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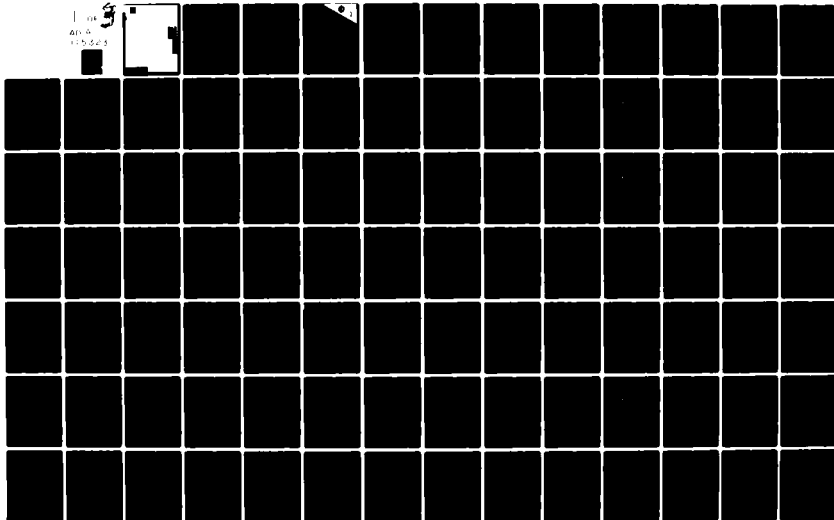
CLIMATIC STUDY OF THE MALACCA AND SUNDA STRAITS, NEAR COASTAL 'Z--ETC(U)

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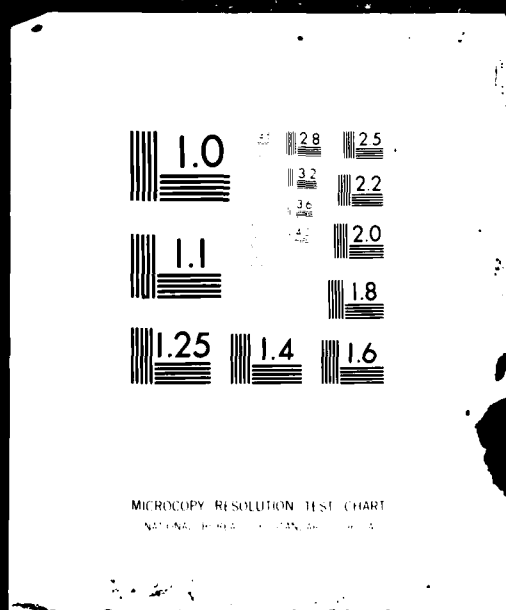
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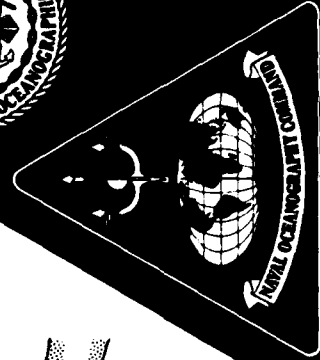
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Climatic Study of the Malacca and Sunda Straits Near Coastal Zone

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This near-coastal zone study was prepared by direction of the Commander, Naval Oceanography Command and coordinated by the Naval Oceanography Command Detachment, Asheville, North Carolina. Work was performed by the National Climatic Center (NCC).

Introduction

The climate within the study area is largely controlled by the two distinct monsoon seasons: the northeast monsoon (December through March) and the southwest monsoon (April through November). The principal transition months or inter-monsoon periods are April through May and October through November. Figure 1 shows the mean equatorial trough and vector mean winds for January and July. This gives some idea as to the annual displacement of the equatorial trough and the prevailing winds for the two distinct monsoon seasons.

Since the equatorial trough moves across the equator once in a northerly direction and once in a southerly direction each year, it is understandable that many locations report a double maximum for precipitation. Many of the double maximums occur in May and November, but occasionally occur in preceding or following months. For more detail, the seasonal distribution of mean rainfall and air temperatures (Figure 2) and annual rainfall amounts (Figure 3) are shown for selected stations.

Latitude is one of the most important factors influencing climate. Being close to the equator, conditions vary little from the mean, and climatology is fairly representative of expected conditions. Within the study area, local climates vary more because of local topography and local wind effects. These factors influence thunderstorm development and propagation. In general, an equatorial monsoon climate brings uniformity of precipitation, humidity, and temperature; and, on a comparative worldwide scale, these three elements are found on the upper end of the scale.

Geographical and Data Coverage

This study covers the marine areas leading into and out of the Strait of Malacca and Sunda Strait. It is significant that this area (10°S to 7°N) is divided by the equator. North of the equator the east-west coverage is from 92°E to 107°E, while south of the equator it is from 90°E to 112°E. The surface marine statistics are presented on monthly charts in the form of tables, graphs, and isopleth maps. Tables and graphs by one-degree quadrangle have been split into two areas of slightly smaller geographical coverage: Strait of Malacca, 1°S to 7°N, 94°E to 105°E; Sunda Strait, 10°S to 2°S, 99°E to 110°E.

To supplement the isopleth maps and the one-degree graphs and tables, four representative areas were chosen and additional statistics given. These presentations have been placed in the lower left corner of the isopleth charts. All of the graphs and tables represent the objective compilation of available data; they were not adjusted for suspected biases, and differences may be found when comparing the graphic data with the isopleth analyses.

Approximately 620,000 surface marine observations were used in computing the statistics. These data, taken from NCC's Tape Data Family 11 (TDF-11), contain data collected by ships of various registry traveling through the study area between 1854 and 1979. Inventories of the NCC data set show that most ocean regions of the world have the largest percentage of their observations taken after 1940; but in this case 60% of the observations were taken prior to 1940. As a rule, earlier observations do not contain as many elements as more recent ones. The sea surface current information was extracted from Naval Oceanographic Office Special Publications 1404-IN2 and 1404-IN4, Surface Currents Northeast Indian Ocean Including the Bay of Bengal, Andaman Sea and South China Sea and Surface Currents Central Indian Ocean, respectively.

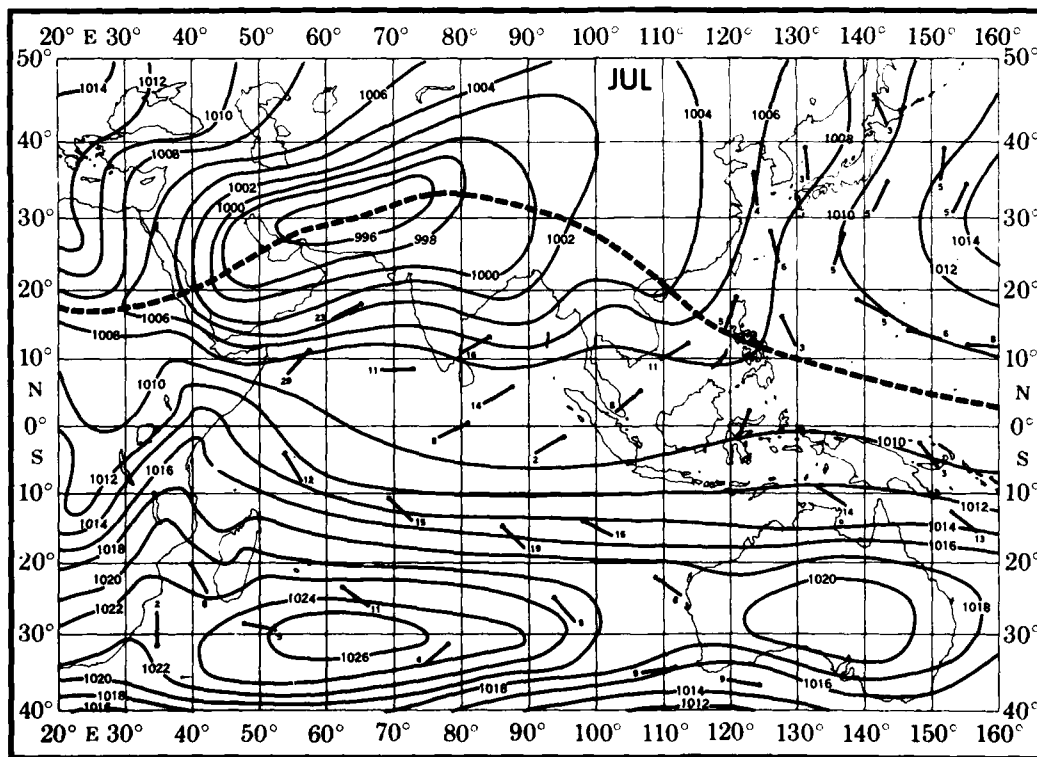
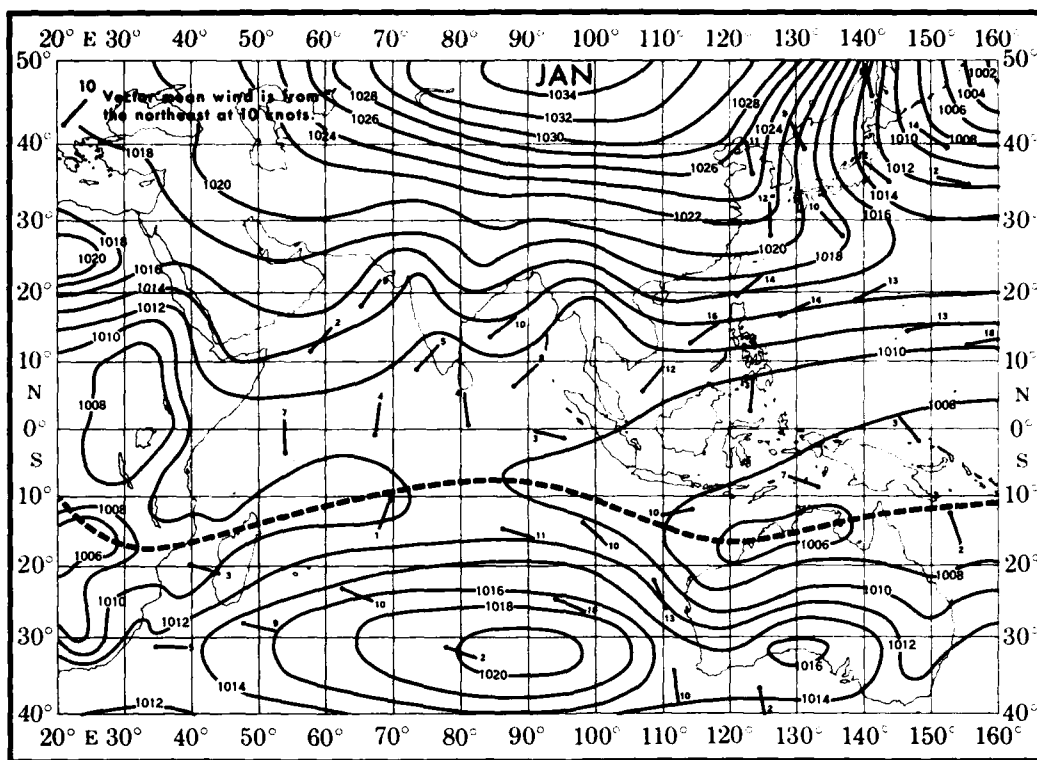


Fig. 1 MEAN EQUATORIAL TROUGH AND VECTOR MEAN WINDS

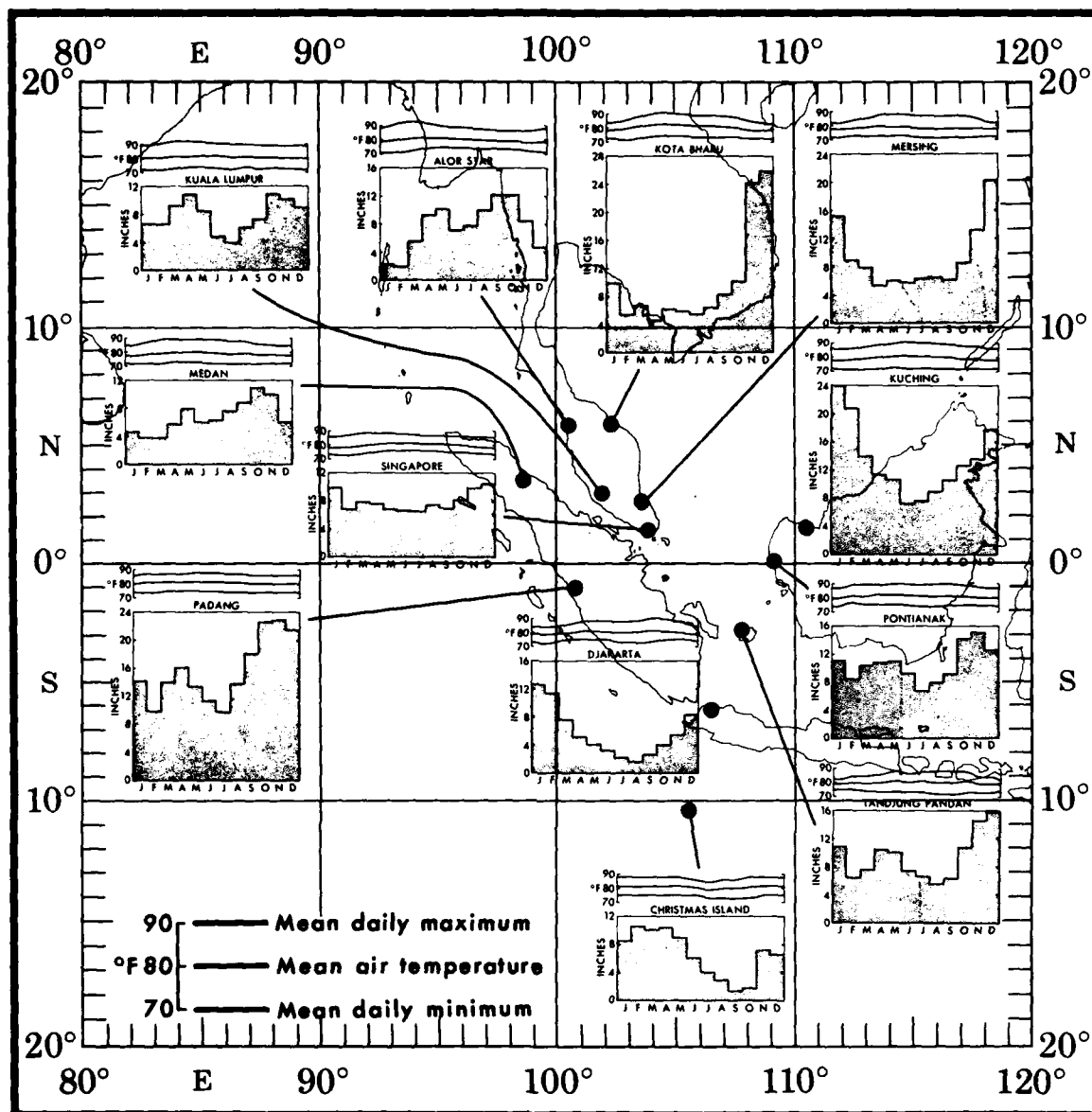


Fig. 2 MONTHLY MEANS OF AIR TEMPERATURE AND RAINFALL

The density of observations is greatest along the major shipping routes and, therefore, the reliability is better in those more-traveled areas. In this region, most of the shipping was in and out of the Malacca Strait providing relatively good coverage, while rather weak coverage is the rule for the remaining areas, especially the region to the west of Sumatra.

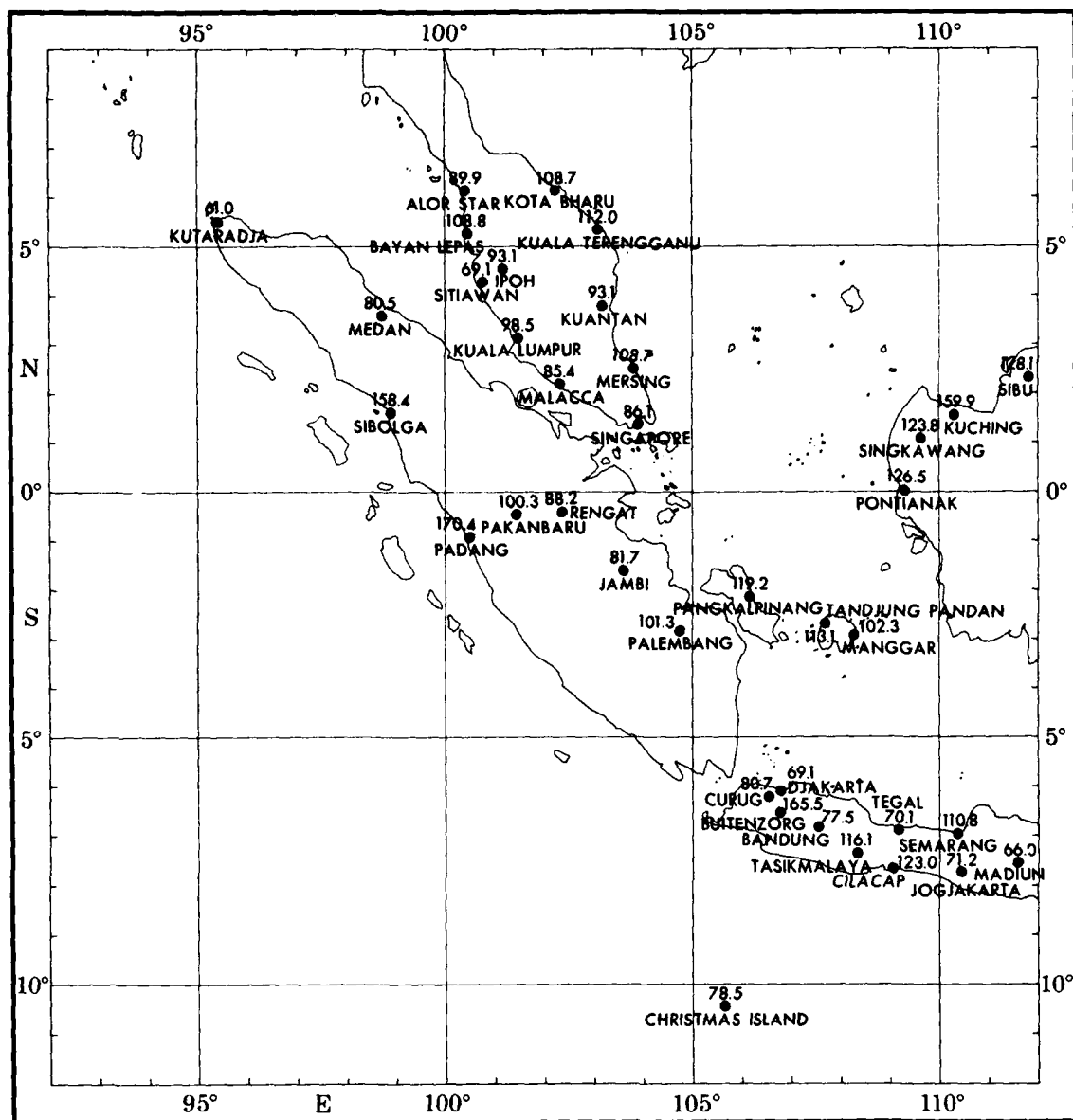


Fig. 3 MEAN ANNUAL RAINFALL (inches)

Physical Features

The Malacca Strait is the highly-traveled channel between the island of Sumatra and the Malay Peninsula that provides passage for trade between the Indian Ocean and the South China Sea. The strait is approximately 500 miles long, varying in width from 40 miles in the south to 300 miles in the north. The depth of the strait ranges from six to 60 fathoms. Also, the southern entrance is restricted to narrower passages by the numerous islands off Singapore. The main connecting route between the Malacca Strait and the South China Sea is through the Singapore Strait which is approximately 10 miles wide by 50 miles long.

Another route between the South China Sea and the Indian Ocean is through the lesser-traveled Sunda Strait which lies between the islands of Sumatra and Java. The channel actually connects the Java Sea, which is a part of the Pacific Ocean (as is the South China Sea), and the Indian Ocean. It is only 16 miles wide at its narrowest point. Depths through the Sunda Strait run from seven to 28 fathoms.

Sumatra, the Malay Peninsula, Borneo, and Java are the major land features in the study area. Sumatra lies on the west side of the Malacca Strait stretching some 1,060 miles in length and with a maximum width of 248 miles. Along its west coast, the Barisan Mountains extend the length of the island containing many peaks from 6,000 feet to 12,000 feet high with the highest being 12,483 feet. Across the Malacca Strait from Sumatra is the Malay Peninsula extending from Thailand to 2°N. The Peninsula also has a mountain range extending down its full length. The highest peak, Tahan, is 7,186 feet; several of the peaks between 3°N and 6°N are near 7,000 feet.

Java lies to the southeast of Sumatra across the Sunda Strait. The island is 661 miles long and 124 miles wide at its widest point. Mountains extend the length of the island with more than 20 peaks extending above 8,000 feet. The highest peak located on the eastern end of the island is 12,060 feet.

East of Sumatra and north of Java lies Borneo, the largest land mass within the study area. It is rather mountainous in the north and central part with the highest peak of 13,455 feet being located in the northeastern corner, outside the study area. Peaks on the western side of the island are from 5,000 feet to 7,000 feet.

Climate

The climatic regime is equatorial monsoon. Uniformity throughout the year, high temperatures, high humidities, and abundant rainfall best describe its characteristics. It differs from most tropical monsoon climates in its lack of a truly dry season. Seasonal monsoon winds are defined as blowing consistently from one direction during the winter and another direction during the summer. They are caused by the temperature variations between large land masses and the sea. During the warm season, the land (in this case Asia) is much warmer than the sea with resultant low pressure over land; with the reverse during the colder season. This pressure distribution causes the seasonal wind flow known as the monsoon.

A general definition of a monsoon has been adapted from Ramage (1971). It defines the monsoon area as encompassing regions with January and July surface circulations in which:

1. The prevailing wind direction shifts by at least 120° between January and July.
2. The average frequency of prevailing wind directions (in quadrants) exceeds 40% in January and July.
3. The mean resultant wind speed in at least one of the months exceeds 3 m sec⁻¹; and,
4. Fewer than one cyclone-anticyclone circulation alternation occurs every two years in either month in a 5° latitude-longitude rectangle.

By "squaring off" and using the south Asian mountains as a natural northern boundary, the only region to meet all of the above criteria is enclosed by 35°N, 25°S, 30°W, and 170°E.

The four representative areas were examined to determine how well they meet these monsoon criteria (see representative statistics). The prevailing winds shifted by at least 120° between January and July for all four areas. To examine the second criterion the eight-point wind scale was adjusted into a four-point system by simply adding adjacent categories together. The results are given in Table 1 below:

TABLE 1

		<u>Prevailing Quadrant</u>	<u>Percent Frequency</u>
Area 1	January	N-NE	71%
	July	S-SE	59%
Area 2	January	NE-E	44%
	July	SE-S	35%
Area 3	January	NE-E	77%
	July	S-SW	80%
Area 4	January	W-NW	52%
	July	E-SE	63%

The second stipulation was met by all except Area 2, which departed marginally from 40%. It must be understood that the orientation of the quadrants could have some bearing on the outcome of this examination, ours being only one expedient method.

Table 2 shows the mean resultant wind speeds for the representative areas used to test the third constraint. Again, Area 2 fails the criteria.

TABLE 2

		<u>Mean Resultant Direction</u>	<u>Mean Resultant Speed</u>
Area 1	January	15 degrees	6.6 knots (3.4 m sec ⁻¹)
	July	164 degrees	4.3 knots (2.2 m sec ⁻¹)
Area 2	January	43 degrees	3.5 knots (1.8 m sec ⁻¹)
	July	177 degrees	1.3 knots (0.7 m sec ⁻¹)
Area 3	January	64 degrees	8.8 knots (4.5 m sec ⁻¹)
	July	218 degrees	11.5 knots (5.9 m sec ⁻¹)
Area 4	January	298 degrees	5.3 knots (2.7 m sec ⁻¹)
	July	126 degrees	7.6 knots (3.9 m sec ⁻¹)

The wind constancy is relatively low for Area 2 at 53% during January and 24% during July, reflecting a variable wind direction. In the same light, the scalar mean winds are also relatively light averaging 3.3 m sec⁻¹ in January and 2.8 m sec⁻¹ in July. Even if Area 2 had a high constancy, it is doubtful the third constraint would have been met with such low scalar mean wind speeds.

The fourth requirement is met by all areas, as substantiated by Klein (1957) where monthly charts show the number of cyclones' and anticyclones' centers for 20 years by five-degree square. Migratory cyclones and anticyclones rarely appear in the lower latitudes.

In the monsoon definition there are no precipitation considerations such as a dry or wet season. For example, the Sahara Desert falls within the defined monsoon region.

As one studies various texts and articles on the tropics, one discovers a number of terms are used to describe the general climatic features of the region. Many of these terms are used interchangeably while others have become outdated as more is learned about the area. The confusion among terms stems from their number; overly-simple models; introduction of new terms by authors who are rightly trying to distinguish their innovations from others; and, as Cumming (1973) pointed out, from extending mid-latitude concepts into the tropics. Some of the terms found in the literature that tend to lead to confusion are listed below. They have been placed in groups, and an attempt at defining them follows.

Group 1: Meteorological equator
Atmospheric equator
Equatorial trough
Near-equatorial trough
Intertropical trough
Monsoon trough
Doldrums equatorial trough
Doldrums

Group 2: Intertropical convergence zone
Intertropical wind convergence zone
Tropical convergence zone
Convergence zone
Equatorial convergence zone
Near-equatorial convergence zone
Intertropical front
Tropical front
Equatorial front
Cyclonic directional shear zone
Cyclonic shear zone
Tropical confluence
Confluent zones

Group 3: Heat low
Thermal low
Monsoon depression
Monsoon low
Mean circulation centers

Group 4: Equatorial easterlies
Deep trades
Deep easterlies

Group 5: Tropical easterlies
Subtropical easterlies

Group 6: Easterly wave
Equatorial vortex
Equatorial wave



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Group 7: Subtropical highs
Subtropical anticyclones
Subtropical ridge line
Near-equatorial buffer zone
Oceanic high
Oceanic anticyclones

Terms in groups 1 and 2, and rarely group 3, are used to define the line of demarkation between the trade winds out of the North (Northeast or Northwest trades) and those out of the South (Southwest or Southeast trades). Generally, this definition is reserved for those terms in group 2. Those in group 1 generally refer to the quasi-continuous belt of low pressure lying between the subtropical highs of the Northern and Southern Hemispheres, and within this region you might detect an area referred to by one of the terms in group 2.

In monsoon meteorology, the terms grouped together in group 3 basically refer to the seasonal low formed over the continent during the warm season and over the adjacent sea during the cold season. In many cases the equatorial trough (group 1) lines up with the monsoon low (group 3).

Those in group 4 are often referred to as the trade winds in the summer hemisphere when they are very deep (8 to 10 km.), while group 5 sometimes refers to the trade winds when they are shallow and exhibit a strong vertical shear. Commonly both groups (4 and 5) are used in the same context referring to the easterly trades.

In group 6 there is a difference in intensity as an equatorial vortex is a closed low within the equatorial trough that develops from an equatorial wave (easterly wave) within the equatorial easterlies.

The last group (7) refers to one of the semi-permanent highs centered near 30°N or 30°S.

No matter what nomenclature is used there is a quasi-continuous belt of low pressure surrounding the globe between the subtropical high pressures. This trough of low pressure near the equator (therefore, named the equatorial or near-equatorial trough) remains relatively constant throughout the year across the Atlantic and the eastern Pacific, but varies markedly by season across the western Pacific and Indian Oceans. The reason for this behavior is related to the subtropical highs which lay off the west coasts of the continents. These highs maintain their character year-round with their positions and intensities varying slightly with the seasons. Where the equatorial trough is tightly wedged between two subtropical highs, there is little migration. However, over Asia during the Northern Hemisphere winter, the main feature is the Siberian high. At that time, the equatorial trough is wedged between the Siberian high and the Mascarene (subtropical South Indian Ocean) high. During the Northern Hemisphere summer, when the Siberian high virtually disappears as a long-term mean feature, the equatorial trough over the Indian Ocean moves far north and aligns itself with the thermal low (monsoon trough) over southwest Asia. Because of the alignment, this equatorial trough is often referred to as the monsoon trough.

In the tropics the locations of the equatorial trough, the wind convergence zone, and maximum cloudiness do not always coincide. Godshall (1968) shows that a displacement exists between the maximum cloud cover areas and the convergence zone centers and that some of these displacements are quite large. The low-level summer monsoon trough, located to the north of our study area, has west winds on the equatorward side. The belt of maximum clouds is often confined to this west-wind area (Sadler, 1970).

