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CLIMATOLOGY OF NORTH PACIFIC TROPICAL CYCLONE TRACKS

Ronald J. Miller, Ted L. Tsui, Ann J. Schrader

Naval Environmental Prediction Research Facility

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This climatology depicts and provides statistics on the tracks of tropical cyclones that have occurred in the North Pacific Ocean during the years 1945-87. The data are summarized in four types of charts -- mean paths, actual tracks, constancy and relative frequency, and speed of movement -- for both the western and eastern North Pacific regions, in 24 half-monthly calendar periods. <i>ETE</i>					
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1. INTRODUCTION

This North Pacific tropical cyclone climatology was compiled at the suggestion of the Environmental Group, U.S. Pacific Command. The climatology is designed to serve as an updated forecast reference for Joint Typhoon Warning Center (JTWC) forecasters, a planning aid to assist fleet scheduling personnel, a decision-making aid for U.S. Pacific commanding officers, and a source of general climatic knowledge about tropical cyclones in the North Pacific basin.

No attempt has been made here to produce a general tropical climatology. All statistics provided are those related solely and directly to tropical cyclone tracks. The information is presented in four types of charts: mean paths, actual tracks, constancy and relative frequency, and speed of movement. Guidance on chart usage is given in para. 3 and a key to charts sequencing is given in para. 4. Data sources and compilation procedures are described in para. 2.

2. DATA

2.1 Data Sources

The data used to develop this climatology were obtained from two sources. For the period of 1959-87 in the western North Pacific, the data were extracted from the JTWC Tropical Cyclone Data Base maintained at the Fleet Numerical Oceanography Center, Monterey, CA. The latitude, longitude, and intensity (maximum surface wind speed) for each tropical cyclone are given at 6-hour

intervals. These positions represent a tropical cyclone's best track, which is a subjectively-smoothed path determined in the post-storm analysis.

For the western North Pacific (1945-1958) and eastern North Pacific (1949-1982), the data were taken from the Consolidated World-Wide Tropical Cyclone Data Base, National Climatic Data Center, Asheville, NC. These data, given at 12-hour intervals, were interpolated to 6-hourly positions before they were used in the analyses and calculations. The interpolation was accomplished by the Akima method.*

(It should be noted that the placing in service of the first meteorological satellite in 1960 greatly enhanced meteorologists' abilities to locate and track tropical cyclones in data-sparse areas. This improvement applies more to the eastern Pacific than to the western Pacific, however, because there was much more storm reporting from increased ship traffic and aircraft reconnaissance in the western region after World War II.)

2.2 Tropical Cyclone Intensities

Tropical cyclones that failed to attain at least tropical storm intensity (maximum surface wind speed greater than 33 kt) were not considered for this study. Because intensities were not given for tropical cyclones occurring before 1973 in the eastern North Pacific basin, all tropical cyclones prior to 1973 were considered in this study.

*Akima, H., 1970: "A New Method of Interpolation and Smooth Curve Fitting Based on Local Procedures," J. Assoc. Comp. Mach., 17, 589-602.

2.3 Background

Table 1 gives background information on the tropical cyclones (> 33 kt) from the two basins. The subjective path classification of straight, recurver, or "other" was made for both basins. A straight tropical cyclone is one whose general direction of movement remained constant throughout its life with a heading between 250° and 360° . A recurver is defined as a tropical cyclone that turned from its initial westward or northwestward path to a path toward the north or northeast. A tropical cyclone that did not fit into either the straight or recurver categories is classified as "other."

Note that some of the tracks may appear to have been incorrectly classified. This generally was due to considerations of storm intensity during the time in question. For example, an erratic track during the formative or dissipative stages of a tropical cyclone does not automatically classify that tropical cyclone as "other."

Intensity statistics were based only on tropical cyclones whose intensities were known.

3. CHARTS

3.1 Timeframe

The tropical cyclone occurrences were divided into 24 half-month periods, with each period centered on either the 1st or 16th day of the month. A period thus will begin approximately a week before the 1st or 16th, and end approximately a week after

the 1st or 16th, as, for example, in the sequence of periods Dec 24-Jan 8, Jan 9-Jan 23, Jan 24-Feb 8. Any tropical cyclone, however, that occurred within 15 days of either side of the 1st or 16th day, also was included in the period. Tropical cyclones were classified into periods according to their starting dates. Each tropical cyclone belongs to two periods, and in some cases three. The starting date was chosen for classification purposes because, in operational fact, a storm's start date is always known. Thus, there would be no confusion as to which climatological period should be used. The overlapping of periods also avoids confusion about tropical cyclones whose starting dates were near the beginning or end of calendar months.

Table 1. Summary of western and eastern North Pacific Tropical Cyclones

	Western (1945-1987)			Eastern (1949-1982)		
Avg. No. Of Tropical Cyclones (> 33 kts)	25.37/year			12.00/year		
Type:	No.	Percent	Avg. Life (Days)	No.	Percent	Avg. Life (Days)
Straight	397	36.4	5.77	286	70.1	4.58
Recurver	464	42.5	7.37	62	15.2	5.74
Other	230	21.1	6.71	60	14.7	5.47
Total	1091	100.0	6.65	408	100.0	4.89
Tropical Storms	355	32.6	4.42	65	43.6	3.85
Typhoons/Hurricanes	572	52.5	7.29	83	55.7	6.99
Super Typhoons/ Hurricanes	162	14.9	9.32	1	.7	11.50

3.2 Chart Types

Four types of charts are provided for each period: mean paths, actual tracks, constancy and frequency, and average speed of movement. Certain periods may not be statistically significant if less than 5% of the total number of tropical cyclones in the entire data base occurred in these periods.

3.2.1 Mean Paths. These charts show the paths most often followed by tropical cyclones in the period. The numbers on the paths represent the percentage of tropical cyclones for the period that followed the indicated paths. Paths that contained less than 5% of the tropical cyclones for the period were not analyzed. These charts also contain statistics similar to those in Table 1, but only for the applicable period. For a period in which 10 tropical cyclones or fewer occurred, a blank Mean Paths chart containing only the statistics is supplied.

NOTE: When one path branches off into multiple paths, the sum of the percentages on the branches does not necessarily equal the percentage indicated on the parent path. This is due to the fact that not all tropical cyclones follow a mean path, and some develop/dissipate along a path.

Also included on these charts is a dashed line representing the mean recurvature position of recurving tropical cyclones. This line was objectively determined by evaluating the mean recurvature position in 5° longitude bands. If a band contained fewer than five recurvature positions, it was not included in

the analysis. Thus, there are no mean recurvature lines for the entire eastern North Pacific basin due to the low number of recurving tropical cyclones.

3.2.2 Actual Tracks. The best track data are plotted on these charts at six-hour intervals. A dot represents the position of the tropical cyclone when it was first considered to have attained at least tropical depression intensity. The typhoon symbol marks the last position of the tropical cyclone before it became extra-tropical or dissipated. There are nine actual track charts for each period (see para. 4).

3.2.3 Constancy and Frequency. Two numbers were computed and plotted for each 5° square on these charts:

Constancy. The top number is constancy, which is defined as the 12-hr average vector speed of the tropical cyclone divided by the 12-hr average scalar speed multiplied by 100. Both numerator and denominator were computed using all tropical cyclones in the square before the division was performed. Thus, constancy is a measure of confidence in direction persistence. A high constancy rate (90 to 100) means that there is a high likelihood that a tropical cyclone will continue in the same general direction for the next 12 hours. As the constancy decreases, confidence decreases that a tropical cyclone will remain on course.

Frequency. The bottom number is the relative frequency of tropical cyclones passing through the square per year for the time period. A value of 0.25 therefore implies that on the average, a tropical cyclone will pass through the square once every four years for that particular period. The frequency can

also be considered as a measure of confidence in the constancy value. For example, a square may have a constancy value of 95, but since the relative frequency is only 0.10, the future 12-hr movement of a tropical cyclone in this square is in doubt.

3.2.4 Average Speed of Movement. Isopleths are drawn on these charts to show the mean scalar movement speed of the tropical cyclone in knots. Each tropical cyclone was interpolated to hourly positions using the Akima method. Speeds were averaged for each 5° square (5° latitude x 5° longitude). Those squares that contained 5% or less of the tropical cyclones in the period were not considered in the analysis. The charts also list the average speed and sample size in each square. Note that some of the squares contain unrealistic speed values (e.g., Nov 9 - Nov 23 at 45° N in the western North Pacific). This is due to a few tropical cyclones whose tracks could not be verified.

4. KEY TO CHARTS SEQUENCE

Charts are grouped by ocean region: those page-numbered W-1, W-2, W-3 ... are for the western North Pacific; and those page-numbered E-1, E-2, E-3 ... are for the eastern North Pacific.

Within each region, charts are grouped in half-month periods, a total of 24 periods. The periods center on the 1st and 16th days of the month -- thus, for example, periods will begin approximately a week before the 1st or 16th, and end approximately a week after the 1st or 16th: [Dec 24-Jan 8] [Jan 9-Jan 23] [Jan 24-Feb 8] [Feb 9-Feb 23], etc.

Within each half-month period, the following charts are provided in sequence:

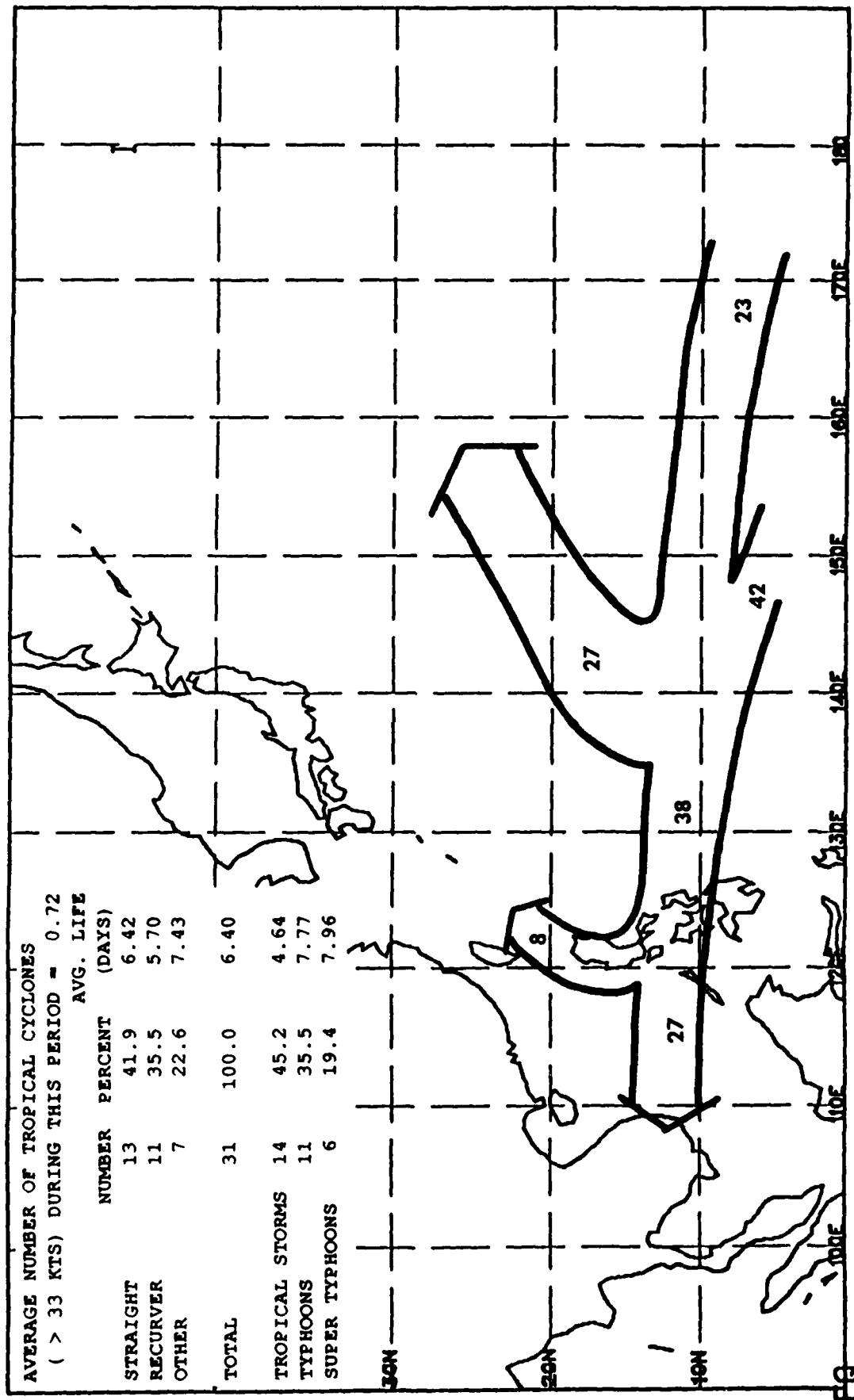
1. Mean Paths

Actual Tracks for

2. Straight - south of 15°N
3. Straight - north of 15°N
4. Straight - all tropical cyclones (in this period)
5. Recurving - south of 15°N
6. Recurving - north of 15°N
7. Recurving - all tropical cyclones (in this period)
8. Other (neither clearly straight nor clearly recurving)
- south of 15°N
9. Other - north of 15°N
10. Other - all tropical cyclones (in this period)
11. Constancy and Relative Frequency
12. Speed of Movement

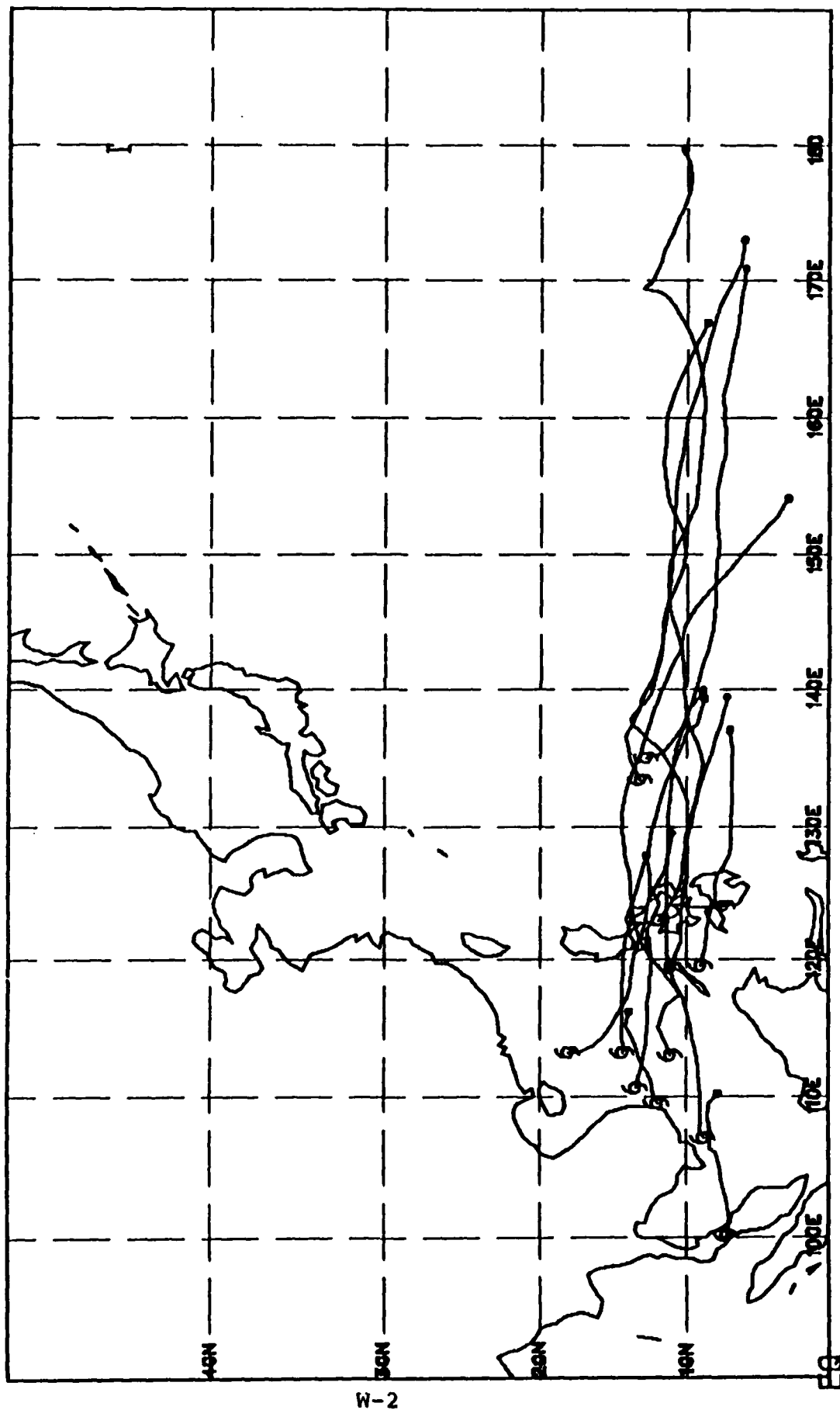
Note: In those few periods when no tropical cyclones occurred, only one chart, with this fact of non-occurrence noted on it, is provided.

MEAN PATHS FOR DEC 24 - JAN 8



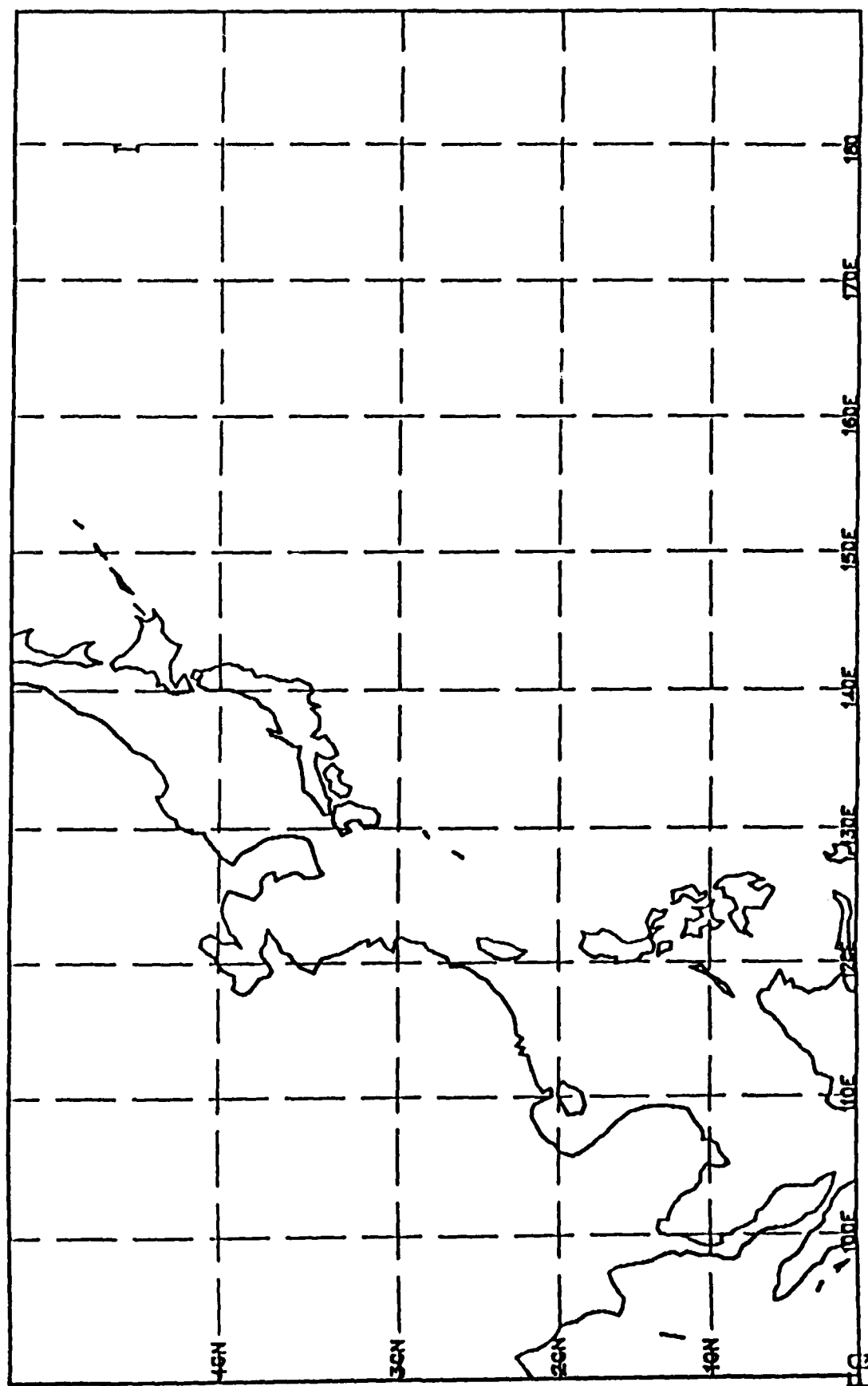
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored.

ACTUAL TRACKS FOR DEC 24 - JAN 8



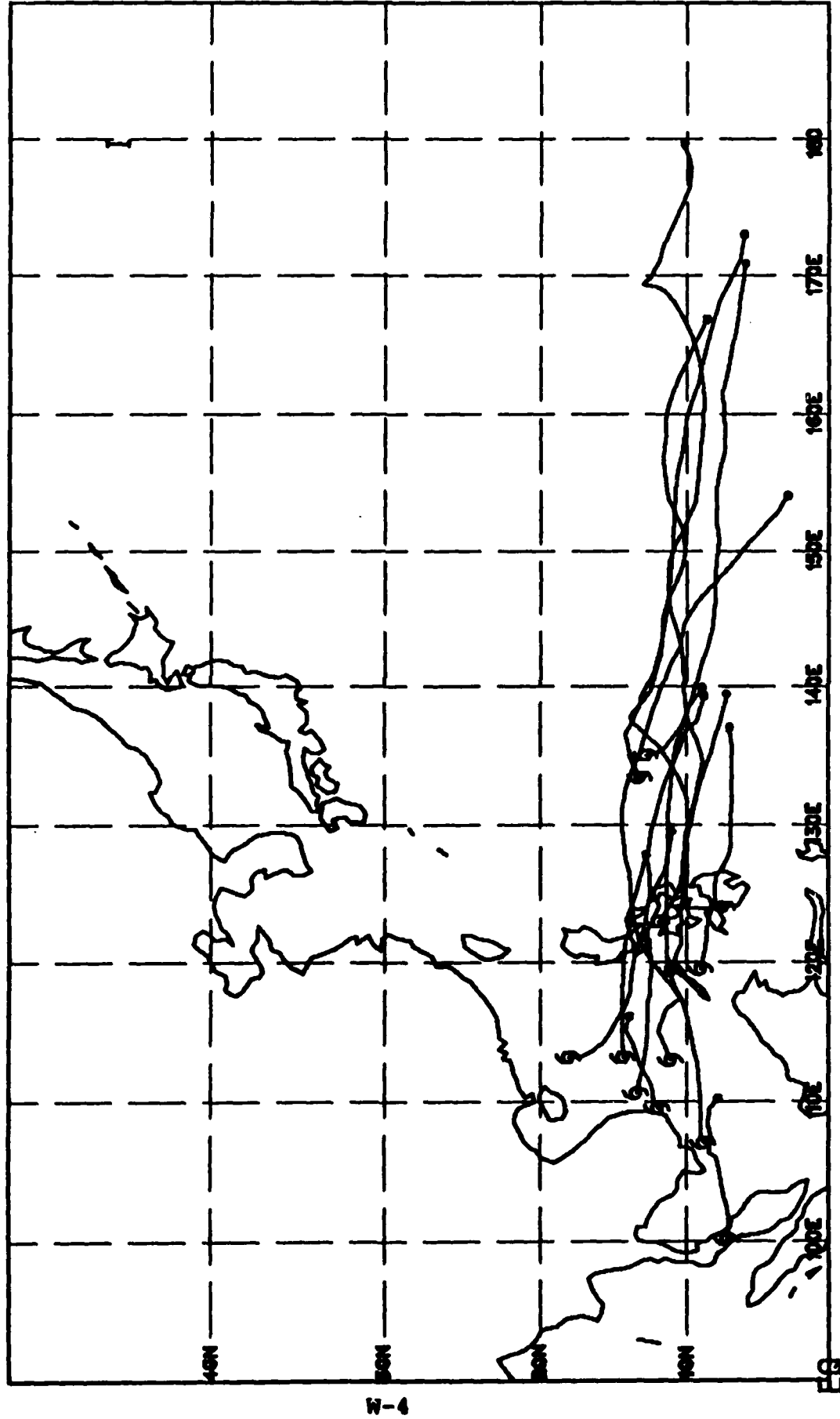
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR DEC 24 - JAN 8



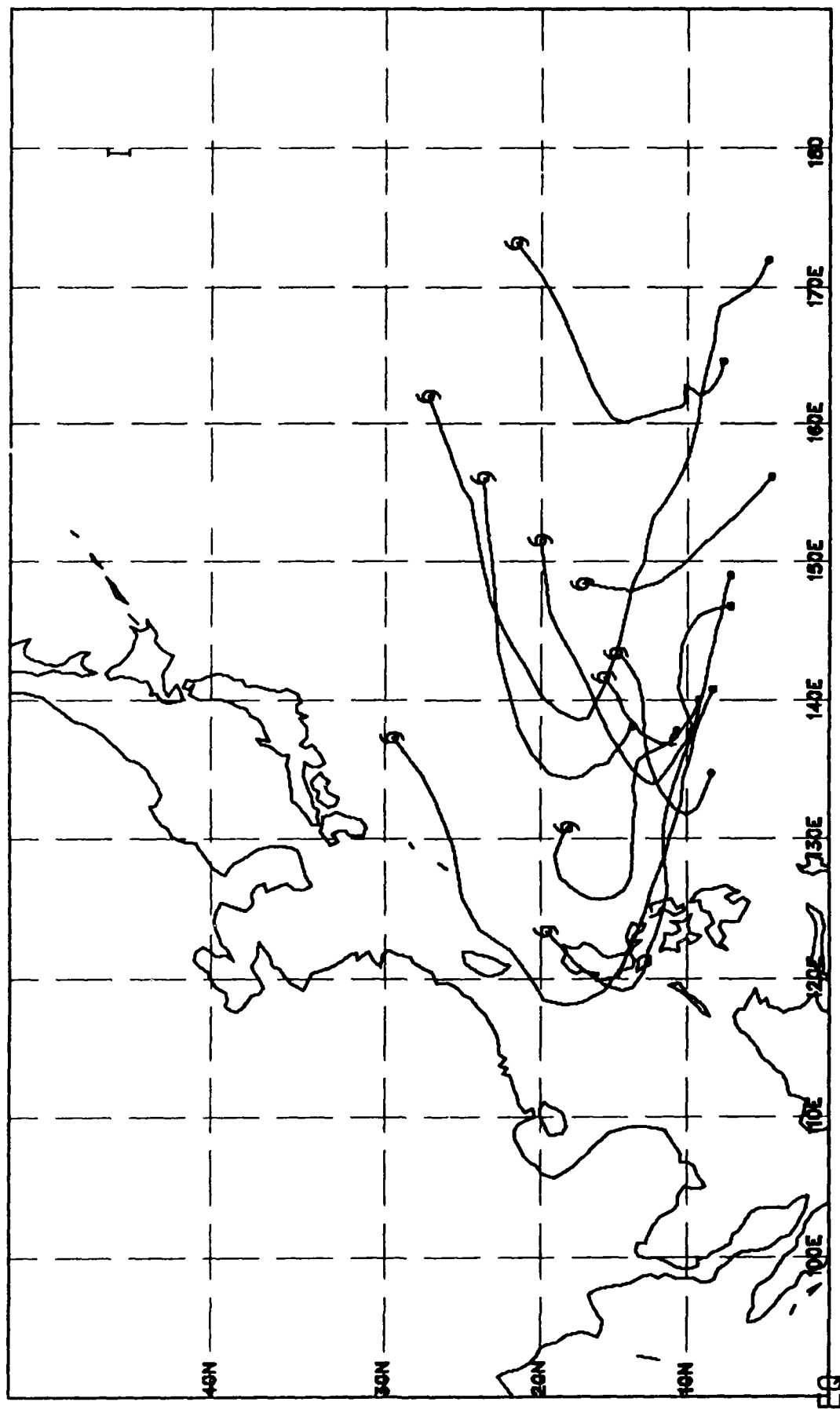
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR DEC 24 - JAN 8



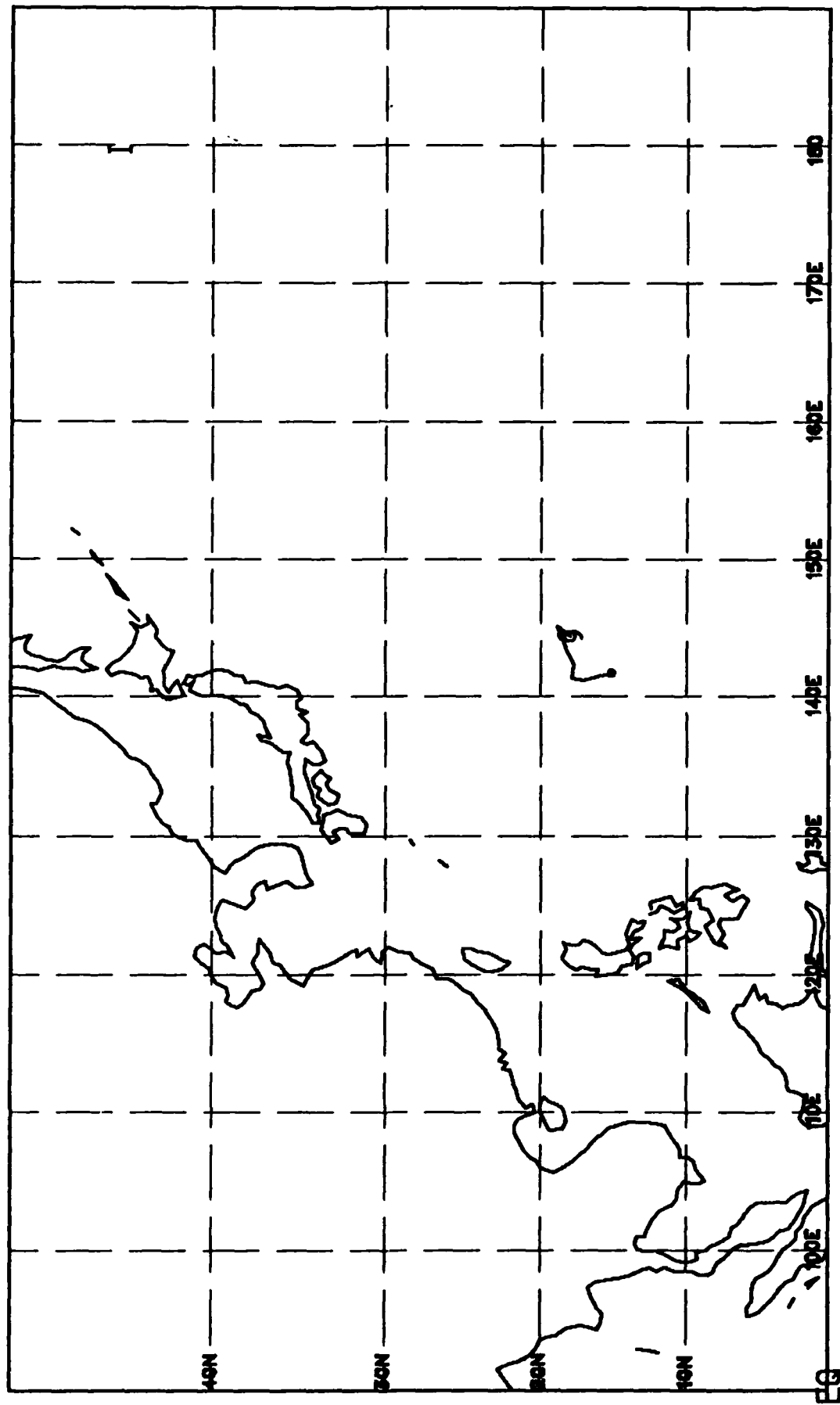
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR DEC 24 - JAN 8



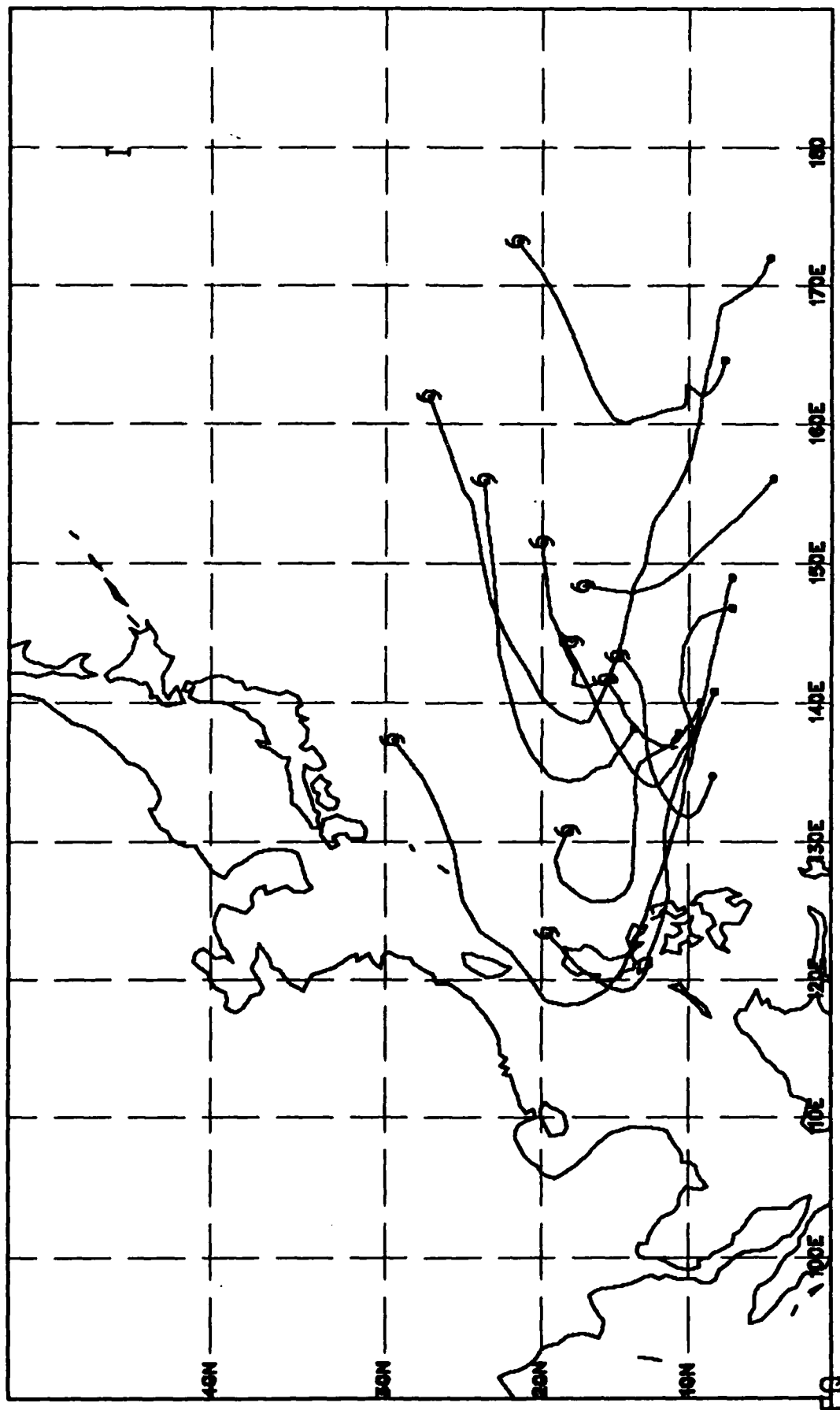
Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR DEC 24 - JAN 8



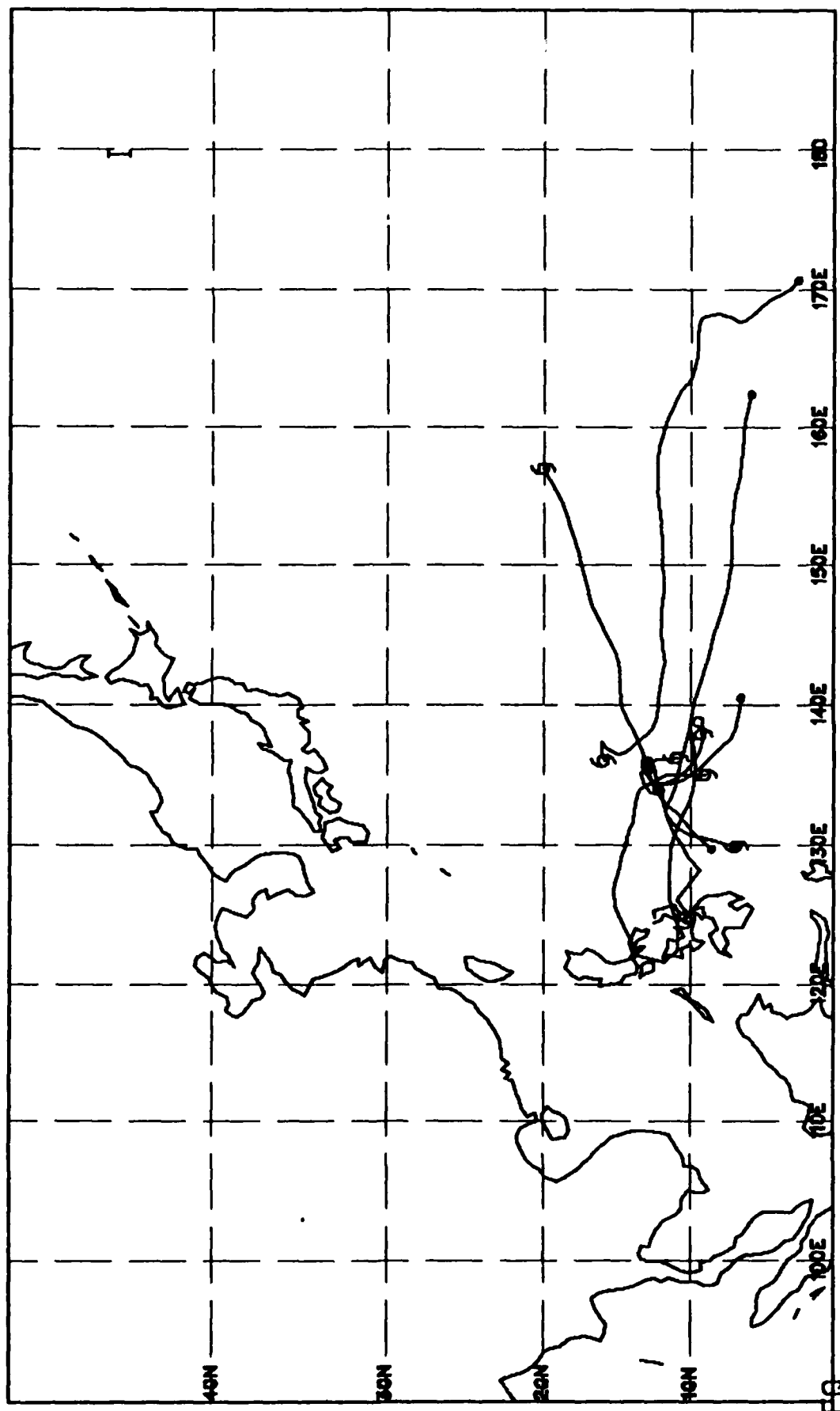
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR DEC 24 - JAN 8



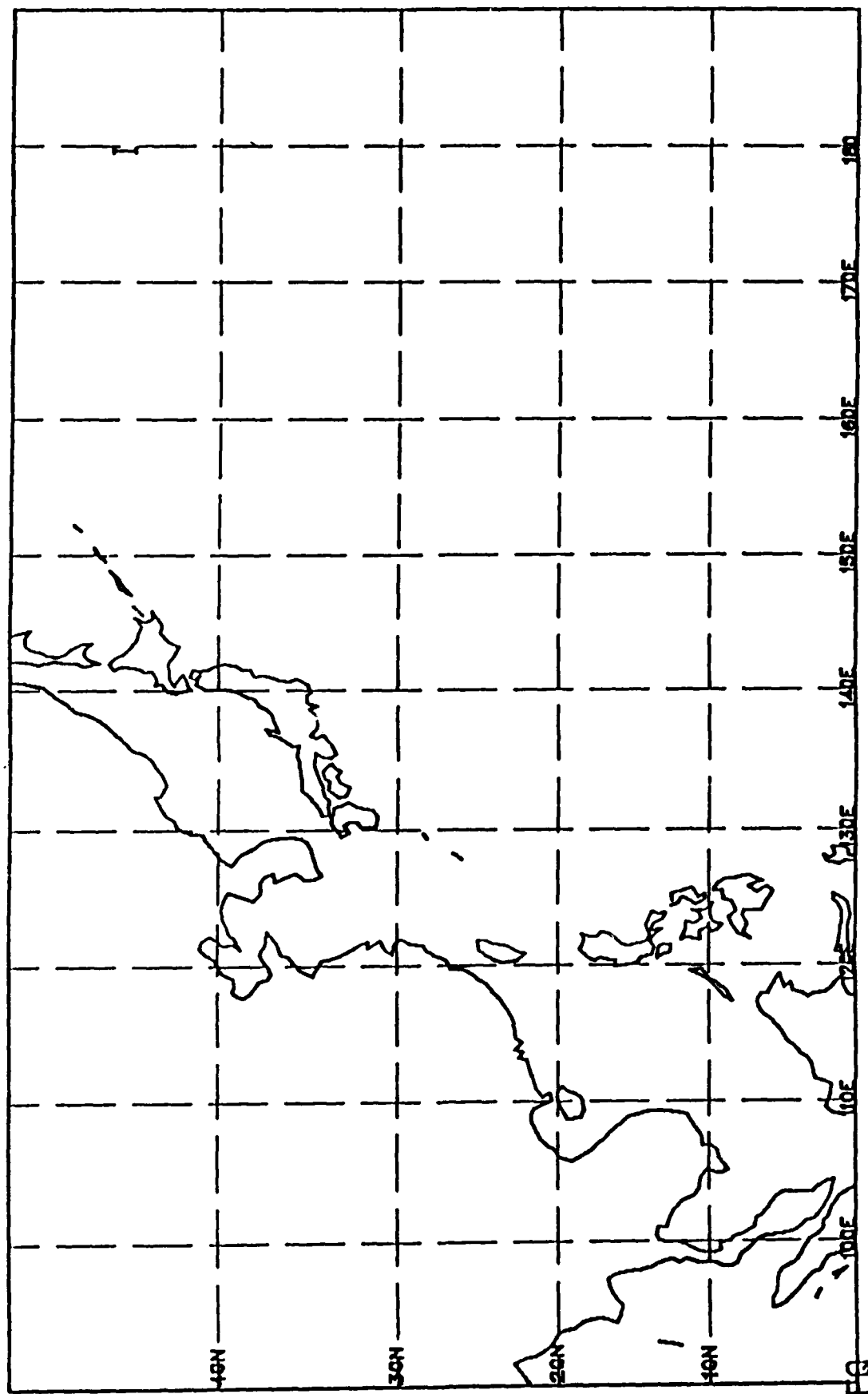
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR DEC 24 - JAN 8



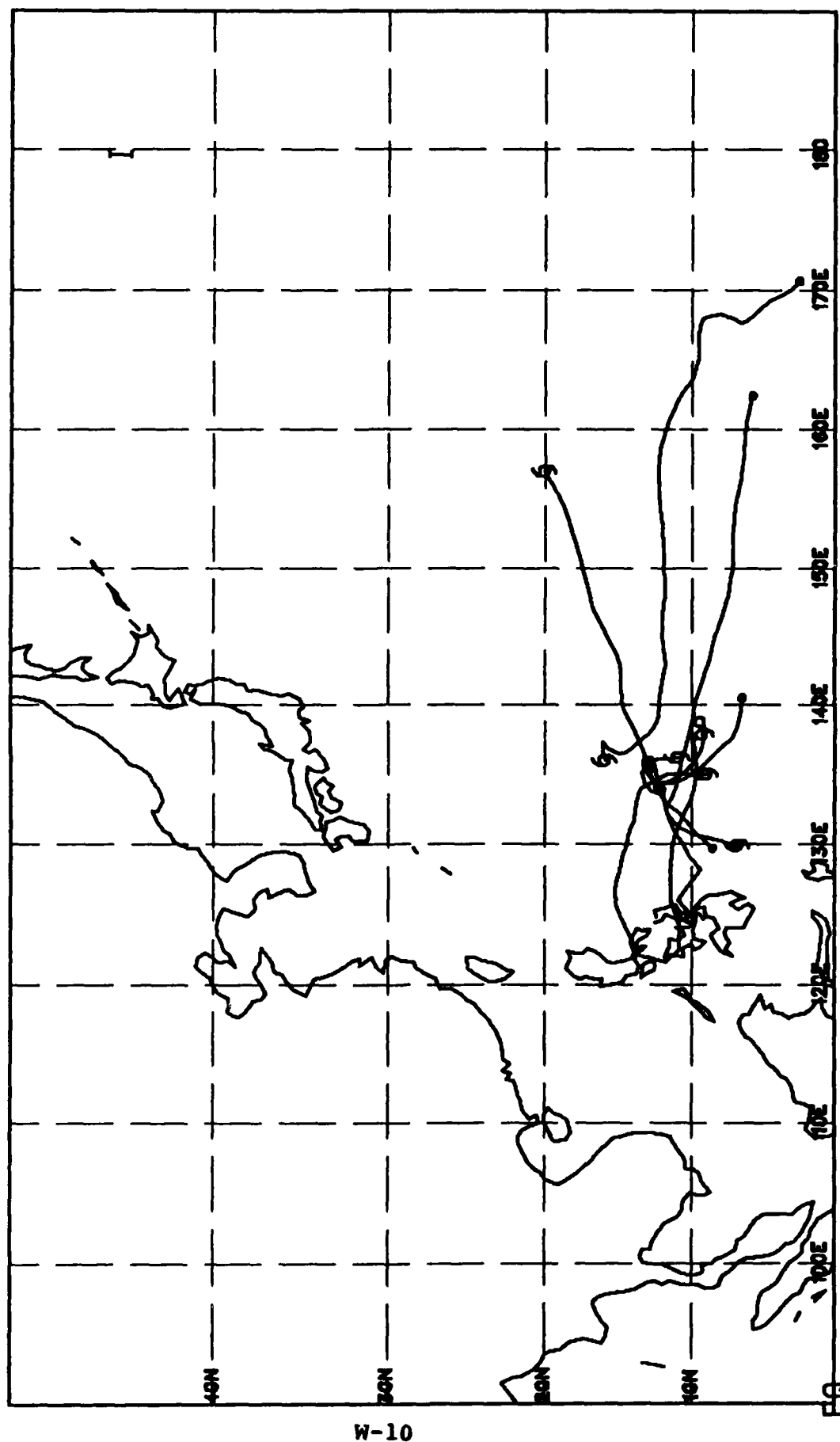
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR DEC 24 - JAN 8



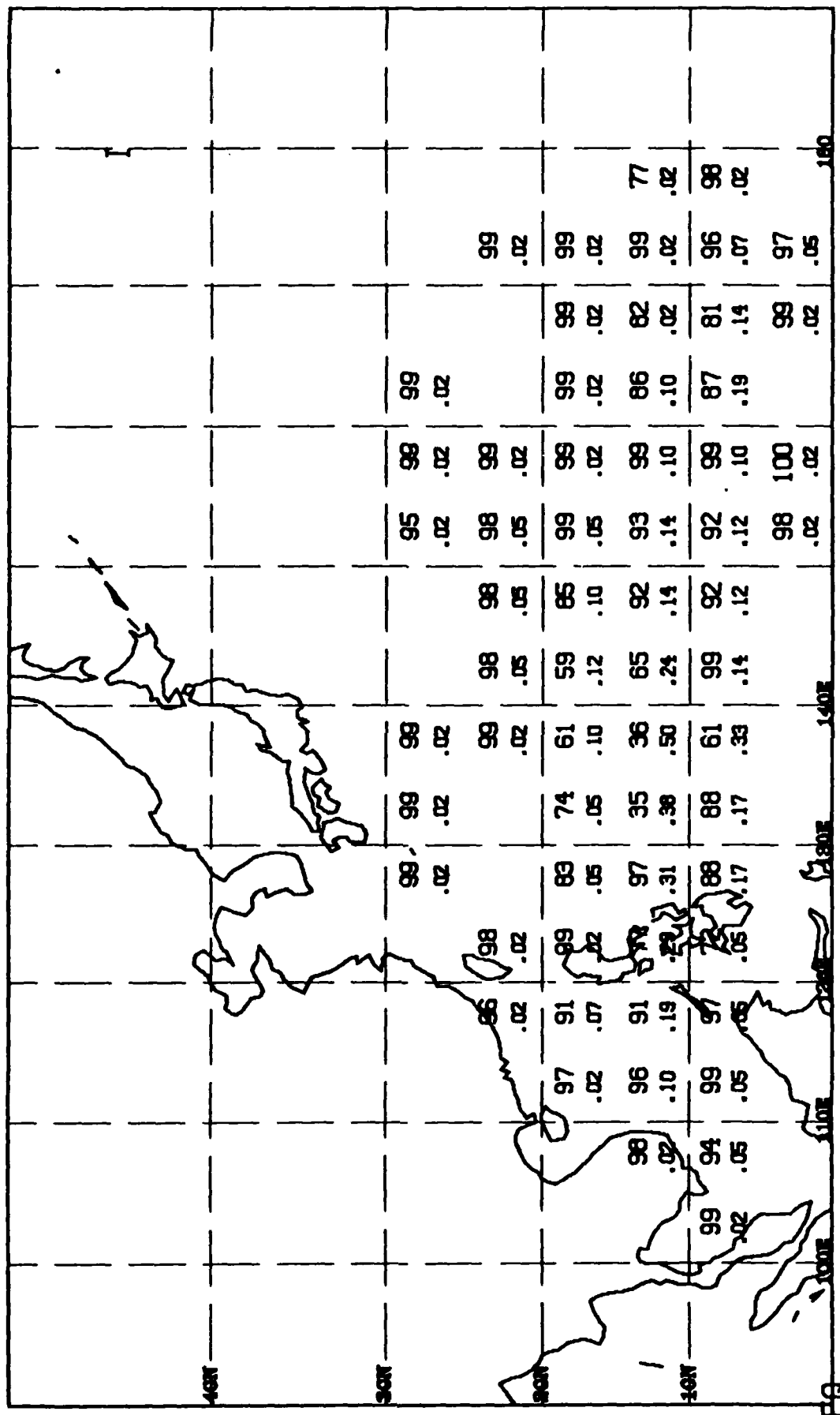
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR DEC 24 - JAN 8



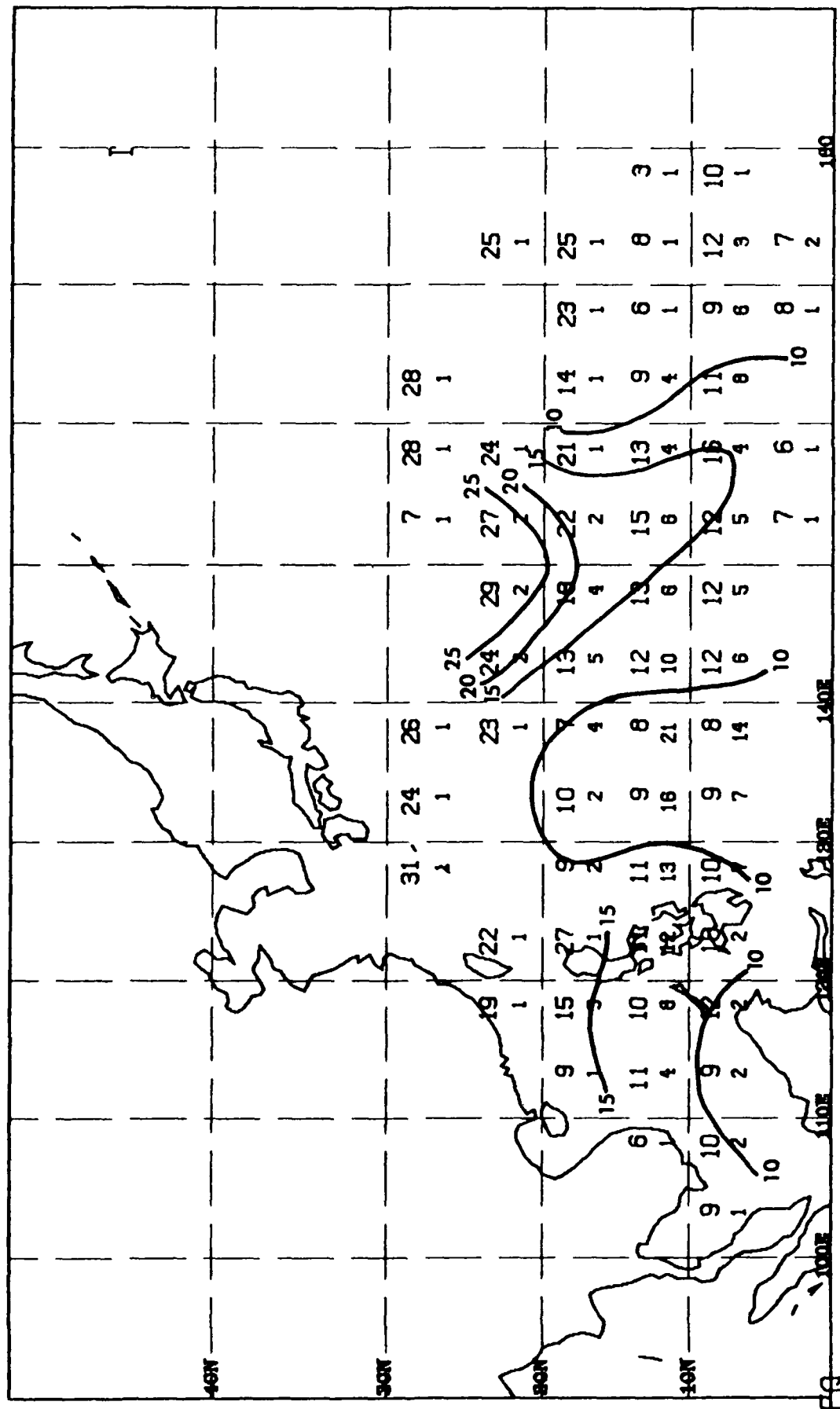
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR DEC 24 - JAN 8



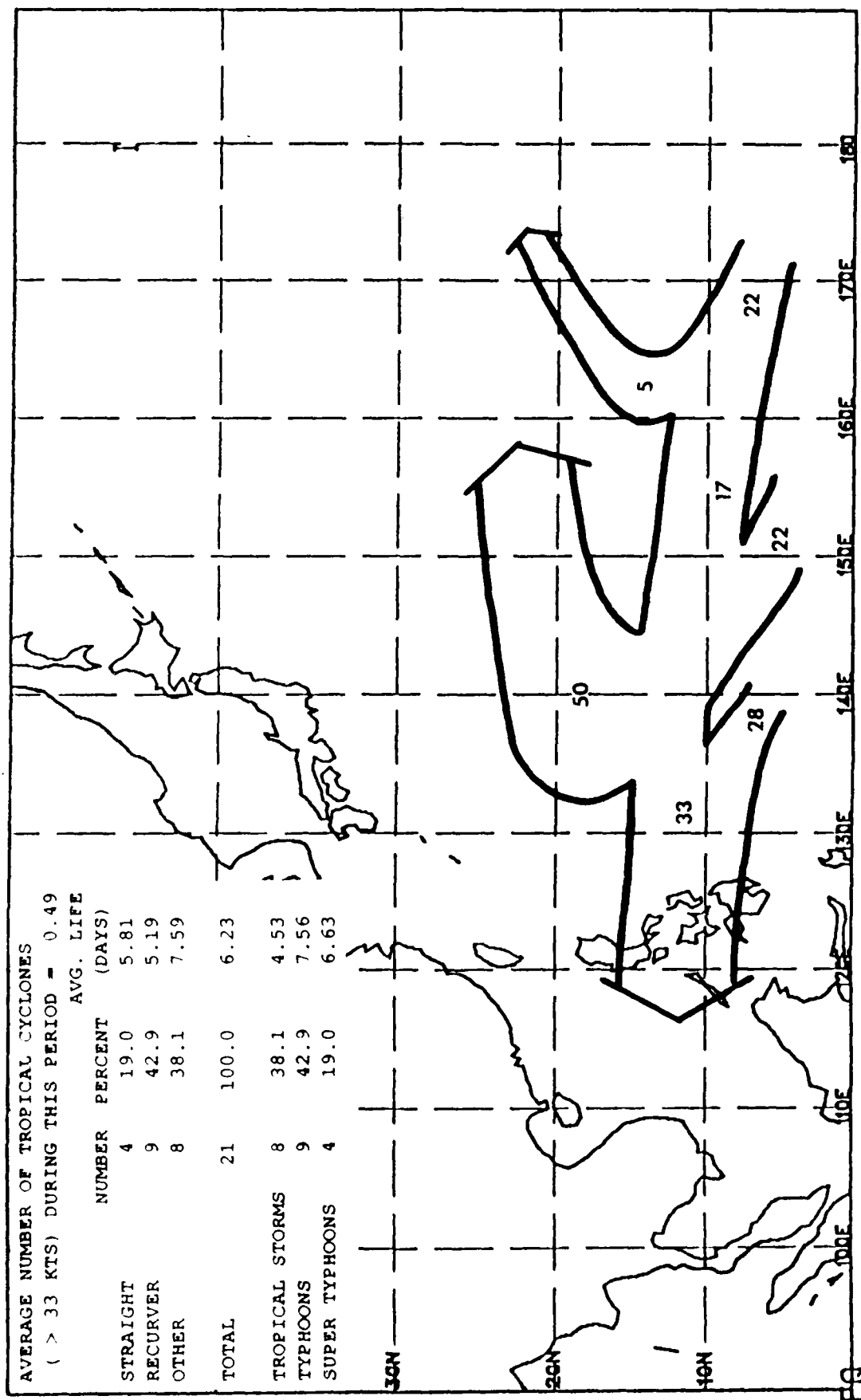
Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number).
 Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed.
 Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year time period.

SPEED OF MOVEMENT FOR DEC 24 - JAN 8



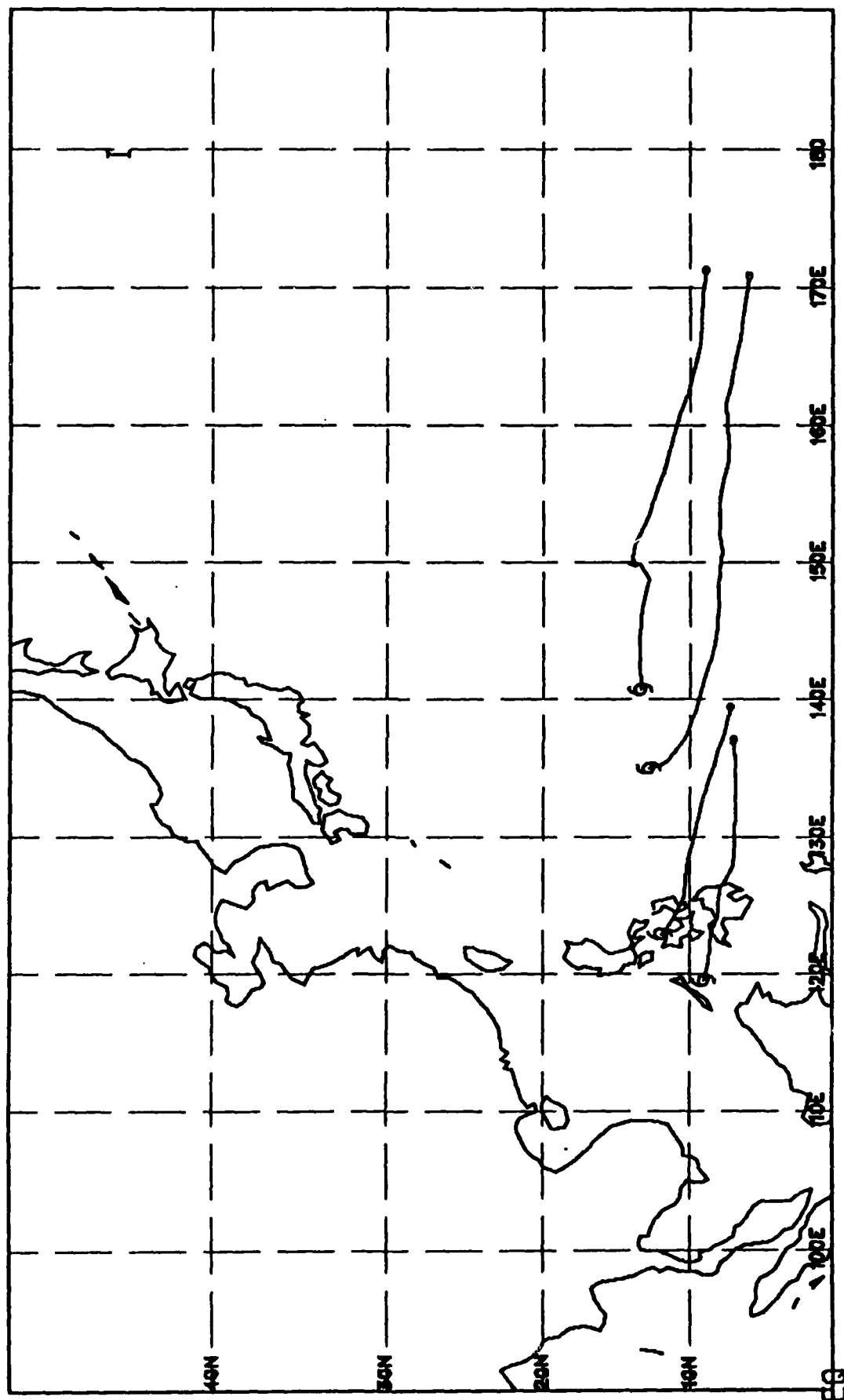
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR JAN 9 - JAN 23



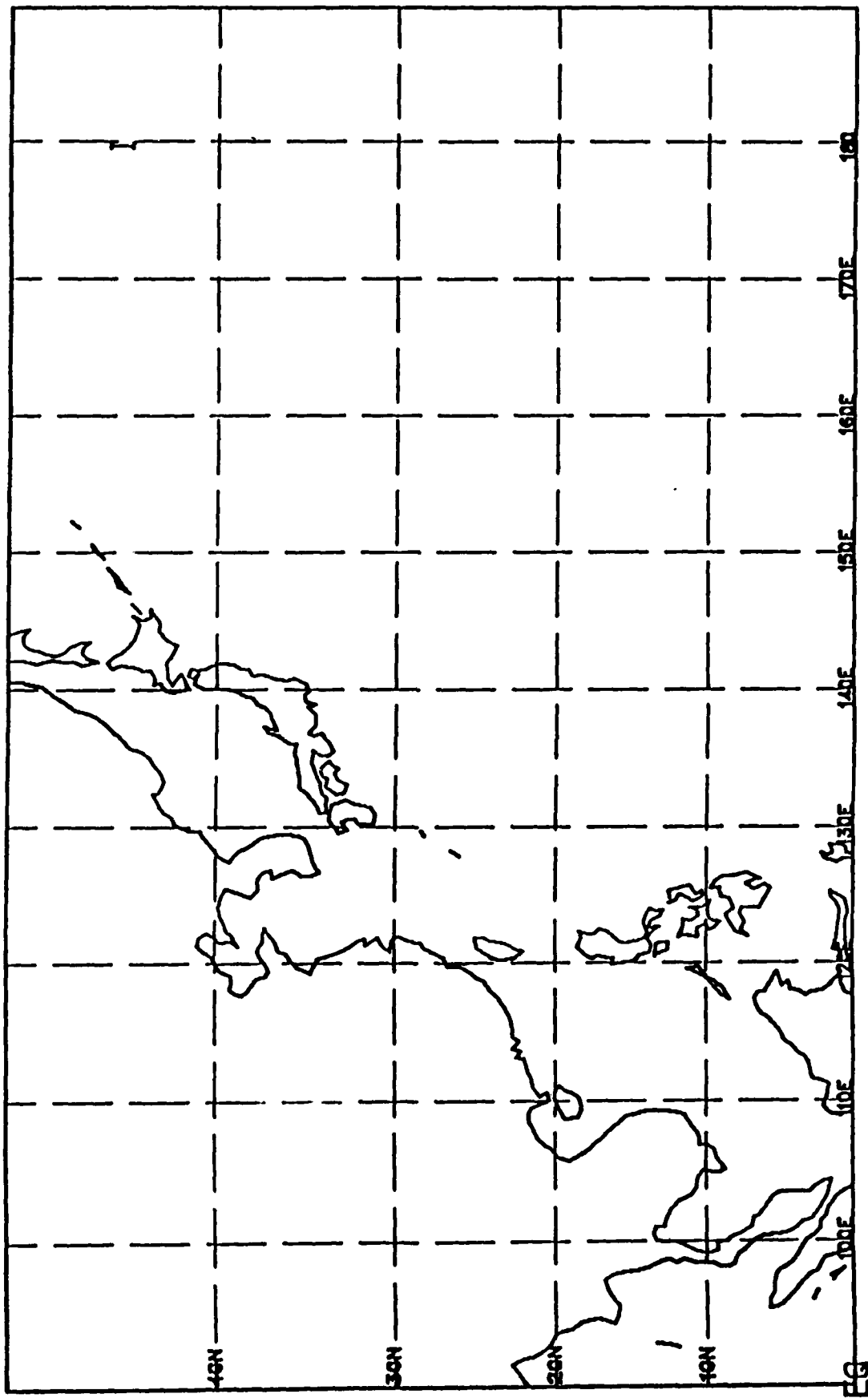
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored.

ACTUAL TRACKS FOR JAN 9 - JAN 23



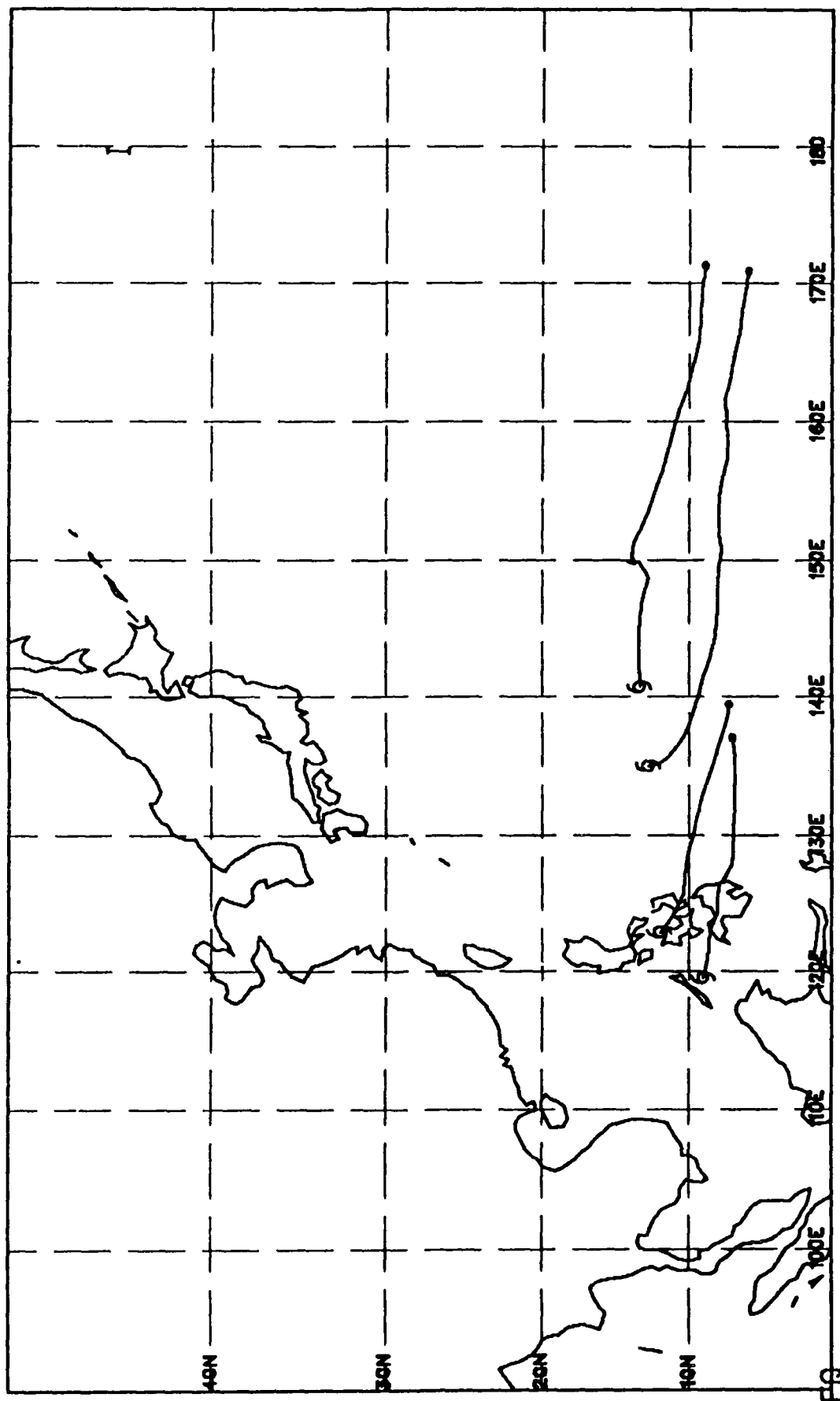
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR JAN 9 - JAN 23



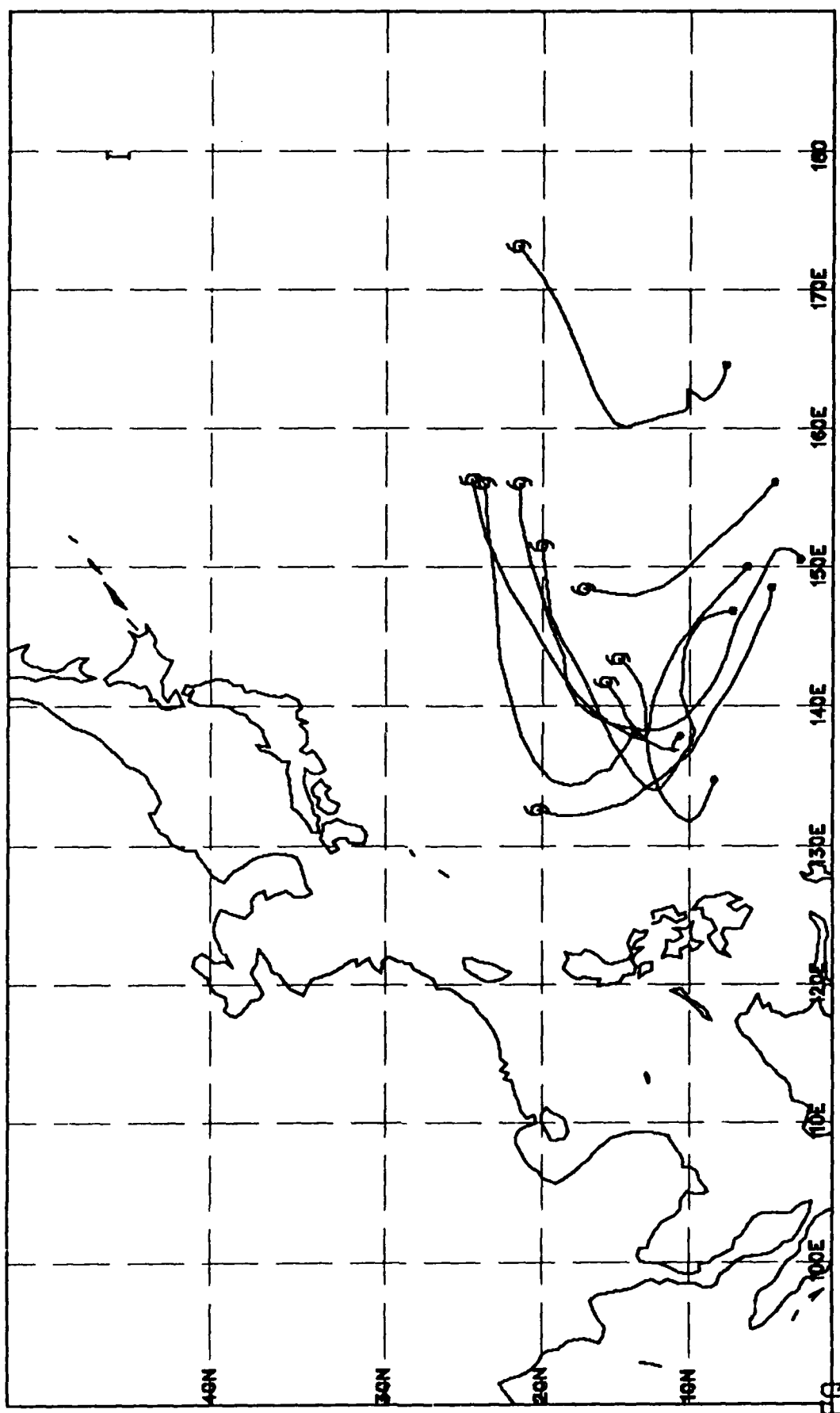
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR JAN 9 - JAN 23



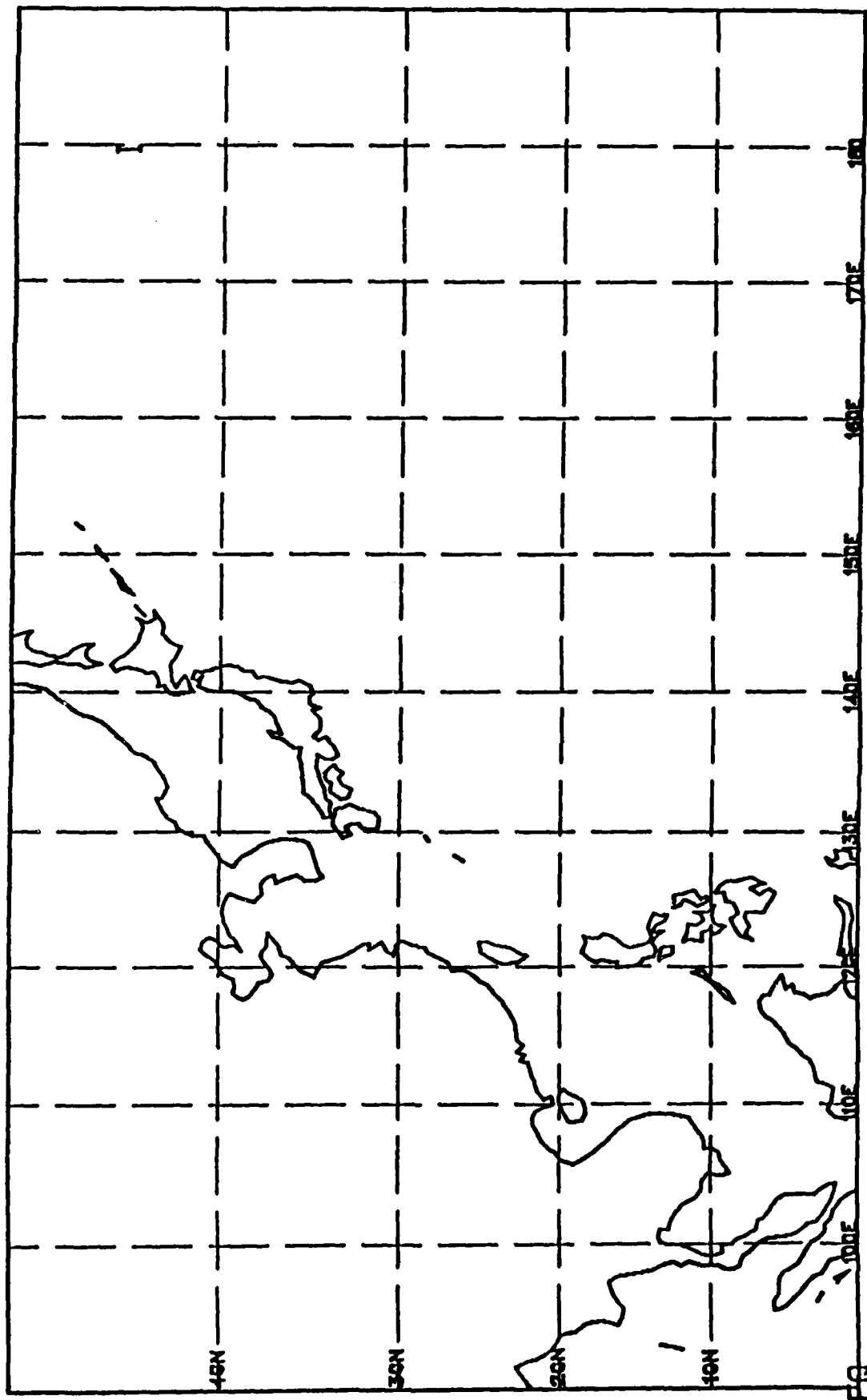
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR JAN 9 - JAN 23



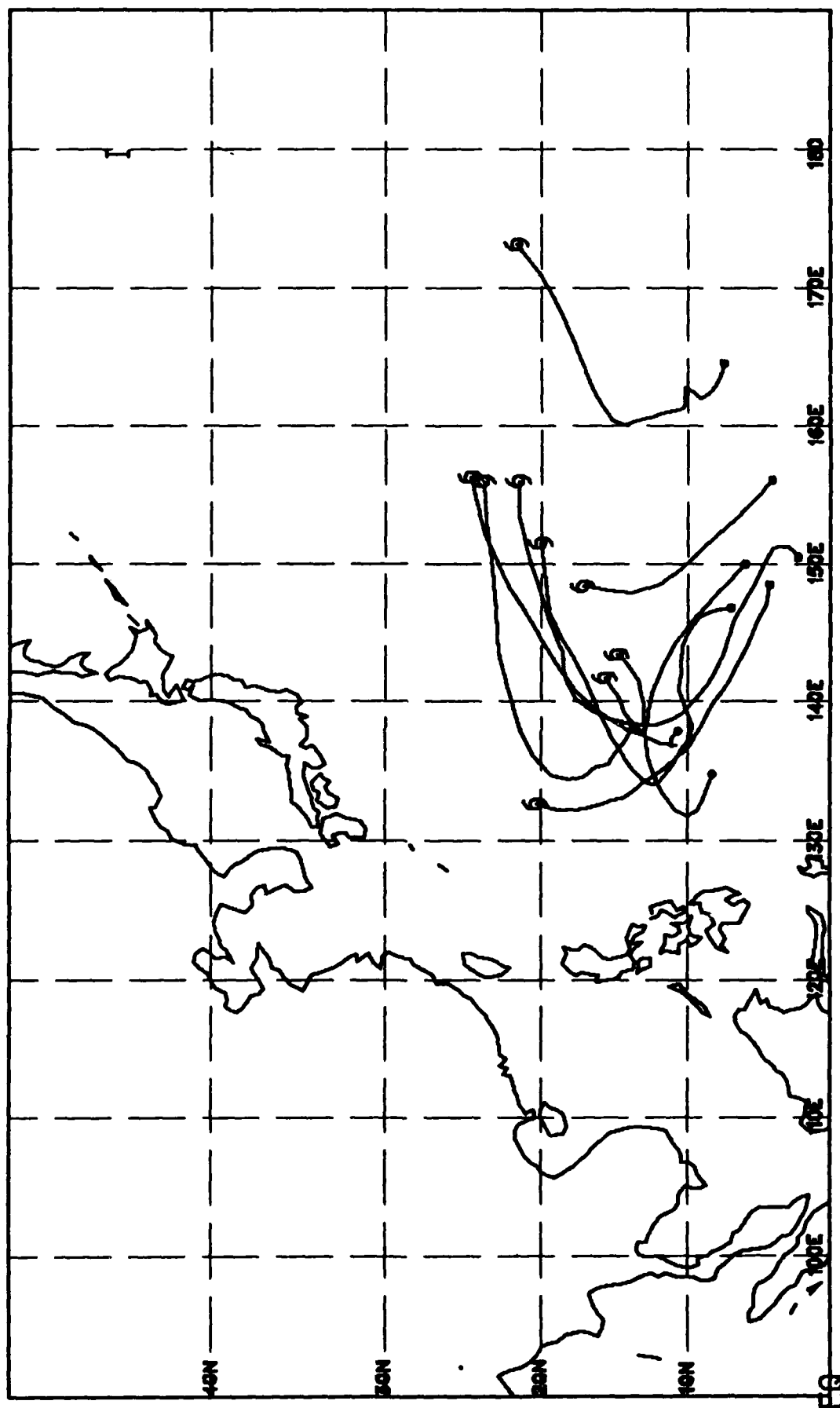
Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR JAN 9 - JAN 23



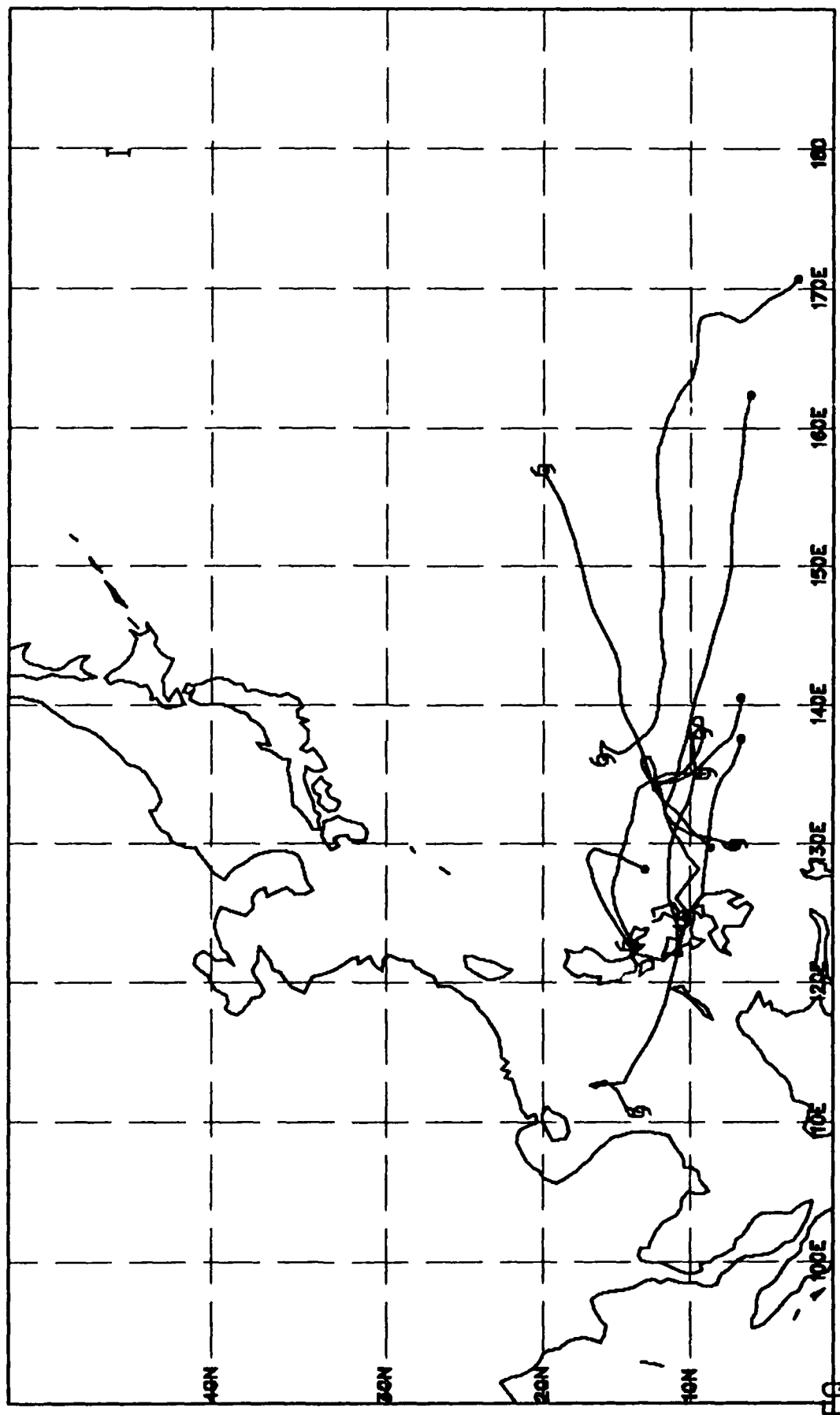
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR JAN 9 - JAN 23



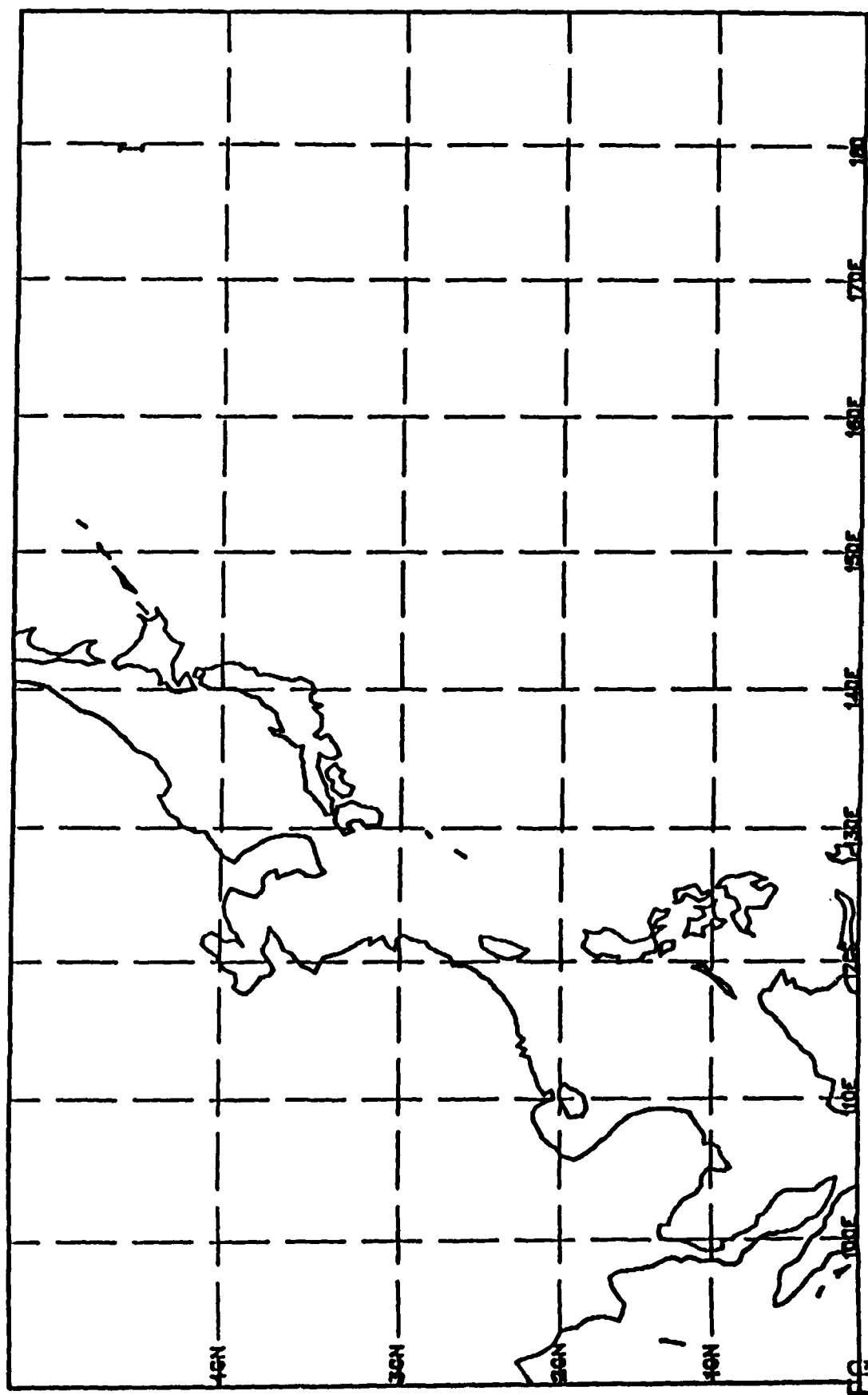
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR JAN 9 - JAN 23



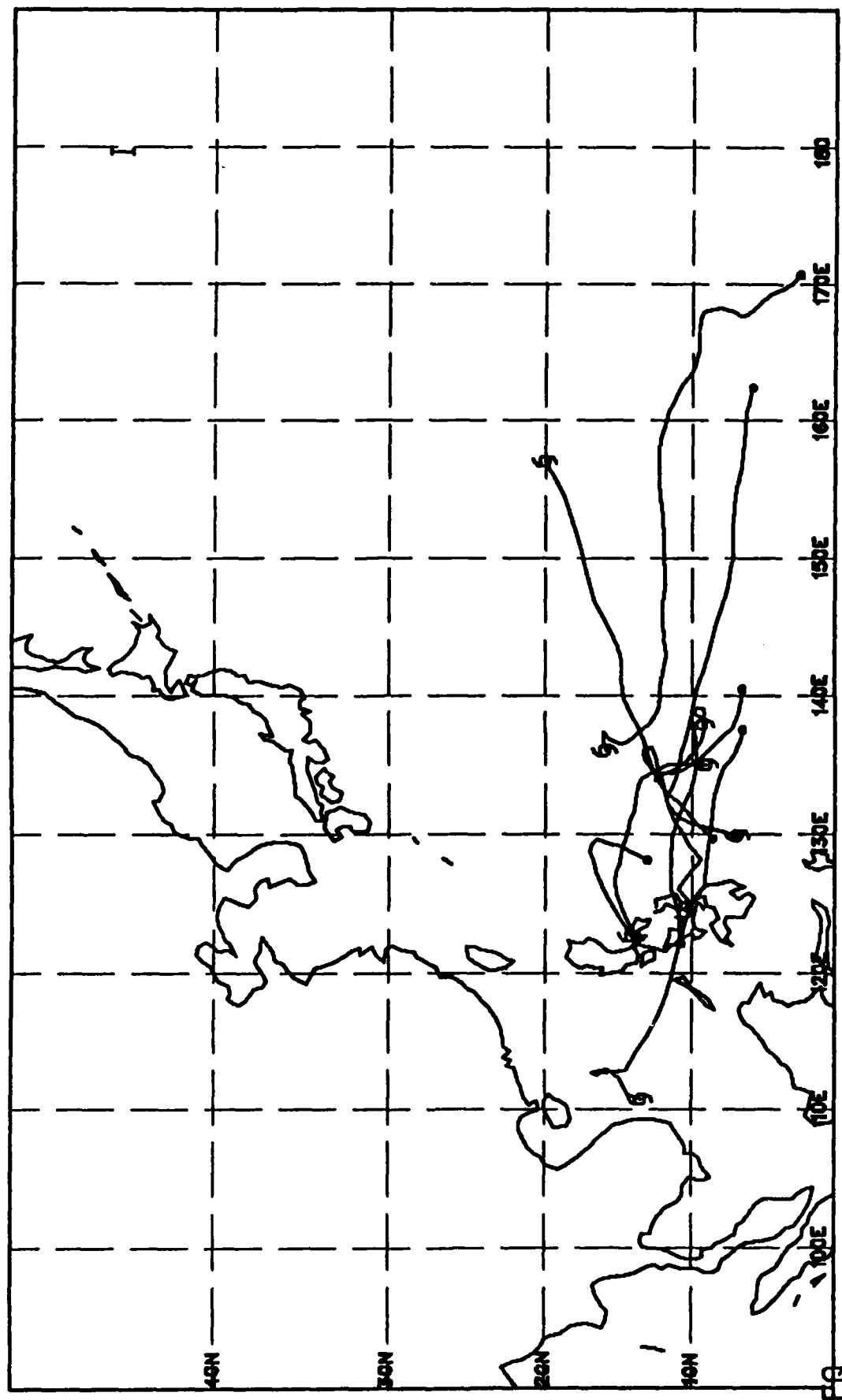
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR JAN 9 - JAN 23



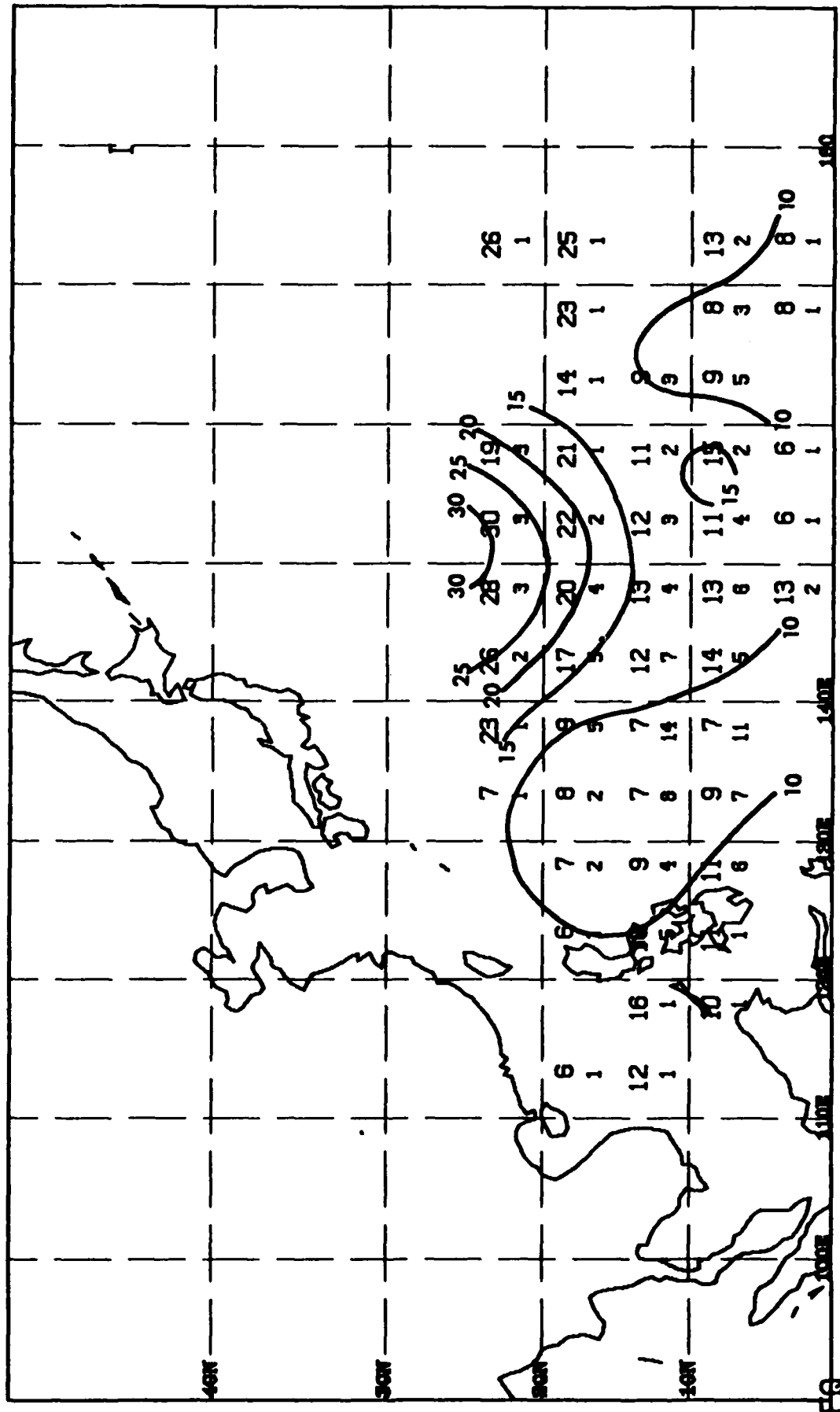
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR JAN 9 - JAN 23



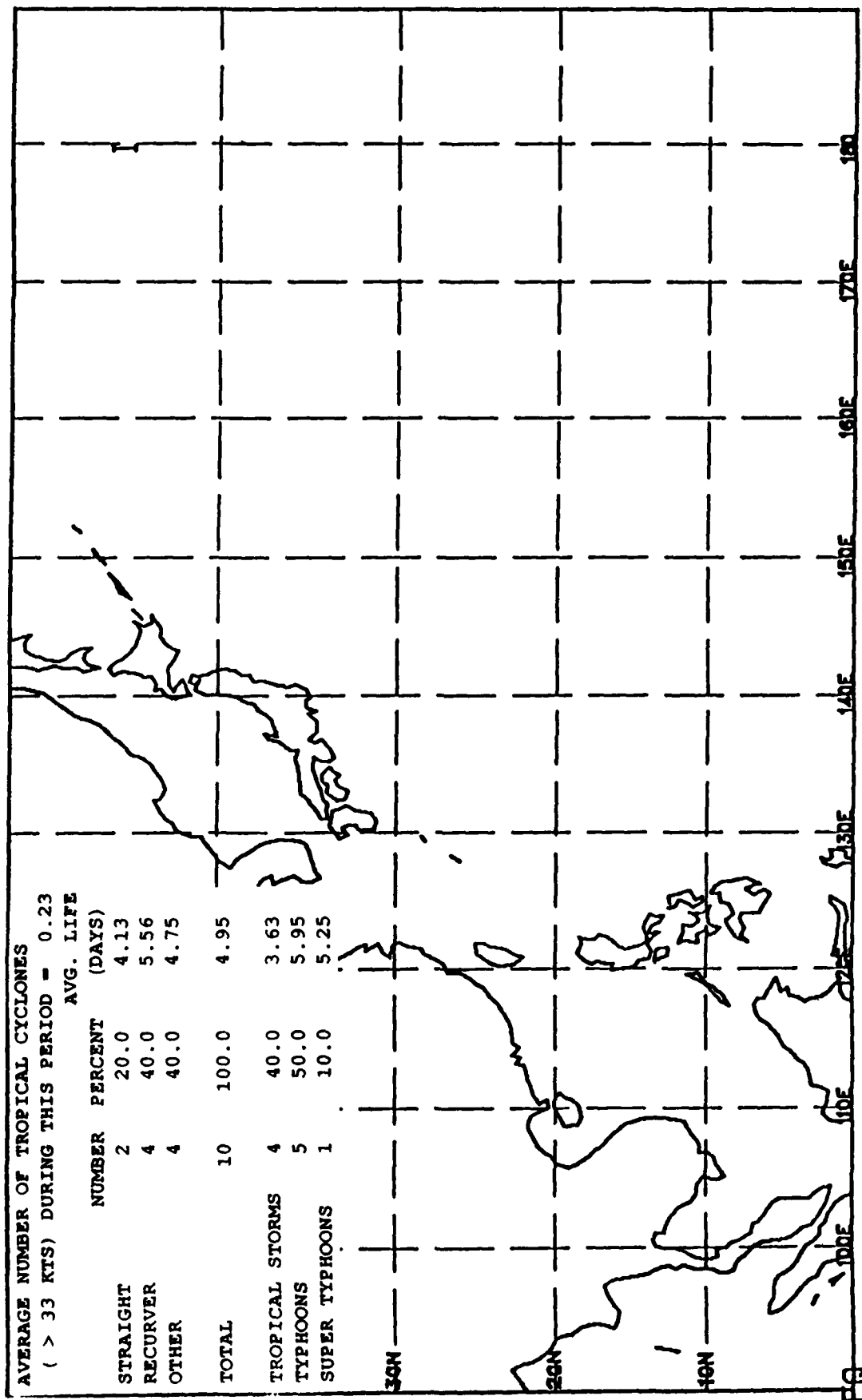
Actual path of all other tropical cyclones (> 33 kts).

SPEED OF MOVEMENT FOR JAN 9 - JAN 23



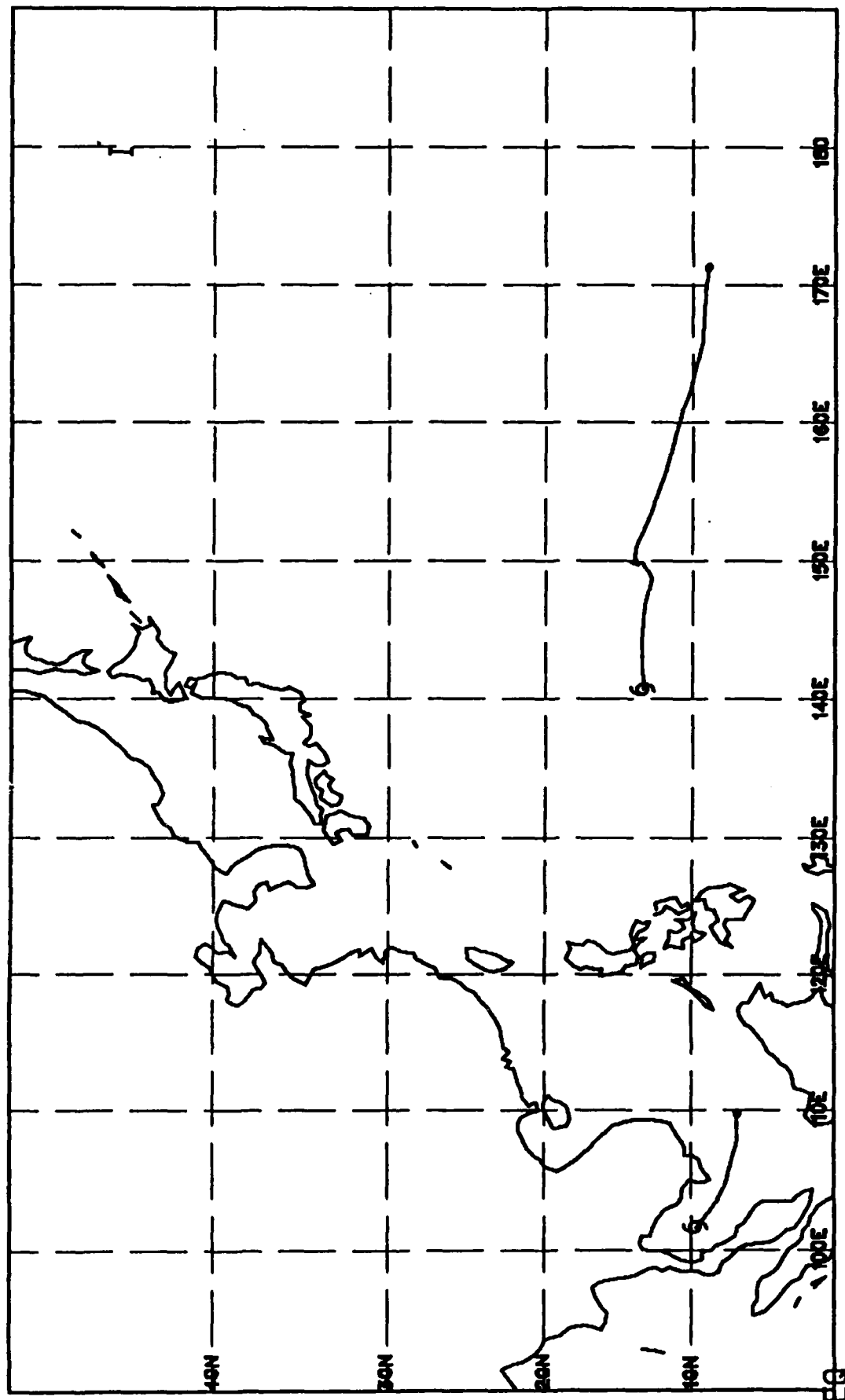
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR JAN 24 - FEB 8



Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored.

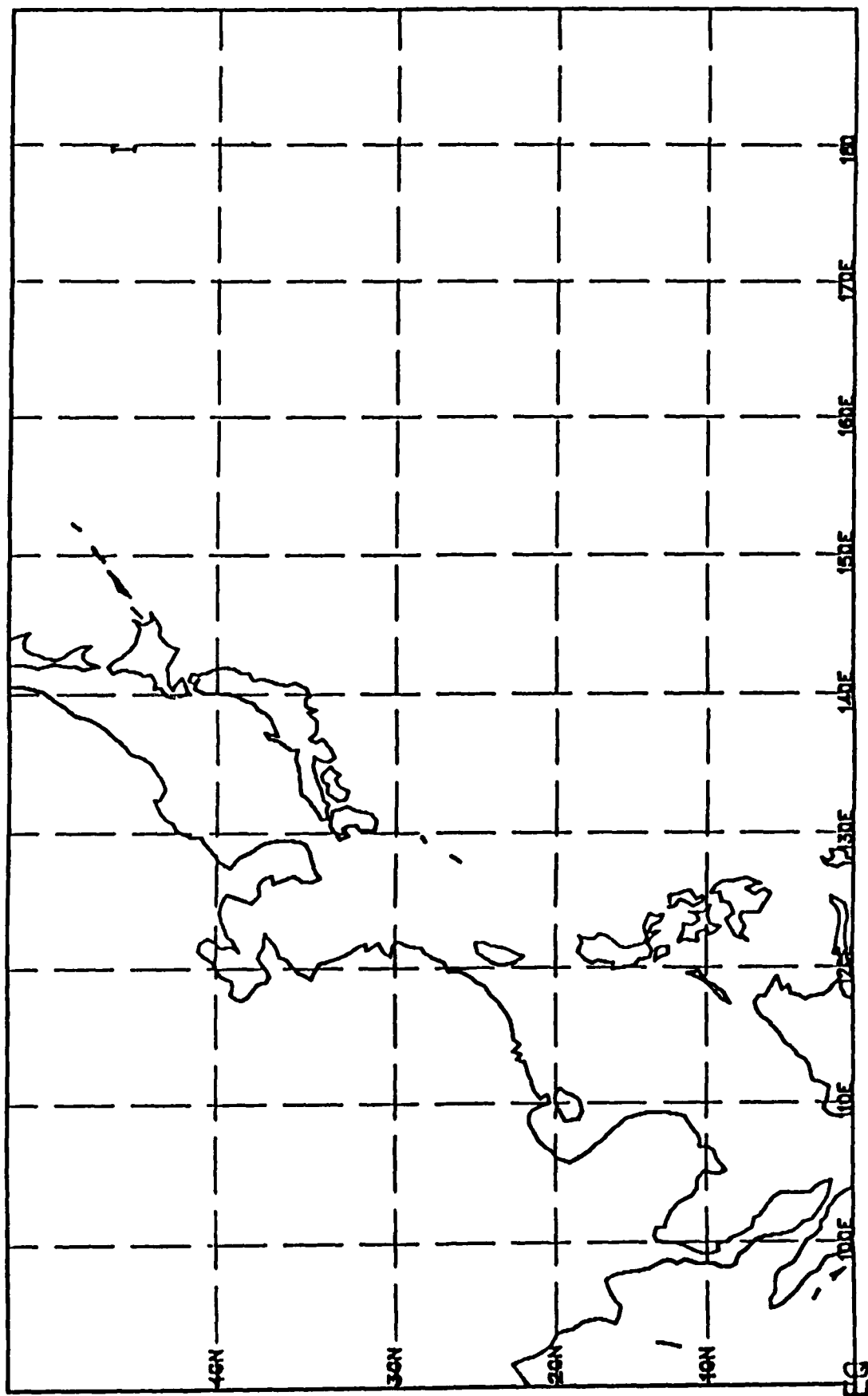
ACTUAL TRACKS FOR JAN 24 - FEB 8



W-26

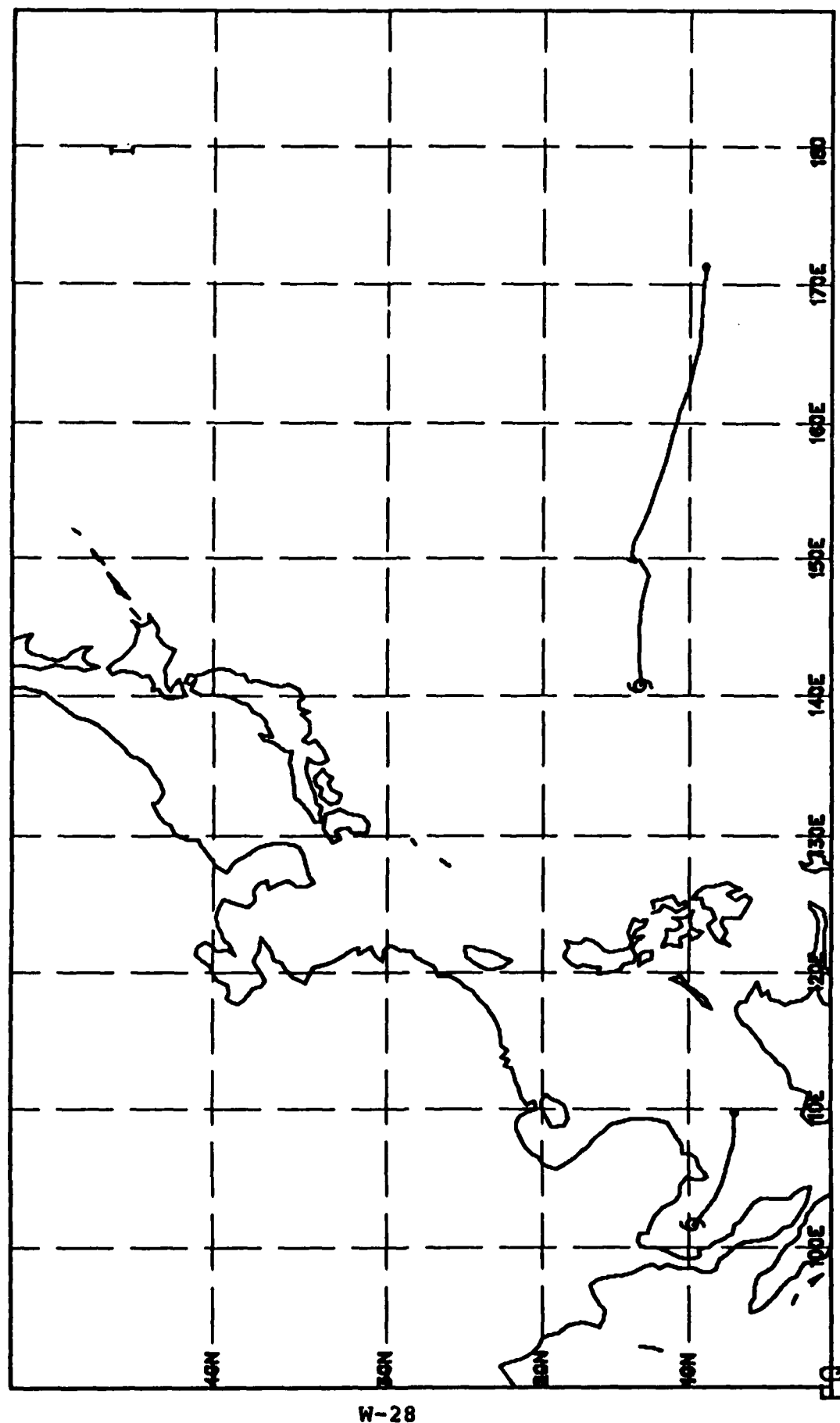
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR JAN 24 - FEB 8



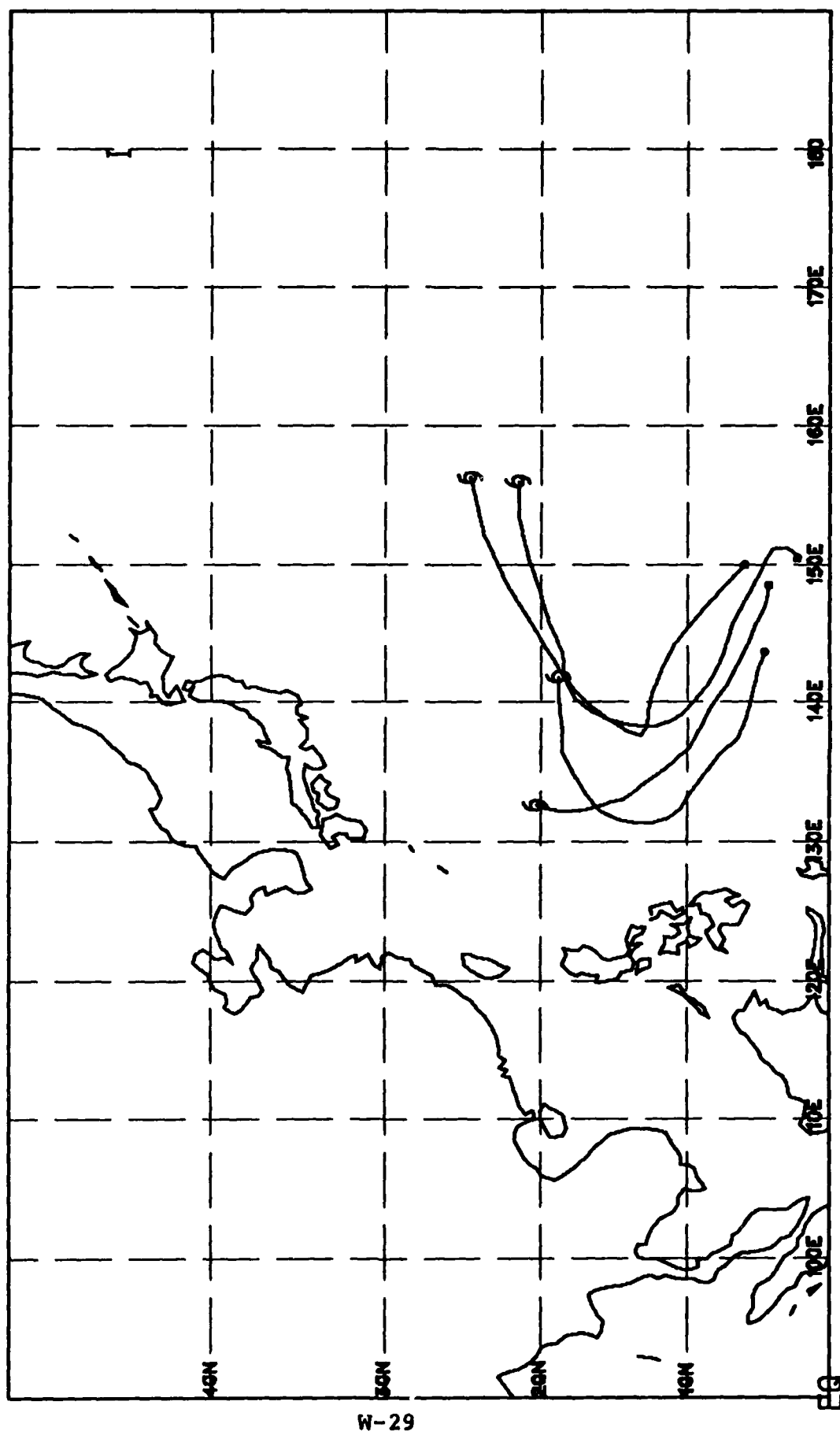
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR JAN 24 - FEB 8



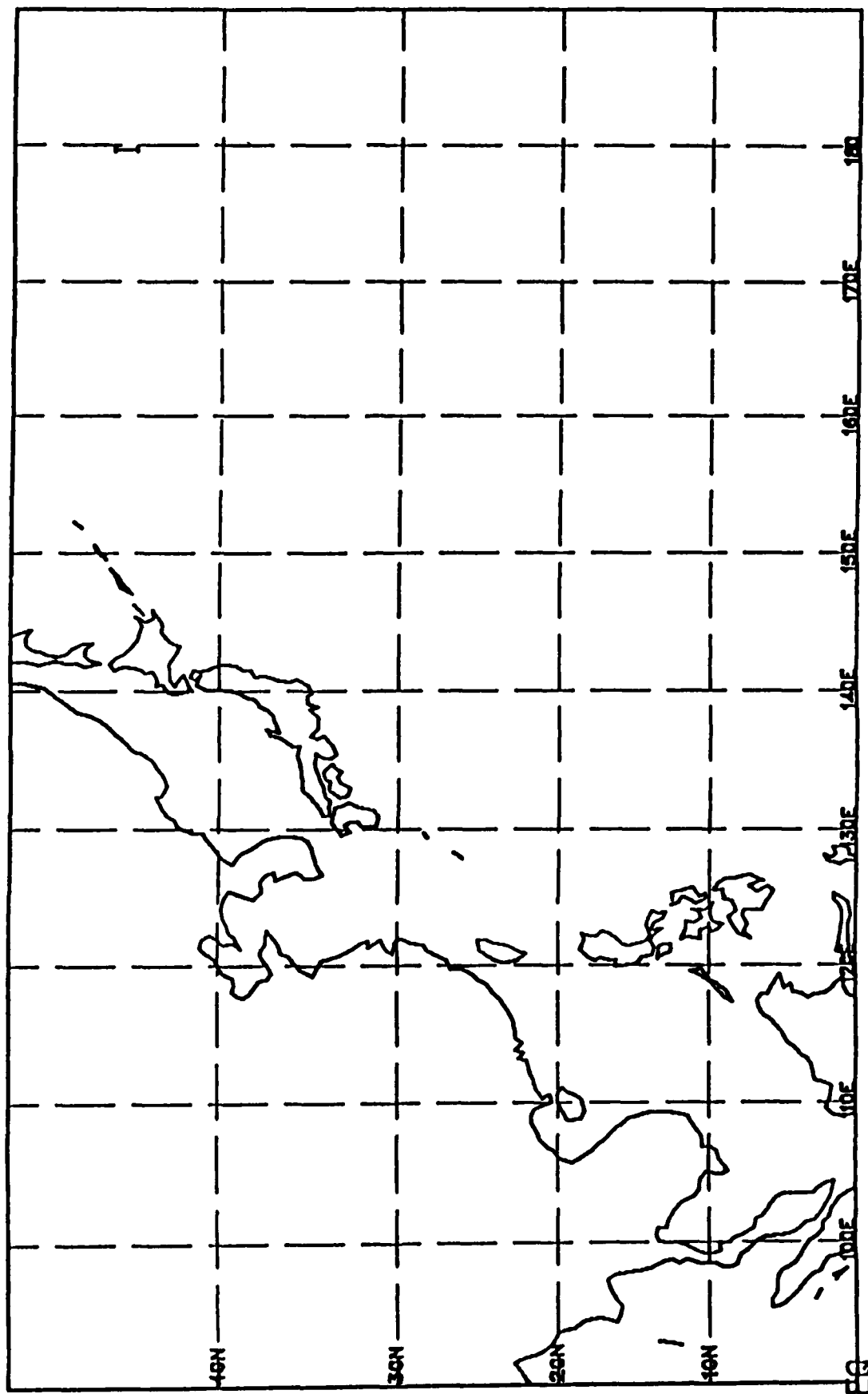
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR JAN 24 - FEB 8



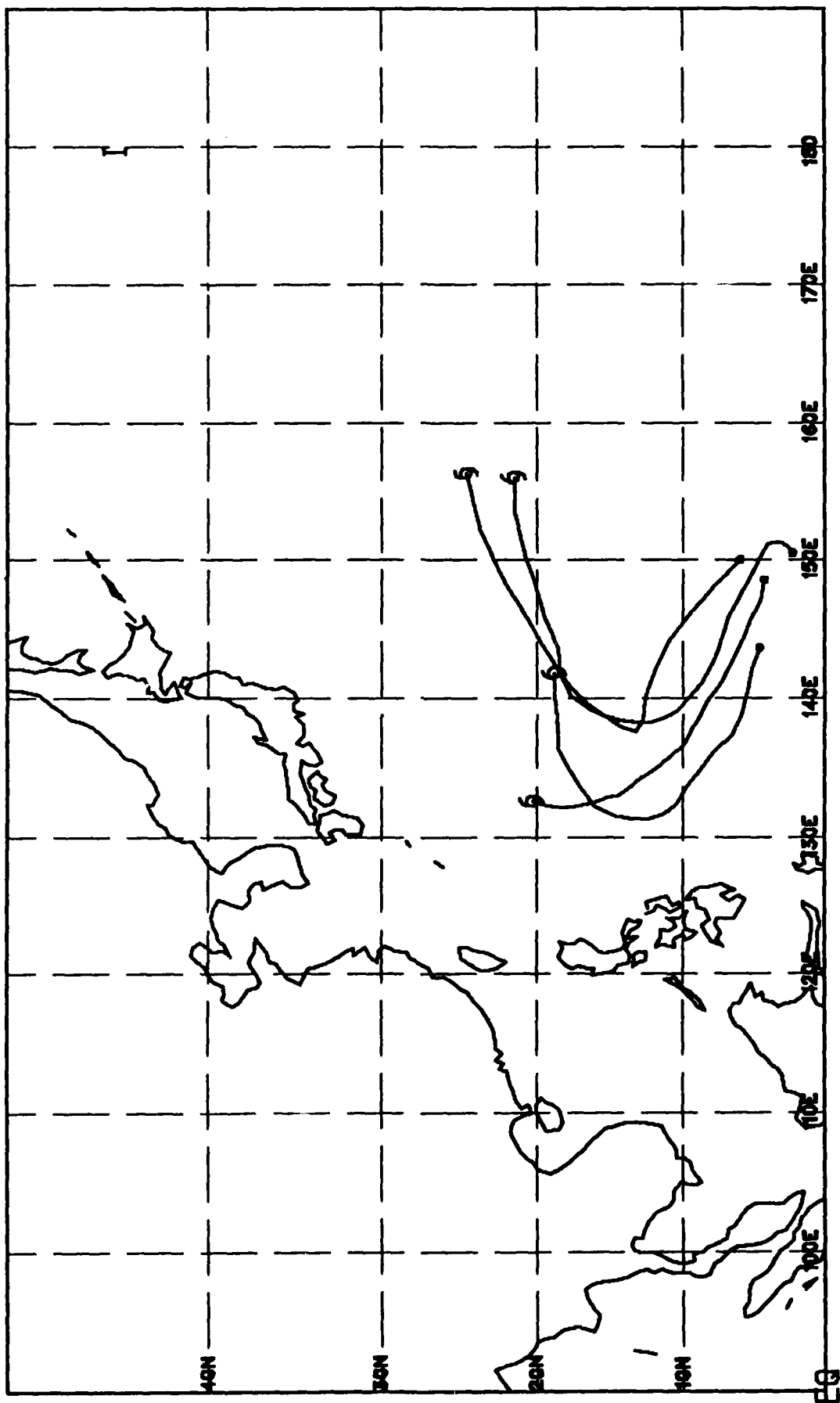
Actual path of recurving tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR JAN 24 - FEB 8



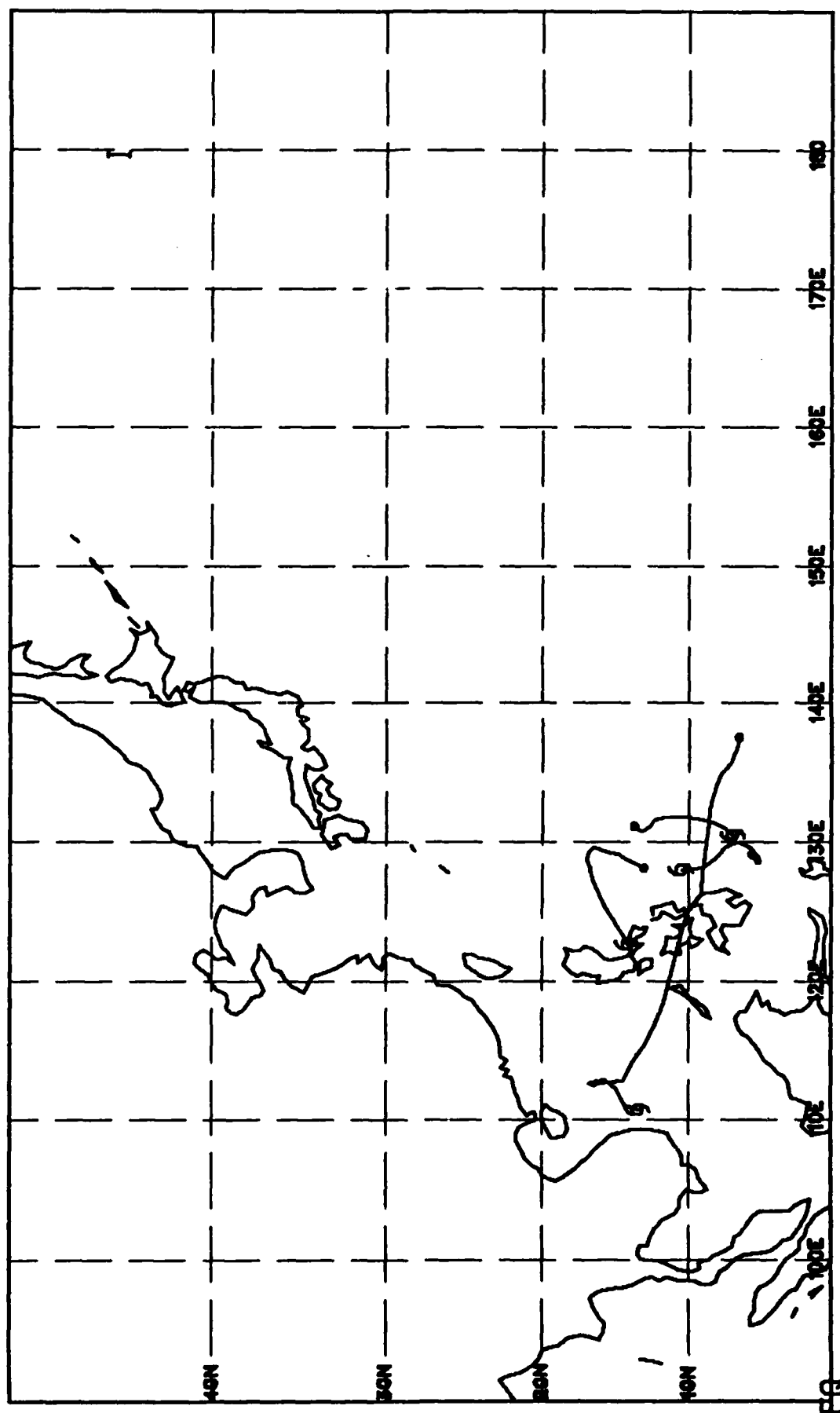
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR JAN 24 - FEB 8



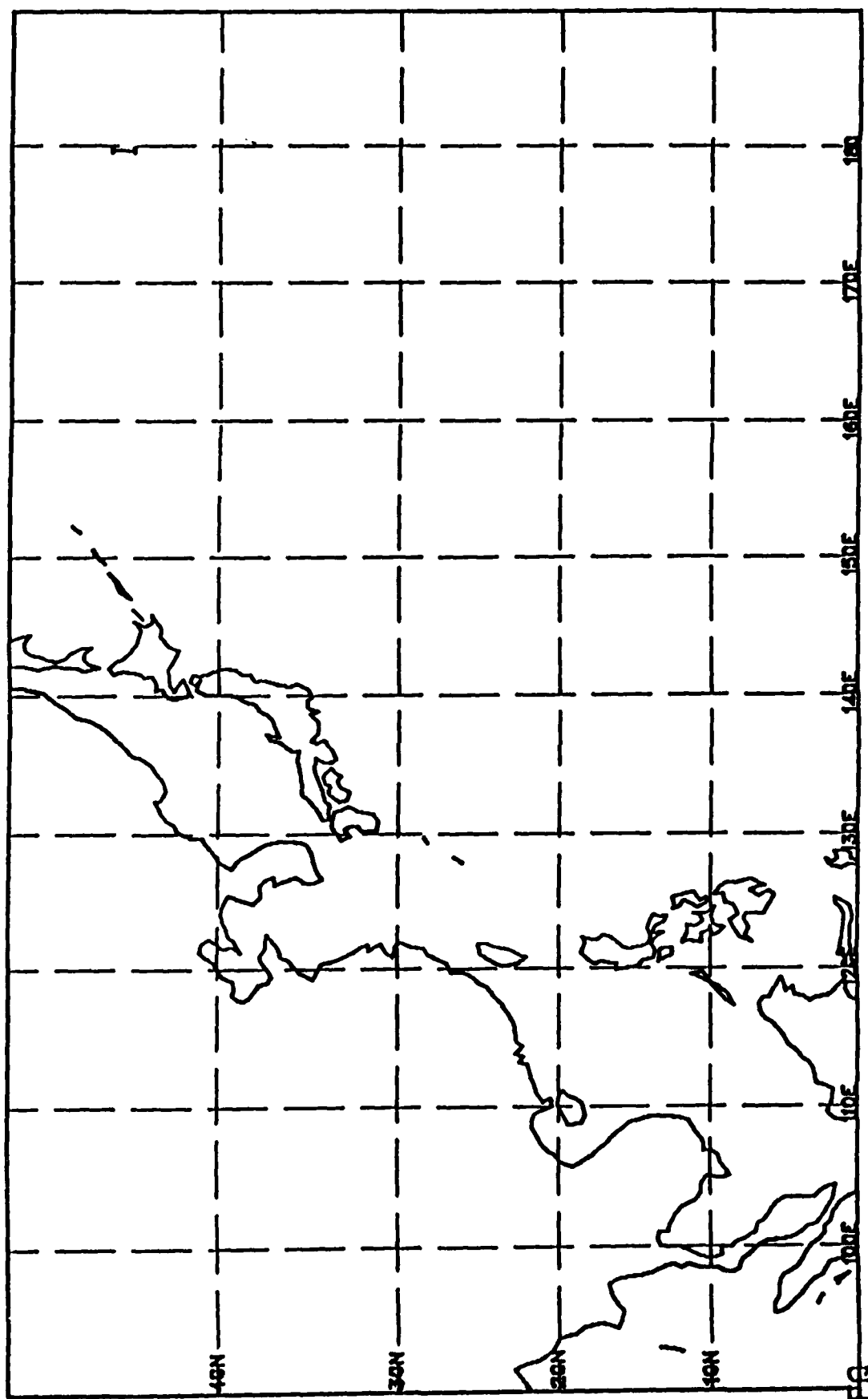
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR JAN 24 - FEB 8



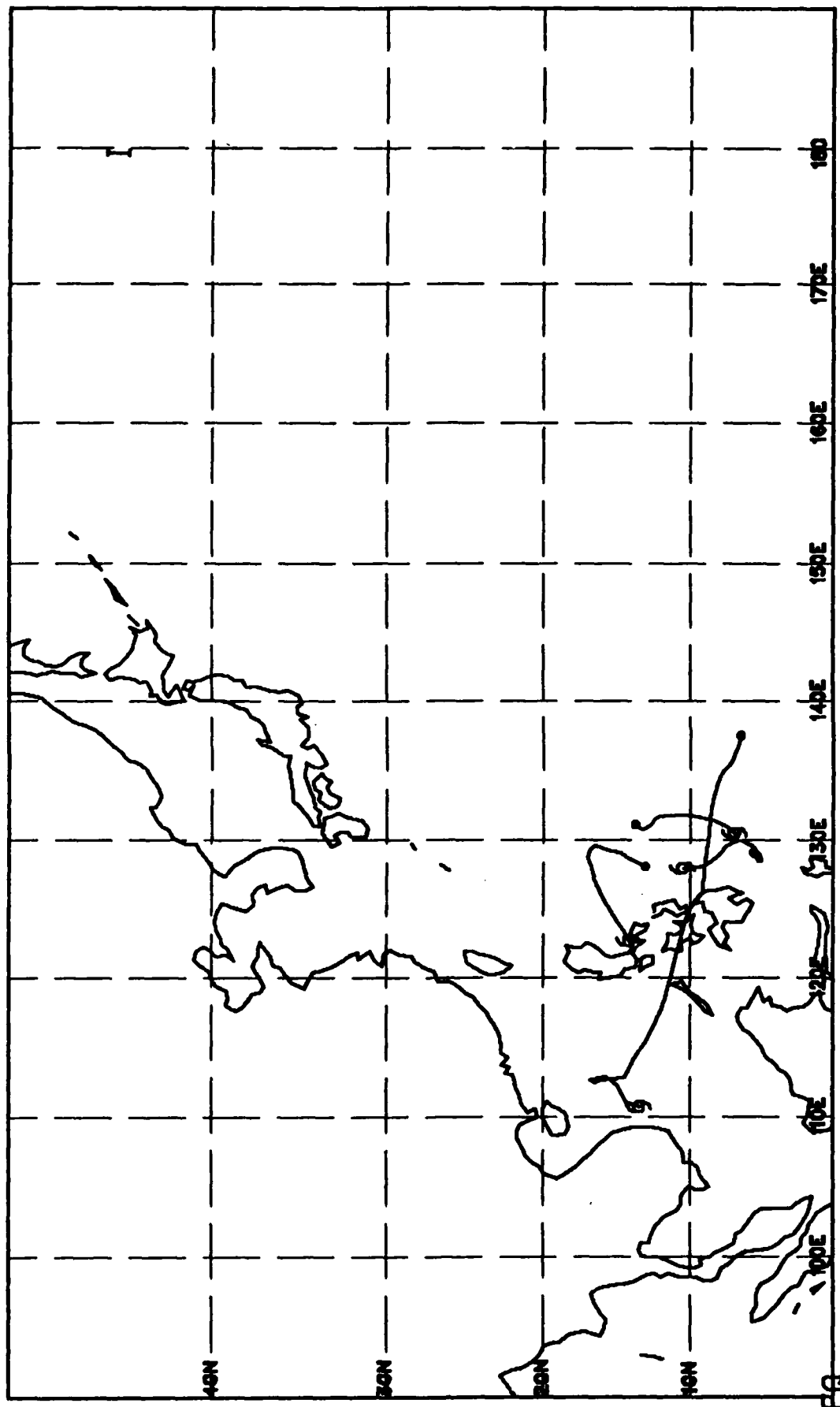
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR JAN 24 - FEB 8



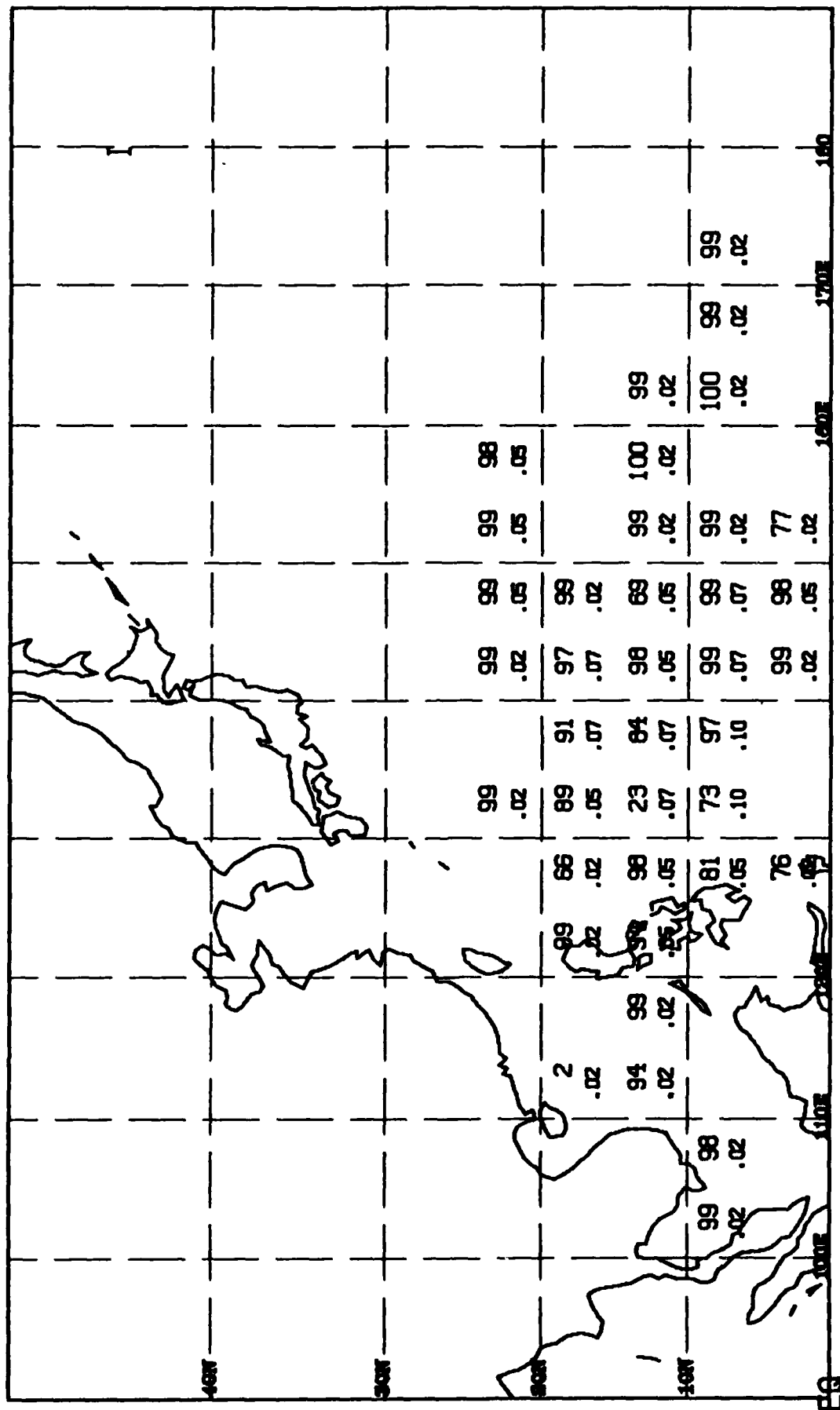
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR JAN 24 - FEB 8



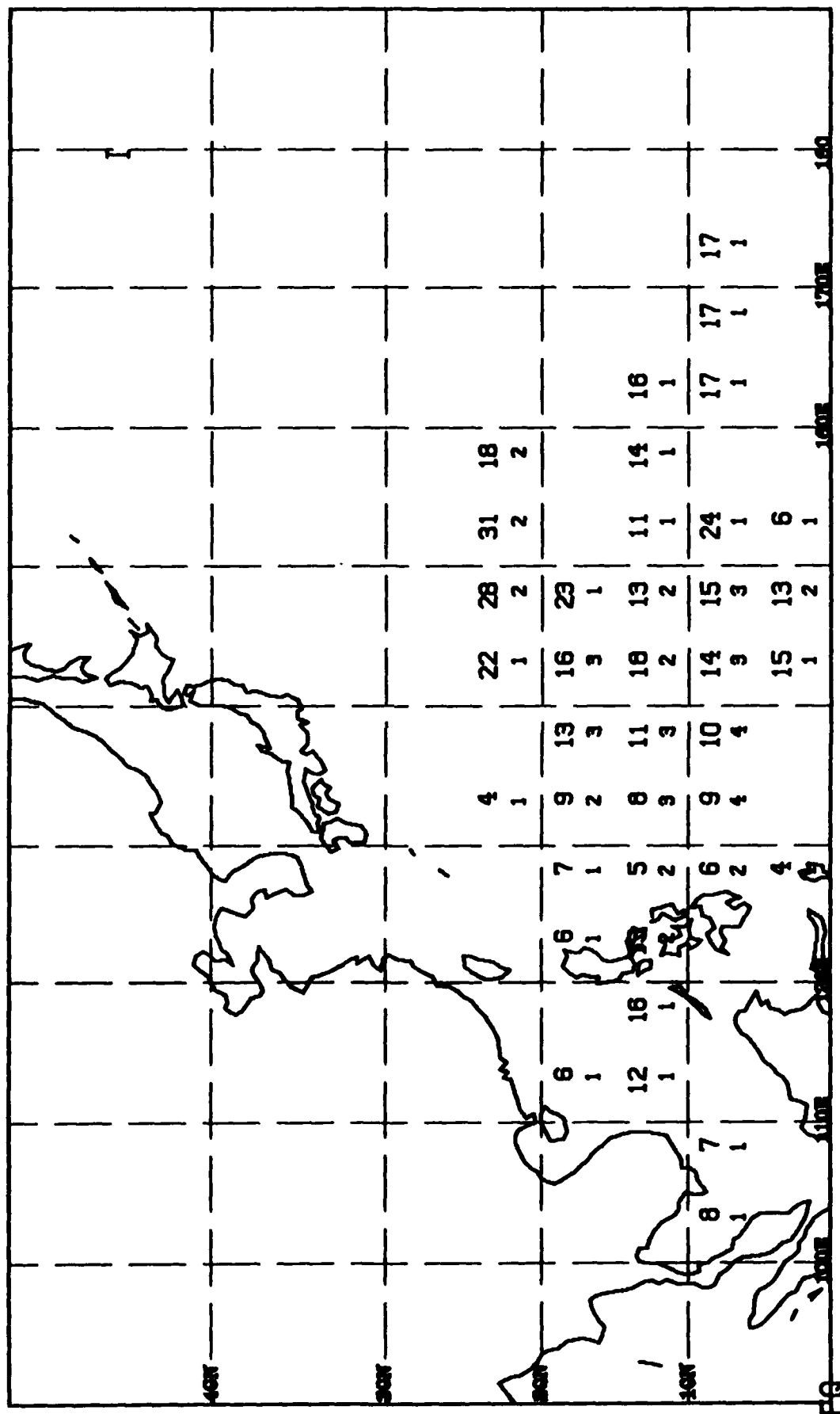
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR JAN 24 - FEB 8



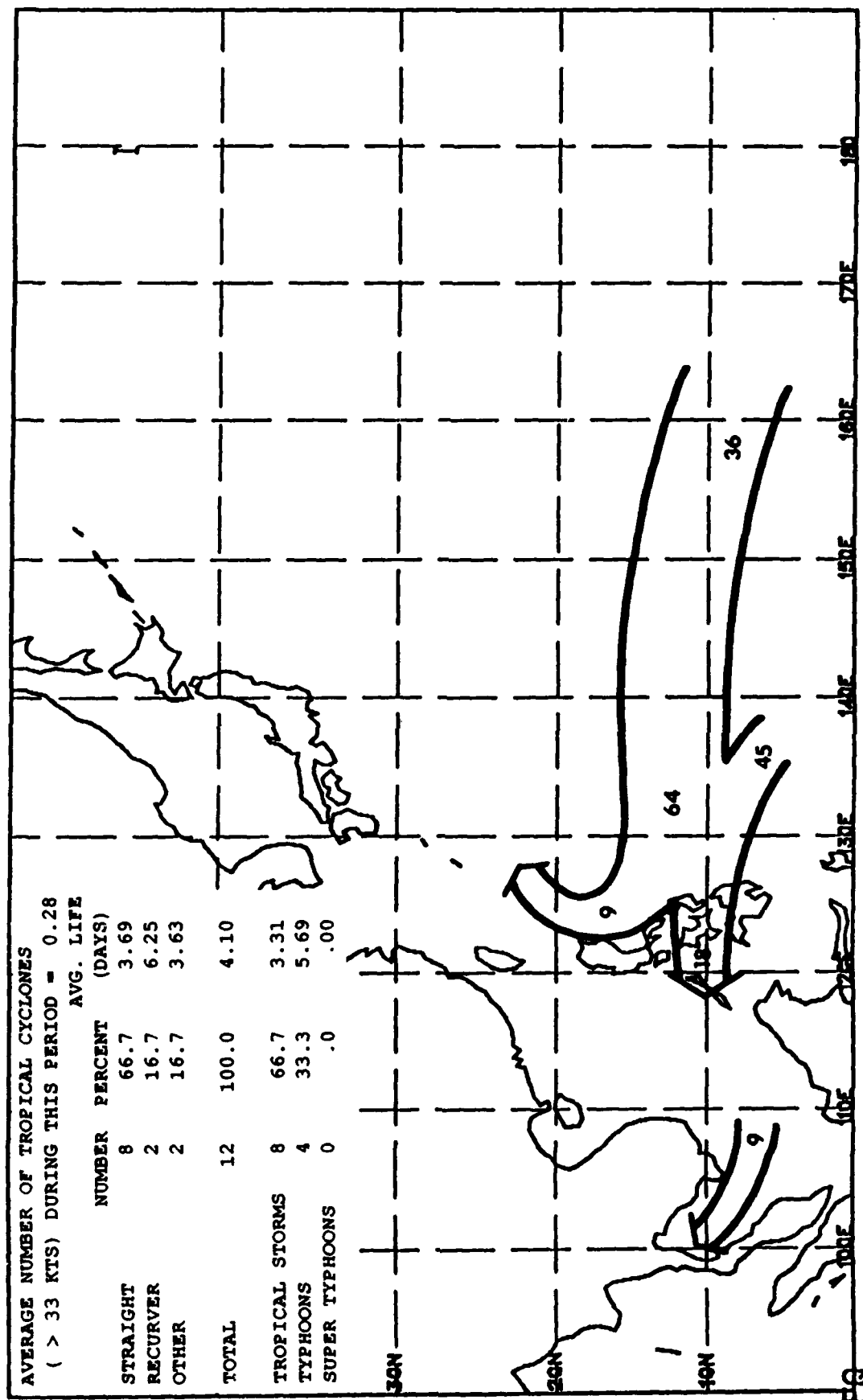
Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number).
 Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed.
 Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year per time period.

SPEED OF MOVEMENT FOR JAN 24 - FEB 8



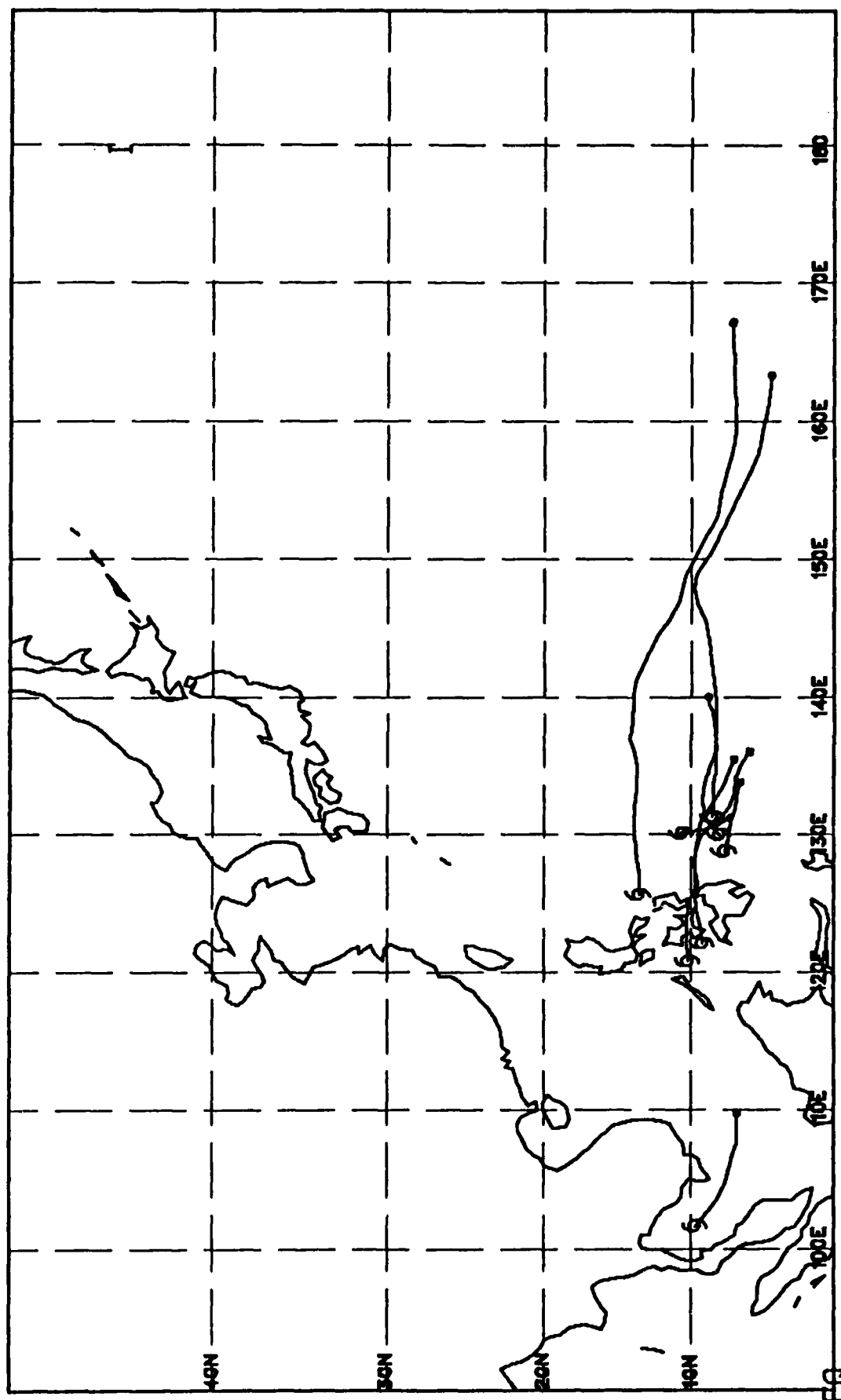
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR FEB 9 - FEB 23



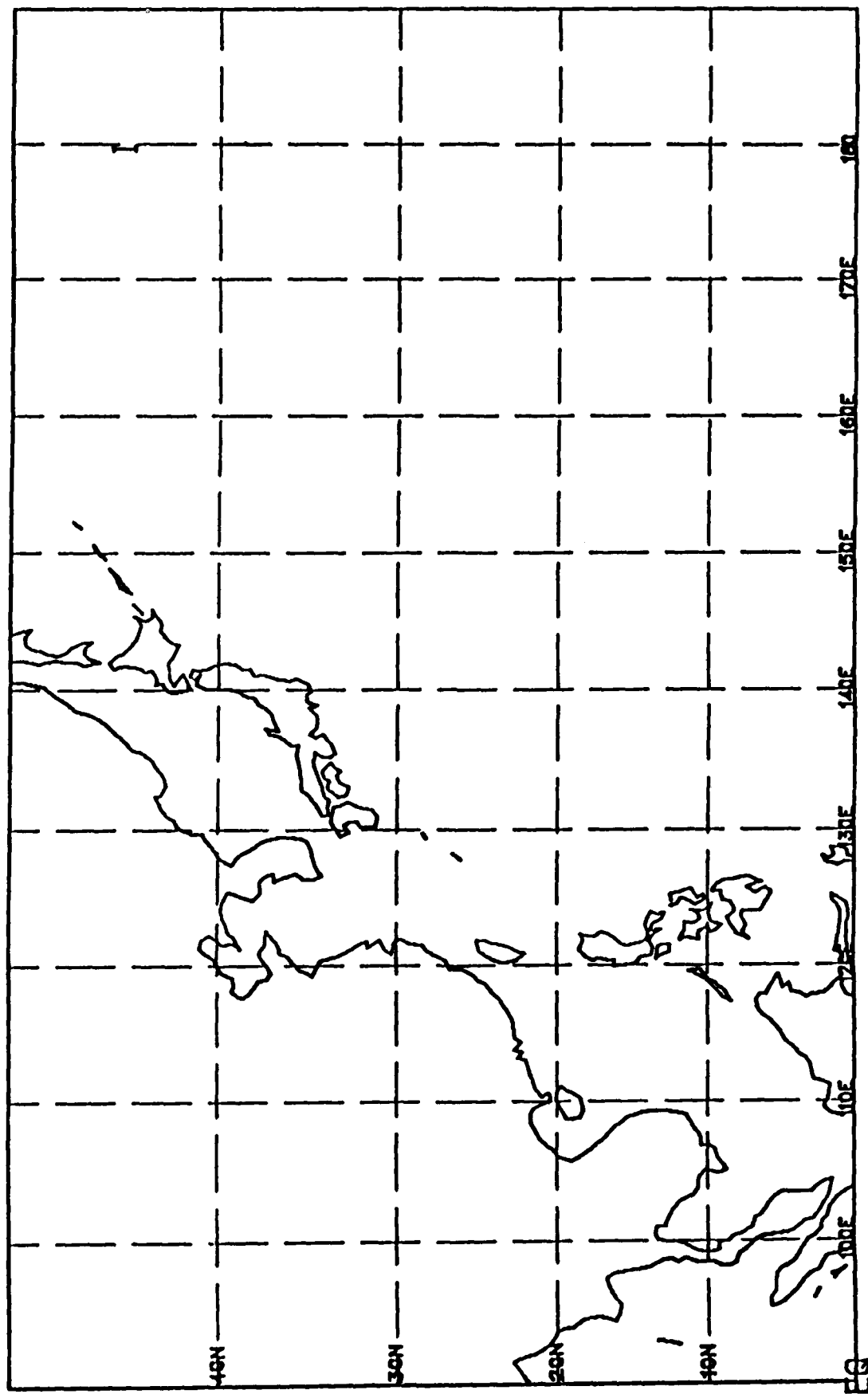
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored.

ACTUAL TRACKS FOR FEB 9 - FEB 23



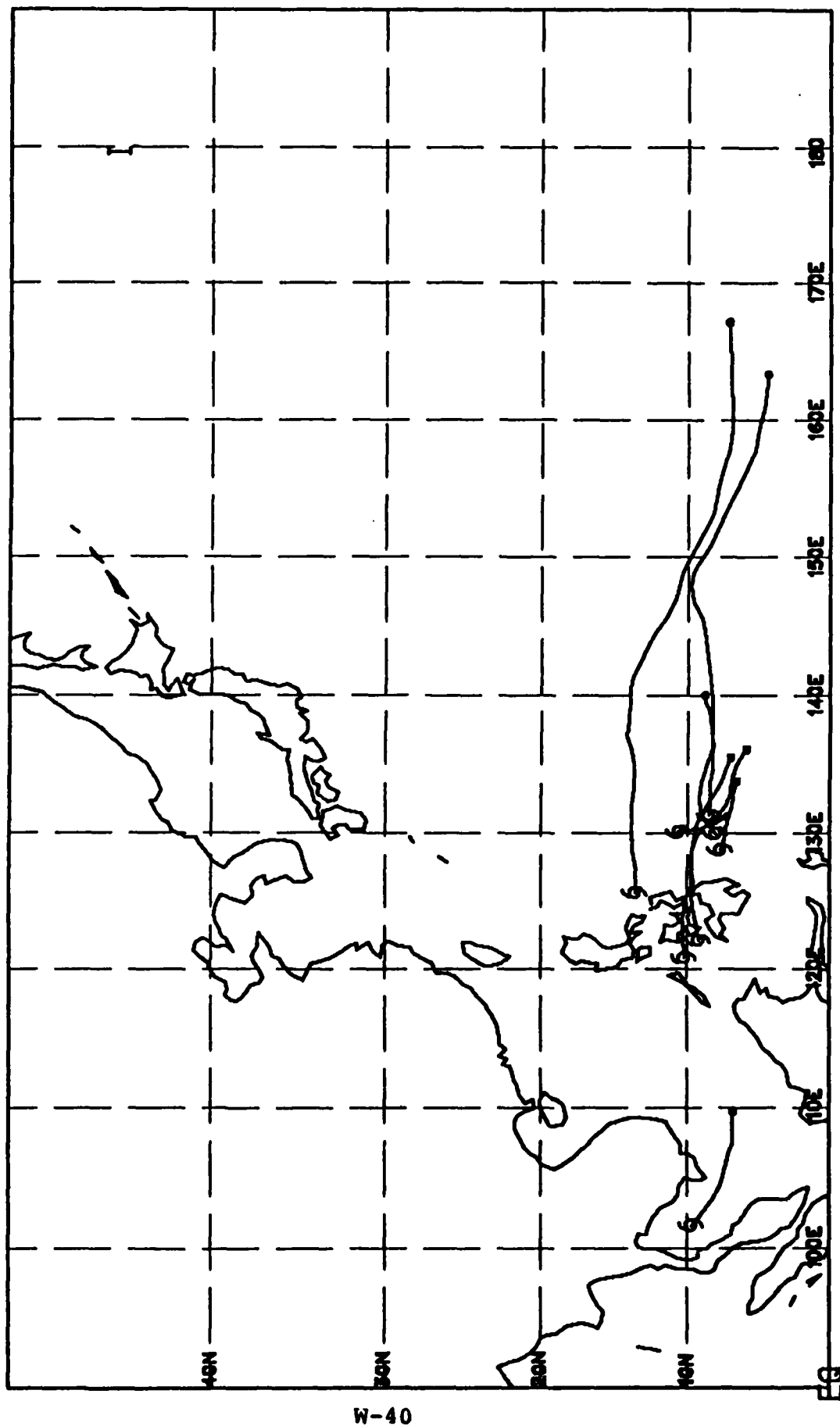
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR FEB 9 - FEB 23



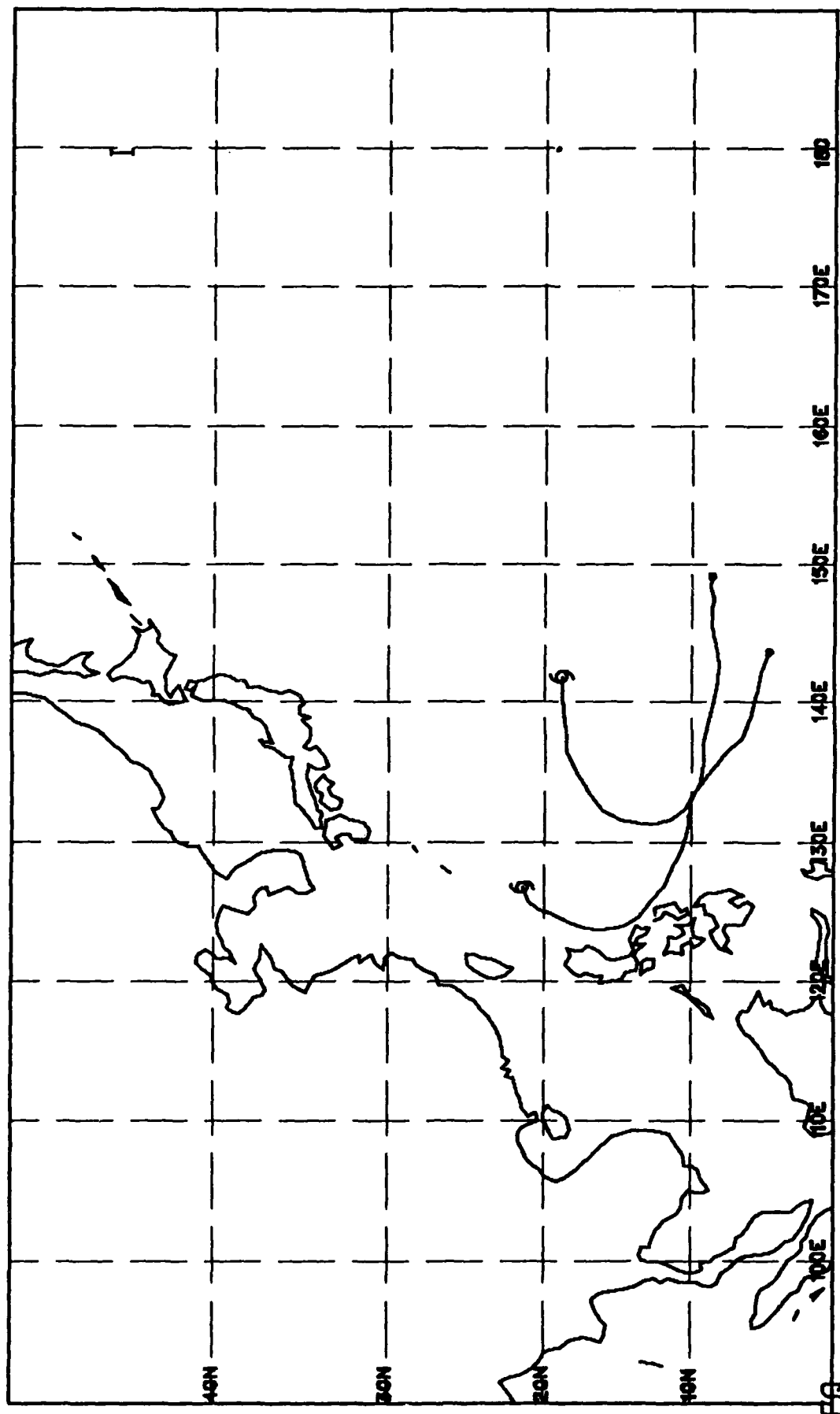
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR FEB 9 - FEB 23



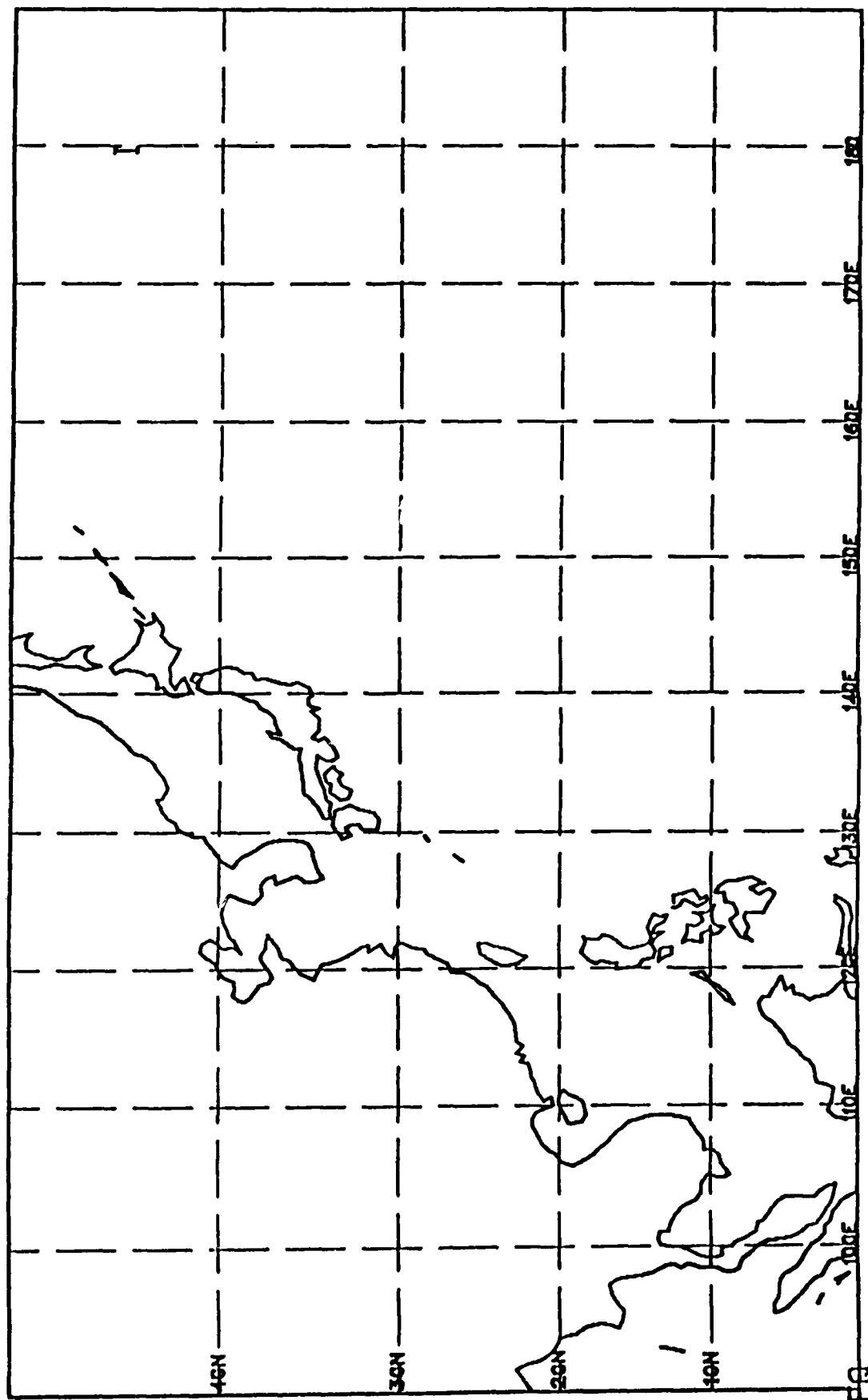
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR FEB 9 - FEB 23



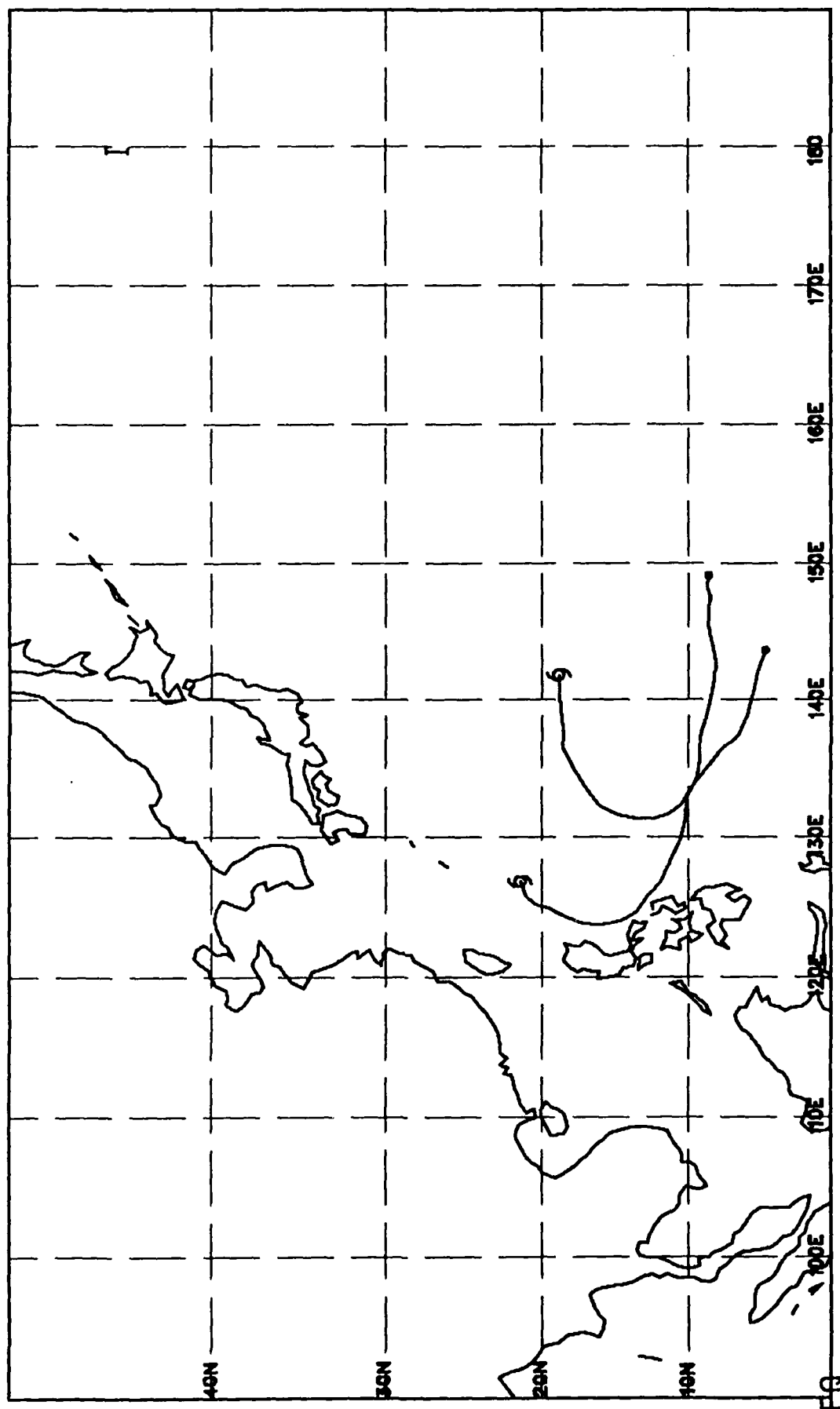
Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR FEB 9 - FEB 23



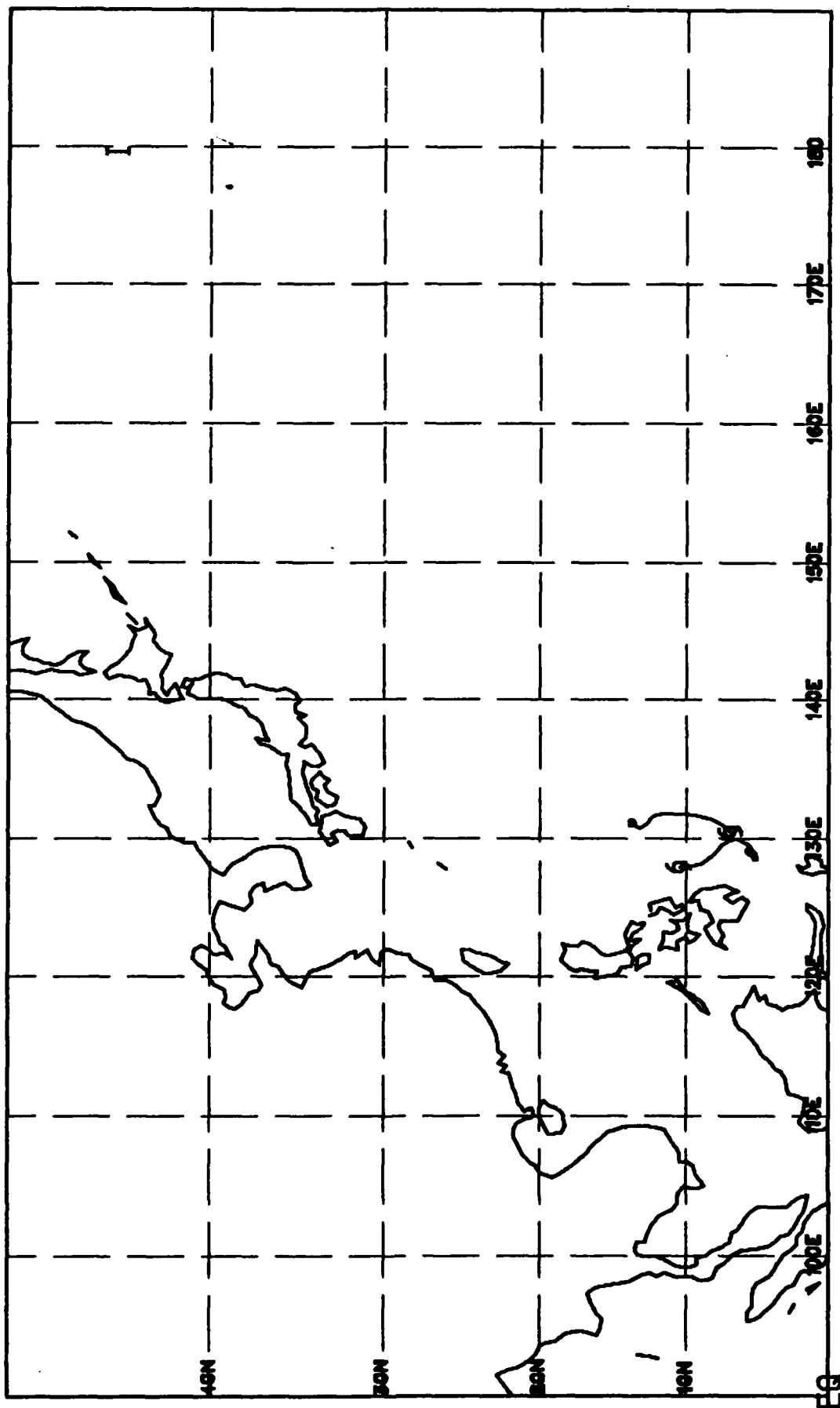
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR FEB 9 - FEB 23



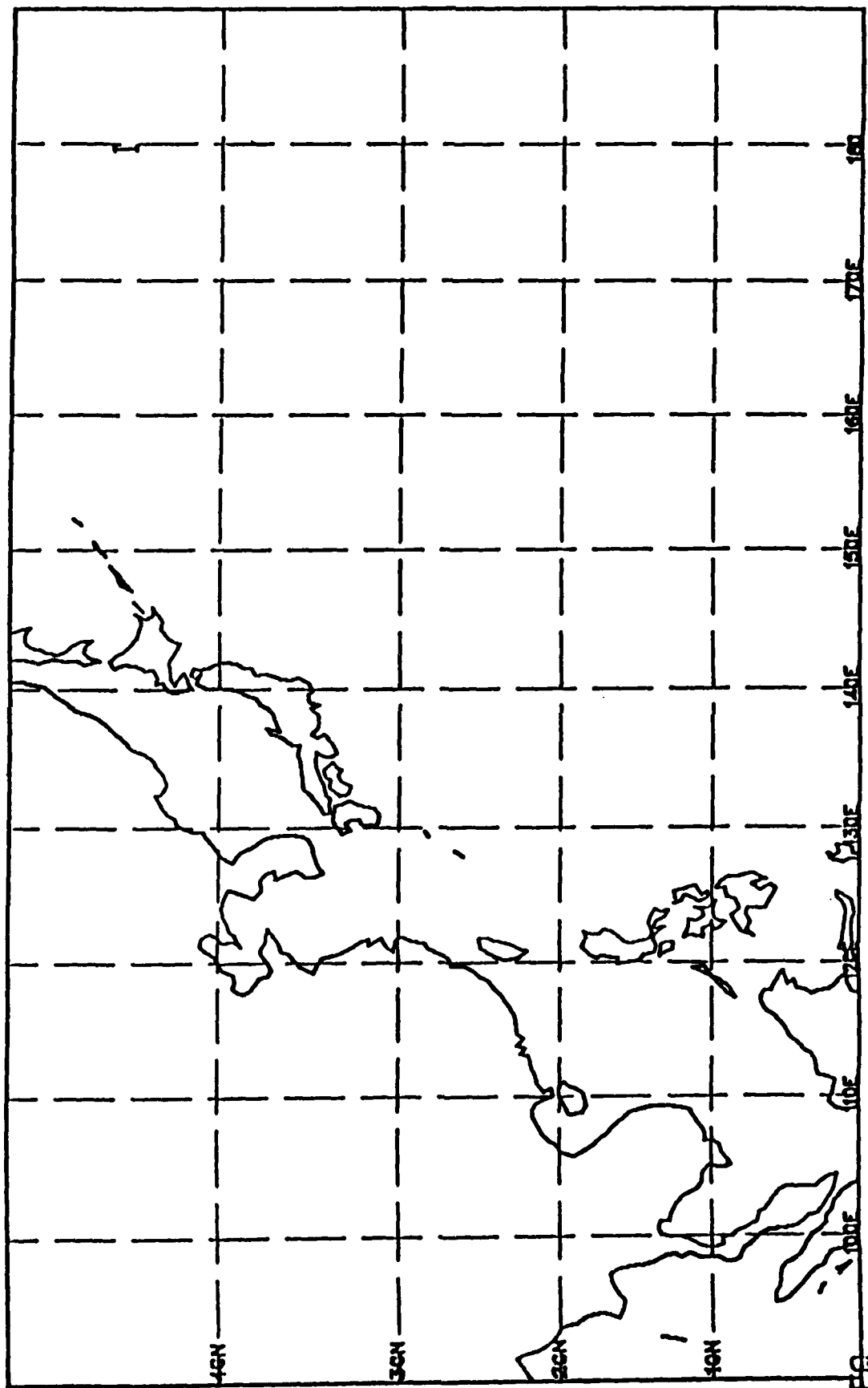
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR FEB 9 - FEB 23



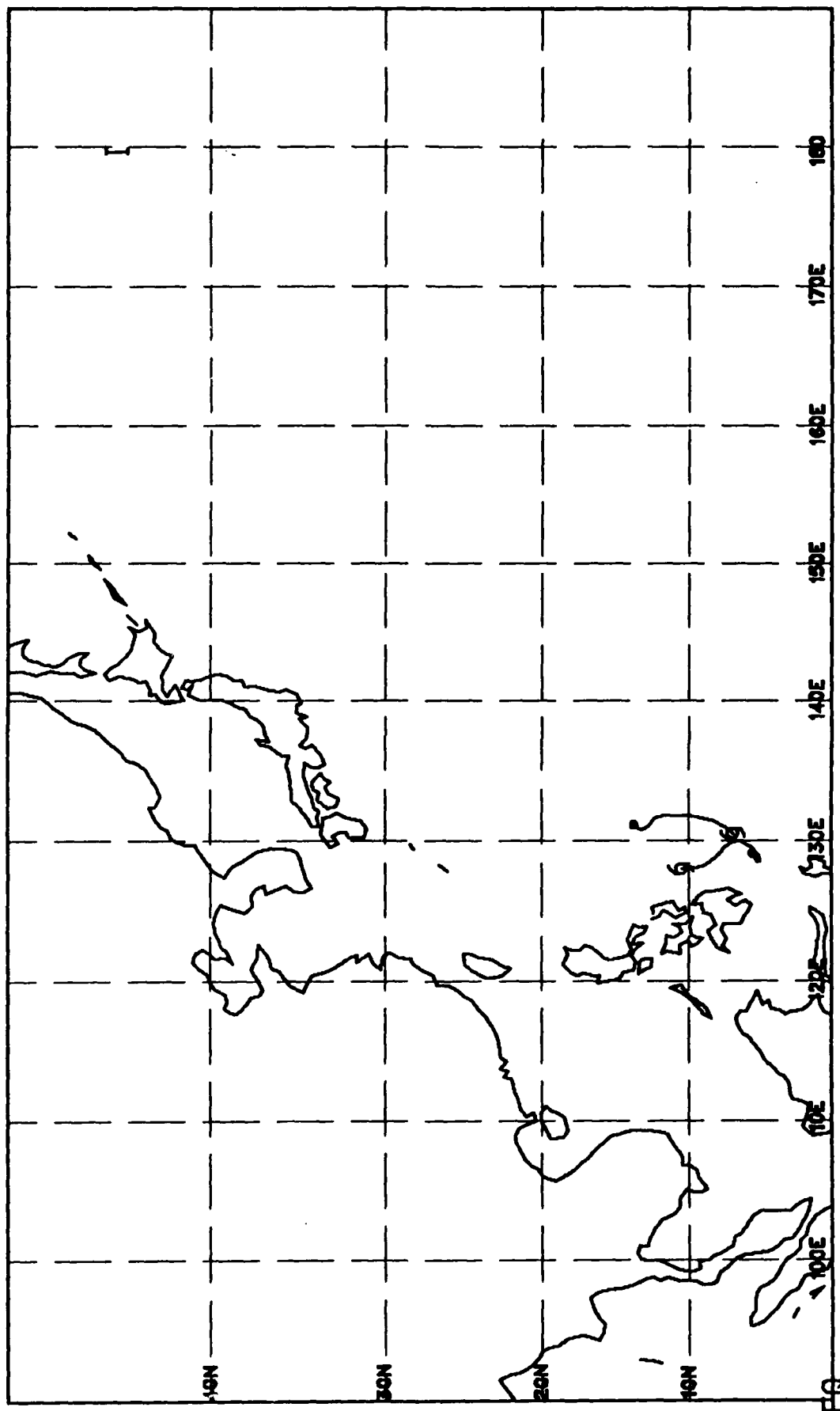
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR FEB 9 - FEB 23



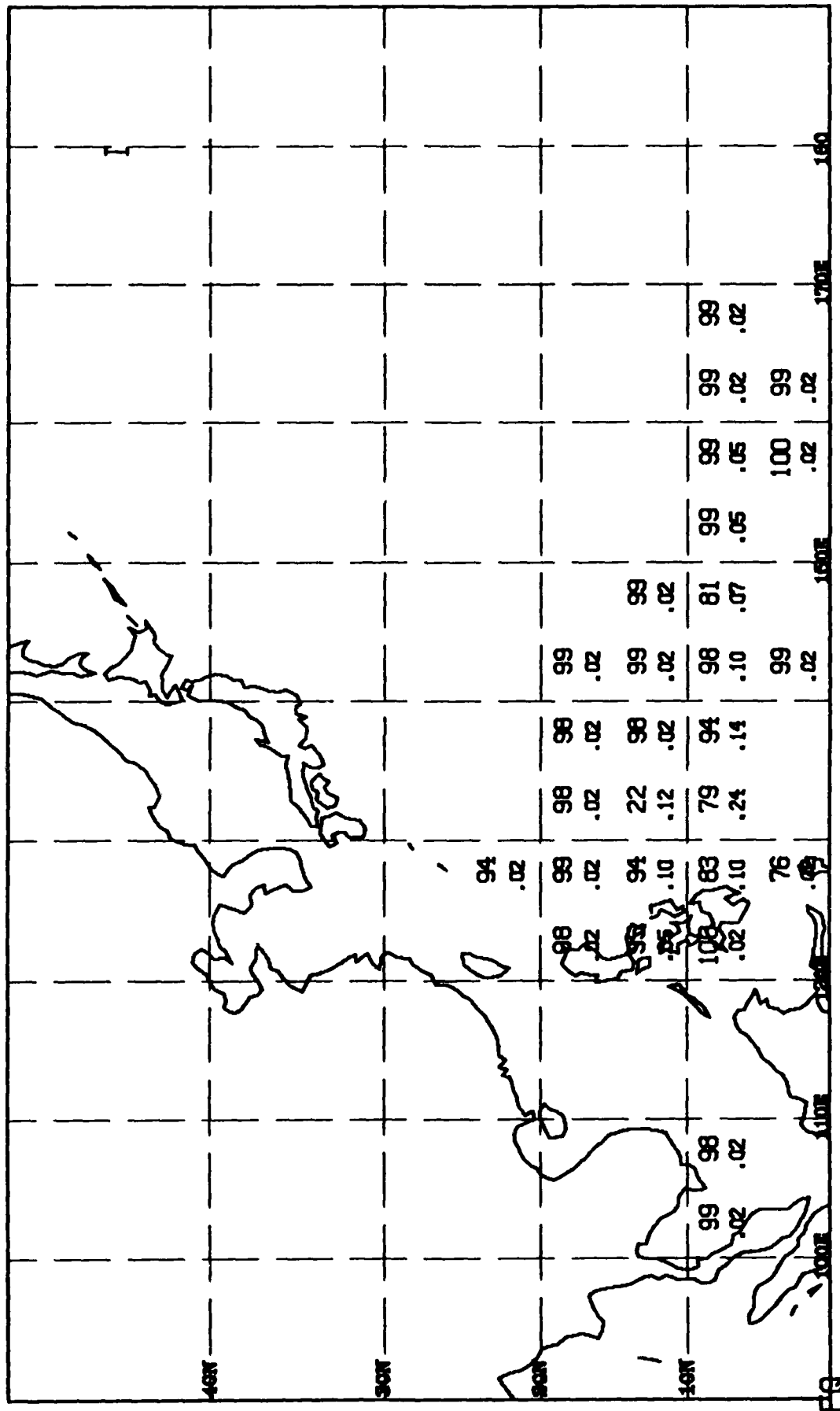
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR FEB 9 - FEB 23



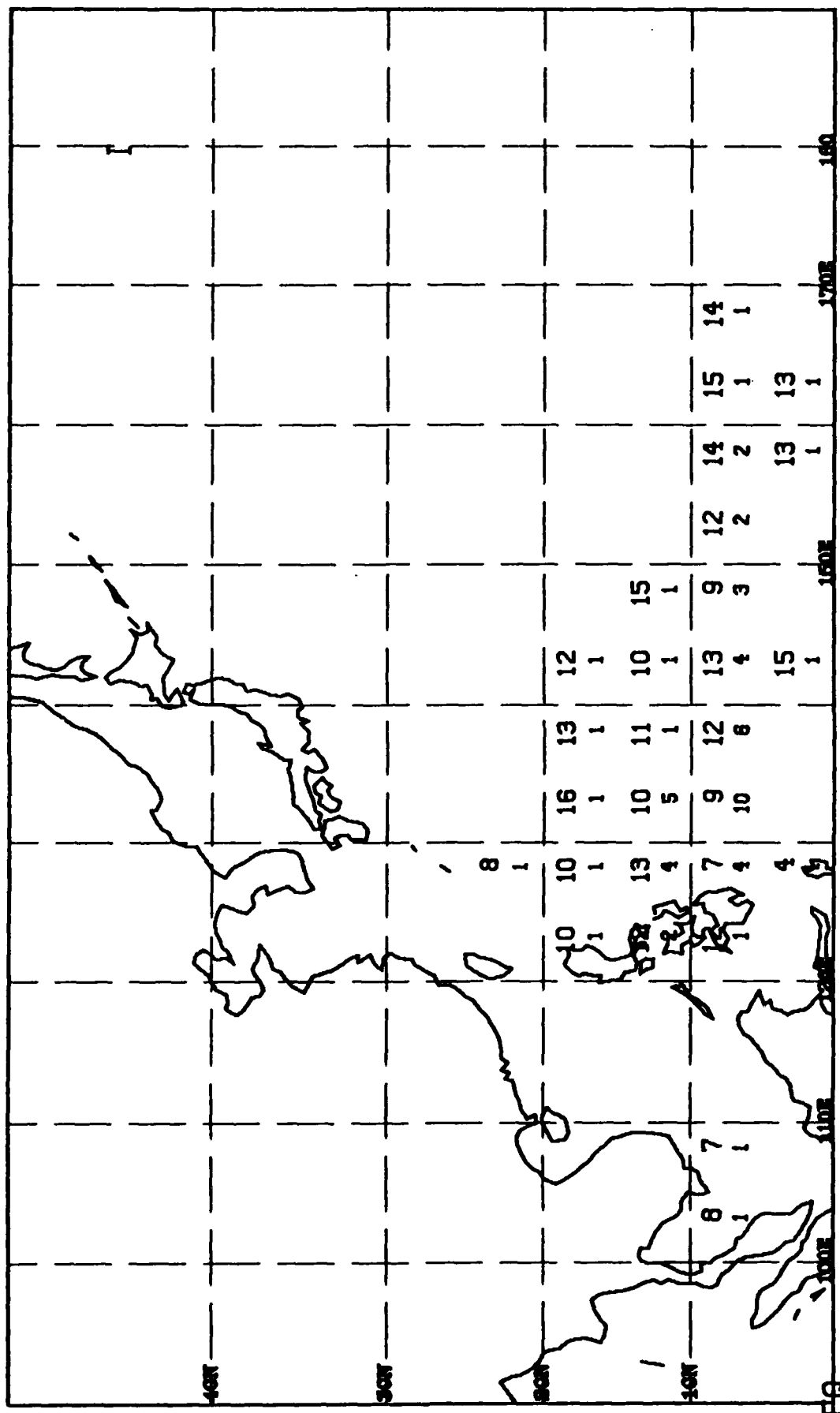
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR FEB 9 - FEB 23

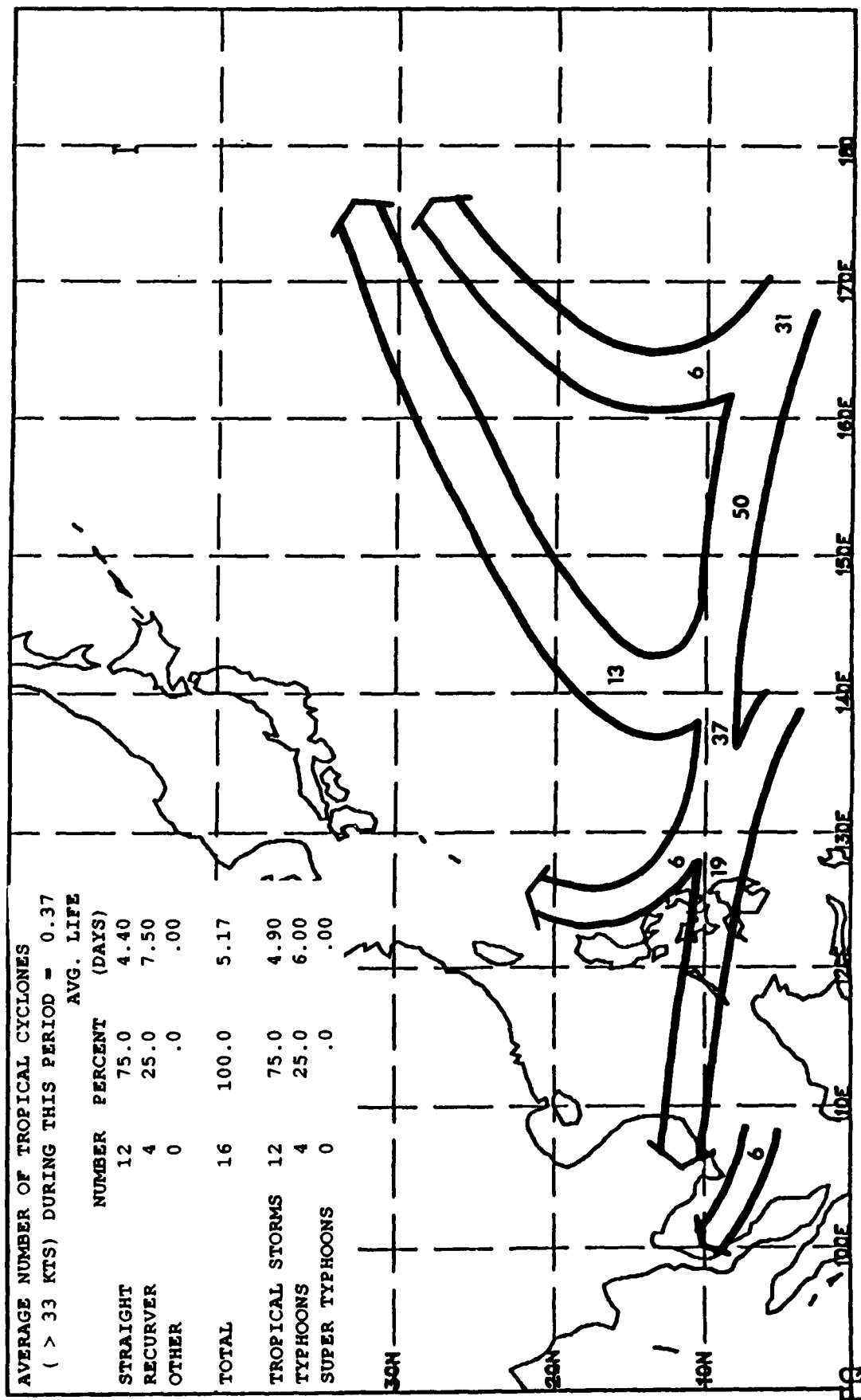


Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number).
 Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed.
 Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year per time period.

SPEED OF MOVEMENT FOR FEB 9 - FEB 23

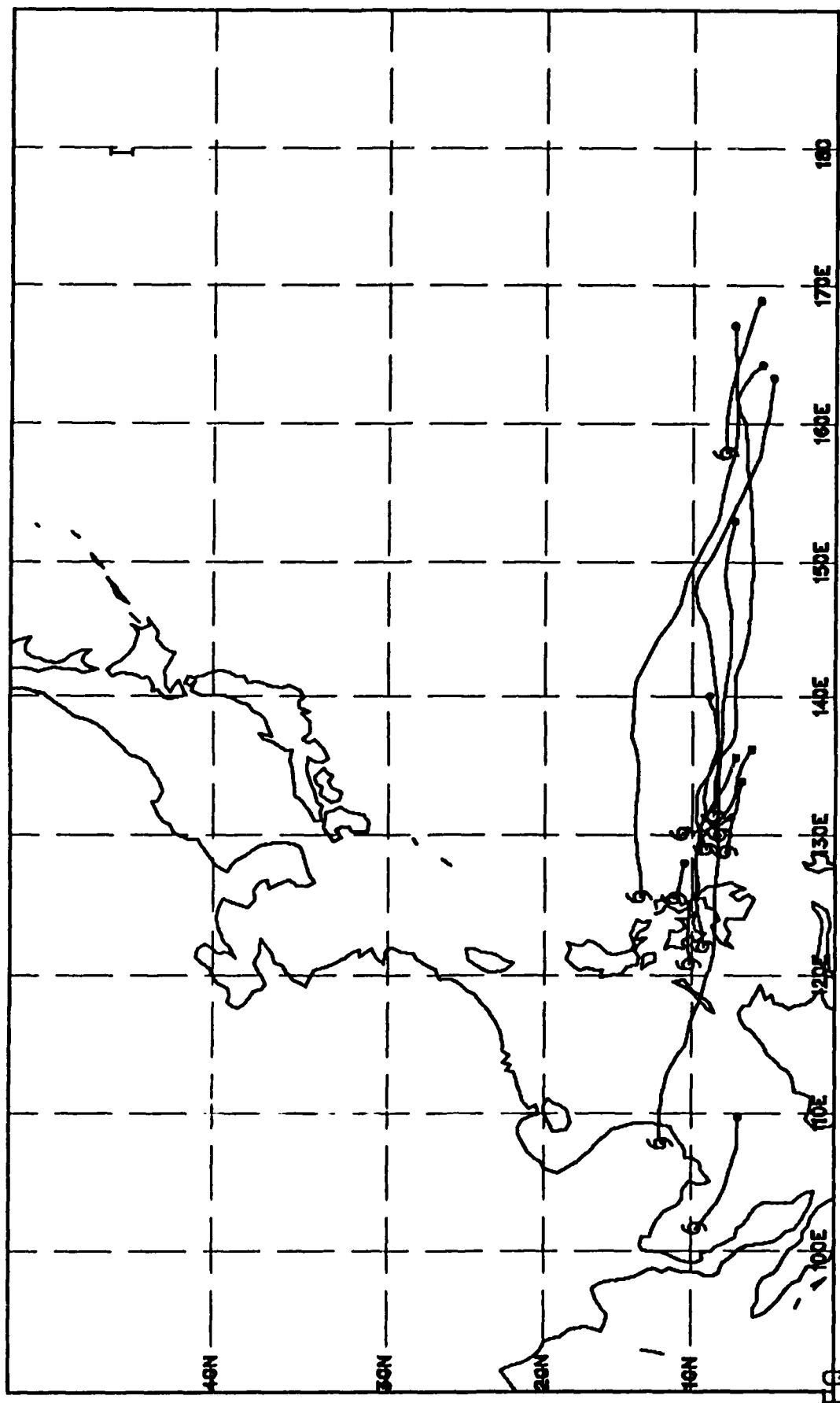


MEAN PATHS FOR FEB 24 - MAR 8



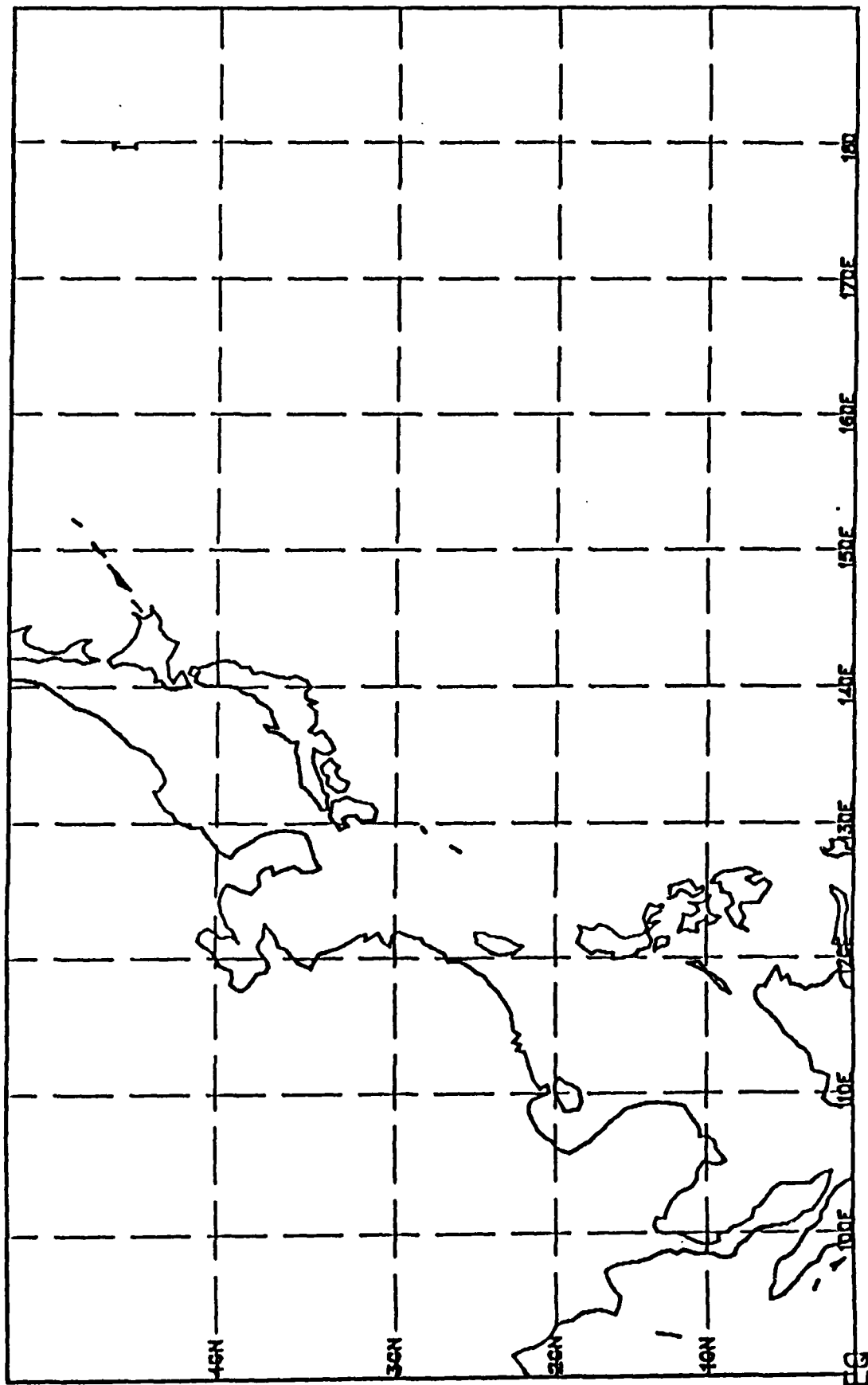
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored.

ACTUAL TRACKS FOR FEB 24 - MAR 8



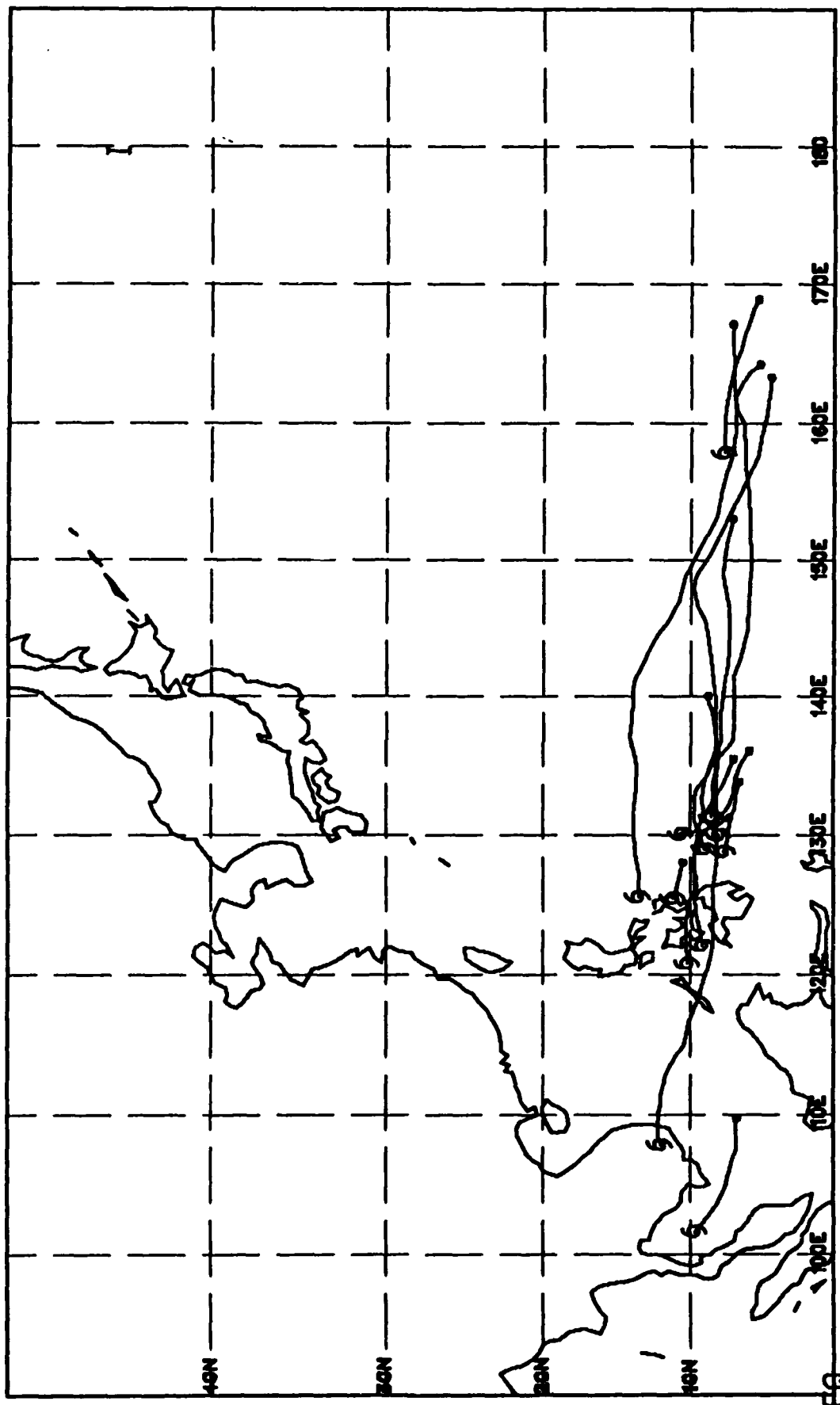
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR FEB 24 - MAR 8



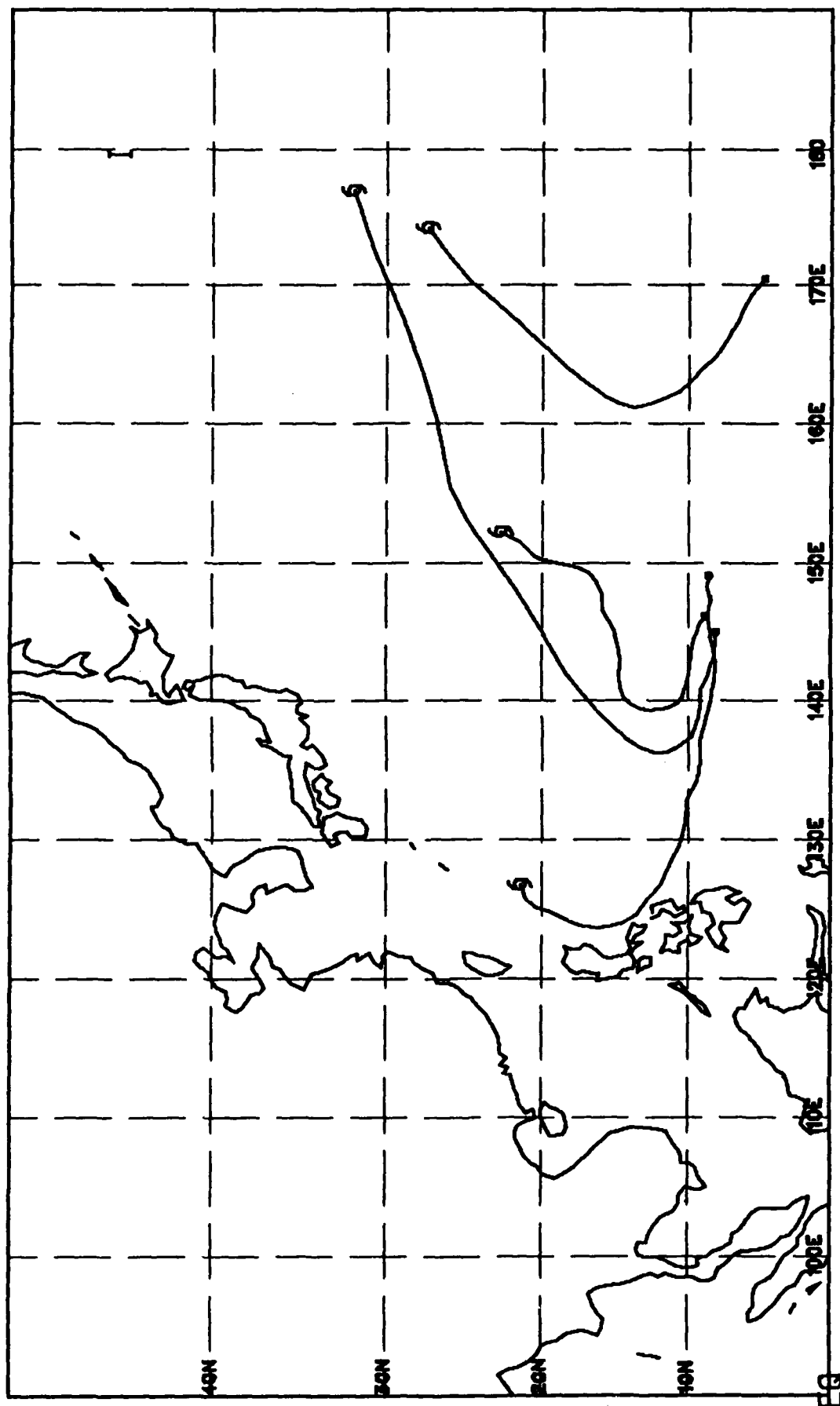
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR FEB 24 - MAR 8



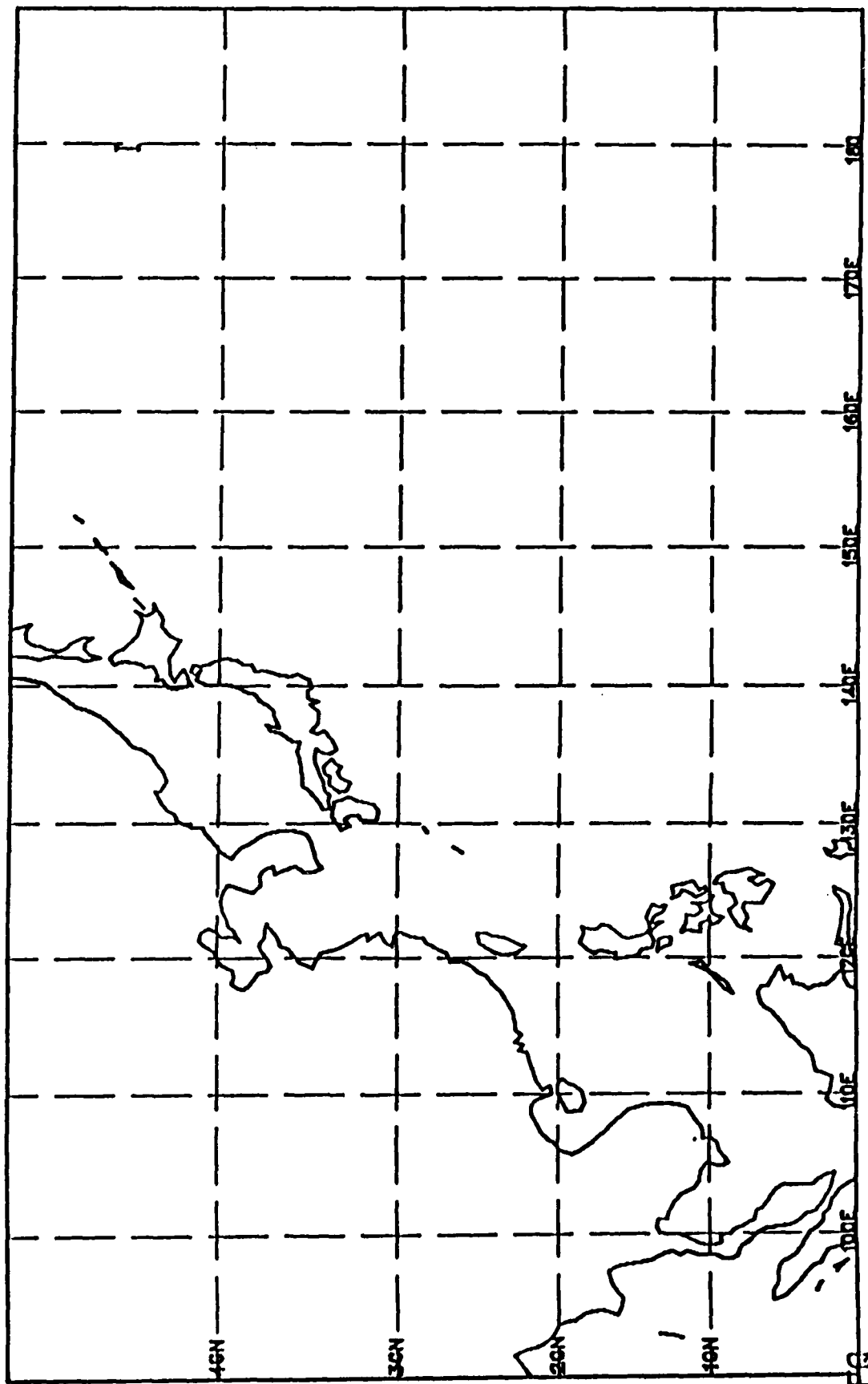
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR FEB 24 - MAR 8



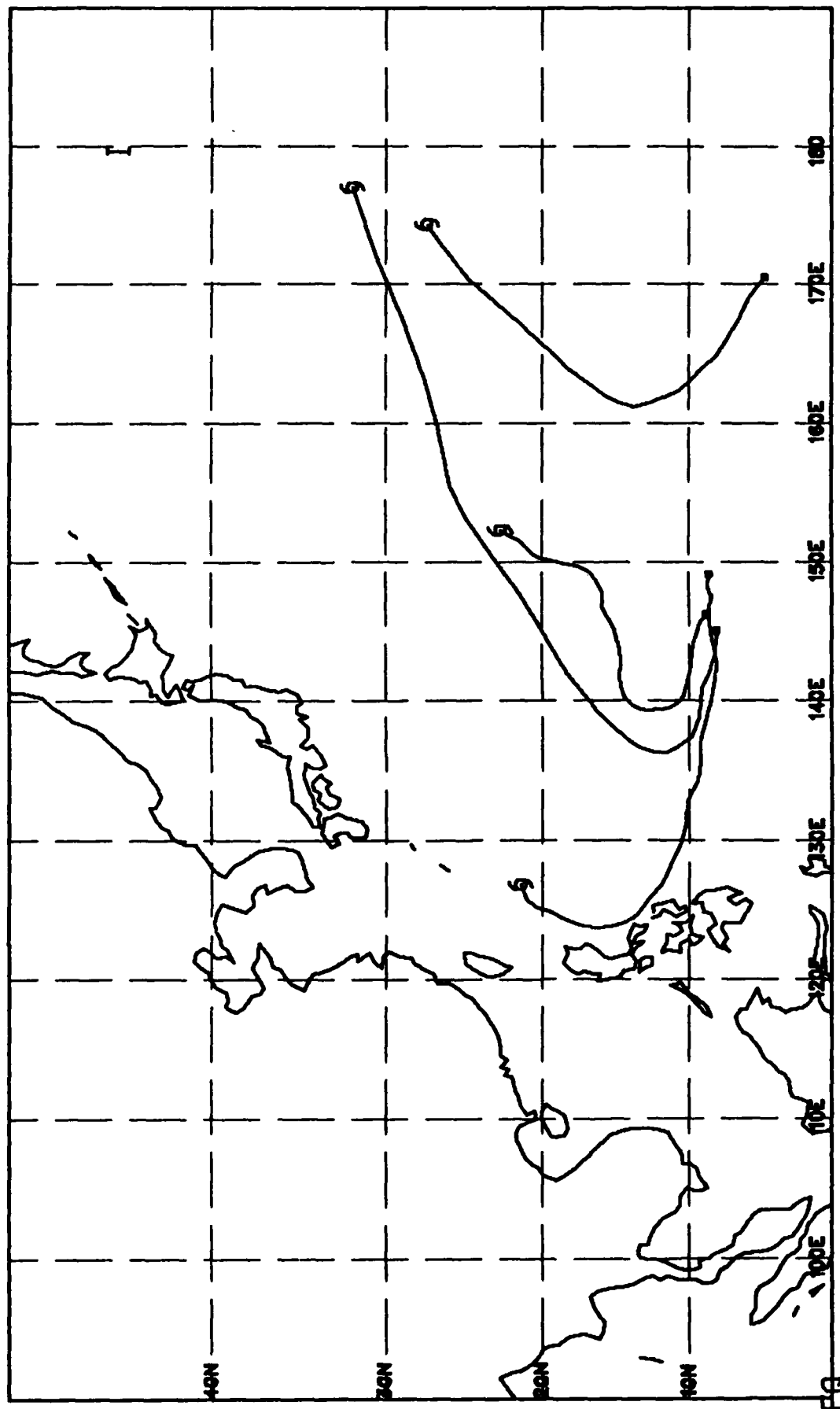
Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR FEB 24 - MAR 8



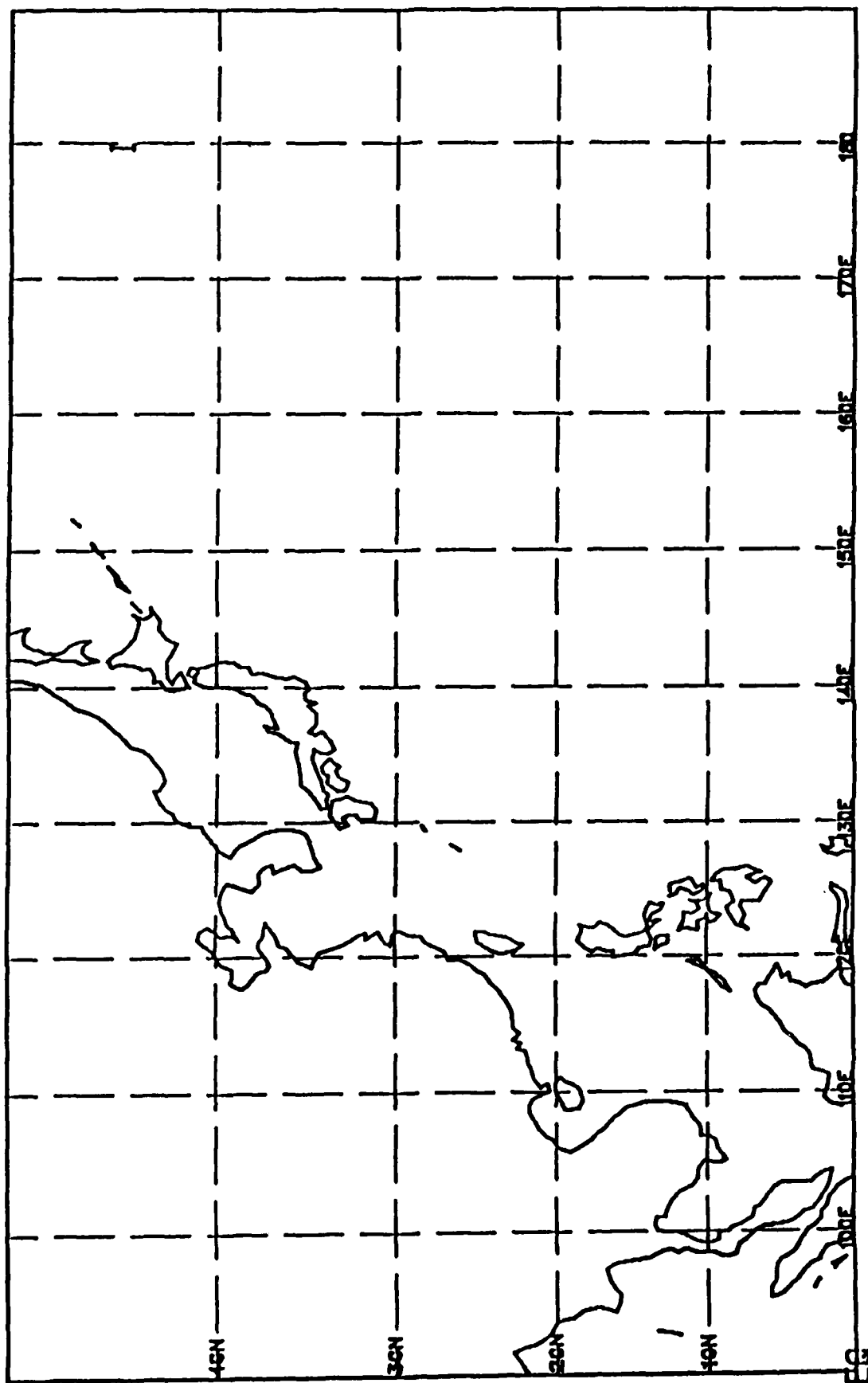
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR FEB 24 - MAR 8



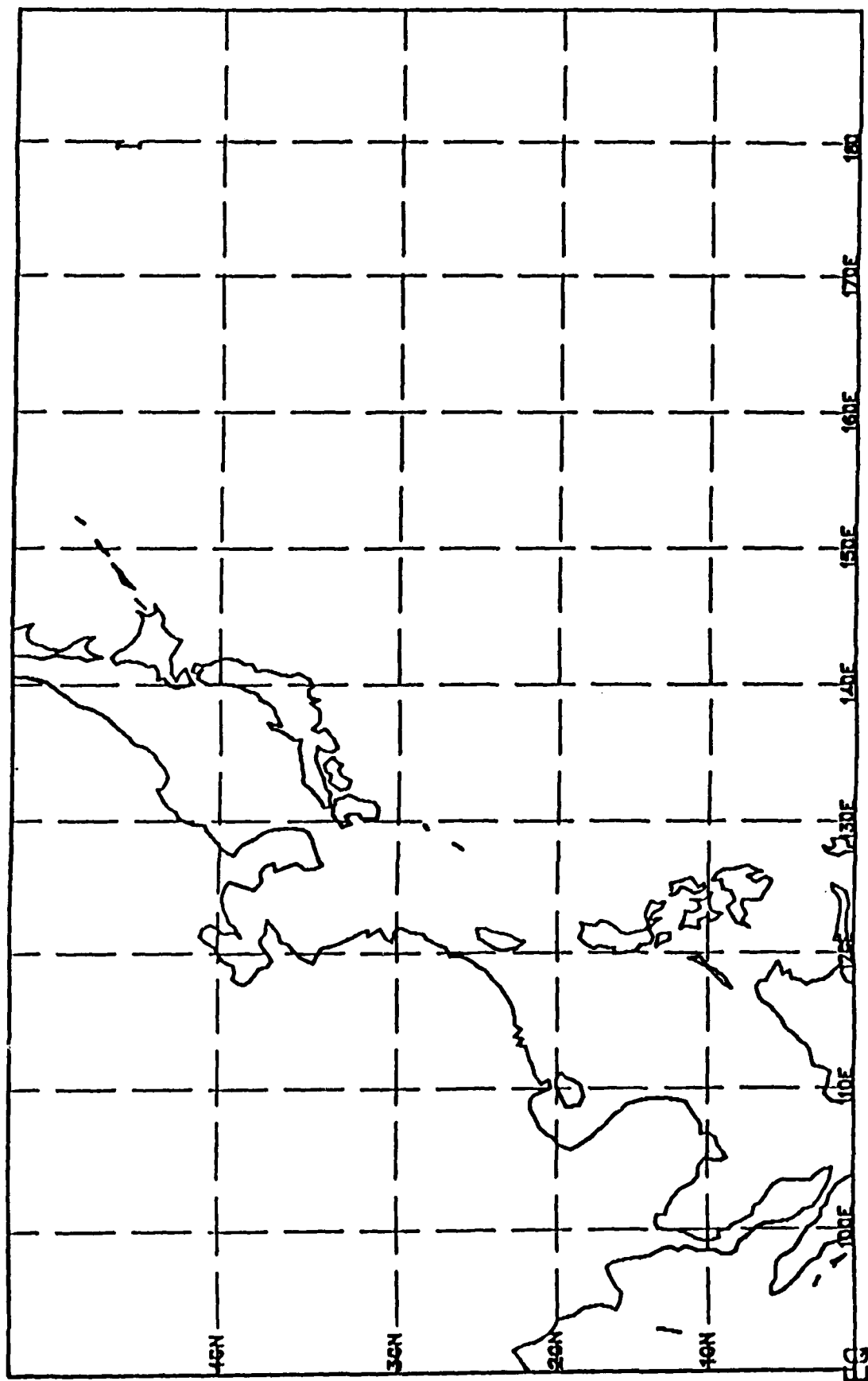
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR FEB 24 - MAR 8



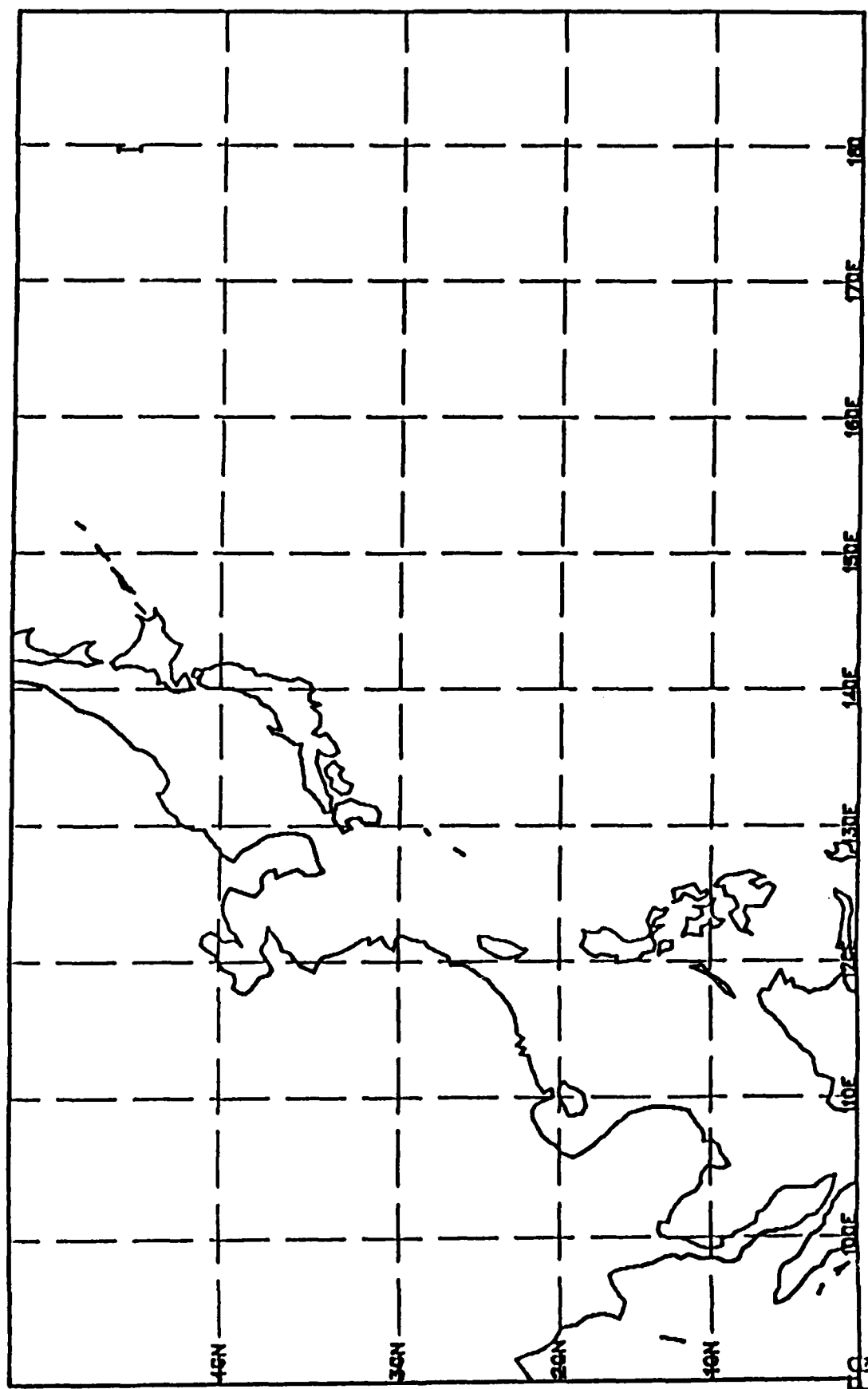
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR FEB 24 - MAR 8



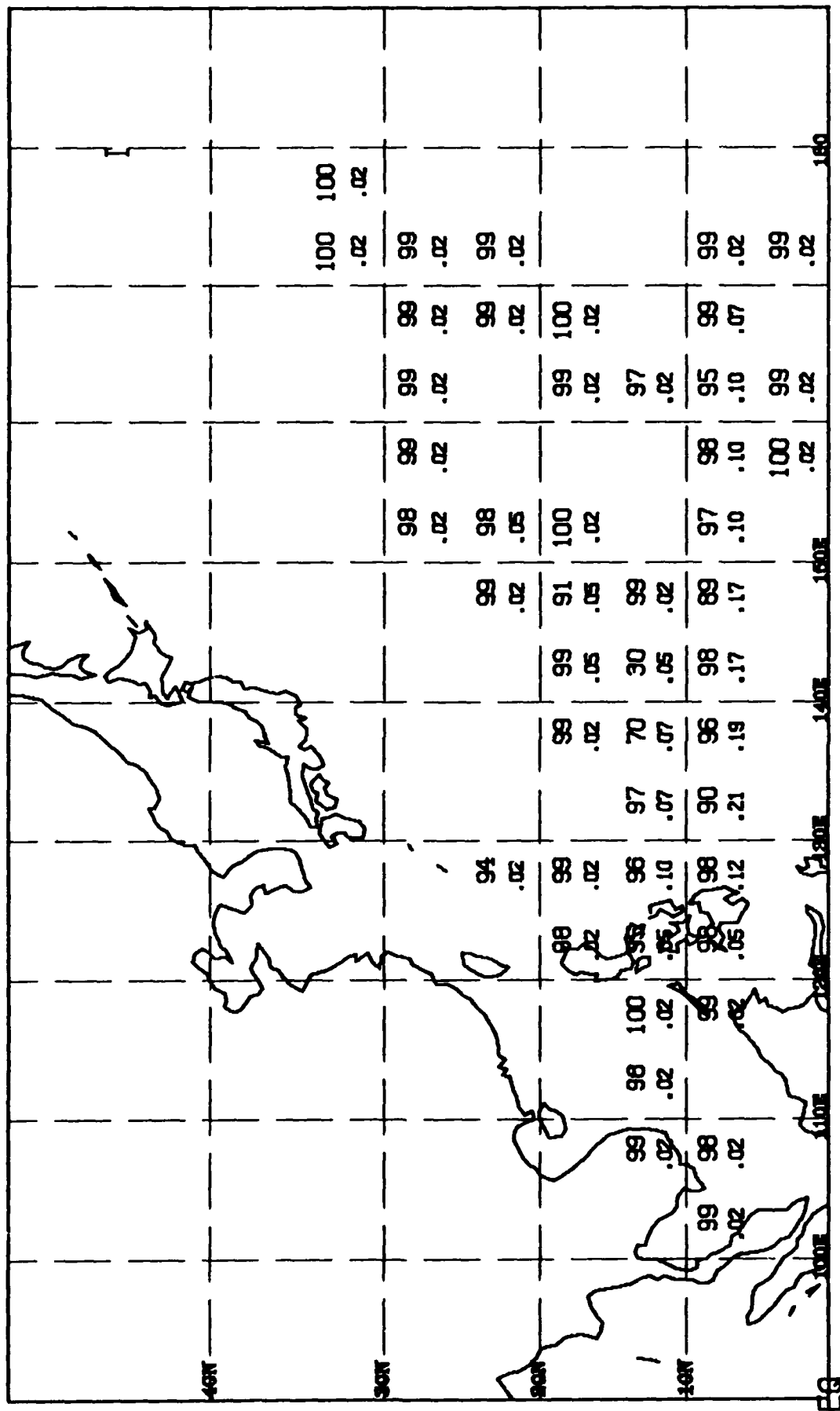
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR FEB 24 - MAR 8



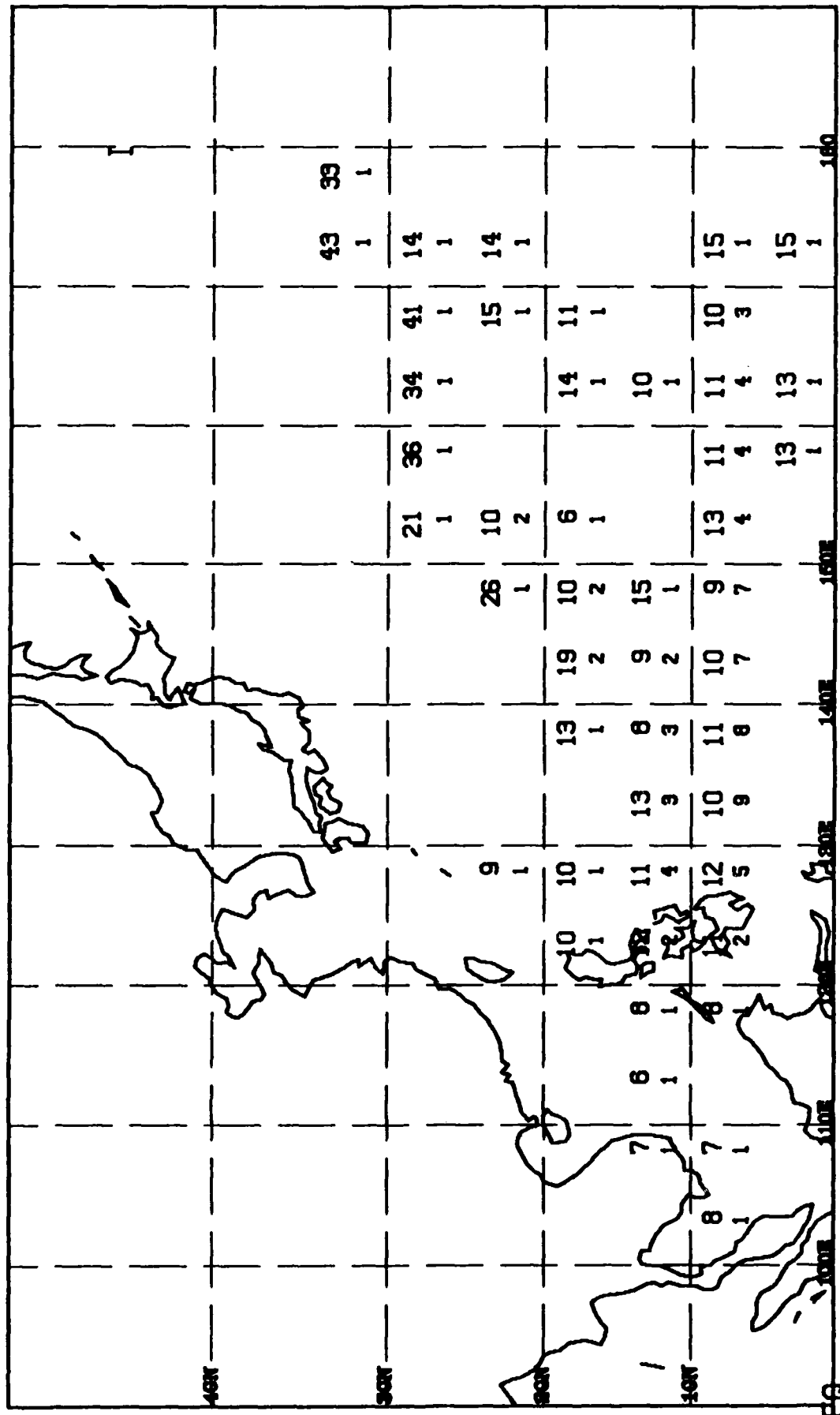
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR FEB 24 - MAR 8



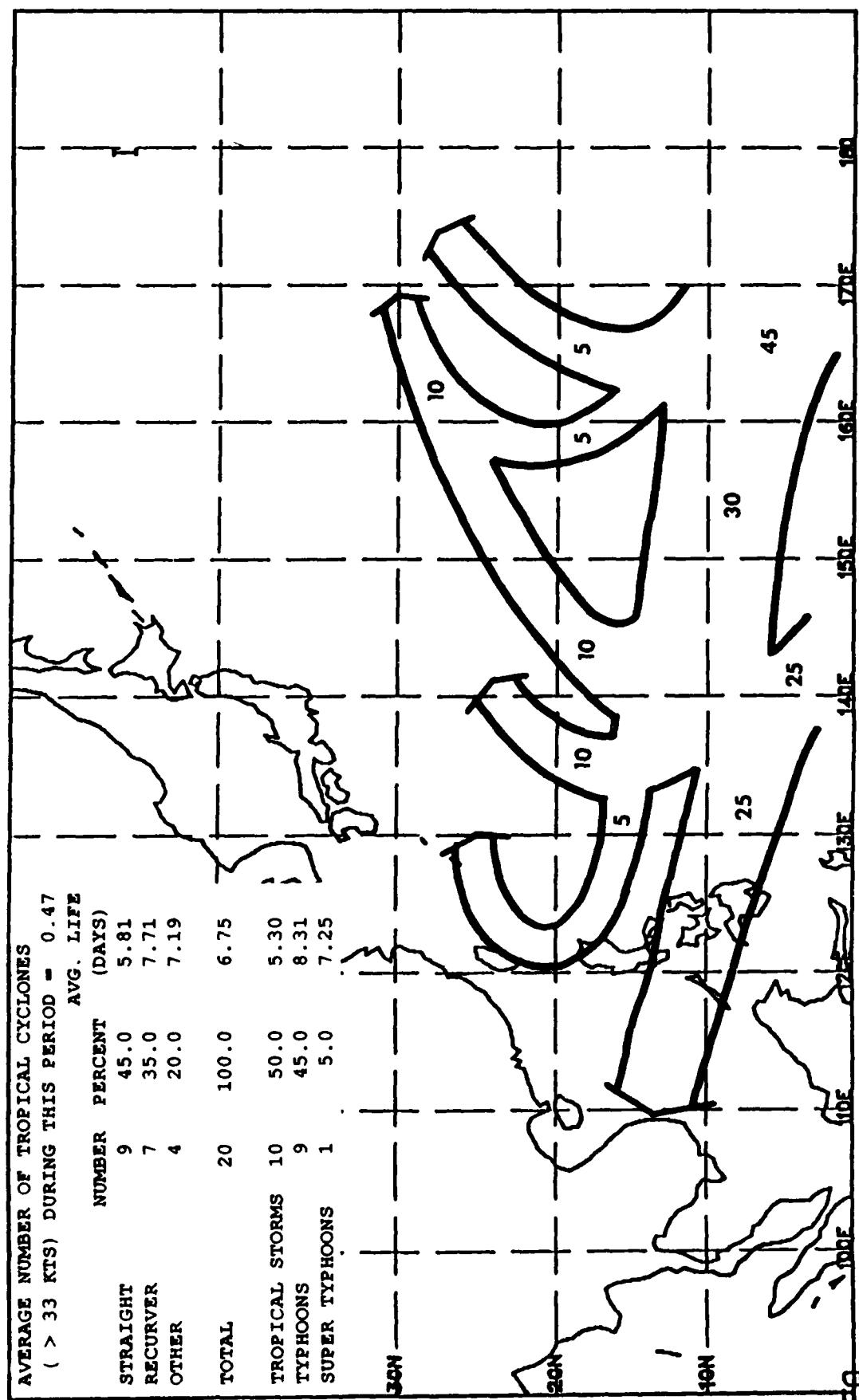
Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number).
 Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed.
 Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year per time period.

