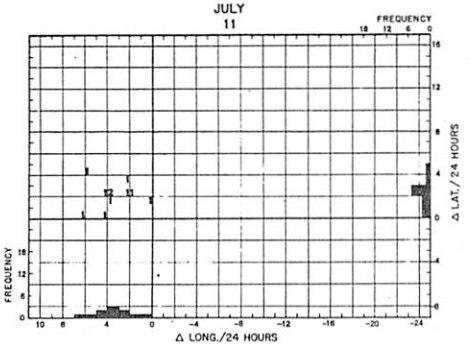
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

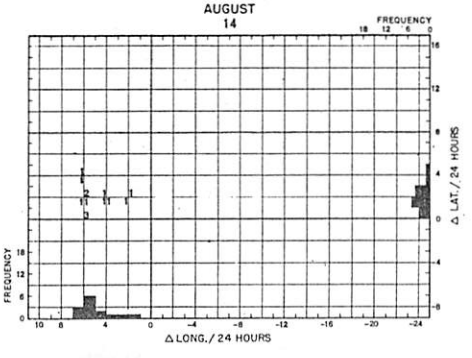
15°-20°N
80°-85°W.

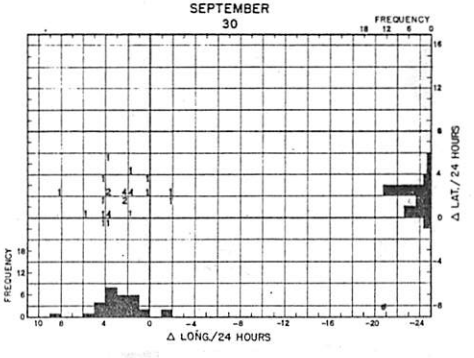


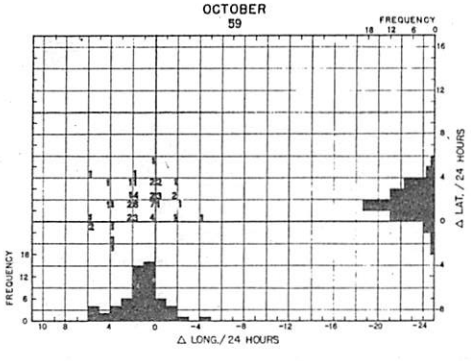


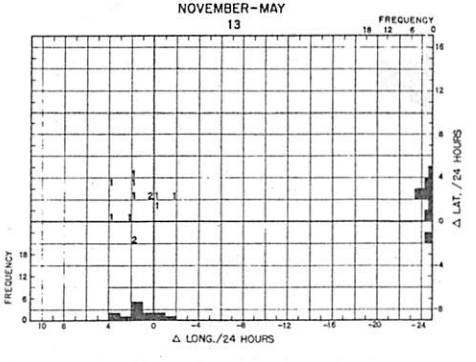










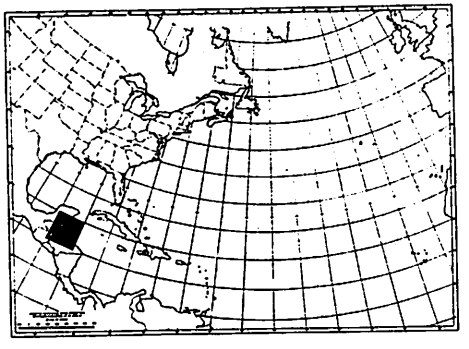


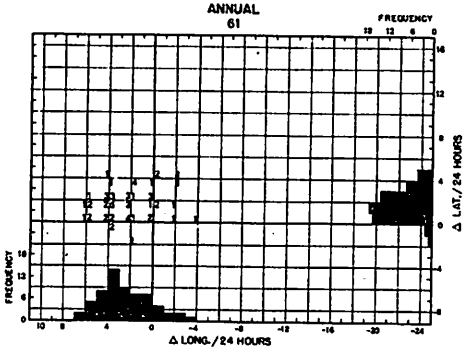
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

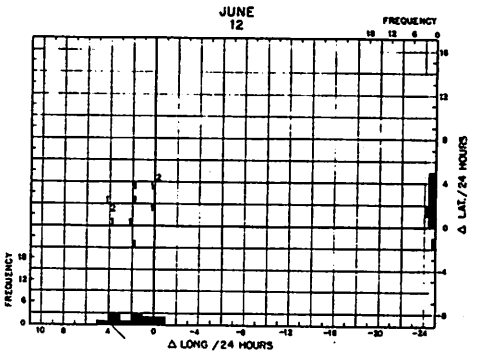
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	10	10	21	37	40	11
STORM ORIGINS	1889 1901 1902 1906	1886 1931	1926	1893 1905 1944 1945 1950 1951	1886 1887-2 1891 1898 1899 1922-2 1924 1926 1927 1932 1939 1943 1945 1948 1950 1958	1925 1949

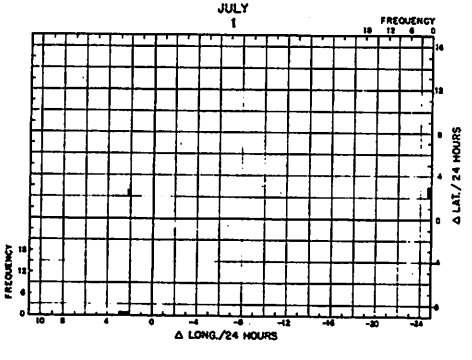
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

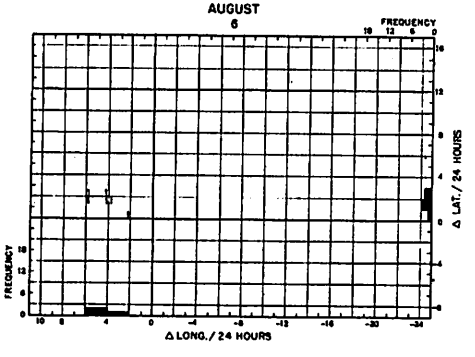
15°-20°N.
85°-90°W.

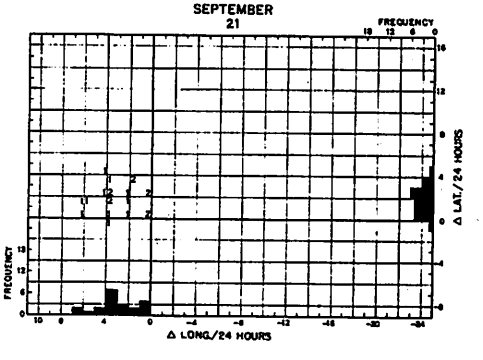


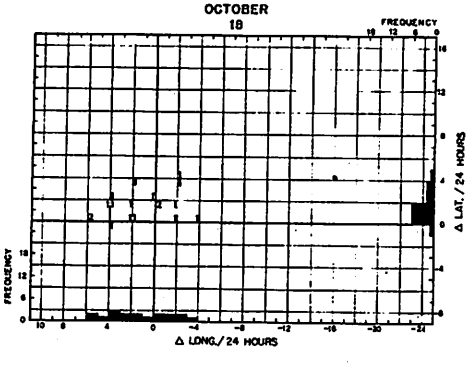


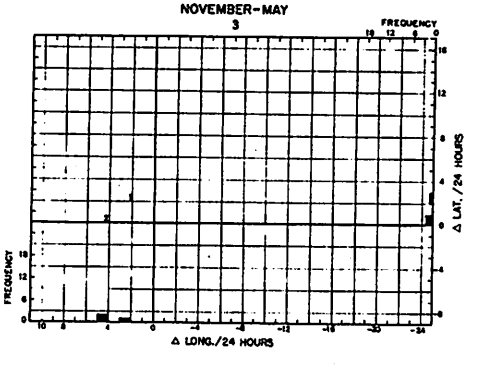










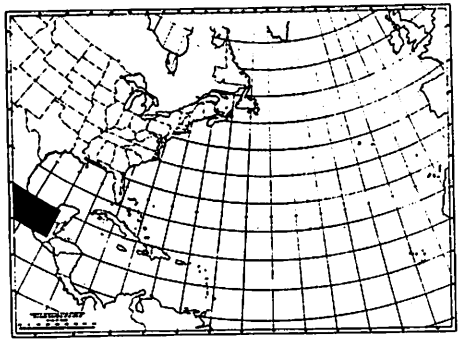


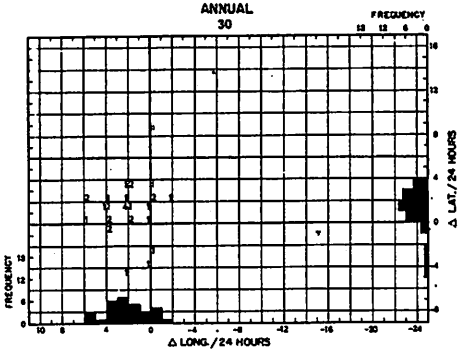
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

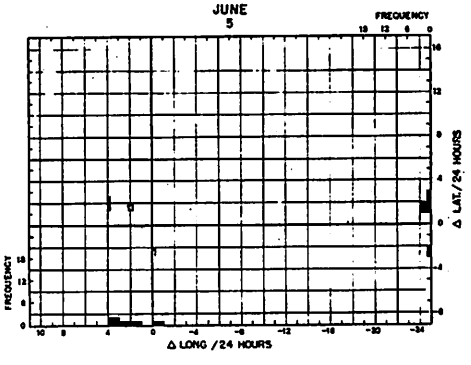
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	10	8	11	25	19	8
STORM ORIGINS	1834		1936	1893	1900	1953
	1834			1895	1904	
	1926			1924	1927	
	1939			1933	1931	
	1943			1937	1938	
				1954	1946	
					1953	

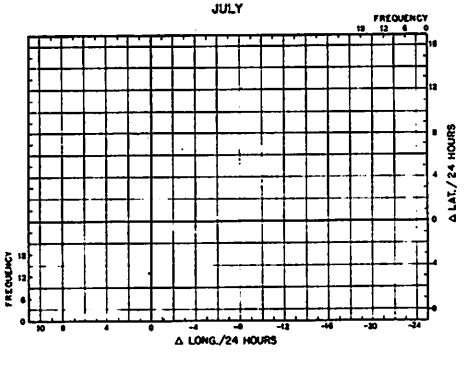
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

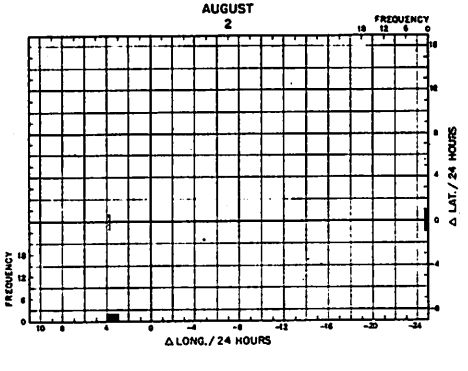
15°-20°N.
90°-100°W.

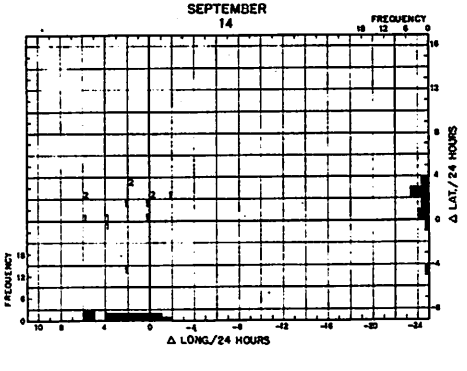


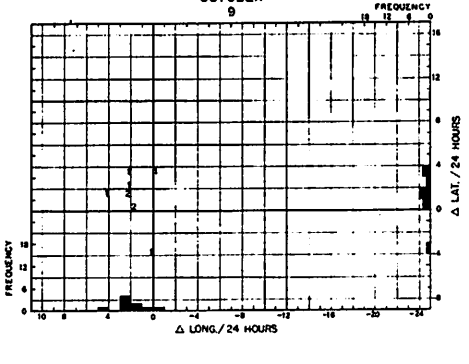


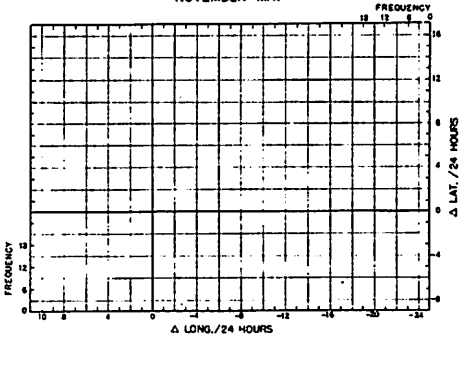








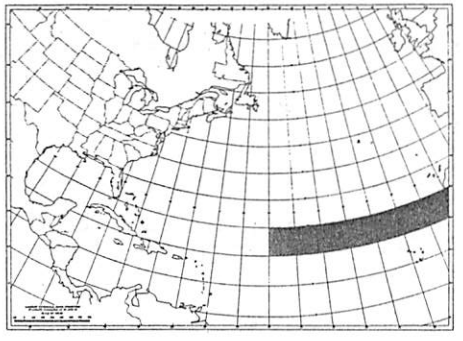


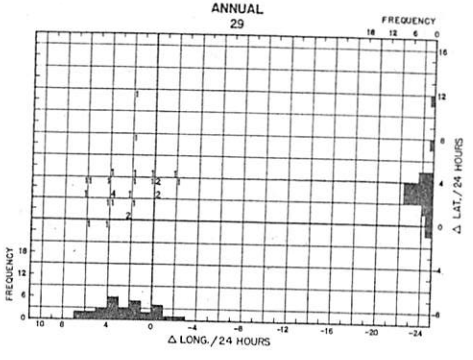


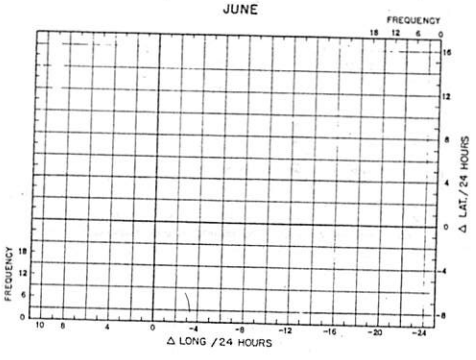
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

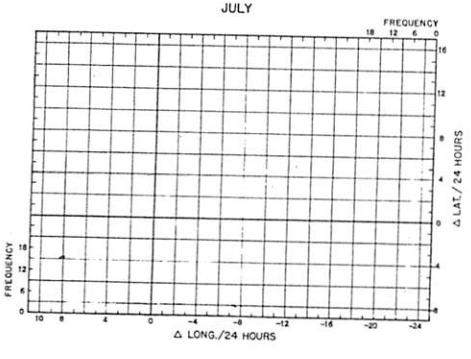
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	4	1	7	21	13	3
STORM ORIGINS		1947	1933 1945	1922 1933 1936 1936 1961 1938	1935 1936	

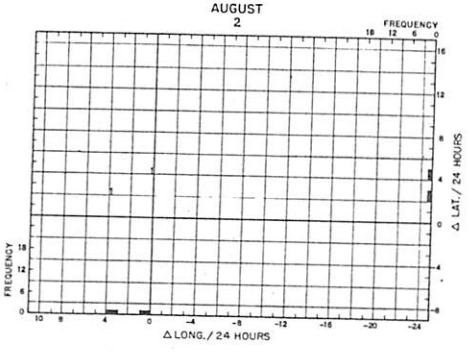
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

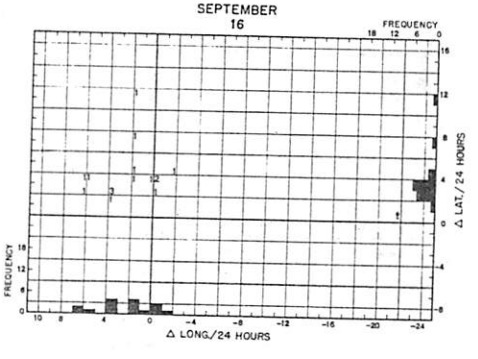


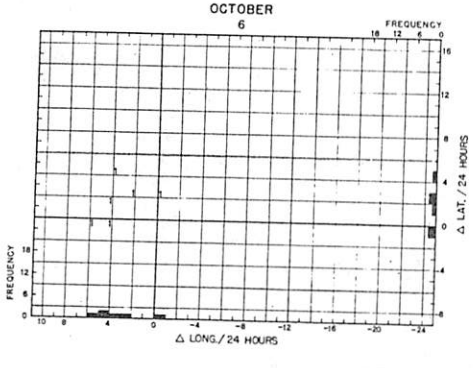


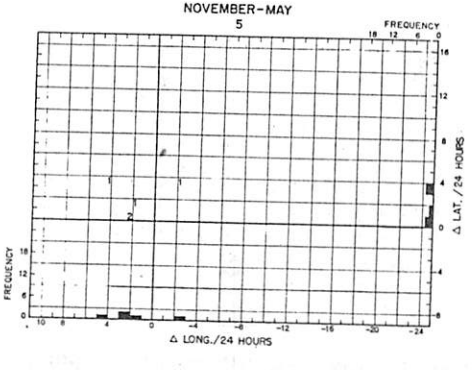








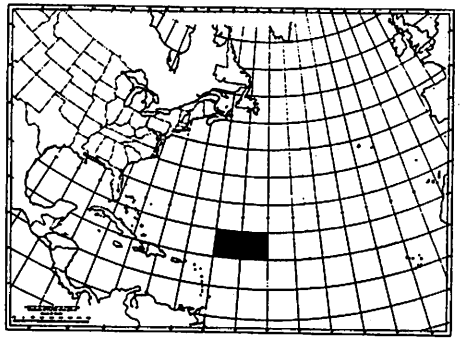


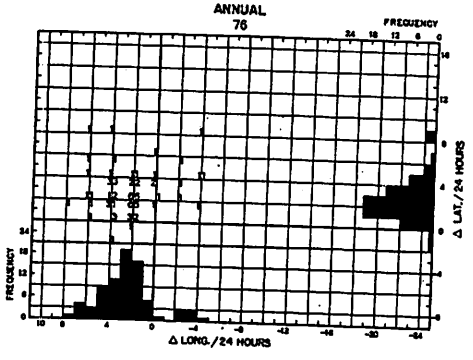


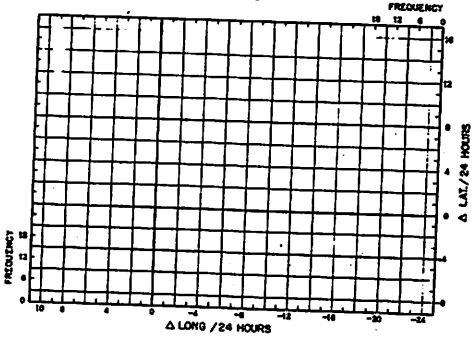
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

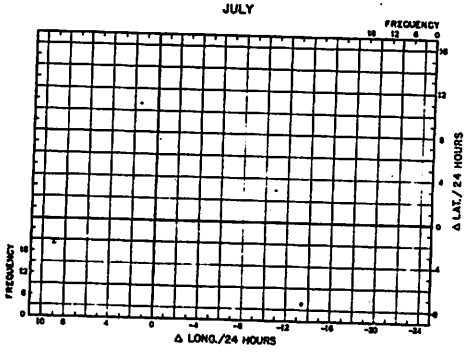
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	0	0	3	15	7	3
STORM ORIGINS			1915	1906 1928	1934 1949 1950-2	1903 1954

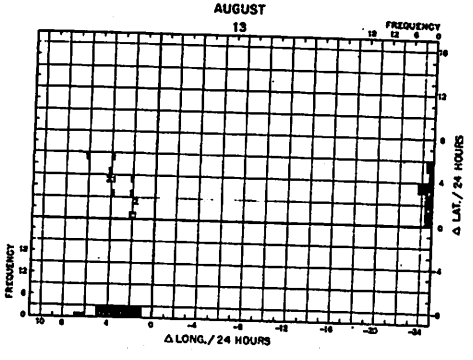
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

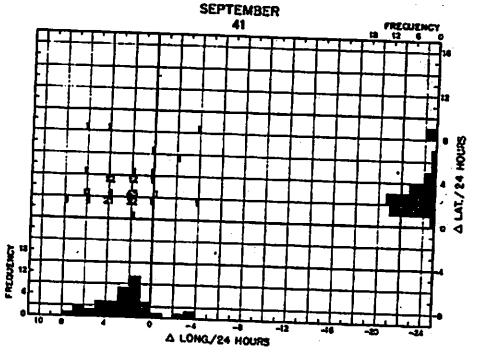


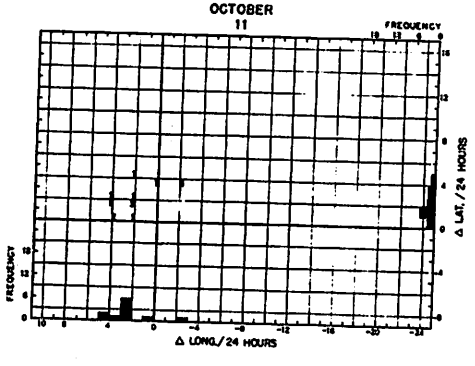


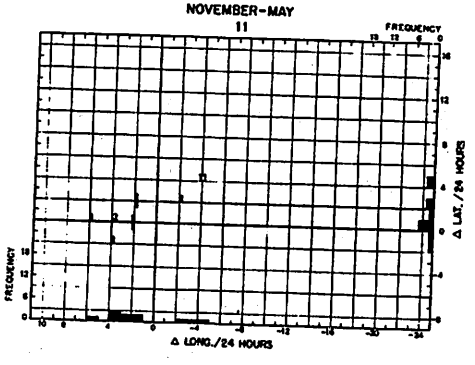








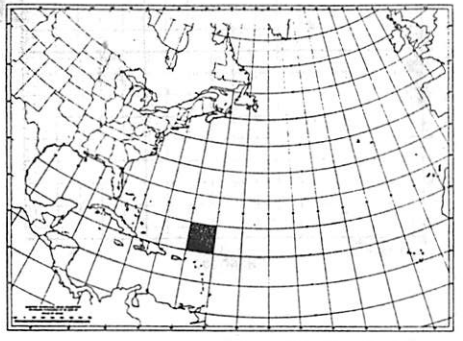


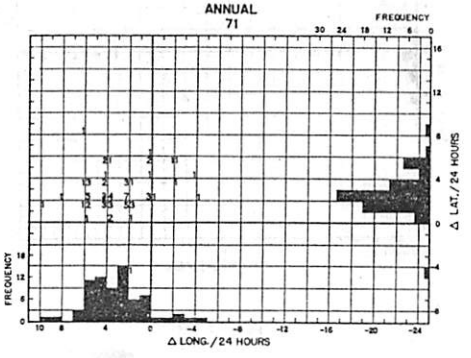


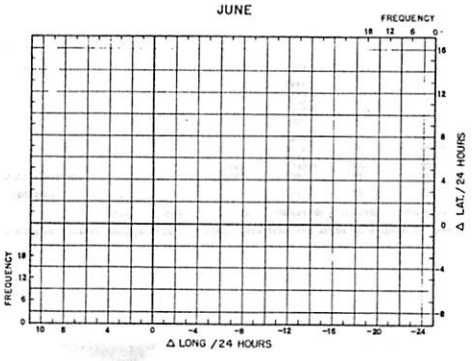
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

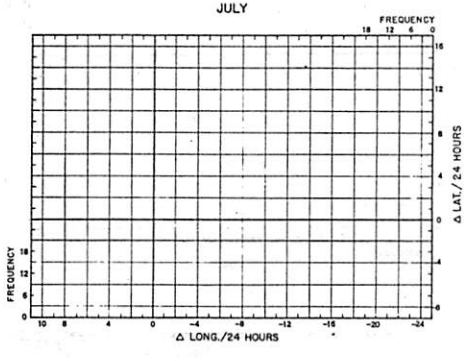
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	0	0	16	43	10	11
STORM ORIGINS			1929	1891	1891	1888
			1931	1903-8	1892	1908
				1910	1923	1934
				1916	1927	1953-8
				1918		1954
				1926		
				1931		
				1936		
				1945		
				1954		
				1960		

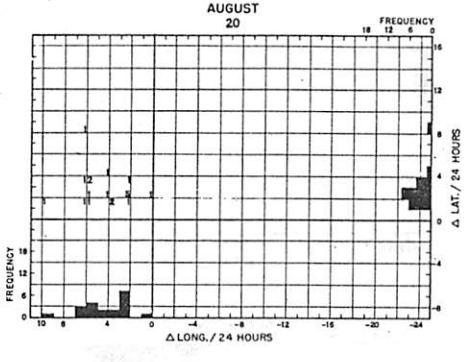
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

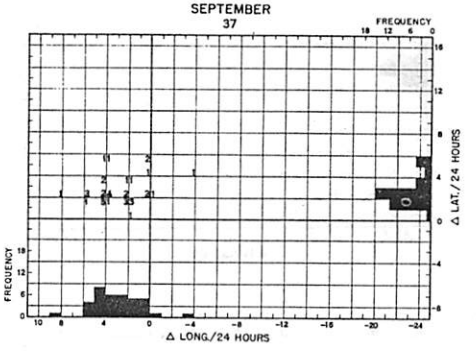


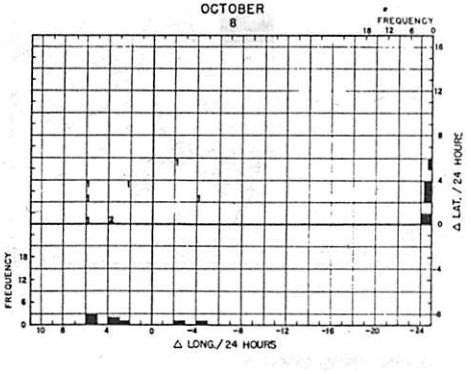


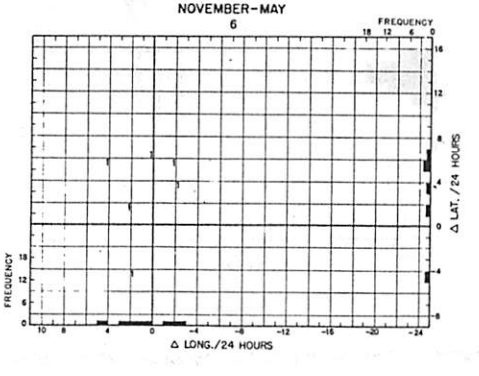










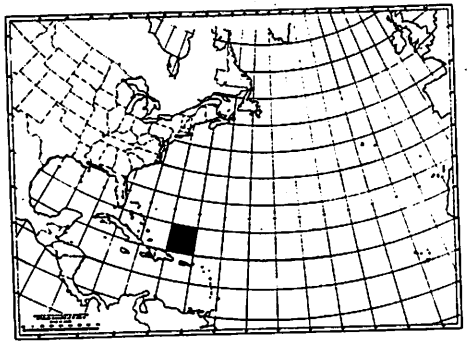


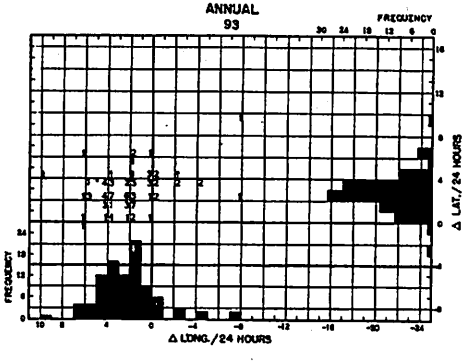
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

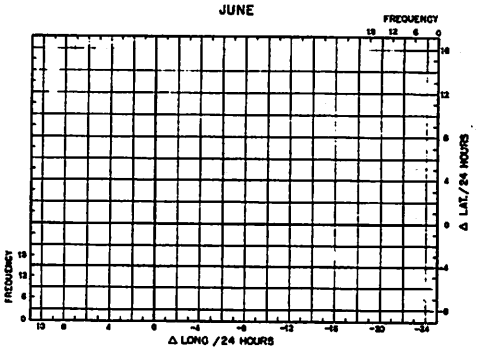
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	0	0	24	38	10	9
STORM ORIGINS			1887 1949	1921 1936 1953	1900 1923 1941	1889 1902 1948

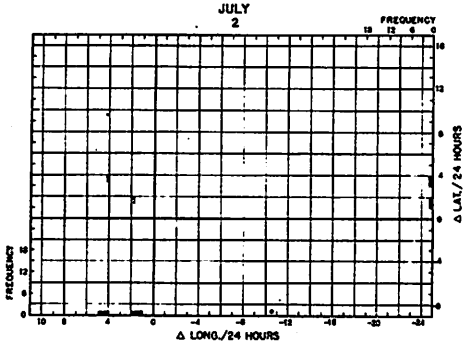
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

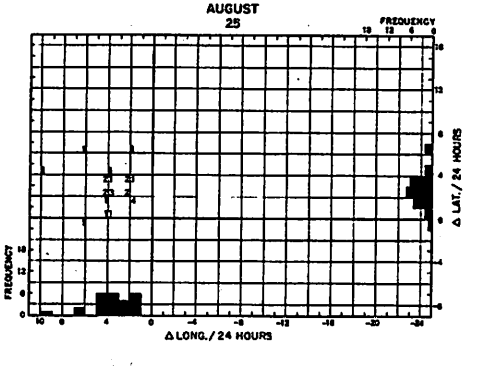
20°-25°N.
65°-70°W.