One of the most useful tools for a forecaster in the tropics is the gradient-level wind chart. Comparisons of the daily gradient-level chart with the mean charts can give an indication to a forecaster that the weather is likely to change, especially where there are significant departures. A useful publication for this purpose is the Air Weather Service Technical Report 215, Volumes I and II, by Atkinson and Sadler (1970). Atkinson states that when comparing the daily isotach patterns to long-term resultant means, an abnormally large horizontal cyclonic wind shear at the gradient-level may indicate above normal convective activity. Atkinson (1971) also authored Forecaster's Guide to Tropical Meteorology, which presents many useful techniques in tropical analysis and forecasting. He states two prerequisites for accurate forecasts: (1) good analyses; and, (2) diagnoses of the cause of existing weather. The sparsity of reporting stations may limit the achievement of these prerequisites and, therefore, adversely affects the forecaster's skill.

Preparation of surface, gradient, and upper level charts proves to be very valuable in making short-range forecasts. By using all available data sources (surface stations, upper air stations, ships, satellites, radar, pilot reports, and climatology), a forecaster can construct a relatively good analysis of existing conditions. (See Fig. 4 for reporting upper air stations within the study area.) Then by extrapolating the analyzed features, one can make a fairly accurate short-range forecast. Due to the nature of the data, it is easier to extrapolate weather features associated with wind directional changes than wind speed changes. In the tropics the diurnal pressure and temperature changes are generally greater than the interdiurnal changes, making a basic knowledge of these diurnal changes a must in preparing skilled forecasts. Temperatures generally peak around 1:00 p.m. local time and reach a minimum near 6:00 a.m. Pressures peak around 10:00 a.m. and 11:00 p.m. with a minimum around 4:00 a.m. and 4:00 p.m. local time.

Stability indices have not proven to be of much use in forecasting convective activity in the tropics. Therefore, the most useful short-range forecast tool for convective activity is the ship's radar or radar reports from coastal sites.

Other forecasting aids such as radar climatologies, conditional climatologies, and objective forecast studies can be prepared for fixed locations but not very effectively for moving ships.

Hubert (1961), in a case study, showed that a vigorous system which was depicted on a satellite picture could not be delineated by standard meteorological analyses. This continues to be true today, thus underscoring the utility of satellite imagery in tropical analysis. Riehl (1979) states that, since tropical cyclones develop from cloud systems, all potential development for any location within the tropics, can be pinpointed with satellite information -- a notable technological achievement. Conventional data must also be heeded. For example, if a forecaster discovers a wind shift at a station in the tropics, then he needs to scrutinize all possible data in an effort to determine if it is a local effect or a moving wave. Again, the satellite can help a great deal with this type of problem since it will show a well-developed wave.

In a study prepared for the U.S. Army Electronics Command by the National Engineering Science Company (Goldman and Freeman, 1965), it was theorized that there is an internal wave in the easterlies at the interface of the tropical inversion which traps the lower moist layer and the upper layer of drier air. Disturbances in this internal wave can create convective activity. Standard analyses in the tropics did not generally recognize these internal waves until they became associated with showers. One of the problems was the lack of soundings. The advent of satellite soundings improved tropical analysis considerably, although further development is necessary to utilize these four-dimensional concepts. Surface data along with the potential temperature and winds along the boundary layer of the inversion must be analyzed a number of times a day in order to locate and track the internal waves.

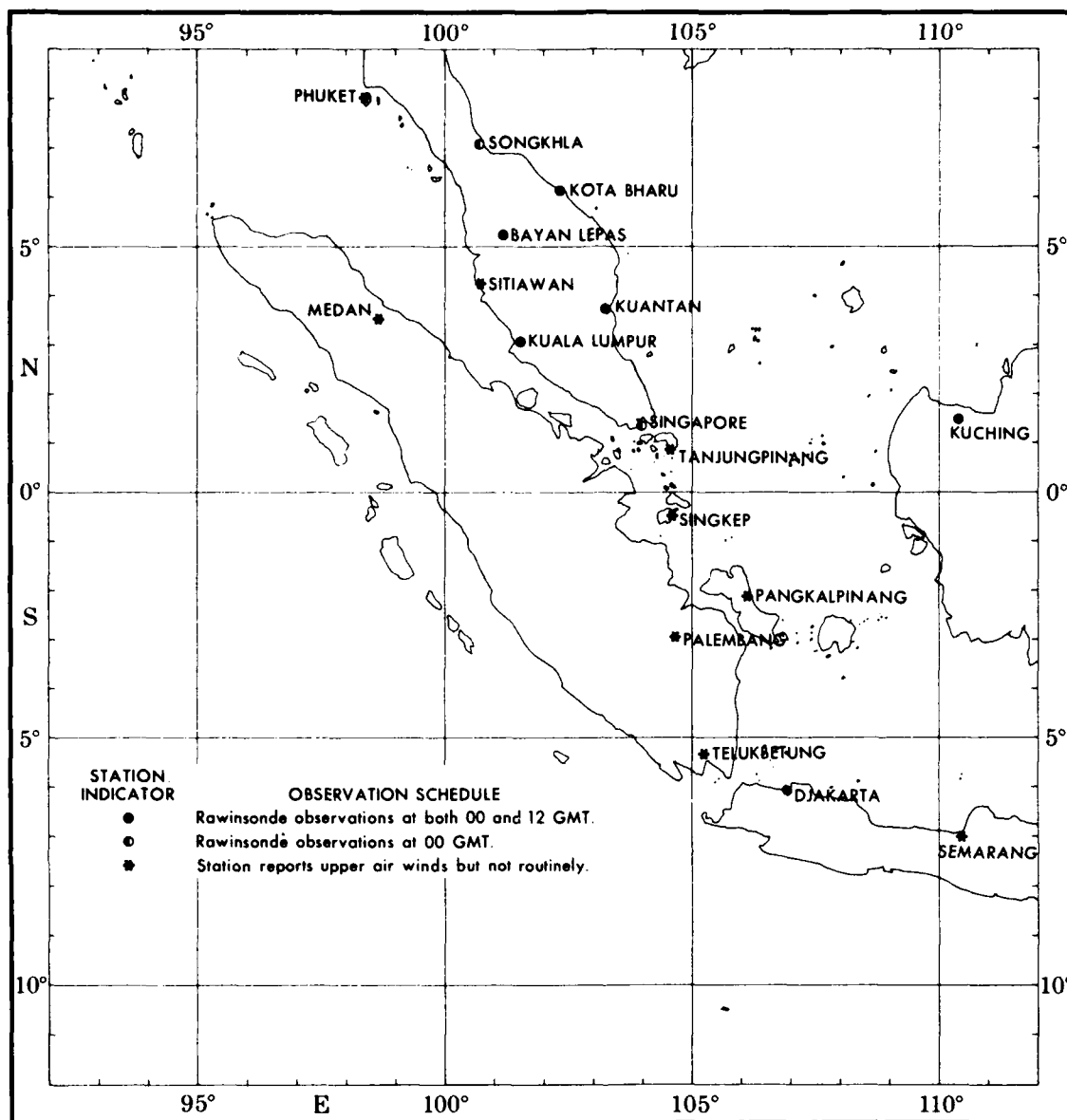


Fig. 4 UPPER AIR REPORTING STATIONS AS OF NOVEMBER 1981

Squalls and thunderstorms are the most significant weather features within the study area. Some of these may be spawned by the rare tropical cyclones that skirt the northern and southern periphery, but they are not generally a problem. Strong lines of thunderstorms that develop across the Malacca Strait are known as "Sumatras." During the southwest monsoon (April through November) the Sumatras, usually occurring at night, generally move from the southwest; although, sometimes out of the west or northwest. Sumatras are produced by the southwest monsoon winds being reinforced by strong mountain winds that are generated by nighttime radiation from the higher grounds followed by the descent of this cooler, more dense air. The warm seas, cool mountain air, and the orographic lift by the numerous mountain ranges produce the heavy thunderstorms and abundant rainfall. These Sumatras move out over the Malacca Strait and, in many instances, onto the west coast of the Malay Peninsula. Although the annual rainfall for the region is one of the heaviest on earth, it is due more to convective downpours rather than extended periods of precipitation (Kendrew, 1942). In fact, they have considerable periods of sunshine.

A maximum number of thunderstorm days occurs on the west coast of the Malay Peninsula during April, the transition into the southwest monsoon. The frequency of thunderstorm days along this area is higher during the southwest monsoon than the northeast monsoon with a minimum number of thunderstorm days occurring during February. Even though the number of thunderstorm days has a seasonal pattern, the monthly precipitation amounts remain relatively uniform. During the northeast monsoon (December-March), there are few thunderstorm days along the east coast of Malay, but a significant number on the west coast. Nieuwolt (1966) points out that an inverse correlation exists over the east coast of Malay between the strength of the monsoon and the amount of precipitation received, so usually the stronger the winds the less the precipitation. This appears in many regions of the study area where the highest mean monthly precipitation values occur during the transition month of November, as the northeast and southwest monsoons coalesce.

EQUATORIAL WEATHER FEATURES WITHIN THE STUDY AREA

Precipitation

Of all the elements recorded in the marine data base, precipitation is one of those most subject to error in both the way it is observed and interpreted. Many observers have a bias for certain present weather codes and there may be a fair weather bias introduced especially in the more recent years as ships try to avoid extremely bad weather (which is seldom encountered in the study area). A fair weather bias may also be enhanced if the weather observer fails to take an observation because of other priorities during foul weather (heavy ship traffic, entering a port, etc.).

Orographic effects may cause precipitation patterns and the frequency of thunderstorms to vary greatly from the ocean environment to nearby land areas. Subtle changes of five to ten percent in the monthly mean precipitation over the water can be detected on the isopleth charts. During the northeast monsoon (as compared to the southwest monsoon) the percent of observations reporting precipitation is five percent less to the northeast of the Malay Peninsula and five percent greater to the southwest of Sumatra and Java. The terms northeast and southwest monsoon are very descriptive of the climate over the South China Sea but not quite so descriptive of conditions in the study area south of the equator, especially south of Java. The characteristic wind flow also depends on the location of the equatorial trough.

The northeast monsoon starts its southerly movement during October over southeast Asia and does not reach the southern end of the Malay Peninsula until mid-December. Over much of the study area during November and December, equatorial westerly winds, remnants of the southwest monsoon, converge with the southerly limit of the northeast monsoon in the equatorial trough resulting in widespread heavy rainfall along the air-mass boundary (World Survey of Climatology, Volume 9). Rainfall is also enhanced by the mountain ranges which provide orographic lift. As a result, November and December are the wettest months along the northeastern coast of the Malay Peninsula, averaging over 20 inches at Kota Bharu and Kula Trengganu. February and April have the minimum precipitation over the northeast Malay Peninsula. Even though the wind force during February is similar to that of January, the average amount of precipitation during February is approximately half that of January. This decrease may be due to a weak thermal low forming over mainland Asia and deflecting the main air current over the South China Sea. This causes divergence, subsidence; and, thus, prevents formation of disturbances (World Survey of Climatology, Volume 9).

With the many mountain ranges, valleys, and coastal areas within the study area, the precipitation pattern tends to be quite complex. The northeast monsoon brings the heaviest rains to the east coast of the Malay Peninsula, and the southwest monsoon the heavier rains to the west coast of Sumatra. In both monsoon seasons the areas on either side of the Malacca Strait find themselves within the rain-shadow (opposite side of the mountain range from the rain-producing winds). This is clearly illustrated by the mean annual rainfall amounts (Fig. 3). The transition months of March to April and October to November bring the greatest amounts of precipitation to the southwest coast of the Malay Peninsula while Singapore on the southern end has its maximum during December.

On the west coast of Sumatra, Padang has its greatest rainfall during November and its least during July. Java has a minimum during the southwest monsoon, and maximum during the northeast monsoon regardless of the prevailing winds or whether one is on the windward or lee side of the mountains. Djakarta, on the northwest end of Java, has its maximum precipitation in January and minimum during July and August; while Cilacap on the south-central portion of the island has its maximum during November and minimum during July.

Looking at the marine area maps, even though the percentage of present weather observations reporting precipitation (an estimate of the probability of precipitation) does not change drastically, one can see a slight decrease in the frequency of precipitation during the southwest monsoon while the equatorial trough has moved far north over southern Asia.

Thunderstorms

Buitenzorg, in the hills nearby Djakarta, reports over 300 thunderstorm days per year (Fig. 5), the highest recorded frequency on earth (Riehl, 1954). Yet, the frequency of marine observations reporting thunder only reaches five to ten percent as a maximum in the marine areas where uniformity is the main theme reflected by the thunderstorm isopleth charts. For the study area a moderate peak in thunderstorm frequency is reported during the November to April period for the Sunda Strait and regions near Java. The April to November period brings the highest frequencies over the Malacca Strait and somewhat of a decrease over the Sunda Strait and Java regions.

Tropical Cyclones

At maturity a tropical cyclone is one of the most feared and hazardous creations of nature and could prove to be disastrous for those ships entering or exiting the study area. In order for convective activity to organize into a vortex, it must be influenced by the coriolis parameter which is too small to be effective within approximately five degrees of the equator. However, the early stages of development of tropical cyclones have been observed within two degrees of the equator in the western Pacific and northeastern Indian Ocean. Thus, the limiting factors of the coriolis parameter may have been overrated (Riehl, 1979). Tropical cyclones do frequently form within eight to ten degrees of the equator; however, it is rare for an intense cyclone to be found within ten degrees of the equator.

Traffic in the Northern Hemisphere has the greatest chance of encountering a tropical cyclone in the North Pacific from May through December, with the greatest probabilities of storms occurring from July through September. In the North Indian Ocean chances are greatest from October through December with a second maximum occurring from April through June. In the Southern Hemisphere the main season runs from November through April.

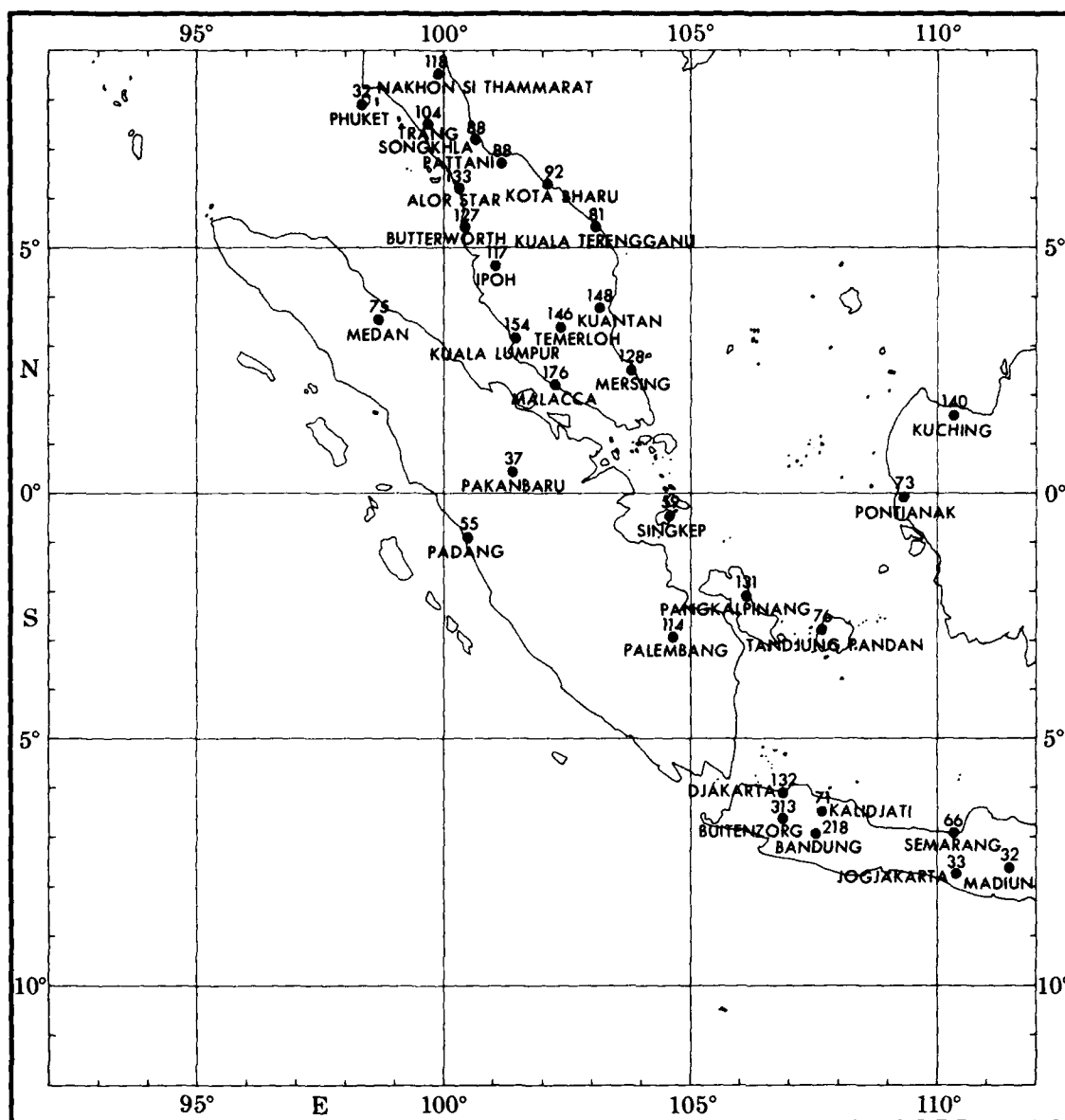


Fig. 5 MEAN ANNUAL NUMBER OF DAYS WITH THUNDERSTORMS

Air Temperature

Air temperatures are one of the most frequently observed elements by mariners. Due to instrument exposure on many ships, the heating effects of the ship's structure has a tendency to produce higher than actual ambient air temperature readings. This is especially true in the tropics where sunny, calm days are numerous. Minimum seasonal variability is noted in the study area as mean monthly temperatures range from only 78°F to 84°F. In fact, the diurnal variation is greater than the mean monthly seasonal variation (Fig. 2).

Sea Surface Temperature

Sea surface temperatures are also recorded with a fairly high frequency in marine observations. Two principal methods for sampling are used, intake thermometers and bucket temperatures. Even though the two systems produce slightly different results, the data can still be used with considerable confidence. The sea surface temperature gradient also reflects the two distinct monsoon seasons. During the northeast monsoon, the sea surface temperature gradient is relatively tight to the east of the Malay Peninsula and weak to the south of Java. The reverse is true during the southwest monsoon. Monthly mean temperatures range from just over 77°F to just under 86°F.

Surface Winds

Surface winds are one of the most commonly observed elements. Many of the observations from the NCC data base are visual observations based on the roughness of the sea. In more recent years more and more ships are acquiring anemometers and reporting measured winds. Prior to 1963 many of the wind speeds were recorded in the Beaufort scale; however, such estimates have proven to be quite reliable and can be used with a high degree of confidence. Five sets of wind speed isopleth charts were produced for this study, but only three are presented: mean winds, percent frequencies of wind less than or equal to 10 knots; and percent frequency of winds between 11 and 21 knots. The other two categories, percent frequency of wind speeds between 22 and 33 knots and greater than or equal to 34 knots, had percent frequencies of less than five percent. For more detail, one should reference the wind speed distribution graphs presented for the four representative areas. As with the sea surface temperatures, the wind speeds as well as the directions reflect the monsoon seasons. During the northeast monsoon, the mean wind speeds and frequency of higher winds are greatest to the east of the Malay Peninsula and less to the south of Java. This process reverses during the southwest monsoon. The remaining areas, especially northwest of Sumatra, do not show quite as strong a transition.

Visibility

Visibilities are difficult to measure at sea because of the lack of reference points. Climatically, many low visibility observations are probably missed because the mate is too busy (fair weather bias). However, the coarseness of the coding intervals tends to minimize the problem permitting the summarized data to be relatively consistent. The visibility-tables that are presented by one-degree square show the entire region to have a high frequency (90% plus) of visibilities of five miles or better.

Ceiling and Visibility

Aircraft-type ceilings are not available from marine observations. The ceilings are estimated as the height of the lowest cloud when low clouds cover more than half the sky. When the sky is totally obscured by rain, fog, smoke or other phenomena, the total obscuration is considered a ceiling with a height of zero. The infrequent occurrence of ceilings less than 600 feet and/or visibility less than two nautical miles lead us to drop this presentation and the lower category of less than 300 feet and/or visibility less than one nautical mile. However, higher categories of ceiling and visibility are presented.

Wave Heights

Wave heights have been recorded in a consistent quantitative code only since 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, makes 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 these suspected biases other than being processed through a quality control procedure where an internal check was made between wind speed and sea height. The data were also arrayed and apparently erroneous outliers deleted in both the sea and swell data. As with both temperature and winds, the effects of monsoon seasons can be detected from the wave height charts. These effects can be spotted on the wave charts greater than or equal to three feet, but even more obviously on the percent frequencies of waves greater than or equal to eight feet. Over the South China Sea, waves are highest during the northeast monsoon. Over the Indian Ocean south of Java and Sumatra, waves are highest during the southwest monsoon.

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 reliability of the current charts is best in these areas. The data are considered most useful when used collectively as in summaries where a large number of observations are available.

The surface current charts displayed for the Malacca Strait are winter (November through April), summer (May through October), and annual (January through December). For the Sunda Strait the displayed charts are summer (January through March), autumn (April through June), winter (July through September), spring (October through December), and annual (January through December).

Summary

To date, no reliable numerical weather prediction models have been developed for the tropics. Until progress is made in this field, climatology will continue to be one of the most valuable forecast tools. As stated in the introduction, conditions vary little from the mean in the tropics making climatology a good representative of expected conditions. The goal of this climatic study is to provide the synoptic meteorologist with the necessary climatology with which to improve his forecasts.

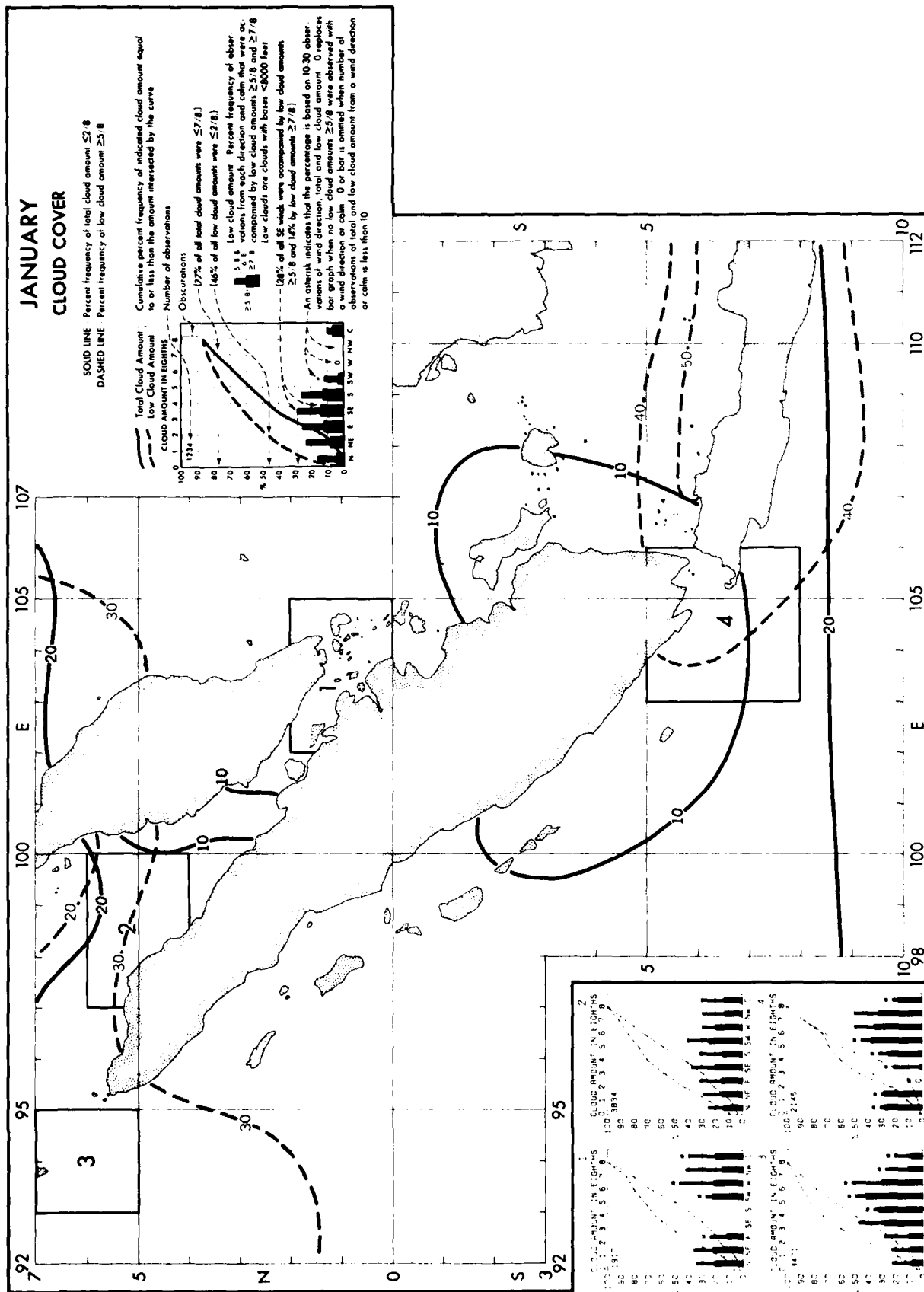
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[illegible]



JANUARY PRECIPITATION

SOLID LINE Percent frequency of observations reporting precipitation
DASHED LINE Percent frequency of observations reporting thunderstorms
and/or lightning

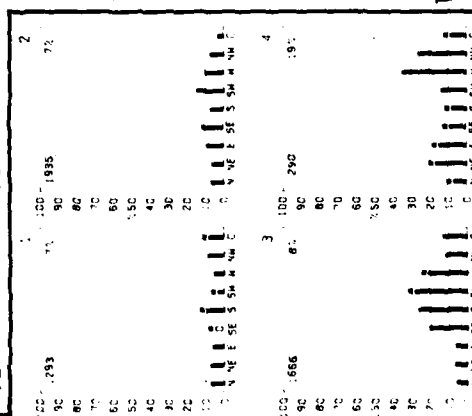
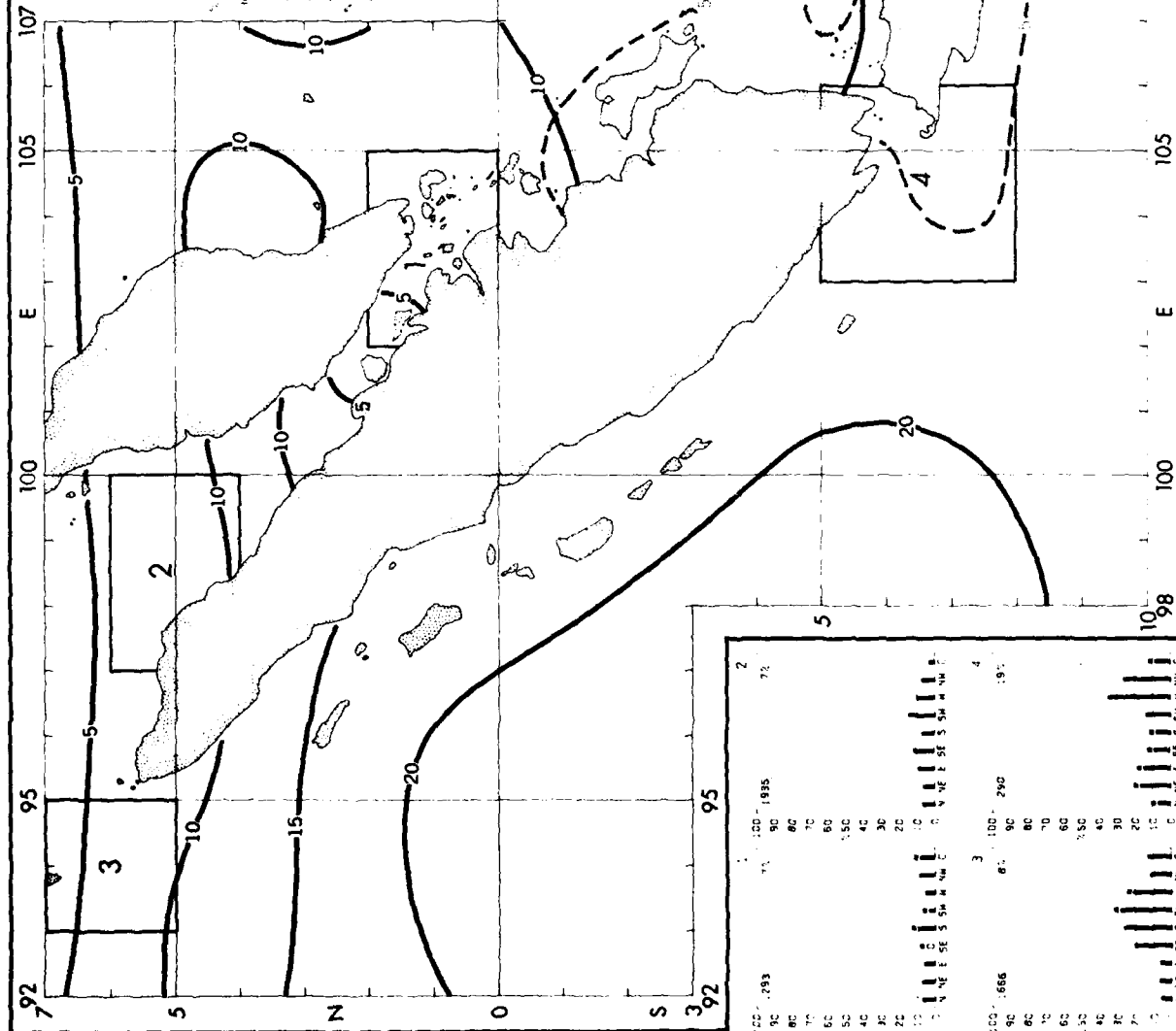
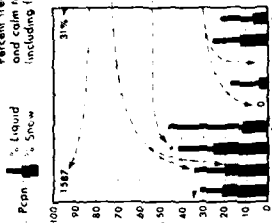
Percent frequency of surface wind observations from each direction
and calm that were accompanied by precipitation, subdivided into liquid type
including freezing rain and freezing drizzle and snow

