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FREQUENCY AND MOTION OF WESTERN NORTH PACIFIC
TROPICAL CYCLONES

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ABSTRACT. This study presents a statistical analysis of Western North Pacific tropical storms and typhoons over the 37-year period, 1946 - 1982. Emphasis is on frequency and motion characteristics. For various intraseasonal periods and storm intensities, charts and diagrams depict: (1) expected storm frequency per unit area per 100-year interval; (2) resultant speed and direction of storms; (3) mean and standard deviation of storm translational (forward) speed, and (4) storm tracks upon which (1), (2), and (3) are based. Examples of the utility of the data through the application of the Poisson and gamma distributions are presented.

1. INTRODUCTION

A statistical analysis of Western North Pacific tropical cyclones is presented. Emphasis is on their frequency and motion characteristics. The study was prompted by the: (1) visiting scientist programs between the United States (National Oceanographic and Atmospheric Administration (NOAA)) and the People's Republic of China (PRC) whereby PRC scientists were assigned to the United States National Hurricane Center (NHC) for extended periods and (2) usefulness of a similar, earlier study for the North Atlantic tropical cyclone basin (Neumann and Pryslak, 1981).

As shown, the data presented here have both meteorological and engineering utility. Meteorologists will find the storm track maps and their digitized versions particularly useful for the proper structuring of analog and CLIPER-class models (World Meteorological Organization, 1979). Such models are used by many meteorological ser-

¹This study was researched while the author was temporarily assigned to the United States National Hurricane Center. A condensed version of the study was presented at a national conference (Xue and Neumann, 1984)

vices as objective guidance for operational prediction of tropical cyclone tracks. For engineering applications, the data will provide users with the ability to assess objectively, (through the Poisson and gamma distributions) site-specific probabilities of various frequency and motion storm parameters.

2. DATA

All data and analyses presented here are based on the 927 recorded Western Pacific tropical cyclone tracks and their associated maximum winds over the 37-year period 1946 - 1982. Tropical systems that failed to attain tropical storm² status were excluded from the analyses. The number of storms recorded each year is shown in Table 1a. Table 1b gives the cumulative monthly totals for these same storms. In the latter table, a storm was assigned to the month during which it first attained tropical storm strength. For example, a storm that became a tropical storm on 31 August, a typhoon on 1 September and a major typhoon on 2 September was assigned to August for all categories. Intraseasonal variation in the frequency of tropical storms and typhoons³ is depicted in Figs. 1a and 1b. In these figures, data are given on a 100-year basis (section 3.4.1).

Table 1a. Number of tropical cyclones with winds of at least: (A) tropical storm intensity (34 kts), (B) typhoon intensity (64 kts) and (C) major typhoon intensity (100 kts) for each year, 1946-1982.

	A	B	C		A	B	C		A	B	C
1946	16	12	10	1959	21	16	13	1972	30	22	13
1947	24	16	7	1960	28	19	9	1973	21	12	4
1948	26	15	5	1961	30	20	9	1974	32	15	3
1949	23	14	7	1962	28	24	12	1975	20	14	5
1950	18	12	6	1963	25	19	12	1976	25	14	9
1951	18	16	10	1964	37	24	12	1977	19	11	4
1952	28	20	11	1965	32	21	15	1978	29	16	4
1953	24	17	14	1966	30	20	8	1979	22	13	7
1954	19	15	10	1967	35	20	11	1980	24	15	9
1955	22	18	10	1968	26	20	12	1981	28	16	6
1956	23	18	9	1969	18	13	7	1982	26	19	12
1957	21	18	14	1970	23	12	11	TOTAL	927	629	345
1958	23	20	15	1971	33	23	10	MEAN	25.1	17.0	9.3

²A tropical storm is technically defined as a warm-core tropical cyclone in which the maximum sustained wind (1-minute mean) ranges from 34 to 63 knots.

³A typhoon is technically defined as a warm-core tropical cyclone in which the maximum sustained wind (1-minute mean) equals or exceeds 64 knots.

The data used to construct Fig. 1b were identical to those used for Fig. 1a, except that a 15-day moving average was needed to remove some of the apparently random day-to-day variations. However, it can be noted in Fig. 1b that some longer period intraseasonal fluctuations remain. It has not been determined whether these variations are real or artificial.

Table 1b. Number of tropical cyclones of specified intensity beginning in each month, 1946 - 1982.													
	J	F	M	A	M	J	J	A	S	O	N	D	ANN
>34 kts	17	10	19	26	39	60	143	173	172	136	89	43	927
>64 kts	10	2	10	20	29	38	90	115	123	105	60	27	629
>100kts	5	2	6	11	13	19	45	53	63	69	43	16	345

Western North Pacific storm tracks, with 6-hourly positions and associated maximum winds, are recorded on a computer file that is maintained by the NHC. The NHC does not have forecast responsibility over this tropical cyclone basin; the file was created solely for the use of visiting scientists undertaking various research projects at the NHC. Originally, storm data at 12-hourly intervals were obtained from the United States National Climatic Center (NCC) in

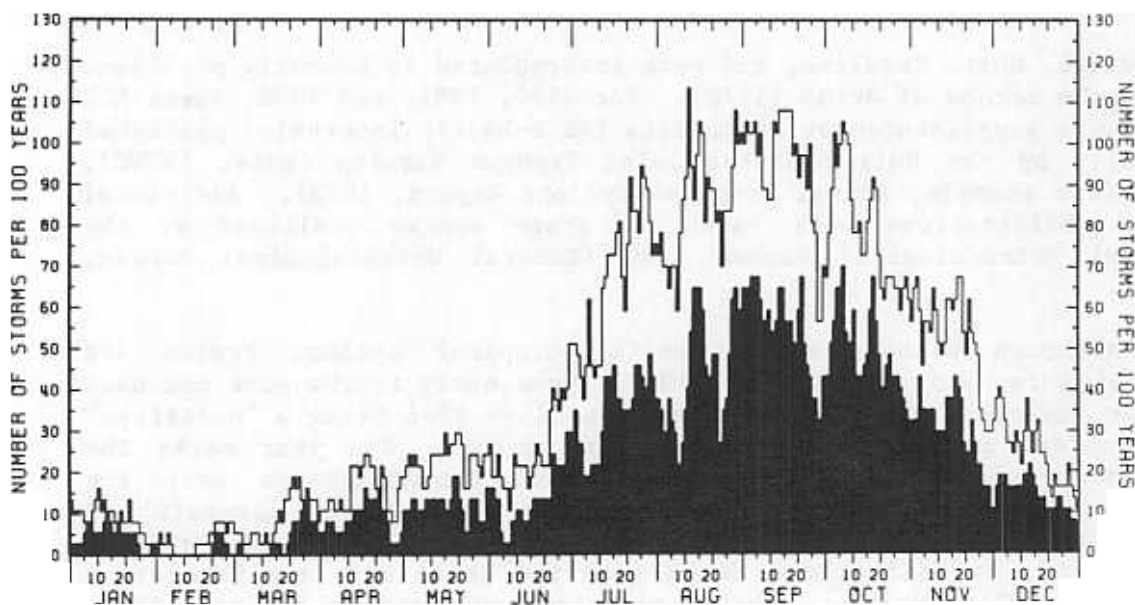


Fig. 1a. Number of tropical storms and typhoons (upper bar) and typhoons alone (lower bar) to be expected per 100-years on any given day. These frequencies are based on all observed occurrences over the 37-year period, 1946 - 1982.

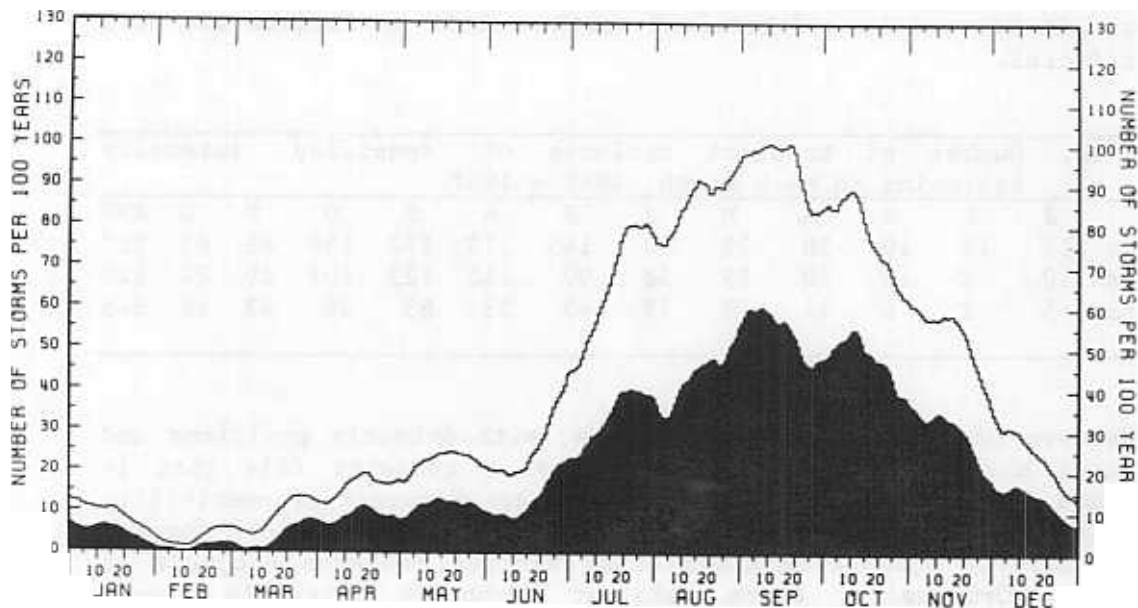


Fig. 1b. Same as Fig. 1a except that data were smoothed using a 15-day moving average.

Asheville, North Carolina, and were interpolated to 6-hourly positions using the method of Akima (1970). For 1980, 1981, and 1982, these NCC data were supplemented by storm data (at 6-hourly intervals) published annually by the United States Joint Typhoon Warning Center (JTWC), Guam (for example, Annual Tropical Cyclone Report, 1982). Additional minor modifications were based on storm tracks published by the Central Meteorological Bureau, PRC (Central Meteorological Bureau, 1972).

Although Western North Pacific tropical cyclone tracks are available for many years before 1946, these early tracks were not used in the analyses. This decision was based on 1946 being a "milestone" in tropical cyclone detection and monitoring. The year marks the beginning of dedicated aircraft typhoon reconnaissance over the Western North Pacific in which specially instrumented aircraft and specially trained flight crews were used. Hence, storm data of 1946 and beyond, as used here, can be expected to be more realistic than data for earlier years. Another milestone occurred in the mid-1960's with the introduction of the weather satellite for the detection and tracking of tropical cyclones and for the assessment of their intensity.

Storm intensities referred to in this study (footnotes 2 and 3) are technically defined by the maximum sustained 1-minute surface wind observed near the tropical cyclone center. However, the ability to measure winds with the precision implied by this definition rarely, if ever, exists. The meteorologist who is responsible for tracking a

storm must assign a maximum sustained surface wind, usually from fragmented or, in some cases, nonexistent, actual wind information. Users of tropical cyclone data should be aware of these practical limitations in the ability to specify maximum surface winds in tropical cyclones.

The tropical cyclone tracks in this study are known, technically, as "best tracks". These are the smoothed, archived renditions of storm tracks from which small-scale (10 to 30 n.mi.) oscillations of the "eye" about its mean track have been removed. These oscillations are not considered representative of the more conservative larger scale motion of the entire storm envelope (World Meteorological Organization, 1979, Chapter 9). Additional information on tracking tropical cyclones is in Crutcher and Quayle (1974), Neumann et al. (1981) and Jarvinen et al. (1984).

3. COMPUTATIONAL PROCEDURES

3.1 Interpolation to Hourly Storm Positions

The Western Pacific storm track computer file, referred to in the section 2, contains 6-hourly storm positions and associated winds at 0000, 0600, 1200 and 1800GMT. For this study, hourly positions and intensities were required. Therefore we used the bivariate interpolation scheme described by Akima (1970). The method has been found to give a more faithful rendition of storm tracks than other interpolation methods. An example of a storm track generated by this method is shown in Figs. 2 and 3.

3.2 The Grid System

The subject tropical cyclone basin extends from the International Dateline (180° longitude) westward through the Asian coastal areas and from a few degrees north of the equator to beyond 45° north latitude. For digital counting, a grid, having a $2\frac{1}{2}^\circ$ latitude and longitude spacing, was constructed to cover this area. The grid extended from 101.25E, eastward to 173.75E (30 grid points) and from 1.25N, northward to 46.25N (19 grid points). Equal-area circles were centered at each of the (30 x 19) grid points. We chose a 75 n.mi. radius circle (139.5 km) for most computations in this study. Rationale for selecting this distance is discussed in this section. An illustration of the grid using the 75 n.mi. circles is included as Fig. 2. Each of the 927 storms over the period of record (in the form of hourly positions) was passed through the grid. Information was recorded for each of the circular areas for various seasonal and intraseasonal periods and storm intensities as follows:

- 1) The number of storms that passed through the circle. If a storm exited a circle and reentered (a rare occurrence), it was counted only once.
- 2) The average meridional component of storm motion while the storm was transiting the circular area.

- 3) The average zonal component of storm motion while the storm was transiting the circular area.

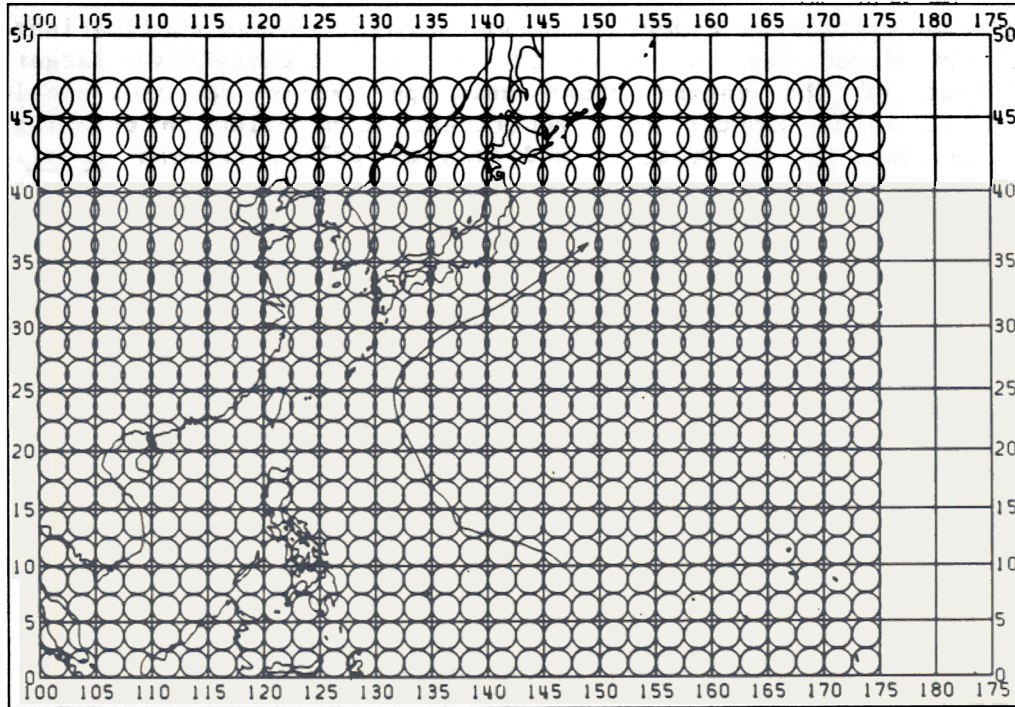


Fig. 2. Array of 75 n.mi. (139km) circles used in storm frequency and motion computations. Storm track is that of typhoon ELSIE, 1981.

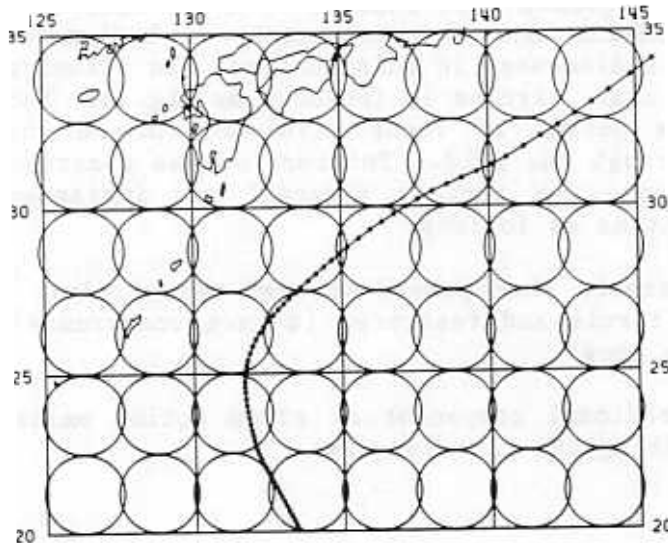


Fig. 3. Enlarged portion of Fig. 2 showing interpolated hourly positions of typhoon ELSIE, 1981.

4) The average translational (forward) speed while the storm was transiting the circular area.

5) The standard deviation of (4)

Note that the speeds in items (2), (3) and (4) were averaged over the time the storm was passing through the circle. This method, rather than one that simply accrues all speeds per circle, avoids a bias towards slower moving storms. For example, typhoon ELSIE, 1981 (Fig. 2) had 13 hourly positions within the circular area directly southeast of 25N, 130E, but only 4 hourly positions within the circular area directly northeast of 30N, 140E. Had each of these speeds been individually summed with the speeds of other storms that passed through the same circle, a bias toward the slower storms would have resulted.

3.3 Scan Distances Other Than 75 n.mi.

The statistical tabulations (1) through (5), above, were computed for areas having a 75 n.mi. radius (139.5 km), as depicted in Fig. 2. The choice of 75 n.mi. for these calculations was prompted by its nearness to the average radius that was associated with at least some damage, damage potential, or damage concern from the storm. However, the frequency of storms passing within other radii also may be of interest. Accordingly, the seasonal calculations in item (1), above, were repeated for radii of 25, 50, 100, 150, and 200 n.mi. with the same (30 x 19) grid shown in Fig. 2.

For some applications, it may be desirable to estimate annual tropical storm and typhoon frequency over radii of still other measurements than those cited above. This analysis could be accomplished with the method illustrated in Fig. 4. Here, the 100-year frequencies at the six data points were estimated from the six charts given in appendix A-IV, pages A69, A70 and A71. Note that the relationship between storm frequency and scan distance (radii) is linear and can be described by an equation of the form, $y = c_1 + c_2x$, where y is number of storms and x is radii. The constants c_1 and c_2 can be determined by the usual least-squares methods (Mills, 1955). At other sites, the relationship between x and y may not be linear and fitting of the six data points to an exponential curve or power function may be required.

3.4 Additional Computational Procedures

3.4.1 Storm Frequency - The tabulation procedure described in item 3.2 (1) yields the number of tropical cyclones of a specific intensity and over a specific time period that passed through the circular area over the 37-year period 1946 - 1982. For user convenience and for comparability with similar data for other tropical cyclone basins, a 100-year storm frequency was estimated by multiplying the 37-year frequencies by the factor 100/37. The storm frequency data were also passed through a nine-point smoothing-desmoothing filter, which is discussed by Gerrity (1977) and Shuman (1957). Next, the grid was

scaled for plotting on a given Mercator map projection using Akima's (1973) bivariate interpolation scheme.

3.4.2 Vector Motions - Resultant storm direction and speeds were computed from items 3.2 (2) and 3.2 (3) whenever the raw storm count (before smoothing and expanding to the 100-year frequency) was at least 5 storms per 37 years. For the expanded 100-year period, this restriction is equivalent to about 14 storms.

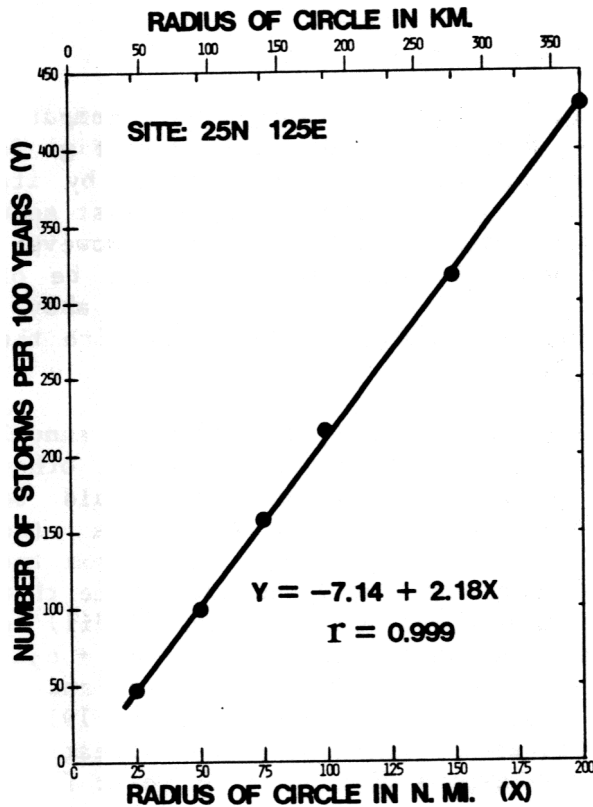


Fig.4. Relationship between circular scan distance (x) and number of storms per 100 years (y) at specified site.

4. CHARTS AND TABLES

Charts and tabular data depicting frequency and motion characteristics of various intensity Western North Pacific tropical cyclones are presented in appendix A for portions of the year as well as for the year as a whole. Chart Series A-I (pp. A4 through A38) is based on all tropical cyclone tracks or track segments having winds of at least tropical storm strength (footnote 2). Chart Series A-II (pp. A39 through A63) and A-III (pp. A65 through A67) are similar to Series A-I, except that they are based on track or track segments having winds of at least typhoon strength (footnote 3) or at least major typhoon strength (≥ 100 kt.), respectively.

Chart Series A-IV (pp. A68 through A71) gives the estimated 100-year frequency of tropical storms and typhoons that passed

within 25, 50, 75, 100, 150, and 200 n.mi. of any given point over the basin. Here, the chart for the 75 n.mi. radius is identical to that given earlier in Series A-I. Reinclusion here facilitates comparison with adjacent charts.

5. DISCUSSION

Data presented graphically and in tabular form in appendices A-I through A-IV have meteorological and engineering applications. Some of them are briefly discussed in this section.

5.1 Storm Tracks

An obvious meteorological application of the analyses is the determination of mean or "prevailing" storm tracks and the ways that they change during the January through December storm season. Knowledge of these patterns will often assist operational forecasters in assessing the climatological credibility of a forecast track.

In the broadest sense, Western North Pacific tropical cyclones, similar to those in other tropical cyclone basins, consist of two classes -- those that spend their entire existence embedded in the easterlies (nonrecurvers) and those that eventually recurve into the westerlies (recurvers). These classes of storms are clearly identifiable in the mean annual depiction shown on pages A36 and A37. Nonrecurving storms advance west-northwestward at lower latitudes in response to a synoptic-scale ridge to their north. The mean track extends across the Northern and Central Philippines into the South China Sea across the Island of Hainan. Recurving storms, on the other hand, although starting out in the easterlies, are subject to more northerly motion in response to an advancing trough in the westerlies and eventually take on an easterly component of motion. This recurving takes place before storms reach as far west as the Philippines; it covers a wide area, but is somewhat concentrated in a southwest-to-northeast "channel", southeast of Japan. Whether a storm will be a recurver or nonrecurver is a recurring forecast problem in most tropical cyclone basins.

Although the broad-scale annual track patterns described above exist in the mean annual sense, they are made up from many intraseasonal patterns that can only be distinguished or inferred through study of shorter period intraseasonal stratifications. For example, one can note the intrusion of accelerating storms into the Yellow Sea, principally 16 July - 15 August (pp. A18 and A19); the southeastern shift of recurving storms away from the Japanese Islands after 15 October (beginning on page A30); the peak storm activity during September over the South China Sea (pp. A24 and A25); the tendency for two recurving zones in November (pp. A32 and A33) as well as during certain other months, etc.

These, and numerous other identifiable intraseasonal patterns, are closely related to seasonal changes in general circulation patterns and associated synoptic-scale events which, if properly identified, can assist the operational forecaster in assessing storm

motion. Analog prediction models objectively identify these "families" of storm tracks. Proper structuring of analog prediction algorithms is facilitated by a knowledge of seasonal trends. Further discussion of analog models is beyond the scope of this study; the reader is referred to World Meteorological Organization, 1979, for additional information.

5.2 Variability of Tropical Cyclone Motion

It is known that tropical cyclone motion is much more persistent in some areas than in others. For example, visual inspection of storm tracks passing across the Central Philippines near 14N, 124E in July (page A17) shows these tracks to be moving toward the west-northwest. However, during this same period, storms in the area near 24N, 136E are seen to be moving from a variety of directions. An index of this "steadiness of motion" or "steadiness", as it is sometimes referred to, can be obtained by dividing mean resultant storm speed for a given site (column D) in the appendix tabular data (Chart 4) by the average (scalar) speed as given in column E. The scalar speeds are always greater or equal to the resultant vector speeds. When this ratio is high (approximately 0.90 or higher), the resultant direction given in column C can be relied upon to represent the most likely direction of motion for storms in that area. When this ratio is low (approximately 0.75 or less), the interpretation is that the resultant direction has been computed from storms that are moving in a variety of directions. Consequently, it is quite likely that a storm might move in a direction different from that of the resultant direction.

For example, consider the storms moving across the Central Philippines and those passing near 24N, 136E, referred to in the preceding paragraph. Fig. 9, on page A3, gives the index number for these locations as 88 and 197, respectively. For site 88, both the vector speed and the average storm translational speed (columns D and E, respectively, of tabular data, page A17) are given as 13 knots. The high value of the steadiness value ($13/13 = 1.0$) indicates that storms moving through this area are subject to only slight deviations from the vector direction of 295° given in column C of the tabular data.

For site 197, the resultant speed (column D) is given as 7 knots and mean speed (column E) is given as 12 knots. This low steadiness value ($7/12 = 0.58$) indicates that storms moving through this area can be expected to deviate considerably from the vector direction of 351° given under column C.

5.3 Storm Intensity

Not including the tropical depression stage, tropical cyclones over the Western North Pacific basin average about 5.6 days duration (Fig. 5) with occasional storms lasting up to 2, or even 3, weeks. During this period, storms go through periods of intensification, maturing and decay, with the duration of each stage and the maximum wind being a function of several of environmental and geographical

factors. There are certain portions of the tropical cyclone basin where storms tend to be more intense. These areas can be identified by an "intensity index", which is computed by dividing the frequency of typhoons for a given site (Chart Series A-II) by the frequency of typhoons and tropical storms combined (Chart Series A-I) for that site.

For example, the 100-year annual frequency of storms that had at least tropical storm strength and that passed within 75 n.mi. of Guam (13.5N, 144.6E) and Okinawa (26.2N, 127.7E) are 120 and 165, respectively. These data are visually interpolated from the isoline analysis given on page A36 of Chart Series A-I. For the same sites, the frequency of storms having at least typhoon strength is read as 55 and 110, respectively (Chart Series A-II, page A62). The intensity index at Guam computes to 0.46 and at Okinawa, 0.67. Thus, storms that affect Okinawa, since they are closer to maturity than those that affect Guam, are, on the average, more intense.

Further calculations similar to the above show that highest intensity indices (near 80%) occur near 24N, 129E where storm motion averages slightly west of due north at about 8 knots. Depending upon user requirements, other indices can be computed from data given in Chart Series A-III.

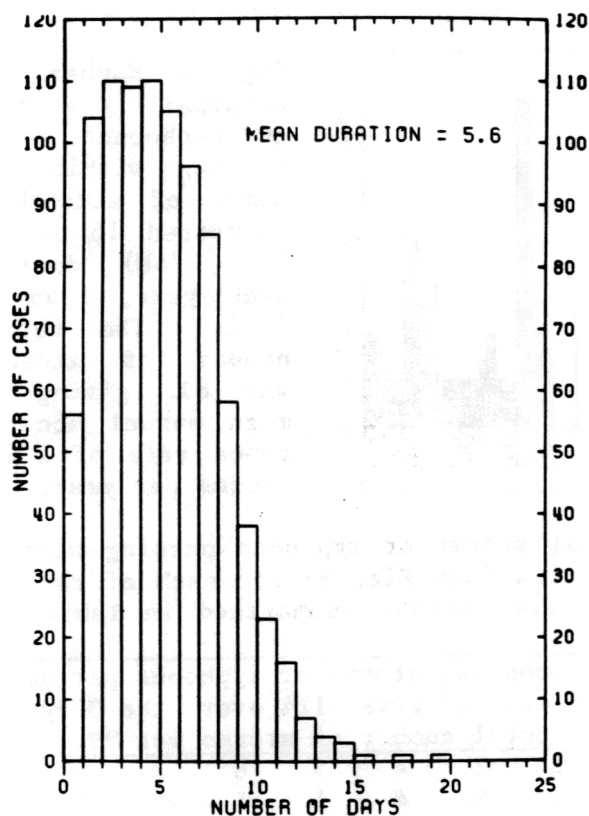


Fig. 5 Frequency distribution of tropical cyclone duration (excluding tropical depression stage). The mean duration is 5.6 days. Total number of storms is 927.

5.4 Poisson Probabilities of Storm Occurrence

One of the main uses of the data given in appendix A is in the determination of site-specific probabilities of storm occurrence. It has been shown for the Atlantic basin (Hope and Neumann, 1969) that the frequency of discrete numbers of storms passing through a given area over a given time interval is described by the Poisson distribution (Burlington and May, 1958)

$$P(x) = e^{-m} m^x / x!,$$

where $P(x)$ is the probability ($0 < P < 1$) of exactly x events over an interval, m is the mean of the event over the interval and e is the base of natural logarithms (2.71828+). For at least one occurrence of the event, it can be shown that (1a) becomes

$$P(x \geq 1) = 1.0 - e^{-m}$$

The Poisson distribution is particularly convenient to use, since the mean of an event⁴ is the only parameter needed to define the distribution.

To test the applicability of the Poisson distribution over the Western North Pacific tropical cyclone basin, consider Fig. 6, which

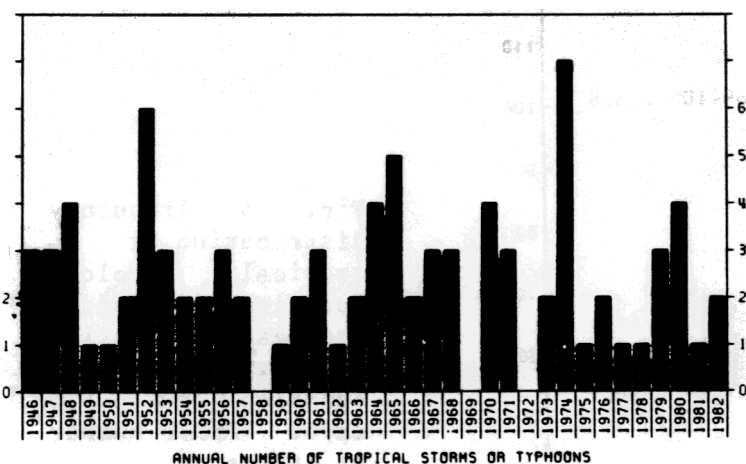


Fig. 6 Number of tropical storms and typhoons passing within 75 n.mi. of site 114 (centered 16 1/4N, 123 3/4E) during each year, 1946 - 1982. The total number of storms was 89, giving a mean annual occurrence rate of 2.41 storms per year.

gives the actual count of tropical storms or typhoons passing within 75 n.mi. of circular area number 114 (see Fig. 9) for each of the 37 years, 1946 - 1982. These data are further summarized in Table 2.

Table 2. Observed frequency of N tropical storms or typhoons per year that passed within 75 n.mi. of site 114 over the 37-year period 1946 - 1982. The total number of storms was 89.

NUMBER OF STORMS (N)	0	1	2	3	4	5	6	7	8	9
NUMBER OF OCCURRENCES	3	8	10	9	4	1	1	1	0	0
FREQUENCY ($0 < F < 1$)	.081	.216	.271	.243	.108	.027	.027	.027	.000	.000

⁴In the Poisson distribution, the mean and variance are equal.

Note that the number of storms that occur in any given year ranges from zero (1958, 1969, and 1972) to seven (1974). The Poisson probabilities of these events from (1a) are given in Table 3 with the mean of the event being taken as $89/37 = 2.41$ storms per year. The observed frequencies given in Table 2 are in close agreement with the computed probabilities given in Table 3. The usual chi-square test (Burlington and May, 1958) indicates a very high degree of certainty that Table 2 data are distributed according to Poisson expectations (null hypothesis not rejected).

Table 3. Computed Poisson probabilities of N tropical storms and typhoons passing within 75 n.mi. of site 114 in any given year.

NUMBER OF STORMS (N)	0	1	2	3	4	5	6	7	8	9
PROBABILITY ($0 < P < 1$)	.090	.217	.261	.209	.126	.061	.024	.008	.003	.001

The following examples illustrate additional uses of the Poisson distribution:

- 1) What is the probability of no typhoons or tropical storms passing within 75 n.mi. of Guam in September?
Solution - From appendix A-I, page A24, the observed frequency of the event as estimated from the isoline analysis is 17 storms per 100 years or 0.17 storms per year. According to (1a) and since $0! = 1.0$, there is a probability of 0.84 or 84 out of 100 years.
- 2) What is the probability of the same site observing no storms passing within 75 n.mi. over two consecutive Septembers?
Solution - The 2-year mean, estimated to be twice the 1-year mean, is given by $2 \times 0.17 = 0.34$. Substituting $m = 0.34$ into (1a) gives a probability of 0.71.
- 3) What is the probability of at least 1 tropical storm or typhoon passing within 75 n.mi. of Shanghai (31.2N, 121.4E) in any given year?
Solution - From appendix A-I, page A36, the 100-year frequency of the event is read as about 35 storms, giving an annual mean of 0.35 storms. From (1b), the probability of at least one storm in any given year is $1.0 - 0.70$ or 0.30.
- 4) What is the probability of ≥ 5 tropical storms or typhoons passing within 200 n.mi. of 15N, 125E in any given year?
Solution - From appendix A-IV, page A71 (bottom of page), the estimated mean number of storms per year is read as 5.6 (560 per 100 years). The desired probability can be obtained from

$$\begin{aligned}
 P(\geq 5) &= 1.0 - P(0) - P(1) - P(2) - P(3) - P(4) \\
 &= 1.0 - .004 - .021 - .058 - .108 - .152 = 0.657
 \end{aligned}$$

- 5) What is the probability of no tropical storms or typhoons being in existence over the Western North Pacific basin on September 15?

Solution - From Fig. 1b, the 100-year frequency of storms is read as 103. This is equivalent to a mean of 1.03 storms per year for that date. From (1a), the probability of no storms in existence on 15 September computes to 0.36 or 36 out of 100 years.

5.5 Storm Translational Speeds

For certain applications, (i.e., determination of storm surge probabilities), distributions of storm translational (forward) speeds are helpful. Storm translational speeds, being bounded at the lower end by zero and, theoretically, unbounded at the upper end, can be described by the gamma distribution (Burington and May, 1958)

$$P(v) = [b^{a+1}\Gamma(a+1)]^{-1}v^a e^{-v/b} \quad b > 0, a > -1, v \geq 0,$$

where a and b (referred to as shape and scale parameters, respectively) are constants, Γ is the gamma function, v is storm speed and $p(v)$ is in units of probability ($0 \leq p \leq 1$). The constants a and b are estimated from the mean (m) and standard deviation (s) of a sample of storms:

$$a = (m^2/s^2) - 1$$

and

$$b = s^2/m.$$

The mode of the distribution (value of v at maximum $P(v)$) is given by the product ab ,

$$\text{mode} = ab = m - s^2/m.$$

Values of m and s , for samples of storms, are given by columns E and F, respectively, of the tabular data included in appendices A-I, A-II, and A-III.

As an example of the use of the gamma distribution, determine the probability of typhoons advancing on Southern Japan (near site 273 - see Fig. 9) during September with forward speeds > 30 knots. On page A53 (appendix A-II), note that the mean and standard deviation of the forward speed of the 13 storms that passed within 75 n.mi. of the site over the 37-year period (36 typhoons over a 100-year period) was 20 and 9.84, respectively. From (3) and (4), the parameters a and b are estimated from the data to be $a = 3.13$ and $b = 4.84$. From statistical tables (Burington and May, 1958), the value of $\Gamma(a+1) = \Gamma(4.131) = 7.090$. Eq. (2) becomes

$$p(v) = 0.000209v^{3.13}e^{-v/4.84}$$

The probability of $v > 30$ is given by

$$P(v > 30) = 1.0 - \int_0^{30} p(v) dv.$$

Eq. 7 can be evaluated by solving for centered speed-class-intervals of 1 knot according to

$$p(v > 30) = 1.0 - \sum_{v=0.5}^{29.5} p(v) = 0.148.$$

The procedure is graphically illustrated in Fig. 7.

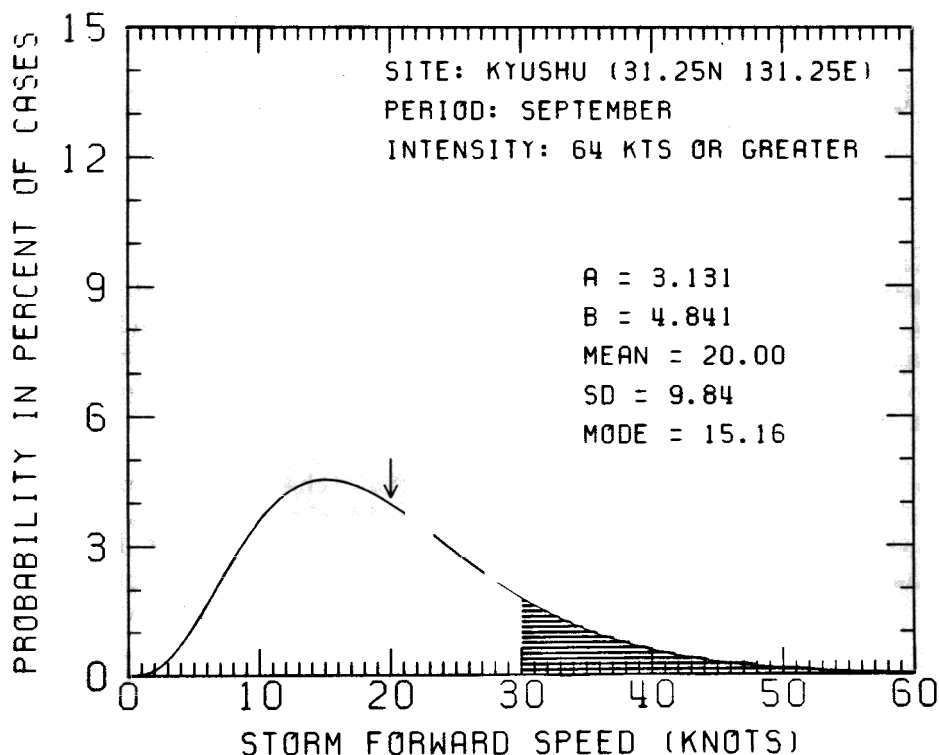
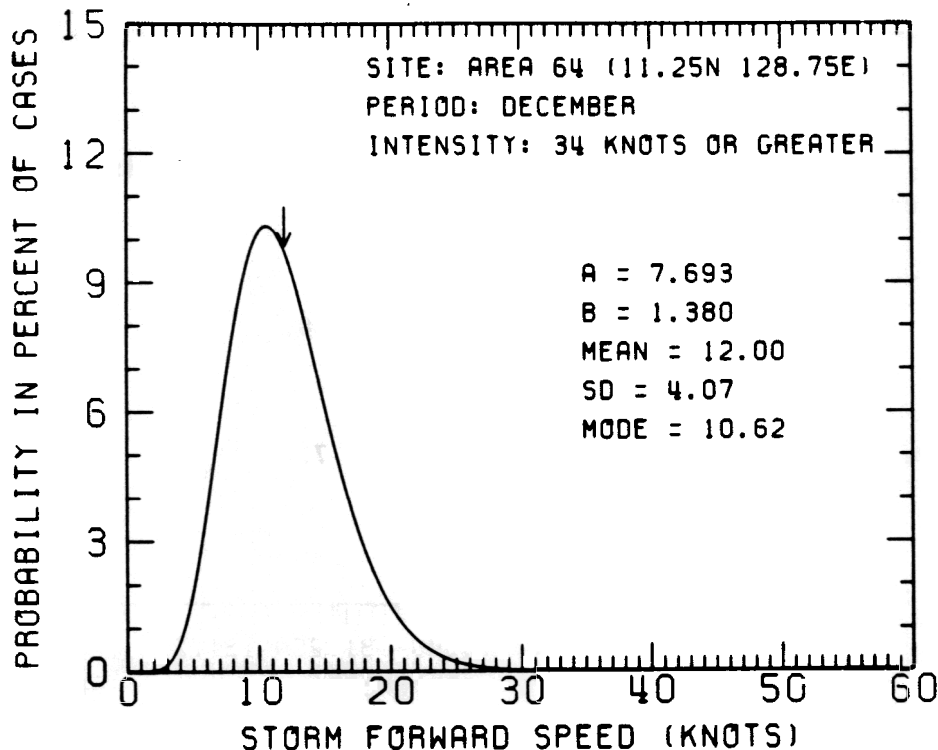


Fig. 7. Gamma distribution of the translational (forward) speeds of September typhoons that moved through site 273 (near Southern Japan). Constants a and b of the gamma distribution were estimated from the 13 September typhoons that moved through the area, 1946 - 1982. Shading, which depicts storm speeds exceeding 30 knots, represents 14.8% of the area under the curve. Arrow shows location of mean speed.



8. Gamma distribution of the translational (forward) speeds of December tropical storms and typhoons that moved through site 64 (east of Central Philippines). Constants a and b of the gamma distribution were estimated from the 13 storms that moved through the area, 1946 - 1982. Arrow shows location of mean speed.

Another example of a gamma distribution that represents a different regime of storm translational speeds is shown in Fig. 8. Here, off the Central Philippines, both the average storm speed (12 knots) and the standard deviation of the speeds (4.07 knots) are considerably less than those used to generate the gamma distribution shown in Fig. 7.

As in other distributions, the use of the gamma distribution requires that certain conditions be met. One of these conditions is that the data fitted to the distribution be homogeneous (i.e., not be a mixture of two or more distributions (Crutcher et al., 1982)). It is likely that annual data, as given on pages A36, A37, A38, A62, A63, A66, and A67 are, indeed, made up of mixtures of two or more speed distributions. This could occur, for example, where storms are under the control of different synoptic regimes. Thus, the use of annual data in determining parameters a and b is questionable over some portions of the basin.

Another consideration in using the gamma distribution relates to in the shape parameter a . The method of estimating the shape

parameter as given by (3) is referred to as the "moment estimator" method. There are somewhat better "maximum likelihood estimators" of the shape parameter that can be used. However, both estimators are subject to bias for small sample sizes ($n < 30$) in that the shape parameter is apt to be too large. A discussion of the problem and tables of corrections for both the moment estimator method and the maximum likelihood estimator method are given by Crutcher and Joiner, 1978, and Crutcher and Joiner, 1980.

6. ACKNOWLEDGMENTS

Microfilmed computer output from the NOAA FR-80 computer graphics system was accomplished by Thomas Tatnall of the Hurricane Research Division of AOML/NOAA. Also, Constance Arnholds of that organization provided an editorial review of the original manuscript. The lead author acknowledges considerable computer assistance from staff members of the National Hurricane Center.

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APPENDIX A -- CHARTS AND TABLES

A.1 Introduction

Charts and tabular data that depict frequency and motion characteristics are presented for various portions of the typhoon season and for three wind speed criteria. Chart Series A-I (pp. A4 through A38) is based on all tropical cyclone tracks or track segments having winds of at least tropical storm strength (1-minute sustained winds of at least 34 knots). Chart Series A-II (pp. A39 through A63) and A-III (pp. A65 through A67) are similar to Series A-I, except that they are based on tracks or track segments that have at least 64 knots (typhoon strength) and 100 knots, respectively. Because sample sizes decrease with increasing wind speed limits, the number of stratifications in each series is greater in the case of the smaller wind speed limits (18 stratifications are given for Chart Series A-I, 12 for Chart Series A-II and 1 for Chart Series A-III). The final Chart Series A-IV (pp. A68 through A71) gives, for the entire year, the number of tropical storms and typhoons that passed within 25, 50, 75, 100, 150, and 200 n.mi. from any given point.

A.2 Chart Descriptions

The basic data set for each temporal stratification consists of four chart types, Chart 1, Chart 2, Chart 3, and Chart 4.

Chart 1 - Contours, at appropriately spaced intervals, depict the number of storms per 100 years that passed within various distances of any point in the basin. For Chart A-I, A-II, and A-III, this distance is 75 n.mi. For Chart Series A-IV, the distances are 25, 50, 75, 100, 150, and 200 n.mi. These distances, respectively, are equivalent to 46, 93, 139, 185, 278, and 371 km.

Chart 2 - Entries give resultant speed (knots) and direction (degrees) toward which storm is moving. Entries have been omitted when the storm frequency was < 5 over the 37-year period of record (approximately 14 storms per 100 years).

Chart 3 - This chart gives specific storm tracks used in the computation of Charts 1 and 2. The entire storm track is shown, even though some portions may not have met the stratification criteria (time of year or intensity) and were not included in the computations.

Chart 4 - This panel gives miscellaneous tabular data A through F as follows:

Column A - The index number of circular area as defined in Fig. 9, page A3.

- Column B - Expected number of tropical cyclones passing within 75 n.mi. of any grid point per 100 years. This is an unsmoothed value (see section 3.4.1) and may differ slightly from the smoothed analysis given in Chart 1.
- Column C - Resultant (vector) direction in degrees towards which storm moved over the period of record. This is identical to the direction implied by the plotted arrow in Chart 2.
- Column D - Resultant (vector) storm translational speed in knots. * This is identical to the speed given in Chart 2.
- Column E - Average translational speed of storms without regard to direction (scalar speed).
- Column F - The standard deviation (knots) of Column E data.

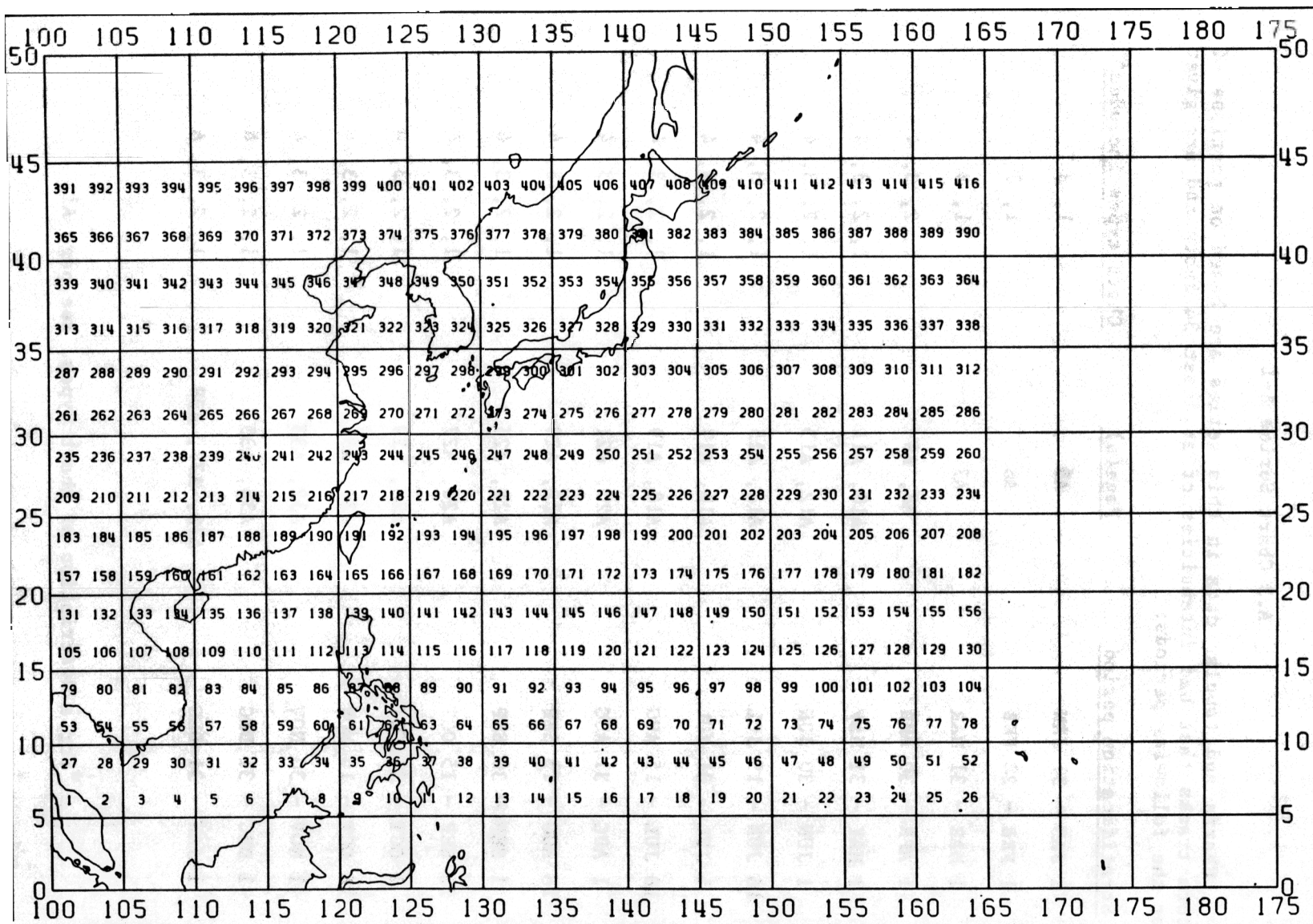


Fig. 9 Index numbers of circular scan areas

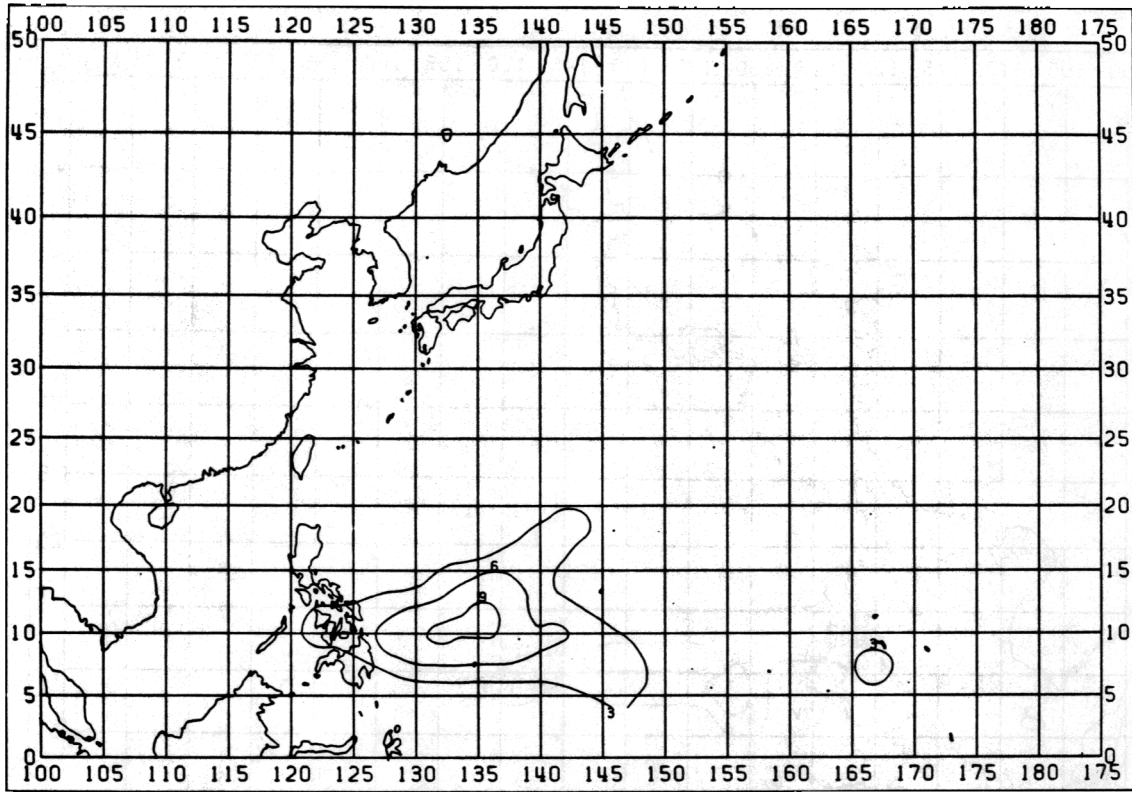
A.3 Chart Series A-I

Charts and tabular data in this series are based on portions of storm tracks that had intensities of at least 34 knots and are given for the following periods:

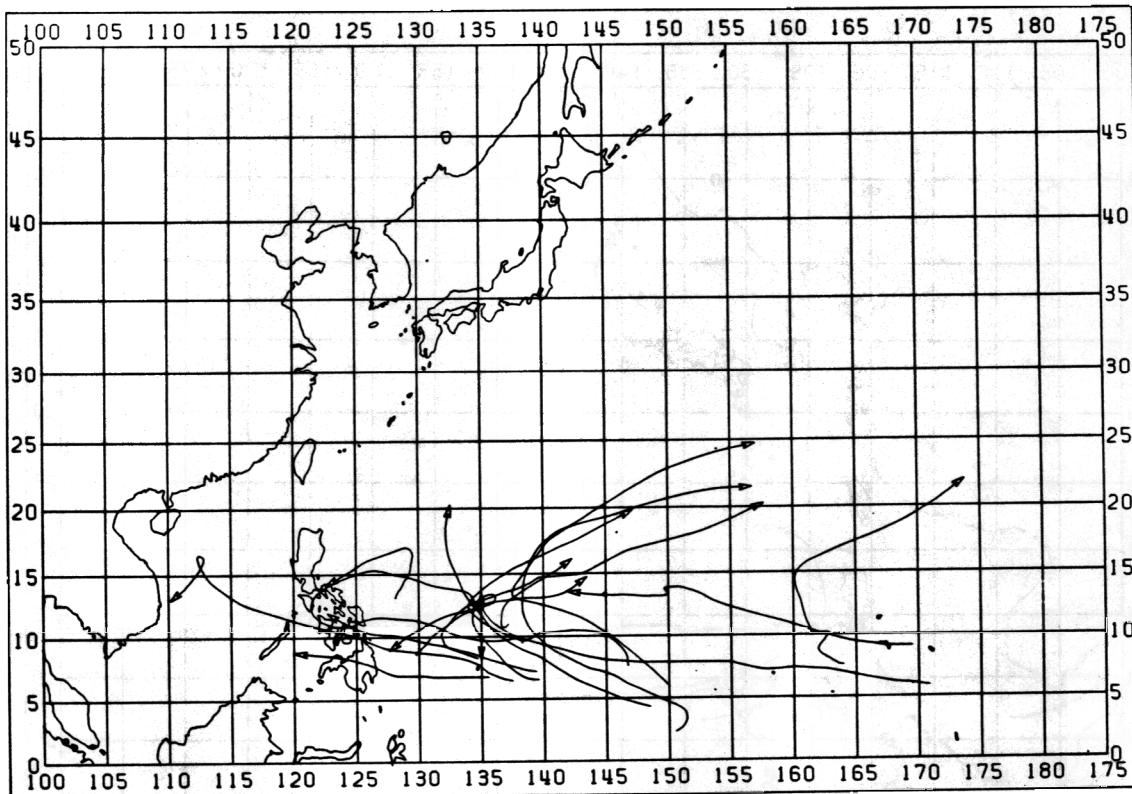
<u>Stratification period</u>	<u>Page(s)</u>	<u>Chart types included*</u>
1 JAN - 31 JAN	A5	
1 FEB - 28 FEB	A6	
1 MAR - 31 MAR	A7	1, 3
1 APR - 30 APR	A8, A9	1, 2, 3, 4
1 MAY - 31 May	A10, A11	1, 2, 3, 4
1 JUN - 30 JUN	A12, A13	1, 2, 3, 4
16 JUN - 15 JUL	A14, A15	1, 2, 3, 4
1 JUL - 31 JUL	A16, A17	1, 2, 3, 4
16 JUL - 15 AUG	A18, A19	1, 2, 3, 4
1 AUG - 31 AUG	A20, A21	1, 2, 3, 4
16 AUG - 15 SEP	A22, A23	1, 2, 3, 4
1 SEP - 30 SEP	A24, A25	1, 2, 3, 4
16 SEP - 15 OCT	A26, A27	1, 2, 3, 4
1 OCT - 31 OCT	A28, A29	1, 2, 3, 4
16 OCT - 15 NOV	A30, A31	1, 2, 3, 4
1 NOV - 30 NOV	A32, A33	1, 2, 3, 4
1 DEC - 31 DEC	A34, A35	1, 2, 3, 4
1 JAN - 31 DEC	A36, A37, A38	1, 2, 3 4

*For a description of chart types, see page A1.