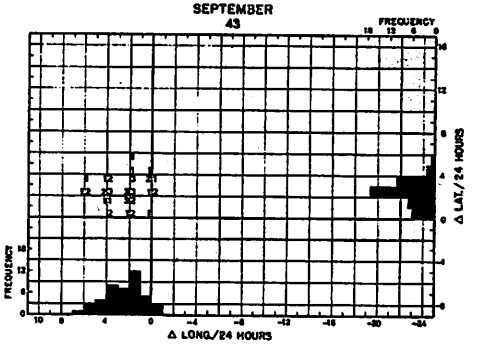


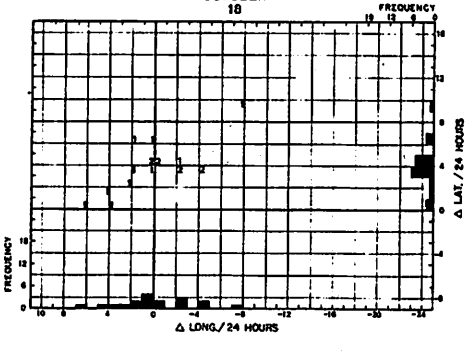


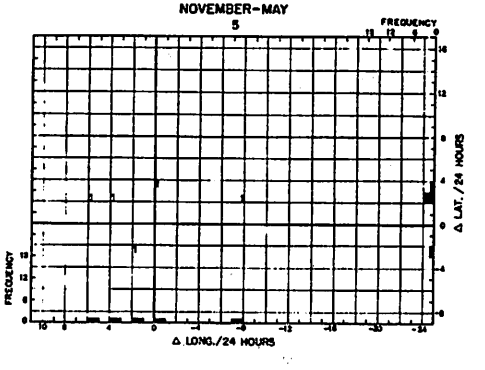








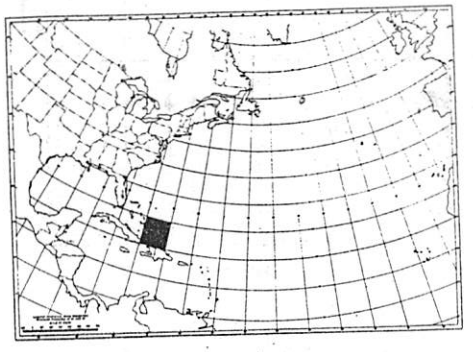




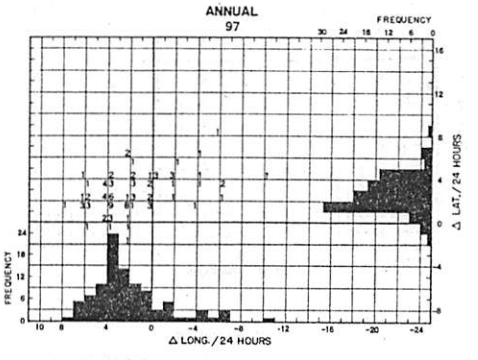
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

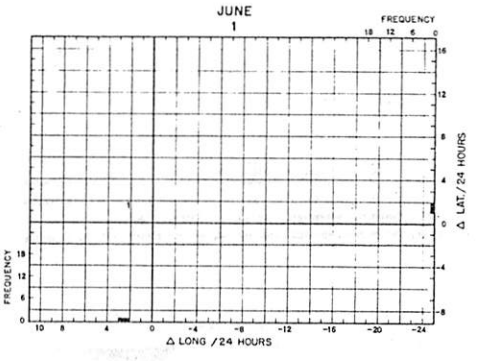
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	0	2	25	43	18	5
STORM ORIGINS		1944	1909 1923 1933	1886 1923 1929	1901 1903 1941	1887

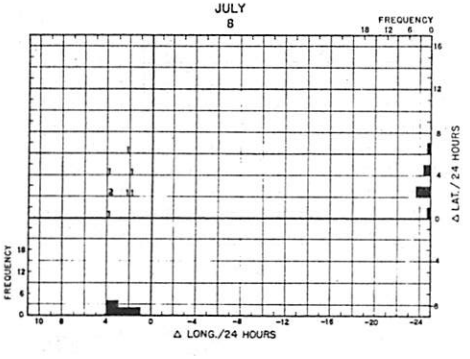
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

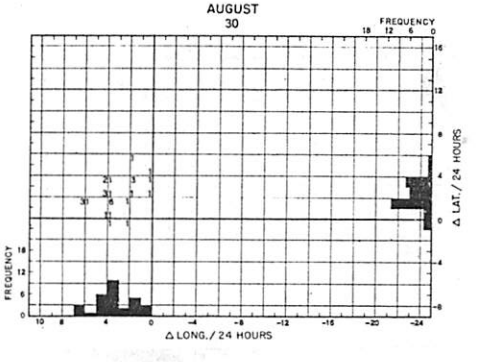


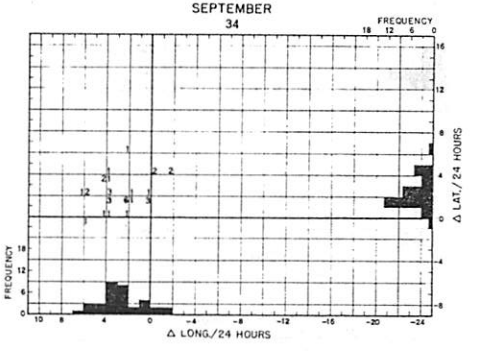
20°-25°N.
70°-75°W.

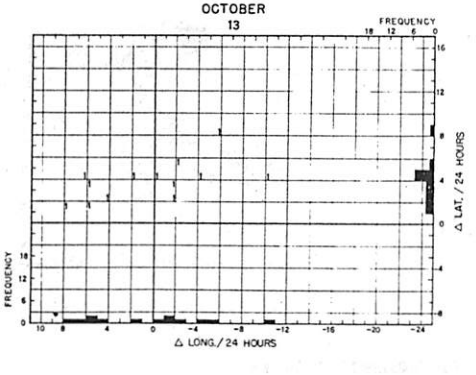


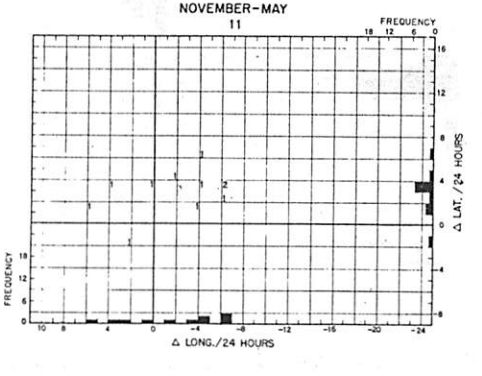










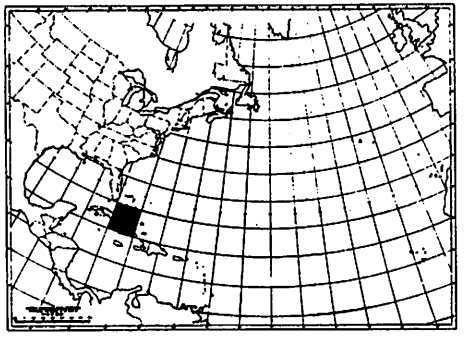


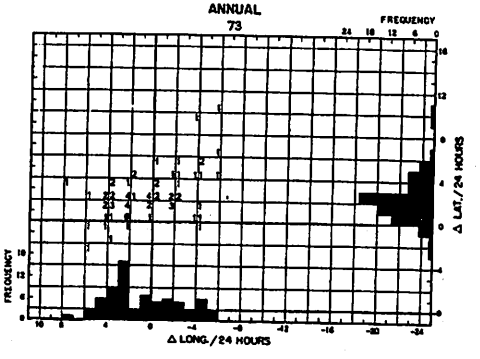
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

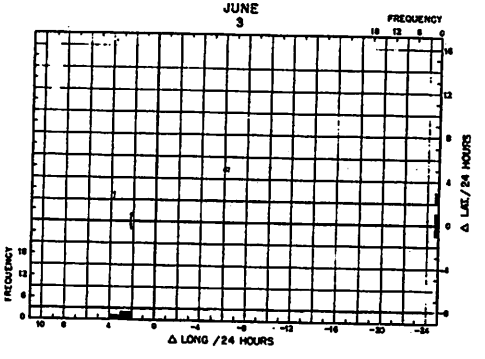
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	2	9	30	35	19	12
STORM ORIGINS	1906 1909	1908 1936	1888 1932 1937 1953 1954	1903-2 1907 1934 1936-2	1927 1940 1942 1946	1891 1940

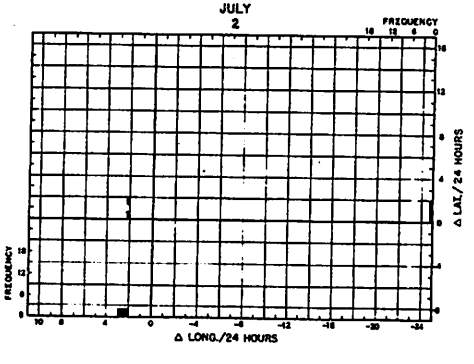
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

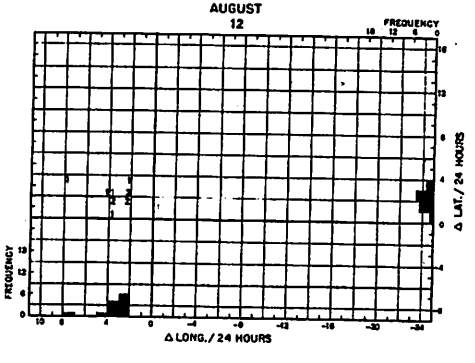
20°-25°N.
75°-80°W.

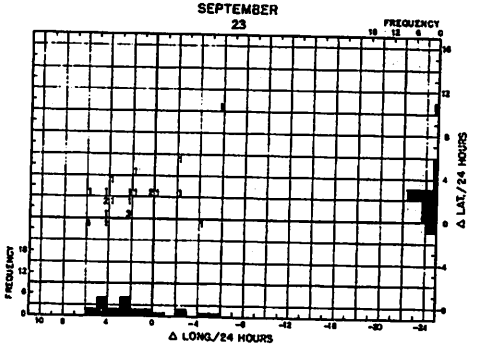


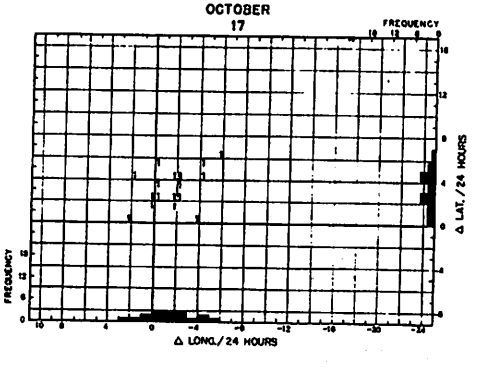


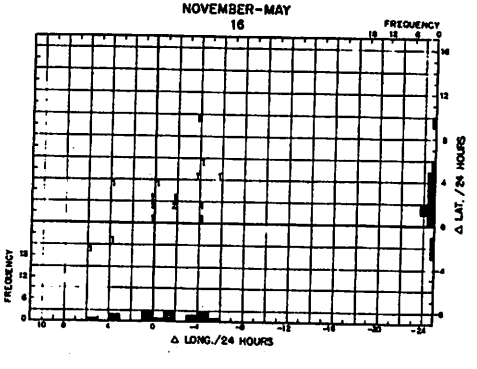








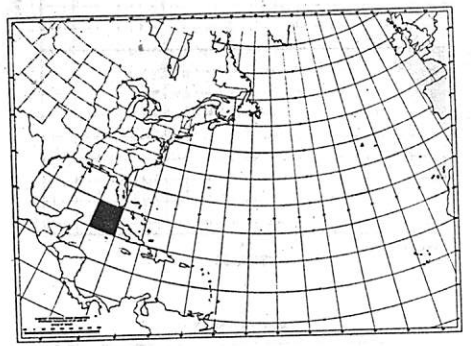




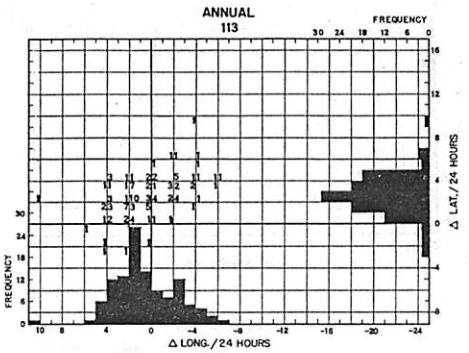
NUMBER OF CYCLONES CENTERED PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

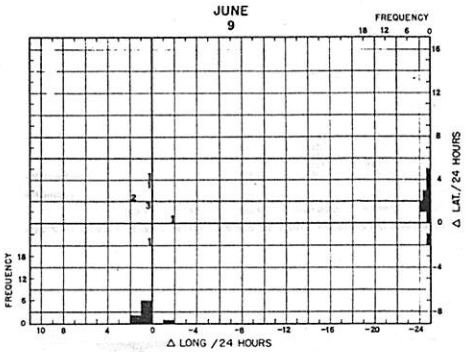
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	3	4	24	33	24	16
STORM ORIGINS			1947	1897 1914 1916 1937 1948	1887 1947	

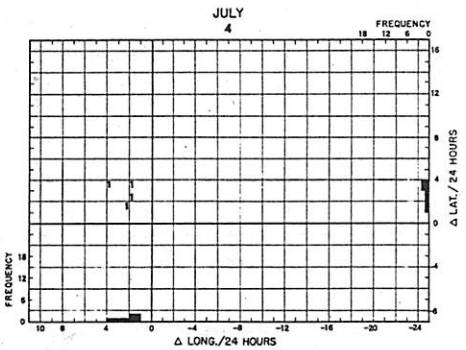
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

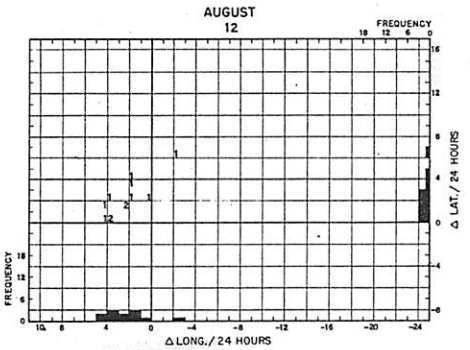


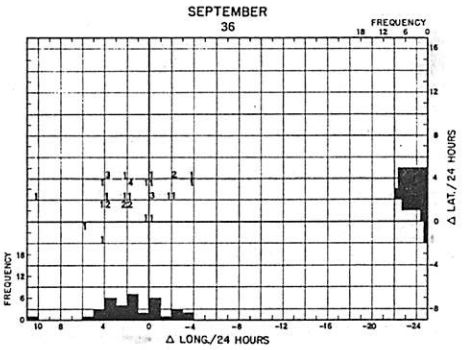
20°-25°N.
80°-85°W.

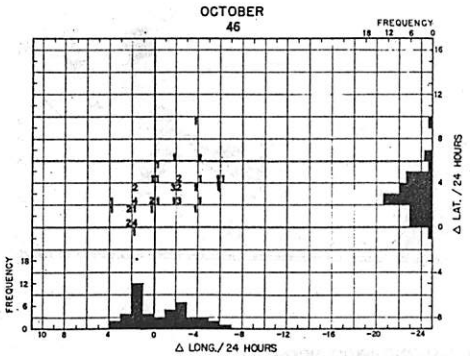


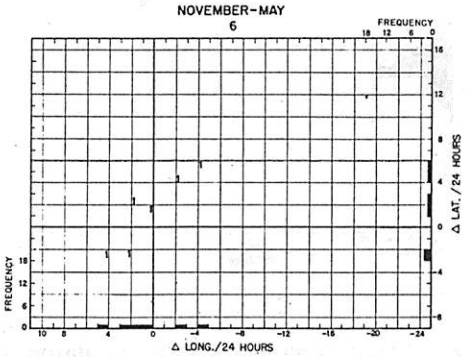










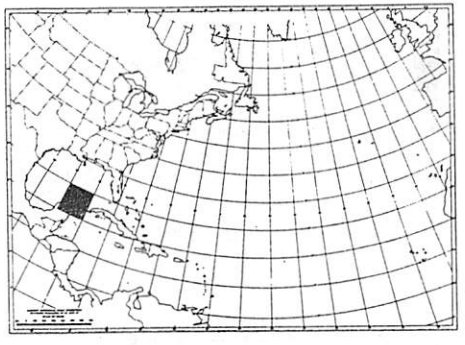


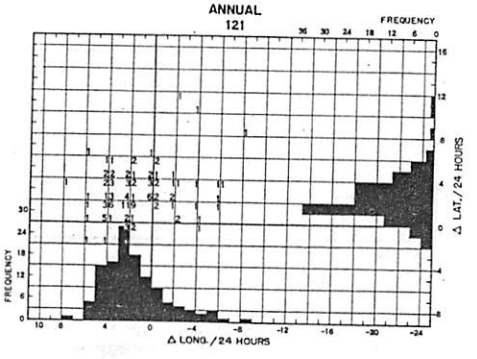
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

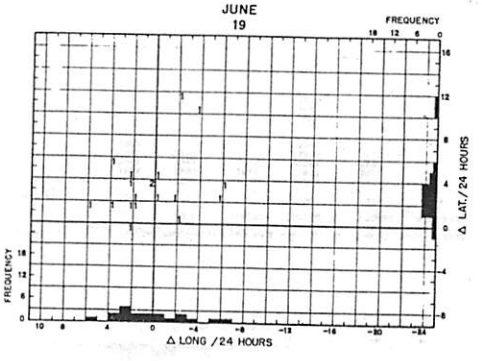
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	10	8	18	35	39	10
STORM ORIGINS	1909 1931	1896 1919 1936	1911 1953	1888 1897 1900 1920 1924	1889 1934	1934

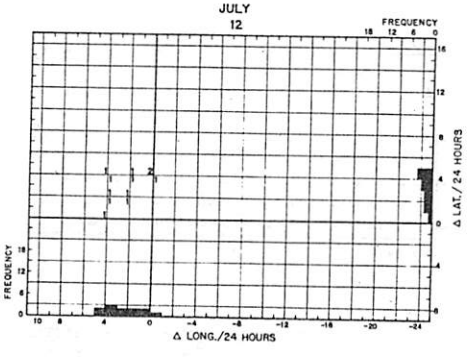
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

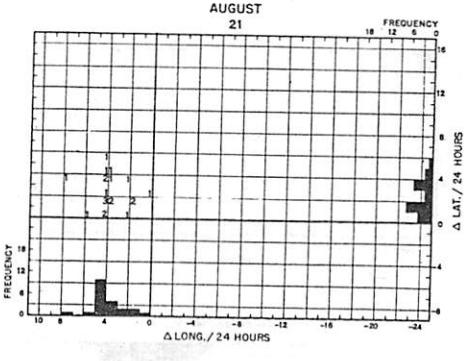
20°-25°N.
85°-90°W.

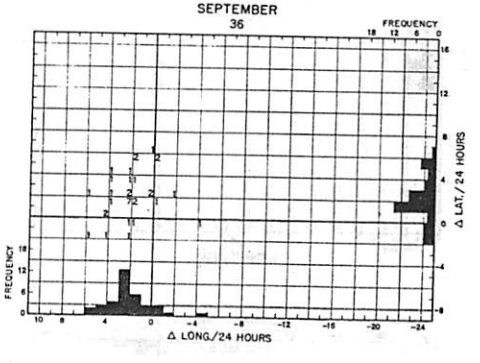


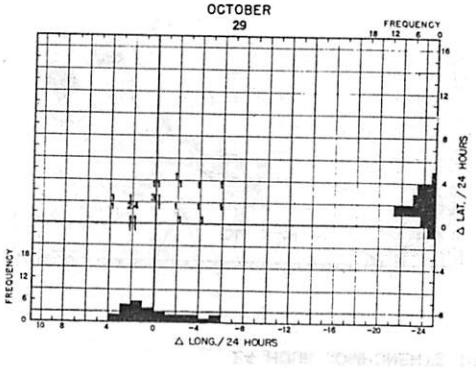


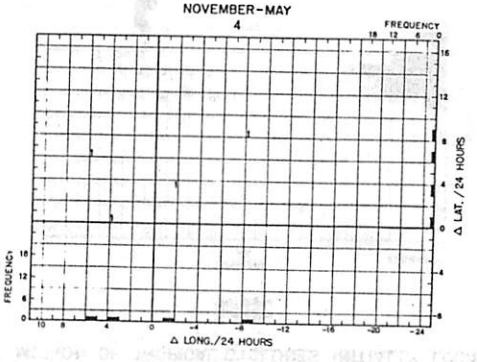








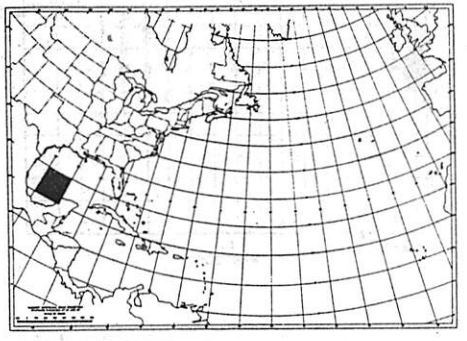


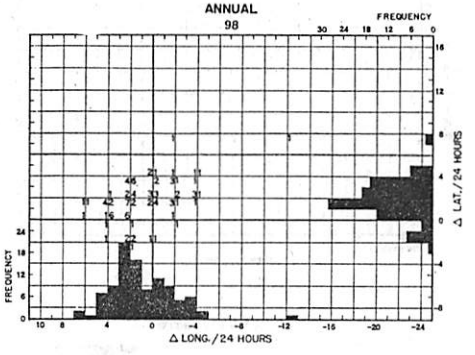


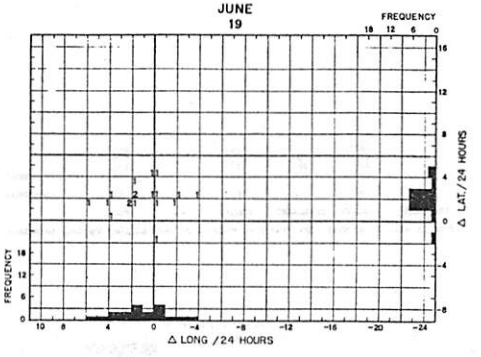
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

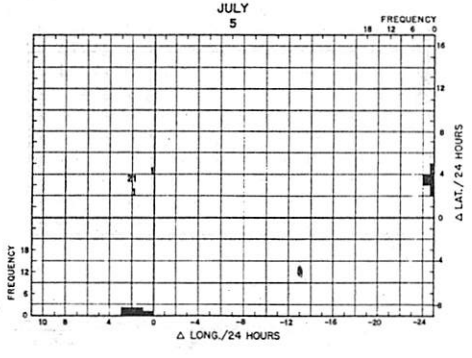
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	15	9	23	38	29	6
STORM ORIGINS	1886		1935	1908	1887	
	1892		1936	1949	1893	
	1912		1942	1957	1896	
	1936		1944		1905	
					1950	

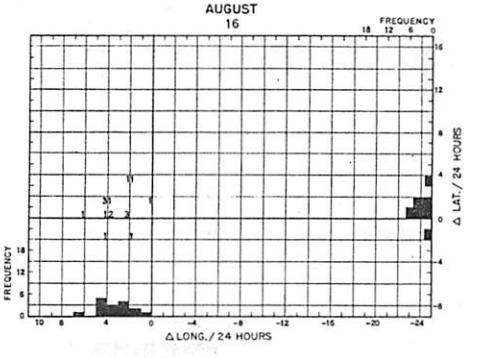
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

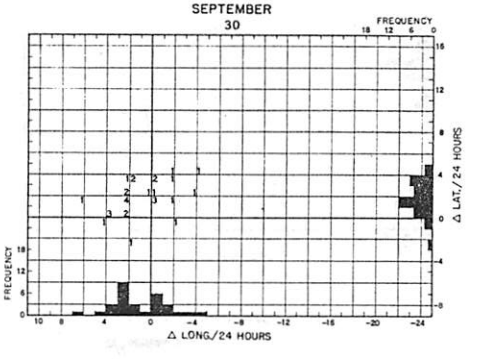


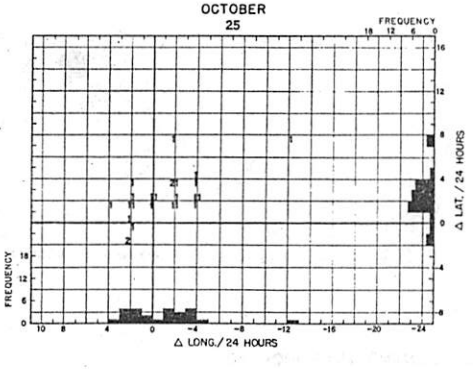


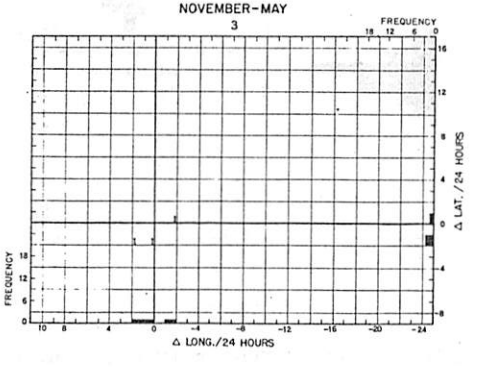










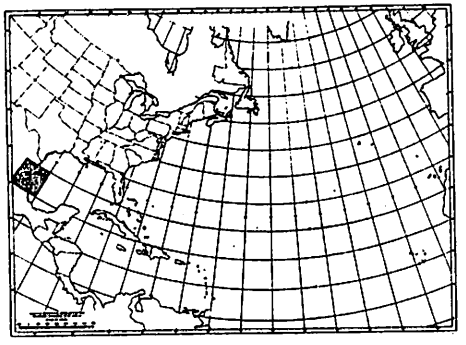


NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

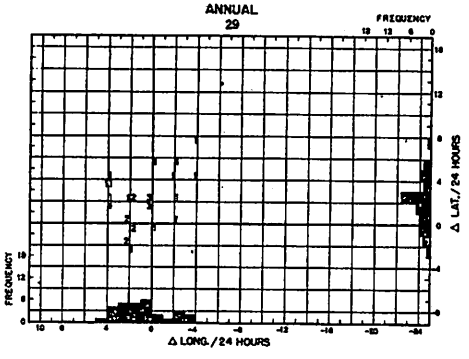
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	14	7	21	40	22	2
STORM ORIGINS	1929 1954 1956 1957 1958	1891 1933 1945 1956	1932 1946	1892 1907 1921 1925 1933 1937 1943 1944 1948 1954 1956 1957	1888 1892 1923 1950	

24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

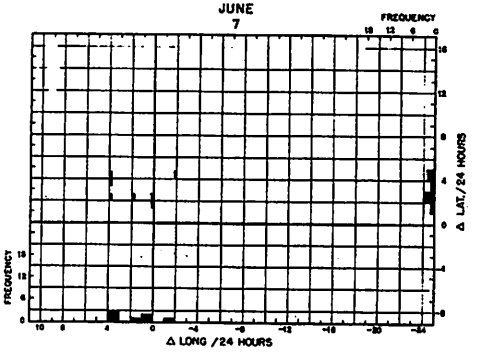
20°-25°N.
95°-100°W.



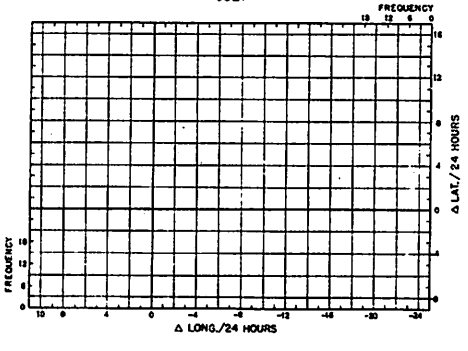
ANNUAL
29



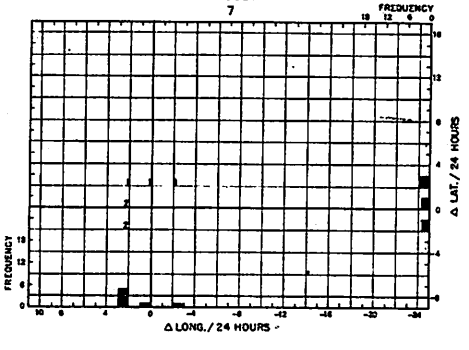
JUNE
7



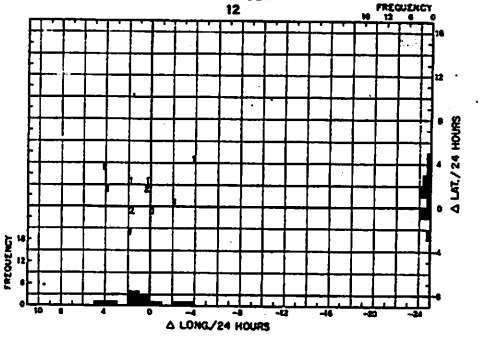
JULY



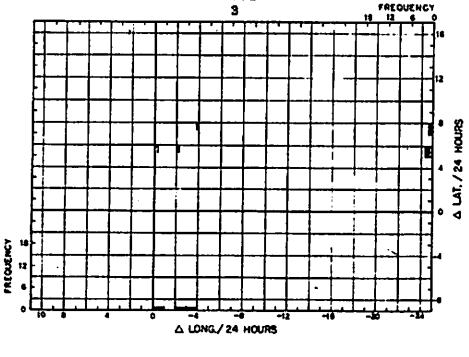
AUGUST
7



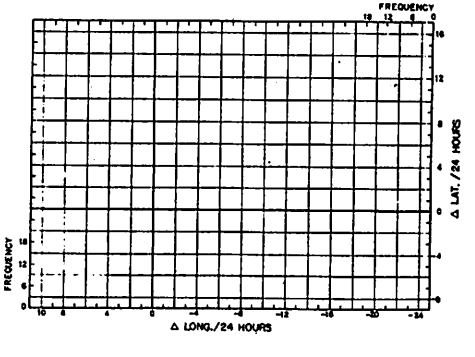
SEPTEMBER
12



OCTOBER
3



NOVEMBER-MAY

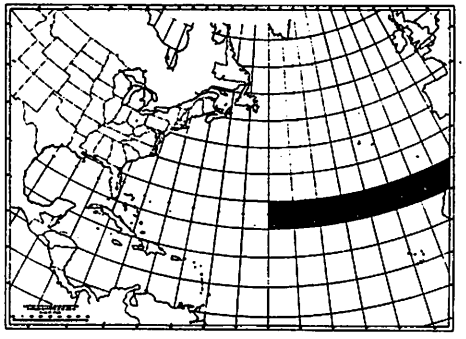


NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

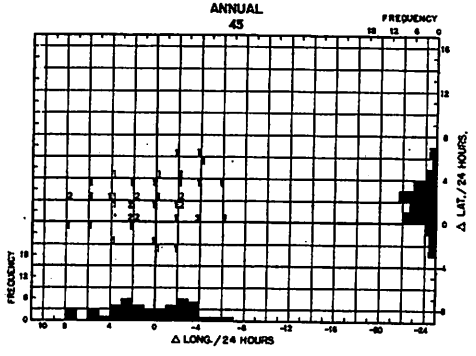
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	9	4	17	21	8	0
STORM ORIGINS	1886 1893			1953	1938	

24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

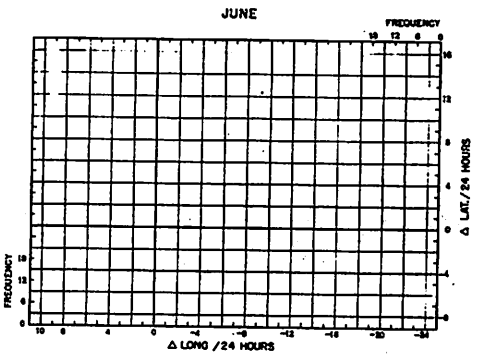
25°-30°N.
10°-50°W.