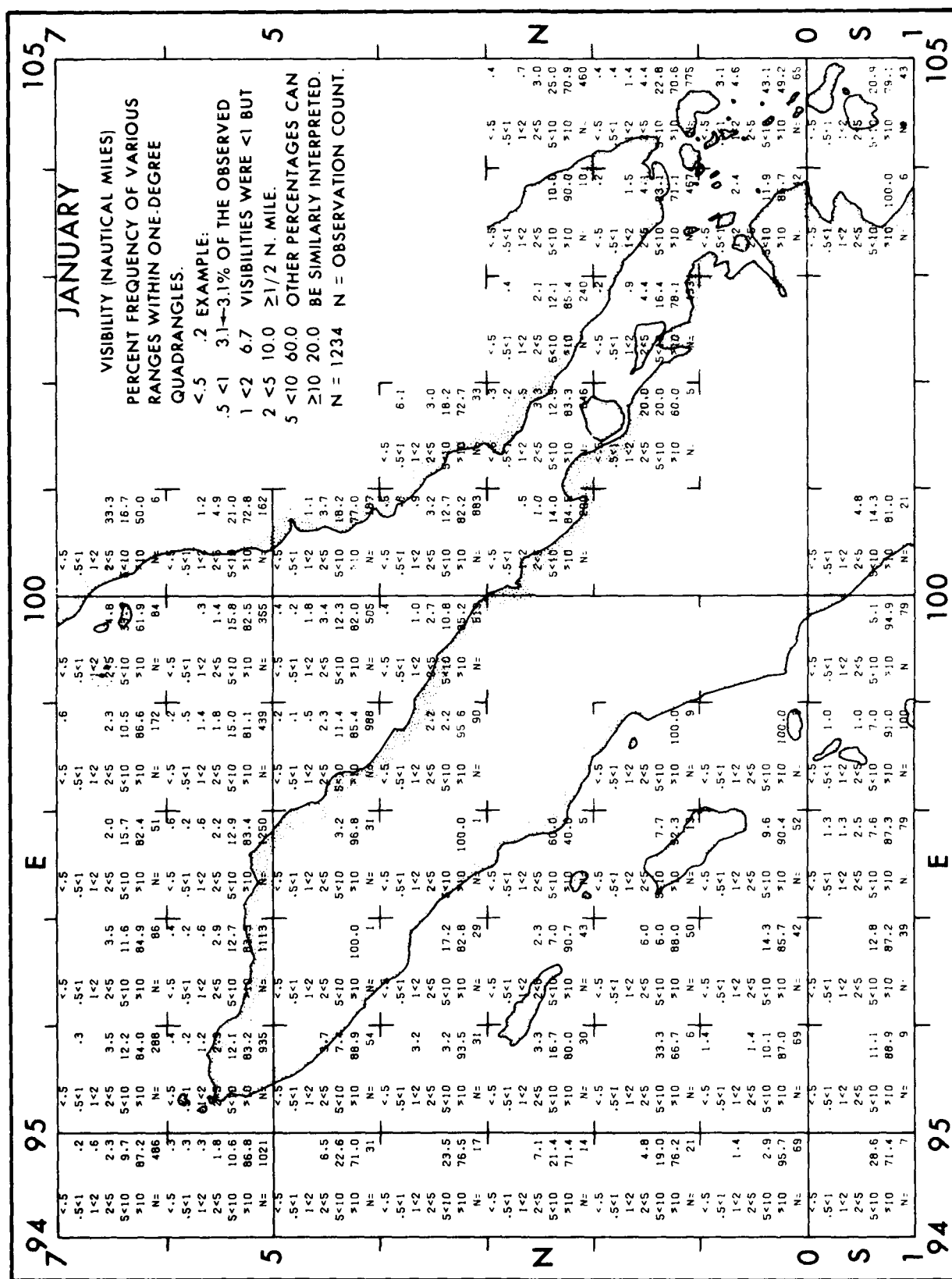
Percentage of present weather observations reporting precipitation
Number of observations

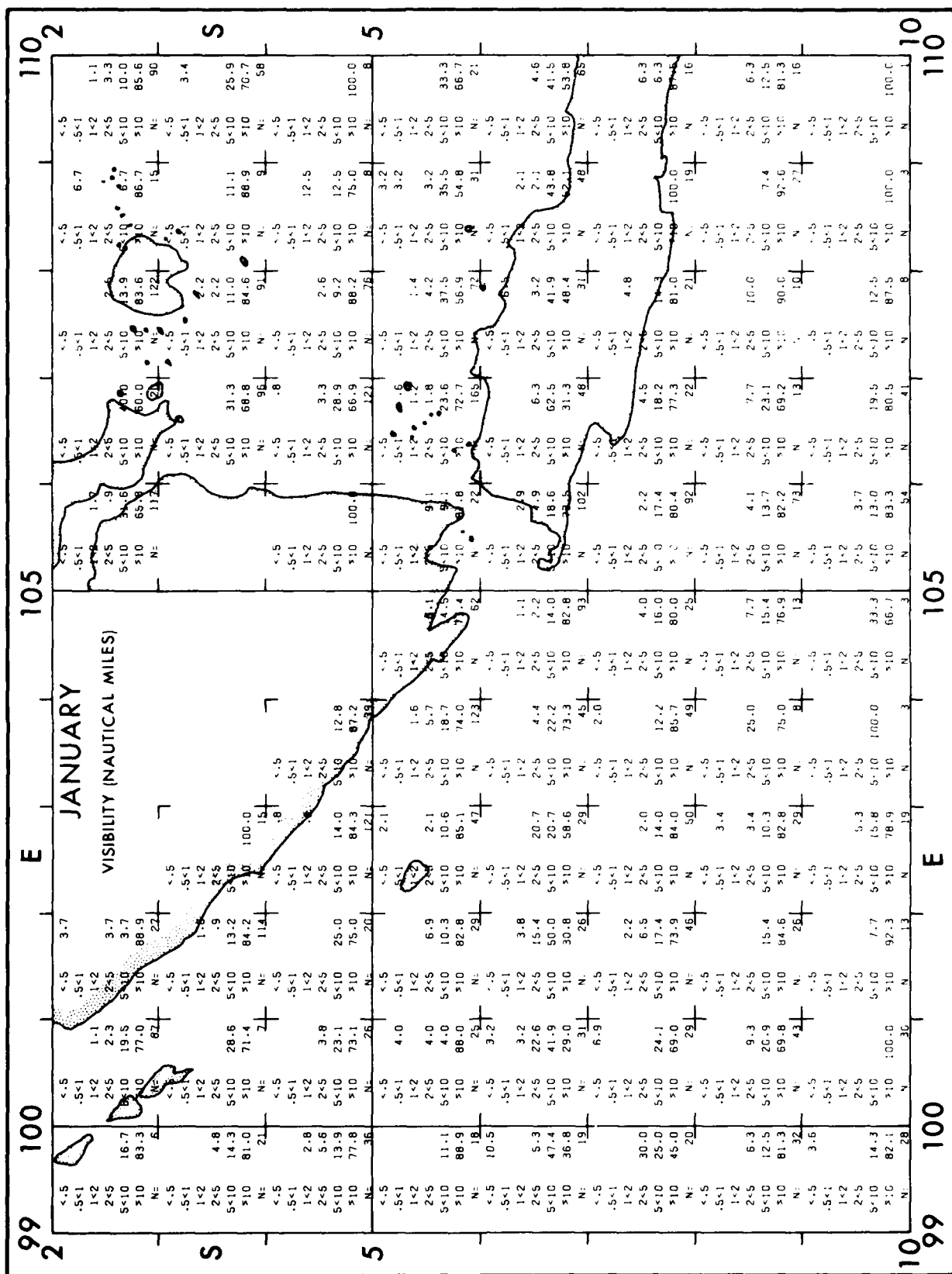
34% of all NE winds were accompanied by precipitation, of which
14% was liquid and 20% was snow

An asterisk in the column for a given direction or calm indicates
percentages were based on 10-30 observations of present
weather and wind direction

0 replaces bar when no precipitation was observed with winds
from a given direction or calm. No bar graph is presented if
less than 10 observations containing present weather are reported
for a given direction or calm







JANUARY CEILING-VISIBILITY

SOLID LINE Percent frequency of ceiling <1000 feet and/or visibility <5 nautical miles
DASHED LINE Percent frequency of ceiling <8000 feet and/or visibility <10 nautical miles

LOW CLOUD CEILING
Percent frequency of simultaneous occurrence of specified low cloud ceilings, hundreds of feet and visibility, nautical miles. Low cloud ceiling heights are estimated from the height of low clouds, h, when low cloud amount, N_h, is ≥ 5.8. Observations are included under ceiling 0 < 1.5. N.C. indicates no ceiling includes bases of clouds ≥ 8000 feet as well as occurrences of N_h < 5.8. 2% of all observations reported ceiling ≥ 1000 feet and visibility < 5 nautical miles simultaneously with visibility ≥ 5 but < 10 nautical miles. Indicates < 5% but > 0. Number of observations

LOW CLOUD 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JANUARY **WIND-VISIBILITY-CLOUDINESS**

Conditions for Carrier Operations
Percent frequency of optimum conditions: LCC ≥ 5000 ft or no LCC, Vbty ≥ 5 N.M., and Wind 11-21 kt.
Percent frequency of poor conditions: Any one of the following: LCC < 3000 ft, Vbty < 1 N.M., Wind ≤ 5 or ≥ 34 kt.

Satisfactory conditions: between poor and optimum

Percent frequency of occurrence of specified wind speed in knots, visibility in nautical miles, and low cloud ceiling LCC in hundreds of feet

Low cloud ceiling heights are estimated from the height of low clouds in when low cloud amount N_L is ≥ 5

7% of the observations reported wind speeds of 11-21 knots, a low cloud ceiling < 1000 feet and or visibility < 2 nautical miles

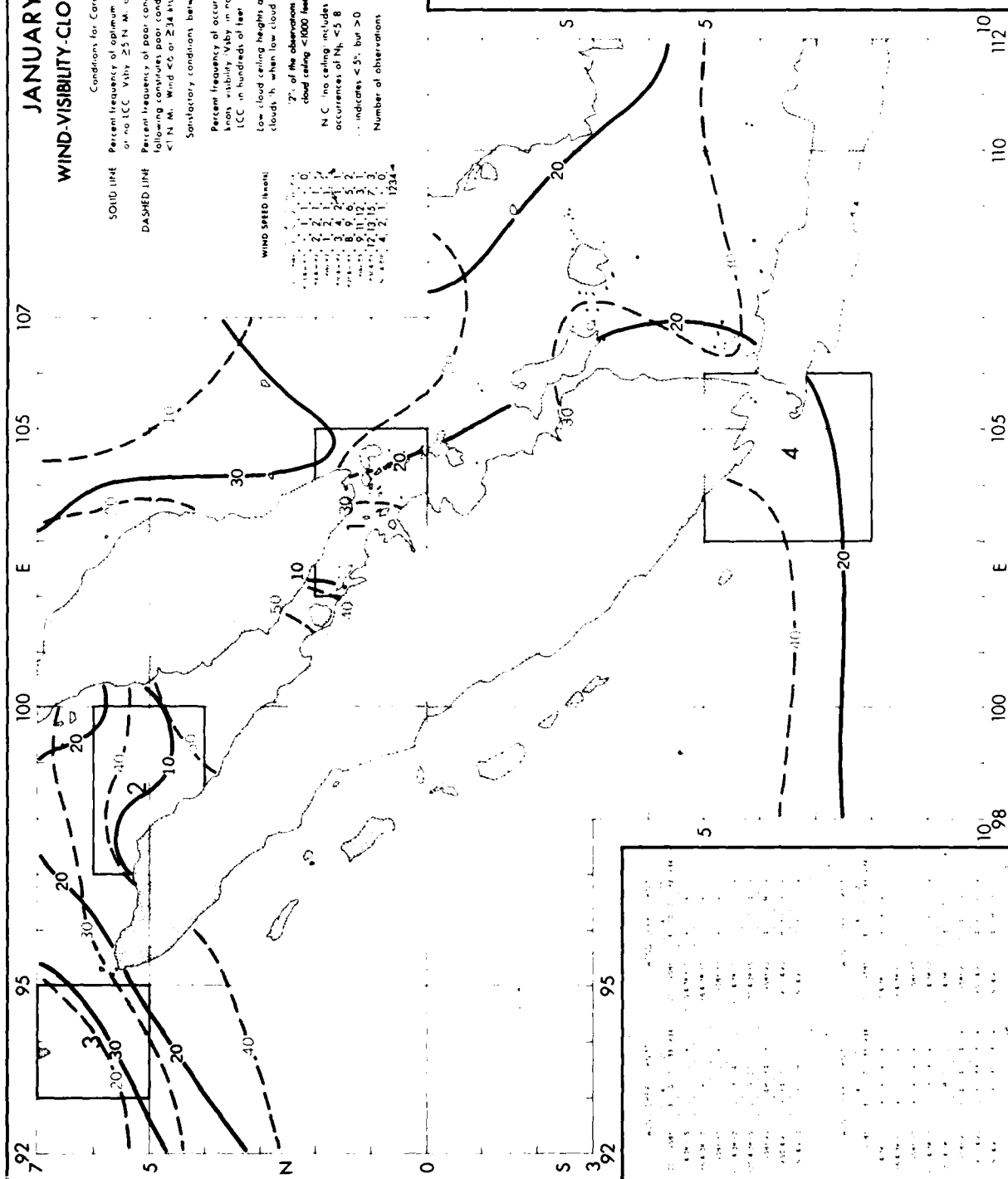
N.C. no ceiling includes bases of clouds ≥ 8000 feet as well as occurrences of $N_L < 5$

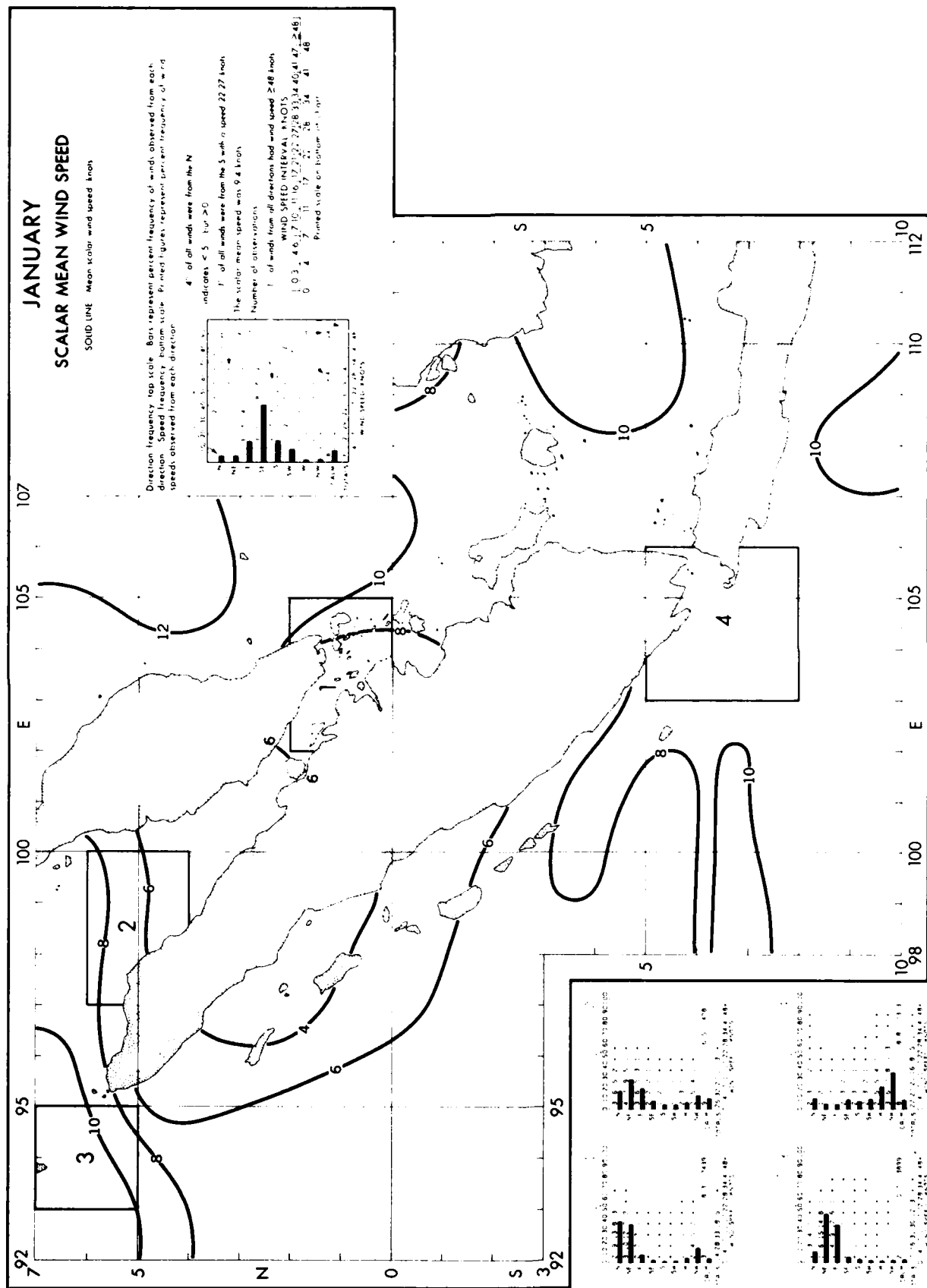
indices ≤ 5 , but > 0

Number of observations

WIND SPEED (knots)

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200
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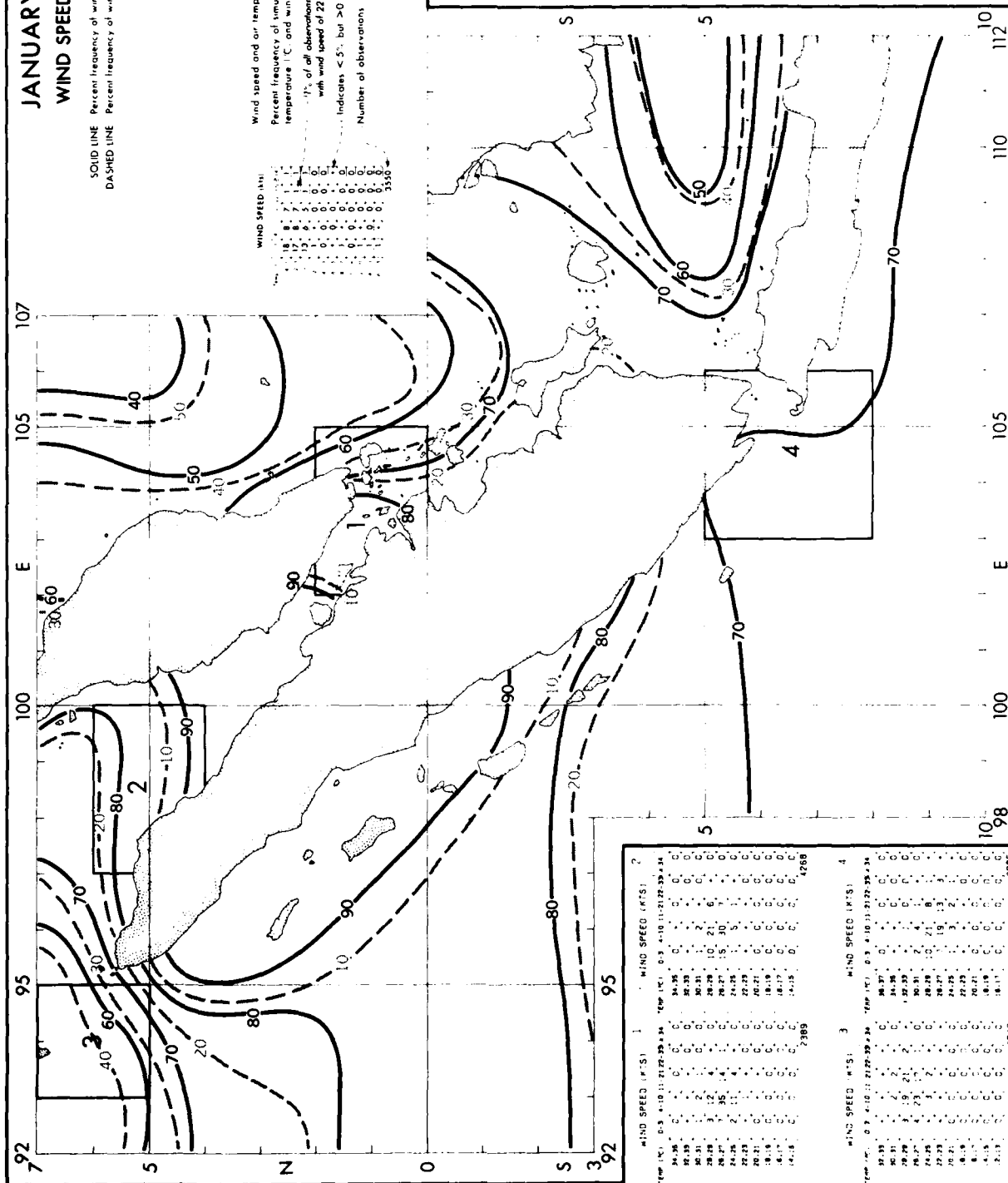




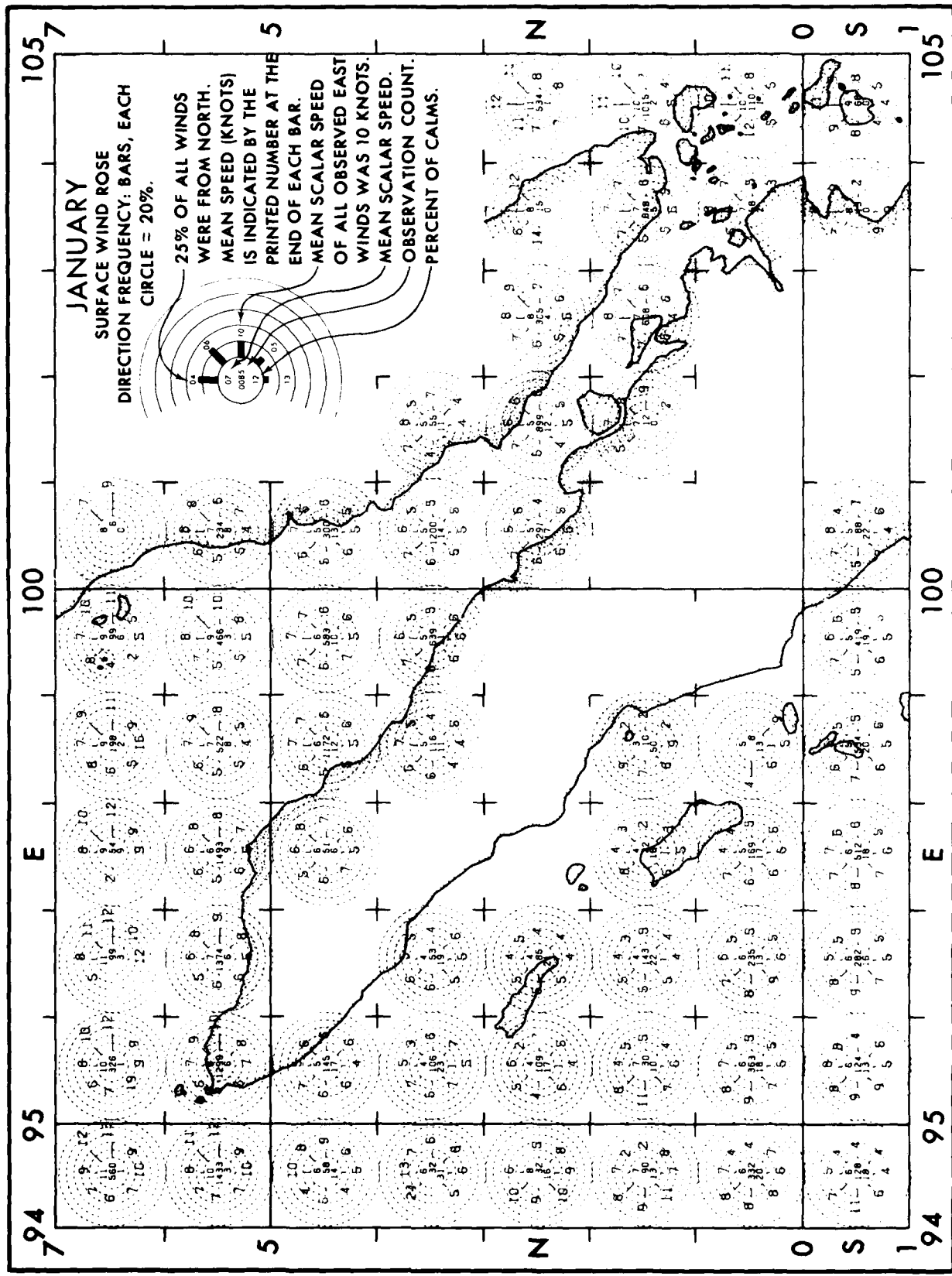
JANUARY WIND SPEED

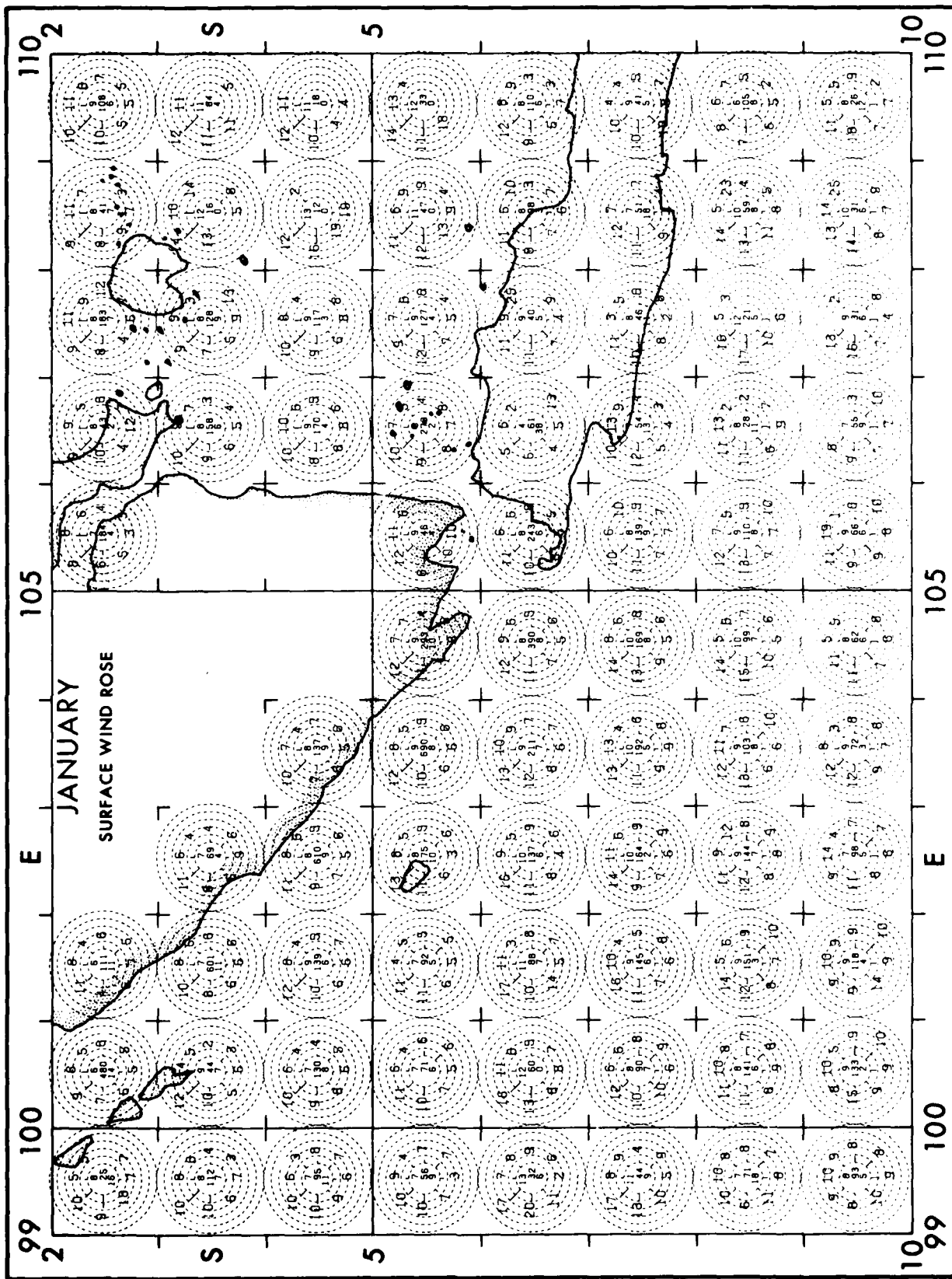
SOLID LINE Percent frequency of wind speed <11 knots
DASHED LINE Percent frequency of wind speed 11-21 knots

