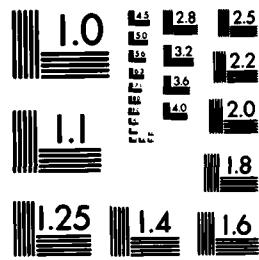


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U.S. NAVY CLIMATIC STUDY OF THE CARIBBEAN SEA AND GULF OF MEXICO VOLUME 2

EAST CARIBBEAN SEA

MARCH, 1986



A black and white map showing the outlines of the Caribbean Sea and the Gulf of Mexico. The landmasses of South America, Central America, and the West Indies are depicted with a stippled pattern. The map is centered on the eastern side of the Caribbean.

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NSTL, MS 39529-5000



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The U.S. Navy Climatic Study of the Caribbean Sea and Gulf of Mexico is made up of four volumes which were prepared under the Commander, Naval Oceanography Command and by the Officer in Charge, Naval Oceanography Command Detachment, Asheville, North Carolina. The work was performed at the National Climatic Data Center (NCDC). Specific acknowledgement of the NCDC staff is made to Mr. J. D. Elms, project leader; Messrs. C. N. Williams Jr., R. G. Baldwin and Ms. P. L. Franks for data processing and digital graphics; Mr. M. J. Changery and Dr. W. J. Koss for technical review; Messrs. M. G. Burgin, J. L. Thomas and Ms. C. L. Herman for their drafting skills.

Geographical and Data Coverage

The series of four volumes covers the Central American Waters from the Gulf Coast of North America to the northern coast of South America. The following figure shows the areas covered by each volume, and how they overlap to provide coverage for the entire region.

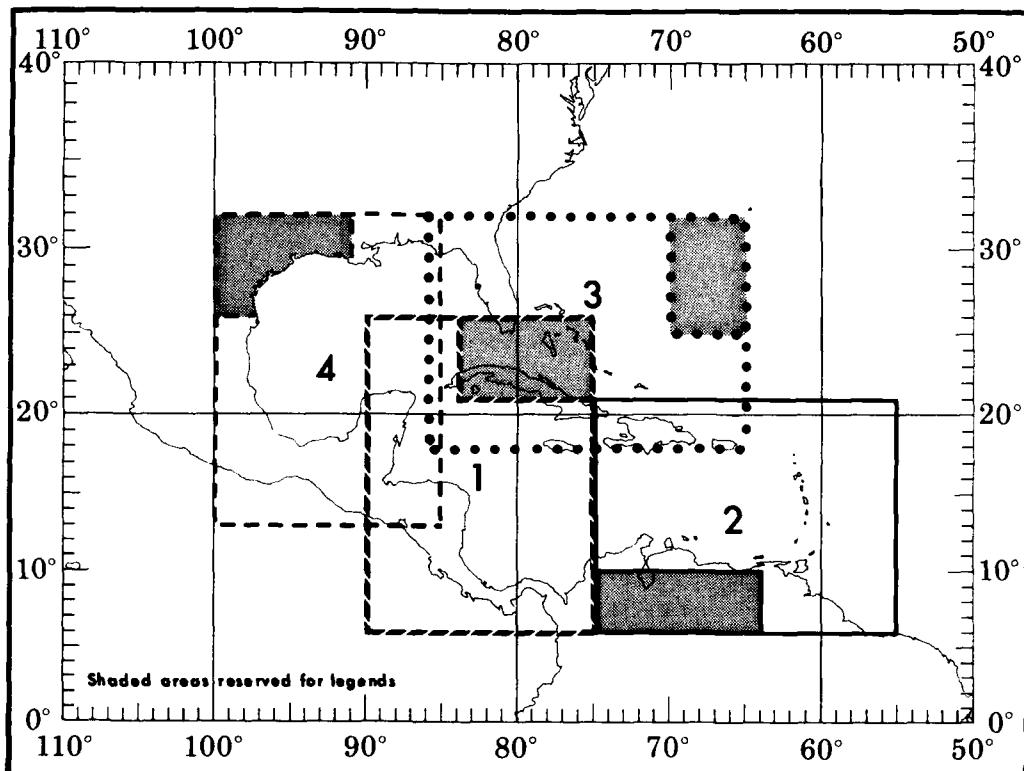


FIG. 1 AREA COVERAGE OF VOLUMES 1-4

This volume, "East Caribbean Sea," covers Region 2 as outlined on the above map (Fig. 1). It extends from the northern coast of South America to just north of Hispaniola and Puerto Rico, and from east of Jamaica to east of the Lesser Antilles (6°N to 21°N; 55°W to 75°W).

Greatest effort and detail were given to the charts and analyses of the marine areas. Surface marine statistics are presented on monthly charts in the form of graphs, tables, and isopleth maps. Land station data appear mostly as graphical presentations within the text. A significant problem in trying to define the climate over many of the areas of Central and South America is the lack of data. Political instability and changing economic conditions create periods when little observational data are collected, and in many cases where data does exist it is often fragmented and neither summarized nor published. For some regions only data collected by the European colonialists are available.



Availability Codes	
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A-1	

The marine data were machine plotted by one-degree quadrangle and then subjectively analyzed. Graphs and tables of marine-area data are also presented by one-degree quadrangle (e.g., visibility, wave heights, and wind roses). These graphs and tables represent the objective compilation of available data. Those data were not adjusted for suspected biases (low observation count, heavy weighting of observations taken during a short time interval, biases in coding of observations from various source decks, etc.), hence differences may be found when comparing the graphical data with the isopleth analyses. The total number of observations for a given one-degree square should always be considered when interpreting the data as there may not be a sufficient number to permit climatically representative statistics.

Nearly one million two hundred thousand surface marine observations were used in computing the statistics for this volume, and over six million for the total region (4 volume set). These data, taken from NCDC's Tape Data Family 11 (TDF-11), were collected by ships of various registry from as early as 1854 to 1983, with the bulk of the observations being collected in the last 30 years. This is significant because the more recent observations contain more elements than pre-1948 reports. Observation density is greatest along the major shipping routes. In this study area most ship traffic moves north-south passing through the Mona Passage (between Puerto Rico and Hispaniola) or the Windward Passage (between Hispaniola and Cuba) on its way to or from the Panama Canal.

Sea surface current information was extracted from the Naval Oceanographic Office Special Publications 1400-NA9 Surface Currents Southwest North Atlantic Ocean Including the Gulf of Mexico and Caribbean Sea.

Physical Features

Four major physical-geographic regions are found within the four-volume study area: the mountains (highlands) of Central America and northwest South America, the tropical savanna of eastern Mexico and Pacific Coast of Central America, the humid subtropical lowlands across the southern United States, and the tropical rainforest along the southeastern Atlantic Coast of Central America and on the windward (eastern) side of most of the West Indies Islands.

Low-lying coastal plains cover a rather wide expanse across the southern United States. Elevations remain below 600 feet for some 150 to 200 miles inland before reaching the foothills of the Appalachians in northern Alabama and Georgia, the Ouachita Mountains of Oklahoma and Arkansas, or the Edwards Plateau in Texas. A much narrower coastal plain extends down the east coast of Mexico and it is a relatively short distance inland before the rapidly rising escarpment of the Sierra Madre Oriental Mountains is encountered. Atop this range is a relatively flat plateau extending a major portion of the length of Mexico with mountain peaks reaching 18,000 feet across its southern end. Similar elevation changes and narrow coastal plain occur along the west coast of Mexico where the Sierra Madre Occidental mountain range borders the plateau (reference Topographic Chart, Fig. 2, and geographical locator chart Fig. 3). A rather abrupt break in the mountain range occurs at the southern end of the Bay of Campeche which provides a narrow passage between the Atlantic and Pacific (known as the Istmo de Tehuantepec). Similar breaks occur in southern Nicaragua and across Panama. From the Istmo de Tehuantepec a rather broad coastal plain extends across the Yucatan Peninsula and along the Atlantic Coast of Honduras and Nicaragua. Rugged mountains again rise along the west coast with heights reaching above 13,000 feet in Guatemala and 11,000 feet in Costa Rica.

Two chains of active volcanic ridges extend along major earthquake faults; one chain runs up the Lesser Antilles Island group and the second up the west side of Central America from Colombia to southern Mexico. Scattered throughout the West Indies are numerous islands with the majority falling along the major fault line, this creates the semblance of a stepping-stone pattern from Florida to Venezuela. The larger islands in the group (Cuba, Hispaniola, Jamaica, and Puerto Rico) form the Greater Antilles, and the smaller islands (Virgin Is., Windward Is., Leeward Is., and the islands in the southern Caribbean north of Venezuela) extending south from Puerto Rico to South America, the Lesser Antilles. The Bahama Islands, which lie to the southeast of Florida and north of Cuba, are the third and final major group making up the West Indies.

The highest elevations in the West Indies are found on Hispaniola where peaks reach above 10,000 feet. Peaks as high as 7,000 feet are located on Jamaica with elevations reaching 6,000 feet in southern Cuba. Four-thousand foot peaks occur on Puerto Rico and a few of the smaller islands. Much lower peaks are found on the remaining islands.

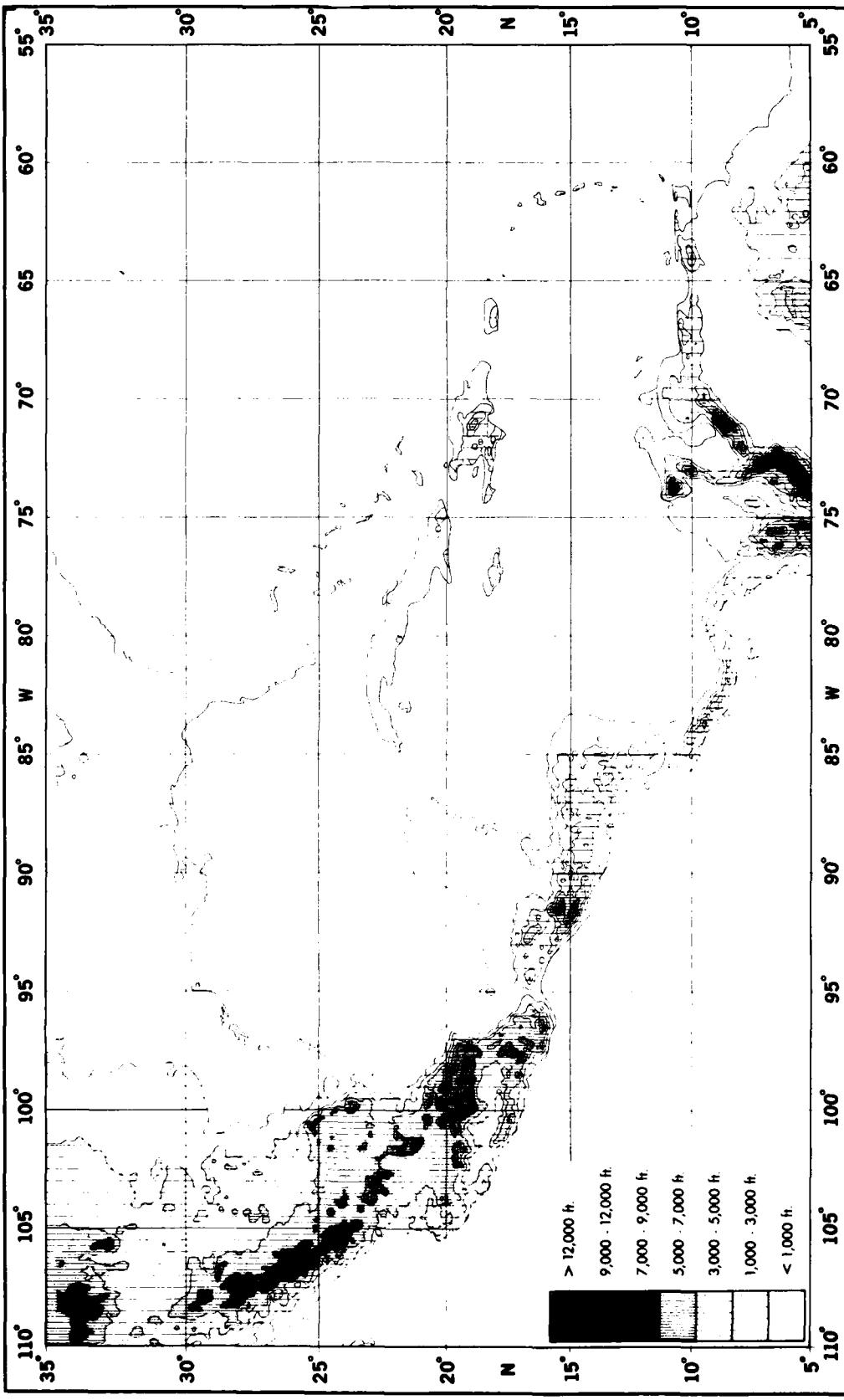


FIG. 2 TOPOGRAPHICAL CHART

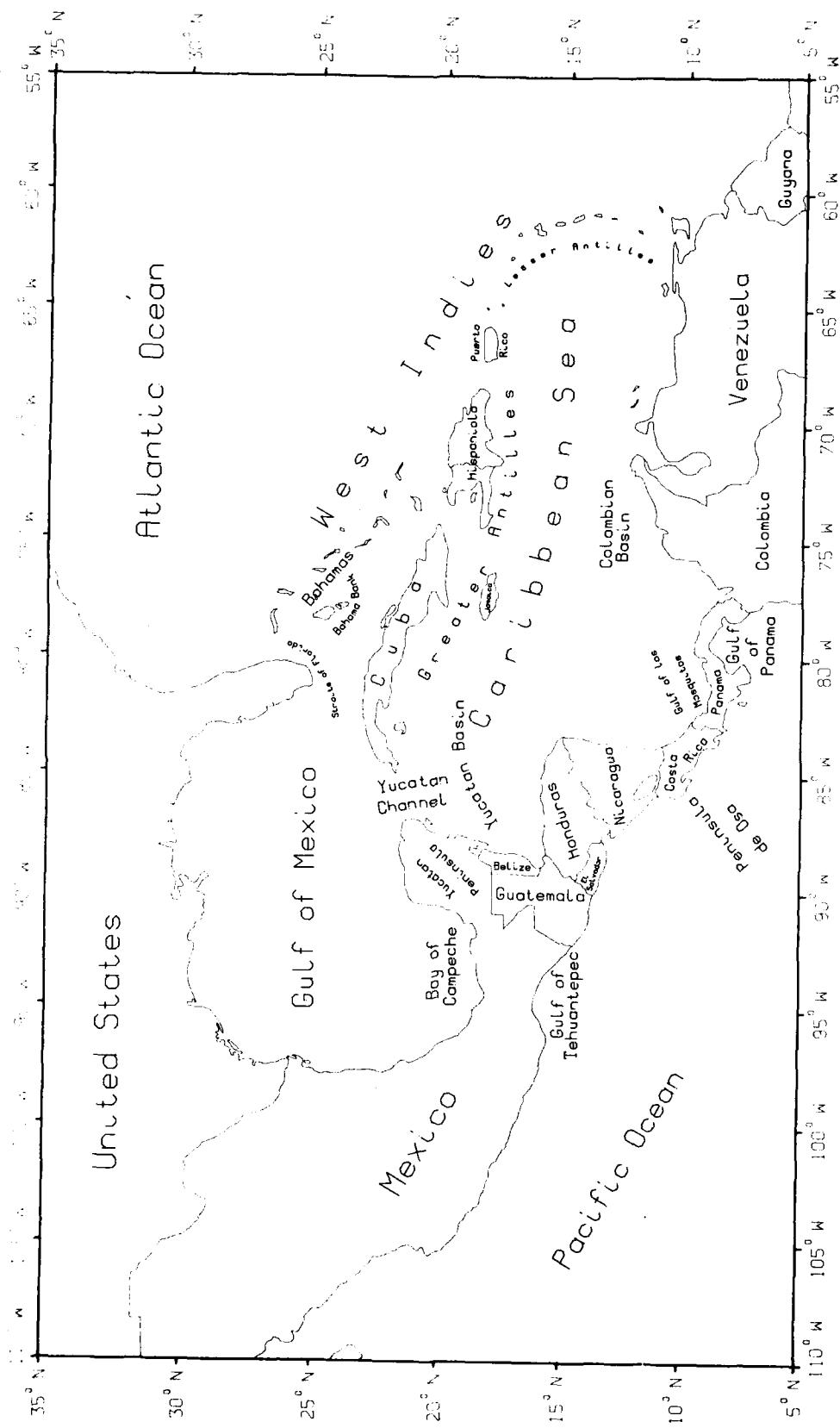


FIG. 3 GEOGRAPHICAL LOCATOR CHART

Figure 4 shows the bathymetry (water depths in fathoms) of the Central American Waters. A broad continental shelf lies along the west coast of Florida extending along the U.S. Gulf Coast narrowing somewhat near the Alabama-Florida state line but then broadening out again until reaching northern Mexico. A rather narrow continental shelf extends down along the east coast of Mexico before widening out significantly along the northwest coast of the Yucatan Peninsula. Another broad shelf area extends from northeast Honduras eastward towards Jamaica. Other broad continental shelf areas include the Bahama Bank, northeast coastal region of South America, and a few smaller areas along the west coast of Cuba. Along the Pacific Coast of Central America a narrow continental shelf runs the full length of the coast except for the Gulf of Panama.

Depths of over 12,000 feet are found in only a few regions of the Gulf of Mexico, but they are rather common in the Caribbean basin. Bathymetry surveys have shown depths of over 20,000 feet in the Cayman Trench south of the Cayman Islands, and over 25,000 feet, the deepest in the Central American Waters, in the Puerto Rico Trench which lies north of the island.

Climate

The northern portions of the Central American Waters lie in the subtropics while southern sections lie within the tropics. This generally means that the Caribbean Sea is under the influence of the easterly trade winds, and the northern part of the Gulf of Mexico the mid-latitude westerlies. Although most parts of the region will feel the effects of both tropical and subtropical conditions, an ill-defined zone exists between the two that is subject to both influences. During the winter, cold air occasionally pushes deep into the Gulf of Mexico with westerly winds often being observed as far south as the southern end of the Mexican Plateau. However, their appearance this far south is often related more to altitude than latitude. The structure of the trade winds is generally rather shallow with the easterlies normally giving way to the upper westerlies (antitradades) above 3,000 feet.

The general circulation over the area is controlled mostly by the North Atlantic subtropical high, which is commonly known as the Azores or Bermuda high, (Fig. 5). Flow along its southern edge produces the large scale northeastern flow known as the trades, the most globally consistent winds for directional constancy. Trade winds are at their weakest during the winter, the dry season, and their strongest during the summer, the wet season. The trades do not generally contain a deep moist layer because of an inversion that usually appears at 3,000 to 5,000 feet above mean sea level. Below this inversion it is quite moist whereas above the inversion it is relatively dry and cloudless. An almost mirror image of the trade wind inversion appears between the northern and southern hemispheres. Equatorward of 15° latitude the inversion rises both westward and equatorward to heights of over 6,000 feet, encircling the equatorial trough. Termination of the trade wind inversion usually takes place in the middle latitudes and variations in the inversion for given locations have proven significant between individual observations (Riehl, 1979). Within the equatorial trough zone and over western portions of the trades the inversion often disappears and it is not considered to be a mean condition. Broad scale subsidence of air within the subtropical high establishes the trade wind inversion. The greatest descent of air takes place across the high's southeastern quadrant which causes the inversion to be generally lower and stronger over the eastern portions of the ocean.

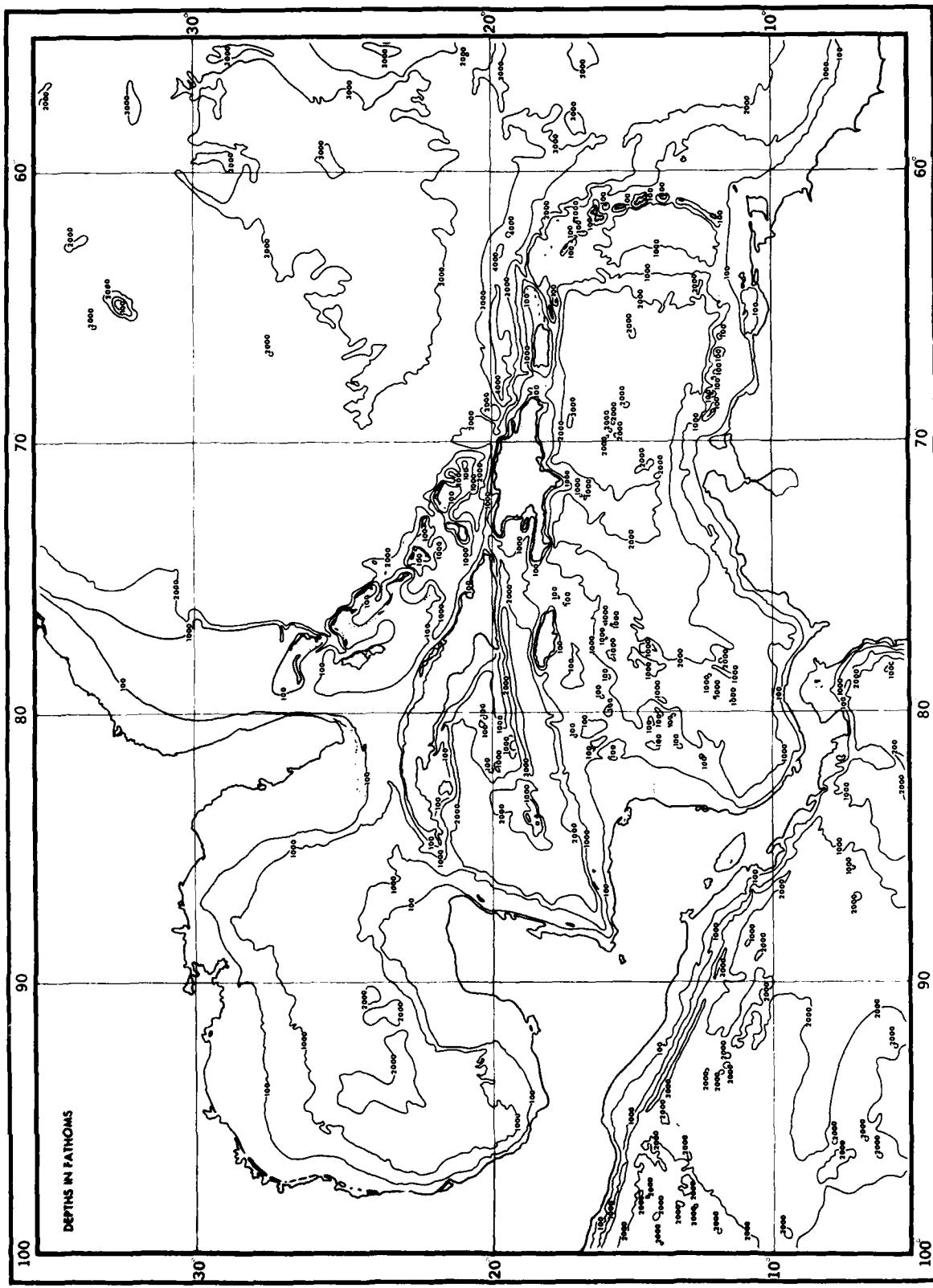


FIG. 4 BATHYMETRY CHART

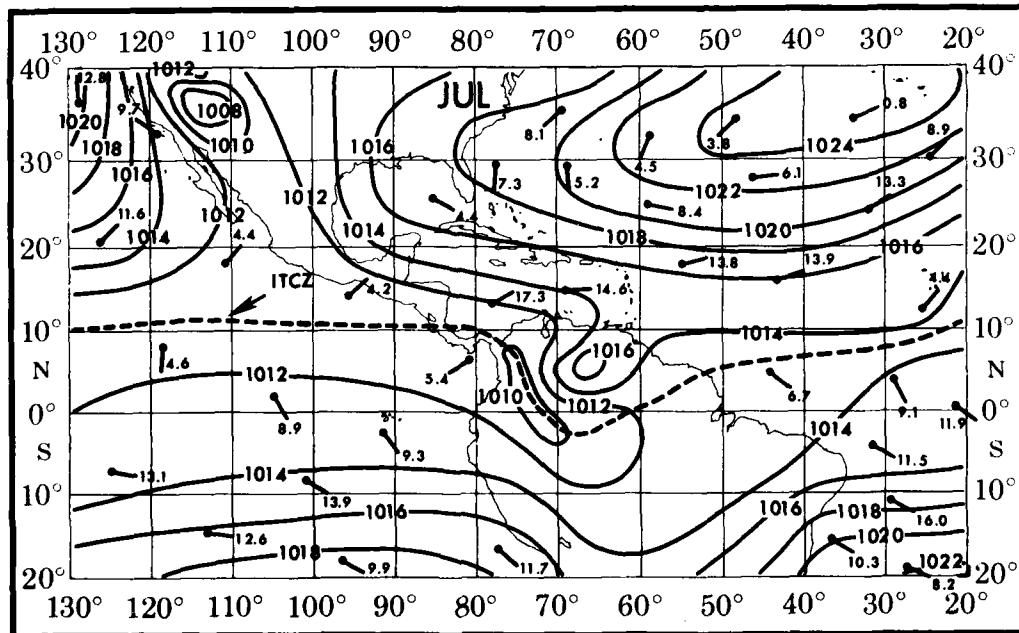
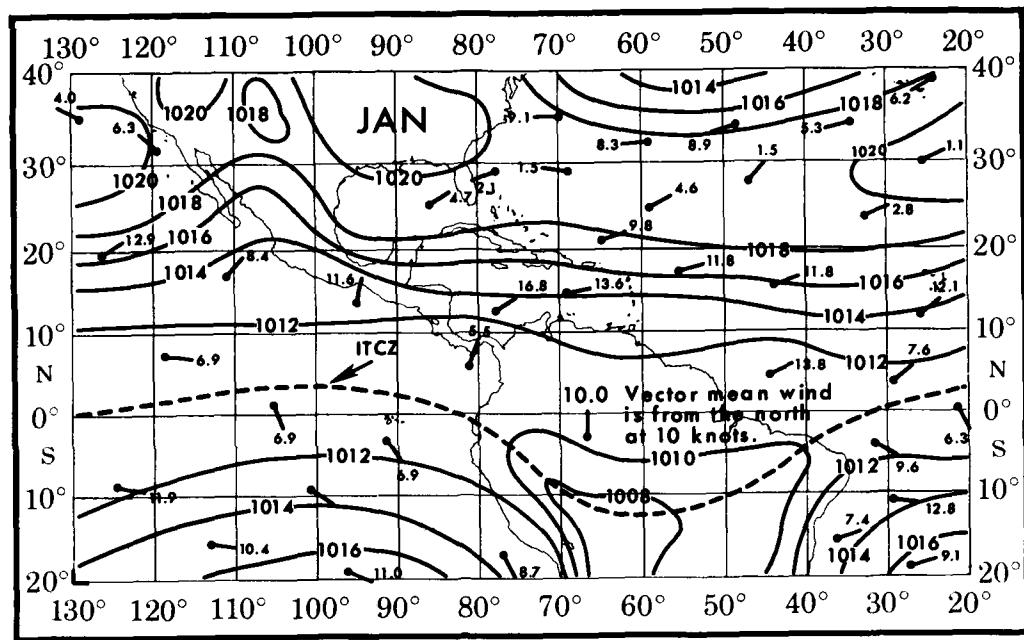


FIG. 5 MEAN EQUATORIAL TROUGH AND VECTOR MEAN WINDS

The Intertropical Convergence Zone (ITCZ), a belt of relatively low pressure lying between the subtropical highs of the northern and southern hemispheres, is another significant climatic feature. This belt is often referred to by many names such as the equatorial trough, trade wind trough, intertropical front, equatorial front, cyclonic directional shear zone, etc. It was originally described as the dividing line between the northeast and southeast trades. Continued research has shown this system to be complex, because it is not necessary for the equatorial trough, the wind convergence zone and maximum cloudiness to coincide. Godshall (1968) showed that a displacement exists between the maximum cloud cover areas and the convergence zone centers and that some of the displacements are quite large. Water vapor transferred from the sea to the atmosphere becomes trapped below the trade inversion and is thus transported to the ITCZ by the trade winds themselves (Augstein, 1976). A good schematic of this process, adapted from Augstein (1976), is shown in Figure 6.

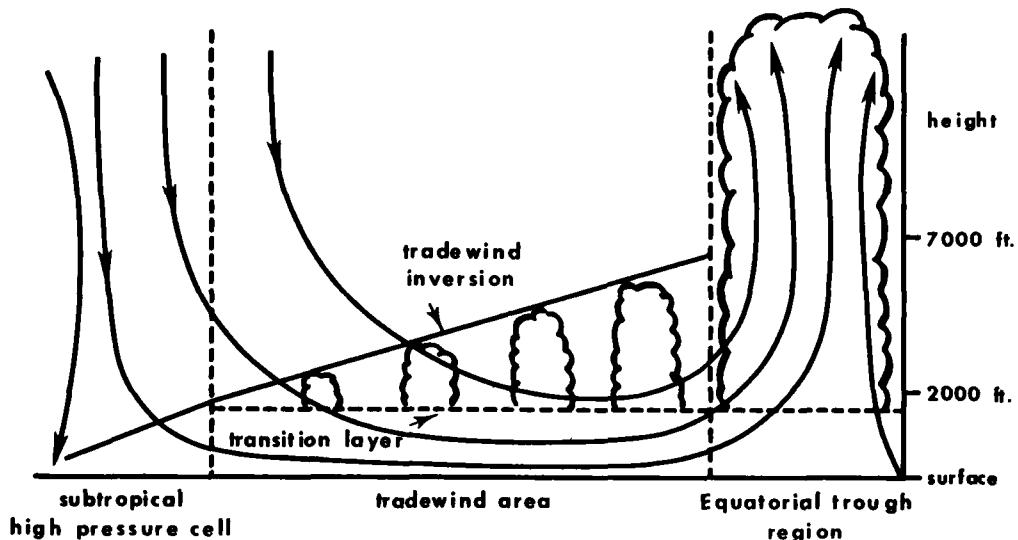


FIG. 6 EQUATORIAL TROUGH/TRADE WIND SCHEMATIC

Movement of the ITCZ, northward and southward, is in harmony with the sun's movement and the resultant strengthening and weakening of the subtropical highs. Studies have shown that the global seasonal progression has its smallest annual displacement between approximately 40°W and 160°W (Riehl, 1979; Balek, 1983) which results in the equatorial trough barely pushing into the Caribbean region even during its most northern extent. During the wet season the equatorial trough tends to lie northwest-southeast across southern Central America (see Fig. 5) affecting the eastern Pacific most significantly.

Continuous change is associated with the ITCZ, from periods with locally heavy downpours to those with clear skies. Large displacements of the zone itself are often observed. Typically there are regions experiencing heavy convective activity while others in close proximity are experiencing no significant weather. An example of such conditions within the ITCZ is seen in Figure 7 (NASA, 1977) where a continuous band of clouds appears over the eastern Pacific while some relatively clear areas appear over the Atlantic.

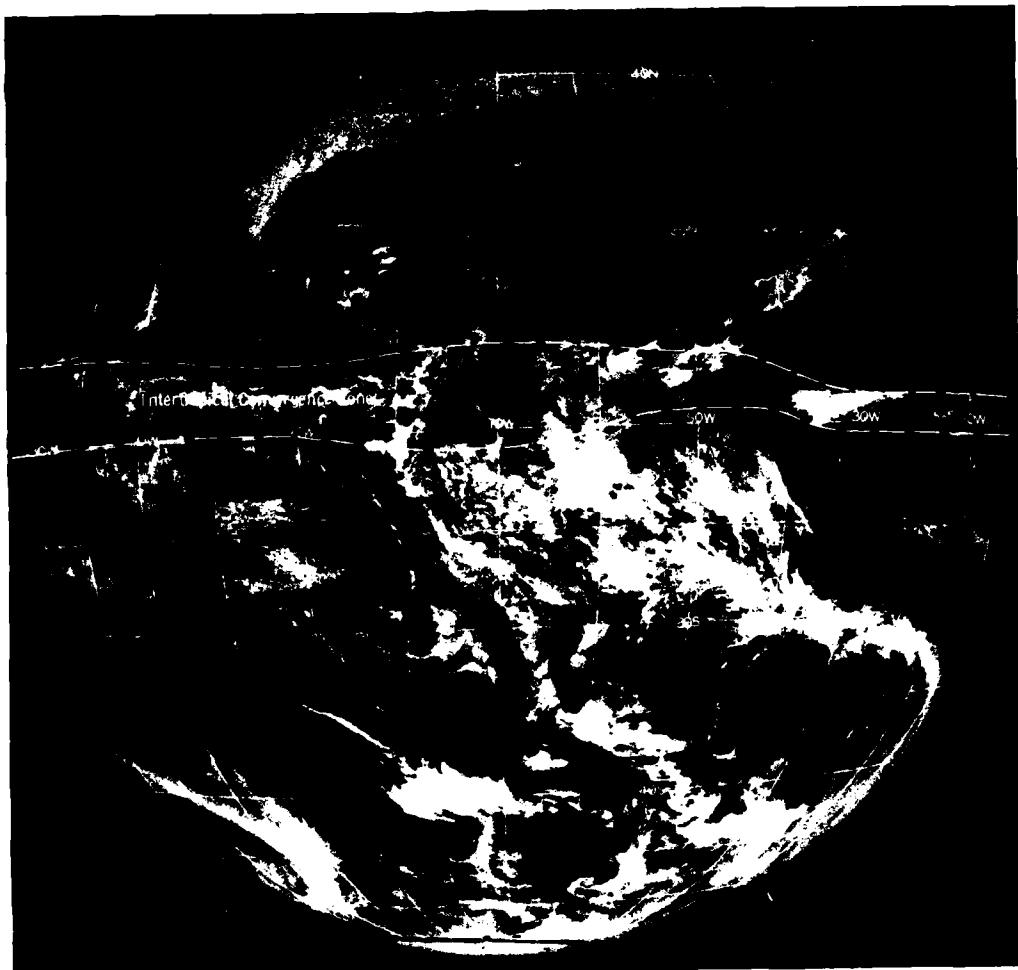


FIG.7 SATELLITE SYNOPTIC IMAGE (JANUARY 3, 1974, 12:20 GMT)

Two distinct precipitation seasons are typical for most regions of the Central American Waters. An exception is along the Gulf Coast of the United States where four distinct seasons associated with the middle latitudes prevail. Intermonthly precipitation averages differ little throughout the Gulf Coast region. A small maximum is noted in July and a minimum in October. For the large remaining portion of the study area, basically only wet and dry seasons are discernible. The wet season normally runs from May through November with the dry season covering the remaining months. Since the sun's position changes little in the tropics the temperature cycle is typically stable with little annual variation. Since expected temperatures are of little concern, the important question is whether the rains will come as expected, for they spell success or failure of the crops. Normal rainfall depends on the major circulation patterns coming into play as the North Atlantic subtropical high builds during the summer season. With its development, easterly winds become stronger aloft transporting increased moisture necessary for the seasonal rains. Orographic effects play an increasingly important role along with convergence and surface heating, as any one of these can trigger the instability necessary for producing rain showers and thunderstorms. As the North Atlantic subtropical high weakens during the winter (see Fig. 5) the westerlies again dominate the flow aloft, cut off the moist easterly flow, and thus bring on the dry season.

Occasionally outbreaks of cold continental air from North America will push into the Gulf of Mexico and Caribbean during the height of the dry season (December through March) bringing precipitation mainly to the coastlines and windward slopes. These cool surges of air are referred to as "northerns" and generally bring stronger-than-normal winds and below-normal temperatures as far south as Panama and the southern Caribbean. Northerns are modified rather quickly by the tropical environment, thus they affect an area for only one to two days.

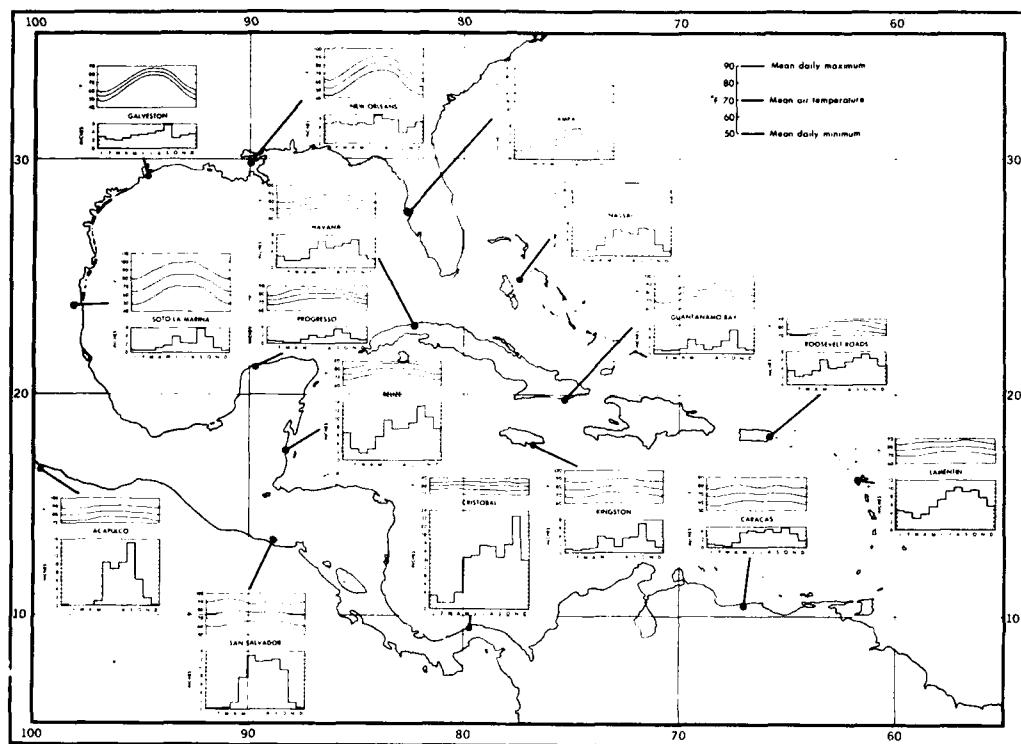


FIG. 8 MONTHLY MEANS OF AIR TEMPERATURE AND RAINFALL

Latitude and maritime influences minimize temperature variations and keep the annual temperature range relatively small. This can be seen in Figure 8 where monthly means of air temperature and rainfall for selected stations are presented. Mean annual temperature ranges are greatest at the higher latitudes, averaging 25°F-30°F along the Gulf Coast of the U.S. and 10°F or less for most regions south of 20°N. Exceptions south of 20°N are found at some of the higher peaks and across most of Mexico north of 16°N and west of 92°W, except for along the Pacific Coast. Diurnal temperature ranges within the tropics are much greater than the monthly mean temperature differences between the warmest and coldest months. Cloudiness is an important factor because it restricts the afternoon maximum temperatures during the rainy season, whereas, the lack of cloud cover during the dry season permits more nighttime cooling resulting in lower minimum temperatures. Northern Mexico and the southern coastal plains of the U.S. experience wintertime mean temperatures of 55°F to 60°F with average summer temperatures increasing to 80°F to 85°F. These summer values are similar in magnitude to those reported in the lower latitudes where seasonal variations are small. The mean freezing level over the Caribbean remains fairly constant throughout the year at 15,000 to 16,000 feet. While freezing level heights remain at these levels over the southern U.S. during the summer, they drop to near 12,000 feet during the winter. Annual variations in the mean tropopause height are also small; the tropopause is usually at from 45,000 to 50,000 feet, across the entire study area.

Tropical cyclones are the most feared and devastating weather phenomena of the region. Annual frequencies of these storms vary widely among years. For the period 1871 through 1984, for which there are reasonably good records in the North Atlantic, the least activity occurred in 1890 and 1914 when only one tropical storm was reported. The most active years were 1933, when 21 tropical cyclones reached tropical storm strength (34 knots or greater), and 1969 when 12 reached hurricane strength (64 knots or greater). In the North Atlantic Basin, the main tropical cyclone season runs from August through October with significant occurrences in June, July, and November. April is the only month in which no tropical cyclone has ever been reported within the North Atlantic basin.

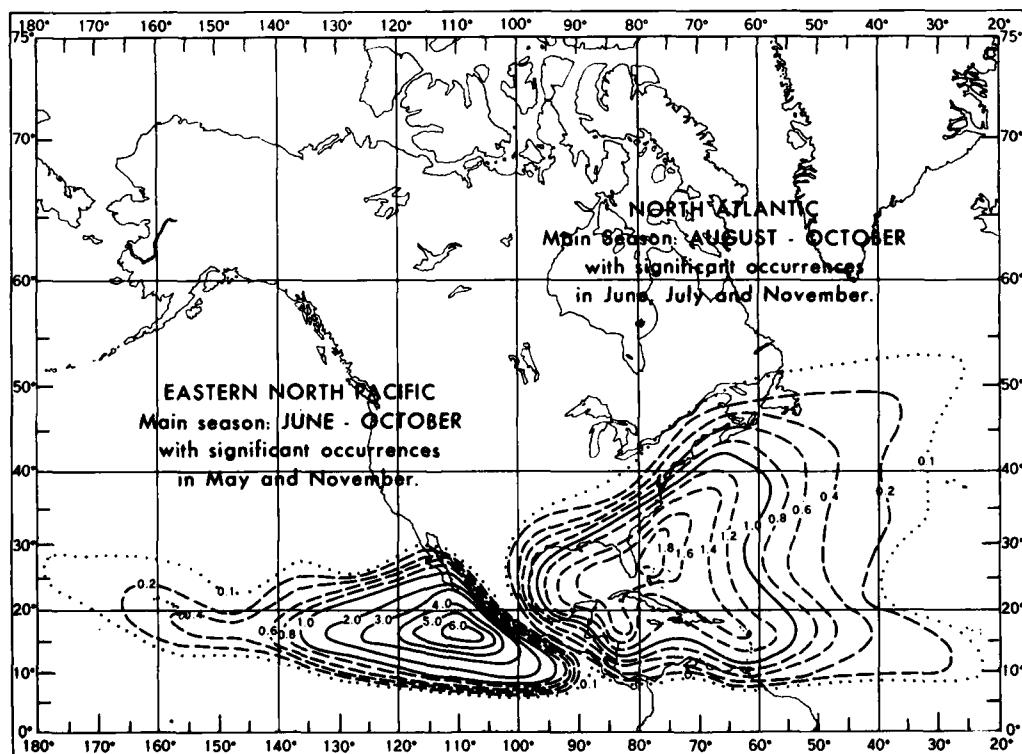


FIG. 9 AVERAGE NUMBER OF TROPICAL CYCLONES PER 5° SQUARE PER YEAR

Highest annual occurrences of tropical cyclones by five-degree square are found in the eastern North Pacific where the main season is from June through October with significant occurrences in May and November. Fortunately most of these storms track west-to-northwestward out to sea with few affecting Central America. The average number of tropical cyclones per five-degree square per year is given in Figure 9 and the annual 12-hourly movements by five-degree square of tropical cyclone centers with tropical storm intensity or greater are shown in Figure 10. Both figures were adapted from Crutcher and Quayle (1974), a major work produced for the U.S. Navy which presents frequencies and preferred tracks for worldwide tropical cyclones.

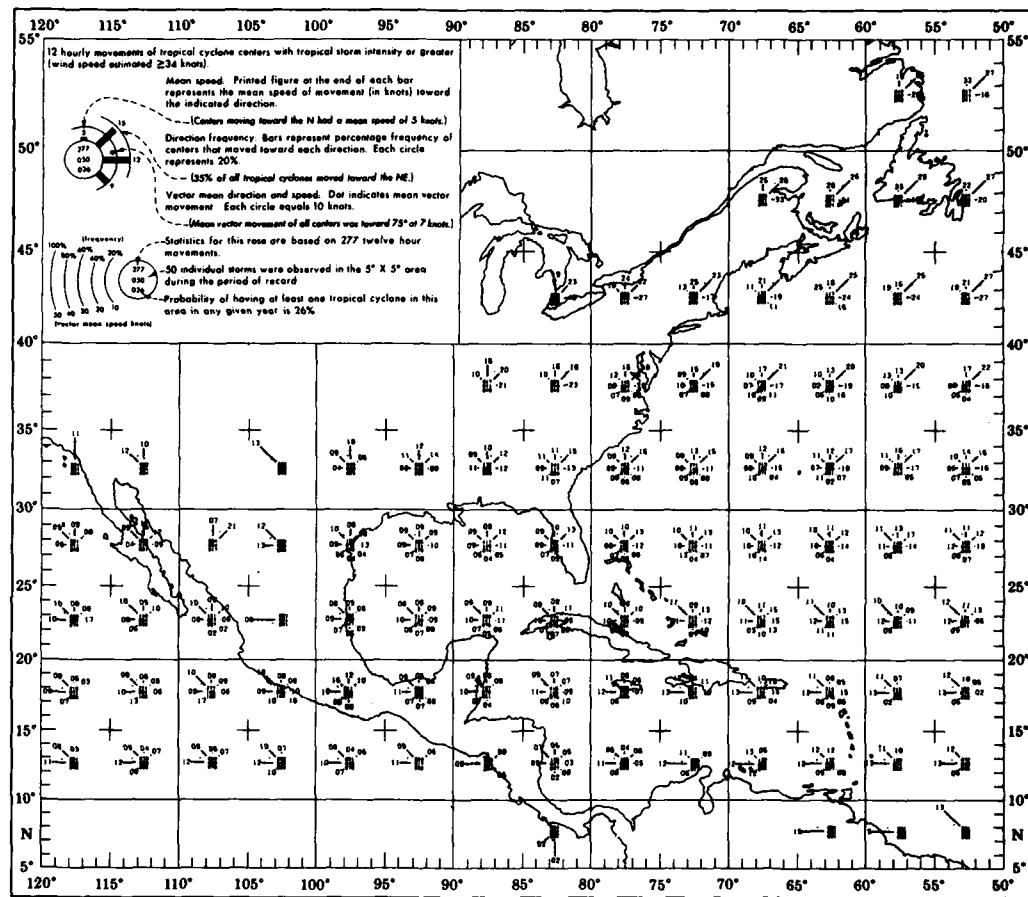


FIG. 10 ANNUAL 12 HOURLY MOVEMENTS OF TROPICAL CYCLONE CENTERS WITH TROPICAL STORM INTENSITY OR GREATER

Marine Climatological Elements

Precipitation

Of the elements recorded in the marine data base, precipitation is the one most subject to error in both the way it is observed and the way it is interpreted. In many areas of the world, especially in more recent years, ships try to avoid foul weather and thus bias the data towards fair weather.

Because of the limited occurrence of precipitation throughout Region 2, basic seasonal patterns are difficult to establish. Present weather observations from ships reporting precipitation remain low, averaging two to eight percent through the year. The lowest frequencies are generally observed between the northern coast of South America and Hispaniola with slightly higher occurrences generally being found east of the Lesser Antilles and northeast South America. The driest period appears from February through May with frequencies generally averaging less than five percent. During June frequencies increase above 10 percent southeast of the Lesser Antilles reaching the yearly maximum, but then quickly dropping to an average of 5 to 8 percent from July through December. For most of the year only two to three percent of the present weather observations taken between South America and Hispaniola report precipitation, however, a slight increase of one to two percent is detected from November through January.

Assessing oceanic rainfall data is a major problem because transit ships are unable to take quantitative precipitation measurements. A number of studies have been conducted in efforts to predict precipitation amounts or rates of fall based on estimates derived from the use of present weather observations from ships of opportunity (Goroch, et al., 1984) and readings from satellites (Rao, et al., 1976).

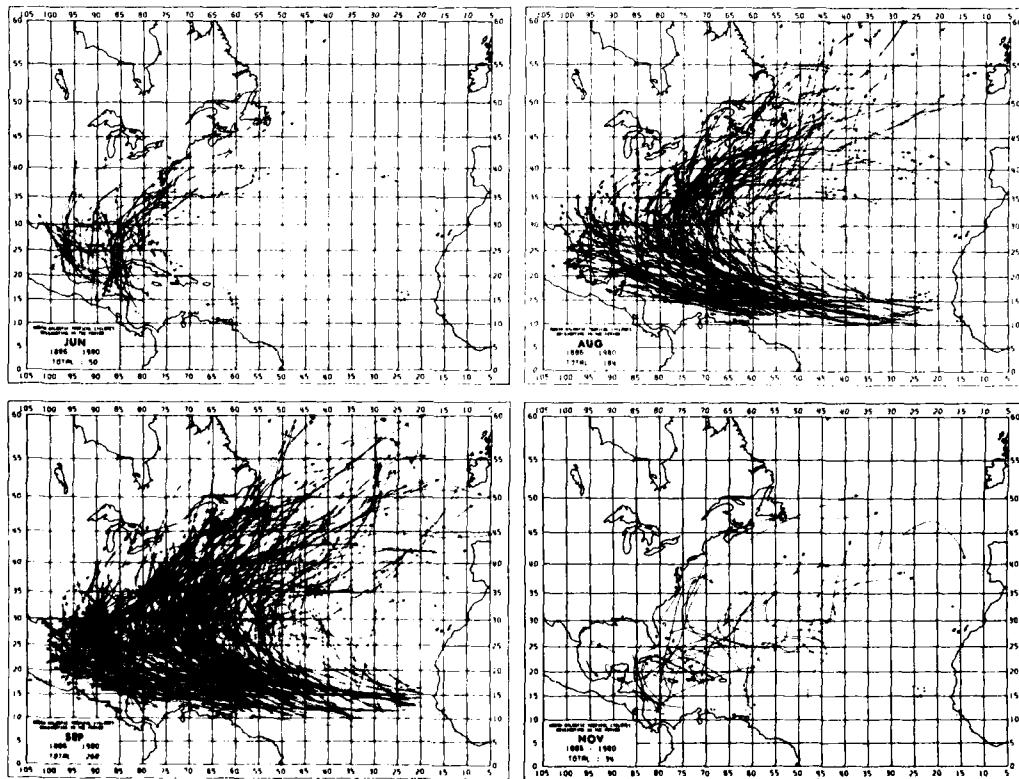


FIG. 11 TROPICAL CYCLONE TRACKS (JUN, AUG, SEP, AND NOV)

Tropical Cyclones

Typically, most tropical cyclone development during the early part of the hurricane season (May and June) occurs in the western Atlantic (Caribbean Sea and Gulf of Mexico). Later in the season (July through September) more development occurs in the central and eastern sections, and the seasonal finale (October and November) distribution is more evenly divided between the eastern and western halves of the tropical Atlantic. To illustrate how storm development shifts with the season, tropical cyclone tracks for storms originating in June, August, September, and November (1886-1980) are presented in Figure 11.

By referring back to Figure 10, inference can be made on preferred tracks for the region along with the annual probabilities of encountering a storm. From Figure 9 one can see that for Region 2, the chances of encountering a tropical storm increase most with increased latitude.

Air Temperature

Air temperature is one of the most frequently observed elements by mariners. On many ships the heating effect of the ship's structure has a tendency to produce higher than actual ambient air temperature readings because of instrument exposure. This is especially true in the tropics where sunny, calm days are numerous. For this study area the problem is somewhat tempered by the strong trade winds.

For each month the mean air temperature distribution over Region 2 is nearly isothermal with the mean temperatures rarely varying by more than two to three degrees Fahrenheit across the entire region. The isotherm pattern is rather zonal during the cooler month (December though May) with mean temperatures ranging from 77°F to 81°F, and the pattern becomes more meridional during the warmer months (June through November) with mean temperatures ranging from 81°F to 83°F.

Sea Surface-Temperature

Sea-surface temperatures are recorded with a fairly high frequency in marine observations. The principle methods for sampling are intake thermometers and buckets. Even though the two methods can produce slightly different results, the data can be used with considerable confidence.

Seasonal variations in mean sea-surface temperatures are small throughout Region 2 as monthly means range from just under 77°F to just over 84°F for the 12 months. From January through March mean sea-surface temperatures are at their coldest ranging from just under 77°F to just over 81°F while during the warmer months (June through October) mean sea-surface temperatures range from just under 80°F to just over 84°F. Isotherm patterns generally show warmer mean sea-surface temperatures over the Venezuelan Basin with cooler values off the coast of South America and to the north and east of Puerto Rico.

Surface Winds

Surface wind is one of the most commonly observed elements. Many of the observations from the NCDC data base are visual observations based on the roughness of the sea. In recent years more ships acquired anemometers and reported measured winds. Prior to 1963 many of the wind speeds were recorded in the Beaufort scale; such estimates have proven to be quite reliable and can be used with a high degree of confidence. Five sets of wind speed isopleths are presented: mean speed, the percent frequency of winds less than 11 knots, 11 to 21 knots, 22 to 33 knots, and greater than or equal to 34 knots. Also included are 'wind roses, by one-degree square.

Throughout the year the northeasterly trades maintain good strength and constancy across the Caribbean Sea (reference Fig. 5). Mean wind speeds average near 20 knots in the vicinity of the Colombian Basin (western portion of Region 2) from December through July with the exception of May. They weaken significantly from September through November with mean speeds dropping below 14 knots over the Colombian Basin during October. Over the central and eastern sections of Region 2 mean wind speeds generally average 4 to 7 knots less than these maximum mean speeds observed over the Colombian Basin. Slightly lower speeds are observed along the northeastern South American coast.

Gale force winds (>34 knots) reach a maximum of five percent during January over the Colombian Basin just west of Region 2 and except for this narrow section along the western edge of Region 2 all other areas report averages of less than one percent. Gale frequencies decrease along this western edge until all sections report frequencies of less than one percent during September and October. This drop during the peak of the hurricane season results from the contributions from tropical cyclones not being sufficient to offset the corresponding drop in the strength of the surface trades. During November, a small area is again established along the western edge of Region 2 where gale frequencies exceed one percent.

Mean monthly frequency patterns for wind speeds less than 11 knots change little throughout Region 2 during the yearly cycle. During winter, the frequencies are less than 10 percent over the Colombian Basin and less than 30 to 40 percent over the Venezuelan Basin. Frequencies as high as 50 to 70 percent are found along the sheltered coasts of South America, and the islands of Hispaniola and Puerto Rico. Summer generally brings an increase of approximately 10 percent in reported wind speeds of 10 knots or less across all sections of Region 2.

The changing of wind speed threshold values does not alter the wind speed patterns because stronger winds still appear over the open ocean (Colombian and Venezuelan Basins) and the weakest ones near sheltered shores. Monthly mean wind speeds of 11 to 21 knots are reported over the open waters of Region 2 nearly 70 percent of the time during June and July, 50 percent for September through November and 60 percent for all remaining months. Near shore frequencies range from 20 to 50 percent for the year with slightly higher occurrences appearing from January through April.

Speeds of 22 to 33 knots are observed less frequently during October than any other month with frequencies averaging less than 10 percent throughout Region 2. Observed frequencies peak in the two periods January to February and June to July with frequencies averaging over 40 percent over the Colombian Basin and over 10 percent east of the Lesser Antilles. Frequencies are less than this in the remaining areas of Region 2.

Visibility

Visibilities are difficult to measure at sea because of the lack of distance reference points. Climatically, many low visibility observations are probably missed because the observer is too busy with other duties (fair weather bias). However, the coarseness of the visibility code intervals tends to minimize the problem thereby permitting the summarized data to be relatively consistent.

Visibility tables, as in previous volumes, are presented by one-degree quadrangle. One trend is noted in that visibilities are generally good throughout Region 2 averaging five miles or better at least 90 percent of the time regardless of the month. Also, no seasonal or monthly shifts between threshold categories are detectable for Region 2, although some slight seasonal shift between the top two categories for Region 1 was apparent. Those subtle shifts in Region 1 took place between the wet and dry seasons which are much better defined than those for Region 2.

Clouds

A survey of the cloud data (total and low cloud amounts) from the marine data base shows a number of total clouds reports significantly greater than low cloud amounts. This is because many of the early marine observations contain only total cloud amounts. For the two presentations (total cloud amount $\leq 2/8$ and low cloud amounts $> 5/8$) only those observations reporting both total and low cloud amounts were summarized. This helps eliminate problems introduced as a result of different size data bases (N-count). The use of satellite data helps bolster confidence in the total cloud analyses because they show fairly close agreement with those analyses (U. S. Department of Commerce and United States Air Force, 1971).

Consistency best describes the mean cloud pattern over Region 2. For example, the percent frequency of low clouds greater than or equal to five oktas generally averages slightly below 20 percent over the Venezuelan Basin, and slightly above 20 percent over the Colombian Basin and across the region east to southeast of the Lesser Antilles. April through June brings a slight increase in low cloud amounts as frequencies increase by 10 percent across the southwest and southeast sections of Region 2. Total cloud amounts of less than or equal to two oktas average near 40 percent from January through March, and nearer 30 percent for the remaining months across most of Region 2, especially the open ocean areas. Near-coastal areas may vary from 10 to 20 percent higher from the general percentages just listed. Except for an occasional tropical cyclone or easterly wave, persistence would be favored when forecasting cloud amounts.

Ceiling and Visibility

Aircraft-type ceilings are not available from marine observations. The ceilings are estimated from the height of the lowest cloud when low clouds cover more than half the sky. When the sky is totally obscured by rain, fog, dust, or other phenomena, the total obscuration is considered a ceiling with a height of zero. Mid-range ceiling and visibility charts (ceiling less than 1,000 feet and/or visibility less than 5 nautical miles; ceiling less than 8,000 feet and/or visibility less than 10 nautical miles) and low range ceiling and visibility charts (ceilings less than 300 feet and/or visibility less than 1 nautical mile; ceiling less than 600 feet and/or visibility less than 2 nautical miles) are presented.

Ceilings less than 8,000 feet and/or visibilities less than 10 nautical miles average near 20 percent for all months except May through July when they increase to near 30 percent. Frequencies across a small area near Puerto Rico, however, average 10 to 20 percent higher than the surrounding area, averaging 30 to 40 percent throughout the year.

The next lower threshold category (less than 1,000 feet and/or 5 nautical miles), averages near 5 percent across most of Region 2 for all months. Frequencies, however, do increase to over 10 percent in the southwest corner from April through July and October through December. Occurrences of 10 percent also appear briefly in the extreme southwest corner of Region 2 during May.

Conditions rarely deteriorate into the lowest threshold category (less than 300 feet and/or 1 nautical mile) as indicated by only one area in June observing frequencies even as high as one percent. For ceilings less than 600 feet and/or visibilities less than two nautical miles monthly frequencies run slightly higher at one to three percent.

Wave Heights

Wave heights have been recorded in a consistent quantitative code since only the late 1940's. The reluctance of many observers to take wave observations in the earlier years and the difficulty in estimating waves, especially in confused seas, make wave observations one of the least commonly observed elements. They are also subject to biases. Generally the heights are too low, the periods too short, and the sea-swell discrimination poor (Quayle, 1980). The data in this study have not been adjusted for the suspected biases but they were processed through a quality control procedure where an internal check was made between wind speed and sea height. The data were also matrix-arrayed and apparent erroneous outliers were deleted in both the sea and swell data. Wave-height presentations include isopleth maps showing percent frequencies of wave-heights \geq 3 feet and \geq 8 feet. In addition, wave-height tables by one-degree quadrangle show frequencies by six wave-height categories. In these presentations, the higher of the sea or swell was selected for summarization. If heights were equal, the wave with the longer period was selected.

Wave-heights of three feet or higher are observed 80 to 90 percent of the time each month across the Colombian Basin and open waters east of the Lesser Antilles. The open ocean between these two regions has wave-heights of this magnitude generally around 10 percent less of the time. Frequencies along the near shore regions of the islands and South America can be as much as 30 to 40 percent less depending on how sheltered the regions are from the prevailing waves.

Ocean Currents

The ocean current charts are compiled principally from ship drift reports that were forwarded by the various merchant marines to the Naval Oceanographic Office. From these drift observations, the set (direction) and drift (speed) of the prevailing currents are calculated for each one-degree square. The density of observations is greatest along the major shipping routes and the reliability of the current charts is best in these areas. The data are considered most useful when used collectively as such in summaries where a large number of observations are available.

Surface current charts displayed for Region 2 are Winter (Jan., Feb., Mar.), Spring (Apr., May, Jun.), Summer (Jul., Aug., Sep.) and Autumn (Oct., Nov., Dec.).

Summary

Large variations in the weather are not experienced at scales that exist in the higher latitudes except during the passage of seasonal tropical cyclones and depressions. In general, weather conditions are pleasant with small diurnal temperature ranges and small intermonthly temperature variations. This is especially true for the marine areas. Land site weather can vary much more depending on elevation, local effects, cloud cover, land and sea breeze, and the effects of ocean currents and sea temperatures. In addition to the persistently warm temperatures, high humidities prevail especially over lowlands and ocean areas.

At lower elevations daily temperatures generally range from nighttime lows in the 60°F's to 70°F's to daytime highs of 80°F's and 90°F's. Temperatures at elevations above 10,000 feet will average 10°F to 20°F lower. Below 3,000 feet, extreme temperatures rarely drop below 40°F although they occasionally rise above 100°F.

Hurricanes are certainly the most destructive natural force in the region, and their associated storm surges prove to be the most damaging phenomenon to low-lying coastal areas because they often rise 10 to 15 feet above normal tide level. Flooding and mudslides also prove dangerous with both usually resulting from a passing hurricane.

Although migratory low pressure systems, such as easterly waves and tropical cyclones, strongly influence the weather from time to time, it is the constancy of the trade winds and high sun angle that establishes the regional climate.

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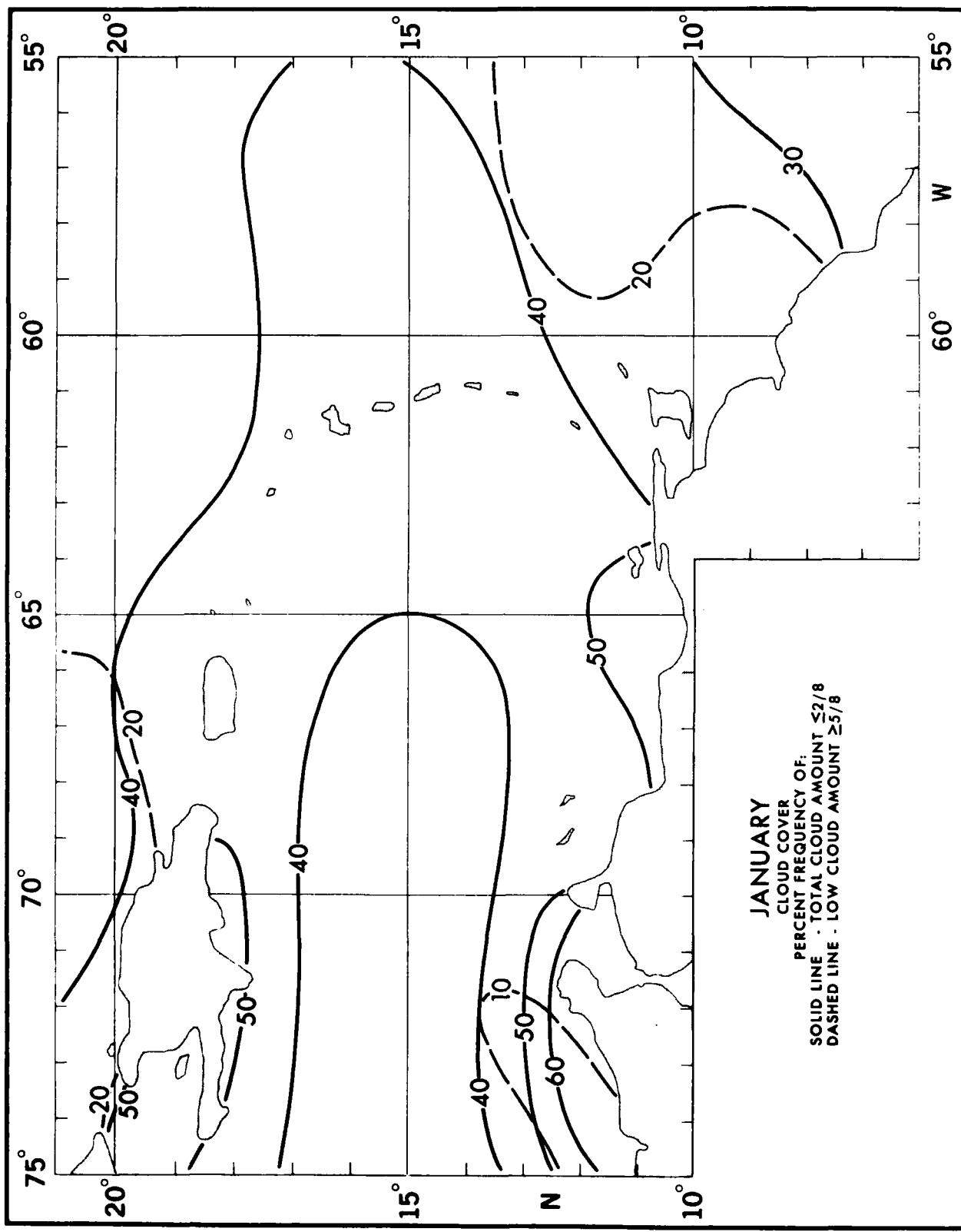
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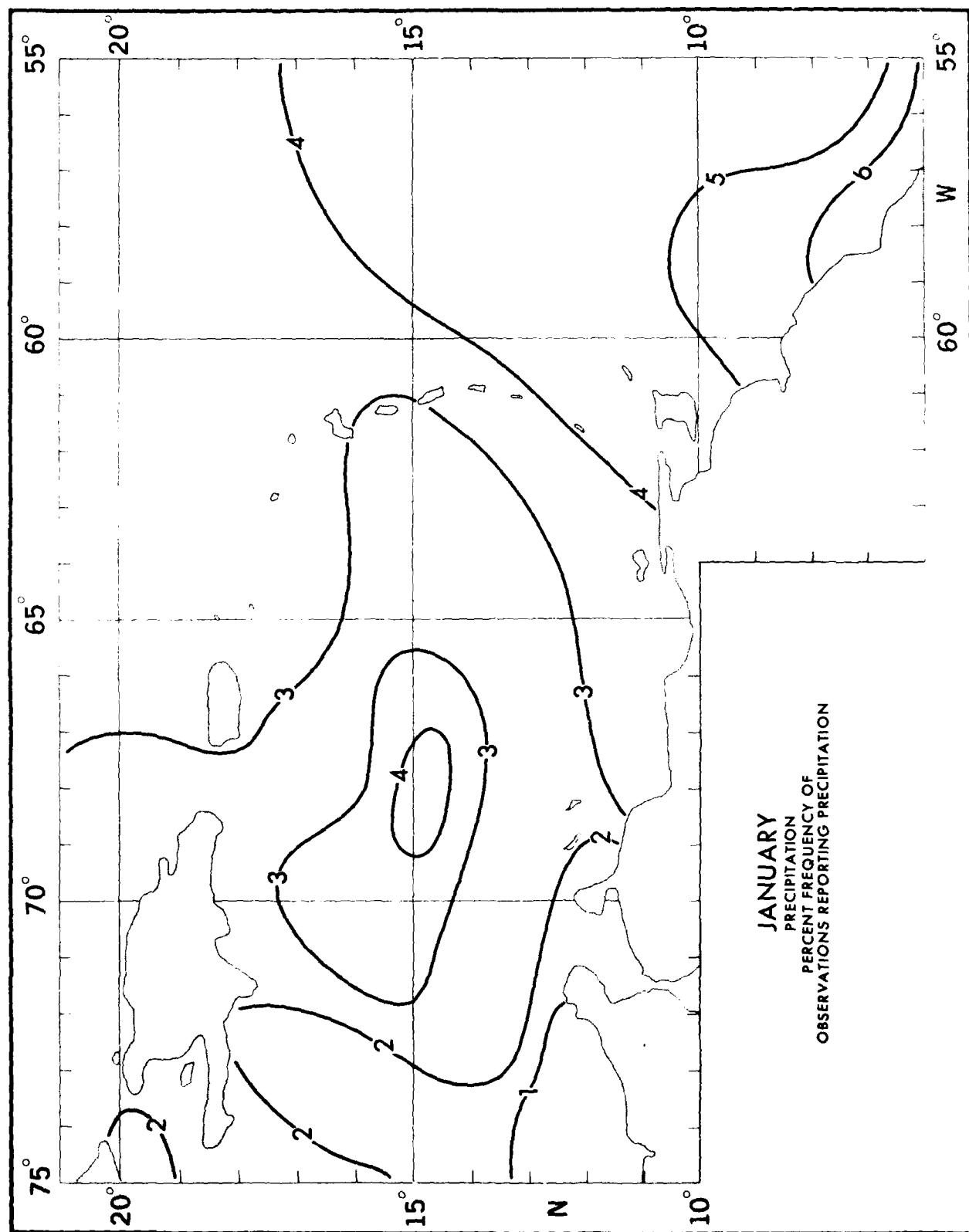
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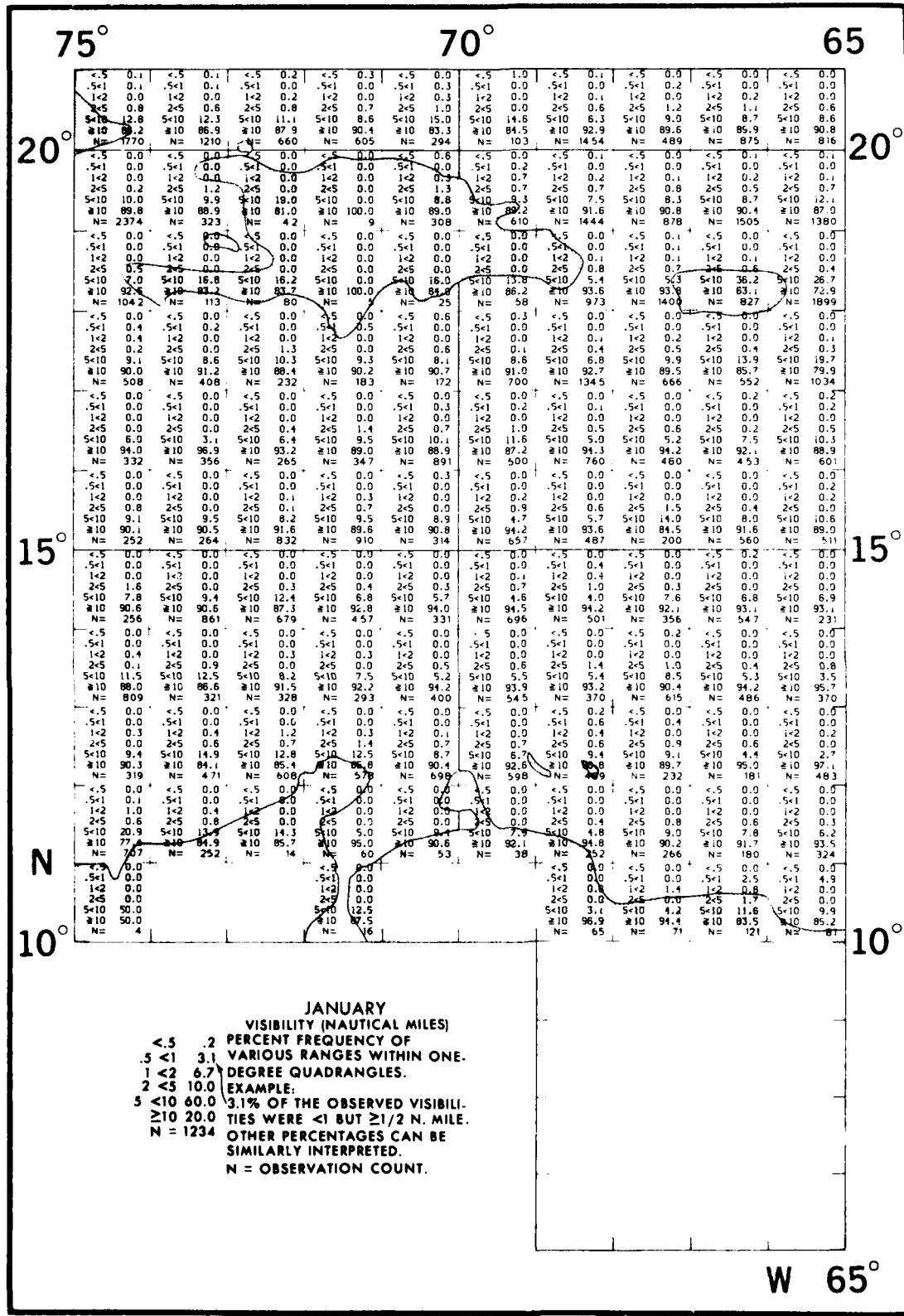
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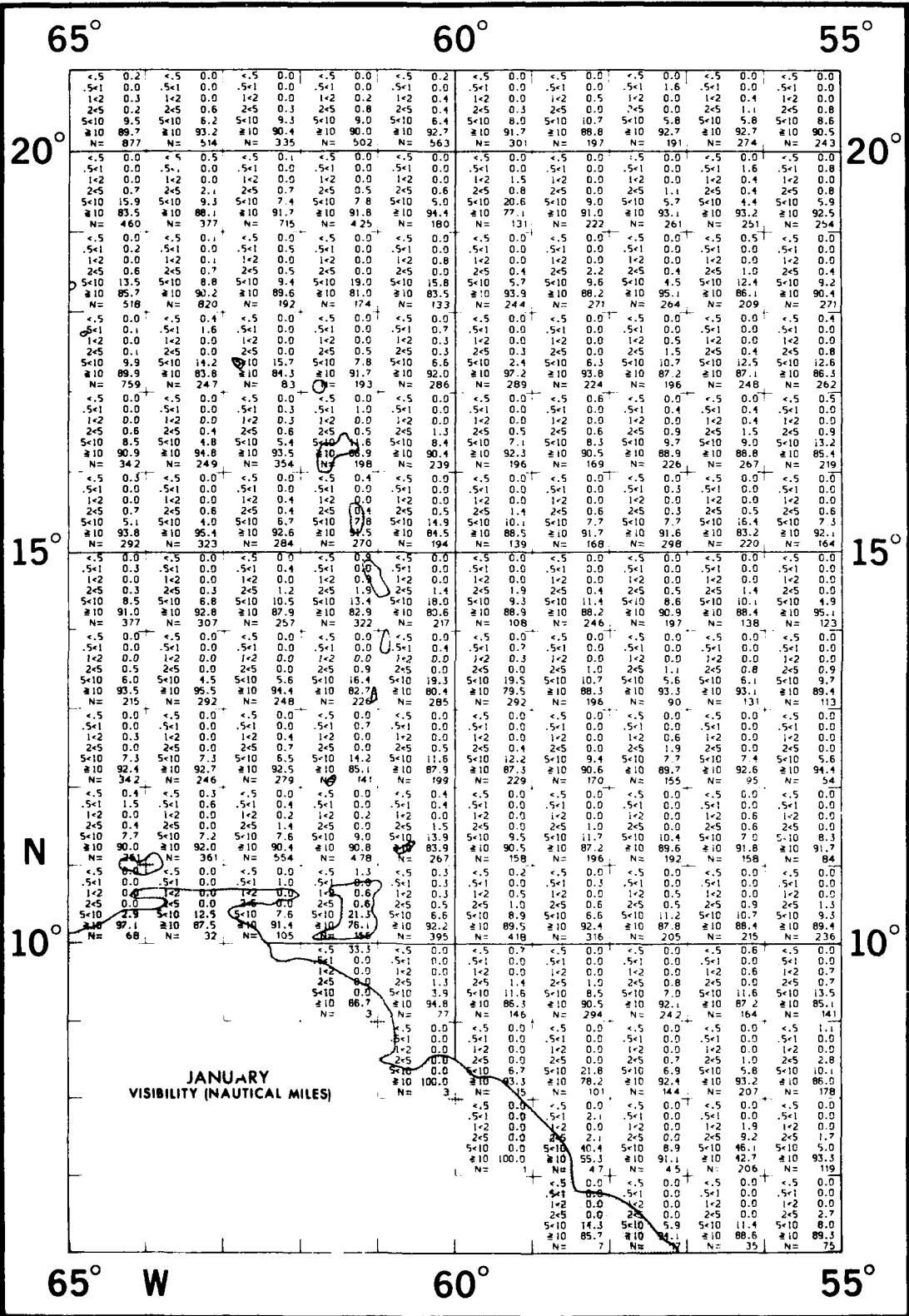
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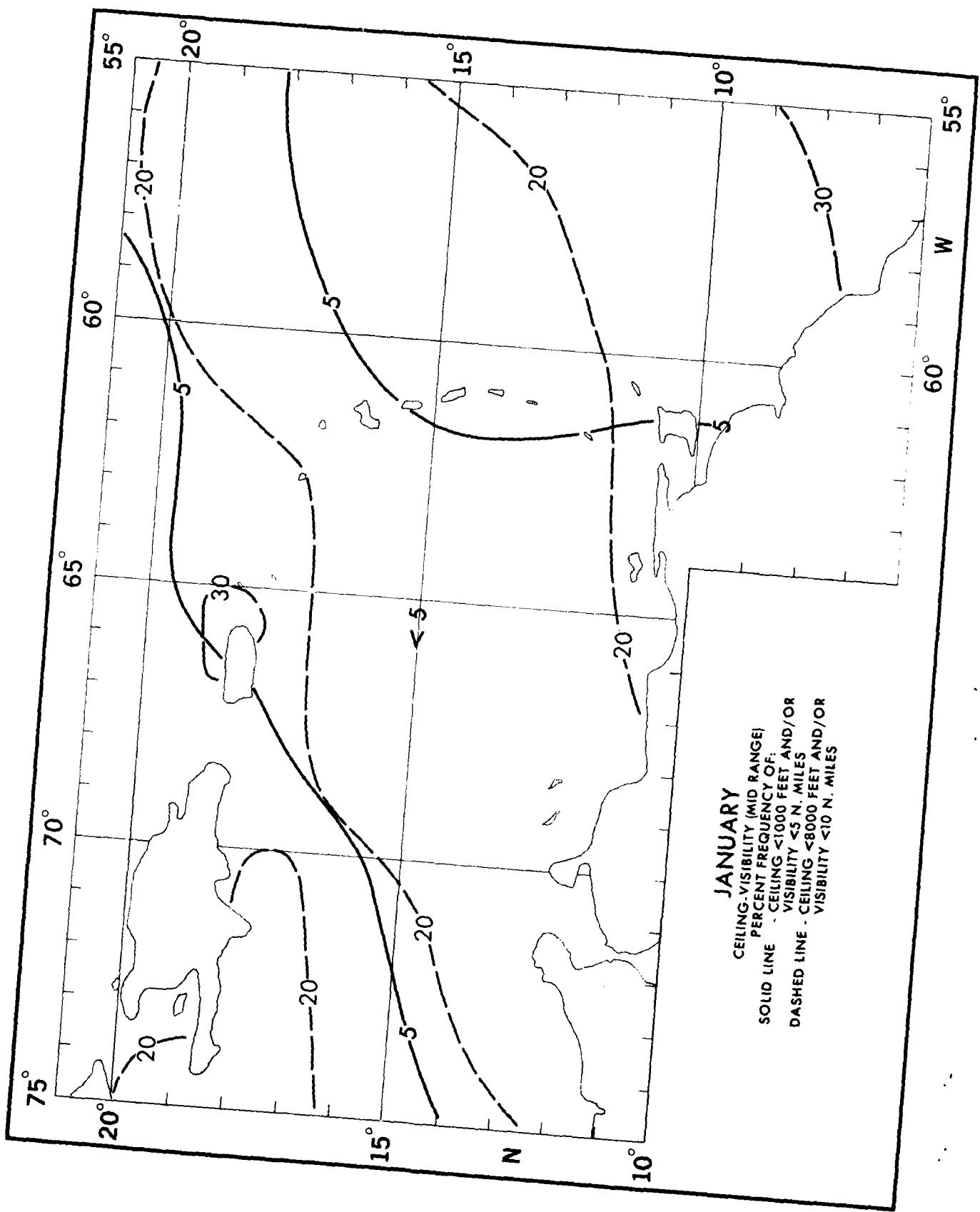
MONTH	CLOUDS ELEMENT												THRU
	CLOUDS VISIBILITY-TABLES	CEILING-VISIBILITY (Mid Range)	WIND-VISIBILITY (Low Range)	SCALAR MEAN WIND SPEED	WIND SPEED 11-21 and 22-33 knots	AIR AND SEA TEMPERATURE	WAVE HEIGHT-ISOPHETS	SURFACE CURRENTS (Seasonal)					
JANUARY	2	3	4	6	7	8	9	10	11	12	14	15	16
FEBRUARY	18	19	20	22	23	24	25	26	27	28	30	31	32
MARCH	34	35	36	38	39	40	41	42	43	44	46	47	48
APRIL	50	51	52	54	55	56	57	58	59	60	62	63	64
MAY	66	67	68	70	71	72	73	74	75	76	78	79	80
JUNE	82	83	84	86	87	88	89	90	91	92	94	95	96
JULY	98	99	100	102	103	104	105	106	107	108	110	111	112
AUGUST	114	115	116	118	119	120	121	122	123	124	126	127	128
SEPTEMBER	130	131	132	134	135	136	137	138	139	140	142	143	144
OCTOBER	146	147	148	150	151	152	153	154	155	156	158	159	160
NOVEMBER	162	163	164	166	167	168	169	170	171	172	174	175	176
DECEMBER	178	179	180	182	183	184	185	186	187	188	190	191	192

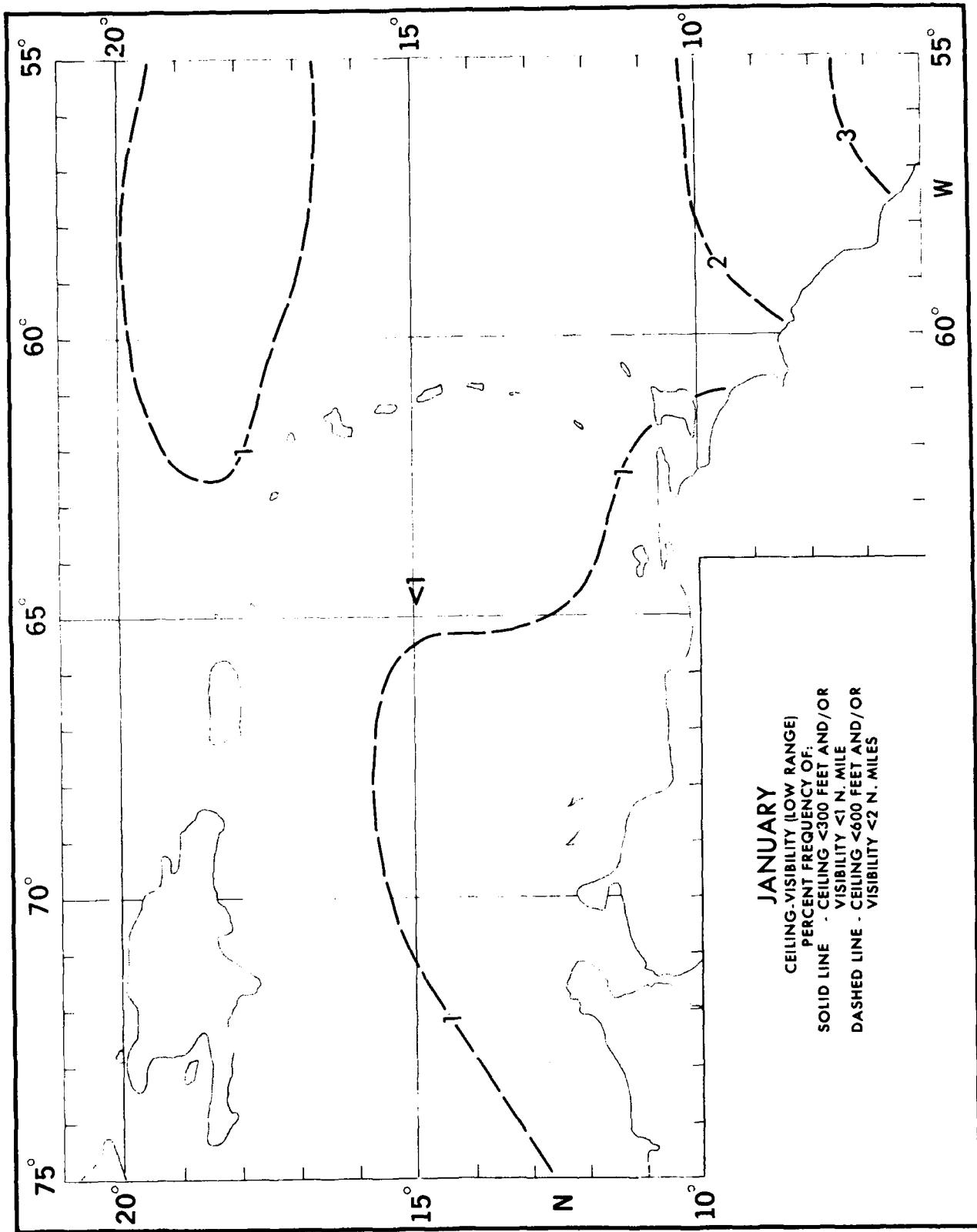


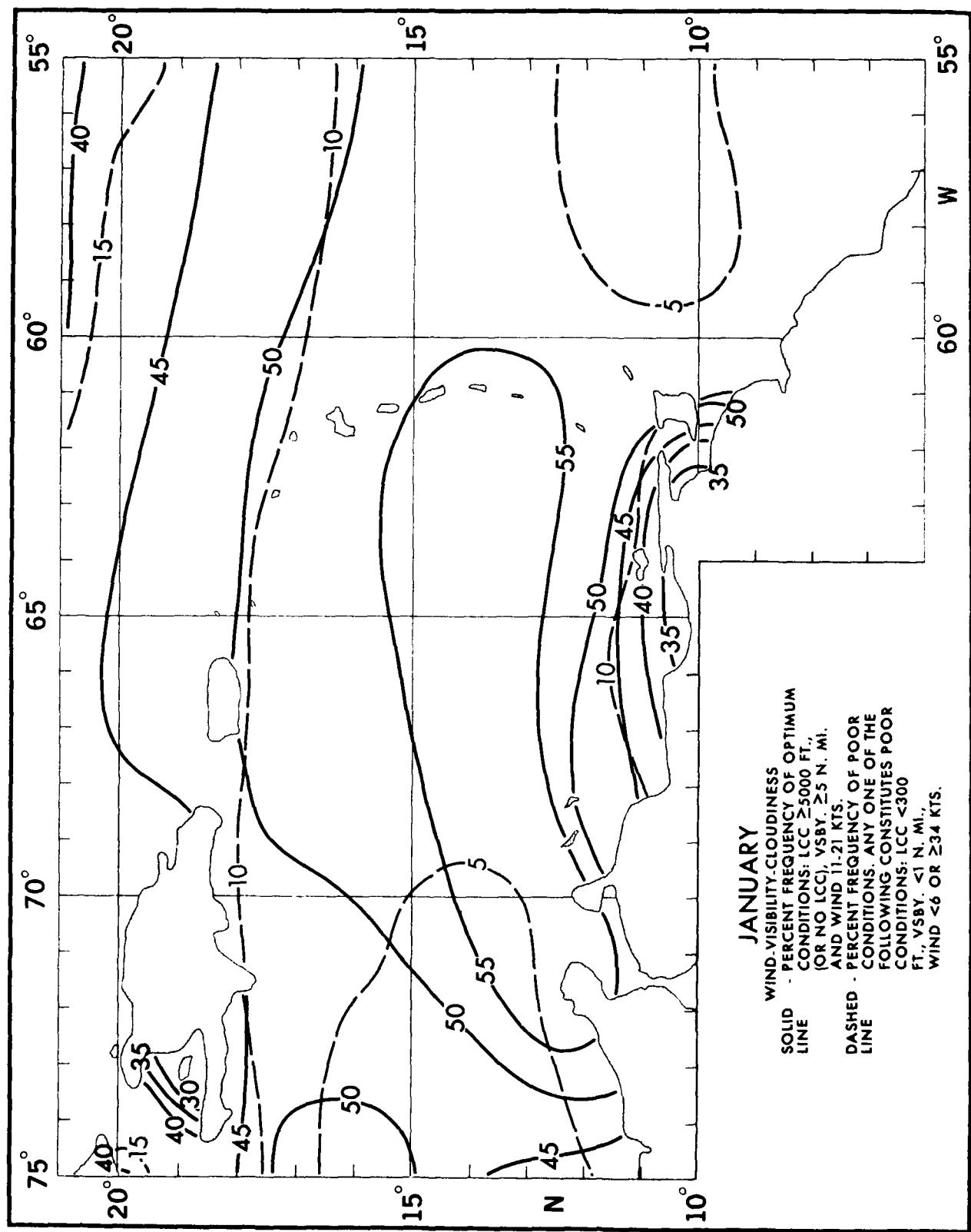


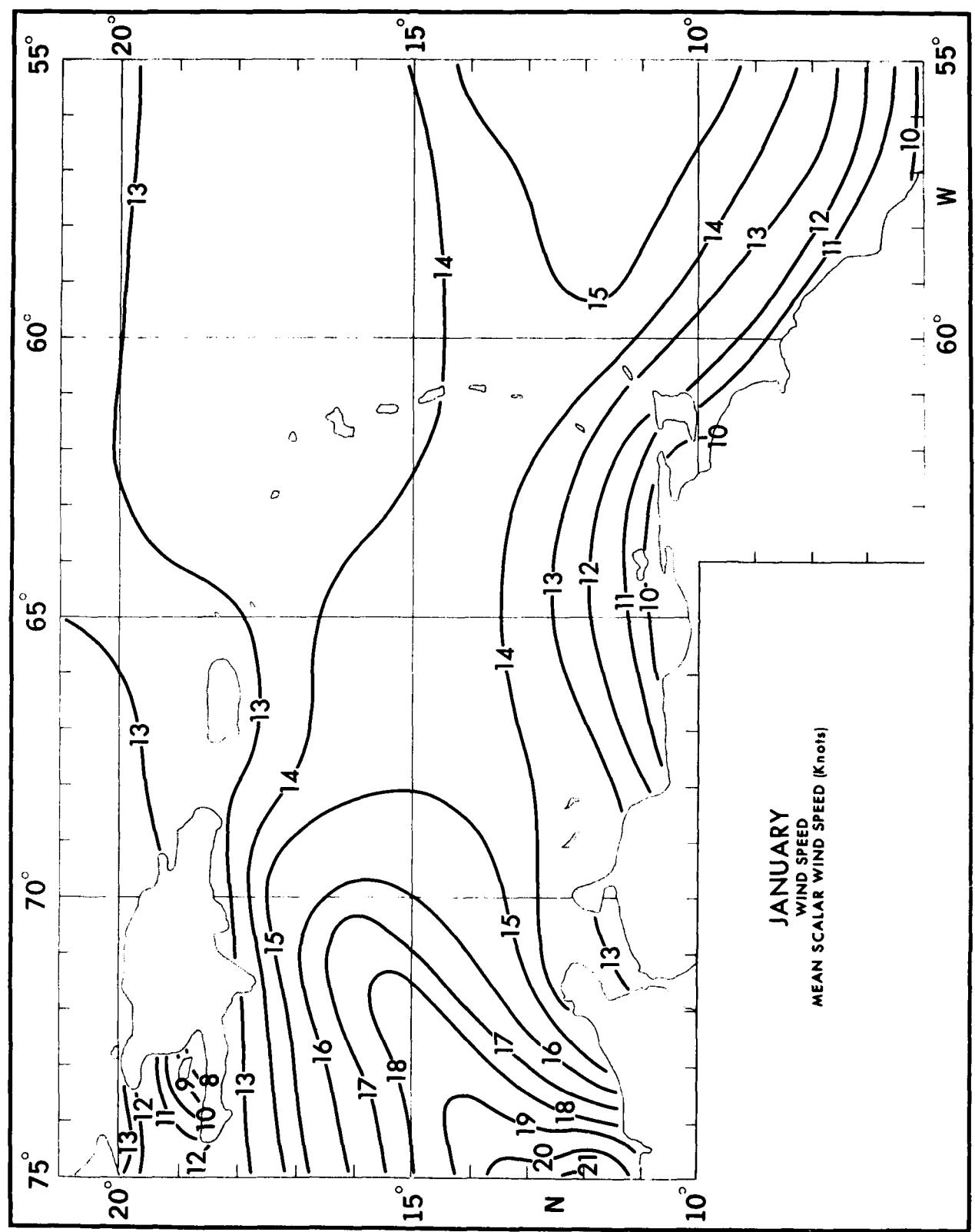


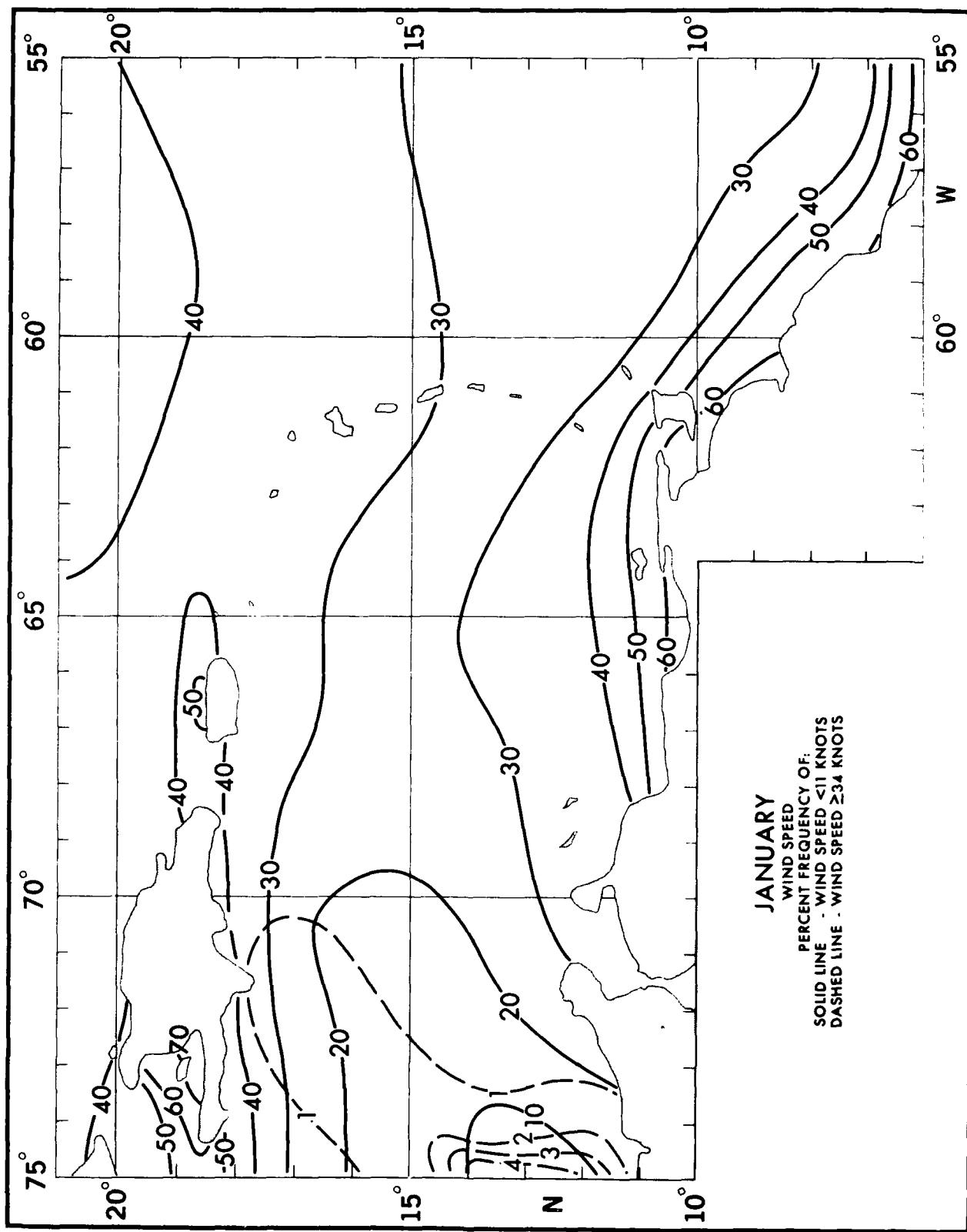


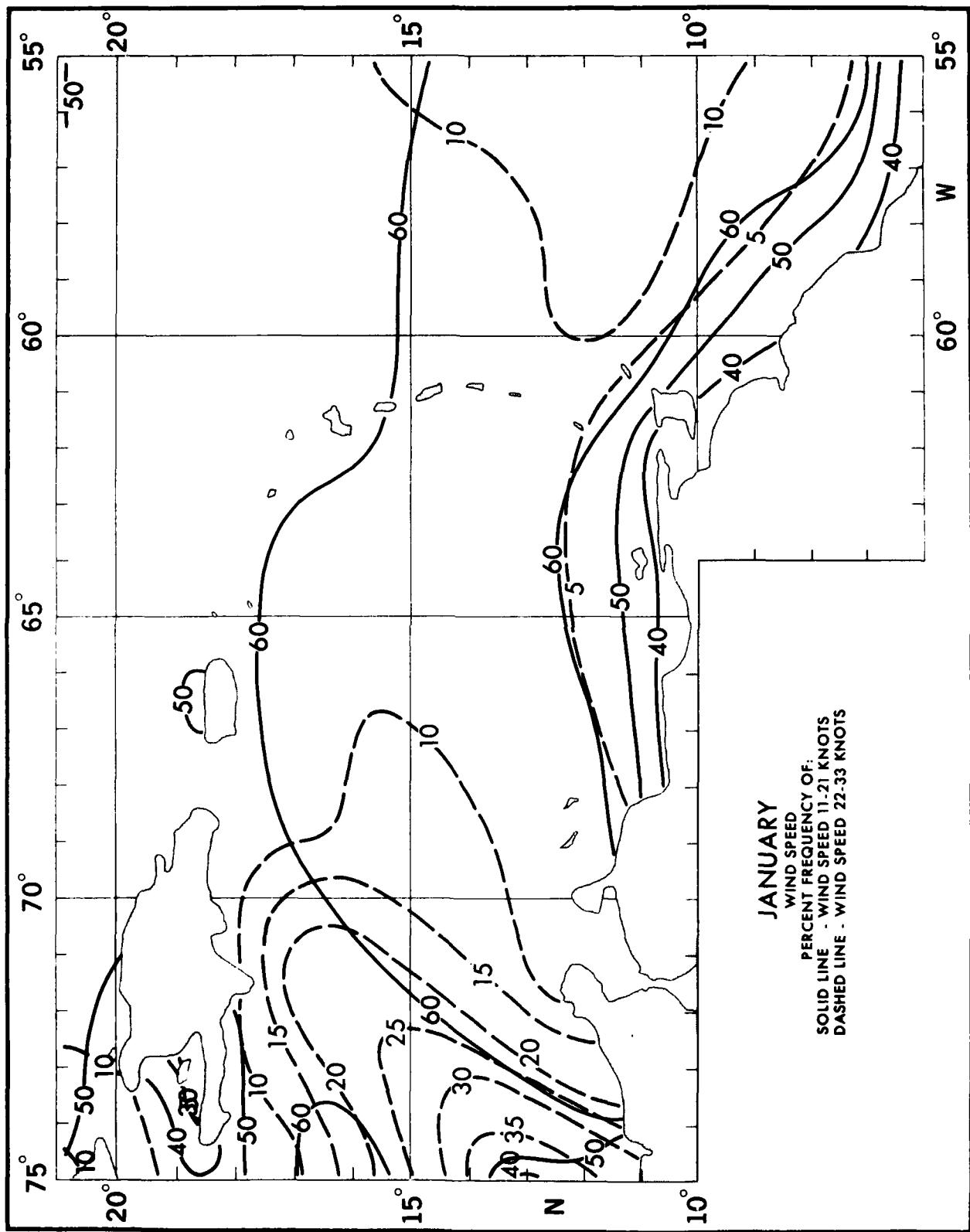


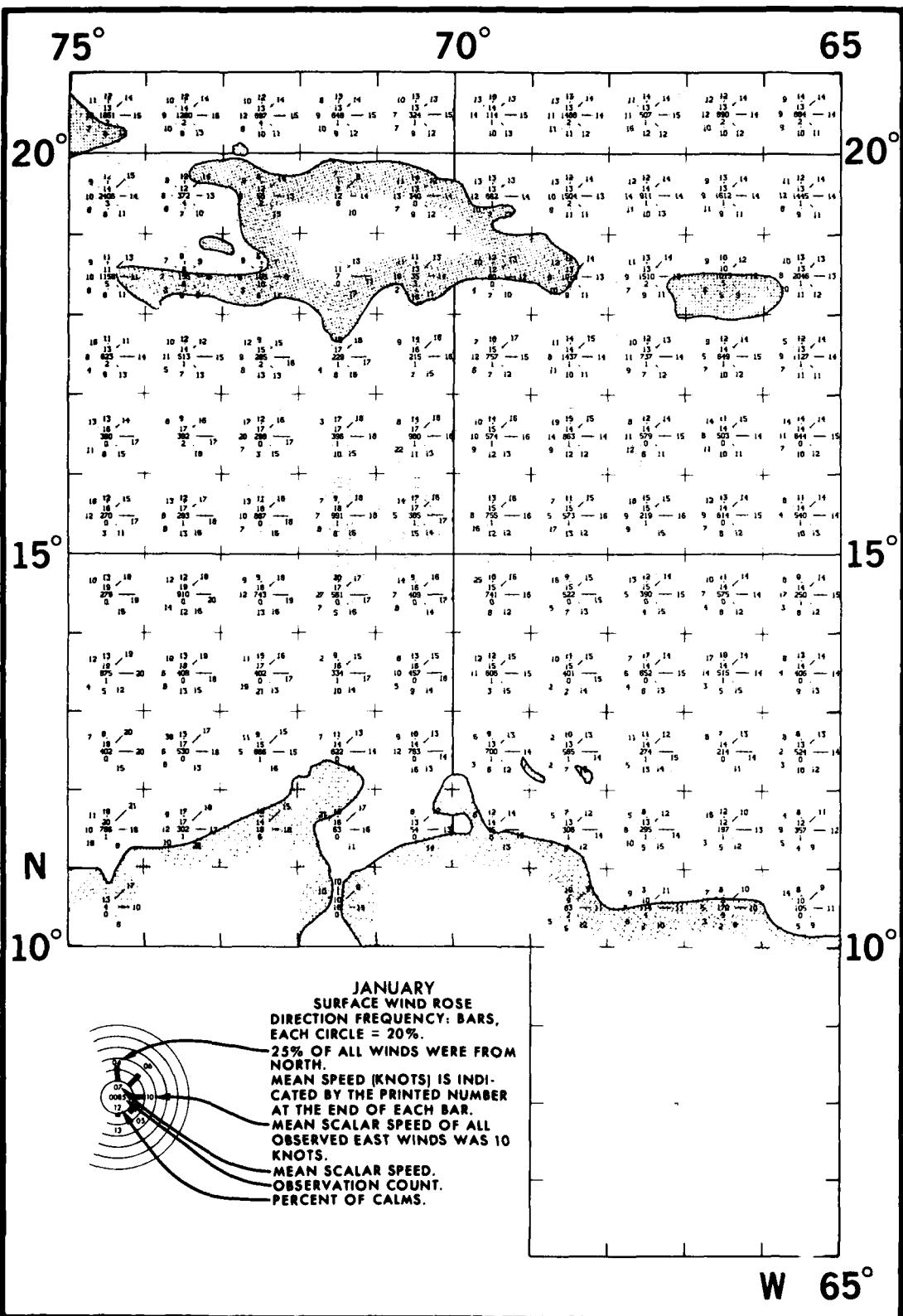


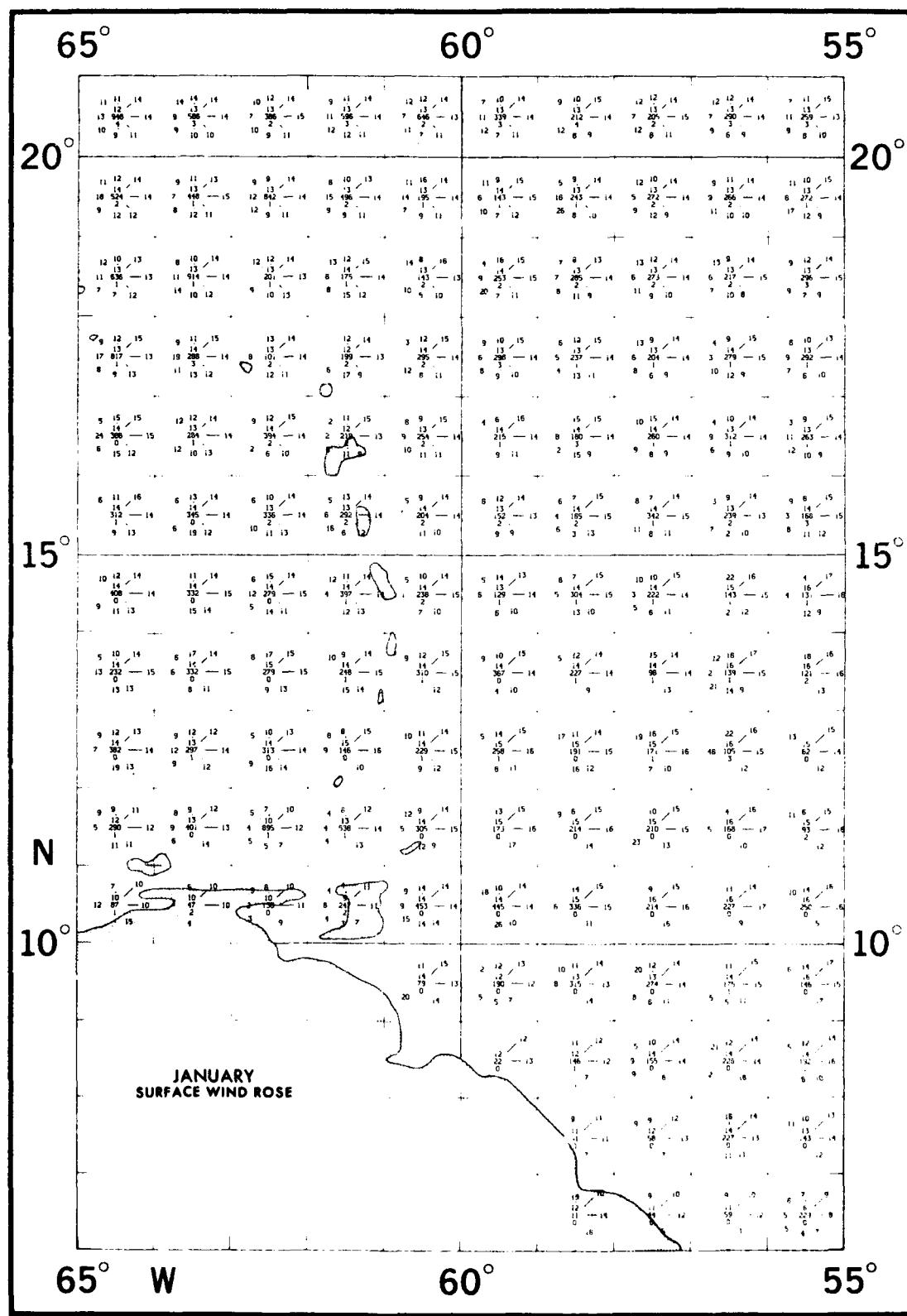


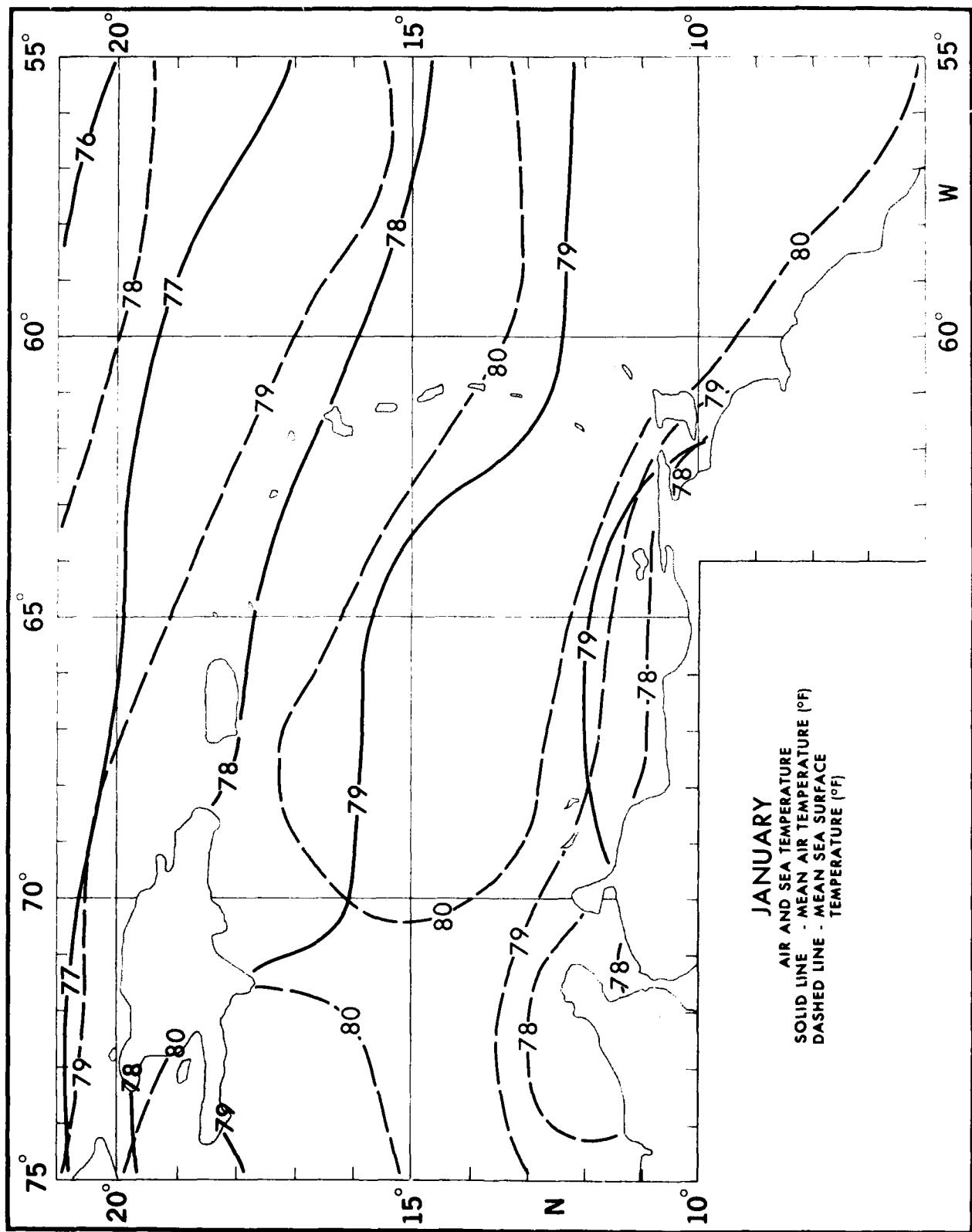


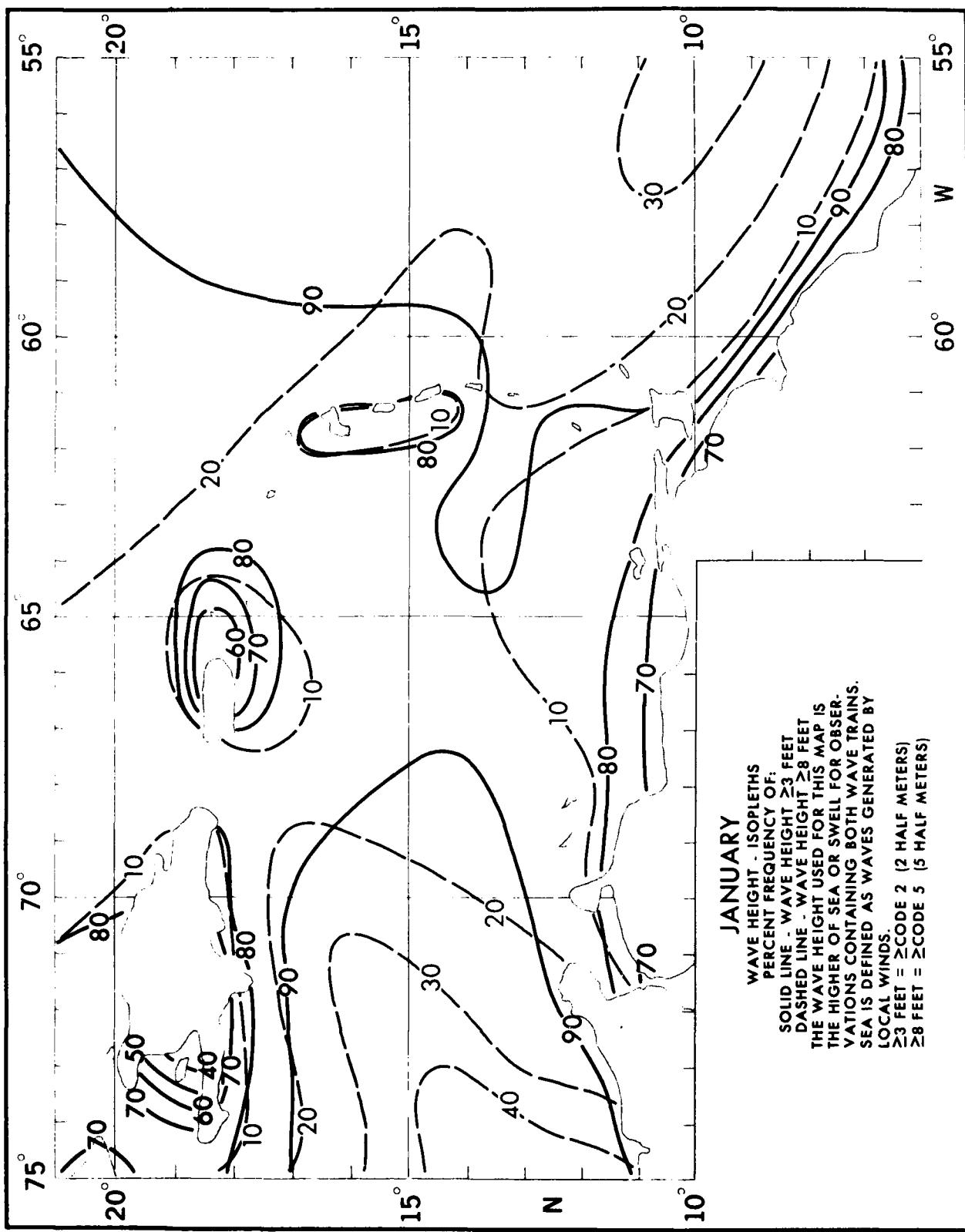












75°

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65

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20°

15°

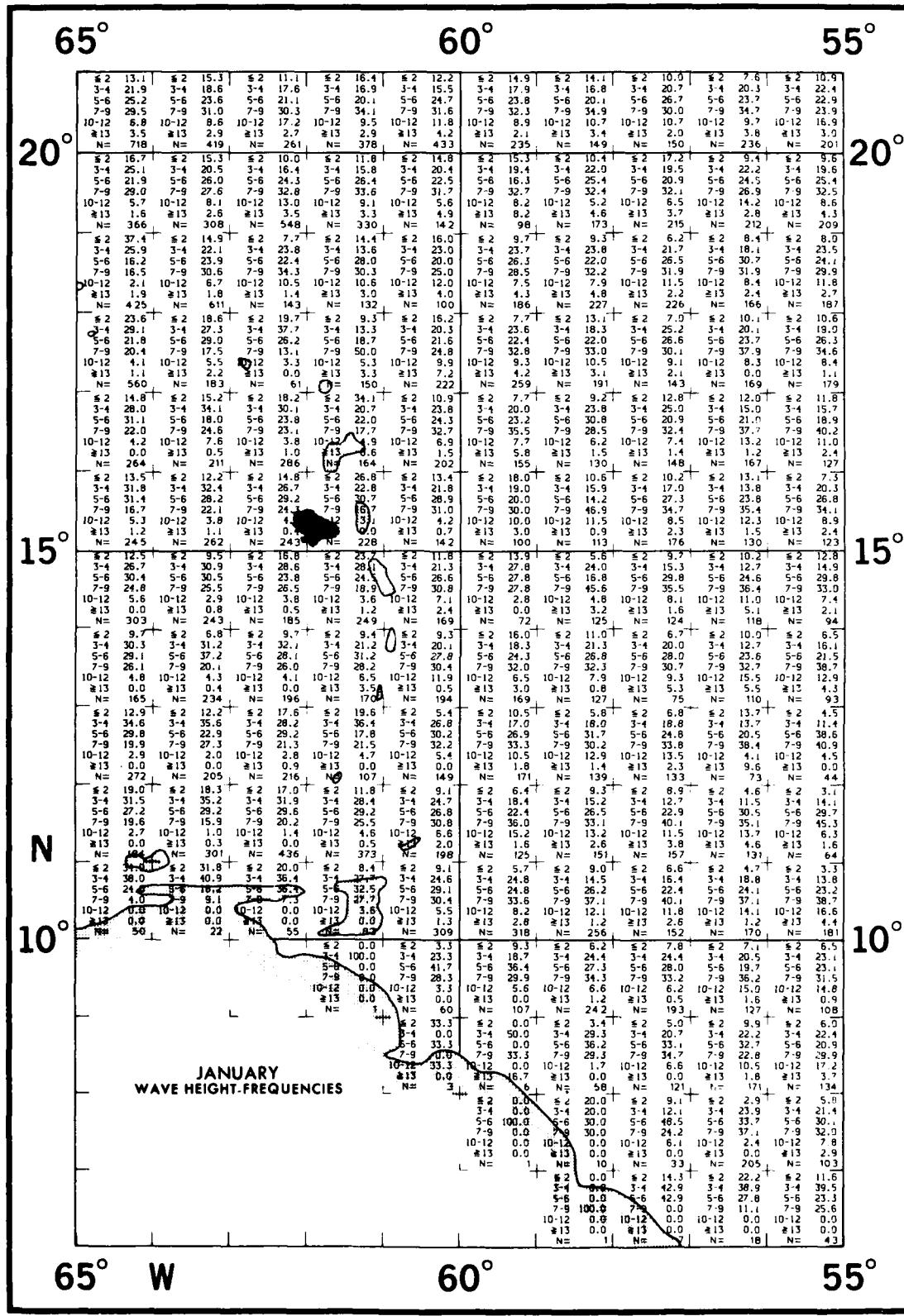
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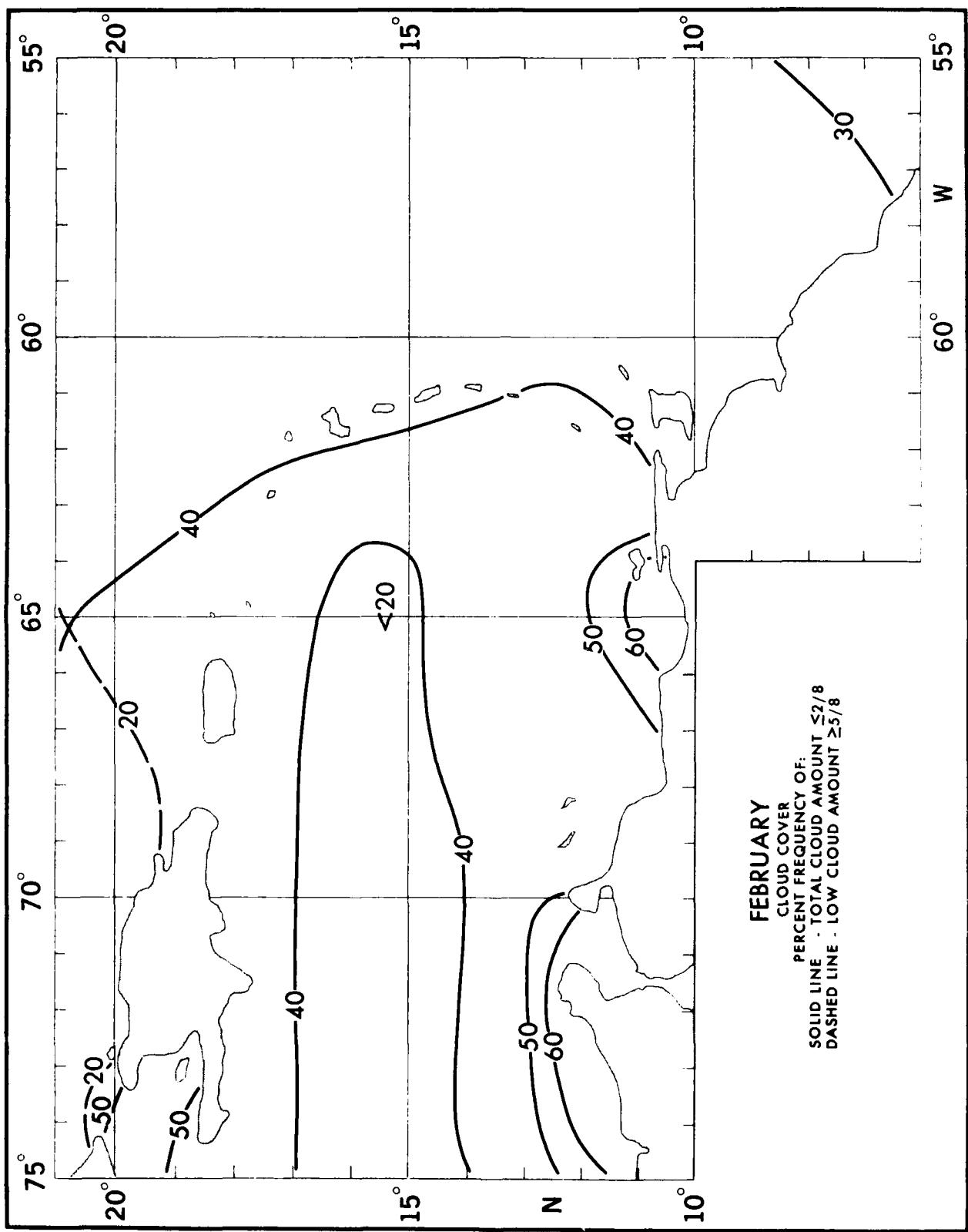
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10°