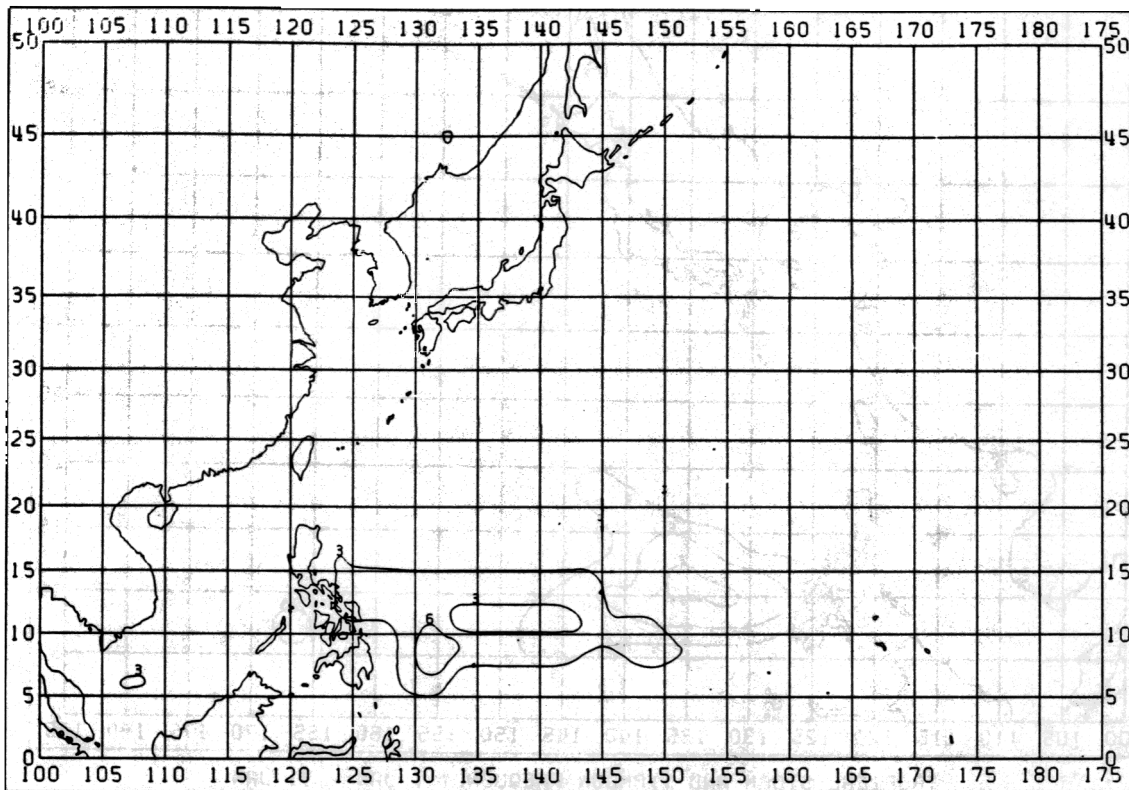
Note: All charts in this series are based on a scan-distance of 75 n.mi. (139.5 km)



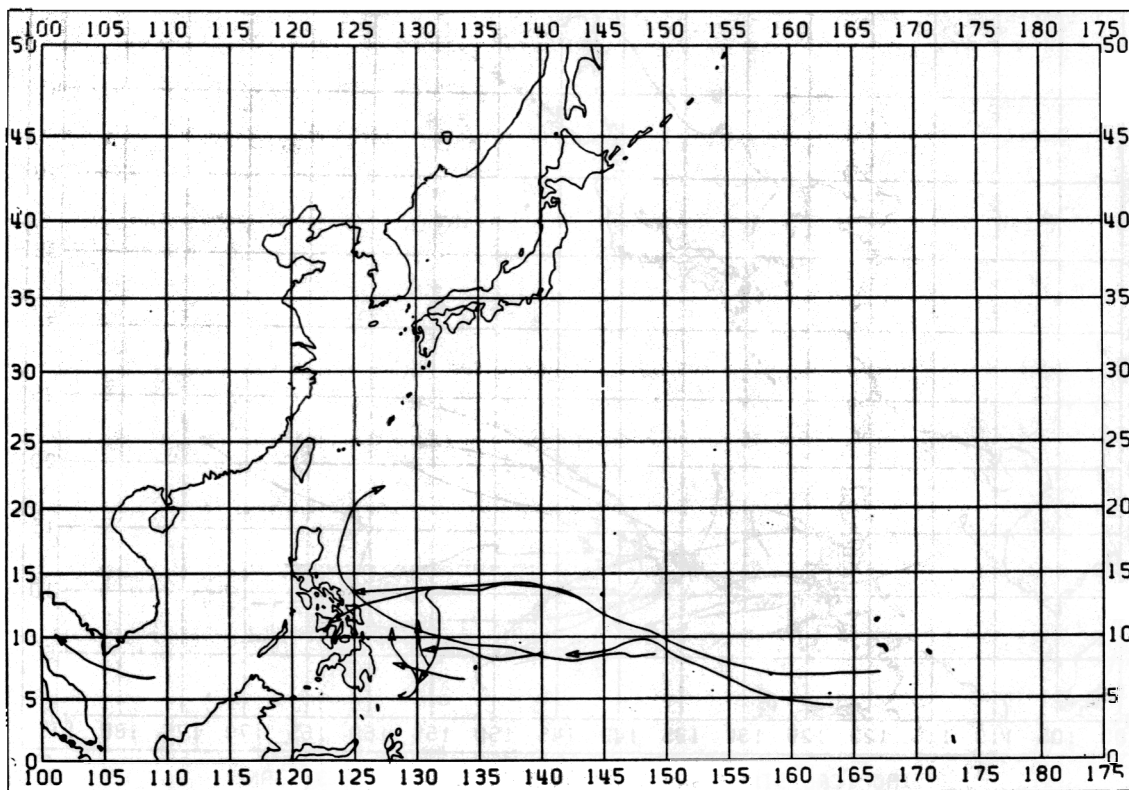
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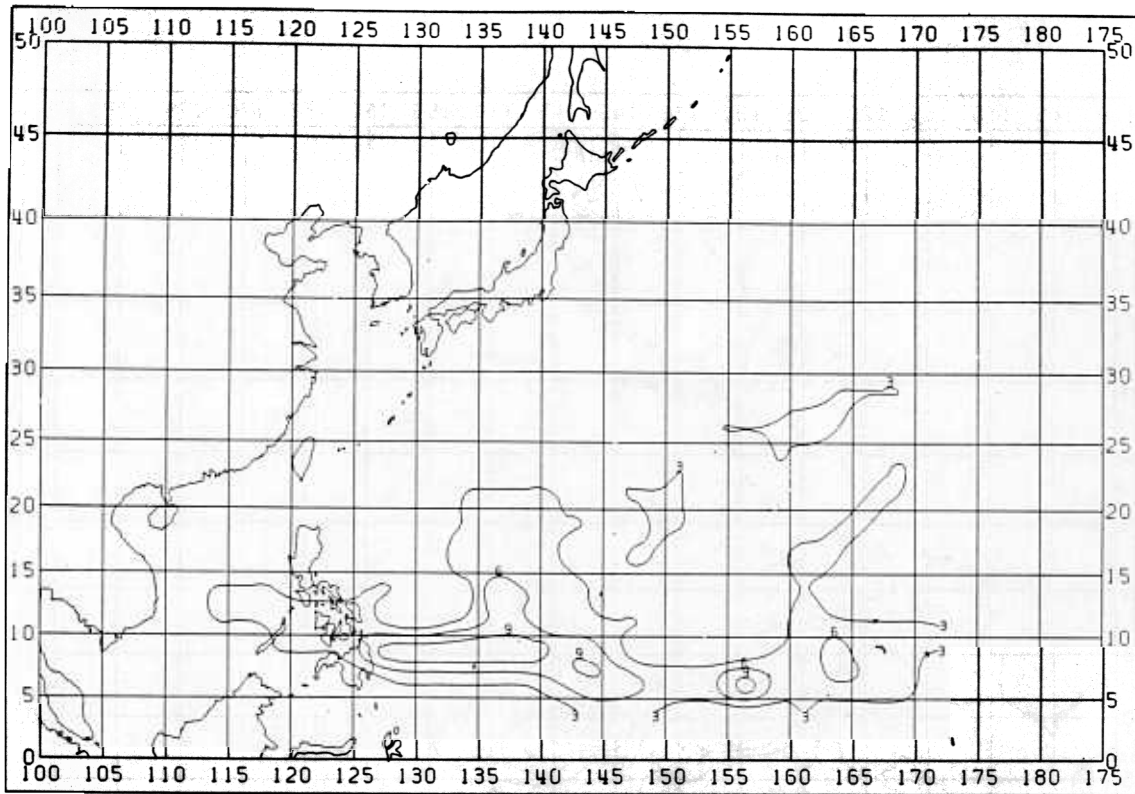
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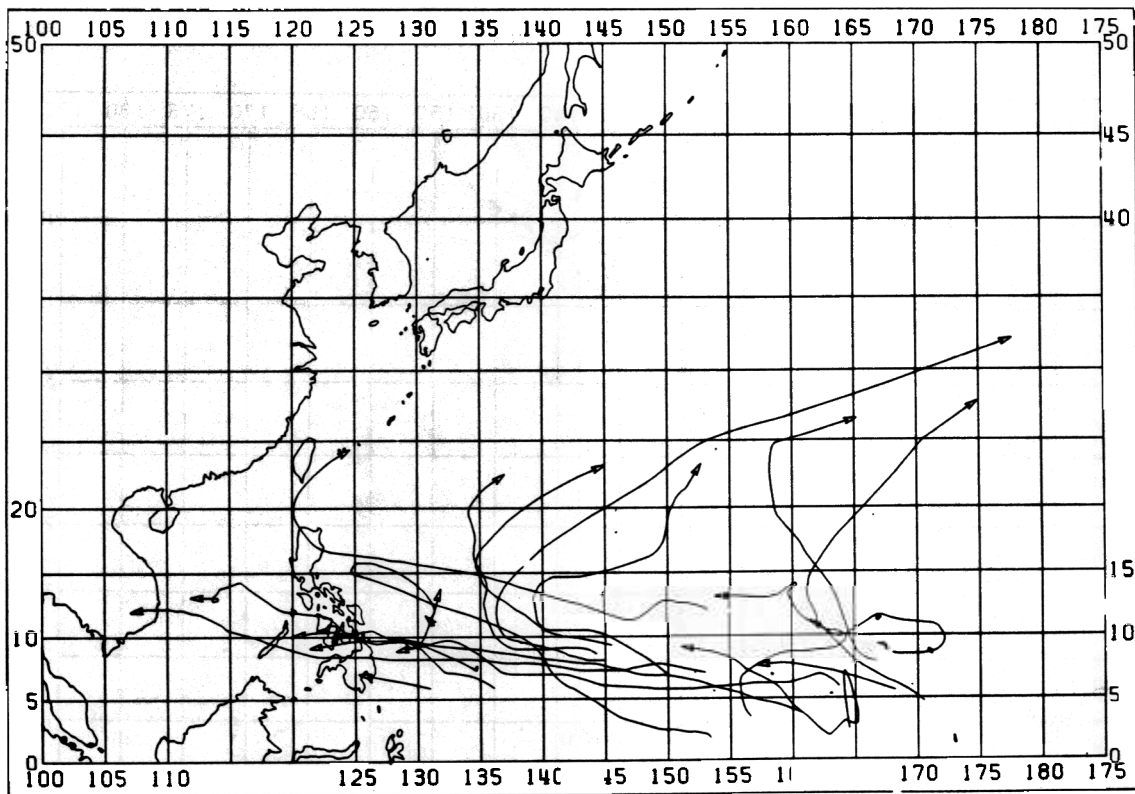
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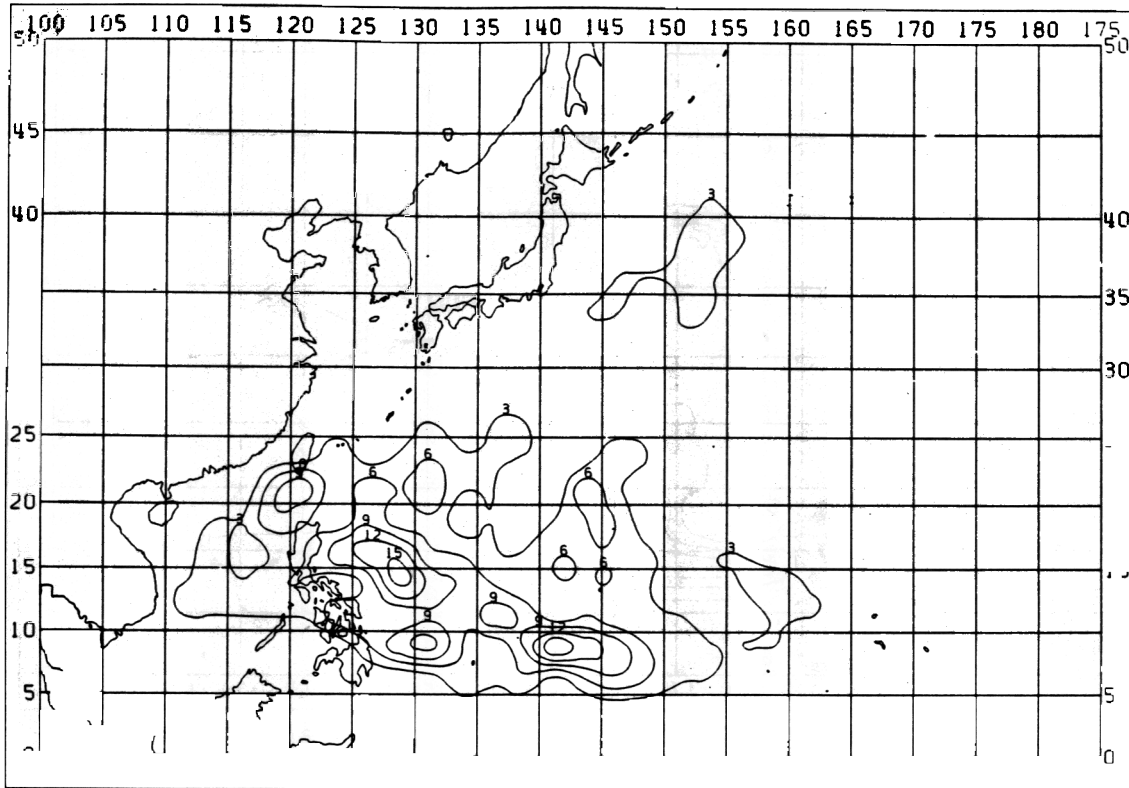
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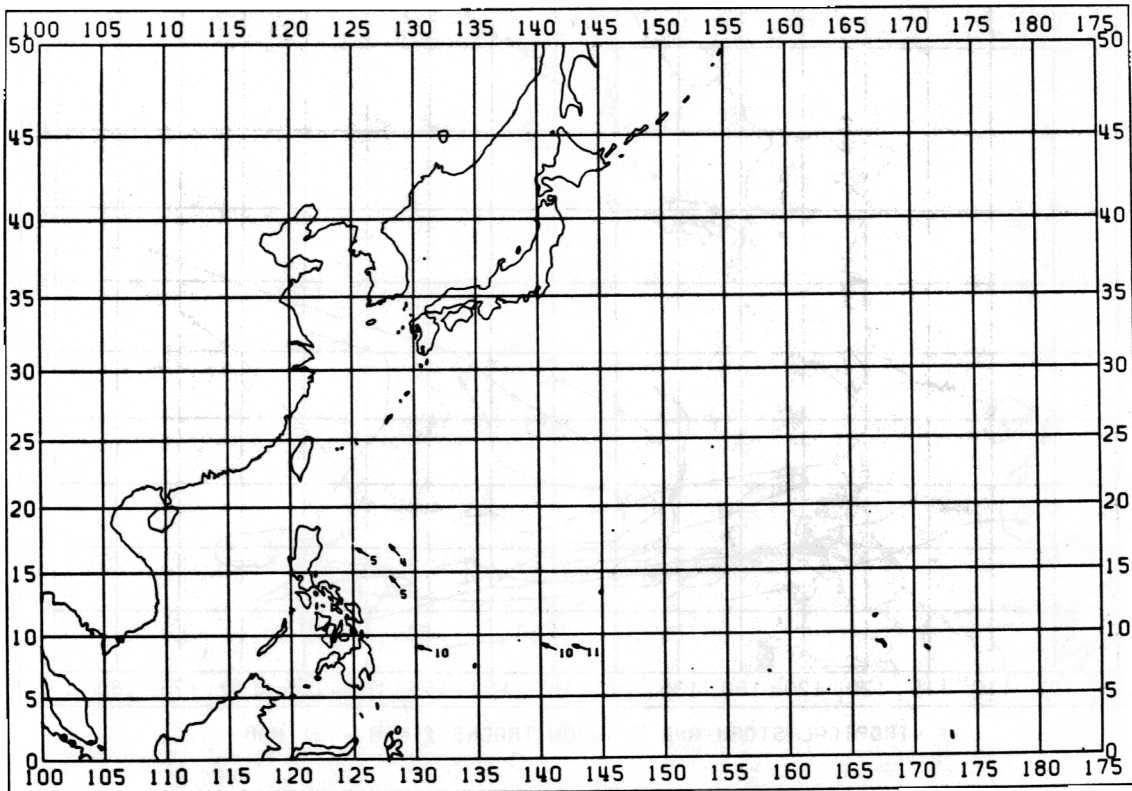
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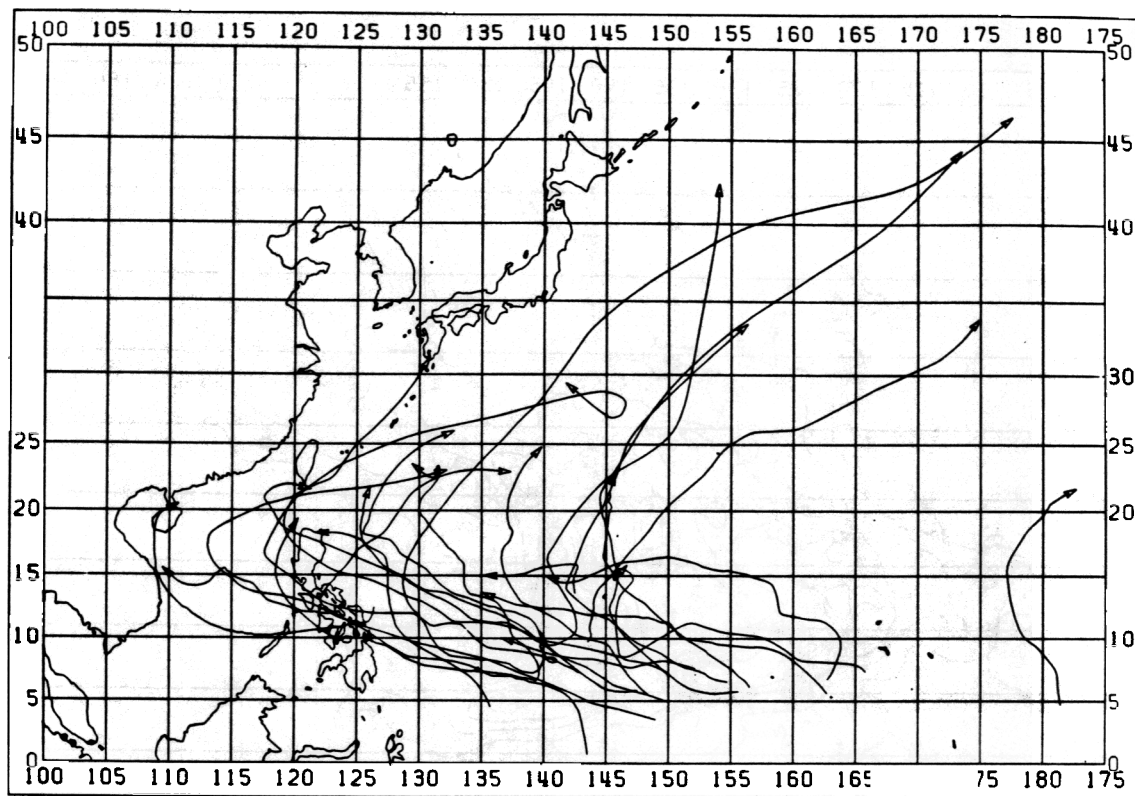
TROPICAL STORM AND TYPHOON TRACKS MAR - 31 MAR



TROPICAL STORM AND TYPHOON FREQUENCY APR - 30 APR

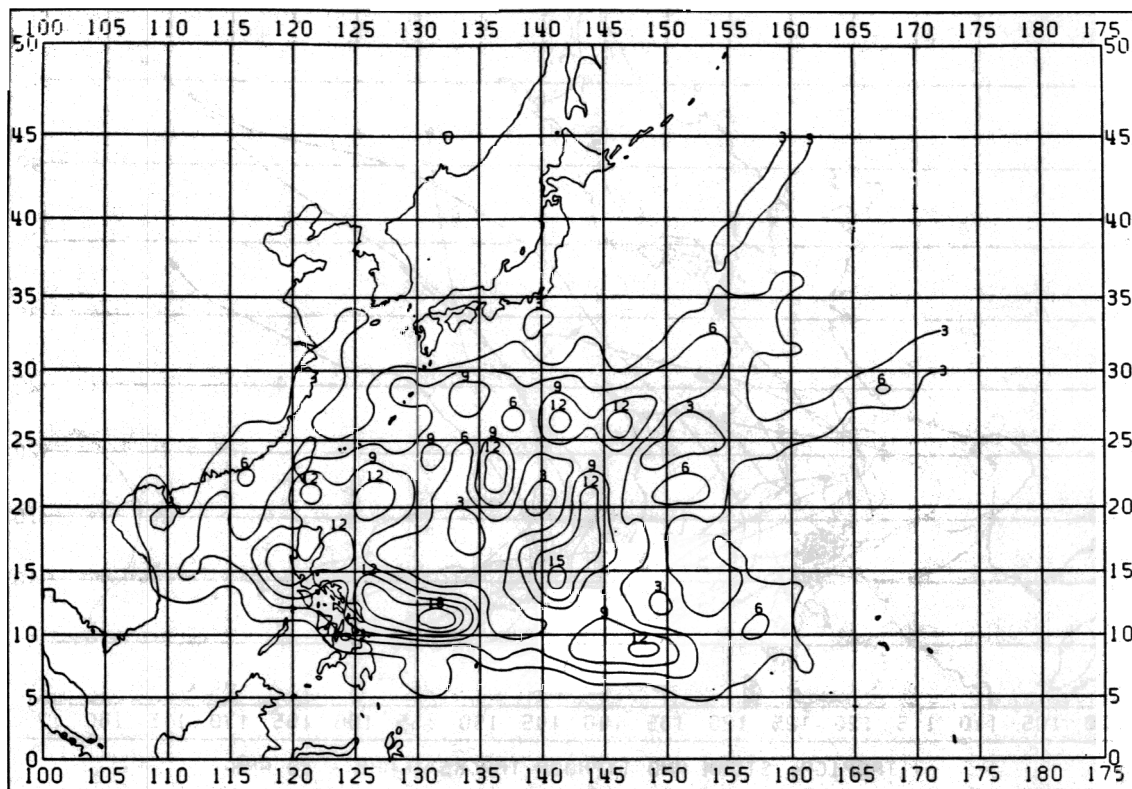


TROPICAL STORM AND TYPHOON MOTION 1 APR - 30 APR

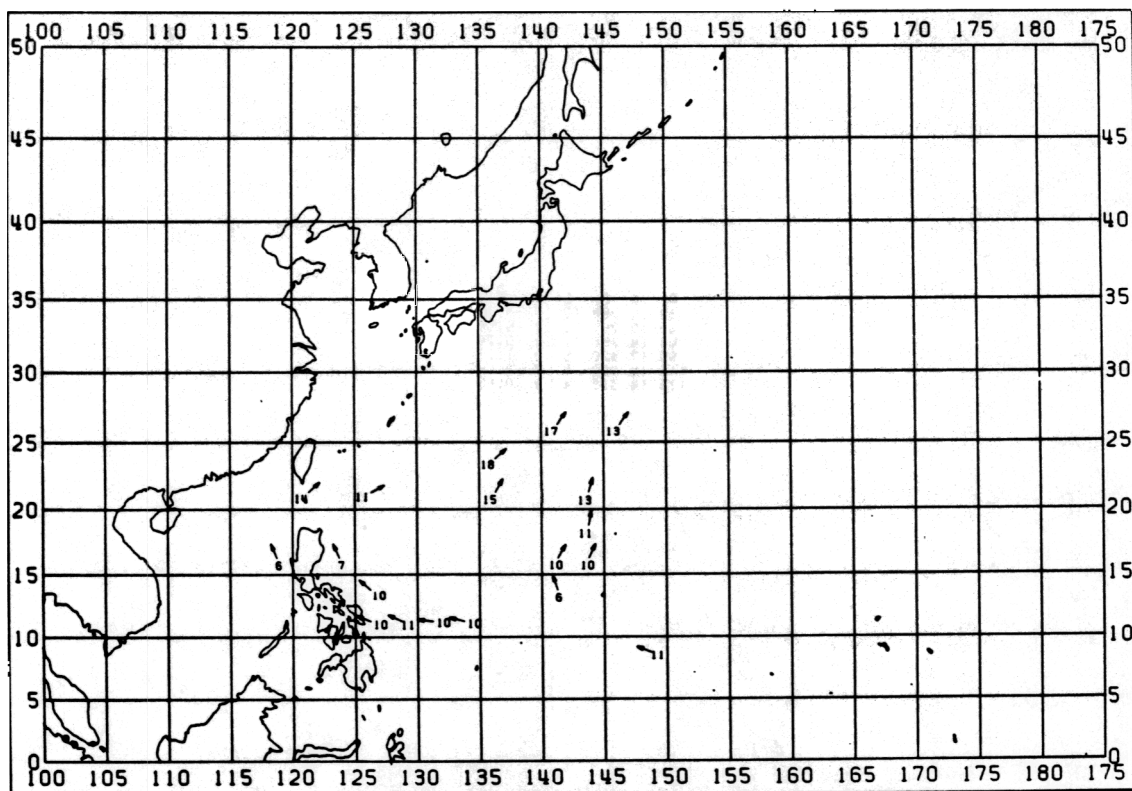


TROPICAL STORM AND TYPHOON TRACKS 1 APR - 30 APR

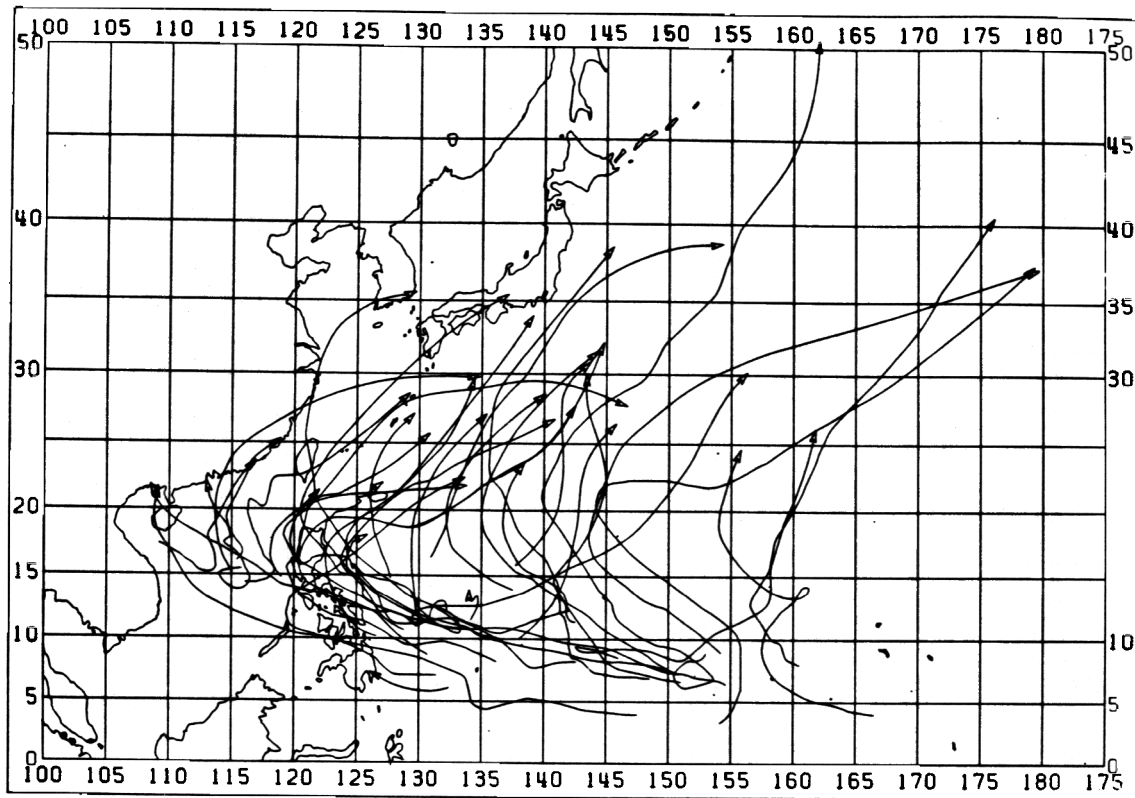
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43	19	295	10	12	5.58
44	14	288	11	12	6.26
90	17	320	5	8	1.23
115	14	302	5	7	2.64
116	14	318	4	9	0.89



TROPICAL STORM AND TYPHOON FREQUENCY MAY - 31 MAY

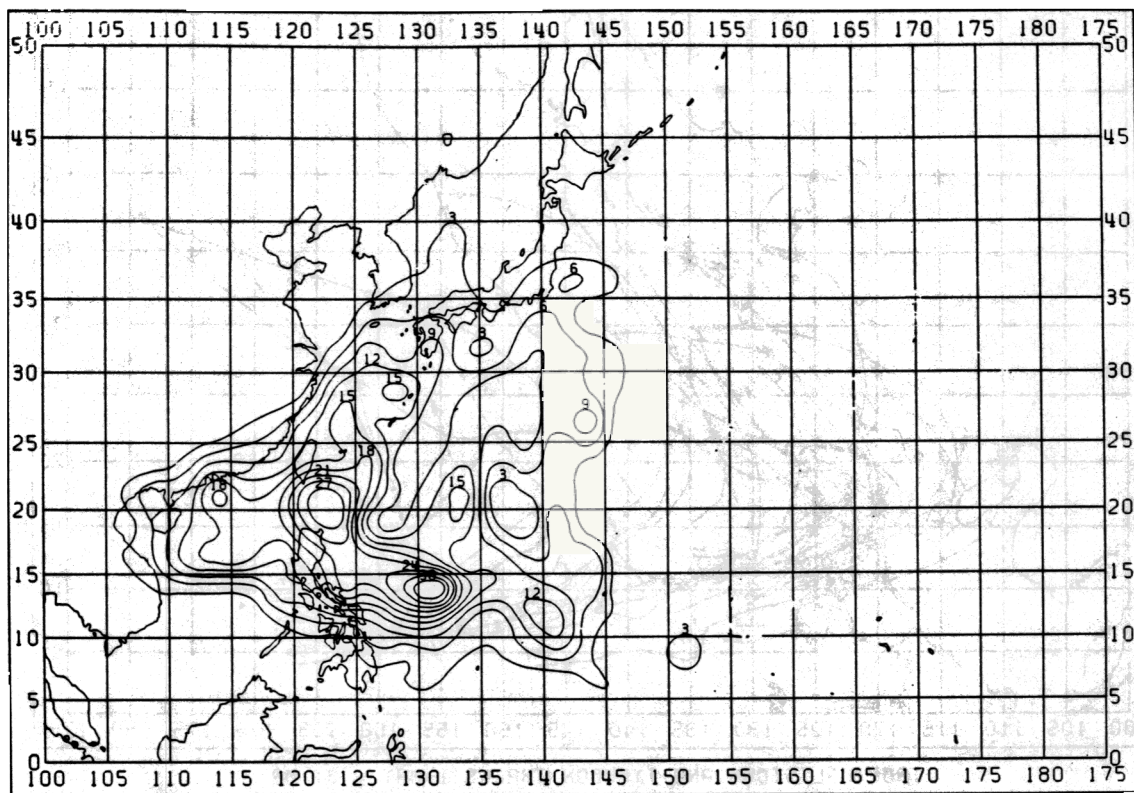


TROPICAL STORM AND TYPHOON MOTION 1 MAY - 31 MAY

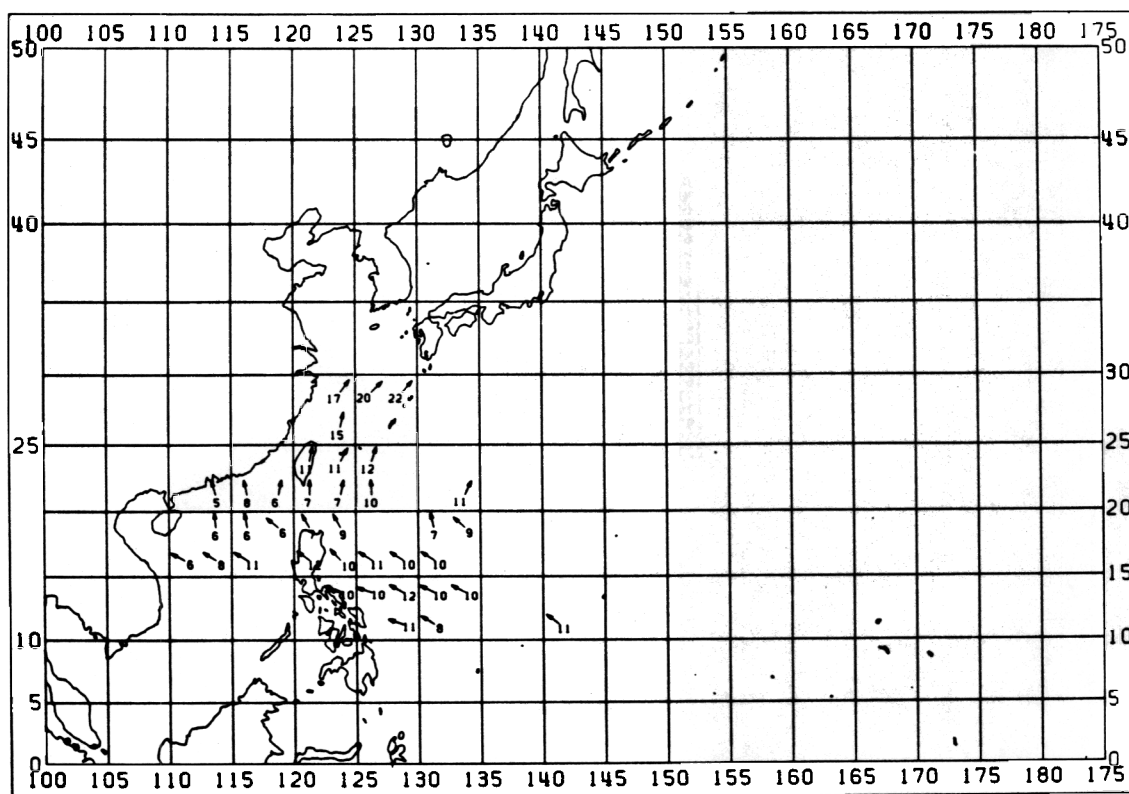


TROPICAL STORM AND TYPHOON TRACKS 1 MAY - 31 MAY

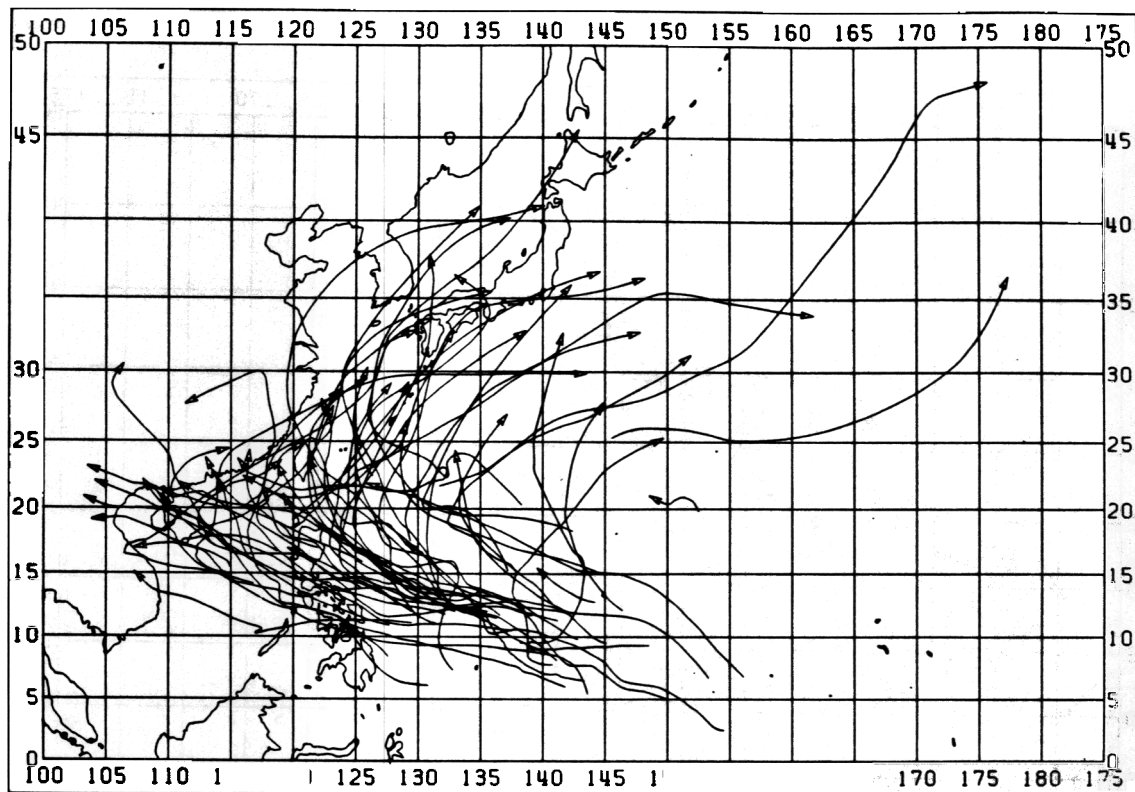
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63	14	292	10	10	1.93
64	17	295	11	12	2.67
65	22	278	10	11	3.92
66	17	285	10	11	4.74
89	17	311	10	10	3.50
95	17	341	6	7	2.90
112	14	337	6	7	3.01
114	17	335	7	8	3.34
121	14	031	10	11	4.52
122	14	025	10	12	5.23
148	14	011	11	12	3.96
165	14	046	14	15	5.13
167	14	061	11	13	5.85
171	14	029	15	18	3.83
174	14	016	13	13	6.04
197	14	047	18	20	3.26
225	14	035	17	19	6.36
227	14	036	13	16	5.46



TROPICAL STORM AND TYPHOON FREQUENCY 1 JUN - 30 JUN

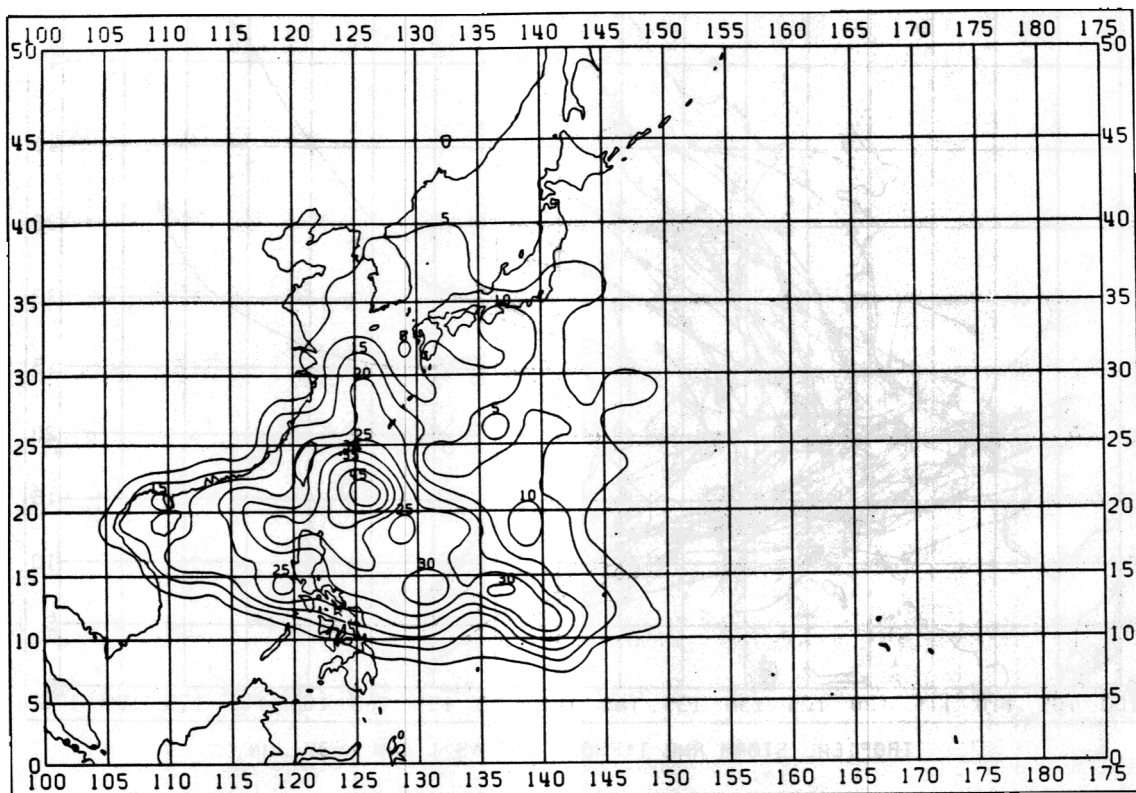


TROPICAL STORM AND TYPHOON MOTION 1 JUN - 30 JUN

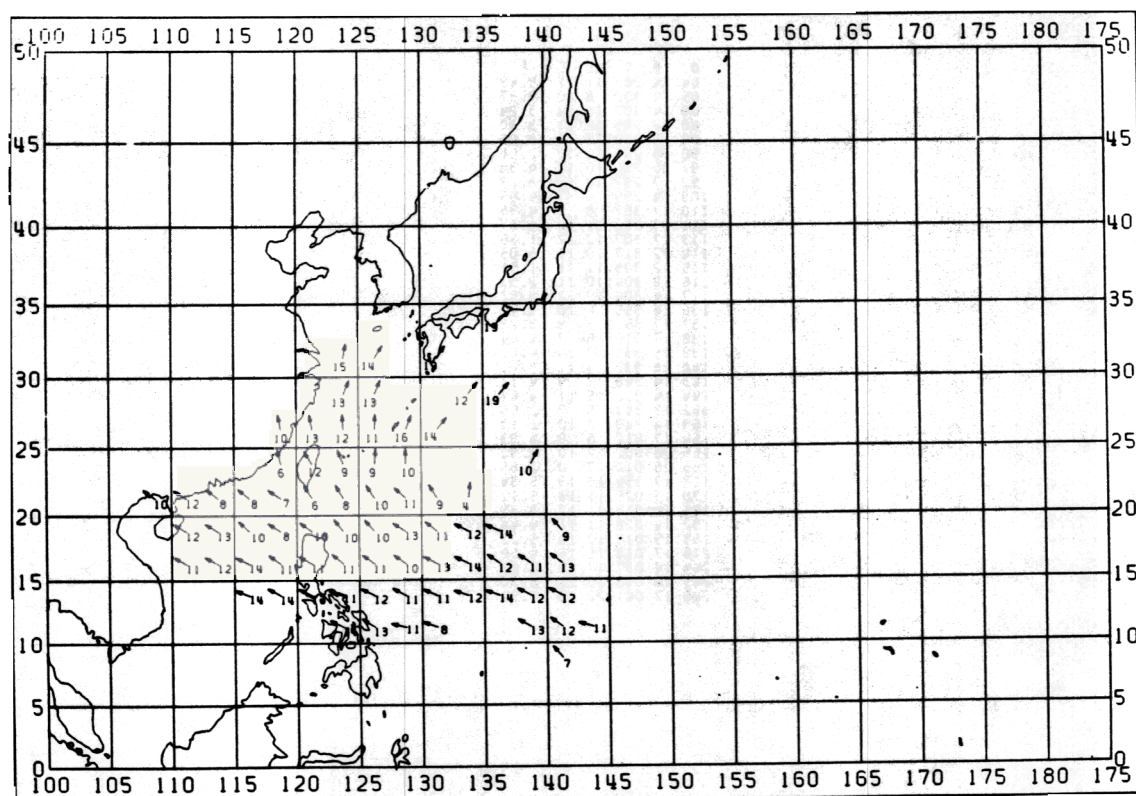


TROPICAL STORM AND TYPHOON TRACKS 1 JUN - 30 JUN

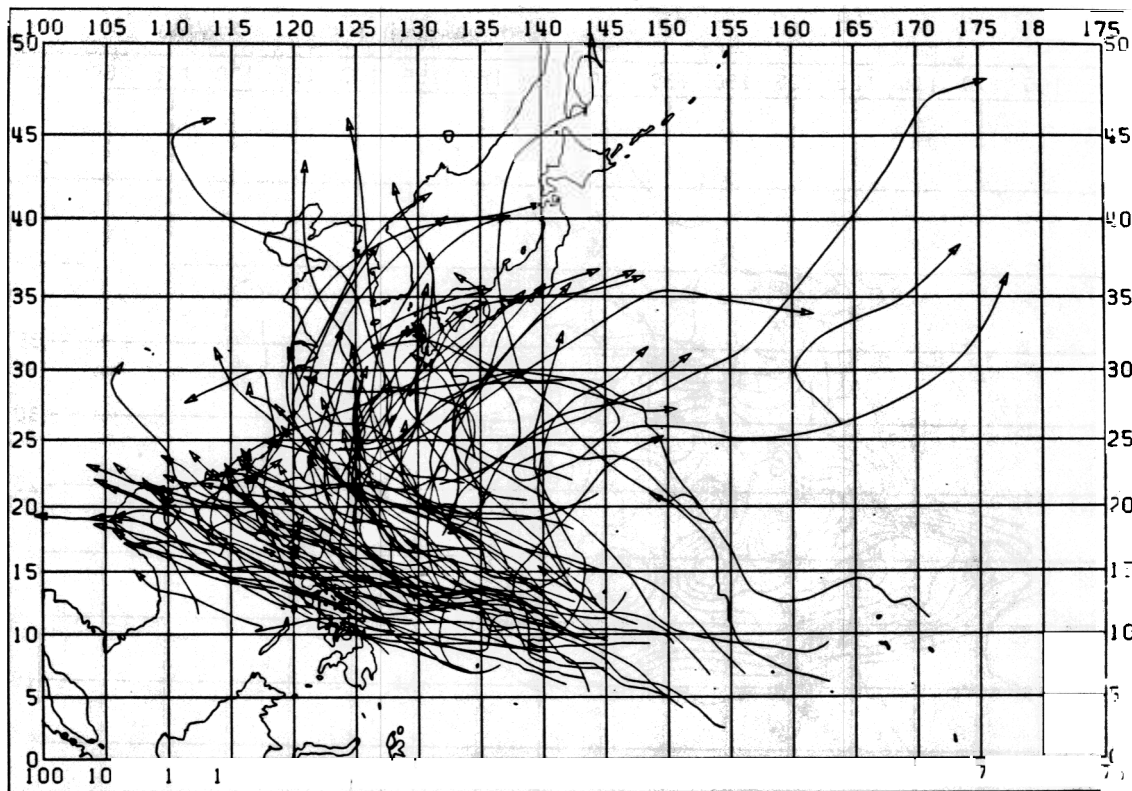
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65	14	302	8	10	3.37
69	14	307	11	14	3.24
88	22	288	10	11	3.30
89	19	288	10	11	2.60
90	28	299	12	12	2.68
91	36	296	10	11	4.38
92	17	297	10	13	5.23
109	14	299	6	7	4.09
110	17	303	8	9	4.38
111	17	302	11	12	4.87
113	17	307	12	12	1.96
114	22	317	10	11	3.05
115	22	303	11	11	1.96
116	19	304	10	11	2.53
117	14	304	10	12	3.52
136	14	355	6	10	3.43
137	17	351	6	9	3.23
138	17	310	6	7	4.64
139	25	331	7	10	4.61
140	28	332	9	11	3.02
143	14	348	7	9	4.13
144	14	312	9	11	4.44
162	19	343	5	7	2.55
163	14	349	8	10	2.13
164	17	012	6	9	4.33
165	28	002	7	10	3.32
166	28	012	7	10	2.85
167	17	358	10	13	5.34
170	17	025	11	13	5.12
191	14	013	11	12	3.35
192	14	028	11	11	4.44
193	19	019	12	14	5.22
218	17	013	15	16	4.60
244	14	037	17	19	6.41
245	14	046	20	21	8.30
246	17	041	22	23	5.94