Wind speed and air temperature
Percent frequency of simultaneous occurrence of specified temperature 1°C and wind speed knots
1% of all observations reported temperature 23°C simultaneously with wind speed of 22-33 kts
Indicates <5% but >0
Number of observations



WIND SPEED (KTS)	1	2
Temp (°C)	0.3	0.3
10-11	21.22-23.34	21.22-23.34
12-13	24.35	24.35
14-15	25.36	25.36
16-17	26.37	26.37
18-19	27.38	27.38
20-21	28.39	28.39
22-23	29.40	29.40
24-25	30.41	30.41
26-27	31.42	31.42
28-29	32.43	32.43
30-31	33.44	33.44
32-33	34.45	34.45
34-35	35.46	35.46
36-37	36.47	36.47
38-39	37.48	37.48
40-41	38.49	38.49
42-43	39.50	39.50
44-45	40.51	40.51
46-47	41.52	41.52
48-49	42.53	42.53
50-51	43.54	43.54
52-53	44.55	44.55
54-55	45.56	45.56
56-57	46.57	46.57
58-59	47.58	47.58
60-61	48.59	48.59
62-63	49.60	49.60
64-65	50.61	50.61
66-67	51.62	51.62
68-69	52.63	52.63
70-71	53.64	53.64
72-73	54.65	54.65
74-75	55.66	55.66
76-77	56.67	56.67
78-79	57.68	57.68
80-81	58.69	58.69
82-83	59.70	59.70
84-85	60.71	60.71
86-87	61.72	61.72
88-89	62.73	62.73
90-91	63.74	63.74
92-93	64.75	64.75
94-95	65.76	65.76
96-97	66.77	66.77
98-99	67.78	67.78
100-101	68.79	68.79
102-103	69.80	69.80
104-105	70.81	70.81
106-107	71.82	71.82
108-109	72.83	72.83
110-111	73.84	73.84
112-113	74.85	74.85
114-115	75.86	75.86
116-117	76.87	76.87
118-119	77.88	77.88
120-121	78.89	78.89
122-123	79.90	79.90
124-125	80.91	80.91
126-127	81.92	81.92
128-129	82.93	82.93
130-131	83.94	83.94
132-133	84.95	84.95
134-135	85.96	85.96
136-137	86.97	86.97
138-139	87.98	87.98
140-141	88.99	88.99
142-143	89.00	89.00
144-145	90.01	90.01
146-147	91.02	91.02
148-149	92.03	92.03
150-151	93.04	93.04
152-153	94.05	94.05
154-155	95.06	95.06
156-157	96.07	96.07
158-159	97.08	97.08
160-161	98.09	98.09
162-163	99.10	99.10
164-165	100.11	100.11
166-167	101.12	101.12
168-169	102.13	102.13
170-171	103.14	103.14
172-173	104.15	104.15
174-175	105.16	105.16
176-177	106.17	106.17
178-179	107.18	107.18
180-181	108.19	108.19
182-183	109.20	109.20
184-185	110.21	110.21
186-187	111.22	111.22
188-189	112.23	112.23
190-191	113.24	113.24
192-193	114.25	114.25
194-195	115.26	115.26
196-197	116.27	116.27
198-199	117.28	117.28
200-201	118.29	118.29
202-203	119.30	119.30
204-205	120.31	120.31
206-207	121.32	121.32
208-209	122.33	122.33
210-211	123.34	123.34
212-213	124.35	124.35
214-215	125.36	125.36
216-217	126.37	126.37
218-219	127.38	127.38
220-221	128.39	128.39
222-223	129.40	129.40
224-225	130.41	130.41
226-227	131.42	131.42
228-229	132.43	132.43
230-231	133.44	133.44
232-233	134.45	134.45
234-235	135.46	135.46
236-237	136.47	136.47
238-239	137.48	137.48
240-241	138.49	138.49
242-243	139.50	139.50
244-245	140.51	140.51
246-247	141.52	141.52
248-249	142.53	142.53
250-251	143.54	143.54
252-253	144.55	144.55
254-255	145.56	145.56
256-257	146.57	146.57
258-259	147.58	147.58
260-261	148.59	148.59
262-263	149.60	149.60
264-265	150.61	150.61
266-267	151.62	151.62
268-269	152.63	152.63
270-271	153.64	153.64
272-273	154.65	154.65
274-275	155.66	155.66
276-277	156.67	156.67
278-279	157.68	157.68
280-281	158.69	158.69
282-283	159.70	159.70
284-285	160.71	160.71
286-287	161.72	161.72
288-289	162.73	162.73
290-291	163.74	163.74
292-293	164.75	164.75
294-295	165.76	165.76
296-297	166.77	166.77
298-299	167.78	167.78
300-301	168.79	168.79
302-303	169.80	169.80
304-305	170.81	170.81
306-307	171.82	171.82
308-309	172.83	172.83
310-311	173.84	173.84
312-313	174.85	174.85
314-315	175.86	175.86
316-317	176.87	176.87
318-319	177.88	177.88
320-321	178.89	178.89
322-323	179.90	179.90
324-325	180.91	180.91
326-327	181.92	181.92
328-329	182.93	182.93
330-331	183.94	183.94
332-333	184.95	184.95
334-335	185.96	185.96
336-337	186.97	186.97
338-339	187.98	187.98
340-341	188.99	188.99
342-343	189.00	189.00
344-345	190.01	190.01
346-347	191.02	191.02
348-349	192.03	192.03
350-351	193.04	193.04
352-353	194.05	194.05
354-355	195.06	195.06
356-357	196.07	196.07
358-359	197.08	197.08
360-361	198.09	198.09
362-363	199.10	199.10
364-365	200.11	200.11
366-367	201.12	201.12
368-369	202.13	202.13
370-371	203.14	203.14
372-373	204.15	204.15
374-375	205.16	205.16
376-377	206.17	206.17
378-379	207.18	207.18
380-381	208.19	208.19
382-383	209.20	209.20
384-385	210.21	210.21
386-387	211.22	211.22
388-389	212.23	212.23
390-391	213.24	213.24
392-393	214.25	214.25
394-395	215.26	215.26
396-397	216.27	216.27
398-399	217.28	217.28
400-401	218.29	218.29
402-403	219.30	219.30
404-405	220.31	220.31
406-407	221.32	221.32
408-409	222.33	222.33
410-411	223.34	223.34
412-413	224.35	224.35
414-415	225.36	225.36
416-417	226.37	226.37
418-419	227.38	227.38
420-421	228.39	228.39
422-423	229.40	229.40
424-425	230.41	230.41
426-427	231.42	231.42
428-429	232.43	232.43
430-431	233.44	233.44
432-433	234.45	234.45
434-435	235.46	235.46
436-437	236.47	236.47
438-439	237.48	237.48
440-441	238.49	238.49
442-443	239.50	239.50
444-445	240.51	240.51
446-447	241.52	241.52
448-449	242.53	242.53
450-451	243.54	243.54
452-453	244.55	244.55
454-455	245.56	245.56
456-457	246.57	246.57
458-459	247.58	247.58
460-461	248.59	248.59
462-463	249.60	249.60
464-465	250.61	250.61
466-467	251.62	251.62
468-469	252.63	252.63
470-471	253.64	253.64
472-473	254.65	254.65
474-475	255.66	255.66
476-477	256.67	256.67
478-479	257.68	257.68
480-481	258.69	258.69
482-483	259.70	259.70
484-485	260.71	260.71
486-487	261.72	261.72
488-489	262.73	262.73
490-491	263.74	263.74
492-493	264.75	264.75
494-495	265.76	265.76
496-497	266.77	266.77
498-499	267.78	267.78
500-501	268.79	268.79
502-503	269.80	269.80
504-505	270.81	270.81
506-507	271.82	271.82
508-509	272.83	272.83
510-511	273.84	273.84
512-513	274.85	274.85
514-515	275.86	275.86
516-517	276.87	276.87
518-519	277.88	277.88
520-521	278.89	278.89
522-523	279.90	279.90
524-525	280.91	280.91
526-527	281.92	281.92
528-529	282.93	282.93
530-531	283.94	283.94
532-533	284.95	284.95
534-535	285.96	285.96
536-537	286.97	286.97
538-539	287.98	287.98
540-541	288.99	288.99
542-543	289.00	289.00
544-545	290.01	290.01
546-547	291.02	291.02
548-549	292.03	292.03
550-551	293.04	293.04
552-553	294.05	294.05
554-555	295.06	295.06
556-557	296.07	296.07
558-559	297.08	297.08
560-561	298.09	298.09
562-563	299.10	299.10
564-565	300.11	300.11
566-567	301.12	301.12
568-569	302.13	302.13
570-571	303.14	303.14
572-573	304.15	304.15
574-575	305.16	305.16
576-577	306.17	306.17
578-579	307.18	307.18
580-581	308.19	308.19
582-583	309.20	309.20
584-585	310.21	310.21
586-587	311.22	311.22
588-589	312.23	312.23
590-591	313.24	313.24
592-593	314.25	314.25
594-595	315.26	315.26
596-597	316.27	316.27
598-599	317.28	317.28
600-601	318.29	318.29
602-603	319.30	319.30
604-605	320.31	320.31
606-607	321.32	321.32
608-609	322.33	322.33
610-611	323.34	323.34



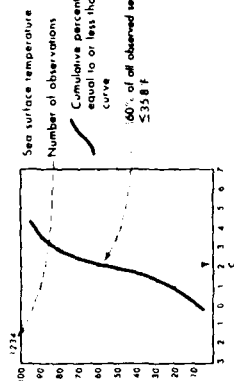


JANUARY

AIR AND SEA TEMPERATURE

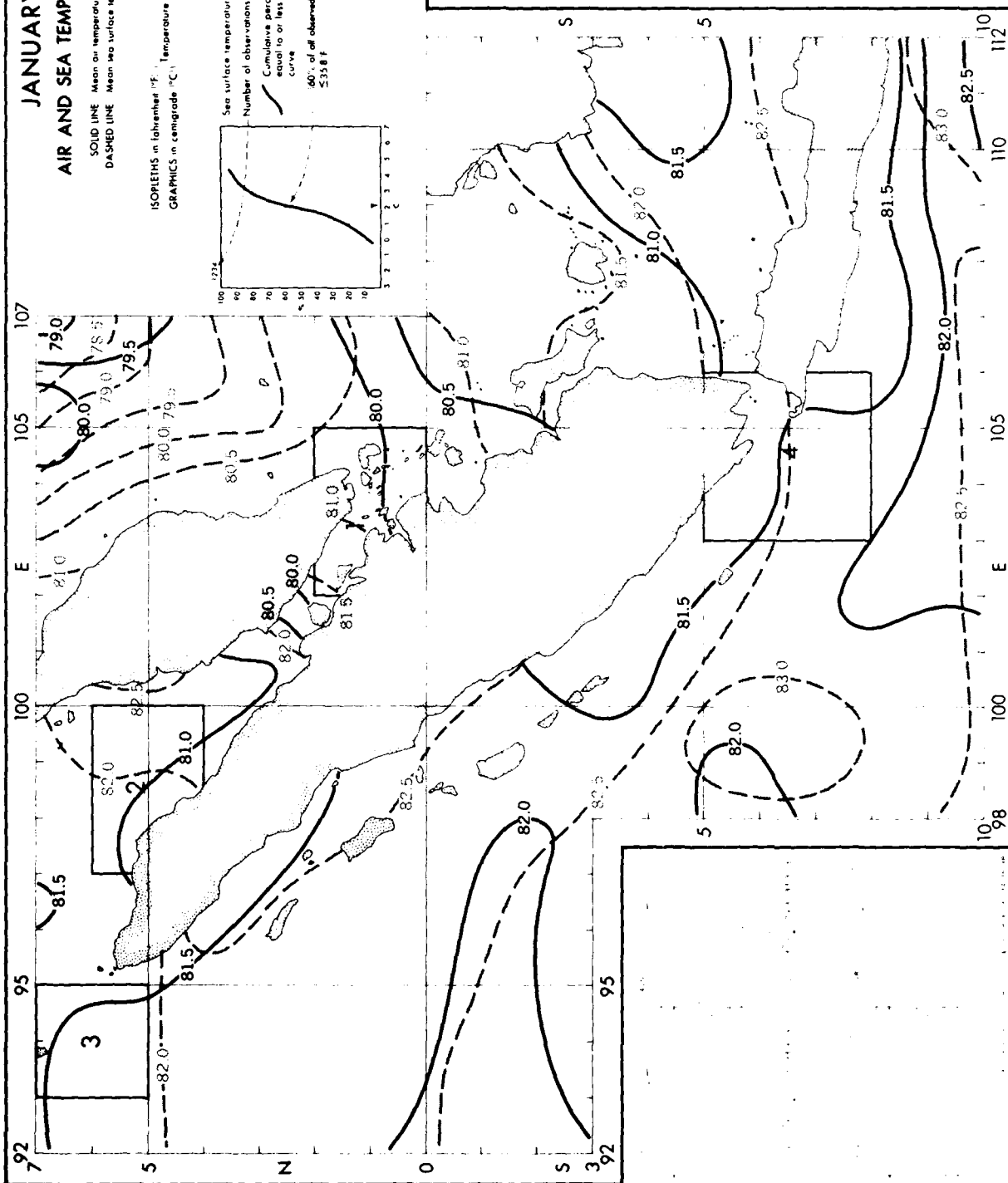
SOLID LINE Mean air temperature °F
DASHED LINE Mean sea surface temperature °F

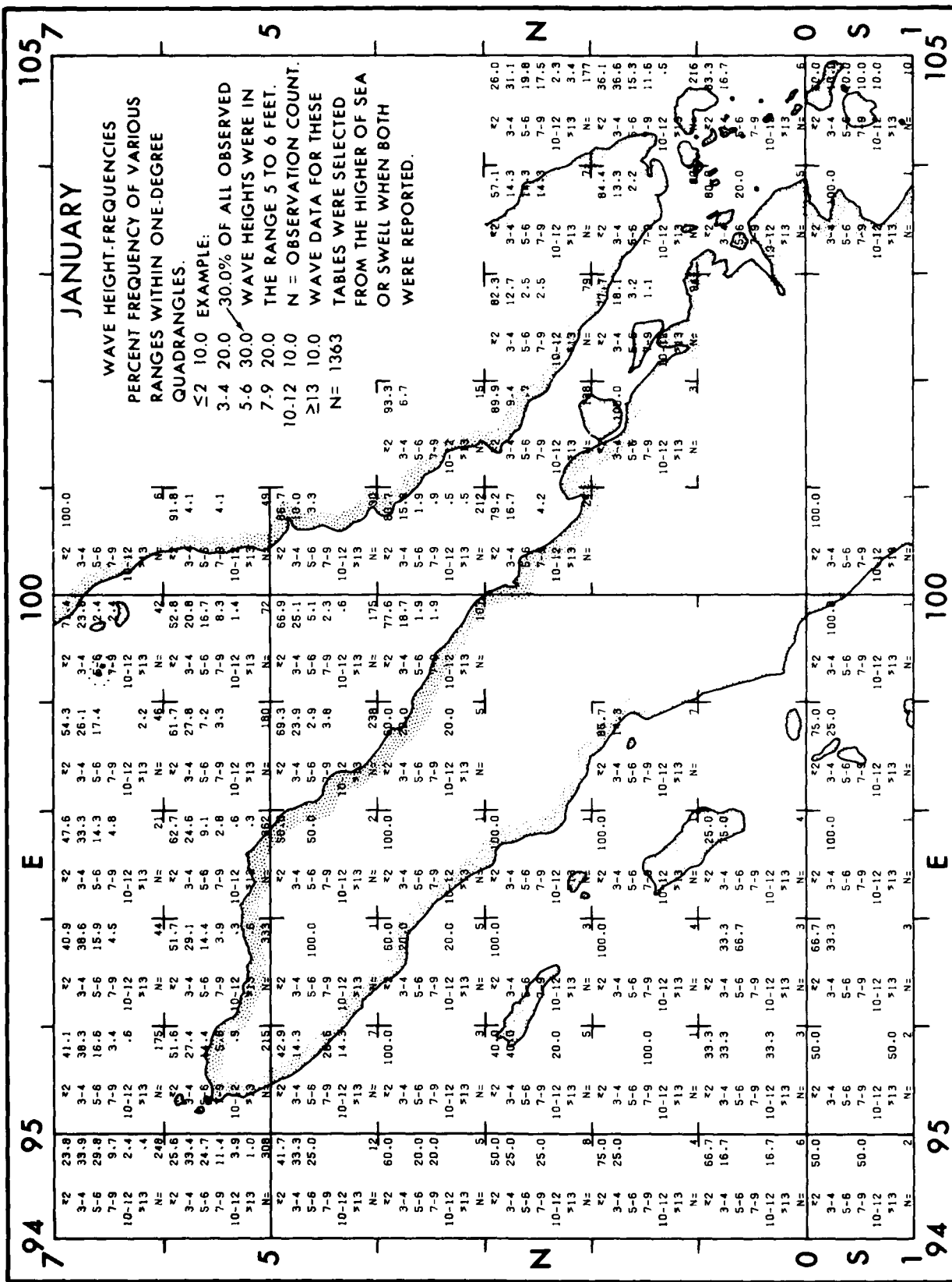
ISOPLTHS in Fahrenheit °F. Temperature conversion table below
GRAPHICS in centigrade °C.

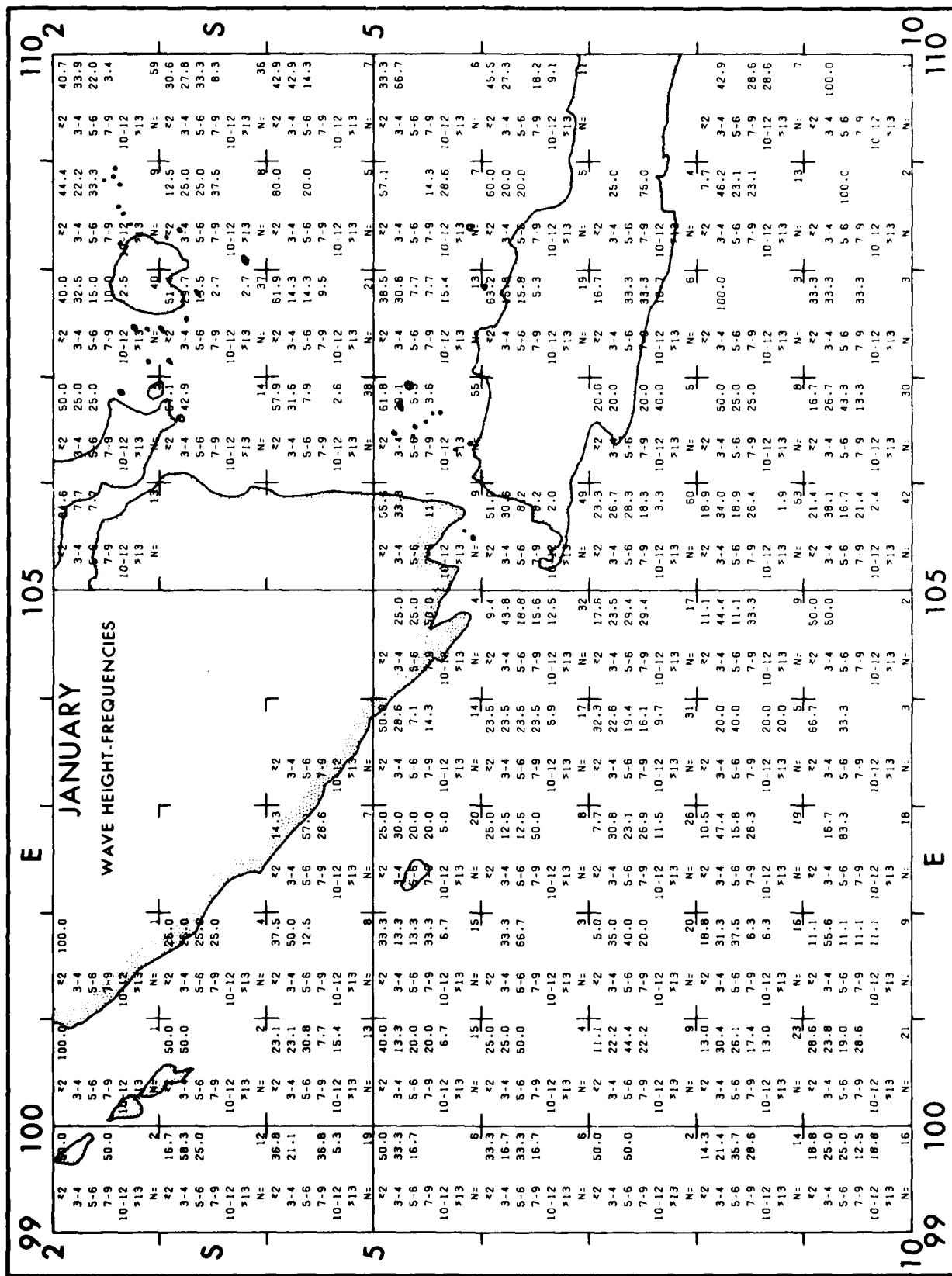


CONVERSION TABLE

°C	°F
16	60.8
17	62.6
18	64.4
19	66.2
20	68.0
21	69.8
22	71.6
23	73.4
24	75.2
25	77.0
26	78.8
27	80.6
28	82.4
29	84.2
30	86.0
31	87.8
32	89.6
33	91.4
34	93.2
35	95.0
36	96.8
37	98.6
38	100.4
39	102.2





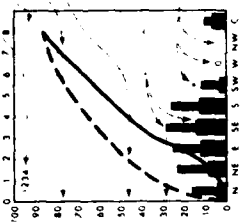


FEBRUARY CLOUD COVER

SOLID LINE
Percent frequency of total cloud amount ≥ 8
DASHED LINE
Percent frequency of low cloud amount ≥ 8

Cumulative percent frequency of indicated cloud amount equal to or less than the amount intersected by the curve

Number of observations



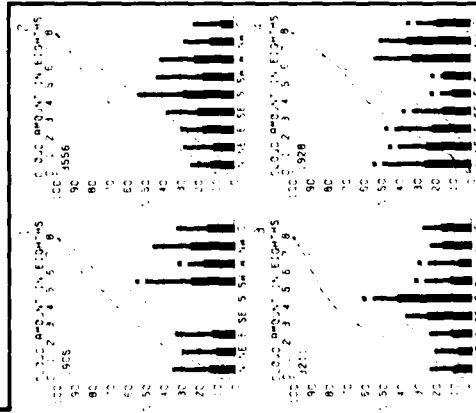
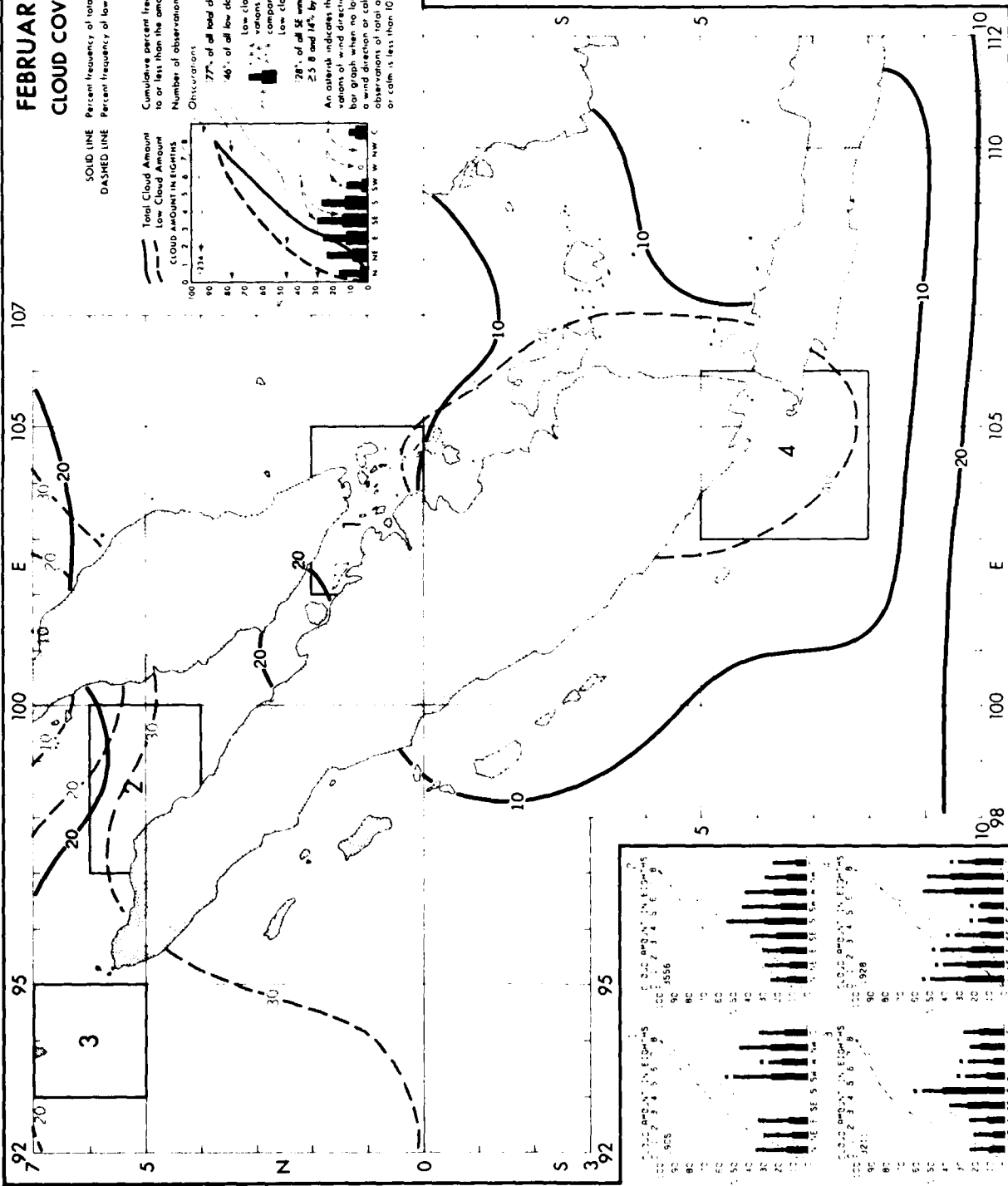
77% of all total cloud amounts were ≤ 8