SPEED OF MOVEMENT FOR FEB 24 - MAR 8



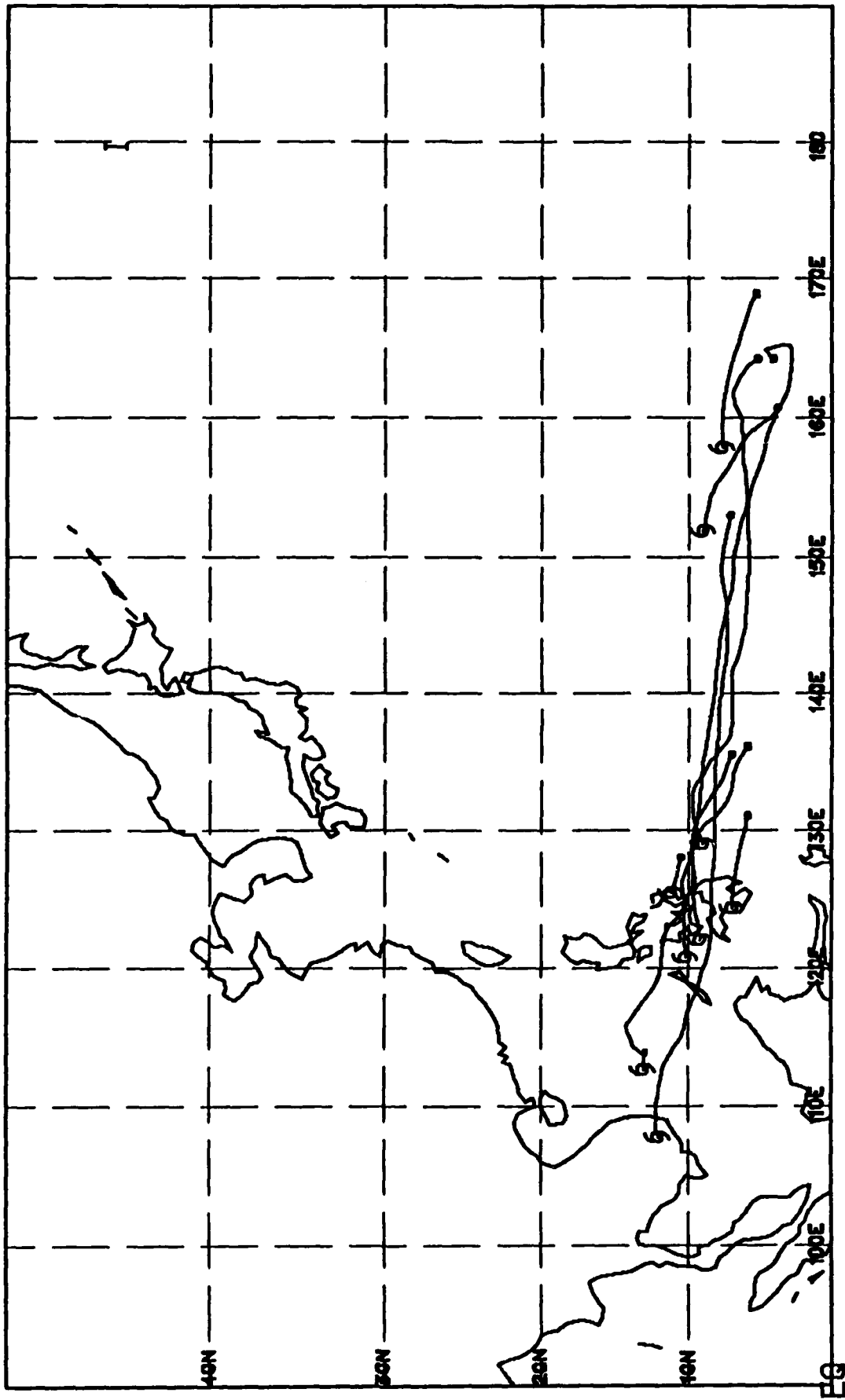
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR MAR 9 - MAR 23



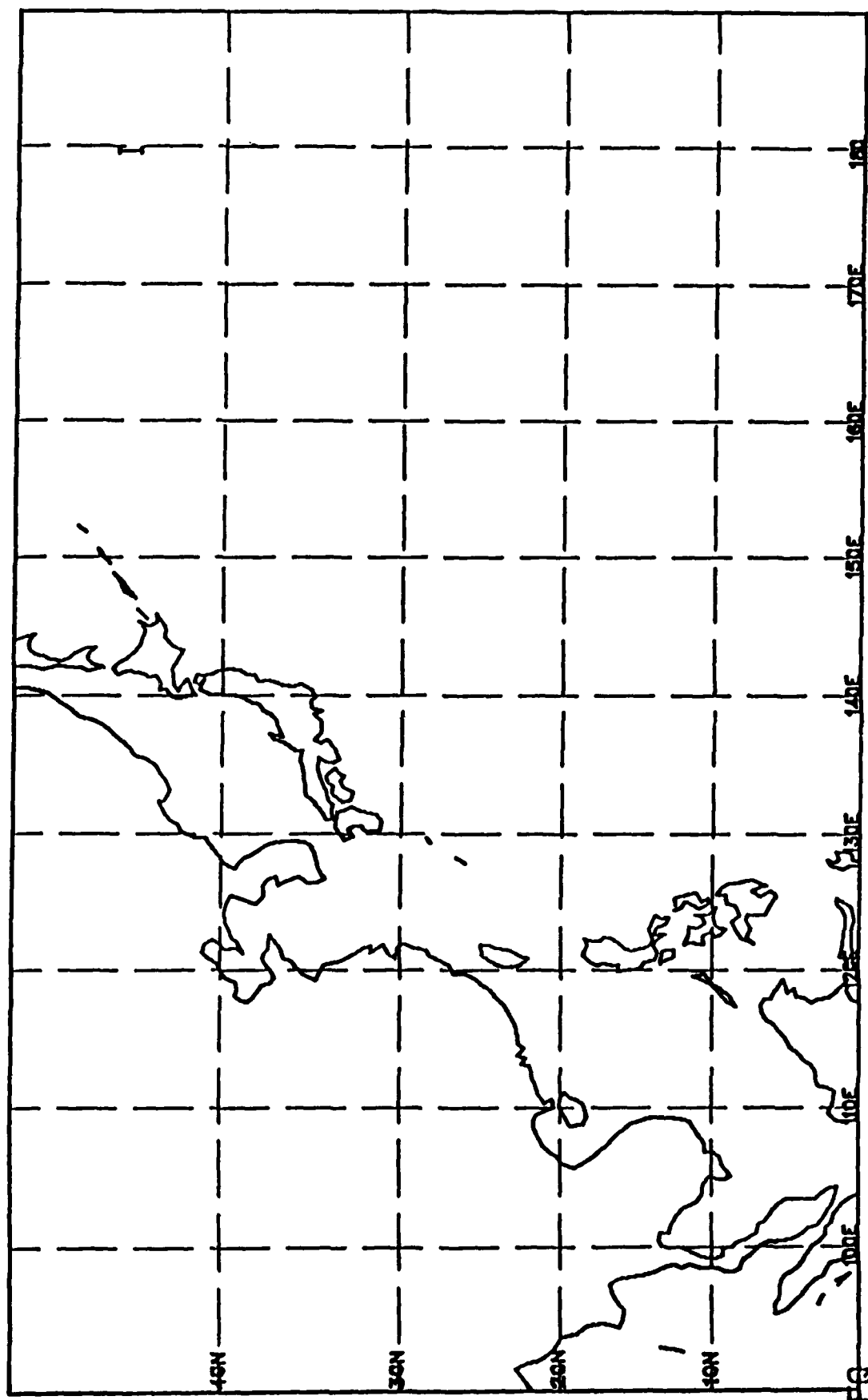
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored.

ACTUAL TRACKS FOR MAR 9 - MAR 23



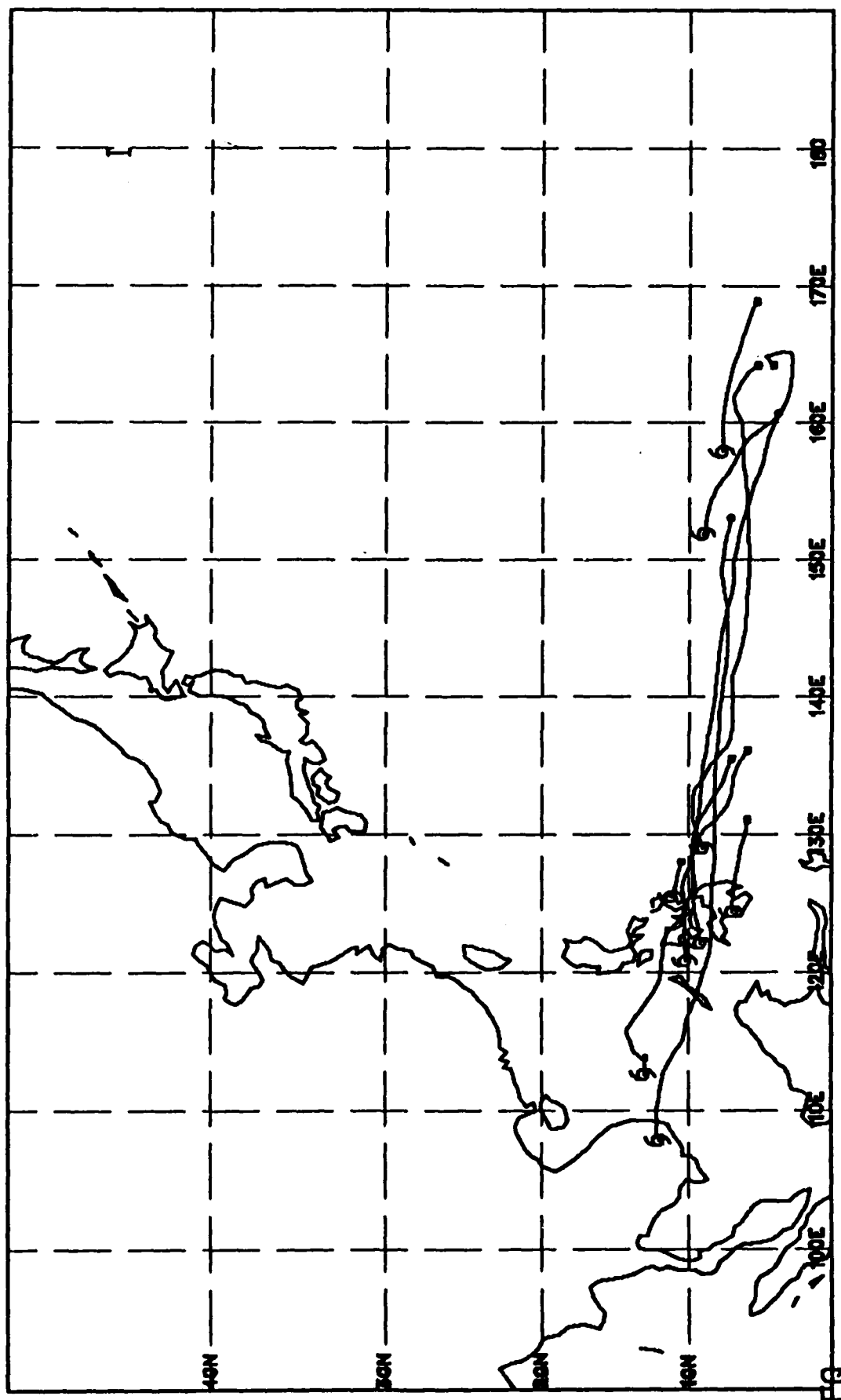
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR MAR 9 - MAR 23



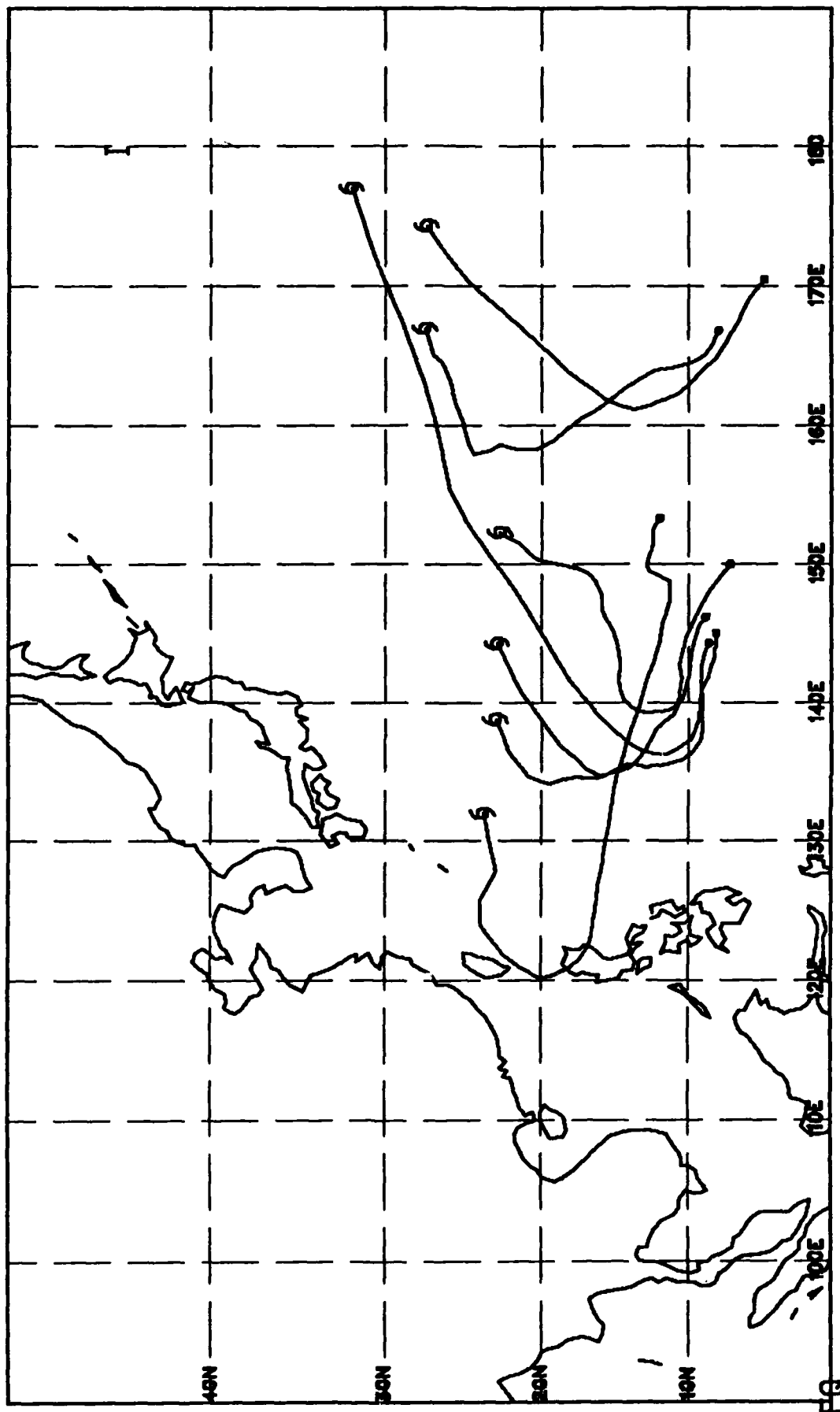
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR MAR 9 - MAR 23



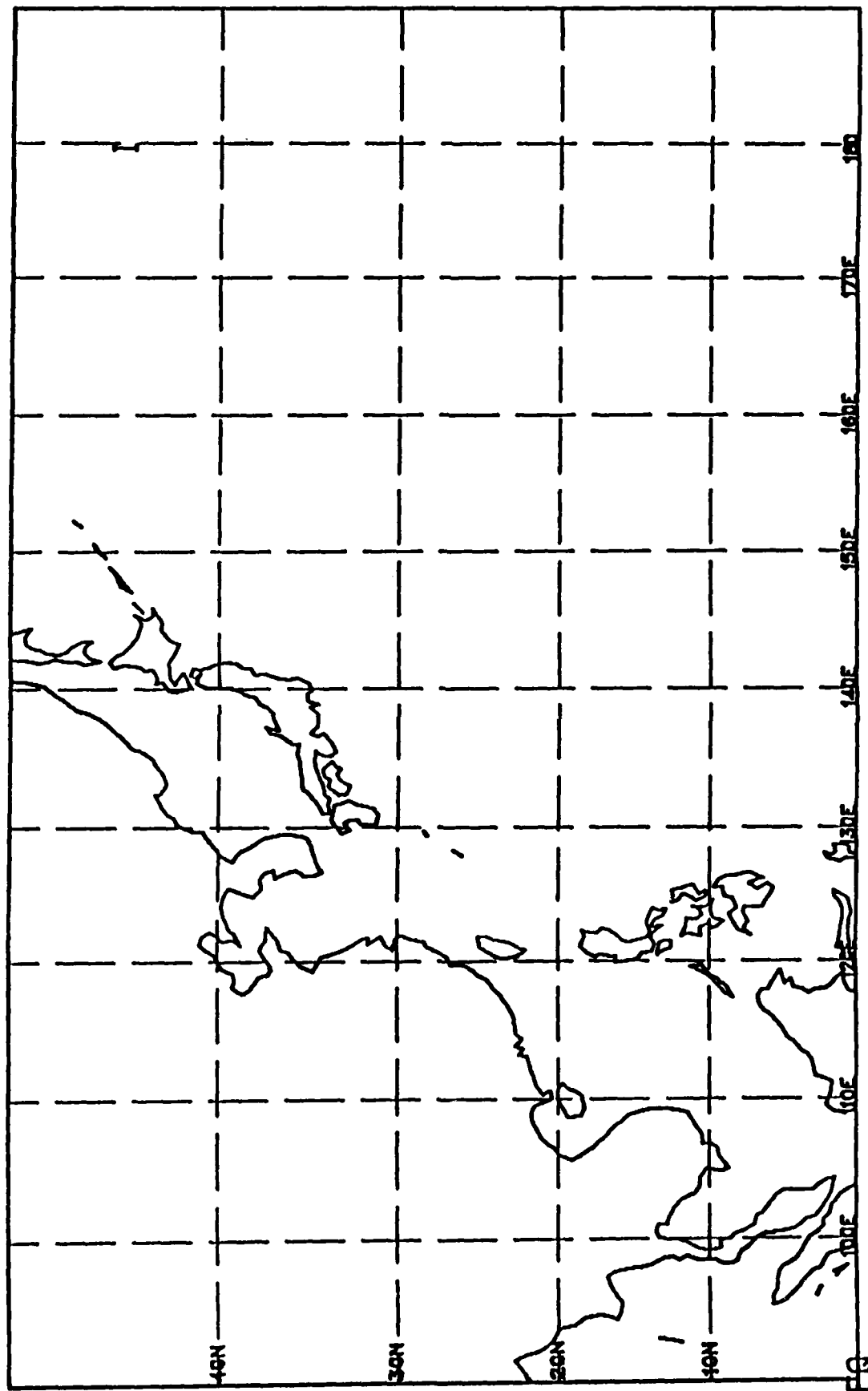
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR MAR 9 - MAR 23



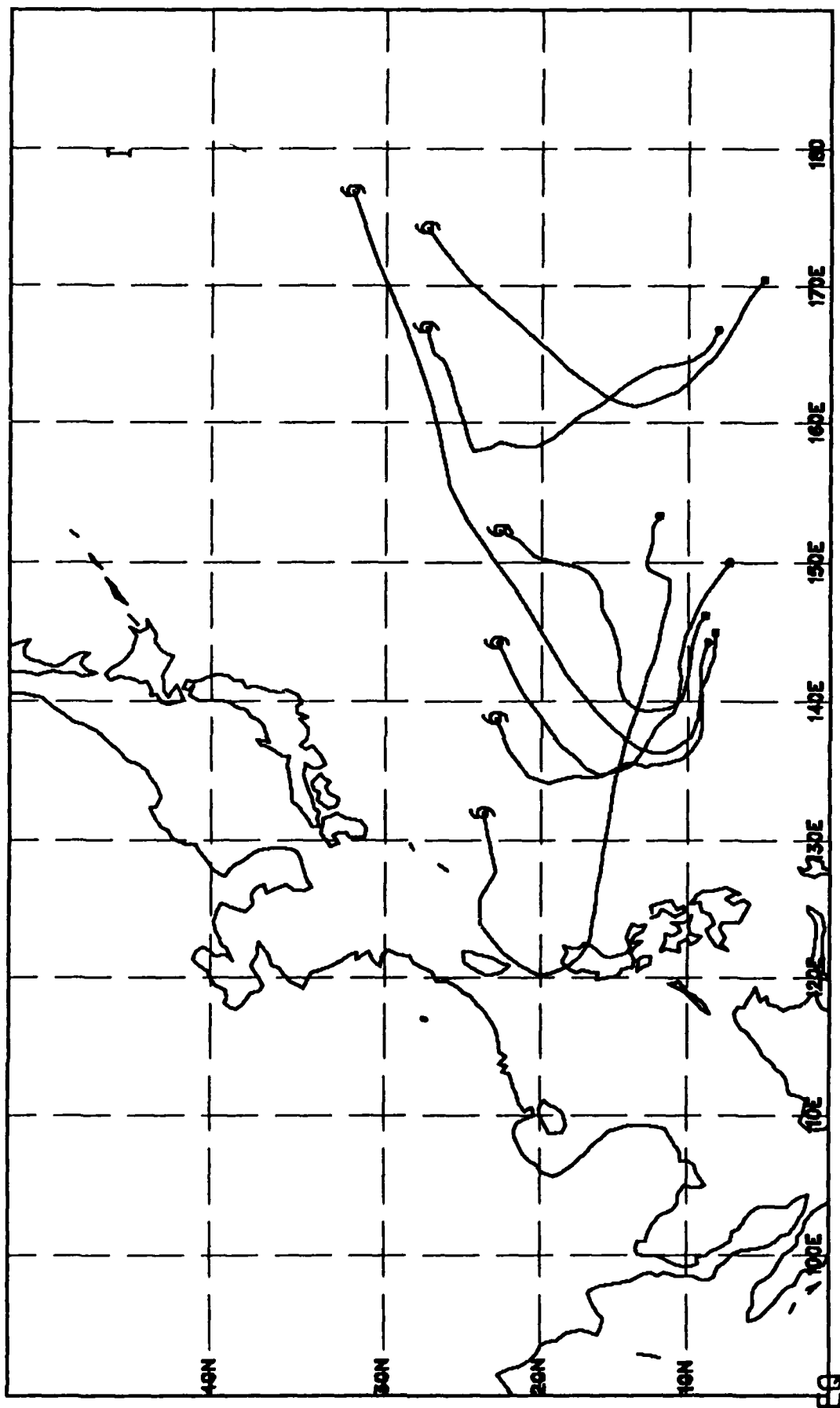
Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR MAR 9 - MAR 23



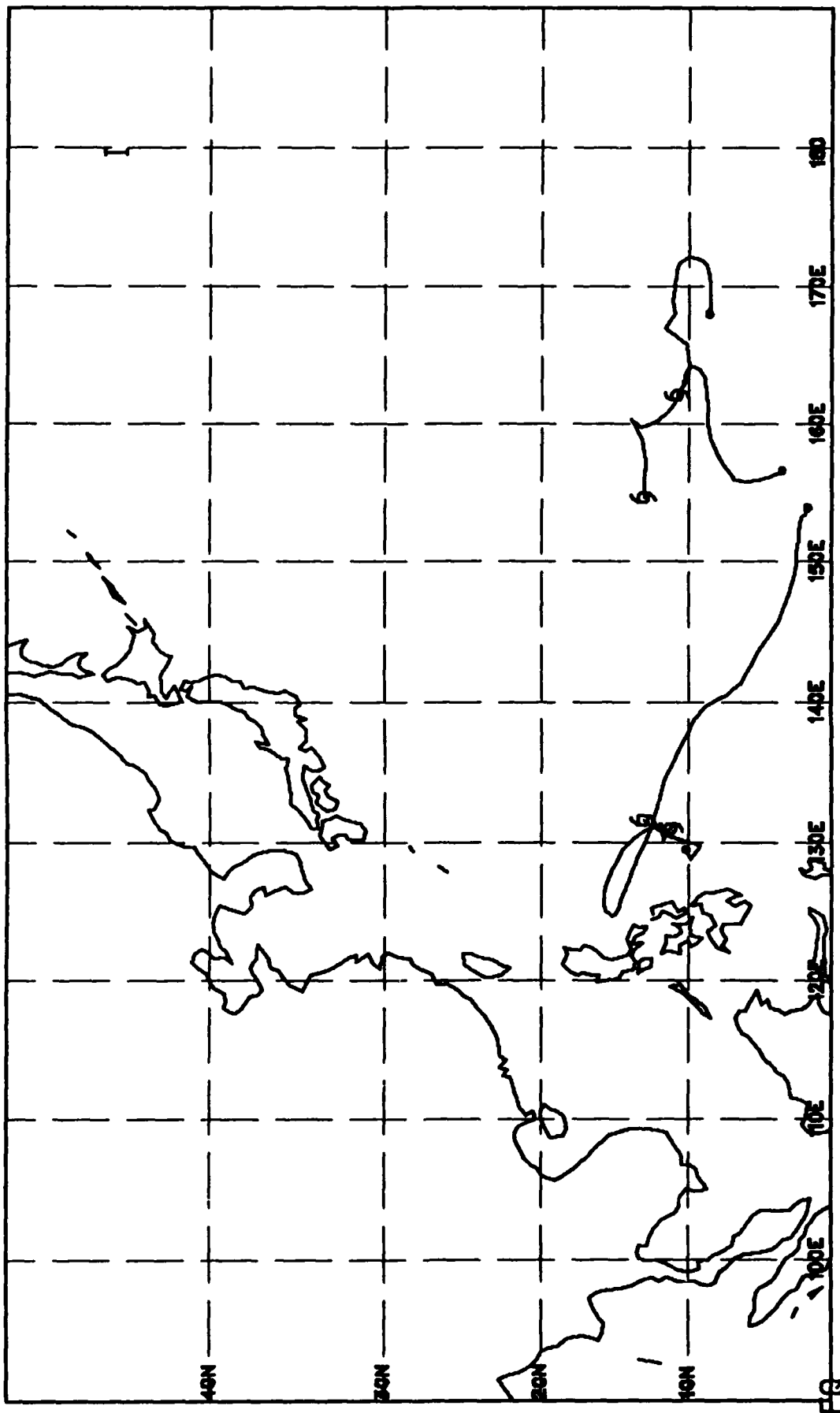
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR MAR 9 - MAR 23



Actual path of all recurring tropical cyclones (> 33 kts).

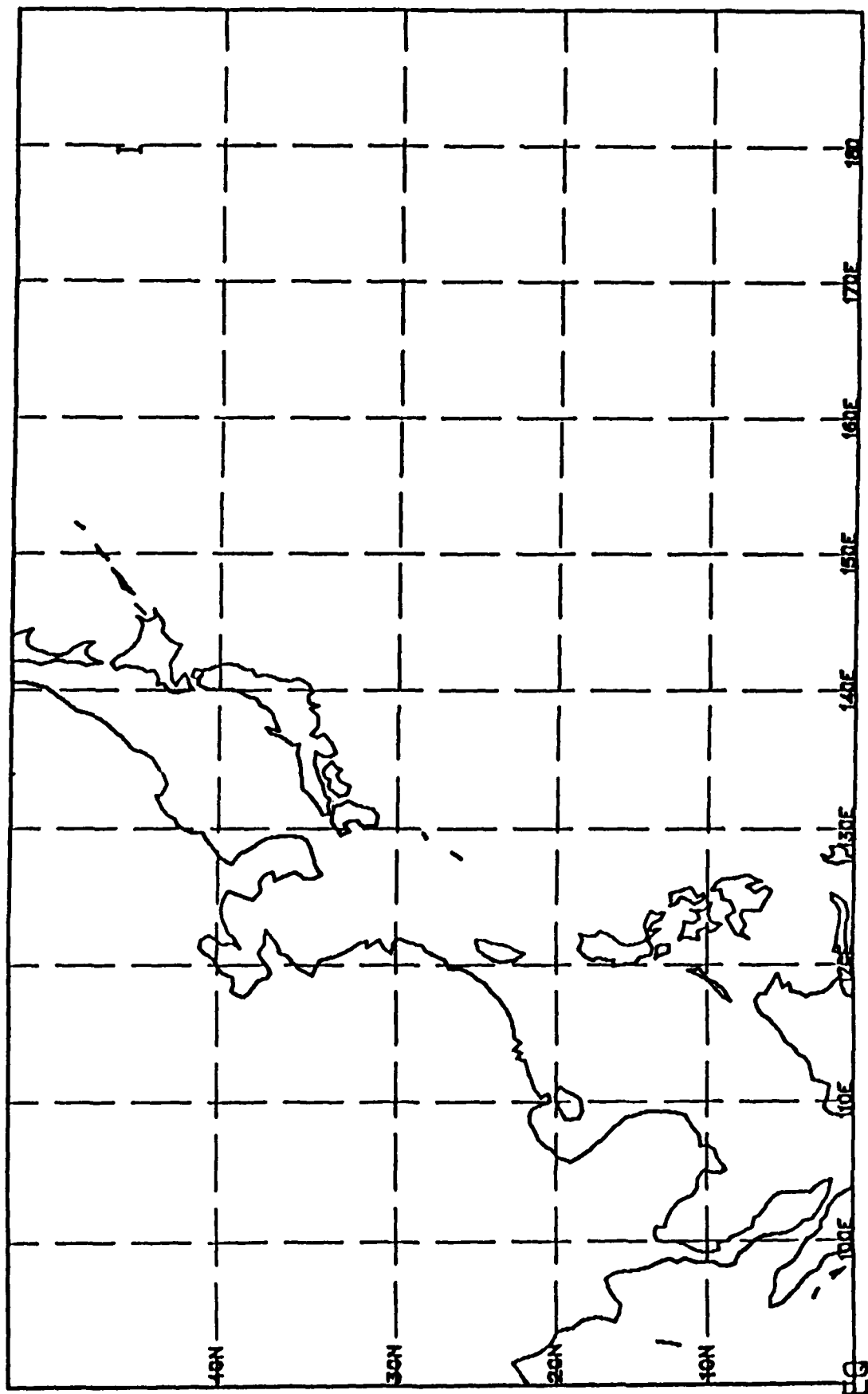
ACTUAL TRACKS FOR MAR 9 - MAR 23



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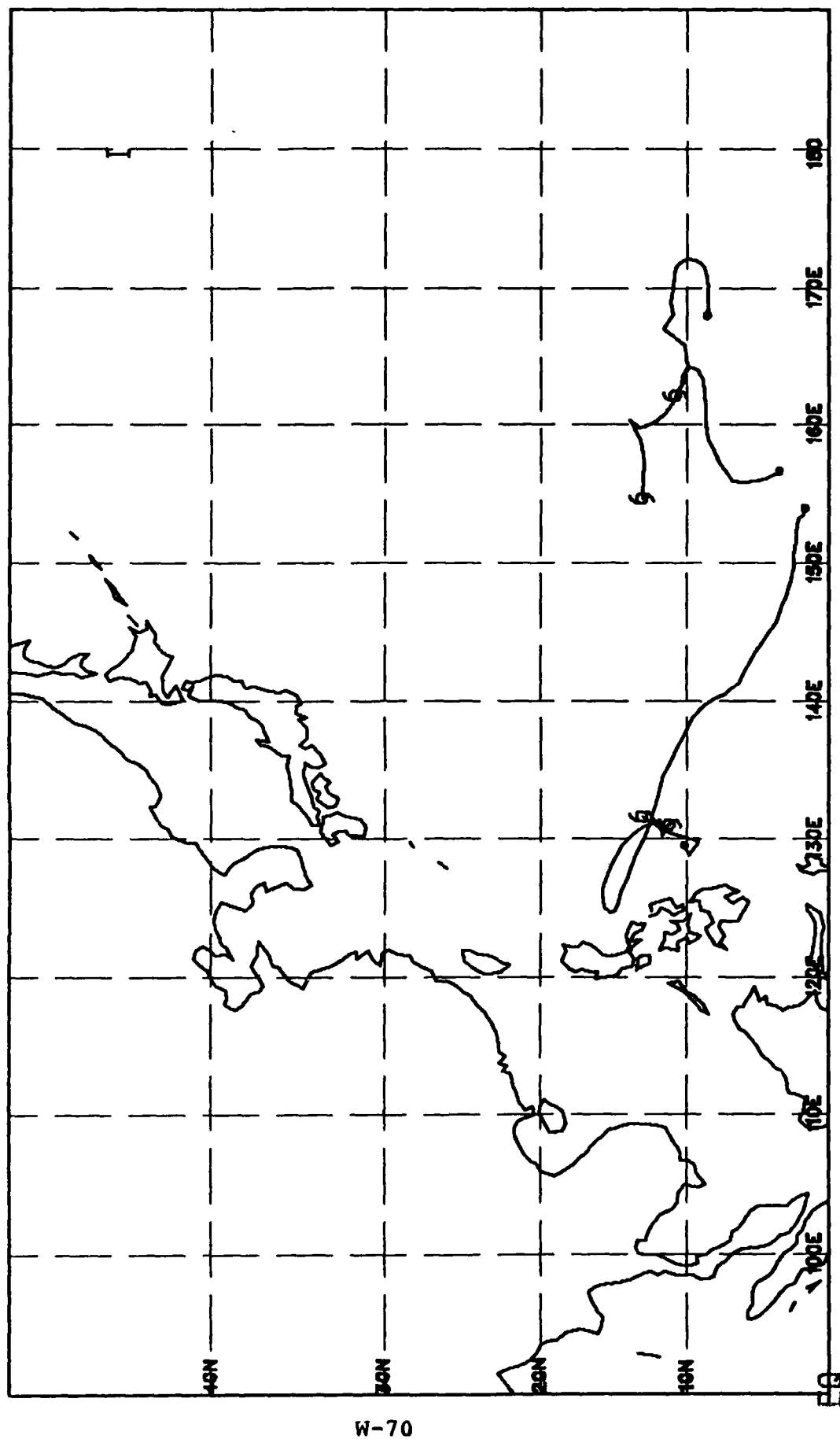
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR MAR 9 - MAR 23



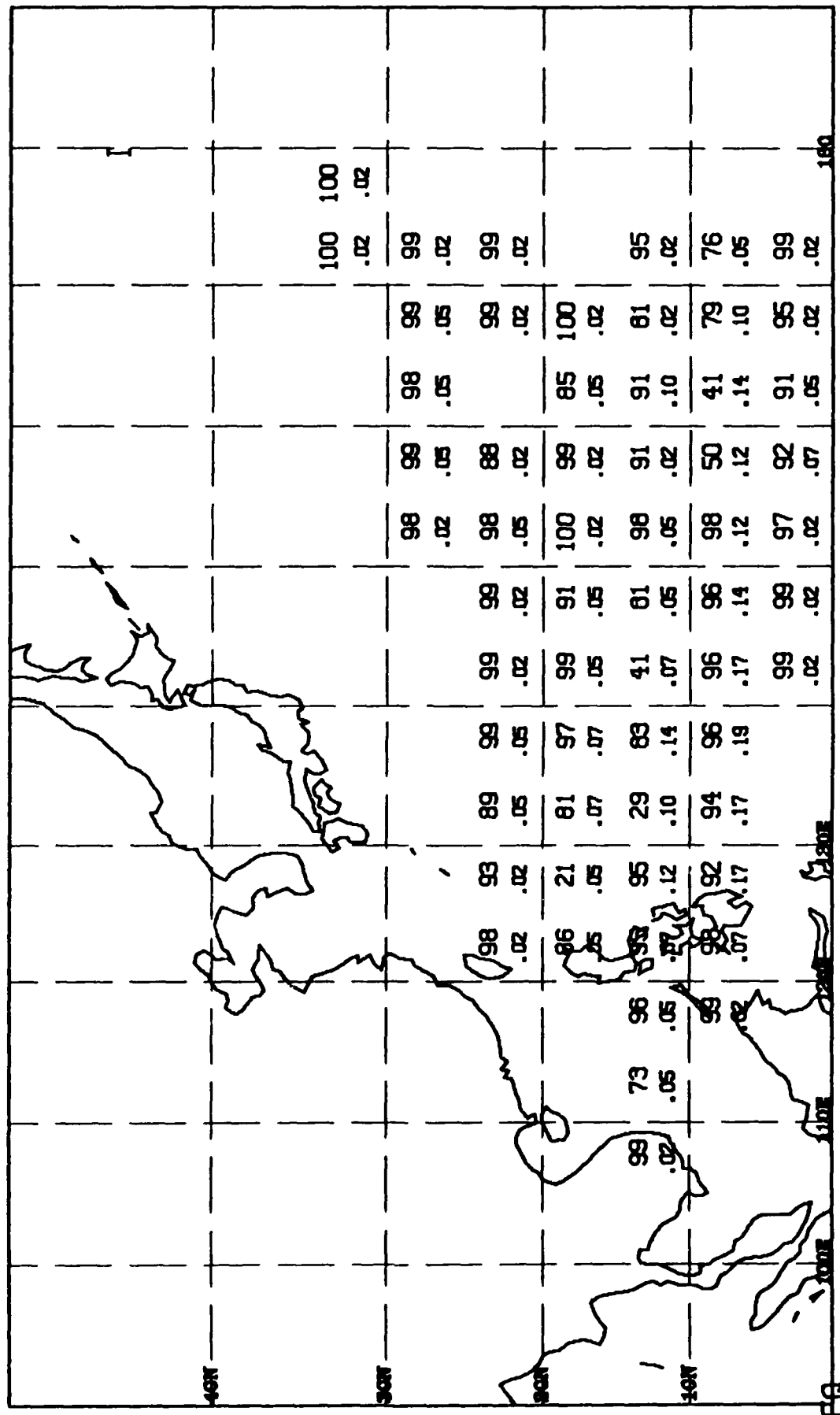
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR MAR 9 - MAR 23



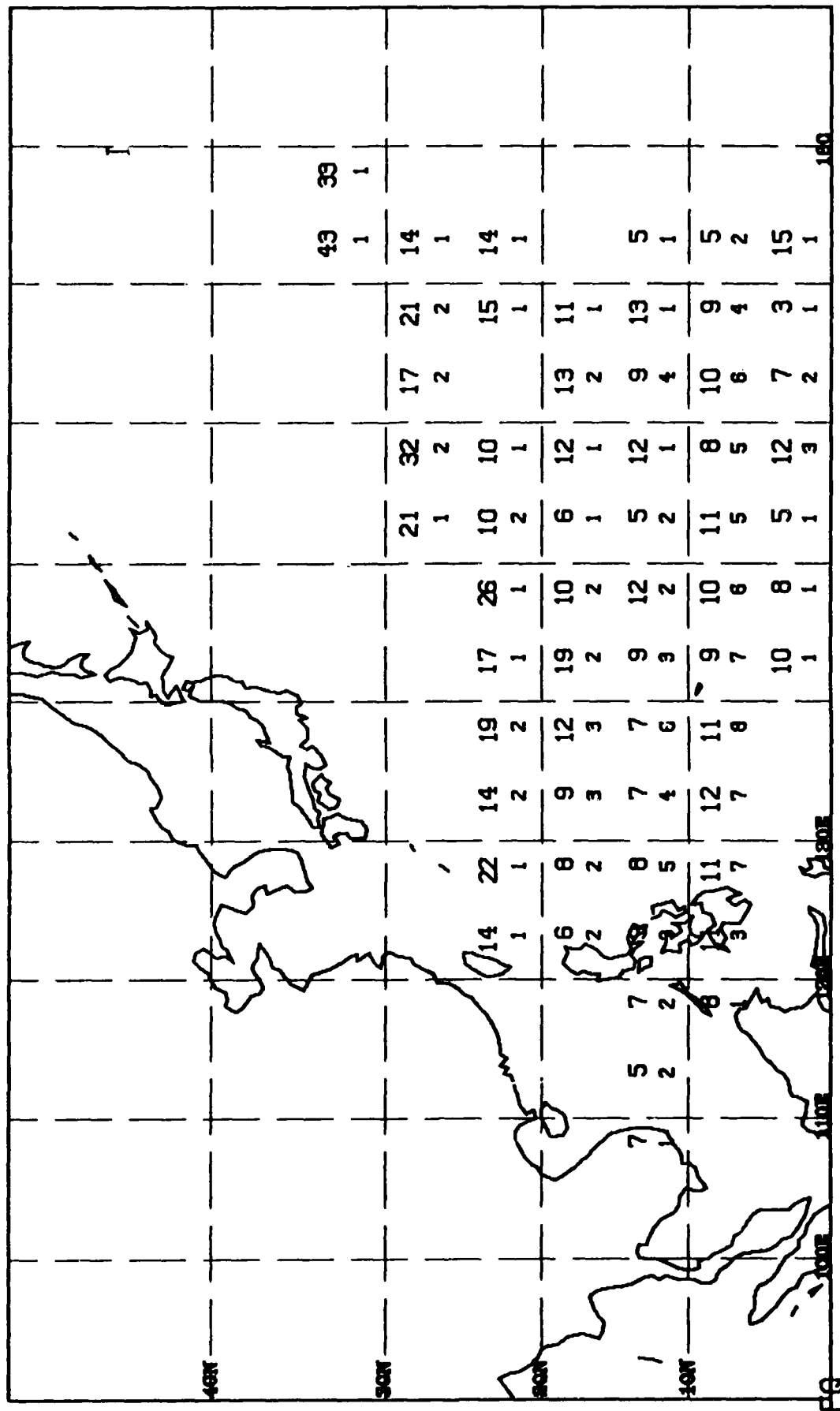
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR MAR 9 - MAR 23



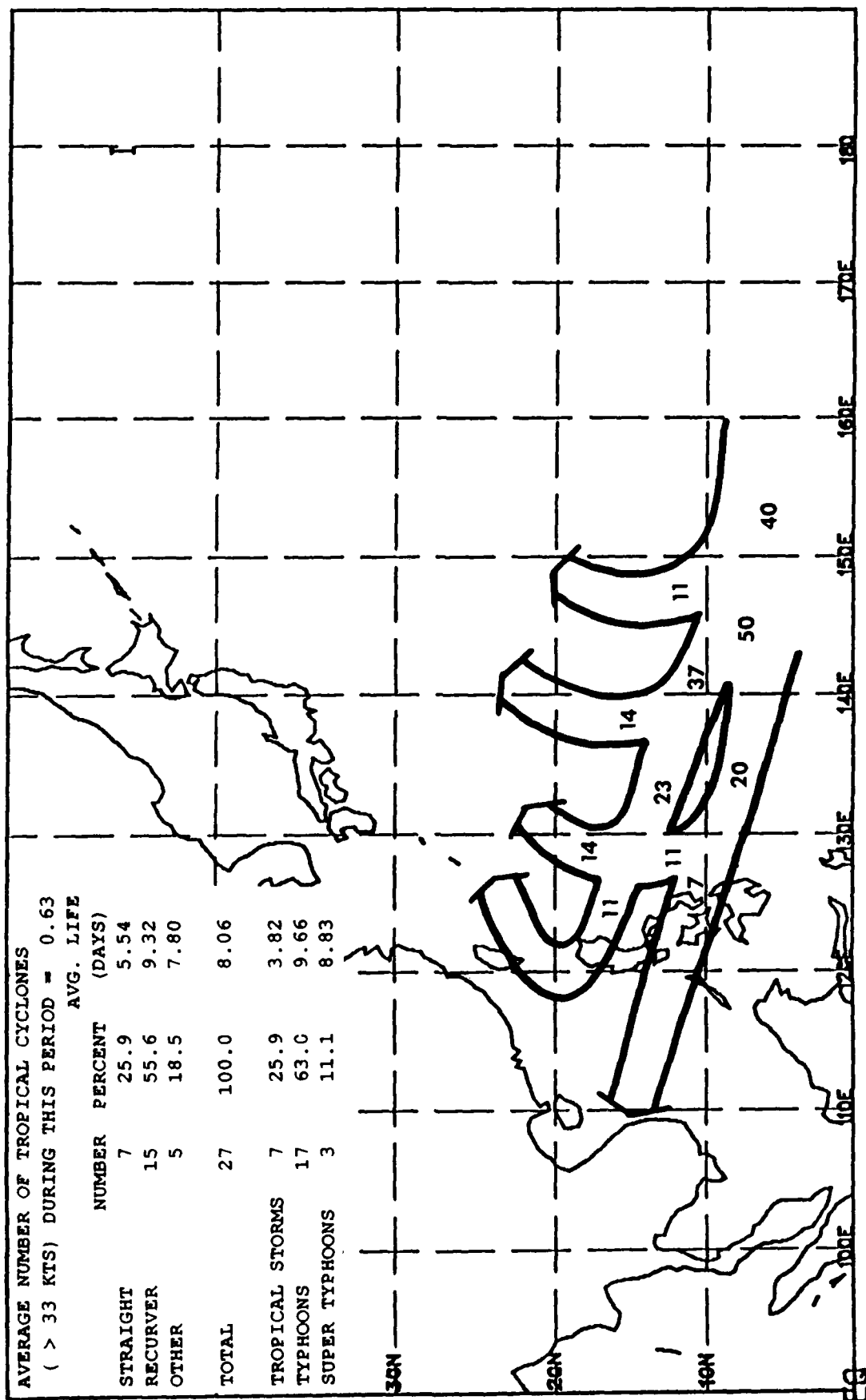
Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number).
 Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed.
 Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year per time period.

SPEED OF MOVEMENT FOR MAR 9 - MAR 23



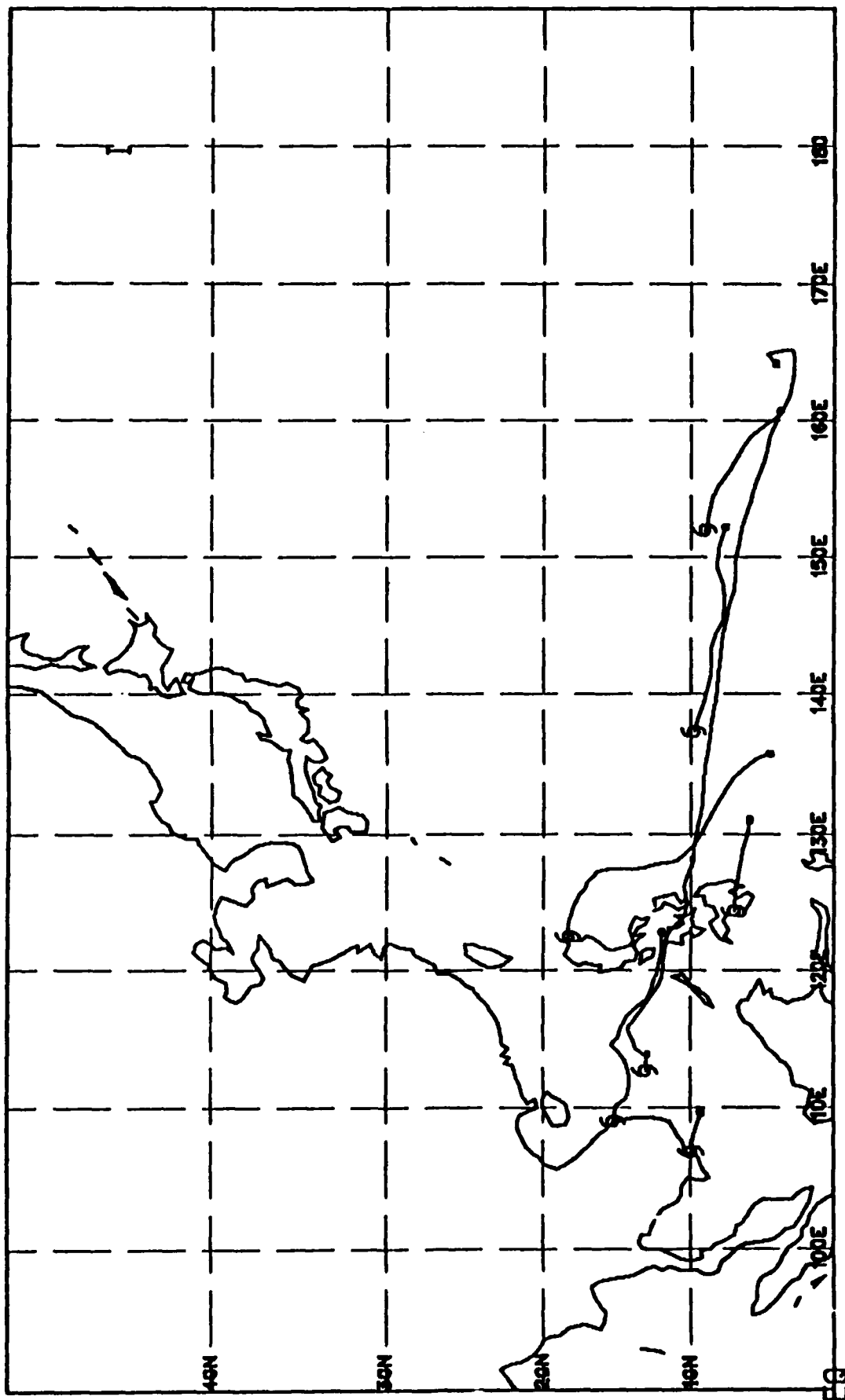
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR MAR 24 - APR 8



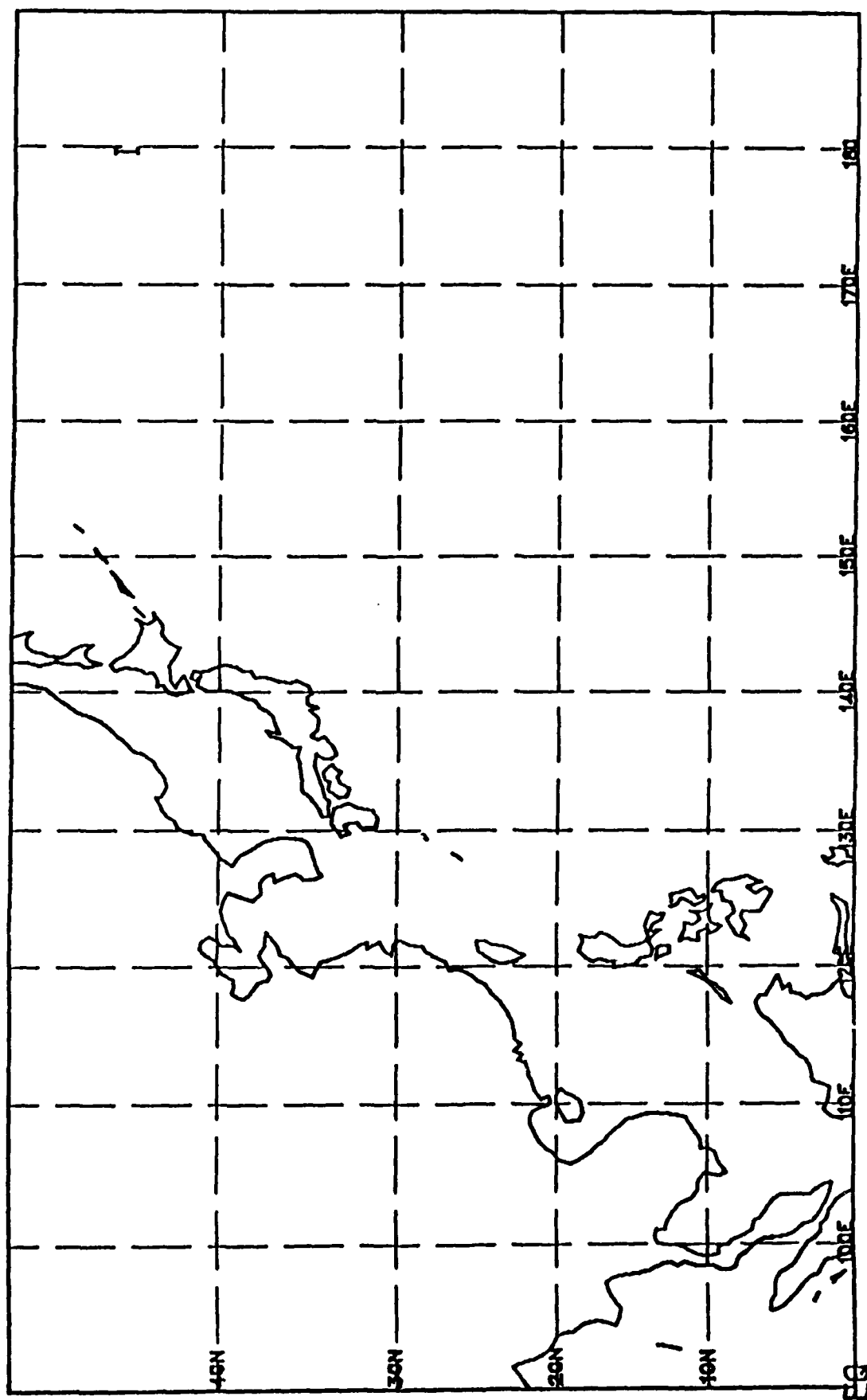
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored.

ACTUAL TRACKS FOR MAR 24 - APR 8



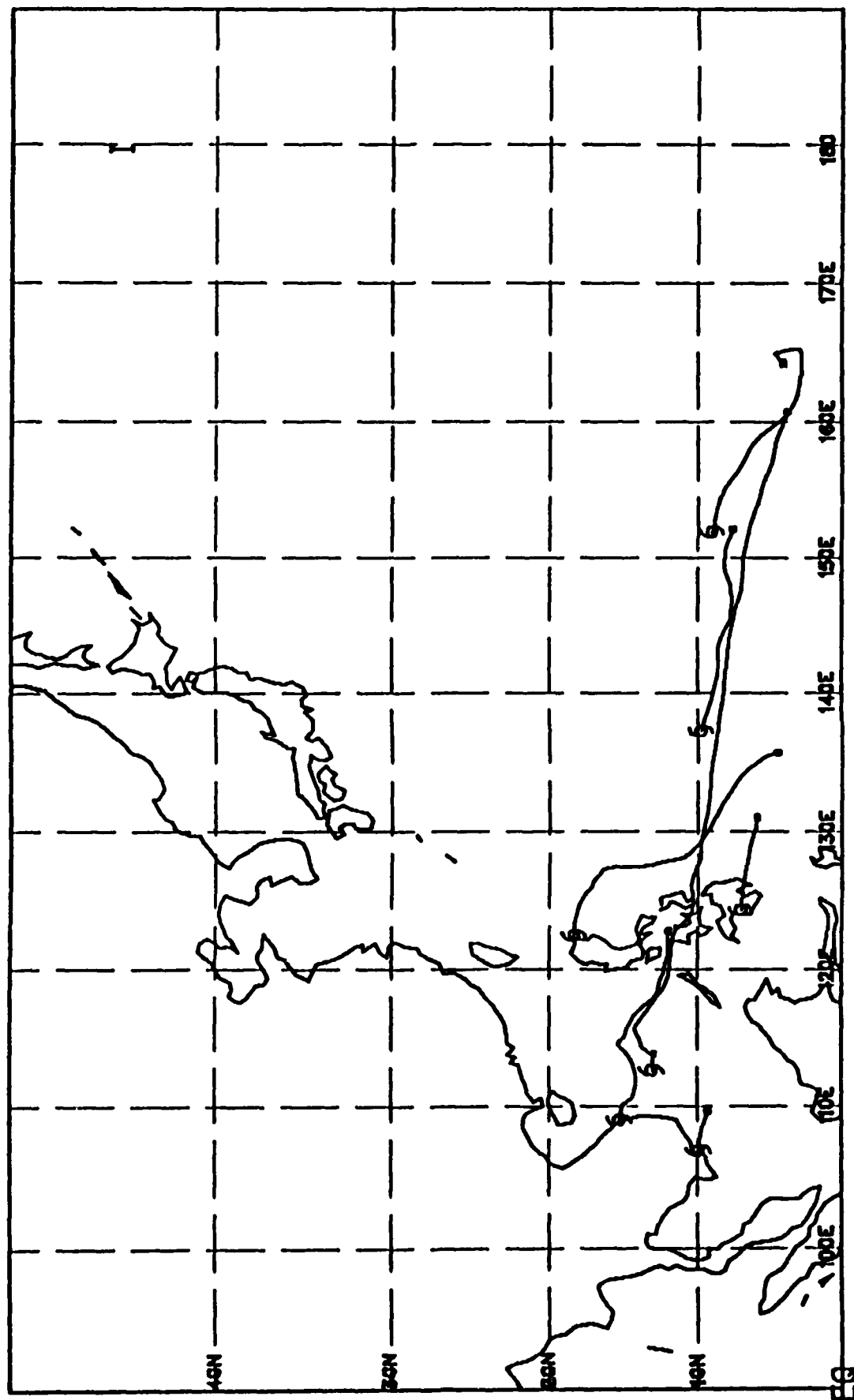
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR MAR 24 - APR 8



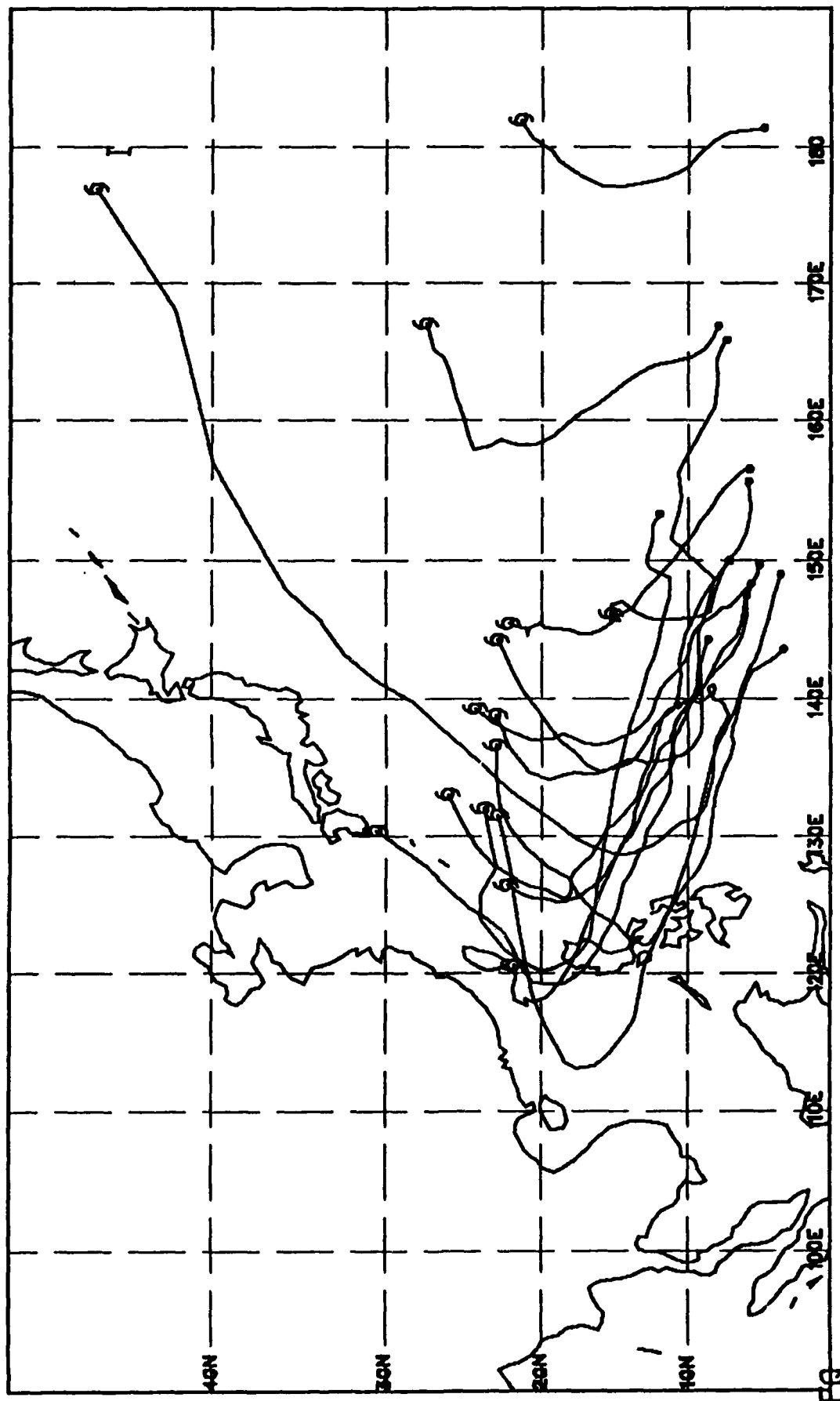
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR MAR 24 - APR 8



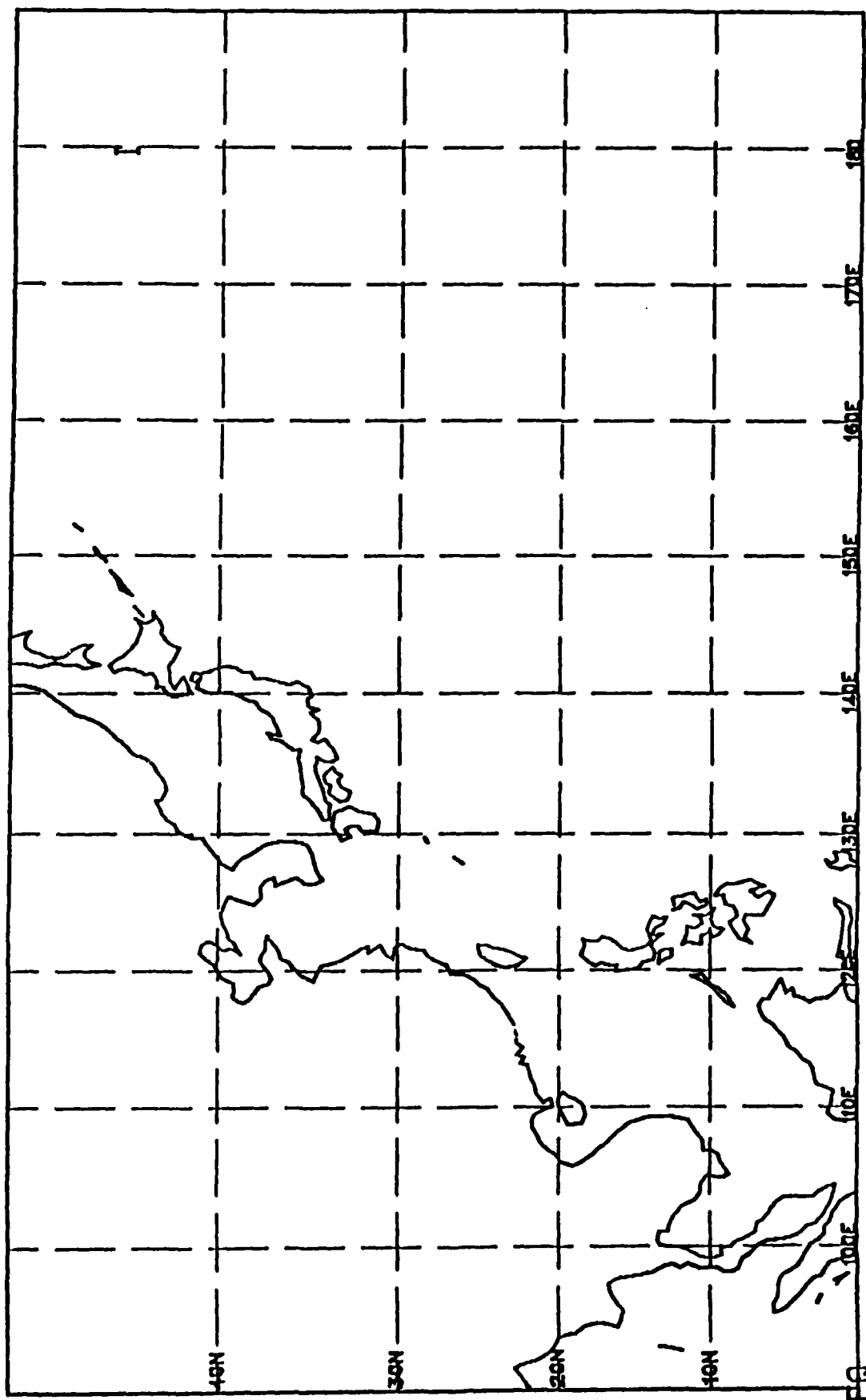
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR MAR 24 - APR 8



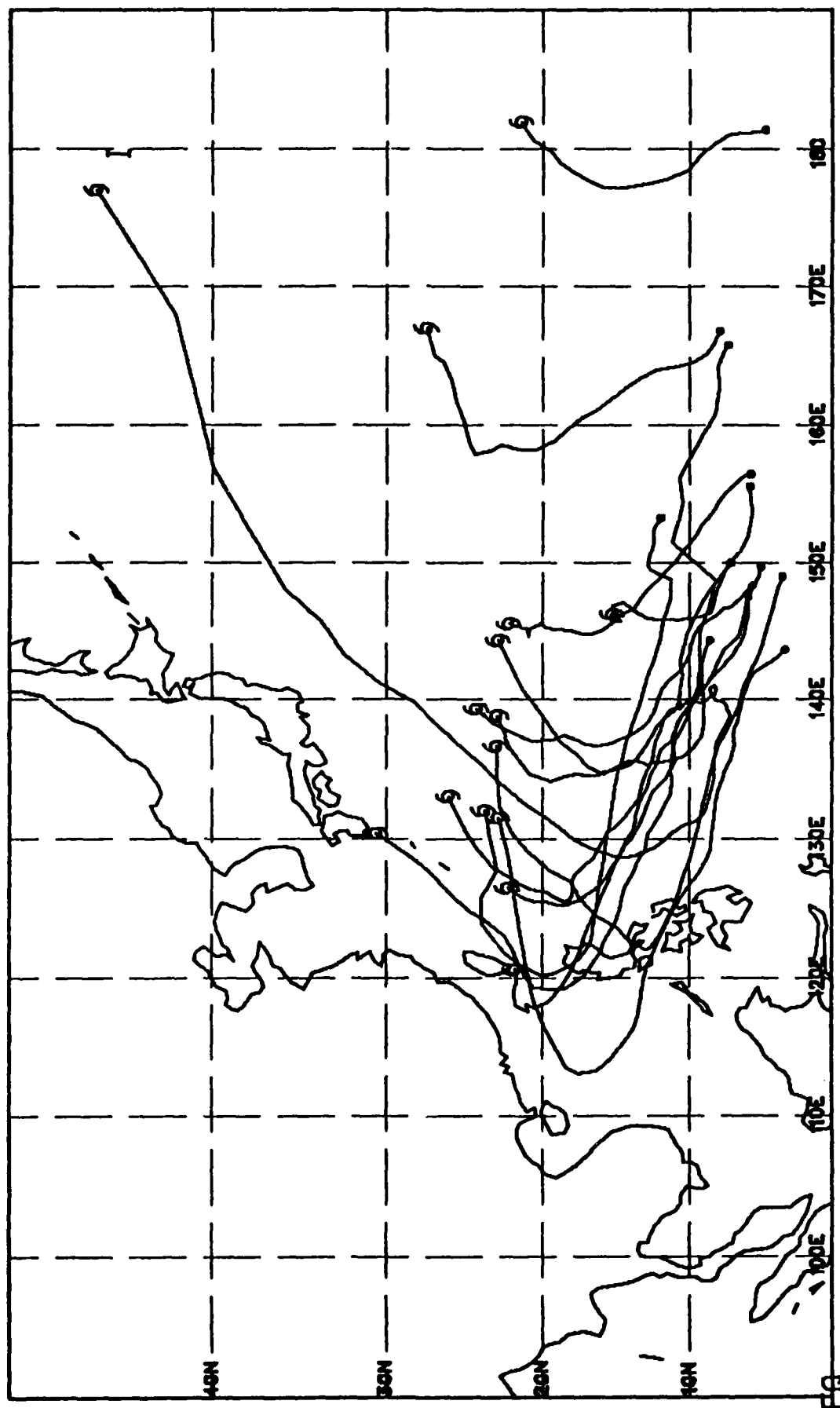
Actual path of recurving tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR MAR 24 - APR 8



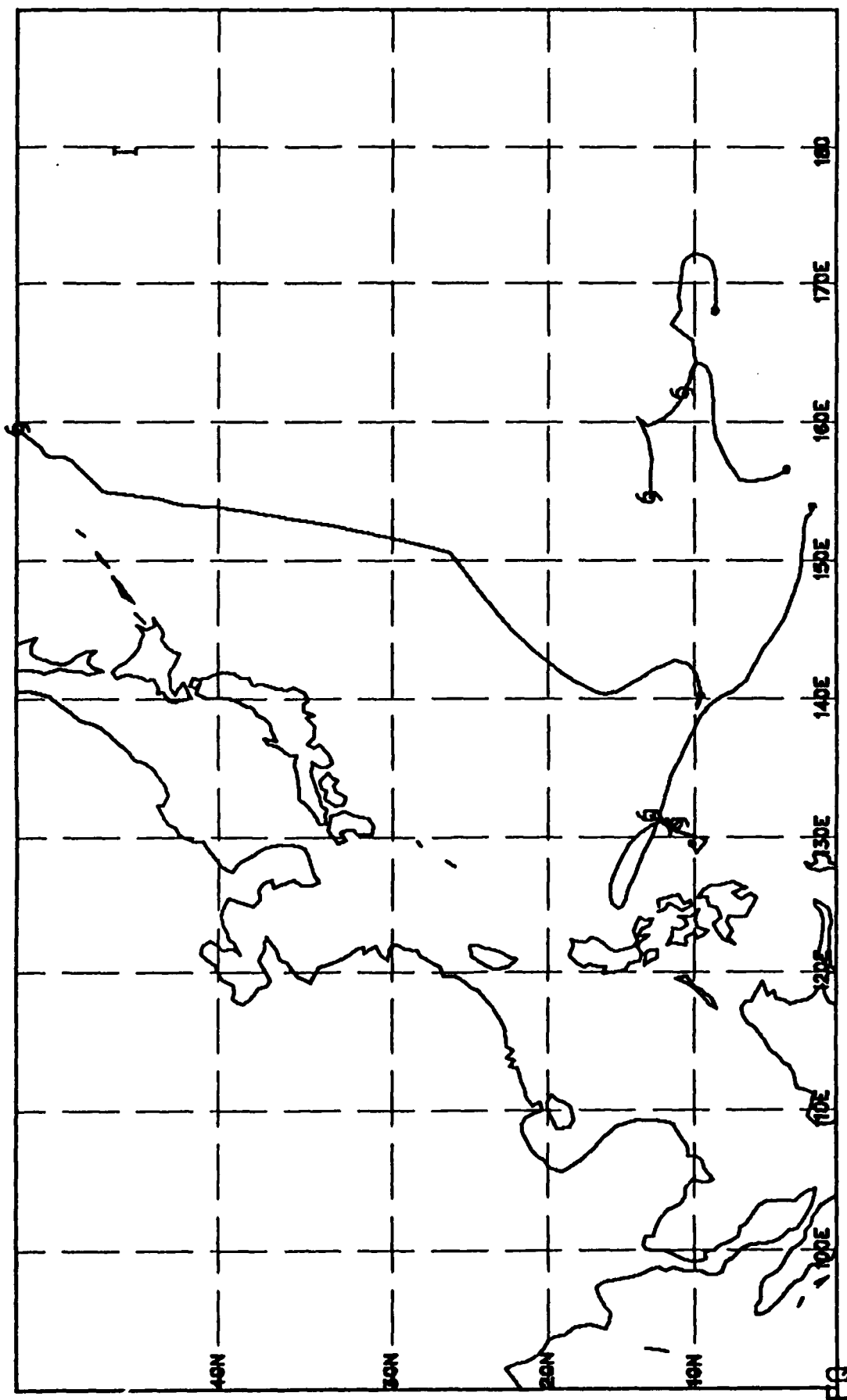
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR MAR 24 - APR 8



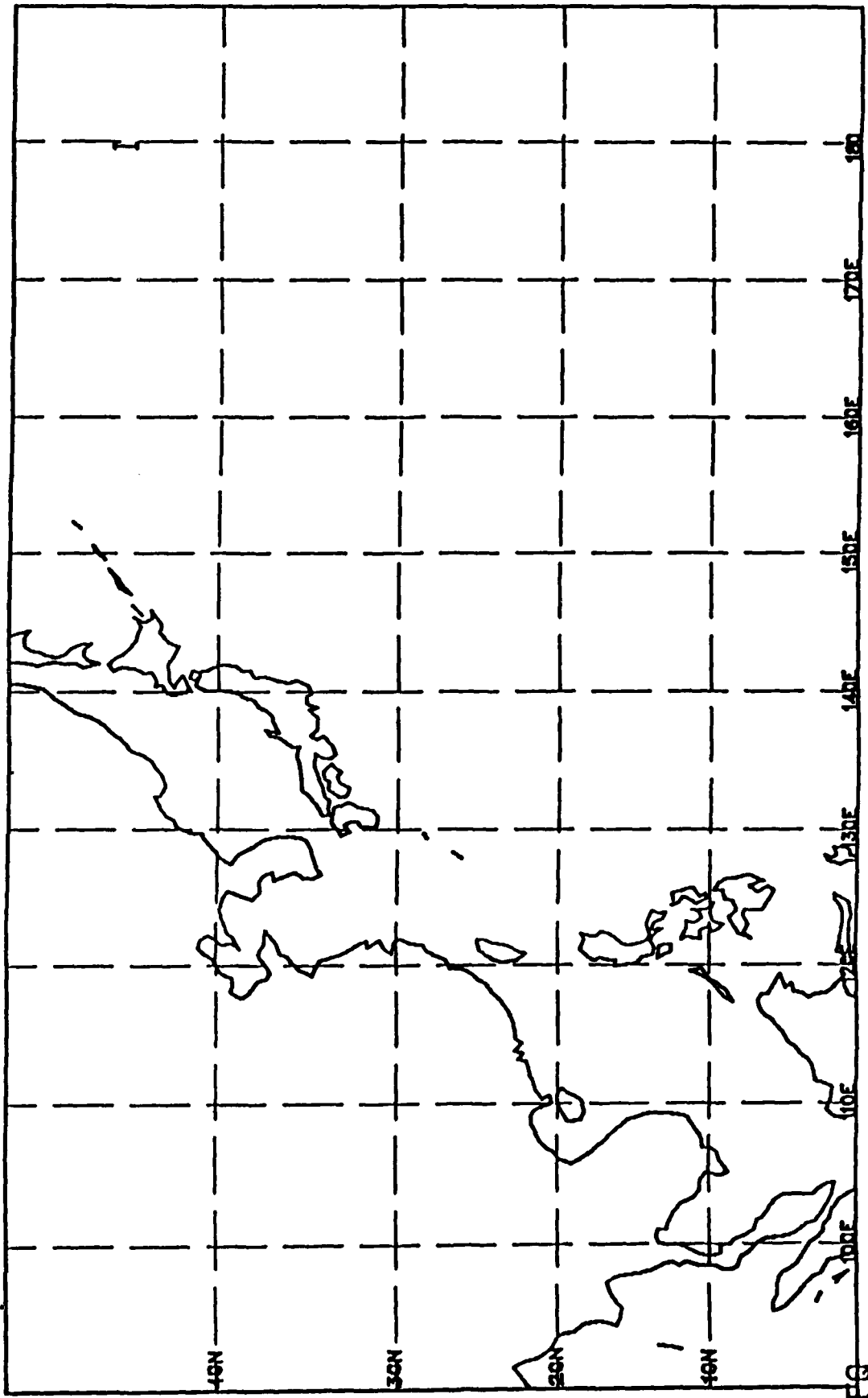
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR MAR 24 - APR 8



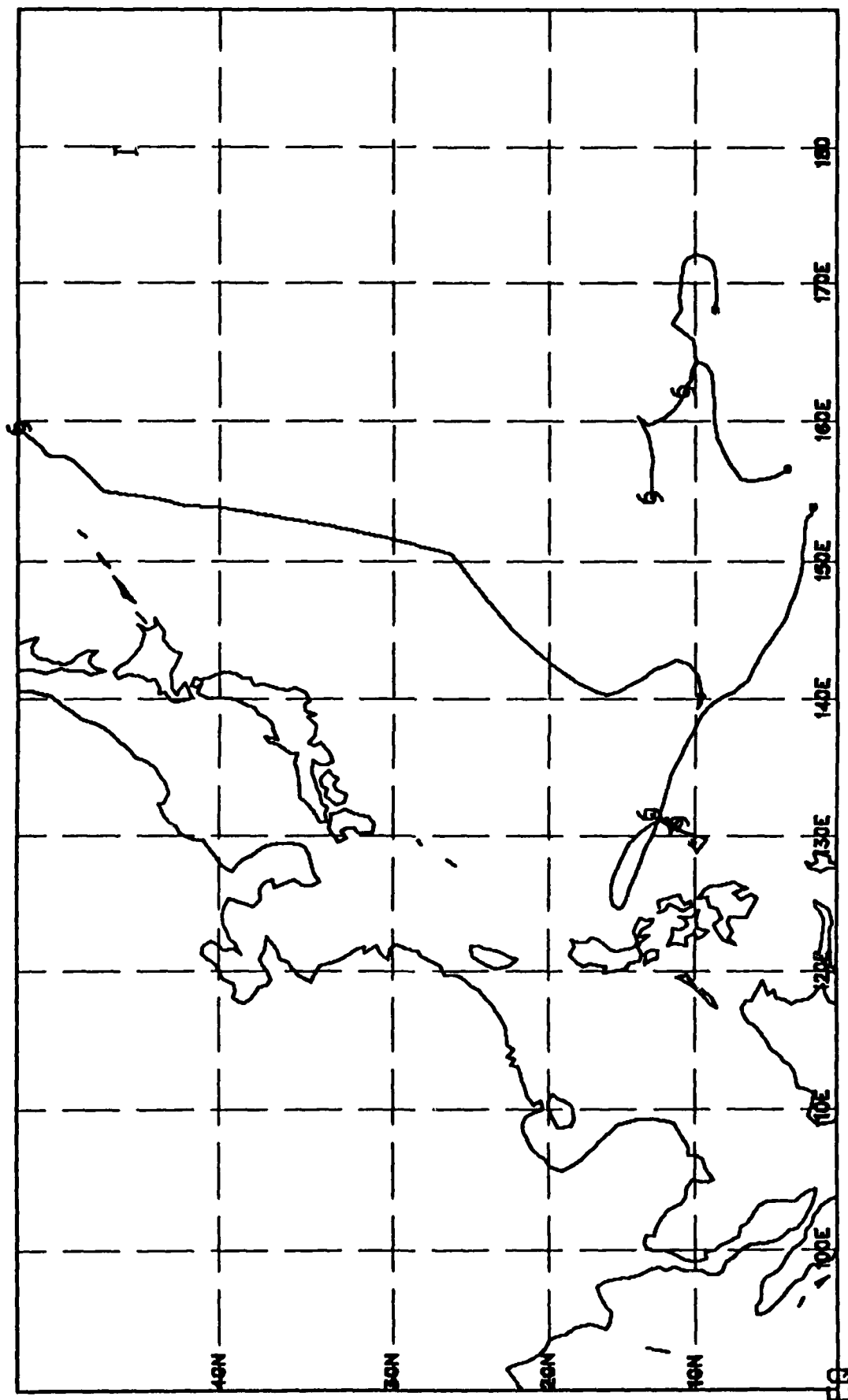
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR MAR 24 - APR 8



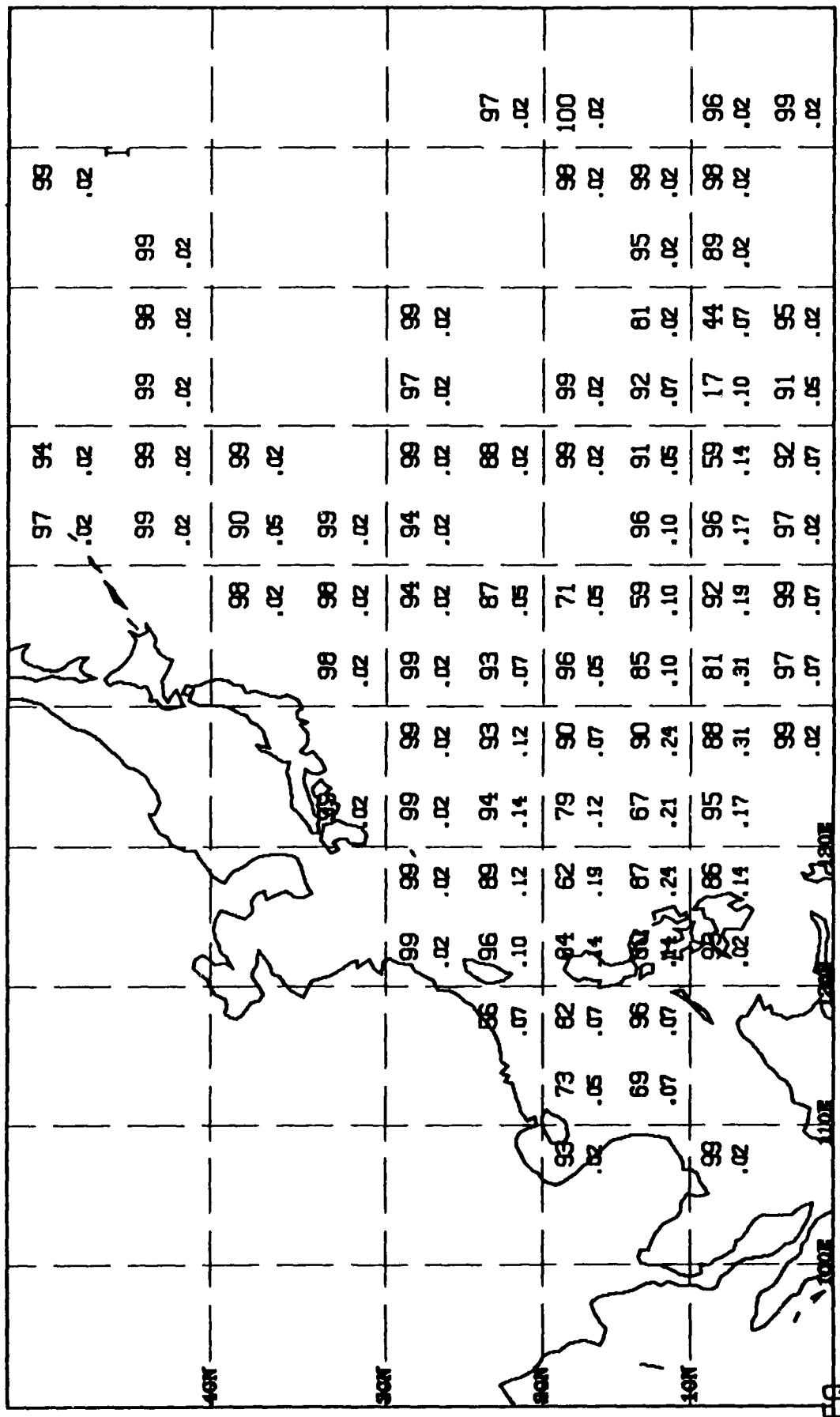
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR MAR 24 - APR 8



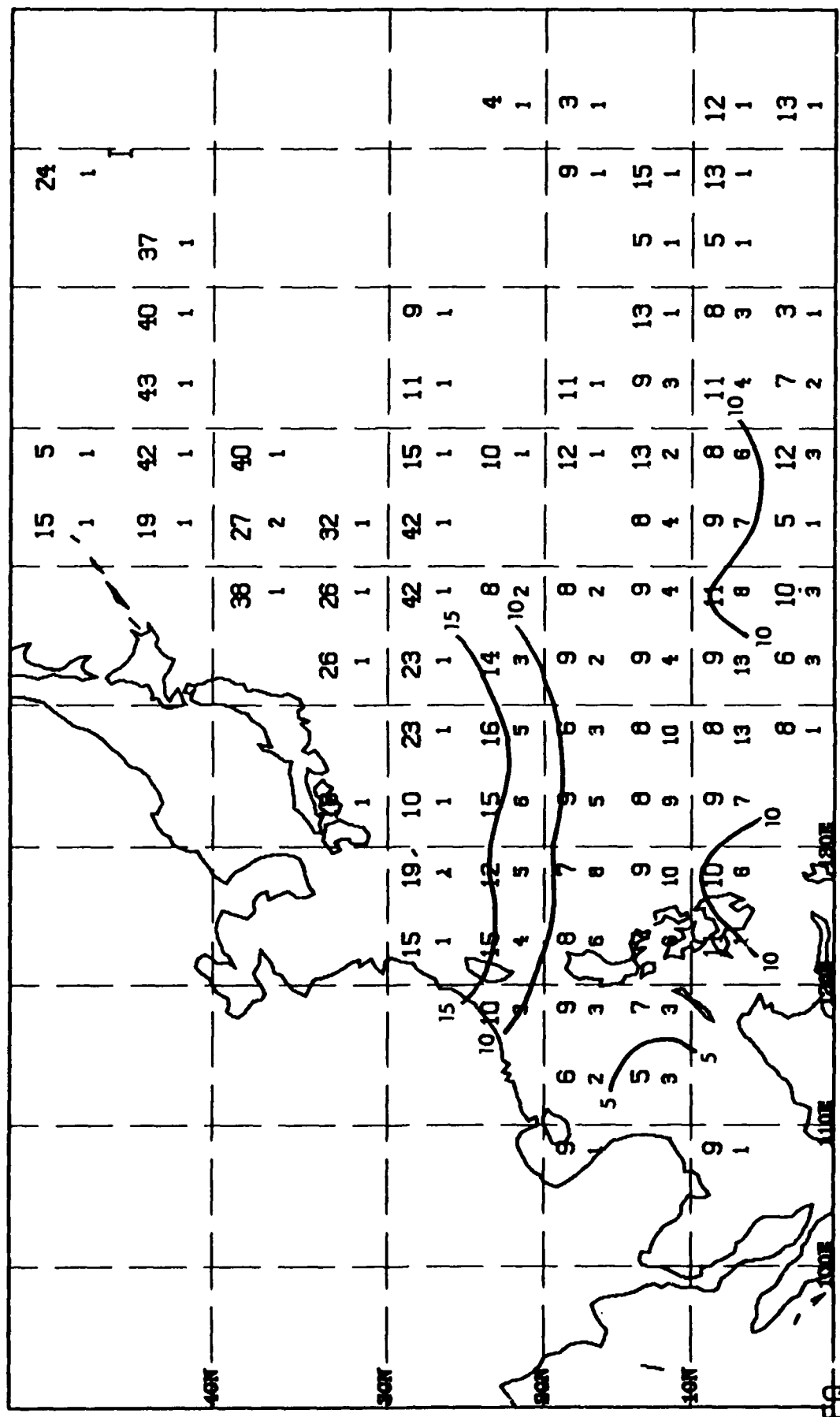
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR MAR 24 - APR 8



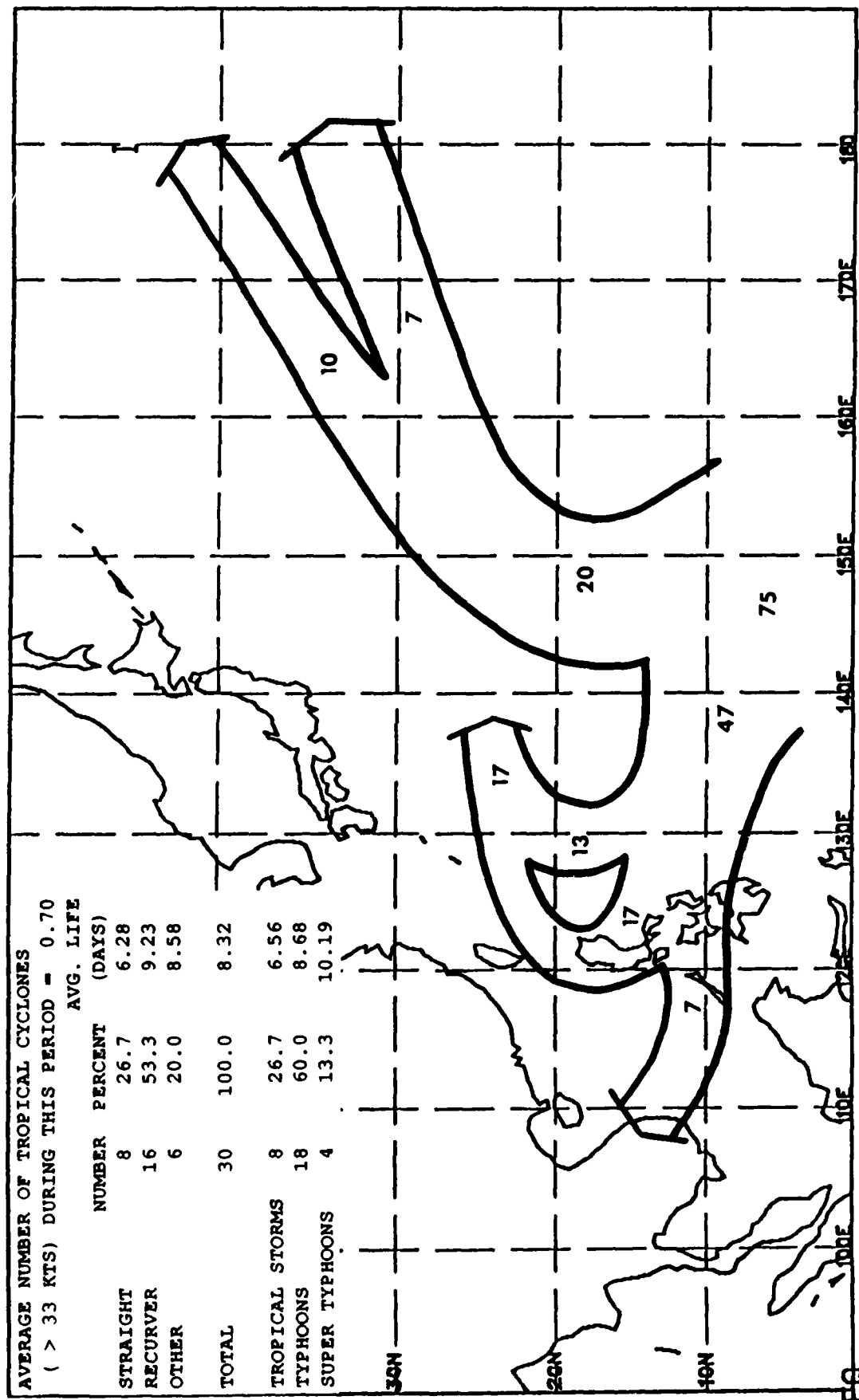
Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number).
 Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed.
 Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year per time period.

SPEED OF MOVEMENT FOR MAR 24 - APR 8



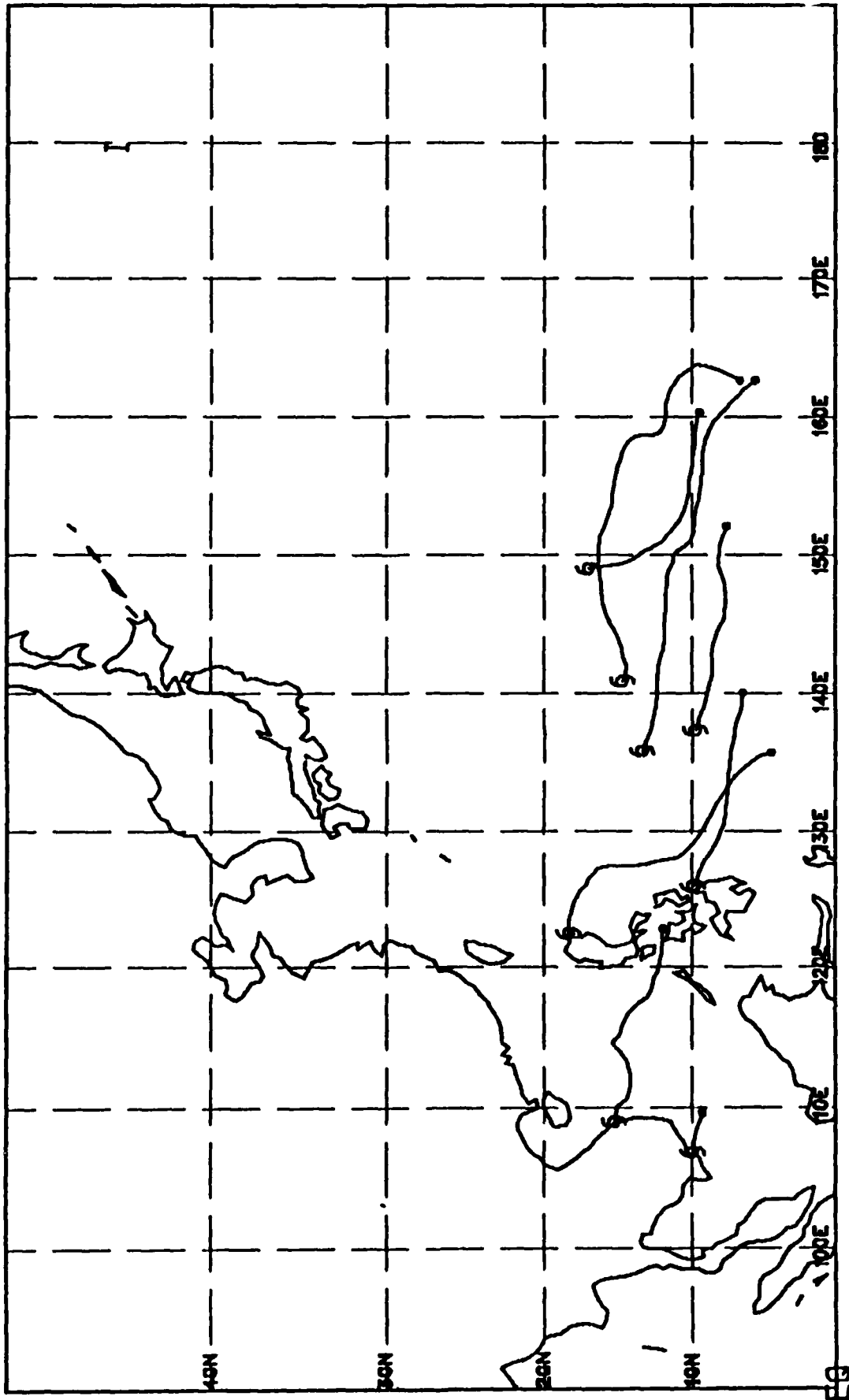
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR APR 9 - APR 23



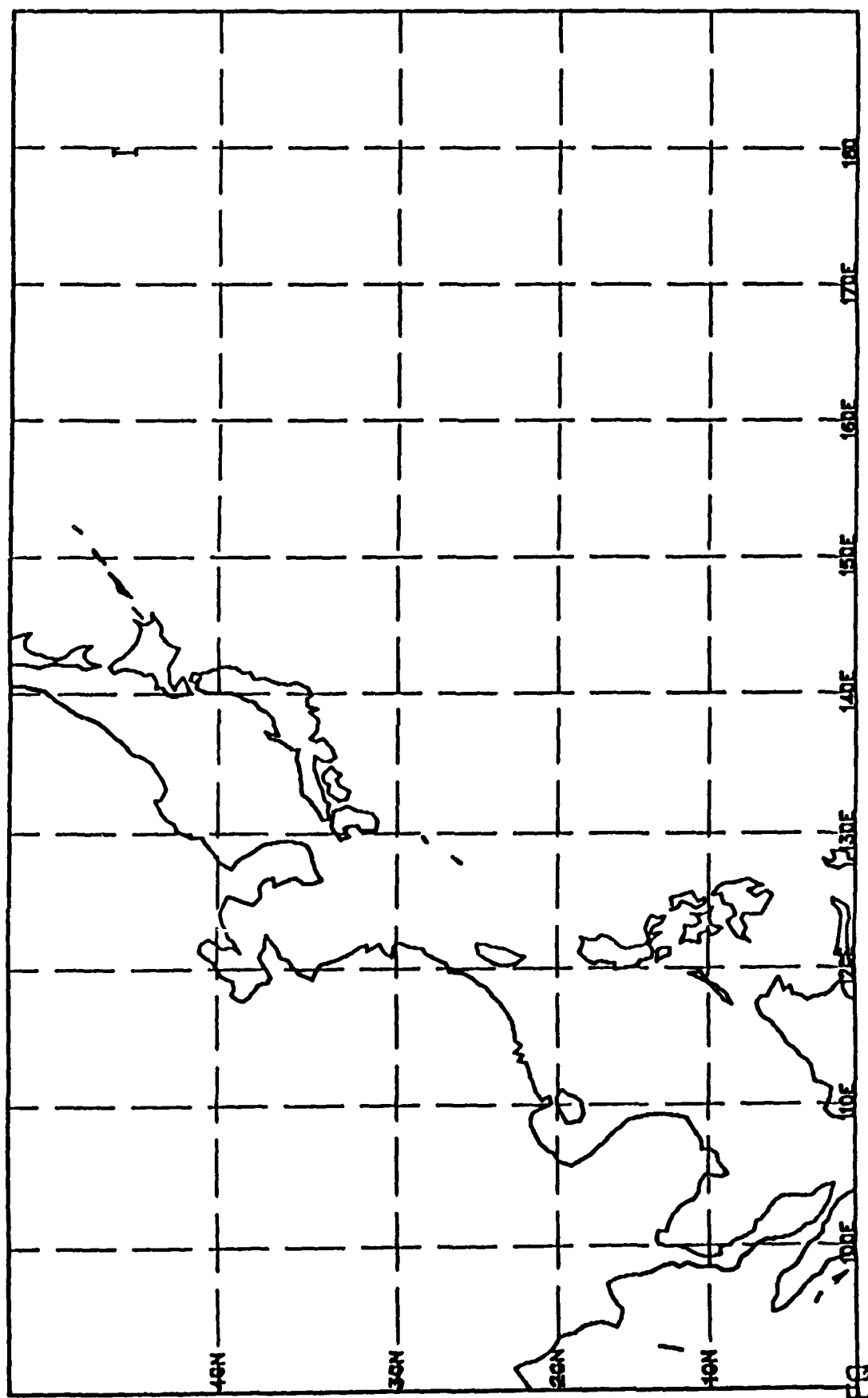
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored.

ACTUAL TRACKS FOR APR 9 - APR 23



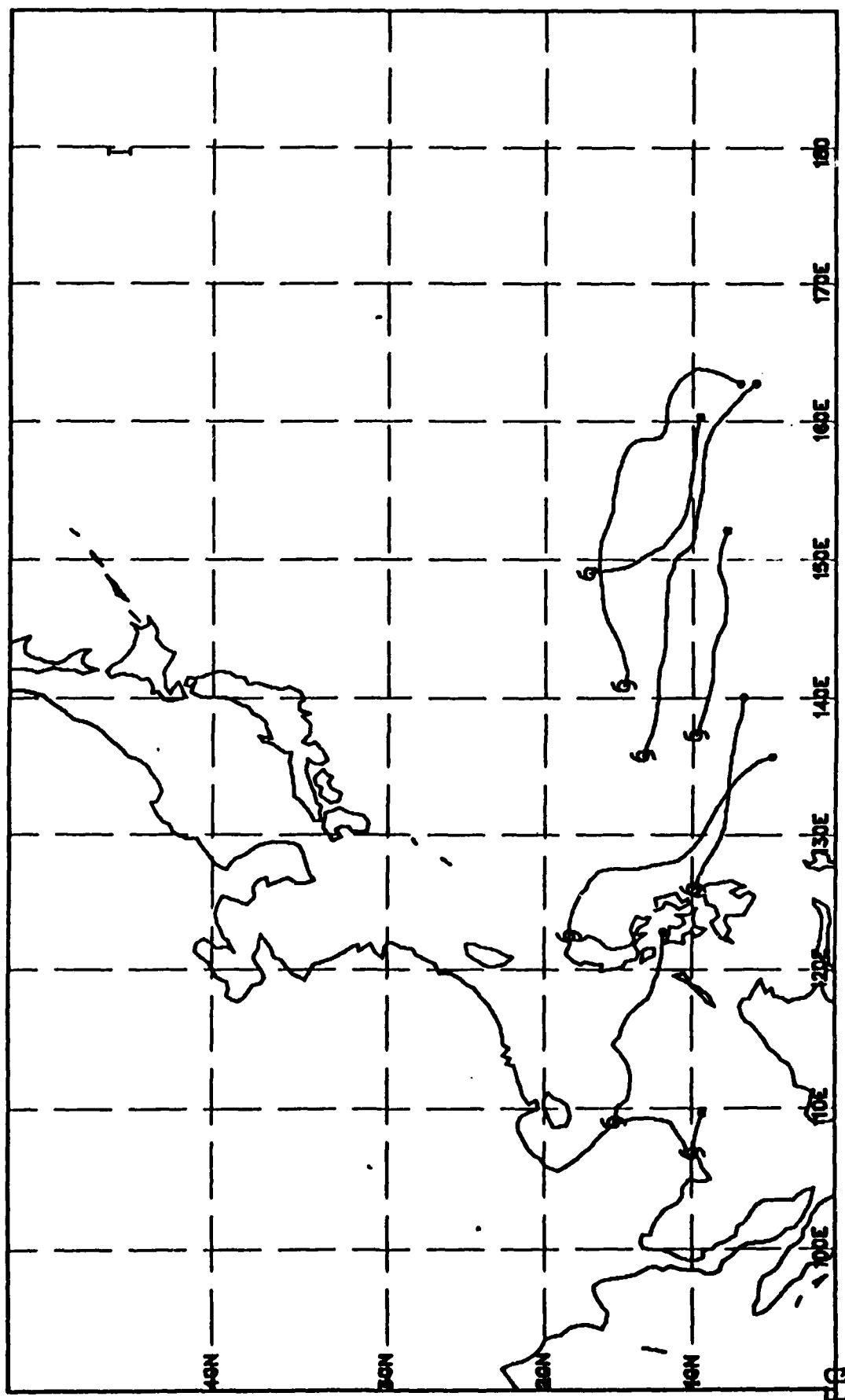
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR APR 9 - APR 23



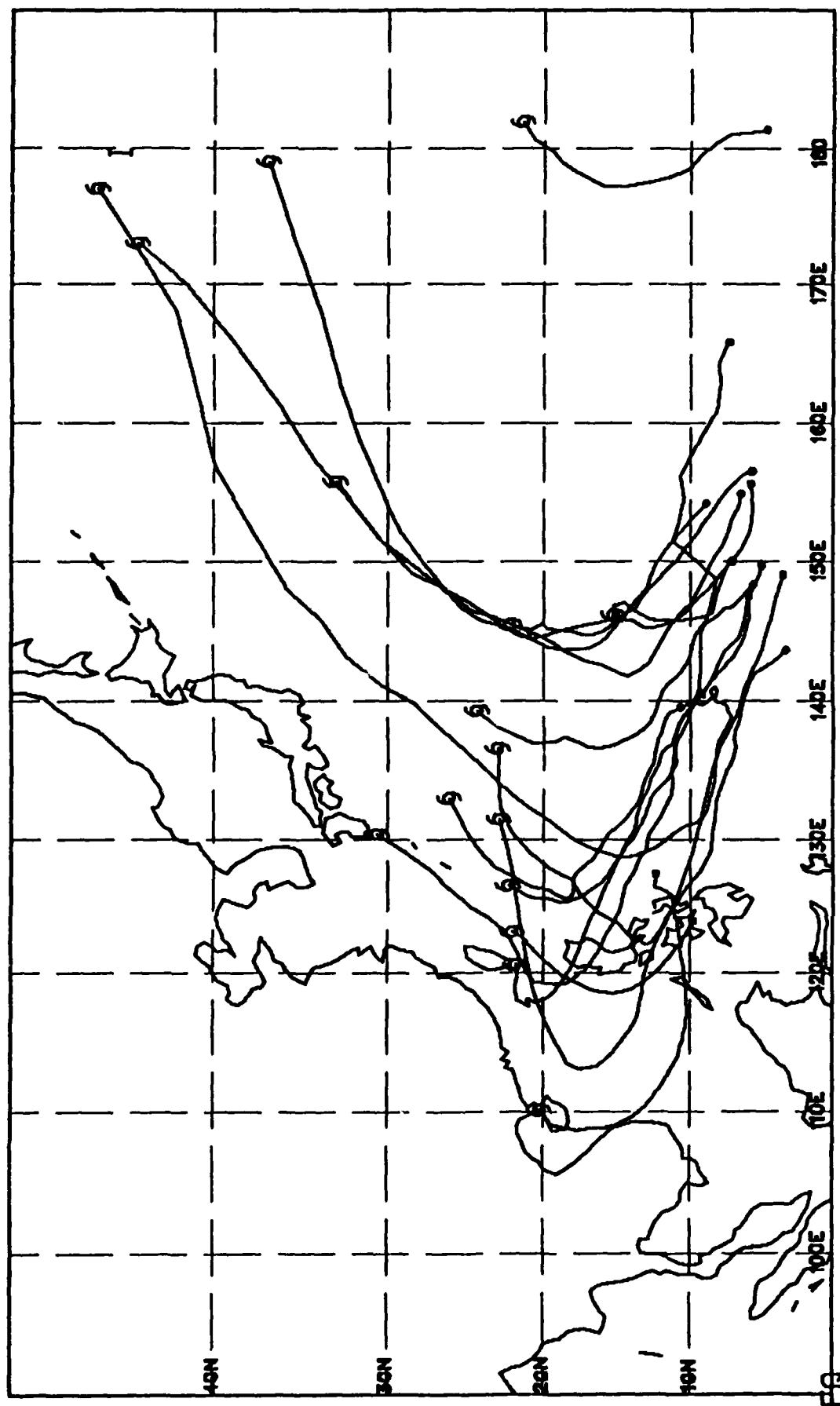
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR APR 9 - APR 23



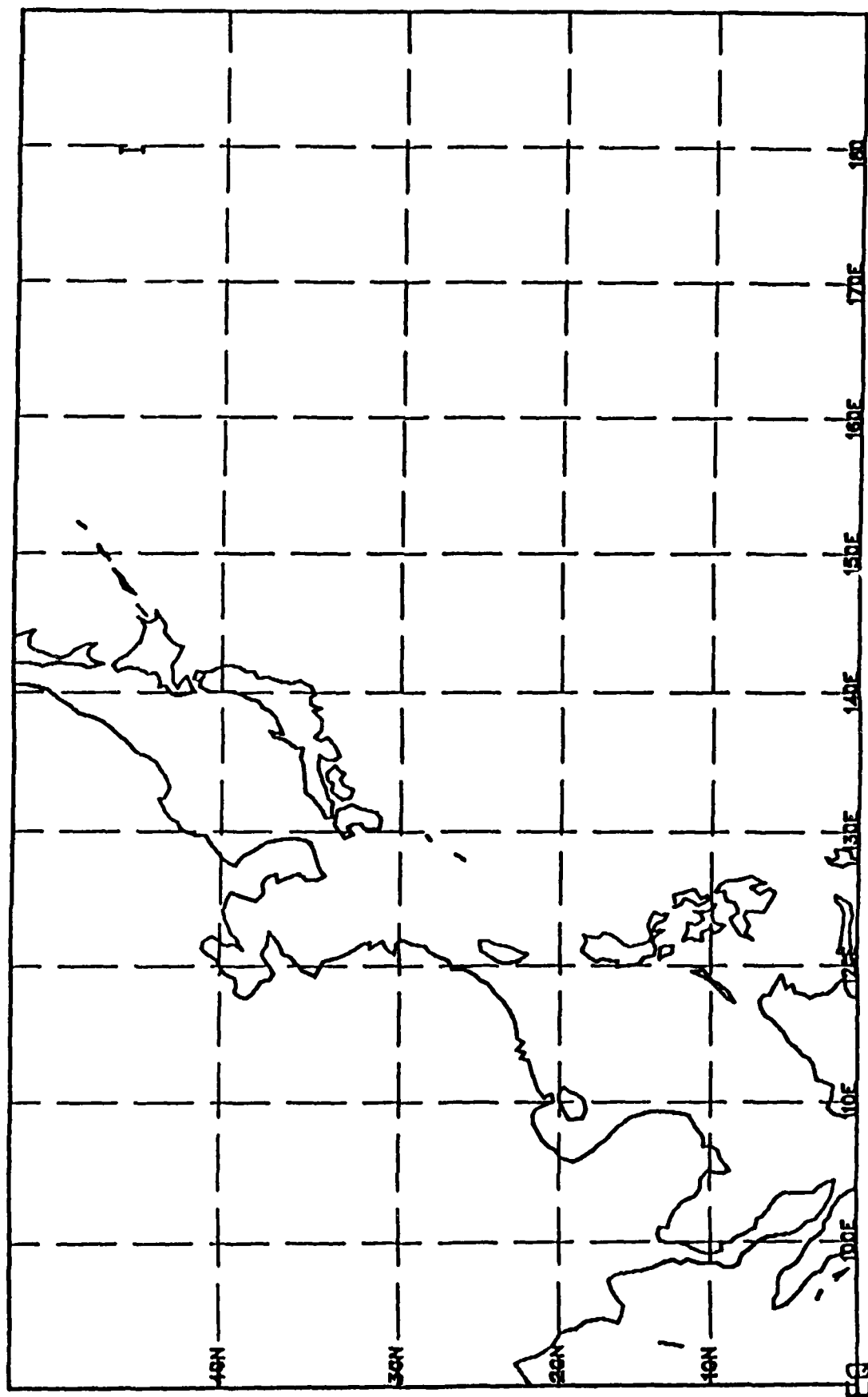
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR APR 9 - APR 23



Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

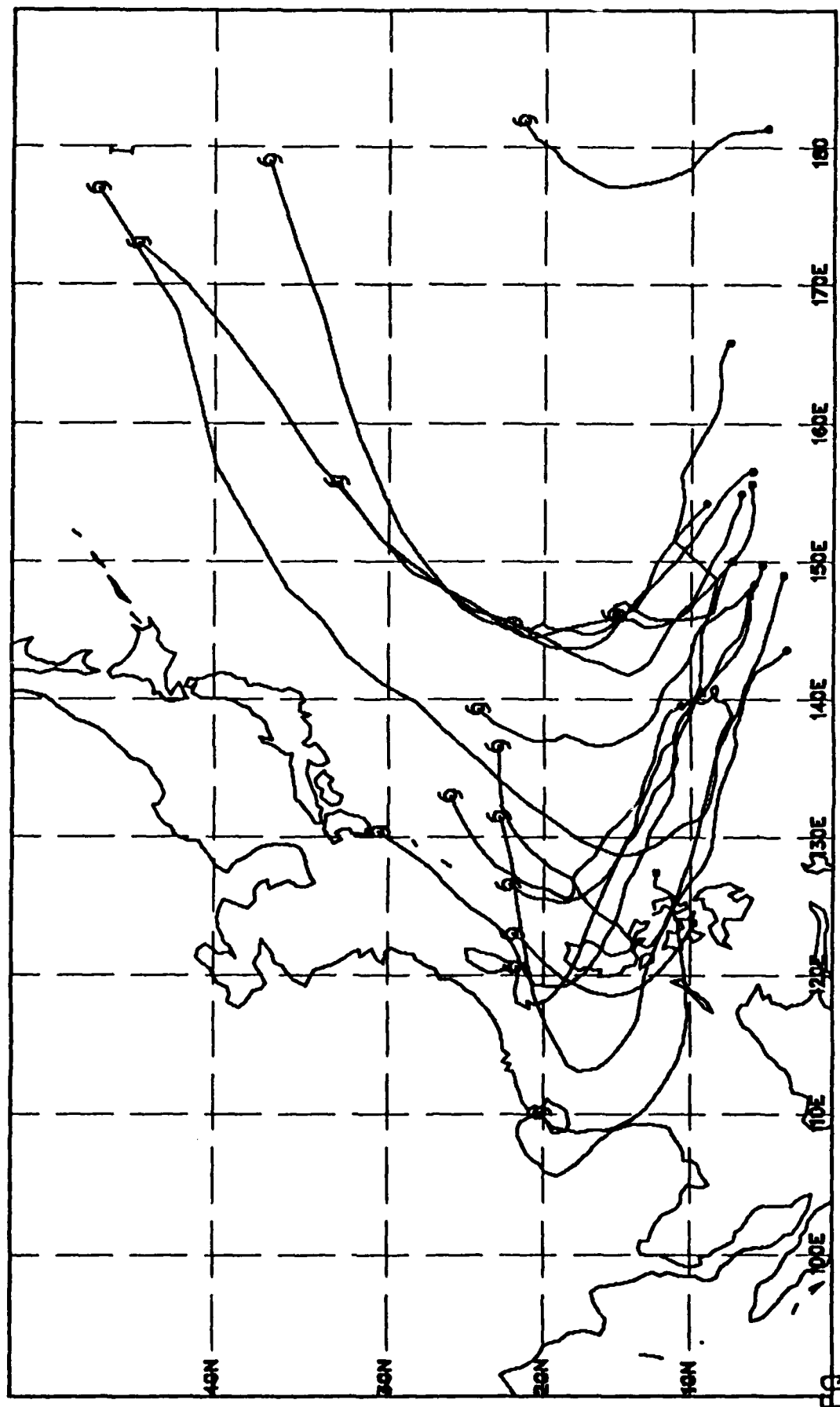
ACTUAL TRACKS FOR APR 9 - APR 23



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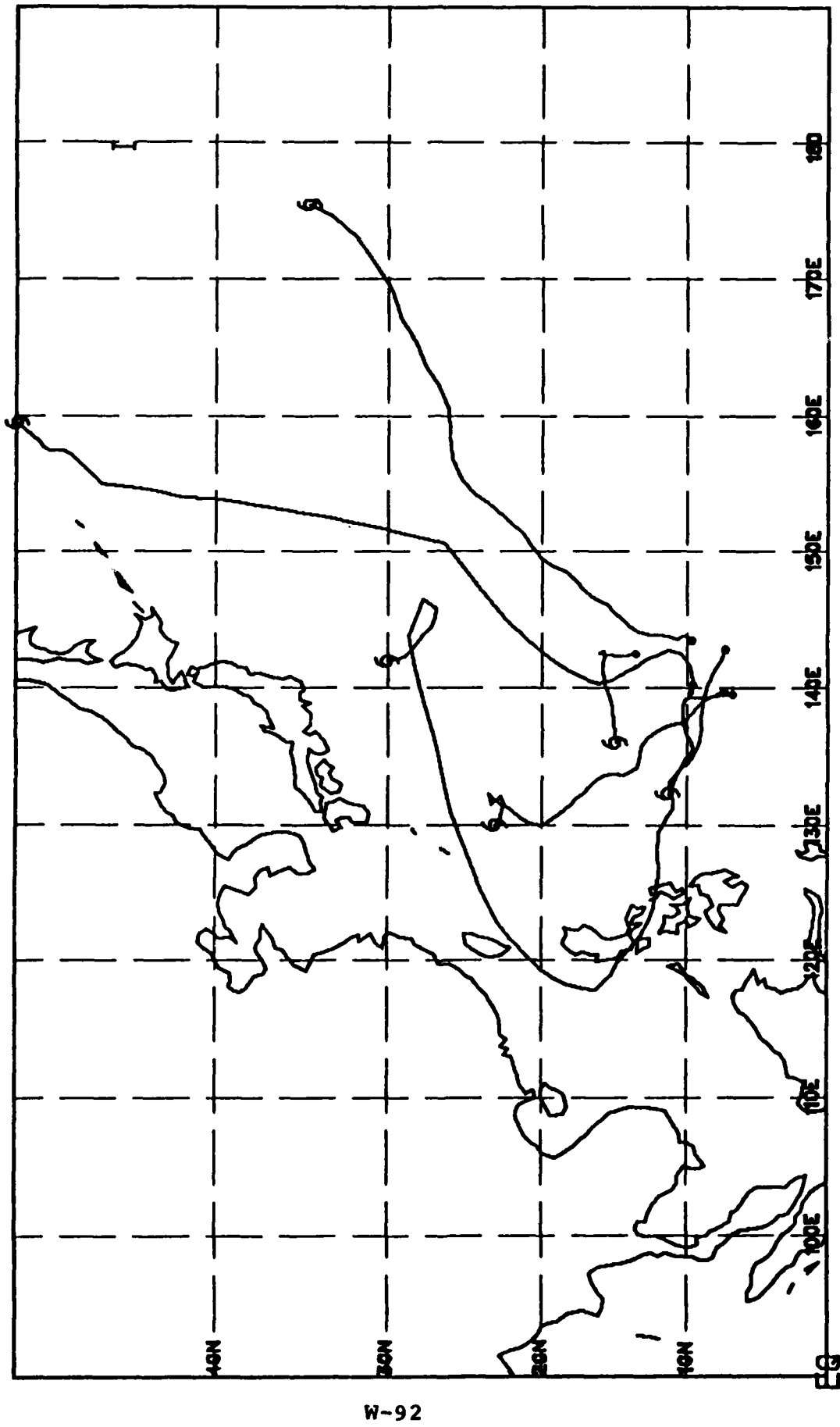
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR APR 9 - APR 23



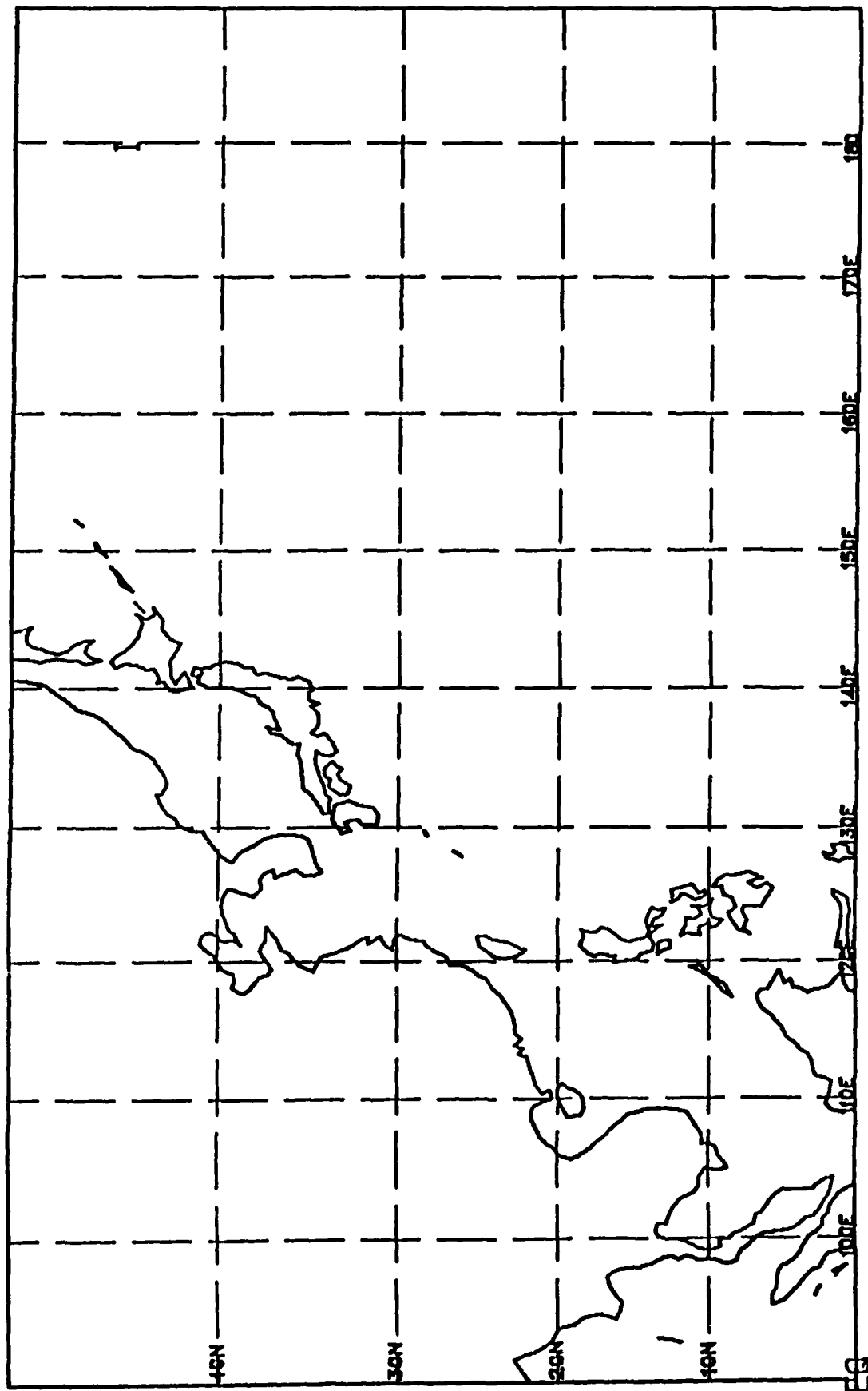
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR APR 9 - APR 23



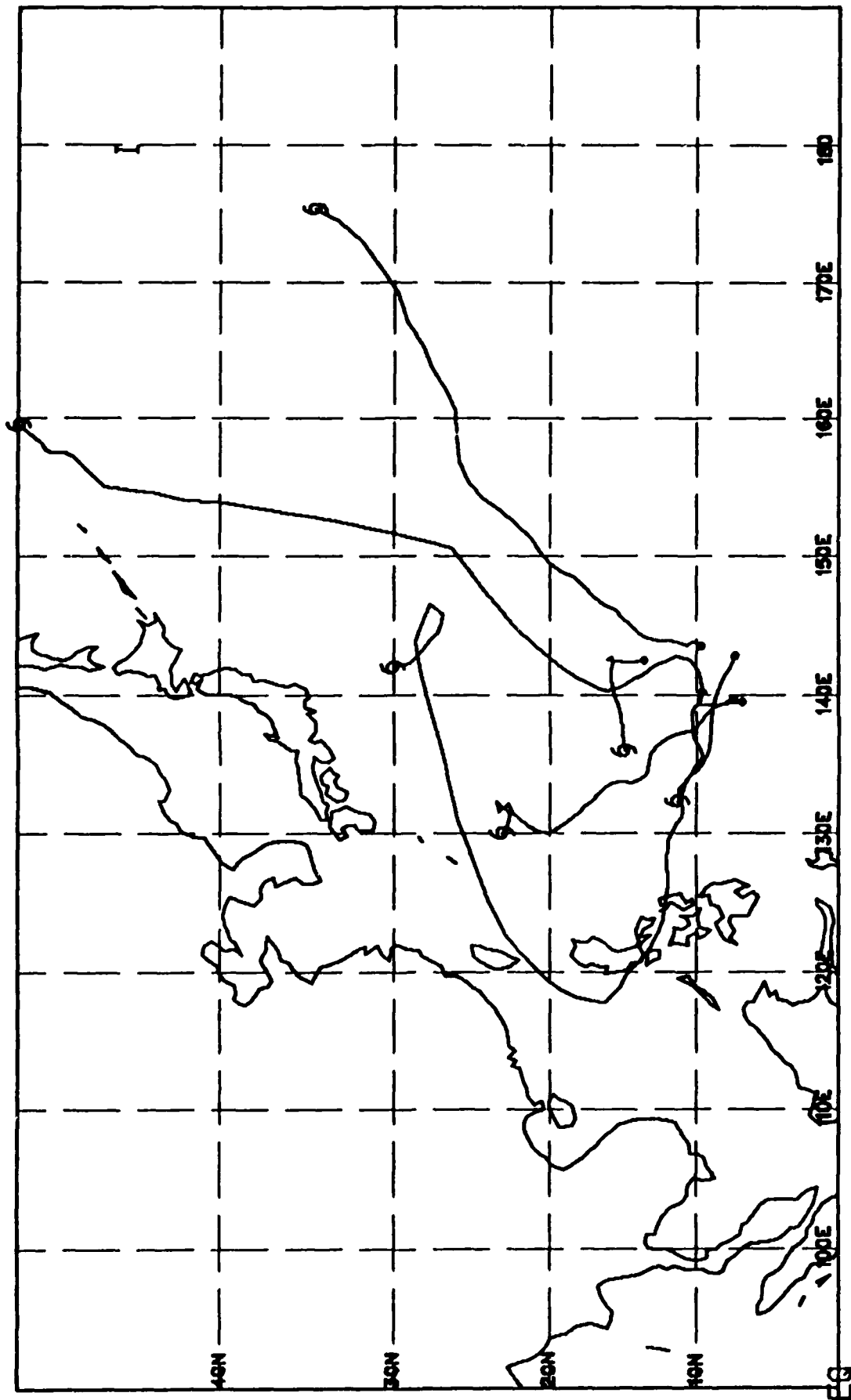
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR APR 9 - APR 23



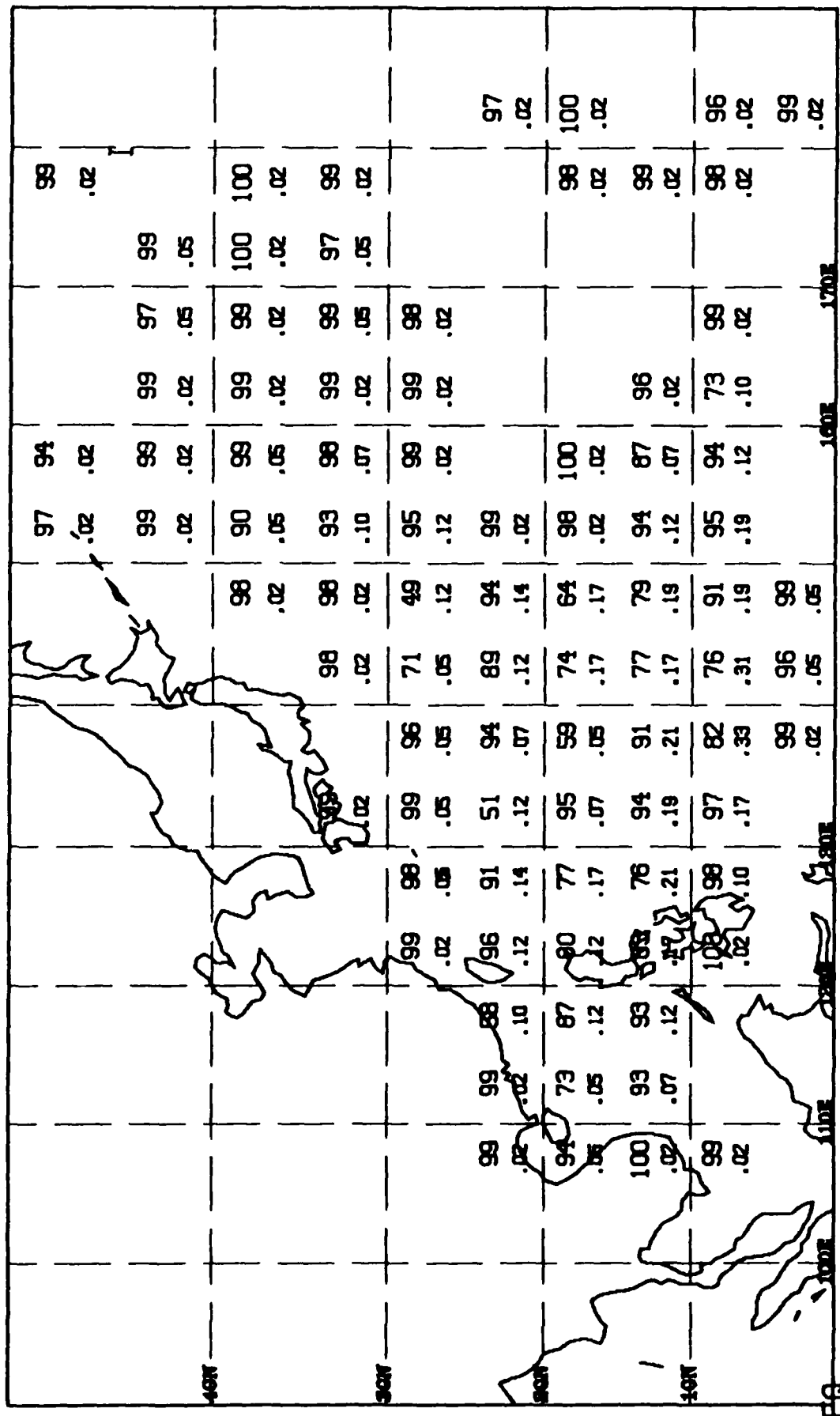
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR APR 9 - APR 23



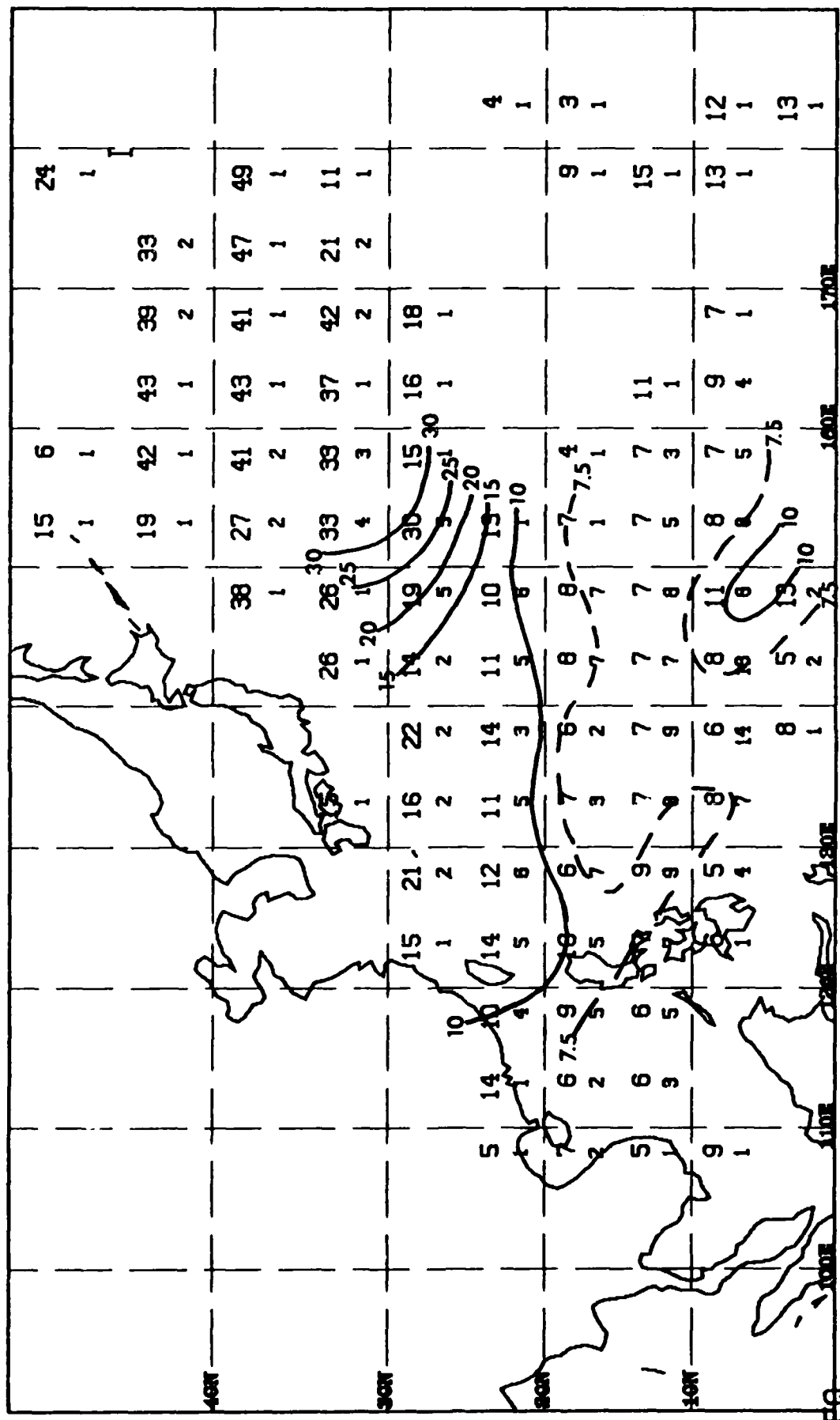
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR APR 9 - APR 23



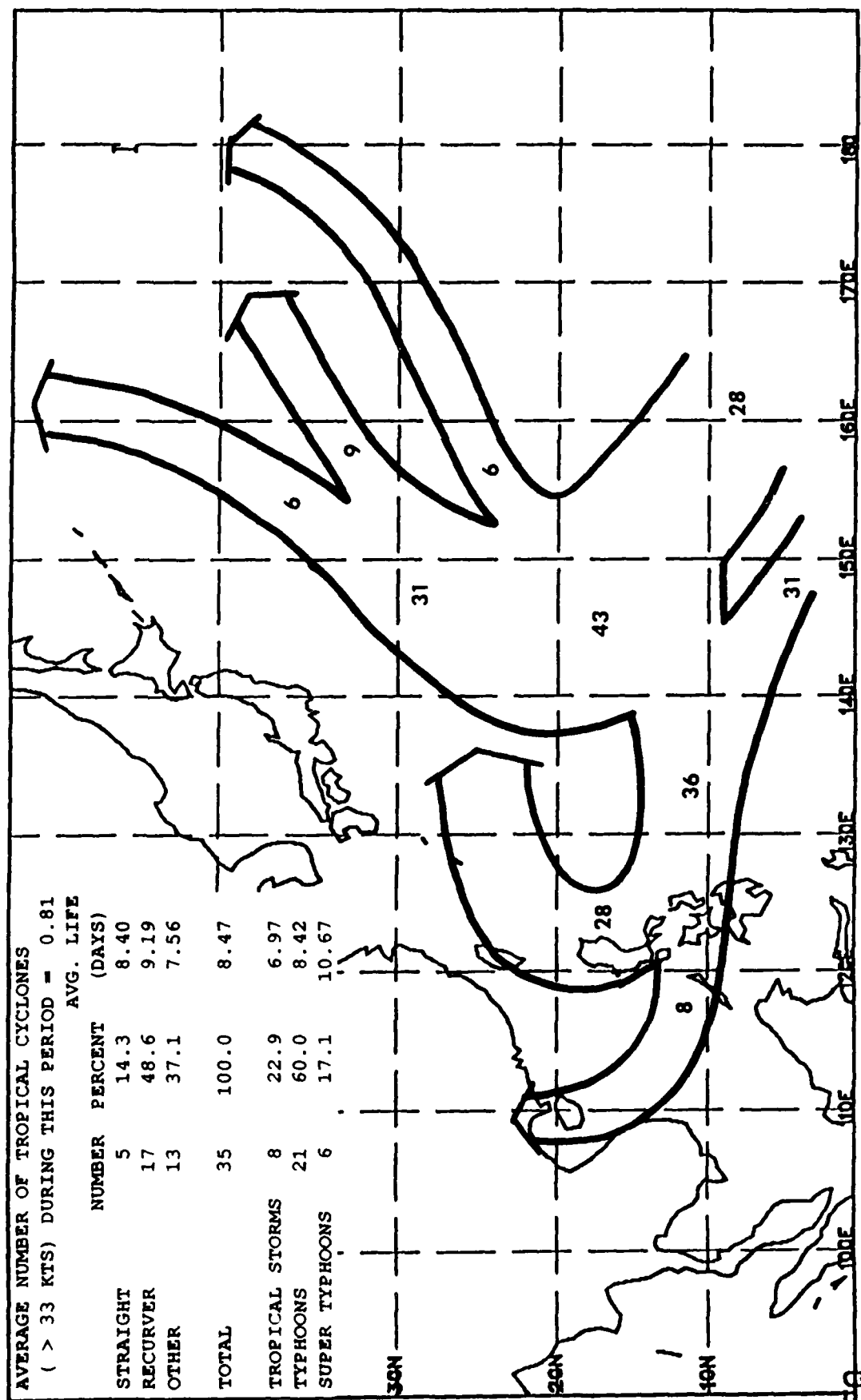
Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number).
 Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed.
 Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year per time period.

SPEED OF MOVEMENT FOR APR 9 - APR 23



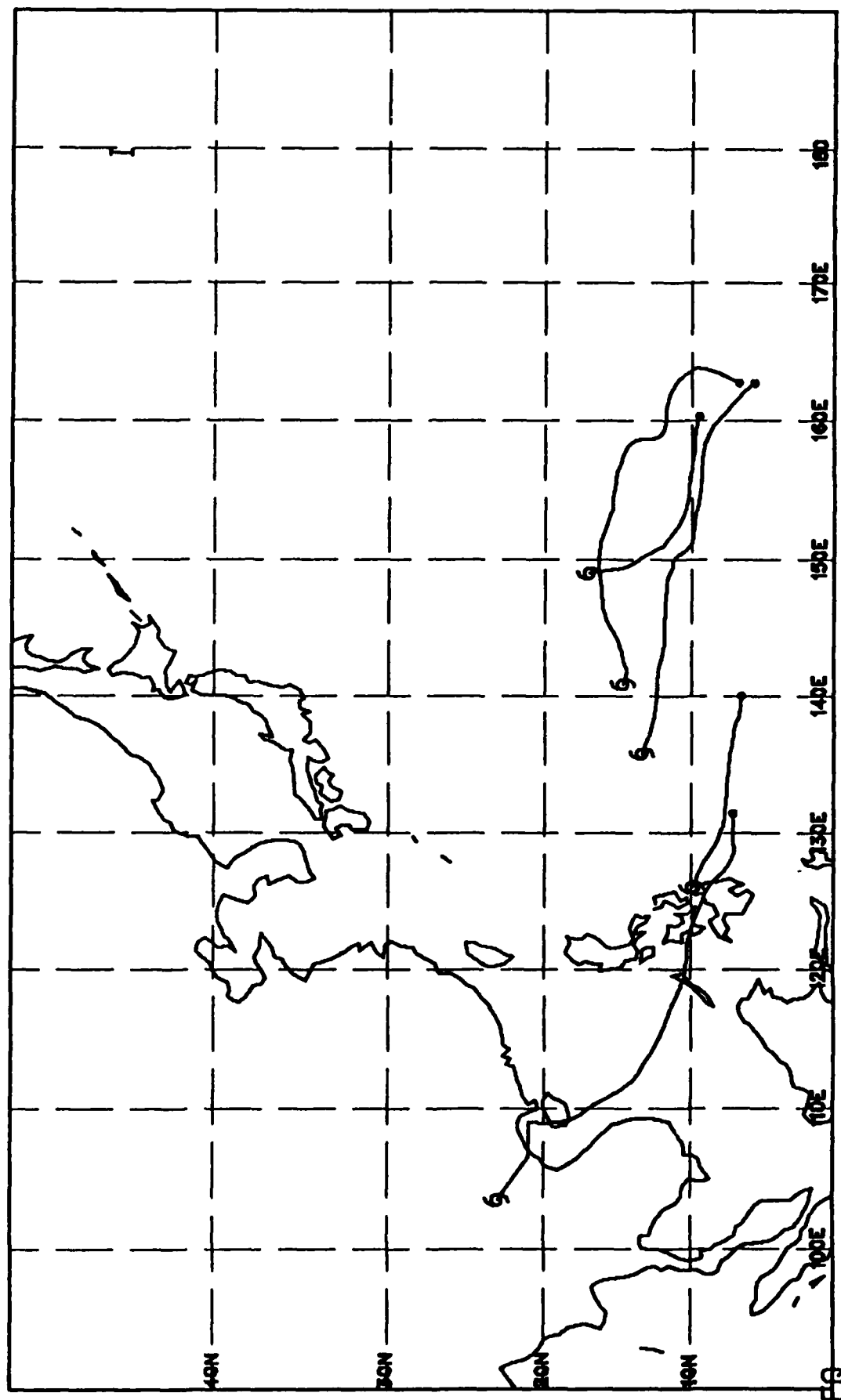
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR APR 24 - MAY 8



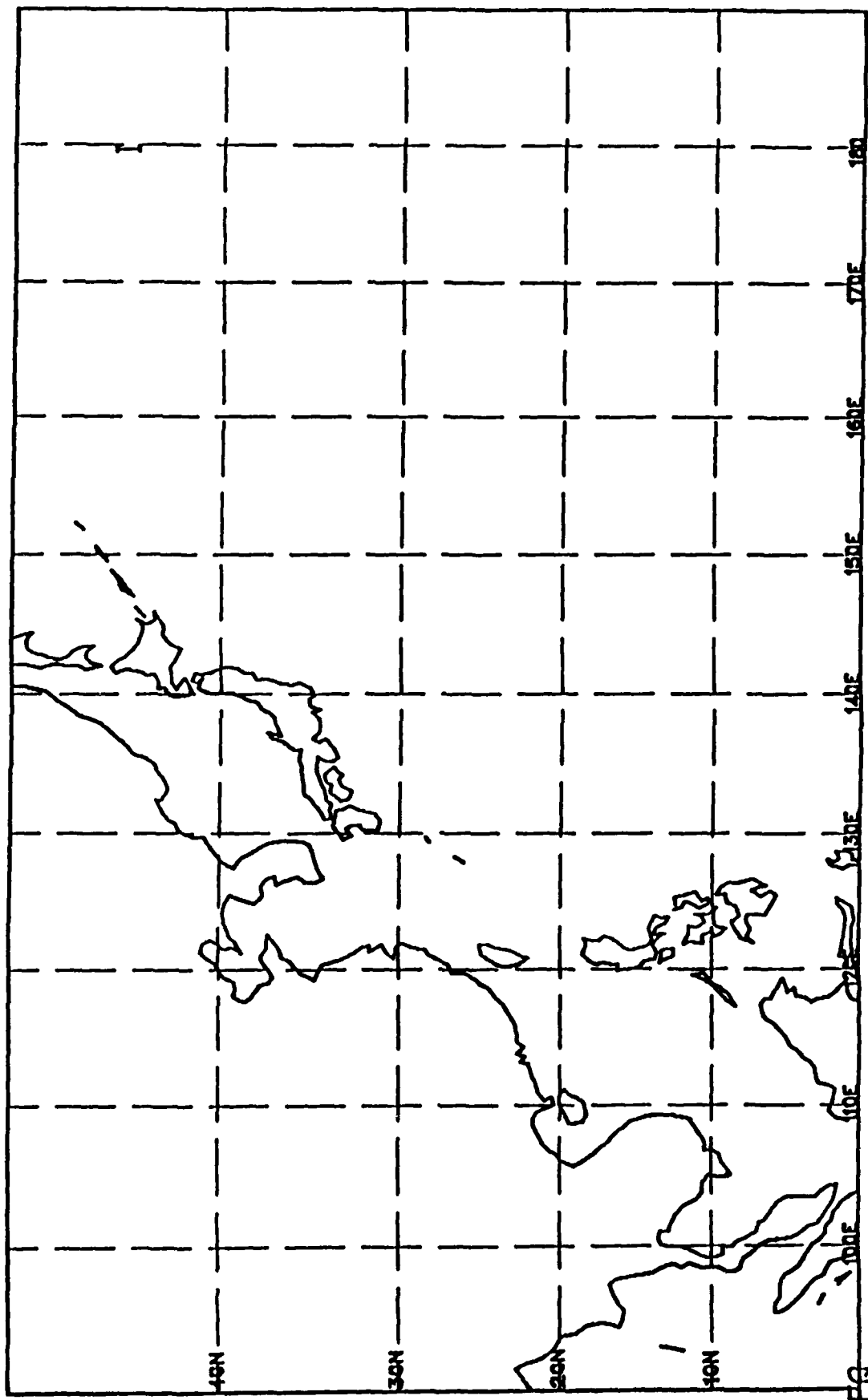
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored.

ACTUAL TRACKS FOR APR 24 - MAY 8



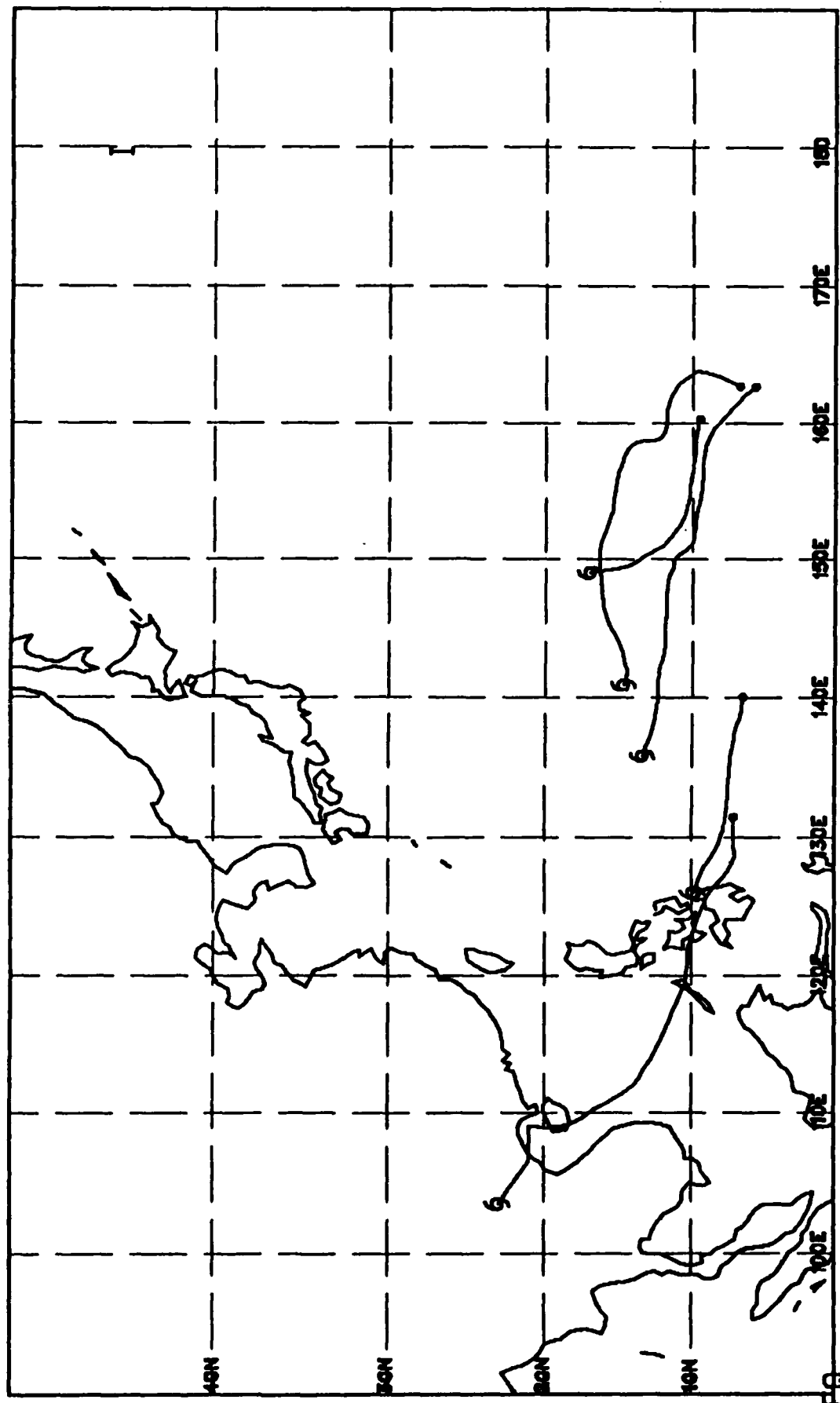
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR APR 24 - MAY 8



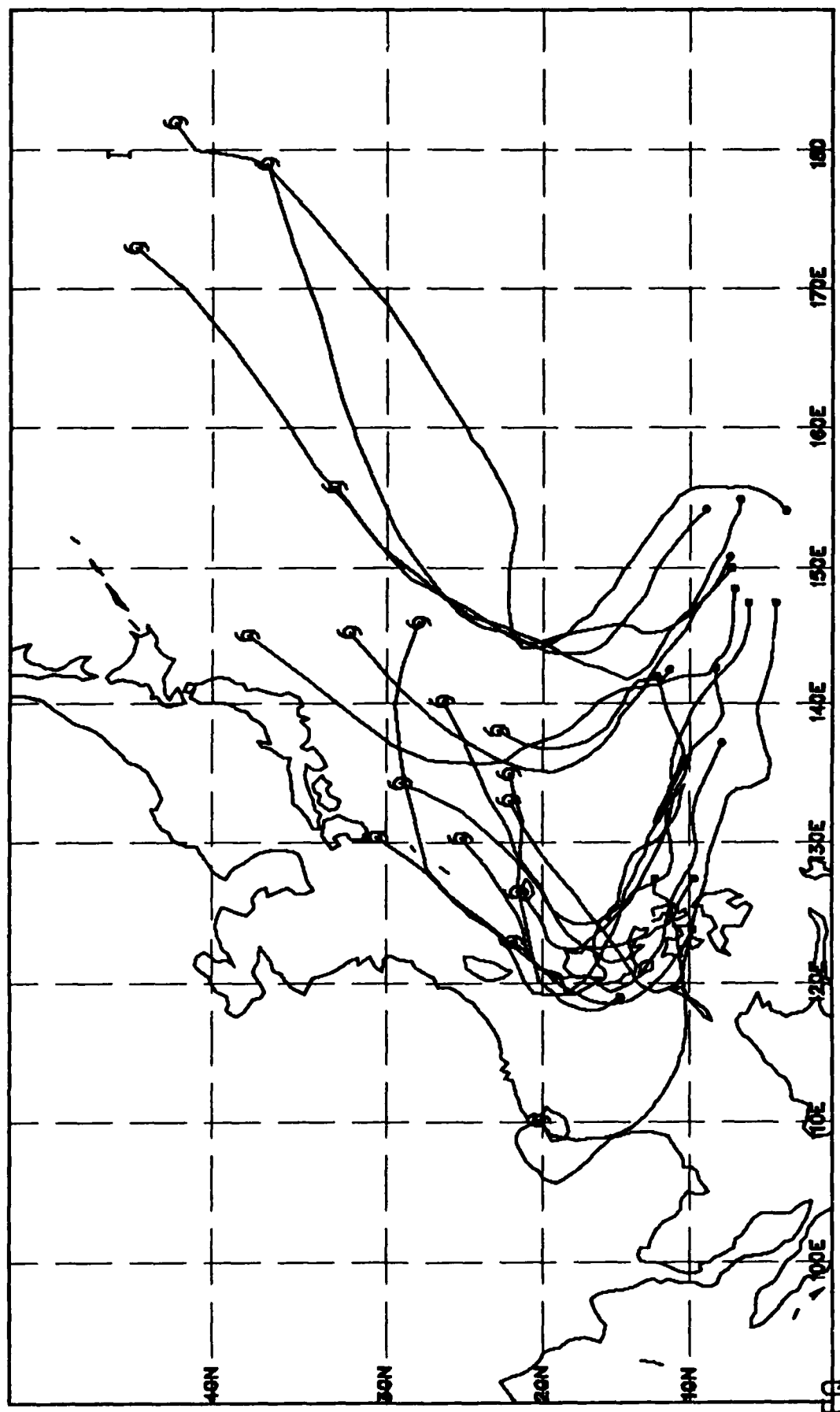
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR APR 24 - MAY 8



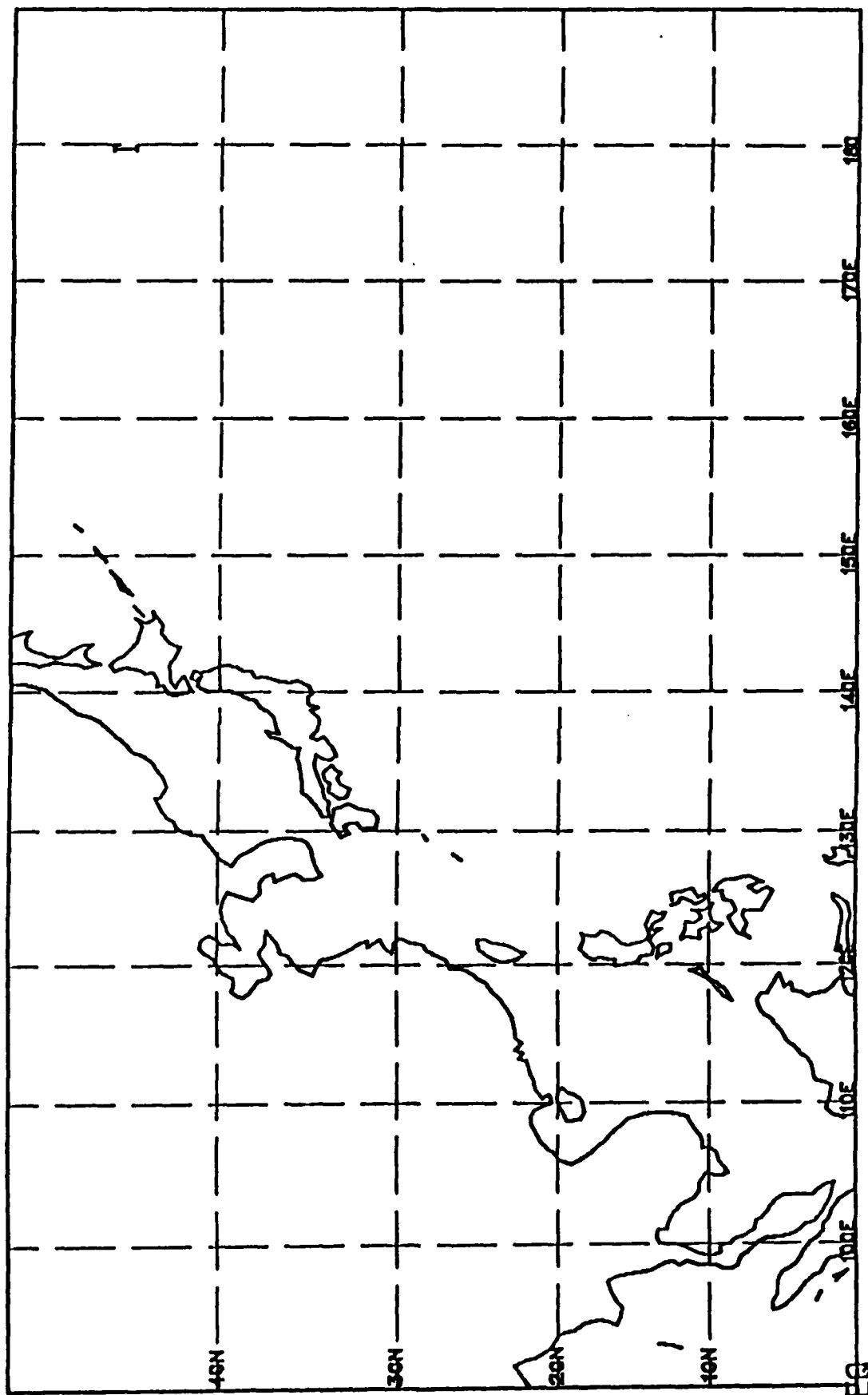
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR APR 24 - MAY 8



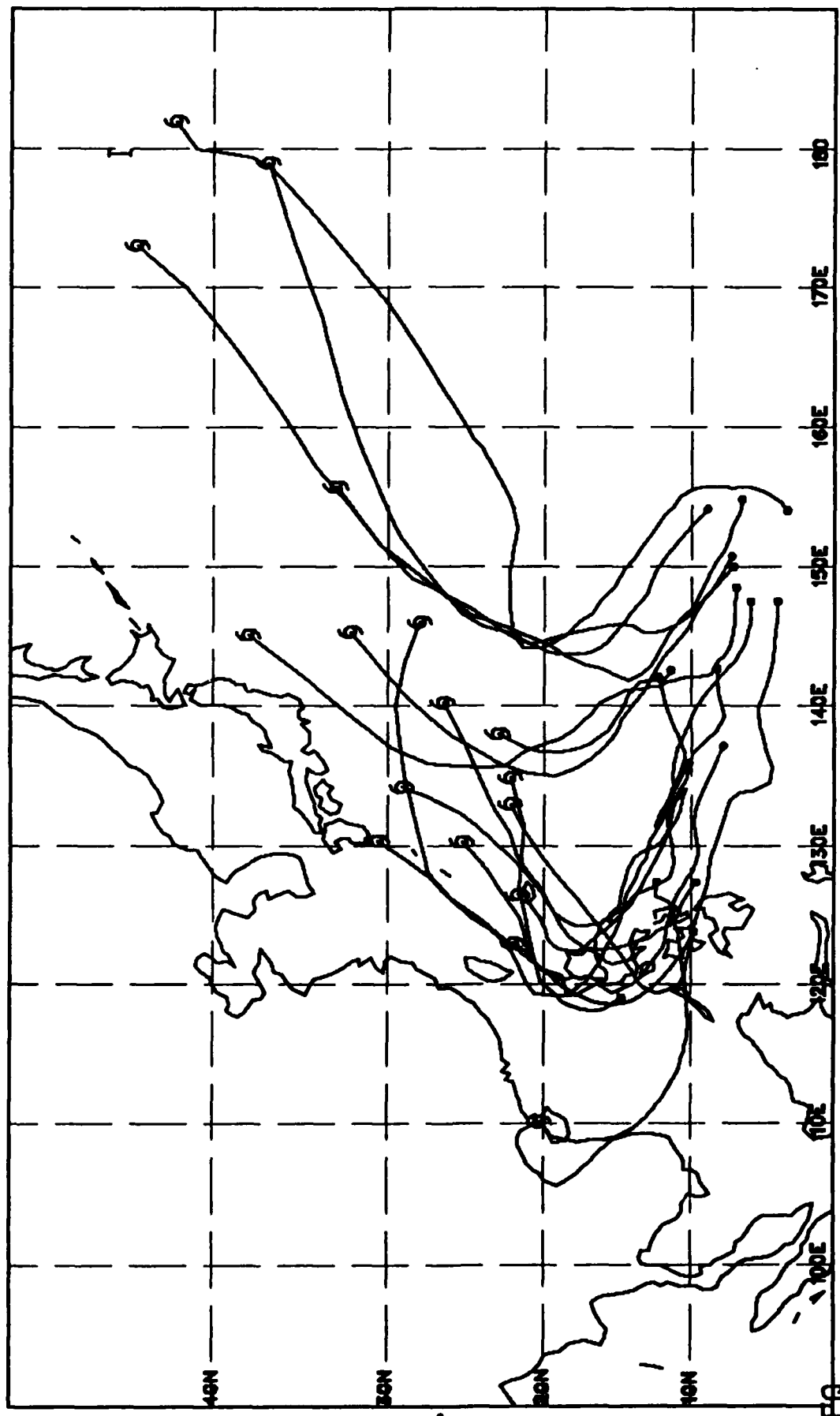
Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR APR 24 - MAY 8



Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N .

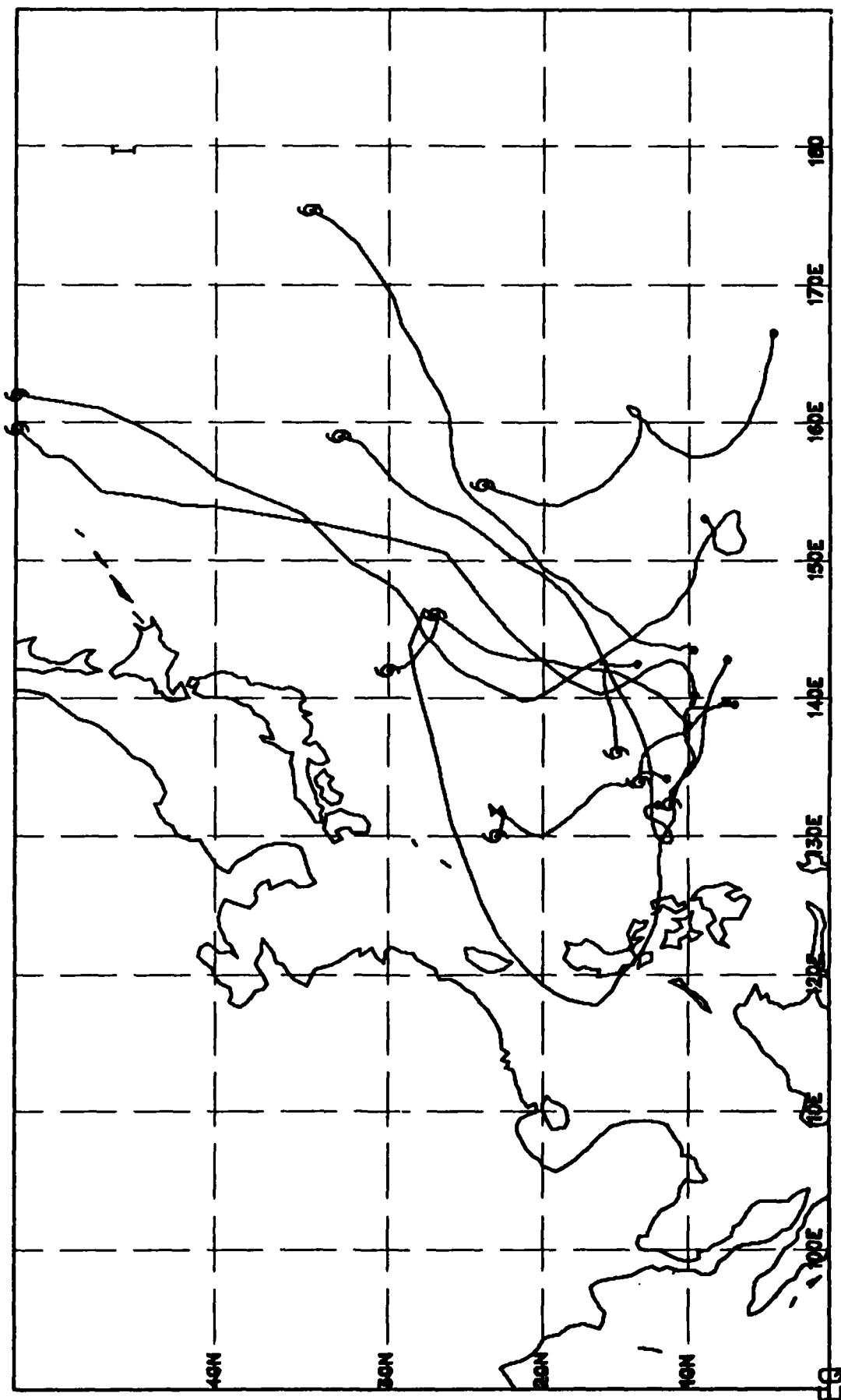
ACTUAL TRACKS FOR APR 24 - MAY 8



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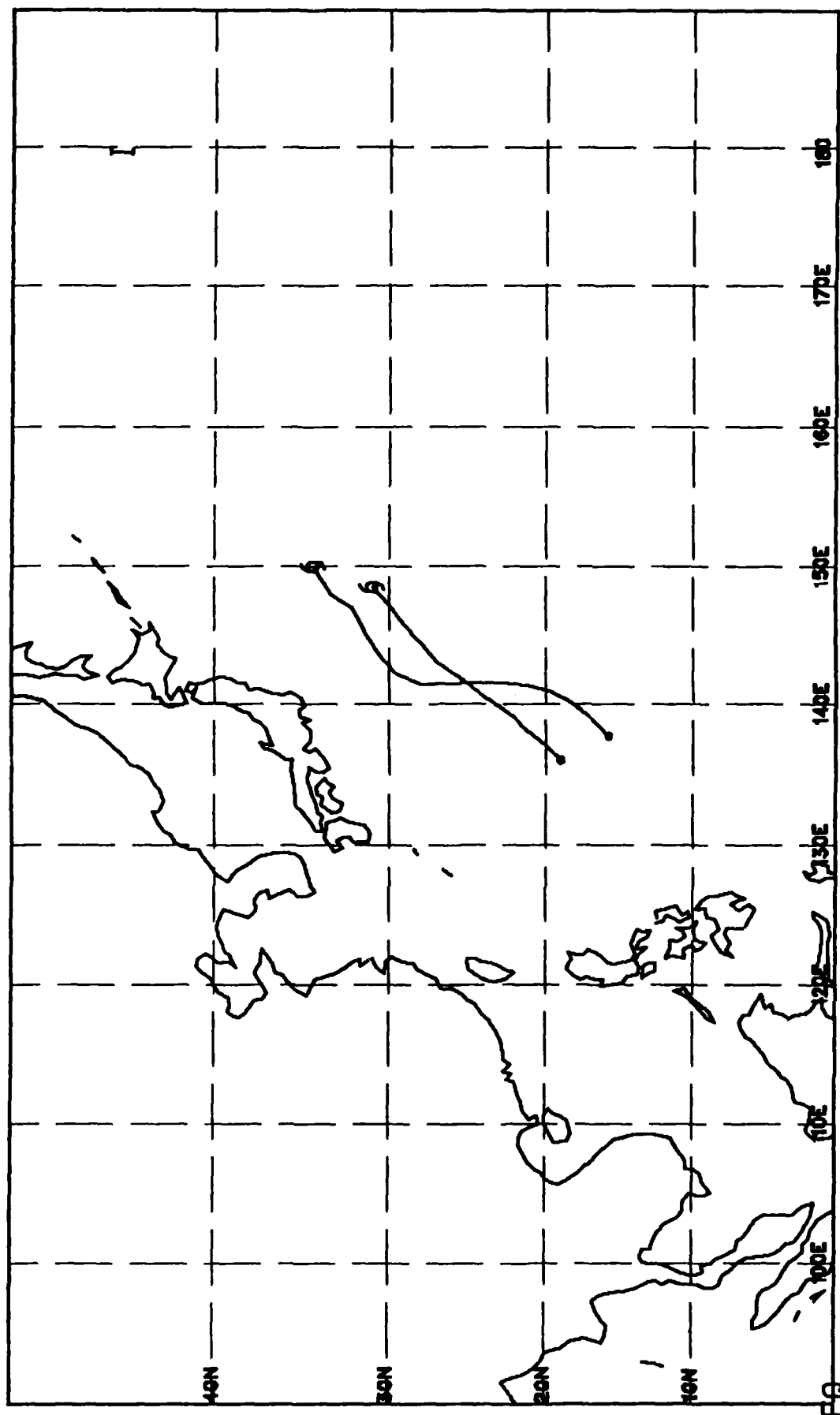
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR APR 24 - MAY 8



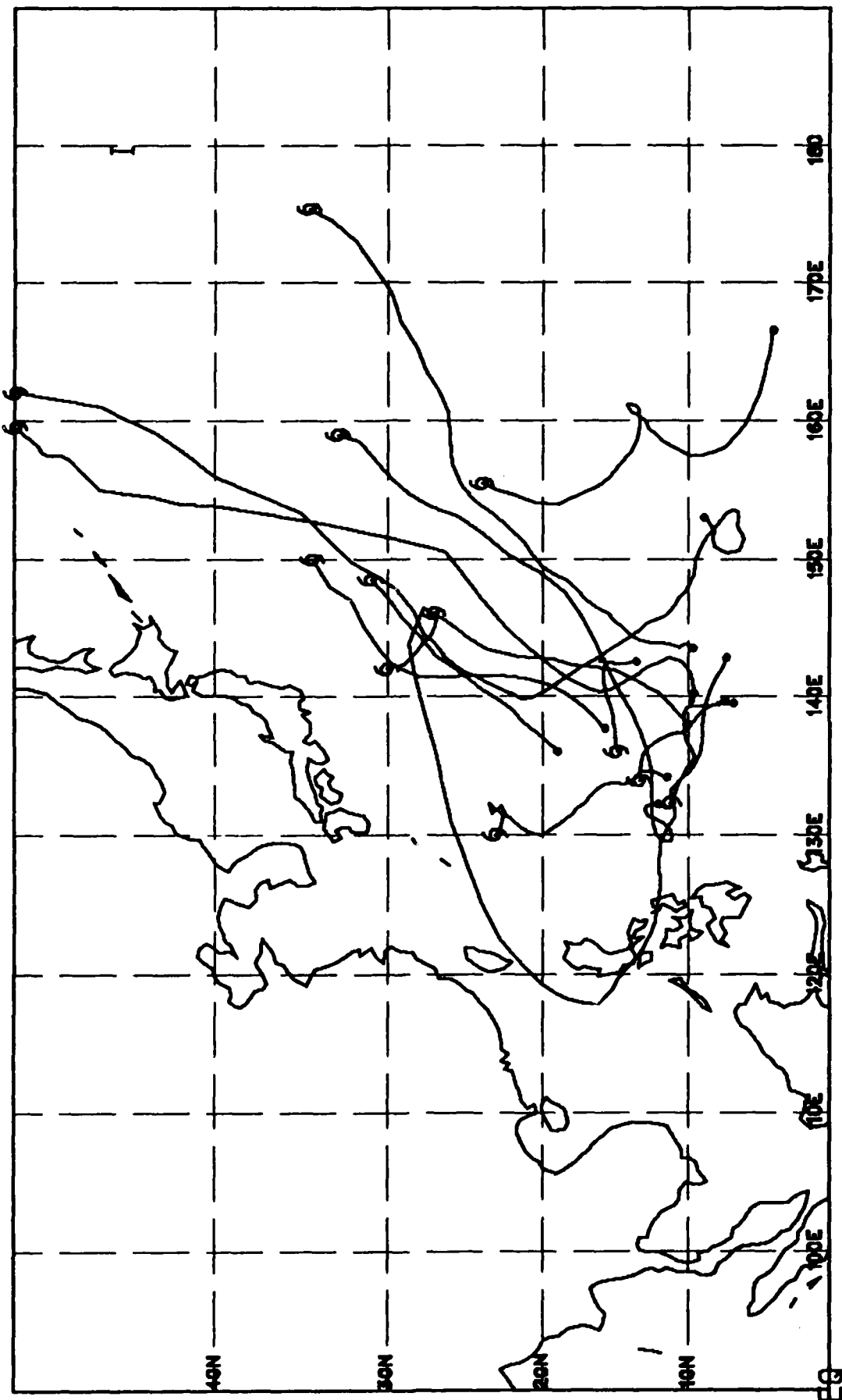
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR APR 24 - MAY 8



Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

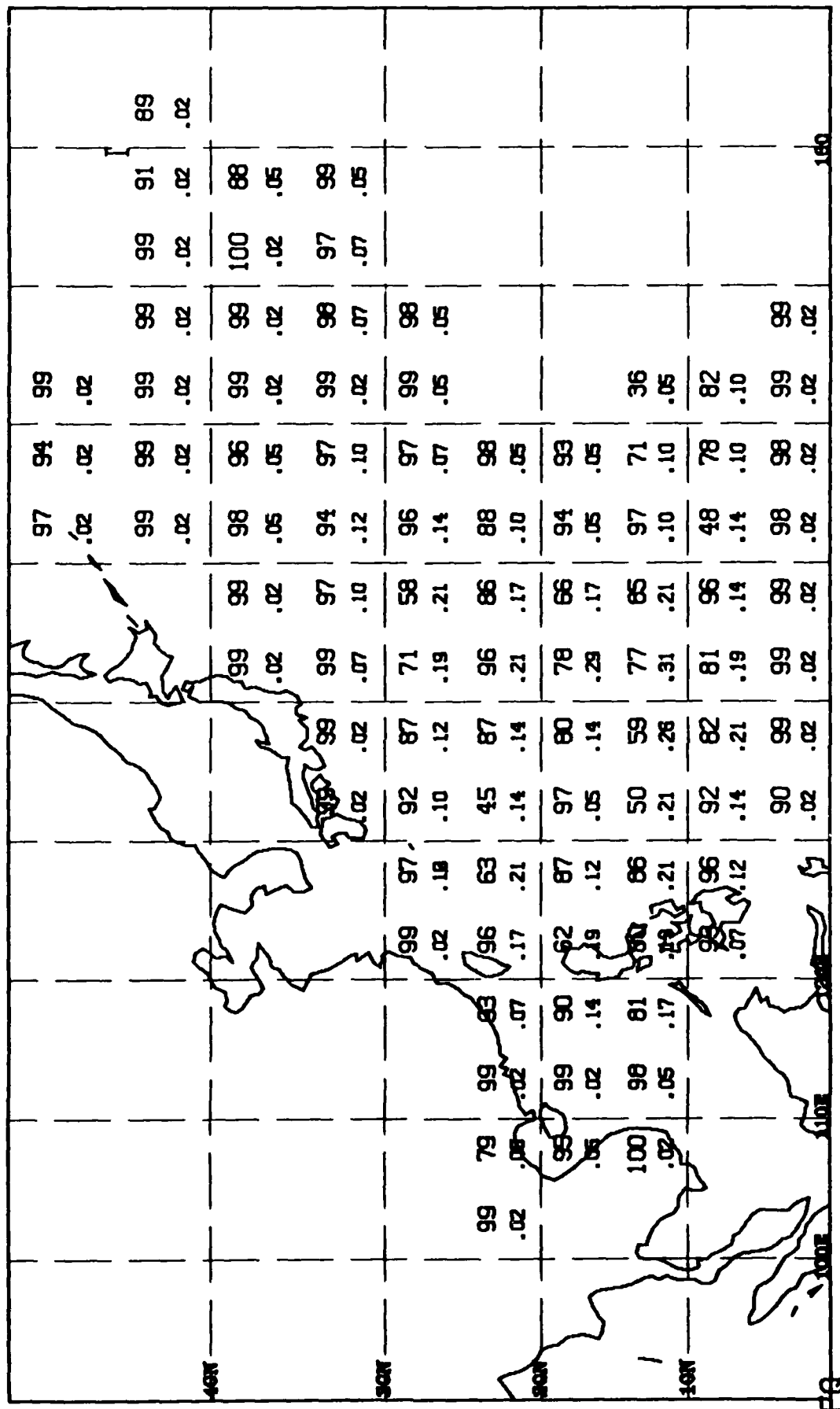
ACTUAL TRACKS FOR APR 24 - MAY 8



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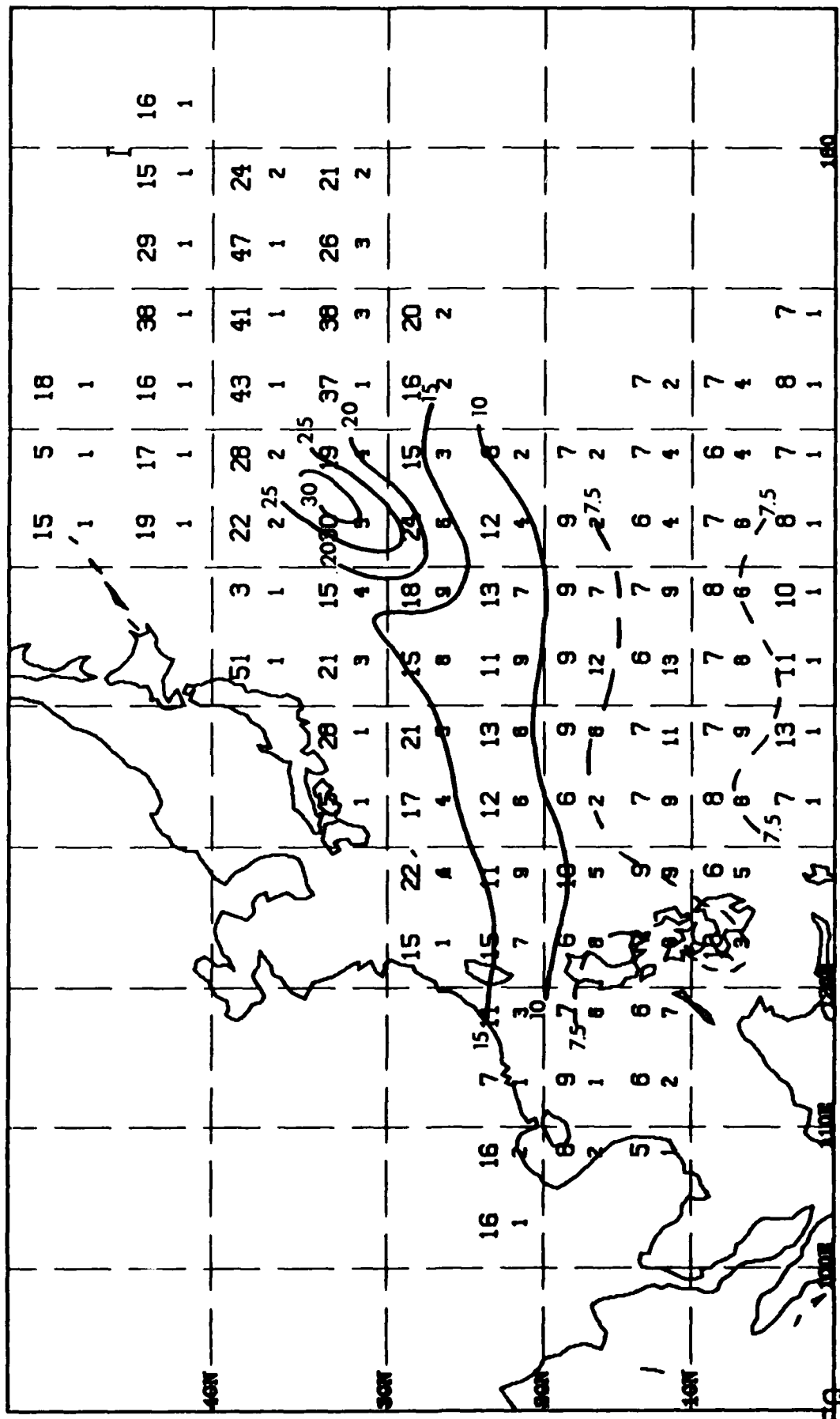
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR APR 24 - MAY 8



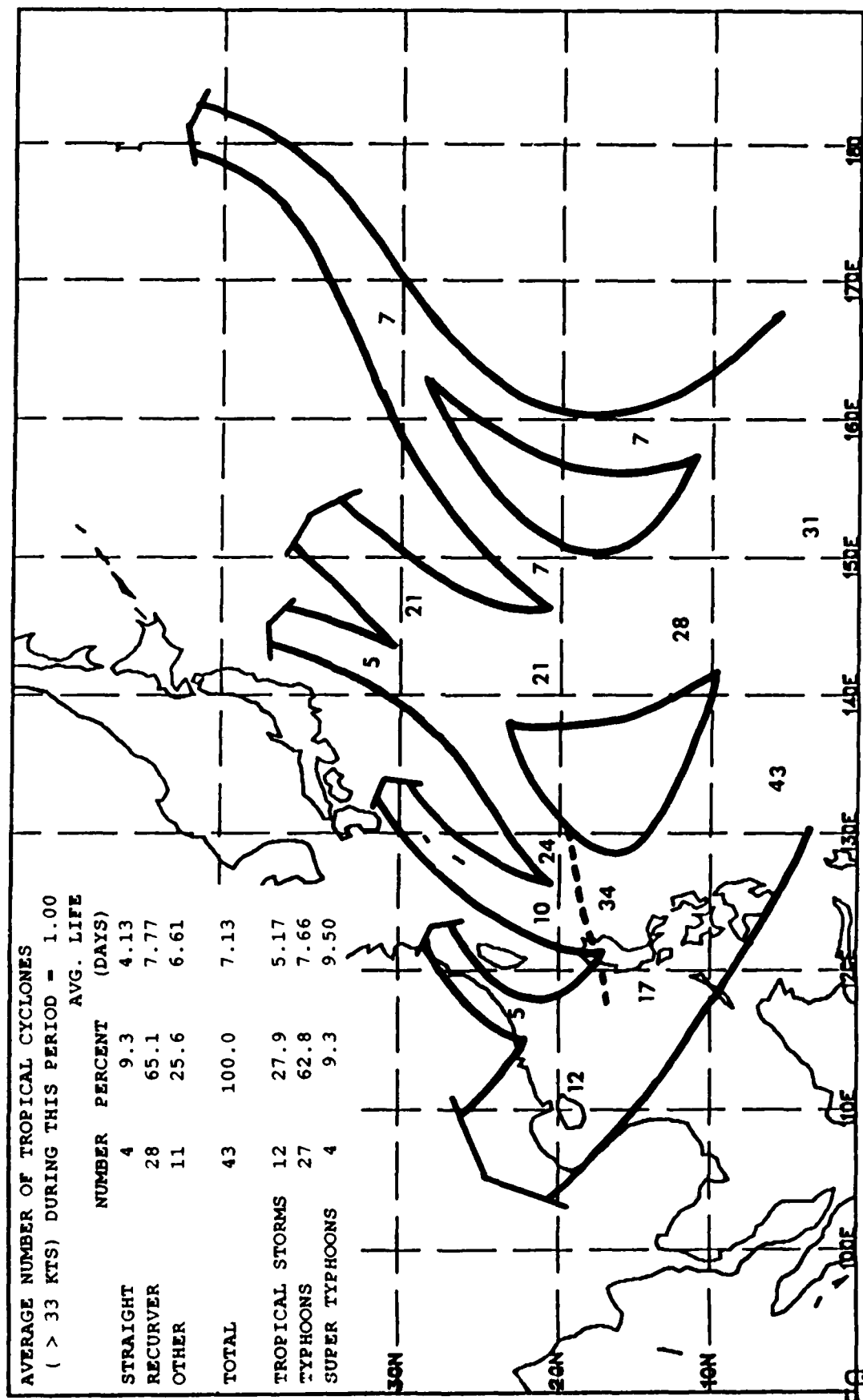
Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number).
 Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed.
 Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year per time period.

SPEED OF MOVEMENT FOR APR 24 - MAY 8



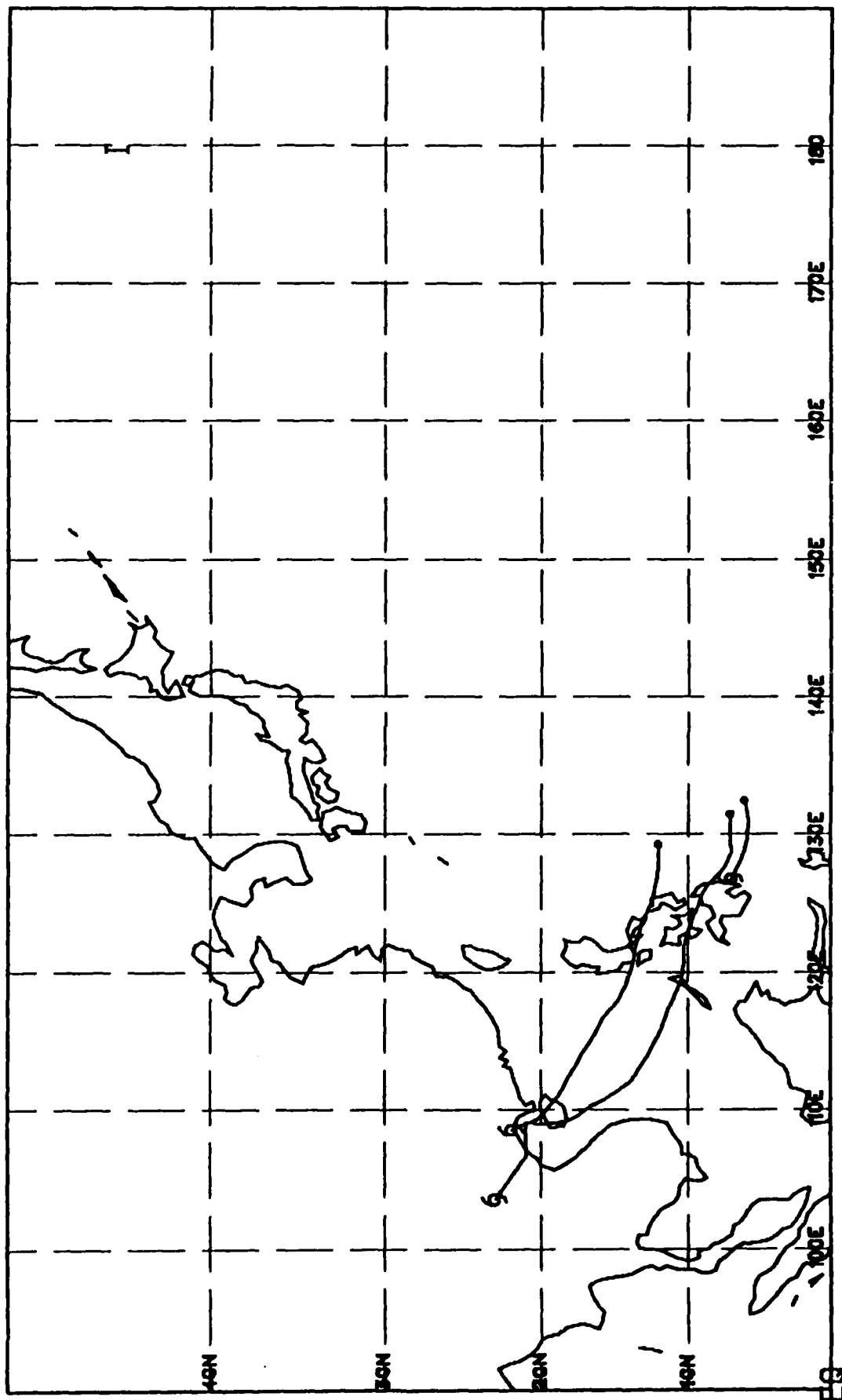
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR MAY 9 - MAY 23



Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored. Dashed line represents mean recurvature position of tropical cyclones (> 33 kts) classified as recurvers.

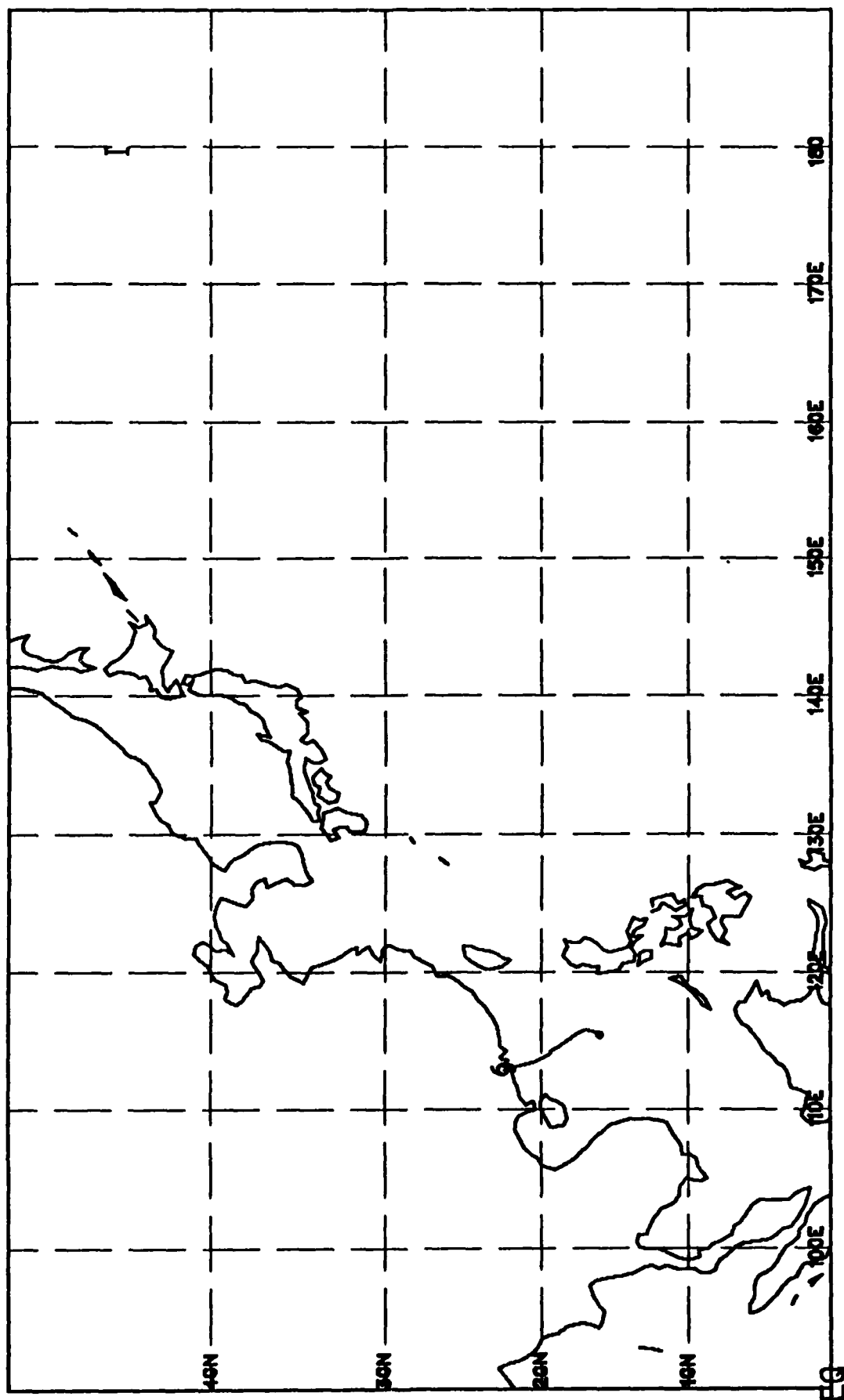
ACTUAL TRACKS FOR MAY 9 - MAY 23



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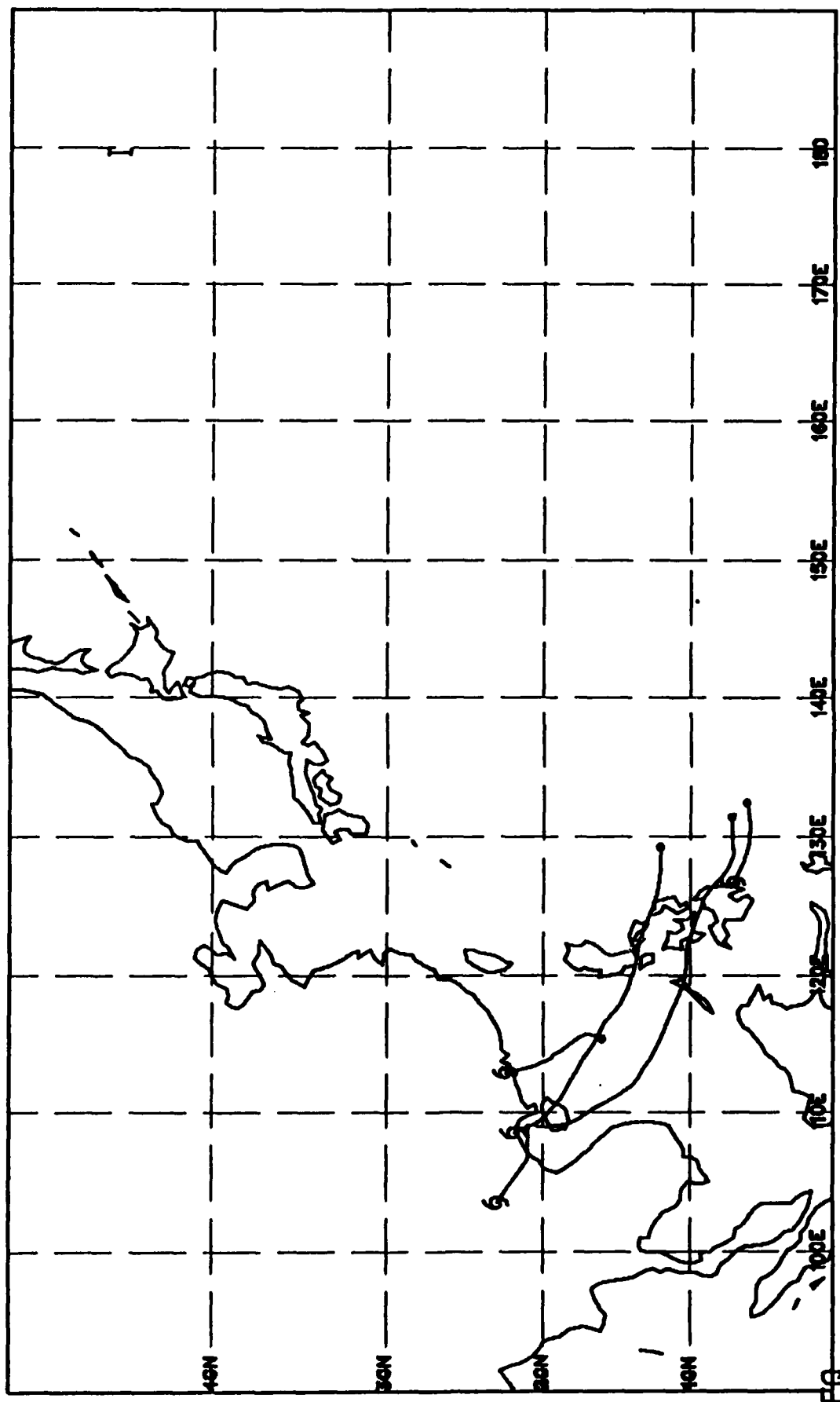
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR MAY 9 - MAY 23



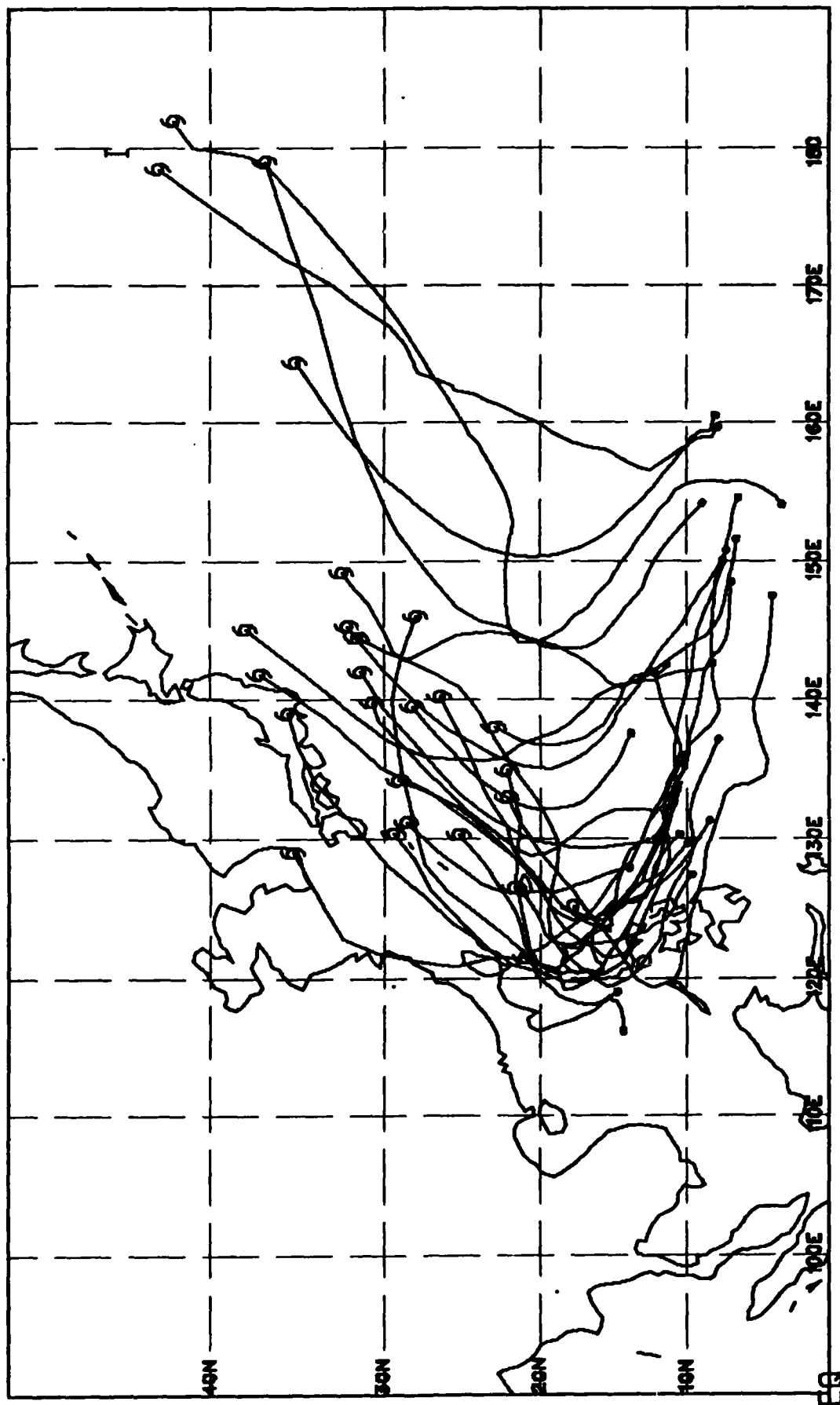
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR MAY 9 - MAY 23



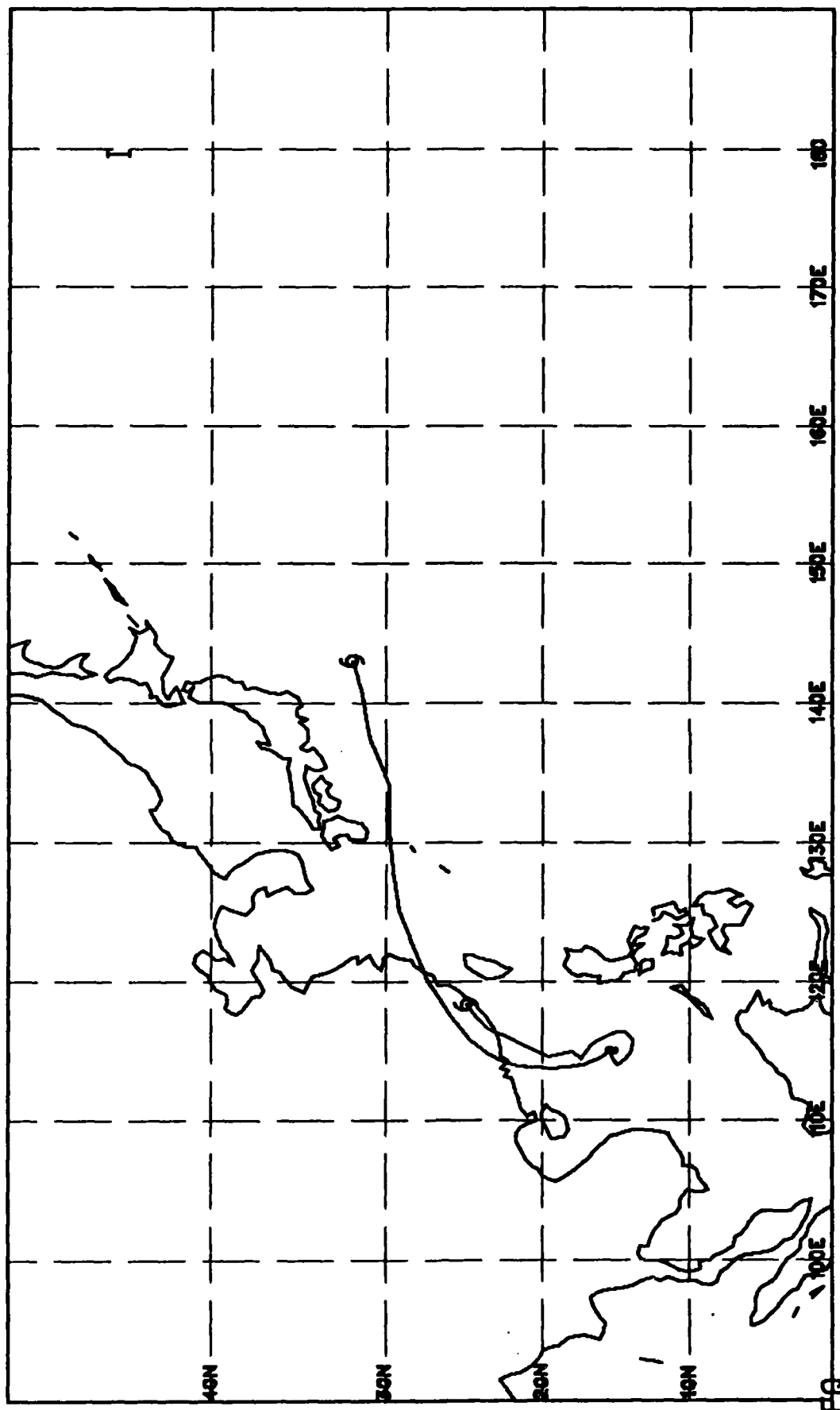
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR MAY 9 - MAY 23



Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

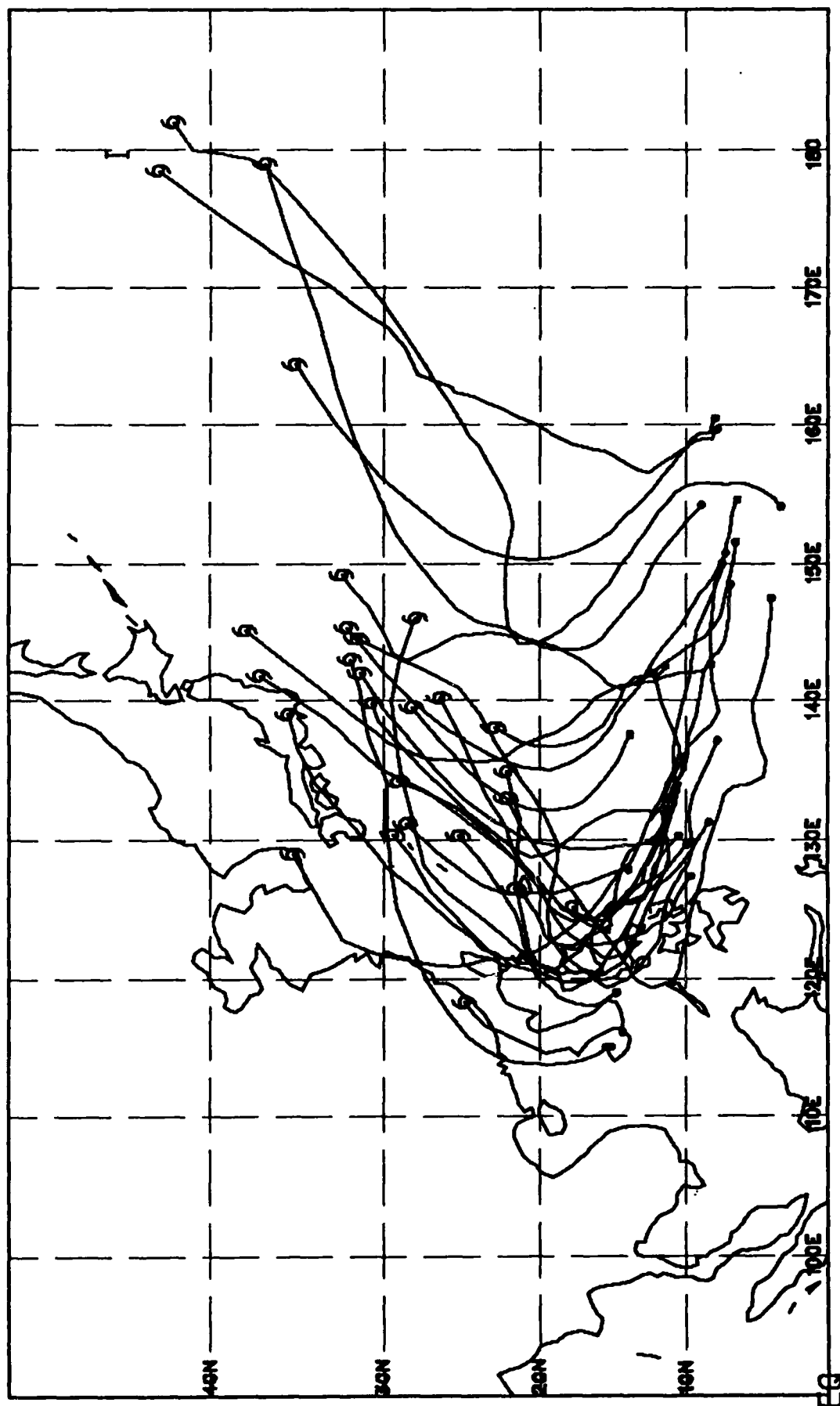
ACTUAL TRACKS FOR MAY 9 - MAY 23



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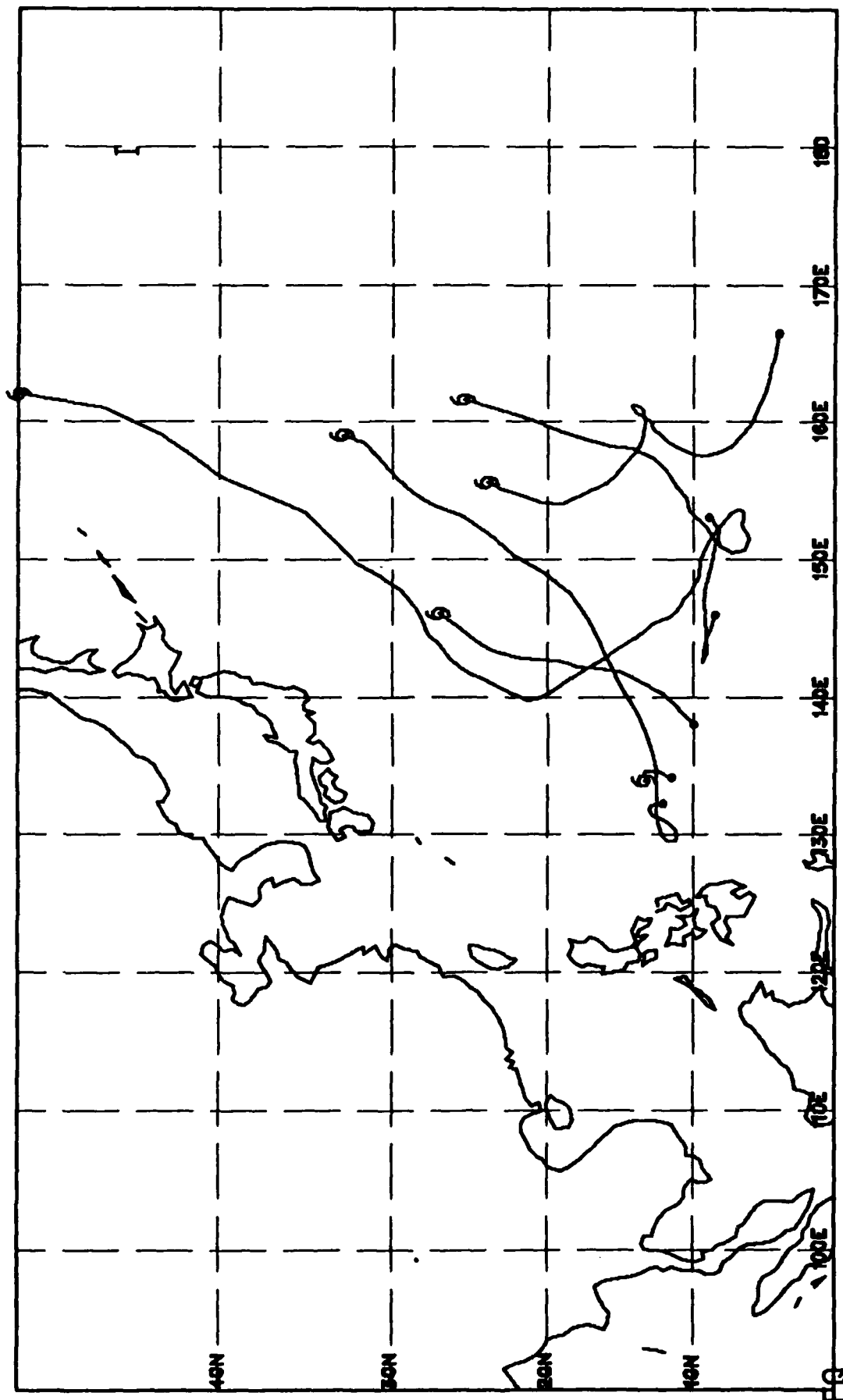
Actual path of recurving tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR MAY 9 - MAY 23



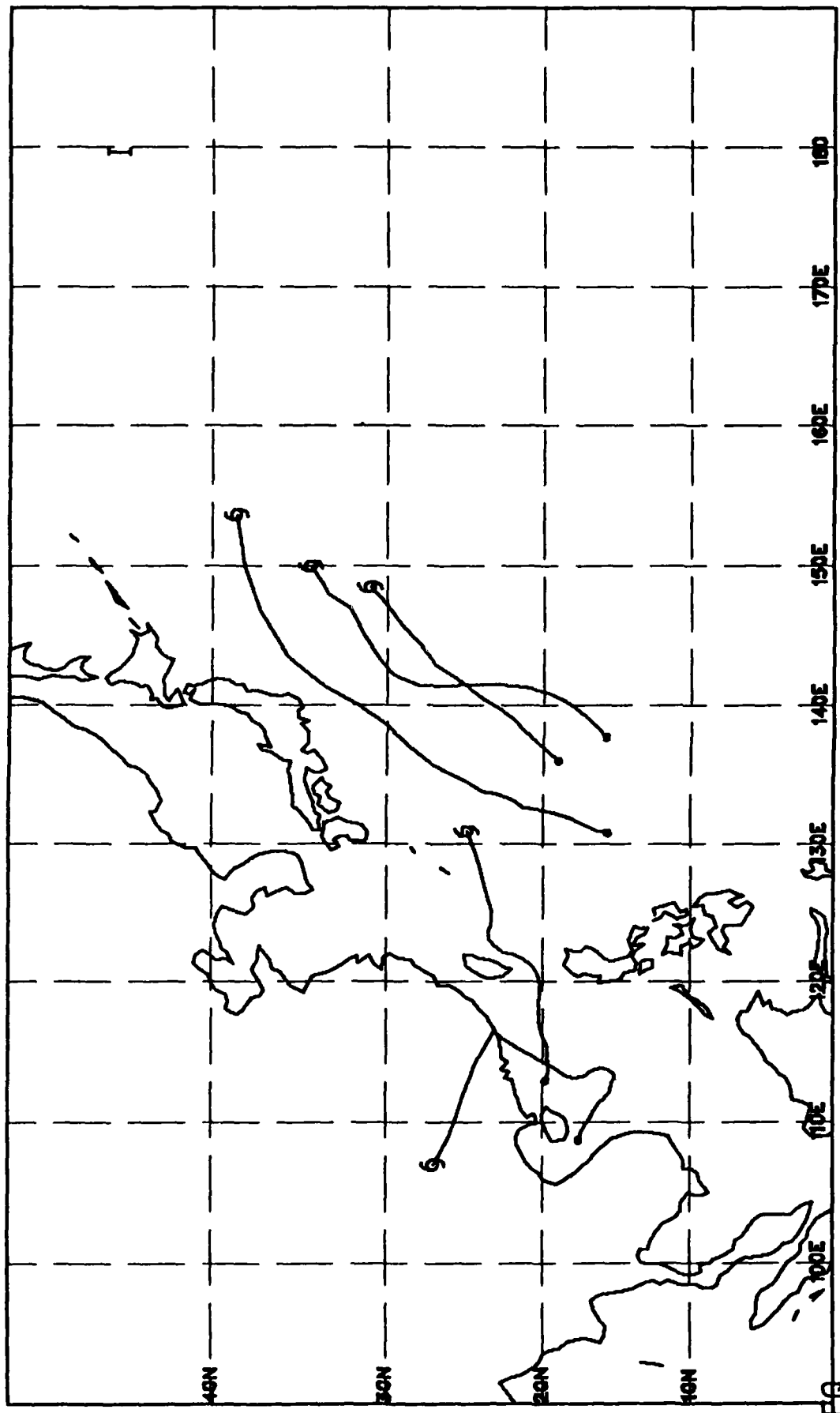
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR MAY 9 - MAY 23



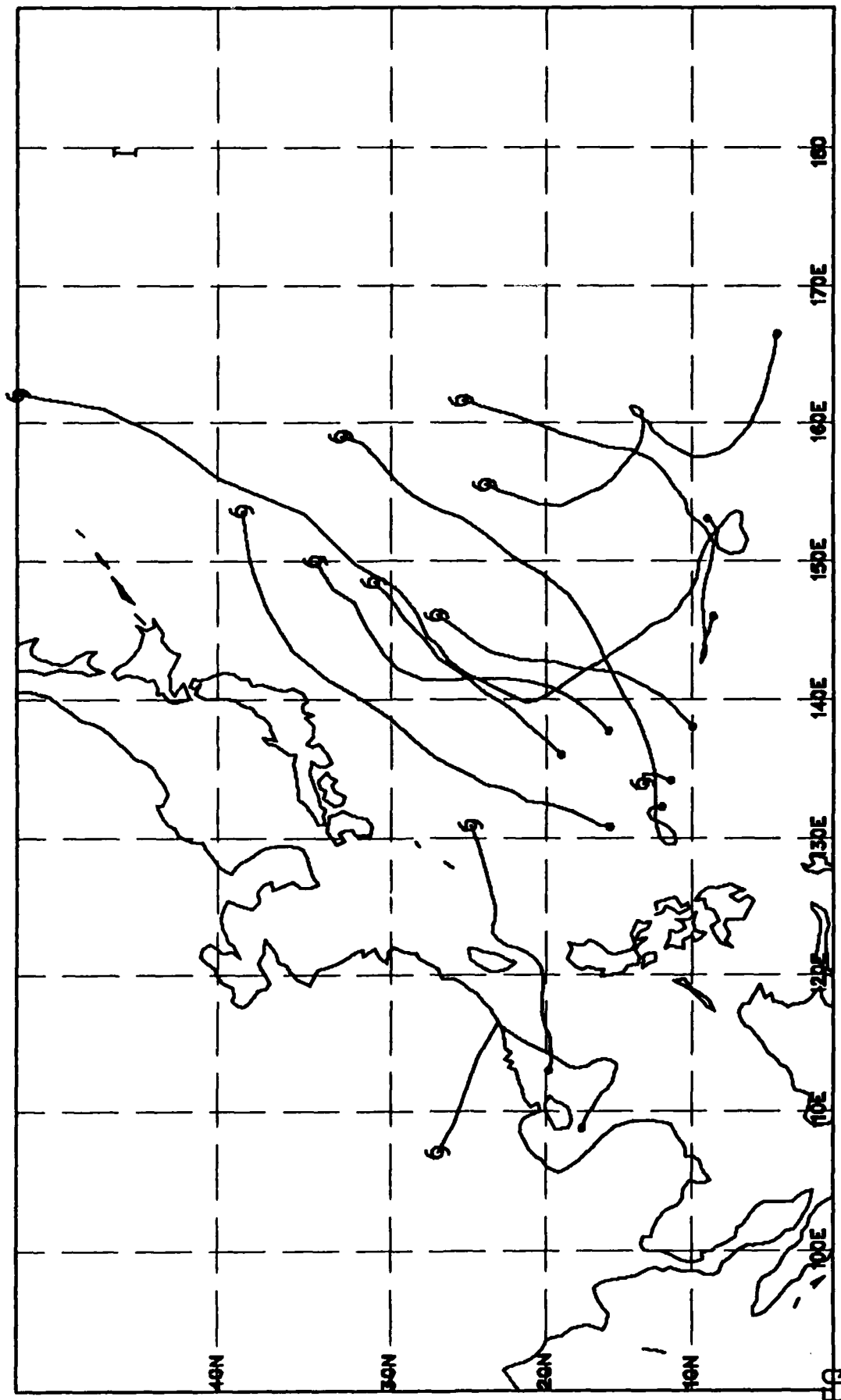
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR MAY 9 - MAY 23



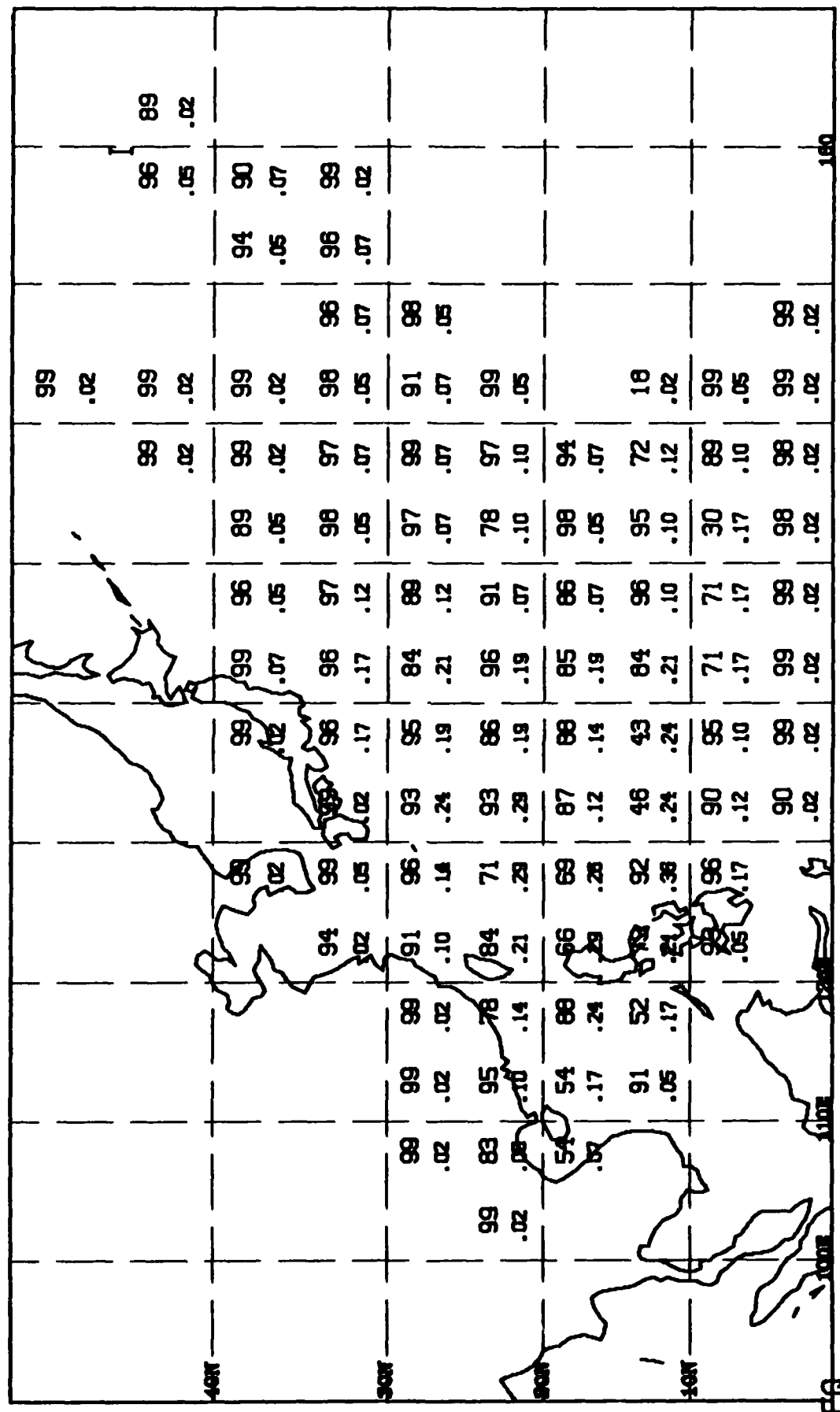
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR MAY 9 - MAY 23



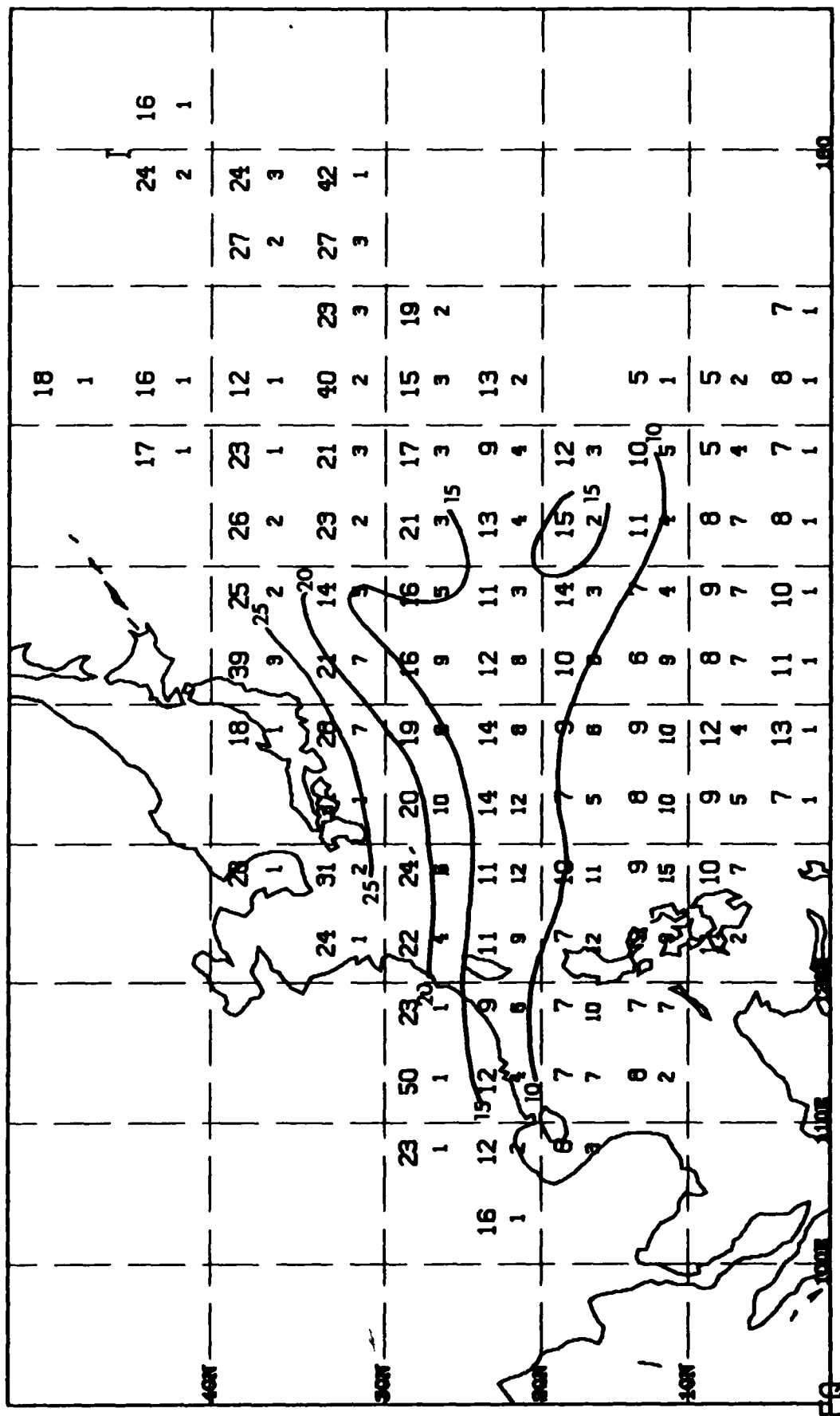
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR MAY 9 - MAY 23



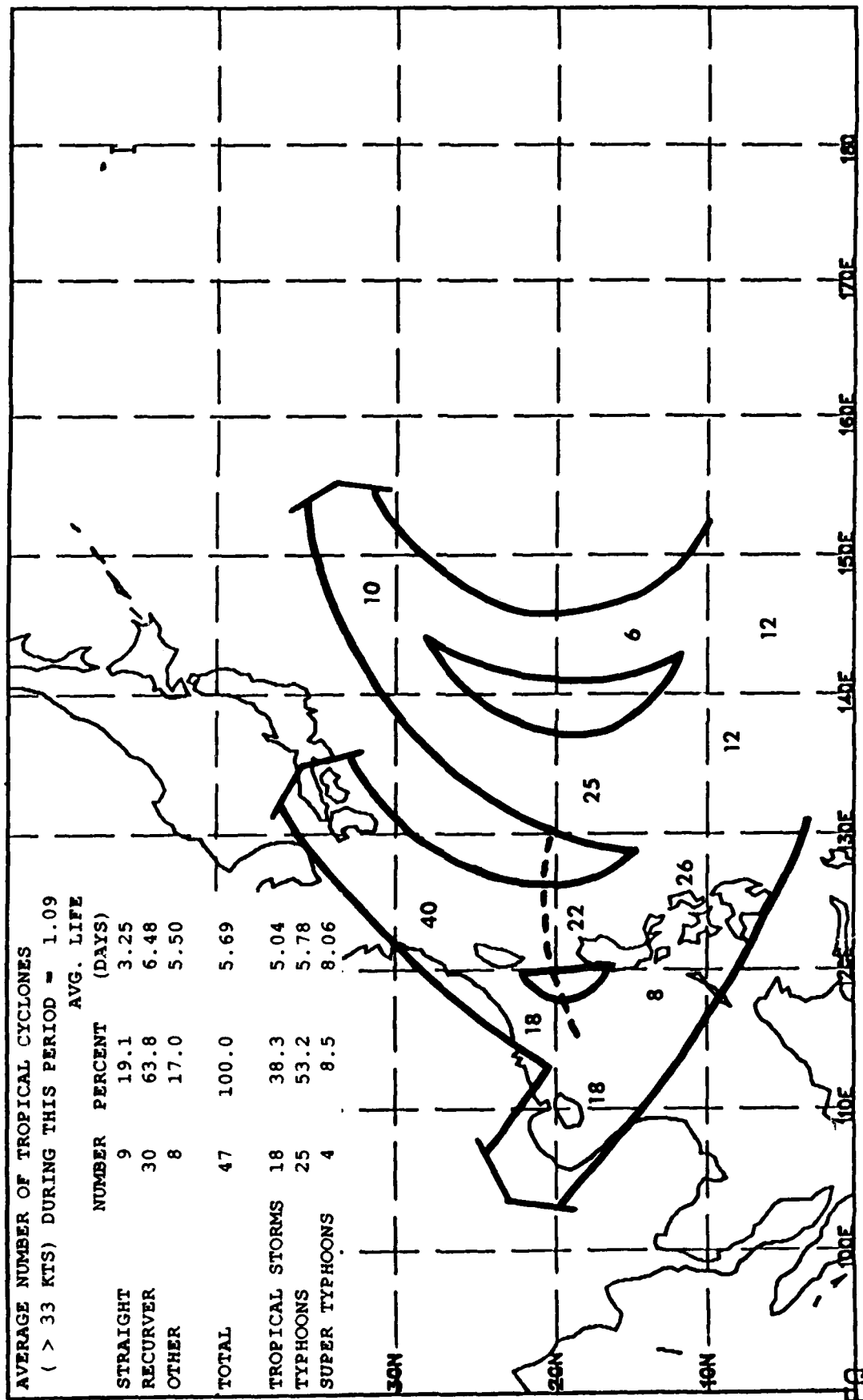
Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number).
 Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed.
 Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year per time period.