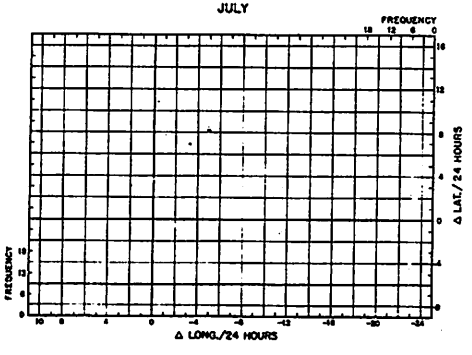
ANNUAL
45



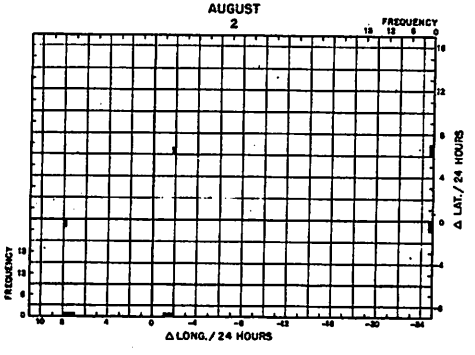
JUNE



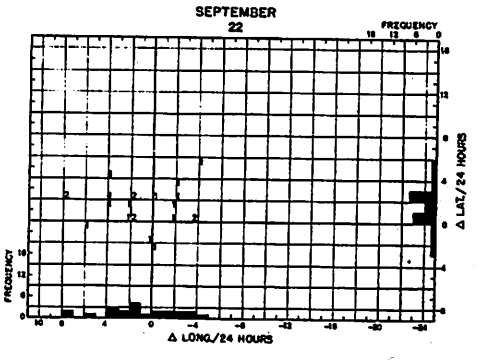
JULY



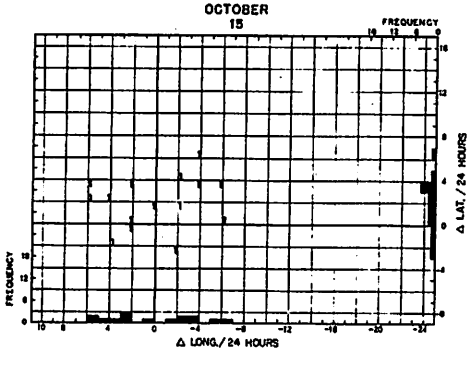
AUGUST
2



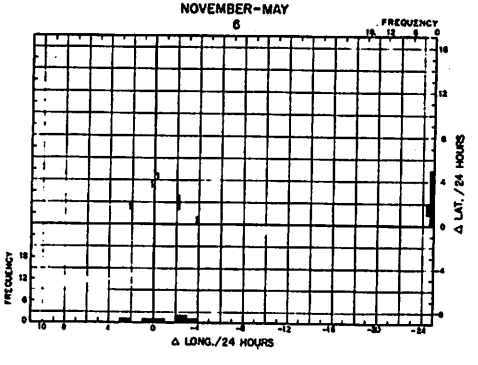
SEPTEMBER
22



OCTOBER
15



NOVEMBER-MAY
6

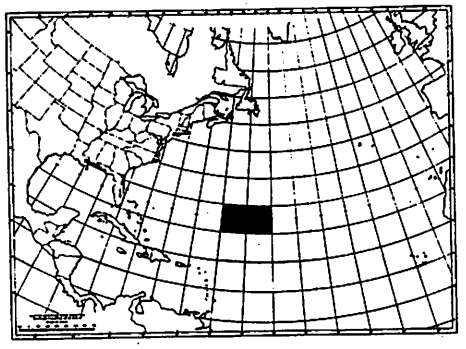


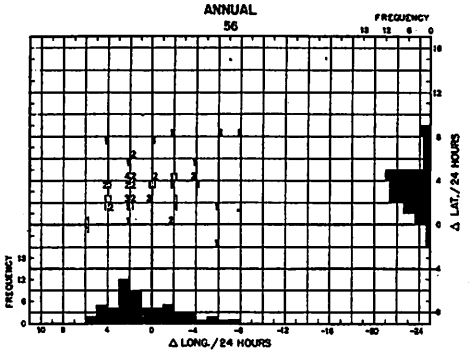
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

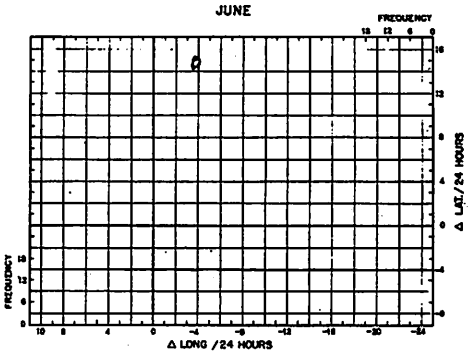
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	0	0	2	11	8	3
STORM ORIGINS			1901	1949	1887 1904 1933	

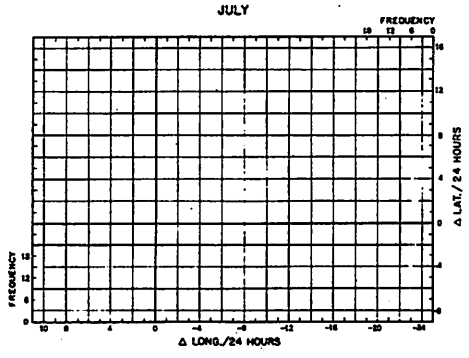
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

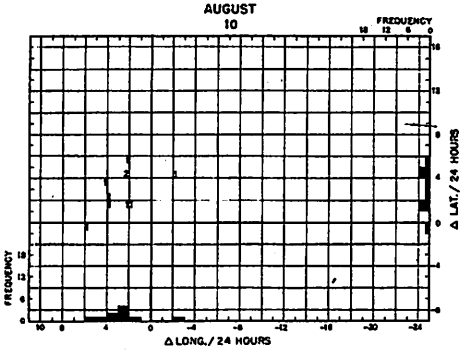
25°-30°N.
50°-60°W.

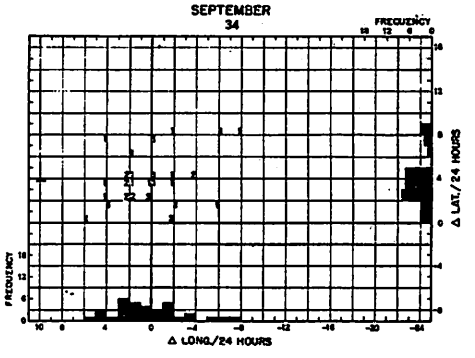


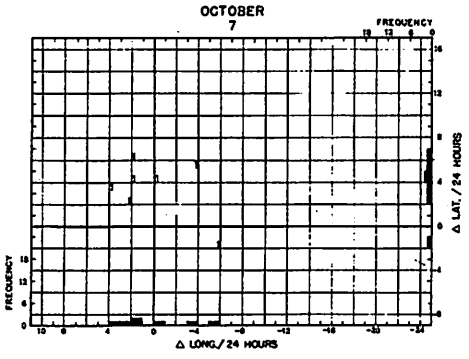


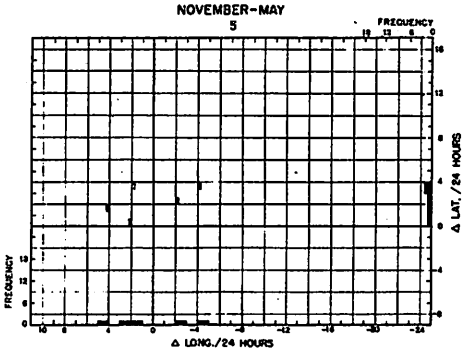










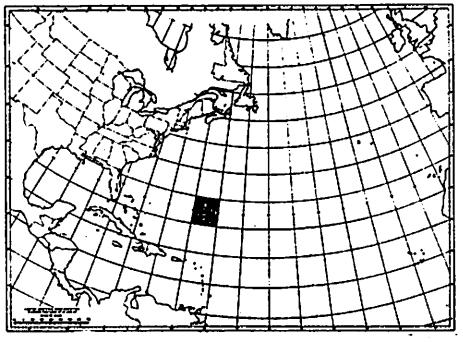


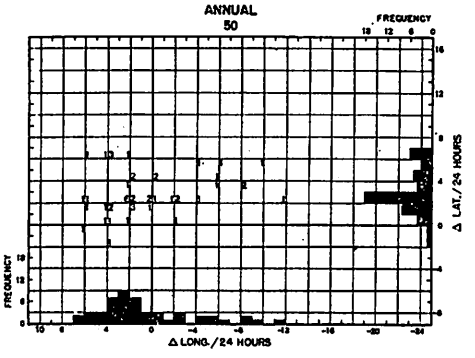
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

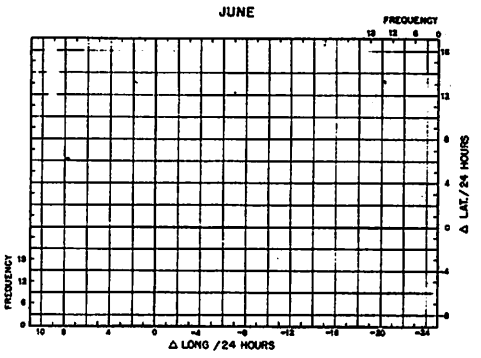
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	0	0	7	33	14	8
STORM ORIGINS				1887-8 1926 1934	1907 1943	1919

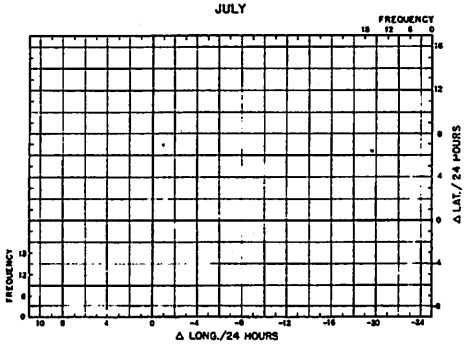
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

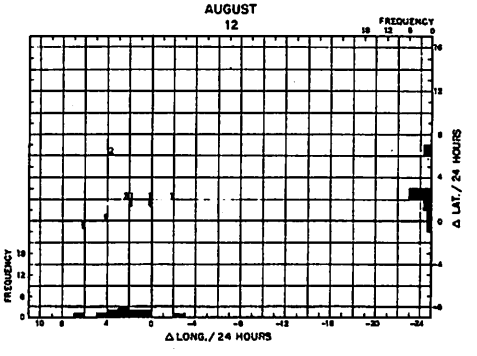
25°-30°N.
60°-65°W.

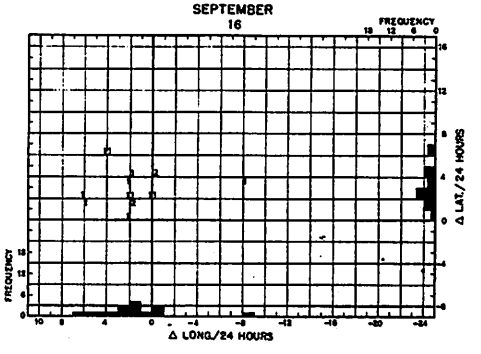


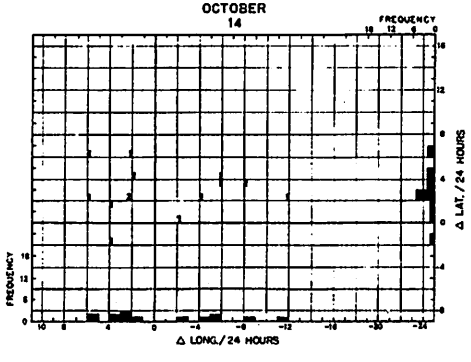


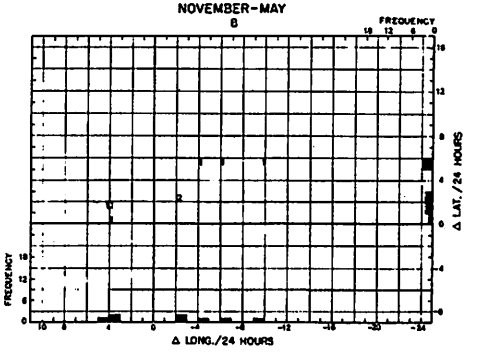








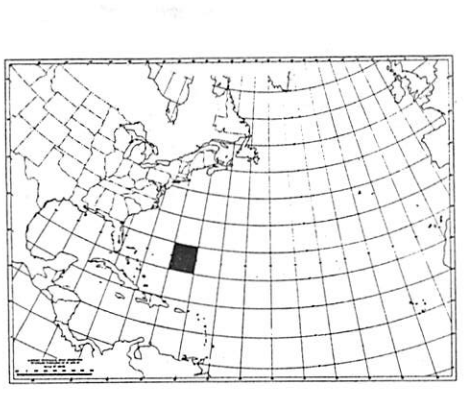


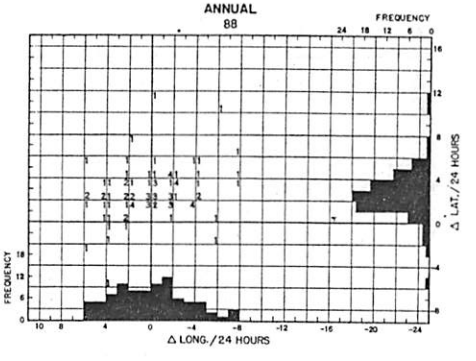


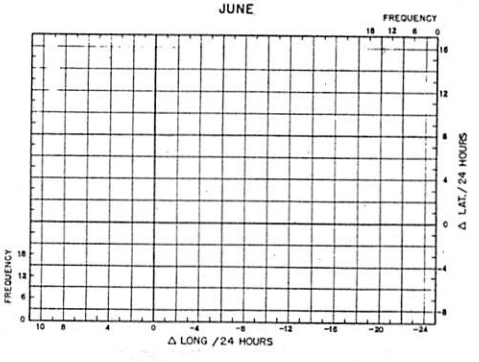
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

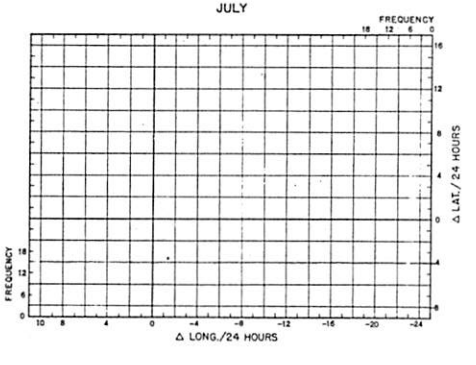
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	0	0	10	23	21	11
STORM ORIGINS			1921 1943	1943		1951

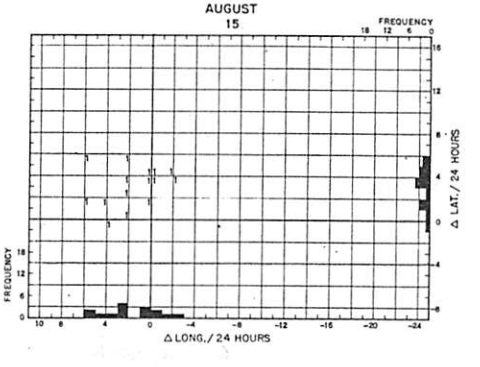
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

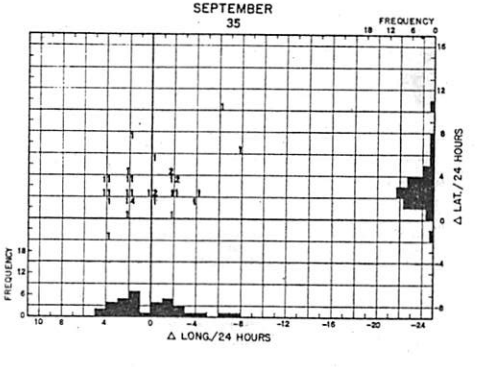


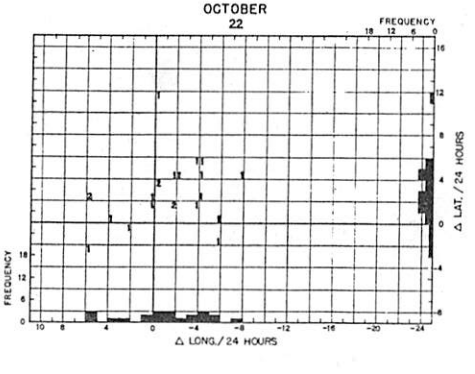


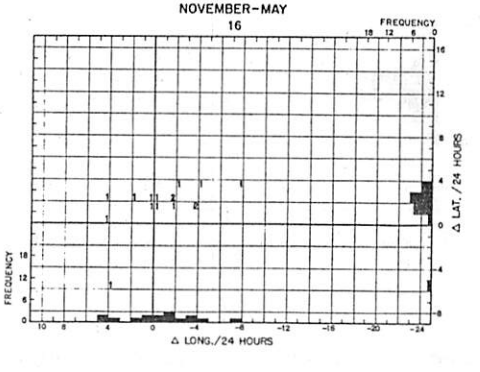










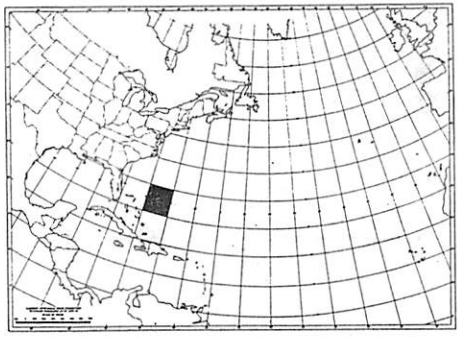


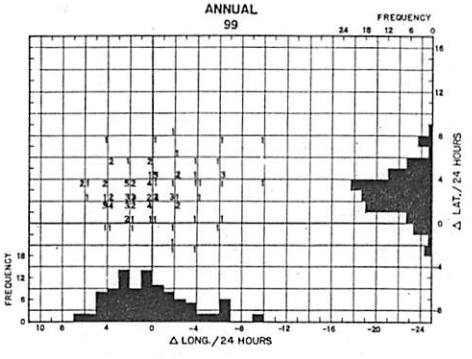
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

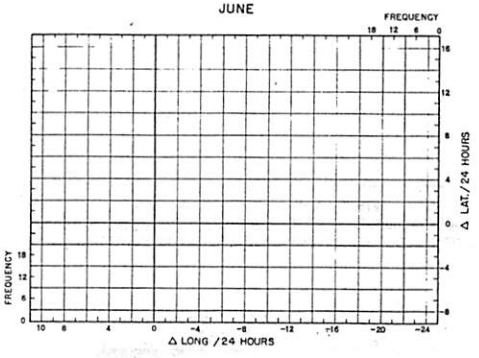
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	0	0	19	42	30	17
STORM ORIGINS			1940	1942 1943	1908	1888

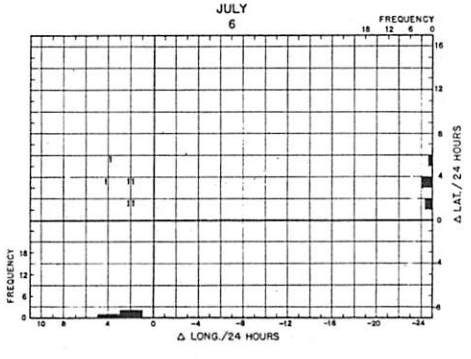
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

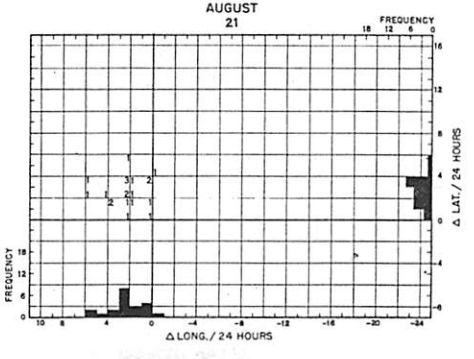
25°-30°N.
70°-75°W.

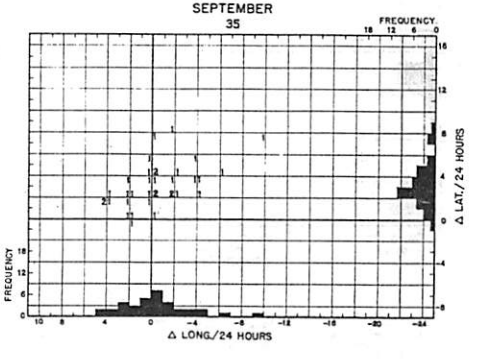


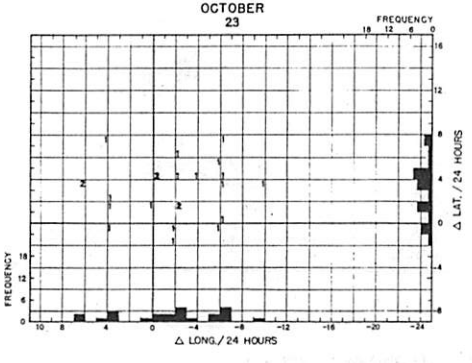


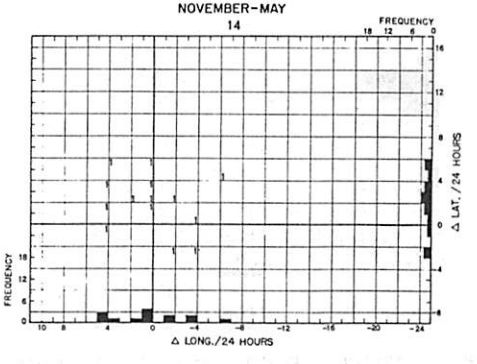










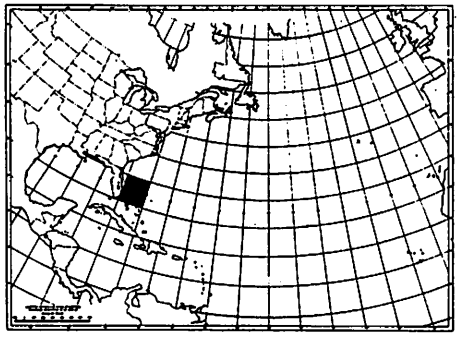


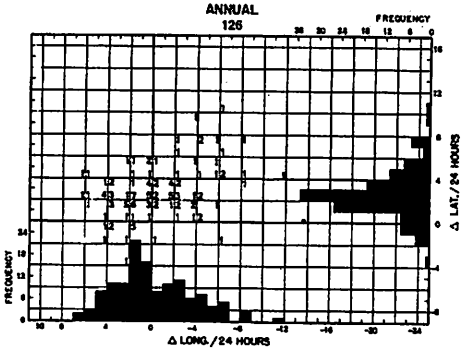
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

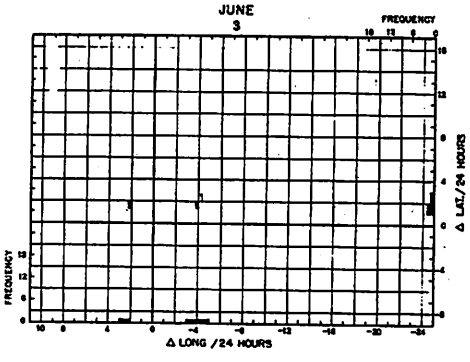
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	2	7	24	40	32	14
STORM ORIGINS		1912 1916	1913 1918 1958	1943	1906 1916 1933 1943	

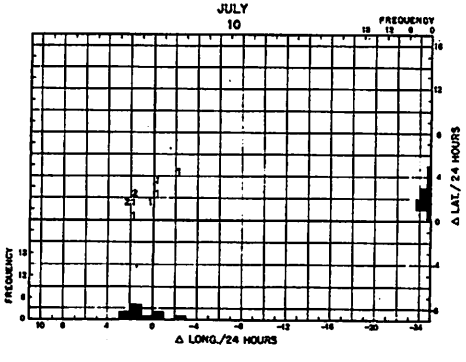
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

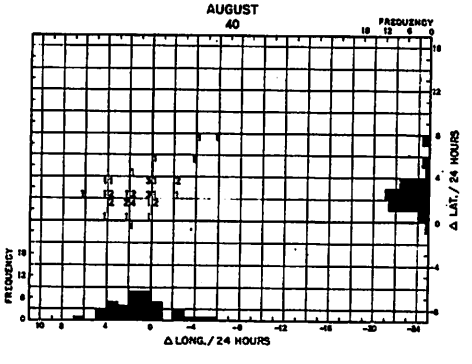
25°-30°N.
75°-80°W.

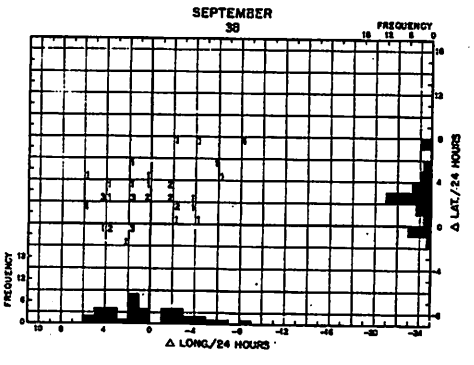


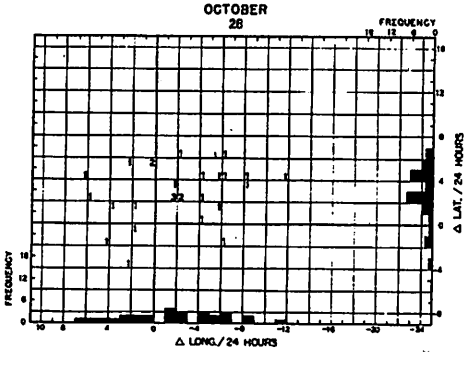


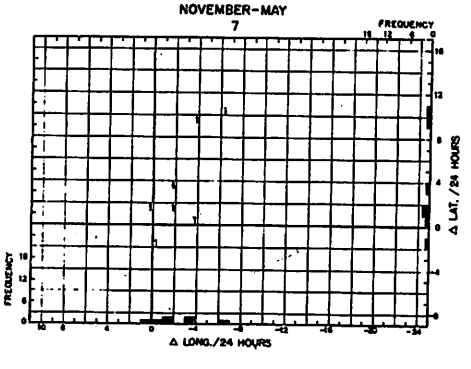










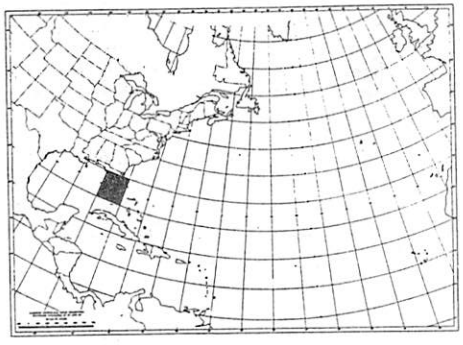


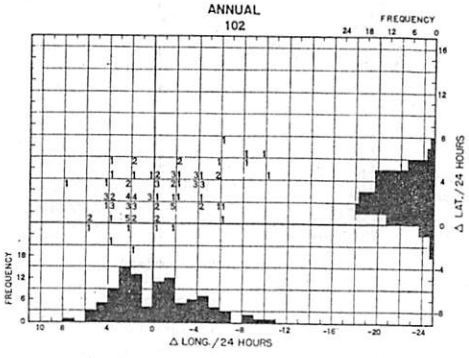
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

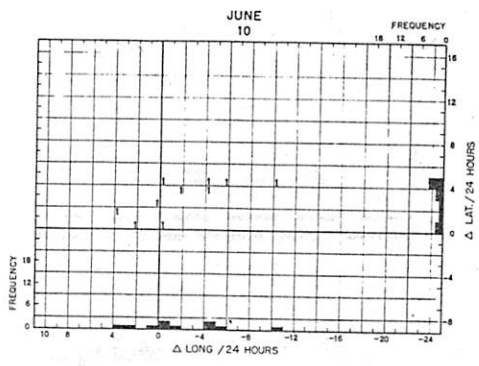
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	4	10	33	31	40	13
STORM ORIGINS		1915 1946	1896-8 1936	1888 1941	1913 1931	

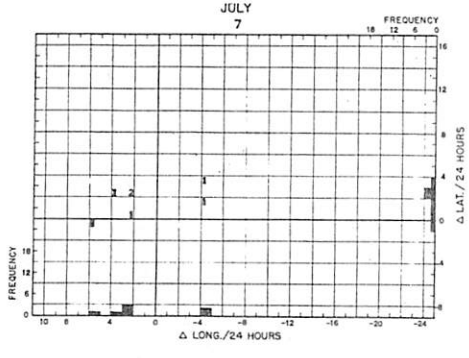
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

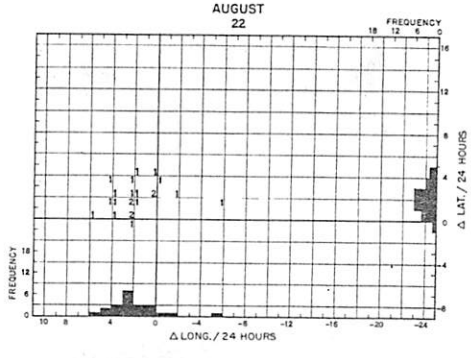
25°-30°N.
80°-85°W.