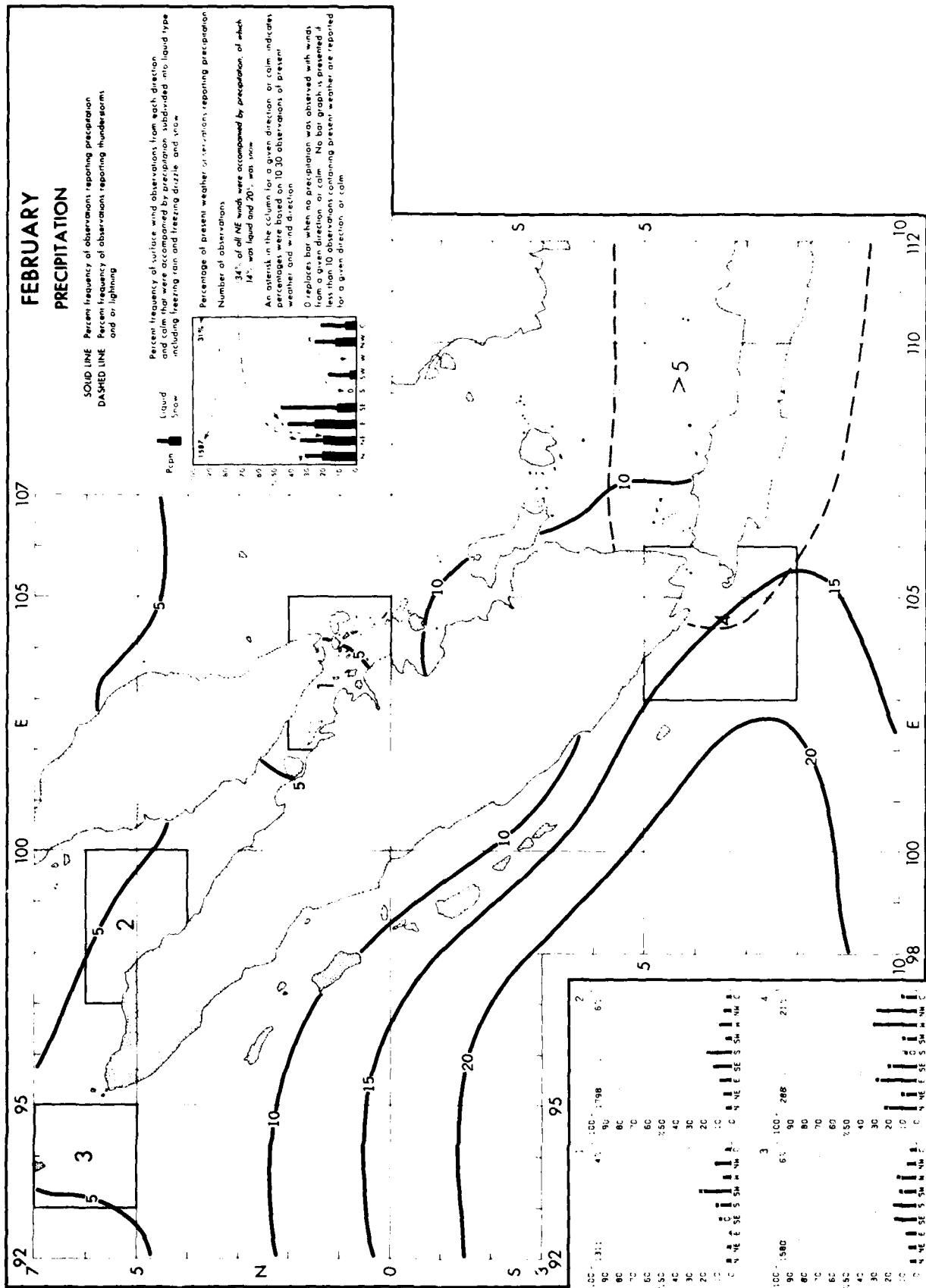
46% of all low cloud amounts were ≤ 8

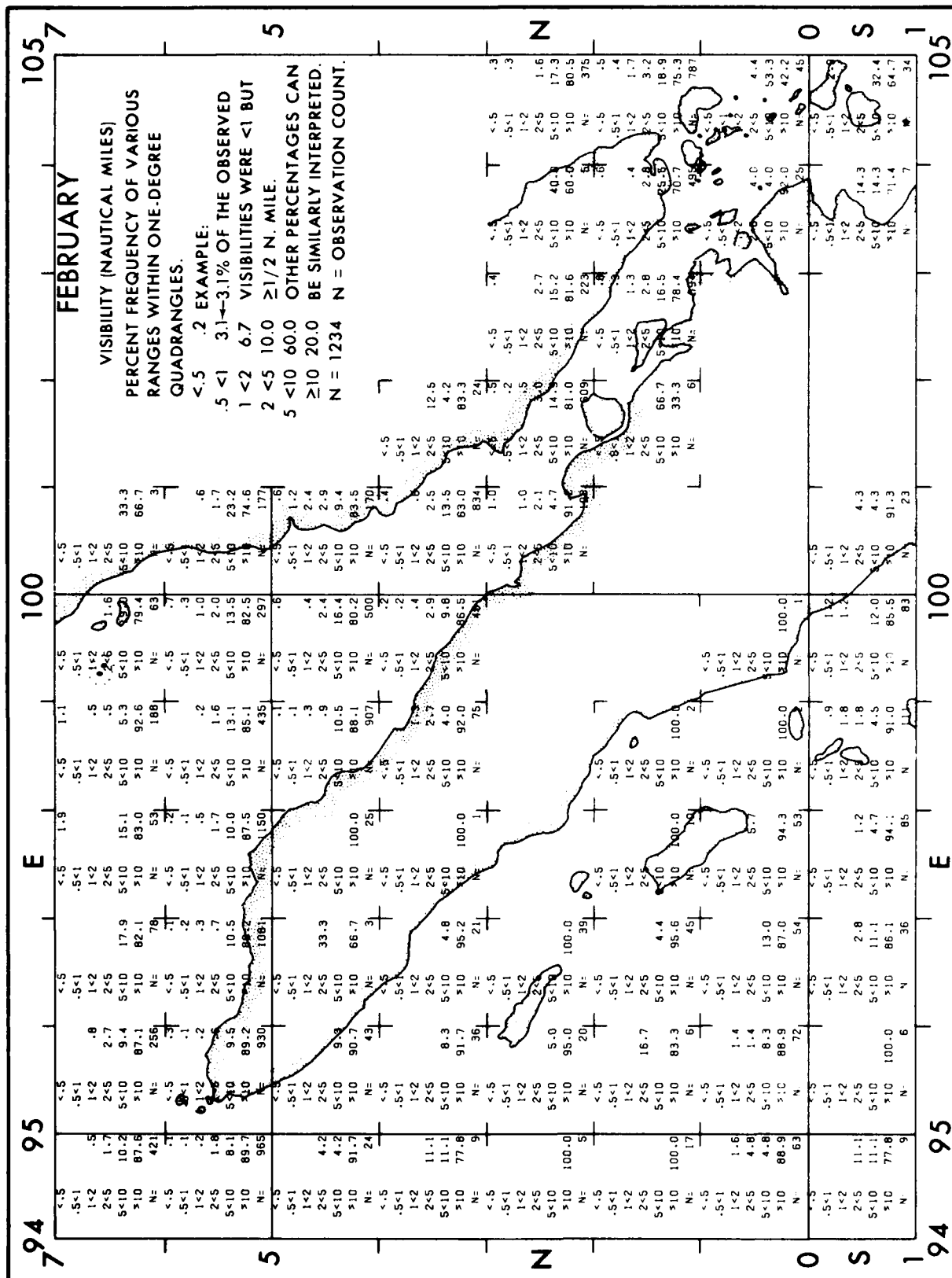
Low cloud amount Percent frequency of observations from each direction and calm that were accompanied by low cloud amounts ≥ 8 and ≥ 7.8
Low clouds are clouds with bases < 8000 feet

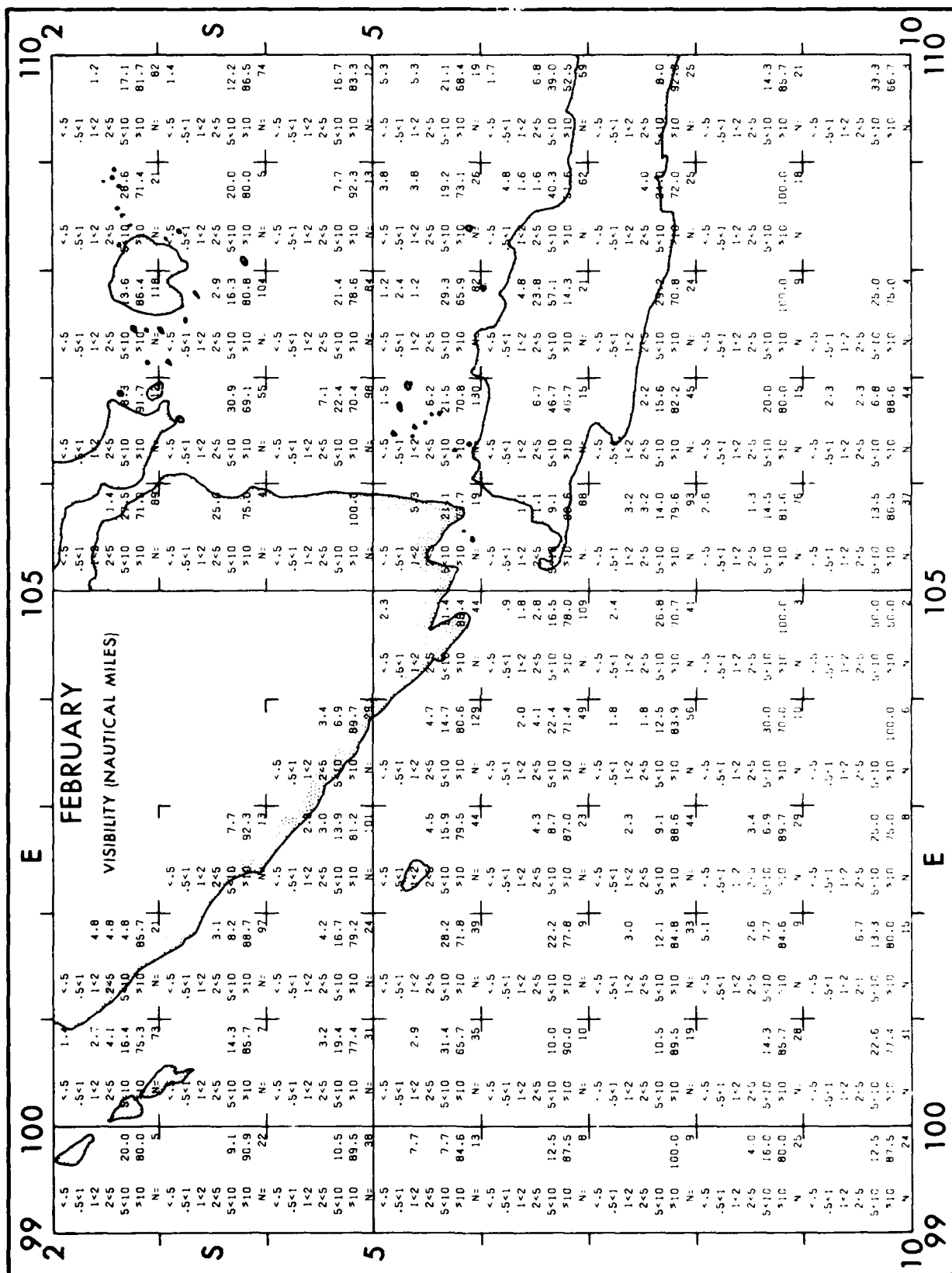
28% of all SE winds were accompanied by low cloud amount ≥ 8
25.8 and 14% by low cloud amount ≥ 7.8

An asterisk indicates that the percentage is based on 10 30 observations of wind direction total and low cloud amount. 0 replaces a bar graph when no low cloud amount ≥ 8 were observed with a wind direction or calm. 0 or bar is omitted when number of observations of total and low cloud amount from a wind direction or calm is less than 10









SOLID LINE Percent frequency of ceiling <1000 feet and/or visibility <5 nautical miles.

DASHED LINE Percent frequency of ceiling <8000 feet and/or visibility <10 nautical miles.

LOW cloud ceiling Visibility

Percent frequency of simultaneous occurrence of specified low cloud ceilings (hundreds of feet) and visibilities (nautical miles).

Low cloud ceiling heights are estimated from the height of low clouds, i. when low cloud amount $N_h \geq 8$

Observations are included under ceiling 0 < 15

N.C. (no ceiling) includes bases of clouds ≥ 8000 feet as well as occurrences of $N_h \leq 5$

12% of all observations reported ceiling ≥ 1000 but <2000 feet simultaneously with visibility ≥ 5 but <10 nautical miles.

- indicates <5% but >0

Number of observations

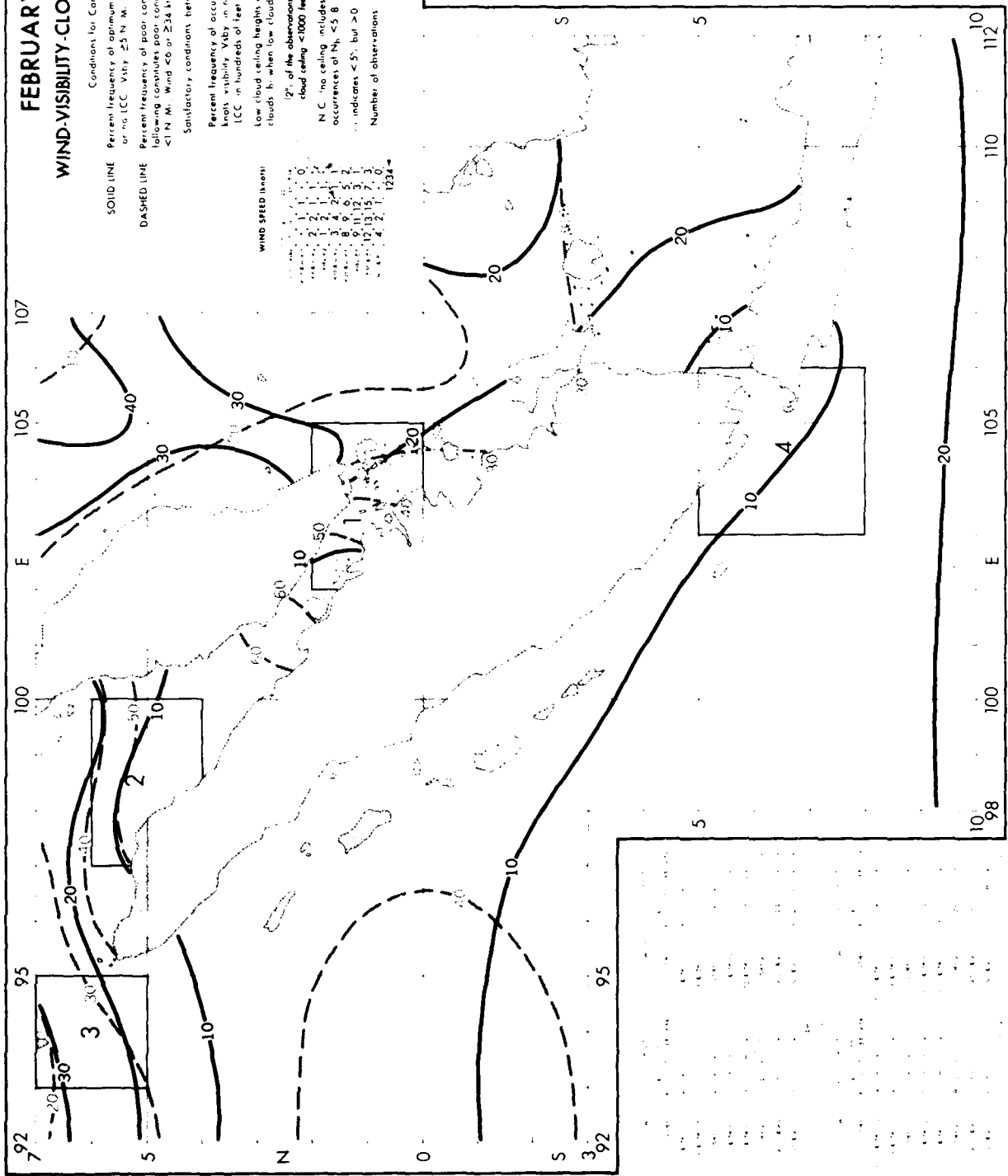


FEBRUARY WIND-VISIBILITY-CLOUDINESS

Conditions for Carrier Operations
 Solid line Percent frequency of optimum conditions, LCC ≥ 5000 ft or no LCC. Wind ≥ 25 N.W. and Wind 11-21 kts.
 Dashed line Percent frequency of poor conditions. Any one of the following constitutes poor conditions: LCC < 5000 ft, ≤ 10 M, Wind ≤ 6 or ≥ 24 kts.
 Satisfactory conditions between poor and optimum
 Percent frequency of occurrence of specified wind speed in knots, visibility in nautical miles, and low cloud ceiling LCC in hundreds of feet
 Low cloud ceiling heights are estimated from the height of low clouds in when low cloud amount N_h is ≥ 5
 1/2% of the observations reported wind speed of 11-21 knots, a low cloud ceiling < 1000 feet and or visibility < 2 nautical miles
 N.C. no ceiling included bases of clouds ≥ 8000 feet as well as occurrences of $N_h < 5$
 ... indicates < 5 , but ≥ 0
 Number of observations

WIND SPEED (knots)

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124
0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124



FEBRUARY SCALAR MEAN WIND SPEED

SOLID LINE Mean scalar wind speed (knots)

Direction frequency (loop scale). Bars represent percent frequency of winds observed from each direction. Speed frequency (baron scale). Printed figures represent percent frequency of wind speeds observed from each direction.

14% of all winds were from the N

1% of all winds were from the S with a speed 22-27 knots

The scalar mean speed was 9.4 knots

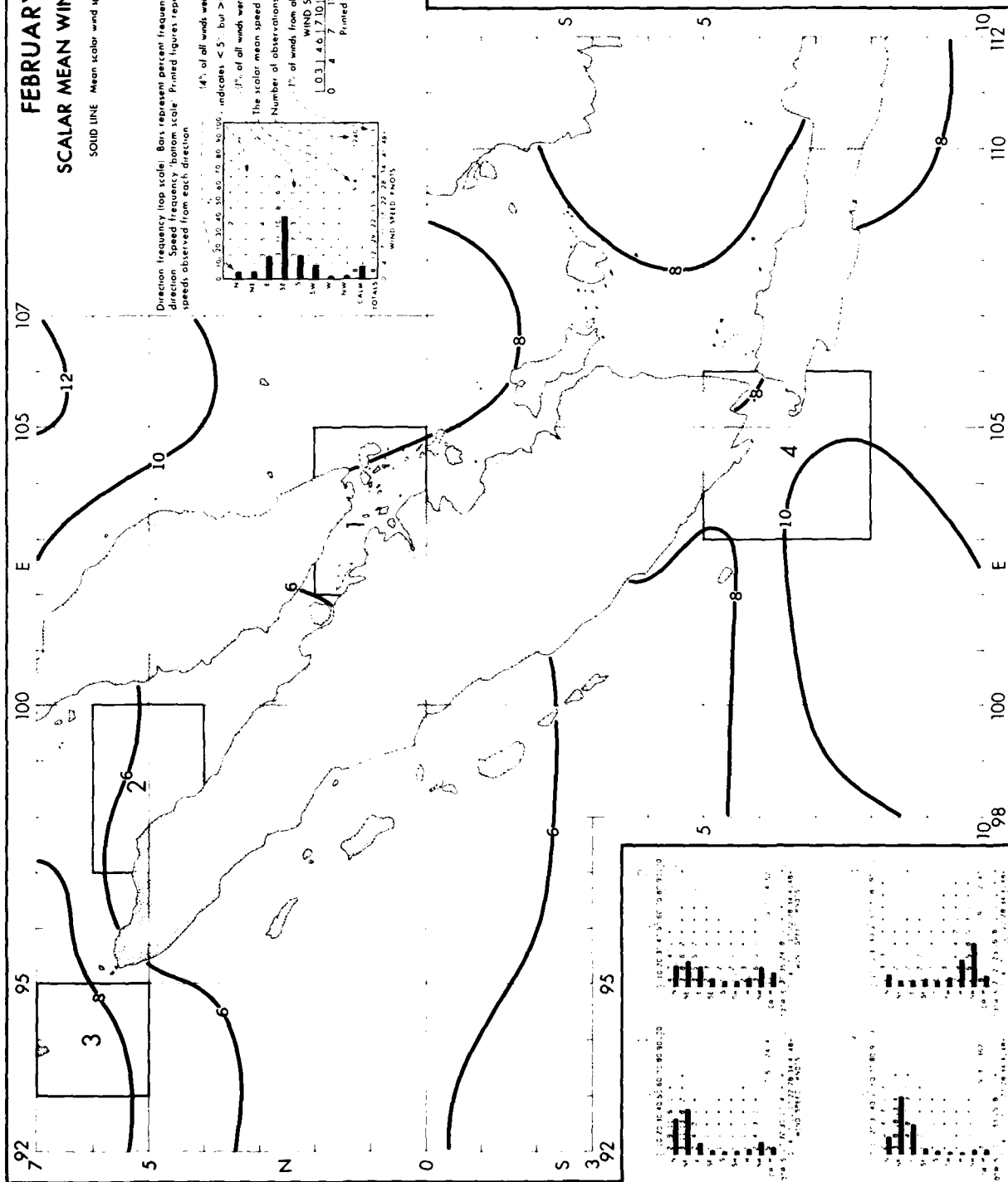
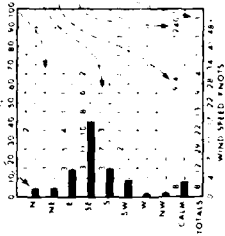
Number of observations