SPEED OF MOVEMENT FOR MAY 9 - MAY 23



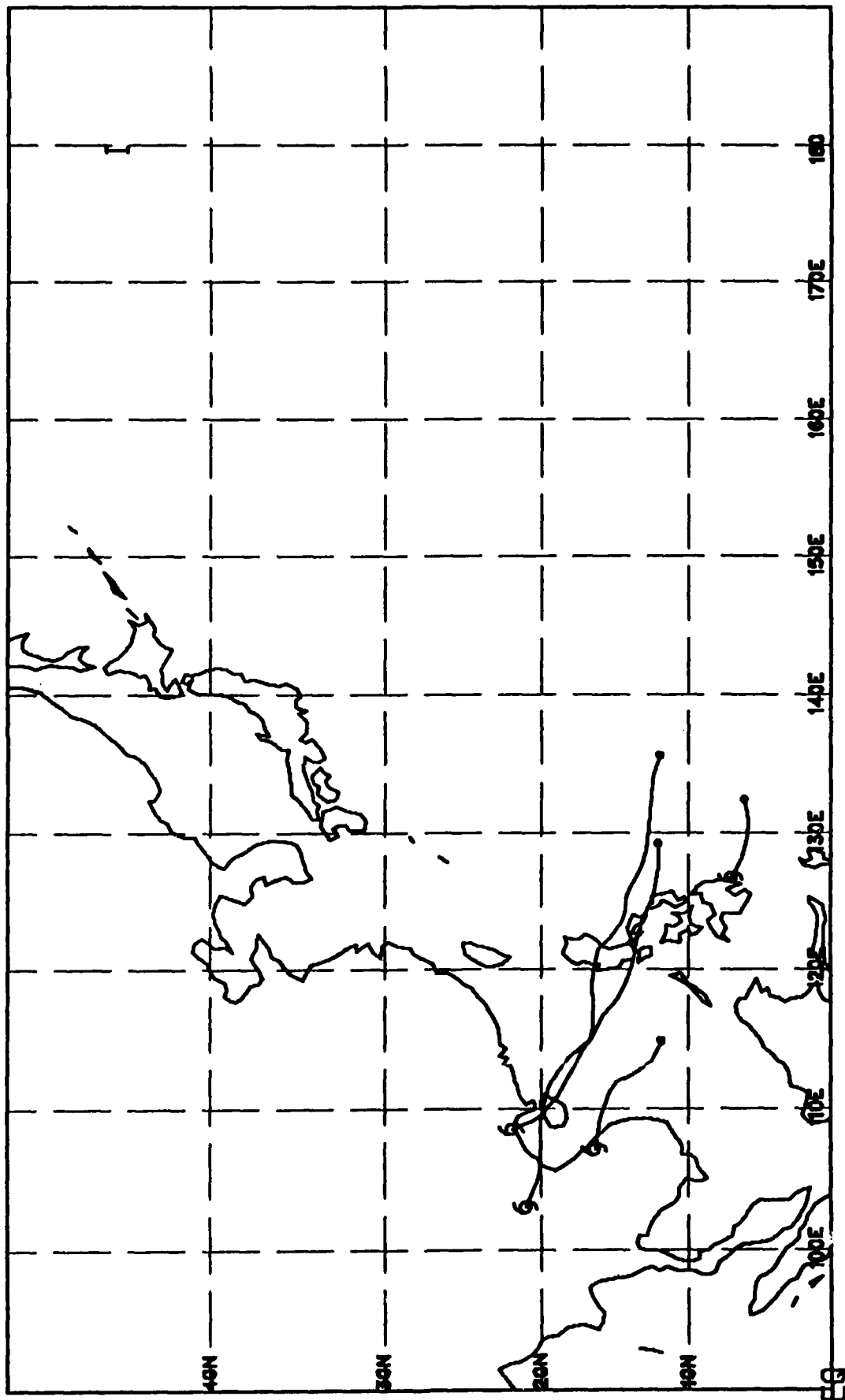
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR MAY 24 - JUN 8



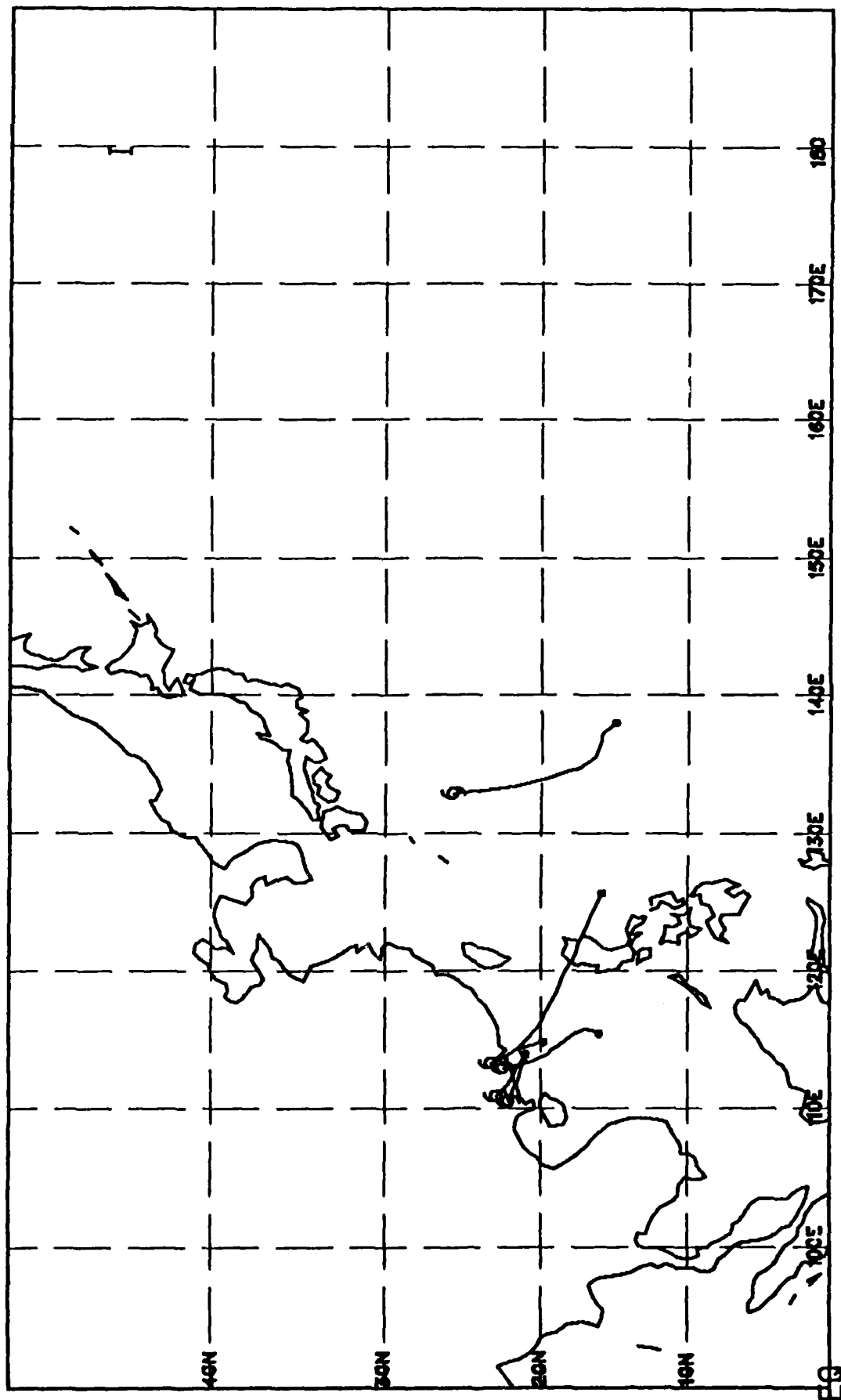
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored. Dashed line represents mean recurvature position of tropical cyclones (> 33 kts) classified as recurvers.

ACTUAL TRACKS FOR MAY 24 - JUN 8



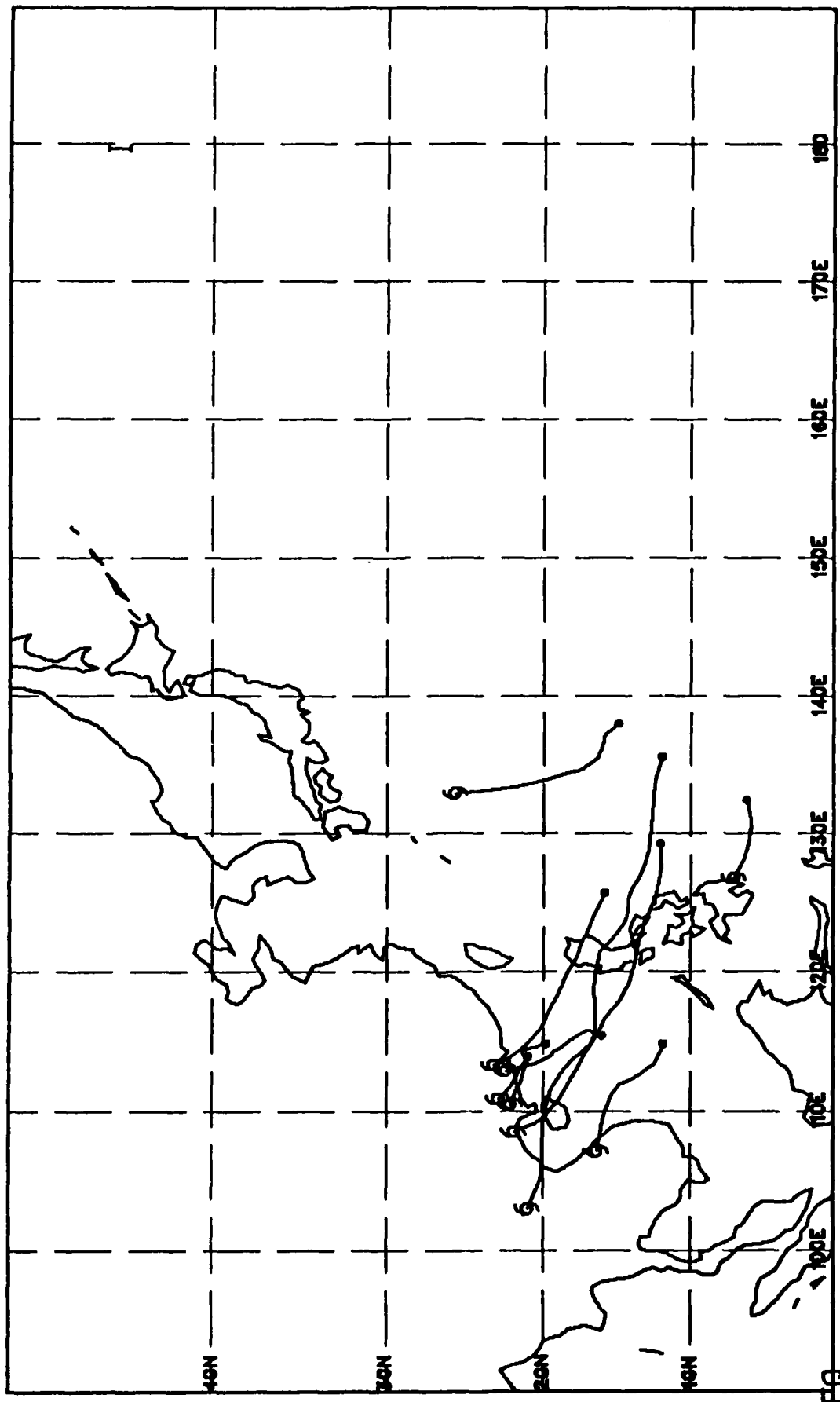
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR MAY 24 - JUN 8



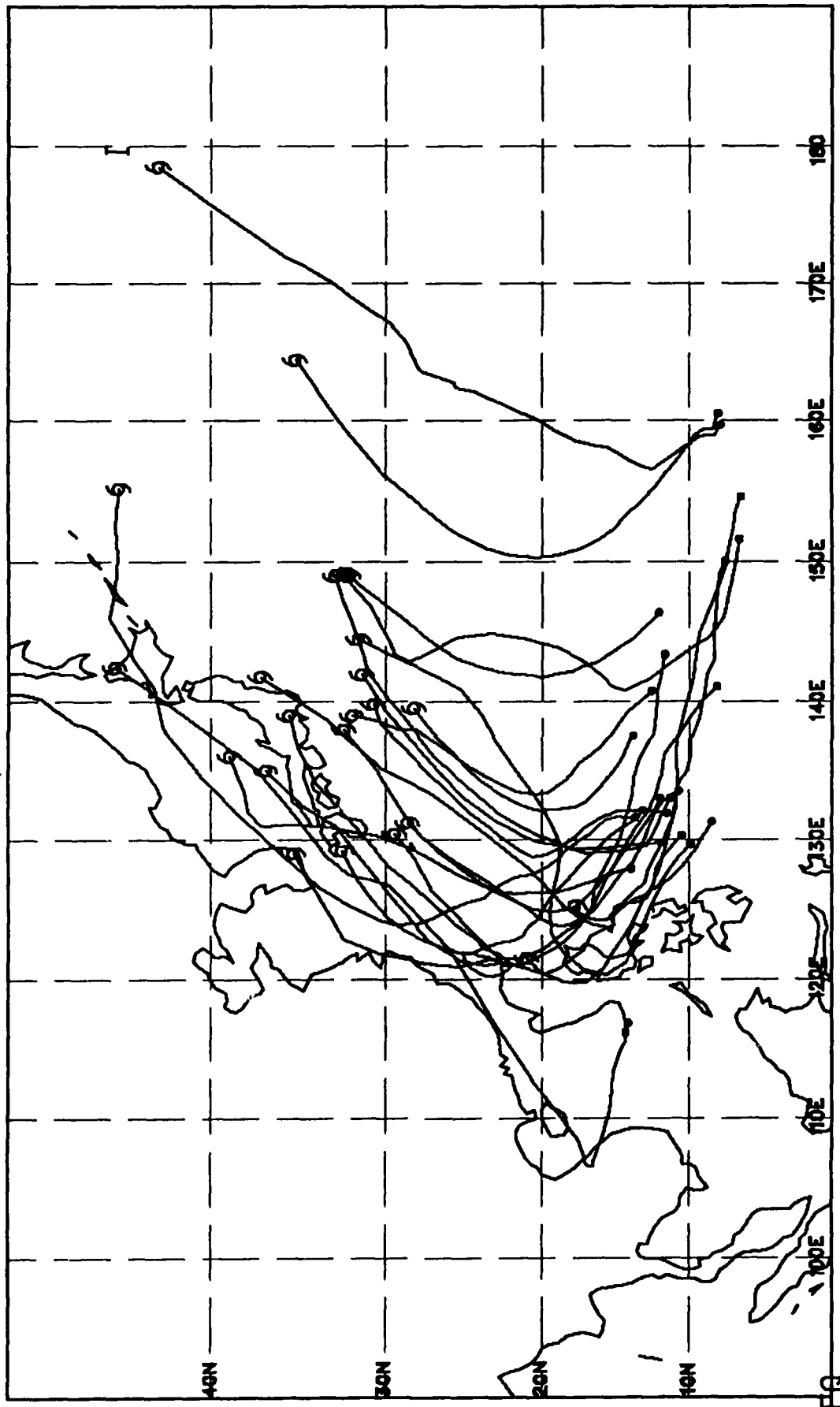
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR MAY 24 - JUN 8



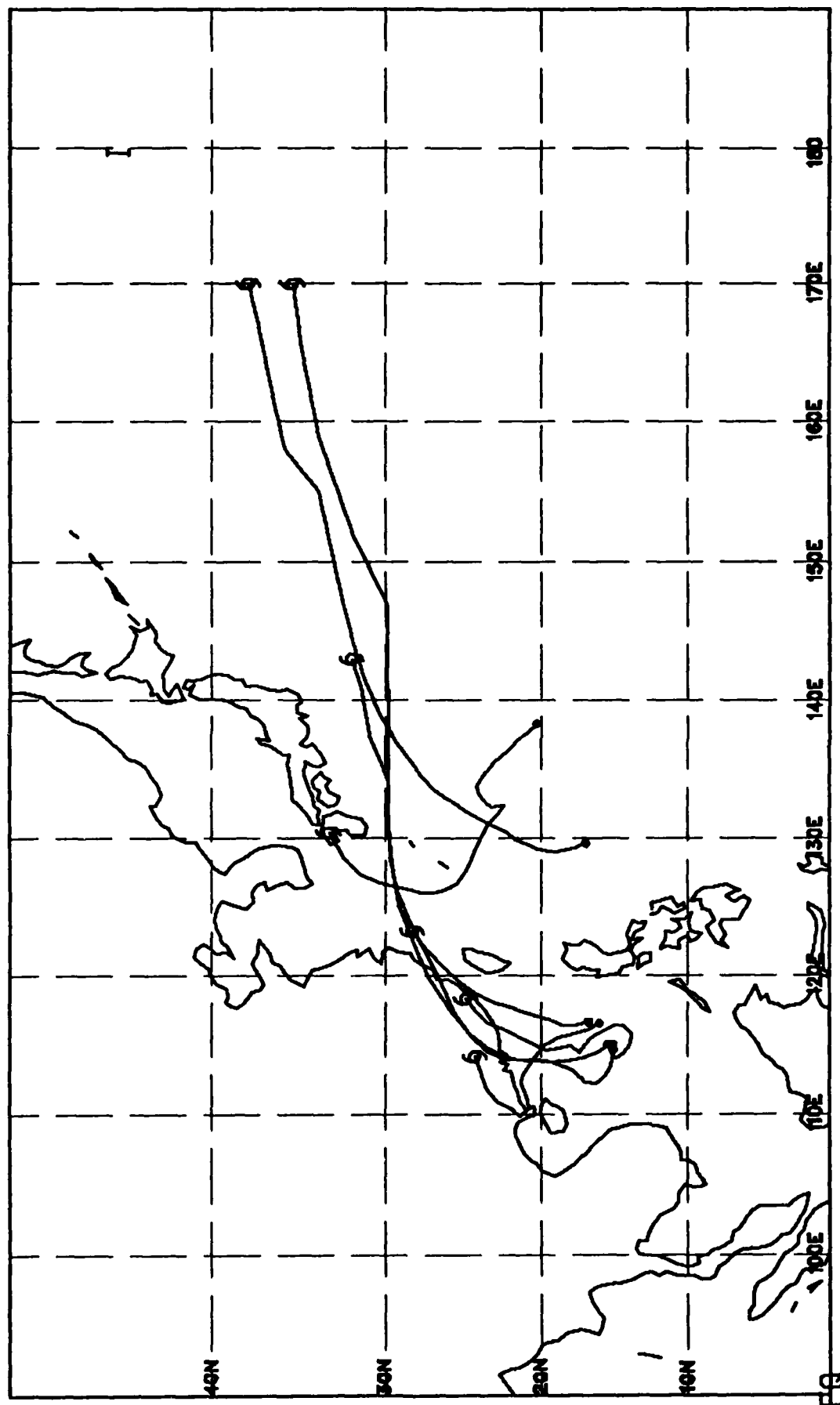
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR MAY 24 - JUN 8



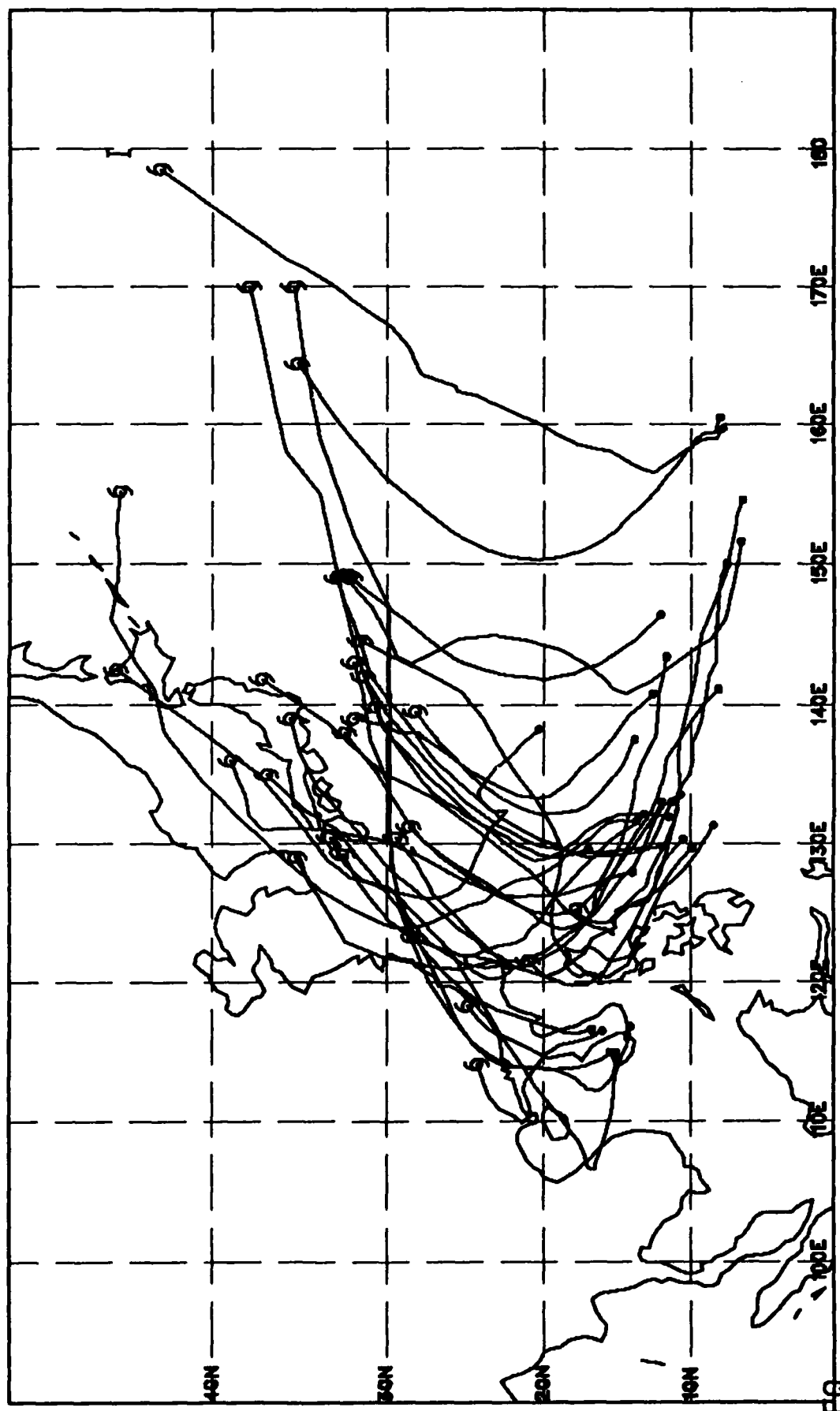
Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR MAY 24 - JUN 8



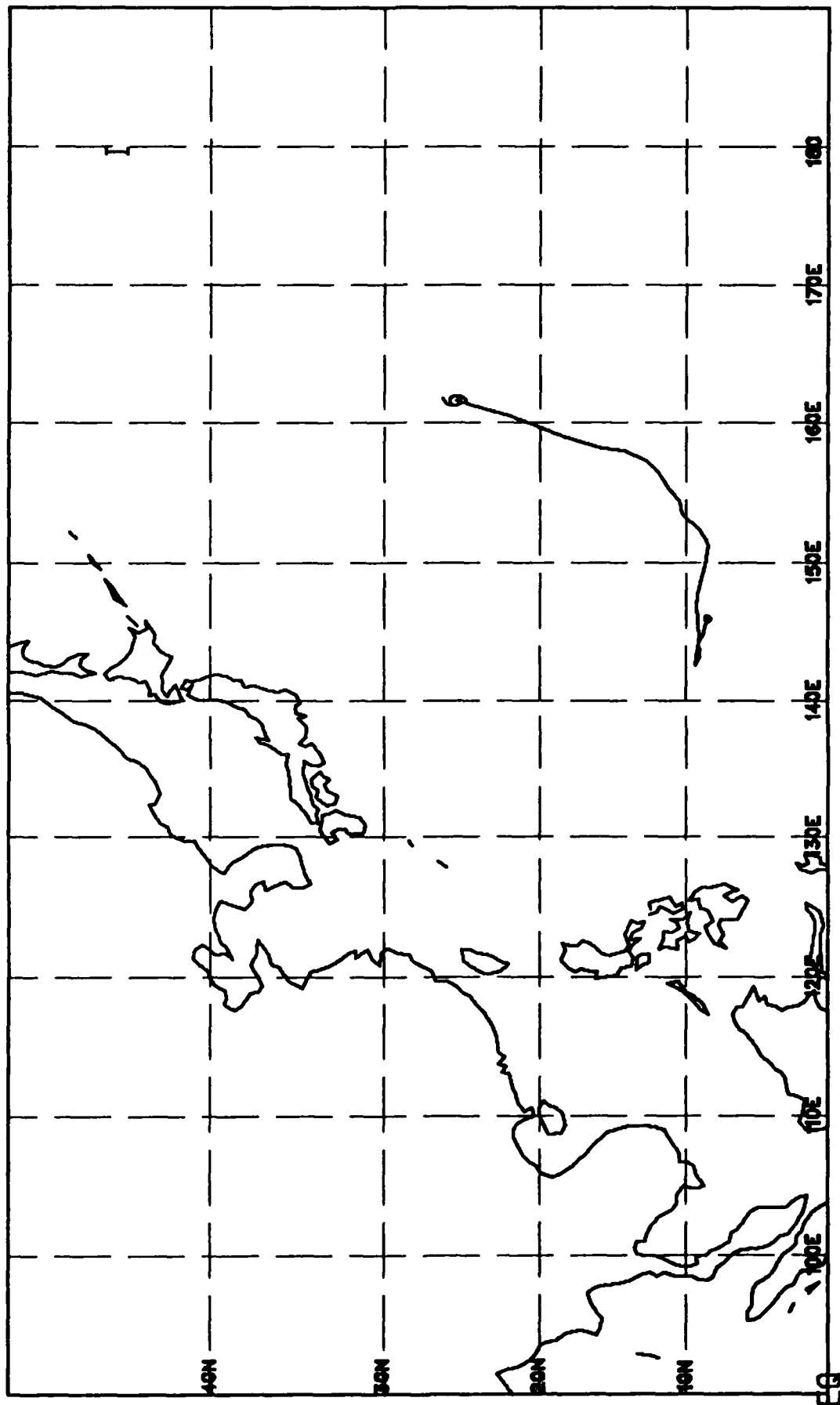
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR MAY 24 - JUN 8



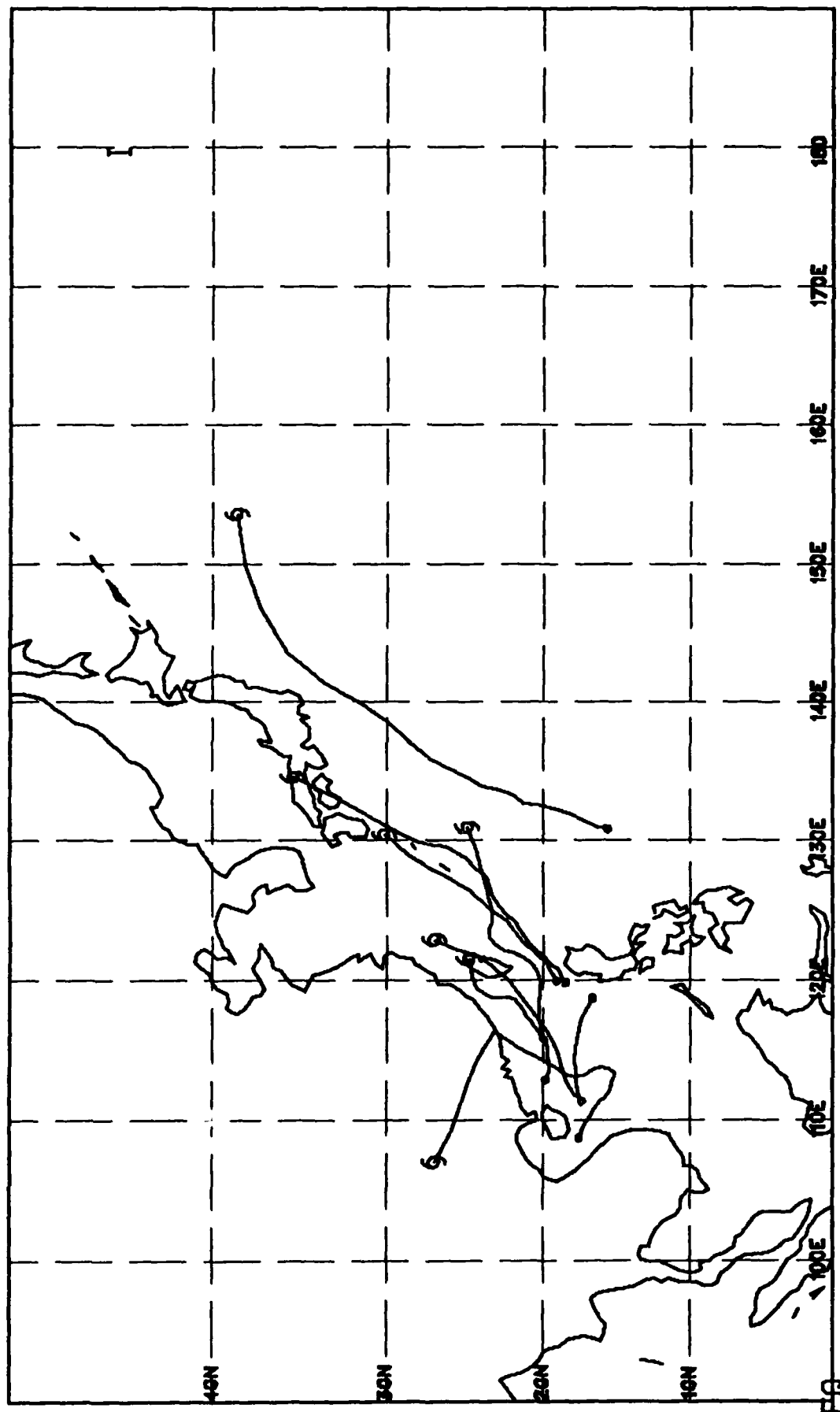
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR MAY 24 - JUN 8



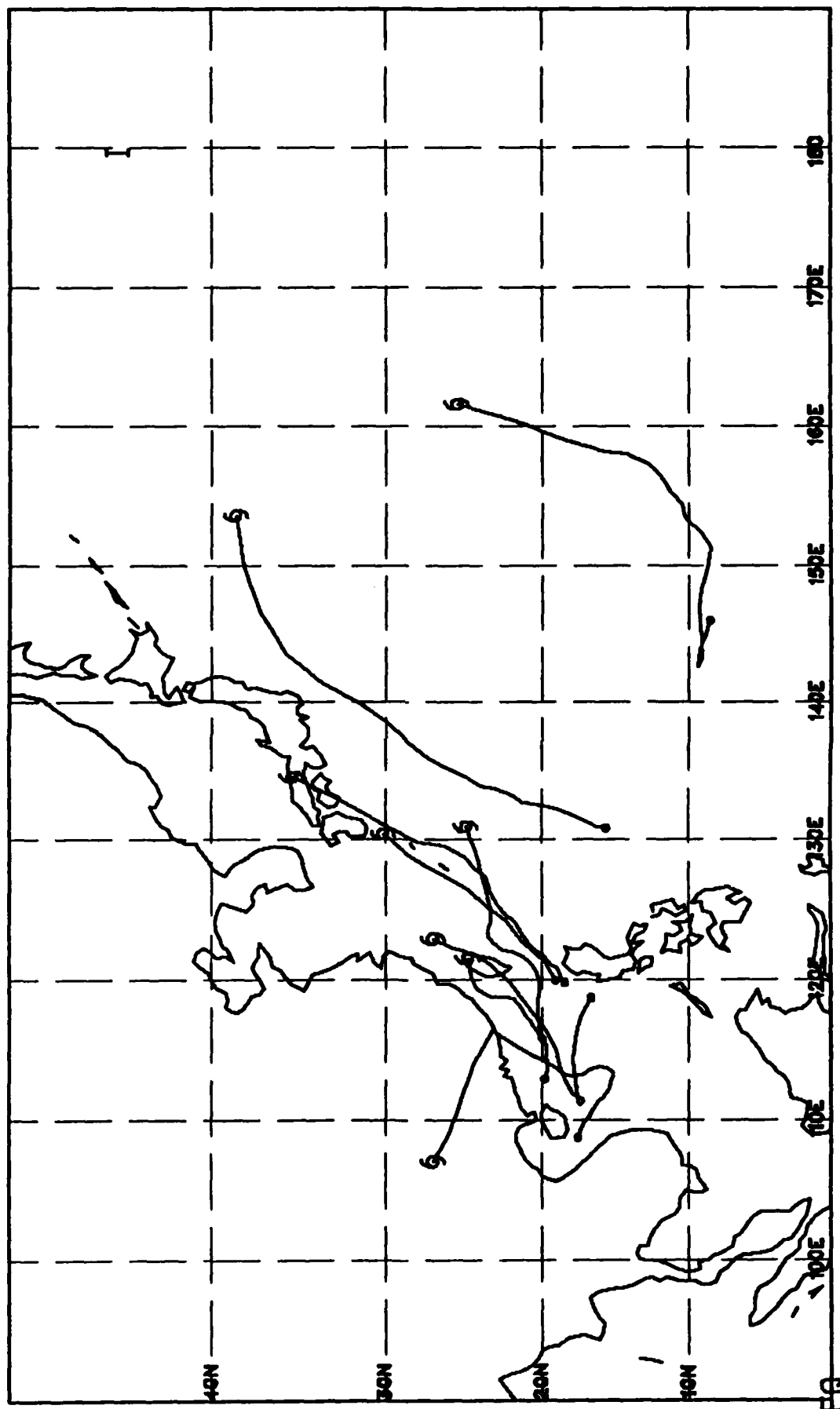
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR MAY 24 - JUN 8



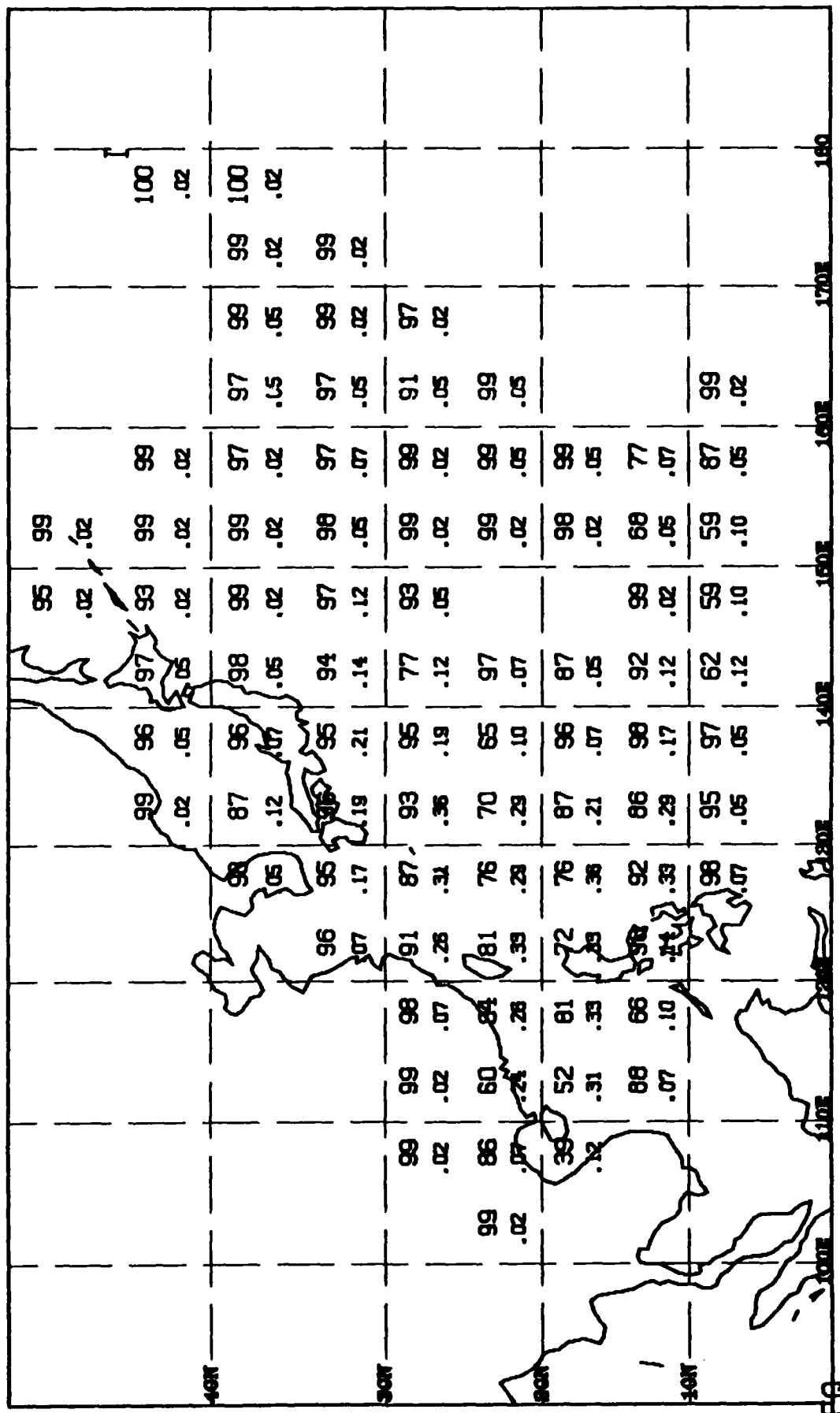
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR MAY 24 - JUN 8

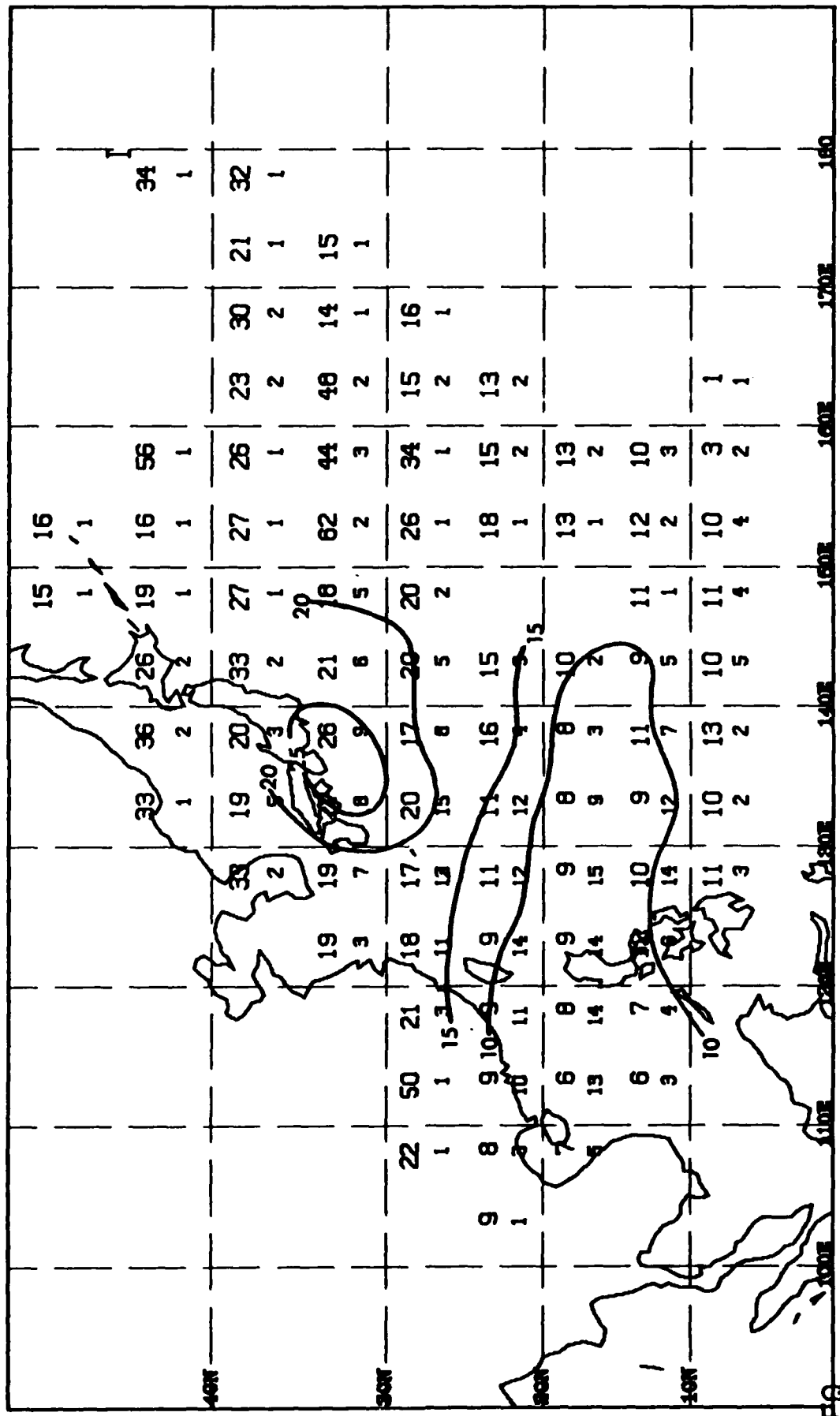


Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR MAY 24 - JUN 8

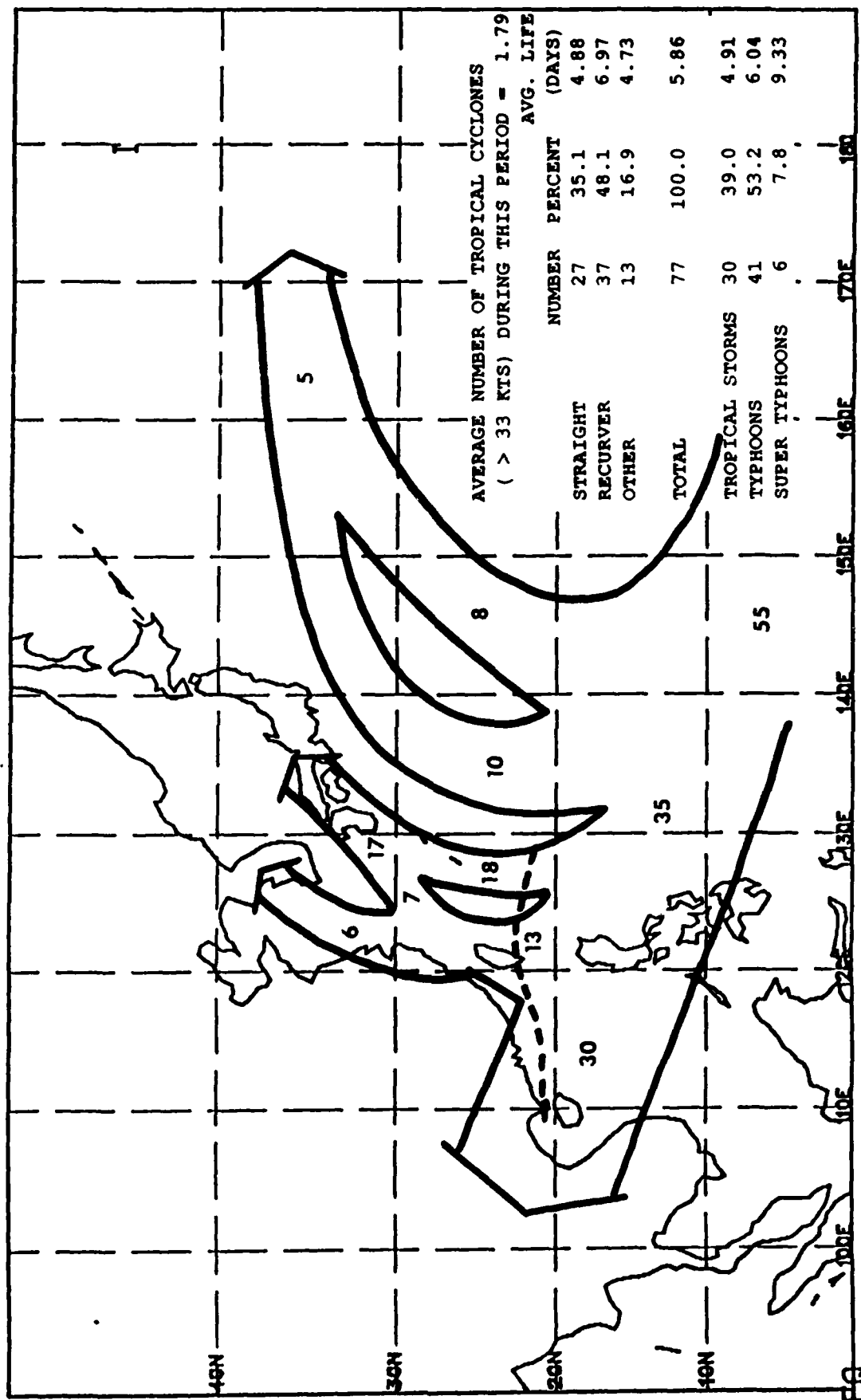


SPEED OF MOVEMENT FOR MAY 24 - JUN 8



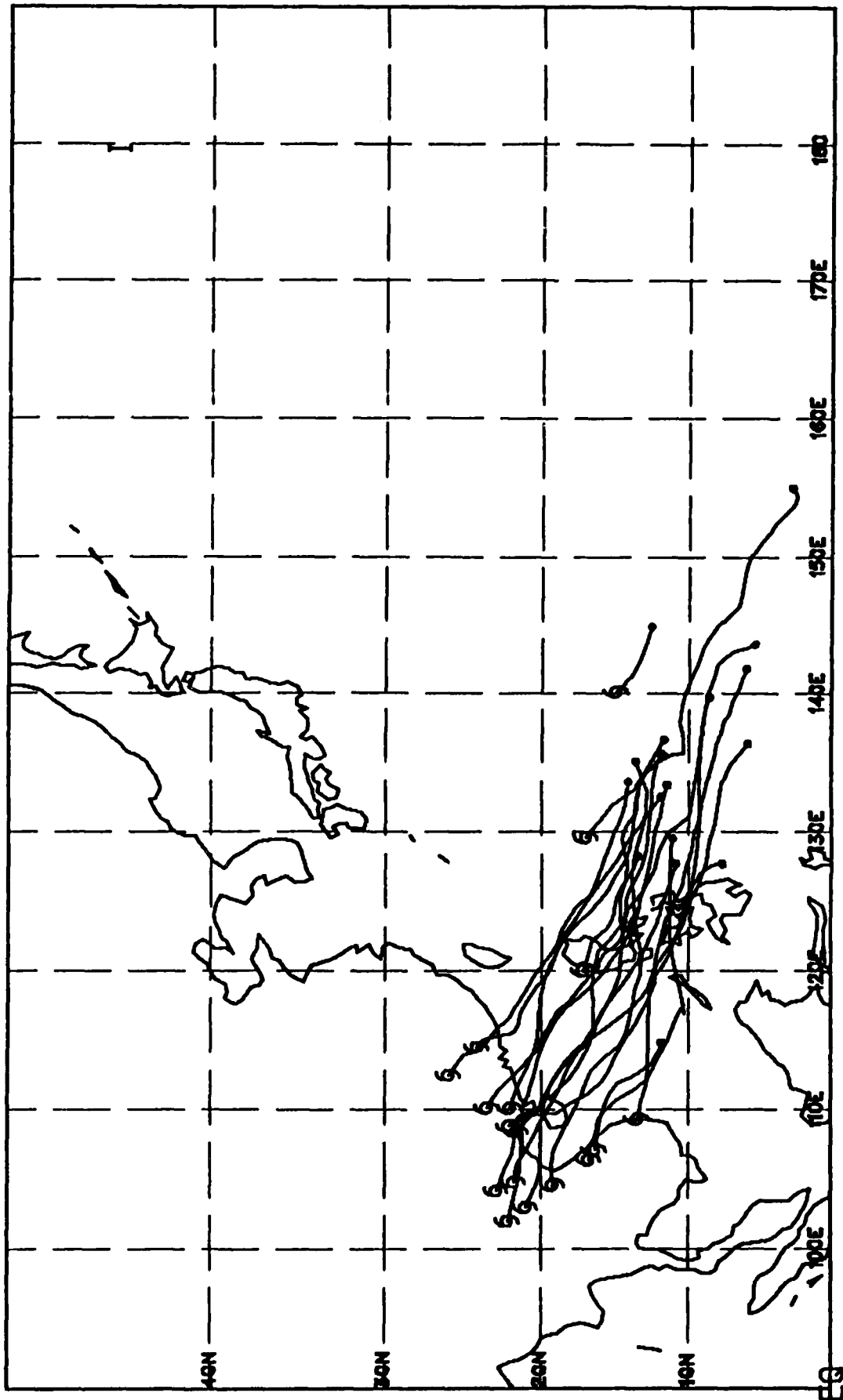
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR JUN 9 - JUN 23



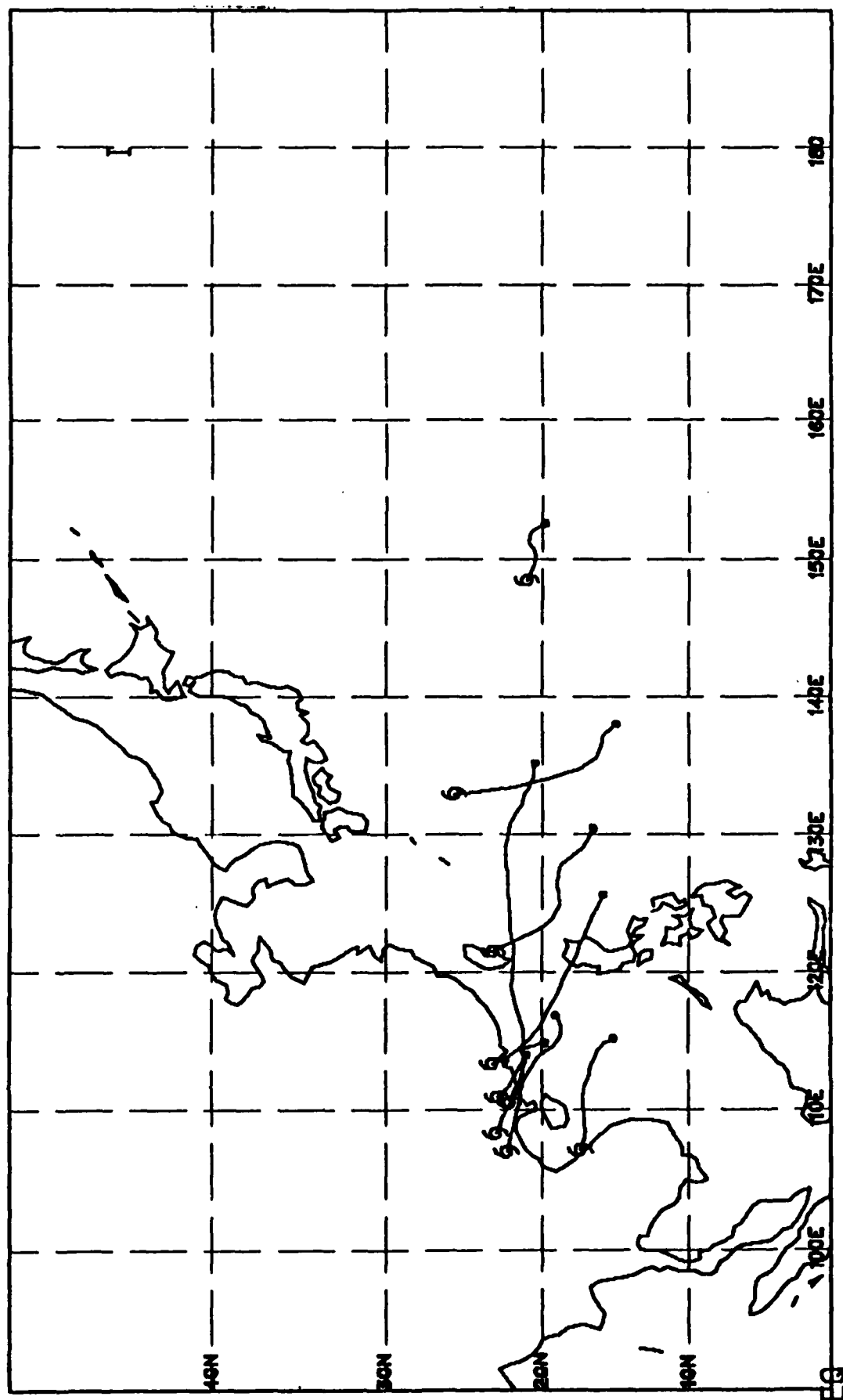
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored. Dashed line represents mean recurvature position of tropical cyclones (> 33 kts) classified as recurvers.

ACTUAL TRACKS FOR JUN 9 - JUN 23



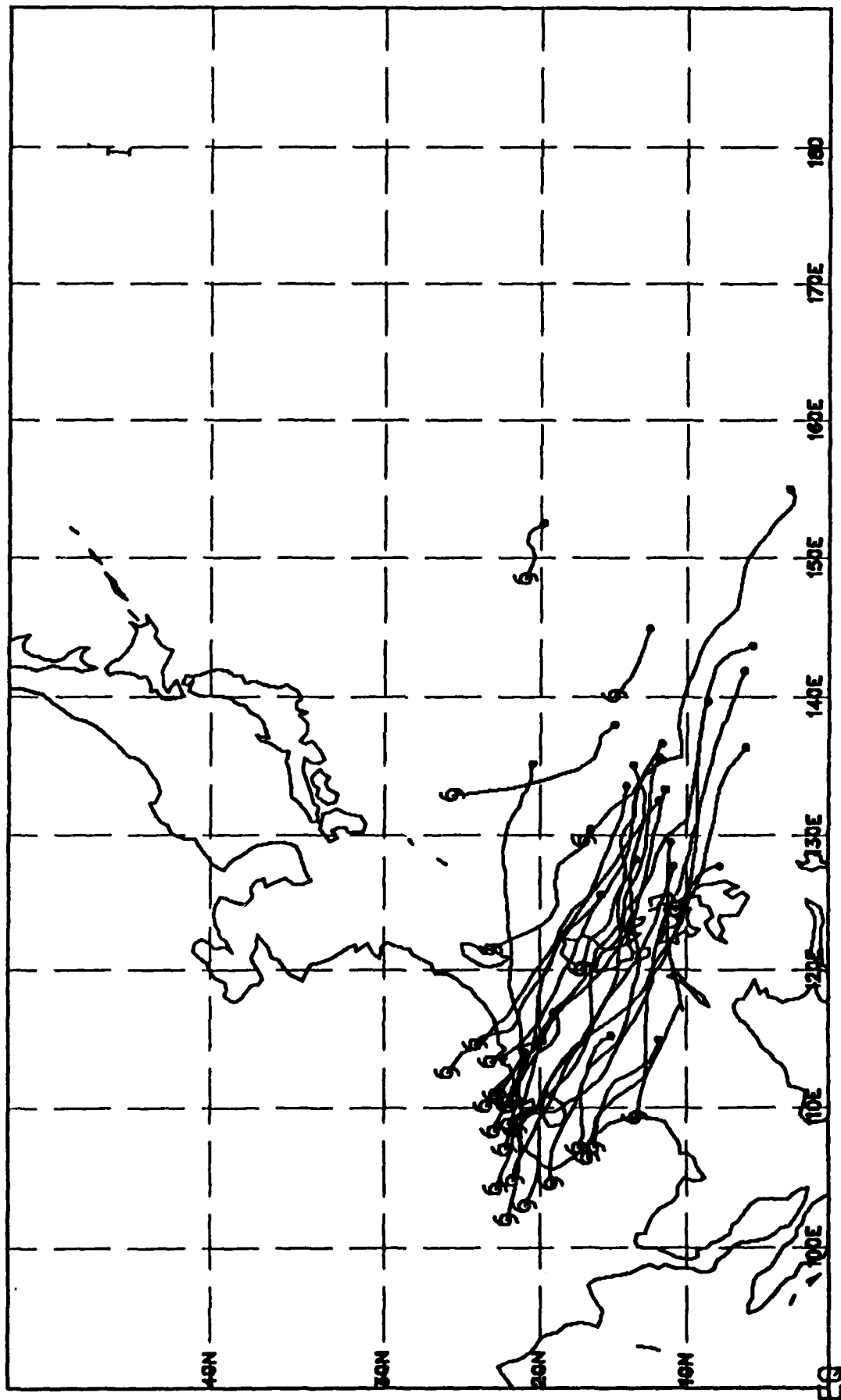
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR JUN 9 - JUN 23



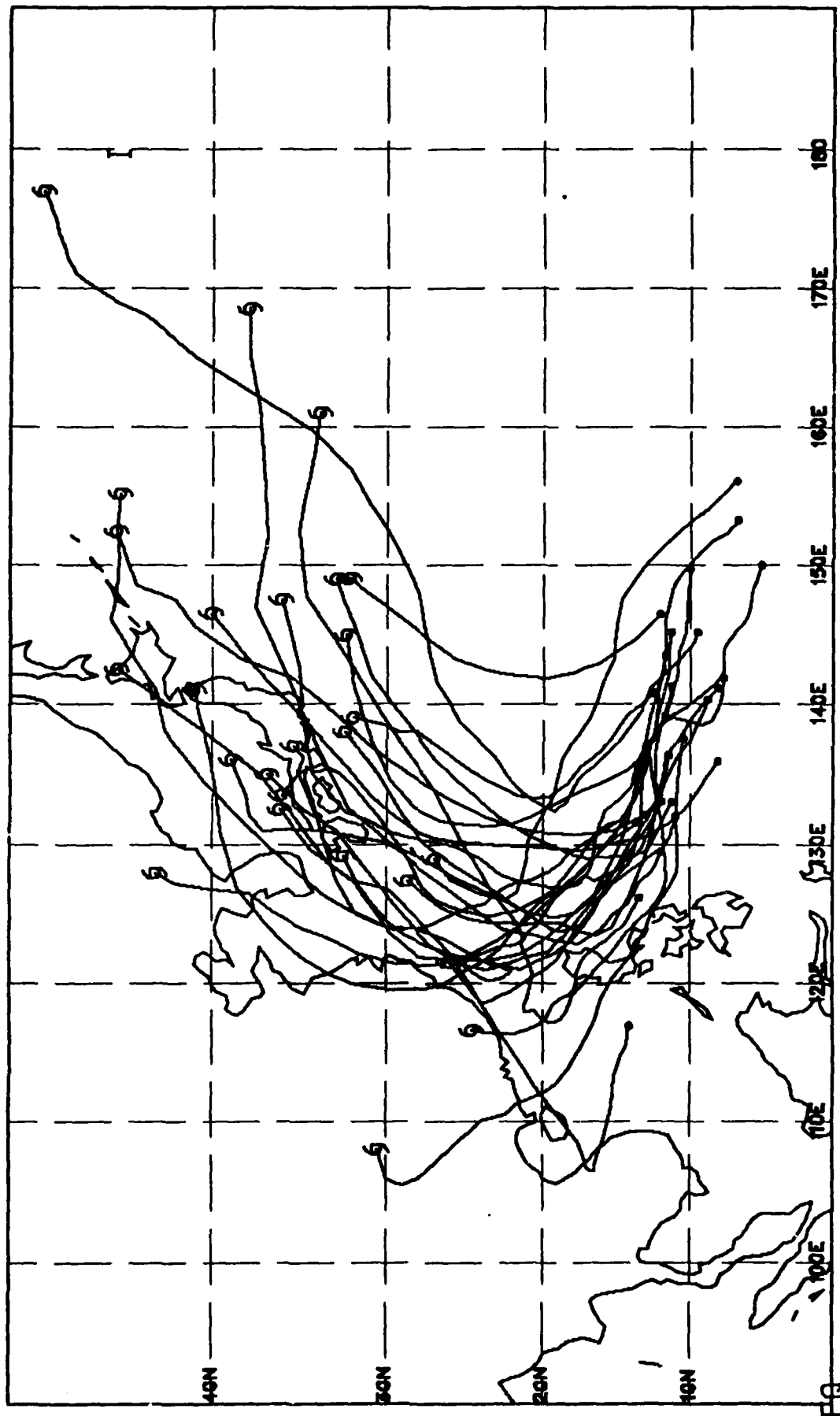
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR JUN 9 - JUN 23



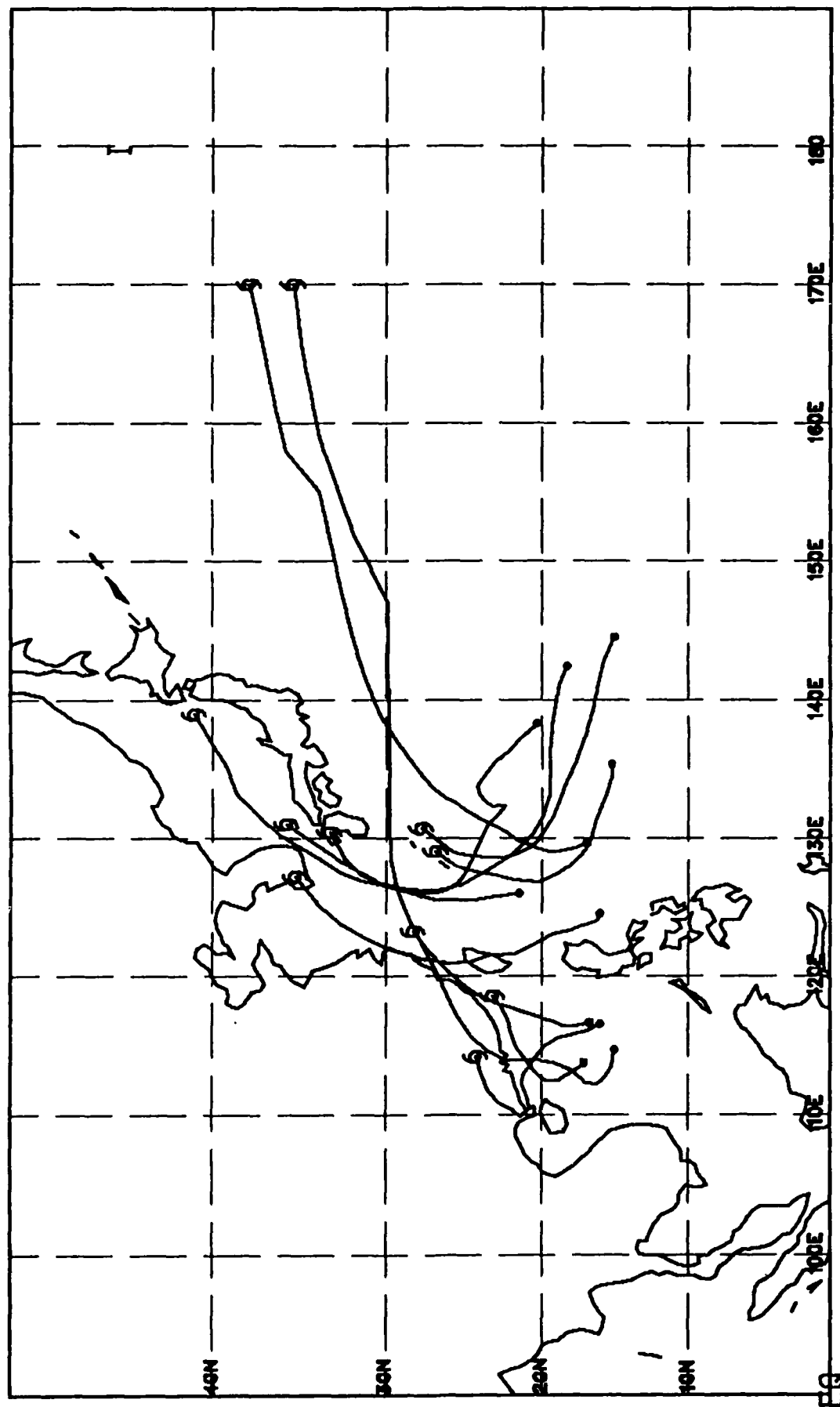
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR JUN 9 - JUN 23



Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

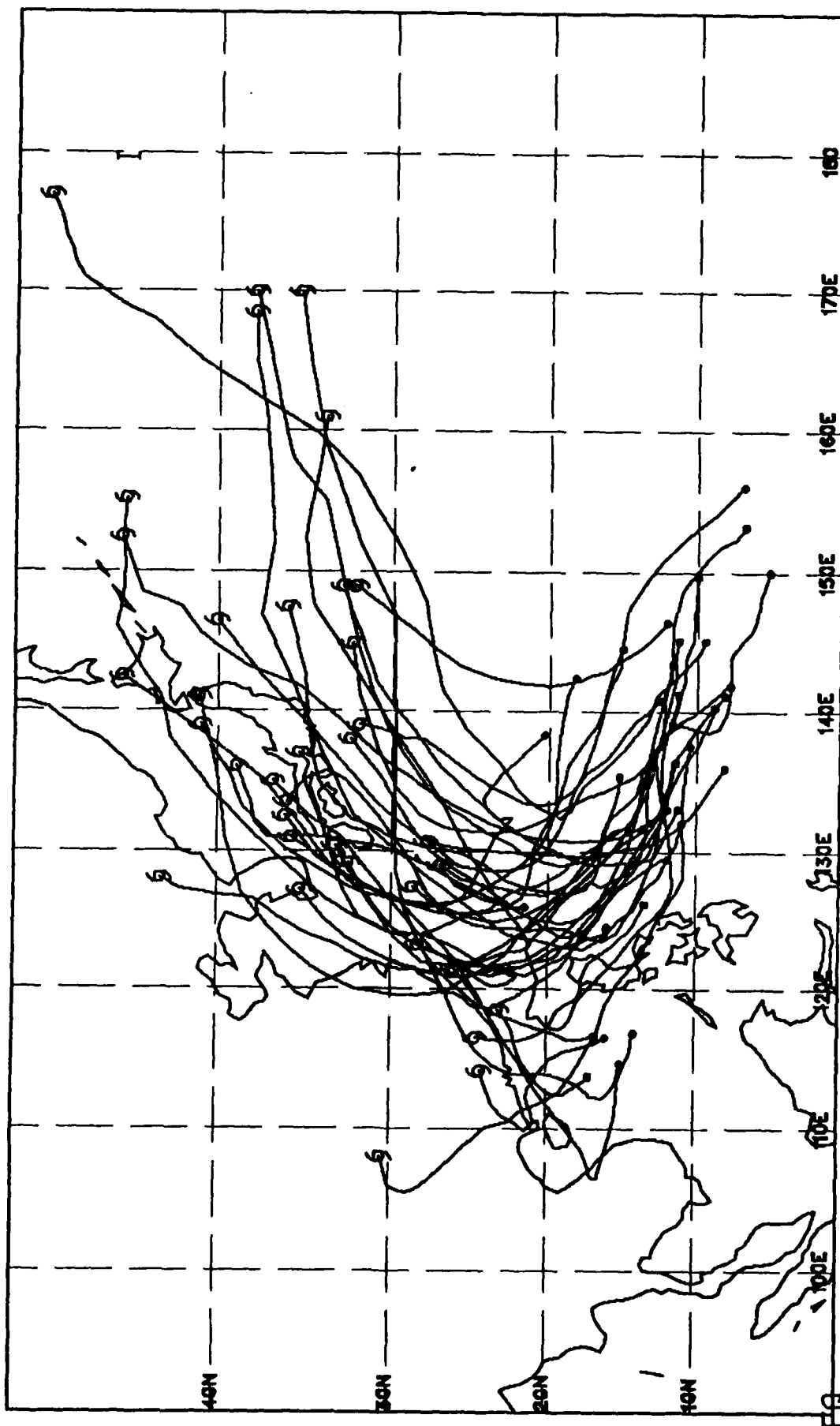
ACTUAL TRACKS FOR JUN 9 - JUN 23



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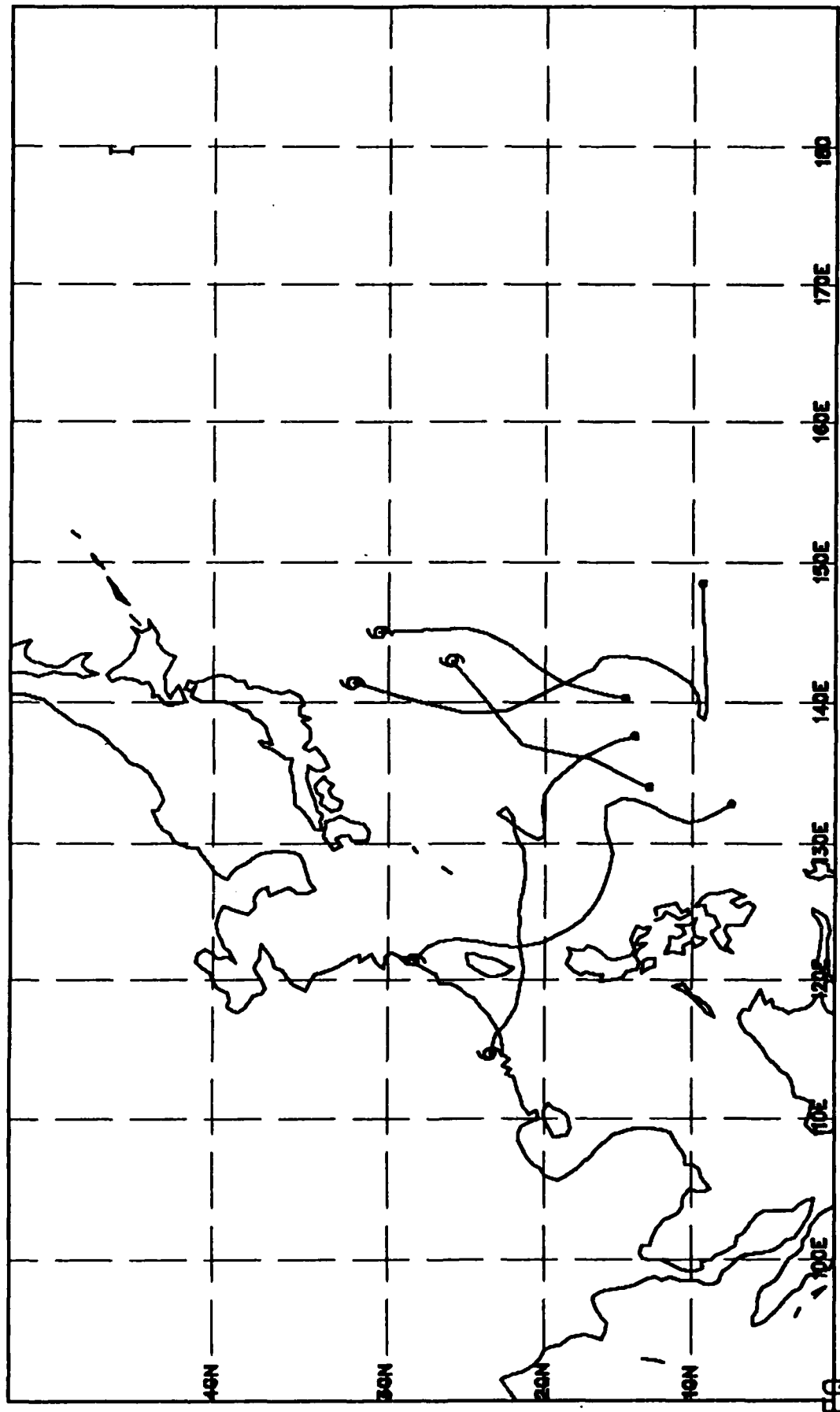
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR JUN 9 - JUN 23



Actual path of all recurring tropical cyclones (> 33 kts).

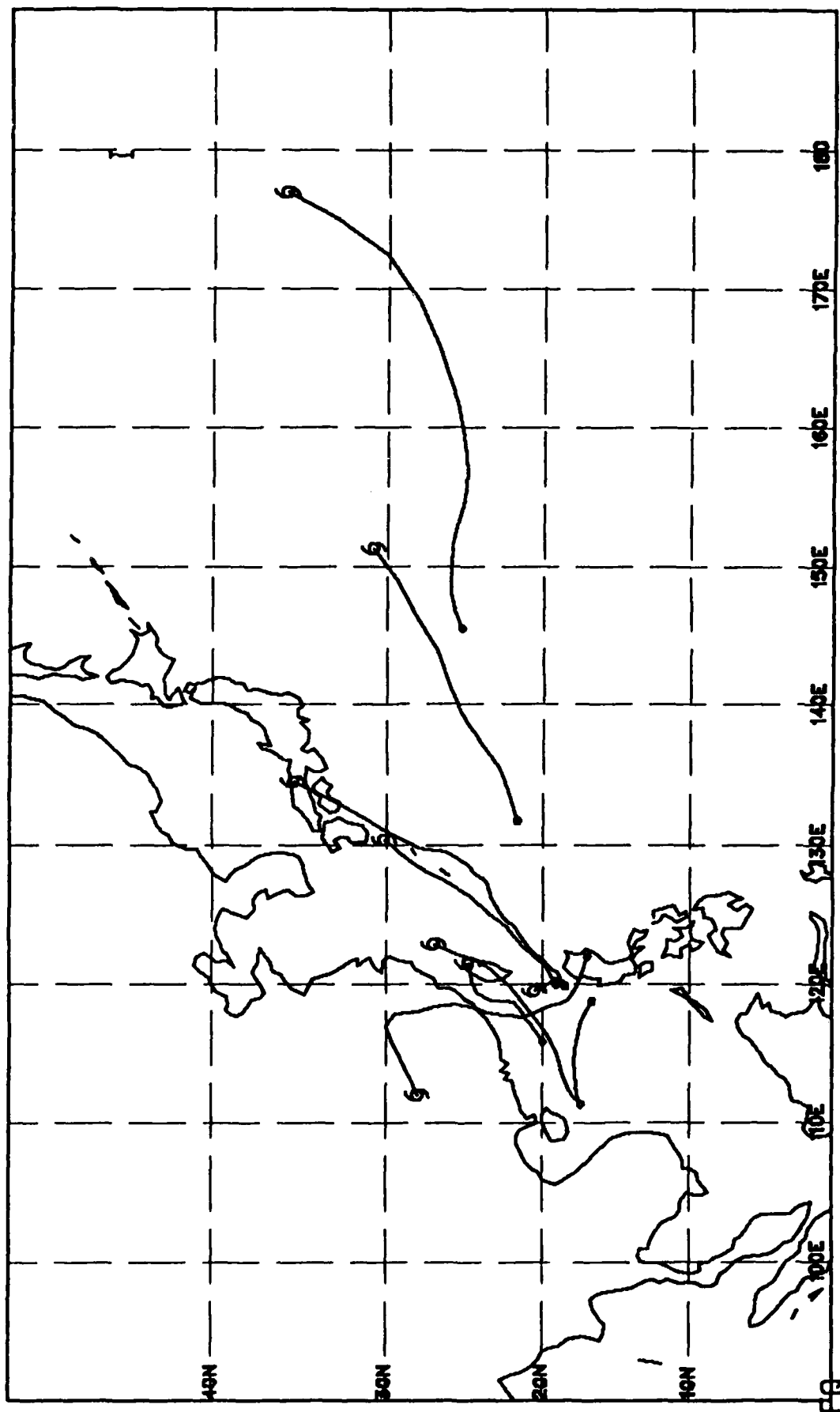
ACTUAL TRACKS FOR JUN 9 - JUN 23



W-140

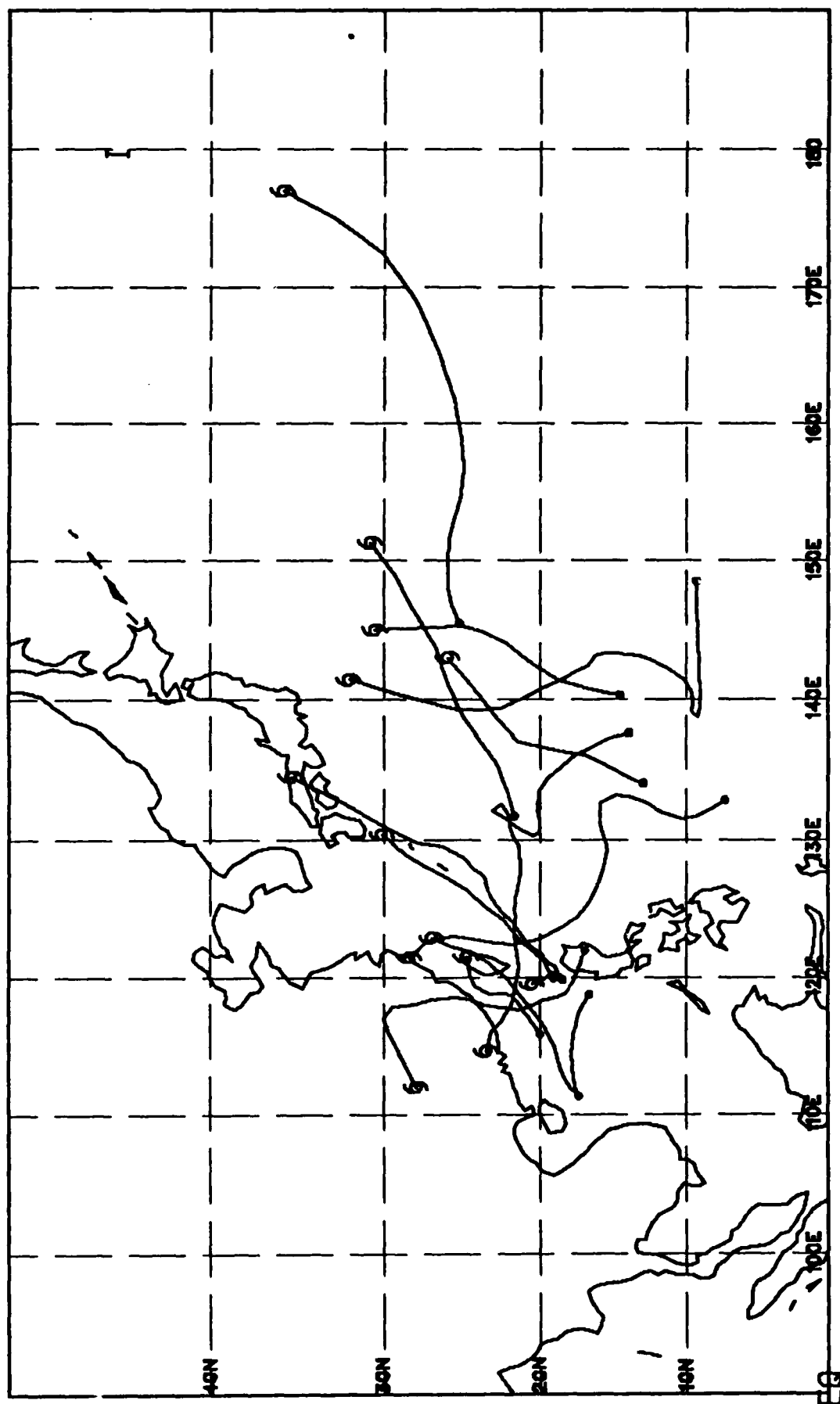
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR JUN 9 - JUN 23



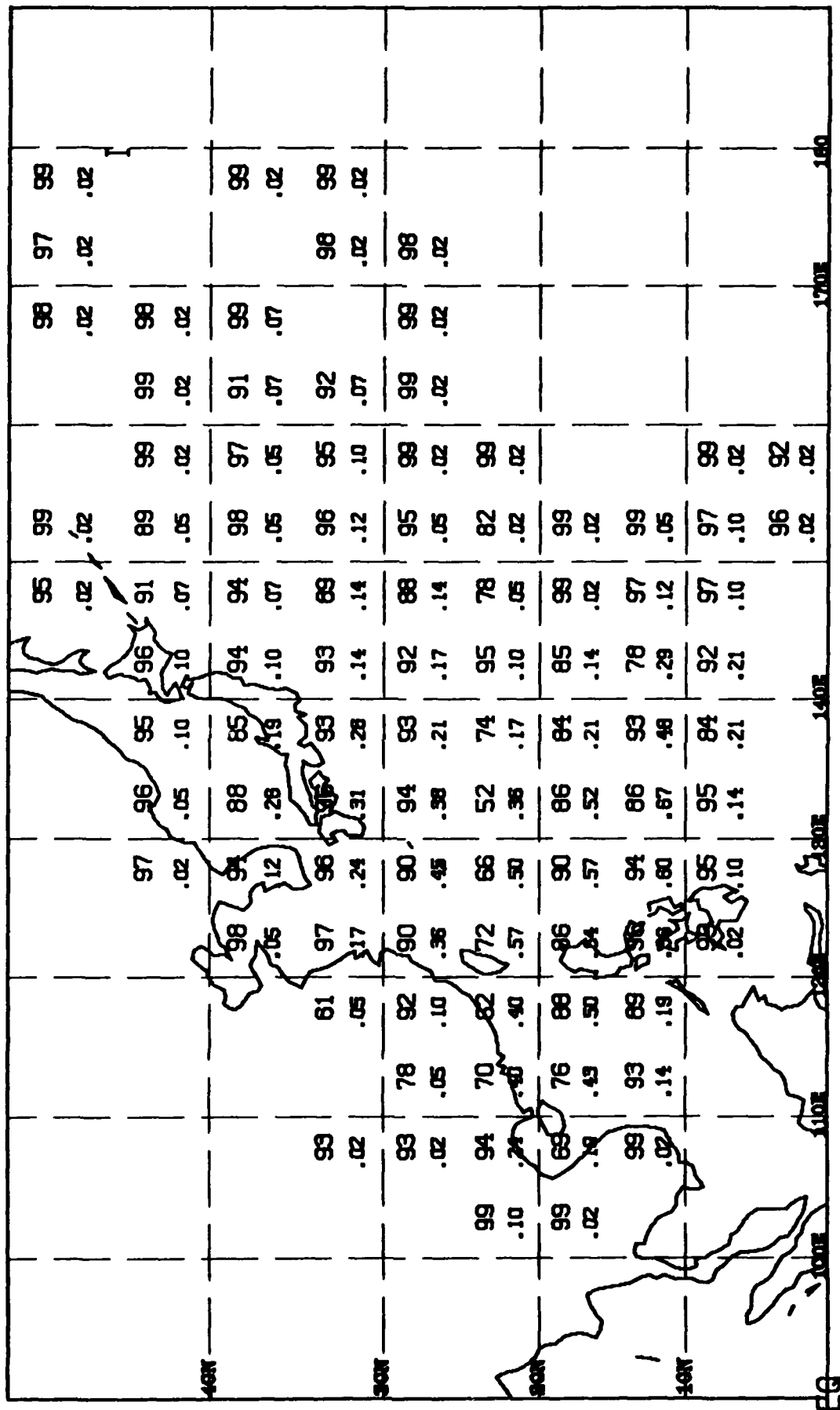
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR JUN 9 - JUN 23



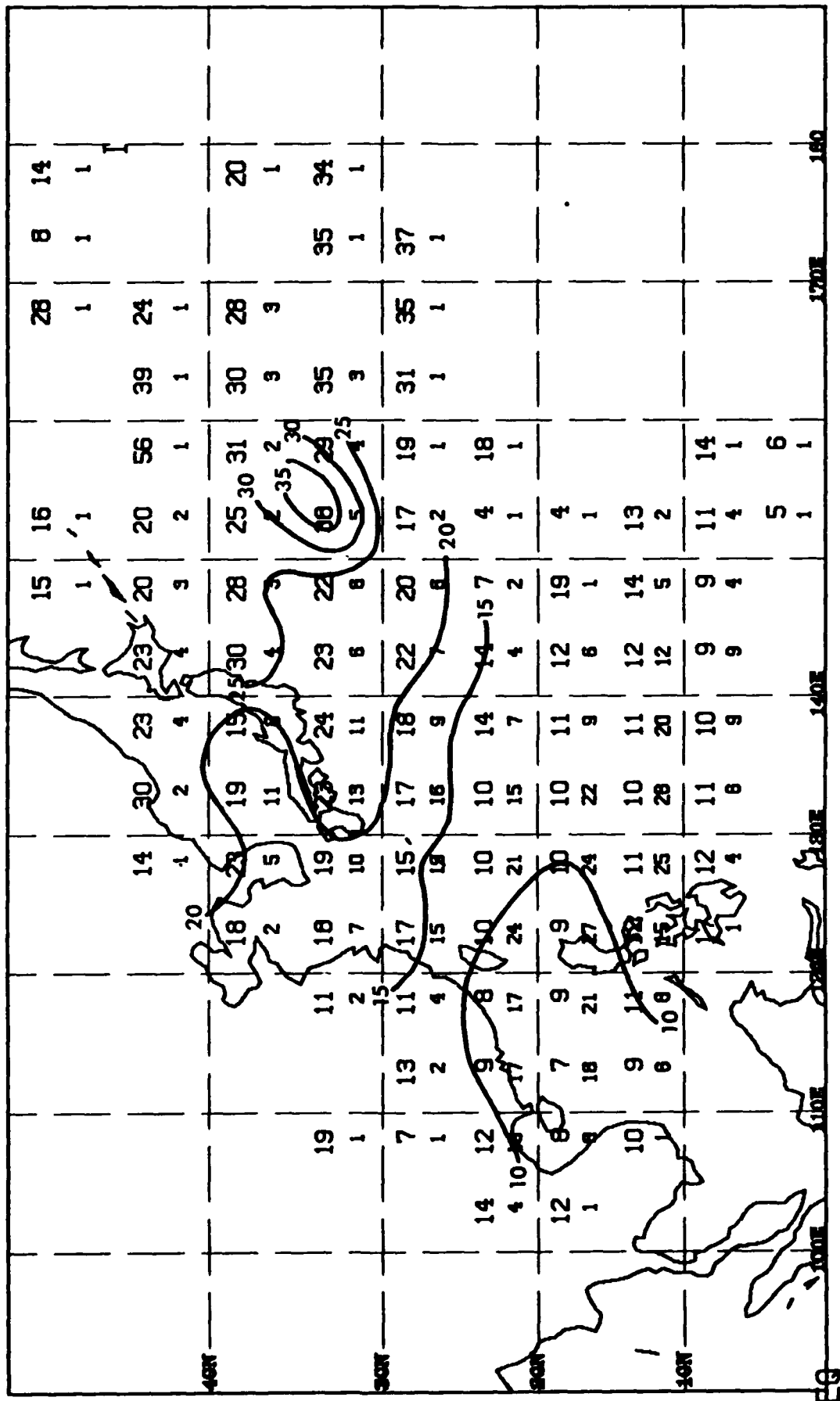
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR JUN 9 - JUN 23



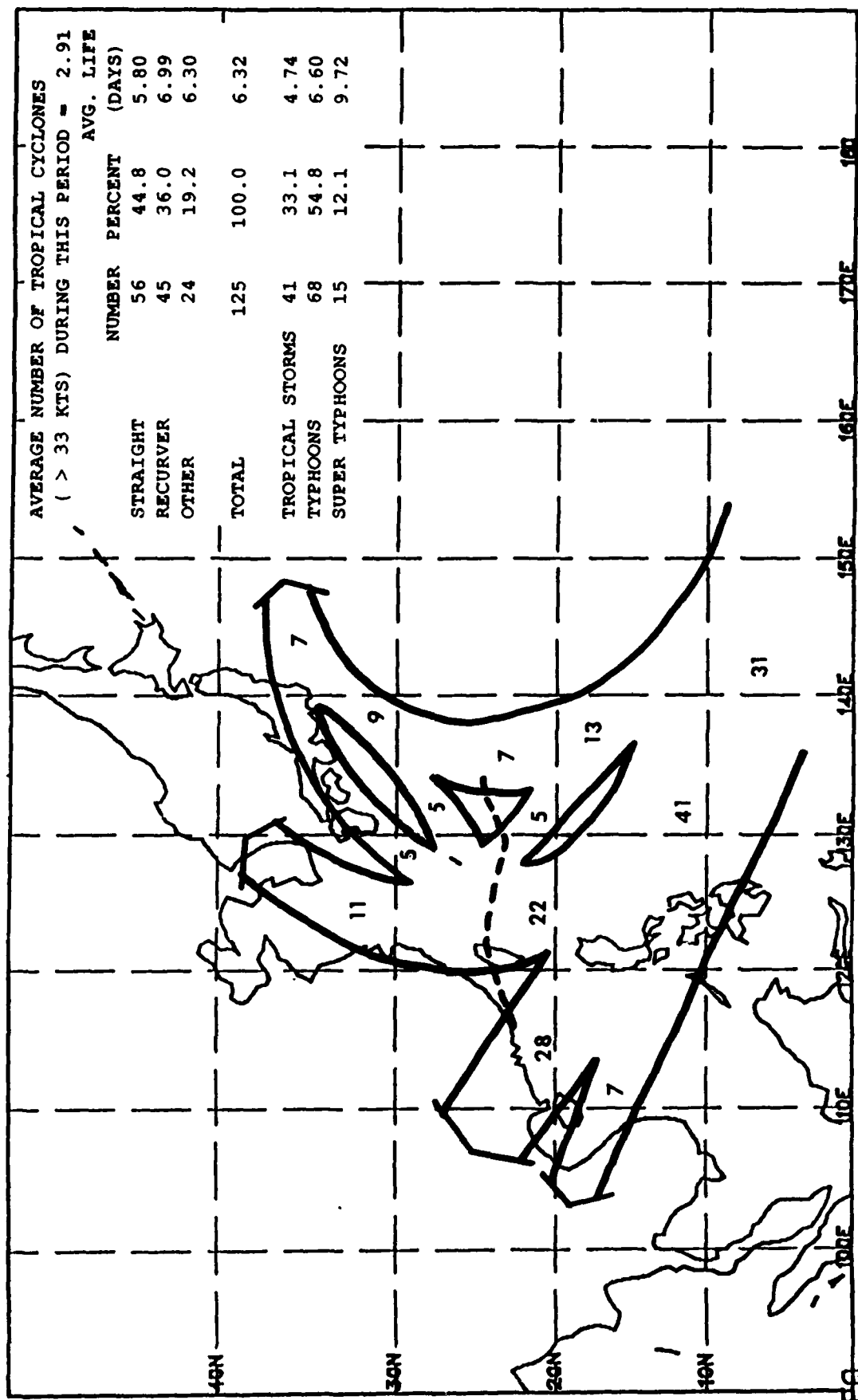
Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number).
 Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed.
 Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year per time period.

SPEED OF MOVEMENT FOR JUN 9 - JUN 23



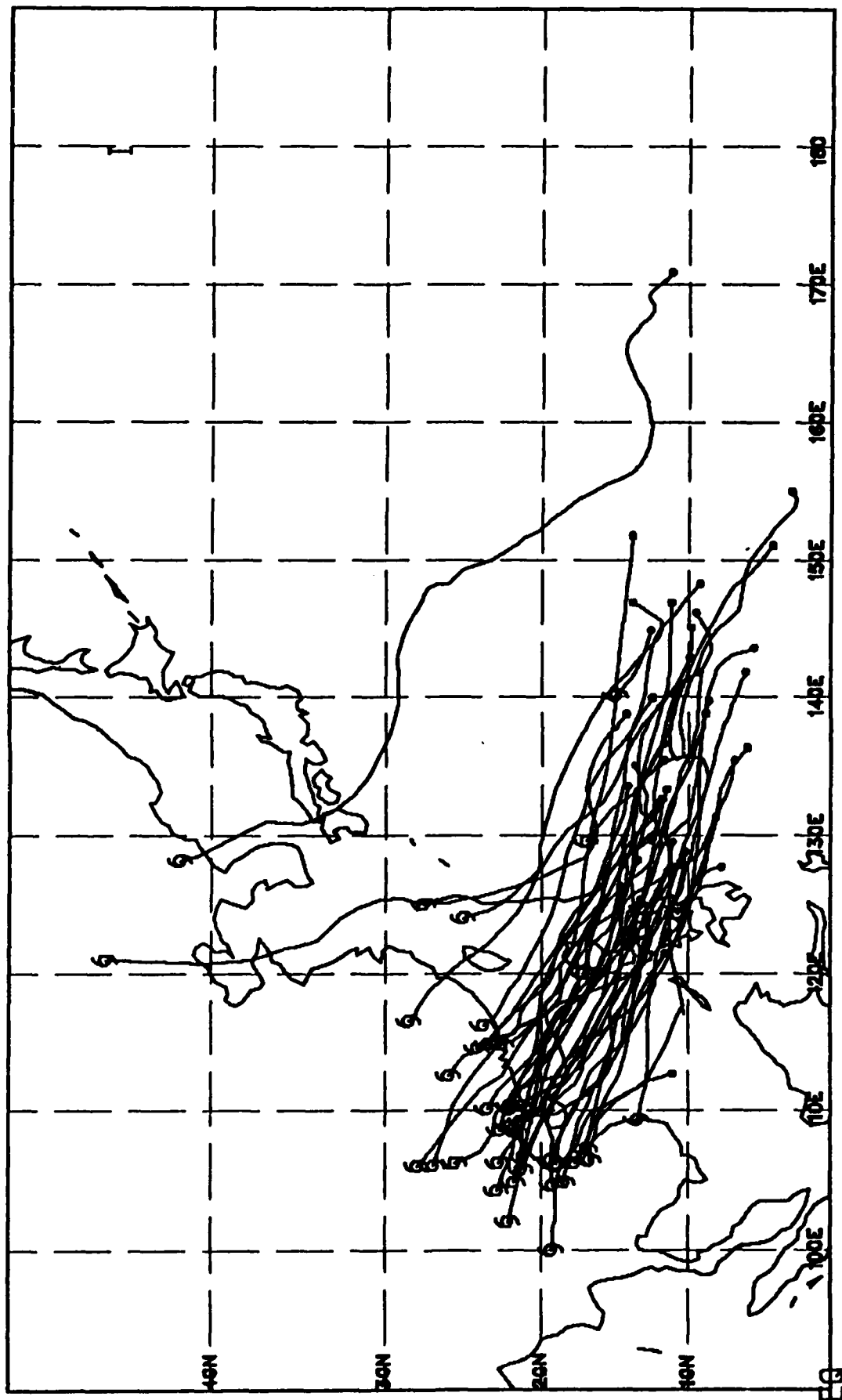
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR JUN 24 - JUL 8



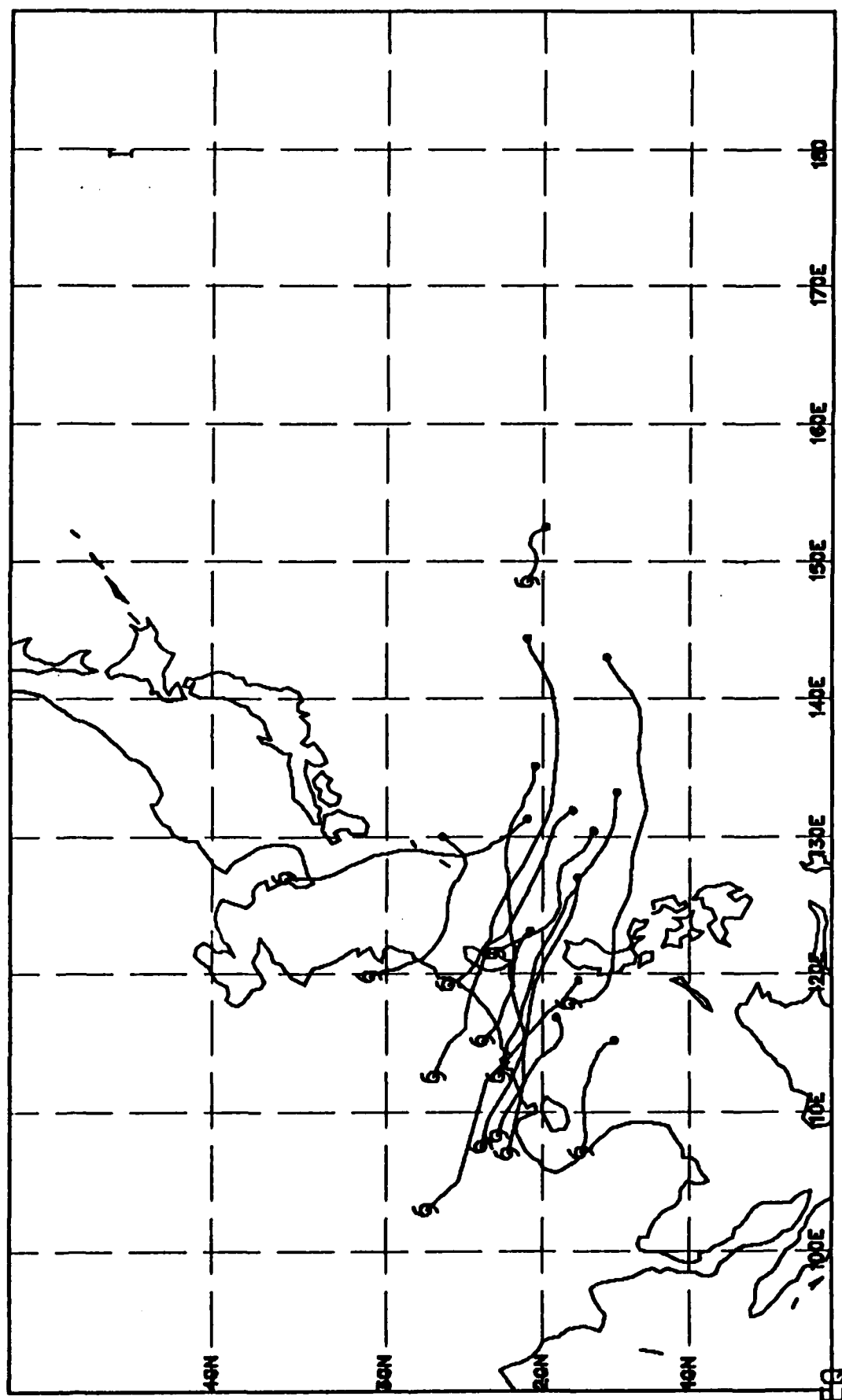
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored. Dashed line represents mean recurvature position of tropical cyclones (> 33 kts) classified as recurvers.

ACTUAL TRACKS FOR JUN 24 - JUL 8



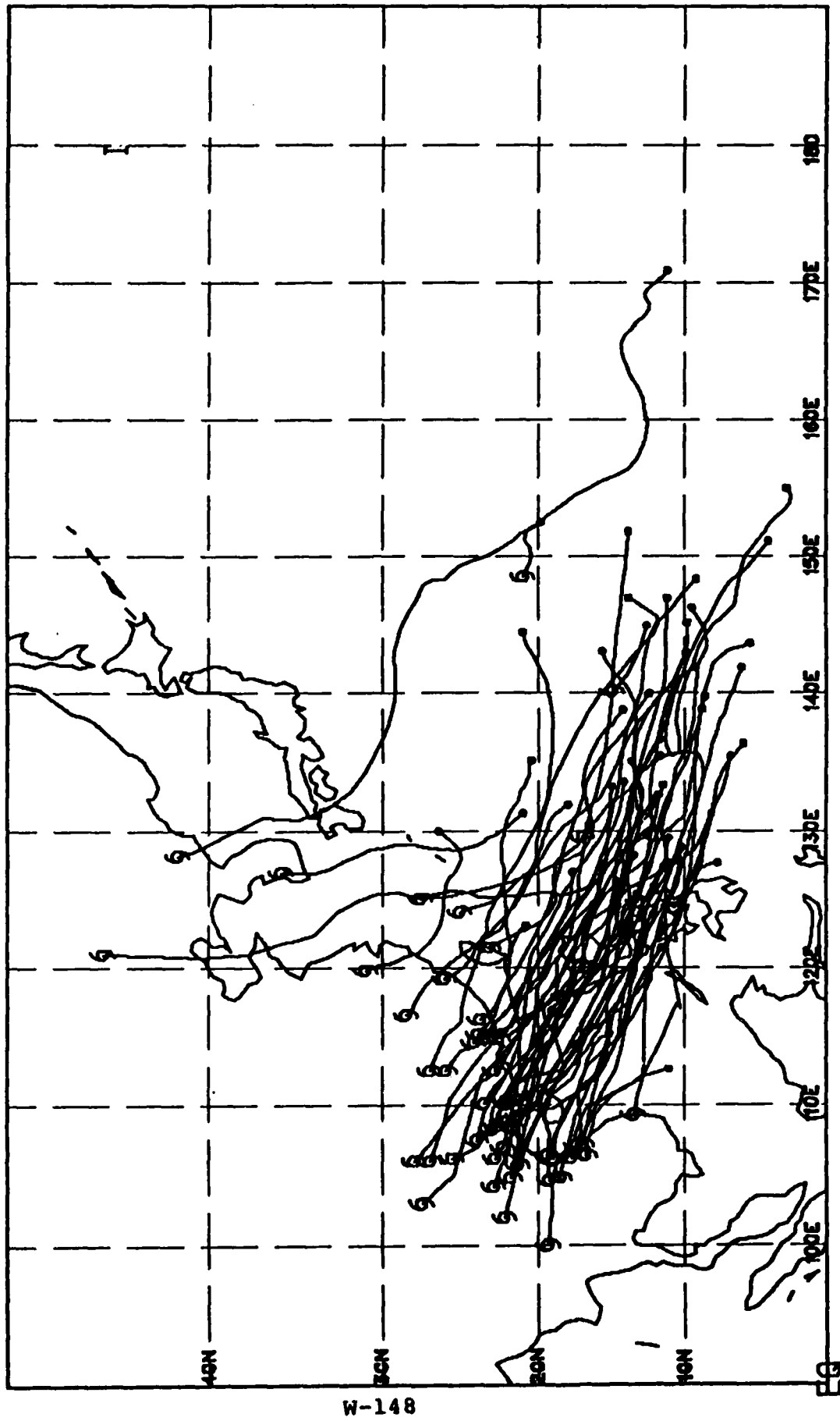
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR JUN 24 - JUL 8



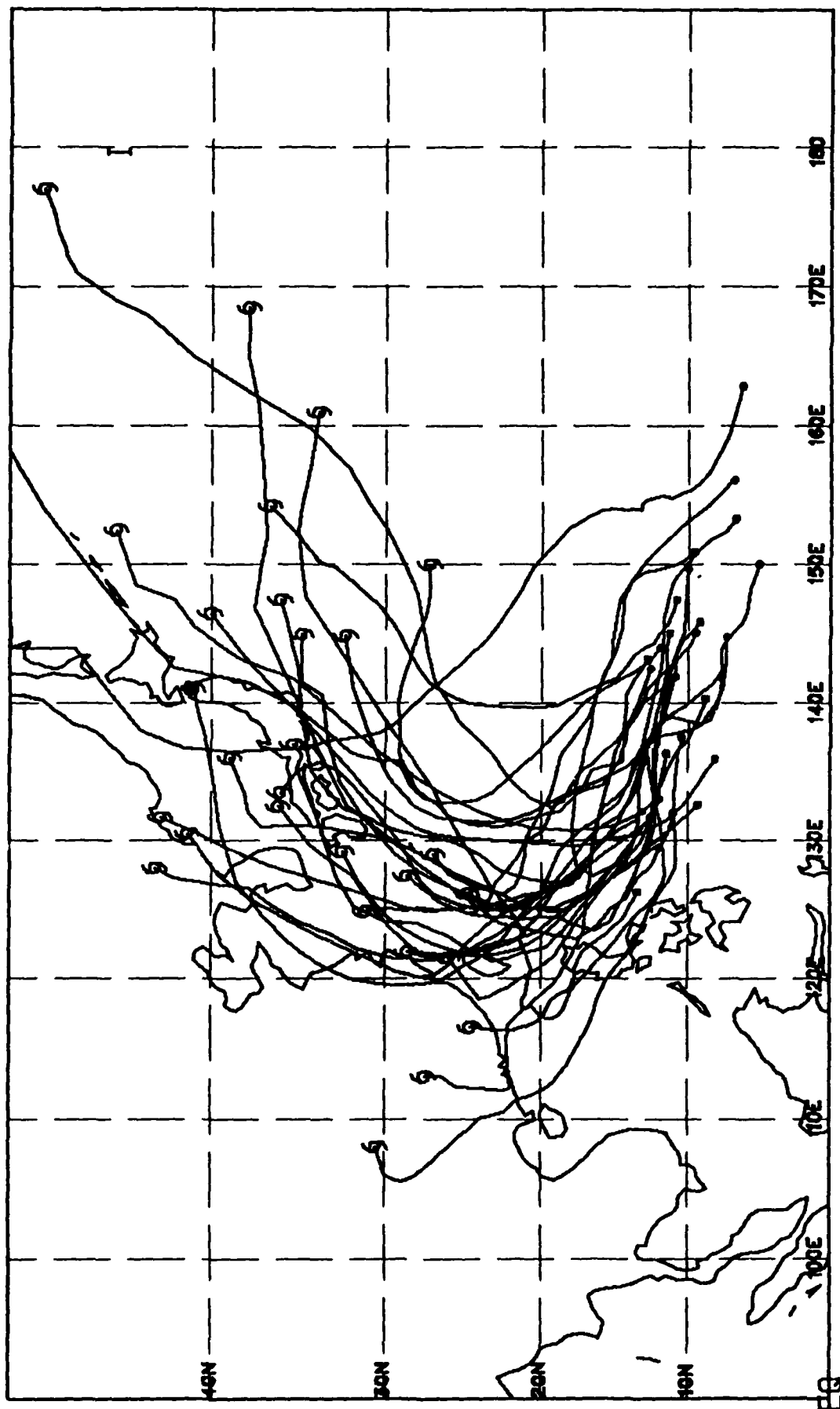
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR JUN 24 - JUL 8



Actual path of all straight tropical cyclones (> 33 kts).

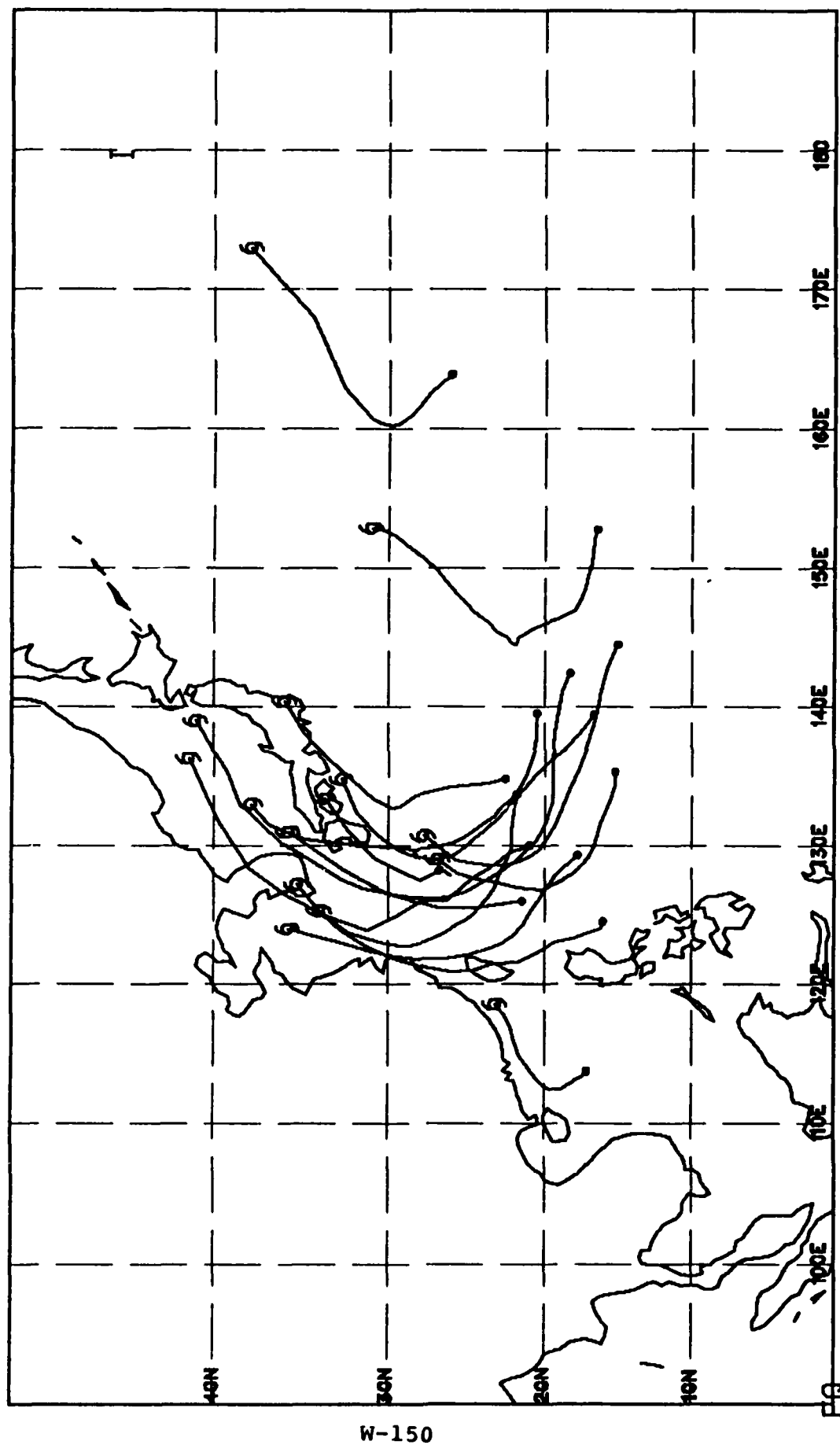
ACTUAL TRACKS FOR JUN 24 - JUL 8



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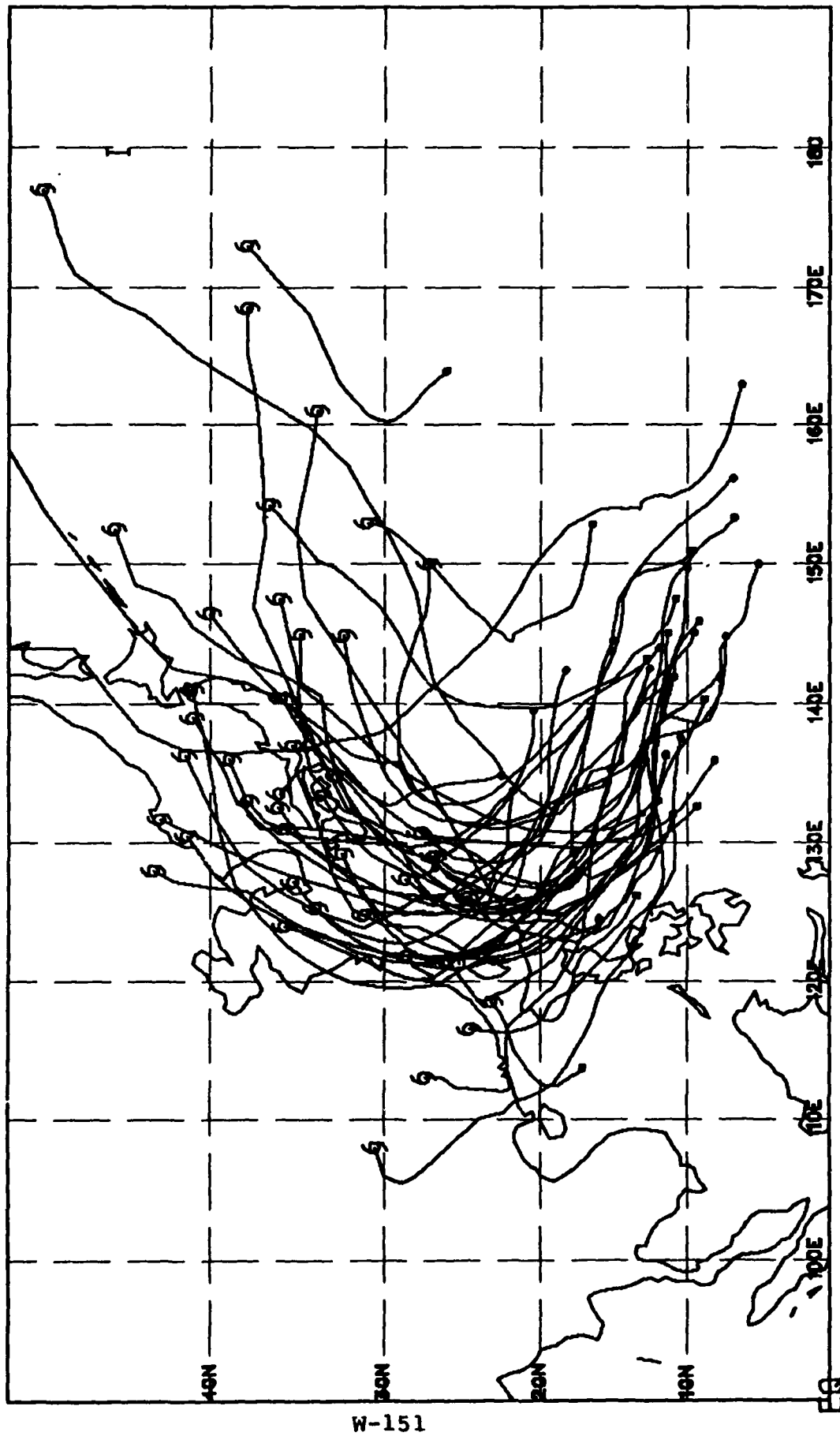
Actual path of recurving tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR JUN 24 - JUL 8



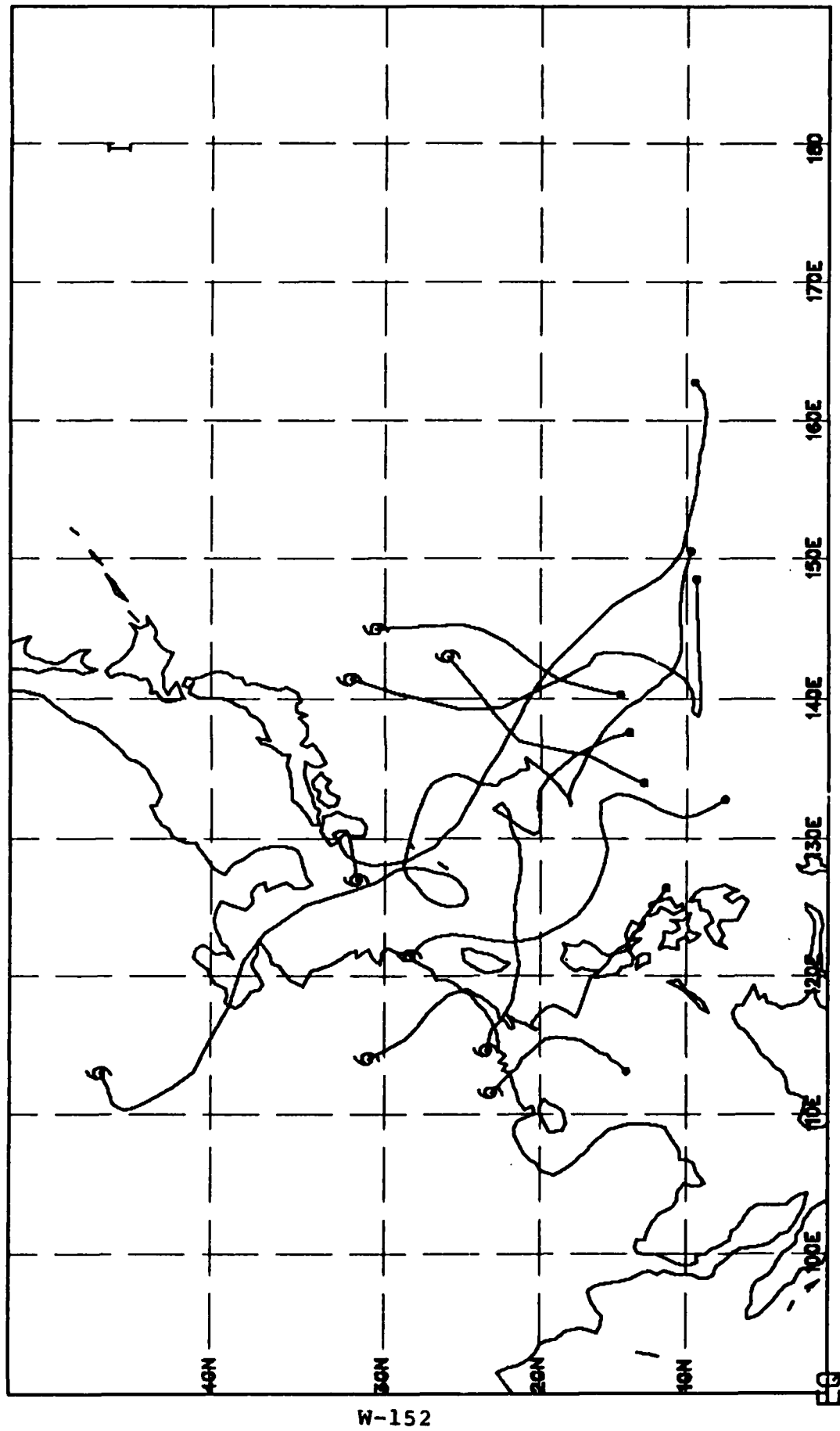
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR JUN 24 - JUL 8



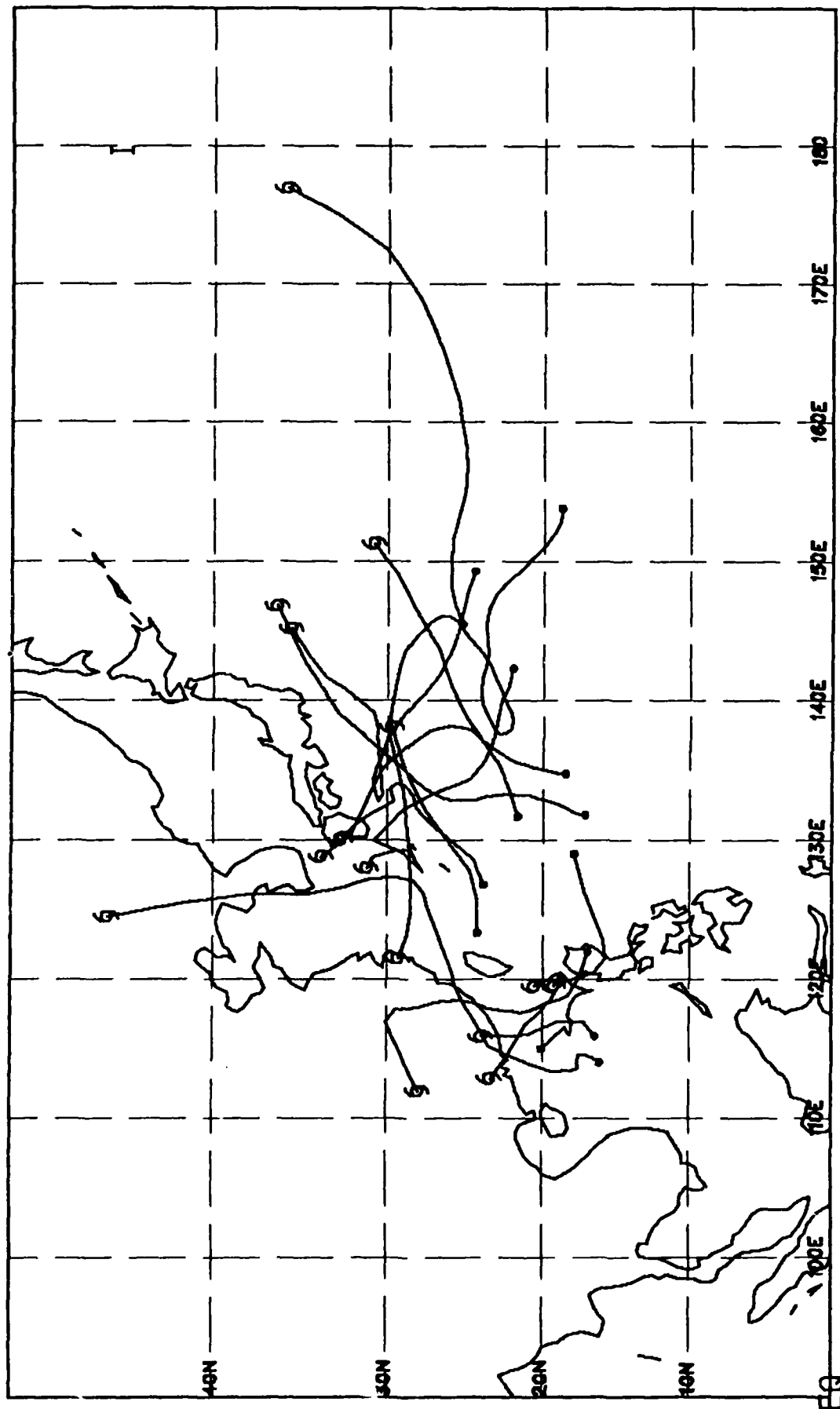
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR JUN 24 - JUL 8



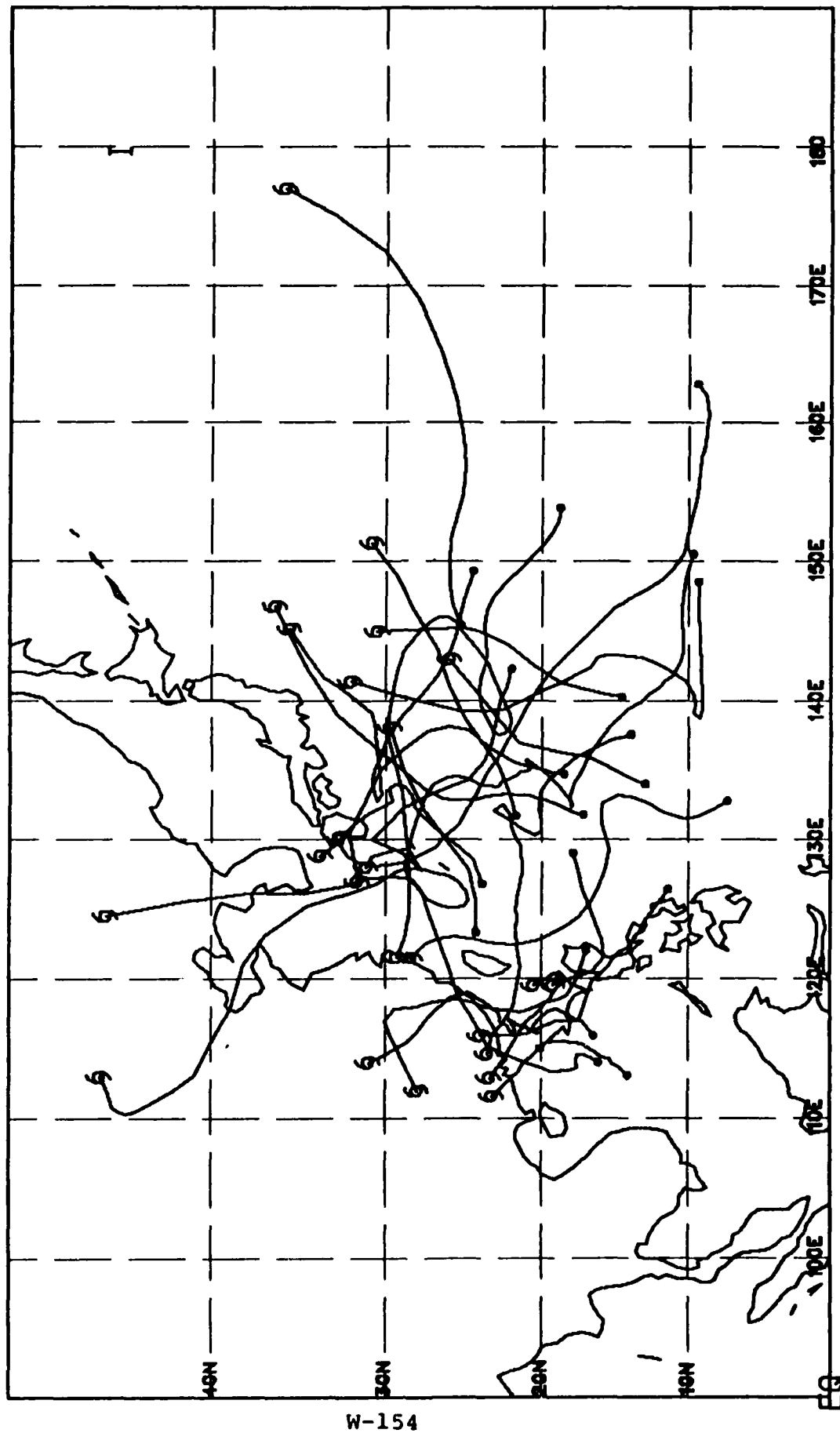
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR JUN 24 - JUL 8



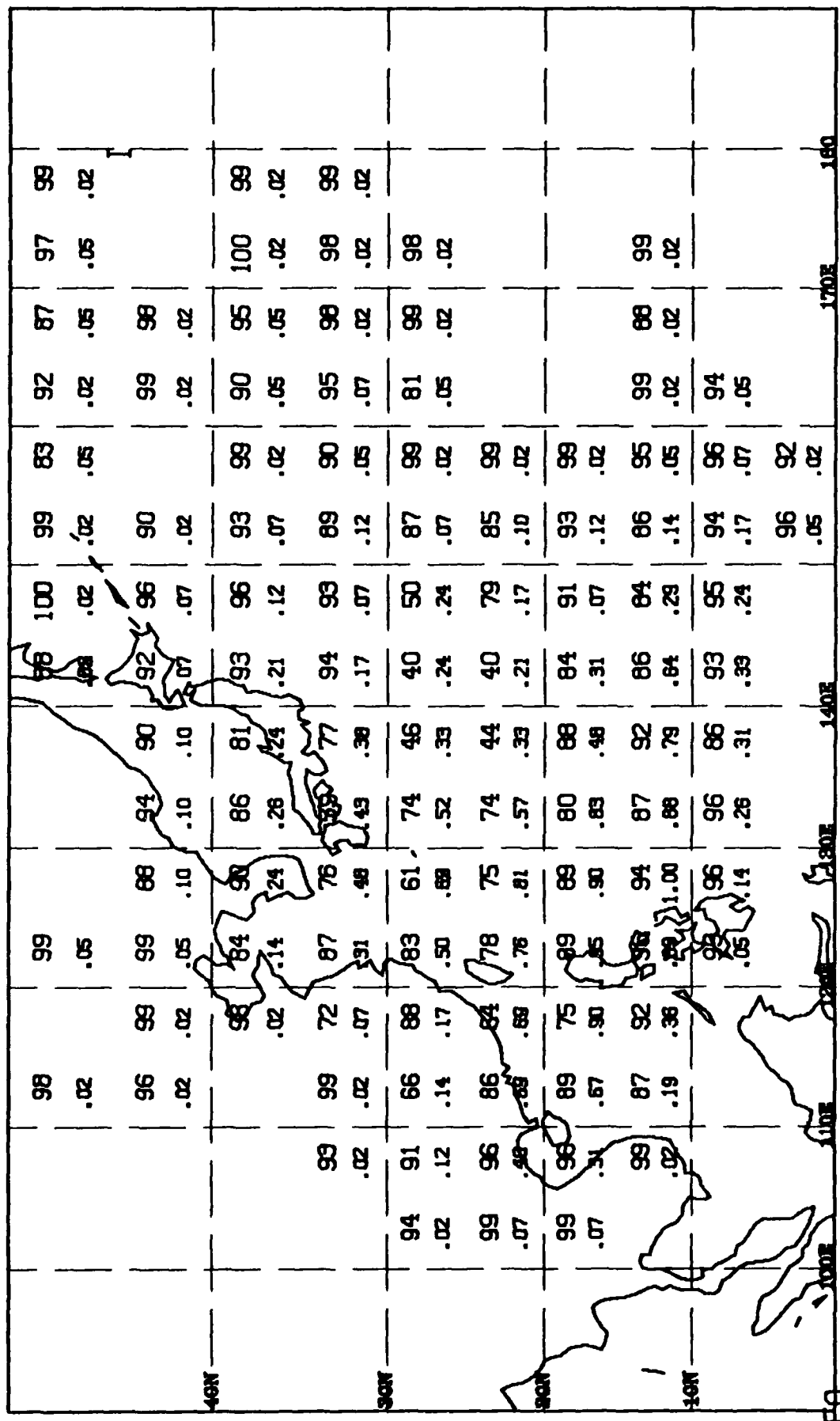
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR JUN 24 - JUL 8



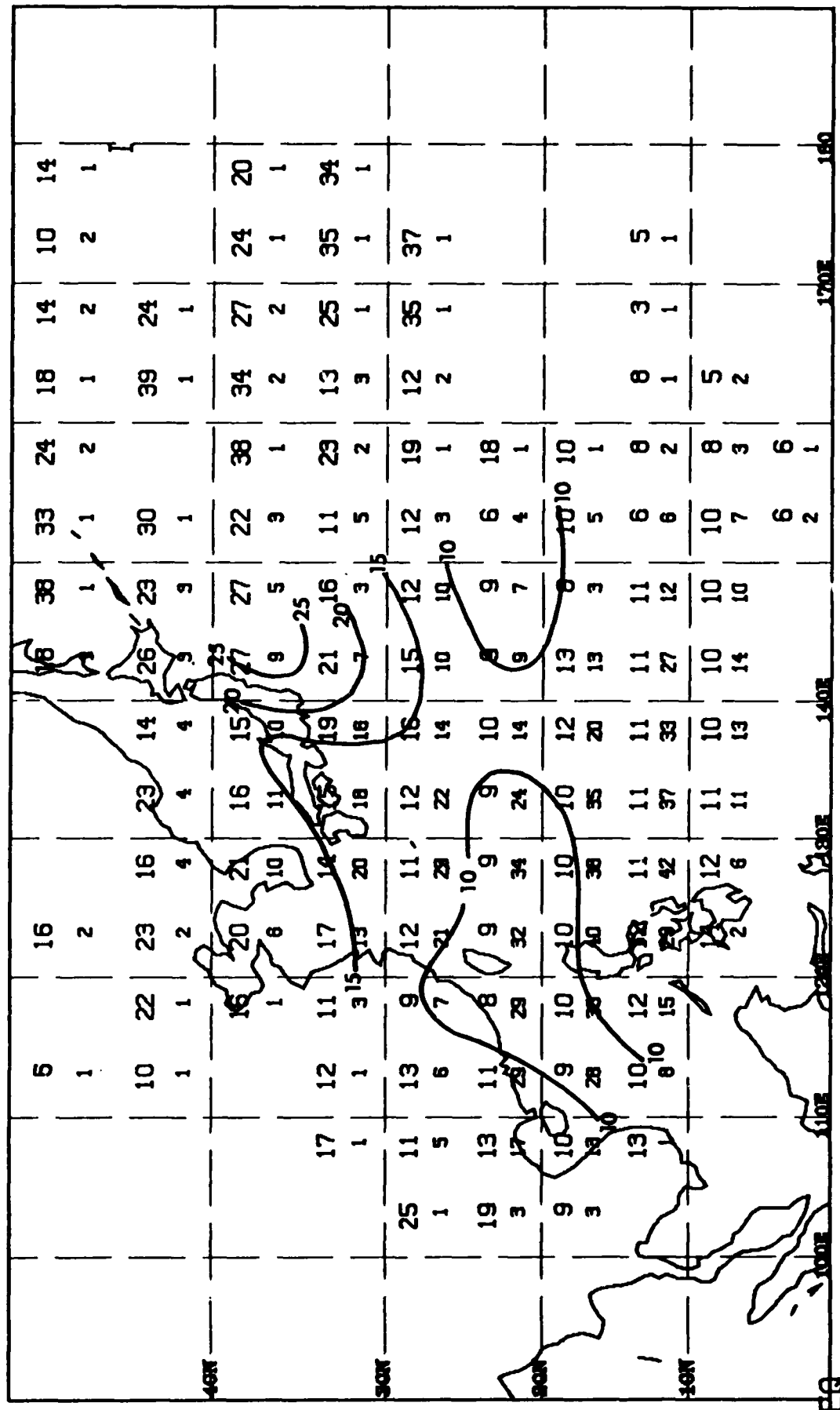
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR JUN 24 - JUL 8



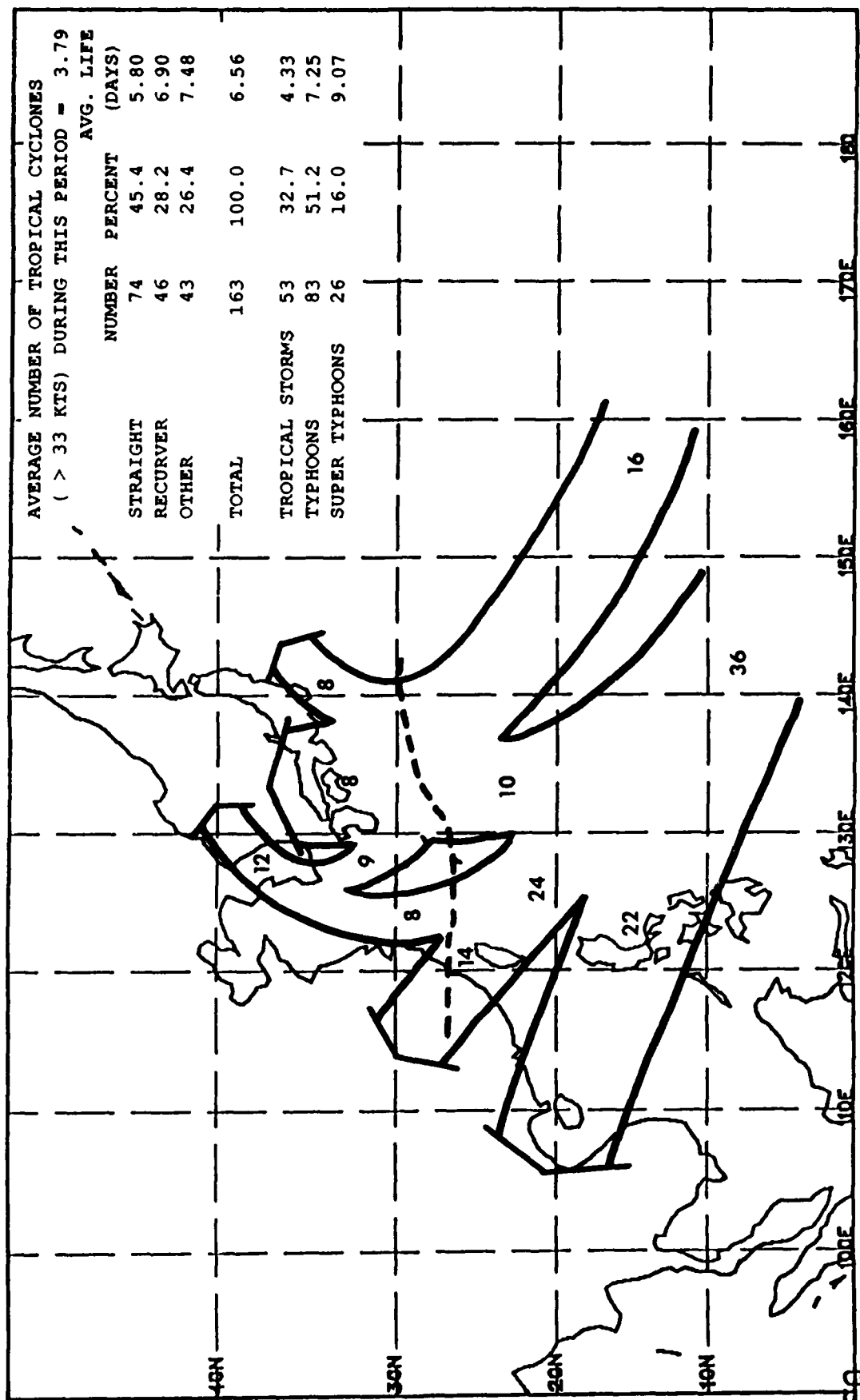
Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number).
 Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed.
 Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year per time period.

SPEED OF MOVEMENT FOR JUN 24 - JUL 8



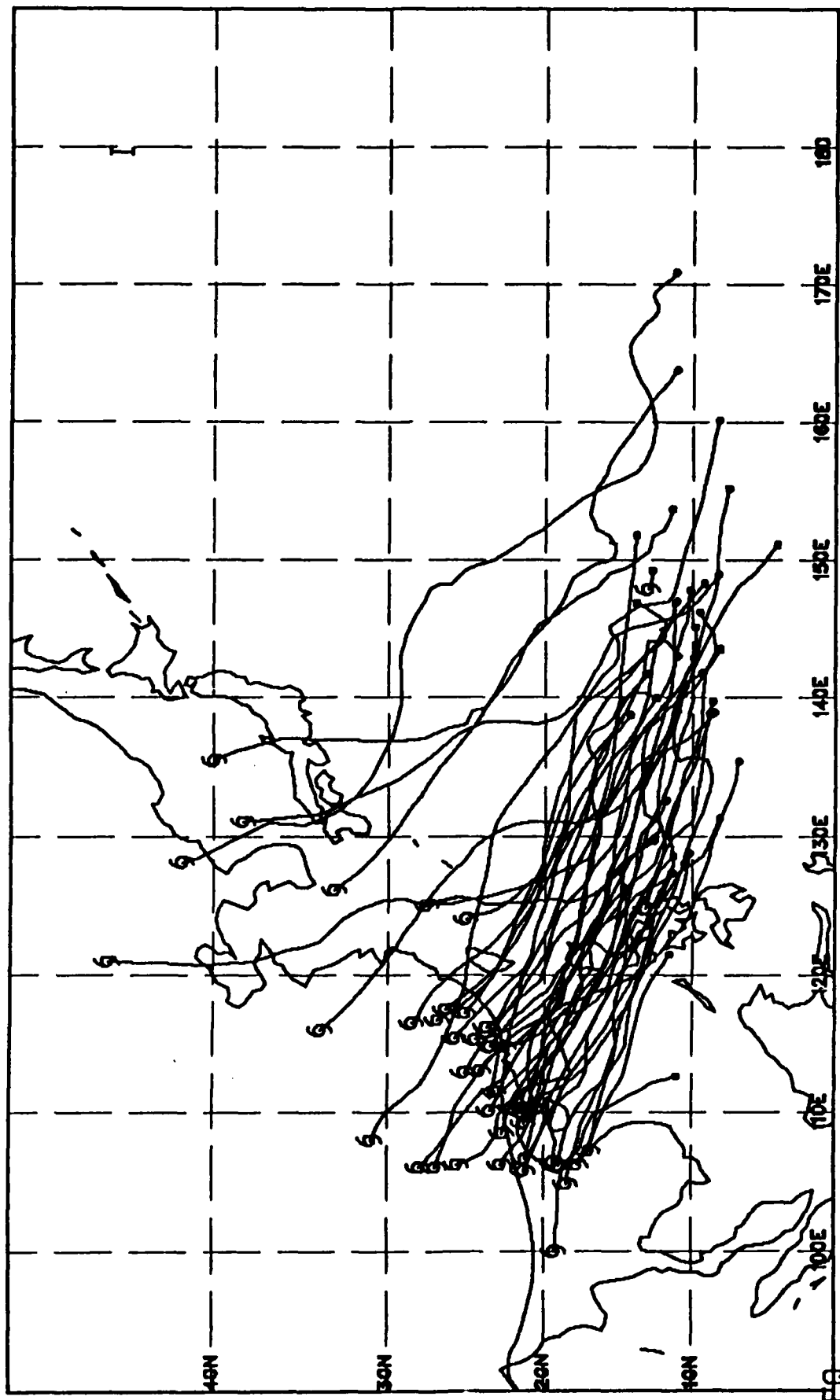
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR JUL 9 - JUL 23



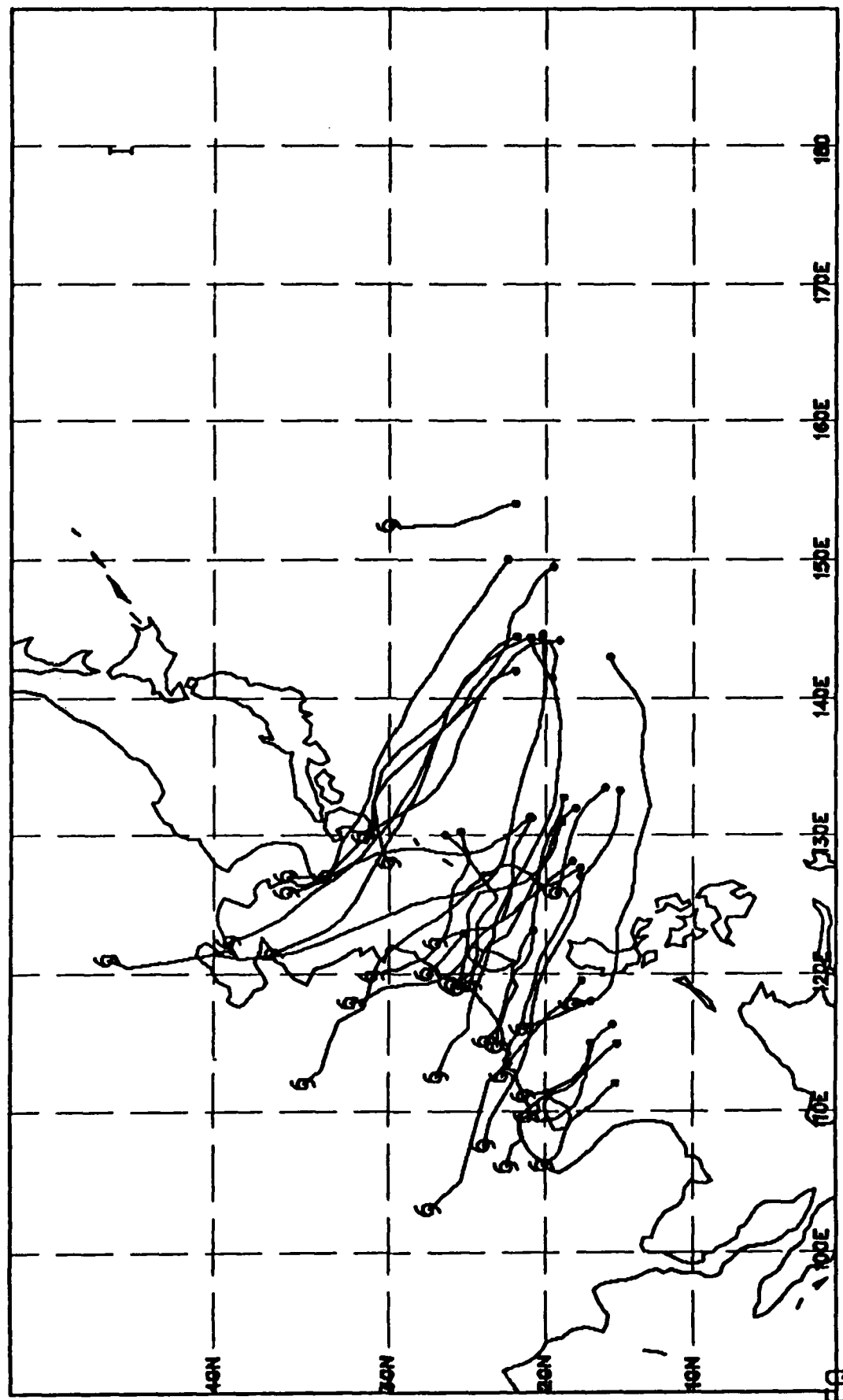
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored. Dashed line represents mean recurvature position of tropical cyclones (> 33 kts) classified as recurvers.

ACTUAL TRACKS FOR JUL 9 - JUL 23



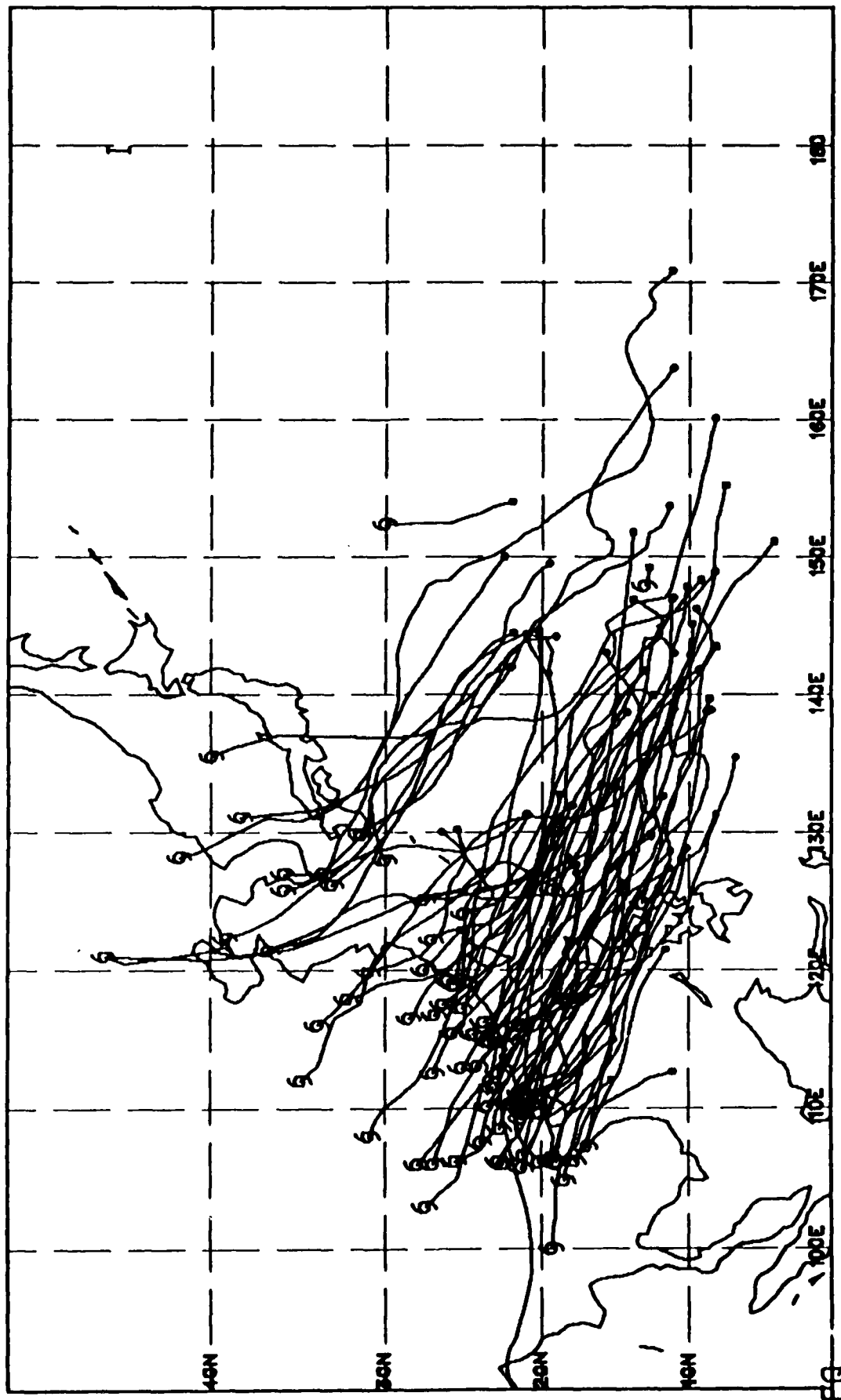
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR JUL 9 - JUL 23



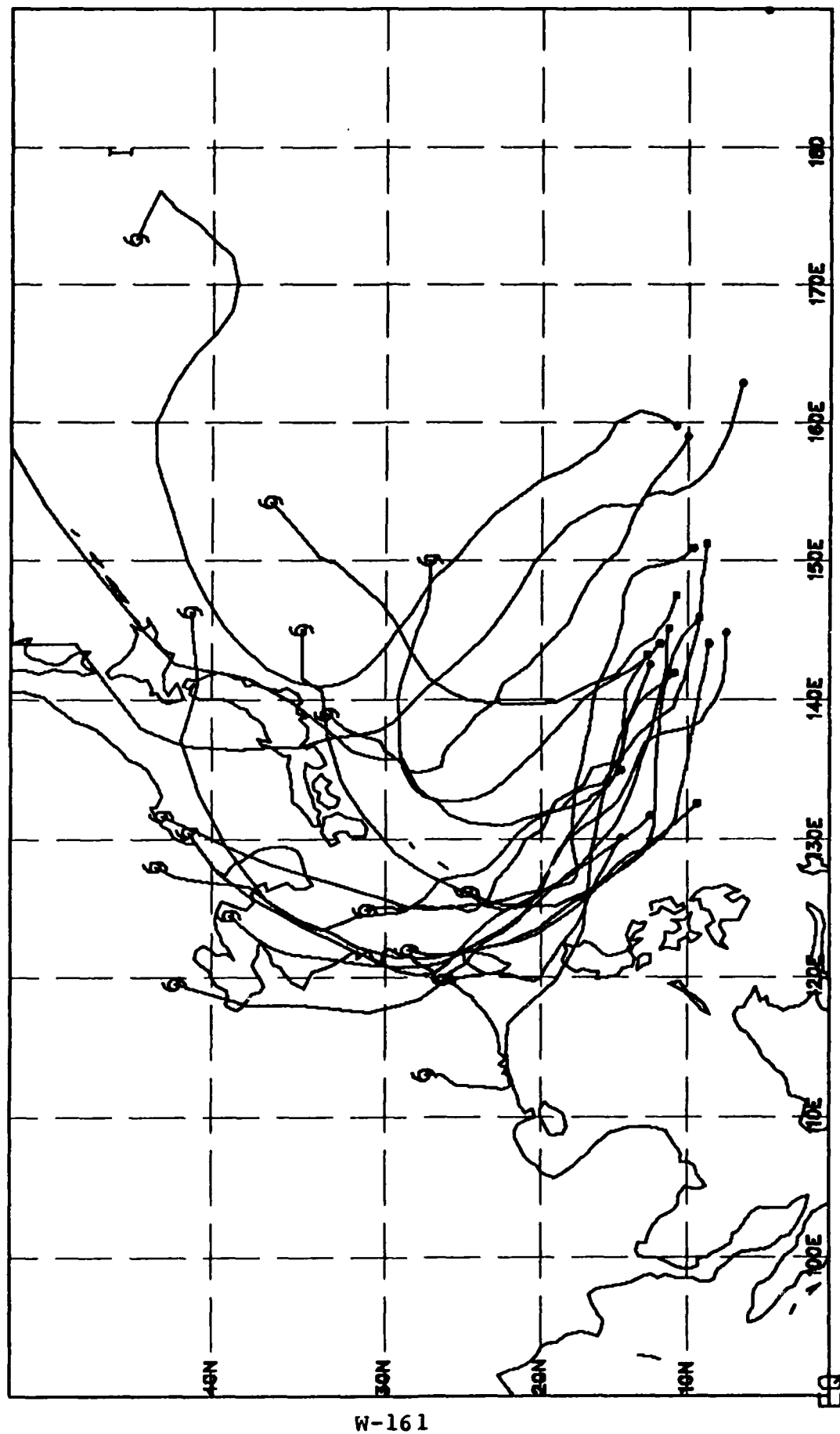
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR JUL 9 - JUL 23



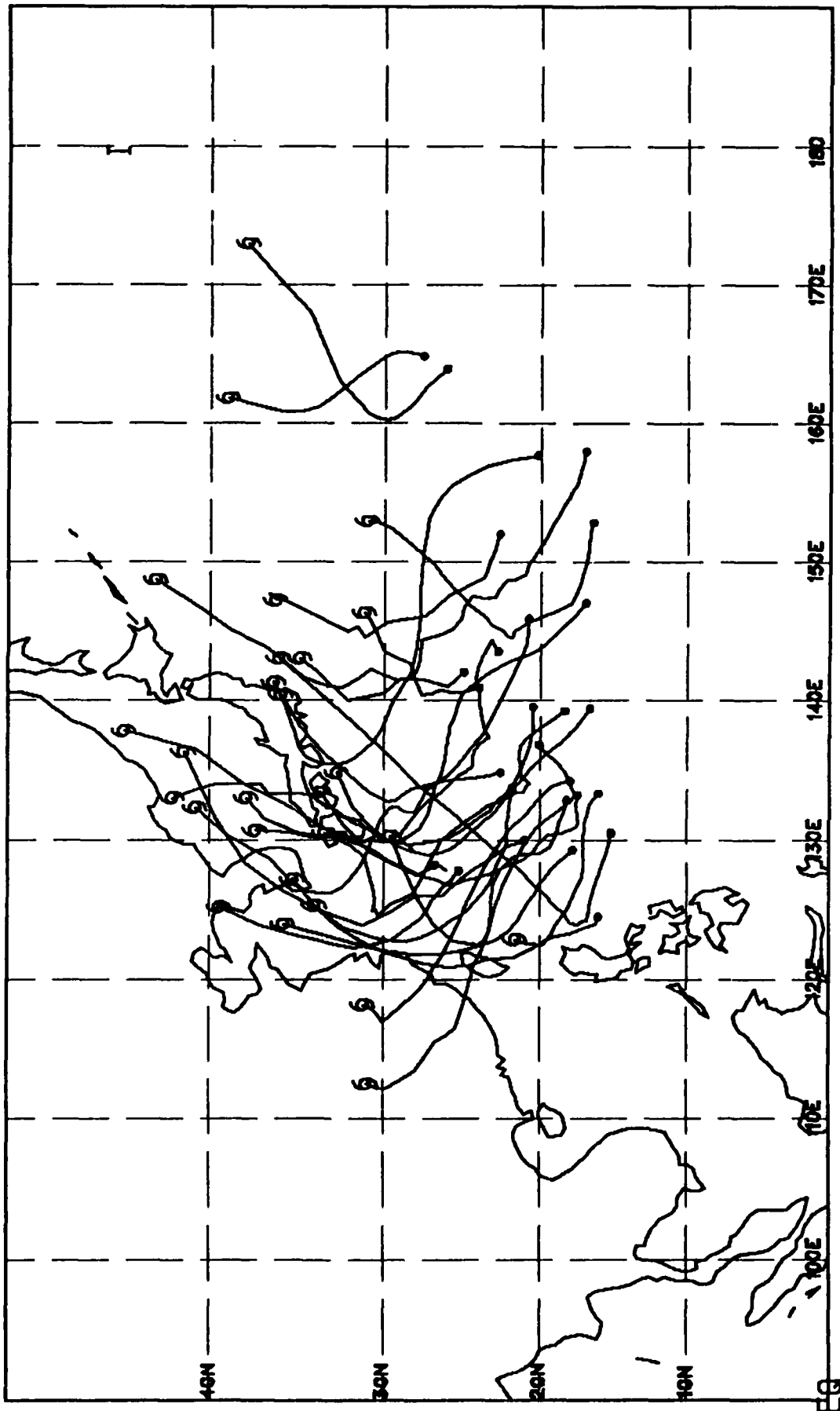
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR JUL 9 - JUL 23



Actual path of recurving tropical cyclones (> 33 kts) developing south of 15°N .

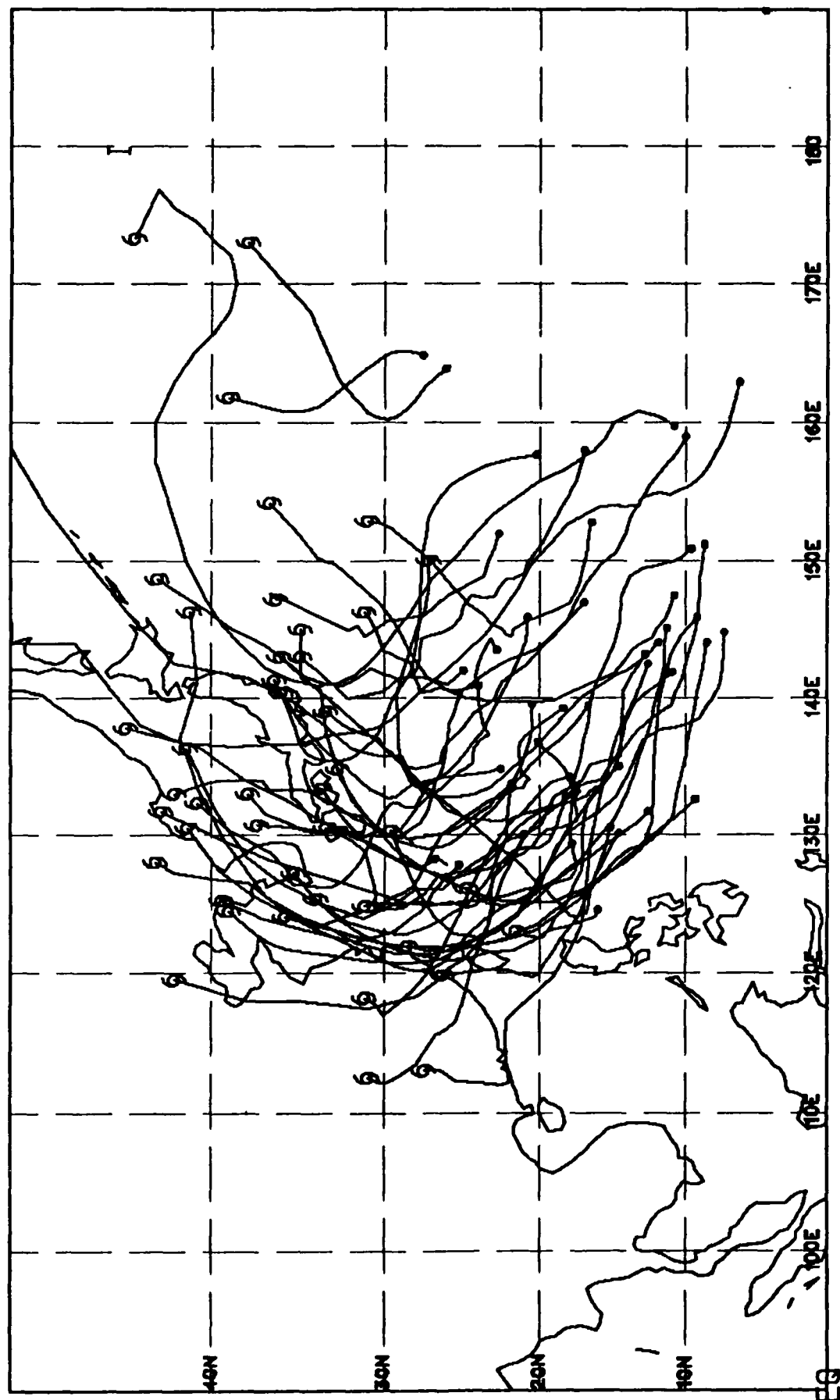
ACTUAL TRACKS FOR JUL 9 - JUL 23



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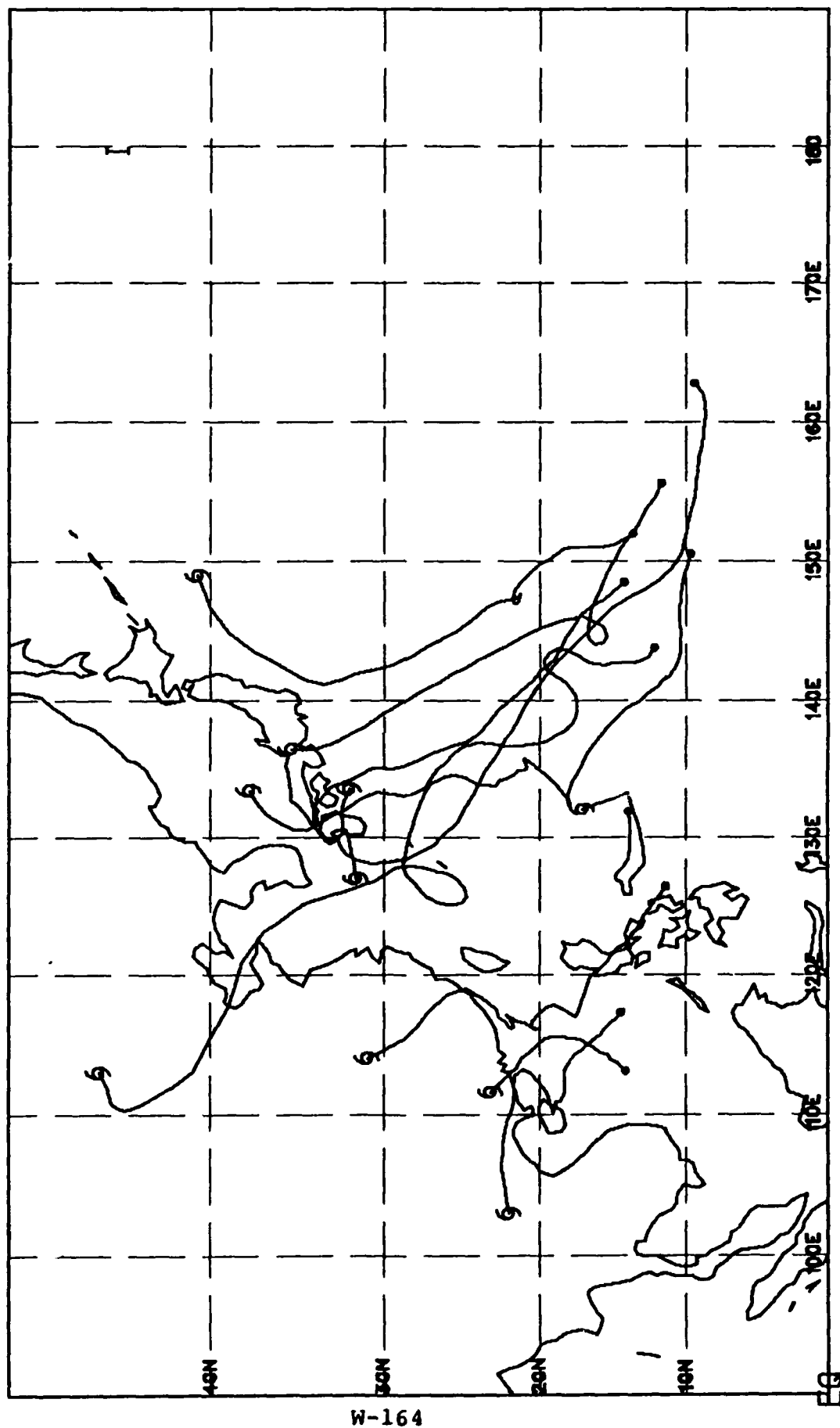
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR JUL 9 - JUL 23



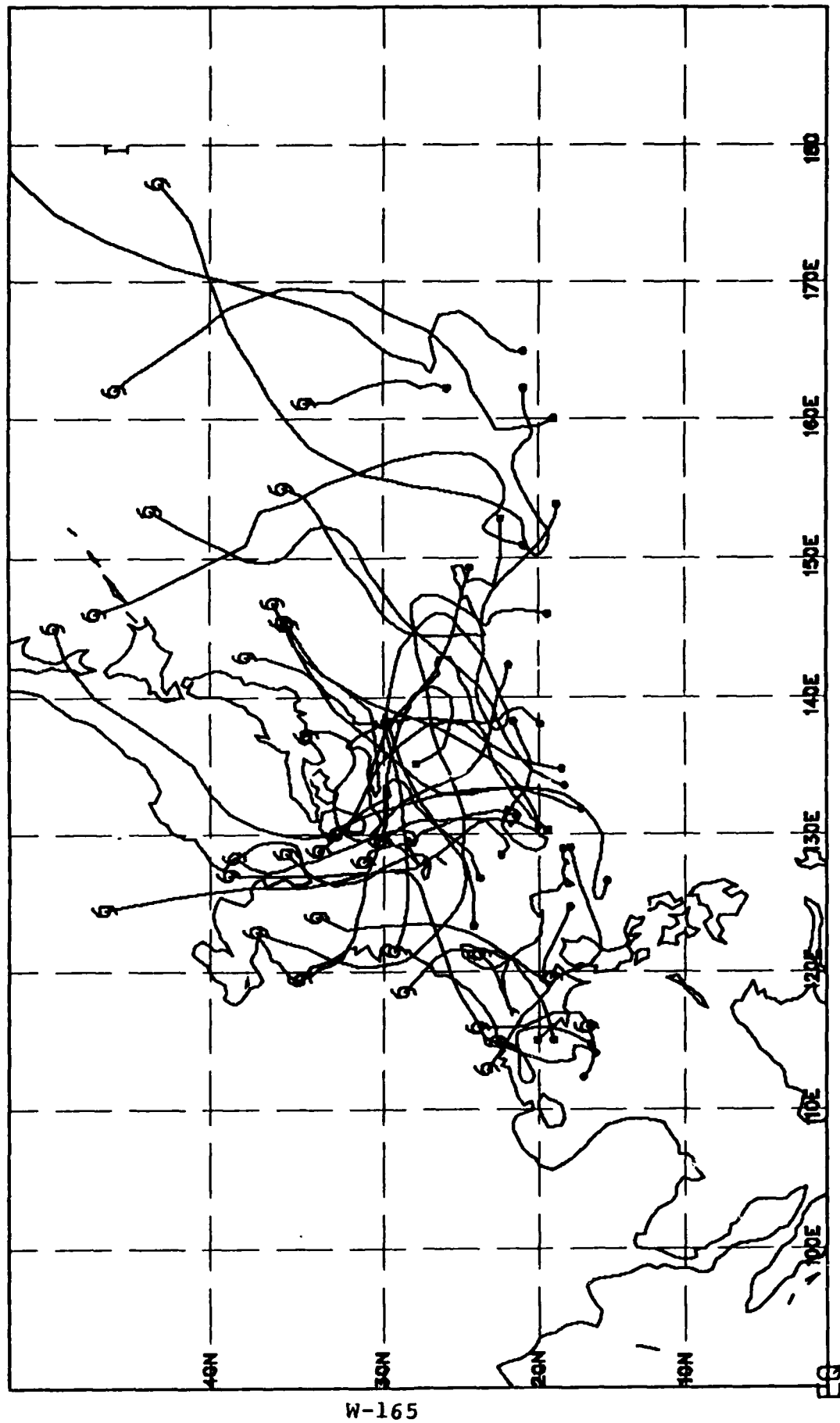
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR JUL 9 - JUL 23



Actual path of other tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR JUL 9 - JUL 23

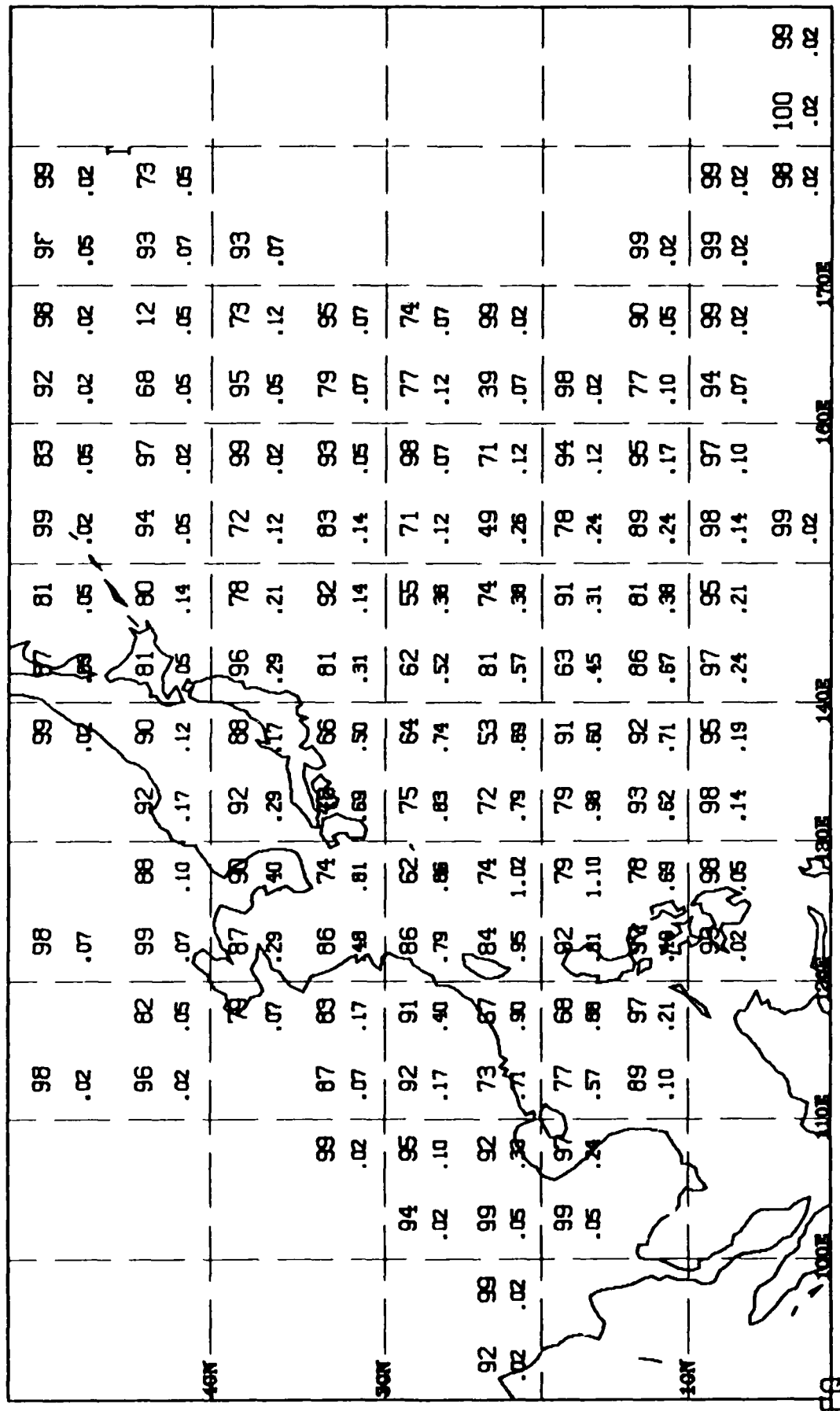


Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N .

A map of the North Pacific Ocean region, bounded by 40°N to 10°N latitude and 100°E to 180° longitude. The map displays numerous cruise tracks, represented by solid black lines, and individual observation stations, marked by small black dots. The tracks are most concentrated in the central North Pacific, particularly between 140°E and 160°E, and 30°N and 40°N, where they form a dense, overlapping network. Other tracks extend towards the western edge of the map (180°) and southwards towards 10°N. The map includes a grid of latitude and longitude lines, with latitude labeled on the left (40N, 30N, 20N, 10N) and longitude labeled on the right (180, 170E, 160E, 150E, 140E, 130E, 120E, 110E, 100E). The outlines of the Japanese archipelago and the Korean peninsula are visible in the lower-left corner.

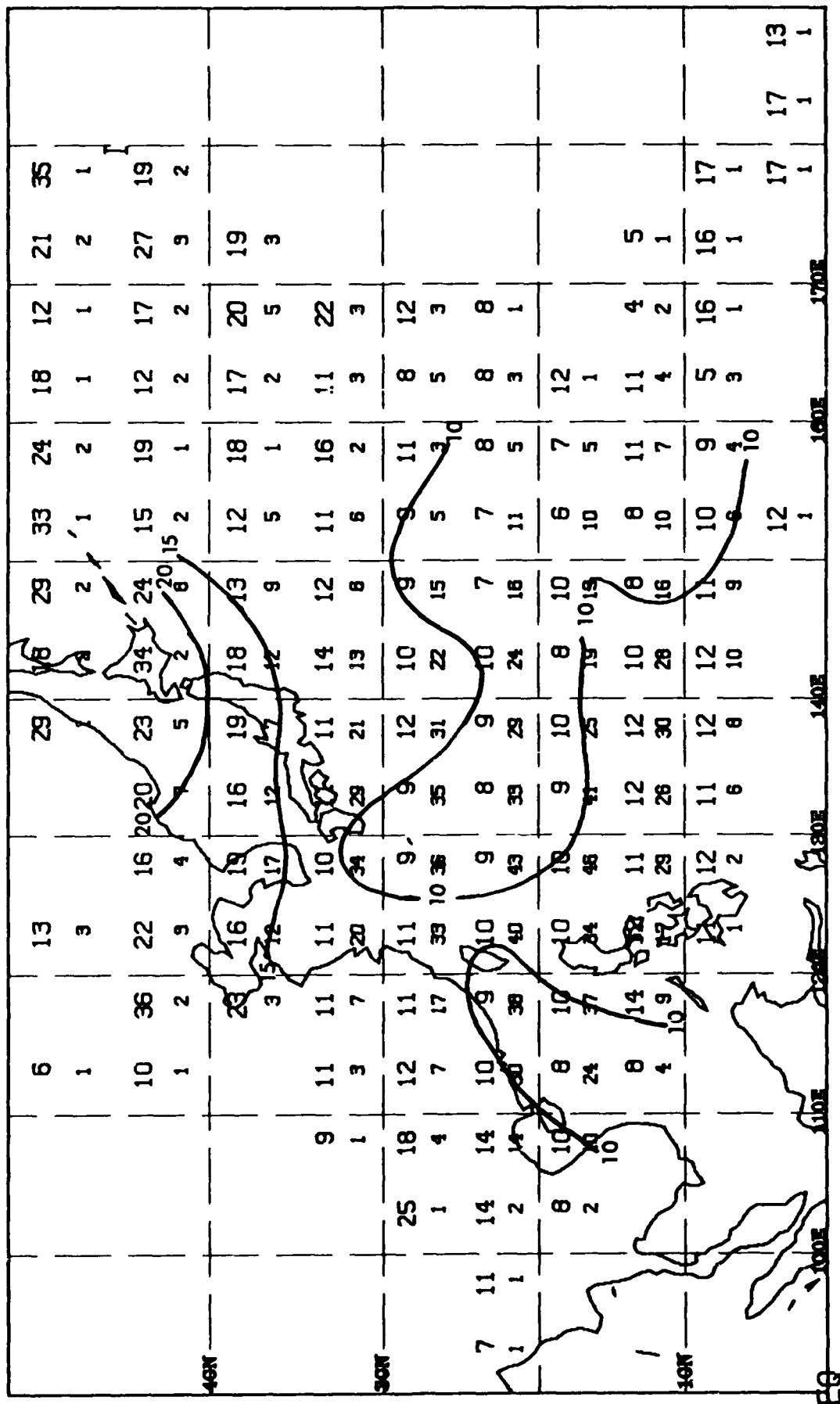
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CONSTANCY AND RELATIVE FREQUENCY FOR JUL 9 - JUL 23

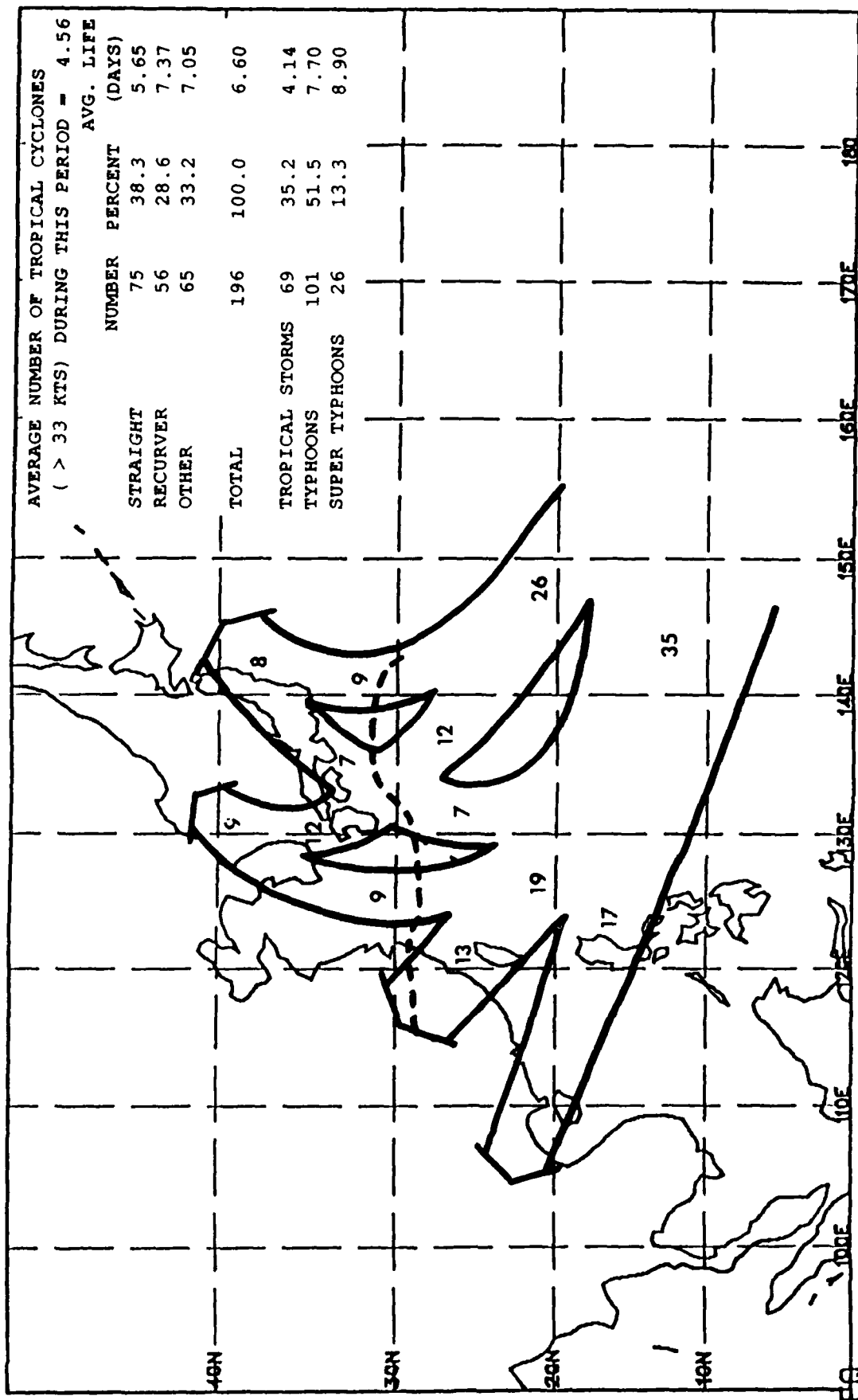


Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number).
 Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed.
 Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year per time period.

SPEED OF MOVEMENT FOR JUL 9 - JUL 23

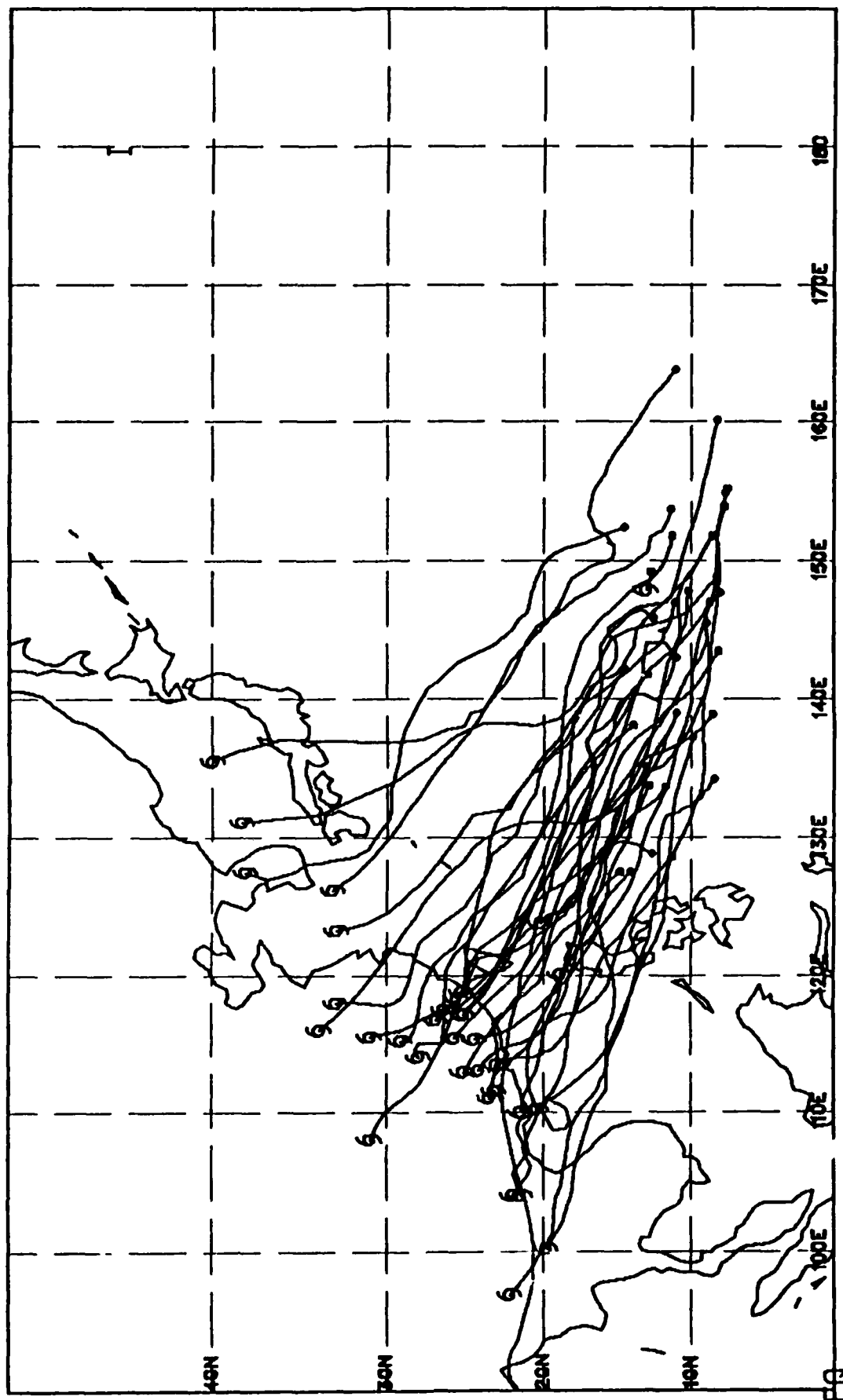


MEAN PATHS FOR JUL 24 - AUG 8



Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored. Dashed line represents mean recurvature position of tropical cyclones (> 33 kts) classified as recurvers.

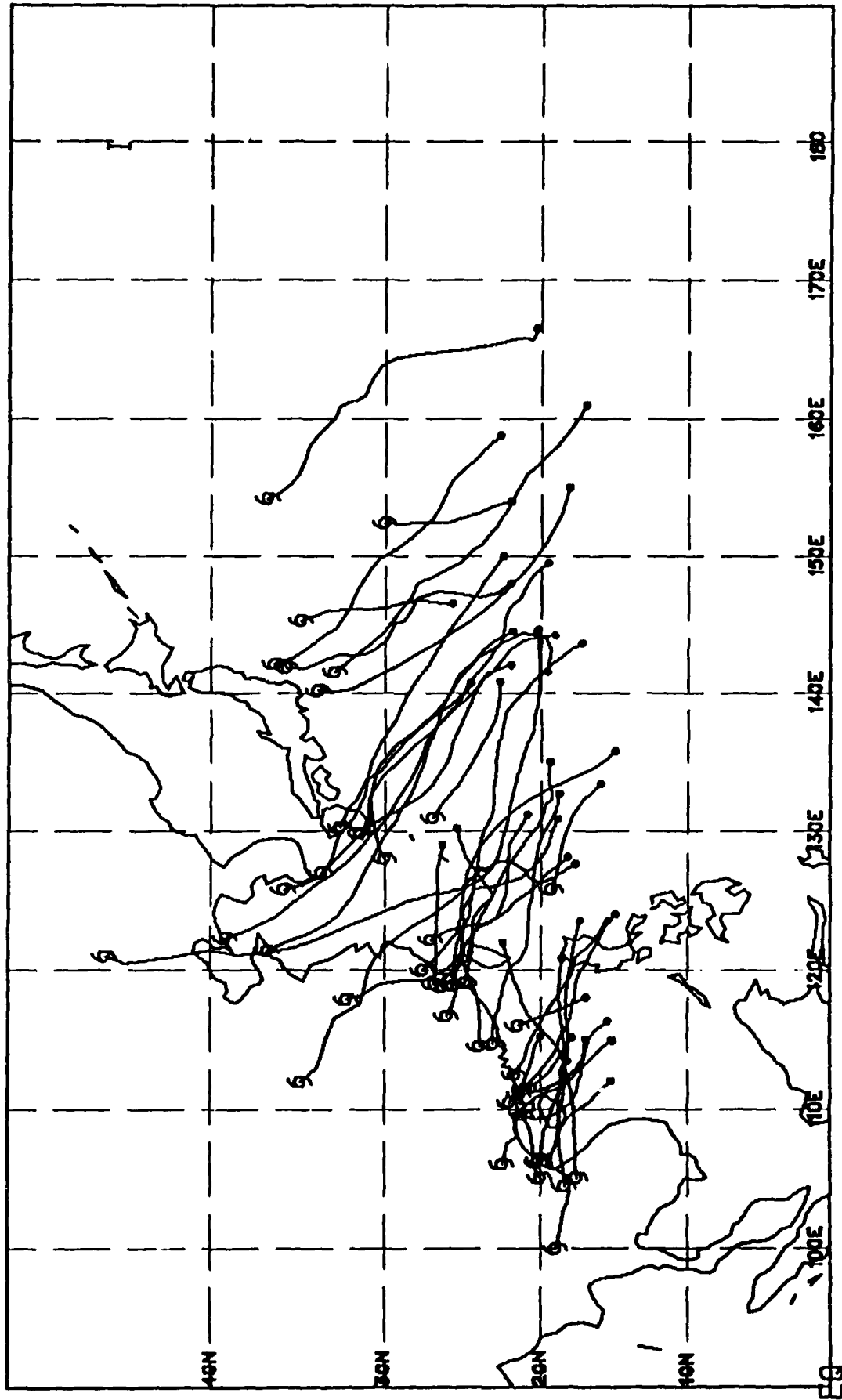
ACTUAL TRACKS FOR JUL 24 - AUG 8



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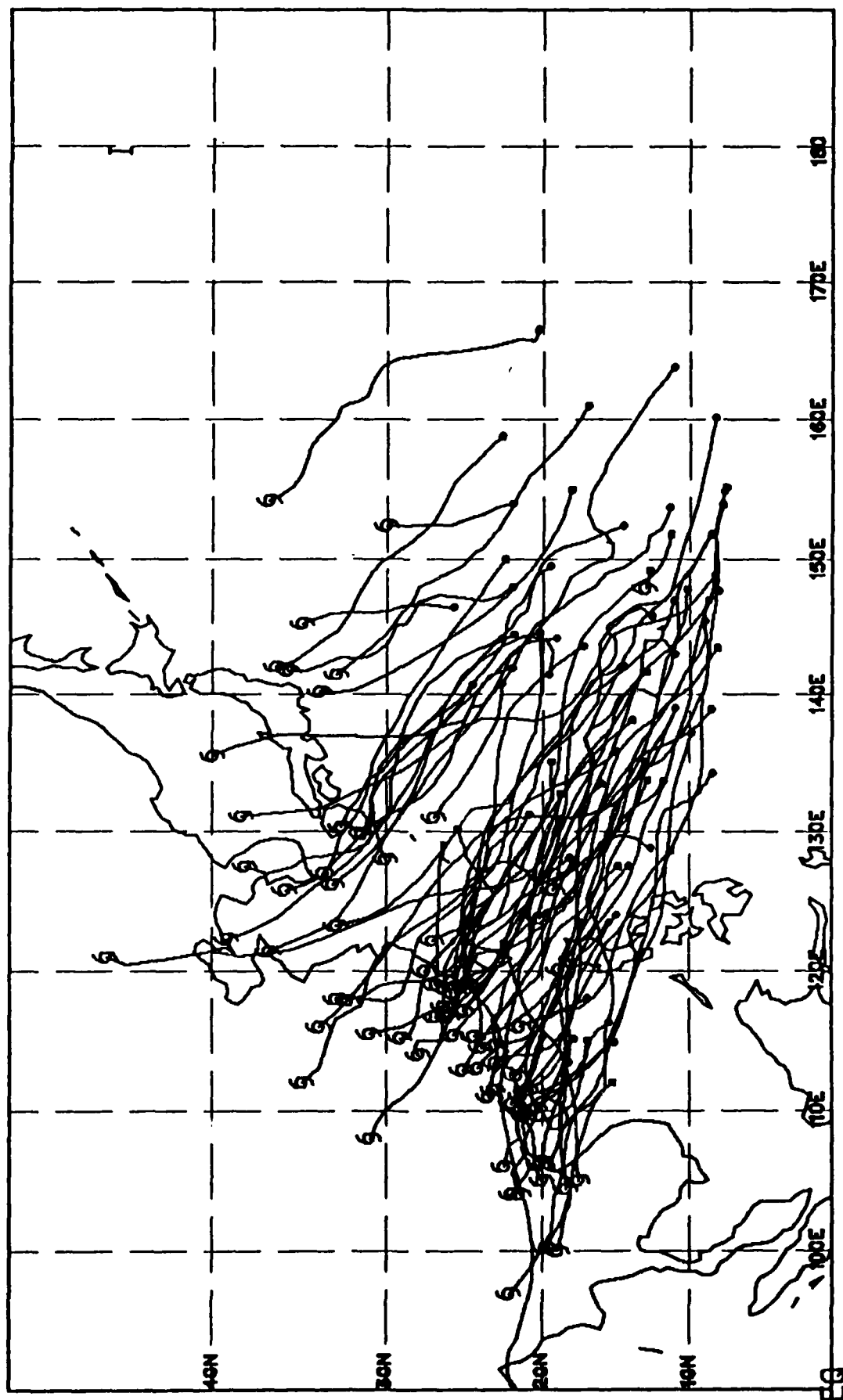
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR JUL 24 - AUG 8



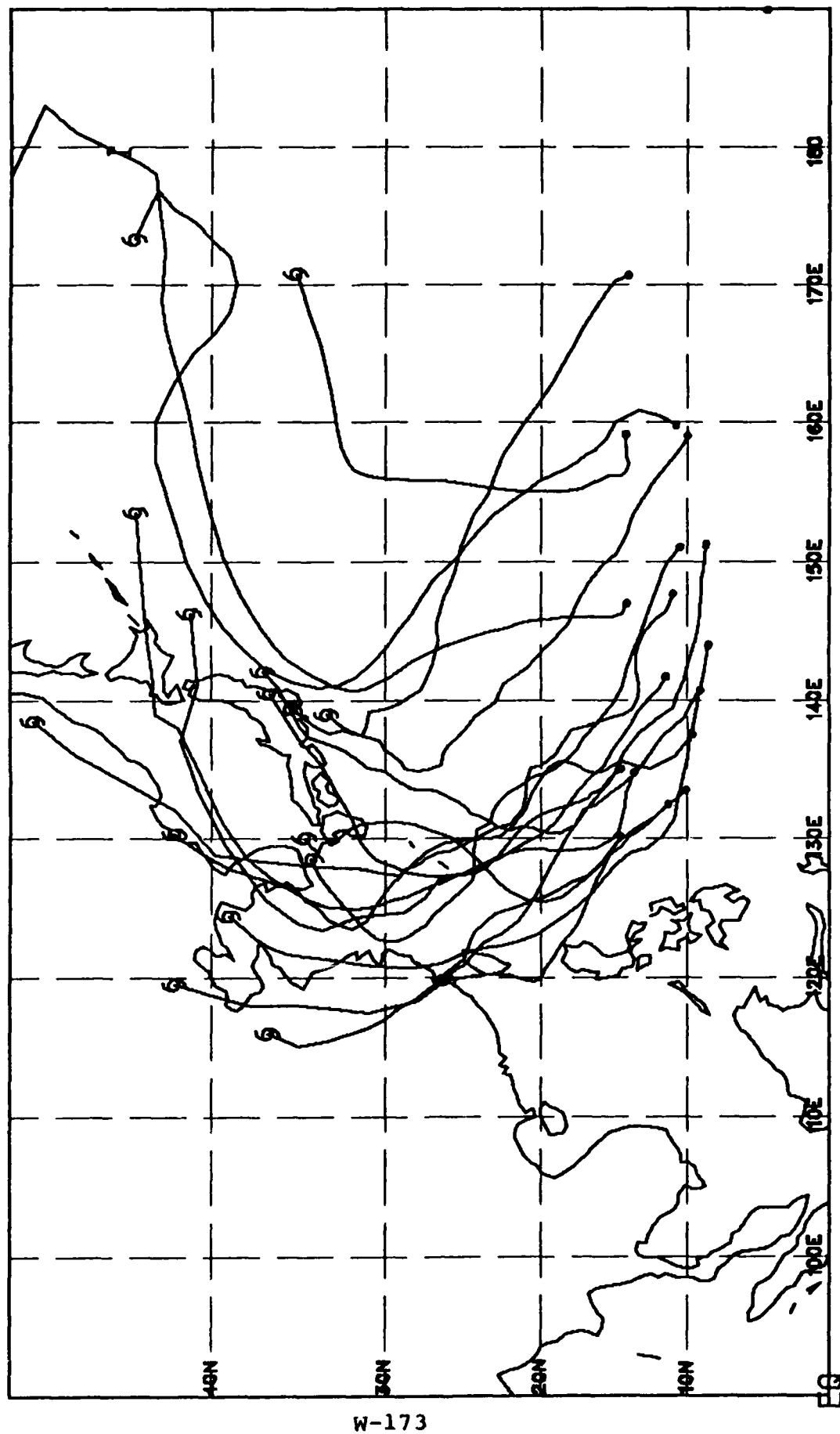
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR JUL 24 - AUG 8



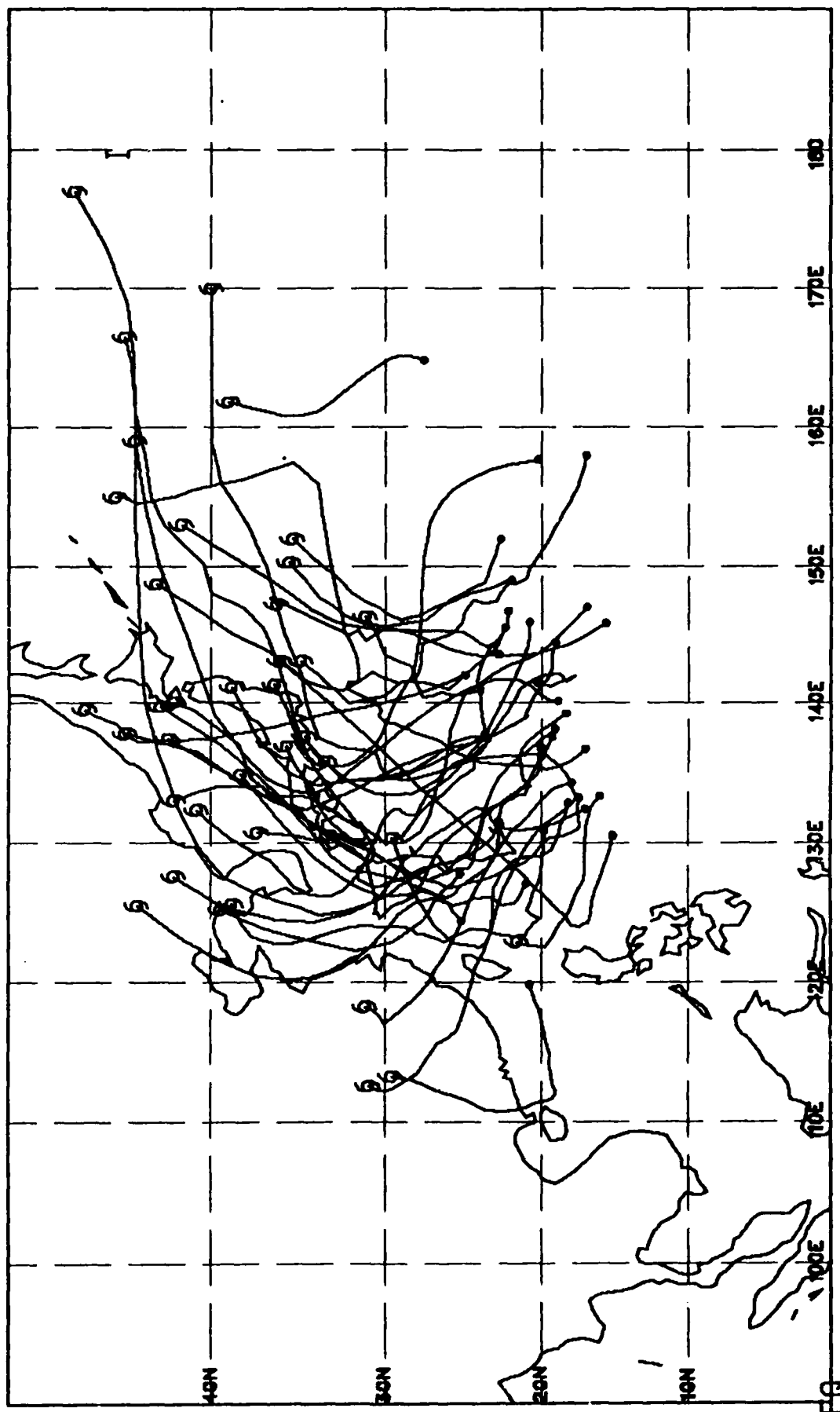
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR JUL 24 - AUG 8



Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

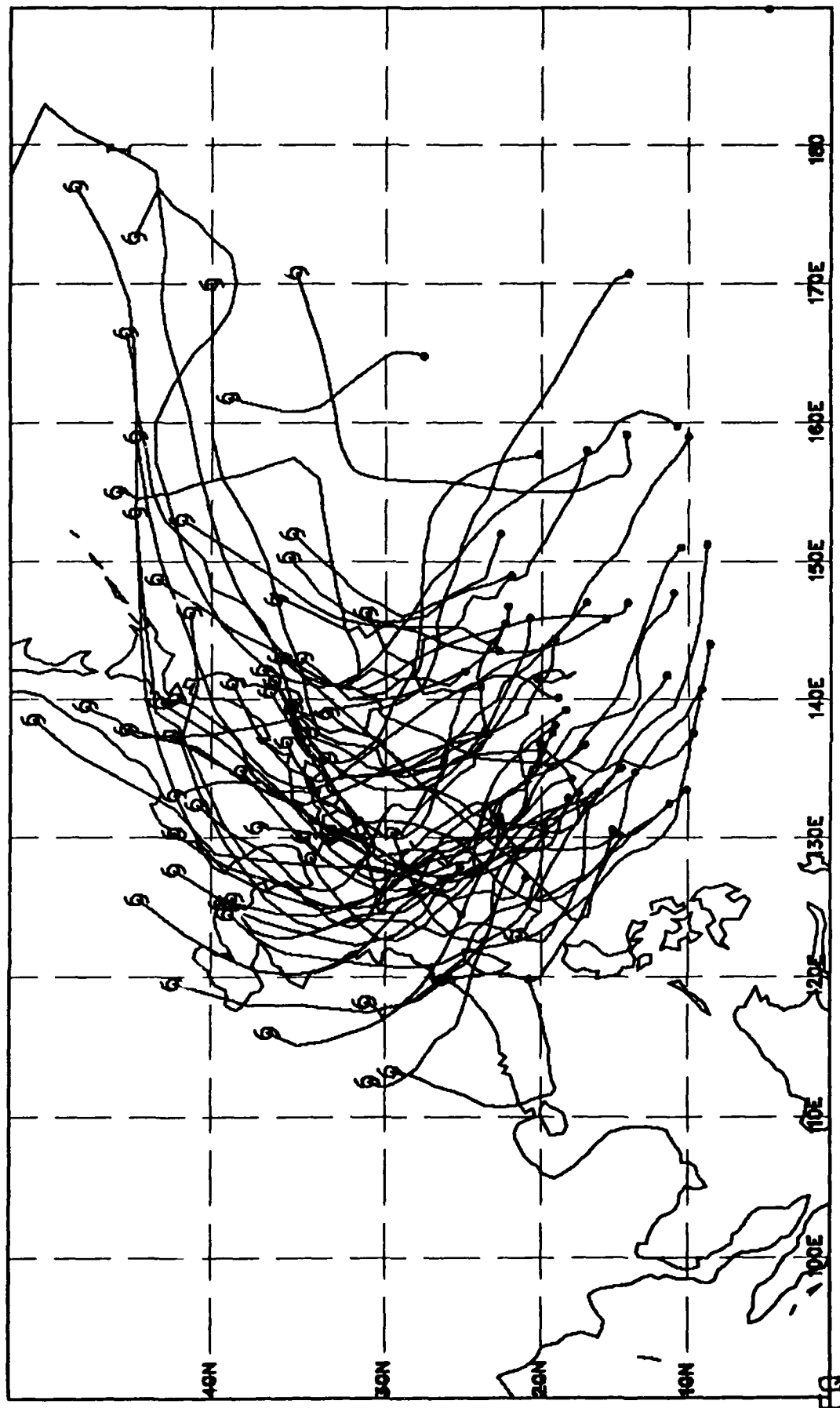
ACTUAL TRACKS FOR JUL 24 - AUG 8



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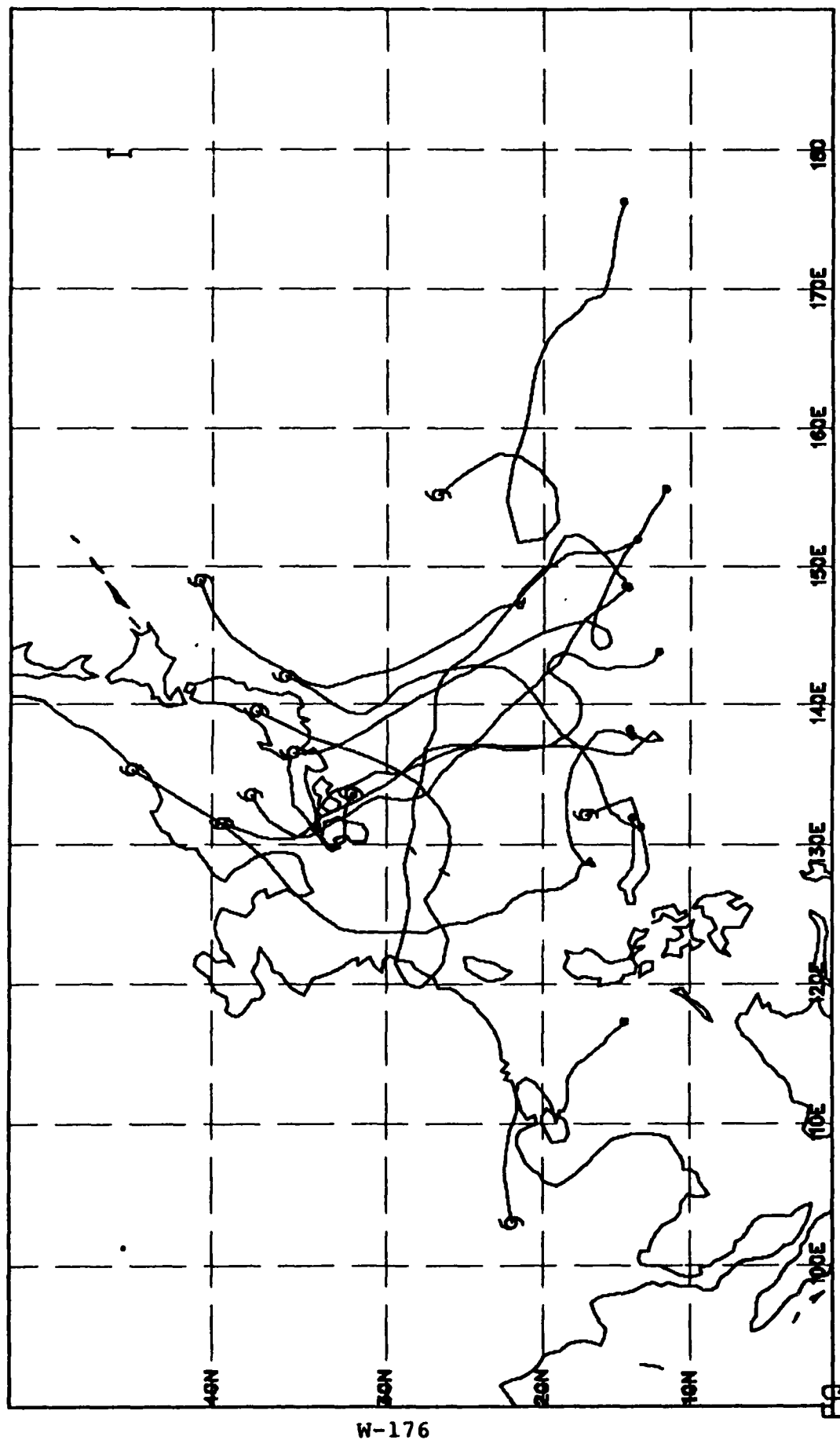
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR JUL 24 - AUG 8



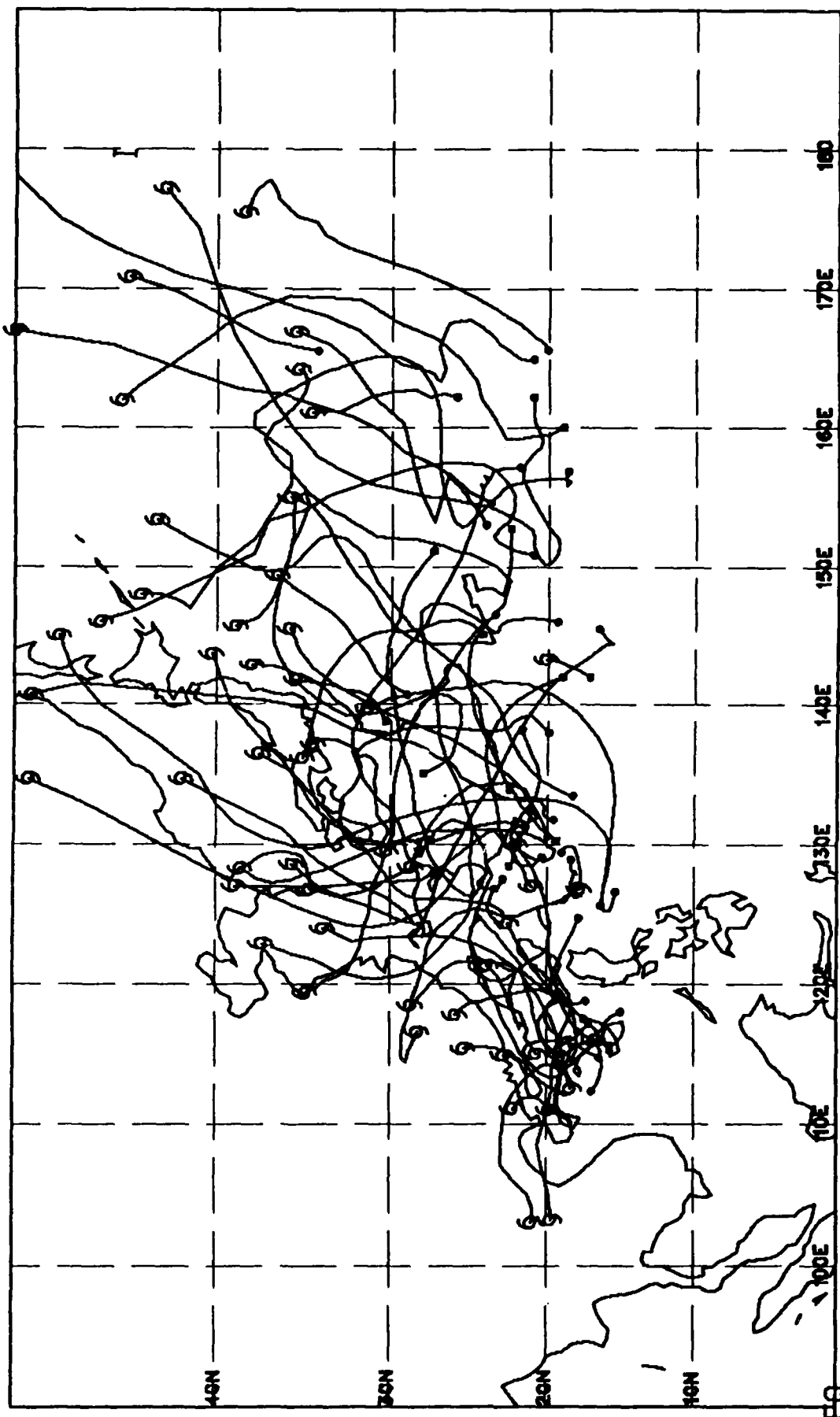
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR JUL 24 - AUG 8



Actual path of other tropical cyclones (> 33 kts) developing south of 15°N .