TROPICAL STORM AND TYPHOON FREQUENCY 16 JUN - 15 JUL

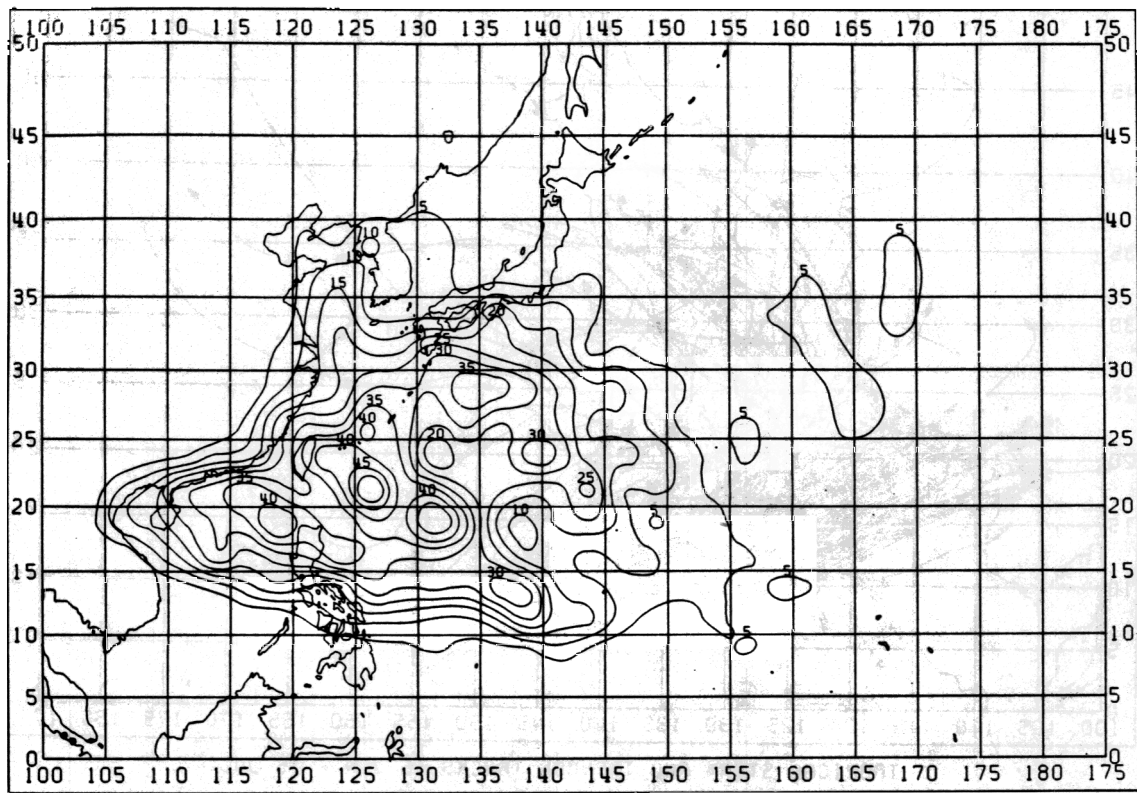


TROPICAL STORM AND TYPHOON MOTION 16 JUN - 15 JUL

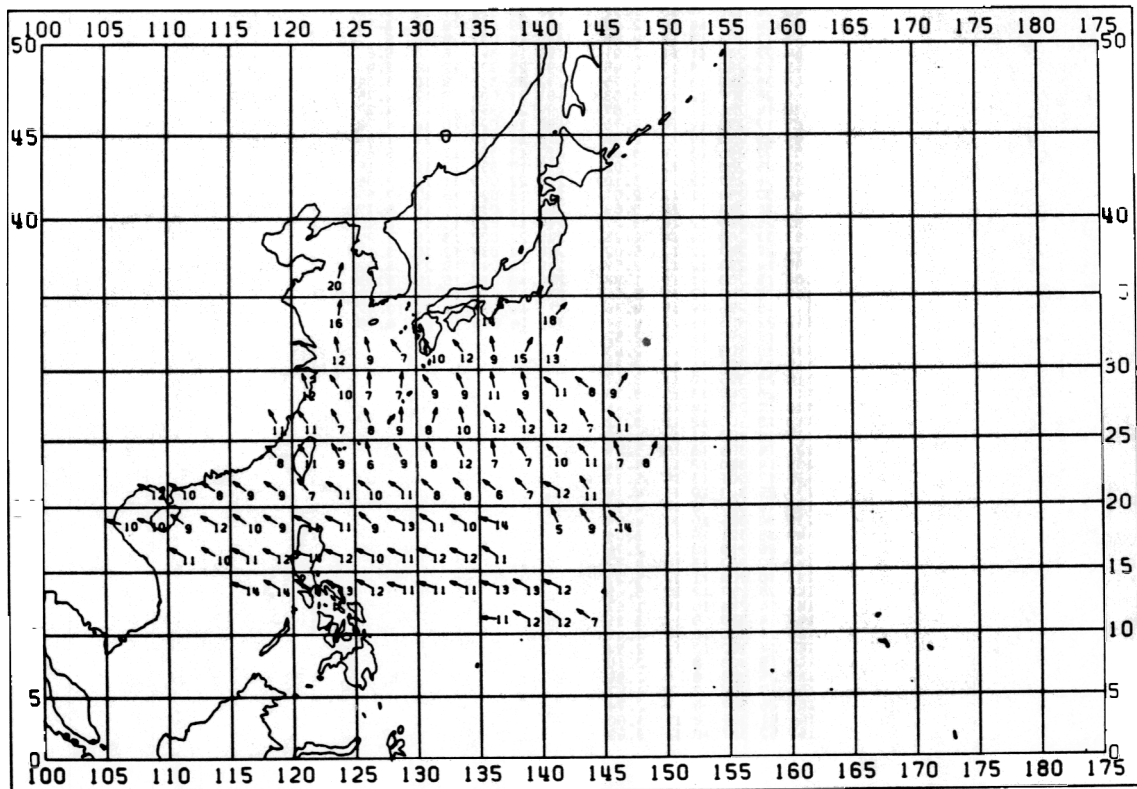


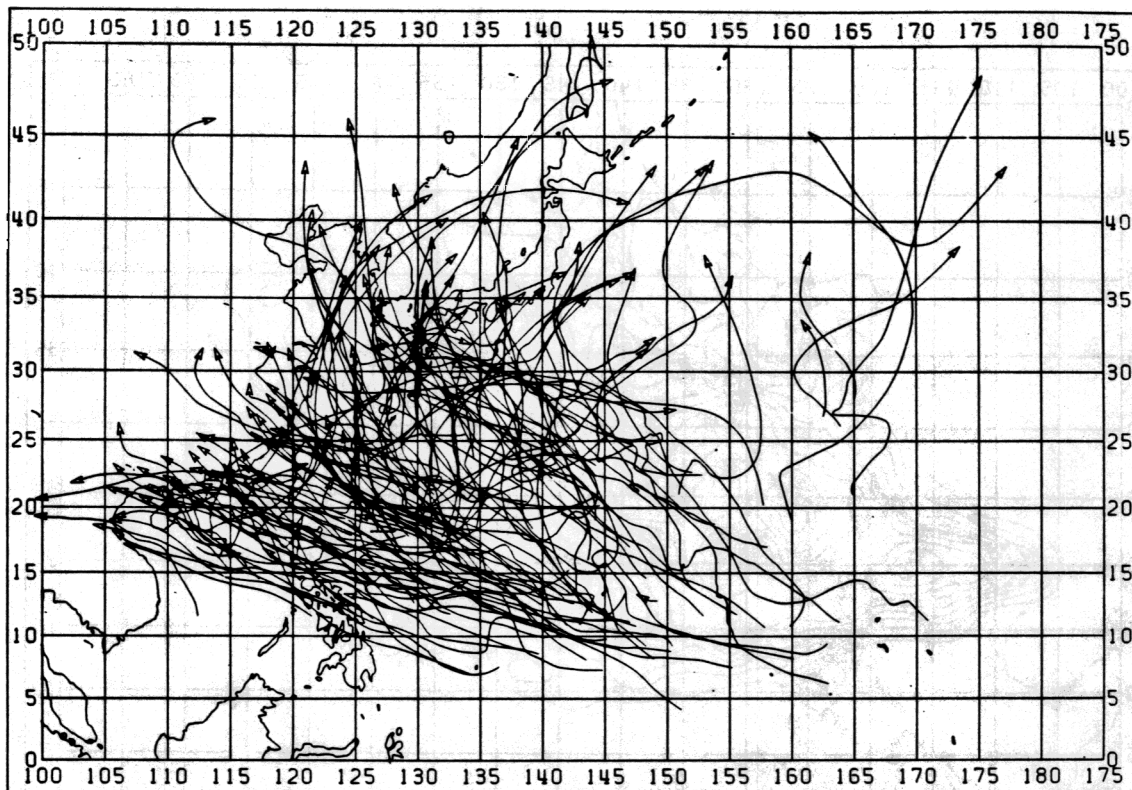
TROPICAL STORM AND TYPHOON TRACKS 16 JUN - 15 JUL

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62	14	297	14	14	2.02	169	19	328	9	14	3.56
63	17	303	13	14	4.58	170	14	007	4	10	5.71
64	22	284	11	11	2.91	190	14	347	6	10	5.61
65	19	290	8	10	4.45	191	25	329	12	13	3.41
68	28	299	13	13	3.75	192	36	338	9	10	3.34
69	28	307	12	13	3.53	193	33	004	9	12	4.75
70	14	286	11	11	3.87	194	22	359	10	13	4.87
85	17	322	14	14	2.76	198	14	028	10	14	4.73
86	28	299	14	15	2.98	216	14	350	10	12	1.88
87	22	296	13	14	3.01	217	17	351	13	15	5.60
88	25	288	11	12	3.02	218	17	357	12	12	6.15
89	28	297	12	13	3.10	219	22	003	11	12	7.08
90	30	299	11	12	2.61	220	19	021	16	17	7.57
91	36	294	11	12	3.69	221	14	039	14	15	6.77
92	25	289	12	14	3.27	244	17	023	13	15	8.42
93	33	289	14	14	4.25	245	22	022	13	15	7.24
94	28	297	12	12	5.02	248	14	038	12	15	9.23
95	14	298	12	12	2.59	249	14	040	19	23	5.62
109	19	299	11	11	1.98	270	14	012	15	16	6.13
110	19	298	12	13	5.05	271	17	032	14	14	5.12
111	19	296	14	15	4.36	273	14	033	19	20	10.47
112	22	306	11	12	4.64	301	14	046	19	23	8.73
113	19	299	11	12	2.52						
114	30	309	11	12	2.63						
115	30	305	11	11	2.33						
116	28	305	10	11	3.67						
117	28	298	13	15	3.78						
118	19	296	14	14	4.46						
119	19	305	12	12	3.72						
120	14	303	11	13	4.99						
121	14	308	13	13	3.89						
135	14	300	12	12	4.04						
136	17	301	13	14	5.37						
137	25	313	10	11	4.14						
138	36	303	8	10	4.52						
139	30	306	10	11	4.05						
140	36	321	10	11	3.09						
141	28	319	10	11	2.76						
142	22	302	13	13	4.72						
143	30	308	11	12	5.23						
144	28	297	12	12	5.65						
145	14	294	14	14	1.67						
147	14	320	9	13	3.85						
160	17	306	10	10	2.45						
161	14	302	12	12	2.94						
162	19	309	8	9	2.10						
163	25	309	8	9	2.96						
164	19	304	7	9	4.47						
165	25	327	6	9	2.74						
166	41	329	8	11	3.00						
167	52	327	10	12	3.69						



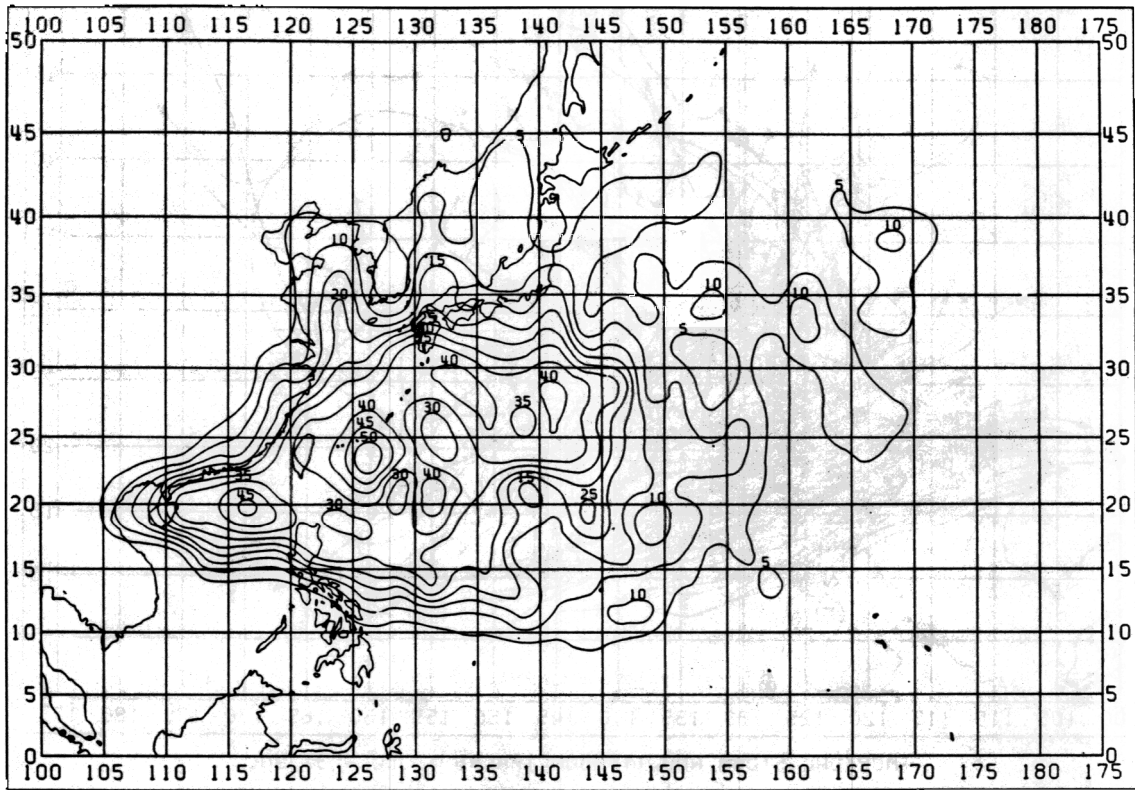
TROPICAL STORM AND TYPHOON FREQUENCY JUL - 31 JUL



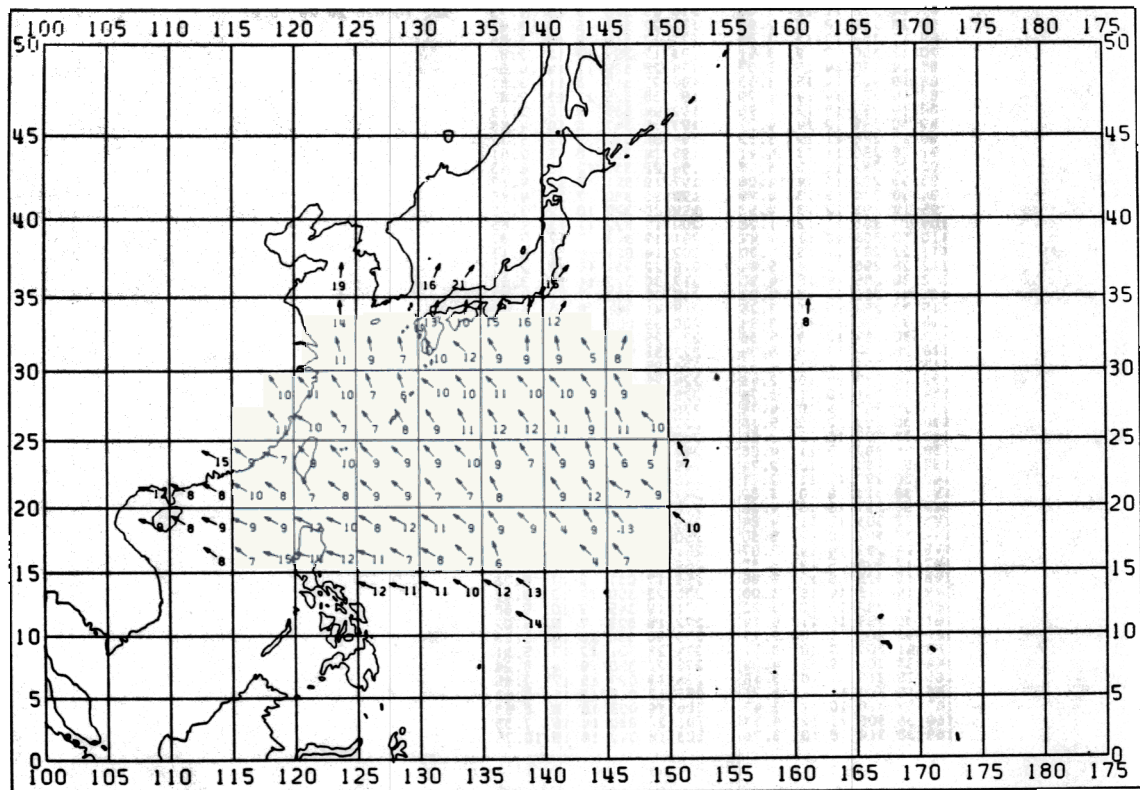


TROPICAL STORM AND TYPHOON TRACKS 1 JUL - 31 JUL

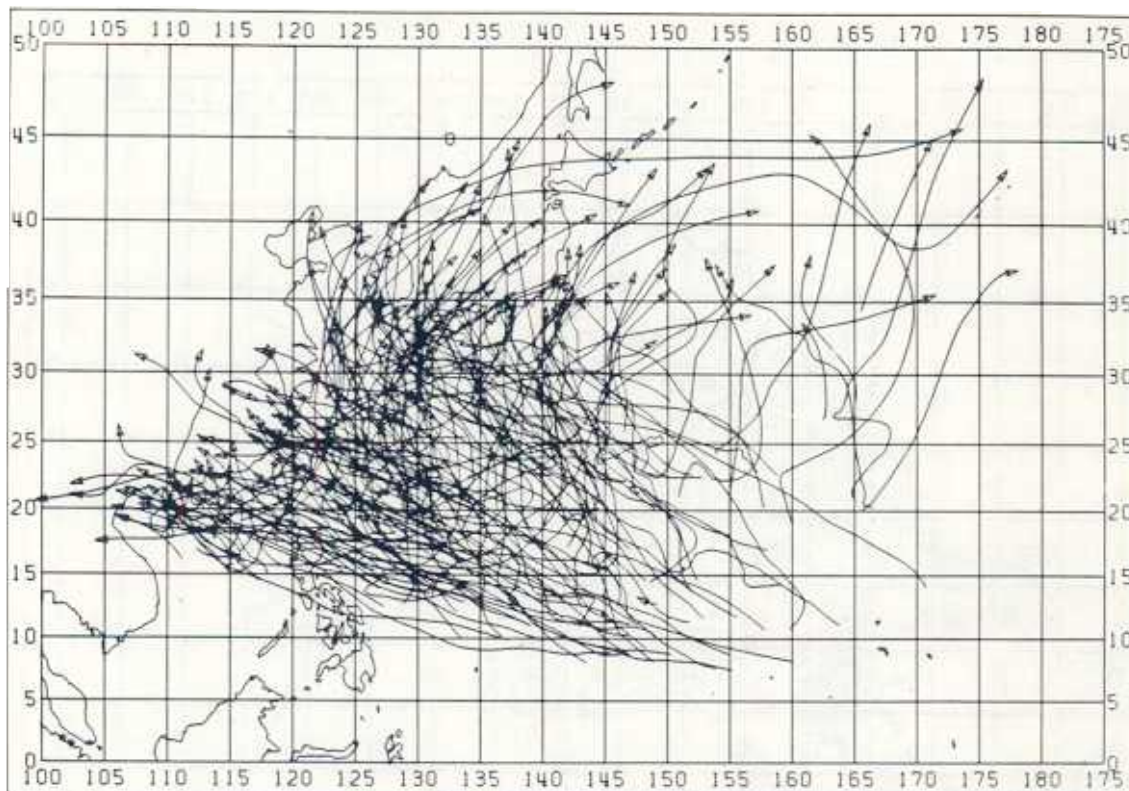
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68	28	299	12	13	2.95	171	22	311	6	10	3.41						
69	17	303	12	13	3.84	172	17	318	7	10	3.98						
70	17	306	7	9	3.51	173	17	299	12	12	3.82						
85	14	290	14	15	3.07	174	28	329	11	14	4.66						
86	19	300	14	15	3.33	190	22	317	8	11	3.81						
87	14	301	14	14	1.79	191	38	325	11	13	2.80						
88	14	295	13	13	1.96	192	44	333	9	10	3.19						
89	30	299	12	14	4.27	193	38	347	6	10	4.48						
90	25	288	11	12	3.12	194	36	332	9	11	5.22						
91	28	290	11	13	4.41	195	14	337	8	8	2.61						
92	25	292	11	15	3.18	196	22	337	12	13	6.53						
93	33	292	13	14	4.06	197	19	351	7	12	4.17						
94	30	299	13	13	4.99	198	33	330	7	11	4.45						
95	14	296	12	13	4.53	199	30	320	10	12	3.66						
109	17	301	11	12	1.28	200	17	322	11	13	4.65						
110	30	303	10	11	4.44	201	17	343	7	12	7.37						
111	22	297	11	13	5.00	202	14	021	8	12	8.13						
112	28	296	12	14	5.84	216	22	331	11	12	2.47						
113	30	285	14	15	4.90	217	30	322	11	12	3.37						
114	41	292	12	13	4.03	218	28	333	7	11	4.77						
115	33	294	10	11	3.25	219	41	341	8	10	5.24						
116	30	295	11	11	3.94	220	33	000	9	12	6.22						
117	30	294	12	13	5.38	221	25	016	8	12	6.44						
118	28	295	12	13	5.04	222	33	348	10	13	6.11						
119	22	303	11	11	4.52	223	25	318	12	14	5.93						
133	14	287	10	10	2.46	224	25	330	12	14	5.15						
134	17	291	10	11	3.74	225	25	323	12	13	3.83						
135	25	307	9	10	4.78	226	14	330	7	14	3.86						
136	30	299	12	13	5.16	227	14	316	11	12	5.38						
137	33	307	10	12	3.65	243	14	341	12	15	6.53						
138	46	302	9	11	4.06	244	19	327	10	11	4.15						
139	38	299	11	12	2.74	245	30	357	7	12	6.13						
140	30	297	11	11	2.71	246	30	004	7	12	5.93						
141	38	313	9	10	3.62	247	30	325	9	13	5.63						
142	38	297	13	13	4.26	248	38	337	9	14	7.77						
143	52	303	11	11	4.84	249	38	349	11	17	7.10						
144	38	302	10	12	5.30	250	33	349	9	15	6.08						
145	14	289	14	14	2.07	251	25	309	11	13	3.40						
147	17	338	5	13	6.37	252	17	311	8	11	1.74						
148	19	328	9	12	5.86	253	17	031	9	17	6.76						
149	14	315	14	15	3.08	270	22	350	12	12	6.41						
160	17	297	12	12	3.22	271	19	345	9	10	5.66						
161	30	299	10	11	4.14	272	19	323	7	9	4.02						
162	33	303	8	10	2.77	273	30	330	10	14	5.23						
163	41	307	9	10	3.71	274	26	321	12	17	5.91						
164	33	307	9	11	4.04	275	22	350	9	14	8.24						
165	28	319	7	10	3.16	276	19	027	15	17	7.85						
166	38	304	11	11	3.71	277	17	019	13	15	6.43						
167	57	310	10	11	3.47	296	19	009	16	18	8.53						
168	36	306	11	12	4.57	301	22	030	14	16	7.33						
169	38	314	8	10	3.76	303	14	042	18	19	10.75						



TROPICAL STORM AND TYPHOON FREQUENCY 16 JUL - 15 AUG

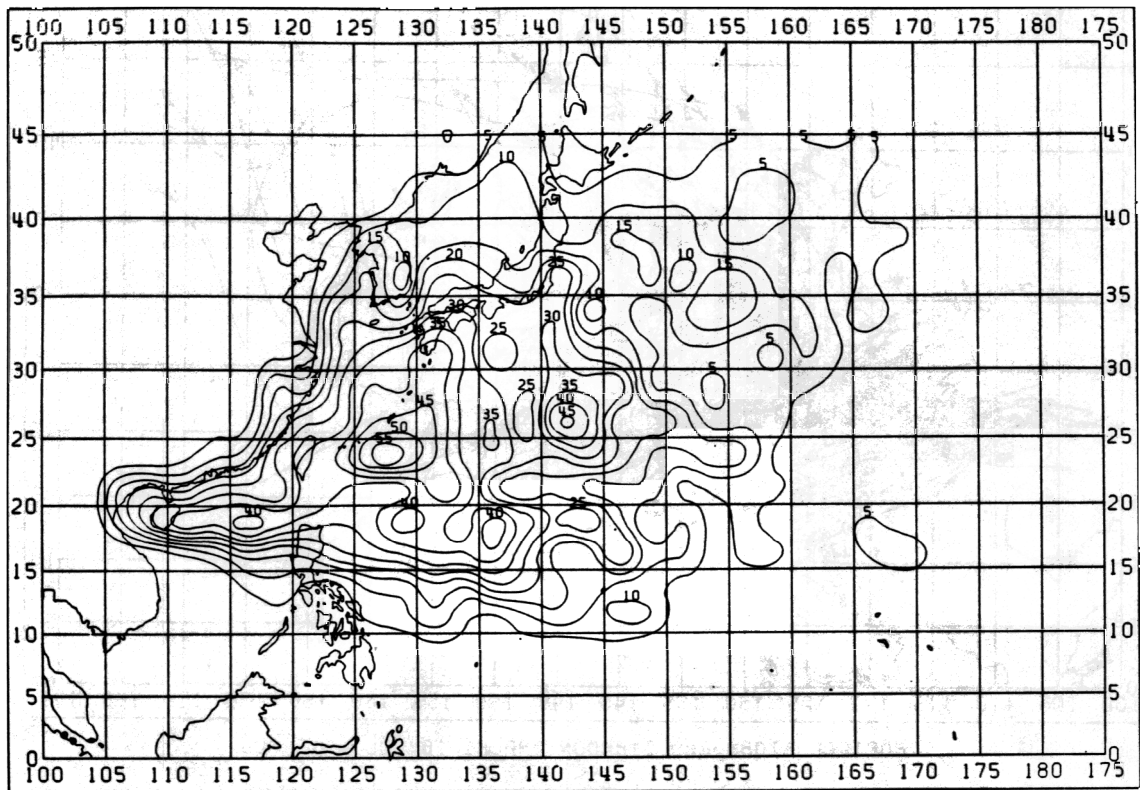


TROPICAL STORM AND TYPHOON MOTION 16 JUL - 15 AUG

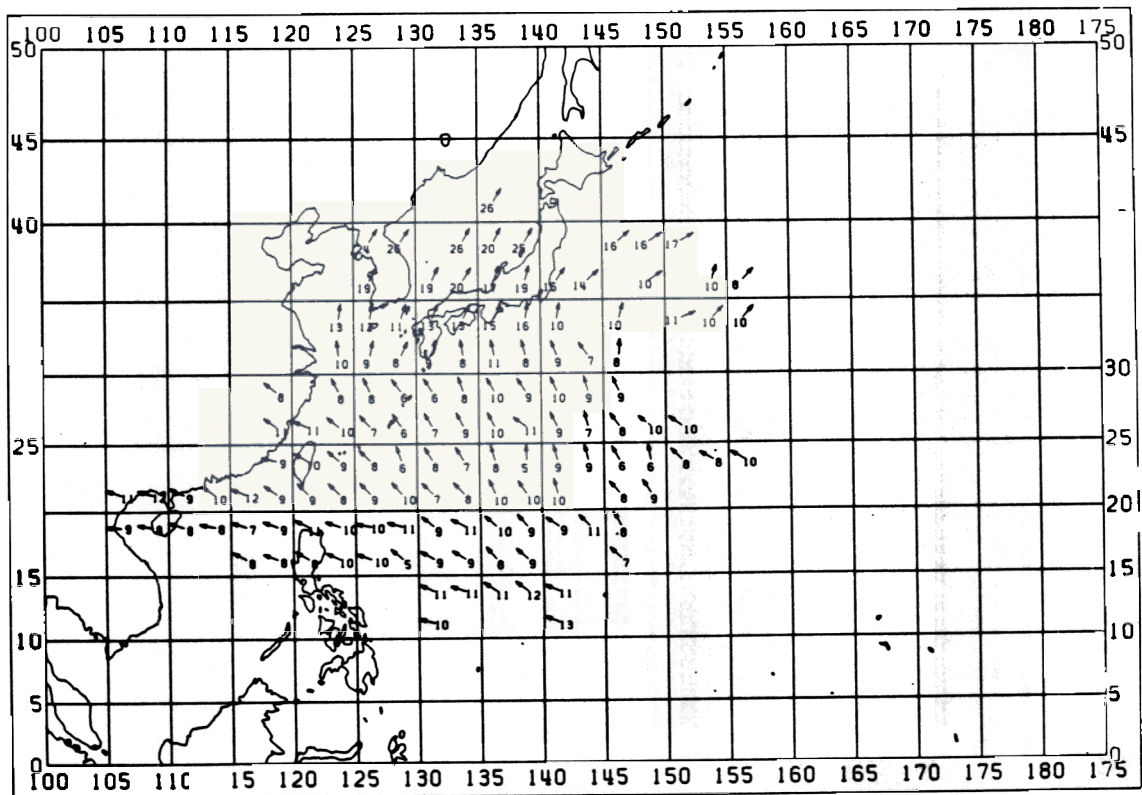


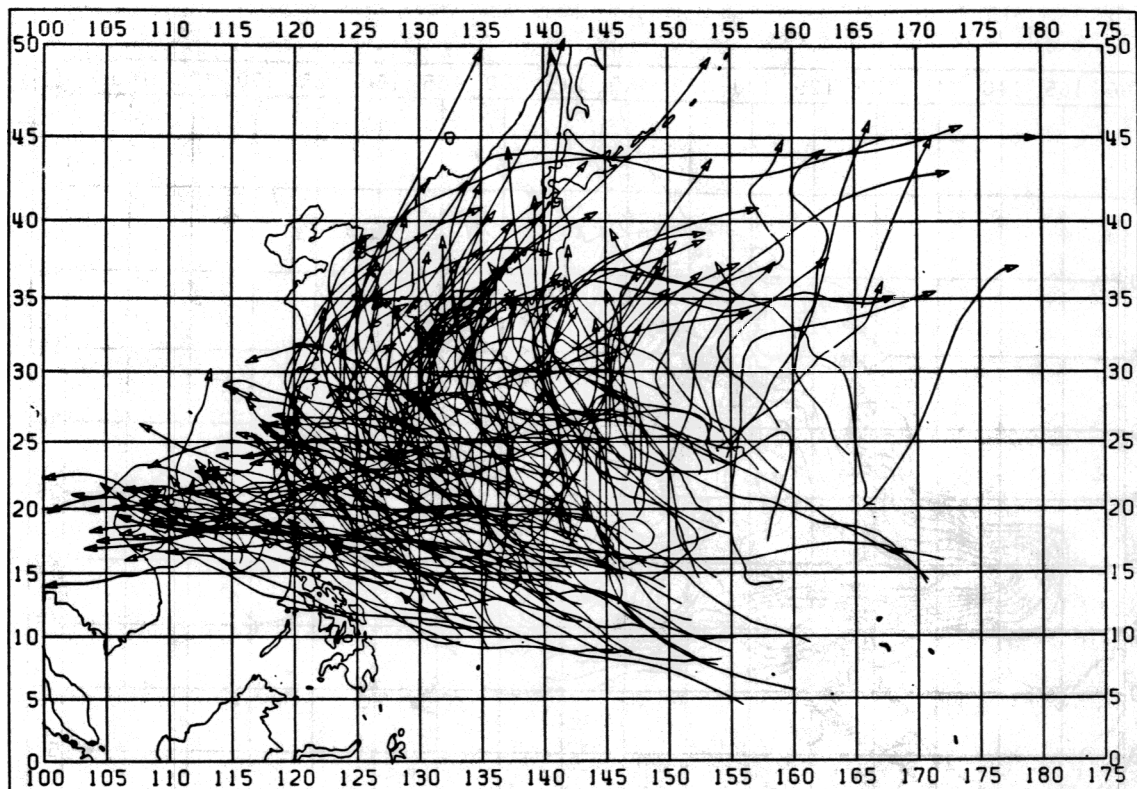
TROPICAL STORM AND TYPHOON TRACKS 16 JUL - 15 AUG

A	B	C	D	E	F	A	B	C	D	E	F	A	B	C	D	E	F
68	17	301	14	14	2.89	188	14	297	15	16	5.85	299	22	015	13	14	5.22
69	22	293	12	13	4.64	189	14	308	9	13	5.65	300	14	005	10	13	4.31
90	19	288	11	13	3.50	190	30	290	7	11	4.85	301	19	018	15	16	8.72
91	33	294	11	13	4.05	191	38	317	9	12	3.10	302	14	013	16	17	8.87
92	19	303	10	15	3.61	192	41	320	10	11	4.09	303	22	027	12	13	4.85
93	25	300	12	13	5.33	193	55	317	9	11	5.31	311	14	002	8	12	5.35
94	19	307	13	14	4.85	194	44	314	9	10	4.80	322	17	005	19	21	8.94
110	22	306	8	10	3.58	195	30	319	9	10	5.53	325	19	023	16	17	8.40
111	19	308	7	10	5.47	196	30	318	10	11	4.99	326	14	035	21	22	6.74
112	17	288	15	15	5.71	197	38	342	9	13	5.02	329	14	037	15	16	1.50
113	30	284	14	15	4.76	198	38	326	7	11	3.93						
114	36	289	12	12	4.55	199	38	327	9	12	3.77						
115	30	291	11	11	3.42	200	36	342	9	12	5.31						
116	36	301	7	11	5.66	201	22	328	6	11	3.70						
117	28	300	8	13	5.72	202	14	009	5	10	5.21						
118	28	317	7	12	5.78	203	14	337	7	9	4.40						
119	25	341	6	13	6.12	216	19	321	11	12	3.23						
122	14	314	4	7	3.34	217	36	301	10	12	2.78						
123	19	321	7	8	3.37	218	36	323	7	11	4.65						
134	19	289	9	10	3.05	219	44	323	7	9	4.80						
135	36	301	8	9	3.50	220	36	330	8	10	4.24						
136	36	295	9	10	3.94	221	28	328	9	10	3.62						
137	44	292	9	11	4.12	222	36	332	11	12	6.10						
138	41	298	9	11	3.60	223	41	328	12	14	5.90						
139	33	295	12	12	2.96	224	30	323	12	15	5.64						
140	28	294	10	10	2.67	225	41	325	11	13	5.92						
141	30	302	8	9	4.02	226	33	343	9	12	5.38						
142	30	298	12	13	3.32	227	22	336	11	13	5.04						
143	41	304	11	11	4.37	228	14	313	10	11	5.73						
144	28	306	9	11	4.61	242	17	326	10	11	1.78						
145	28	322	9	12	4.75	243	17	317	11	13	2.83						
146	19	313	9	12	4.06	244	30	327	10	11	4.12						
147	14	318	4	9	4.62	245	33	340	7	12	5.68						
148	28	332	9	11	4.61	246	38	341	6	10	4.92						
149	17	320	13	14	3.41	247	38	308	10	12	4.74						
151	14	312	10	10	6.24	248	44	323	10	13	6.19						
160	17	285	12	13	5.08	249	38	318	11	14	5.09						
161	33	298	8	9	3.85	250	38	320	10	13	5.06						
162	36	300	8	10	3.11	251	41	321	10	13	4.43						
163	41	301	10	11	4.35	252	36	326	9	11	3.57						
164	33	306	8	12	4.02	253	33	331	9	12	4.90						
165	30	331	7	11	2.75	270	22	345	11	12	5.19						
166	36	308	8	10	3.82	271	22	350	9	11	5.76						
167	44	313	9	10	4.36	272	36	346	7	9	3.58						
168	25	311	9	10	4.87	273	38	328	10	13	5.01						
169	44	323	7	10	3.09	274	33	313	12	15	6.22						
170	36	322	7	10	4.01	275	28	328	9	13	5.92						
171	28	334	8	11	5.10	276	28	358	9	12	7.51						
173	19	326	9	13	4.34	277	33	349	9	12	4.65						
174	25	325	12	13	4.15	278	14	328	5	9	2.91						
175	17	307	7	8	3.90	279	17	016	8	9	3.20						
176	17	310	9	9	5.49	296	22	356	14	15	7.13						



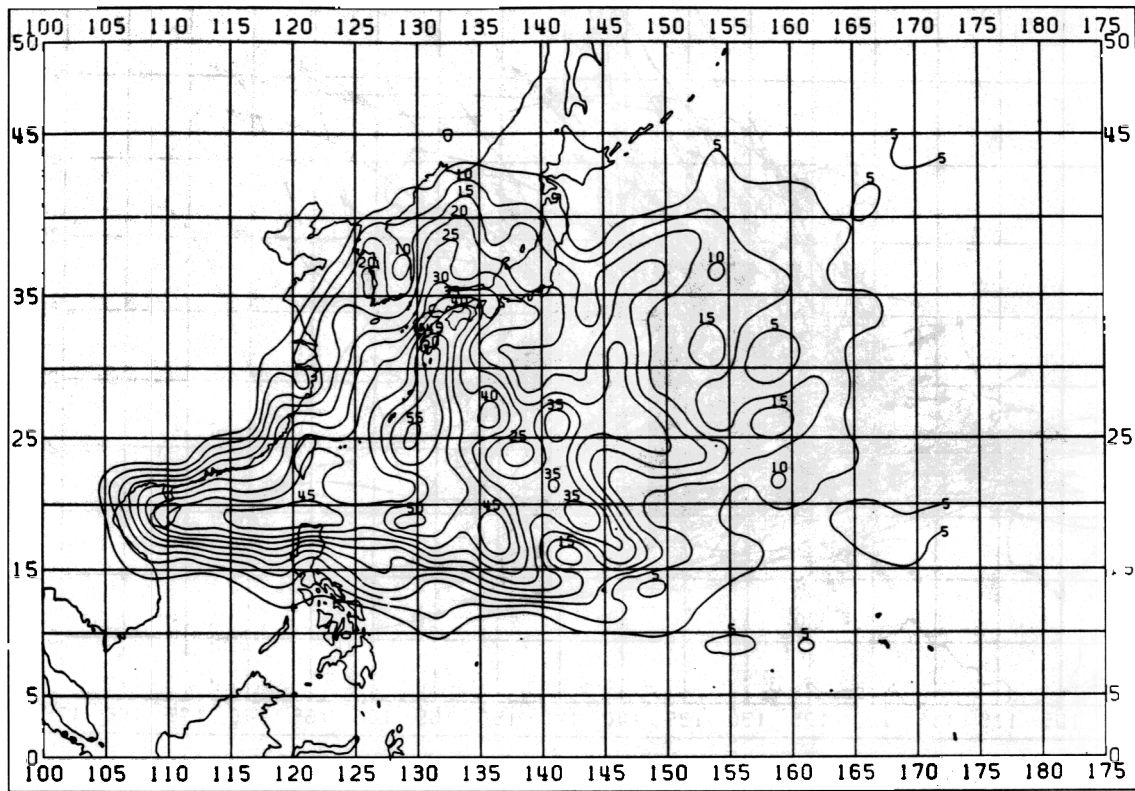
TROPICAL STORM AND TYPHOON FREQUENCY AUG - 31 AUG



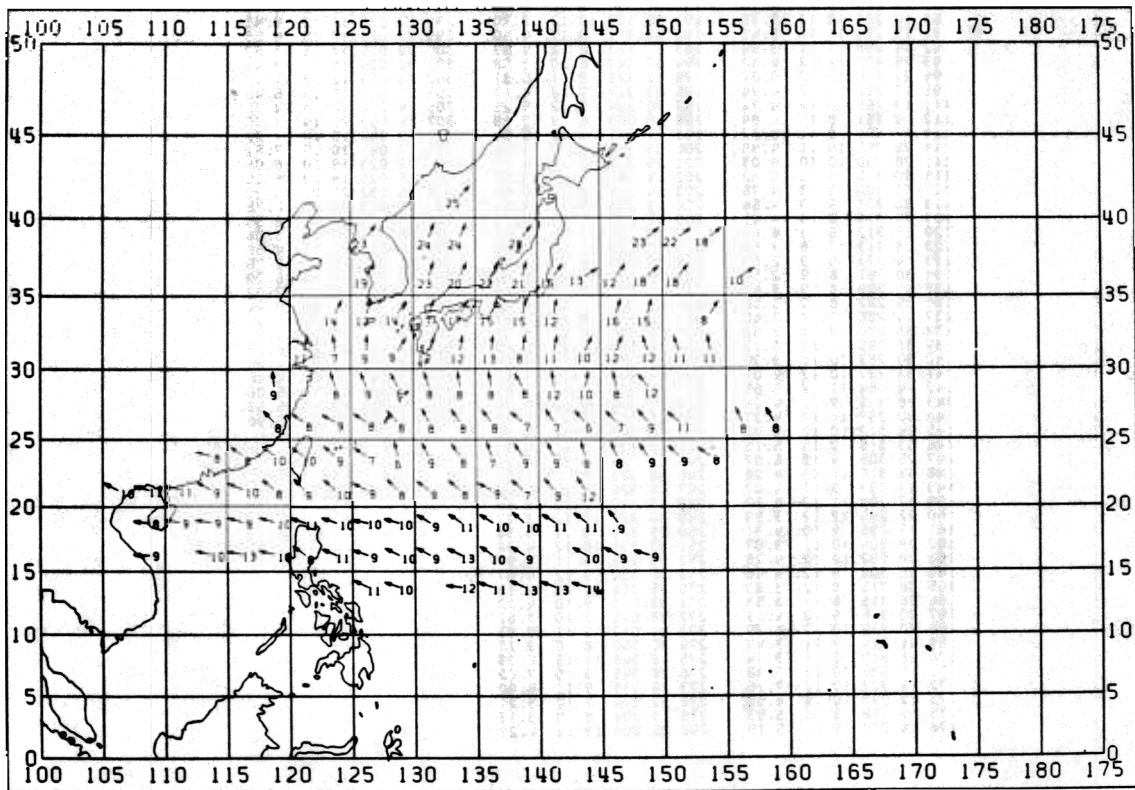


TROPICAL STORM AND TYPHOON TRACKS 1 AUG - 31 AUG

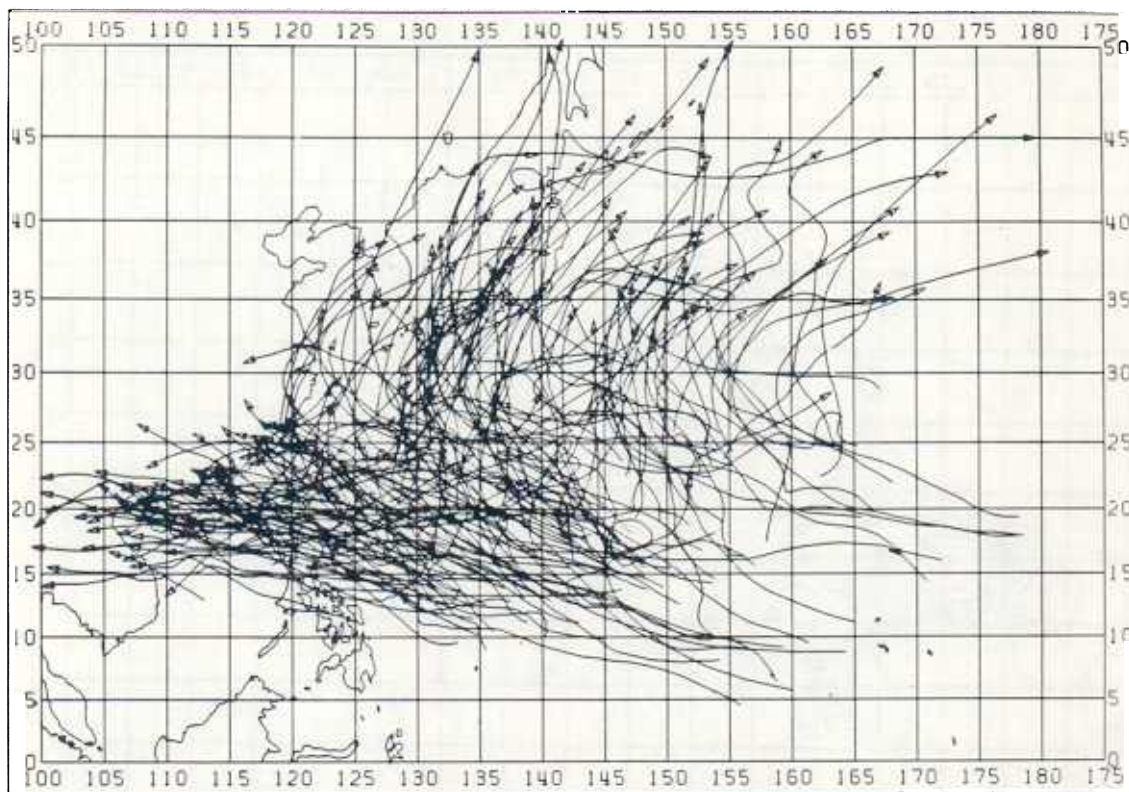
A	B	C	D	E	F	A	B	C	D	E	F	A	B	C	D	E	F
65	14	284	10	10	4.25	190	33	285	9	11	5.08	297	22	012	12	13	4.76
69	14	292	13	13	3.38	191	36	300	10	12	3.70	298	17	020	11	13	8.45
91	19	294	11	11	3.45	192	41	311	9	11	4.40	299	30	022	13	15	4.65
92	14	288	11	11	3.80	193	57	313	8	12	4.93	300	30	026	13	15	3.57
93	25	302	11	12	4.82	194	57	340	6	10	3.98	301	30	024	15	16	7.49
94	22	306	12	12	3.01	195	46	328	8	11	5.31	302	28	009	16	18	7.17
95	17	292	11	12	4.74	196	33	327	7	10	4.17	303	30	011	10	13	6.40
111	17	298	8	11	4.74	197	36	344	8	12	5.25	305	14	016	10	11	4.79
112	14	281	8	11	4.89	198	28	000	5	9	3.19	307	14	068	11	14	7.39
113	17	301	8	11	3.82	199	25	345	9	12	3.34	308	19	044	10	14	7.52
114	25	295	10	11	4.99	200	25	346	9	13	5.68	309	17	041	10	15	7.81
115	28	290	10	10	4.03	201	25	330	6	11	4.20	323	22	028	19	20	8.08
116	30	310	5	10	6.32	202	14	350	6	12	3.80	325	25	026	19	20	8.66
117	36	300	9	13	4.76	203	14	314	8	11	2.84	326	25	032	20	21	5.29
118	36	303	9	13	4.54	204	19	299	8	11	4.51	327	19	018	17	20	6.78
119	38	319	8	13	4.41	205	17	299	10	13	7.14	328	14	015	19	22	8.55
120	25	312	9	13	4.01	216	19	306	11	11	2.41	329	30	035	15	16	6.08
123	28	313	7	8	3.59	217	30	293	11	12	2.69	330	19	047	14	15	4.58
133	14	273	9	9	2.85	218	30	309	10	11	3.46	332	19	055	10	13	6.76
134	30	281	8	9	2.56	219	44	318	7	10	4.82	334	17	018	10	14	6.29
135	41	289	8	9	3.47	220	46	326	6	10	5.12	335	17	042	8	11	7.02
136	36	282	8	9	3.40	221	46	329	7	11	4.47	349	14	032	24	25	10.24
137	44	288	7	9	3.40	222	33	332	9	11	5.42	350	14	034	26	28	7.30
138	38	290	9	11	3.93	223	36	332	10	12	5.30	352	14	029	26	26	4.77
139	33	296	11	12	3.13	224	19	306	11	12	6.04	353	14	027	20	22	6.03
140	30	289	10	11	3.30	225	46	333	9	12	6.00	354	14	030	25	28	4.64
141	33	282	10	12	4.07	226	41	346	7	11	5.41	357	17	047	16	18	4.46
142	44	284	11	12	3.63	227	19	323	8	11	5.15	358	14	057	16	17	5.06
143	38	309	9	11	4.24	228	25	308	10	12	4.18	359	14	059	17	18	5.53
144	30	297	11	12	4.27	229	19	305	10	11	5.13	379	14	031	26	30	5.90
145	44	312	10	12	4.42	242	17	308	8	10	3.60						
146	33	319	9	14	5.15	244	30	332	8	10	4.33						
147	25	305	9	13	6.07	245	41	335	8	10	4.12						
148	33	316	11	13	4.28	246	38	323	6	9	3.22						
149	17	333	8	11	4.07	247	44	326	6	9	3.44						
159	17	288	11	12	4.67	248	33	340	8	10	3.89						
160	22	286	12	12	3.98	249	30	328	10	12	3.77						
161	17	295	9	10	4.31	250	25	326	9	11	5.38						
162	28	304	10	11	3.07	251	33	335	10	12	4.38						
163	28	292	12	12	4.28	252	33	344	9	11	3.97						
164	25	304	9	12	4.46	253	36	334	9	12	4.67						
165	38	315	9	12	3.93	270	25	354	10	10	4.13						
166	36	315	8	11	3.53	271	33	013	9	10	4.22						
167	30	316	9	10	4.11	272	38	025	8	10	3.62						
168	30	319	10	12	4.39	273	44	012	9	11	3.93						
169	41	314	7	11	4.42	274	36	350	8	10	3.17						
170	41	316	8	11	3.74	275	19	348	11	15	6.79						
171	19	336	10	12	7.38	276	28	345	8	10	7.02						
172	14	327	10	12	7.16	277	30	338	9	11	4.90						
173	19	345	10	14	4.58	278	22	324	7	10	5.21						
175	14	318	8	9	3.53	279	19	004	8	9	3.13						
176	14	328	9	11	5.19	296	25	008	13	14	4.27						