1% of winds from all directions had wind speed 2-48 knots

WIND SPEED INTERVAL KNOTS

0 3 4 6 7 10 11 16 17 20 22 27 28 33 40 41 47 48

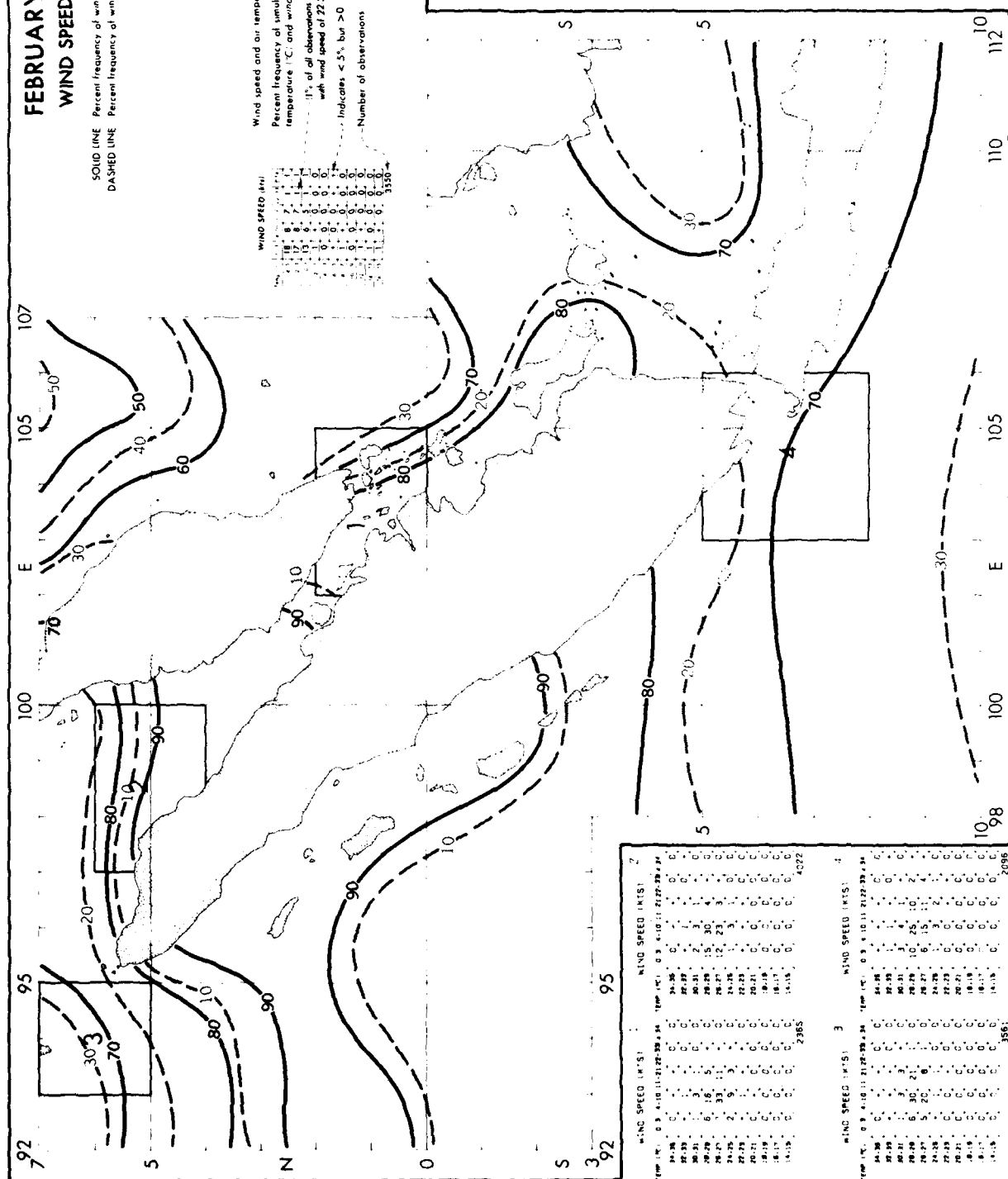
Printed scale on bottom of chart

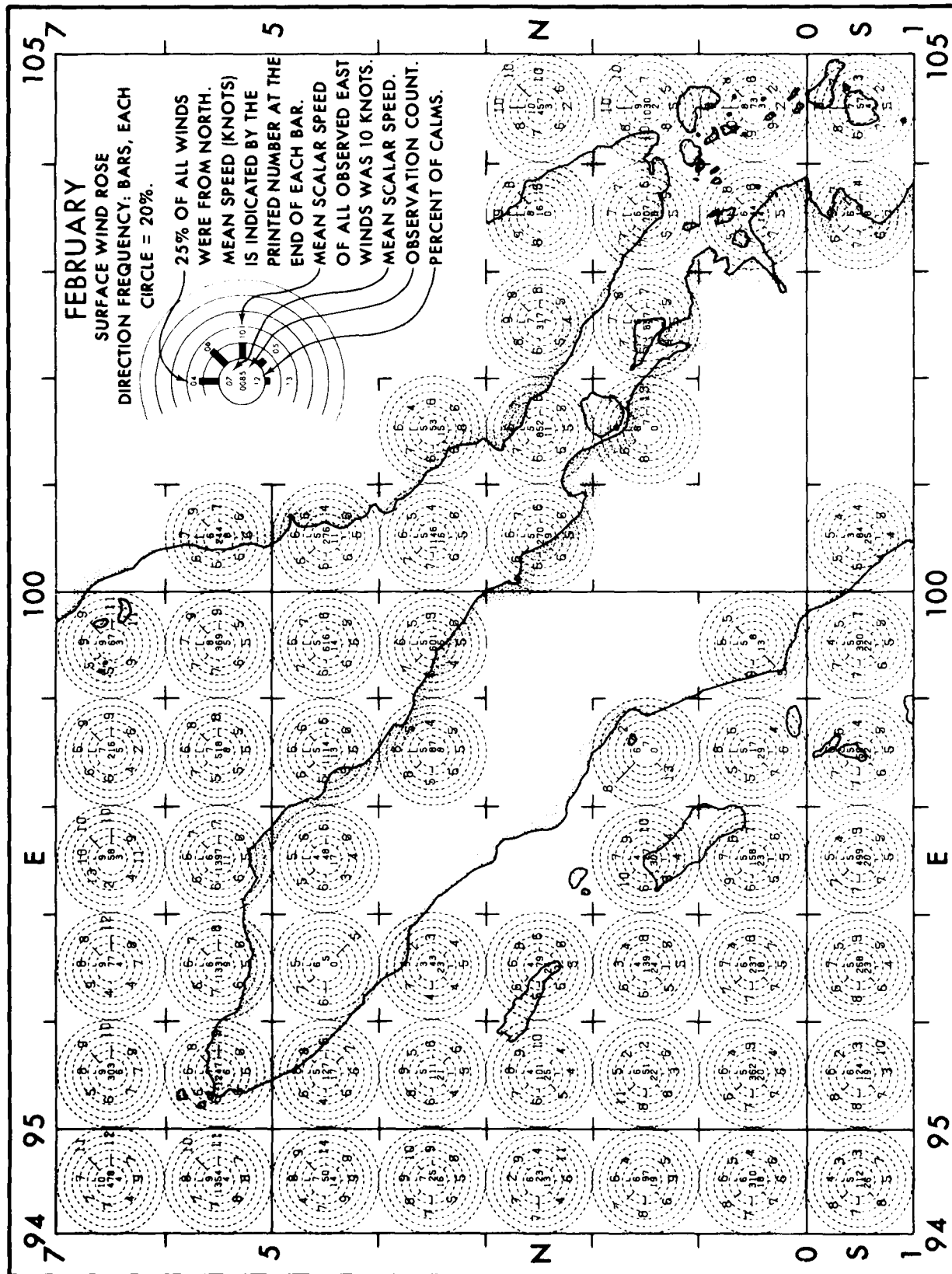


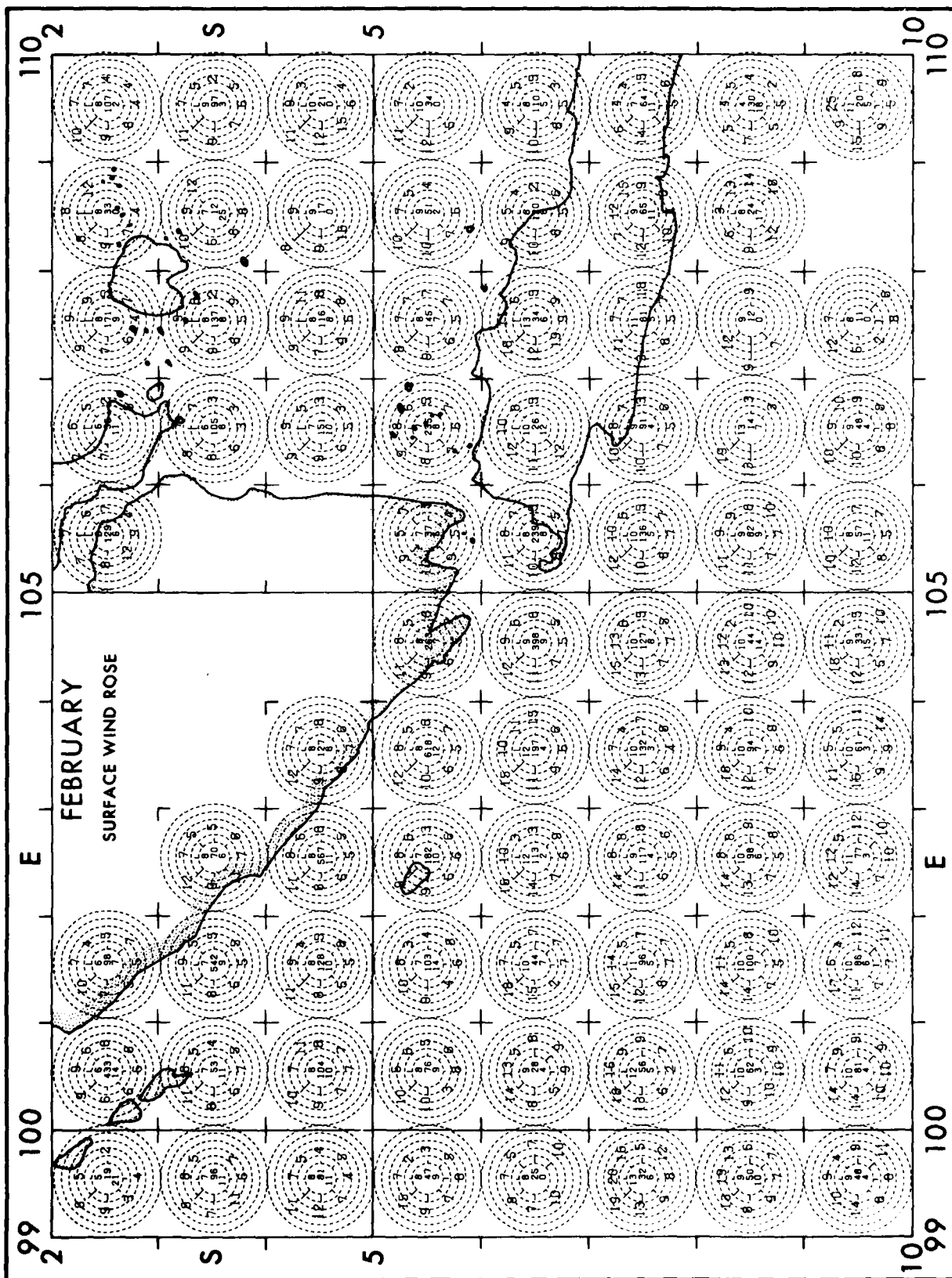
WIND SPEED

SOLID LINE Percent frequency of wind speed <11 knots
DASHED LINE Percent frequency of wind speed 11-21 knots

Wind speed and air temperature
Percent frequency of simultaneous occurrence of specified
temperature ($^{\circ}\text{C}$ and wind speed knots)
- - - 1% of all observations reported temperature 2°C simultaneously
with wind speed of 22-33 kts
• Indicates $< 5\%$, but > 0
Number of observations



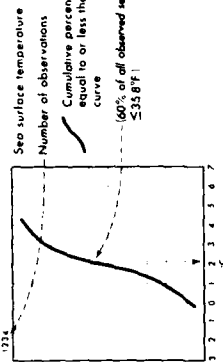




FEBRUARY AIR AND SEA TEMPERATURE

SOLID LINE Mean air temperature (°F)
DASHED LINE Mean sea surface temperature (°F)

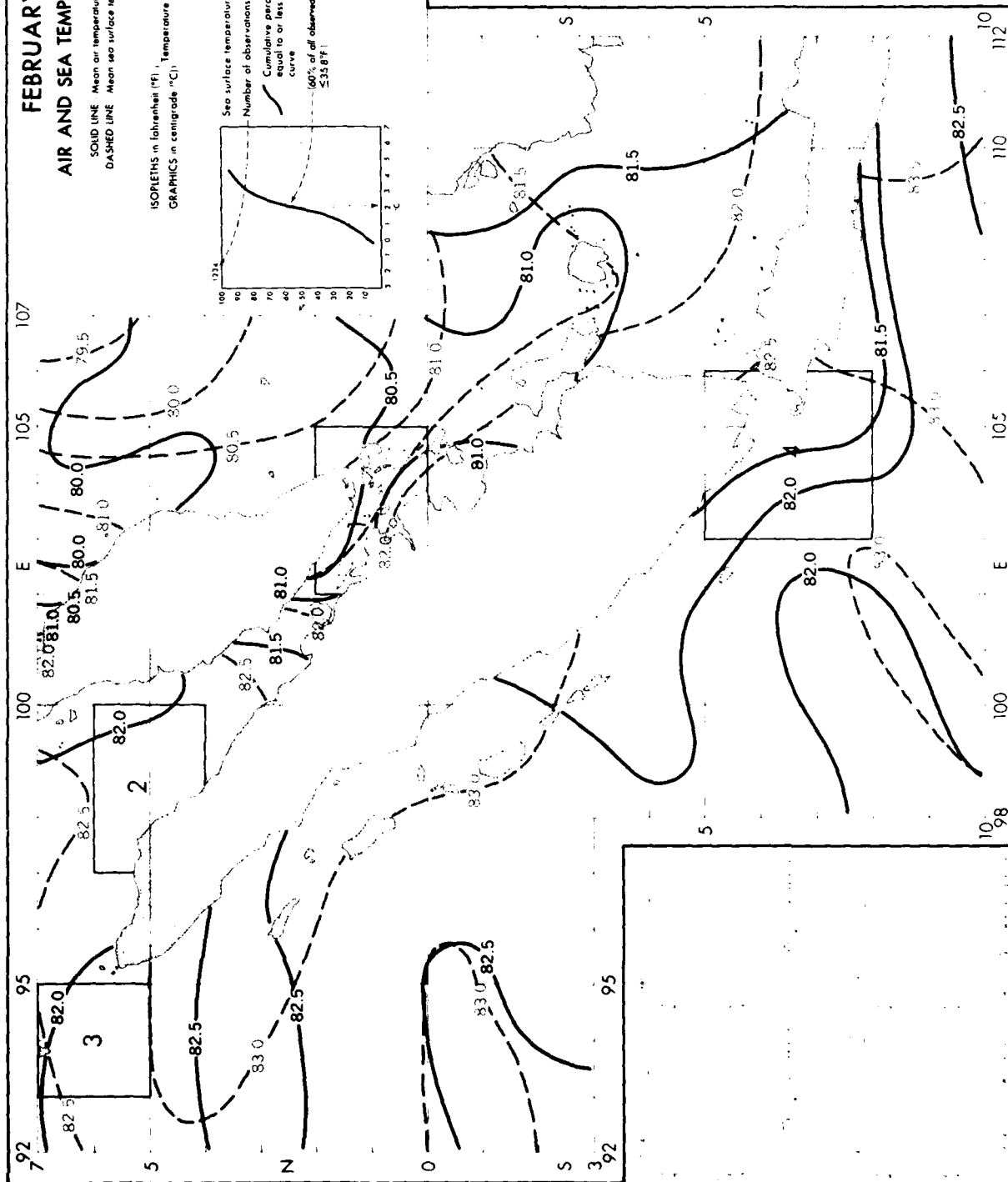
ISOPLETHS in Fahrenheit (°F) Temperature conversion table below
GRAPHICS in centigrade (°C)



Cumulative percent frequency of sea surface temperatures equal to or less than the temperature intersected by the curve
60% of all observed sea surface temperatures were 52.7°C or 53.5°F

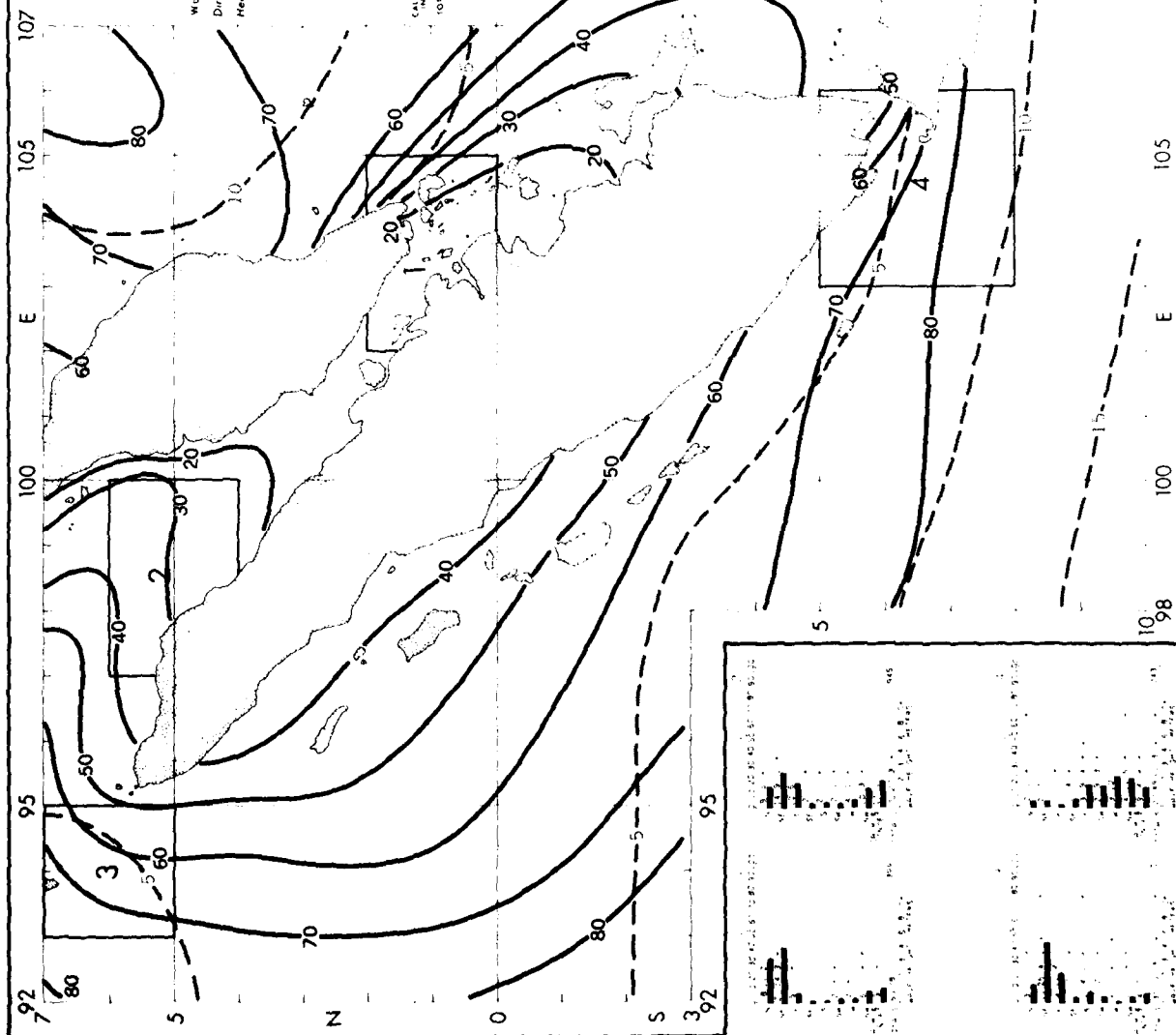
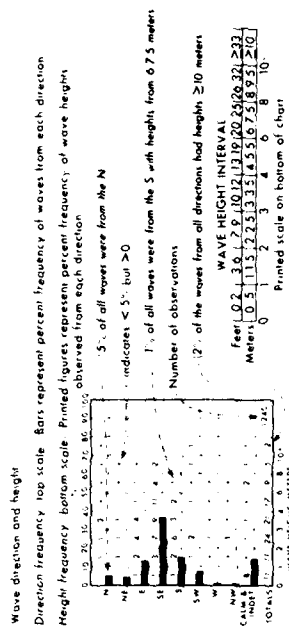
CONVERSION TABLE

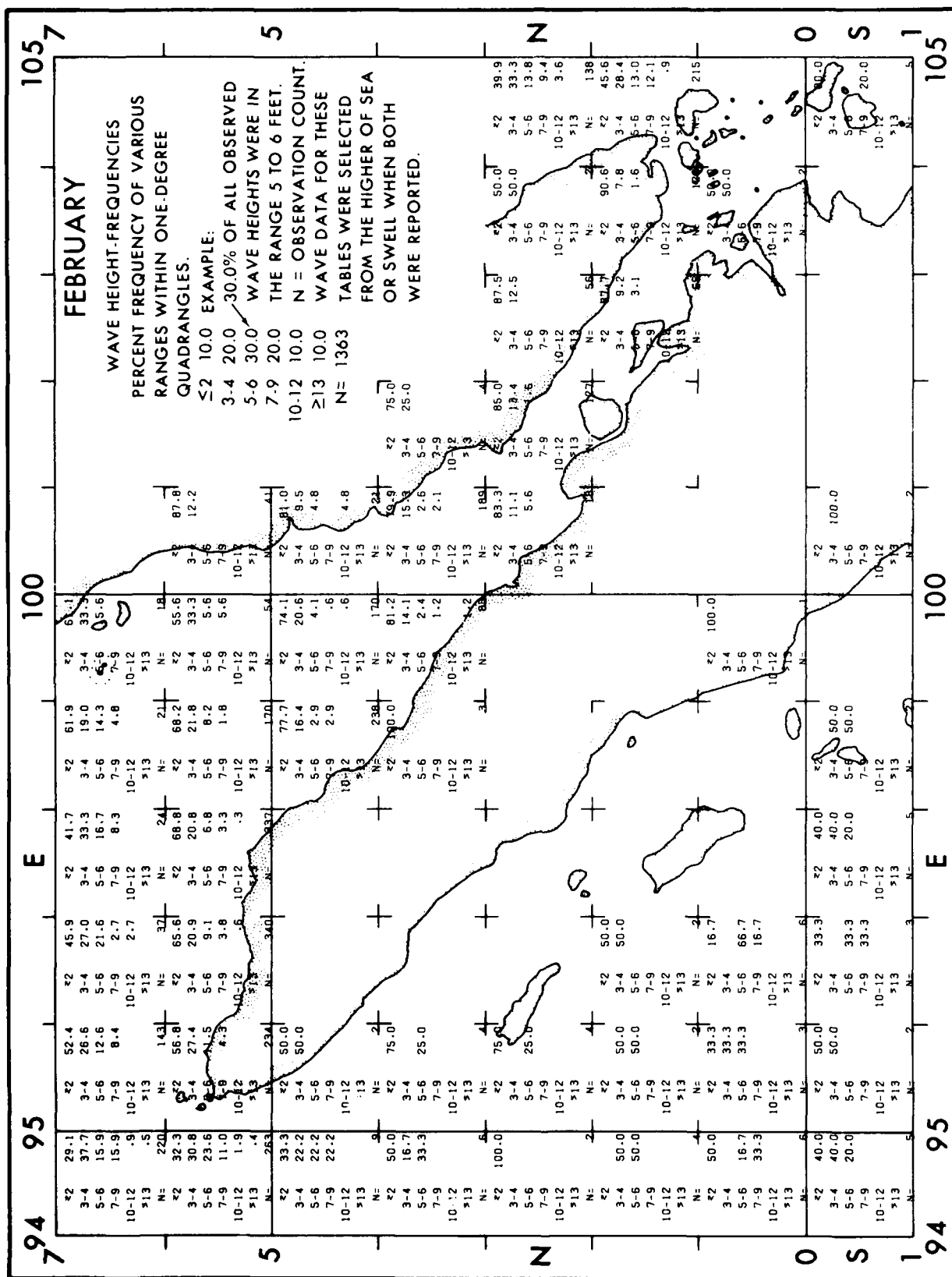
°C	°F
16	60.8
17	62.6
18	64.4
19	66.2
20	68.0
21	69.8
22	71.6
23	73.4
24	75.2
25	77.0
26	78.8
27	80.6
28	82.4
29	84.2
30	86.0
31	87.8
32	89.6
33	91.4
34	93.2
35	95.0
36	96.8
37	98.6
38	100.4
39	102.2

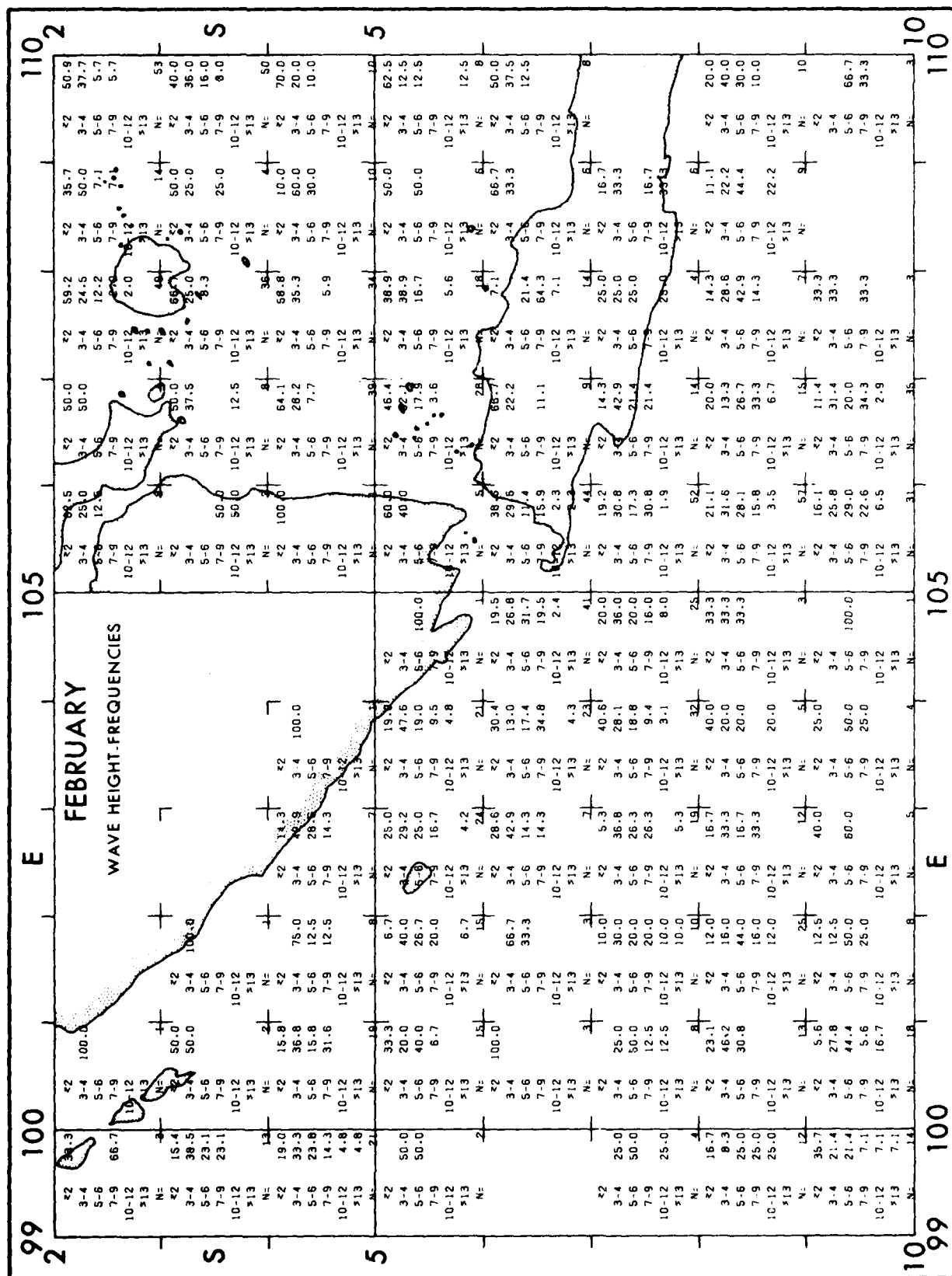


FEBRUARY WAVES

SOLID LINE Percent frequency of wave height ≥ 3 feet
DASHED LINE Percent frequency of wave height ≥ 8 feet

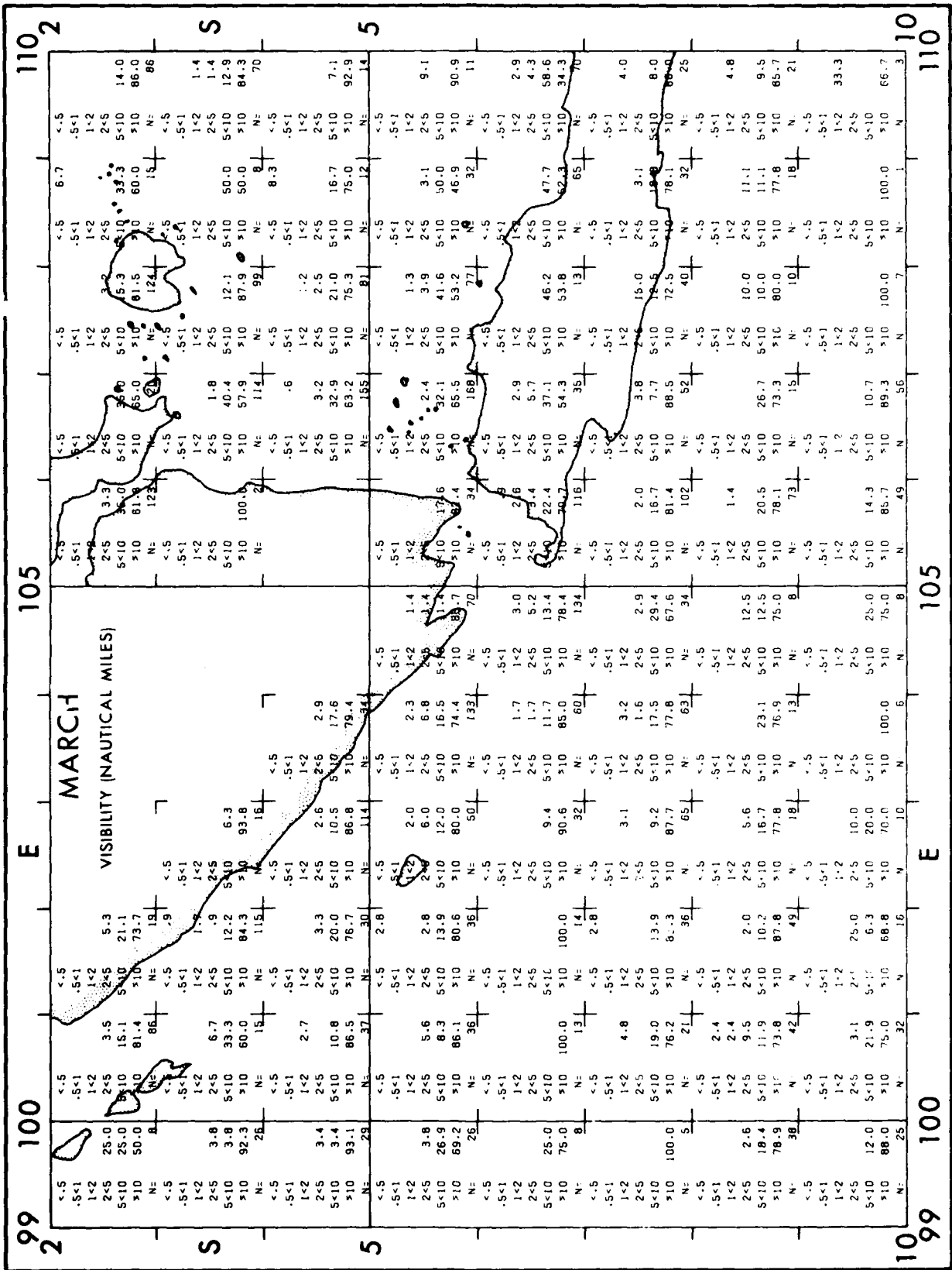






* DUID LINE Percent frequency of observations reporting precipitation
DASHED LINE Percent frequency of observations reporting thunderstorms
 and/or lightning





MARCH CEILING-VISIBILITY

SOLID LINE Percent frequency of ceiling <1000 feet and or visibility <5 nautical miles
DASHED LINE Percent frequency of ceiling <8000 feet and or visibility <10 nautical miles

Low cloud ceiling Visibility

Percent frequency of simultaneous occurrence of specified low cloud ceilings hundreds of feet and visibilities nautical miles

Low cloud ceiling heights are estimated from the height of low clouds in when low cloud amount N_h is 2-5. 8

Observations are included under ceiling 0 <15

N C line ceiling includes bases of clouds ≥8000 feet as well as occurrences of N_h <5. 8

2% of all observations reported ceiling ≥1000 but <2000 feet simultaneously with visibility 2.5 but <10 nautical miles

indicates <5% but >0

Number of observations

LOW CLOUD CEILING	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	12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ATTENTIA

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000112000
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MARCH

SCALAR MEAN WIND SPEED

SOLID LINE Mean scalar wind speed (knots)

Direction frequency (top scale). Bars represent percent frequency of winds observed from each direction. Speed frequency (bottom scale). Printed figures represent percent frequency of wind speeds observed from each direction.