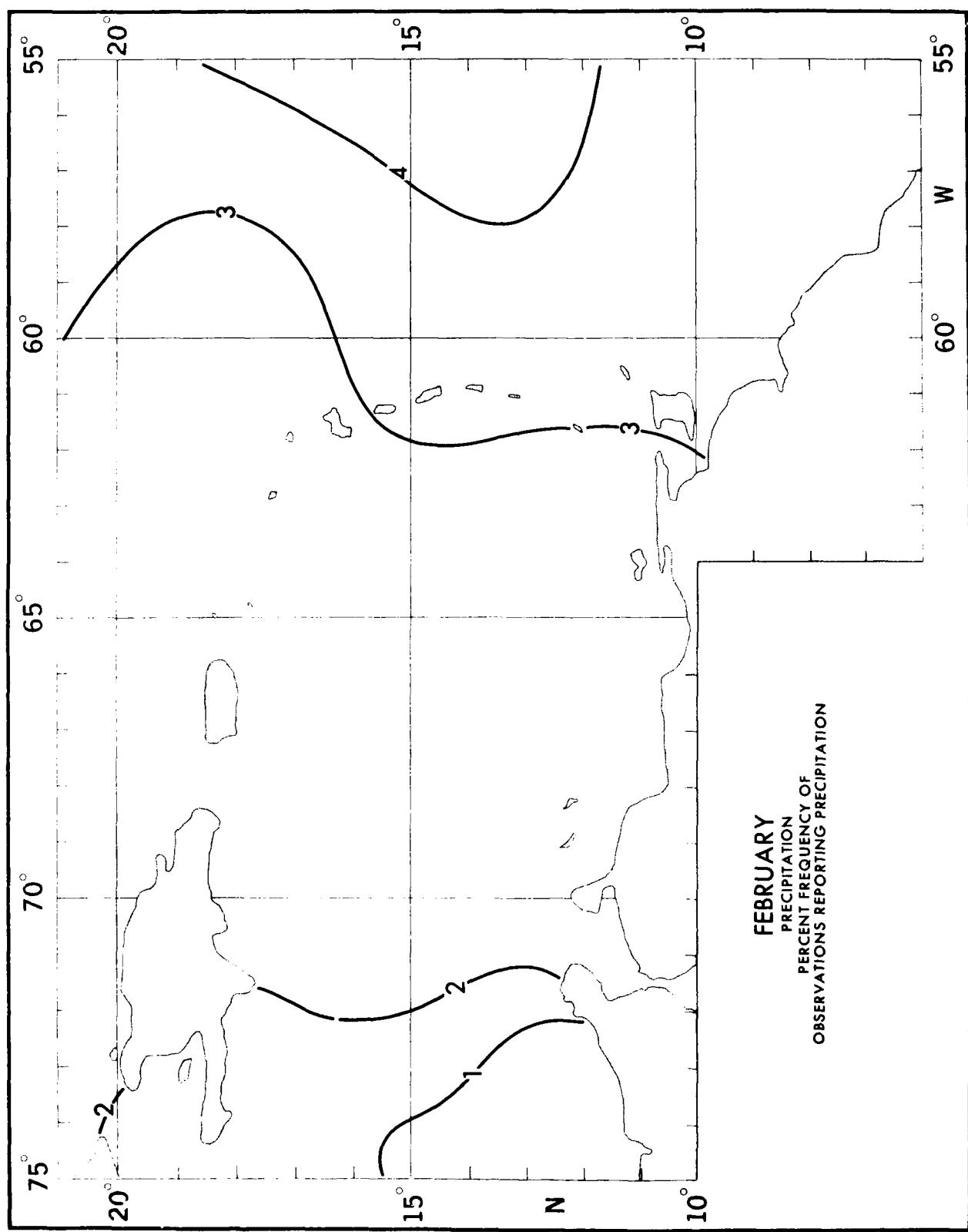
10°

W 65°

≤ 2	24.4	≤ 2	24.2	≤ 2	21.4	≤ 2	20.6	≤ 2	10.0	≤ 2	14.7	≤ 2	15.4	≤ 2	13.8	≤ 2	16.3		
3-4	30.2	3-4	28.1	3-4	26.9	3-4	31.0	3-4	29.2	3-4	28.9	3-4	24.4	3-4	22.4	3-4	21.9		
5-6	21.7	5-6	21.8	5-6	21.6	5-6	17.8	5-6	16.7	5-6	17.8	5-6	26.2	5-6	25.2	5-6	27.1		
7-8	17.7	7-9	17.8	7-9	21.6	7-9	17.8	7-9	16.7	7-9	17.8	7-9	26.2	7-9	26.4	7-9	27.1		
10-12	2.7	10-12	3.6	10-12	1.9	10-12	3.4	10-12	3.1	10-12	5.6	10-12	4.7	10-12	7.9	10-12	8.9		
≤ 13	0.7	≤ 13	0.5	≤ 13	0.4	≤ 13	0.4	≤ 13	0.4	≤ 13	2.2	≤ 13	2.5	≤ 13	2.6	≤ 13	1.5		
N =	195	N =	94.5	N =	570	N =	523	N =	257	N =	90	N =	1200	N =	416	N =	639		
≤ 2	28.5	≤ 2	32.7	≤ 2	13.3	≤ 2	42.0	≤ 2	14.9	≤ 2	17.9	≤ 2	16.1	≤ 2	12.9	≤ 2	14.7		
3-4	33.0	3-4	32.7	3-4	40.0	3-4	20.6	3-4	35.6	3-4	27.6	3-4	29.6	3-4	23.8	3-4	29.9		
5-6	21.7	5-6	21.6	5-6	20.0	5-6	26.6	5-6	26.4	5-6	26.8	5-6	25.4	5-6	27.1	5-6	23.9		
7-8	13.8	7-9	10.5	7-9	26.7	7-9	0.0	7-9	19.4	7-9	23.3	7-9	22.6	7-9	26.6	7-9	21.7		
10-12	2.3	10-12	1.8	10-12	0.0	10-12	0.0	10-12	2.8	10-12	3.1	10-12	5.2	10-12	6.6	10-12	8.0		
≤ 13	0.6	≤ 13	0.6	≤ 13	0.0	≤ 13	0.0	≤ 13	0.7	≤ 13	1.1	≤ 13	1.2	≤ 13	3.1	≤ 13	1.7		
N =	1669	N =	151	N =	7	N =	288	N =	537	N =	1182	N =	753	N =	1214	N =	1111		
≤ 2	30.0	≤ 2	80.9	≤ 2	66.7	≤ 2	25.0	≤ 2	33.3	≤ 2	25.0	≤ 2	15.9	≤ 2	16.0	≤ 2	59.7		
3-4	25.6	3-4	17.7	3-4	25.0	3-4	23.8	3-4	34.1	3-4	28.0	3-4	26.1	3-4	16.9	3-4	36.5		
5-6	21.4	5-6	17.4	5-6	12.5	5-6	50.0	5-6	14.3	5-6	13.6	5-6	24.6	5-6	11.4	5-6	12.4		
7-8	18.5	7-9	8.2	7-8	4.2	7-9	0.0	7-9	23.8	7-9	25.0	7-9	25.4	7-9	9.7	7-9	7.2		
10-12	2.2	10-12	2.2	10-12	0.0	10-12	0.0	10-12	4.8	10-12	2.3	10-12	4.6	10-12	7.9	10-12	2.4		
≤ 13	0.3	≤ 13	0.6	≤ 13	0.0	≤ 13	0.0	≤ 13	0.0	≤ 13	0.0	≤ 13	1.5	≤ 13	0.0	≤ 13	0.5		
N =	687	N =	46	N =	24	N =	21	N =	44	N =	766	N =	1088	N =	694	N =	1538		
≤ 2	15.8	≤ 2	16.5	≤ 2	14.7	≤ 2	17.7	≤ 2	6.3	≤ 2	11.9	≤ 2	13.3	≤ 2	17.5	≤ 2	32.1		
3-4	28.5	3-4	24.9	3-4	23.3	3-4	25.5	3-4	16.9	3-4	17.2	3-4	24.2	3-4	34.7	3-4	29.7		
5-6	25.6	5-6	21.8	5-6	24.3	5-6	24.1	5-6	26.1	5-6	22.2	5-6	29.2	5-6	24.0	5-6	21.6		
7-8	24.9	7-9	31.2	7-9	23.4	7-9	37.3	7-9	36.0	7-9	25.9	7-9	20.4	7-9	15.0	7-9	9.8		
10-12	4.7	10-12	4.6	10-12	6.2	10-12	11.7	10-12	12.0	10-12	10.8	10-12	5.3	10-12	2.7	10-12	1.3		
≤ 13	0.5	≤ 13	1.1	≤ 13	3.6	≤ 13	1.4	≤ 13	2.0	≤ 13	1.2	≤ 13	0.8	≤ 13	0.4	≤ 13	0.1		
N =	386	N =	285	N =	177	N =	137	N =	142	N =	564	N =	1038	N =	525	N =	854		
≤ 2	8.8	≤ 2	6.1	≤ 2	6.3	≤ 2	7.0	≤ 2	7.9	≤ 2	11.8	≤ 2	11.5	≤ 2	13.4	≤ 2	14.6		
3-4	26.3	3-4	21.8	3-4	22.9	3-4	34.4	3-4	14.7	3-4	21.9	3-4	26.5	3-4	32.6	3-4	32.2		
5-6	26.3	5-6	26.8	5-6	22.9	5-6	26.8	5-6	21.8	5-6	25.9	5-6	28.5	5-6	22.6	5-6	23.8		
7-8	29.2	7-9	30.3	7-9	32.7	7-9	32.0	7-9	35.6	7-9	28.6	7-9	27.0	7-9	28.7	7-9	24.3		
10-12	6.0	10-12	9.5	10-12	6.1	10-12	10.6	10-12	15.0	10-12	8.6	10-12	5.3	10-12	6.7	10-12	5.1		
≤ 13	3.2	≤ 13	3.4	≤ 13	2.6	≤ 13	4.8	≤ 13	1.9	≤ 13	1.4	≤ 13	0.8	≤ 13	0.5	≤ 13	2.2		
N =	251	N =	294	N =	192	N =	284	N =	719	N =	374	N =	565	N =	389	N =	376	N =	453
≤ 2	7.6	≤ 2	7.4	≤ 2	6.0	≤ 2	6.8	≤ 2	7.0	≤ 2	10.0	≤ 2	10.5	≤ 2	15.4	≤ 2	16.6		
3-4	19.8	3-4	16.2	3-4	12.5	3-4	16.2	3-4	20.7	3-4	26.7	3-4	24.7	3-4	28.7	3-4	25.8		
5-6	26.6	5-6	21.4	5-6	22.5	5-6	19.7	5-6	26.1	5-6	26.3	5-6	24.9	5-6	25.0	5-6	31.2		
7-8	29.5	7-9	35.3	7-9	39.1	7-9	32.6	7-9	32.9	7-9	38.7	7-9	31.5	7-9	31.6	7-9	22.3		
10-12	9.2	10-12	14.0	10-12	13.5	10-12	16.6	10-12	8.5	10-12	7.2	10-12	6.6	10-12	6.2	10-12	5.7		
≤ 13	3.4	≤ 13	4.8	≤ 13	6.6	≤ 13	5.8	≤ 13	4.3	≤ 13	1.7	≤ 13	1.7	≤ 13	2.6	≤ 13	0.5		
N =	207	N =	229	N =	679	N =	737	N =	258	N =	530	N =	361	N =	156	N =	433	N =	368
≤ 2	7.2	≤ 2	3.4	≤ 2	5.8	≤ 2	6.0	≤ 2	9.9	≤ 2	10.0	≤ 2	9.9	≤ 2	9.5	≤ 2	13.5		
3-4	11.9	3-4	14.2	3-4	13.8	3-4	16.2	3-4	18.6	3-4	25.5	3-4	28.0	3-4	27.6	3-4	28.7		
5-6	16.7	5-6	17.3	5-6	23.1	5-6	5.6	5-6	24.9	5-6	27.3	5-6	29.3	5-6	28.9	5-6	30.1		
7-8	11.9	7-9	36.7	7-9	33.8	7-9	39.3	7-9	35.2	7-9	29.6	7-9	27.7	7-9	25.2	7-9	26.7		
10-12	14.8	10-12	17.4	10-12	15.6	10-12	10.0	10-12	9.1	10-12	6.3	10-12	3.7	10-12	7.8	10-12	5.2		
≤ 13	7.1	≤ 13	9.0	≤ 13	7.7	≤ 13	3.7	≤ 13	2.4	≤ 13	1.2	≤ 13	1.3	≤ 13	1.0	≤ 13	0.7		
N =	210	N =	711	N =	571	N =	351	N =	253	N =	568	N =	375	N =	294	N =	407	N =	176
≤ 2	5.7	≤ 2	6.0	≤ 2	7.8	≤ 2	7.2	≤ 2	10.0	≤ 2	11.5	≤ 2	9.8	≤ 2	12.6	≤ 2	13.8		
3-4	10.9	3-4	13.9	3-4	22.7	3-4	15.6	3-4	19.7	3-4	26.7	3-4	28.0	3-4	24.1	3-4	29.4		
5-6	21.0	5-6	15.8	5-6	19.9	5-6	30.8	5-6	24.9	5-6	23.1	5-6	25.2	5-6	31.9	5-6	24.5		
7-8	35.3	7-9	39.1	7-9	32.6	7-9	32.9	7-9	37.9	7-9	31.5	7-9	25.7	7-9	32.3	7-9	27.5		
10-12	17.6	10-12	16.2	10-12	13.5	10-12	11.8	10-12	5.5	10-12	5.0	10-12	5.9	10-12	4.3	10-12	4.3		
≤ 13	9.6	≤ 13	9.0	≤ 13	3.5	≤ 13	1.7	≤ 13	1.3	≤ 13	2.2	≤ 13	0.7	≤ 13	1.1	≤ 13	0.7		
N =	649	N =	266	N =	282	N =	237	N =	309	N =	416	N =	286	N =	461	N =	412	N =	302
≤ 2	2.7	≤ 2	3.4	≤ 2	6.5	≤ 2	6.0	≤ 2	11.0	≤ 2	13.0	≤ 2	11.0	≤ 2	13.2	≤ 2	18.7		
3-4	13.3	3-4	17.6	3-4	21.1	3-4	21.6	3-4	28.3	3-4	23.8	3-4	26.7	3-4	25.1	3-4	29.8		
5-6	21.0	5-6	29.6	5-6	26.1	5-6	24.2	5-6	29.8	5-6	27.1	5-6	22.2	5-6	26.2	5-6	24.6		
7-8	36.7	7-9	30.7	7-9	30.8	7-9	28.5	7-9	27.1	7-9	29.8	7-9	25.3	7-9	32.3	7-9	27.3		
10-12	14.9	10-12	12.6	10-12	11.1	10-12	10.8	10-12	4.3	10-12	4.0	10-12	3.3	10-12	4.3	10-12	3.4		
≤ 13	4.1	≤ 13	4.1	≤ 13	3.3	≤ 13	0.6	≤ 13	0.6	≤ 13	1.4	≤ 13	0.7	≤ 13	0.6	≤ 13	0.7		
N =	248	N =	341	N =	399	N =	399	N =	491	N =	362	N =	233	N =	167	N =	131	N =	411
≤ 2	2.9	≤ 2	3.4	≤ 2	0.0	≤ 2	1.4	≤ 2	10.3	≤ 2	15.1	≤ 2	15.2	≤ 2	12.6	≤ 2	21.6		
3-4	18.9	3-4	18.7	3-4	3.4	3-4	24.5	3-4	30.0	3-4	24.0	3-4	25.7	3-4	23.5	3-4	35.8		
5-6	20.6	5-6	13.6	5-6	50.0	5-6	30.4	5-6	24.2	5-6	24.1	5-6	25.7	5-6	33.1	5-6	20.1		
7-8	34.3	7-9	42.9	7-9	37.5	7-9	19.6	7-9	17.0	7-9	22.6	7-9	18.2	7-9	24.8	7-9	18.5		
10-12	18.4	10-12	18.0	10-12	12.5	10-12	4.3	10-12	2.1	10-12	0.0	10-12	3.6	10-12	3.8	10-12	0.7		
≤ 13	11.9	≤ 13</td																	







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15°

15°

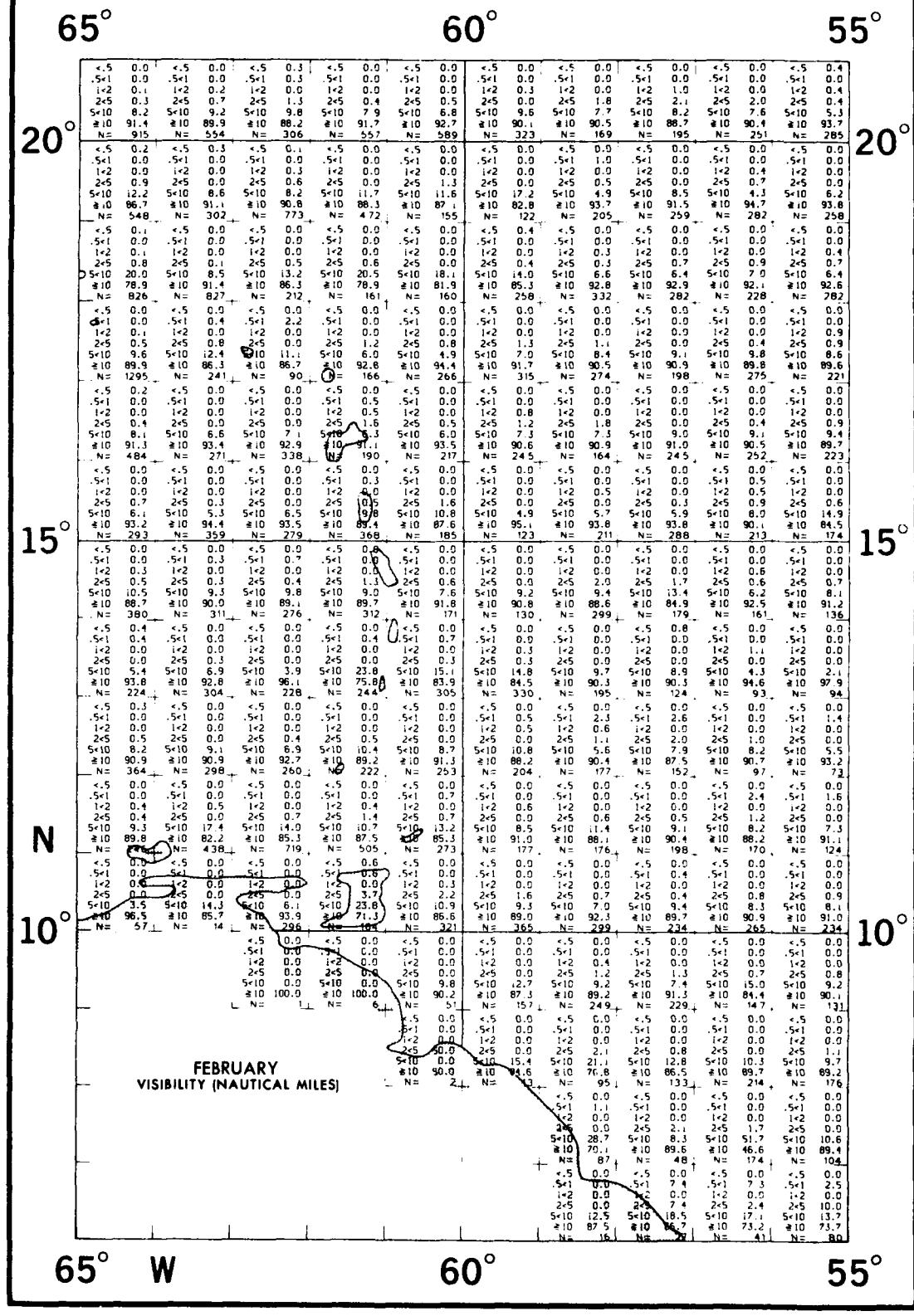
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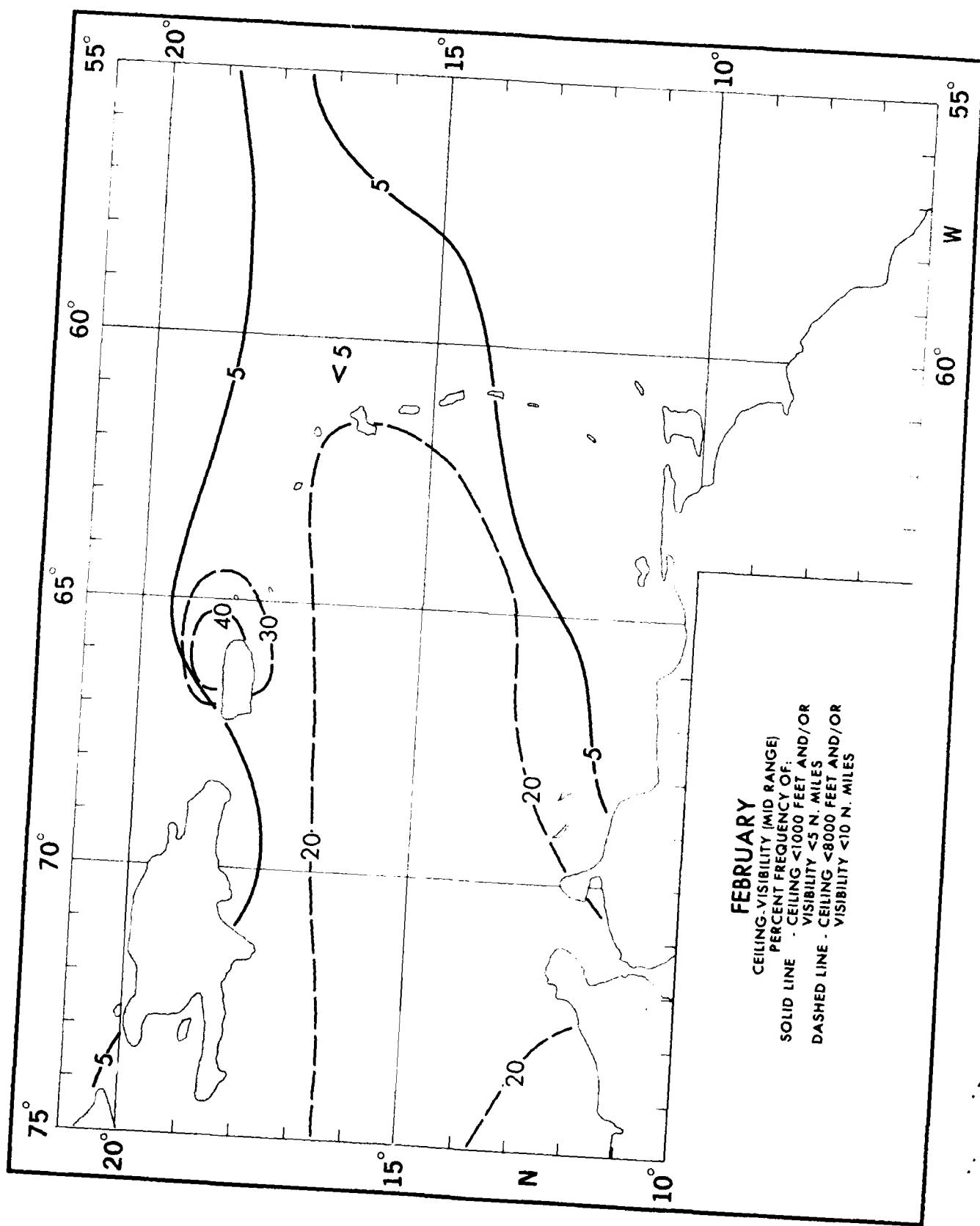
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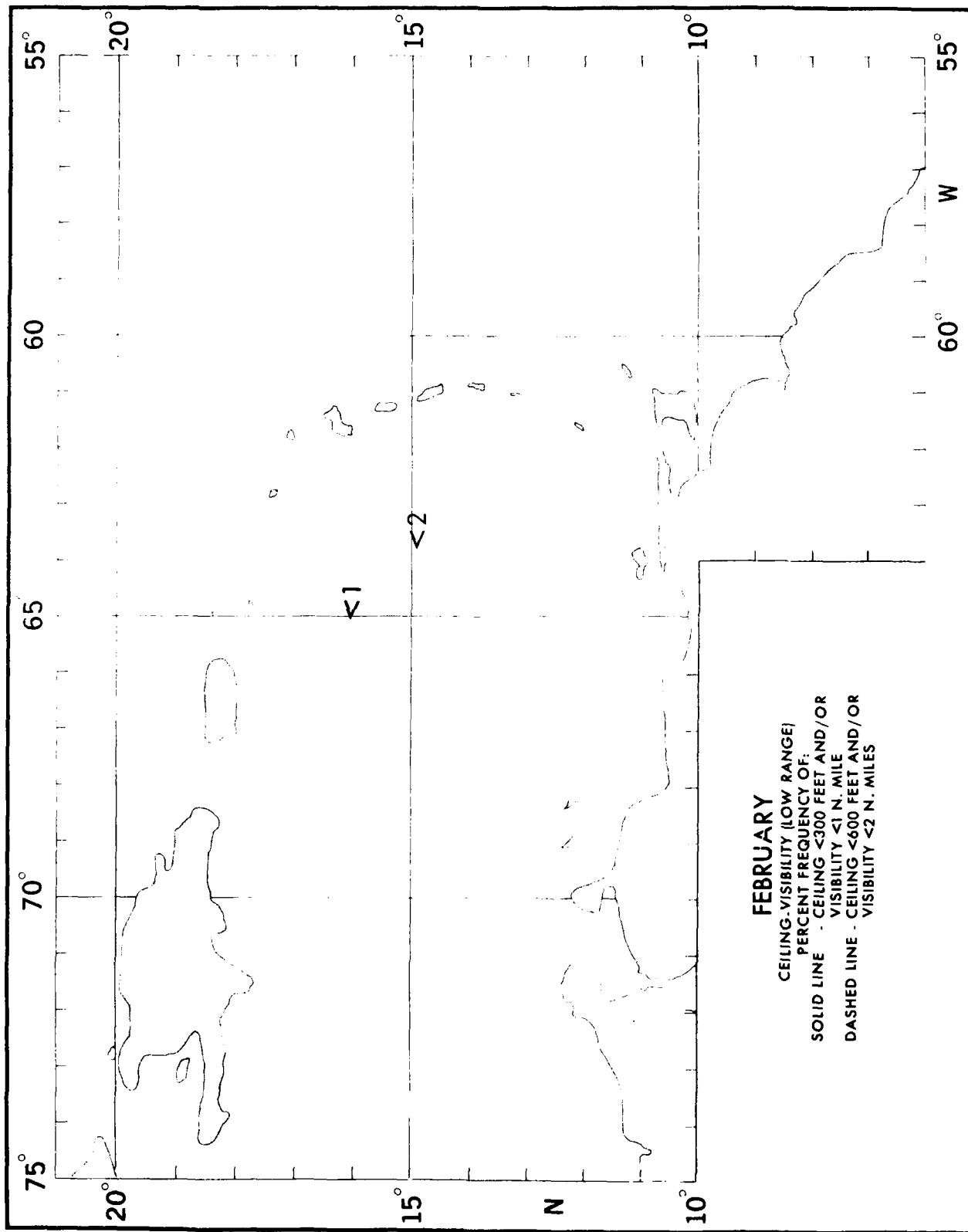
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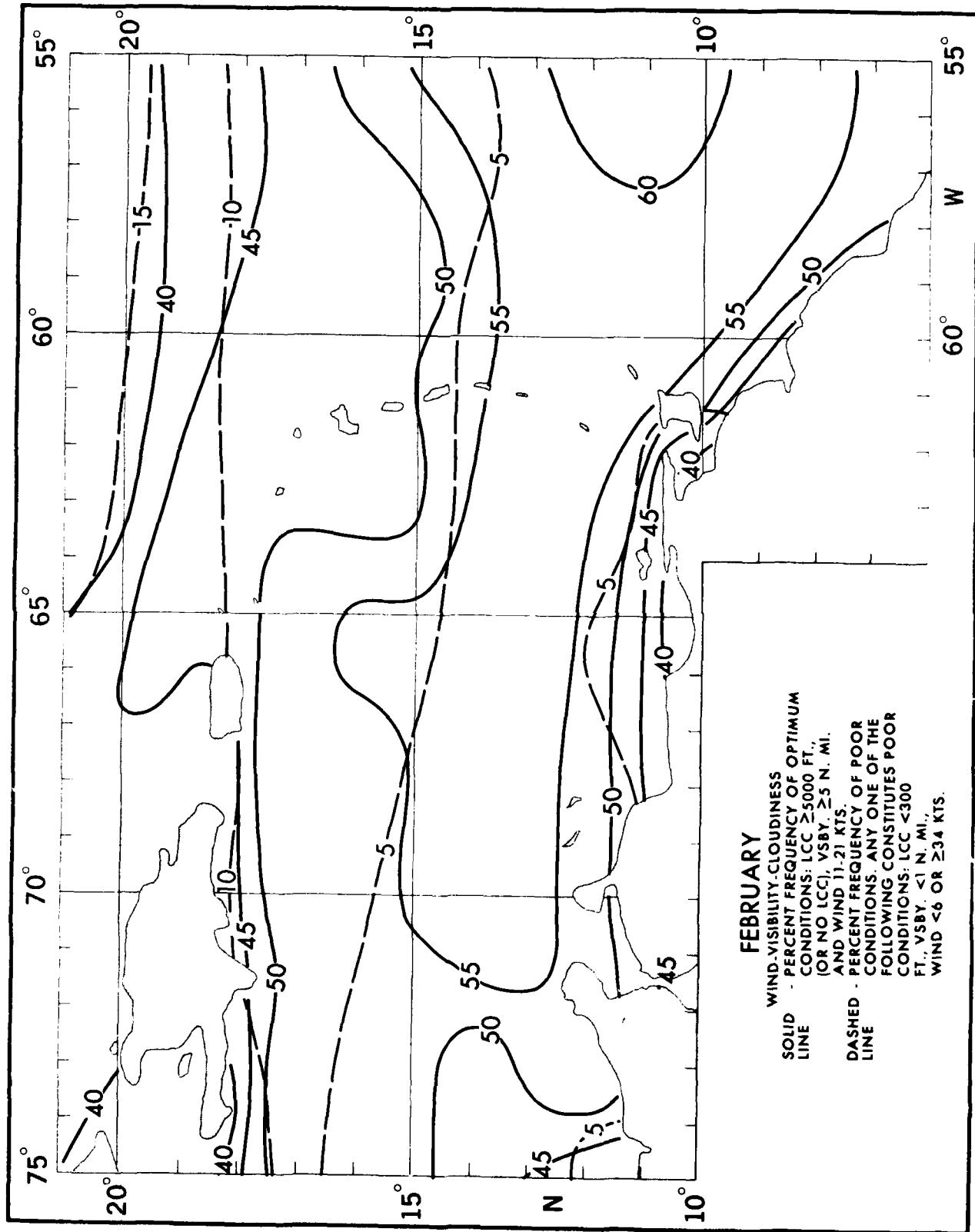
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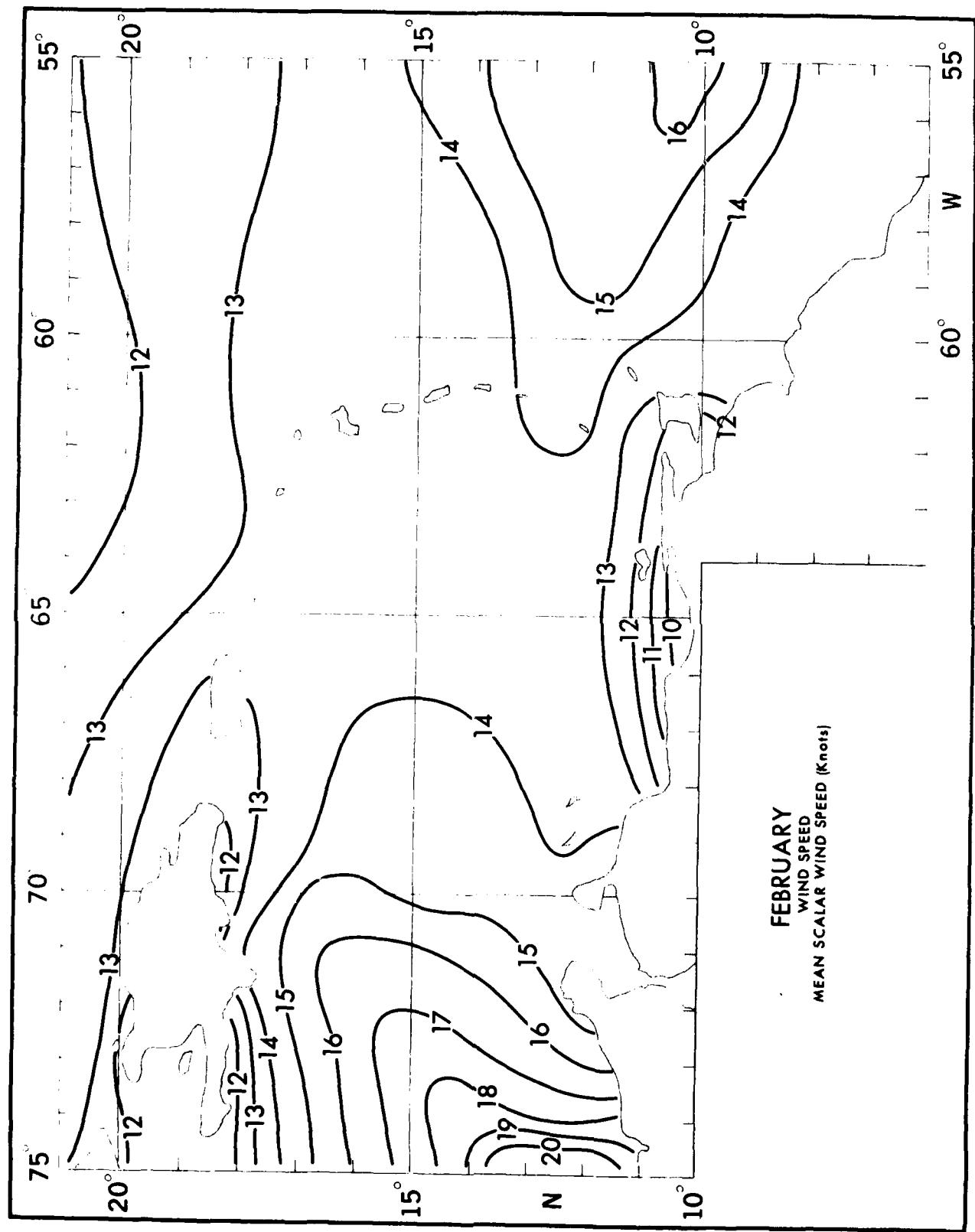
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<.51		0.1		<.51		0.1		<.51		0.0		<.51		0.0		<.51		0.1		<.51		0.0		<.51		0.1		<.51	
1<2		0.1		1<2		0.0		1<2		0.0		1<2		0.3		1<2		0.0		1<2		0.1		1<2		0.1		1<2	
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5<10		14.1		5<10		11.3		5<10		10.1		5<10		9.3		5<10		11.4		5<10		10.3		5<10		10.7		5<10	
>10		80.1		>10		87.4		>10		88.8		>10		90.2		>10		87.3		>10		89.7		>10		94.8		>10	
N=		1726		N=		1187		N=		644		N=		706		N=		307		N=		136		N=		1414		N=	
<.5		0.0		<.5		0.2		<.5		0.3		<.5		0.0		<.5		0.3		<.5		0.1		<.5		0.1		<.5	
<.51		0.1		<.51		0.1		<.51		0.0		<.51		0.0		<.51		0.1		<.51		0.0		<.51		0.2		<.51	
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N=		1187		N=		644		N=		706		N=		307		N=		136		N=		1414		N=		574		N=	
<.5		0.0		<.5		0.0		<.5		0.0		<.5		0.0		<.5		0.0		<.5		0.0		<.5		0.0		<.5	
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>10		80.4		>10		81.0		>10		81.3		>10		81.7		>10		82.5		>10		82.8		>10		89.8		>10	
N=		1234		N=		93.3		>10		94.7		>10		94.7		>10		90.4		>10		88.6		>10		86.7		>10	
<.5		0.0		<.5		0.0		<.5		0.0		<.5		0.0		<.5		0.0		<.5		0.0		<.5		0.0		<.5	
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>10		80.4		>10		81.0		>10		81.3		>10		81.7		>10		82.1		>10		82.5		>10		82.8		>10	
N=		1234		N=		93.3		>10		94.7		>10		94.7		>10		90.4		>10		88.6		>10		86.7		>10	
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<.51		0.1		<.51		0.1																							