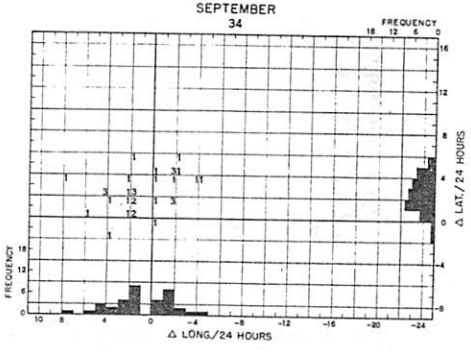


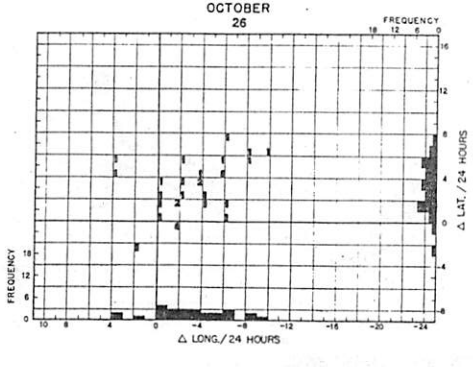


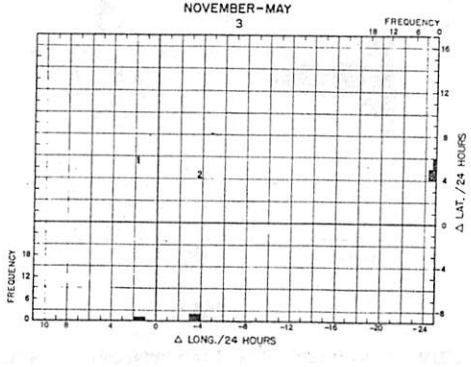










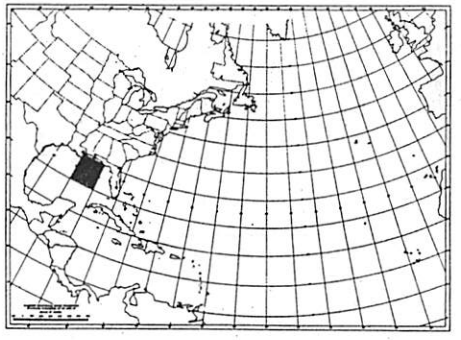


NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

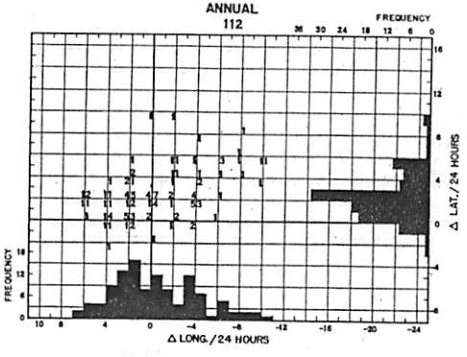
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY .	15	10	18	35	40	7
STORM ORIGINS		1899 1937		1912 1941		

24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

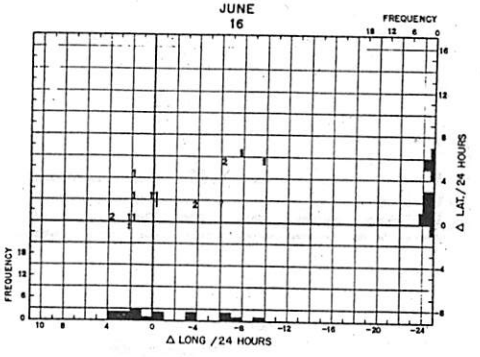
25°30'N.
85°-90°W.



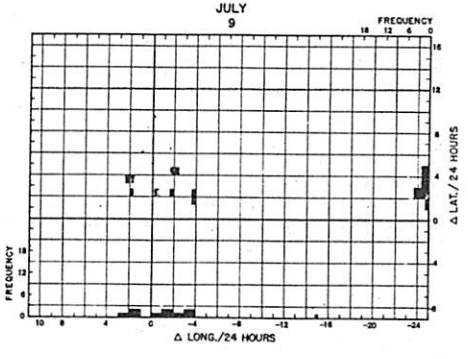
ANNUAL
112



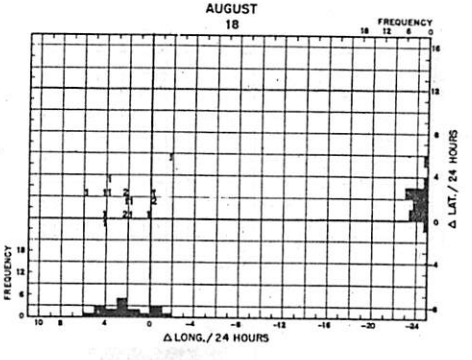
JUNE
16



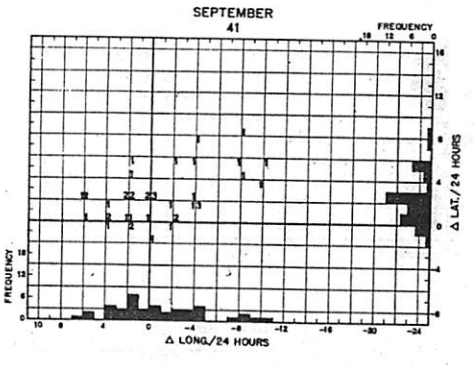
JULY
9



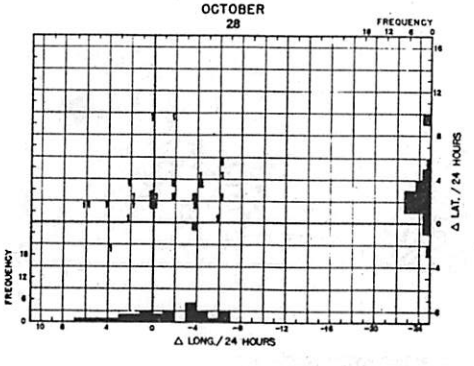
AUGUST
18



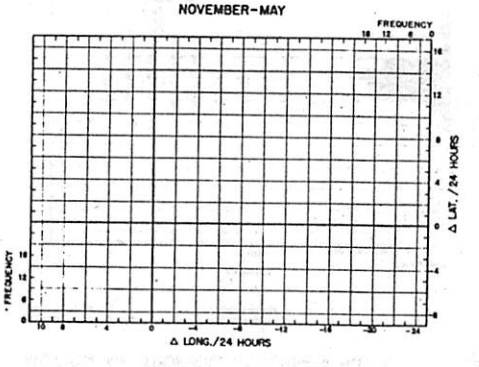
SEPTEMBER
41



OCTOBER
28



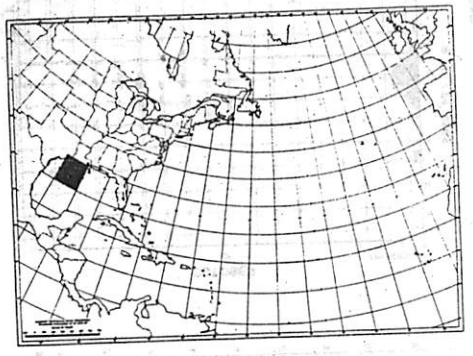
NOVEMBER-MAY

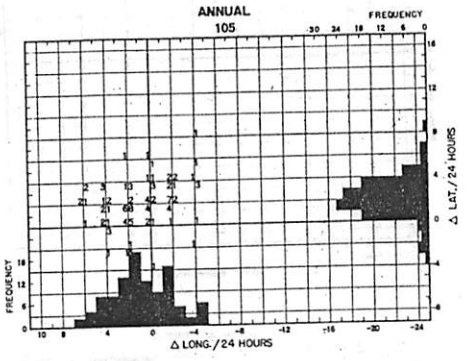


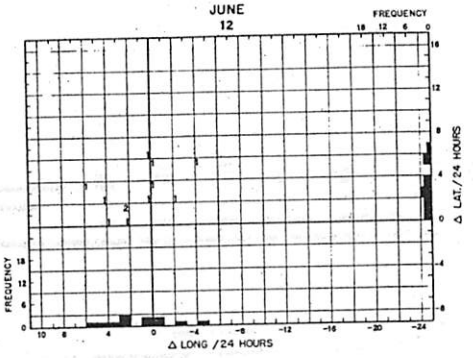
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

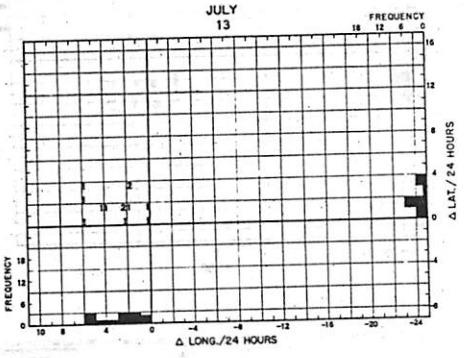
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	15	14	30	39	23	2
STORM ORIGINS	1946 1957	1945 1954 1958	1954 1936 1938 1957	1941 1947	1954 1950	

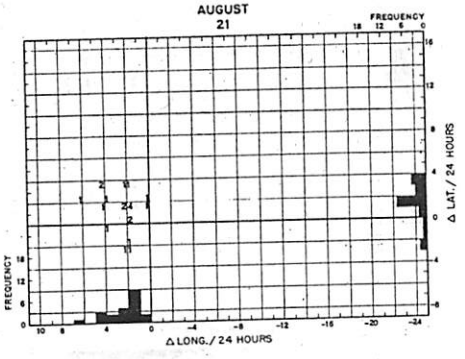
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

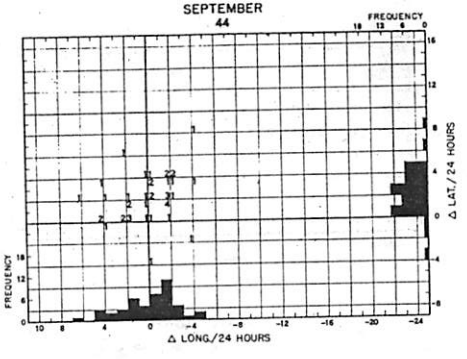


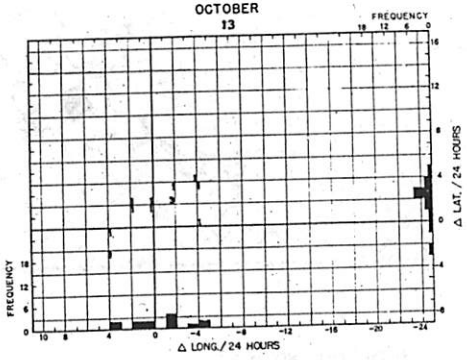


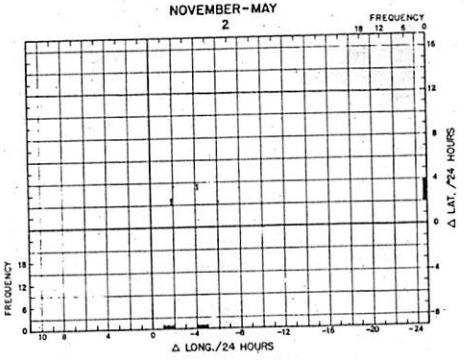










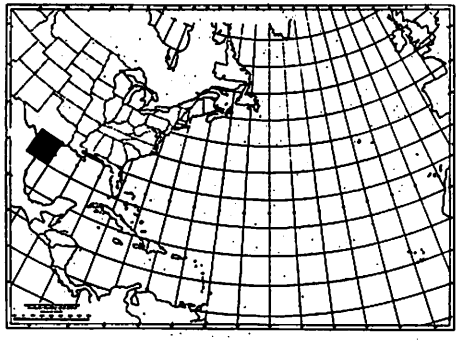


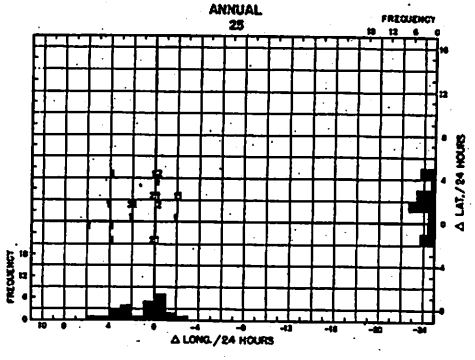
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

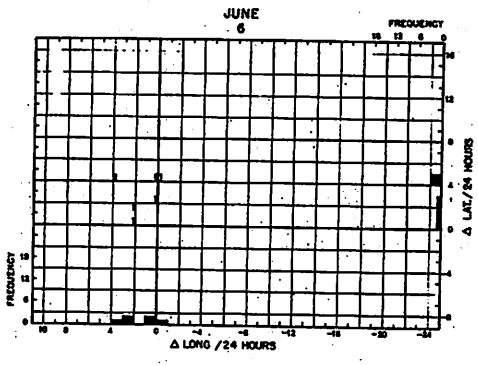
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	15	11	19	34	15	1
STORM ORIGINS	1888	1888 1948	1895	1949		

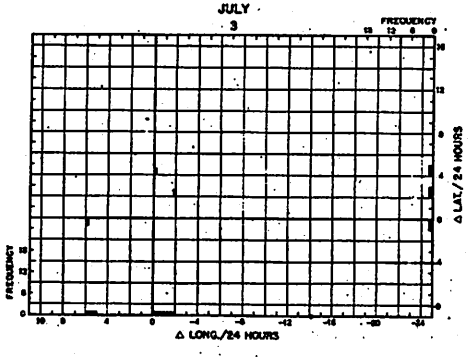
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

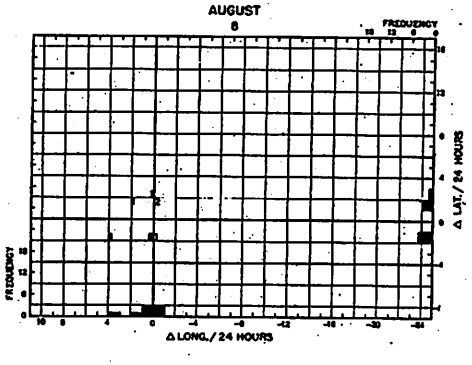
25°-30°N.
95°-100°W.

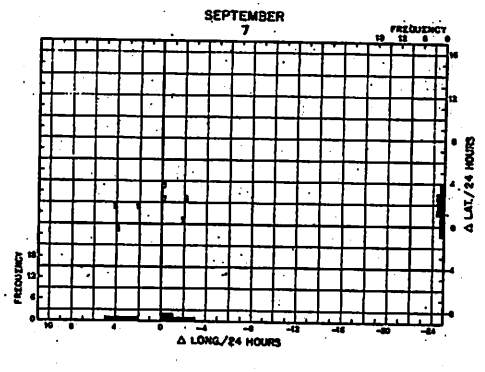


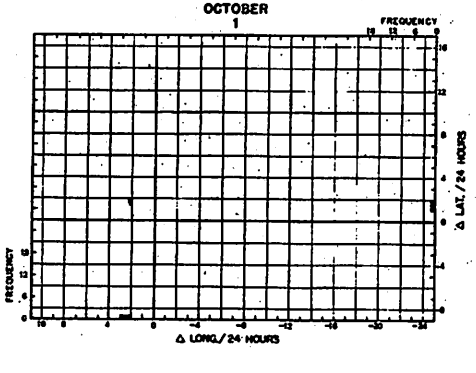


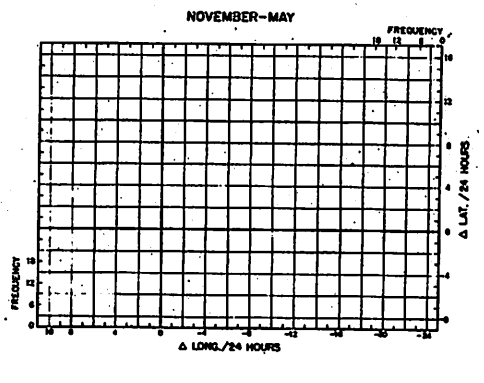








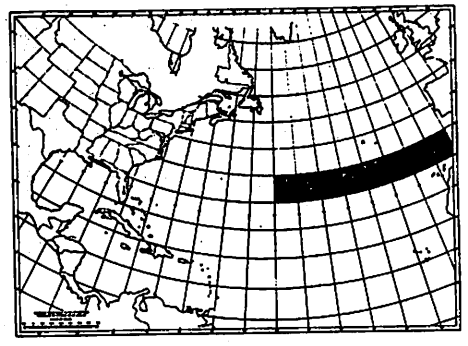


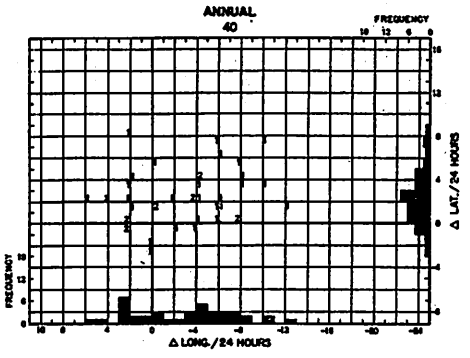


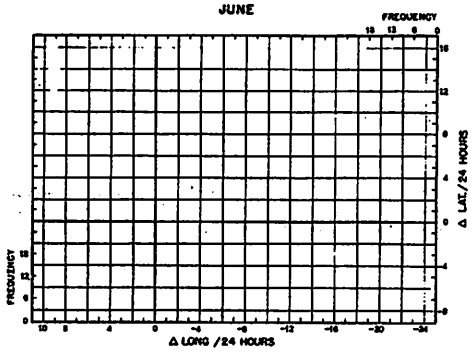
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

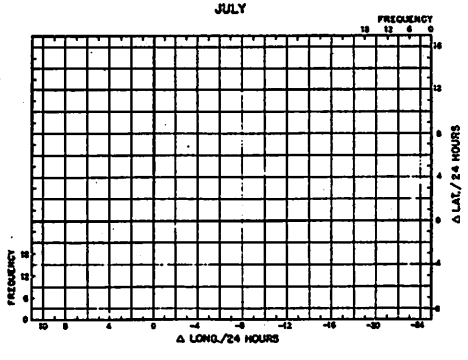
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	13	8	16	13	6	0
STORM ORIGINS	1936					

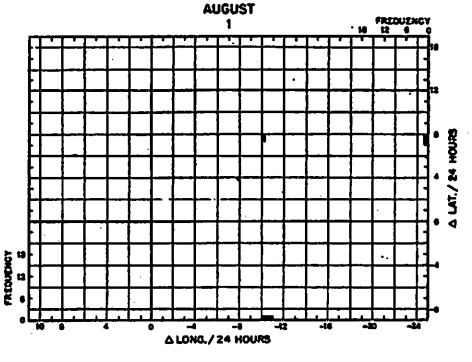
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

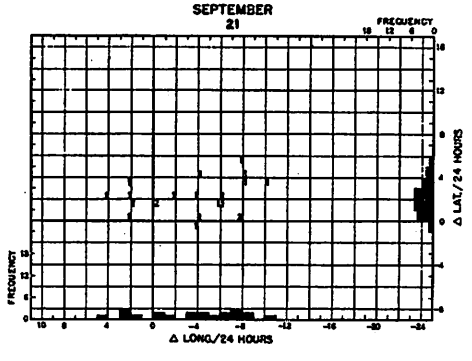


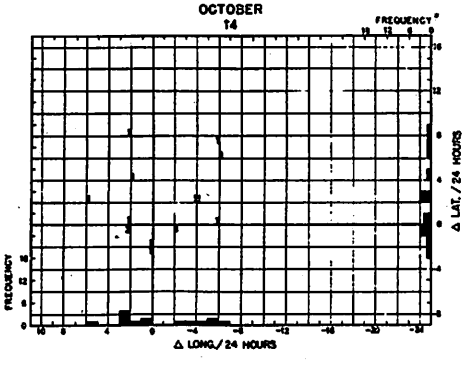


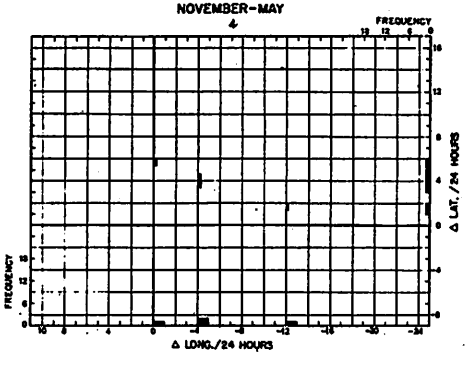










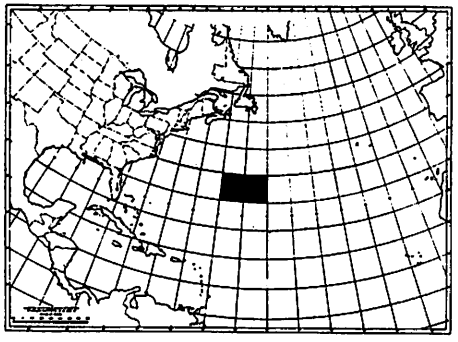


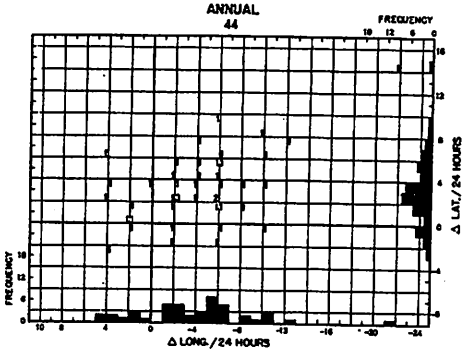
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND TRACK OF ORIGINS IN AREA

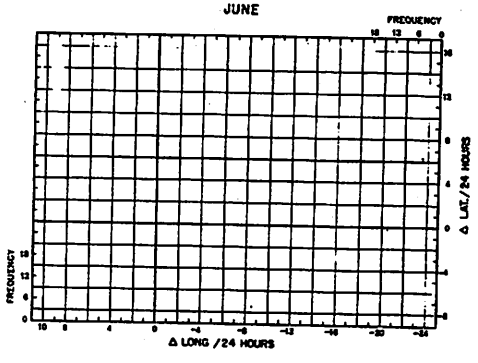
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	0	0	1	17	10	6
STORM ORIGINS					1939	

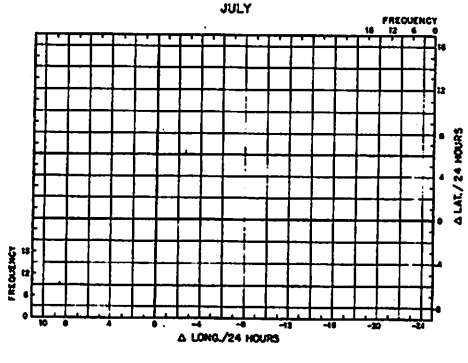
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

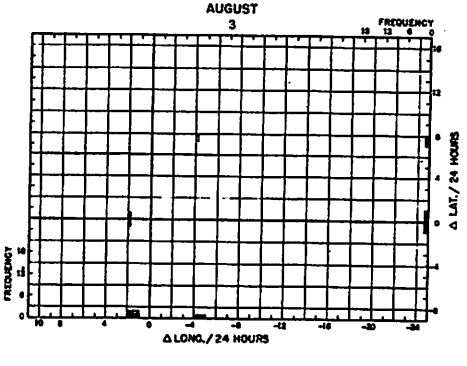
30°-35°N.
50°-60°W.

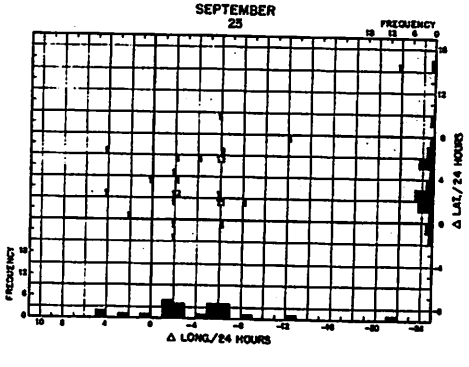


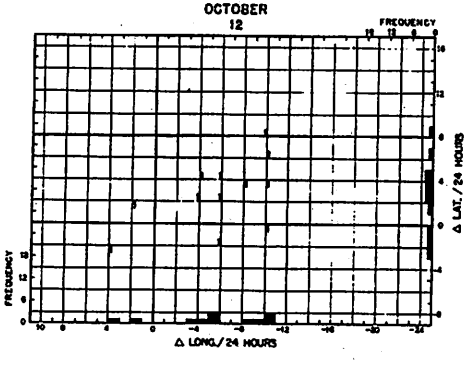


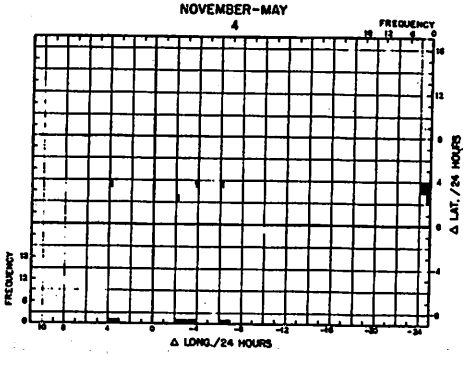










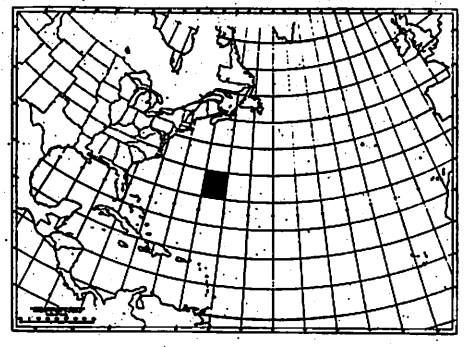


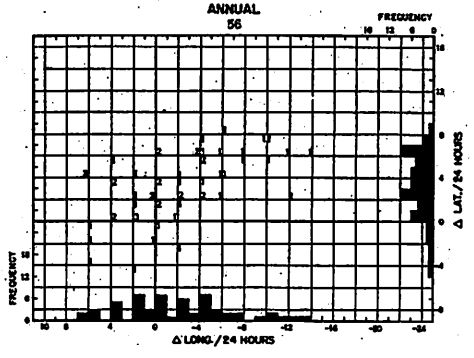
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

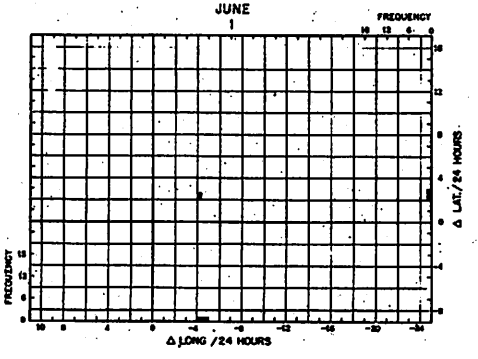
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	1	0	6	33	18	13
STORM ORIGINS			1903			

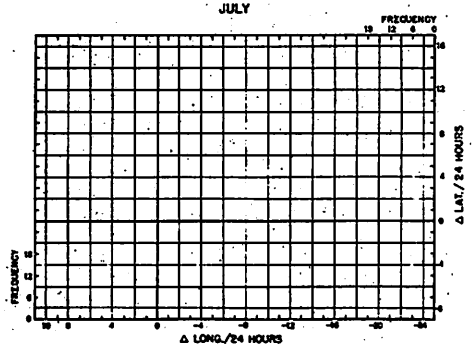
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

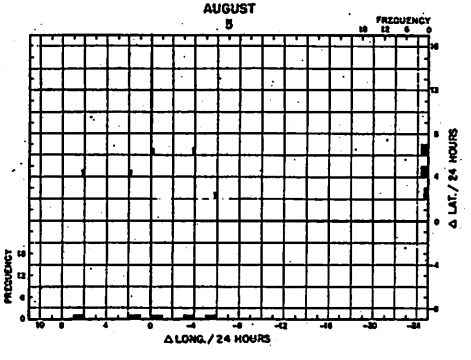
30°-35°N.
60°-65°W.