4% of all winds were from the N

indices < 5% but > 0

1% of all winds were from the S with a speed 22 knots

The scalar mean speed was 9.4 knots

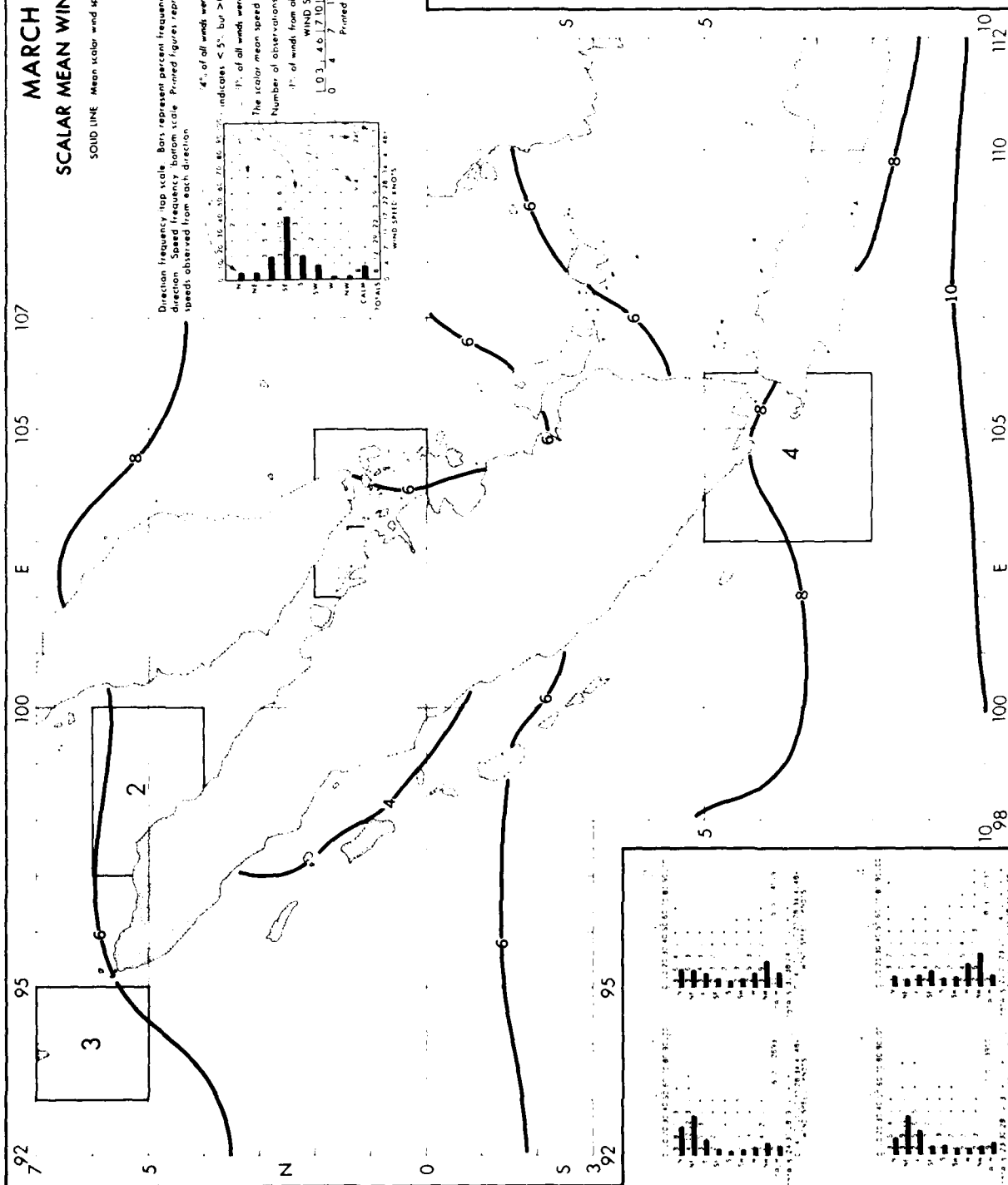
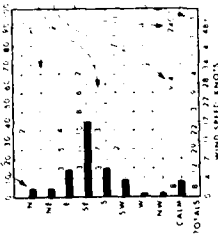
Number of observations

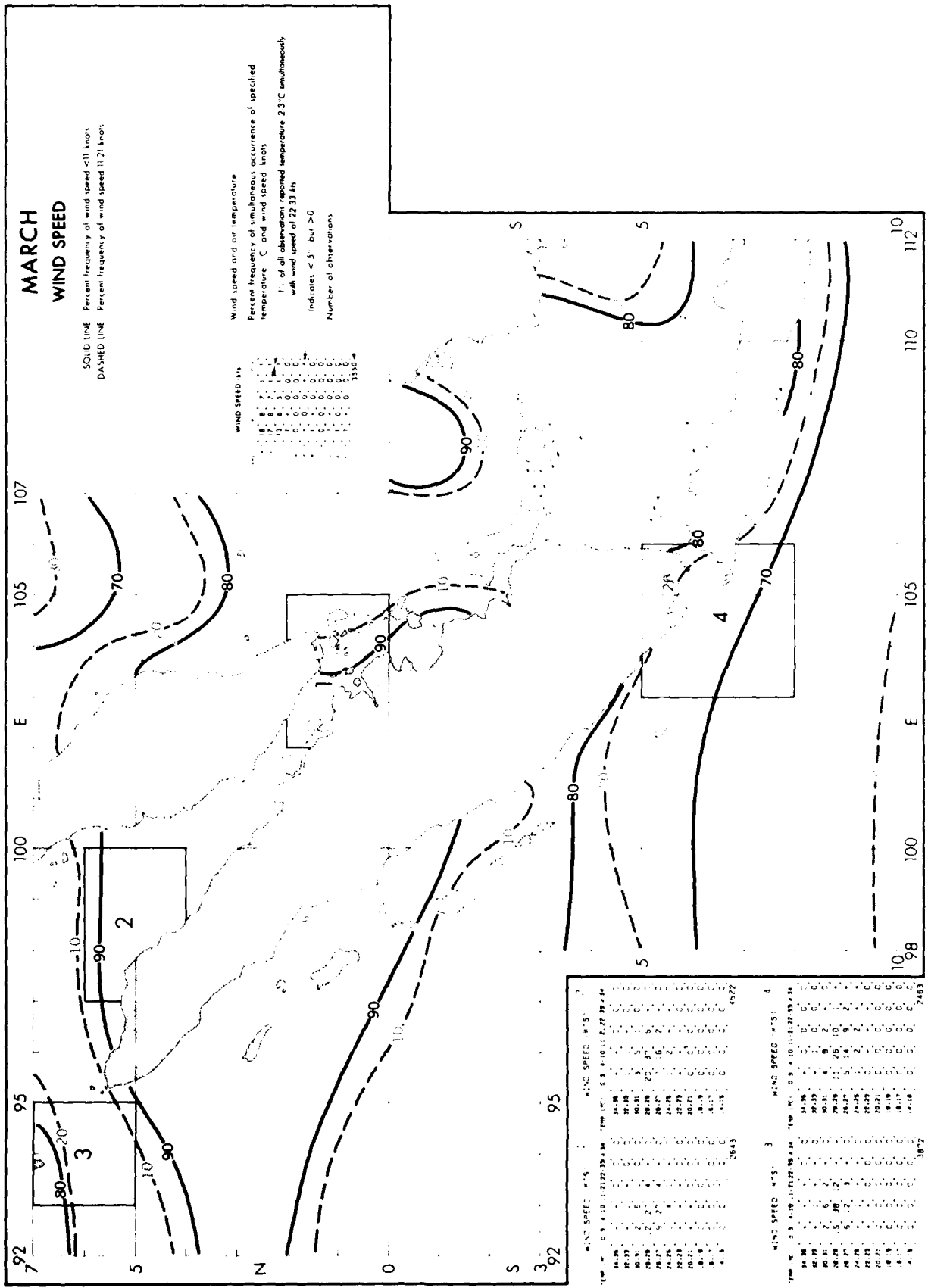
1% of winds from all directions had wind speed ≥ 48 knots

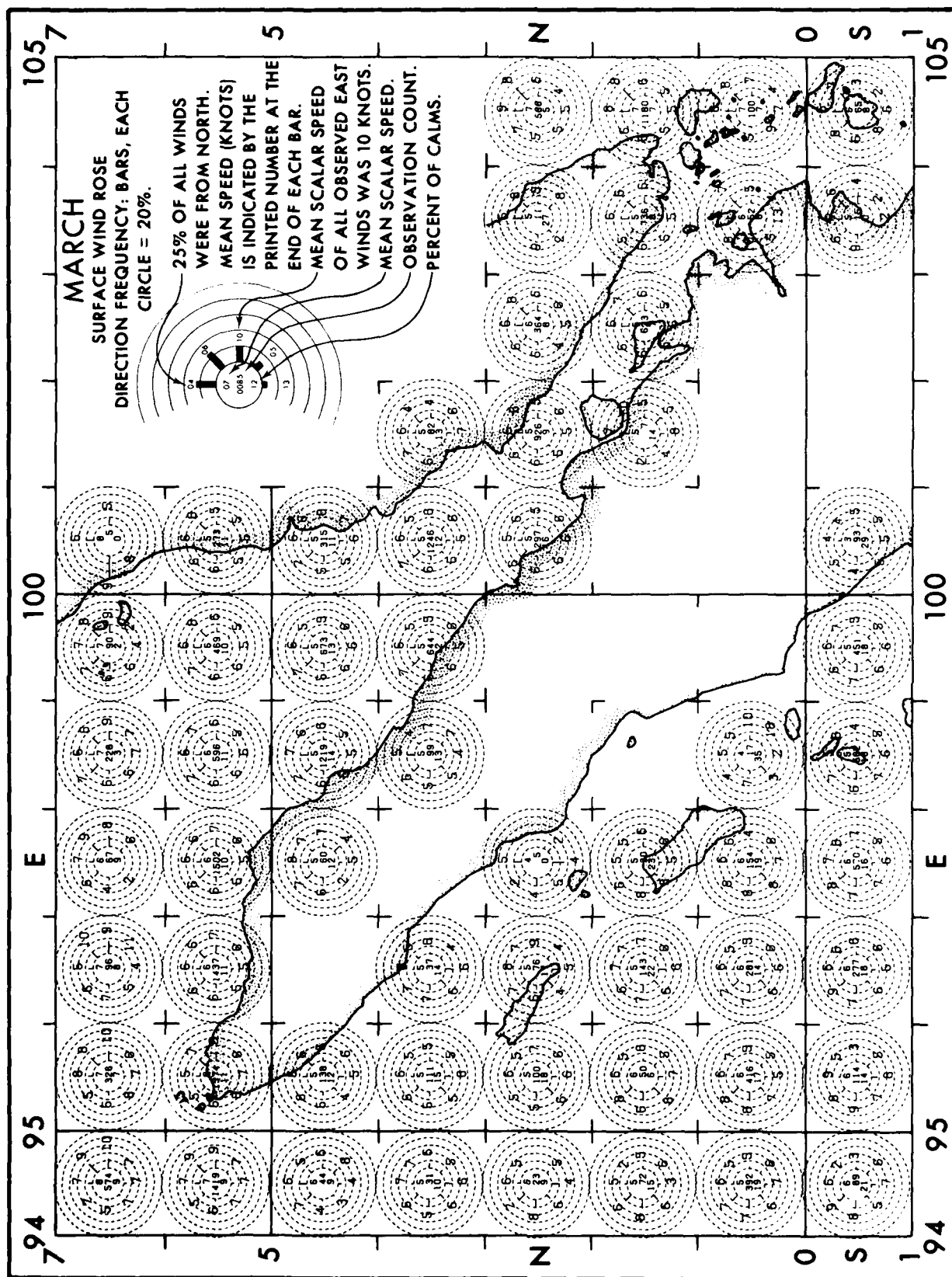
WIND SPEED INTERVAL, KNOTS

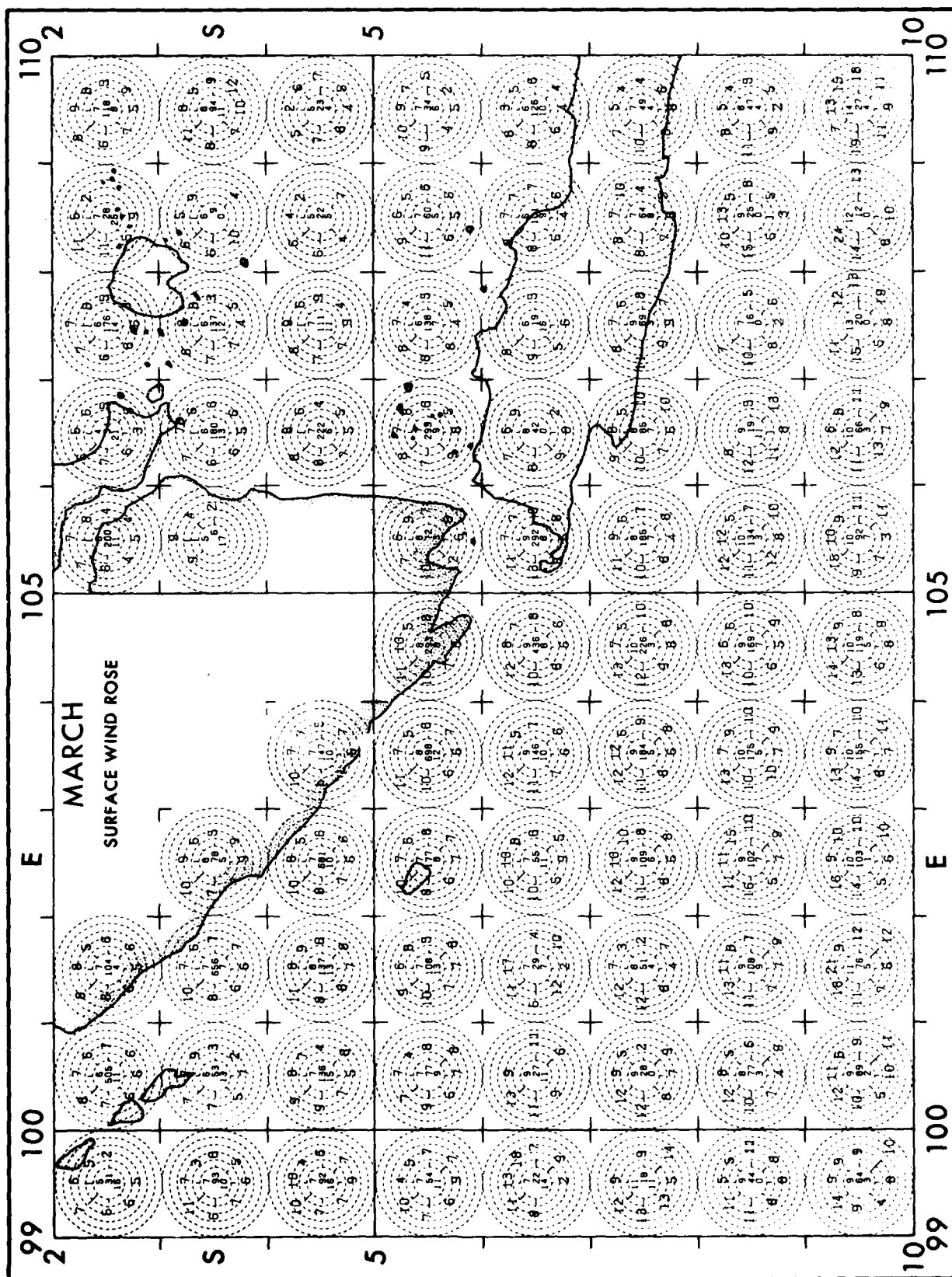
0 4 7 11 17 22 27 33 34 40 41 47 48

Printed scale on bottom of chart









MARCH

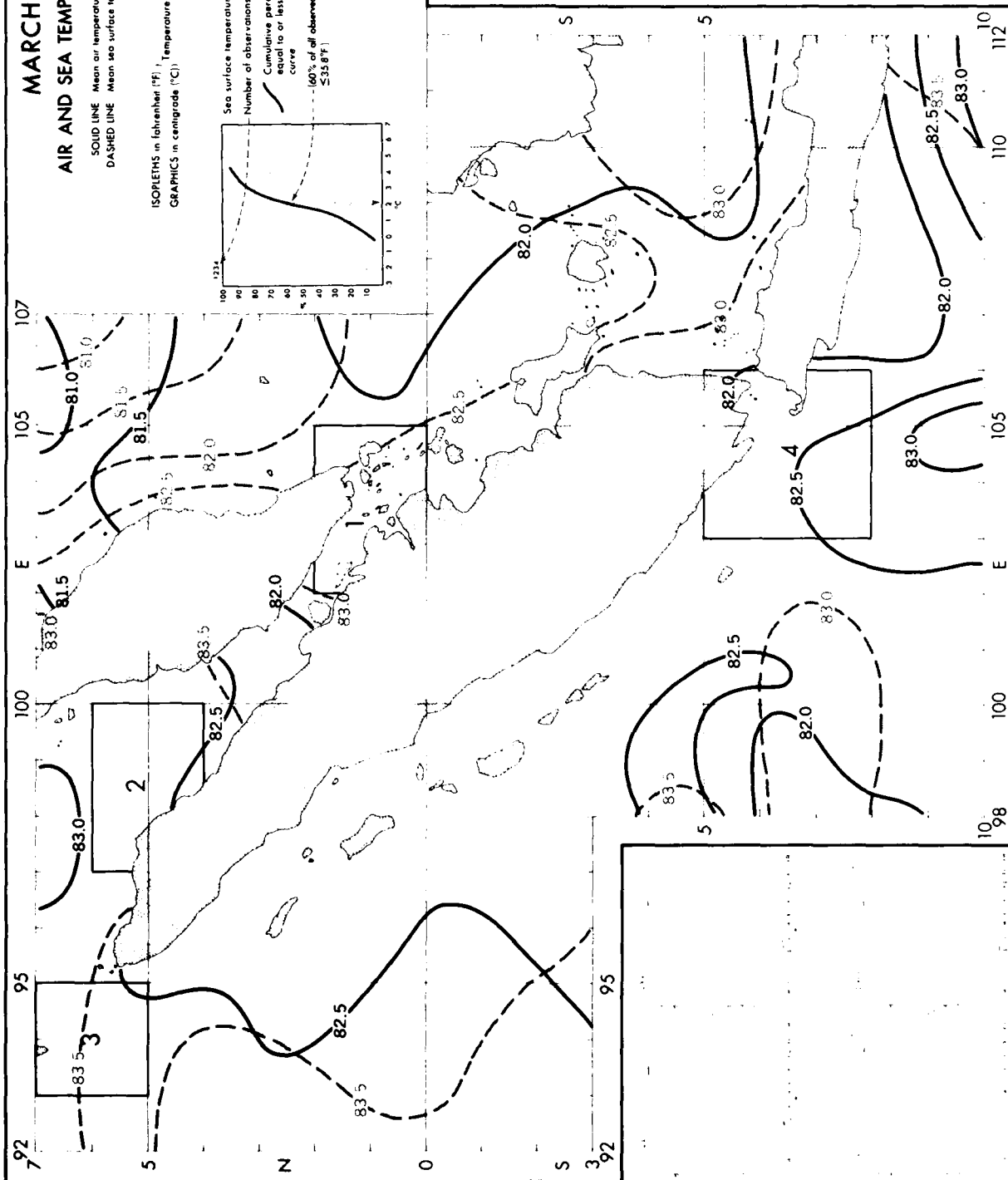
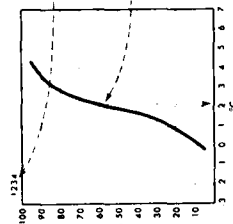
AIR AND SEA TEMPERATURE

SOLID LINE Mean air temperature (°F)
DASHED LINE Mean sea surface temperature (°F)

ISOPLETHS in Fahrenheit (°F) Temperature conversion table below
GRAPHICS in centigrade (°C)

Sea surface temperature
Number of observations

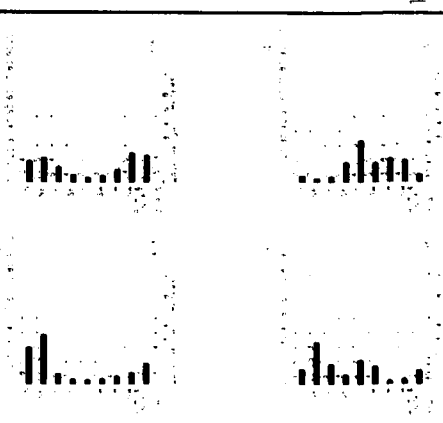
Cumulative percent frequency of sea surface temperatures sorted to or less than the temperature intersected by the curve
(60% of all observed sea surface temperatures were 52.1°C or 53.8°F)

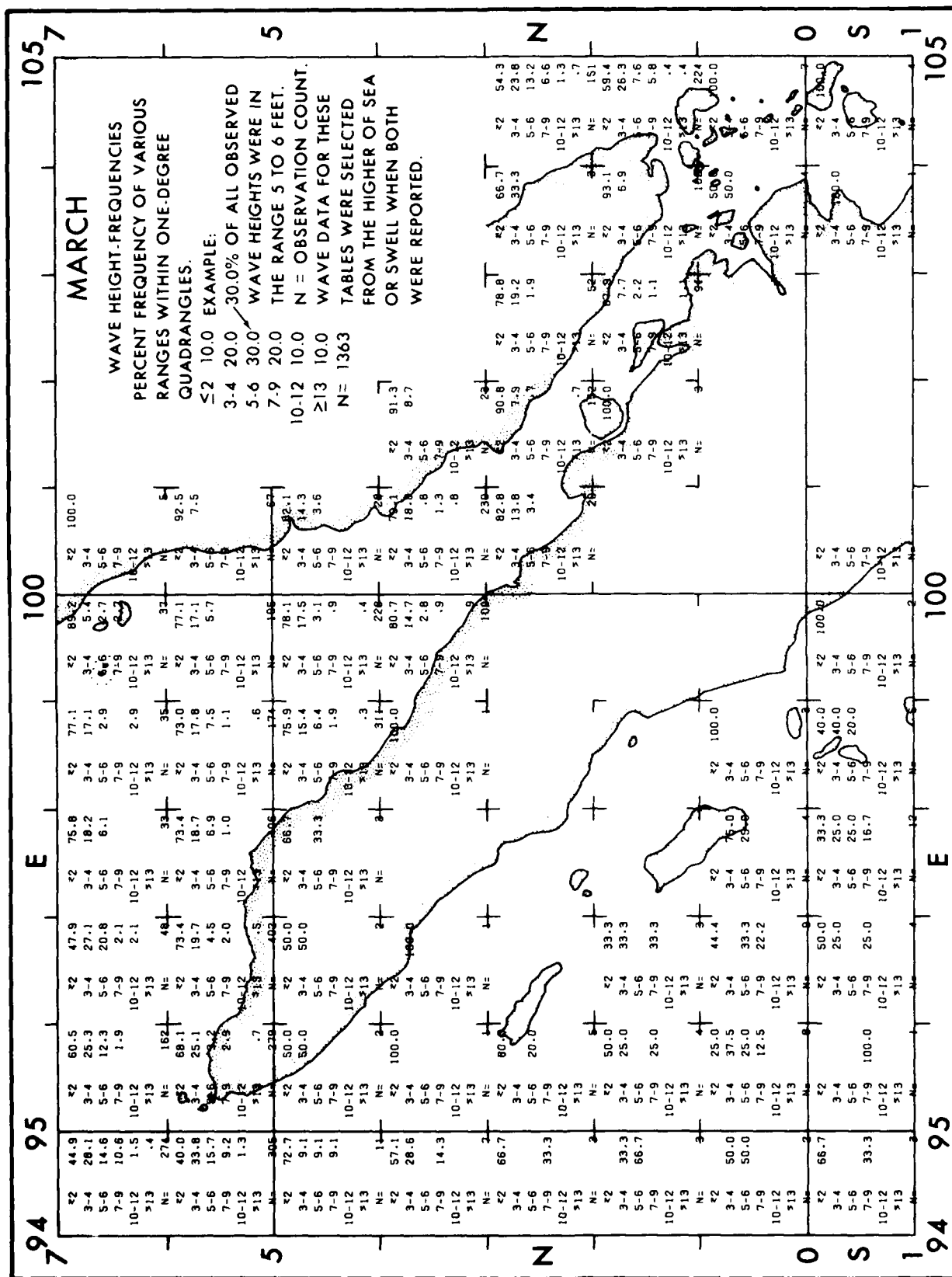


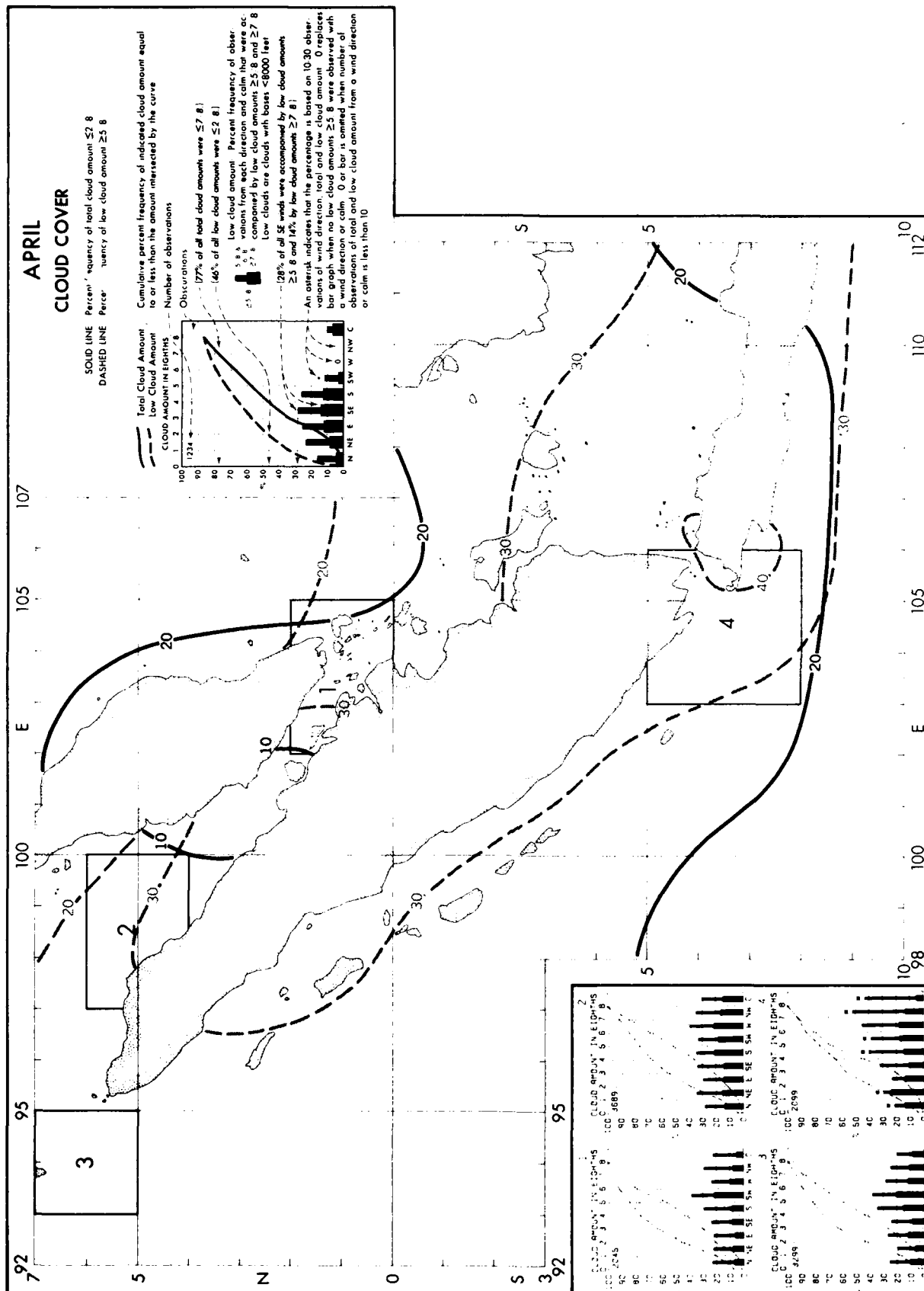
CONVERSION TABLE

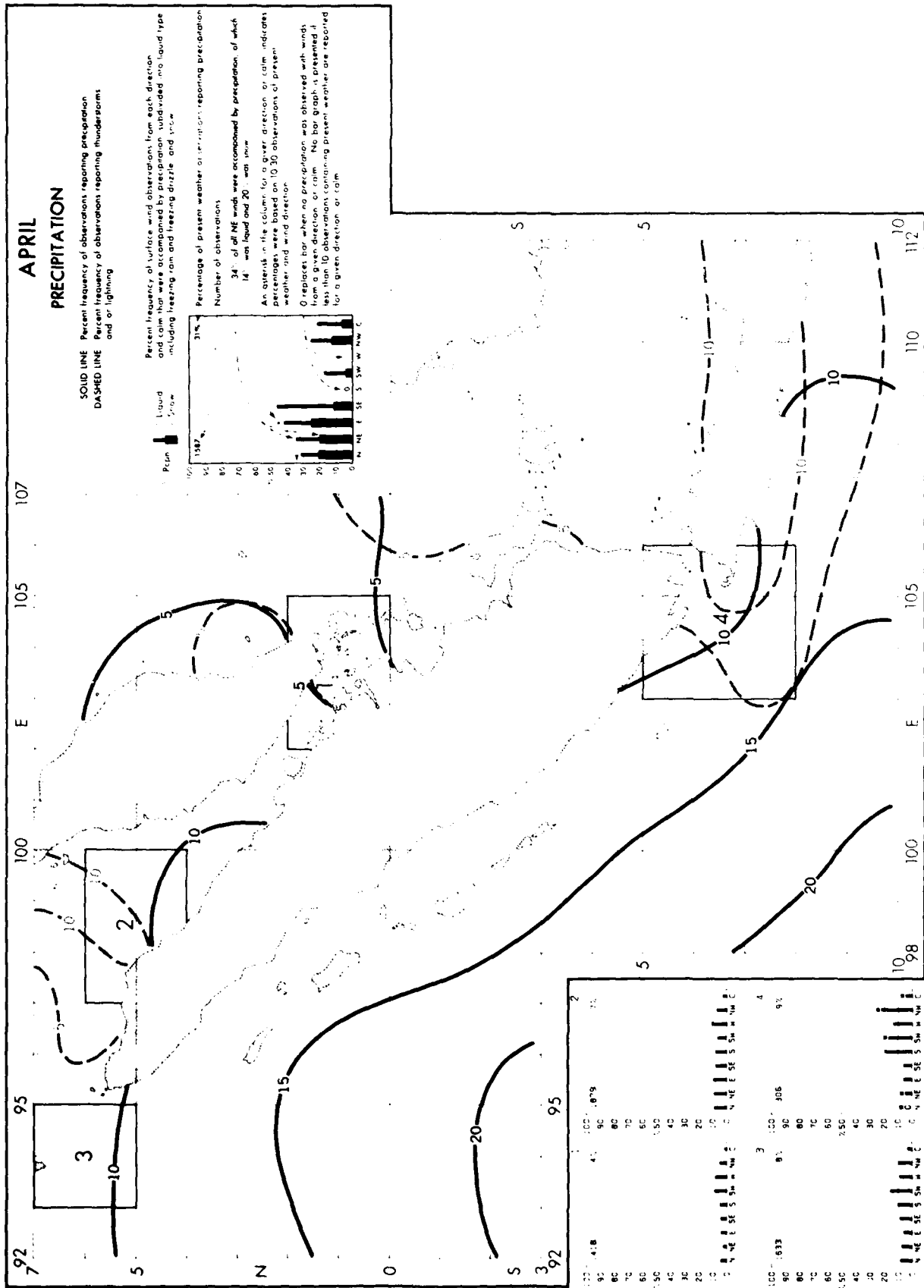
°C	°F
16	60.8
17	62.6
18	64.4
19	66.2
20	68.0
21	69.8
22	71.6
23	73.4
24	75.2
25	77.0
26	78.8
27	80.6
28	82.4
29	84.2
30	86.0
31	87.8
32	89.6
33	91.4
34	93.2
35	95.0
36	96.8
37	98.6
38	100.4
39	102.2