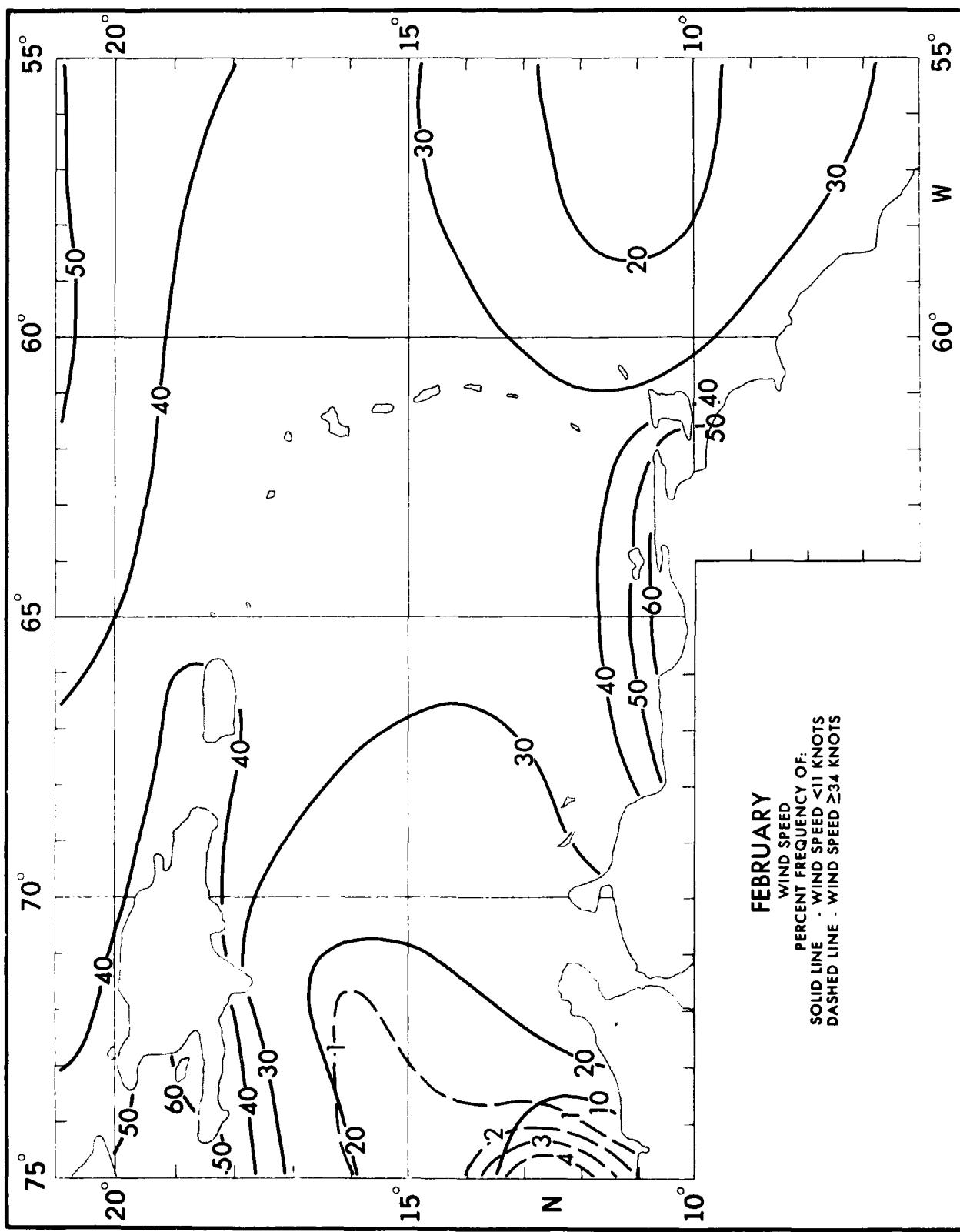


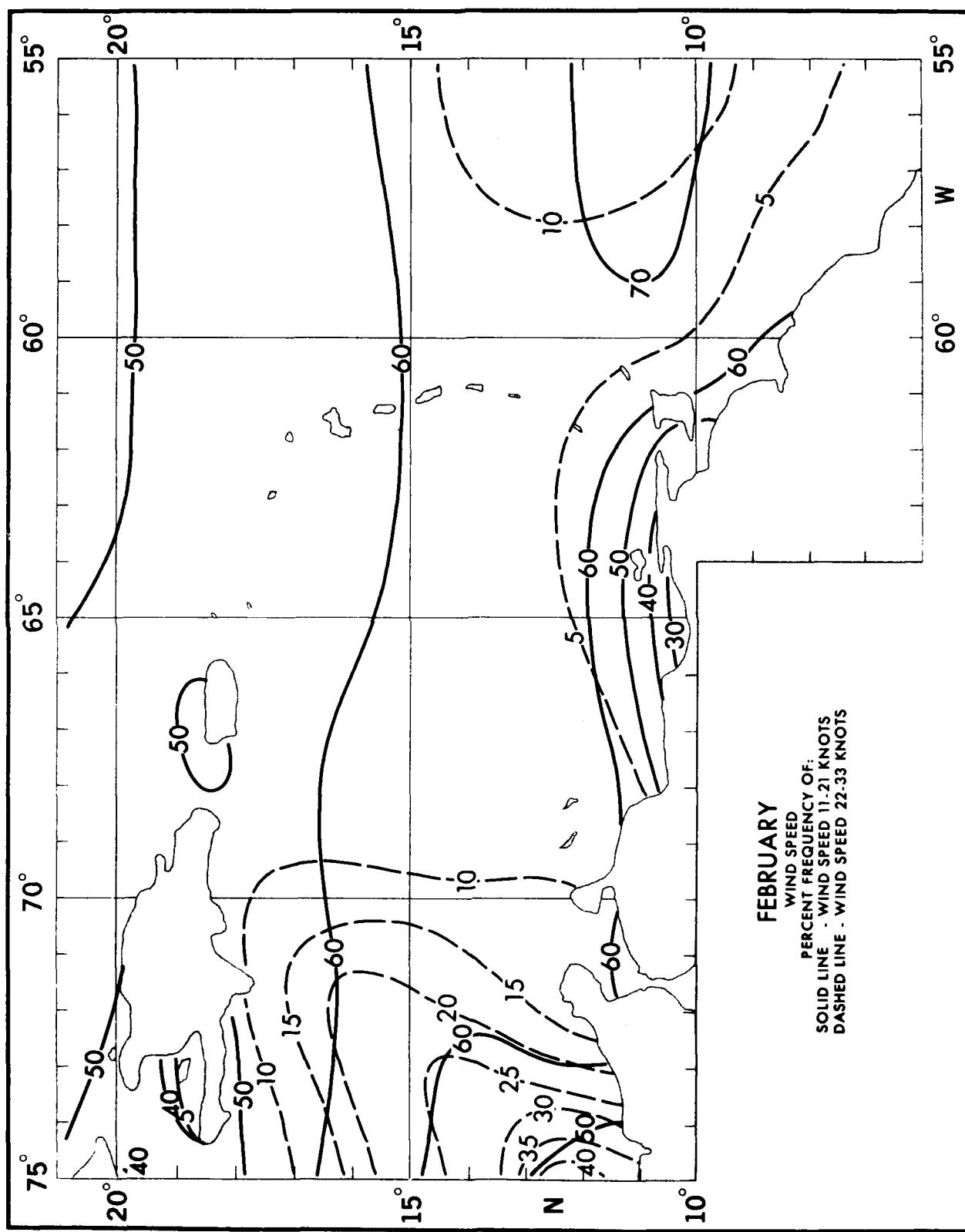


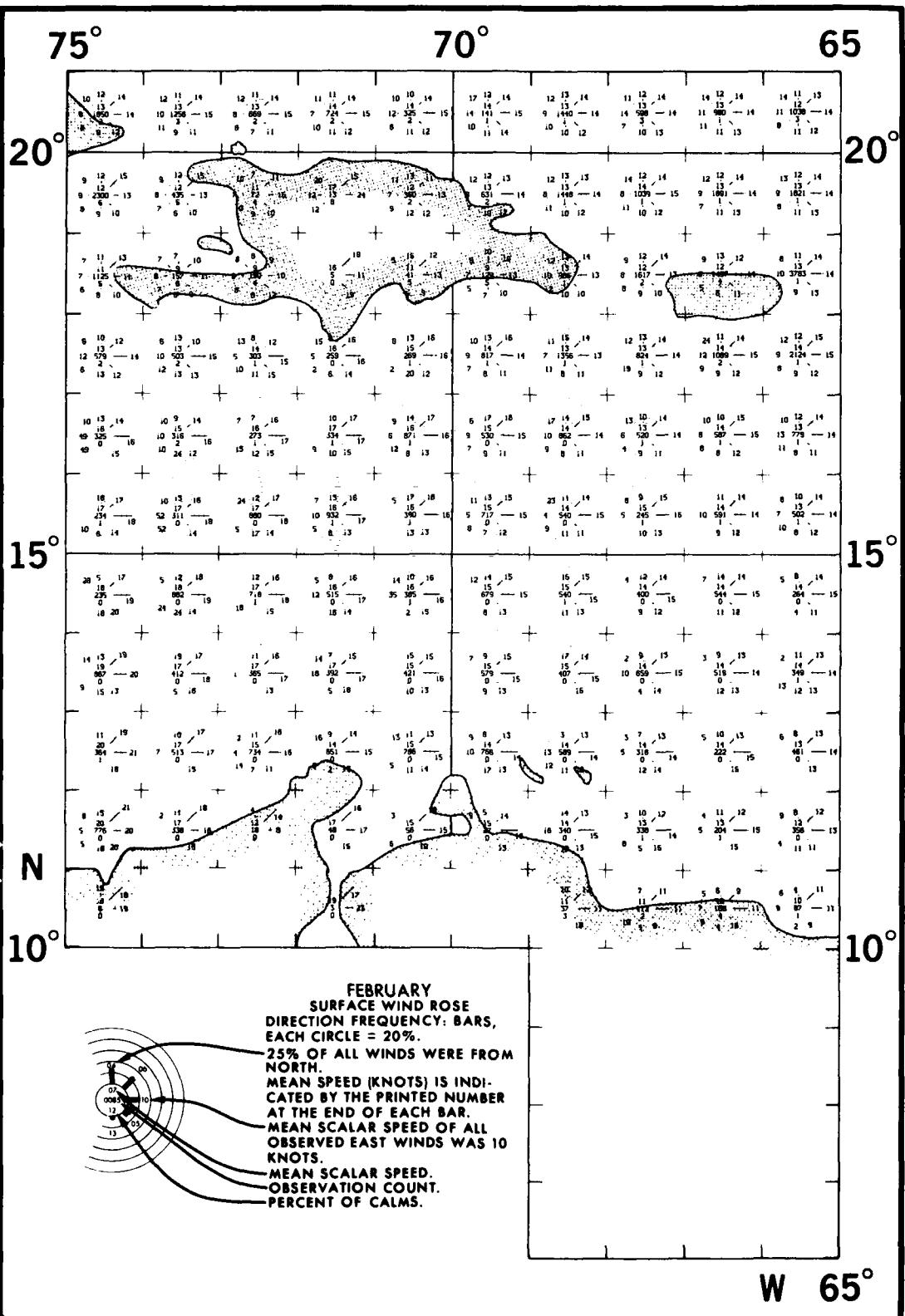


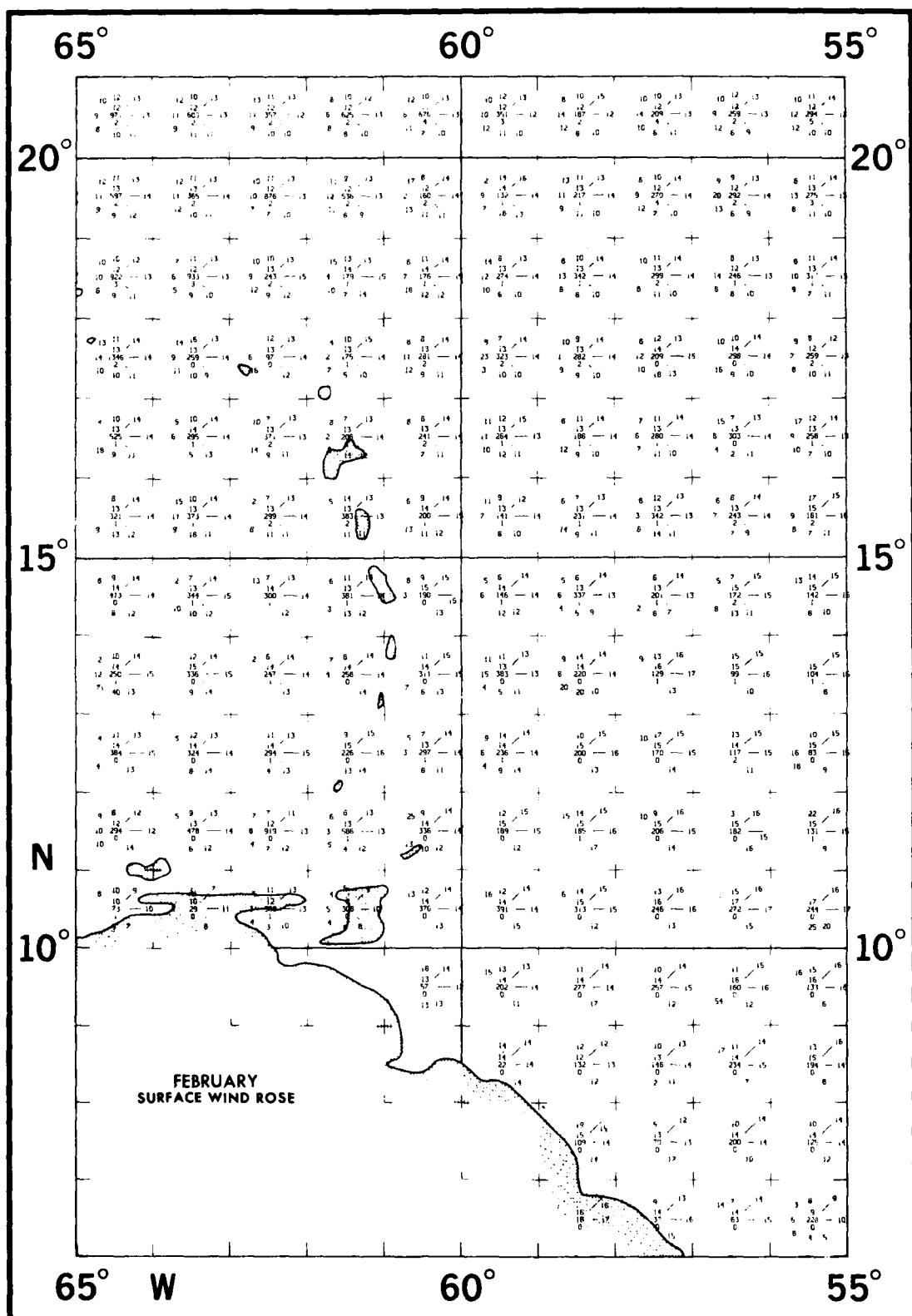


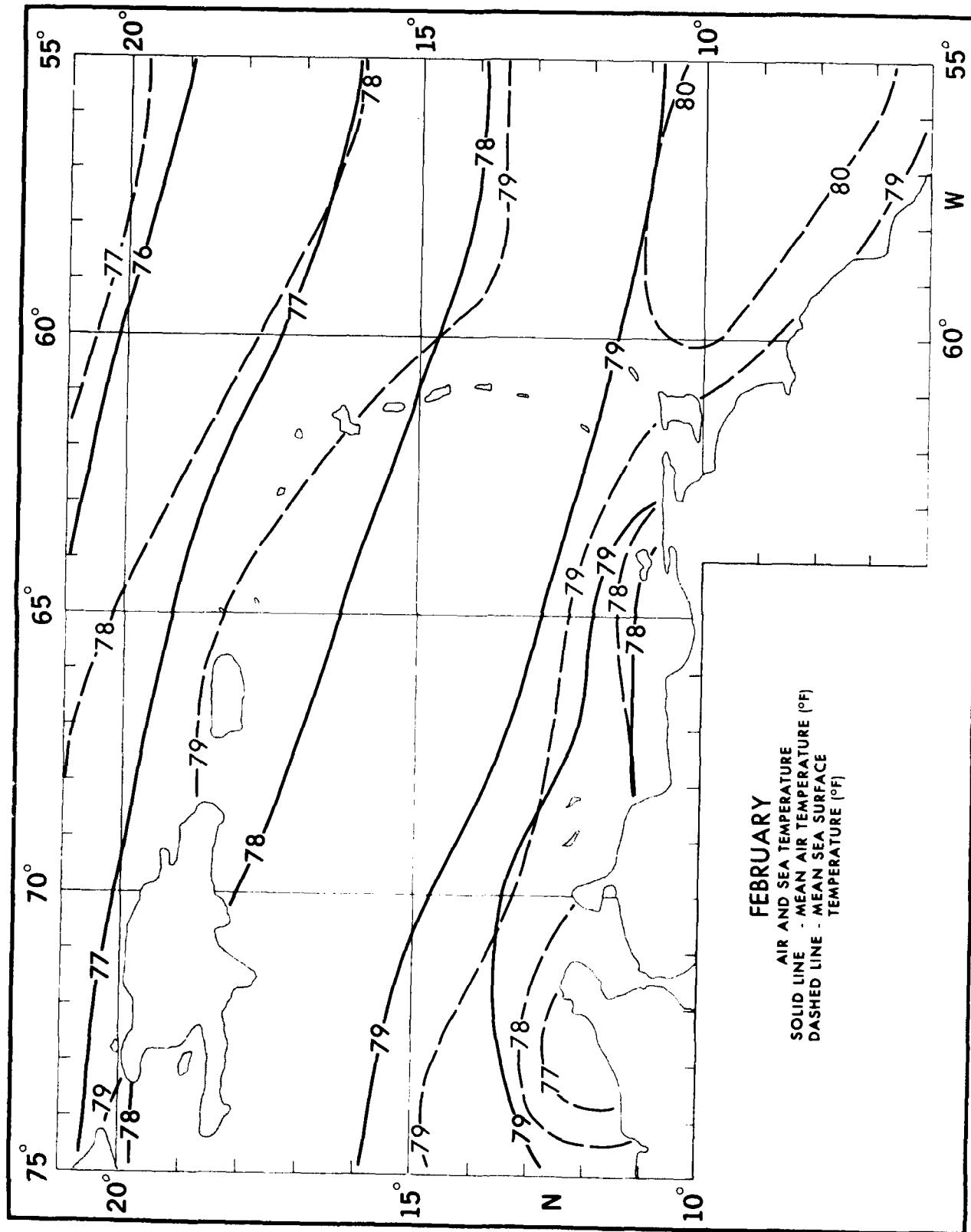


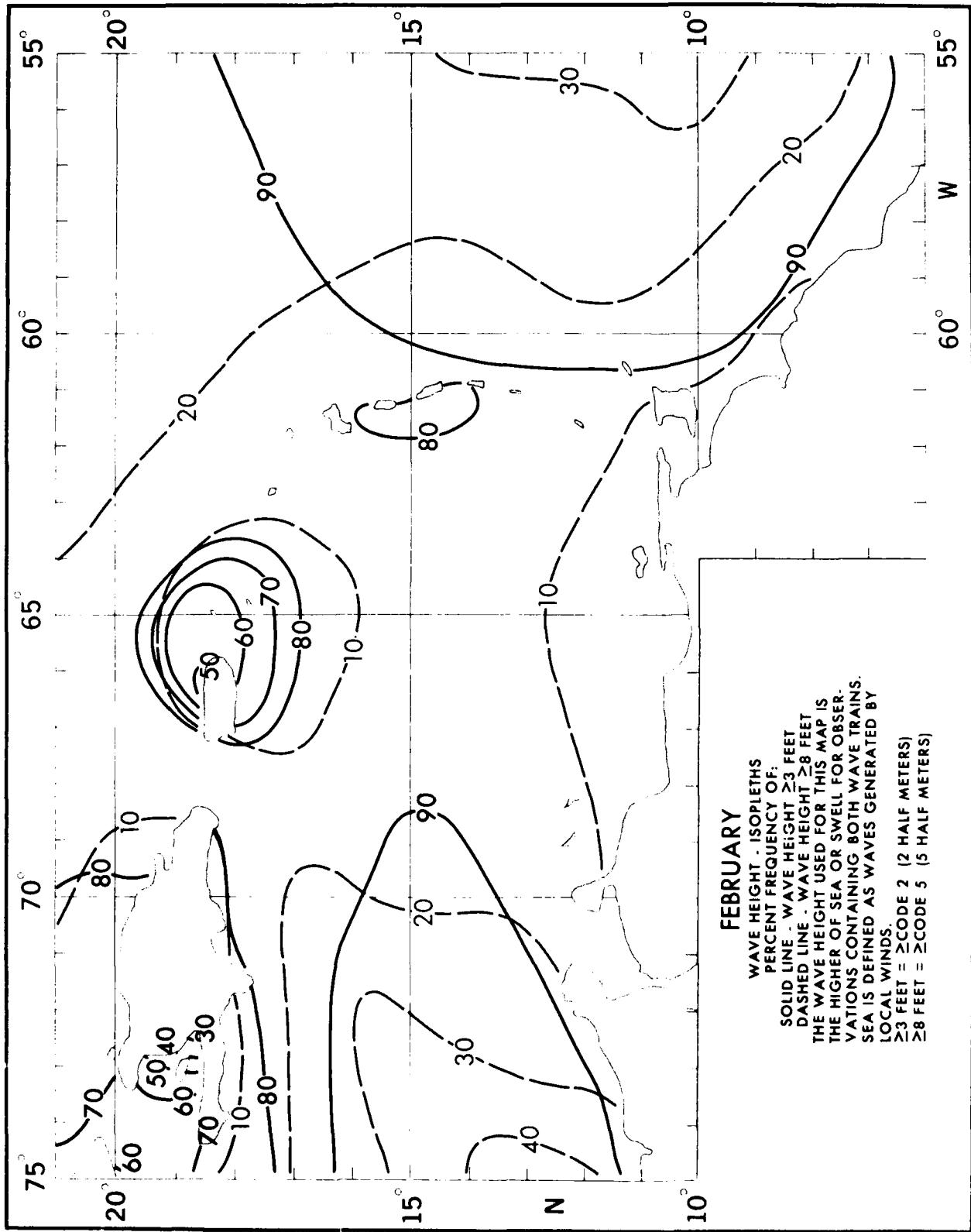


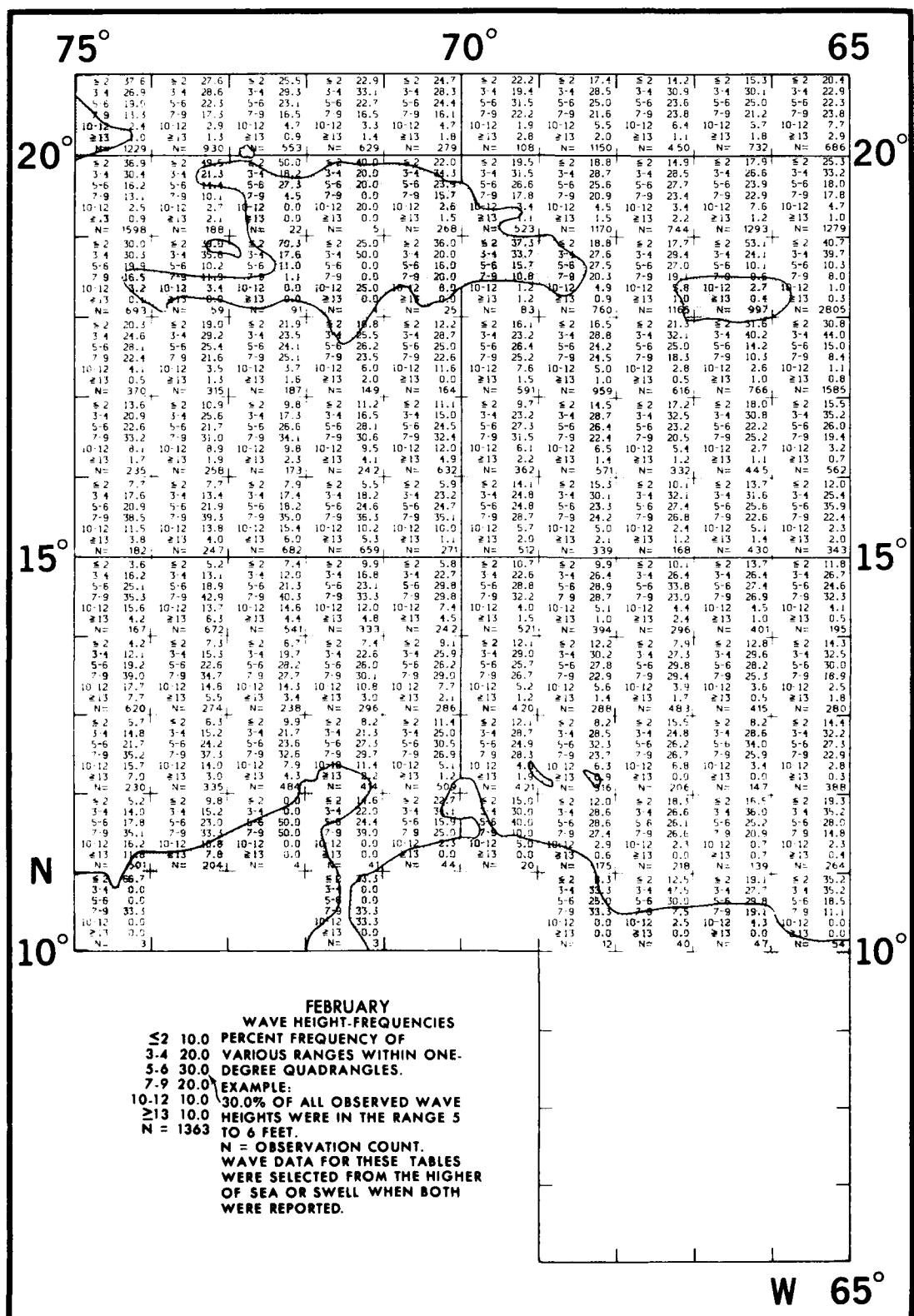


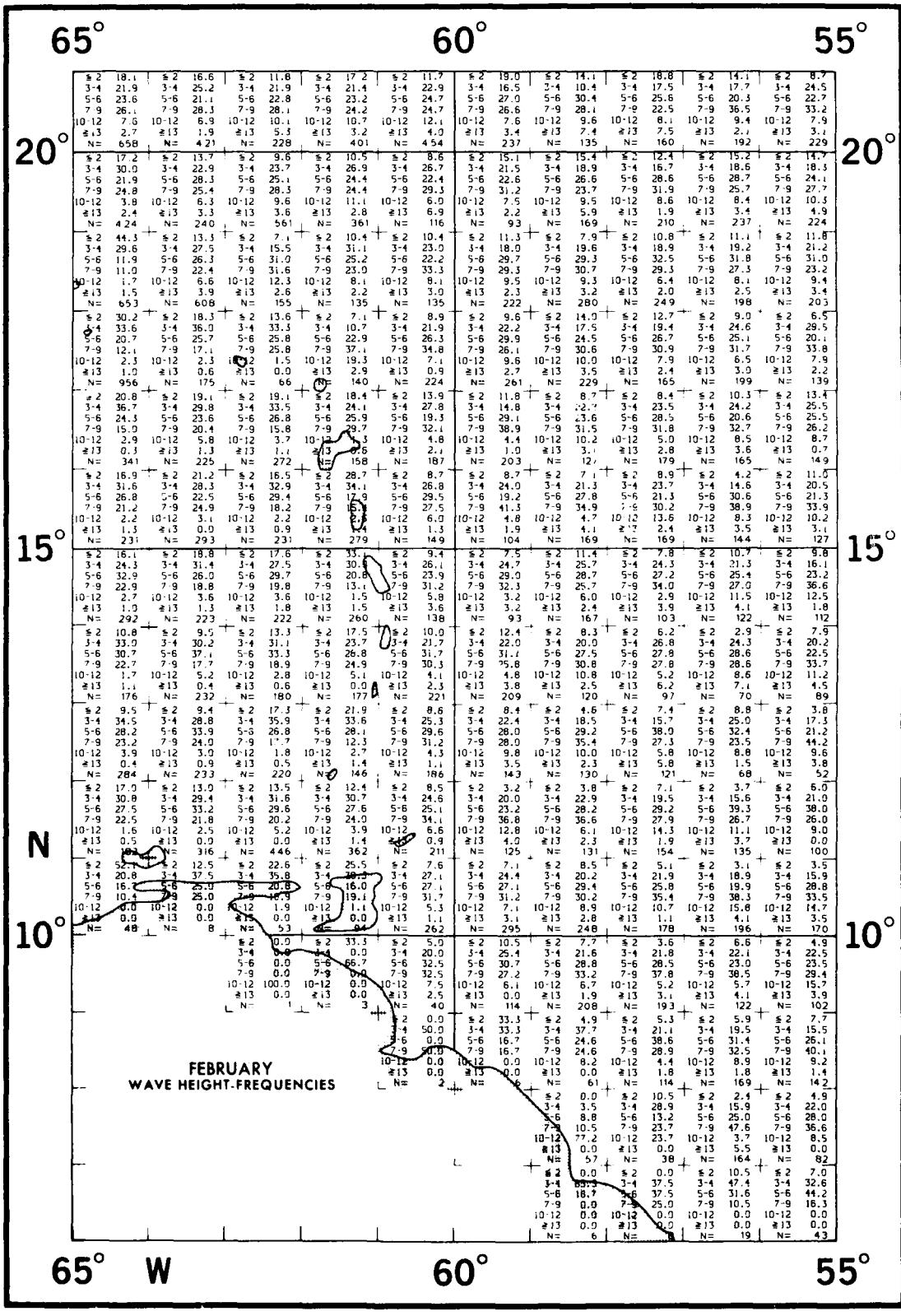


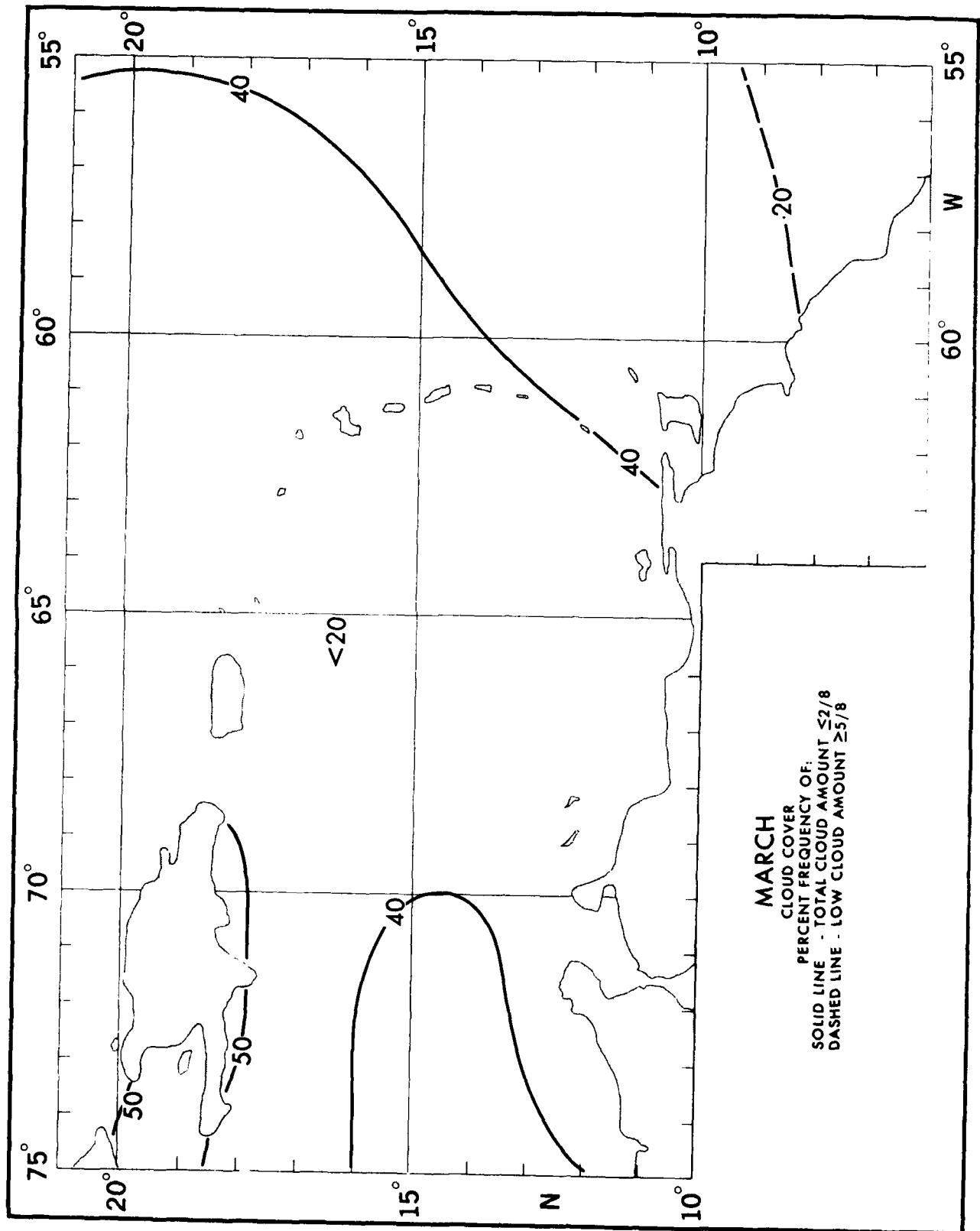


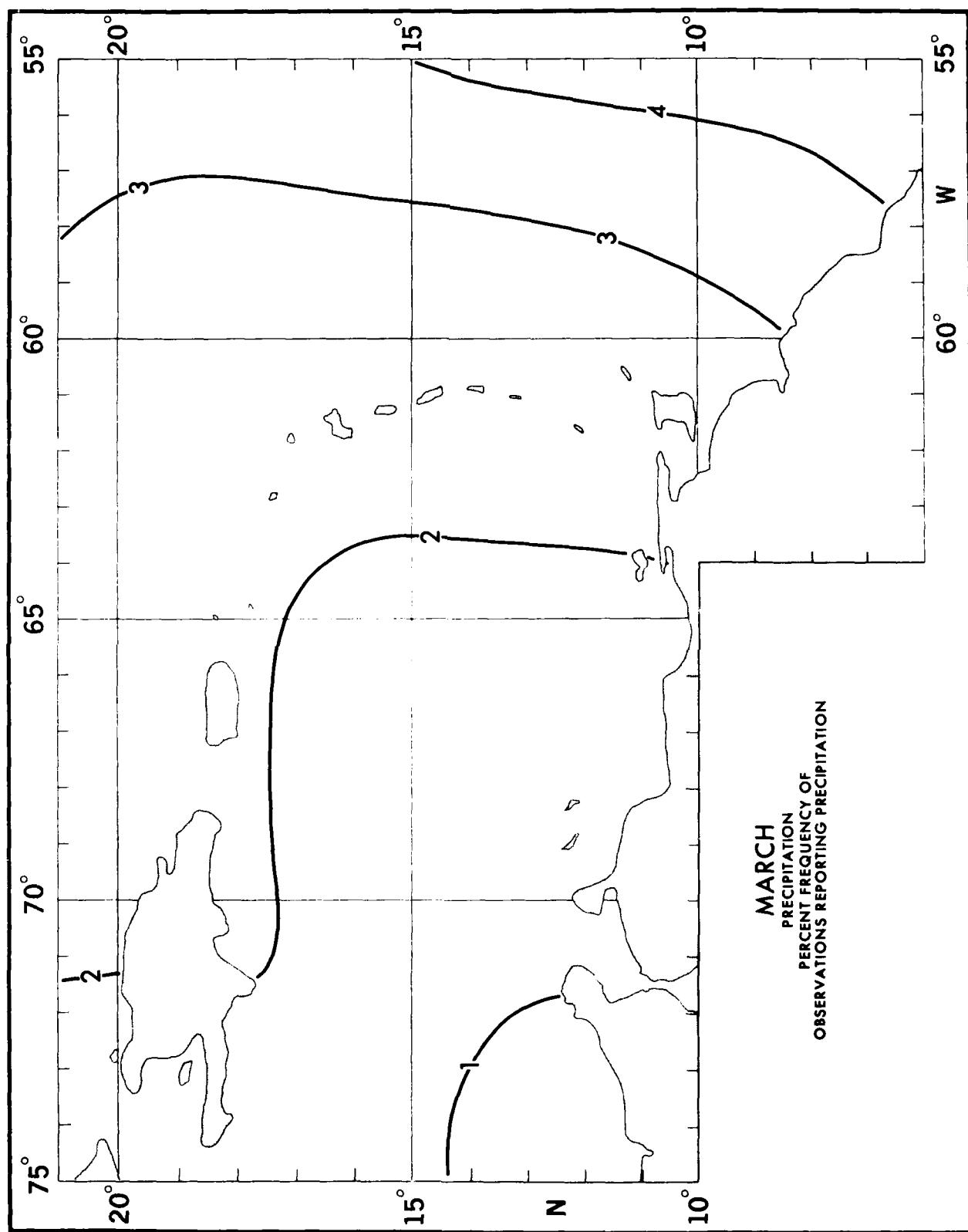


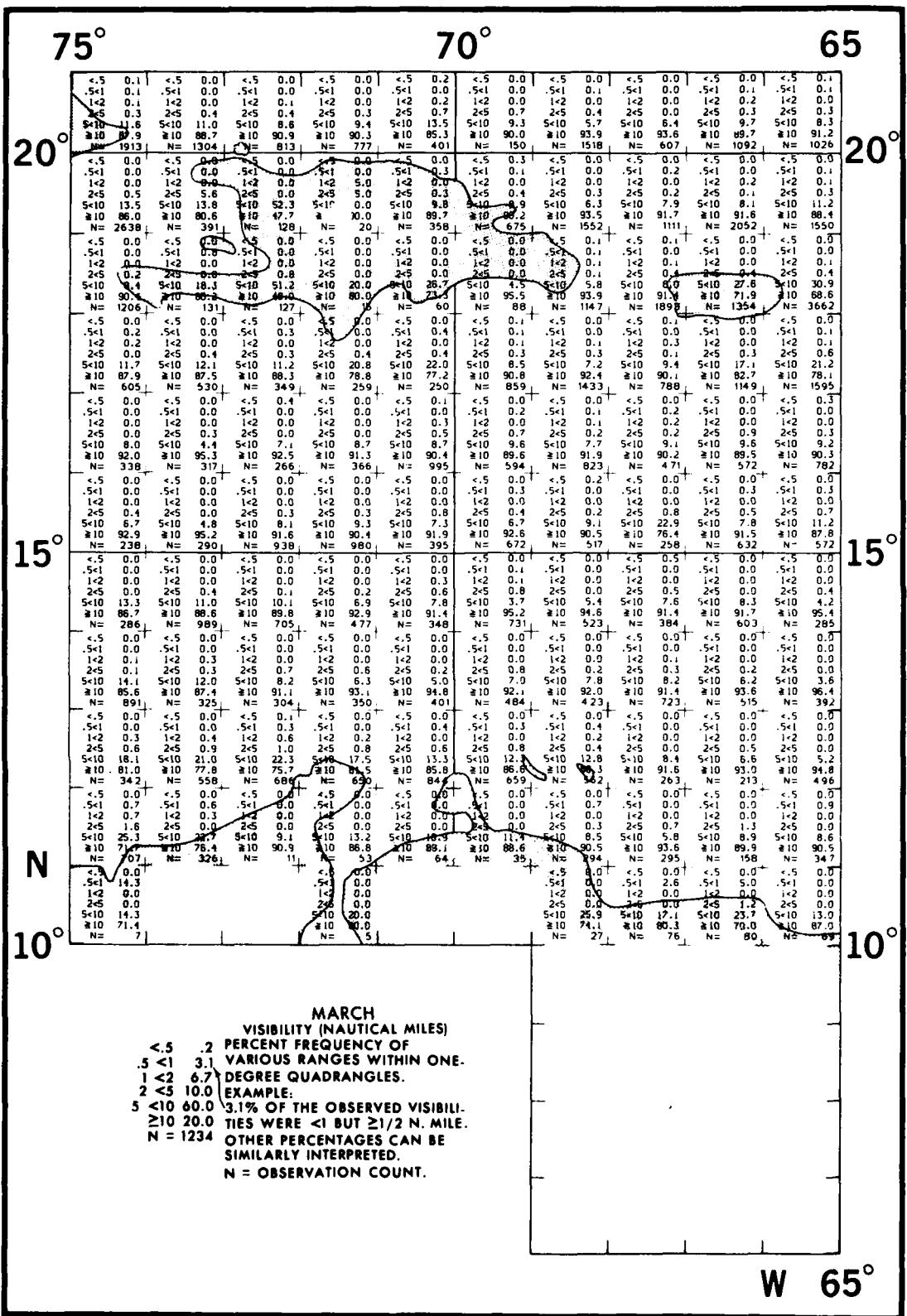


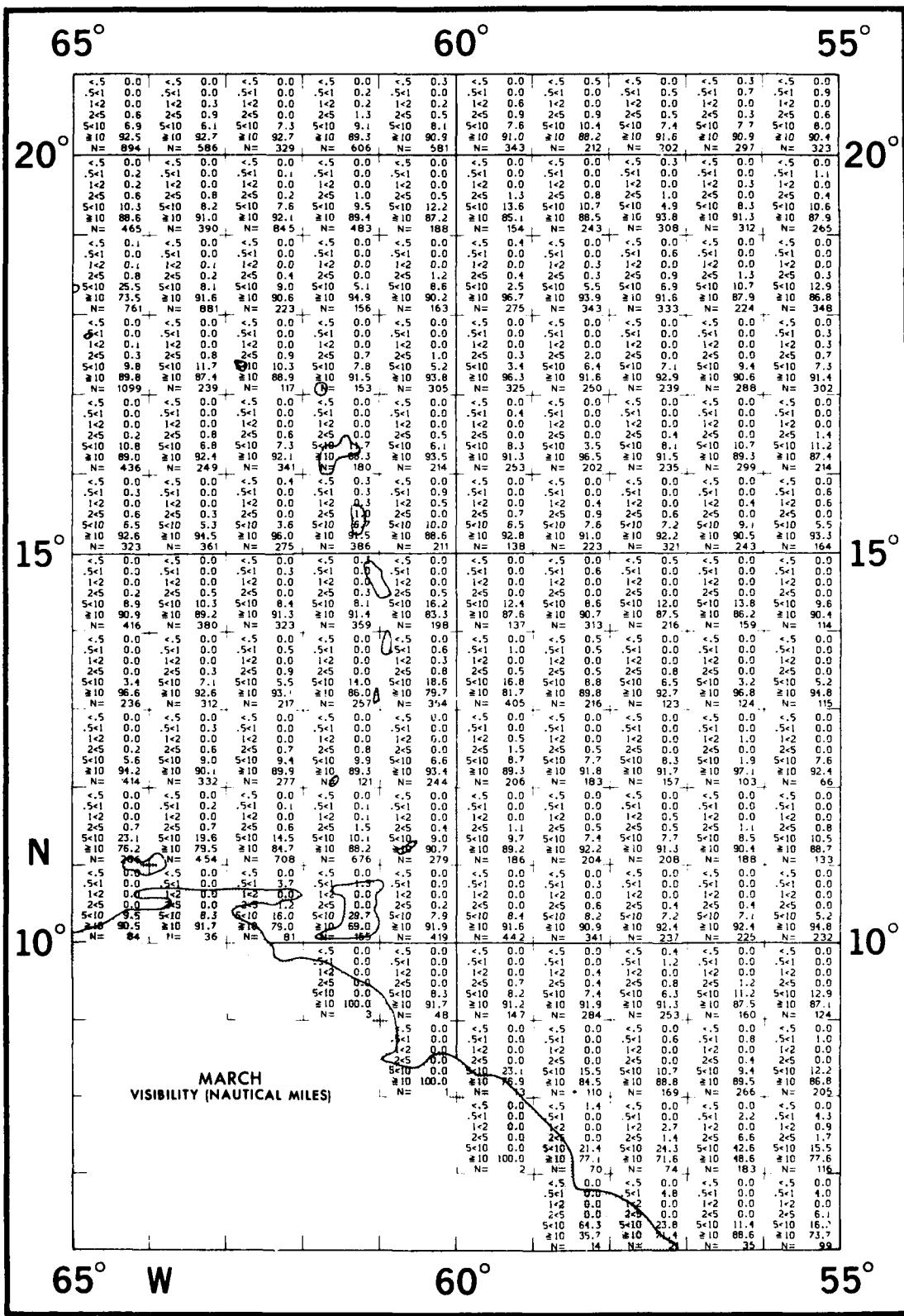


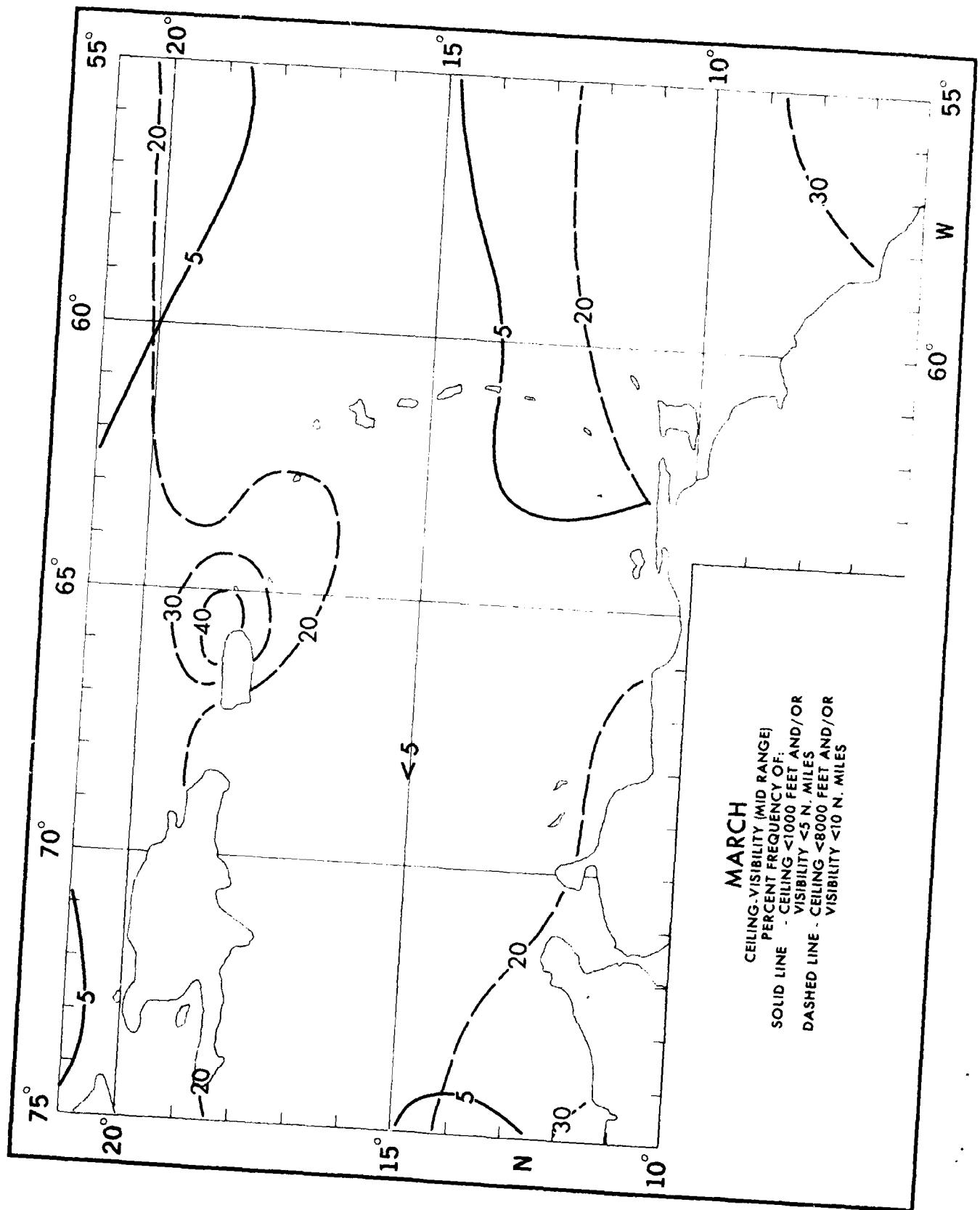


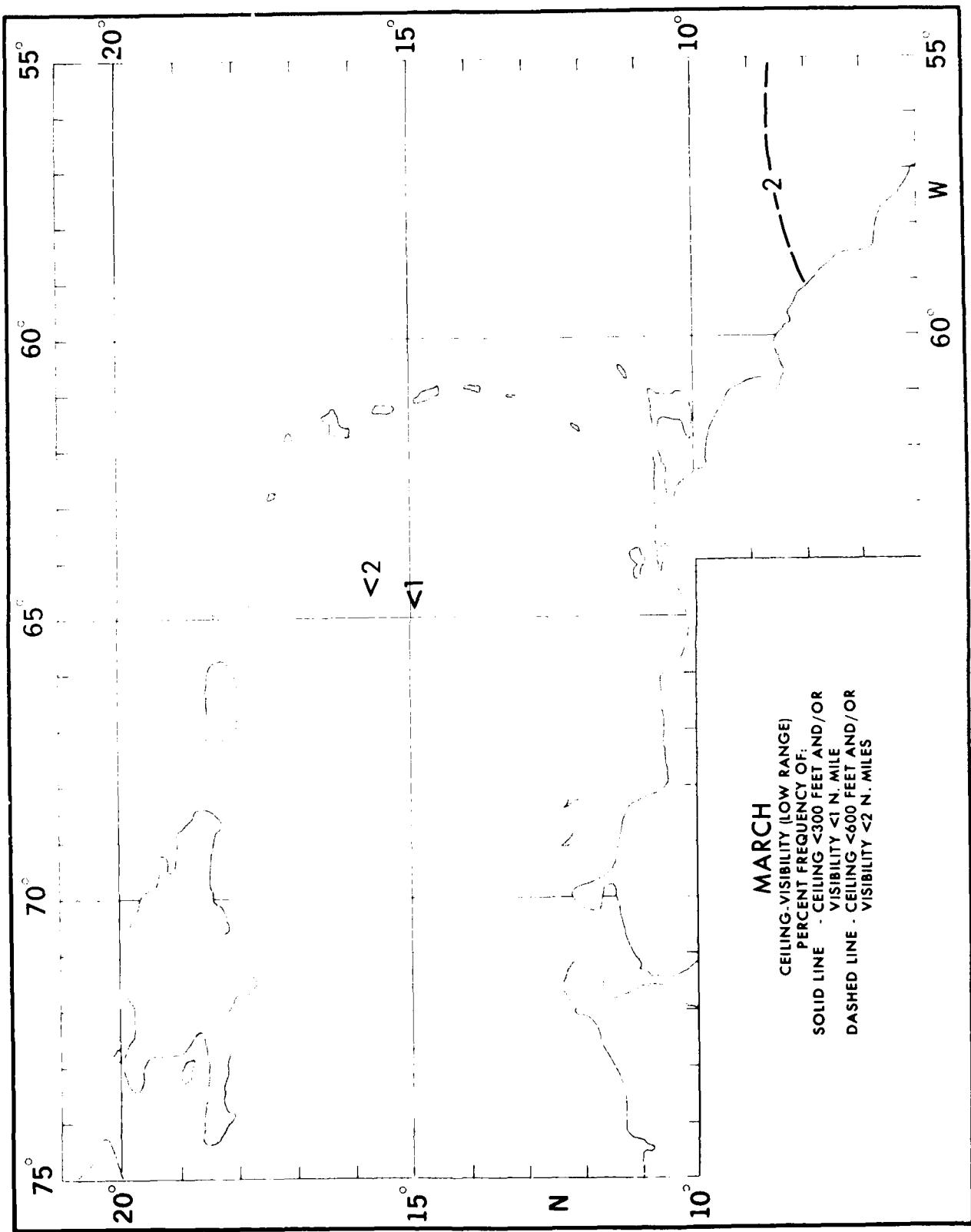


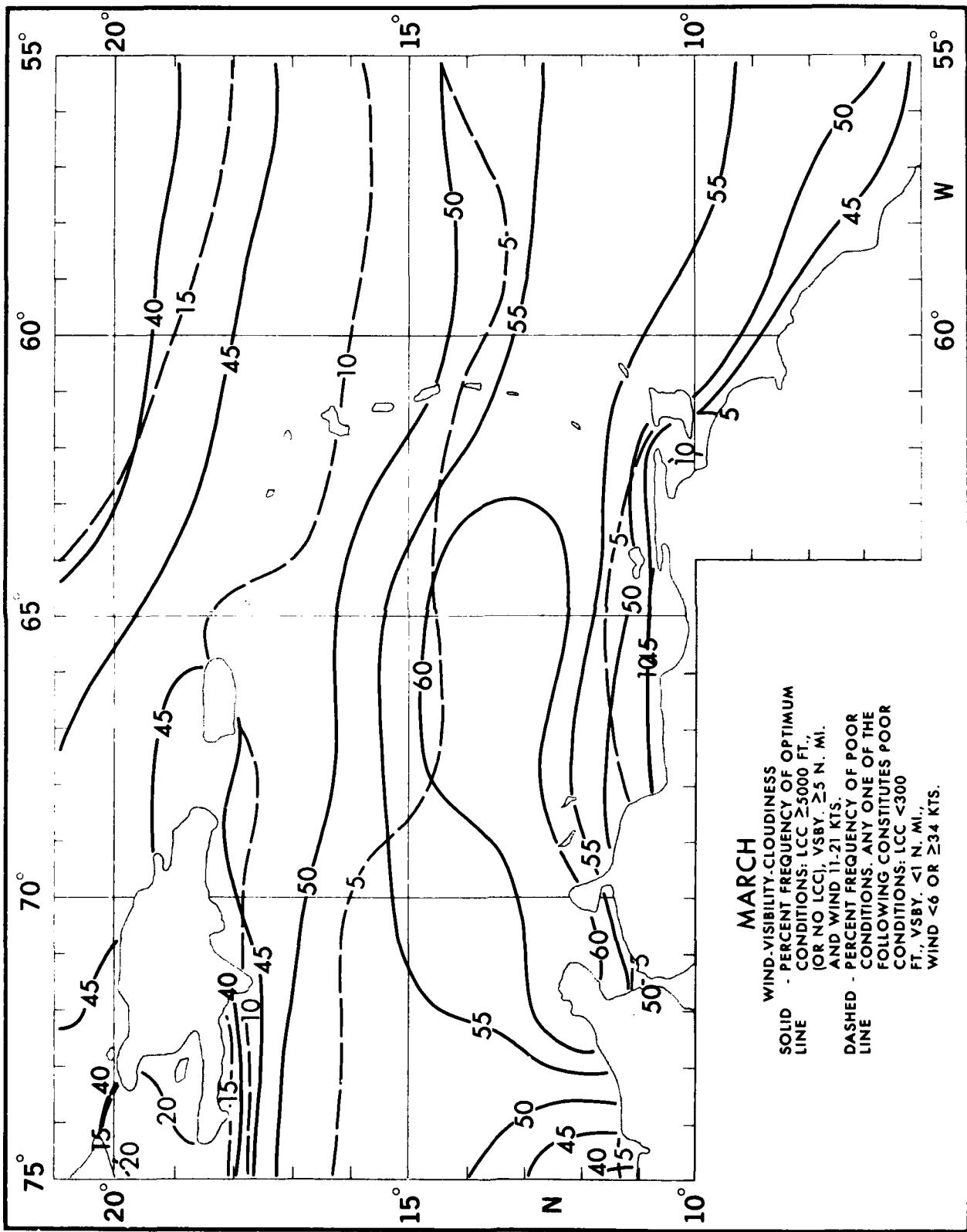


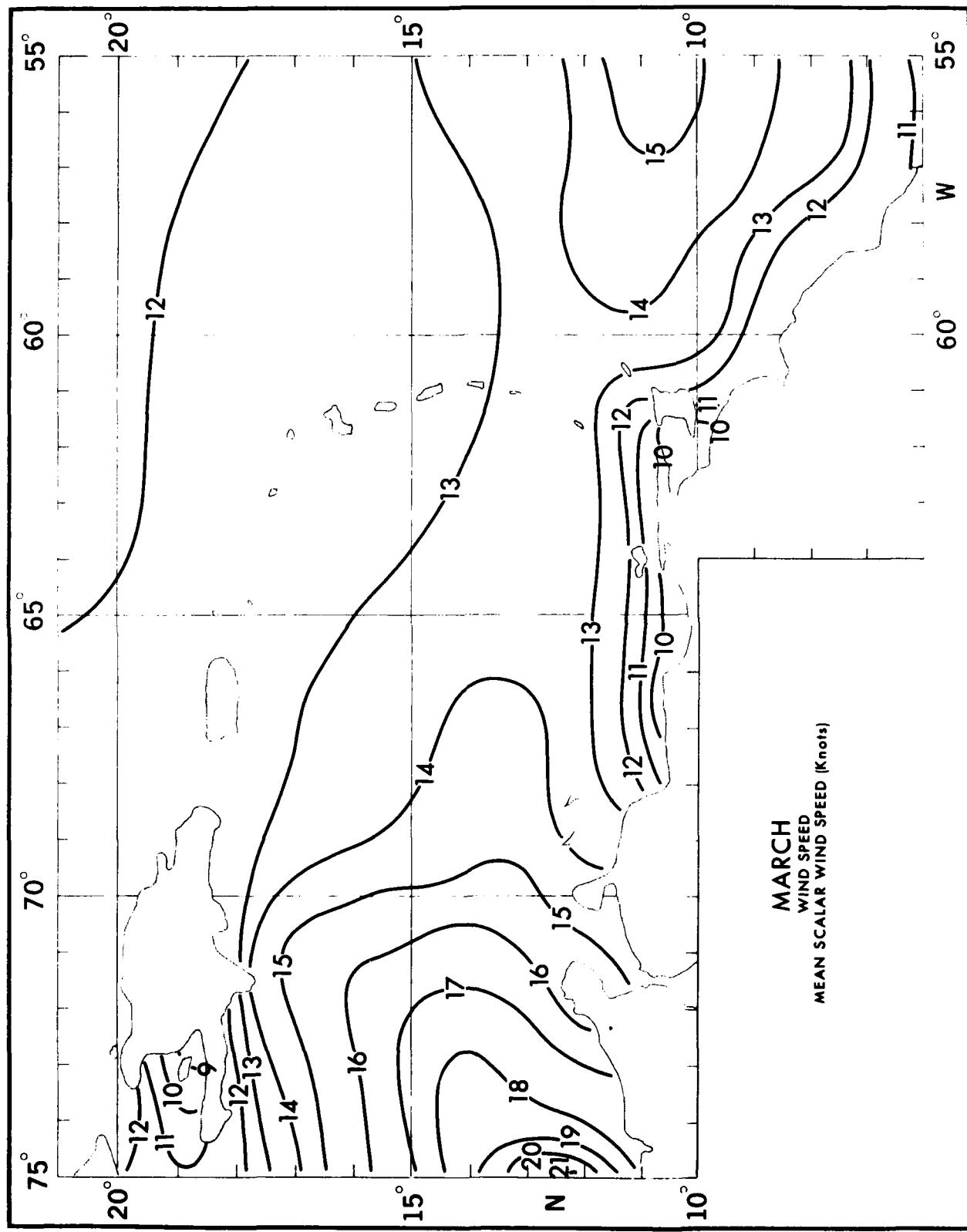


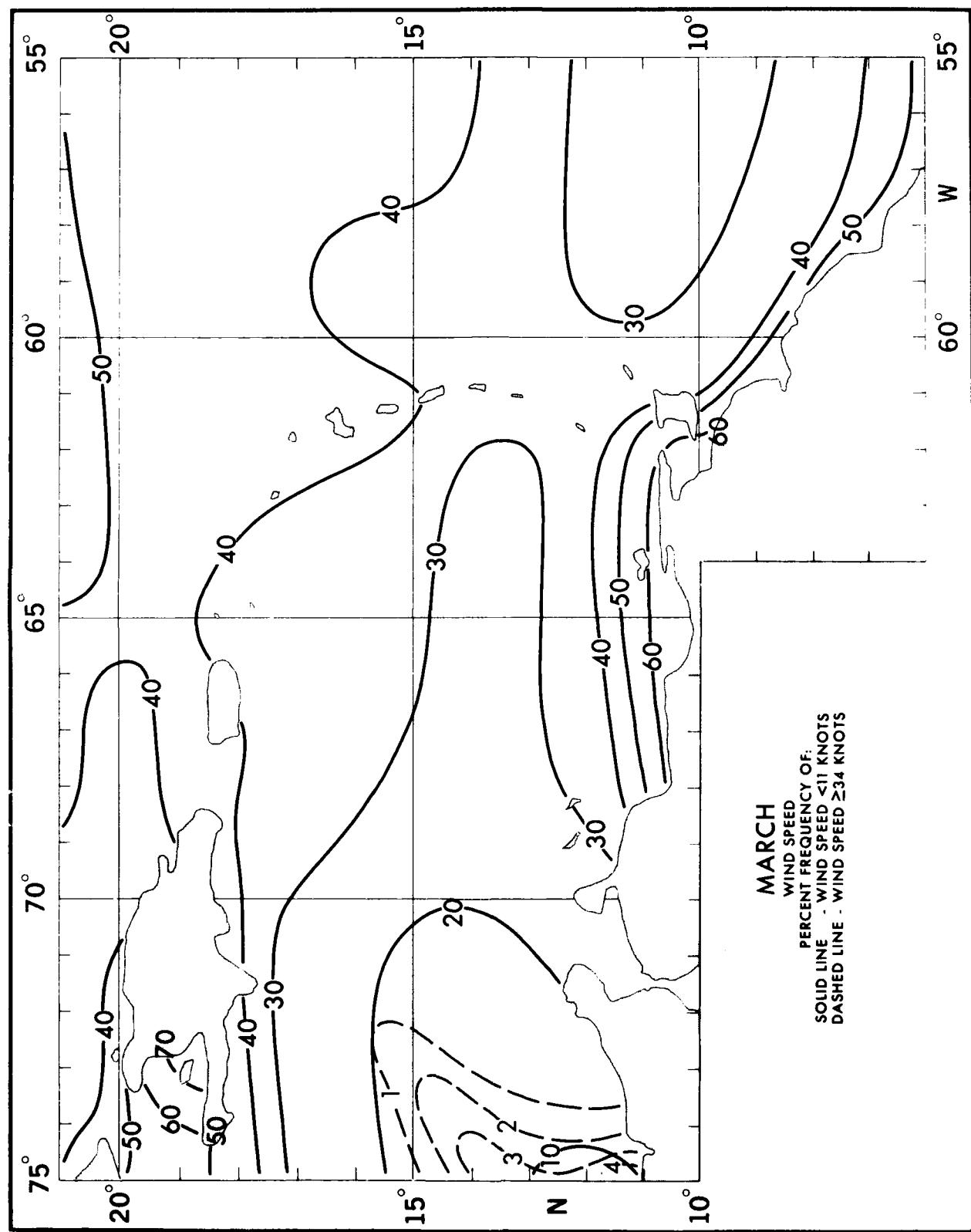


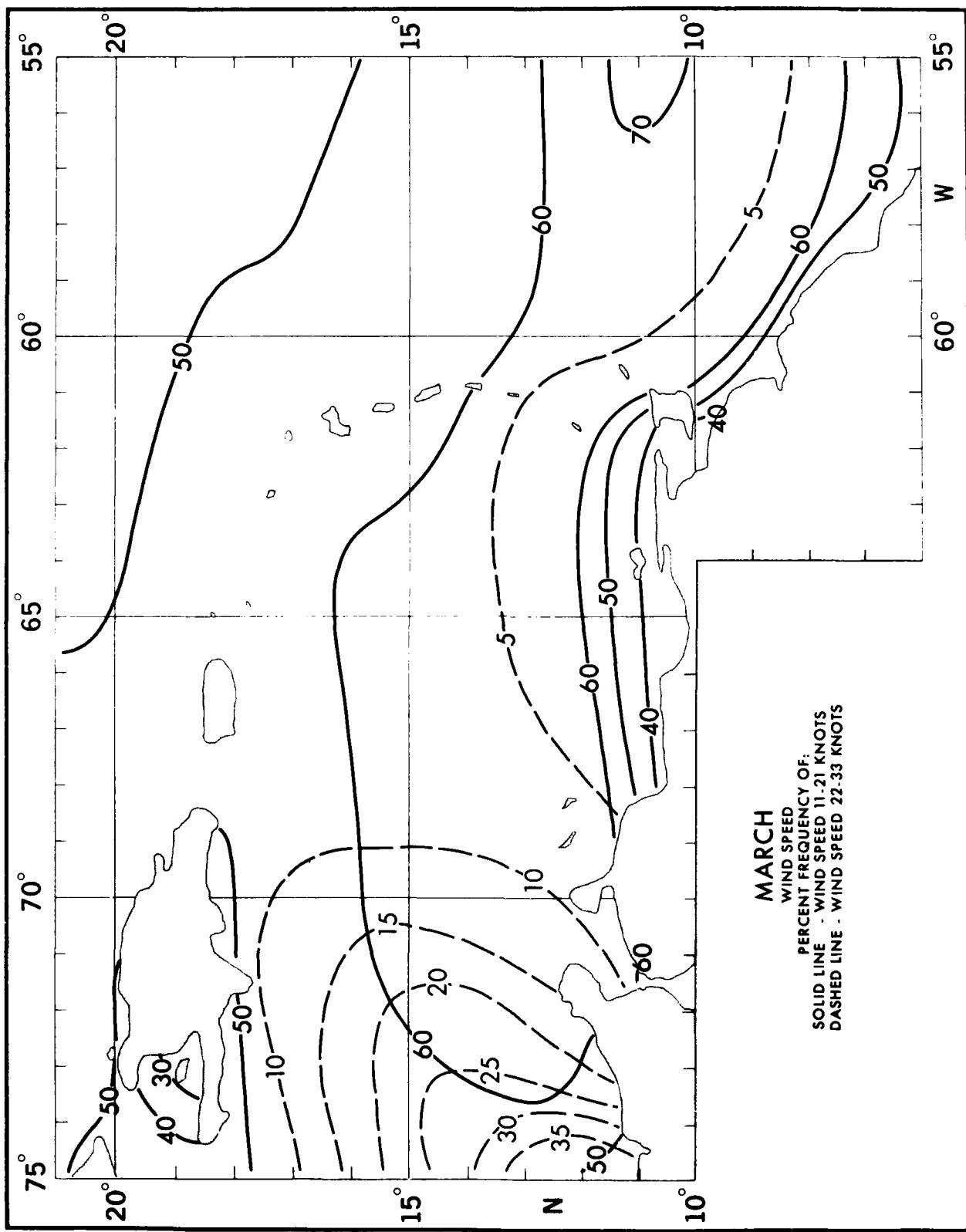


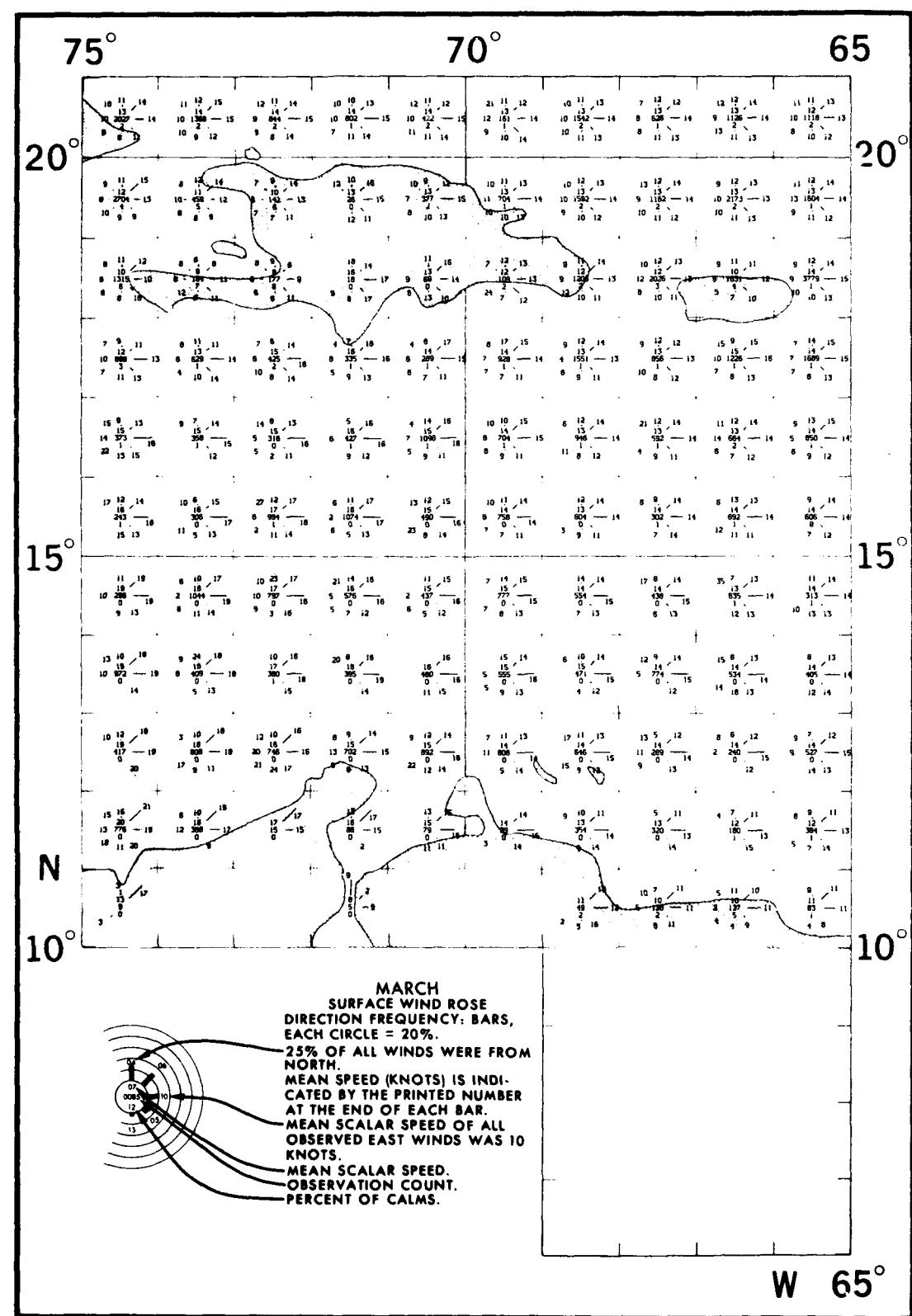


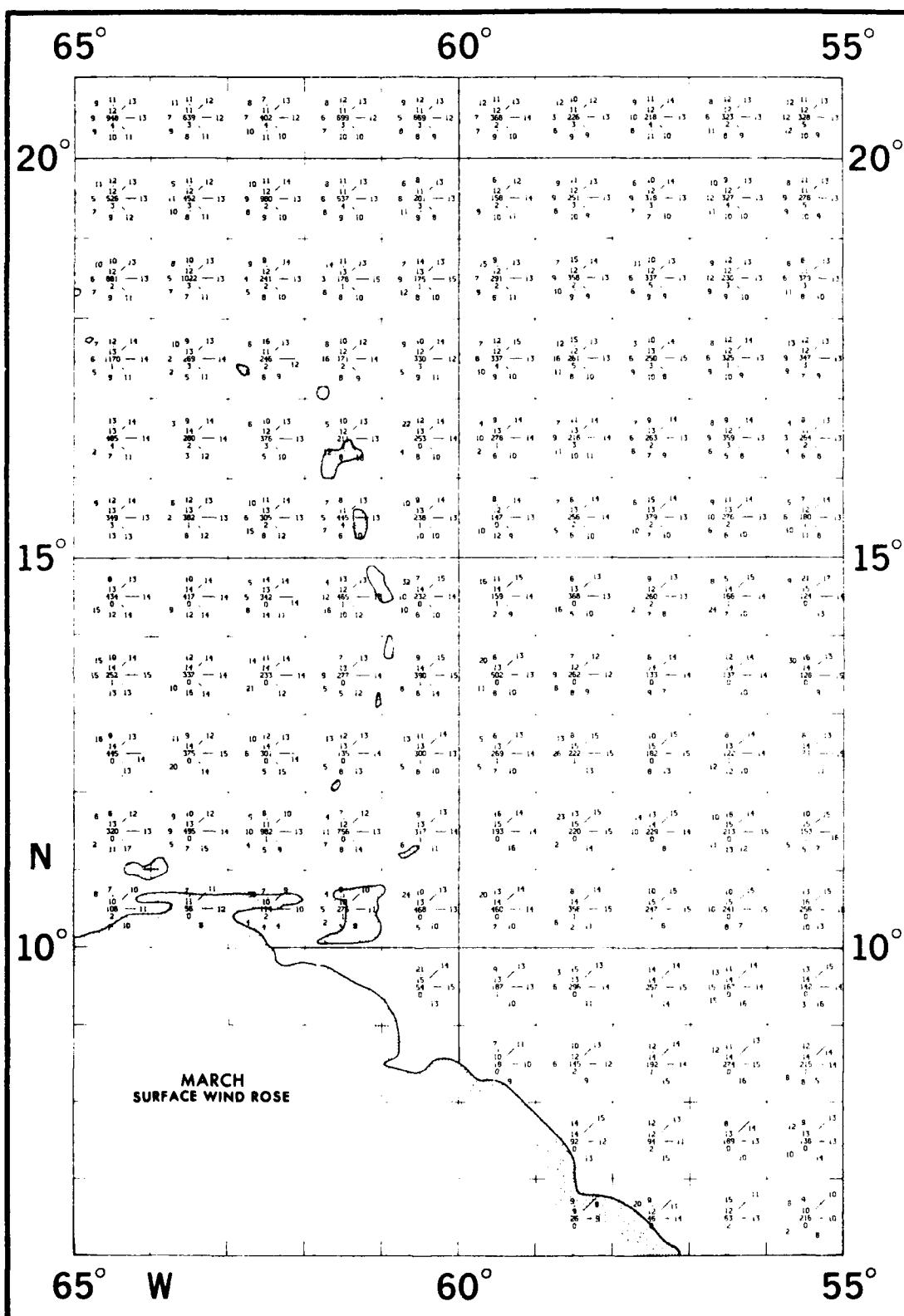


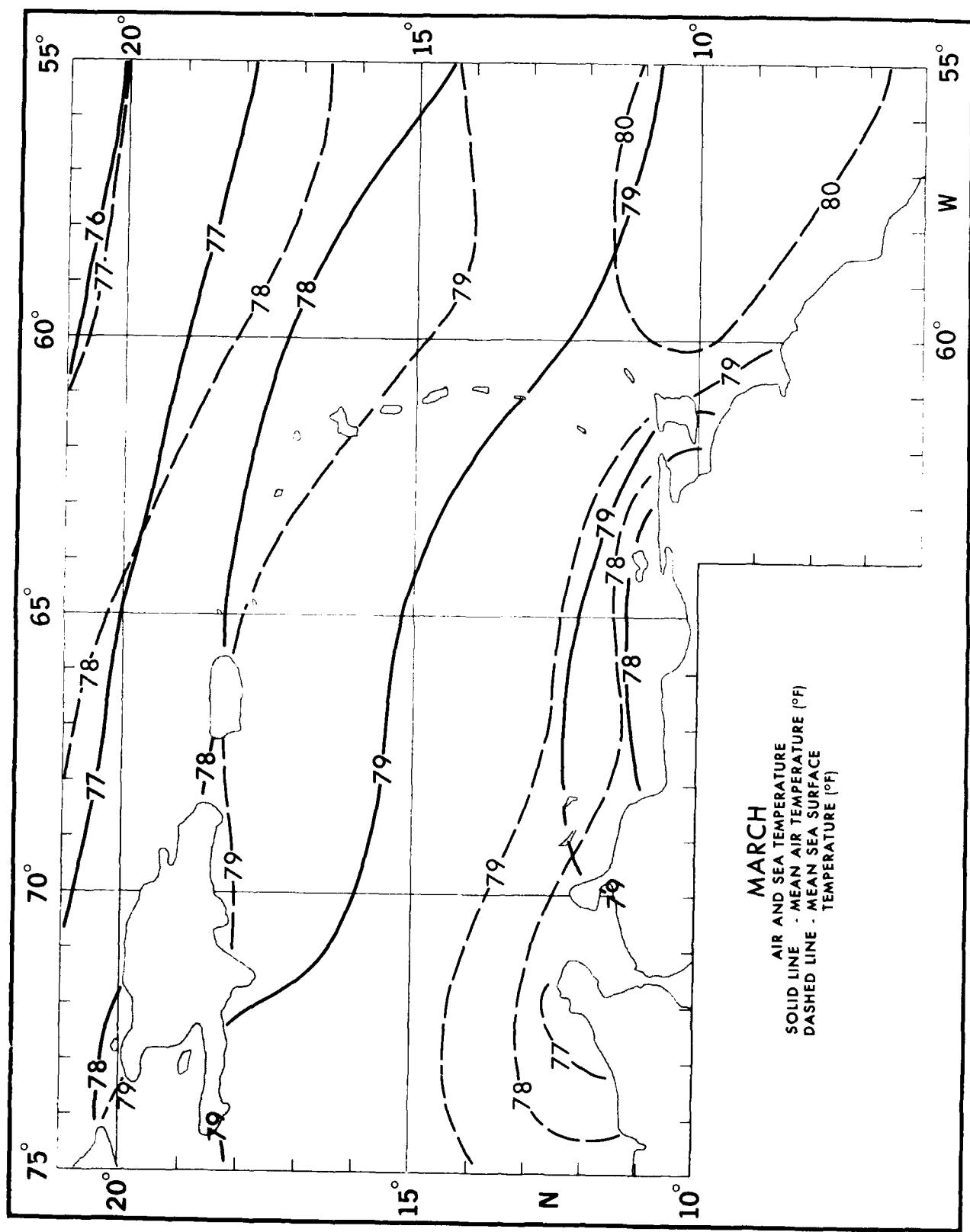


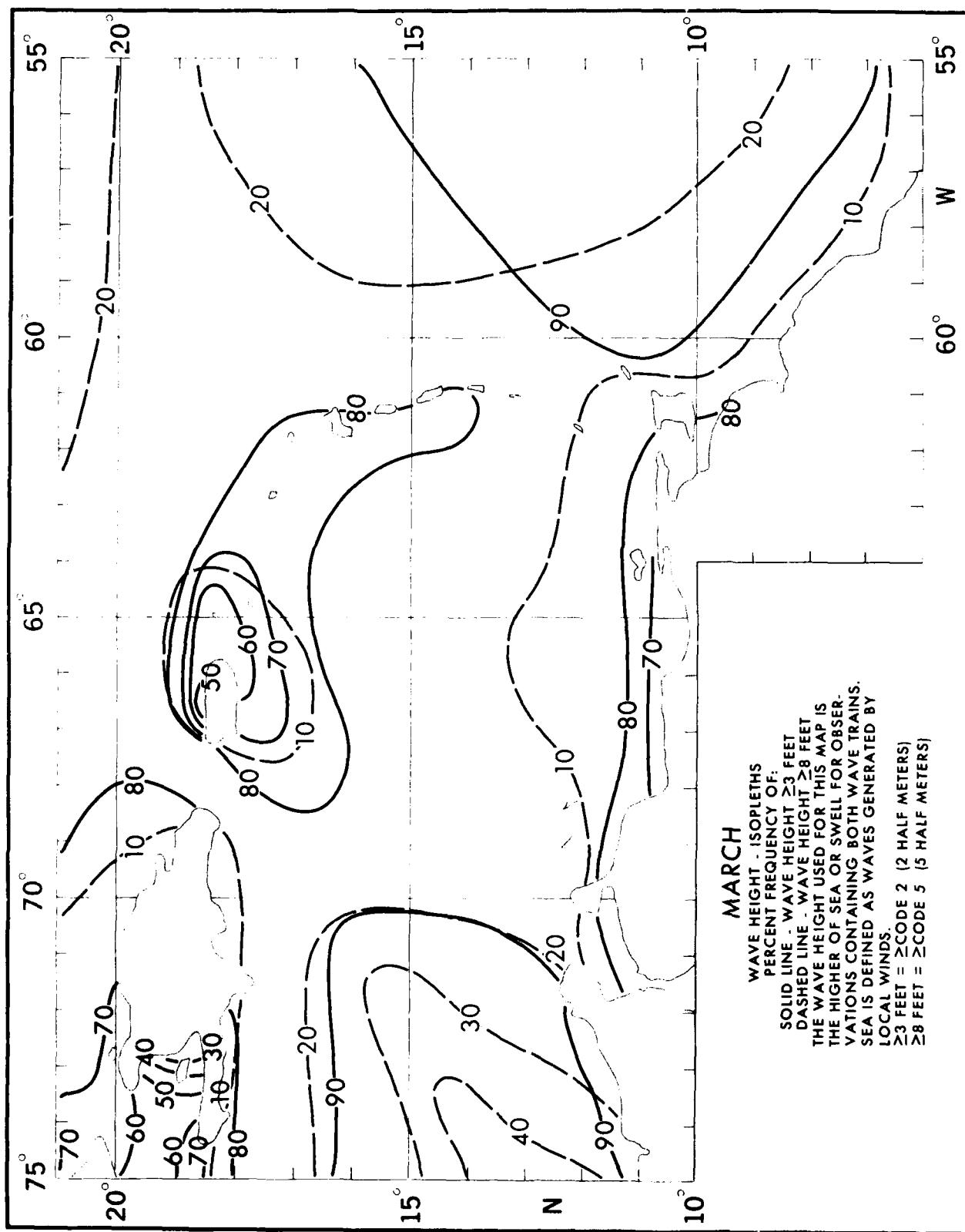


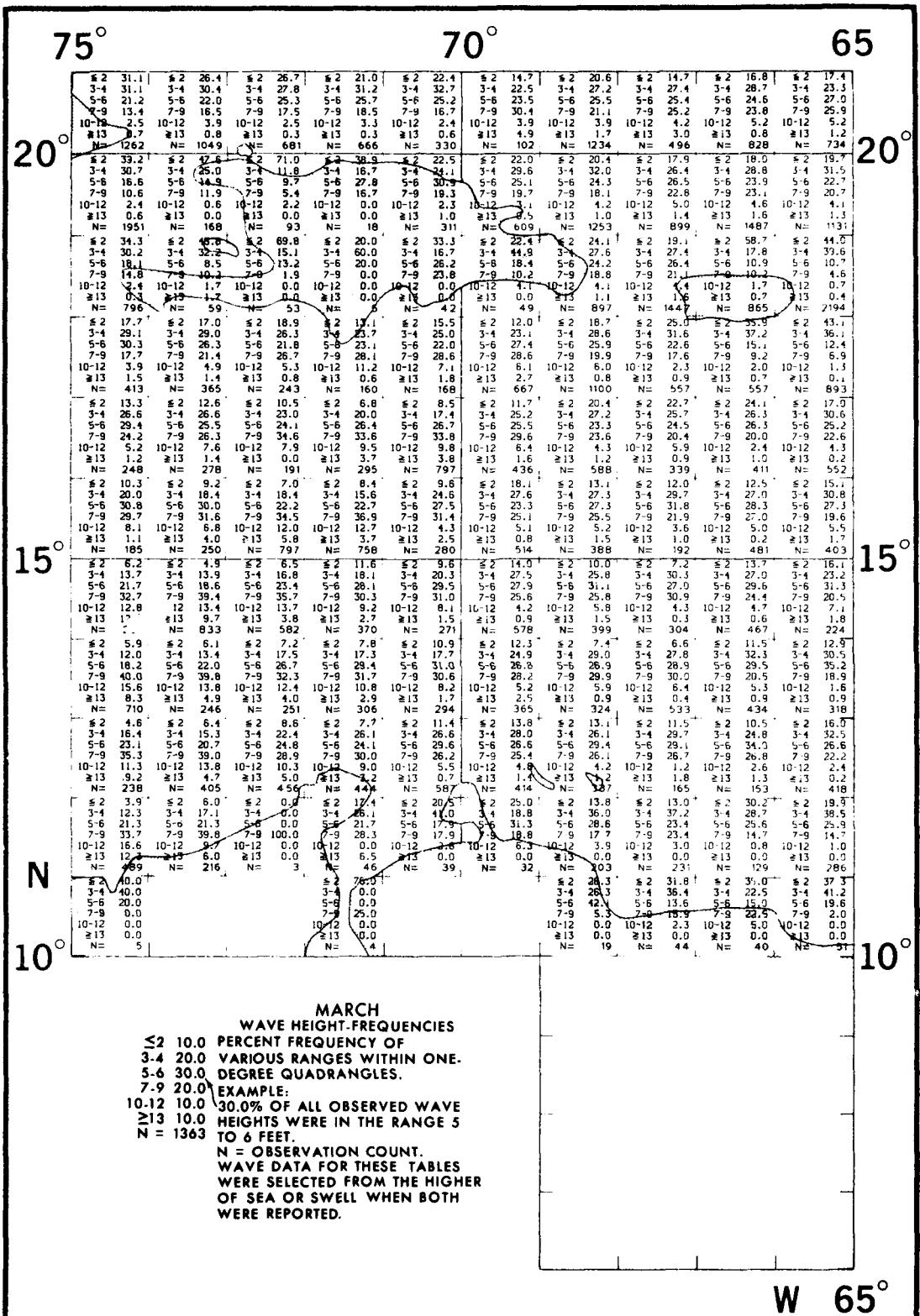


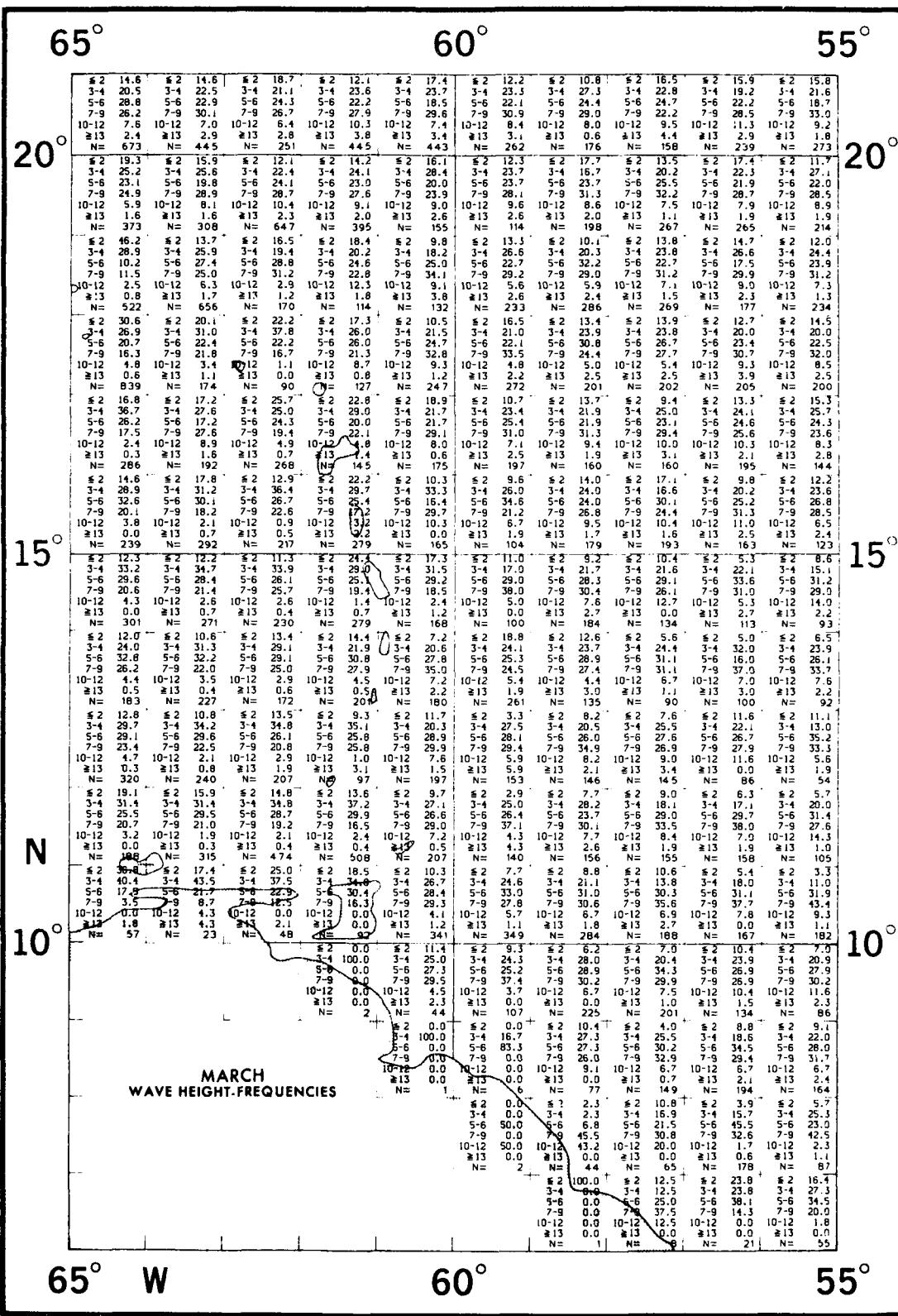


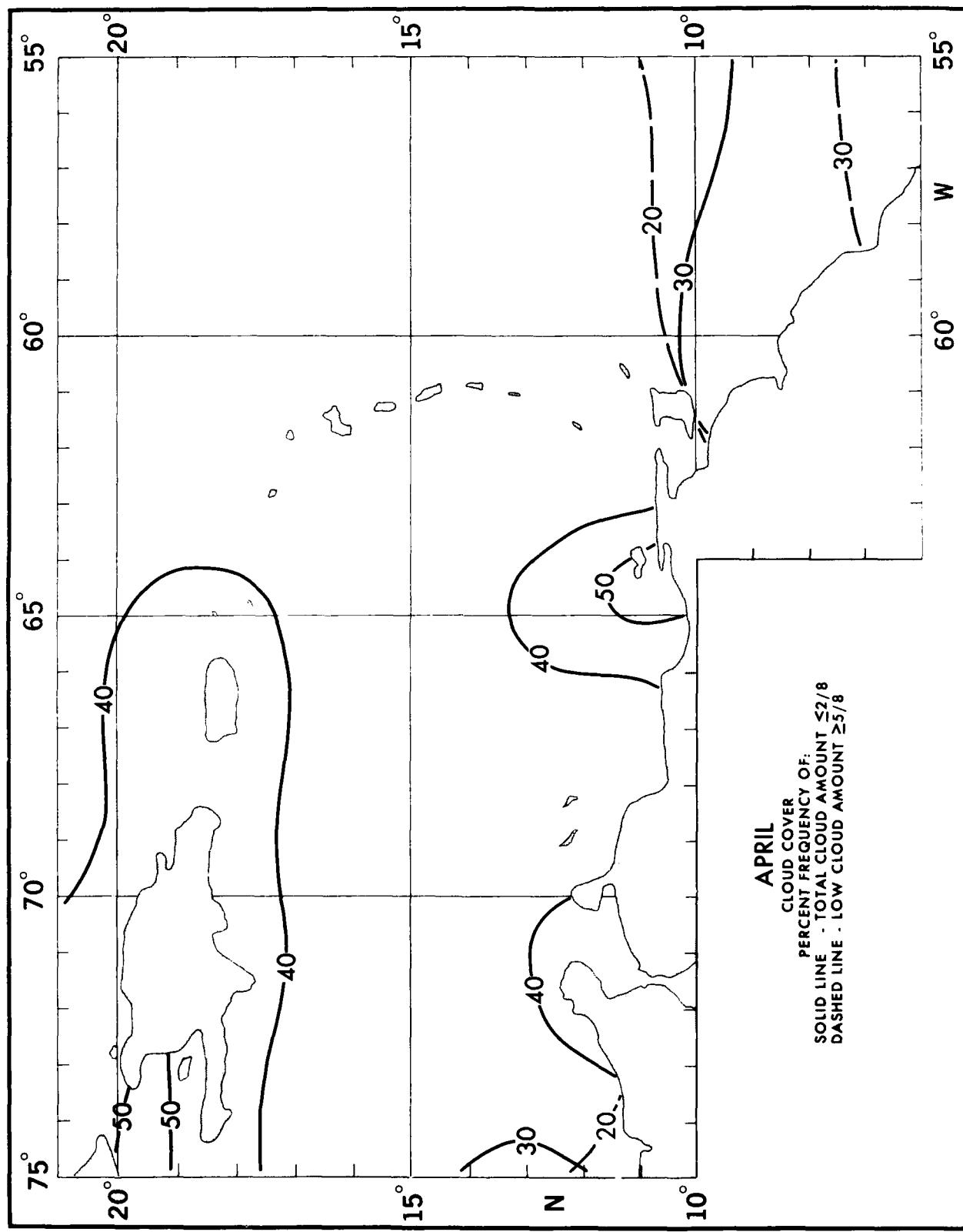


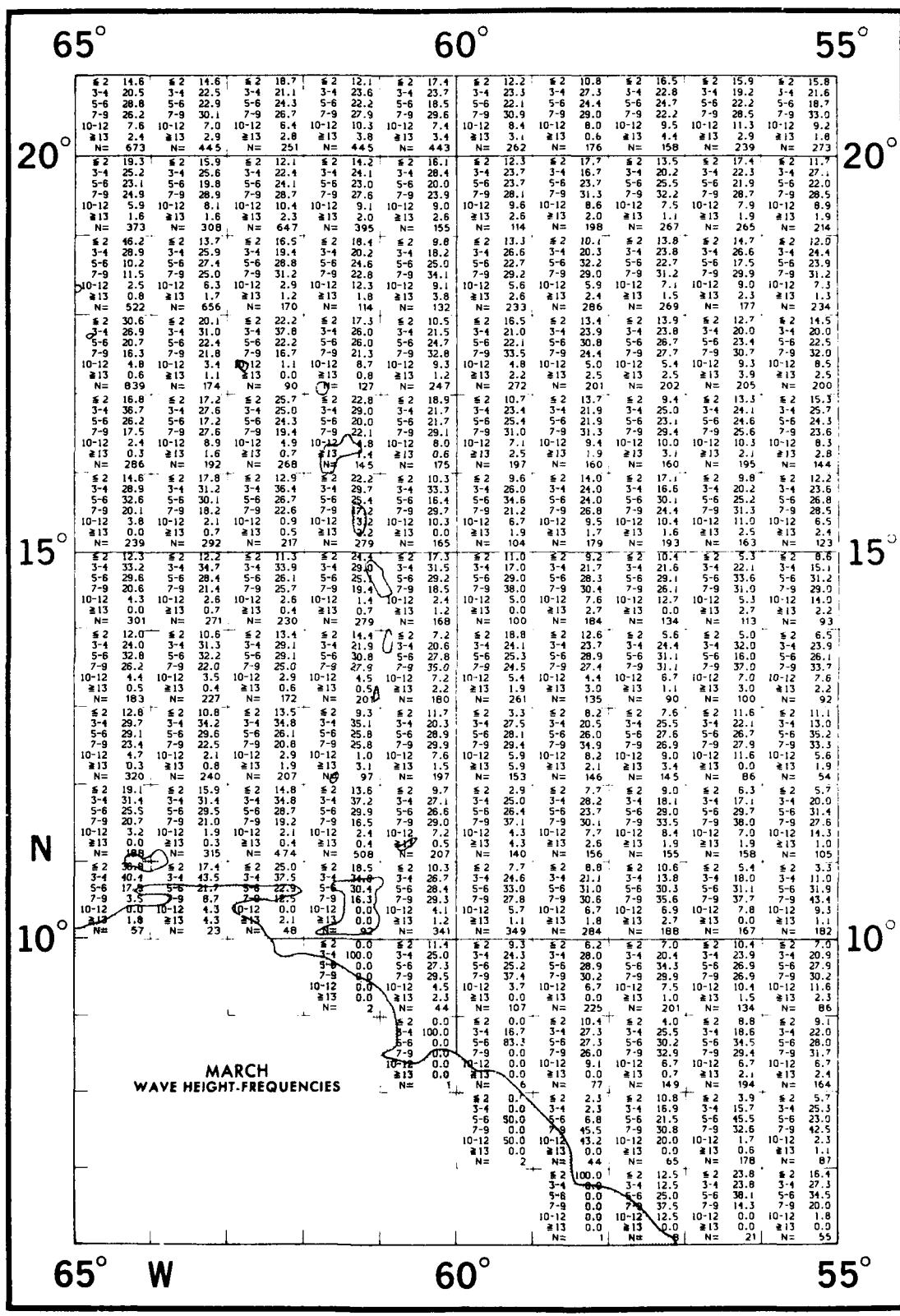


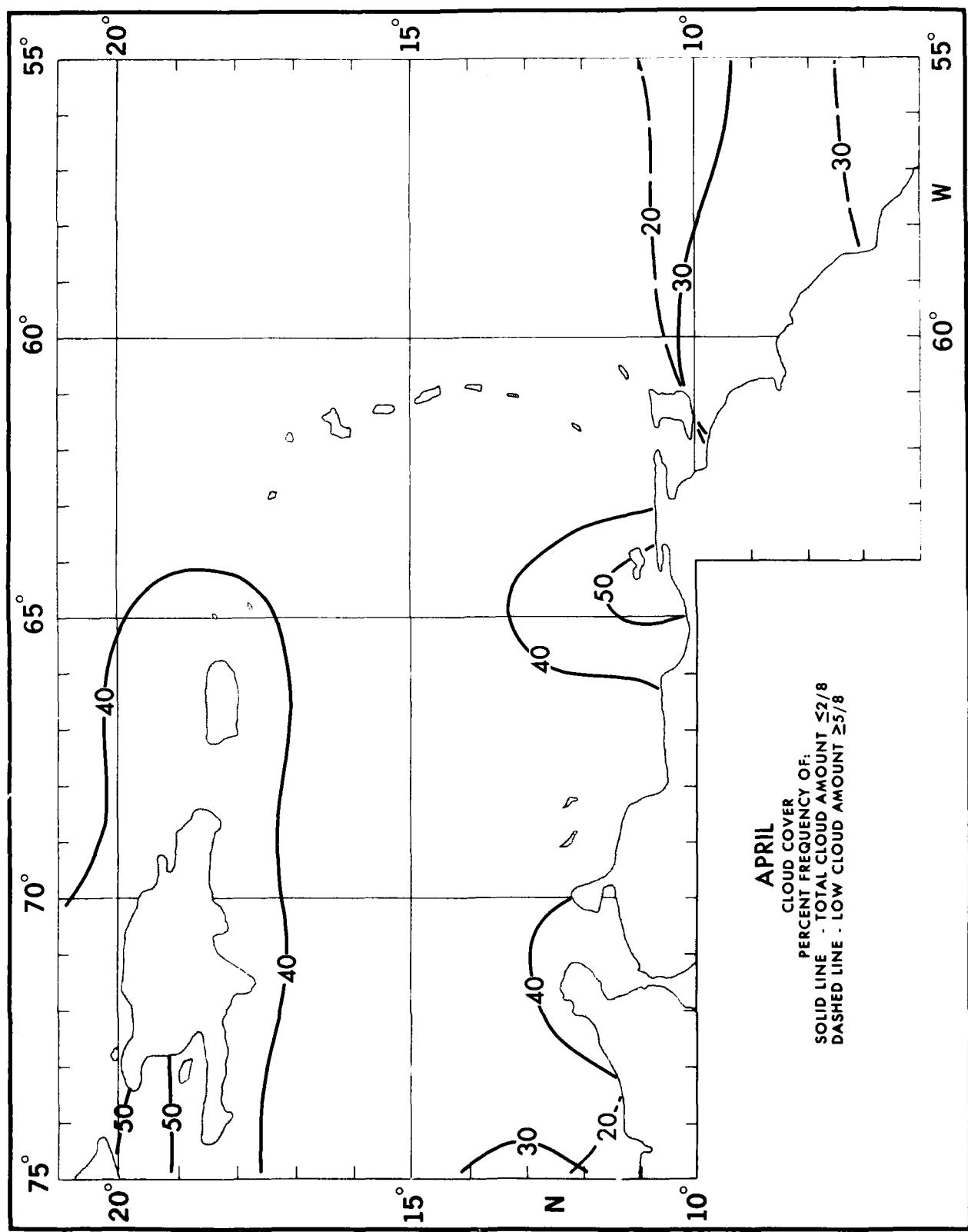


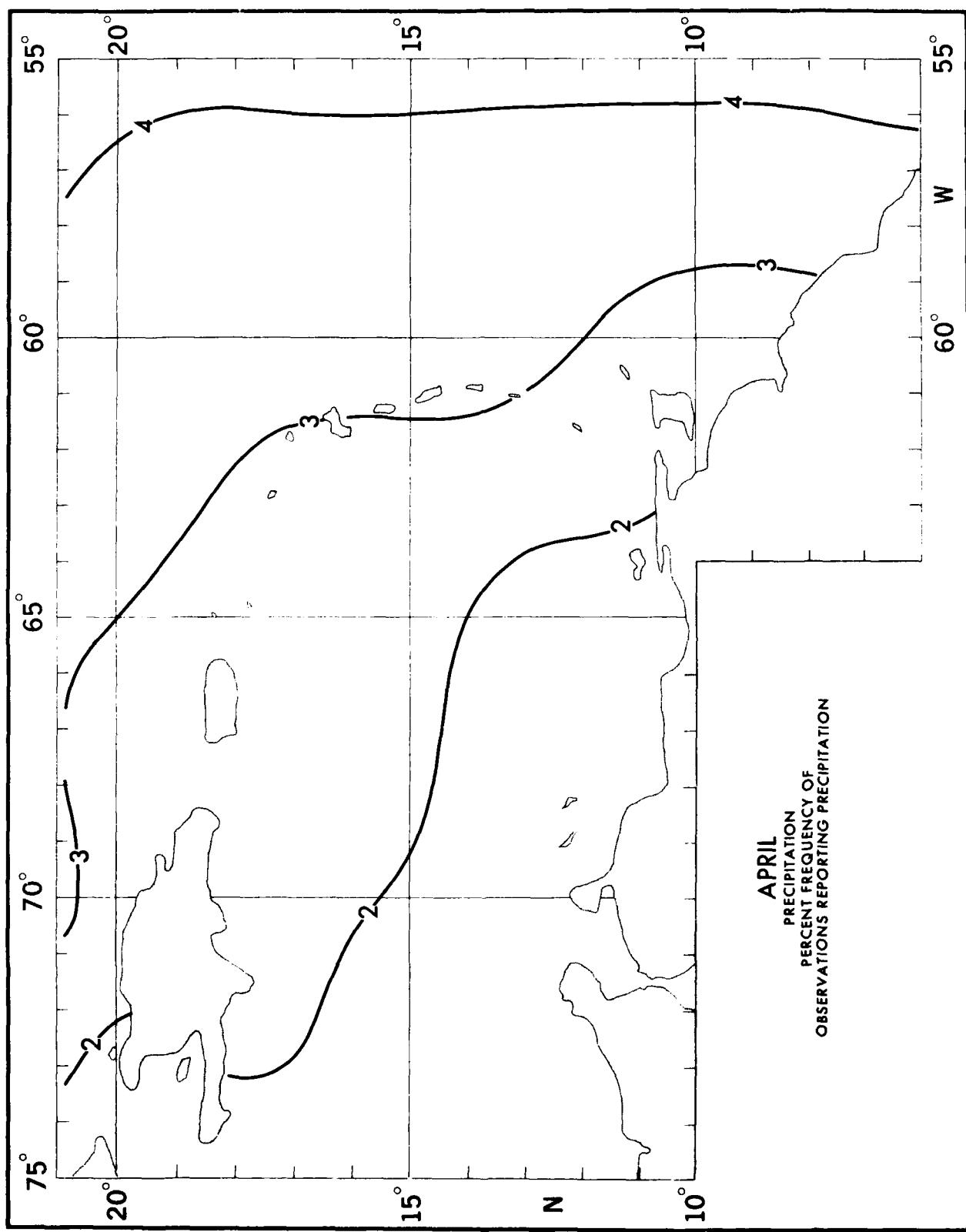


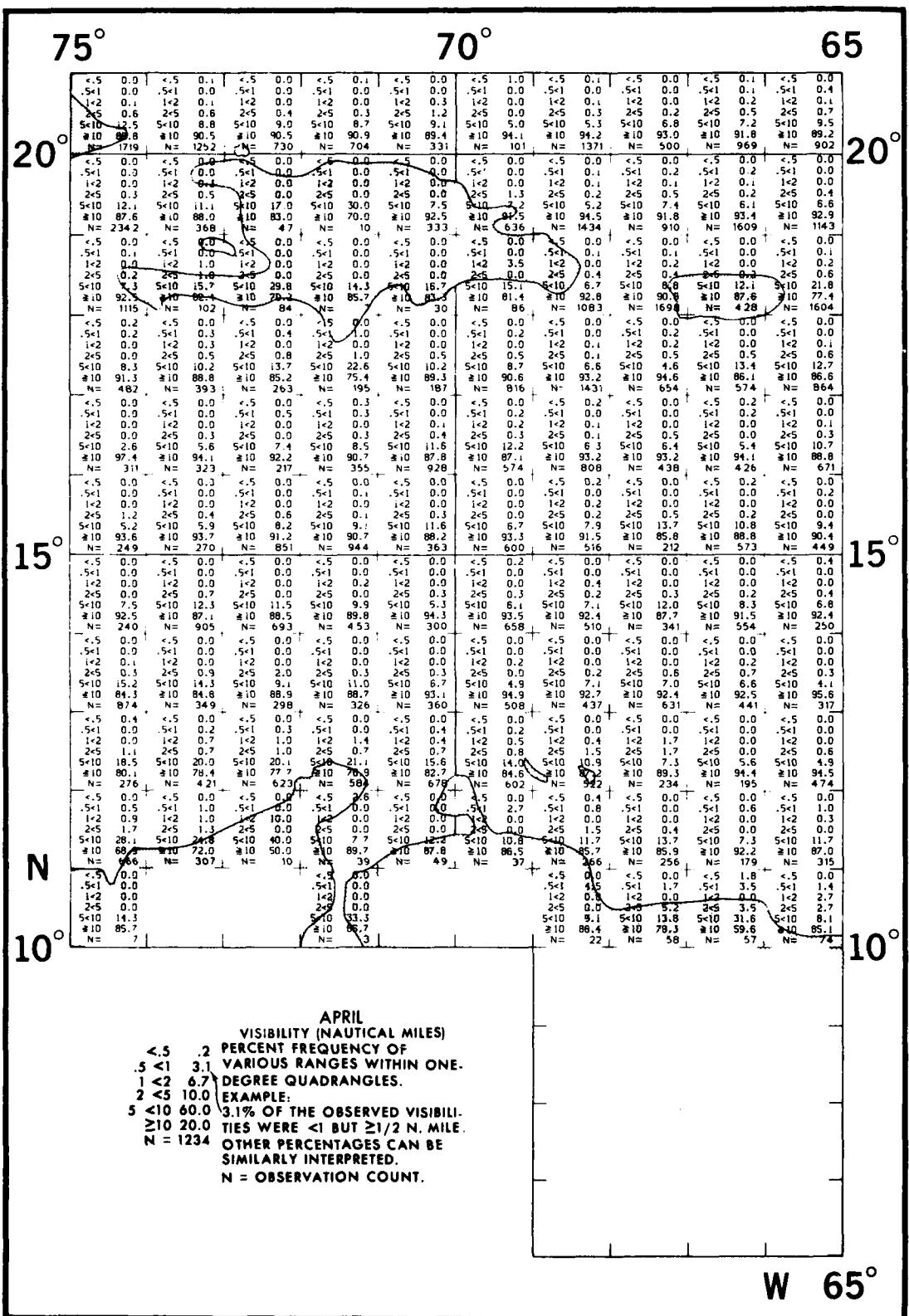


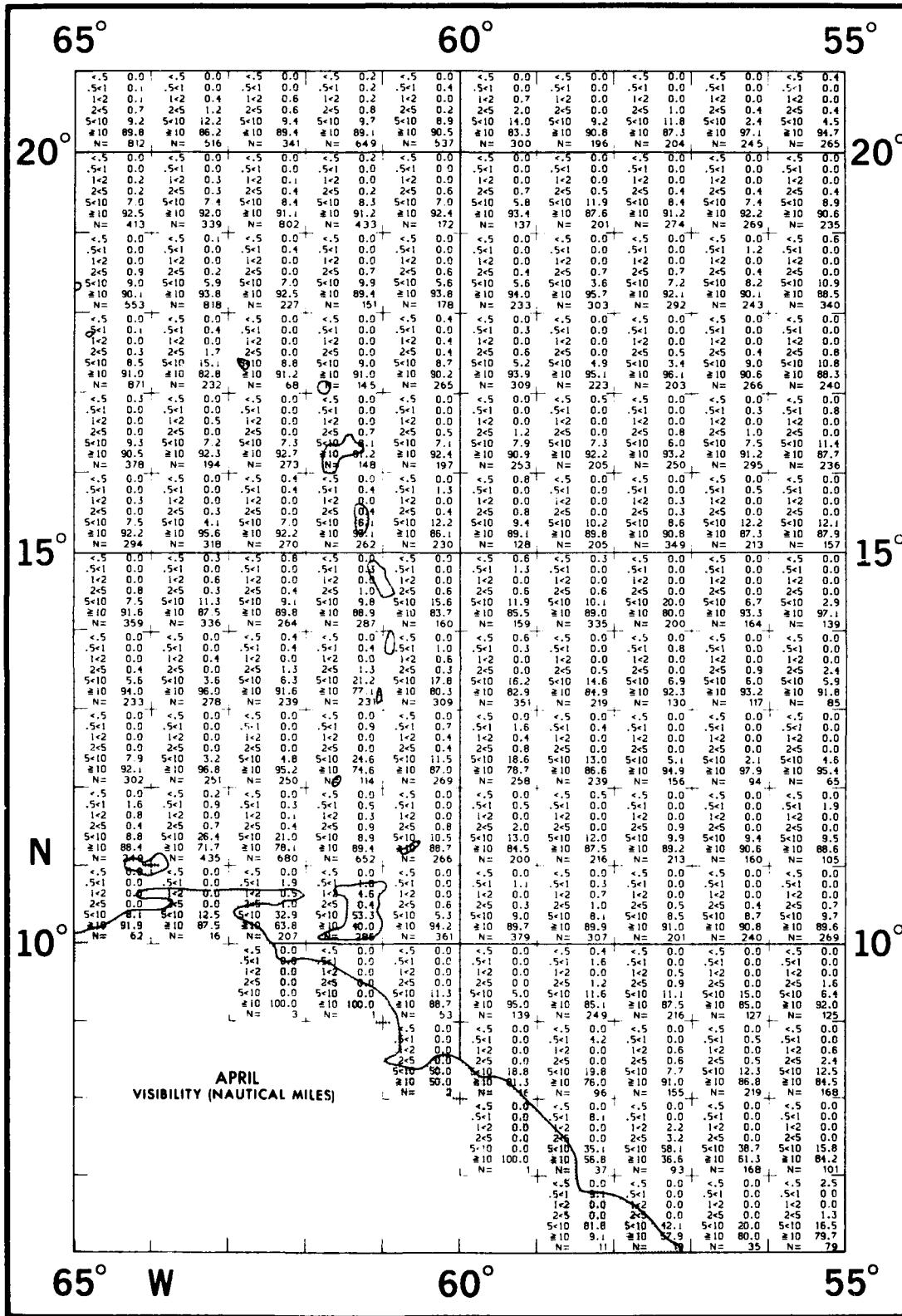


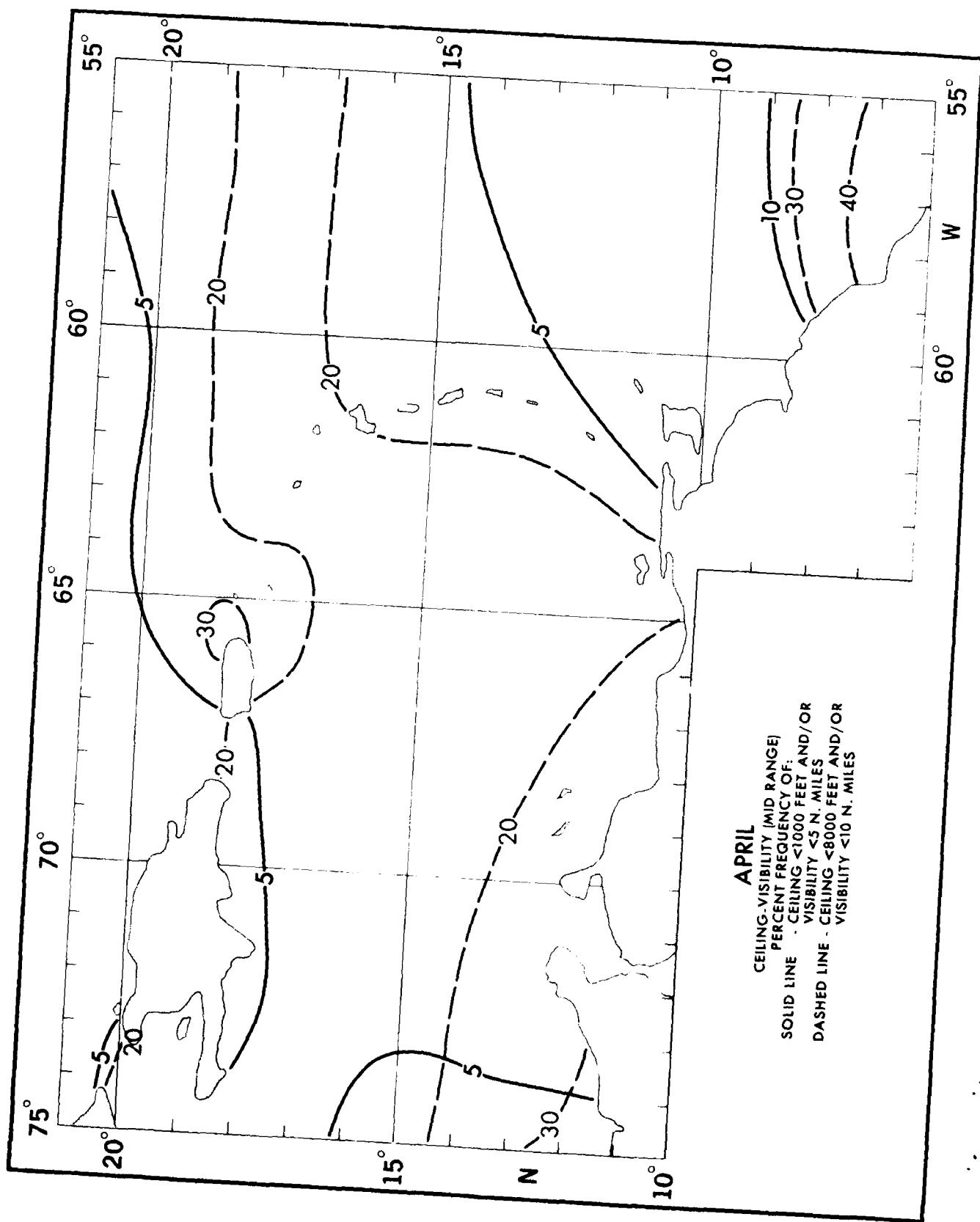


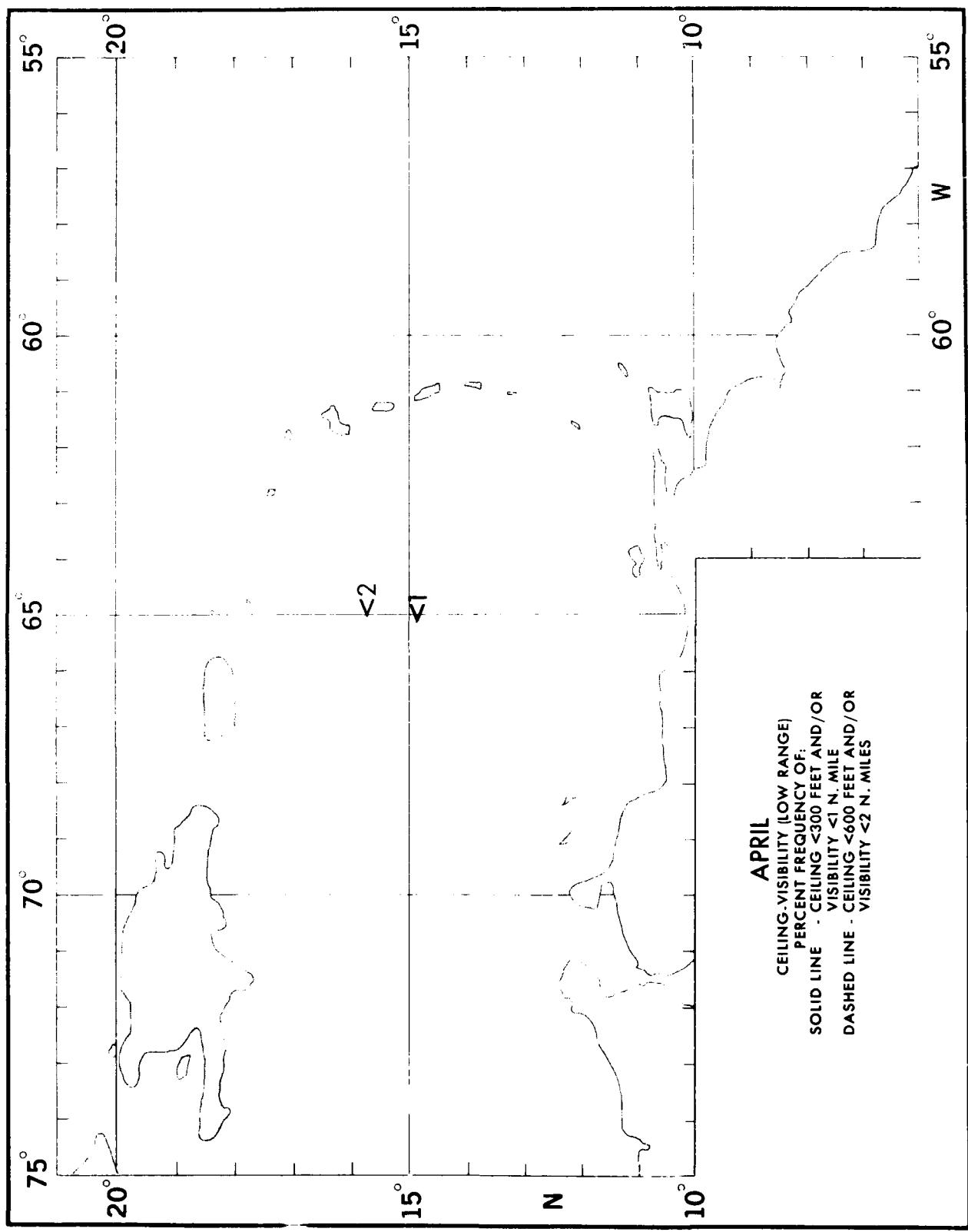


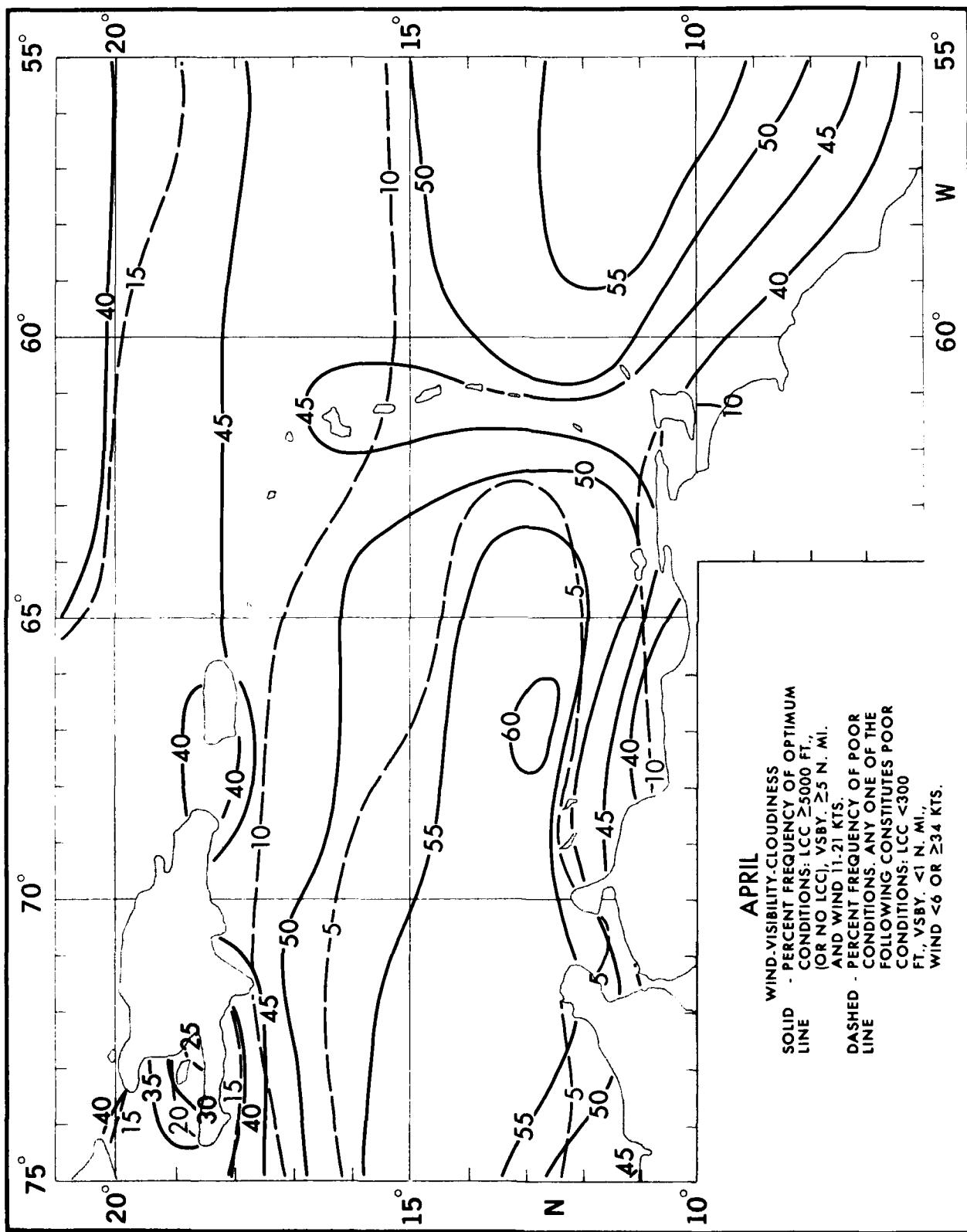


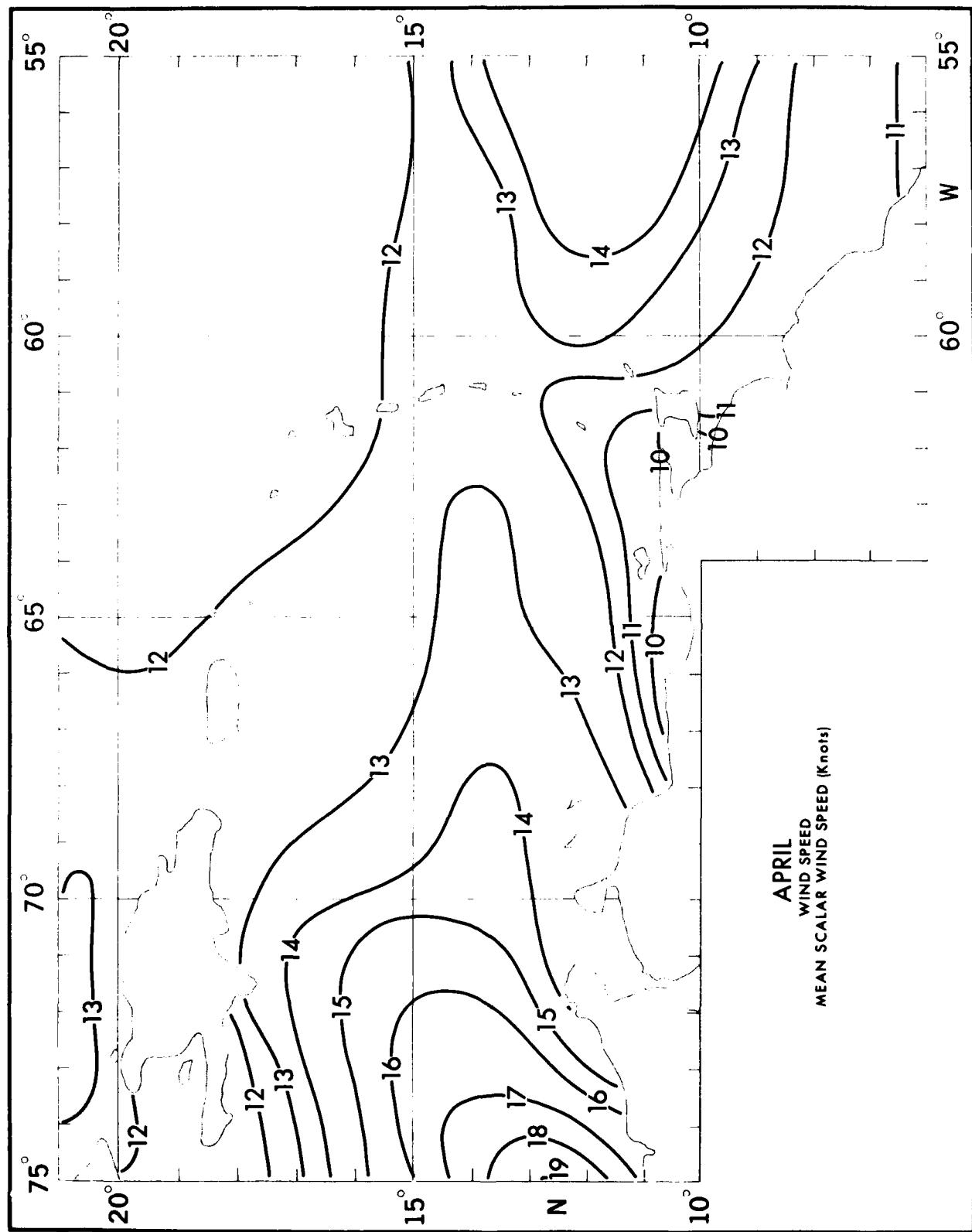


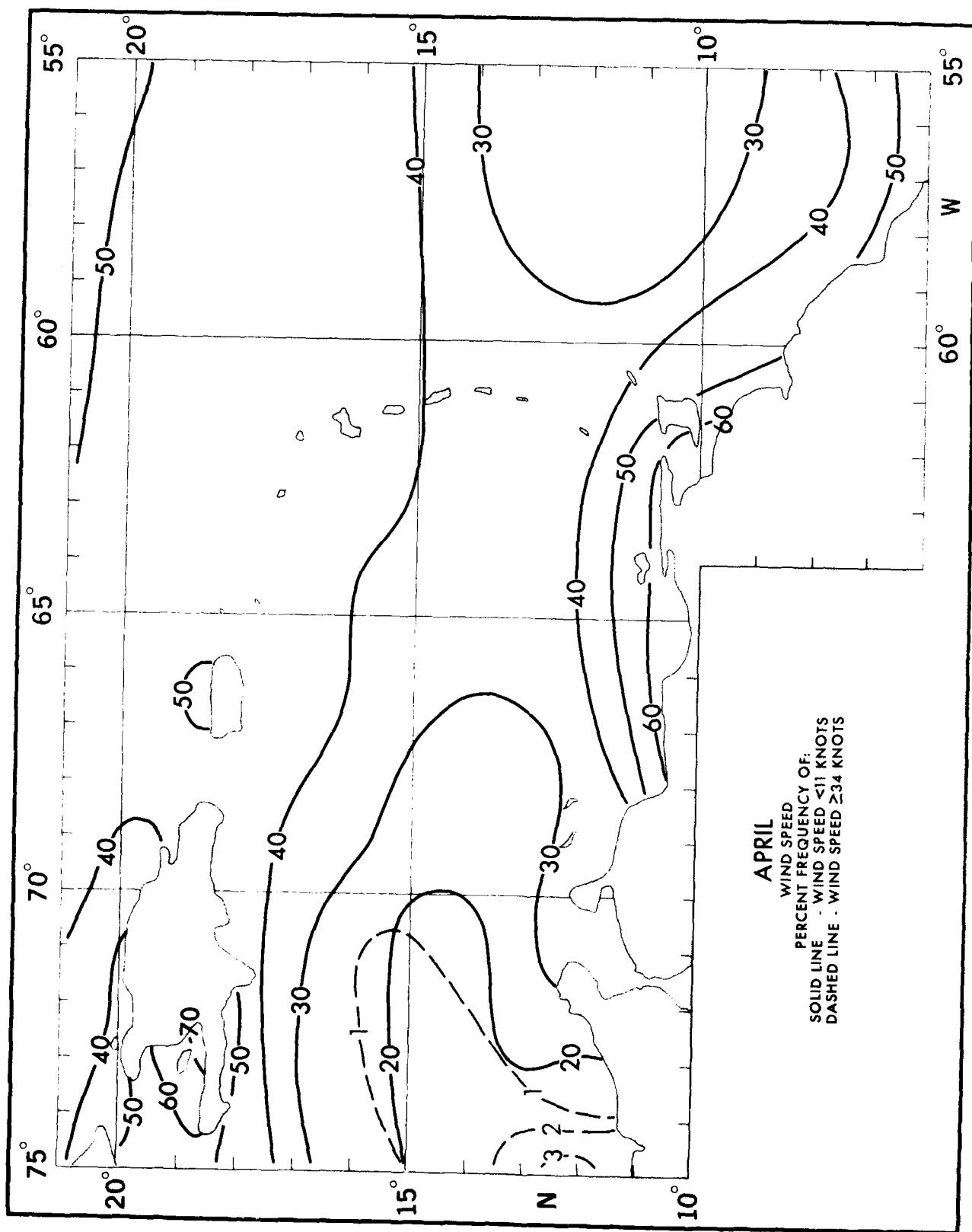


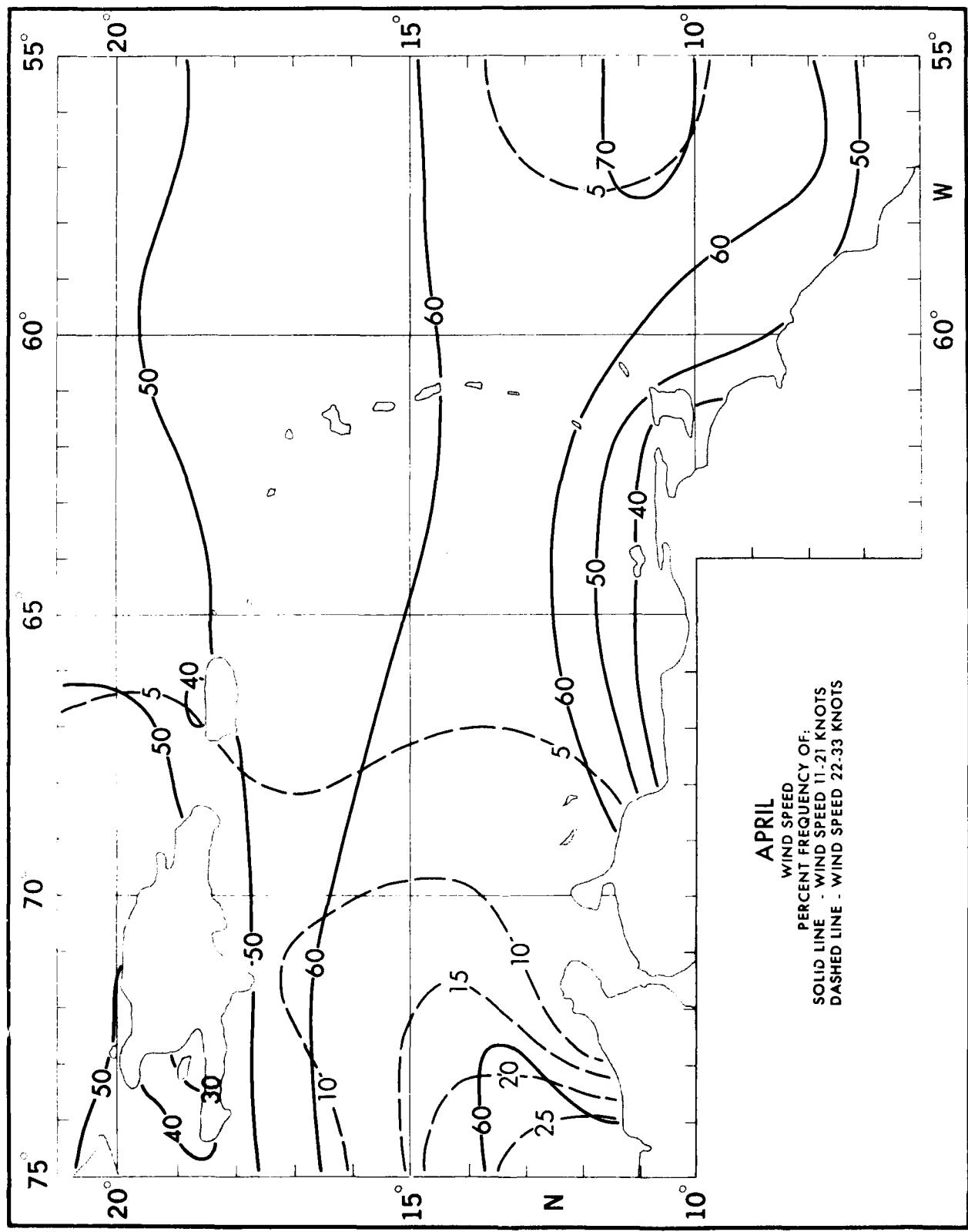


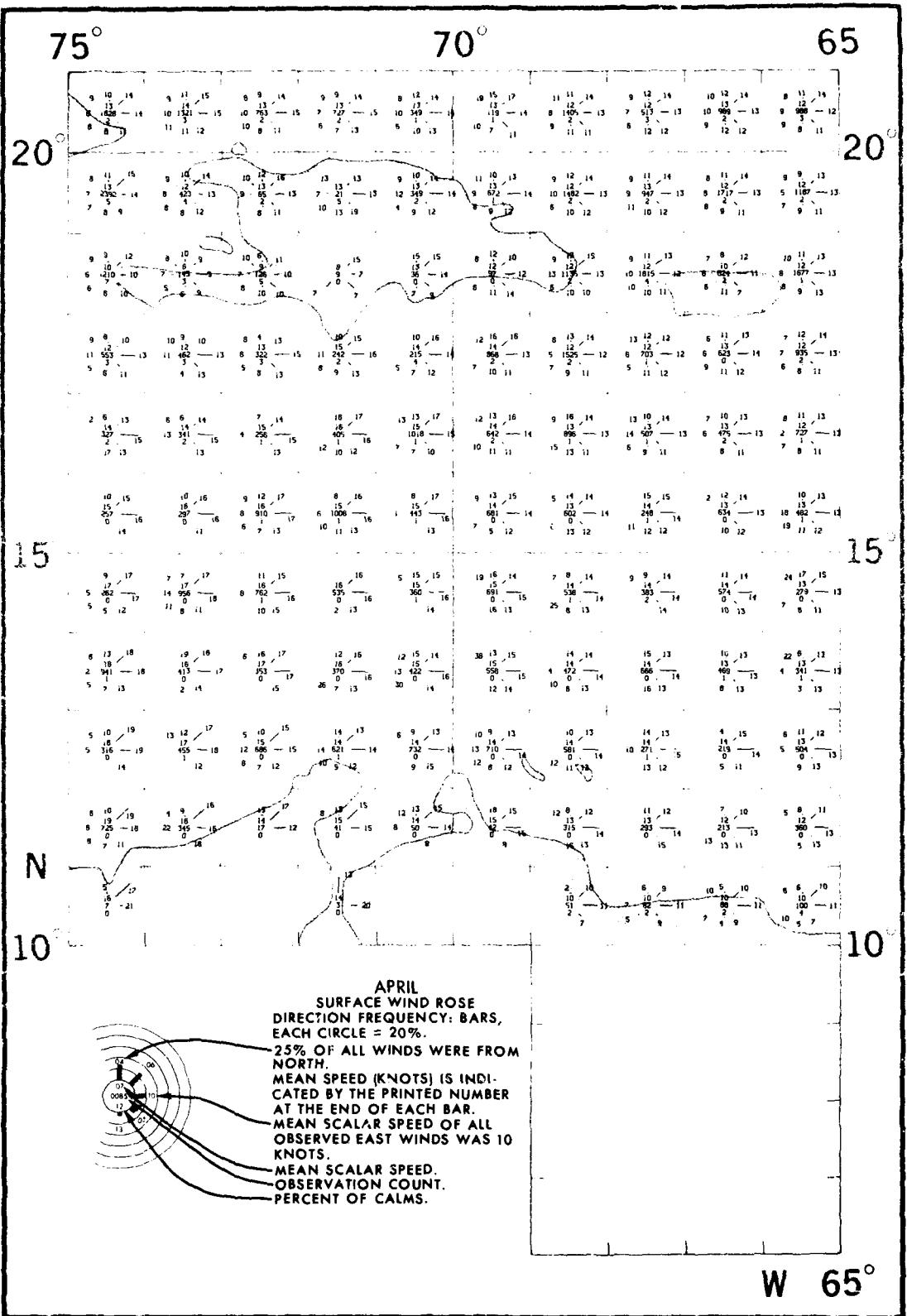


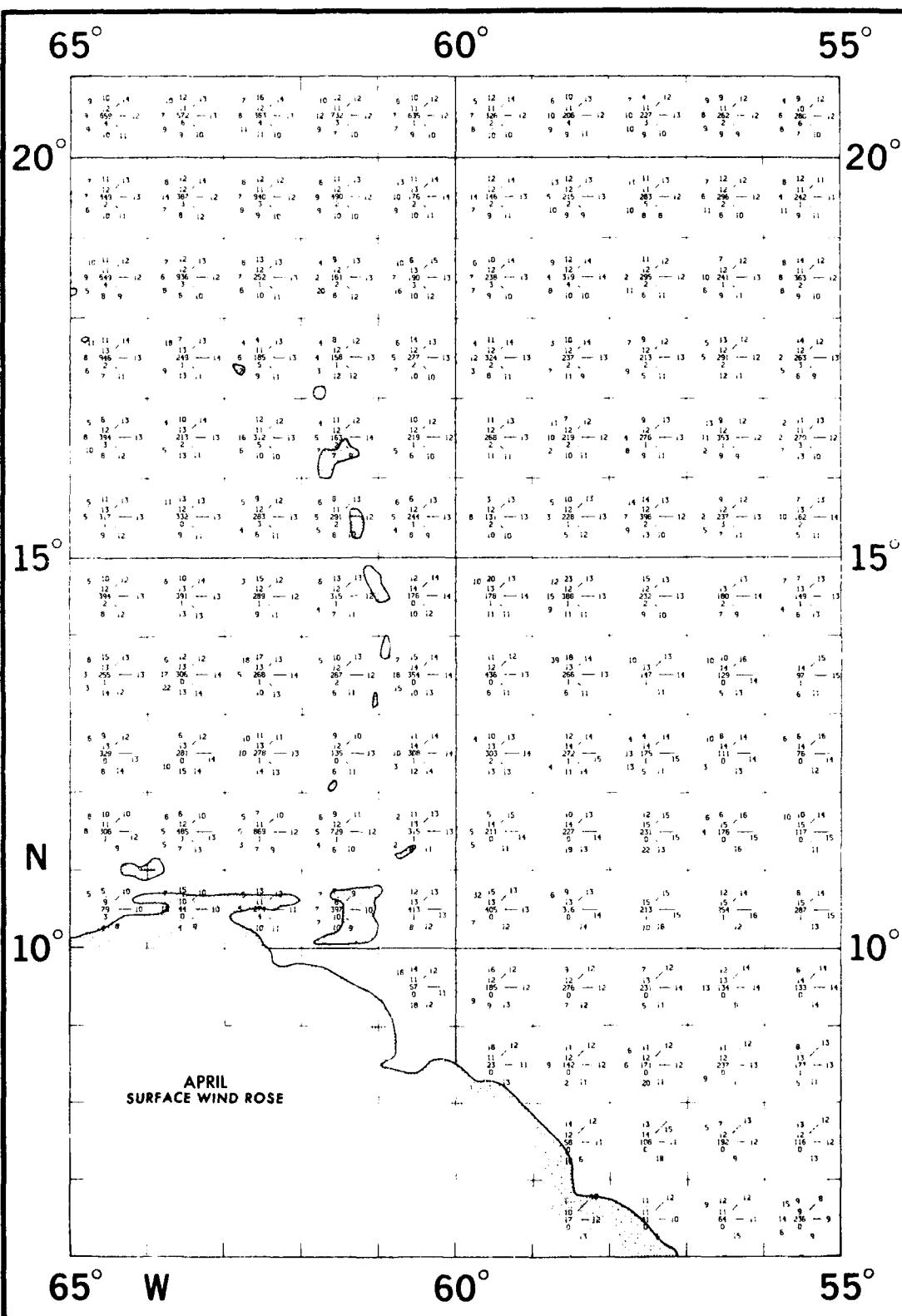


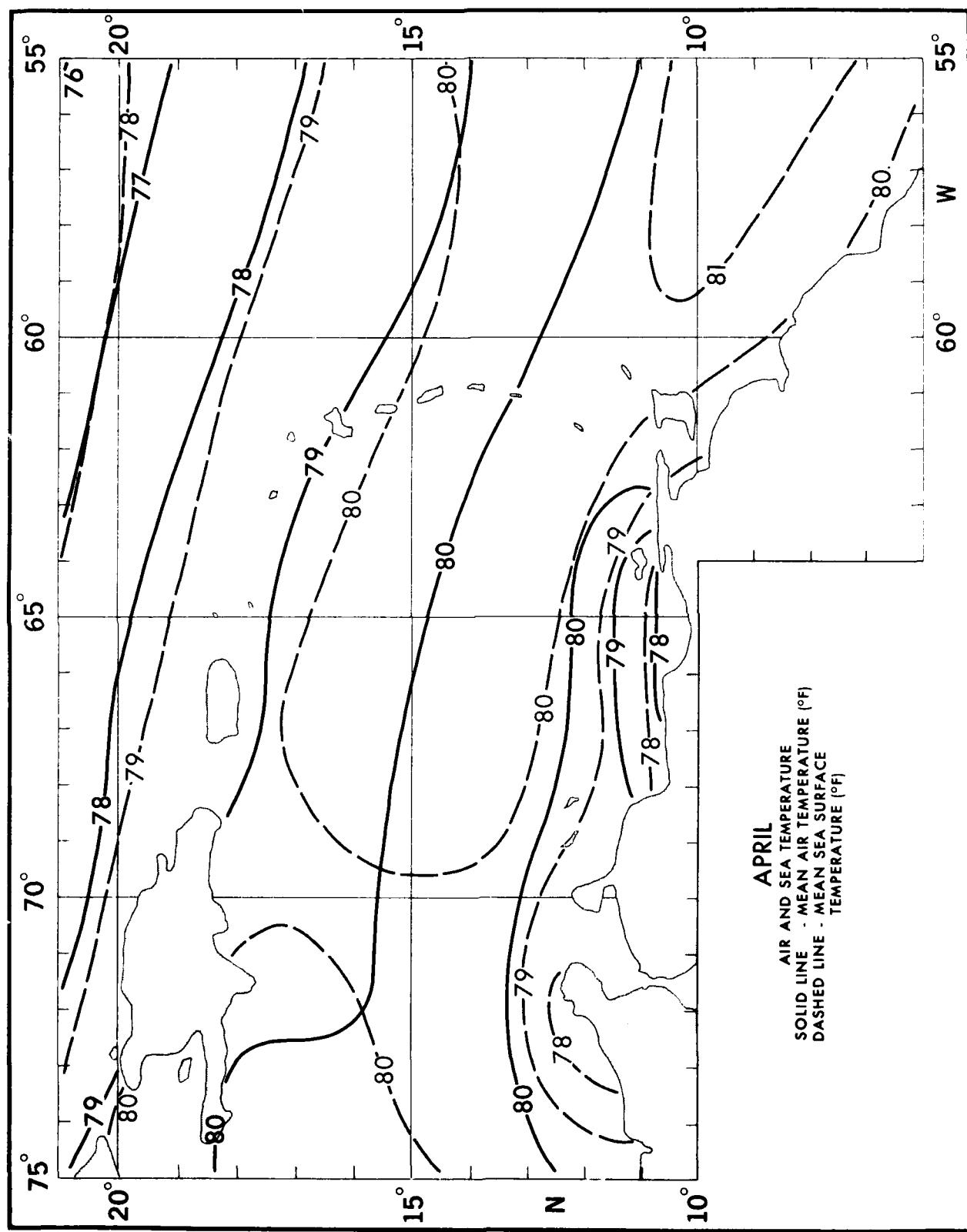


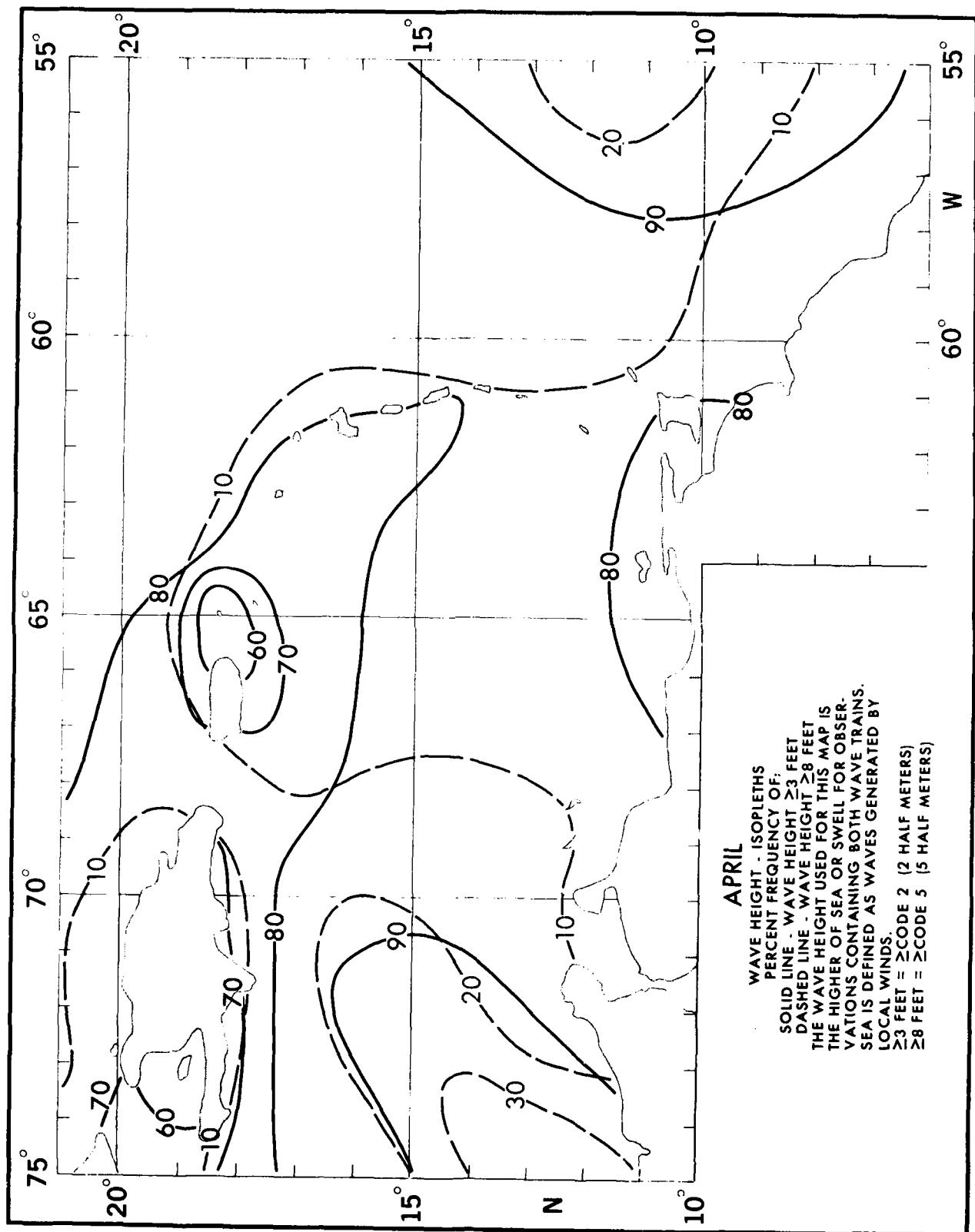


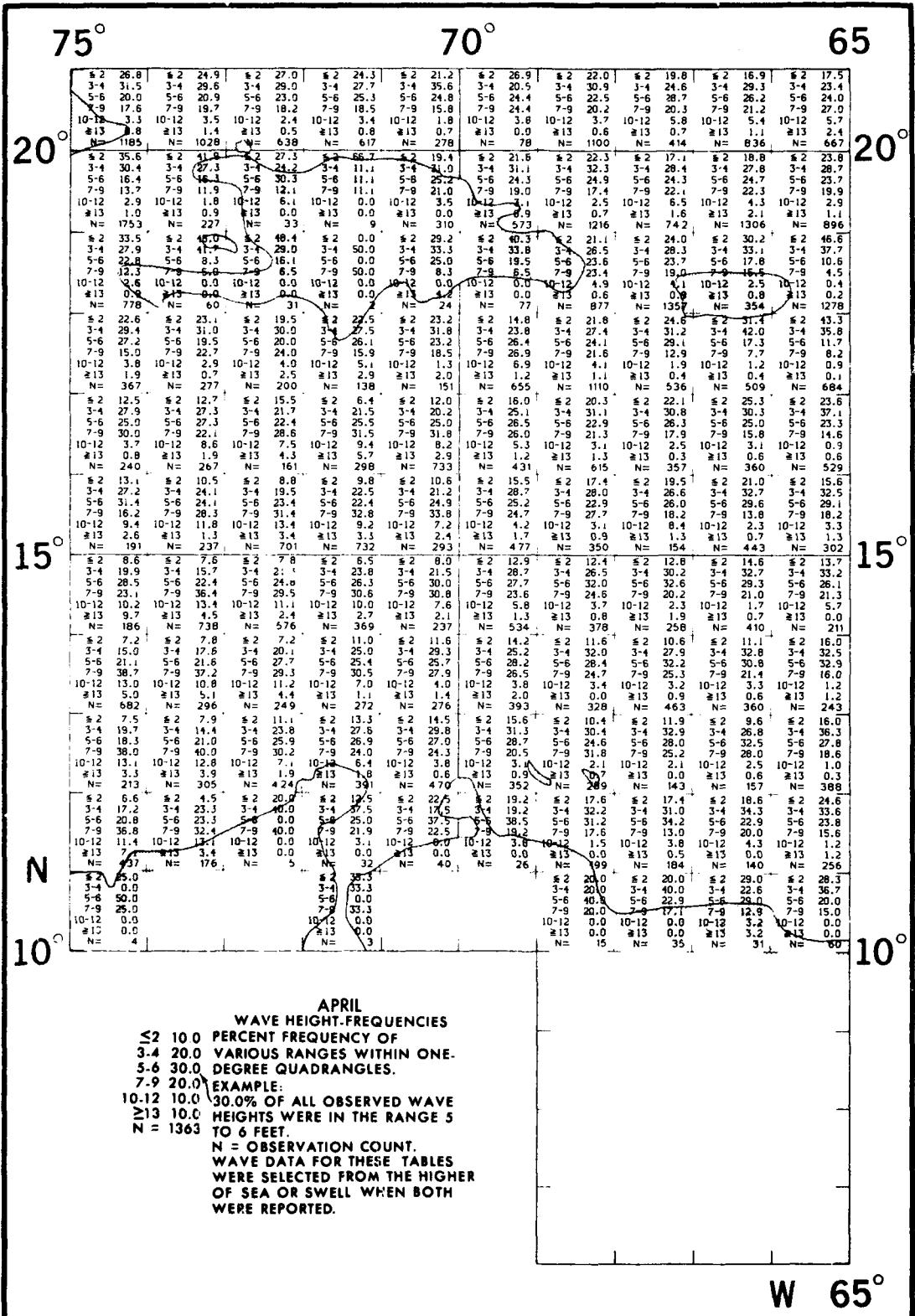


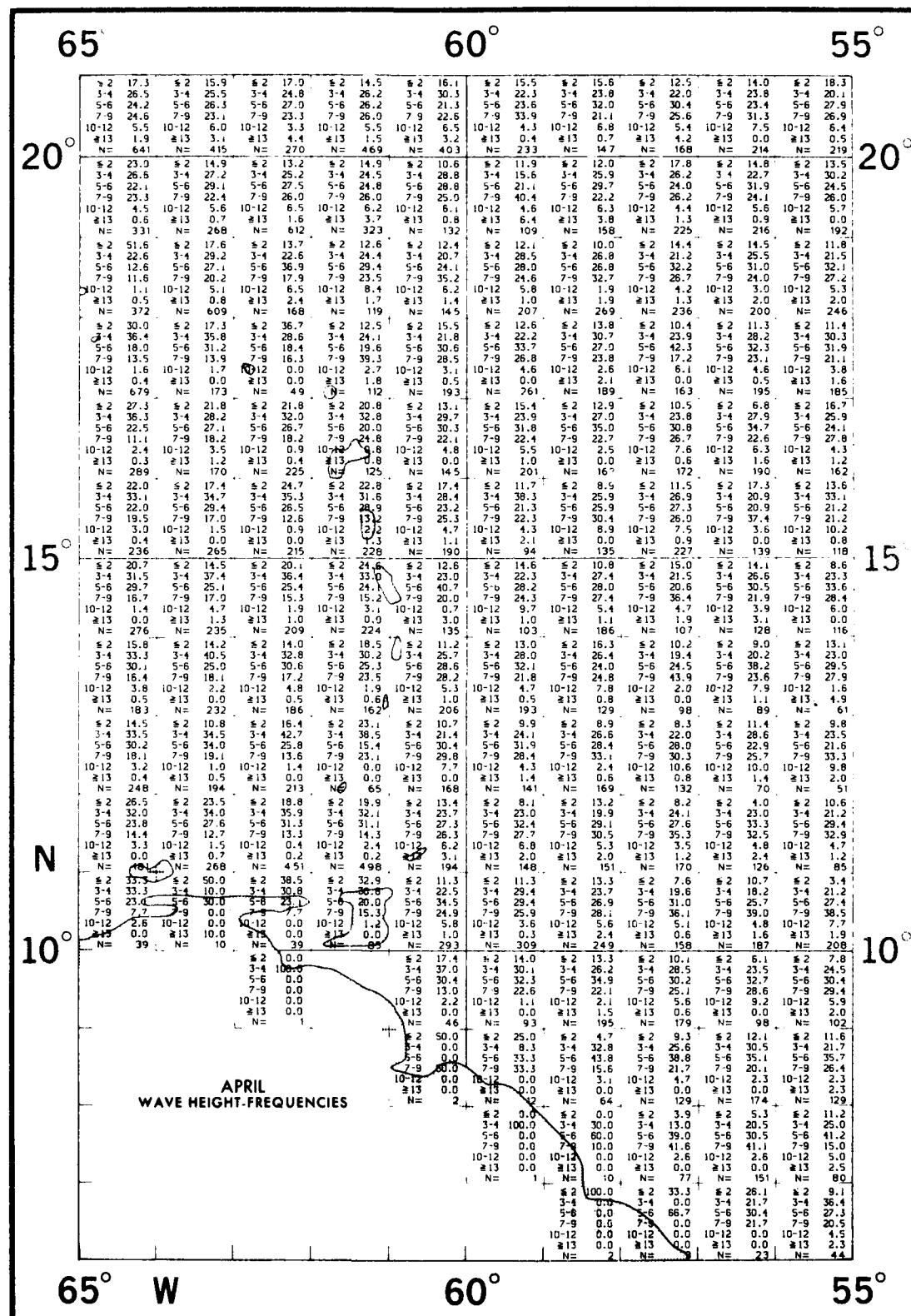


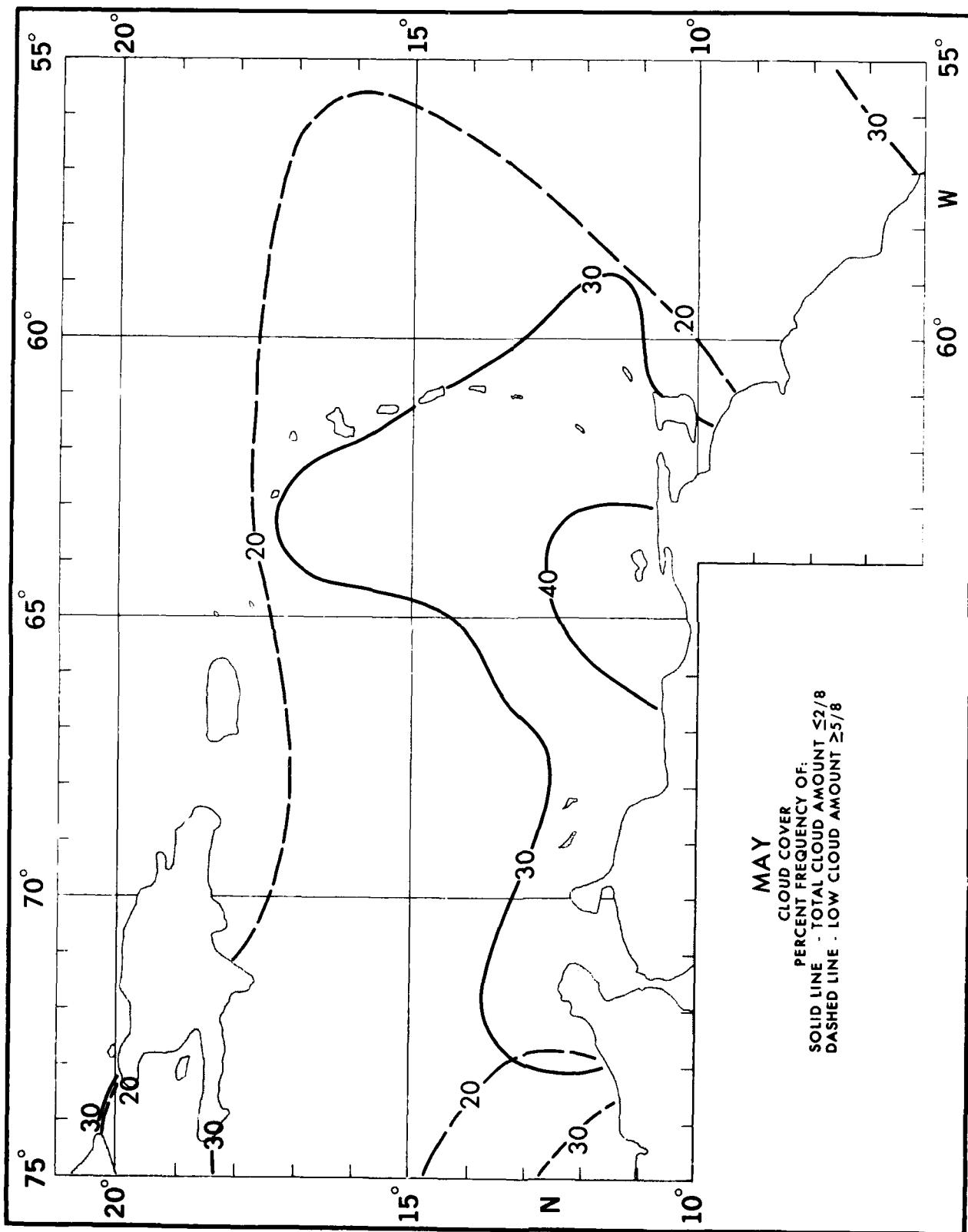


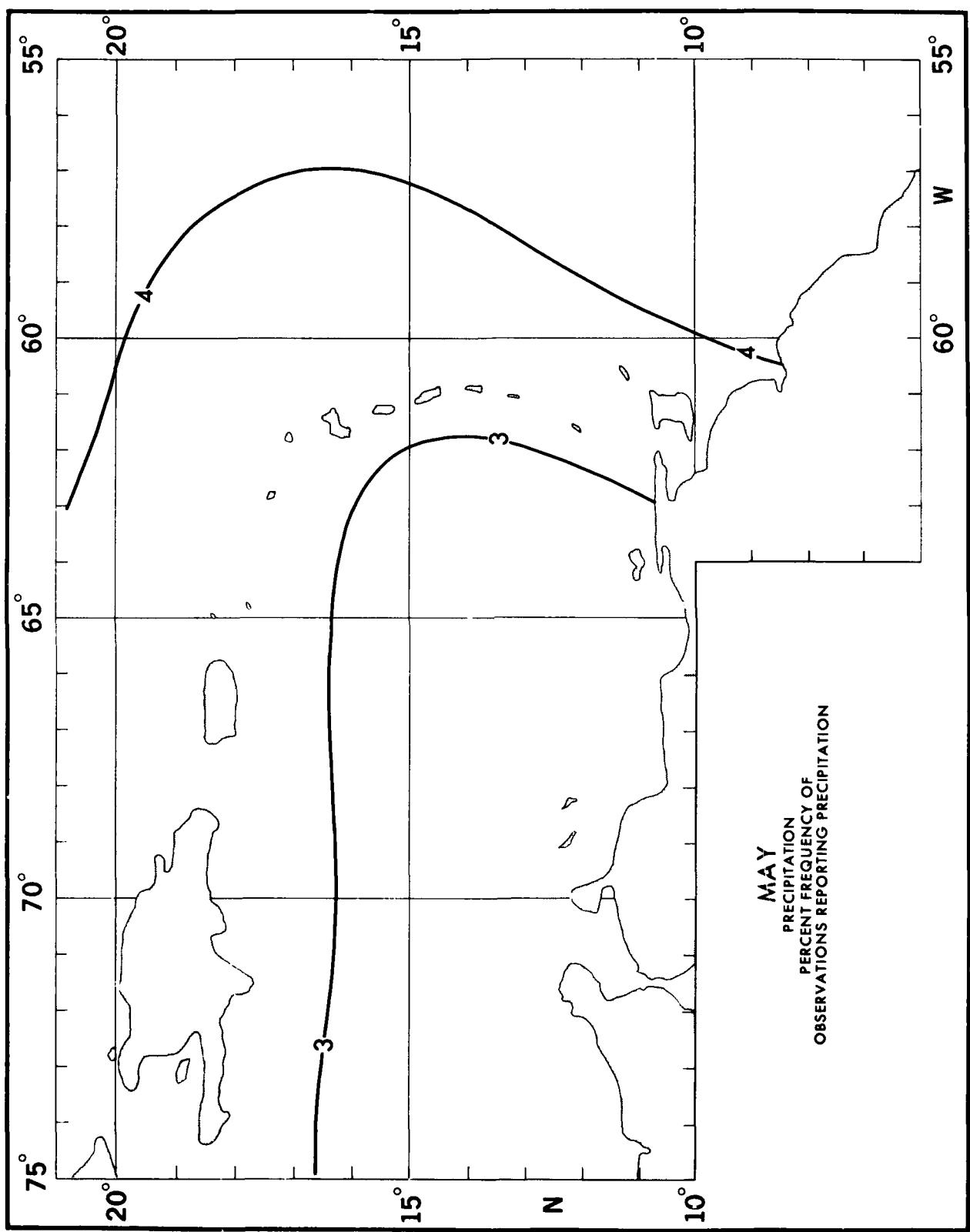


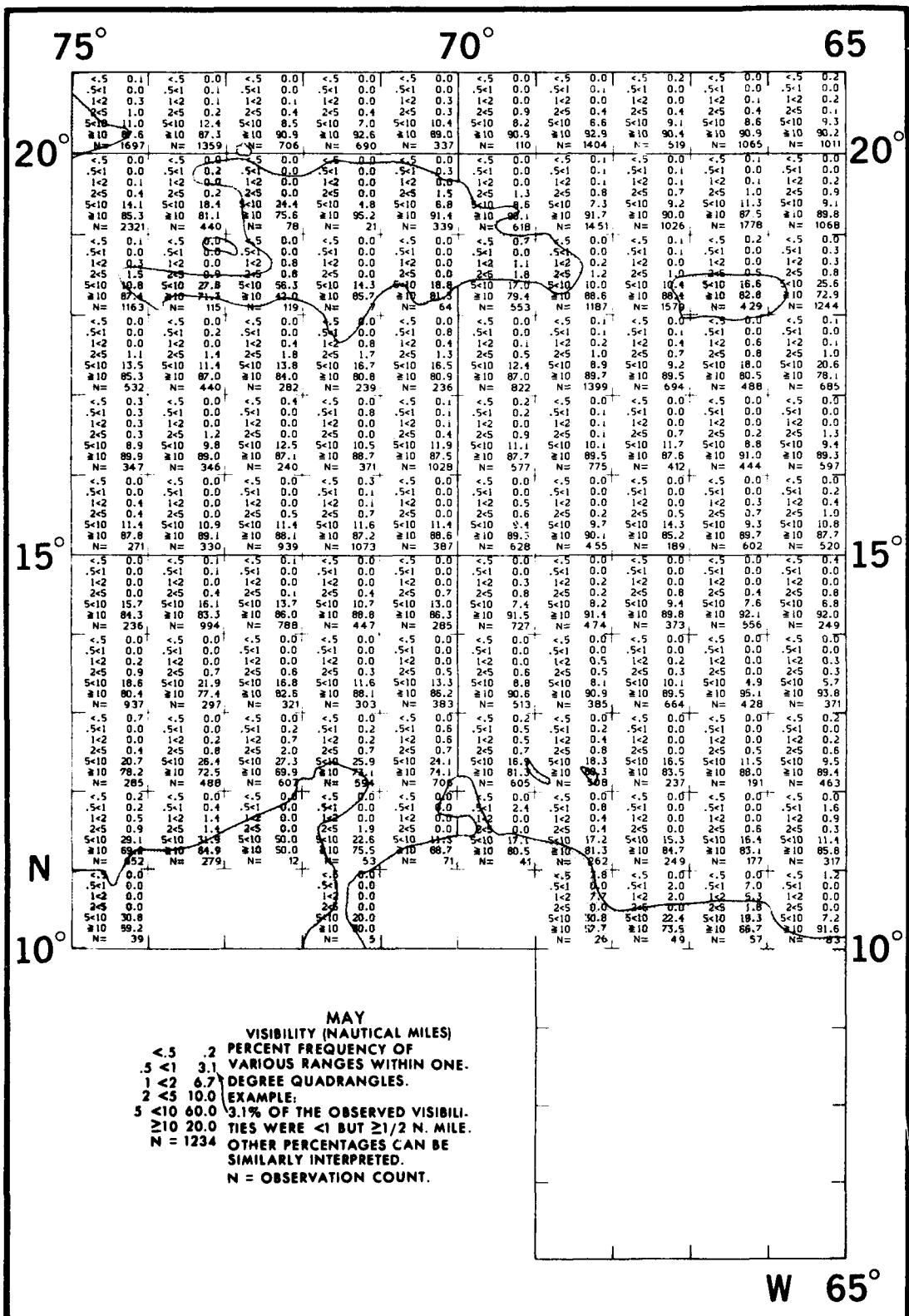


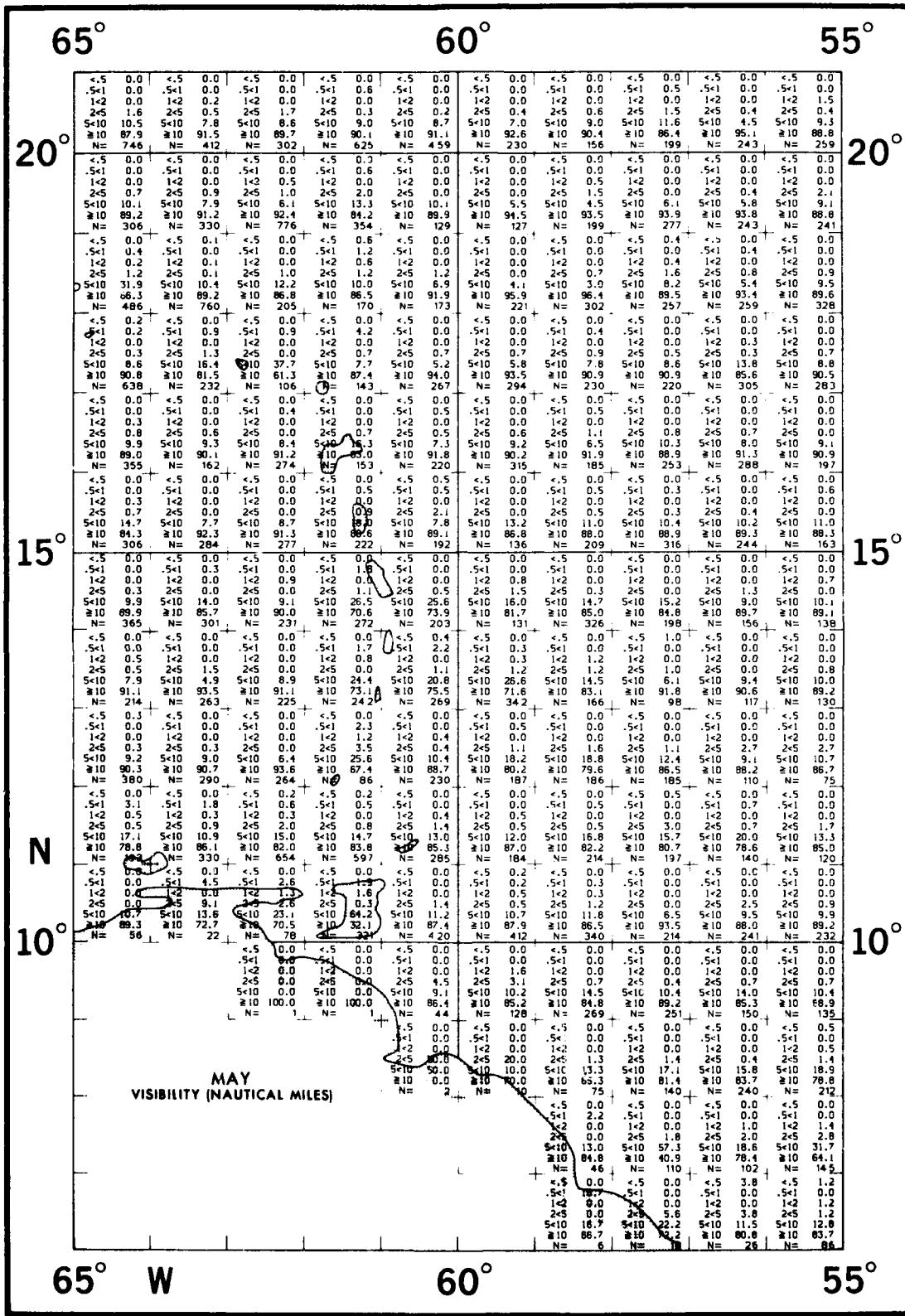


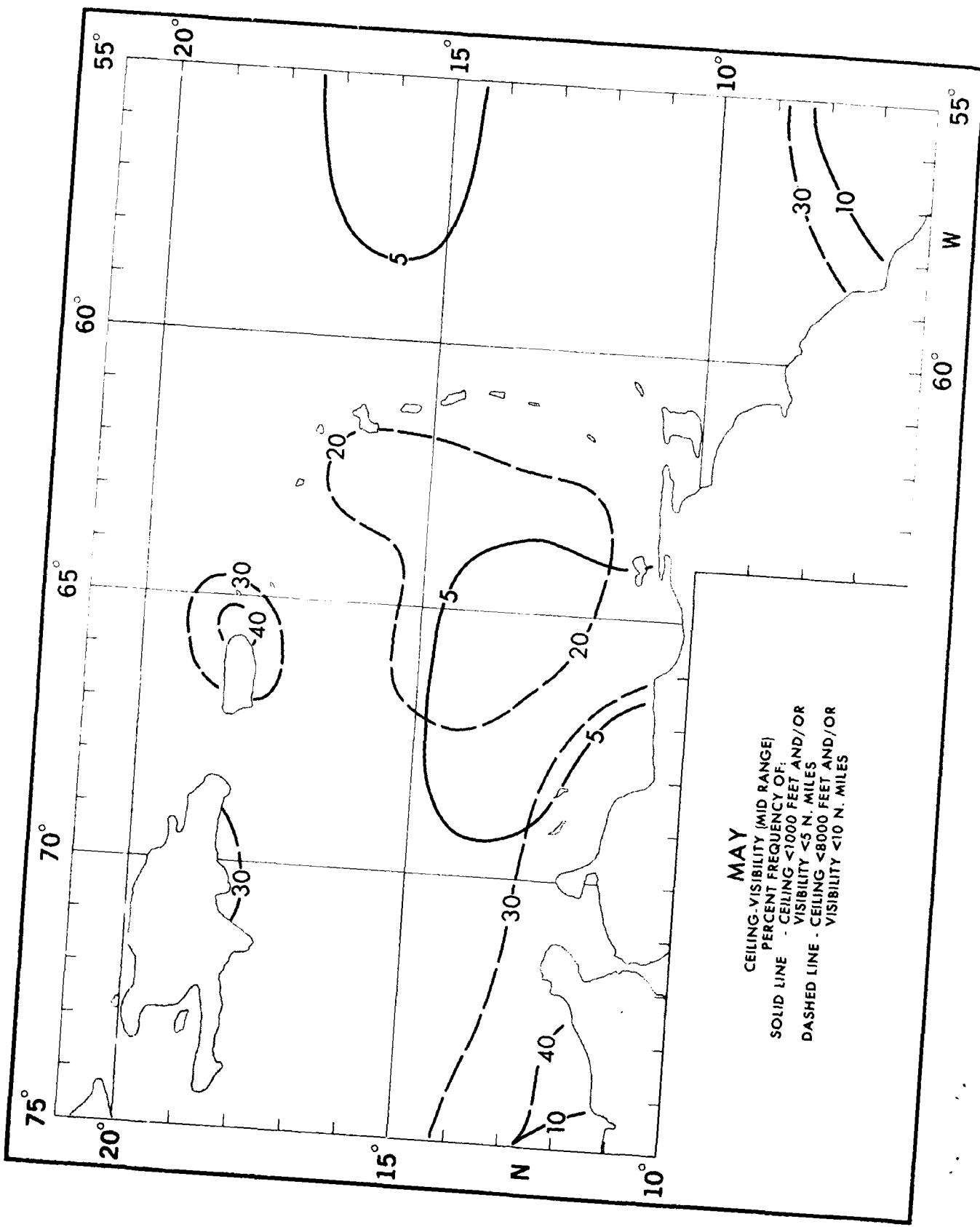


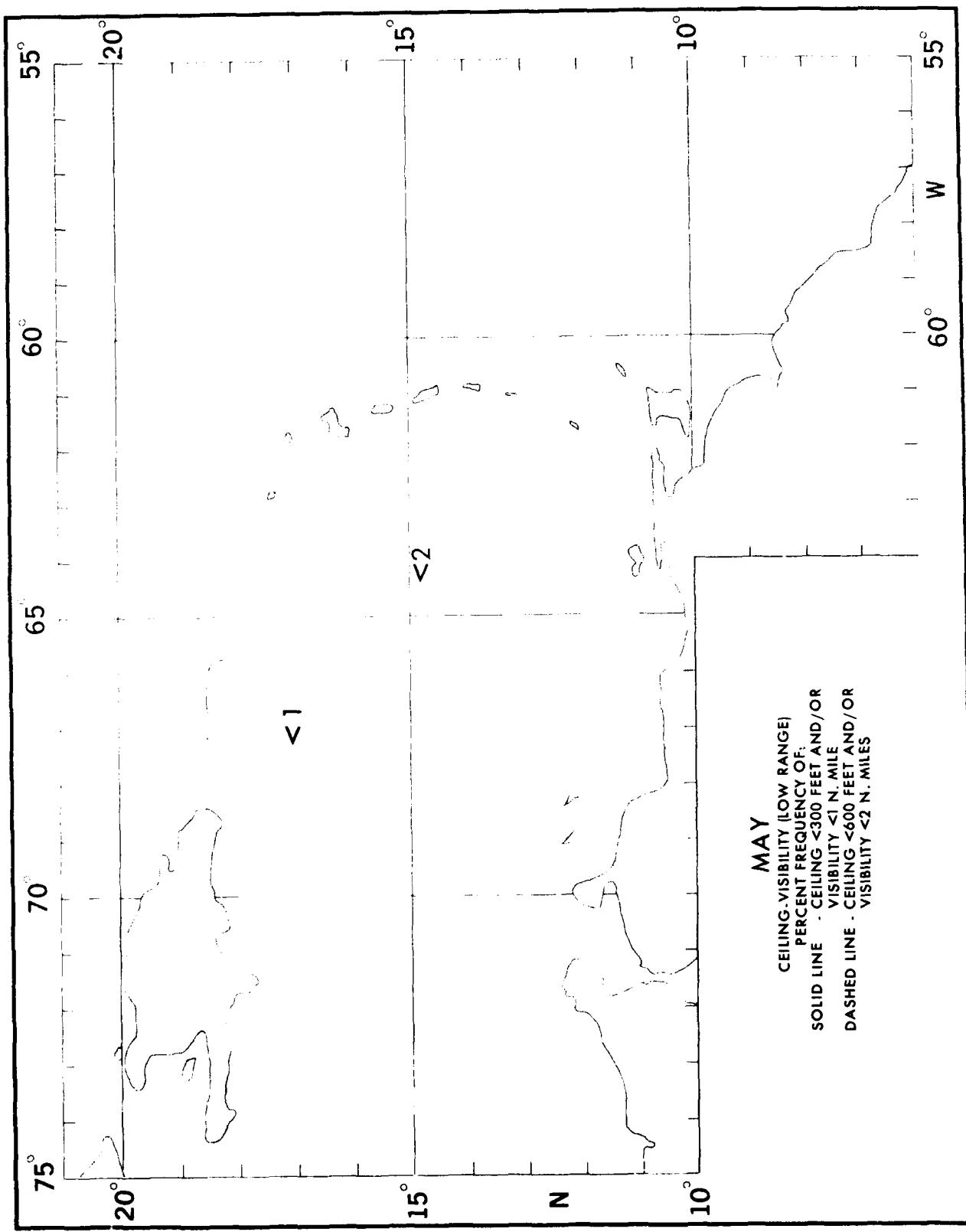


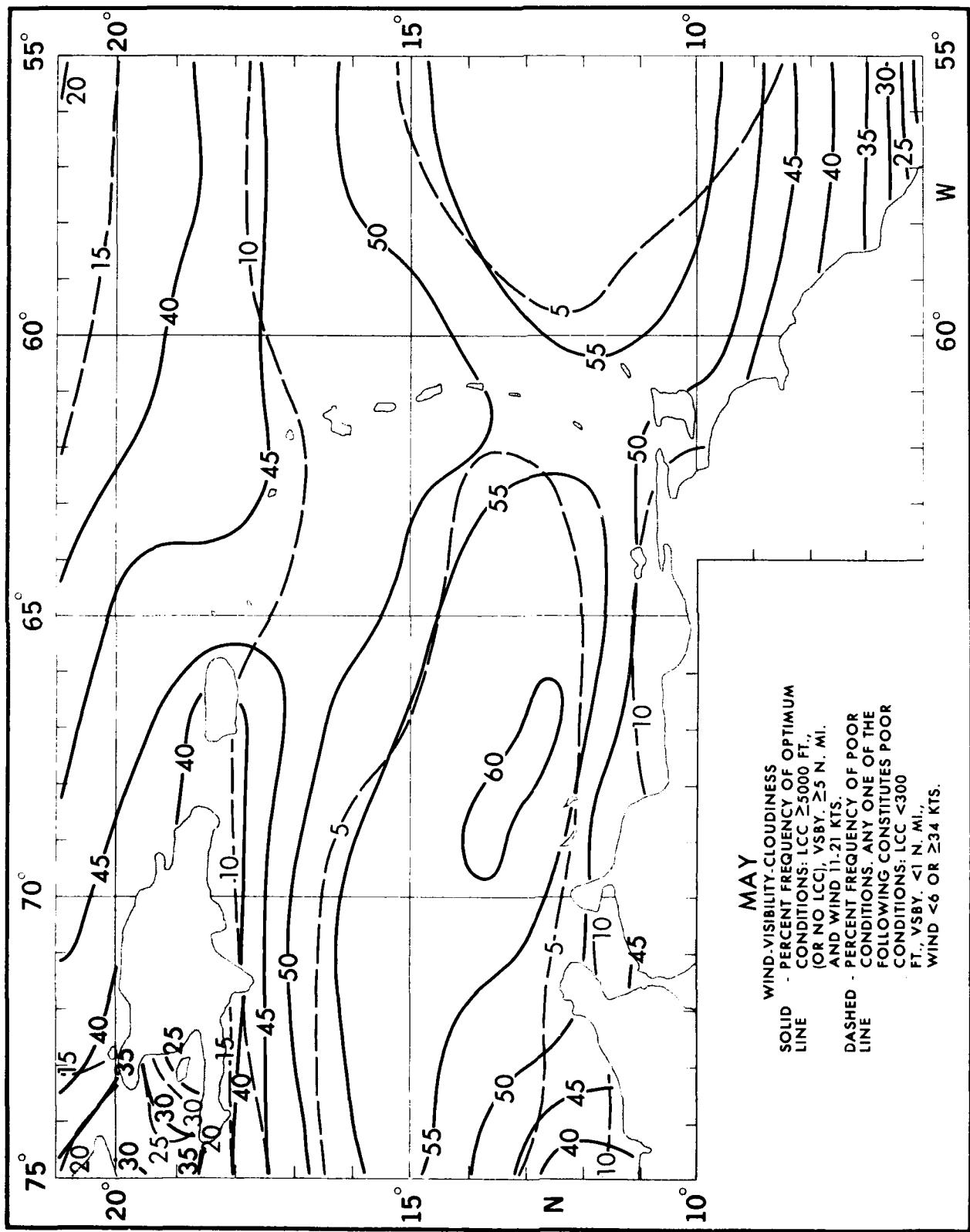


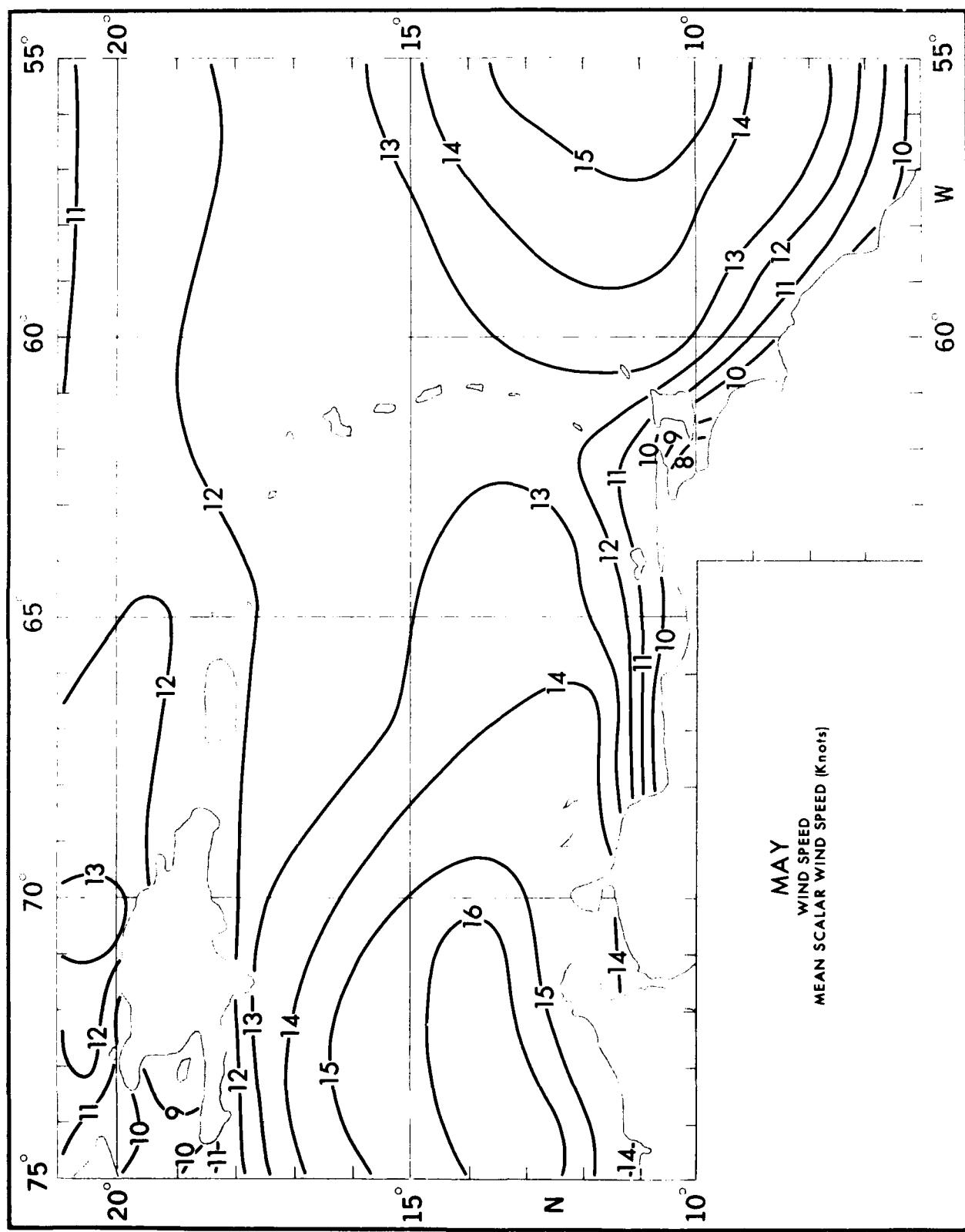








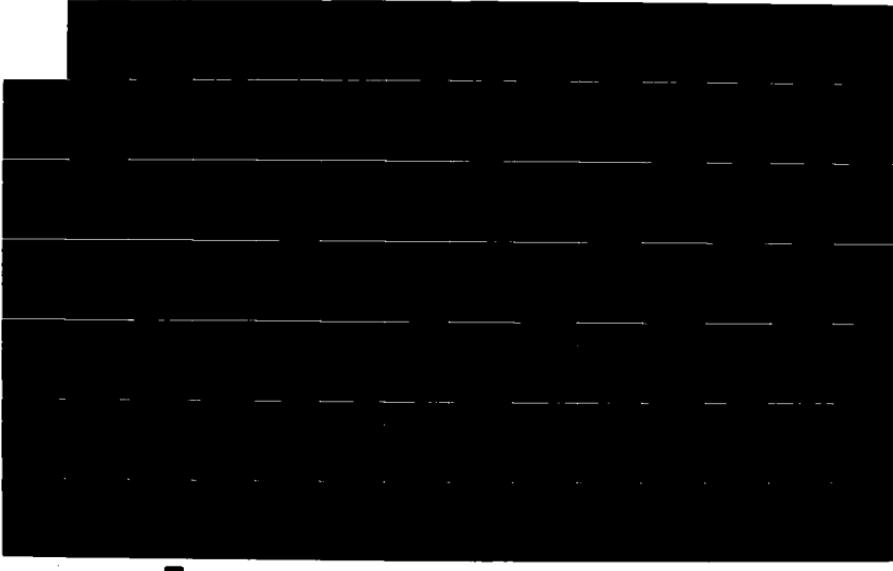




AD-A171 487 US NAVY CLIMATIC STUDY OF THE CARIBBEAN SEA AND GULF OF MEXICO VOLUME 2 EAST CARIBBEAN SEAS(U) NAVAL AIR SYSTEMS
UNCLASSIFIED

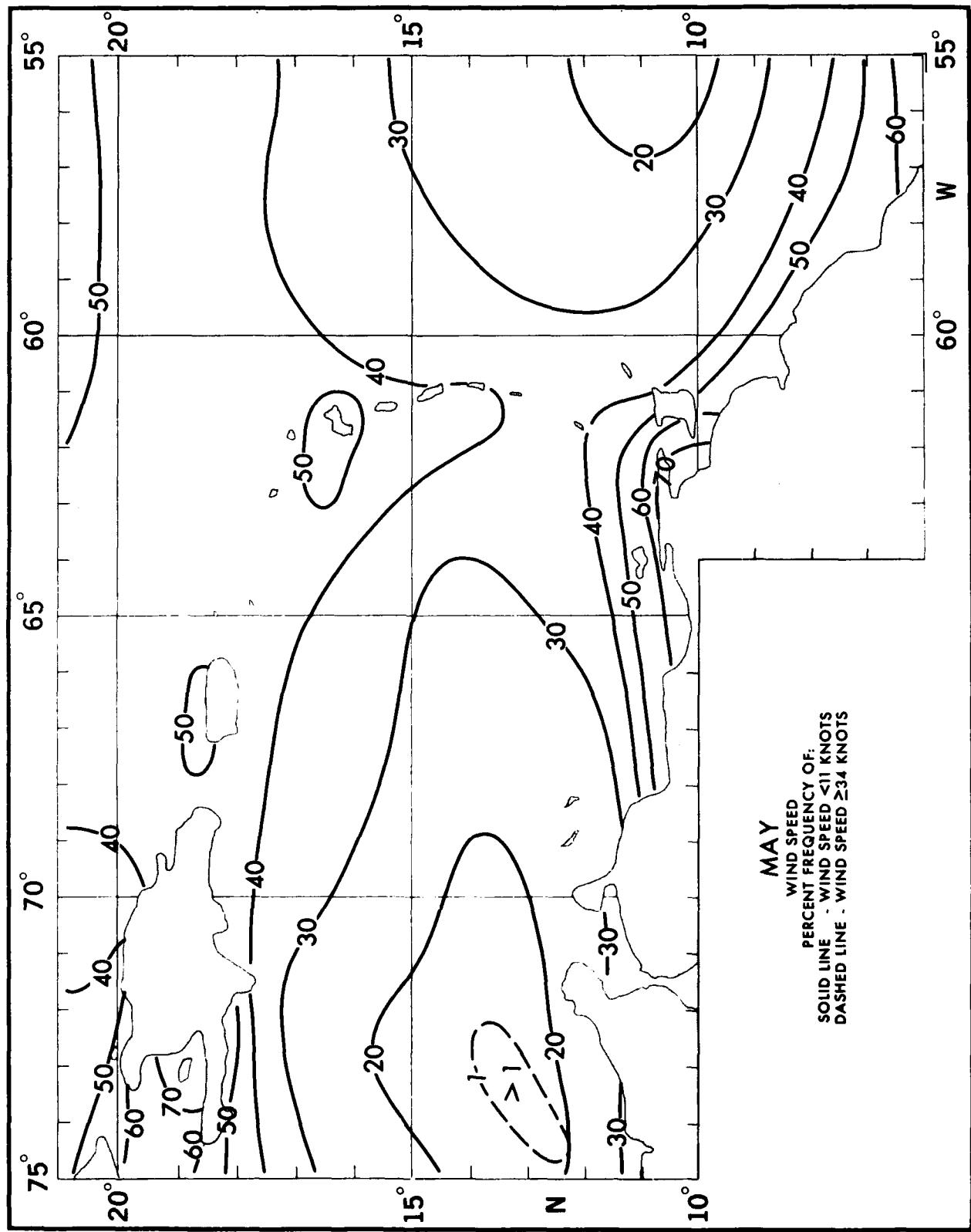
2/3
COMMAND WASHINGTON DC MAR 86 NAVAIR-50-1C-544

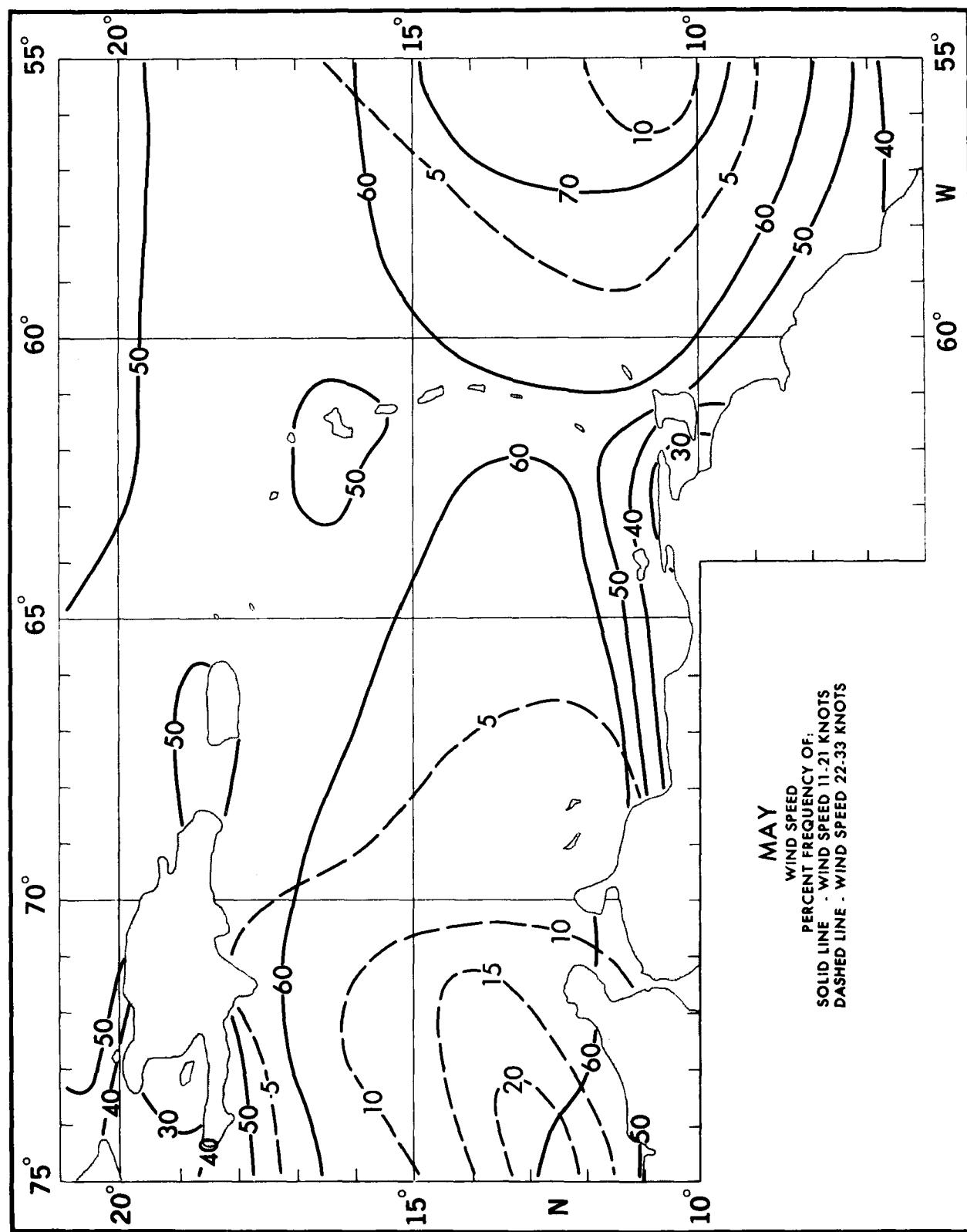
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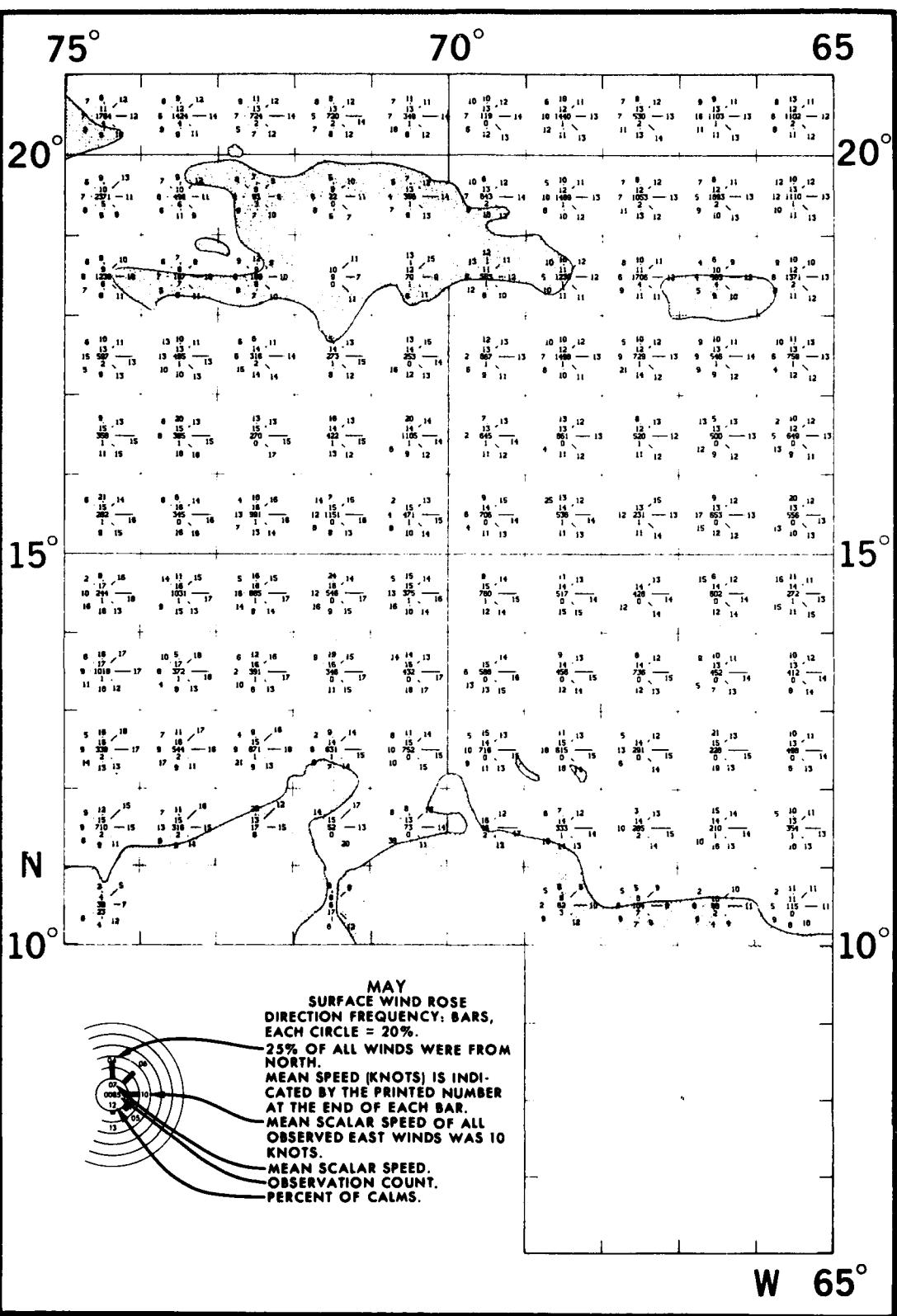


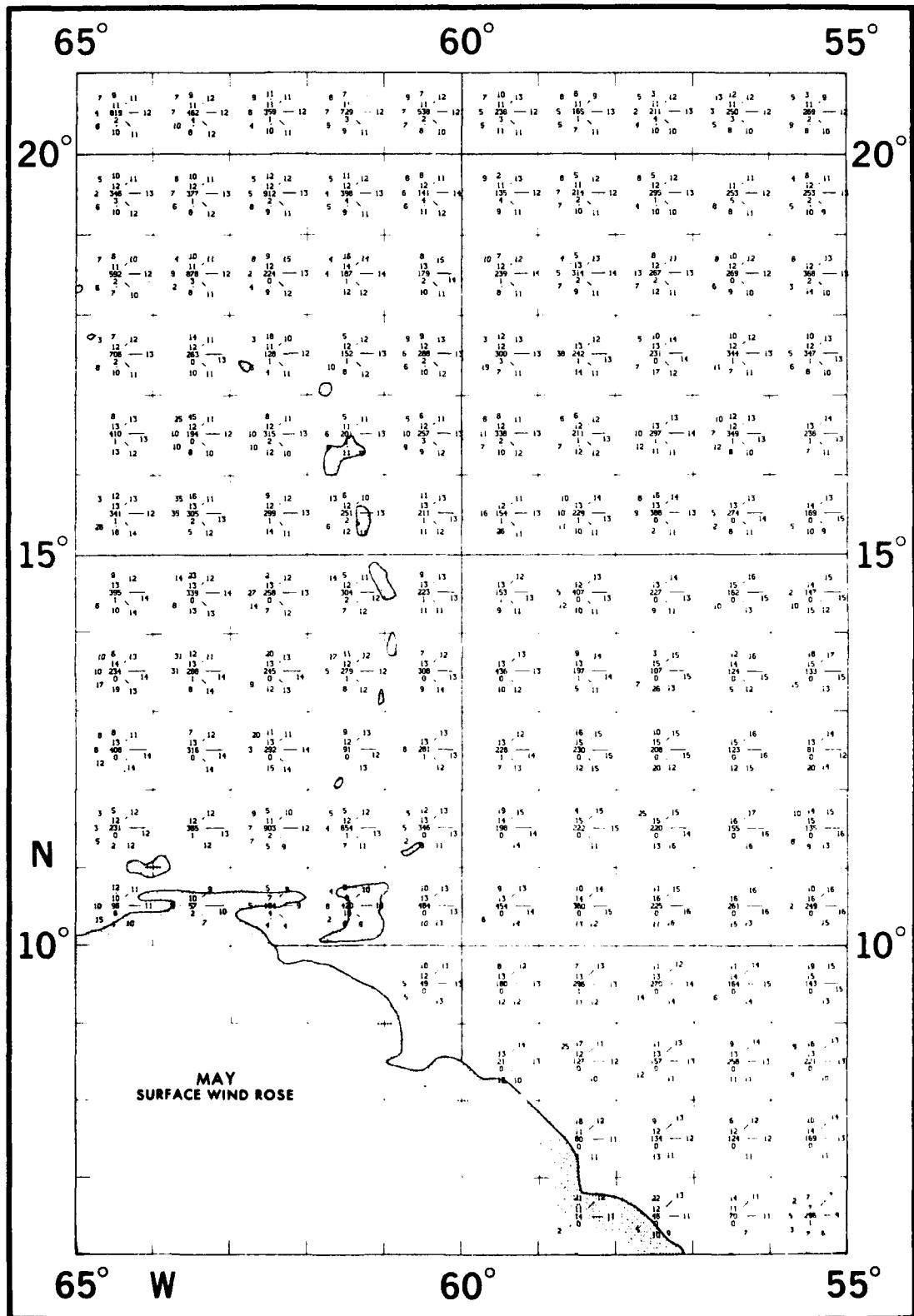


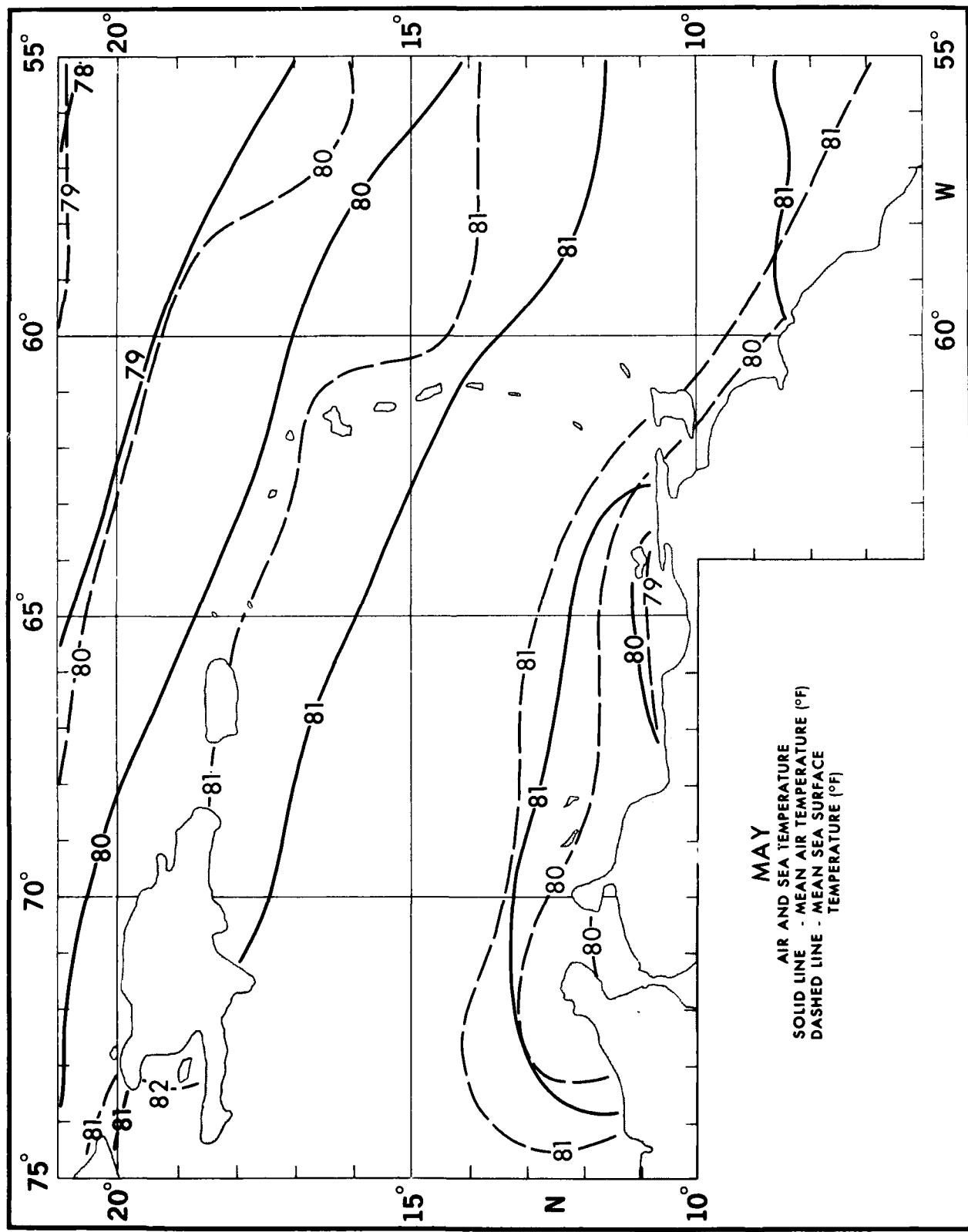
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

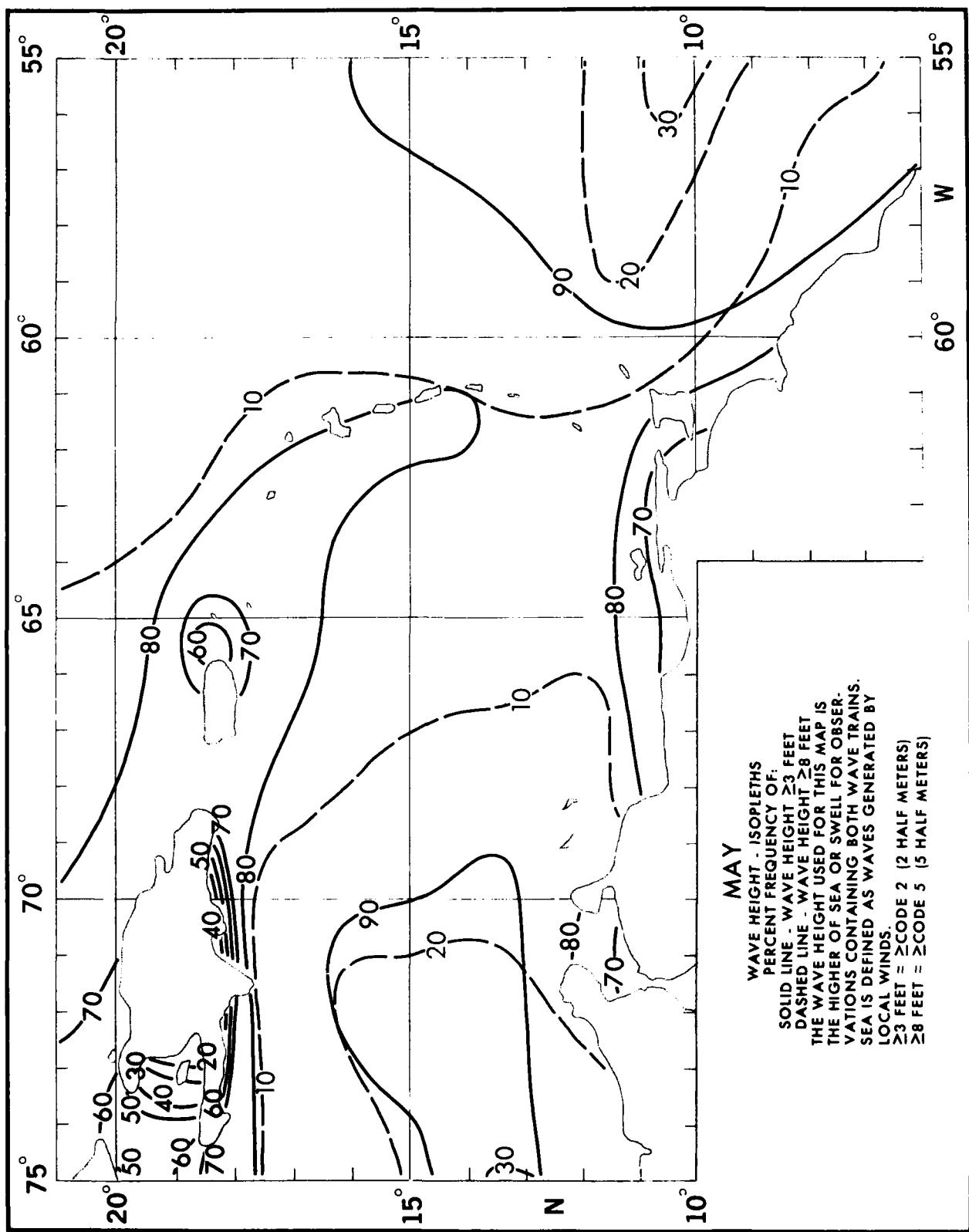












75°

70°

65

20°

20°

15°

15°

10°

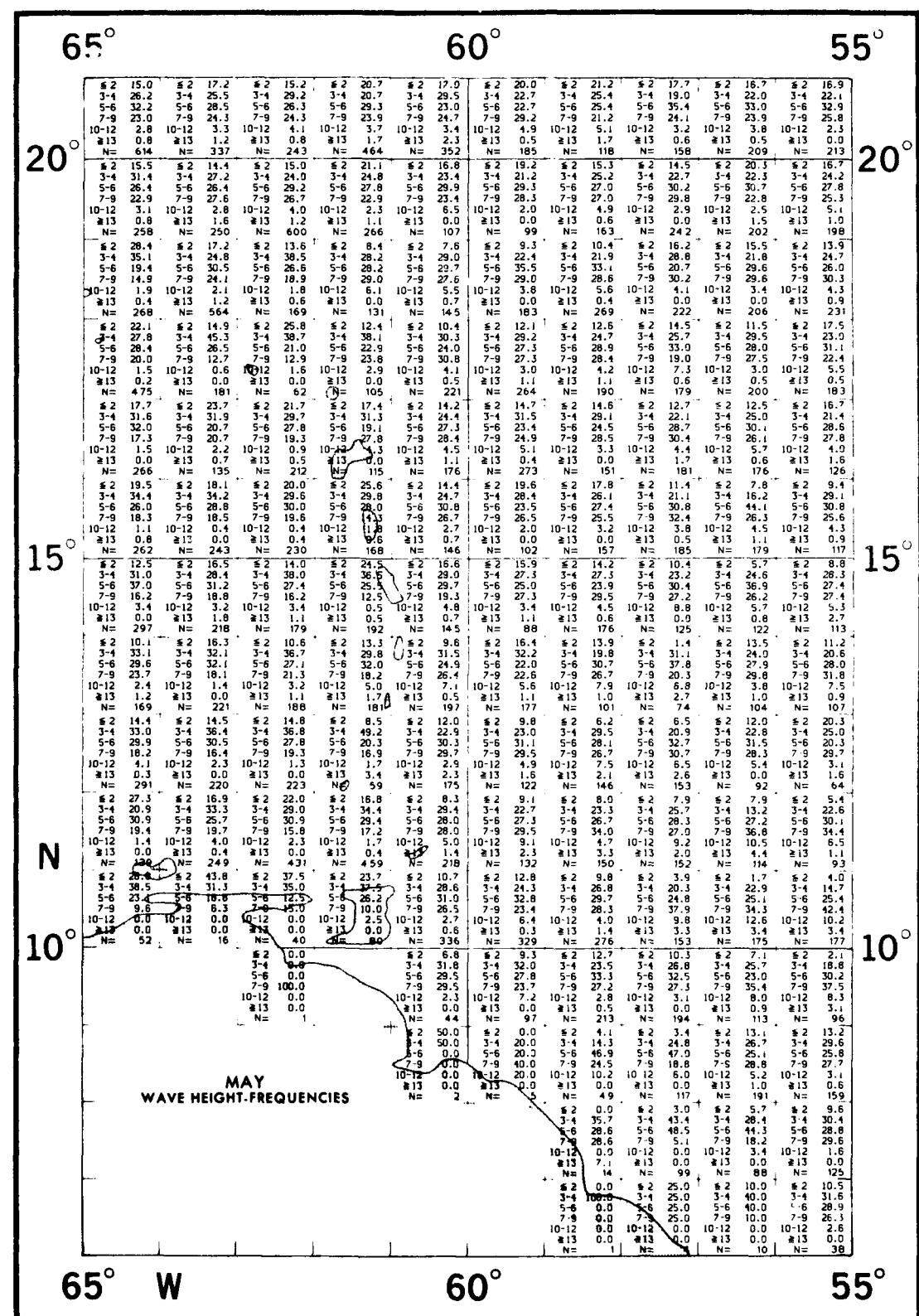
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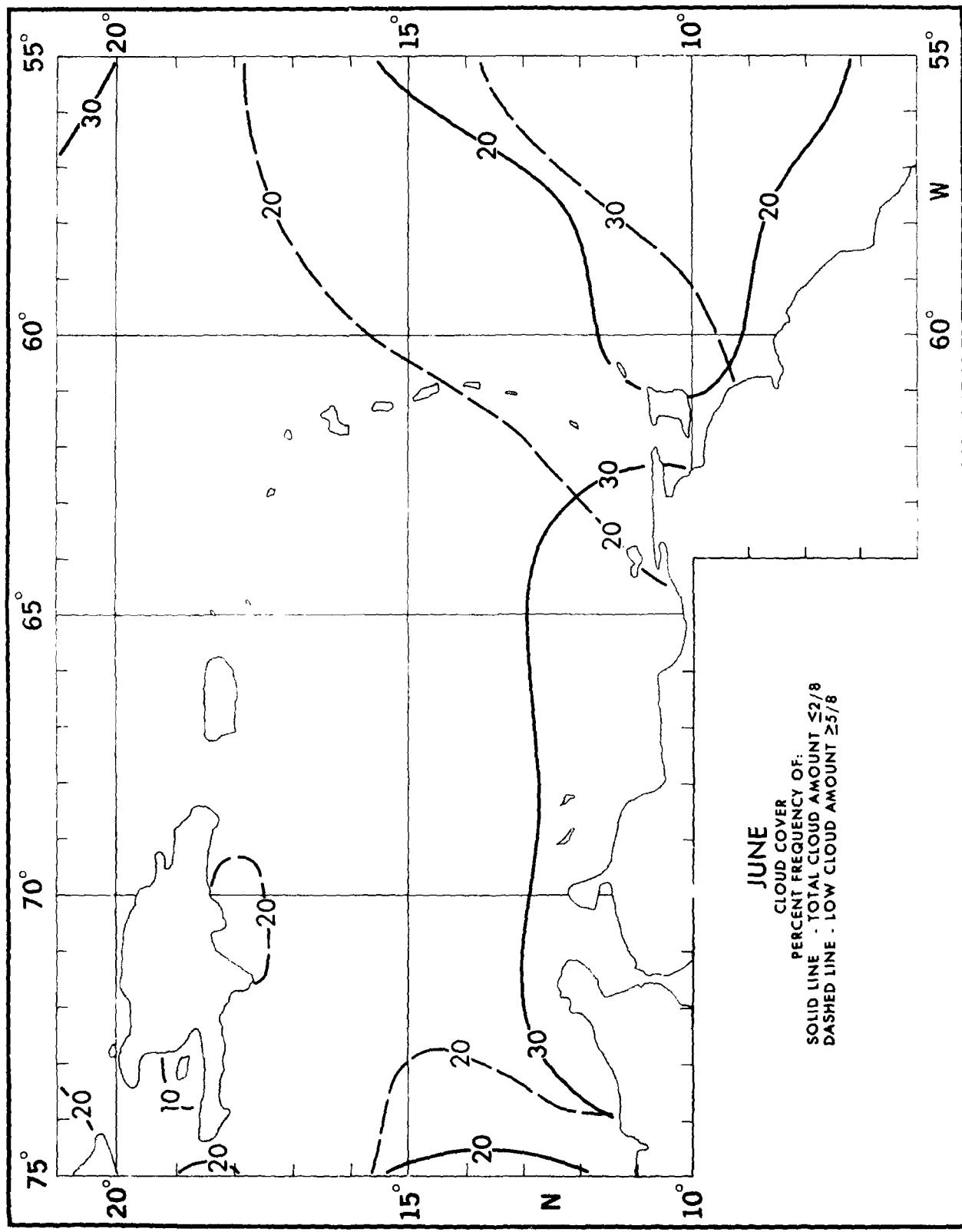
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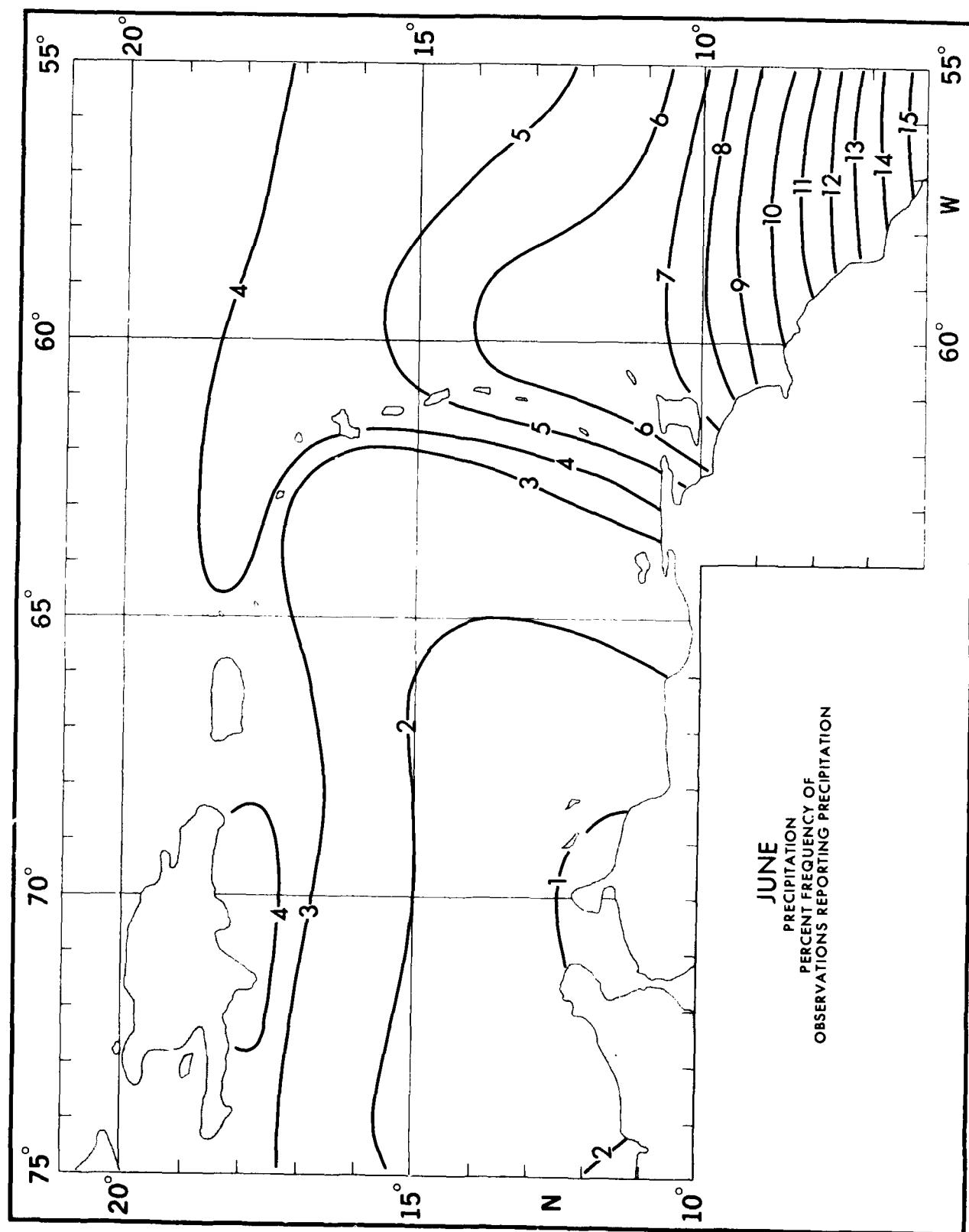
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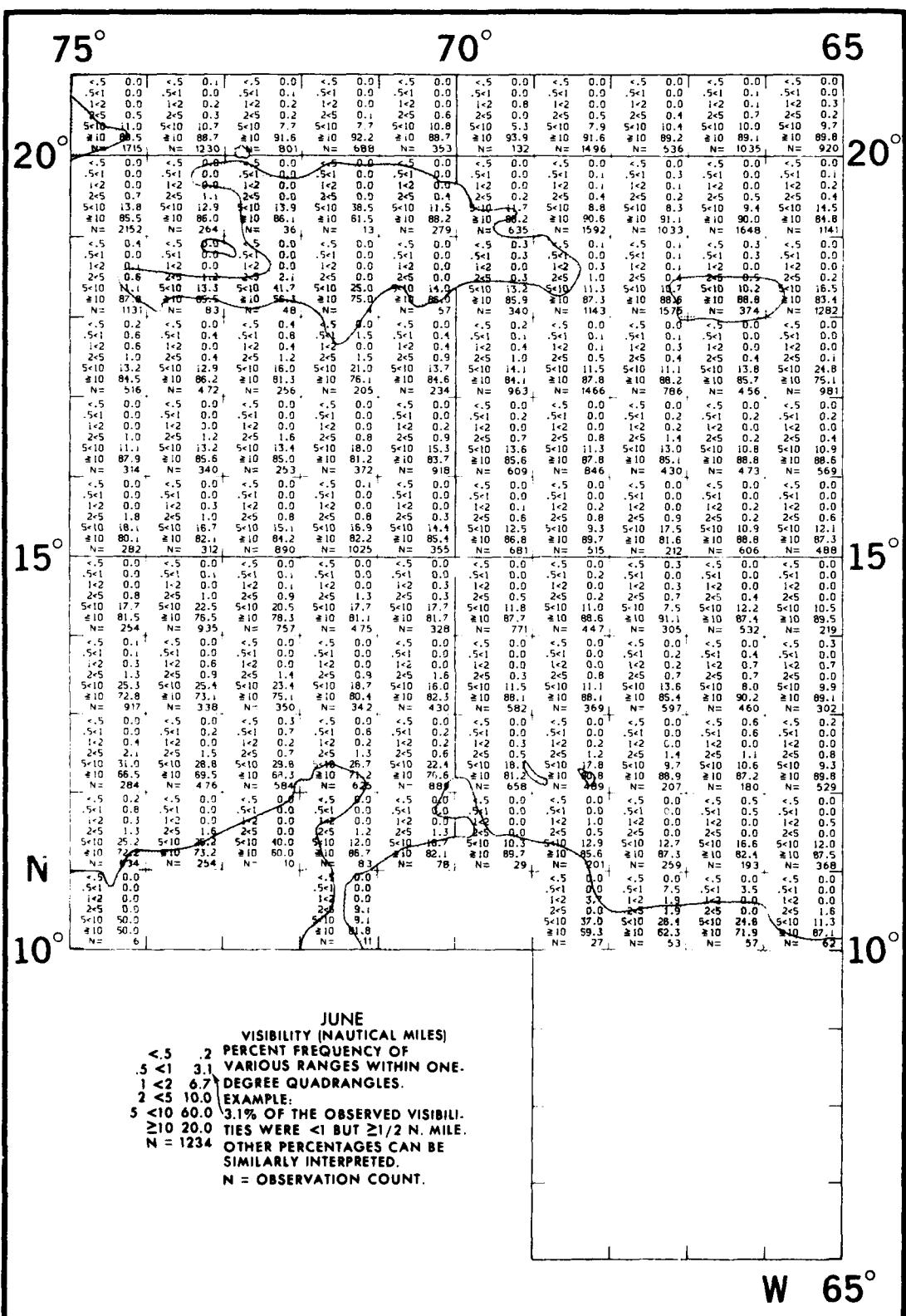
≤ 2 37.7	≤ 2 30.5	≤ 2 27.1	≤ 2 25.9	≤ 2 26.5	≤ 2 21.5	≤ 2 20.0	≤ 2 17.8	≤ 2 15.3	≤ 2 16.4
3-4 31.6	3-4 32.7	3-4 32.1	3-4 34.4	3-4 31.1	3-4 25.8	3-4 35.0	3-4 32.7	3-4 33.0	3-4 25.2
5-6 19.6	5-6 21.6	5-6 26.3	5-6 23.9	5-6 27.2	5-6 28.0	5-6 27.2	5-6 28.4	5-6 27.6	5-6 27.6
7-9 9.6	7-9 14.3	7-9 13.0	7-9 14.0	7-9 13.9	7-9 21.5	7-9 14.9	7-9 18.0	7-9 19.5	7-9 26.7
10-12 1.2	10-12 0.8	10-12 1.0	10-12 1.5	10-12 1.3	10-12 2.2	10-12 2.1	10-12 2.3	10-12 2.8	10-12 3.6
≤ 13 0.3	≤ 13 0.1	≤ 13 0.5	≤ 13 0.3	≤ 13 0.0	≤ 13 1.1	≤ 13 0.7	≤ 13 0.0	≤ 13 1.0	≤ 13 0.5
N= 1205	N= 1140	N= 616	N= 599	N= 302	N= 93	N= 121	N= 428	N= 872	N= 746
≤ 2 42.1	≤ 2 60.3	≤ 2 84.2	≤ 2 65.2	≤ 2 23.6	≤ 2 21.9	≤ 2 20.5	≤ 2 18.5	≤ 2 20.2	≤ 2 19.1
3-4 31.6	3-4 23.0	3-4 5.1	3-4 33.3	3-4 30.9	3-4 34.9	3-4 35.1	3-4 31.7	3-4 29.0	3-4 31.3
5-6 16.6	5-6 11.0	5-6 7.9	5-6 0.0	5-6 31.8	5-6 28.5	5-6 27.9	5-6 27.3	5-6 29.4	5-6 24.0
7-9 8.5	7-9 4.6	7-9 2.6	7-9 0.0	7-9 13.6	7-9 13.0	7-9 14.7	7-9 18.5	7-9 17.9	7-9 21.8
10-12 1.0	10-12 0.7	10-12 0.0	10-12 0.0	10-12 1.0	10-12 1.6	10-12 1.5	10-12 3.1	10-12 2.8	10-12 0.7
≤ 13 0.2	≤ 13 0.4	≤ 13 0.0	≤ 13 0.3	≤ 13 0.3	≤ 13 0.3	≤ 13 0.3	≤ 13 1.0	≤ 13 0.4	≤ 13 1.1
N= 1730	N= 282	N= 38	N= 6	N= 301	N= 561	N= 1237	N= 878	N= 13.37	N= 754
≤ 2 33.5	≤ 2 88.3	≤ 2 88.0	≤ 2 0.0	≤ 2 72.6	≤ 2 20.5	≤ 2 23.5	≤ 2 29.6	≤ 2 46.3	≤ 2 19.1
3-4 30.3	3-4 26.3	3-4 5.3	3-4 57.1	3-4 30.0	3-4 21.6	3-4 36.6	3-4 29.6	3-4 30.0	3-4 39.5
5-6 22.0	5-6 8.2	5-6 4.0	5-6 14.3	5-6 5.0	5-6 4.8	5-6 26.1	5-6 24.0	5-6 9.7	5-6 9.7
7-9 12.6	7-9 0.0	7-9 2.7	7-9 26.6	7-9 1.7	7-9 0.8	7-9 15.3	7-9 17.7	7-9 13.9	7-9 3.6
10-12 0.6	10-12 0.0	10-12 0.0	10-12 0.0	10-12 0.2	10-12 1.3	10-12 2.5	10-12 1.4	10-12 2.2	10-12 0.7
≤ 13 0.1	≤ 13 0.6	≤ 13 0.0	≤ 13 0.0	≤ 13 0.0	≤ 13 0.2	≤ 13 0.6	≤ 13 1.0	≤ 13 0.2	≤ 13 0.2
N= 802	N= 49	N= 75	N= 0	N= 60	N= 976	N= 1299	N= 287	N= 870	N= 870
≤ 2 17.6	≤ 2 21.2	≤ 2 9.5	≤ 2 18.3	≤ 2 13.1	≤ 2 14.7	≤ 2 15.3	≤ 2 23.3	≤ 2 20.3	≤ 2 38.7
3-4 20.3	3-4 24.2	3-4 3.9	3-4 28.1	3-4 32.1	3-4 26.6	3-4 32.2	3-4 36.1	3-4 35.4	3-4 36.0