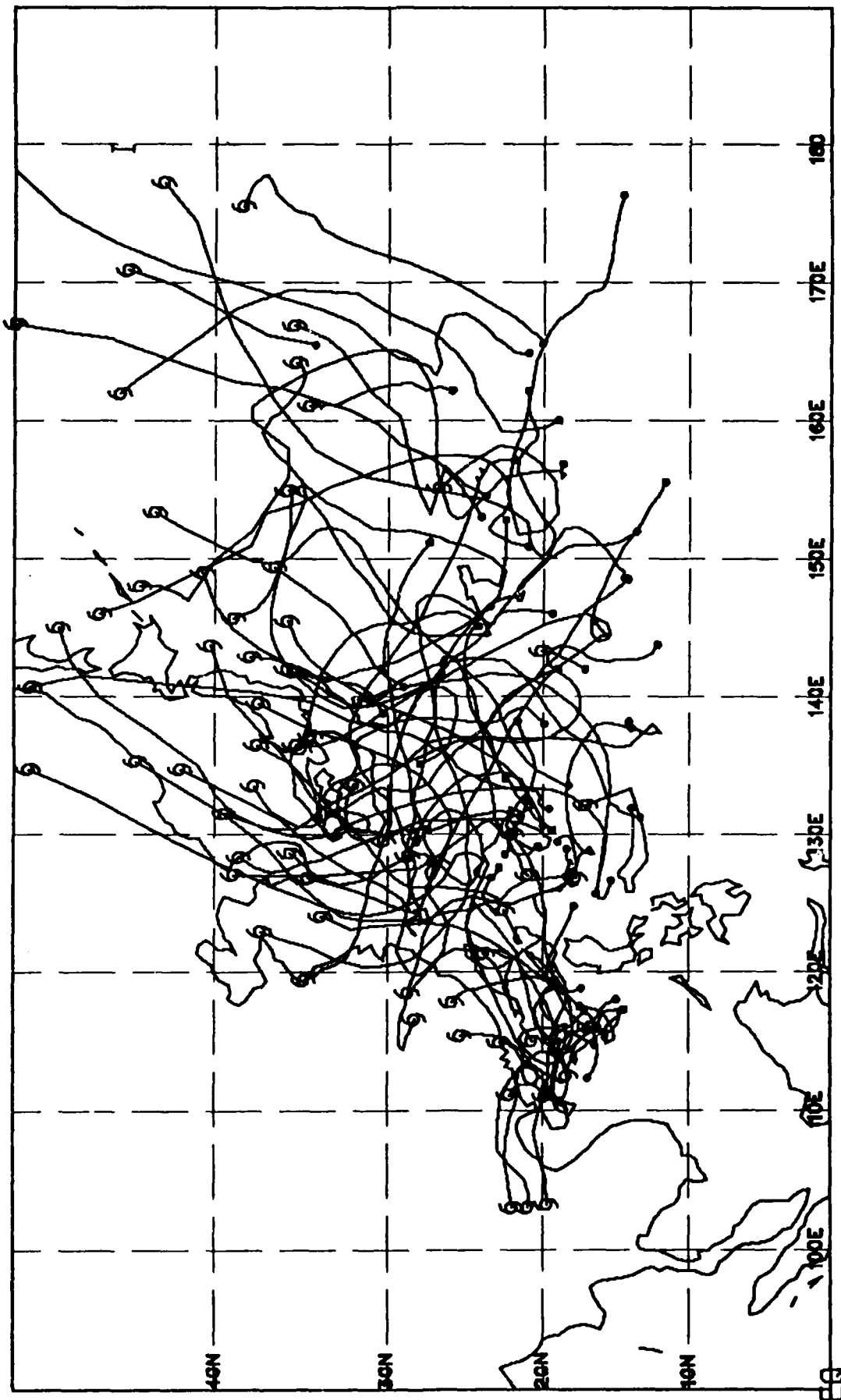
ACTUAL TRACKS FOR JUL 24 - AUG 8



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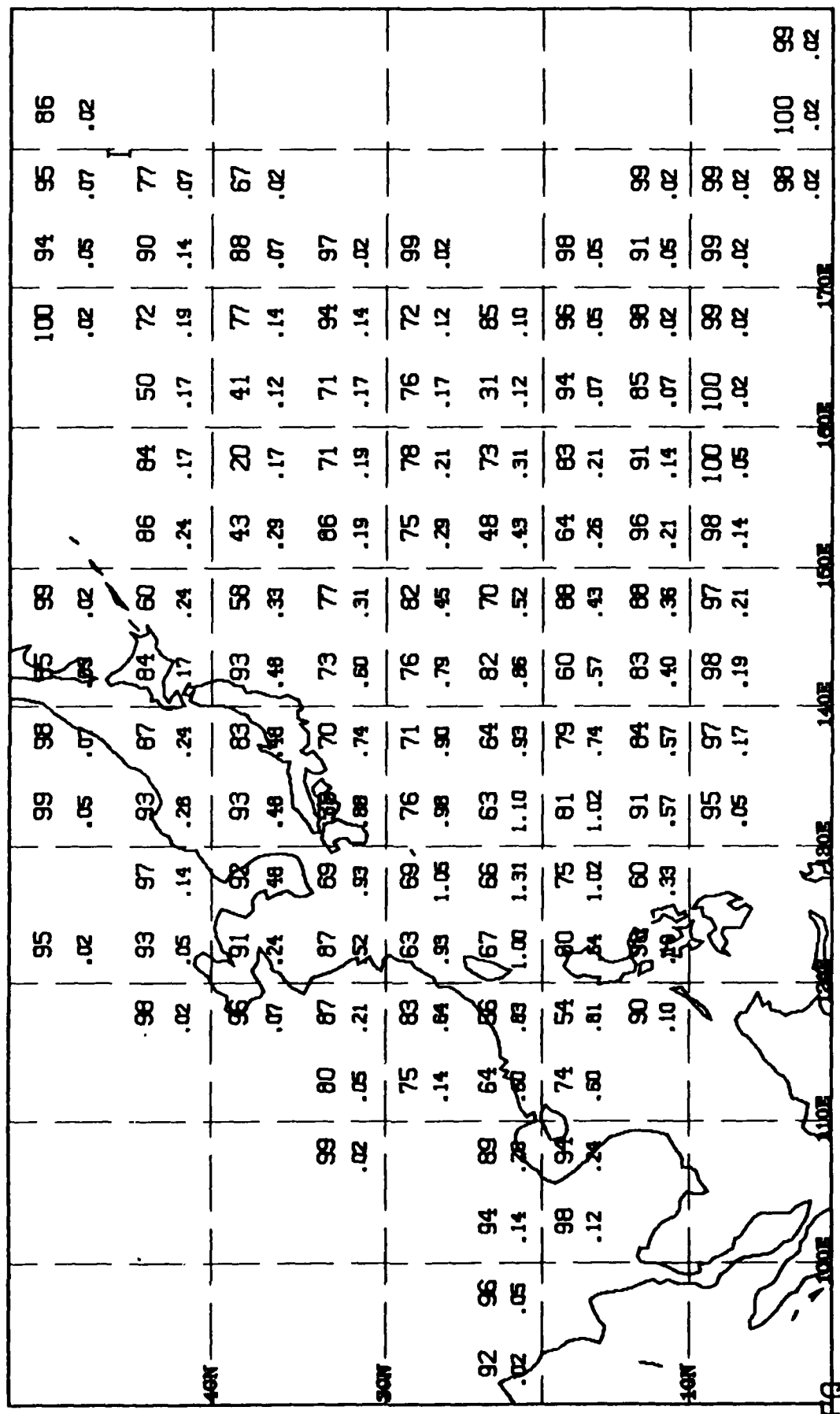
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR JUL 24 - AUG 8



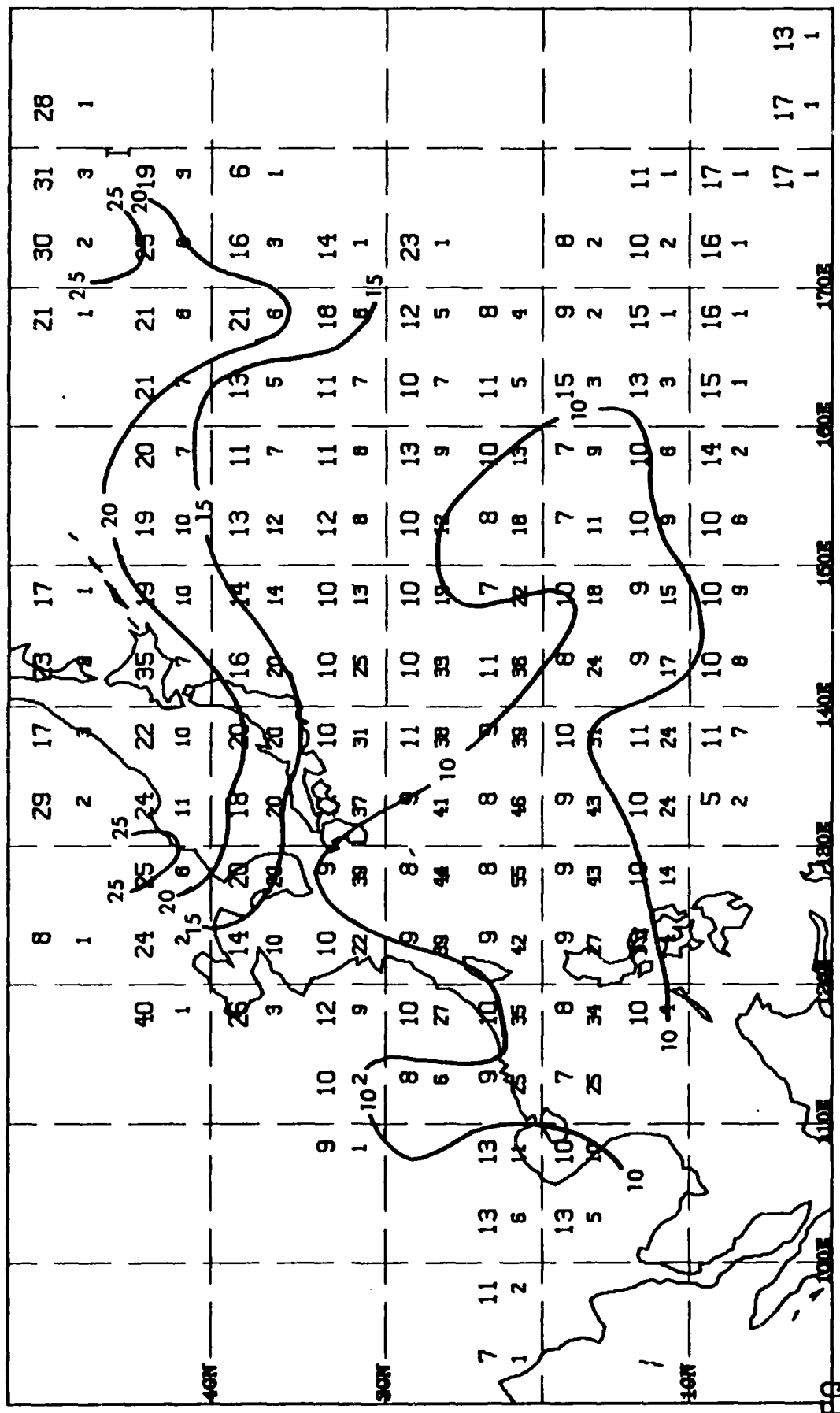
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR JUL 24 - AUG 8



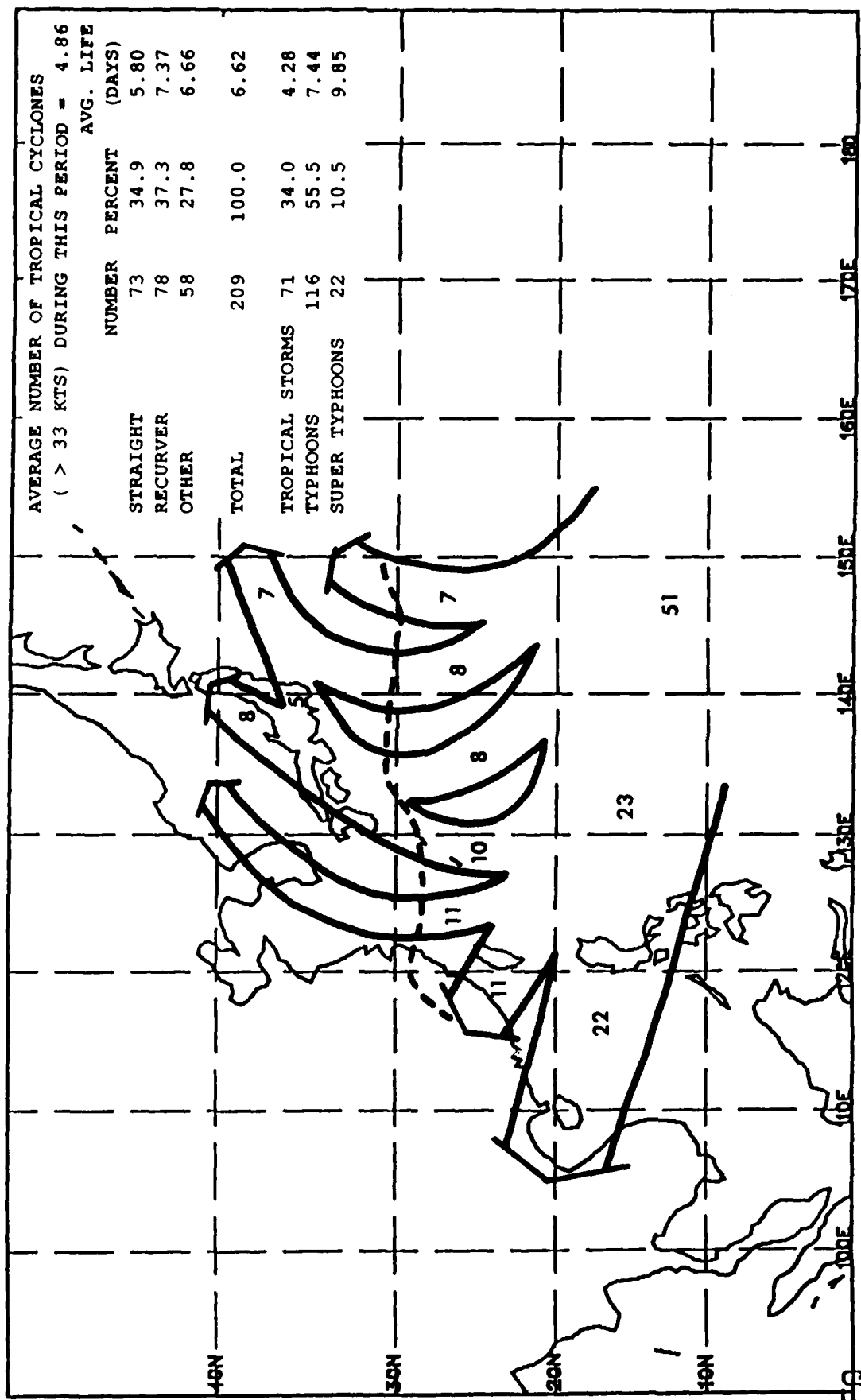
Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number).
 Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed.
 Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year per time period.

SPEED OF MOVEMENT FOR JUL 24 - AUG 8



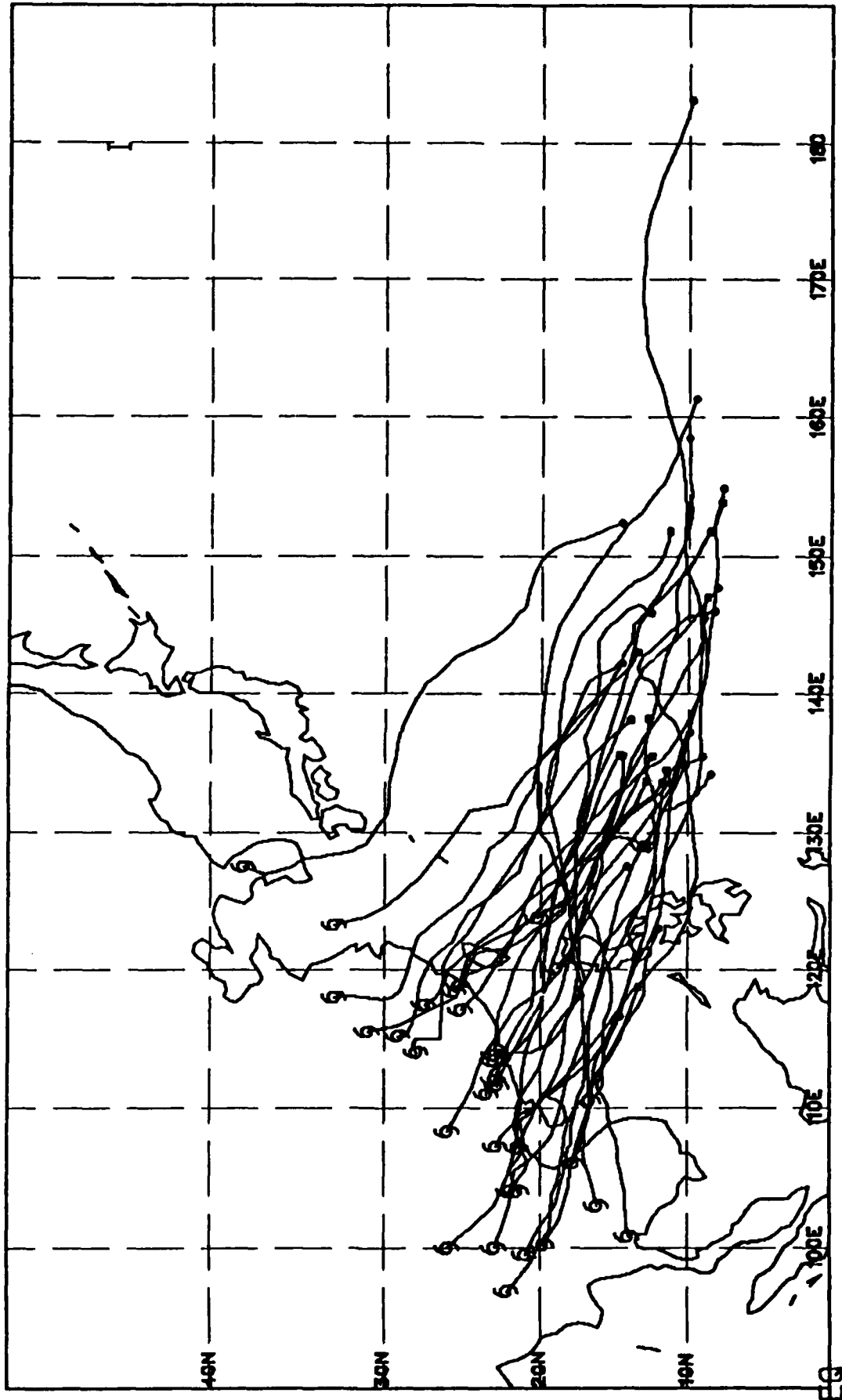
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR AUG 9 - AUG 23



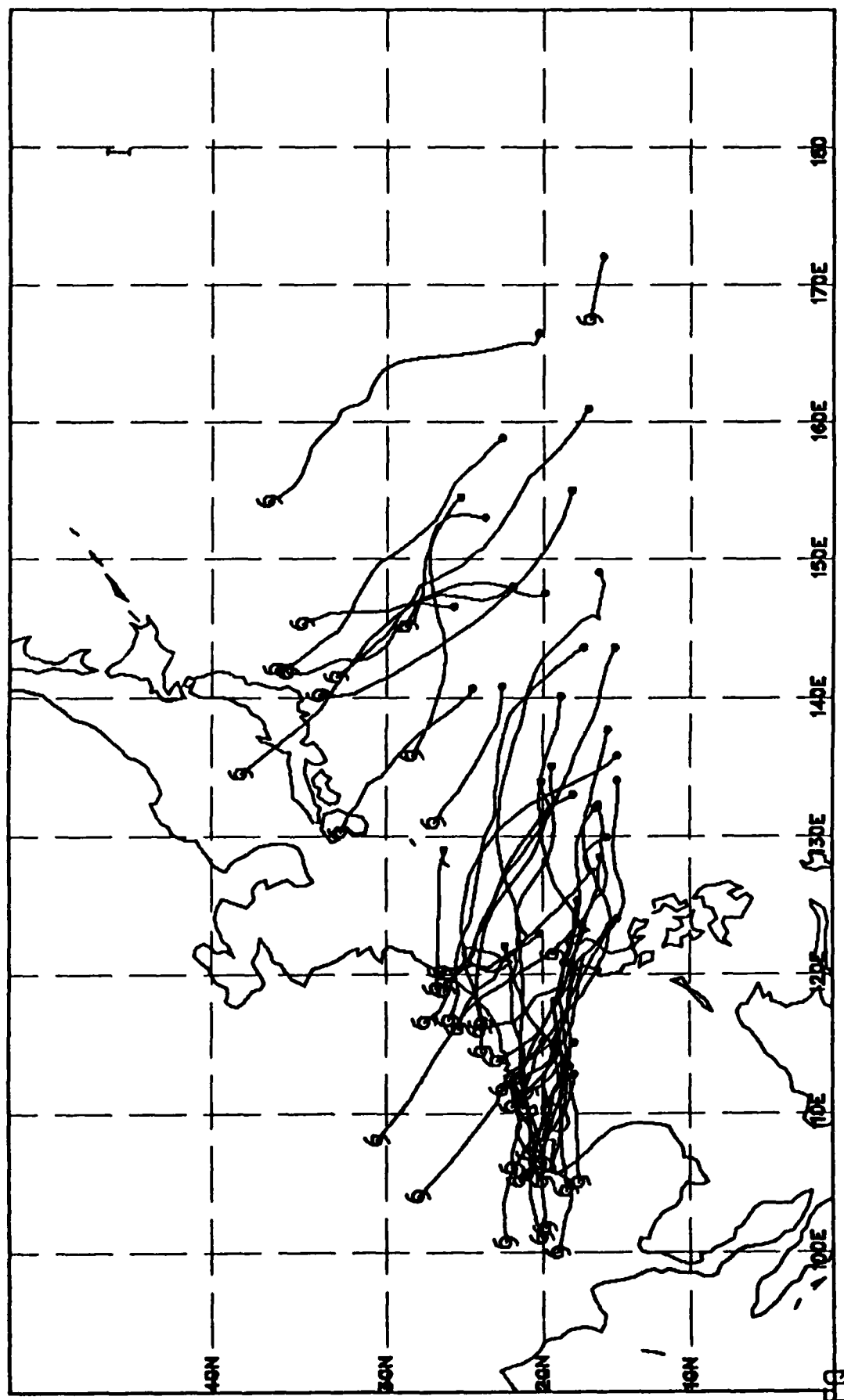
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored. Dashed line represents mean recurvature position of tropical cyclones (> 33 kts) classified as recurvers.

ACTUAL TRACKS FOR AUG 9 - AUG 23



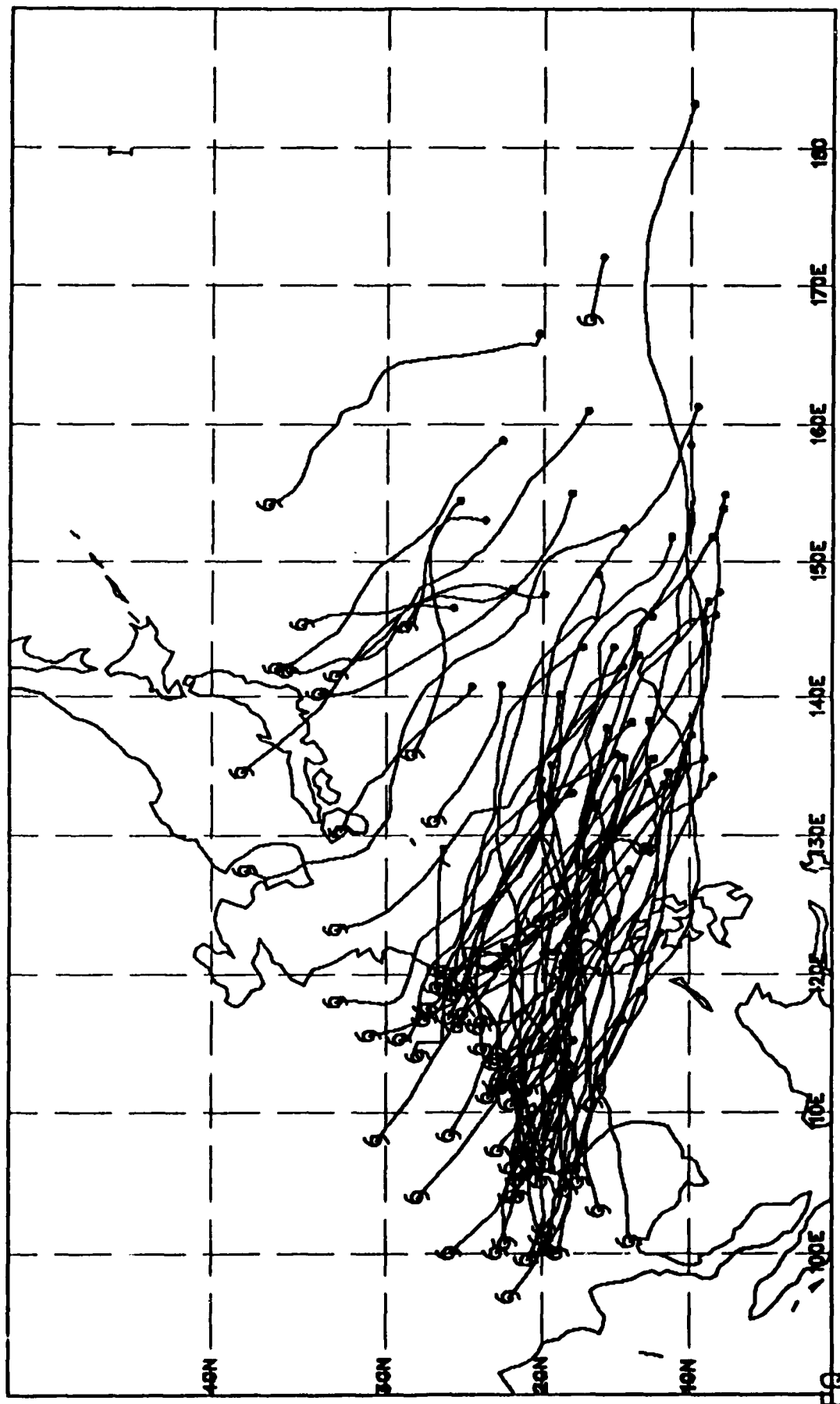
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR AUG 9 - AUG 23



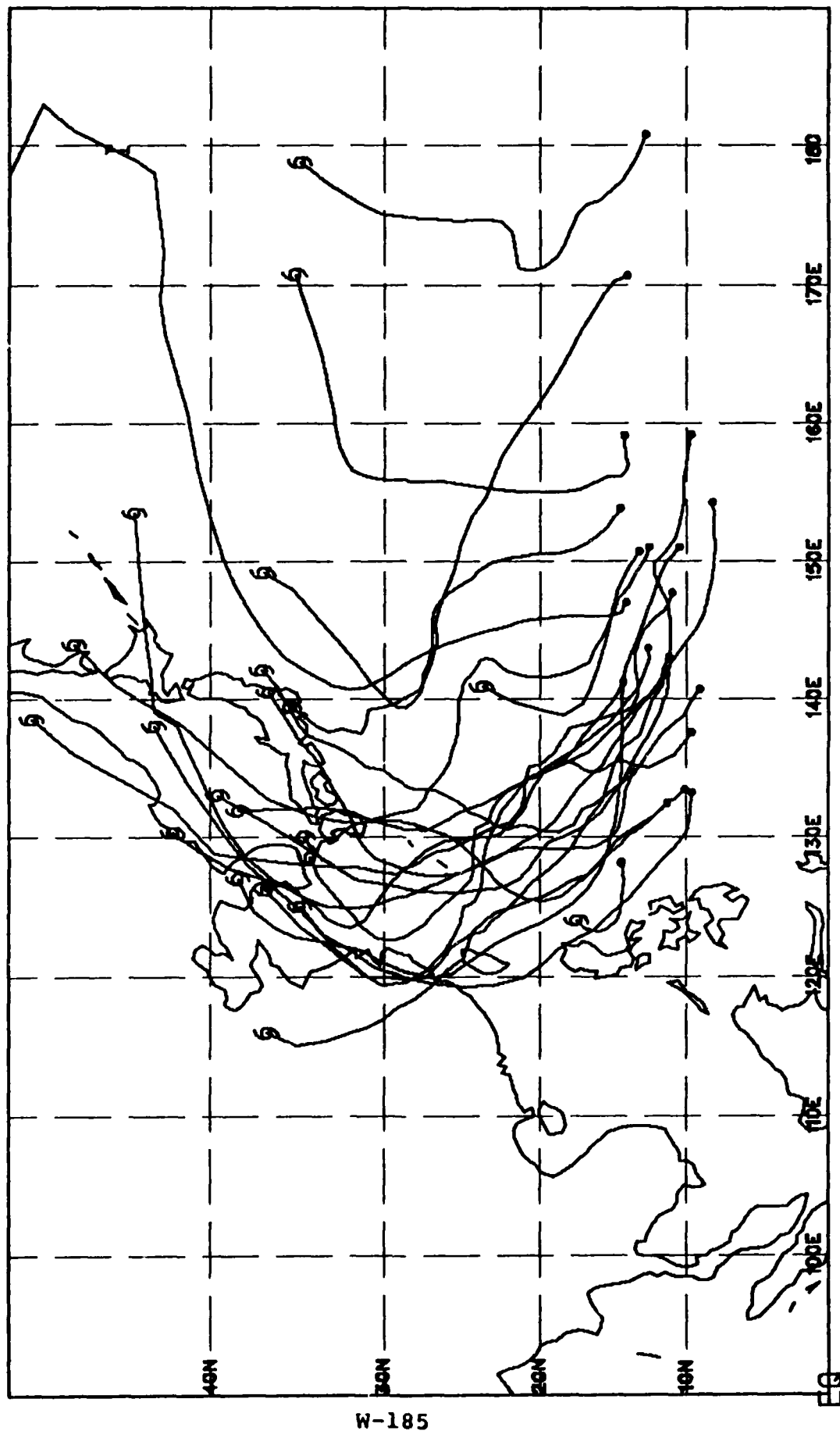
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR AUG 9 - AUG 23



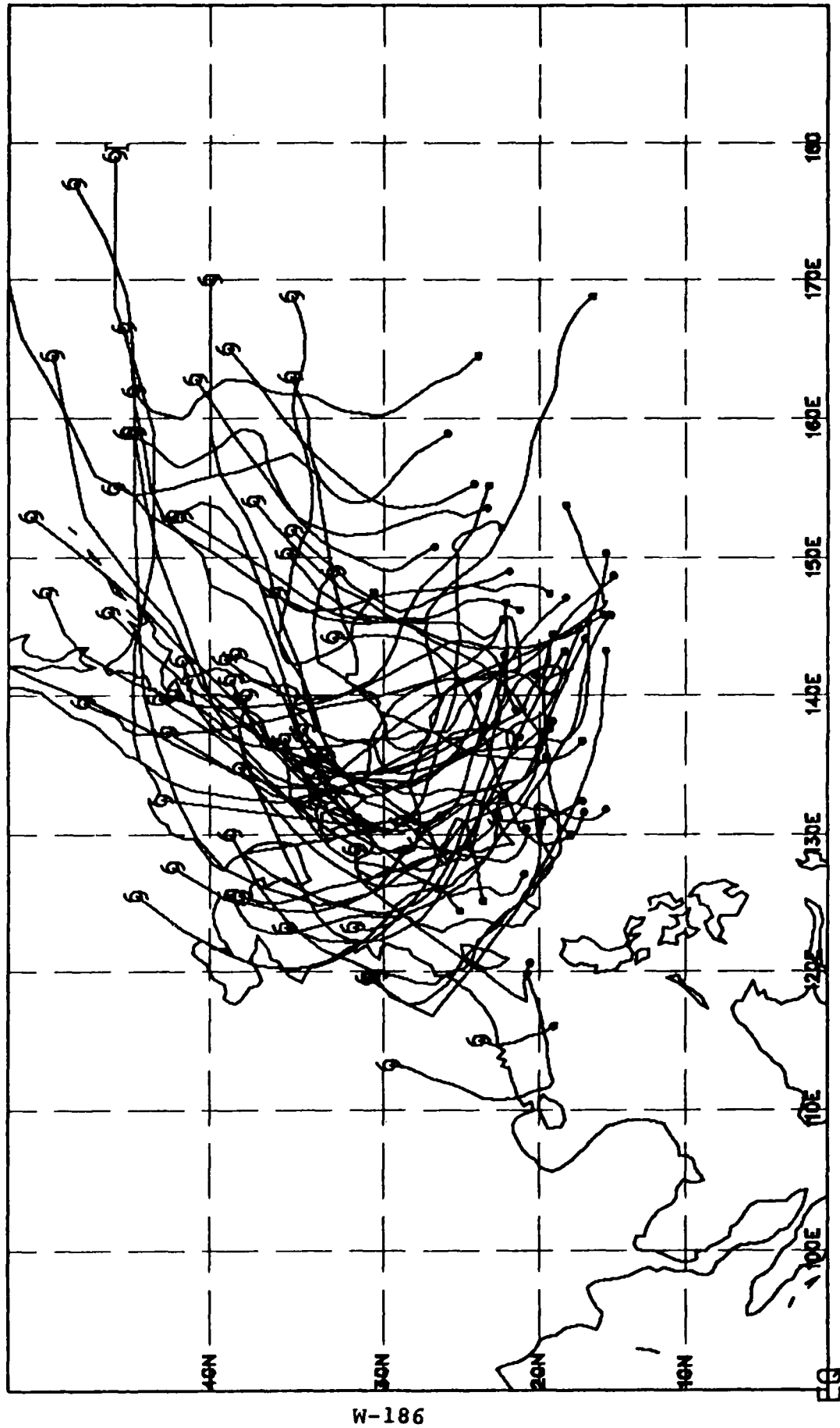
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR AUG 9 - AUG 23



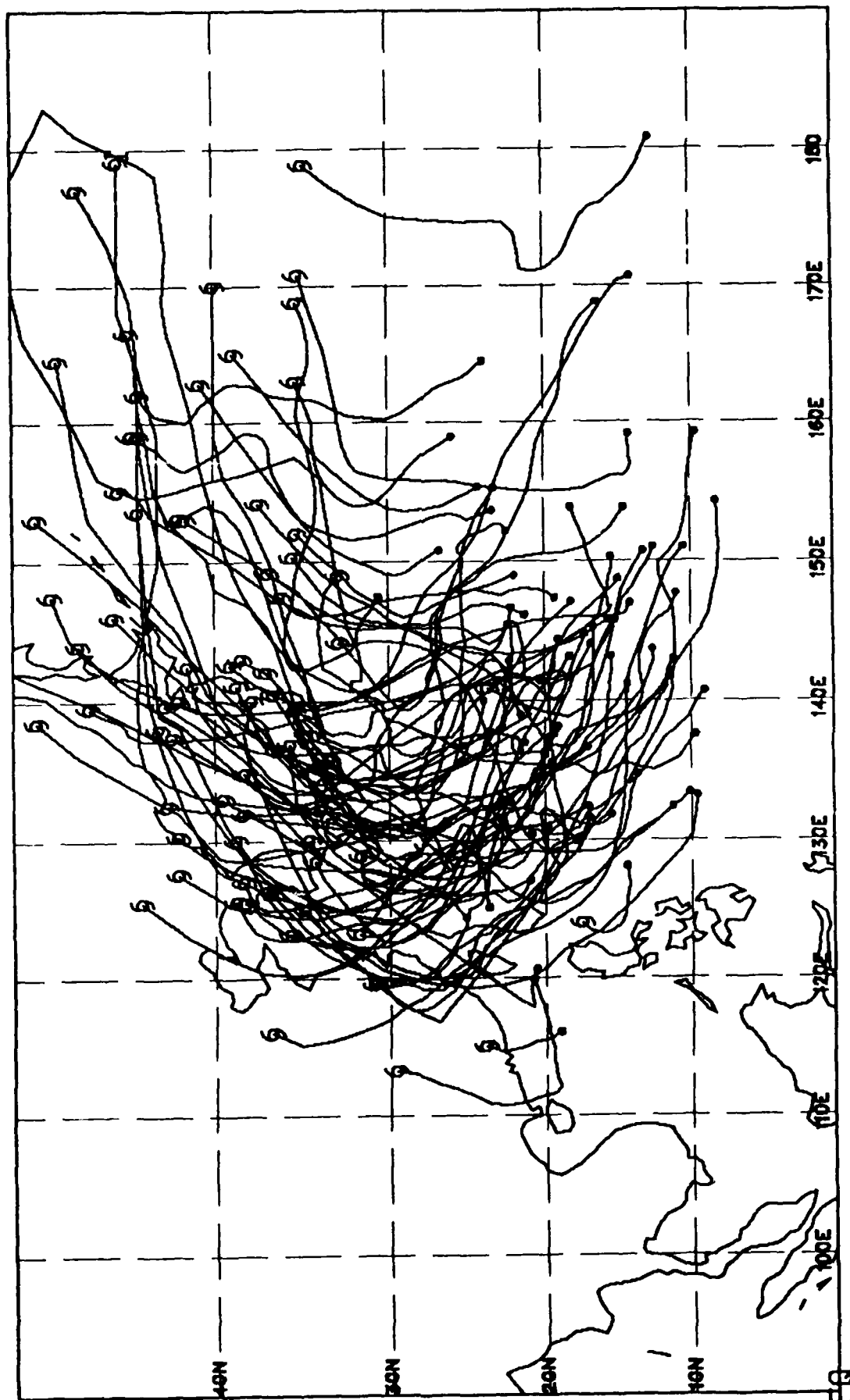
Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR AUG 9 - AUG 23



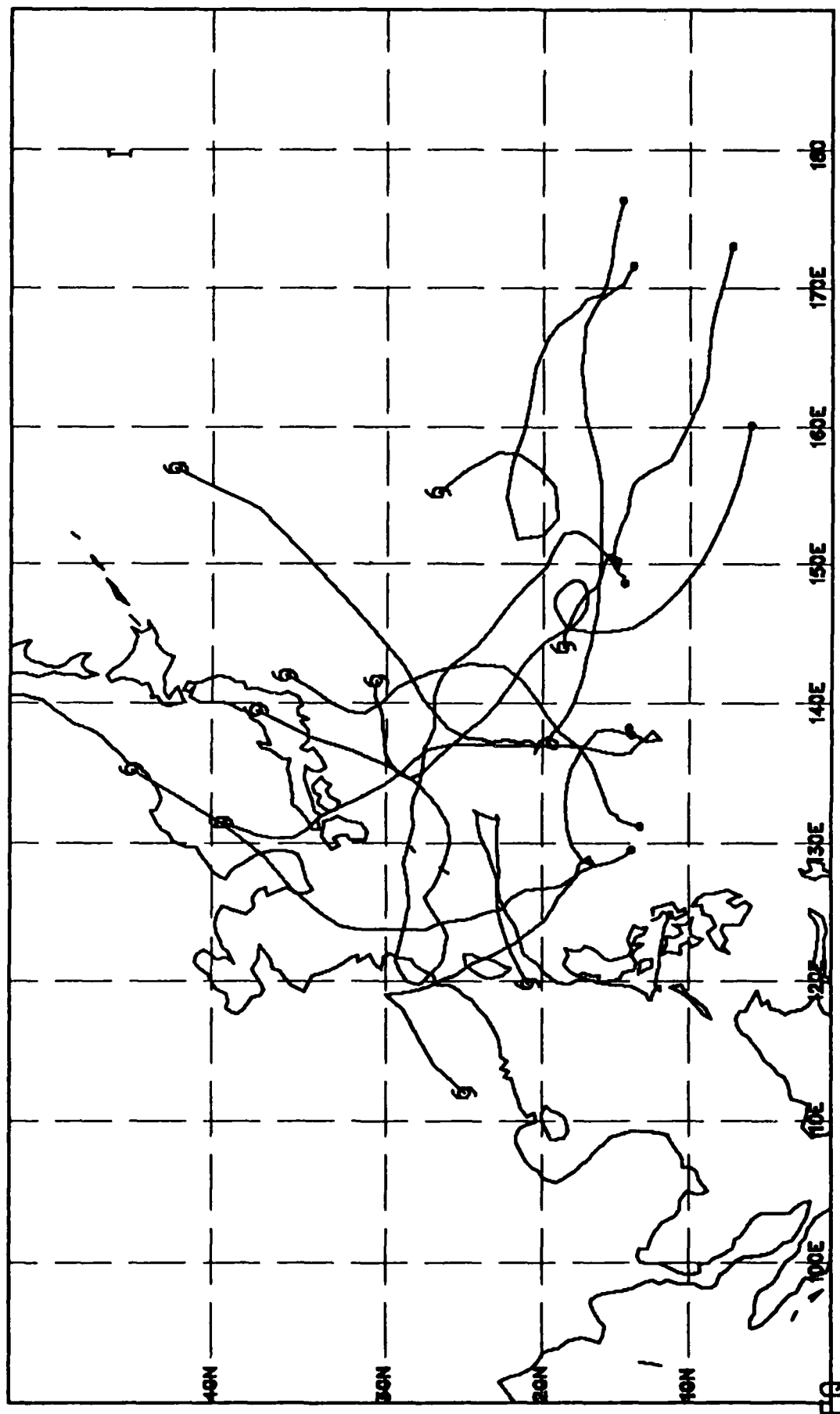
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR AUG 9 - AUG 23



Actual path of all recurring tropical cyclones (> 33 kts).

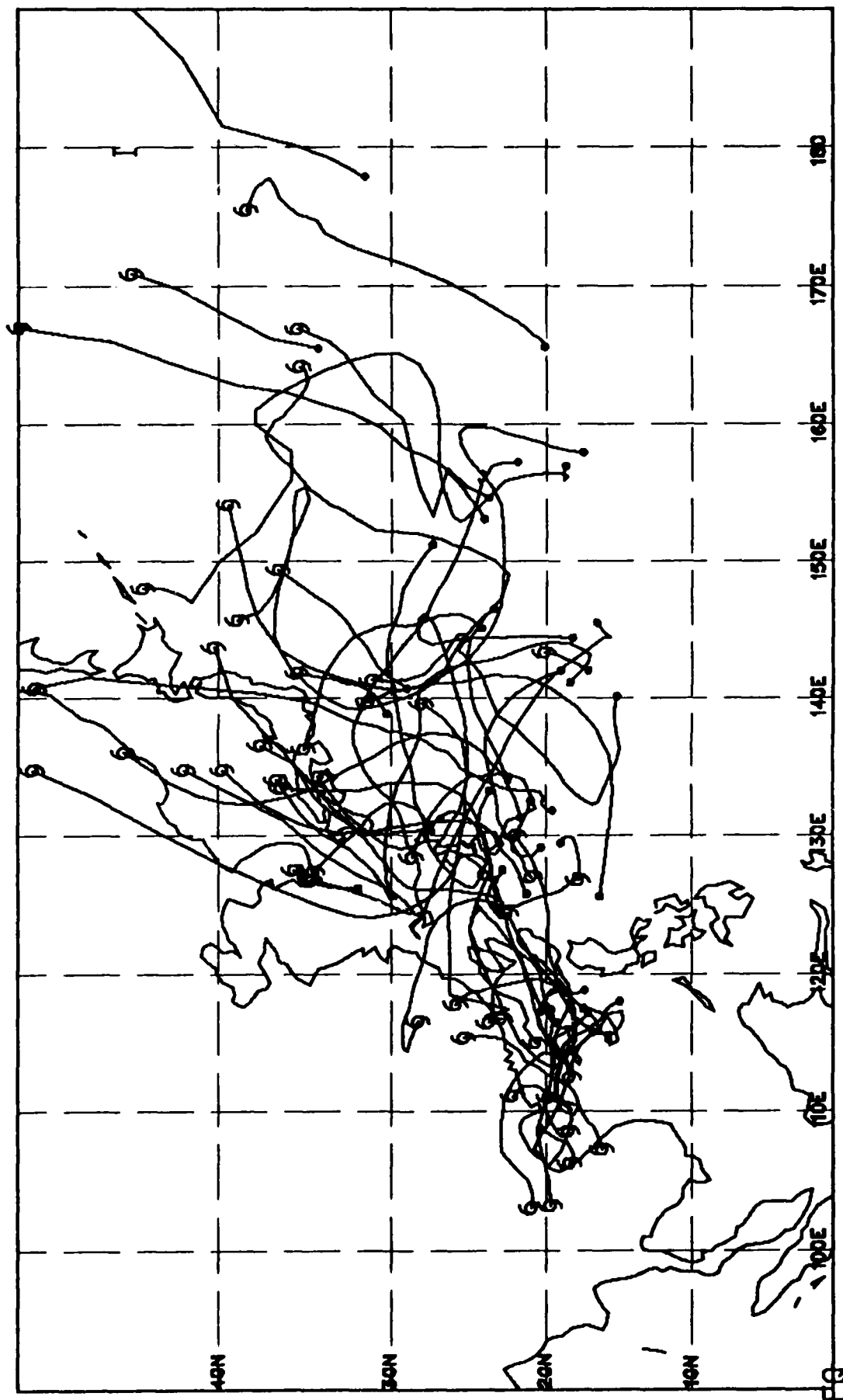
ACTUAL TRACKS FOR AUG 9 - AUG 23



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Actual path of other tropical cyclones (> 33 kts) developing south of 15°N .

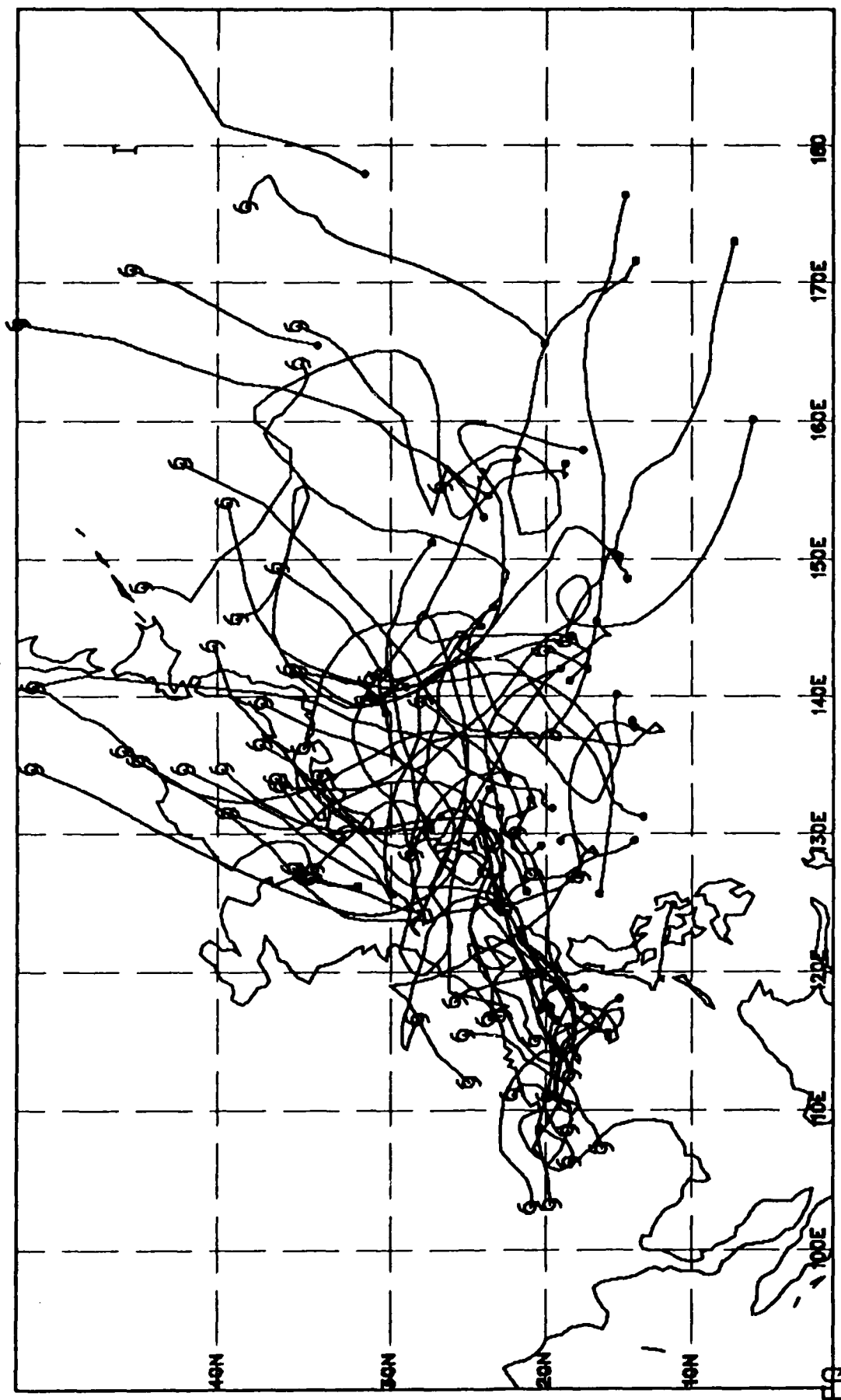
ACTUAL TRACKS FOR AUG 9 - AUG 23



W-189

Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR AUG 9 - AUG 23

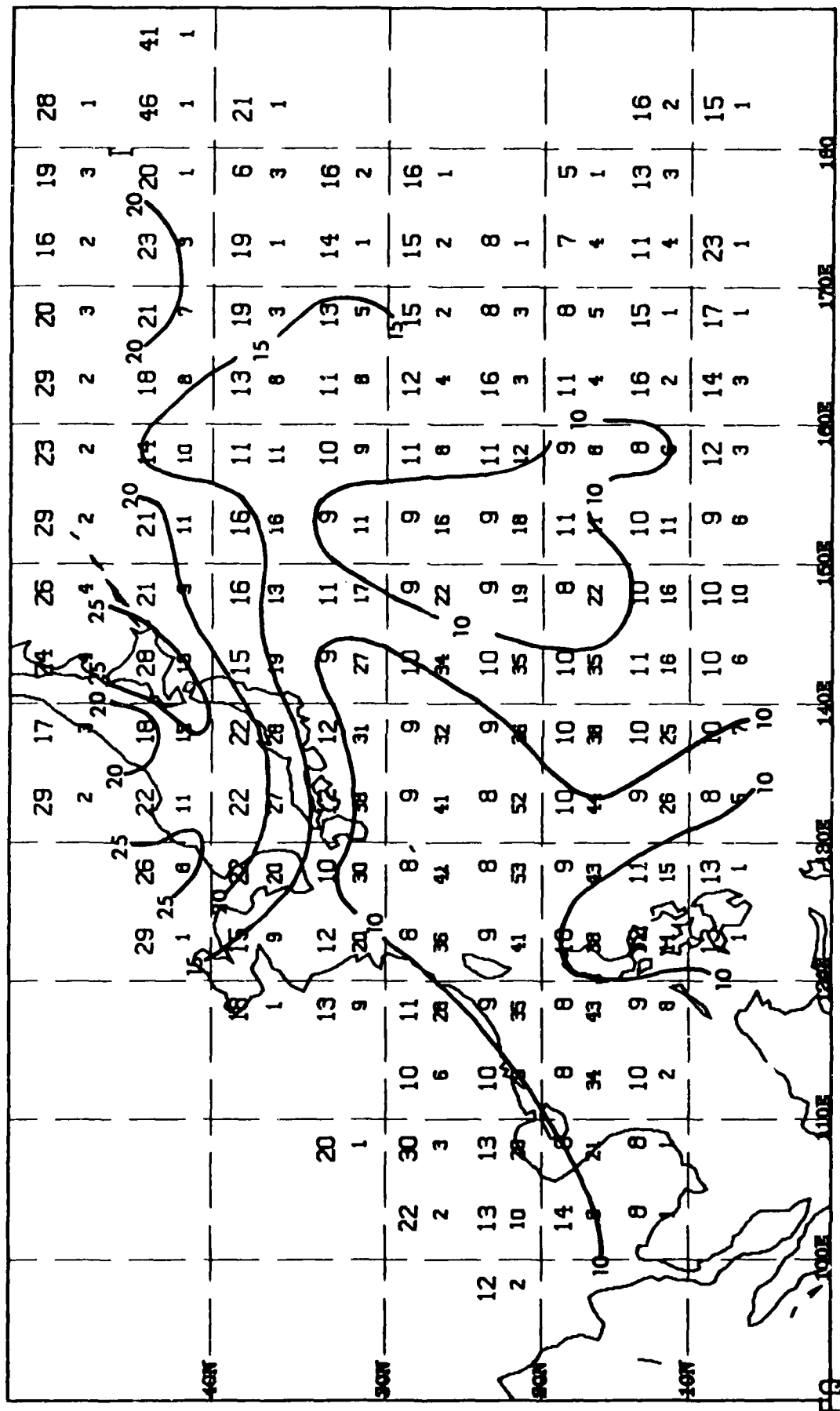


Actual path of all other tropical cyclones (> 33 kts).

[illegible]

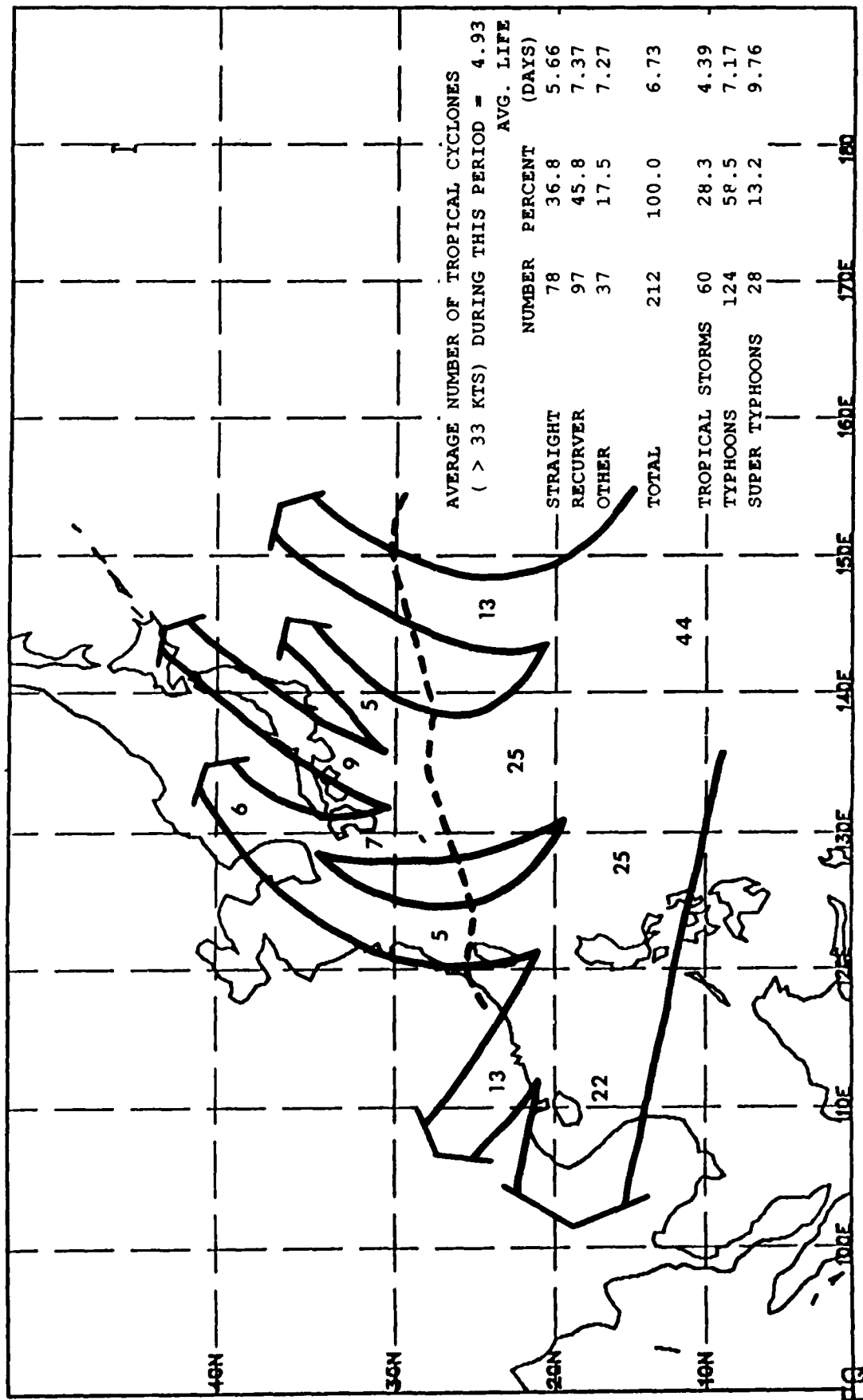
W-191

SPEED OF MOVEMENT FOR AUG 9 - AUG 23



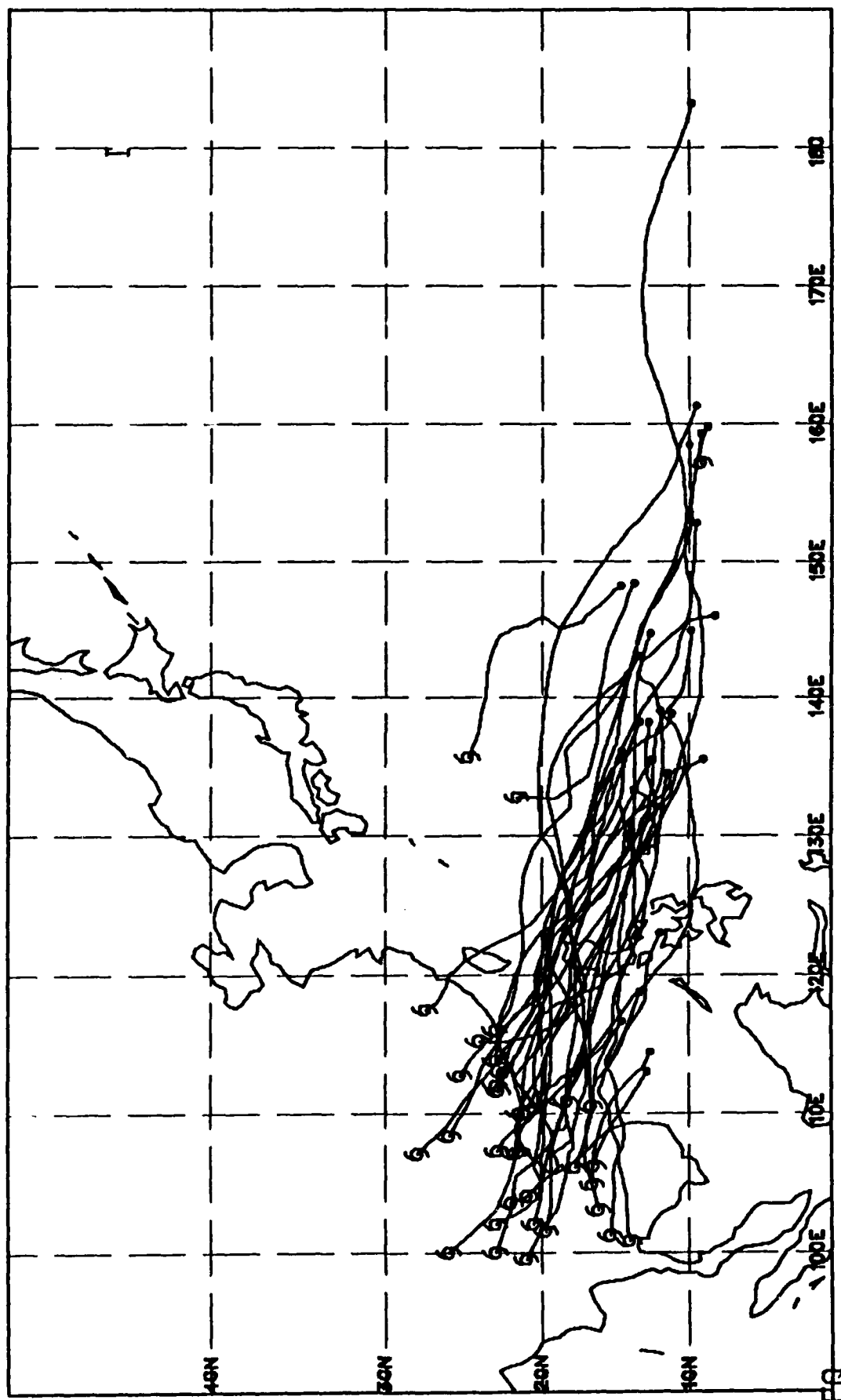
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR AUG 24 - SEP 8



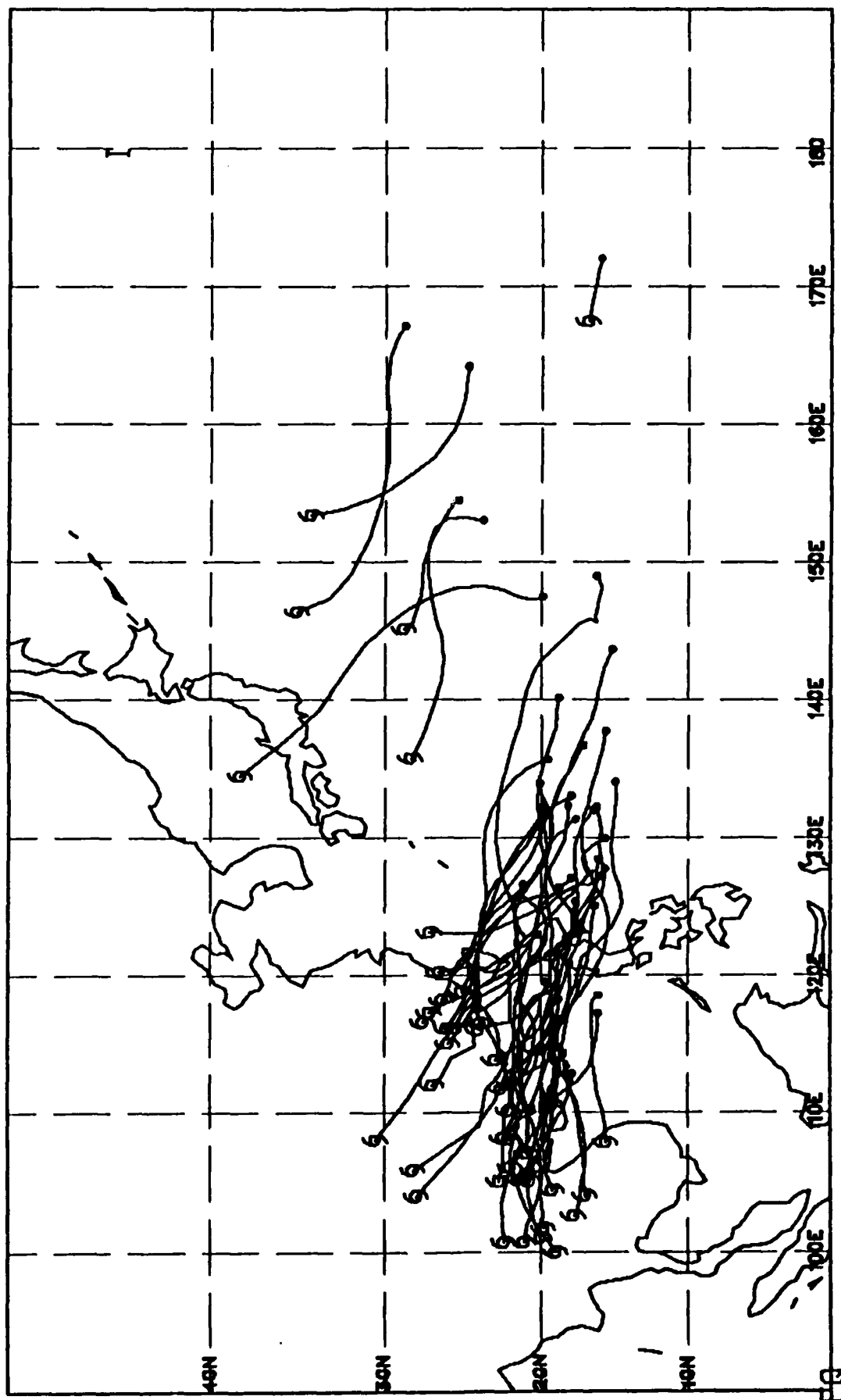
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored. Dashed line represents mean recurvature position of tropical cyclones (> 33 kts) classified as recurvers.

ACTUAL TRACKS FOR AUG 24 - SEP 8



Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR AUG 24 - SEP 8

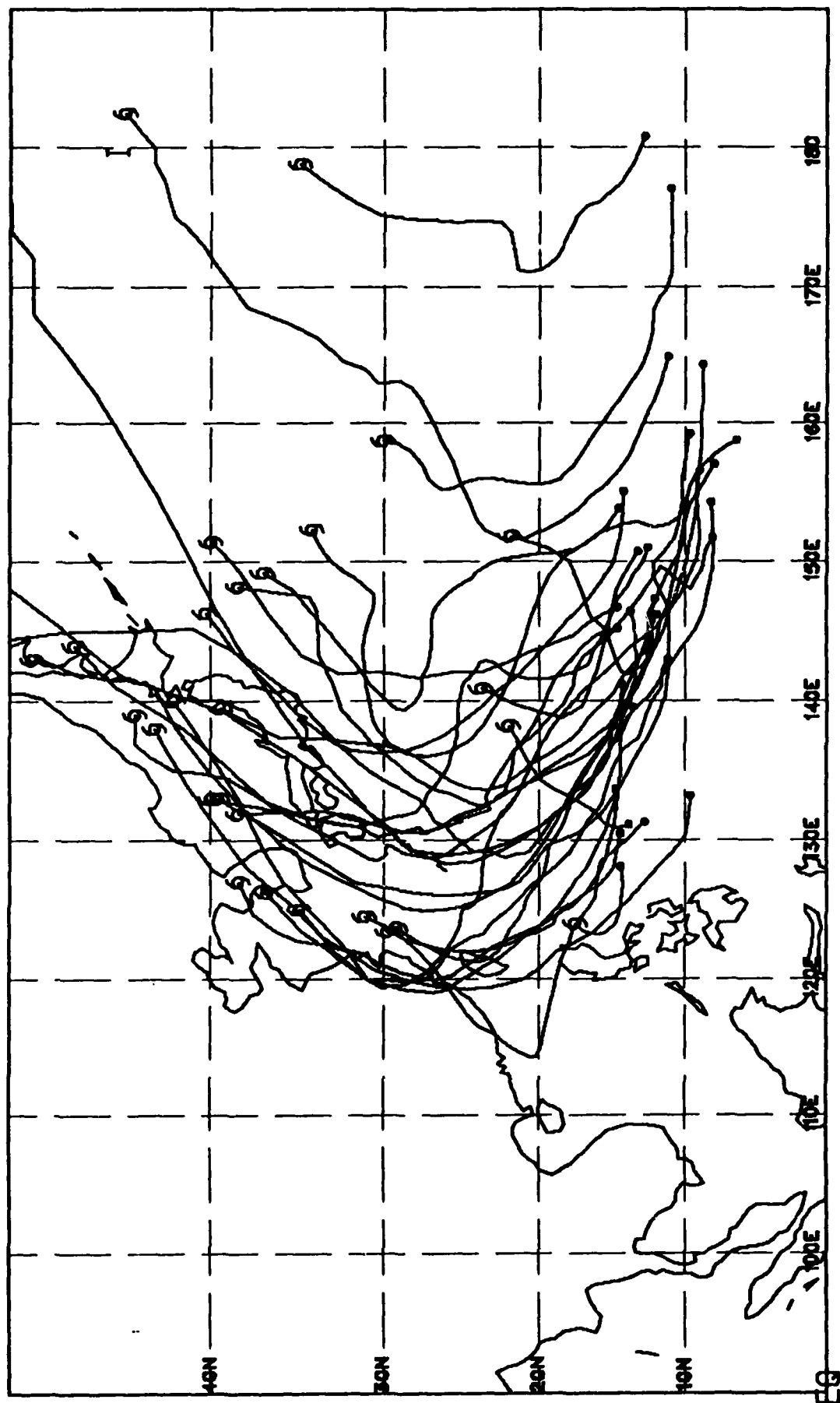


Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

A map of the North Pacific Ocean region, bounded by 40°N to 10°N latitude and 100°E to 180° longitude. The map displays a dense network of ship tracks, represented by lines with small circles at various points. Many of these points are labeled with dates, such as '10/1', '10/2', '10/3', '10/4', '10/5', '10/6', '10/7', '10/8', '10/9', '10/10', '10/11', '10/12', '10/13', '10/14', '10/15', '10/16', '10/17', '10/18', '10/19', '10/20', '10/21', '10/22', '10/23', '10/24', '10/25', '10/26', '10/27', '10/28', '10/29', '10/30', '10/31', '11/1', '11/2', '11/3', '11/4', '11/5', '11/6', '11/7', '11/8', '11/9', '11/10', '11/11', '11/12', '11/13', '11/14', '11/15', '11/16', '11/17', '11/18', '11/19', '11/20', '11/21', '11/22', '11/23', '11/24', '11/25', '11/26', '11/27', '11/28', '11/29', '11/30', '12/1', '12/2', '12/3', '12/4', '12/5', '12/6', '12/7', '12/8', '12/9', '12/10', '12/11', '12/12', '12/13', '12/14', '12/15', '12/16', '12/17', '12/18', '12/19', '12/20', '12/21', '12/22', '12/23', '12/24', '12/25', '12/26', '12/27', '12/28', '12/29', '12/30', '12/31'. The tracks are most concentrated in the central North Pacific, between 140°E and 160°E, and 30°N and 40°N. The map also shows the outlines of the Japanese archipelago, the Korean peninsula, and the eastern coast of China.

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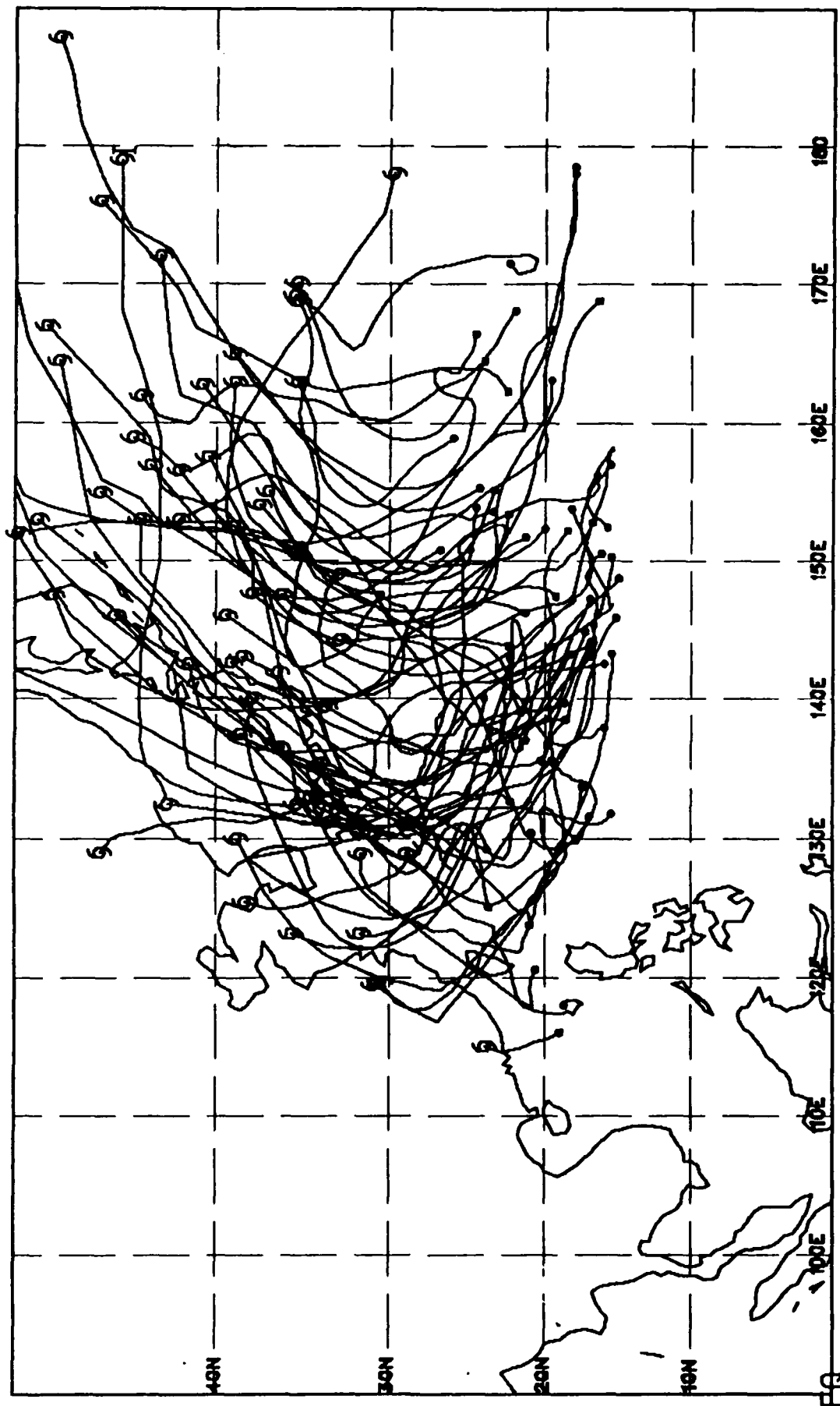
ACTUAL TRACKS FOR AUG 24 - SEP 8



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Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

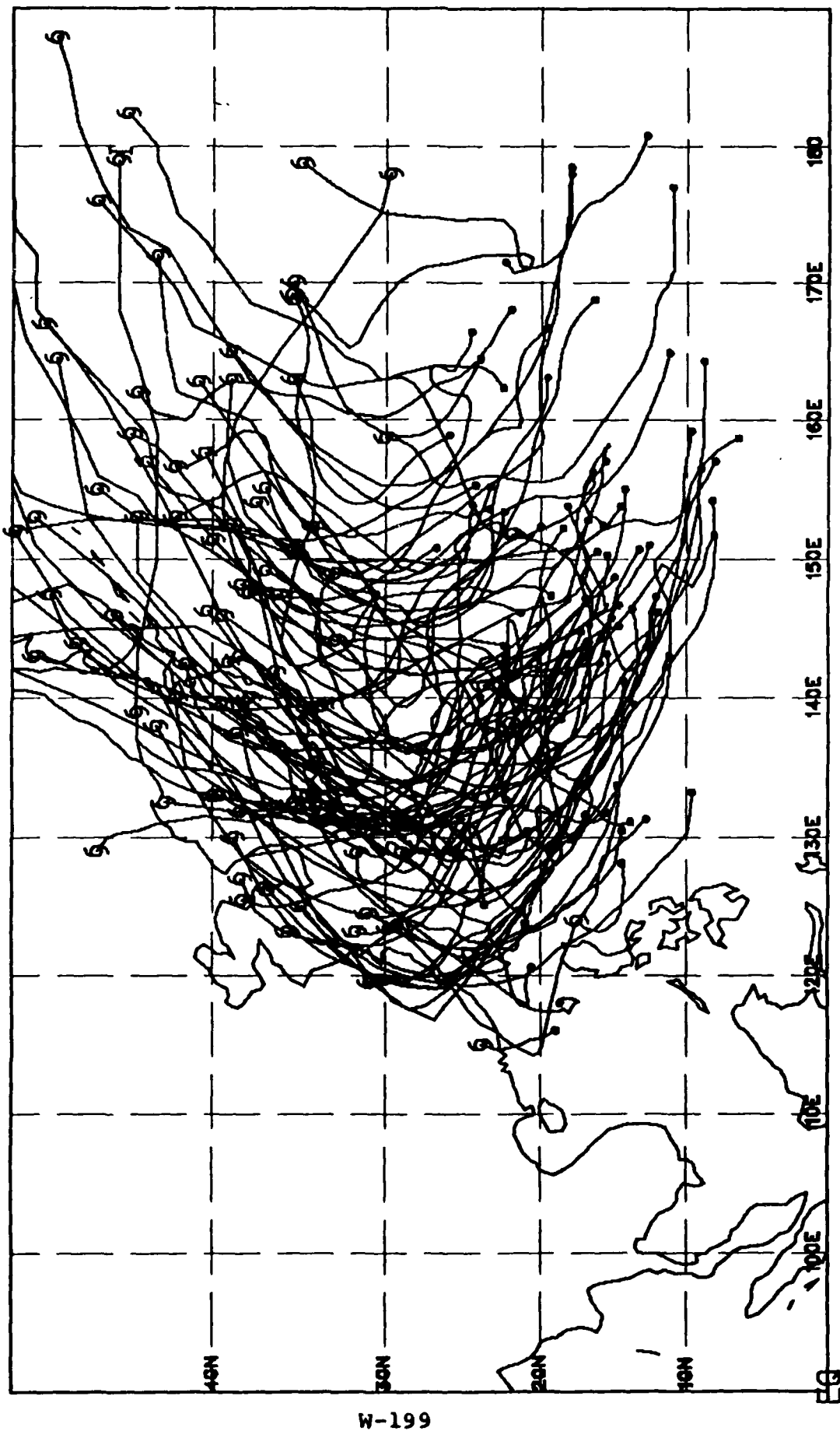
ACTUAL TRACKS FOR AUG 24 - SEP 8



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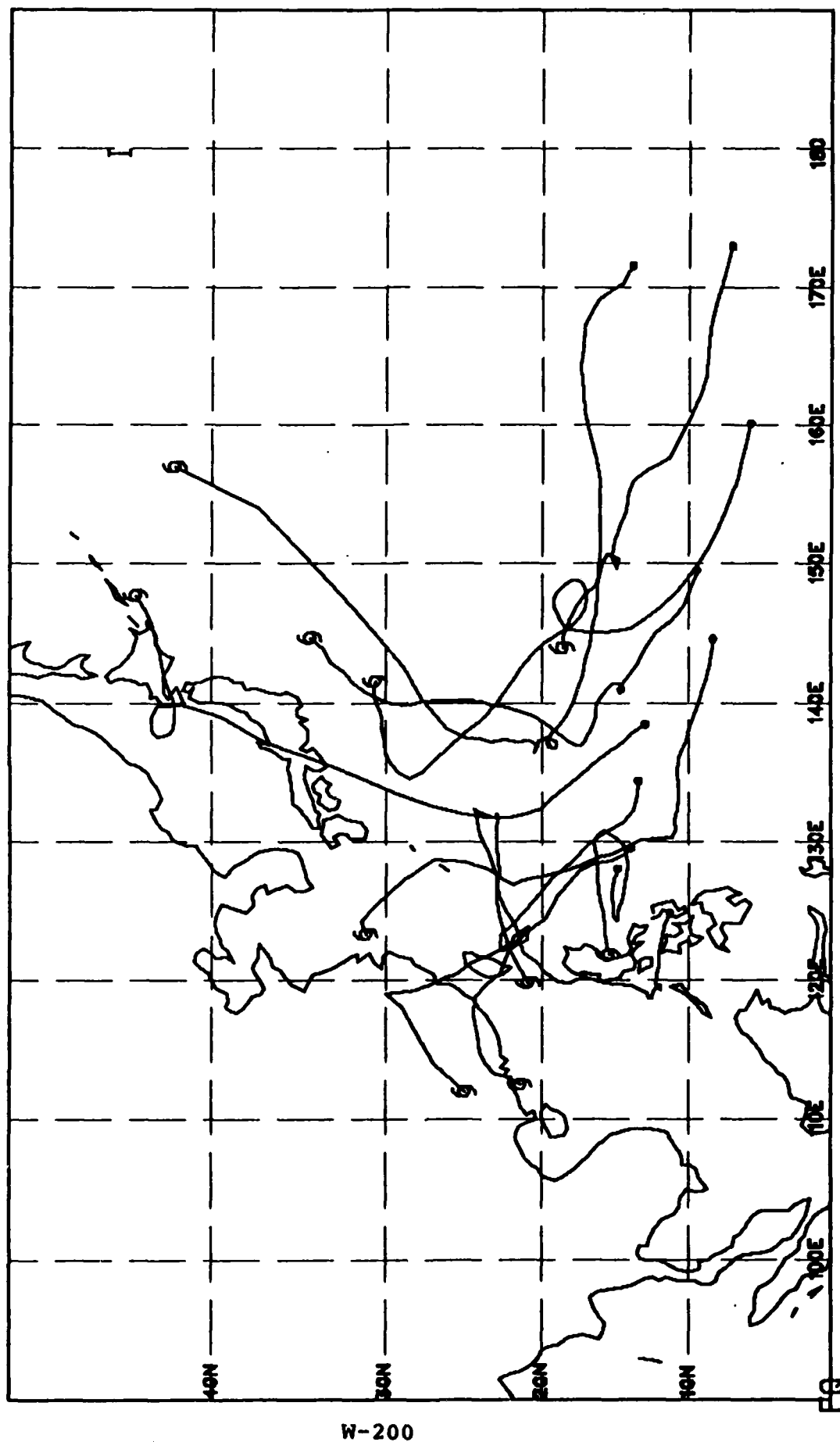
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR AUG 24 - SEP 8



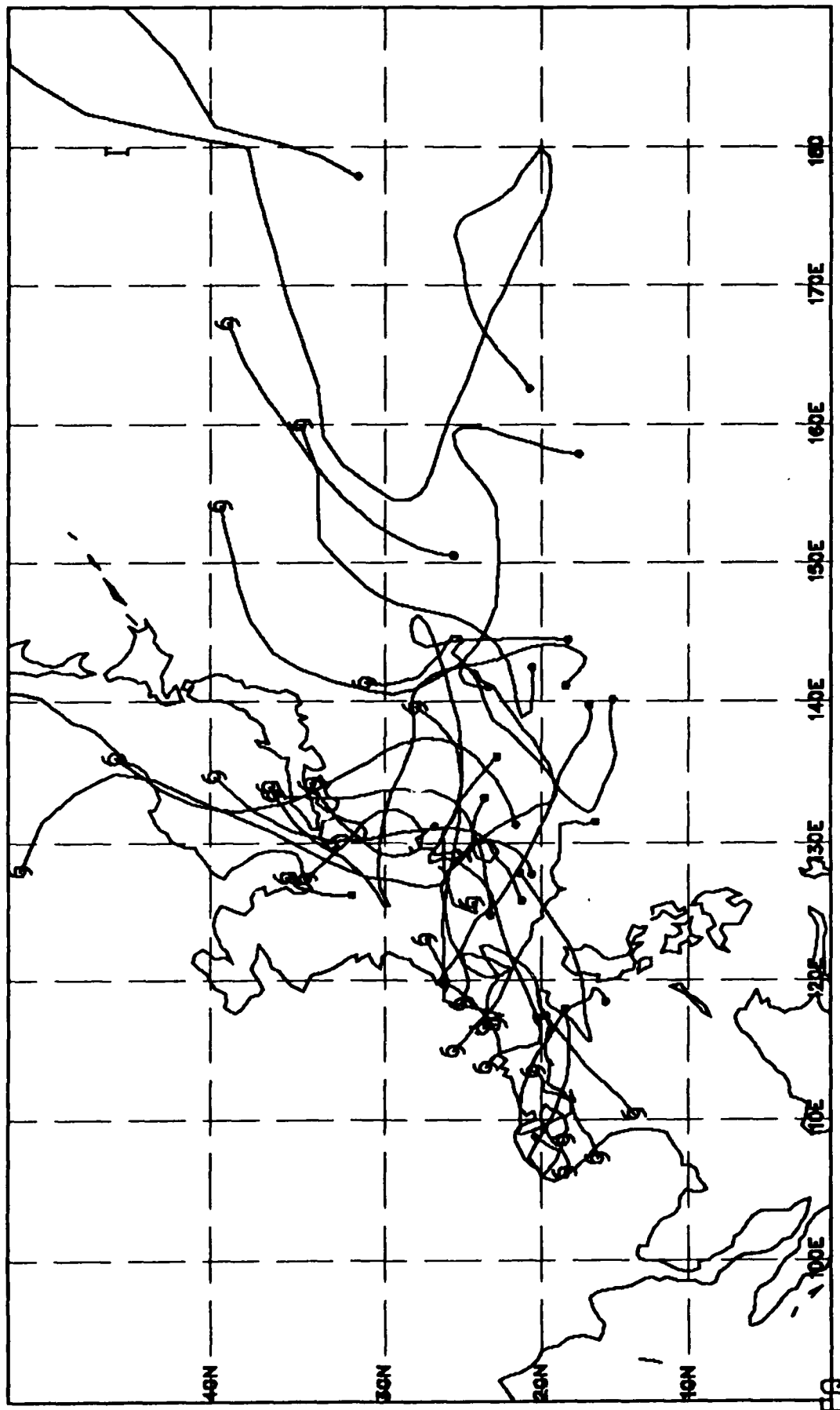
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR AUG 24 - SEP 8



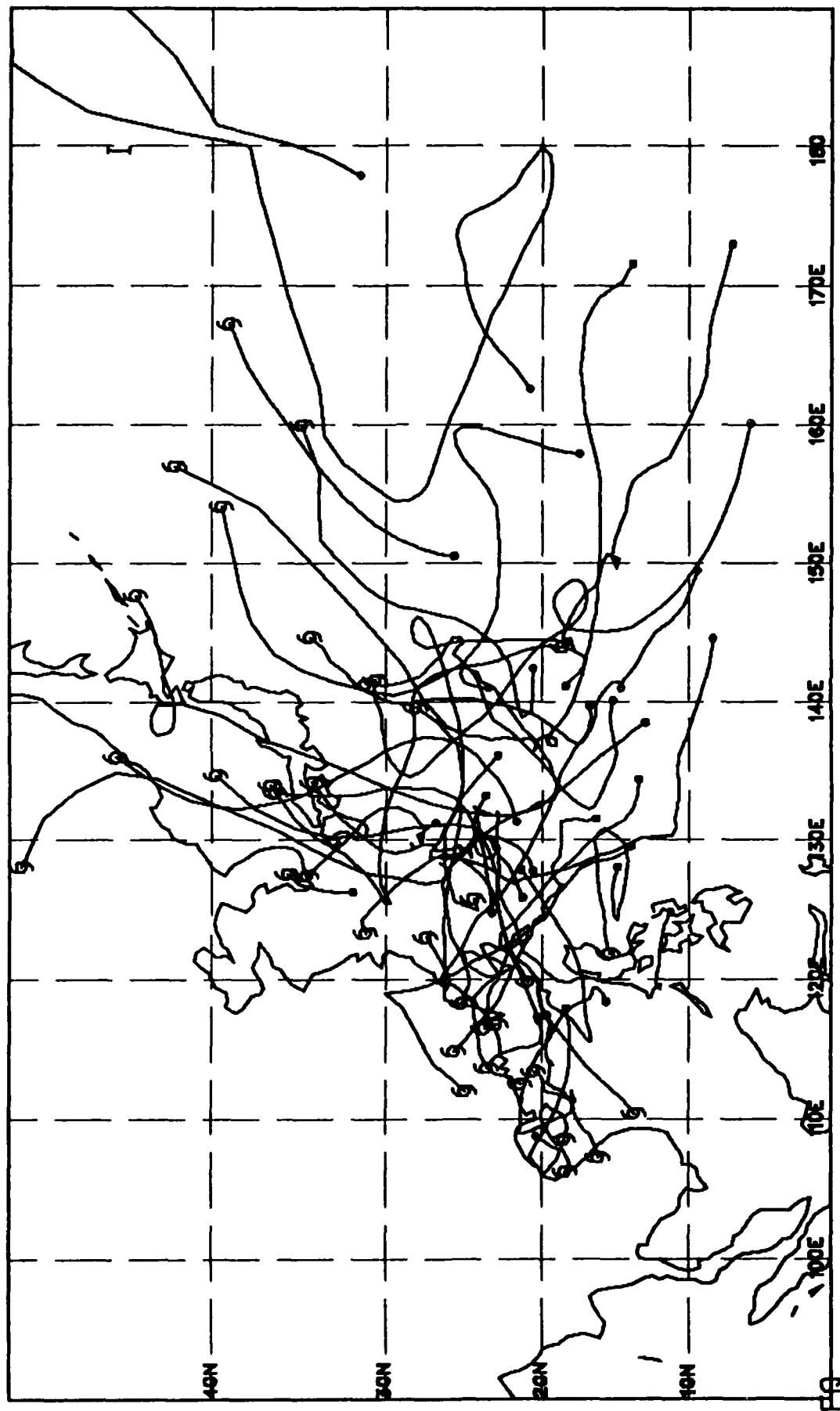
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR AUG 24 - SEP 8



Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

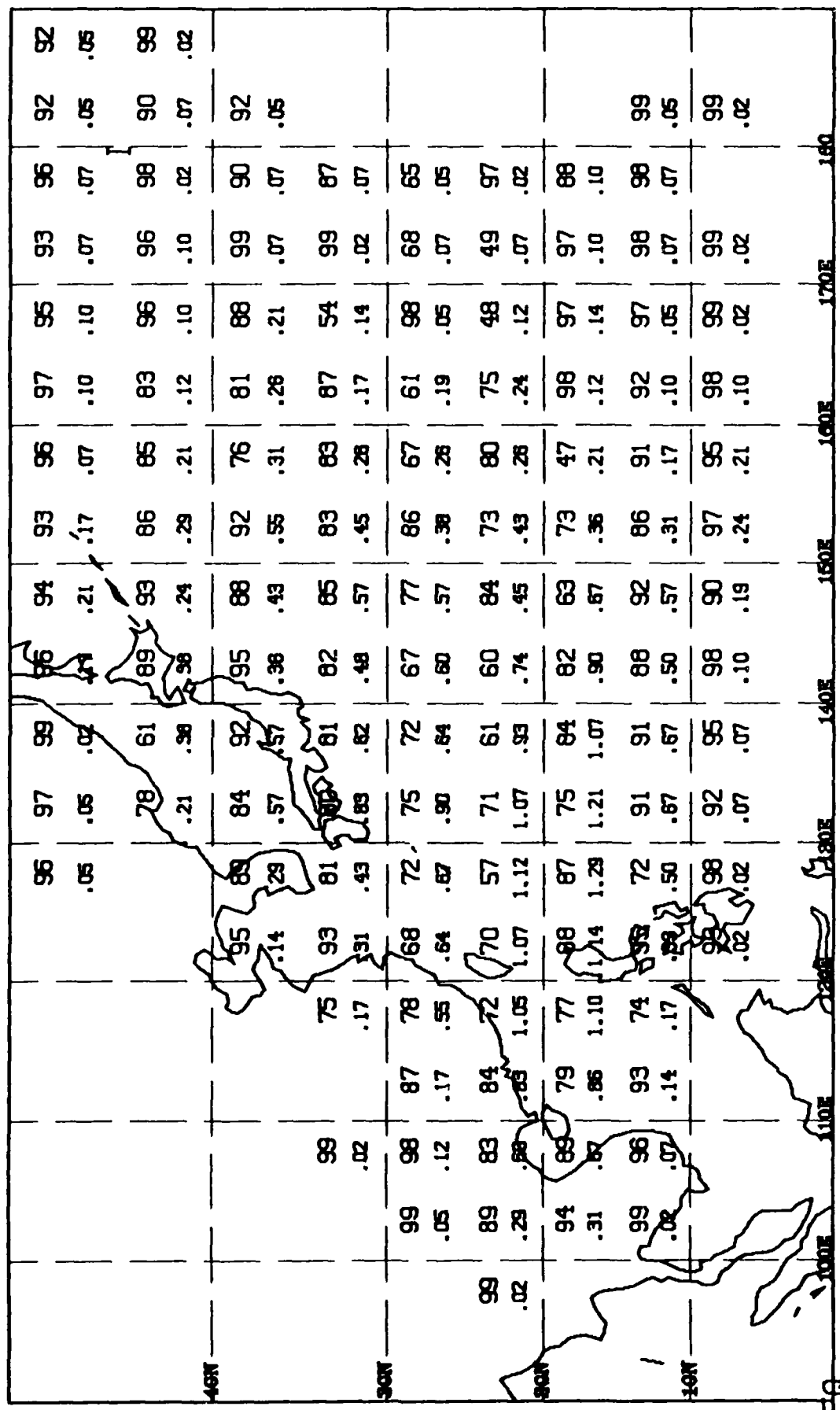
ACTUAL TRACKS FOR AUG 24 - SEP 8



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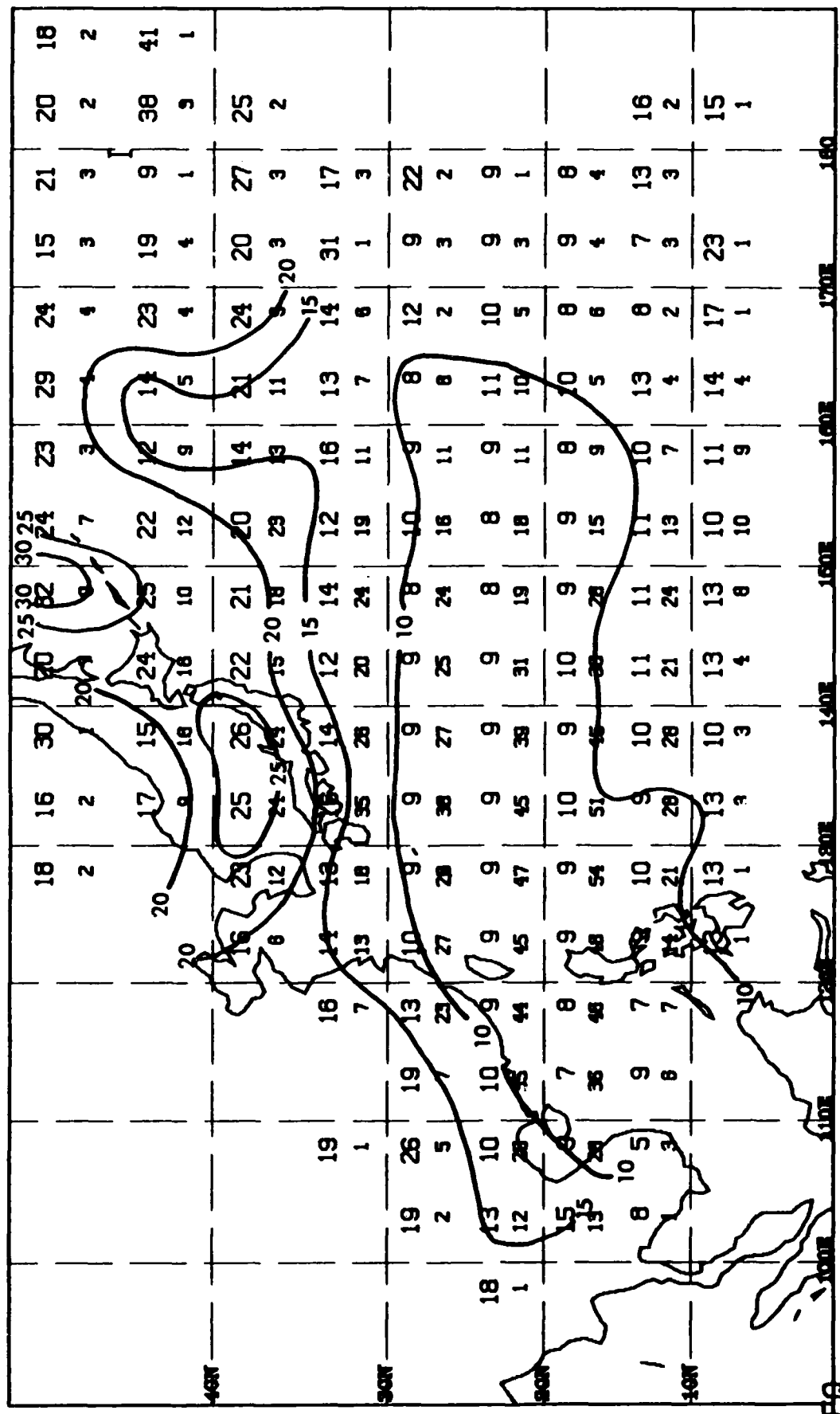
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR AUG 24 - SEP 8



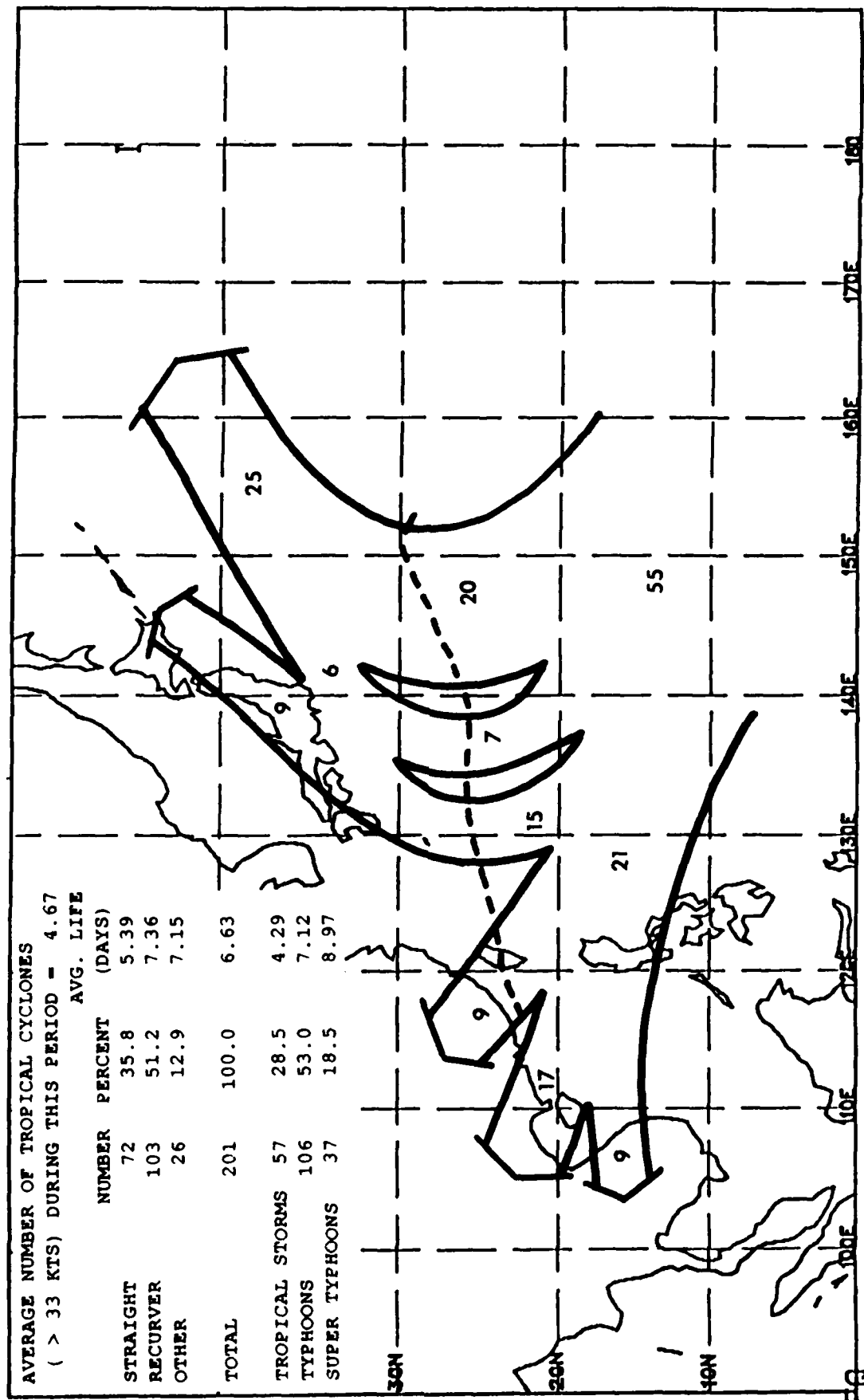
Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number). Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed. Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year per time period.

SPEED OF MOVEMENT FOR AUG 24 - SEP 8



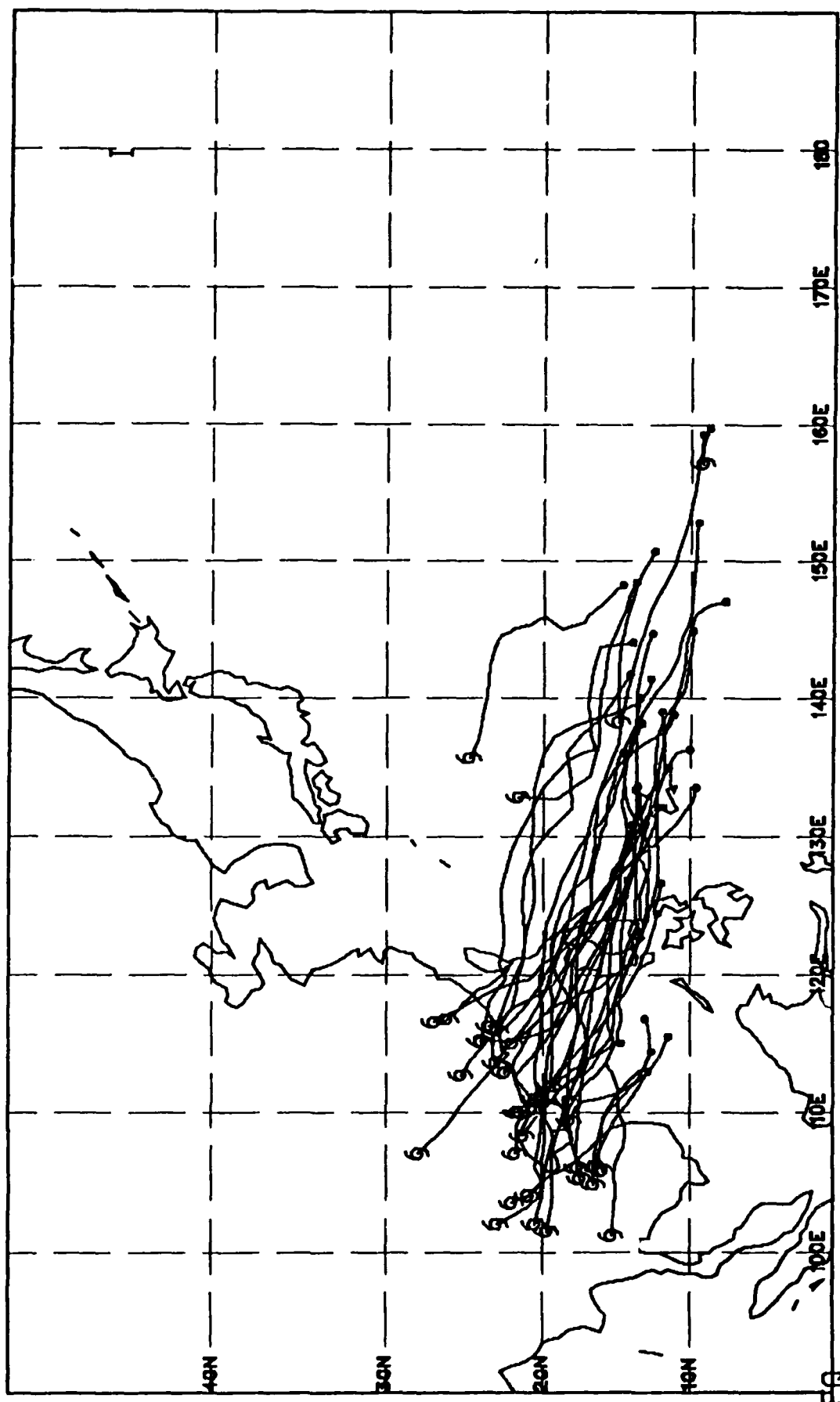
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR SEP 9 - SEP 23



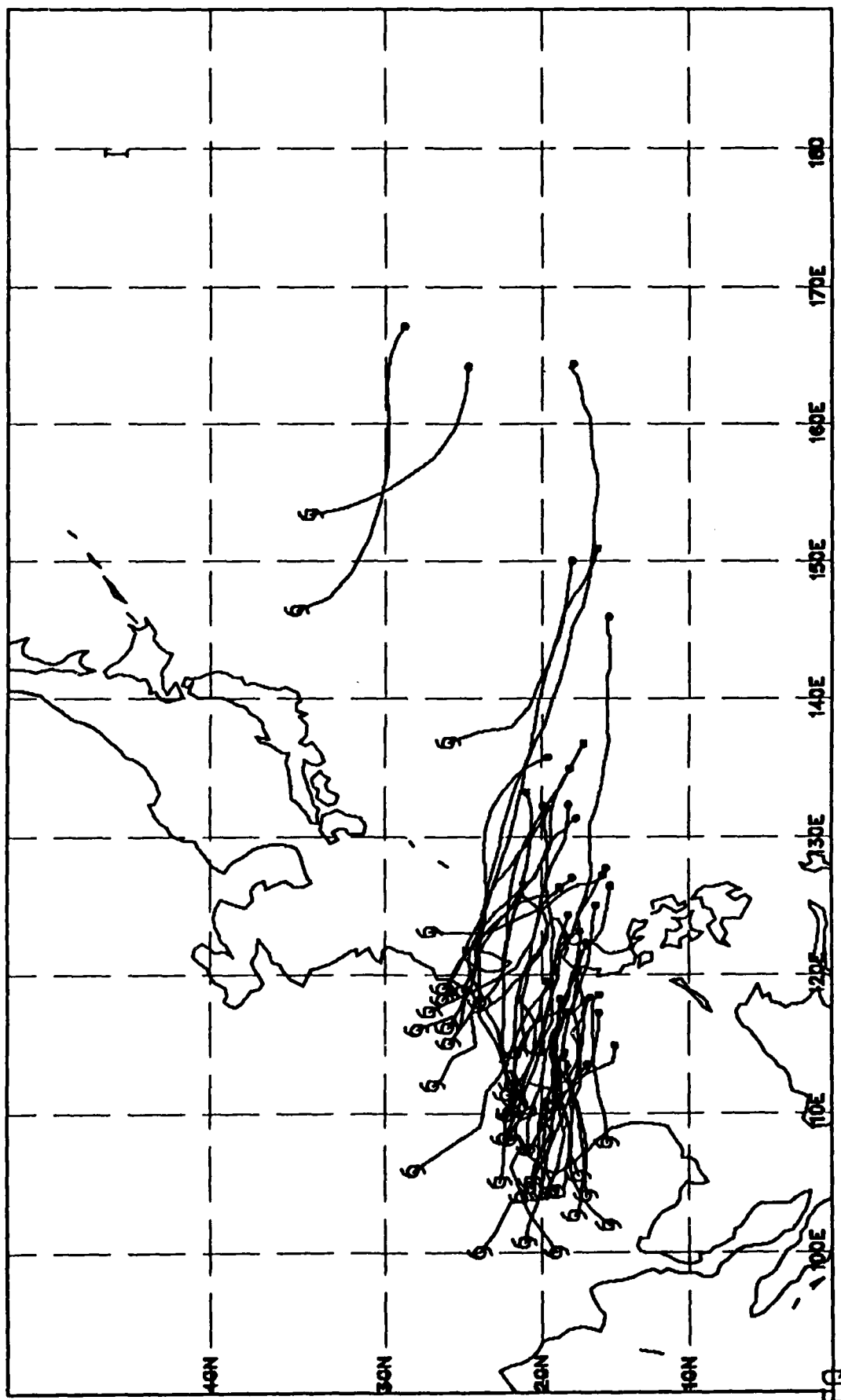
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored. Dashed line represents mean recurvature position of tropical cyclones (> 33 kts) classified as recurvers.

ACTUAL TRACKS FOR SEP 9 - SEP 23



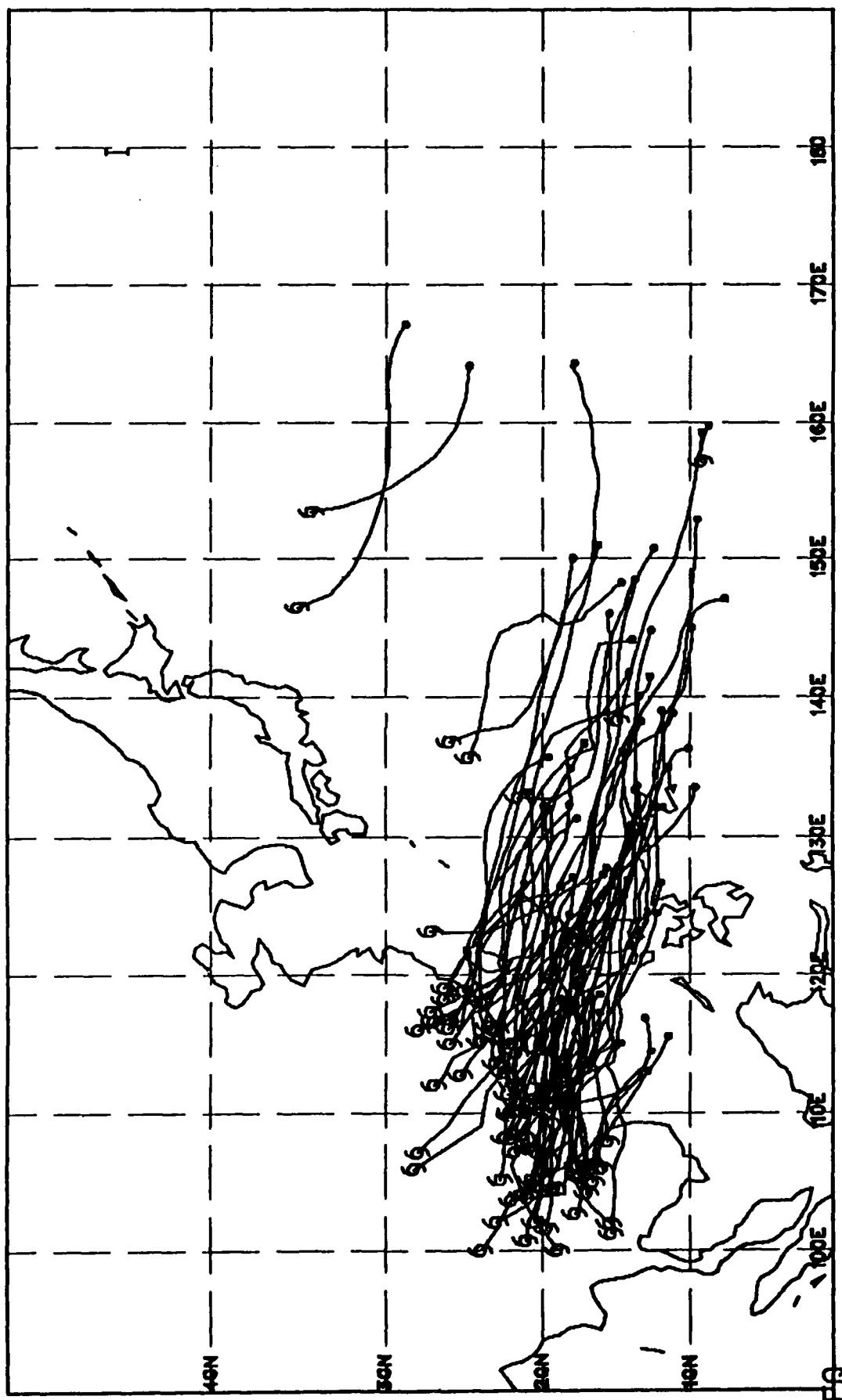
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR SEP 9 - SEP 23



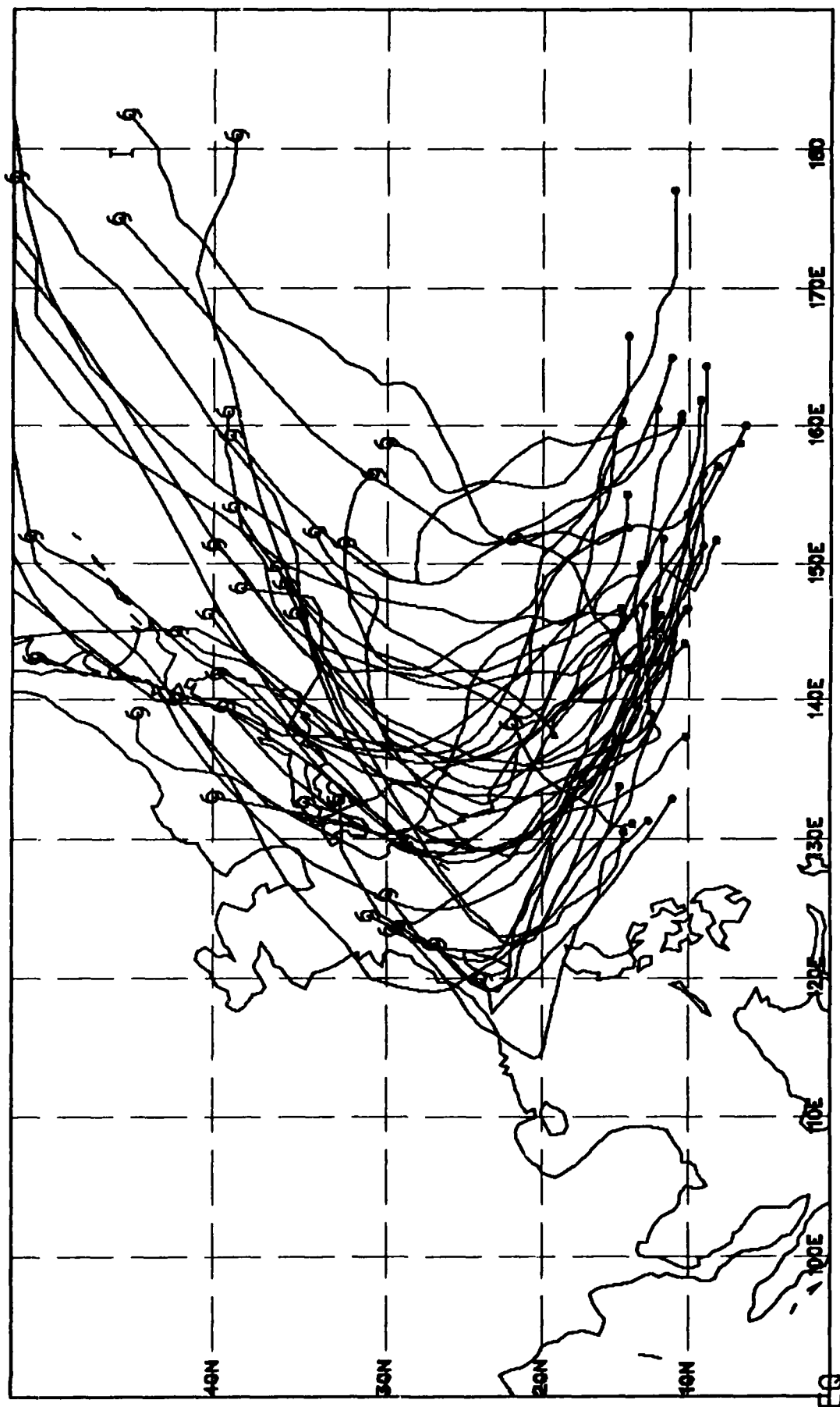
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR SEP 9 - SEP 23



Actual path of all straight tropical cyclones (> 33 kts).

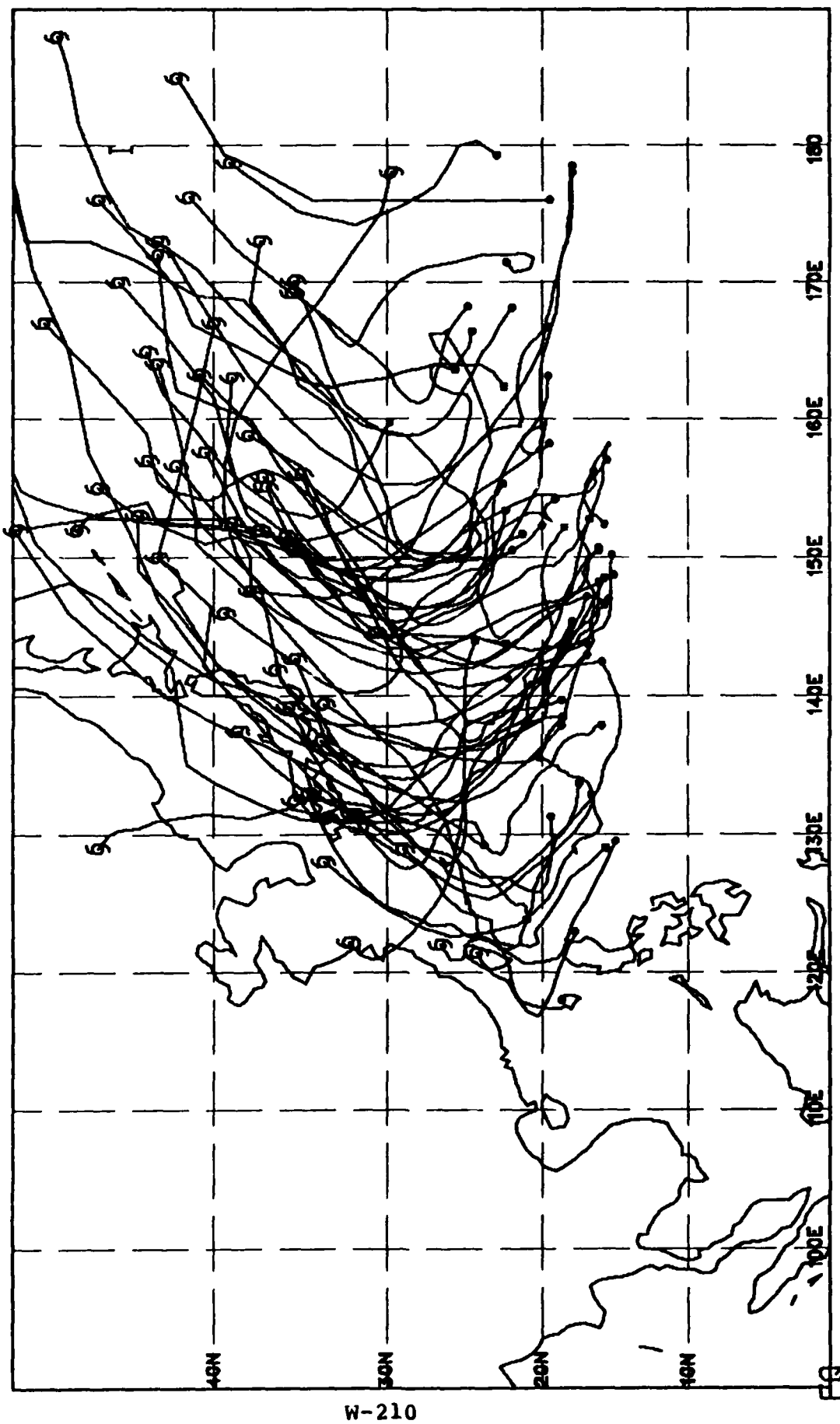
ACTUAL TRACKS FOR SEP 9 - SEP 23



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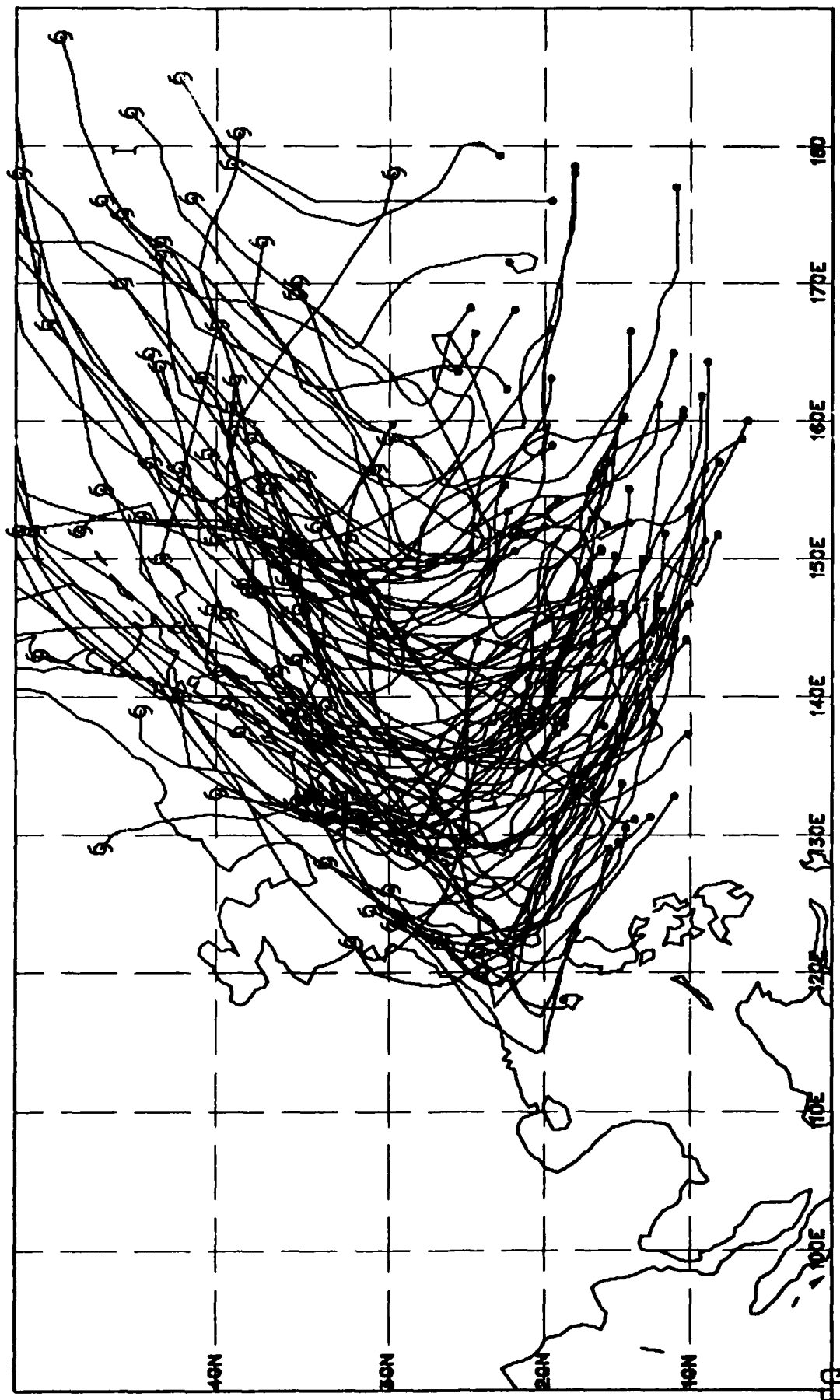
Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR SEP 9 - SEP 23



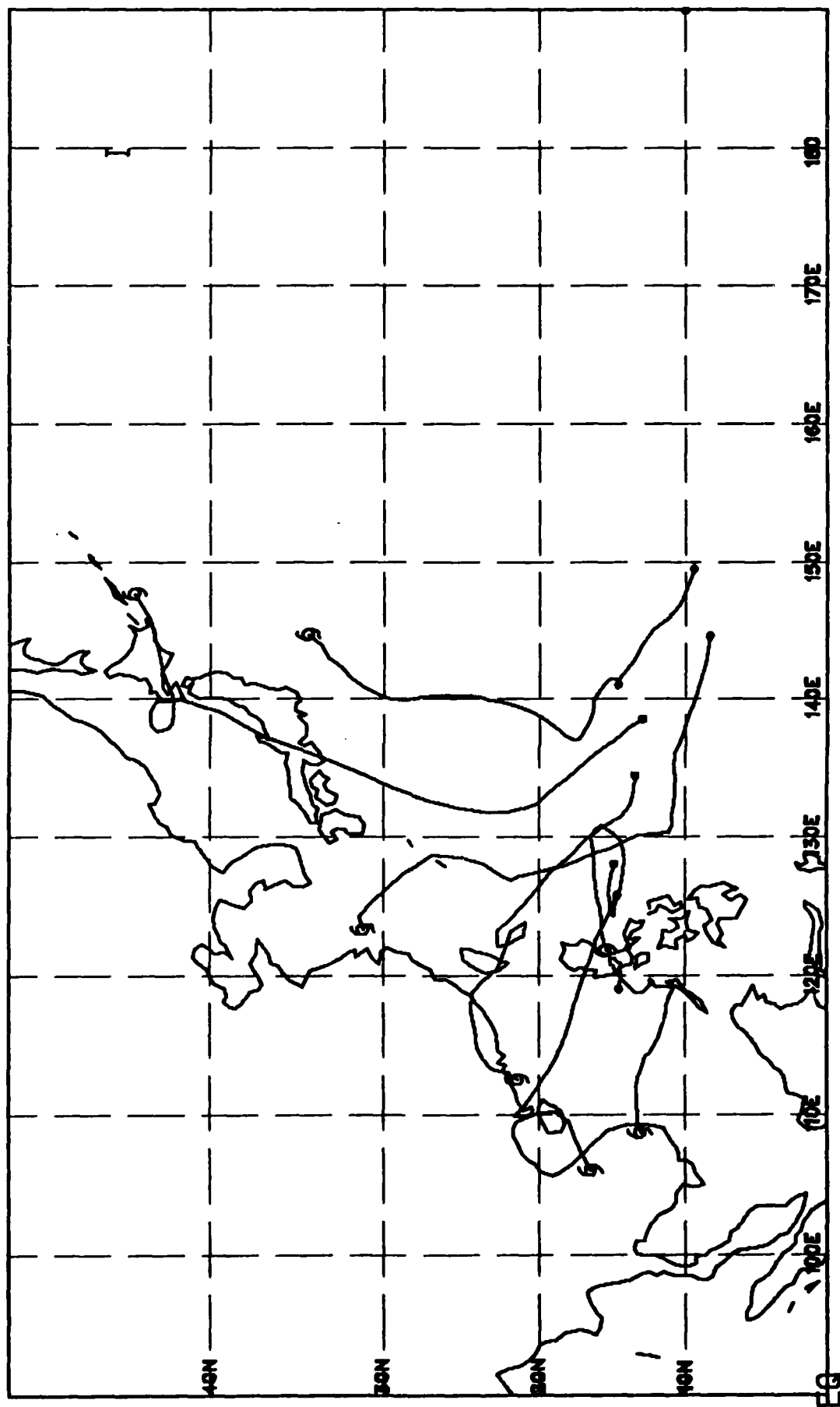
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR SEP 9 - SEP 23



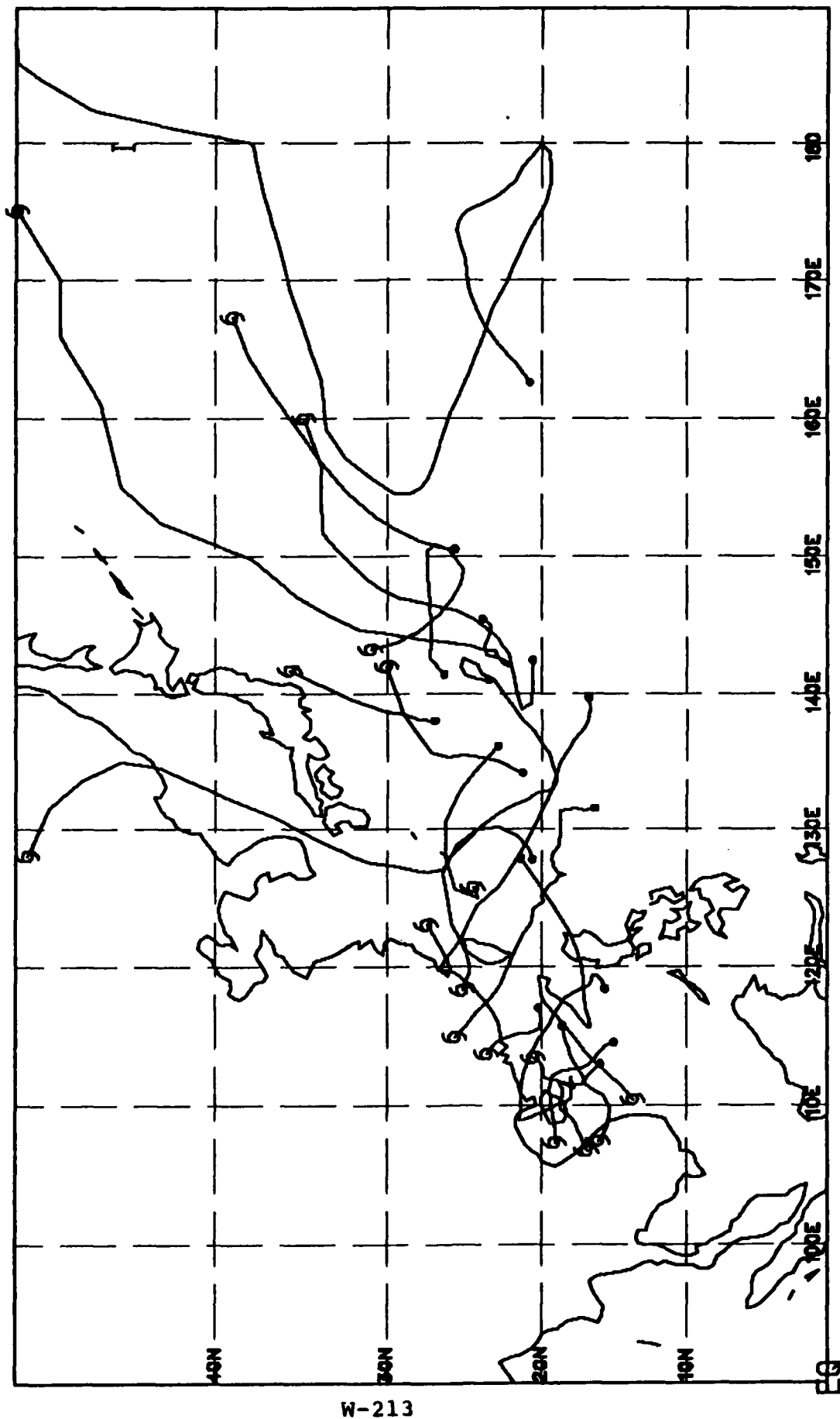
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR SEP 9 - SEP 23



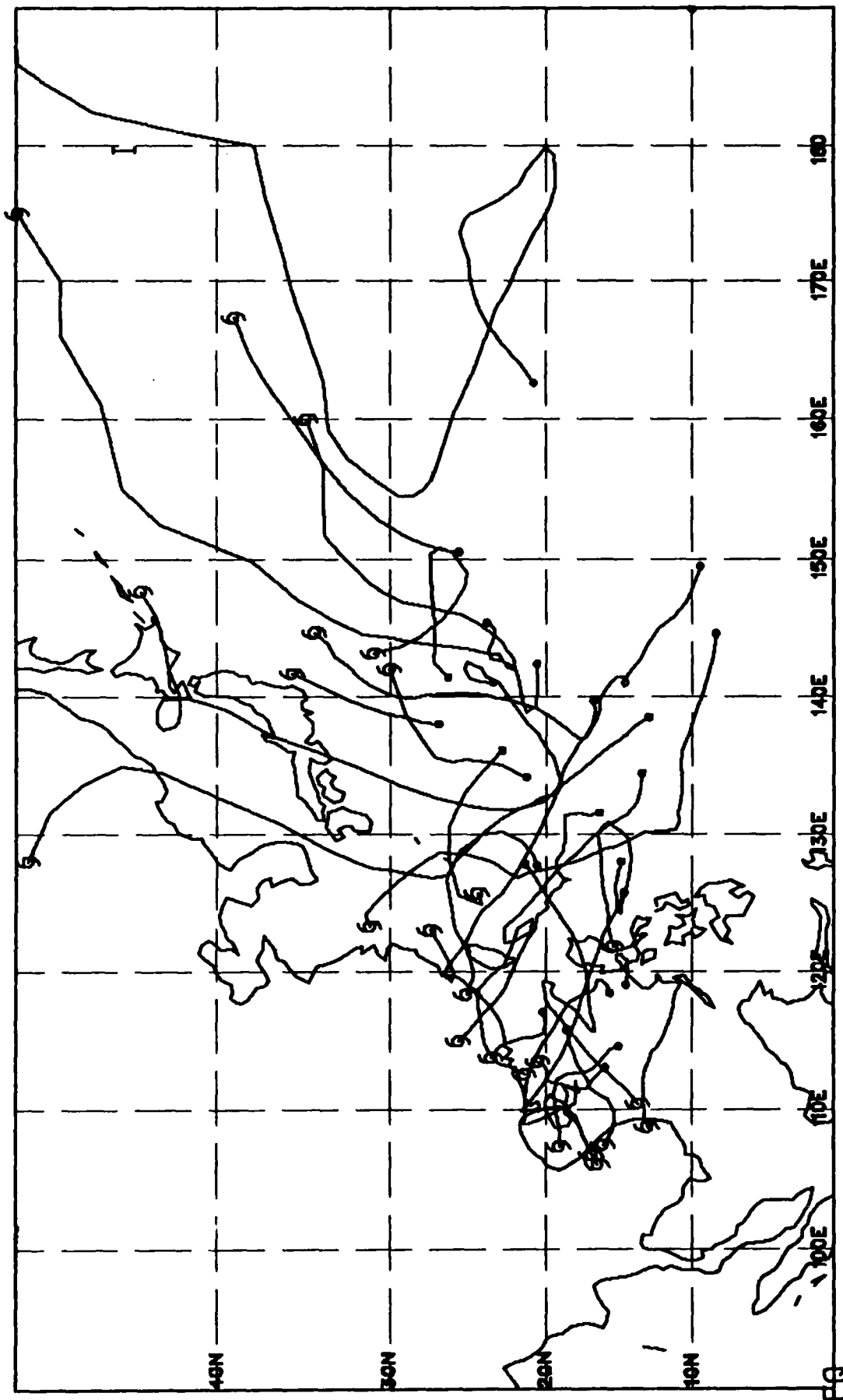
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR SEP 9 - SEP 23



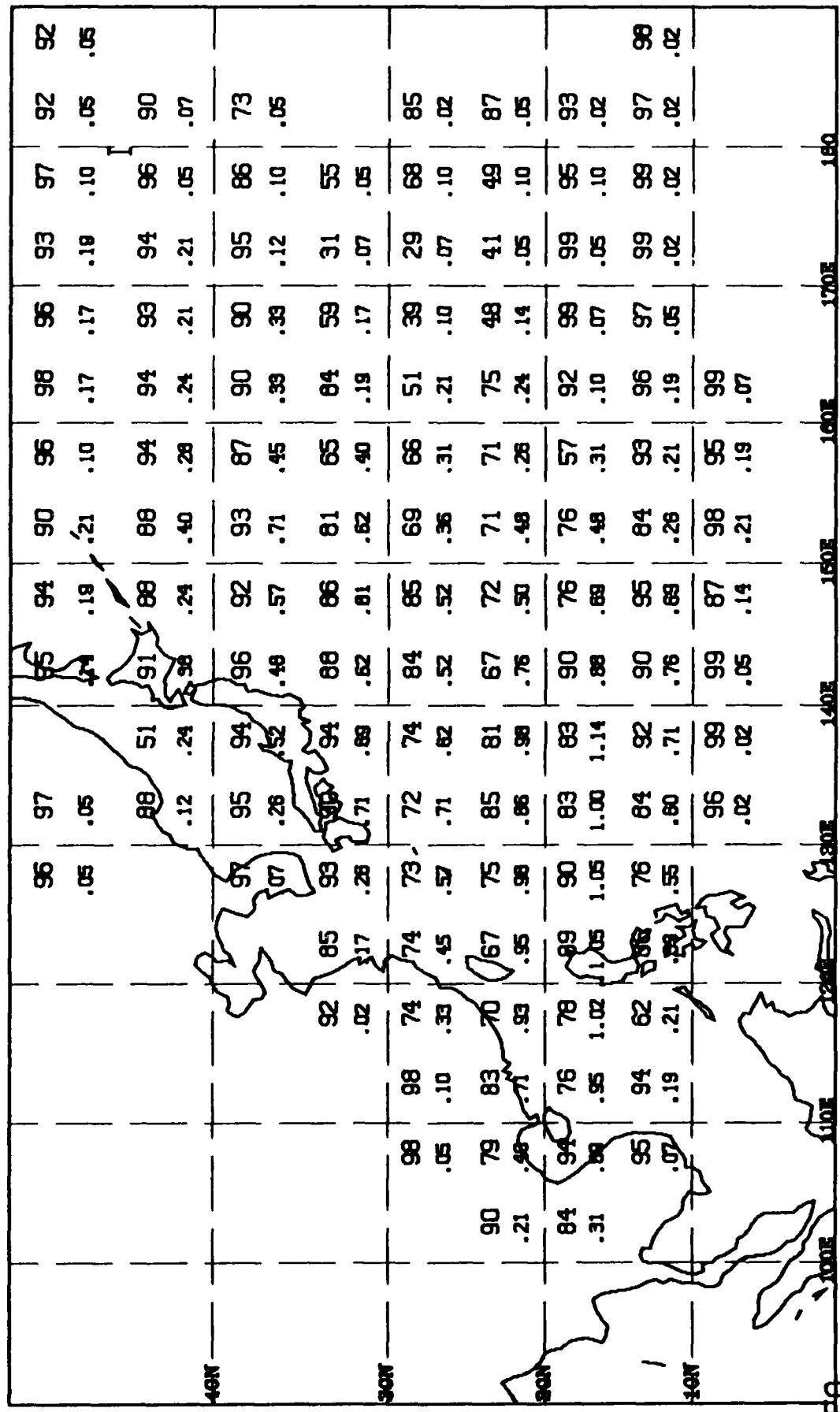
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR SEP 9 - SEP 23



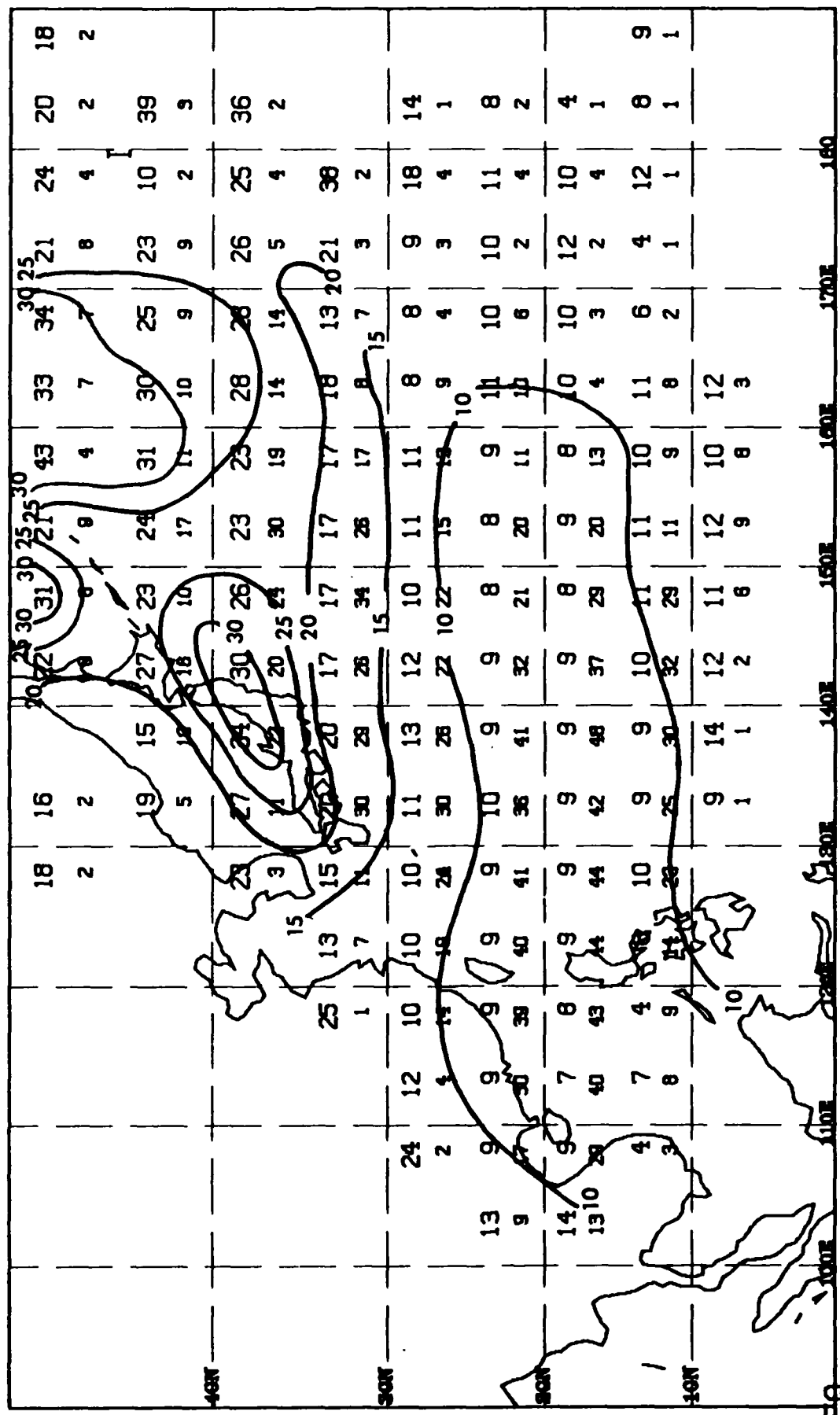
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR SEP 9 - SEP 23



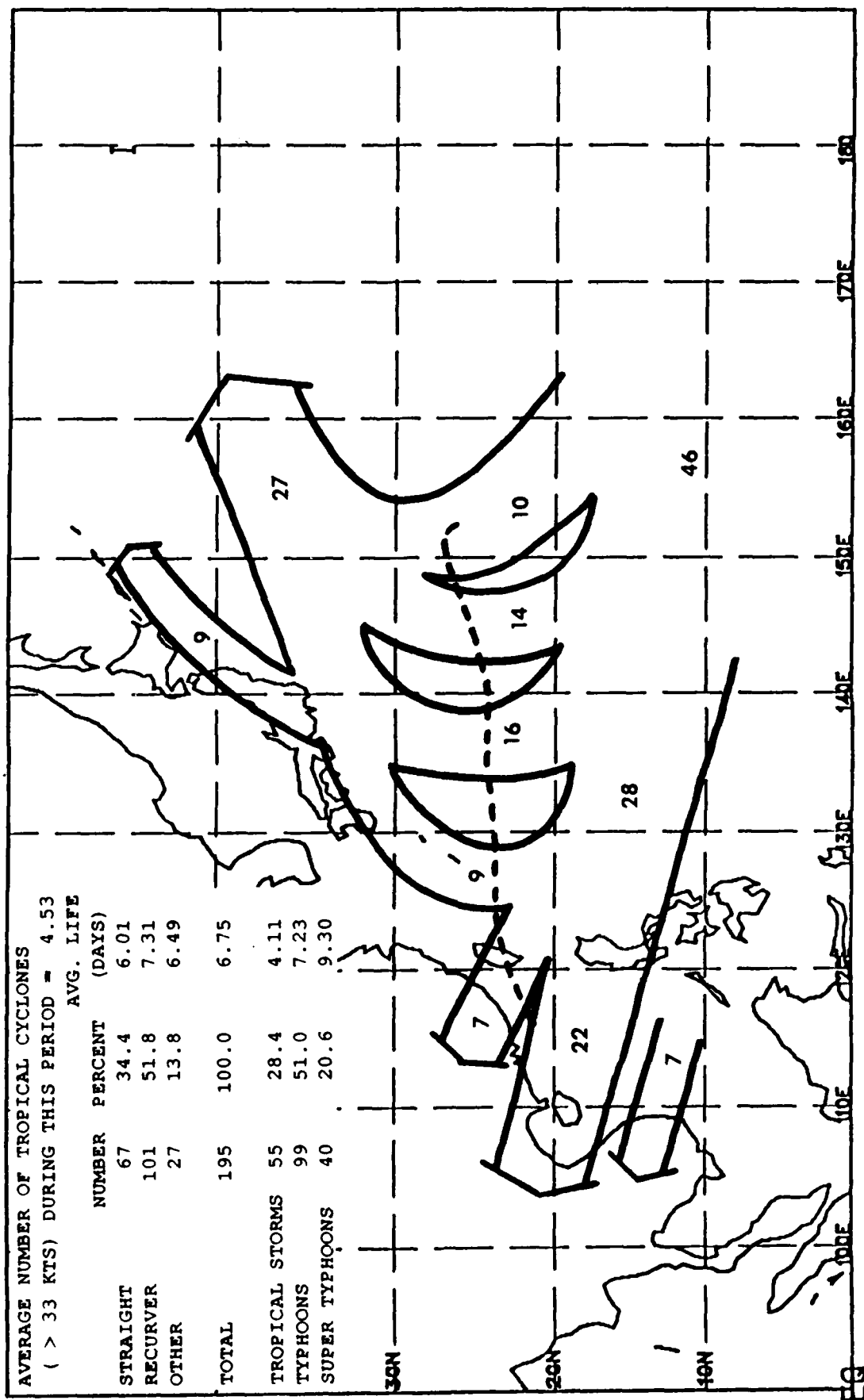
Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number).
 Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed.
 Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year per time period.

SPEED OF MOVEMENT FOR SEP 9 - SEP 23



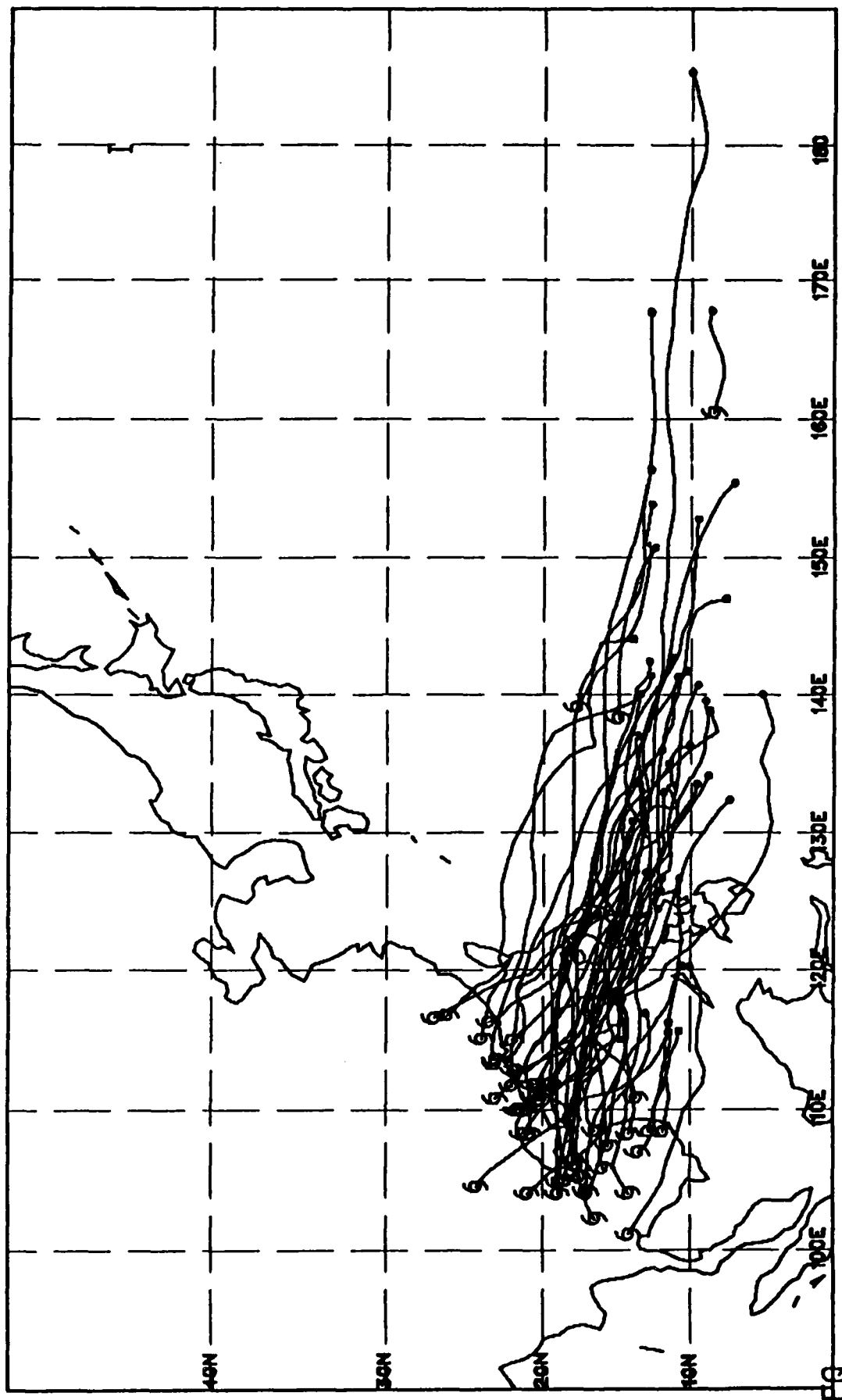
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR SEP 24 - OCT 8



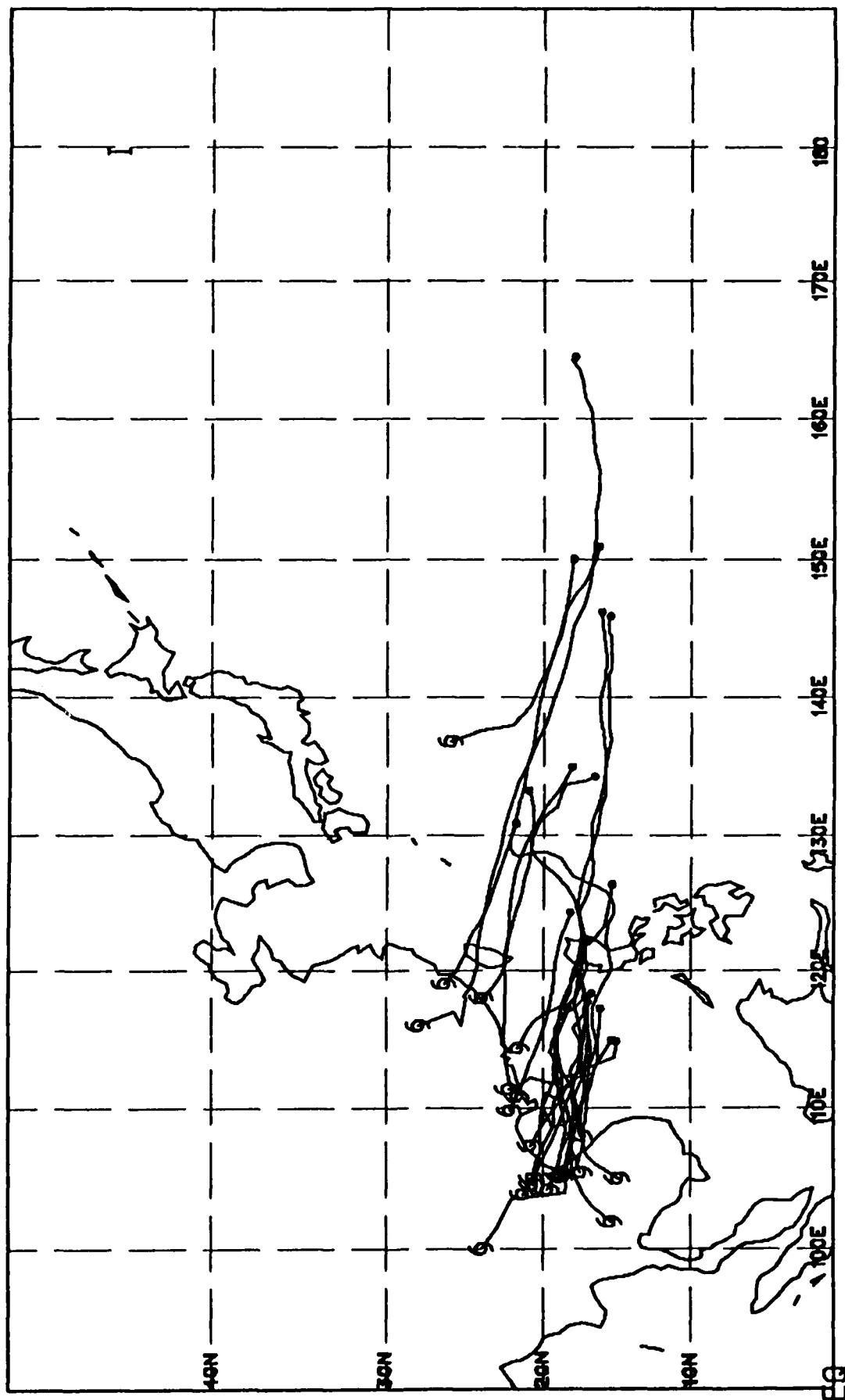
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored. Dashed line represents mean recurvature position of tropical cyclones (> 33 kts) classified as recurvers.

ACTUAL TRACKS FOR SEP 24 - OCT 8



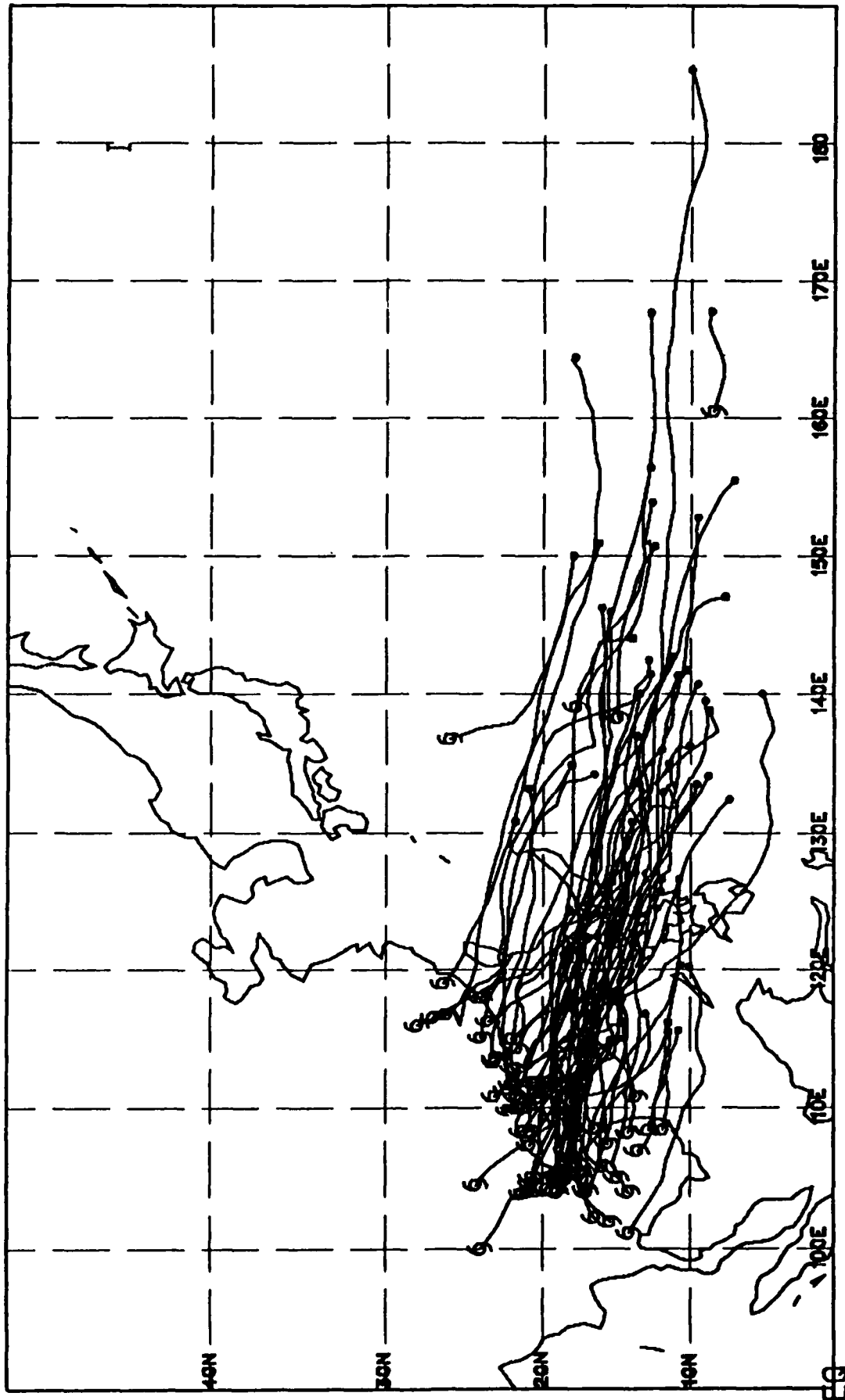
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR SEP 24 - OCT 8



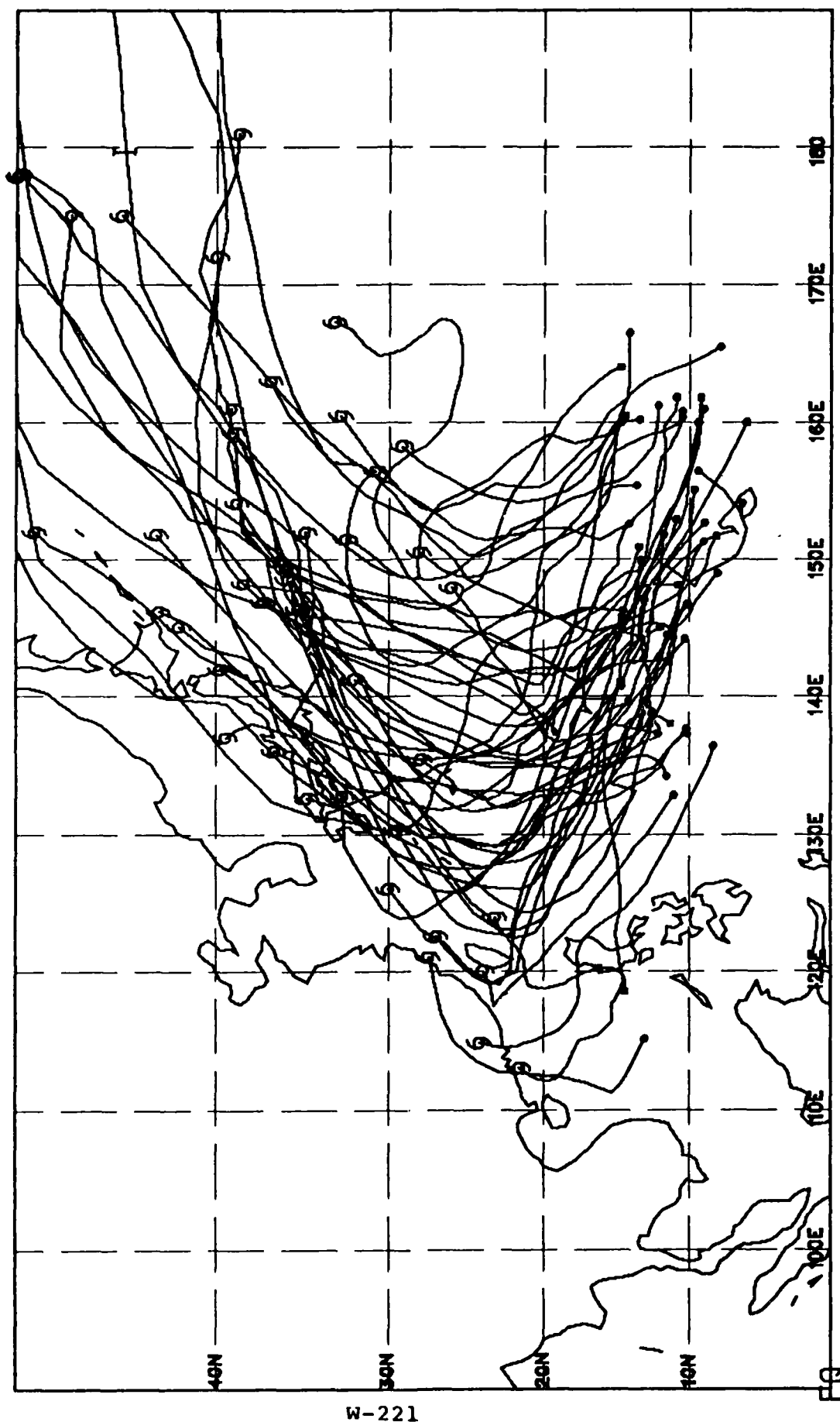
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR SEP 24 - OCT 8



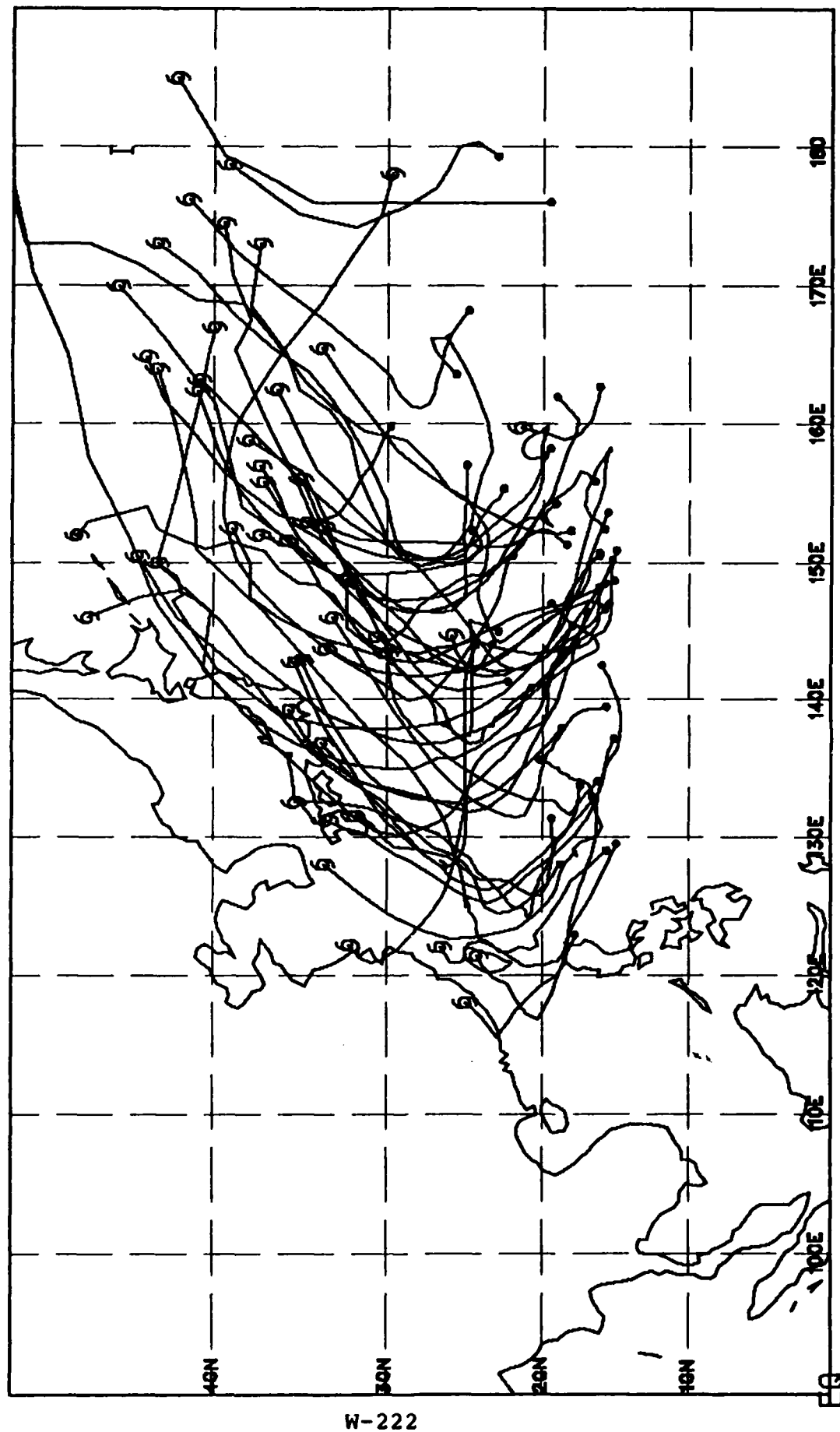
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR SEP 24 - OCT 8



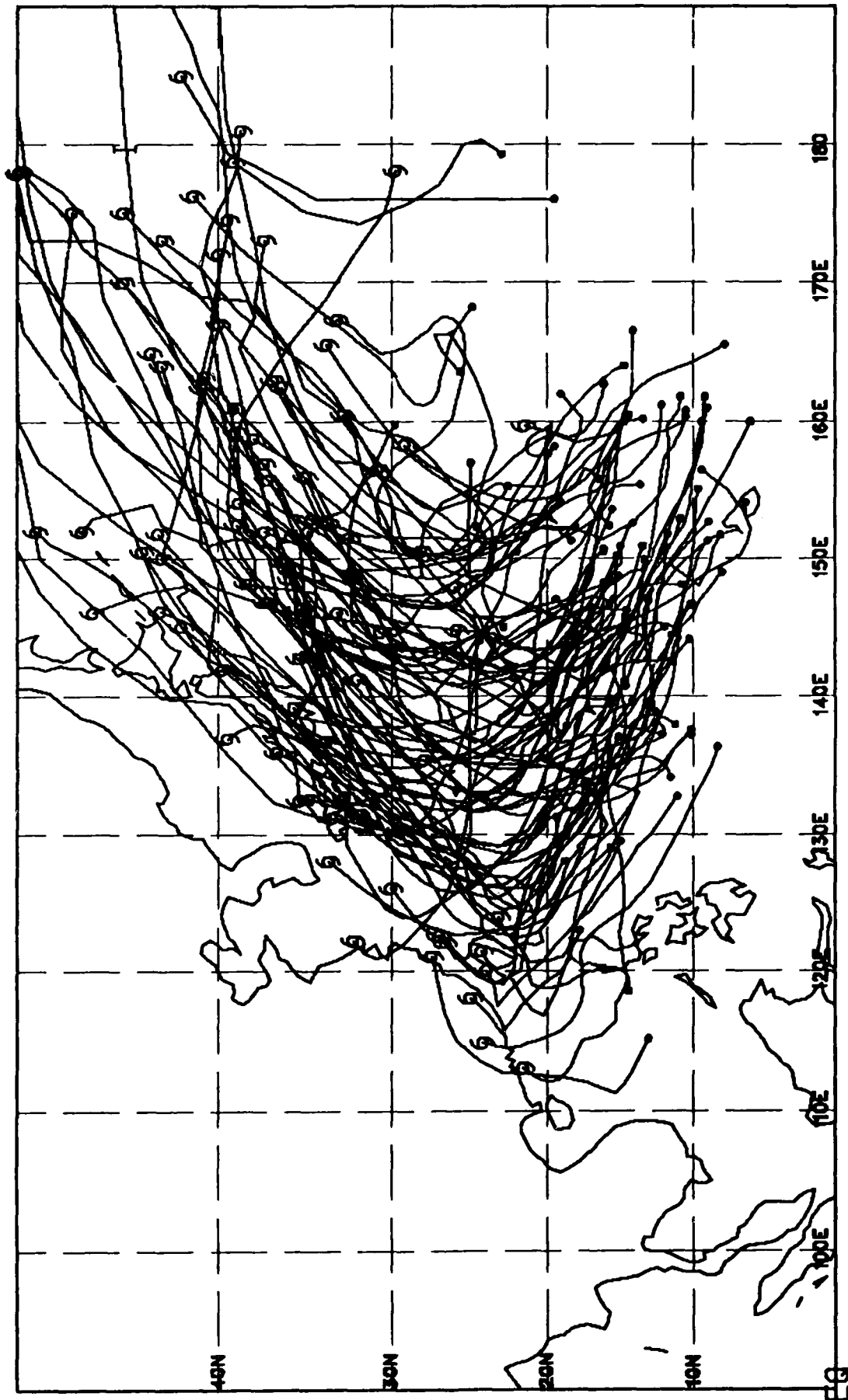
Actual path of recurving tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR SEP 24 - OCT 8



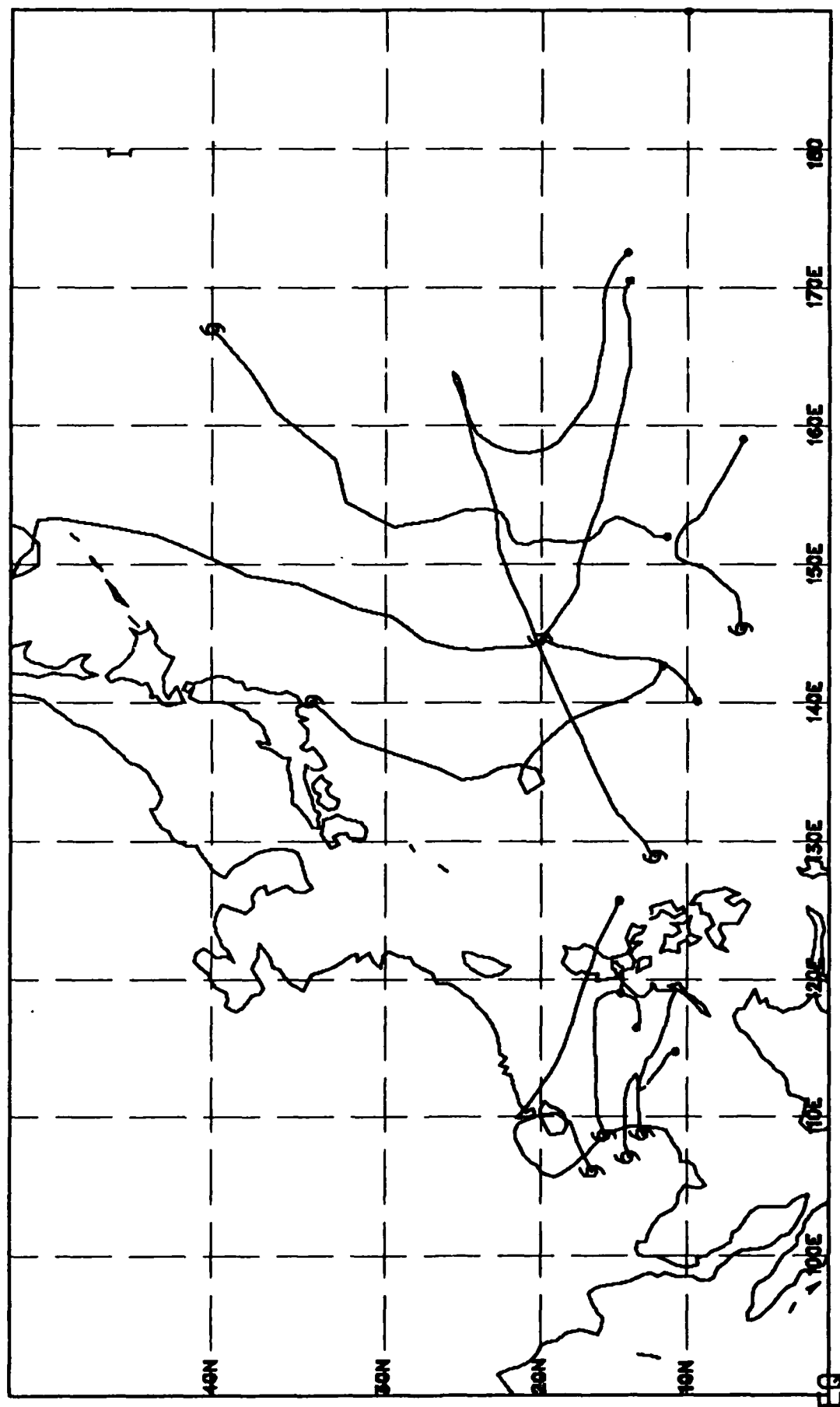
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR SEP 24 - OCT 8



Actual path of all recurring tropical cyclones (> 33 kts).

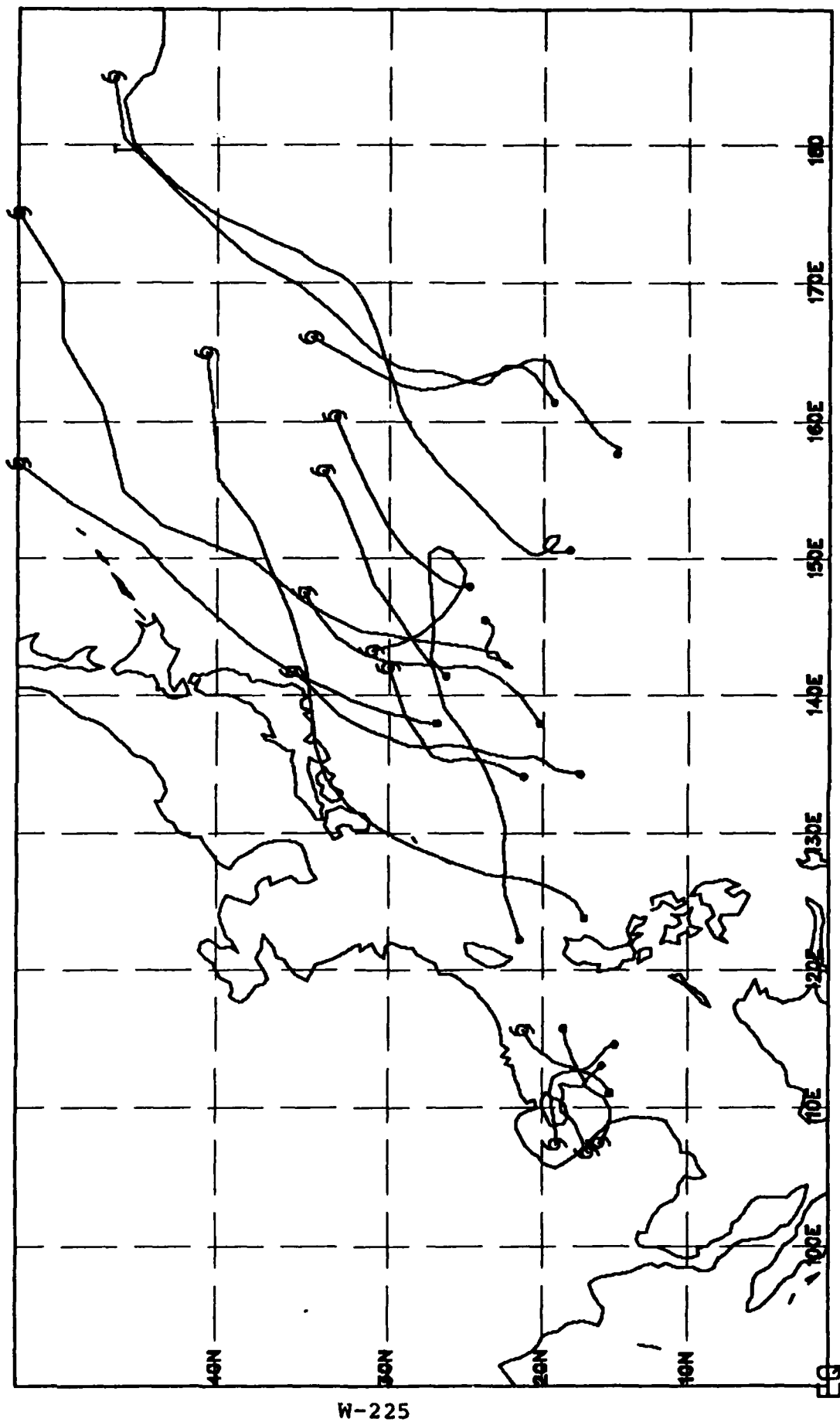
ACTUAL TRACKS FOR SEP 24 - OCT 8



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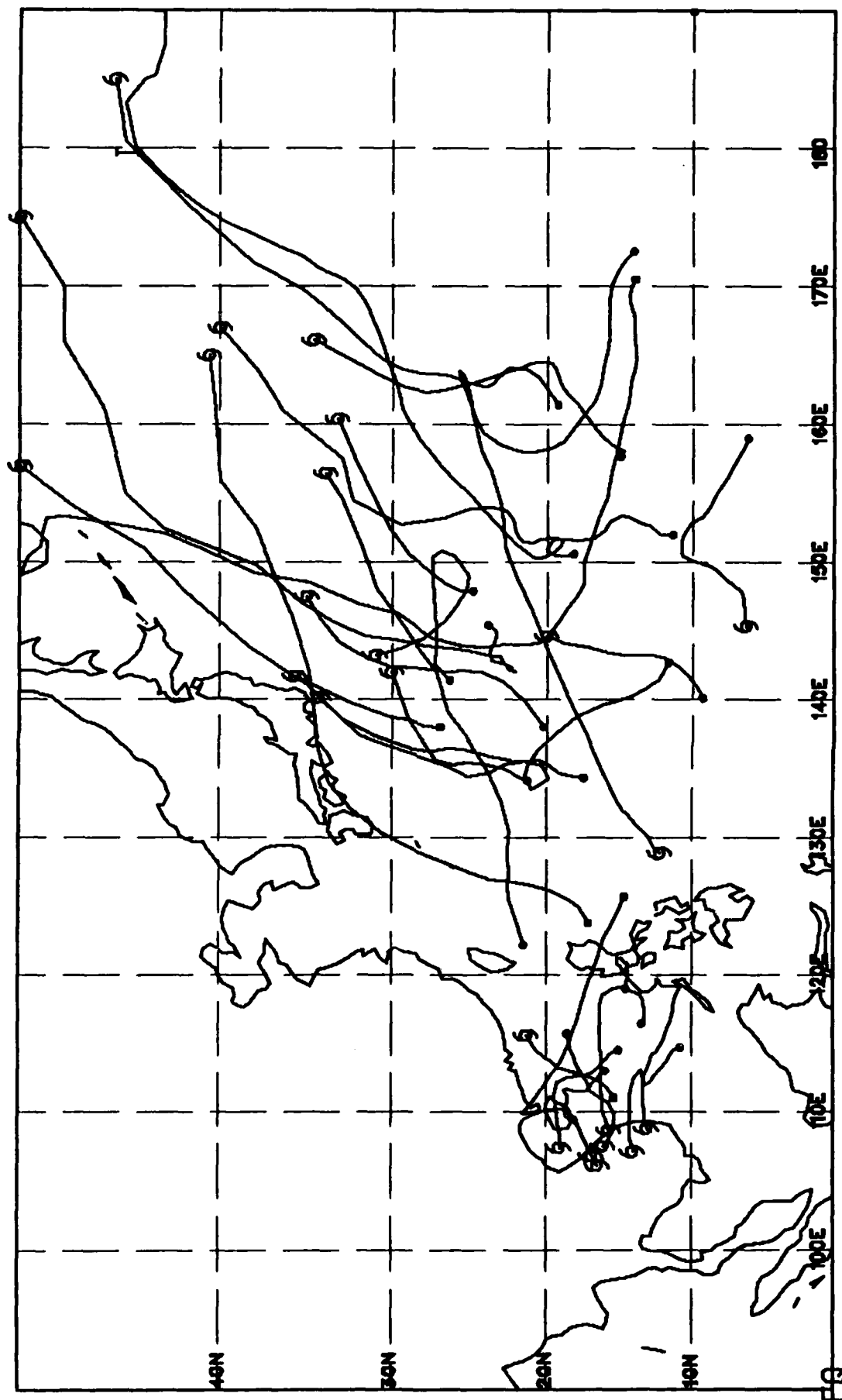
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR SEP 24 - OCT 8



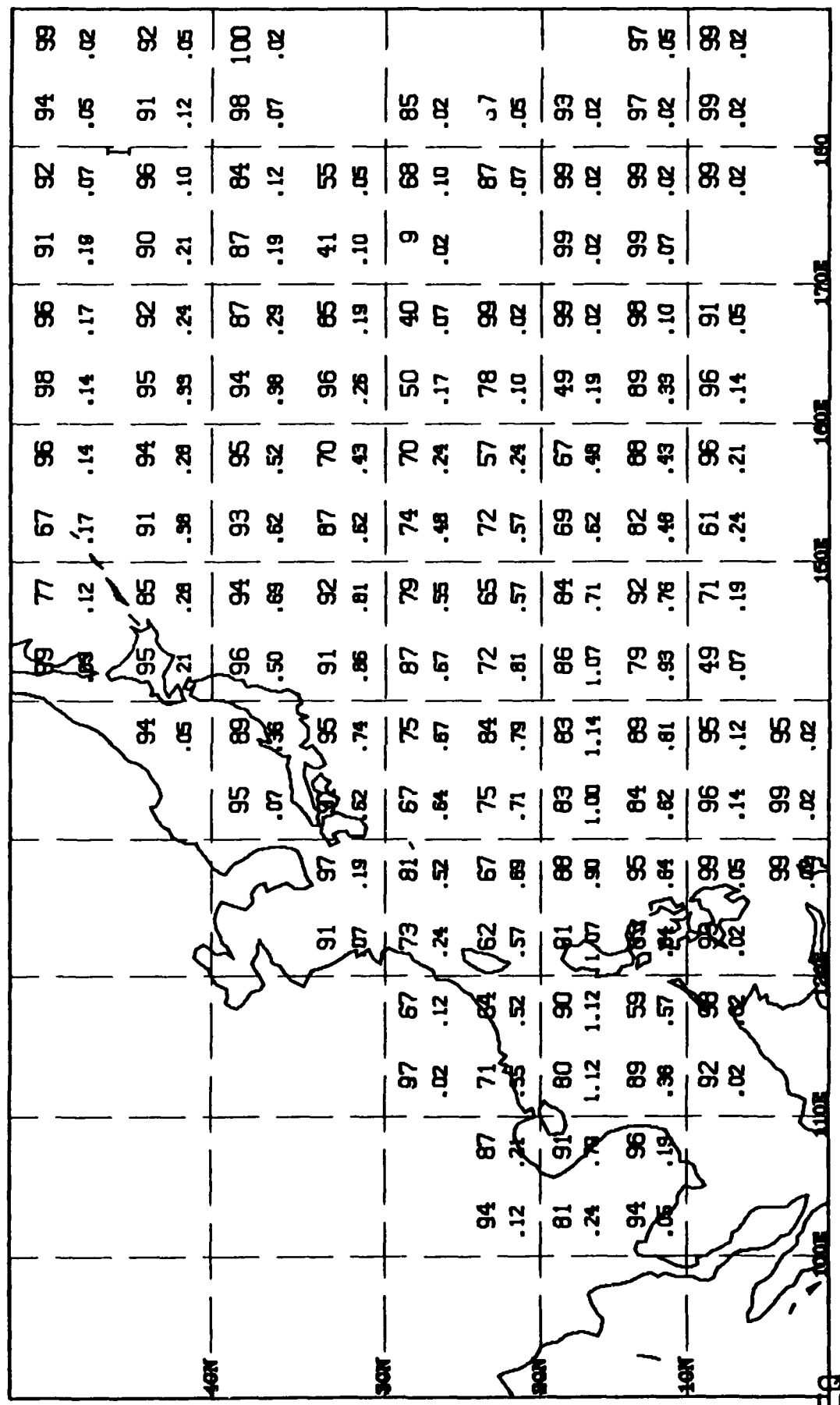
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR SEP 24 - OCT 8



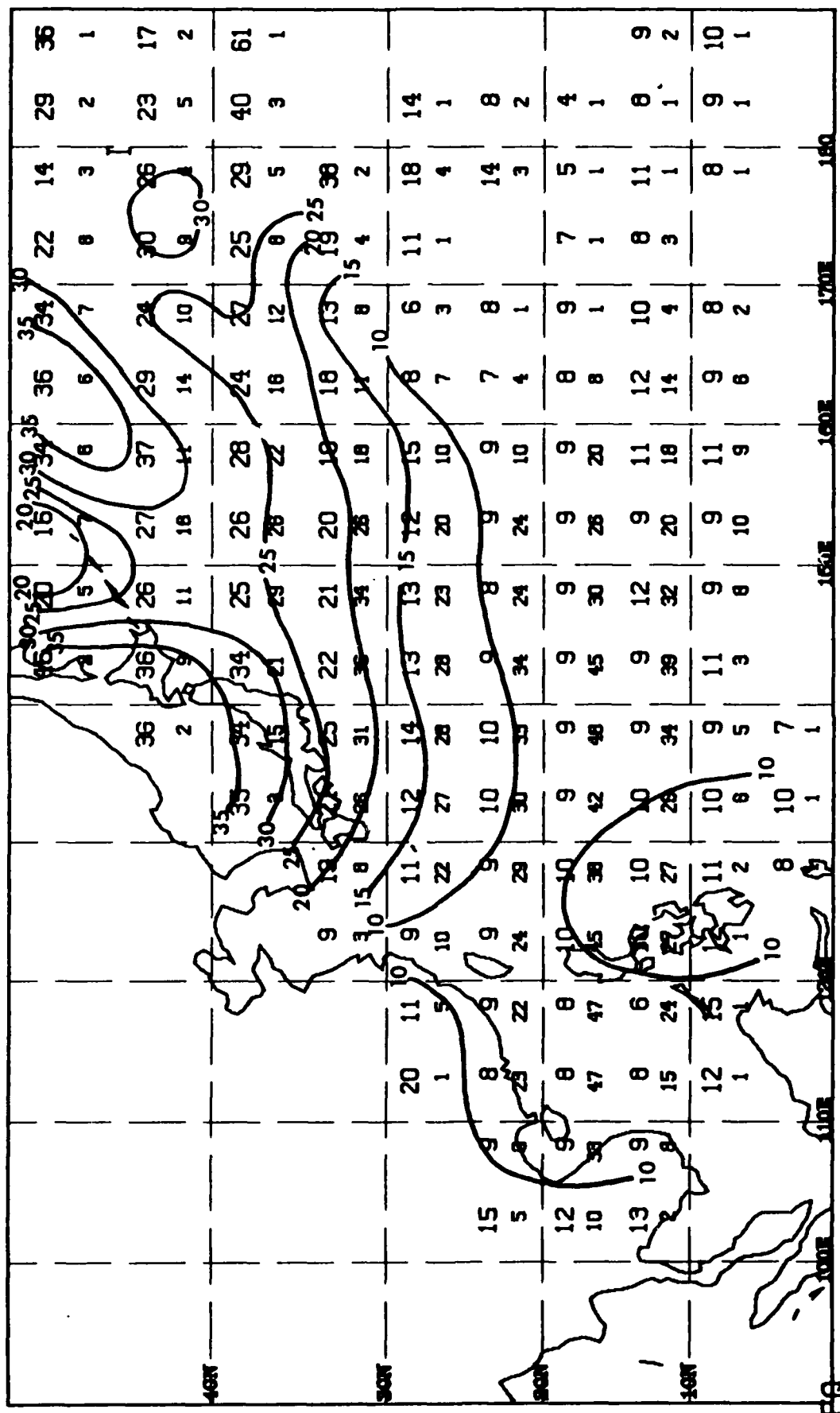
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR SEP 24 - OCT 8



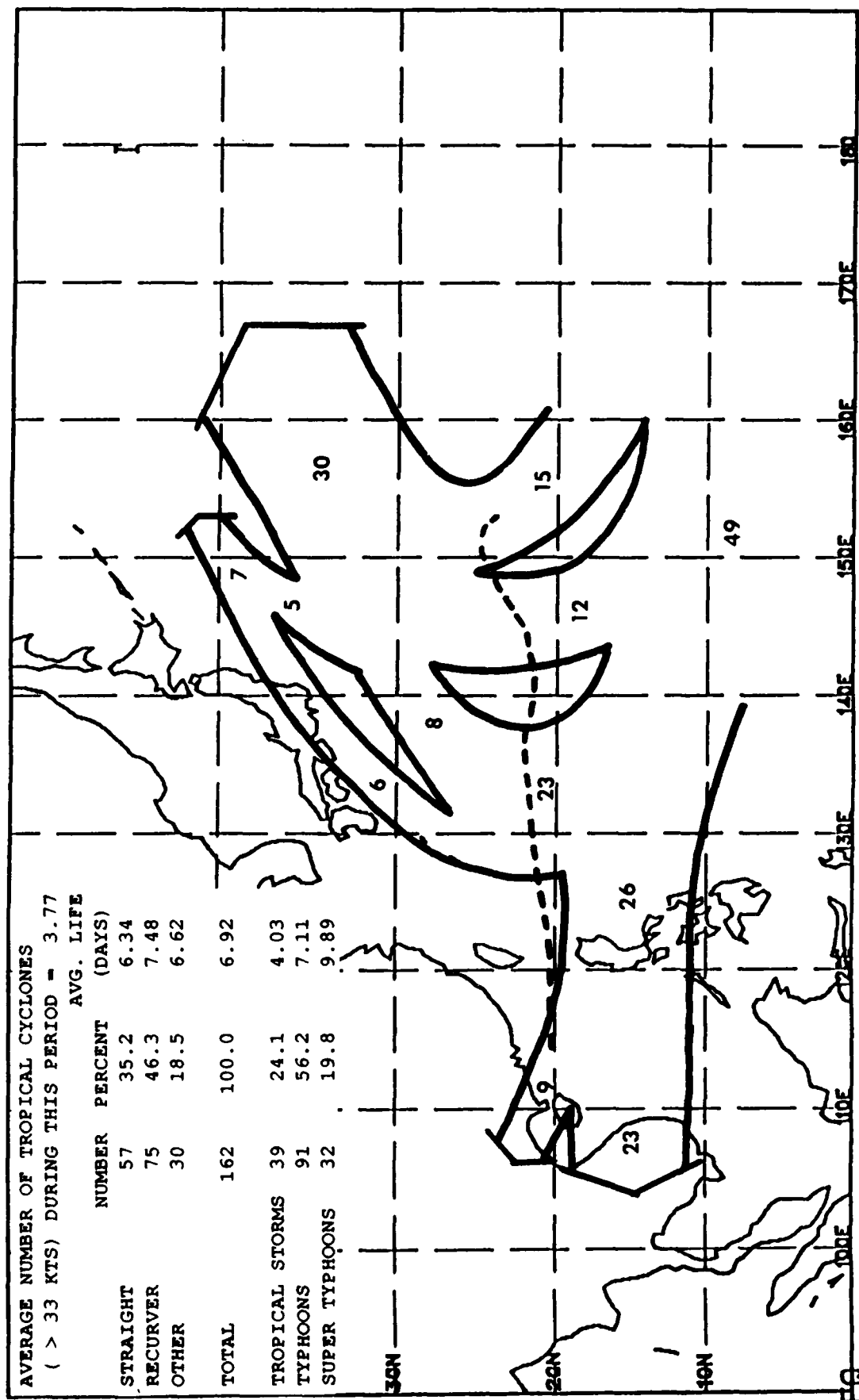
Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number).
 Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed.
 Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year time period.

SPEED OF MOVEMENT FOR SEP 24 - OCT 8



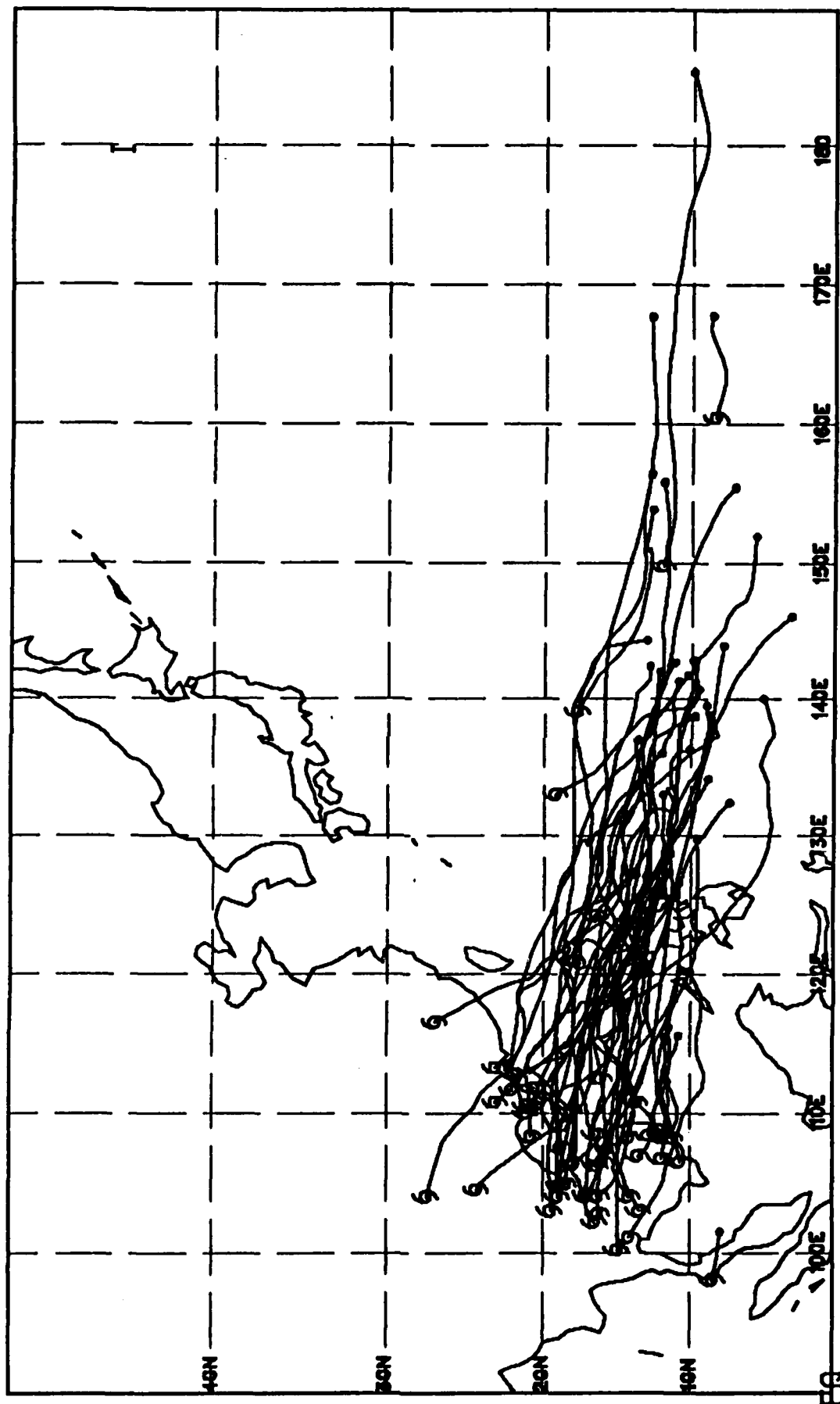
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 50 latitude by 50 longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR OCT 9 - OCT 23



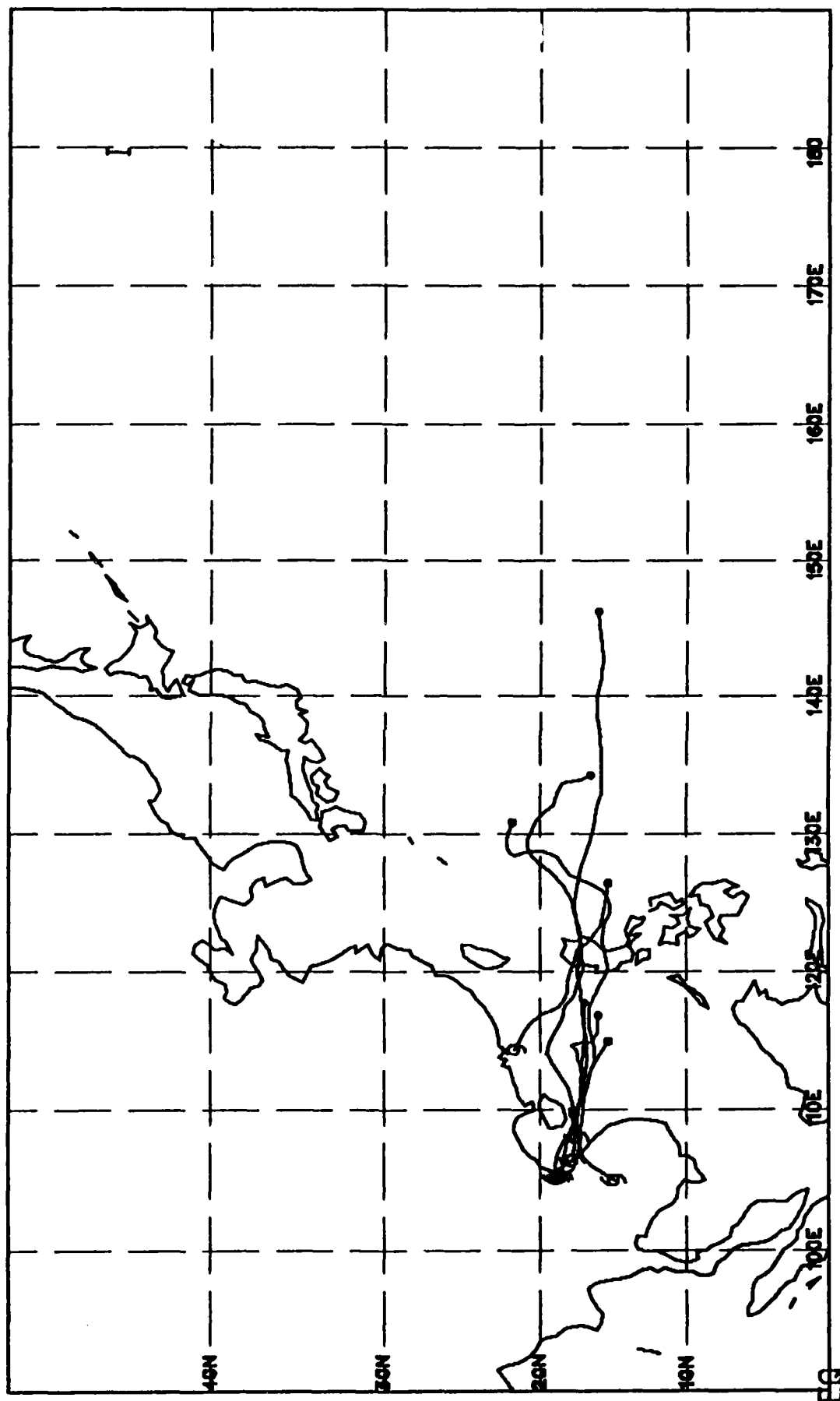
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored. Dashed line represents mean recurvature position of tropical cyclones (> 33 kts) classified as recurvers.

ACTUAL TRACKS FOR OCT 9 - OCT 23



Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N .

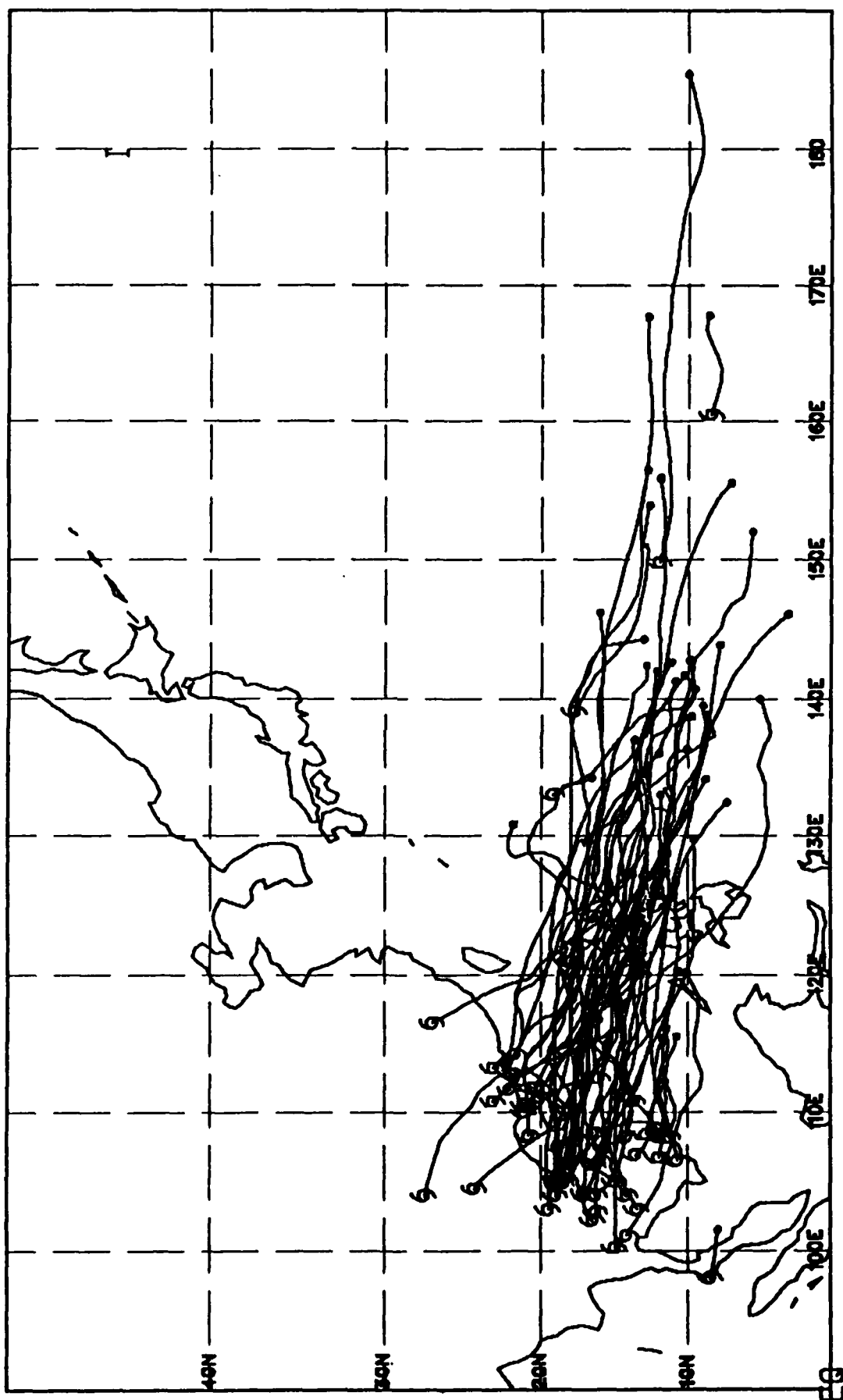
ACTUAL TRACKS FOR OCT 9 - OCT 23



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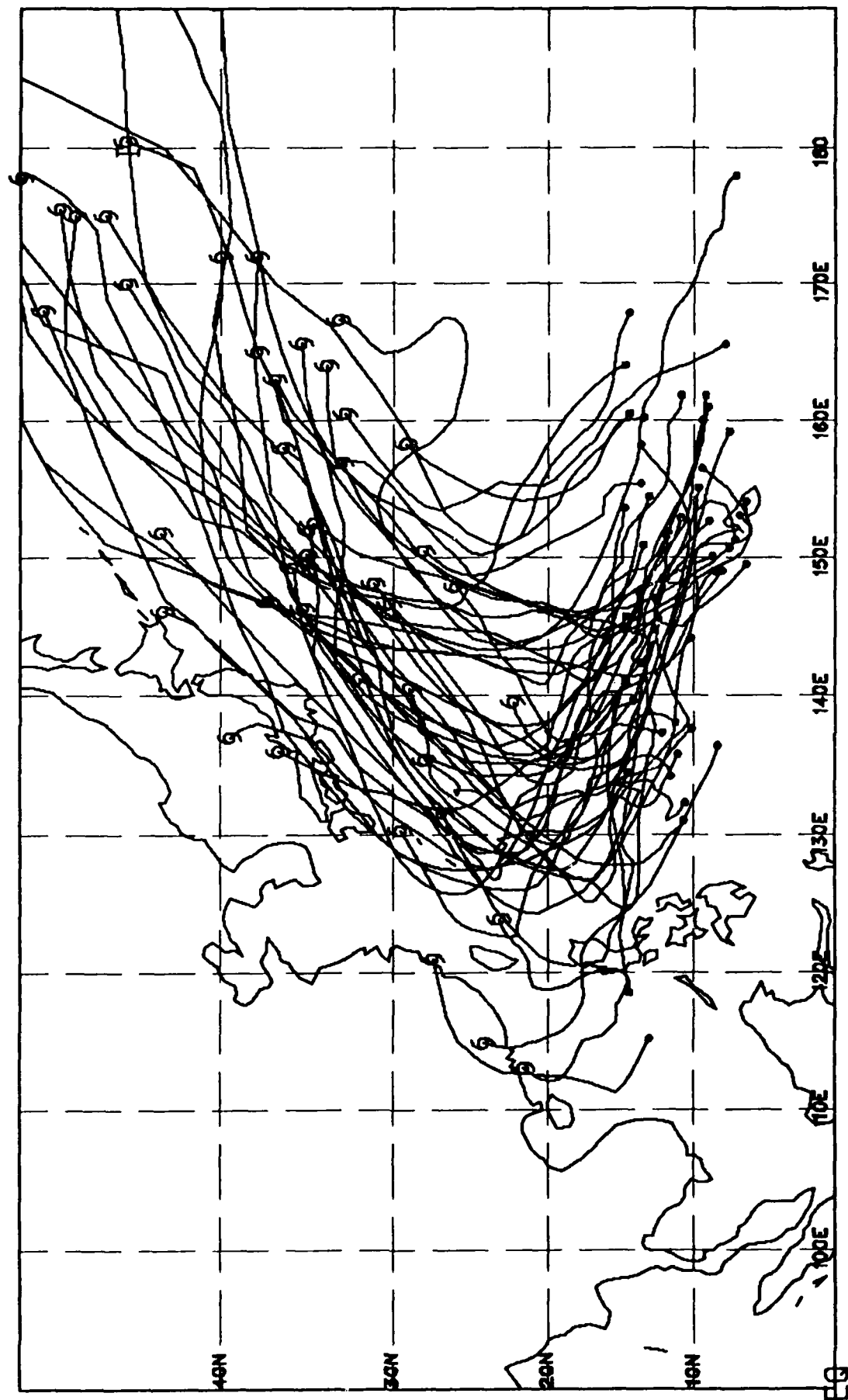
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR OCT 9 - OCT 23



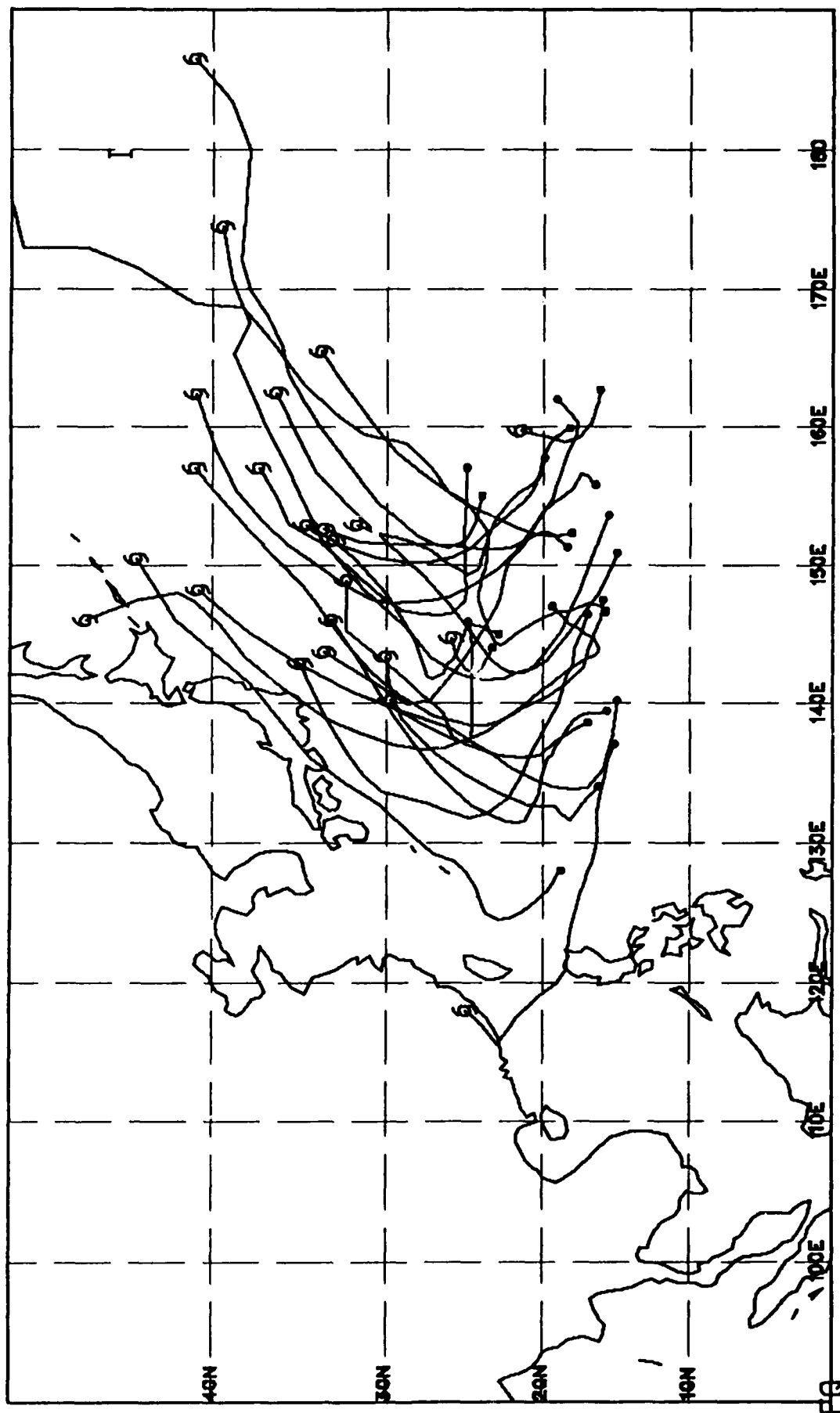
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR OCT 9 - OCT 23



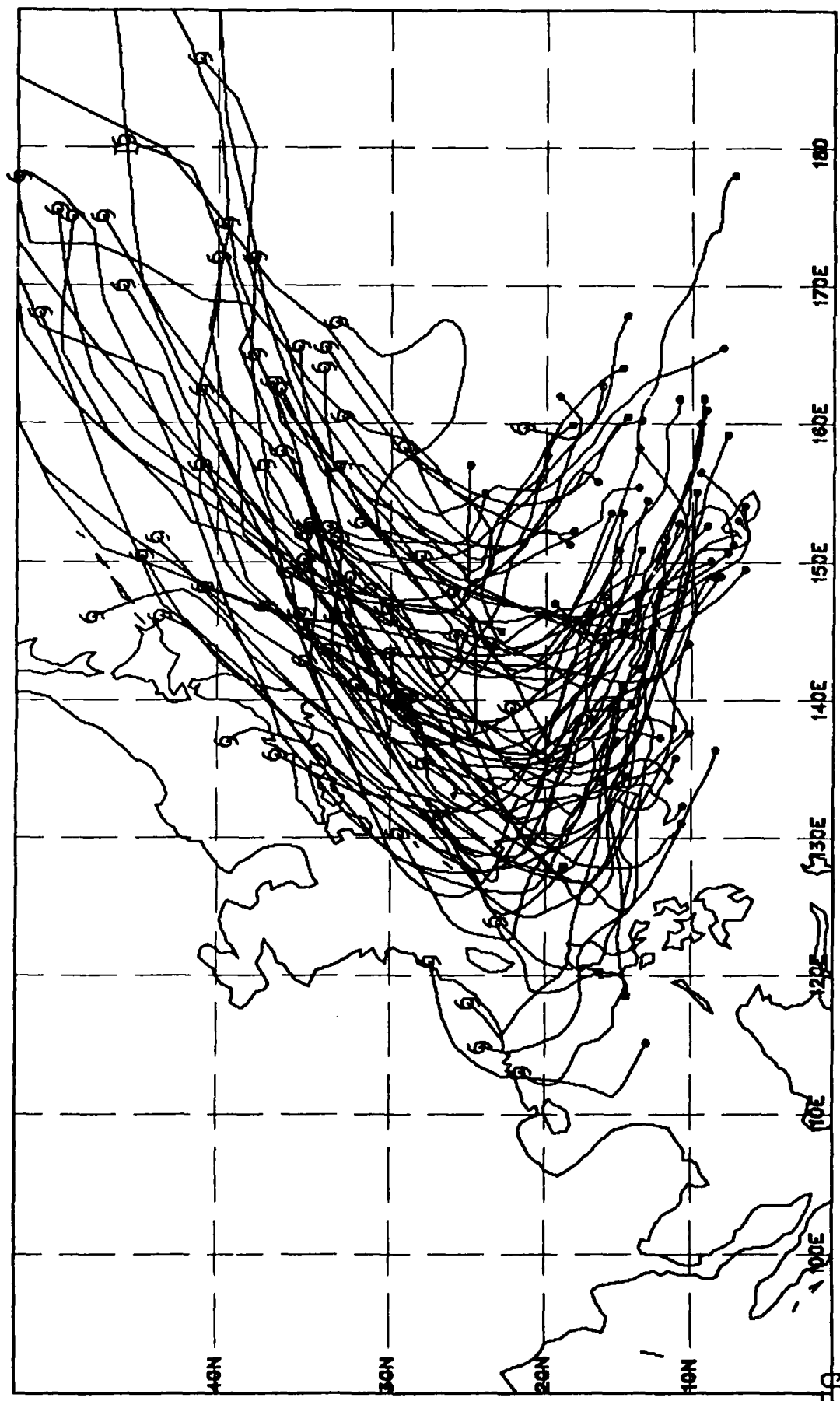
Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR OCT 9 - OCT 23



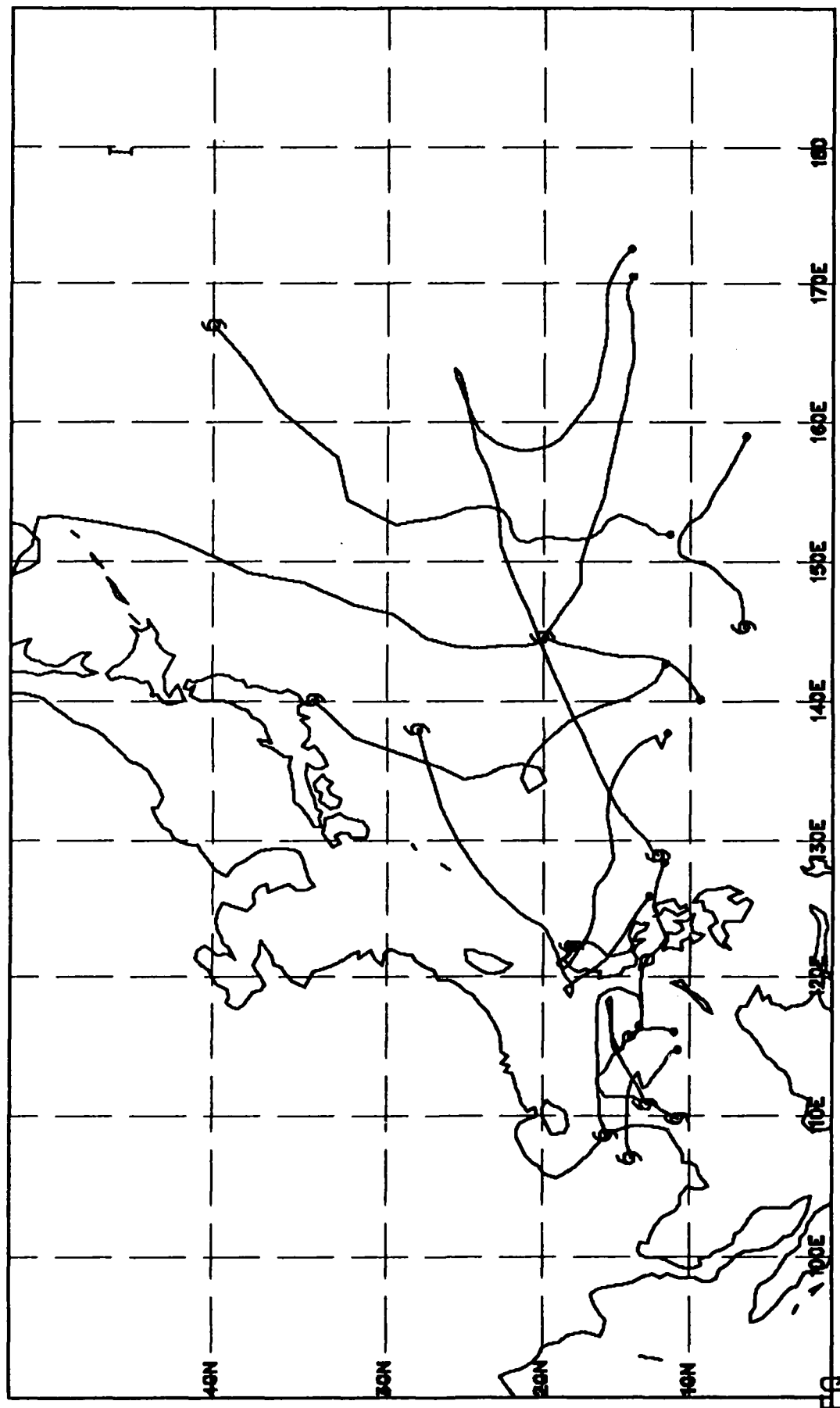
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR OCT 9 - OCT 23



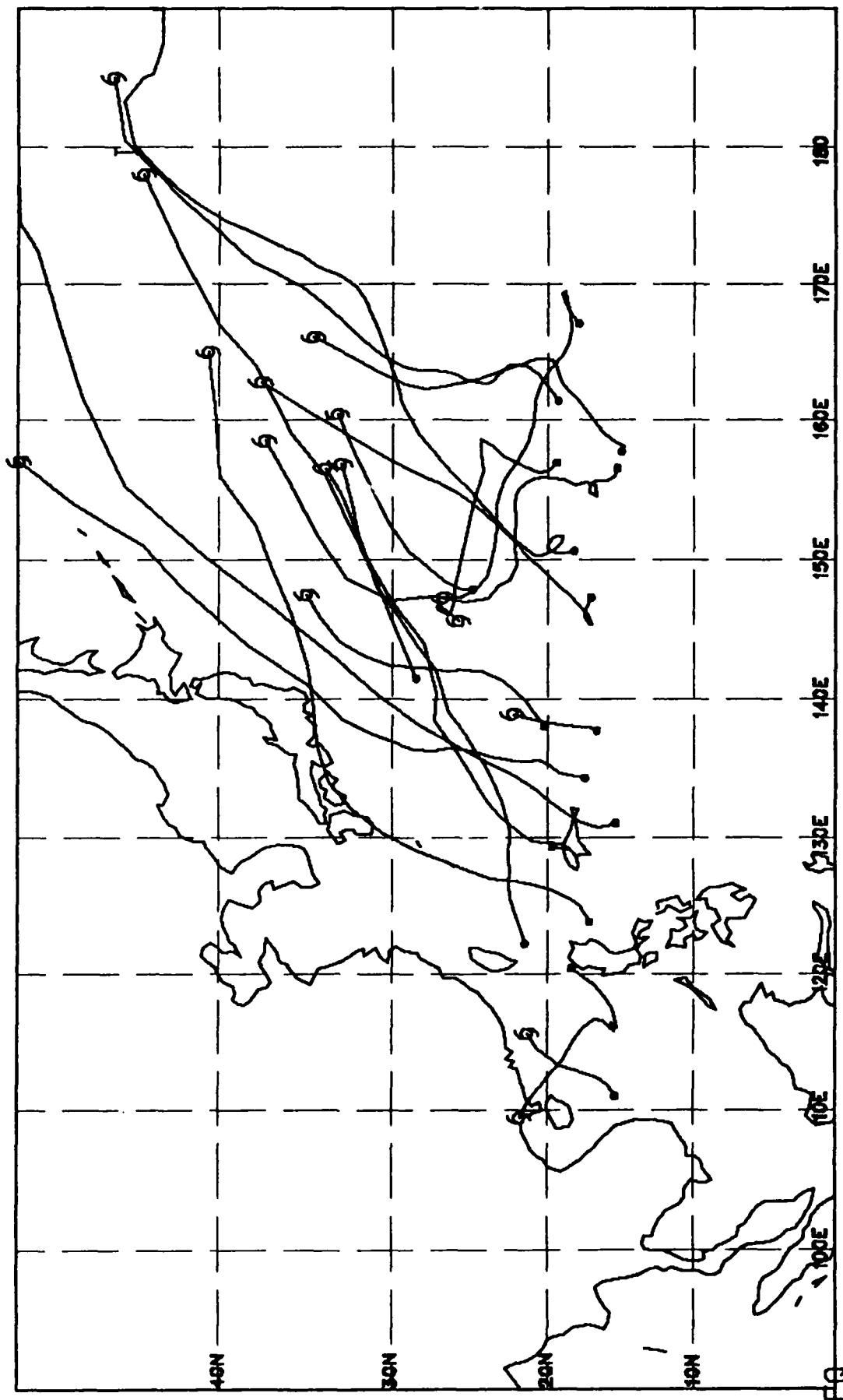
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR OCT 9 - OCT 23



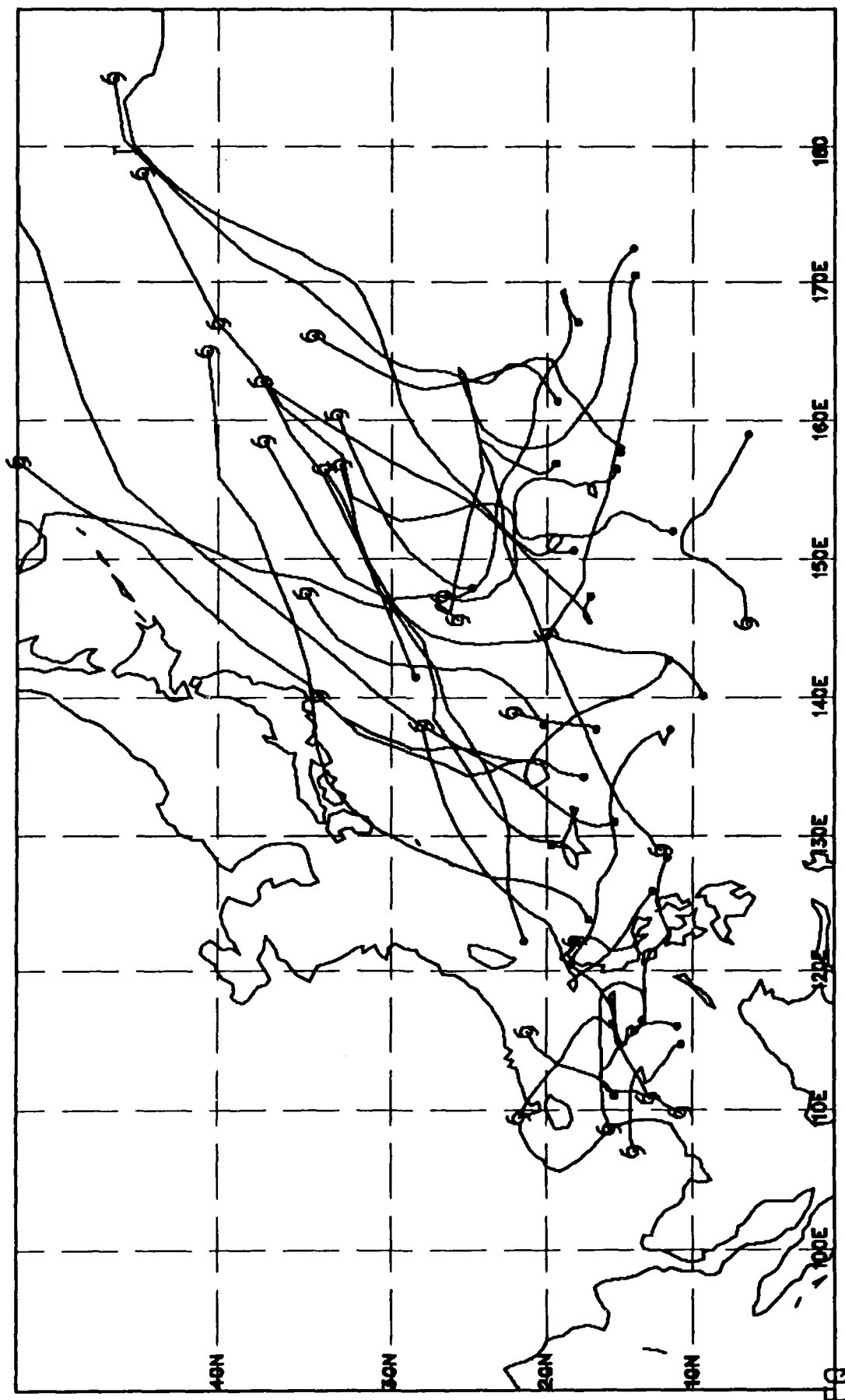
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR OCT 9 - OCT 23



Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR OCT 9 - OCT 23

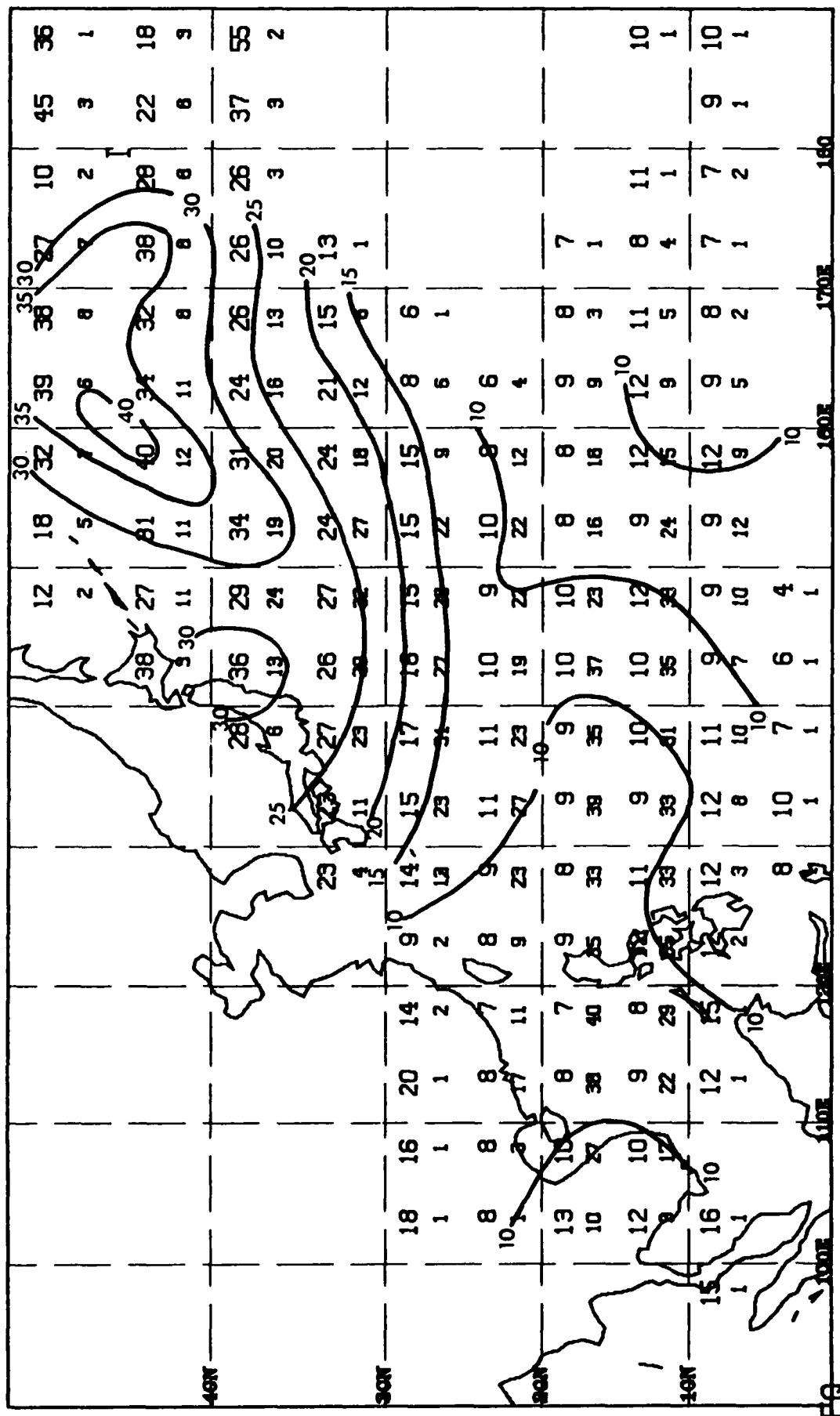


Actual path of all other tropical cyclones (> 33 kts).