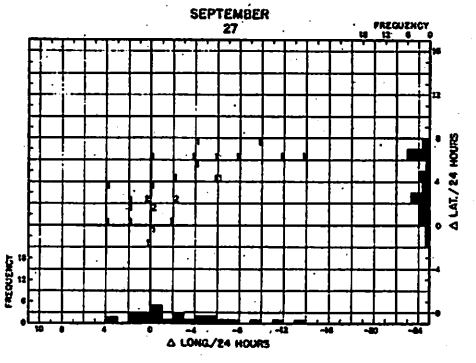


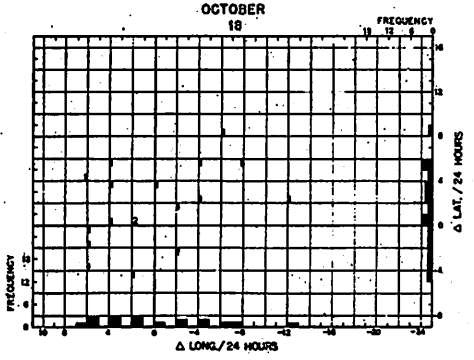


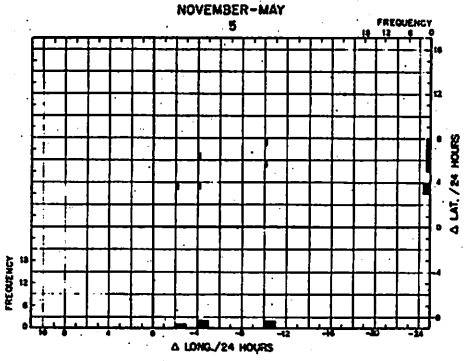










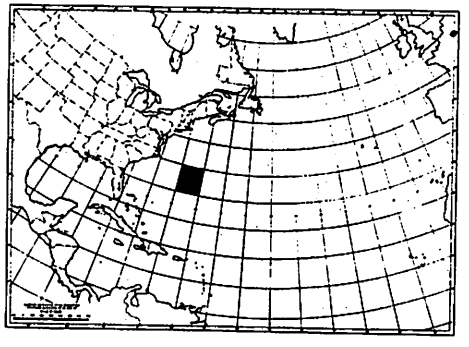


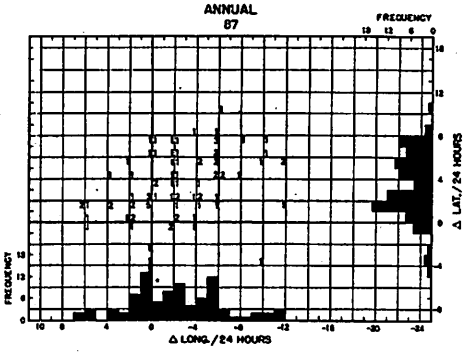
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

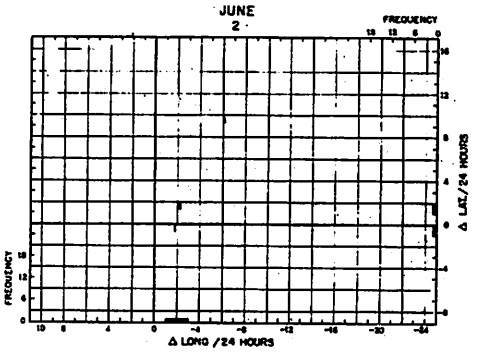
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	2	0	9	31	31	11
STORM ORIGINS					1904 1908 1933 1938	

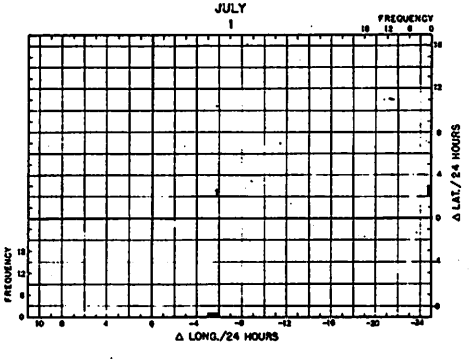
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

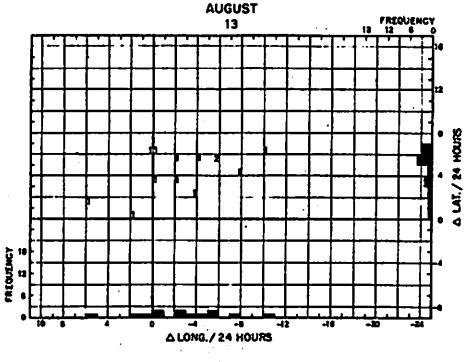
30°-35°N.
65°-70°W

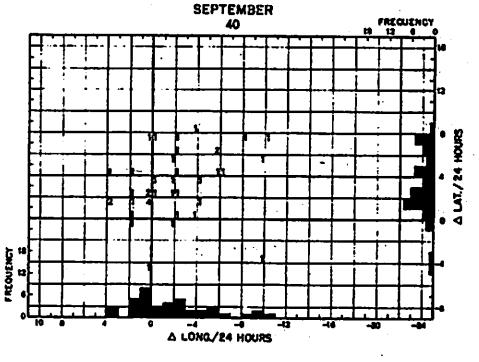


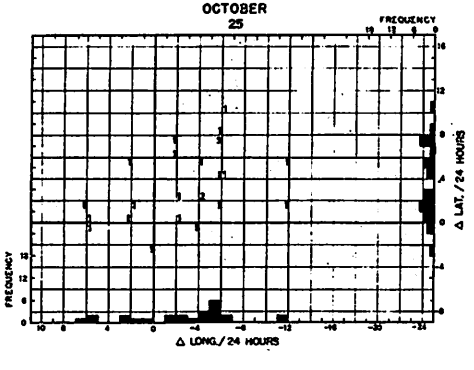


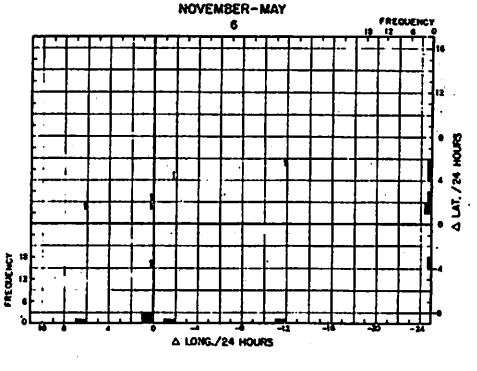










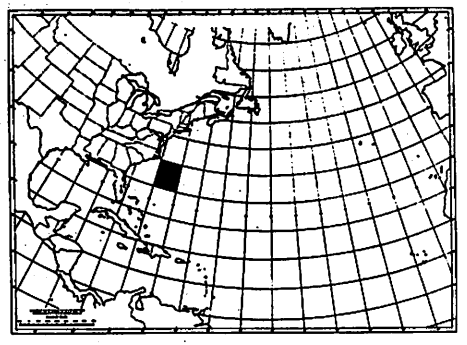


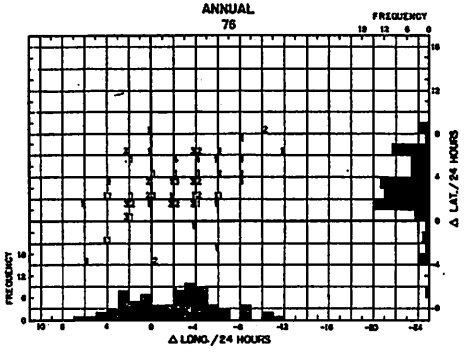
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

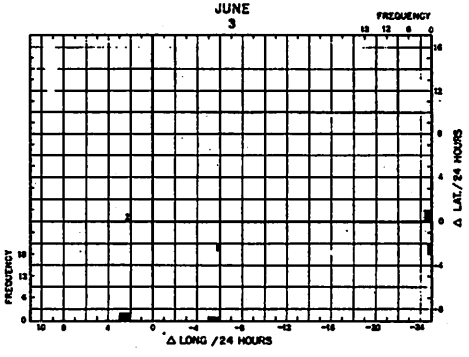
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	3	2	13	43	40	7
STORM ORIGINS			1917	1907		

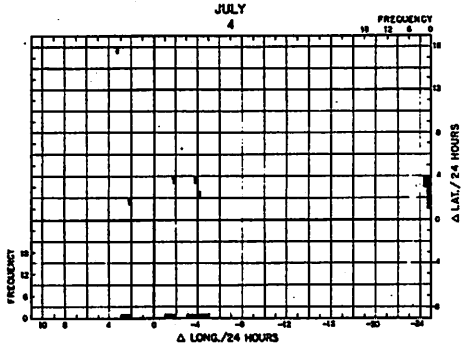
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

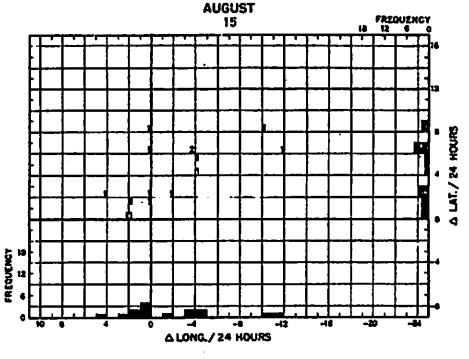
30°-35°N
70°-75°W.

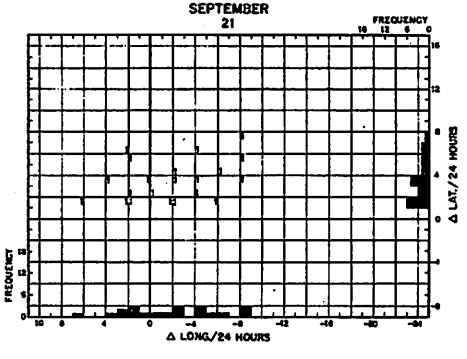


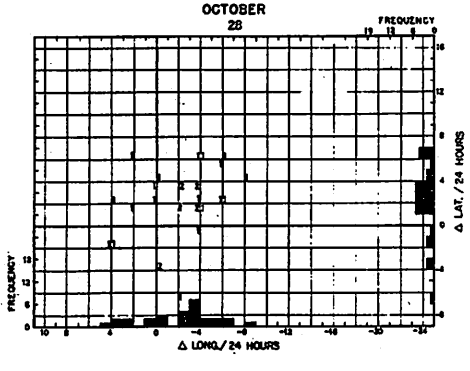


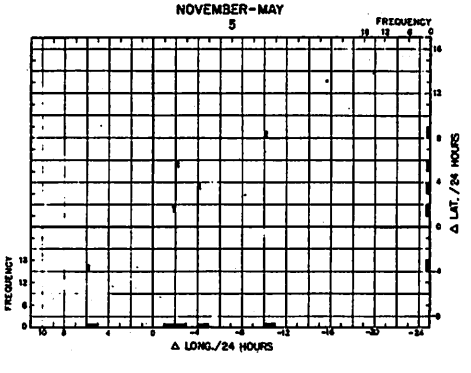










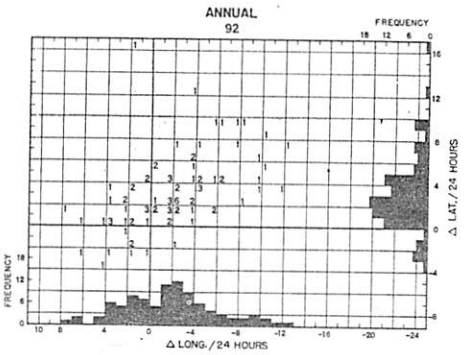


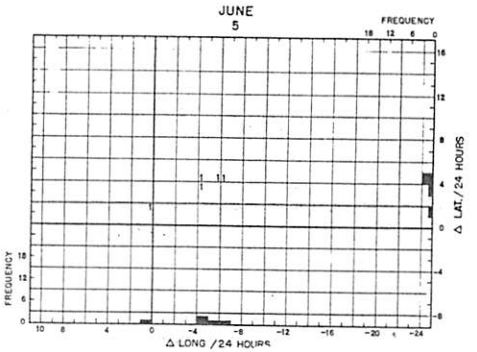
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

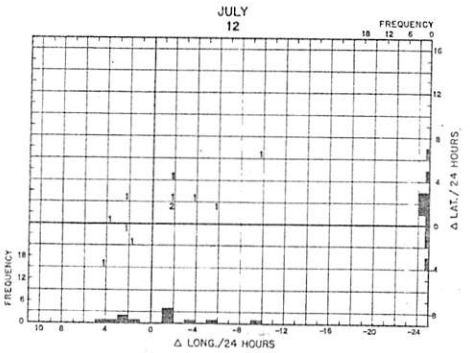
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	3	4	21	27	40	11
STORM ORIGINS			1906	1920	1903	

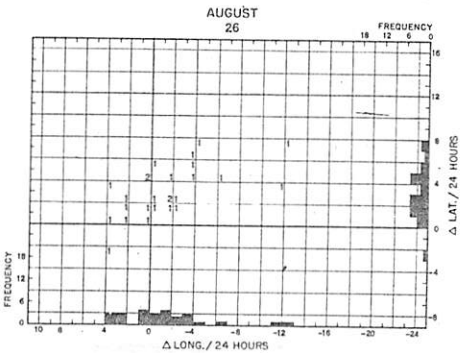
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

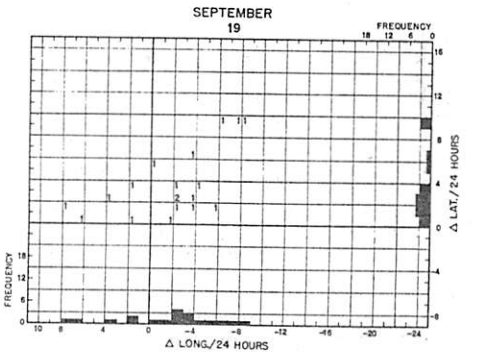
30°-35°N.
75°-80°W.

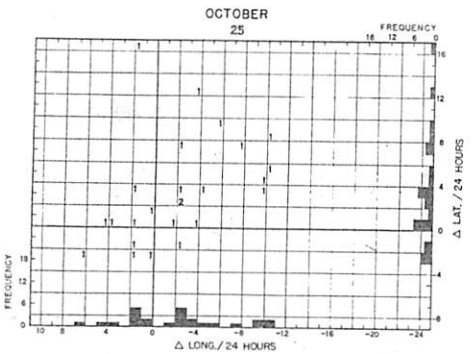


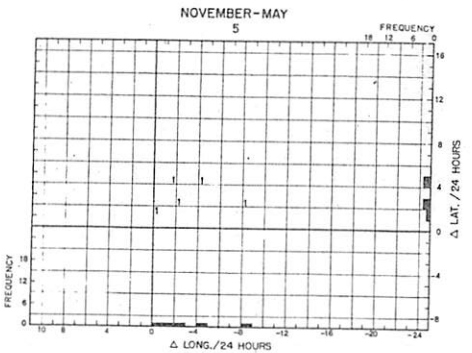










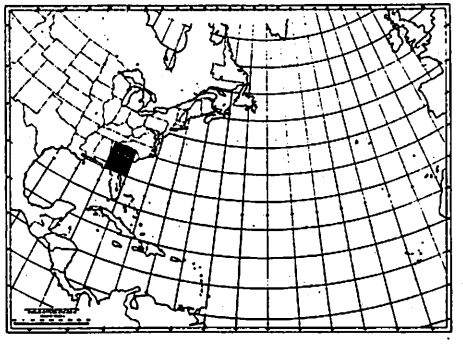


NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

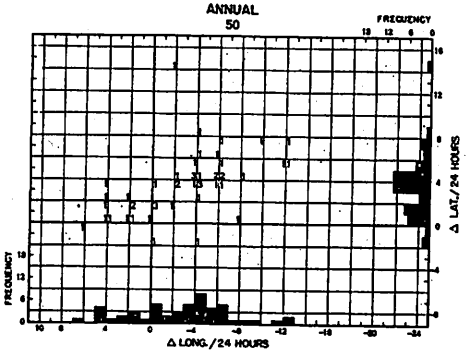
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	7	11	26	*34	39	10
STORM ORIGINS		1934	1940		1921	

24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

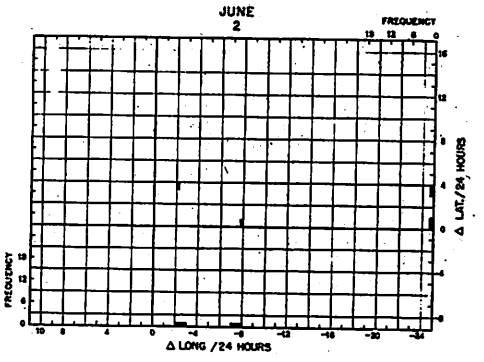
30°-35°N.
80°-85°W.



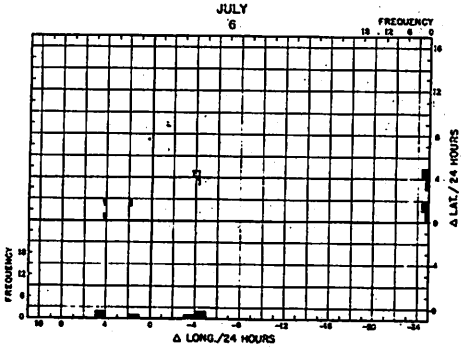
ANNUAL
50



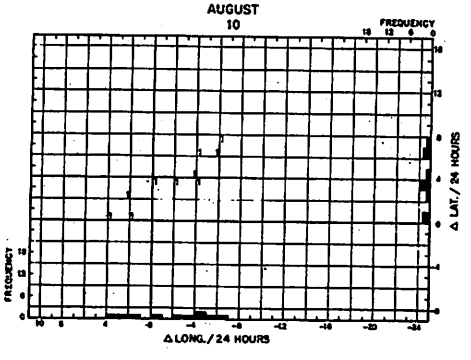
JUNE
2



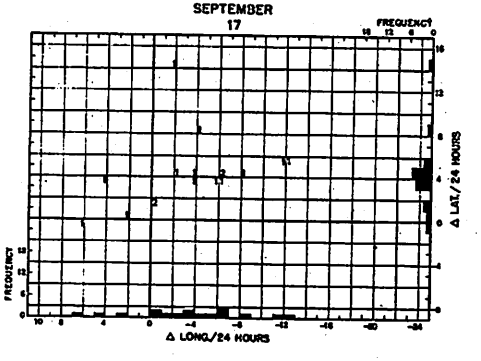
JULY
6



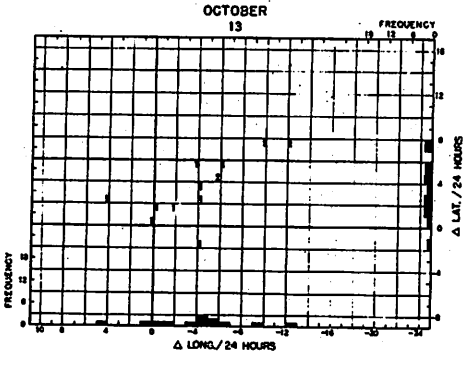
AUGUST
10



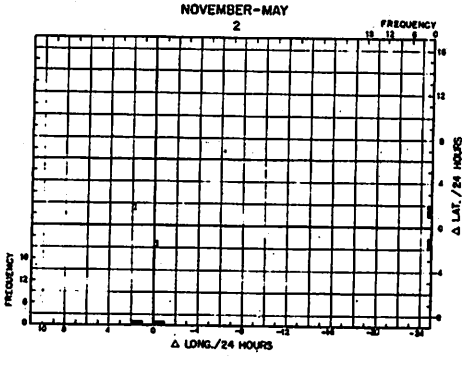
SEPTEMBER
17



OCTOBER
13



NOVEMBER-MAY
2

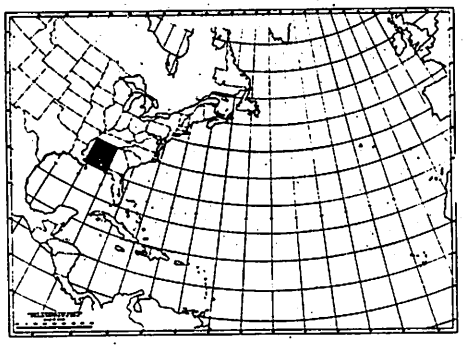


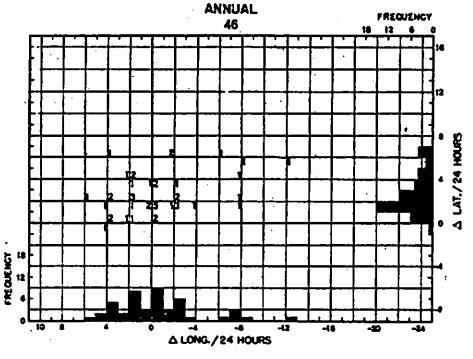
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

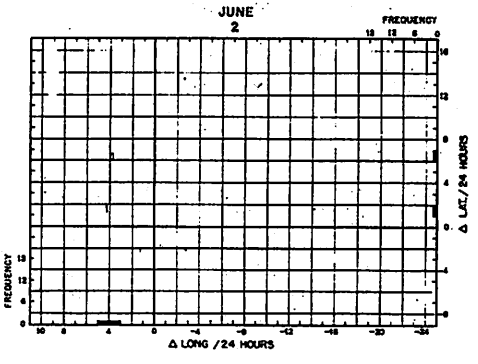
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	9	6	15	33	27	3
STORM ORIGINS			NONE			

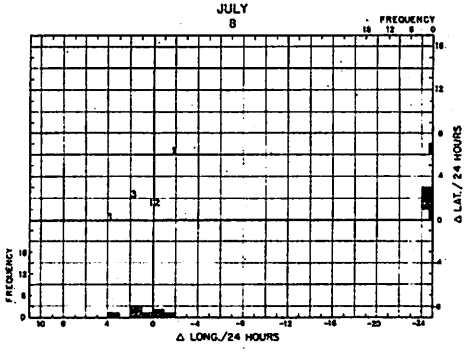
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

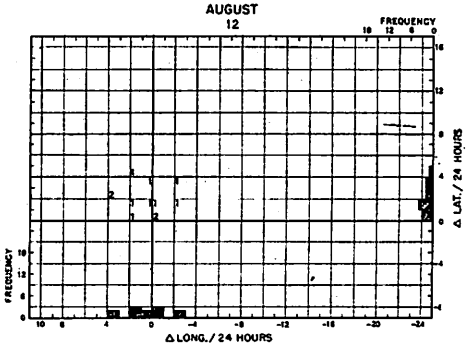
30°-35°N.
85°-90°W.

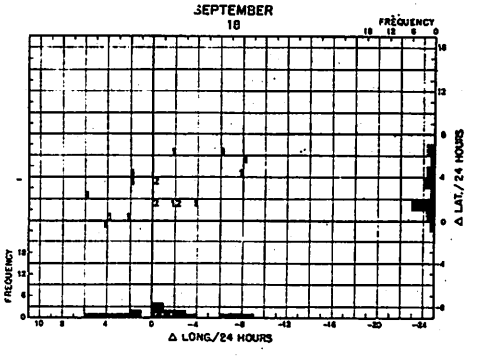


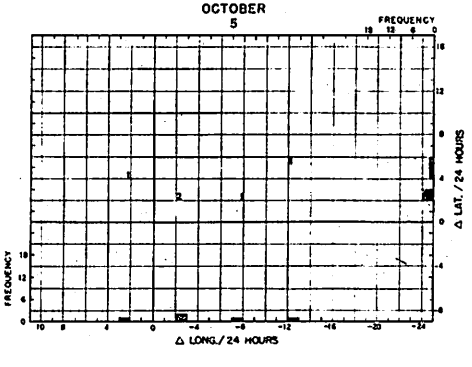


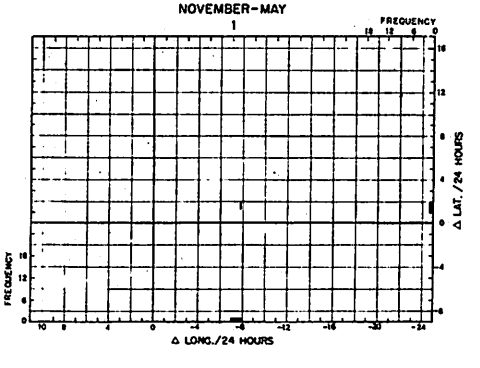










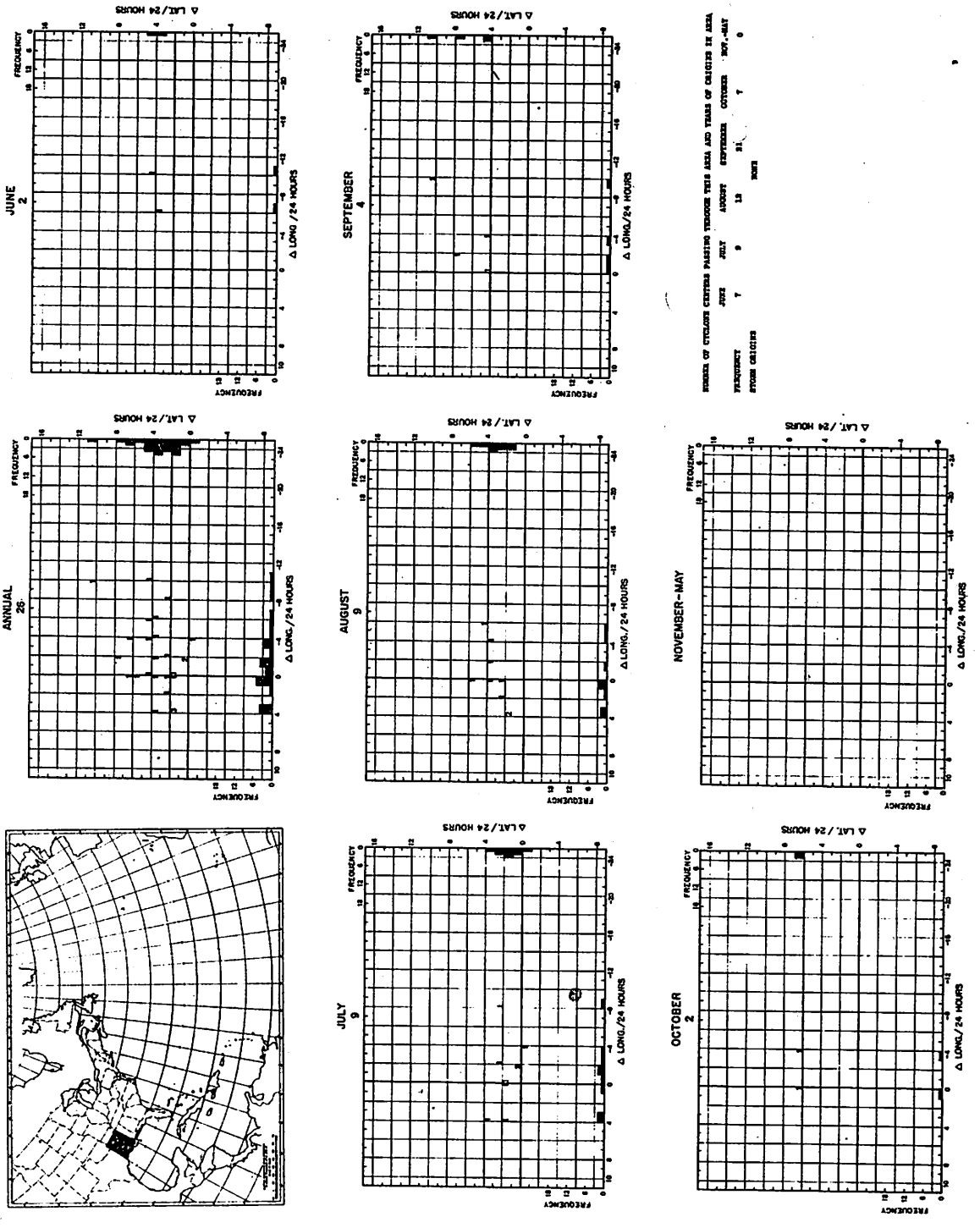


NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	6	9	13	22	12	1
STORM ORIGINS			NONE			

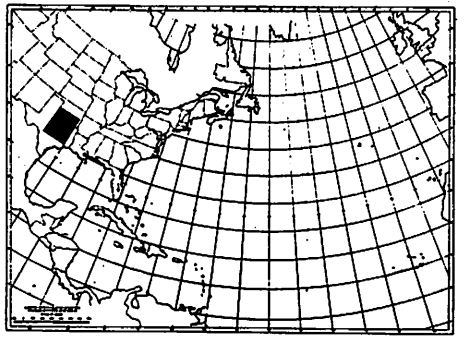
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

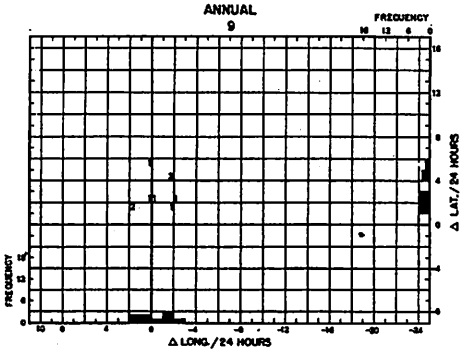
30°-35°N
90°-95°W

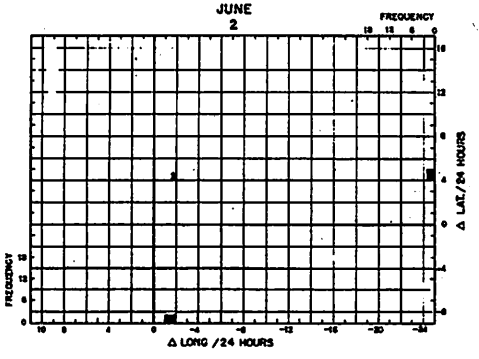


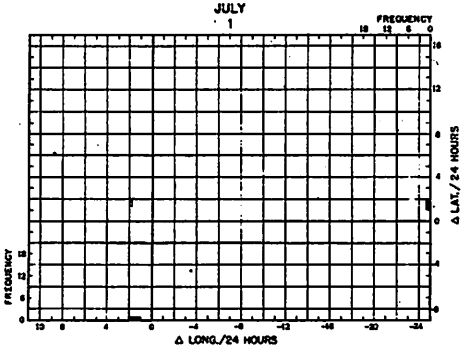
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

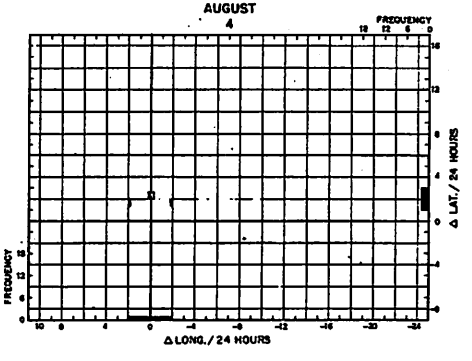
30°-35°N
95°-100°W.