TROPICAL STORM AND TYPHOON FREQUENCY 16 AUG - 15 SEP

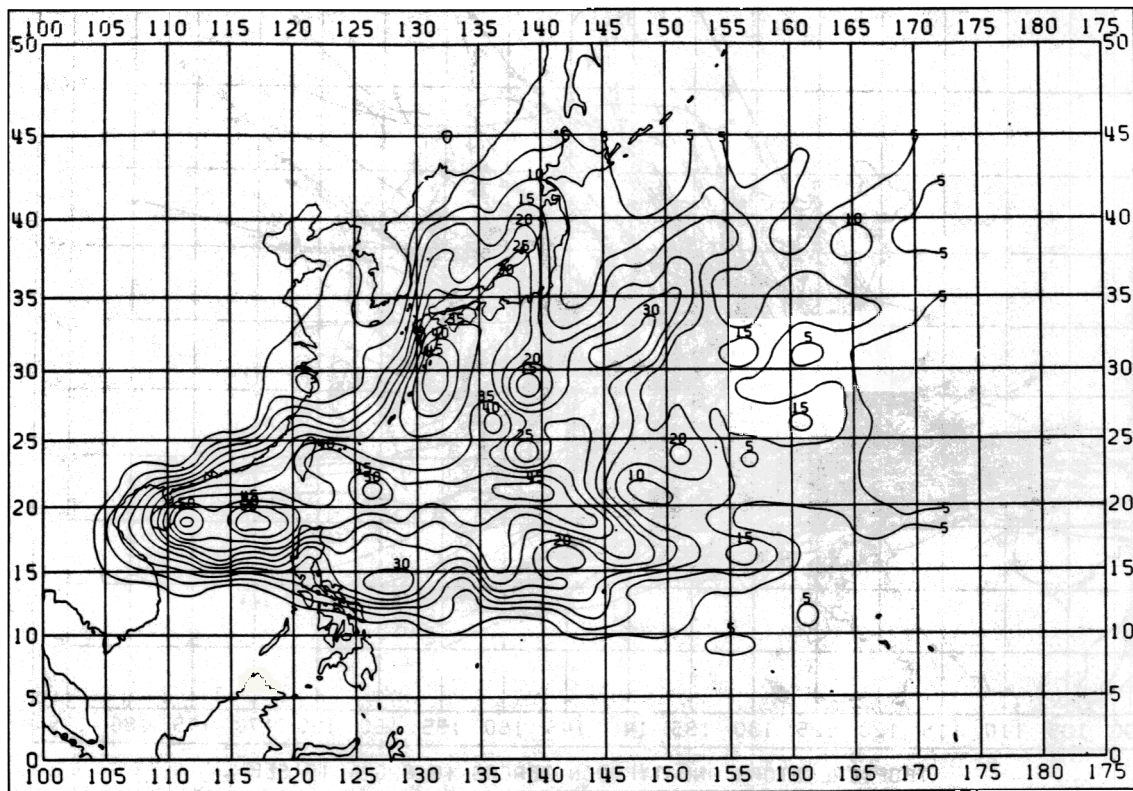


TROPICAL STORM AND TYPHOON MOTION 16 AUG - 15 SEP

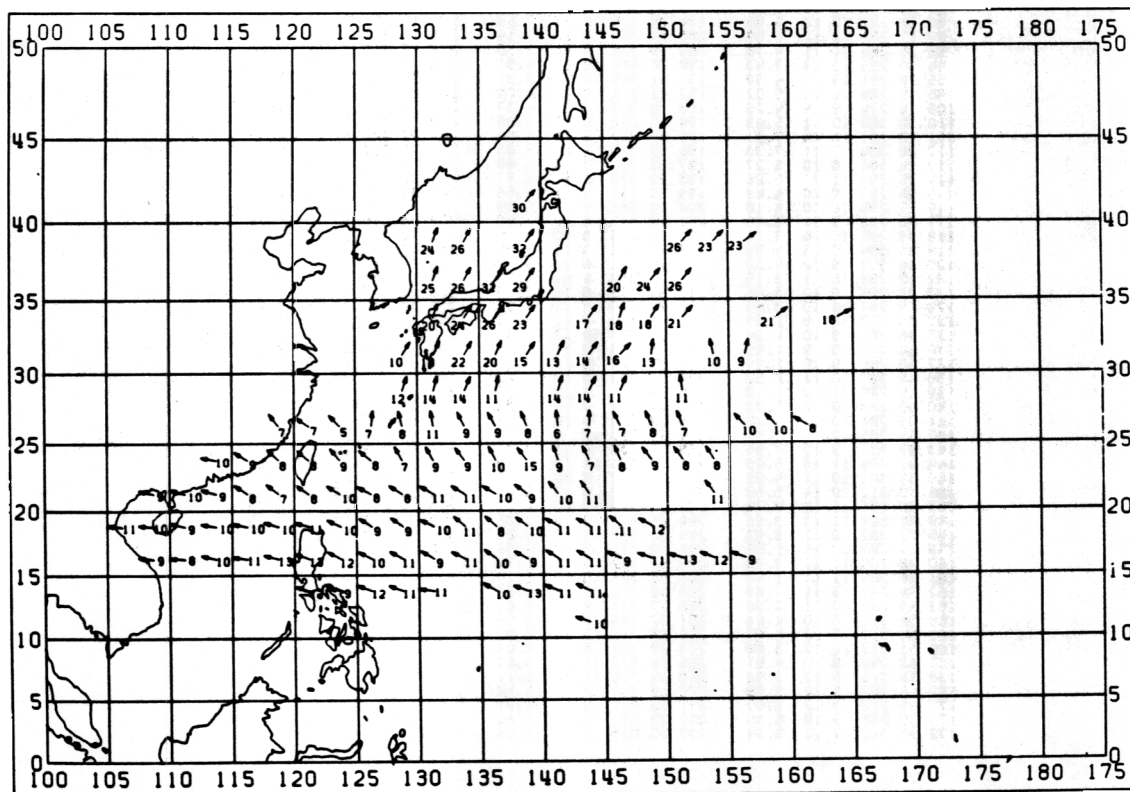


TROPICAL STORM AND TYPHOON TRACKS 16 AUG 15 SEP

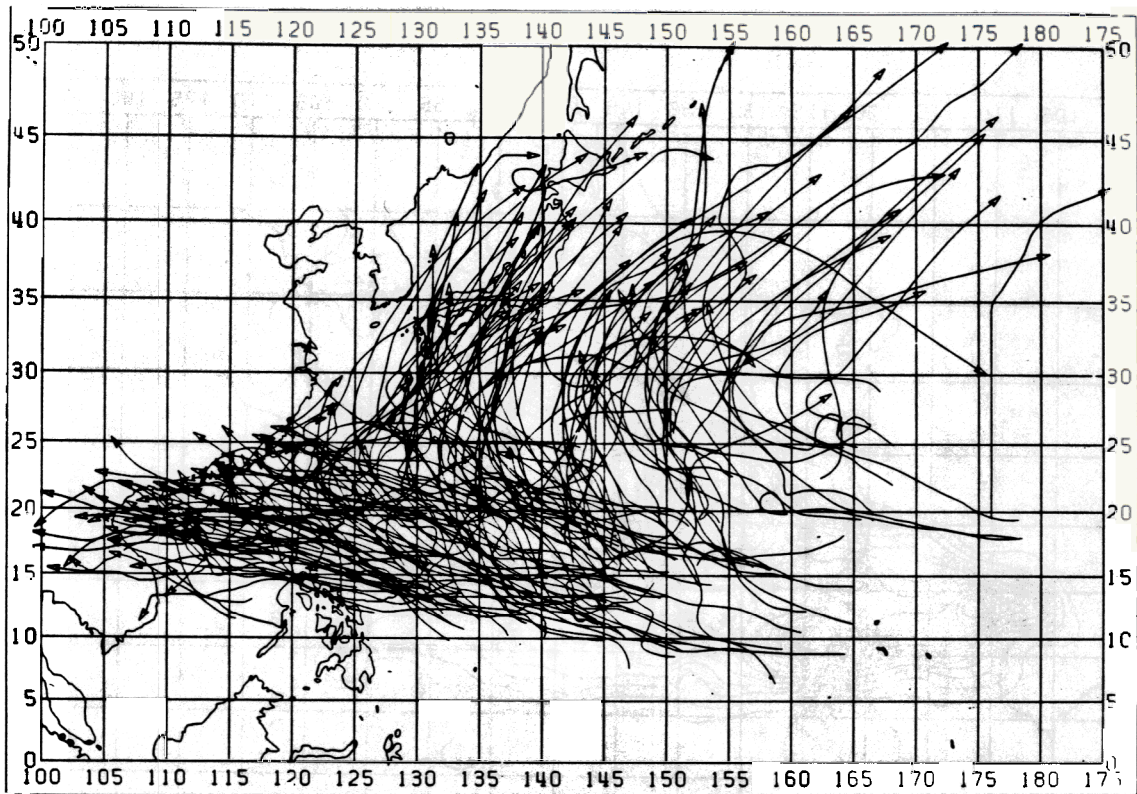
A	B	C	D	E	F	A	B	C	D	E	F	A	B	C	D	E	F
89	22	296	11	14	6.80	173	36	320	9	12	4.43	274	33	009	12	13	6.50
90	22	289	10	12	5.96	174	25	326	12	14	2.50	275	19	006	13	15	5.57
92	17	278	12	12	6.09	188	17	287	8	10	3.14	276	19	010	8	10	3.77
93	25	289	11	11	4.18	189	19	308	8	11	2.50	277	19	013	11	14	7.66
94	30	295	13	13	3.43	190	28	310	10	11	4.91	278	19	026	10	15	7.68
95	28	291	13	13	4.30	191	41	305	10	12	3.31	279	28	020	12	14	5.86
96	19	288	14	14	5.02	192	41	311	9	11	4.04	280	14	342	12	14	5.85
108	14	274	9	9	4.20	193	38	305	7	10	4.37	281	14	341	11	14	7.15
110	19	283	10	11	6.59	194	55	347	6	10	3.98	282	19	351	11	15	7.34
111	19	281	13	14	7.21	195	49	332	9	12	4.64	296	22	025	14	14	4.97
112	28	284	10	11	7.38	196	38	325	8	11	5.03	297	19	018	12	13	5.13
113	14	306	8	10	5.27	197	25	343	7	10	4.89	298	19	033	14	15	9.07
114	25	293	11	11	5.06	198	22	326	9	12	4.72	299	36	020	17	18	5.94
115	28	289	9	10	4.48	199	33	333	9	11	5.56	300	44	031	17	18	6.06
116	25	296	10	10	4.10	200	19	343	9	11	5.49	301	30	023	15	16	6.55
117	38	298	9	11	3.89	201	19	337	8	10	3.40	302	28	015	15	18	6.58
118	33	295	13	14	3.11	202	25	325	9	10	3.45	303	22	012	12	15	8.44
119	46	304	10	13	4.94	203	25	313	9	11	3.79	305	22	016	16	18	5.76
120	36	303	9	12	4.60	204	19	304	8	11	5.58	306	14	016	15	17	3.03
122	17	298	10	11	3.15	216	25	318	8	11	4.56	308	14	032	8	10	4.21
123	33	299	9	10	3.85	217	30	305	8	10	2.42	323	22	030	19	20	8.38
124	19	287	9	10	3.89	218	28	300	9	11	2.94	325	30	017	23	24	6.91
134	33	277	8	9	3.33	219	41	304	8	11	4.55	326	22	026	20	21	2.94
135	46	281	9	10	4.24	220	52	317	8	12	5.95	327	28	025	22	24	8.10
136	44	278	9	9	4.45	221	55	333	8	11	6.16	328	14	015	21	22	9.68
137	49	286	9	10	3.79	222	38	326	8	11	5.02	329	19	034	15	16	7.79
138	49	287	10	11	4.50	223	44	323	8	10	3.42	330	14	057	13	14	5.04
139	49	288	11	12	3.70	224	28	311	7	10	4.35	331	19	037	12	17	6.53
140	46	288	10	11	3.22	225	41	327	7	10	5.29	332	22	047	18	21	10.54
141	41	281	10	11	4.24	226	28	318	6	10	3.61	333	17	038	18	20	8.30
142	55	285	10	11	3.91	227	30	316	7	9	3.39	335	14	057	10	11	7.66
143	49	301	9	10	3.55	228	28	320	9	11	4.32	349	17	036	23	24	9.86
144	41	304	11	13	5.00	229	17	311	11	12	5.79	351	22	020	24	26	7.21
145	49	302	10	11	4.25	231	14	338	8	14	3.13	352	25	023	24	25	5.85
146	30	312	10	14	5.50	232	19	332	8	13	5.43	354	19	036	28	30	5.34
147	30	303	11	14	4.36	242	14	354	9	12	6.07	358	14	050	23	24	10.25
148	44	308	11	13	5.56	244	25	342	8	9	3.56	359	17	053	22	23	6.15
149	22	322	9	12	3.83	245	36	337	9	11	5.66	360	14	049	18	21	12.07
159	17	297	10	10	1.95	246	38	332	6	9	6.08	378	17	040	25	27	7.24
160	28	285	11	11	3.35	247	52	342	8	11	4.79						
161	28	285	11	11	3.45	248	33	351	8	10	5.19						
162	36	297	9	11	2.69	249	36	350	8	11	4.36						
163	33	294	10	11	2.96	250	17	331	8	9	3.83						
164	36	310	8	10	4.64	251	22	353	12	15	7.69						
165	44	313	9	12	4.07	252	19	012	10	14	6.82						
166	33	312	10	12	3.03	253	28	347	8	10	5.03						
167	38	298	9	10	4.01	254	14	323	12	14	3.67						
168	33	315	8	12	3.92	269	14	014	11	14	4.11						
169	46	307	9	12	3.88	270	19	352	7	9	3.44						
170	46	310	8	12	4.07	271	33	001	9	11	4.27						
171	36	298	9	10	5.30	272	33	032	9	10	3.84						
172	33	312	7	11	5.34	273	55	021	12	14	5.68						



TROPICAL STORM AND TYPHOON FREQUENCY SEP - 30 SEP

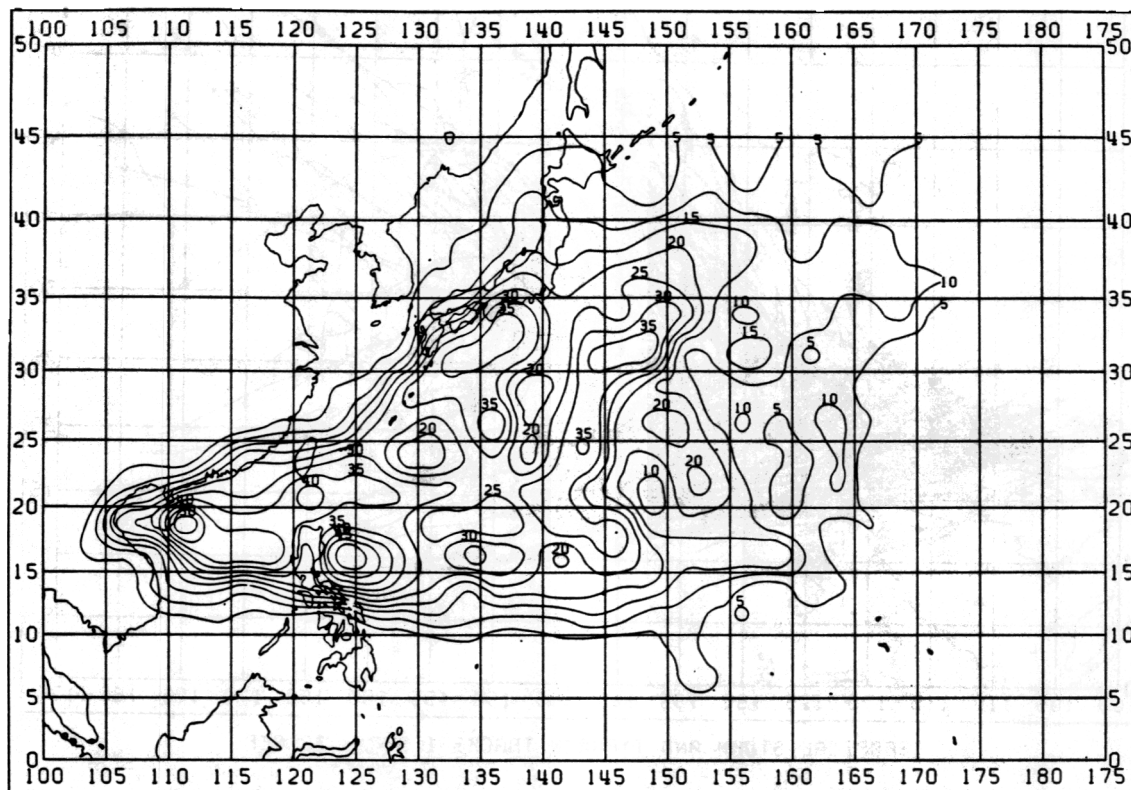


TROPICAL STORM AND TYPHOON MOTION 1 SEP - 30 SEP

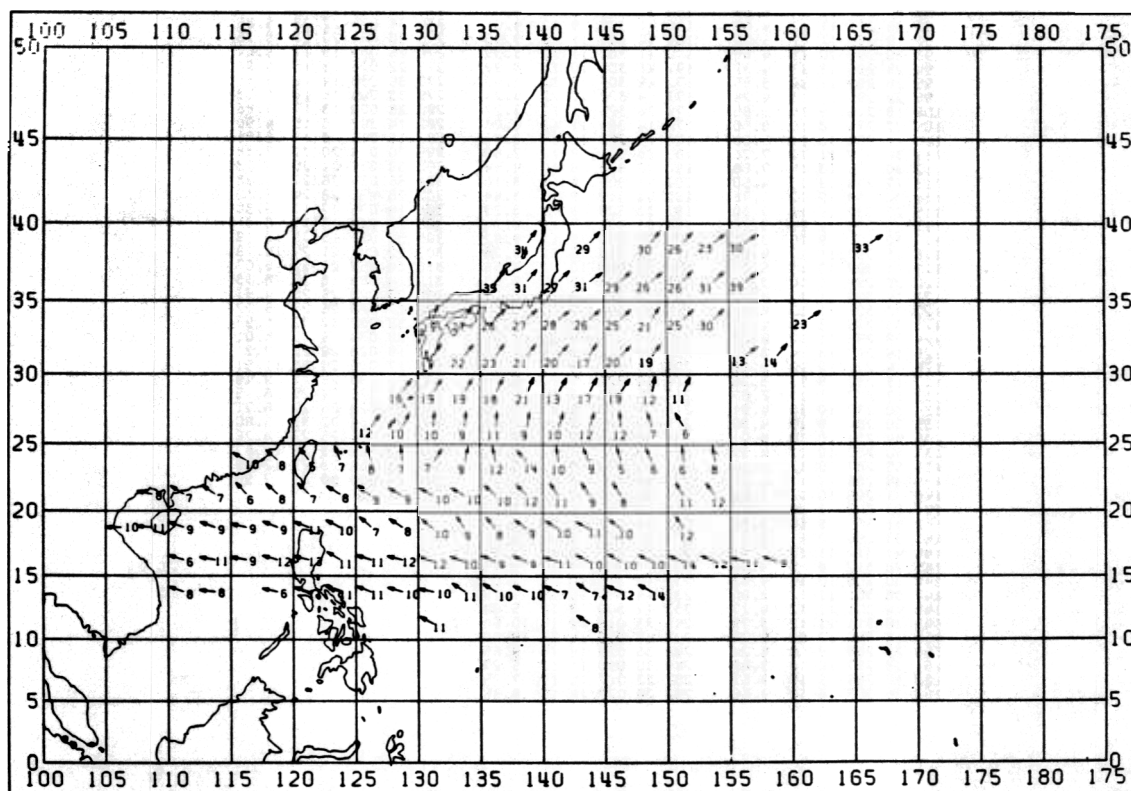


TROPICAL STORM AND TYPHOON TRACKS 1 SEP - 30 SEP

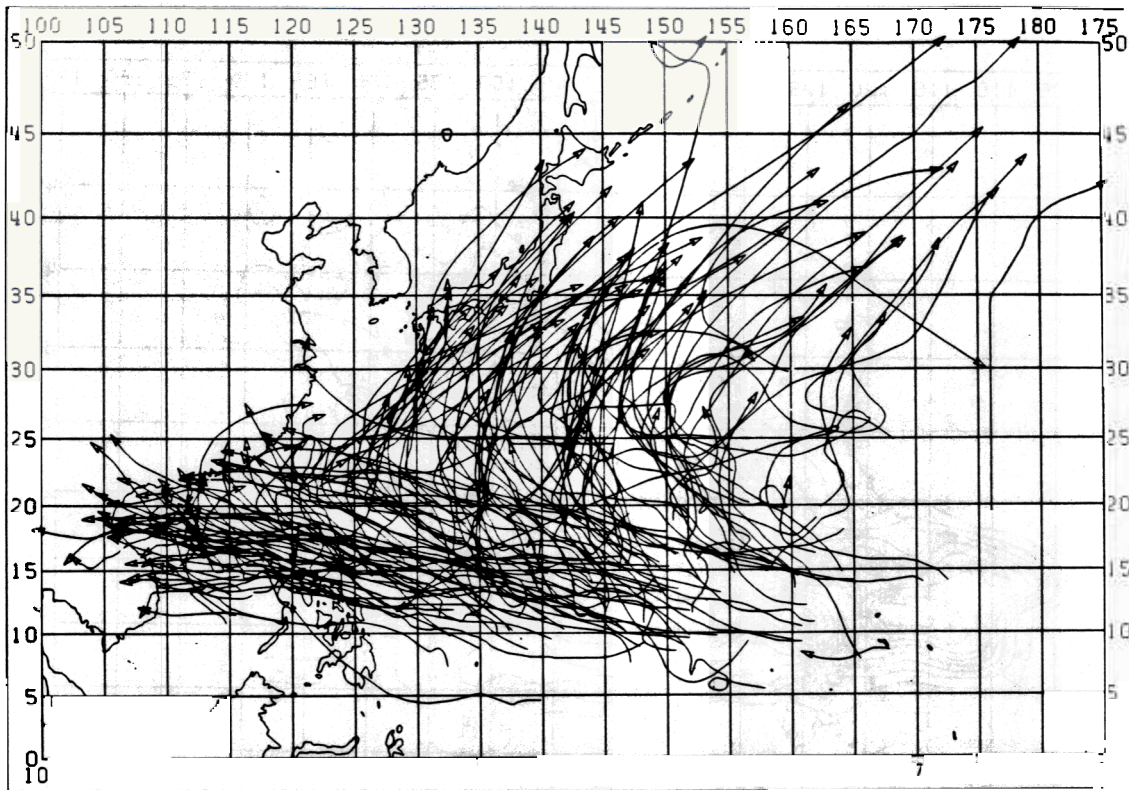
A	B	C	D	E	F	A	B	C	D	E	F	A	B	C	D	E	F
70	17	289	10	10	3.37	164	38	307	7	9	4.59	253	22	023	11	13	9.03
87	17	287	12	12	7.12	165	36	304	8	11	4.69	255	14	352	11	14	3.93
88	25	288	9	12	5.42	166	41	301	10	11	4.22	272	14	032	10	11	3.04
89	33	291	12	14	5.88	167	55	298	8	10	4.07	273	46	026	18	18	9.05
90	36	291	11	12	4.63	168	41	302	8	12	4.01	274	38	029	22	23	6.85
91	19	278	11	12	5.20	169	44	301	11	13	3.36	275	30	023	20	21	8.25
93	30	299	10	11	4.63	170	41	301	11	12	3.35	276	25	033	15	17	9.67
94	25	290	13	13	4.32	171	46	301	10	11	3.92	277	22	025	13	15	6.91
95	28	292	11	12	3.85	172	49	307	9	12	3.99	278	30	036	14	16	5.86
96	22	295	11	13	4.24	173	44	322	10	12	4.24	279	33	044	16	18	8.53
108	19	276	9	10	3.95	174	28	325	11	12	3.27	280	28	009	13	17	7.86
109	22	275	8	10	3.50	178	14	324	11	12	6.06	282	14	348	10	19	4.90
110	41	284	10	11	5.06	188	19	282	10	11	3.83	283	19	014	9	17	6.81
111	30	279	11	12	7.26	189	28	301	9	12	2.89	299	30	019	20	21	5.38
112	36	285	13	14	7.58	190	30	313	8	10	4.54	300	33	031	24	25	9.03
113	17	289	13	13	4.50	191	41	309	8	11	3.10	301	36	034	26	27	5.98
114	30	298	12	12	3.76	192	44	319	9	13	3.44	302	28	035	23	24	9.12
115	25	297	10	11	3.30	193	33	309	8	10	3.23	304	14	035	17	17	9.30
116	25	299	11	11	3.14	194	33	331	7	11	4.24	305	22	018	18	19	6.31
117	30	301	9	10	3.97	195	30	330	9	12	4.92	306	30	031	18	20	10.19
118	25	297	11	12	4.85	196	36	323	9	11	5.26	307	22	041	21	24	14.19
119	41	307	10	11	5.07	197	33	333	10	12	4.66	310	14	052	21	21	6.07
120	28	299	9	10	3.68	198	19	323	15	16	4.03	312	14	063	18	20	8.13
121	14	303	11	12	4.02	199	33	341	9	12	4.39	325	25	020	25	26	4.91
122	22	301	11	12	4.52	200	30	334	7	9	3.56	326	17	028	26	27	8.22
123	33	295	9	10	4.45	201	19	337	8	9	3.18	327	30	032	32	32	5.97
124	28	290	11	12	4.07	202	17	323	9	10	3.52	328	28	034	29	30	8.01
125	19	287	13	14	3.89	203	22	324	8	9	4.65	331	19	028	20	22	7.31
126	14	291	12	12	2.88	204	14	327	8	10	6.06	332	17	038	24	24	11.51
127	19	292	9	11	3.26	216	19	322	7	10	5.13	333	25	038	26	27	9.49
133	17	277	11	11	2.87	217	25	304	7	10	2.60	351	17	021	24	25	8.15
134	30	277	10	10	4.31	218	17	316	5	11	3.70	352	19	028	26	26	6.71
135	60	284	9	10	4.30	219	28	006	7	14	6.48	354	25	034	32	33	5.80
136	44	281	10	10	4.01	220	36	346	8	13	6.56	359	17	041	26	27	4.26
137	60	282	10	11	4.30	221	38	351	11	14	8.45	360	19	044	23	25	10.87
138	55	287	10	11	4.48	222	33	333	9	11	5.25	361	14	054	23	27	12.48
139	44	286	11	11	4.22	223	44	331	9	11	4.29	380	14	038	30	31	7.96
140	41	296	10	11	3.44	224	30	338	8	12	6.73						
141	33	303	9	10	4.59	225	30	354	6	11	5.63						
142	41	306	9	10	3.55	226	30	002	7	10	4.14						
143	33	296	10	11	3.14	227	25	334	7	9	3.22						
144	41	312	11	13	4.64	228	14	337	8	10	3.90						
145	38	312	8	9	3.96	229	17	338	7	10	4.49						
146	30	308	10	11	4.42	231	14	316	10	14	2.85						
147	38	301	11	12	3.00	232	14	315	10	14	4.19						
148	44	301	11	12	4.27	233	17	300	8	12	5.94						
149	30	311	11	12	3.79	246	33	019	12	14	10.54						
150	14	300	12	12	5.75	247	49	015	14	17	10.88						
160	22	283	9	9	4.24	248	36	023	14	16	9.65						
161	33	287	10	10	3.62	249	30	013	11	12	5.27						
162	38	286	9	10	3.52	251	22	017	14	17	7.75						
163	36	303	8	10	3.66	252	28	027	14	16	8.35						



TROPICAL STORM AND TYPHOON FREQUENCY 16 SEP - 15 OCT

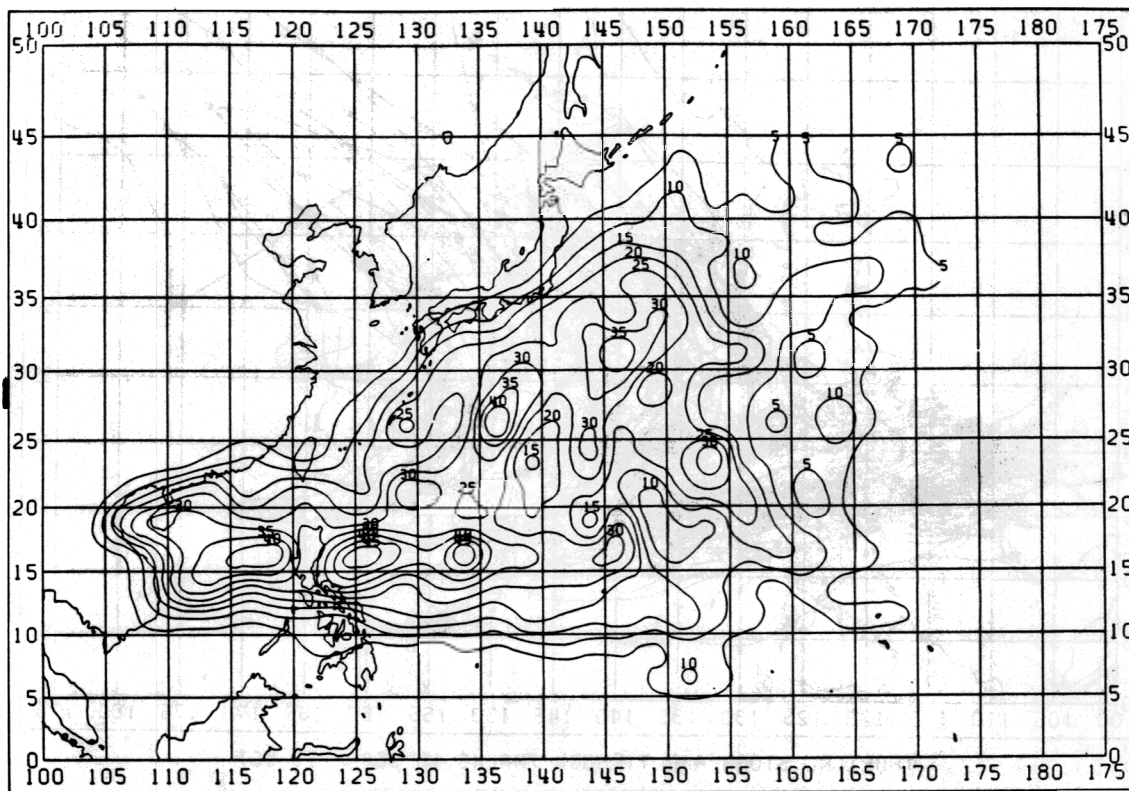


TROPICAL STORM AND TYPHOON MOTION 16 SEP - 15 OCT

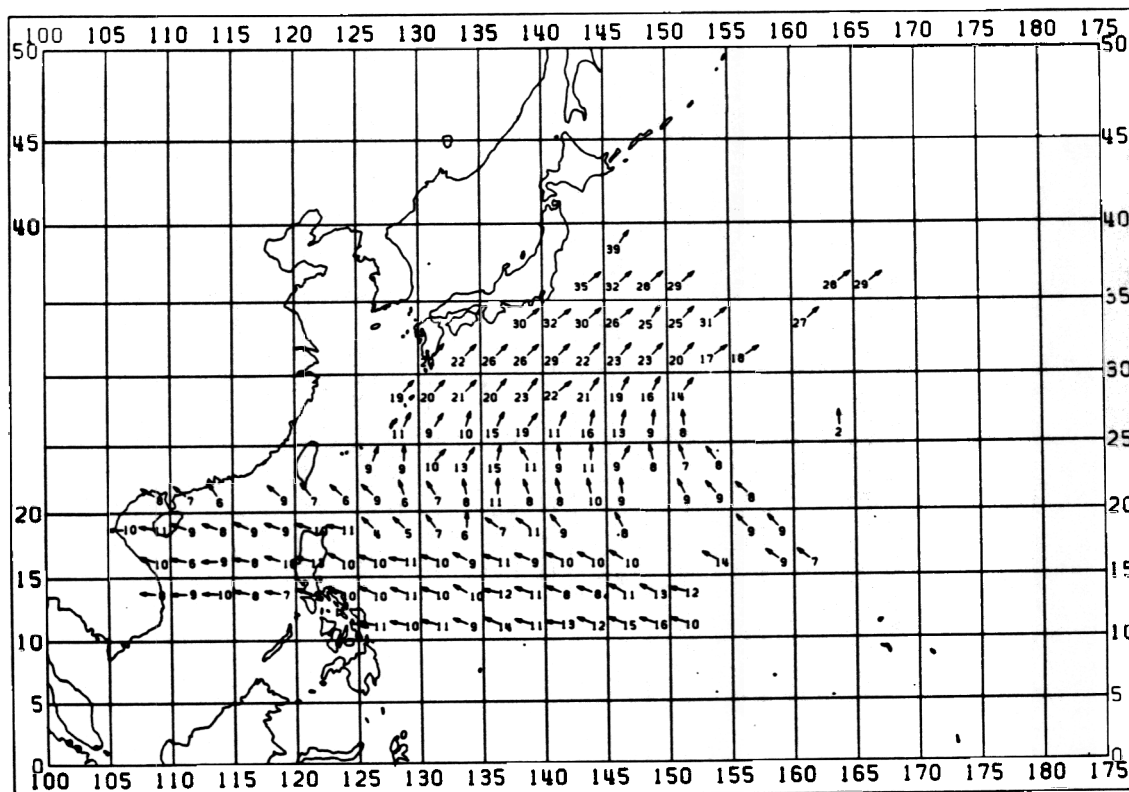


TROPICAL STORM AND TYPHOON TRACKS 16 SEP 15 OCT

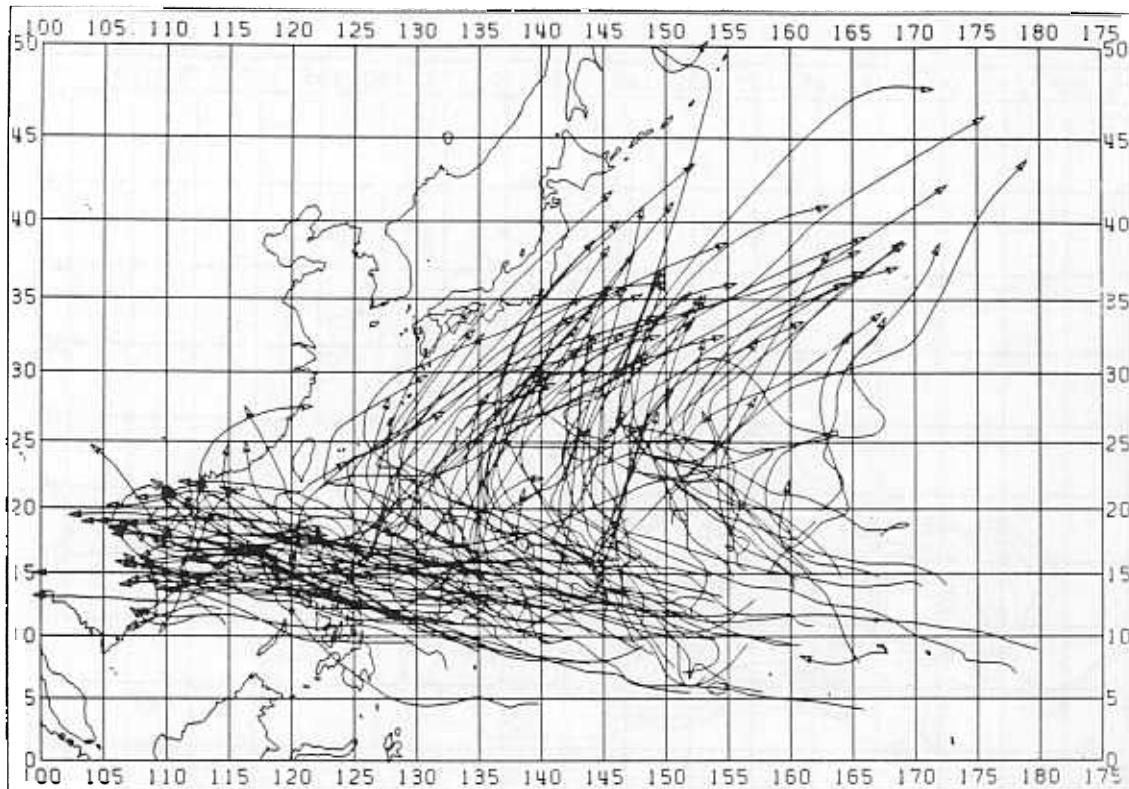
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65	14	298	11	12	4.48	148	30	298	11	11	4.76	250	14	023	21	23	9.23
70	14	302	8	10	3.27	149	33	308	10	12	3.95	251	22	029	13	15	6.16
83	17	289	8	10	4.40	151	14	326	12	13	7.14	252	33	027	17	19	8.84
84	17	277	8	9	4.17	160	14	282	8	9	3.89	253	25	034	19	21	8.33
86	19	283	6	8	5.56	161	25	303	7	9	3.96	254	14	011	12	13	1.47
87	28	287	11	13	5.23	162	30	304	7	9	3.94	255	14	024	11	14	4.25
88	33	292	11	11	2.93	163	28	317	6	8	4.50	273	30	033	19	20	10.22
89	38	291	11	12	3.90	164	33	312	8	10	4.28	274	38	036	22	23	7.21
90	30	286	10	10	2.58	165	44	314	7	11	4.72	275	36	034	23	25	6.60
91	25	283	10	11	2.60	166	36	300	8	11	4.73	276	33	037	21	23	9.79
92	14	304	11	13	3.96	167	38	303	9	11	3.72	277	19	042	20	22	8.42
93	25	302	10	11	3.88	168	36	300	9	12	3.45	278	36	032	17	18	7.21
94	22	293	10	10	3.87	169	33	299	10	12	3.70	279	38	045	20	22	8.65
95	25	292	7	9	2.50	170	30	300	10	12	3.04	280	38	038	19	21	9.43
96	22	304	7	9	3.77	171	25	312	10	12	2.95	283	19	050	13	17	6.91
97	19	294	12	13	3.83	172	33	316	12	13	3.83	284	14	040	14	17	5.72
98	19	298	14	14	5.23	173	33	326	11	13	3.58	299	14	018	19	20	6.85
109	30	287	6	9	2.72	174	22	328	9	9	2.60	300	19	032	27	28	10.66
110	44	280	11	12	3.63	175	14	328	8	9	2.54	301	36	041	26	27	6.29
111	44	280	9	10	4.67	177	19	328	11	12	5.86	302	33	044	27	28	7.36
112	44	285	12	13	5.04	178	19	325	12	13	5.11	303	22	052	28	29	11.48
113	25	283	13	14	2.75	189	25	300	10	11	3.75	304	28	048	26	27	11.55
114	57	301	11	12	3.18	190	22	312	8	10	3.26	305	22	046	25	27	12.96
115	49	287	11	11	3.07	191	25	323	5	9	2.93	306	33	034	21	22	11.04
116	36	284	12	13	3.35	192	30	339	7	11	4.19	307	30	047	25	26	13.48
117	28	289	12	12	3.28	193	30	345	8	11	3.67	308	14	043	30	33	10.23
118	38	290	10	11	3.41	194	17	356	7	11	3.36	311	14	054	23	23	2.19
119	36	294	9	10	3.90	195	17	034	7	11	6.17	327	17	035	35	35	5.77
120	30	293	9	11	3.72	196	25	014	9	12	5.74	328	22	037	31	32	6.32
121	17	289	11	12	4.75	197	30	347	12	15	4.90	329	17	044	27	27	5.47
122	28	298	10	11	7.00	198	17	319	14	15	5.50	330	19	053	31	31	10.79
123	30	302	10	10	6.49	199	30	352	10	12	4.67	331	25	047	29	30	11.91
124	22	297	10	11	4.41	200	36	336	9	11	4.43	332	25	050	26	29	10.77
125	17	293	14	15	3.22	201	17	345	5	7	4.23	333	22	043	26	27	9.89
126	19	295	12	13	3.33	202	14	335	6	8	3.27	334	17	046	31	31	9.33
127	19	286	11	12	3.76	203	19	355	6	9	3.41	335	14	053	39	39	7.06
128	22	289	9	12	4.87	204	17	352	8	13	4.50	354	14	034	34	34	4.96
133	30	271	10	10	3.29	219	25	036	12	14	5.95	356	14	041	29	30	3.86
134	33	275	11	11	4.76	220	28	028	10	12	7.22	358	17	037	30	31	8.41
135	57	289	9	10	3.86	221	22	005	10	14	8.82	359	19	043	26	28	6.69
136	38	289	9	10	3.10	222	30	006	9	12	3.88	360	17	052	23	24	6.76
137	38	283	9	10	4.66	223	41	005	11	14	5.17	361	17	055	30	31	10.11
138	38	291	9	10	4.55	224	19	009	9	14	8.51						
139	33	290	11	11	4.33	225	28	019	10	14	6.02						
140	33	296	10	11	2.87	226	36	017	12	14	6.06						
141	30	311	7	10	4.79	227	17	355	12	14	4.09						
142	30	302	8	11	3.63	228	22	342	7	10	2.07						
143	19	309	10	10	3.27	229	22	330	6	10	3.48						
144	22	327	9	11	3.01	246	30	036	16	17	9.89						
145	19	320	8	9	3.93	247	33	033	19	20	11.63						
146	25	306	9	10	3.88	248	30	030	19	20	8.99						
147	36	303	10	11	3.44	249	30	028	18	19	5.82						



TROPICAL STORM AND TYPHOON FREQUENCY OCT - 31 OCT

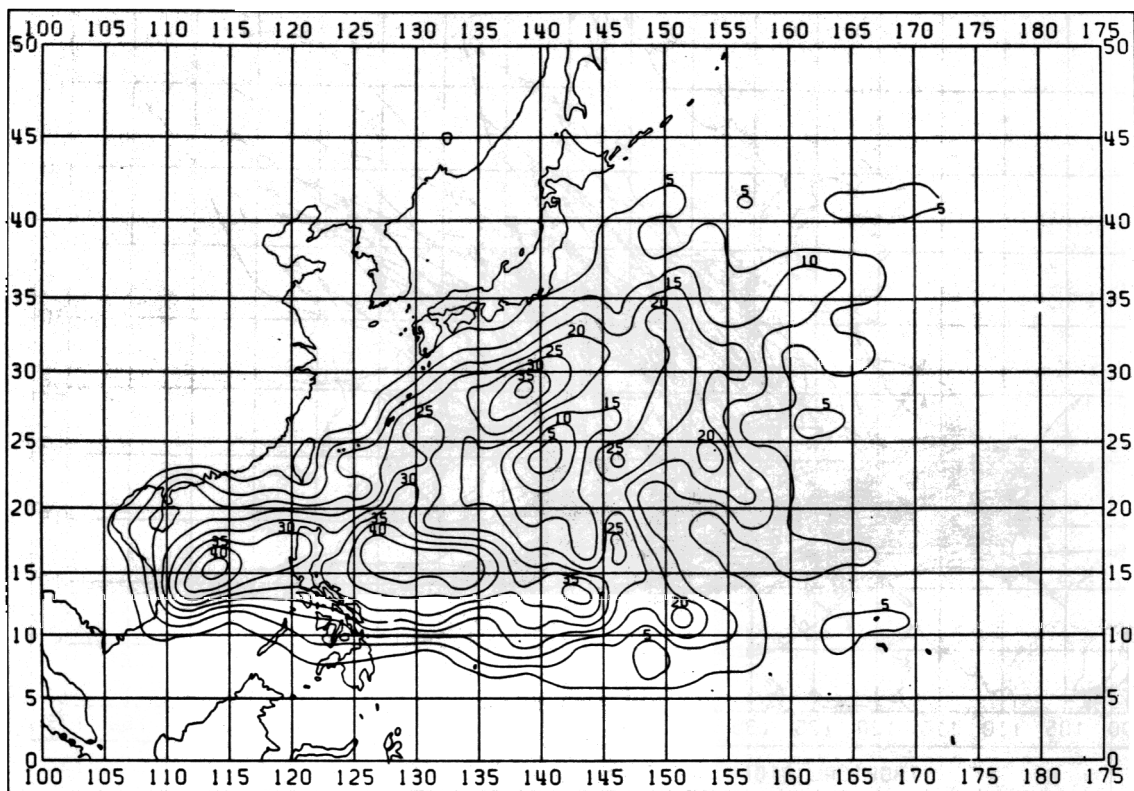


TROPICAL STORM AND TYPHOON MOTION 1 OCT - 31 OCT

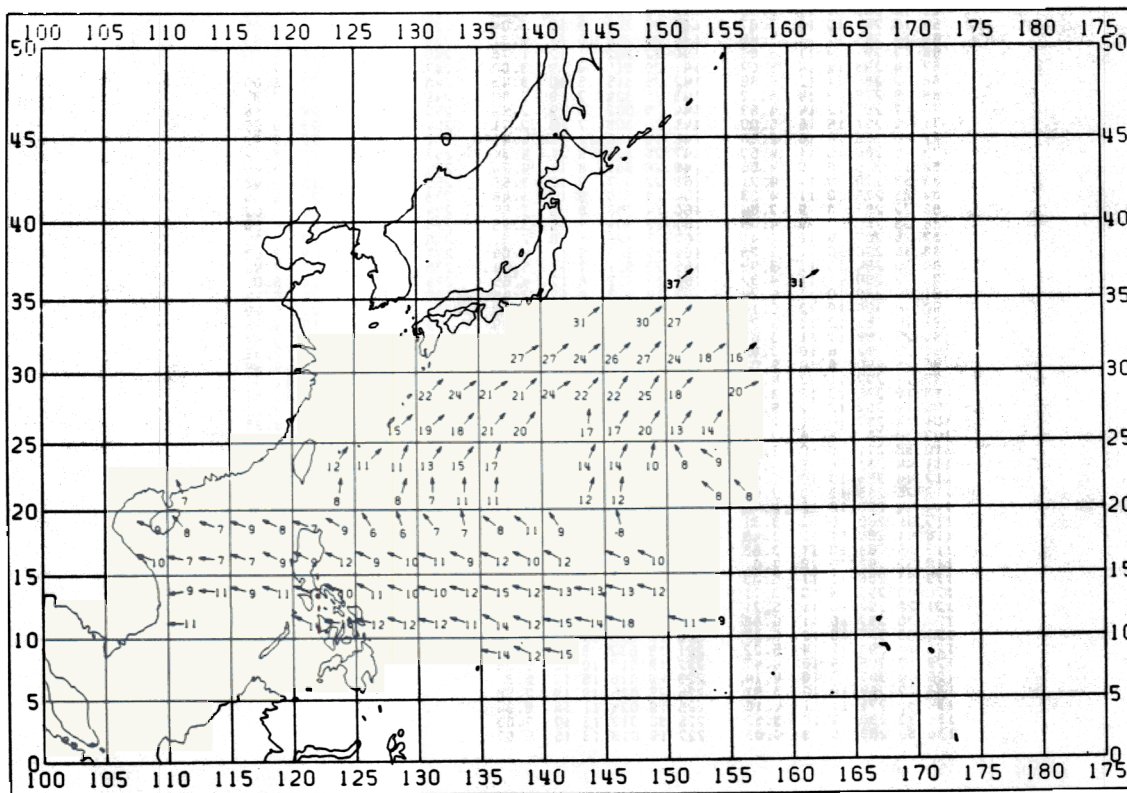


TROPICAL STORM AND TYPHOON TRACKS 1 OCT 31 OCT

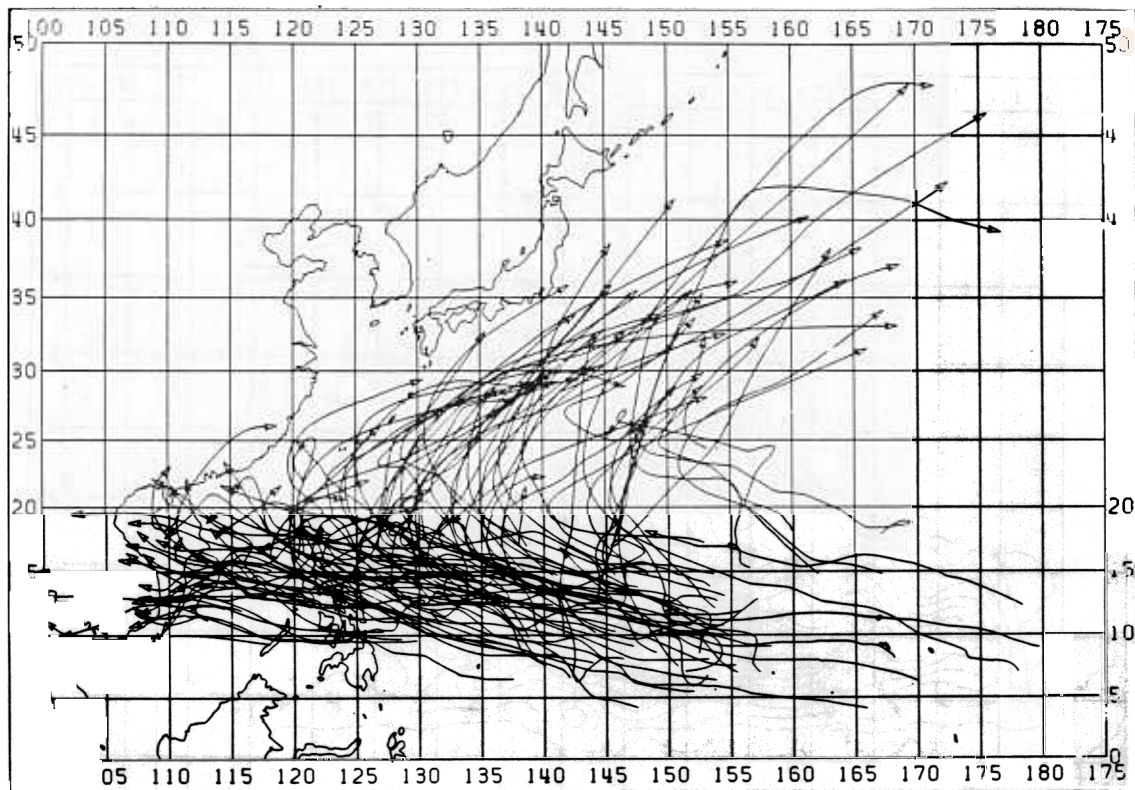
A	B	C	D	E	F	A	B	C	D	E	F	A	B	C	D	E	F
63	14	282	11	11	2.53	137	28	293	9	9	2.66	228	25	005	9	11	4.84
64	19	282	10	11	3.87	138	25	289	9	10	3.04	229	22	356	8	11	2.65
65	19	285	11	11	5.48	139	28	288	10	11	4.21	234	14	357	2	8	3.49
66	17	291	9	11	6.85	140	22	282	11	12	1.78	246	14	042	19	19	6.65
67	14	293	14	14	5.07	141	25	315	4	9	3.00	247	22	042	20	21	7.10
68	22	286	11	12	5.80	142	25	315	5	10	3.43	248	19	043	21	22	8.00
69	19	279	13	14	5.12	143	25	324	7	9	2.80	249	30	038	20	21	7.35
70	17	291	12	14	4.83	144	25	002	6	9	2.52	250	36	037	23	24	7.58
71	19	291	15	16	5.00	145	25	308	7	9	2.71	251	25	052	22	23	9.25
72	14	288	16	16	2.58	146	19	305	11	12	4.41	252	30	034	21	22	8.72
73	19	288	10	11	4.69	147	25	323	9	11	4.34	253	30	029	19	20	8.12
82	14	275	8	9	4.06	149	28	333	8	11	4.24	254	14	029	16	17	5.40
83	33	270	9	11	4.21	153	22	317	9	10	3.53	255	22	037	14	15	3.43
84	33	273	10	11	4.63	154	14	318	9	10	3.46	273	17	039	20	22	6.36
85	22	283	8	9	2.84	160	14	299	8	9	3.56	274	22	044	22	24	6.62
86	28	280	7	9	4.06	161	22	309	7	9	3.95	275	25	045	26	27	6.65
87	28	287	9	11	2.41	162	25	326	6	8	2.91	276	28	045	26	27	8.75
88	36	290	10	11	2.28	164	19	310	9	11	4.09	277	25	045	29	29	3.63
89	30	294	10	11	3.99	165	22	321	7	11	5.04	278	30	040	22	23	7.98
90	22	290	11	11	4.32	166	17	312	6	12	4.65	279	41	041	23	24	8.05
91	30	290	10	11	4.74	167	14	313	9	12	3.44	280	30	044	23	24	8.14
92	30	300	10	12	5.16	168	36	341	6	10	3.50	281	22	042	20	21	5.69
93	25	282	12	13	4.21	169	33	328	7	10	2.99	282	22	054	17	19	4.35
94	25	289	11	11	3.69	170	25	349	8	12	4.73	283	22	057	18	19	6.97
95	25	292	8	10	3.86	171	28	002	11	12	4.33	302	19	051	30	30	7.33
96	25	290	8	10	5.03	172	19	342	8	11	4.26	303	25	054	32	33	9.59
97	17	287	11	12	4.79	173	19	348	8	11	4.01	304	30	049	30	31	11.93
98	19	296	13	13	3.53	174	22	349	10	12	4.42	305	19	053	26	28	13.35
99	14	284	12	12	5.08	175	14	356	9	10	5.89	306	30	035	25	26	9.12
108	14	287	10	11	2.64	177	22	334	9	12	5.57	307	28	044	25	26	8.93
109	30	281	6	8	2.10	178	25	319	9	11	3.47	308	14	051	31	33	7.01
110	38	271	9	10	3.28	179	22	313	8	9	3.84	311	17	047	27	27	8.49
111	44	281	8	9	4.04	193	17	020	9	11	5.17	330	19	051	35	36	12.58
112	44	288	10	10	2.56	194	17	002	9	10	3.91	331	25	049	32	34	15.35
113	25	285	13	13	2.69	195	19	043	10	13	6.04	332	28	049	28	31	11.84
114	44	298	10	12	2.72	196	28	031	13	15	6.12	333	19	050	29	30	12.80
115	49	289	10	12	3.31	197	30	013	15	17	5.66	338	14	052	28	29	11.09
116	41	280	11	12	3.49	198	14	329	11	14	4.99	357	14	036	39	40	10.19
117	36	289	10	11	3.83	199	19	356	9	11	5.58						
118	52	298	9	10	4.01	200	33	004	11	13	5.83						
119	33	288	11	11	5.03	201	17	029	9	10	8.49						
120	33	293	9	10	3.71	202	22	347	8	11	5.26						
121	28	294	10	11	5.21	203	25	341	7	11	1.95						
122	30	297	10	11	6.88	204	36	324	8	13	4.10						
123	33	303	10	12	6.27	220	28	026	11	13	6.10						
126	14	298	14	14	5.22	221	19	032	9	13	7.45						
128	17	306	9	10	4.47	222	19	017	10	12	5.39						
129	14	307	7	10	4.14	223	49	026	15	17	6.31						
133	22	269	10	10	3.81	224	25	035	19	19	7.58						
134	33	279	11	11	4.16	225	19	024	11	14	8.34						
135	33	290	9	10	3.42	226	30	013	16	17	7.03						
136	30	289	8	9	4.03	227	19	013	13	15	5.87						