	40N	30N	20N	10N	0N	10S	20S	30S	40S
52	.05	.12	.17	.14	.18	.17	.05	.89	.99
53	.07	.14	.19	.19	.19	.19	.14	.86	.88
54	.07	.14	.19	.19	.19	.19	.14	.14	.07
55	.07	.14	.19	.19	.19	.19	.14	.14	.07
56	.07	.14	.19	.19	.19	.19	.14	.14	.07
57	.07	.14	.19	.19	.19	.19	.14	.14	.07
58	.07	.14	.19	.19	.19	.19	.14	.14	.07
59	.07	.14	.19	.19	.19	.19	.14	.14	.07
60	.07	.14	.19	.19	.19	.19	.14	.14	.07
61	.07	.14	.19	.19	.19	.19	.14	.14	.07
62	.07	.14	.19	.19	.19	.19	.14	.14	.07
63	.07	.14	.19	.19	.19	.19	.14	.14	.07
64	.07	.14	.19	.19	.19	.19	.14	.14	.07
65	.07	.14	.19	.19	.19	.19	.14	.14	.07
66	.07	.14	.19	.19	.19	.19	.14	.14	.07
67	.07	.14	.19	.19	.19	.19	.14	.14	.07
68	.07	.14	.19	.19	.19	.19	.14	.14	.07
69	.07	.14	.19	.19	.19	.19	.14	.14	.07
70	.07	.14	.19	.19	.19	.19	.14	.14	.07
71	.07	.14	.19	.19	.19	.19	.14	.14	.07
72	.07	.14	.19	.19	.19	.19	.14	.14	.07
73	.07	.14	.19	.19	.19	.19	.14	.14	.07
74	.07	.14	.19	.19	.19	.19	.14	.14	.07
75	.07	.14	.19	.19	.19	.19	.14	.14	.07
76	.07	.14	.19	.19	.19	.19	.14	.14	.07
77	.07	.14	.19	.19	.19	.19	.14	.14	.07
78	.07	.14	.19	.19	.19	.19	.14	.14	.07
79	.07	.14	.19	.19	.19	.19	.14	.14	.07
80	.07	.14	.19	.19	.19	.19	.14	.14	.07
81	.07	.14	.19	.19	.19	.19	.14	.14	.07
82	.07	.14	.19	.19	.19	.19	.14	.14	.07
83	.07	.14	.19	.19	.19	.19	.14	.14	.07
84	.07	.14	.19	.19	.19	.19	.14	.14	.07
85	.07	.14	.19	.19	.19	.19	.14	.14	.07
86	.07	.14	.19	.19	.19	.19	.14	.14	.07
87	.07	.14	.19	.19	.19	.19	.14	.14	.07
88	.07	.14	.19	.19	.19	.19	.14	.14	.07
89	.07	.14	.19	.19	.19	.19	.14	.14	.07
90	.07	.14	.19	.19	.19	.19	.14	.14	.07
91	.07	.14	.19	.19	.19	.19	.14	.14	.07
92	.07	.14	.19	.19	.19	.19	.14	.14	.07
93	.07	.14	.19	.19	.19	.19	.14	.14	.07
94	.07	.14	.19	.19	.19	.19	.14	.14	.07
95	.07	.14	.19	.19	.19	.19	.14	.14	.07
96	.07	.14	.19	.19	.19	.19	.14	.14	.07
97	.07	.14	.19	.19	.19	.19	.14	.14	.07
98	.07	.14	.19	.19	.19	.19	.14	.14	.07
99	.07	.14	.19	.19	.19	.19	.14	.14	.07

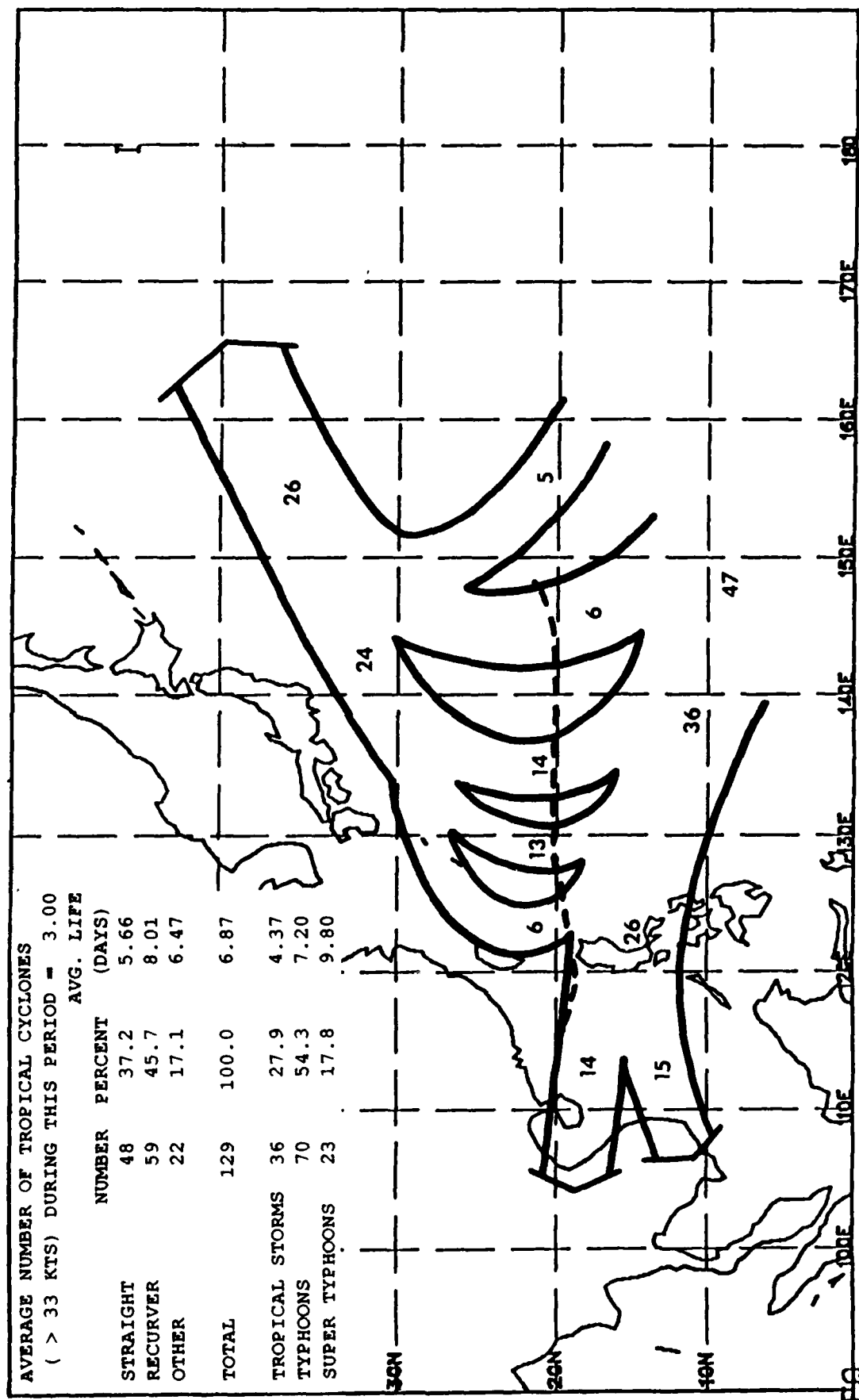
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SPEED OF MOVEMENT FOR OCT 9 - OCT 23



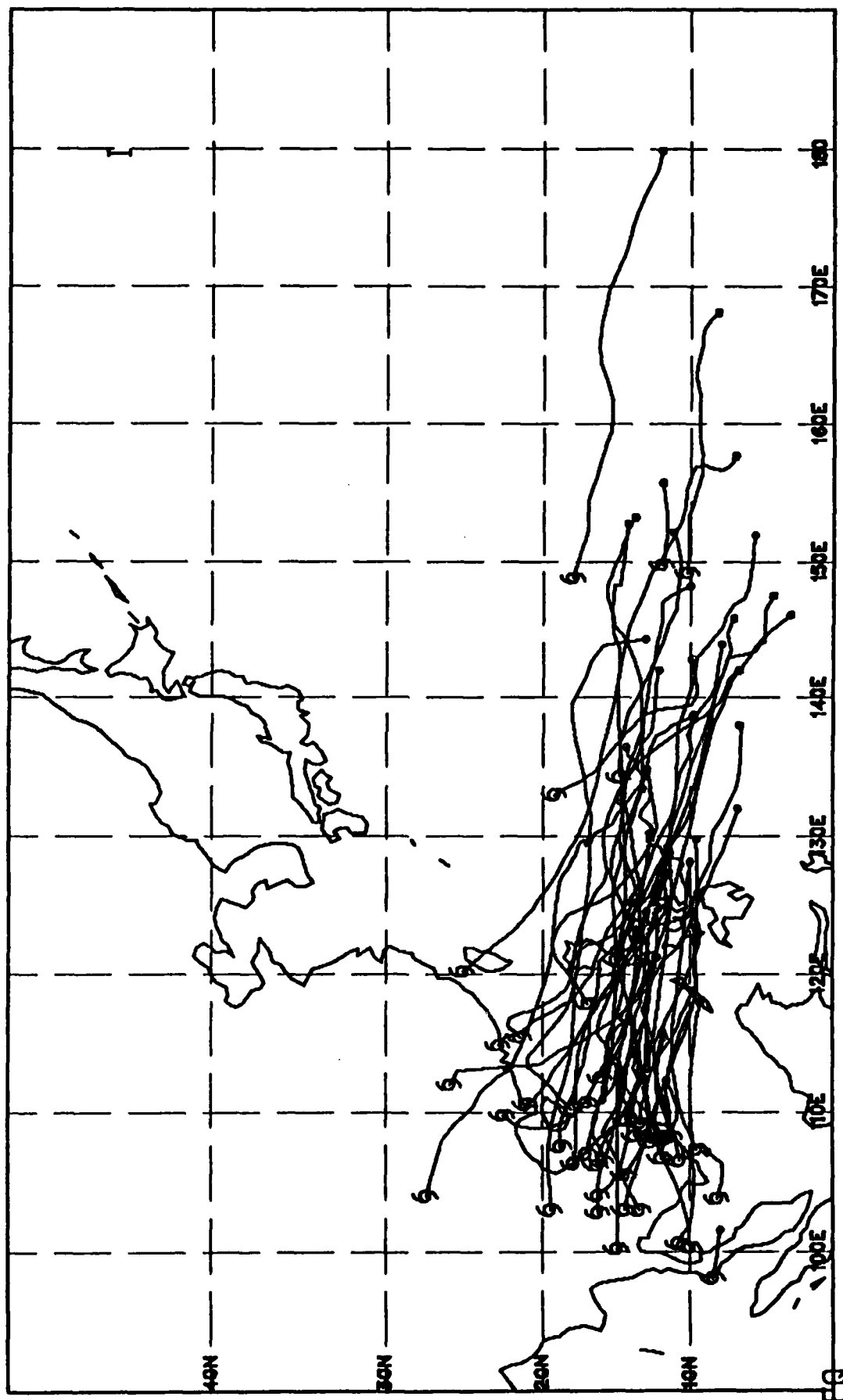
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR OCT 24 - NOV 8



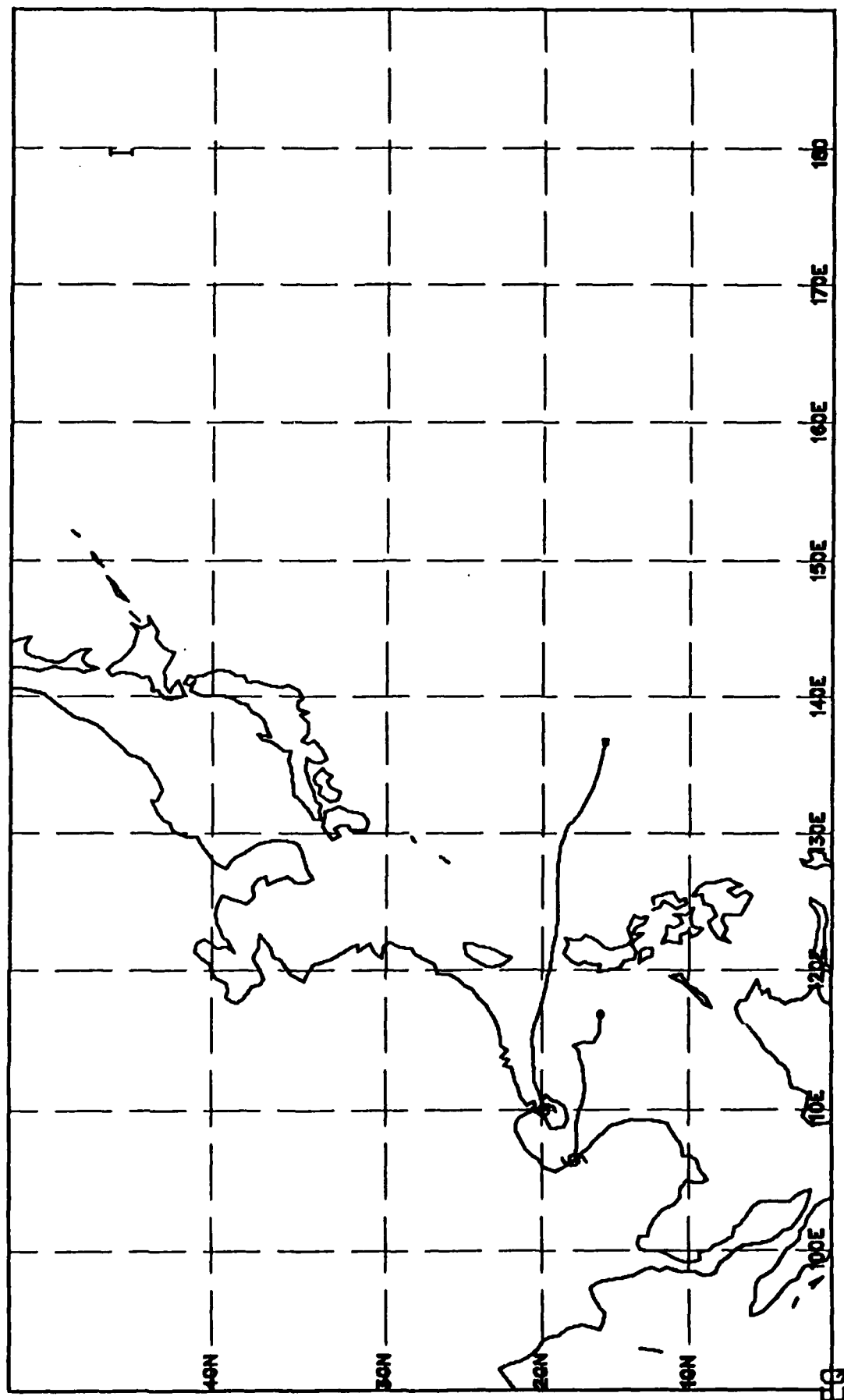
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored. Dashed line represents mean recurvature position of tropical cyclones (> 33 kts) classified as recurvers.

ACTUAL TRACKS FOR OCT 24 - NOV 8



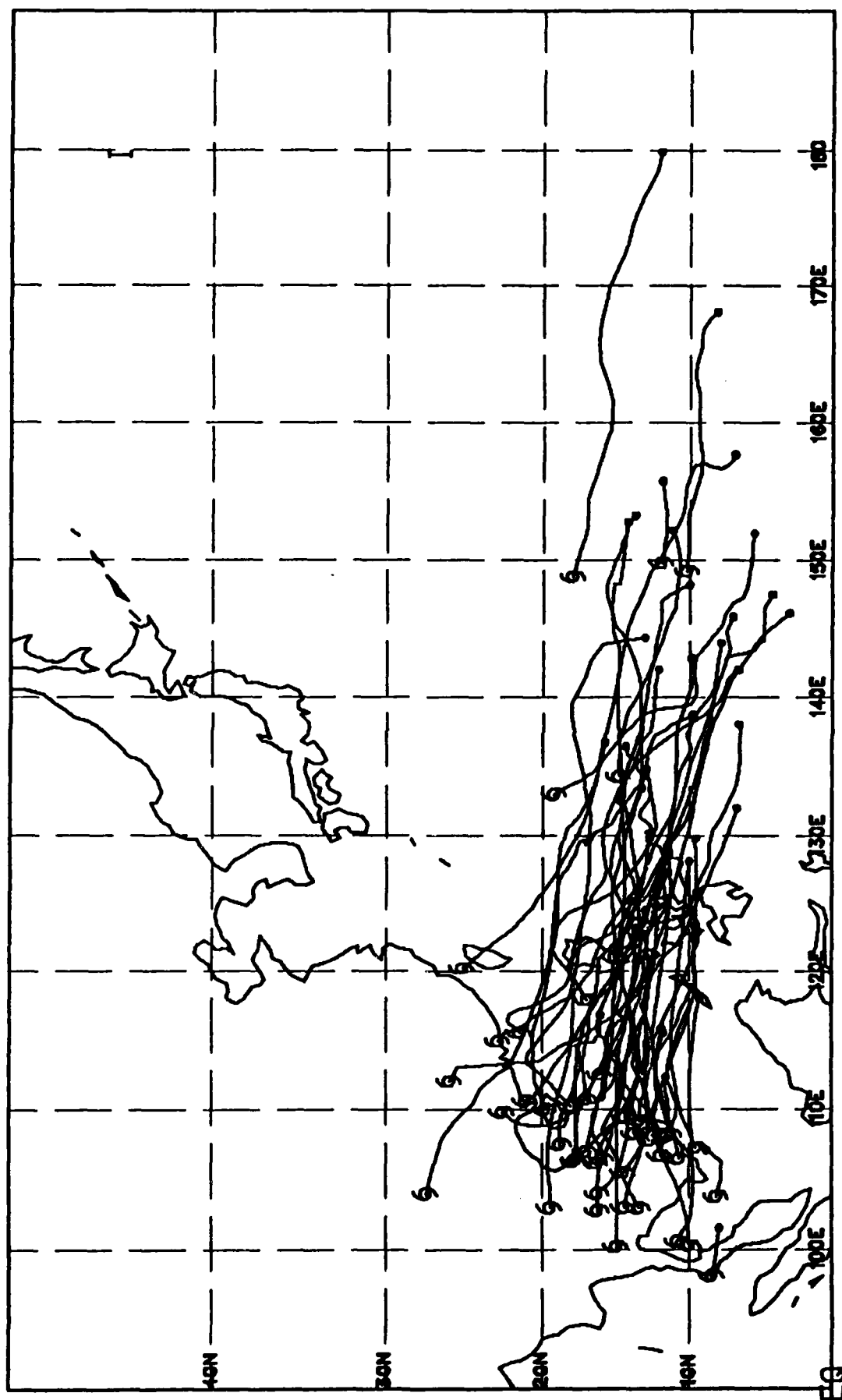
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR OCT 24 - NOV 8



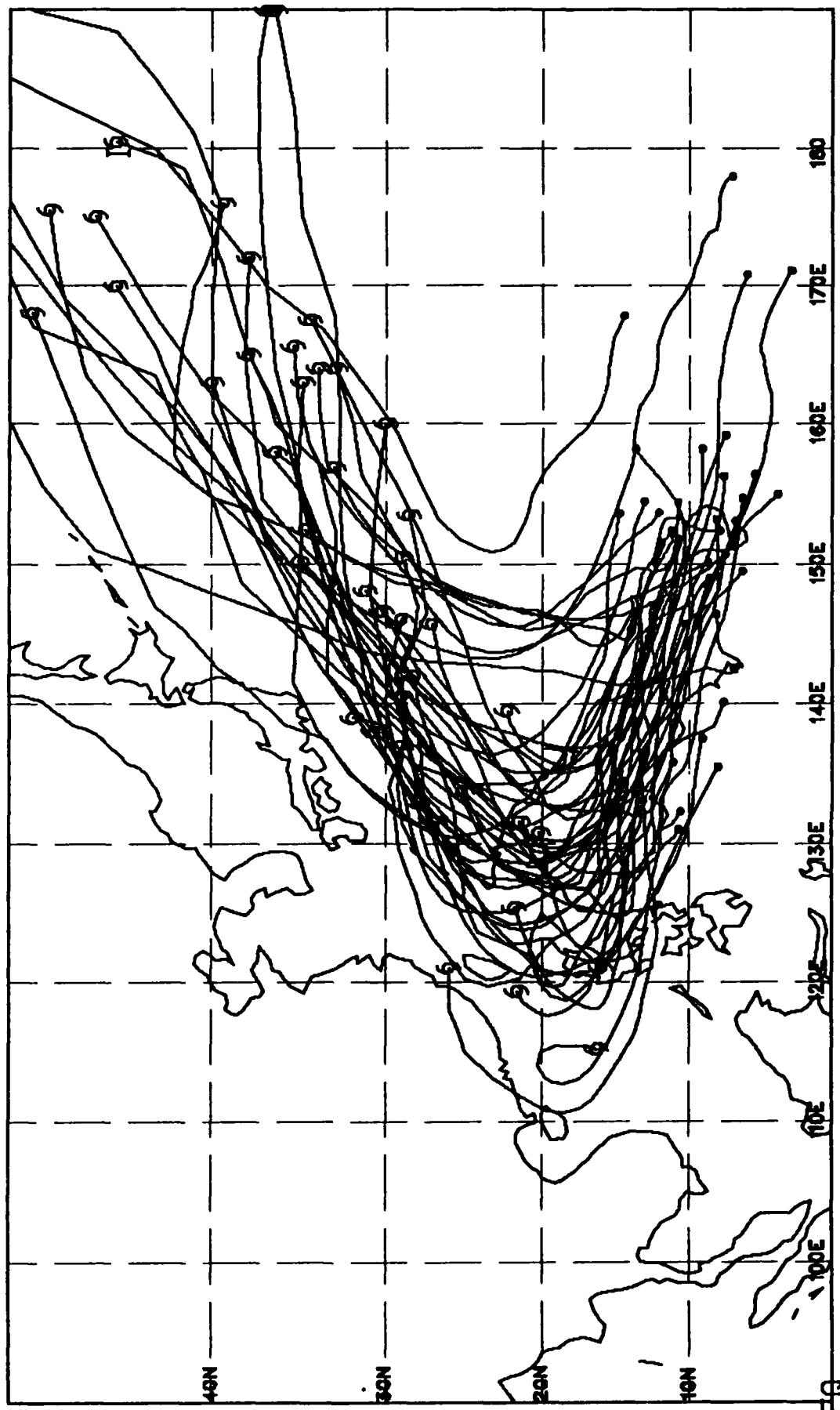
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR OCT 24 - NOV 8



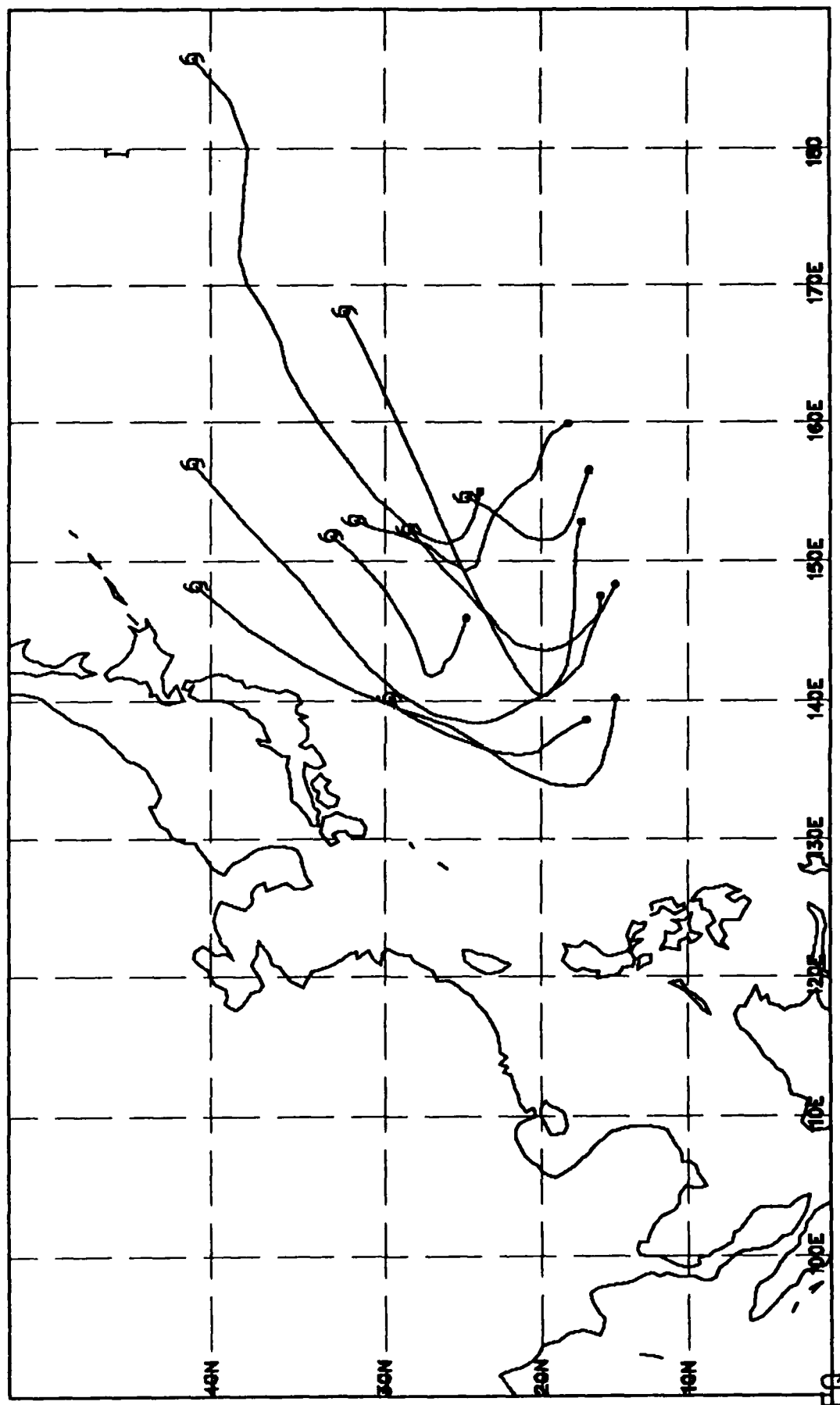
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR OCT 24 - NOV 8



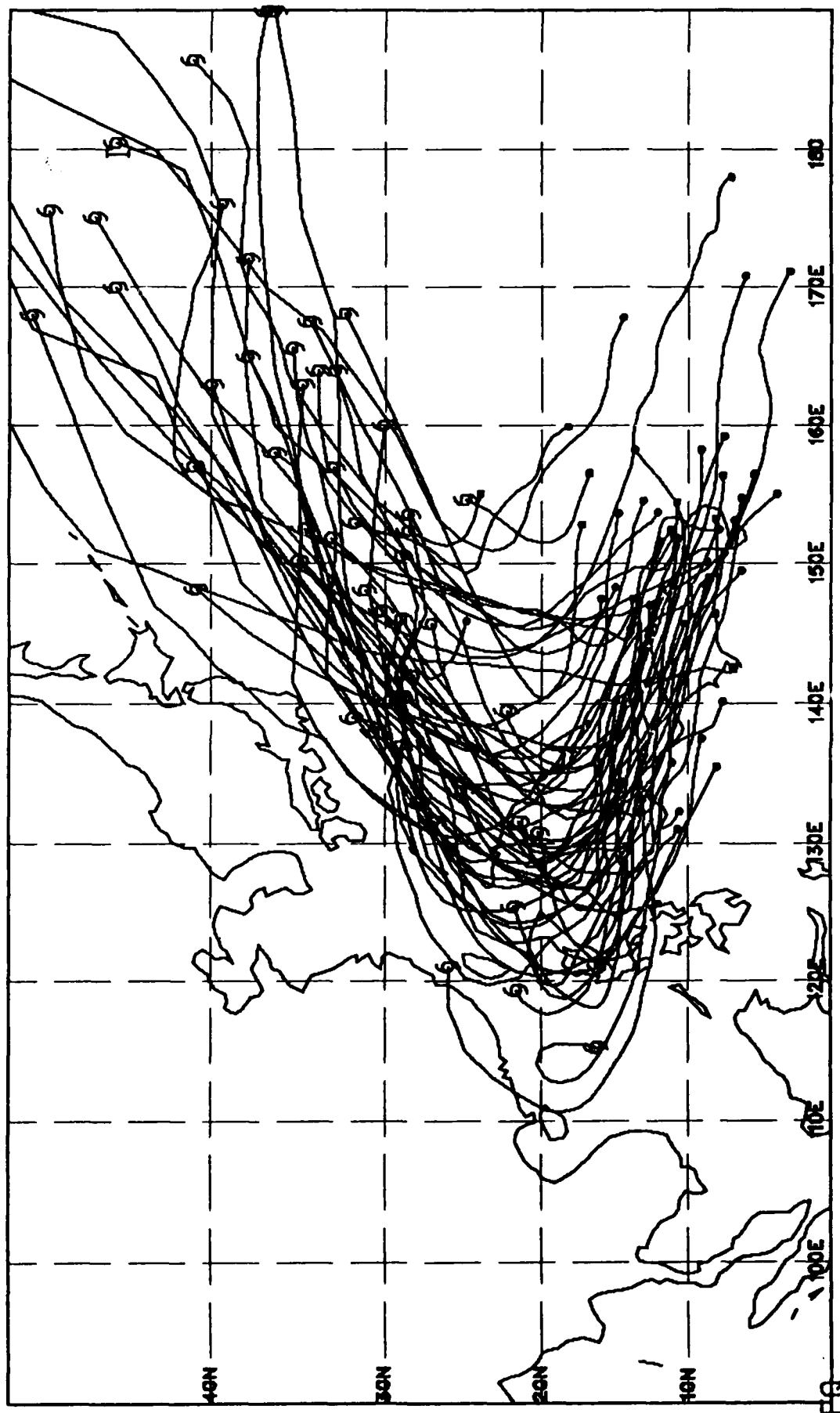
Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR OCT 24 - NOV 8



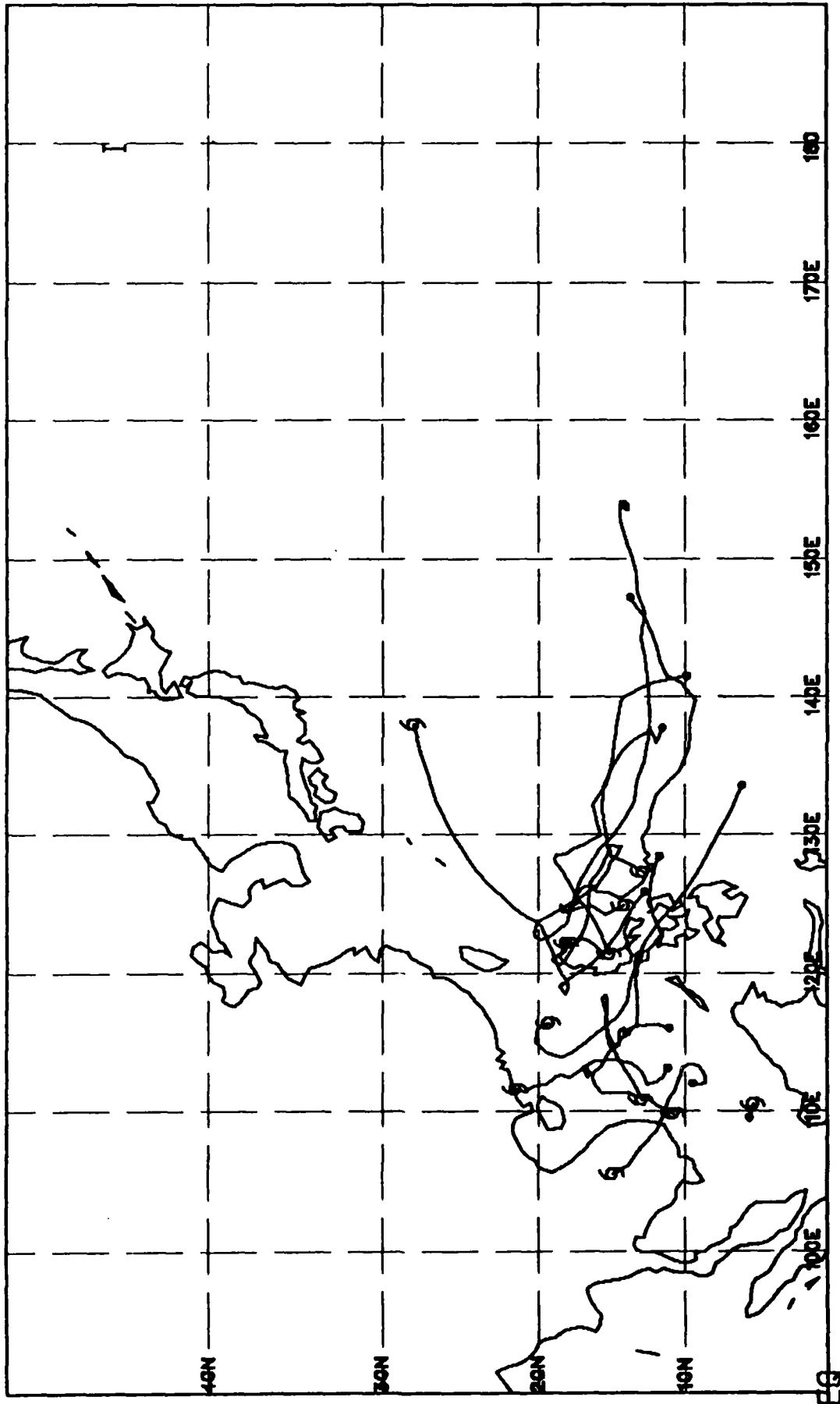
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR OCT 24 - NOV 8



Actual path of all recurring tropical cyclones (> 33 kts).

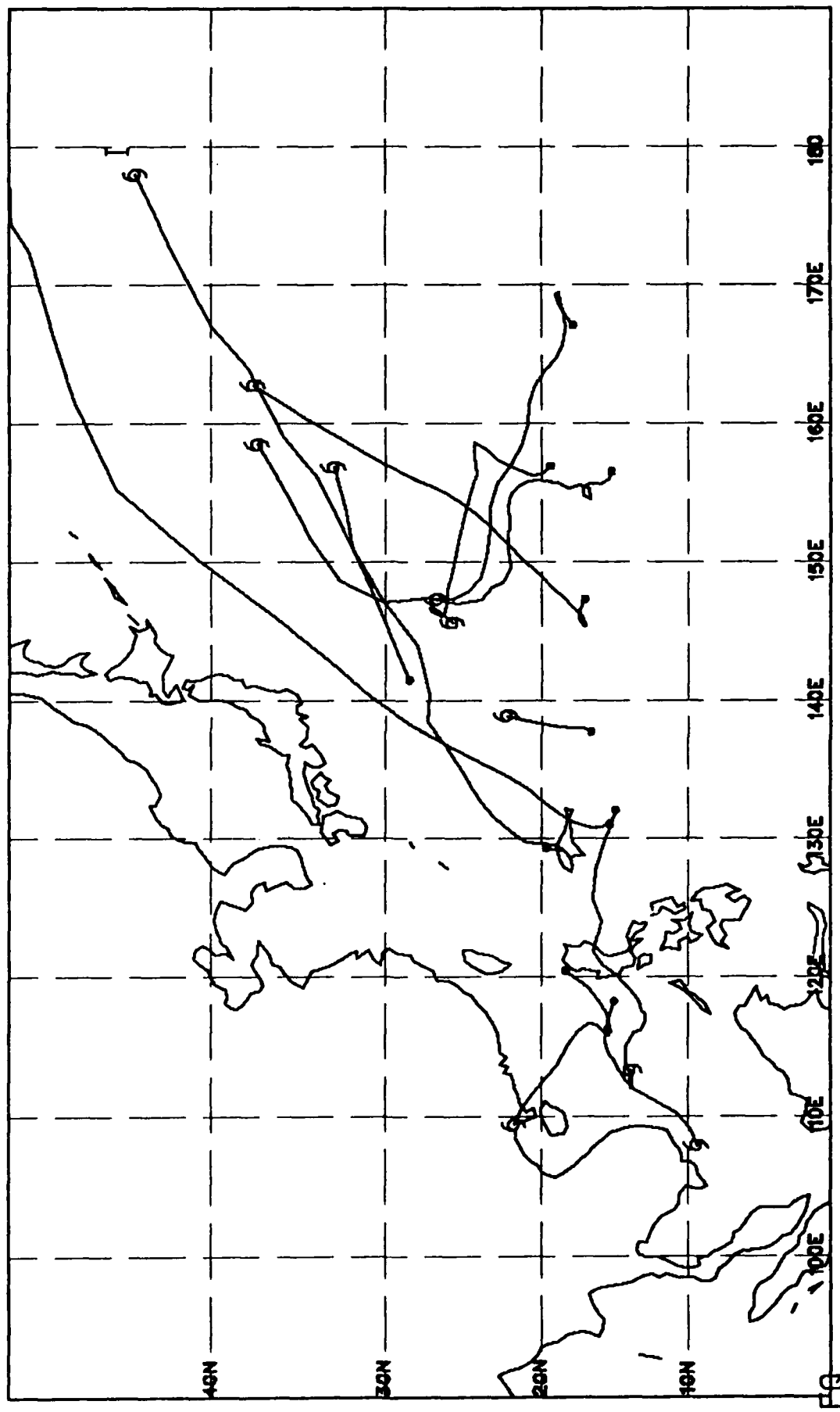
ACTUAL TRACKS FOR OCT 24 - NOV 8



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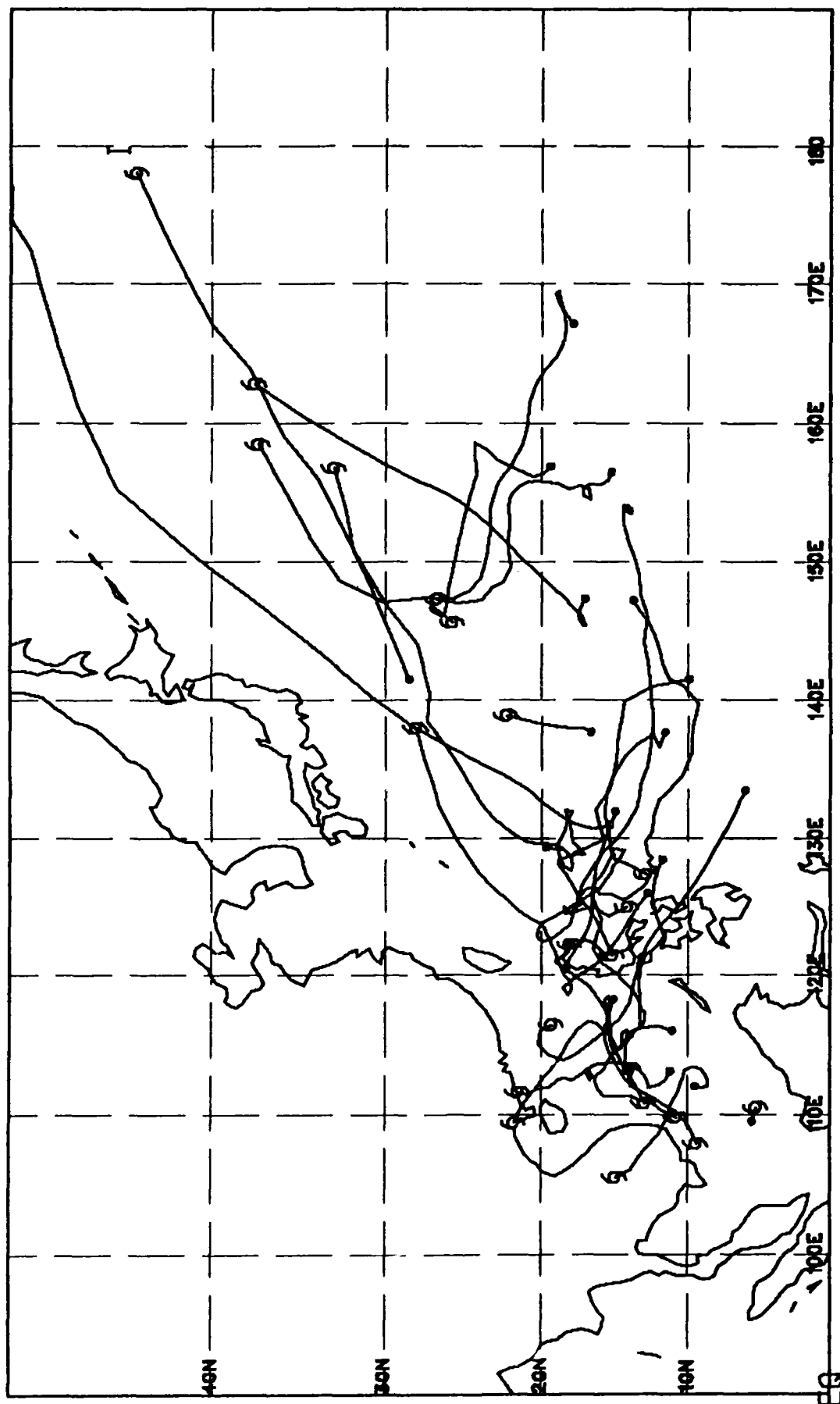
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR OCT 24 - NOV 8



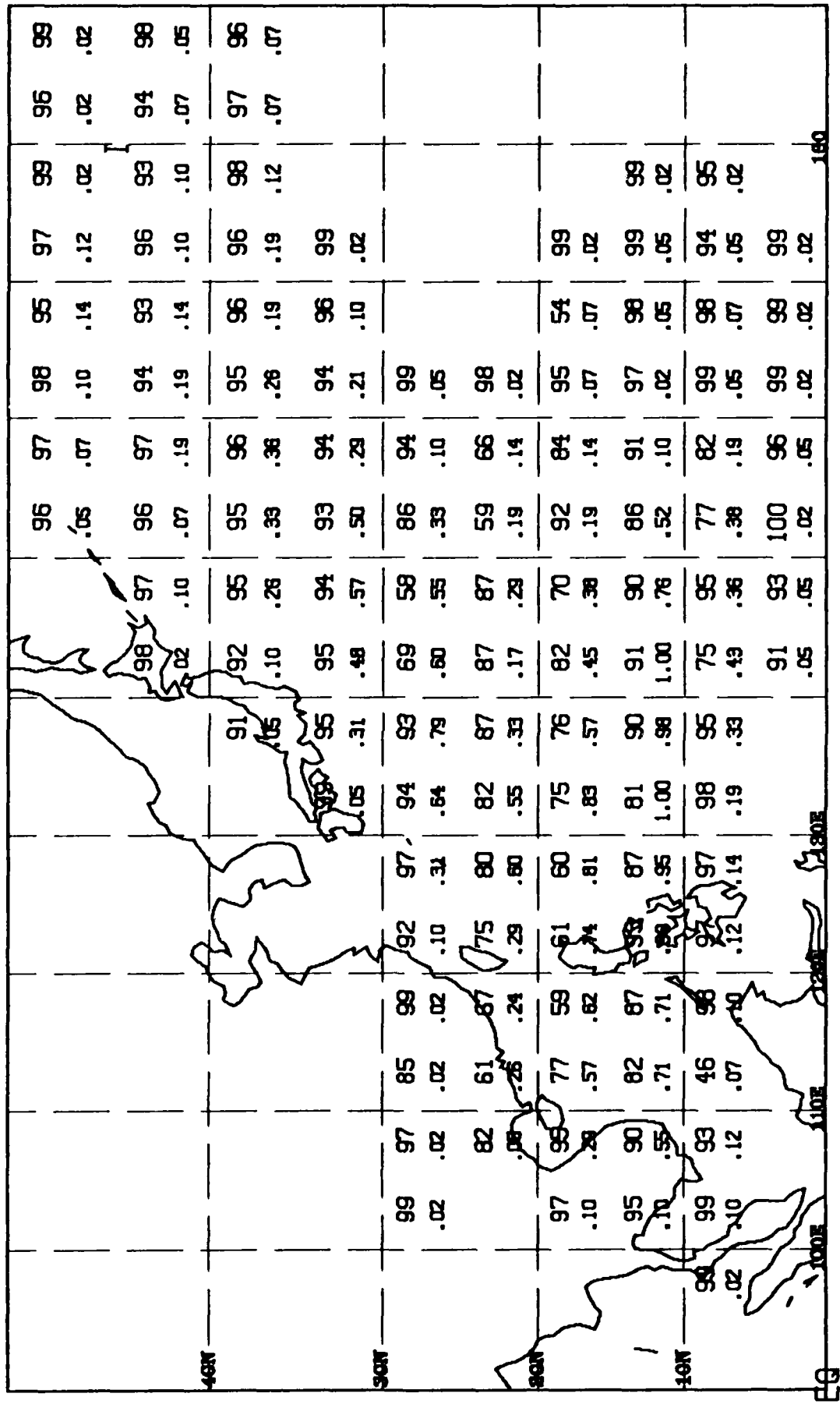
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR OCT 24 - NOV 8



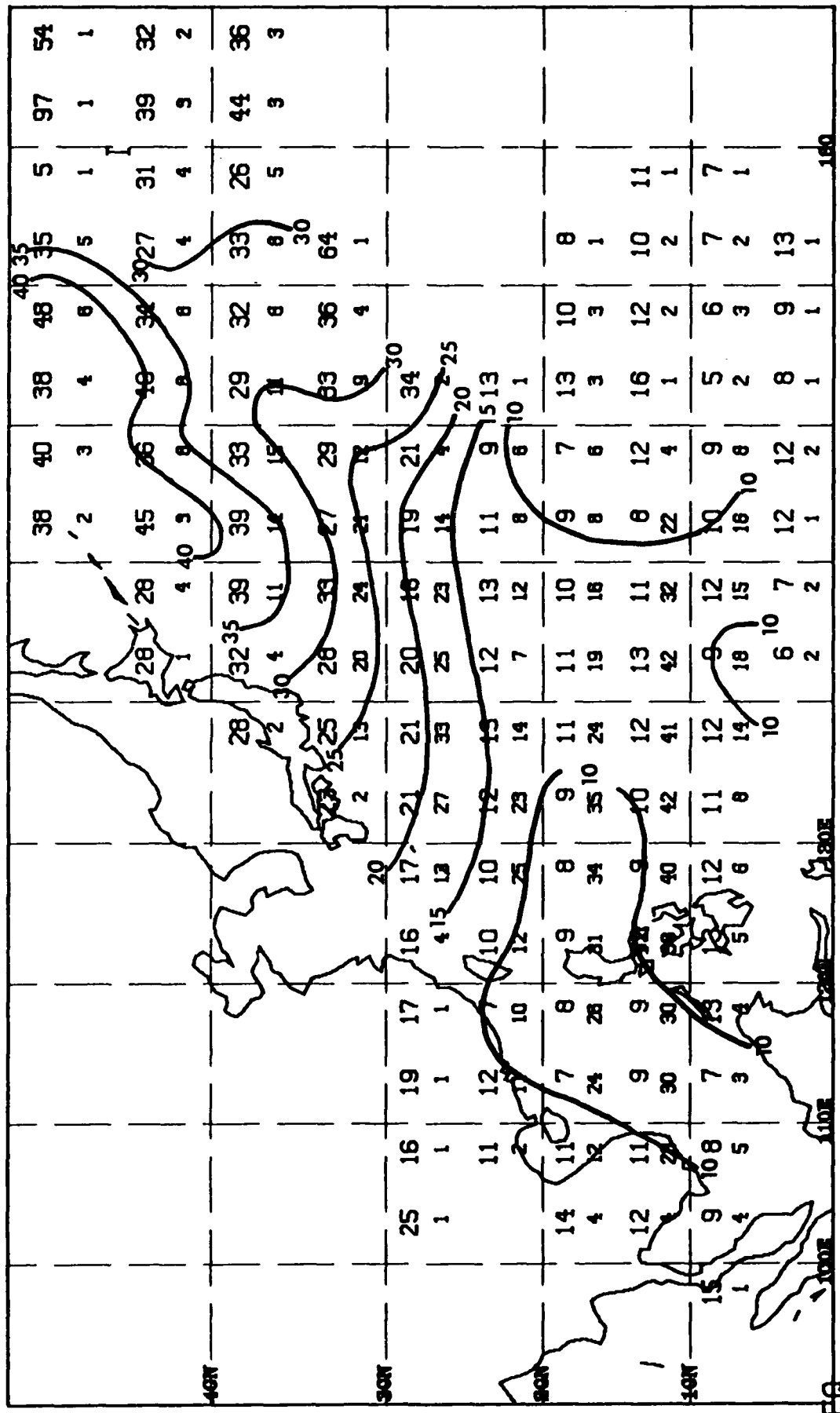
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR OCT 24 - NOV 8



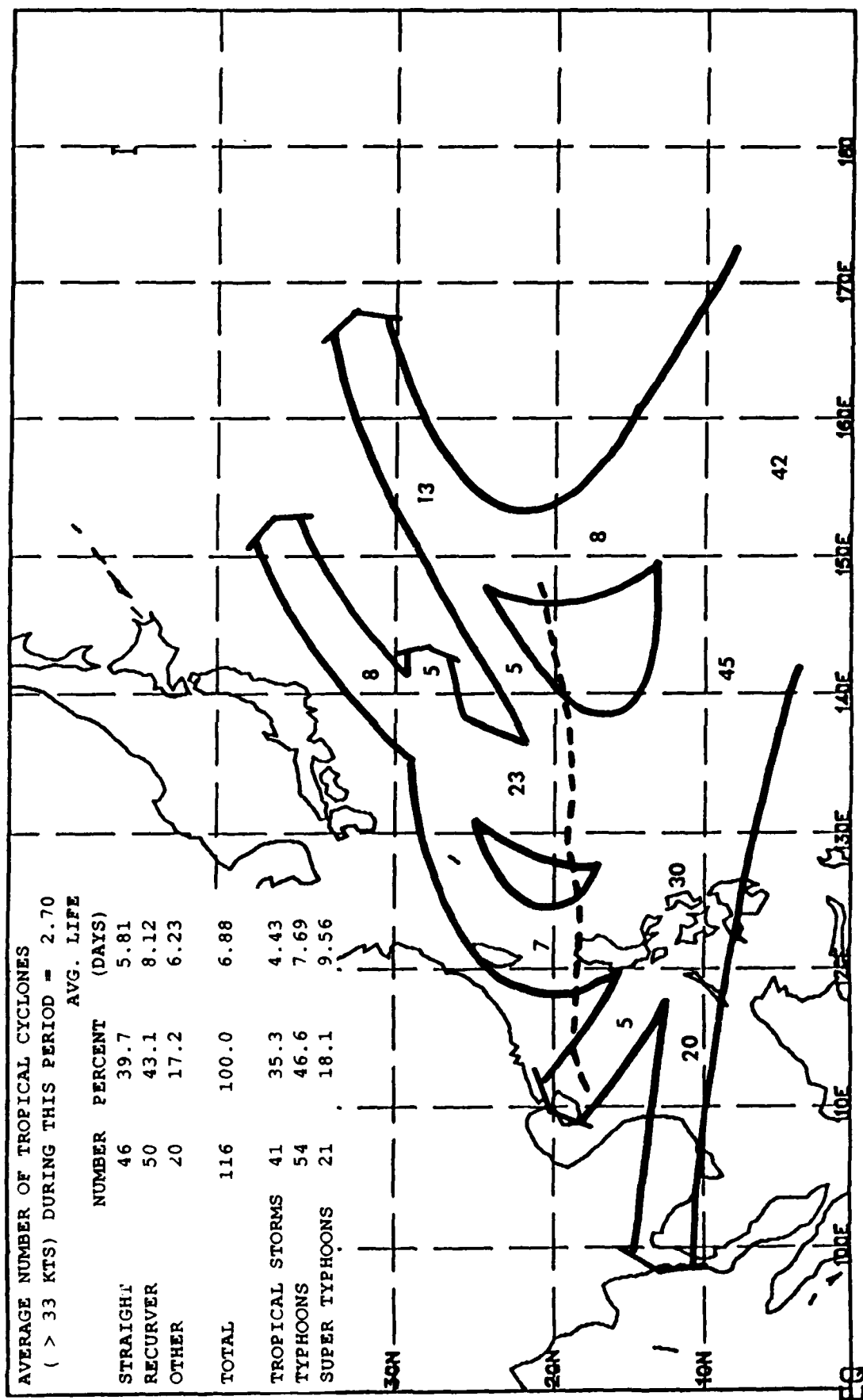
Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number).
 Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed.
 Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year per time period.

SPEED OF MOVEMENT FOR OCT 24 - NOV 8



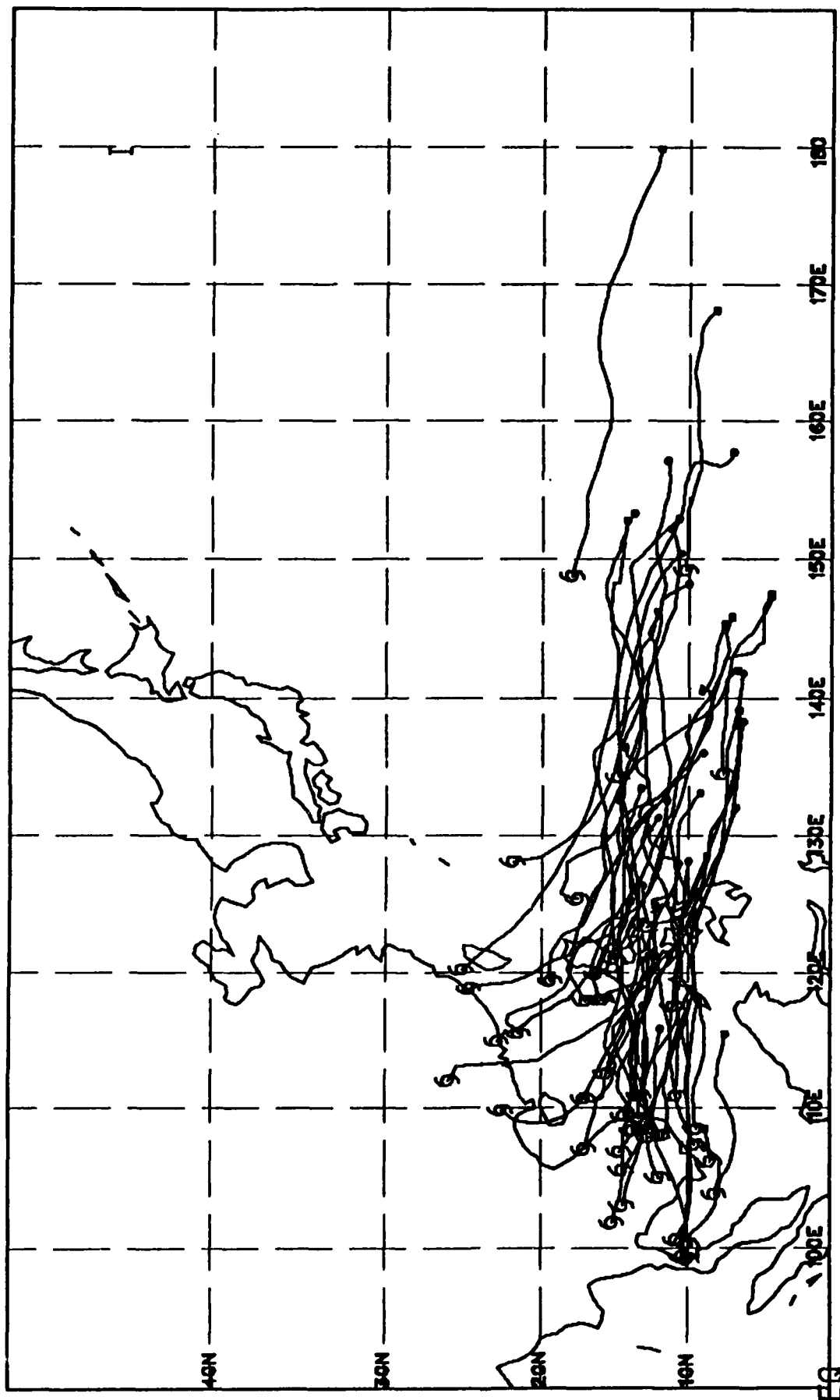
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR NOV 9 - NOV 23



Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored. Dashed line represents mean recurvature position of tropical cyclones (> 33 kts) classified as recurvers.

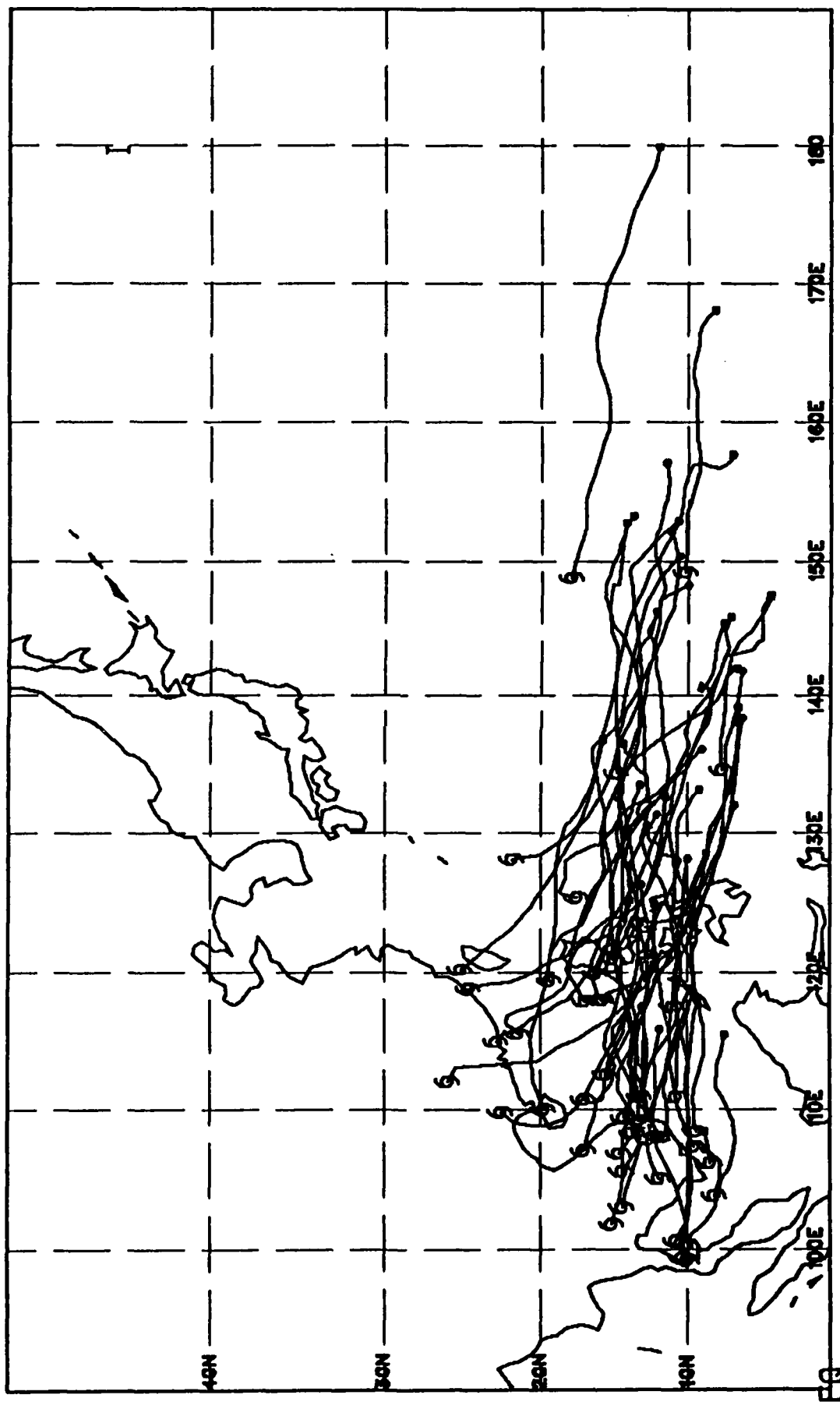
ACTUAL TRACKS FOR NOV 9 - NOV 23



Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N .

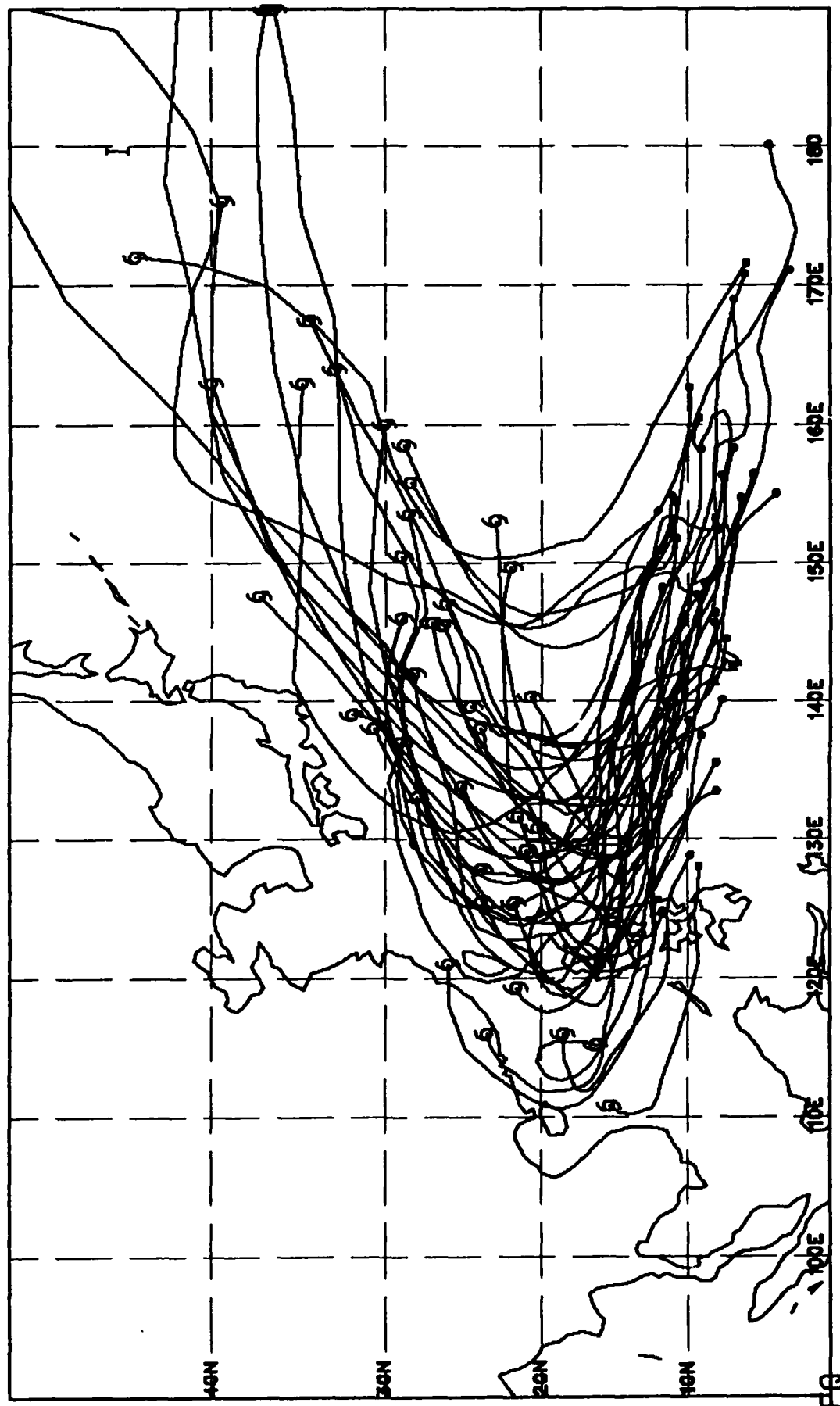
W-255

ACTUAL TRACKS FOR NOV 9 - NOV 23



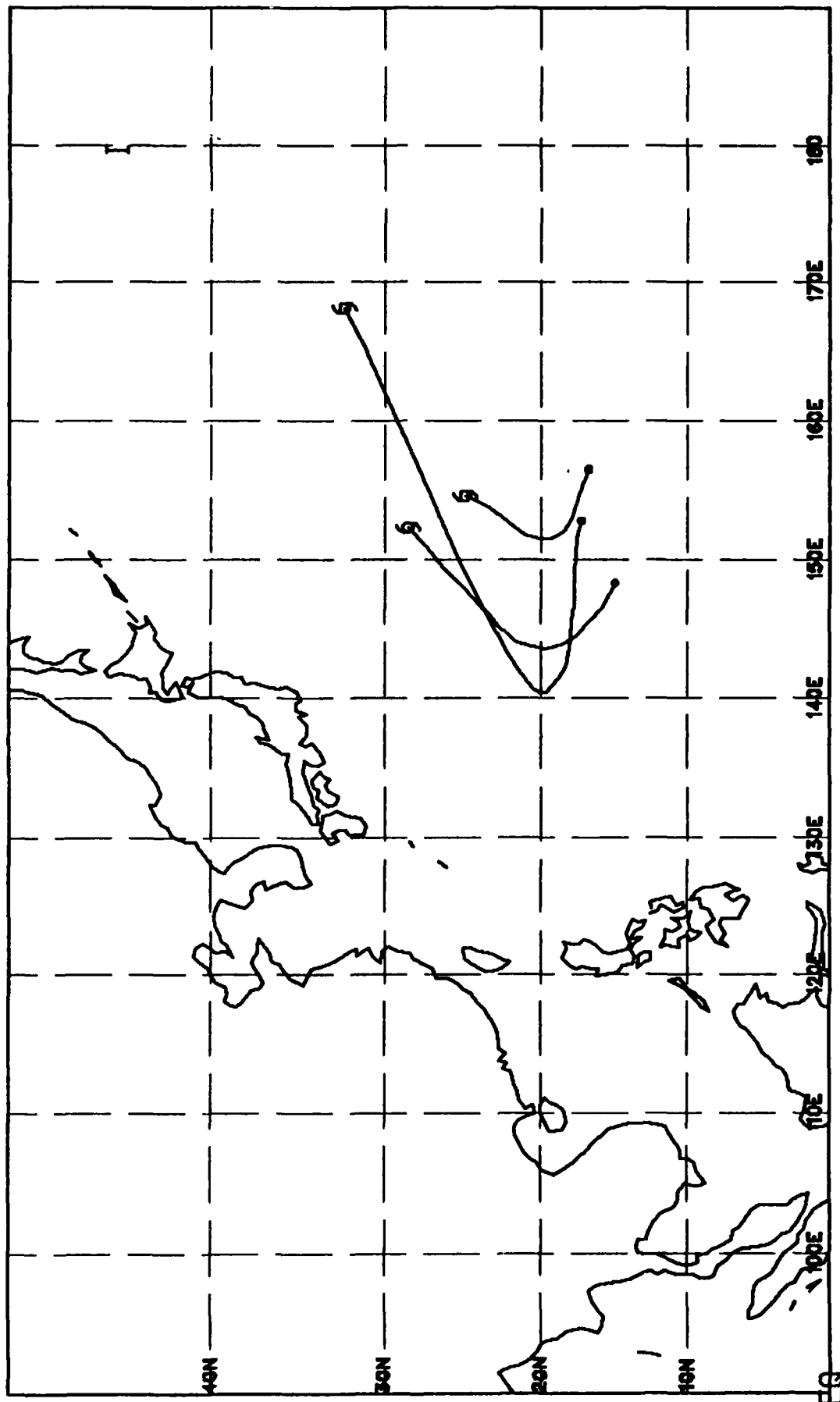
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR NOV 9 - NOV 23



Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

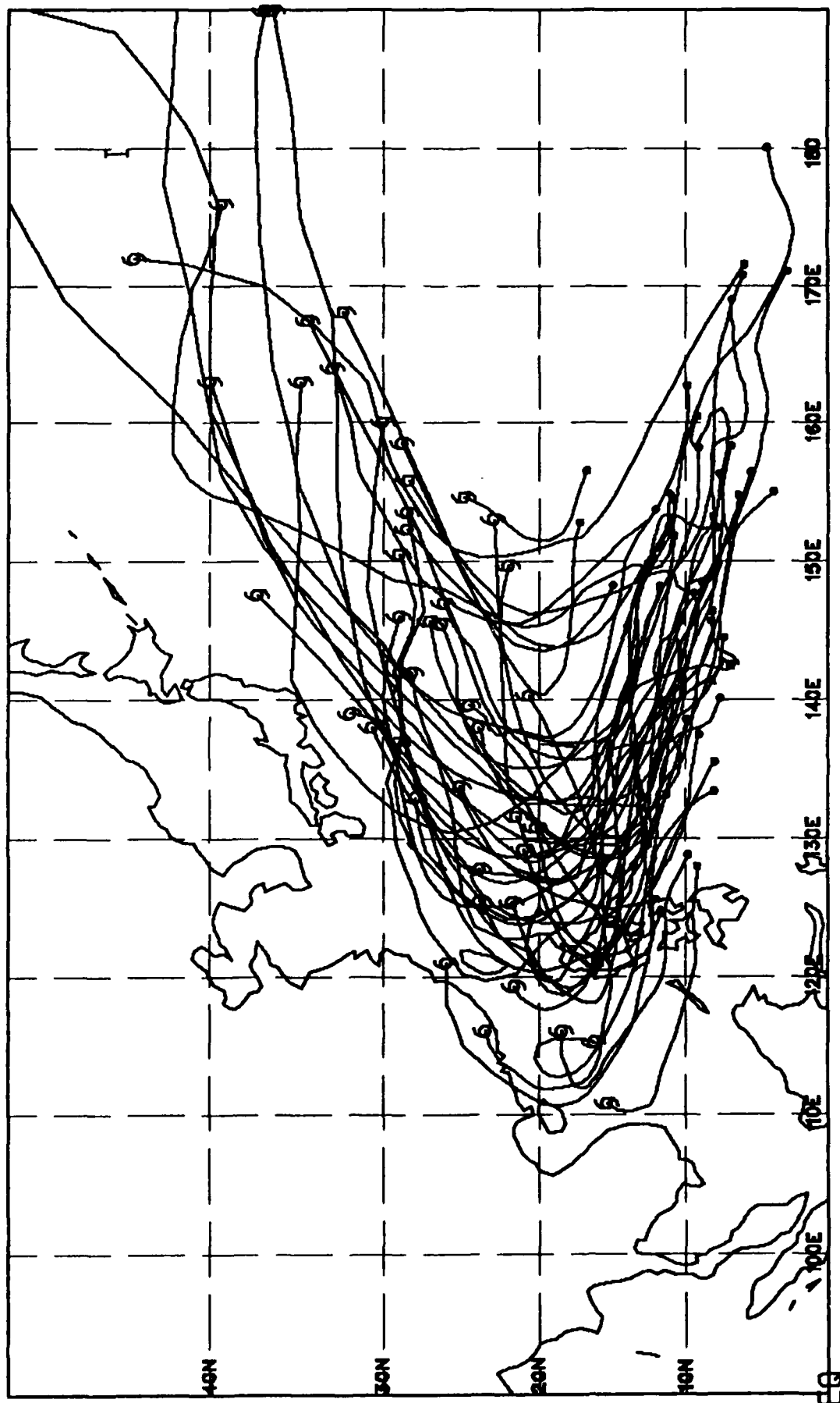
ACTUAL TRACKS FOR NOV 9 - NOV 23



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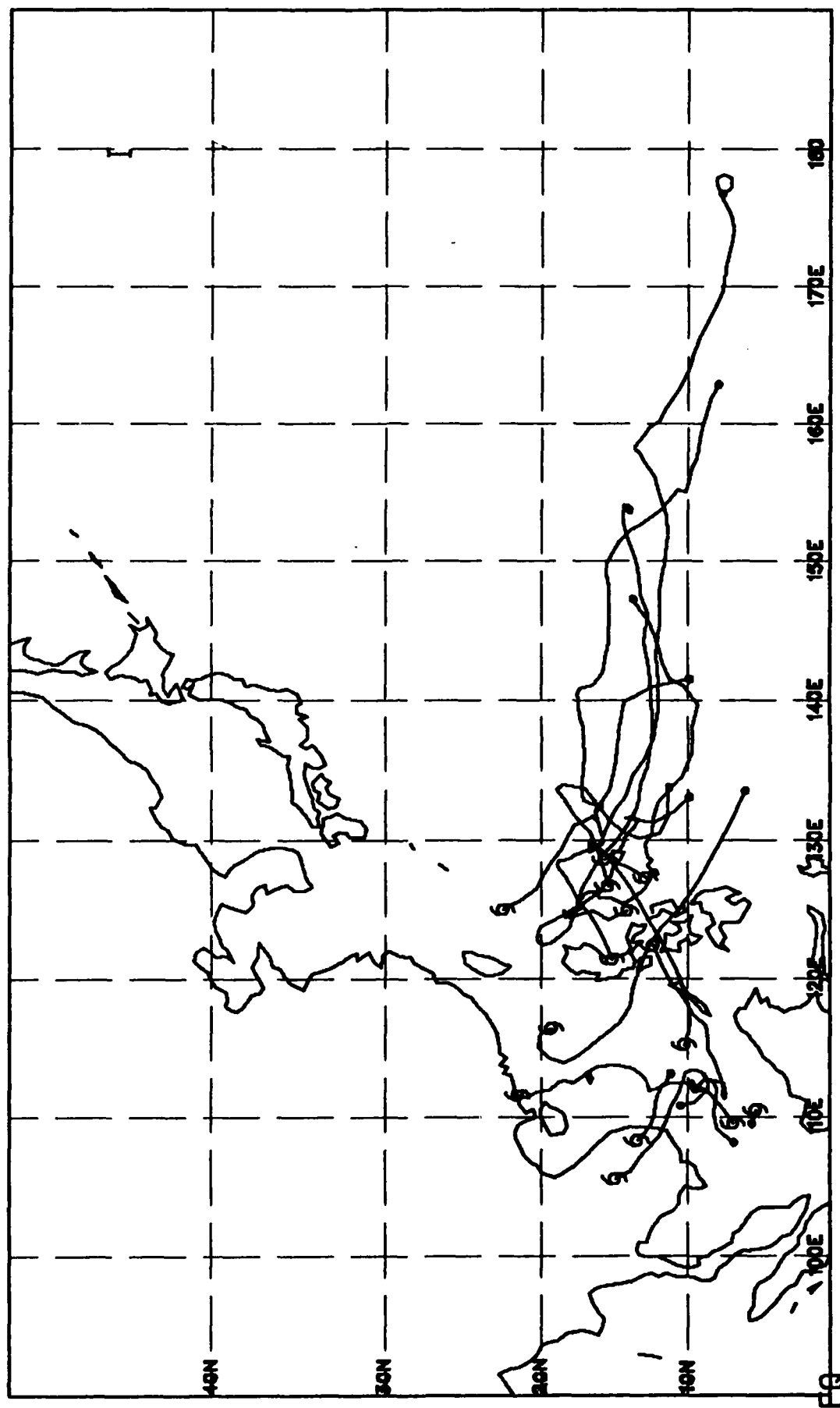
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR NOV 9 - NOV 23



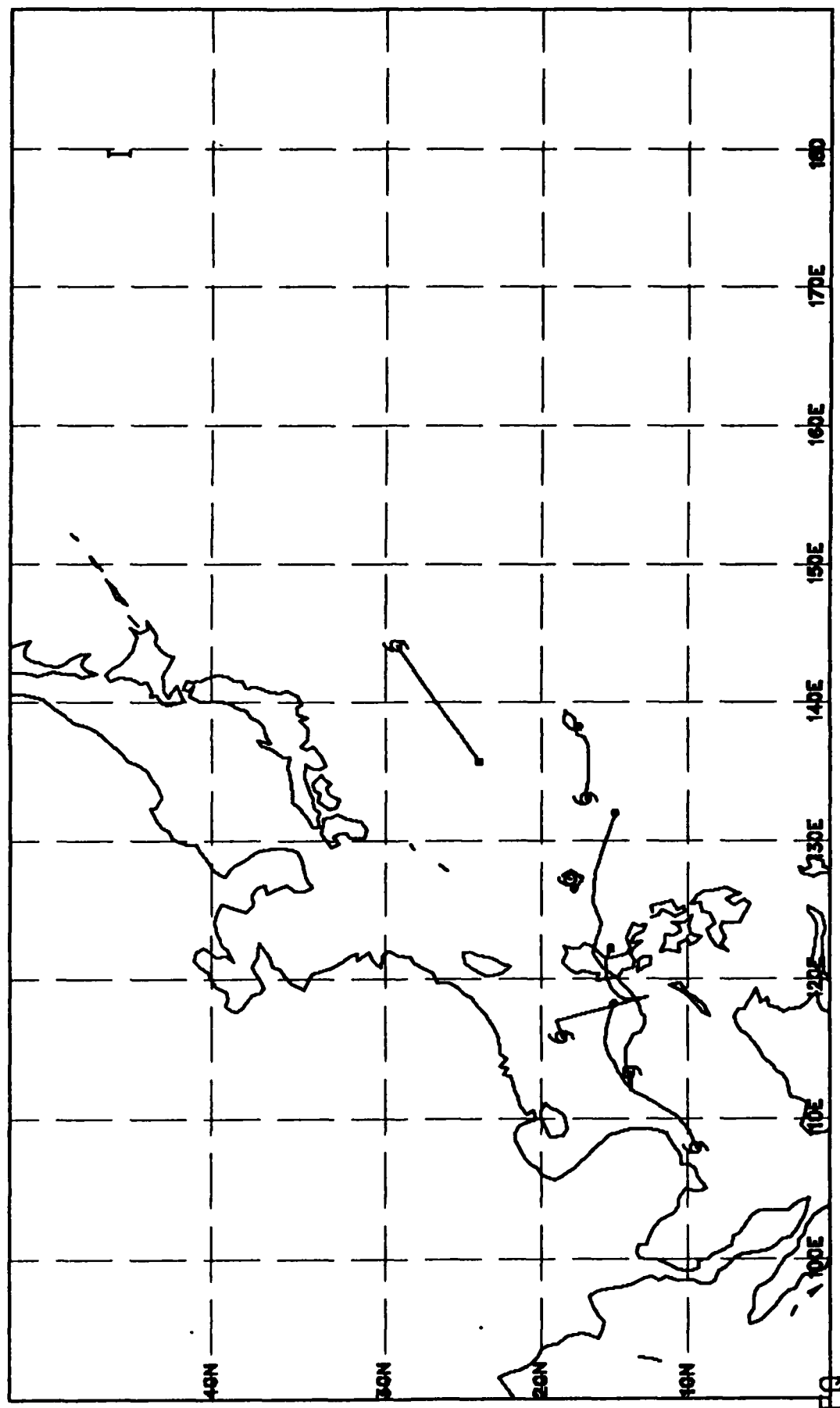
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR NOV 9 - NOV 23



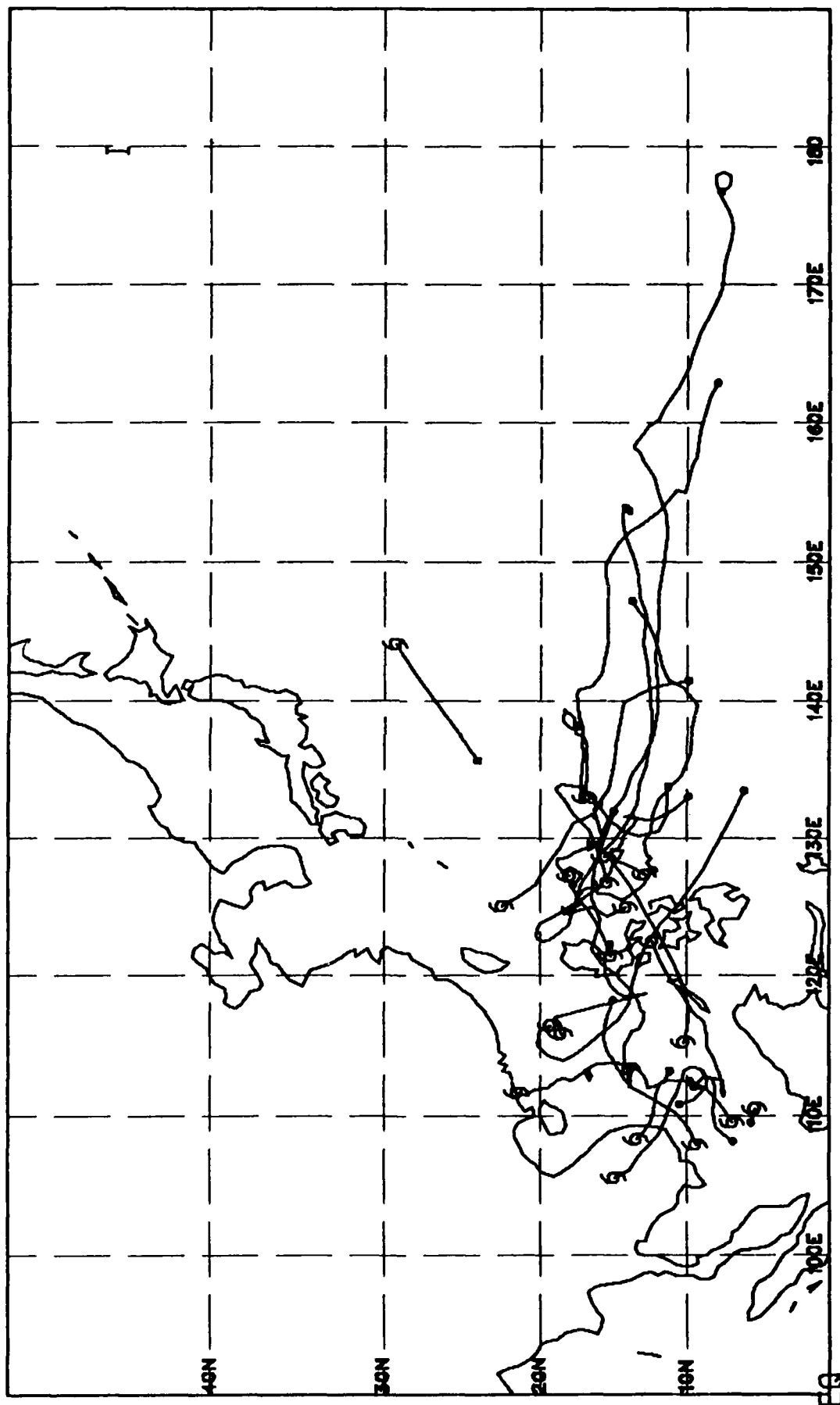
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR NOV 9 - NOV 23



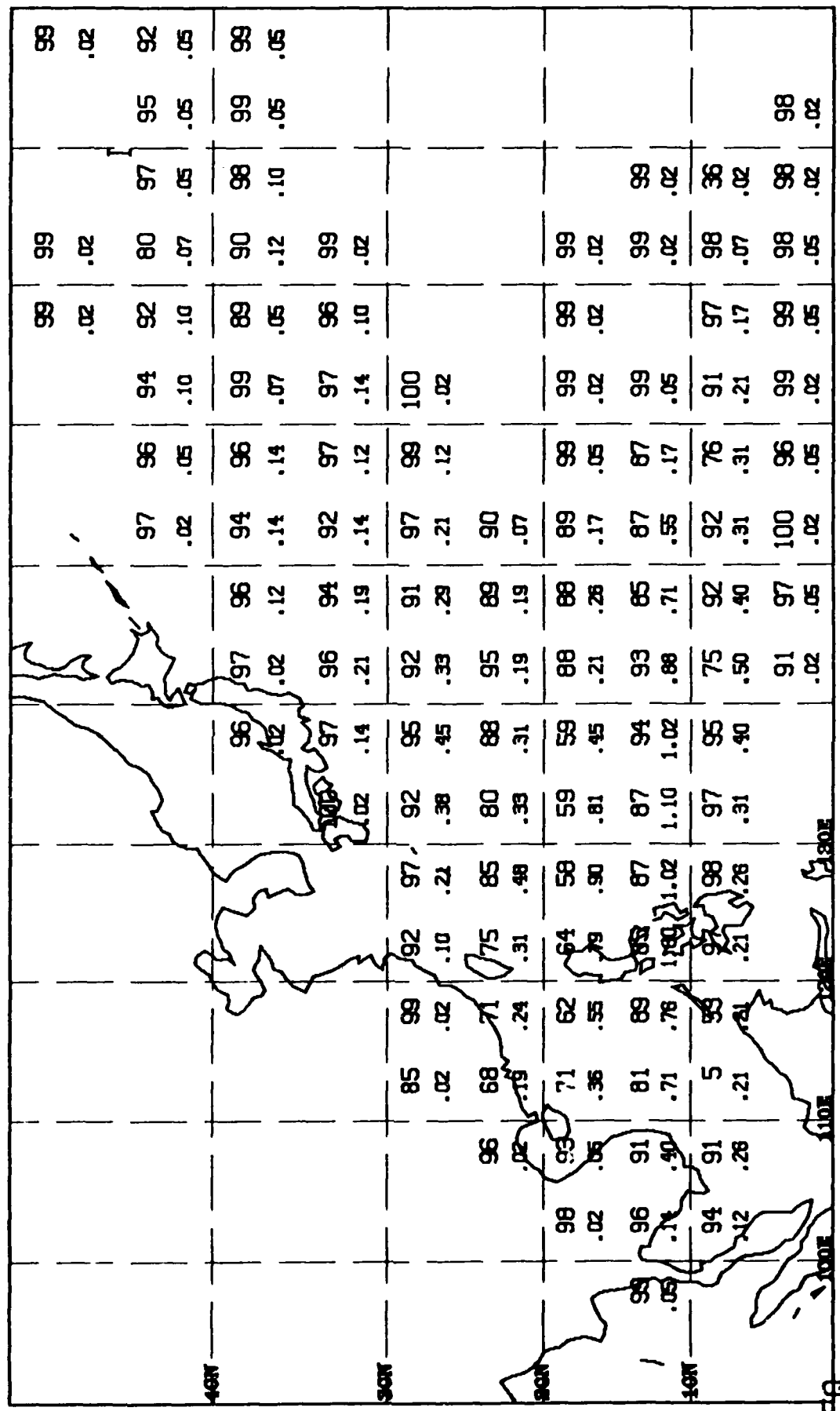
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR NOV 9 - NOV 23



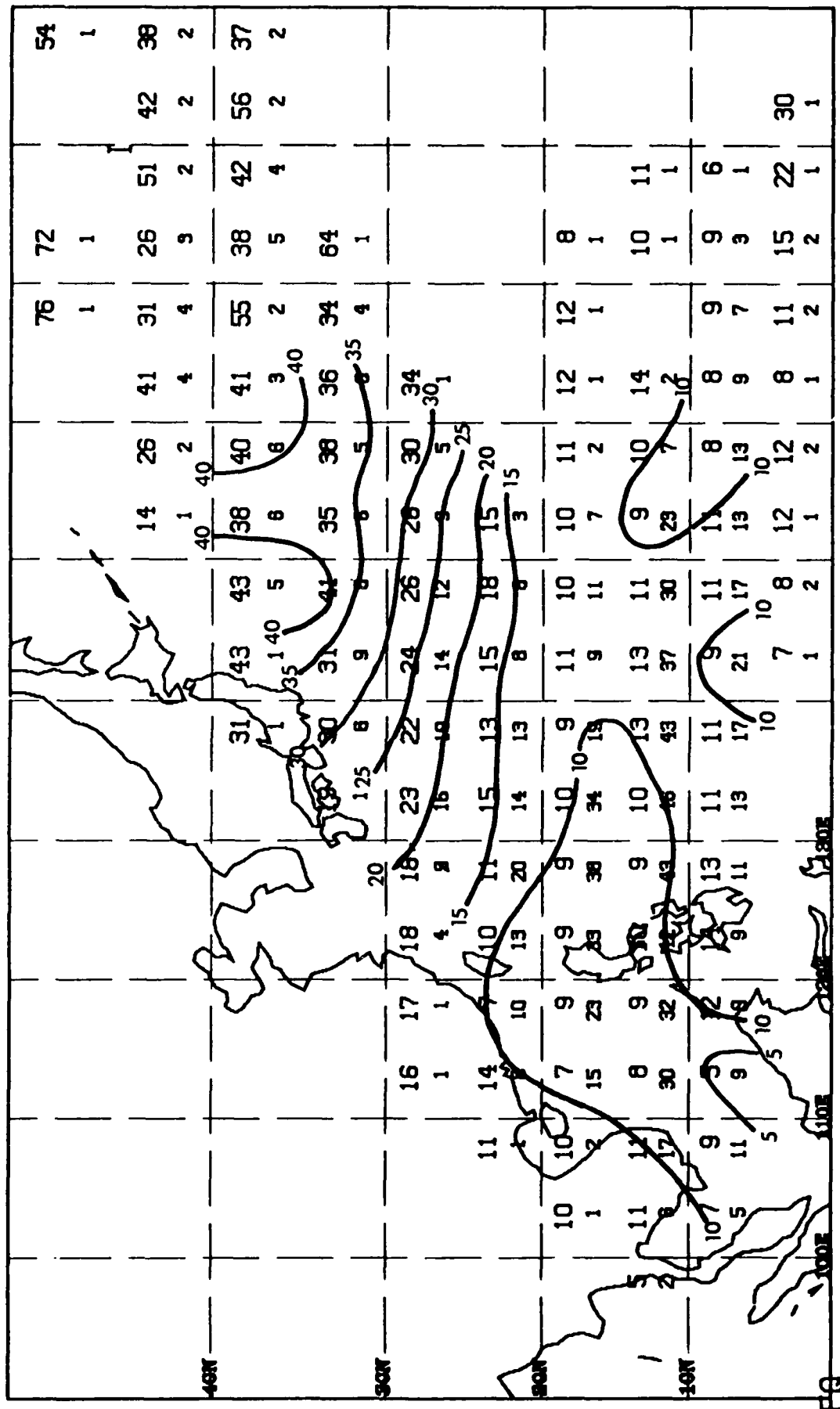
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR NOV 9 - NOV 23



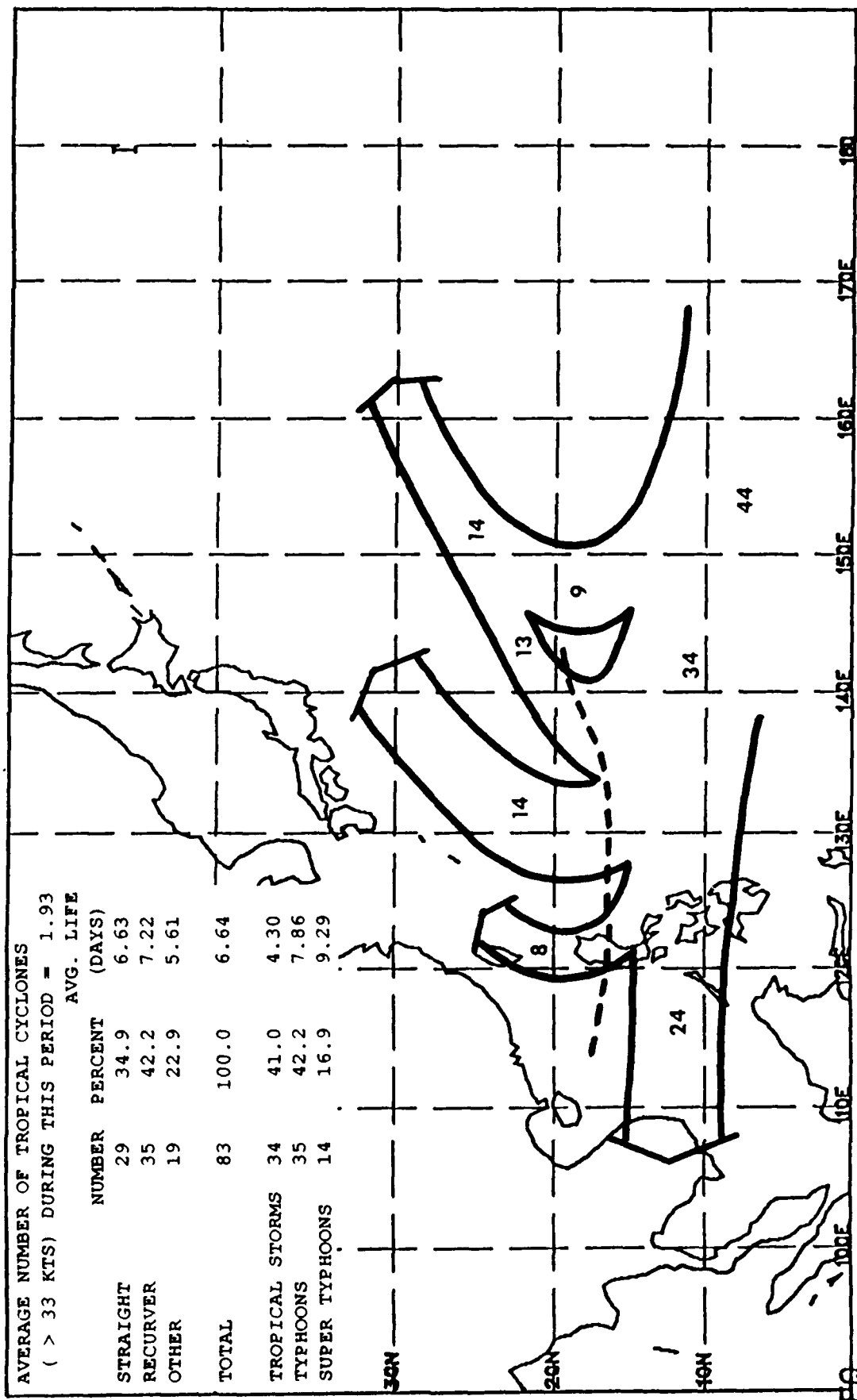
Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number).
 Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed.
 Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year time period.

SPEED OF MOVEMENT FOR NOV 9 - NOV 23



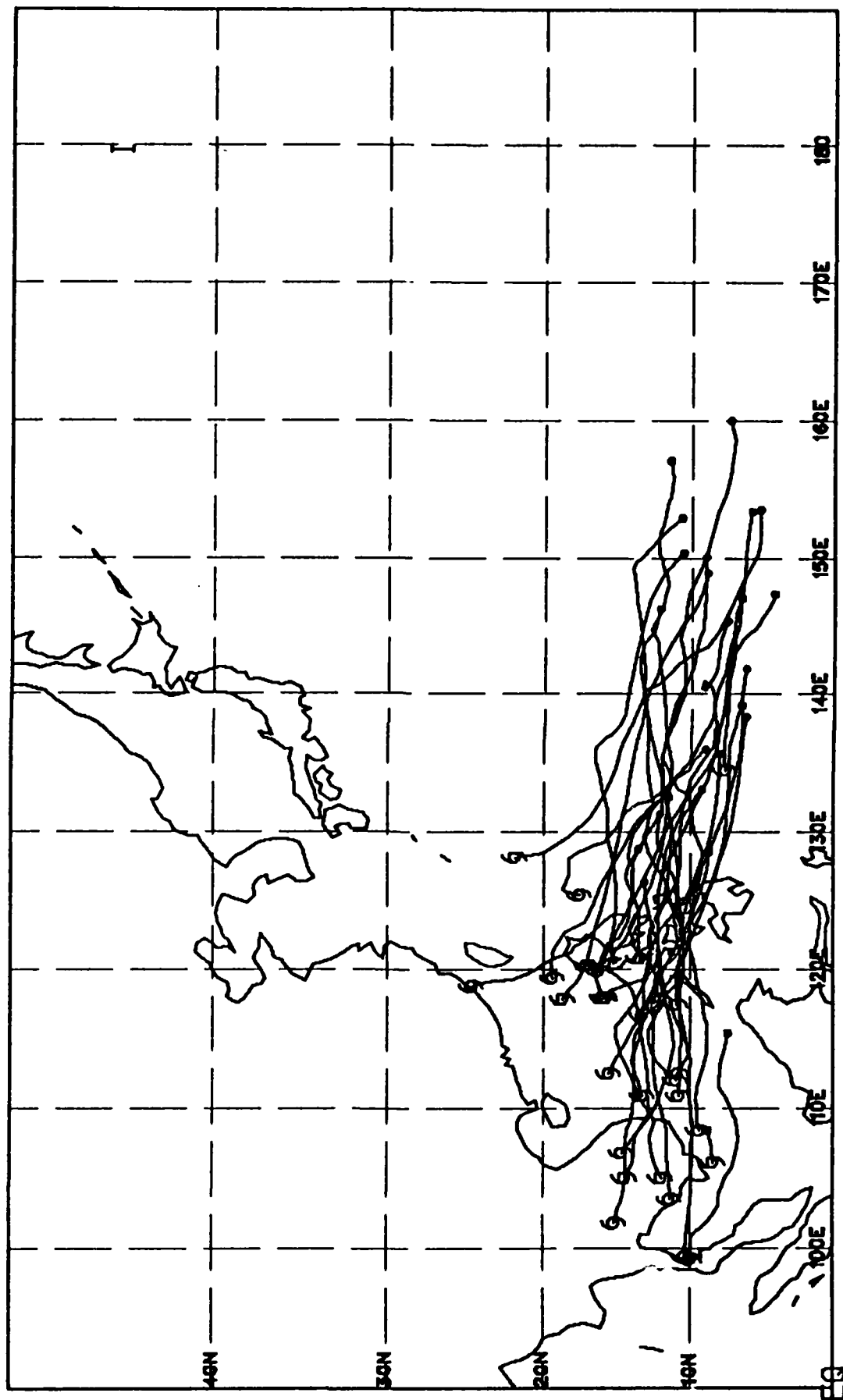
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR NOV 24 - DEC 8



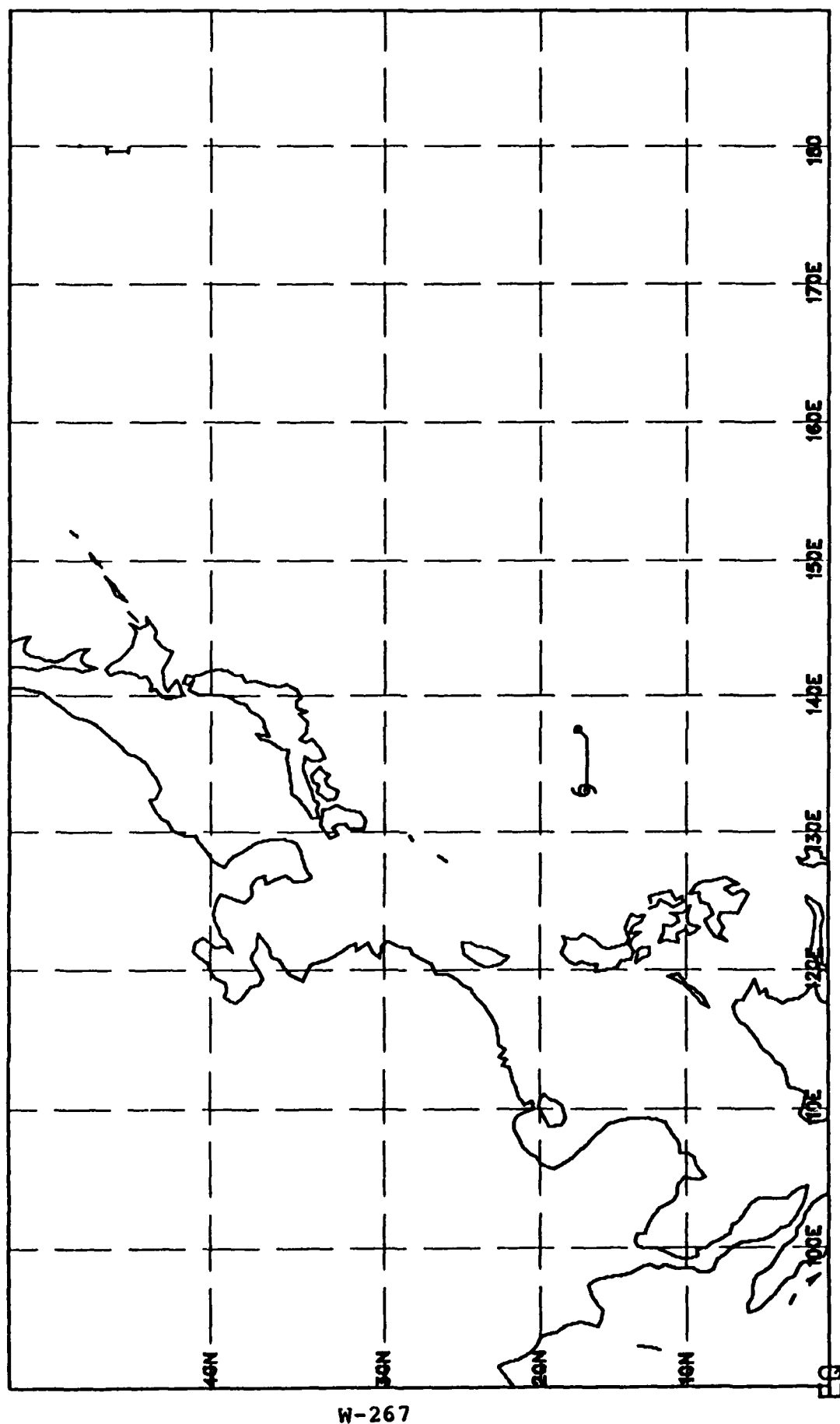
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored. Dashed line represents mean recurvature position of tropical cyclones (> 33 kts) classified as recurvers.

ACTUAL TRACKS FOR NOV 24 - DEC 8



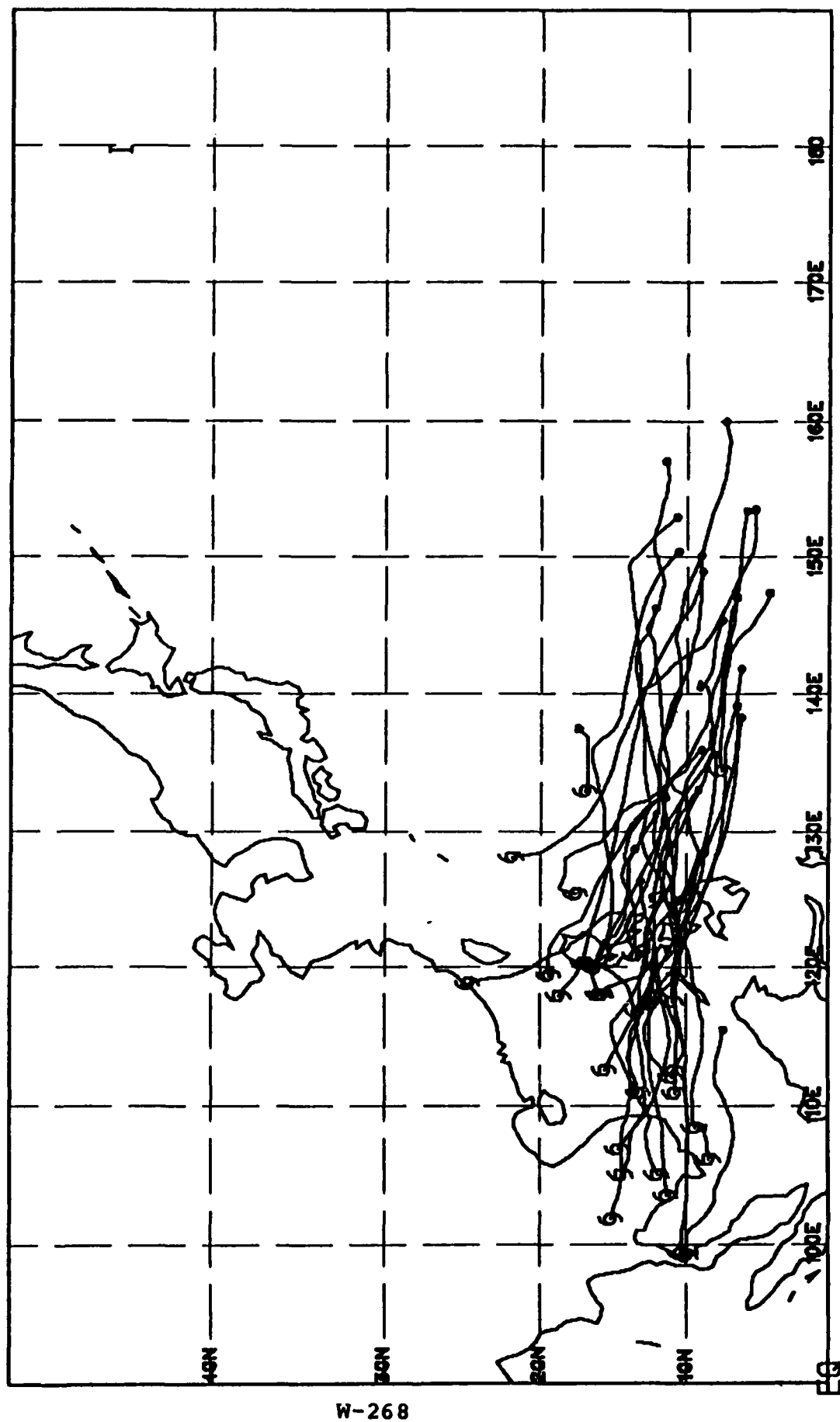
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR NOV 24 - DEC 8



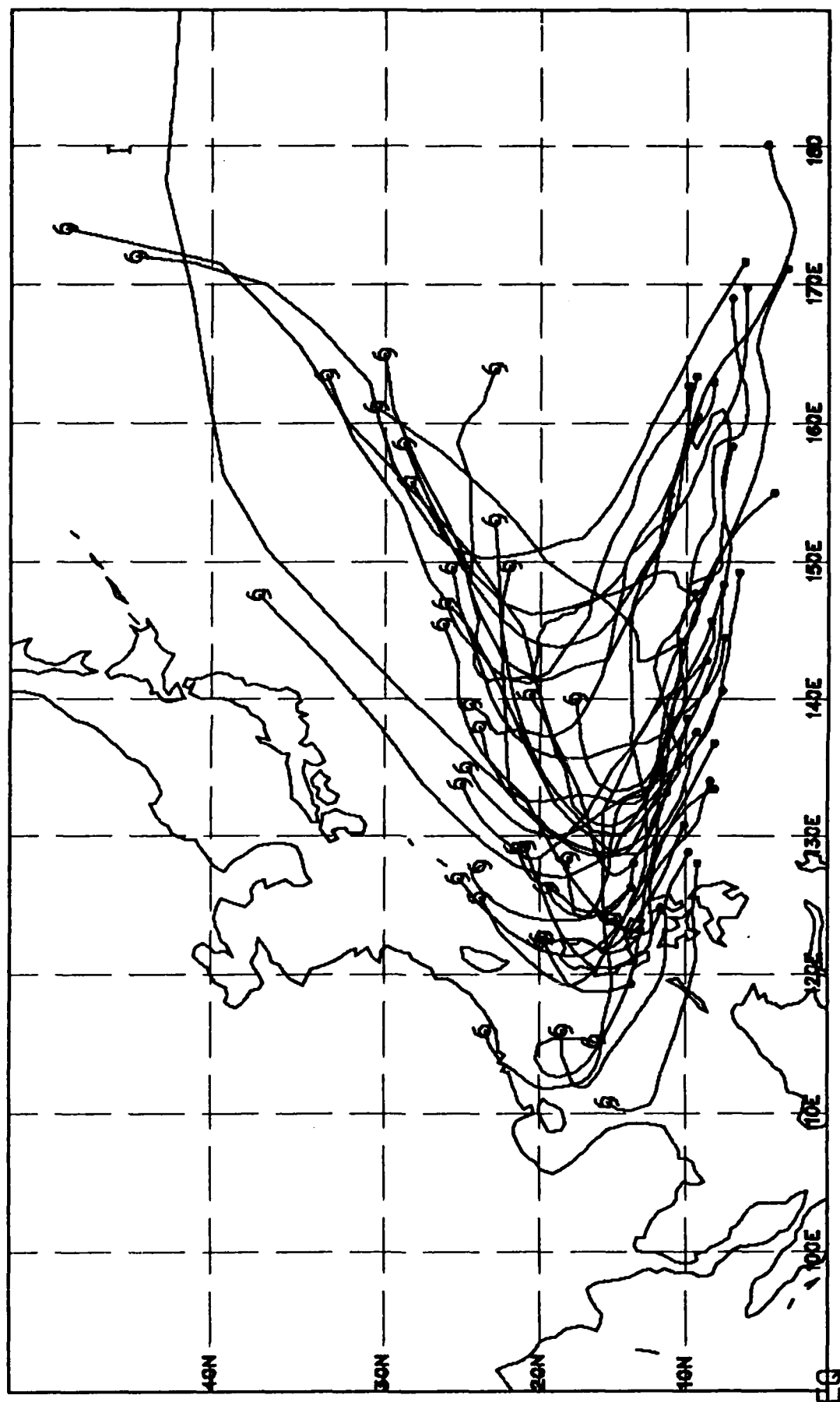
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR NOV 24 - DEC 8



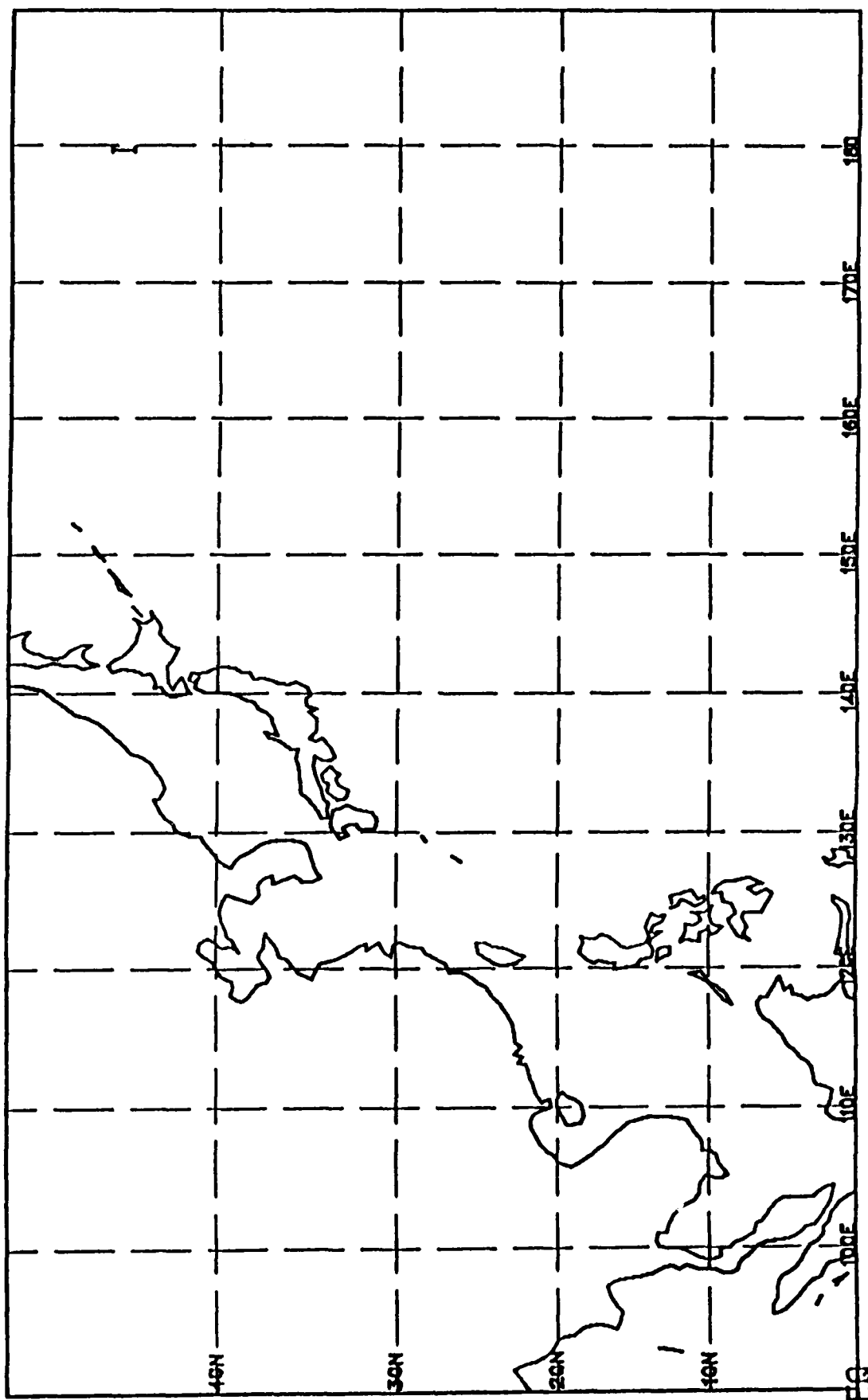
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR NOV 24 - DEC 8



Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

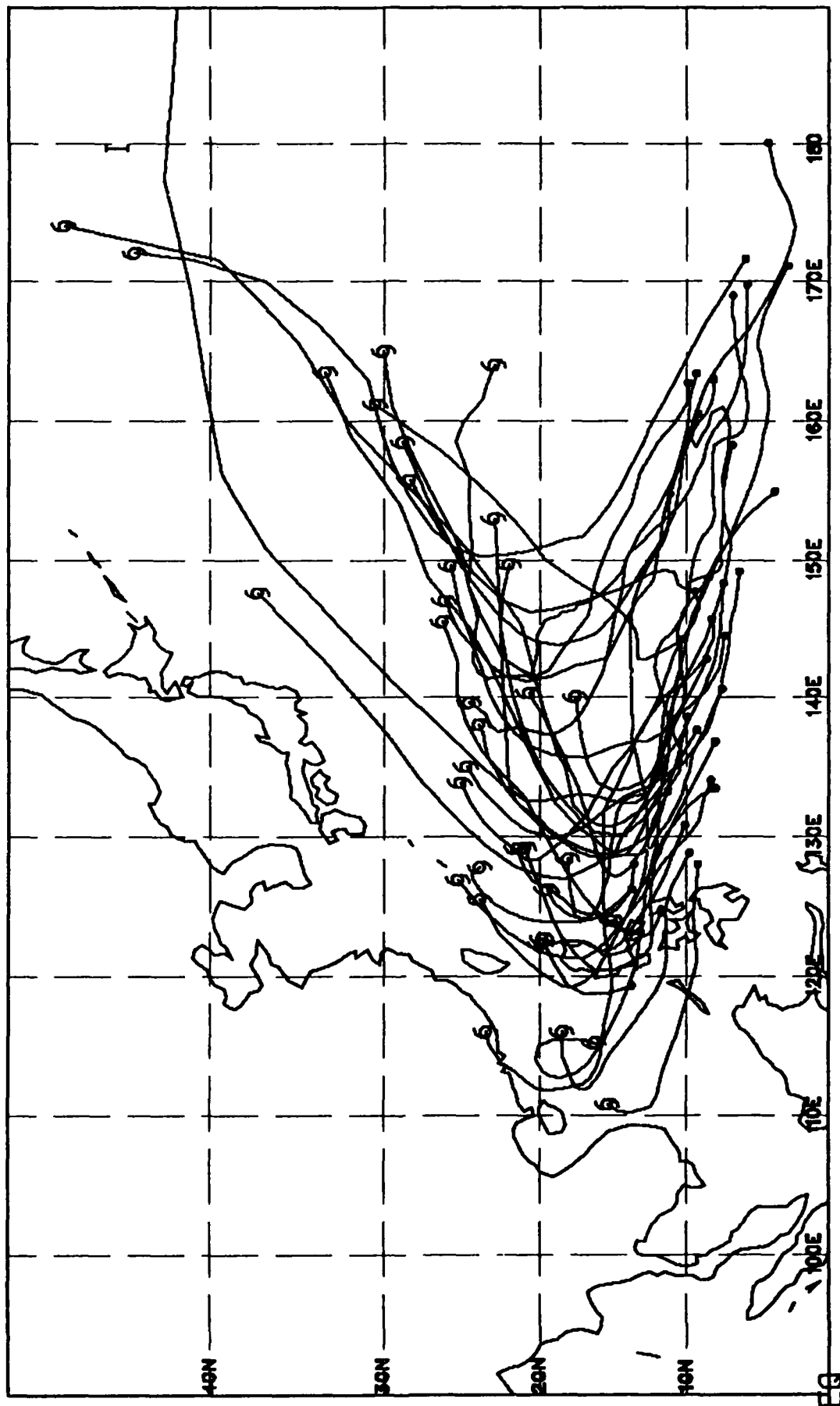
ACTUAL TRACKS FOR NOV 24 - DEC 8



W-270

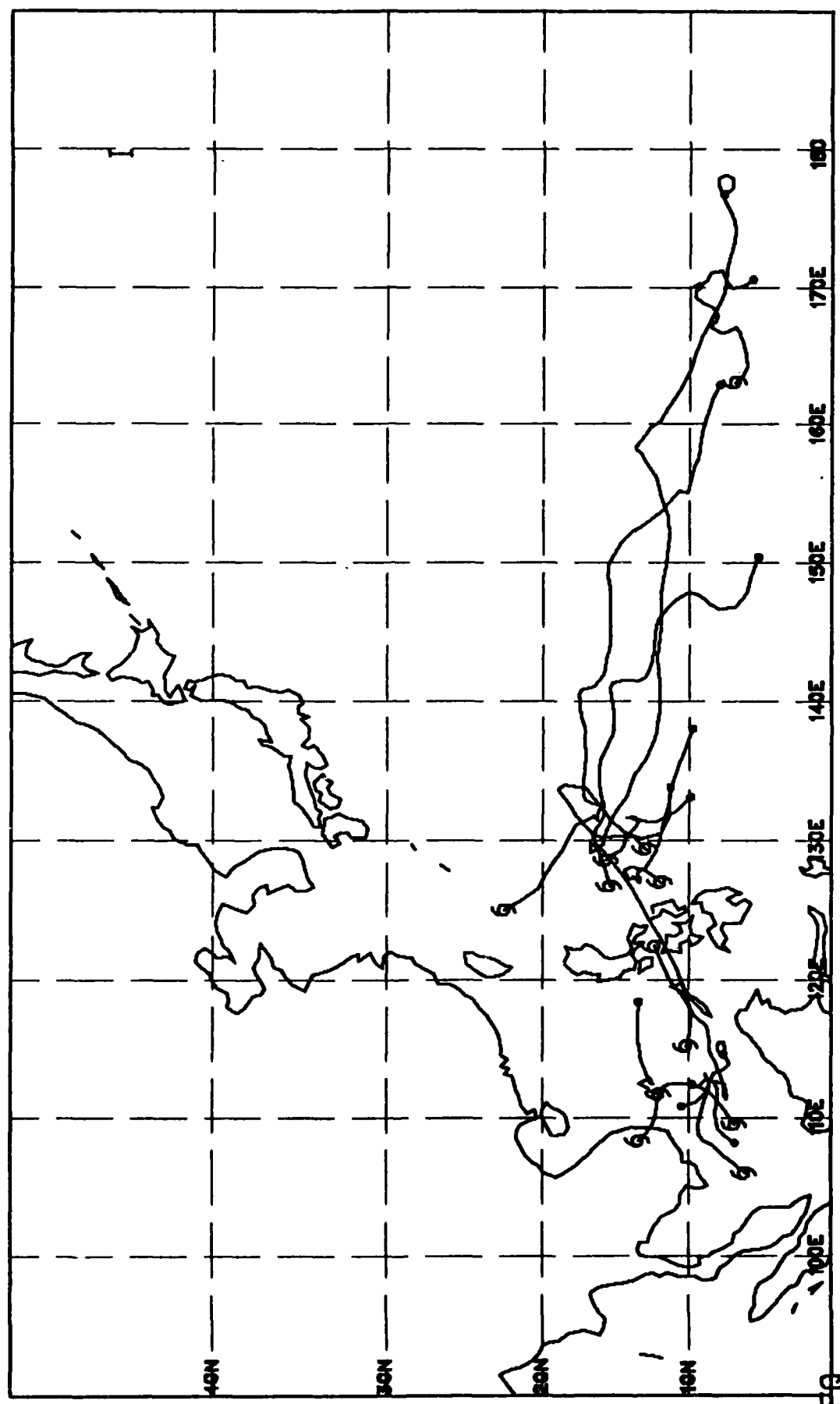
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR NOV 24 - DEC 8



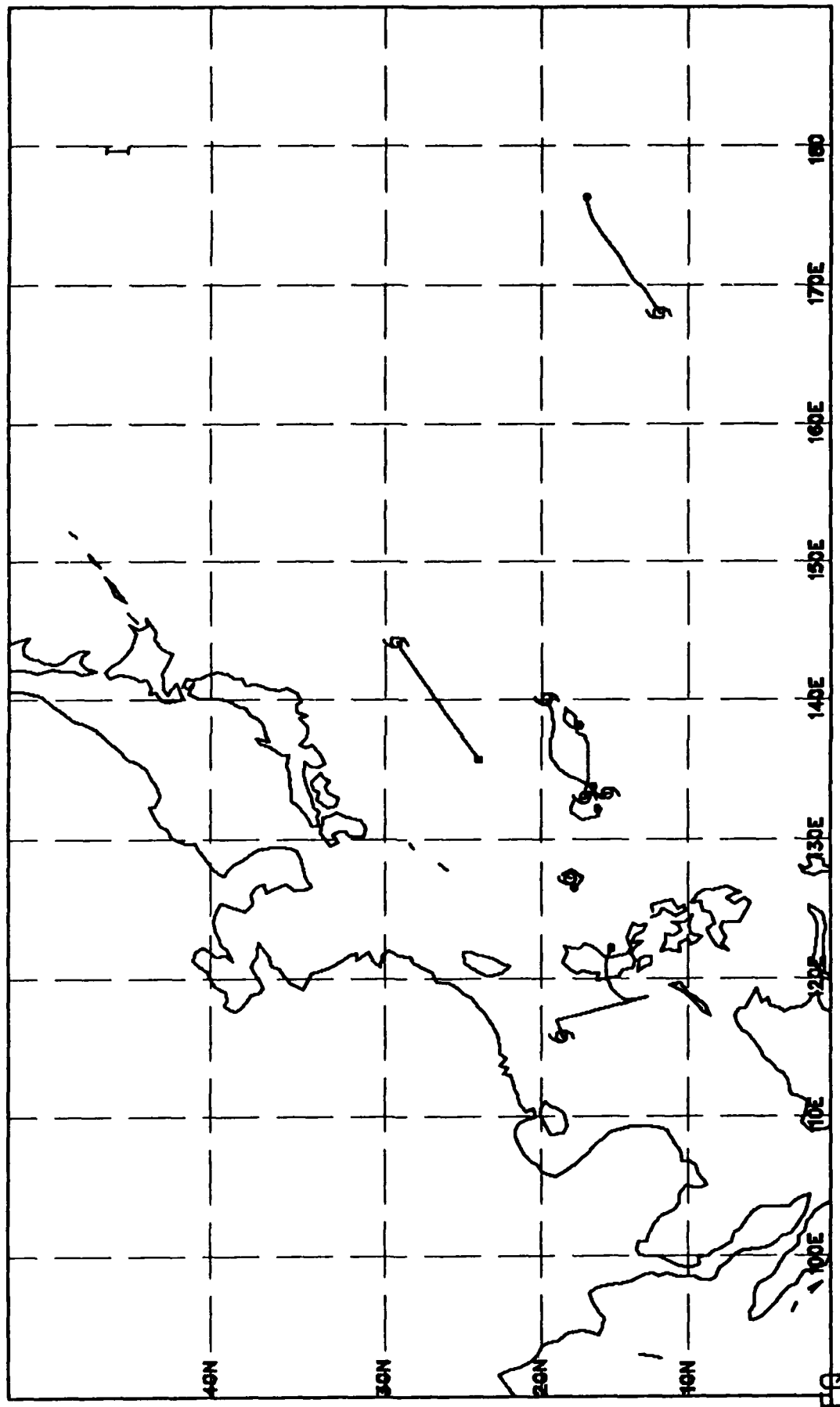
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR NOV 24 - DEC 8



Actual path of other tropical cyclones (> 33 kts) developing south of 15°N.

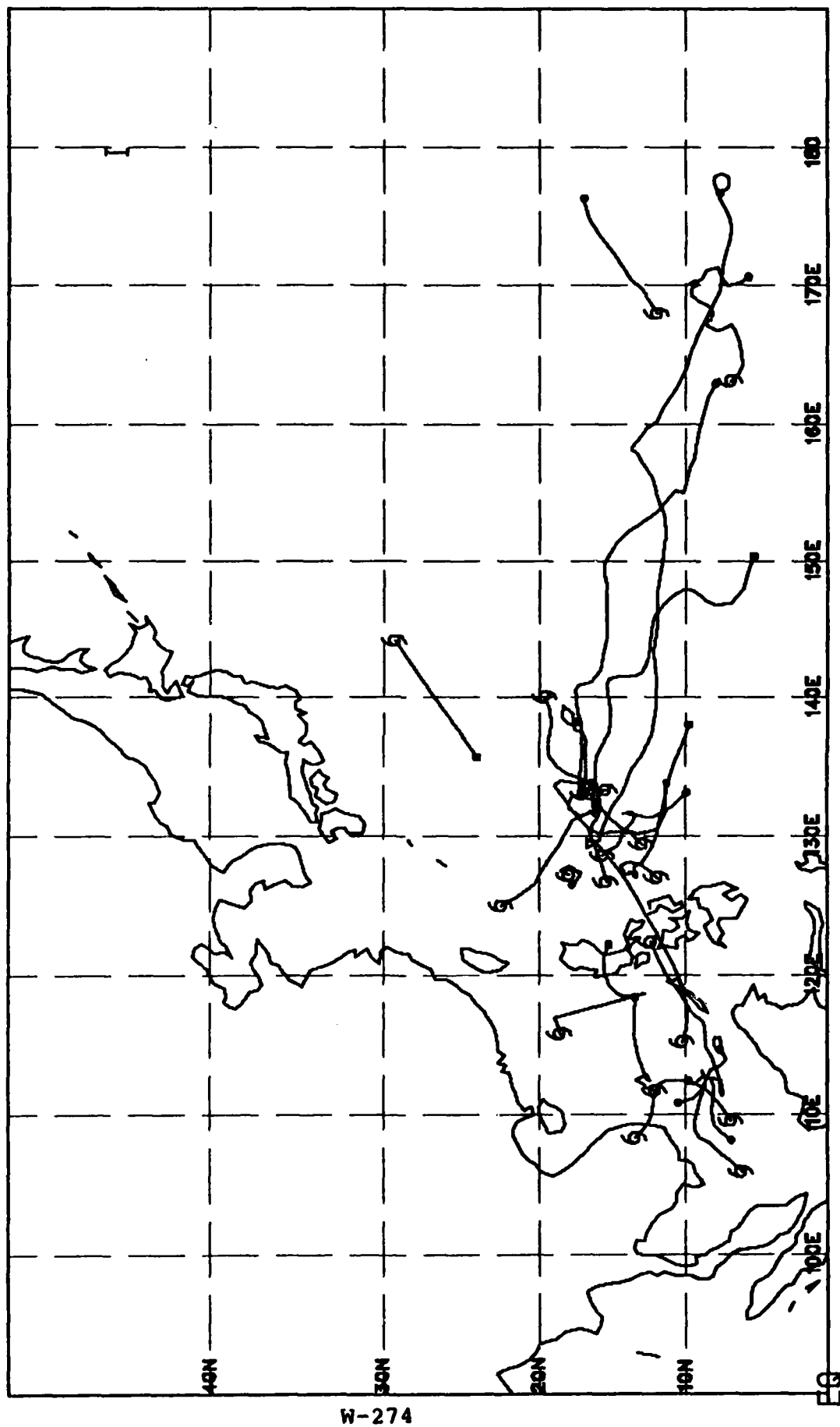
ACTUAL TRACKS FOR NOV 24 - DEC 8



W-273

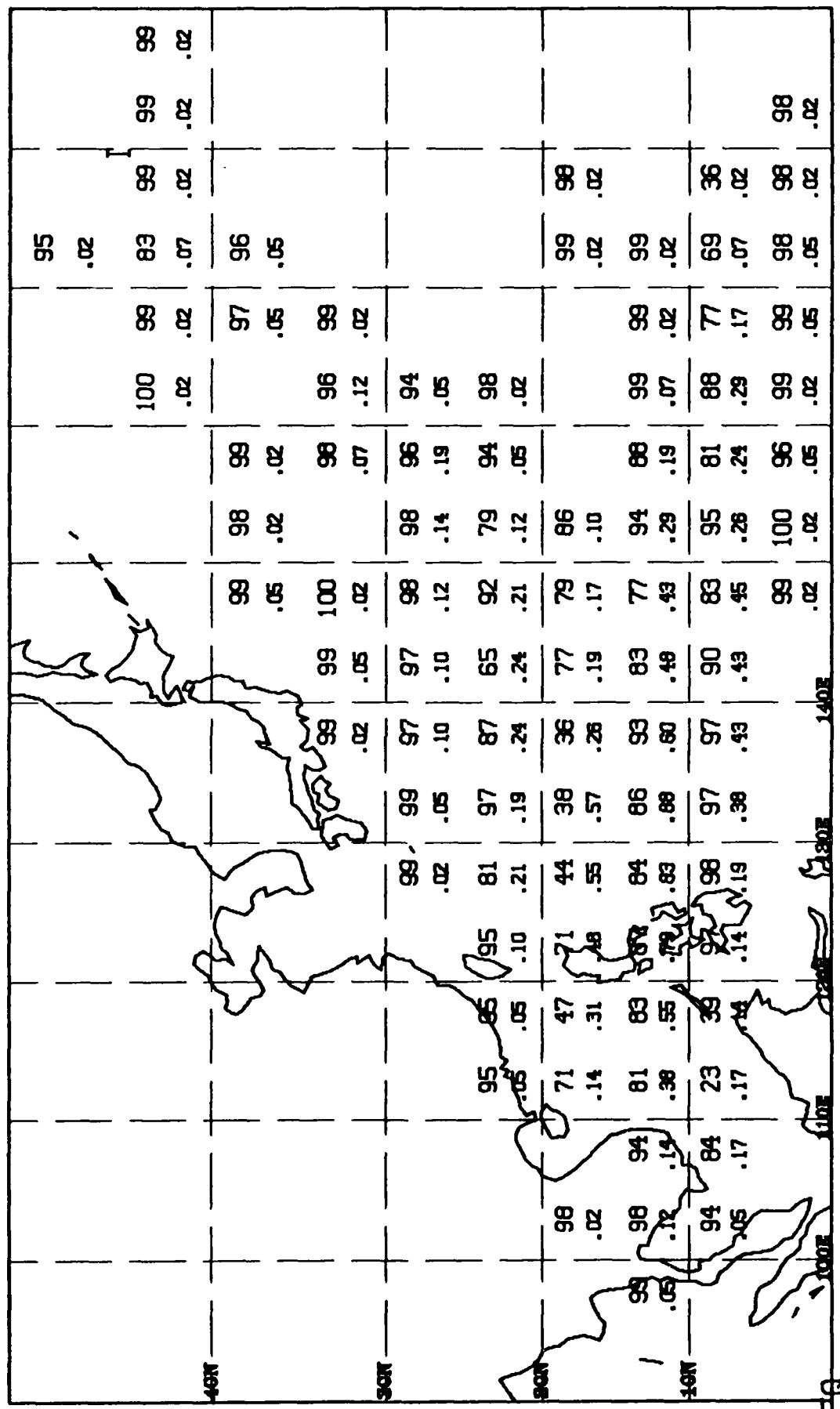
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR NOV 24 - DEC 8



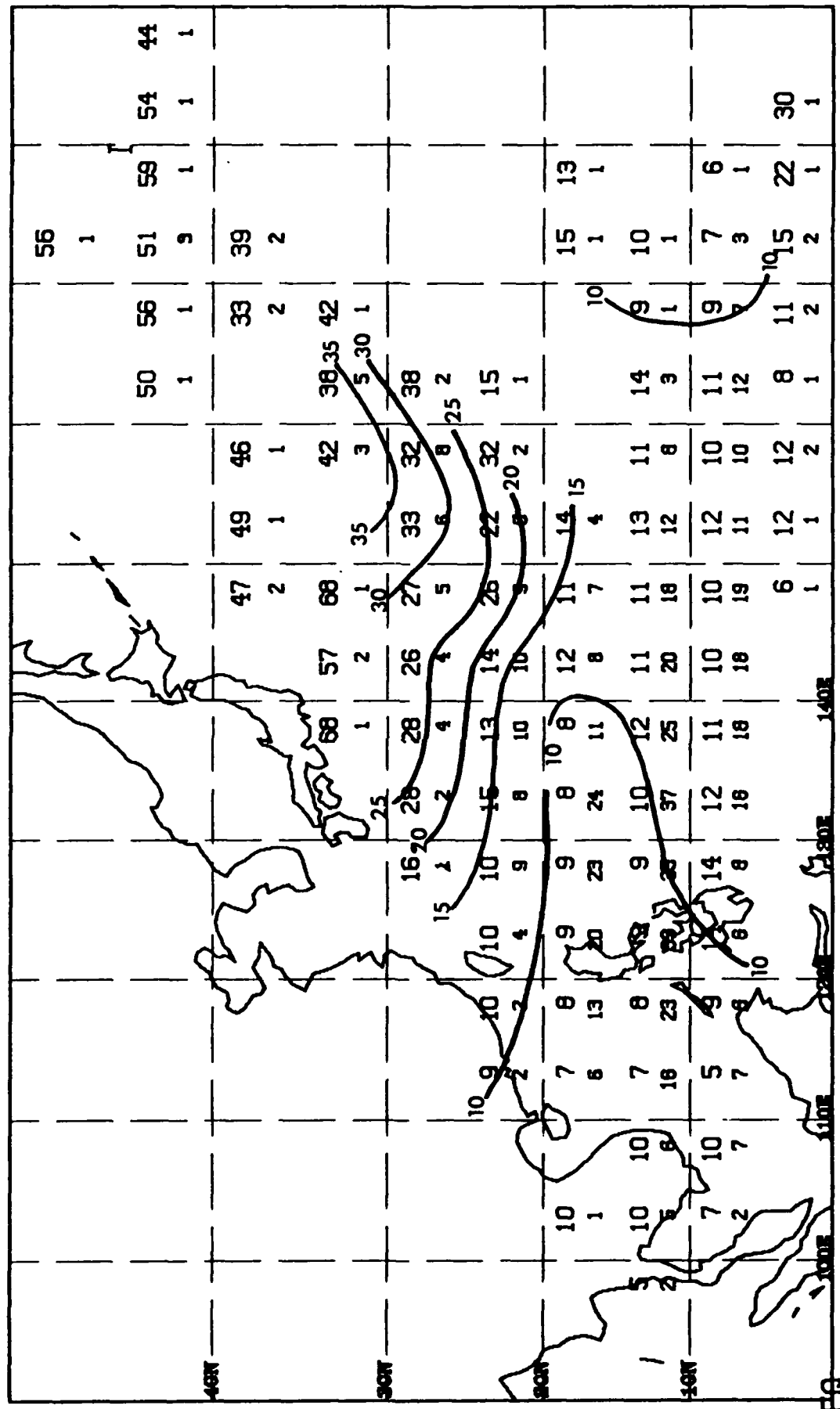
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR NOV 24 - DEC 8



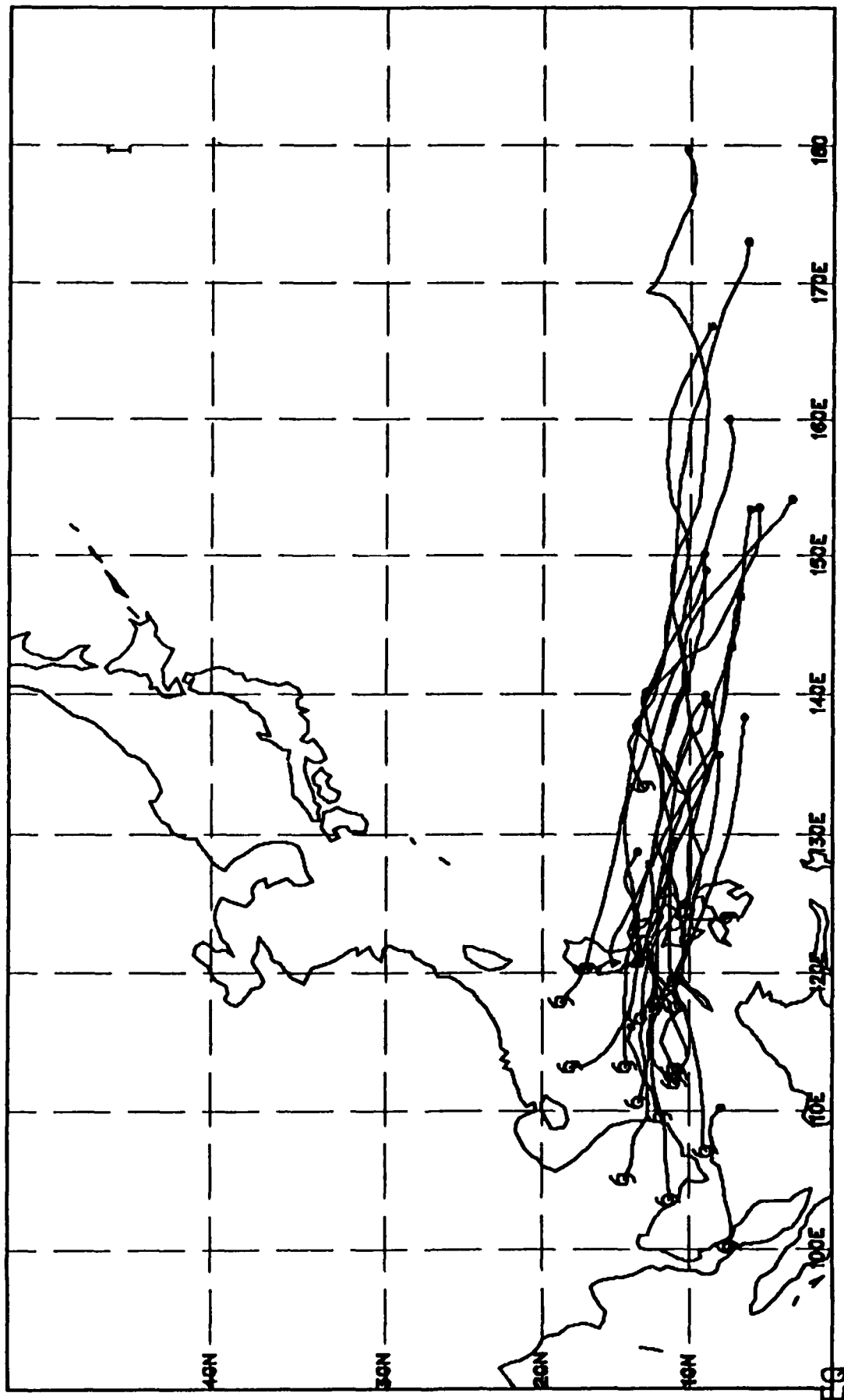
Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number).
 Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed.
 Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year per time period.

SPEED OF MOVEMENT FOR NOV 24 - DEC 8



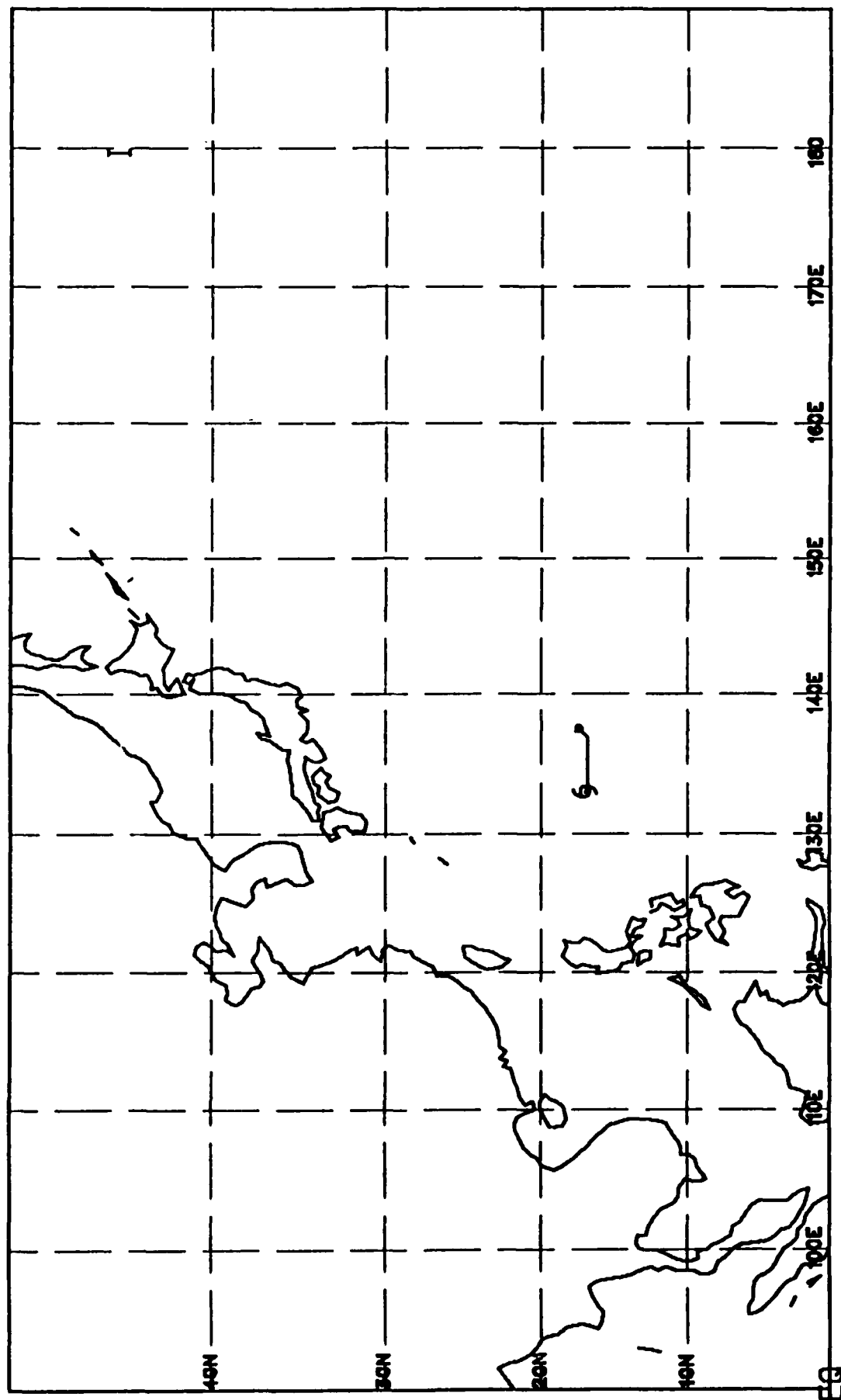
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

ACTUAL TRACKS FOR DEC 9 - DEC 23



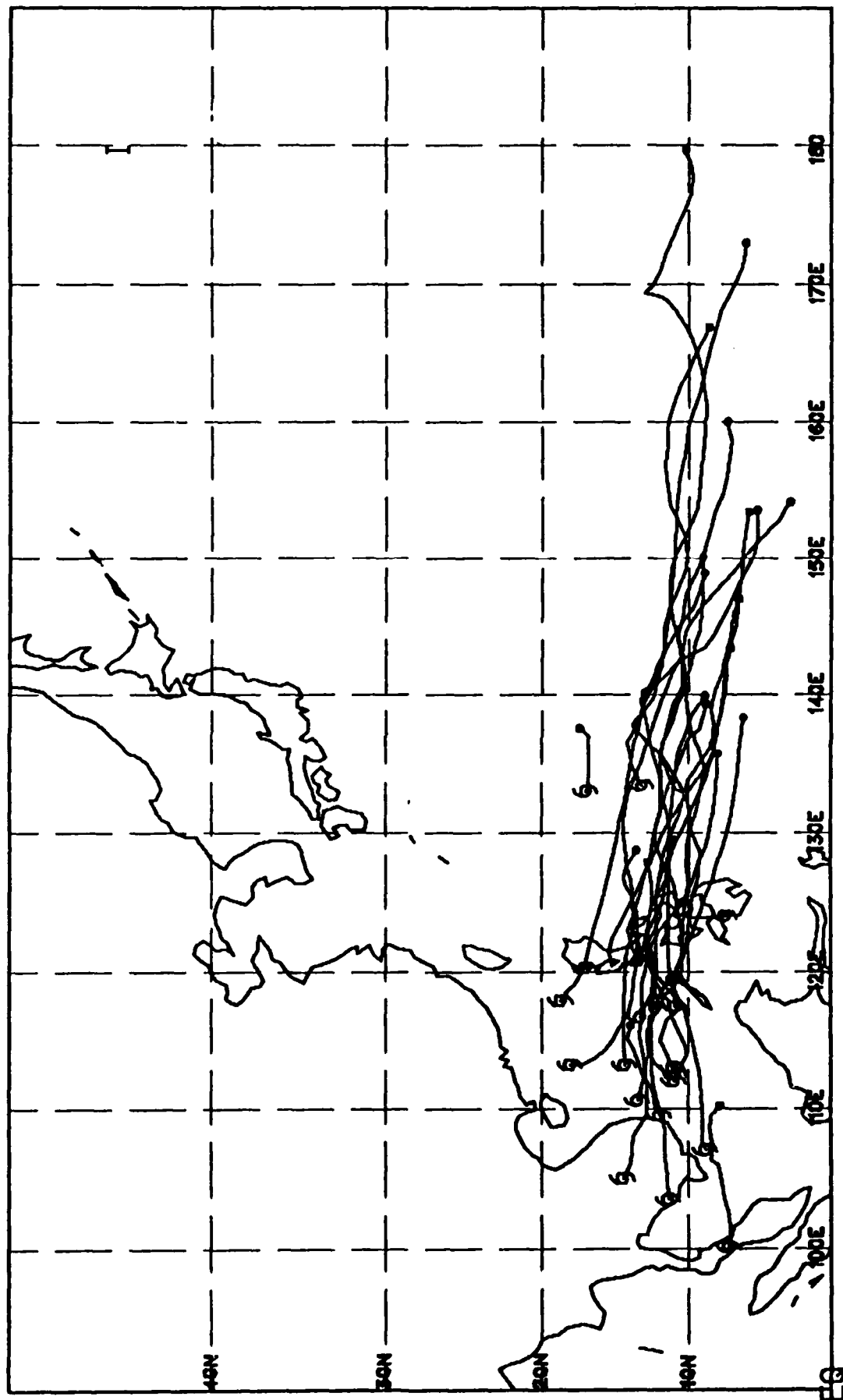
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR DEC 9 - DEC 23



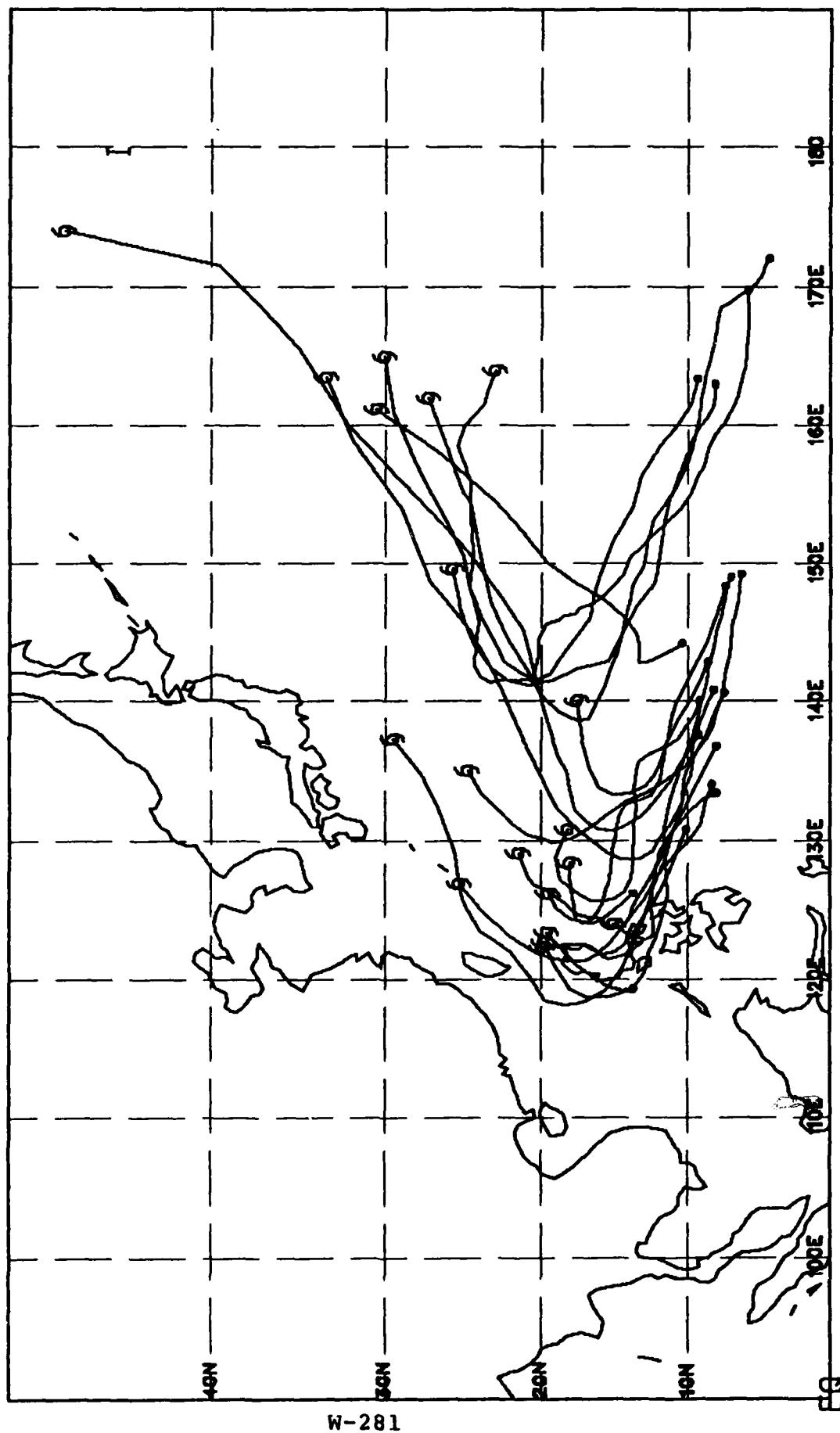
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR DEC 9 - DEC 23



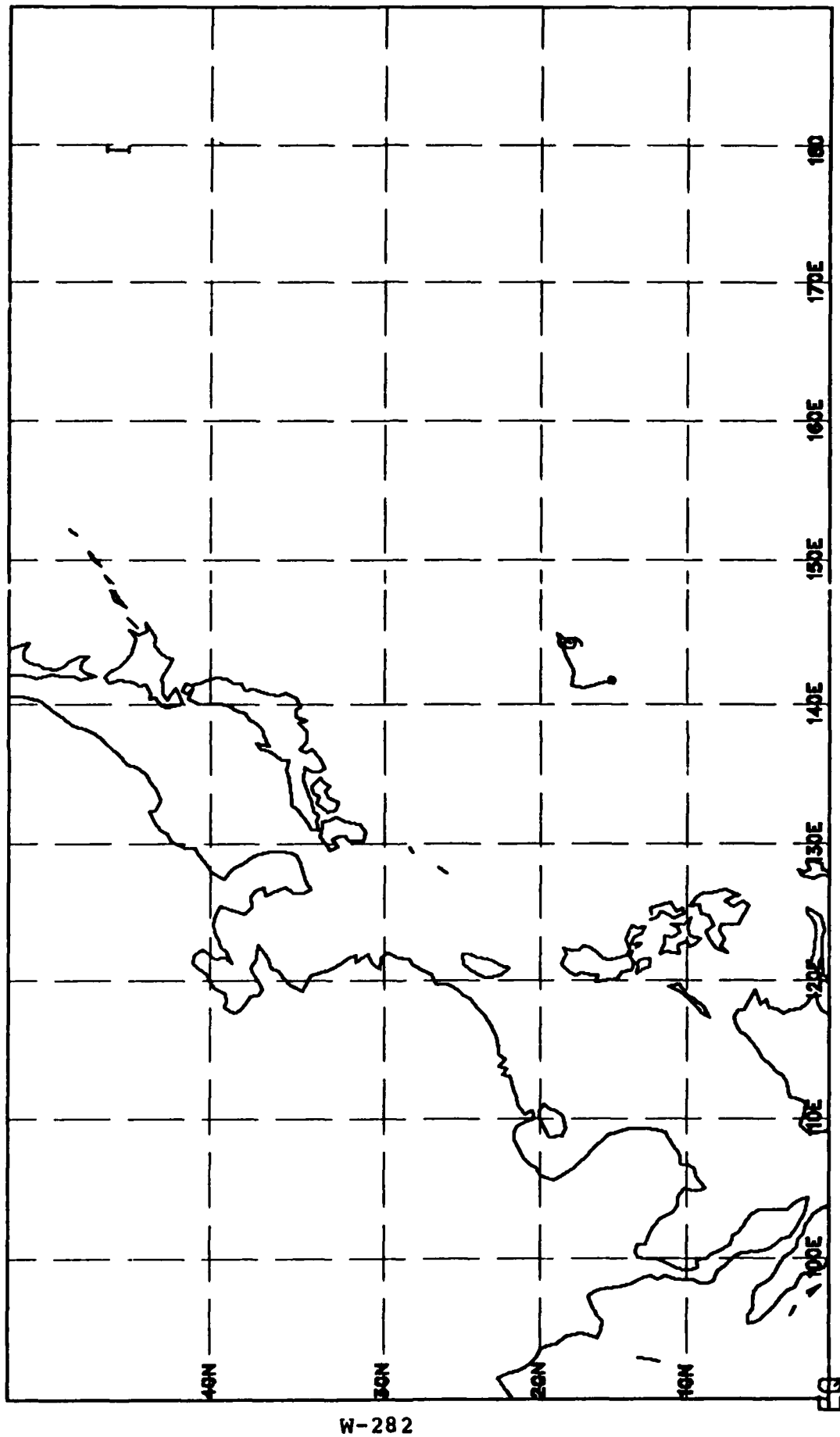
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR DEC 9 - DEC 23



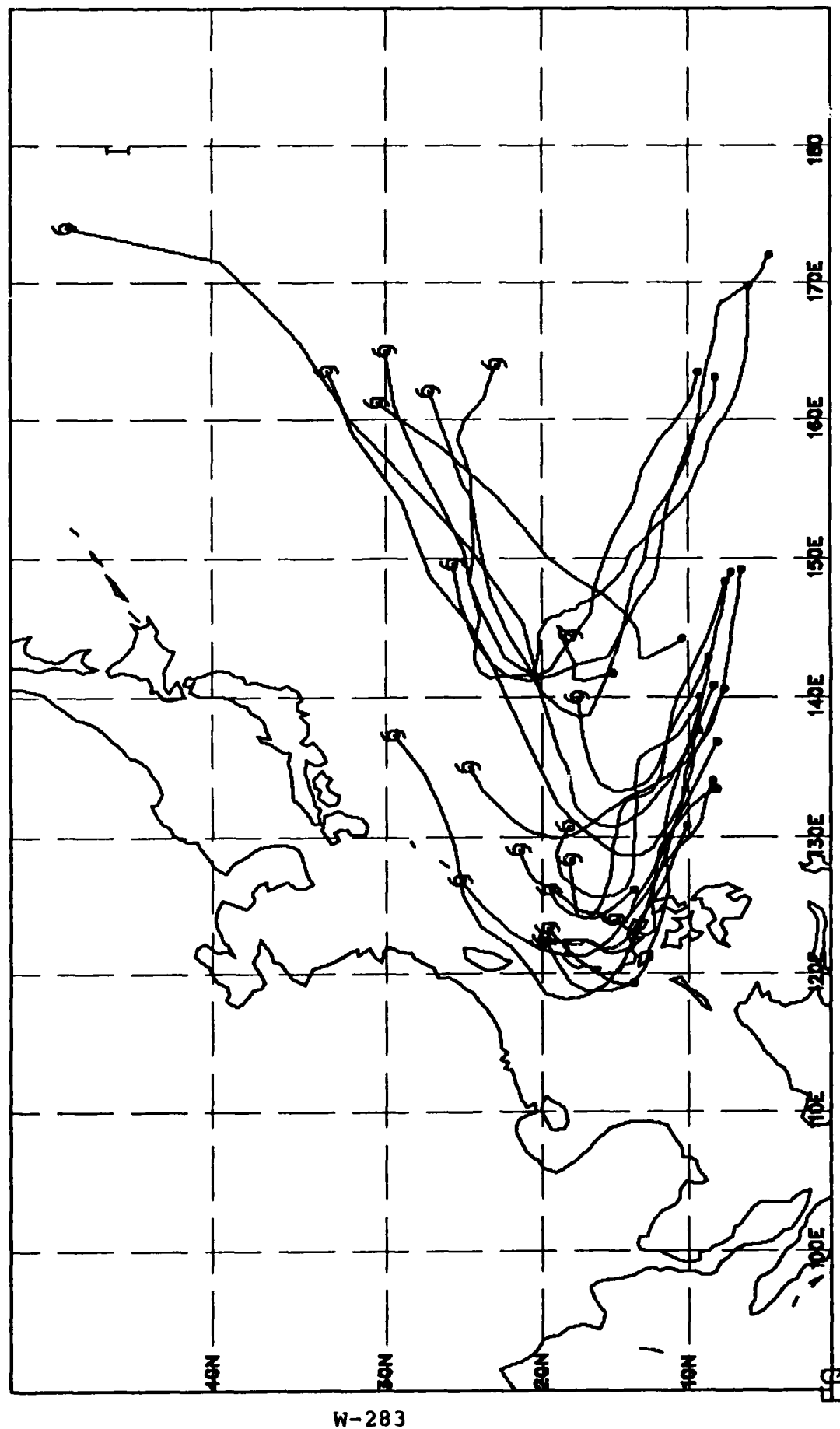
Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR DEC 9 - DEC 23



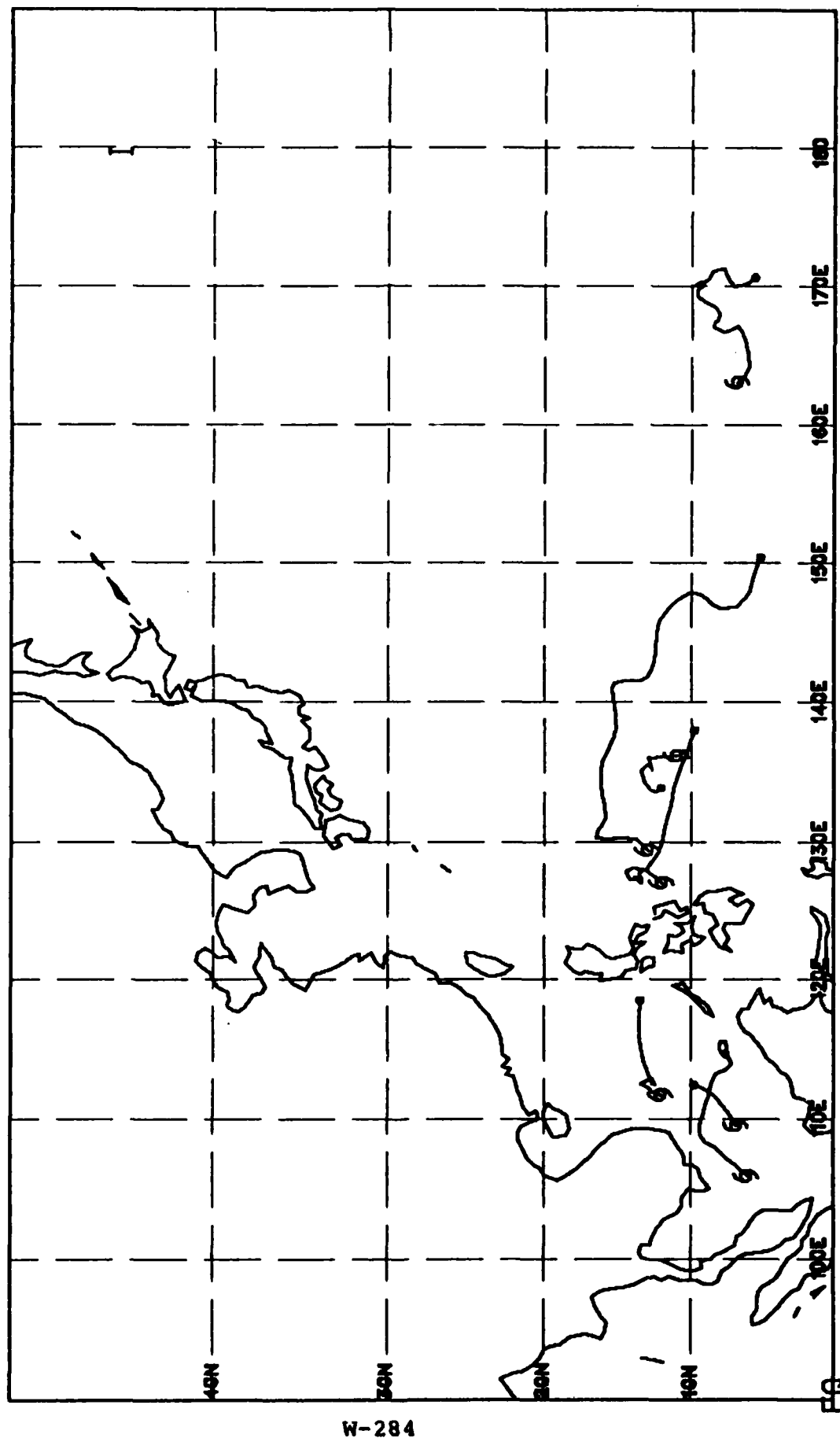
Actual path of recurving tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR DEC 9 - DEC 23



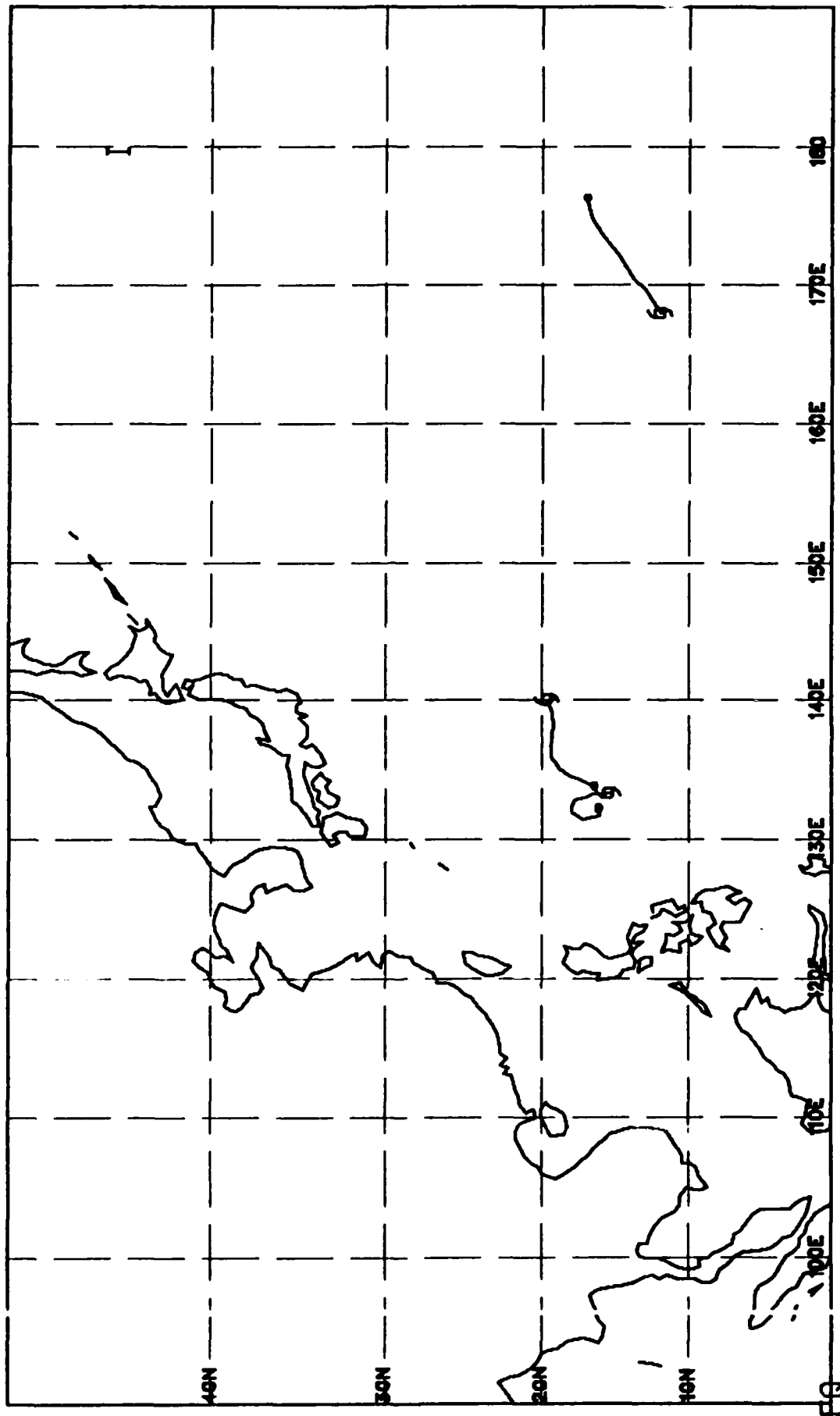
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR DEC 9 - DEC 23



Actual path of other tropical cyclones (> 33 kts) developing south of 15°N.

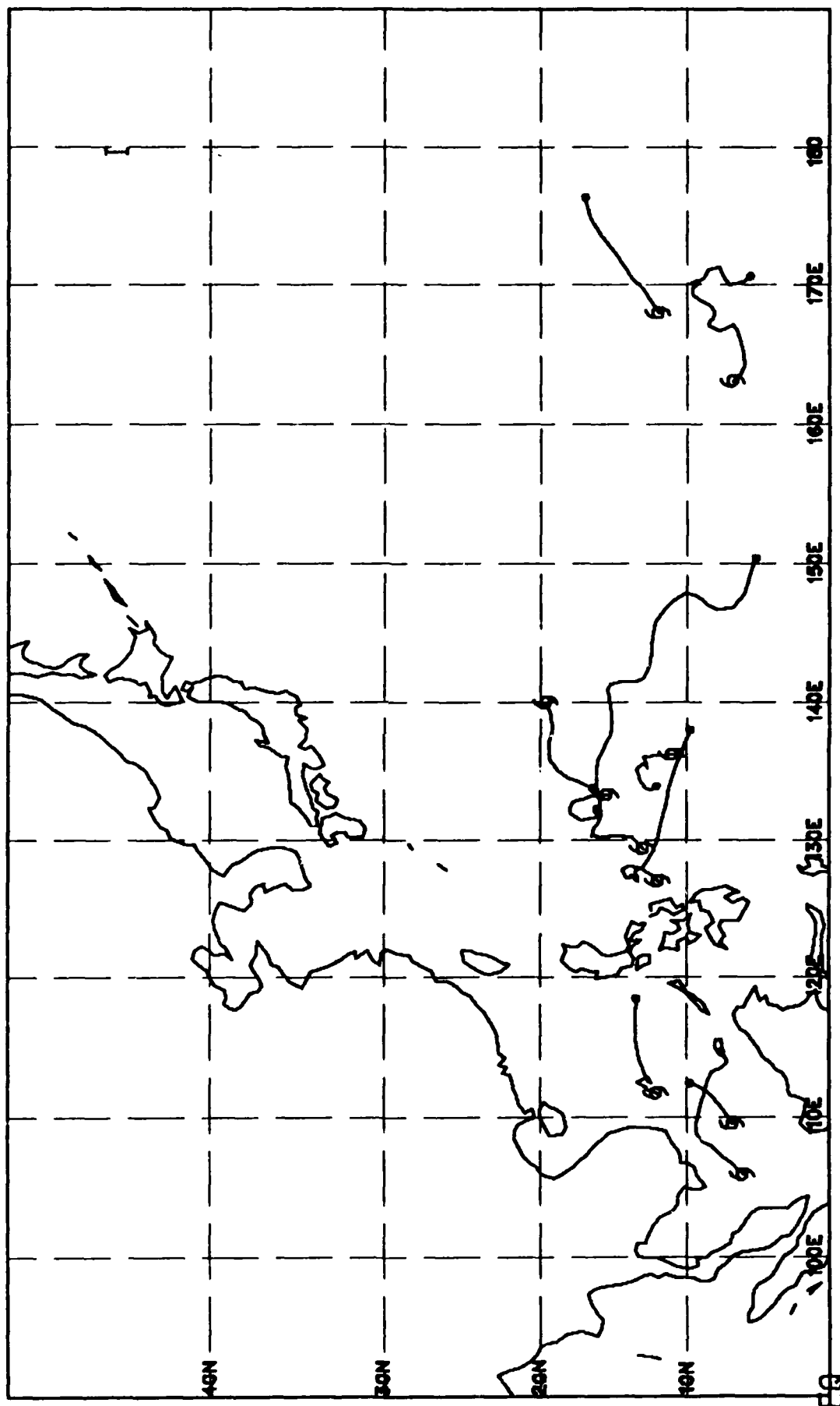
ACTUAL TRACKS FOR DEC 9 - DEC 23



W-285

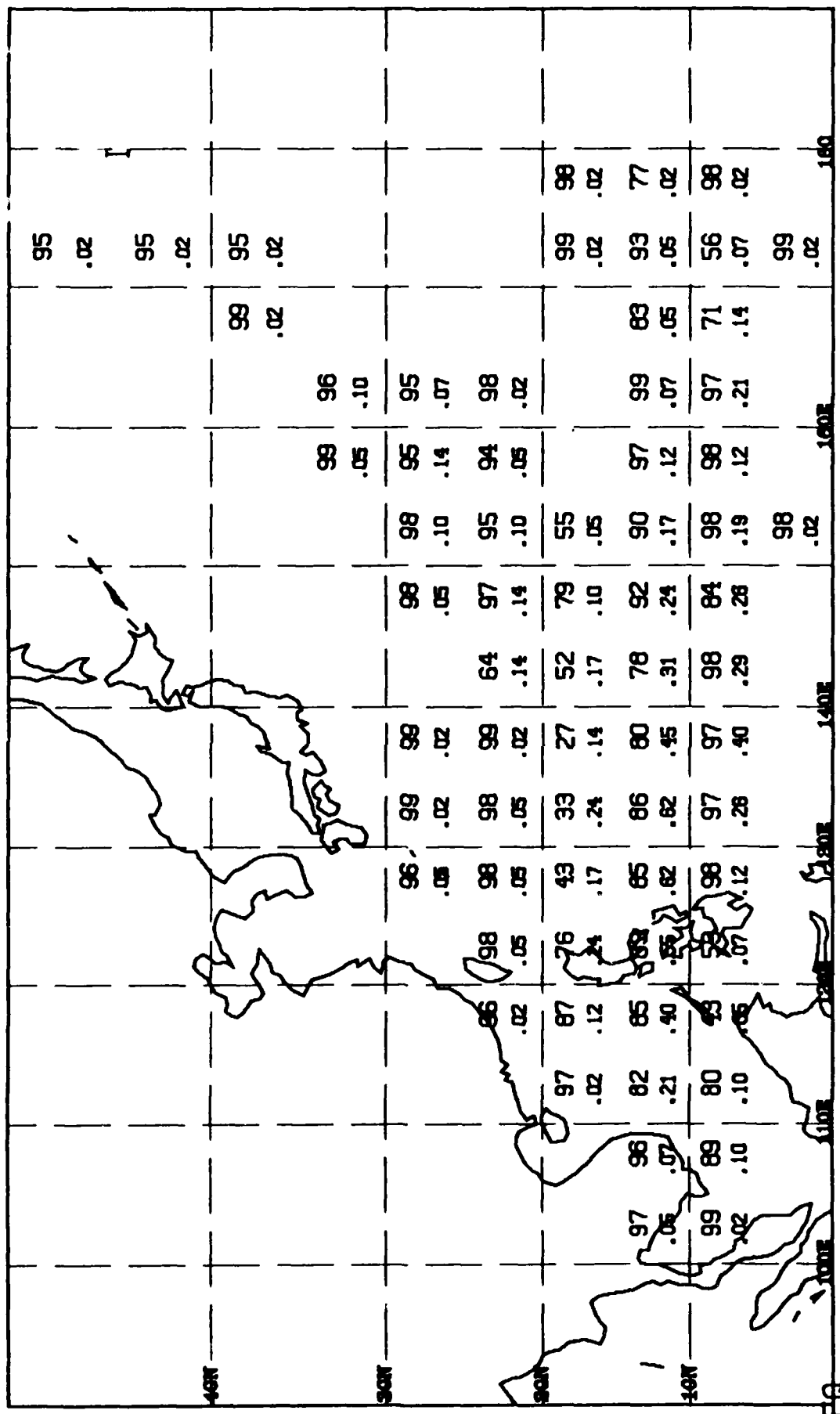
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR DEC 9 - DEC 23



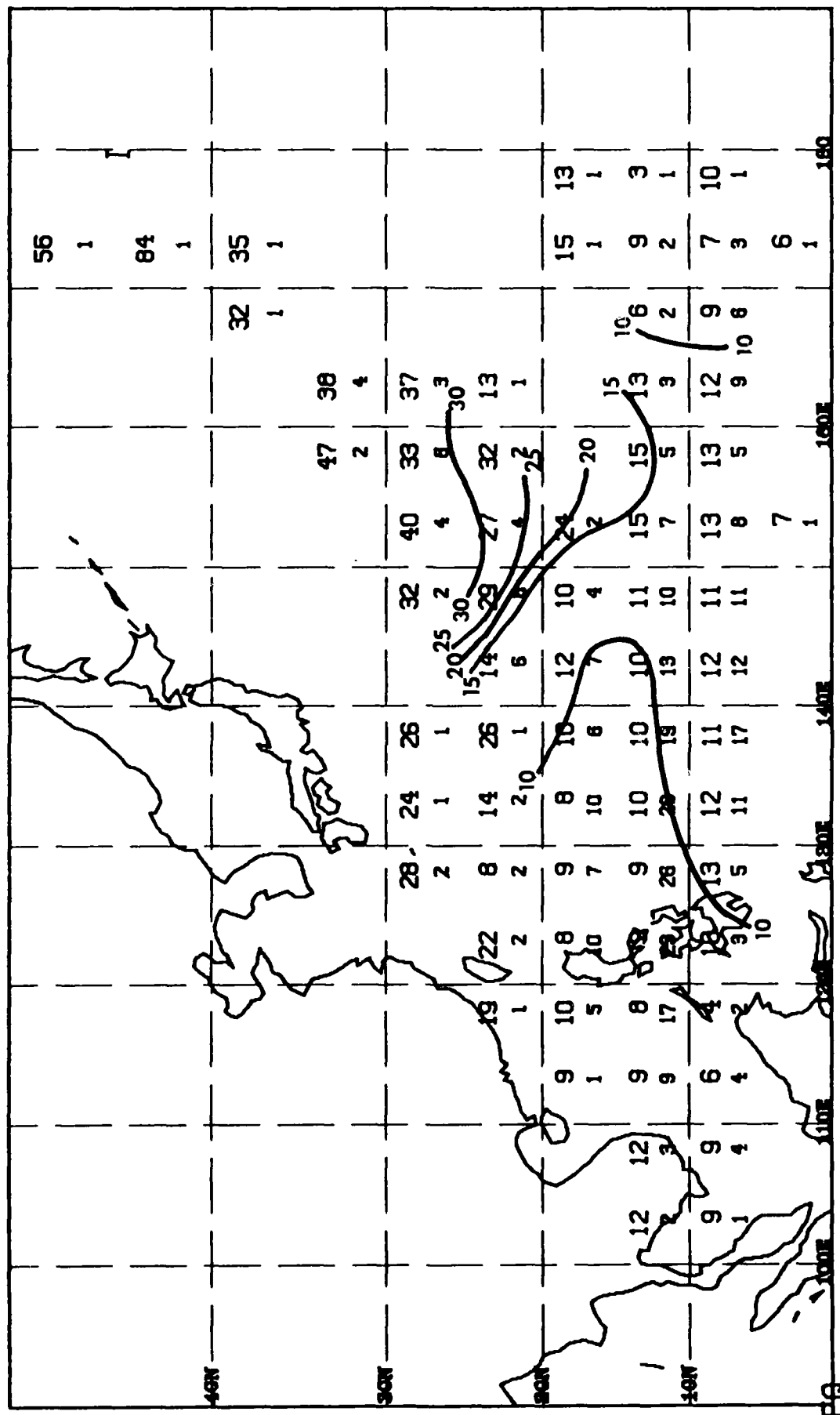
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR DEC 9 - DEC 23



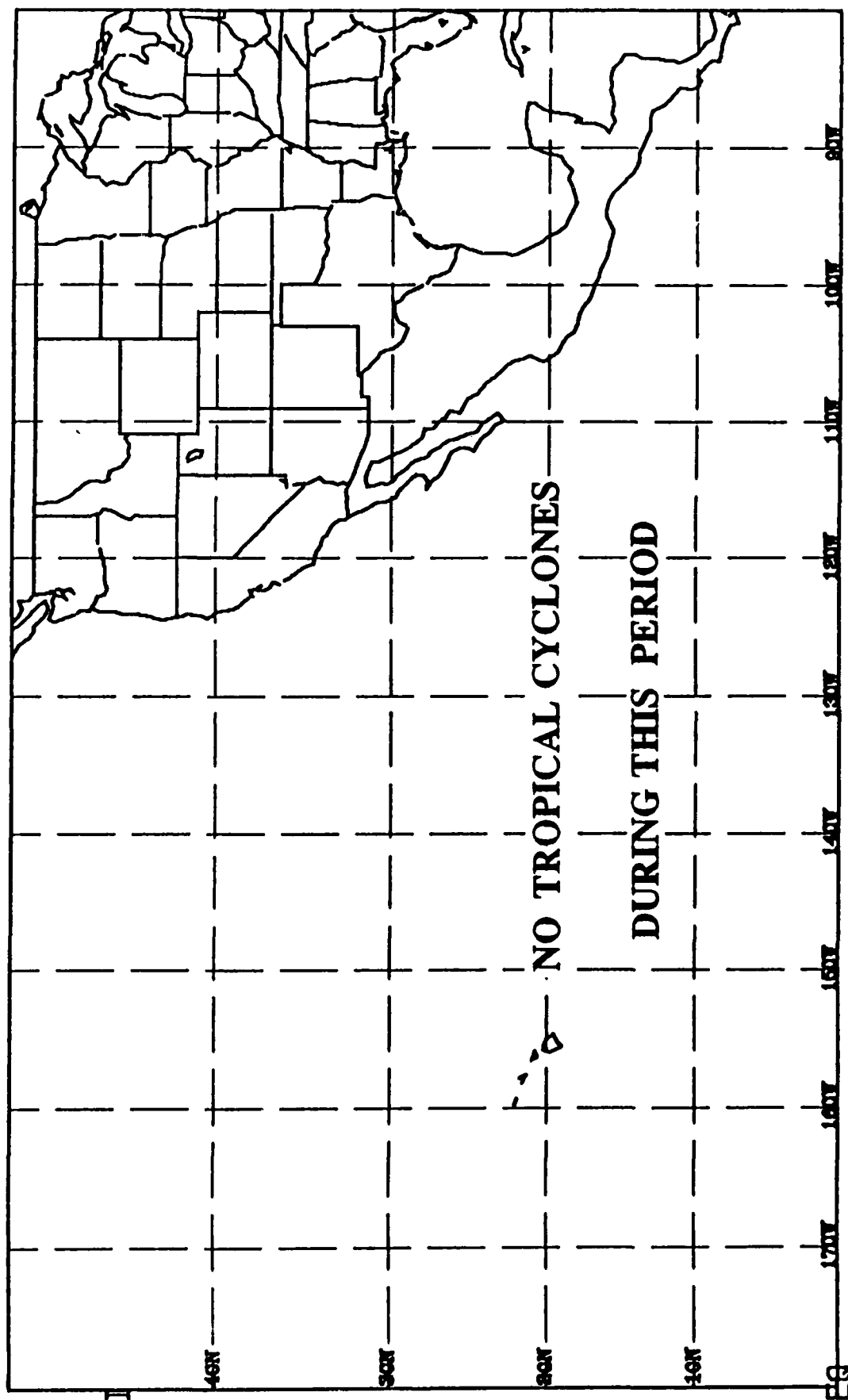
Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number).
 Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed.
 Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year per time period.

SPEED OF MOVEMENT FOR DEC 9 - DEC 23

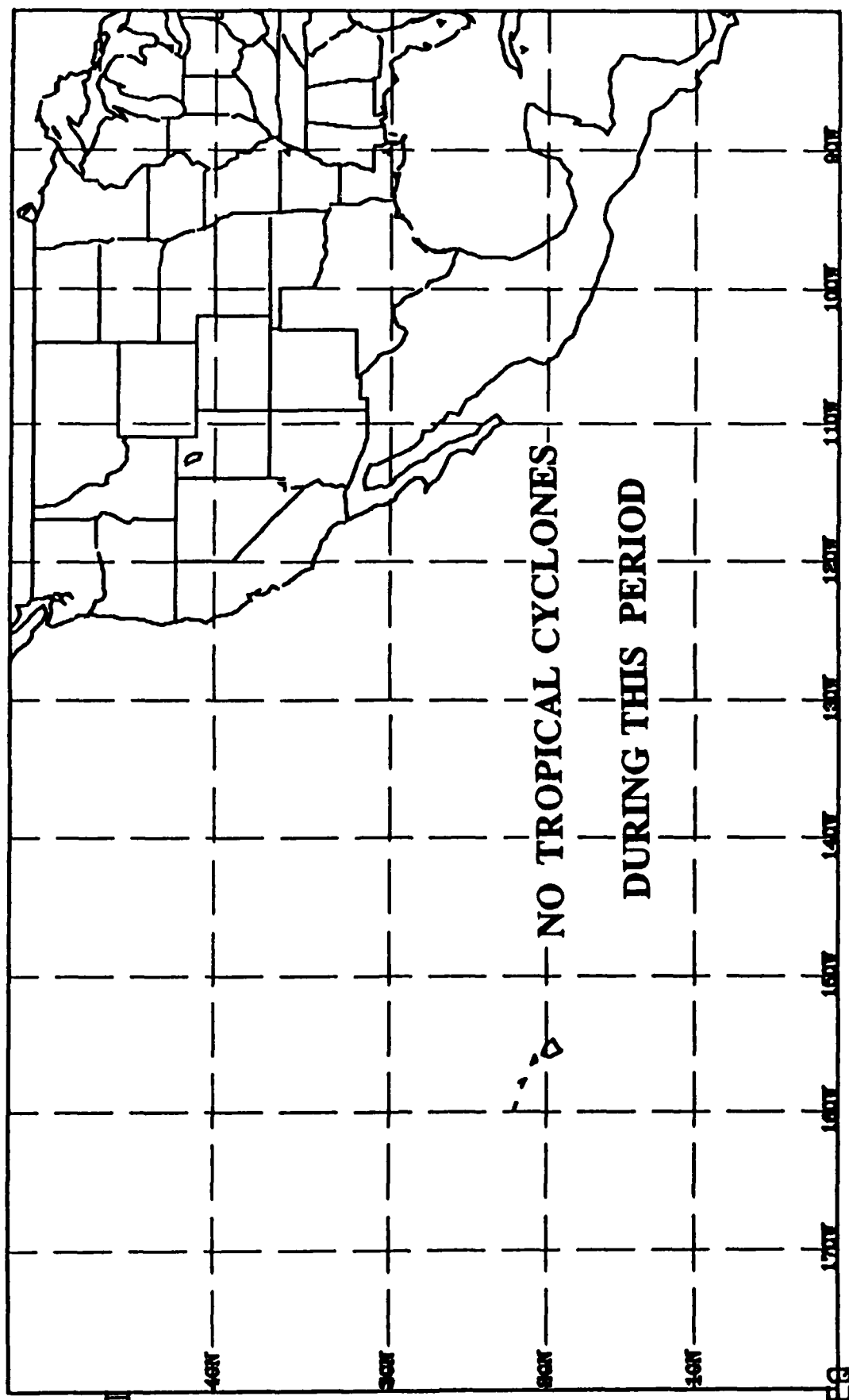


Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

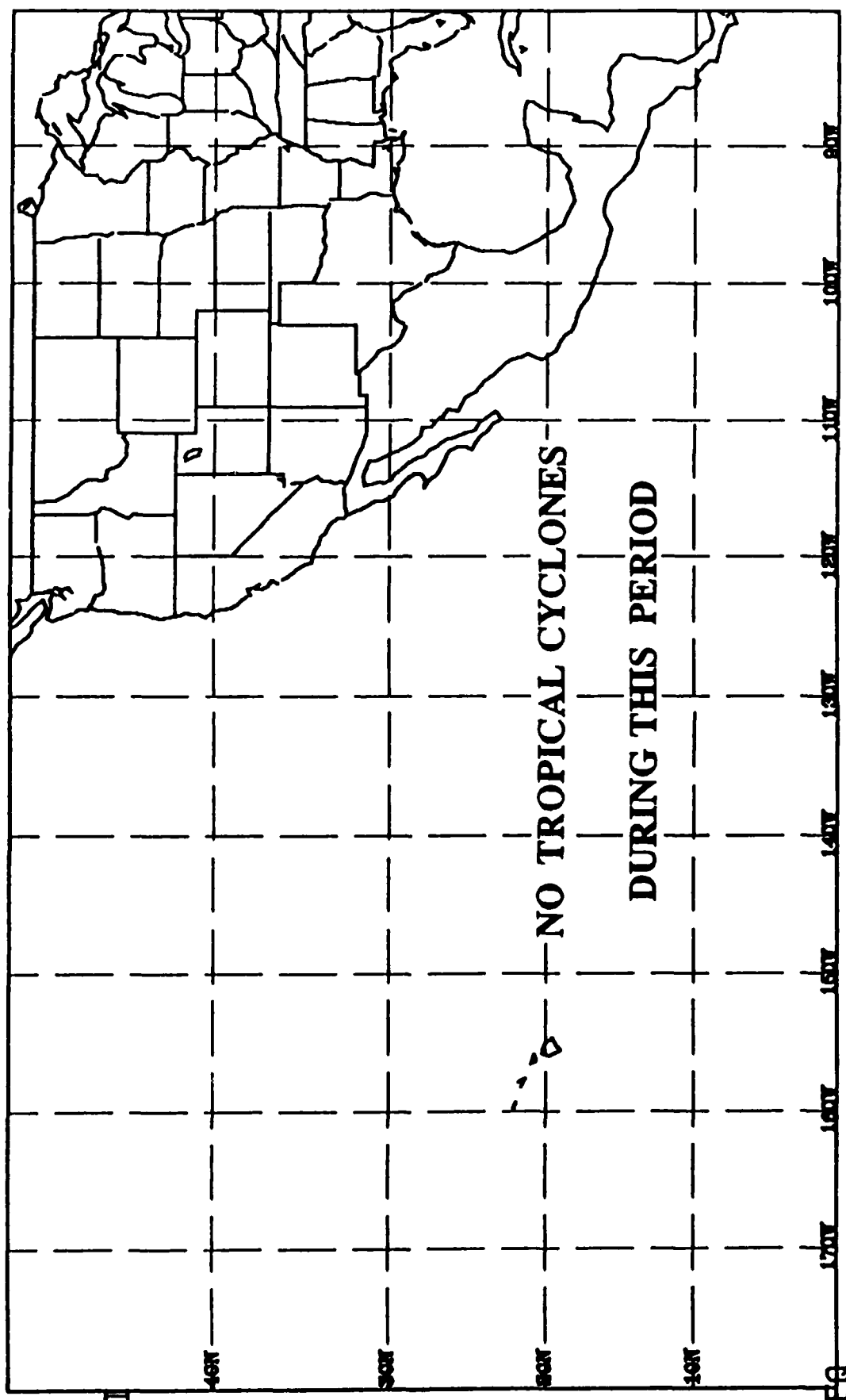
DEC 24 - JAN 8



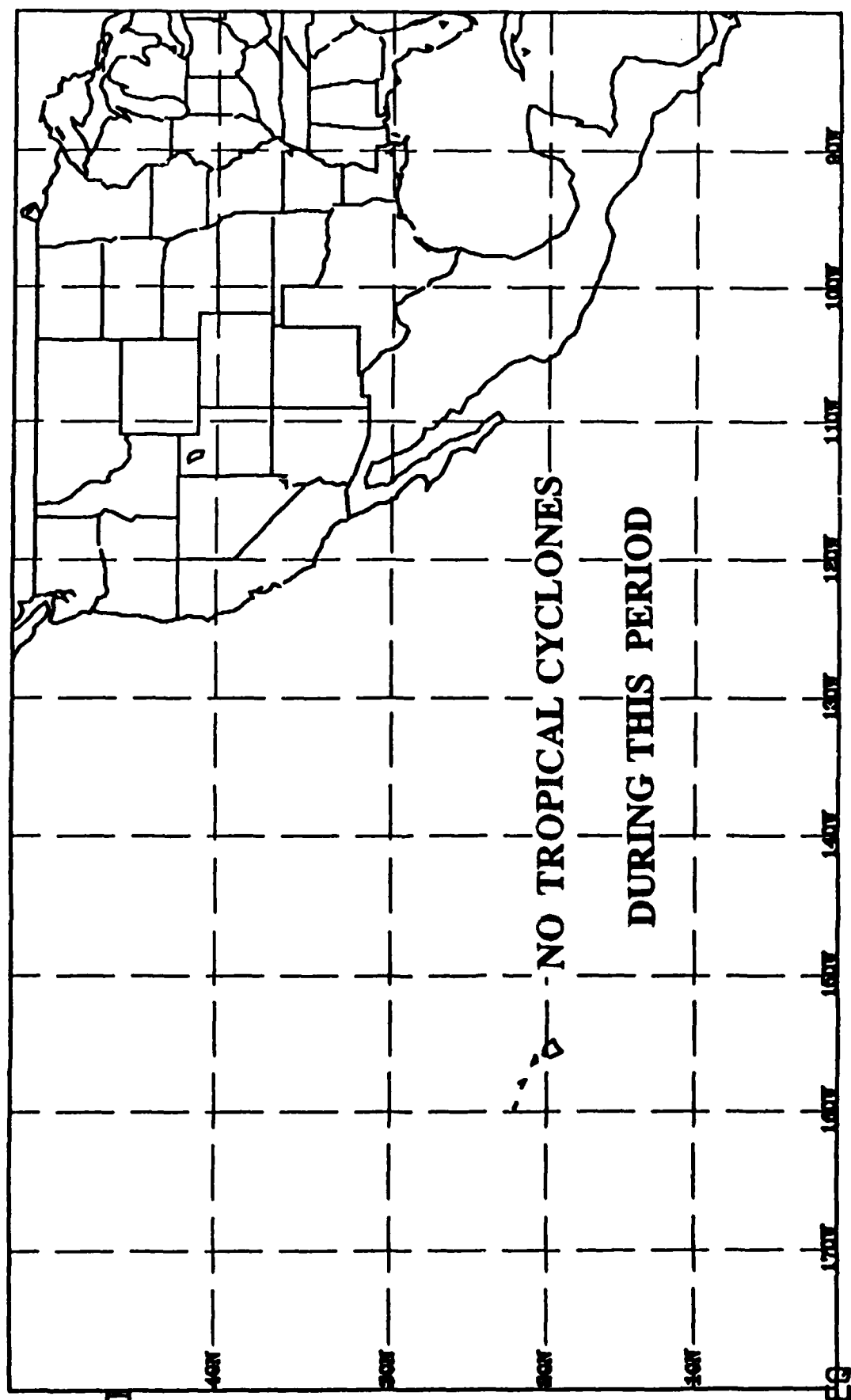
JAN 9 - JAN 23



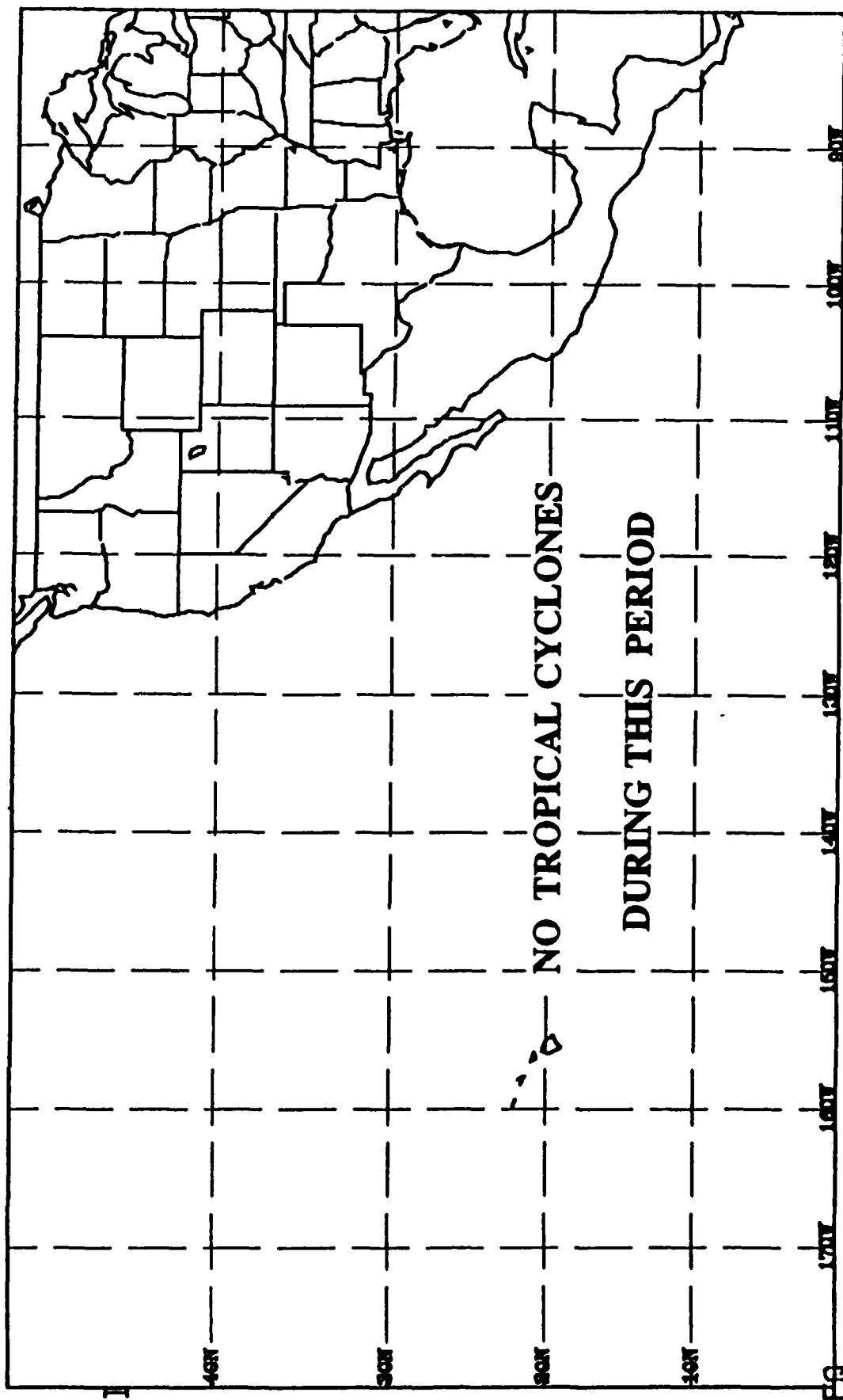
JAN 24 - FEB 8



FEB 9 - FEB 23

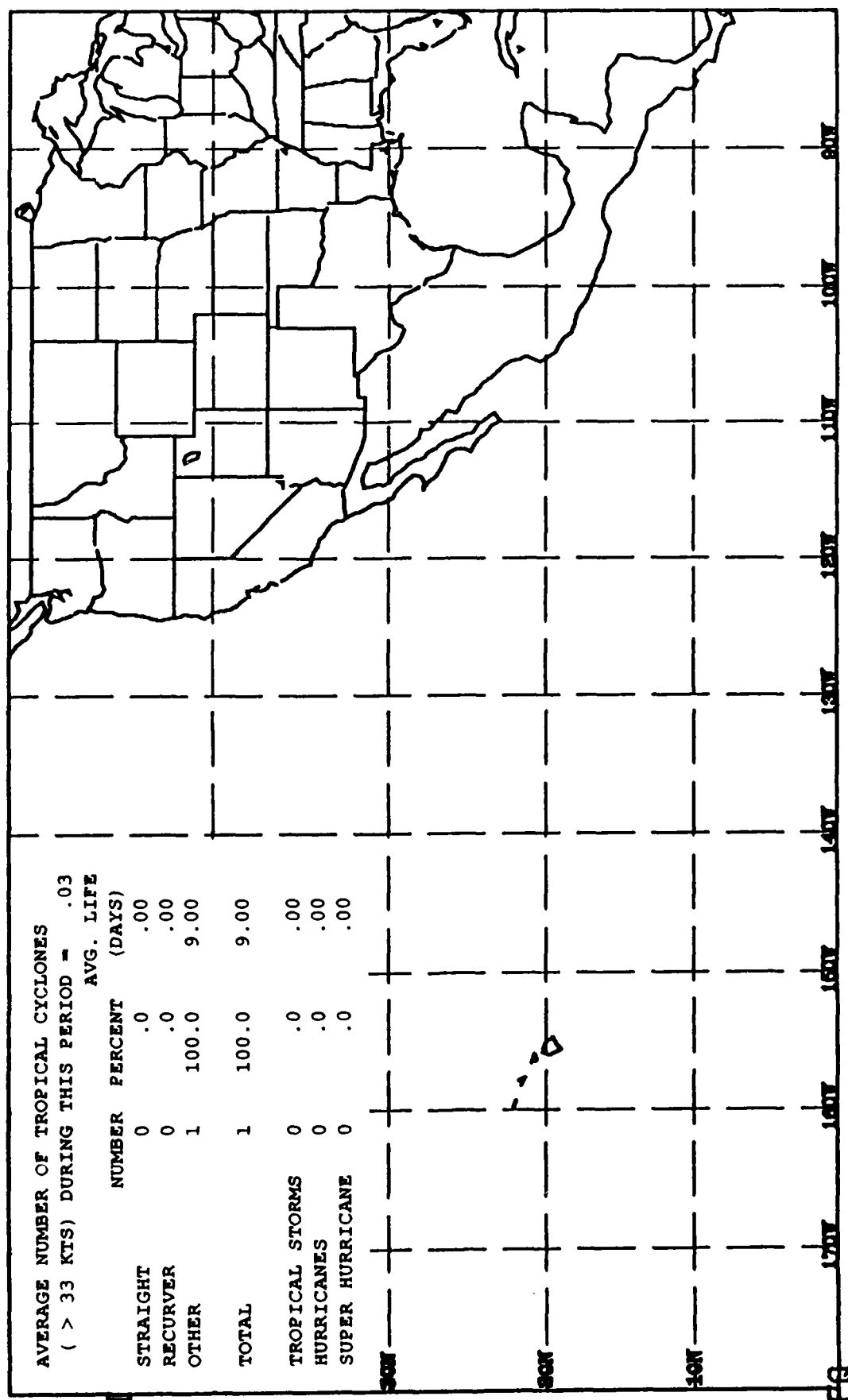


FEB 24 - MAR 8



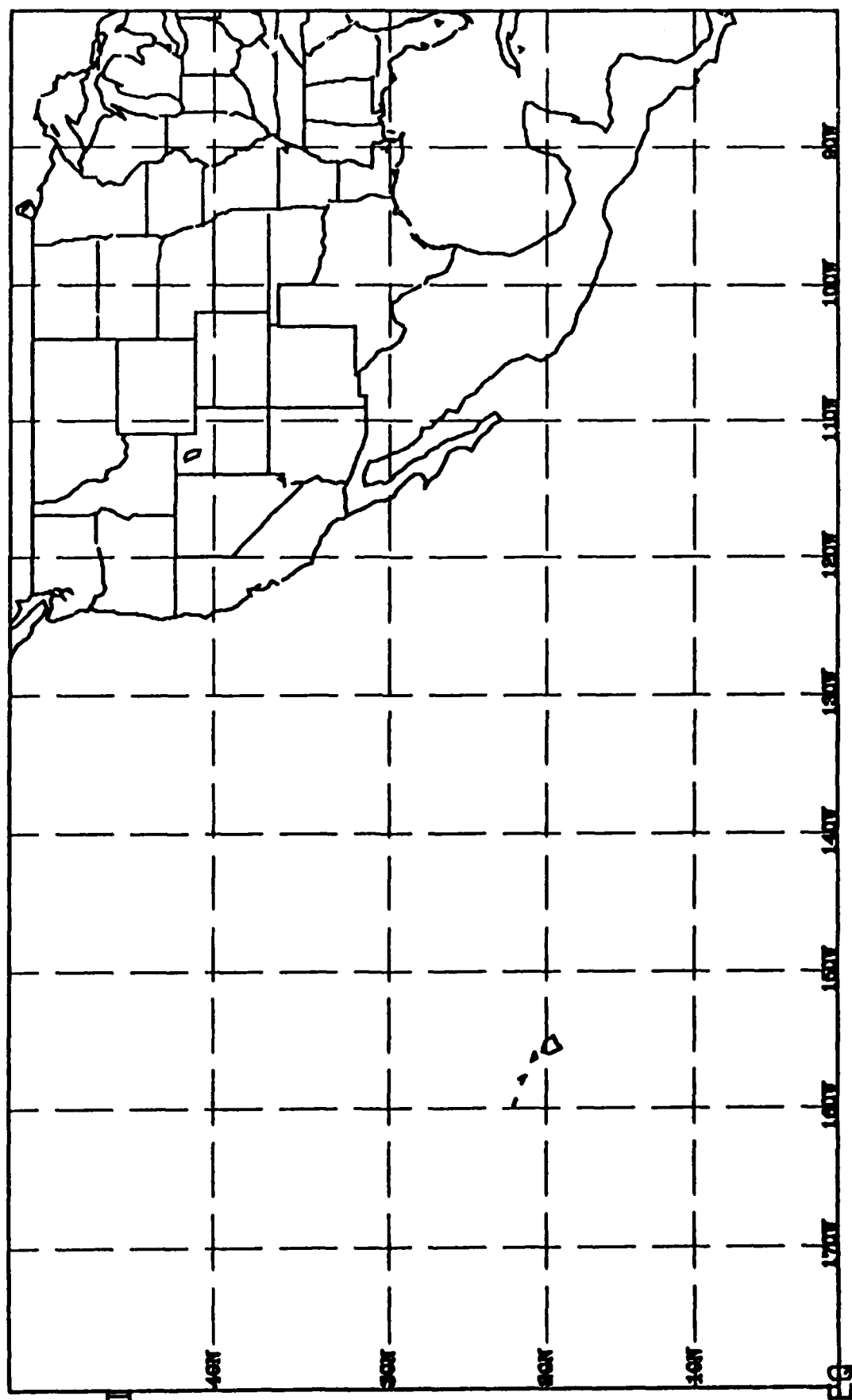
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MEAN PATHS FOR MAR 9 - MAR 23



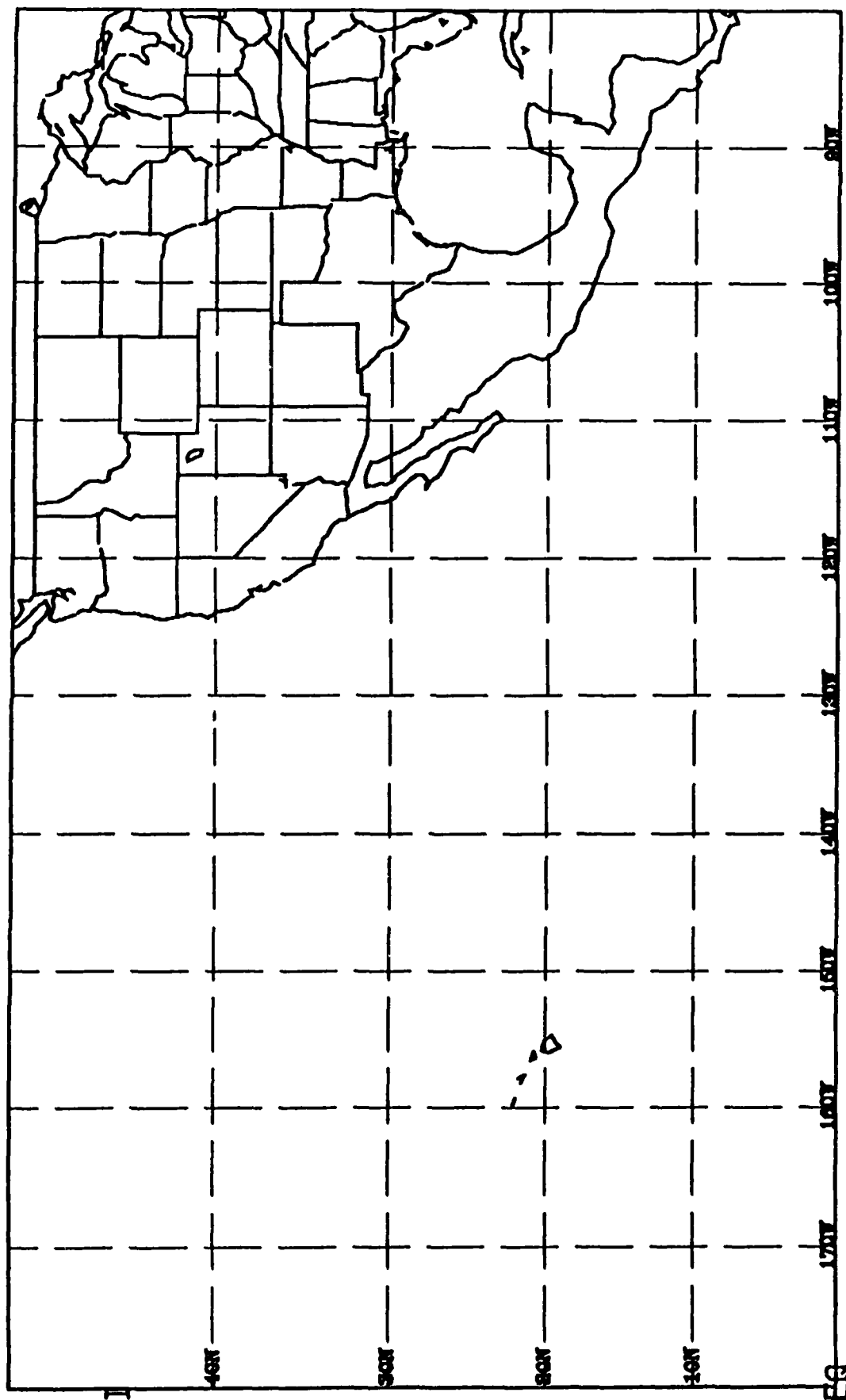
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored.

ACTUAL TRACKS FOR MAR 9 - MAR 23



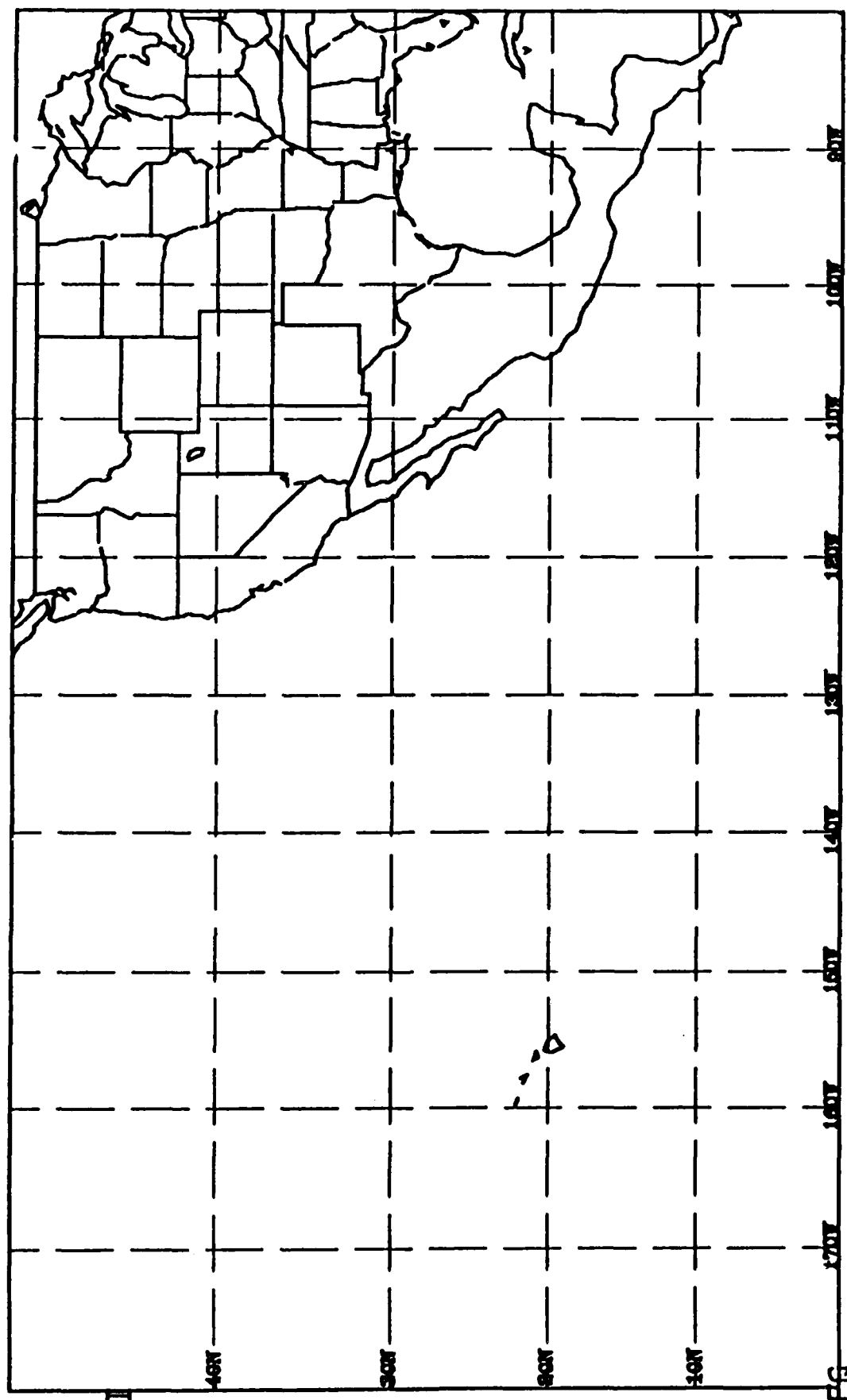
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR MAR 9 - MAR 23



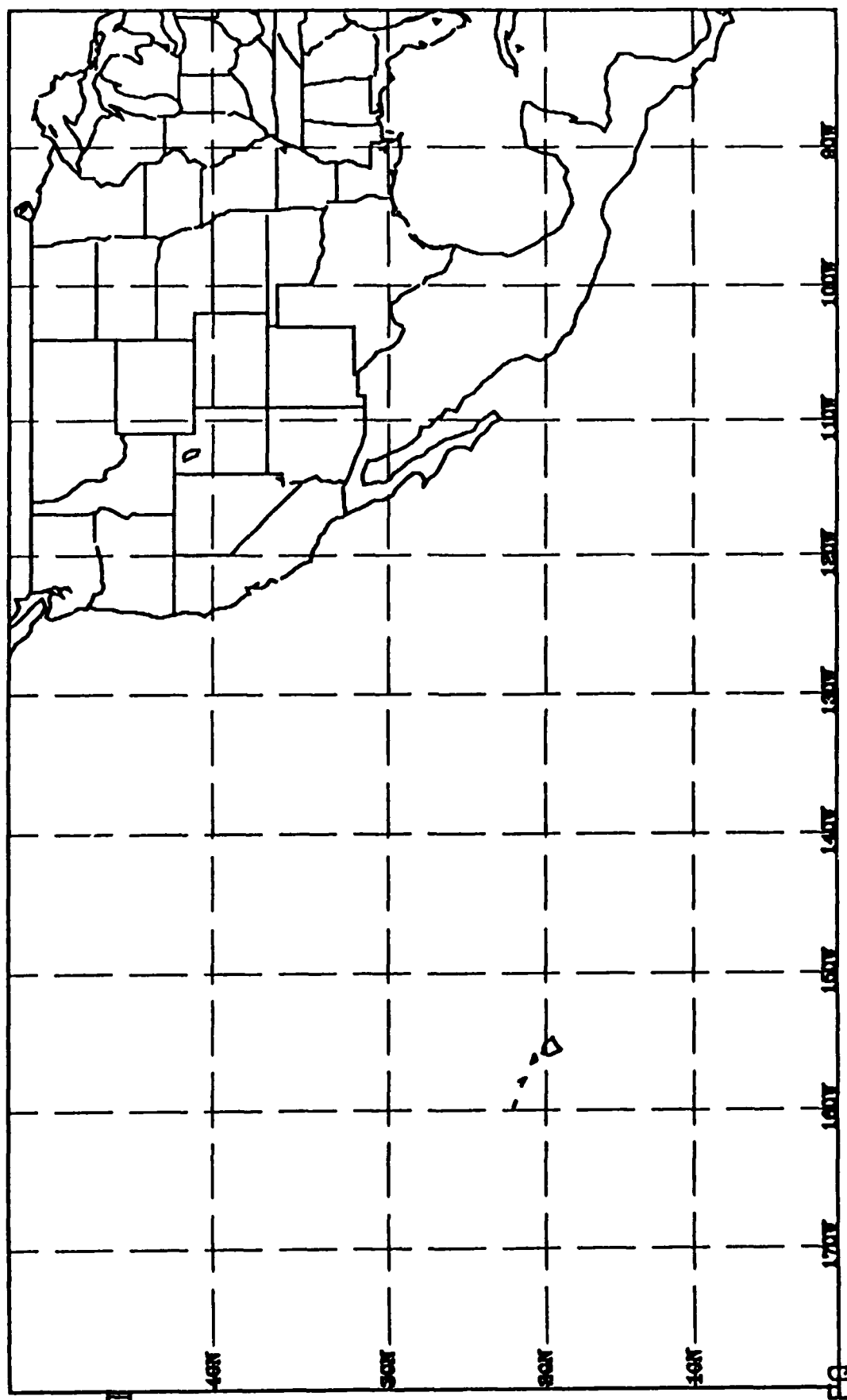
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR MAR 9 - MAR 23



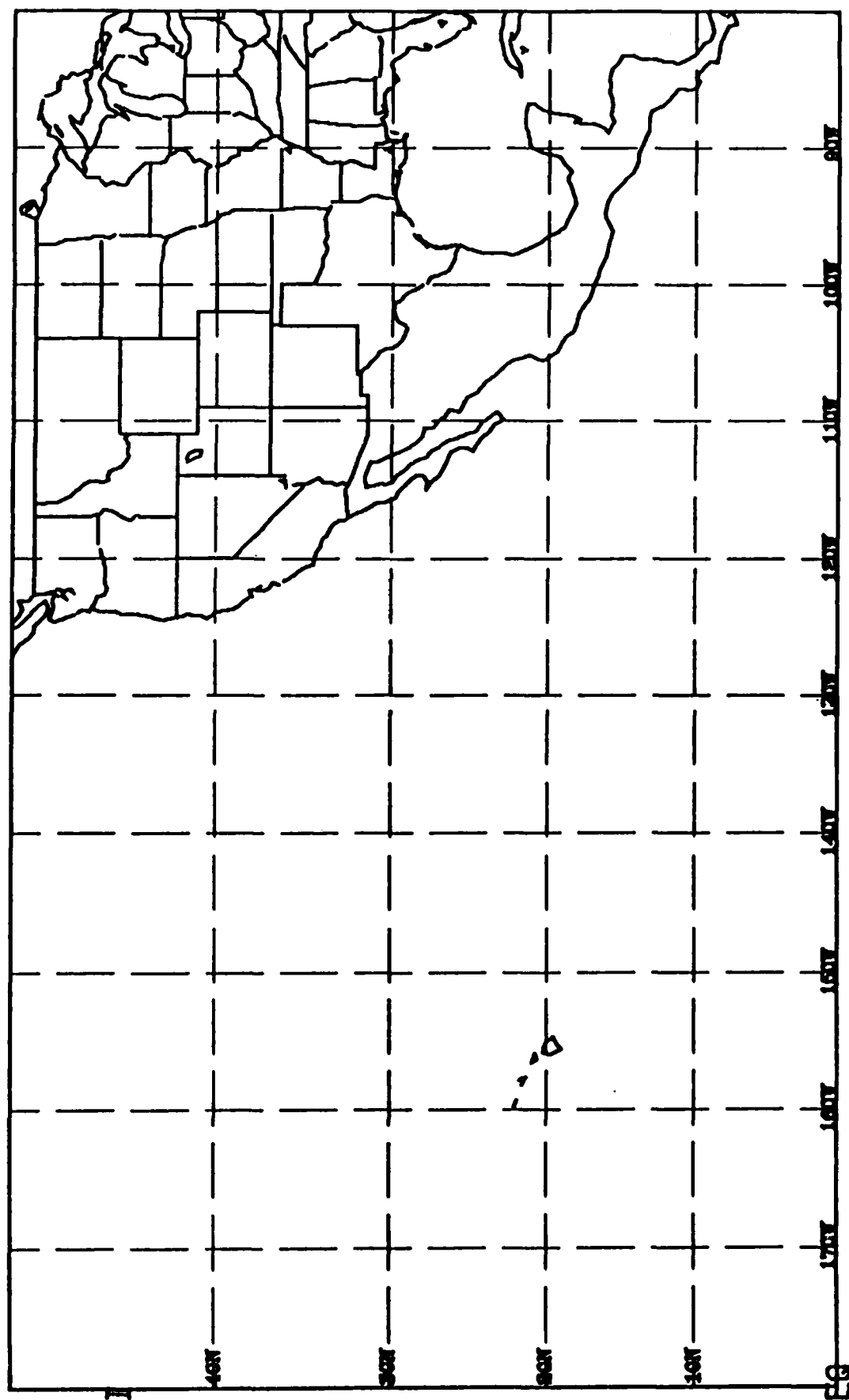
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR MAR 9 - MAR 23



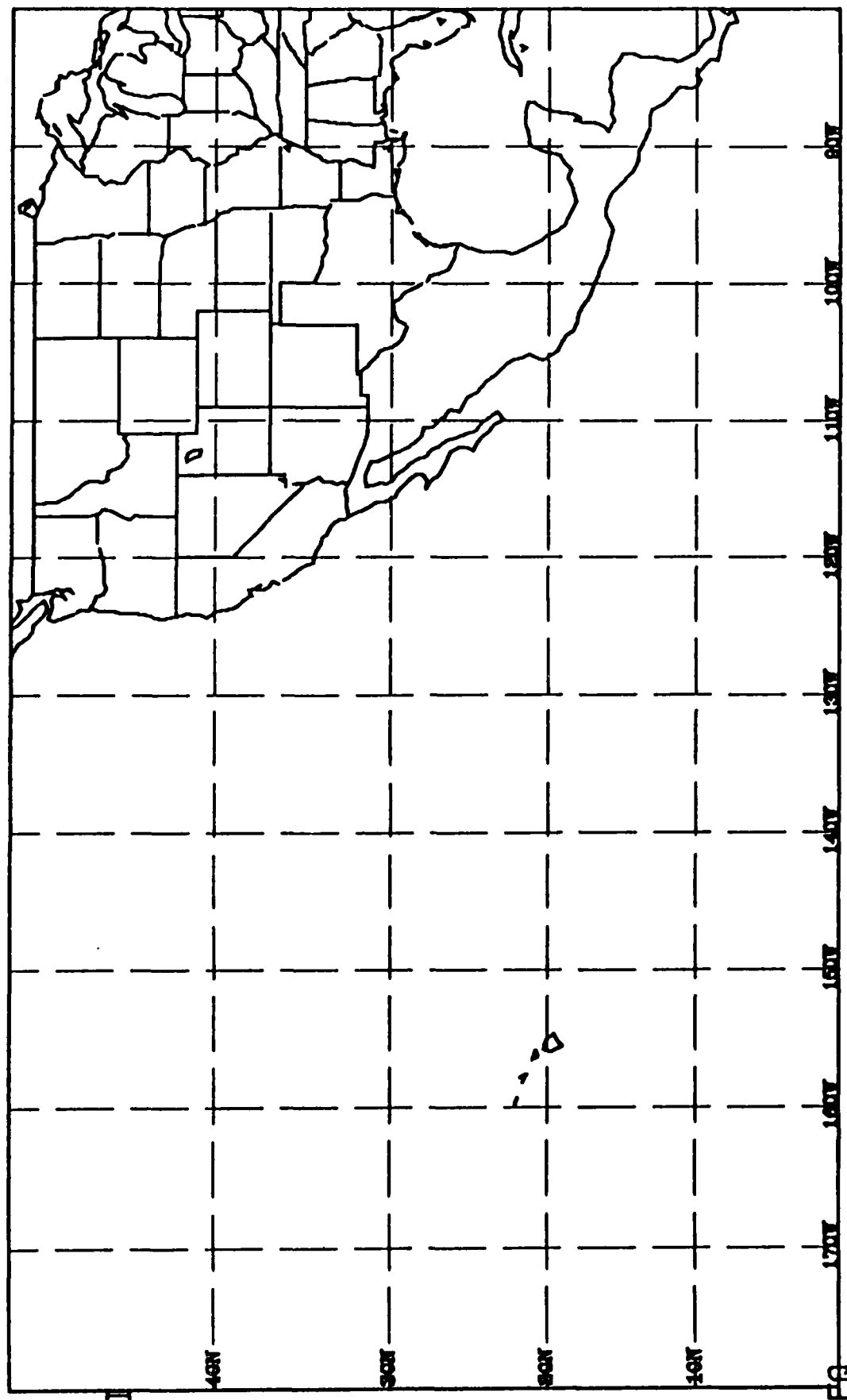
Actual path of recurving tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR MAR 9 - MAR 23



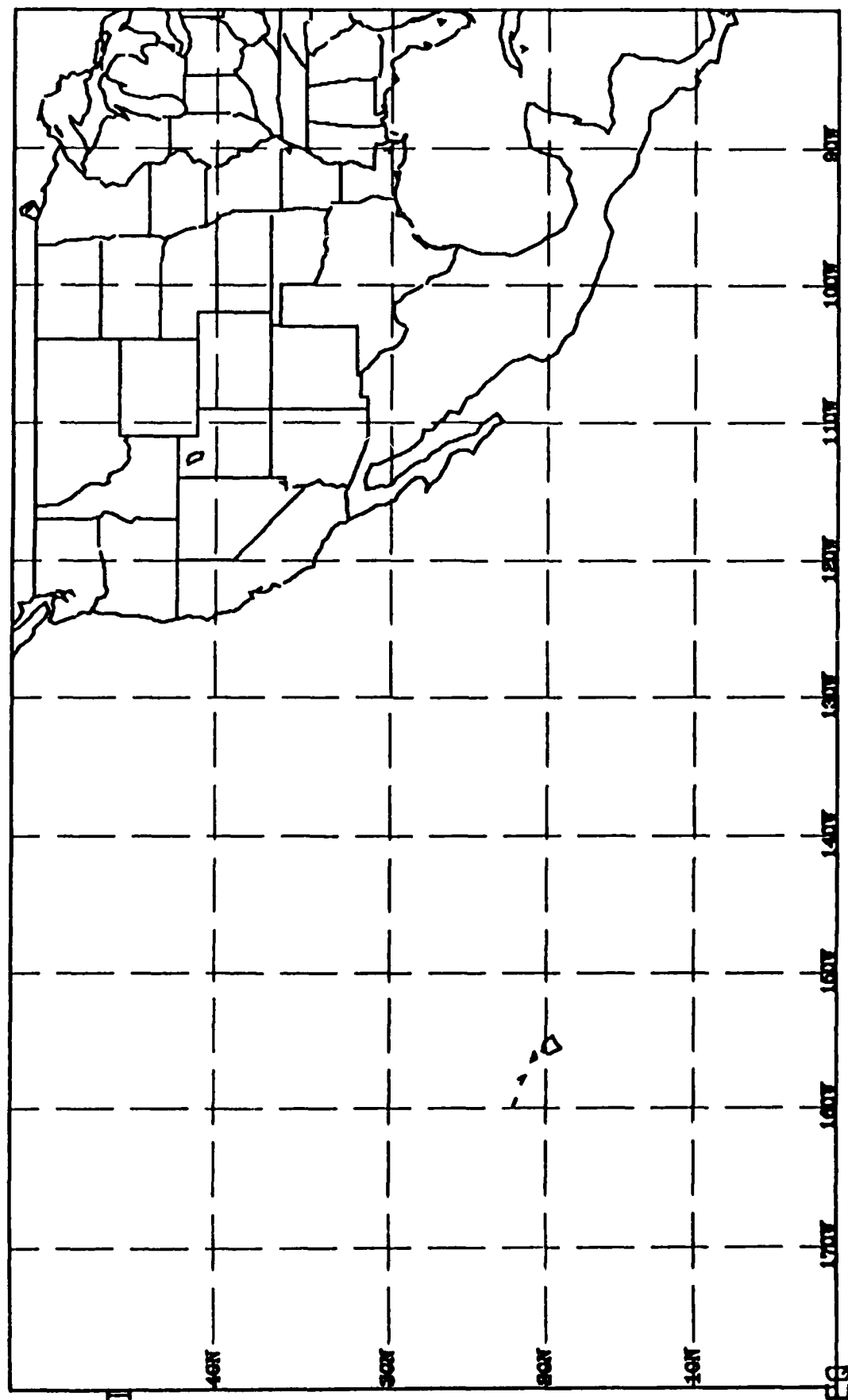
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR MAR 9 - MAR 23



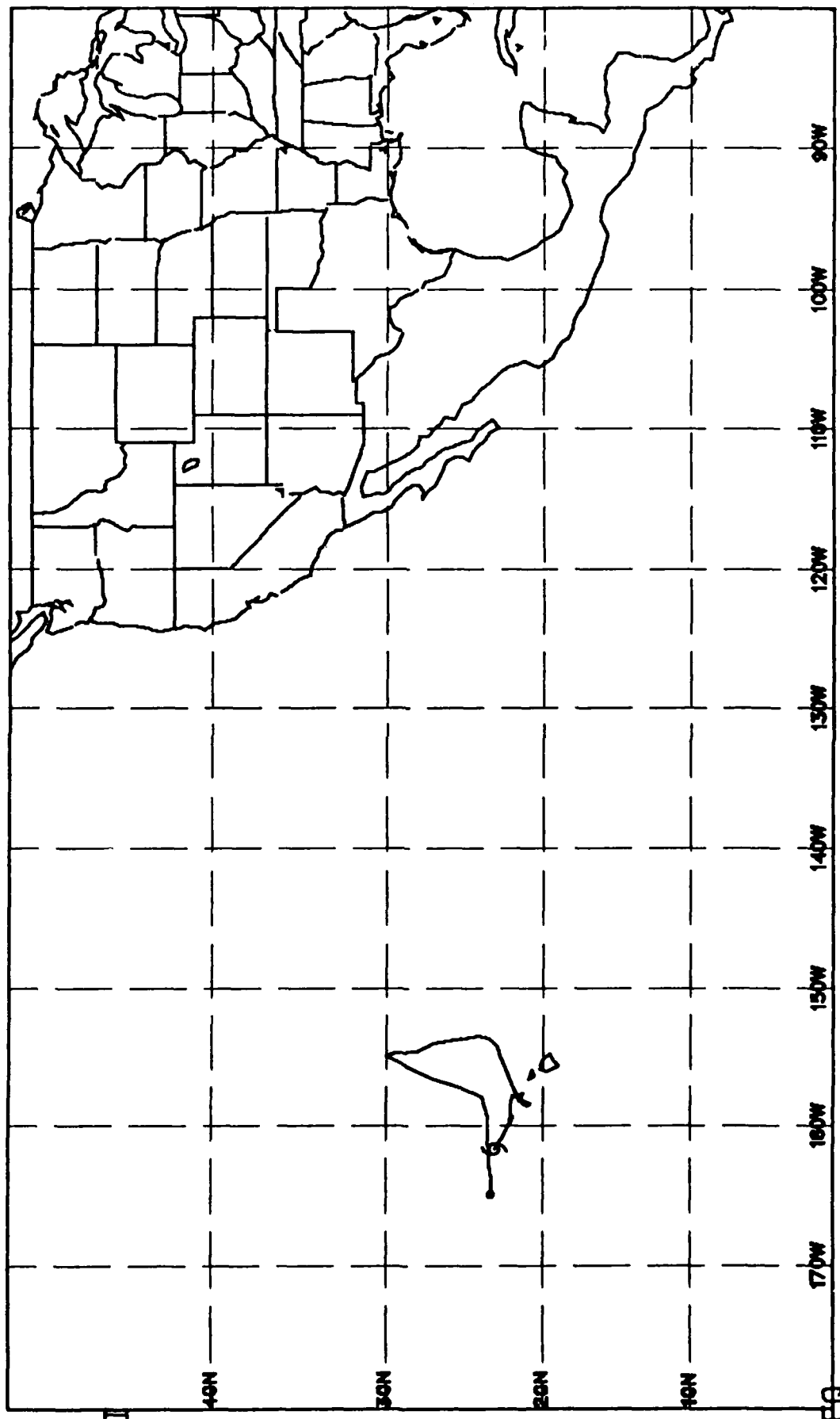
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR MAR 9 - MAR 23



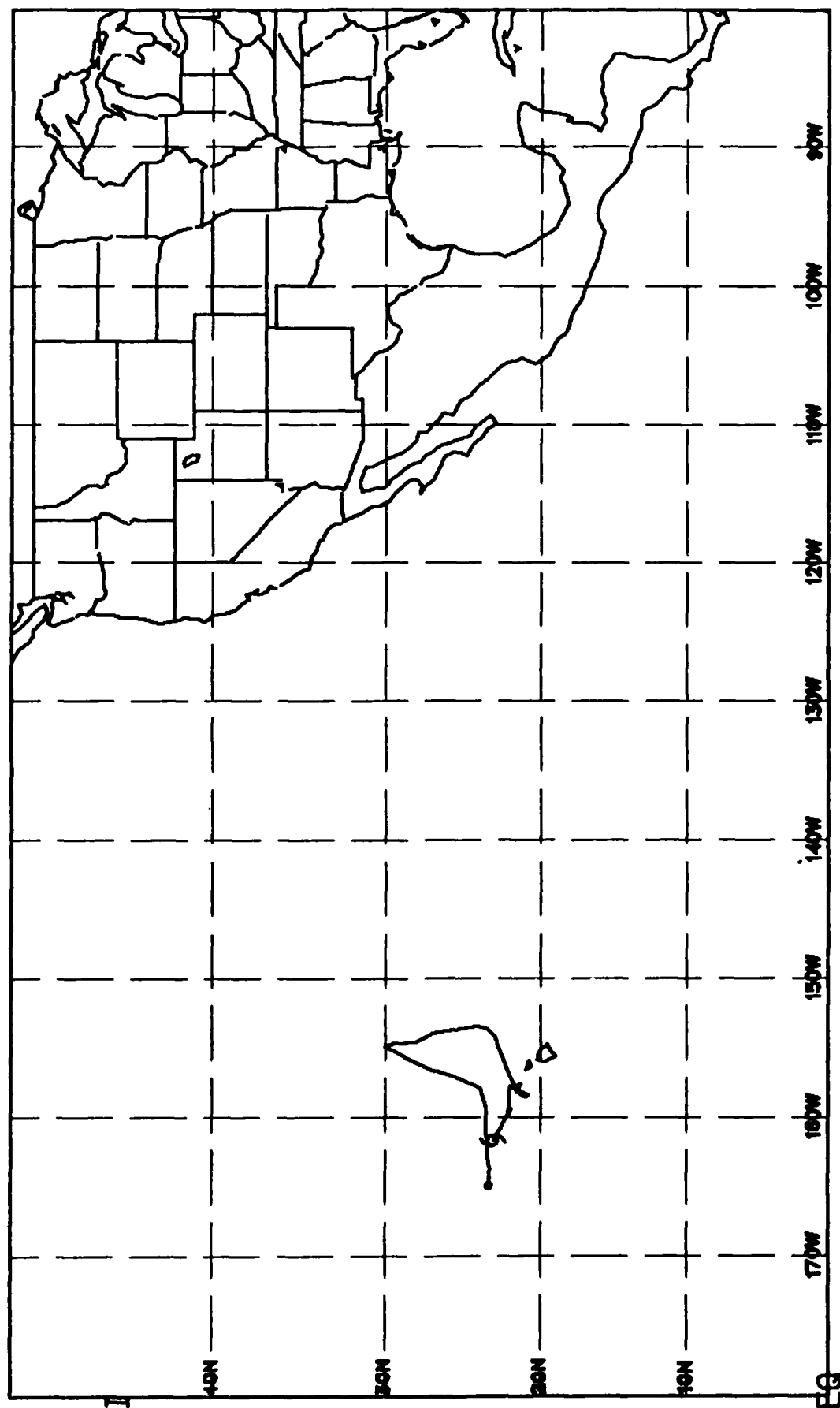
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR MAR 9 - MAR 23



Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

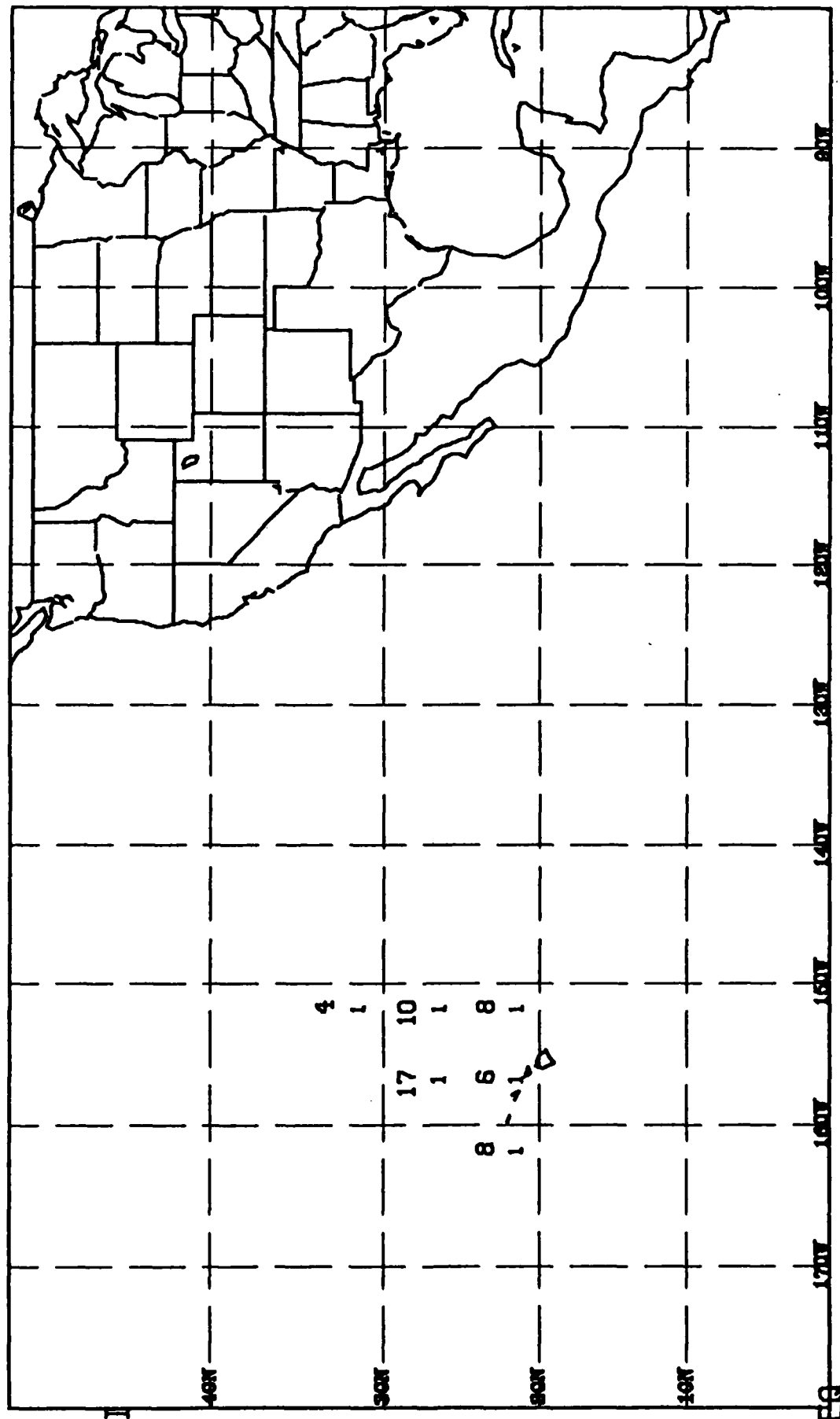
ACTUAL TRACKS FOR MAR 9 - MAR 23



Actual path of all other tropical cyclones (> 33 kts).