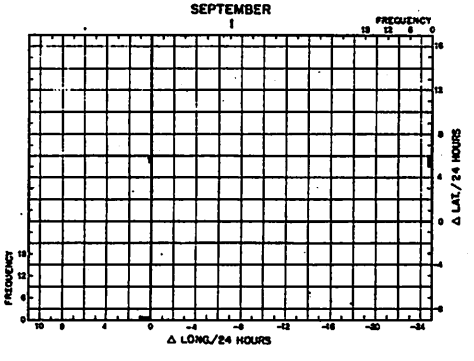


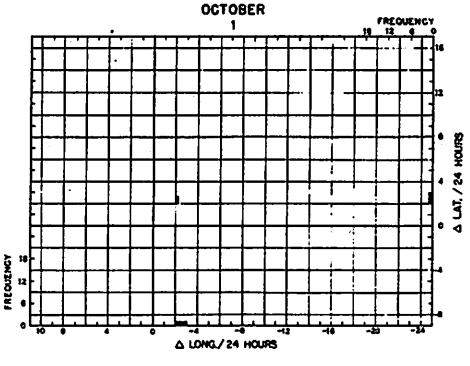


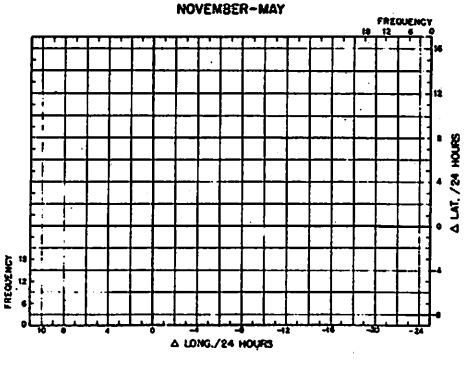










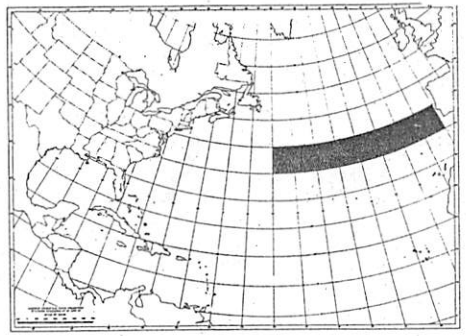


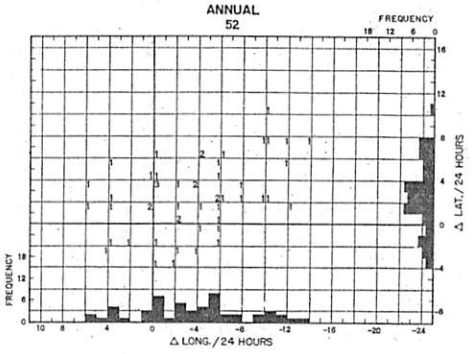
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

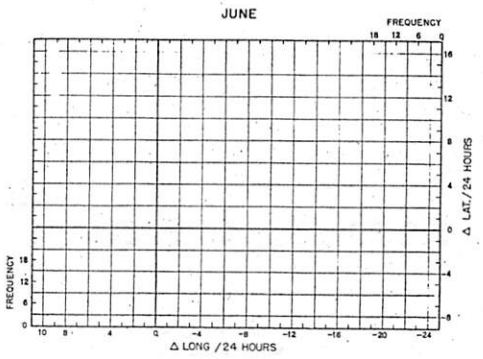
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	9	7	13	8	2	0
STORM ORIGINS			NONE			

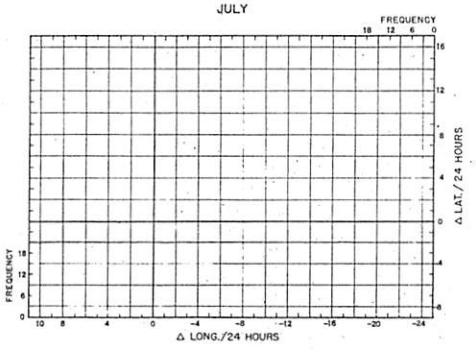
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

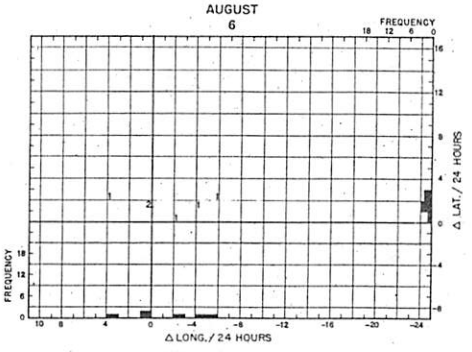
35°-40°N.
10°-50°W.

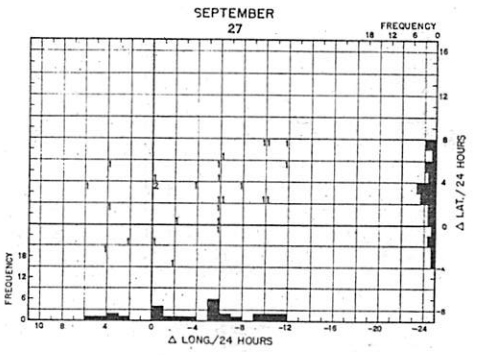


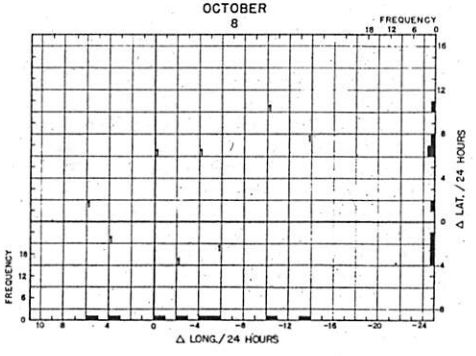


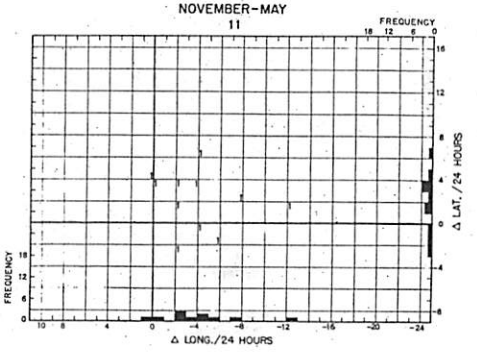








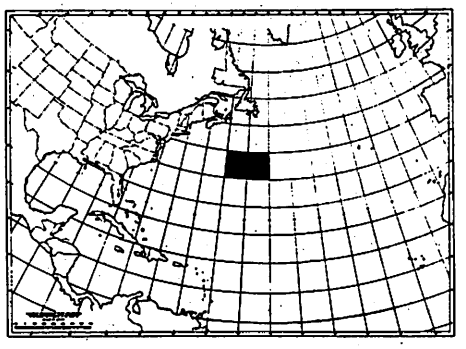


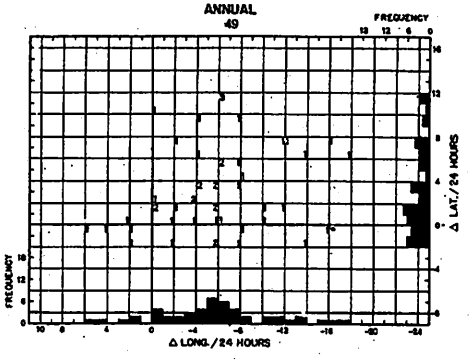


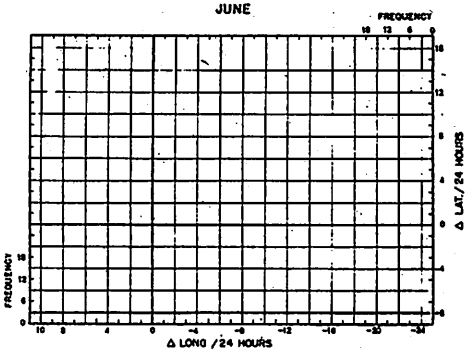
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

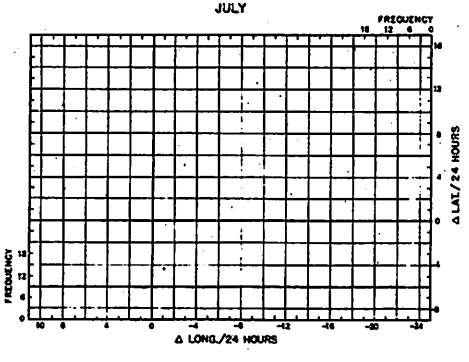
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	0	1	3	29	14	10
STORM ORIGINS				NONE		

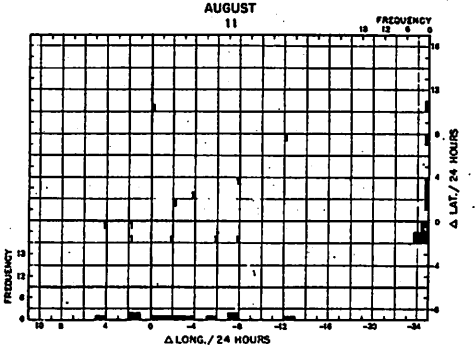
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

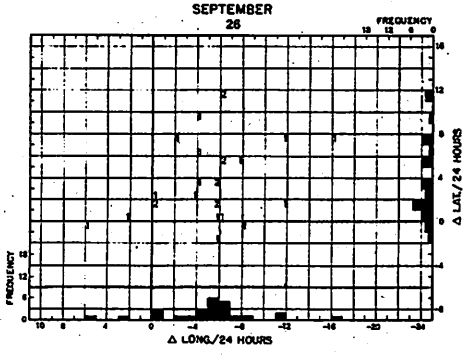


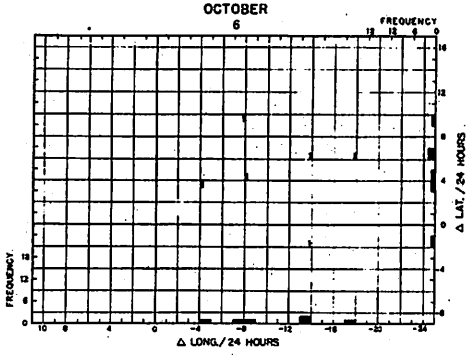


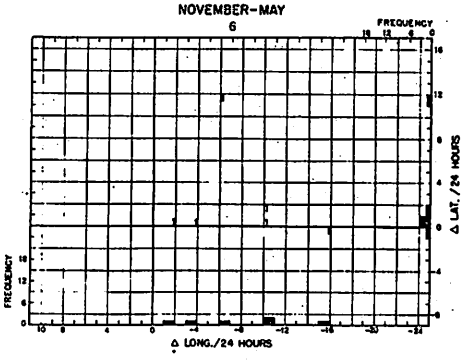










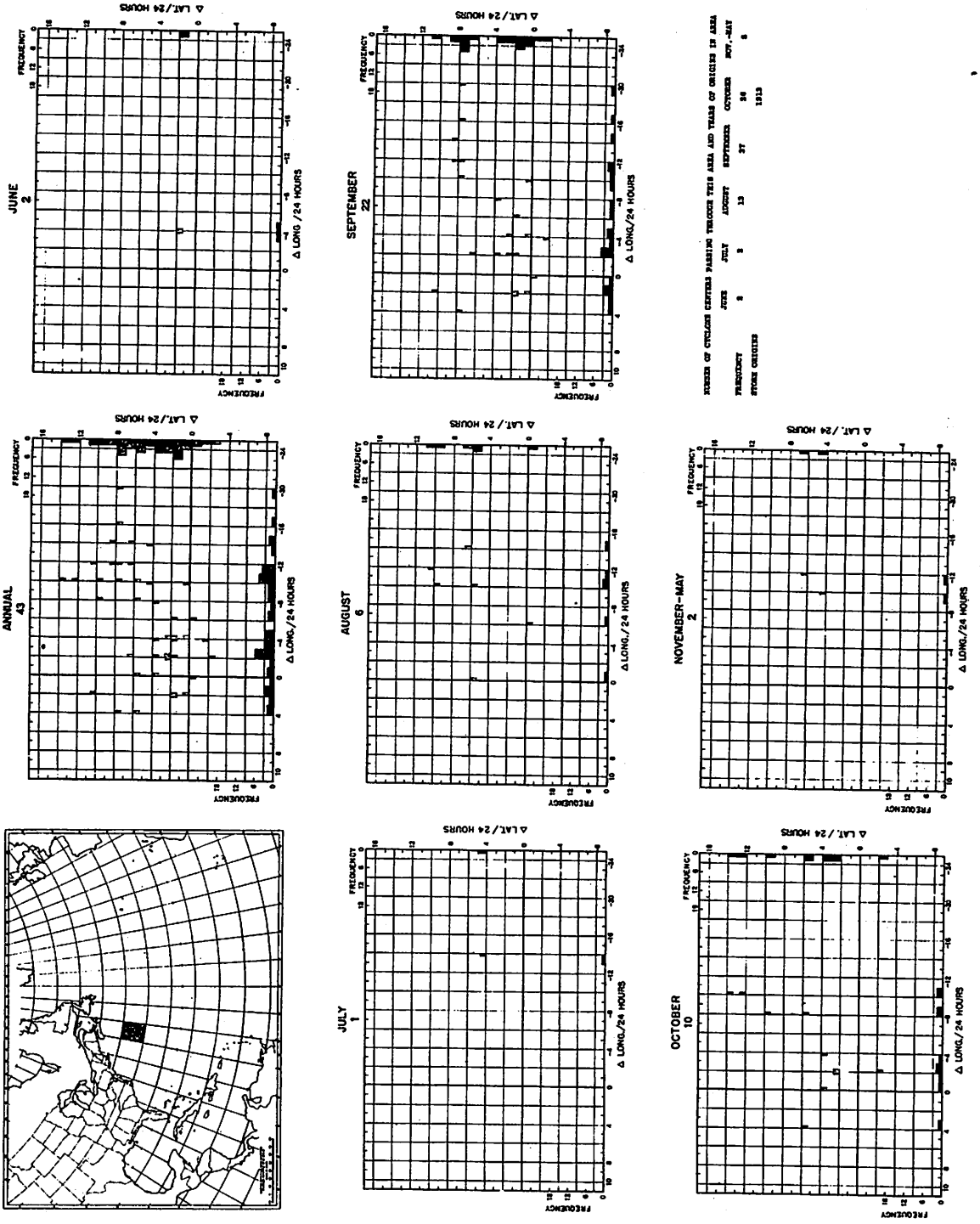


NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	3	3	8	45	22	8
STORM ORIGINS			NONE			

24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

35°-40°N
60°-65°W

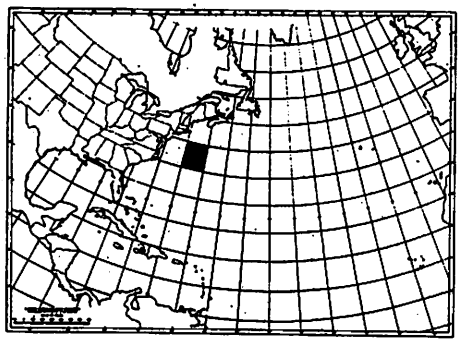


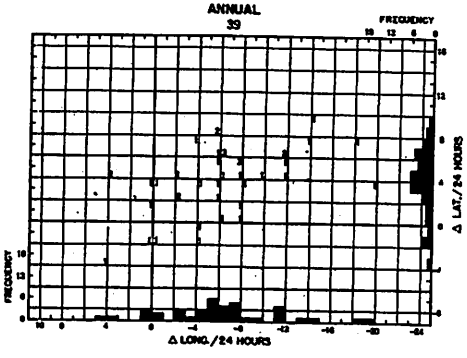
NUMBER OF CYCLONES CENTERED PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

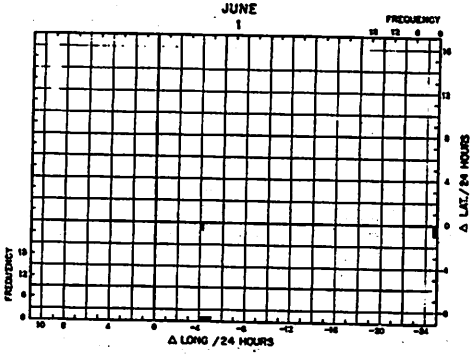
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	2	1	6	22	10	2
STORM ORIGINS				27	14	
					1913	

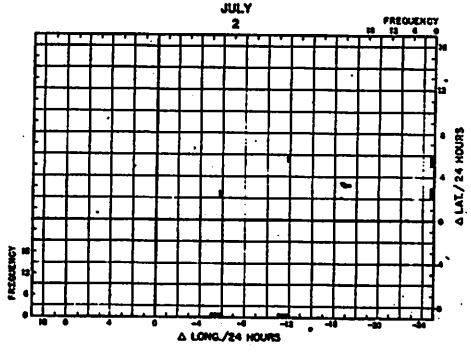
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

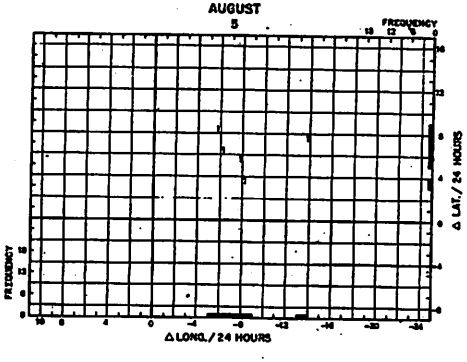
35°-40°N.
65°-70°W.

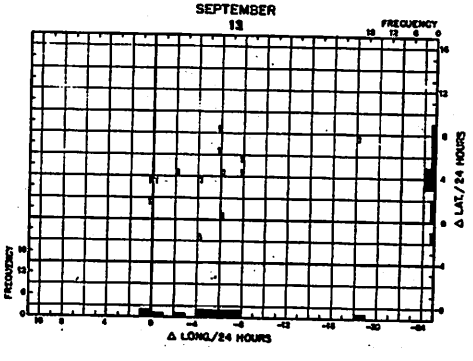


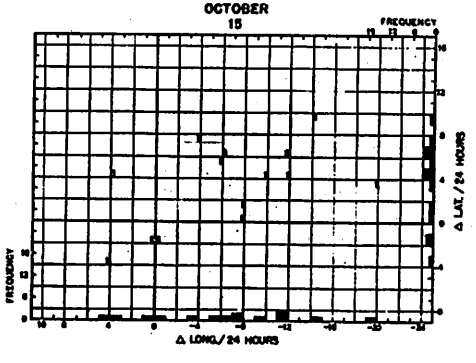


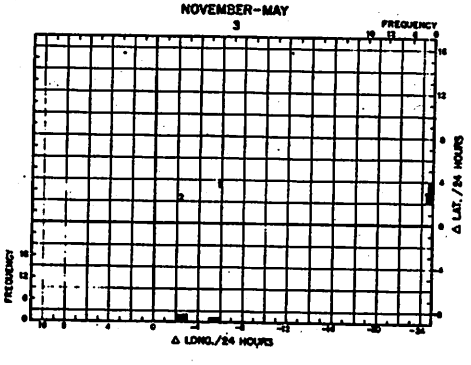








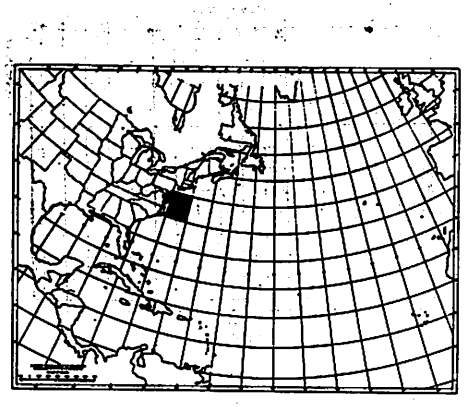


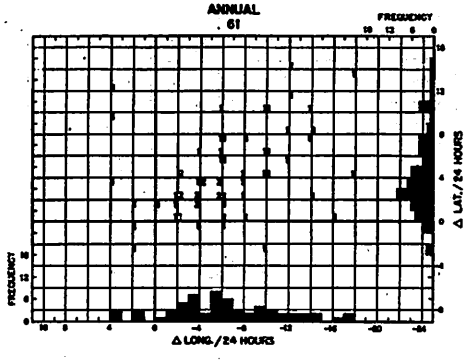


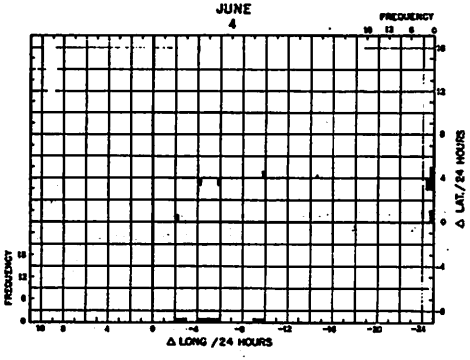
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

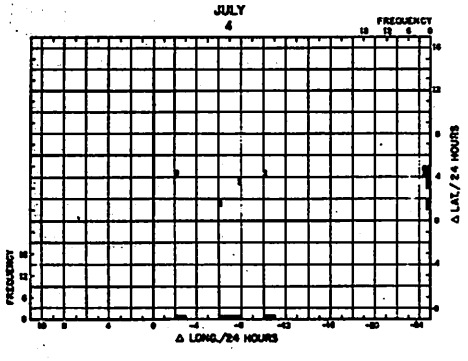
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	3	4	21	41	21	7
STORM ORIGINS				JUNE		

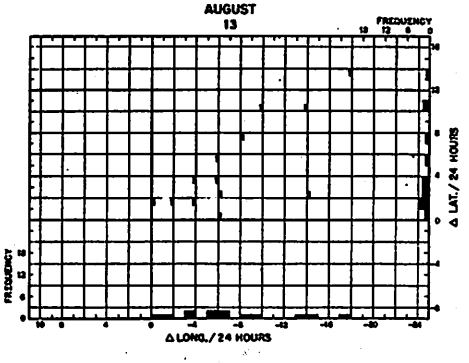
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

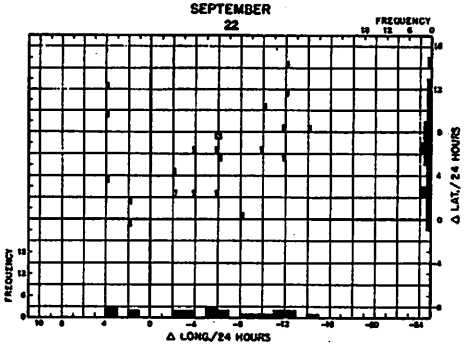


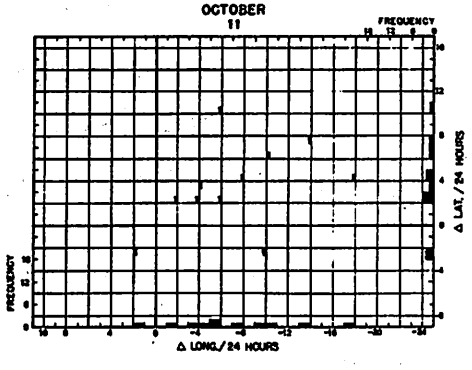


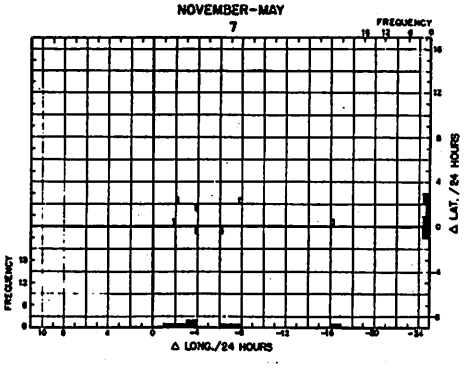










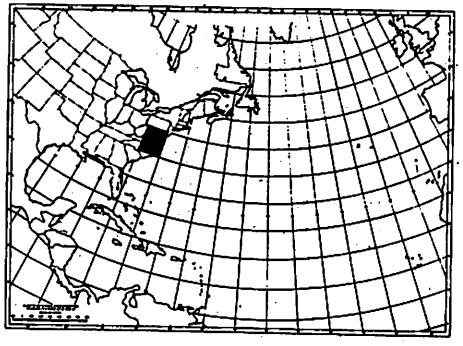


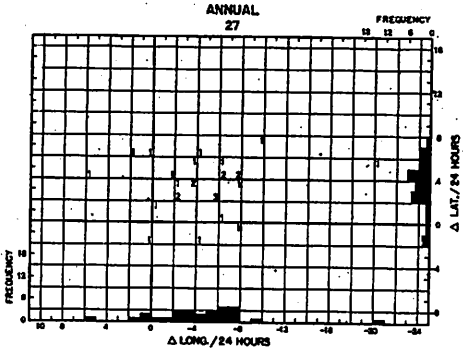
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

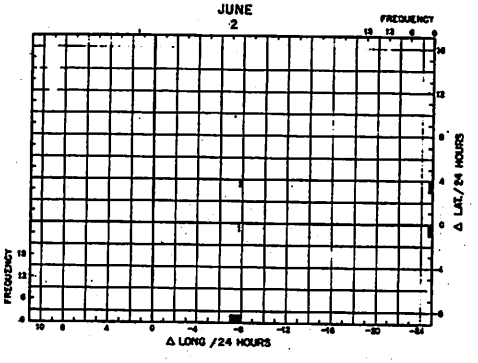
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	7	6	53	57	34	13
STORM ORIGINS			NONE			

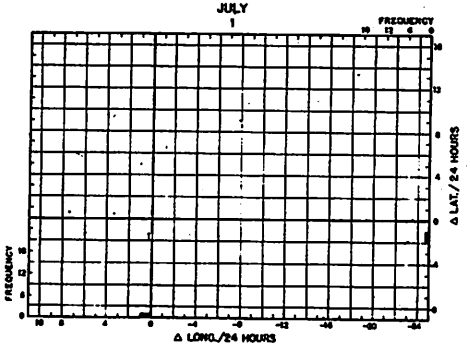
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

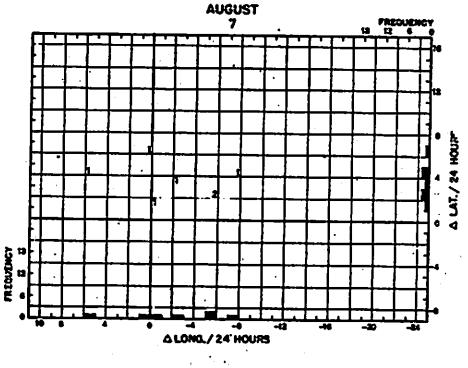
35°-40°N.
75°-80°W.