TROPICAL STORM AND TYPHOON FREQUENCY 16 OCT - 15 NOV

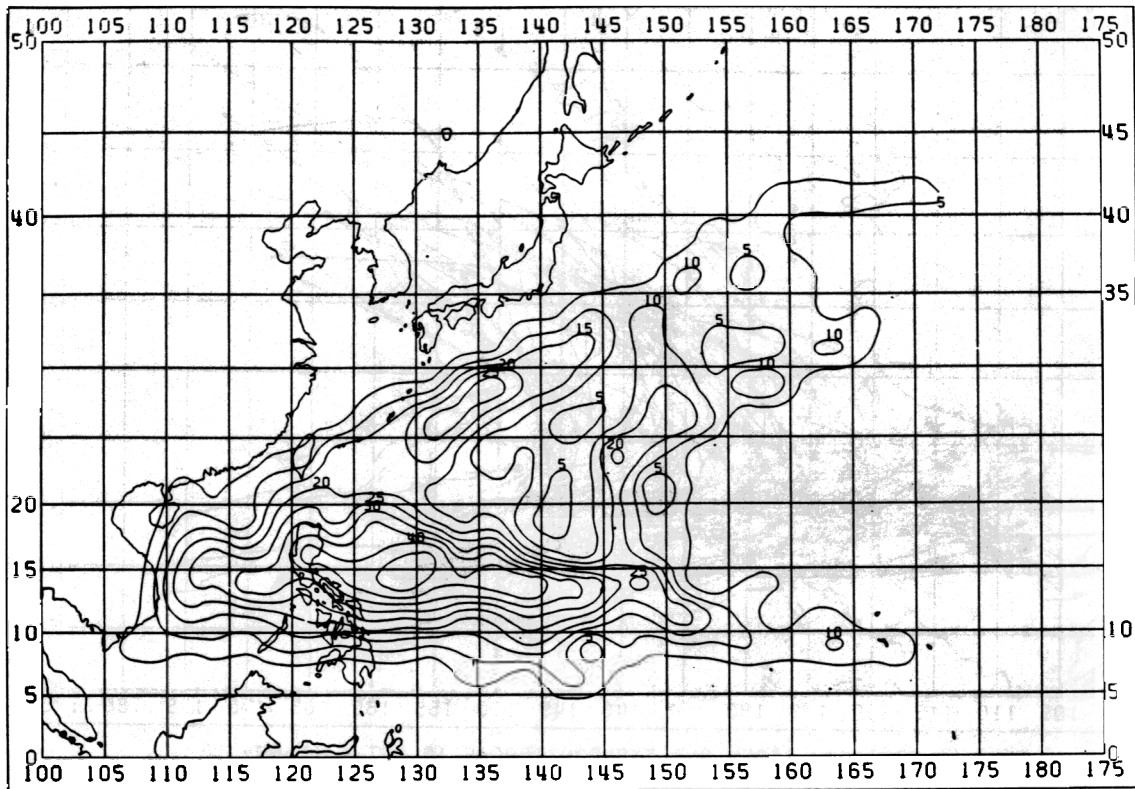


TROPICAL STORM AND TYPHOON MOTION 16 OCT - 15 NOV

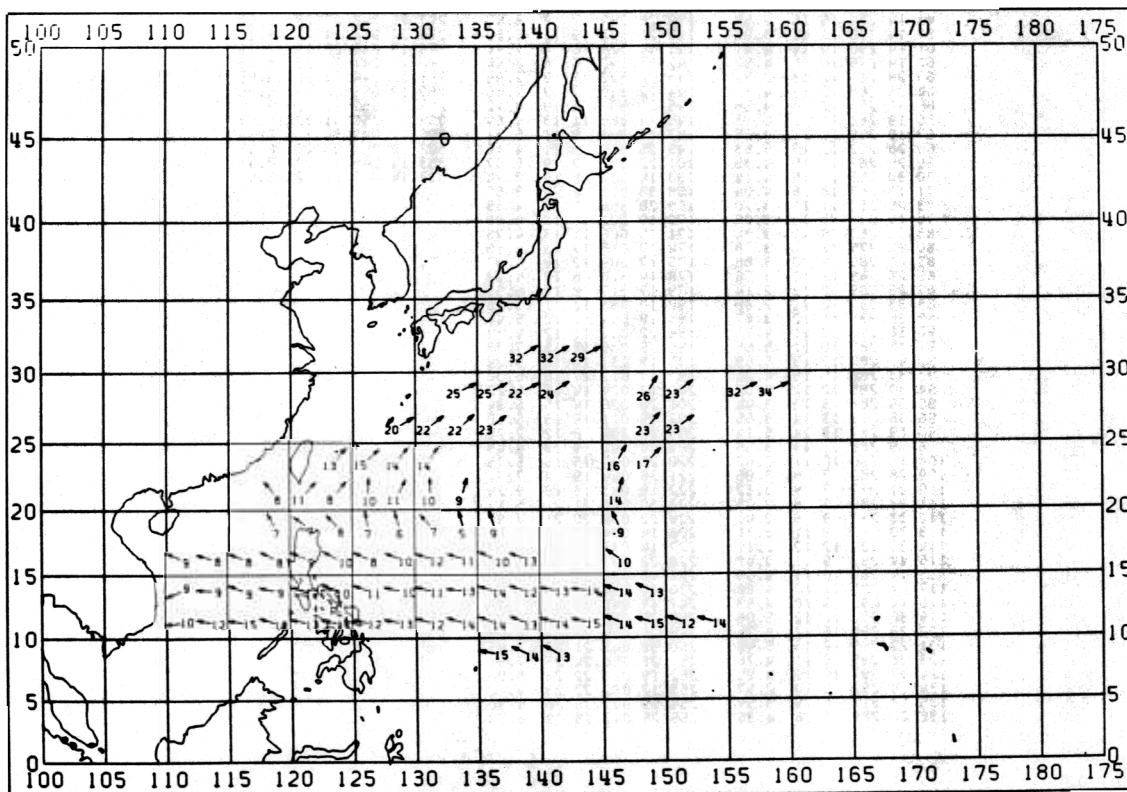


TROPICAL STORM AND TYPHOON TRACKS 16 OCT - 15 NOV

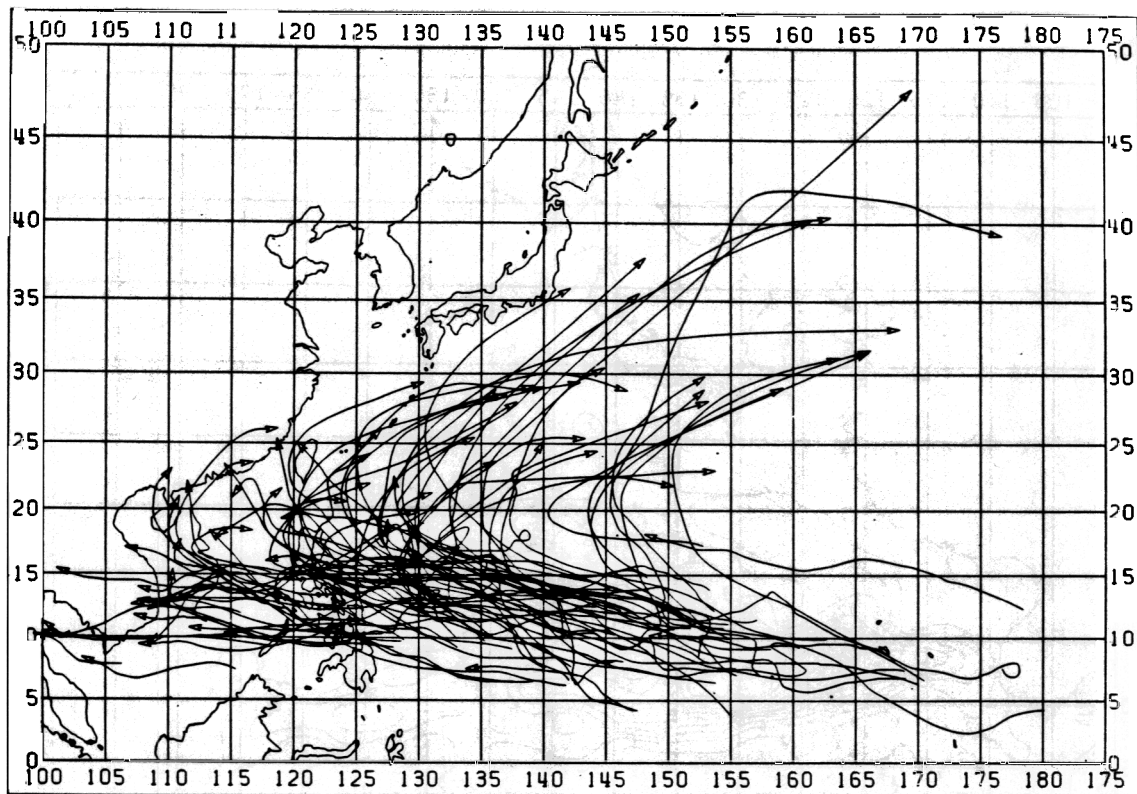
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41	17	282	14	14	5.38	137	22	289	9	10	2.06	257	14	065	20	23	9.55
42	19	295	12	13	4.59	138	25	295	8	10	3.34	276	17	056	27	28	6.56
43	14	284	15	15	2.58	139	28	289	7	9	3.66	277	25	048	27	28	6.62
57	14	270	11	11	3.06	140	22	302	9	11	3.60	278	22	051	24	26	9.16
61	14	296	14	14	4.41	141	36	328	6	11	2.34	279	19	045	26	27	7.29
62	14	276	16	16	4.52	142	33	340	6	11	3.56	280	17	041	27	29	8.83
63	28	285	12	13	2.97	143	22	322	7	11	2.94	281	22	044	24	26	9.65
64	25	288	12	12	4.30	144	22	350	7	11	2.66	282	17	053	18	19	5.15
65	30	284	12	12	4.58	145	22	307	8	11	4.12	283	17	052	16	18	7.54
66	19	286	11	12	6.13	146	14	308	11	15	4.84	304	17	050	31	32	13.28
67	19	299	14	15	4.25	147	17	326	9	11	5.31	306	22	049	30	32	6.33
68	28	292	12	13	5.63	149	25	345	8	11	4.16	307	19	043	27	28	6.46
69	25	282	15	15	4.39	161	22	337	7	9	5.07	333	14	048	37	38	7.41
70	30	285	14	15	4.14	166	14	007	8	10	3.24	337	14	057	31	32	8.45
71	17	287	18	18	4.04	168	33	018	8	9	3.56						
73	25	287	11	11	3.10	169	28	358	7	10	4.35						
74	14	272	9	10	3.09	170	19	002	11	12	4.90						
83	36	262	9	12	3.34	171	19	006	11	13	4.75						
84	36	275	11	12	3.76	174	17	018	12	13	4.16						
85	28	286	9	10	3.88	175	17	009	12	13	4.97						
86	25	288	11	12	3.56	178	14	310	8	10	4.33						
87	25	289	12	12	2.14	179	17	317	8	10	5.59						
88	33	290	10	11	2.38	192	17	033	12	12	3.58						
89	36	298	11	12	3.87	193	19	044	11	12	5.46						
90	38	292	10	11	4.73	194	22	023	11	12	4.34						
91	36	285	10	11	5.56	195	25	035	13	15	7.73						
92	41	286	12	13	5.69	196	19	037	15	16	6.34						
93	33	286	15	15	4.26	197	17	019	17	18	5.30						
94	30	288	12	12	4.02	200	17	024	14	15	5.22						
95	36	283	13	13	3.44	201	28	026	14	15	6.34						
96	36	279	13	14	3.55	202	19	011	10	13	6.10						
97	19	287	13	14	5.14	203	14	332	8	12	2.28						
98	19	288	12	13	3.55	204	25	306	9	13	4.69						
108	14	290	10	11	2.62	220	25	047	15	15	6.76						
109	28	282	7	8	3.05	221	28	049	19	19	7.72						
110	41	277	7	9	3.32	222	19	041	18	19	9.24						
111	33	289	7	8	2.75	223	30	041	21	21	5.11						
112	33	297	9	9	2.41	224	22	036	20	21	4.97						
113	30	296	9	11	3.11	226	14	004	17	18	7.42						
114	30	294	12	12	2.11	227	14	032	17	19	8.07						
115	44	297	9	11	3.48	228	22	033	20	20	9.18						
116	44	294	10	11	4.59	229	19	036	13	15	4.64						
117	44	291	11	12	4.98	230	14	034	14	17	8.04						
118	44	296	9	10	4.53	247	17	045	22	22	7.16						
119	36	292	12	12	5.05	248	25	055	24	24	4.85						
120	22	295	10	12	4.74	249	28	056	21	22	8.21						
121	22	299	12	13	5.44	250	38	043	21	22	7.46						
123	28	295	9	11	4.76	251	28	058	24	25	7.91						
124	17	297	10	11	4.04	252	19	041	22	24	8.92						
134	14	292	9	10	2.57	253	17	032	22	23	9.60						
135	17	317	8	9	3.57	254	19	032	25	26	5.90						
136	22	289	7	8	4.36	255	25	043	18	19	6.59						



TROPICAL STORM AND TYPHOON FREQUENCY 1 NOV - 30 NOV

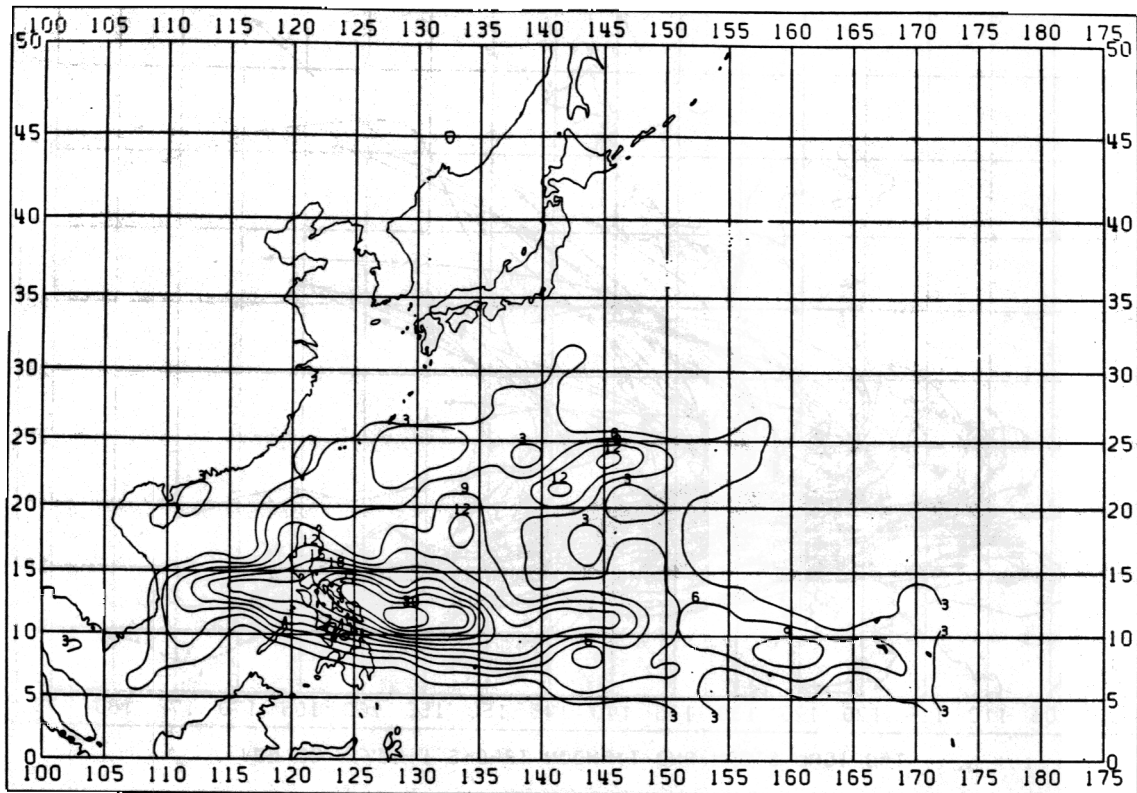


TROPICAL STORM AND TYPHOON MOTION 1 NOV - 30 NOV

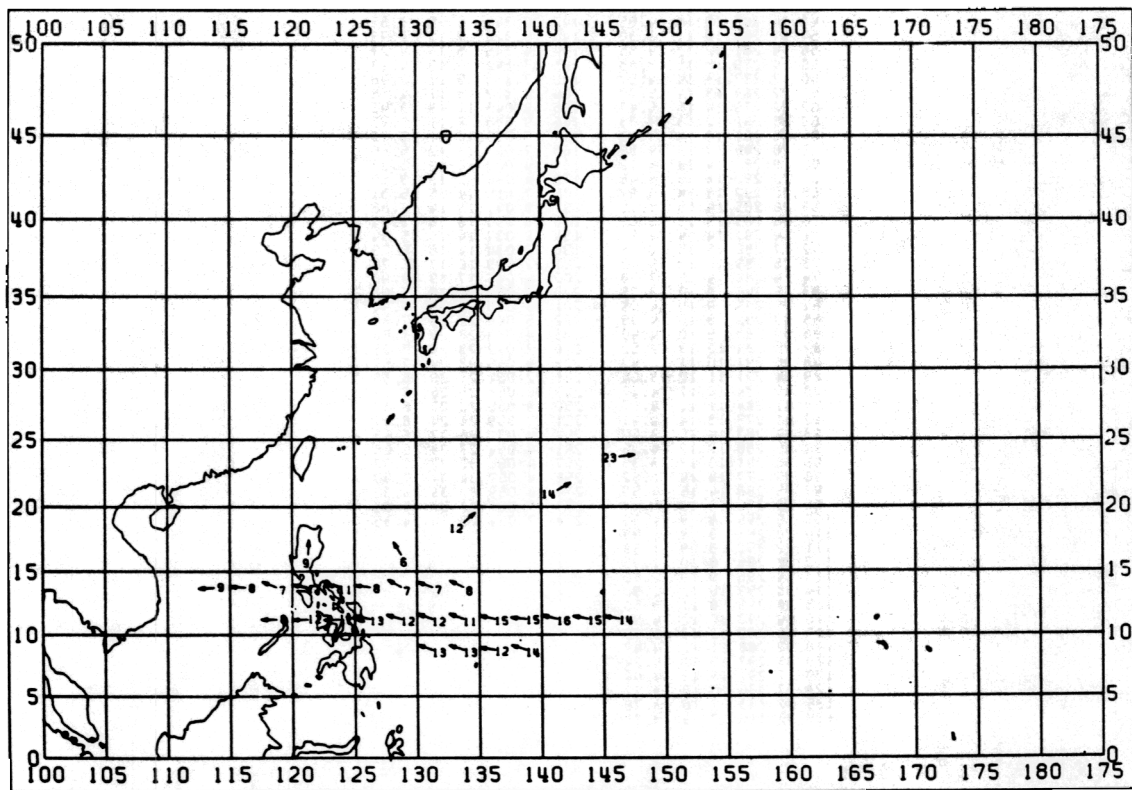


TROPICAL STORM AND TYPHOON TRACKS 1 NOV - 30 NOV

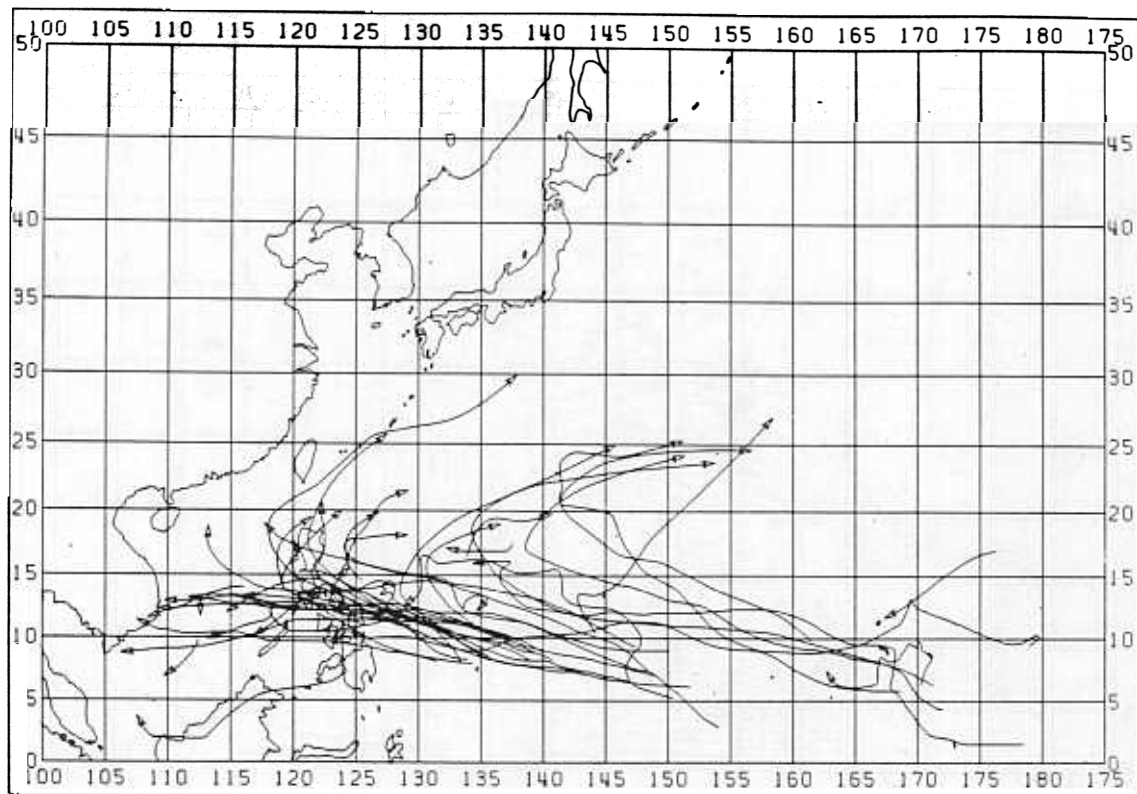
A	B	C	D	E	F	A	B	C	D	E	F
41	14	281	15	16	3.25	140	22	319	8	11	3.92
42	19	286	14	15	3.28	141	36	350	7	10	2.94
43	14	300	13	14	4.05	142	30	344	6	9	3.85
57	17	265	10	11	3.90	143	19	320	7	11	2.79
58	14	281	12	13	4.55	144	14	345	5	10	4.27
59	14	279	15	15	3.83	145	17	342	9	10	4.43
60	17	287	13	14	4.51	149	17	335	9	11	2.96
61	22	283	13	14	5.72	164	14	322	8	11	4.58
62	22	279	14	15	5.47	165	19	043	11	13	3.95
63	28	282	12	13	3.73	166	19	038	8	11	5.70
64	25	281	13	14	5.48	167	17	005	10	11	3.29
65	28	286	12	13	4.85	168	17	027	11	12	5.56
66	19	287	14	14	4.12	169	14	000	10	12	5.23
67	22	292	14	15	3.48	170	14	016	9	12	3.50
68	30	292	13	14	3.97	175	17	015	14	15	5.31
69	28	285	14	15	5.10	192	19	041	13	14	2.88
70	25	283	15	15	3.62	193	19	050	15	16	3.34
71	14	291	14	14	4.91	194	19	037	14	16	5.54
72	17	286	15	15	5.65	195	22	034	14	18	6.79
73	25	289	12	13	5.63	201	22	029	16	17	5.78
74	14	286	14	15	7.08	202	14	045	17	19	8.90
83	25	246	9	10	3.75	220	17	059	20	20	7.63
84	25	275	9	10	4.05	221	28	053	22	23	7.94
85	33	292	9	10	4.39	222	25	048	22	23	7.30
86	33	283	9	10	4.40	223	14	053	23	23	3.78
87	25	284	12	13	2.52	228	17	042	23	24	7.23
88	38	291	10	11	2.42	229	19	055	23	24	7.57
89	44	291	11	12	3.64	248	22	064	25	26	6.88
90	49	284	10	11	4.47	249	30	063	25	26	8.14
91	41	284	11	11	4.67	250	19	065	22	23	8.37
92	41	277	13	14	4.41	251	17	059	24	24	8.67
93	44	287	14	15	3.60	254	14	031	26	27	6.63
94	46	288	12	13	4.25	255	14	054	23	23	6.66
95	38	281	13	13	3.35	257	14	066	32	32	7.37
96	36	277	14	14	2.62	258	14	067	34	34	7.40
97	25	288	14	15	4.59	276	14	059	32	33	15.30
98	28	294	13	13	5.47	277	17	061	32	32	15.09
109	19	295	9	9	4.50	278	17	064	29	30	14.35
110	28	286	8	9	3.99						
111	22	292	8	9	1.99						
112	28	298	8	10	1.95						
113	44	296	9	10	2.56						
114	38	299	10	11	3.90						
115	38	295	8	11	3.56						
116	44	292	10	12	4.91						
117	46	289	12	13	5.12						
118	30	288	11	12	4.47						
119	36	297	10	11	4.24						
120	17	291	13	13	4.09						
123	17	306	10	12	4.72						
138	22	333	7	10	3.78						
139	30	310	7	9	3.73						



TROPICAL STORM AND TYPHOON FREQUENCY 1 DEC - 31 DEC

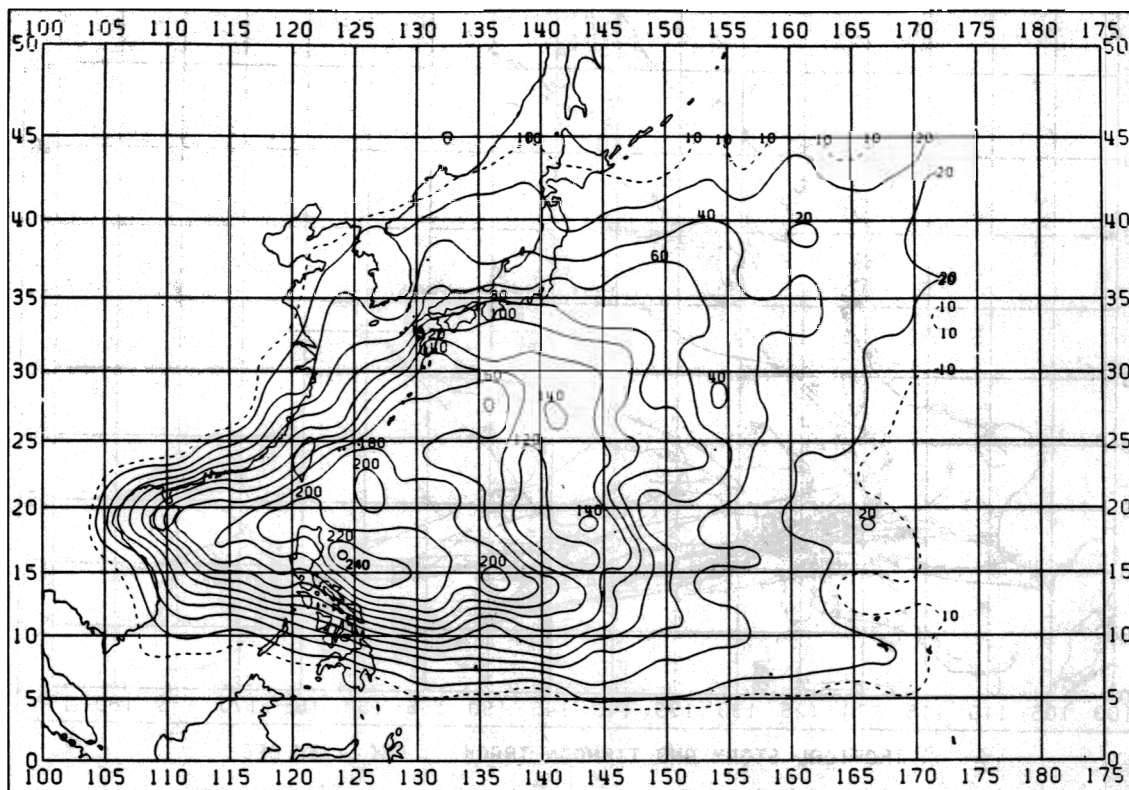


TROPICAL STORM AND TYPHOON MOTION DEC - 31 DEC

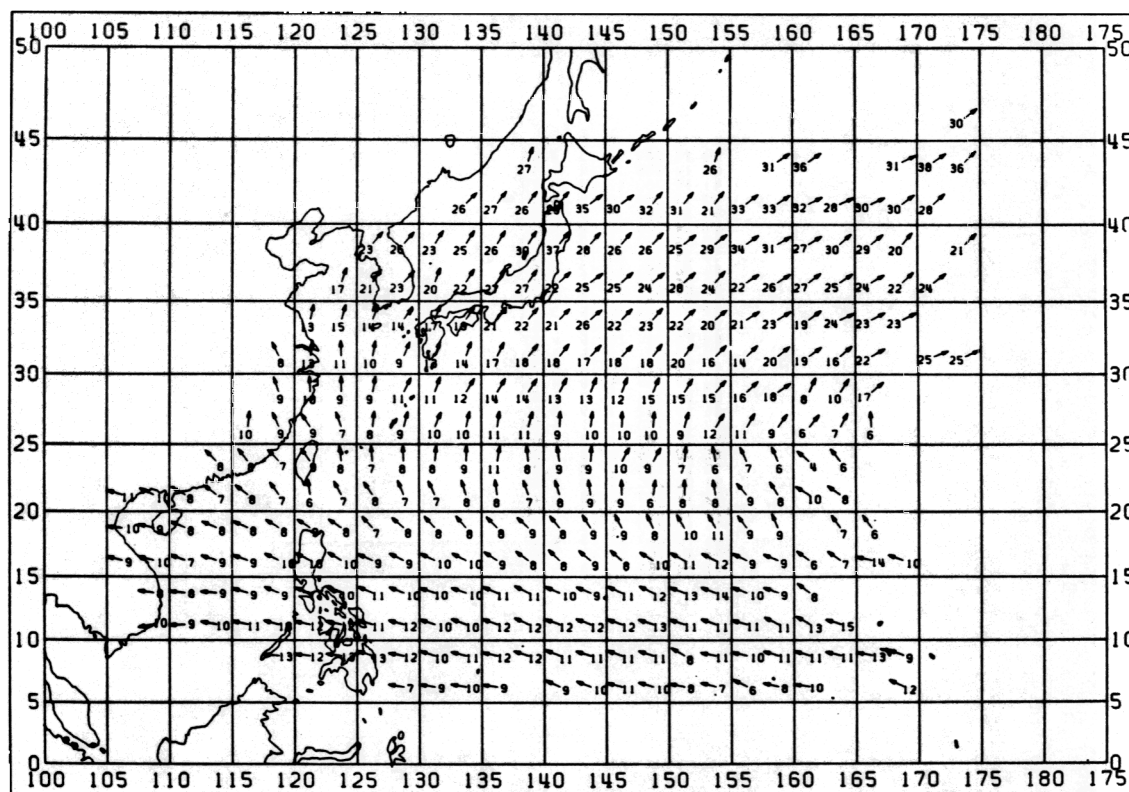


TROPICAL STORM AND TYPHOON TRACKS 1 DEC - 31 DEC

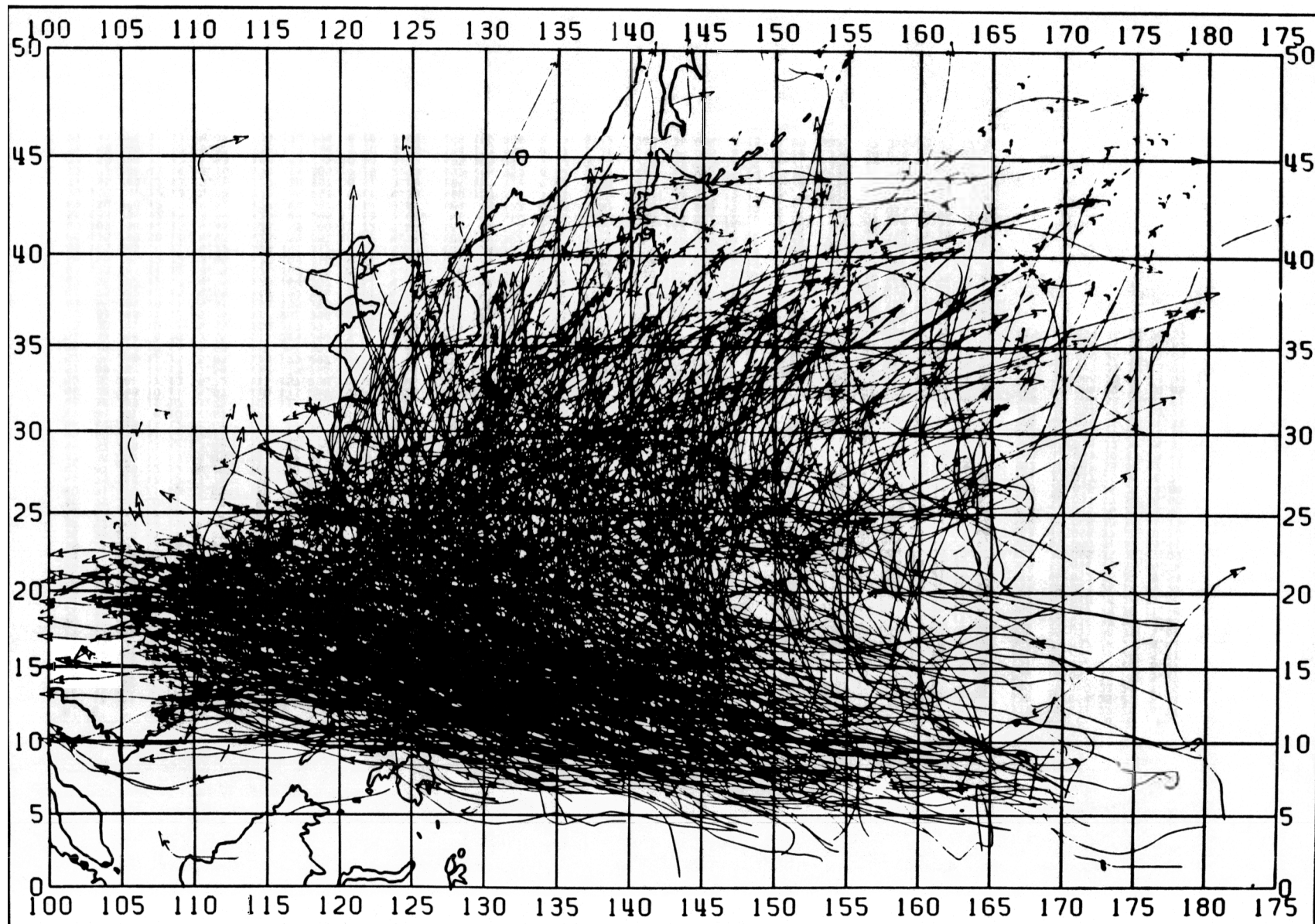
A	B	C	D	E	F
39	14	289	13	13	2.08
40	14	288	13	14	1.36
41	17	280	12	13	3.29
42	17	286	14	14	4.94
50	14	265	8	8	5.32
51	14	268	12	12	4.61
52	1	267	11	12	5.08
53	1	283	13	13	3.99
54	1	286	12	12	4.07
55	1	289	12	12	3.03
56	1	290	11	11	4.43
57	1	283	15	16	3.93
58	14	276	15	15	1.81
59	14	284	16	16	4.27
70	14	281	15	16	5.20
71	14	280	14	15	8.27
84	14	267	9	9	4.15
85	14	274	8	9	2.52
86	14	292	7	9	3.50
87	14	280	11	11	4.93
88	14	286	11	12	4.66
89	14	279	8	9	4.00
90	17	300	7	8	2.93
91	22	290	7	9	2.80
92	14	297	8	10	5.48
113	14	004	9	12	8.60
116	14	330	6	11	3.32
144	14	047	12	13	4.99
173	14	061	14	17	7.14
201	14	082	23	23	5.37



TROPICAL STORM AND TYPHOON FREQUENCY 1 JAN - 31 DEC



TROPICAL STORM AND TYPHOON MOTION 1 JAN - 31 DEC



TROPICAL STORM AND TYPHOON TRACKS, 1 JAN - 31 DEC, 1946 - 1982 (927 STORMS)

A	B	C	D	E	F	A	B	C	D	E	F	A	B	C	D	E	F	A	B	C	D	E	F	A	B	C	D	E	F	A	B	C	D	E	F
12	14	281	7	8	3.51	76	28	297	11	13	5.93	136	173	294	8	10	4.13	196	141	002	9	13	5.77	268	14	334	8	12	3.30	337	44	051	27	28	10.74
13	22	280	9	11	2.88	77	30	301	13	13	4.87	137	187	295	8	10	3.76	197	146	010	11	14	5.48	269	33	009	13	15	5.52	338	28	054	25	29	8.23
14	19	281	10	11	4.25	78	17	288	15	15	4.51	138	222	303	8	10	4.00	198	114	355	8	13	5.11	270	57	358	11	12	5.79	349	30	040	23	24	7.74
15	17	279	9	9	5.32	82	33	279	8	8	3.48	139	211	304	9	11	4.17	199	125	352	9	12	5.38	271	71	011	10	12	5.30	350	19	041	26	28	5.97
16	22	296	9	10	5.47	83	84	277	8	10	3.76	140	190	305	9	11	3.15	200	133	004	9	13	5.81	272	79	023	9	11	5.44	351	38	032	23	26	6.47
17	22	292	10	10	5.07	84	95	276	9	10	4.03	141	195	318	7	10	3.75	201	117	028	10	14	7.47	273	146	020	13	16	8.10	352	38	032	25	26	5.61
18	38	286	11	11	3.85	85	111	288	9	10	4.05	142	198	311	8	11	4.15	202	92	029	9	15	8.82	274	125	020	14	19	8.18	353	25	032	26	27	8.42
19	38	288	10	10	3.31	86	144	293	9	10	4.34	143	195	318	8	11	4.04	203	87	007	7	13	7.74	275	103	026	17	20	9.16	354	38	033	30	31	5.63
20	33	288	10	10	3.31	87	130	290	11	12	4.21	144	171	320	8	12	4.45	204	82	350	6	14	7.88	276	122	038	18	20	11.52	355	22	038	37	38	10.25
21	30	283	8	10	3.87	88	171	291	10	11	3.50	145	155	316	8	11	4.13	205	44	335	7	15	8.21	277	117	037	18	21	12.35	356	25	042	28	28	11.18
22	22	286	7	9	4.61	89	222	293	11	12	4.24	146	103	314	9	12	4.59	206	28	337	6	10	3.74	278	114	042	17	20	11.57	357	36	040	26	28	12.56
23	17	298	6	9	4.69	90	217	292	10	11	3.90	147	128	322	8	12	4.16	207	17	310	4	12	5.50	279	109	043	18	20	10.93	358	38	043	26	28	11.27
24	17	284	8	8	3.83	91	211	289	10	11	4.32	148	146	328	9	12	4.69	208	19	322	6	11	4.23	280	84	036	18	21	10.45	359	46	052	25	27	9.63
25	14	279	10	11	2.92	92	173	289	10	12	4.79	149	117	333	9	12	4.59	215	14	007	10	16	3.93	281	57	035	20	22	10.05	360	57	051	29	31	16.74
26	25	277	12	13	2.83	93	206	293	11	12	4.50	150	41	336	8	13	6.05	216	68	336	9	12	4.50	282	57	044	16	20	7.90	361	38	055	34	36	17.03
27	28	278	13	14	2.83	94	152	297	11	12	4.10	151	52	332	11	12	6.35	217	98	325	9	12	4.10	283	52	044	14	18	7.52	362	25	060	31	33	13.11
28	52	288	13	13	4.07	95	165	294	10	11	4.08	152	30	332	11	12	3.41	218	92	340	7	12	4.40	284	28	050	20	22	7.48	363	17	058	27	29	10.10
29	63	281	12	12	4.27	96	138	293	9	12	4.05	153	28	324	9	10	3.67	219	152	007	8	13	7.06	285	30	053	19	21	14.08	364	28	048	30	31	11.13
30	79	288	10	11	4.09	97	87	295	11	13	4.74	154	22	337	9	11	3.26	220	173	015	9	14	7.08	286	36	049	16	20	12.01	378	22	045	26	28	6.46
31	71	285	11	12	3.46	98	79	296	12	13	5.09	155	14	325	7	12	6.67	221	168	023	10	15	8.16	295	19	013	13	14	3.90	379	22	037	27	30	5.50
32	79	283	12	12	3.74	99	46	292	13	13	5.48	159	41	287	11	12	3.56	222	163	014	10	14	7.21	296	52	016	15	17	6.93	380	25	035	26	29	8.68
33	87	288	12	13	4.20	100	30	291	14	15	6.26	160	87	295	10	11	3.78	223	179	009	11	15	6.58	297	41	021	14	17	7.26	381	17	037	29	33	8.71
34	98	292	11	13	4.09	101	33	291	10	12	4.77	161	119	301	8	10	3.87	224	128	016	11	16	7.46	298	38	035	14	16	9.07	382	14	053	35	38	12.16
35	57	288	11	12	3.92	102	28	290	9	10	5.01	162	149	308	7	9	3.10	225	144	003	9	14	6.57	299	76	021	17	18	6.77	383	17	053	32	33	13.60
36	60	290	11	12	4.11	103	28	307	8	11	4.21	163	138	308	8	10	3.81	226	128	008	10	14	6.14	300	84	033	19	21	10.06	384	17	039	32	34	14.37
37	44	289	11	12	3.61	107	17	285	9	9	3.65	164	157	324	7	11	4.45	227	95	002	10	14	6.24	301	101	036	21	23	10.92	385	25	039	31	32	13.18
38	44	301	8	10	4.69	108	55	285	10	10	2.94	165	195	352	6	12	4.36	228	95	006	10	14	7.30	302	95	038	22	25	9.46	386	25	036	21	24	11.33
39	38	283	11	12	3.75	109	111	290	7	9	3.41	166	184	332	7	11	4.16	229	84	016	9	15	8.17	303	87	042	21	23	13.35	387	19	052	33	34	13.71
40	38	283	10	11	4.07	110	173	288	9	10	4.25	167	214	326	8	11	4.12	230	46	033	12	18	9.25	304	68	048	26	27	14.08	388	25	056	33	34	21.61
41	36	286	11	13	5.72	111	157	290	9	10	4.95	168	182	338	7	12	4.68	231	49	031	11	16	7.33	305	68	043	22	24	12.30	389	25	064	32	34	20.89
42	31	287	11	13	7.64	112	179	296	10	12	5.18	169	198	335	7	12	4.11	232	38	036	9	17	8.34	306	73	039	23	25	11.67	390	25	066	28	31	13.00
43	36	284	11	13	5.83	113	173	297	10	12	4.34	170	179	343	8	12	4.33	233	36	040	6	14	7.92	307	76	046	22	24	11.54	406	14	017	27	29	13.97
44	19	261	10	11	1.90	114	241	301	10	11	3.63	171	152	353	8	13	5.31	243	38	357	10	15	6.41	308	57	048	20	24	12.39	412	17	020	26	27	11.04
45	38	268	9	10	3.35	115	219	294	9	11	3.25	172	117	342	7	12	5.50	242	33	340	9	11	3.87	309	44	057	21	25	12.46	414	17	055	31	33	13.82
46	30	281	10	11	4.36	116	217	297	8	11	4.09	173	125	344	8	13	4.61	243	38	357	10	15	6.41	310	46	058	23	25	11.78	415	22	054	36	38	20.57
47	33	283	11	12	5.74	117	206	296	10	12	4.49	174	125	353	9	13	5.04	244	76	360	9	13	6.00	311	52	053	19	22	12.02						
48	55	284	10	11	5.31	118	198	298	10	11	4.49	175	76	359	9	10	6.59	245	106	011	9	13	6.85	312	28	065	24	25	13.82						
49	73	282	12	13	4.68	119	192	304	9	11	4.56	176	57	009	6	14	7.49	246	146	028	11	15	8.81	322	33	019	17	19	7.74						
50	95	282	12	13	4.79	120	144	307	8	11	4.03	177	68	001	8	12	6.44	247	157	020	11	16	8.72	323	33	033	21	22	8.12						
51	128	287	11	12	3.74	121	109	315	8	12	4.60	178	57	351	8	14	7.27	248	163	032	12	17	9.46	324	19	043	23	25	4.82						
52	146	285	12	12	3.95	122	103	310	9	11	5.40	179	38	320	9	10	3.99	249	176	032	14	19	8.47	325	60	021	20	21	7.95						
53	165	288	10	11	4.22	123	141	312	8	11	5.03	180	28	328	8	11	5.93	250	138	033	14	19	8.80	326	46	031	22	24	7.62						
54	125	290	10	11	4.46	124	84	302	10	12	4.18	181	17	302	10	13	4.74	251	136	028	13	18	9.26	327	55	029	27	29	11.44						
55	103	290	12	13	4.45	125	55	300	11	12	5.55	182	14	306	8	10	4.61	252	125	023	13	17	8.46	328	49	034	27	29	11.45						

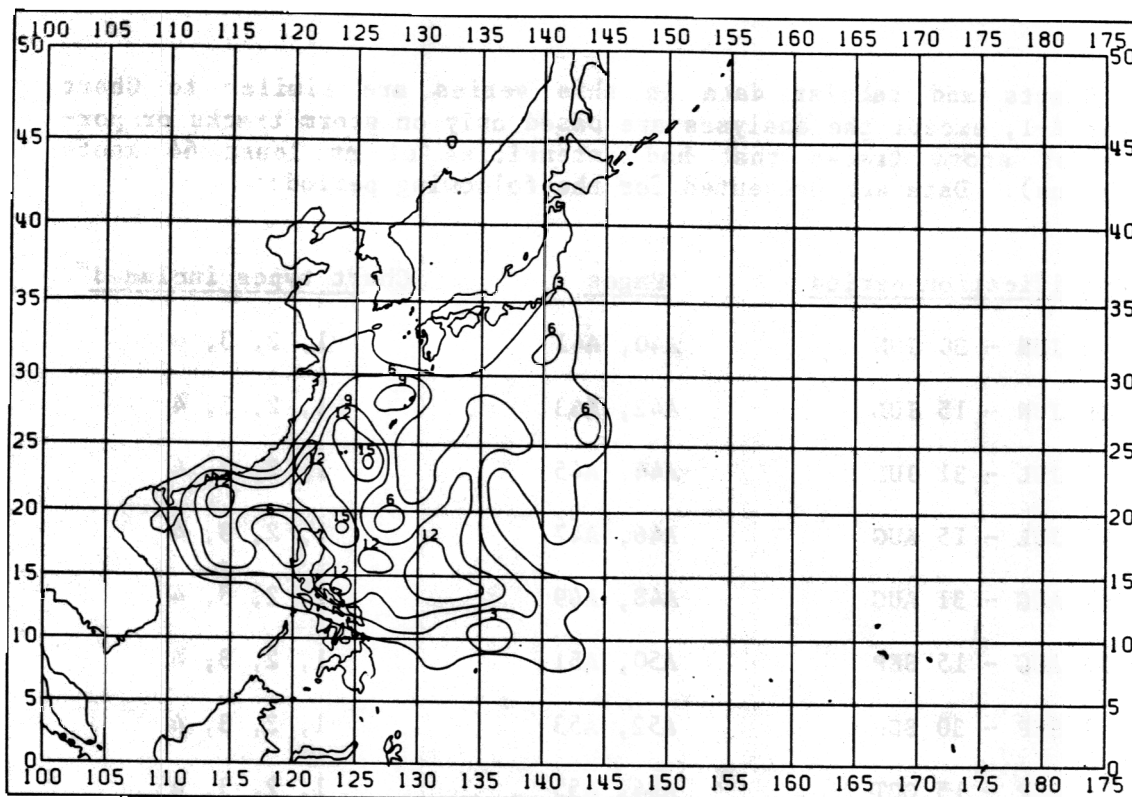
A.4 Chart Series A-II

Charts and tabular data in this series are similar to Chart Series A-I, except the analyses are based only on storm tracks or portions of storm tracks that had intensities of at least 64 knots (typhoons). Data are presented for the following periods:

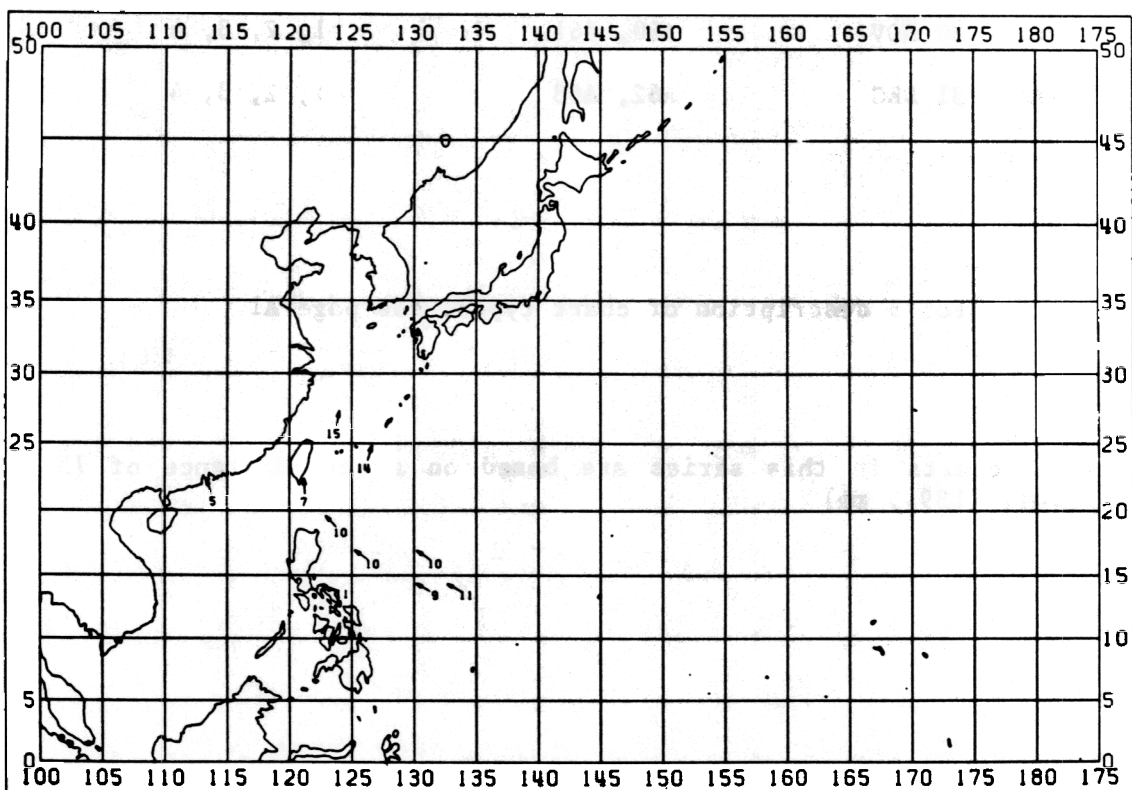
<u>Stratification period</u>	<u>Pages</u>	<u>Chart types included*</u>
1 JUN - 30 JUN	A40, A41	1, 2, 3, 4
16 JUN - 15 JUL	A42, A43	1, 2, 3, 4
1 JUL - 31 JUL	A44, A45	1, 2, 3, 4
16 JUL - 15 AUG	A46, A47	1, 2, 3, 4
1 AUG - 31 AUG	A48, A49	1, 2, 3, 4
16 AUG - 15 SEP	A50, A51	1, 2, 3, 4
1 SEP - 30 SEP	A52, A53	1, 2, 3, 4
16 SEP - 15 OCT	A54, A55	1, 2, 3, 4
1 OCT - 31 OCT	A56, A57	1, 2, 3, 4
16 OCT - 15 NOV	A58, A59	1, 2, 3, 4
1 NOV - 30 NOV	A60, A61	1, 2, 3, 4
1 JAN - 31 DEC	A62, A63	1, 2, 3, 4

*For a description of chart types, see page A1.