5-6 33.1	5-6 27.9	5-6 30.0	5-6 24.9	5-6 25.6	5-6 27.6	5-6 28.2	5-6 26.4	5-6 22.4	5-6 14.8
7-9 17.8	7-9 22.7	7-9 27.1	7-9 22.5	7-9 26.2	7-9 25.6	7-9 21.6	7-9 12.0	7-9 11.8	7-9 9.3
10-12 2.6	10-12 3.1	10-12 3.3	10-12 5.3	10-12 1.8	10-12 4.2	10-12 2.3	10-12 1.4	10-12 2.2	10-12 0.6
≤ 13 0.5	≤ 13 0.9	≤ 13 0.5	≤ 13 0.8	≤ 13 1.2	≤ 13 1.3	≤ 13 0.5	≤ 13 0.9	≤ 13 0.0	≤ 13 0.6
N= 381	N= 326	N= 210	N= 169	N= 168	N= 673	N= 1108	N= 576	N= 407	N= 494
≤ 2 11.1	≤ 2 12.1	≤ 2 8.6	≤ 2 6.7	≤ 2 9.5	≤ 2 10.3	≤ 2 16.4	≤ 2 20.2	≤ 2 16.9	≤ 2 20.3
3-4 27.9	3-4 23.3	3-4 3.9	3-4 23.8	3-4 23.9	3-4 24.6	3-4 28.6	3-4 34.8	3-4 37.2	3-4 29.8
5-6 31.2	5-6 28.6	5-6 2.6	5-6 29.2	5-6 29.2	5-6 30.5	5-6 33.0	5-6 29.5	5-6 26.9	5-6 26.9
7-9 26.1	7-9 5.9	7-9 32.7	7-9 31.6	7-9 31.5	7-9 30.3	7-9 18.9	7-9 12.6	7-9 15.5	7-9 20.6
10-12 1.4	10-12 5.7	10-12 4.3	10-12 8.6	10-12 7.5	10-12 10.3	10-12 10.3	10-12 10.3	10-12 10.3	10-12 3.6
≤ 13 0.4	≤ 13 0.0	≤ 13 1.9	≤ 13 2.2	≤ 13 0.9	≤ 13 0.7	≤ 13 0.3	≤ 13 0.3	≤ 13 0.3	≤ 13 0.6
N= 234	N= 283	N= 162	N= 313	N= 813	N= 455	N= 597	N= 342	N= 384	N= 467
≤ 2 10.2	≤ 2 10.8	≤ 2 7.4	≤ 2 7.9	≤ 2 9.1	≤ 2 12.4	≤ 2 11.6	≤ 2 12.8	≤ 2 13.7	≤ 2 17.3
3-4 22.8	3-4 19.9	3-4 19.4	3-4 19.1	3-4 24.8	3-4 24.2	3-4 27.7	3-4 31.1	3-4 28.5	3-4 30.4
5-6 26.6	5-6 26.9	5-6 25.7	5-6 27.0	5-6 28.2	5-6 34.6	5-6 33.2	5-6 25.6	5-6 33.2	5-6 27.7
7-9 31.6	7-9 35.5	7-9 34.8	7-9 34.8	7-9 31.5	7-9 24.0	7-9 22.6	7-9 26.3	7-9 21.6	7-9 22.0
10-12 3.9	10-12 6.4	10-12 10.9	10-12 9.7	10-12 4.4	10-12 3.7	10-12 4.9	10-12 1.5	10-12 2.7	10-12 2.1
≤ 13 2.9	≤ 13 1.6	≤ 13 1.9	≤ 13 1.5	≤ 13 2.0	≤ 13 1.2	≤ 13 0.0	≤ 13 0.8	≤ 13 0.2	≤ 13 0.5
N= 205	N= 251	N= 282	N= 84.5	N= 298	N= 509	N= 328	N= 133	N= 473	N= 382
≤ 2 12.2	≤ 2 7.7	≤ 2 6.8	≤ 2 8.4	≤ 2 10.2	≤ 2 12.1	≤ 2 9.6	≤ 2 9.3	≤ 2 12.6	≤ 2 10.4
3-4 13.8	3-4 15.3	3-4 20.6	3-4 17.4	3-4 27.8	3-4 24.1	3-4 25.5	3-4 21.6	3-4 27.9	3-4 33.9
5-6 23.8	5-6 27.2	5-6 23.1	5-6 27.2	5-6 25.5	5-6 30.5	5-6 32.5	5-6 28.6	5-6 30.1	5-6 29.2
7-9 37.6	7-9 34.6	7-9 39.1	7-9 37.4	7-9 27.8	7-9 29.1	7-9 28.4	7-9 31.2	7-9 26.0	7-9 23.4
10-12 9.0	10-12 11.7	10-12 10.2	8.9	10-12 7.3	10-12 8.3	10-12 3.9	10-12 4.1	10-12 6.3	10-12 2.9
≤ 13 3.7	≤ 13 3.4	≤ 13 1.6	≤ 13 2.2	≤ 13 0.5	≤ 13 0.3	≤ 13 0.0	≤ 13 3.0	≤ 13 0.5	≤ 13 0.0
N= 189	N= 623	N= 676	N= 356	N= 216	N= 597	N= 345	N= 301	N= 419	N= 192
≤ 2 5.3	≤ 2 6.2	≤ 2 12.6	≤ 2 8.8	≤ 2 6.9	≤ 2 10.0	≤ 2 12.5	≤ 2 10.6	≤ 2 13.5	≤ 2 12.3
3-4 17.6	3-4 18.3	3-4 17.6	3-4 23.5	3-4 19.0	3-4 20.6	3-4 21.7	3-4 34.0	3-4 30.7	3-4 32.7
5-6 23.0	5-6 26.8	5-6 28.7	5-6 29.8	5-6 29.7	5-6 33.3	5-6 29.5	5-6 29.1	5-6 31.3	5-6 34.6
7-9 38.6	7-9 32.3	7-9 29.9	7-9 27.3	7-9 35.5	7-9 28.8	7-9 30.5	7-9 26.3	7-9 21.7	7-9 18.2
10-12 12.0	10-12 13.6	10-12 7.0	10-12 9.2	10-12 8.6	10-12 6.3	10-12 5.1	10-12 5.1	10-12 2.5	10-12 1.9
≤ 13 3.5	≤ 13 2.7	≤ 13 3.4	≤ 13 1.3	≤ 13 0.3	≤ 13 1.0	≤ 13 0.7	≤ 13 1.0	≤ 13 0.3	≤ 13 0.3
N= 769	N= 257	N= 261	N= 236	N= 290	N= 299	N= 299	N= 299	N= 491	N= 355
≤ 2 10.6	≤ 2 8.6	≤ 2 10.6	≤ 2 10.7	≤ 2 11.3	≤ 2 14.8	≤ 2 13.0	≤ 2 9.3	≤ 2 12.9	≤ 2 16.2
3-4 18.9	3-4 22.2	3-4 19.7	3-4 21.5	3-4 23.6	3-4 23.9	3-4 24.2	3-4 24.2	3-4 29.5	3-4 33.8
5-6 24.1	5-6 26.4	5-6 26.4	5-6 26.5	5-6 29.8	5-6 24.3	5-6 25.6	5-6 26.6	5-6 20.5	5-6 29.5
7-9 32.7	7-9 30.3	7-9 31.5	7-9 32.2	7-9 27.9	7-9 31.2	7-9 29.5	7-9 32.1	7-9 29.5	7-9 18.2
10-12 8.2	10-12 7.6	10-12 9.6	10-12 6.7	10-12 6.7	10-12 5.8	10-12 5.8	10-12 5.0	10-12 9.9	10-12 3.8
≤ 13 4.1	≤ 13 4.3	≤ 13 2.2	≤ 13 4.4	≤ 13 1.6	≤ 13 1.5	≤ 13 1.6	≤ 13 0.6	≤ 13 0.0	≤ 13 0.0
N= 217	N= 347	N= 416	N= 40	N= 507	N= 398	N= 340	N= 161	N= 139	N= 396
≤ 2 13.1	≤ 2 8.4	≤ 2 25.4	≤ 2 20.0	≤ 2 29.2	≤ 2 18.9	≤ 2 13.0	≤ 2 14.9	≤ 2 15.7	≤ 2 19.2
3-4 19.0	3-4 20.8	3-4 0.0	3-4 35.0	3-4 24.8	3-4 16.2	3-4 26.1	3-4 29.1	3-4 24.2	3-4 32.3
5-6 27.4	5-6 26.4	5-6 25.0	5-6 18.2	5-6 29.7	5-6 18.9	5-6 29.0	5-6 30.3	5-6 26.1	5-6 29.7
7-9 27.9	7-9 24.8	7-9 25.0	7-9 29.5	7-9 12.5	7-9 24.2	7-9 21.1	7-9 29.4	7-9 16.2	7-9 16.2
10-12 10.4	10-12 8.1	10-12 0.0	10-12 2.3	10-12 0.0	10-12 5.4	10-12 6.8	10-12 4.3	10-12 4.6	10-12 2.6
≤ 13 2.0	≤ 13 1.1	≤ 13 0.0	≤ 13 0.0	≤ 13 1.6	≤ 13 2.7	≤ 13 1.0	≤ 13 0.6	≤ 13 0.0	≤ 13 0.0
N= 152	N= 178	N= 4	N= 44	N= 64	N= 37	N= 207	N= 188	N= 153	N= 266
≤ 2 10.0	≤ 2 20.0	≤ 2 30.0	≤ 2 10.0	≤ 2 20.4	≤ 2 20.0	≤ 2 20.0	≤ 2 20.0	≤ 2 40.0	≤ 2 20.6
3-4 40.0	3-4 40.0	3-4 0.0	3-4 0.0	3-4 47.1	3-4 34.0	3-4 33.3	3-4 34.0	3-4 42.6	3-4 42.6
5-6 20.0	5-6 20.0	5-6 0.0	5-6 0.0	5-6 11.1	5-6 23.3	5-6 23.3	5-6 23.3	5-6 23.5	5-6 23.5
7-9 20.0	7-9 20.0	7-9 0.0	7-9 0.0	7-9 11.8	7-9 8.7	7-9 8.0	7-9 13.2	7-9 13.2	7-9 13.2
10-12 10.0	10-12 10.0	10-12 0.0	10-12 0.0	10-12 0.0	10-12 0.0	10-12 0.0	10-12 0.0	10-12 0.0	10-12 0.0
≤ 13 0.0	≤ 13 0.0	≤ 13 0.0	≤ 13 0.0	≤ 13 0.0	≤ 13 0.0	≤ 13 0.0	≤ 13 0.0	≤ 13 0.0	≤ 13 0.0
N= 10	N= 10	N= 0	N= 0	N= 0	N= 0	N= 0	N= 0	N= 0	N= 68

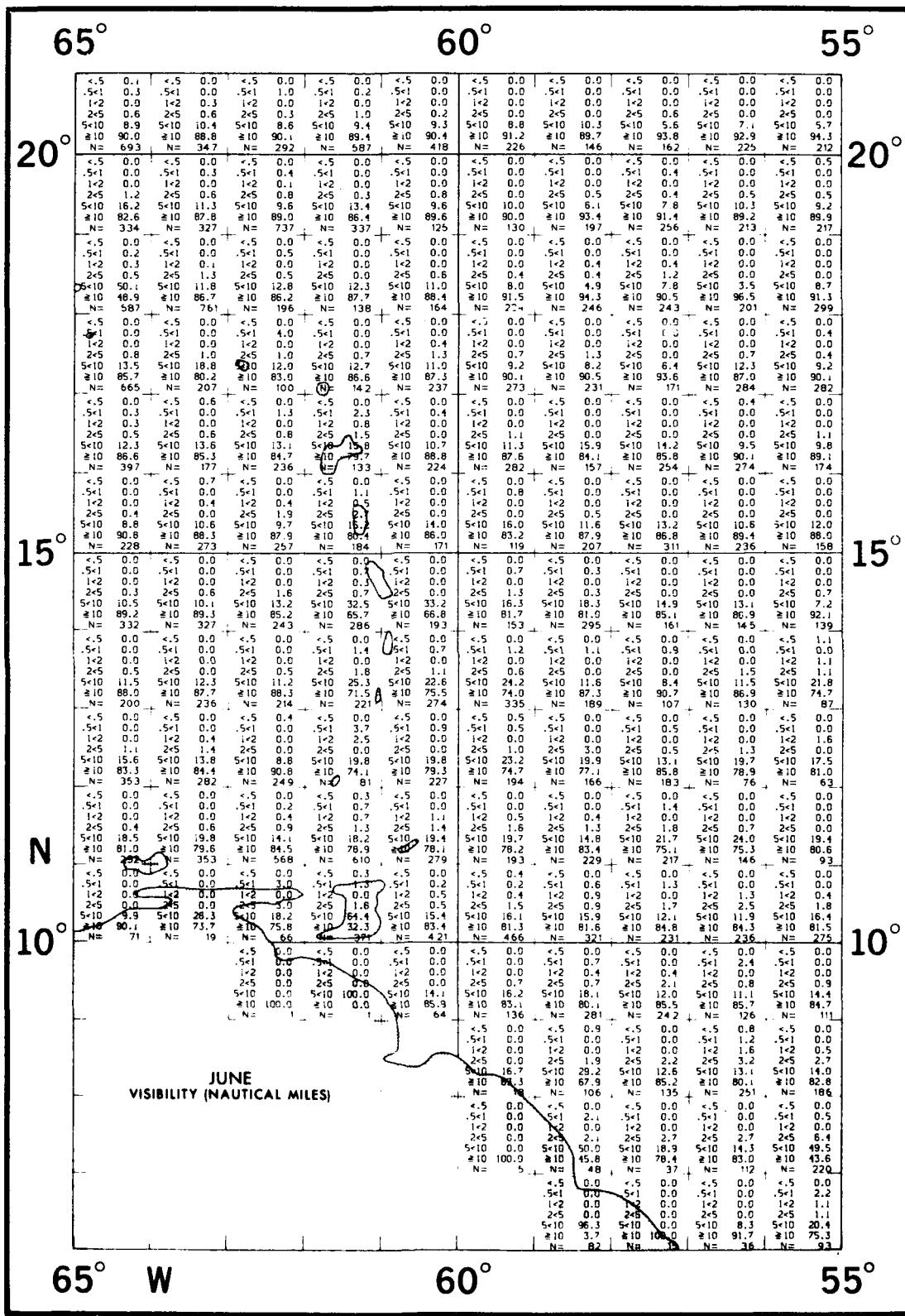
MAY
 WAVE HEIGHT-FREQUENCIES
 ≤ 2 10.0 PERCENT FREQUENCY OF
 3-4 20.0 VARIOUS RANGES WITHIN ONE-
 5-6 30.0 DEGREE QUADRANGLES.
 7-9 20.0 EXAMPLE:
 10-12 10.0 30.0% OF ALL OBSERVED WAVE
 ≥ 13 10.0 HEIGHTS WERE IN THE RANGE 5
 N = 1363 TO 6 FEET.
 N = OBSERVATION COUNT.
 WAVE DATA FOR THESE TABLES
 WERE SELECTED FROM THE HIGHER
 OF SEA OR SWELL WHEN BOTH
 WERE REPORTED.