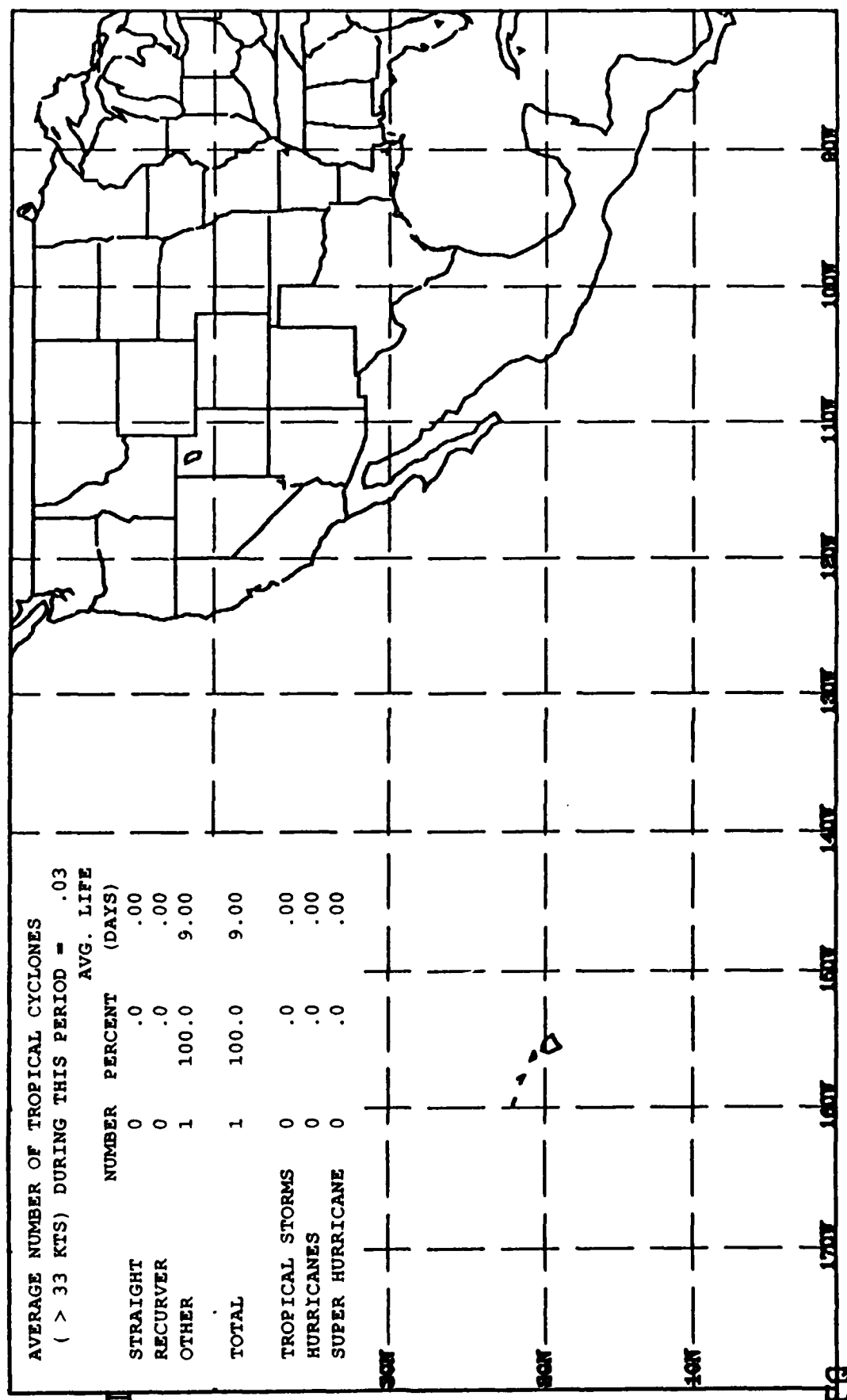
E-17

SPEED OF MOVEMENT FOR MAR 9 - MAR 23



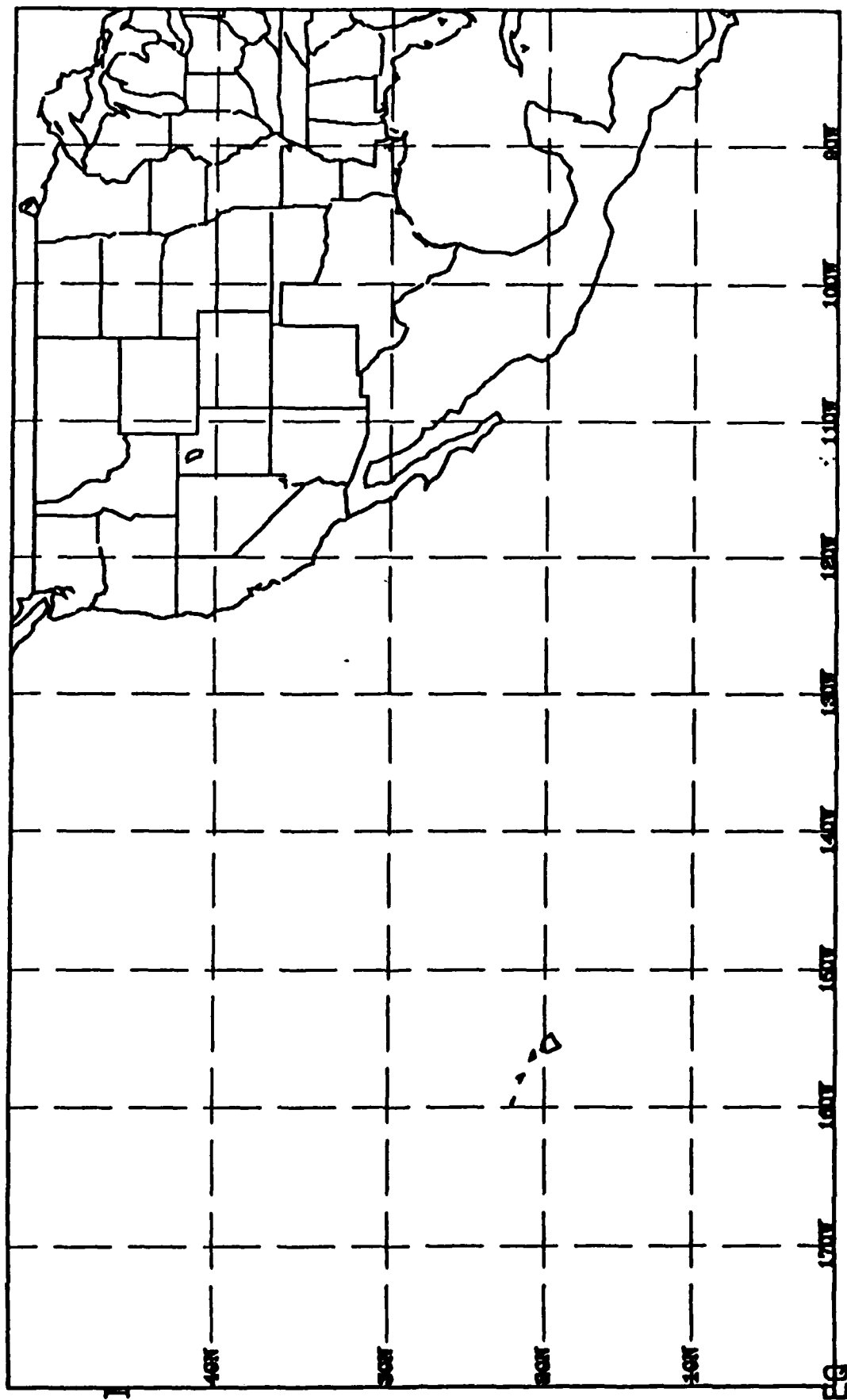
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR MAR 24 - APR 8



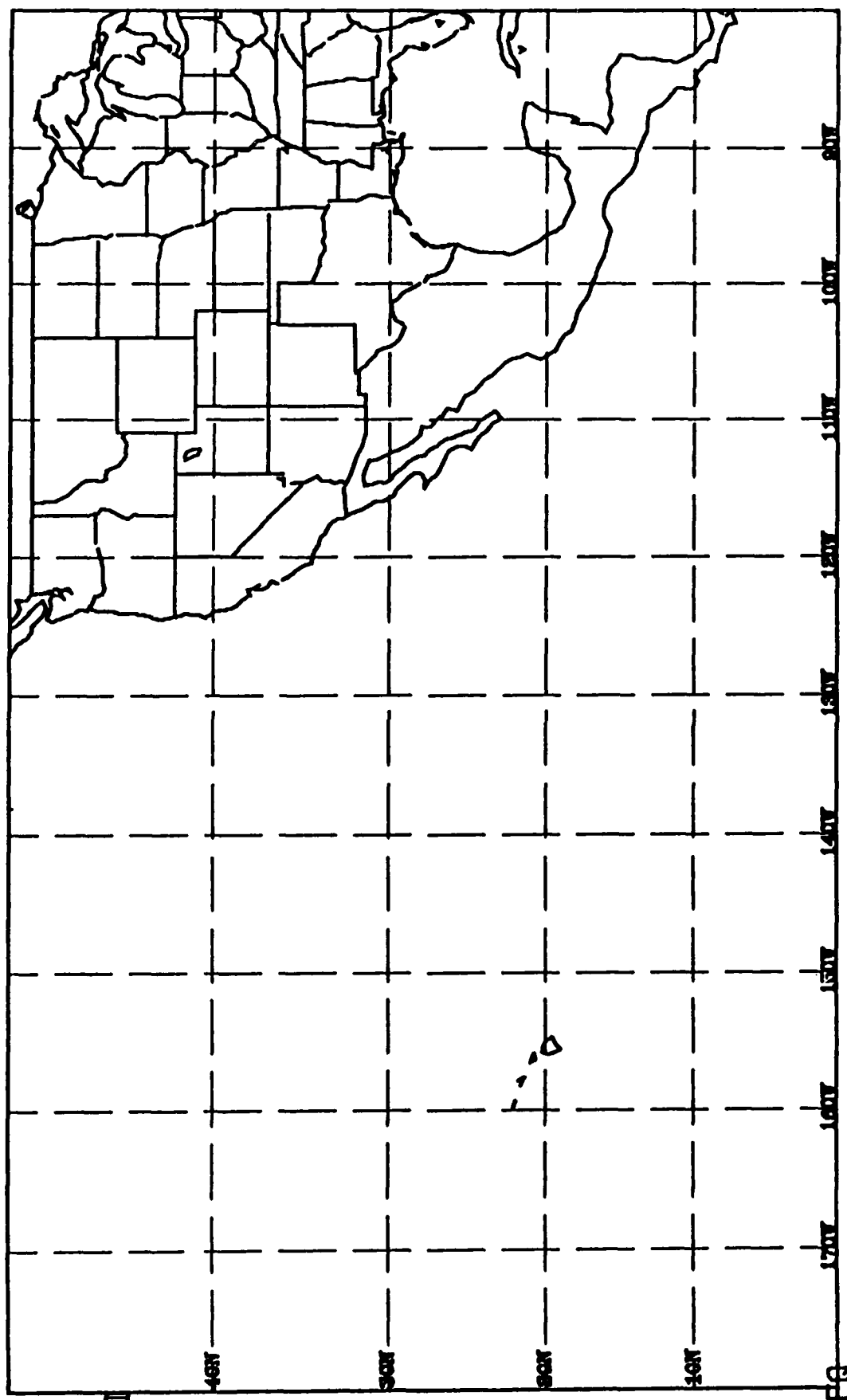
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored.

ACTUAL TRACKS FOR MAR 24 - APR 8



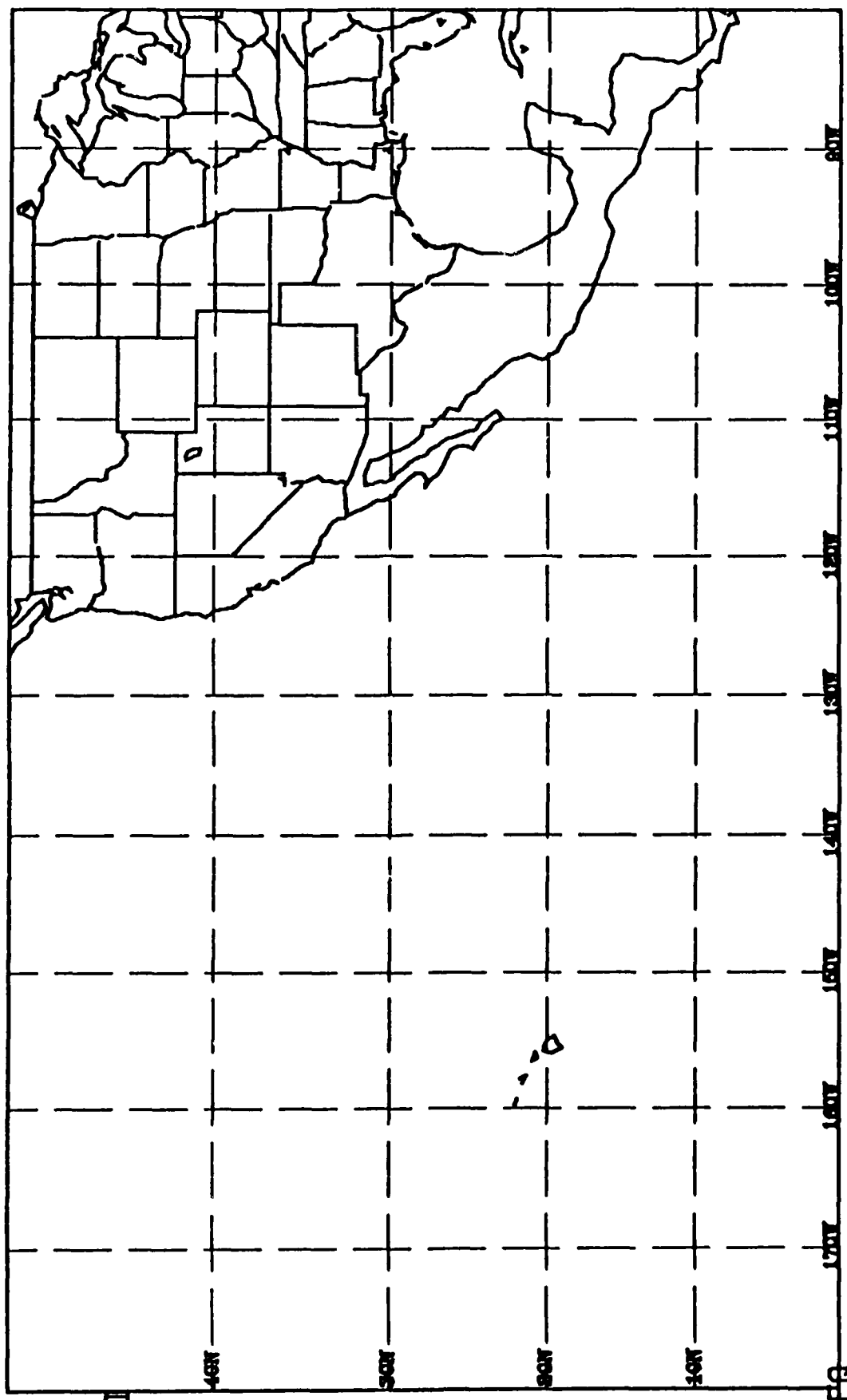
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR MAR 24 - APR 8



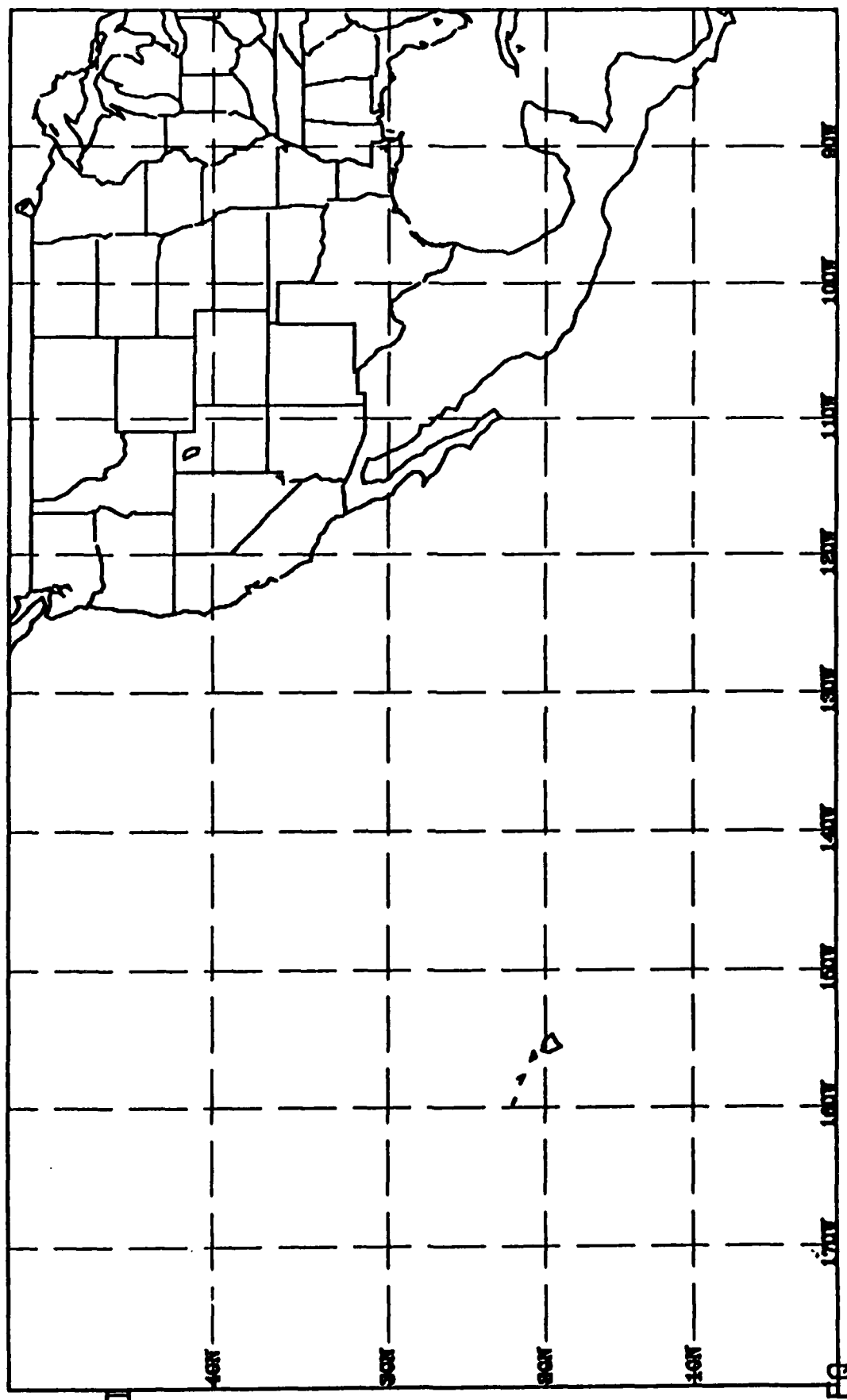
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR MAR 24 - APR 8



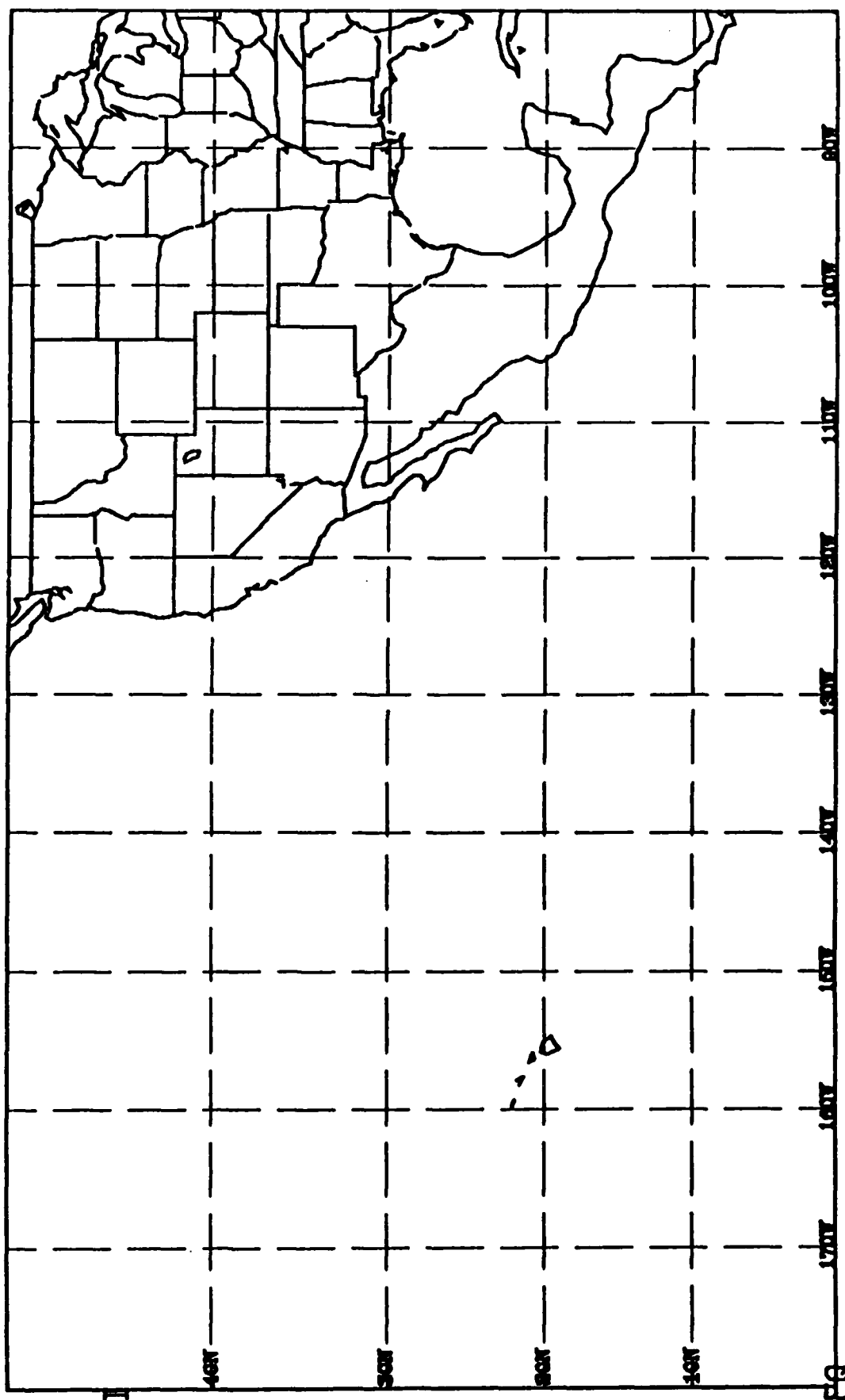
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR MAR 24 - APR 8



Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

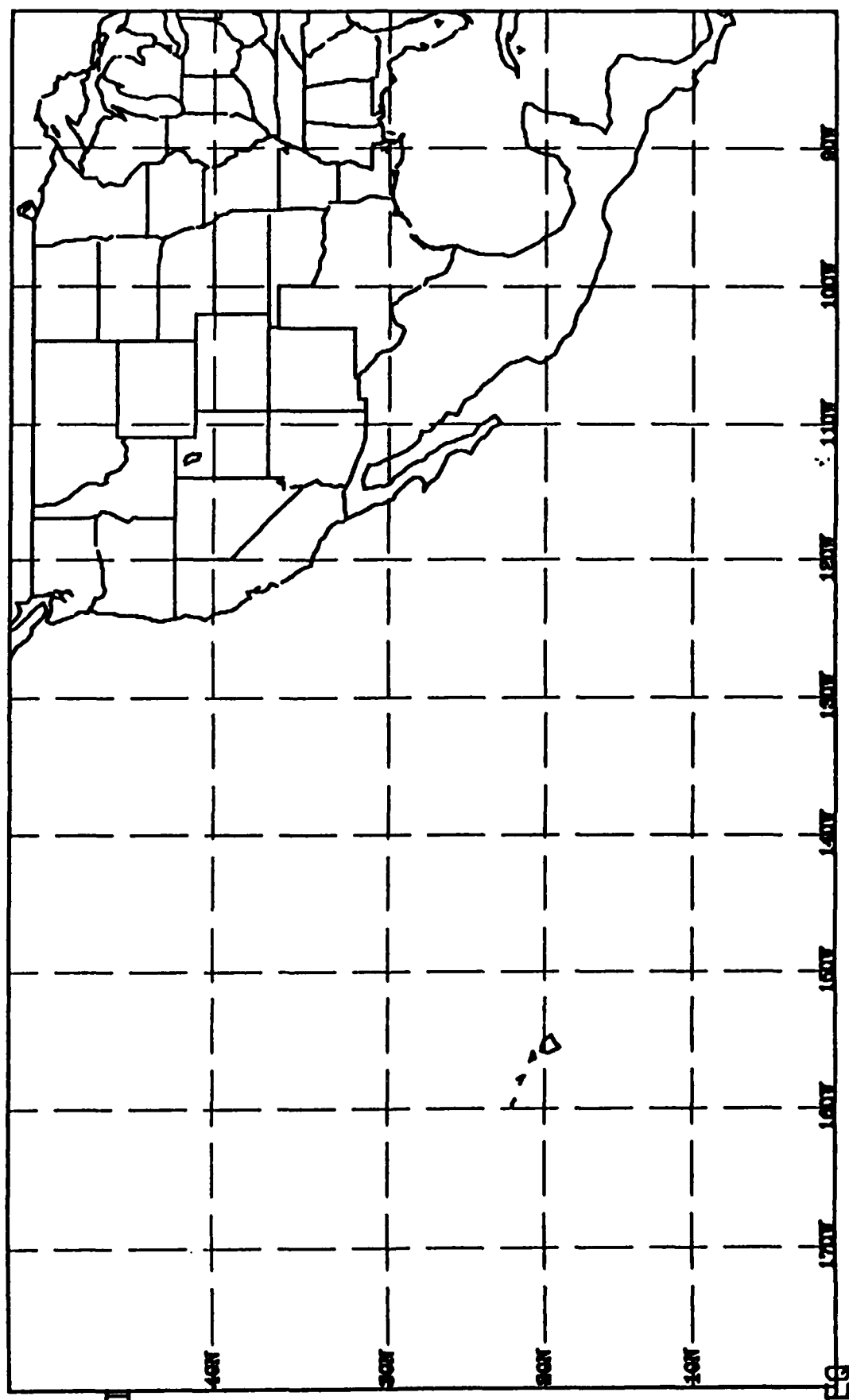
ACTUAL TRACKS FOR MAR 24 - APR 8



Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N .

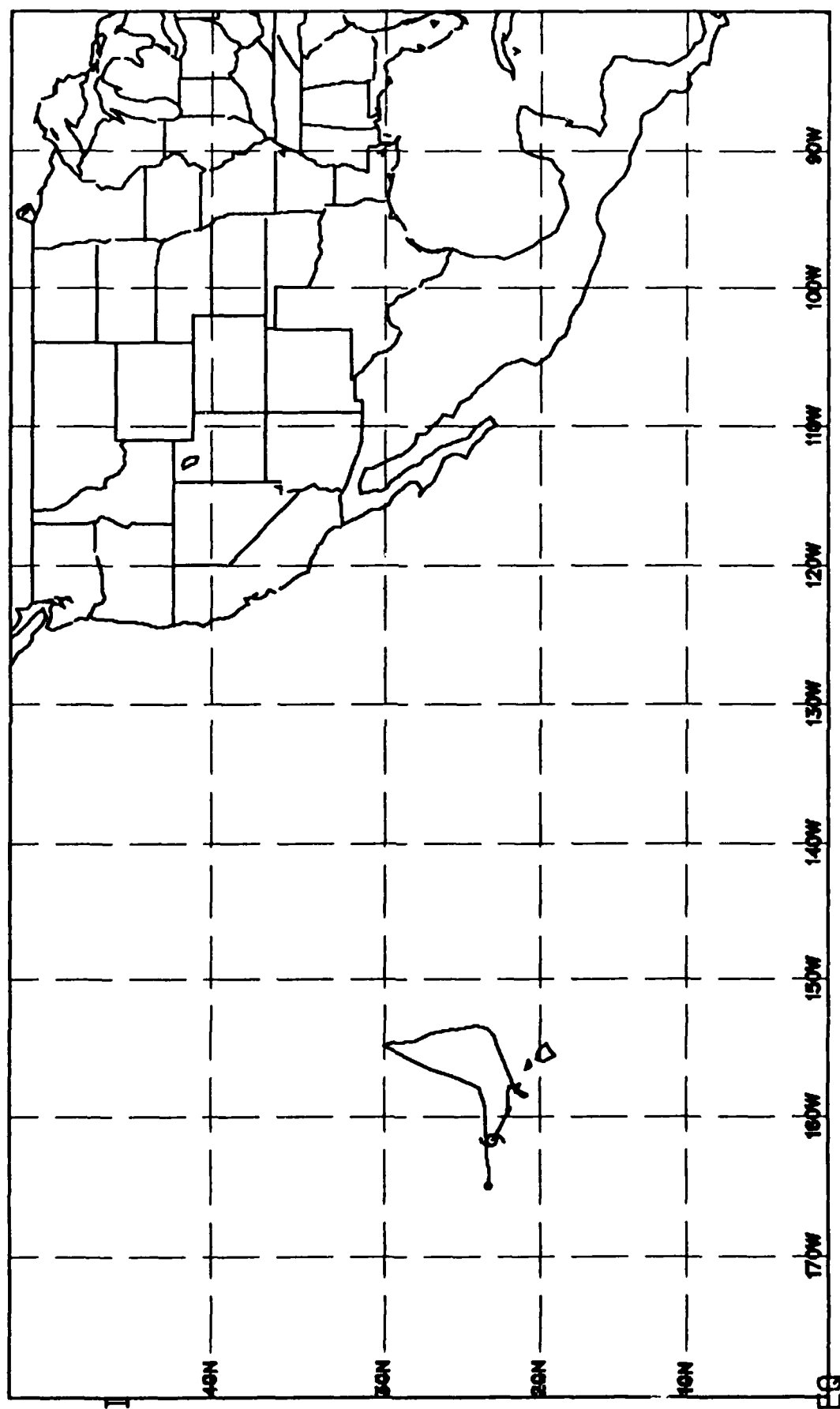
E-25

ACTUAL TRACKS FOR MAR 24 - APR 8



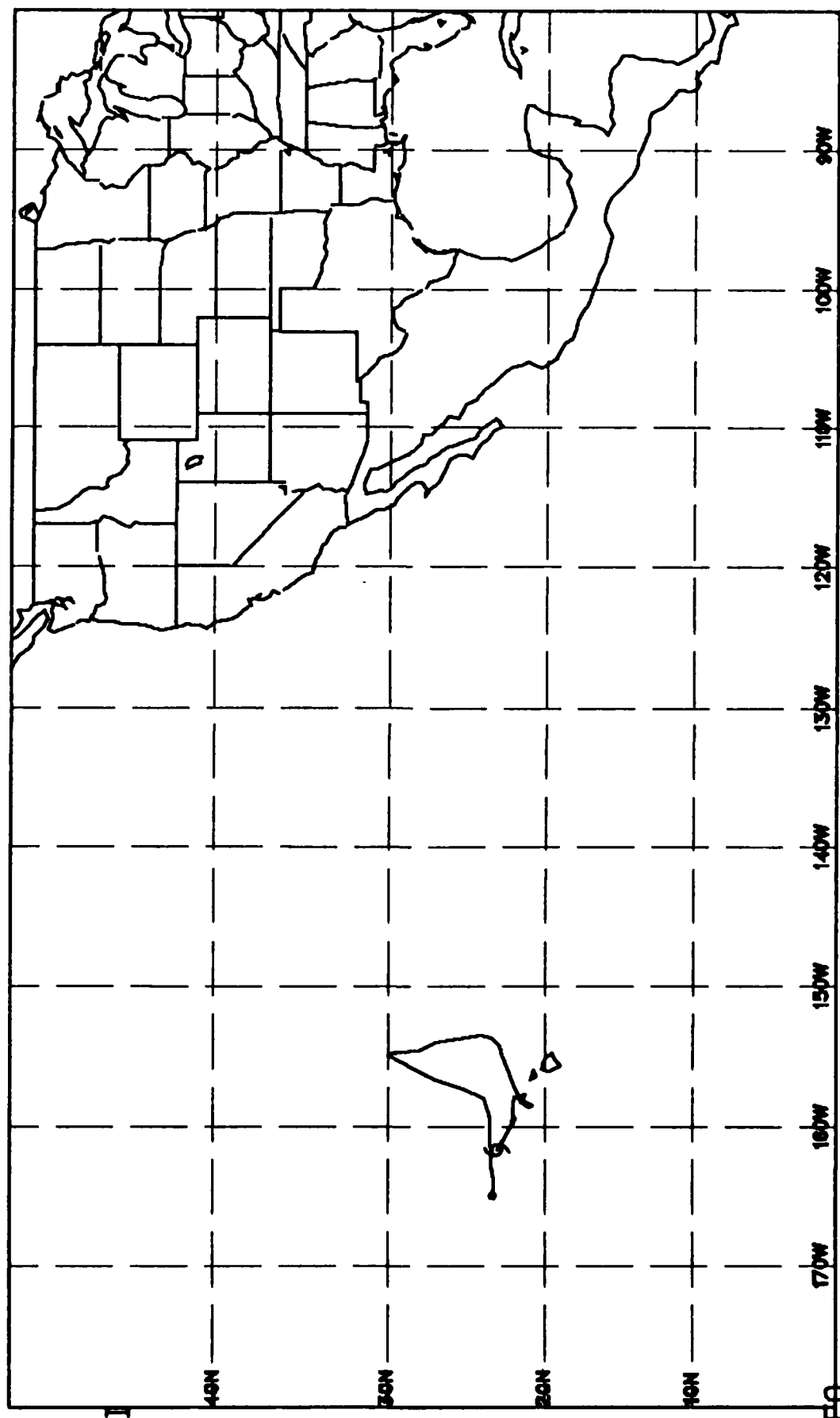
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR MAR 24 - APR 8



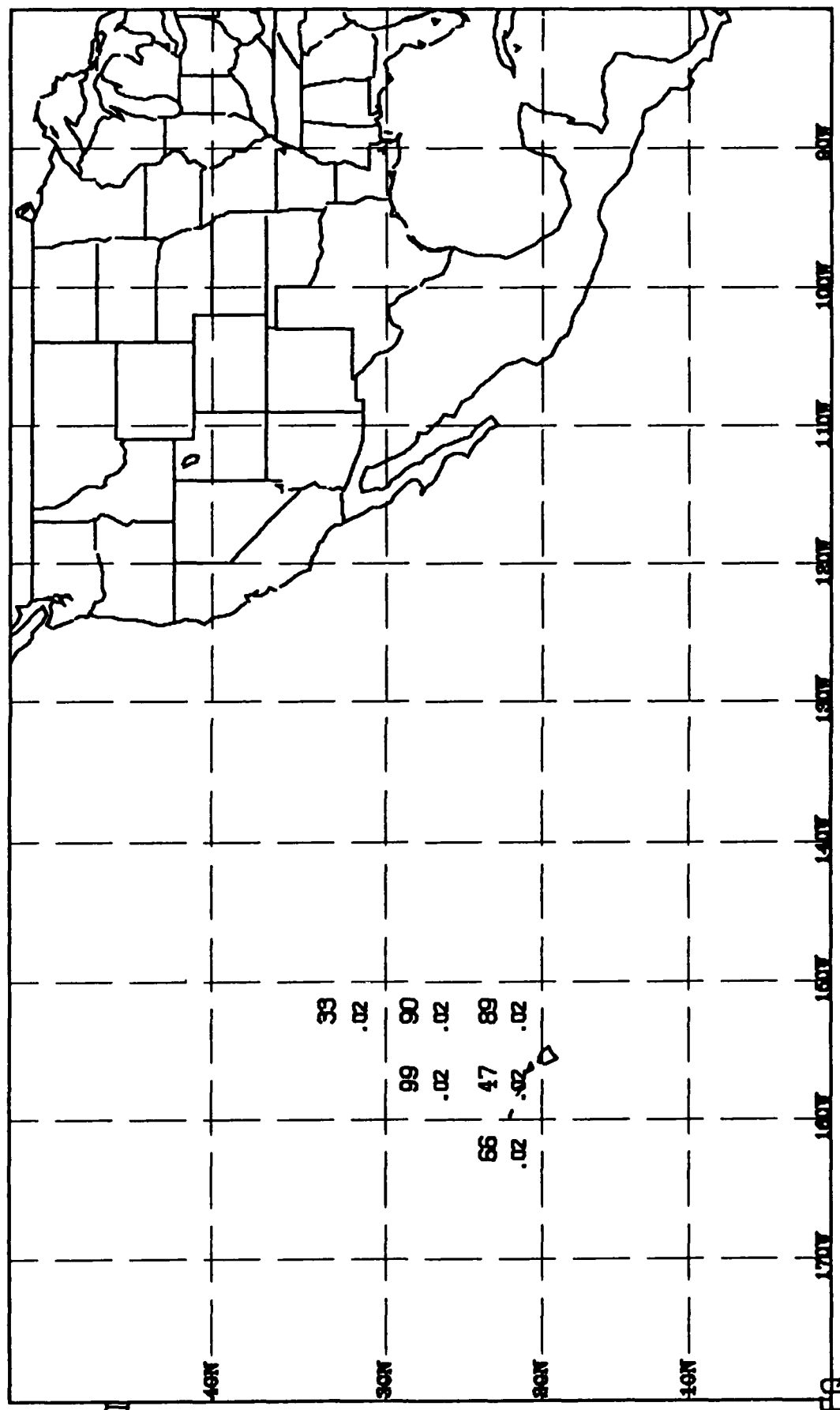
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR MAR 24 - APR 8



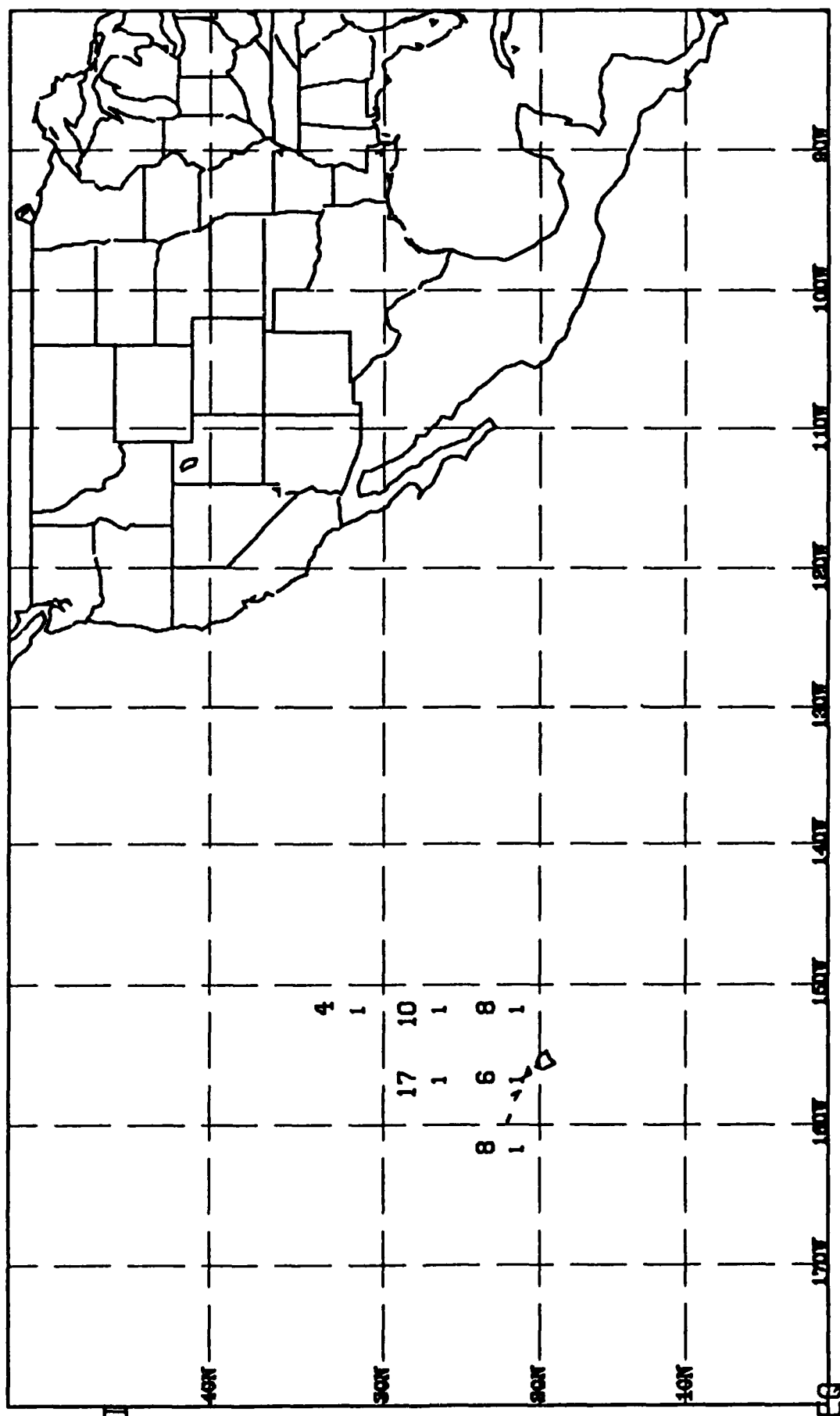
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR MAR 24 - APR 8



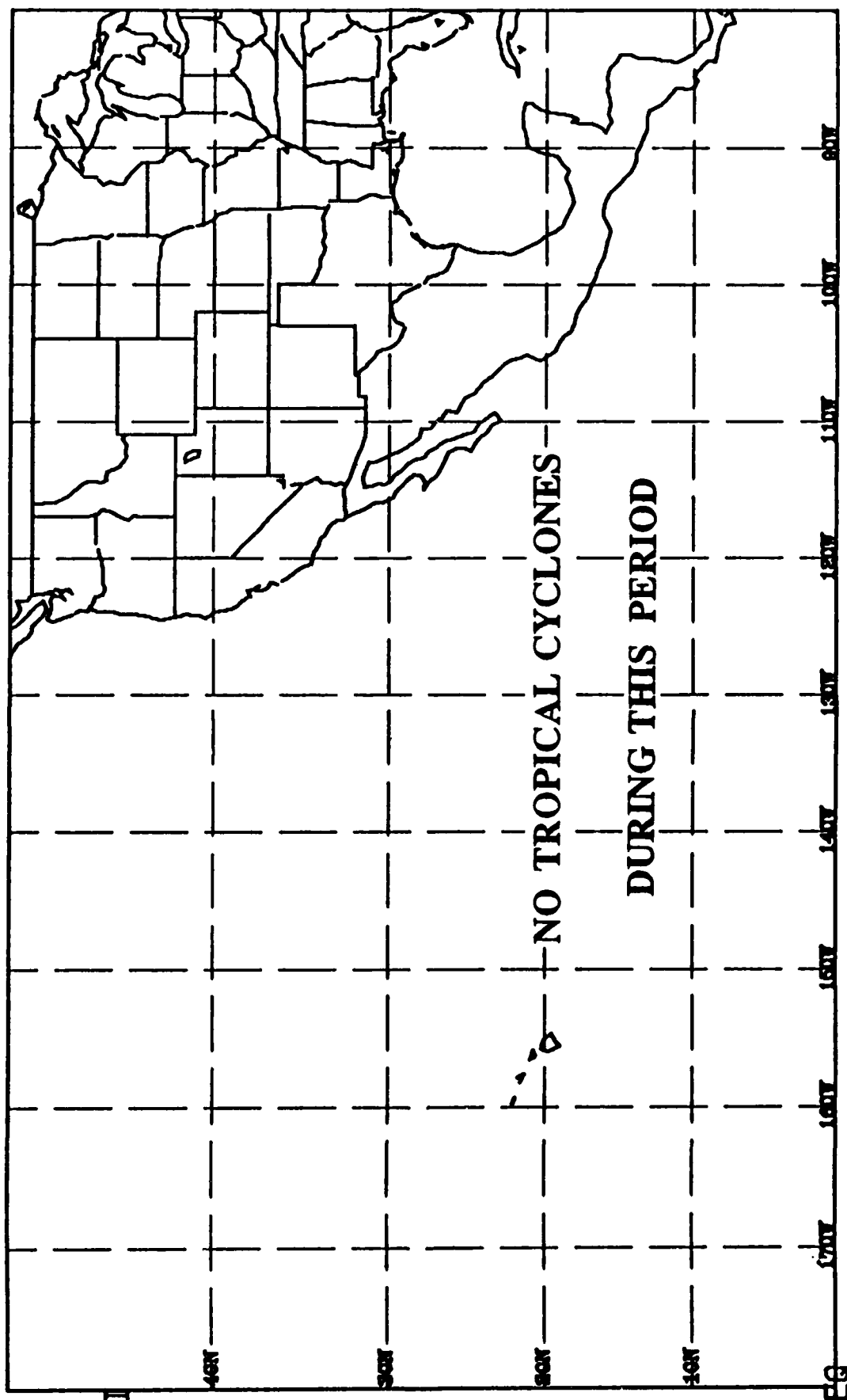
Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number).
 Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed.
 Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year per time period.

SPEED OF MOVEMENT FOR MAR 24 - APR 8

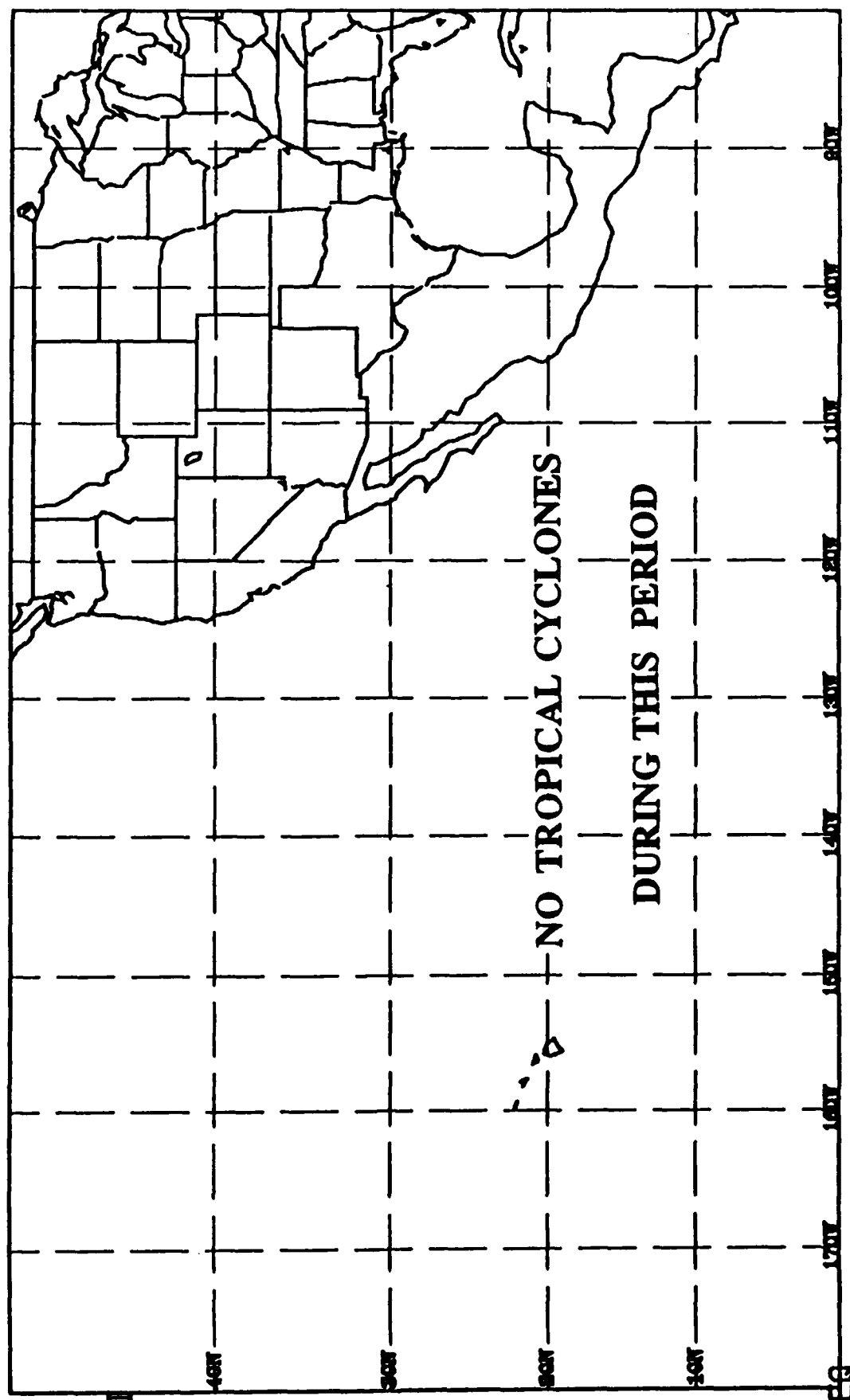


Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

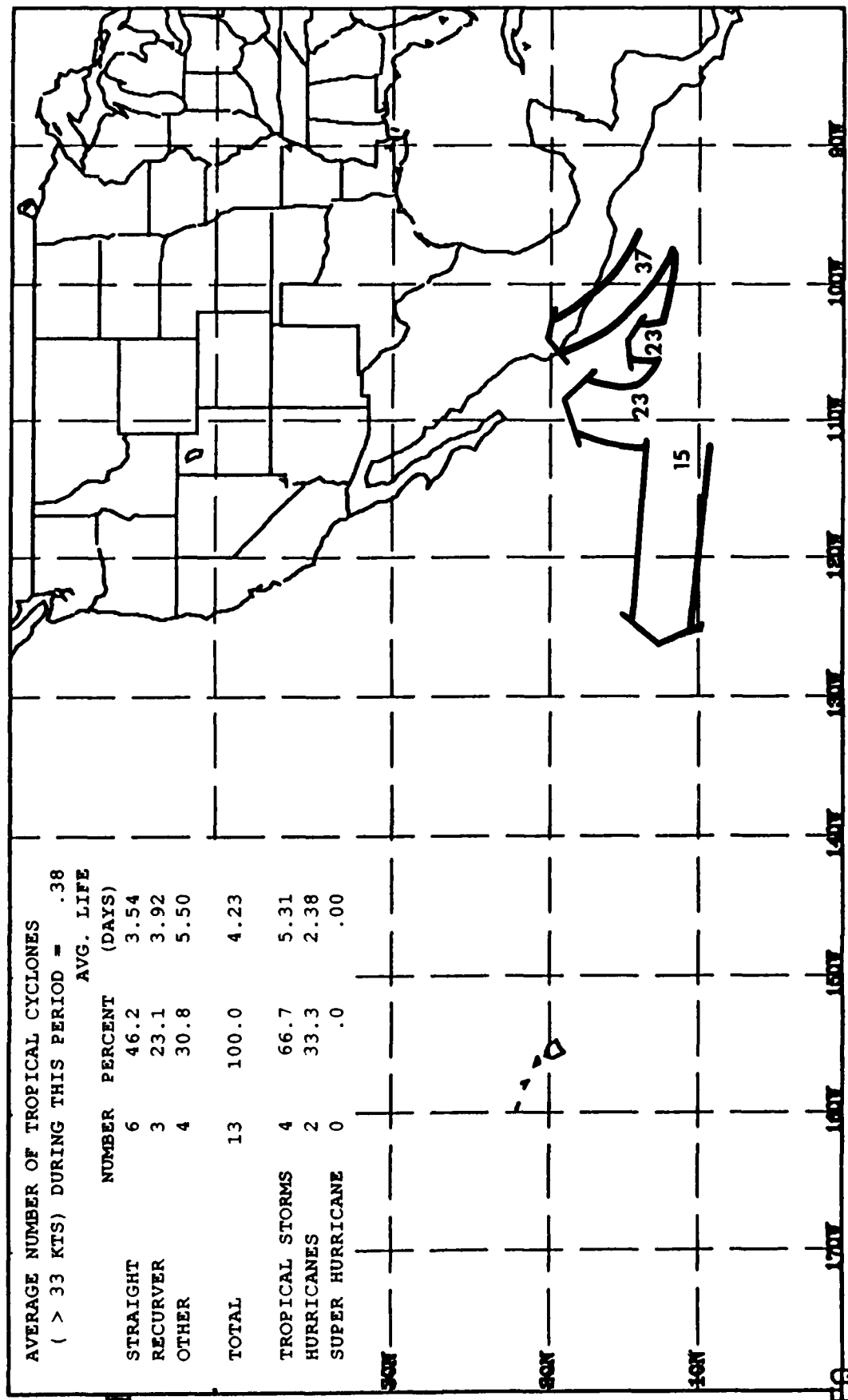
APR 9 - APR 23



APR 24 - MAY 8

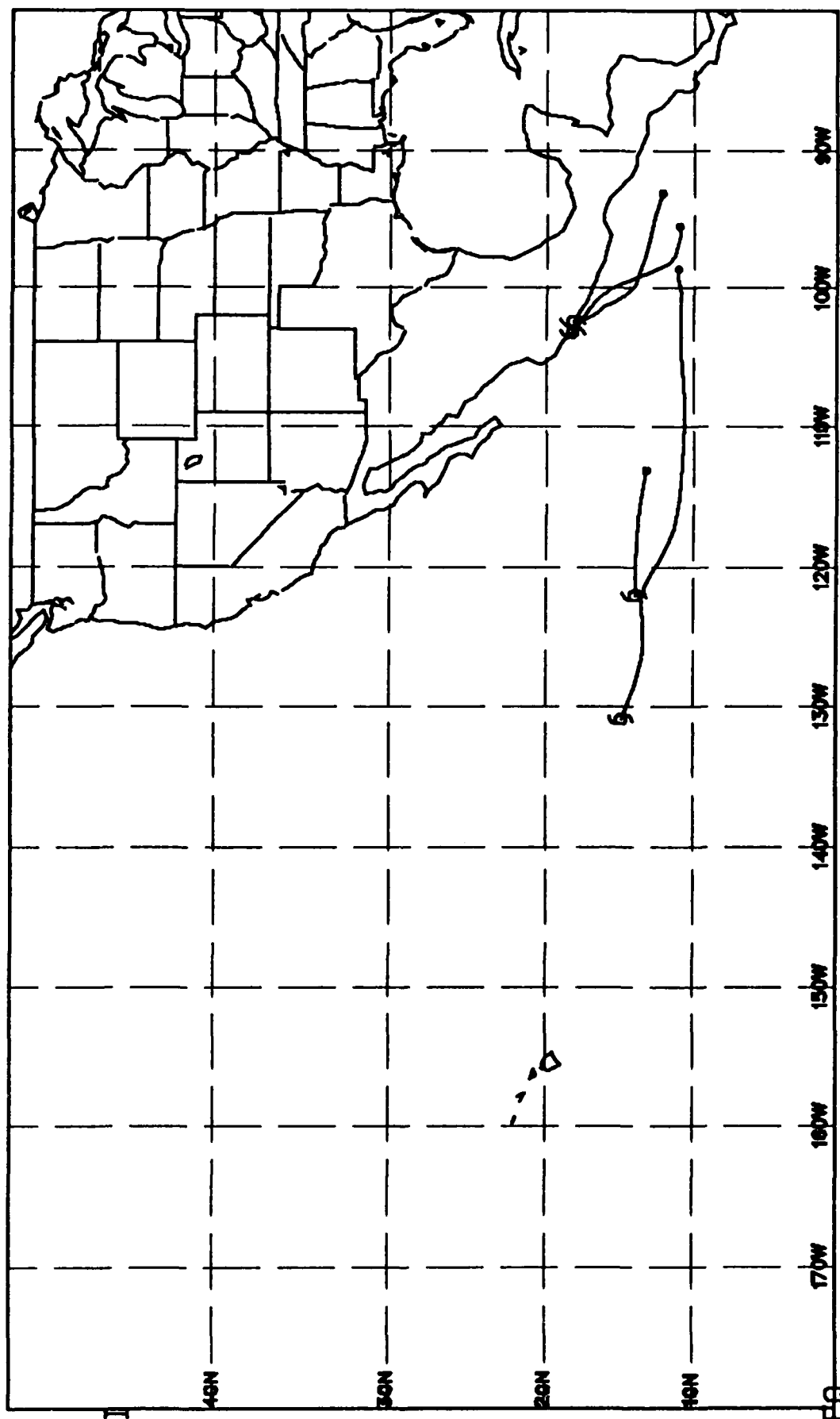


MEAN PATHS FOR MAY 9 - MAY 23



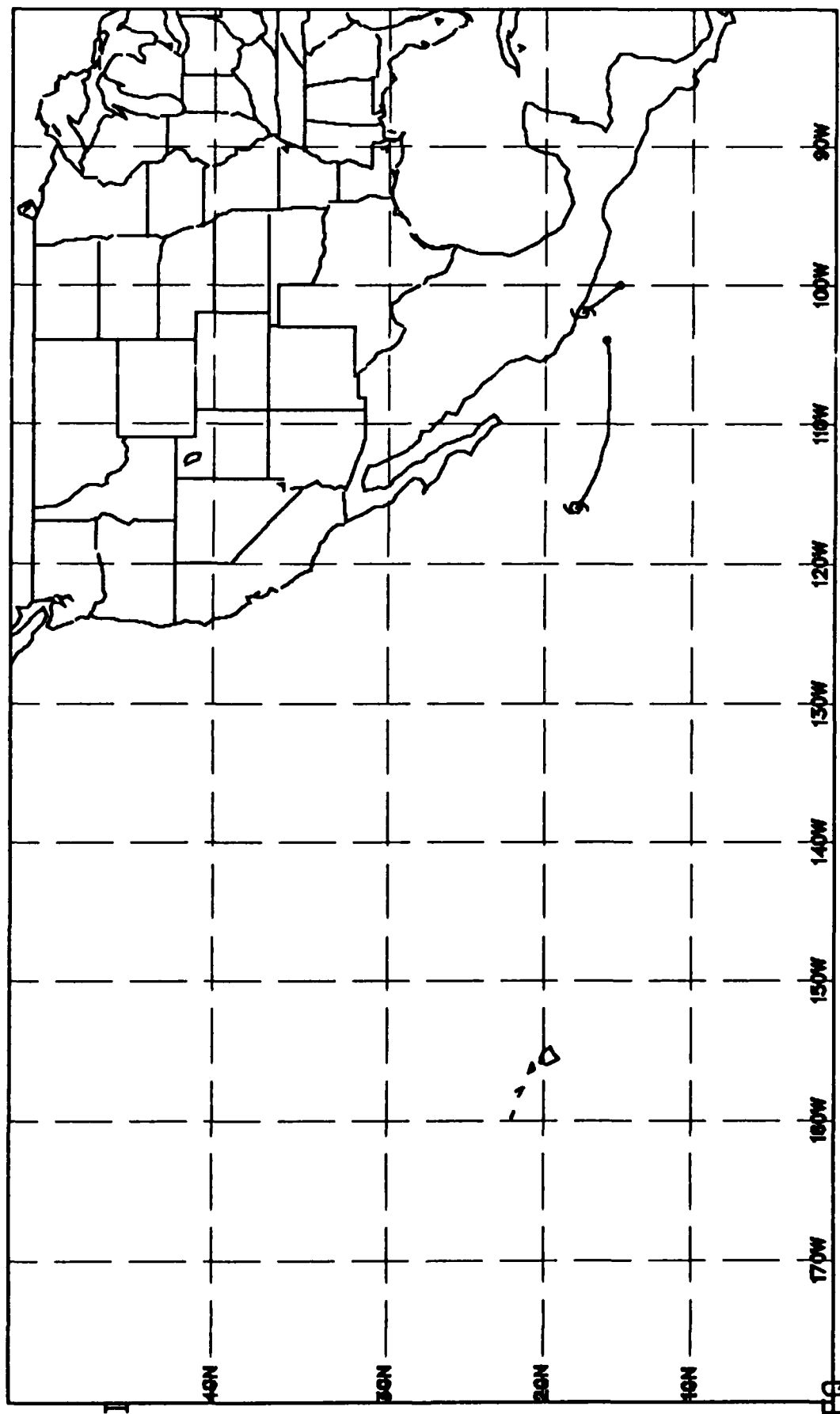
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored.

ACTUAL TRACKS FOR MAY 9 - MAY 23



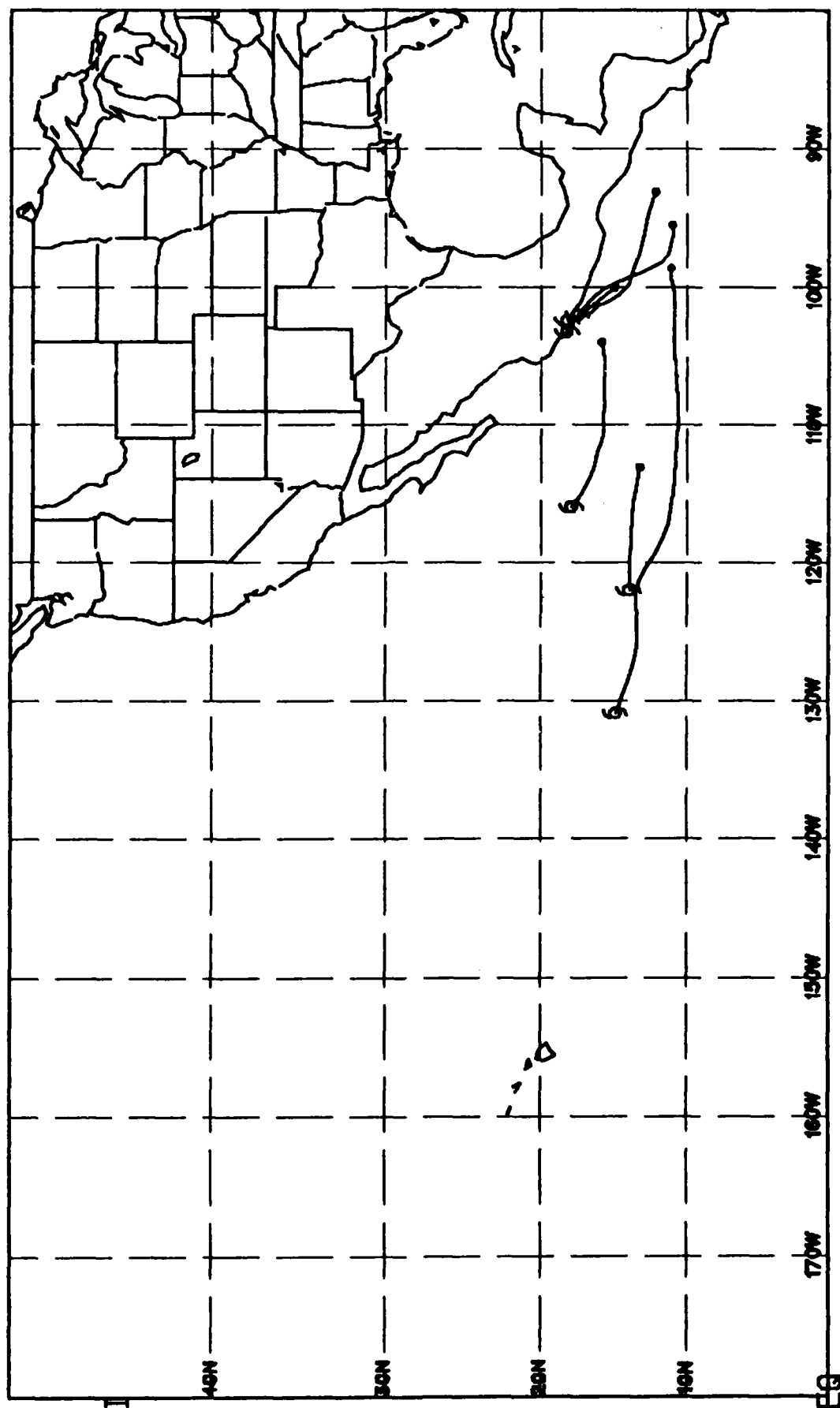
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR MAY 9 - MAY 23



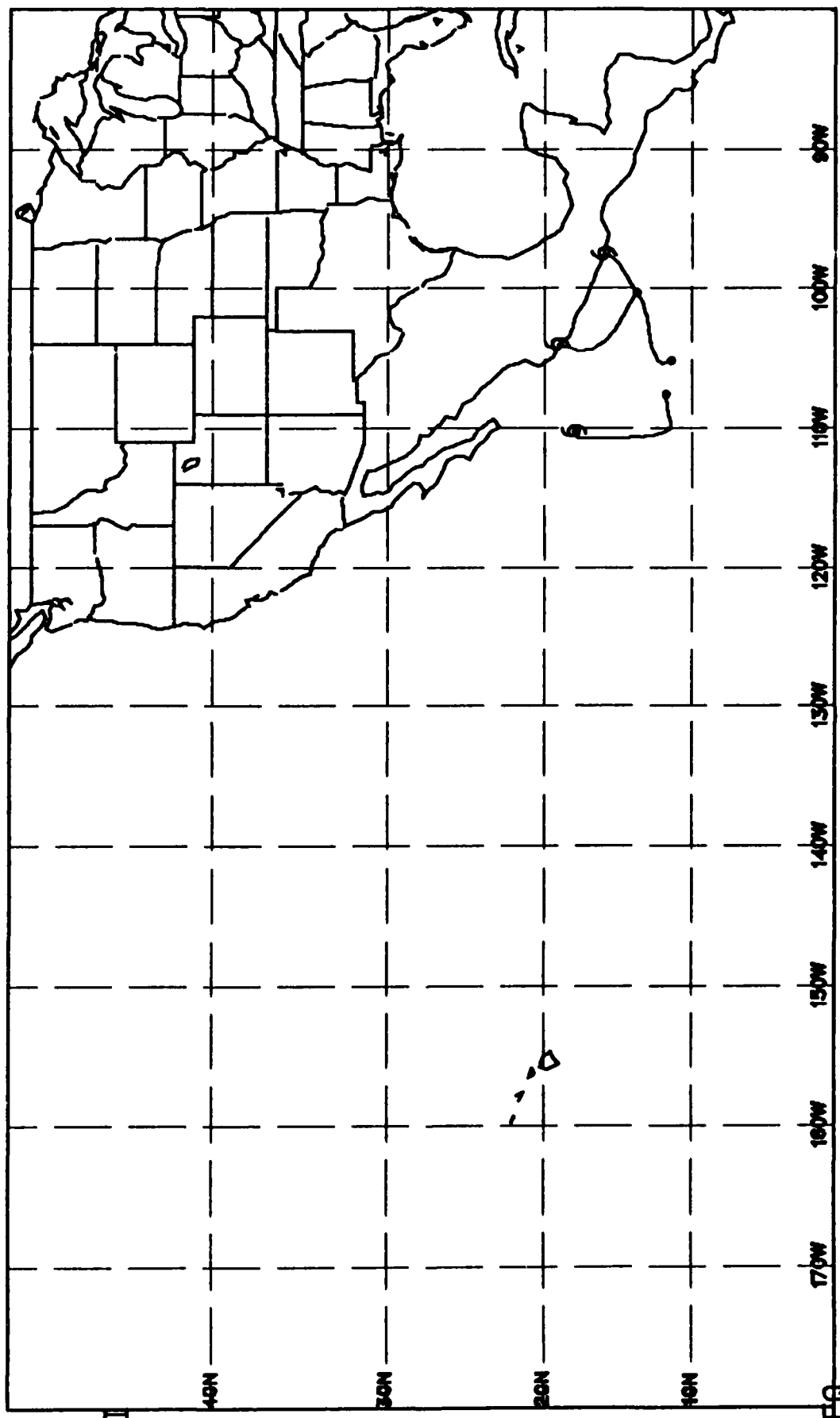
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR MAY 9 - MAY 23



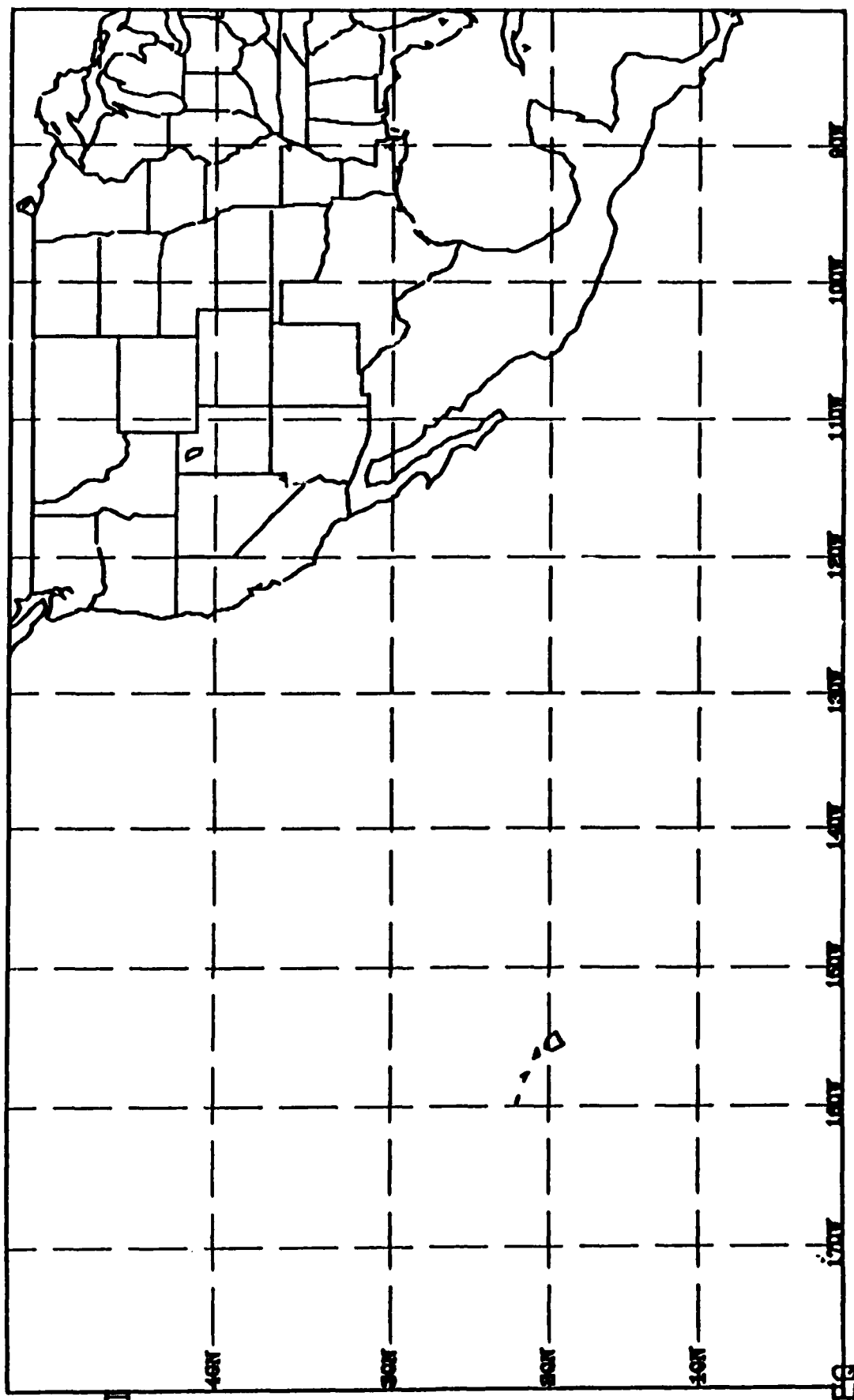
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR MAY 9 - MAY 23



Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR MAY 9 - MAY 23



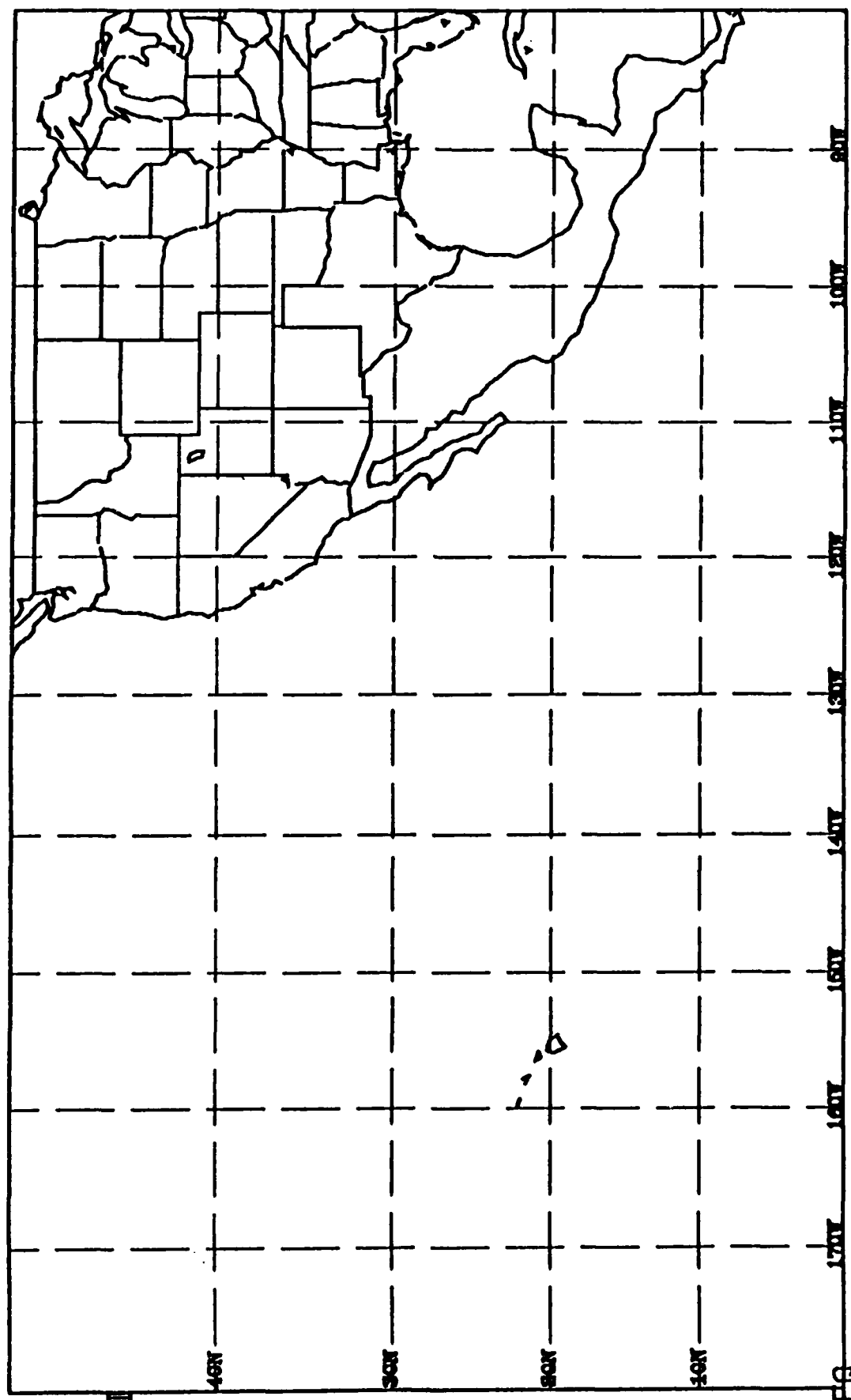
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N.

E-39

A map of the Pacific Ocean showing the distribution of the genus *Puffinus*. The map covers the area from 170°W to 90°W and 10°N to 40°N. The distribution is indicated by a solid line along the coast of North America and the Hawaiian Islands, and a dashed line further west. The Hawaiian Islands are labeled with numbers 1 through 10.

E-40

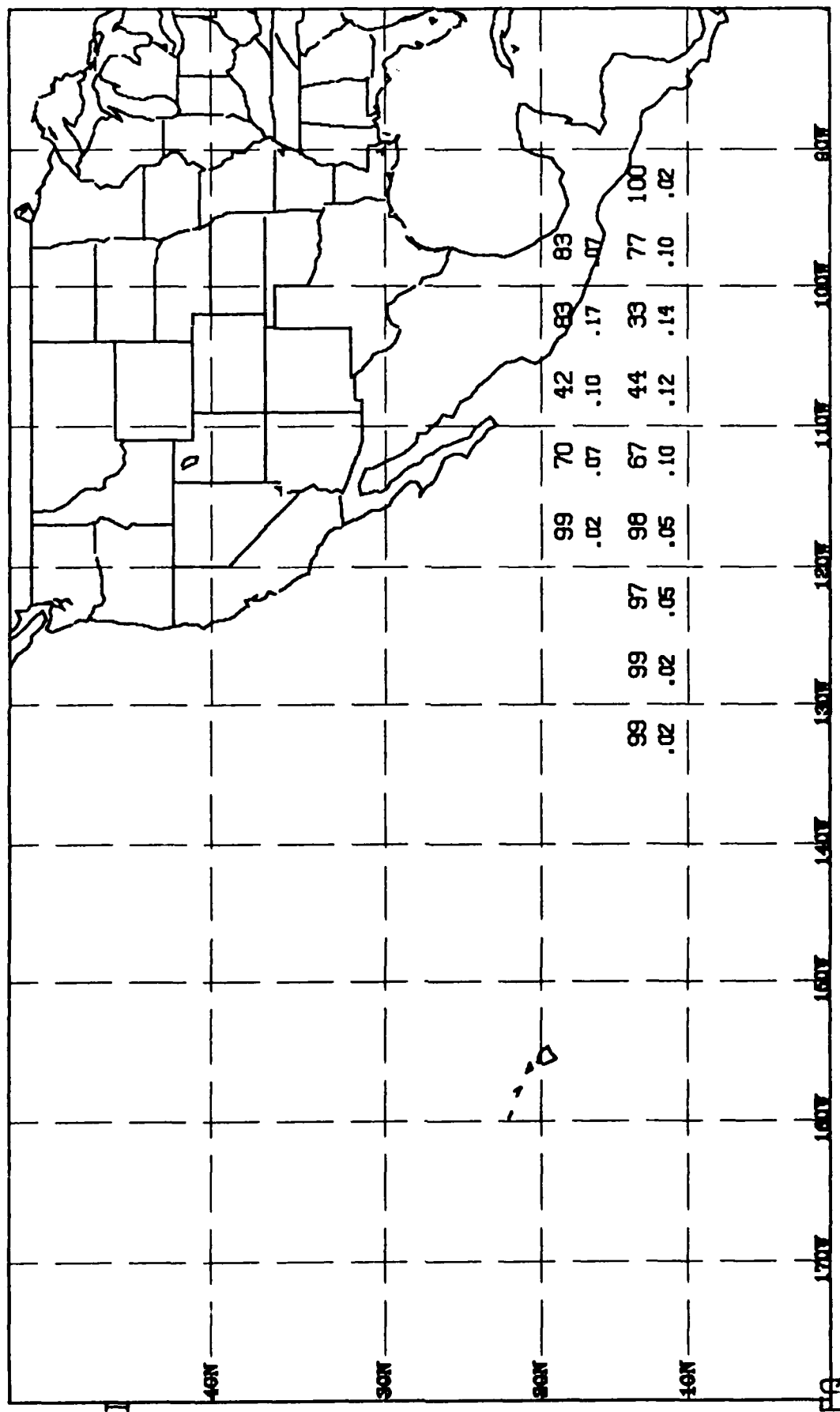
ACTUAL TRACKS FOR MAY 9 - MAY 23



Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

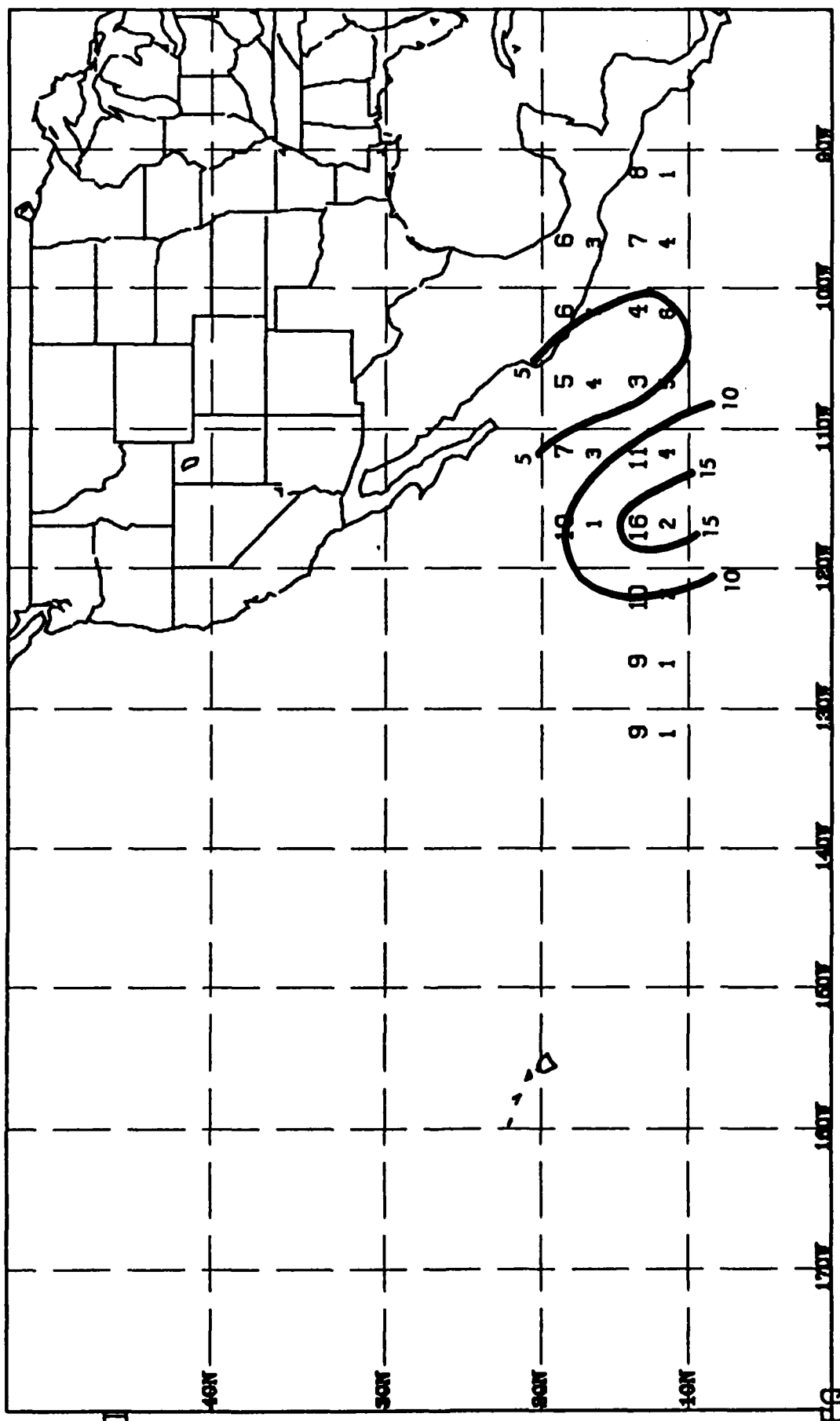
E-42

CONSTANCY AND RELATIVE FREQUENCY FOR MAY 9 - MAY 23



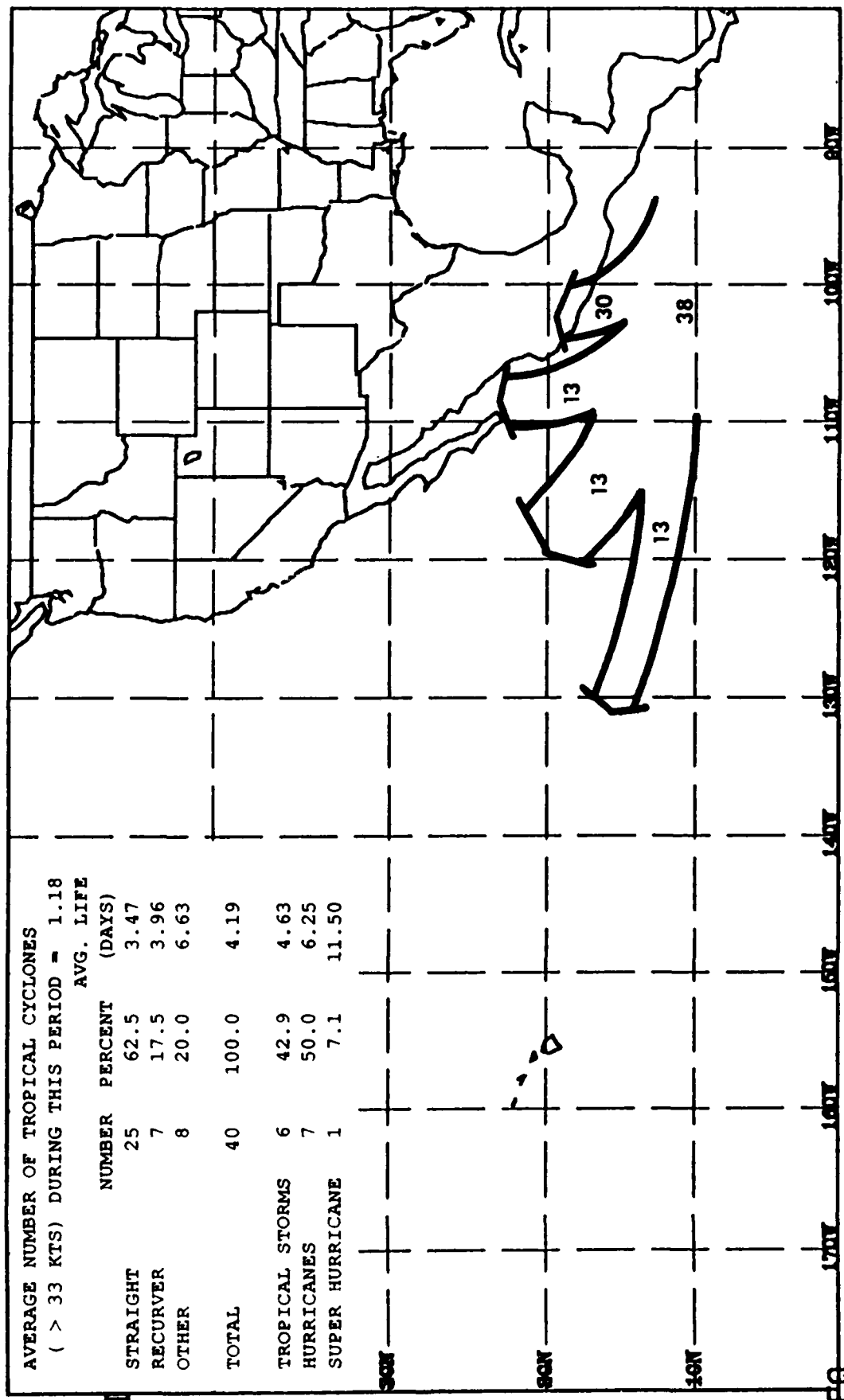
Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number).
 Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed.
 Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year per time period.

SPEED OF MOVEMENT FOR MAY 9 - MAY 23



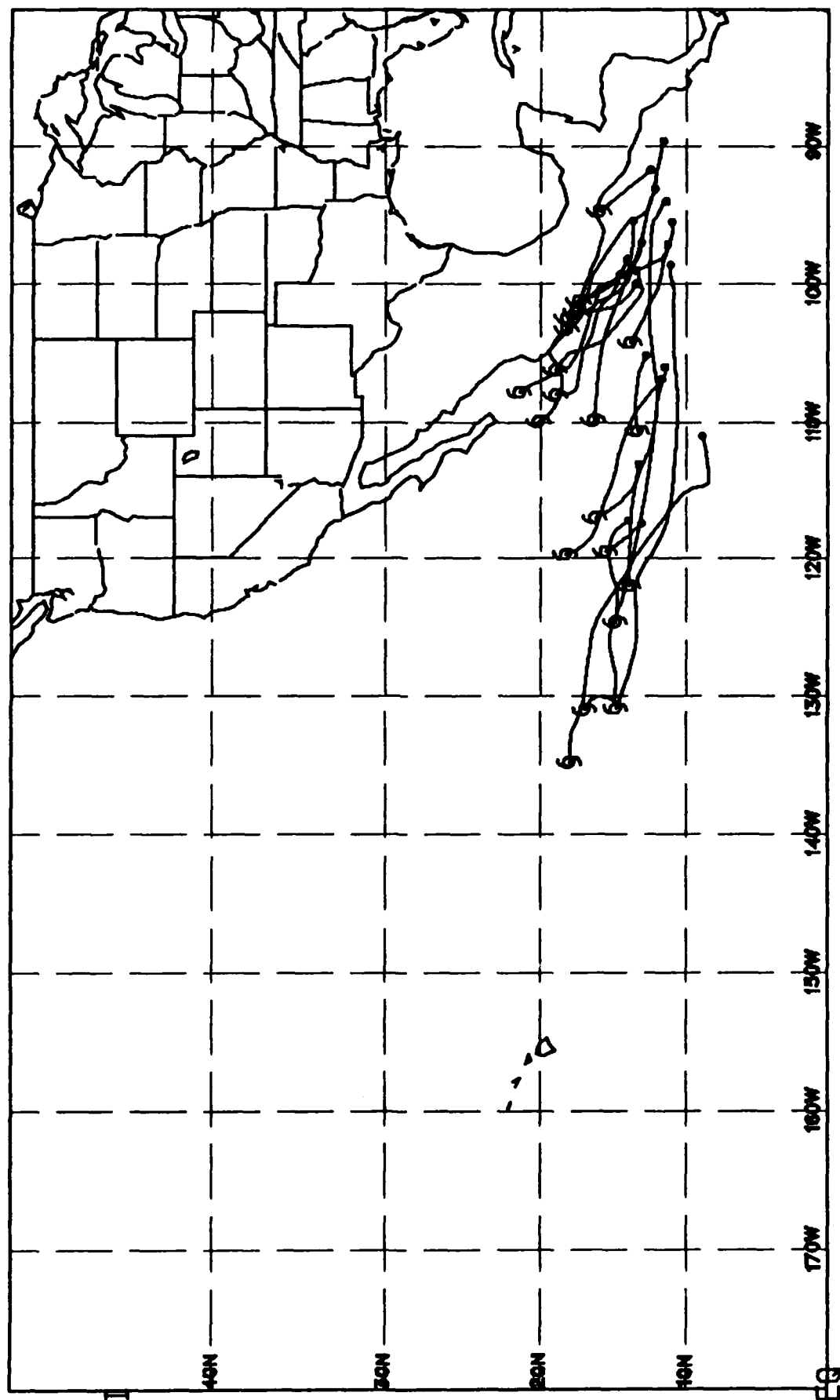
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR MAY 24 - JUN 8



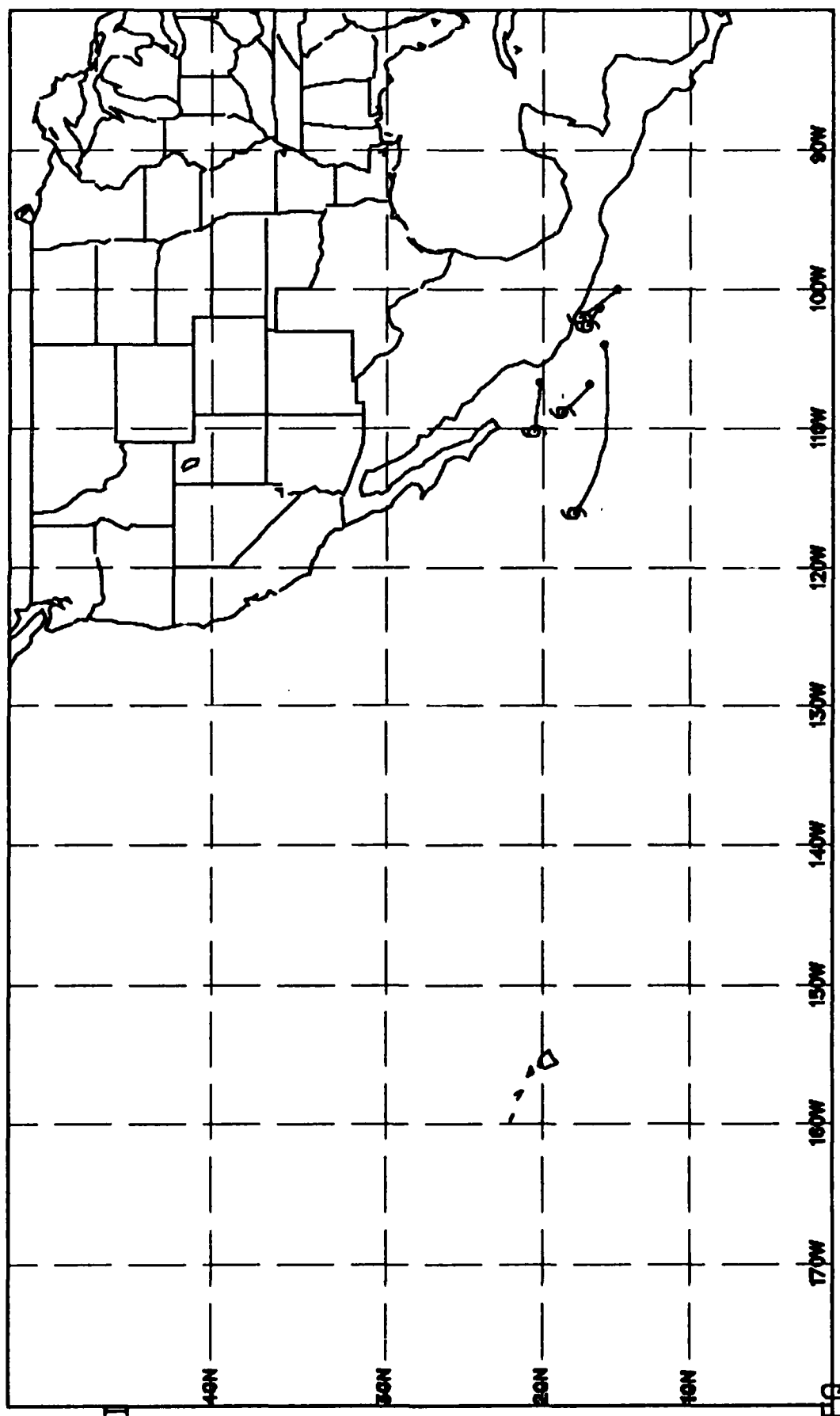
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored.

ACTUAL TRACKS FOR MAY 24 - JUN 8



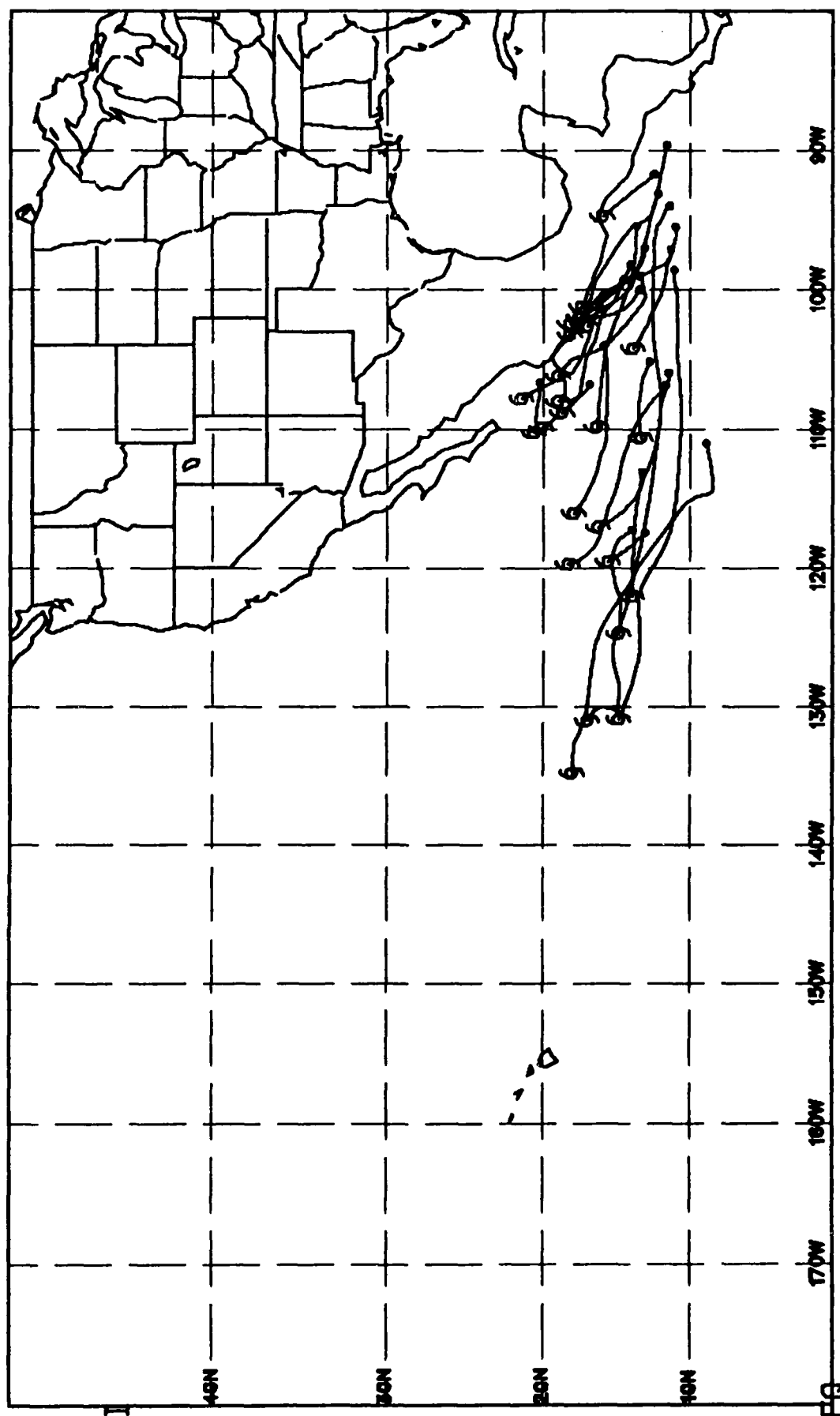
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR MAY 24 - JUN 8



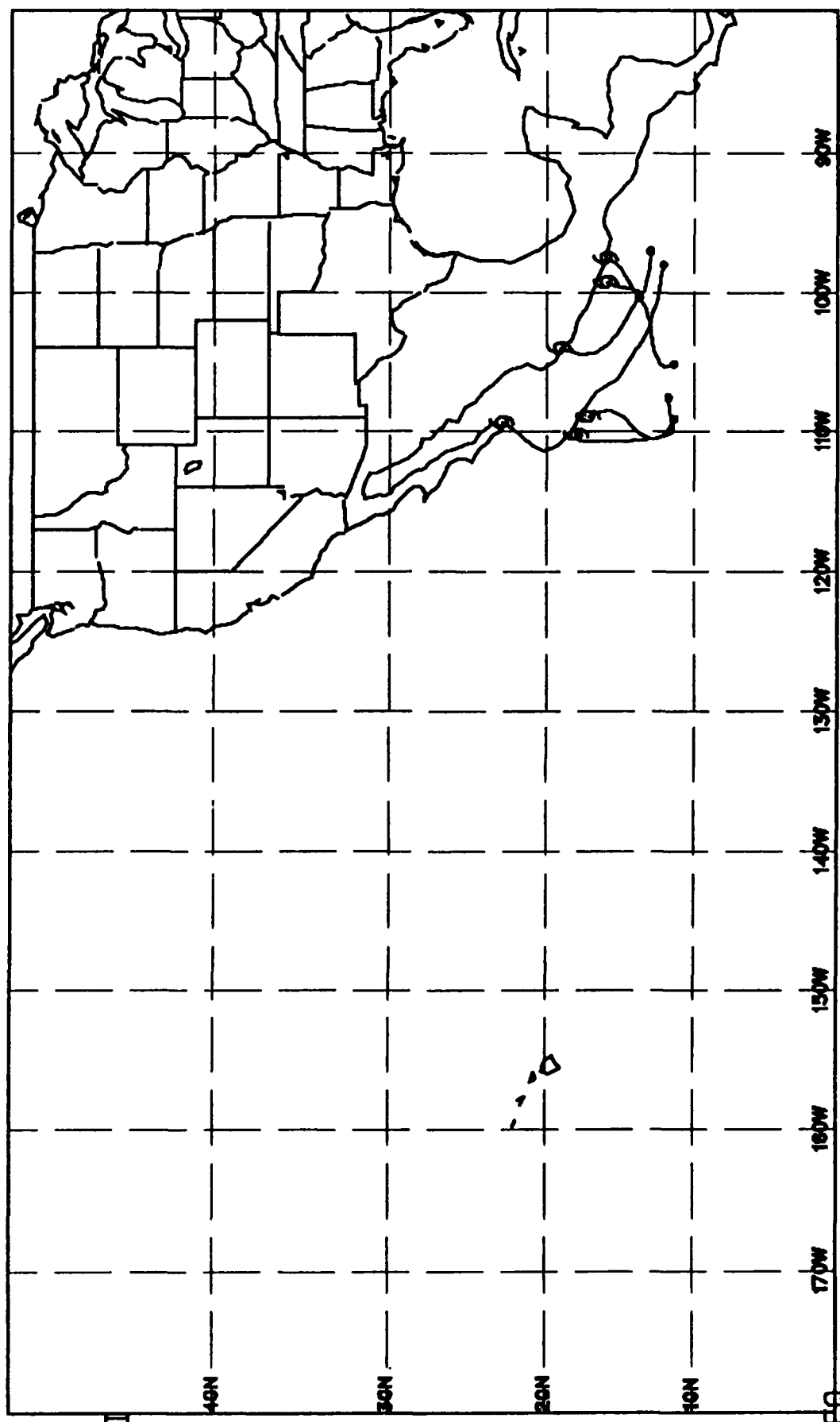
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR MAY 24 - JUN 8



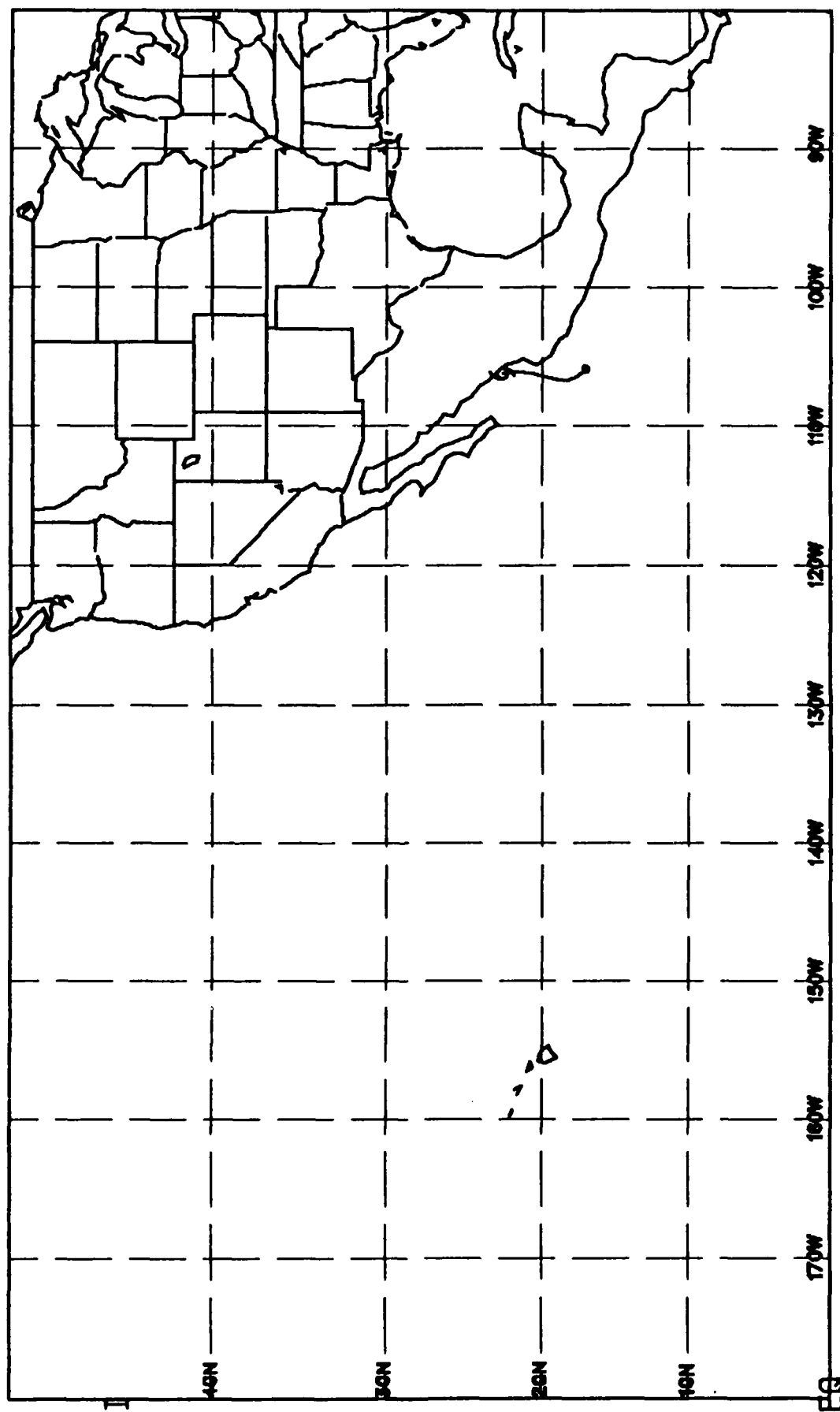
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR MAY 24 - JUN 8



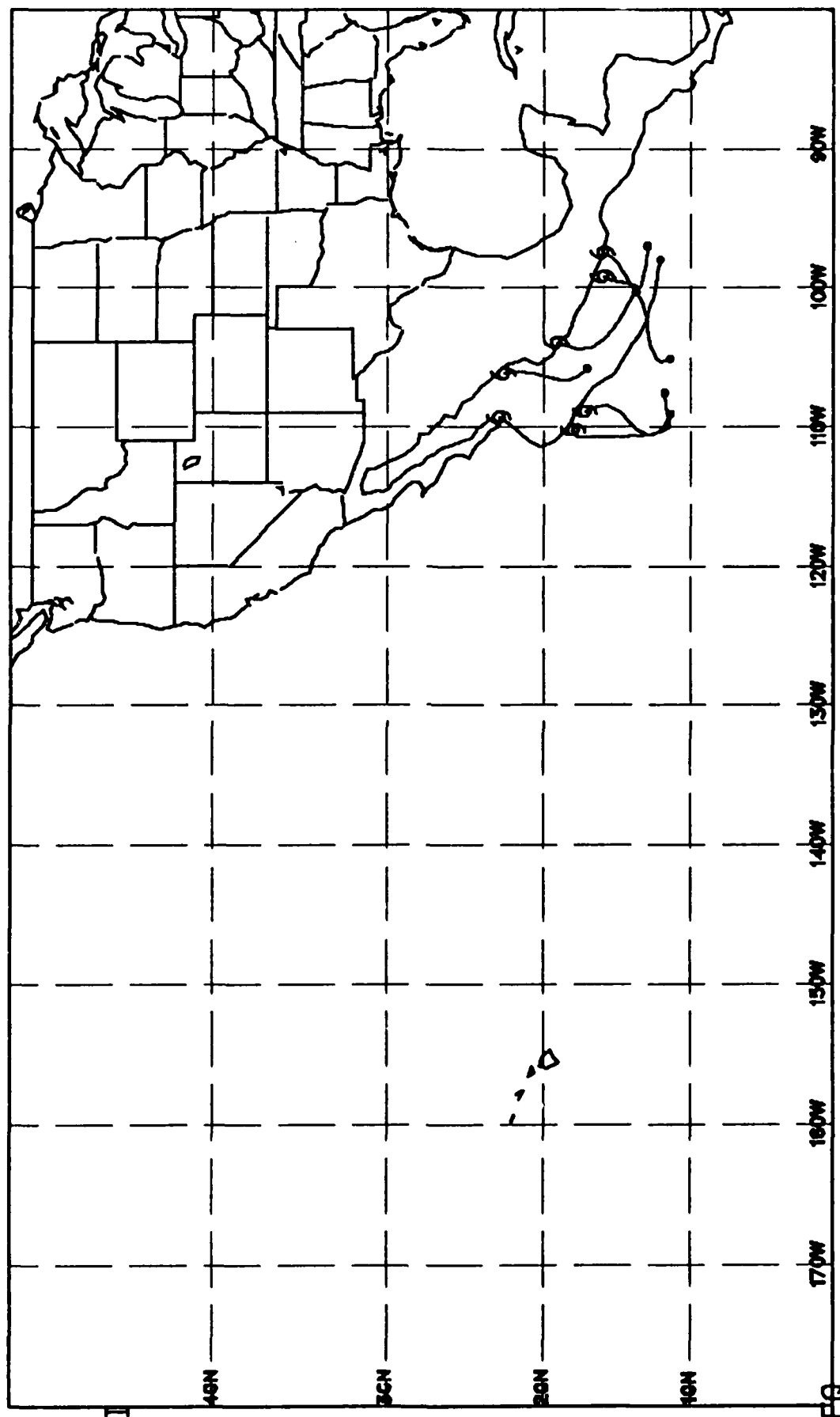
Actual path of recurving tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR MAY 24 - JUN 8



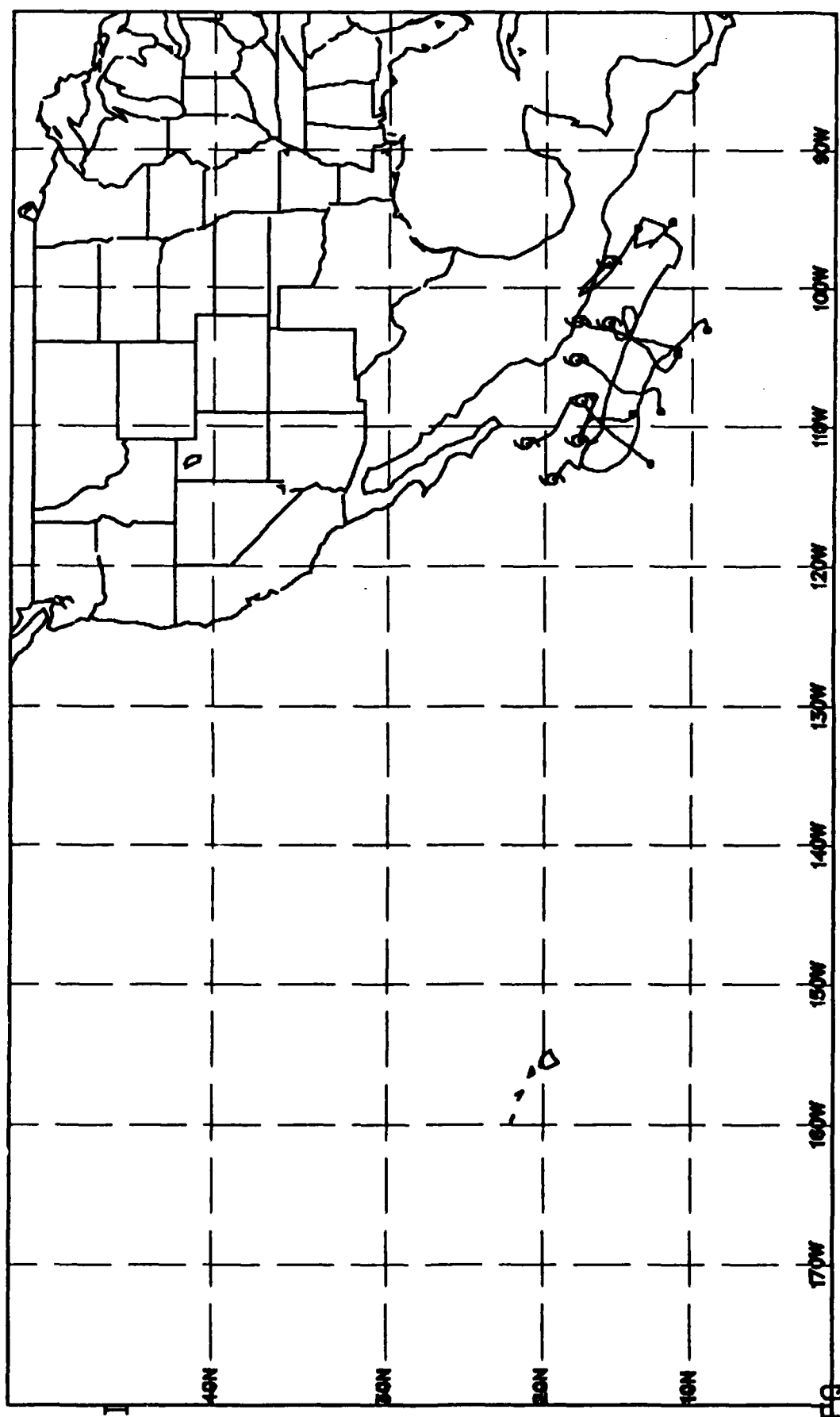
Actual path of recurving tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR MAY 24 - JUN 8



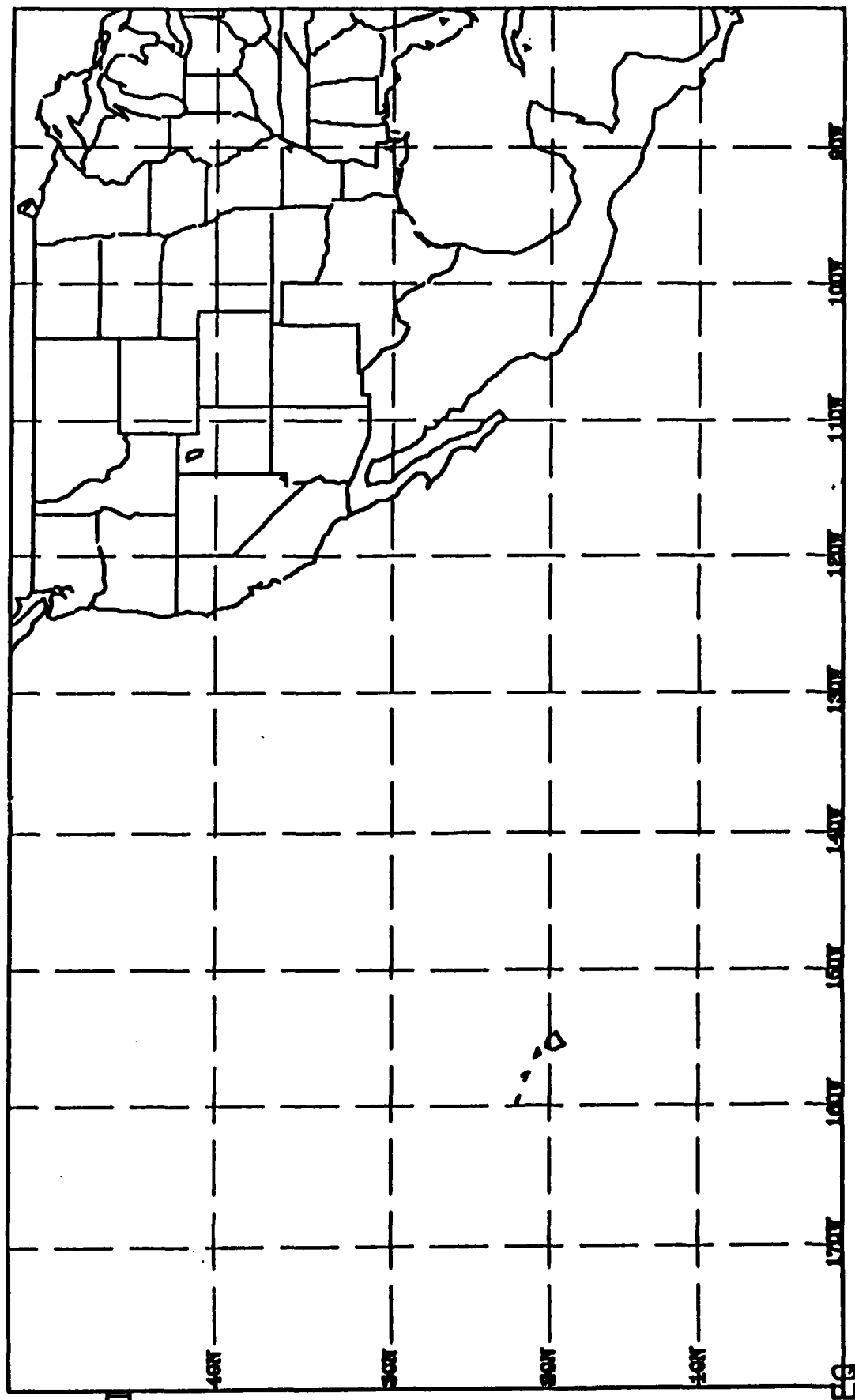
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR MAY 24 - JUN 8



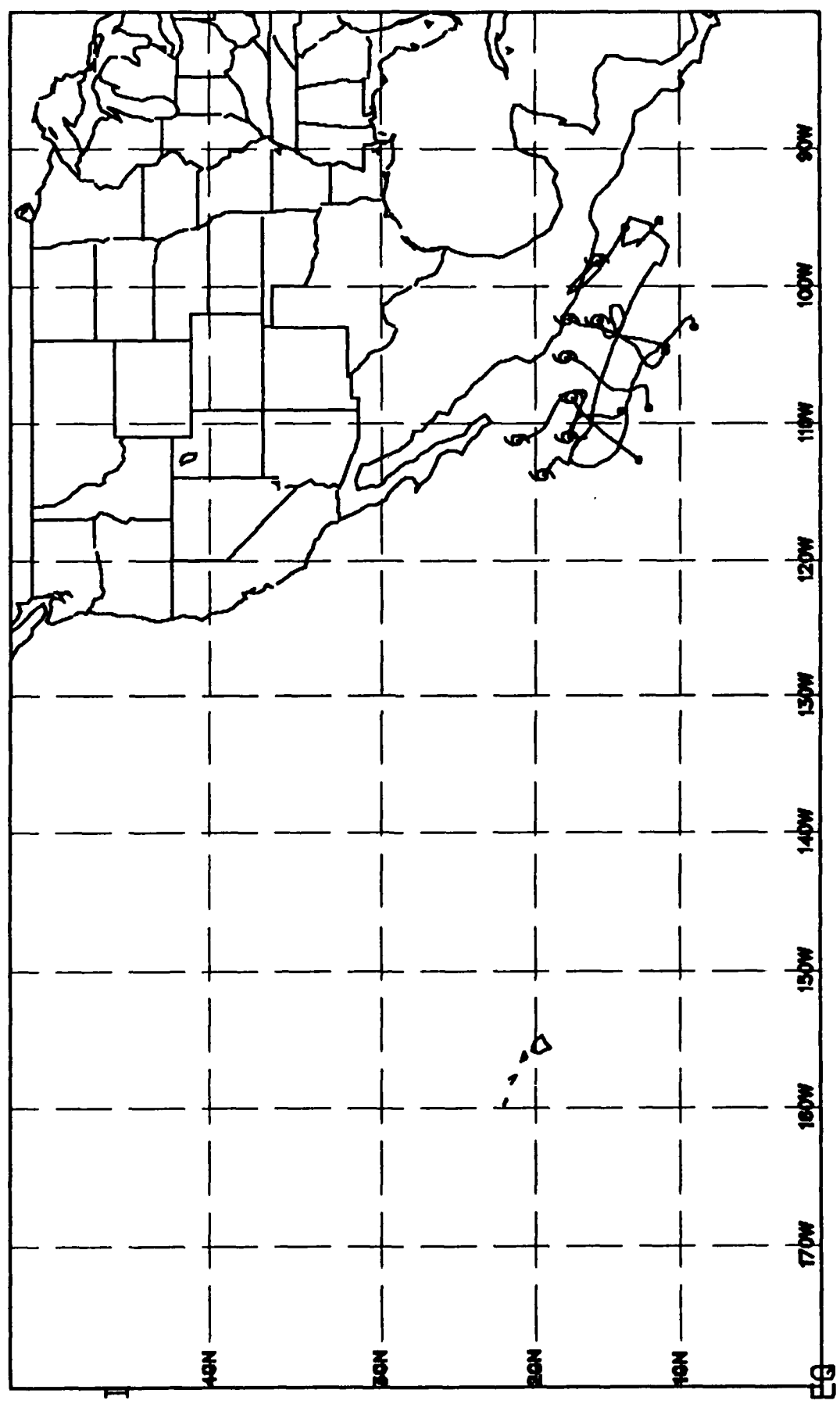
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR MAY 24 - JUN 8



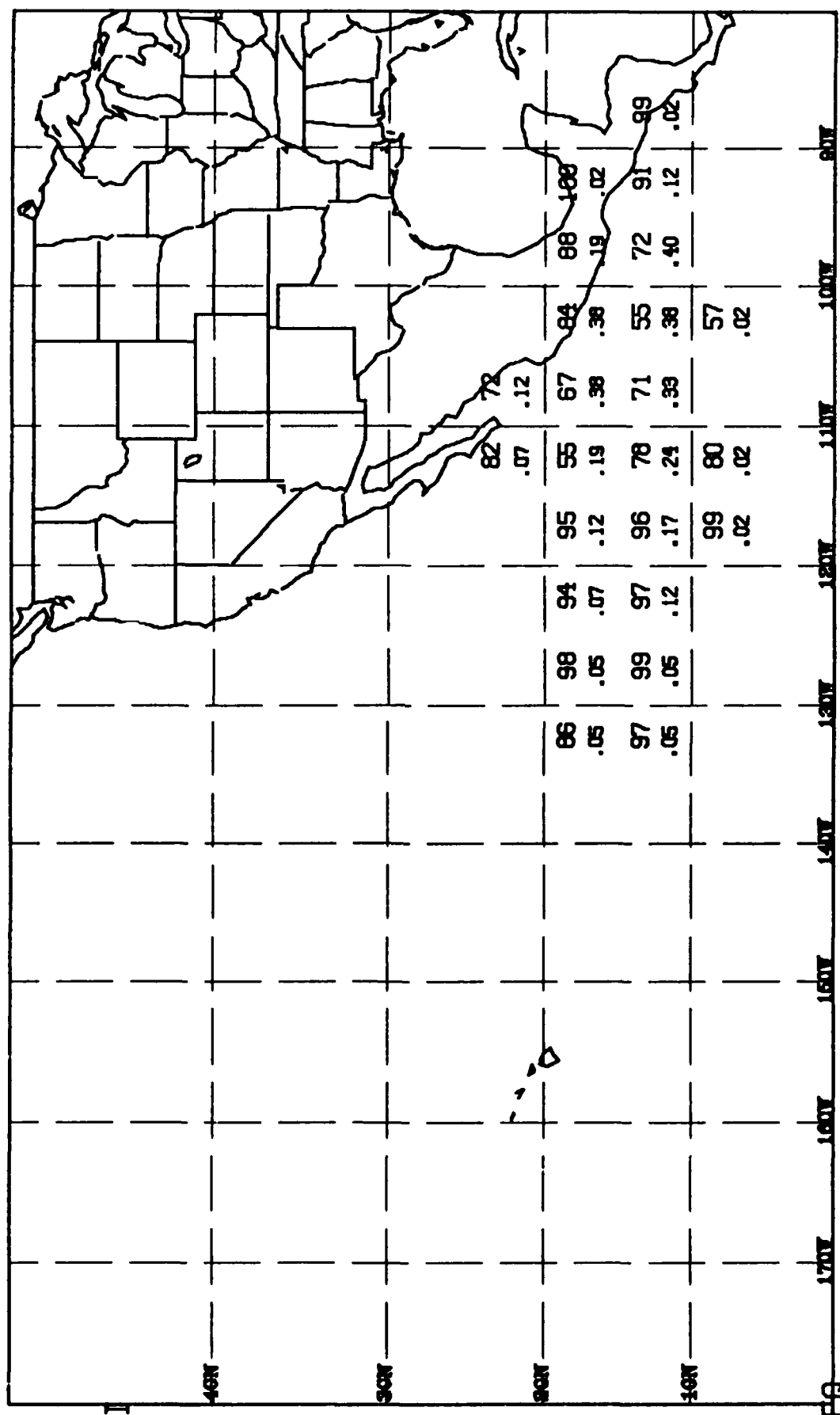
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR MAY 24 - JUN 8



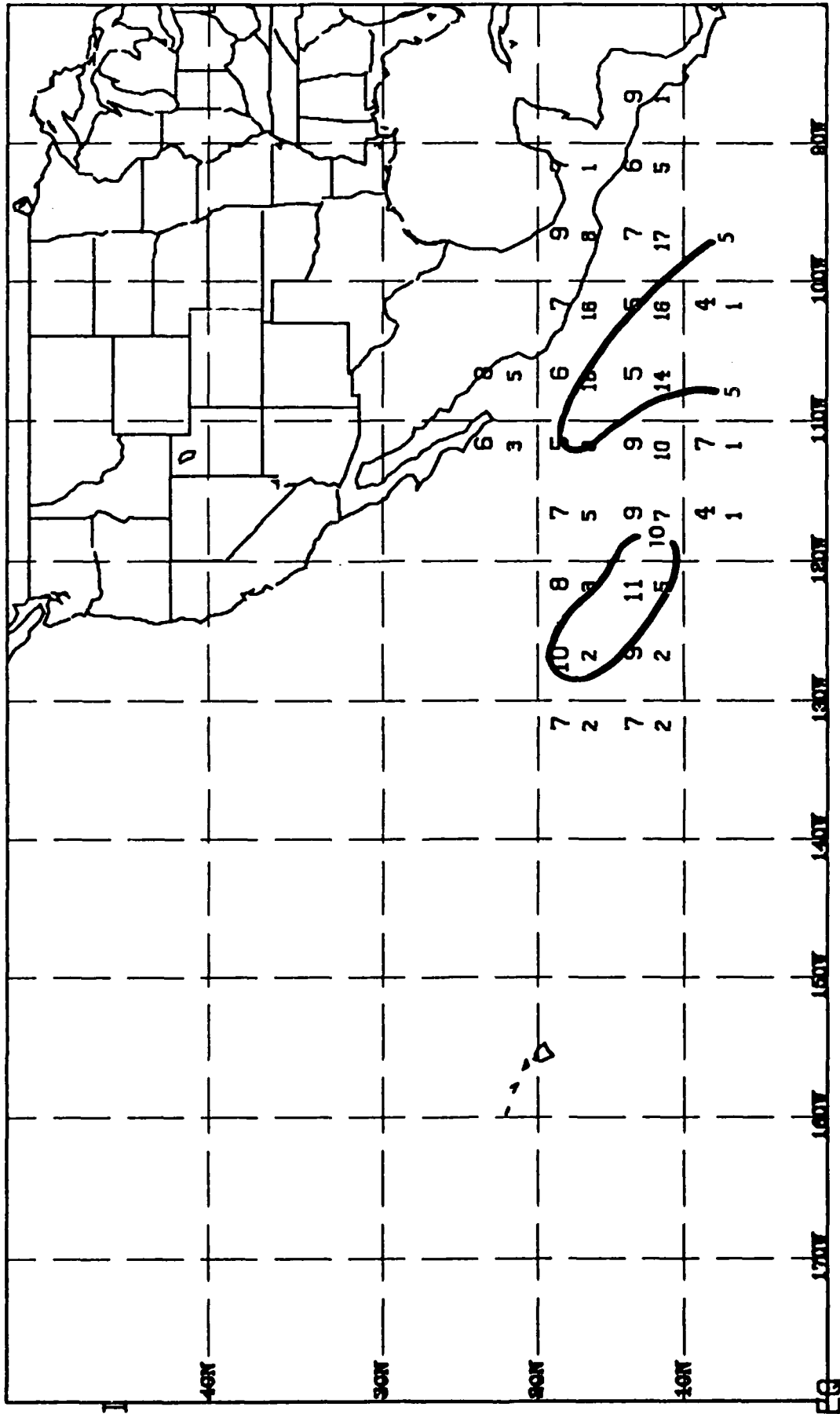
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR MAY 24 - JUN 8



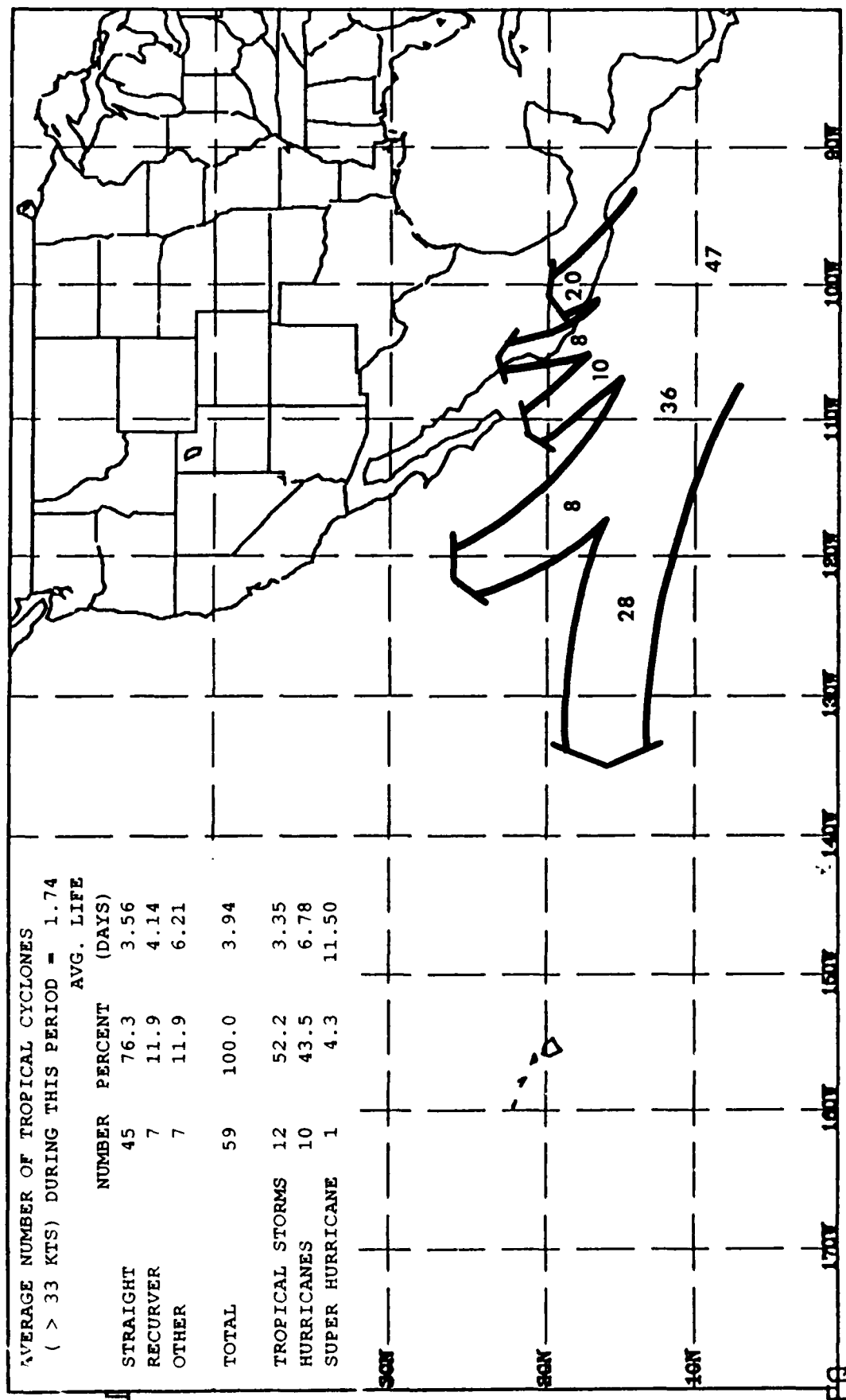
Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number).
 Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed.
 Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year per time period.

SPEED OF MOVEMENT FOR MAY 24 - JUN 8



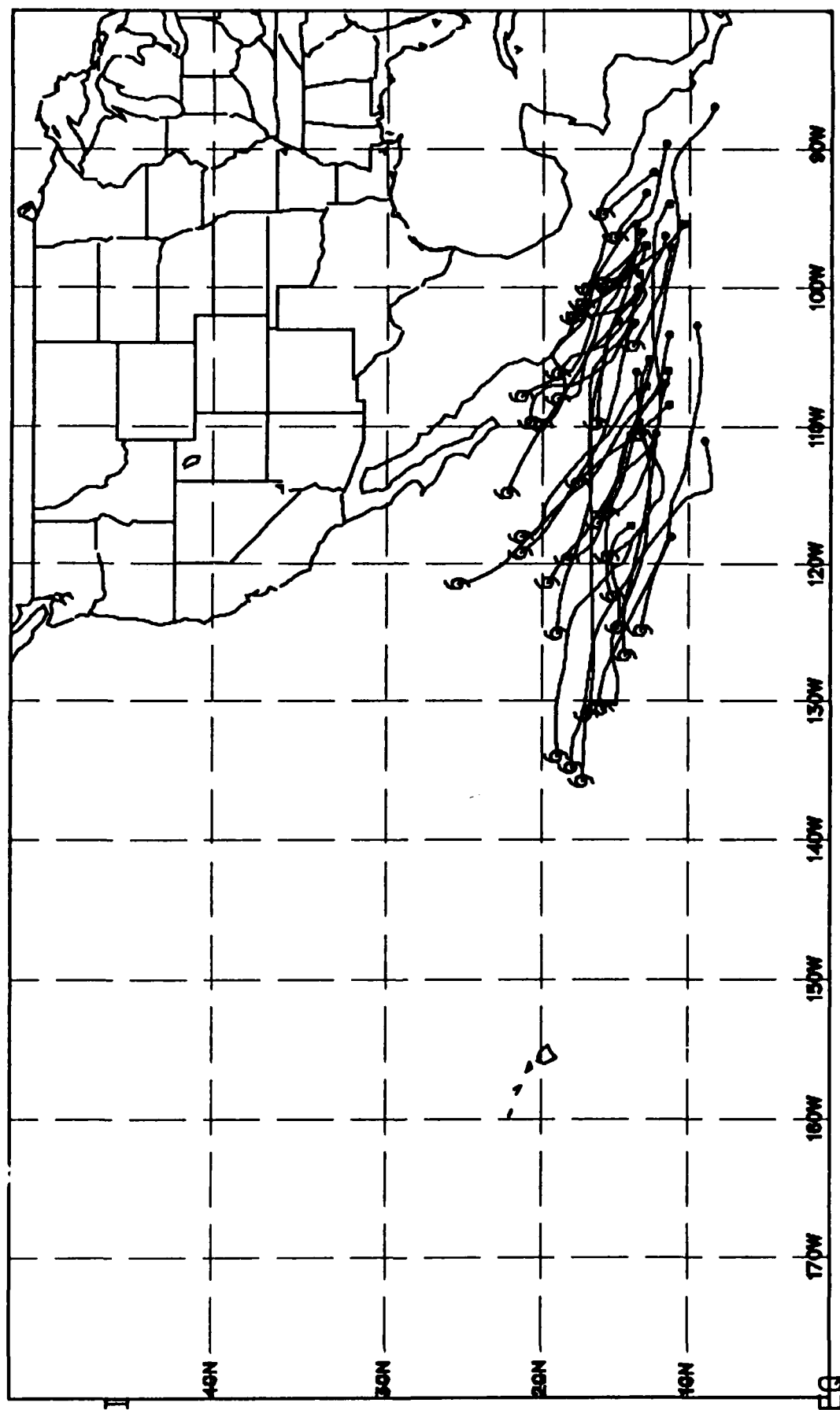
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR JUN 9 - JUN 23



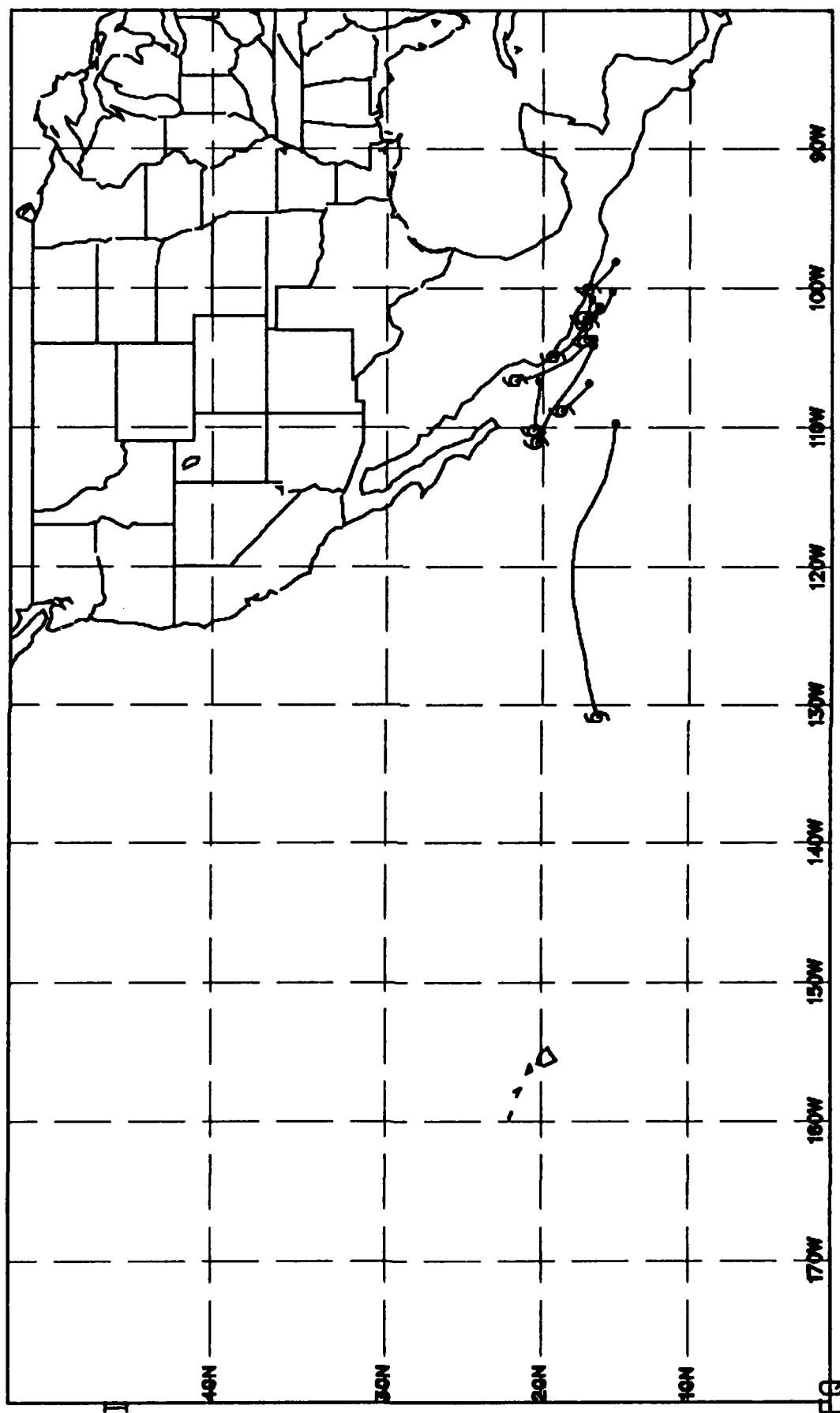
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored.

ACTUAL TRACKS FOR JUN 9 - JUN 23



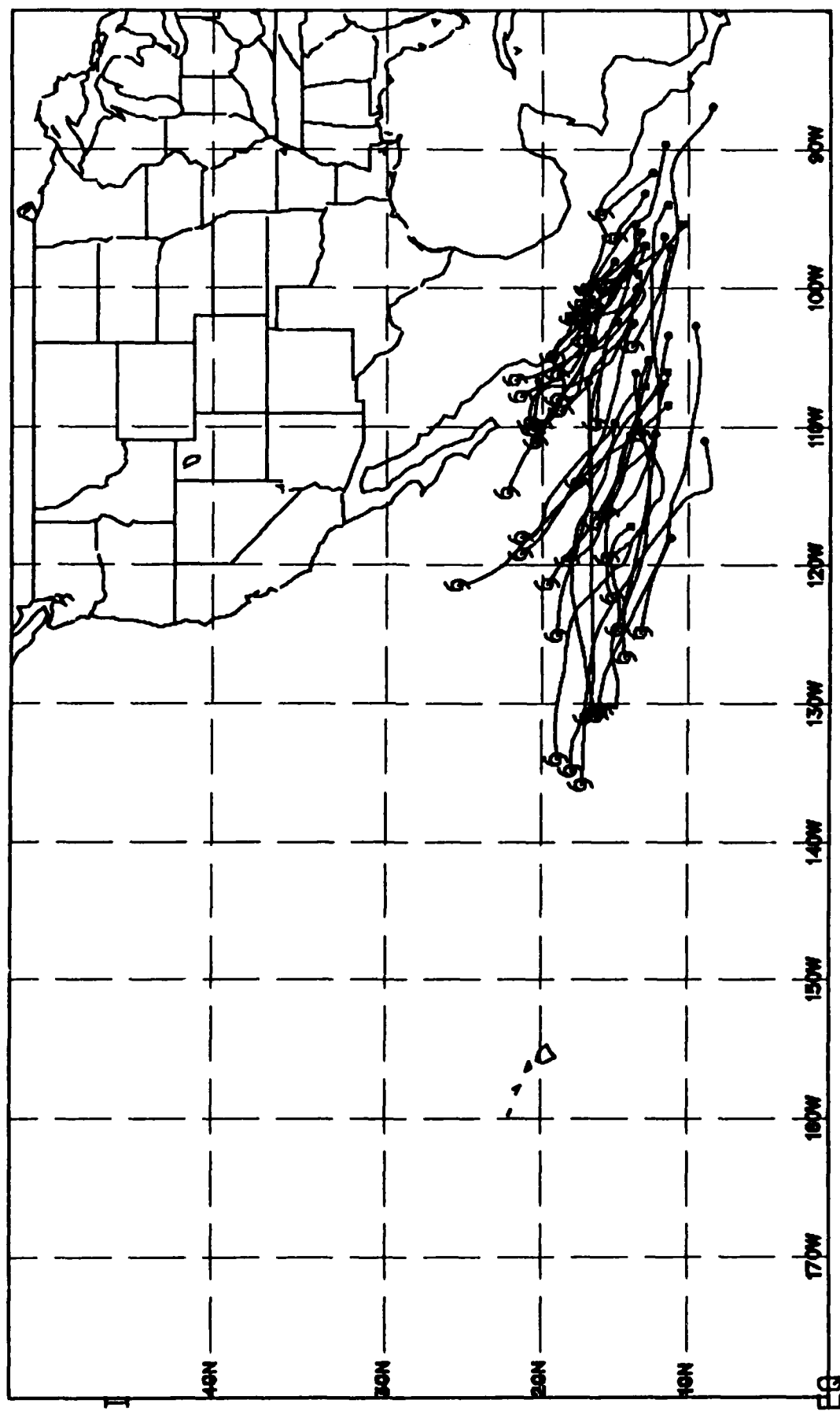
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR JUN 9 - JUN 23



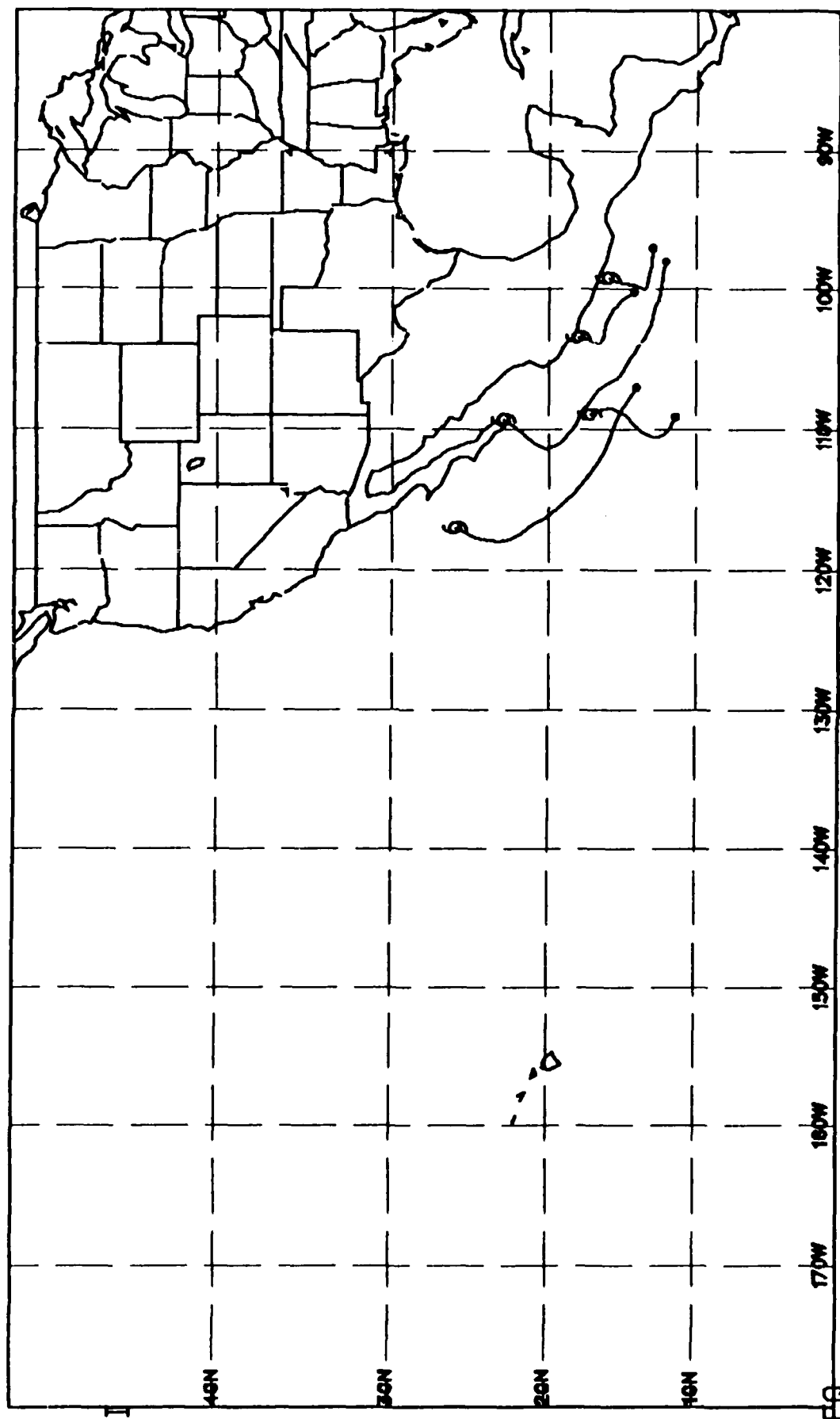
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR JUN 9 - JUN 23



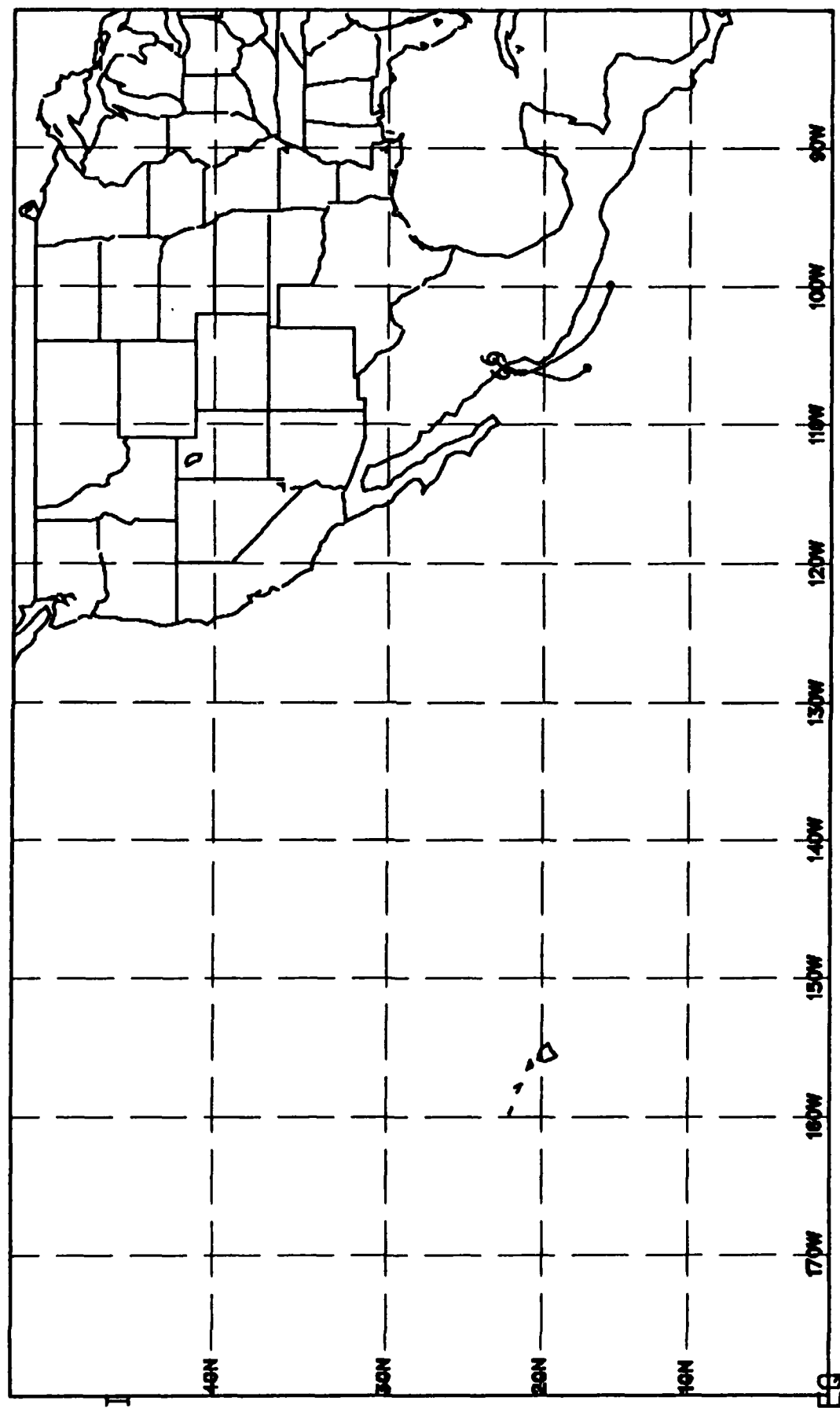
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR JUN 9 - JUN 23



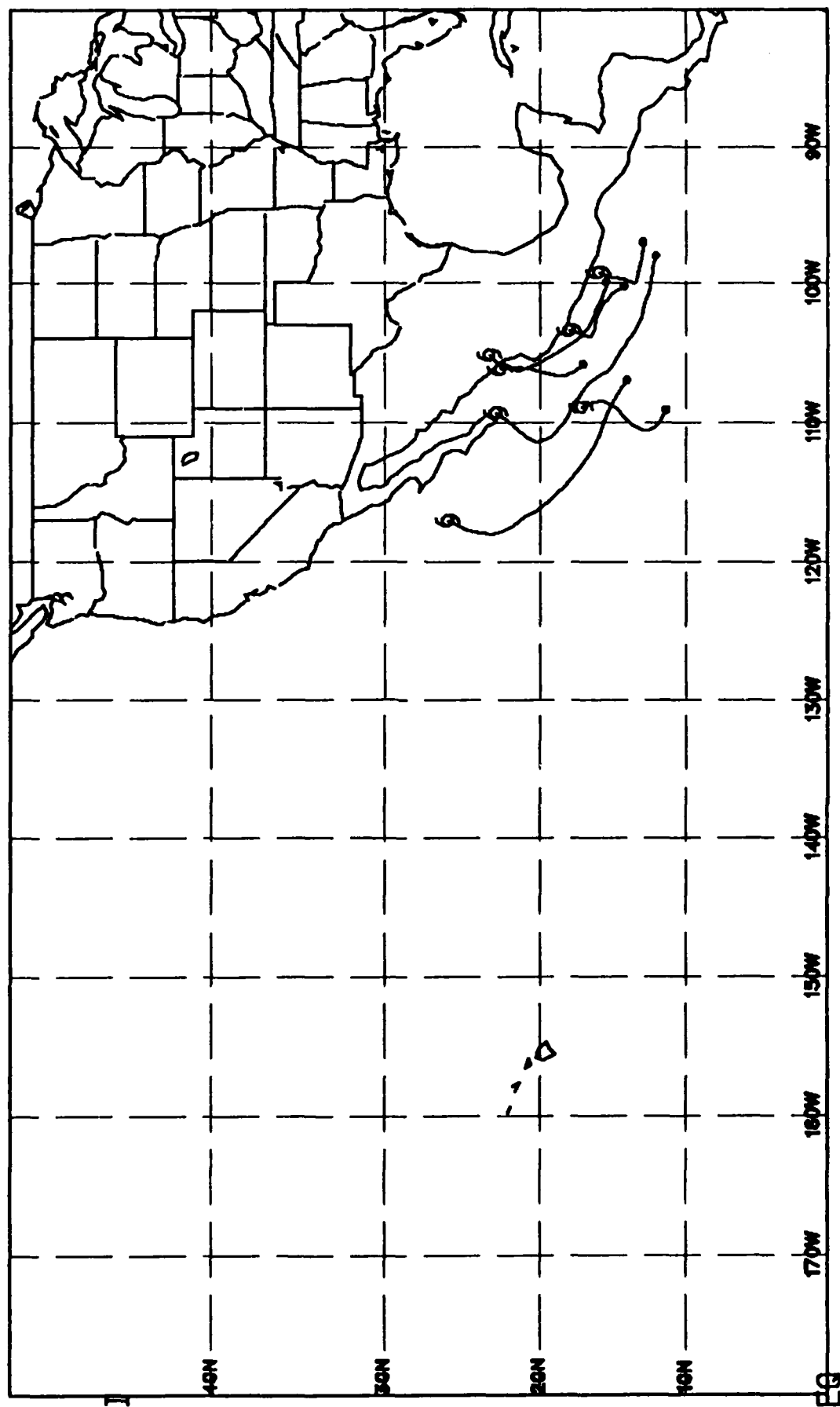
Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR JUN 9 - JUN 23



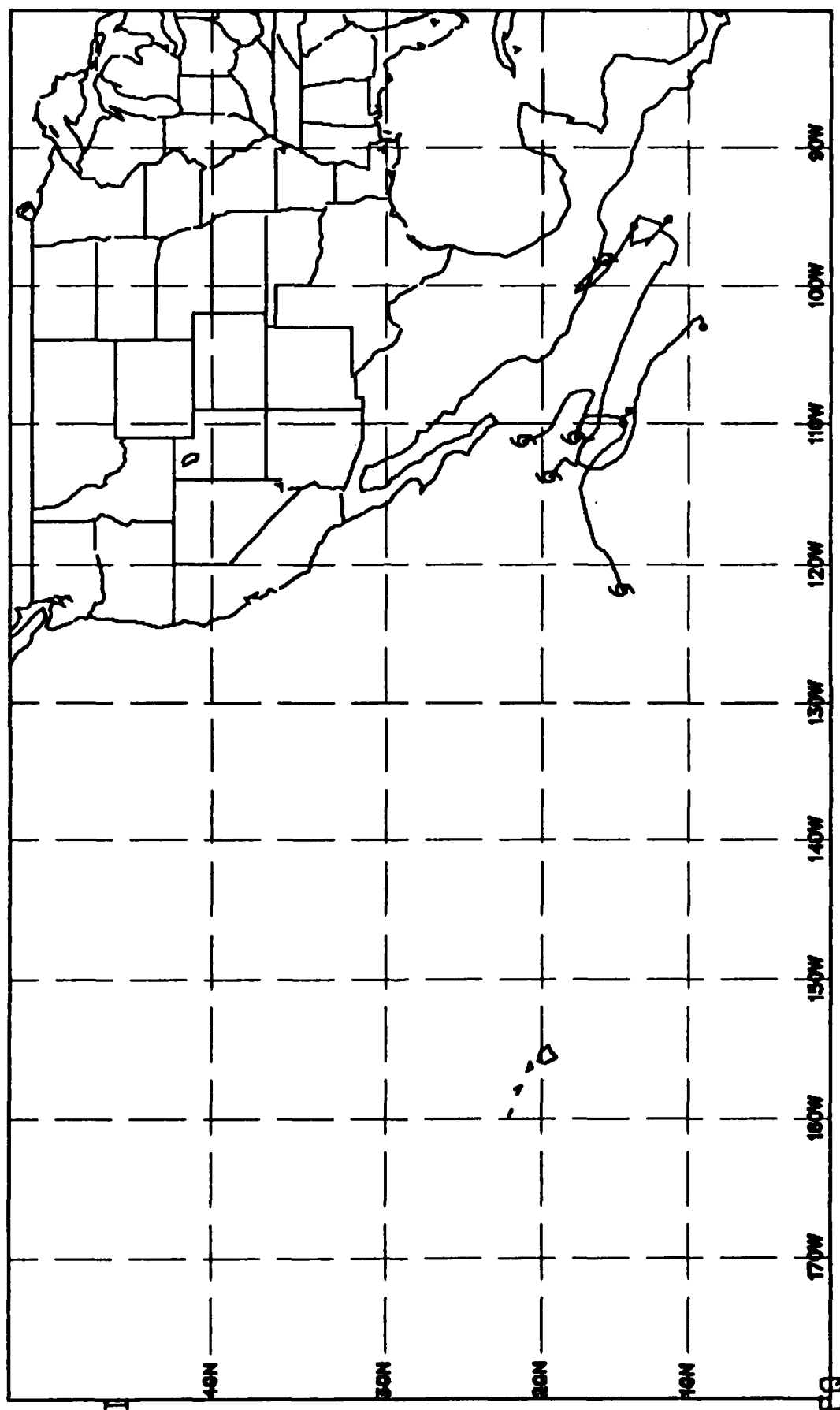
Actual path of recurving tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR JUN 9 - JUN 23



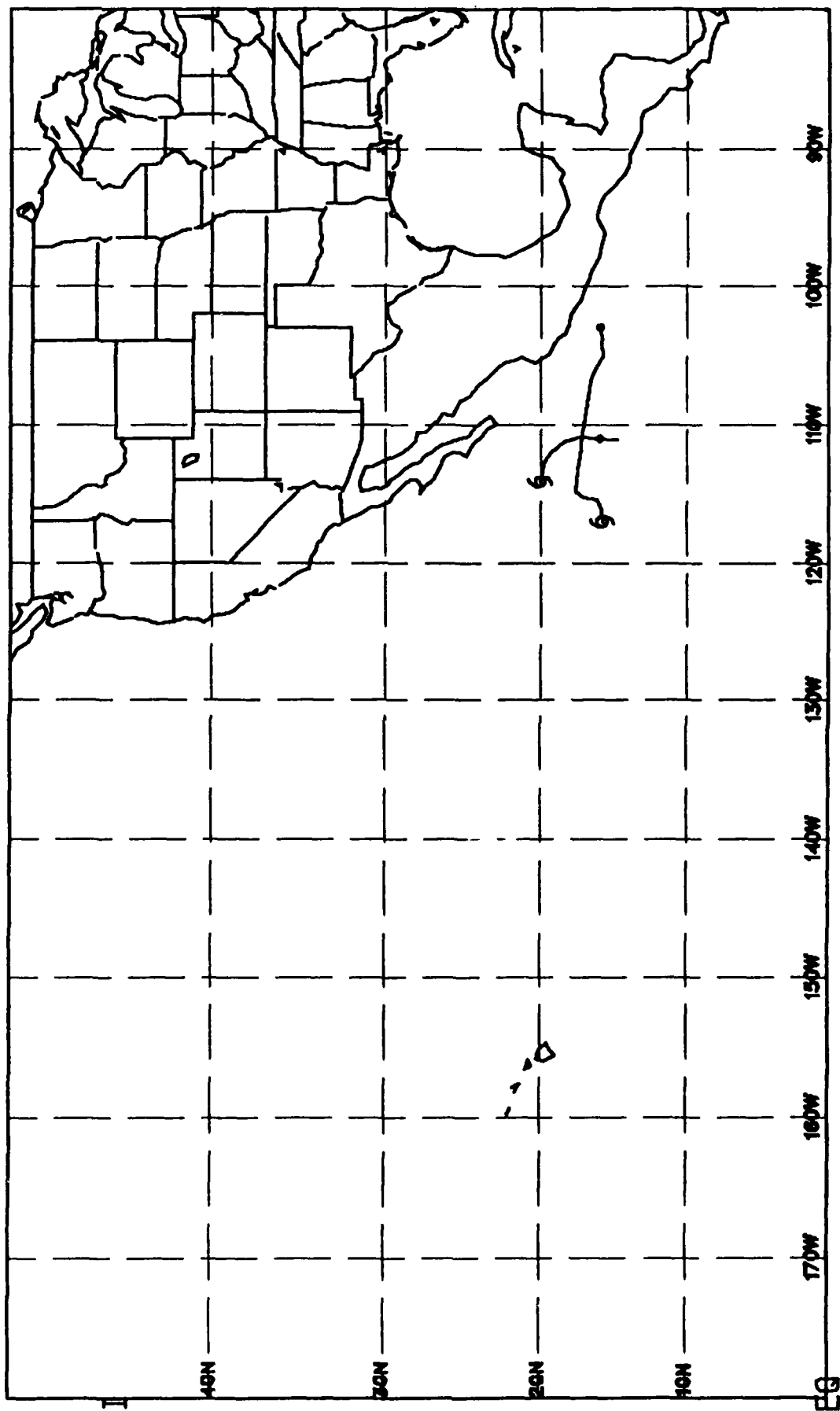
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR JUN 9 - JUN 23



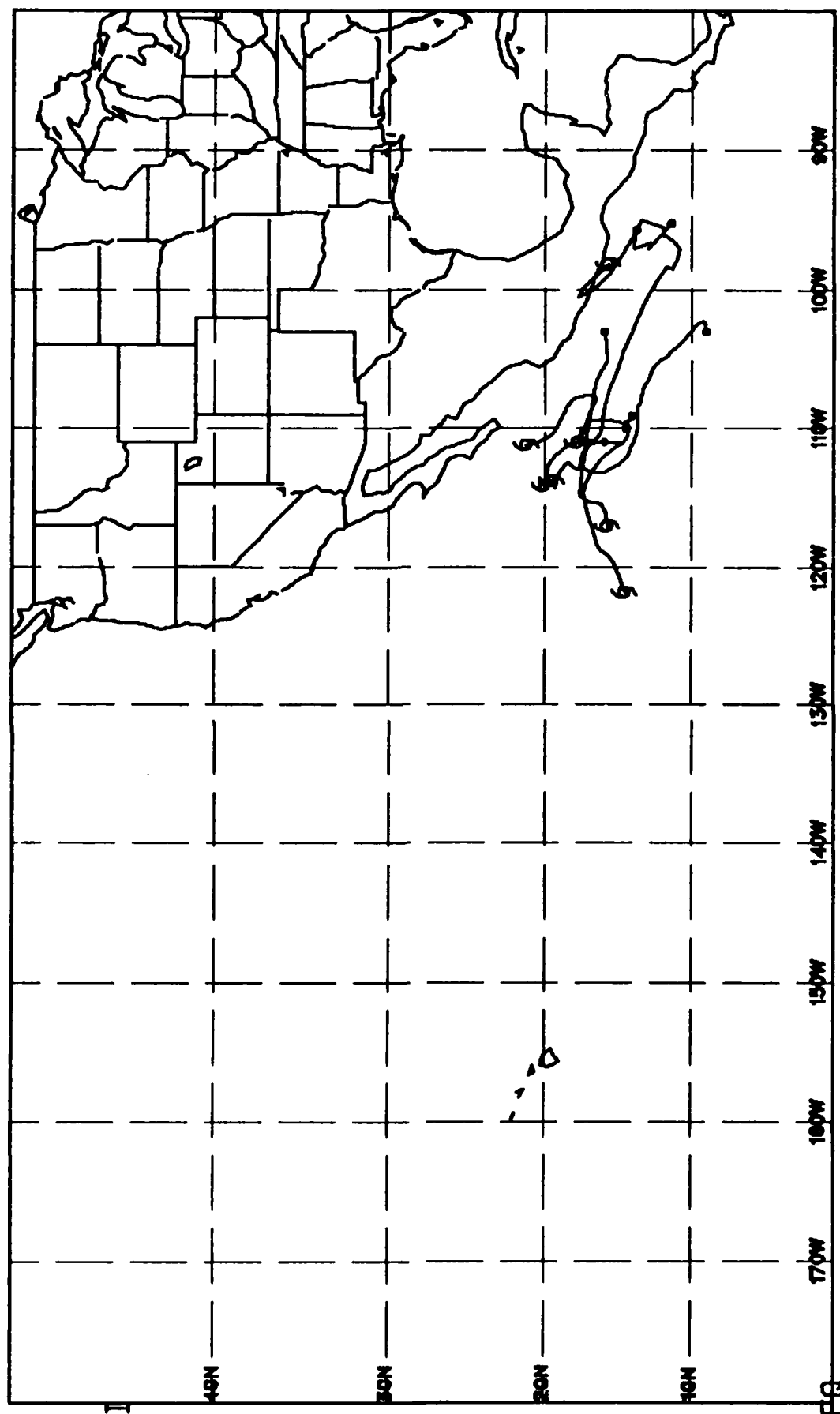
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR JUN 9 - JUN 23



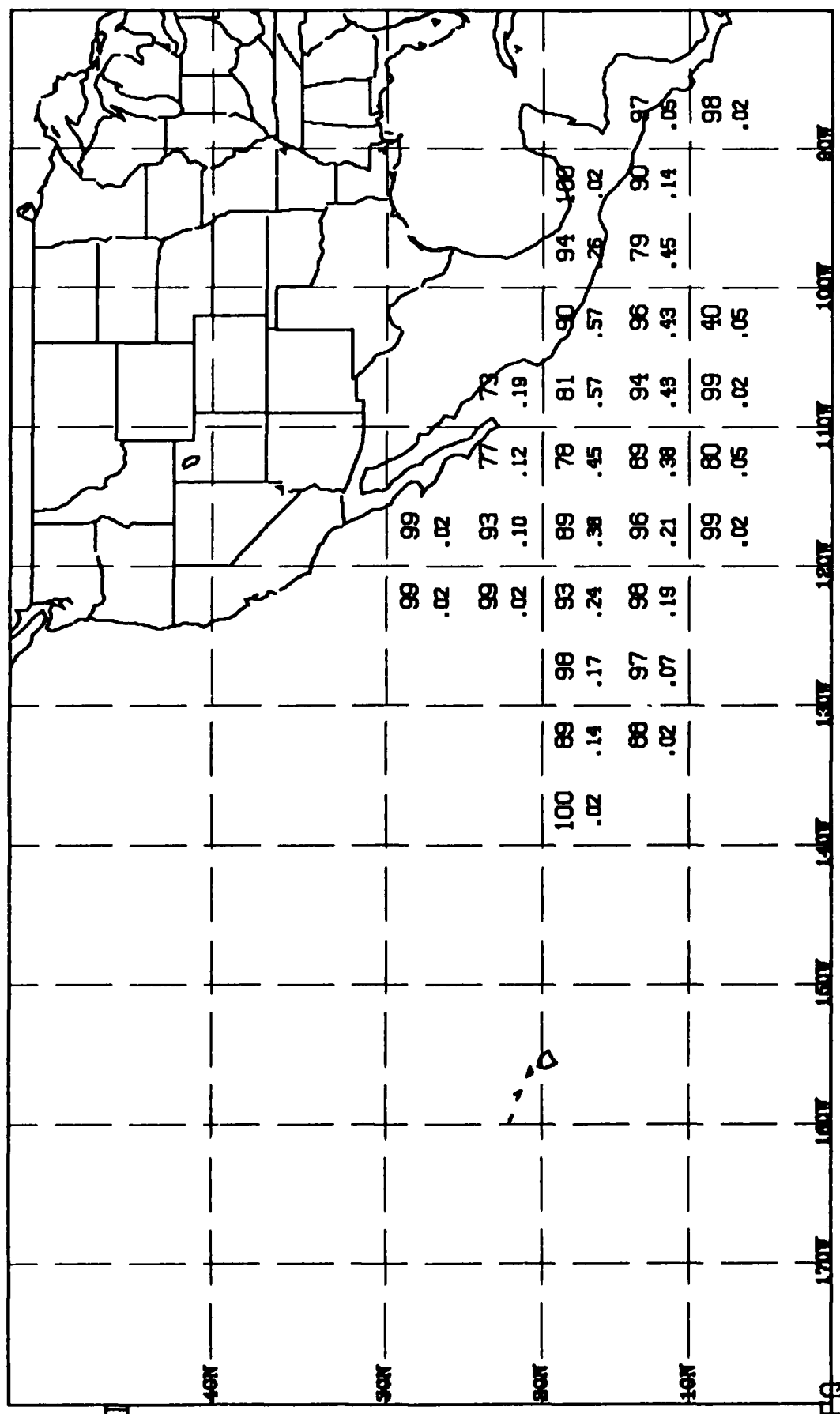
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR JUN 9 - JUN 23



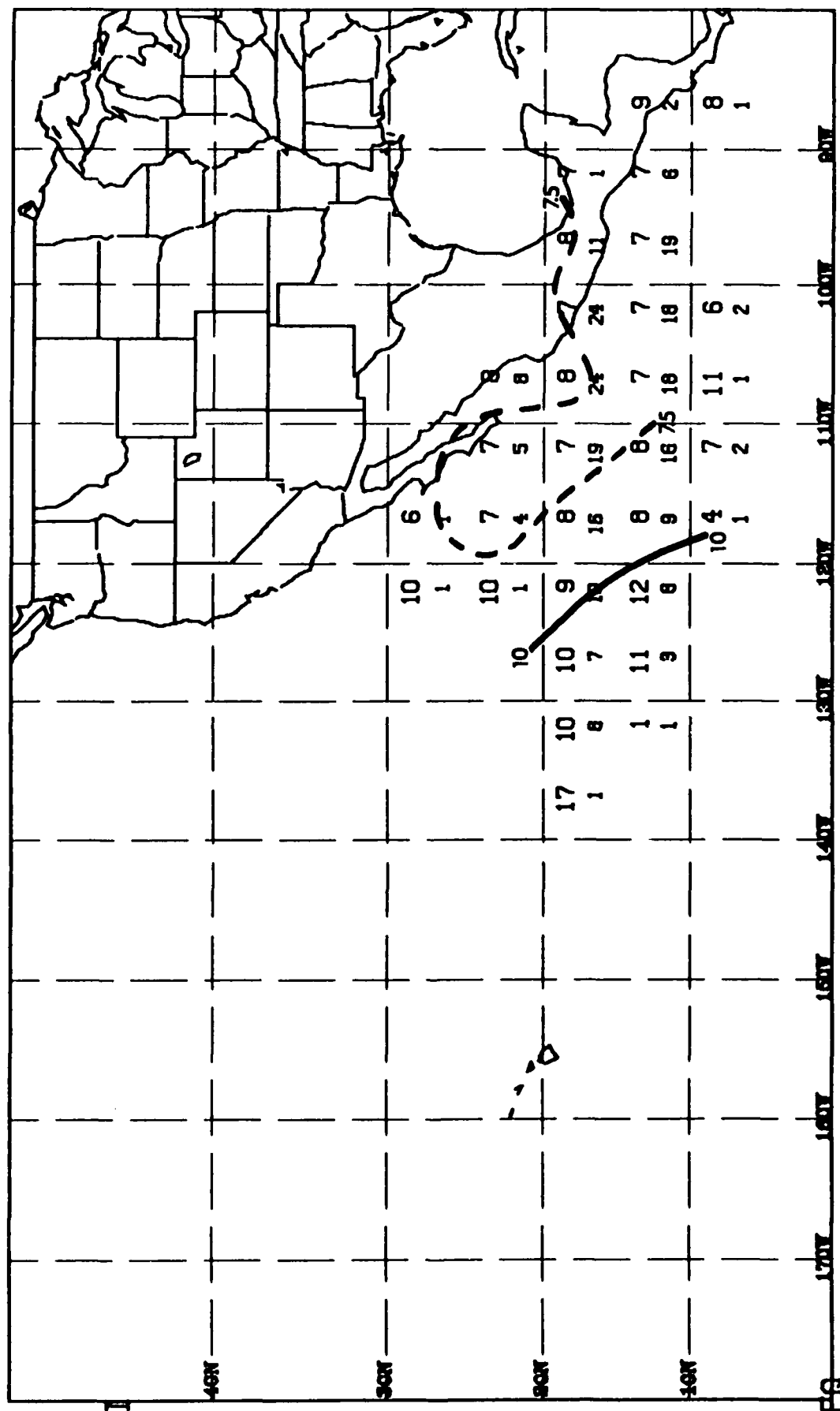
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR JUN 9 - JUN 23



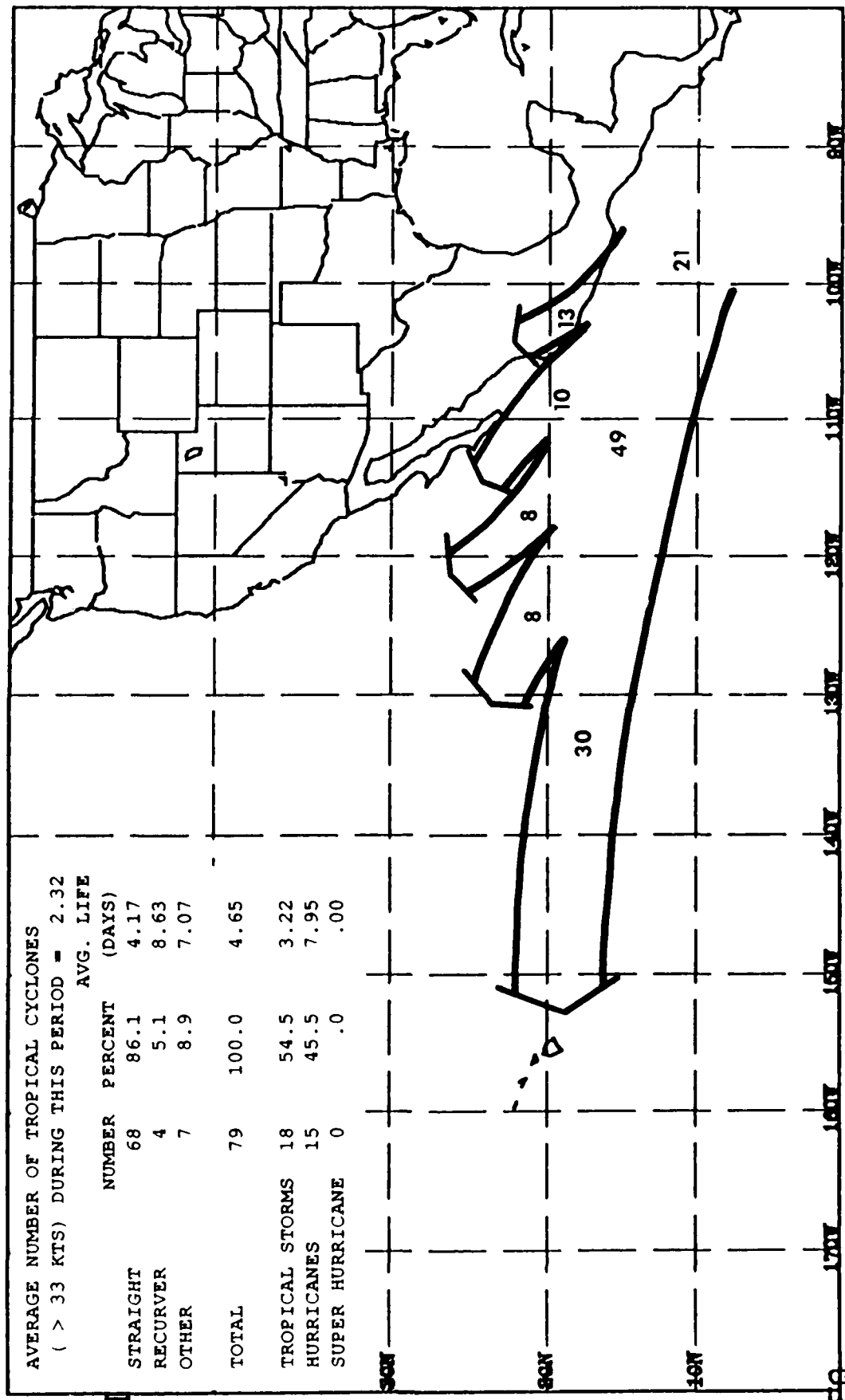
Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number).
 Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed.
 Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year per time period.

SPEED OF MOVEMENT FOR JUN 9 - JUN 23



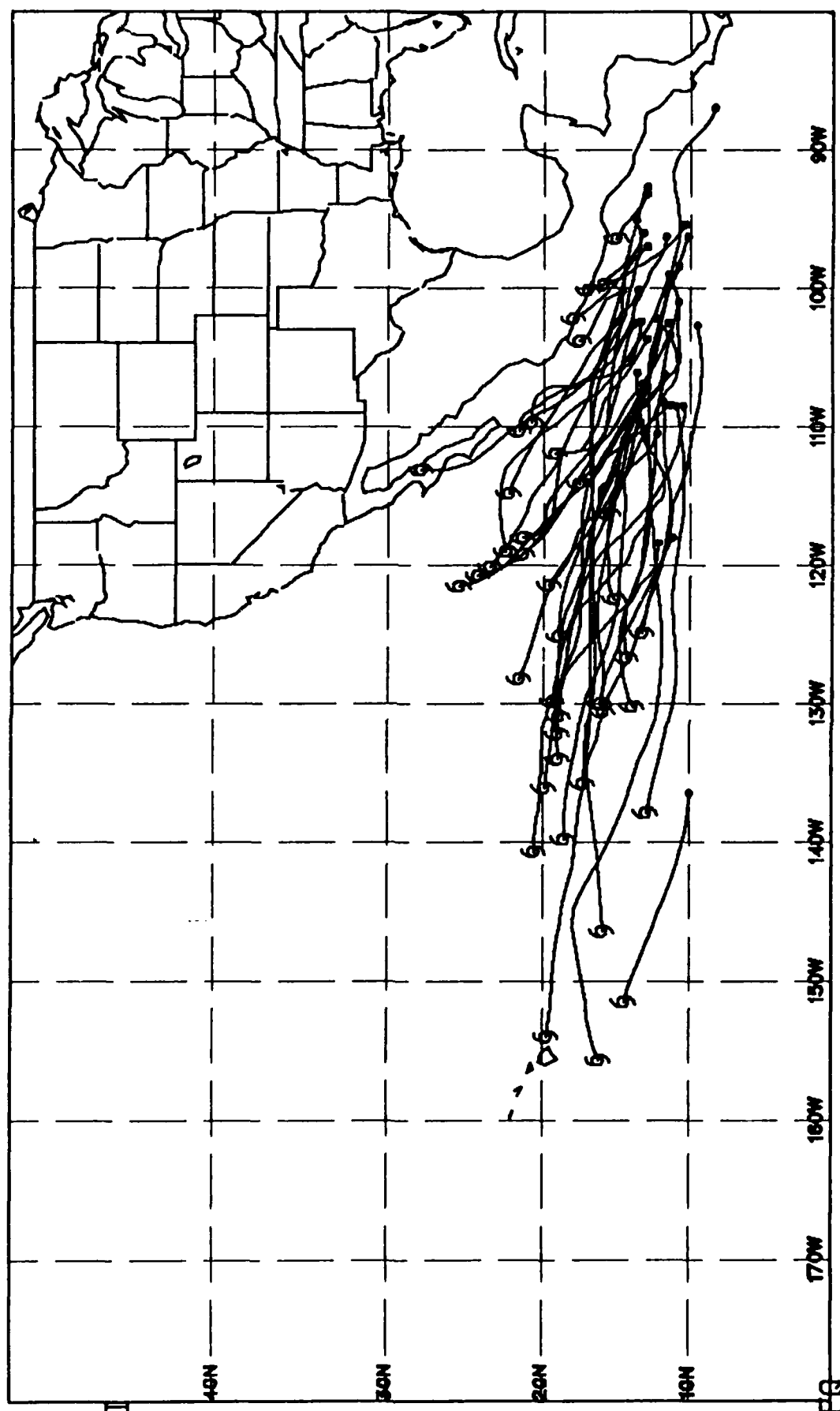
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR JUN 24 - JUL 8



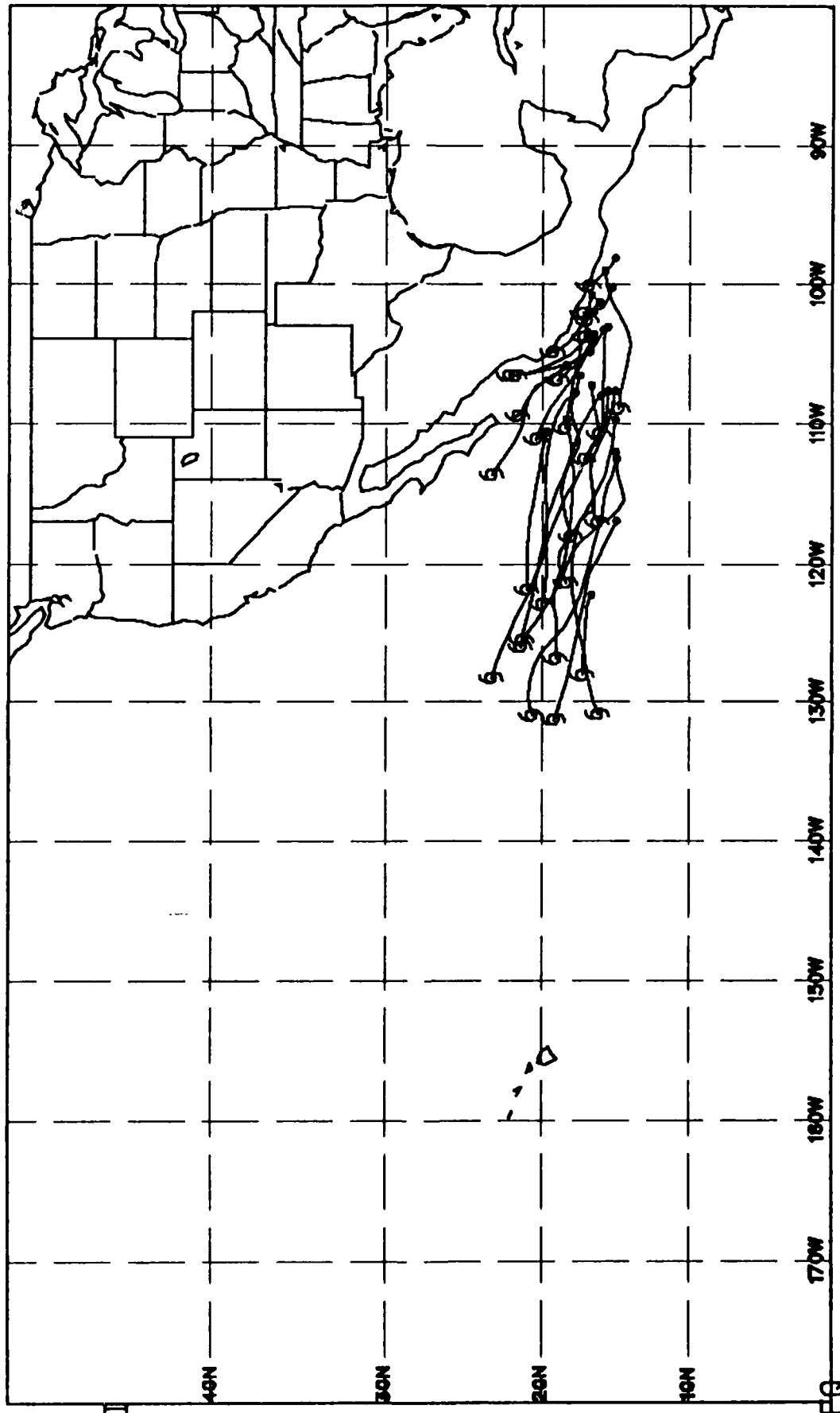
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored.

ACTUAL TRACKS FOR JUN 24 - JUL 8



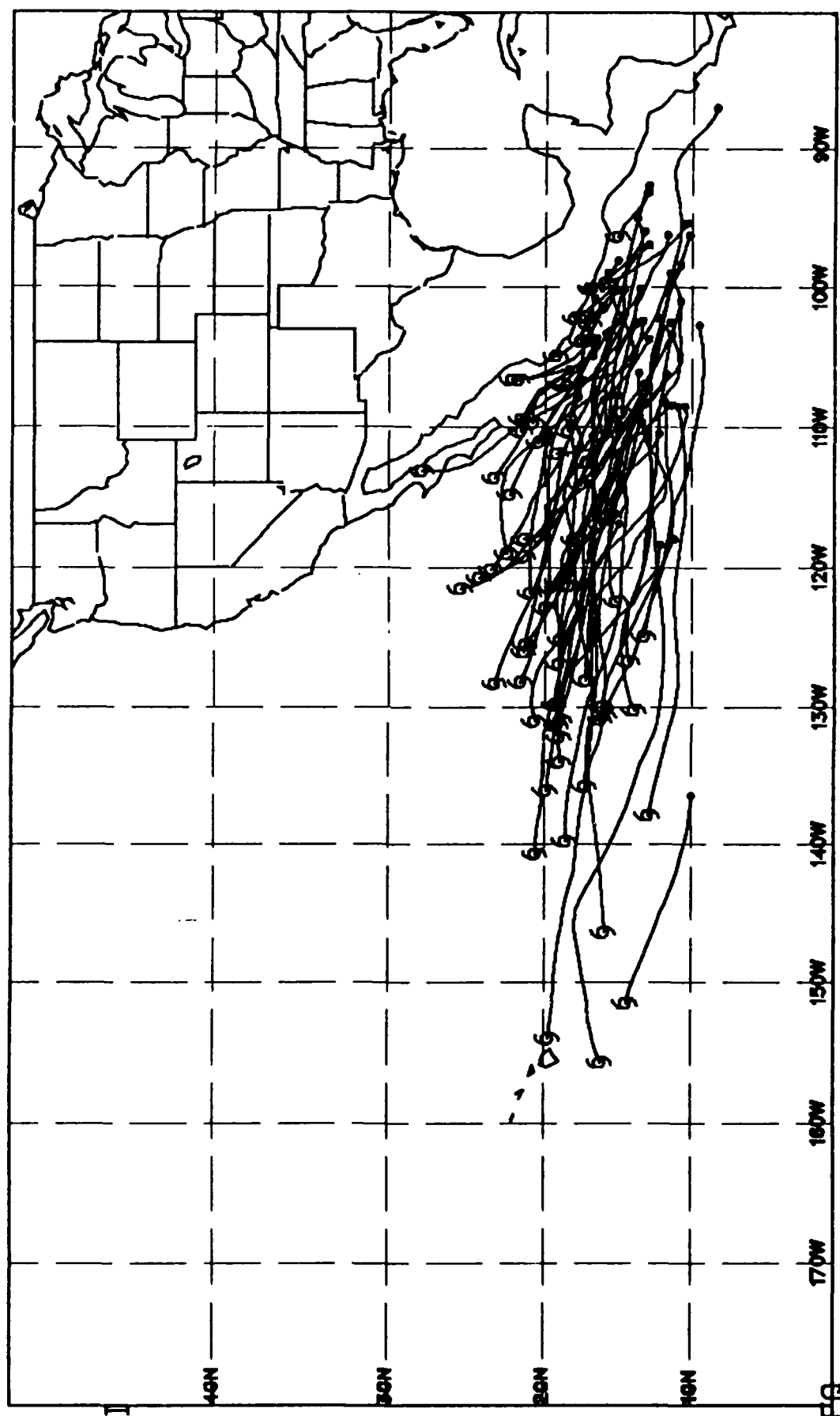
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR JUN 24 - JUL 8



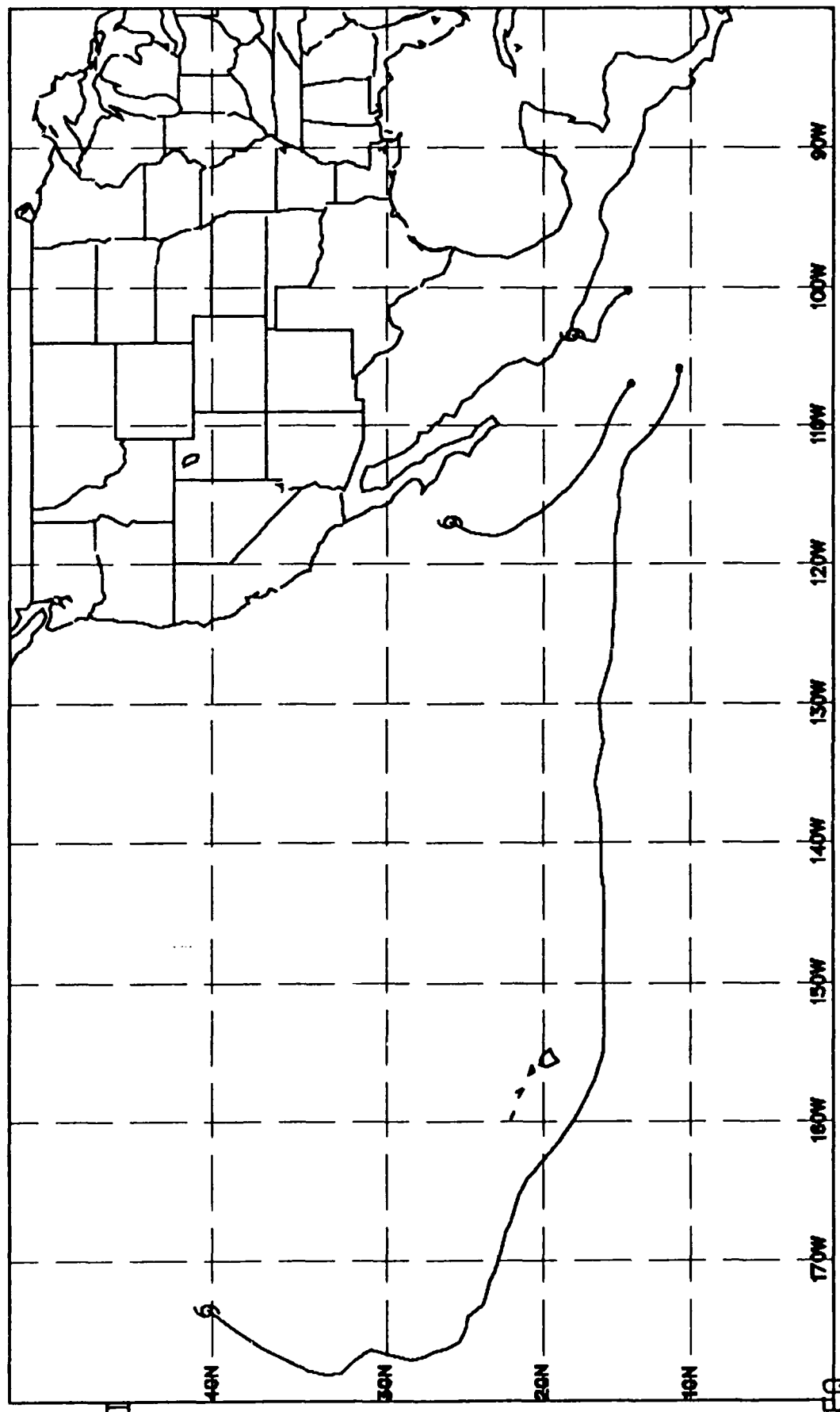
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR JUN 24 - JUL 8



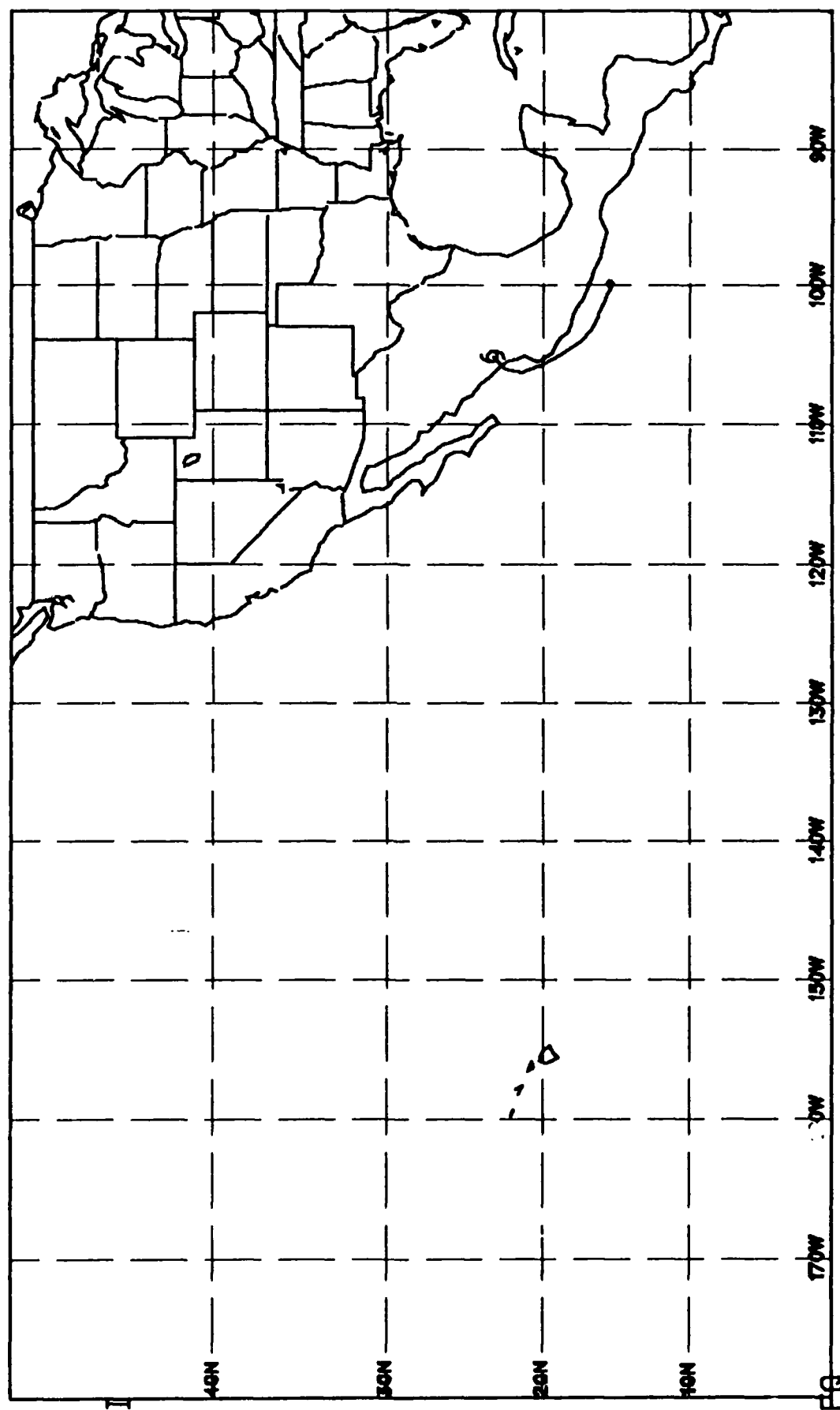
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR JUN 24 - JUL 8



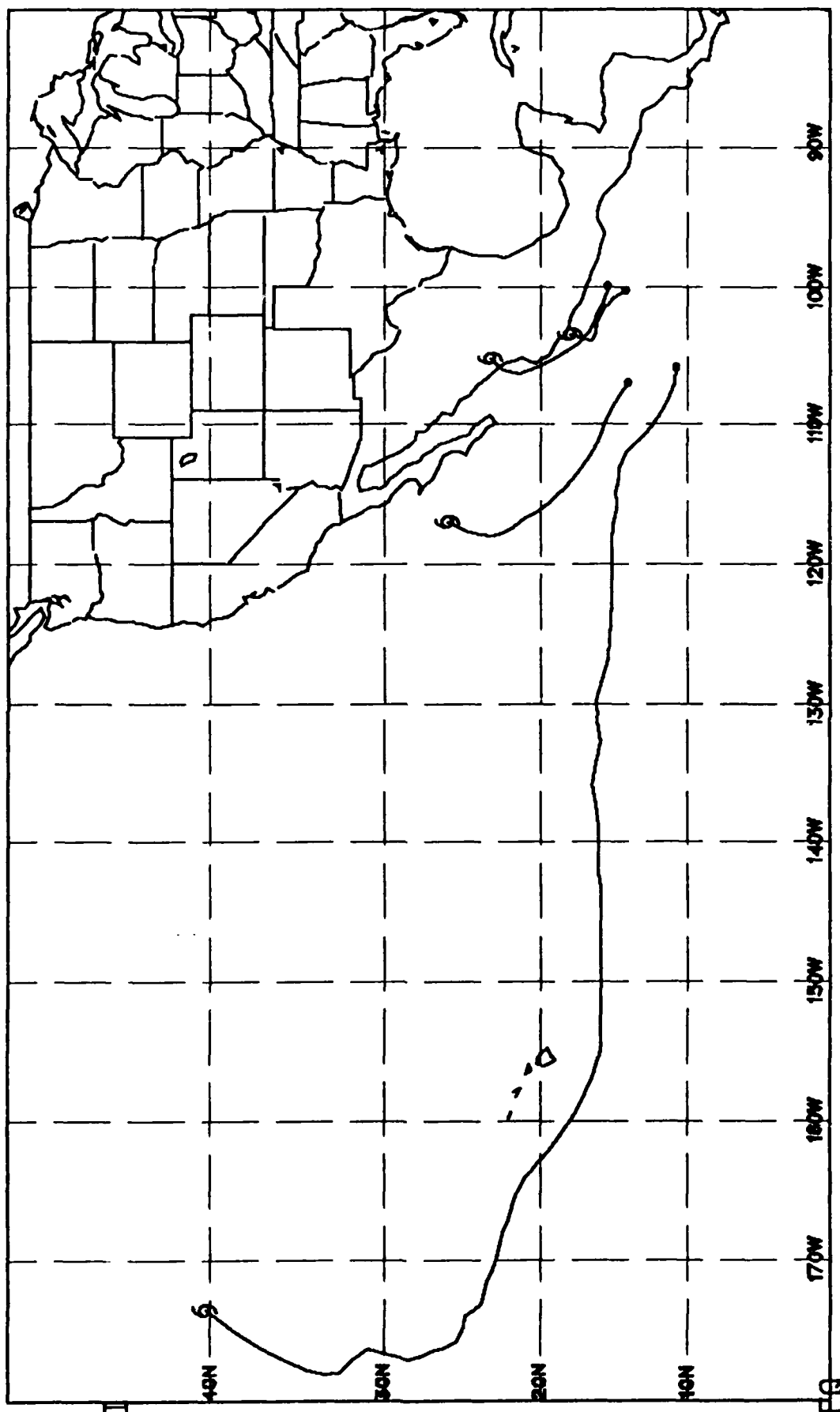
Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR JUN 24 - JUL 8



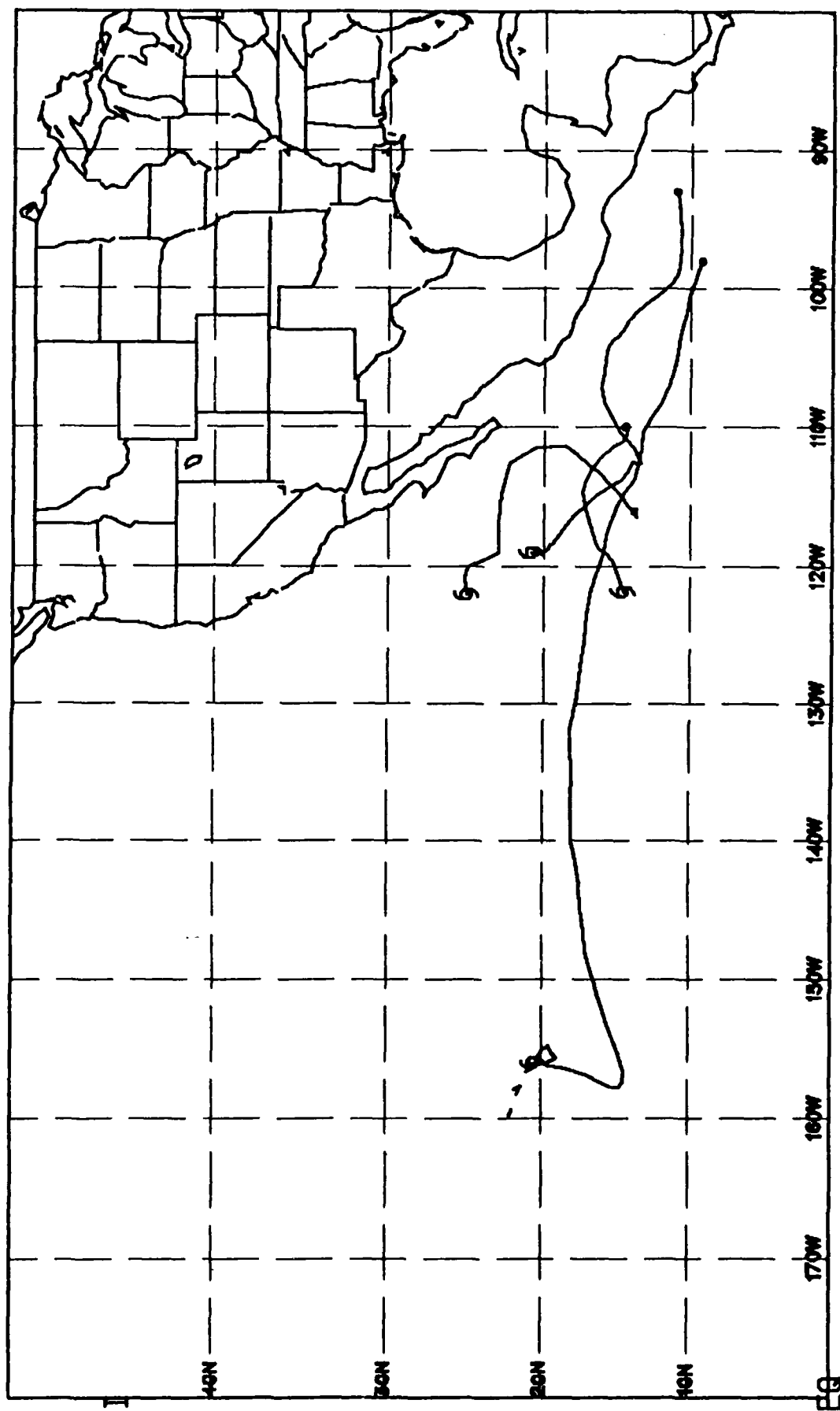
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR JUN 24 - JUL 8



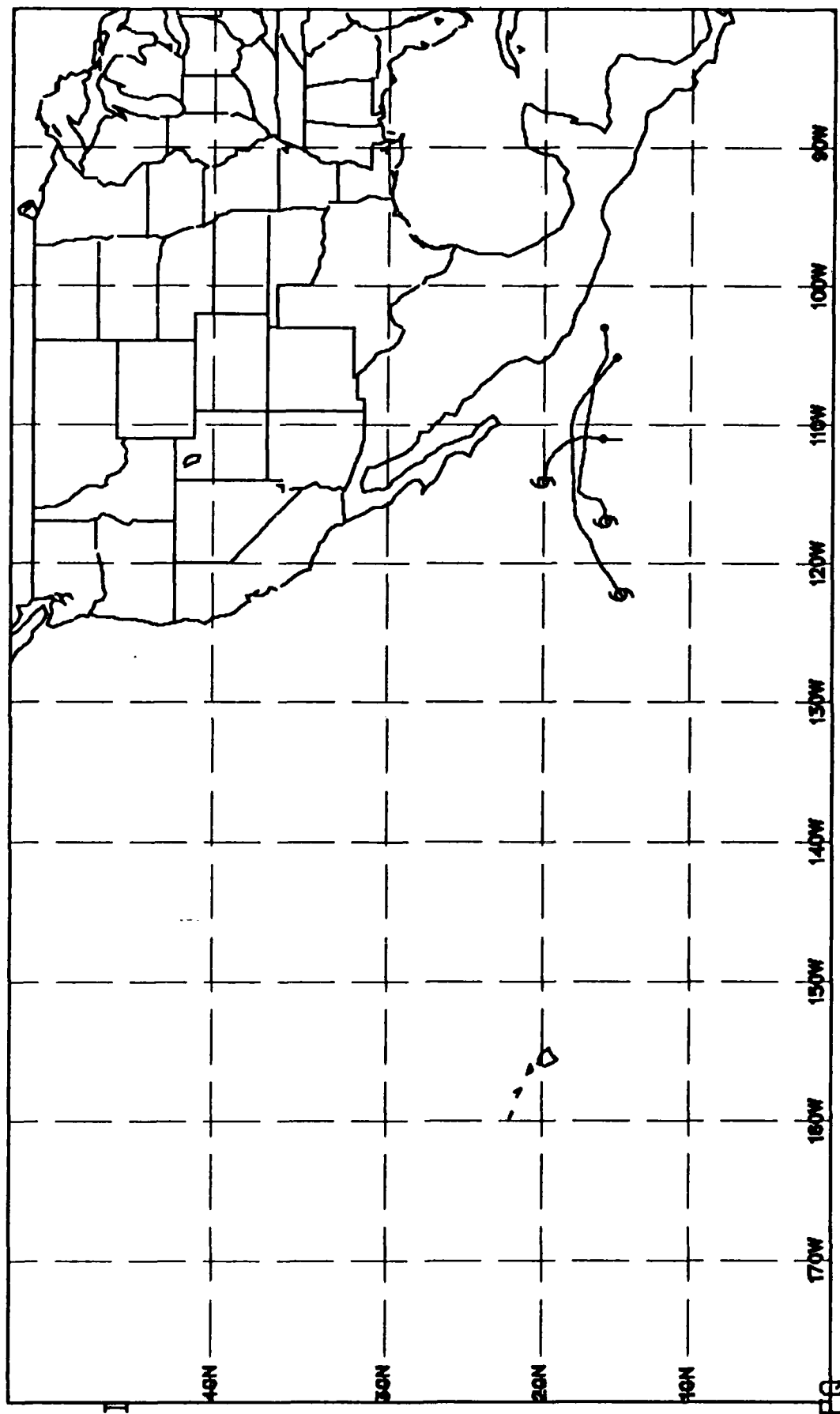
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR JUN 24 - JUL 8



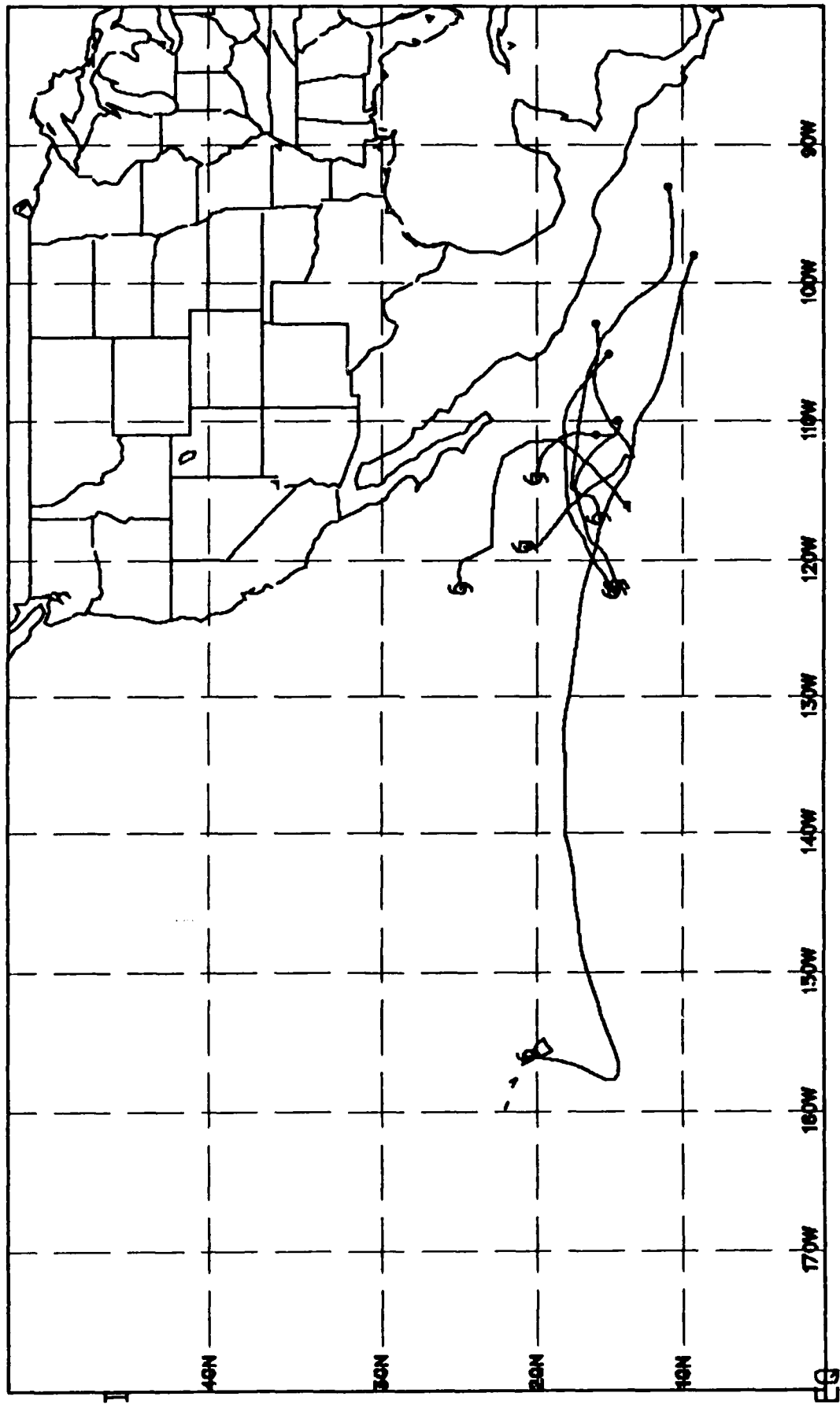
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR JUN 24 - JUL 8



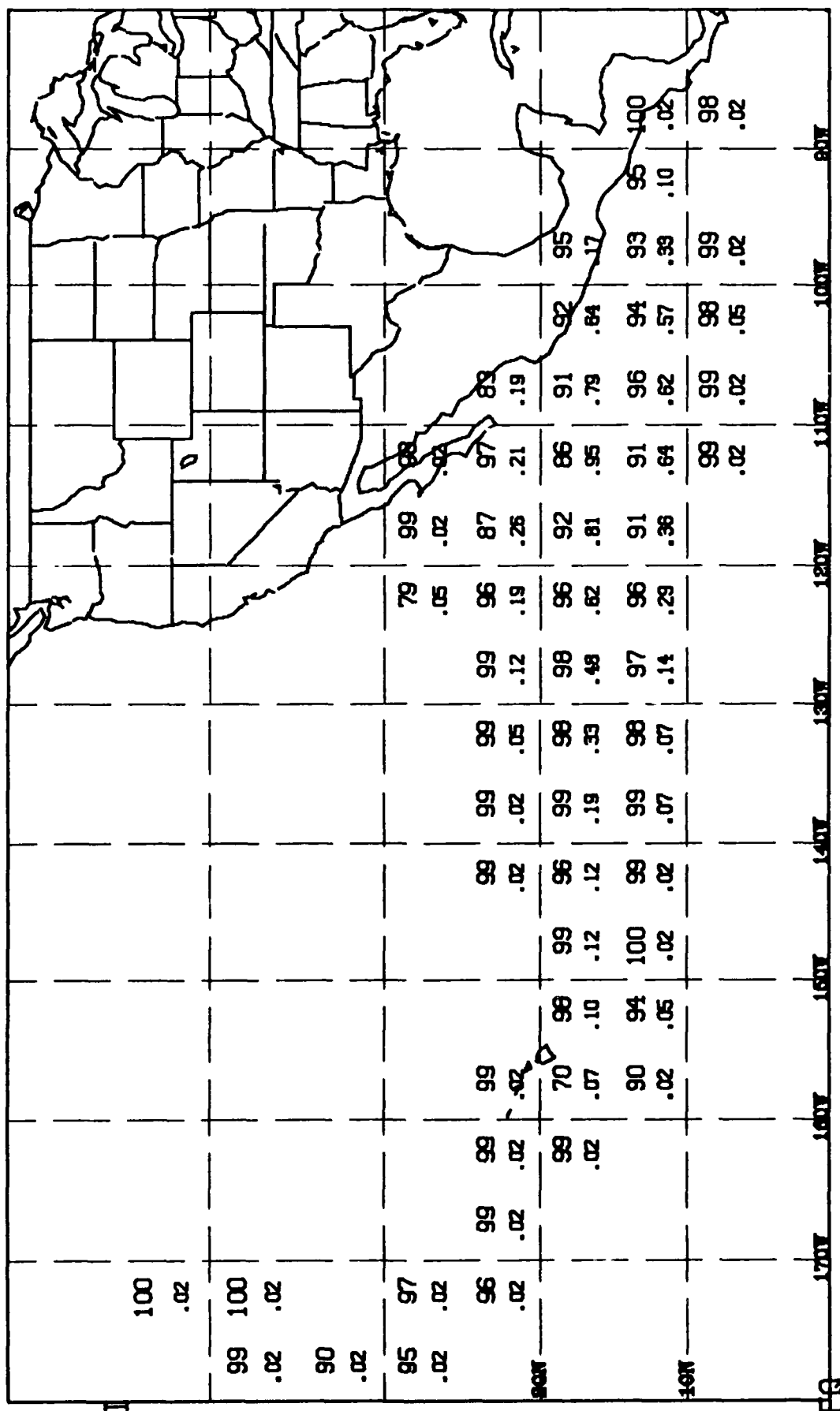
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR JUN 24 - JUL 8



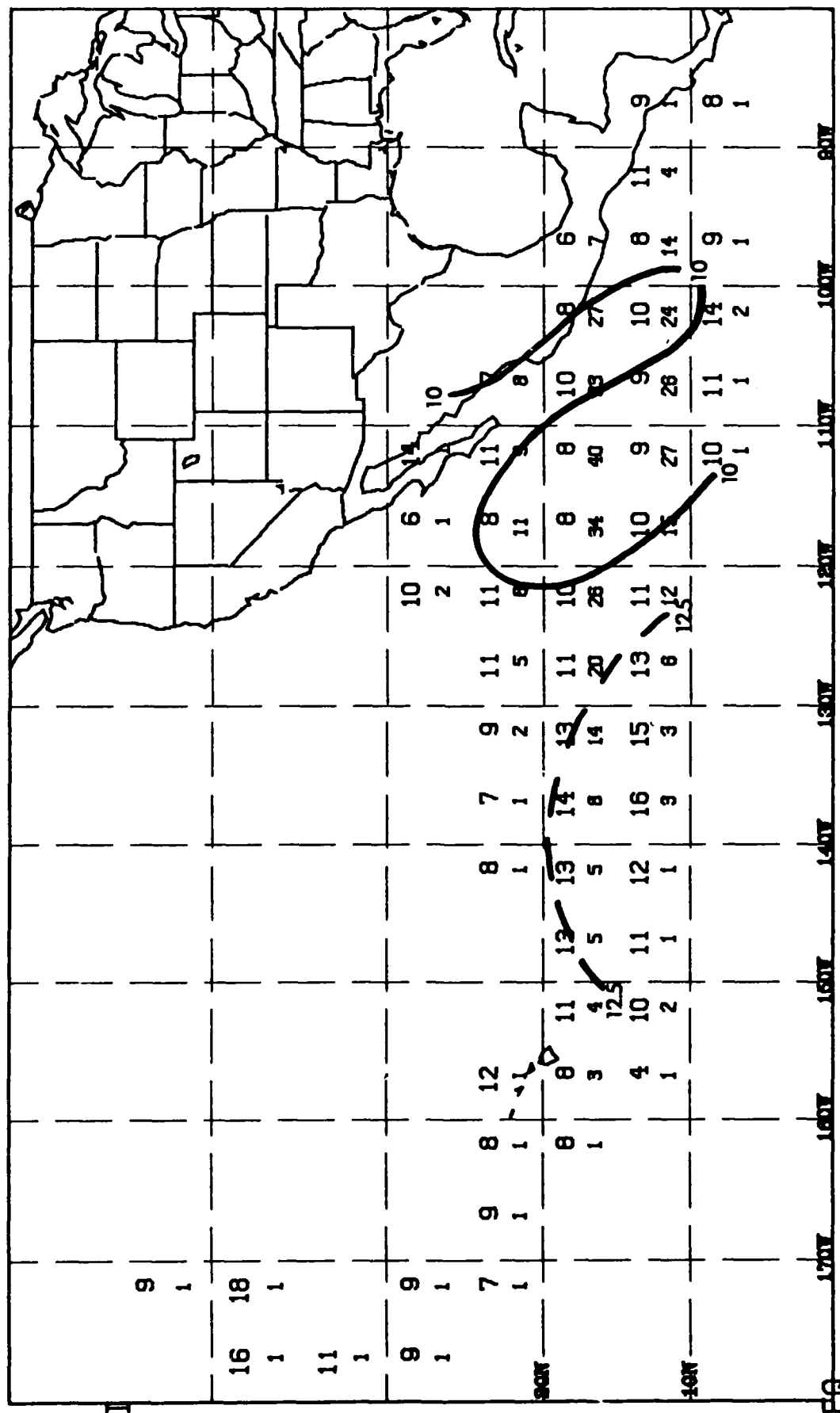
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR JUN 24 - JUL 8



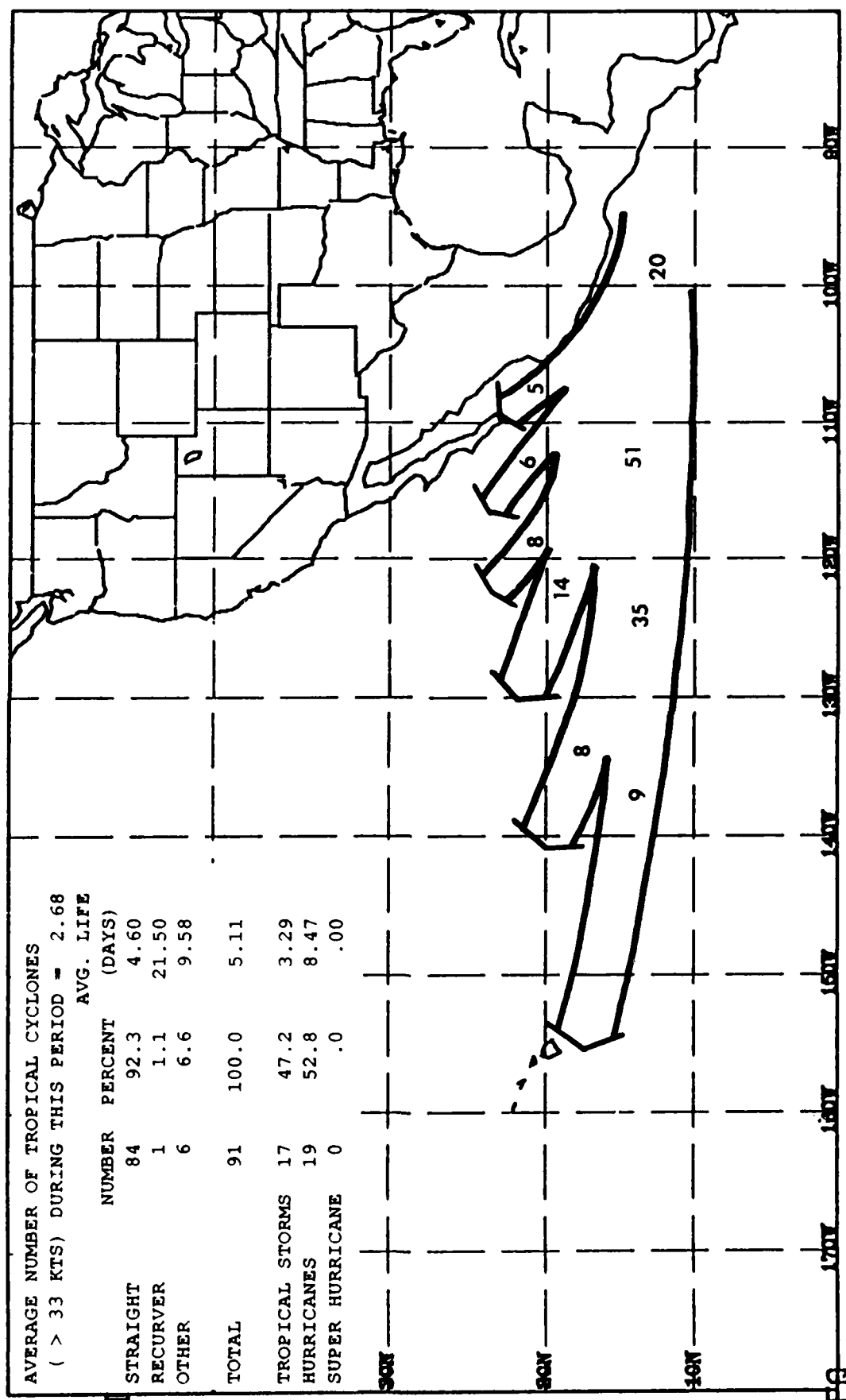
Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number).
 Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed.
 Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year per time period.