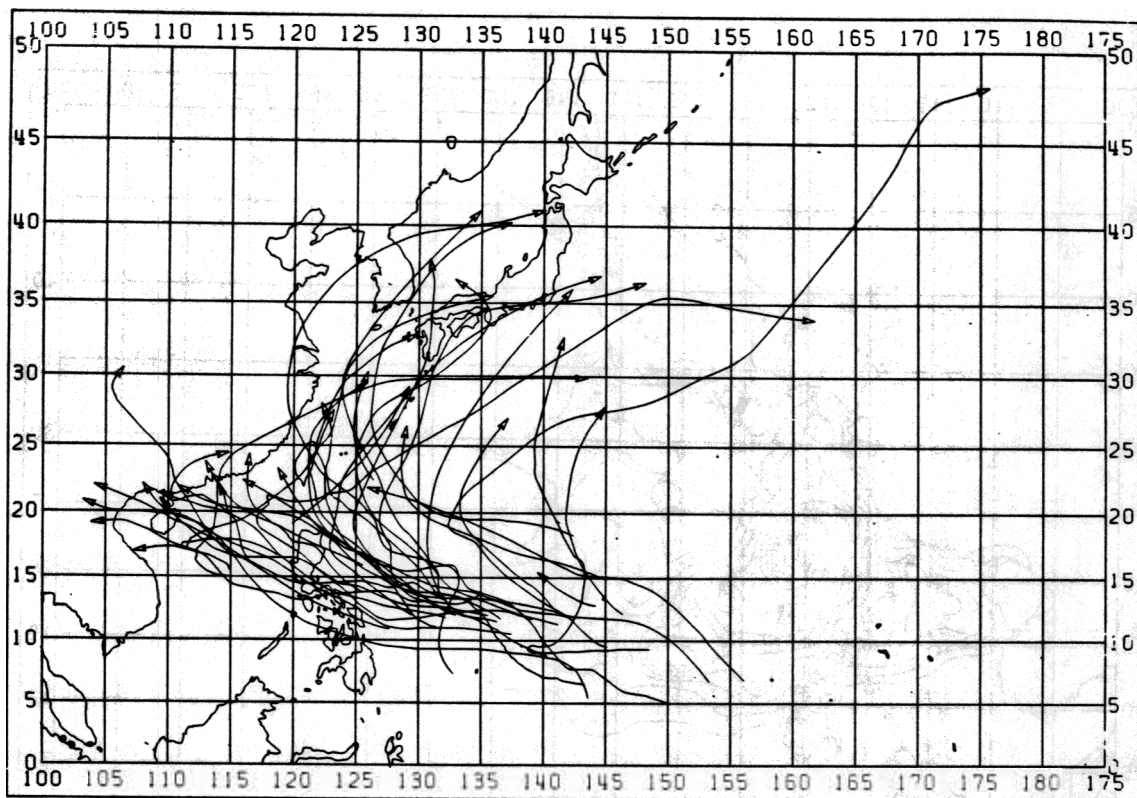
Note: All charts in this series are based on a scan-distance of 75 n.mi. (139.5 km)



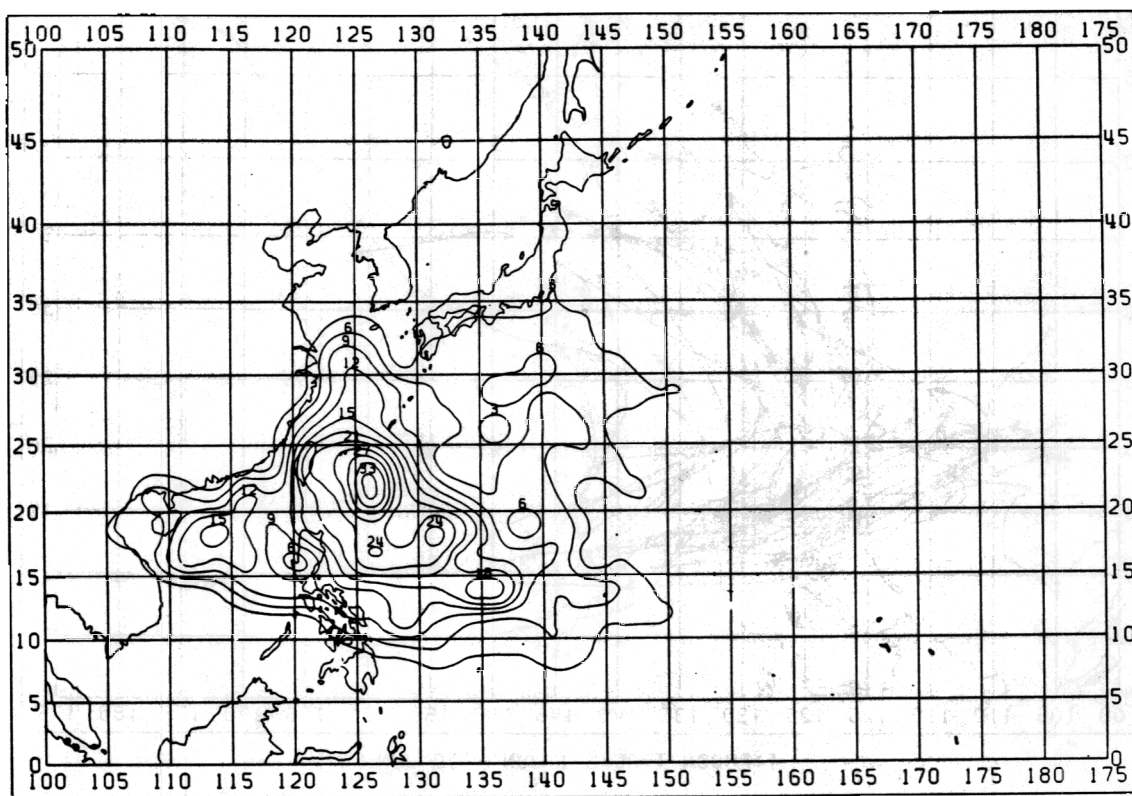
TYPHOON FREQUENCY JUN - 30 JUN



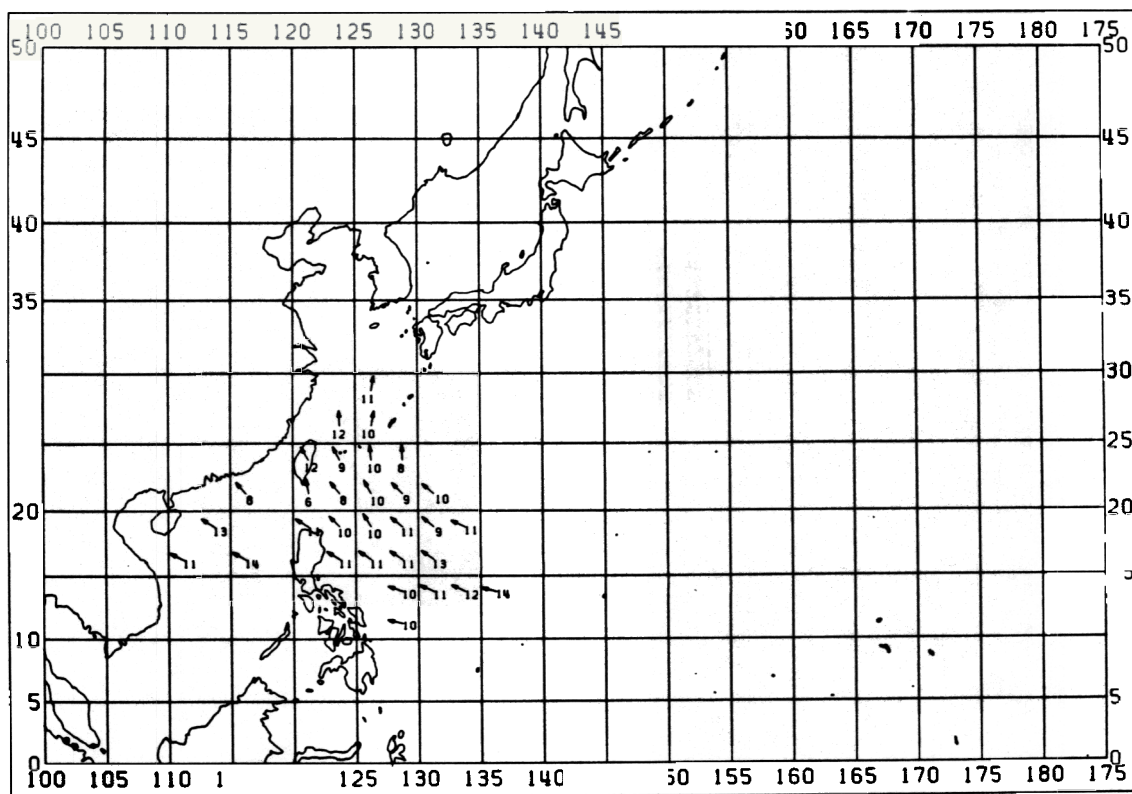
TYPHOON MOTION 1 JUN - 30 JUN



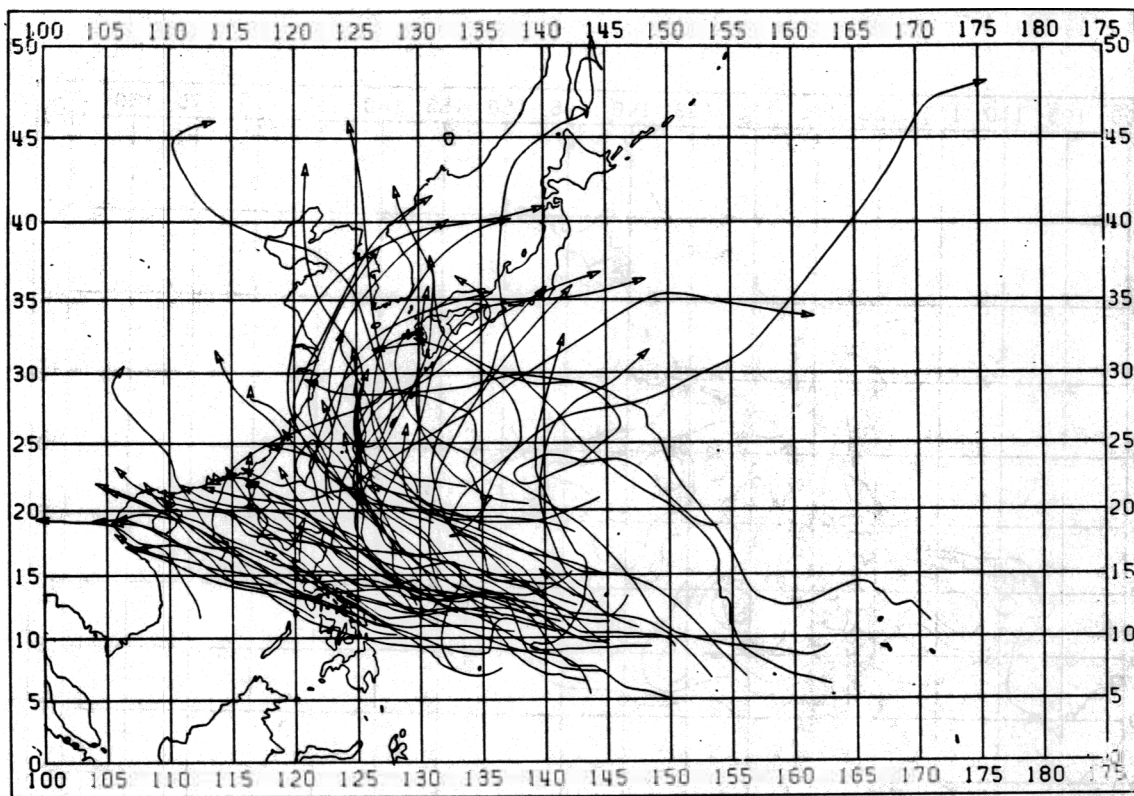
88	C	11	11	3.76
91	290	9	10	5.14
92		9	10	2.46
115	14	305		2.04
117	14	304		3.52
140	17	316		2.93
162	14	338		2.94
165	14	357		1.97
193	17	016	14 16	3.96
218	17	011	15 16	



TYPHOON FREQUENCY 16 JUN - 15 JUL



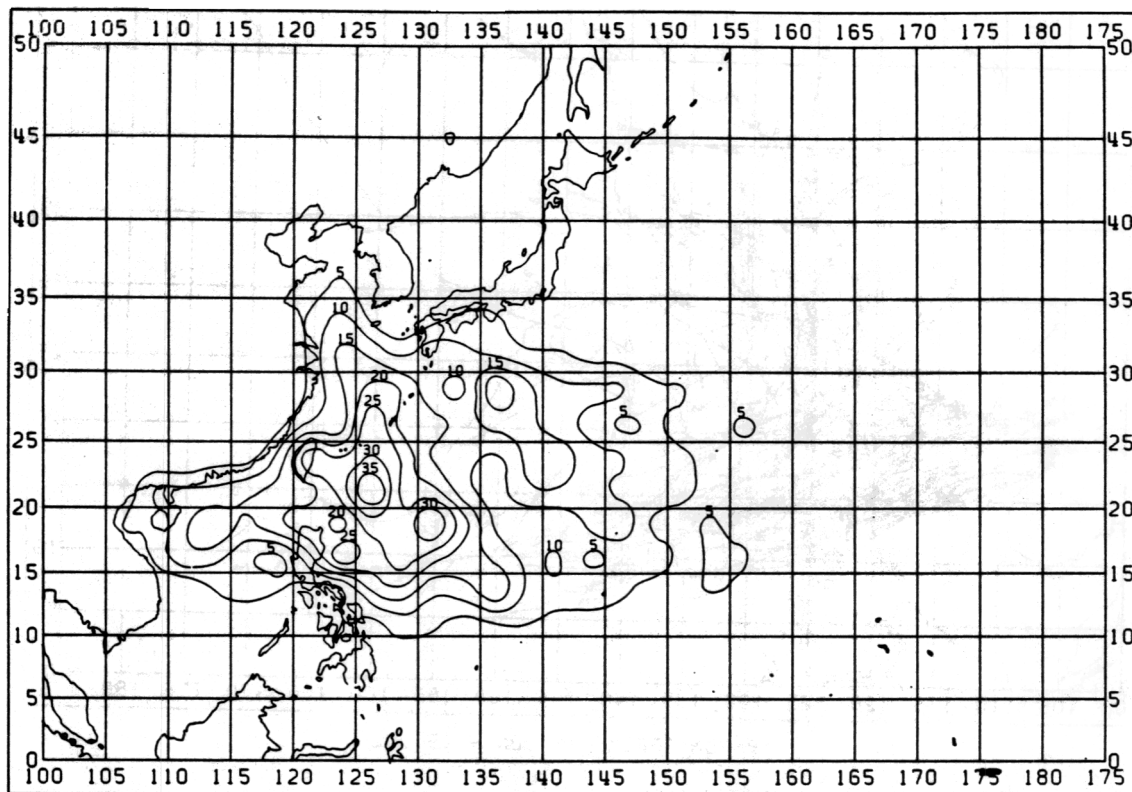
TYPHOON MOTION 16 JUN - 15 JUL



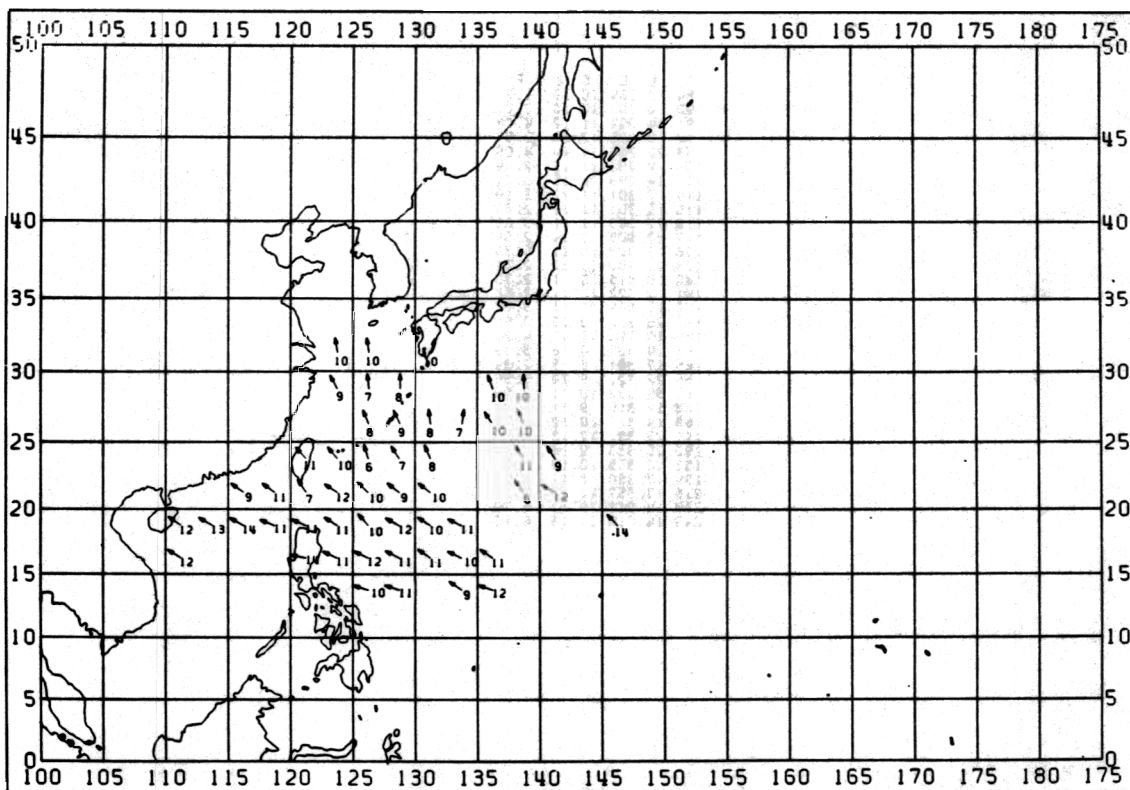
PHOON TRACKS

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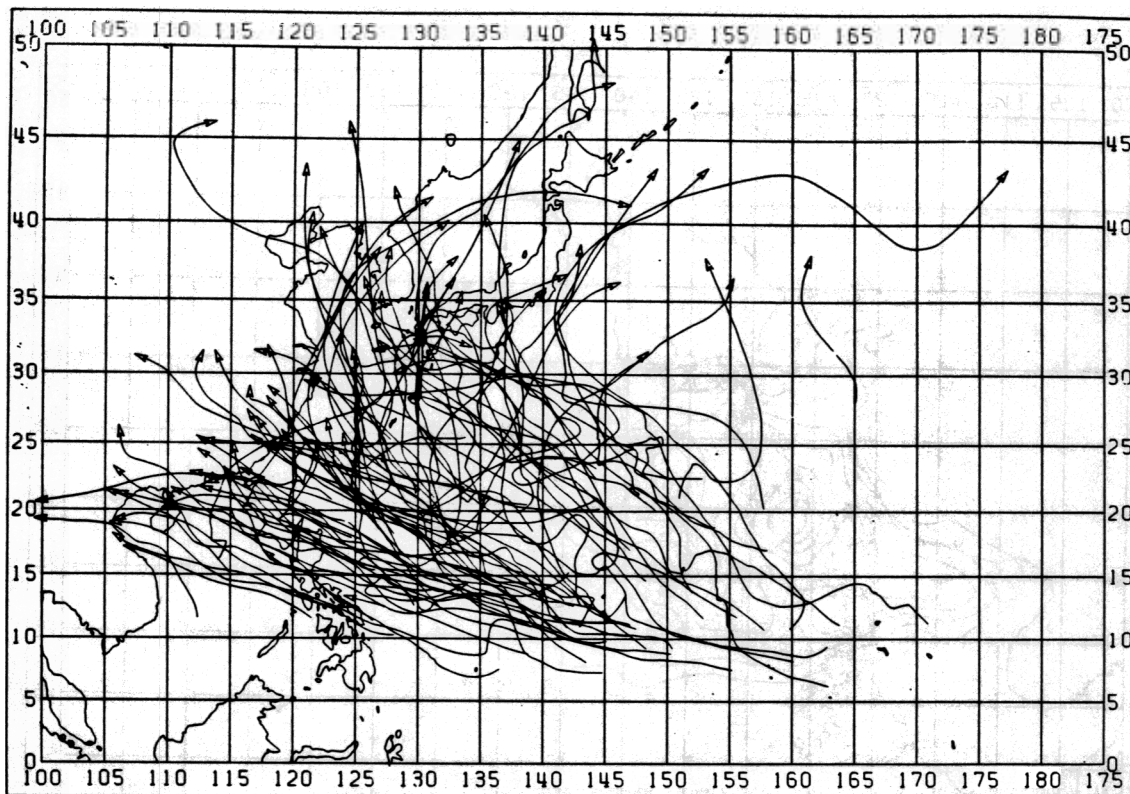
B	C	E
54	284	10
90	290	2.01
91	294	4.28
92	295	2.57
93	285	4.09
109	296	2.04
111	299	3.01
114	301	3.18
115	303	2.37
116	303	3.80
117	305	2.59
135	303	5.30
14	303	2.31
17	11	2.70
19	10	2.68
	11	3.50
25	310	
144	295	11
153	320	4.28
155	351	2.34
156	321	3.56
167	332	2.59
168	315	2.80
169	14	2.79
191	22	3.57
	25	3.12
	30	4.52
194	17	3.19
218	17	5.15
219	14	5.79
245	011	



TYPHOON FREQUENCY JUL - 31 JUL

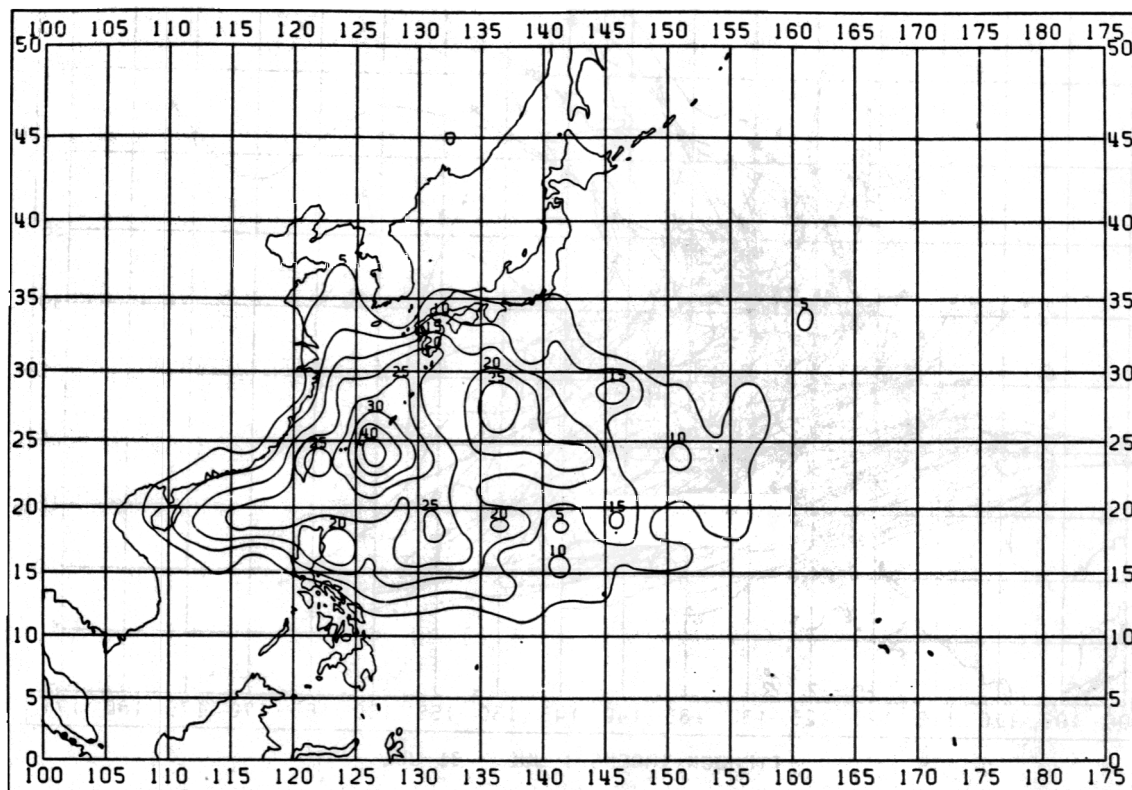


TYPHOON MOTION 1 JUL - 31 JUL

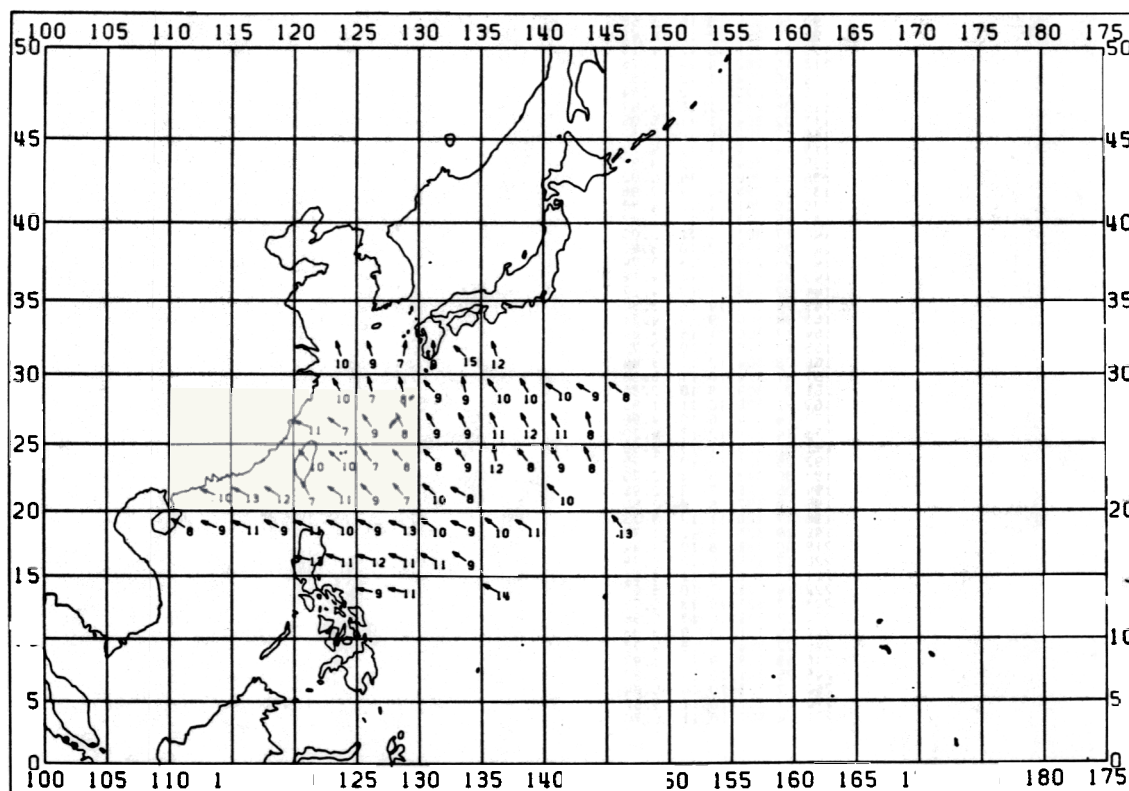


TYPHOON TRACKS

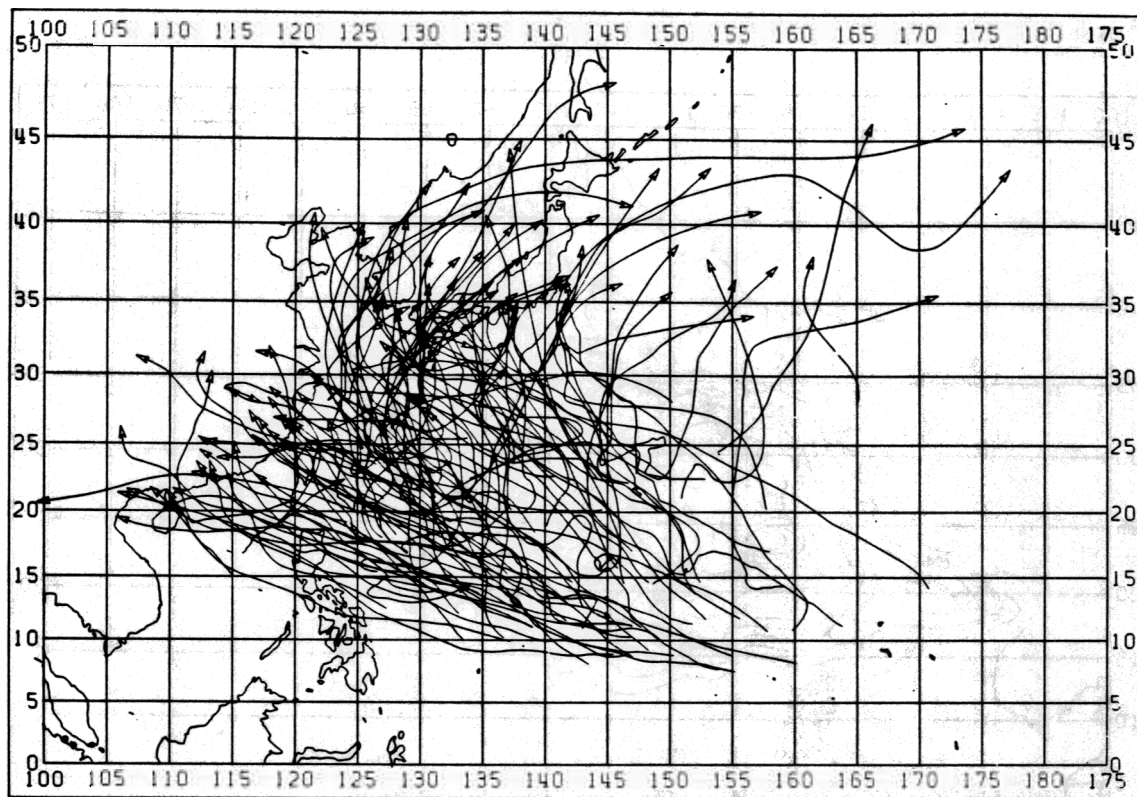
89	0	1.34
90	10	1.00
92	14	
93	19	1.13
	14	1.18
114	30	
115	22	2.44
116	28	3.67
		5.05
118		3.52
119		4.14
135	14	3.97
136	19	5.02
137	14	3.98
138	19	
	25	2.42
	17	2.09
	28	
	25	
149	14	3.30
163	9	4.71
164		3.44
	17	2.72
	28	3.44
		3.58
169	14	1.95
172	9	4.96
173	10	4.20
		2.99
193	10	2.79
194	6	2.94
195		2.56
	12	3.73
219	12	3.44
220	10	2.79
221		3.13
222		3.67
223		5.75
224		3.96
244	13	3.33
245	13	4.78
246	8	3.97
247	10	4.97
248		5.84
249		5.52
250		5.70



TYPHOON FREQUENCY 16 JUL - 15 AUG

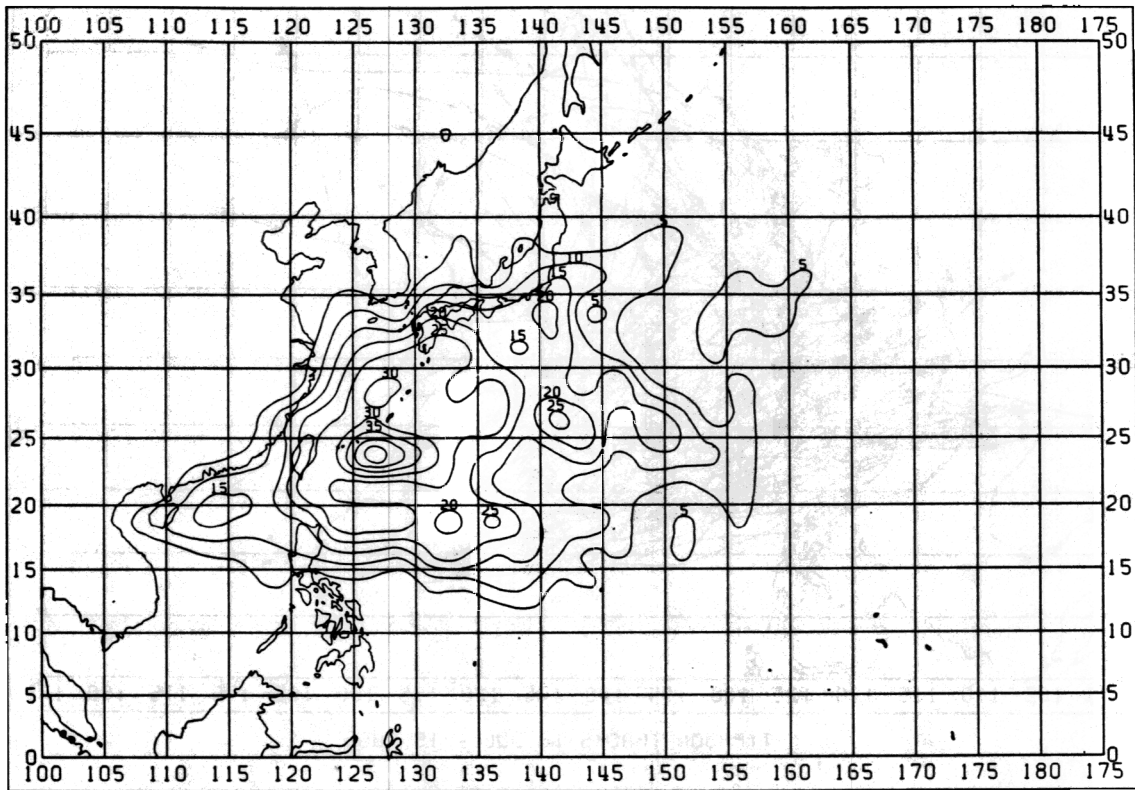


TYPHOON MOTION 16 JUL - 15 AUG

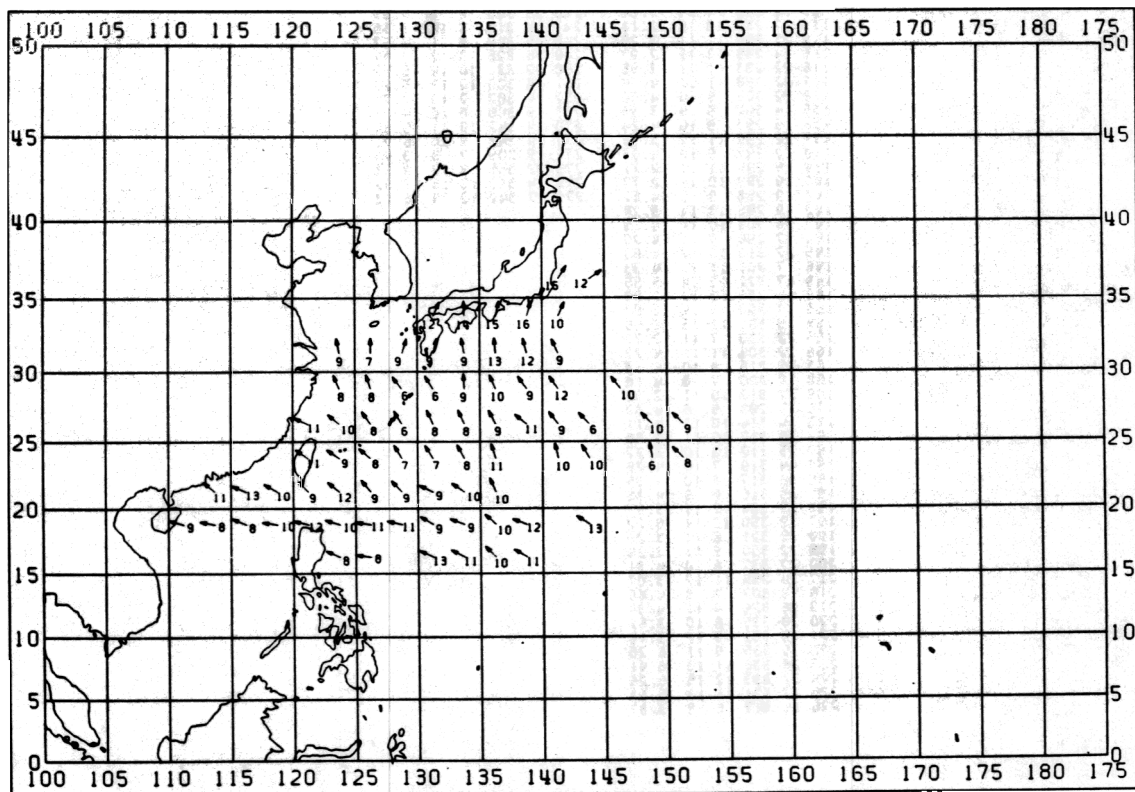


YPHOON TRACKS

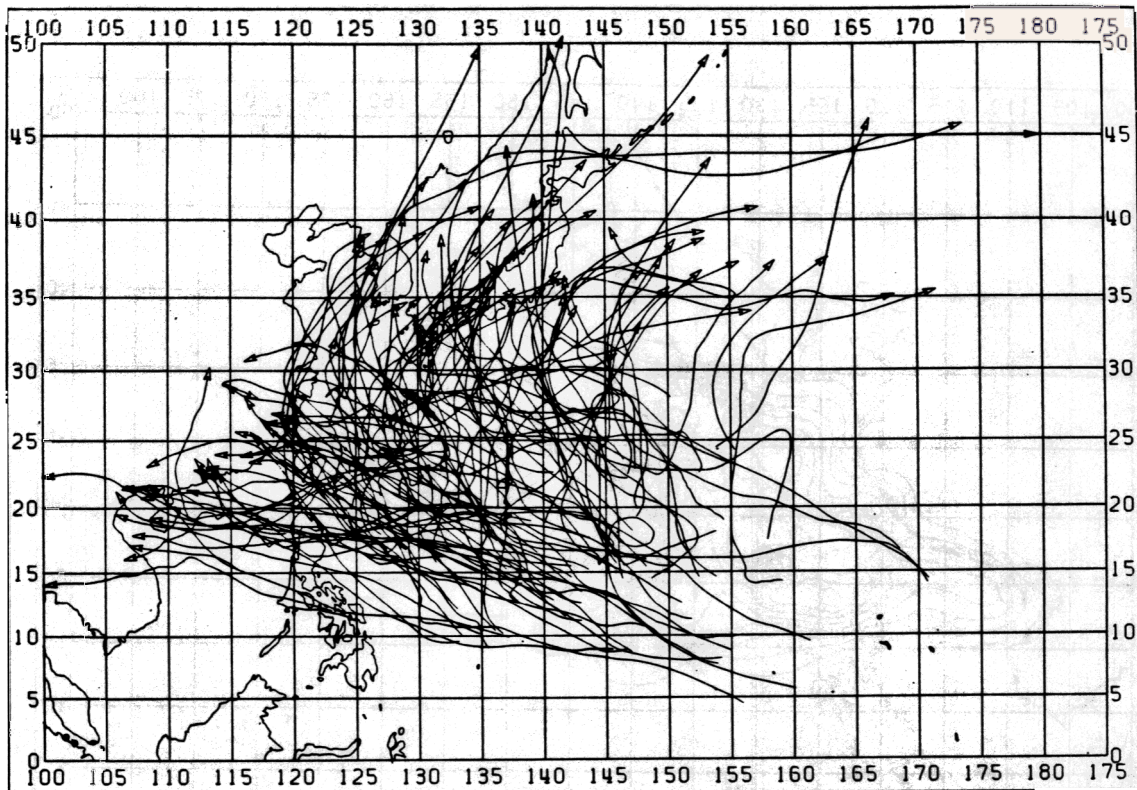
[illegible]



TYPHOON FREQUENCY 1 AUG - 31 AUG

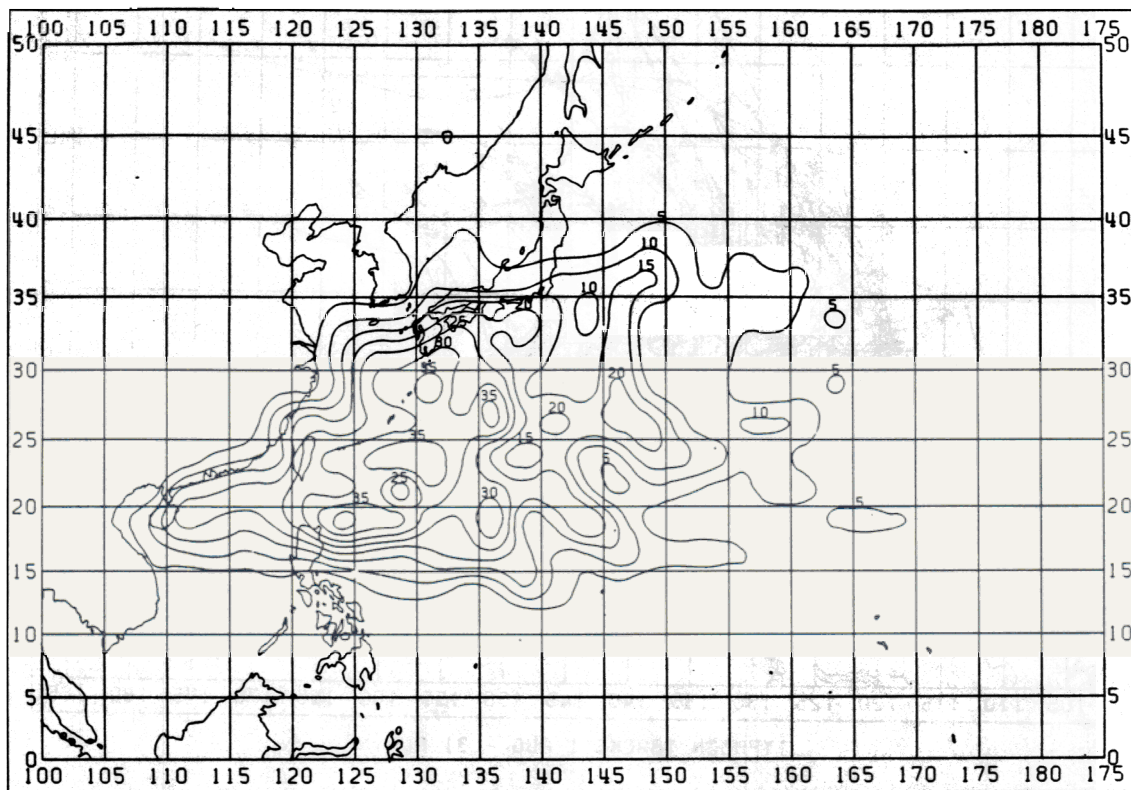


TYPHOON MOTION 1 AUG - 31 AUG

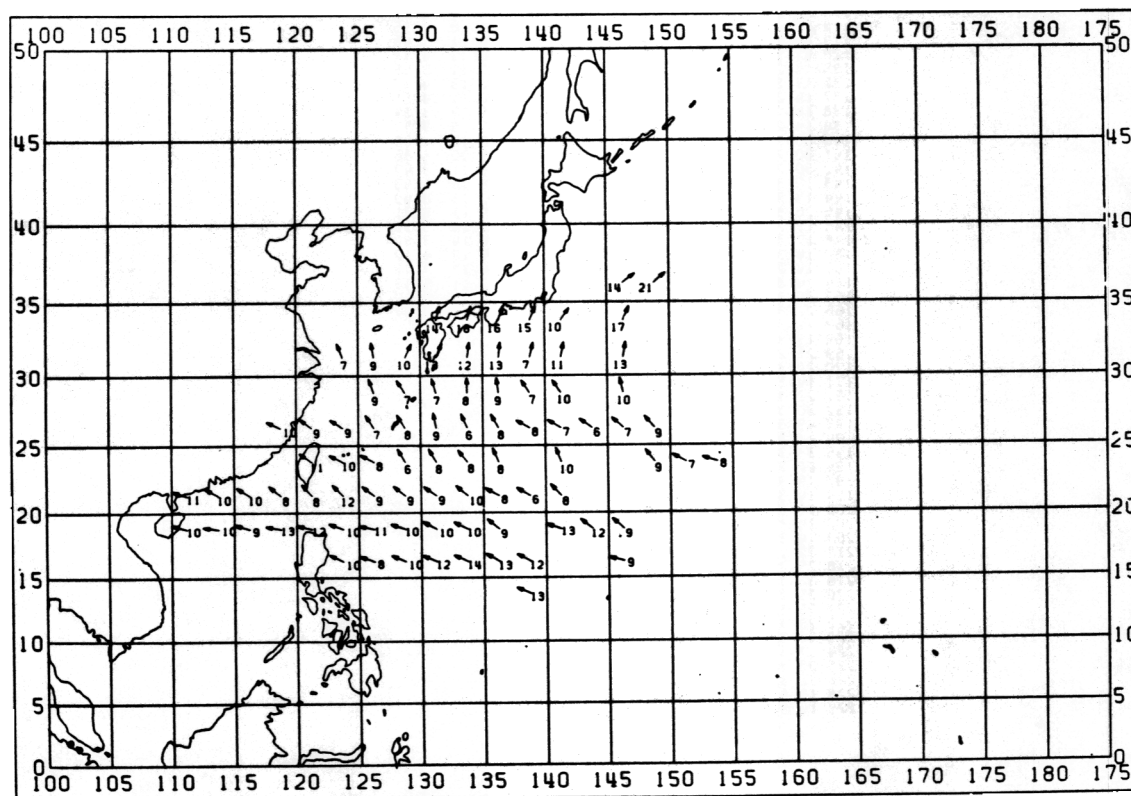


TYPHOON TRACKS 1 AUG - 31 AUG

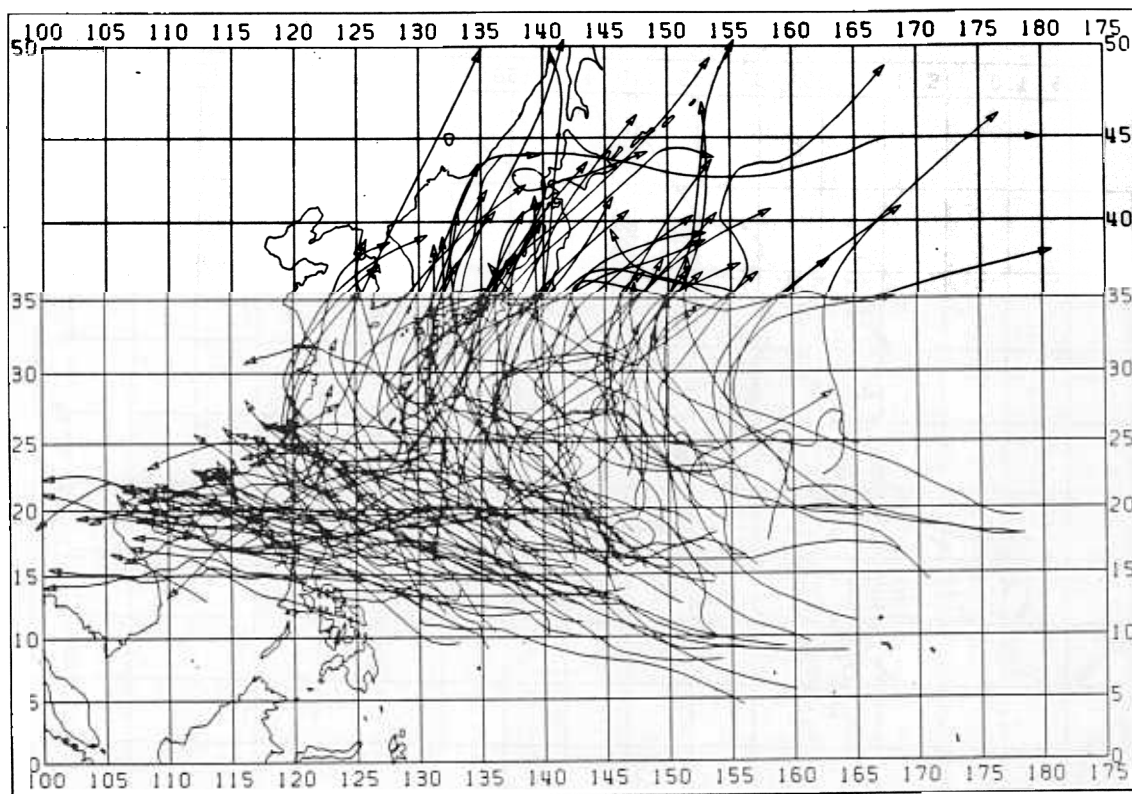
A	B	C	D	E	F	A	B	C	D	E	F
114	14	295	8	9	5.12	244	19	337	8	9	5.14
115	14	279	8	8	3.71	245	30	343	8	10	4.28
117	22	296	13	13	2.93	246	30	324	6	9	3.20
118	22	298	11	12	3.98	247	28	329	6	8	2.95
119	14	315	10	12	3.19	248	22	357	9	11	5.48
120	17	301	11	12	3.95	249	28	337	10	13	4.47
135	14	287	9	9	3.74	250	19	325	9	11	5.45
136	17	285	8	9	3.77	251	17	326	12	13	4.37
137	14	293	8	10	3.55	253	22	323	10	11	4.51
138	14	279	10	12	4.61	270	14	349	9	9	3.34
139	14	284	12	13	1.41	271	22	360	7	9	3.57
140	30	287	10	11	3.26	272	25	017	9	10	4.09
141	30	279	11	12	4.01	273	28	014	9	10	3.86
142	30	284	11	13	3.63	274	28	350	9	11	3.47
143	19	301	9	11	3.84	275	17	355	13	16	6.93
144	19	292	9	11	3.64	276	14	345	12	13	8.49
145	28	313	10	11	4.02	277	19	336	9	12	5.31
146	19	291	12	13	5.61	299	19	023	12	14	5.36
148	17	304	13	14	4.56	300	17	359	14	14	3.82
162	14	310	11	12	3.10	301	17	013	15	17	8.22
163	14	293	13	14	4.39	302	19	015	16	17	7.73
164	14	300	10	13	4.73	303	22	023	10	11	5.58
165	30	316	9	12	4.32	329	14	032	15	16	8.60
166	22	309	12	12	4.40	330	14	055	12	13	3.97
167	19	321	9	11	3.31						
168	19	317	9	9	4.04						
169	25	296	9	10	3.86						
170	22	304	10	11	4.42						
171	14	336	10	13	8.52						
191	22	304	11	12	4.21						
192	30	304	9	11	3.62						
193	49	310	8	11	4.60						
194	44	329	7	10	4.06						
195	33	328	7	9	4.06						
196	22	331	8	9	3.78						
197	19	342	11	12	6.68						
199	14	347	10	11	4.31						
200	19	330	10	11	4.80						
202	14	350	6	12	3.78						
203	14	314	8	11	2.79						
217	22	295	11	12	2.80						
218	25	311	10	11	3.73						
219	30	325	8	10	4.50						
220	25	329	6	9	4.05						
221	25	336	8	11	3.06						
222	28	336	8	11	5.91						
223	30	333	9	11	5.61						
224	17	309	11	12	6.46						
225	28	323	9	11	5.17						
226	22	317	6	8	3.73						
228	19	315	10	11	4.55						
229	14	315	9	10	5.52						