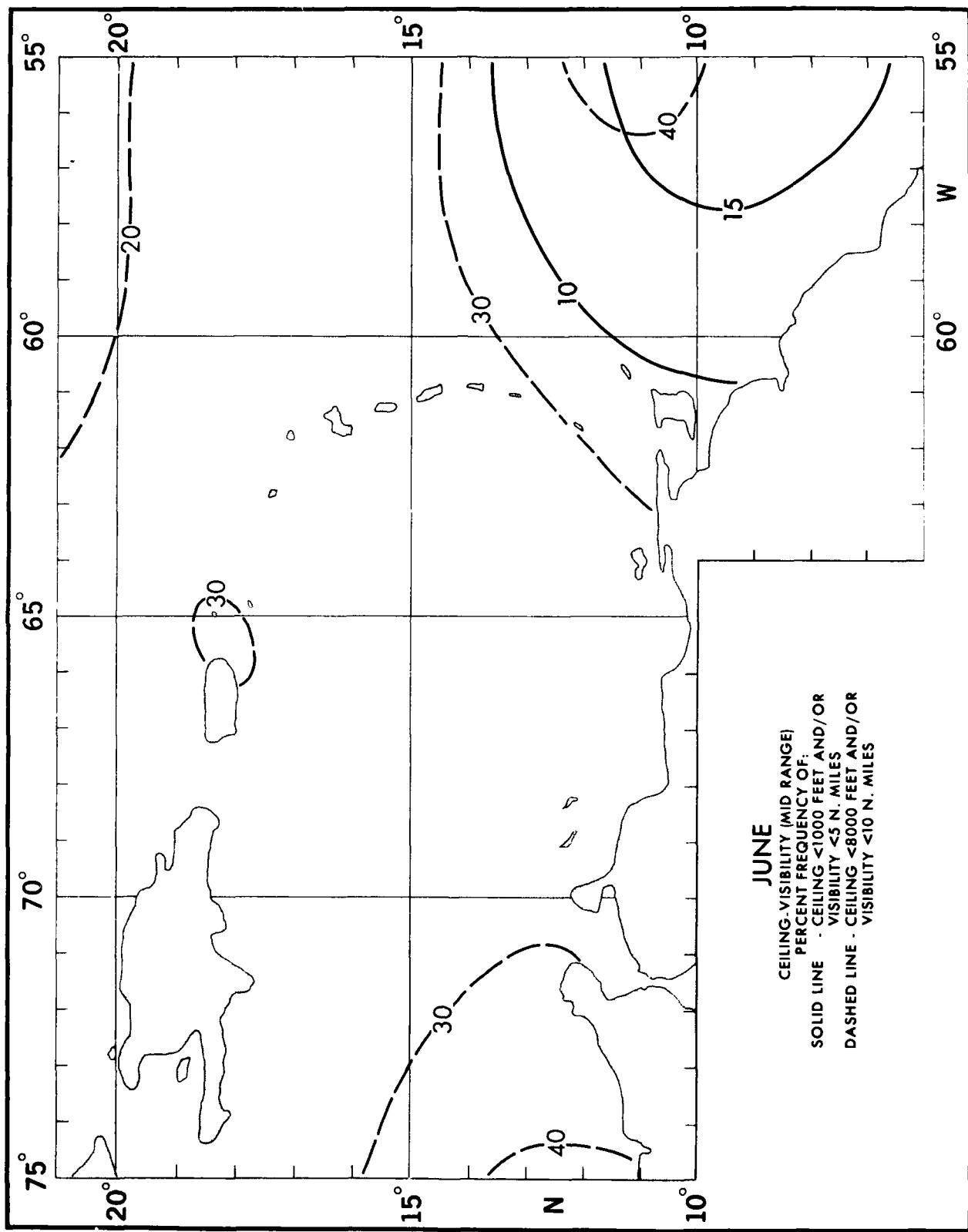


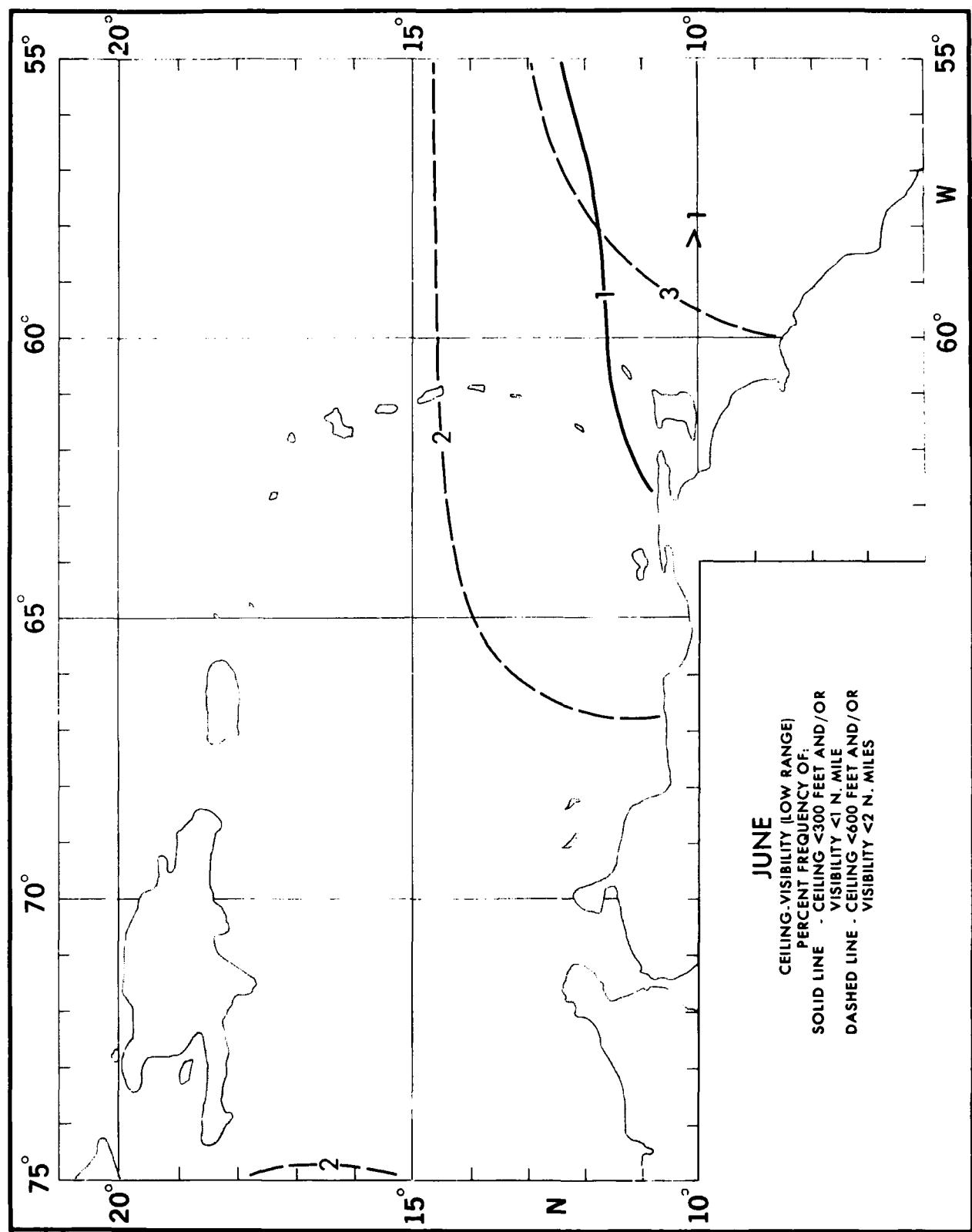


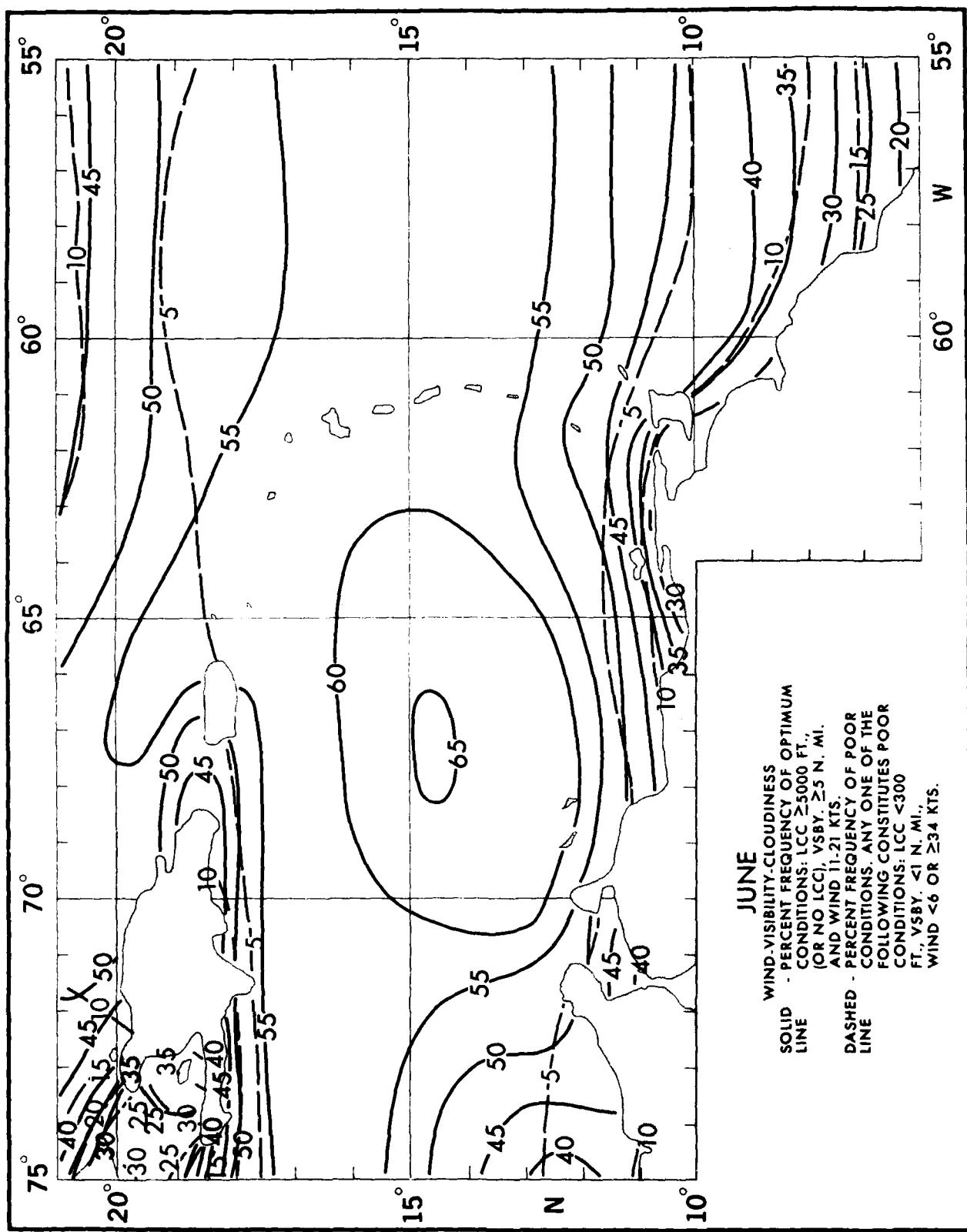


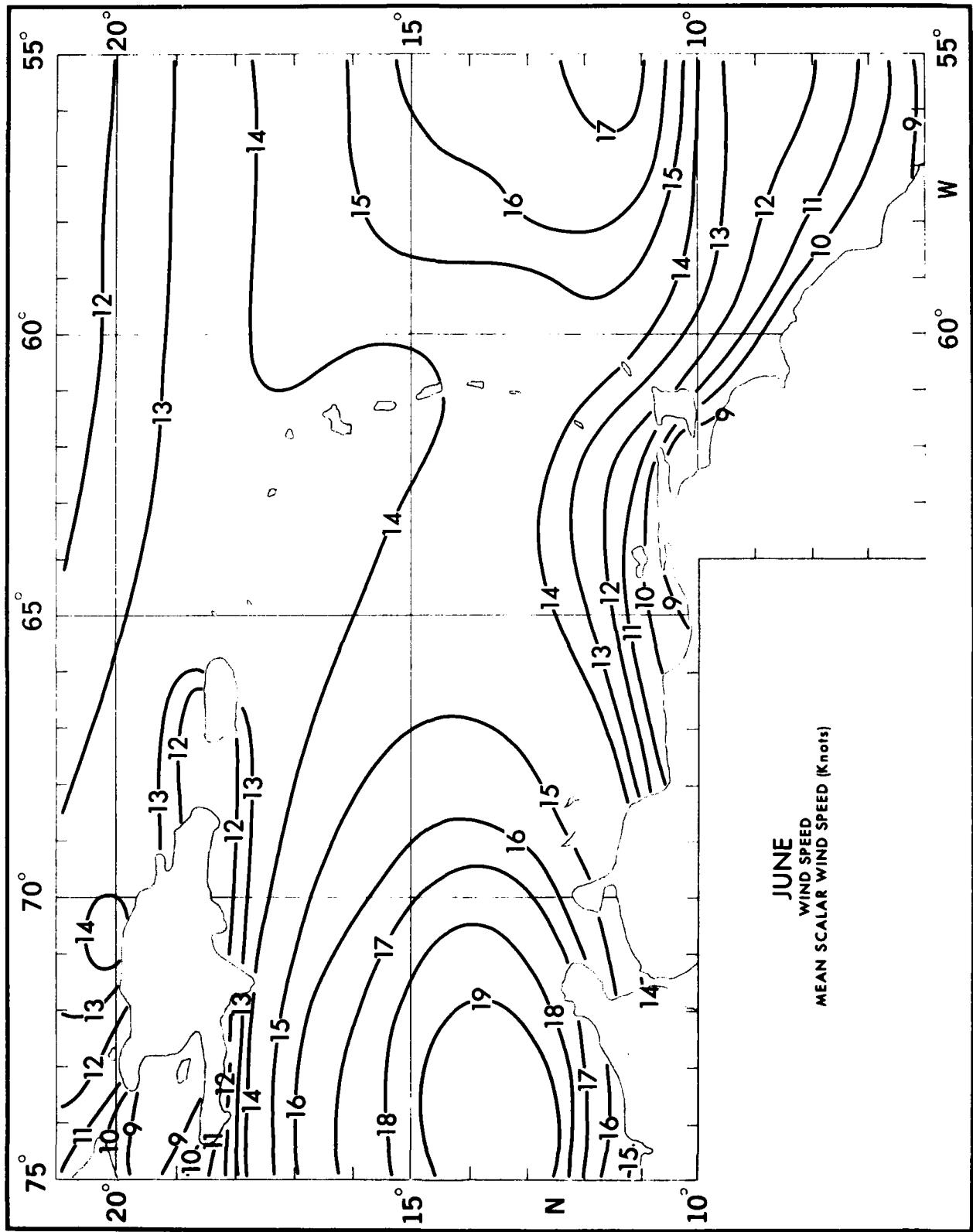


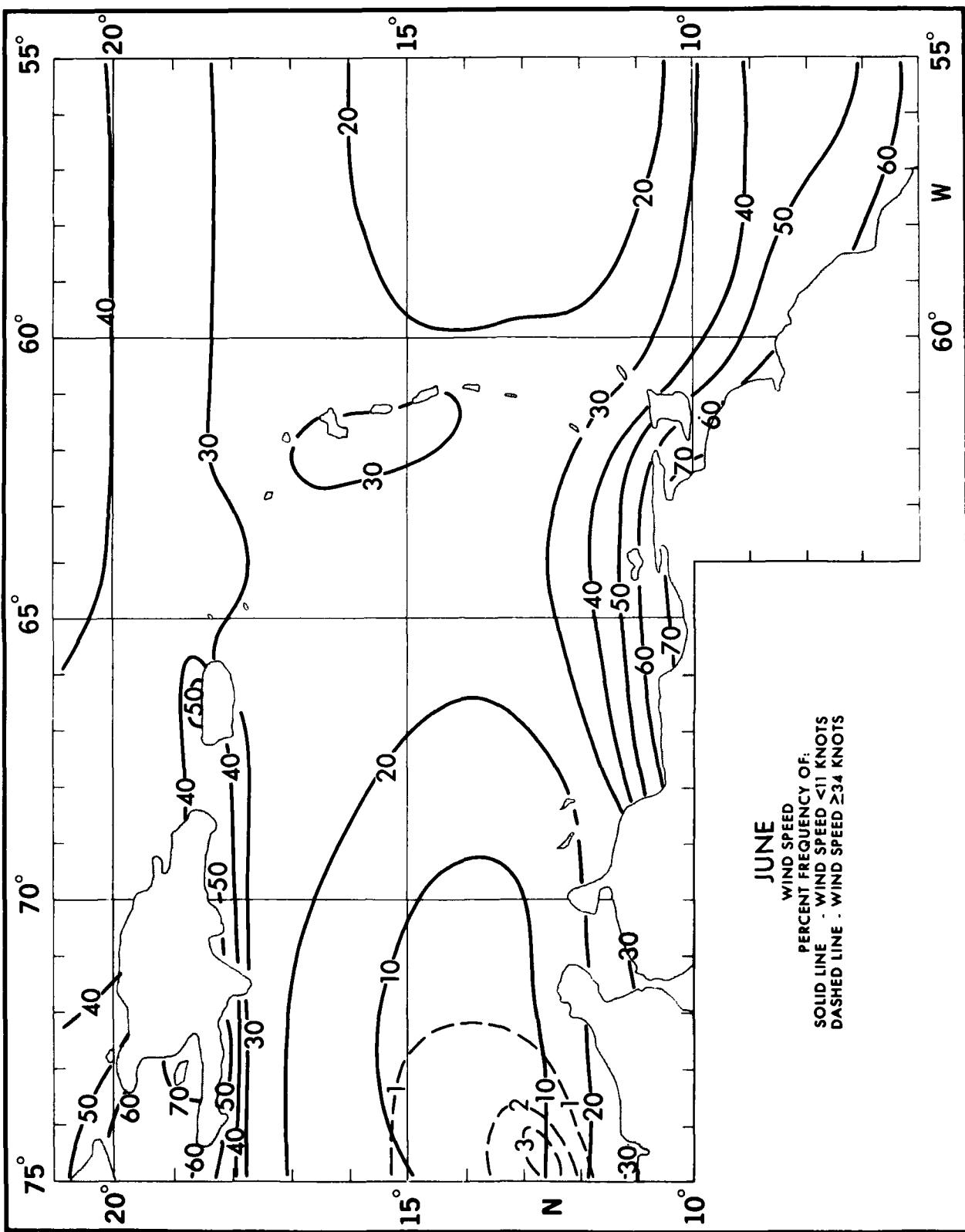


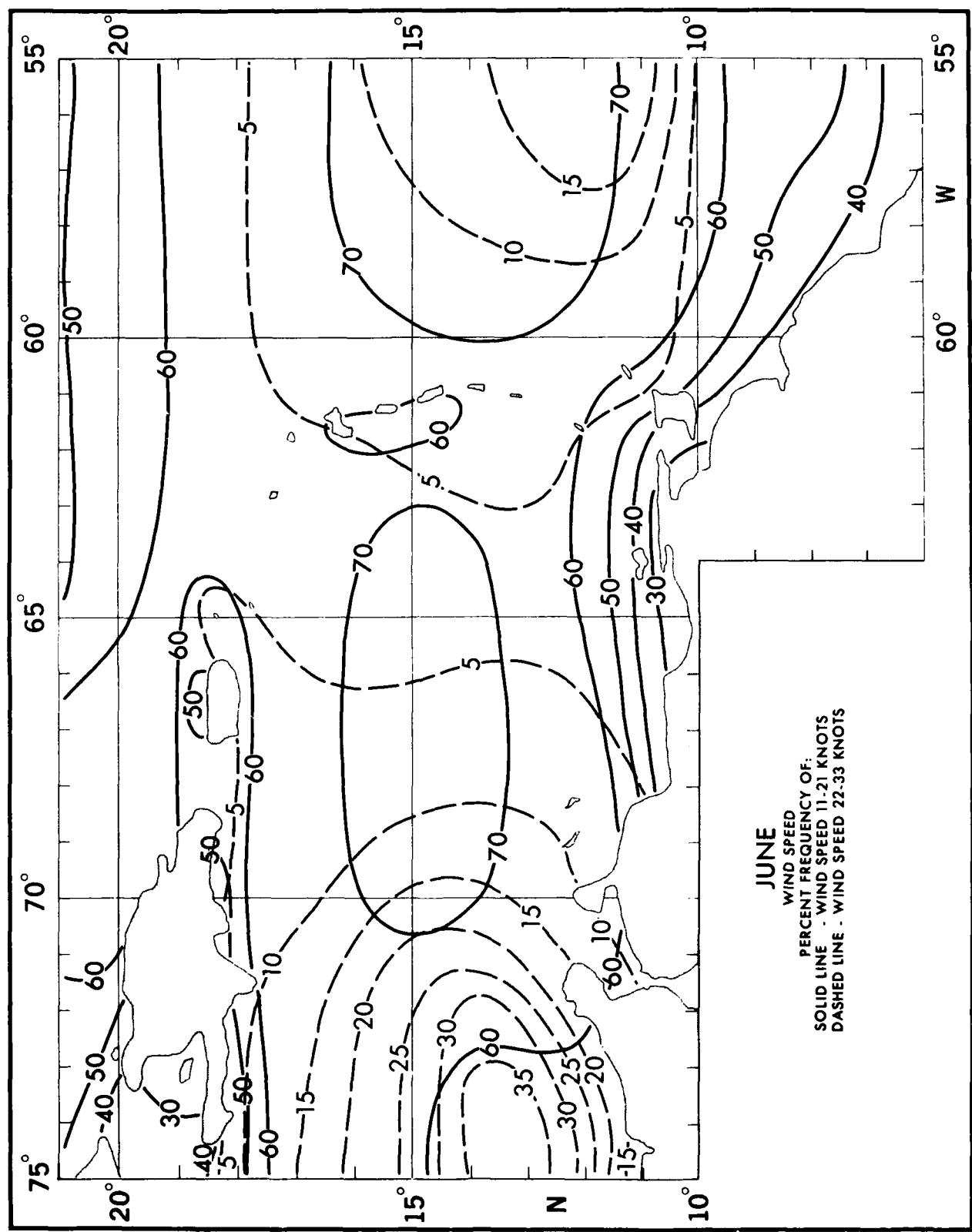


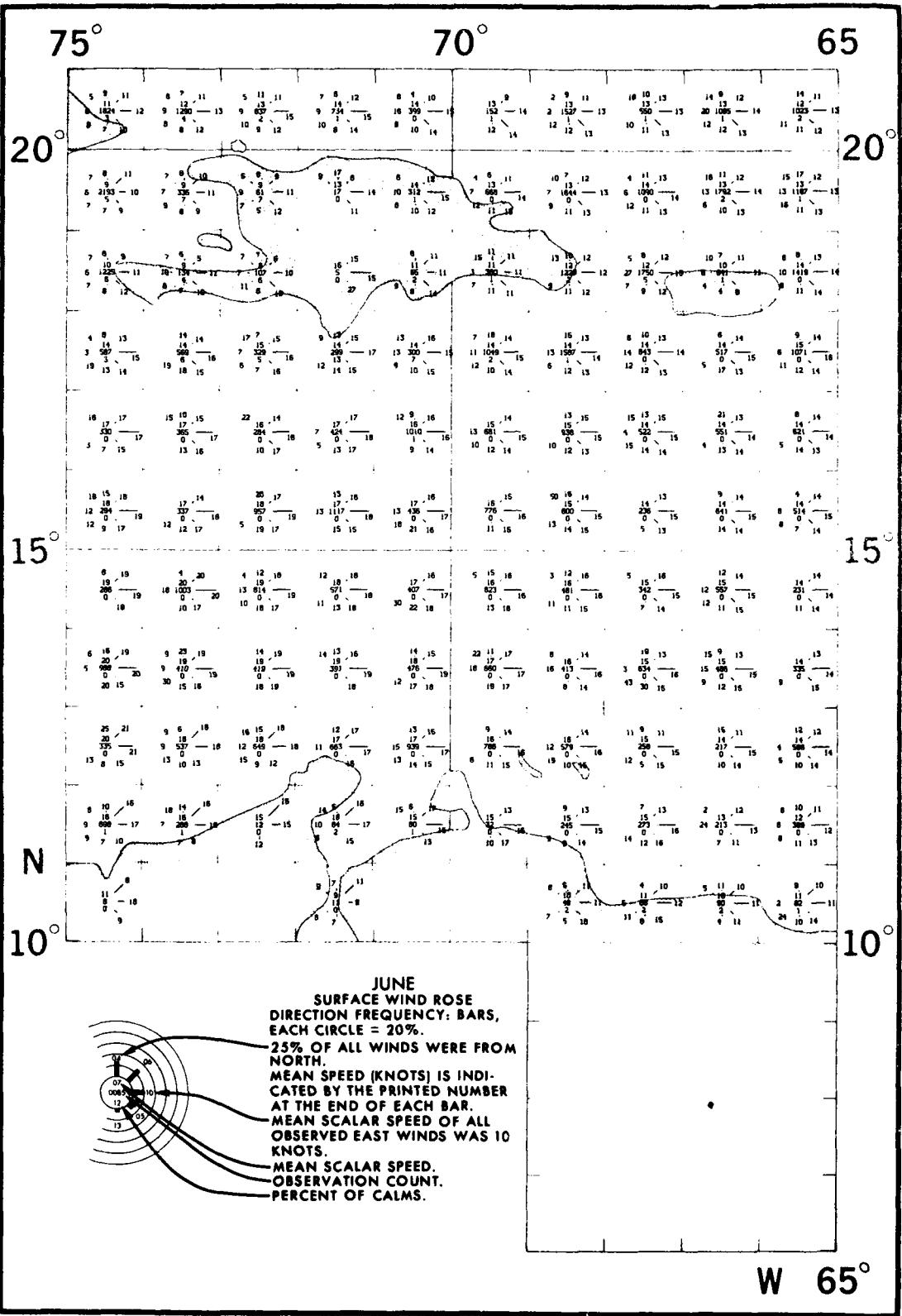


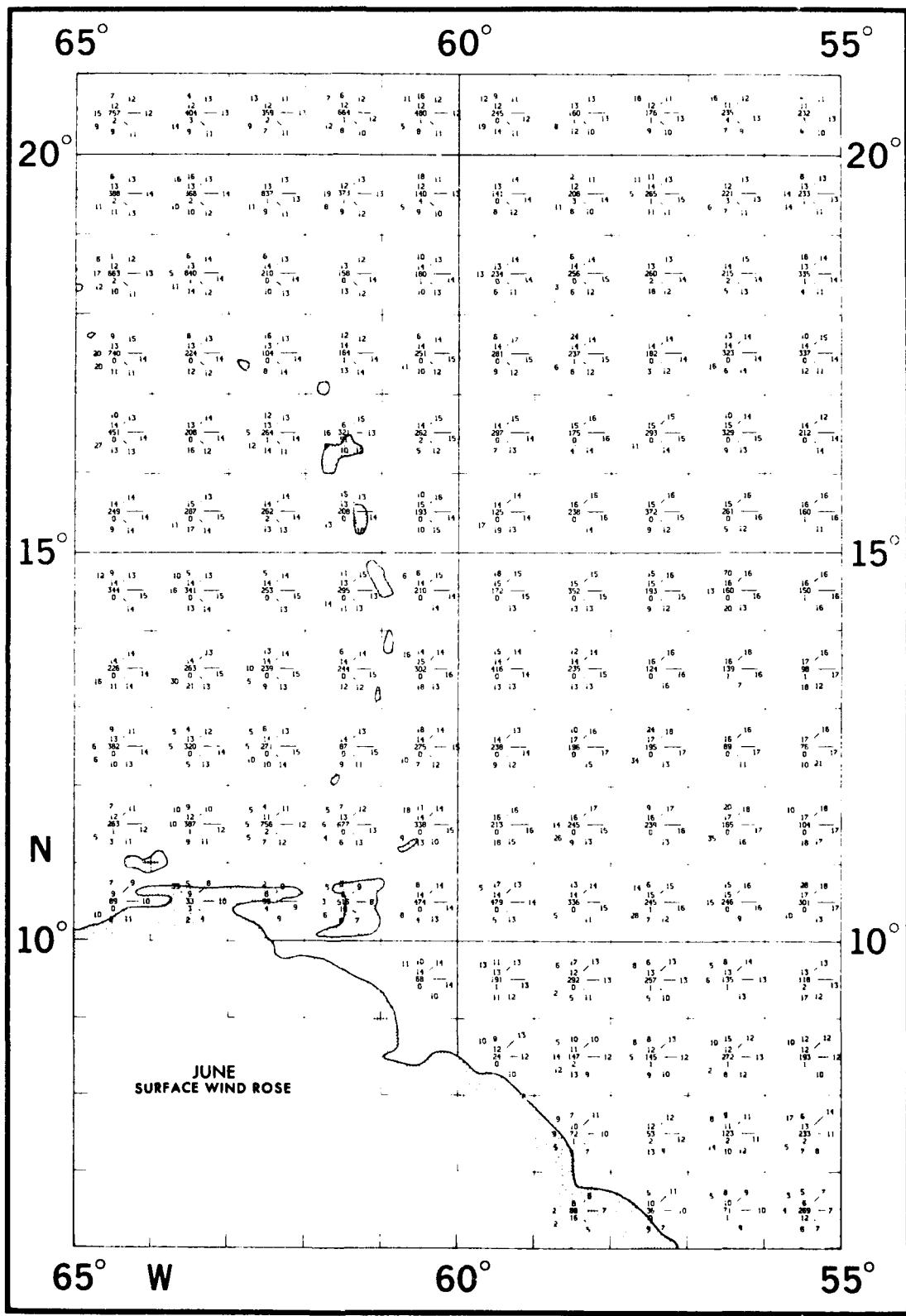


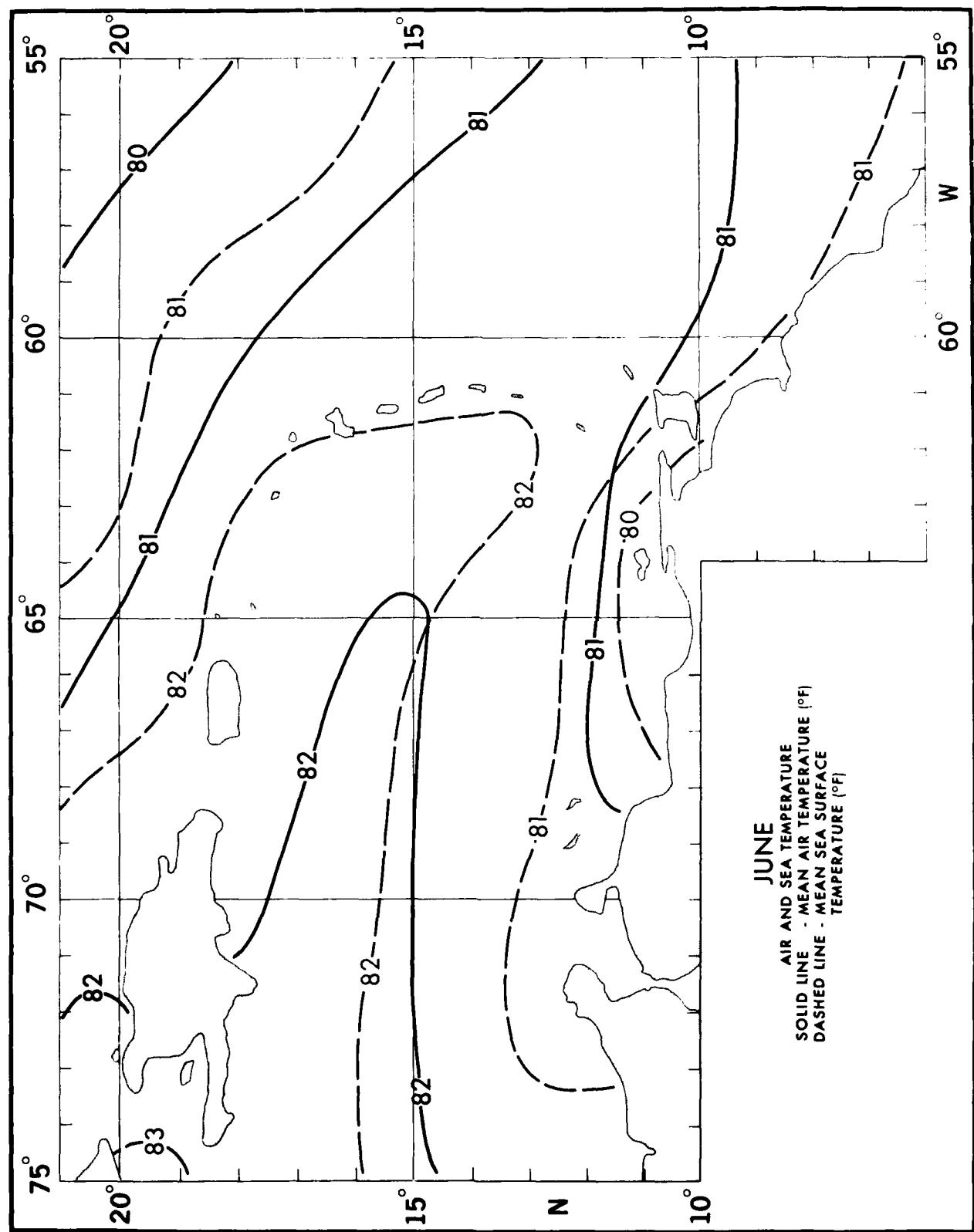


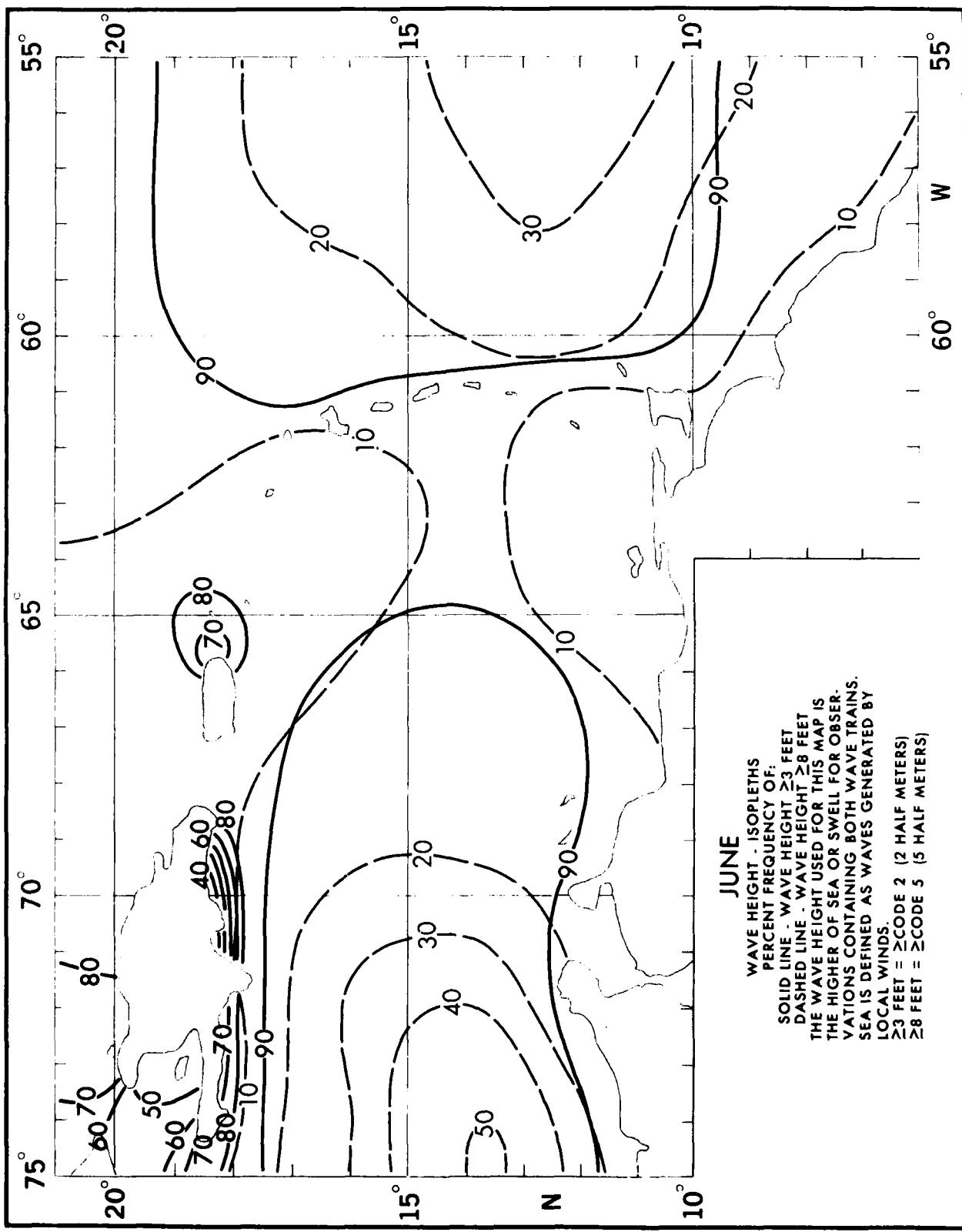












75°

70°

65°

20°

20°

15°

15°

10°

10°

N

W 65°

\$ 2 36.0	≤ 2 27.4	≤ 2 21.9	≤ 2 19.4	≤ 2 17.5	≤ 2 13.7	≤ 2 14.9	≤ 2 14.4	≤ 2 12.7
3-4 32.9	3-4 33.7	3-4 32.7	3-4 28.2	3-4 36.2	3-4 37.9	3-4 33.8	3-4 36.3	3-4 28.3
5-6 17.8	5-6 23.5	5-6 26.0	5-6 31.2	5-6 31.1	5-6 25.3	5-6 31.8	5-6 29.7	5-6 28.6
7-8 11.1	7-9 13.4	7-9 17.4	7-9 18.9	7-9 12.3	7-9 18.9	7-9 17.0	7-9 17.6	7-9 27.3
10-12 1.7	10-12 1.6	10-12 1.8	10-12 1.6	10-12 2.3	10-12 4.2	10-12 1.9	10-12 1.1	10-12 2.7
≤ 13 0.6	≤ 13 0.4	≤ 13 0.3	≤ 13 0.7	≤ 13 0.6	≤ 13 0.0	≤ 13 0.6	≤ 13 0.5	≤ 13 0.4
N = 1293.	N = 998.	N = 685.	N = 613.	N = 309.	N = 95.	N = 1282.	N = 444.	N = 869.
\$ 2 44.8	≤ 2 56.3	≤ 2 50.0	≤ 2 16.4	≤ 2 15.4	≤ 2 16.7	≤ 2 14.2	≤ 2 12.7	≤ 2 18.8
3-4 30.6	3-4 26.2	3-4 18.2	3-4 15.4	3-4 32.7	3-4 31.3	3-4 33.8	3-4 30.6	3-4 38.3
5-6 16.0	5-6 10.4	5-6 13.6	5-6 15.4	5-6 27.7	5-6 32.5	5-6 31.5	5-6 32.1	5-6 28.5
7-9 7.2	7-9 6.0	7-9 9.1	7-9 46.2	7-9 16.9	7-9 17.0	7-9 17.4	7-9 21.3	7-9 19.1
10-12 0.7	10-12 0.5	10-12 9.1	10-12 7.7	10-12 3.4	10-12 10.2	2.5	10-12 2.5	10-12 2.0
≤ 13 0.7	≤ 13 0.5	≤ 13 0.0	≤ 13 0.0	≤ 13 0.0	≤ 13 0.2	≤ 13 0.6	≤ 13 0.8	≤ 13 0.4
N = 1642.	N = 183.	N = 22.	N = 260.	N = 588.	N = 1376.	N = 891.	N = 1335.	N = 921.
\$ 2 26.5	≤ 2 50.6	≤ 2 58.8	≤ 2 25.0	≤ 2 62.5	≤ 2 67.9	≤ 2 18.2	≤ 2 16.4	≤ 2 34.6
3-4 29.7	3-4 25.0	3-4 17.6	3-4 0.0	3-4 16.7	3-4 22.3	3-4 33.1	3-4 35.2	3-4 51.4
5-6 26.4	5-6 14.3	5-6 11.8	5-6 50.0	5-6 12.5	5-6 5.8	5-6 29.8	5-6 27.8	5-6 9.3
7-9 14.9	7-9 7.7	7-9 11.8	7-9 25.0	7-9 6.3	7-9 3.7	7-9 15.4	7-9 19.1	7-9 4.3
10-12 4.1	10-12 0.0	10-12 0.0	10-12 0.0	10-12 2.1	10-12 0.3	10-12 3.1	10-12 3.4	10-12 0.2
≤ 13 0.6	≤ 13 0.0	≤ 13 0.0	≤ 13 0.0	≤ 13 0.0	≤ 13 0.3	≤ 13 0.0	≤ 13 0.0	≤ 13 0.2
N = 838.	N = 56.	N = 17.	N = 48.	N = 327.	N = 992.	N = 1296.	N = 304.	N = 1113.
\$ 2 6.9	≤ 2 6.1	≤ 2 6.0	≤ 2 1.2	≤ 2 5.0	≤ 2 7.2	≤ 2 11.0	≤ 2 11.8	≤ 2 21.4
3-4 21.2	3-4 27.0	3-4 20.9	3-4 21.1	3-4 32.2	3-4 32.8	3-4 28.1	3-4 34.5	3-4 44.7
5-6 31.3	5-6 25.7	5-6 30.7	5-6 26.7	5-6 25.6	5-6 29.9	5-6 29.3	5-6 28.5	5-6 20.5
7-9 31.3	7-9 37.4	5-6 32.8	7-9 32.6	7-9 34.0	7-9 28.7	7-9 26.3	7-9 23.1	7-9 11.3
10-12 1.2	10-12 7.7	10-12 7.0	10-12 3.0	10-12 4.0	10-12 6.9	10-12 3.3	10-12 3.0	10-12 1.5
≤ 13 1.2	≤ 13 2.1	≤ 13 1.6	≤ 13 2.3	≤ 13 1.3	≤ 13 2.0	≤ 13 1.2	≤ 13 1.6	≤ 13 0.6
N = 15.	N = 374.	N = 215.	N = 156.	N = 202.	N = 821.	N = 1209.	N = 655.	N = 814.
\$ 2 2.4	≤ 2 4.2	≤ 2 4.8	≤ 2 3.7	≤ 2 4.8	≤ 2 7.2	≤ 2 5.2	≤ 2 8.8	≤ 2 13.4
3-4 13.2	3-4 11.1	3-4 14.4	3-4 12.4	3-4 16.3	3-4 19.2	3-4 24.2	3-4 21.7	3-4 33.5
5-6 30.0	5-6 37.4	5-6 32.8	5-6 19.2	5-6 23.2	5-6 30.7	5-6 31.5	5-6 31.3	5-6 30.9
7-9 42.8	7-9 38.4	7-9 35.5	7-9 44.3	7-9 40.6	7-9 36.0	7-9 29.4	7-9 24.4	7-9 19.3
10-12 8.8	10-12 6.6	10-12 12.9	10-12 16.4	10-12 11.7	10-12 5.5	10-12 5.2	10-12 2.3	10-12 5.2
≤ 13 2.8	≤ 13 2.1	≤ 13 1.6	≤ 13 4.0	≤ 13 1.3	≤ 13 1.2	≤ 13 1.4	≤ 13 0.5	≤ 13 0.7
N = 250.	N = 289.	N = 186.	N = 323.	N = 753.	N = 489.	N = 653.	N = 348.	N = 440.
\$ 2 2.5	≤ 2 2.2	≤ 2 3.1	≤ 2 3.2	≤ 2 4.6	≤ 2 3.7	≤ 2 5.2	≤ 2 5.7	≤ 2 8.6
3-4 13.9	3-4 13.0	3-4 8.8	3-4 10.2	3-4 15.1	3-4 19.5	3-4 20.4	3-4 21.7	3-4 27.3
5-6 23.4	5-6 27.4	5-6 24.6	5-6 25.9	5-6 25.0	5-6 36.5	5-6 33.9	5-6 33.1	5-6 31.5
7-9 41.4	7-9 38.3	7-9 40.3	7-9 40.6	7-9 43.4	7-9 32.7	7-9 31.0	7-9 31.8	7-9 26.7
10-12 13.5	10-12 14.4	10-12 16.6	10-12 15.2	10-12 10.5	10-12 5.7	10-12 5.2	10-12 4.9	10-12 5.3
≤ 13 5.3	≤ 13 4.7	≤ 13 6.5	≤ 13 4.8	≤ 13 1.3	≤ 13 1.9	≤ 13 1.3	≤ 13 1.3	≤ 13 0.6
N = 244.	N = 277.	N = 771.	N = 849.	N = 304.	N = 565.	N = 387.	N = 157.	N = 466.
\$ 2 2.3	≤ 2 2.7	≤ 2 2.2	≤ 2 4.1	≤ 2 4.7	≤ 2 5.5	≤ 2 5.1	≤ 2 7.3	≤ 2 8.6
3-4 11.3	3-4 7.3	3-4 9.1	3-4 11.7	3-4 14.6	3-4 21.0	3-4 19.4	3-4 16.3	3-4 24.9
5-6 16.4	5-6 17.3	5-6 22.6	5-6 23.0	5-6 25.3	5-6 28.2	5-6 35.3	5-6 31.4	5-6 33.5
7-9 42.7	7-9 39.7	7-9 45.1	7-9 40.8	7-9 41.5	7-9 38.9	7-9 31.7	7-9 36.7	7-9 30.3
10-12 17.8	10-12 24.3	10-12 15.4	10-12 16.0	10-12 8.3	10-12 5.5	10-12 7.1	10-12 6.1	10-12 2.7
≤ 13 9.4	≤ 13 8.7	≤ 13 5.6	≤ 13 4.8	≤ 13 5.5	≤ 13 0.9	≤ 13 0.3	≤ 13 2.0	≤ 13 0.0
N = 213.	N = 804.	N = 628.	N = 392.	N = 253.	N = 638.	N = 350.	N = 245.	N = 398.
\$ 2 3.7	≤ 2 2.9	≤ 2 4.7	≤ 2 3.7	≤ 2 5.2	≤ 2 5.2	≤ 2 5.4	≤ 2 7.7	≤ 2 6.0
3-4 6.9	3-4 11.2	3-4 13.5	3-4 12.5	3-4 14.6	3-4 17.5	3-4 22.9	3-4 21.3	3-4 24.5
5-6 16.1	5-6 22.7	5-6 21.5	5-6 26.2	5-6 27.8	5-6 31.4	5-6 31.4	5-6 35.2	5-6 29.5
7-9 41.9	7-9 37.2	7-9 39.1	7-9 40.2	7-9 38.7	7-9 38.4	7-9 31.1	7-9 36.1	7-9 28.7
10-12 23.1	10-12 18.1	10-12 16.8	10-12 14.0	10-12 15.2	10-12 5.7	10-12 8.2	10-12 4.8	10-12 5.0
≤ 13 6.3	≤ 13 7.9	≤ 13 4.4	≤ 13 3.3	≤ 13 1.0	≤ 13 1.0	≤ 13 1.0	≤ 13 0.9	≤ 13 0.8
N = 763.	N = 277.	N = 297.	N = 271.	N = 349.	N = 458.	N = 280.	N = 441.	N = 384.
\$ 2 2.2	≤ 2 2.9	≤ 2 6.6	≤ 2 5.4	≤ 2 6.1	≤ 2 7.6	≤ 2 6.9	≤ 2 6.3	≤ 2 10.6
3-4 3.2	3-4 9.1	3-4 13.7	3-4 12.7	3-4 15.1	3-4 20.6	3-4 21.1	3-4 24.5	3-4 29.6
5-6 20.5	5-6 24.6	5-6 25.7	5-6 24.4	5-6 31.6	5-6 37.7	5-6 34.7	5-6 28.1	5-6 32.1
7-9 44.9	7-9 45.0	7-9 34.4	7-9 42.2	7-9 38.4	7-9 29.4	7-9 34.5	7-9 32.0	7-9 24.0
10-12 19.2	10-12 14.3	10-12 12.0	10-12 11.3	10-12 7.4	10-12 7.4	10-12 3.8	10-12 4.9	10-12 2.5
≤ 13 8.2	≤ 13 4.1	≤ 13 5.6	≤ 13 6.6	≤ 13 1.0	≤ 13 0.5	≤ 13 0.7	≤ 13 2.8	≤ 13 1.1
N = 219.	N = 342.	N = 393.	N = 450.	N = 674.	N = 432.	N = 143.	N = 140.	N = 442.
\$ 2 9.2	≤ 2 0.0	≤ 2 4.6	≤ 2 5.2	≤ 2 9.5	≤ 2 9.2	≤ 2 11.0	≤ 2 14.6	≤ 2 18.0
3-4 12.9	3-4 11.8	3-4 0.0	3-4 21.2	3-4 27.5	3-4 52.4	3-4 30.3	3-4 33.5	3-4 36.7
5-6 21.8	5-6 26.1	5-6 0.0	5-6 31.8	5-6 27.5	5-6 19.0	5-6 32.2	5-6 25.2	5-6 27.4
7-9 39.8	7-9 37.9	7-9 100.0	7-9 24.2	7-9 20.1	7-9 19.0	7-9 24.3	7-9 20.5	7-9 17.4
10-12 12.4	10-12 11.4	10-12 0.0	10-12 3.0	10-12 2.9	10-12 0.0	10-12 2.6	10-12 5.7	10-12 1.3
≤ 13 4.9	≤ 13 3.3	≤ 13 0.0	≤ 13 1.5	≤ 13 0.0	≤ 13 0.0	≤ 13 1.3	≤ 13 0.5	≤ 13 0.3
N = 12.	N = 153.	N = 1.	N = 69.	N = 69.	N = 21.	N = 552.	N = 210.	N = 164.
\$ 2 50.0	≤ 2 1.6	≤ 2 9.1	≤ 2 3.4	≤ 2 21.7	≤ 2 51.1	≤ 2 14.7	≤ 2 23.3	≤ 2 25.5
3-4 0.0	3-4 0.0	3-4 9.1	3-4 2.1	3-4 29.4	3-4 34.0	3-4 30.0	3-4 40.4	3-4 40.4
5-6 0.0	5-6 0.0	5-6 9.1	5-6 0.0	5-6 26.5	5-6 36.7	5-6 36.7	5-6 19.1	5-6 19.1
7-9 0.0	7-9 0.0	7-9 9.1	7-9 0.0	7-9 26.5	7-9 7.9	7-9 10.0	7-9 12.8	7-9 12.8
10-12 0.0	10-12 0.0	10-12 0.0	10-12 0.0	10-12 0.0	10-12 0.0	10-12 0.0	10-12 0.0	10-12 2.1
≤ 13 50.0	≤ 13 0.0	≤ 13 0.0	≤ 13 0.0	≤ 13 0.0	≤ 13 0.0	≤ 13 0.0	≤ 13 0.0	≤ 13 0.0

JUNE
 WAVE HEIGHT-FREQUENCIES
 ≤ 2 10.0 PERCENT FREQUENCY OF
 3-4 20.0 VARIOUS RANGES WITHIN ONE-
 5-6 30.0 DEGREE QUADRANGLES.
 7-9 20.0 EXAMPLE:
 10-12 10.0 30.0% OF ALL OBSERVED WAVE
 ≥ 13 10.0 HEIGHTS WERE IN THE RANGE 5
 N = 1363 TO 6 FEET.
 N = OBSERVATION COUNT.
 WAVE DATA FOR THESE TABLES
 WERE SELECTED FROM THE HIGHER
 OF SEA OR SWELL WHEN BOTH
 WERE REPORTED.

65°

60°

55°

20°

20°

15°

15°

N
10°

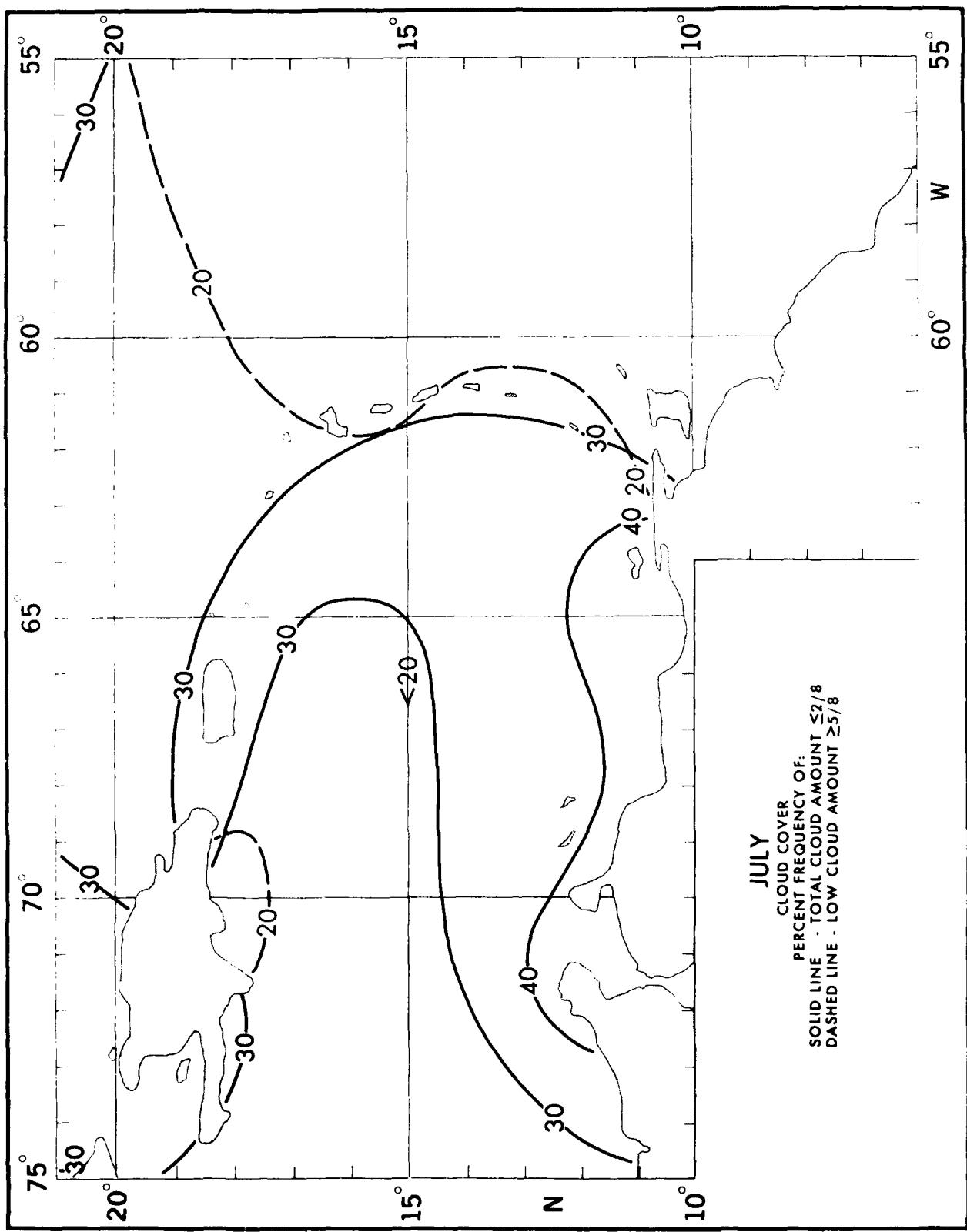
10°

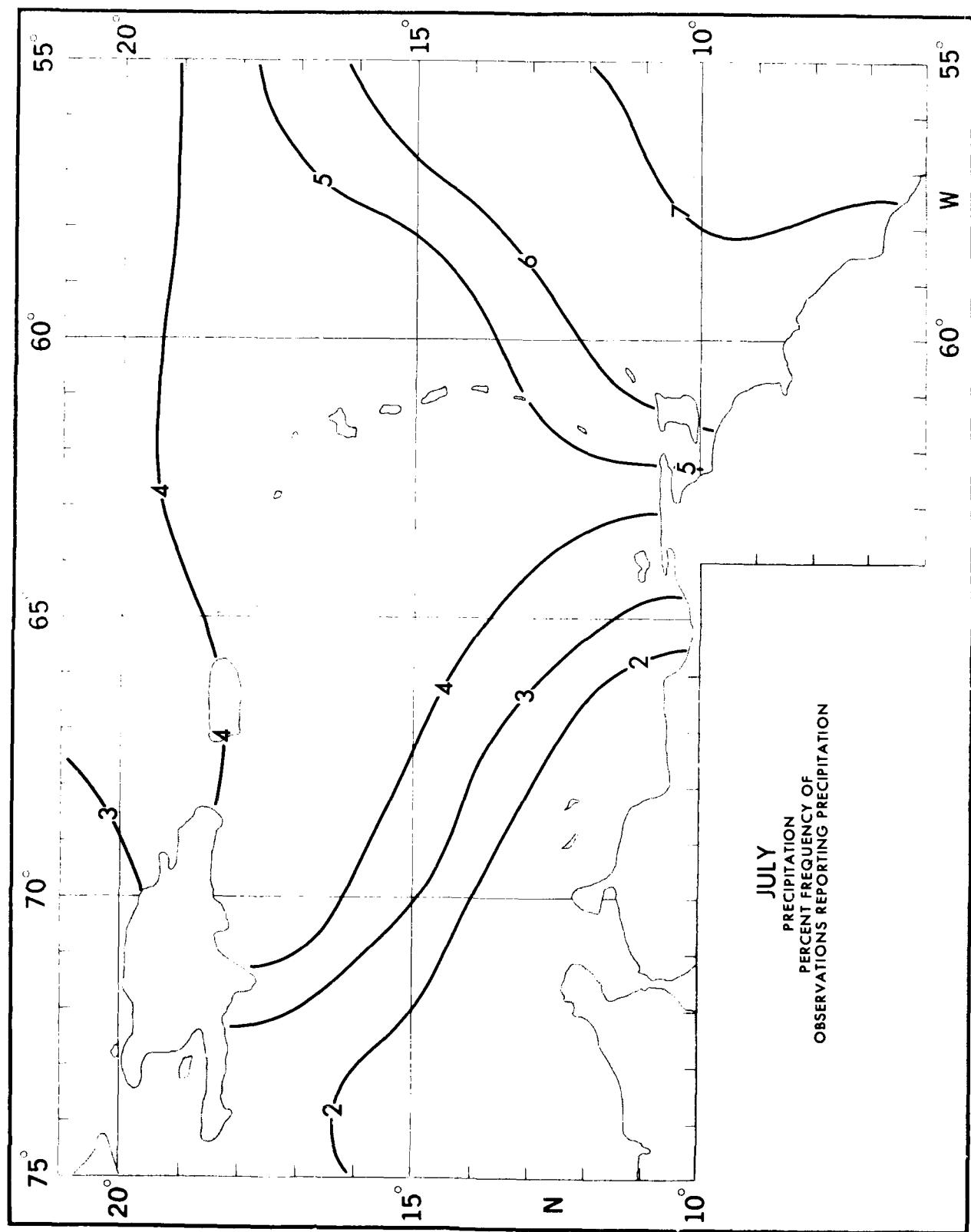
65° W

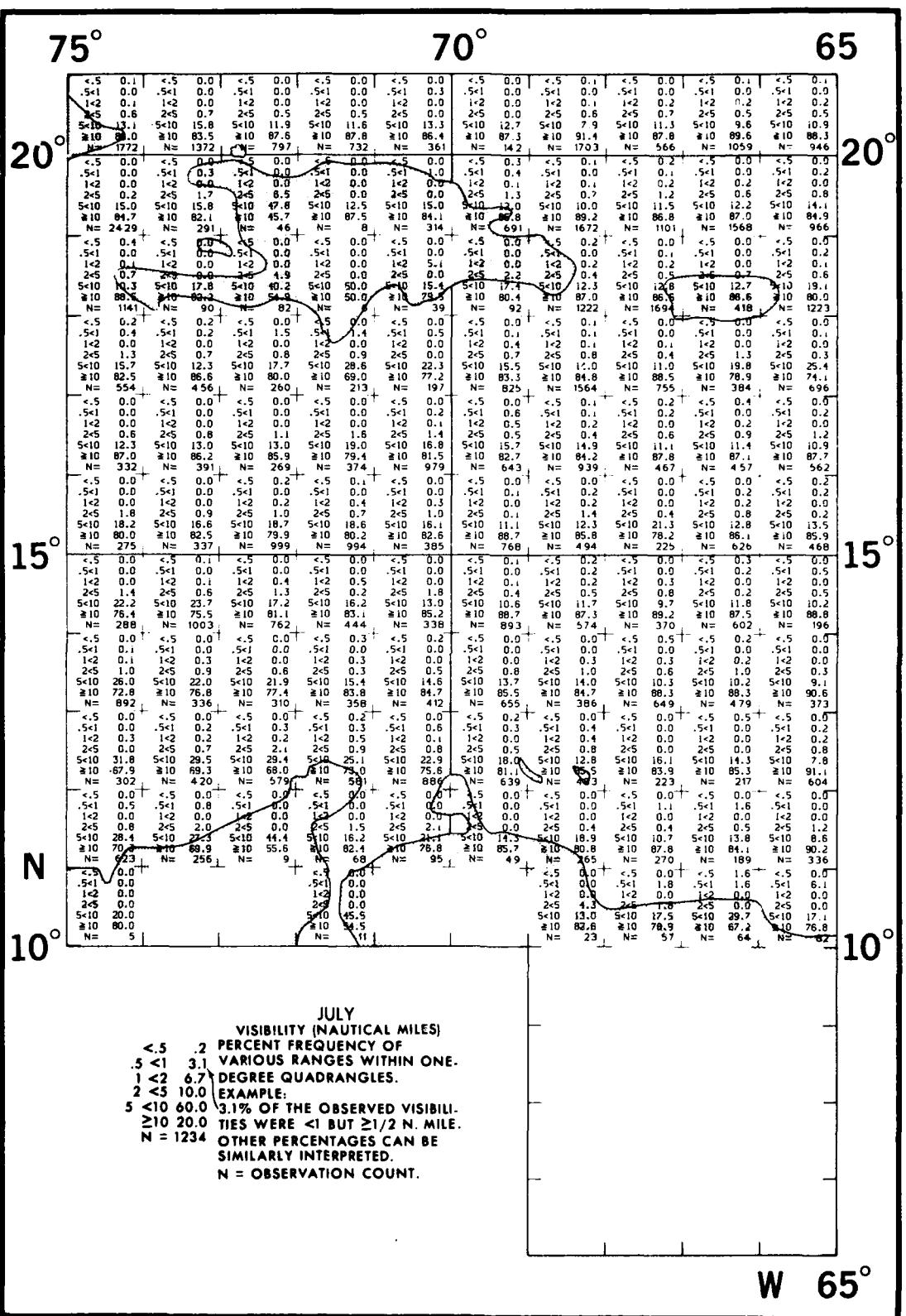
60°

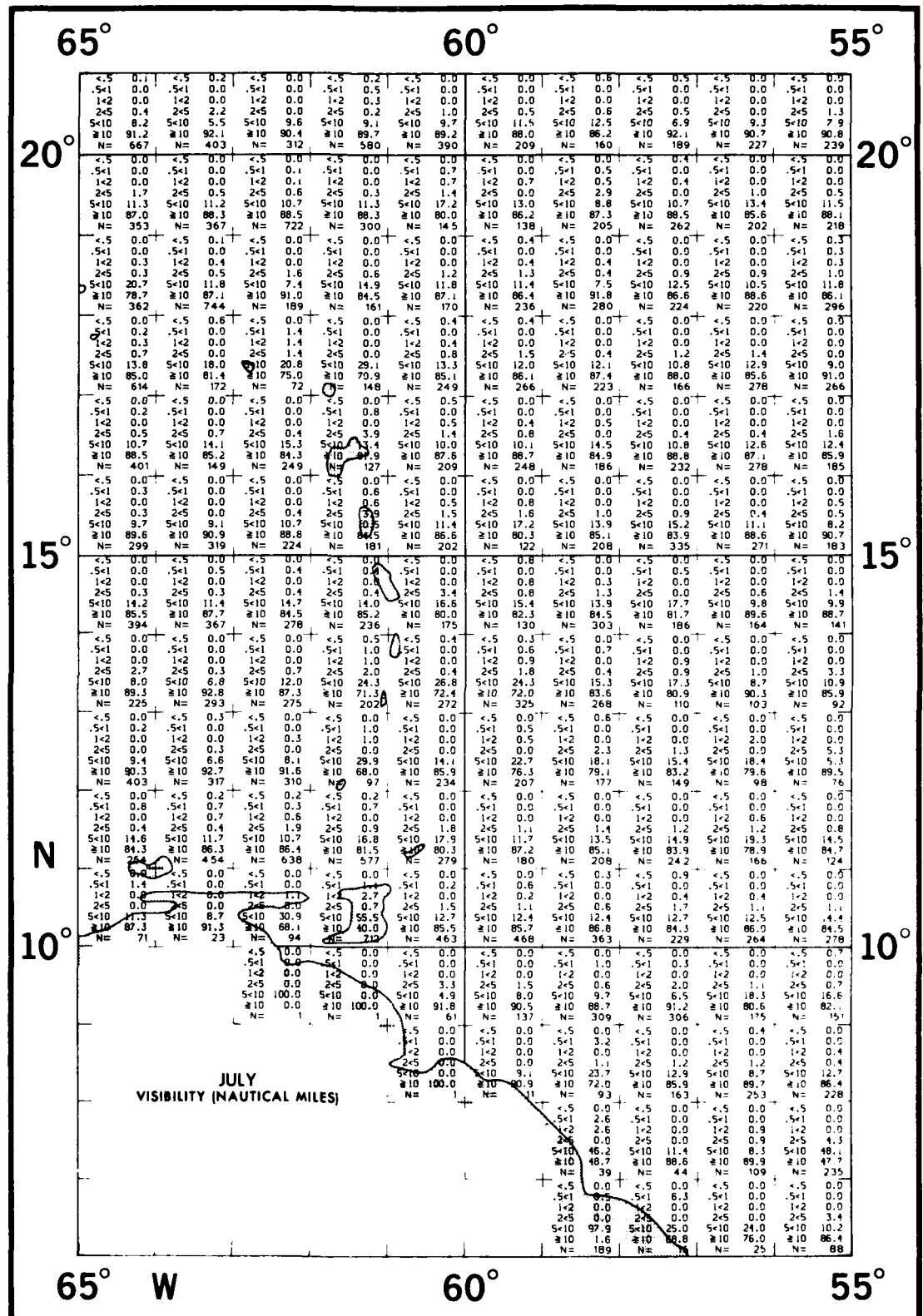
55°

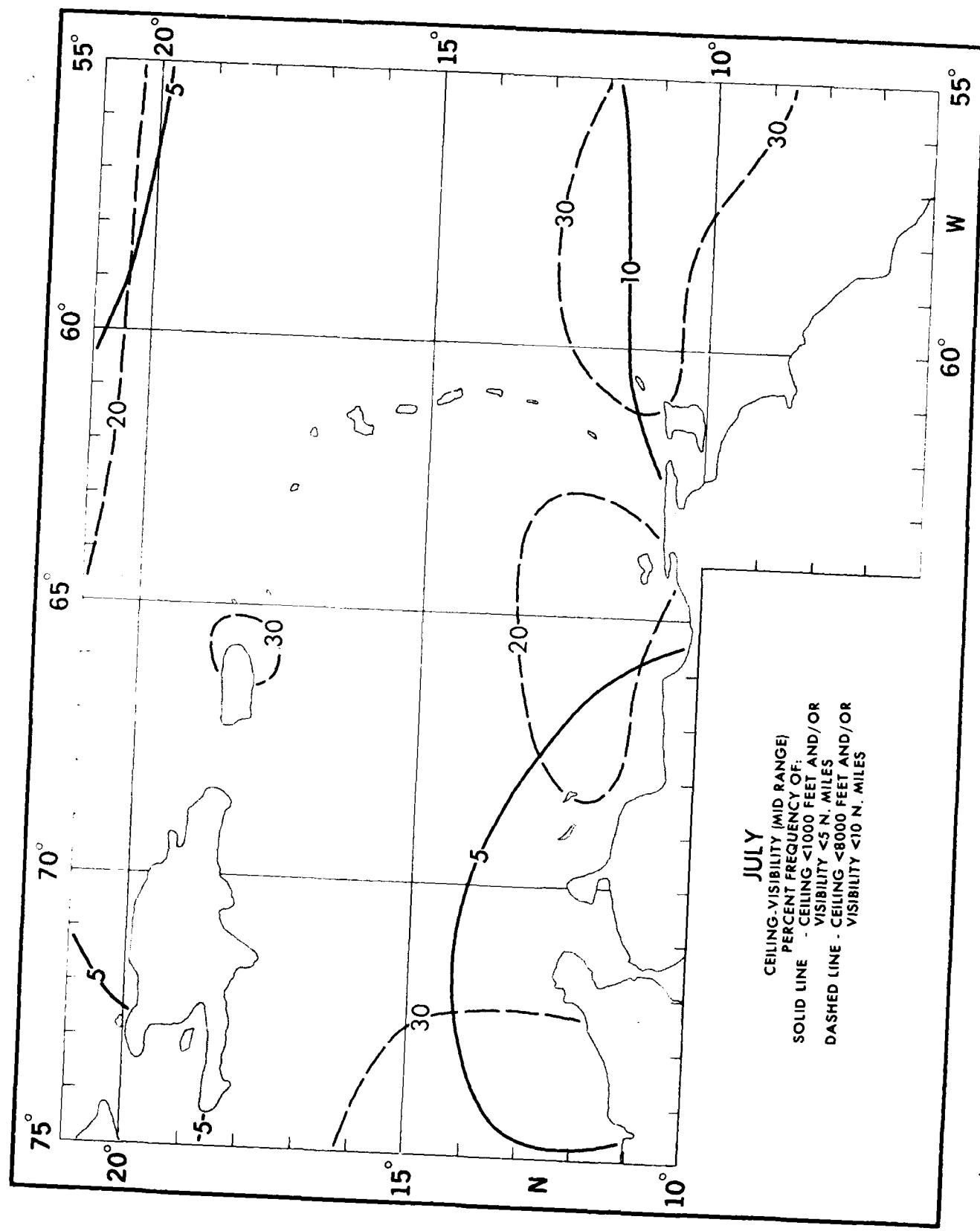
JUNE
WAVE HEIGHT-FREQUENCIES

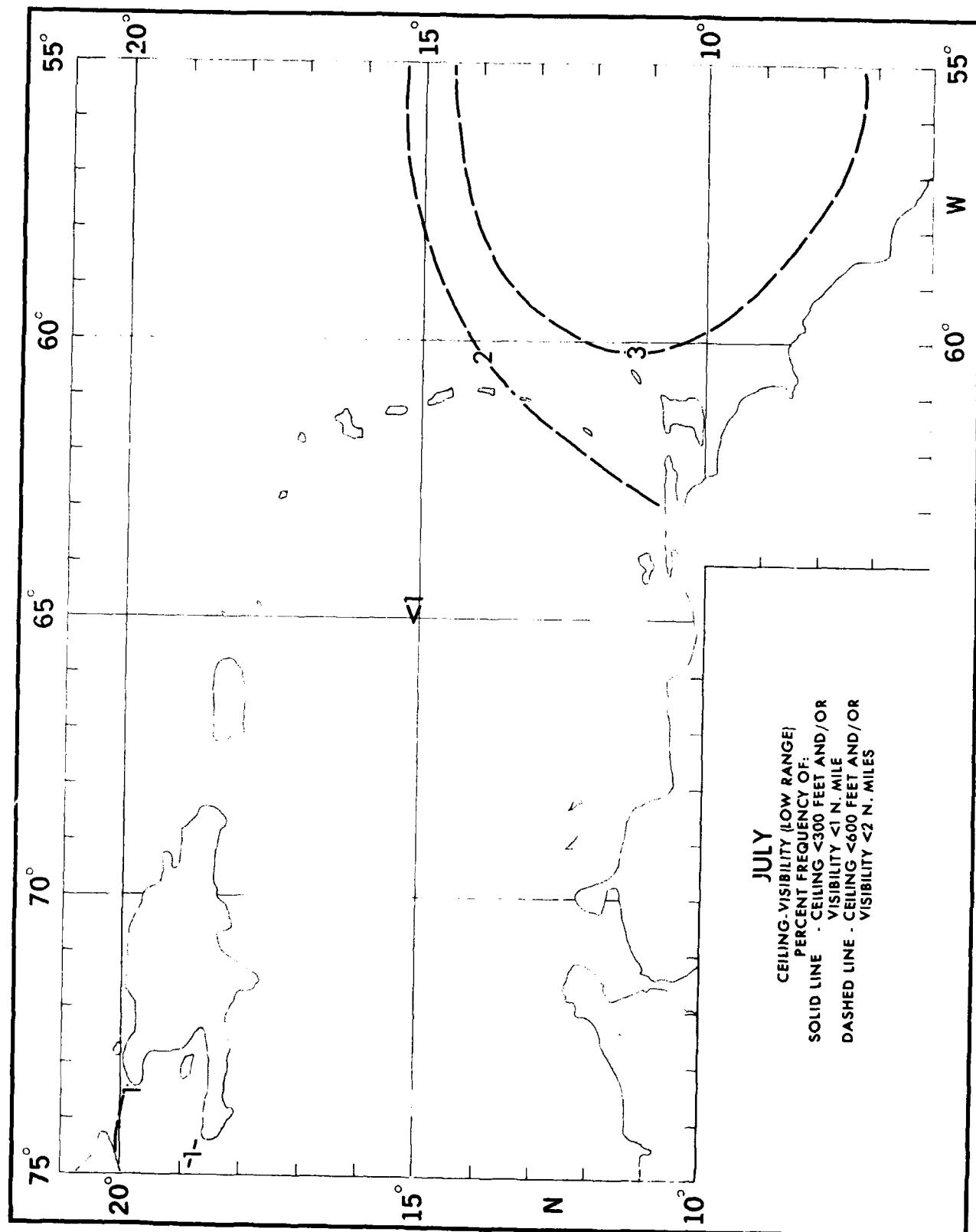


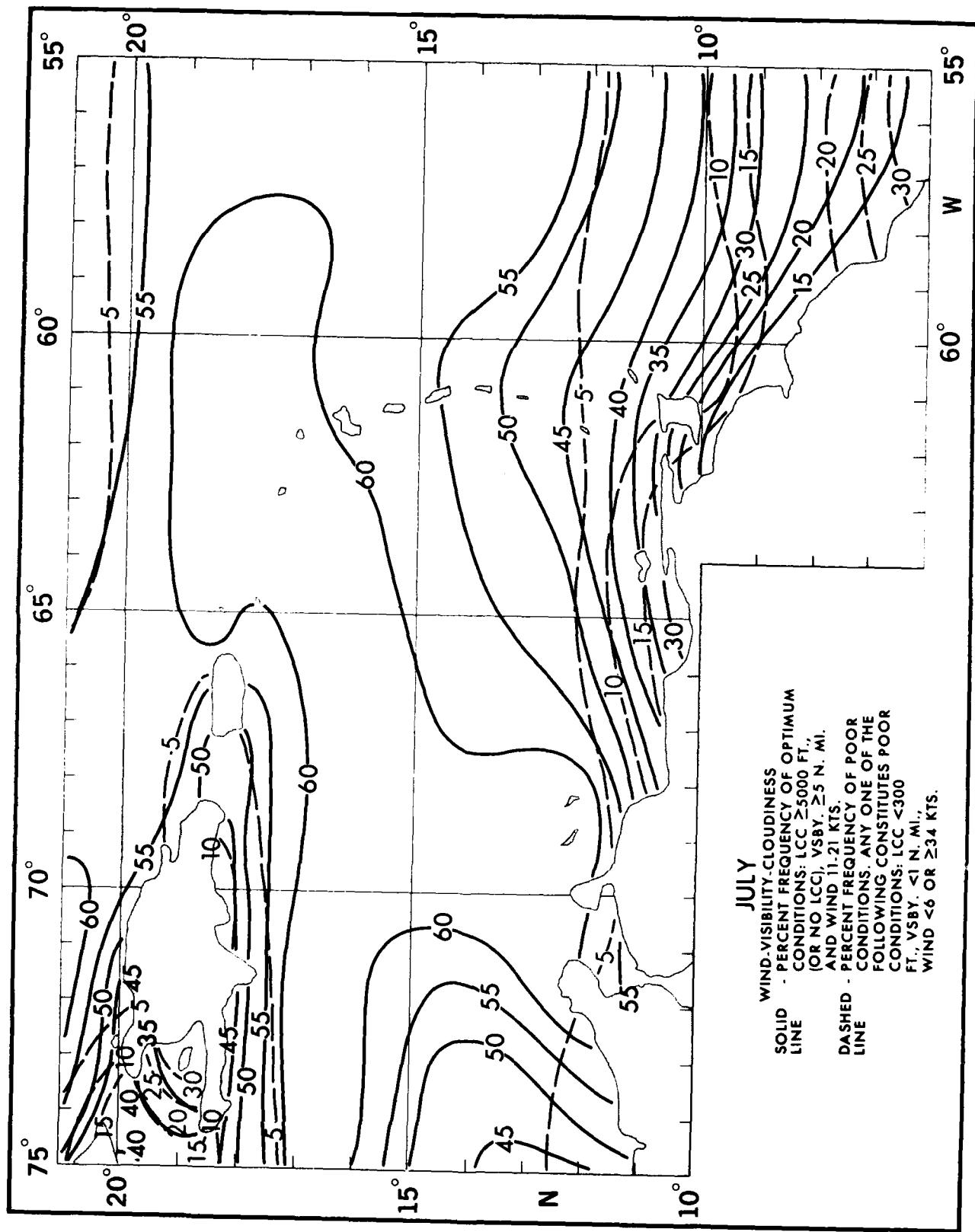


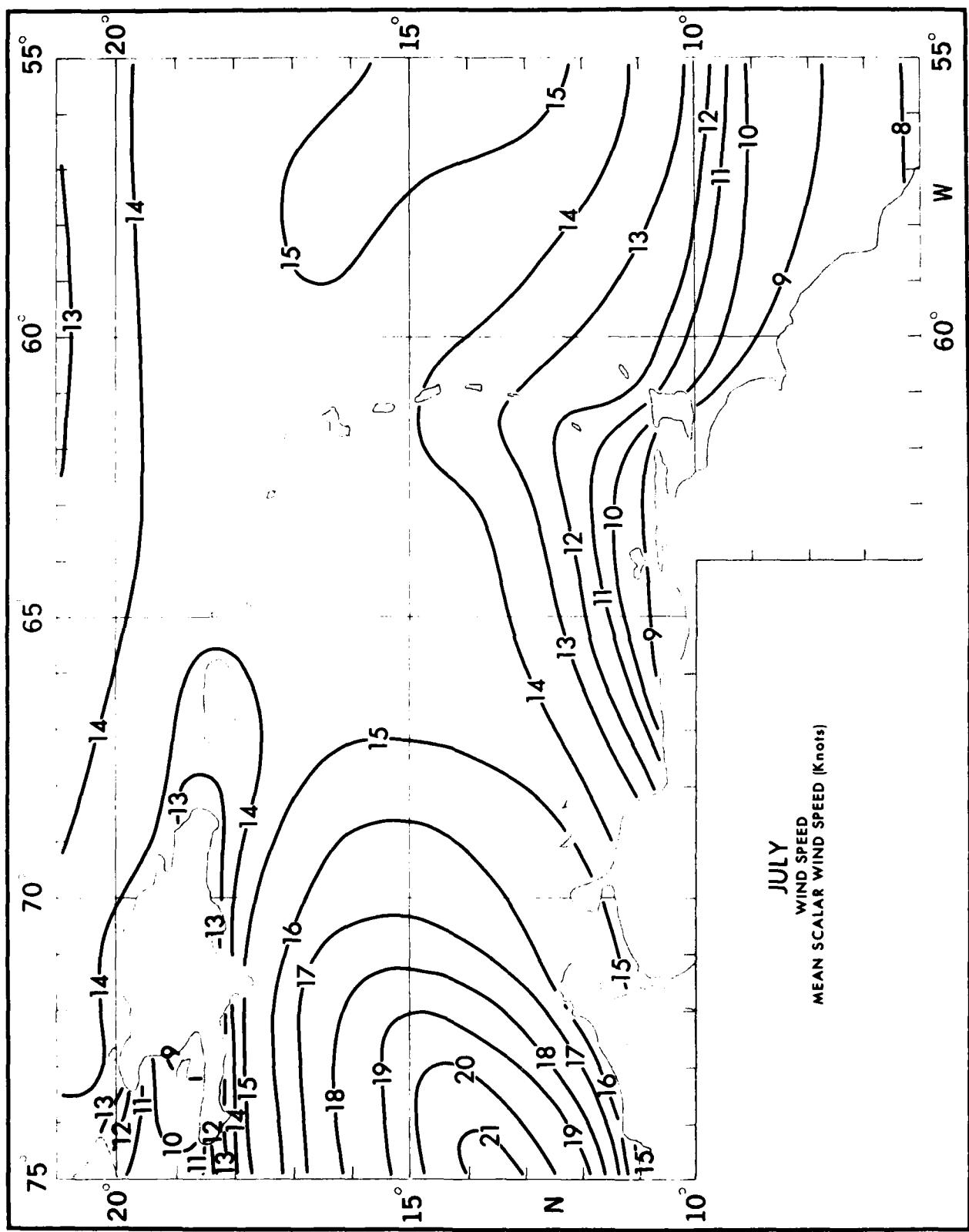


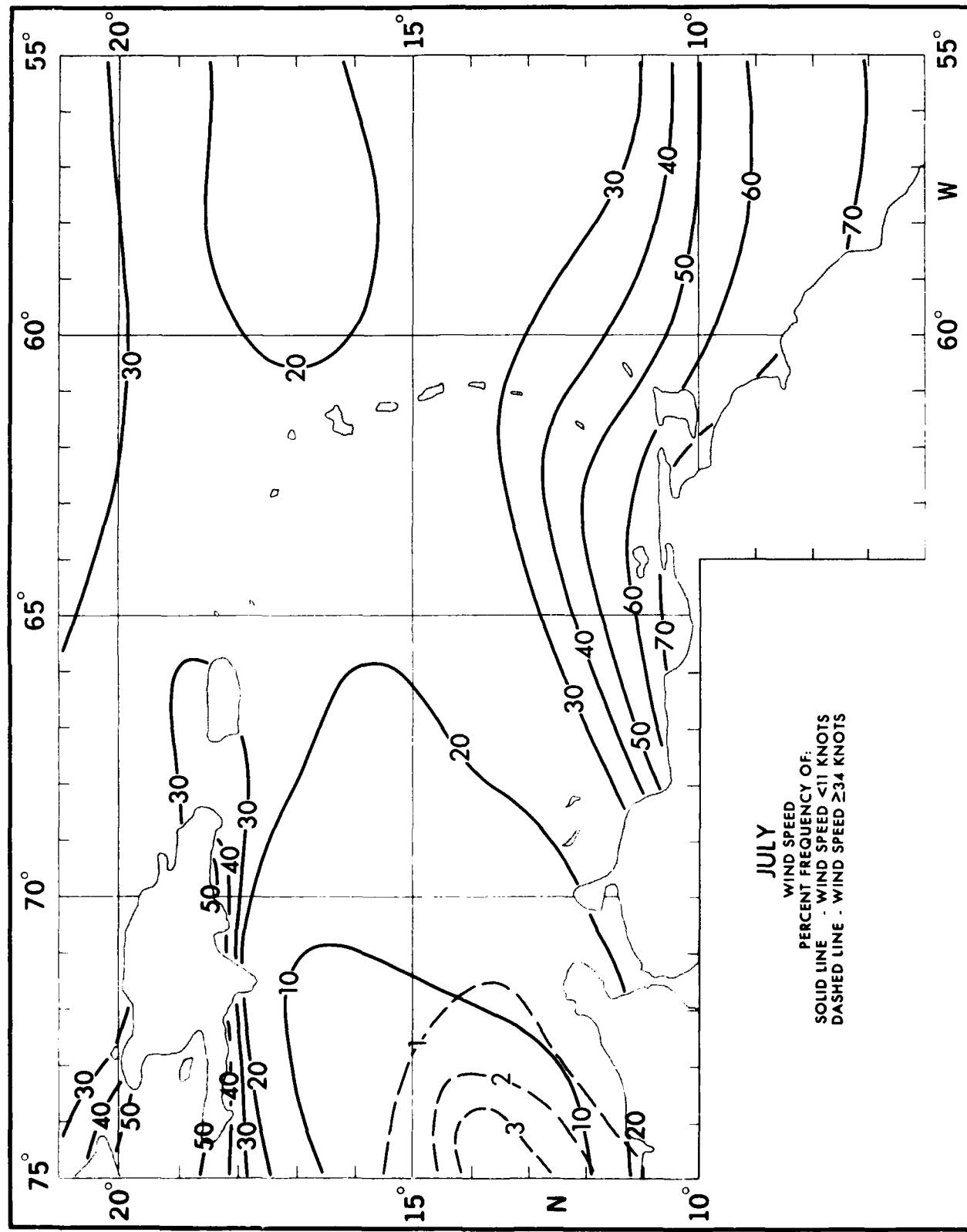


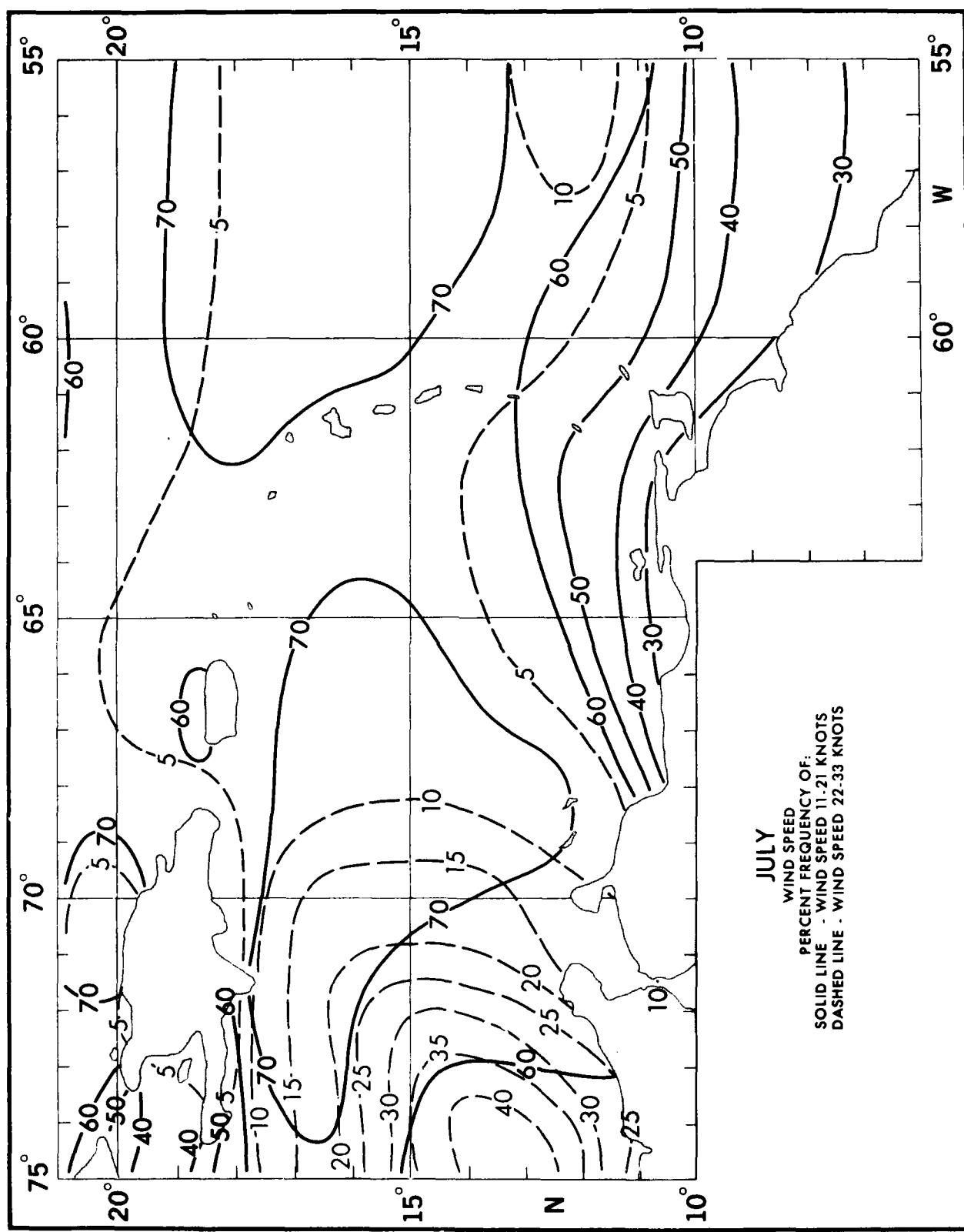


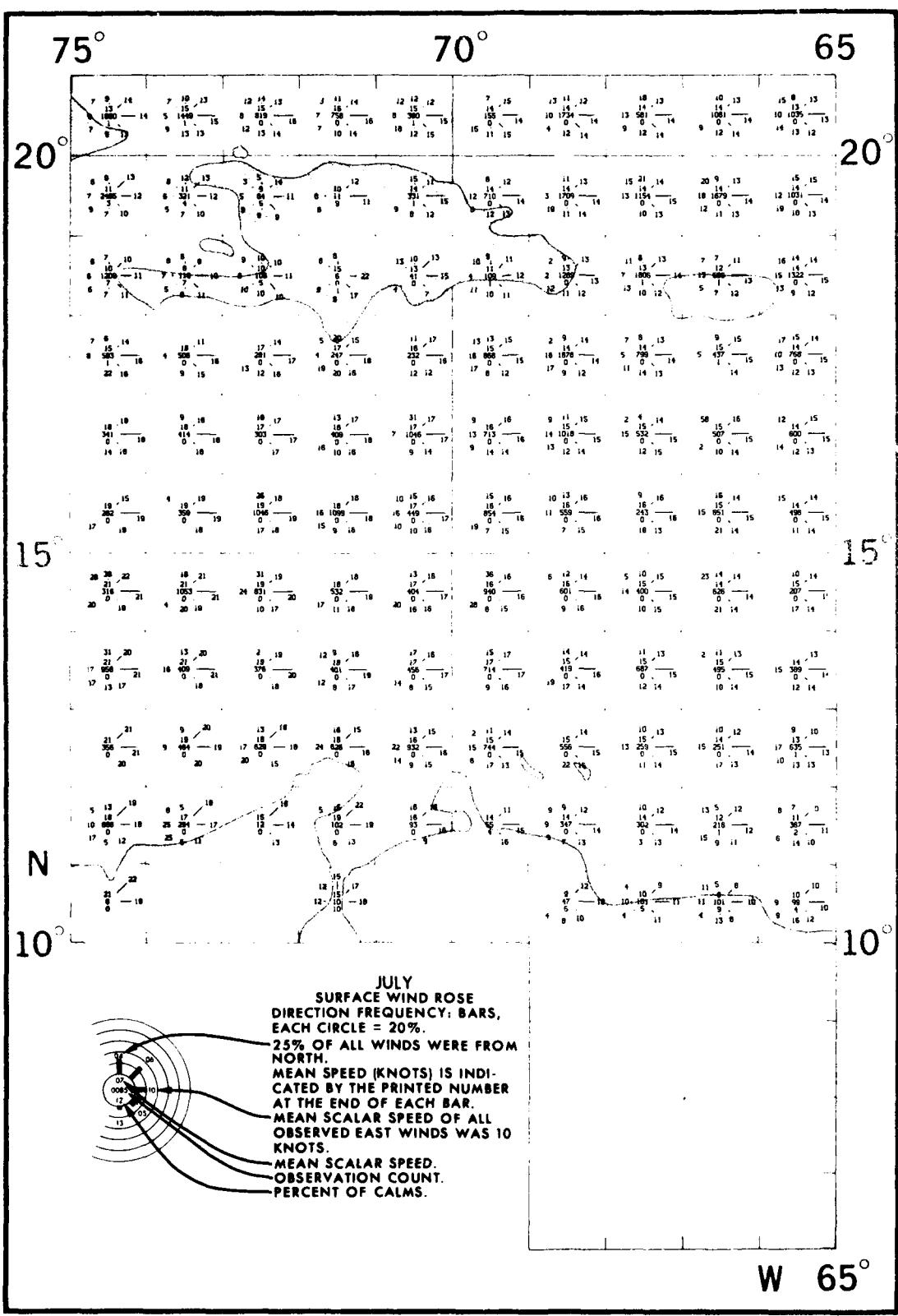


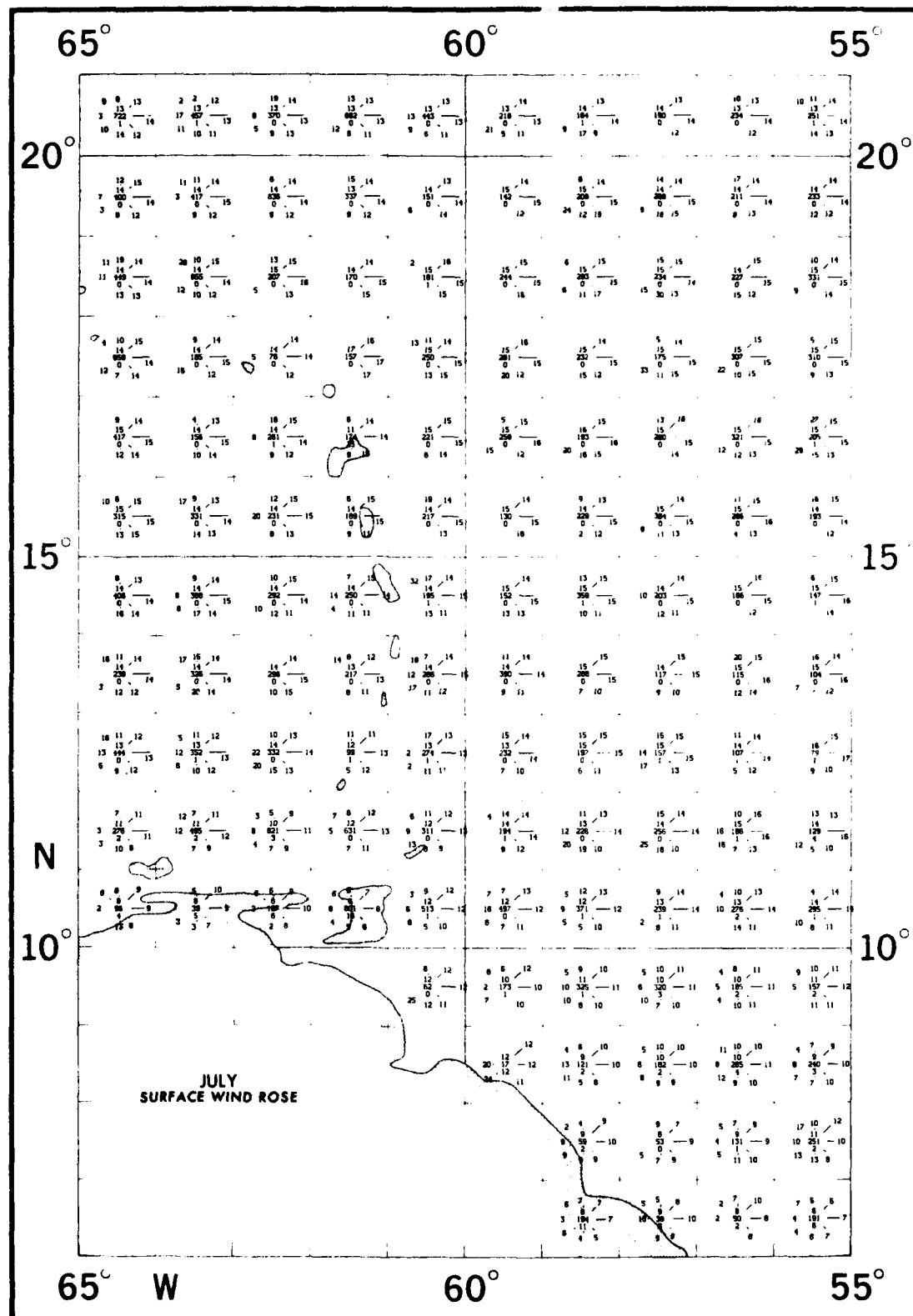


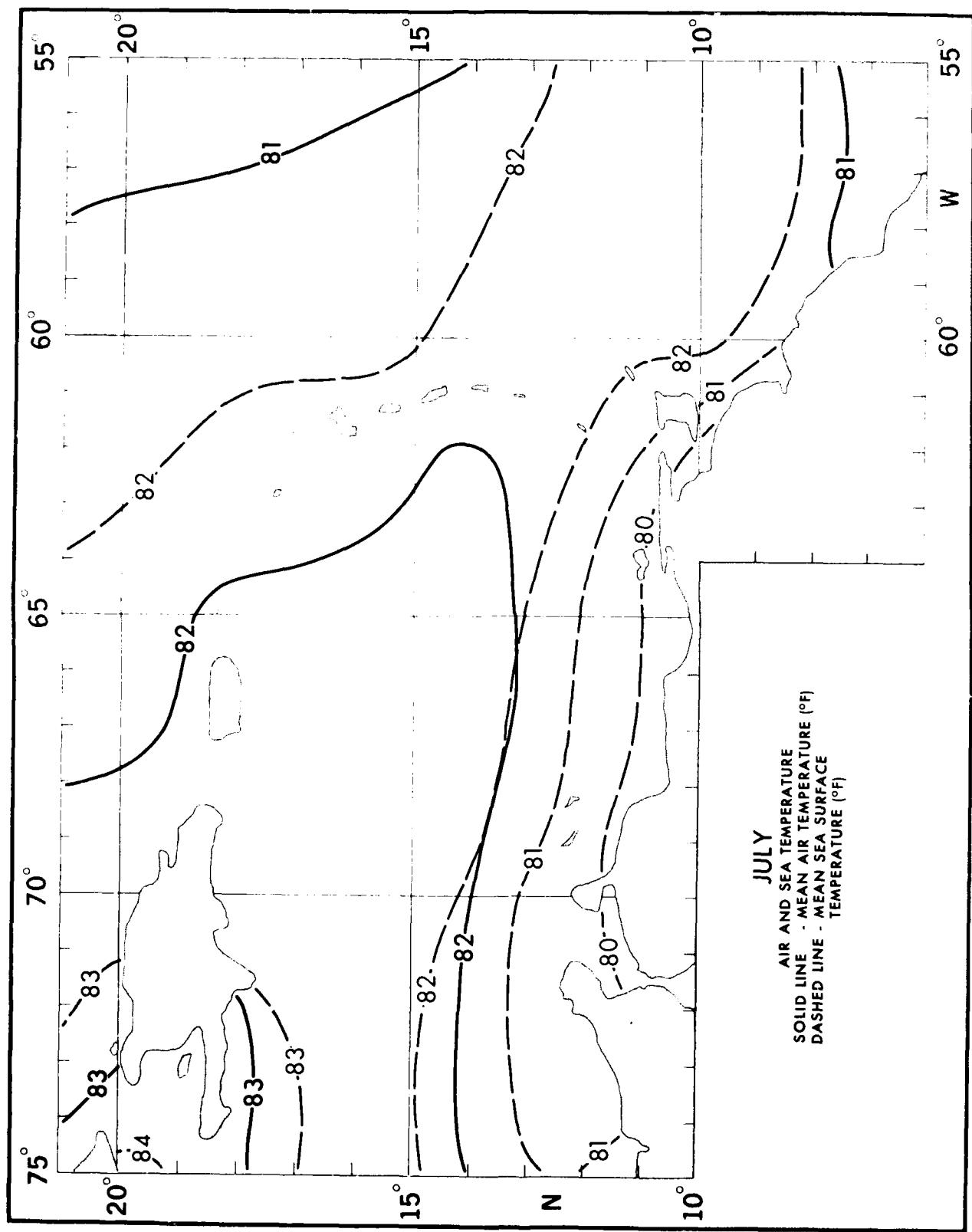


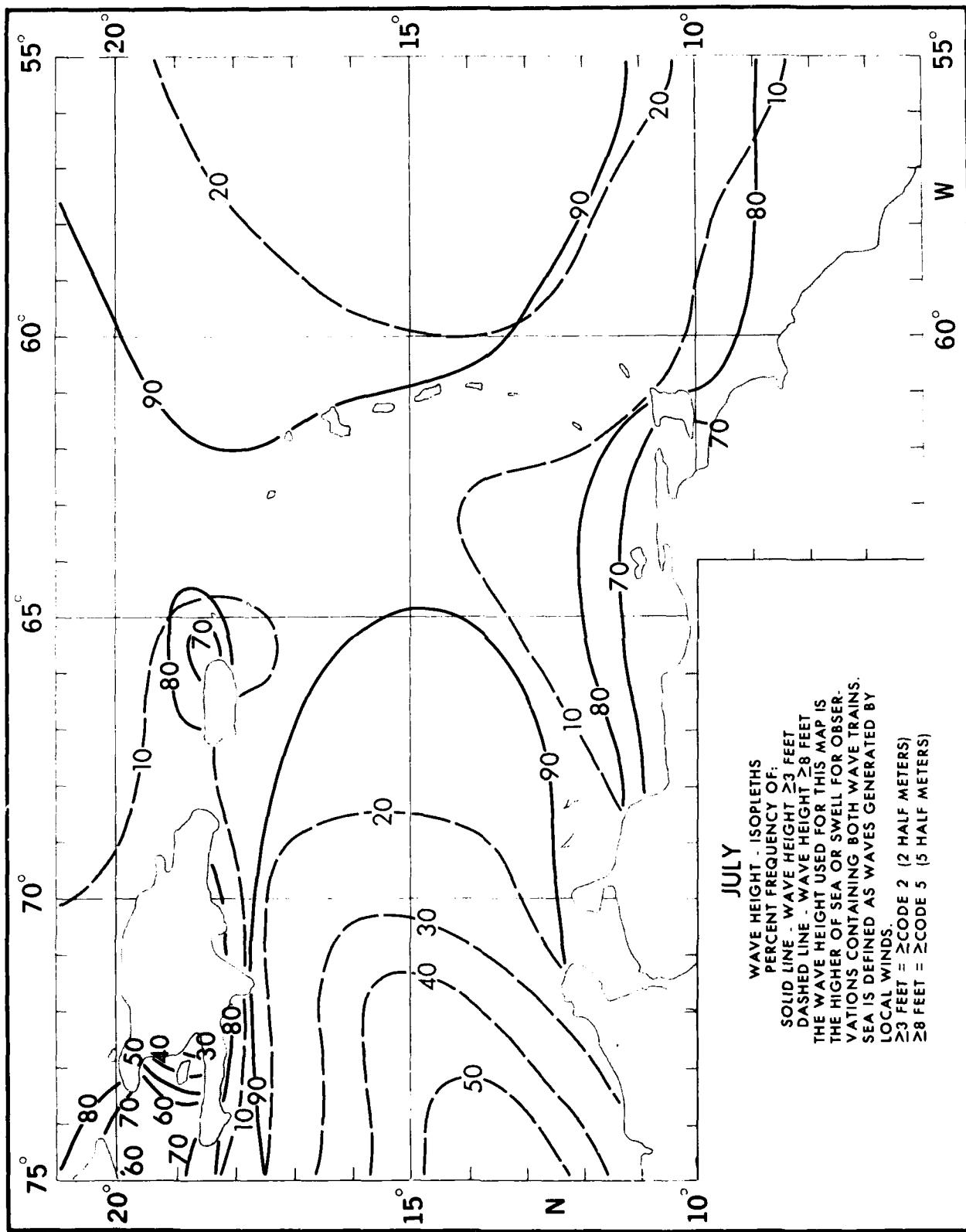












75°

70°

65°

20

20

15

15

N

10

10

\$ 2 20.5	\$ 2 17.8	\$ 2 11.6	\$ 2 10.3	\$ 2 13.8	\$ 2 11.0	\$ 2 11.0	\$ 2 11.4	\$ 2 11.0	\$ 2 10.4
3-4 29.3	3-4 30.9	3-4 30.7	3-4 29.0	3-4 34.8	3-4 33.0	3-4 29.7	3-4 29.1	3-4 26.9	3-4 23.9
5-6 27.9	5-6 26.2	5-6 30.0	5-6 32.5	5-6 27.6	5-6 26.4	5-6 29.3	5-6 27.5	5-6 30.7	5-6 28.9
X-9 19.1	7-9 21.1	7-9 24.7	7-9 23.5	7-9 20.1	7-9 22.0	7-9 26.0	7-9 28.1	7-9 26.4	7-9 30.7
10-12 2.4	10-12 3.5	10-12 2.2	10-12 4.0	10-12 3.4	10-12 3.7	10-12 3.3	10-12 3.4	10-12 3.9	10-12 4.6
#13 0.8	#13 0.4	#13 0.9	#13 0.8	#13 0.3	#13 1.8	#13 0.7	#13 0.6	#13 1.1	#13 1.5
N= 1283	N= 1161	N= 697	N= 631	N= 319	N= 109	N= 1459	N= 499	N= 935	N= 733
\$ 2 31.3	\$ 2 36.2	\$ 2 60.5	\$ 2 28.6	\$ 2 13.6	\$ 2 12.9	\$ 2 10.3	\$ 2 8.4	\$ 2 8.6	\$ 2 13.6
3-4 33.6	3-4 36.3	3-4 15.8	3-4 57.1	3-4 33.0	3-4 33.0	3-4 30.5	3-4 26.7	3-4 24.8	3-4 29.3
5-6 20.8	5-6 15.4	5-6 13.2	5-6 14.3	5-6 25.4	5-6 29.2	5-6 31.6	5-6 29.4	5-6 30.3	5-6 26.3
7-9 12.1	7-9 12.8	7-9 7.9	7-9 0.0	7-9 2.1	7-9 21.4	7-9 23.6	7-9 29.3	7-9 30.0	7-9 27.3
10-12 1.8	10-12 1.1	10-12 0.0	10-12 0.0	10-12 3.8	10-12 3.8	10-12 3.3	10-12 5.6	10-12 5.3	10-12 3.1
#13 0.4	#13 1.1	#13 2.6	#13 0.4	#13 1.1	#13 0.6	#13 0.7	#13 0.6	#13 1.1	#13 0.5
N= 1852	N= 179	N= 38	N= 7	N= 264	N= 636	N= 1442	N= 956	N= 1284	N= 811
\$ 2 29.1	\$ 2 4.2	\$ 2 71.7	\$ 2 20.0	\$ 2 8.3	\$ 2 21.8	\$ 2 13.9	\$ 2 13.3	\$ 2 23.3	\$ 2 38.6
3-4 28.6	3-4 37.7	3-4 15.2	3-4 20.0	3-4 33.3	3-4 46.2	3-4 30.0	3-4 26.5	3-4 33.5	3-4 42.5
5-6 24.4	5-6 9.4	5-6 8.7	5-6 0.0	5-6 22.2	5-6 19.2	5-6 27.3	5-6 29.4	5-6 23.3	5-6 11.6
7-9 15.5	7-9 7.8	7-9 4.3	7-9 60.0	7-9 33.1	7-9 12.6	7-9 24.1	7-9 25.2	7-9 16.0	7-9 6.6
10-12 0.7	10-12 1.9	10-12 0.0	10-12 0.0	10-12 0.0	10-12 0.0	10-12 0.0	10-12 1.1	10-12 2.3	10-12 0.8
#13 0.6	#13 0.6	#13 0.0	#13 0.0	#13 0.0	#13 0.0	#13 0.6	#13 1.6	#13 1.5	#13 0.2
N= 821	N= 53	N= 46	N= 6	N= 36	N= 78	N= 1031	N= 1396	N= 343	N= 1036
\$ 2 8.5	\$ 2 5.5	\$ 2 5.9	\$ 2 8.4	\$ 2 7.5	\$ 2 7.2	\$ 2 9.1	\$ 2 12.9	\$ 2 17.7	\$ 2 18.6
3-4 24.3	3-4 17.5	3-4 20.6	3-4 22.9	3-4 15.5	3-4 21.6	3-4 25.1	3-4 30.1	3-4 30.0	3-4 42.3
5-6 29.8	5-6 31.9	5-6 28.9	5-6 22.3	5-6 23.2	5-6 27.4	5-6 27.3	5-6 32.2	5-6 30.7	5-6 23.4
7-9 31.5	7-9 36.2	7-9 35.6	7-9 36.1	7-9 35.6	7-9 33.1	7-9 31.6	7-9 23.4	7-9 22.6	7-9 13.2
10-12 7.5	10-12 7.8	10-12 4.9	10-12 7.2	10-12 5.6	10-12 10.2	10-12 5.2	10-12 5.9	10-12 3.1	10-12 0.2
#13 0.9	#13 1.1	#13 3.9	#13 3.0	#13 3.7	#13 2.3	#13 0.9	#13 0.5	#13 0.6	#13 1.1
N= 426	N= 348	N= 204	N= 16	N= 161	N= 699	N= 1259	N= 644	N= 332	N= 560
\$ 2 4.1	\$ 2 2.4	\$ 2 3.6	\$ 2 3.7	\$ 2 5.4	\$ 2 8.2	\$ 2 6.0	\$ 2 8.2	\$ 2 9.6	\$ 2 8.6
3-4 13.1	3-4 15.2	3-4 13.0	3-4 13.4	3-4 13.8	3-4 16.3	3-4 23.8	3-4 23.3	3-4 30.2	3-4 27.4
5-6 29.8	5-6 24.8	5-6 22.1	5-6 22.1	5-6 23.2	5-6 27.6	5-6 29.3	5-6 32.1	5-6 28.5	5-6 28.1
7-9 36.9	7-9 39.9	7-9 38.6	7-9 43.3	7-9 42.1	7-9 40.7	7-9 29.8	7-9 31.6	7-9 28.5	7-9 27.6
10-12 16.3	10-12 7.9	10-12 9.2	10-12 12.7	10-12 14.4	10-12 8.7	10-12 7.1	10-12 6.2	10-12 3.7	10-12 7.0
#13 2.1	#13 3.8	#13 1.9	#13 4.9	#13 2.5	#13 1.4	#13 1.8	#13 0.8	#13 0.7	#13 0.2
N= 282	N= 341	N= 207	N= 307	N= 827	N= 504	N= 719	N= 386	N= 400	N= 416
\$ 2 1.8	\$ 2 3.0	\$ 2 1.5	\$ 2 2.6	\$ 2 2.8	\$ 2 5.4	\$ 2 5.5	\$ 2 4.9	\$ 2 7.6	\$ 2 8.6
3-4 12.6	3-4 12.1	3-4 8.6	3-4 11.5	3-4 14.4	3-4 21.3	3-4 21.1	3-4 23.0	3-4 22.5	3-4 27.1
5-6 26.5	5-6 21.1	5-6 23.8	5-6 23.0	5-6 27.3	5-6 31.5	5-6 30.3	5-6 29.0	5-6 31.7	5-6 31.7
7-9 36.3	7-9 37.2	7-9 39.4	7-9 39.3	7-9 40.1	7-9 34.5	7-9 37.4	7-9 33.9	7-9 31.3	7-9 28.0
10-12 17.5	10-12 21.1	10-12 20.3	10-12 18.2	10-12 11.6	10-12 6.0	10-12 7.1	10-12 7.1	10-12 6.3	10-12 4.0
#13 5.4	#13 5.0	#13 6.4	#13 5.4	#13 3.8	#13 1.4	#13 1.3	#13 0.3	#13 0.6	#13 0.6
N= 223	N= 298	N= 823	N= 809	N= 319	N= 653	N= 380	N= 183	N= 489	N= 350
\$ 2 2.9	\$ 2 1.7	\$ 2 2.0	\$ 2 4.5	\$ 2 5.1	\$ 2 6.1	\$ 2 5.0	\$ 2 7.4	\$ 2 9.1	\$ 2 5.6
3-4 8.8	3-4 8.0	3-4 8.1	3-4 9.0	3-4 17.8	3-4 22.3	3-4 21.9	3-4 24.7	3-4 26.2	3-4 23.5
5-6 12.6	5-6 15.1	5-6 21.8	5-6 26.4	5-6 26.7	5-6 29.9	5-6 30.5	5-6 26.7	5-6 31.2	5-6 34.6
7-9 37.2	7-9 37.5	7-9 43.6	7-9 40.4	7-9 37.5	7-9 33.0	7-9 33.1	7-9 34.5	7-9 28.9	7-9 29.0
10-12 25.5	10-12 10.2	10-12 19.4	10-12 16.6	10-12 9.5	10-12 7.3	10-12 7.9	10-12 4.1	10-12 3.9	10-12 6.8
#13 13.0	#13 10.1	#13 5.1	#13 2.8	#13 2.2	#13 1.4	#13 1.5	#13 0.3	#13 0.6	#13 0.6
N= 239	N= 848	N= 651	N= 356	N= 275	N= 782	N= 456	N= 296	N= 484	N= 162
\$ 2 1.4	\$ 2 2.1	\$ 2 4.6	\$ 2 4.3	\$ 2 6.1	\$ 2 7.5	\$ 2 6.2	\$ 2 5.7	\$ 2 9.0	\$ 2 12.4
3-4 4.7	3-4 8.6	3-4 7.3	3-4 15.3	3-4 17.9	3-4 19.4	3-4 20.9	3-4 27.1	3-4 30.4	3-4 33.3
5-6 13.1	5-6 15.5	5-6 23.4	5-6 24.1	5-6 25.6	5-6 29.1	5-6 32.7	5-6 33.4	5-6 30.1	5-6 26.7
7-9 41.5	7-9 40.5	7-9 36.6	7-9 36.9	7-9 37.9	7-9 37.4	7-9 34.7	7-9 27.7	7-9 24.2	7-9 24.1
10-12 26.1	10-12 25.1	10-12 19.2	10-12 13.6	10-12 9.8	10-12 10.1	10-12 8.2	10-12 5.6	10-12 5.2	10-12 3.5
#13 13.3	#13 8.2	#13 10.0	#13 2.7	#13 2.3	#13 2.4	#13 1.6	#13 0.6	#13 0.7	#13 0.0
N= 731	N= 291	N= 261	N= 301	N= 347	N= 532	N= 306	N= 494	N= 401	N= 315
\$ 2 2.2	\$ 2 5.8	\$ 2 5.5	\$ 2 6.3	\$ 2 7.3	\$ 2 6.4	\$ 2 9.2	\$ 2 7.9	\$ 2 11.1	\$ 2 15.9
3-4 7.4	3-4 8.4	3-4 15.5	3-4 18.0	3-4 25.0	3-4 25.7	3-4 23.1	3-4 33.6	3-4 36.4	3-4 35
5-6 19.7	5-6 22.7	5-6 24.0	5-6 25.0	5-6 26.2	5-6 31.4	5-6 33.0	5-6 25.0	5-6 22.8	5-6 28.1
7-9 35.8	7-9 42.9	7-9 36.5	7-9 37.1	7-9 34.2	7-9 29.2	7-9 27.7	7-9 28.9	7-9 25.3	7-9 16.9
10-12 25.6	10-12 15.9	10-12 13.5	10-12 8.9	10-12 5.7	10-12 10.2	10-12 5.9	10-12 4.6	10-12 3.7	10-12 3.0
#13 9.2	#13 4.2	#13 4.0	#13 3.7	#13 1.6	#13 1.5	#13 1.0	#13 0.0	#13 0.6	#13 0.4
N= 229	N= 308	N= 400	N= 428	N= 669	N= 408	N= 303	N= 152	N= 162	N= 508
\$ 2 3.6	\$ 2 5.7	\$ 2 0.6	\$ 2 12.5	\$ 2 14.1	\$ 2 13.2	\$ 2 13.7	\$ 2 15.8	\$ 2 23.0	\$ 2 27.5
3-4 11.2	3-4 13.9	3-4 50.0	3-4 8.9	3-4 46.8	3-4 39.5	3-4 33.8	3-4 32.9	3-4 40.9	3-4 40.9
5-6 21.9	5-6 22.8	5-6 50.0	5-6 35.7	5-6 22.5	5-6 23.7	5-6 28.9	5-6 26.4	5-6 24.8	5-6 19.2
7-9 37.7	7-9 7.9	7-9 0.0	7-9 33.9	7-9 15.1	7-9 15.8	7-9 19.1	7-9 20.3	7-9 18.5	7-9 11.3
10-12 19.9	10-12 15.3	10-12 5.0	10-12 5.4	10-12 4.2	10-12 5.3	10-12 3.9	10-12 2.7	10-12 0.6	10-12 0.7
#13 8.13	2.5	8.13	0.0	#13 3.6	#13 2.8	#13 2.6	#13 0.5	#13 0.0	#13 0.3
N= 448	N= 158	N= 2	N= 6	N= 71	N= 38	N= 304	N= 222	N= 161	N= 291
\$ 2 0.0	\$ 2 16.7	\$ 2 4.0	\$ 2 1.7	\$ 2 41.7	\$ 2 3.4	\$ 2 27.3	\$ 2 42.9	\$ 2 35.7	\$ 2 35.7
3-4 0.0	3-4 16.7	3-4 1.7	3-4 25.0	3-4 25.7	3-4 3.4	3-4 30.3	3-4 37.1	3-4 42.9	3-4 42.9
5-6 0.0	5-6 16.7	5-6 1.7	5-6 8.1	5-6 8.3	5-6 3.4	5-6 33.3	5-6 8.6	5-6 14.3	5-6 14.3
7-9 50.0	7-9 33.3	7-9 33.3	7-9 33.3	7-9 33.3	7-9 6.1	7-9 8.6	7-9 7.1	7-9 7.1	7-9 7.1
10-12 50.0	10-12 16.7	10-12 0.0	10-12 0.0	10-12 0.0	10-12 3.0	10-12 0.0	10-12 0.0	10-12 0.0	10-12 0.0
#13 0.0	#13 0.0	#13 0.0	#13 0.0	#13 0.0	#13 0.0	#13 0.0	#13 0.0	#13 0.0	#13 0.0
N= 448	N= 1	N= 1	N= 6	N= 6	N= 12	N= 33	N= 35	N= 35	N= 56

JULY
 WAVE HEIGHT-FREQUENCIES
 ≤ 10.0 PERCENT FREQUENCY OF
 20.0 VARIOUS RANGES WITHIN ONE-
 30.0 DEGREE QUADRANGLES.
 7-9 20.0 EXAMPLE:
 10-12 10.0 30.0% OF ALL OBSERVED WAVE
 ≥ 13 10.0 HEIGHTS WERE IN THE RANGE 5
 N = 1363 TO 6 FEET.

N = OBSERVATION COUNT.
 WAVE DATA FOR THESE TABLES
 WERE SELECTED FROM THE HIGHER
 OF SEA OR SWELL WHEN BOTH
 WERE REPORTED.