SPEED OF MOVEMENT FOR JUN 24 - JUL 8



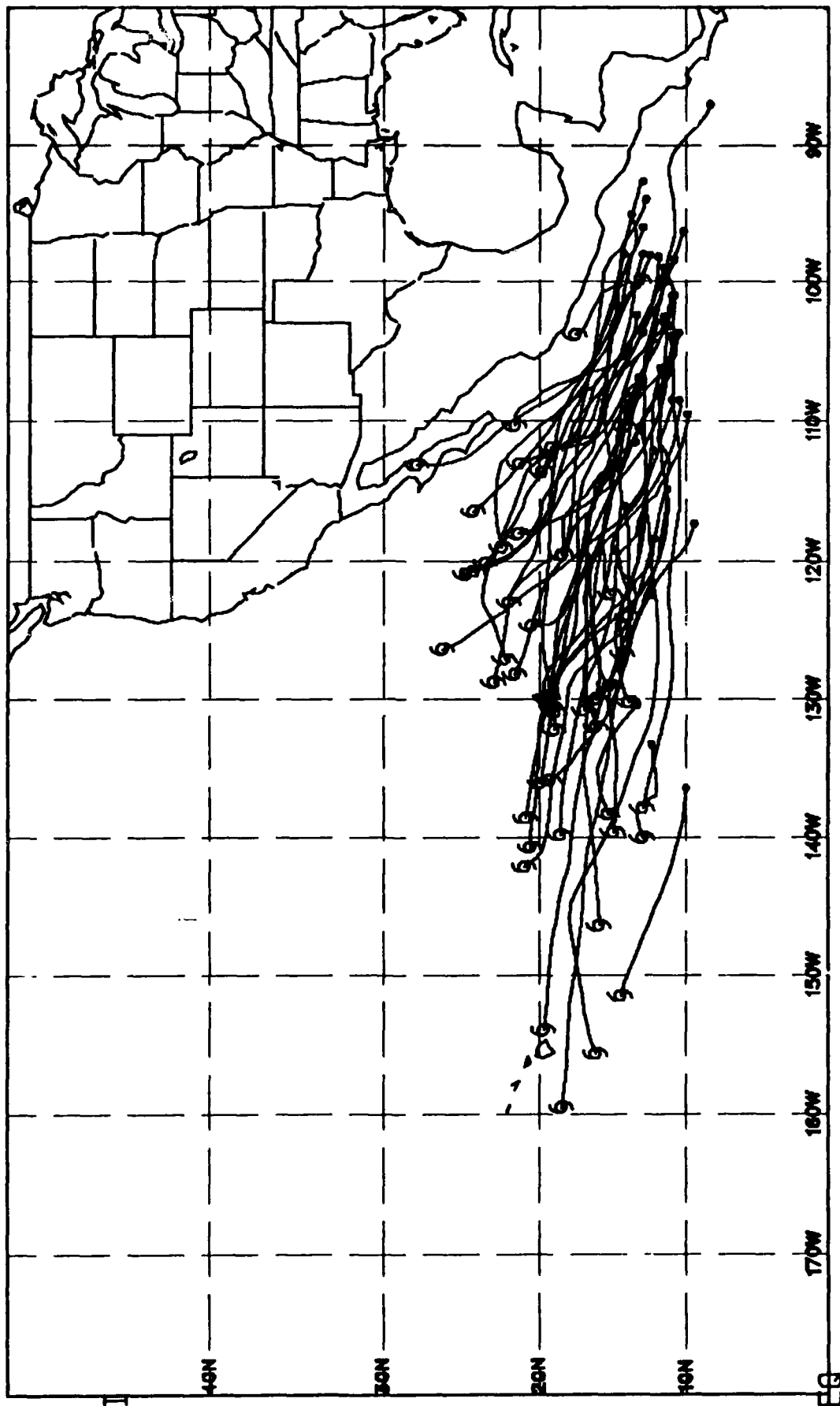
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR JUL 9 - JUL 23



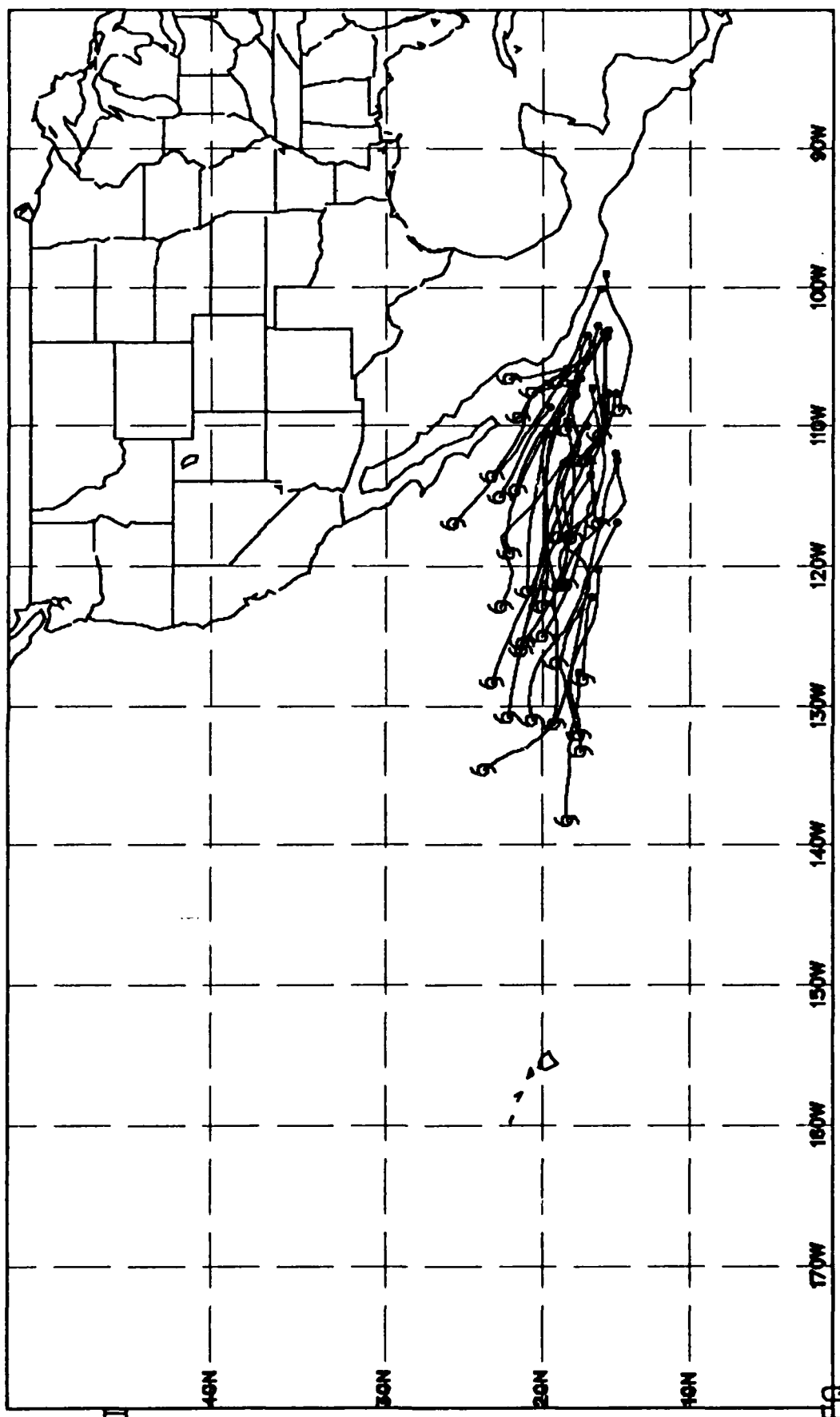
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored.

ACTUAL TRACKS FOR JUL 9 - JUL 23



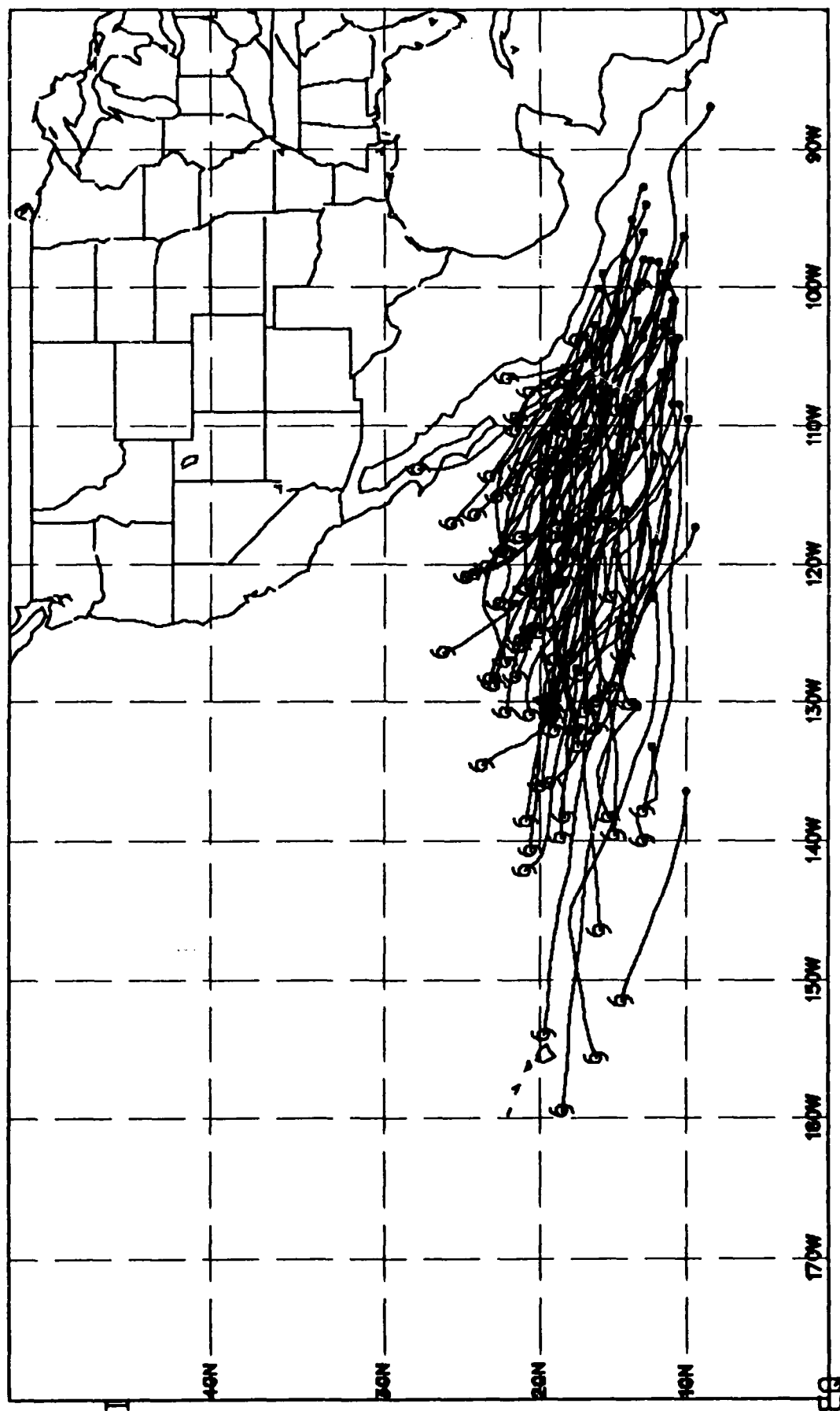
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR JUL 9 - JUL 23



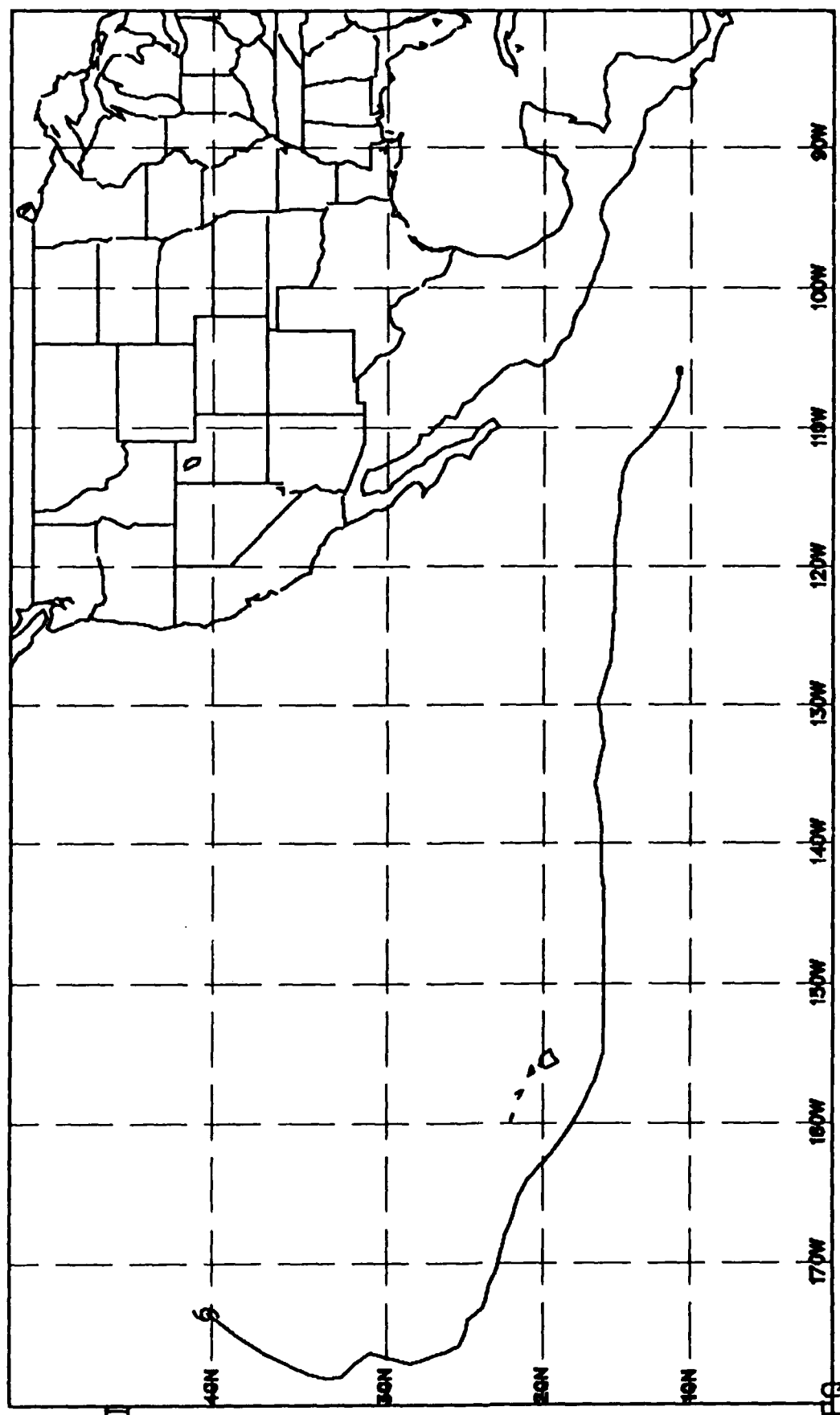
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR JUL 9 - JUL 23



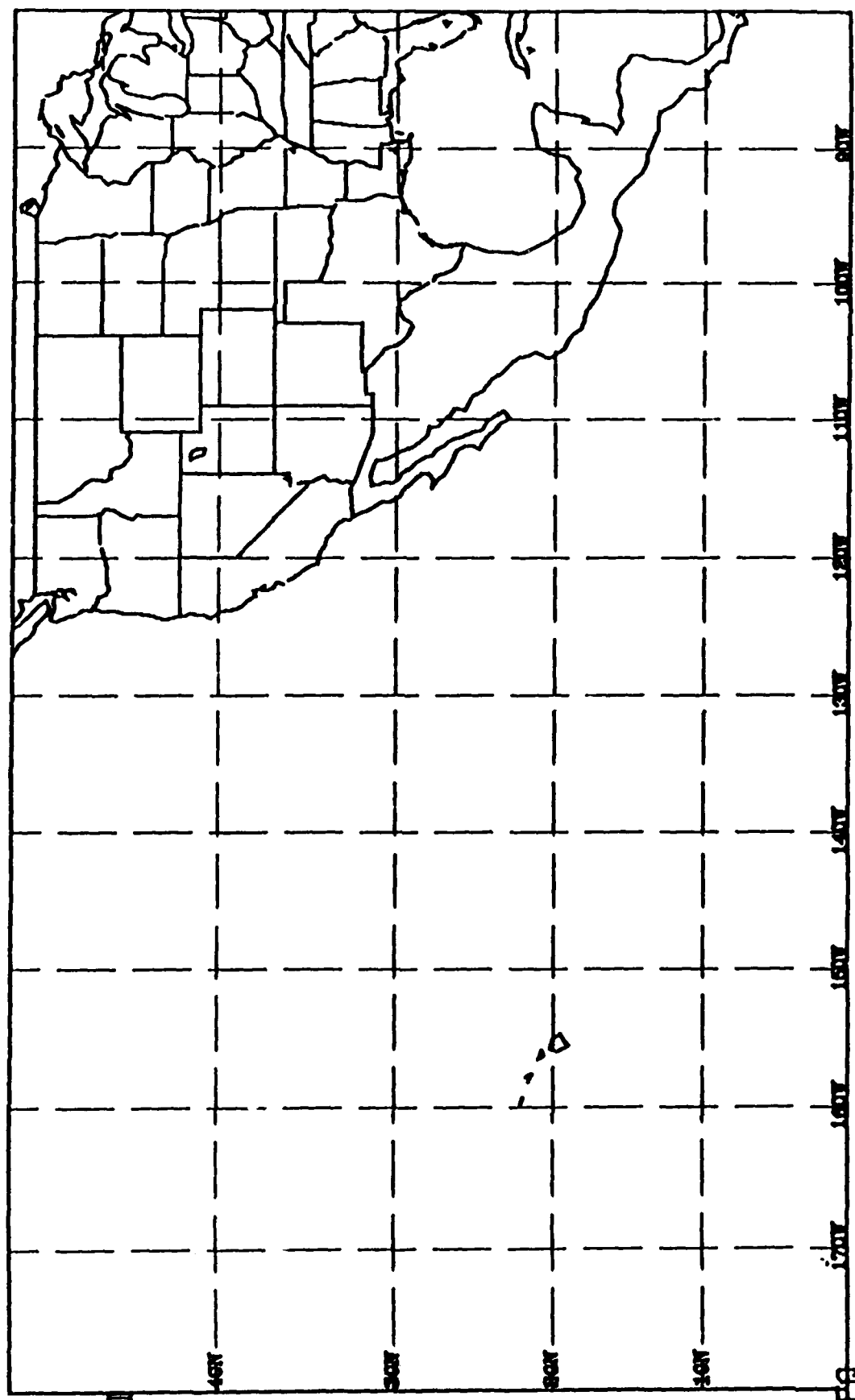
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR JUL 9 - JUL 23



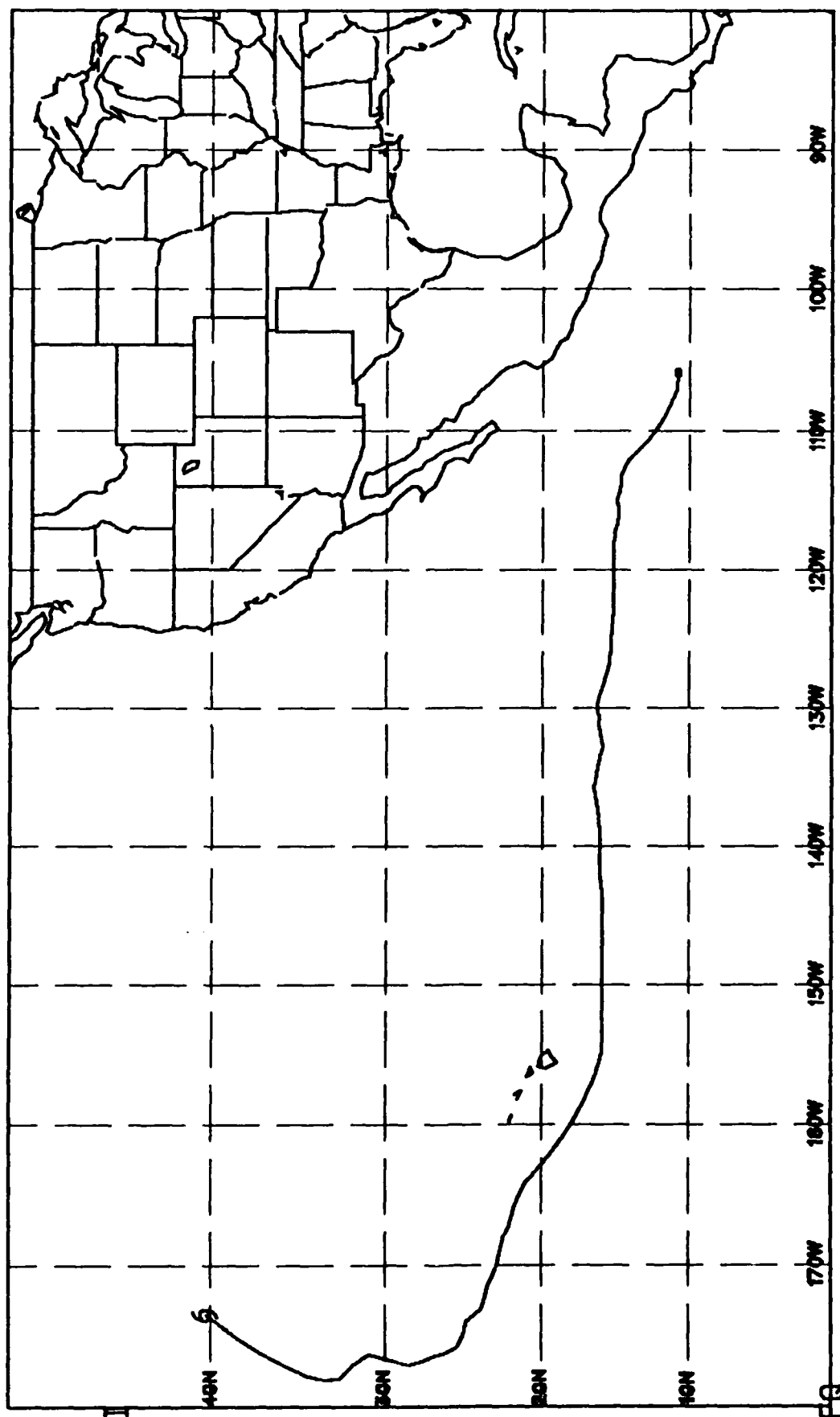
Actual path of recurving tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR JUL 9 - JUL 23



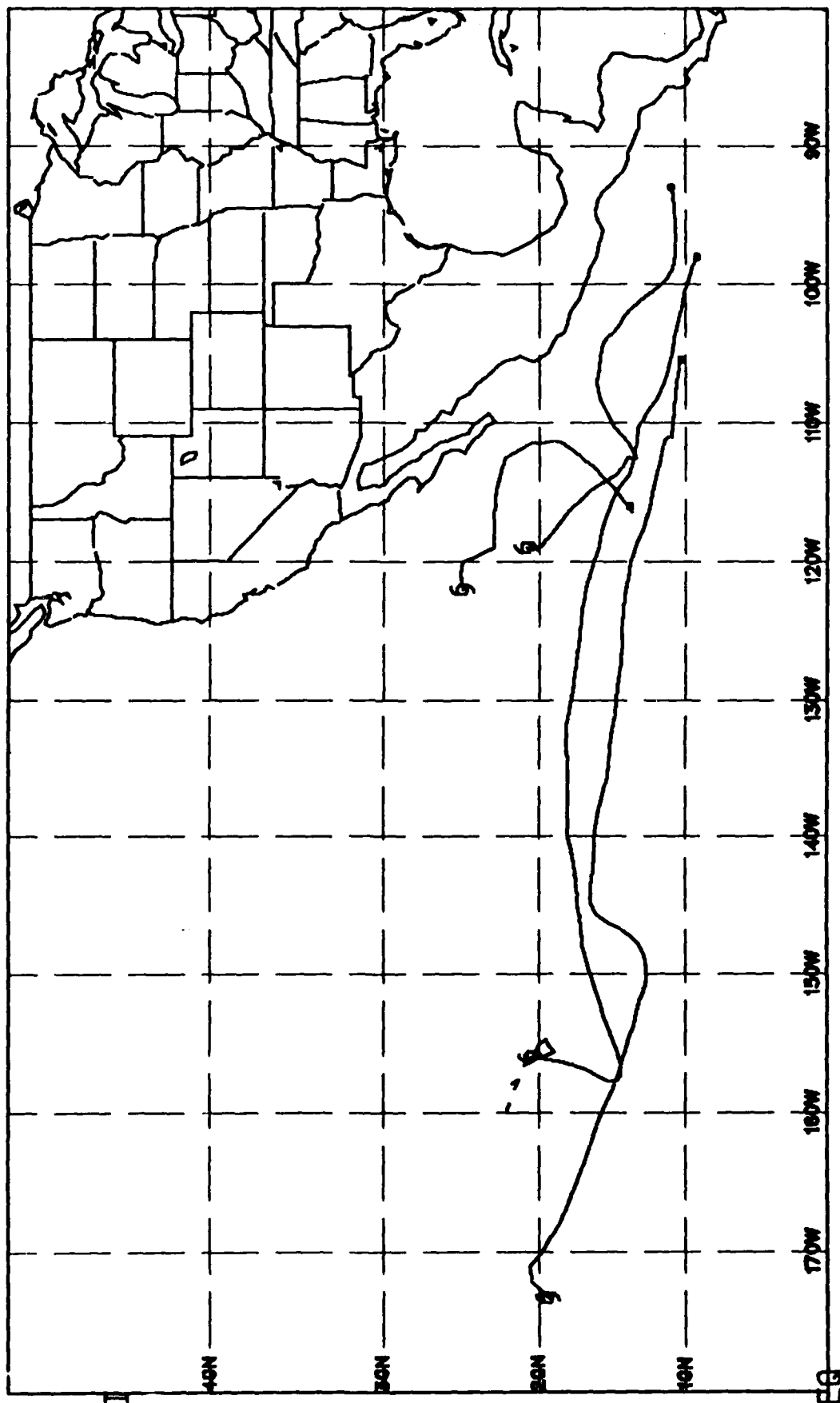
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR JUL 9 - JUL 23



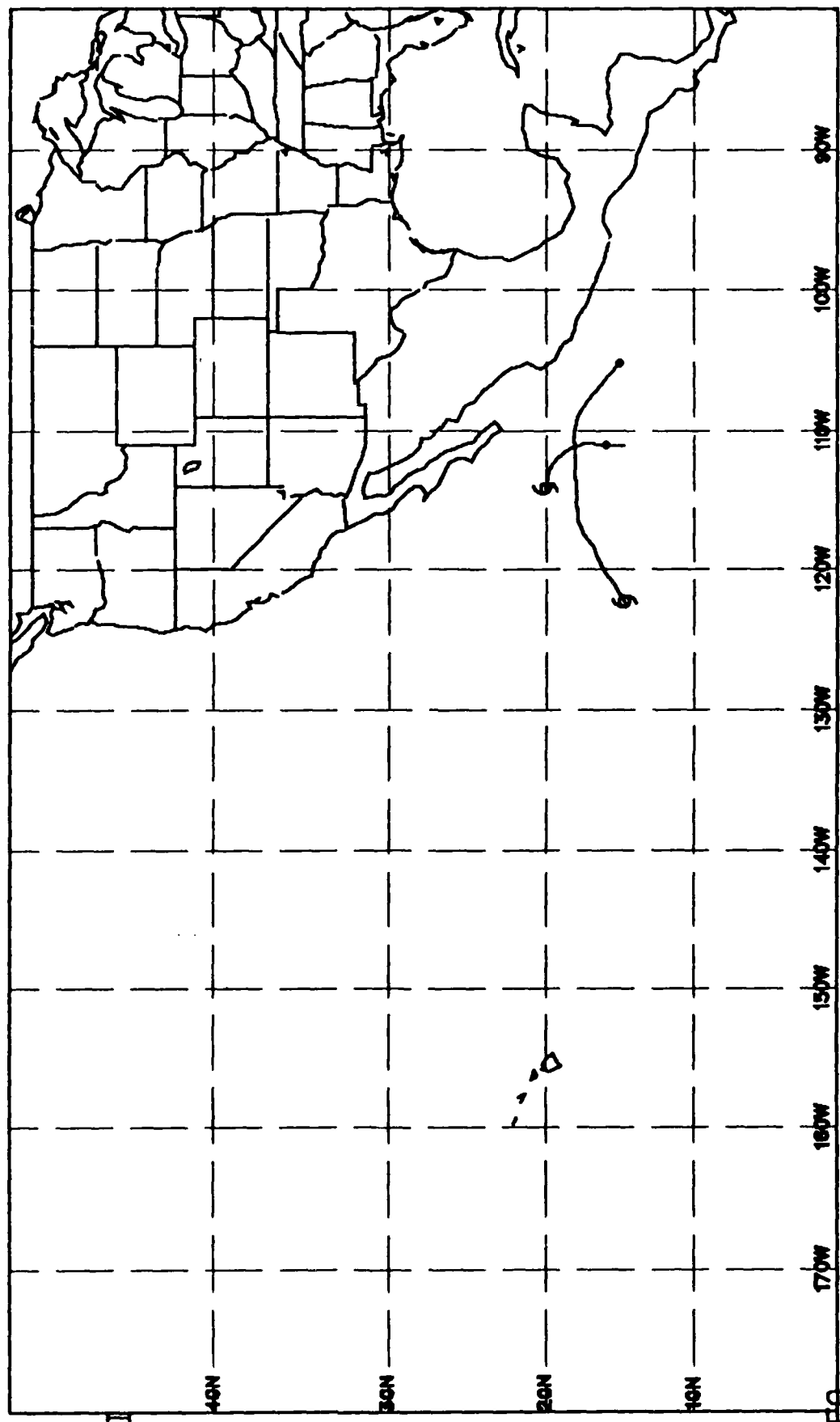
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR JUL 9 - JUL 23



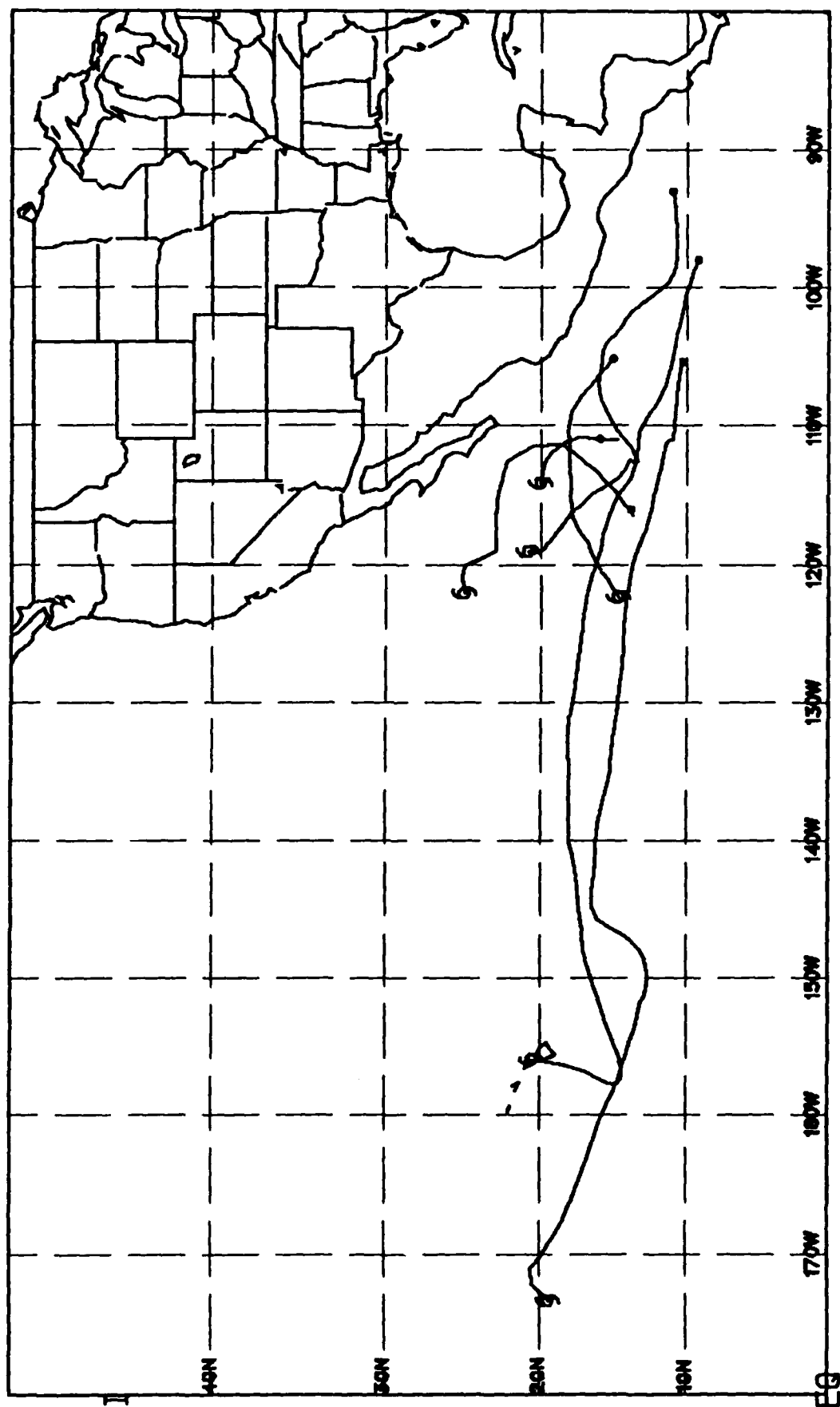
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR JUL 9 - JUL 23



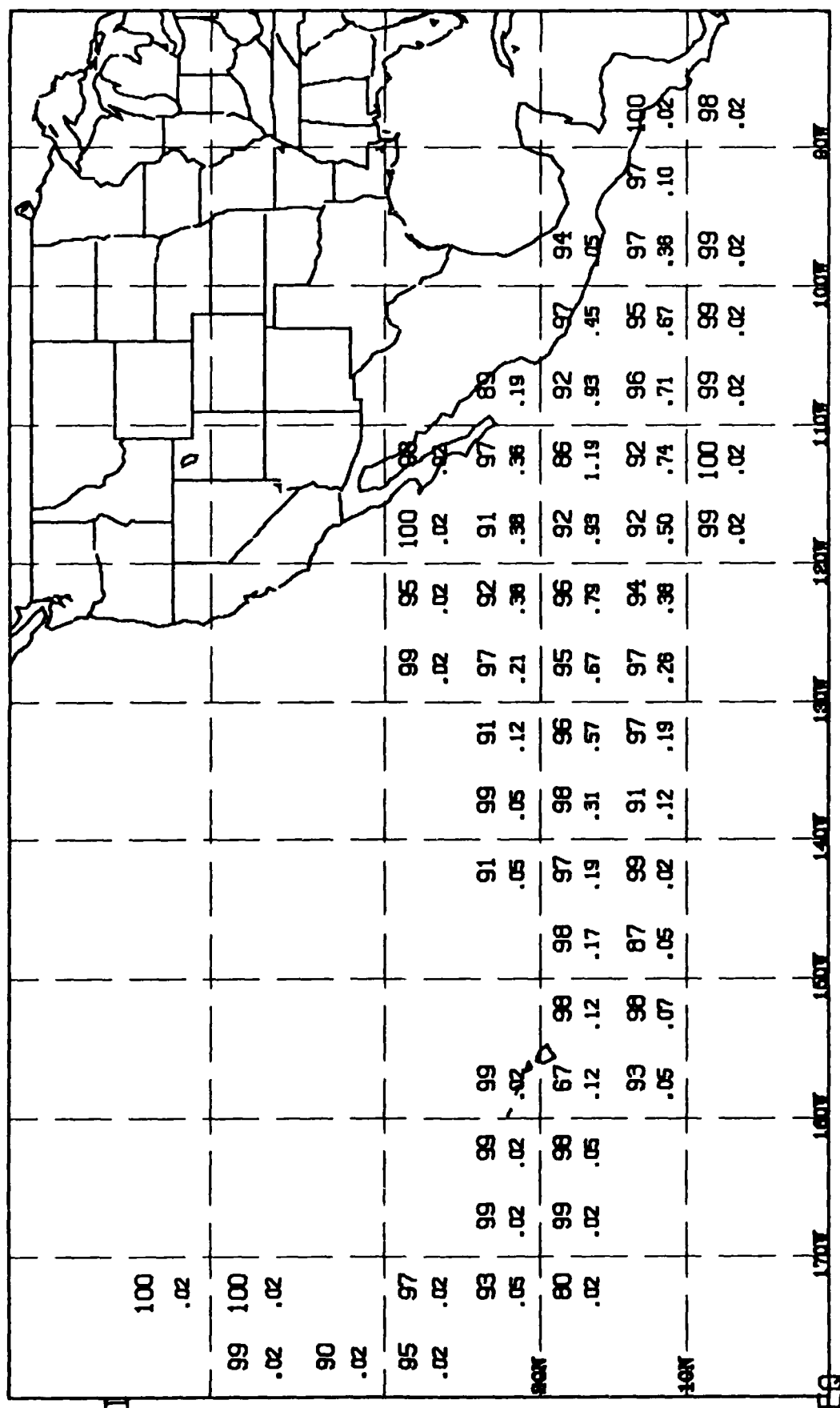
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR JUL 9 - JUL 23



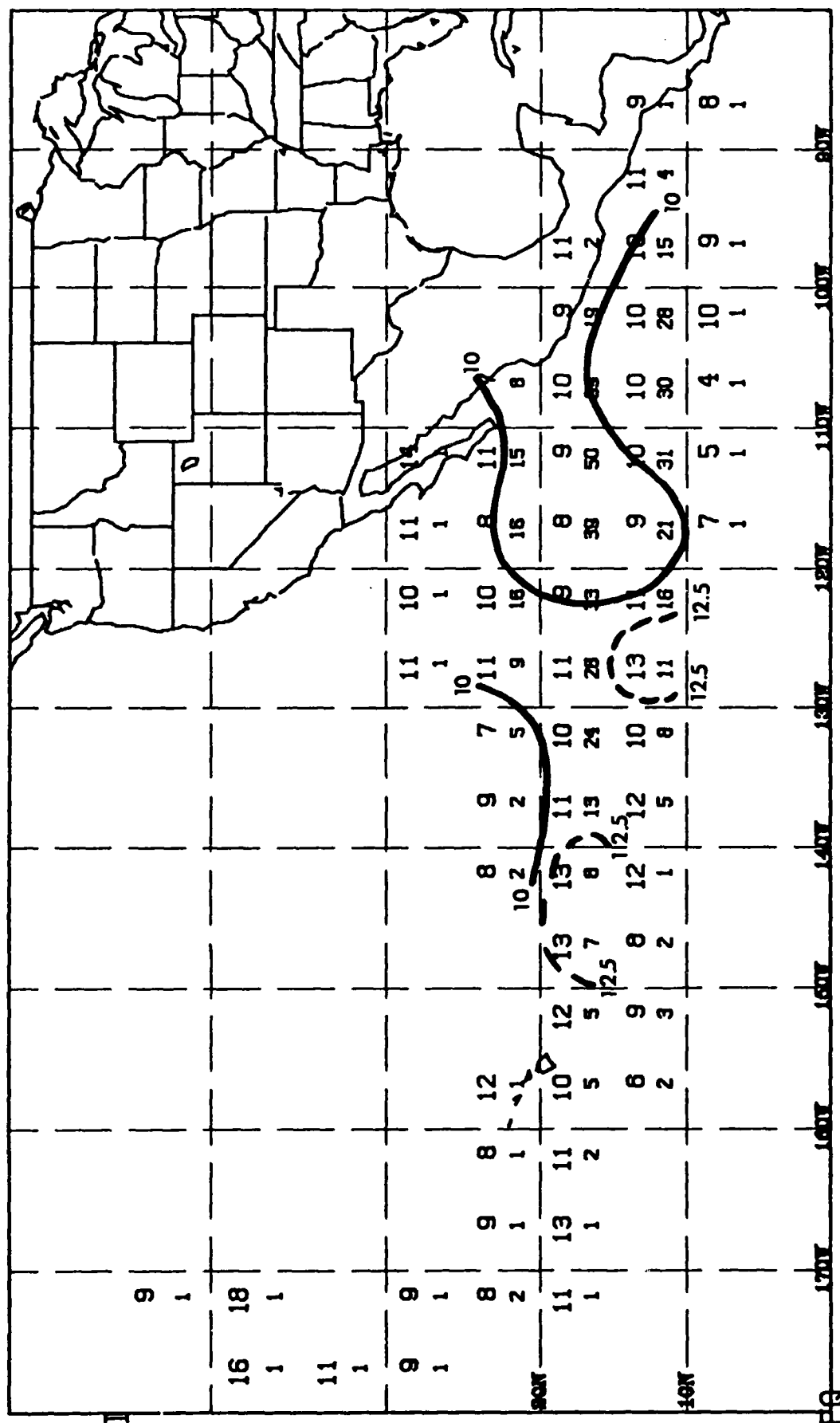
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR JUL 9 - JUL 23



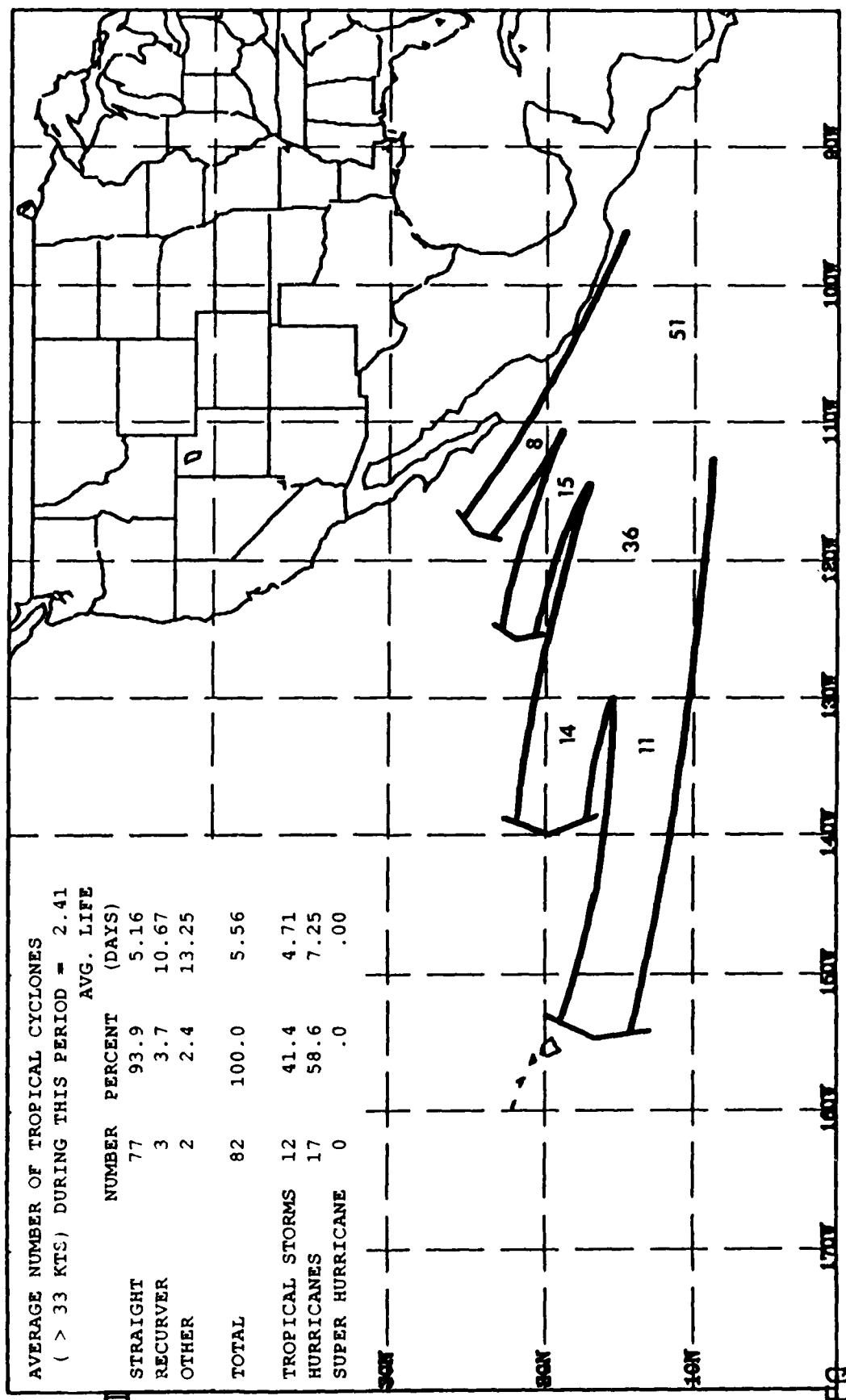
Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number). Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed. Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year per time period.

SPEED OF MOVEMENT FOR JUL 9 - JUL 23



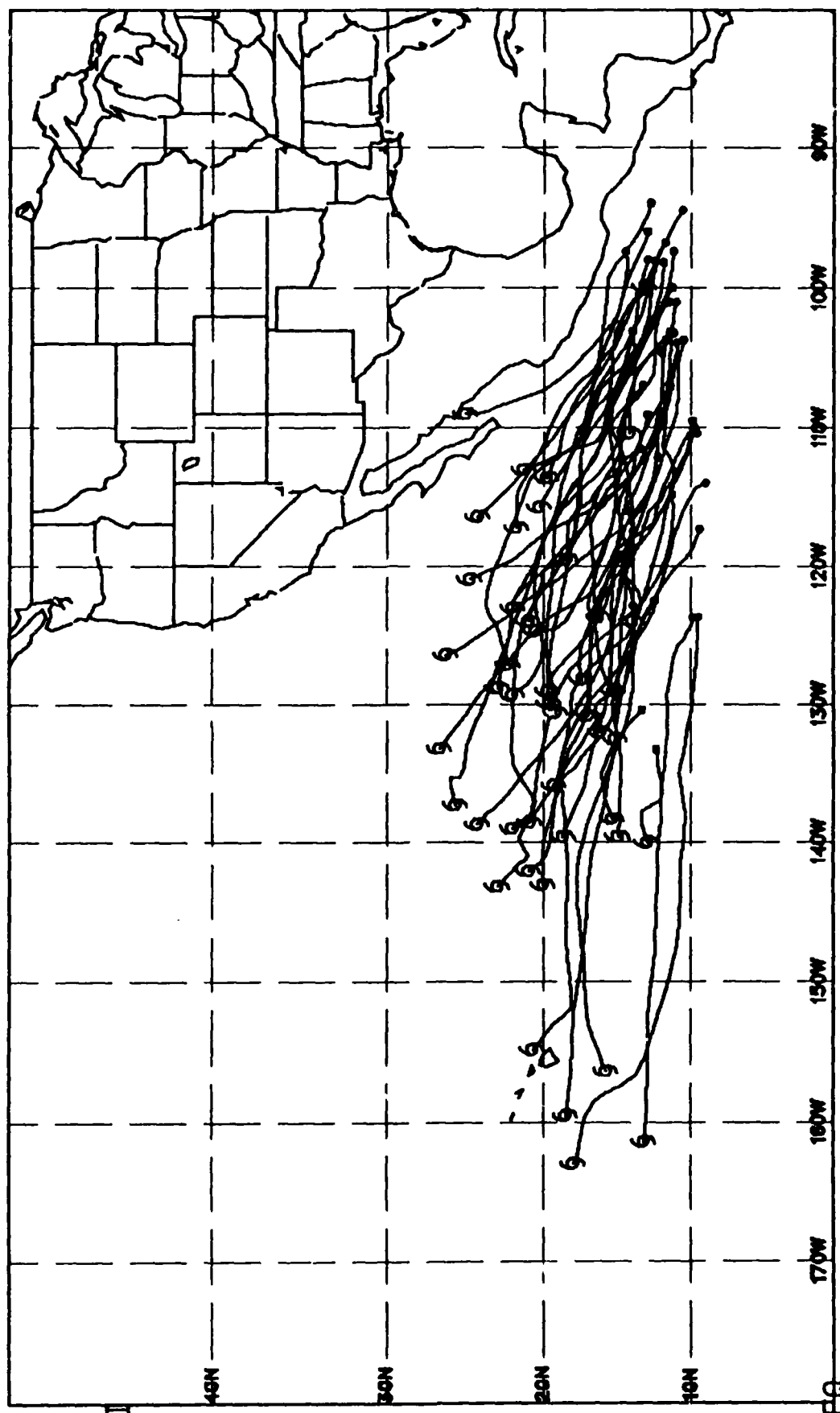
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR JUL 24 - AUG 8



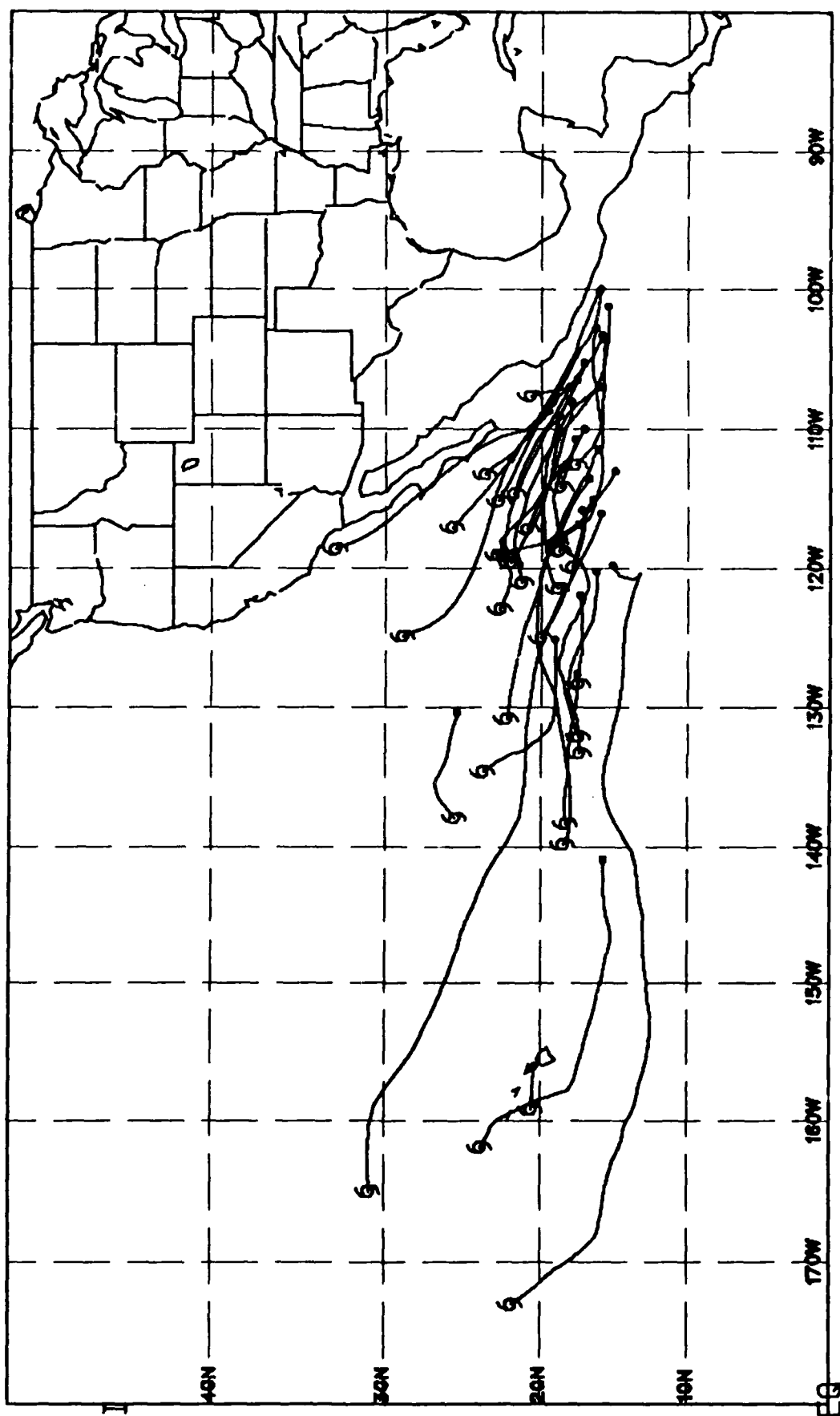
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored.

ACTUAL TRACKS FOR JUL 24 - AUG 8



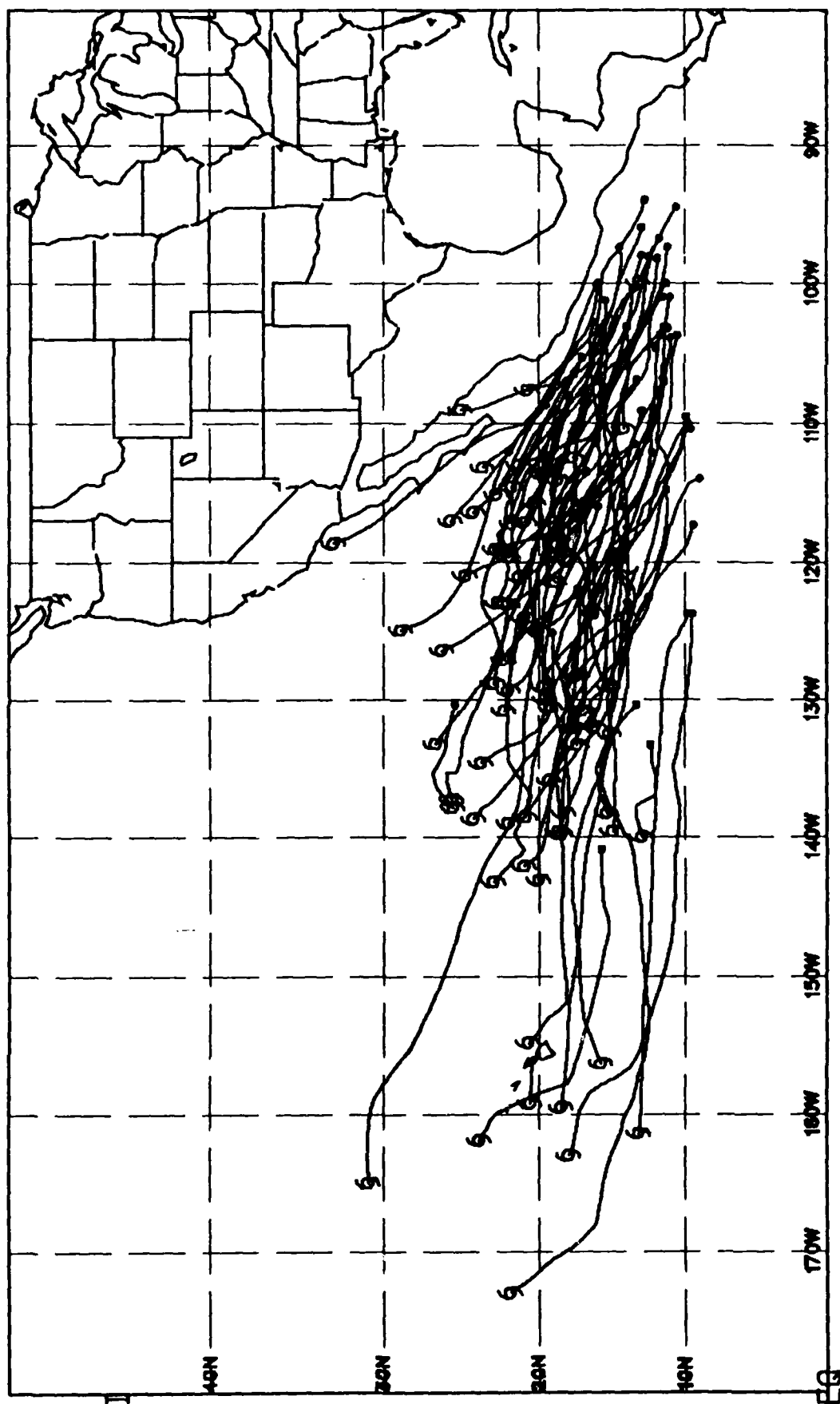
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR JUL 24 - AUG 8

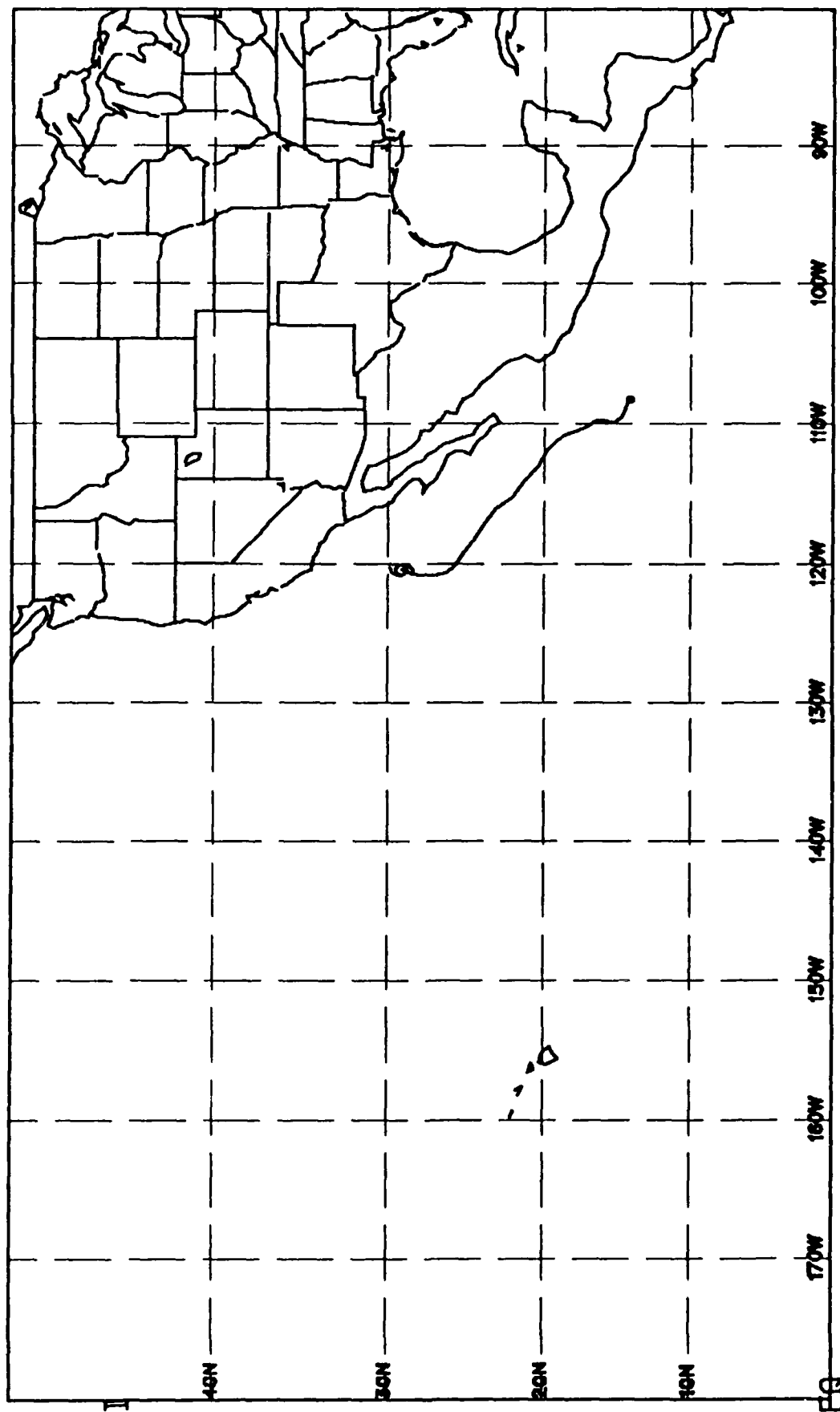


Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR JUL 24 - AUG 8

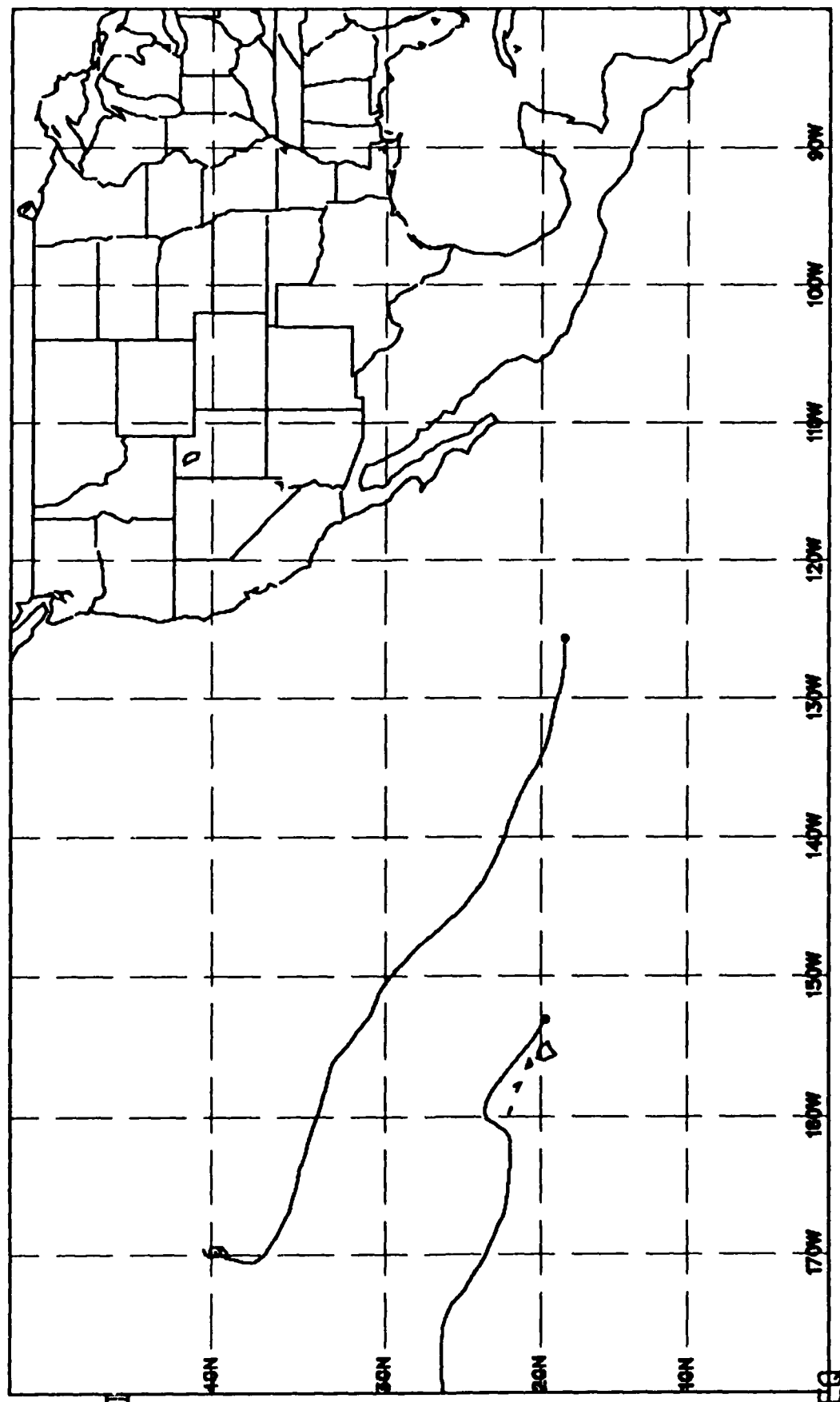


ACTUAL TRACKS FOR JUL 24 - AUG 8



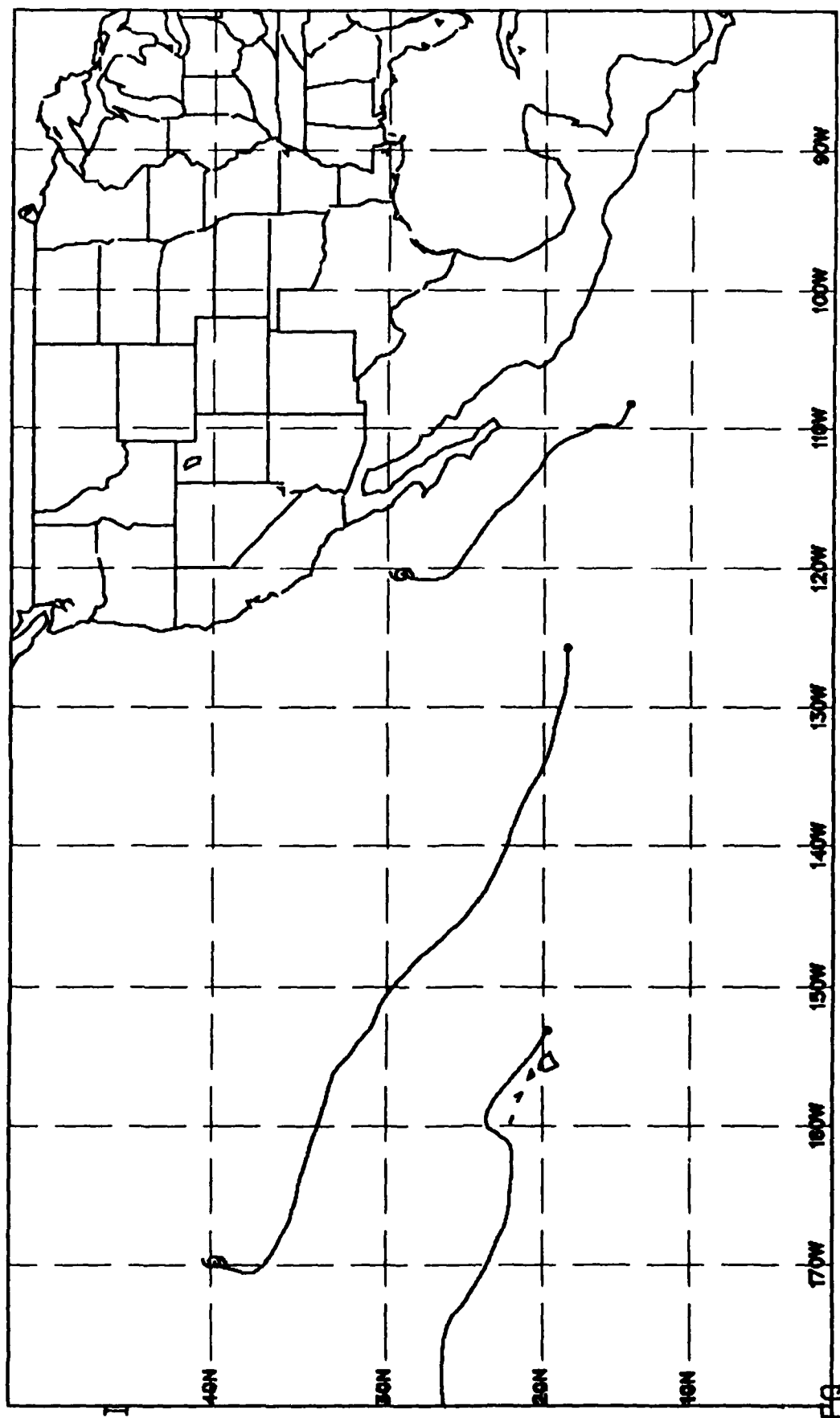
Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR JUL 24 - AUG 8



Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N .

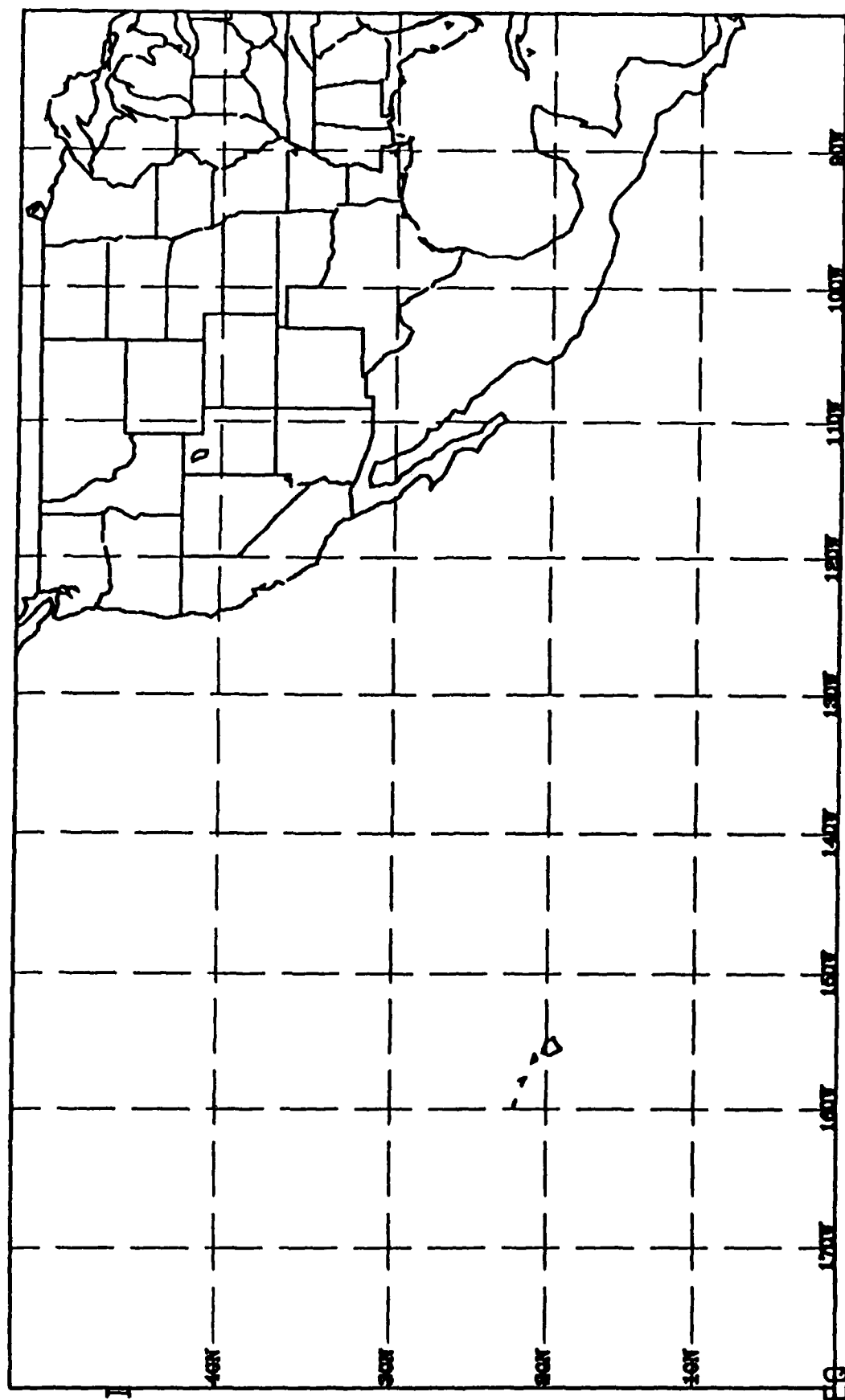
ACTUAL TRACKS FOR JUL 24 - AUG 8



Actual path of all recurring tropical cyclones (> 33 kts).

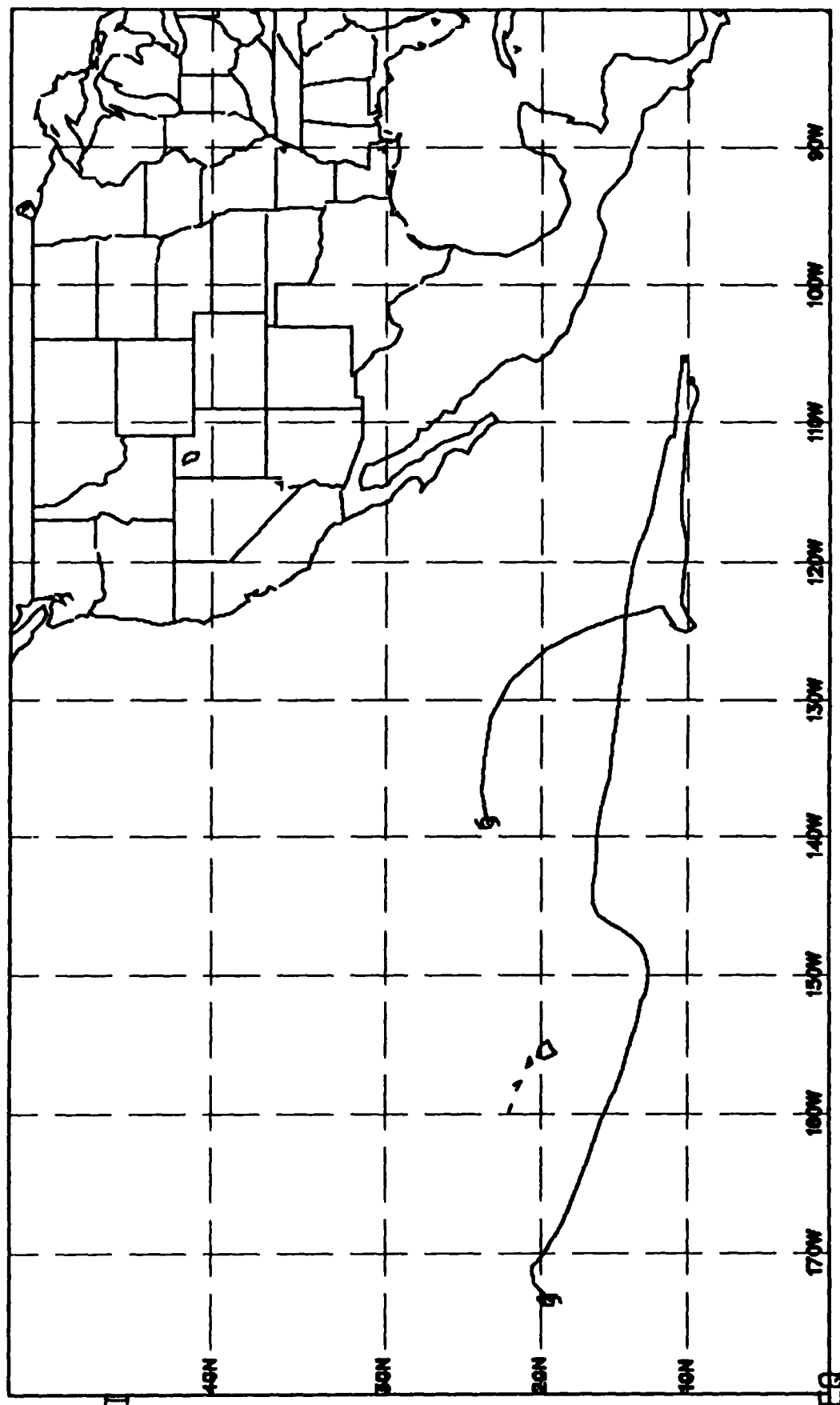
E-100

ACTUAL TRACKS FOR JUL 24 - AUG 8



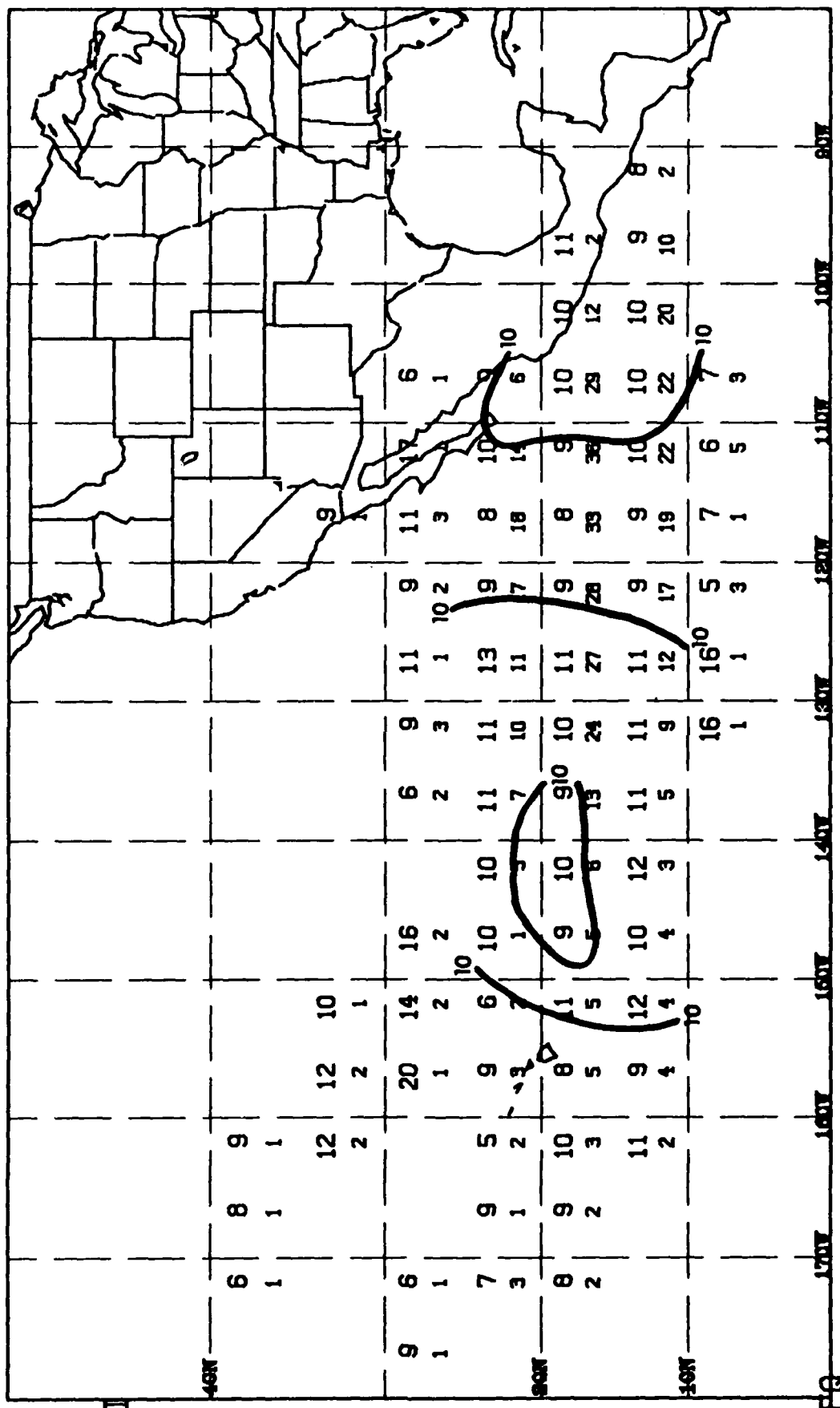
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR JUL 24 - AUG 8



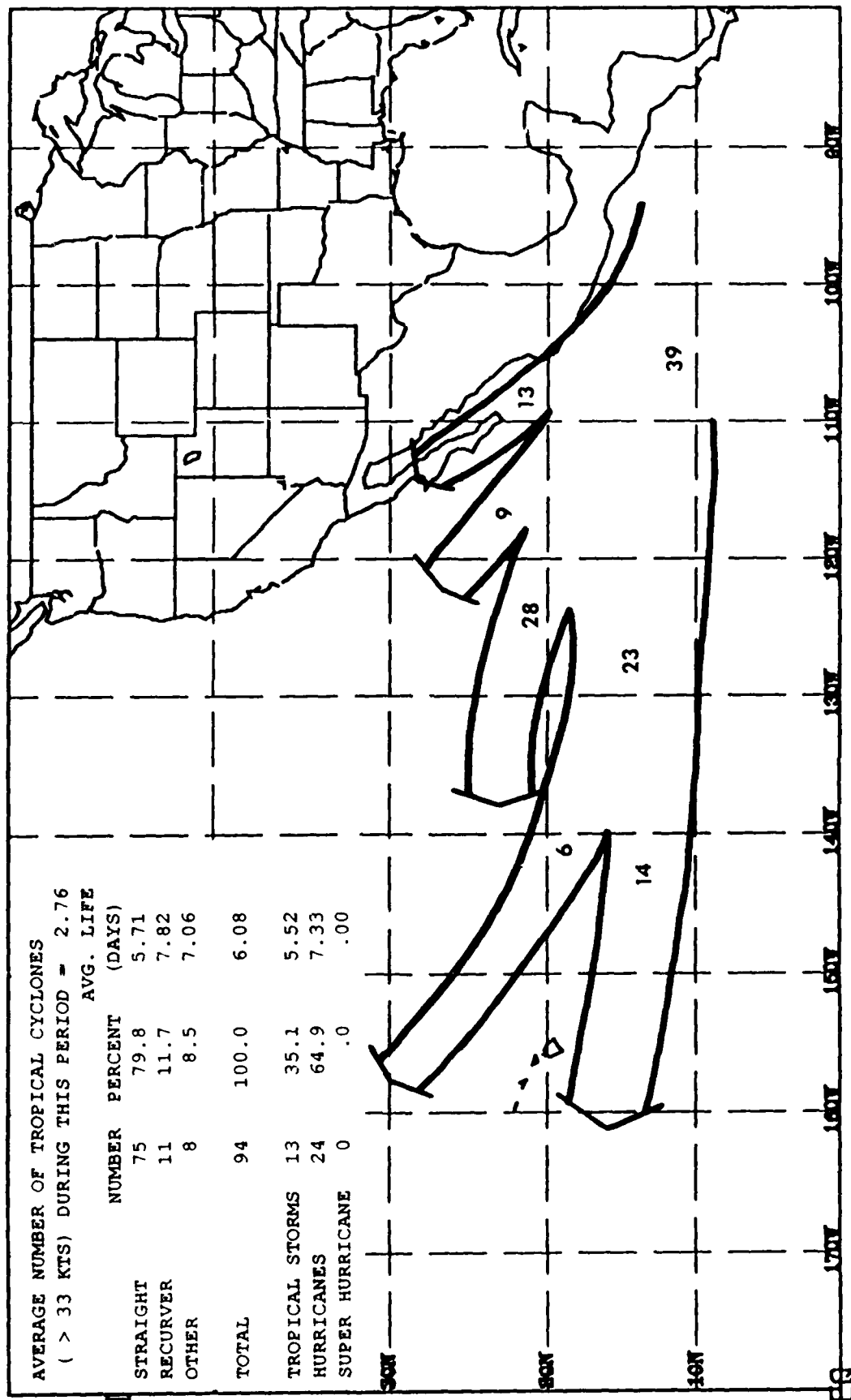
Actual path of all other tropical cyclones (> 33 kts).

SPEED OF MOVEMENT FOR JUL 24 - AUG 8



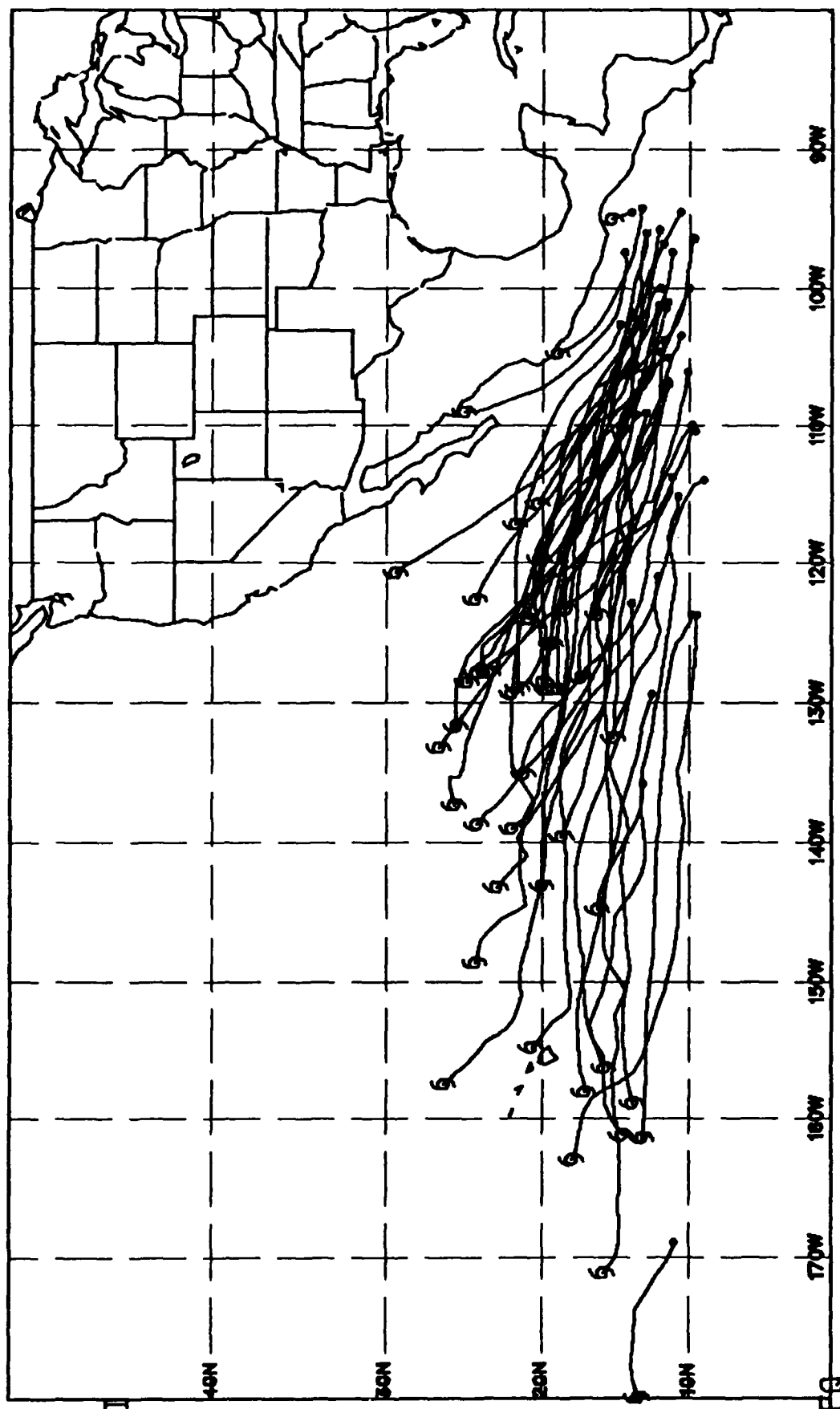
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR AUG 9 - AUG 23



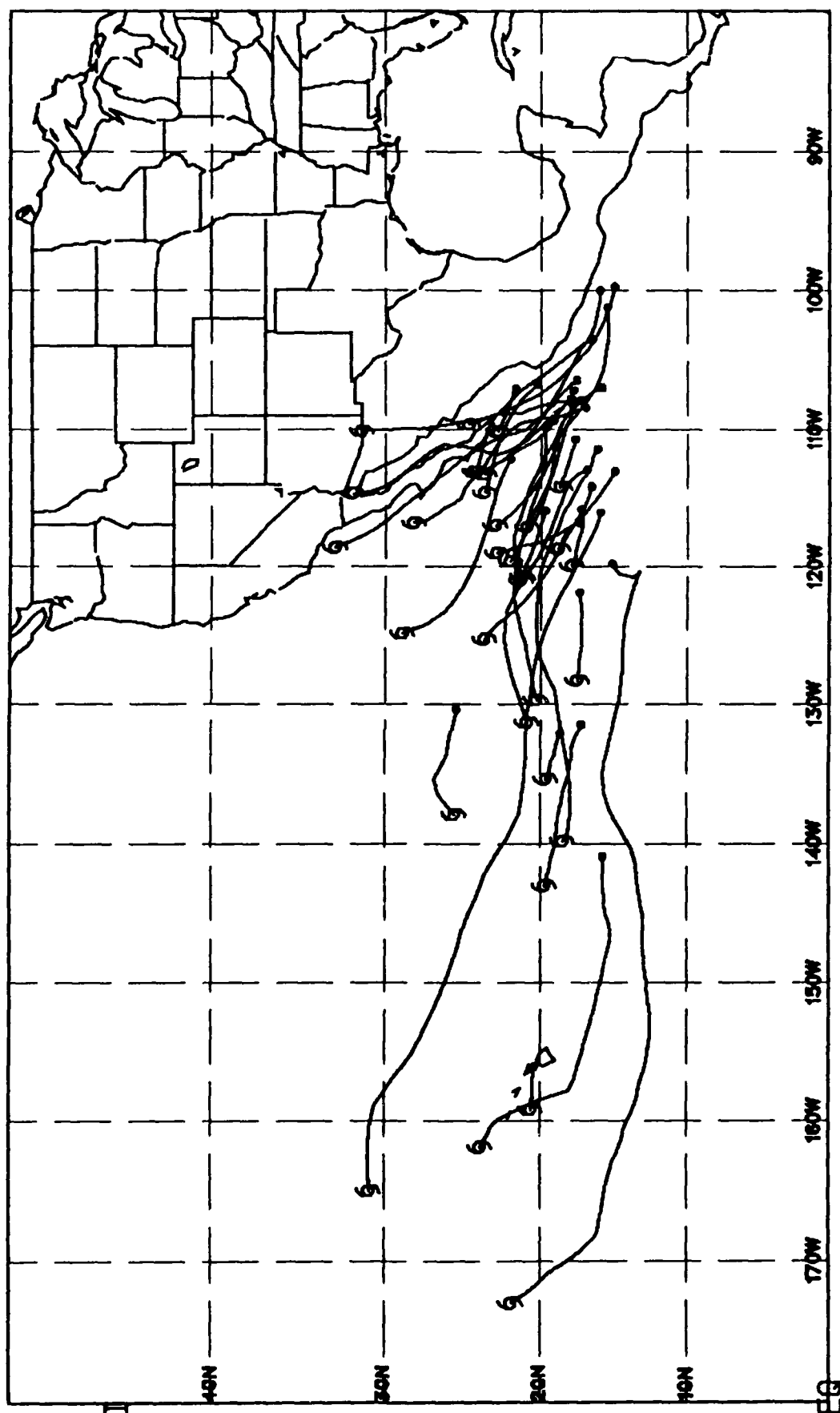
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ACTUAL TRACKS FOR AUG 9 - AUG 23



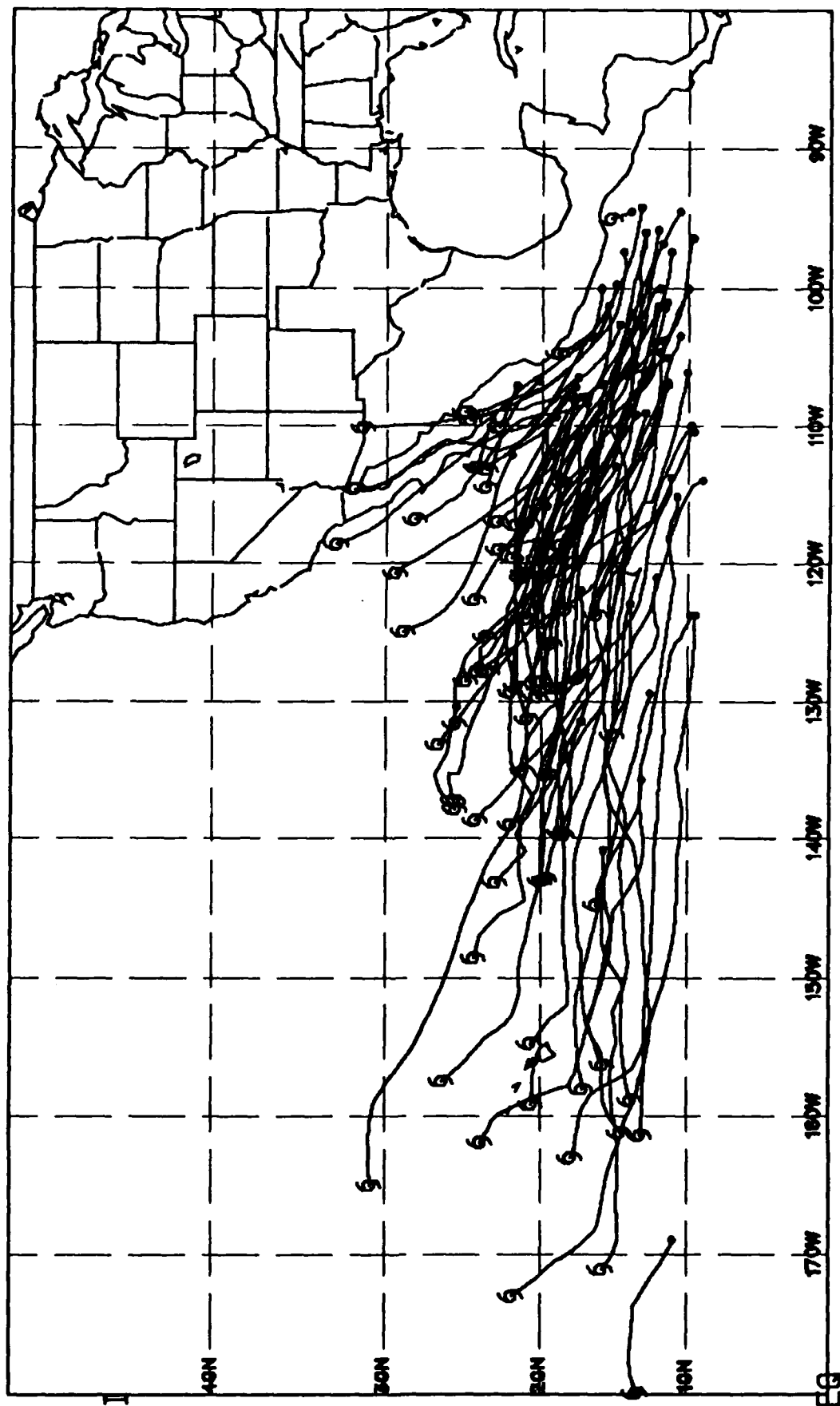
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR AUG 9 - AUG 23



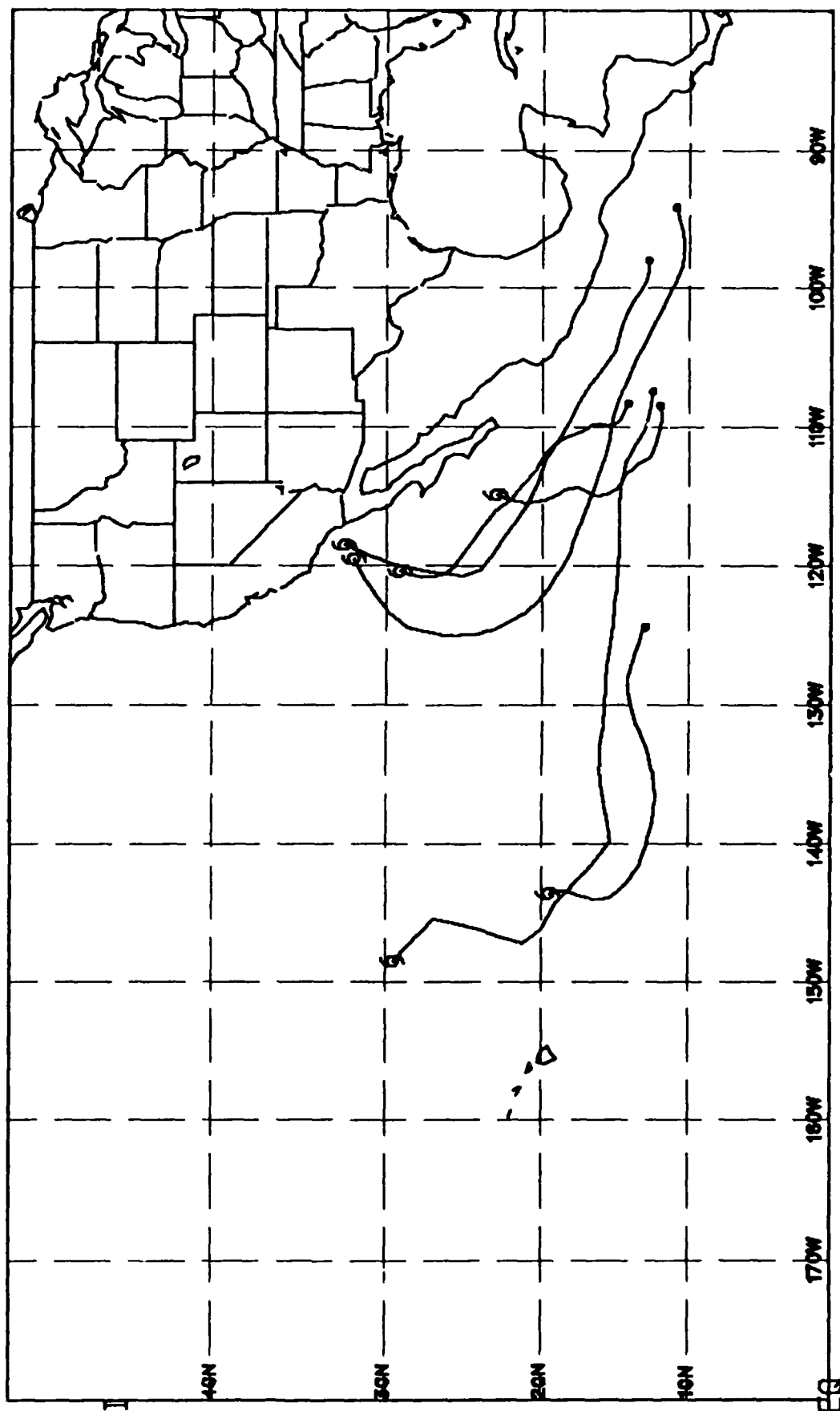
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR AUG 9 - AUG 23



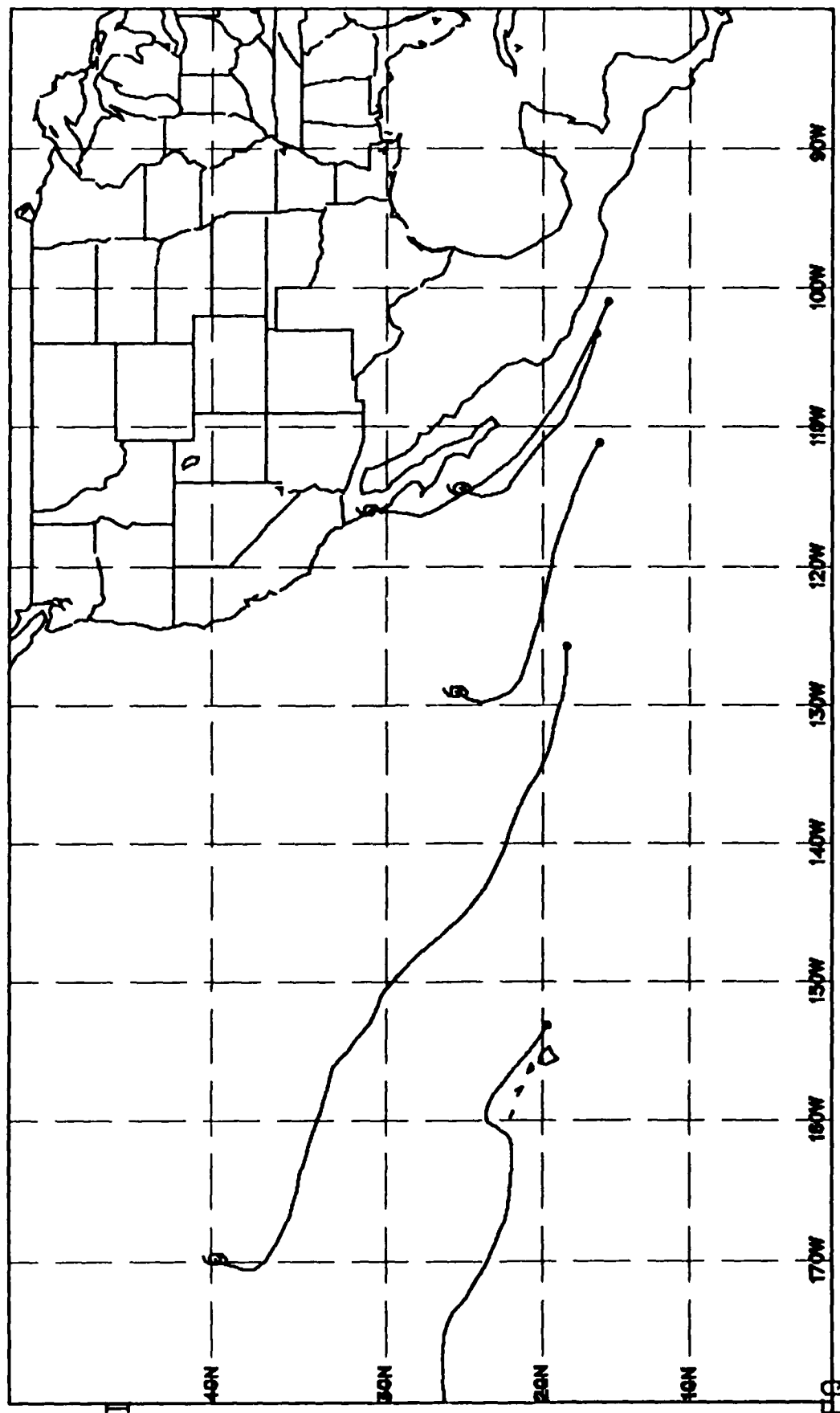
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR AUG 9 - AUG 23



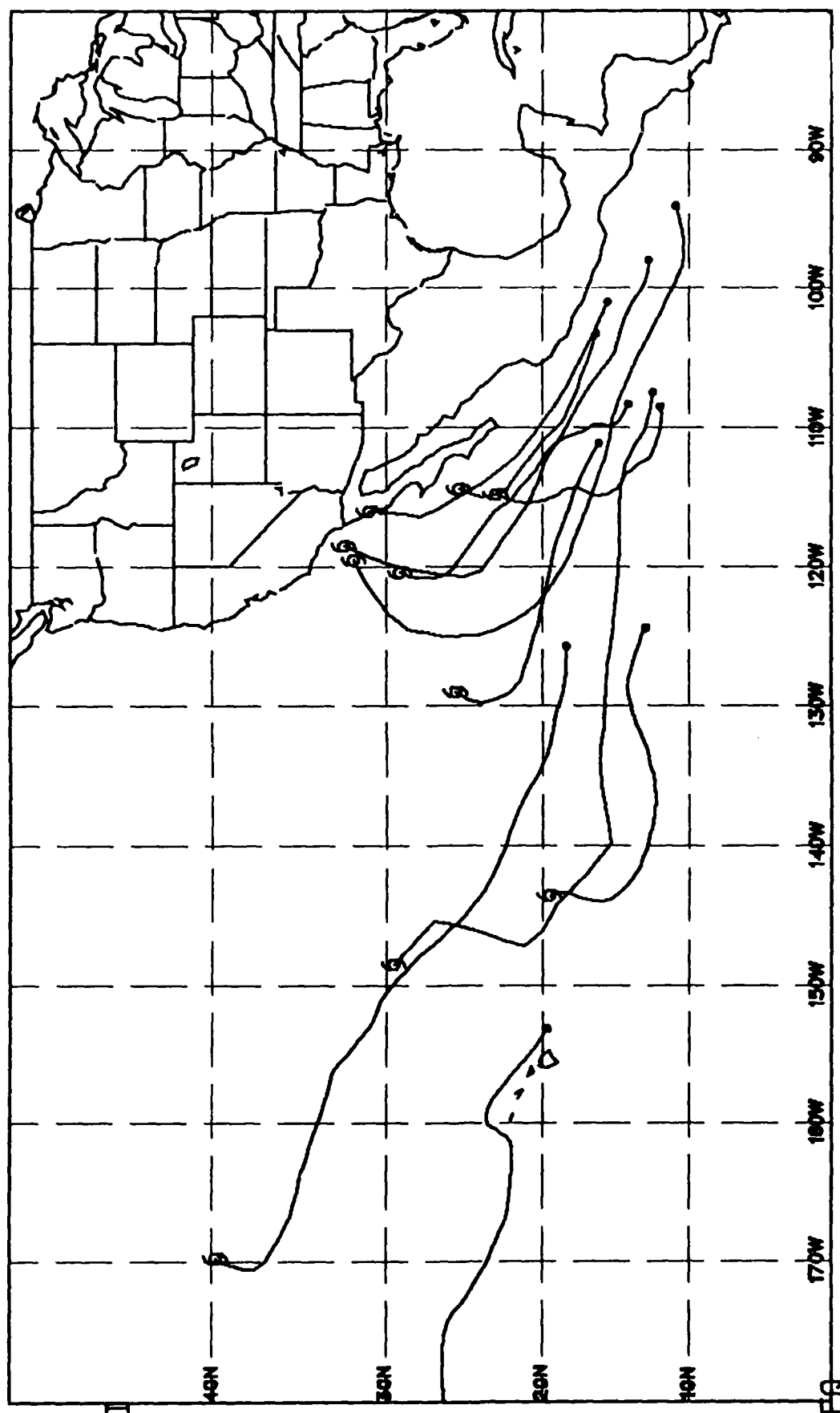
Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR AUG 9 - AUG 23



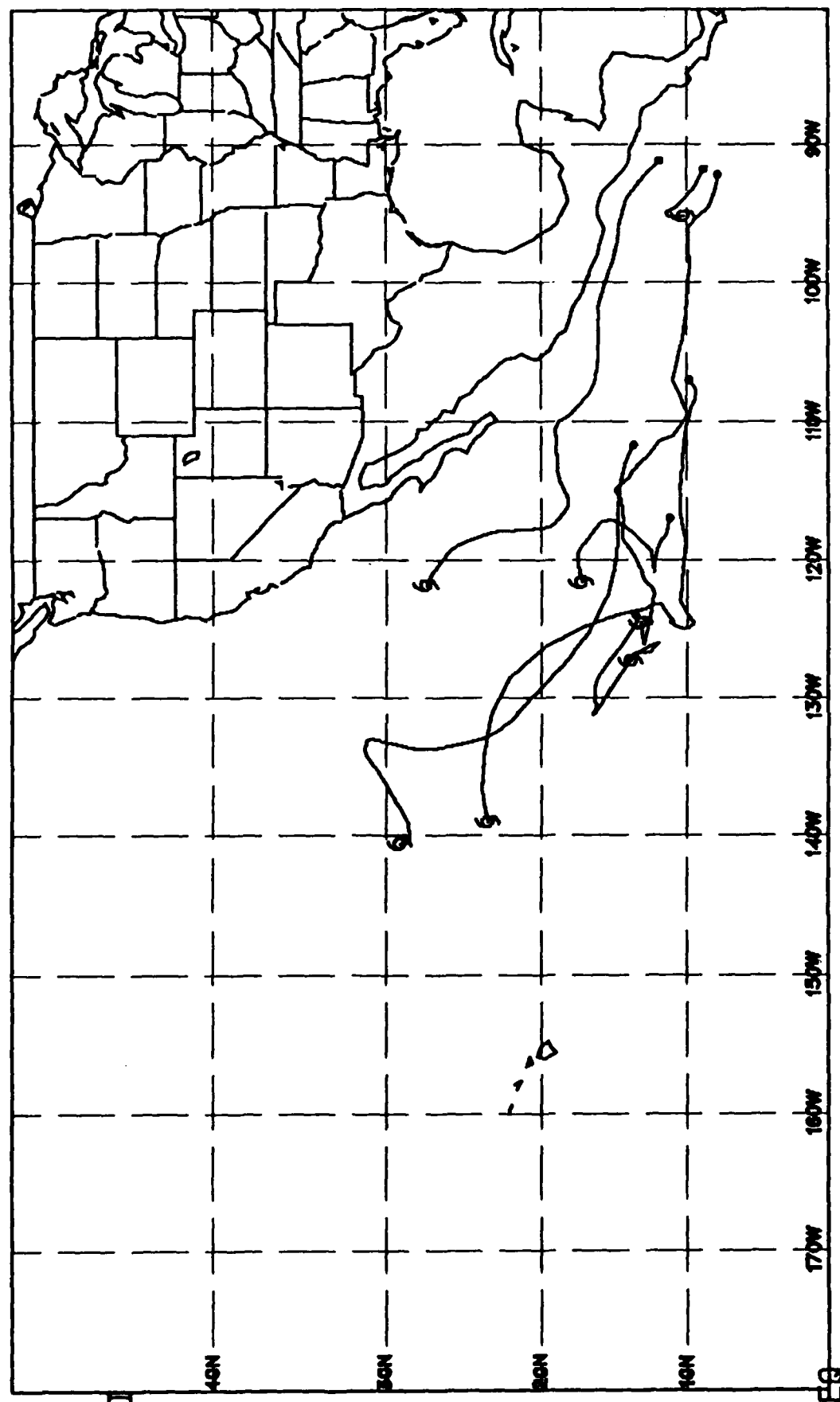
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR AUG 9 - AUG 23



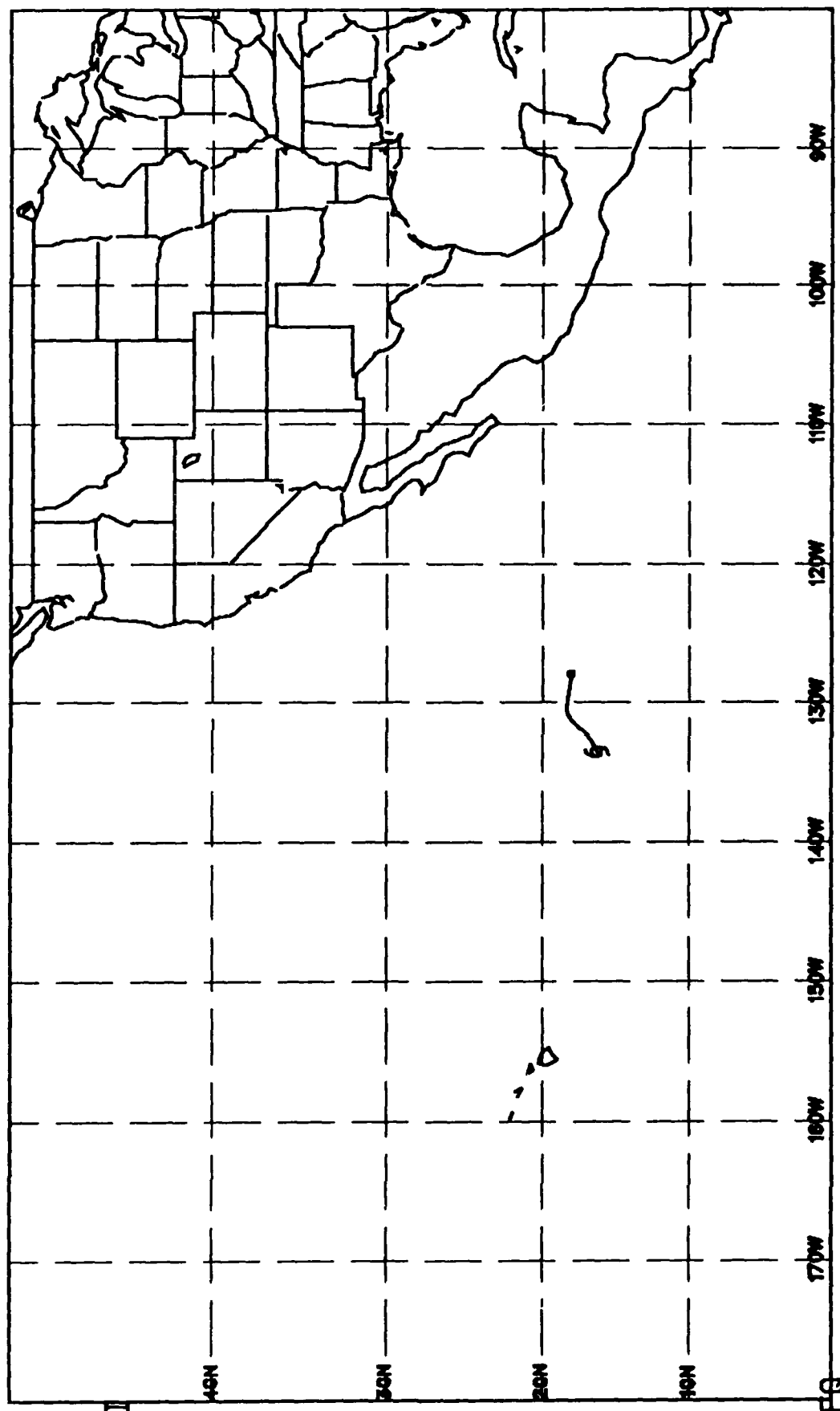
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR AUG 9 - AUG 23



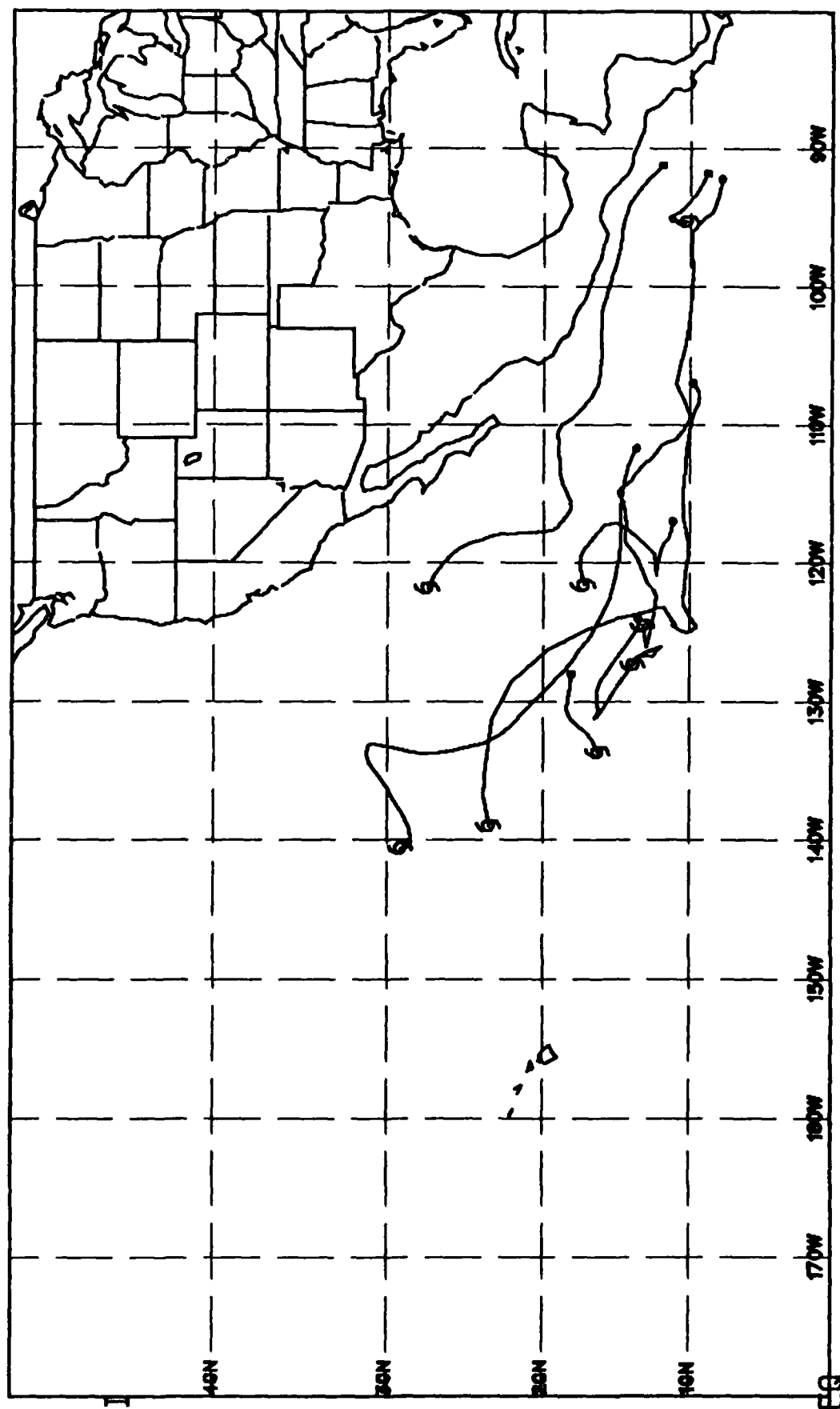
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR AUG 9 - AUG 23



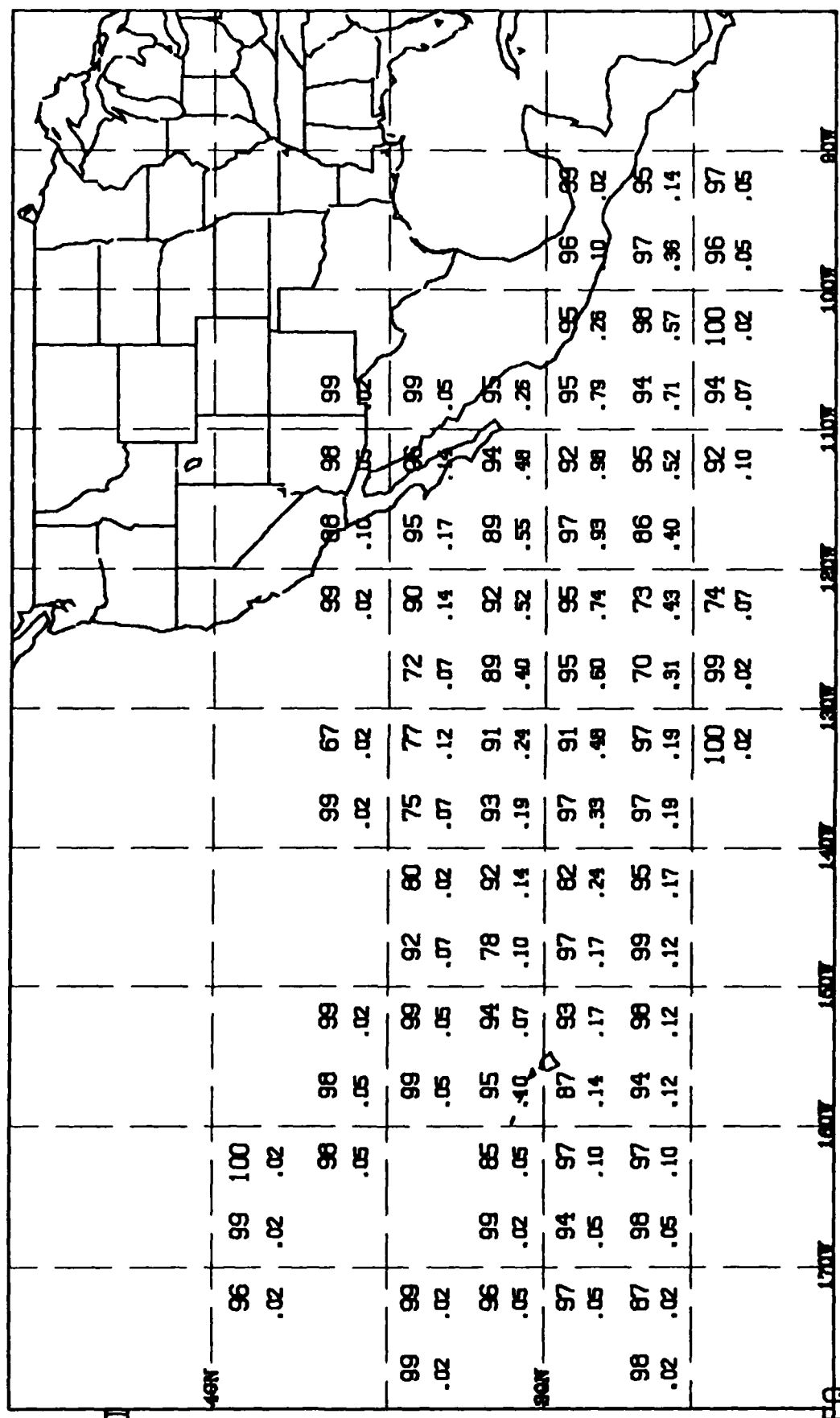
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR AUG 9 - AUG 23



Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR AUG 9 - AUG 23

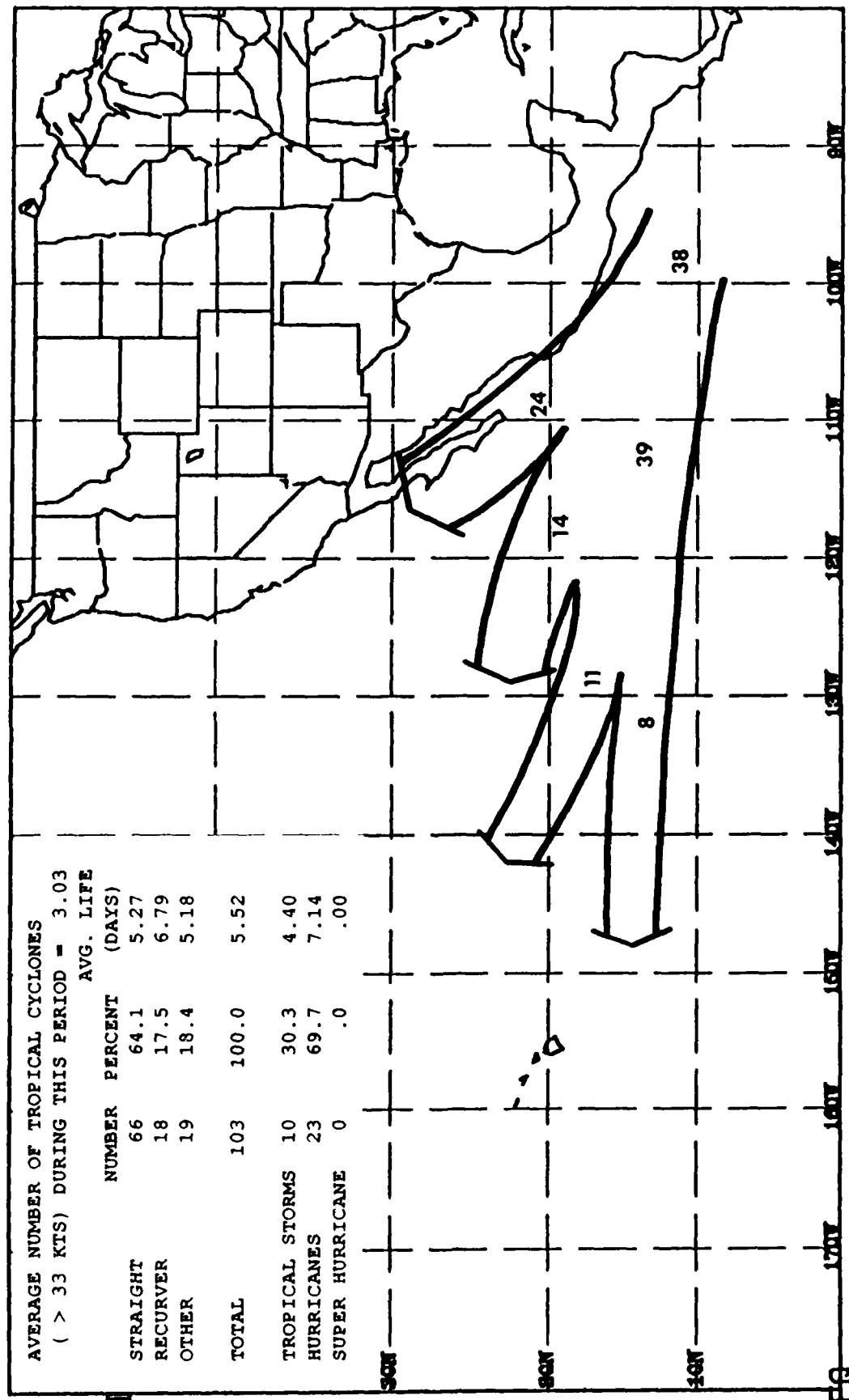


Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number). Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed. Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year per time period.

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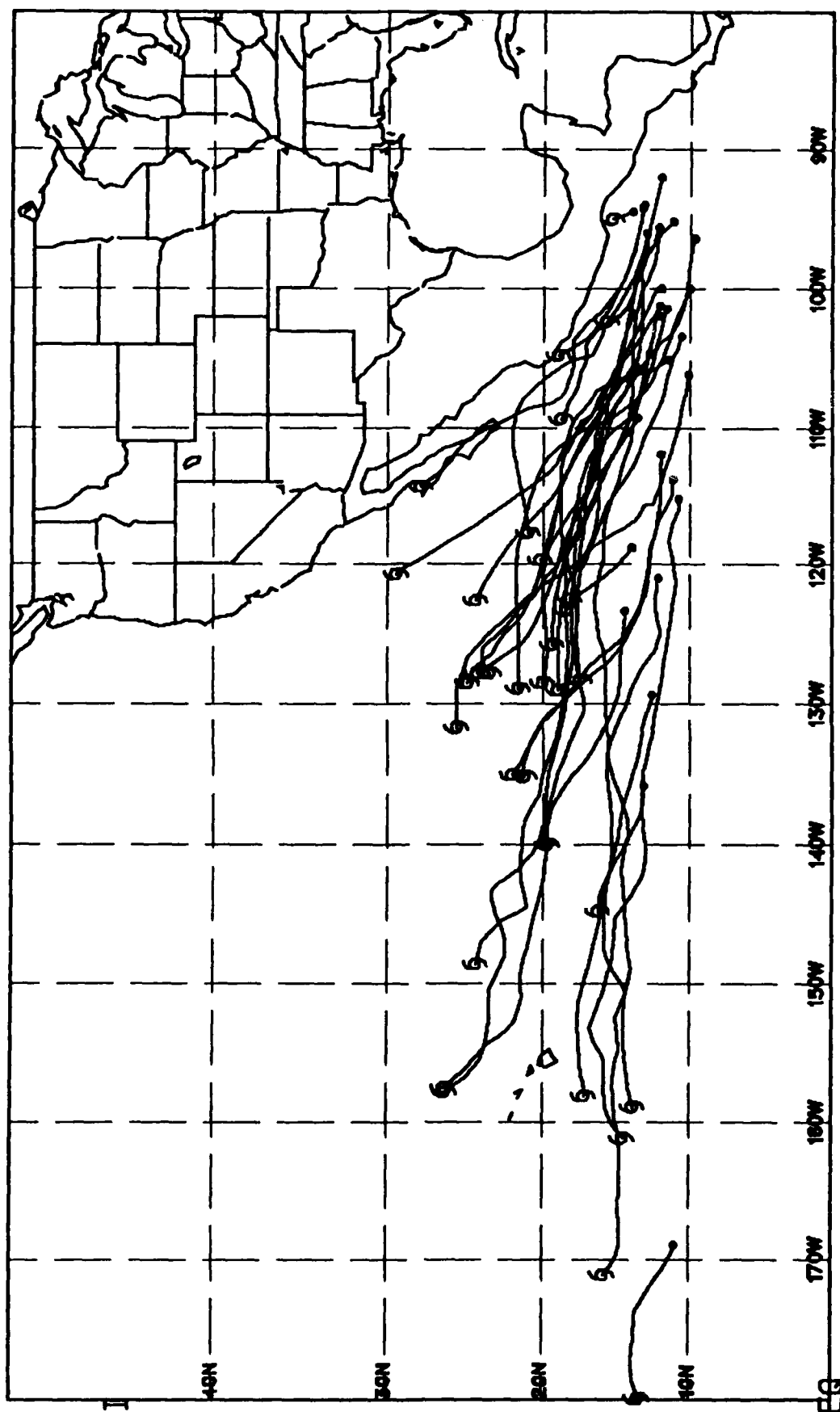
E-116

MEAN PATHS FOR AUG 24 - SEP 8



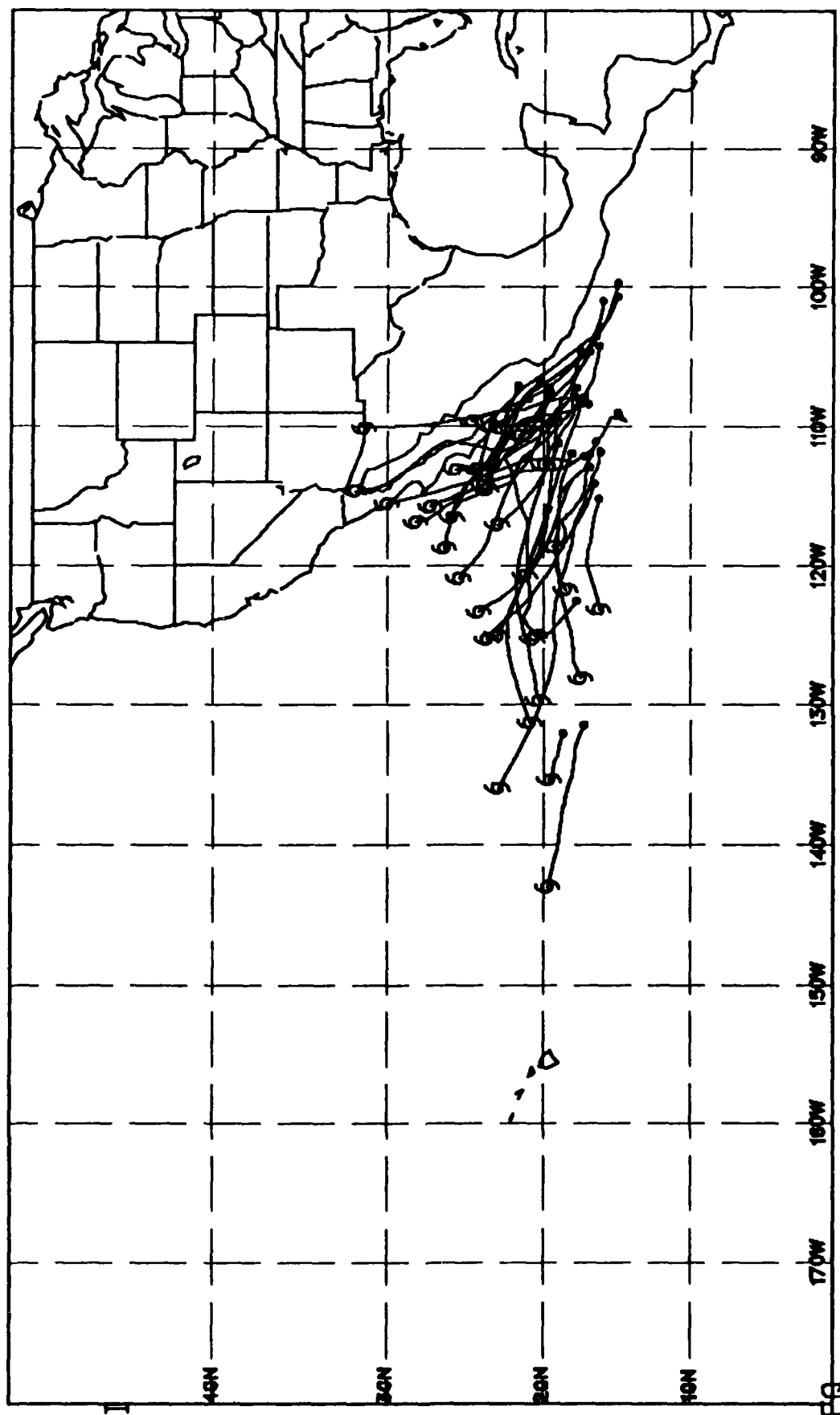
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored.

ACTUAL TRACKS FOR AUG 24 - SEP 8



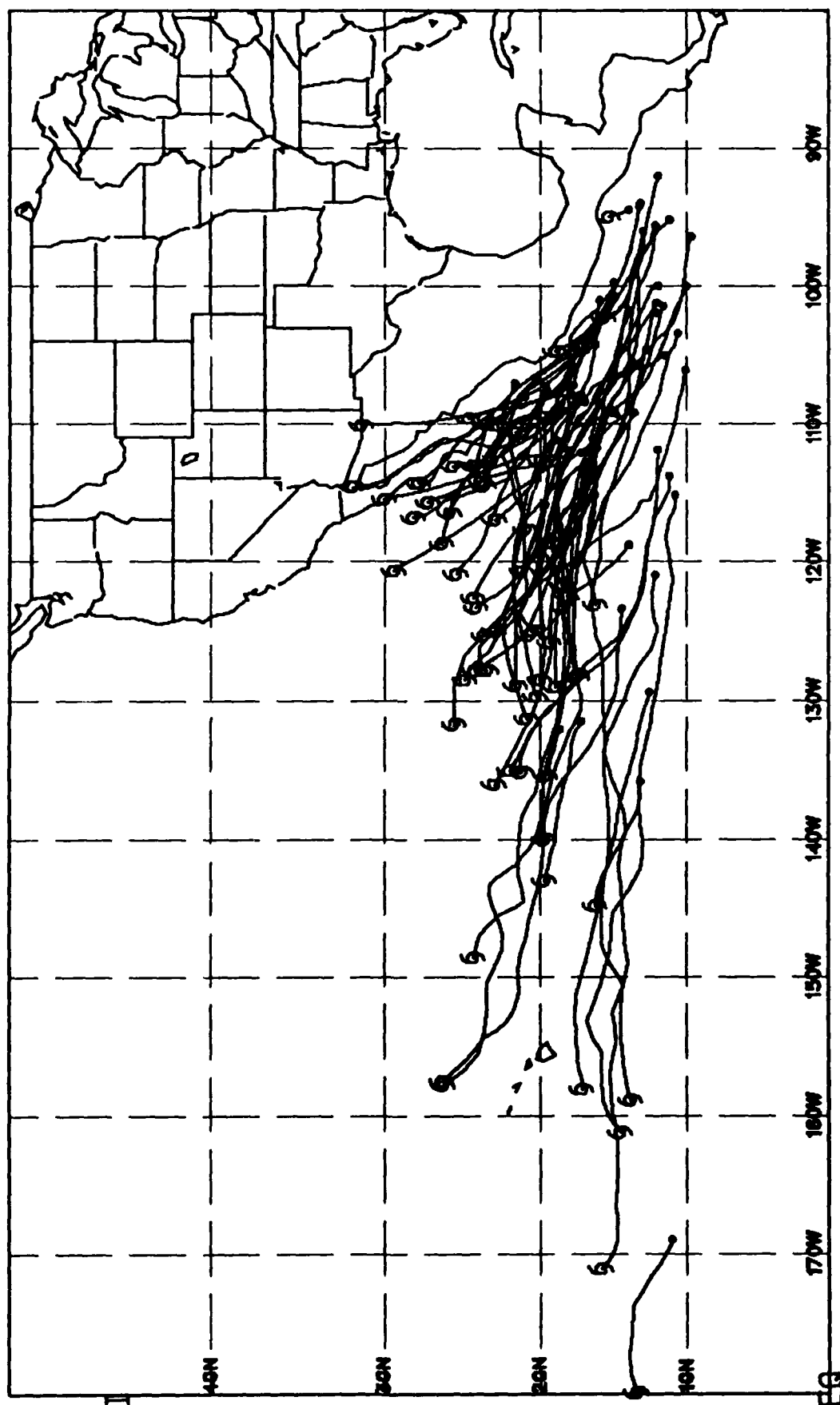
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR AUG 24 - SEP 8



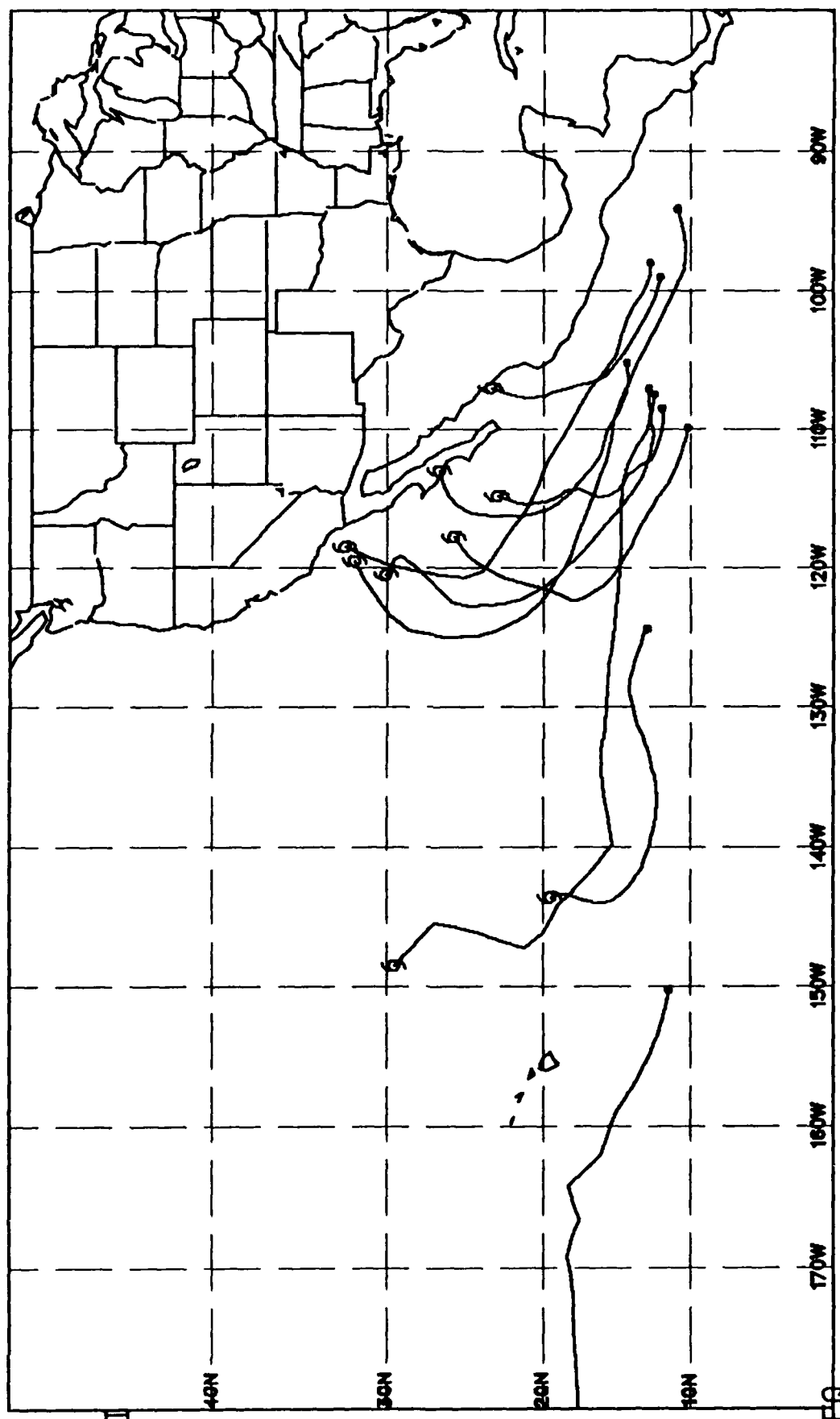
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR AUG 24 - SEP 8



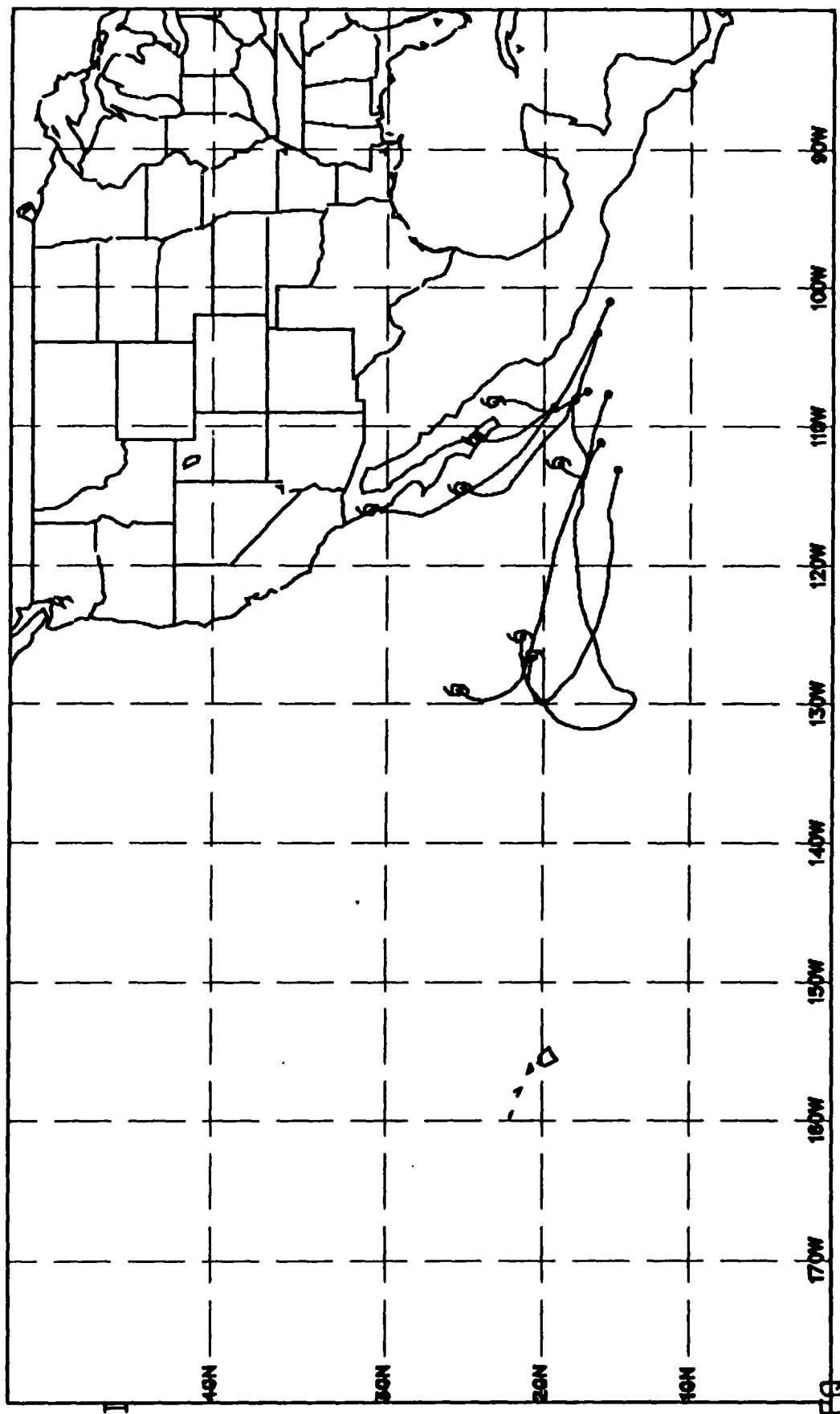
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR AUG 24 - SEP 8



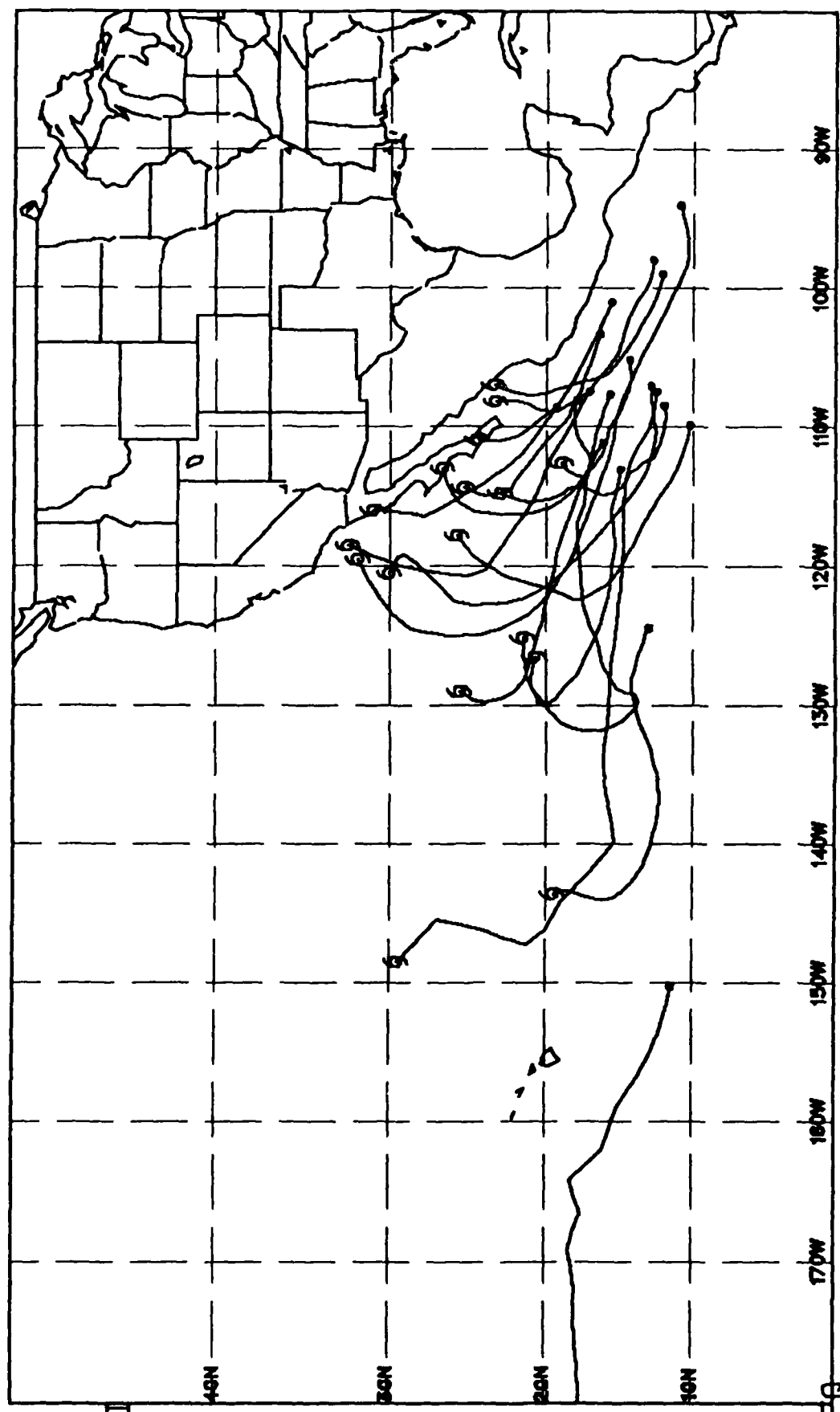
Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR AUG 24 - SEP 8



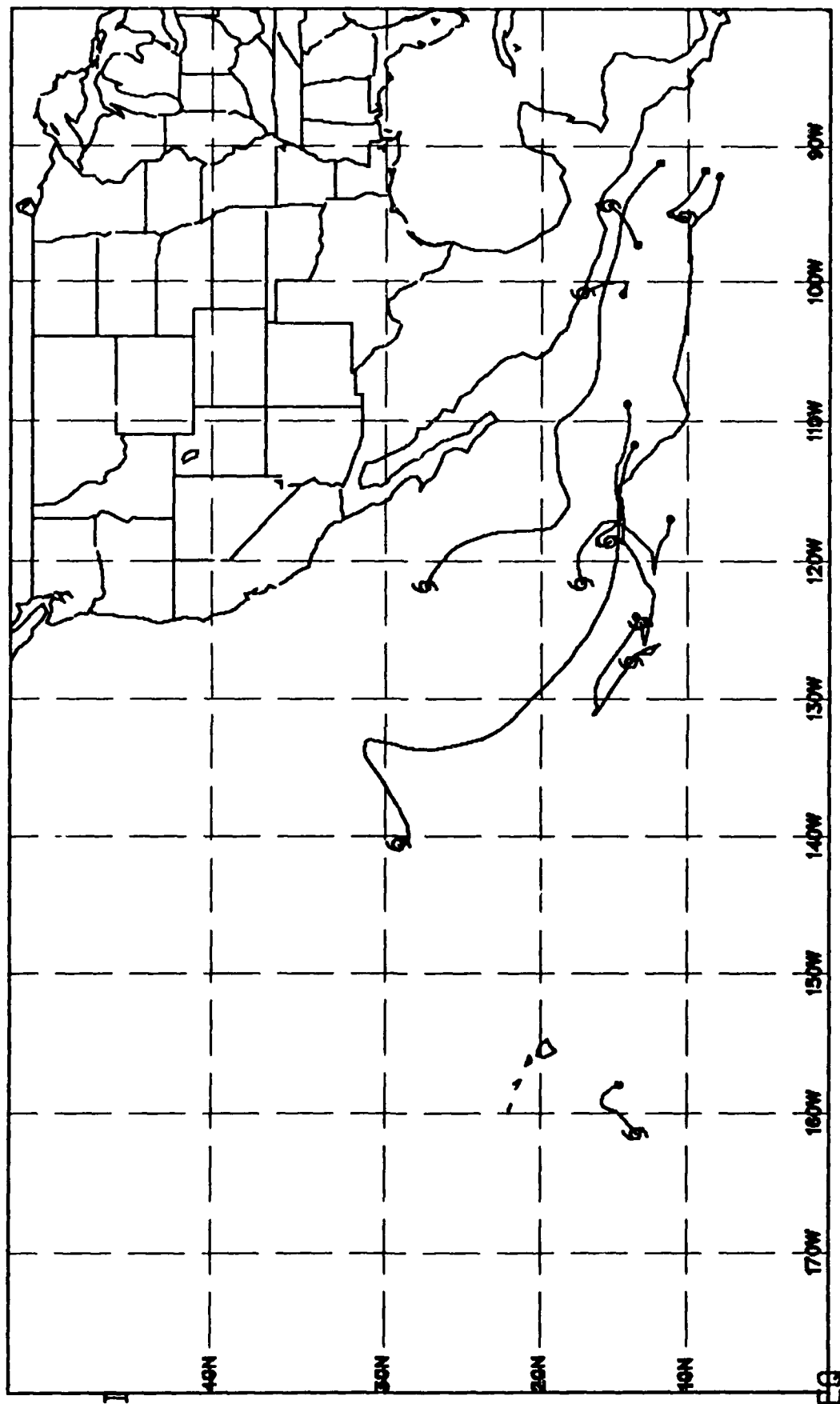
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR AUG 24 - SEP 8



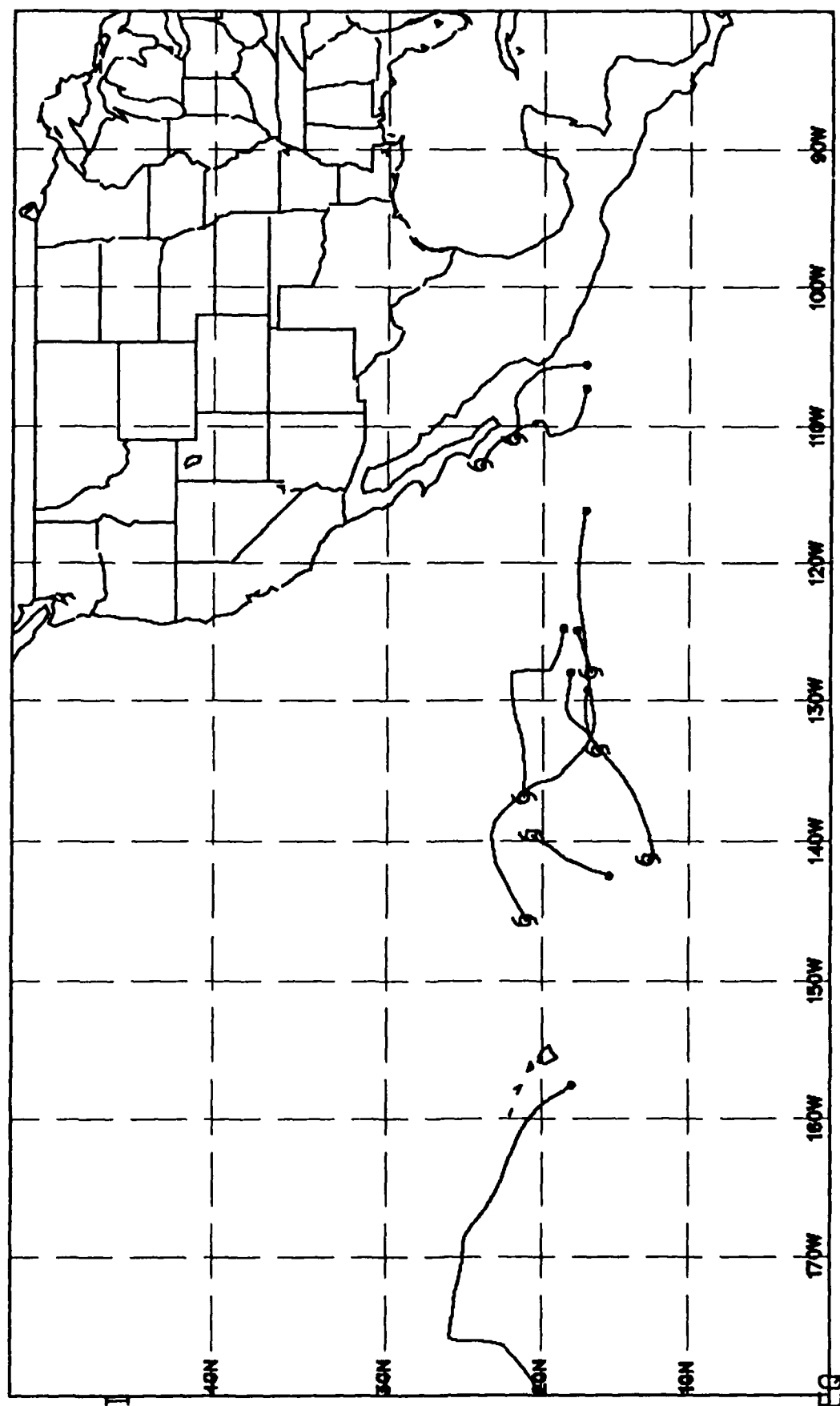
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR AUG 24 - SEP 8



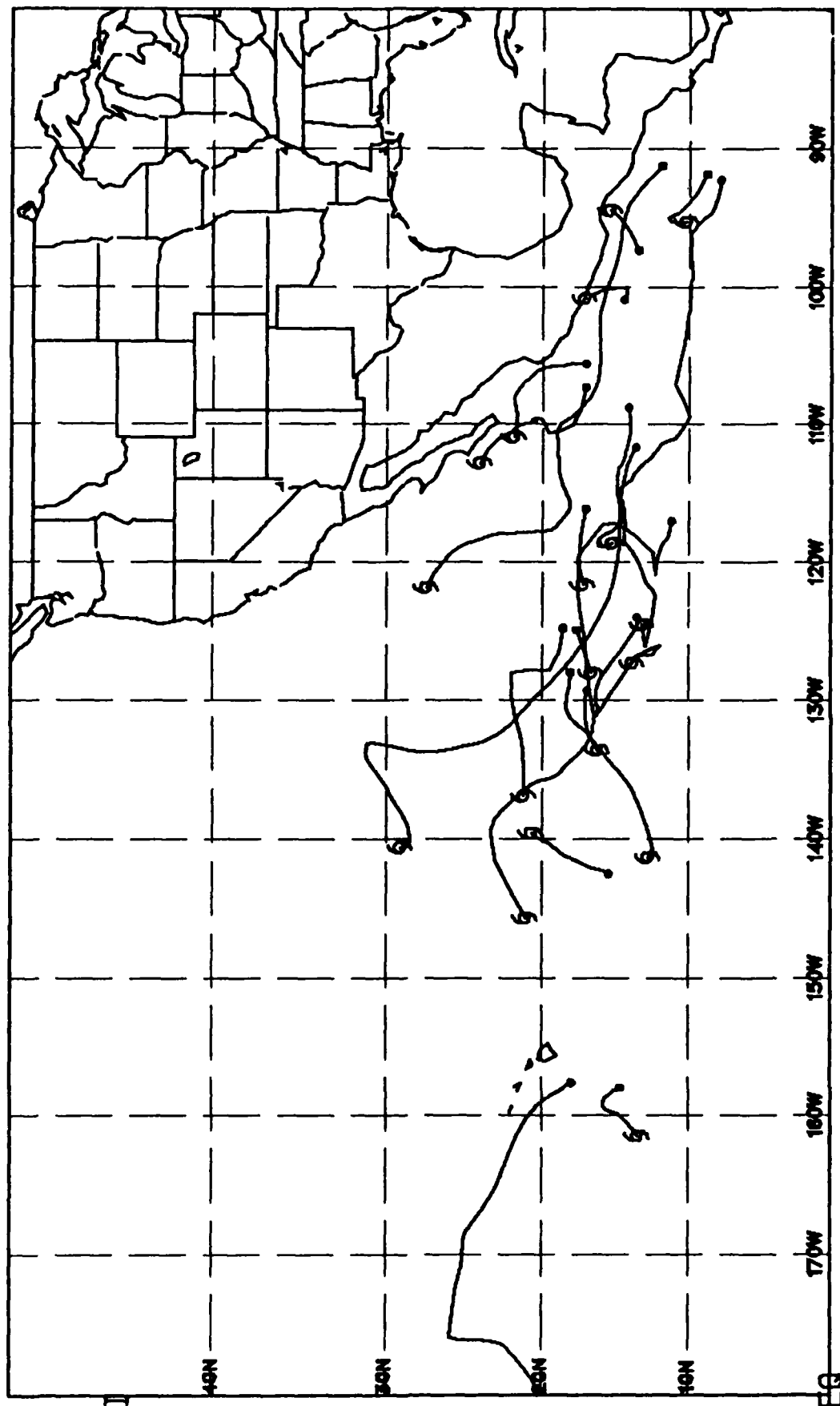
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR AUG 24 - SEP 8



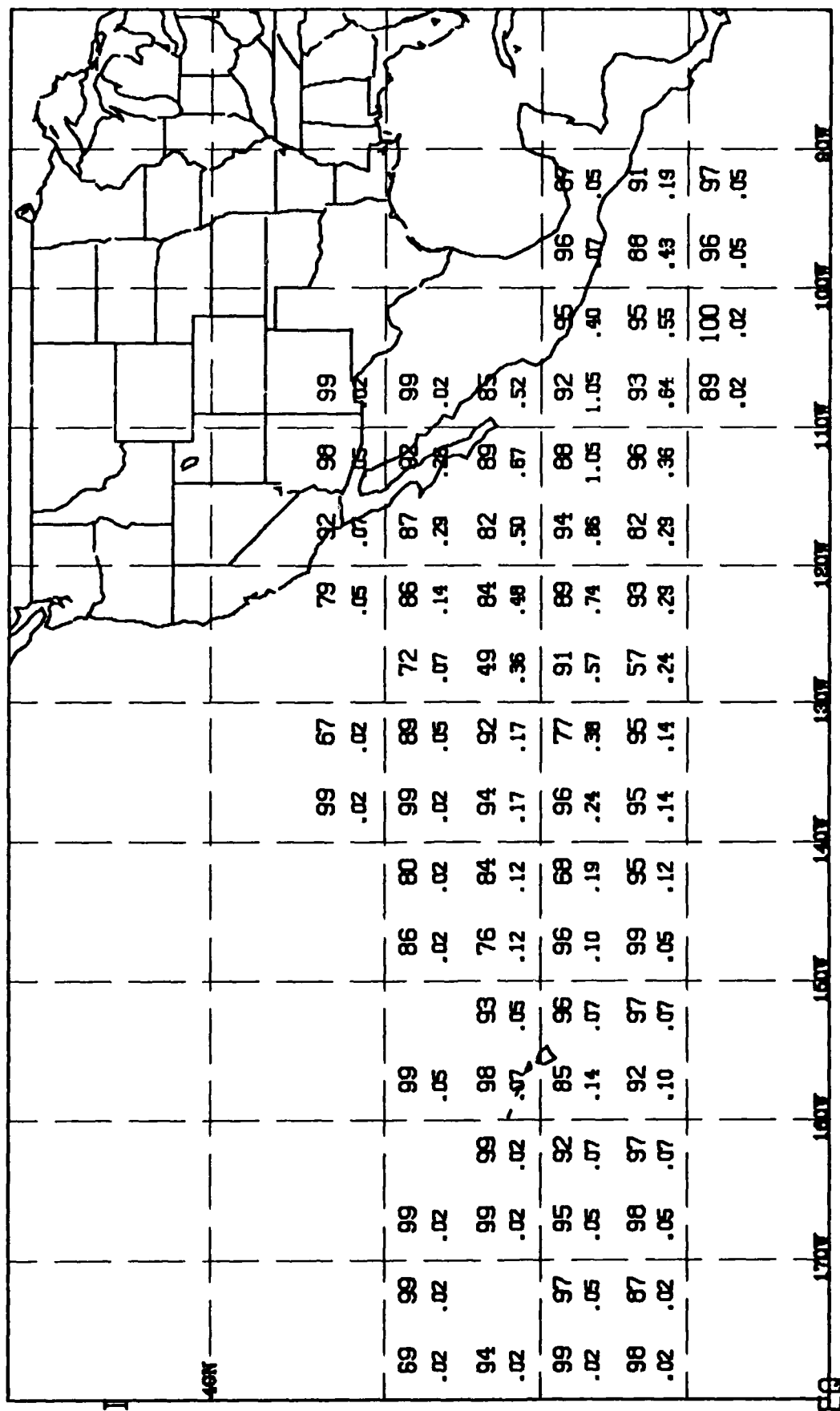
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR AUG 24 - SEP 8



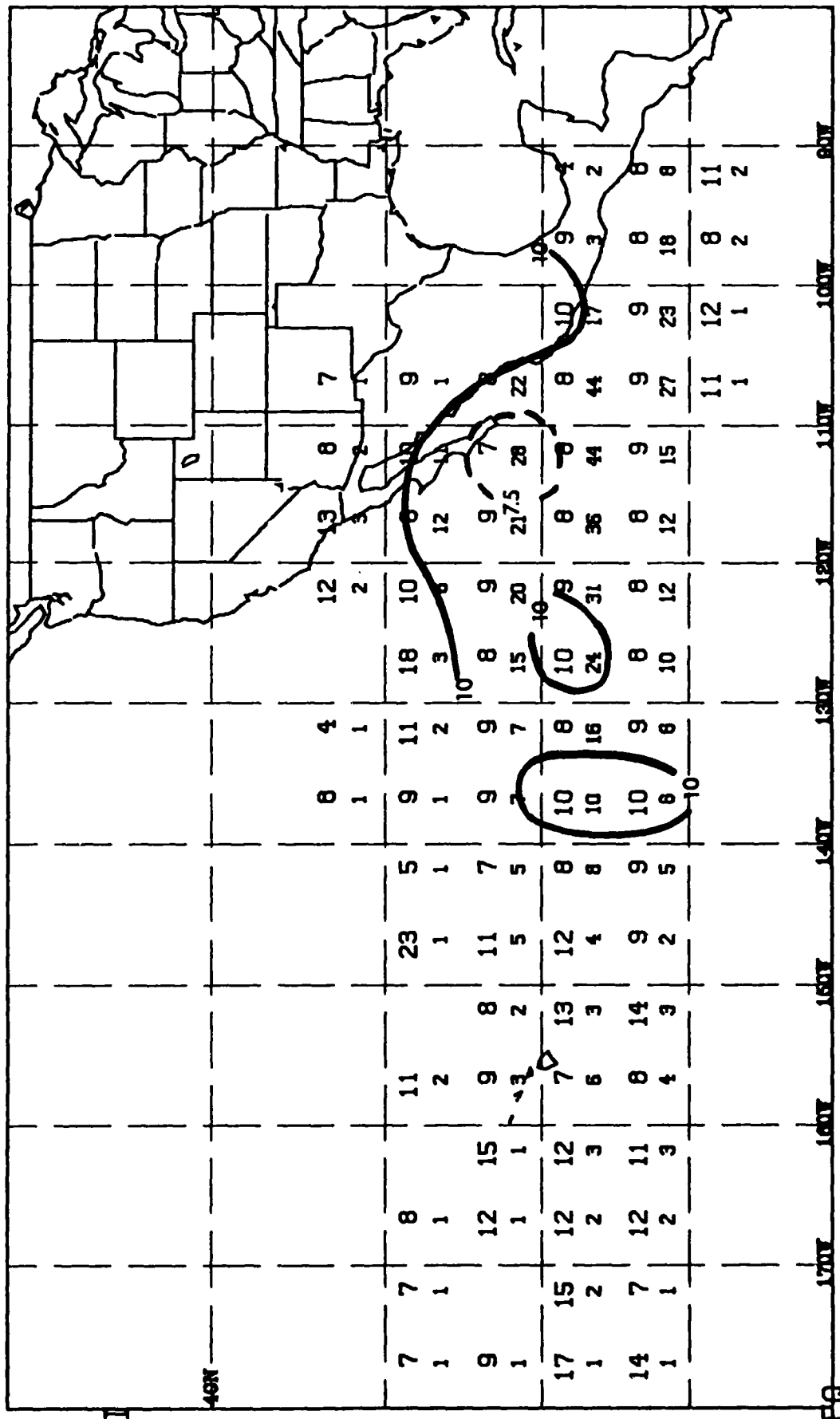
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR AUG 24 - SEP 8



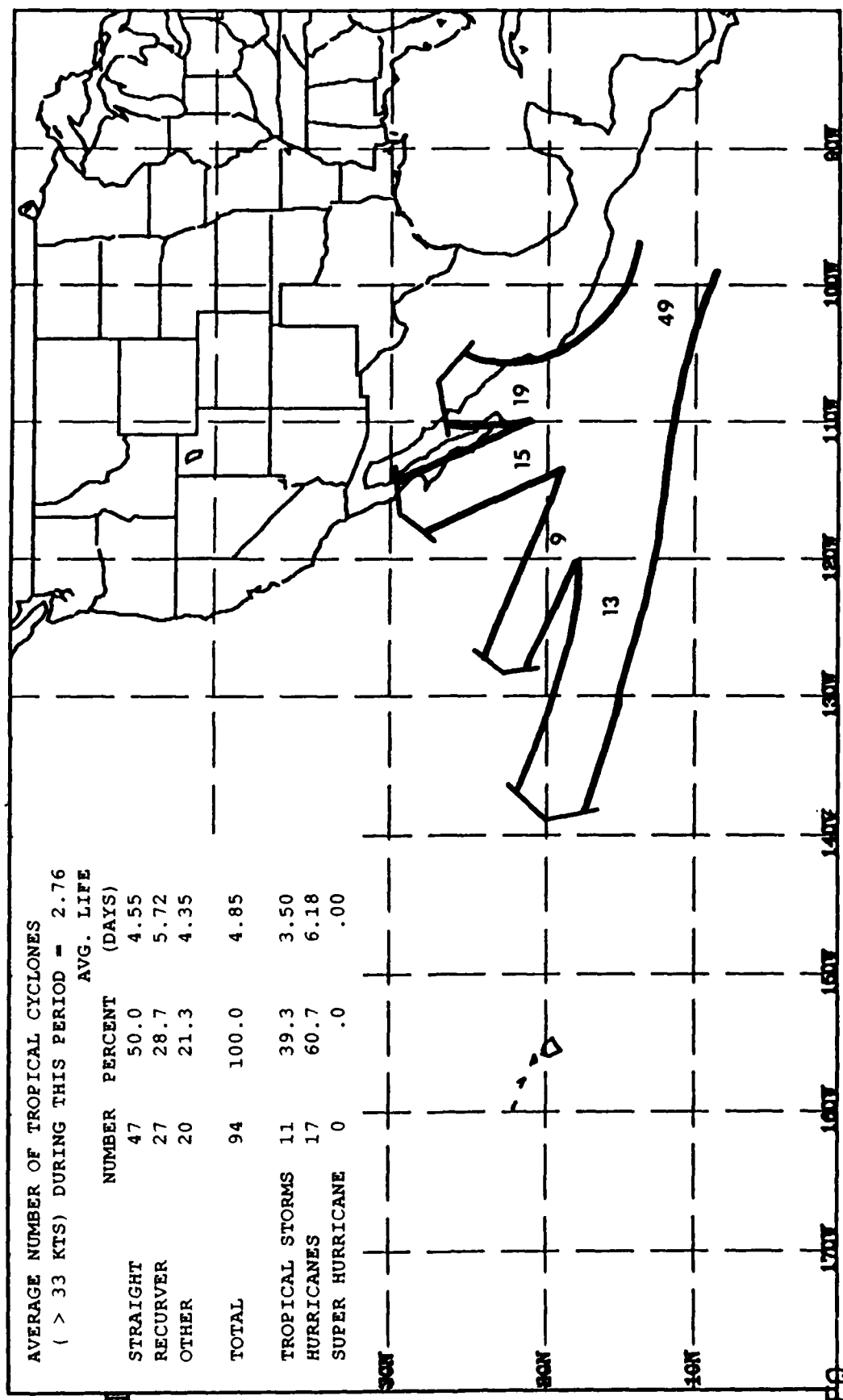
Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number).
 Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed.
 Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year period.

SPEED OF MOVEMENT FOR AUG 24 - SEP 8



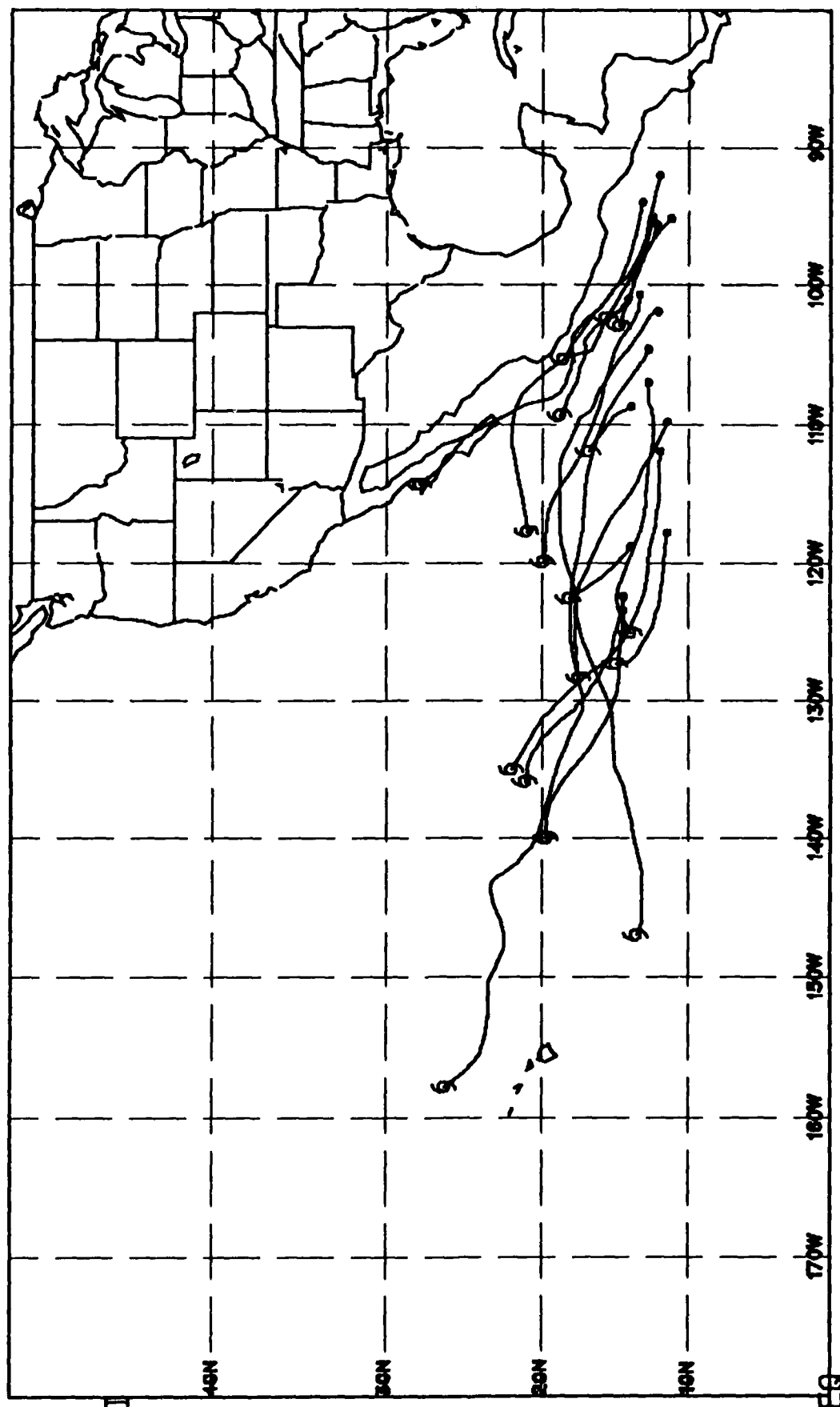
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR SEP 9 - SEP 23



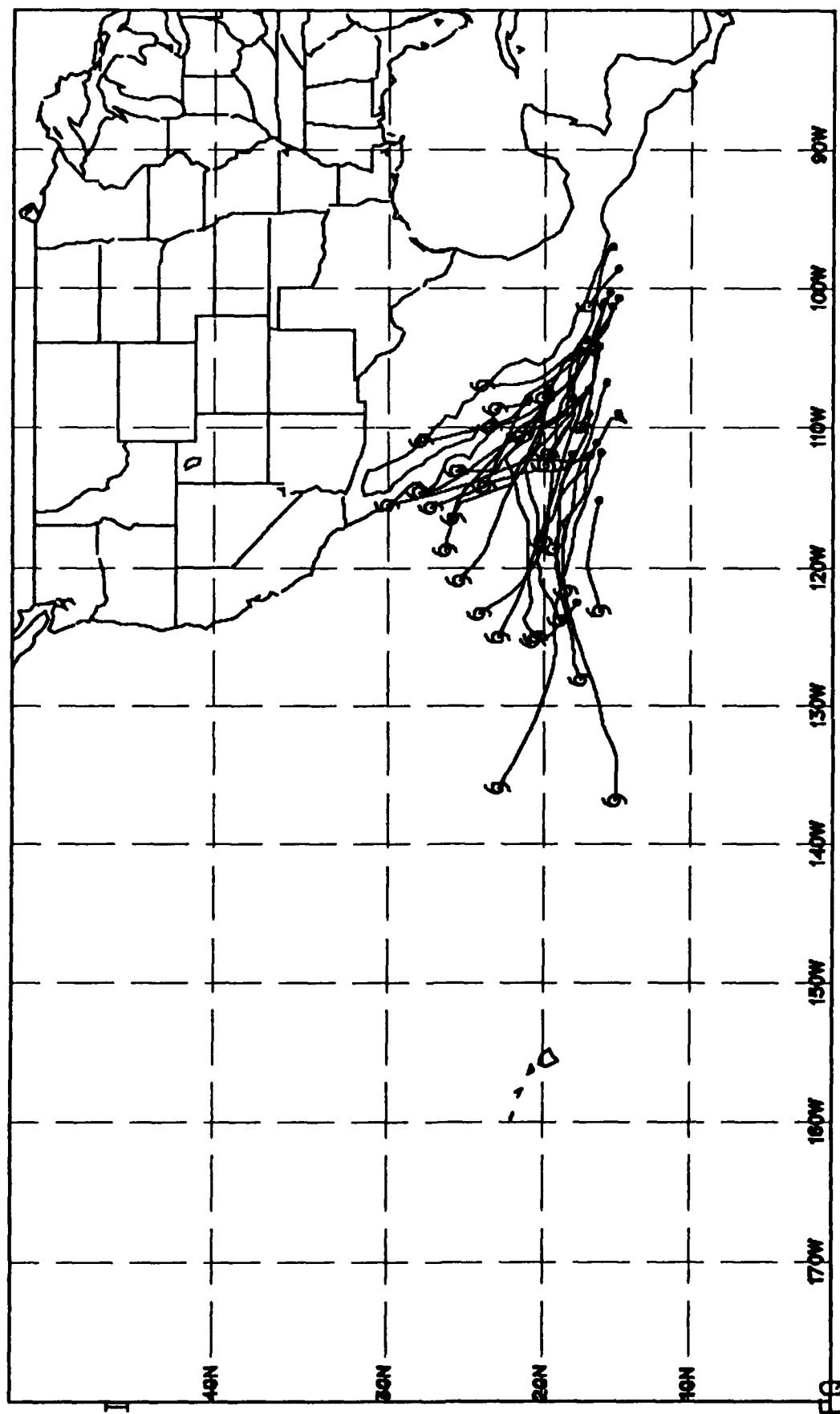
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored.

ACTUAL TRACKS FOR SEP 9 - SEP 23



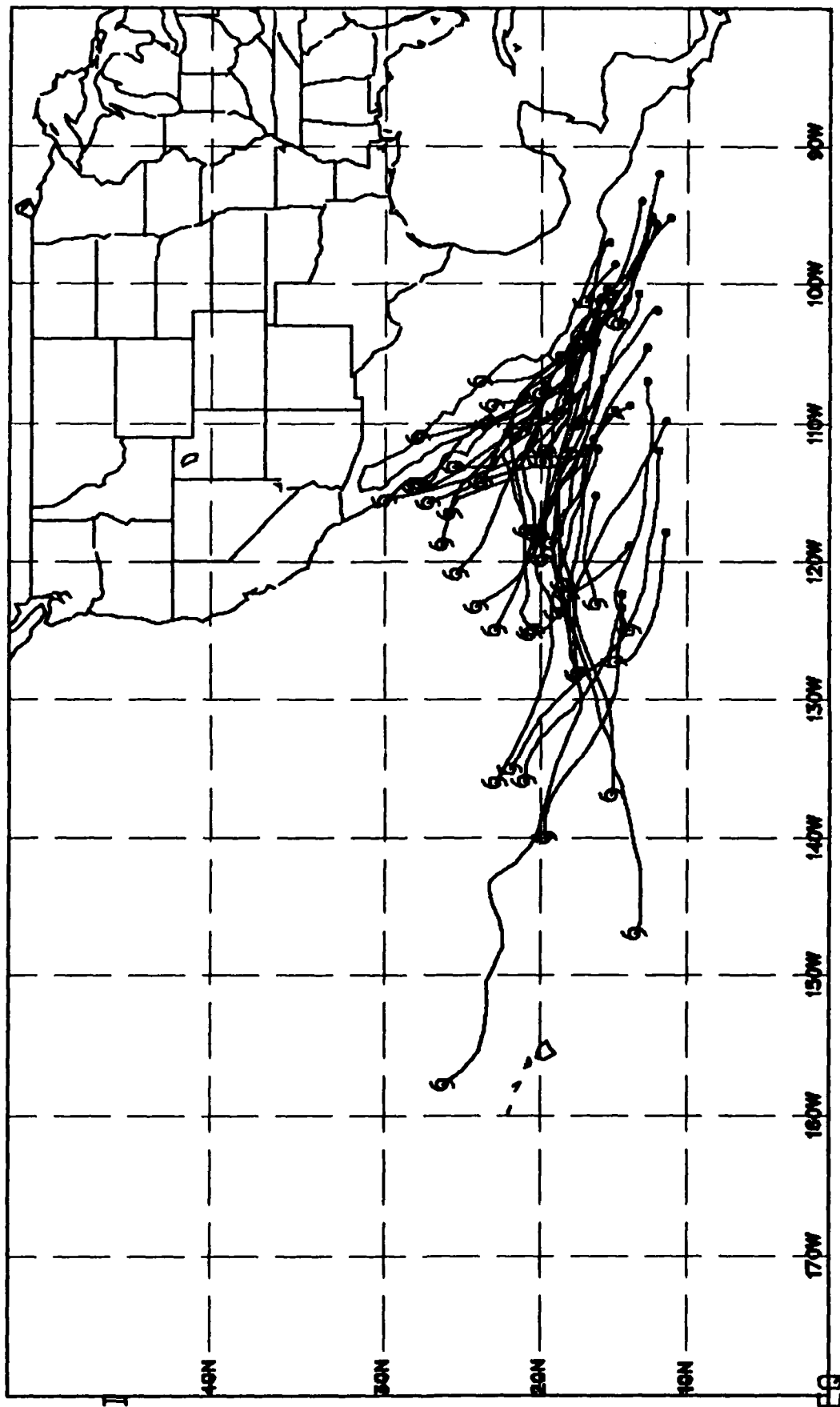
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR SEP 9 - SEP 23



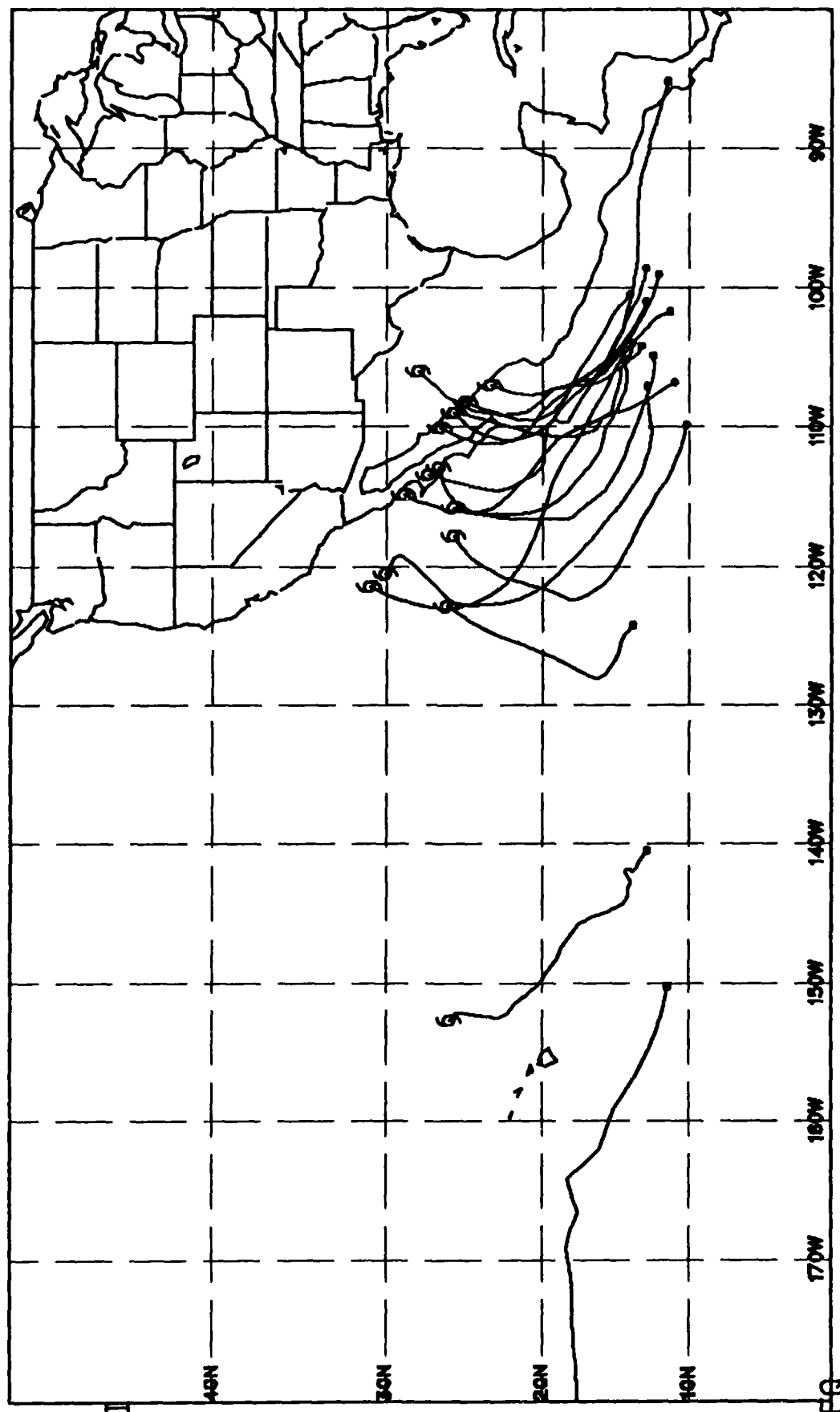
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR SEP 9 - SEP 23



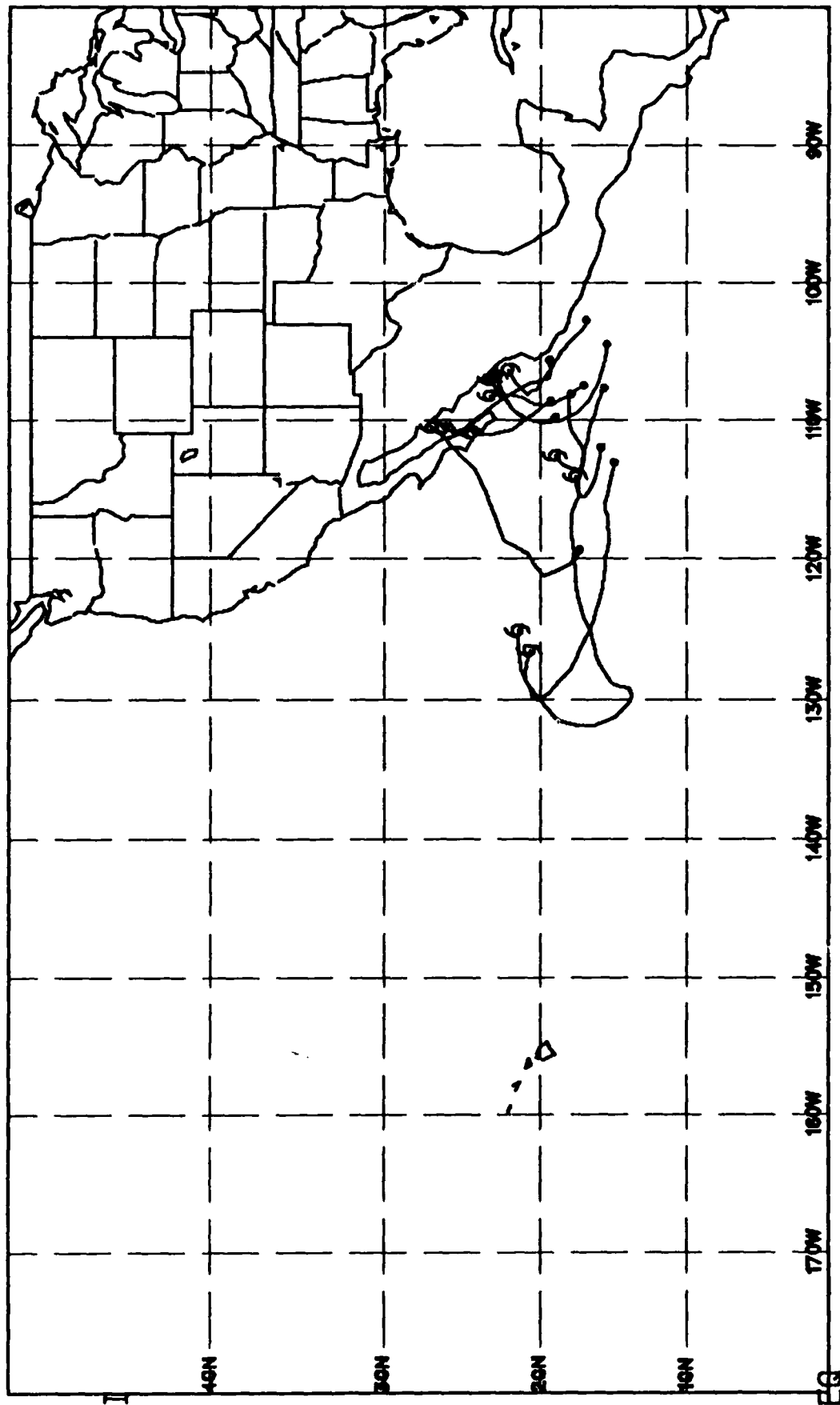
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR SEP 9 - SEP 23



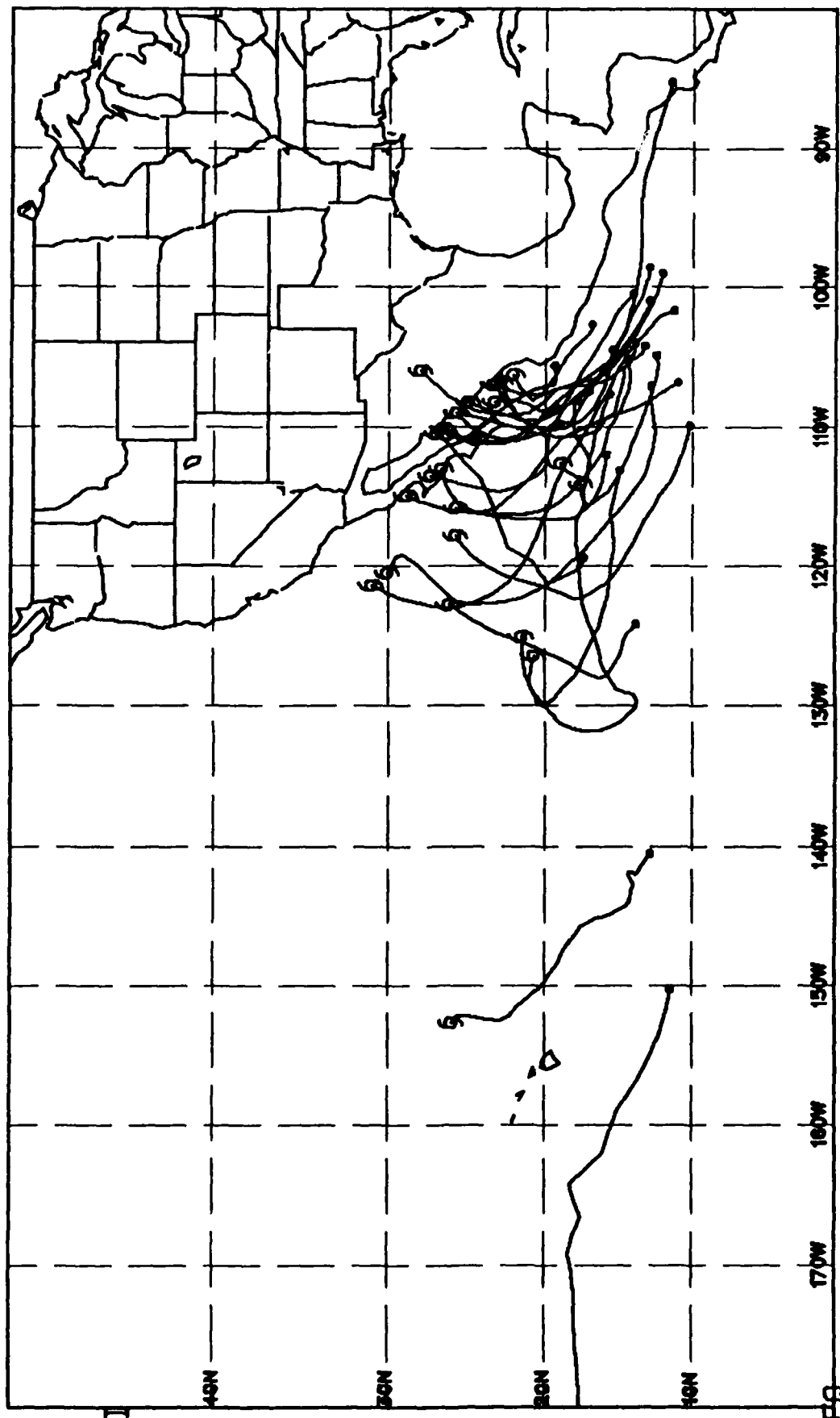
Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR SEP 9 - SEP 23



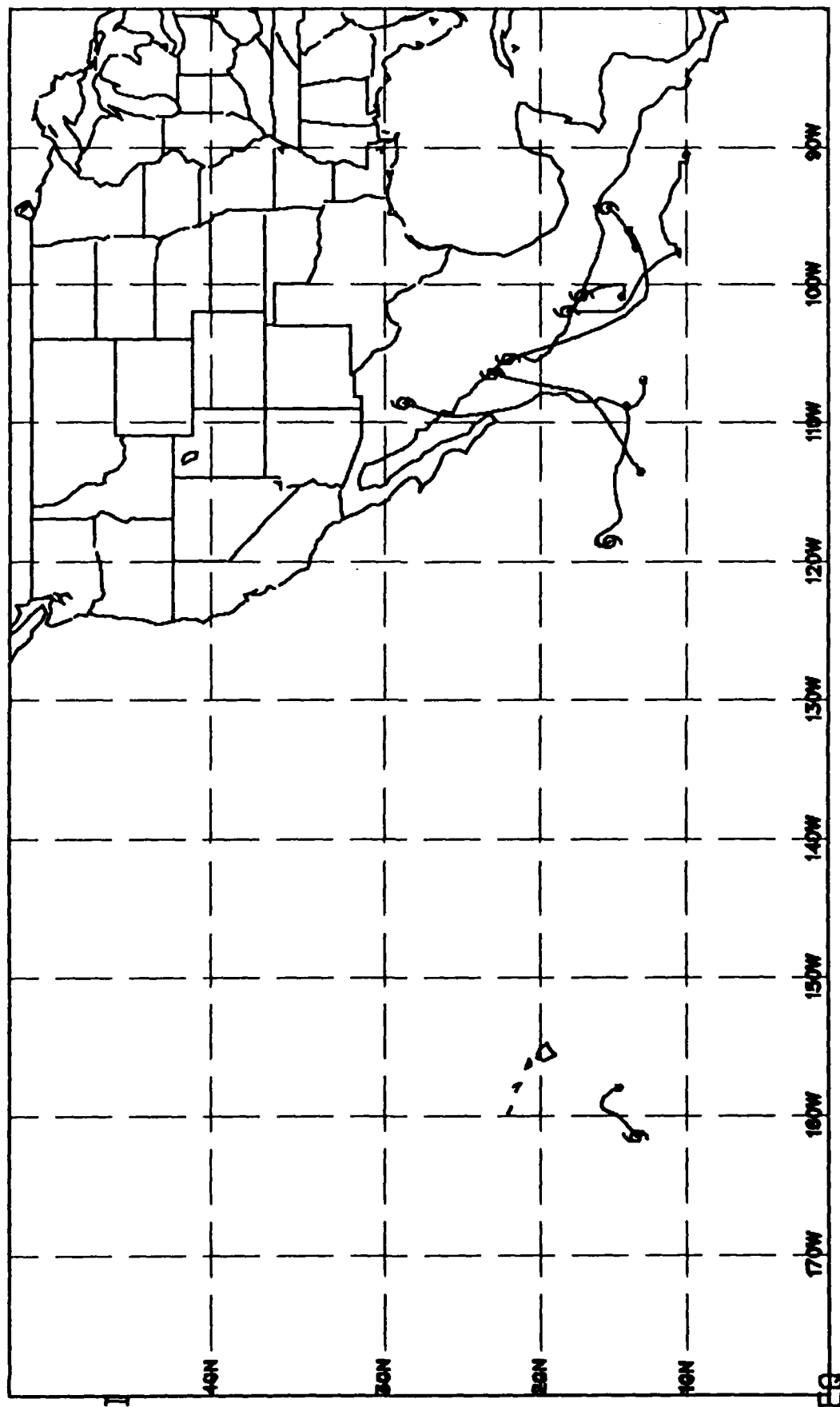
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR SEP 9 - SEP 23



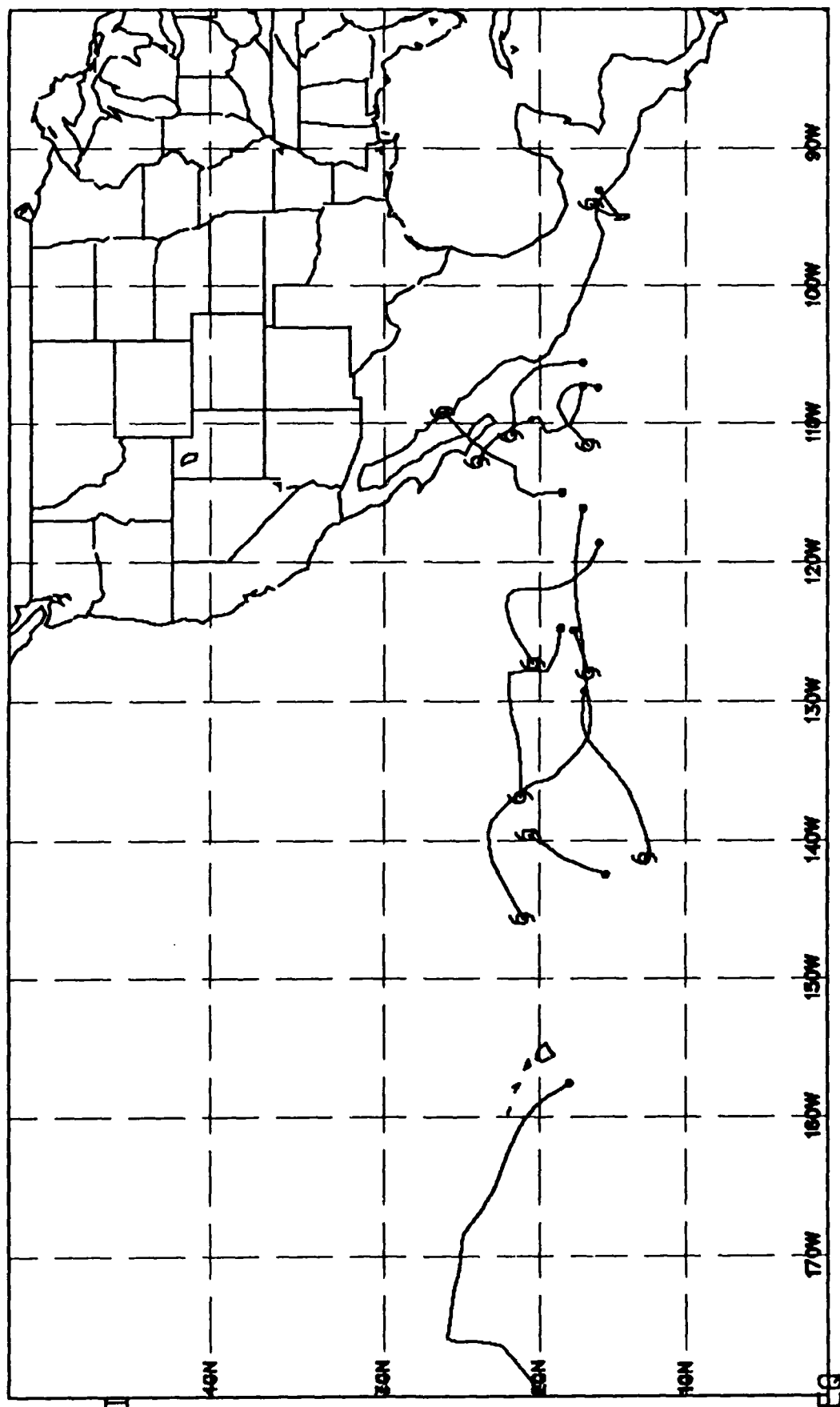
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR SEP 9 - SEP 23



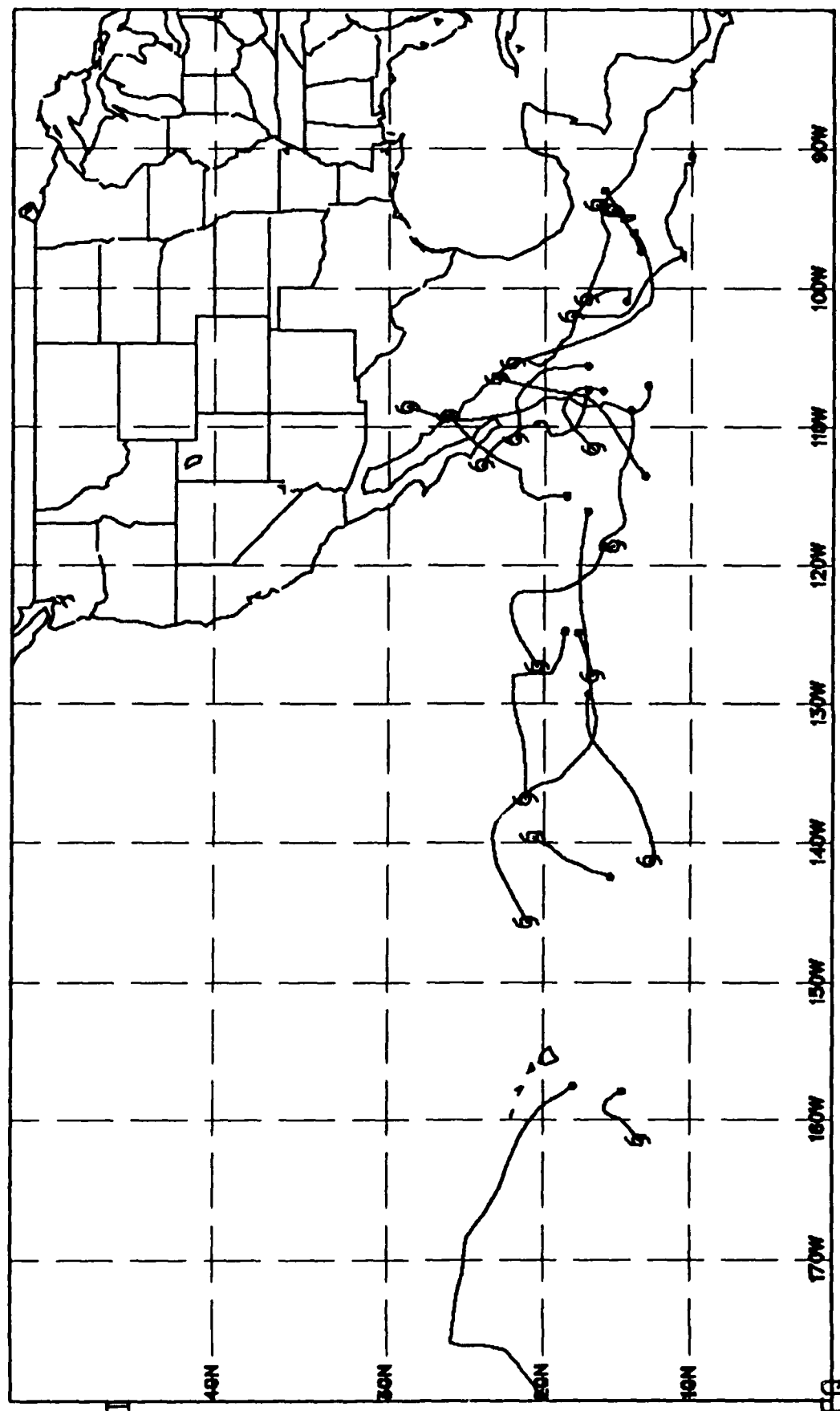
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR SEP 9 - SEP 23



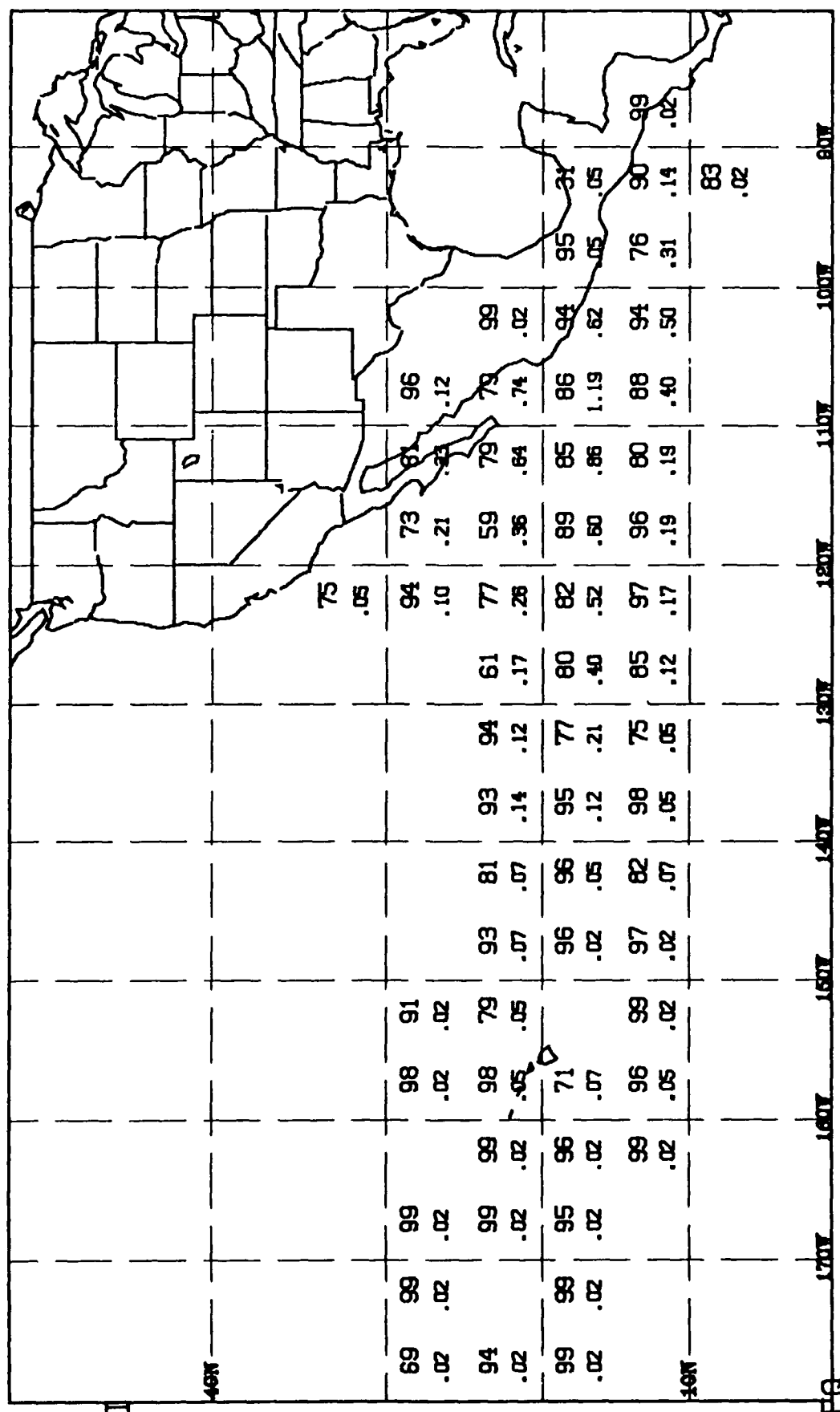
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR SEP 9 - SEP 23



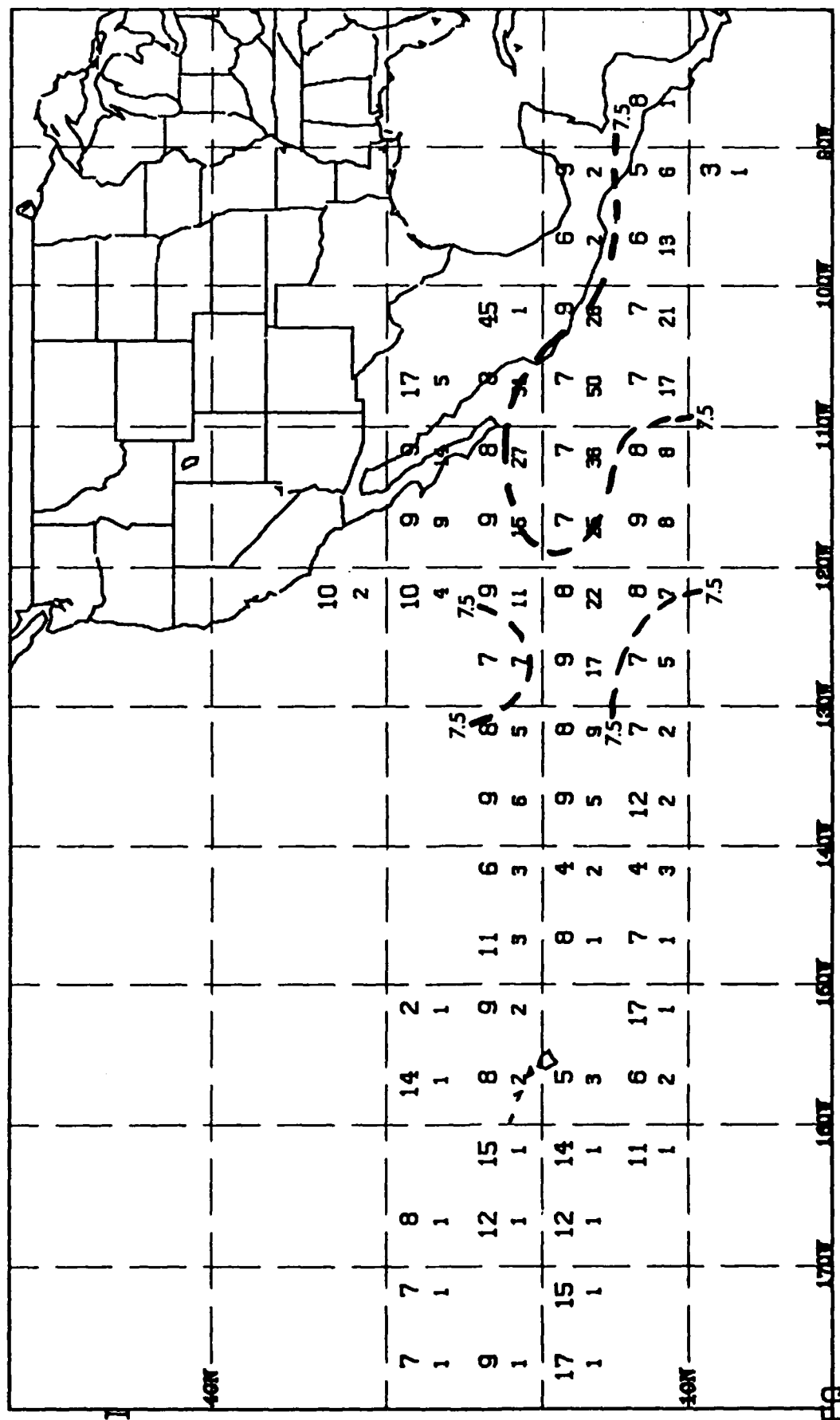
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR SEP 9 - SEP 23



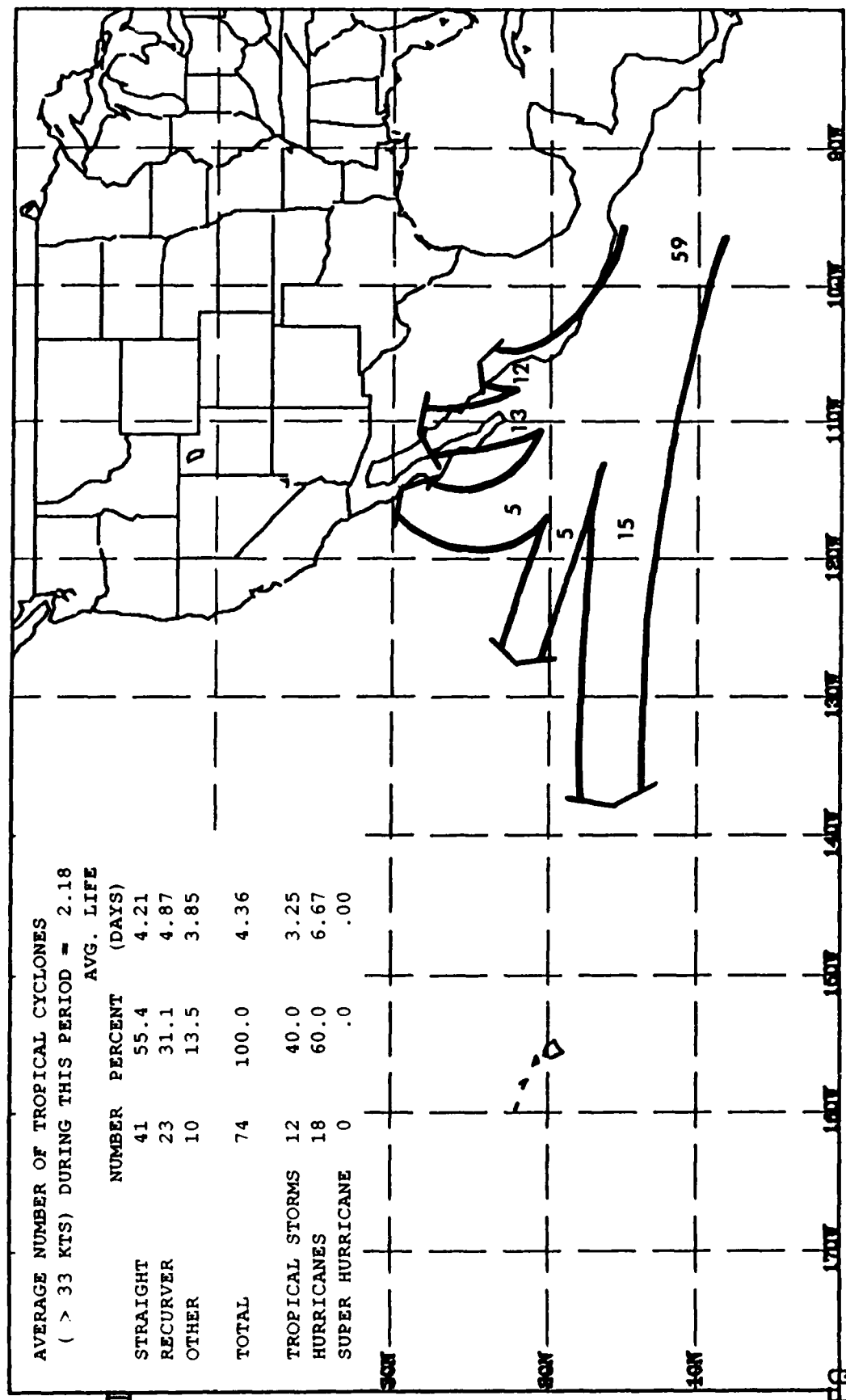
Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number). Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed. Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year per time period.