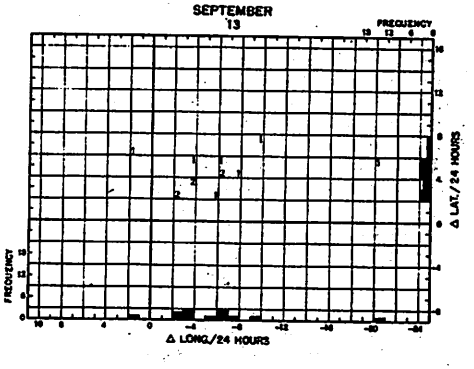


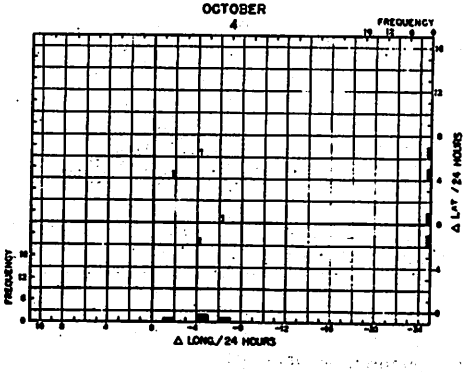


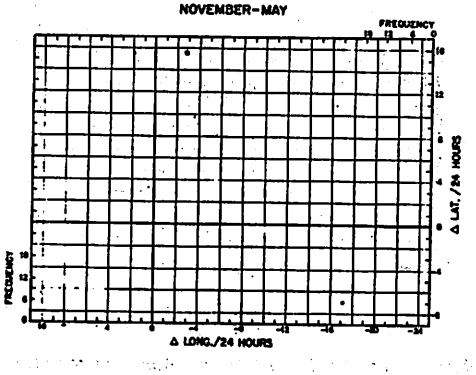








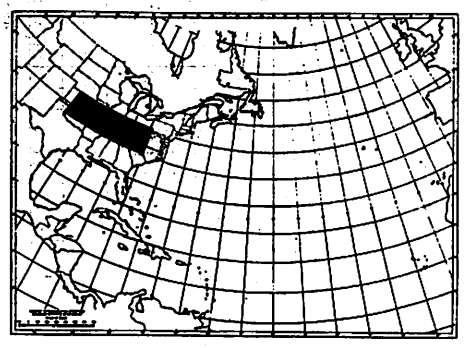


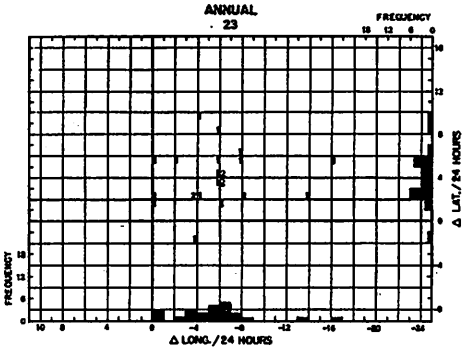


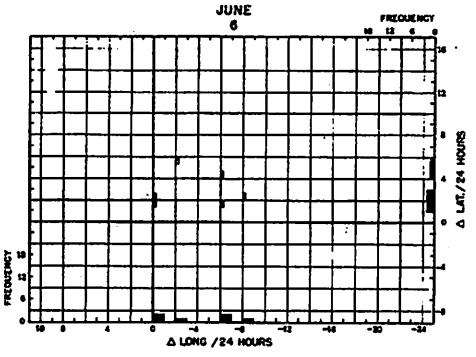
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

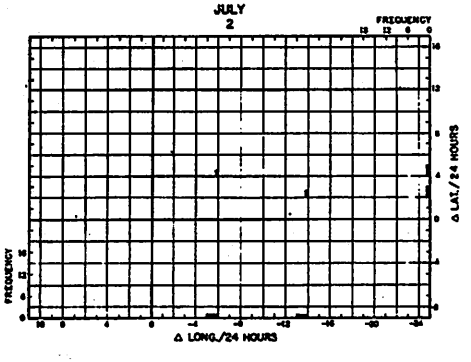
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	2	1	7	13	4	1
STORM ORIGINS			NONE			

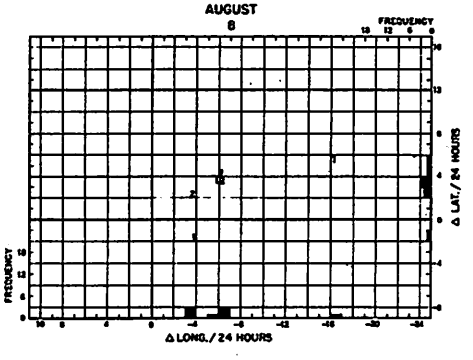
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

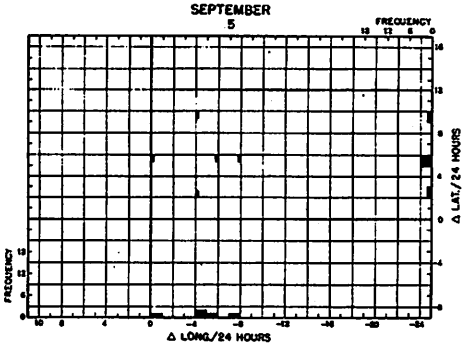


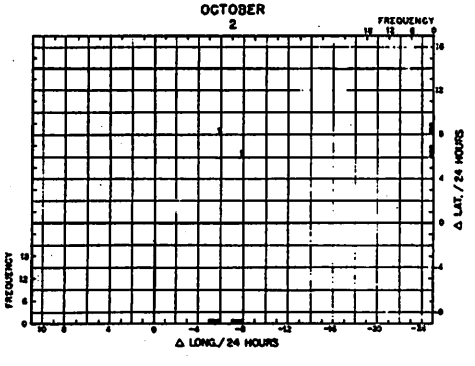


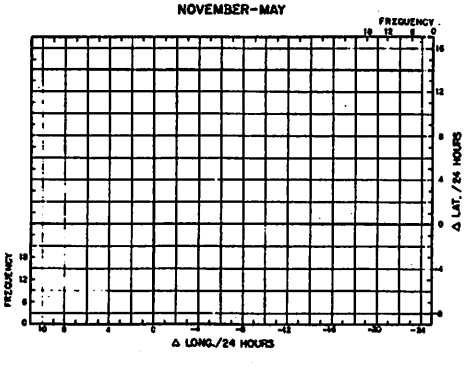










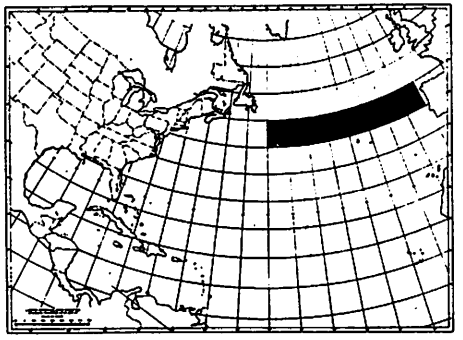


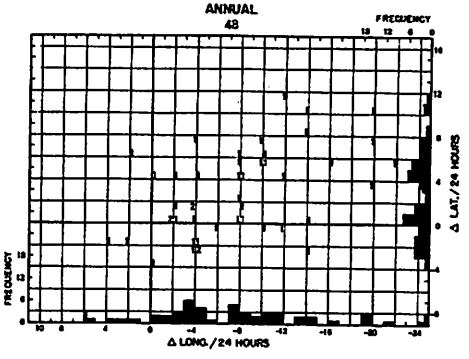
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND TRANS OF ORIGINS IN AREA

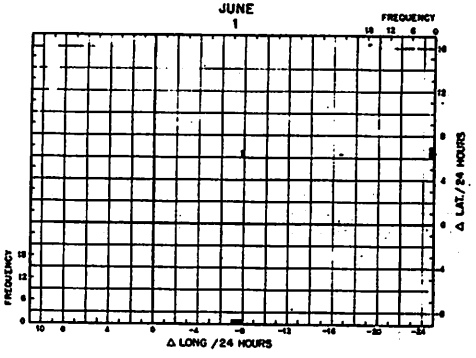
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	7	7	16	86	0	0
STORM ORIGINS			NONE			

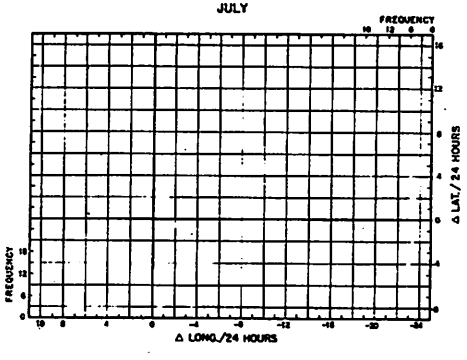
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

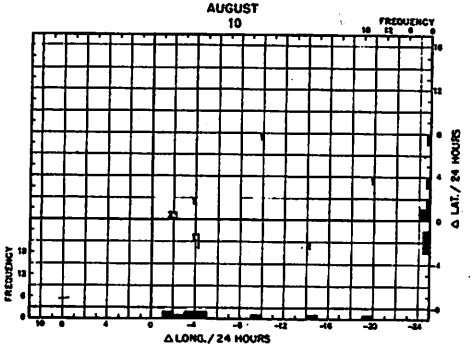
40°-45°N.
10°-50°W.

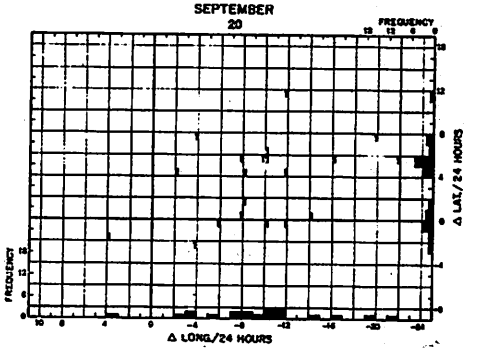


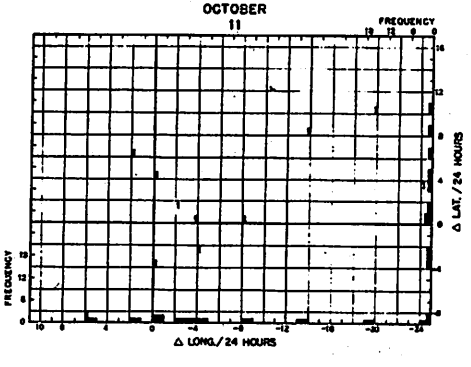


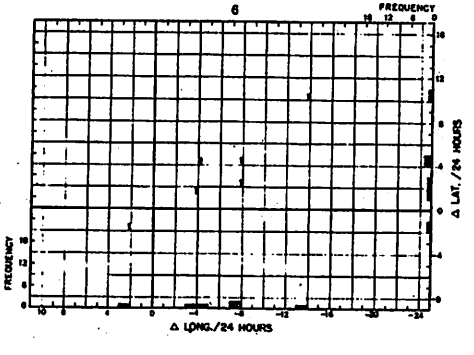








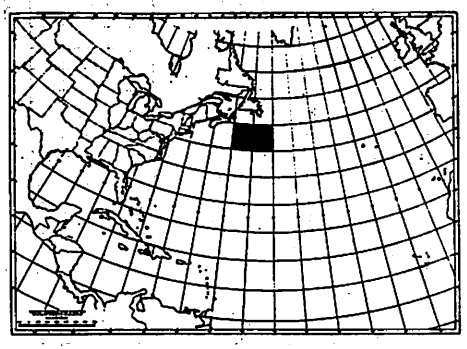


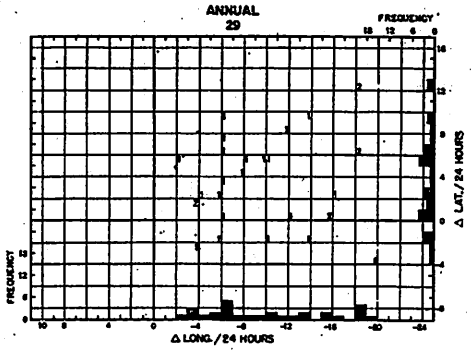


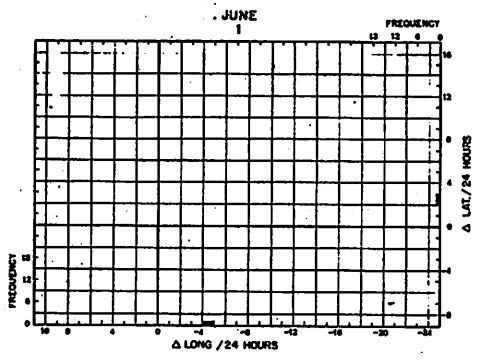
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

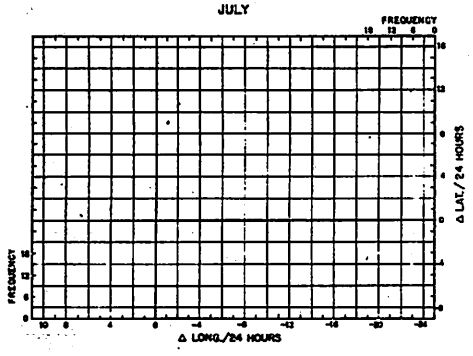
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	3	3	11	40	23	10
STORM ORIGINS				NONE		

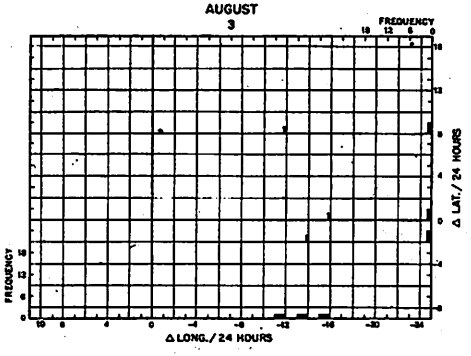
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

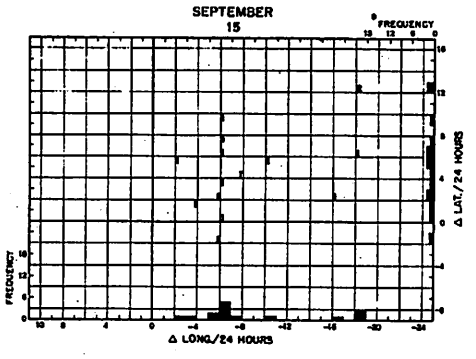


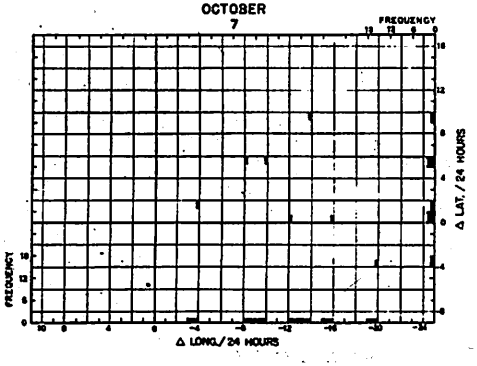


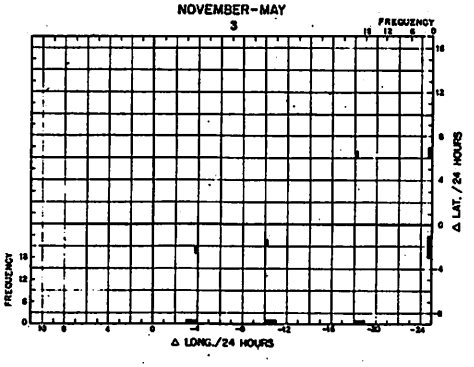










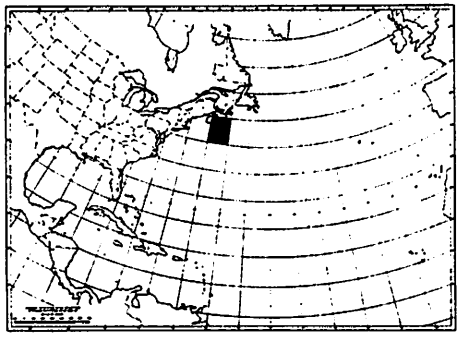


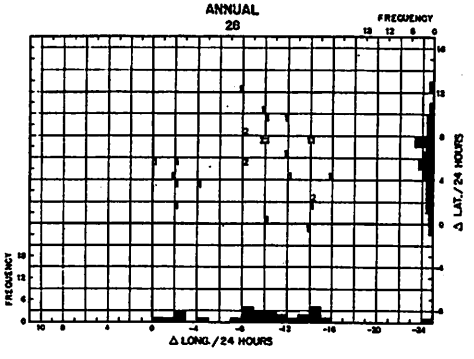
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

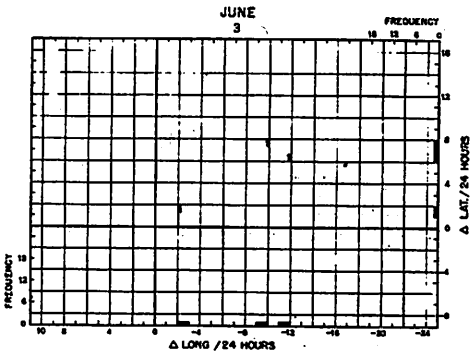
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	4	4	13	45	26	8
STORM ORIGINS			NONE			

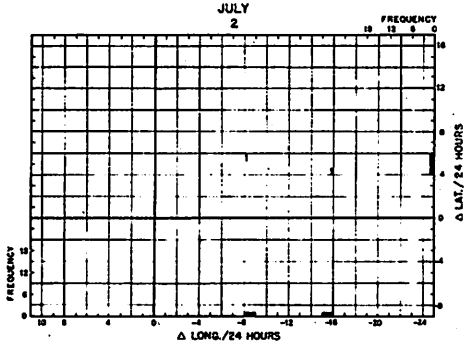
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

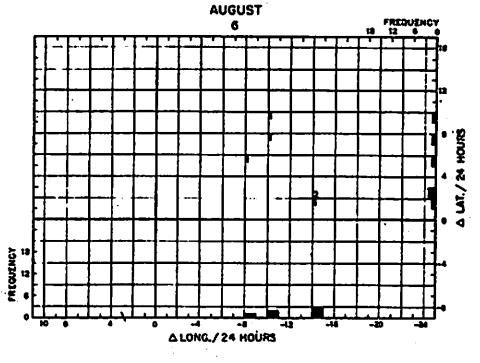
40°-45°N.
60°-65°W.

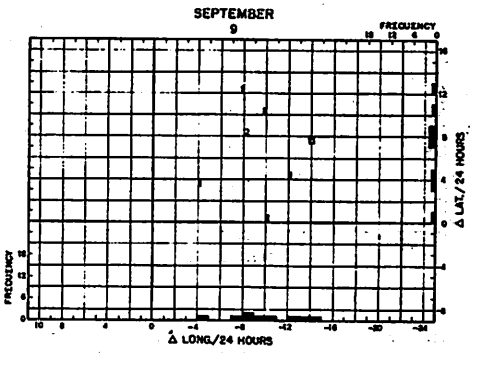


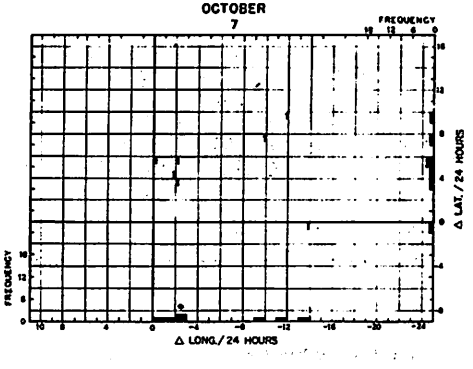


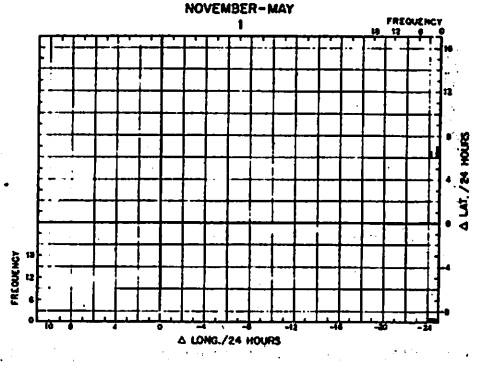










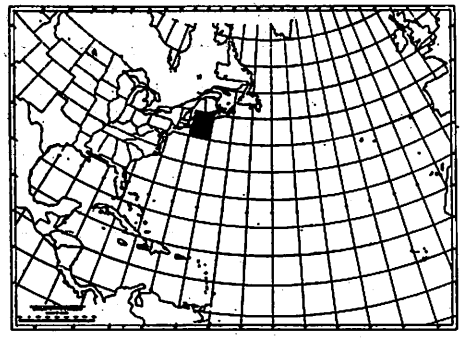


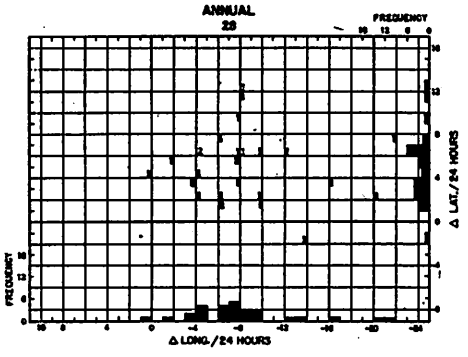
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND TRUE OF ORIGINS IN AREA

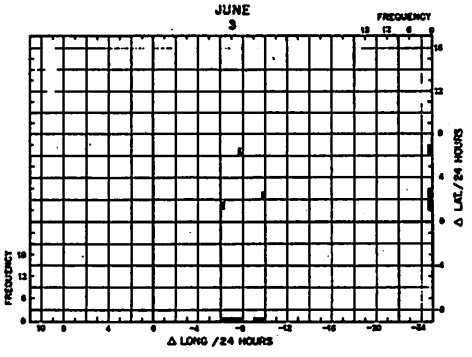
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	3	2	23	29	27	2
STORM ORIGINS			NONE			

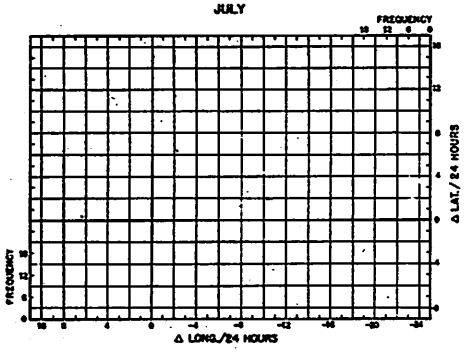
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

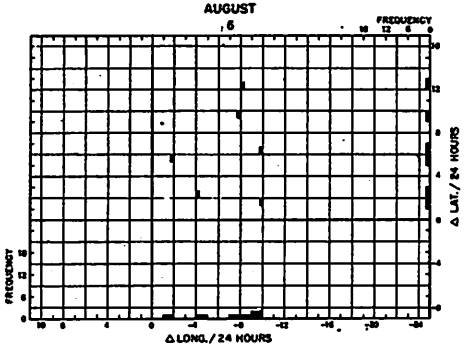
40°-45°N
65°-70°W

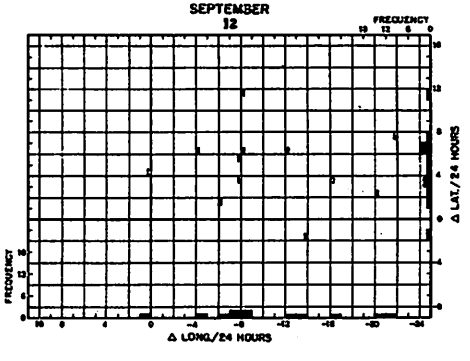


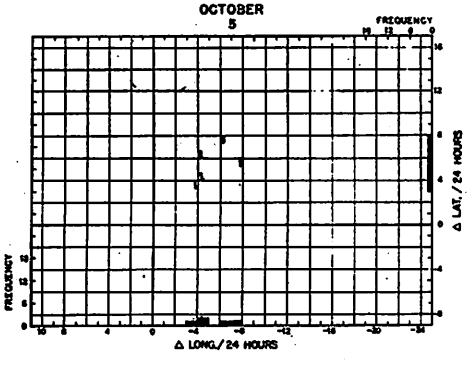


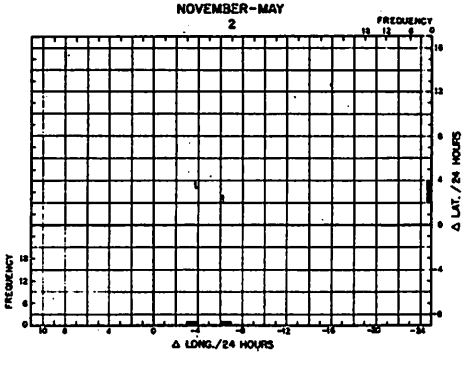










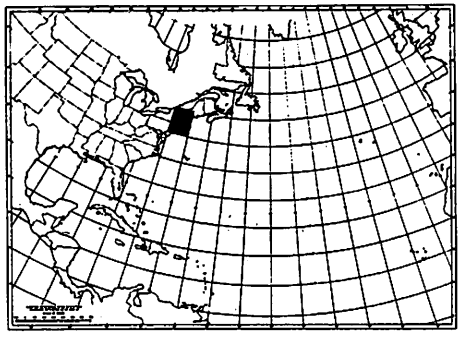


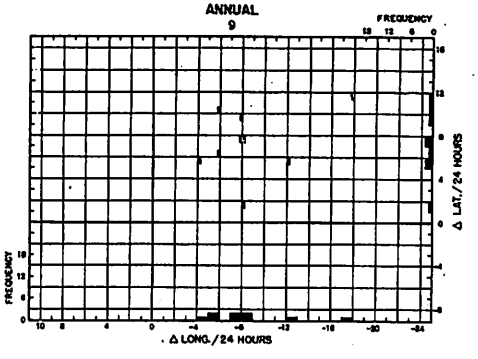
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

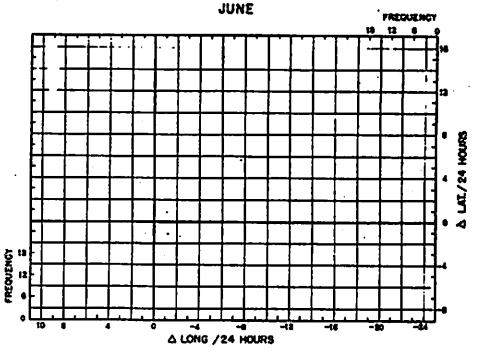
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	4	5	19	34	19	5
STORM ORIGINS				NONE		

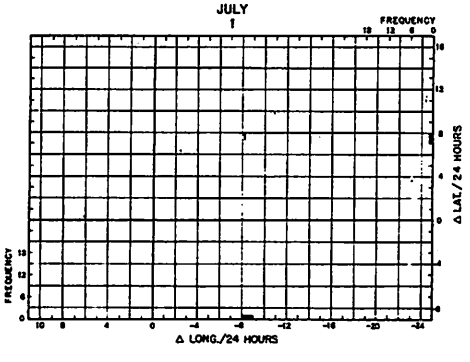
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

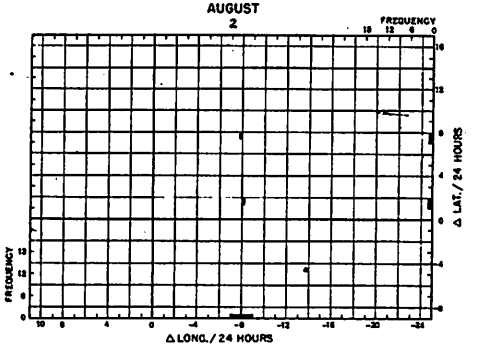
40°-45°N.
70°-75°W.

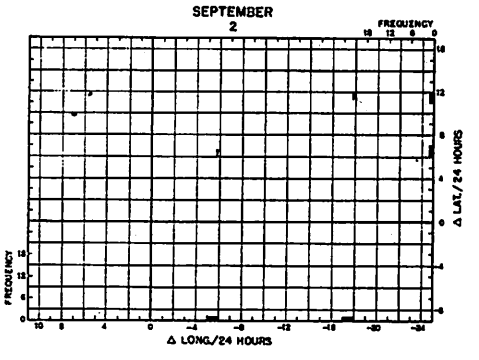


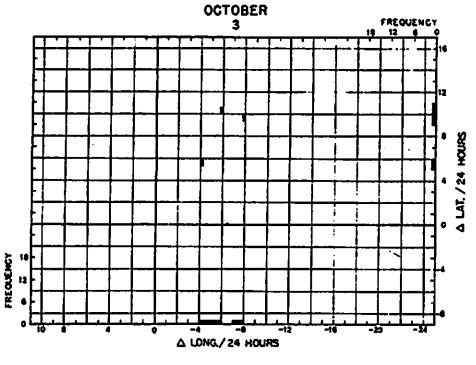


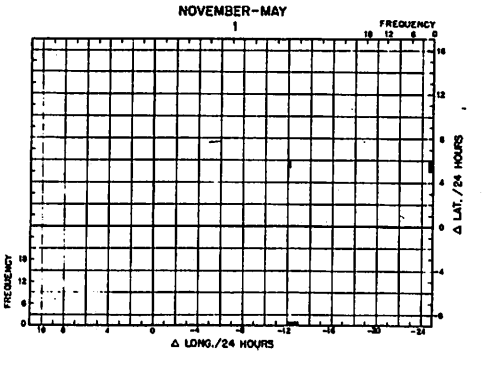










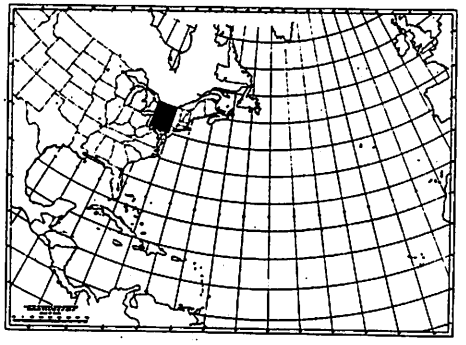


NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

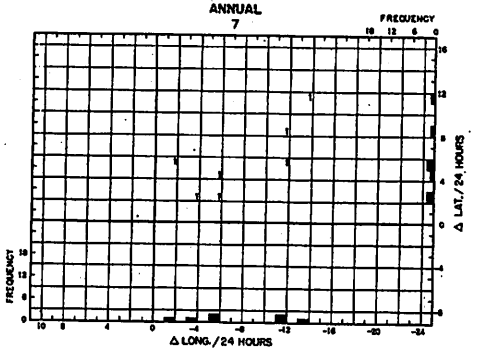
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	2	1	16	17	9	2
STORM ORIGINS				NONE		

24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

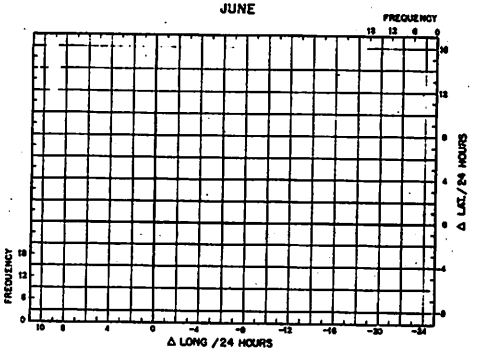
40°-45 N.
75°-80°W.