65

60°

55

20

20

15

15

N

10

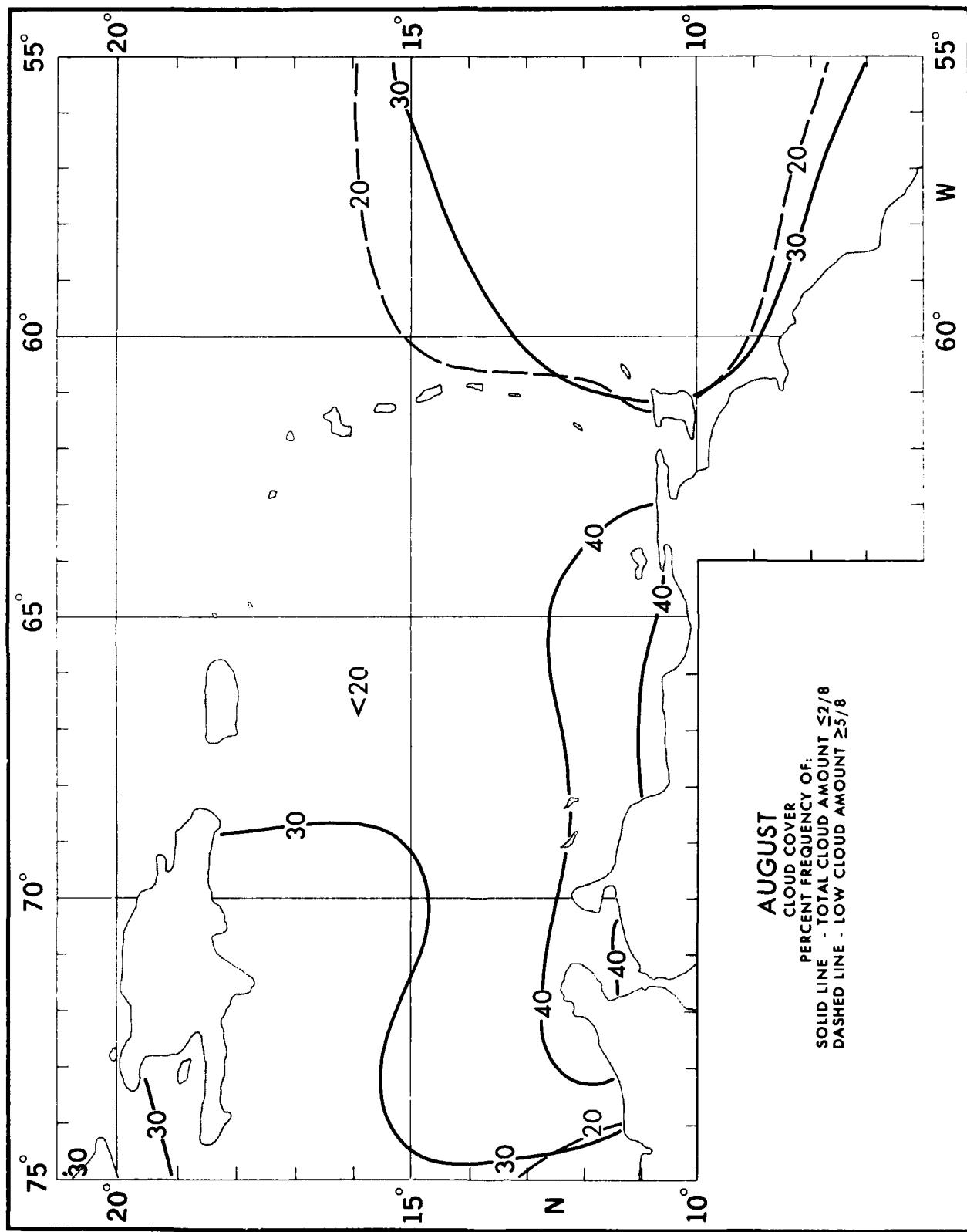
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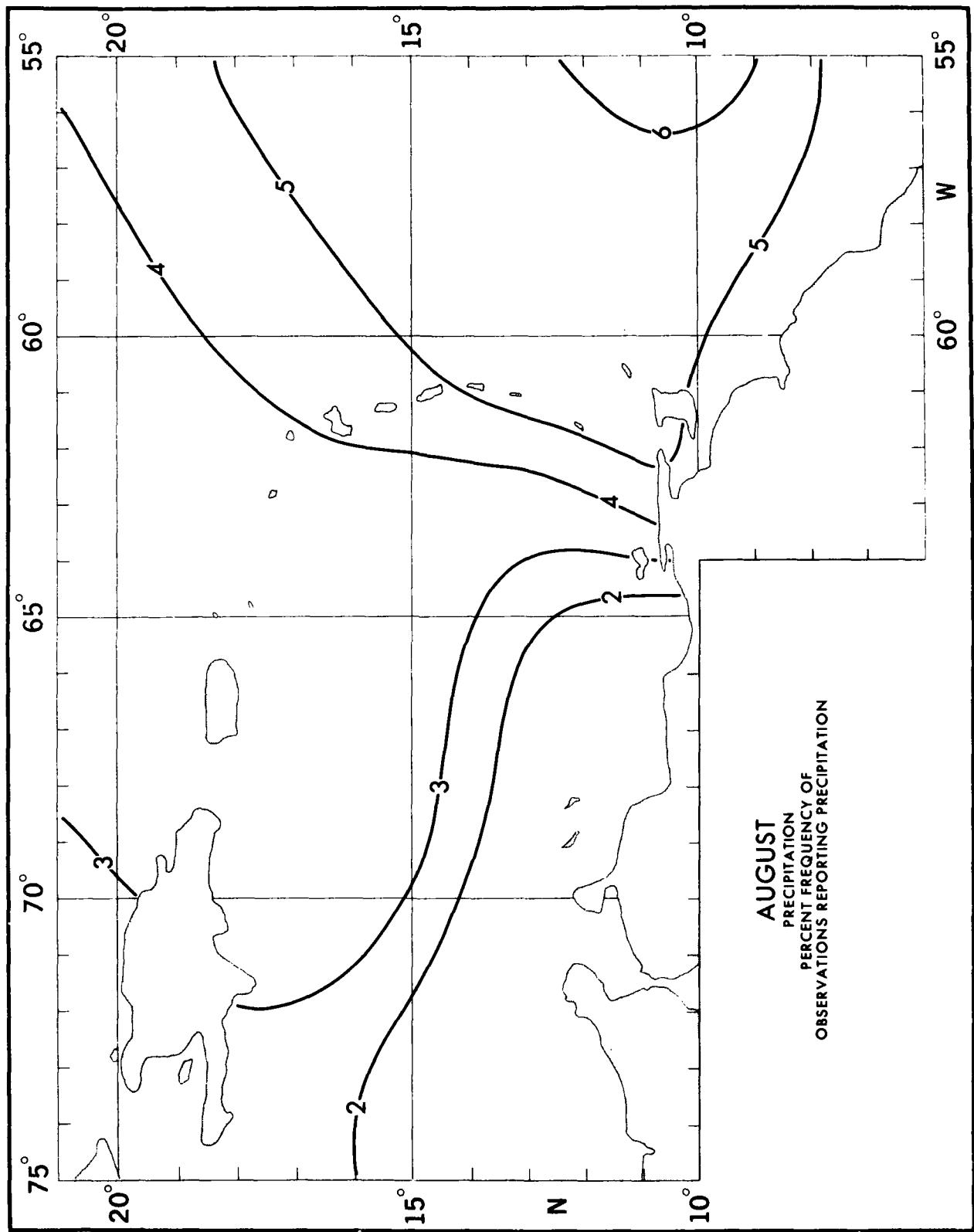
**JULY
WAVE HEIGHT-FREQUENCIES**

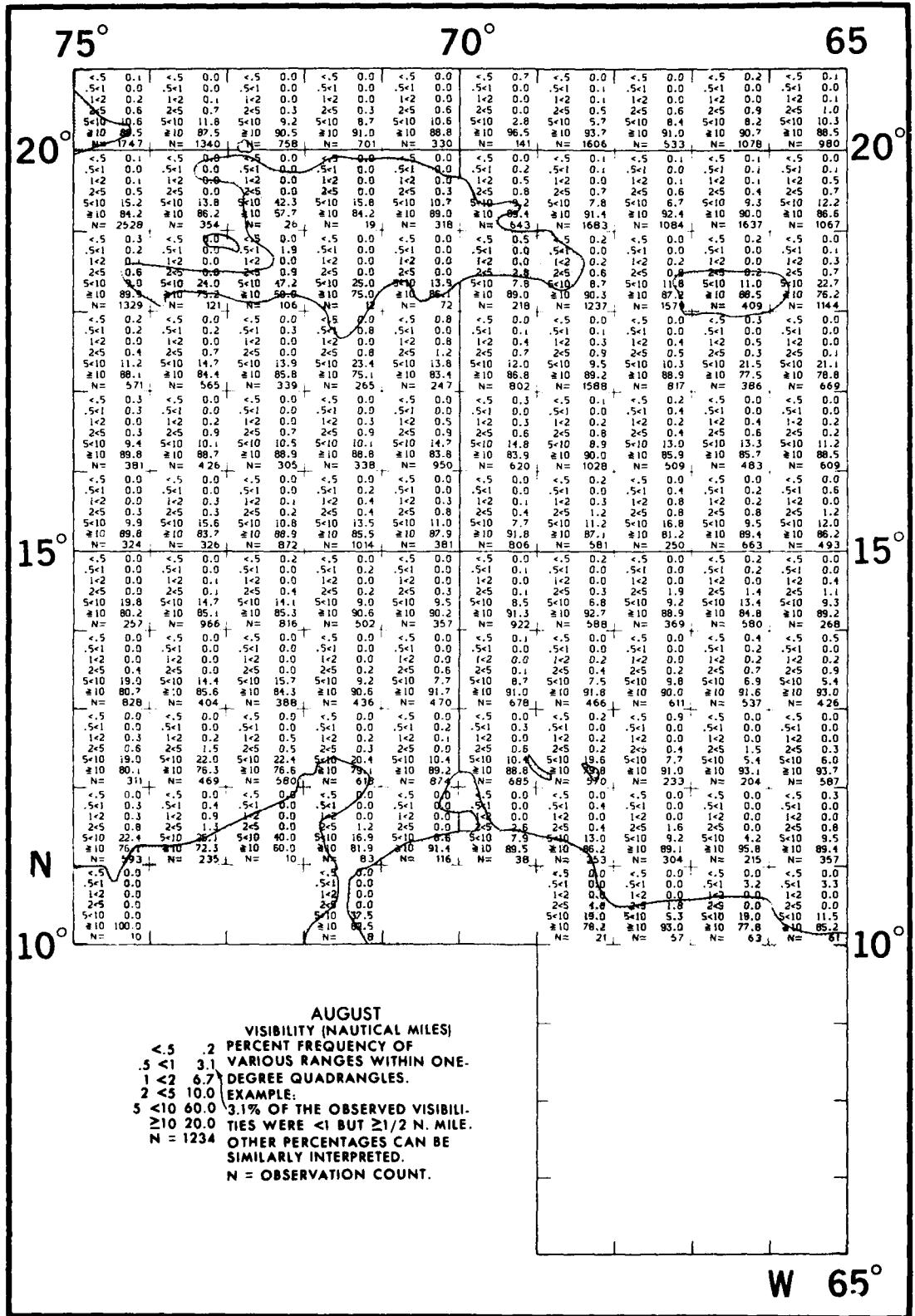
65° W

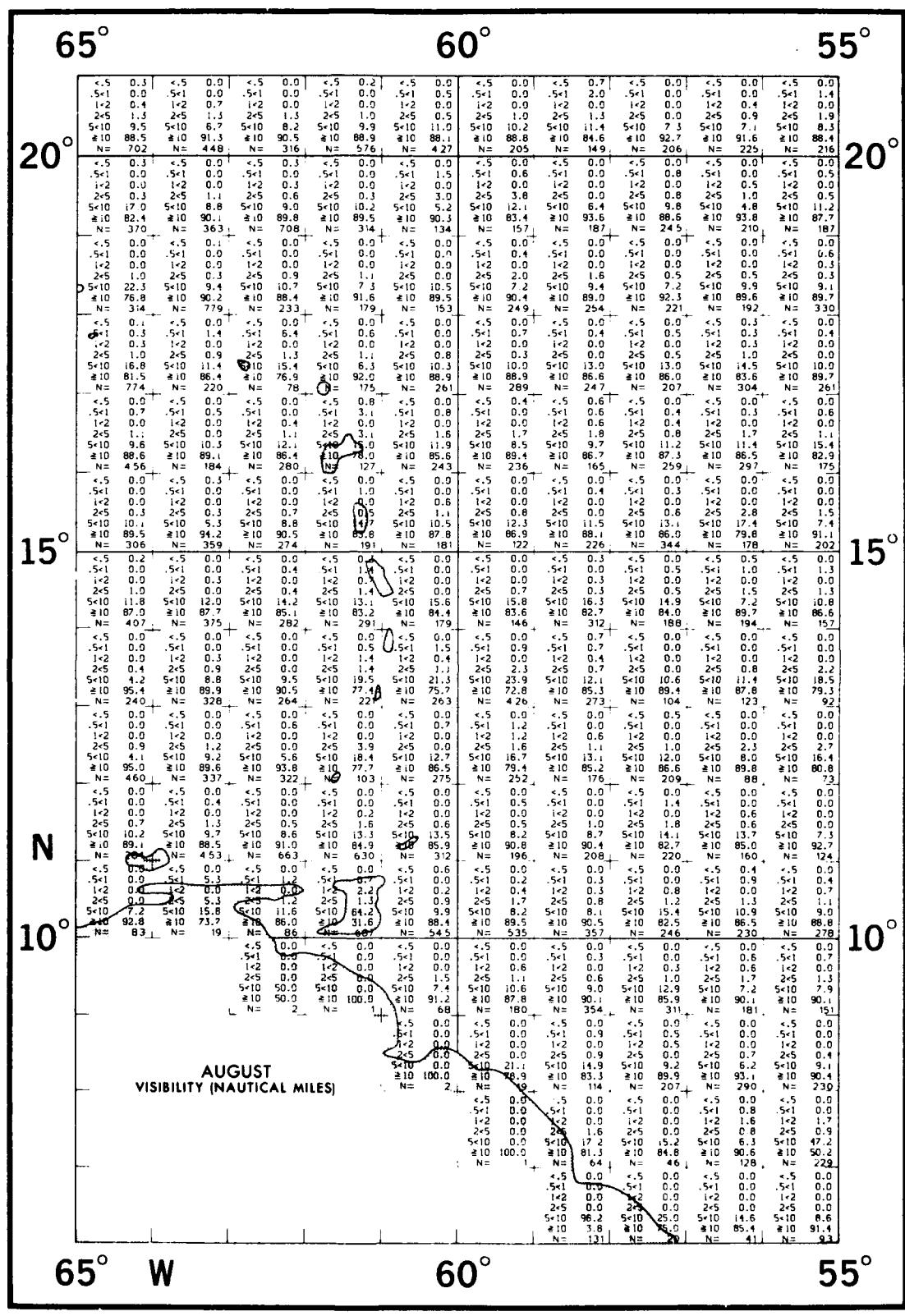
60°

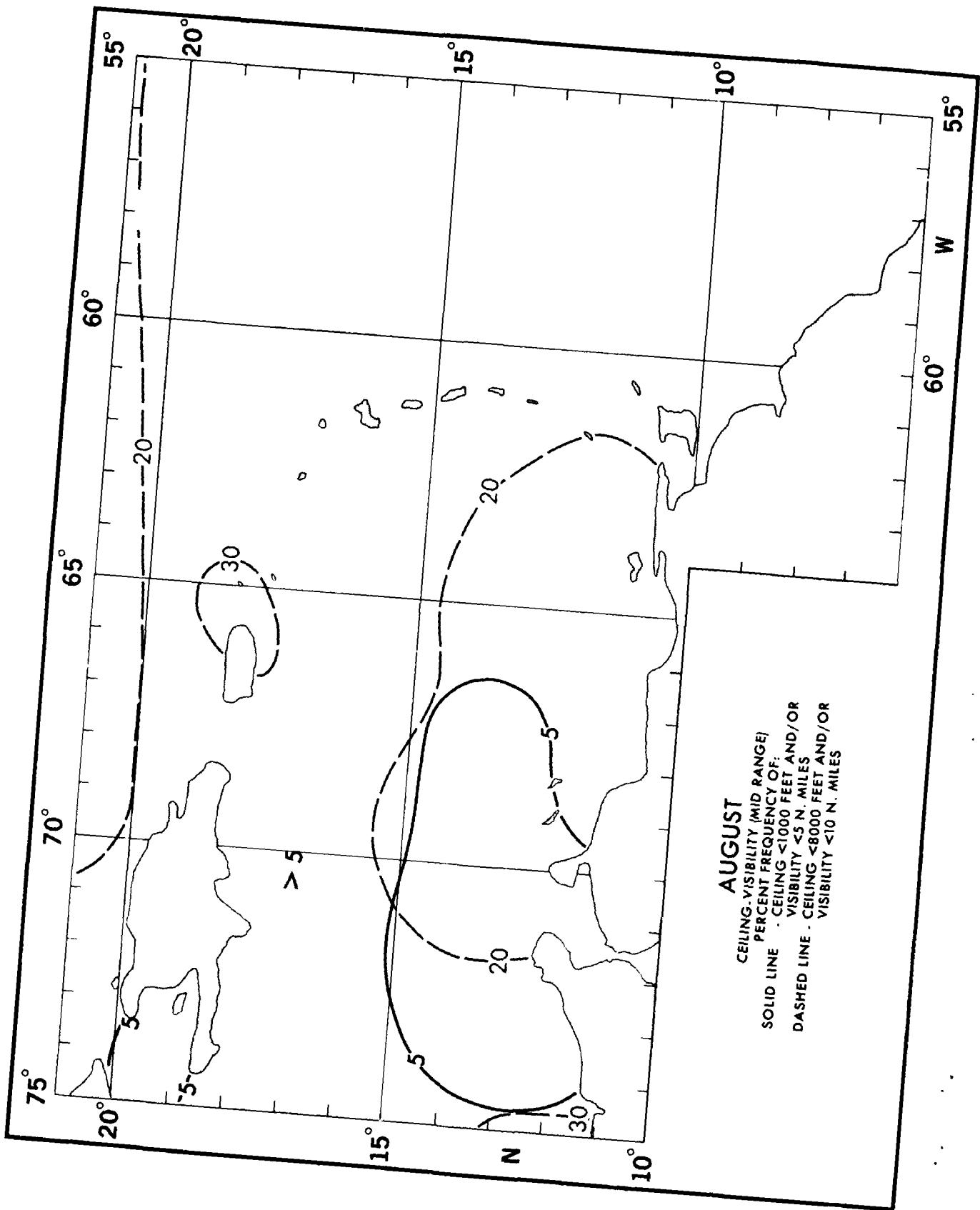
55

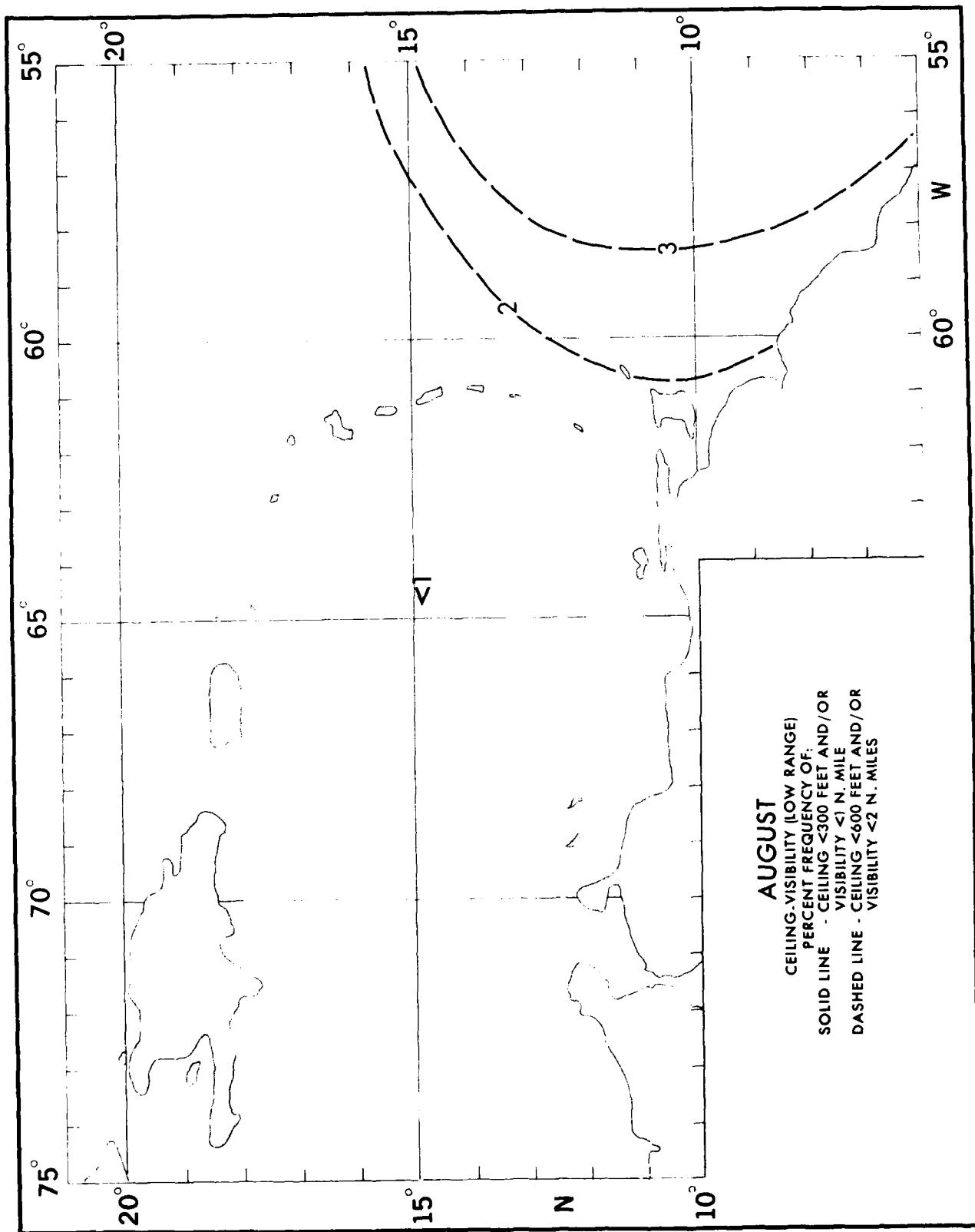


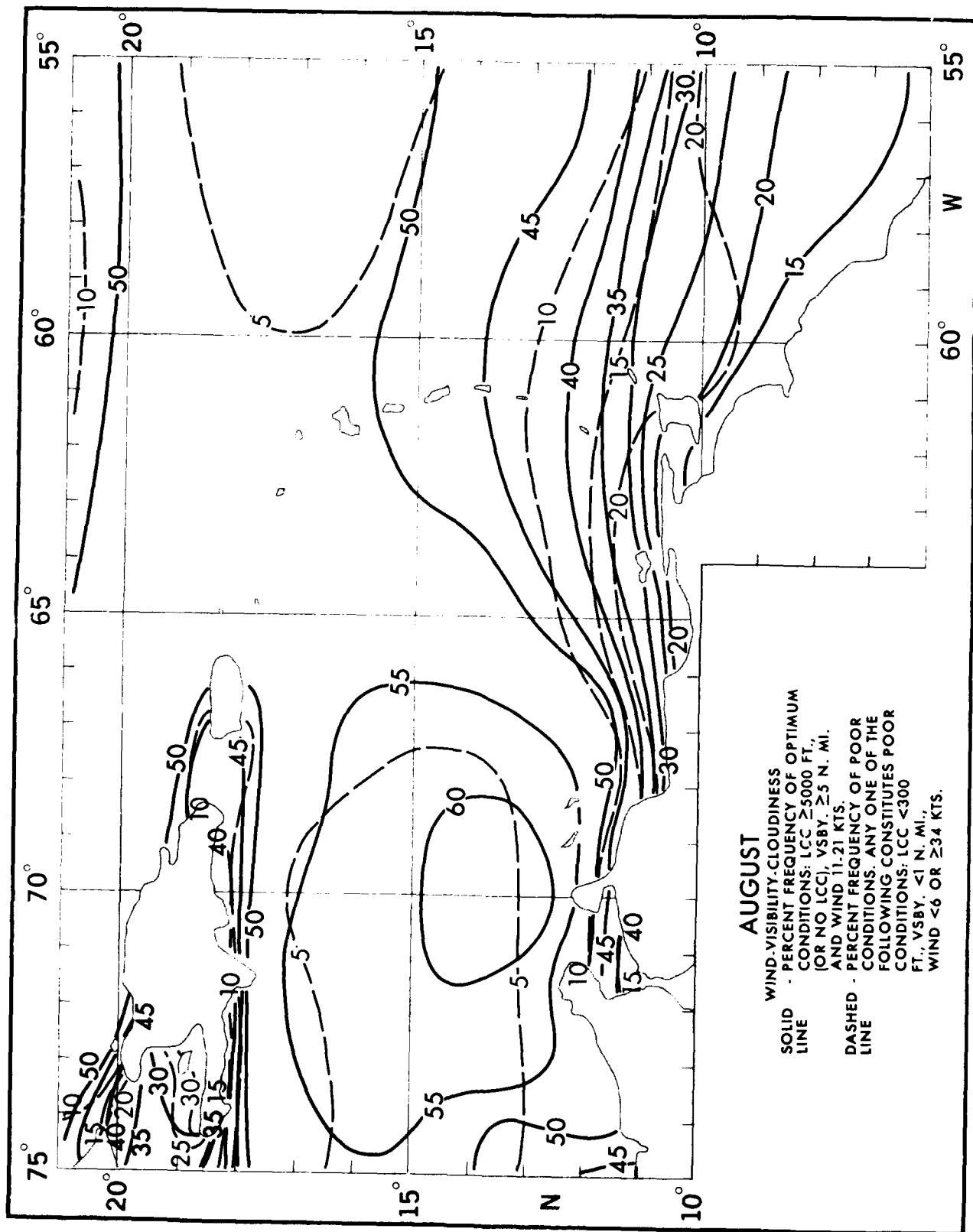


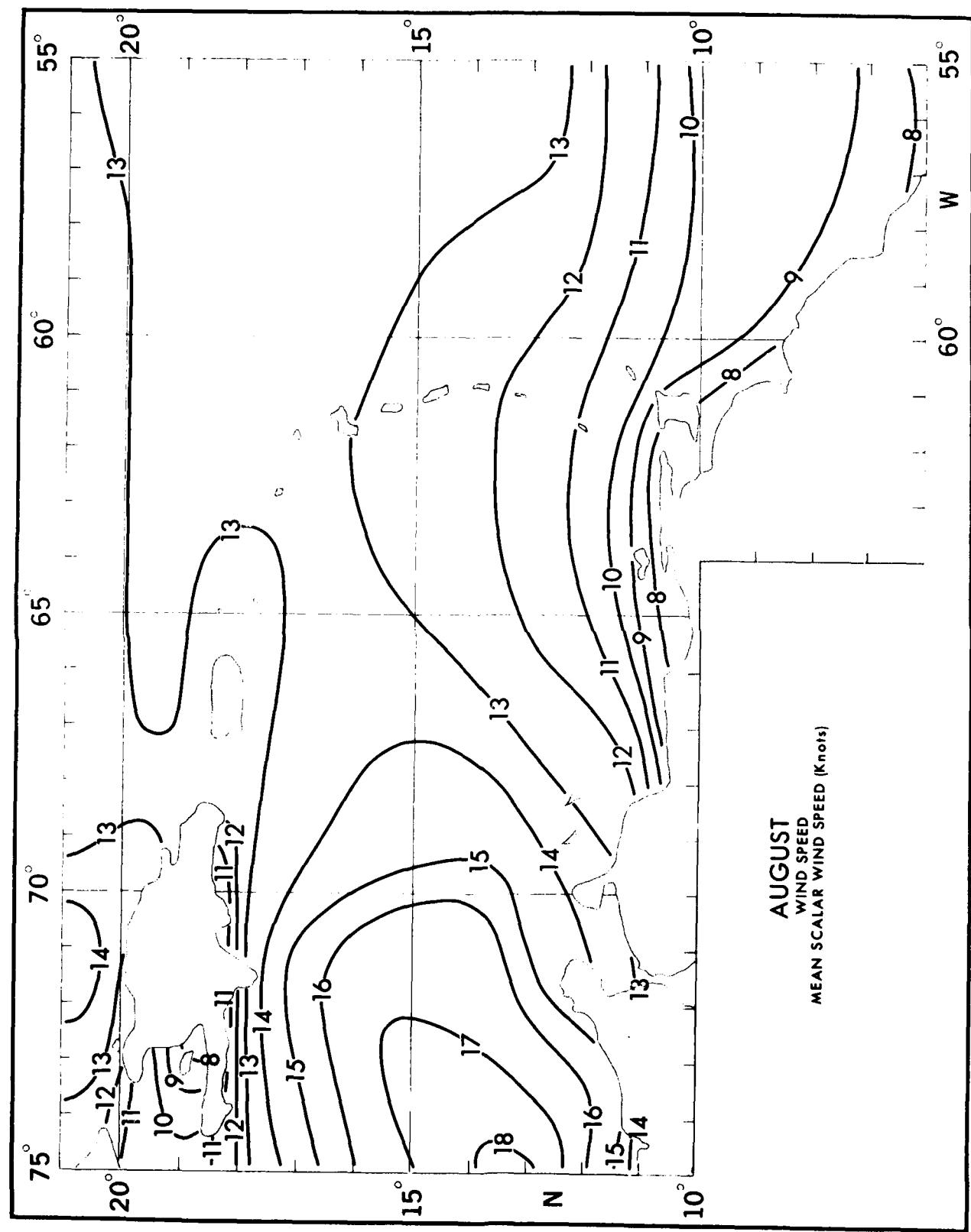


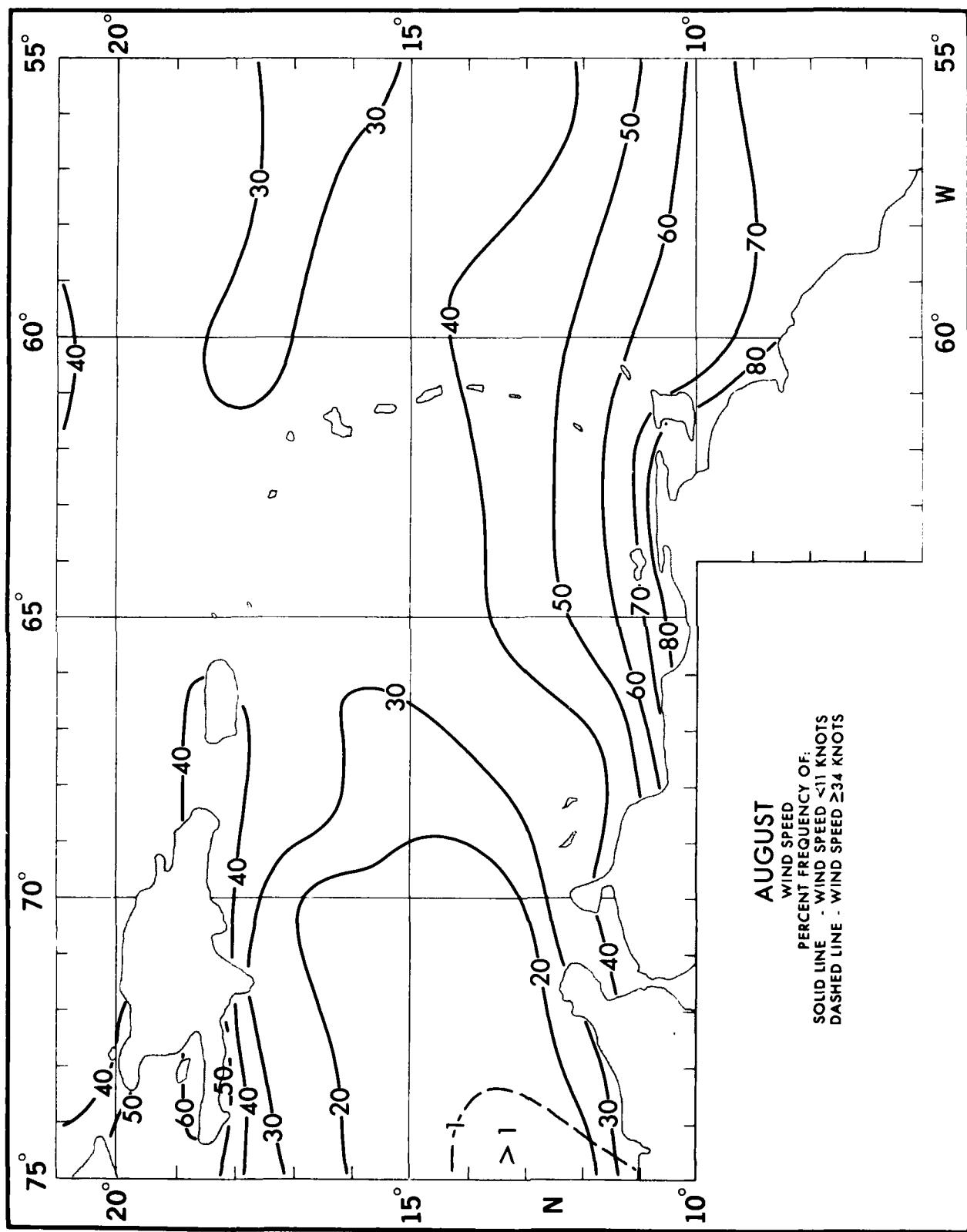


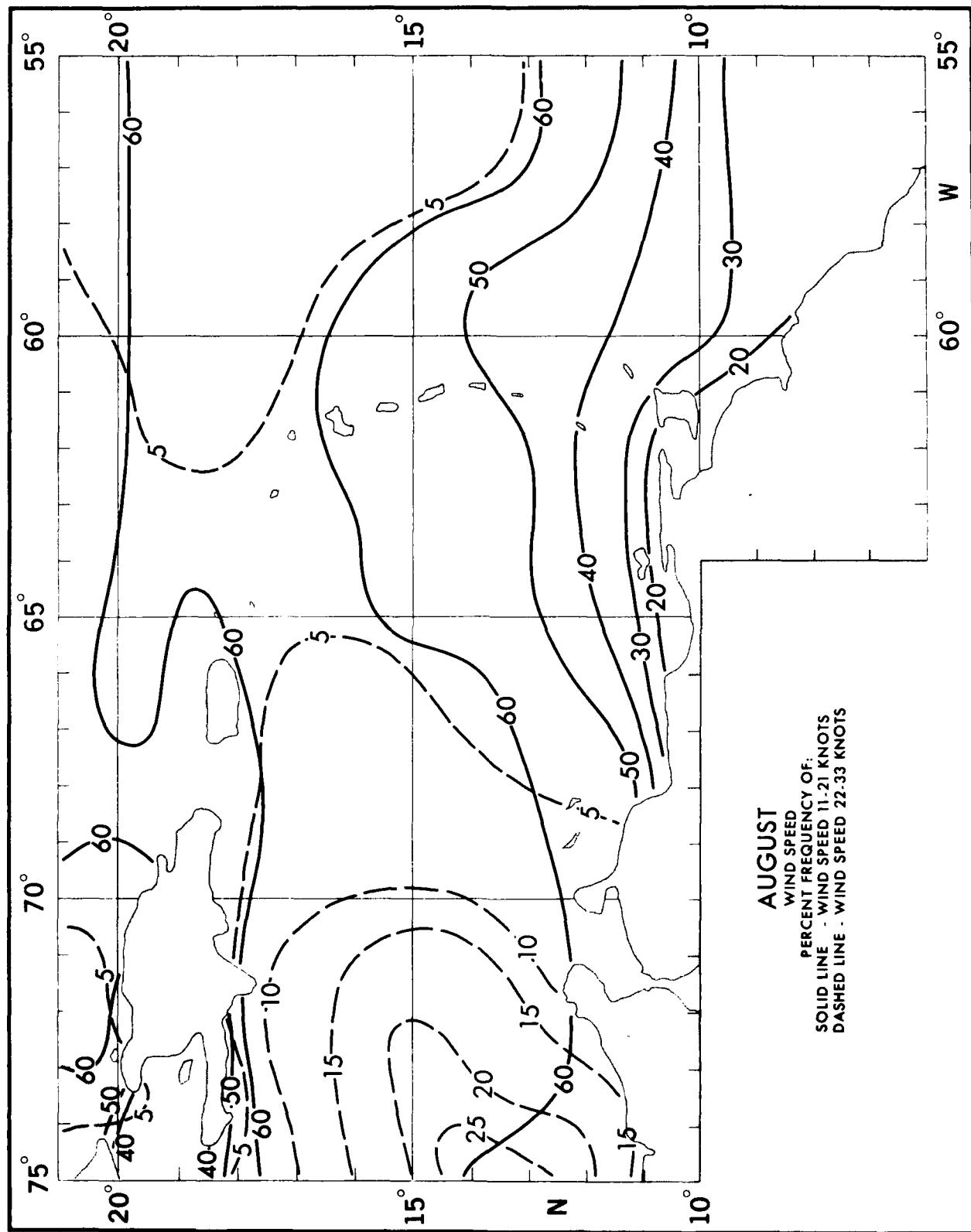


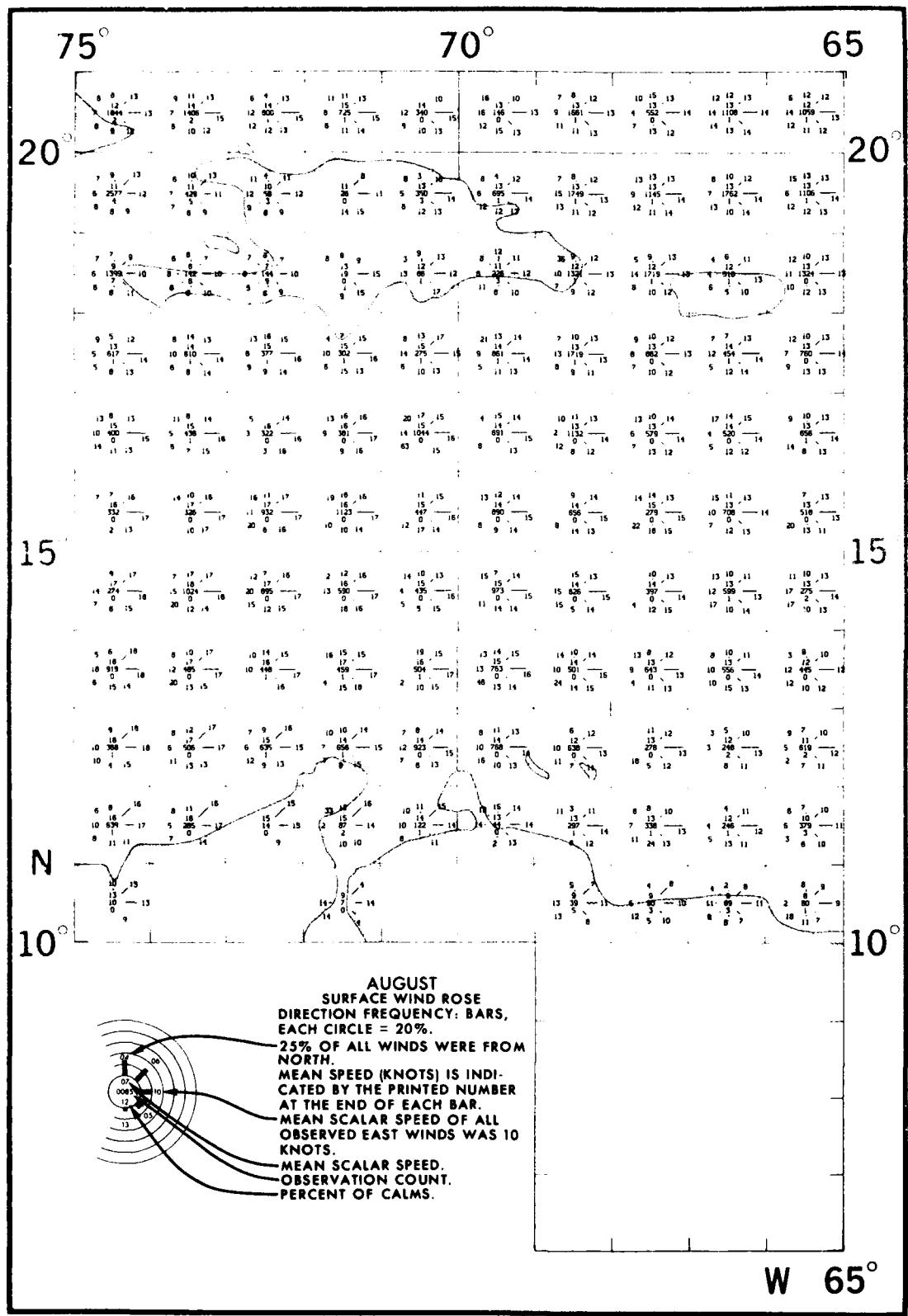


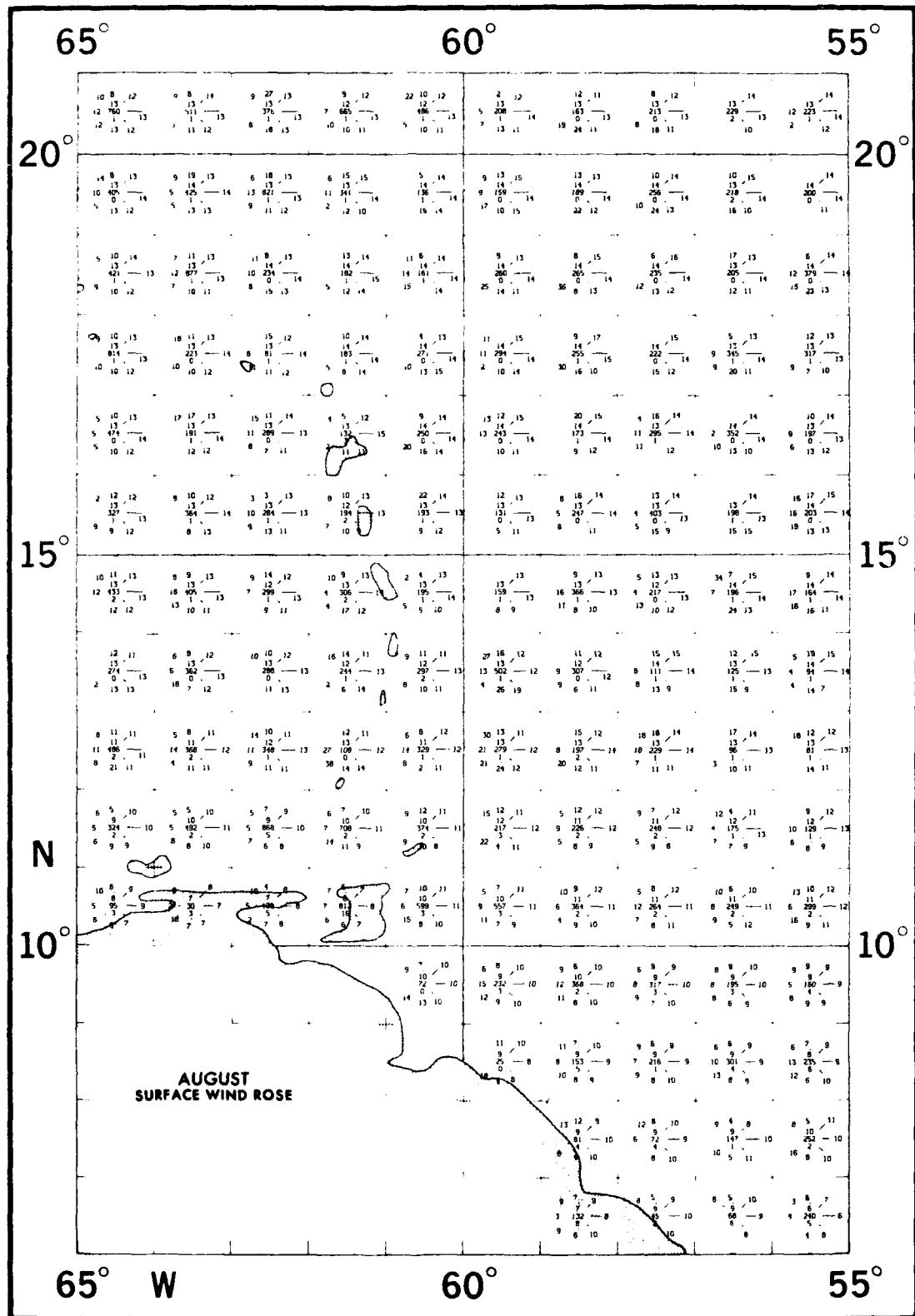


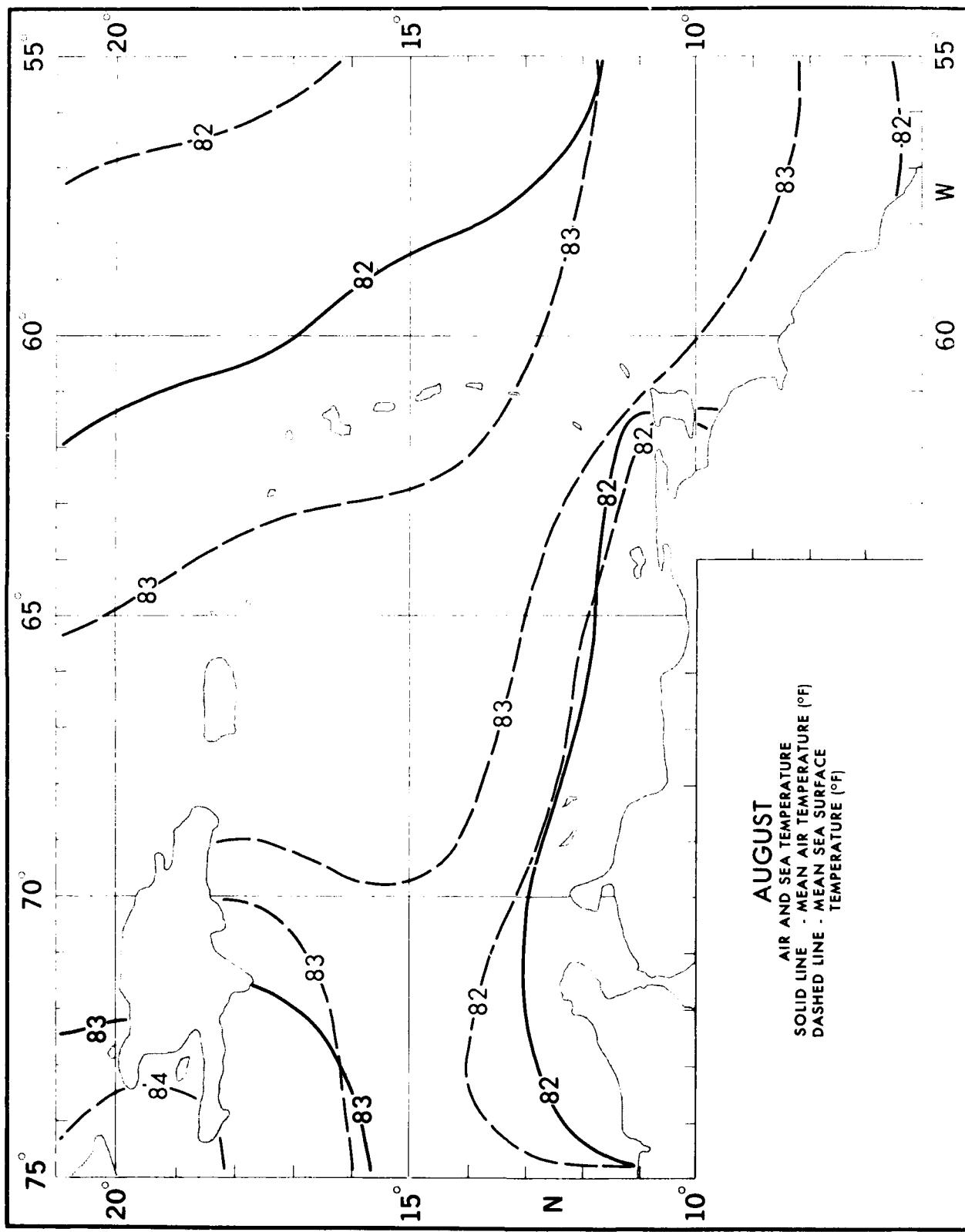


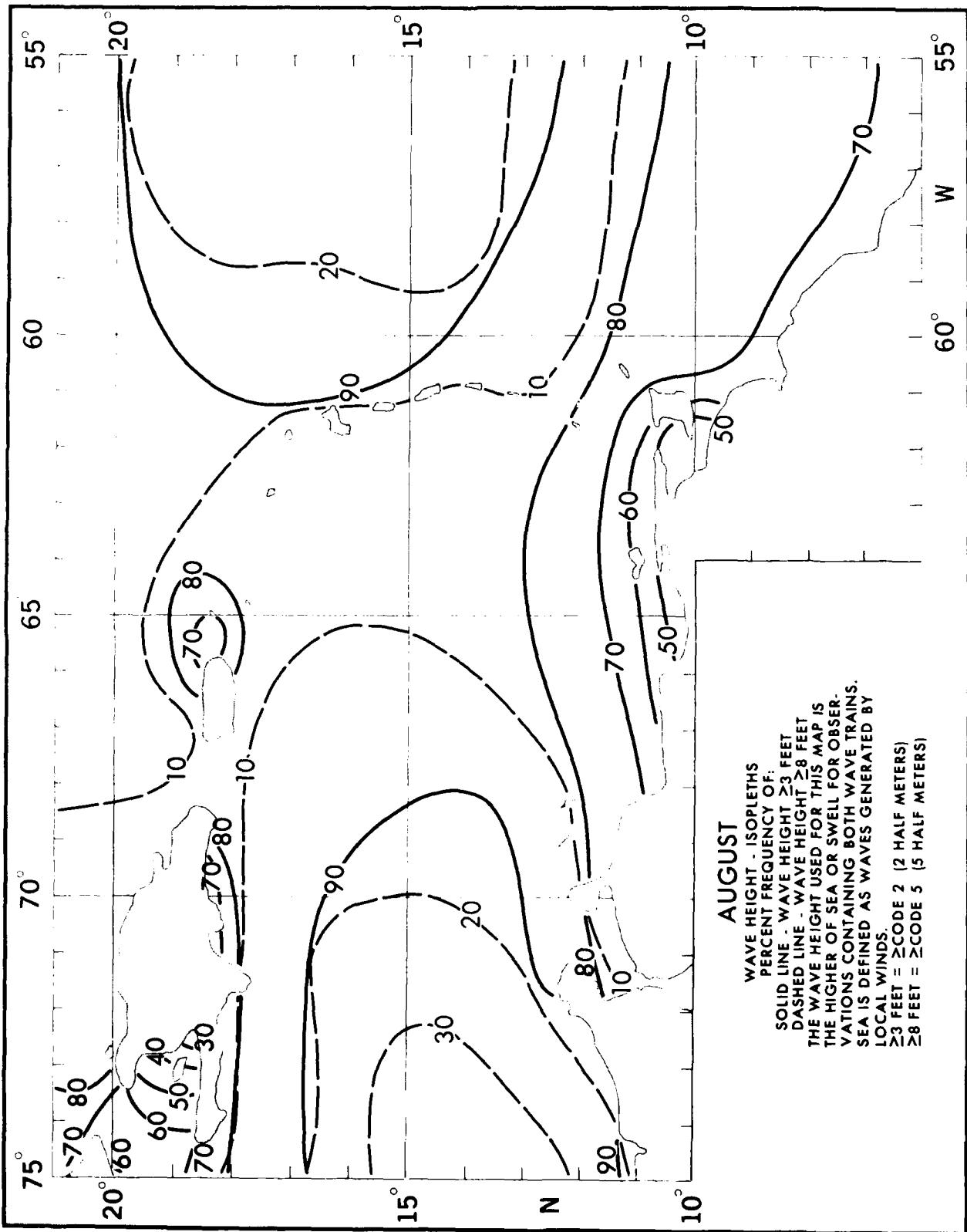


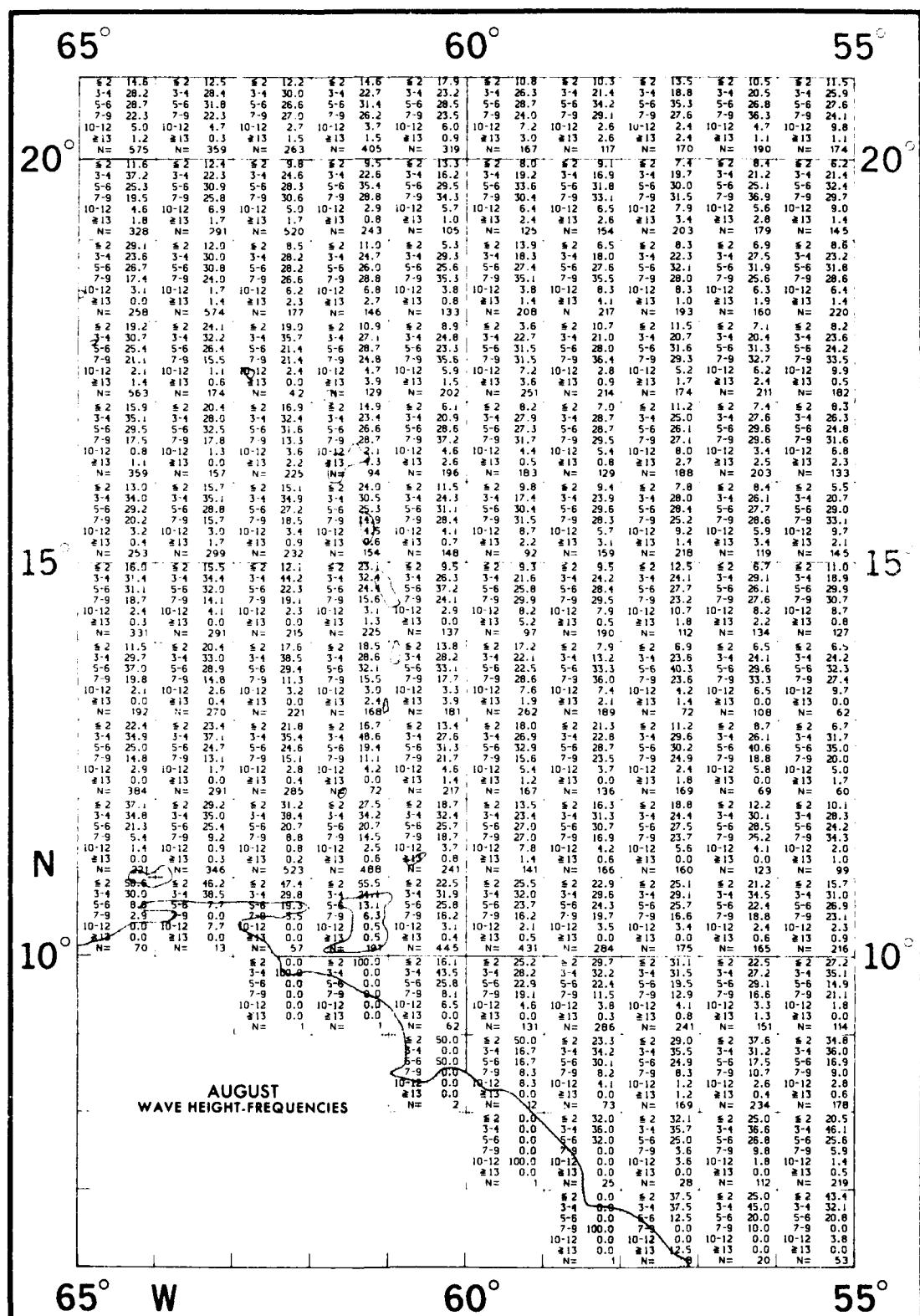




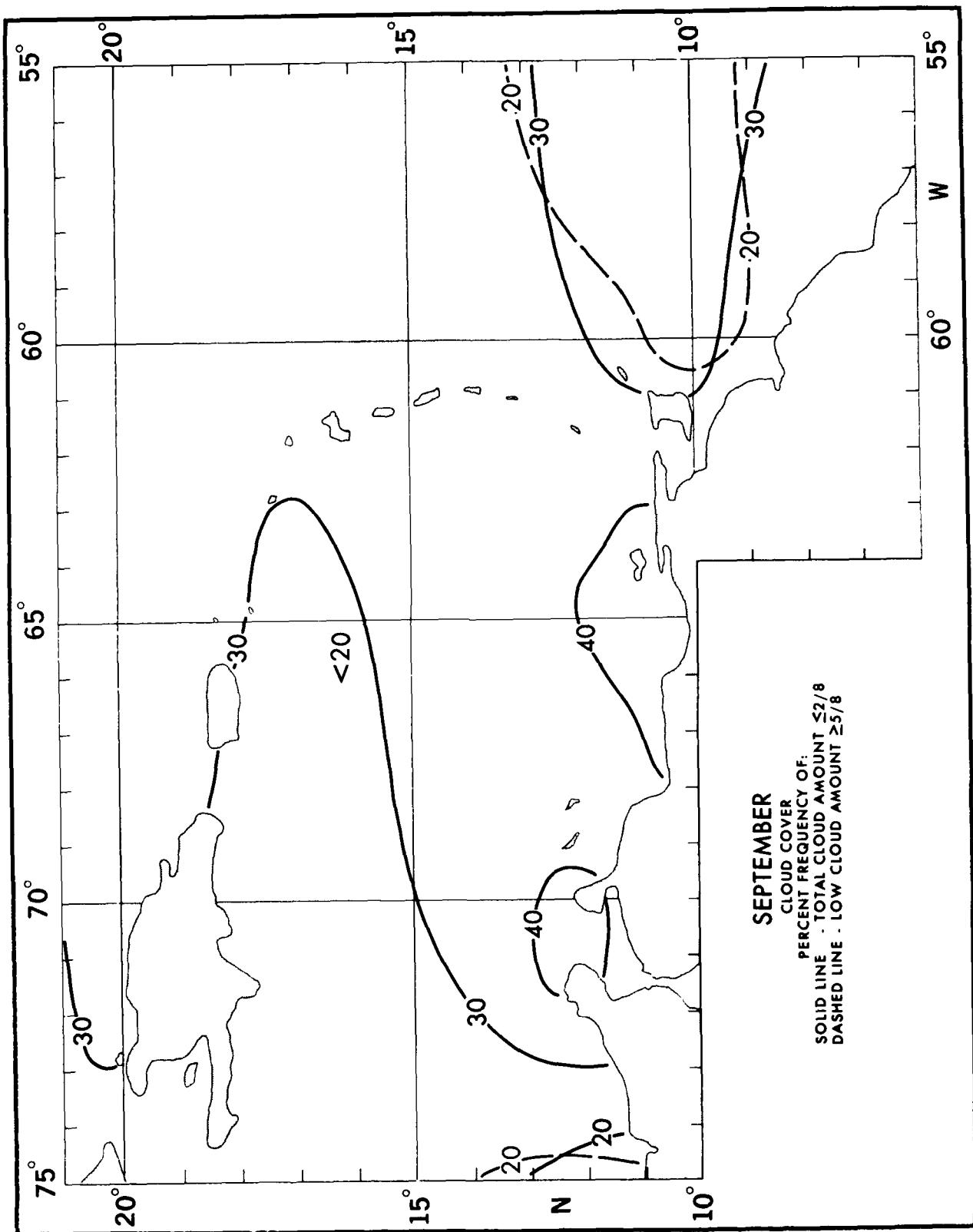


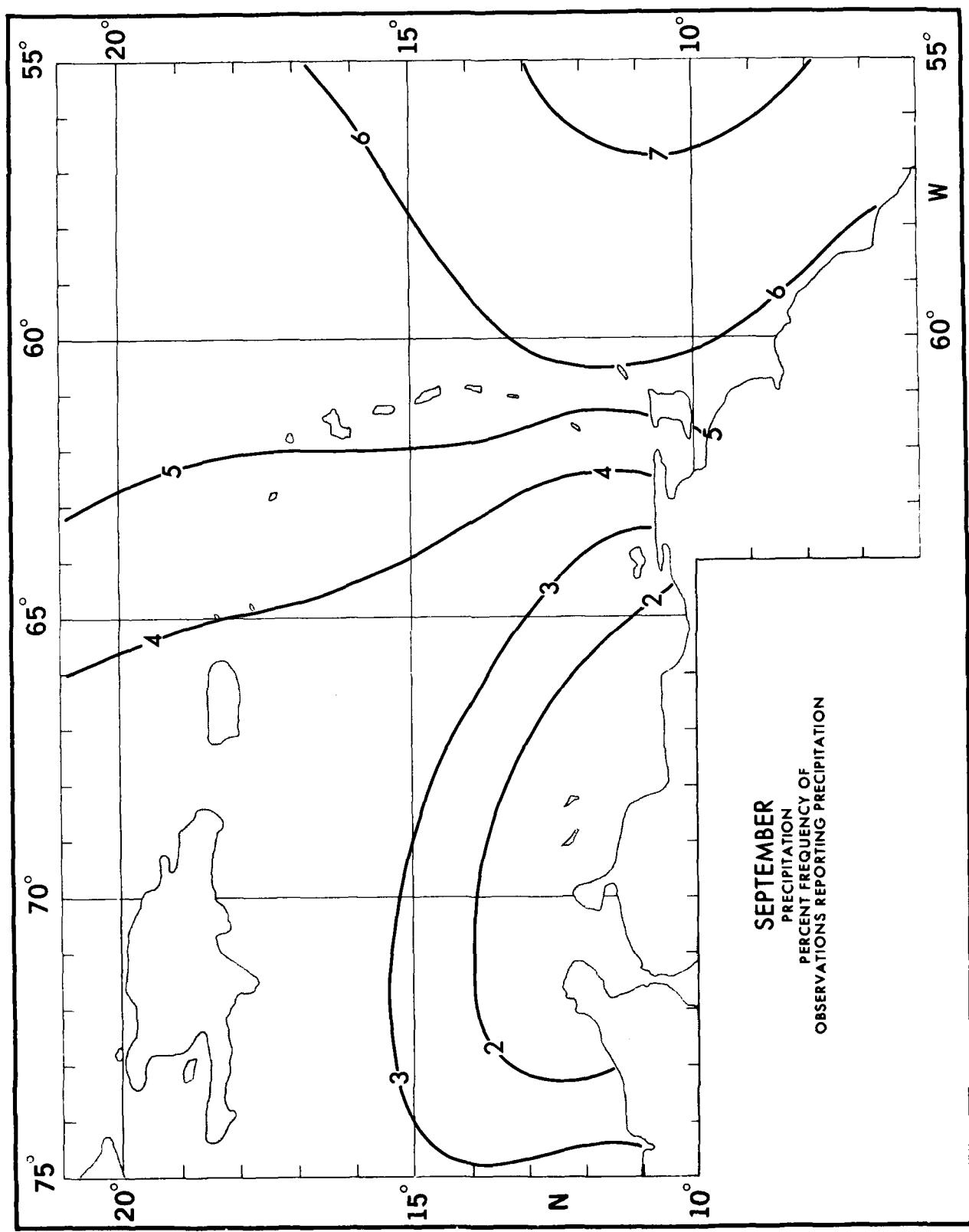


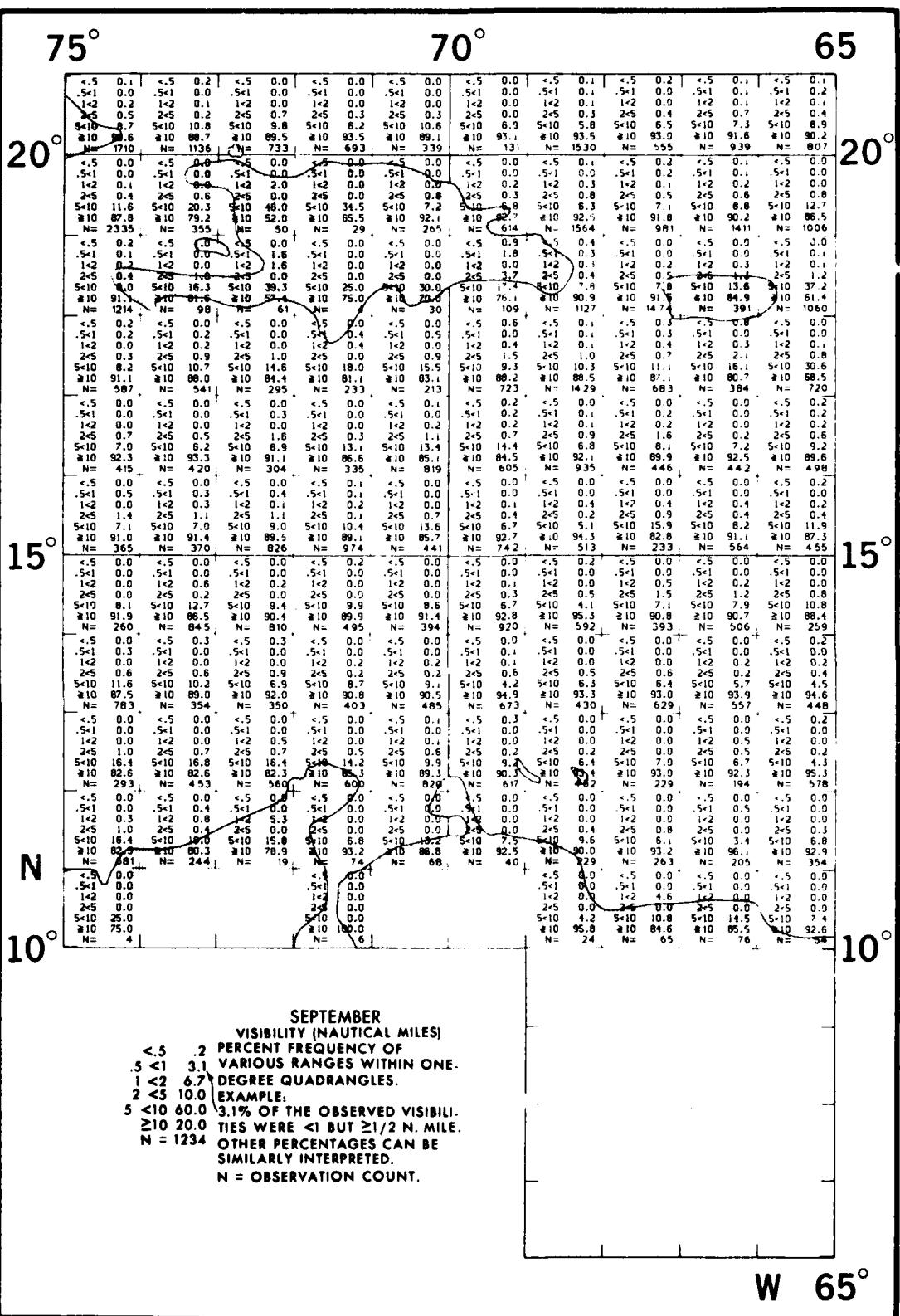




AUGUST WAVE HEIGHT-FREQUENCIES

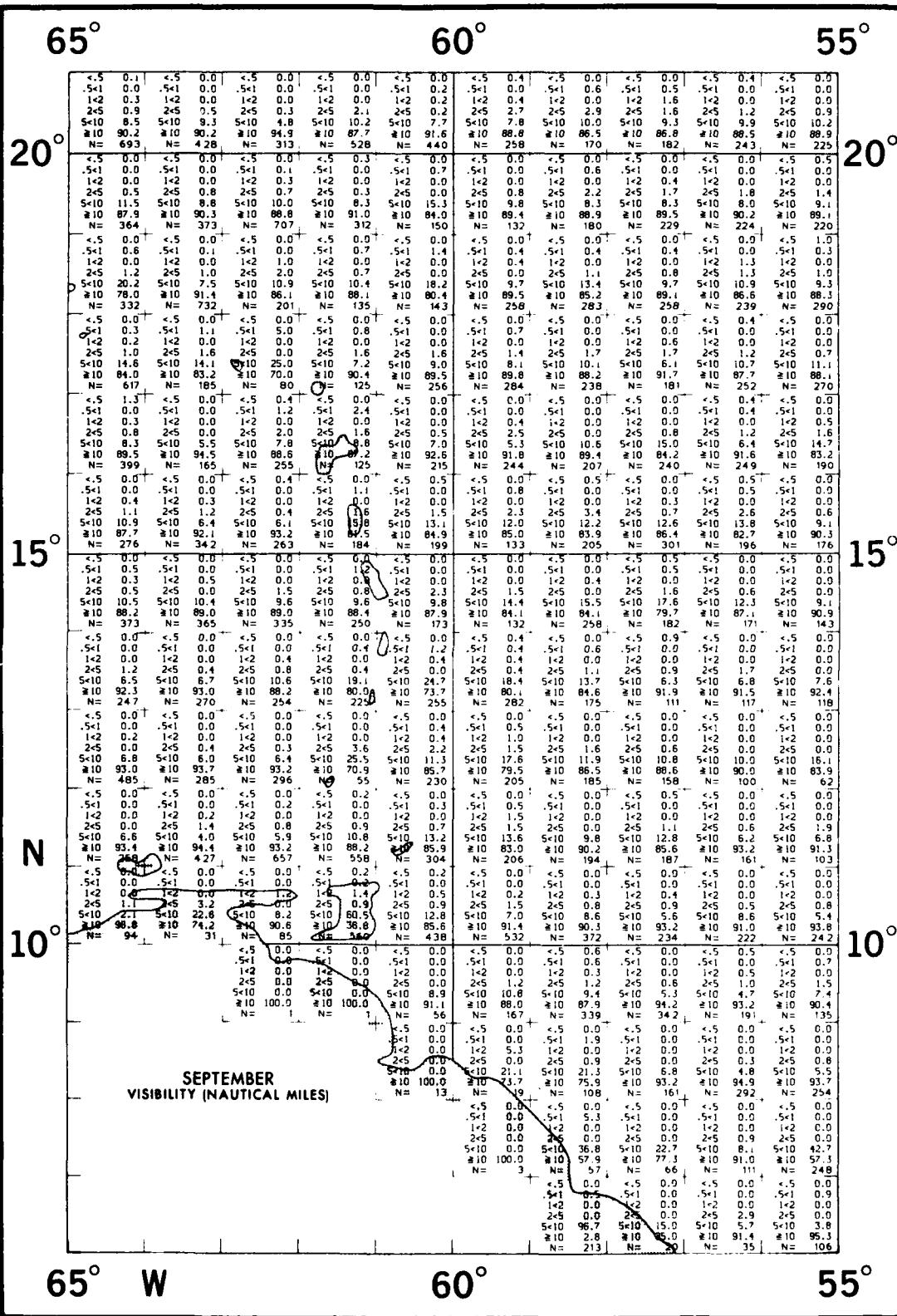


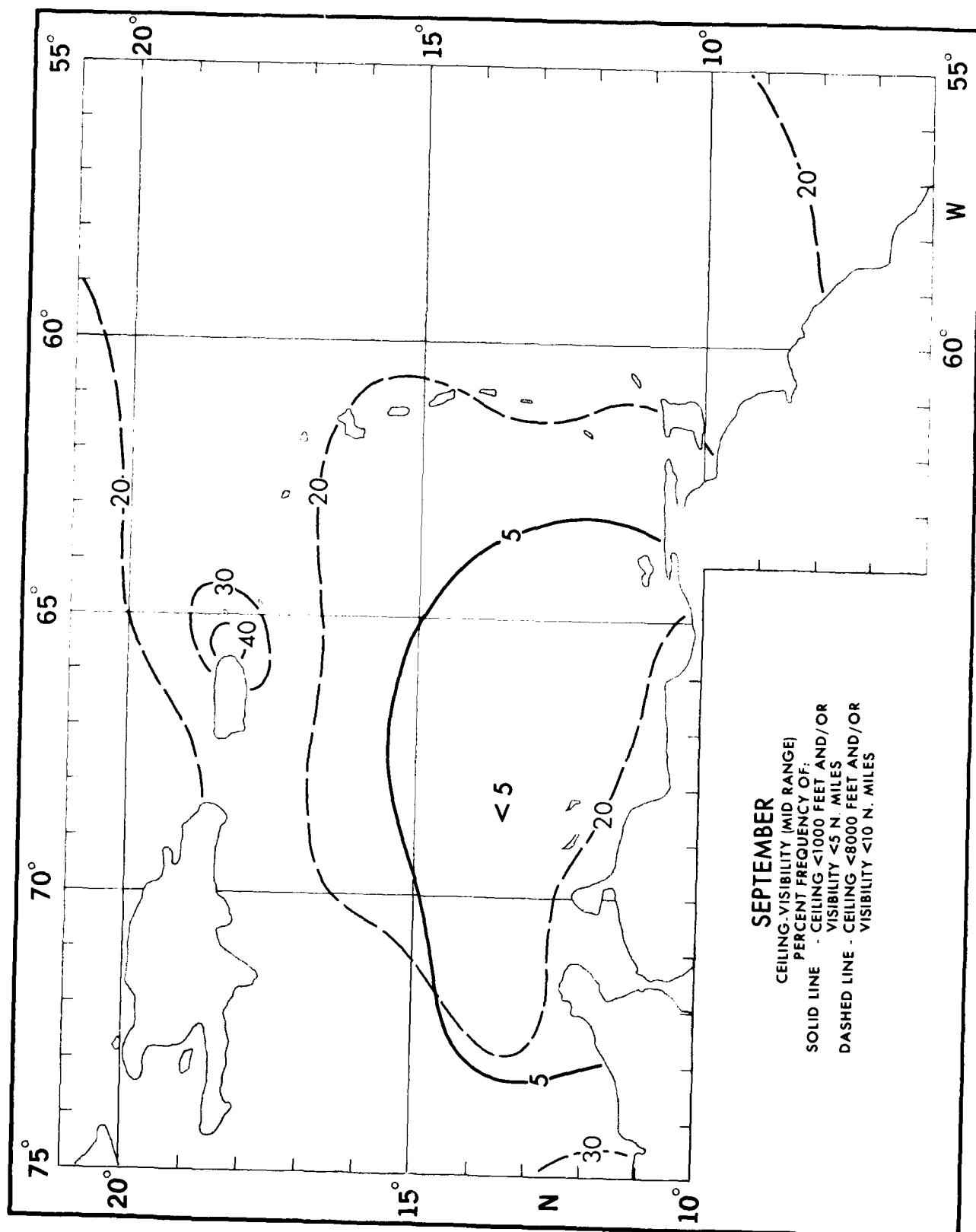


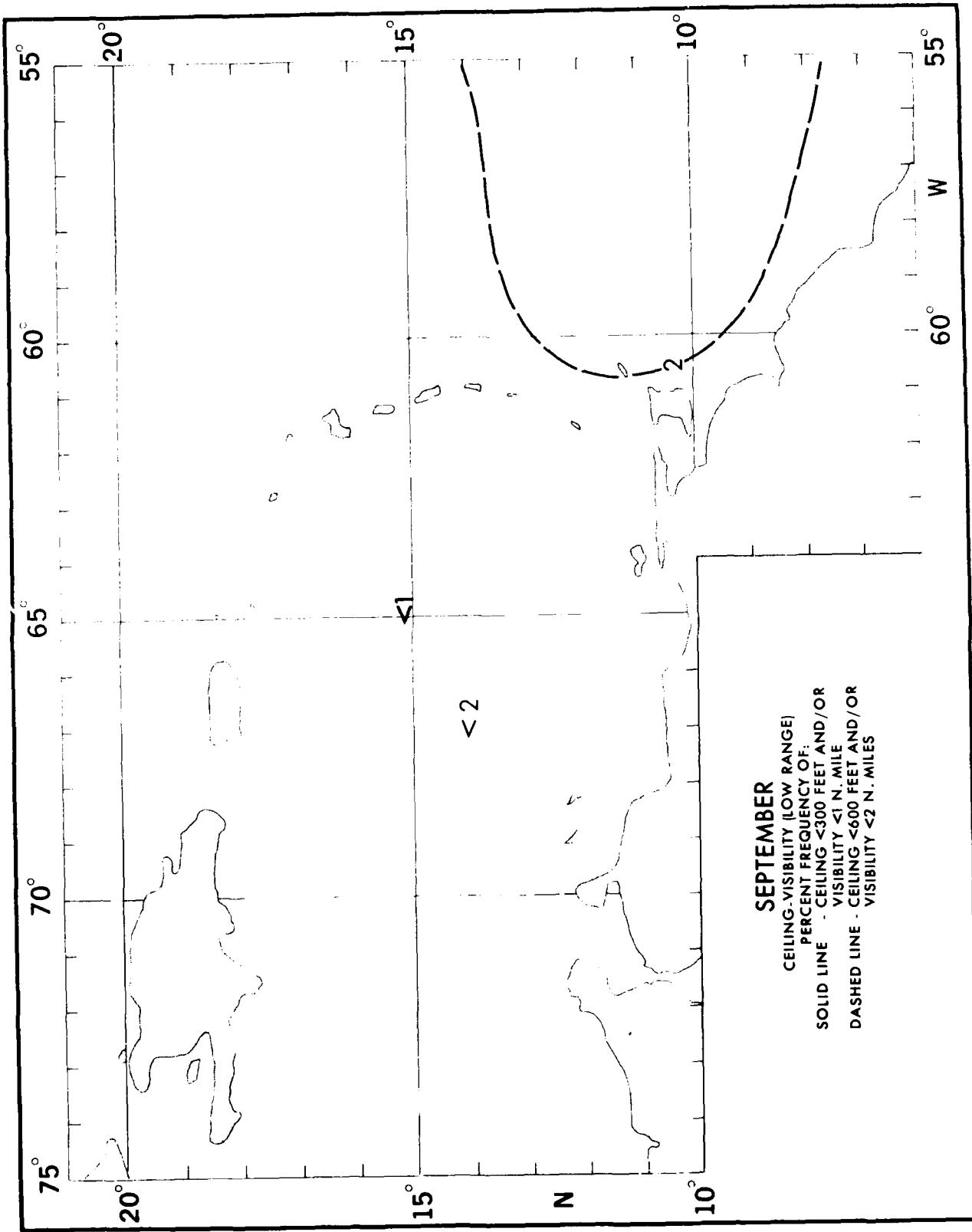


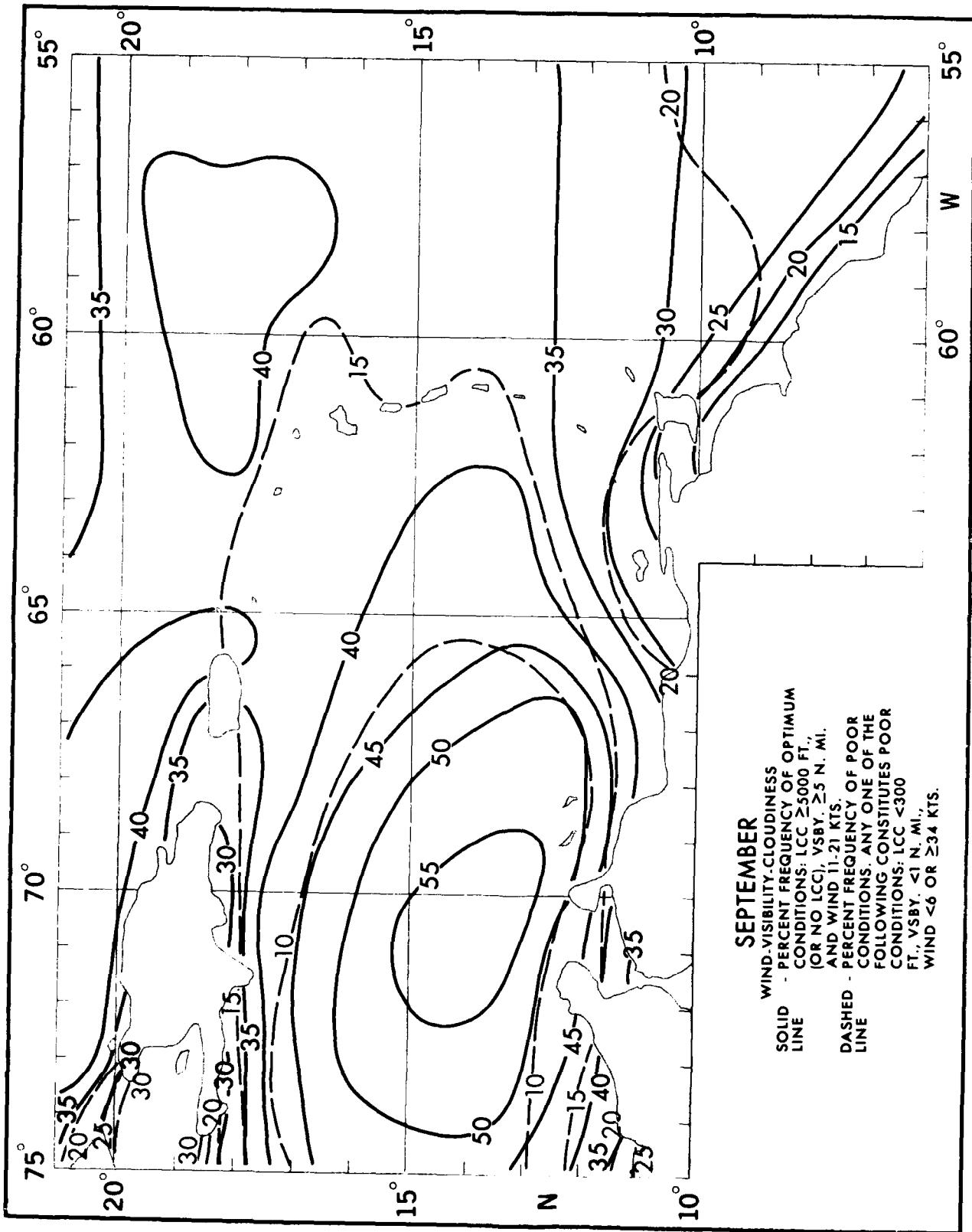
SEPTEMBER

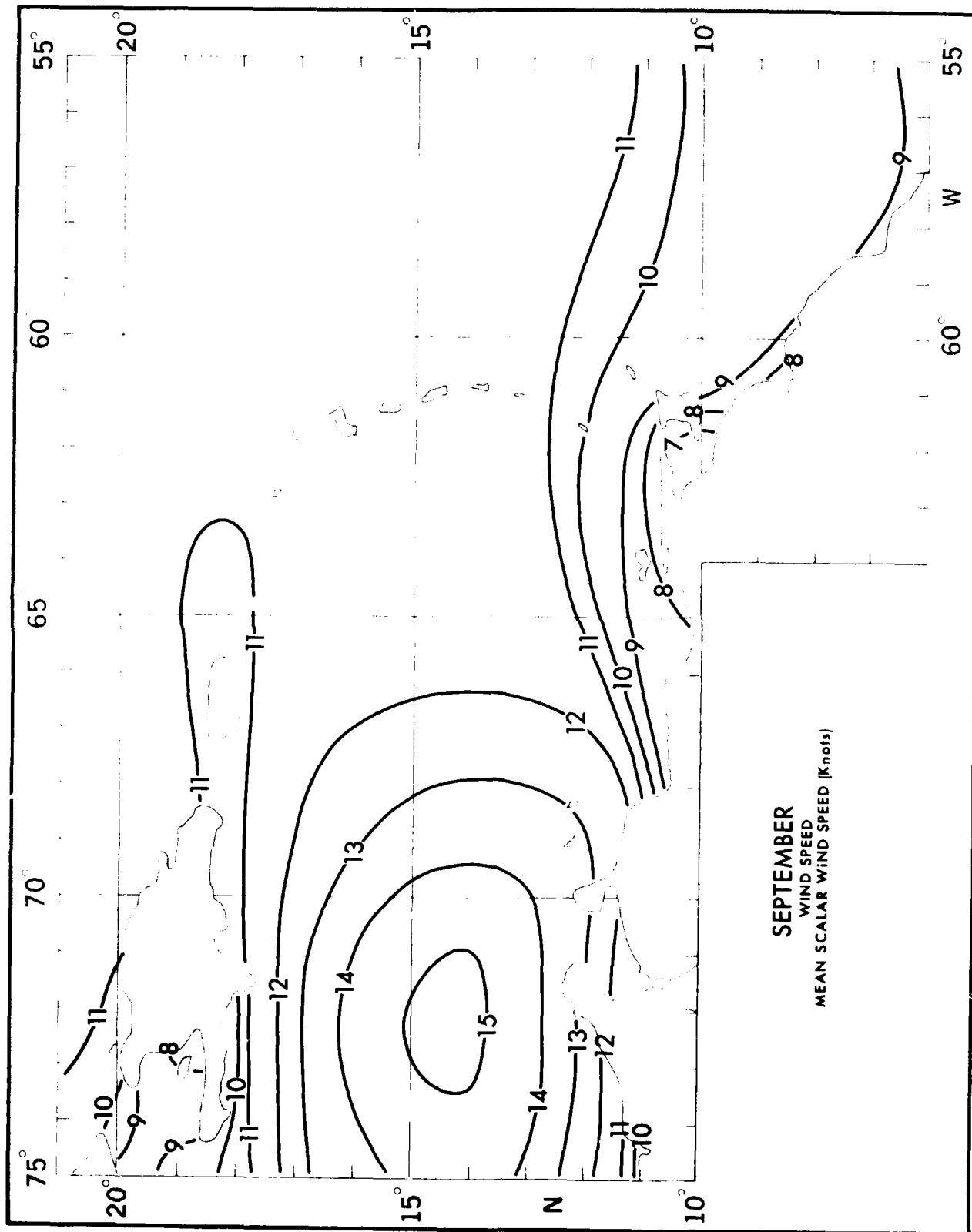
VISIBILITY (NAUTICAL MILES)
 PERCENT FREQUENCY OF
 VARIOUS RANGES WITHIN ONE-
 DEGREE QUADRANGLES.
 EXAMPLE:
 3.1% OF THE OBSERVED VISIBIL-
 IES WERE <1 BUT $\geq 1/2$ N. MILE.
 OTHER PERCENTAGES CAN BE
 SIMILARLY INTERPRETED.
 N = OBSERVATION COUNT.