TYPHOON FREQUENCY 16 AUG - 15 SEP

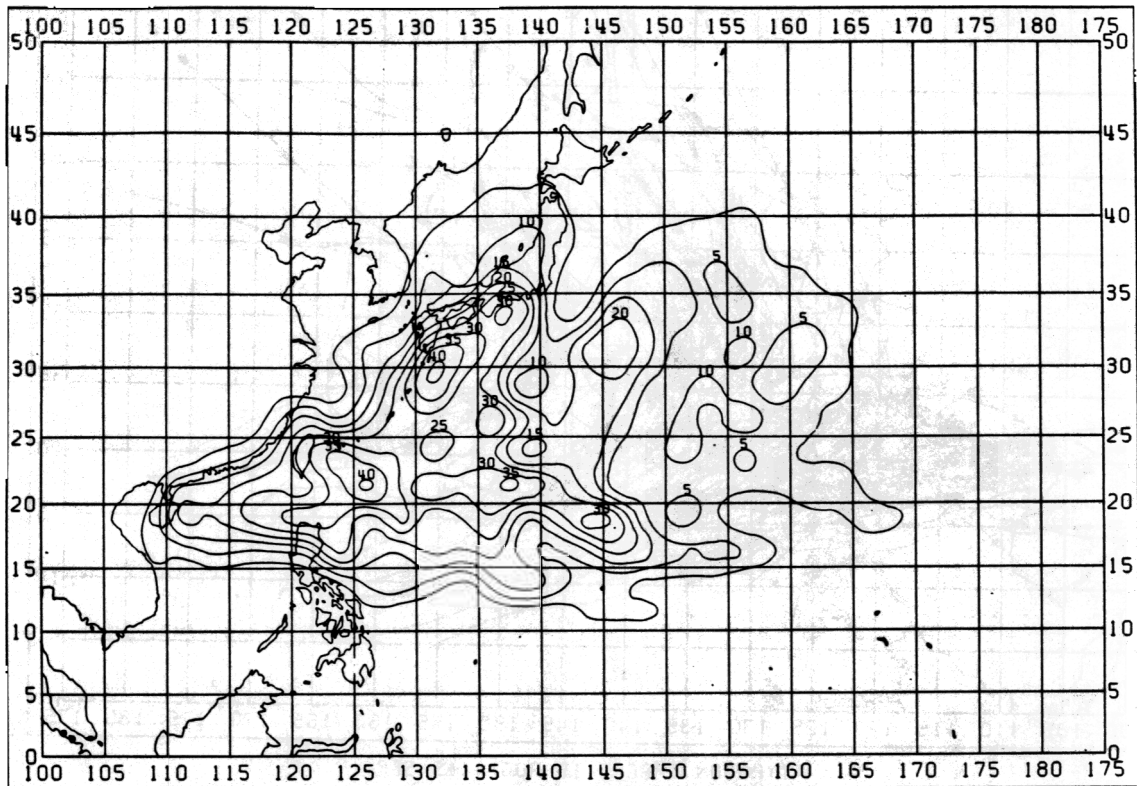


TYPHOON MOTION 16 AUG - 15 SEP

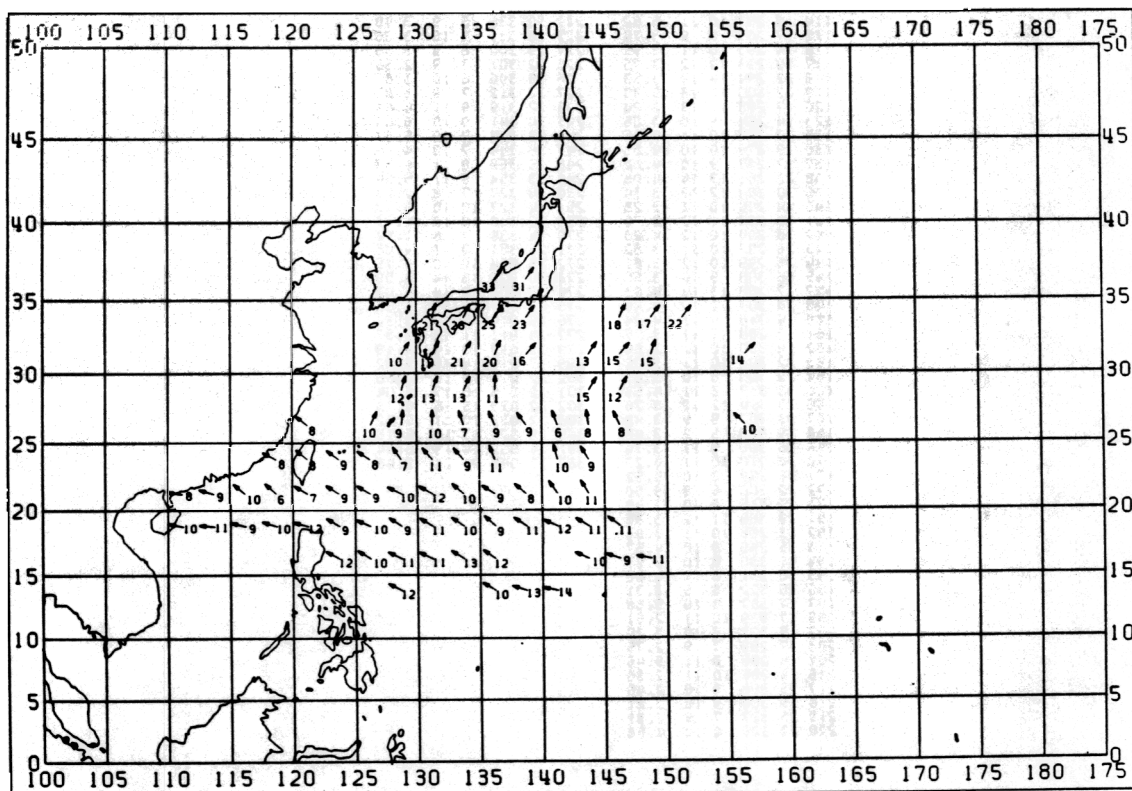


TYPHOON TRACKS 16 AUG - 15 SEP

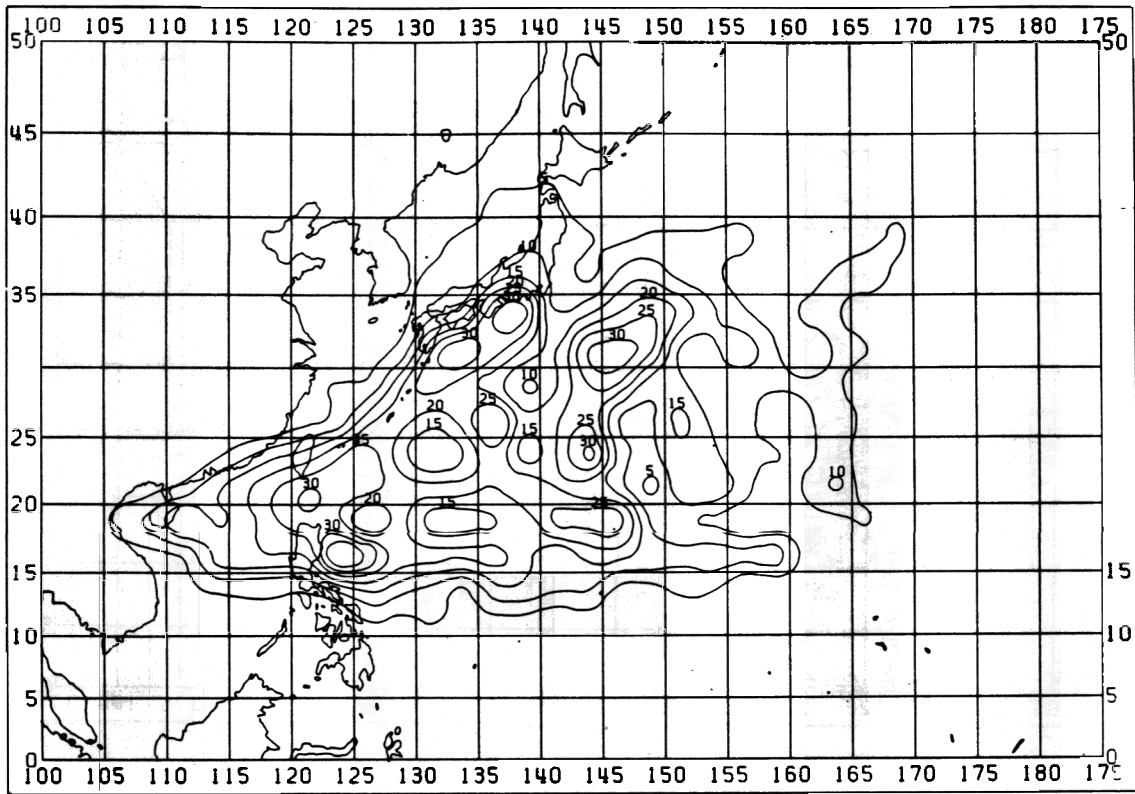
A	B	C	D	E	F
94	17	293			
114	19	295			
115	17	289	8	9	3.74
116	14	293	10	11	3.95
117	19	293	12	12	3.75
118	22	294	14	14	3.53
119	22	300	13	13	3.38
120	17	298	12	13	2.24
123	14	284	9	10	3.06
135	22	286	10	11	4.76
136	19	279	10	10	4.85
137	17	287	9	10	4.62
138	22	281	13	14	4.06
139	30	284	12	12	3.34
140	44	290	10	11	3.28
141	38	283	11	12	3.79
142	38	288	10	12	4.23
143	25	297	10	11	3.82
144	25	295	10	12	3.81
145	36	308	9	10	3.50
147	17	288	13	14	4.83
148	28	307	12	12	4.49
149	14	310	9	11	4.24
161	17	289	11	11	3.77
162	19	300	10	11	2.84
163	22	302	10	11	3.06
164	22	309	8	10	3.61
165	30	317	8	11	4.59
166	25	314	12	12	3.26
167	33	307	9	9	3.48
168	19	308	9	9	3.48
169	36	305	9	11	3.74
170	28	310	10	11	4.22
171	28	299	8	10	5.52
172	22	300	6	9	3.00
173	25	315	8	10	2.48
191	28	306	11	12	3.38
192	33	298	10	11	3.61
193	36	299	8	10	4.57
194	41	330	6	10	3.93
195	38	331	8	11	4.60
196	30	322	8	9	3.31
197	17	337	8	10	5.58
199	17	339	10	11	2.51
202	19	323	9	10	3.20
203	17	299	7	9	2.75
204	14	288	8	11	5.46
216	14	295	10	11	2.36
217	25	308	9	10	2.46
218	19	304	9	10	2.21
219	25	327	7	9	2.31
220	28	329	8	10	4.68
221	30	349	9	12	5.35
222	30	336	6	9	3.48
223	38	331	8	10	3.06
224	19	300	8	9	3.35
225	22	301	7	9	2.36
226	19	306	6	10	3.87
227	22	312	7	9	3.85
228	22	319	9	11	4.61
245	30	341	9	10	6.03
246	33	328	7	10	6.37
247	38	344	7	10	4.98
248	25	359	8	11	6.57
249	33	354	9	11	5.04
250	14	327	7	8	2.63
251	14	327	10	10	3.19
253	22	348	10	12	4.73
270	14	339	7	8	2.84
271	25	351	9	11	4.65
272	25	024	10	10	4.15
273	30	022	13	14	6.59
274	30	008	12	14	6.62
275	19	007	13	15	5.55
276	19	014	7	10	3.54
277	14	011	11	13	5.87
279	19	010	13	14	4.49
299	17	015	14	15	5.82
300	22	015	18	18	6.66
301	19	018	16	17	6.04
302	22	023	15	16	6.73
303	17	033	10	11	5.82
305	19	023	17	18	6.16
331	14	052	14	18	6.24
332	17	048	21	24	9.48



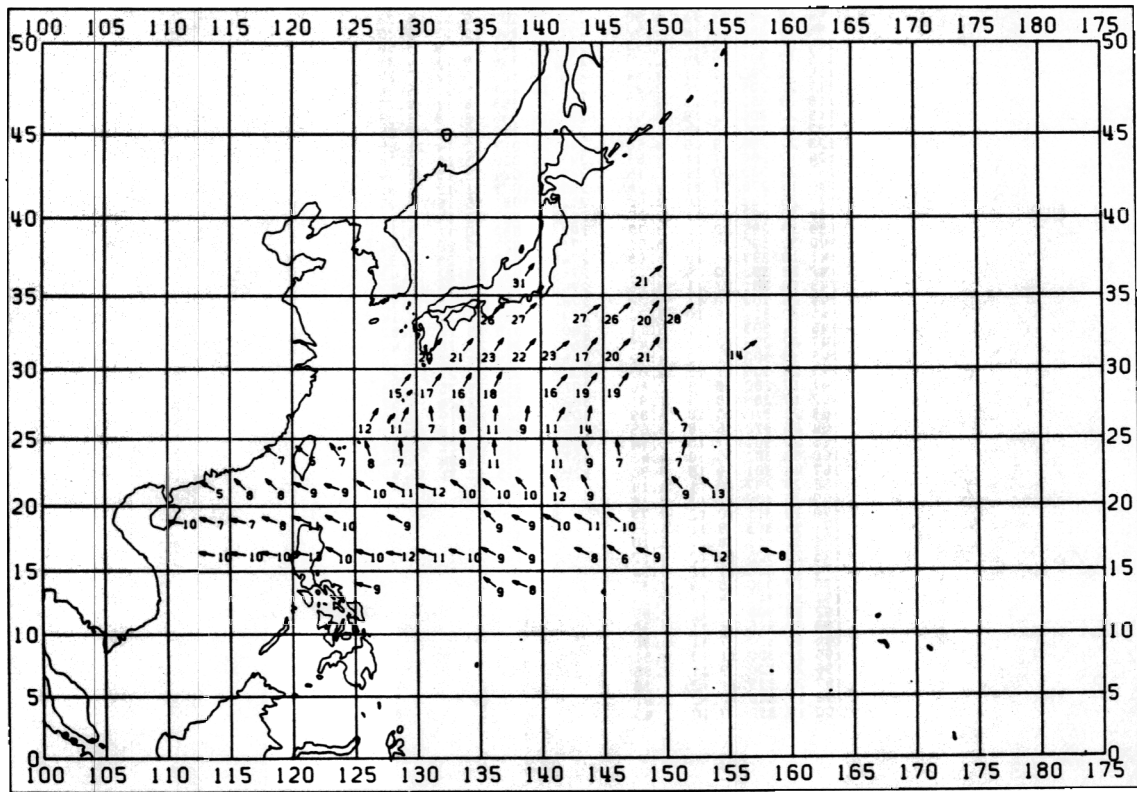
TYPHOON FREQUENCY 1 SEP - 30 SEP



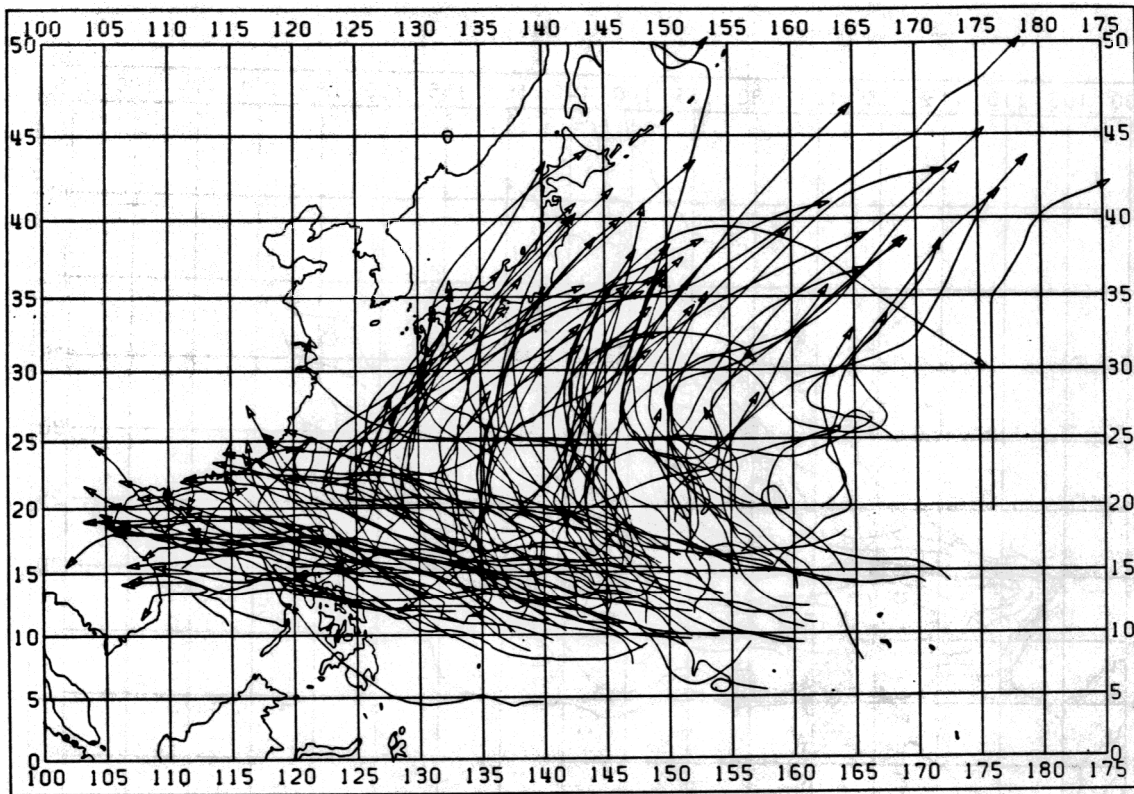
TYPHOON MOTION 1 SEP - 30 SEP



TYPHOON FREQUENCY 16 SEP - 15 OCT

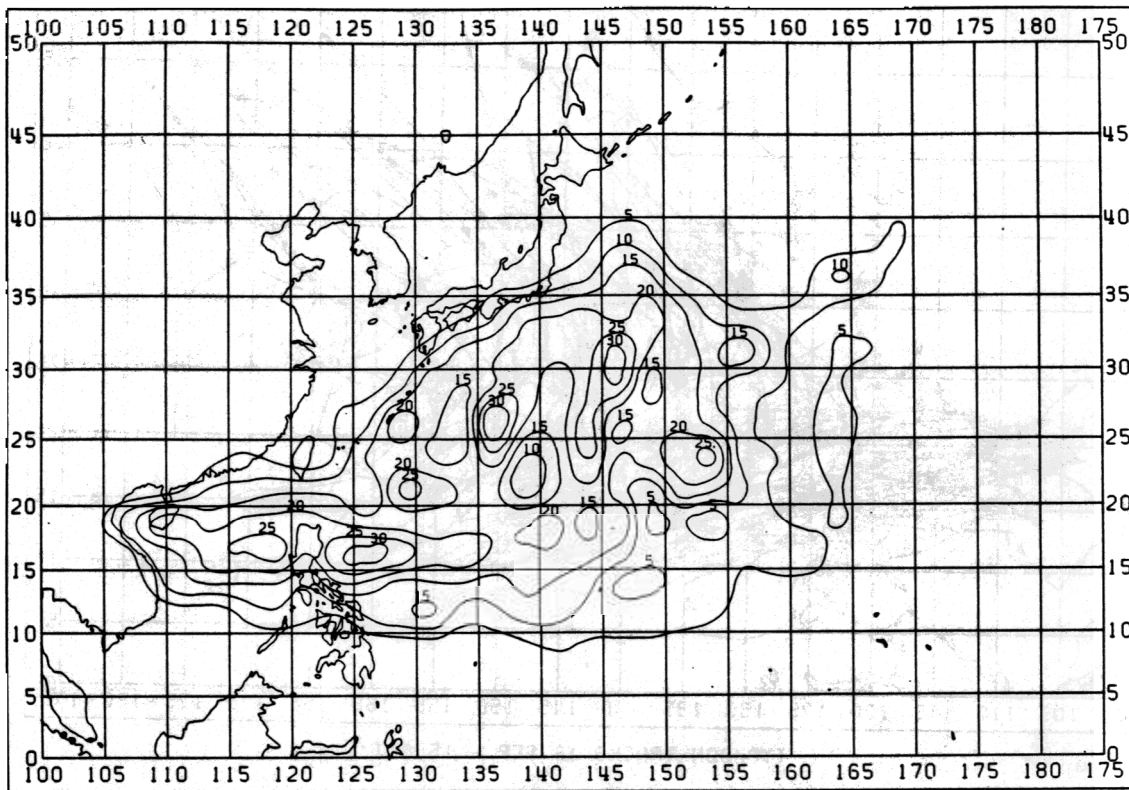


TYPHOON MOTION 16 SEP - 15 OCT

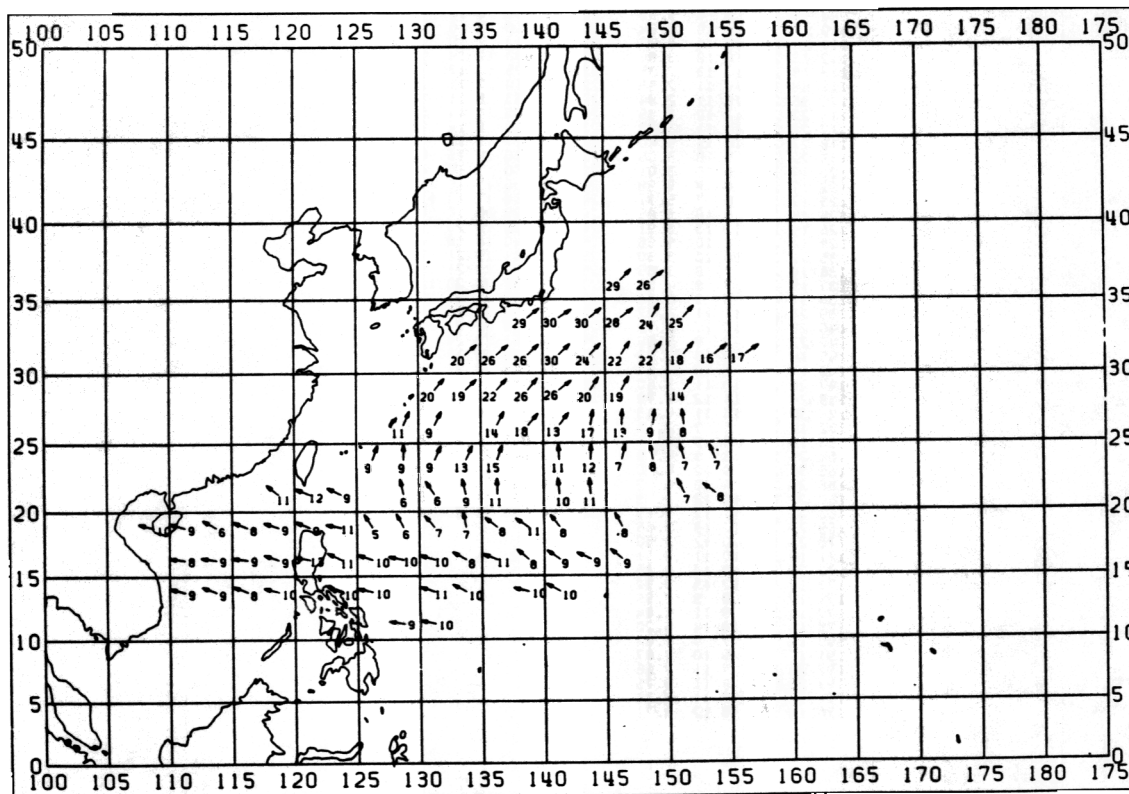


TYPHOON TRACKS 16 SEP - 15 OCT

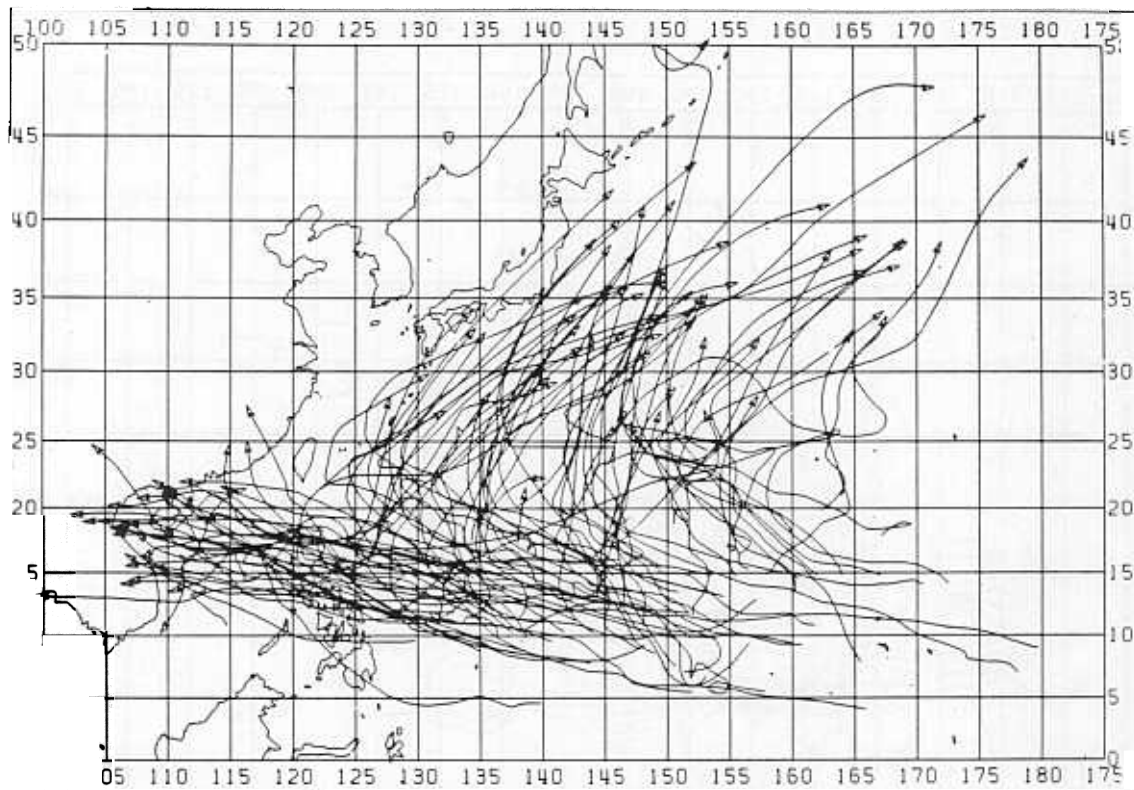
A	B	C	D	E	F	A	B	C	D	E	F
89	17	285	9	9	3.84	197	25	358	11	14	4.53
93	14	310	9	10	4.50	199	19	350	11	14	4.61
94	14	293	8	8	3.99	200	33	339	9	11	4.38
110	17	281	10	10	2.94	201	14	350	7	8	4.28
111	19	279	10	10	3.47	203	14	013	7	10	3.04
112	19	281	10	12	3.80	219	19	030	12	14	6.65
113	19	280	13	13	2.35	220	22	025	11	13	7.74
114	44	300	10	11	2.93	221	17	354	7	11	2.92
115	36	288	10	11	2.94	222	22	353	8	11	4.15
116	22	280	12	12	3.39	223	33	005	11	14	5.40
117	22	289	11	11	3.38	224	17	009	9	14	9.18
118	22	290	10	11	3.40	225	19	027	11	14	7.21
119	22	297	9	10	3.06	226	25	010	14	15	6.36
120	17	301	9	10	3.01	229	17	330	7	10	4.07
122	17	296	8	8	5.98	246	19	036	15	16	11.79
123	17	306	6	7	5.31	247	28	034	17	19	11.66
124	14	292	9	10	3.85	248	22	029	16	18	8.29
126	14	291	12	13	3.91	249	17	025	18	20	5.33
128	14	287	8	10	5.66	251	14	040	16	18	4.87
135	22	278	10	10	3.30	252	25	034	19	21	9.22
136	14	289	7	9	3.65	253	25	034	19	21	8.33
137	17	284	7	8	4.02	273	25	037	20	20	11.19
138	25	291	8	9	3.83	274	36	037	21	22	6.75
139	28	293	11	11	2.77	275	28	035	23	25	6.76
140	25	297	10	11	2.72	276	19	039	22	24	8.34
142	22	298	9	9	3.00	277	14	051	23	24	9.18
145	14	316	9	10	3.23	278	30	036	17	18	7.86
146	17	296	9	10	3.87	279	33	043	20	21	9.17
147	28	298	10	11	3.60	280	28	033	21	22	10.19
148	28	299	11	12	4.78	283	14	053	14	16	6.23
149	30	308	10	11	4.13	301	30	041	26	26	6.25
152	14	300	5	7	2.55	302	33	044	27	28	7.46
153	19	315	8	9	5.11	304	14	053	27	28	8.89
154	25	314	8	9	4.79	305	19	045	26	28	13.47
155	30	296	9	12	4.86	306	25	032	20	21	8.98
156	28	291	9	10	4.92	307	19	048	28	29	12.33
157	28	302	10	12	3.73	328	14	033	31	31	6.91
158	22	295	11	12	3.19	332	14	049	21	23	11.11
159	22	289	12	13	3.66						
170	22	306	10	12	2.80						
171	19	311	10	11	3.11						
172	25	320	10	12	3.36						
173	13	338	12	13	3.92						
174	17	335	9	9	2.99						
177	14	320	9	11	4.84						
178	14	314	13	14	5.20						
190	14	309	7	9	1.82						
191	17	310	5	10	2.87						
192	25	325	7	11	2.66						
193	28	342	8	11	3.75						
194	17	356	7	11	3.36						
196	14	355	9	12	3.71						



TYPHOON FREQUENCY 1 OCT - 31 OCT

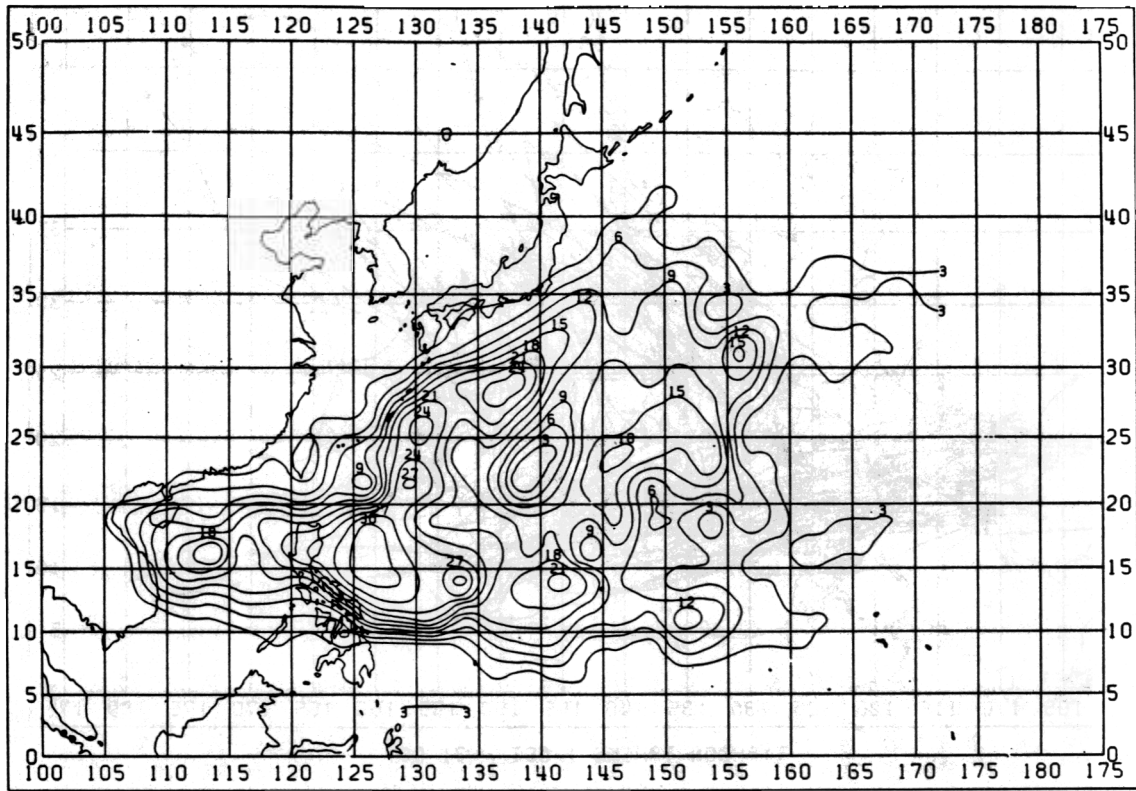


TYPHOON MOTION OCT - 31 OCT

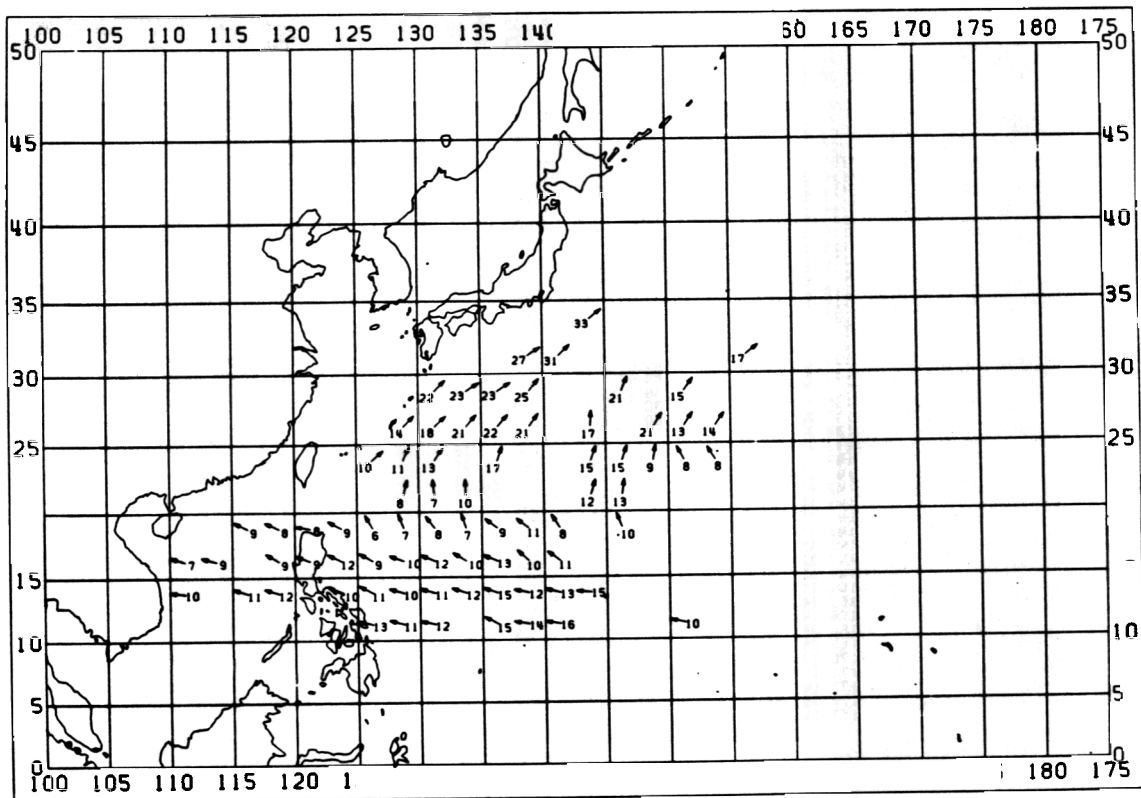


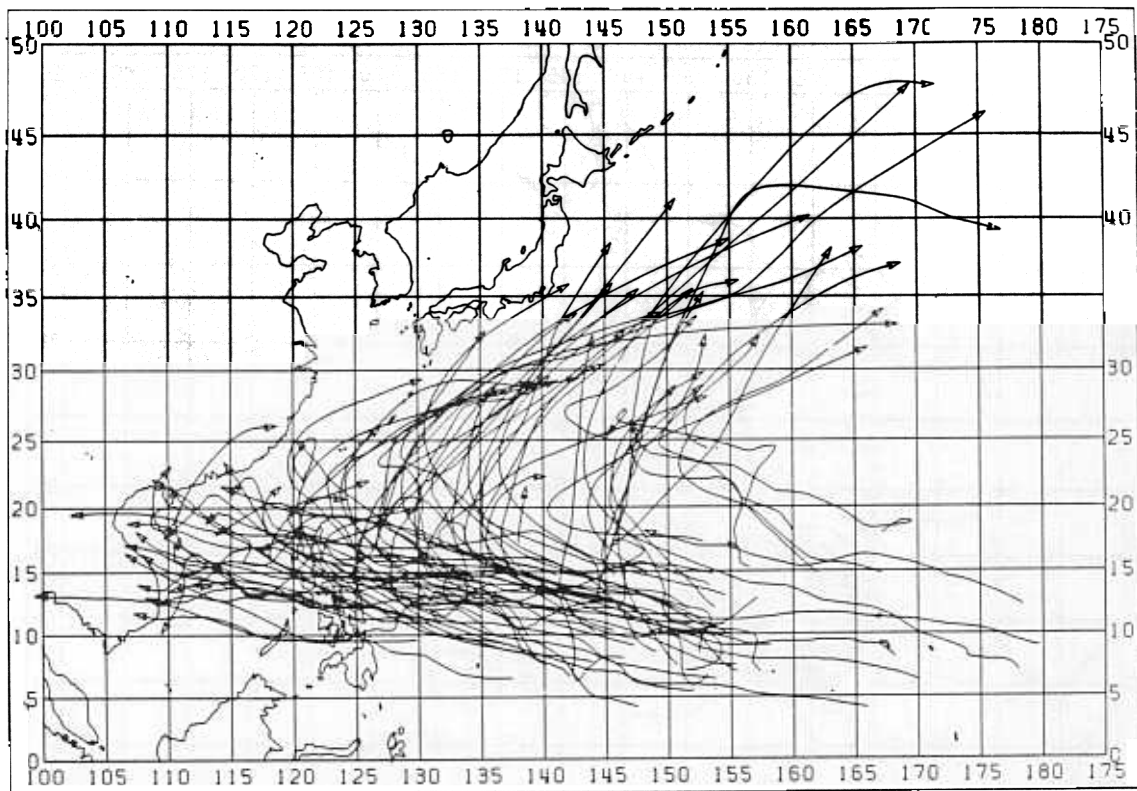
TYPHOON TRACKS 1 OCT - 31 OCT

A	B	C	D	E	F	A	B	C	D	E	F
64	14	280	9	10	3.85	178	17	306	8	10	3.16
65	17	282	10	10	5.51	193	17	020	9	11	5.17
83	14	285	9	10	3.68	194	17	002	9	10	3.91
84	14	291	9	10	5.23	195	14	024	9	11	5.26
85	14	292	8	9	3.82	196	14	025	13	15	4.49
86	14	285	10	11	4.08	197	25	020	15	16	5.90
88	19	291	10	10	5.58	198	14	358	11	13	5.25
89	17	283	10	10	5.09	200	28	003	12	14	5.76
91	14	289	11	12	6.02	201	14	013	7	8	8.14
92	14	299	10	11	6.97	202	19	350	8	11	5.62
94	17	284	10	10	4.33	203	22	344	7	12	2.01
95	14	300	10	11	4.23	204	28	338	7	12	2.97
109	14	279	8	8	2.45	220	25	023	11	13	6.09
110	25	279	9	10	3.04	221	17	026	9	14	7.93
111	25	278	9	9	3.98	223	38	027	14	17	7.00
112	28	288	9	10	3.47	224	19	040	18	19	8.32
113	19	281	13	13	2.53	225	17	036	13	14	9.08
114	30	296	11	11	2.42	226	28	010	17	18	6.84
115	33	289	10	11	3.63	227	14	004	13	14	5.32
116	30	282	10	11	3.54	228	17	008	9	12	6.13
117	22	287	10	11	3.89	229	19	354	8	11	2.82
118	25	300	8	10	4.27	247	19	040	20	20	7.63
119	19	291	11	11	5.73	248	14	045	19	20	8.57
120	19	311	8	10	2.38	249	19	041	22	23	6.38
121	19	305	9	11	5.22	250	25	038	26	27	5.73
122	17	295	9	10	6.78	251	14	051	26	26	8.00
123	14	310	9	12	6.85	252	25	032	20	22	9.26
134	22	286	10	10	1.84	253	30	029	19	20	8.12
135	25	286	9	10	2.64	255	19	035	14	15	3.21
136	17	299	6	7	3.80	274	17	047	20	22	7.24
137	22	291	8	9	2.80	275	19	049	26	27	7.66
138	22	288	9	9	2.90	276	22	046	26	26	6.92
139	22	291	9	10	2.29	277	22	045	30	30	2.86
140	19	282	11	12	1.66	278	22	042	24	25	9.02
141	17	328	5	9	2.84	279	33	034	22	23	7.75
142	17	332	6	9	3.28	280	19	036	22	23	9.85
143	17	319	7	8	2.14	281	17	040	18	19	3.85
144	17	350	7	9	3.07	282	14	051	16	17	3.07
145	19	308	8	9	3.12	283	19	055	17	19	6.45
146	19	304	11	12	4.43	302	19	050	29	30	7.62
147	22	323	8	10	4.34	303	19	056	30	31	9.03
149	22	332	8	11	4.63	304	22	050	30	31	11.73
164	14	308	11	12	4.51	305	17	052	28	30	13.54
165	14	292	12	12	5.35	306	22	029	24	25	10.54
166	14	295	9	11	4.57	307	17	042	25	25	10.38
168	28	348	6	10	3.54	331	17	042	29	30	17.96
169	25	326	6	10	3.14	332	17	051	26	28	14.32
170	19	348	9	11	4.18						
171	17	000	11	12	4.92						
173	14	355	10	10	3.68						
174	19	356	11	12	4.70						
177	19	333	7	10	3.86						



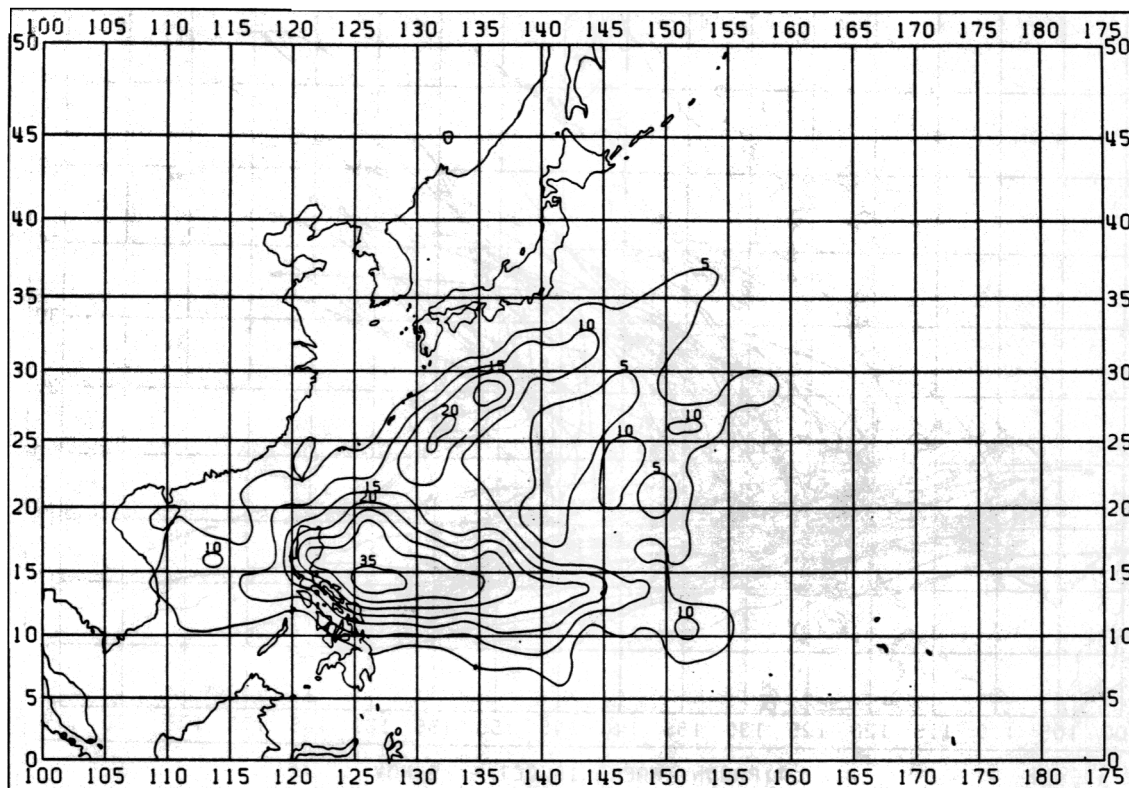
TYPHOON FREQUENCY 16 OCT - 15 NOV



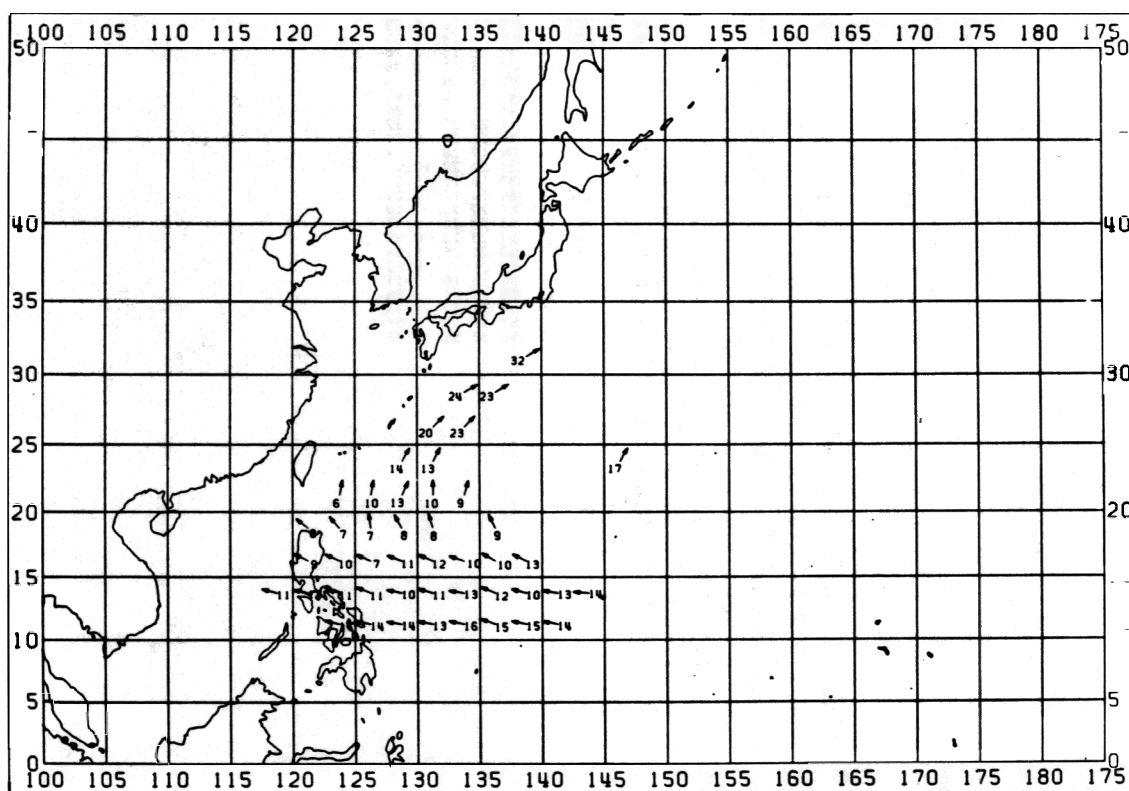


TYPHOON TRACKS 16 OCT - 15 NOV

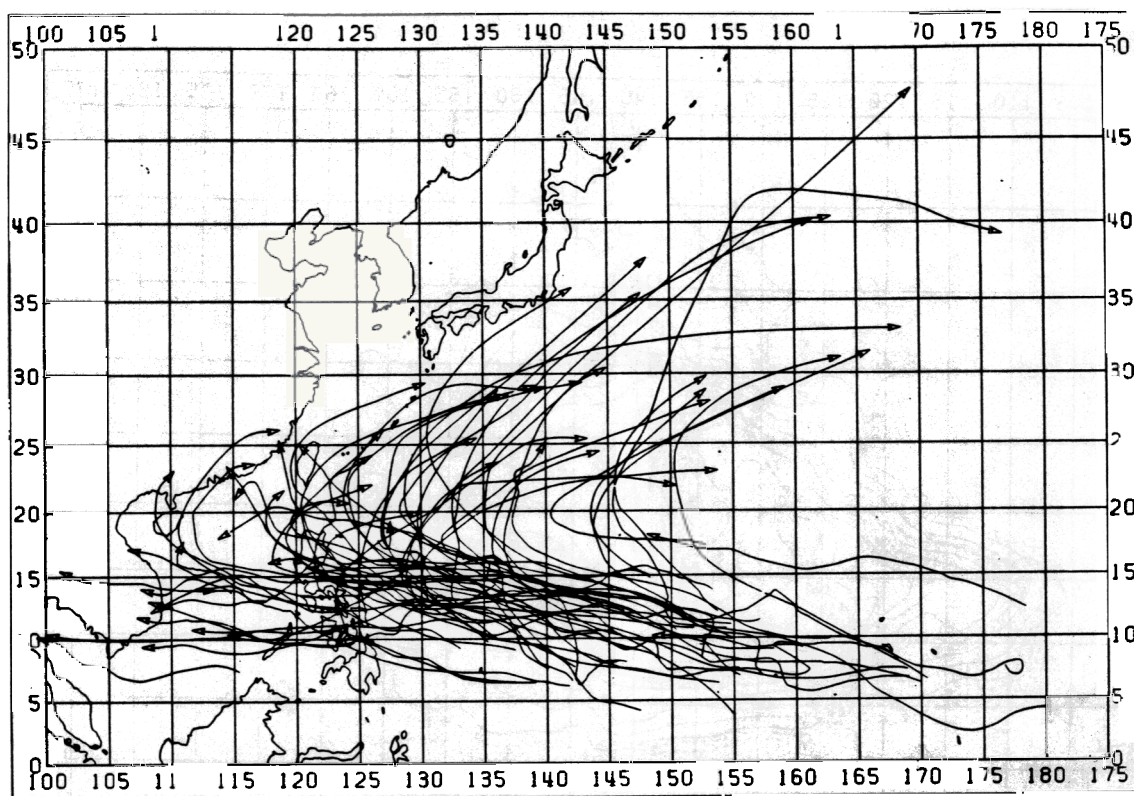
A	B	C	D	E	F	A	B	C	D	E	F
63	19	284	13	13	2.91	200	14	020	15	17	4.65
64	22	285	11	12	4.14	201	19	019	15	16	6.99
65	25	283	12	12	4.99	202	17	010	9	13	6.67
67	17	298	15	16	3.46	203	14	332	8	12	2.28
68	17	280	14	14	4.91	204	19	329	8	11	2.98
69	17	280	16	17	4.04	220	22	044	14	14	5.73
73	14	284	10	10	2.99	221	25	047	18	18	7.47
83	14	278	10	11	2.57	222	17	041	21	21	7.28
85	14	288	11	11	2.49	223	22	041	22	23	5.32
86	14	287	12	12	3.60	224	14	036	21	21	5.61
88	25	294	10	10	2.21	226	14	004	17	18	7.44
89	30	298	11	11	3.92	228	17	031	21	22	10.43
90	30	286	10	11	4.99	229	17	033	13	15	5.01
91	25	286	11	11	5.42	230	14	034	14	17	8.04
92	33	288	12	13	5.97	247	17	045	22	22	7.18
93	17	288	15	16	5.05	248	22	058	23	24	4.73
94	19	283	12	12	4.17	249	25	057	23	24	6.99
95	22	284	13	15	3.01	250	25	040	25	26	6.00
96	19	276	15	16	2.62	253	14	023	21	22	9.62
109	19	288	7	8	3.30	255	14	036	15	16	3.11
110	25	285	9	9	3.57	276	17	056	27	28	6.56
112	19	299	9	9	2.58	277	17	045	31	32	4.33
113	25	290	9	10	3.18	283	17	051	17	19	7.06
114	28	295	12	12	2.16	304	14	050	33	35	12.76
115	33	298	9	11	4.03						
116	28	289	10	11	5.17						
117	25	292	12	13	5.82						
118	22	301	10	11	5.12						
119	19	291	13	14	5.57						
120	14	311	10	12	4.32						
121	17	305	11	13	4.95						
137	17	296	9	10	2.16						
138	19	295	8	9	1.82						
139	17	281	8	10	3.83						
140	22	299	9	11	3.58						
141	30	330	6	9	2.28						
142	25	338	7	9	3.43						
143	17	322	8	10	3.15						
144	17	341	7	9	3.04						
145	17	307	9	10	4.84						
146	14	308	11	13	4.89						
147	14	327	8	10	5.57						
149	17	338	10	13	4.36						
168	28	015	8	10	3.68						
169	25	354	7	10	4.60						
170	17	359	10	11	3.99						
174	17	017	12	14	3.90						
175	14	009	13	13	5.26						
193	14	047	10	11	5.21						
194	22	023	11	12	4.34						
195	22	033	13	16	7.99						
197	14	019	17	18	5.92						