SPEED OF MOVEMENT FOR SEP 9 - SEP 23



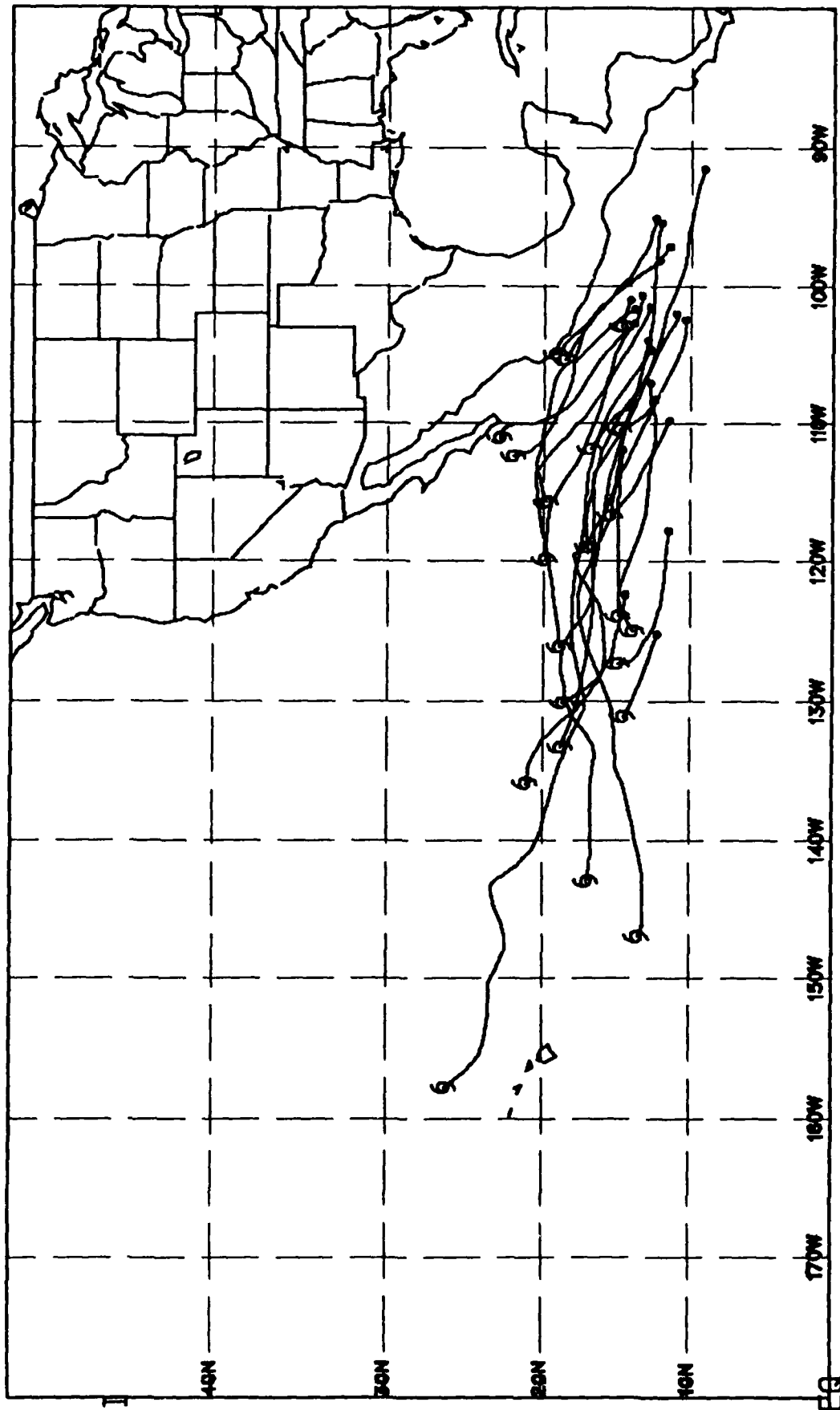
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR SEP 24 - OCT 8



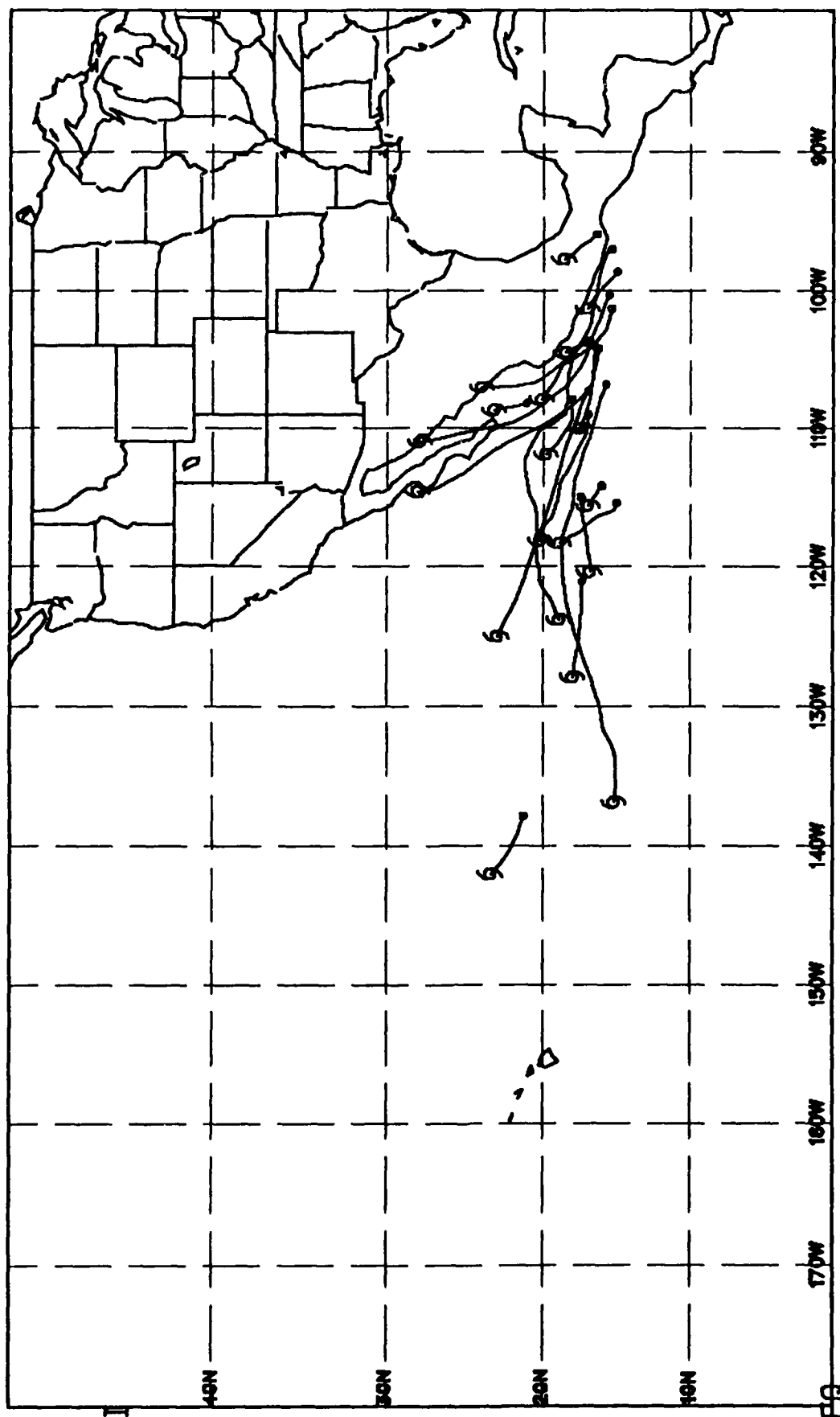
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ACTUAL TRACKS FOR SEP 24 - OCT 8



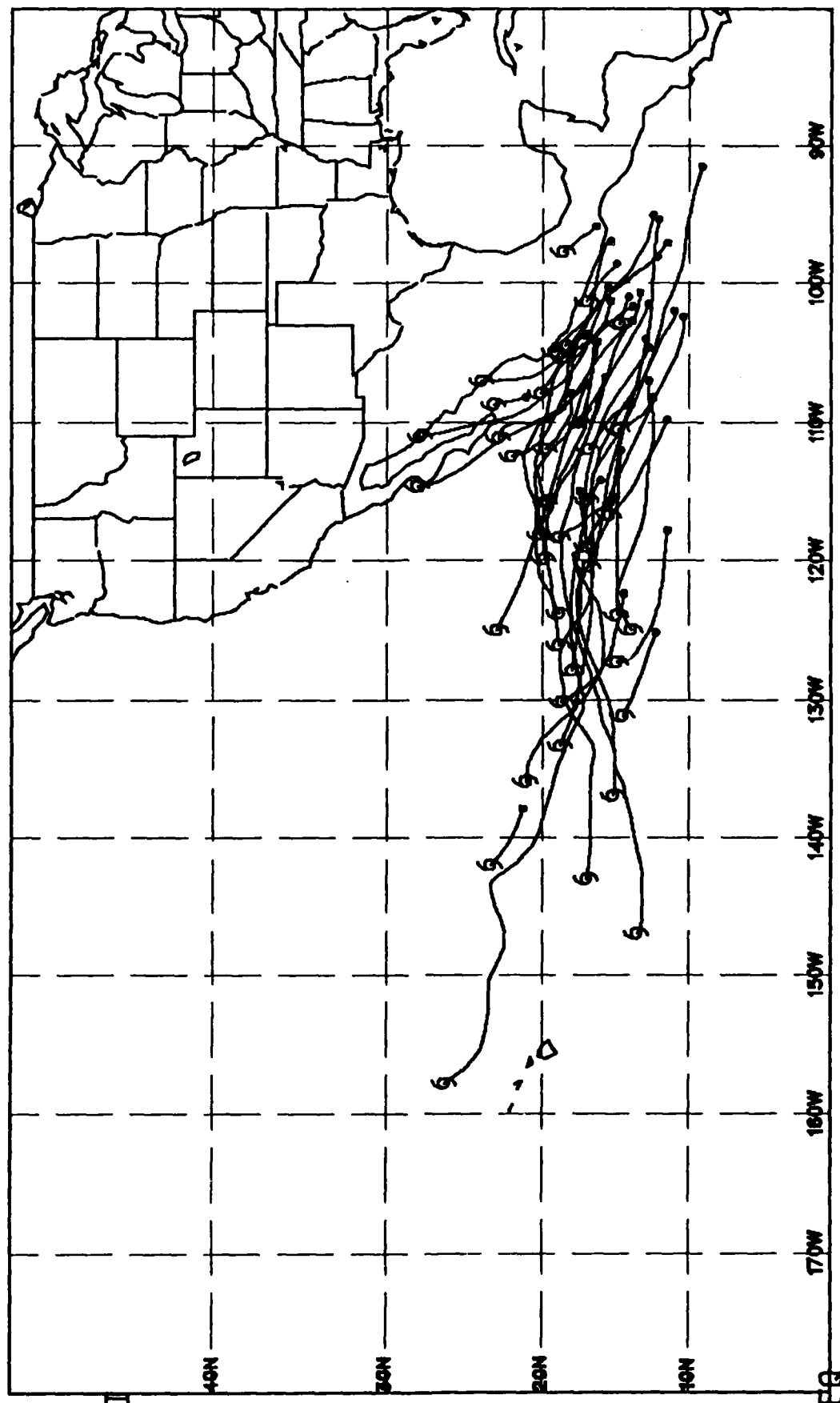
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR SEP 24 - OCT 8



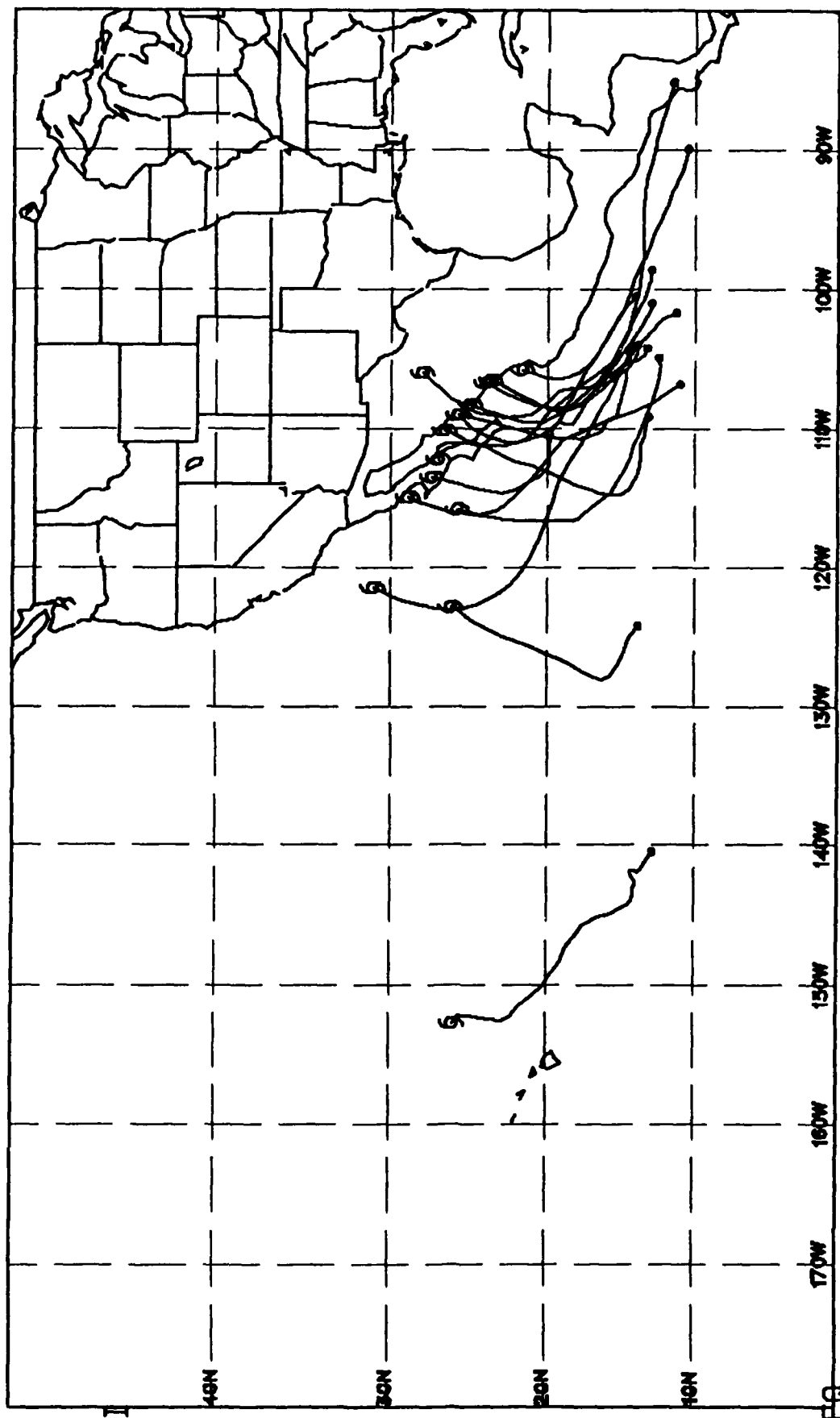
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR SEP 24 - OCT 8



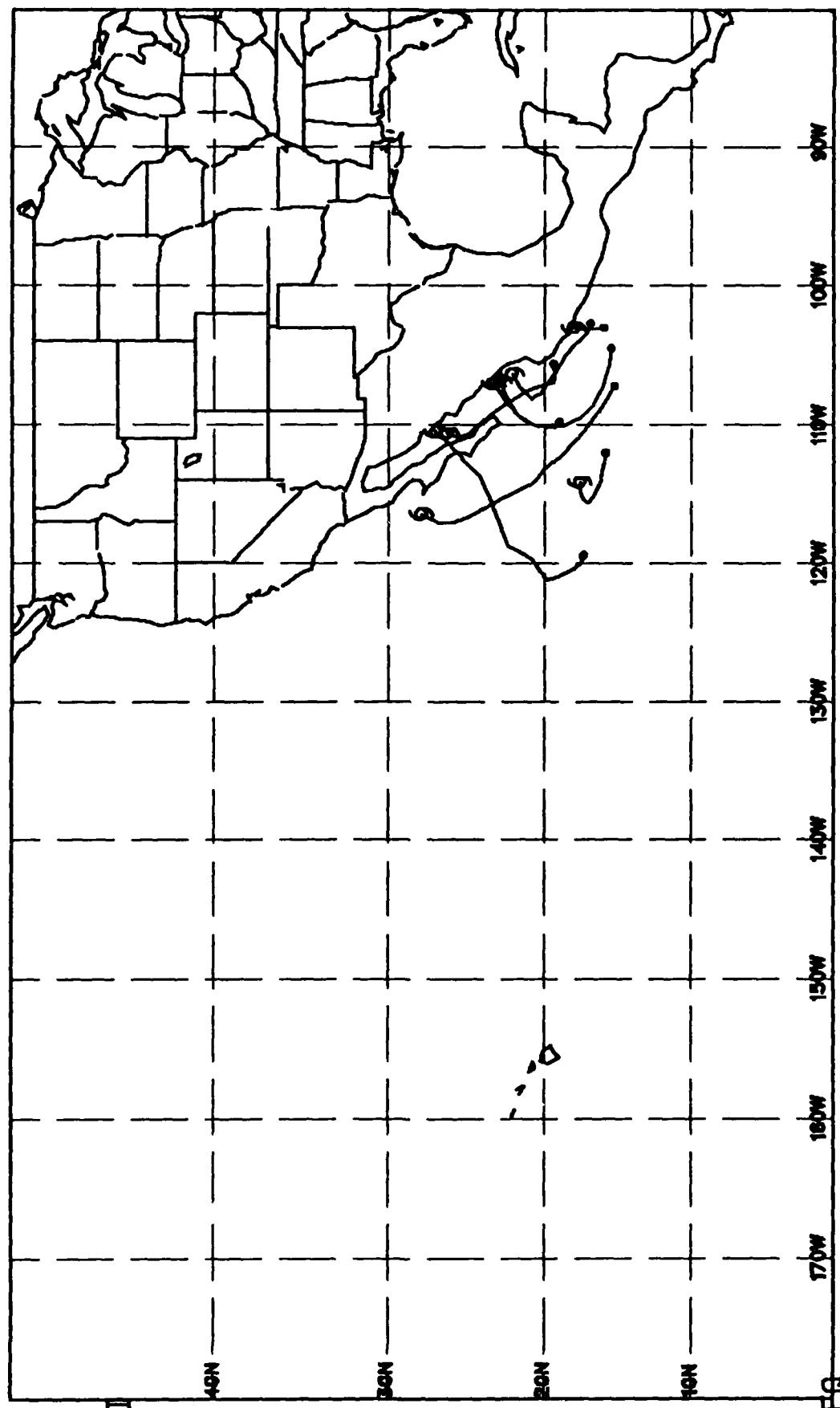
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR SEP 24 - OCT 8



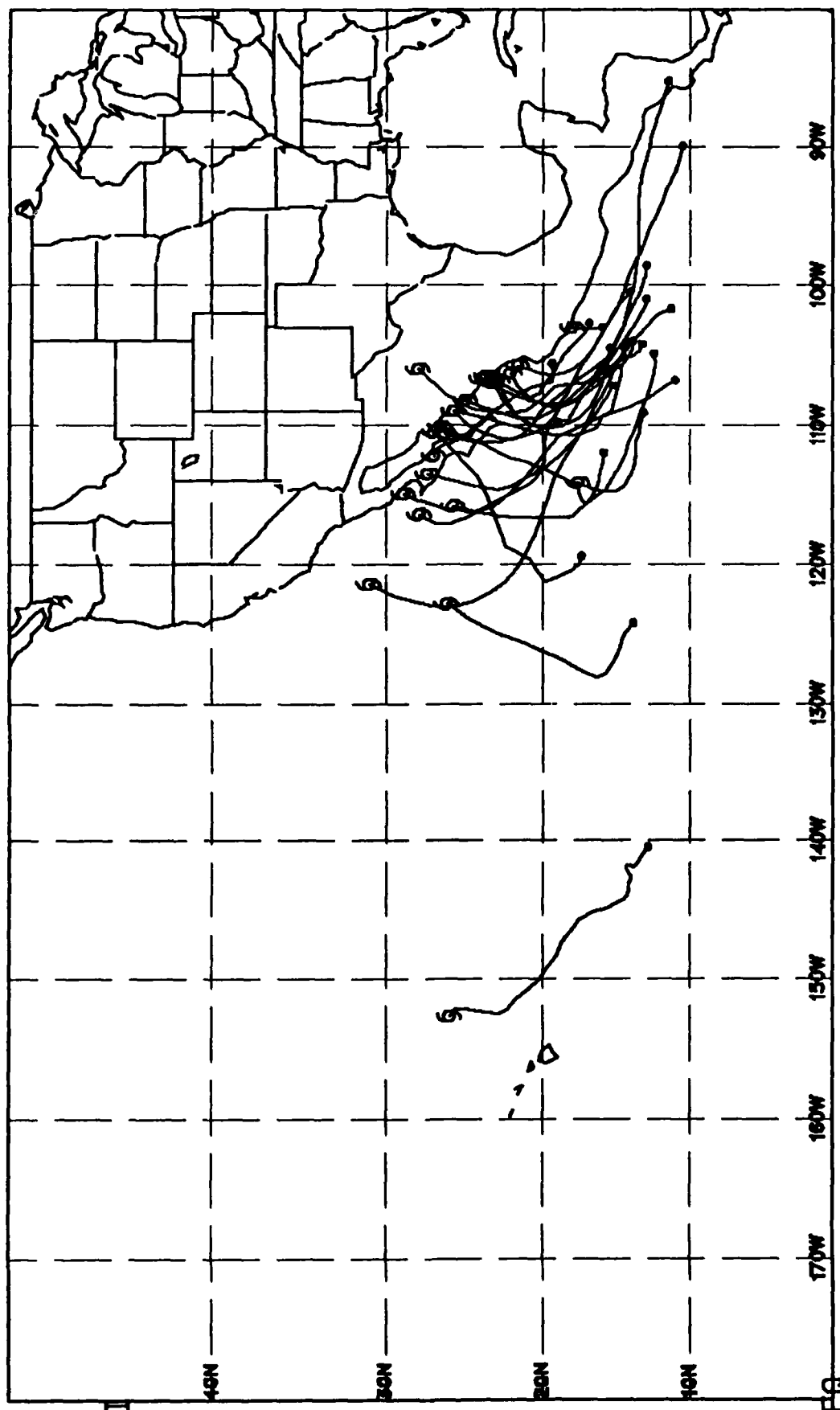
Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR SEP 24 - OCT 8



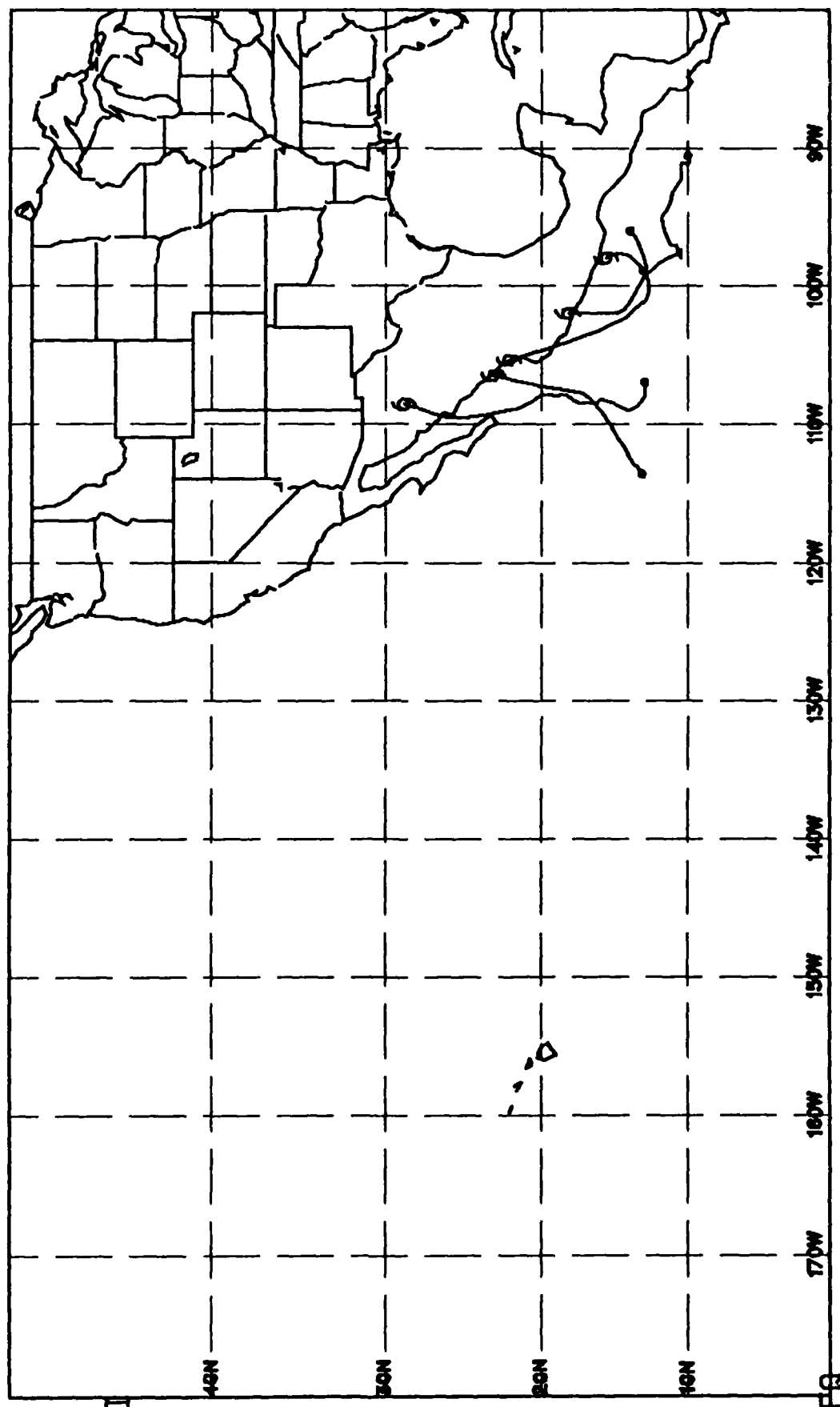
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR SEP 24 - OCT 8



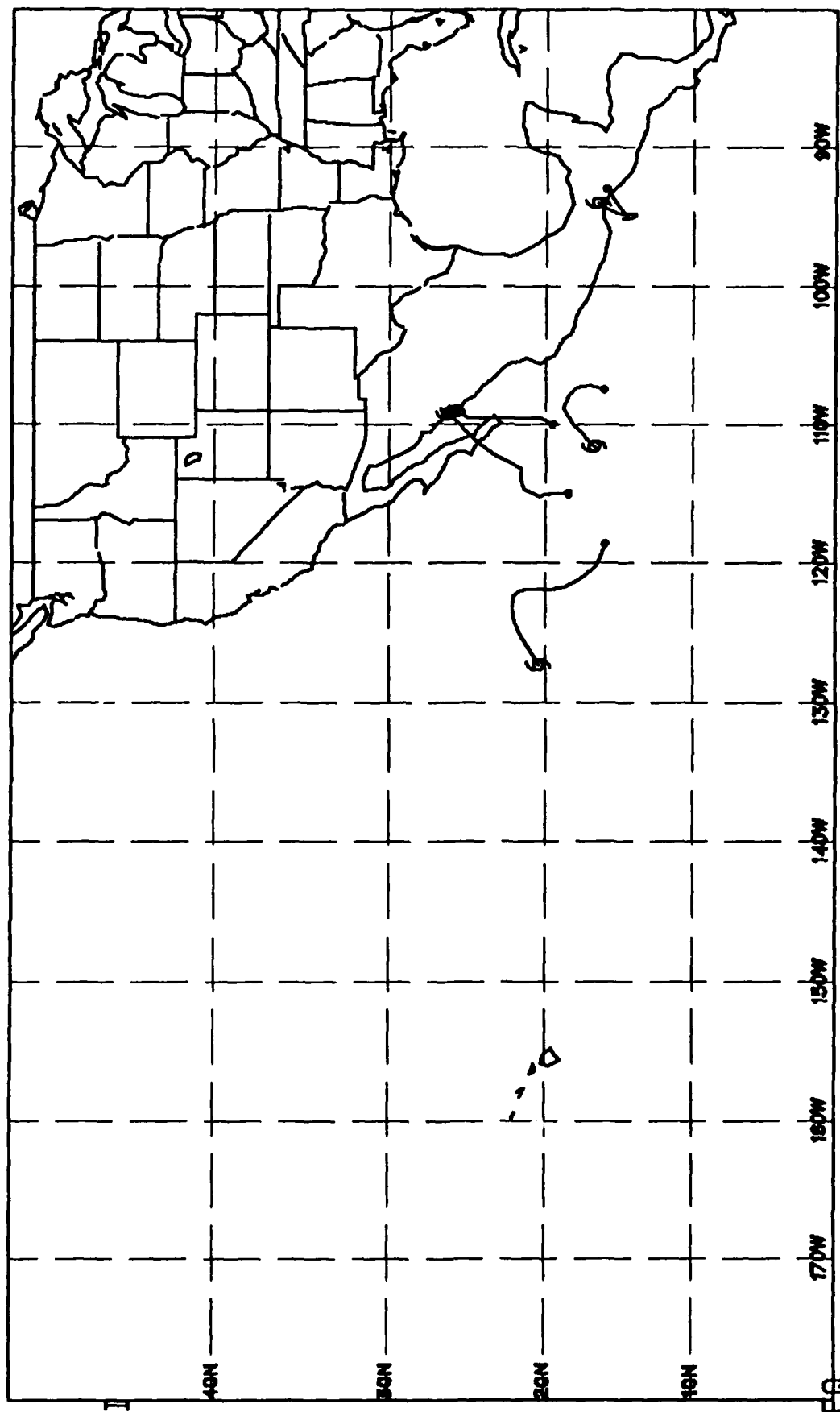
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR SEP 24 - OCT 8



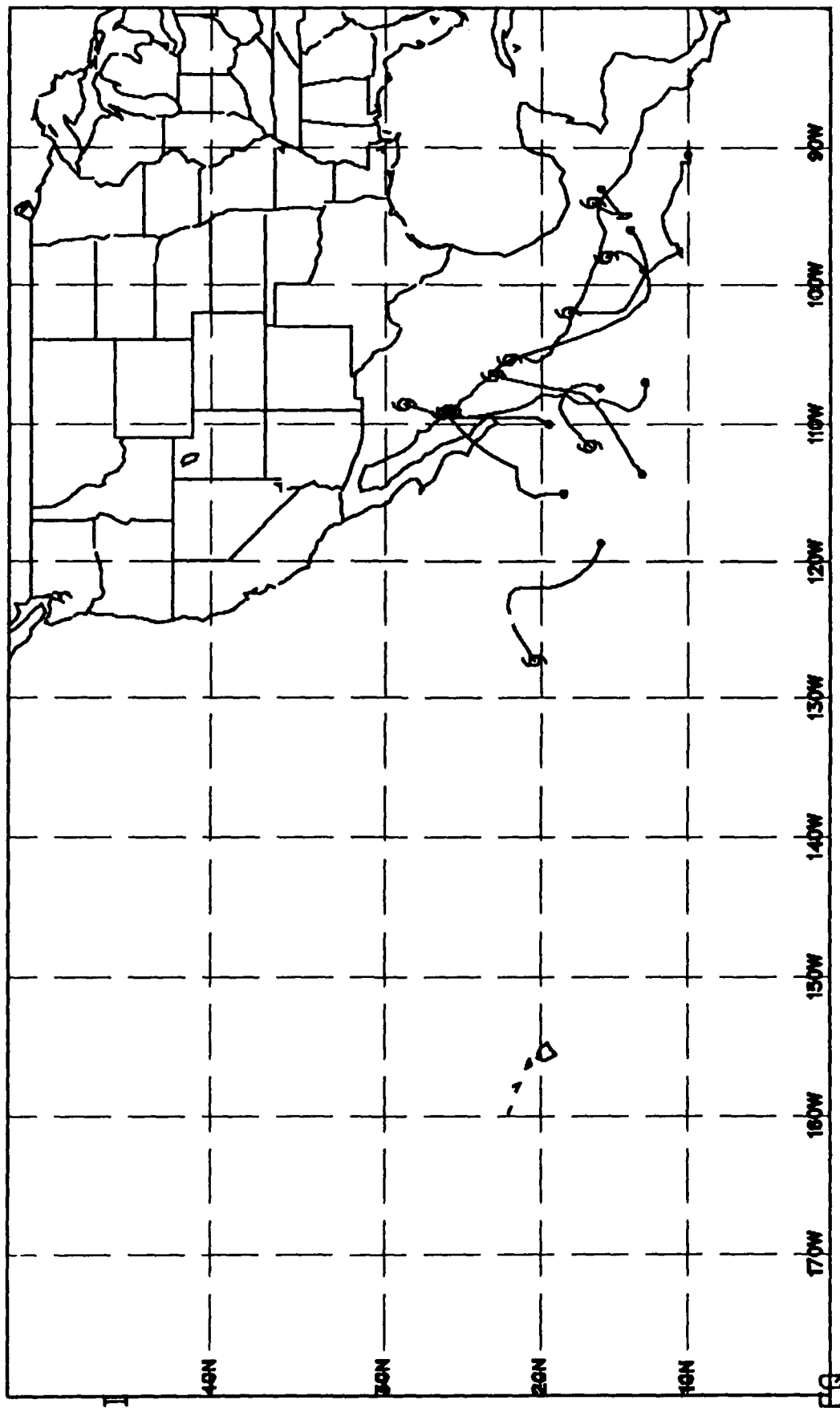
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR SEP 24 - OCT 8



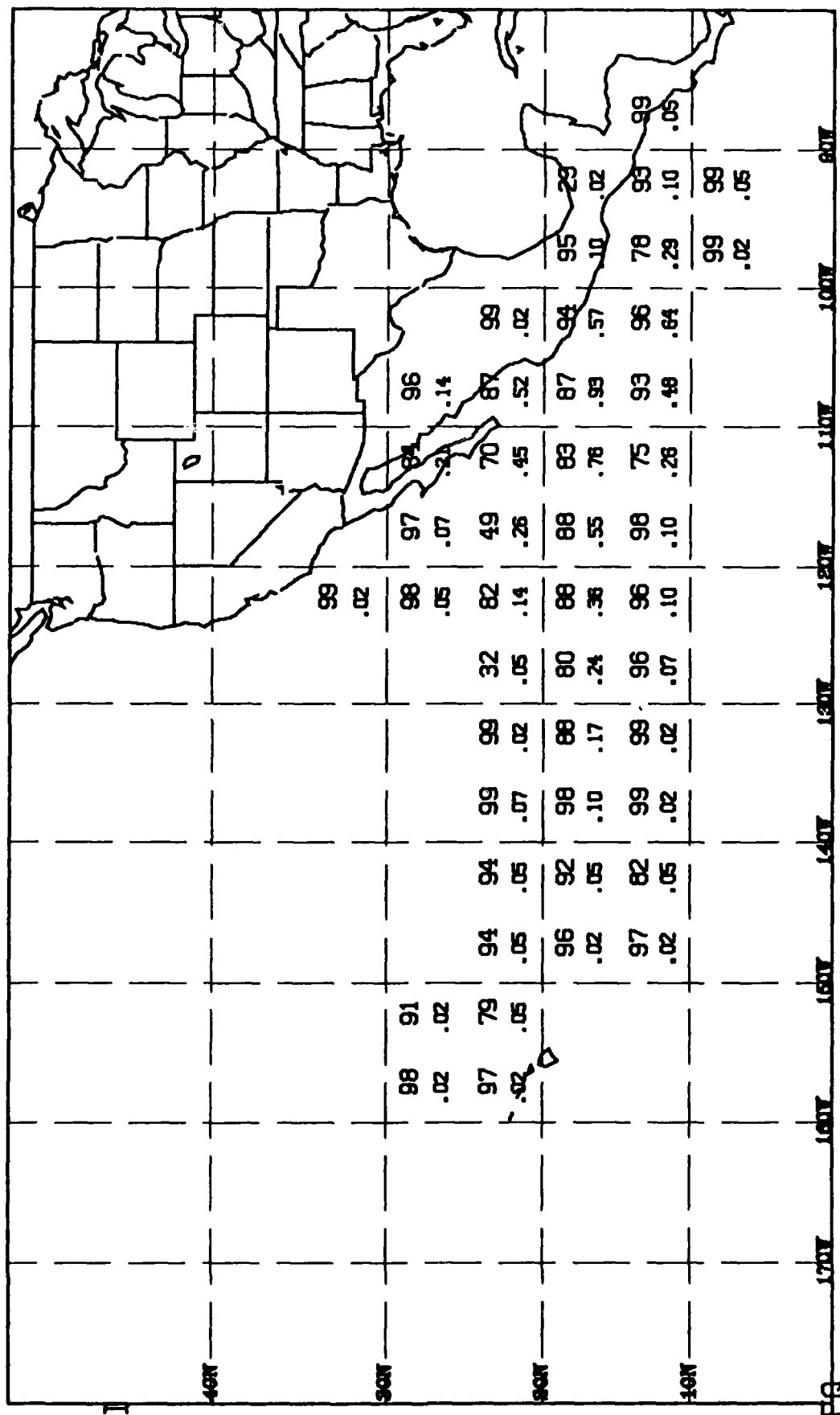
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR SEP 24 - OCT 8



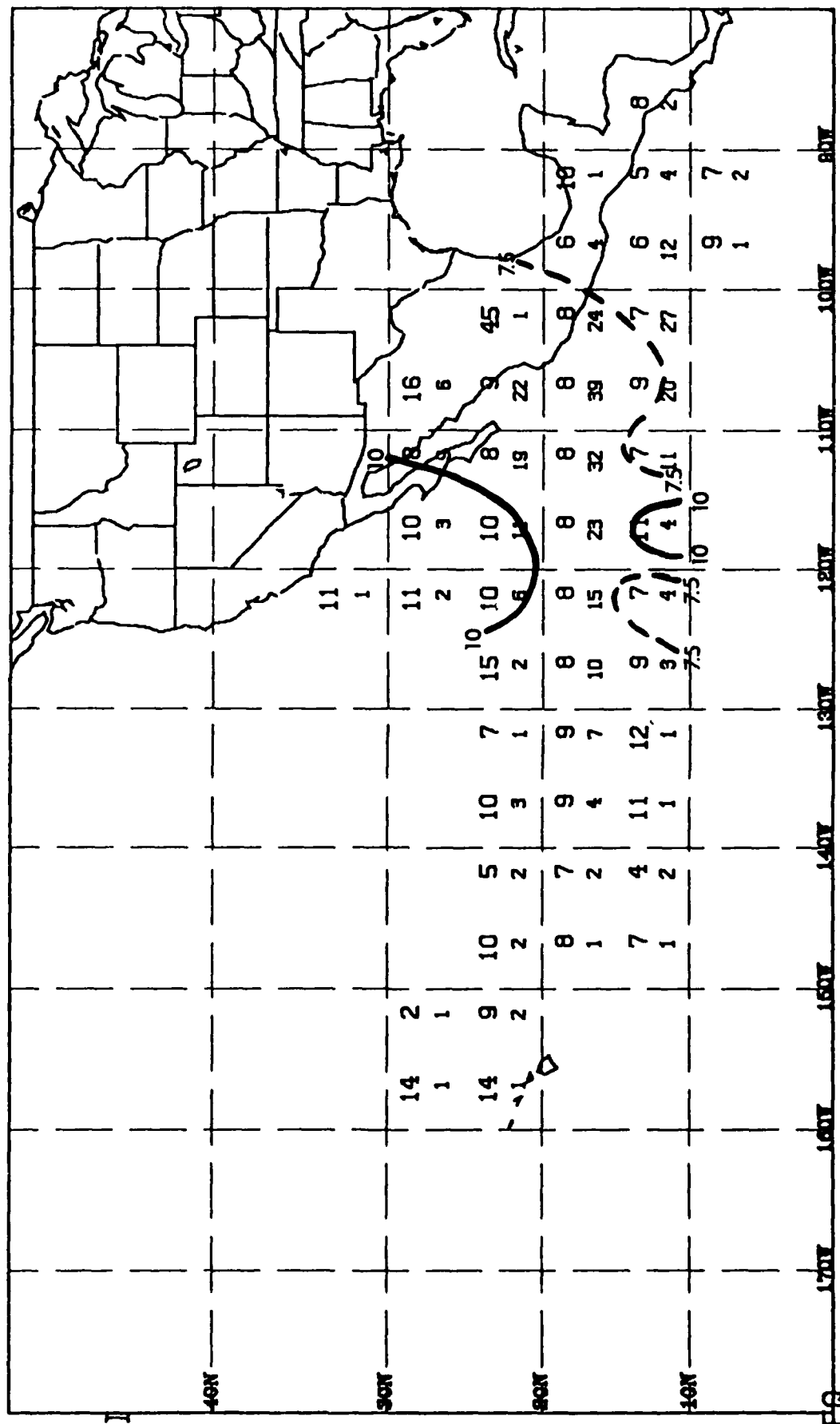
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR SEP 24 - OCT 8



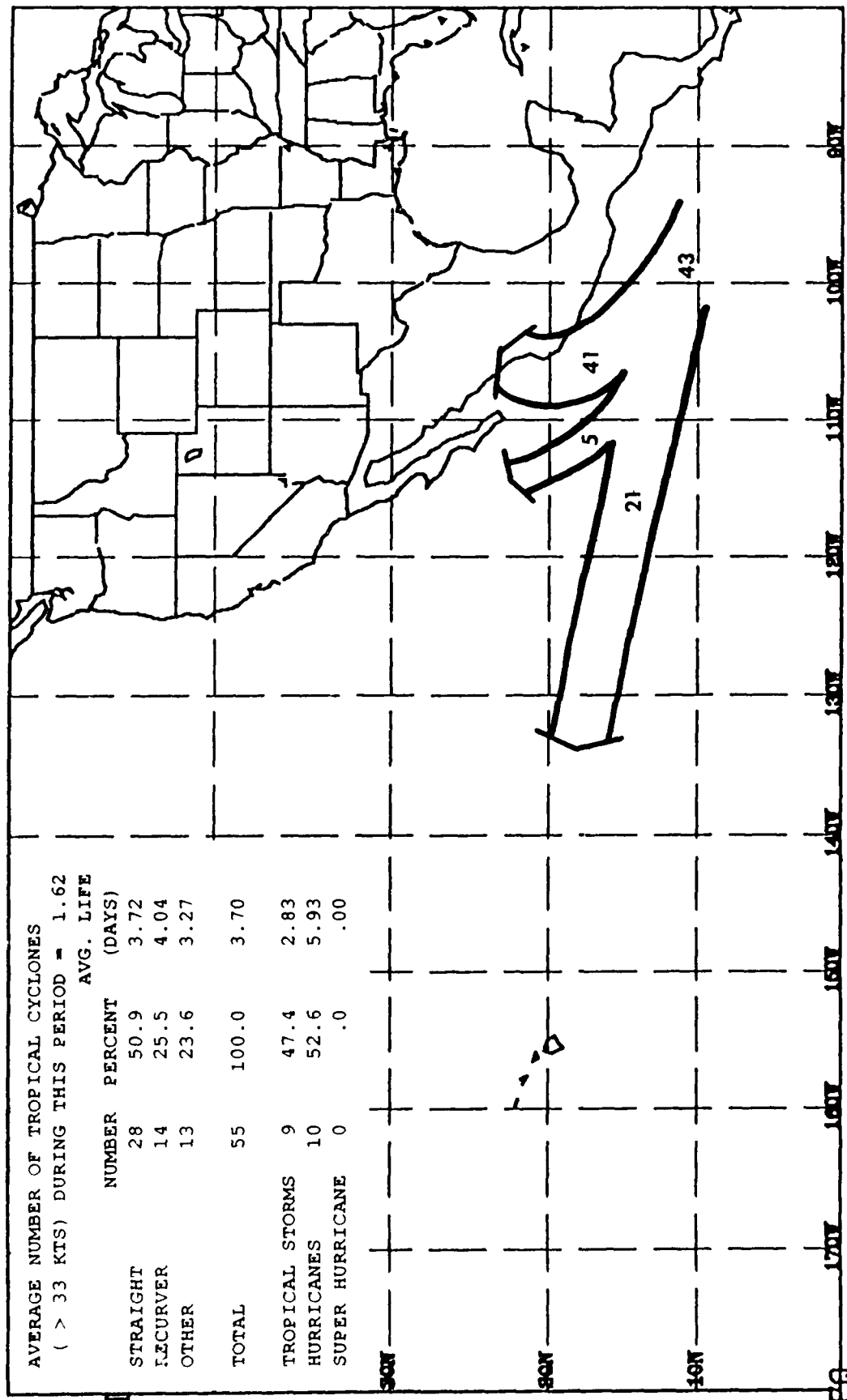
Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number).
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SPEED OF MOVEMENT FOR SEP 24 - OCT 8



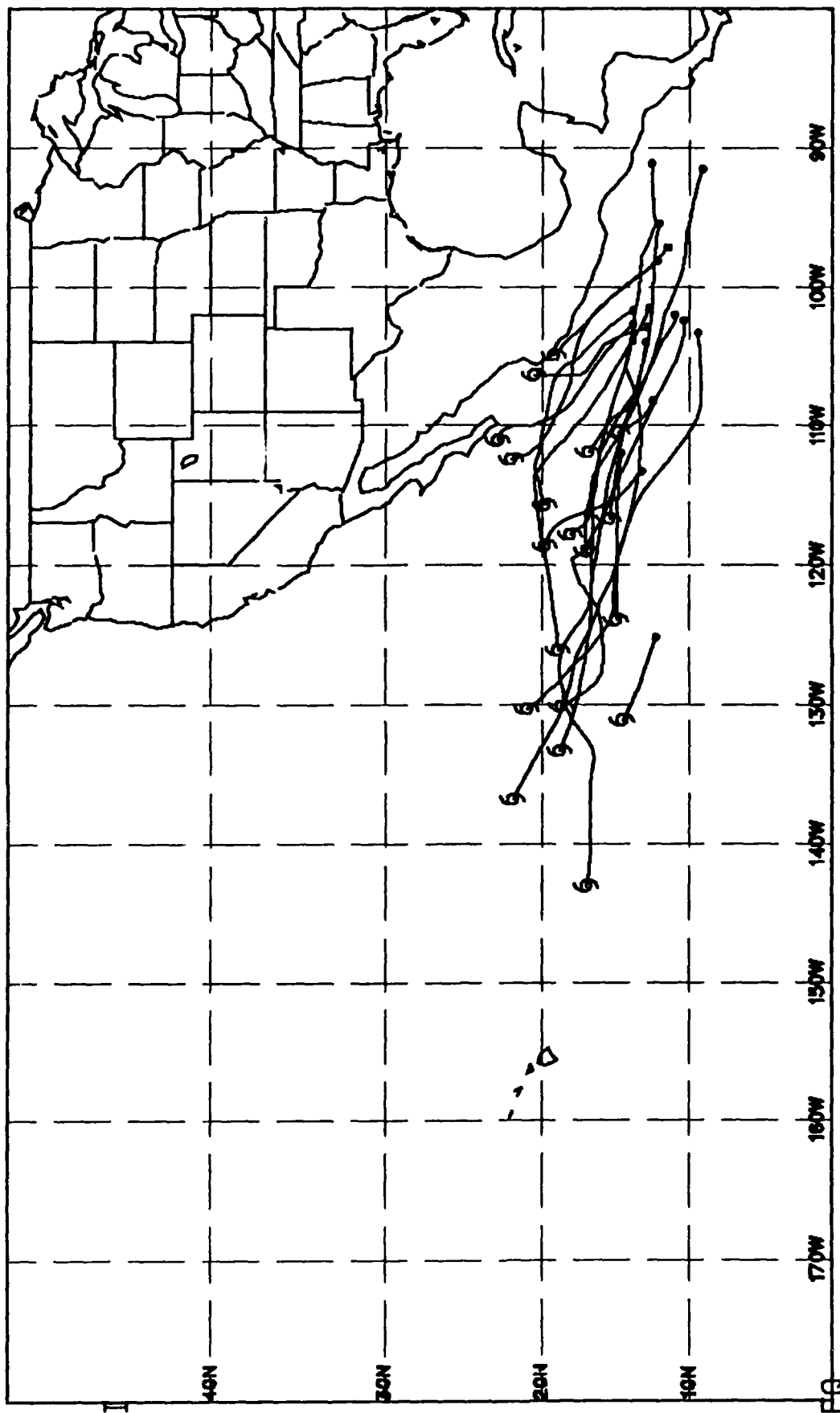
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR OCT 9 - OCT 23



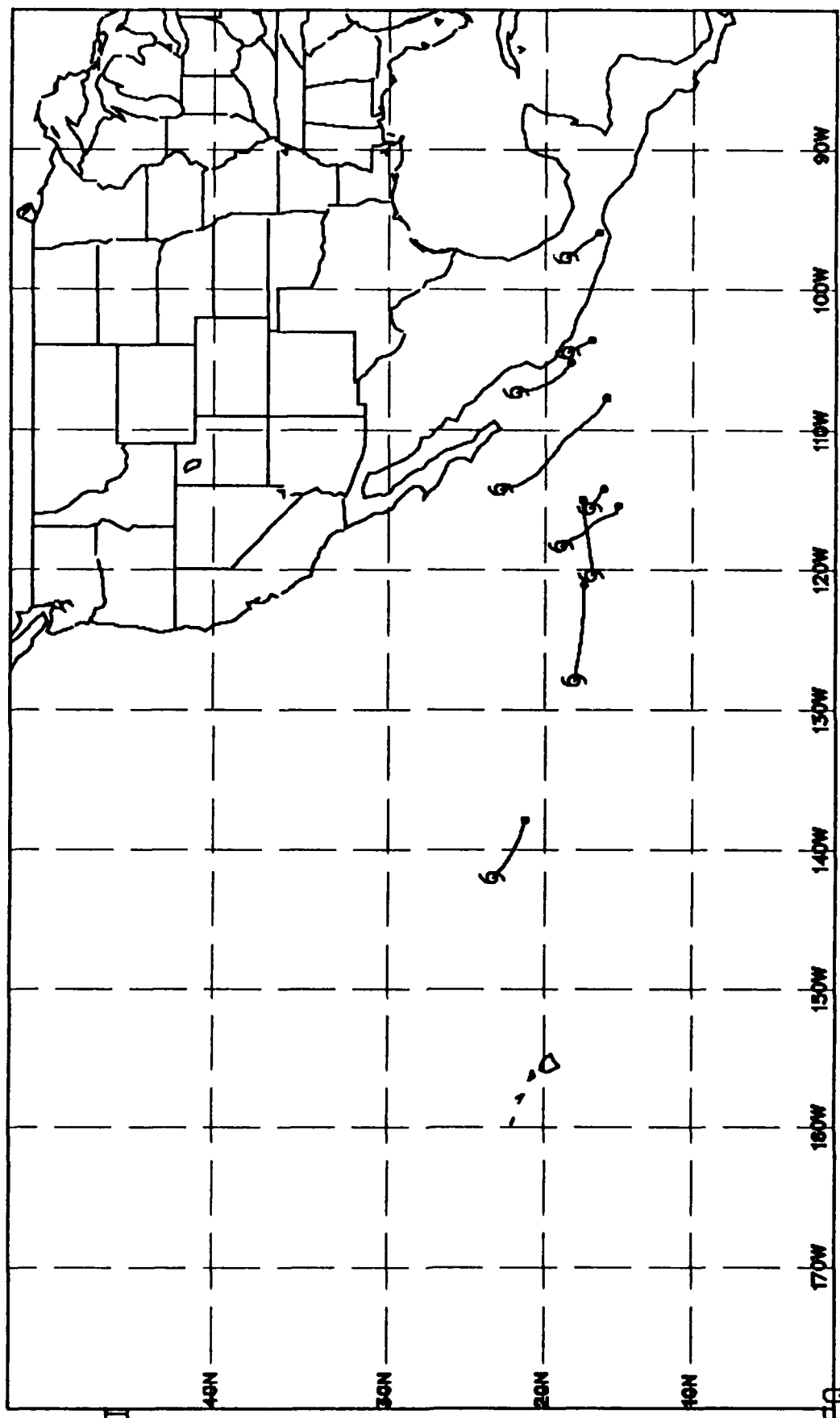
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ACTUAL TRACKS FOR OCT 9 - OCT 23



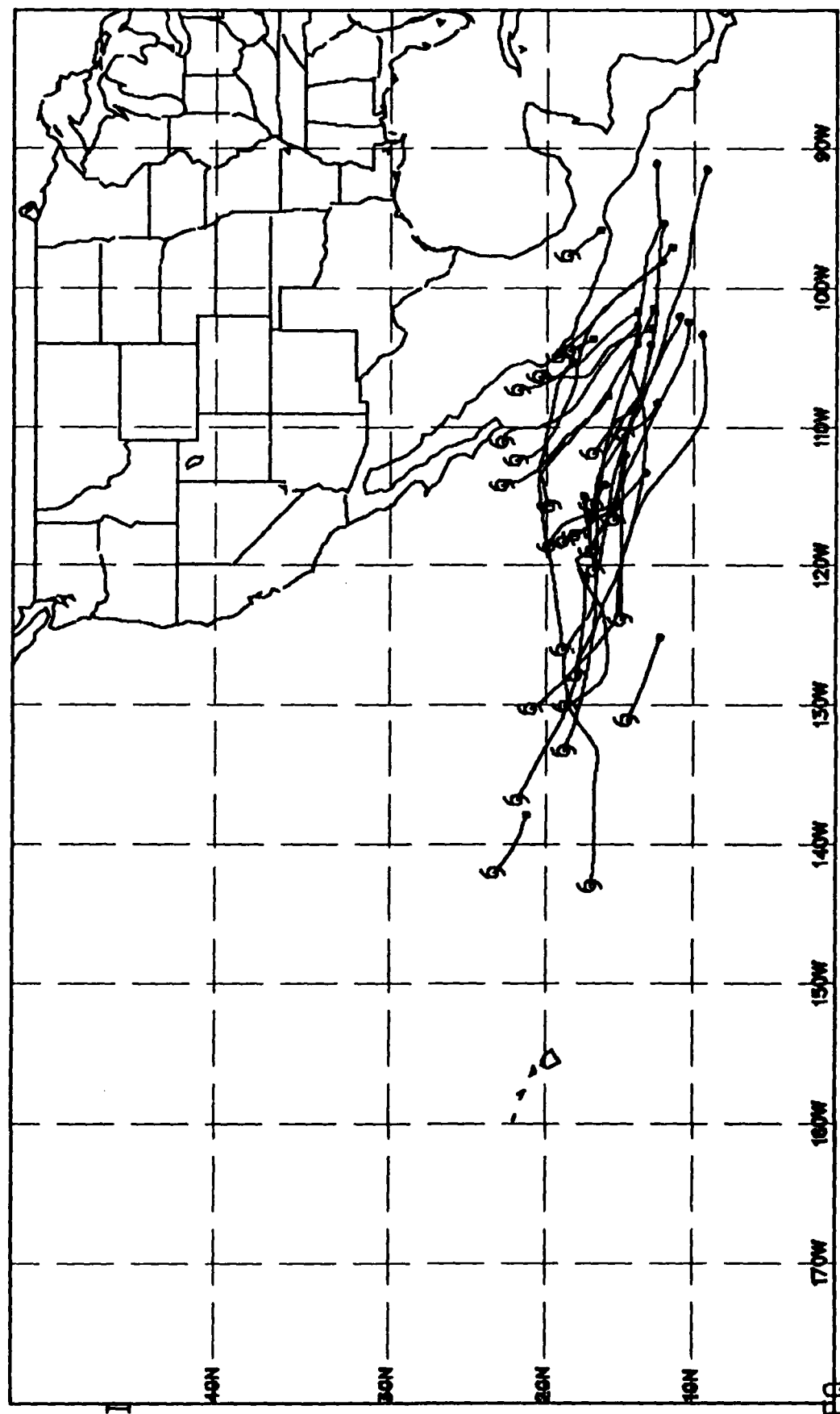
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR OCT 9 - OCT 23



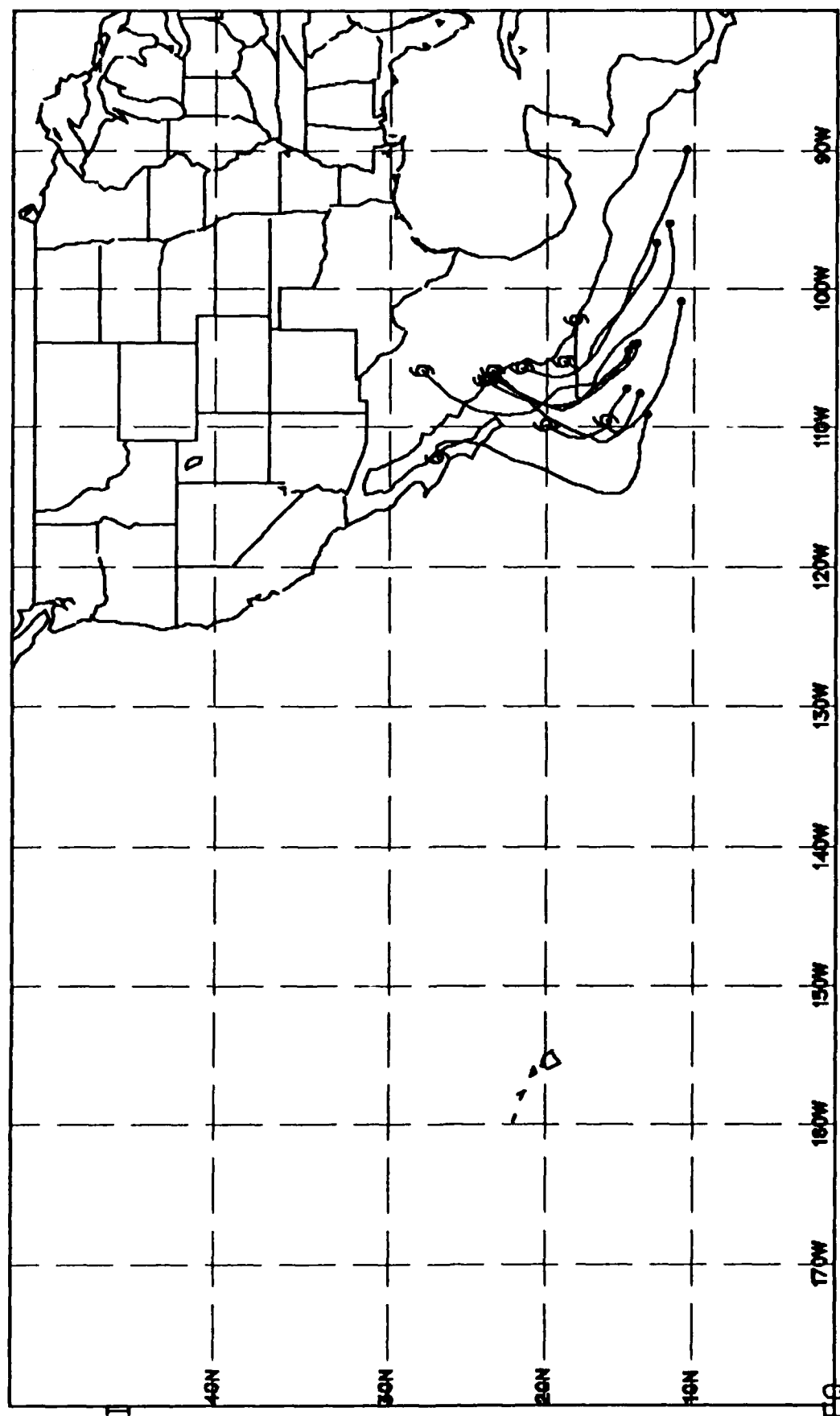
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR OCT 9 - OCT 23



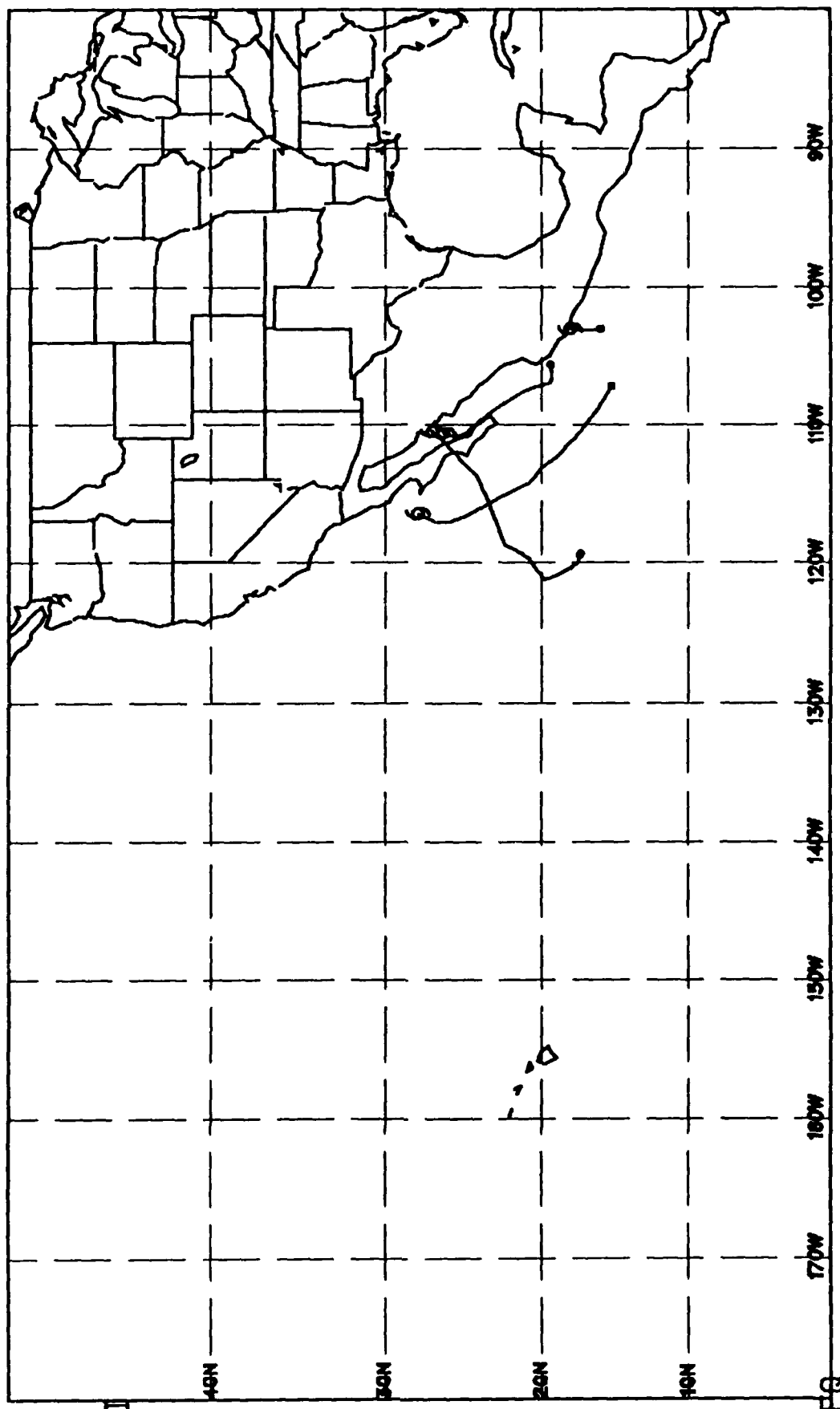
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR OCT 9 - OCT 23



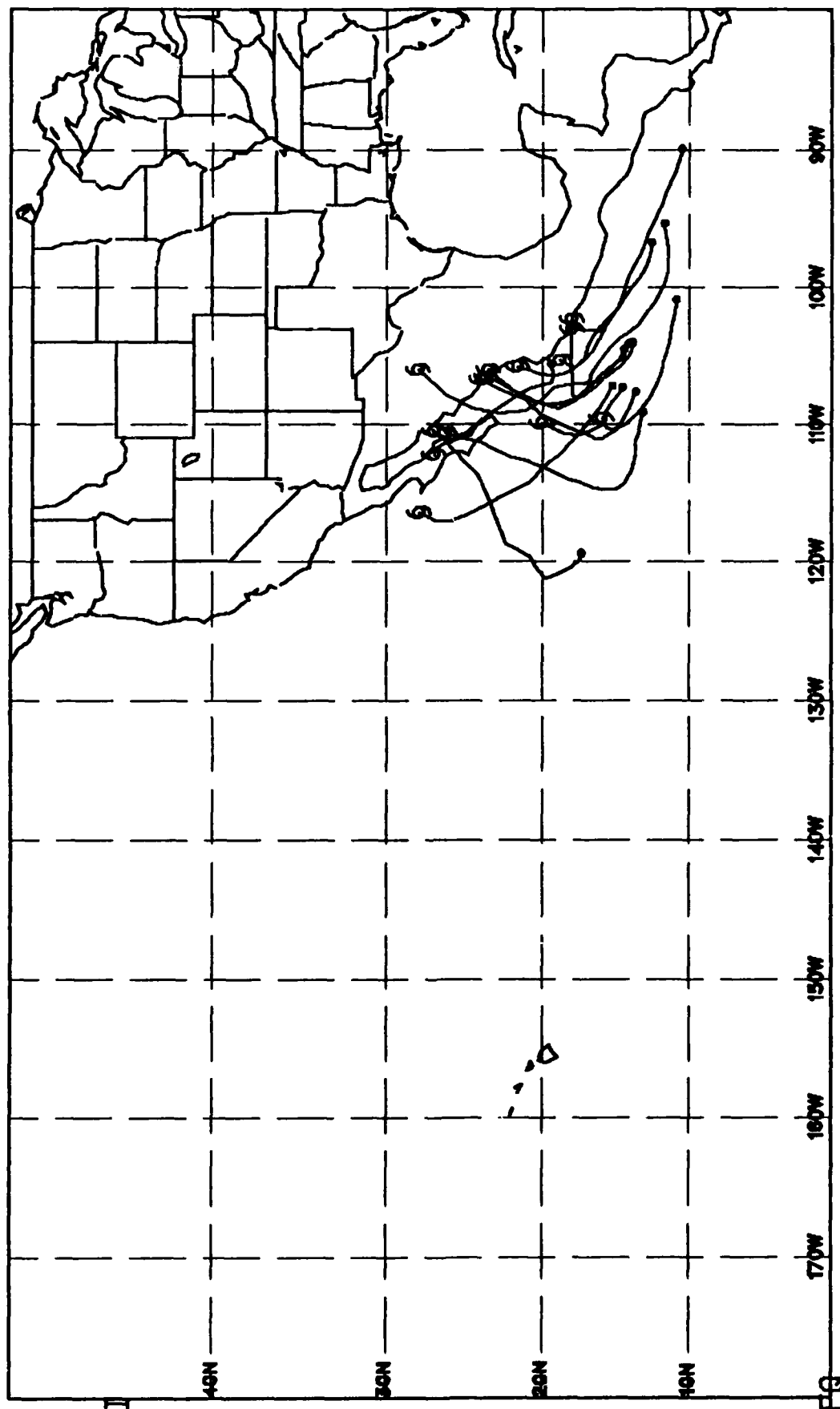
Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR OCT 9 - OCT 23



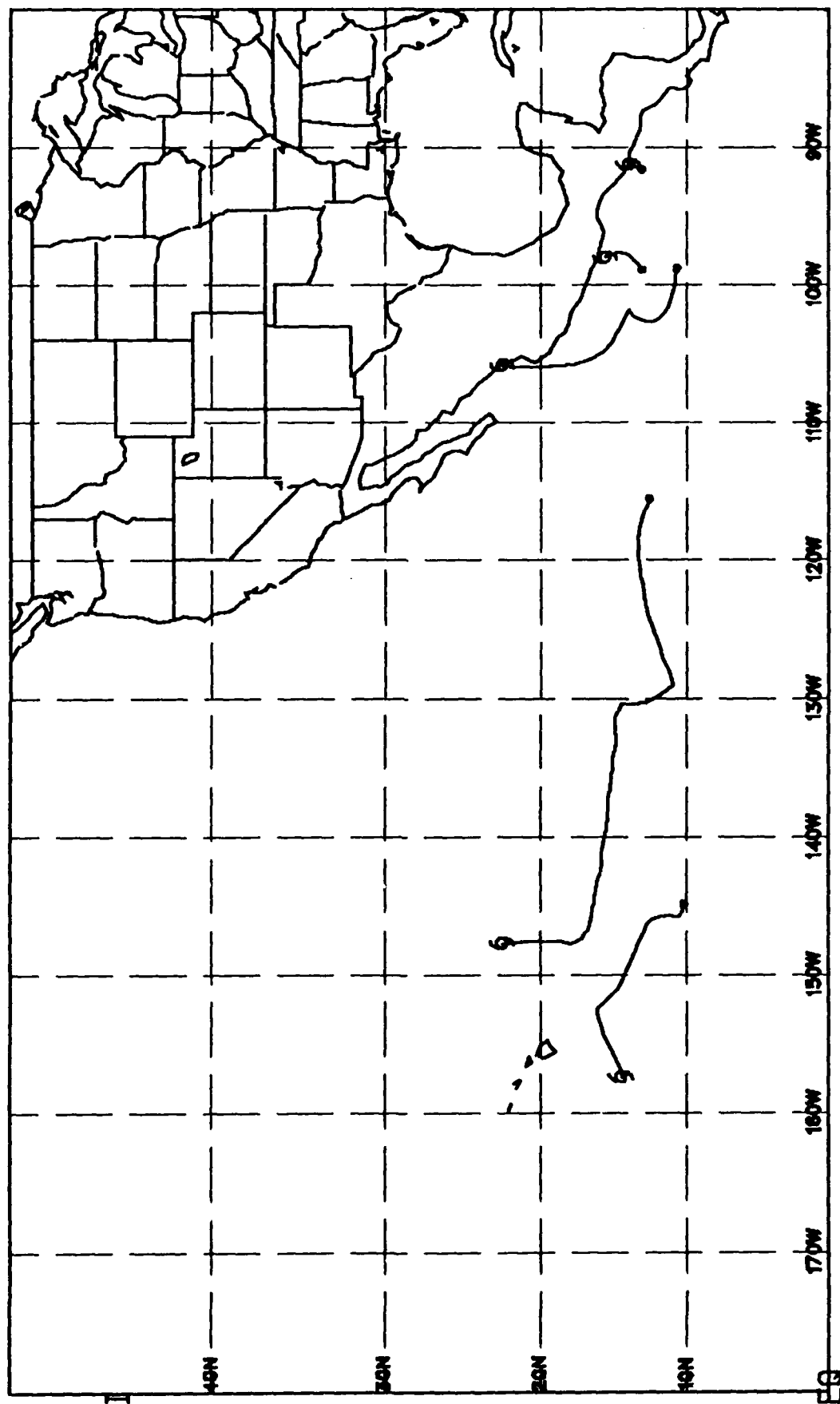
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR OCT 9 - OCT 23



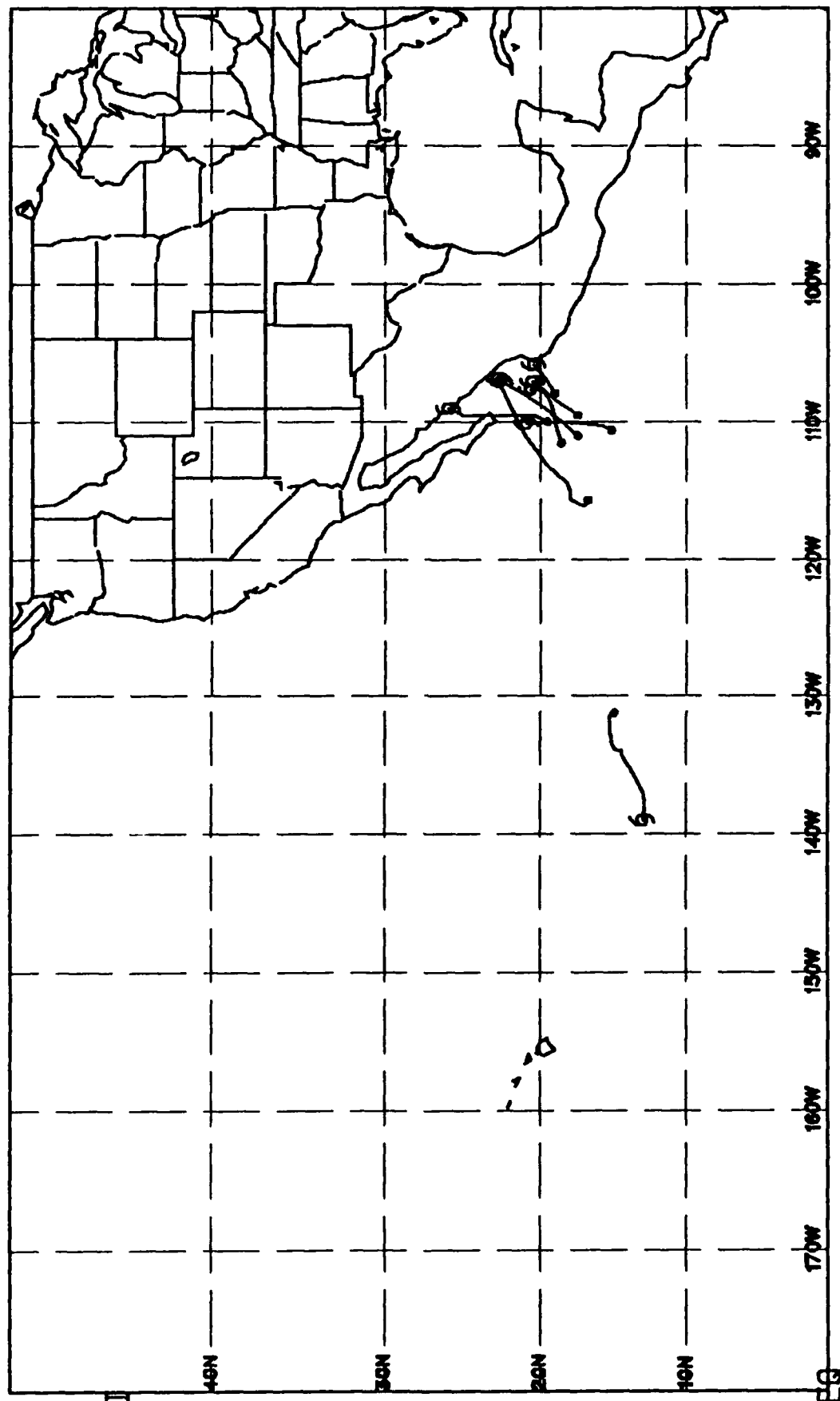
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR OCT 9 - OCT 23



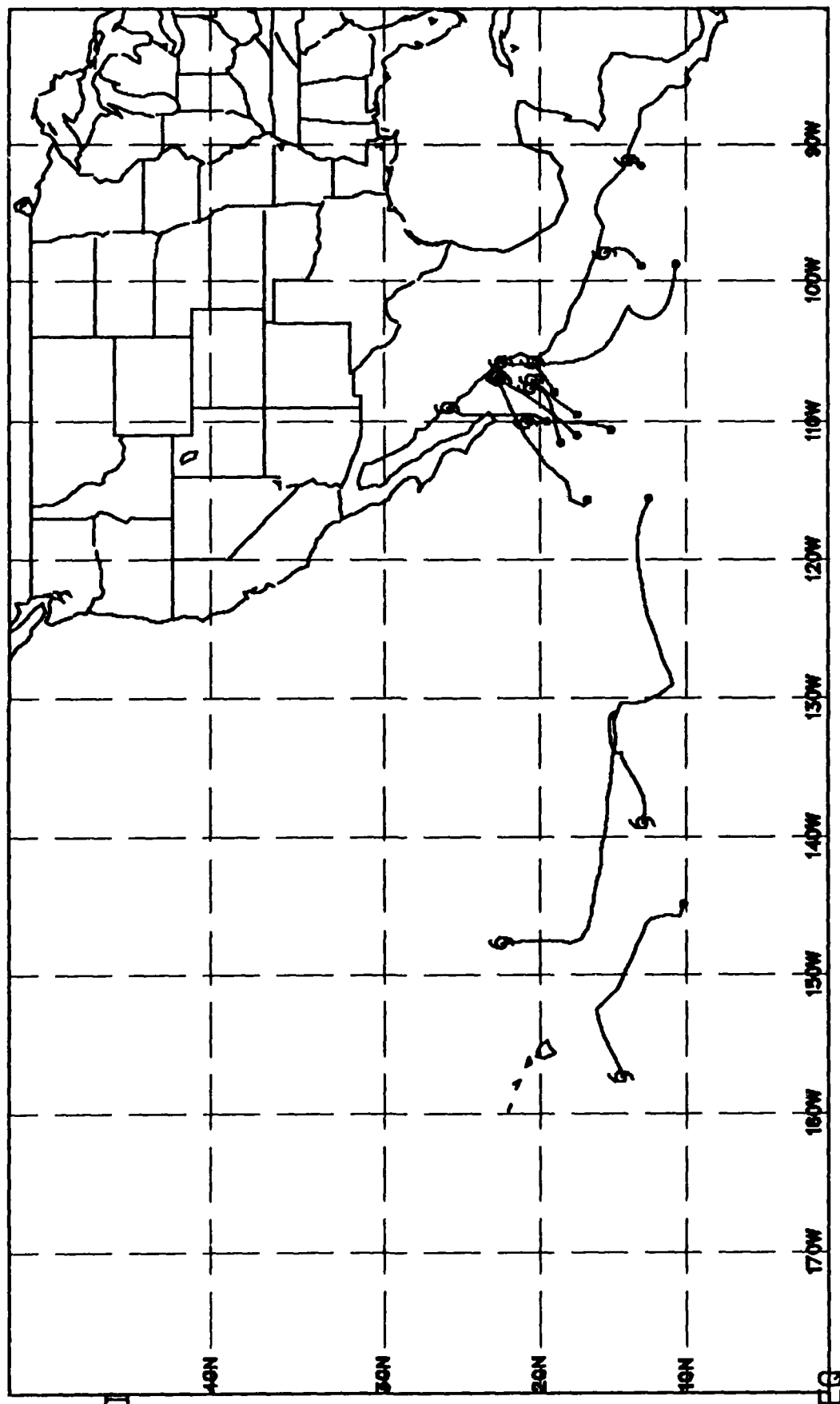
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR OCT 9 - OCT 23



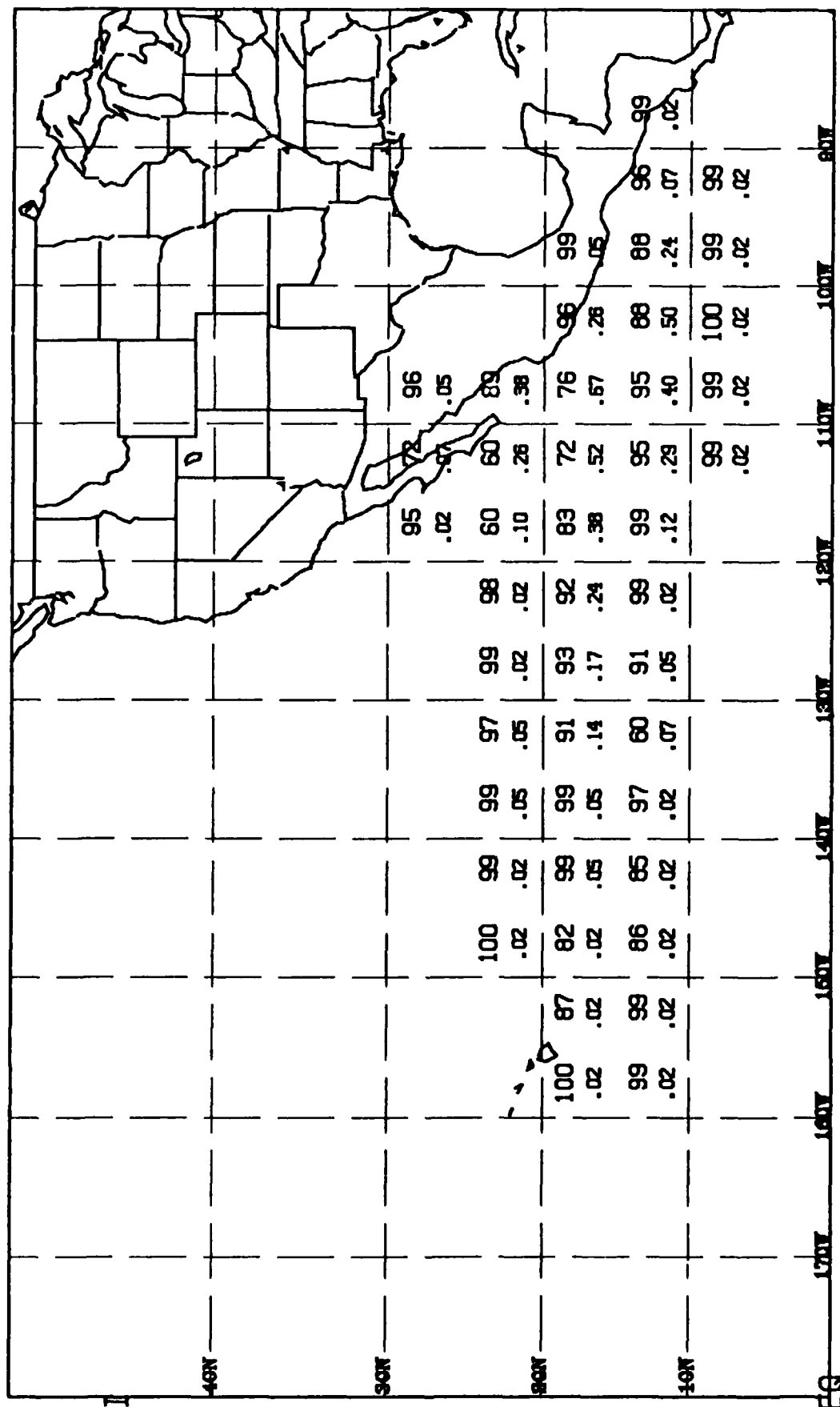
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR OCT 9 - OCT 23



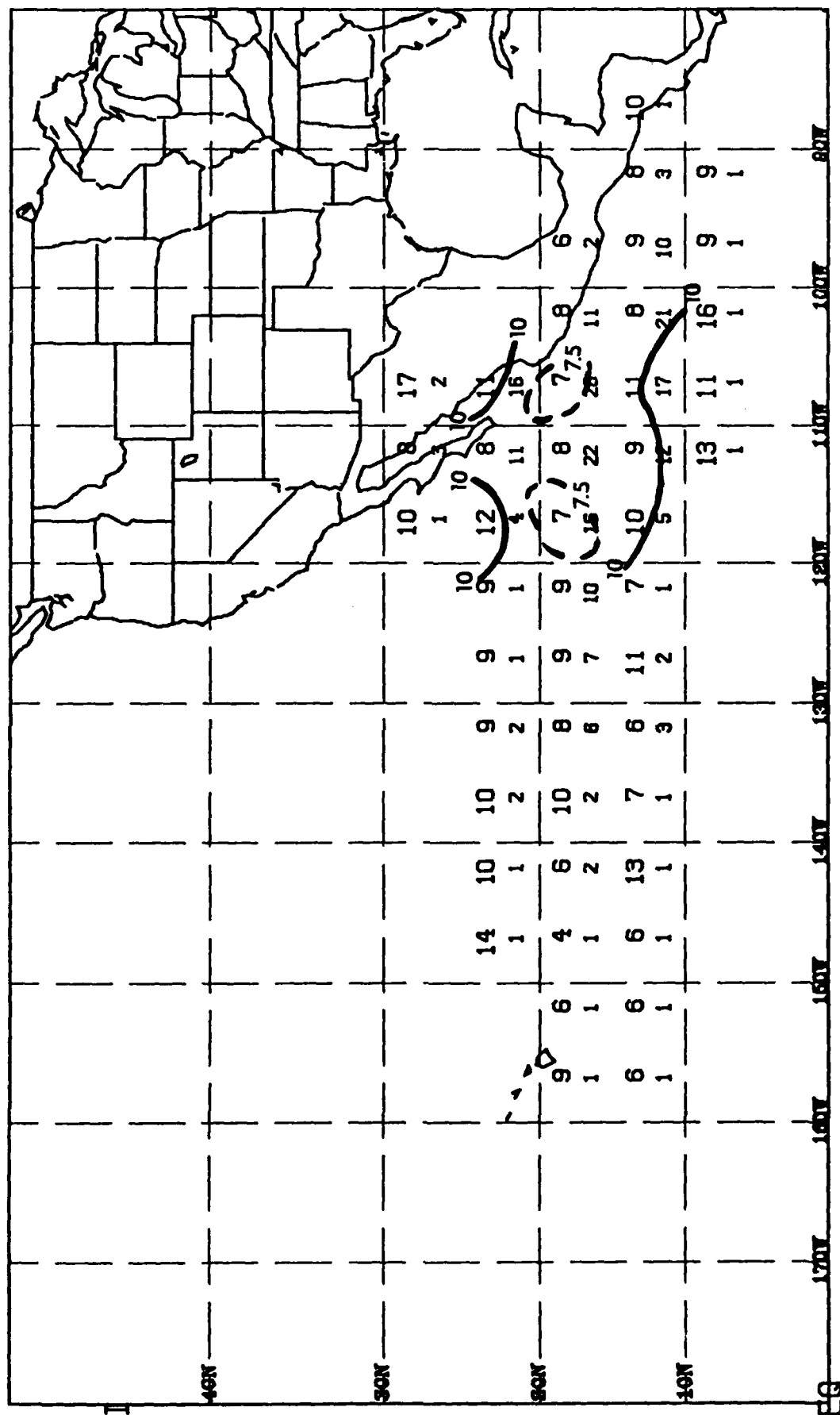
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR OCT 9 - OCT 23



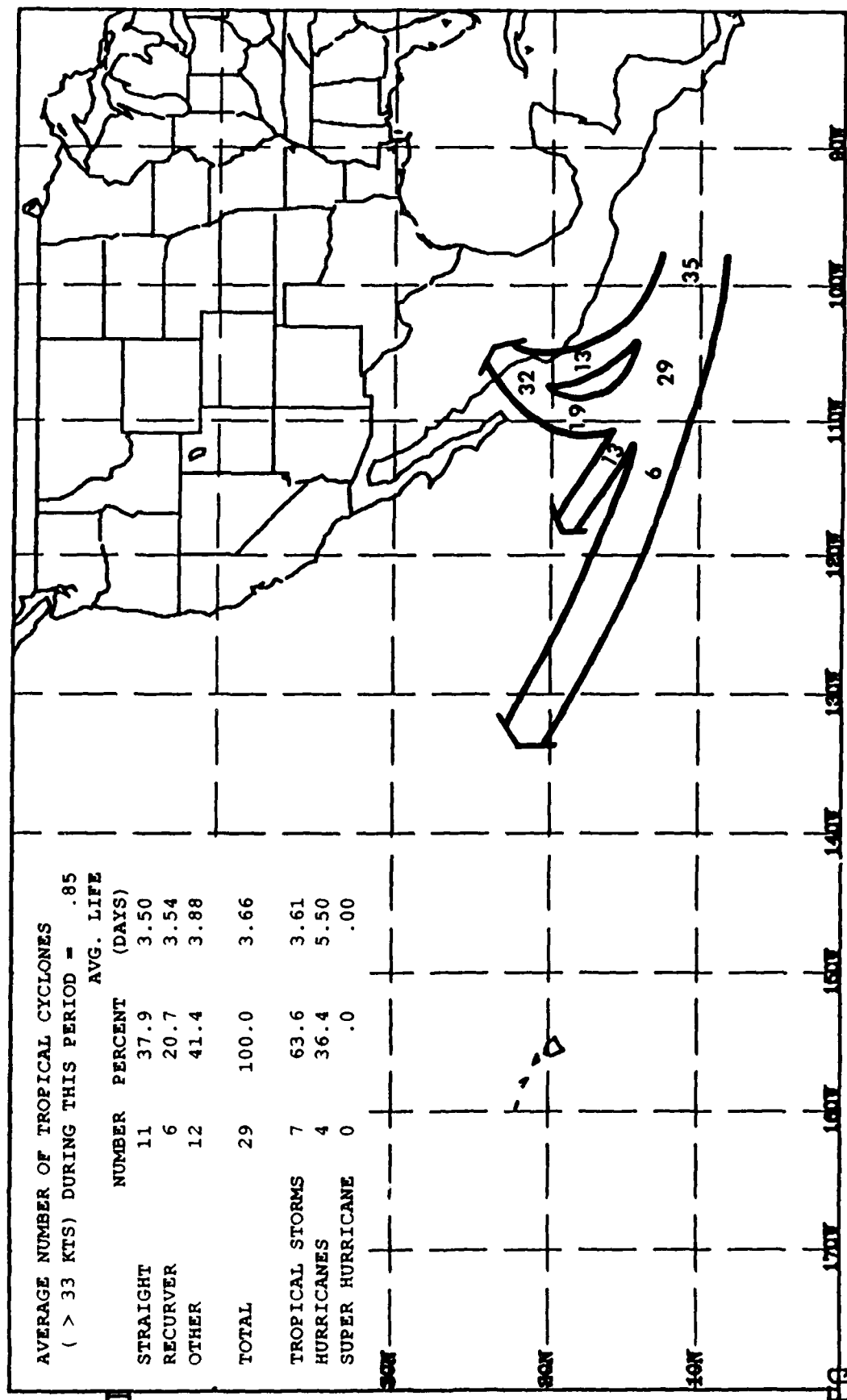
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SPEED OF MOVEMENT FOR OCT 9 - OCT 23



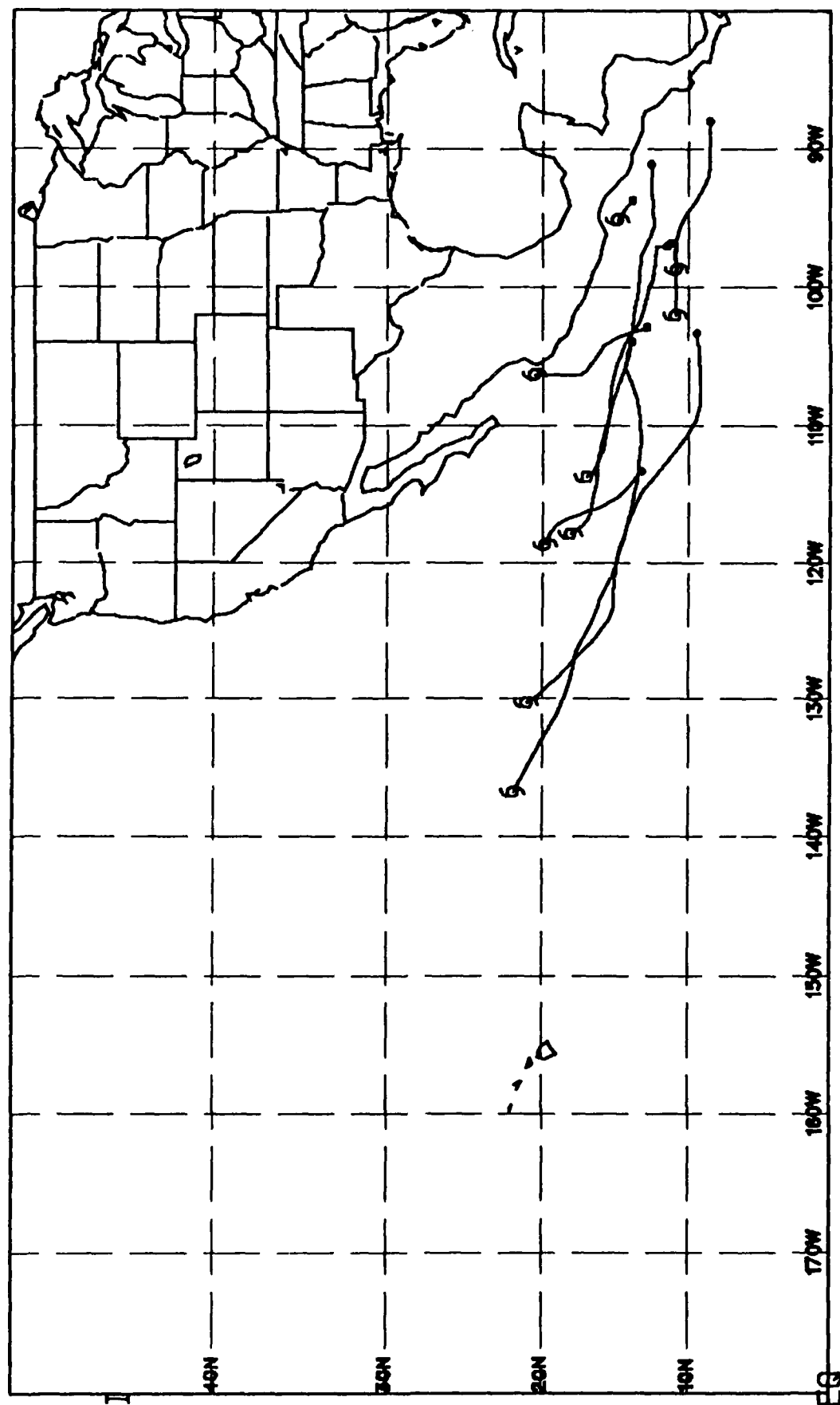
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR OCT 24 - NOV 8



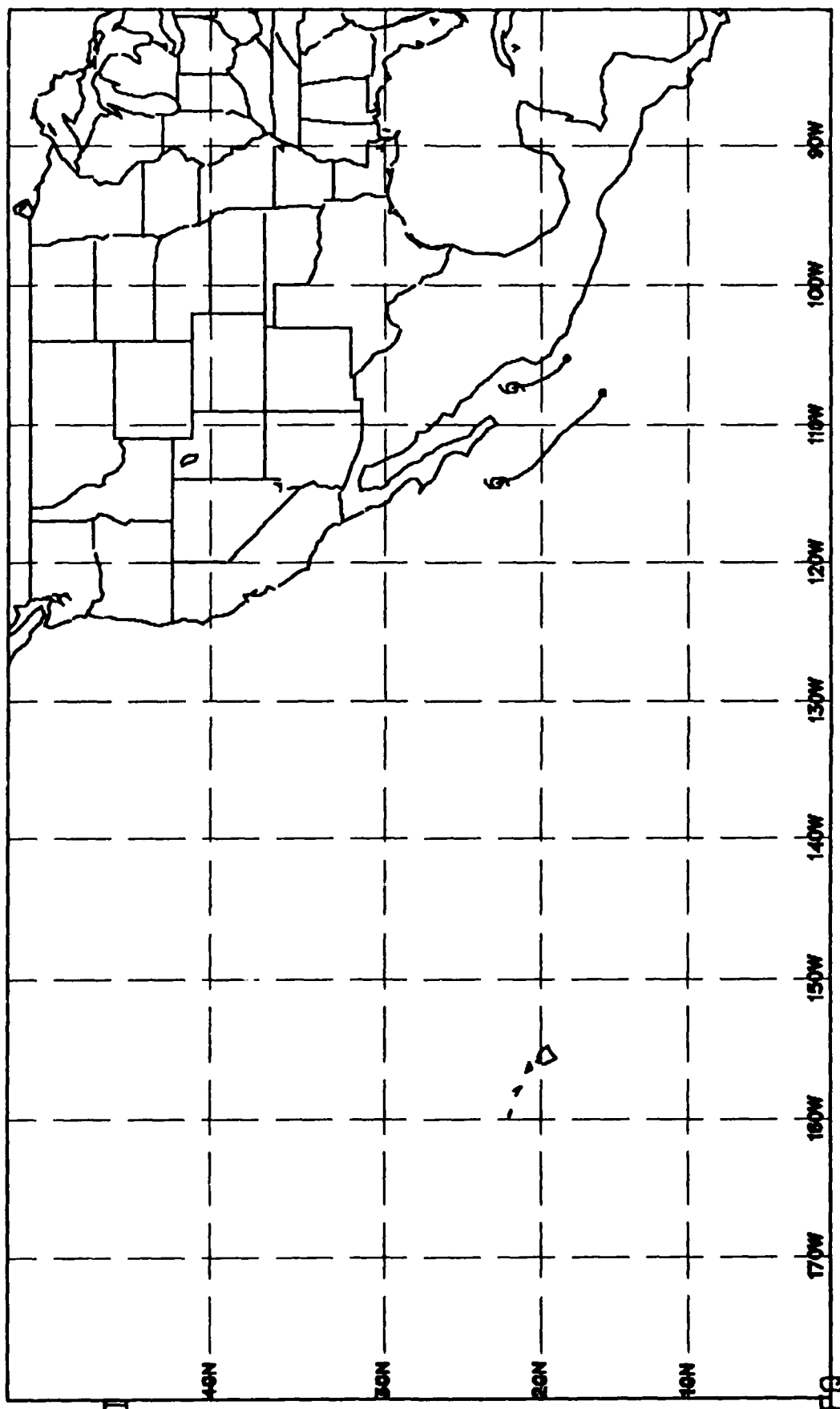
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ACTUAL TRACKS FOR OCT 24 - NOV 8



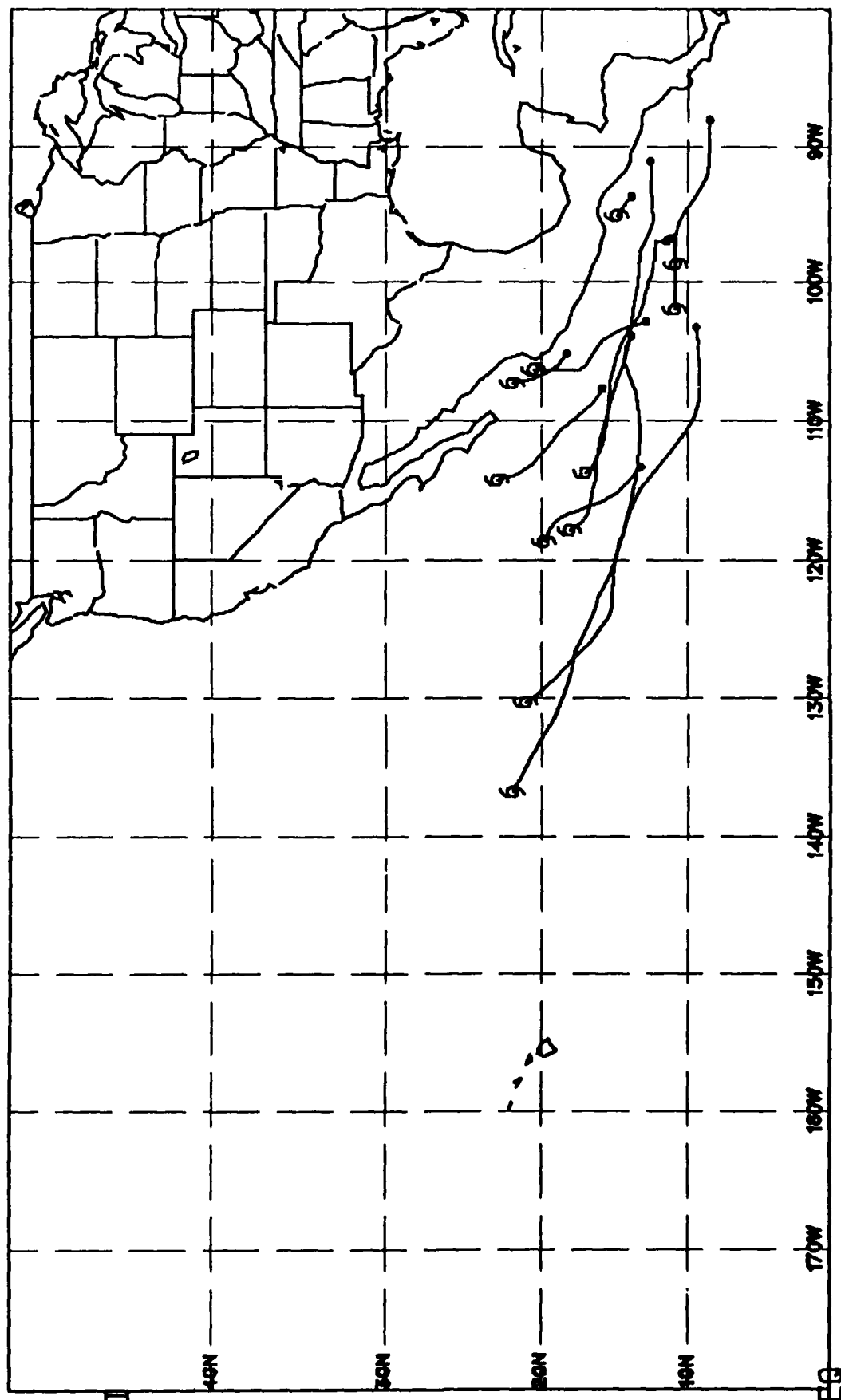
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR OCT 24 - NOV 8



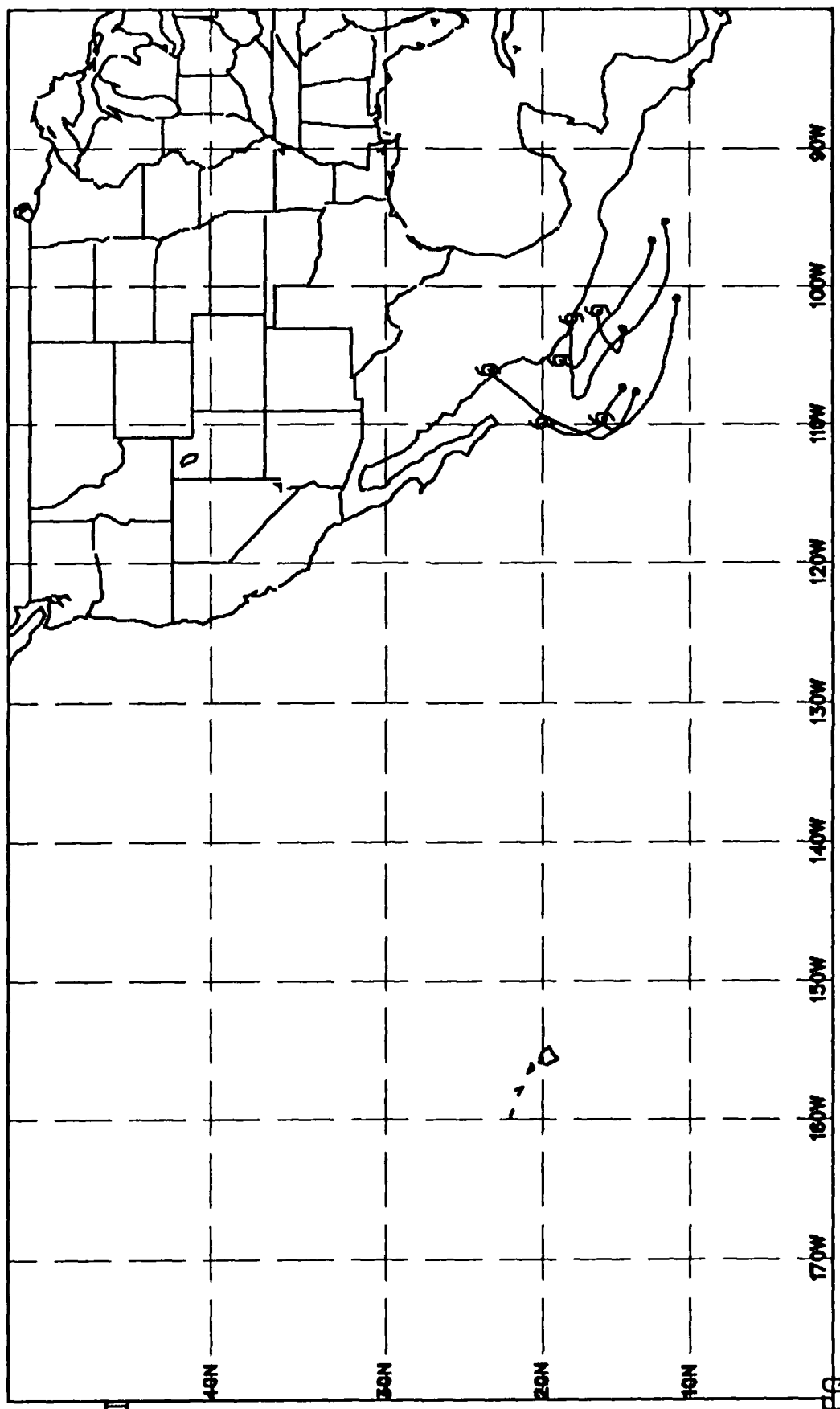
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR OCT 24 - NOV 8



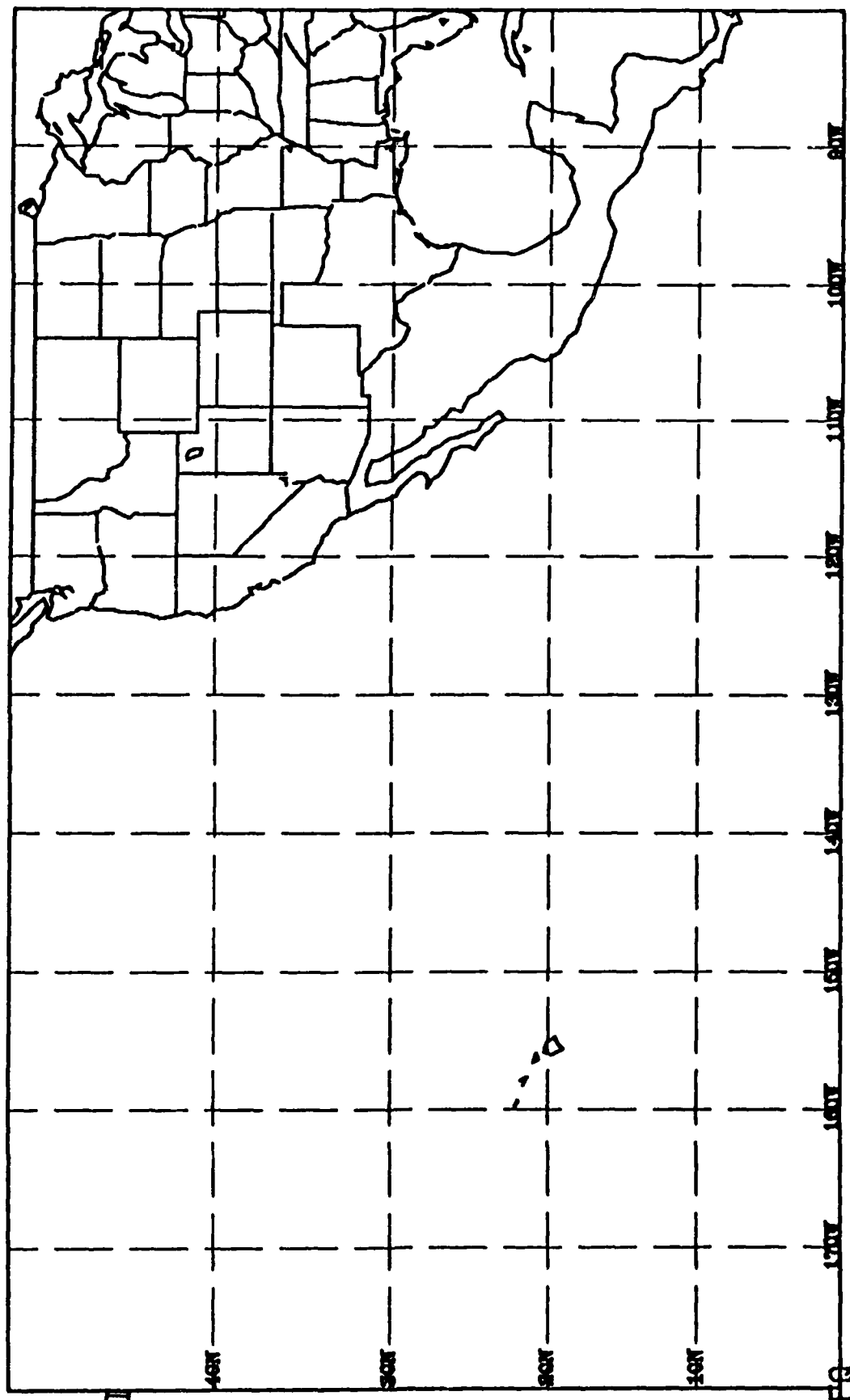
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR OCT 24 - NOV 8



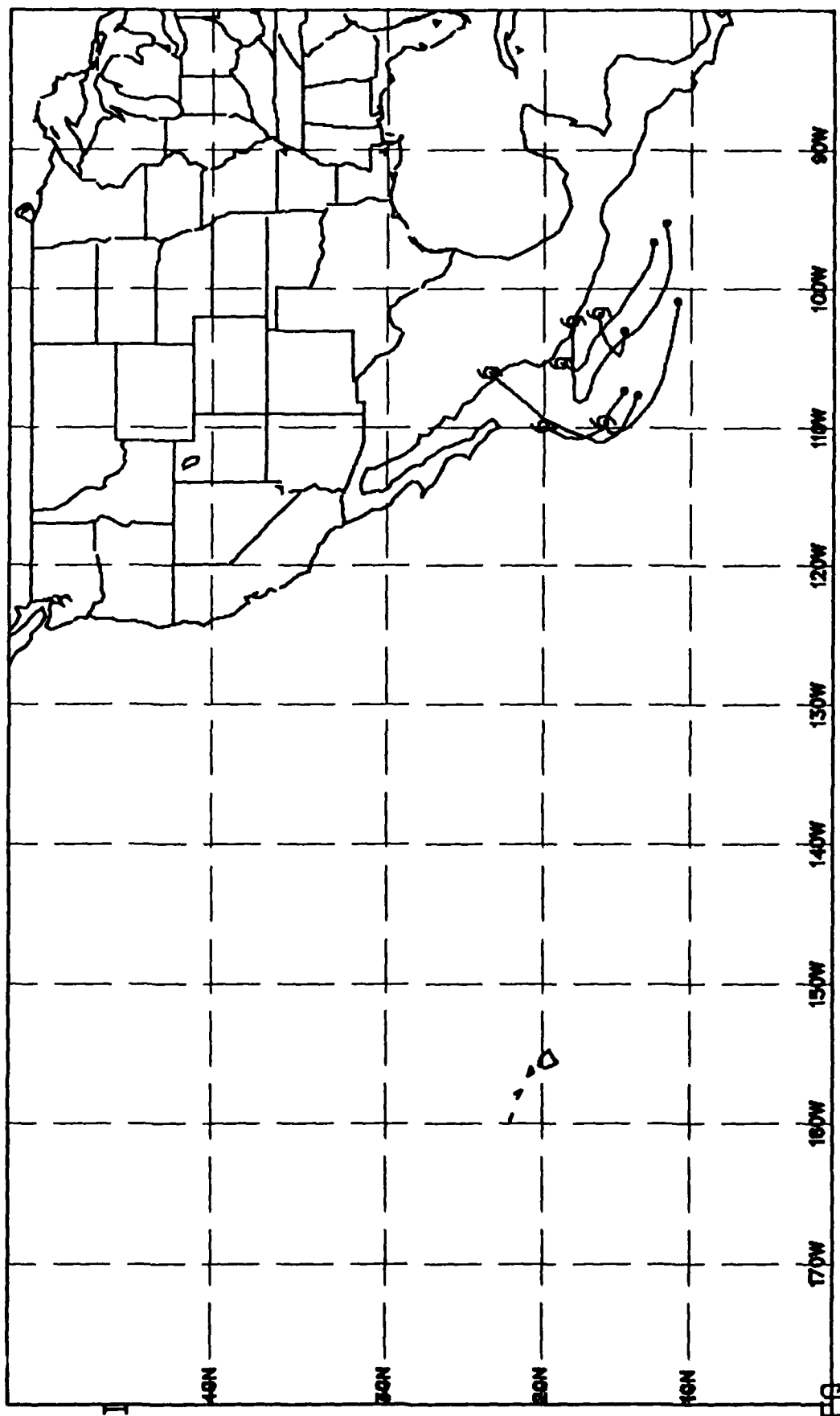
Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR OCT 24 - NOV 8



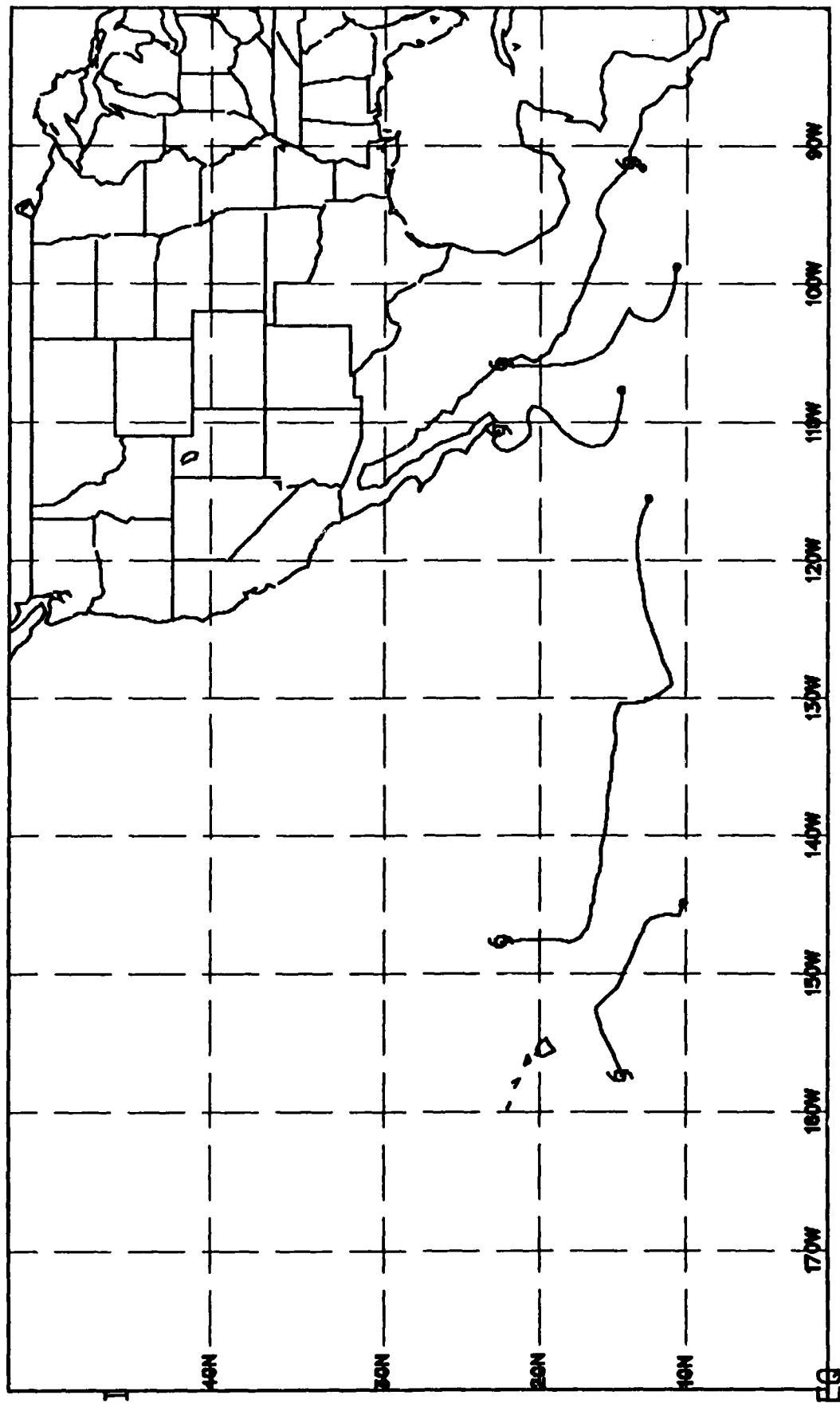
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR OCT 24 - NOV 8



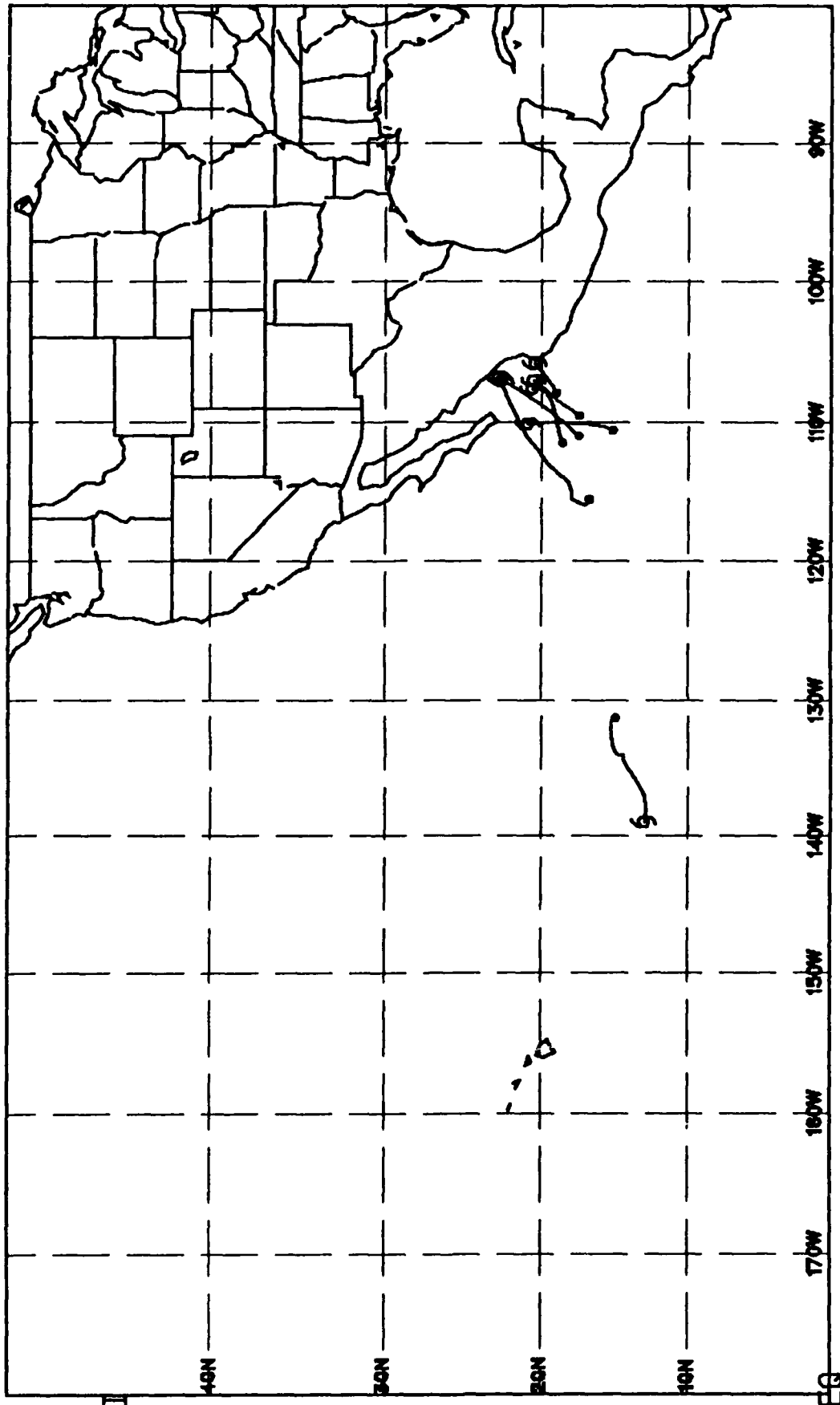
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR OCT 24 - NOV 8



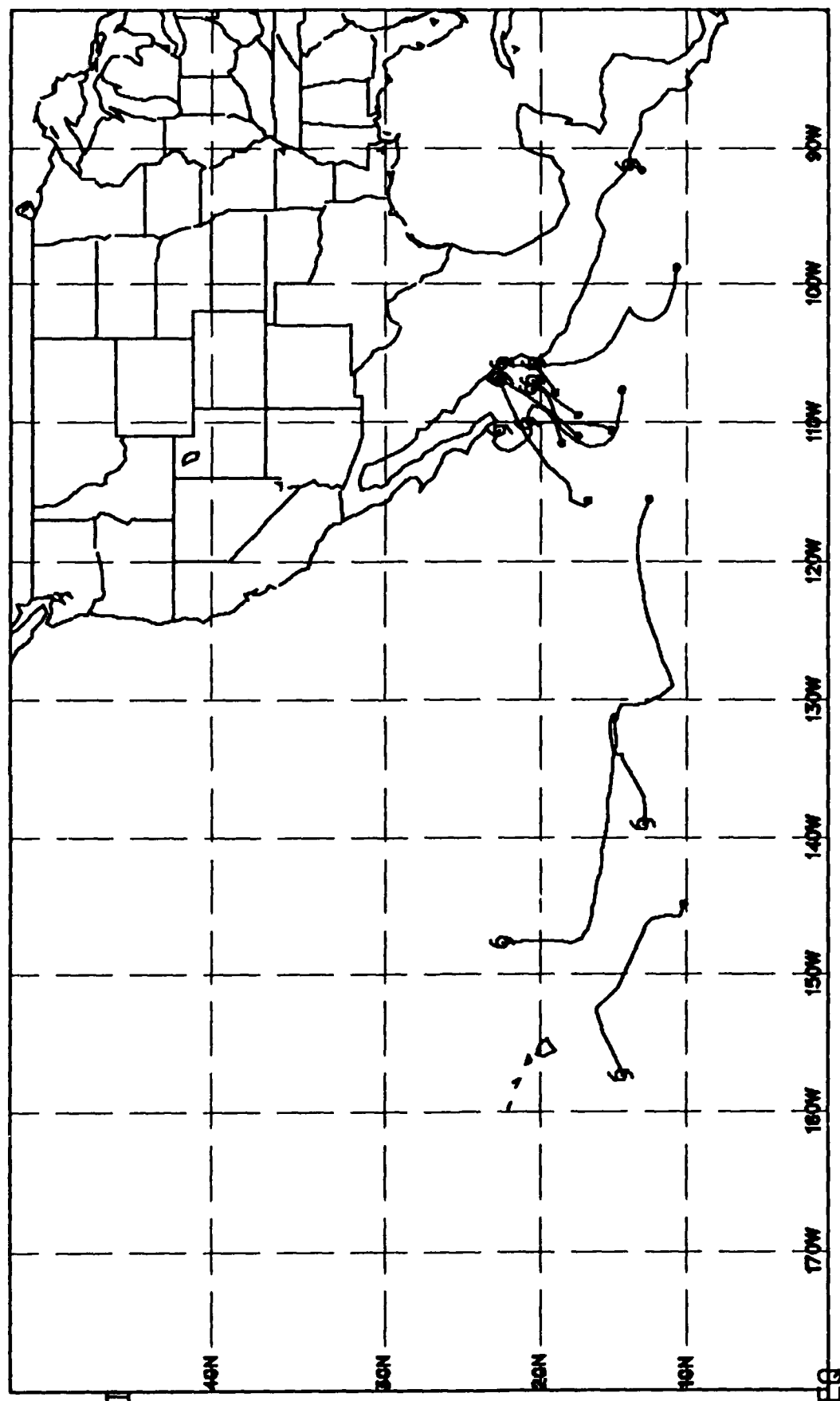
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR OCT 24 - NOV 8



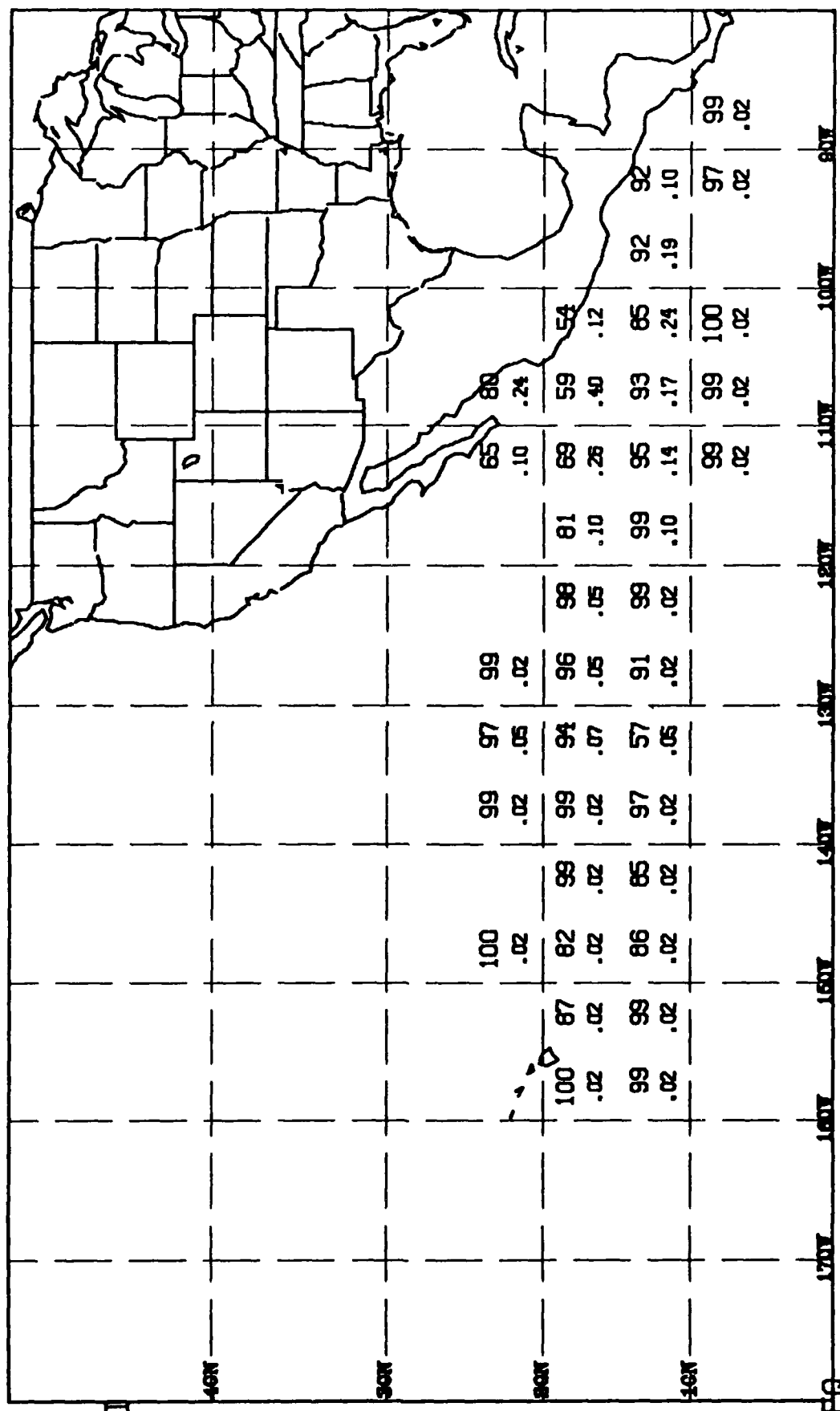
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR OCT 24 - NOV 8



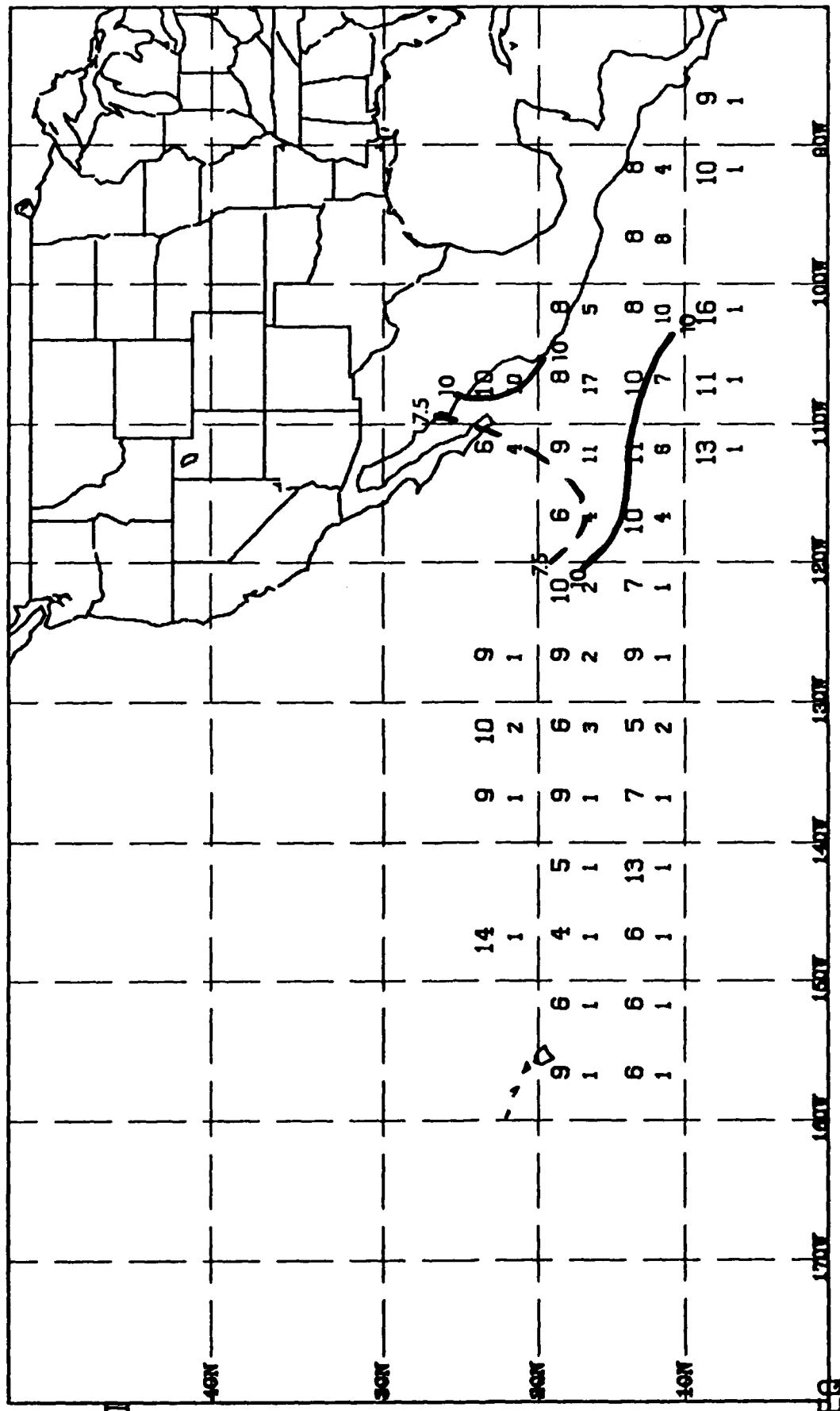
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR OCT 24 - NOV 8



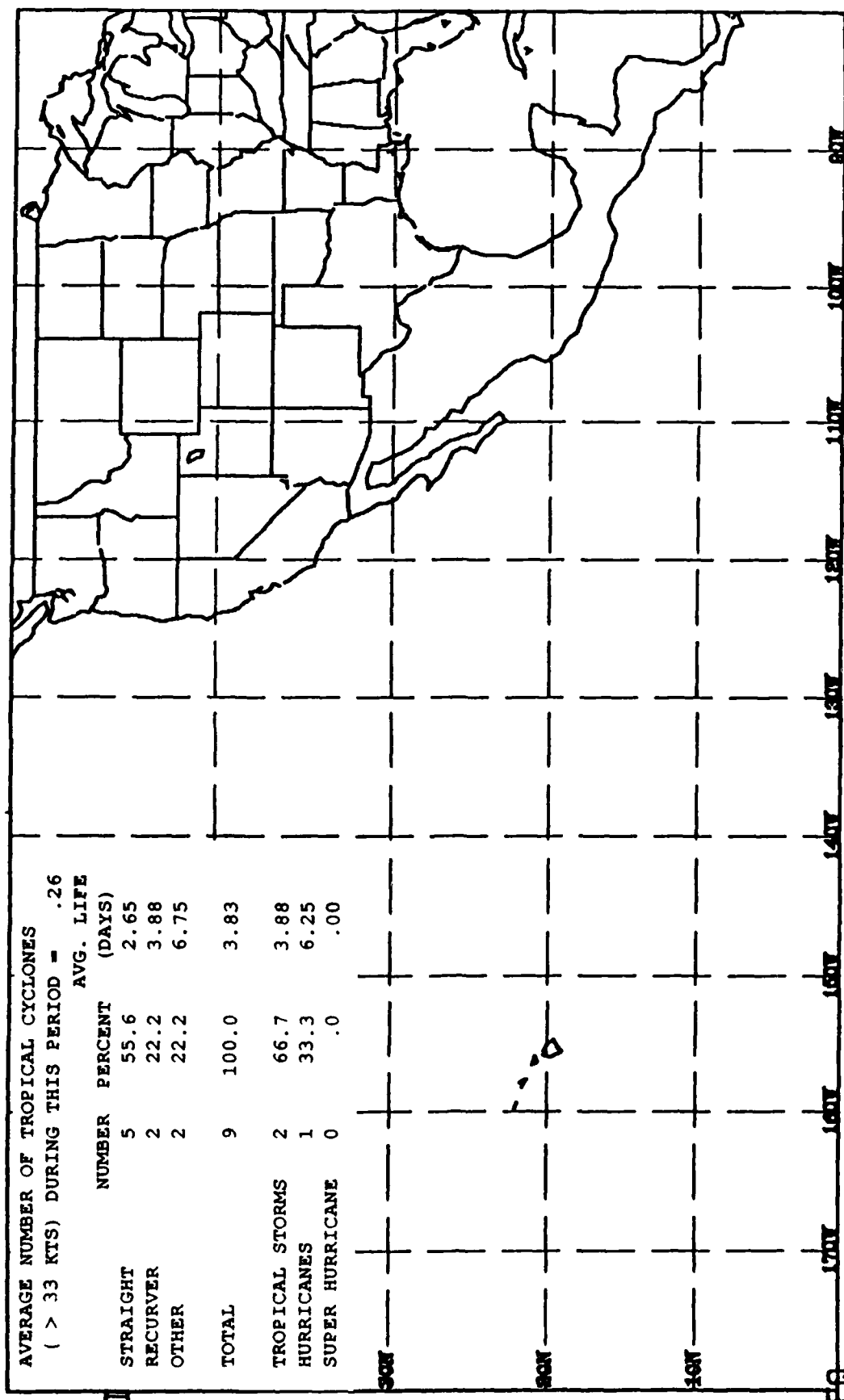
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SPEED OF MOVEMENT FOR OCT 24 - NOV 8



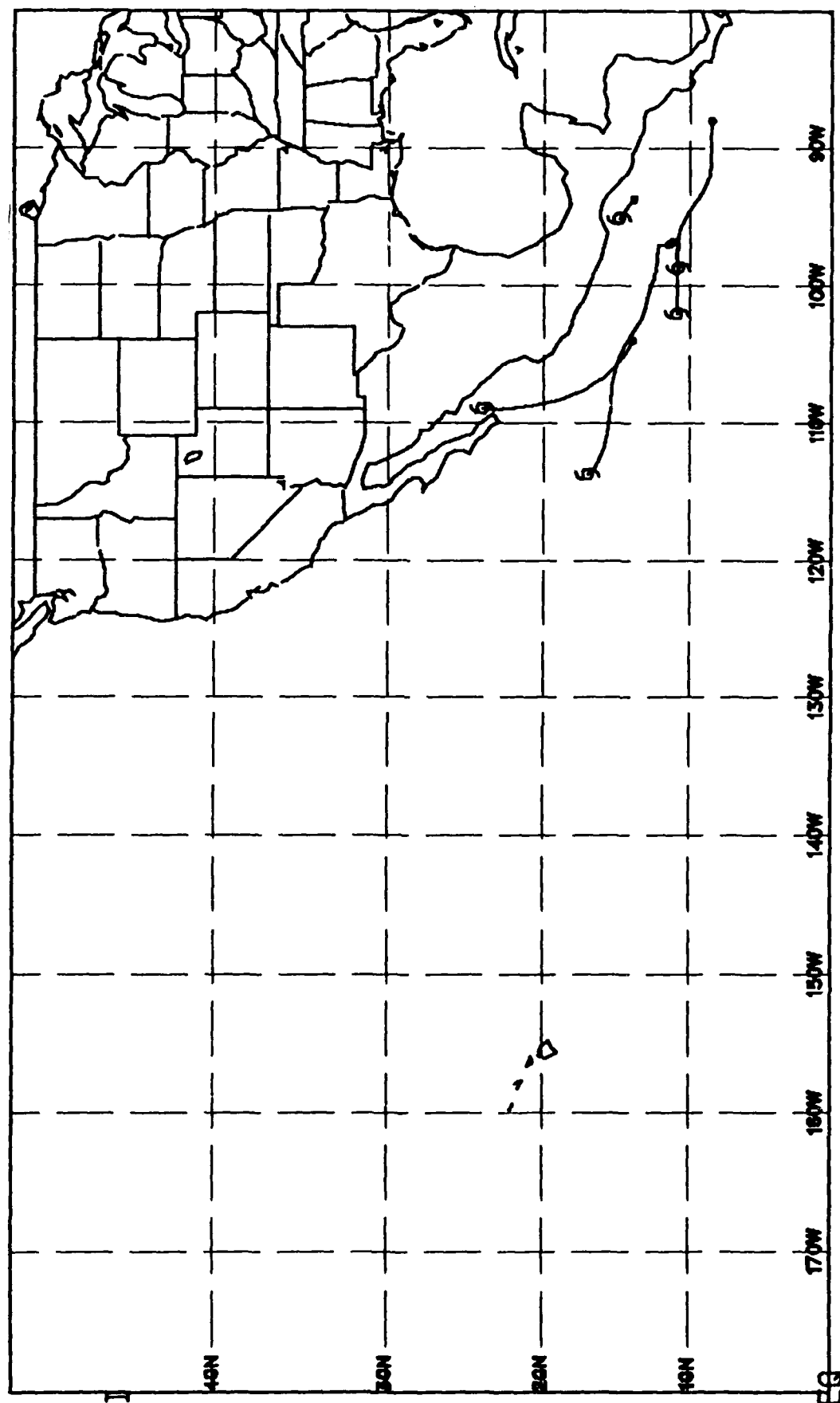
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR NOV 9 - NOV 23



Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored.

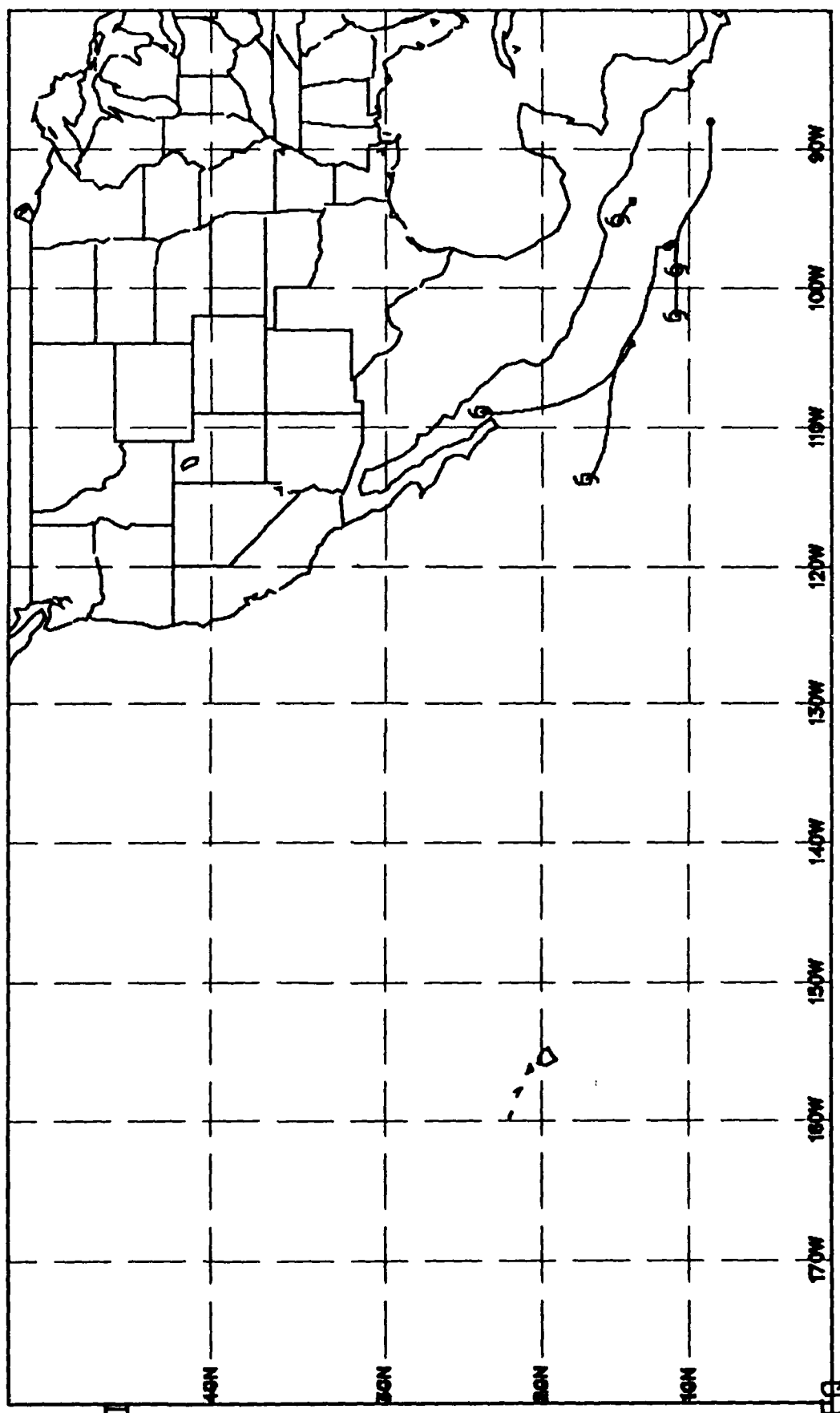
ACTUAL TRACKS FOR NOV 9 - NOV 23



Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

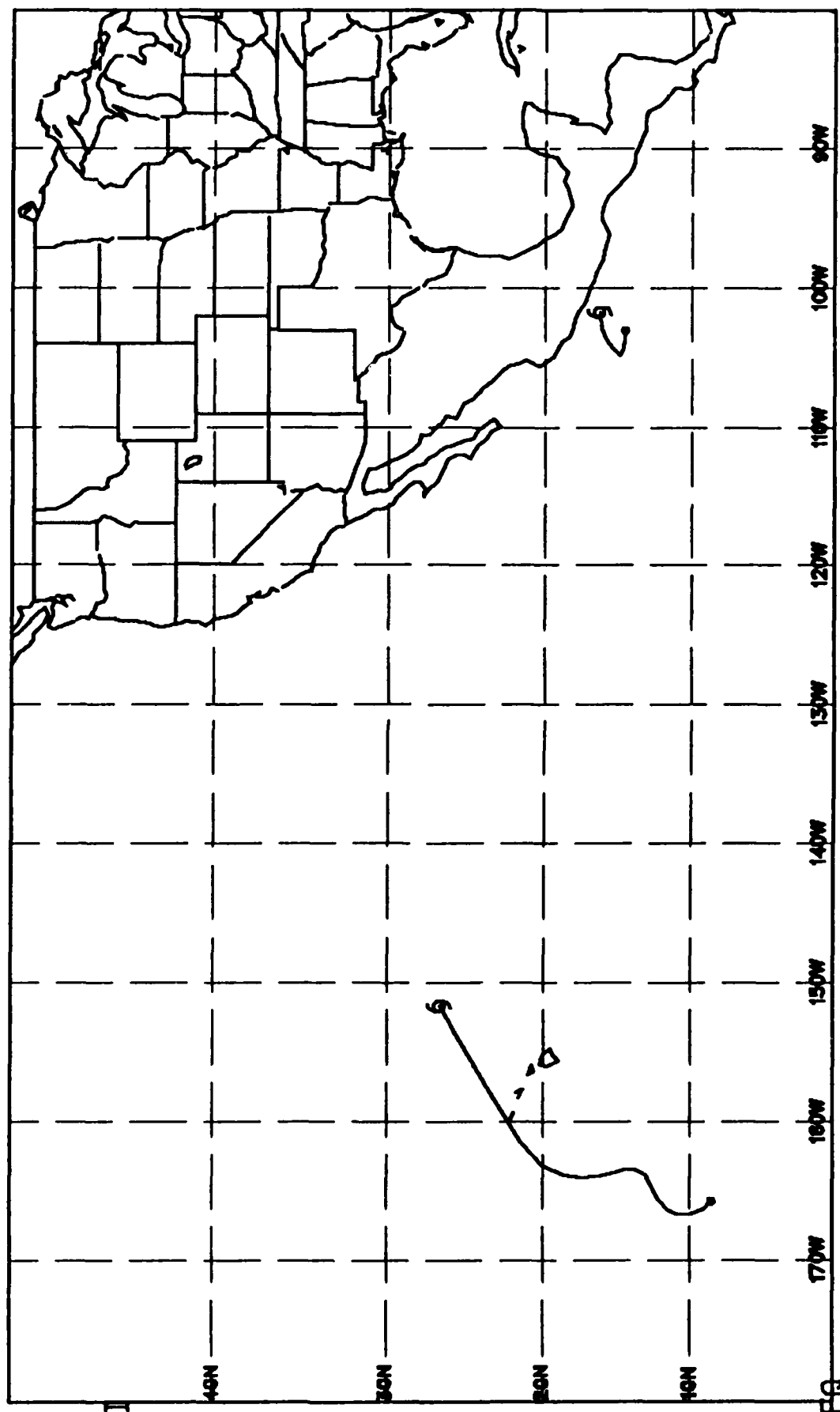
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ACTUAL TRACKS FOR NOV 9 - NOV 23



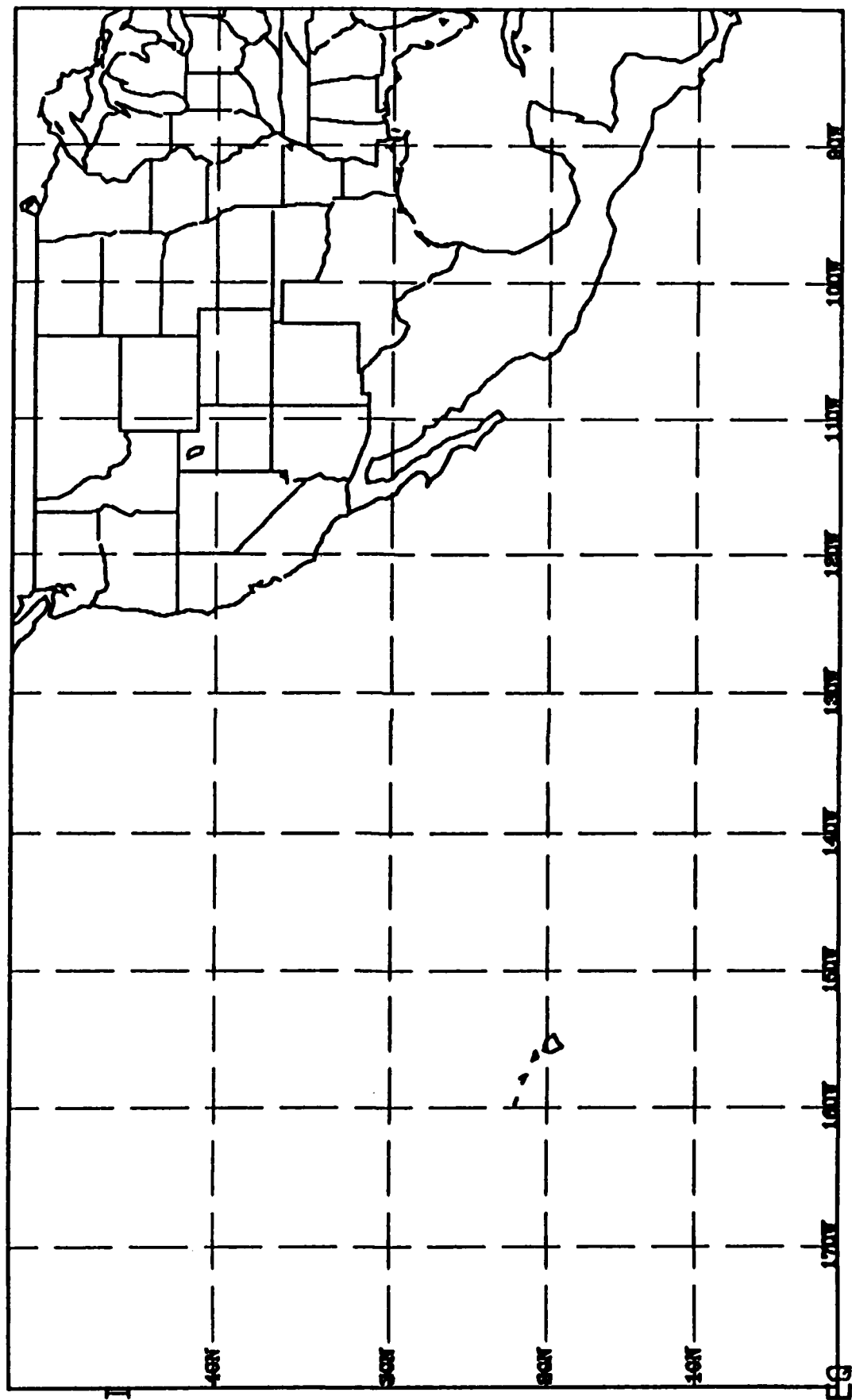
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR NOV 9 - NOV 23



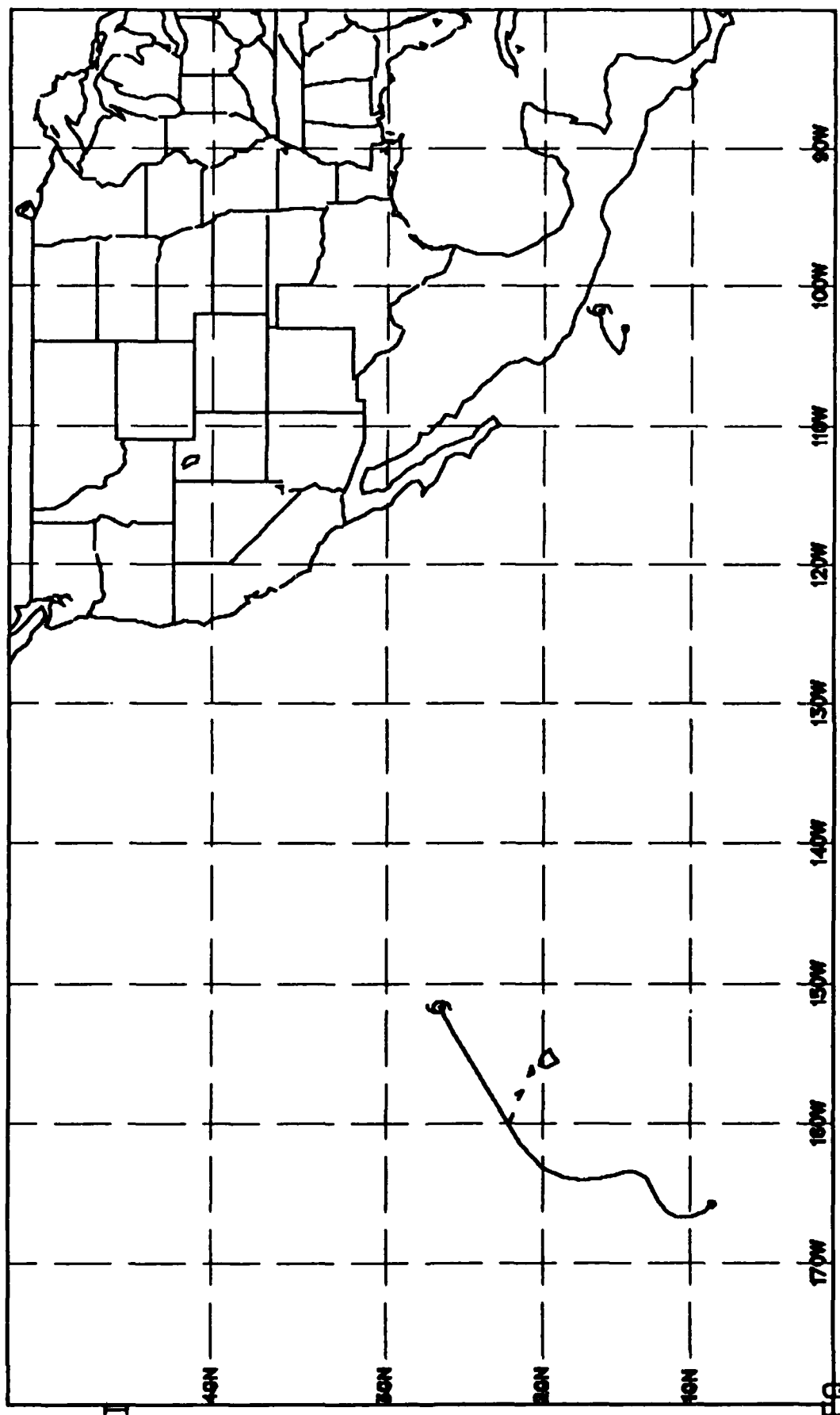
Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR NOV 9 - NOV 23



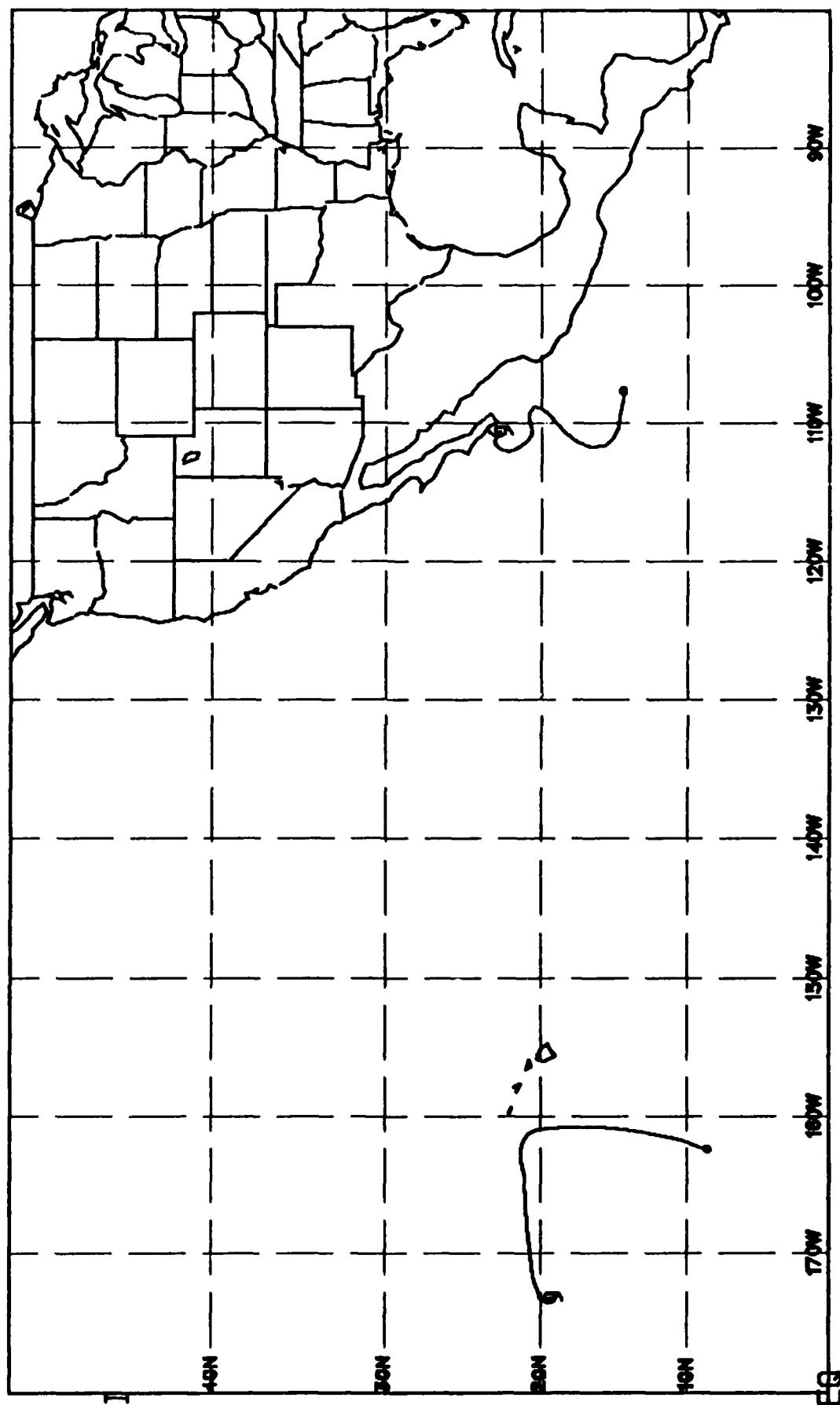
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR NOV 9 - NOV 23



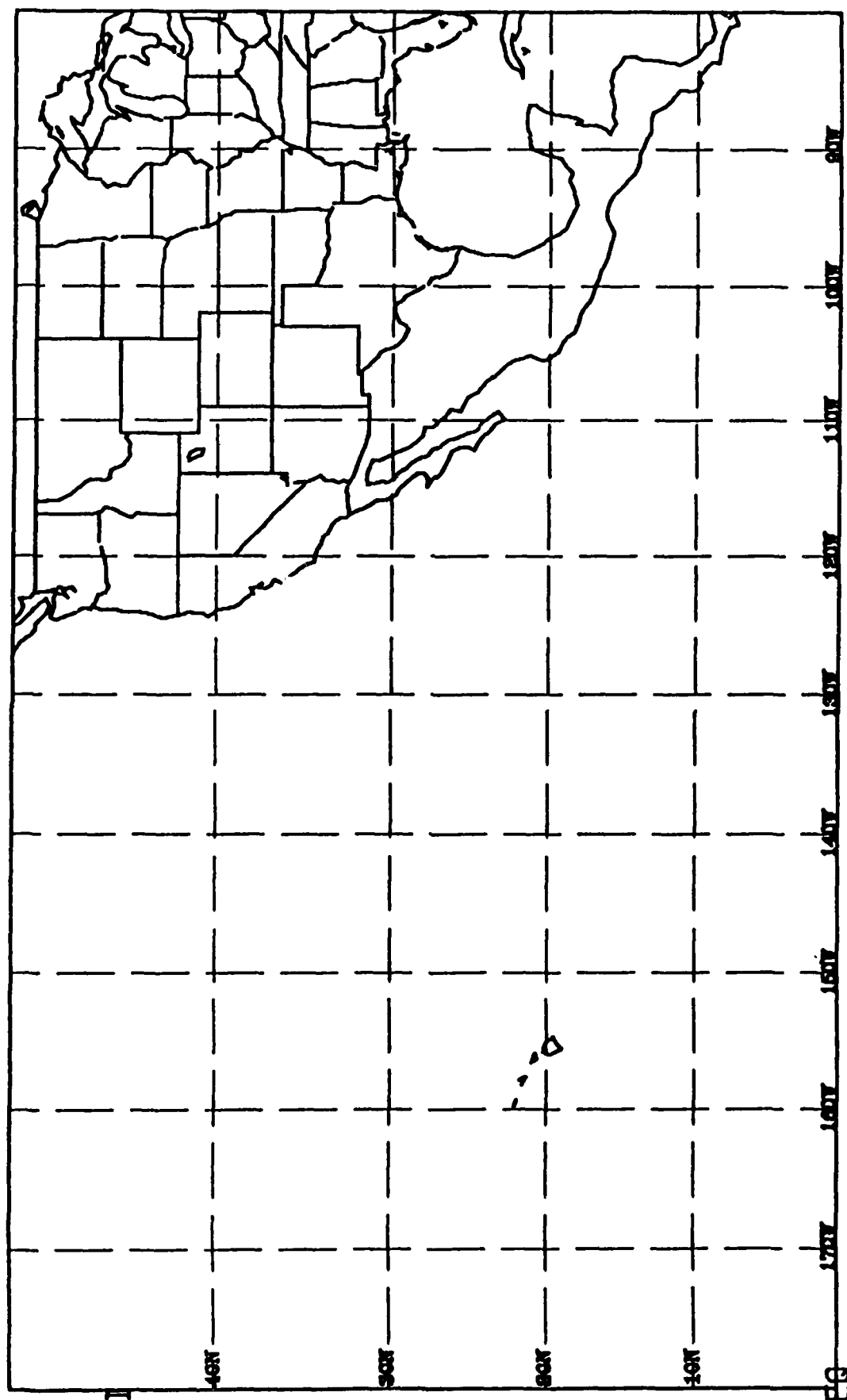
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR NOV 9 - NOV 23



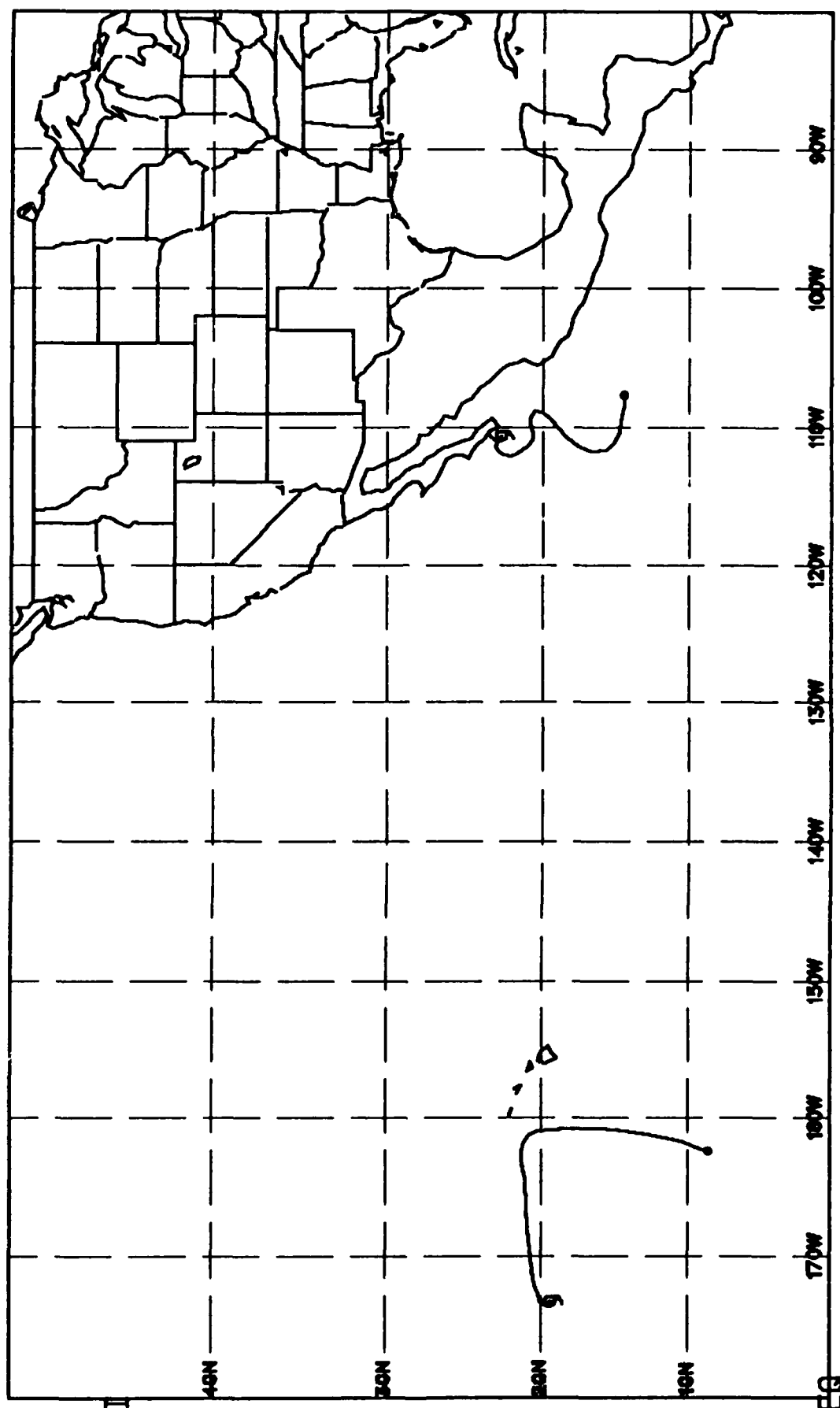
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR NOV 9 - NOV 23



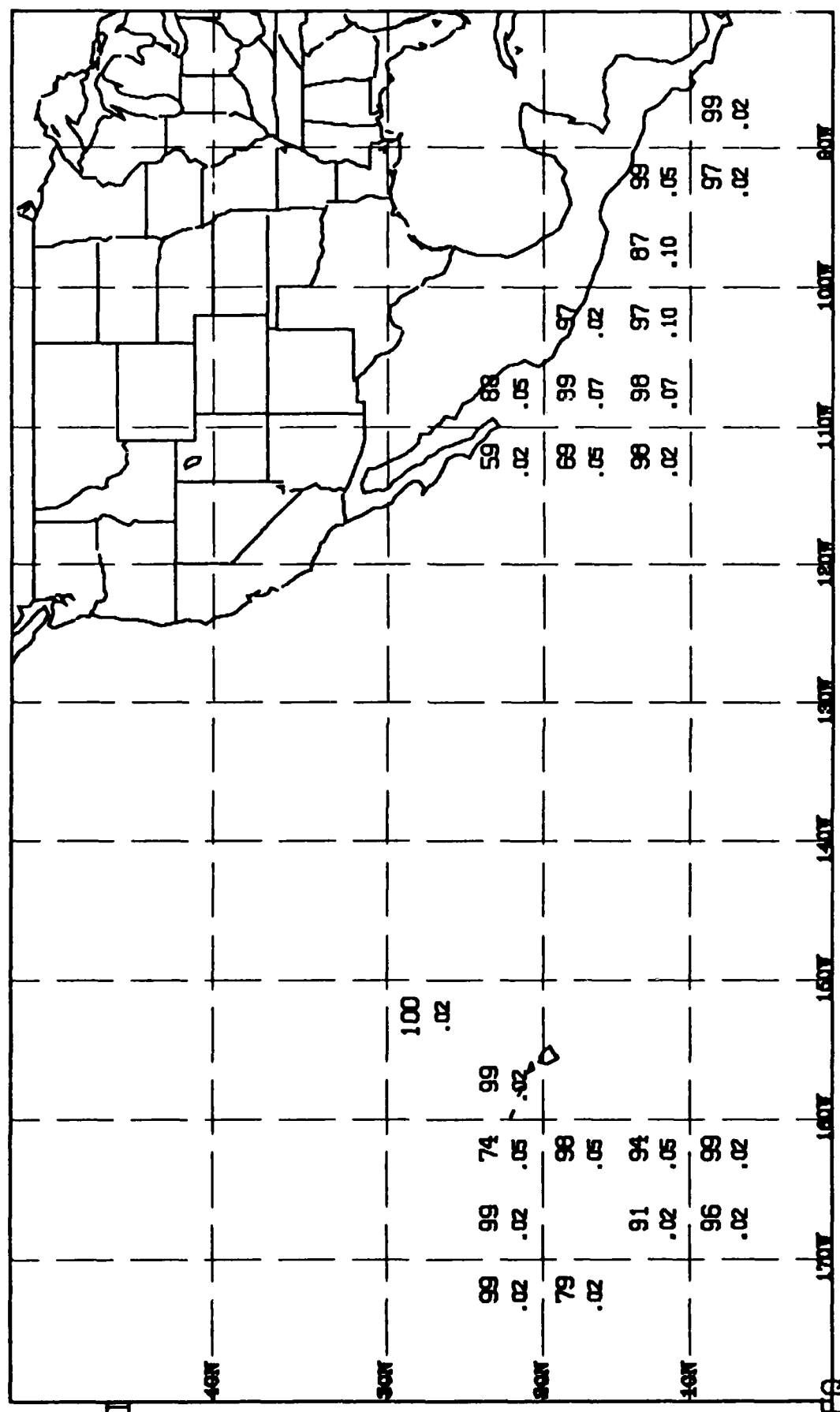
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR NOV 9 - NOV 23



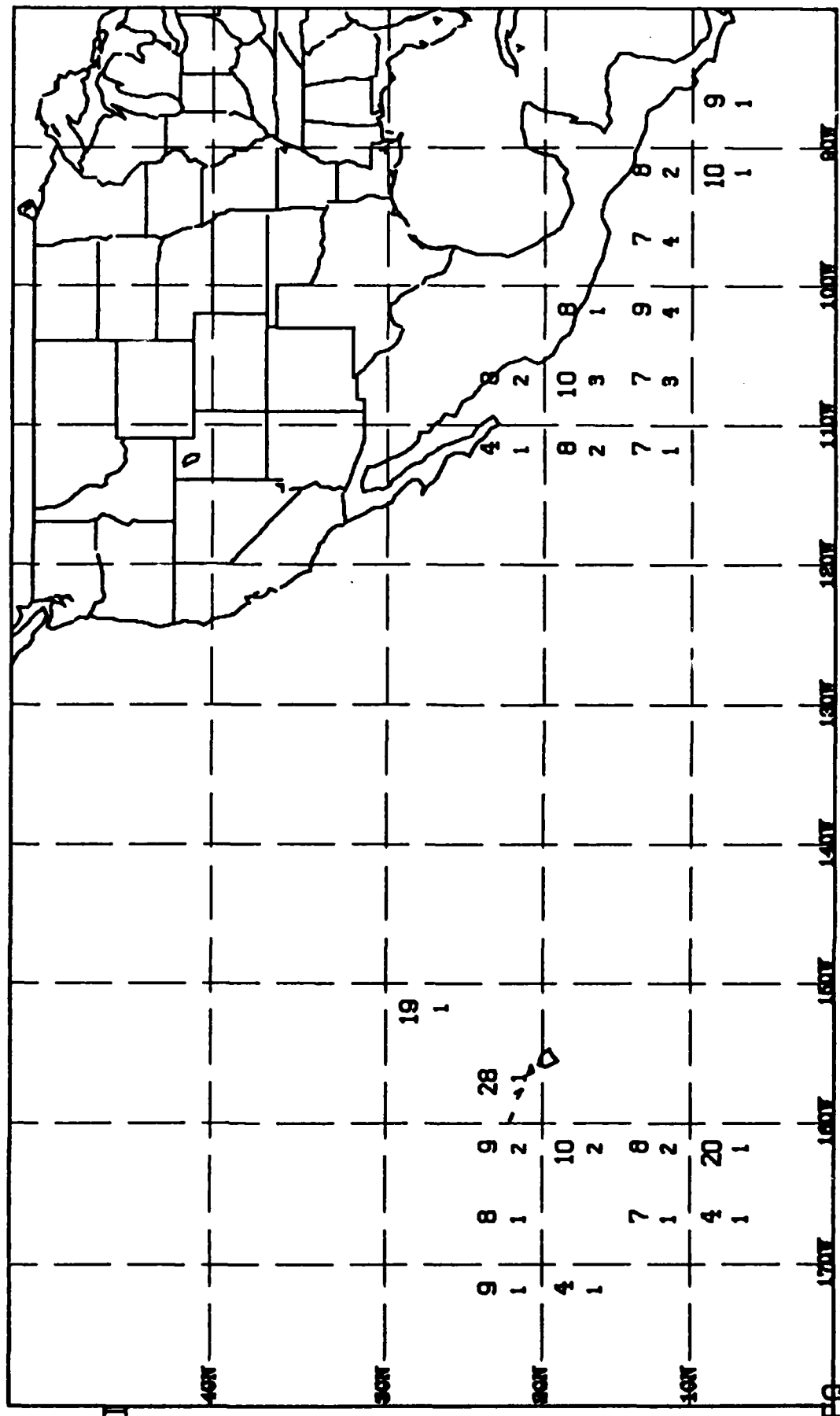
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR NOV 9 - NOV 23



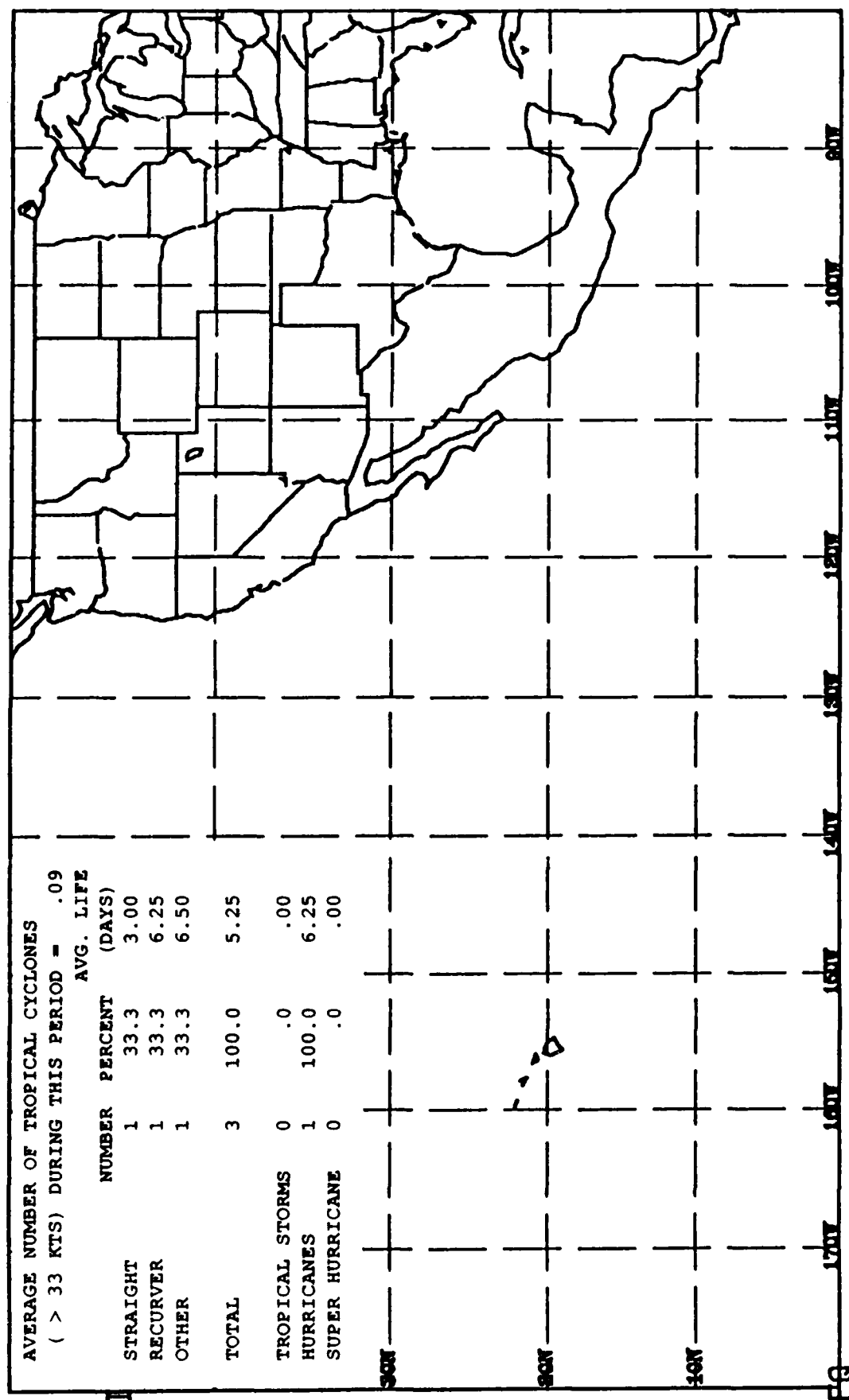
Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number). Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed. Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year per time period.

SPEED OF MOVEMENT FOR NOV 9 - NOV 23



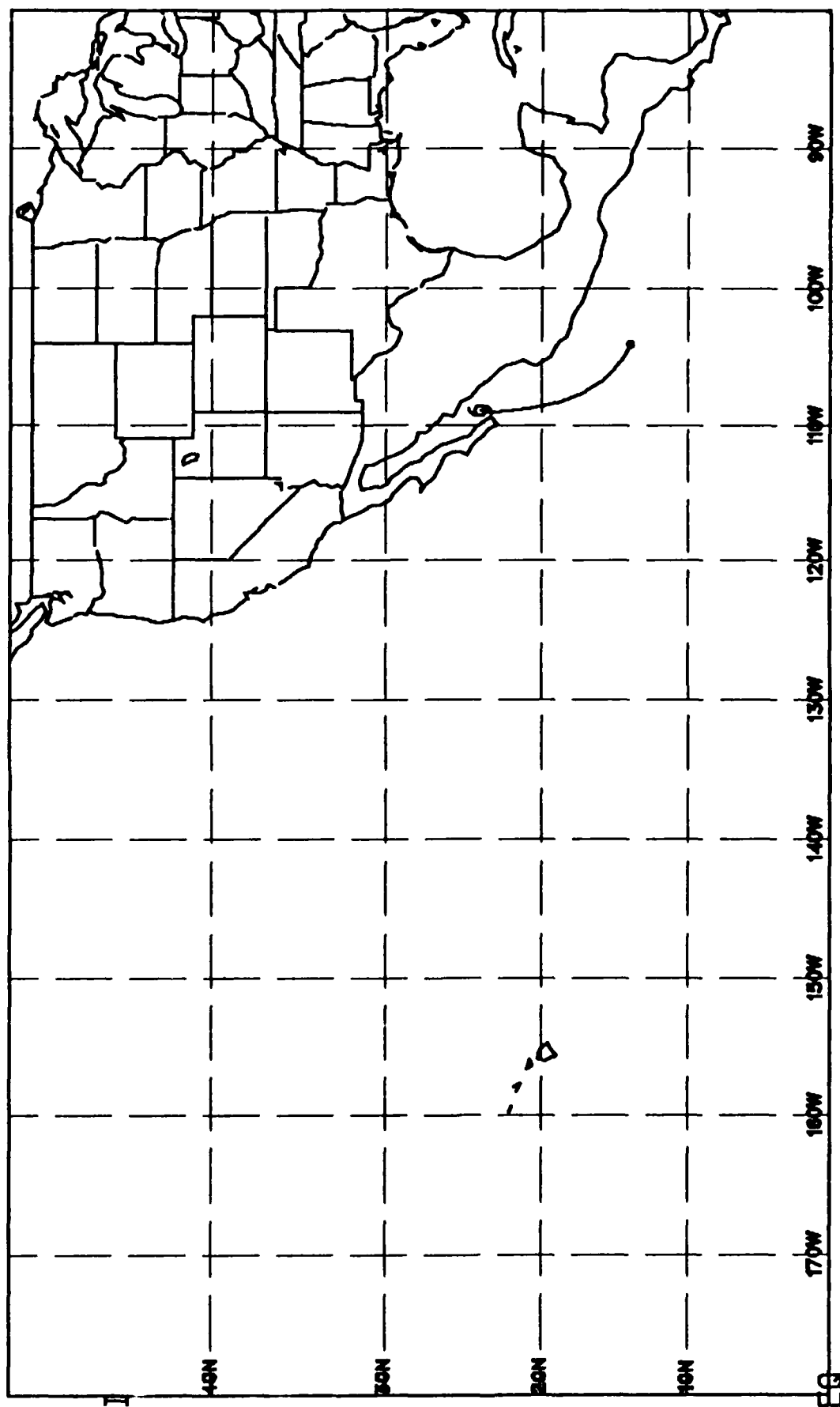
Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

MEAN PATHS FOR NOV 24 - DEC 8



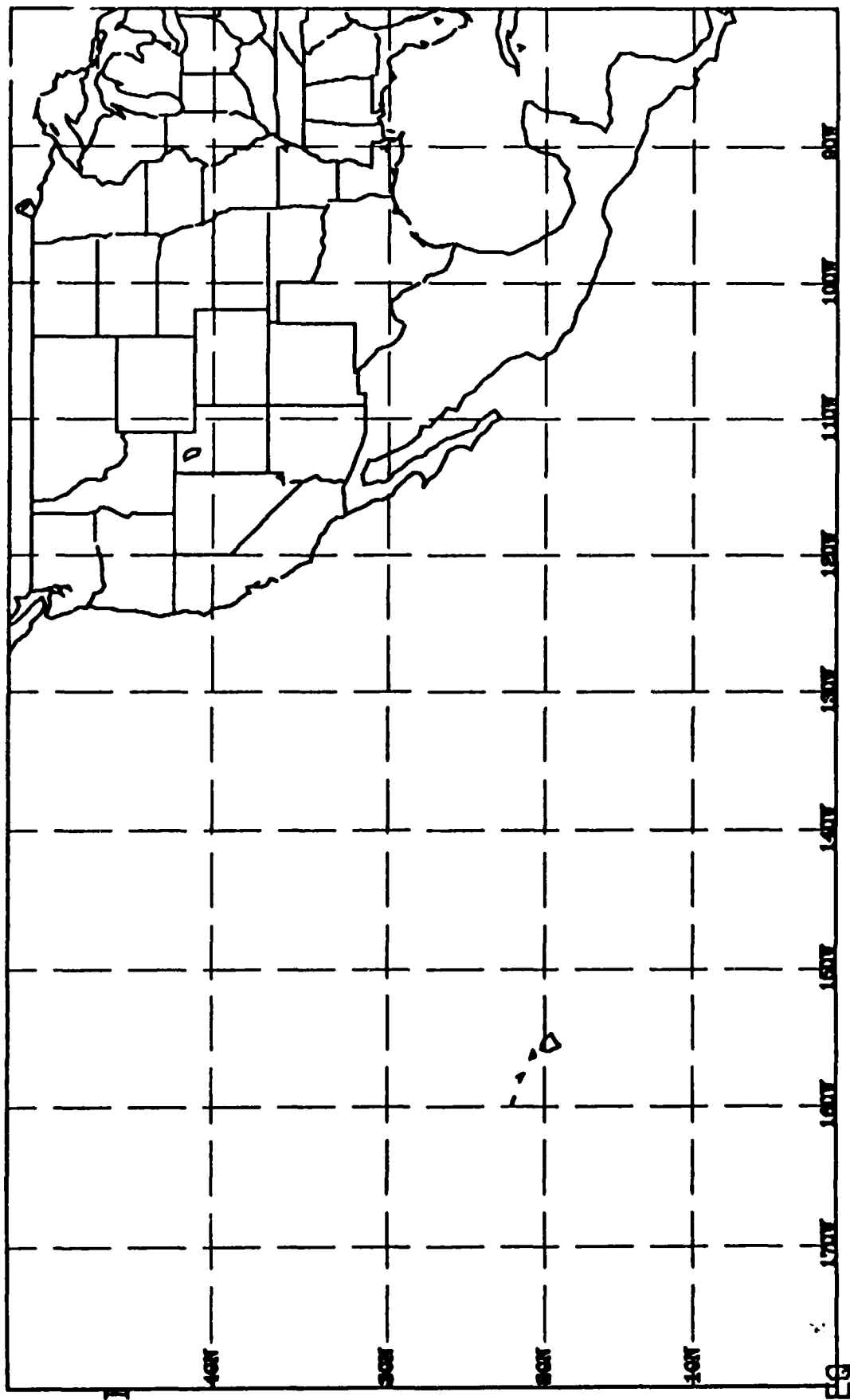
Mean tropical cyclone (> 33 kts) path. Numbers represent the percentage of tropical cyclones (> 33 kts) which followed the indicated path. These numbers may not add up to 100% since not all tropical cyclones (> 33 kts) follow a mean path and some develop/dissipate along a path. Tracks which contained less than 5% of the tropical cyclones (> 33 kts) are ignored.

ACTUAL TRACKS FOR NOV 24 - DEC 8



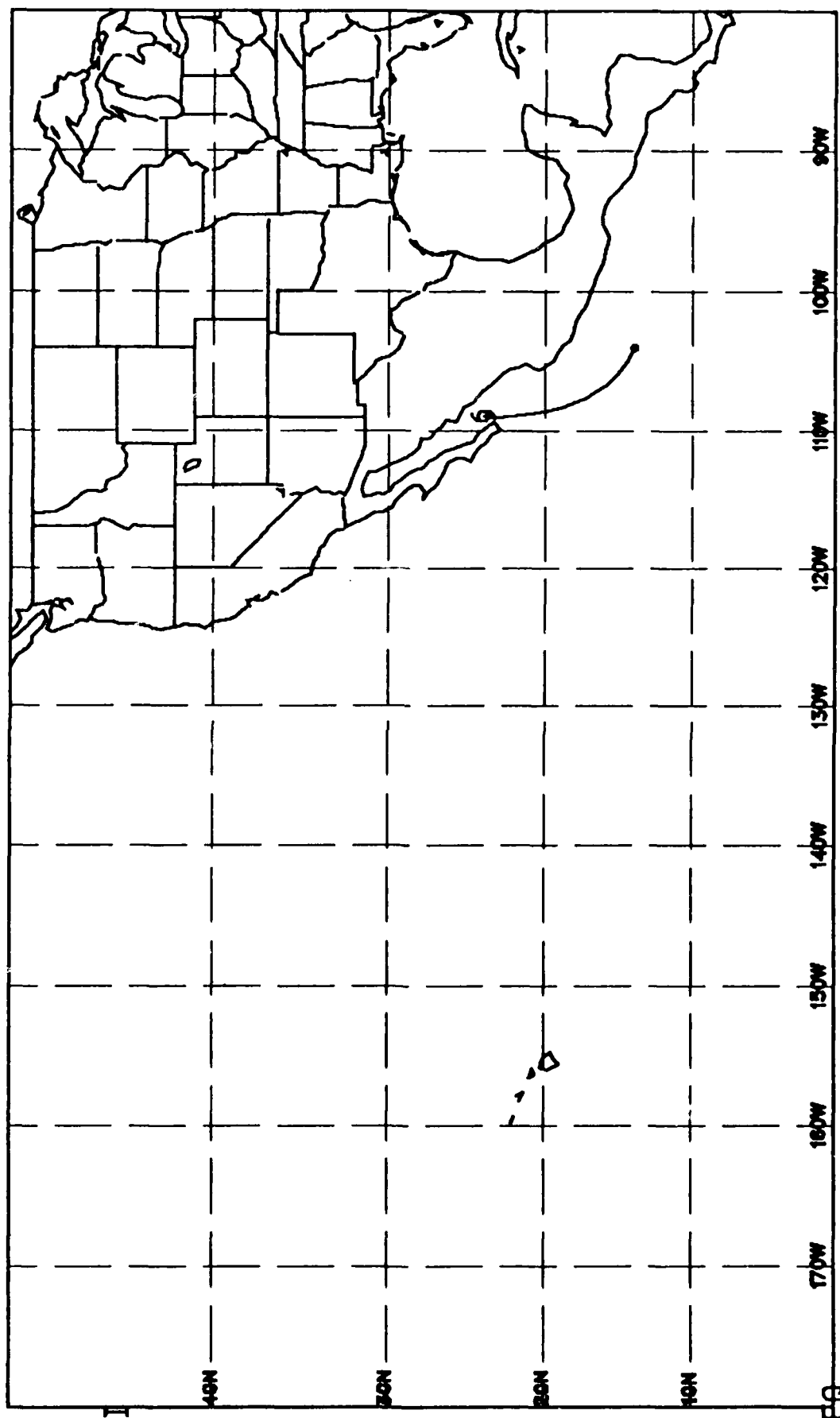
Actual path of straight tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR NOV 24 - DEC 8



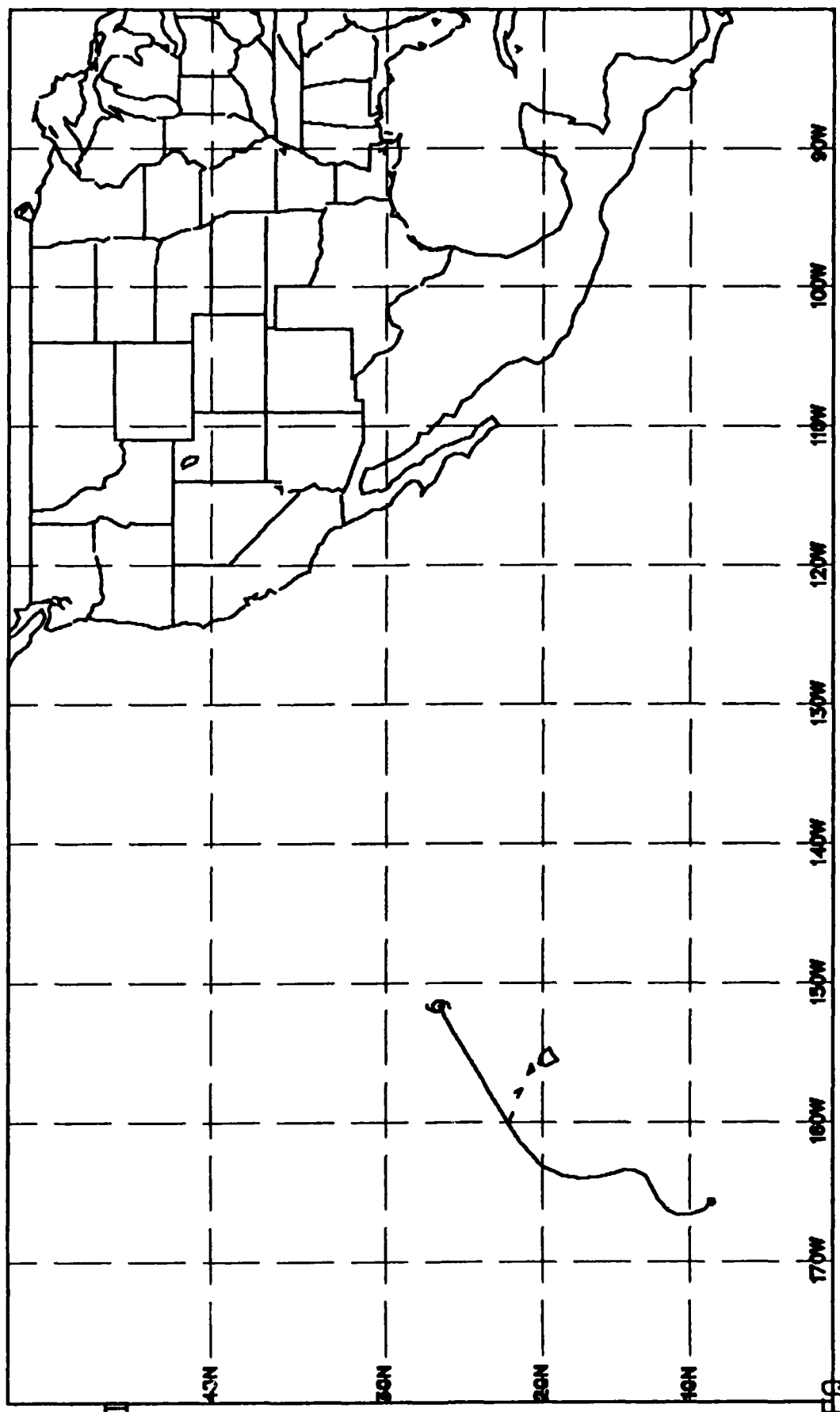
Actual path of straight tropical cyclones (> 33 kts) developing at or north of 15°N .

ACTUAL TRACKS FOR NOV 24 - DEC 8



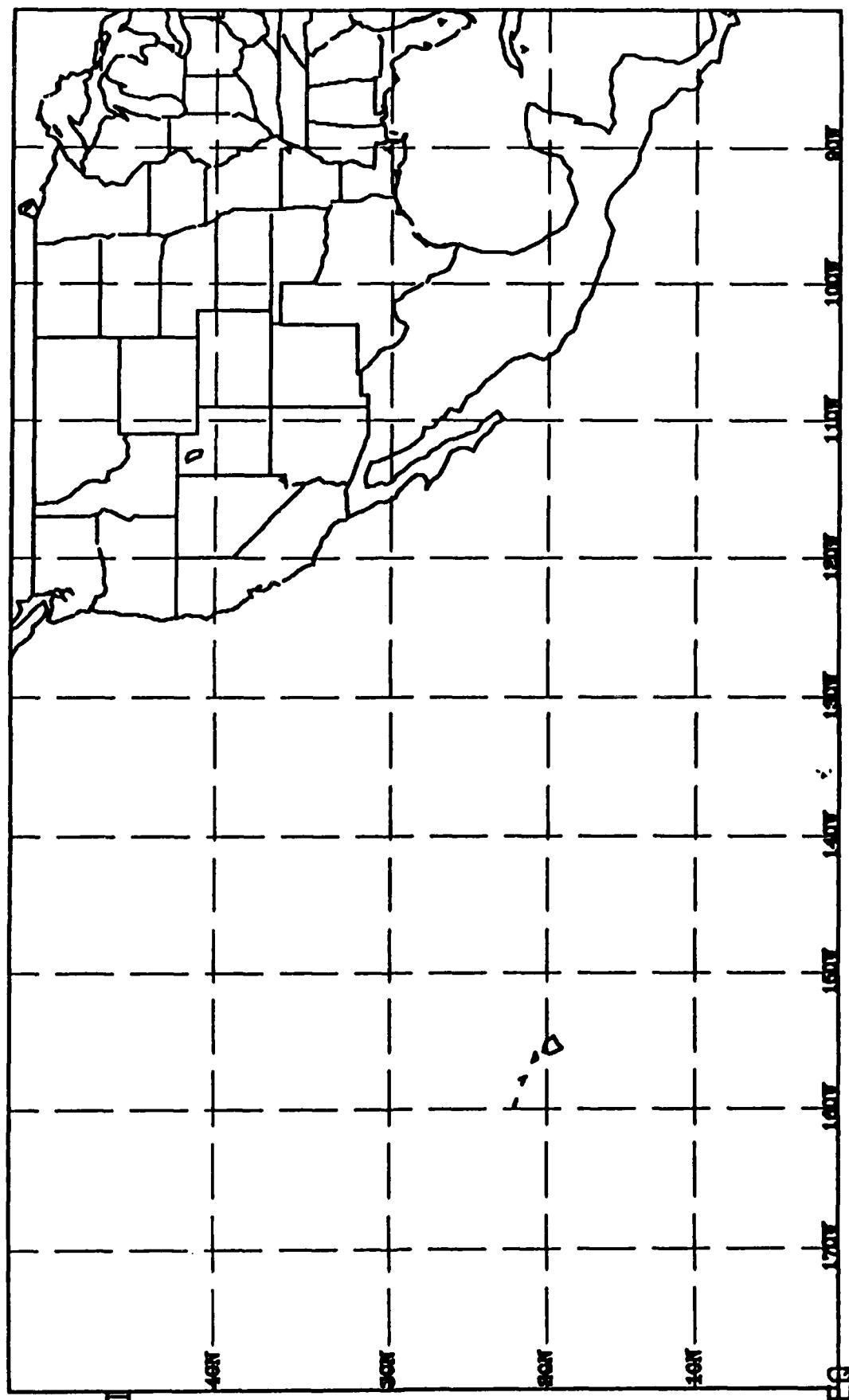
Actual path of all straight tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR NOV 24 - DEC 8



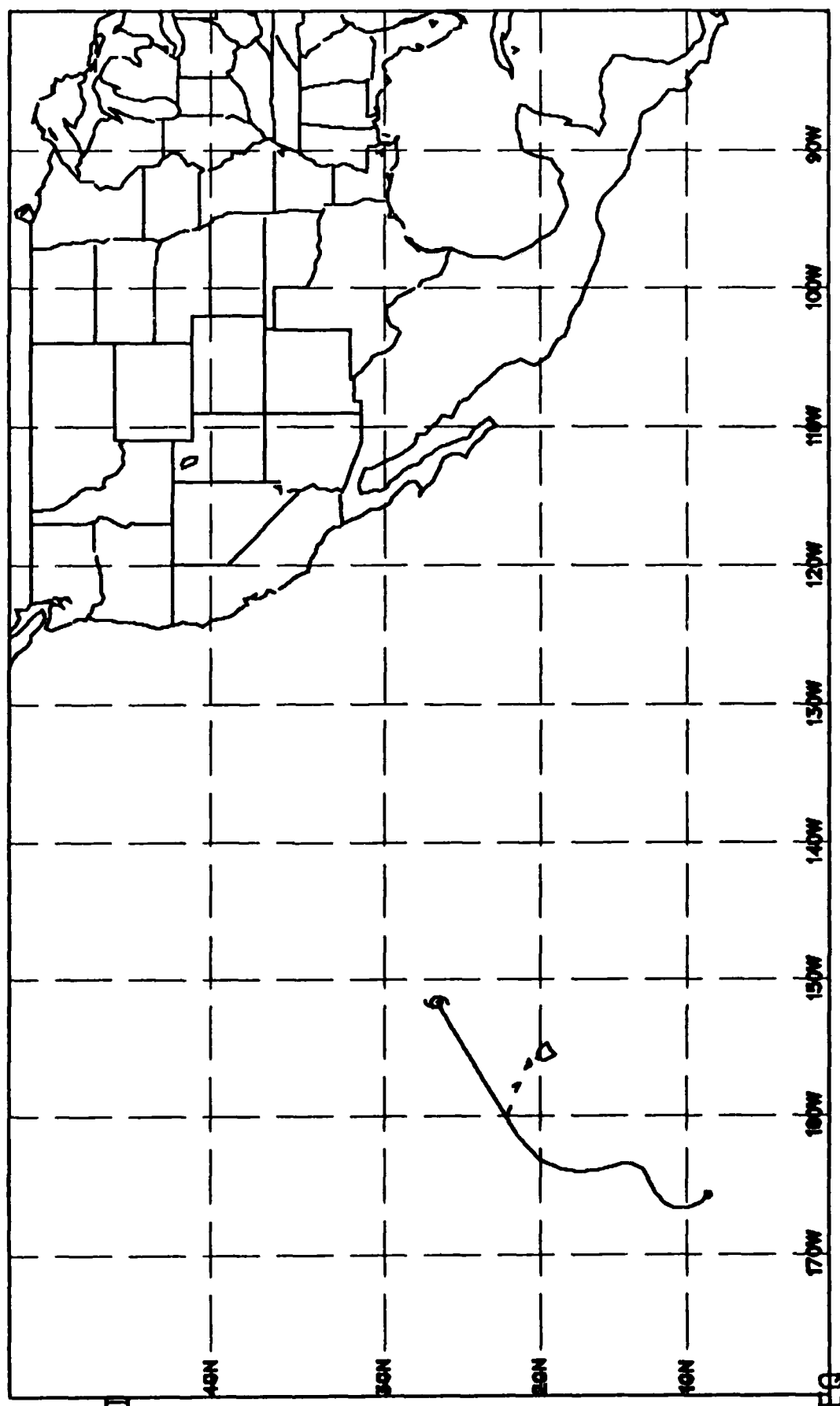
Actual path of recurring tropical cyclones (> 33 kts) developing south of 15°N .

ACTUAL TRACKS FOR NOV 24 - DEC 8



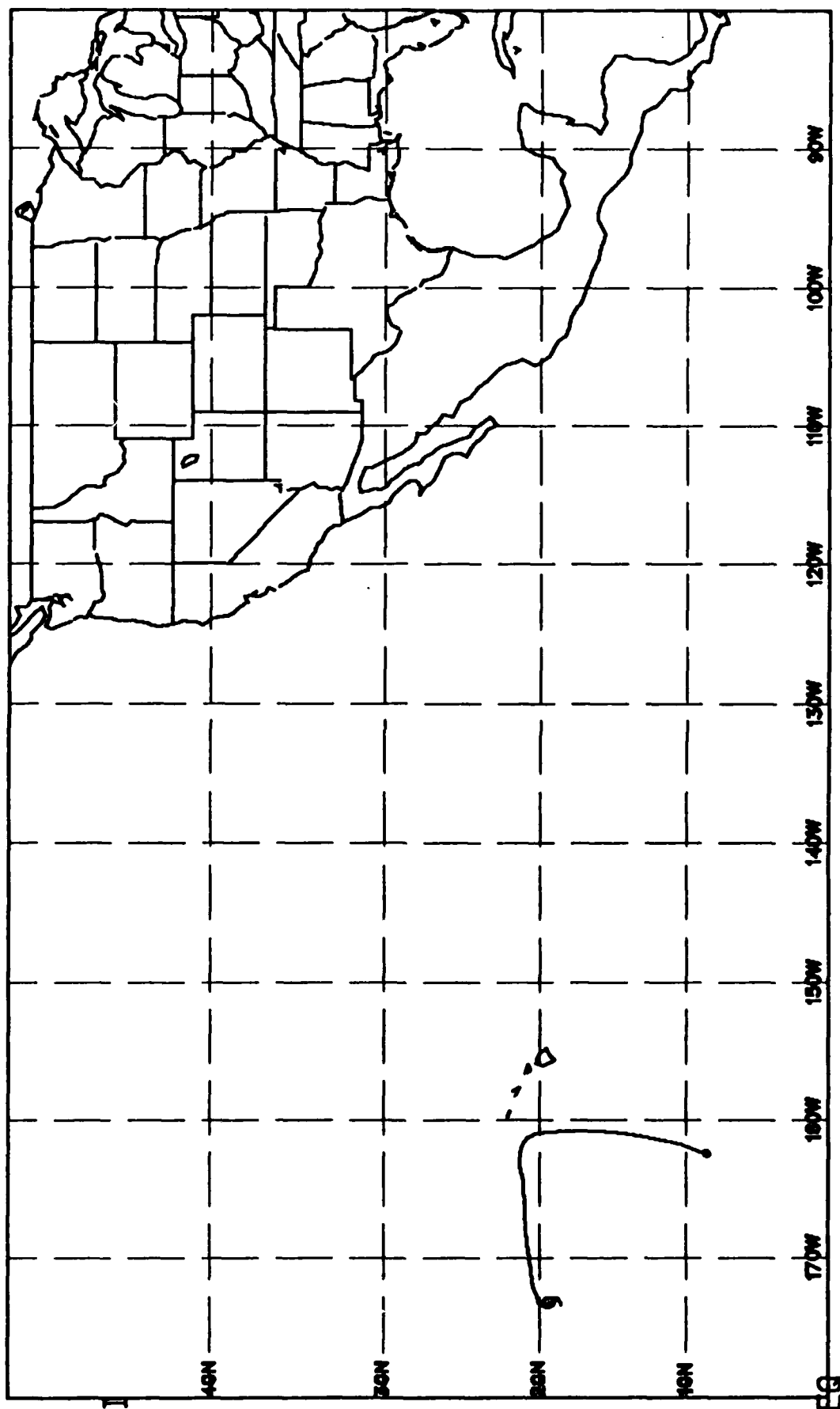
Actual path of recurring tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR NOV 24 - DEC 8



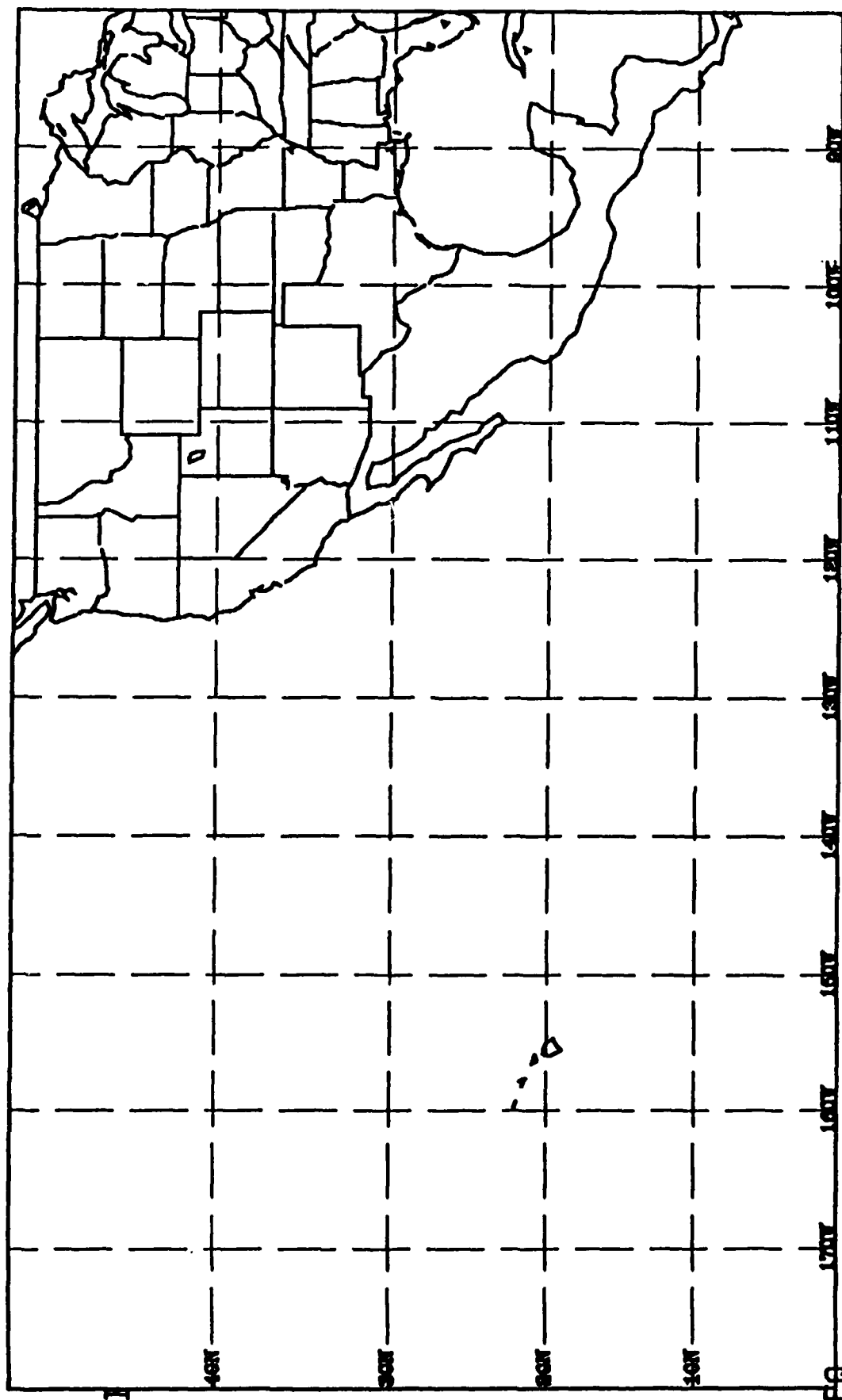
Actual path of all recurring tropical cyclones (> 33 kts).

ACTUAL TRACKS FOR NOV 24 - DEC 8



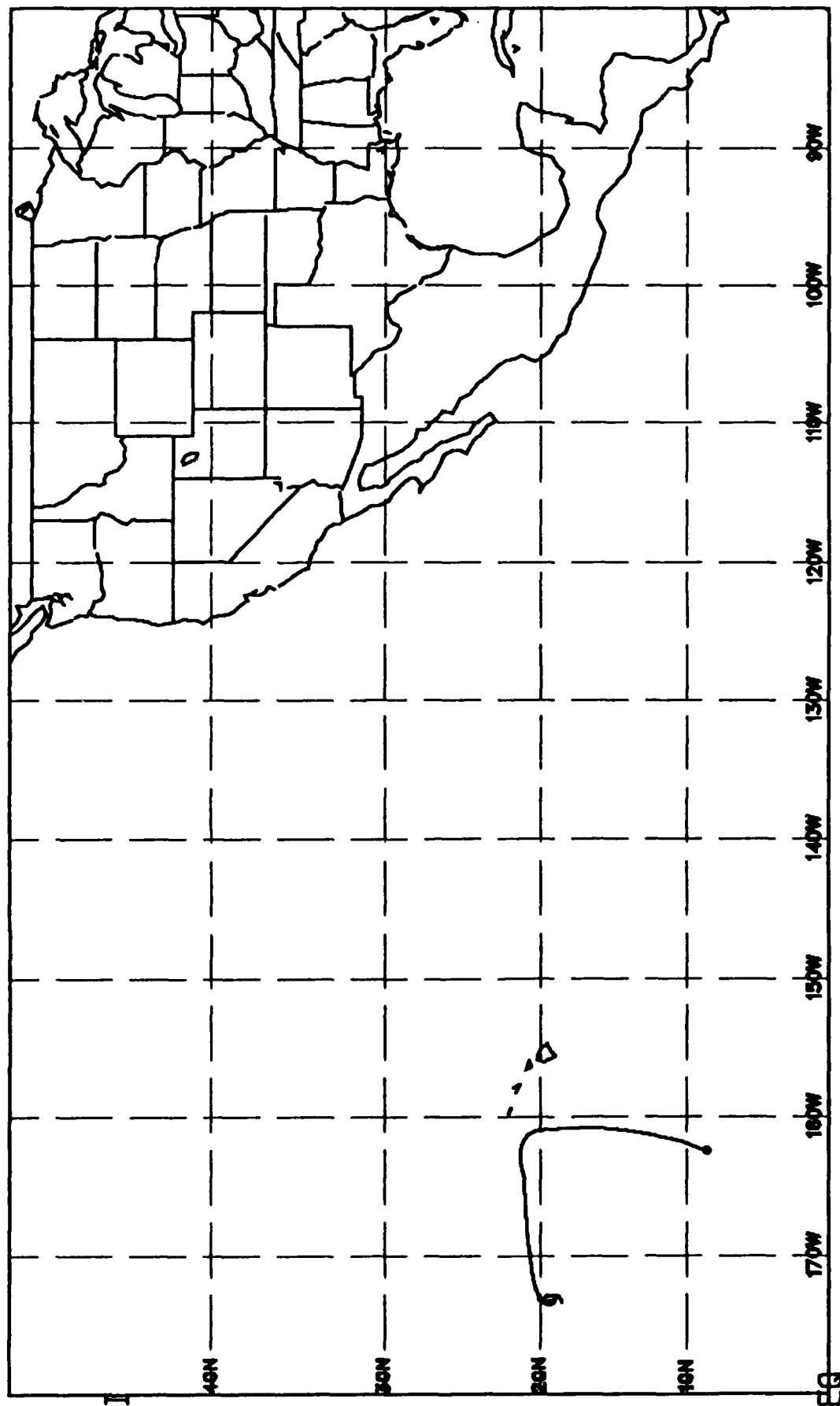
Actual path of other tropical cyclones (> 33 kts) developing south of 15°N.

ACTUAL TRACKS FOR NOV 24 - DEC 8



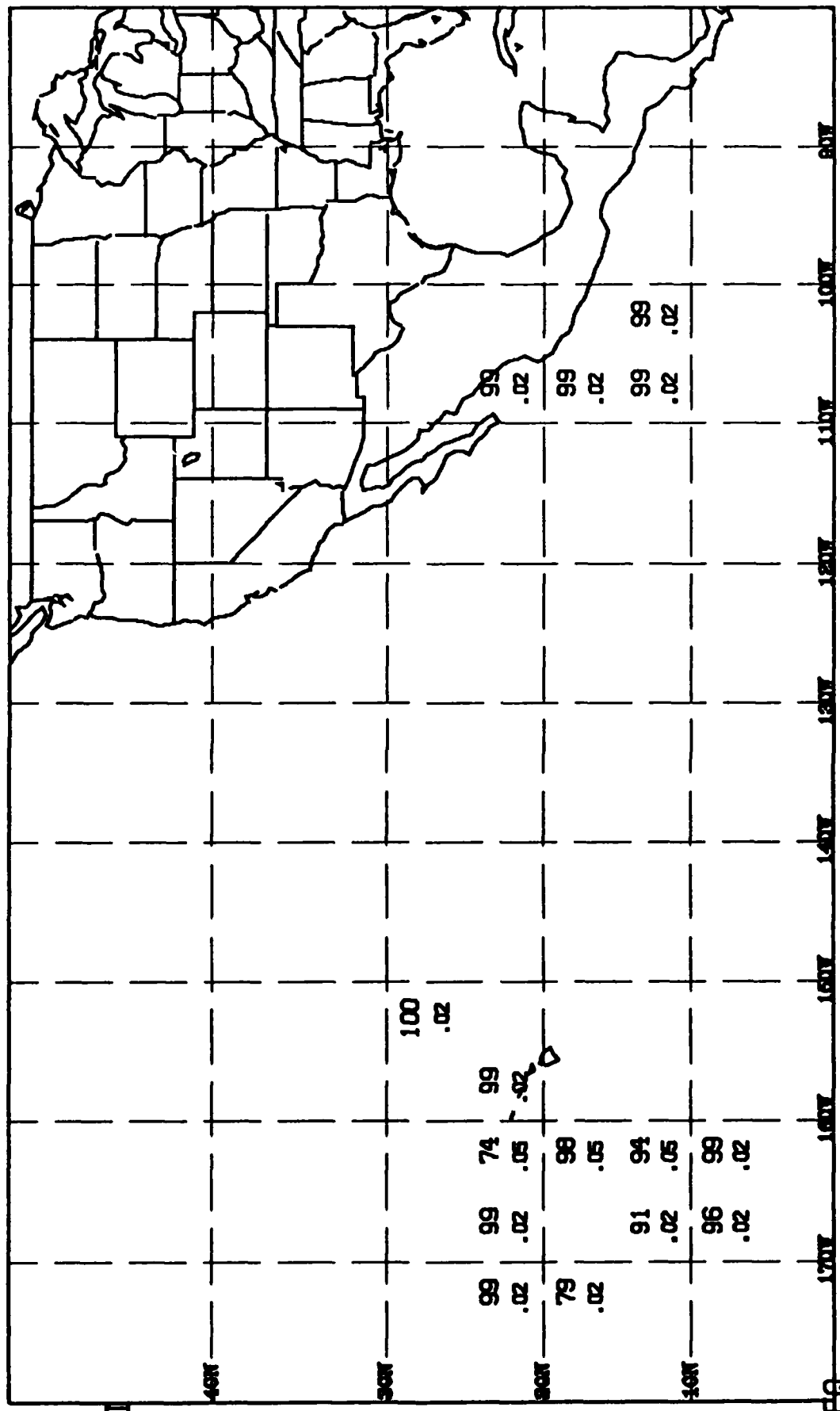
Actual path of other tropical cyclones (> 33 kts) developing at or north of 15°N.

ACTUAL TRACKS FOR NOV 24 - DEC 8



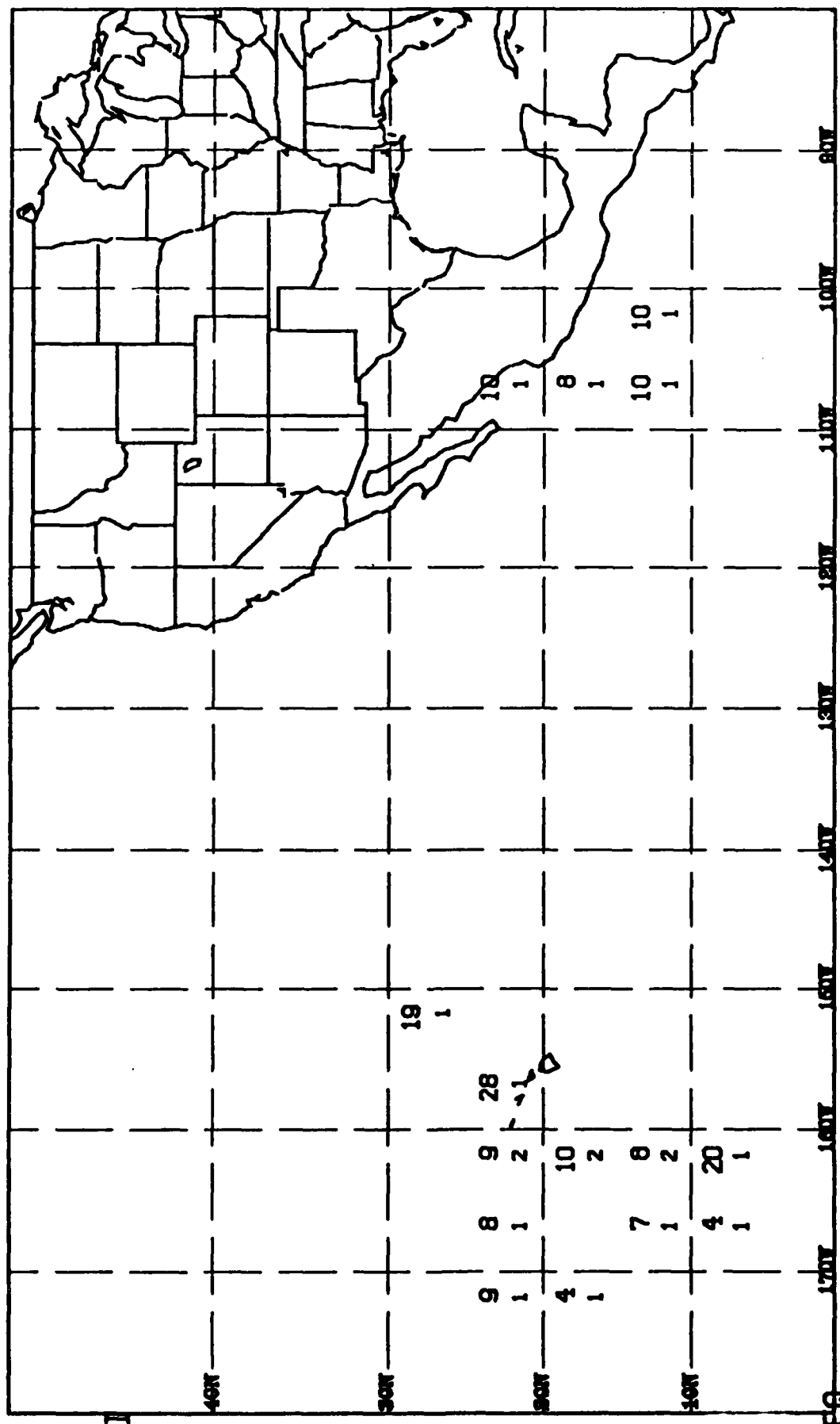
Actual path of all other tropical cyclones (> 33 kts).

CONSTANCY AND RELATIVE FREQUENCY FOR NOV 24 - DEC 8



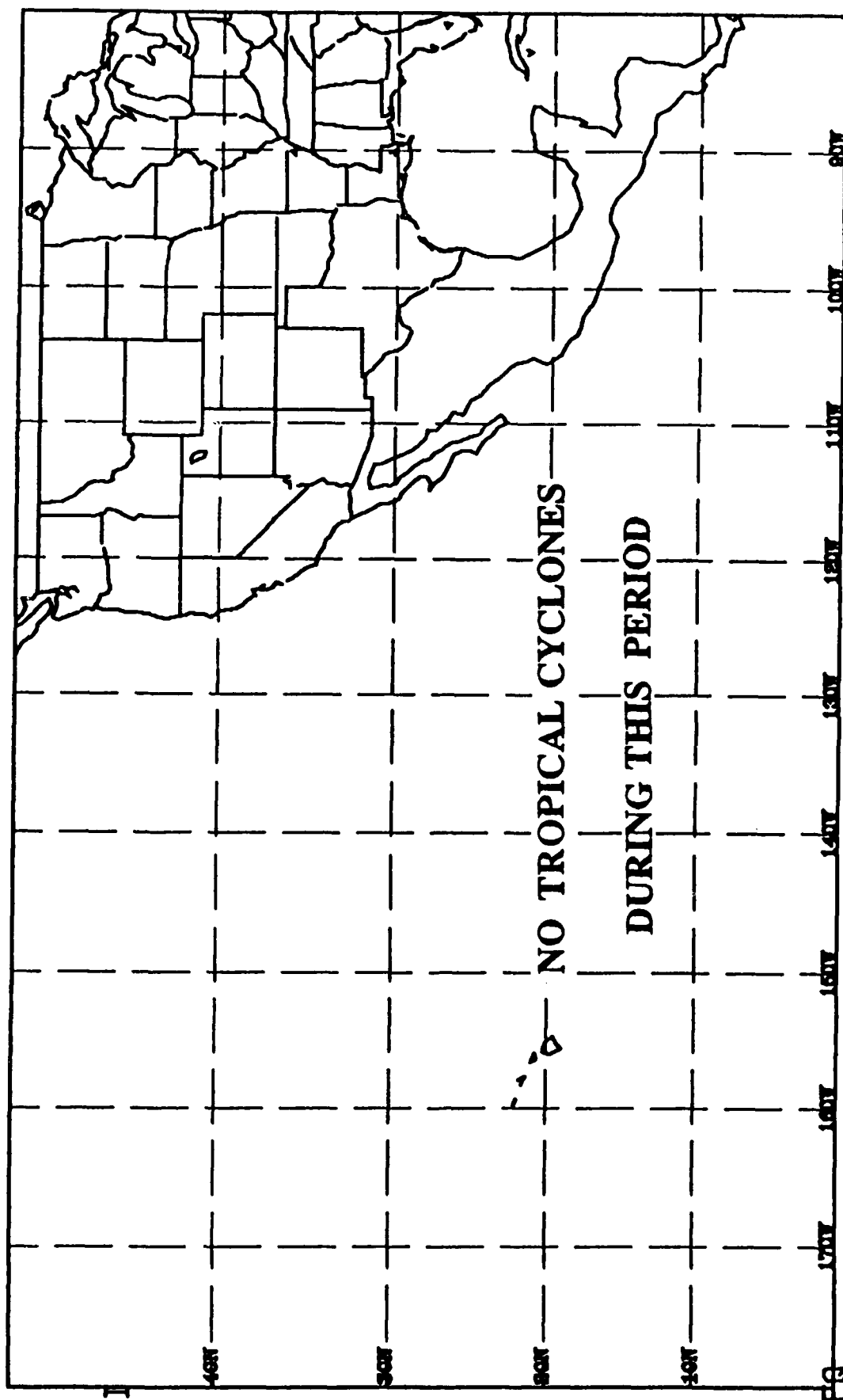
Tropical cyclone (> 33 kts) Constancy (top number) and Relative Frequency (bottom number). Constancy is defined as the 12-hr average vector speed divided by the 12-hr average scalar speed. Relative Frequency is the number of tropical cyclones passing through the 5° latitude by 5° longitude square per year per time period.

SPEED OF MOVEMENT FOR NOV 24 - DEC 8



Average tropical cyclone (> 33 kts) Speed (top number) in knots and sample size (bottom number) for each 5° latitude by 5° longitude square. Contours are drawn only to those squares containing at least 5% of the sample.

DEC 9 - DEC 23



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AFGWC/WF (2)
OFFUTT AFB, NE 68113-

DET 1, 1 WW (5)
BOX 17
FPO SAN FRANCISCO 96630-2926

7 WW/DO (2)
SCOTT AFB, IL 62225-5000

PACAF/DOW (2)
HICKAM AFB, HI 96853-5001

DET 15, 30 WS (2)
APO SAN FRANCISCO 96570-5000

4 WW/DO
PETERSON AFB, CO 80914-5000

DET 7, 20 WS
SCHOFIELD BKS, HI 96857-5000

DET 13, 20 WS
APO SAN FRANCISCO 96519-5000

CDRWESTCOM/APIN-WE
FT. SHAFTER, HI 96858-5200

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