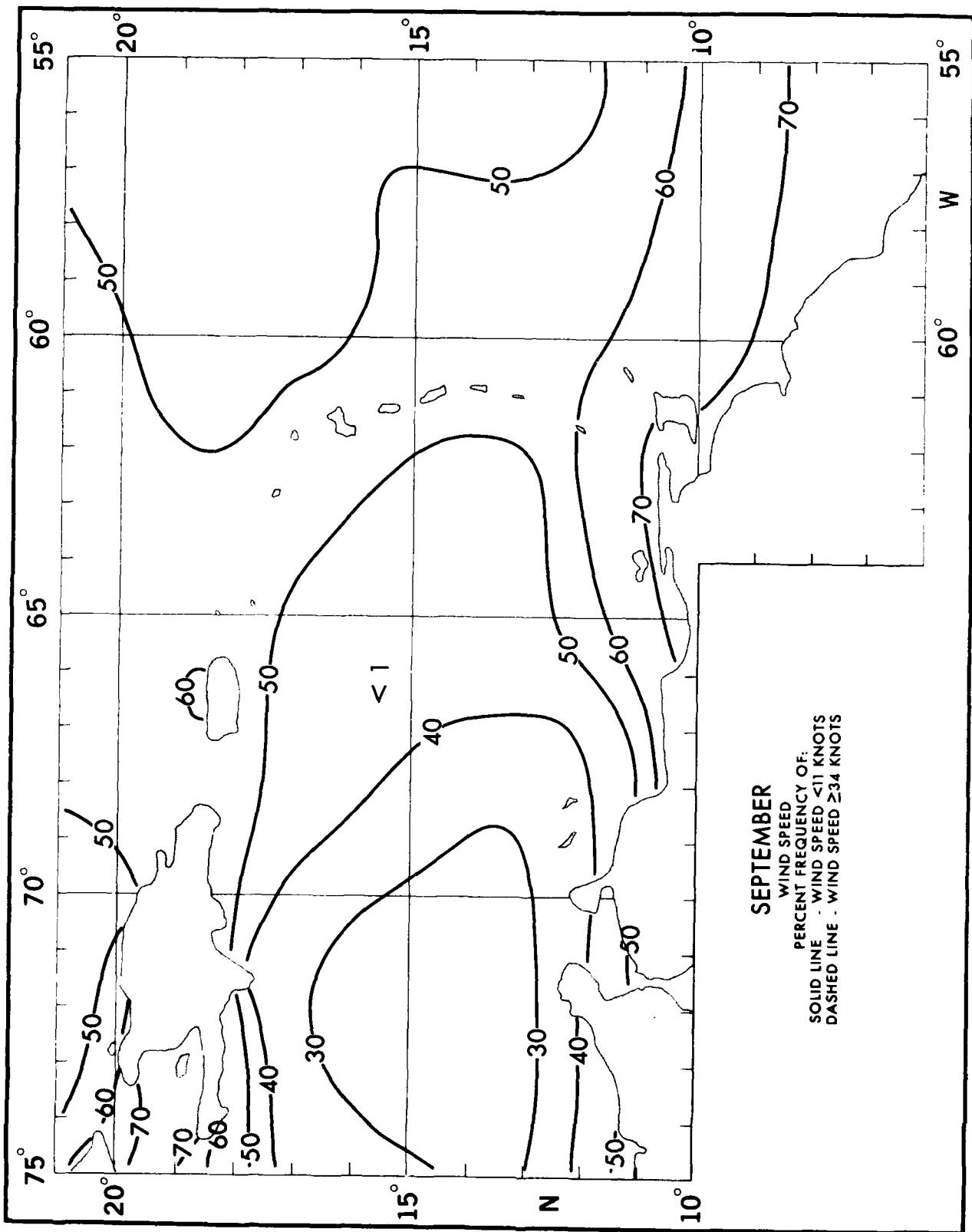


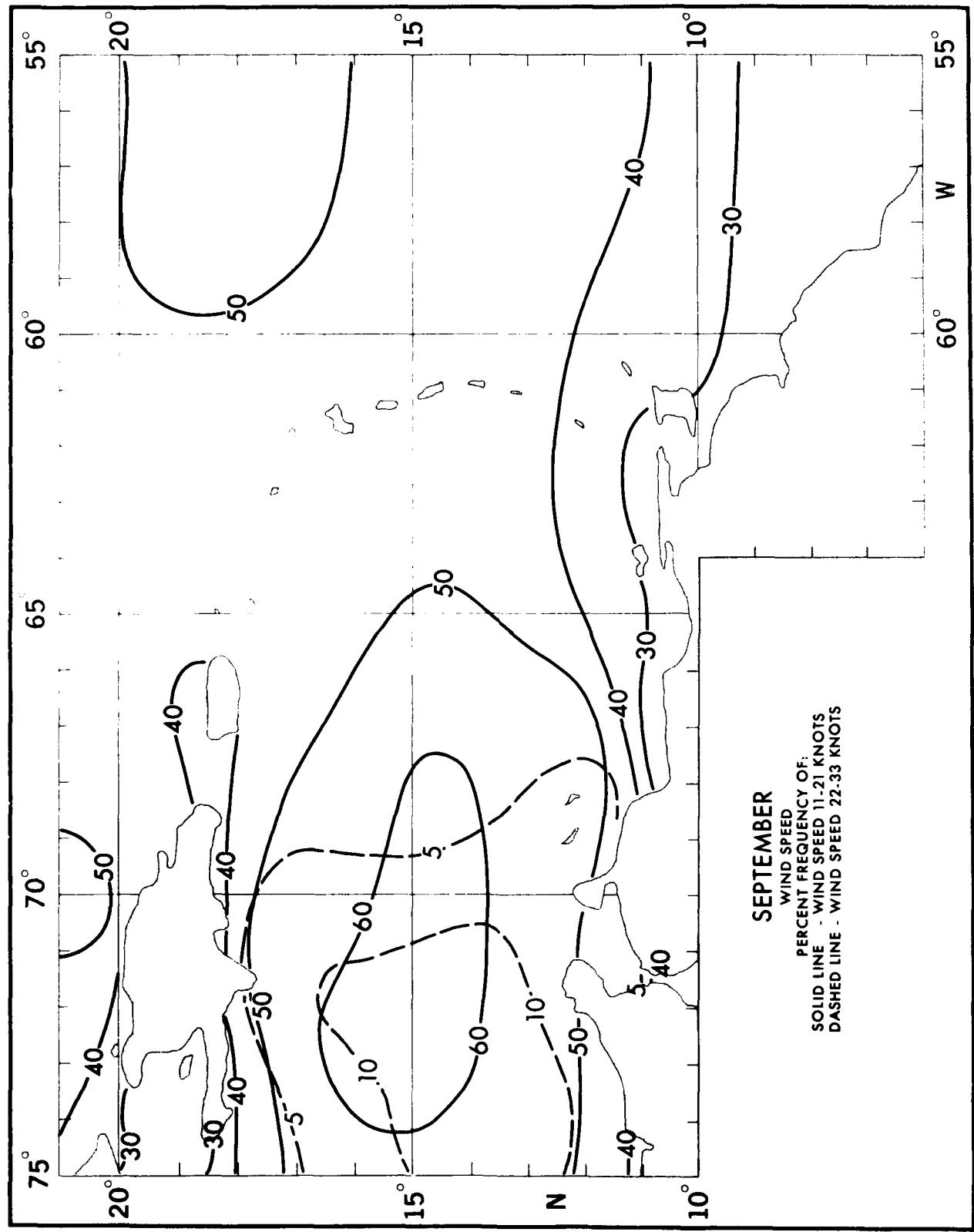


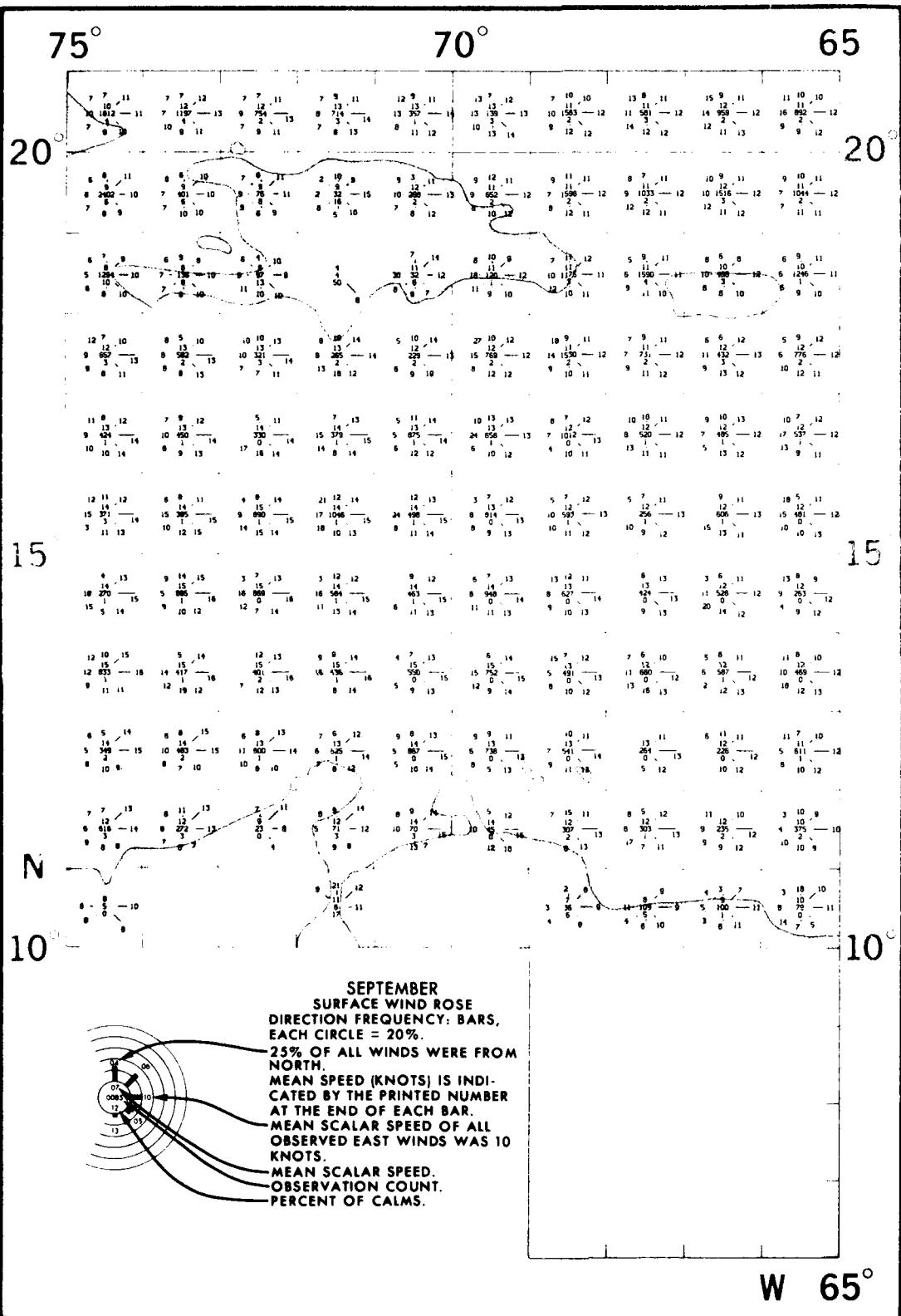


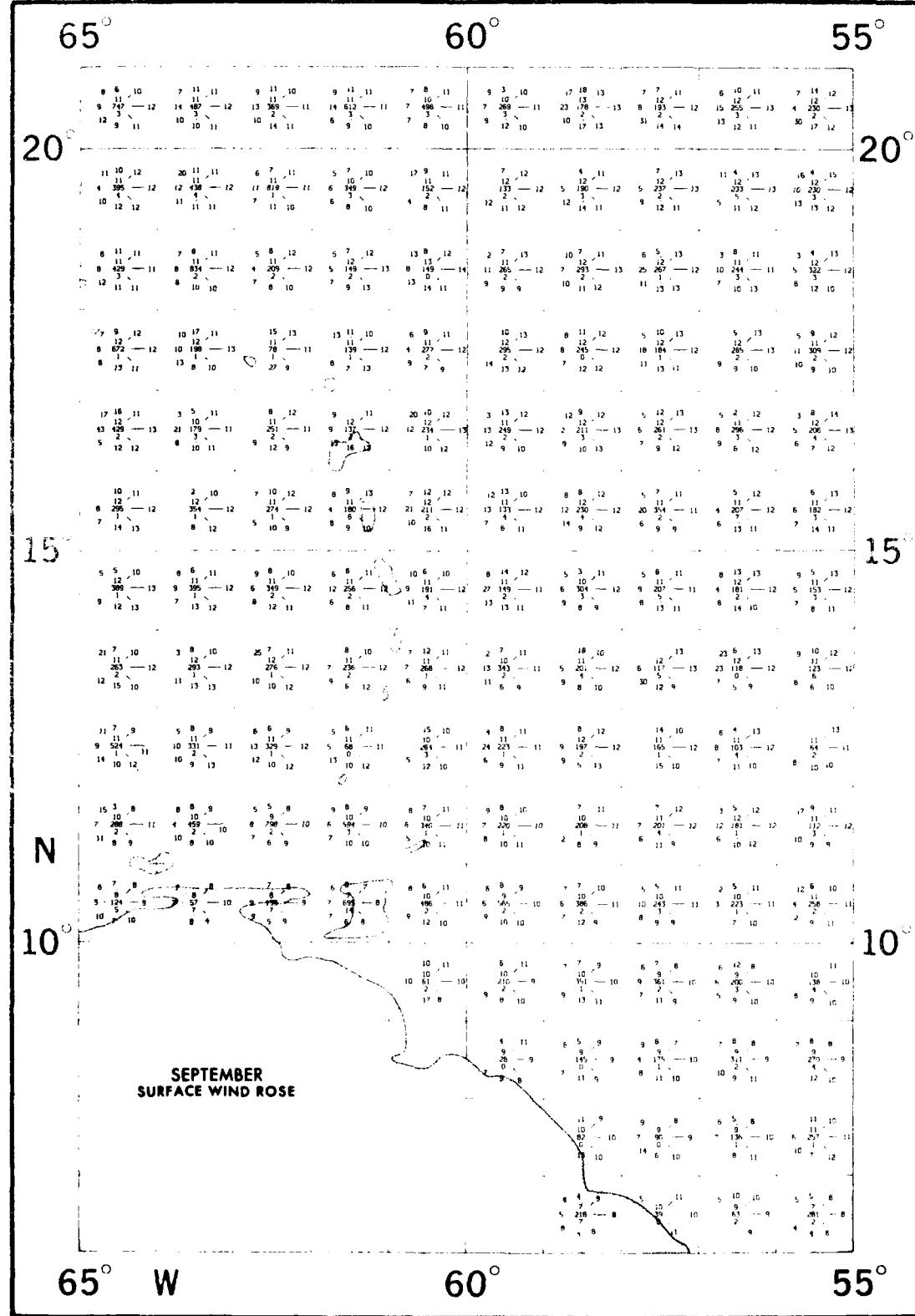


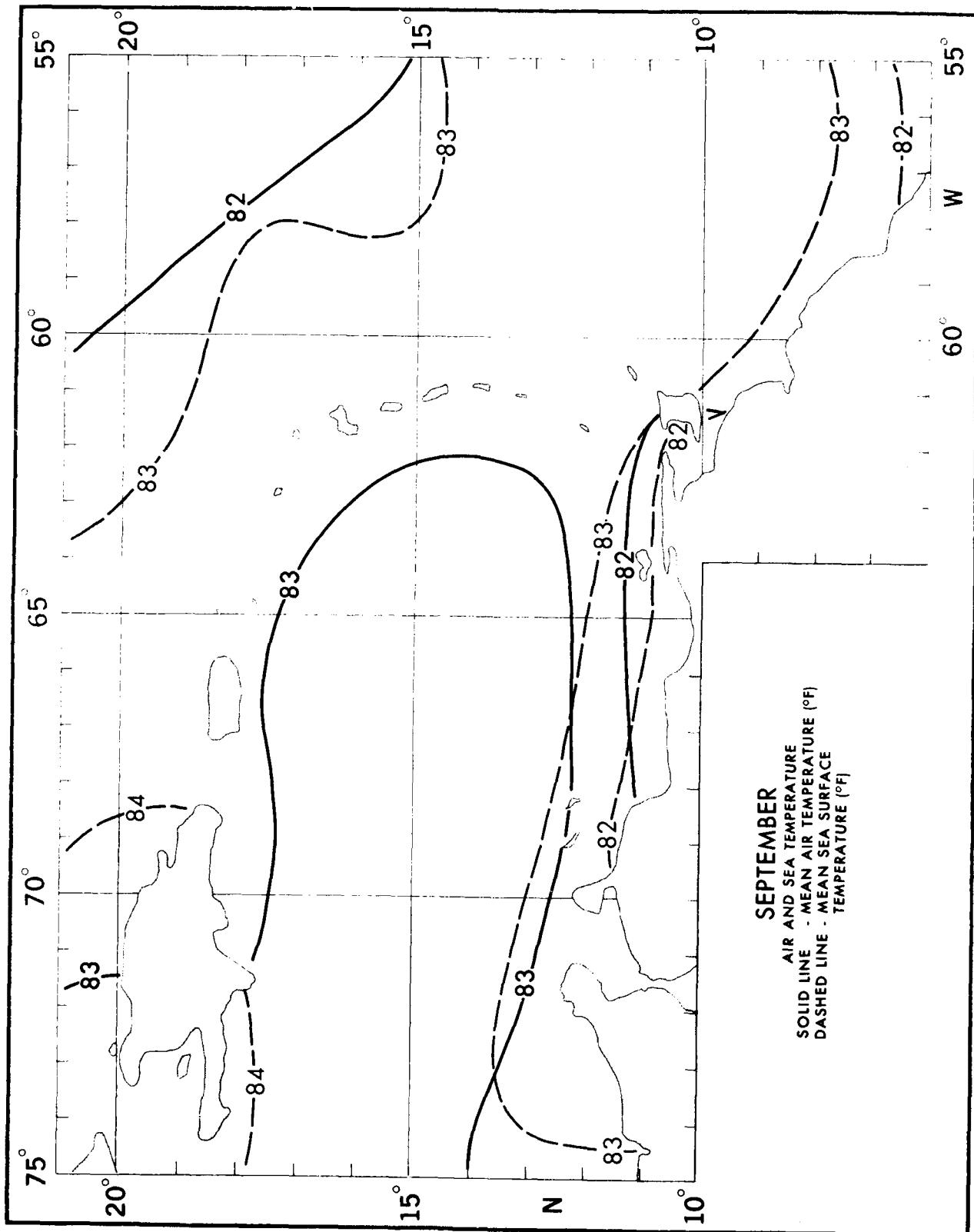


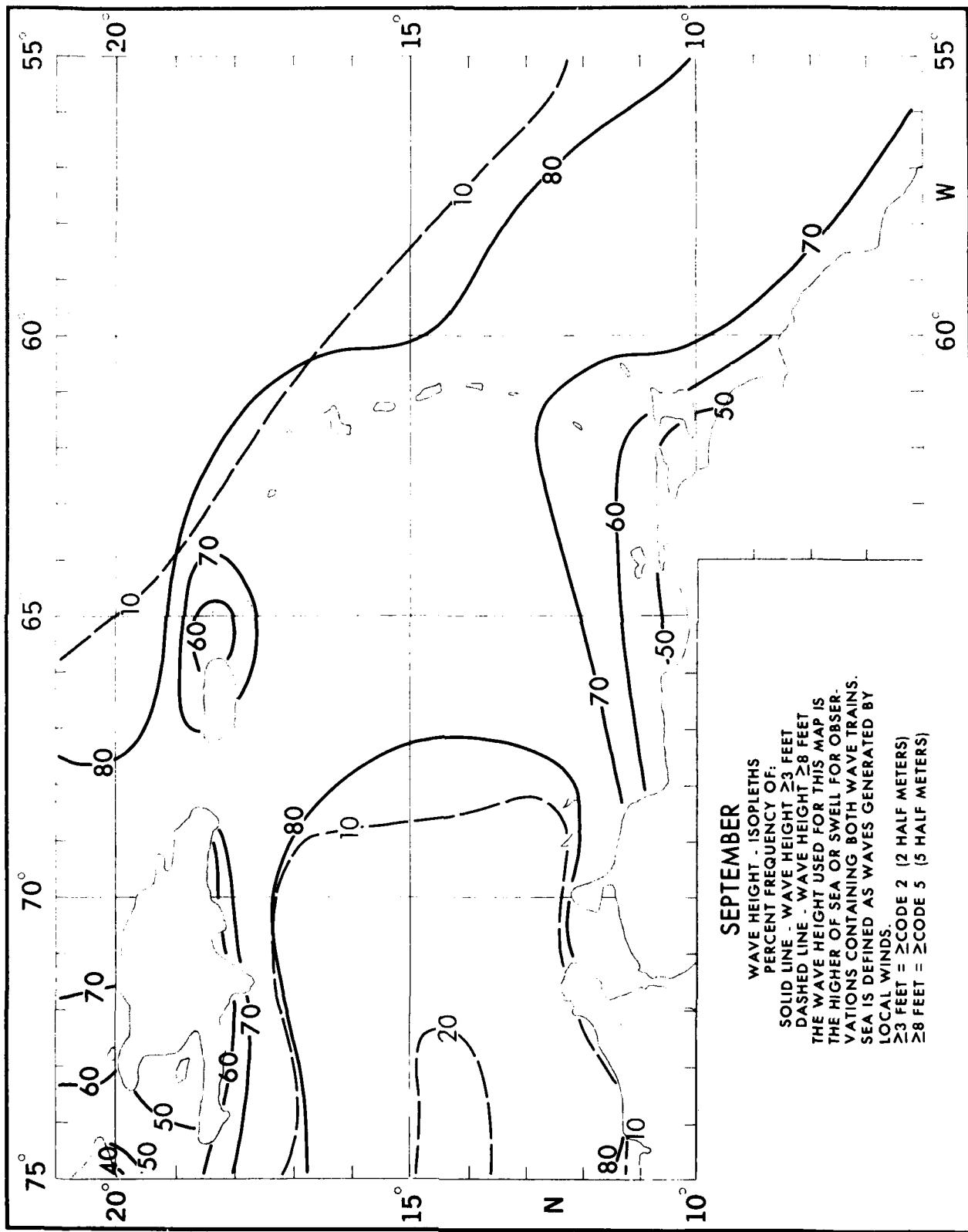












75°

70°

65°

20°

20°

15°

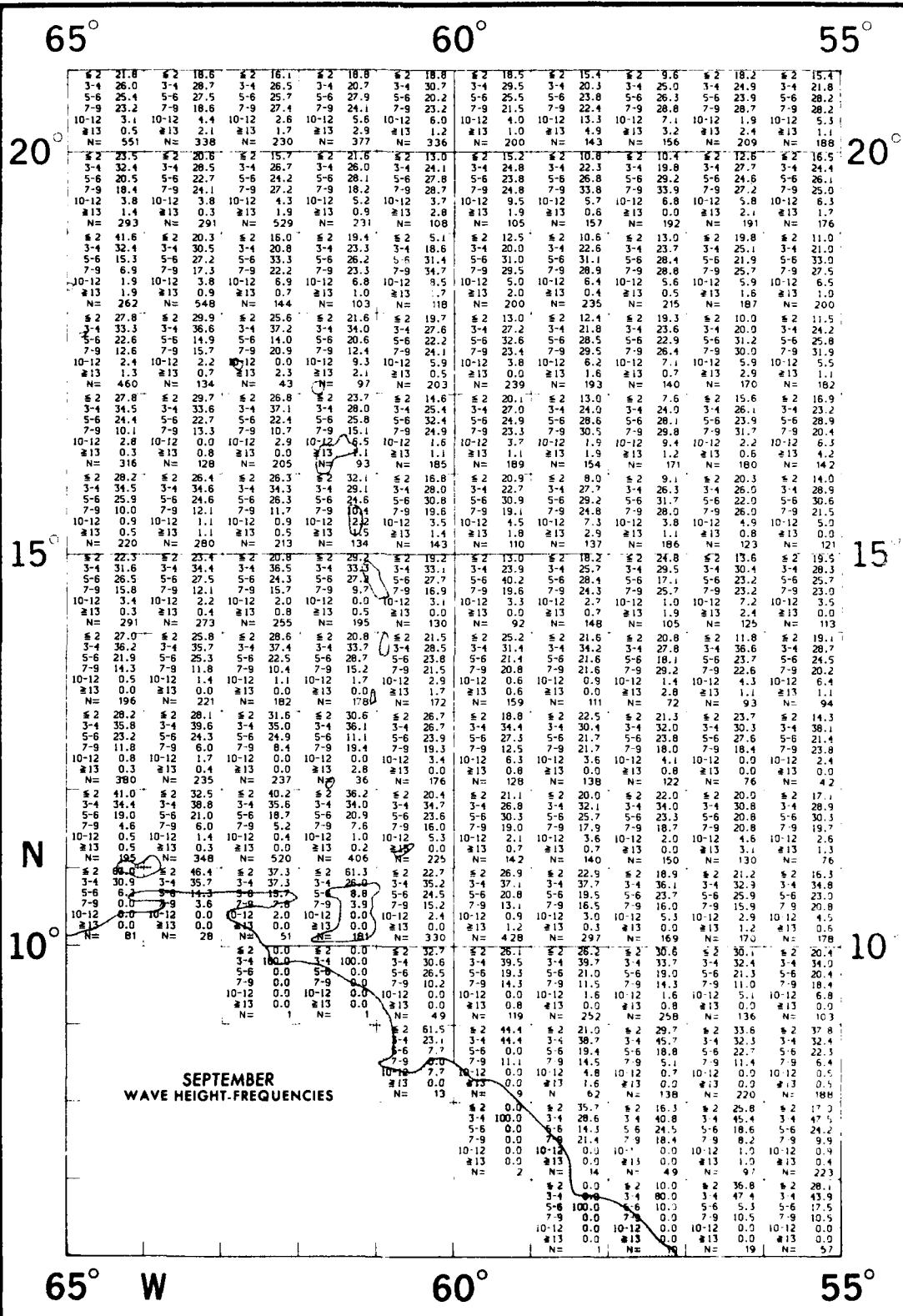
15°

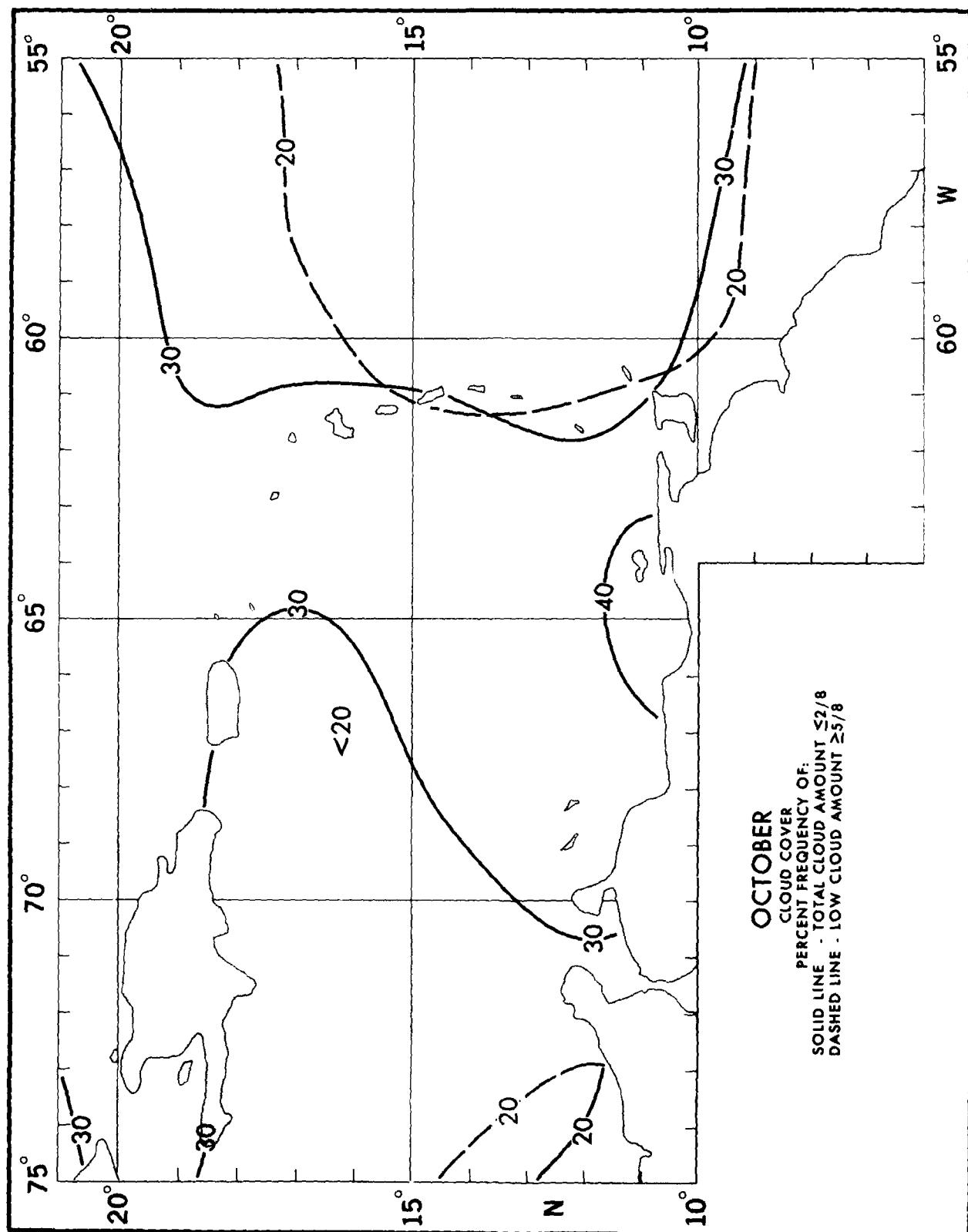
10°

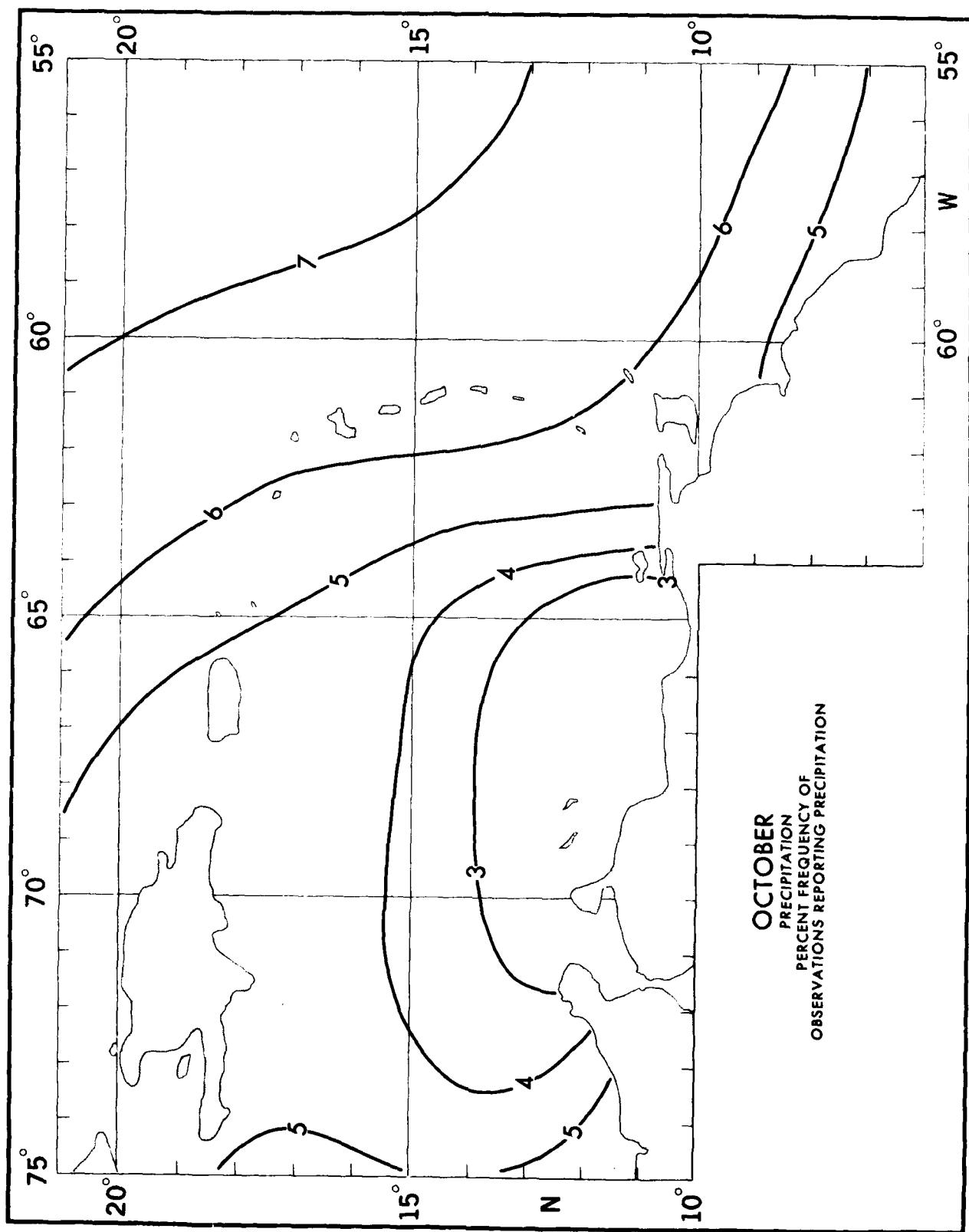
10°

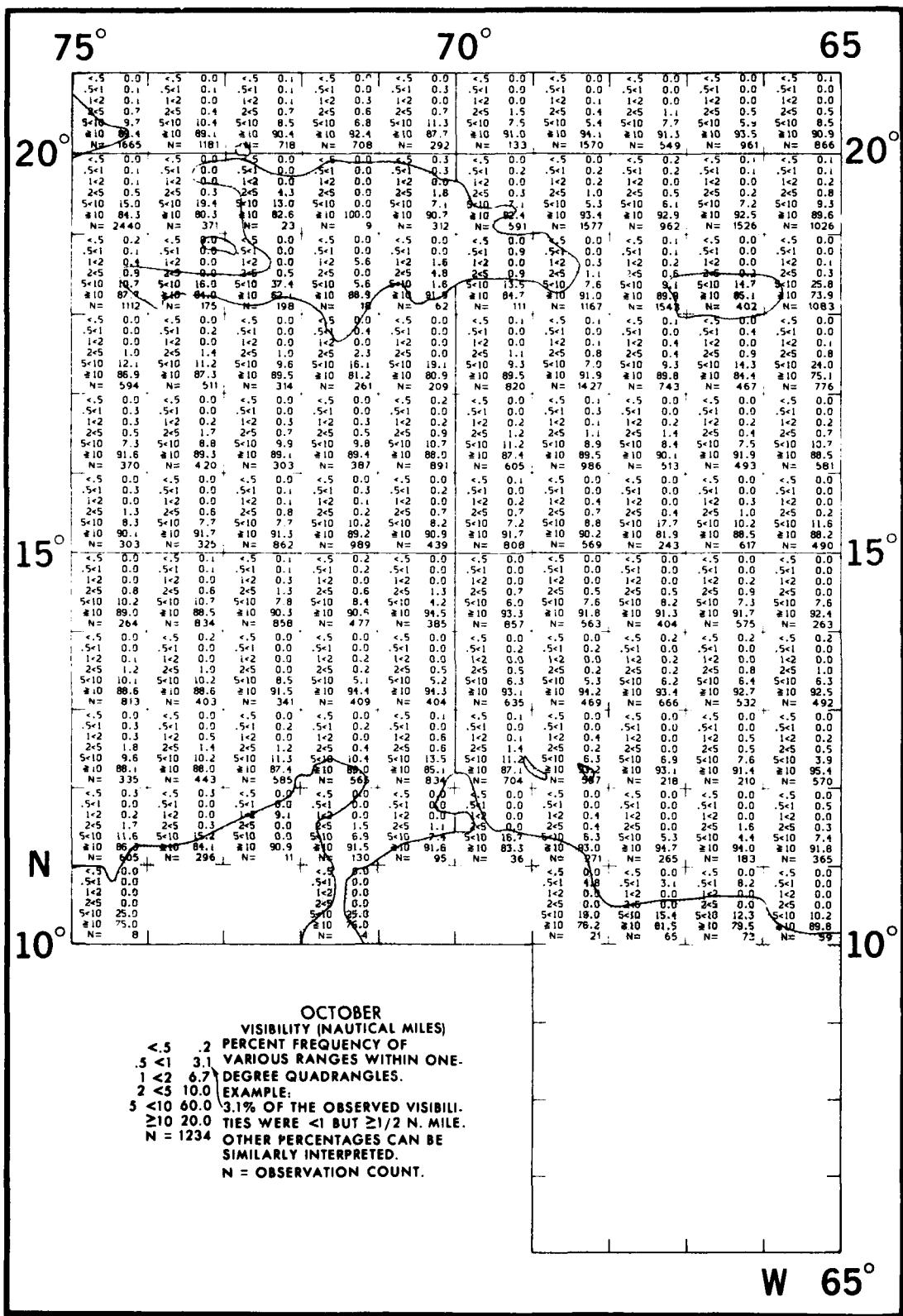
W 65°

≤ 2	42.4	≤ 2	34.9	≤ 2	34.7	≤ 2	23.0	≤ 2	25.9	≤ 2	19.6	≤ 2	21.1	≤ 2	18.3	≤ 2	19.0	≤ 2	18.8
3-4	31.6	3-4	31.0	3-4	31.5	3-4	36.8	3-4	35.3	3-4	30.8	3-4	31.7	3-4	35.8	3-4	35.3	3-4	27.3
5-6	17.1	5-6	20.4	5-6	21.1	5-6	24.0	5-6	24.8	5-6	29.9	5-6	28.5	5-6	25.5	5-6	26.1	5-6	31.4
7-8	7.8	7-9	11.2	7-9	10.5	7-9	14.3	7-9	11.5	7-9	16.8	7-9	15.7	7-9	17.9	7-9	15.3	7-9	15.7
10-12	0.9	10-12	2.4	10-12	1.4	10-12	1.6	10-12	1.7	10-12	2.8	10-12	2.4	10-12	1.9	10-12	3.3	10-12	4.6
213	0.2	213	0.1	213	0.8	213	0.2	213	0.7	213	0.0	213	0.6	213	0.6	213	1.0	213	2.1
N =	1289	N =	917	N =	622	N =	608	N =	286	N =	107	N =	1270	N =	475	N =	811	N =	605
≤ 2	49.8	≤ 2	53.4	≤ 2	50.0	≤ 2	53.1	≤ 2	52.7	≤ 2	24.8	≤ 2	22.3	≤ 2	19.2	≤ 2	16.5	≤ 2	23.0
3-4	28.6	3-4	28.4	3-4	31.1	3-4	33.3	3-4	33.6	3-4	33.5	3-4	36.0	3-4	32.6	3-4	32.2	3-4	36.5
5-6	13.4	5-6	19.2	5-6	8.3	5-6	6.7	5-6	28.2	5-6	25.2	5-6	25.3	5-6	25.5	5-6	27.3	5-6	21.2
7-9	6.2	7-9	5.9	7-9	4.2	7-9	6.7	7-9	9.5	7-9	14.6	7-9	14.1	7-9	19.2	7-9	19.8	7-9	15.6
10-12	1.4	10-12	1.7	10-12	4.2	10-12	0.0	10-12	2.1	10-12	1.3	10-12	1.9	10-12	2.8	10-12	3.1	10-12	2.8
213	0.6	213	0.4	213	0.0	213	0.0	213	0.8	213	0.7	213	0.4	213	0.7	213	1.0	213	0.9
N =	1730	N =	236	N =	24	N =	15	N =	241	N =	1318	N =	813	N =	1131	N =	808	N =	808
≤ 2	41.3	≤ 2	53.1	≤ 2	47.4	≤ 2	100.0	≤ 2	21.1	≤ 2	39.2	≤ 2	26.0	≤ 2	27.3	≤ 2	36.8	≤ 2	45.5
3-4	30.5	3-4	26.5	3-4	10.5	3-4	34.0	3-4	47.4	3-4	36.2	3-4	35.0	3-4	34.2	3-4	30.3	3-4	39.3
5-6	17.6	5-6	10.2	5-6	26.3	5-6	0.0	5-6	5.3	5-6	10.8	5-6	23.3	5-6	21.2	5-6	18.0	5-6	9.0
7-9	9.0	7-9	10.2	7-9	7.9	7-9	26.3	7-9	8.8	7-9	12.3	7-9	14.2	7-9	14.4	7-9	5.1	7-9	5.1
10-12	4.3	10-12	0.0	10-12	0.0	10-12	0.0	10-12	2.0	10-12	2.7	10-12	2.4	10-12	1.2	10-12	0.5	10-12	0.5
213	0.4	213	0.0	213	0.0	213	0.0	213	0.0	213	1.0	213	0.8	213	0.7	213	0.3	213	0.6
N =	892	N =	49	N =	19	N =	19	N =	102	N =	928	N =	1209	N =	323	N =	882	N =	882
≤ 2	24.3	≤ 2	21.2	≤ 2	21.4	≤ 2	15.2	≤ 2	18.2	≤ 2	20.9	≤ 2	23.5	≤ 2	28.4	≤ 2	21.1	≤ 2	35.7
3-4	31.2	3-4	32.6	3-4	32.1	3-4	33.0	3-4	30.3	3-4	27.8	3-4	34.5	3-4	32.6	3-4	35.9	3-4	37.6
5-6	21.0	5-6	23.0	5-6	21.0	5-6	22.7	5-6	31.5	5-6	26.7	5-6	24.3	5-6	21.2	5-6	23.7	5-6	16.3
7-9	20.6	7-9	20.2	7-9	23.9	7-9	22.7	7-9	15.2	7-9	20.1	7-9	15.2	7-9	14.5	7-9	13.7	7-9	9.1
10-12	2.0	10-12	2.5	10-12	0.9	10-12	5.1	10-12	3.0	10-12	2.5	10-12	2.0	10-12	2.1	10-12	1.0	10-12	1.0
213	0.9	213	0.5	213	1.3	213	0.6	213	1.8	213	2.2	213	0.5	213	0.3	213	0.2	213	0.2
N =	461	N =	405	N =	24	N =	176	N =	165	N =	604	N =	1128	N =	580	N =	329	N =	582
≤ 2	17.3	≤ 2	15.2	≤ 2	18.4	≤ 2	10.1	≤ 2	11.6	≤ 2	15.0	≤ 2	18.9	≤ 2	24.6	≤ 2	21.7	≤ 2	19.3
3-4	31.3	3-4	24.4	3-4	25.0	3-4	24.5	3-4	28.1	3-4	30.0	3-4	35.1	3-4	37.6	3-4	36.1	3-4	34.7
5-6	26.6	5-6	33.4	5-6	26.8	5-6	25.6	5-6	26.8	5-6	28.7	5-6	25.2	5-6	24.6	5-6	23.6	5-6	26.6
7-9	19.9	7-9	23.9	7-9	31.0	7-9	25.9	7-9	23.0	7-9	18.2	7-9	17.9	7-9	16.1	7-9	16.2	7-9	16.2
10-12	3.5	10-12	2.8	10-12	3.5	10-12	7.6	10-12	5.6	10-12	2.9	10-12	1.7	10-12	3.6	10-12	1.9	10-12	2.3
213	1.5	213	0.3	213	0.4	213	1.1	213	1.1	213	0.4	213	0.8	213	0.0	213	0.3	213	0.8
N =	342	N =	356	N =	28	N =	277	N =	637	N =	453	N =	709	N =	362	N =	368	N =	383
≤ 2	16.4	≤ 2	12.2	≤ 2	12.6	≤ 2	9.4	≤ 2	12.9	≤ 2	19.0	≤ 2	16.8	≤ 2	19.8	≤ 2	20.4	≤ 2	22.1
3-4	30.0	3-4	23.4	3-4	34.2	3-4	23.2	3-4	23.2	3-4	31.1	3-4	32.5	3-4	34.7	3-4	35.4	3-4	36.2
5-6	22.3	5-6	25.1	5-6	24.7	5-6	23.4	5-6	29.6	5-6	28.3	5-6	30.7	5-6	31.0	5-6	24.6	5-6	24.6
7-9	22.6	7-9	34.2	7-9	29.6	7-9	29.5	7-9	26.6	7-9	17.4	7-9	16.5	7-9	17.4	7-9	14.0	7-9	14.2
10-12	5.9	10-12	4.7	10-12	6.5	10-12	7.1	10-12	5.1	10-12	4.3	10-12	2.6	10-12	2.3	10-12	1.6	10-12	1.5
213	1.7	213	1.9	213	1.6	213	1.3	213	0.3	213	0.2	213	0.8	213	1.2	213	0.2	213	0.3
N =	287	N =	319	N =	680	N =	775	N =	350	N =	605	N =	388	N =	172	N =	436	N =	331
≤ 2	12.9	≤ 2	11.4	≤ 2	8.1	≤ 2	14.5	≤ 2	14.6	≤ 2	16.2	≤ 2	17.0	≤ 2	17.2	≤ 2	24.1	≤ 2	23.6
3-4	29.7	3-4	19.4	3-4	22.5	3-4	23.2	3-4	23.4	3-4	31.1	3-4	32.5	3-4	34.7	3-4	35.4	3-4	36.2
5-6	23.3	5-6	25.1	5-6	24.7	5-6	23.4	5-6	29.6	5-6	28.3	5-6	30.7	5-6	31.0	5-6	24.6	5-6	24.6
7-9	19.3	7-9	29.9	7-9	34.6	7-9	32.6	7-9	22.7	7-9	20.5	7-9	20.1	7-9	13.2	7-9	13.6	7-9	13.6
10-12	11.9	10-12	11.7	10-12	7.5	10-12	4.7	10-12	2.0	10-12	3.4	10-12	2.8	10-12	3.3	10-12	2.1	10-12	1.5
213	3.0	213	1.7	213	1.4	213	1.3	213	1.6	213	0.5	213	0.9	213	0.7	213	0.3	213	0.5
N =	202	N =	669	N =	679	N =	380	N =	304	N =	760	N =	452	N =	303	N =	390	N =	199
≤ 2	11.9	≤ 2	12.2	≤ 2	15.3	≤ 2	8.0	≤ 2	12.9	≤ 2	10.9	≤ 2	18.8	≤ 2	21.6	≤ 2	25.5	≤ 2	26.3
3-4	21.1	3-4	22.1	3-4	23.0	3-4	23.2	3-4	27.1	3-4	30.1	3-4	32.6	3-4	35.5	3-4	33.0	3-4	36.8
5-6	22.7	5-6	25.2	5-6	26.5	5-6	32.4	5-6	24.9	5-6	28.8	5-6	25.5	5-6	23.7	5-6	26.0	5-6	23.0
7-9	31.6	7-9	26.6	7-9	27.2	7-9	29.8	7-9	25.5	7-9	24.9	7-9	24.6	7-9	16.2	7-9	13.4	7-9	11.6
10-12	9.4	10-12	10.2	10-12	6.6	10-12	4.2	10-12	8.3	10-12	4.9	10-12	2.2	10-12	2.7	10-12	2.1	10-12	1.7
213	3.3	213	1.7	213	1.4	213	1.3	213	1.3	213	0.4	213	0.3	213	0.4	213	0.0	213	0.6
N =	598	N =	294	N =	287	N =	336	N =	373	N =	531	N =	325	N =	482	N =	470	N =	361
≤ 2	17.5	≤ 2	17.5	≤ 2	16.2	≤ 2	14.0	≤ 2	17.8	≤ 2	14.1	≤ 2	15.9	≤ 2	23.6	≤ 2	28.6	≤ 2	28.6
3-4	24.1	3-4	28.5	3-4	31.6	3-4	29.0	3-4	31.4	3-4	26.7	3-4	32.3	3-4	34.0	3-4	34.7	3-4	38.7
5-6	27.6	5-6	23.5	5-6	26.0	5-6	25.6	5-6	27.2	5-6	26.7	5-6	27.0	5-6	29.9	5-6	27.8	5-6	20.6
7-9	20.6	7-9	26.8	7-9	20.2	7-9	21.0	7-9	23.9	7-9	20.6	7-9	22.4	7-9	18.9	7-9	12.5	7-9	11.2
10-12	7.9	10-12	6.0	10-12	3.9	10-12	0.0	10-12	3.0	10-12	3.8	10-12	4.2	10-12	1.5	10-12	2.0	10-12	0.6
213	2.2	213	1.1	213	0.8	213	0.8	213	0.5	213	0.5	213	0.5	213	1.1	213	0.2	213	0.2
N =	228	N =	319	N =	36	N =	59	N =											









OCTOBER

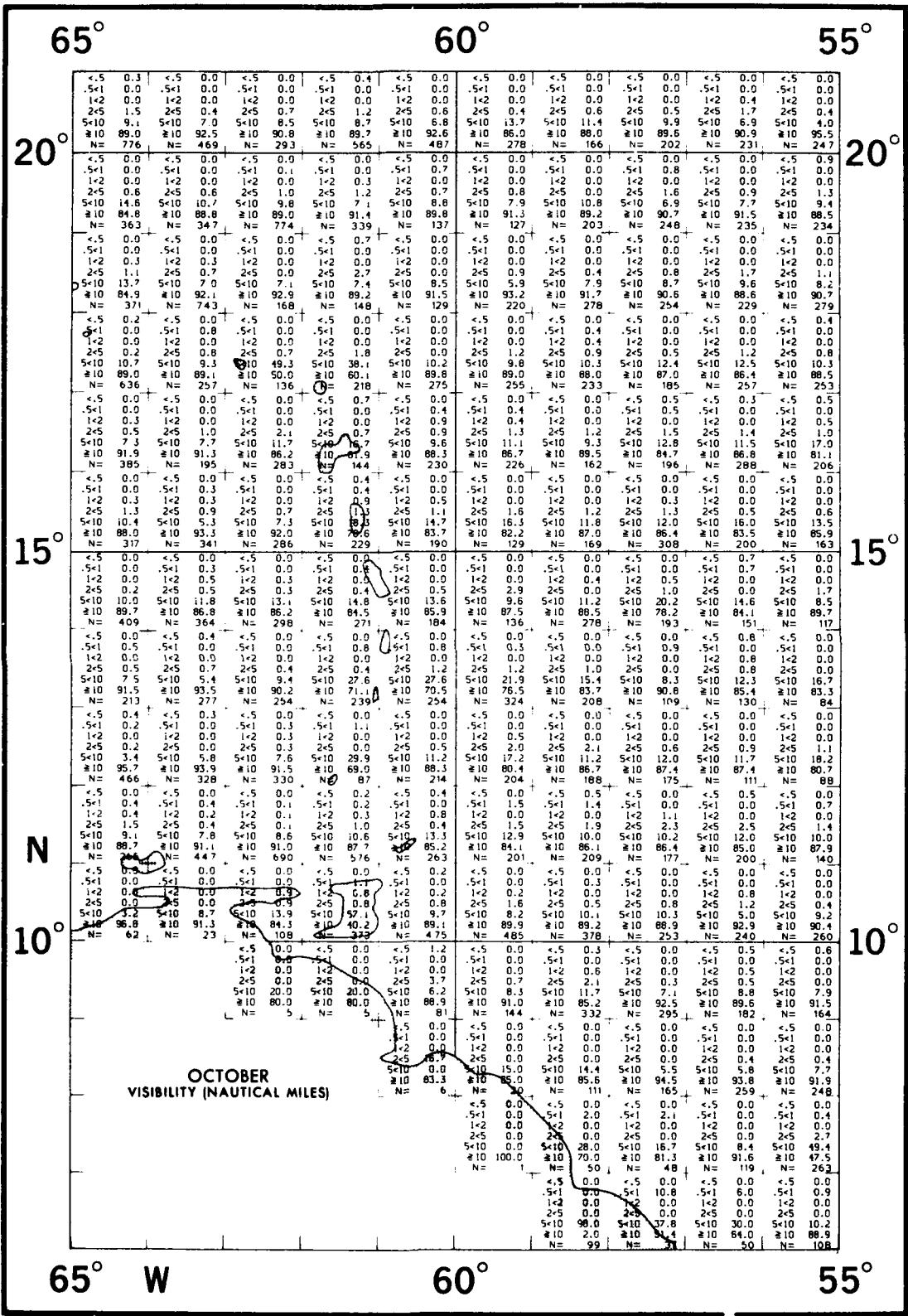
VISIBILITY (NAUTICAL MILES)

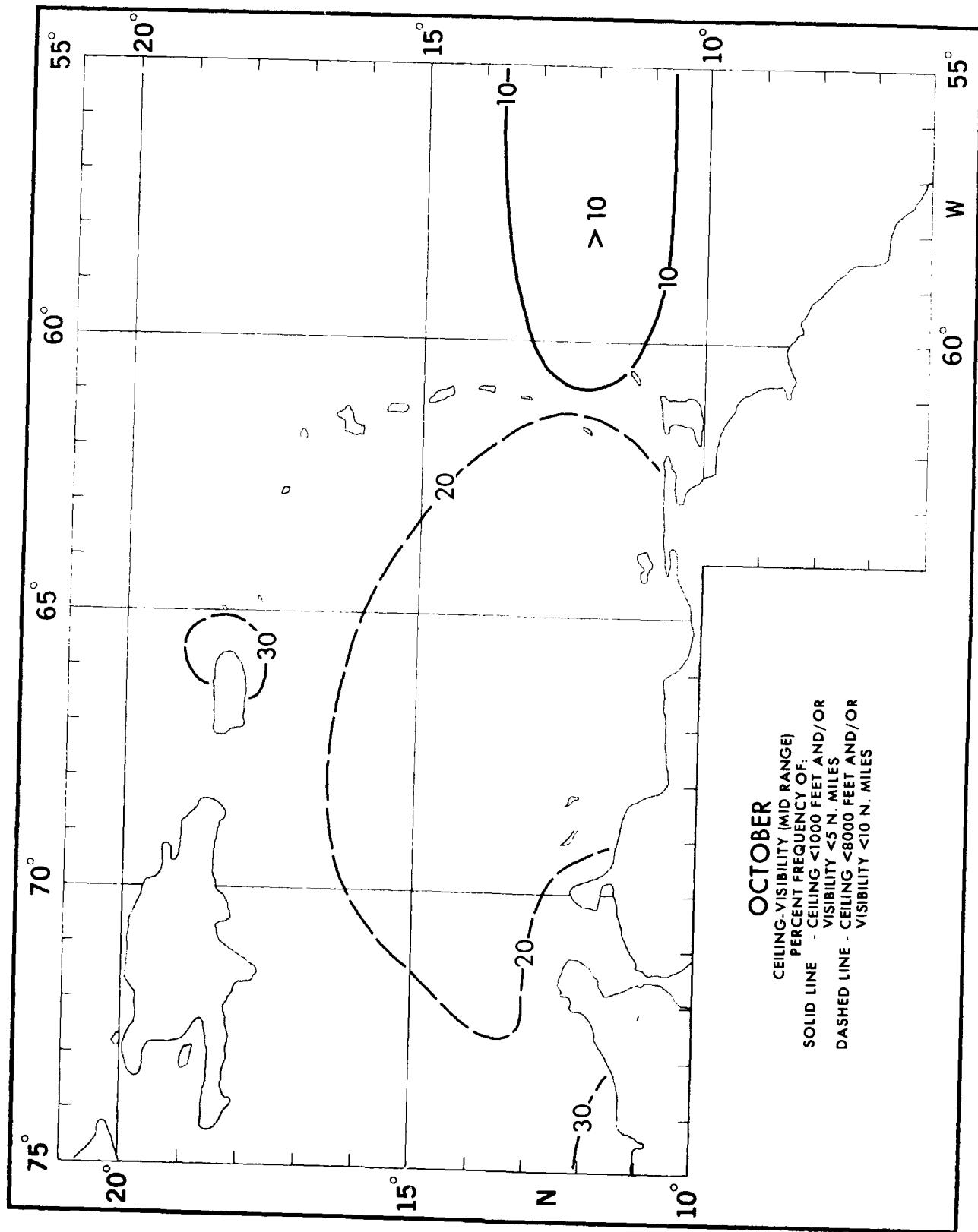
**.5 .2 PERCENT FREQUENCY OF
.5 <1 3.1 VARIOUS RANGES WITHIN ONE-
1-12 4.7 DEGREE QUADRANGLES**

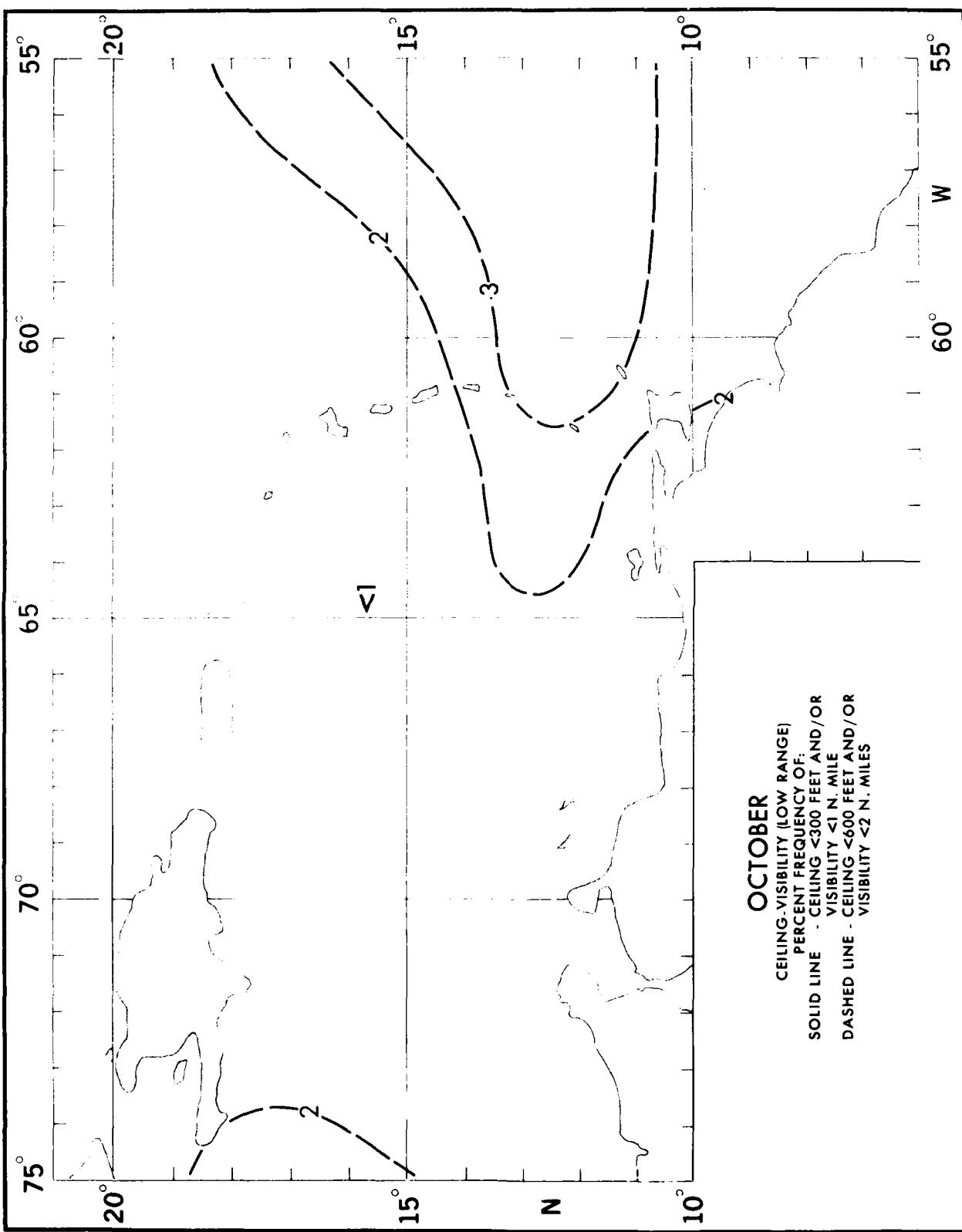
1 <2 6.7 DEGREE Q
2 <5 10.0 EXAMPLE

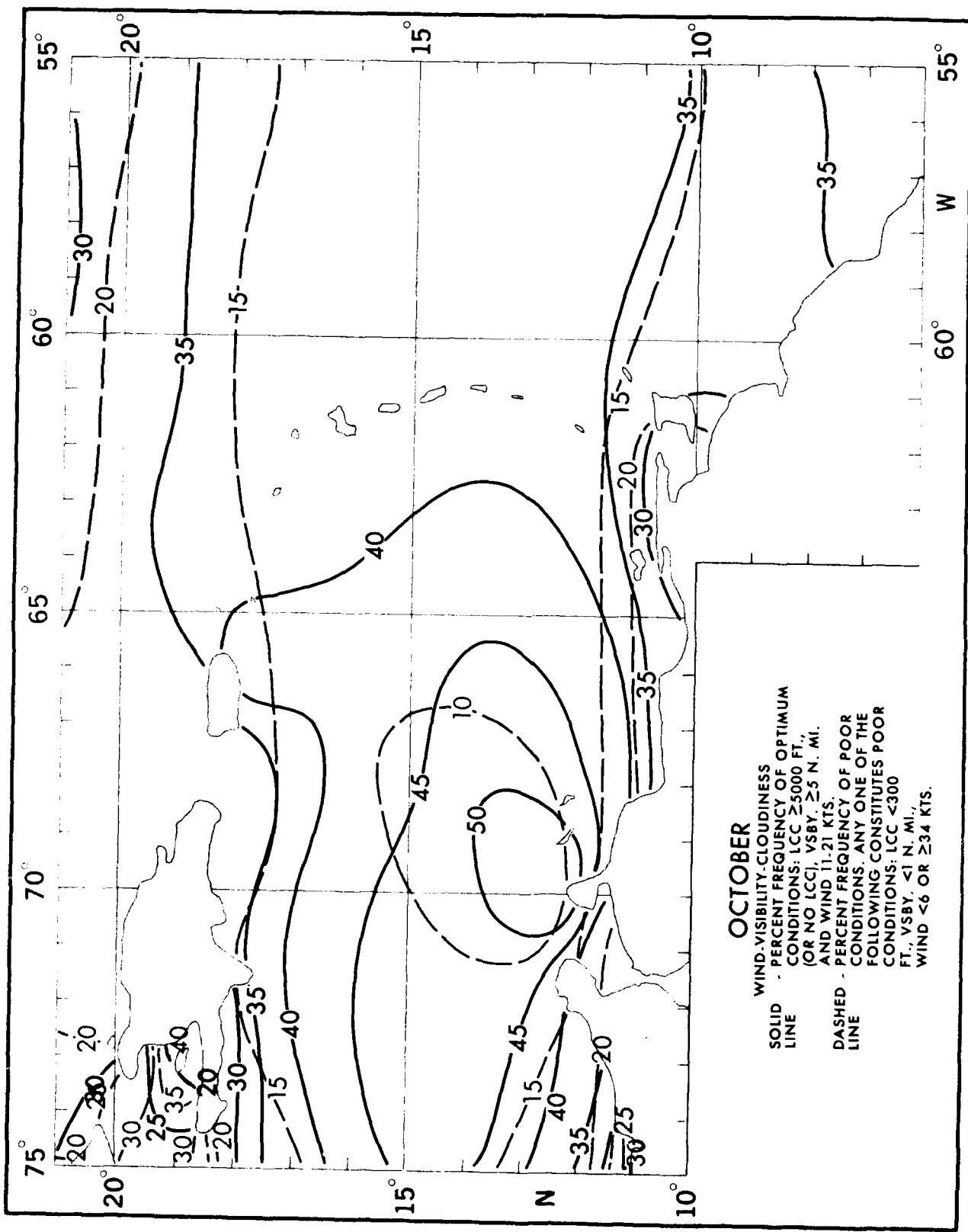
EXAMPLE:
3.1% OF THE OBSERVED VISIBILITY
TIES WERE <1 BUT \geq 1/2 N MILE

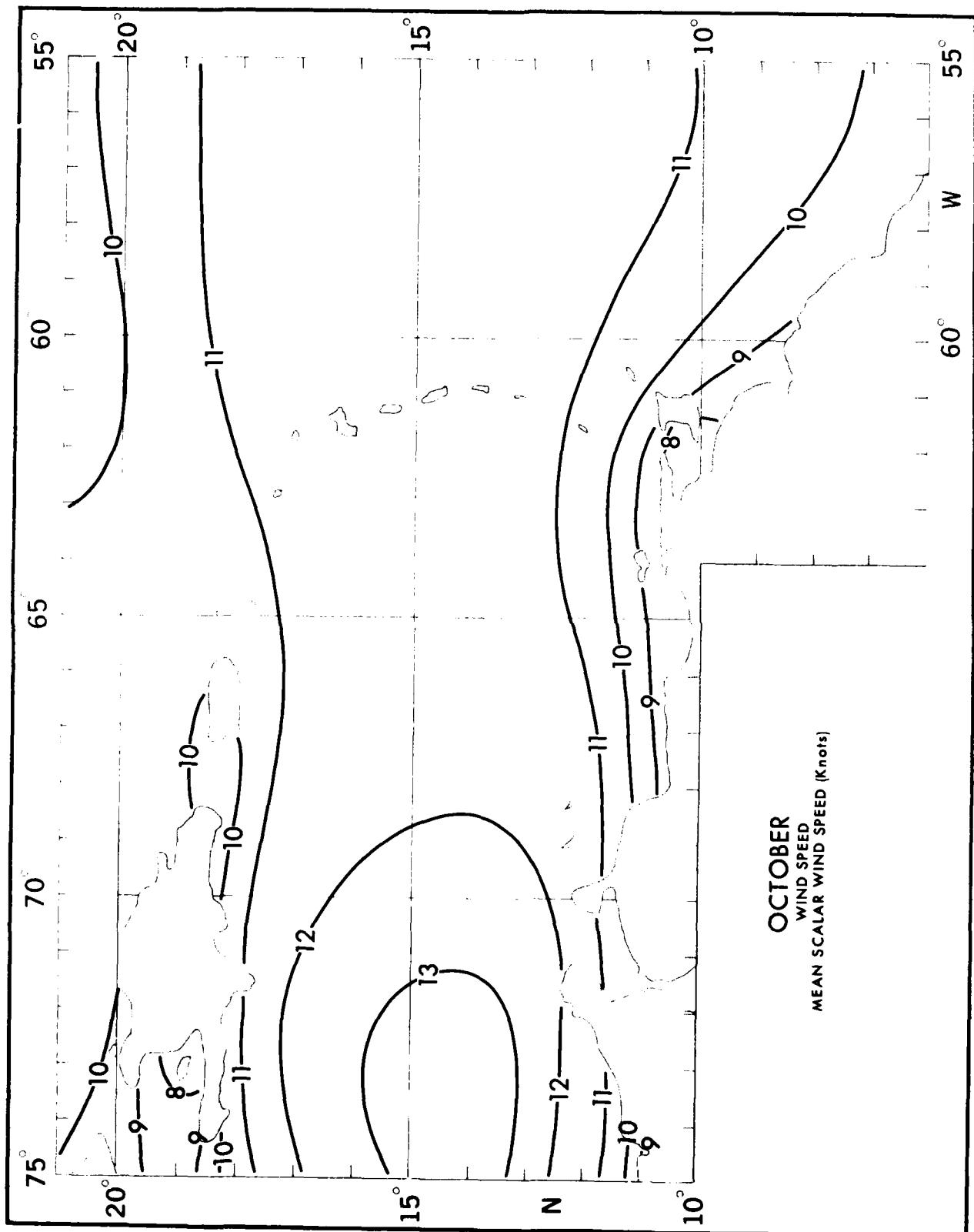
OTHER PERCENTAGES CAN

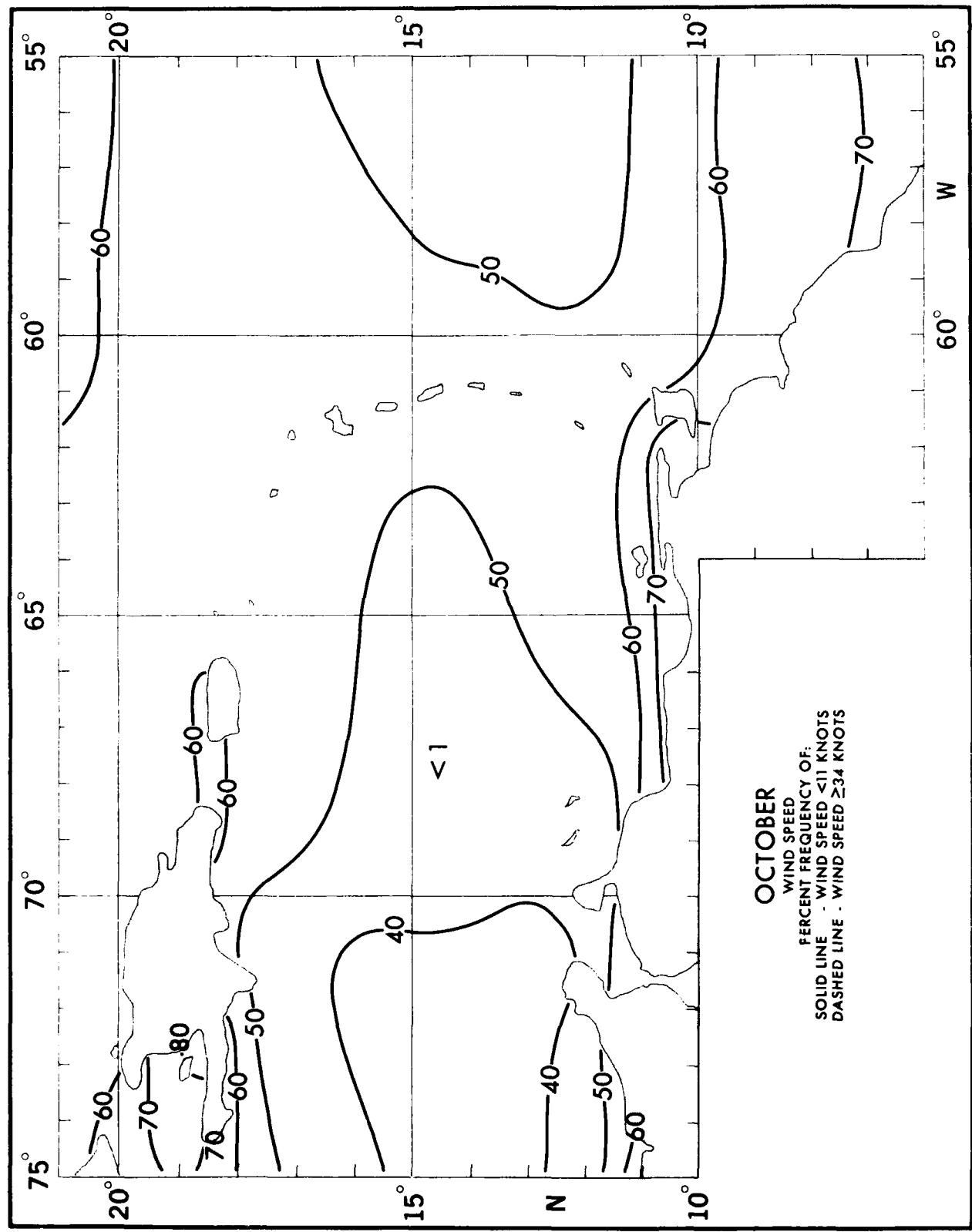


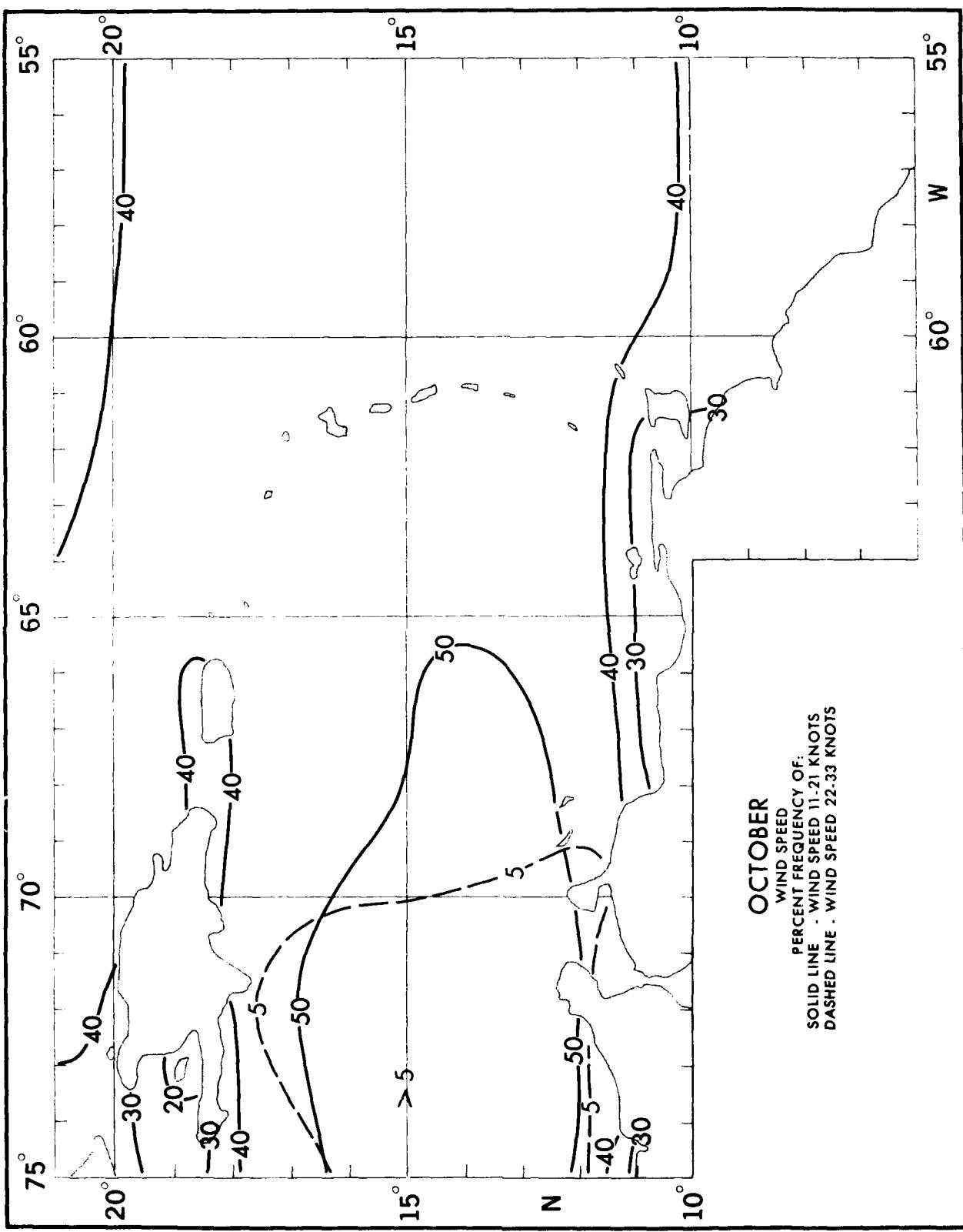


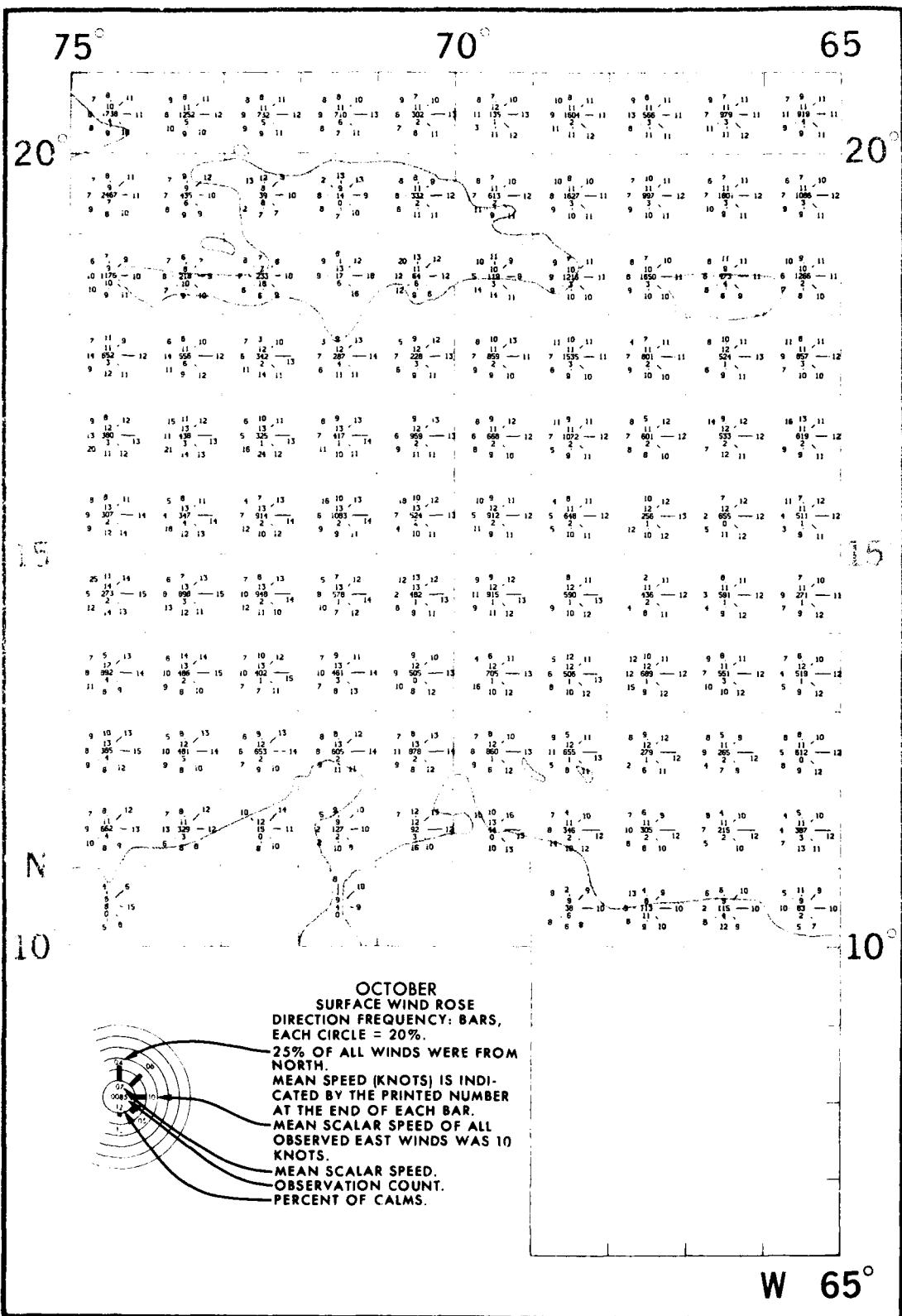


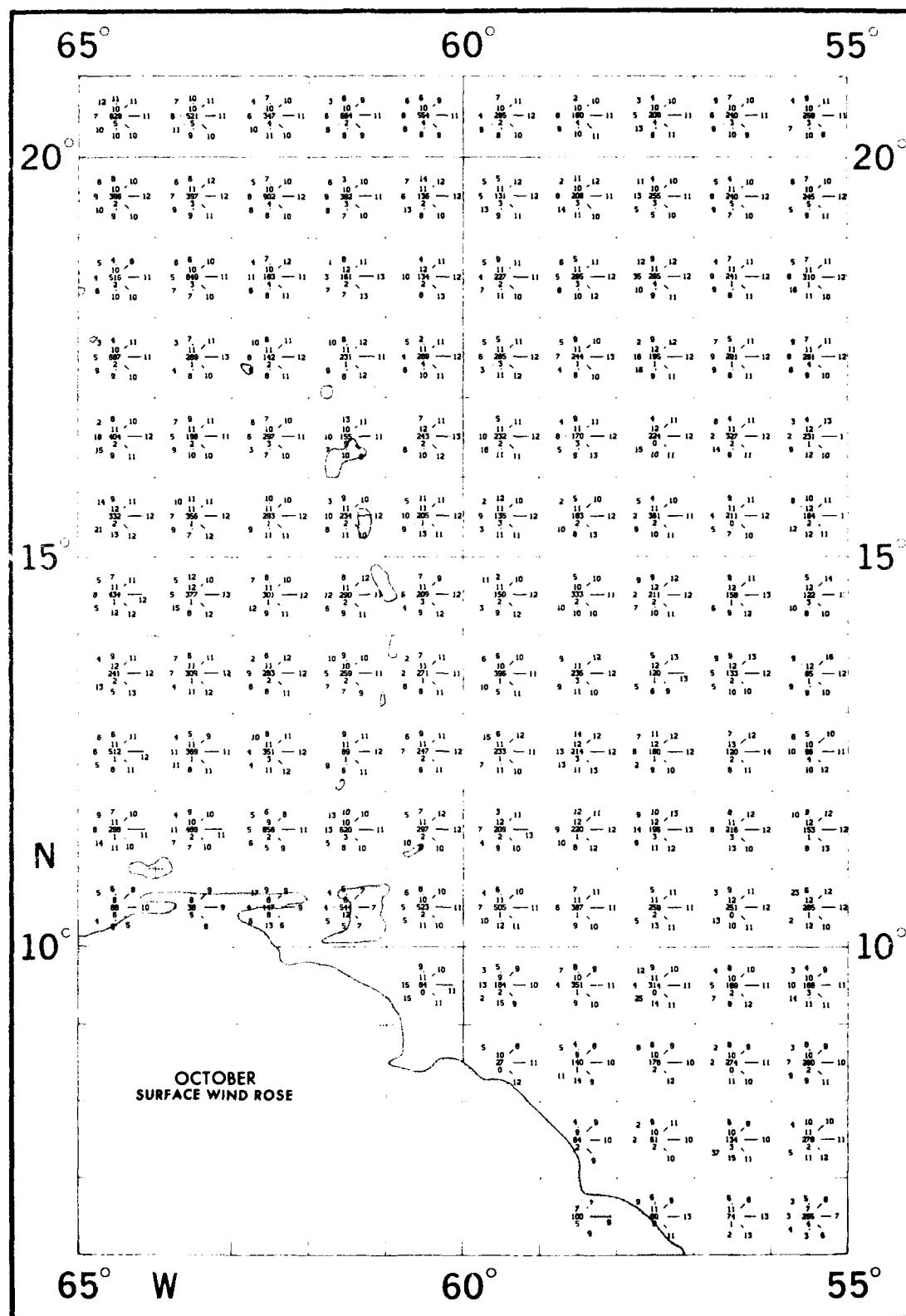


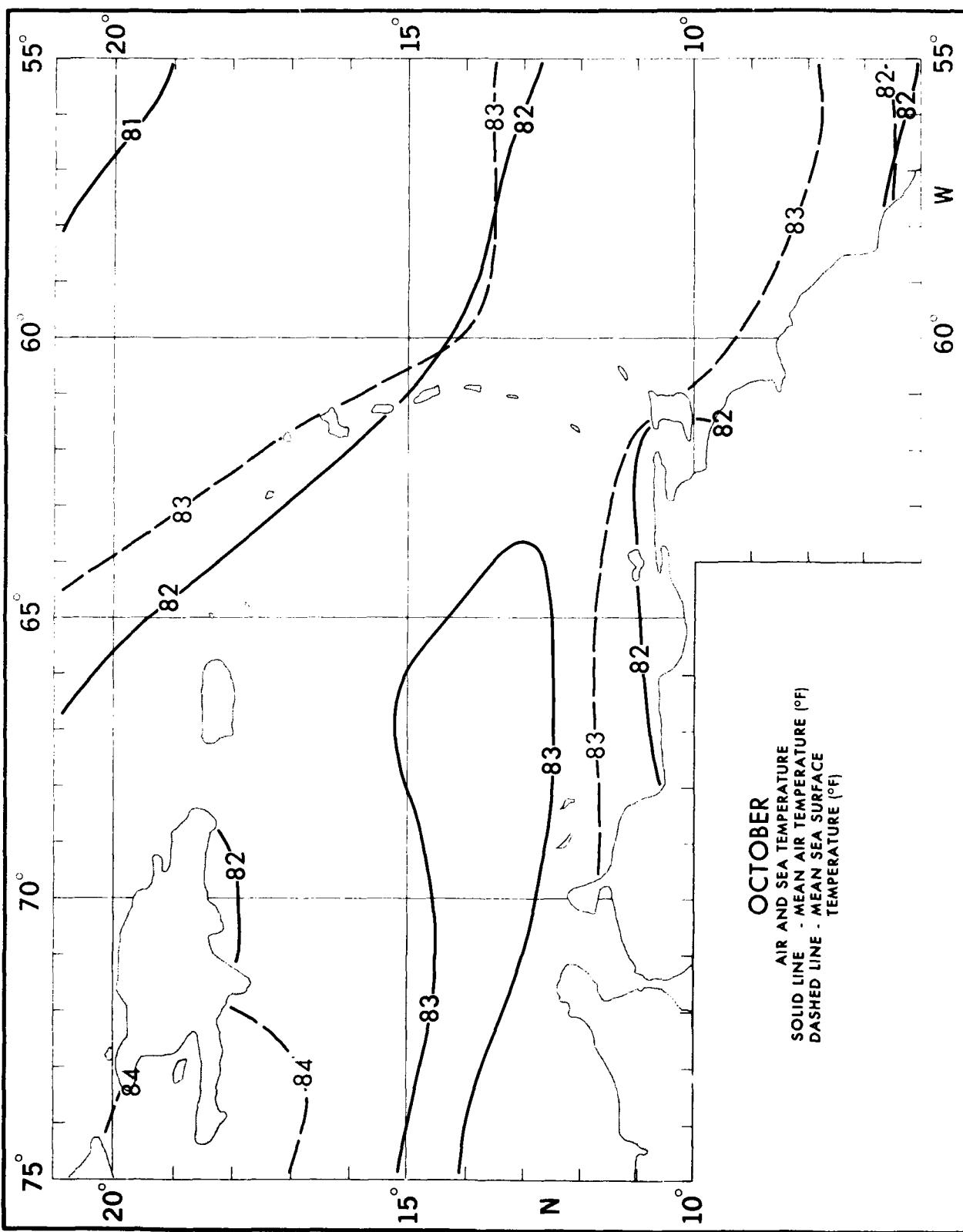


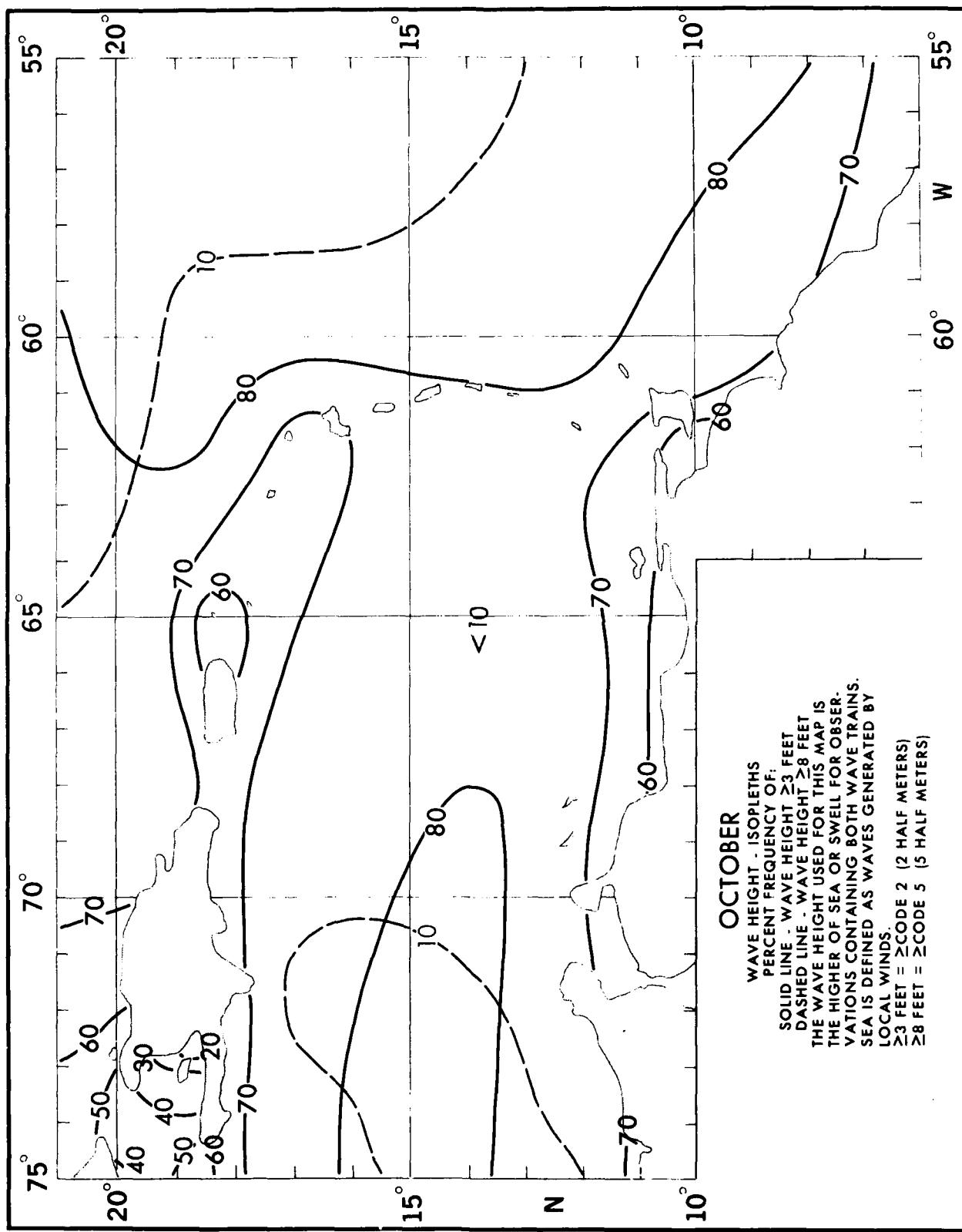


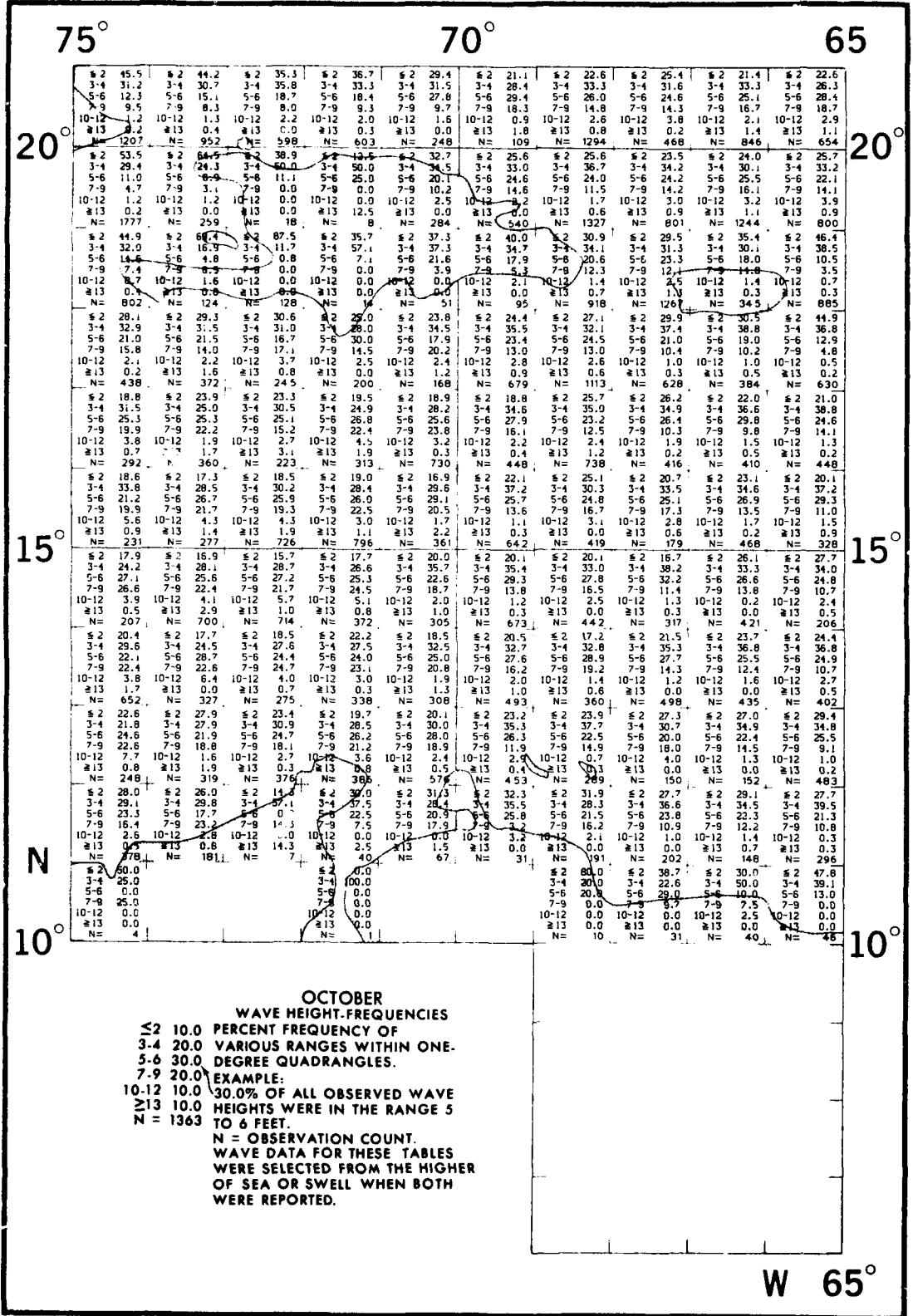












65°

60°

55°

20°

20°

15°

15°

10°

10°

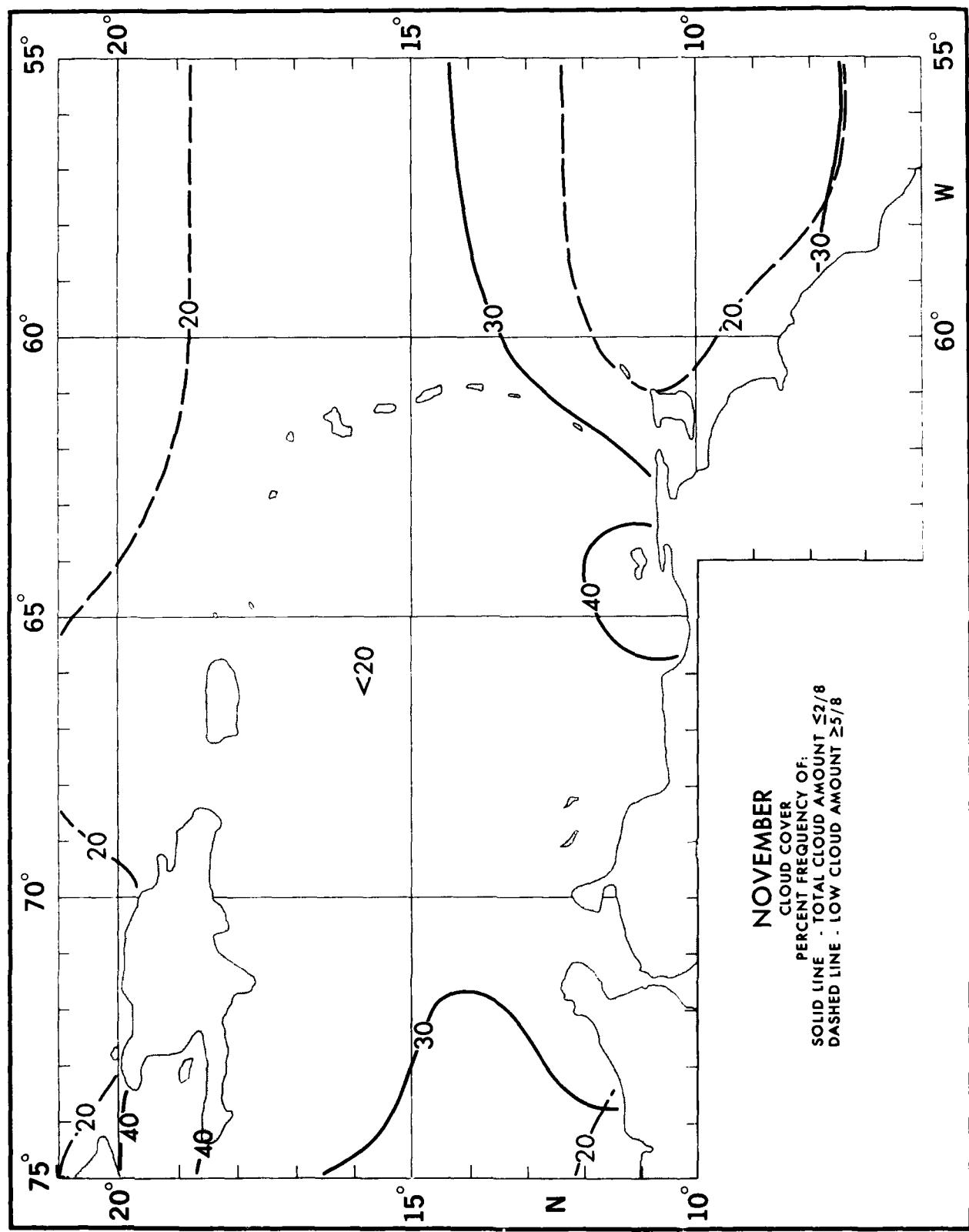
N

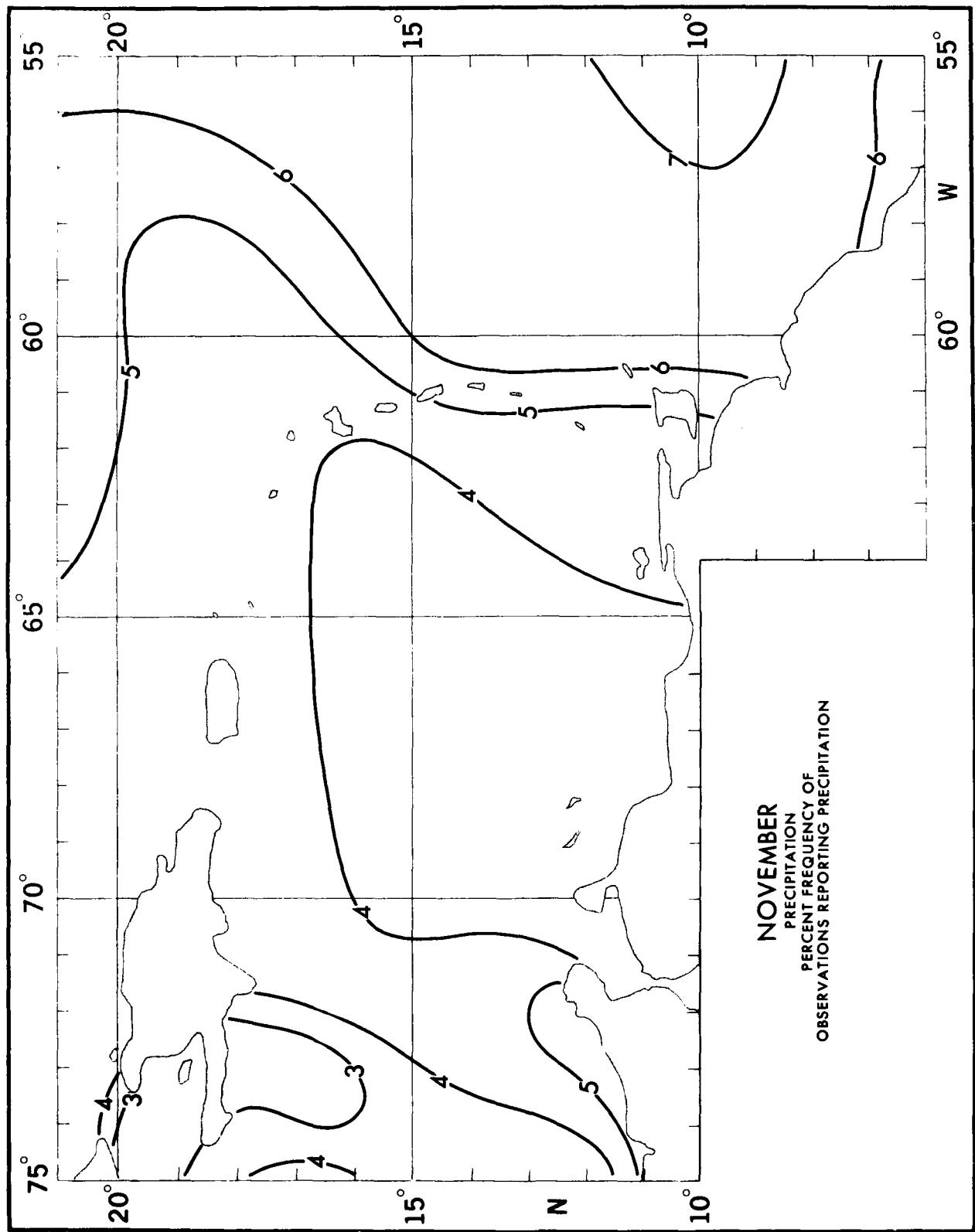
OCTOBER
WAVE HEIGHT-FREQUENCIES

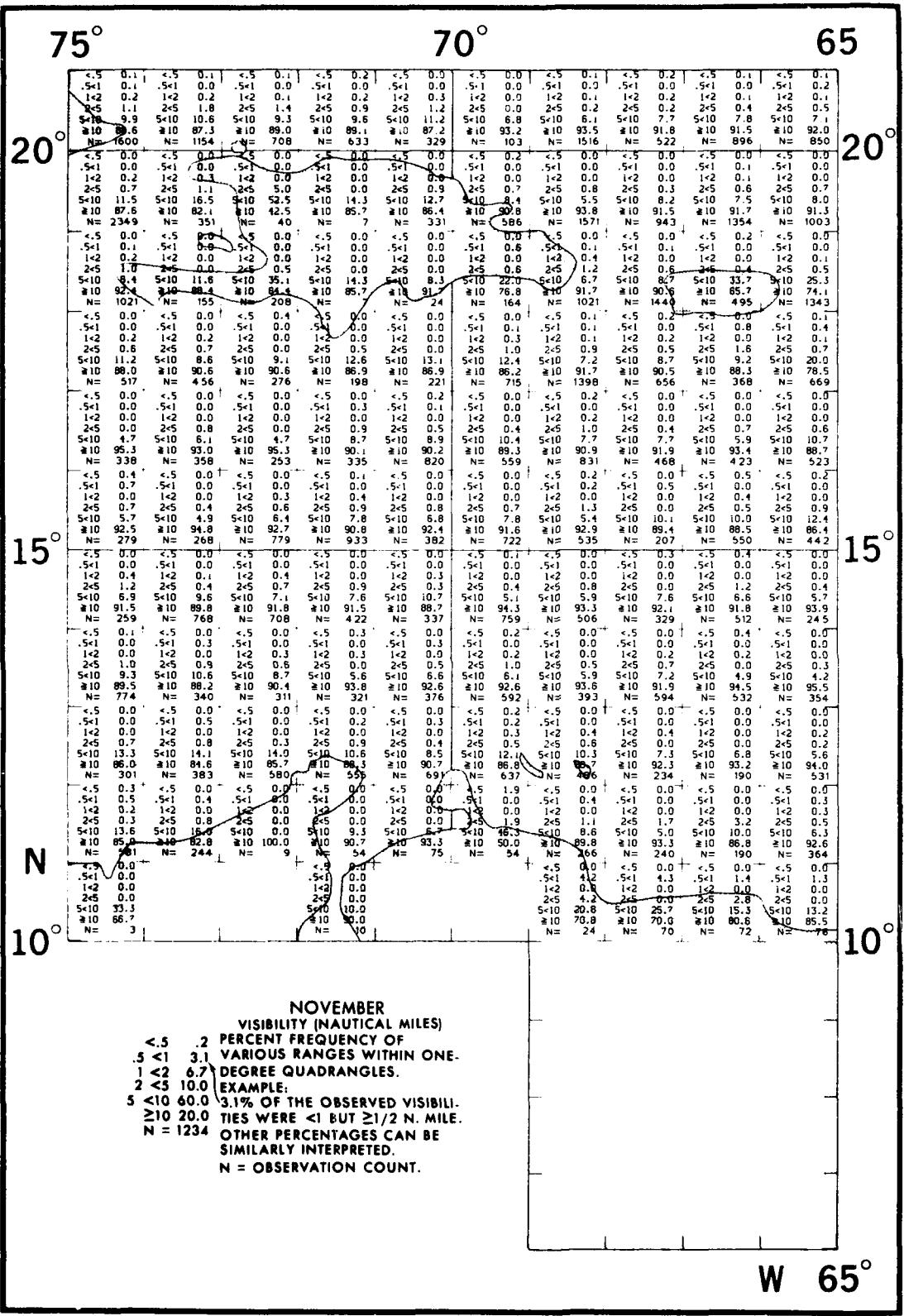
65° W

60°

55°

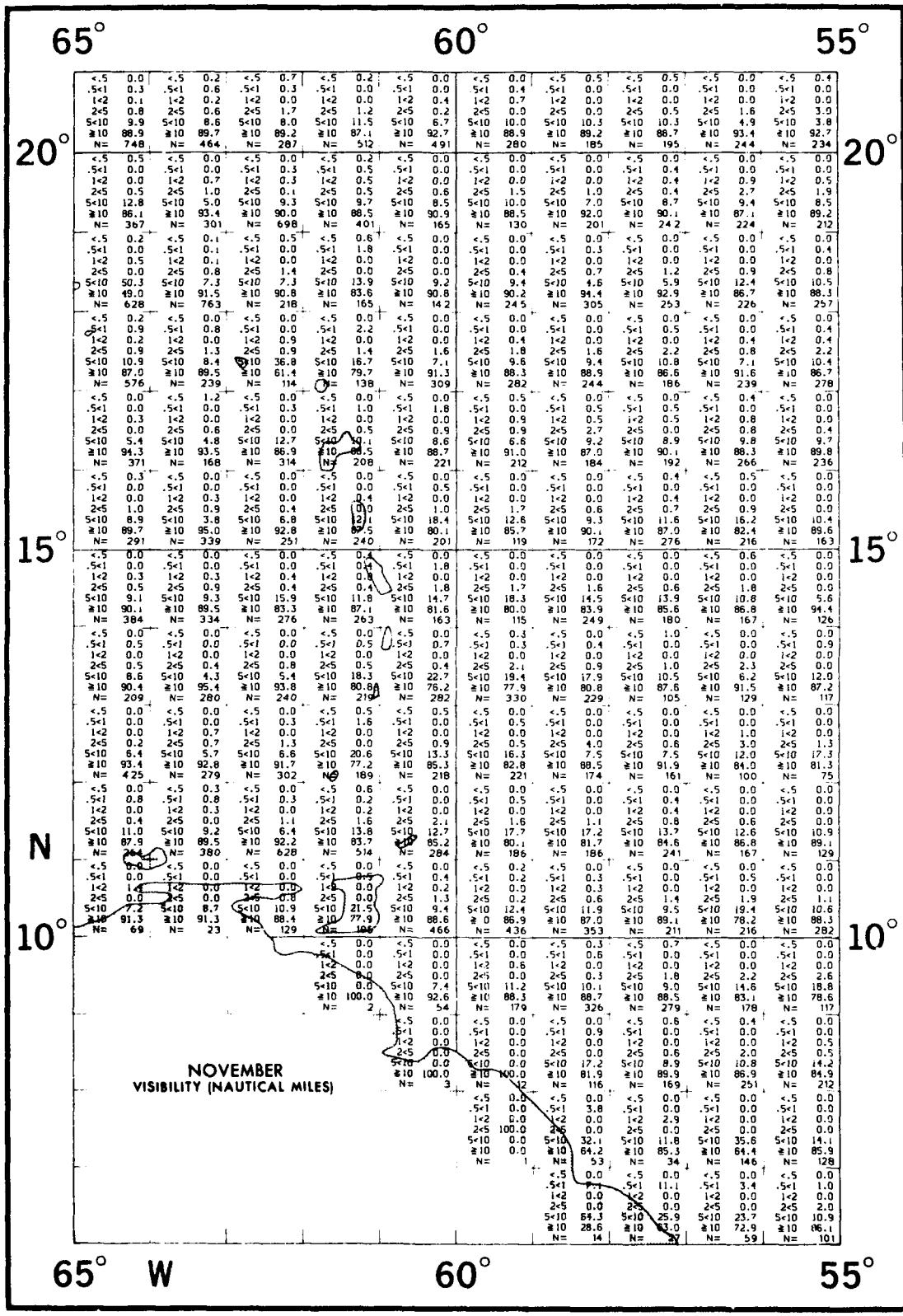


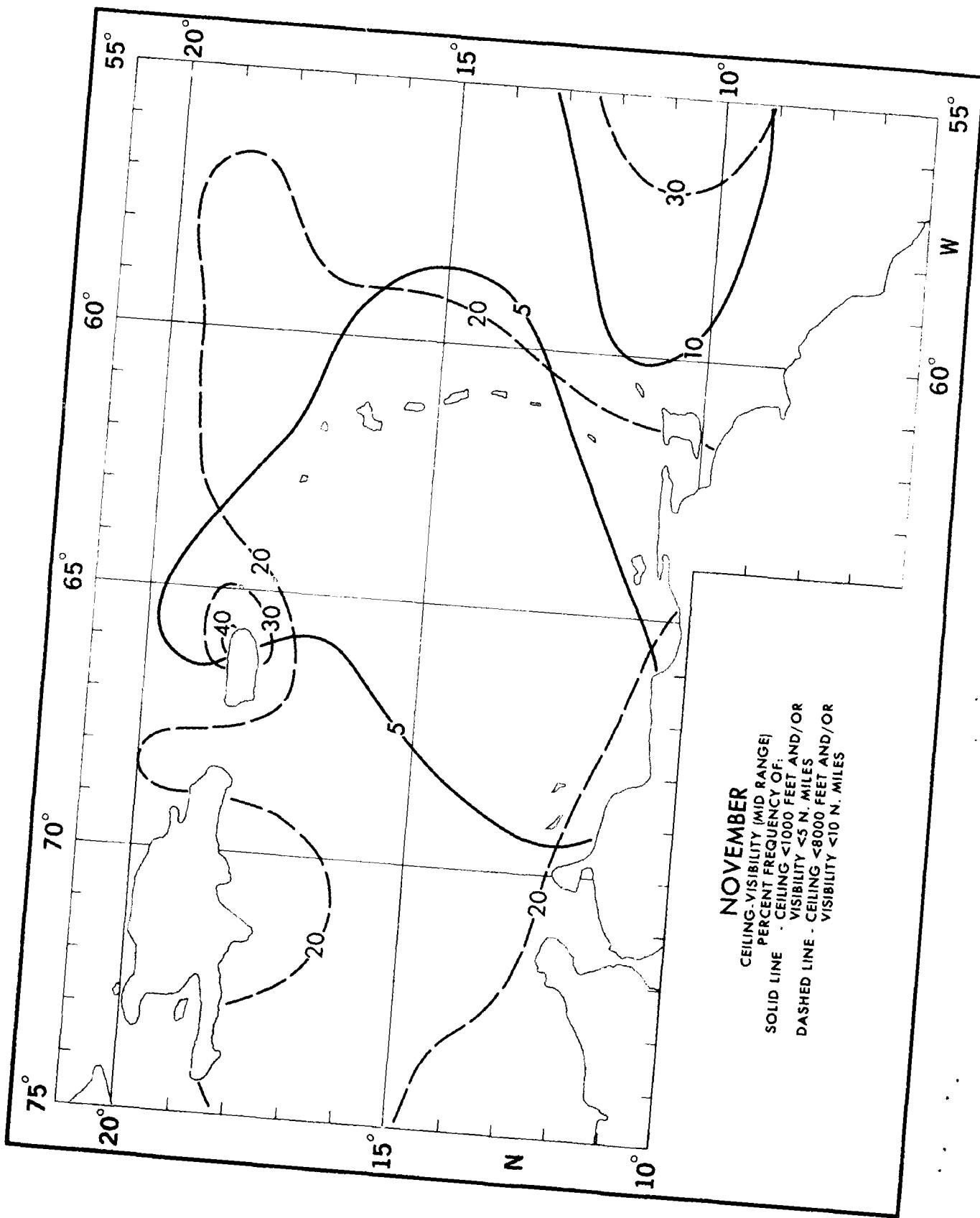


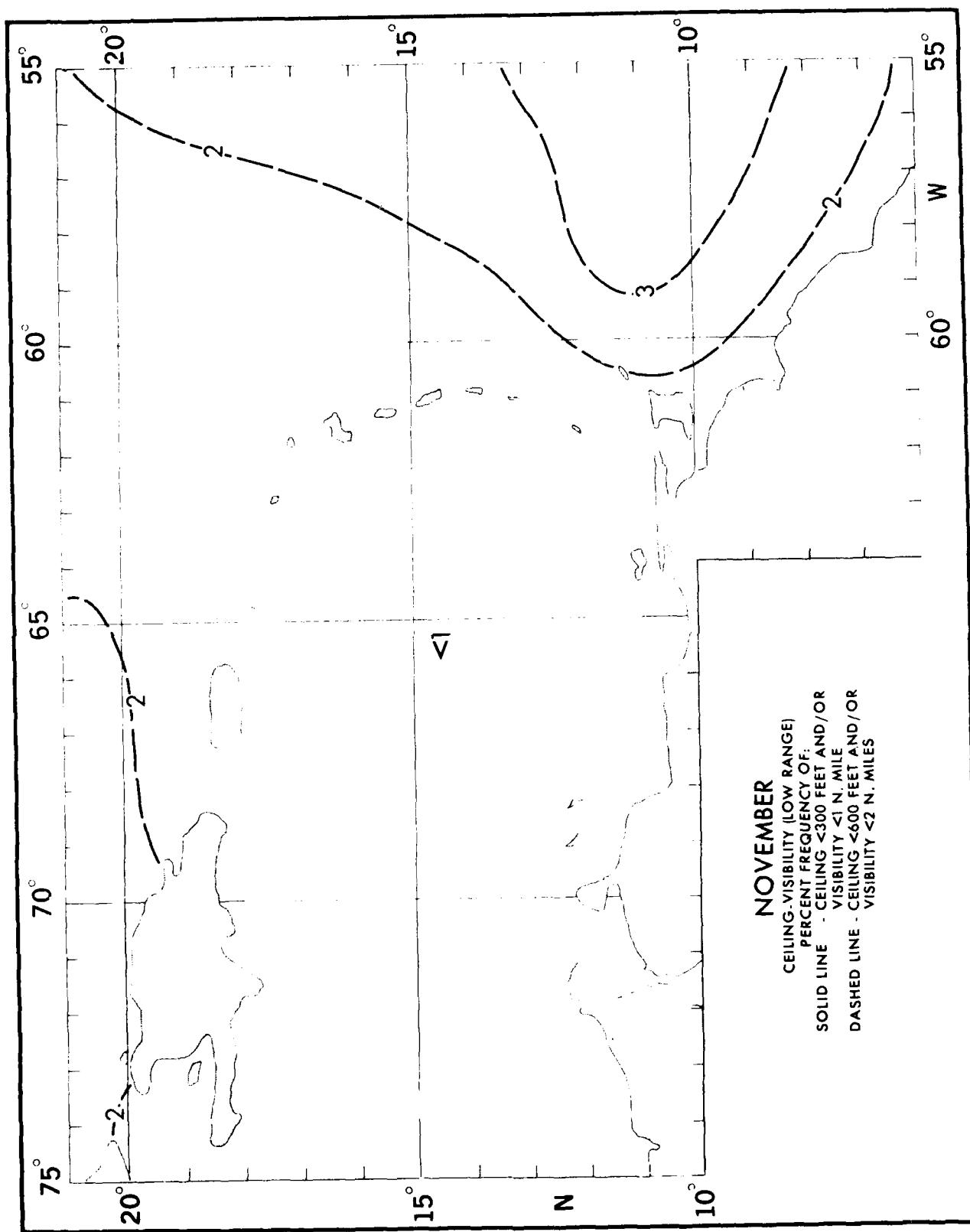


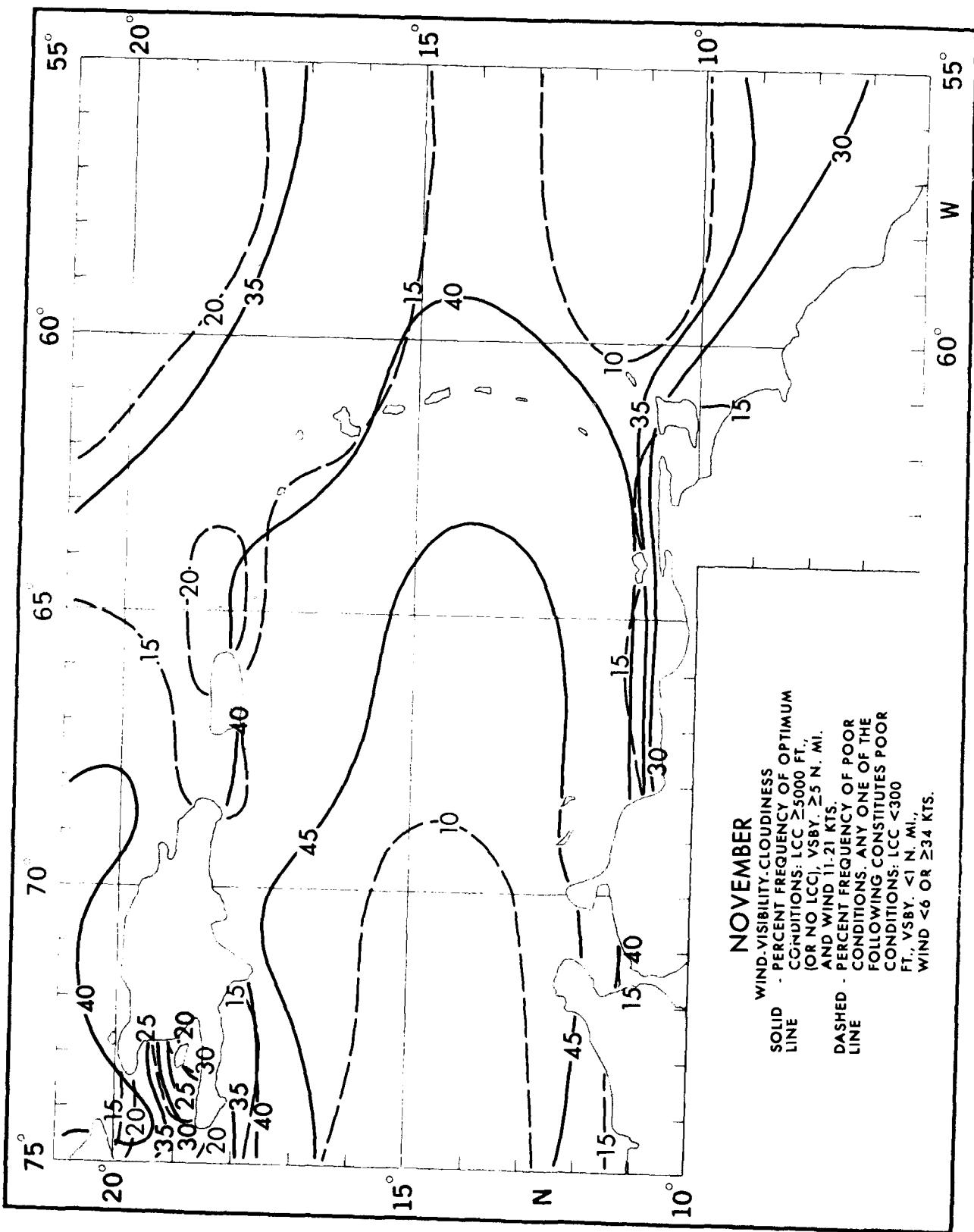
**NOVEMBER
VISIBILITY (NAUTICAL MILES)**

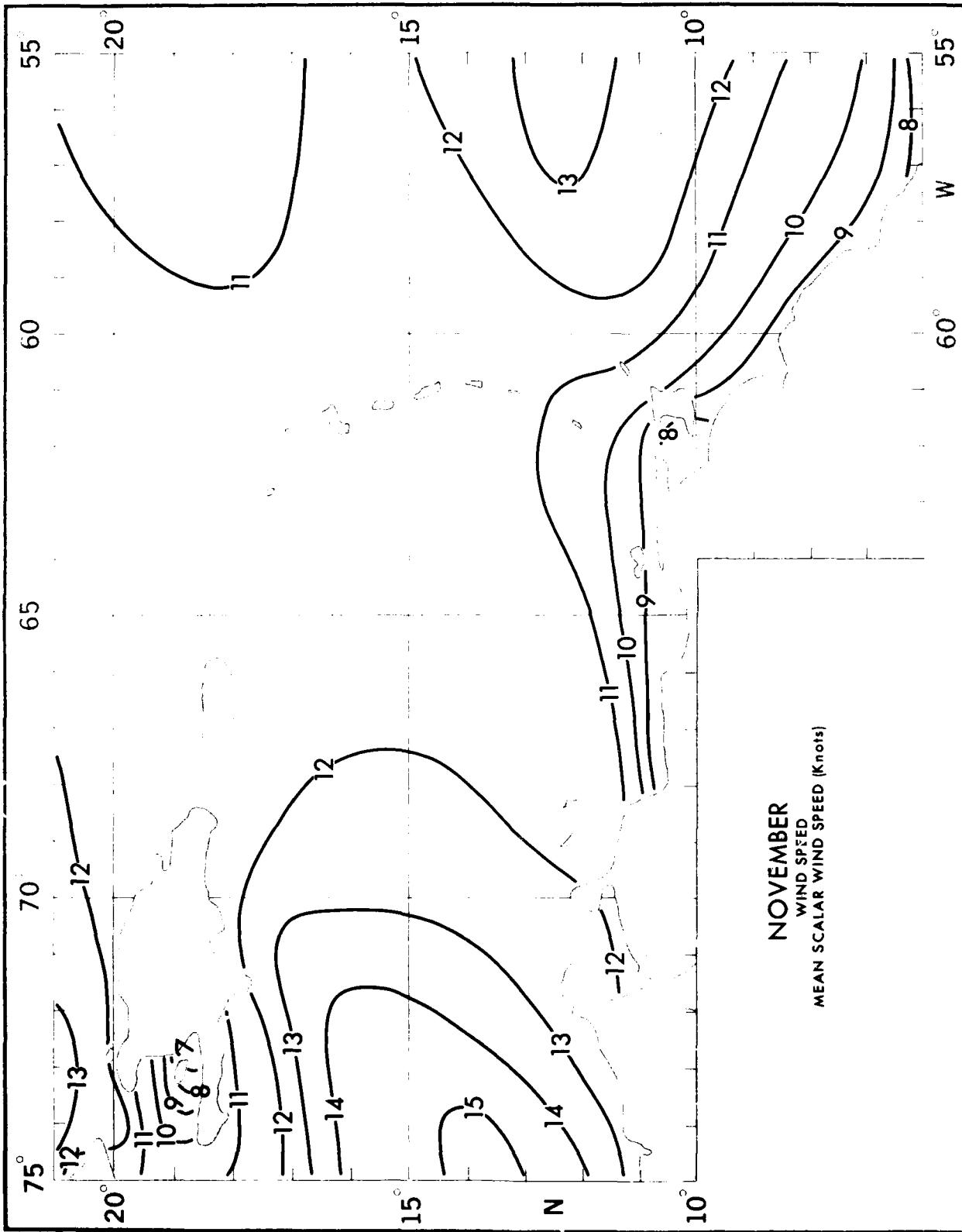
VISIBILITY (Nautical Miles)
 <.5 .2 PERCENT FREQUENCY OF
 ≤.5 <1 3.1 VARIOUS RANGES WITHIN ONE-
 1 ≤ 2 6.7 DEGREE QUADRANGLES.
 2 ≤ 5 10.0 EXAMPLE:
 3 <10 60.0 3.1% OF THE OBSERVED VISIBILI-
 ≥10 20.0 TIES WERE <1 BUT ≥1/2 N. MILE.
 N = 1234 OTHER PERCENTAGES CAN BE
 SIMILARLY INTERPRETED.
 N = OBSERVATION COUNT.