TYPHOON FREQUENCY 1 NOV - 30 NOV

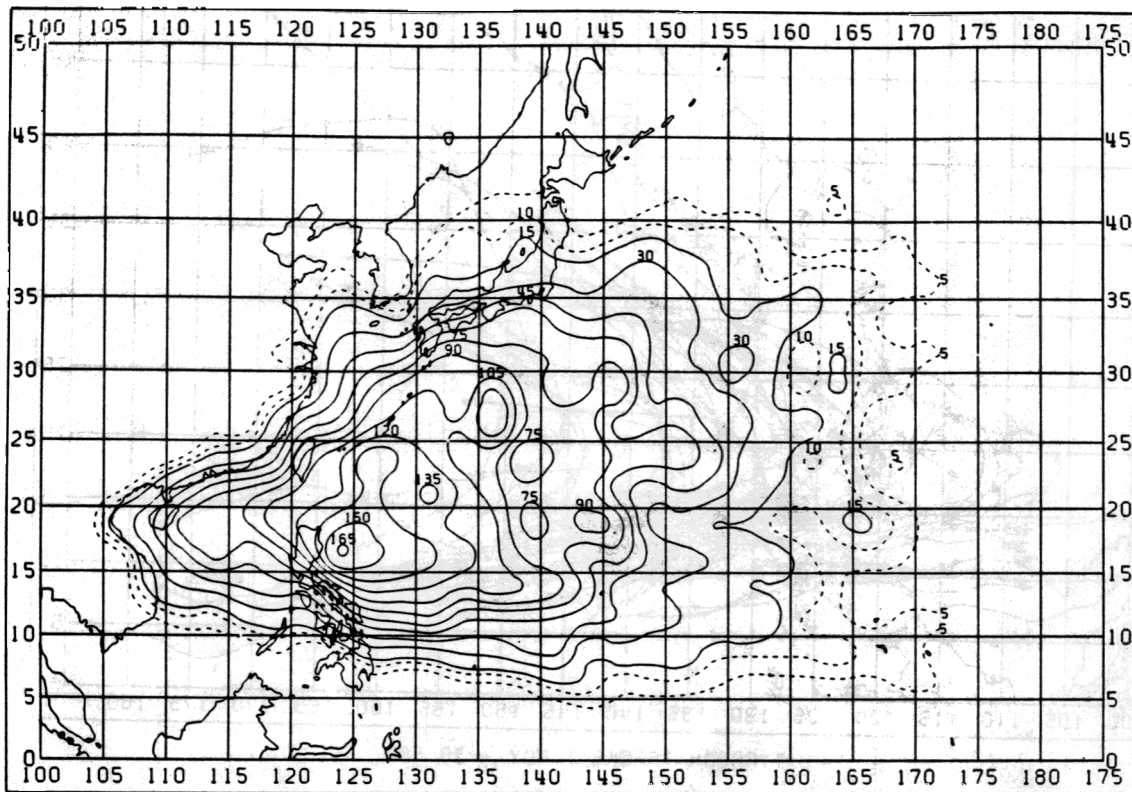


TYPHOON MOTION 1 NOV - 30 NOV

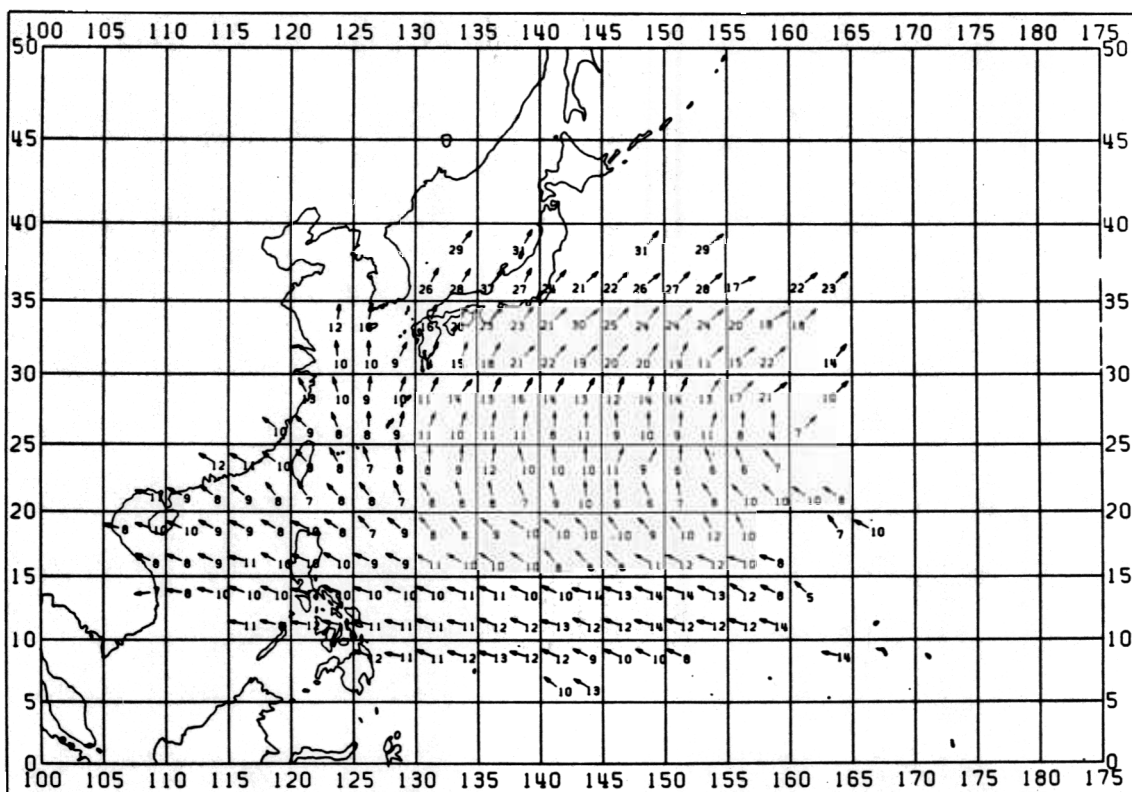


TYPHOON TRACKS 1 NOV - 30 NOV

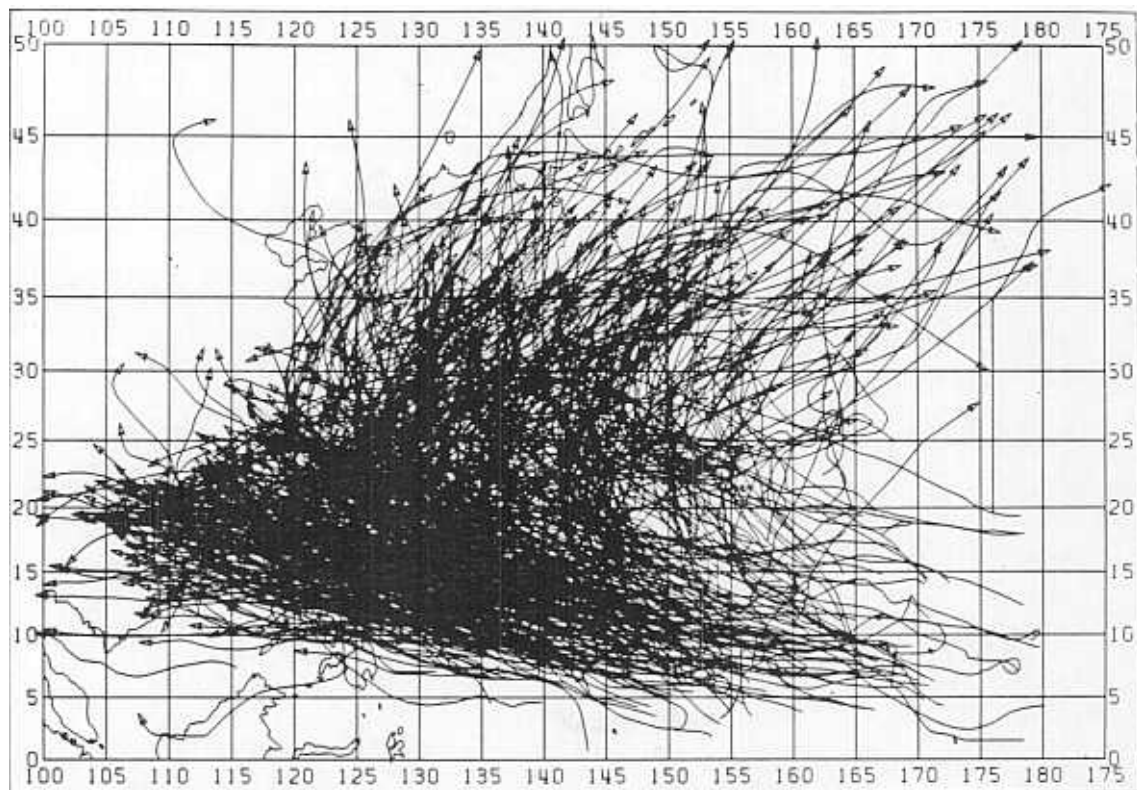
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63	17	283	14	15	3.19
64	17	279	14	14	5.04
65	19	281	13	14	5.16
66	14	283	16	16	3.09
67	19	291	15	16	2.61
68	17	283	15	15	2.86
69	17	281	14	16	3.95
86	14	284	11	11	4.81
87	14	282	13	13	2.81
88	28	289	11	11	2.54
89	38	291	11	12	3.65
90	36	282	10	11	4.88
91	33	286	11	12	3.93
92	36	280	13	13	4.37
93	28	293	12	14	3.53
94	25	285	10	11	3.94
95	22	281	13	13	3.25
96	22	275	14	14	2.19
113	33	296	9	10	2.80
114	33	295	10	11	2.97
115	33	293	7	11	3.70
116	30	291	11	12	4.72
117	30	294	12	13	5.68
118	22	289	10	11	4.15
119	28	300	10	11	4.48
120	14	296	13	13	4.08
139	17	309	8	10	3.70
140	19	320	7	10	3.79
141	33	353	7	10	3.06
142	22	332	8	10	3.33
143	14	344	8	11	3.19
145	14	334	9	10	4.76
166	14	011	6	9	2.96
167	14	010	10	11	3.67
168	14	024	13	13	5.14
169	14	000	10	12	5.23
170	14	016	9	12	3.50
194	17	030	14	15	5.70
195	19	027	13	17	7.15
201	17	029	17	19	5.04
221	19	045	20	21	6.75
222	19	044	23	24	7.73
248	17	061	24	25	4.34
249	25	059	23	24	7.78
276	14	059	32	33	15.31



TYPHOON FREQUENCY 1 JAN - 31 DEC



TYPHOON MOTION JAN - 31 DEC



TYPHOON TRACKS 1 JAN - 31 DEC

A	B	C	D	E	F	A	B	C	D	E	F	A	B	C	D	E	F	A	B	C	D	E	F	A	B	C	D	E	F	
17	14	309	10	11	5.72	102	14	297	8	9	4.20	167	138	324	8	11	3.47	233	19	043	7	13	4.03	328	22	025	27	29	8.91	
18	14	301	13	14	4.43	103	14	314	5	10	3.93	168	119	337	7	11	4.32	243	14	332	13	15	6.40	329	28	039	24	25	11.66	
37	25	290	12	12	4.27	108	28	295	8	9	2.77	169	141	330	8	12	3.98	244	44	343	10	11	4.81	330	22	046	21	21	14.95	
38	22	281	11	12	4.41	109	52	292	8	9	3.22	170	117	341	8	11	4.26	245	76	006	9	12	6.58	331	33	045	22	25	14.15	
39	25	292	11	12	3.68	110	82	294	9	10	3.74	171	95	347	8	13	5.80	246	98	019	10	13	8.44	332	41	050	26	29	13.55	
40	33	287	12	12	3.22	111	63	286	11	12	5.59	172	79	340	7	12	5.48	247	106	025	11	15	8.81	333	28	042	27	29	13.85	
41	36	286	13	13	4.42	112	76	298	10	12	5.07	173	87	342	9	12	4.37	248	92	037	14	17	9.23	334	14	049	28	31	11.19	
42	45	285	12	12	3.81	113	111	293	10	11	3.49	174	79	356	10	13	4.66	249	122	026	13	17	8.22	335	14	063	17	19	15.40	
43	52	293	12	13	2.68	114	171	298	10	11	3.41	175	49	355	9	11	5.50	250	84	028	16	20	8.87	337	14	051	22	23	9.23	
44	14	296	9	10	2.49	115	154	294	9	10	3.28	176	33	338	6	10	5.95	251	71	027	14	19	10.17	338	14	046	23	24	4.20	
45	25	294	10	11	3.42	116	149	297	9	11	3.66	177	46	325	7	11	4.90	252	73	027	13	18	9.02	352	14	036	29	30	5.09	
46	19	296	10	11	3.19	117	138	297	11	12	4.20	178	36	325	8	12	4.54	253	87	019	12	16	8.08	354	17	028	31	33	5.16	
47	22	294	8	9	4.80	118	128	300	10	11	3.98	179	25	317	10	11	3.83	254	38	012	14	18	7.62	358	17	035	31	32	13.09	
52	14	283	14	14	5.43	119	109	305	10	12	4.10	180	14	317	10	12	7.89	255	41	024	14	17	9.51	360	14	050	29	32	16.05	
59	17	283	11	11	5.95	120	87	306	10	11	3.53	181	14	306	10	13	5.26	256	30	032	13	14	4.40							
60	22	285	8	9	5.32	121	79	319	8	12	4.29	182	14	304	8	13	4.69	257	28	044	17	19	8.69							
61	19	280	12	12	3.44	122	57	317	8	11	5.54	188	17	300	12	15	6.04	258	14	051	21	22	8.43							
62	49	283	11	12	4.32	123	68	315	8	11	5.24	189	22	300	11	12	4.66	260	17	045	10	12	2.90							
63	73	285	11	12	3.49	124	44	299	11	12	3.68	190	41	307	10	12	3.71	270	38	356	10	11	5.12							
64	79	285	11	11	3.67	125	36	297	12	13	5.74	191	98	319	9	12	3.33	271	46	000	10	12	5.77							
65	87	288	11	12	4.28	126	30	295	12	13	4.20	192	119	330	8	11	3.47	272	49	025	9	10	4.09							
66	60	285	11	12	4.01	127	25	289	10	12	4.53	193	146	340	7	11	4.89	273	84	026	14	16	8.43							
67	57	292	12	13	4.13	128	19	289	8	11	5.12	194	136	350	8	11	4.90	274	90	022	15	19	7.44							
68	57	293	12	14	3.79	133	25	284	8	9	2.77	195	117	001	8	12	6.14	275	79	028	18	21	9.13							
69	55	286	13	14	5.56	134	44	287	10	10	2.57	196	95	005	9	13	5.22	276	76	042	21	23	11.49							
70	49	294	12	13	4.58	135	82	294	10	11	3.69	197	98	010	12	15	5.87	277	73	042	22	25	13.84							
71	46	290	12	13	5.11	136	90	298	9	10	4.55	198	57	342	10	13	4.09	278	71	042	19	23	13.36							
72	36	286	14	15	4.58	137	87	296	9	10	3.75	199	76	354	10	13	4.76	279	71	039	20	22	11.19							
73	30	288	12	12	6.93	138	114	299	8	11	3.83	200	92	359	10	13	5.46	280	44	033	20	23	10.39							
74	22	284	12	13	6.01	139	125	295	10	11	2.93	201	71	022	11	15	8.06	281	30	026	19	20	8.99							
75	25	289	12	12	4.74	140	146	304	8	11	3.04	202	65	029	9	14	8.10	282	28	047	13	16	4.77							
76	17	289	14	15	6.07	141	149	319	7	10	3.67	203	65	004	6	12	6.22	283	36	050	15	17	6.86							
82	19	263	7	8	2.86	142	133	309	9	11	3.93	204	55	337	6	12	4.53	284	17	047	22	23	4.81							
83	30	279	8	9	2.88	143	125	320	8	11	3.97	205	25	334	6	15	6.73	286	17	038	14	17	11.85							
84	36	285	10	10	4.02	144	111	321	8	11	3.82	206	19	321	7	11	4.15	296	19	007	12	13	4.21							
85	46	291	10	10	4.31	145	111	315	9	11	4.04	216	22	307	10	11	3.11	297	19	013	16	18	6.27							
86	45	294	10	11	5.06	146	68	303	10	12	4.46	217	55	317	9	12	3.39	299	36	019	16	17	6.51							
87	52	283	11	11	3.90	147	79	311	10	12	4.02	218	63	338	8	11	4.65	300	44	023	20	22	12.38							
88	98	291	10	11	3.35	148	98	316	10	12	4.36	219	101	000	8	12	5.16	301	60	035	23	25	11.29							
89	28	290	10	11	3.92	149	87	324	10	12	4.47	220	109	013	9	12	6.36	302	71	037	23	25	9.68							
90	22	292	10	11	4.05	150	25	317	9	14	4.67	221	109	020	11	14	6.79	303	52	046	21	22	14.63							
91	19	292	10	12	4.59	151	22	324	10	11	4.60	222	106	018	10	14	7.64	304	41	051	30	31	13.89							
92	103	290	11	13	5.03	152	14	331	12	12	2.14	223	138	012	11	15	6.99	305	46	045	25	28	13.95							
93	17	293	11	12	4.78	153	14	335	10	11	3.77	224	90	012	11	16	8.16	306	44	038	24	26	12.12							
94	106	295	10	12	4.41	154	14	325	7	12	6.68	225	79	000	8	13	5.94	307	41	046	24	26	11.54							
95	98	296	10	11	4.49	155	160	17	288	11	12	3.47	226	82	002	11	13	6.31	308	19	050	24	25	14.94						
96	68	287	11	12	4.27	161	44	297	9	11	4.03	227	52	354	9	12	6.61	309	14	045	20	20	7.61							
97	36	292	13	14	5.52	162	71	307	8	10	3.13	228	57	001	10	14	8.41	310	19	056	18	18	5.87							
98	30	292	14	15	6.21	163	79	309	9	10	4.19	229	60	006	9	14	7.89	311	17	047	18	20	6.05							
99	28	290	14	15	5.42	164	95	324	8	11	4.28	230	36	018	11	15	7.68	312	17	027	26	27	4.09							
100	25	295	13	14	6.86	165	111	327	7	11	4.32	231	36	003	8	13	2.63	313	14	030	28	28	9.57							
101	14	303	12	14	6.37	166	117	317	8	11	4.16	232	17	357	4	12	4.37	314	19	035	37	38	11.87							

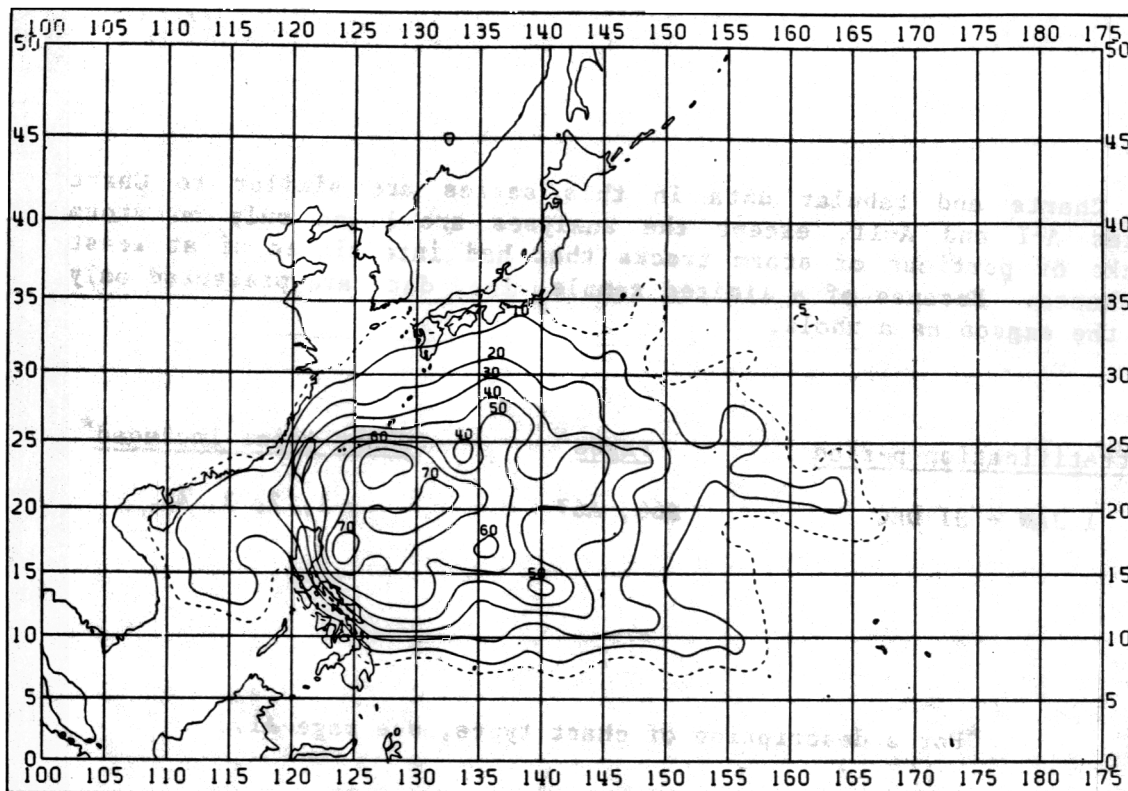
A.5 Chart Series A-III

Charts and tabular data in this series are similar to Chart Series A-I and A-II, except the analyses are based only on storm tracks or portions of storm tracks that had intensities of at least 100 knots. Because of a limited sample size, data are presented only for the season as a whole.

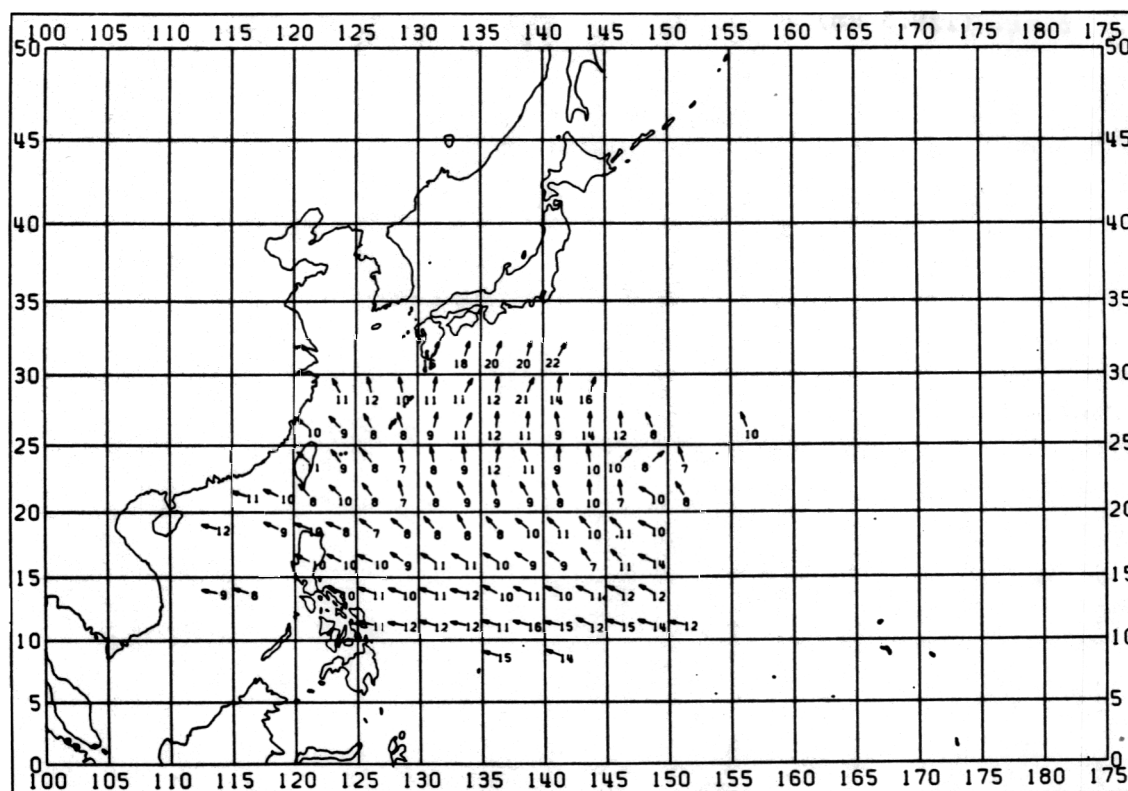
<u>Stratification period</u>	<u>Pages</u>	<u>Chart types included*</u>
1 JAN - 31 DEC	A66, A67	1, 2, 3, 4

*For a description of chart types, see page A1

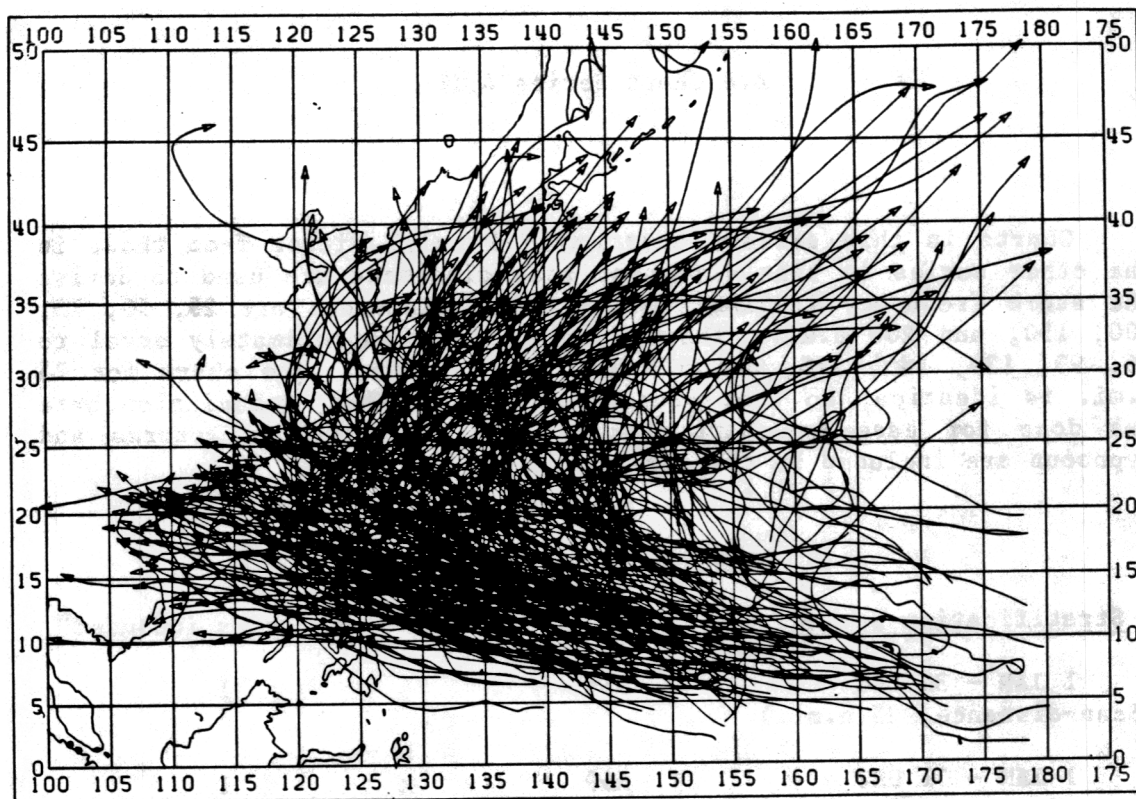
Note: All charts in this series are based on a scan-distance of 75 n.mi. (139.5 km)



TYPHOON (≥ 100 KTS) FREQUENCY 1 JAN - 31 DEC



TYPHOON (≥ 100 KTS) MOTION 1 JAN - 31 DEC



TYPHOON (≥ 100 KTS) TRACKS 1 JAN - 31 DEC

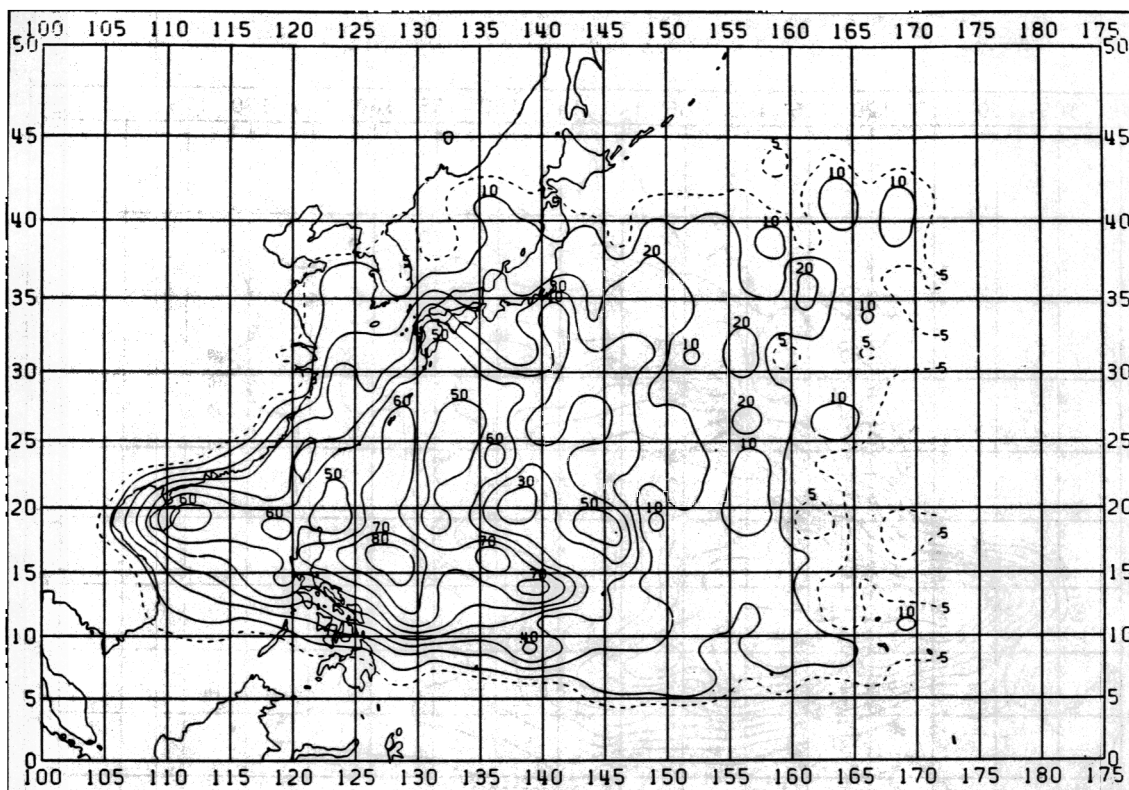
A	B	C	D	E	F	A	B	C	D	E	F	A	B	C	D	E	F
41	17	287	15	15	4.28	163	17	287	11	12	5.20	275	19	019	20	22	8.42
43	14	293	14	15	2.94	164	22	294	10	11	3.96	276	17	015	20	22	9.42
63	36	283	11	11	4.02	165	44	317	8	11	3.21	277	19	030	22	25	7.84
64	41	281	12	12	4.38	166	55	313	10	11	3.72						
65	41	286	12	13	5.35	167	71	324	8	10	3.00						
66	28	282	12	13	4.73	168	57	345	7	10	4.07						
67	28	287	11	12	4.56	169	76	334	8	12	3.92						
68	19	285	16	17	2.16	170	71	333	9	13	4.00						
69	22	283	15	16	6.03	171	57	347	9	14	5.54						
70	30	295	12	13	5.48	172	46	332	9	12	5.76						
71	25	288	15	15	5.59	173	41	339	8	12	4.49						
72	25	288	14	15	5.28	174	44	357	10	13	5.42						
73	14	282	12	12	6.91	175	25	353	7	9	2.27						
84	14	283	9	9	2.81	176	14	303	10	11	5.06						
85	14	287	8	9	3.45	177	14	330	8	9	3.90						
88	44	292	10	11	2.80	191	41	310	11	13	2.67						
89	55	290	11	12	3.54	192	57	324	9	11	3.07						
90	57	290	10	11	4.11	193	76	321	8	11	3.84						
91	52	289	11	12	4.37	194	76	349	7	12	5.07						
92	36	285	12	14	3.78	195	60	350	8	12	4.13						
93	33	299	10	12	4.95	196	33	354	9	13	4.41						
94	52	293	11	11	3.85	197	60	010	12	15	5.95						
95	52	295	10	11	4.07	198	30	338	11	12	3.36						
96	30	296	11	12	4.06	199	38	000	9	13	5.86						
97	19	296	12	13	4.48	200	52	353	10	13	4.26						
98	14	299	12	12	2.57	201	36	039	10	15	9.07						
113	25	297	10	10	3.33	202	33	047	8	13	8.18						
114	79	298	10	10	3.25	203	14	342	7	12	4.02						
115	57	296	10	10	2.64	217	19	306	10	11	2.73						
116	63	306	9	11	3.01	218	36	316	9	10	3.19						
117	49	301	11	12	3.50	219	38	332	8	10	3.71						
118	57	300	11	11	4.00	220	36	341	8	10	3.86						
119	63	302	10	11	3.91	221	44	014	9	12	6.08						
120	41	305	9	10	3.63	222	41	024	11	15	8.57						
121	36	309	9	11	4.31	223	57	005	12	15	7.10						
122	25	326	7	10	5.14	224	46	004	11	15	9.73						
123	25	318	11	12	4.55	225	25	351	9	12	3.59						
124	14	295	14	14	2.53	226	25	002	14	16	5.89						
136	17	285	12	13	4.08	227	14	358	12	16	5.95						
138	17	295	9	9	3.77	228	19	338	8	10	4.05						
139	33	291	10	11	3.10	231	19	339	10	14	2.09						
140	63	295	8	10	3.11	244	14	332	11	12	3.05						
141	71	310	7	11	3.46	245	14	347	12	14	6.55						
142	73	311	8	11	3.57	246	22	349	10	12	6.25						
143	68	321	8	11	3.47	247	22	010	11	13	4.88						
144	55	331	8	11	4.12	248	30	029	11	15	8.55						
145	60	319	8	10	3.88	249	38	009	12	16	6.10						
146	36	310	10	11	4.16	250	25	024	21	24	9.28						
147	38	313	11	13	3.67	251	19	007	14	17	7.42						
148	36	319	10	12	4.96	252	25	018	16	20	7.70						
149	33	314	11	12	3.98	273	14	021	16	18	5.45						
150	14	298	10	13	3.64	274	17	019	18	20	6.86						

A.6 Chart Series A-IV

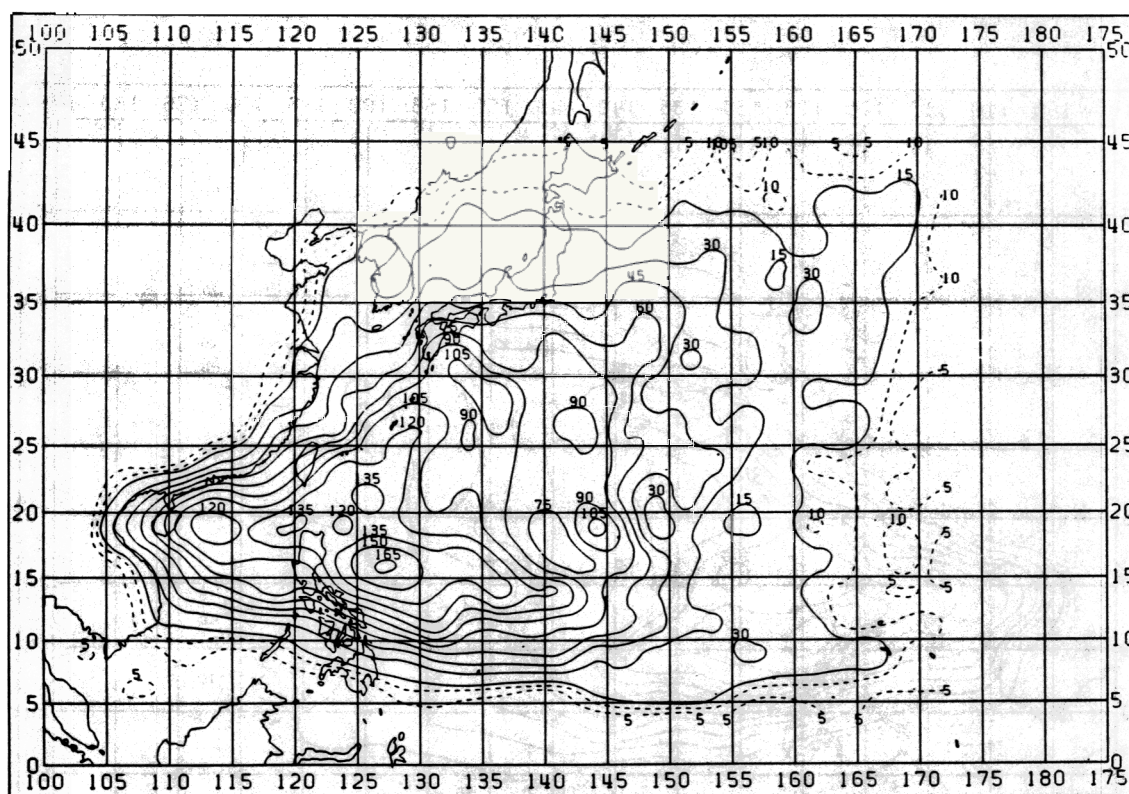
Charts in this series (Chart type 1 only) differ from those in the other series in that different scan distances are used to derive the storm frequency isoline charts. Scan distances are 25, 50, 75, 100, 150, and 200 n.mi. These distances are approximately equal to 46, 93, 139, 185, 278, and 371 km, respectively. The chart for 75 n.mi. is identical to that presented on page A36. Reinclusion here was done for ease in chart comparison. Both tropical storms and typhoons are included in the analyses.

<u>Stratification period</u>	<u>Page</u>	<u>Chart types included*</u>
1 JAN - 31 DEC (Scan-distance, 25 n.mi.)	A69	1
1 JAN - 31 DEC (Scan-distance, 50 n.mi.)	A69	1
1 JAN - 31 DEC (Scan-distance, 75 n.mi.)	A70	1
1 JAN - 31 DEC (Scan-distance, 100 n.mi.)	A70	1
1 JAN - 31 DEC (Scan-distance, 150 n.mi.)	A71	1
1 JAN - 31 DEC (Scan-distance, 200 n.mi.)	A71	1

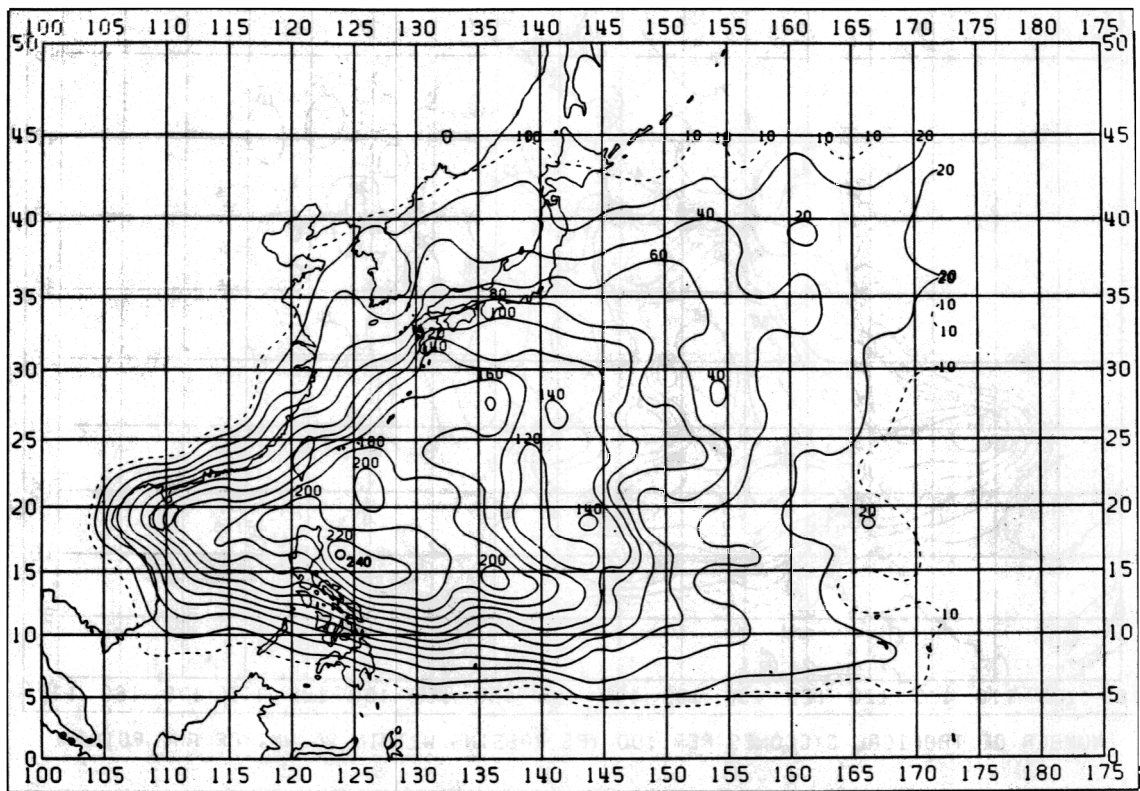
*For a description of chart types, see page A1.



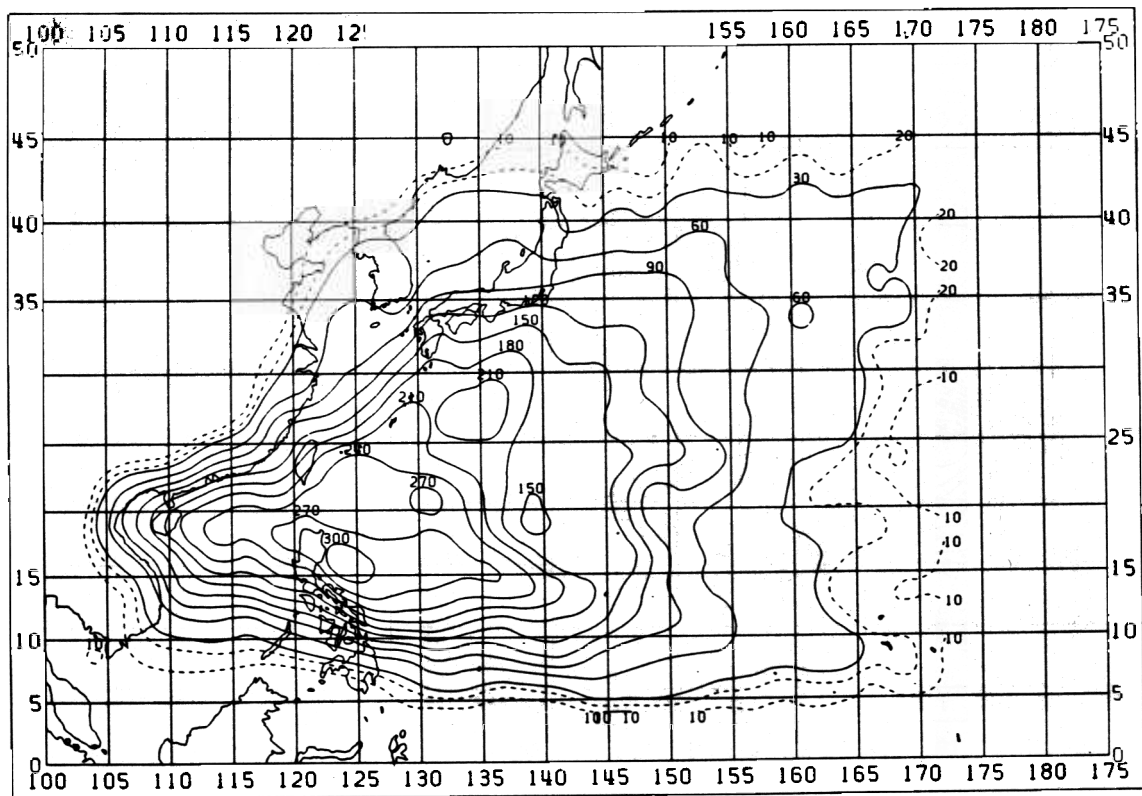
NUMBER OF TROPICAL CYCLONES PER 100 YRS PASSING WITHIN 25 NMI OF ANY POINT



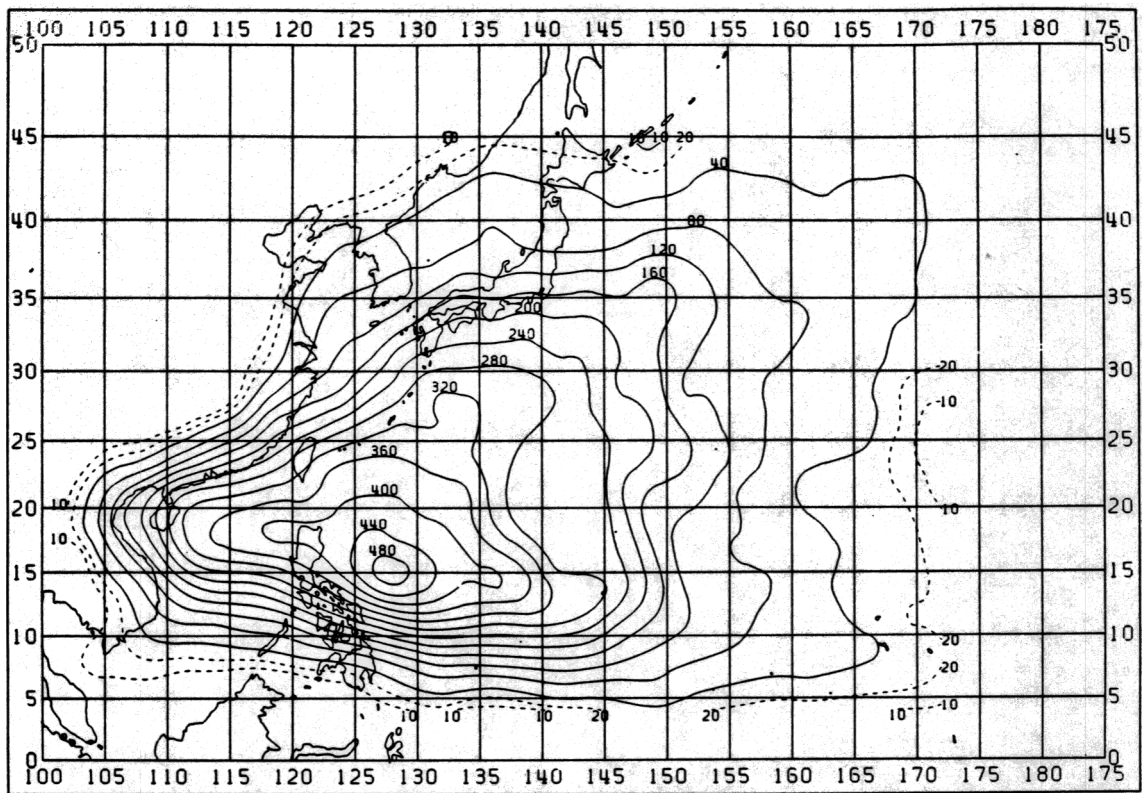
NUMBER OF TROPICAL CYCLONES PER 100 YRS PASSING WITHIN 50 NMI OF ANY POINT



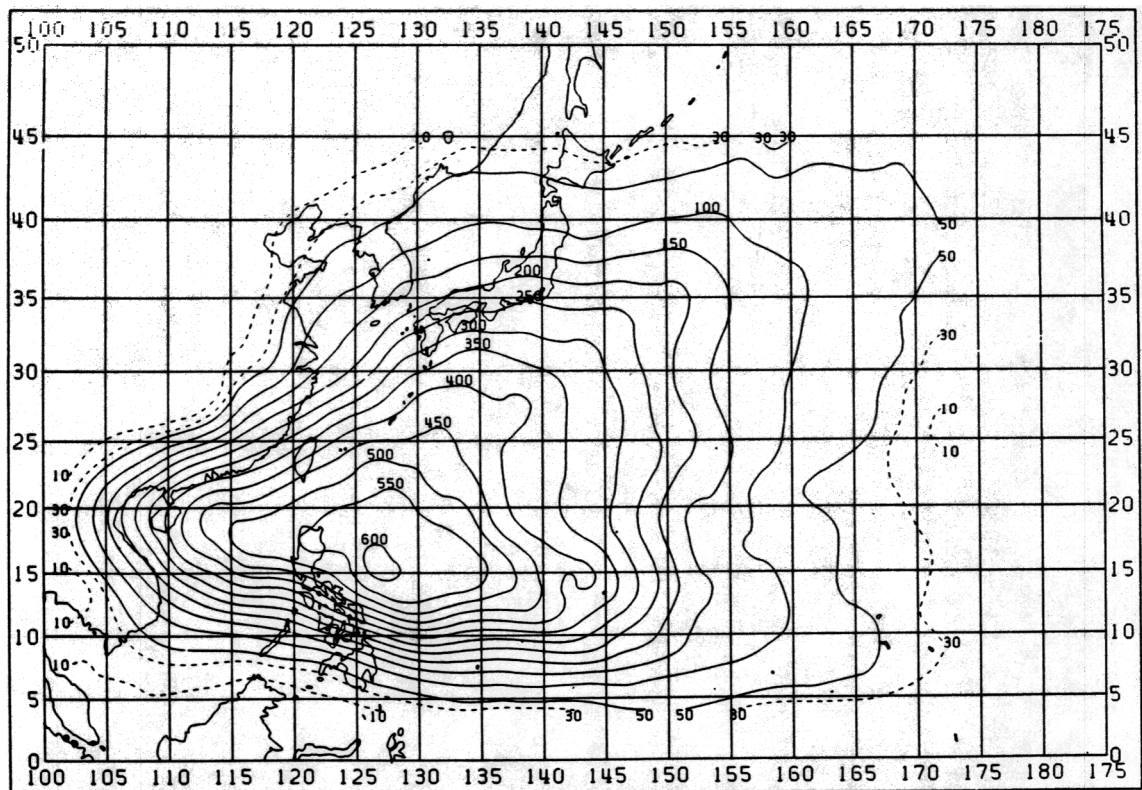
NUMBER OF TROPICAL CYCLONES PER 100 YRS PASSING WITHIN 75 NMI OF ANY POINT



NUMBER OF TROPICAL CYCLONES PER 100 YRS PASSING WITHIN 100 NMI OF ANY POINT



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