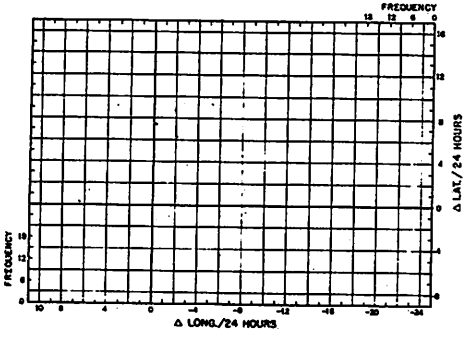
ANNUAL
7



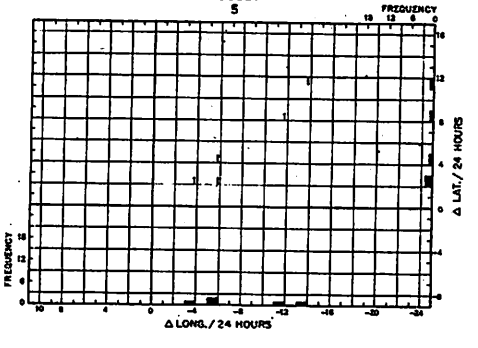
JUNE



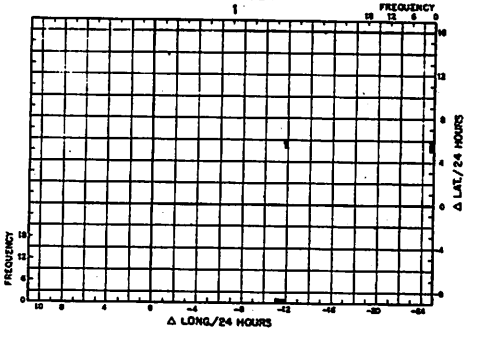
JULY



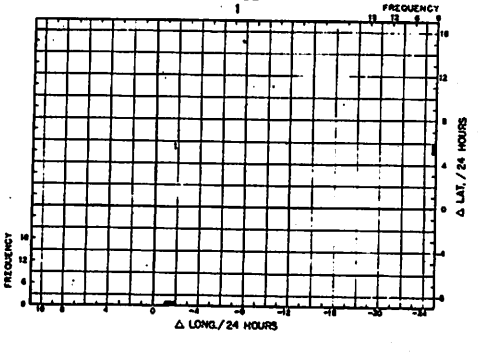
AUGUST
5



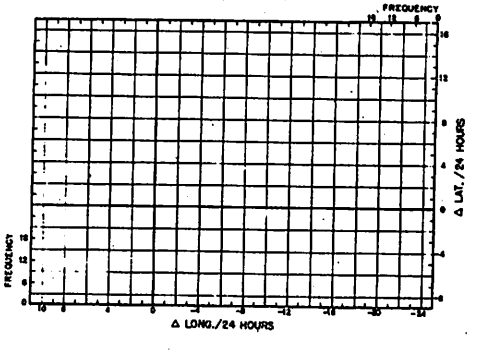
SEPTEMBER
1



OCTOBER
1



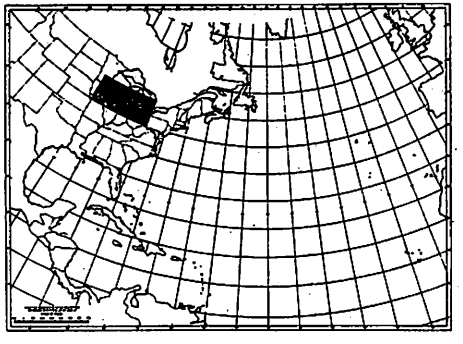
NOVEMBER-MAY

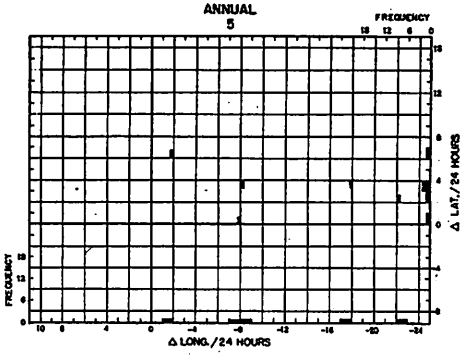


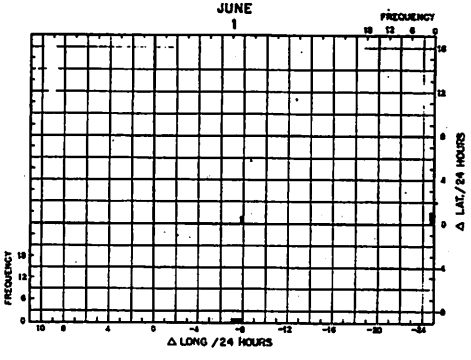
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

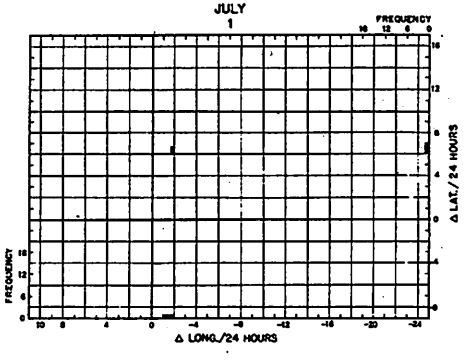
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	2	0	9	7	7	1
STORM ORIGINS			1936			

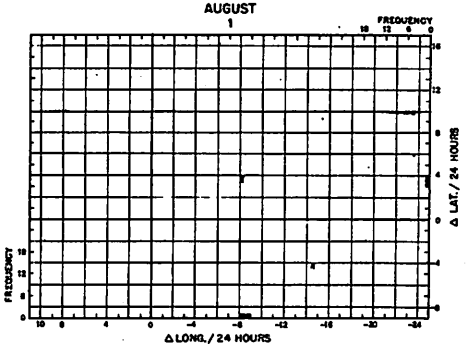
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

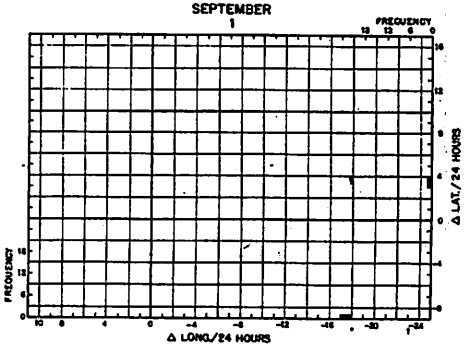


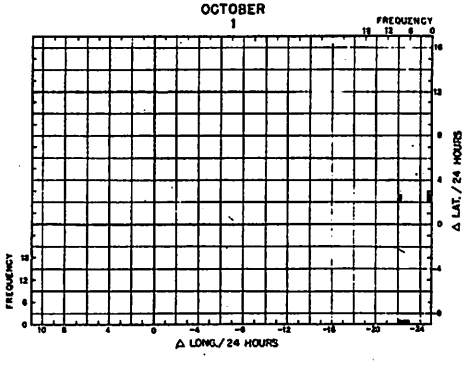


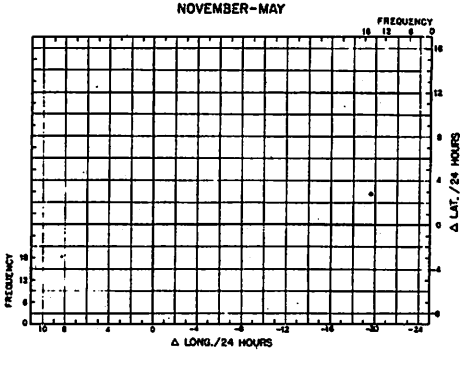










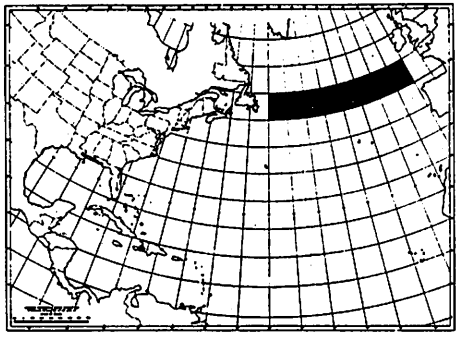


NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

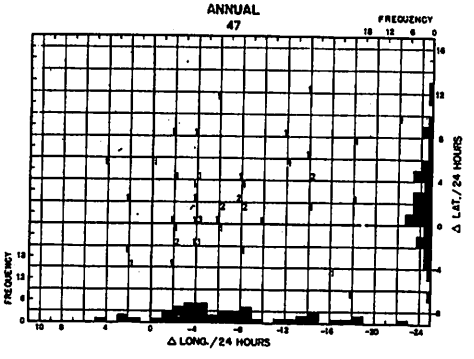
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	3	1	3	10	7	0
STORM ORIGINS			NONE			

24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

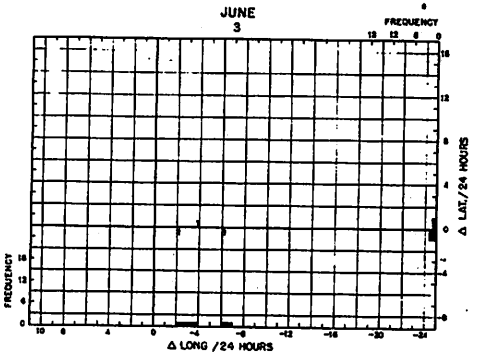
45°-50°N.
10°-50°W.



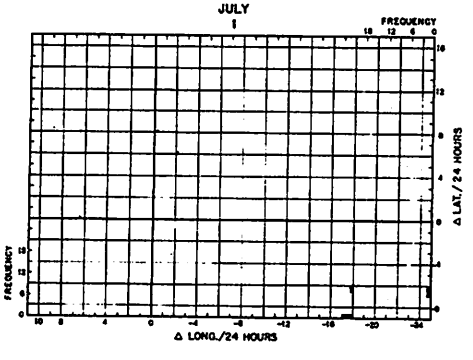
ANNUAL
47



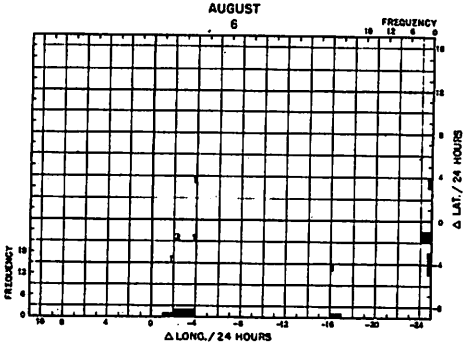
JUNE
3



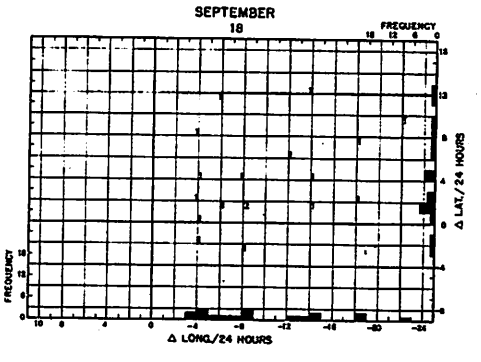
JULY
1



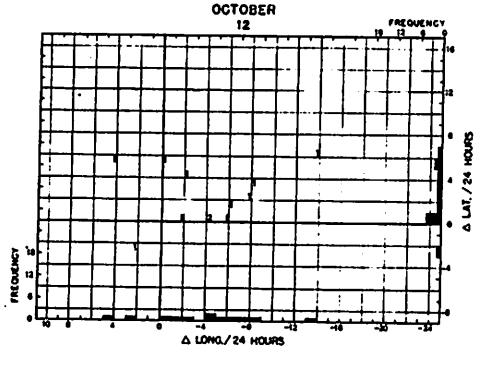
AUGUST
6



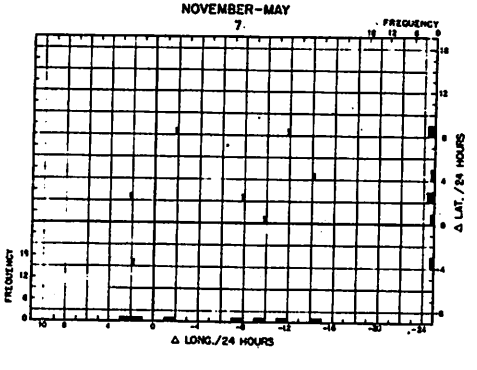
SEPTEMBER
18



OCTOBER
12



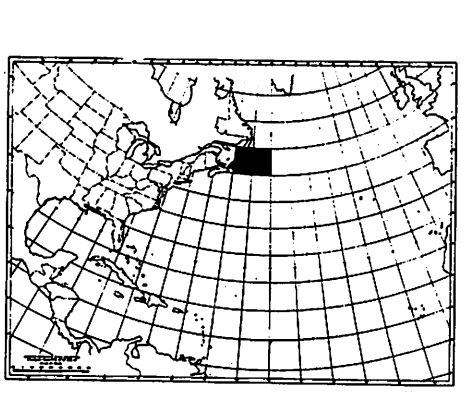
NOVEMBER–MAY
7

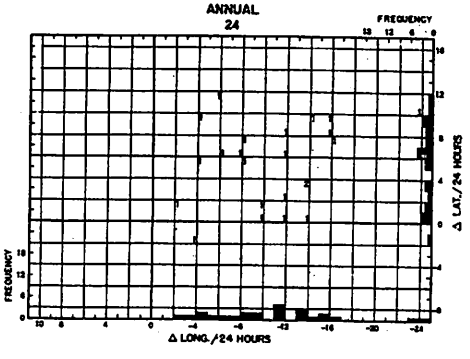


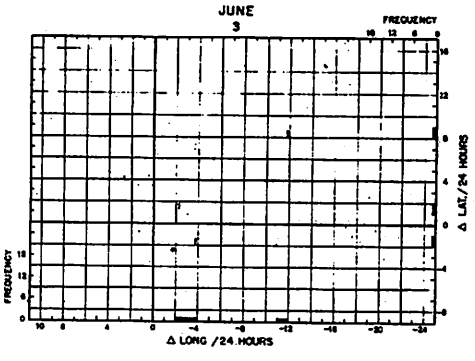
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

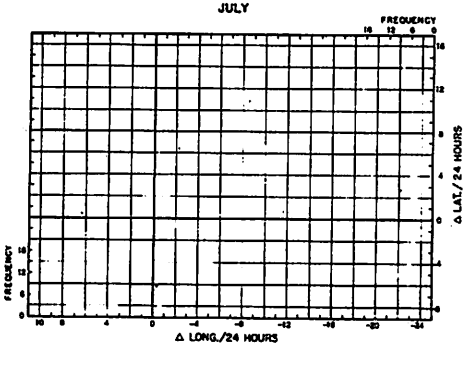
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	3	3	10	43	21	19
STORM ORIGINS			NONE			

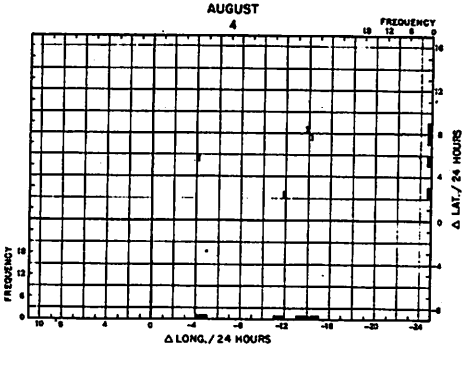
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

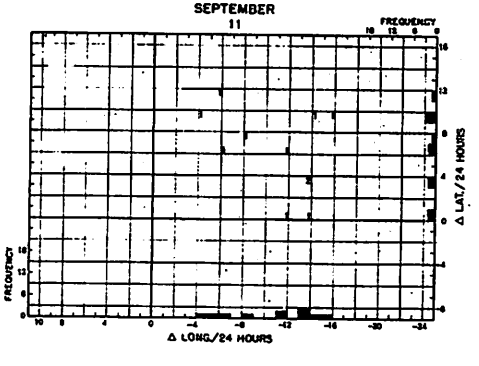


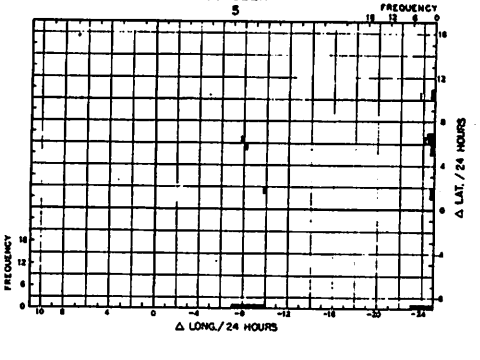


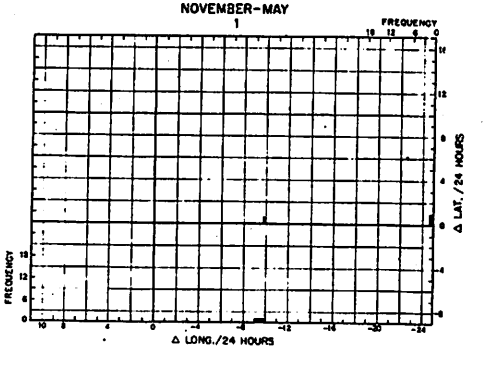










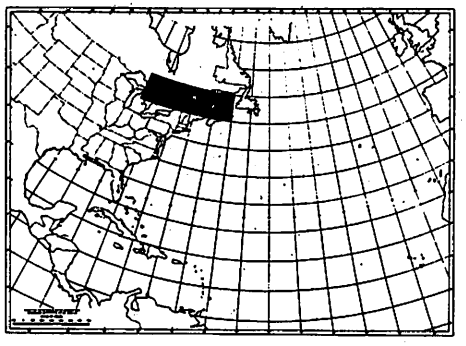


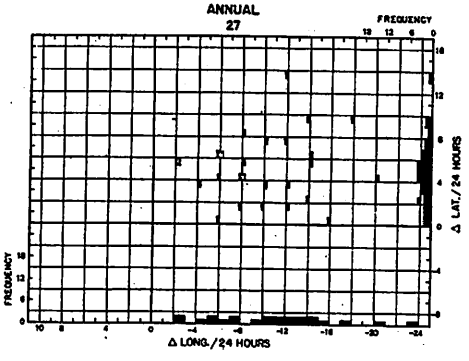
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

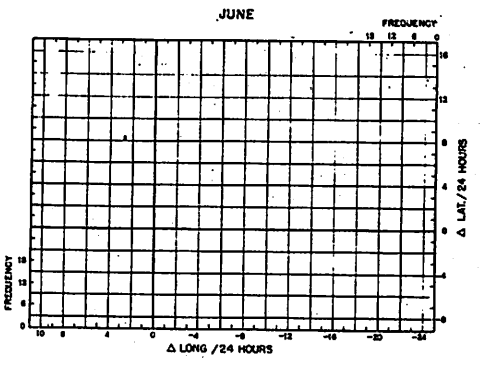
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	3	3	19	40	23	4
STORM ORIGINS			NONE			

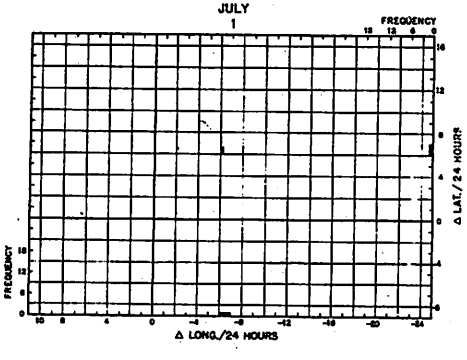
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

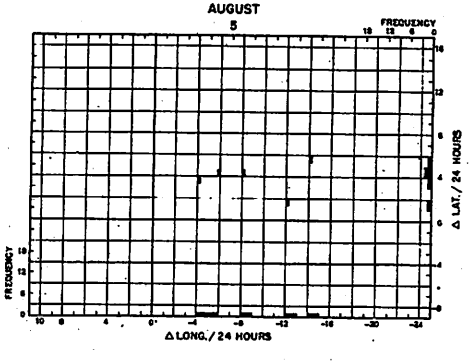
45°-50°N.
60°-85°W.

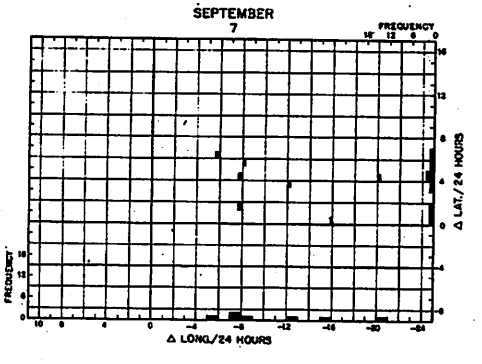


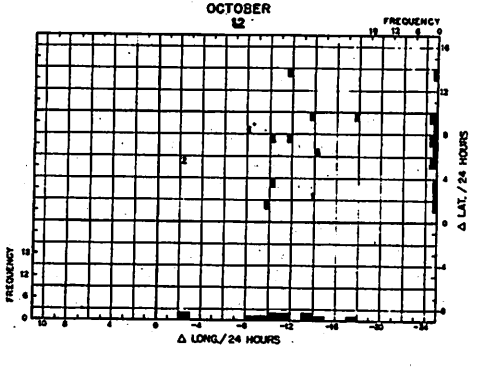


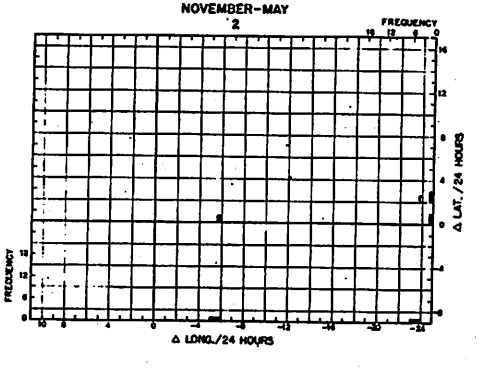








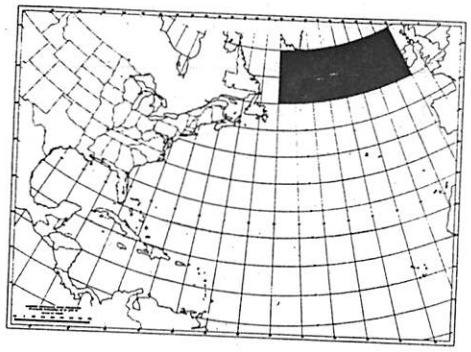




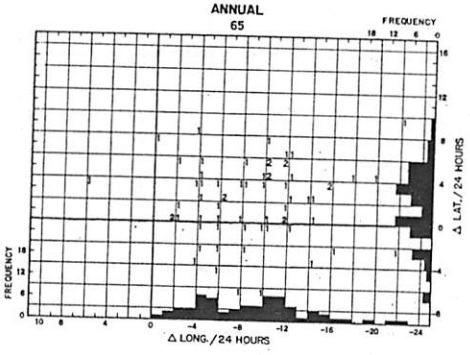
NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

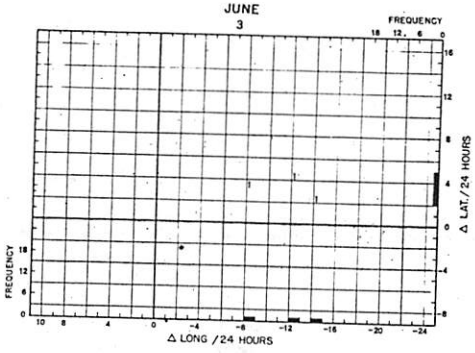
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	3	2	15	30	21	2
STORM ORIGINS			NONE			

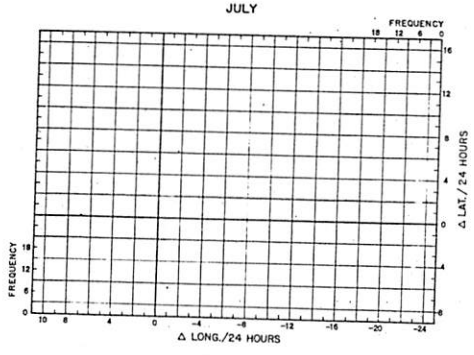
24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

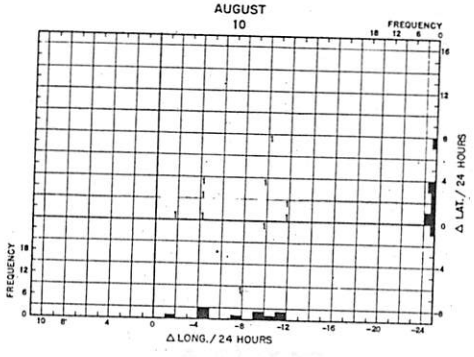


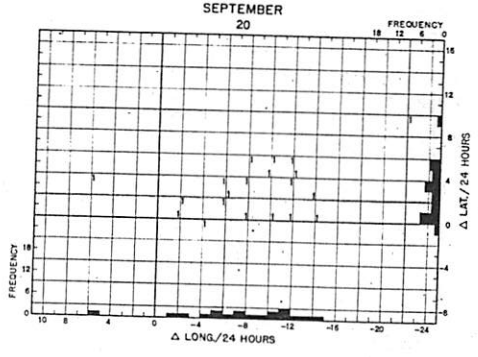
50°-60°N.
10°-50°W.

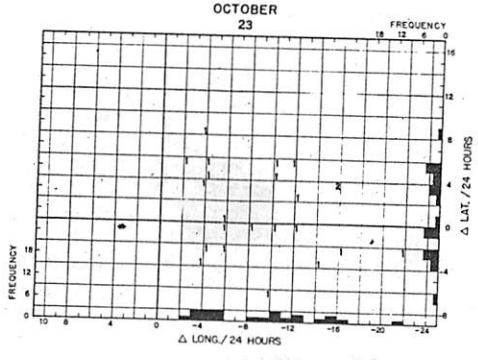


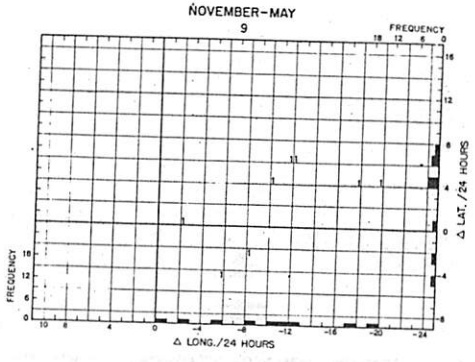










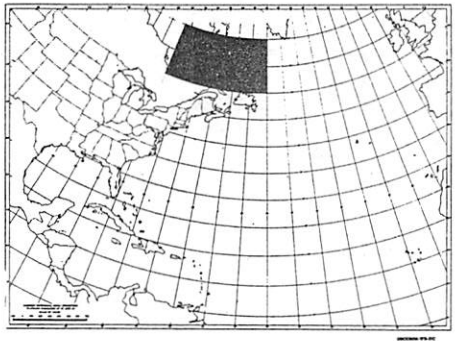


NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

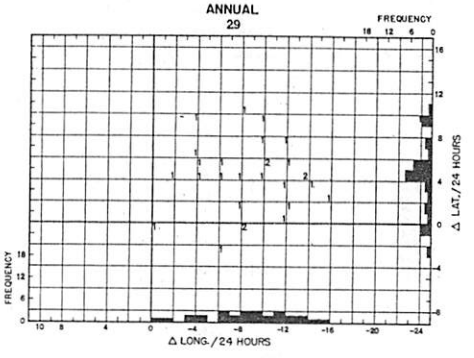
	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	3	1	12	45	28	9
STORM ORIGINS				NONE		

24 HOUR COMPONENTS OF MOTION OF TROPICAL CYCLONES INITIALLY LOCATED WITHIN THE SHADED AREA

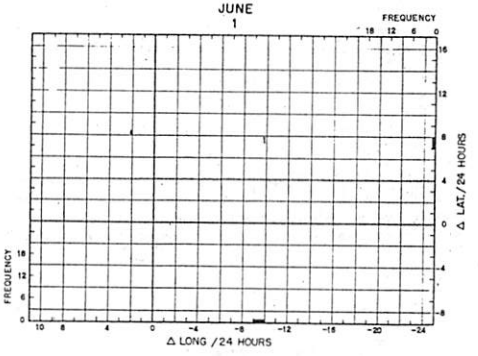
50°-60°N.
50°-80°W.



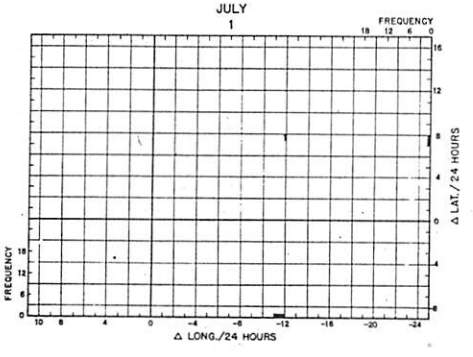
ANNUAL
29



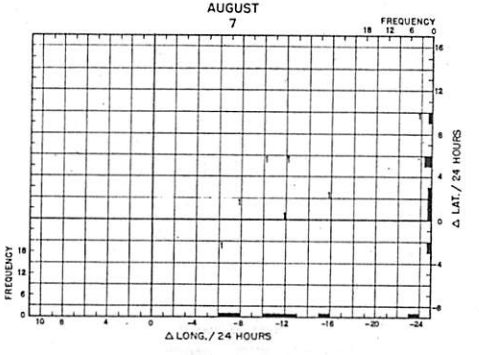
JUNE
1



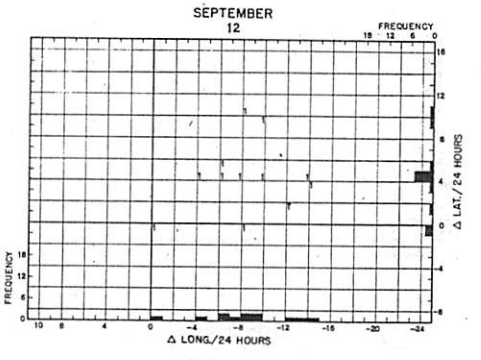
JULY
1



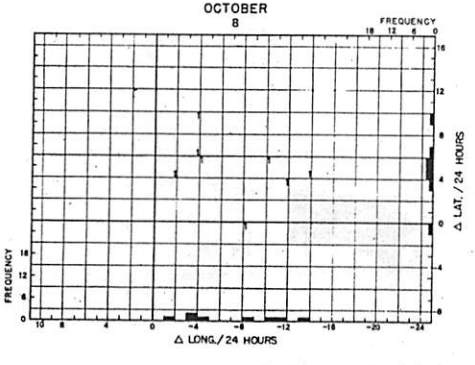
AUGUST
7



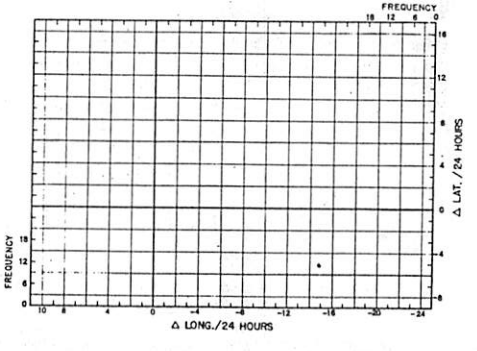
SEPTEMBER
12



OCTOBER
8



NOVEMBER-MAY



NUMBER OF CYCLONE CENTERS PASSING THROUGH THIS AREA AND YEARS OF ORIGINS IN AREA

	JUNE	JULY	AUGUST	SEPTEMBER	OCTOBER	NOV.-MAY
FREQUENCY	3	2	11	21	22	0.
STORM ORIGINS			NONE			