AD-A171 487

US NAVY CLIMATIC STUDY OF THE CARIBBEAN SEA AND GULF OF MEXICO VOLUME 2 EAST CARIBBEAN SEA(U) NAVAL AIR SYSTEMS COMMAND WASHINGTON DC MAR 86 NAVAIR-5G-1C-544 3/3

UNCLASSIFIED

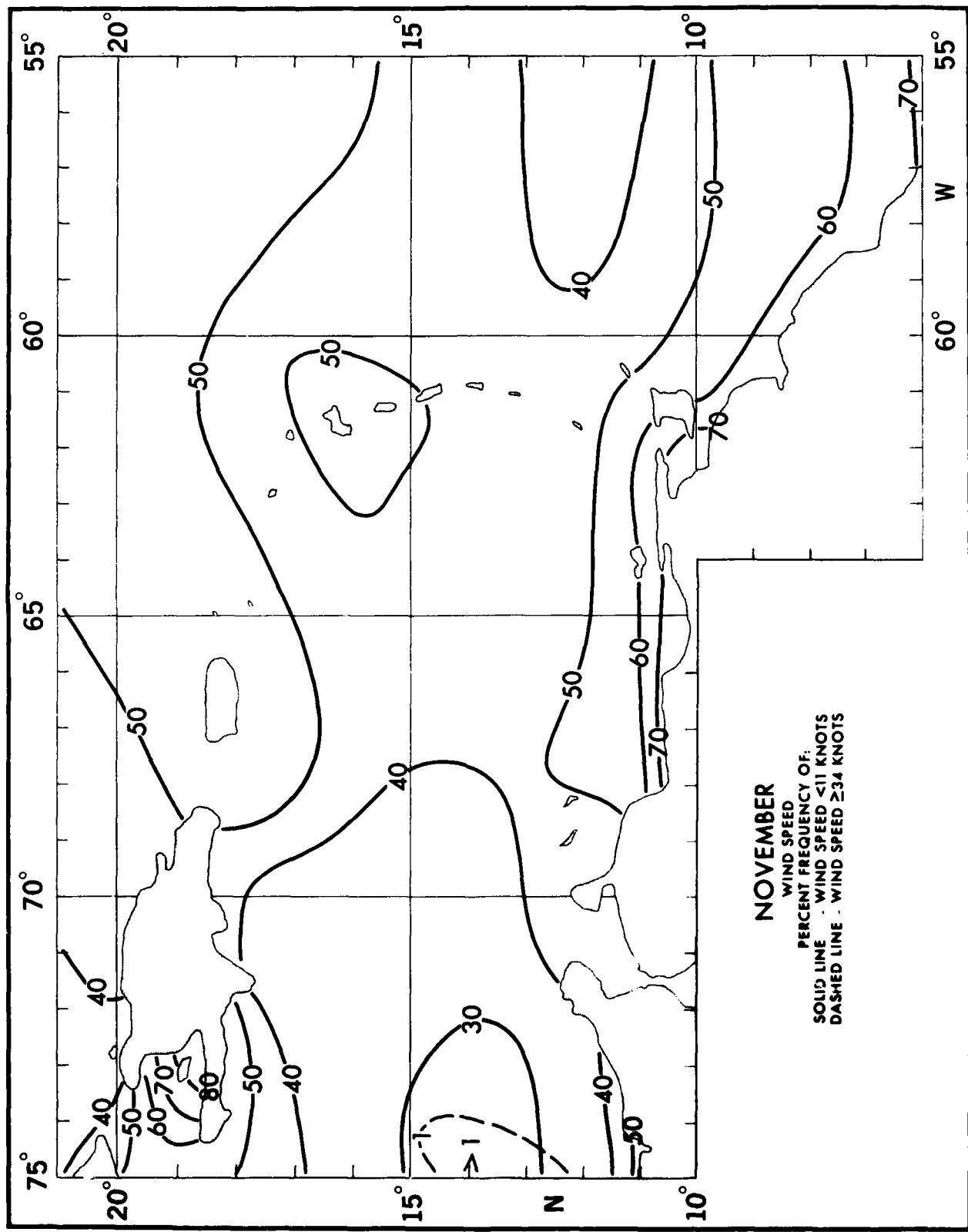
F/G 4/2

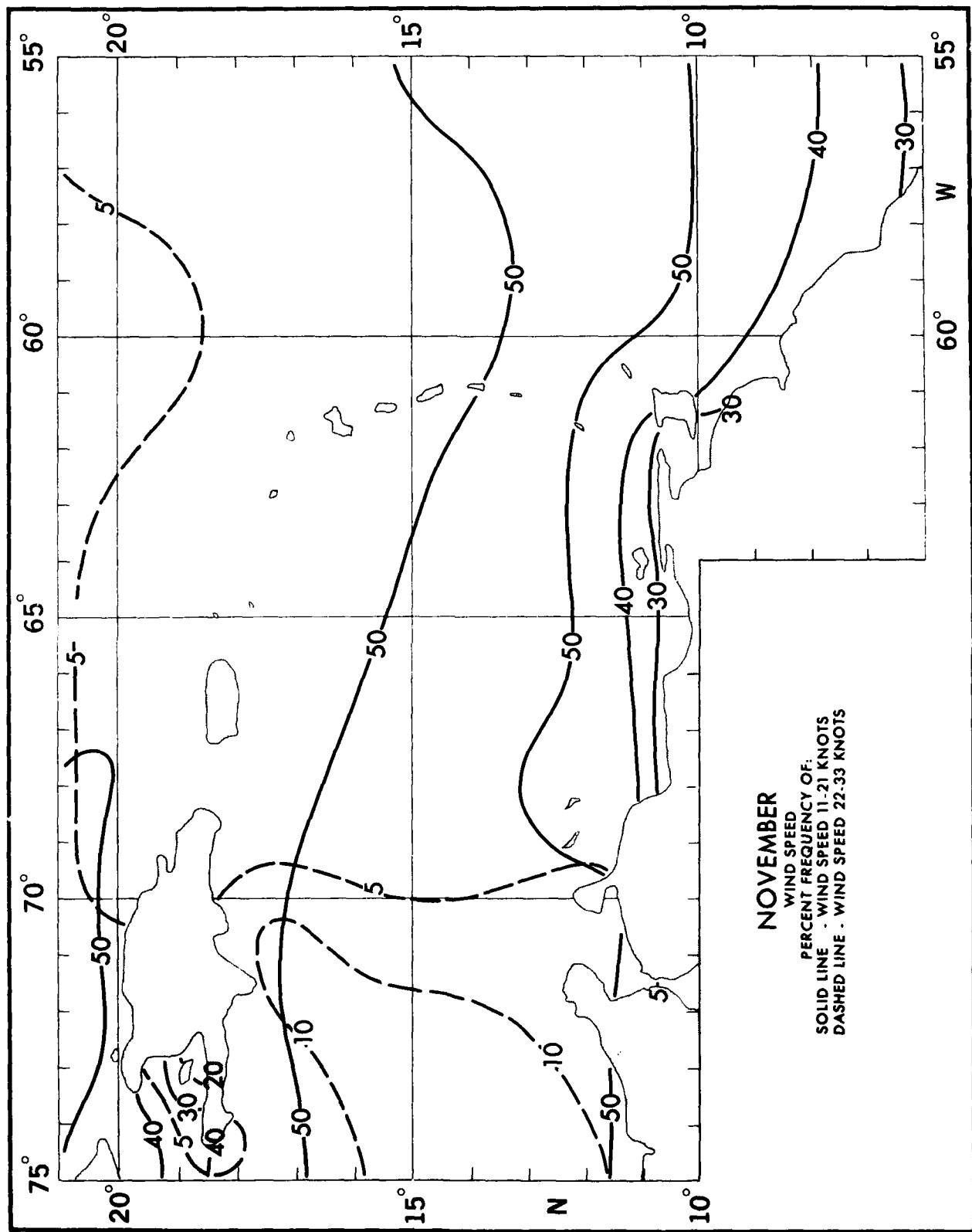
ML

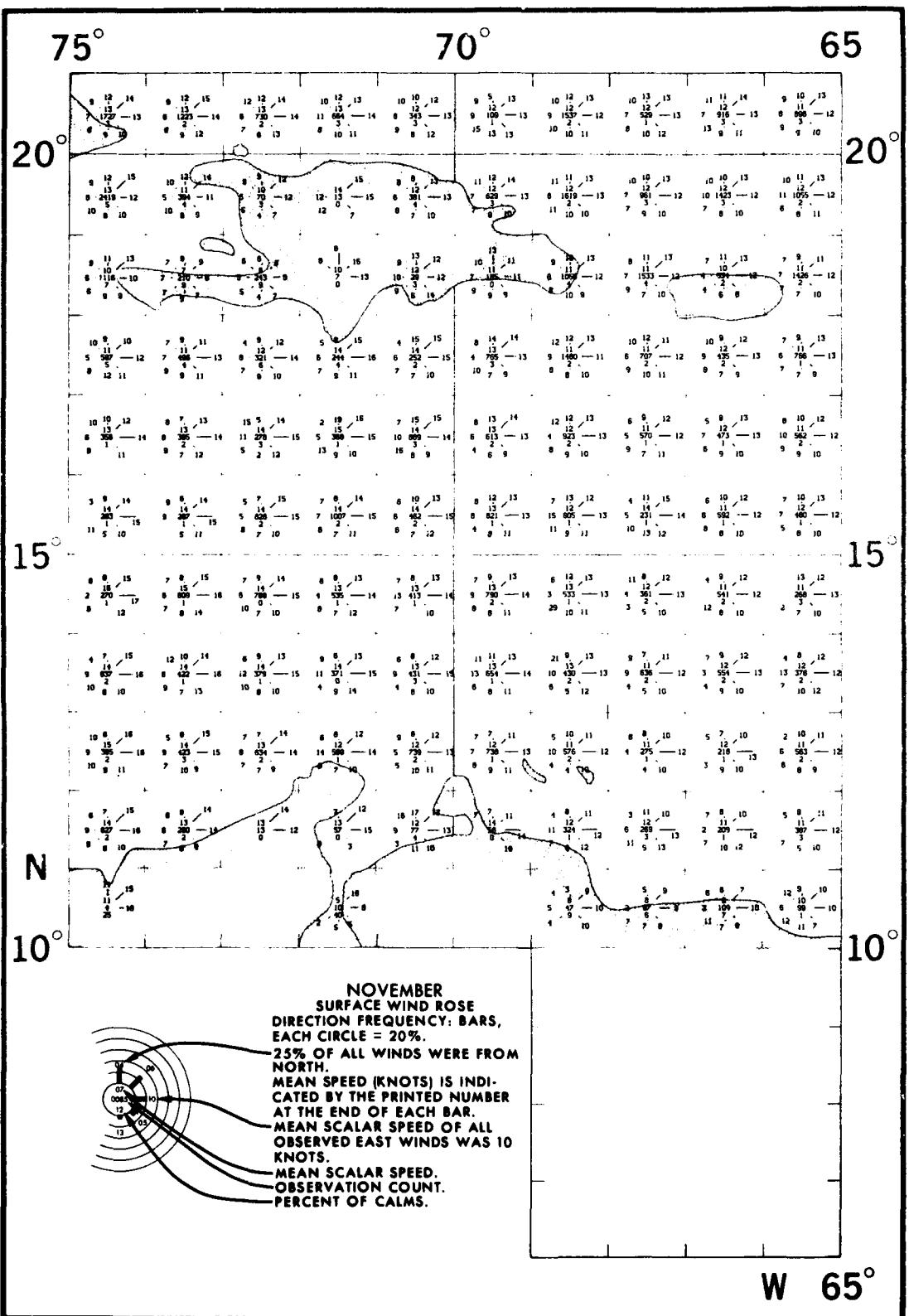
END
10-1986

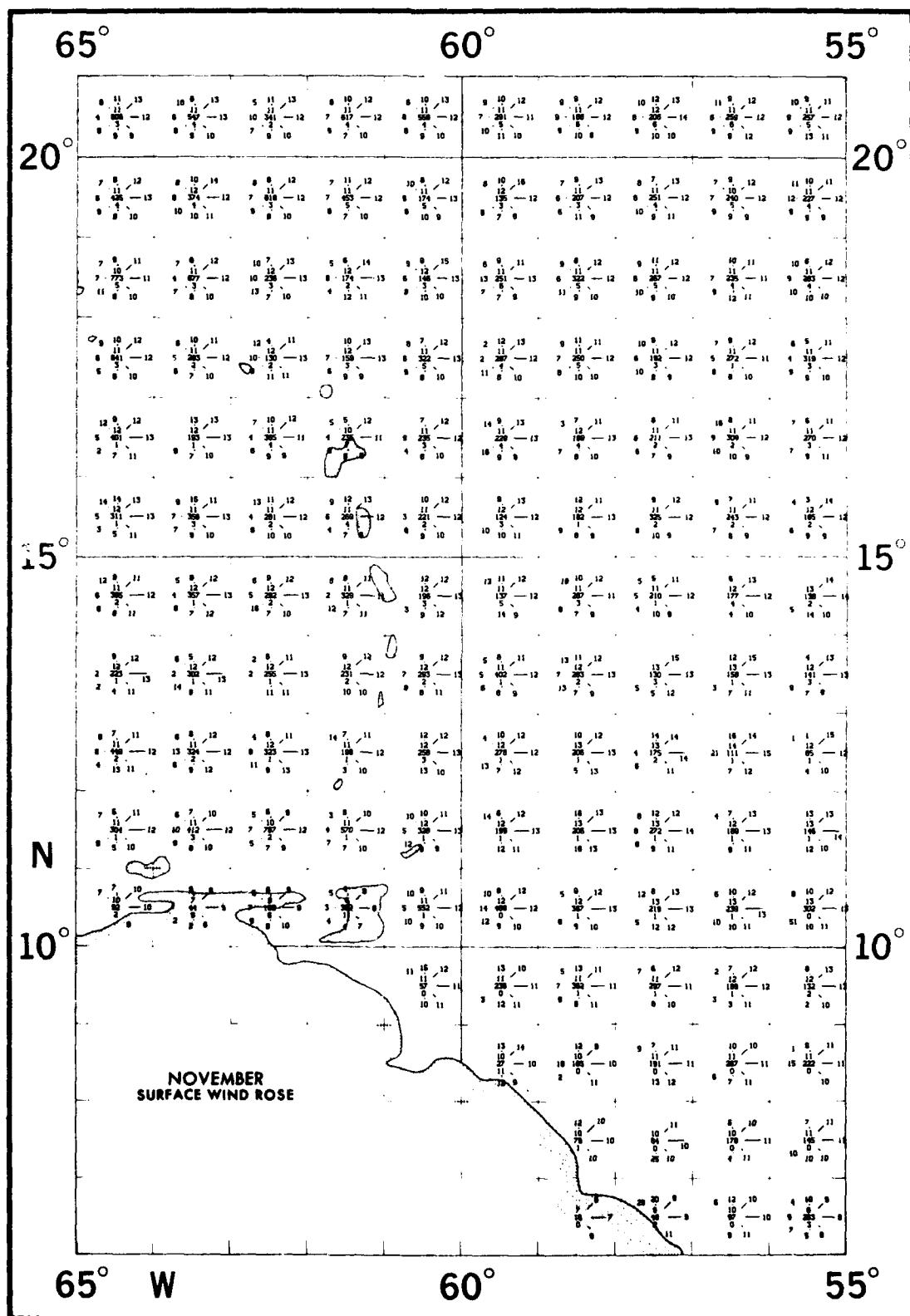


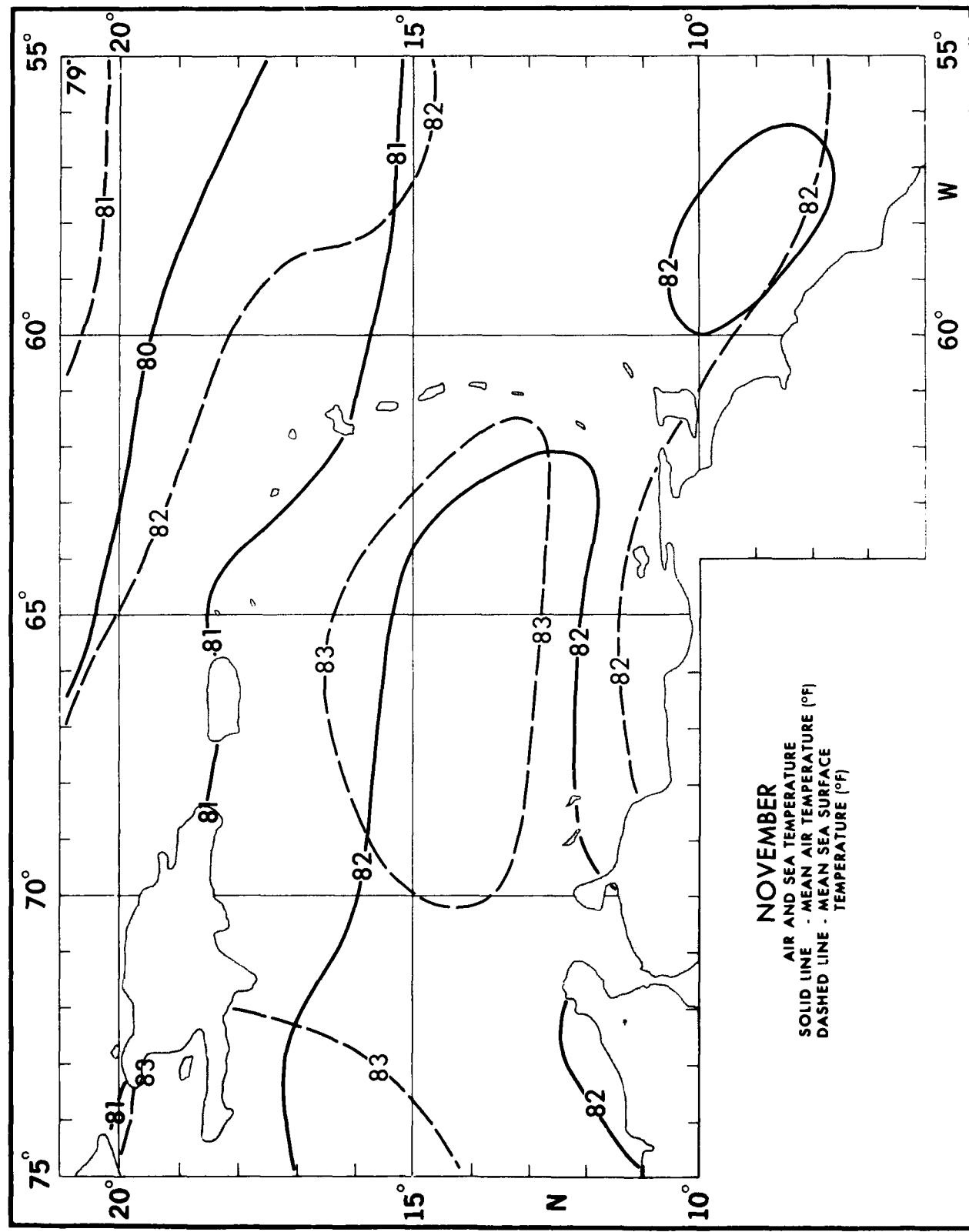
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

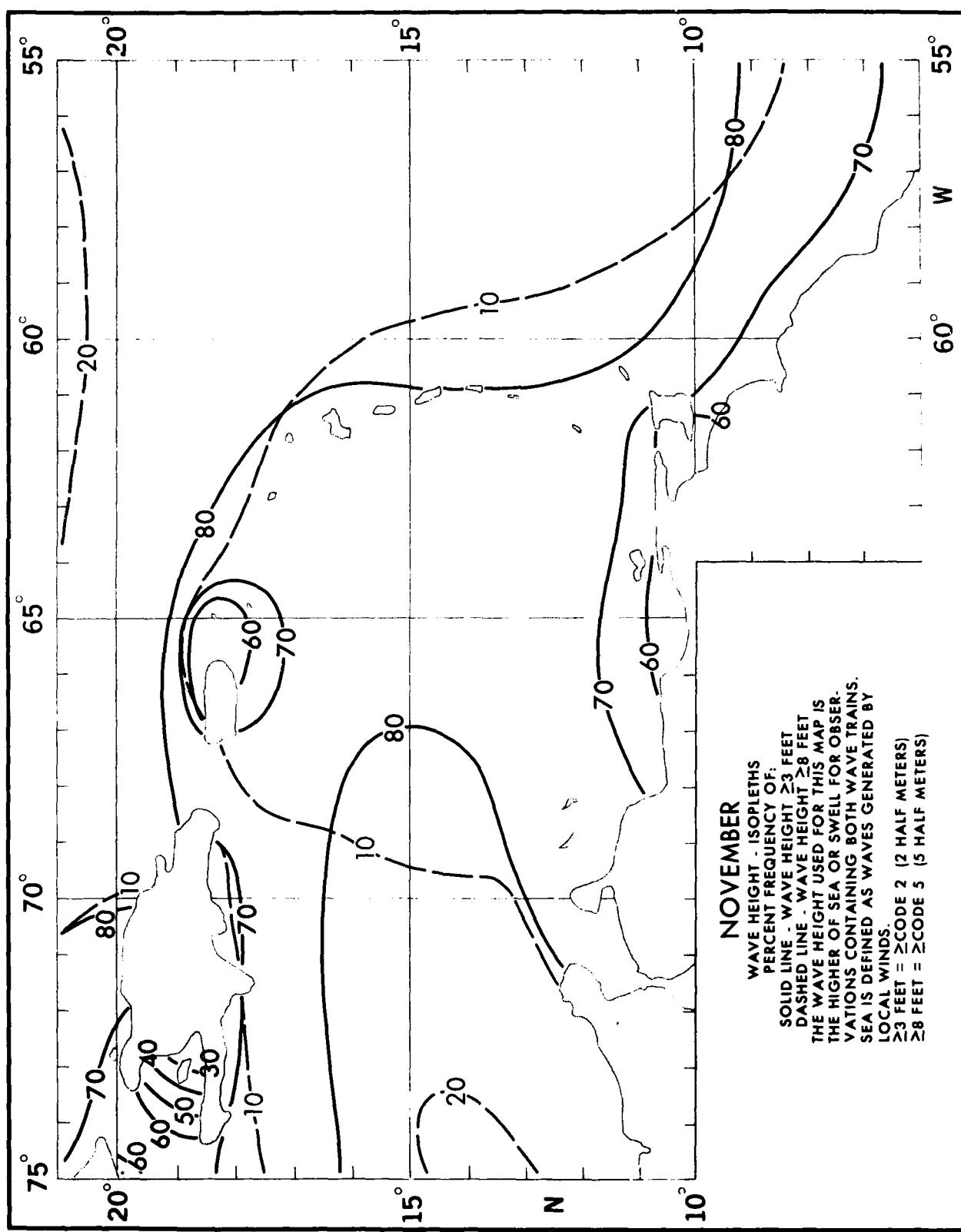


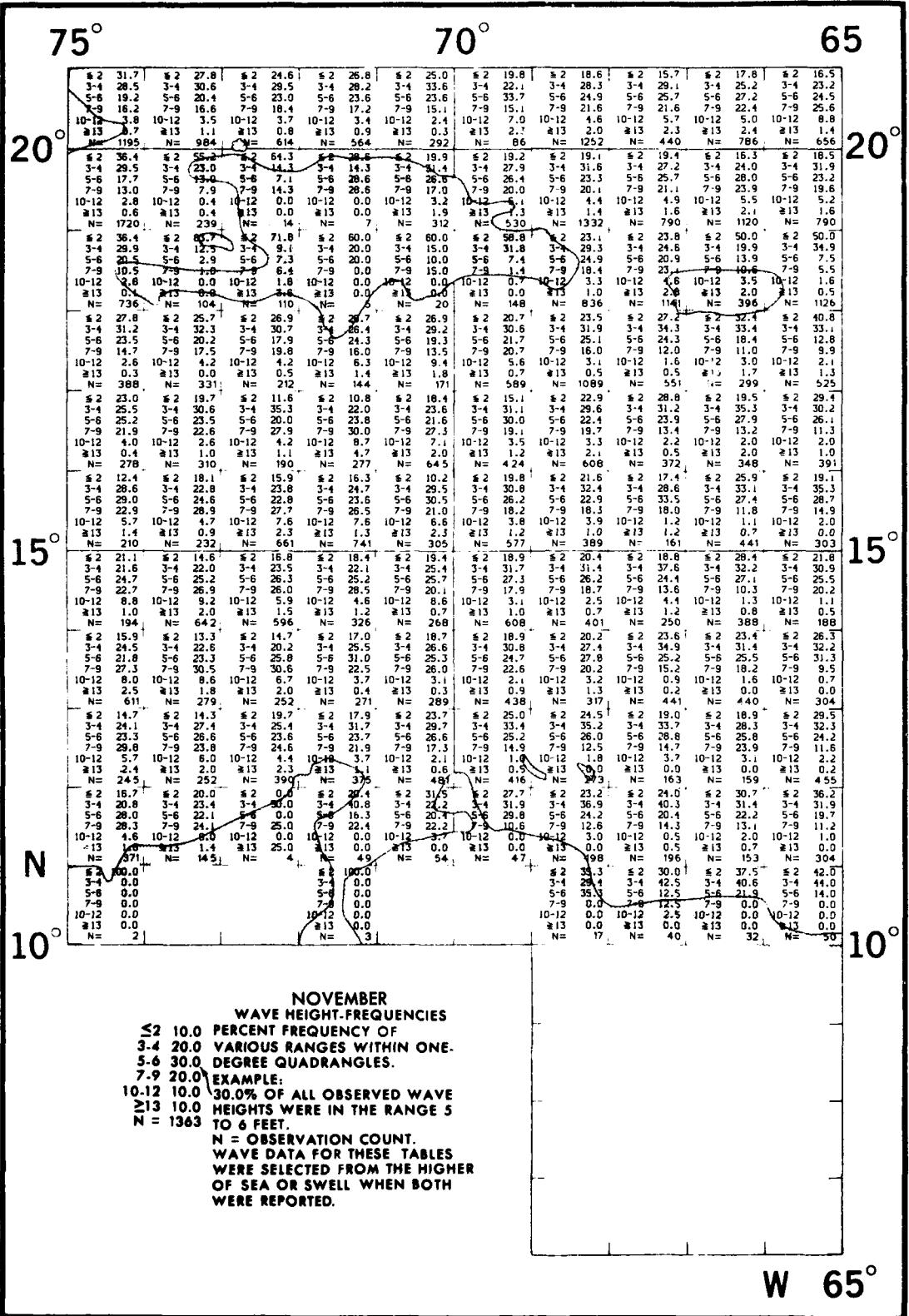










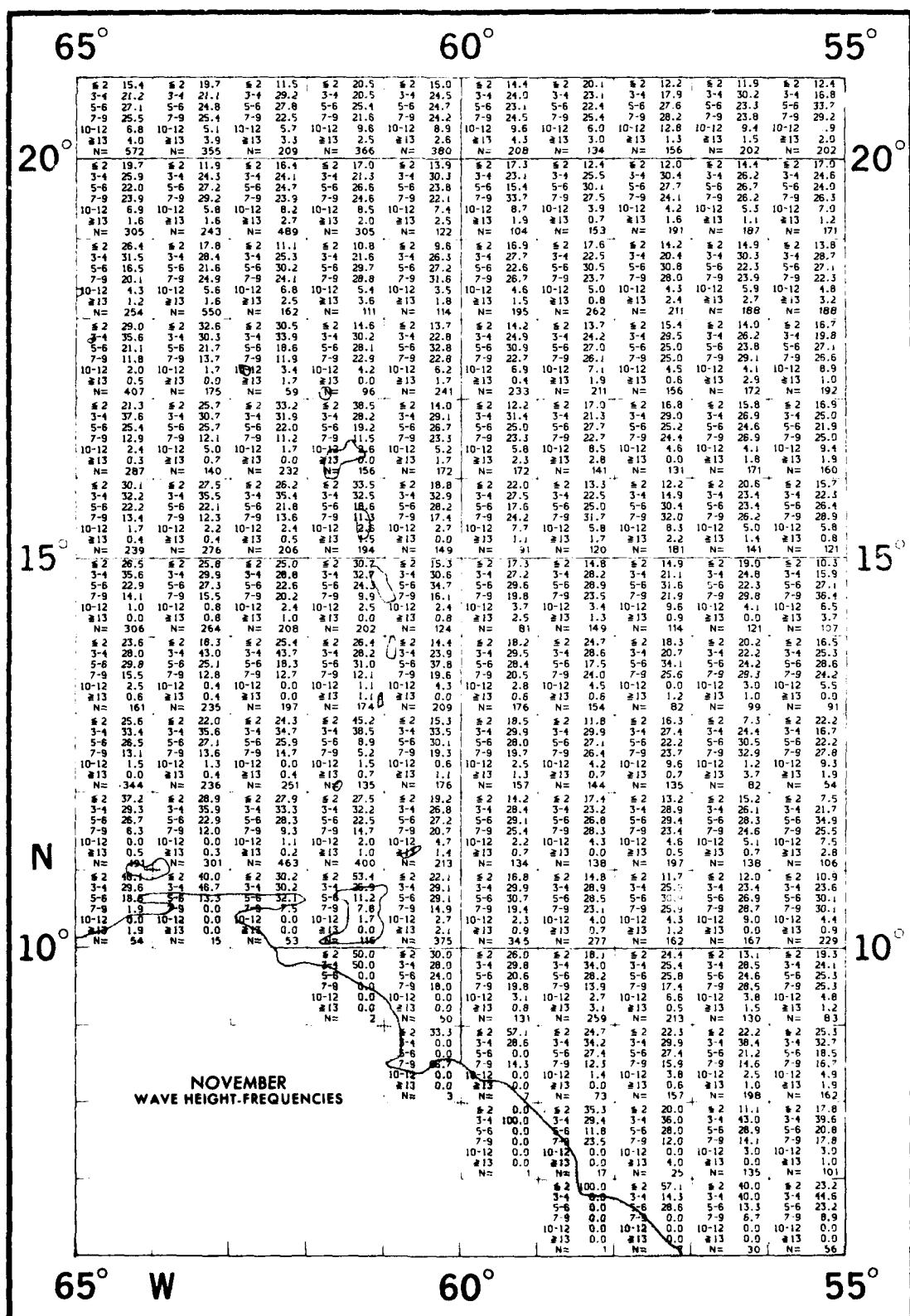


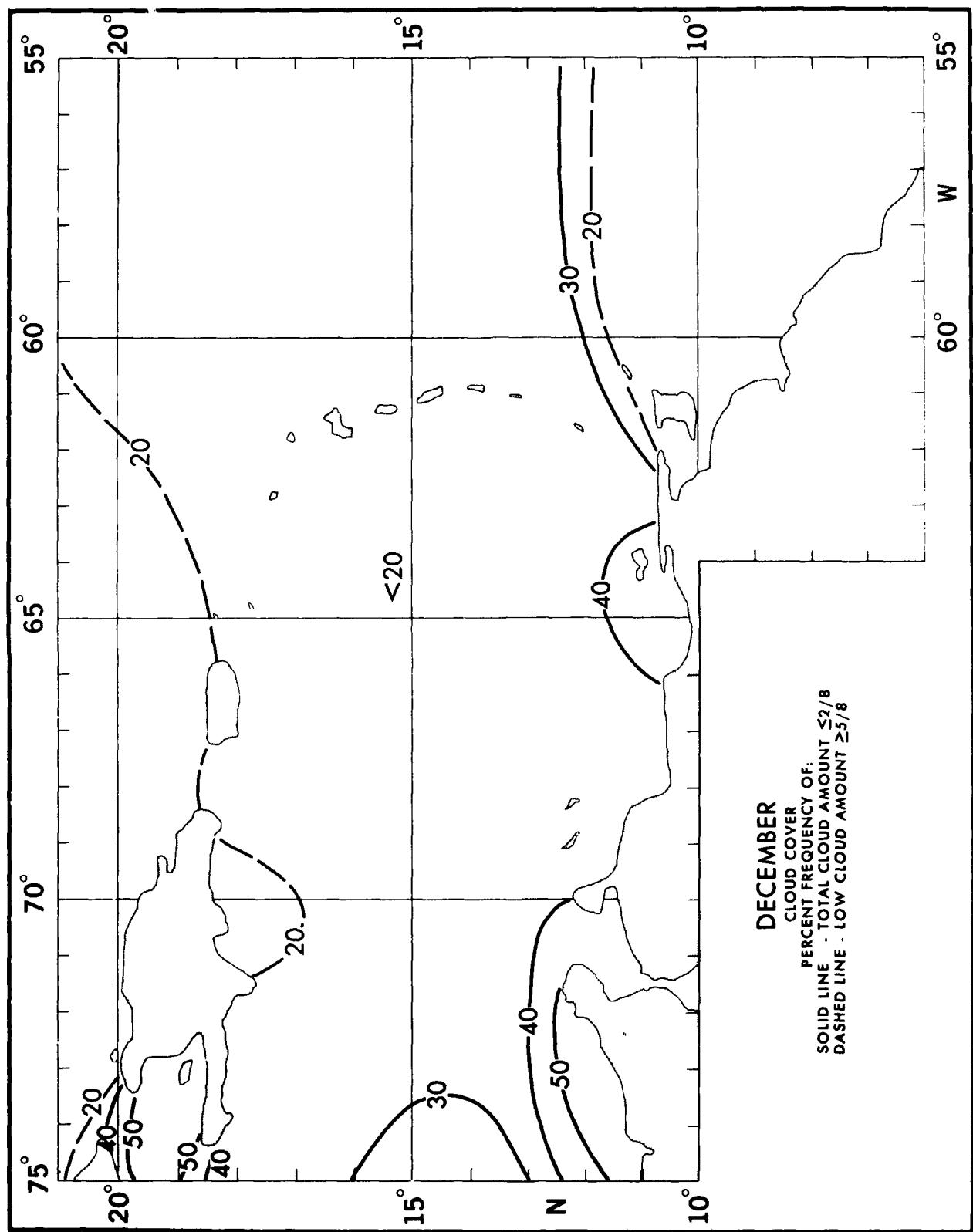
NOVEMBER

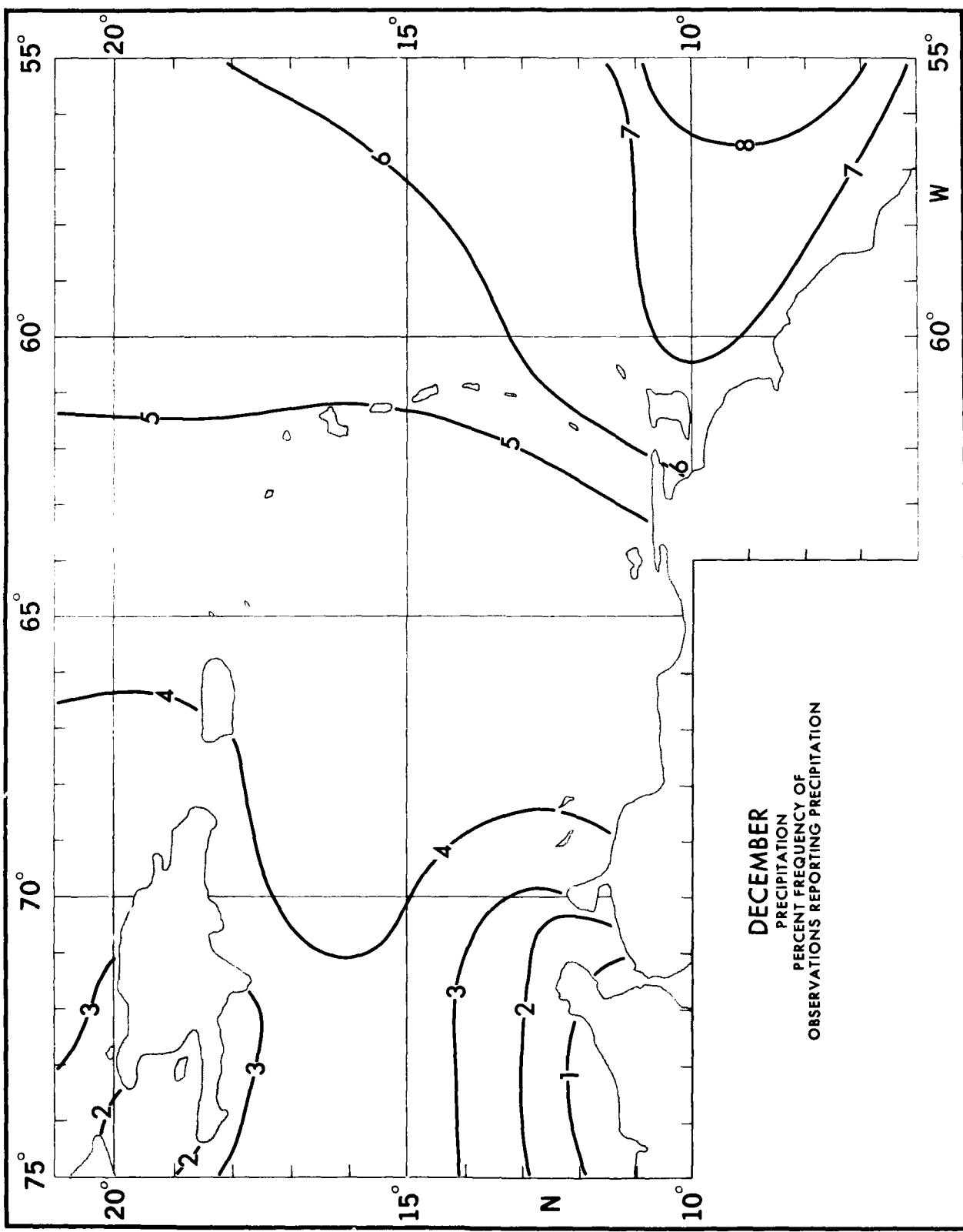
WAVE HEIGHT-FREQUENCIES
PERCENT FREQUENCY OF
VARIOUS RANGES WITHIN ONE-
DEGREE QUADRANGLES.

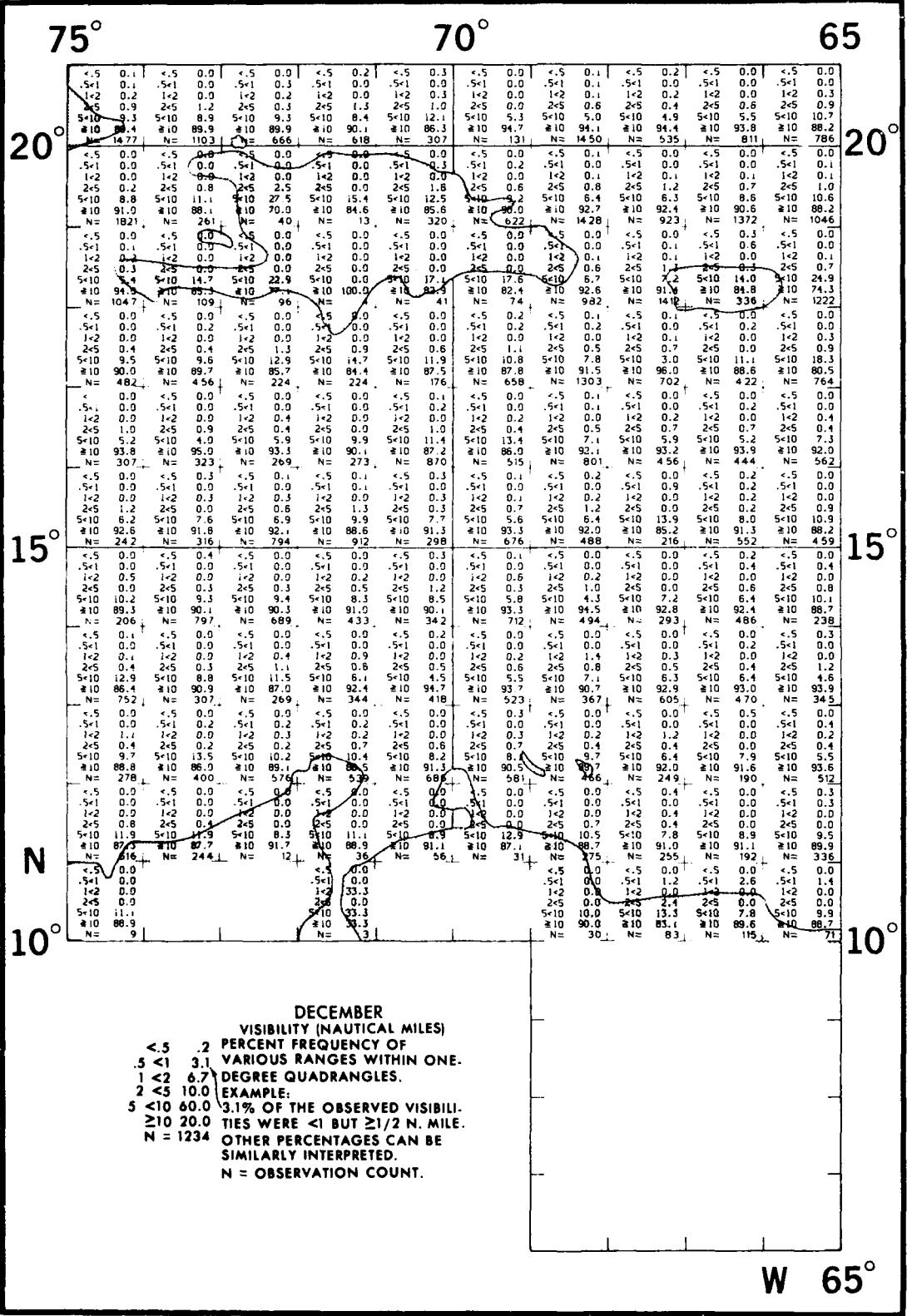
EXAMPLE: 30.0% OF ALL OBSERVED WAVE
 HEIGHTS WERE IN THE RANGE 5
 TO FEET.
 $N = 1363$
 $N =$ OBSERVATION COUNT.
 WAVE DATA FOR THESE TABLES

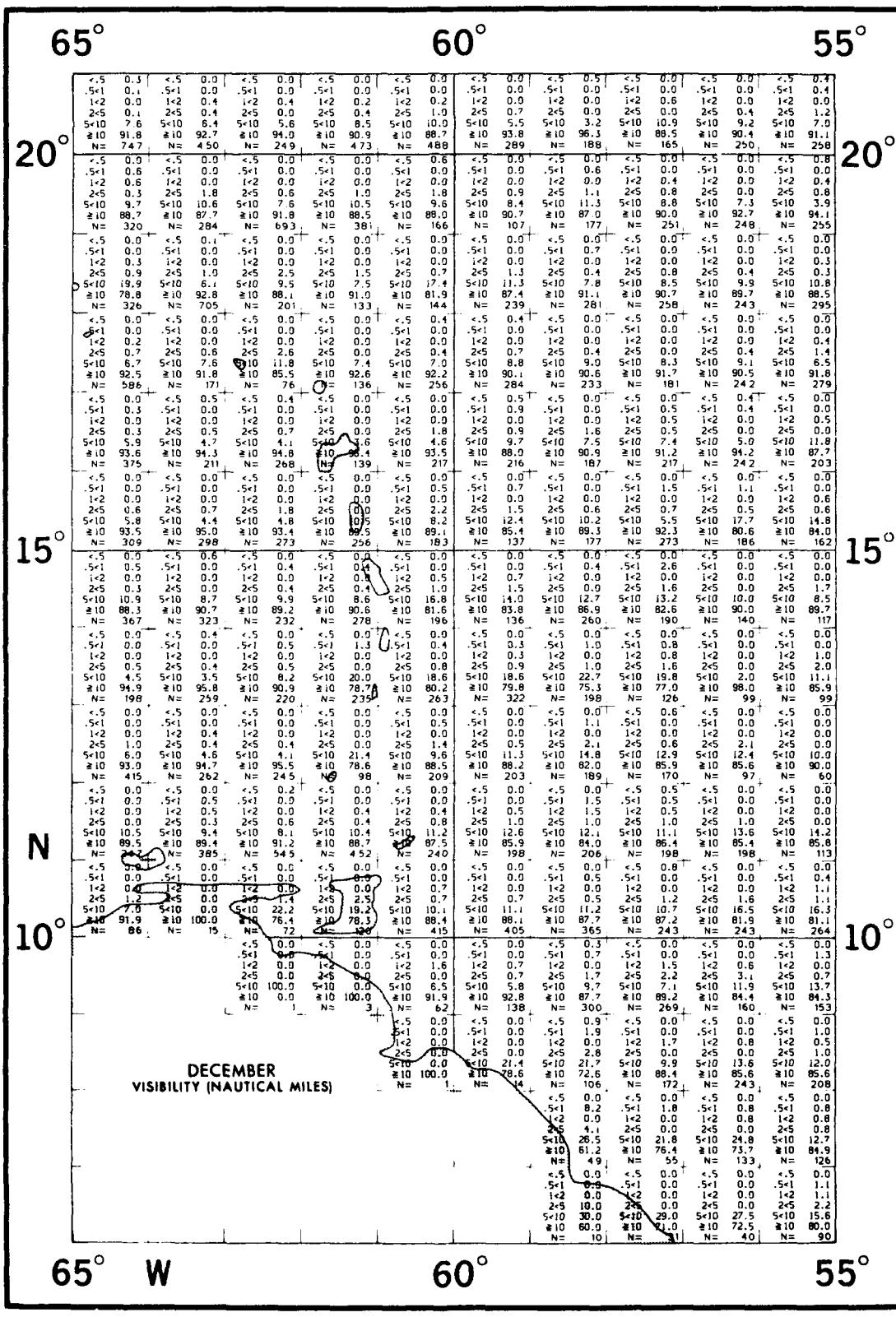
**N = OBSERVATION COUNT.
WAVE DATA FOR THESE TABLES
WERE SELECTED FROM THE HIGHER
OF SEA OR SWELL WHEN BOTH
WERE REPORTED.**

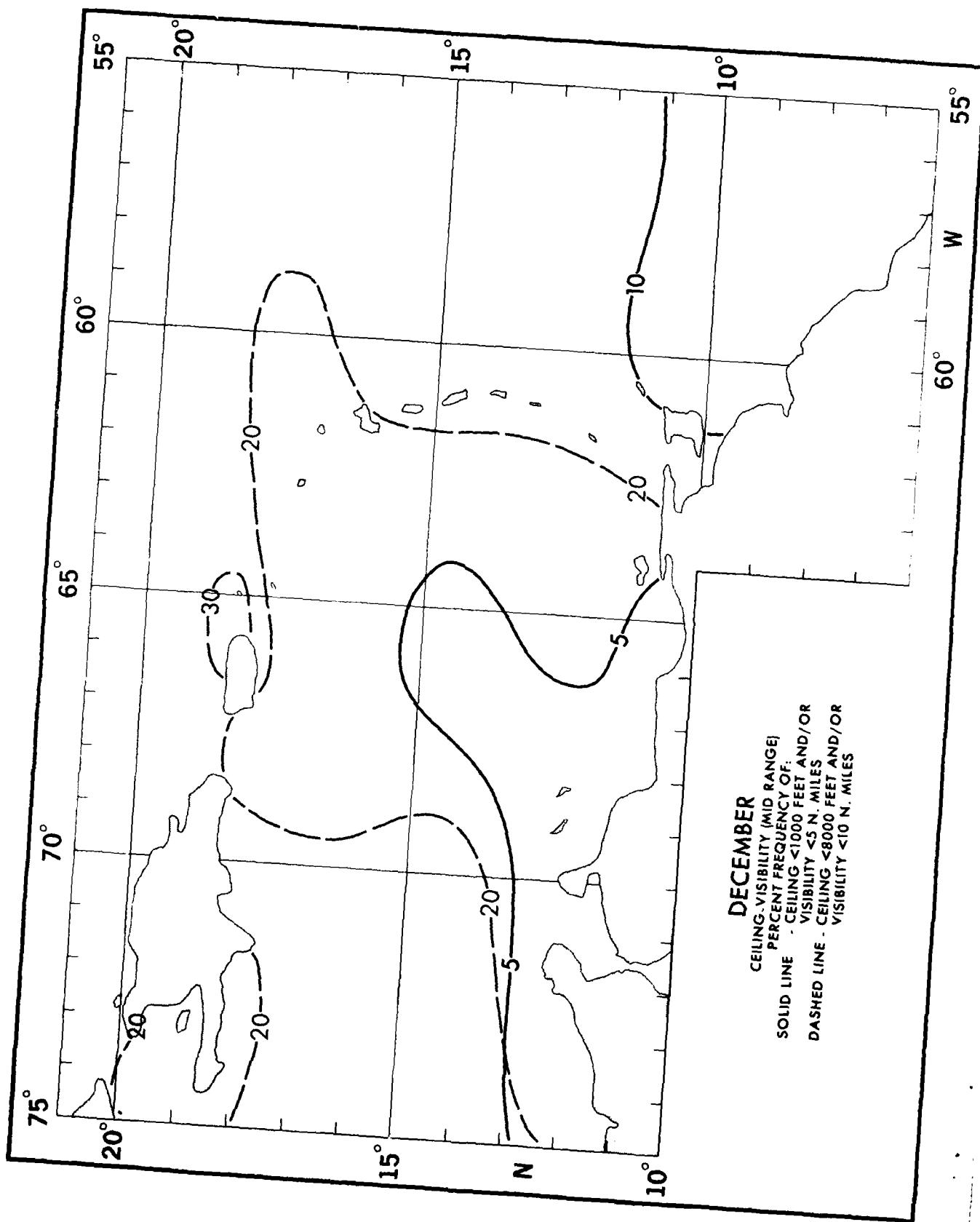


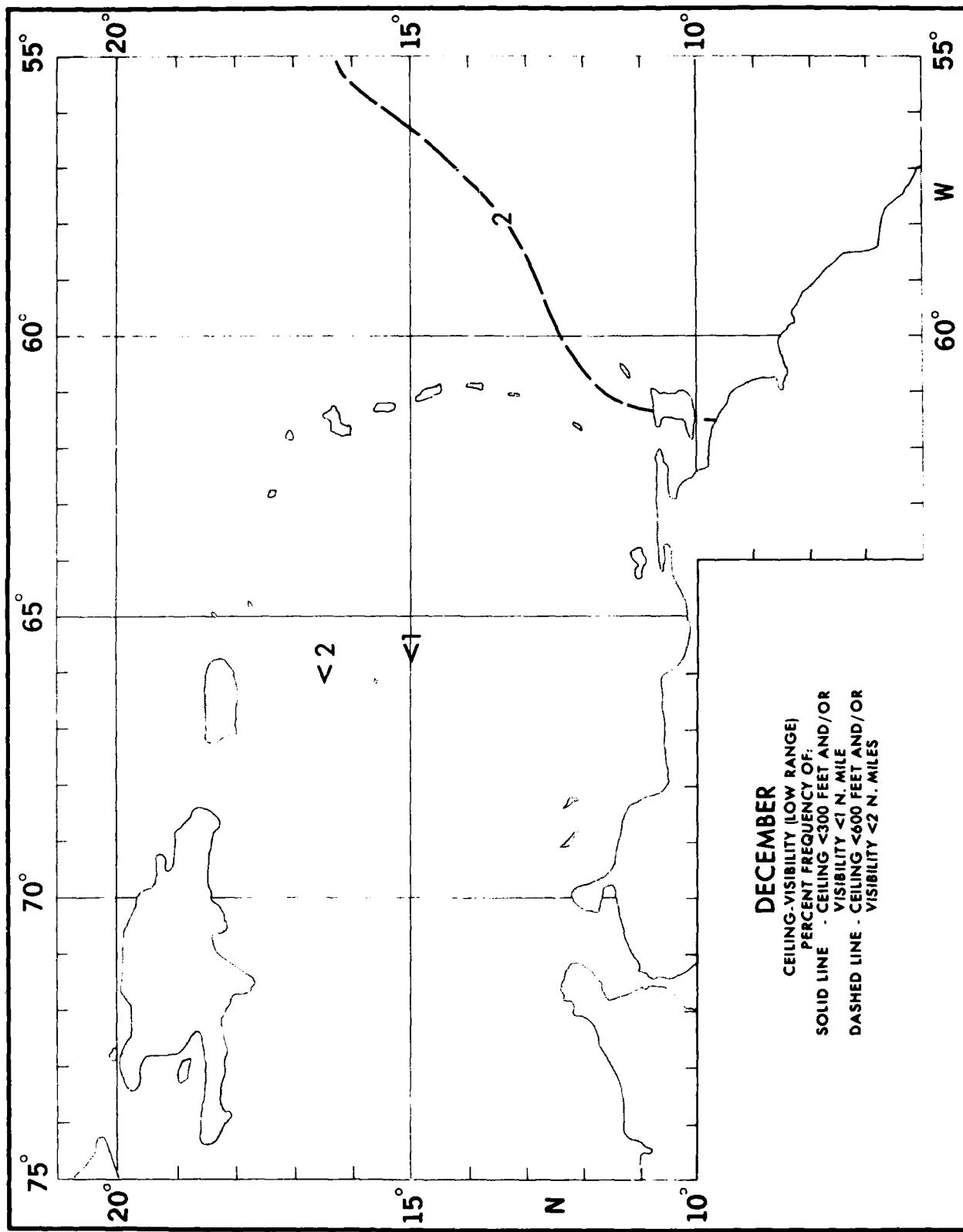


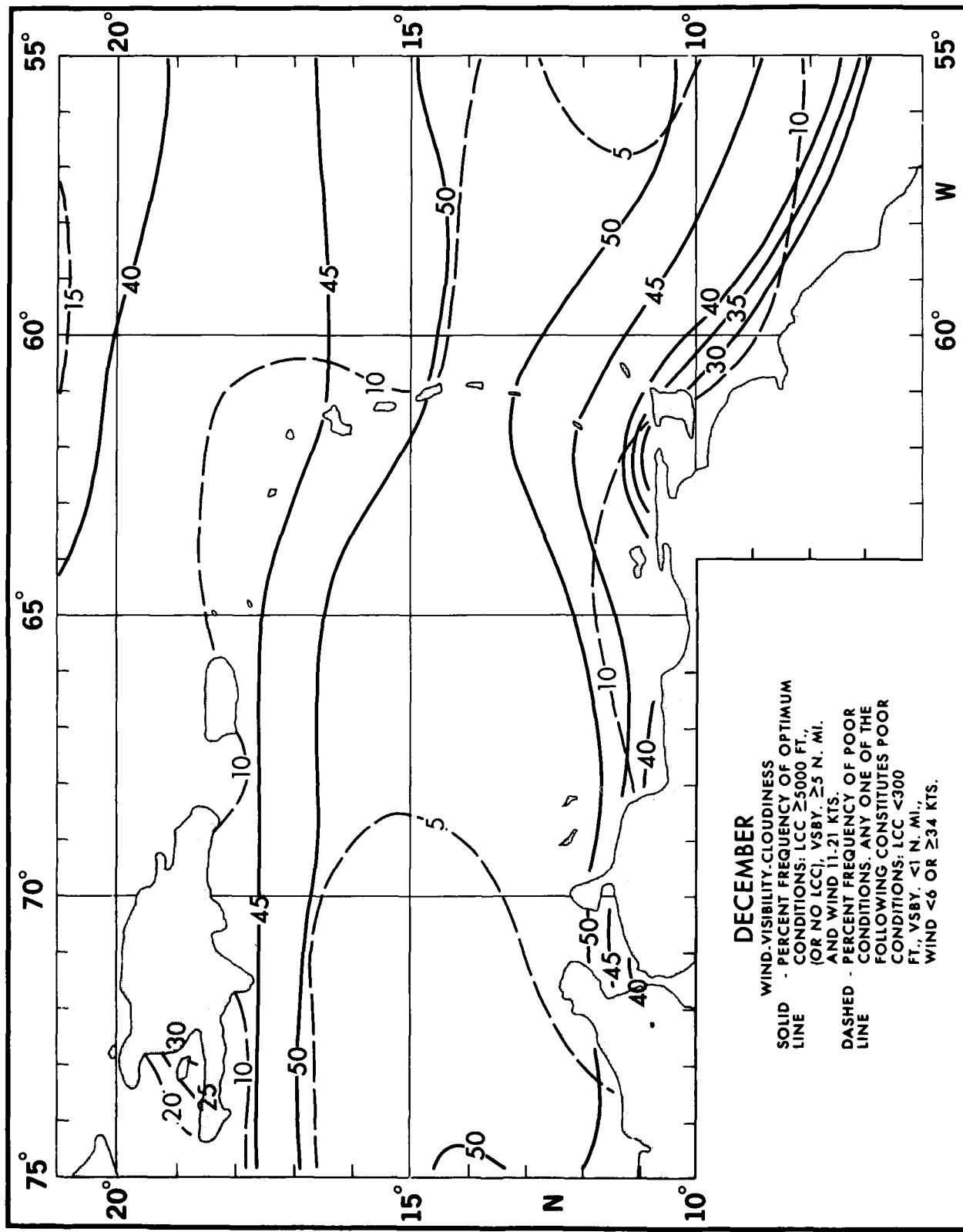


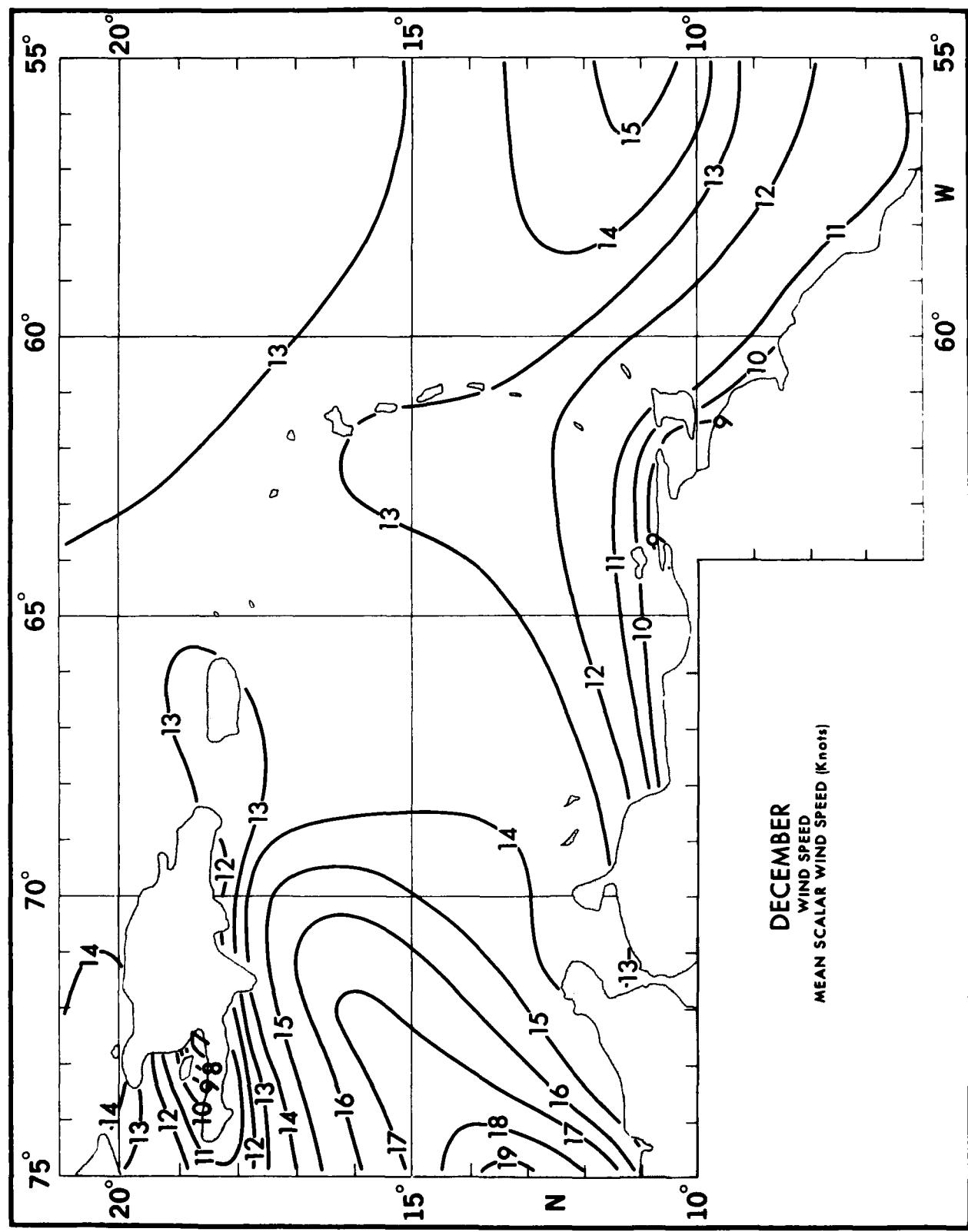


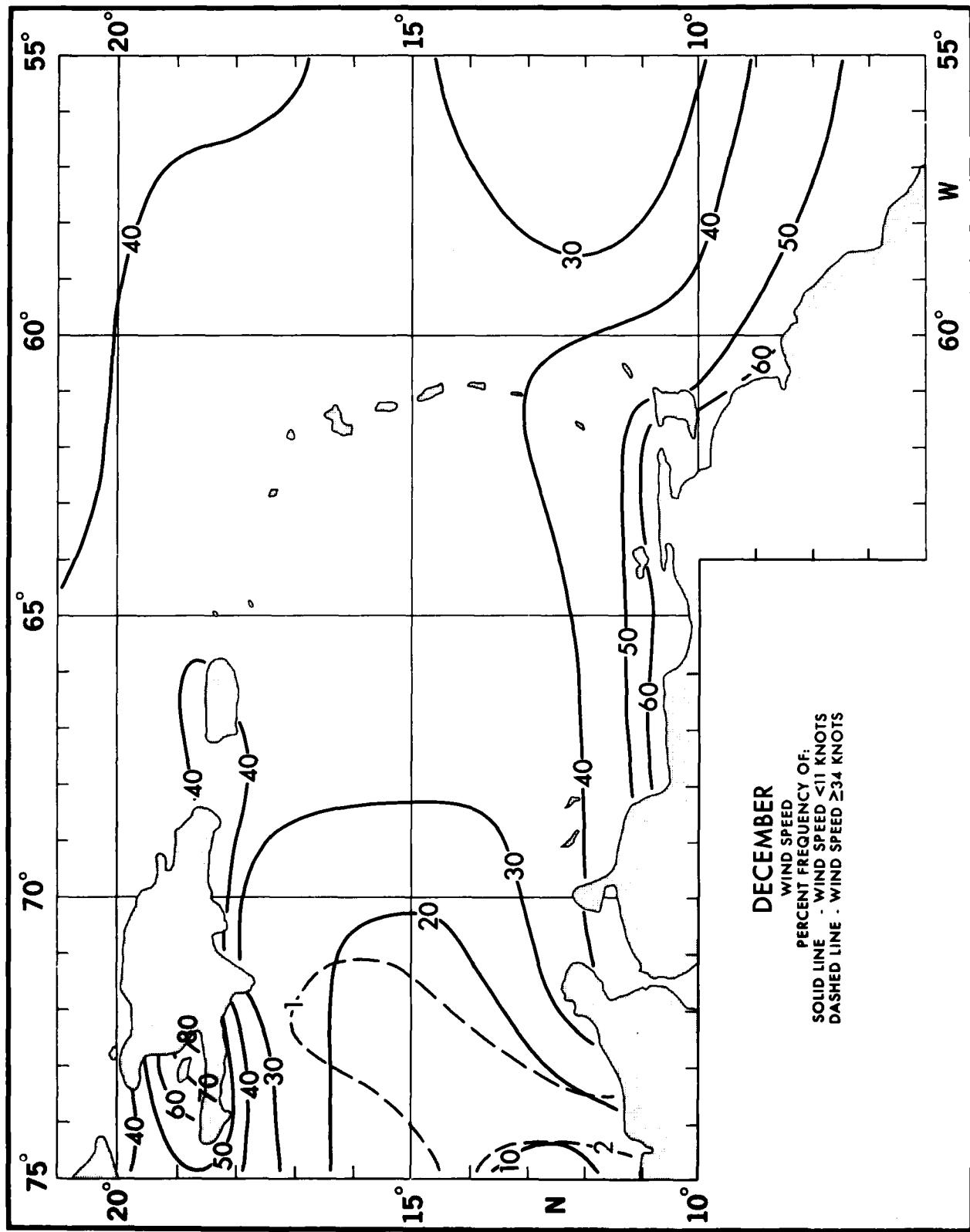


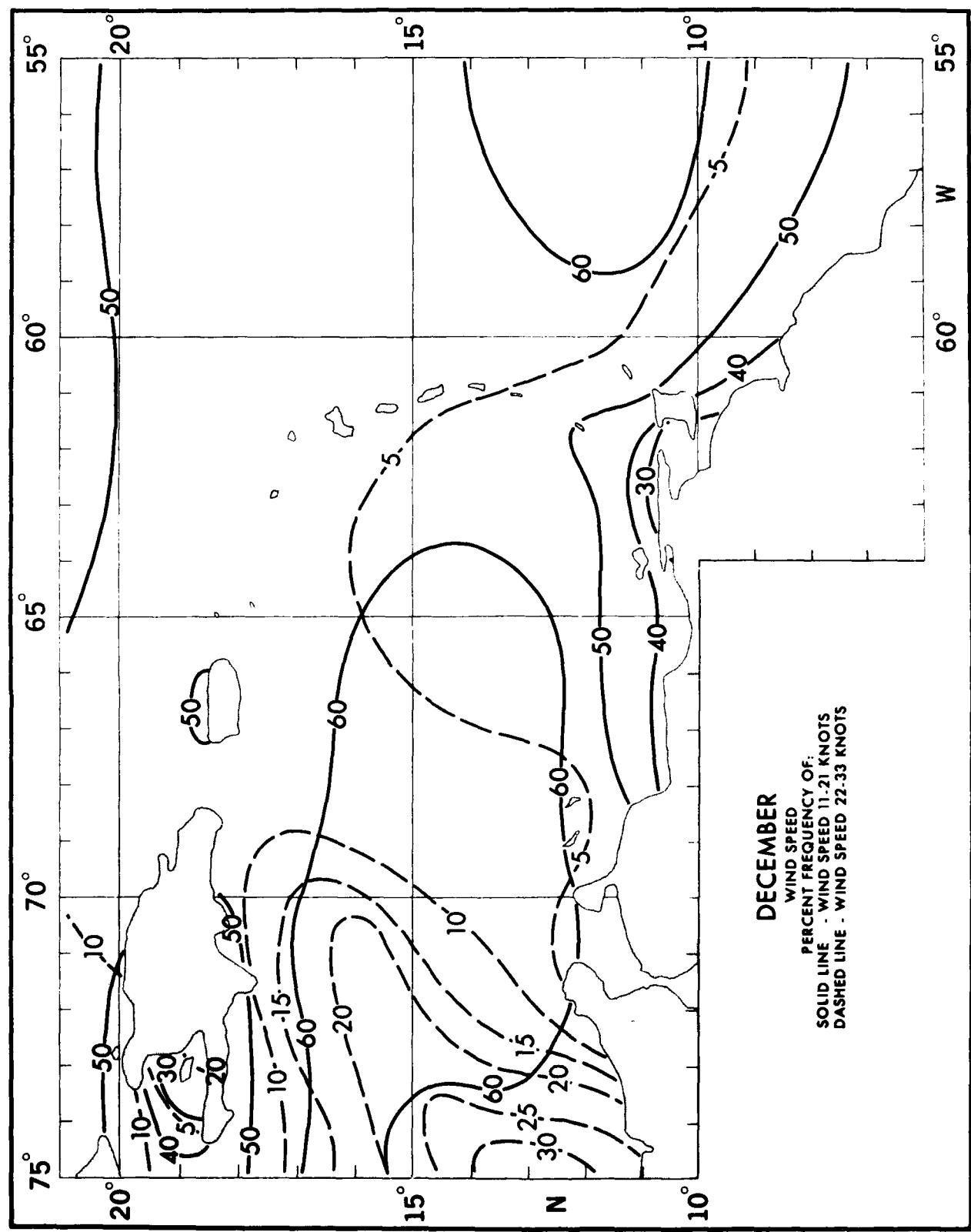


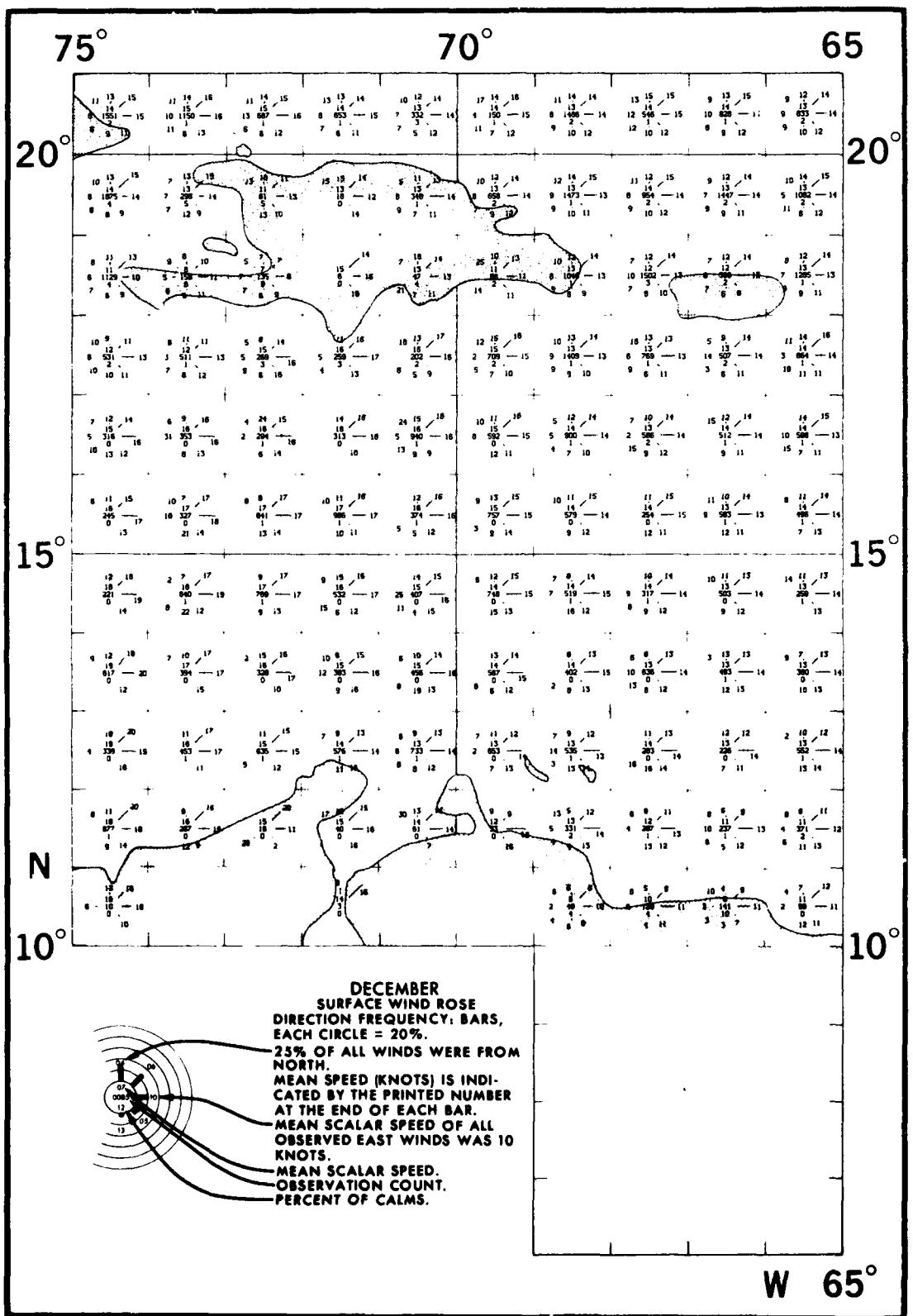


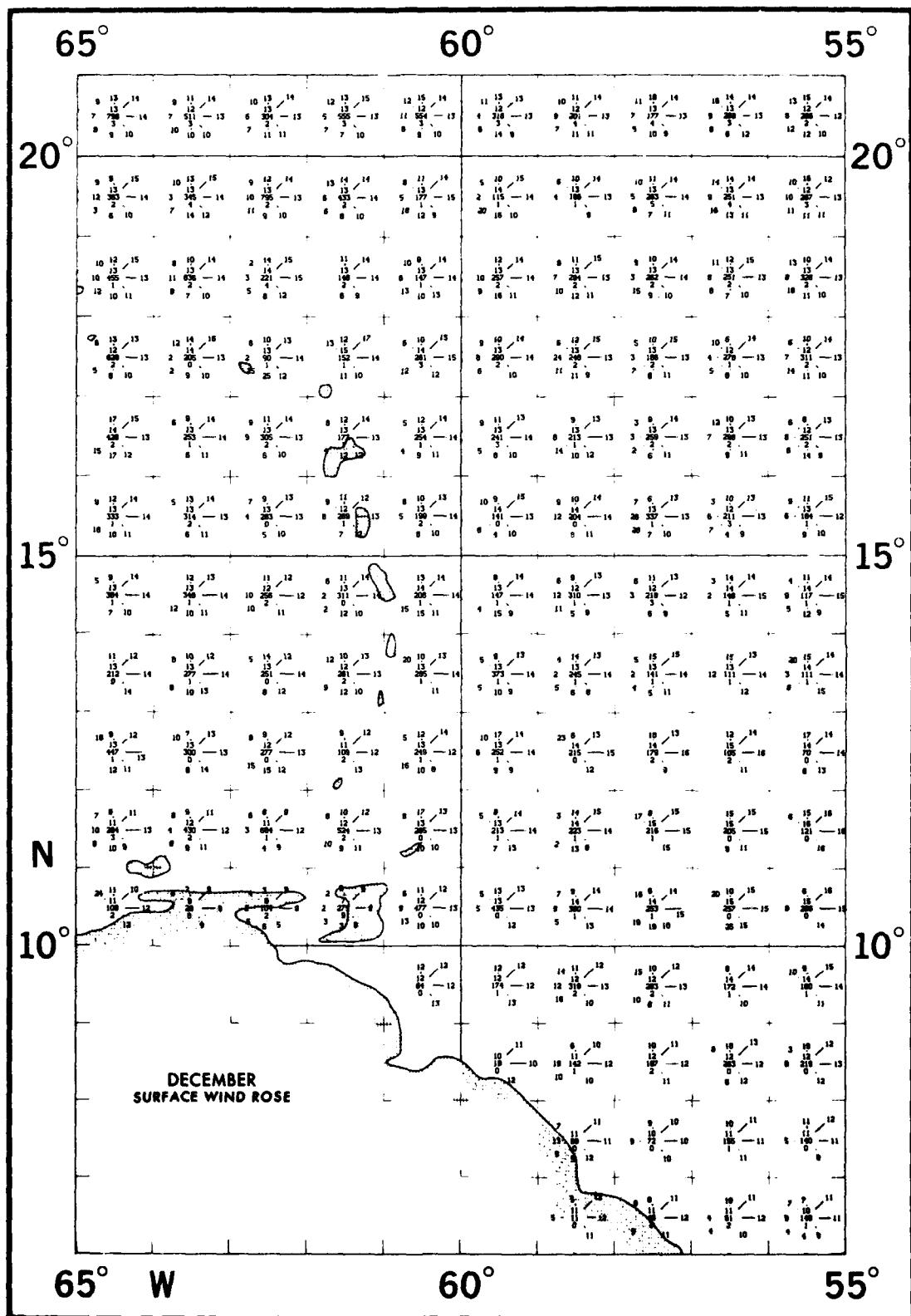


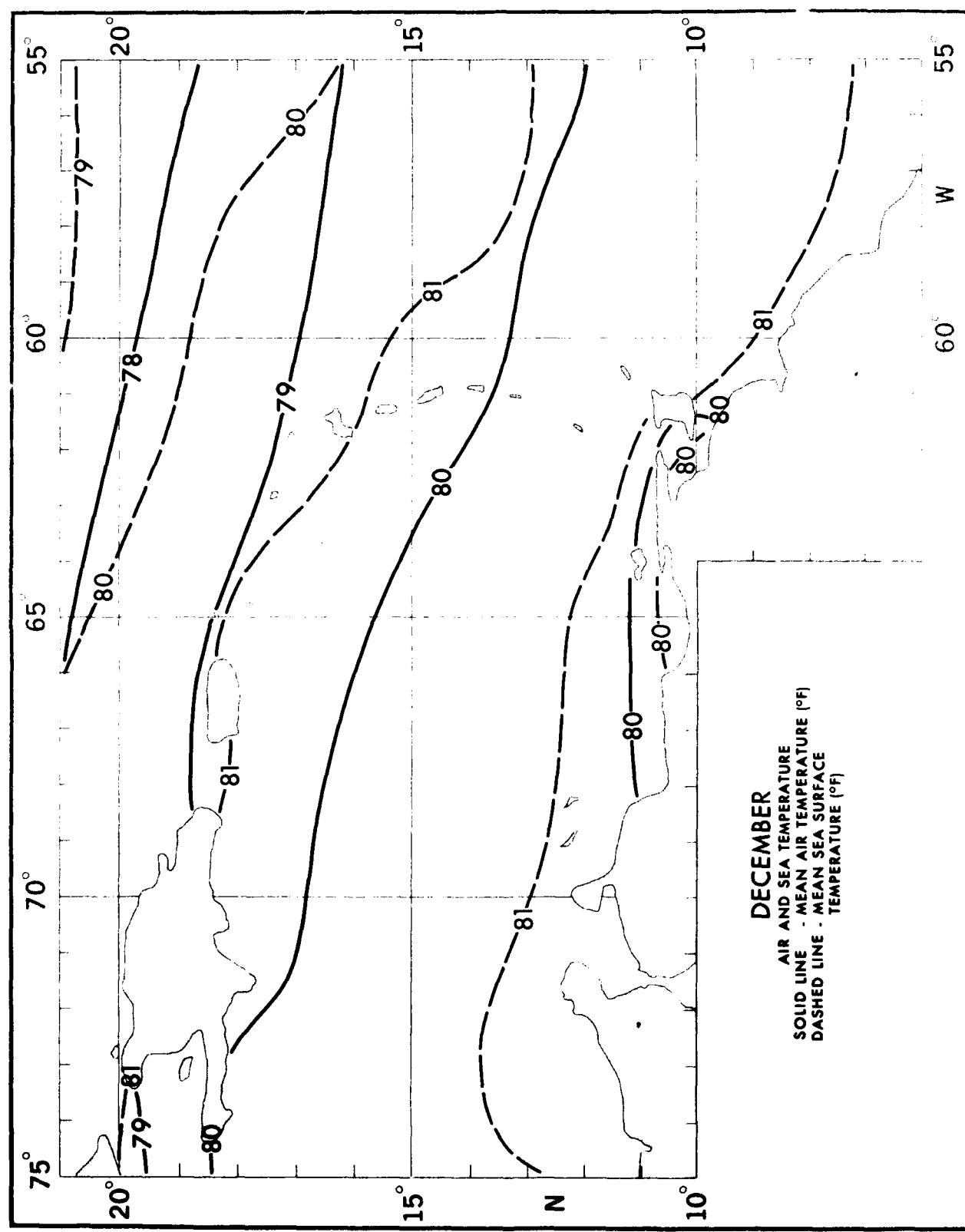


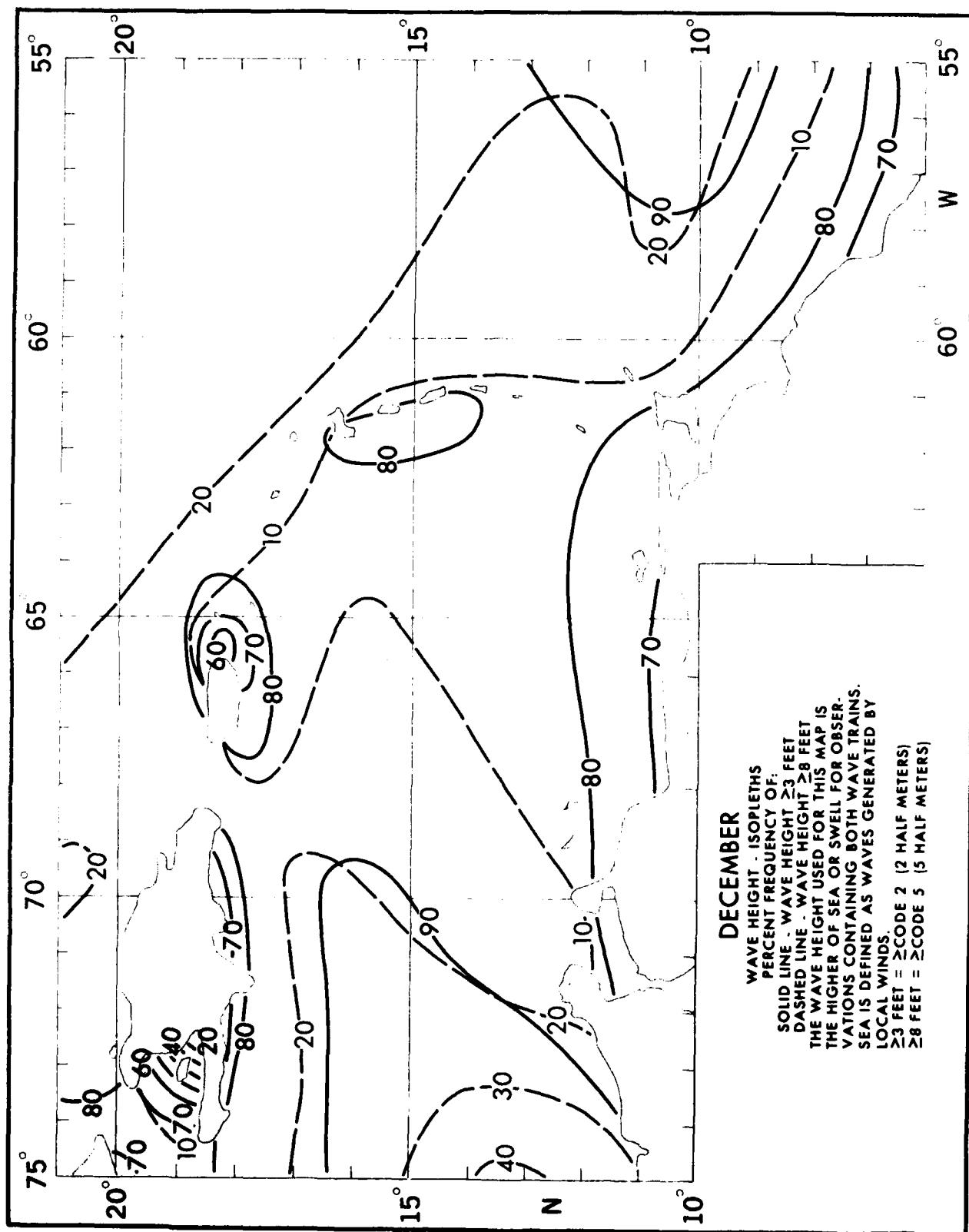


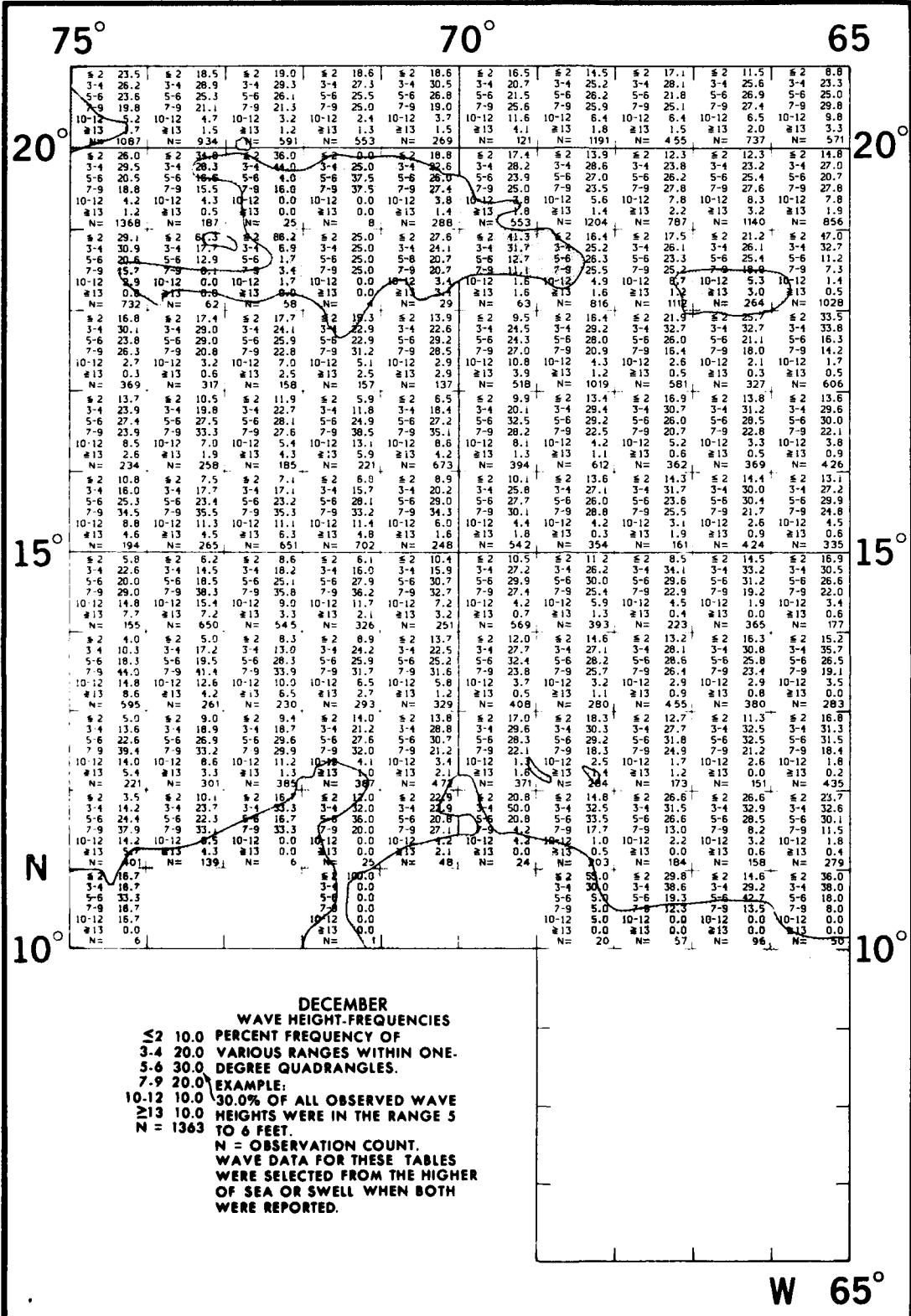












65°

60°

55°

20°

20°

15°

15°

10°

10°

65° W

60°

55°

DECEMBER
WAVE HEIGHT-FREQUENCIES

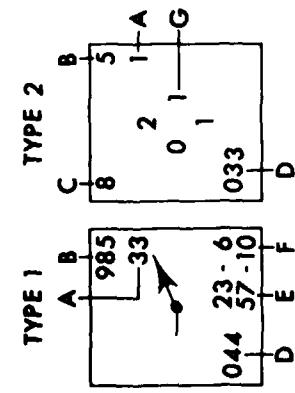
\$ 2 10.4	\$ 2 15.0	\$ 2 11.8	\$ 2 12.9	\$ 2 14.1	\$ 2 13.1	\$ 2 9.9	\$ 2 11.0	\$ 2 11.7	\$ 2 [2.3]
3-4 21.5	\$ 2 20.5	3-4 17.2	3-4 20.6	3-4 17.7	3-4 21.3	3-4 22.5	3-4 18.9	3-4 17.8	3-4 20.3
5-6 25.3	S-6 18.9	5-6 21.0	5-6 20.6	5-6 24.1	5-6 19.6	5-6 22.5	5-6 18.2	5-6 18.7	5-6 21.2
7-8 28.7	7-8 30.8	7-8 37.9	7-8 30.6	7-8 29.0	7-8 29.0	7-8 29.8	7-8 27.6	7-8 41.1	7-8 30.2
10-12 9.6	10-12 10.2	7-2 10-12 7.2	10-12 11.5	10-12 9.0	10-12 10.6	10-12 11.9	10-12 11.9	10-12 6.5	10-12 12.7
±13 2.5	±13 5.8	±13 4.1	±13 3.8	±13 3.0	±13 4.5	±13 5.3	±13 5.5	±13 4.2	±13 3.3
N= 596	N= 360	N= 195	N= 340	N= 369	N= 245	N= 151	N= 127	N= 214	N= 212
\$ 2 13.3	\$ 2 14.6	\$ 2 9.0	\$ 2 8.0	\$ 2 11.0	\$ 2 8.2	\$ 2 6.2	\$ 2 7.5	\$ 2 5.8	\$ 2 12.8
3-4 23.3	3-4 18.4	3-4 23.6	3-4 21.6	3-4 24.4	3-4 24.7	3-4 22.6	3-4 15.6	3-4 21.1	3-4 19.4
5-6 22.2	5-6 21.9	5-6 26.5	5-6 26.5	5-6 22.8	5-6 23.5	5-6 26.5	5-6 23.2	5-6 27.5	5-6 25.0
7-8 27.0	7-8 34.0	7-8 31.1	7-8 30.1	7-8 26.8	7-8 31.9	7-8 29.3	7-8 32.8	7-8 29.6	7-8 29.6
10-12 4.8	10-12 8.5	10-12 10.4	10-12 11.0	10-12 11.8	10-12 8.2	10-12 10.3	10-12 12.1	10-12 6.9	10-12 9.7
±13 1.5	±13 2.4	±13 2.7	±13 3.1	±13 3.5	±13 3.5	±13 2.1	±13 1.5	±13 2.0	±13 3.6
N= 270	N= 212	N= 511	N= 264	N= 127	N= 85	N= 146	N= 199	N= 204	N= 196
\$ 2 21.7	\$ 2 10.7	\$ 2 8.5	\$ 2 11.0	\$ 2 5.4	\$ 2 6.2	\$ 2 11.9	\$ 2 11.8	\$ 2 9.6	\$ 2 9.6
3-4 22.9	25.6	3-4 17.0	3-4 20.0	3-4 25.4	3-4 16.7	3-4 20.8	3-4 23.2	3-4 19.8	3-4 17.7
5-6 19.7	5-6 24.0	5-6 28.4	5-6 29.0	5-6 21.4	5-6 26.4	5-6 23.0	5-6 21.3	5-6 20.9	5-6 26.2
7-8 16.9	7-8 30.5	7-8 29.8	7-8 26.0	7-8 29.5	7-8 33.8	7-8 30.5	7-8 29.9	7-8 26.7	7-8 34.4
10-12 6.8	10-12 12.3	10-12 9.0	10-12 12.5	10-12 12.3	10-12 8.0	10-12 11.8	10-12 8.6	10-12 6.7	10-12 10.7
±13 2.0	±13 3.0	±13 5.0	±13 5.0	±13 6.3	±13 2.0	±13 1.8	±13 1.4	±13 5.3	±13 3.3
N= 249	N= 141	N= 100	N= 112	N= 204	N= 220	N= 178	N= 135	N= 167	N= 206
\$ 2 18.6	\$ 2 25.8	\$ 2 18.7	\$ 2 3.8	\$ 2 5.9	\$ 2 10.5	\$ 2 10.1	\$ 2 13.3	\$ 2 12.0	\$ 2 11.7
3-4 29.8	3-4 32.0	3-4 24.1	3-4 26.7	3-4 18.6	3-4 19.1	3-4 22.5	3-4 17.0	3-4 18.6	3-4 18.0
5-6 27.2	5-6 18.0	5-6 31.5	5-6 22.9	5-6 28.8	5-6 25.0	5-6 23.6	5-6 26.7	5-6 26.1	5-6 26.7
7-8 21.7	7-8 21.1	7-8 22.2	7-8 23.8	7-8 31.4	7-8 34.5	7-8 26.4	7-8 31.9	7-8 31.1	7-8 31.1
10-12 2.3	10-12 12.2	3-7 12.2	10-12 16.2	10-12 11.3	10-12 6.4	10-12 11.8	10-12 8.1	10-12 10.2	10-12 10.7
±13 0.5	±13 0.0	±13 1.9	±13 6.7	±13 3.9	±13 4.5	±13 5.6	±13 3.0	±13 3.0	±13 1.9
N= 429	N= 128	N= 54	N= 105	N= 204	N= 220	N= 178	N= 135	N= 167	N= 206
\$ 2 17.0	\$ 2 12.9	\$ 2 17.1	\$ 2 20.2	\$ 2 8.6	\$ 2 14.8	\$ 2 13.5	\$ 2 13.2	\$ 2 11.5	\$ 2 16.1
3-4 32.6	3-4 30.0	3-4 35.5	3-4 30.7	3-4 23.9	3-4 20.5	3-4 17.0	3-4 19.1	3-4 23.7	3-4 16.1
5-6 27.1	5-6 31.2	5-6 24.1	5-6 22.8	5-6 19.6	5-6 19.3	5-6 19.1	5-6 26.3	5-6 22.4	5-6 23.7
7-8 21.2	7-8 19.4	7-8 19.7	7-8 17.5	7-8 35.0	7-8 35.2	7-8 39.7	7-8 31.6	7-8 32.7	7-8 29.7
10-12 1.7	10-12 5.9	10-12 3.1	10-12 6.1	10-12 11.7	10-12 8.5	10-12 7.8	10-12 7.9	10-12 8.3	10-12 11.0
±13 0.3	±13 0.4	±13 0.4	±13 2.6	±13 1.2	±13 1.7	±13 2.8	±13 2.0	±13 1.3	±13 3.4
N= 288	N= 170	N= 228	N= 114	N= 163	N= 176	N= 141	N= 152	N= 156	N= 118
\$ 2 15.0	\$ 2 20.2	\$ 2 17.8	\$ 2 30.5	\$ 2 19.9	\$ 2 9.4	\$ 2 8.7	\$ 2 11.9	\$ 2 10.5	\$ 2 11.8
3-4 29.9	3-4 32.5	3-4 34.4	3-4 20.7	3-4 19.2	3-4 20.8	3-4 27.0	3-4 18.1	3-4 19.0	3-4 26.1
5-6 27.2	5-6 28.8	5-6 30.3	5-6 28.6	5-6 24.5	5-6 18.8	5-6 22.2	5-6 27.1	5-6 24.8	5-6 24.4
7-8 22.0	7-8 17.3	7-8 19.9	7-8 14.9	7-8 15.8	7-8 27.2	7-8 39.6	7-8 28.6	7-8 35.6	7-8 32.4
10-12 3.5	10-12 0.9	10-12 1.6	10-12 2.5	10-12 7.3	10-12 9.4	10-12 12.7	10-12 4.5	10-12 8.6	10-12 7.6
±13 2.4	±13 0.4	±13 1.8	±13 2.0	±13 2.0	±13 2.1	±13 0.8	±13 4.8	±13 1.7	±13 1.7
N= 254	N= 243	N= 221	N= 203	N= 151	N= 96	N= 126	N= 177	N= 105	N= 119
\$ 2 16.7	\$ 2 16.4	\$ 2 17.2	\$ 2 22.8	\$ 2 16.4	\$ 2 14.6	\$ 2 6.5	\$ 2 11.9	\$ 2 14.3	\$ 2 11.0
3-4 30.8	3-4 29.0	3-4 33.3	3-4 27.9	3-4 20.1	3-4 22.5	3-4 3.4	3-4 19.3	3-4 15.2	3-4 20.9
5-6 28.3	5-6 25.6	5-6 26.7	5-6 28.5	5-6 23.9	5-6 27.0	5-6 31.8	5-6 26.6	5-6 26.7	5-6 16.5
7-8 21.7	7-8 25.6	7-8 18.9	7-8 18.3	7-8 32.1	7-8 27.0	7-8 29.9	7-8 33.0	7-8 27.6	7-8 38.5
10-12 1.4	10-12 3.4	10-12 1.7	10-12 2.6	10-12 5.0	10-12 3.4	10-12 7.8	10-12 7.3	10-12 12.4	10-12 12.1
±13 1.1	±13 0.4	±13 2.2	±13 0.0	±13 2.5	±13 5.6	±13 0.5	±13 2.8	±13 3.8	±13 1.1
N= 276	N= 238	N= 180	N= 235	N= 159	N= 89	N= 154	N= 109	N= 105	N= 91
\$ 2 14.1	\$ 2 15.2	\$ 2 14.2	\$ 2 19.4	\$ 2 7.9	\$ 2 8.2	\$ 2 19.6	\$ 2 11.2	\$ 2 4.1	\$ 2 10.7
3-4 37.2	3-4 32.0	3-4 32.2	3-4 26.9	3-4 26.6	3-4 20.0	3-4 17.9	3-4 16.9	3-4 28.8	3-4 25.3
5-6 26.2	5-6 32.3	5-6 30.6	5-6 28.1	5-6 31.7	5-6 32.8	5-6 27.7	5-6 26.1	5-6 24.7	5-6 26.7
7-8 17.3	7-8 18.8	7-8 20.2	7-8 27.0	7-8 27.0	7-8 32.3	7-8 27.9	7-8 34.0	7-8 27.4	7-8 26.7
10-12 1.9	10-12 0.9	10-12 1.6	10-12 1.2	10-12 4.2	10-12 5.6	10-12 10.7	10-12 6.7	10-12 13.7	10-12 6.7
±13 1.3	±13 0.0	±13 1.1	±13 0.0	±13 0.5	±13 1.0	±13 2.7	±13 2.2	±13 1.4	±13 4.0
N= 156	N= 217	N= 183	N= 160	N= 189	N= 195	N= 112	N= 89	N= 73	N= 75
\$ 2 16.0	\$ 2 17.0	\$ 2 18.8	\$ 2 25.7	\$ 2 11.4	\$ 2 9.0	\$ 2 11.6	\$ 2 9.9	\$ 2 4.0	\$ 2 10.6
3-4 38.2	3-4 33.0	3-4 38.9	3-4 25.7	3-4 29.3	3-4 23.3	3-4 14.5	3-4 19.2	3-4 21.1	3-4 14.9
5-6 29.1	5-6 31.6	5-6 24.0	5-6 26.7	5-6 29.9	5-6 30.8	5-6 30.6	5-6 23.9	5-6 28.8	5-6 28.8
7-8 16.0	7-8 15.6	7-8 16.7	7-8 27.3	7-8 25.1	7-8 31.4	7-8 31.5	7-8 33.8	7-8 27.7	7-8 27.7
10-12 1.8	10-12 1.0	10-12 1.0	10-12 1.4	10-12 3.0	10-12 7.5	10-12 10.9	10-12 6.0	10-12 6.2	10-12 10.6
±13 0.9	±13 1.4	±13 0.5	±13 0.0	±13 0.5	±13 2.3	±13 1.1	±13 1.5	±13 2.3	±13 6.4
N= 337	N= 218	N= 208	N= 74	N= 167	N= 133	N= 138	N= 130	N= 71	N= 47
\$ 2 24.0	\$ 2 23.5	\$ 2 6.2	\$ 2 20.0	\$ 2 11.9	\$ 2 11.8	\$ 2 10.7	\$ 2 11.7	\$ 2 8.9	\$ 2 4.8
3-4 32.8	3-4 34.4	3-4 34.3	3-4 30.3	3-4 31.1	3-4 26.0	3-4 18.9	3-4 18.8	3-4 16.5	3-4 26.3
5-6 27.9	5-6 26.4	5-6 27.4	5-6 27.6	5-6 20.3	5-6 25.7	5-6 25.2	5-6 28.6	5-6 35.5	5-6 27.4
7-8 12.6	7-8 14.8	7-8 12.6	7-8 19.7	7-8 27.1	7-8 31.6	7-8 38.4	7-8 26.6	7-8 30.4	7-8 27.7
10-12 2.2	10-12 10.2	10-12 1.0	10-12 1.6	10-12 1.9	10-12 6.2	10-12 4.4	10-12 5.7	10-12 13.0	10-12 4.1
±13 0.5	±13 0.0	±13 0.0	±13 0.5	±13 0.5	±13 3.4	±13 1.3	±13 1.3	±13 3.8	±13 1.2
N= 351	N= 311	N= 0	N= 435	N= 370	N= 177	N= 136	N= 159	N= 154	N= 84
\$ 2 16.2	\$ 2 28.6	\$ 2 20.8	\$ 2 28.7	\$ 2 17.3	\$ 2 12.2	\$ 2 10.9	\$ 2 6.0	\$ 2 7.1	\$ 2 9.8
3-4 23.6	3-4 42.9	3-4 34.4	3-4 28.6	3-4 29.5	3-4 23.1	3-4 22.1	3-4 22.5	3-4 19.4	3-4 14.2
5-6 26.4	5-6 21.4	5-6 24.5	5-6 26.2	5-6 26.9	5-6 25.5	5-6 27.4	5-6 31.0	5-6 27.1	5-6 29.2
7-8 15.3	7-8 9.0	7-8 16.9	7-8 17.5	7-8 22.1	7-8 30.0	7-8 25.3	7-8 29.5	7-8 35.9	7-8 34.4
10-12 1.4	10-12 1.0	10-12 1.9	10-12 1.0	10-12 3.4	10-12 6.8	10-12 12.3	10-12 9.5	10-12 8.2	10-12 8.5
±13 0.0	±13 0.0	±13 0.0	±13 0.0	±13 0.8	±13 2.4	±13 2.1	±13 1.5	±13 2.4	±13 3.8
N= 72	N= 14	N= 53	N= 0	N= 353	N= 337	N= 285	N= 200	N= 170	N= 212
\$ 2 50.0	\$ 2 13.8	\$ 2 16.7	\$ 2 6.2	\$ 2 12.0	\$ 2 9.1	\$ 2 8.2	\$ 2 6.3	\$ 2 6.3	\$ 2 6.3
3-4 50.0	3-4 29.3	3-4 20.1	3-4 3.4	3-4 26.9	3-4 25.8	3-4 19.4	3-4 3.4	3-4 13.0	3-4 20.4
5-6 0.0	5-6 22.4	5-6 24.0	5-6 22.4	5-6 26.5	5-6 34.3	5-6 29.2	5-6 26.4	5-6 20.4	5-6 20.4
7-8 0.0	7-8 32.8	7-8 26.3	7-8 22.7	7-8 22.7	7-8 26.0	7-8 30.3	7-8 49.1	7-8 49.1	7-8 49.1
10-12 0.0	10-12 1.7	10-12 0.9	10-12 0.9	10-12 0.9	10-12 3.7	10-1			

SURFACE CURRENTS

Data Presentation

The following legend shows two types of surface current presentations by 1° quadrangle, type 1 with 12 or more observations and type 2 with fewer than 12 observations. Where there are 11 or fewer observations within a 1° quadrangle, the total number of observations is shown within the 90° quadrant containing the observations.

A Number of calms (included in total observations).



B Total observations

C Mean speed (0.8 knot) for all observations.

D Vector resultant direction (0° T) for all observations.

E Percent frequencies (57% primary direction, 23% secondary direction).

F Mean speeds (1.0 knot primary direction, 0.6 knot secondary direction).

G Number of observations by quadrant.

Type 1 - If there are 12 or more non-calm observations in a 1° quadrangle, the surface current is depicted by vector resultants as follows:

Persistent Current - 60 percent or more of all observations fall within a 45° sector of the 8-point compass.

Primary Current with Secondary Direction -

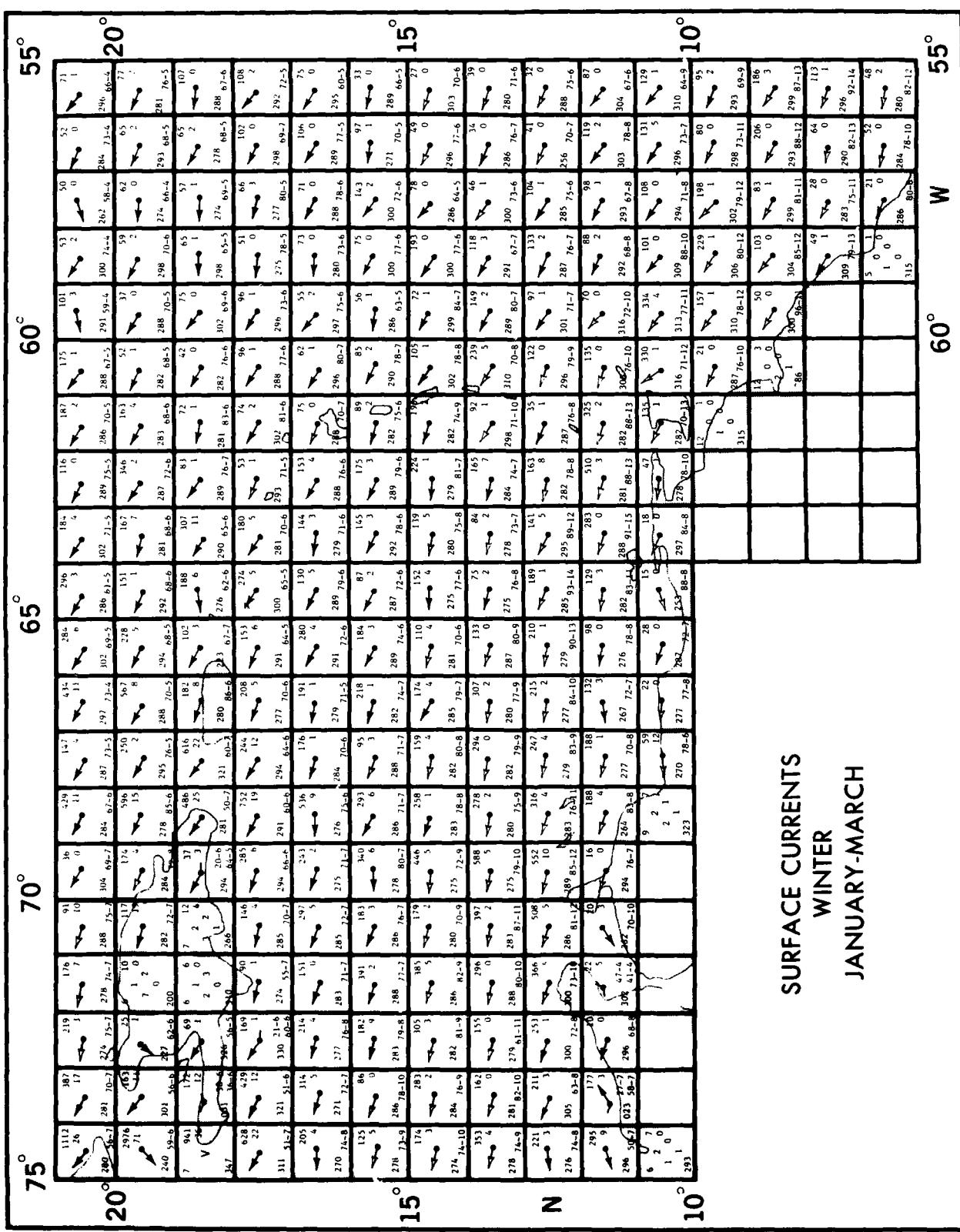
Primary Current - 50 percent or more of all observations fall within three adjacent 45° sectors.

Secondary Direction - 20 percent or more of all observations fall within a 45° sector, and the two resultant vector directions are separated by more than 90° of arc.

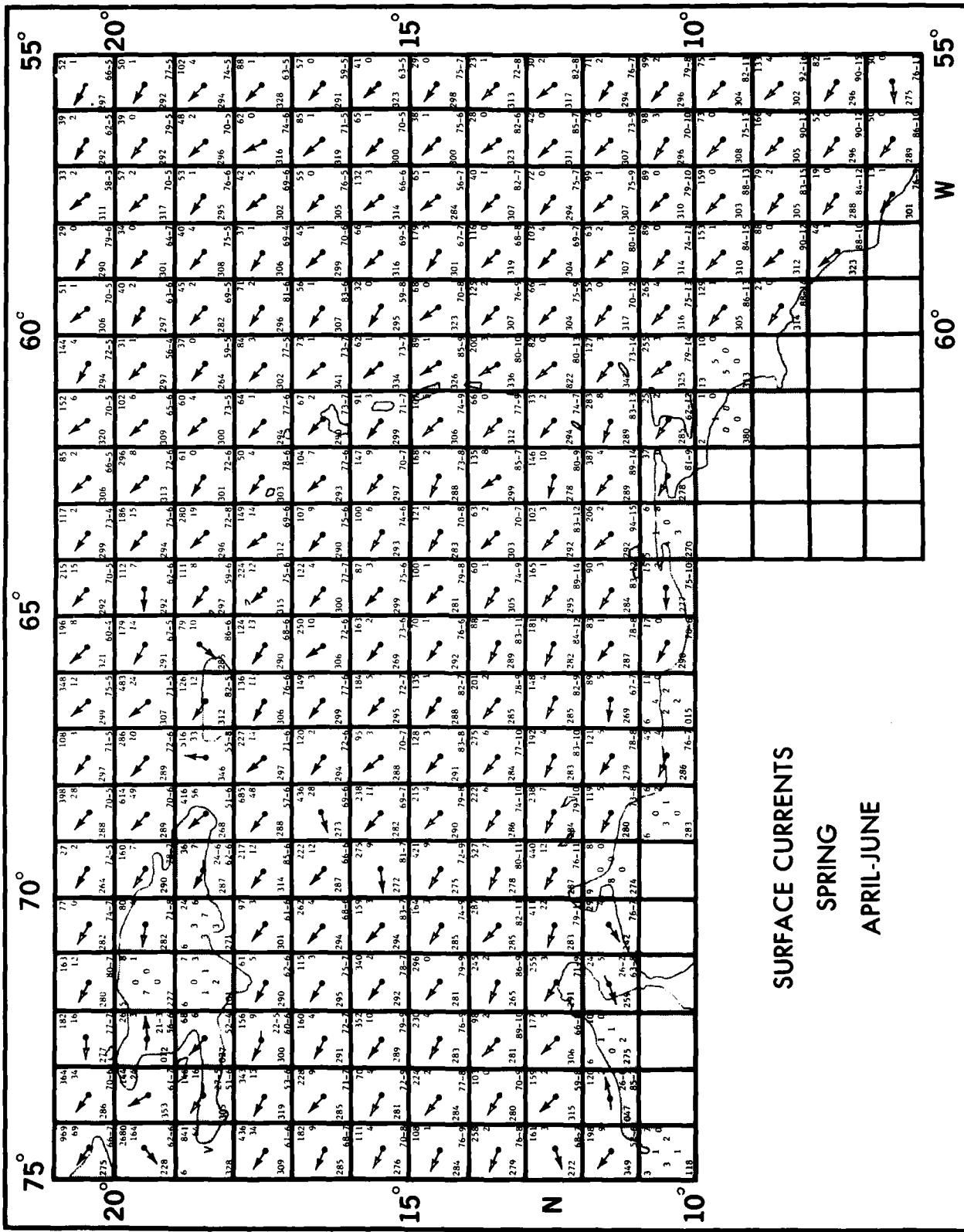
Prevailing Current - 70 percent or more of all observations fall within two adjacent 45° sectors.

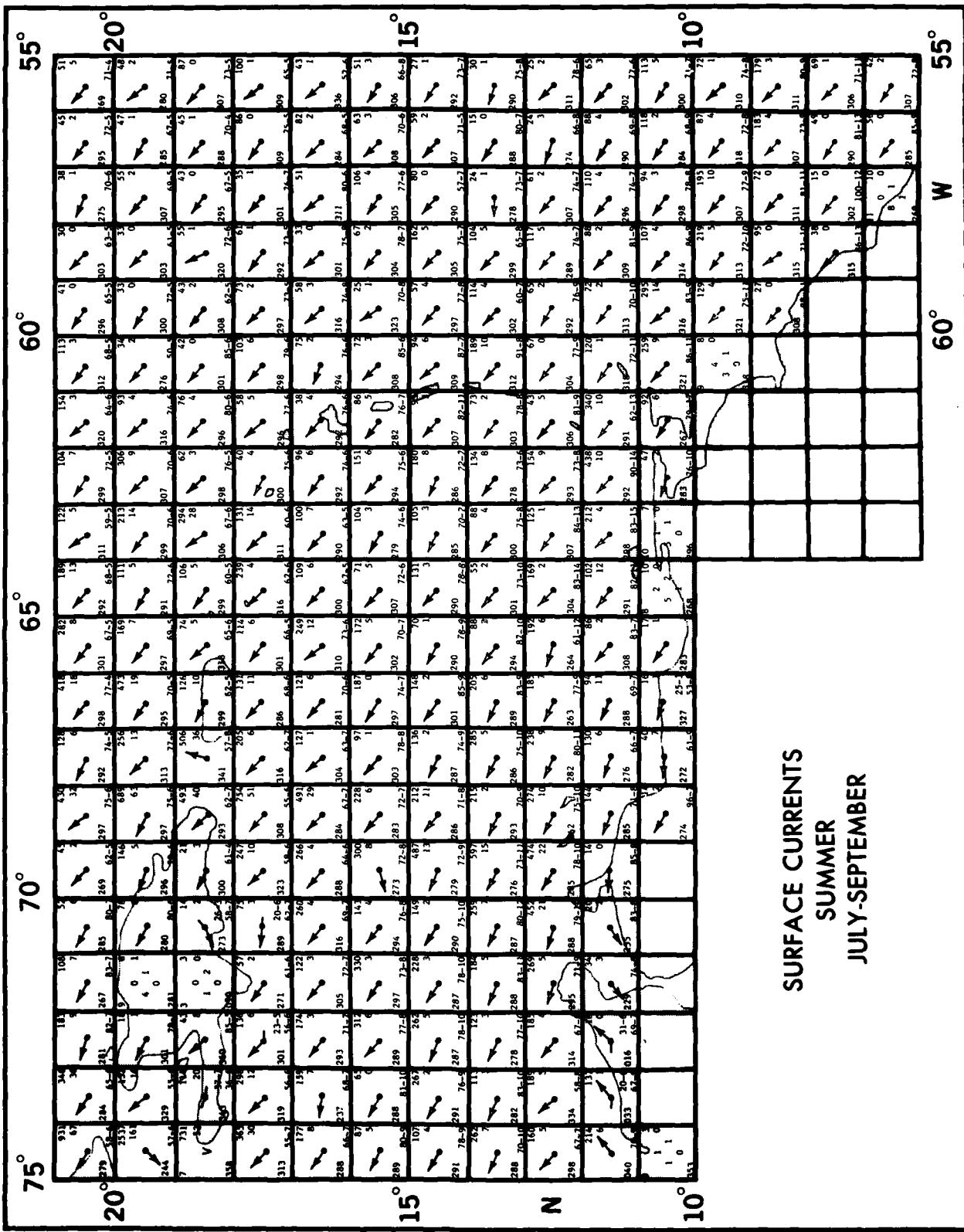
Bizonal Flow - Practically all observations are concentrated in opposite pairs of 45° sectors, and one pair contains at least 80 percent as many observations as the opposite pair. This generally indicates variability that occurs in zones of entrainment between opposing currents.

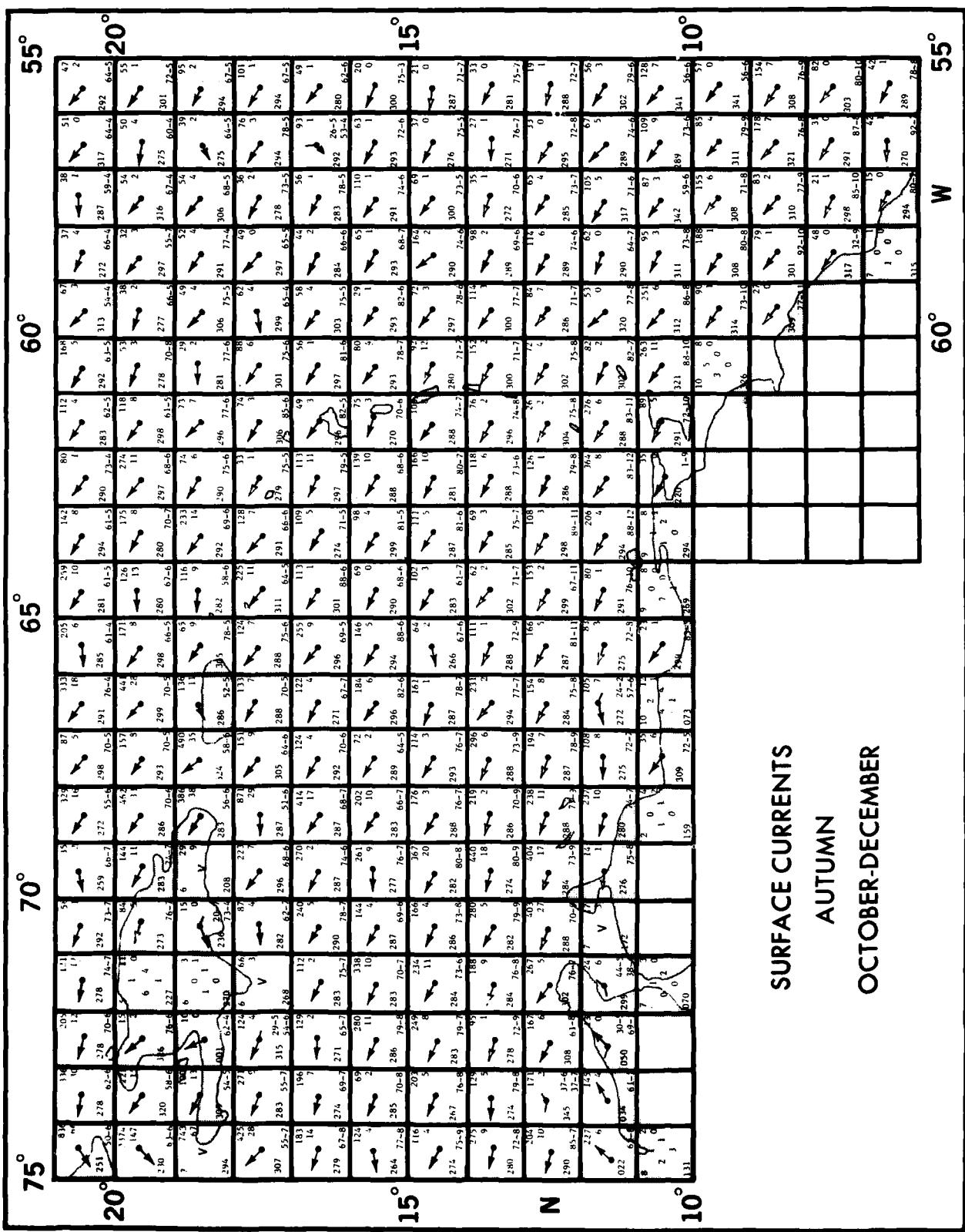
Variable Current - The 45° sector with most observations has less than 25 percent of all observations; direction is indeterminate.



SURFACE CURRENTS
WINTER
JANUARY-MARCH







SURFACE CURRENTS
AUTUMN
OCTOBER-DECEMBER

END
DATE
FILMED
10-86