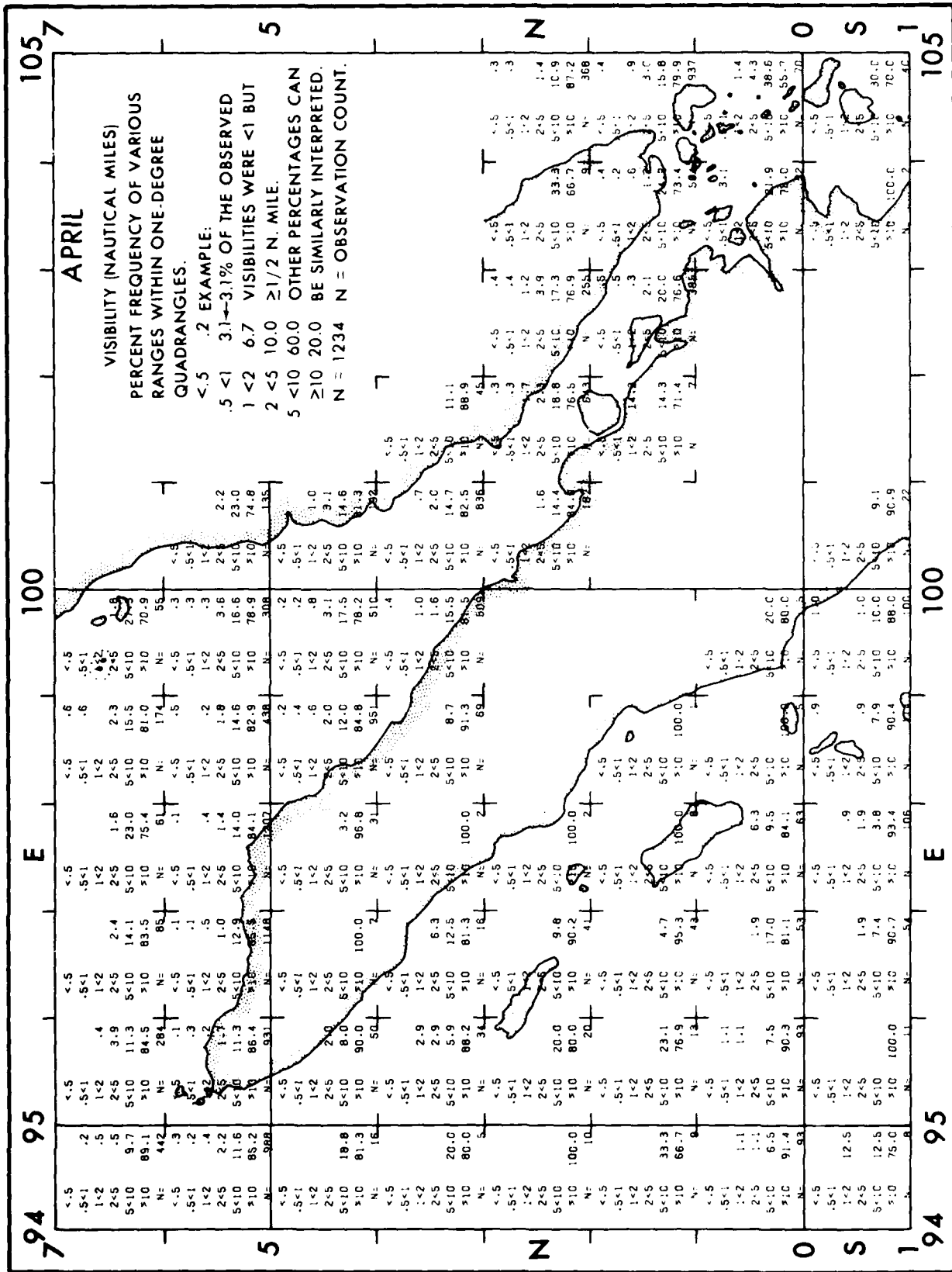
SOLID LINE Percent frequency of wave height ≥ 3 feet
DASHED LINE Percent frequency of wave height ≥ 8 feet











CEILING-VISIBILITY

SOLID LINE Percent frequency of ceiling <1000 feet and or visibility <5 nautical miles

DASHED LINE Percent frequency of ceiling <8000 feet and or visibility <10 nautical miles

low cloud ceiling Visibility

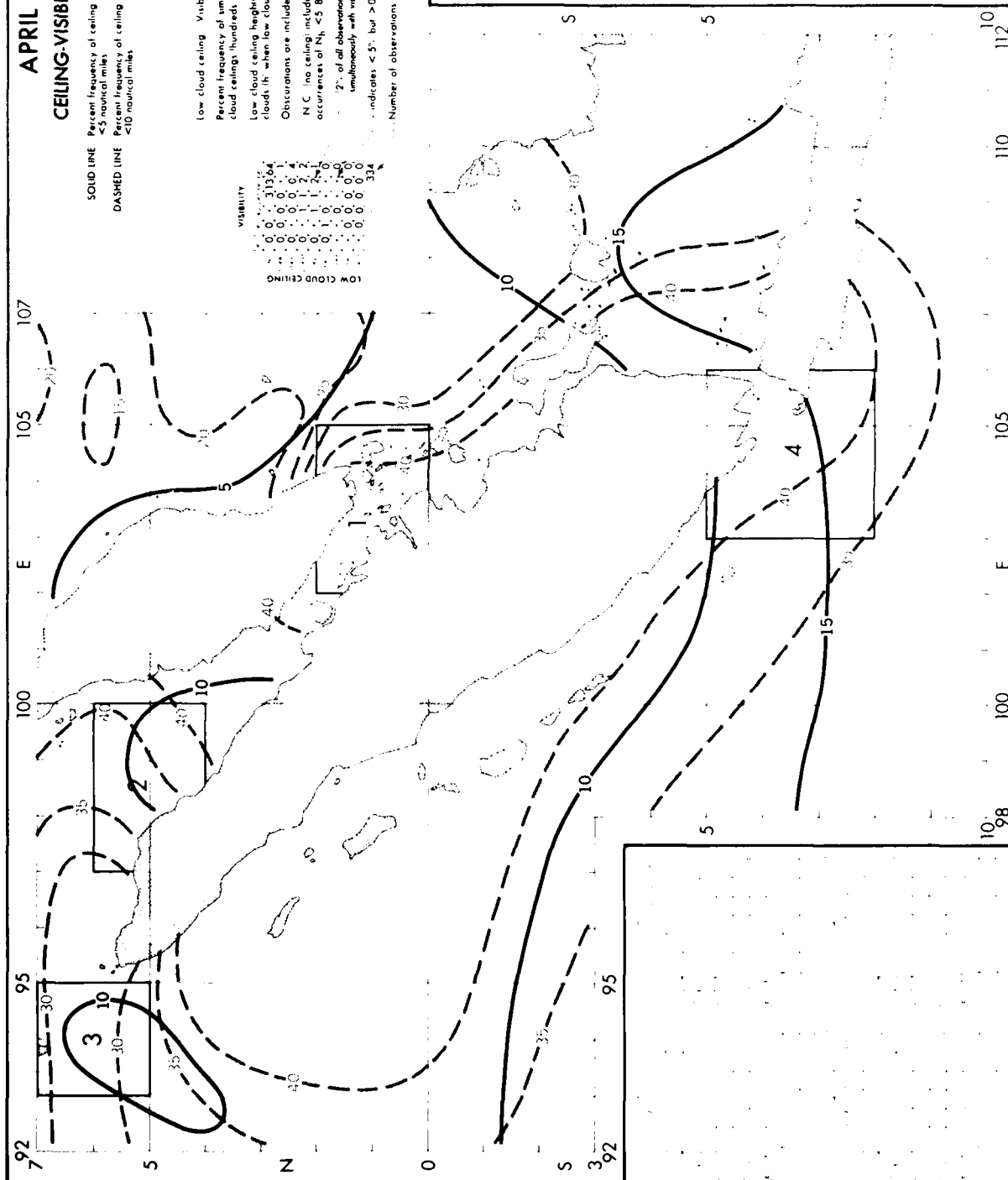
Percent frequency of simultaneous occurrence of specified low cloud ceilings, hundreds of feet and visibility: nautical miles.

Low cloud ceiling heights are estimated from the height of low clouds, ft, when low cloud amount $N_{lh} \geq 8$.

Observations are included under ceiling $0 < 15$ in occurrence of ceiling includes bases of clouds ≥ 8000 feet as well as $N_{lh} \leq 8$.

2% of all observations reported ceiling ≥ 1000 but < 2000 feet simultaneously with visibility ≥ 5 but < 10 nautical miles.

indicates $\leq 5^\circ$, but > 0 .



APRIL WIND-VISIBILITY-CLOUDINESS

Conditions for Carrier Operations
Percent frequency of optimum conditions (CC ≥ 5000 ft
or no ICC, Vbty ≥ 5 N Mi, and Wind 11-21 kts)
Percent frequency of poor conditions. Any one of the
following constitutes poor conditions: ICC < 300 ft, Vbty
 < 1 N Mi, Wind < 6 or ≥ 24 kts
Satisfactory conditions between poor and optimum

Percent frequency of occurrence of specified wind speed in
knots, visibility (Vbty) in nautical miles and low cloud ceiling
(ICC) in hundreds of feet

Low cloud ceiling heights are estimated from the height of low
clouds (h) when low cloud amount N_h is ≥ 5 8

2% of the observations reported wind speeds of 11-21 knots, a low
cloud ceiling < 1000 feet and or visibility < 2 nautical miles

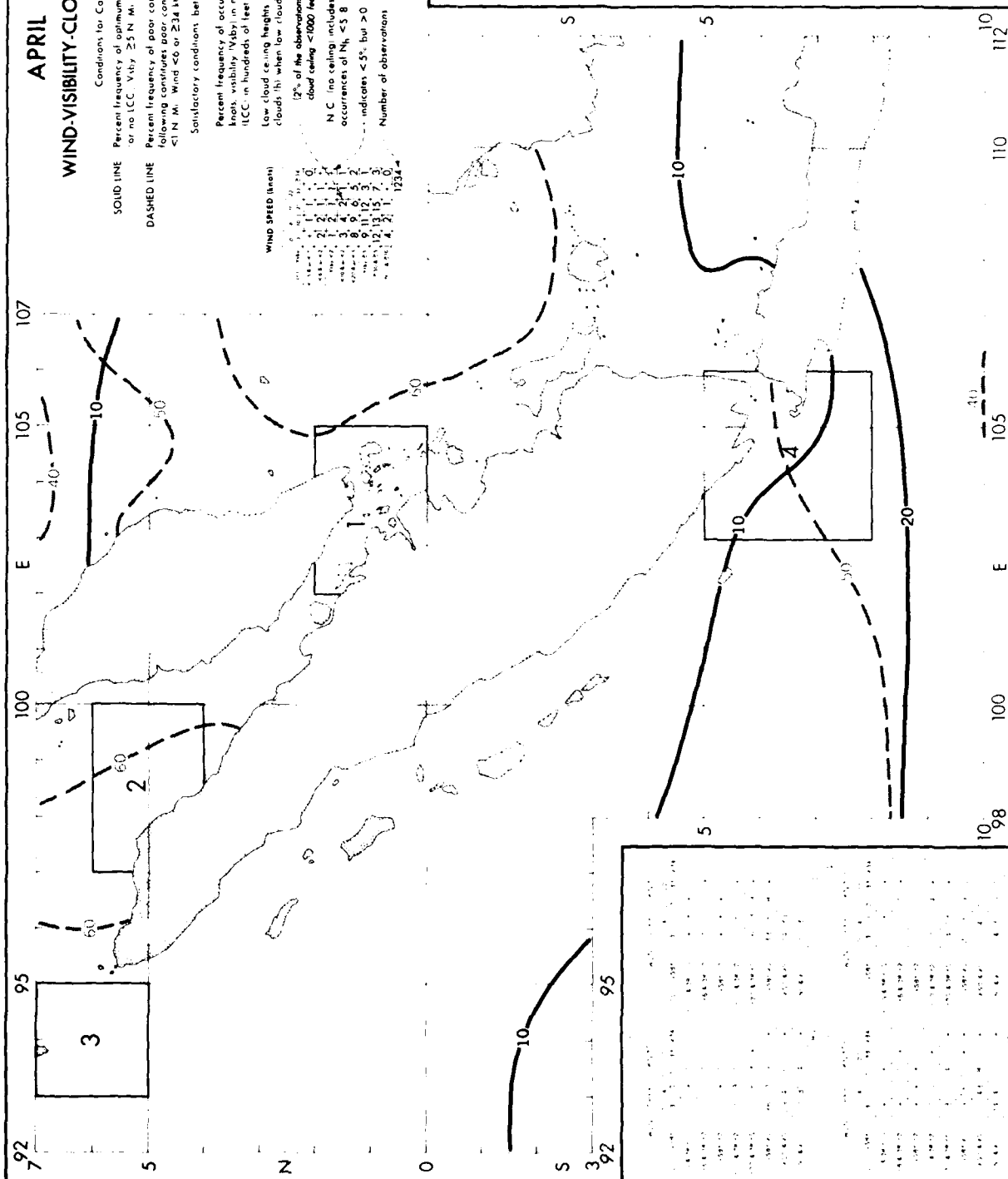
N.C. no ceiling includes bases of clouds ≥ 8000 feet as well as
occurrences of $N_h < 5$ 8

indicates $< 5\%$, but > 0

Number of observations

WIND SPEED (knots)

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	
2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	2	
3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	3	
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6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	6	
7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7	
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18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	
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30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	30	



APRIL SCALAR MEAN WIND SPEED

SOLID LINE Mean scalar wind speed (knots)

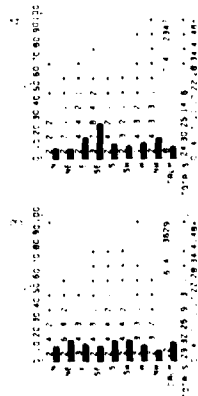
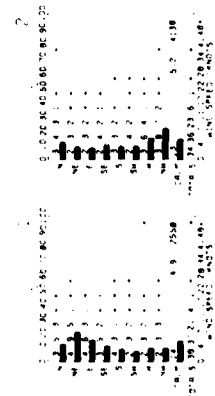
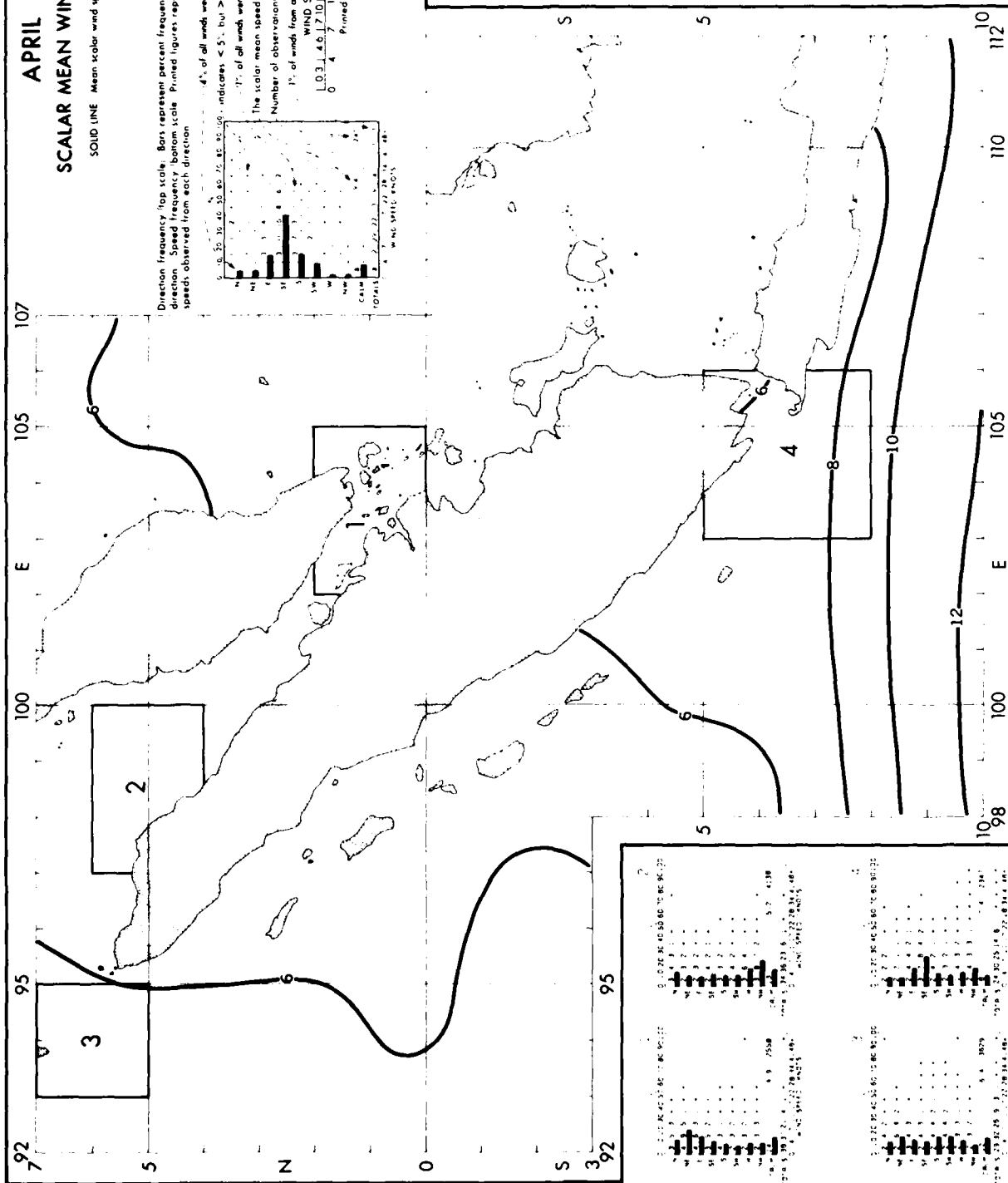
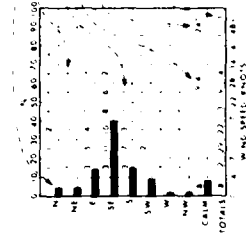
Direction frequency (top scale): Bars represent percent frequency of winds observed from each direction. Speed frequency (bottom scale): Printed figures represent percent frequency of wind speeds observed from each direction.

4% of all winds were from the N
1% of all winds were from the S with a speed 22-27 knots

The scalar mean speed was 9.4 knots
Number of observations: 1% of winds from all directions had wind speed ≥ 48 knots

WIND SPEED INTERVAL KNOTS
0-3 4-6 7-10 11-16 17-22 23-28 29-34 35-41 42-48

Printed scale on bottom of chart

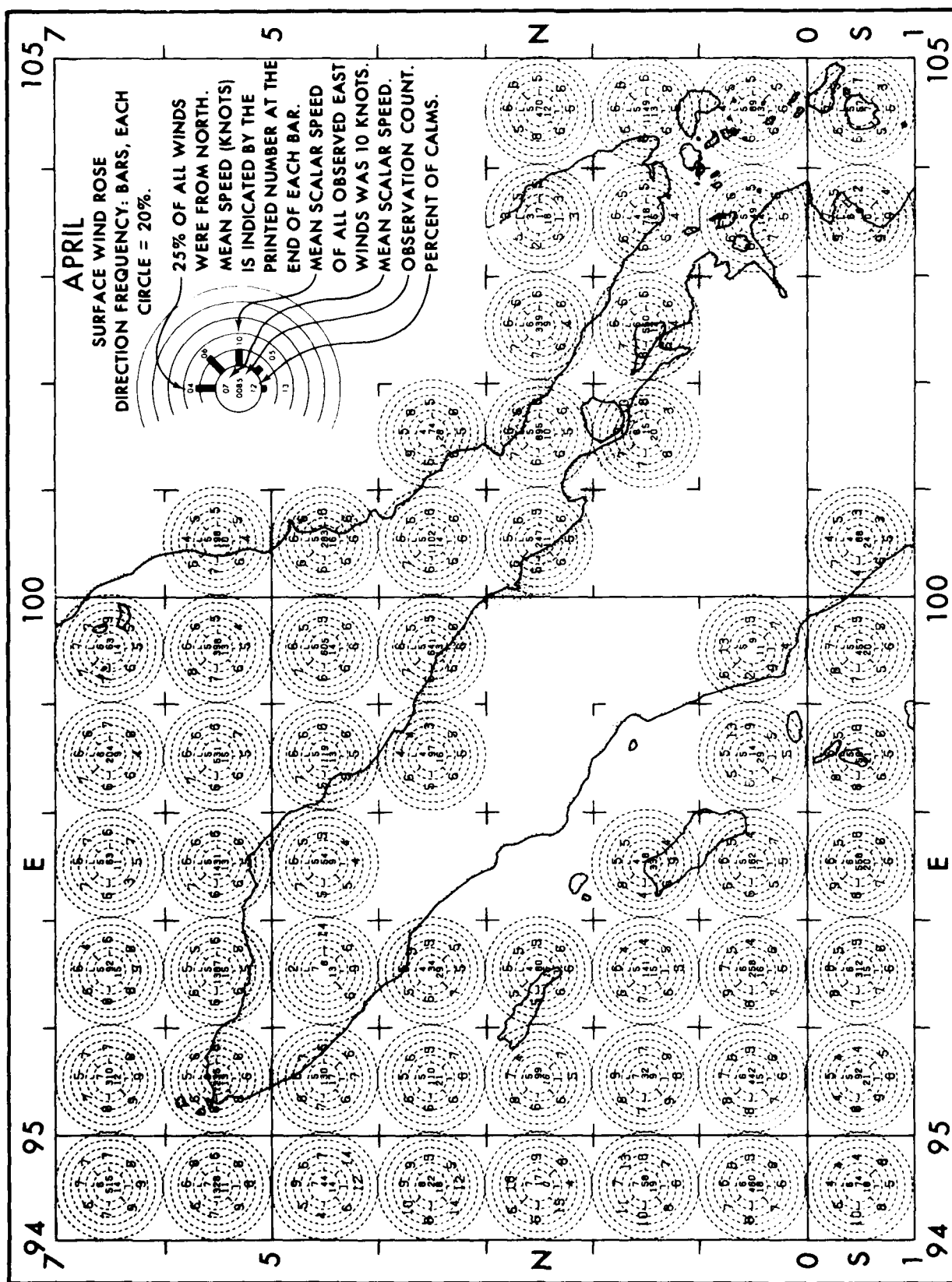


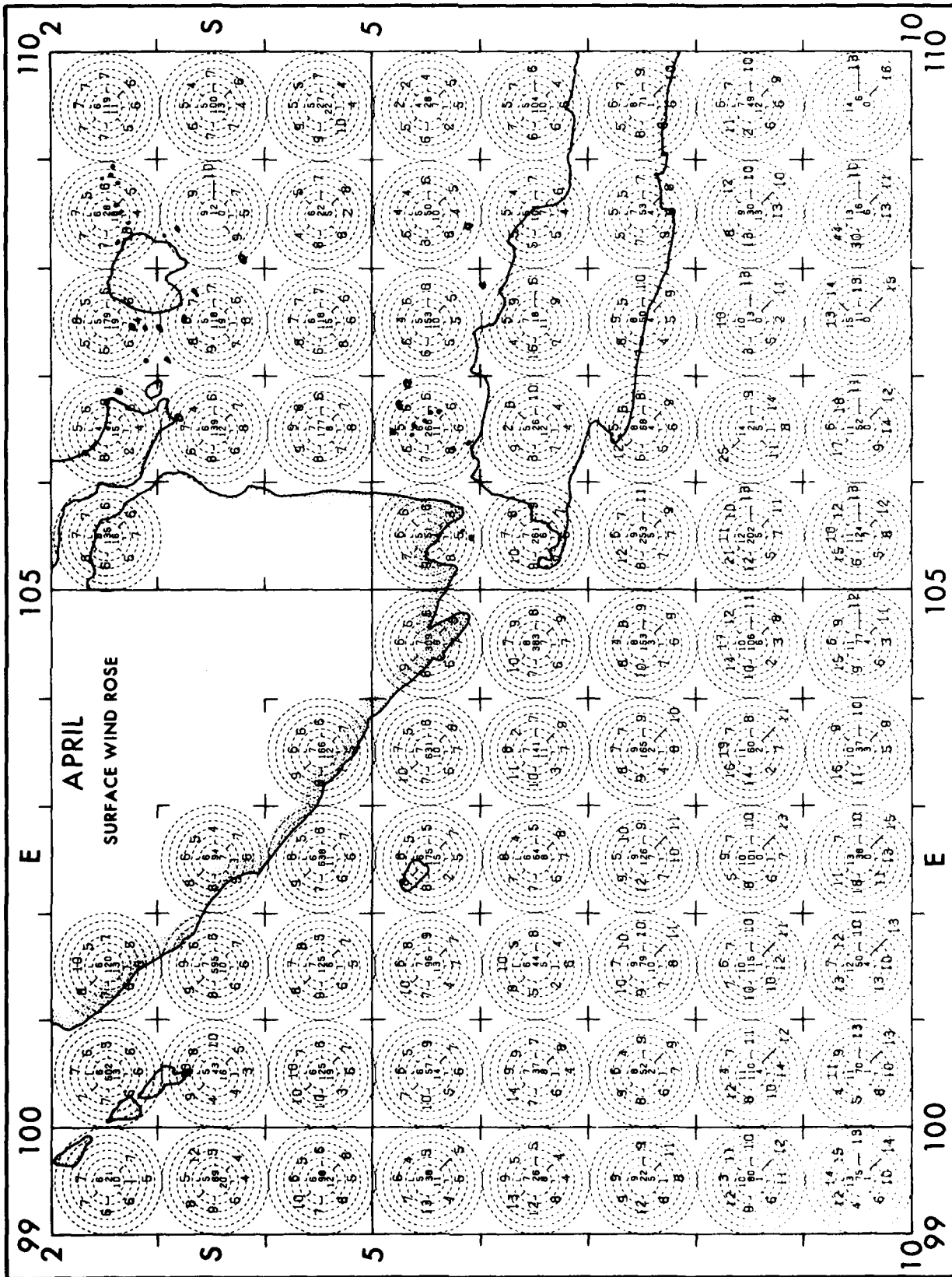
APRIL WIND SPEED

SOLID LINE Percent frequency of wind speed (kts)
DASHED LINE Percent frequency of wind speed (1/2 kts)

Wind speed and air temperature
Percent frequency of simultaneous occurrence of specified
temperature (°C) and wind speed (kts)
--- 1% of all observations reported temperature 23°C simultaneously
with wind speed of 22.3 kts
--- Indicate - 5% but > 0
--- N.M., of observations

WIND SPEED (kts)	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1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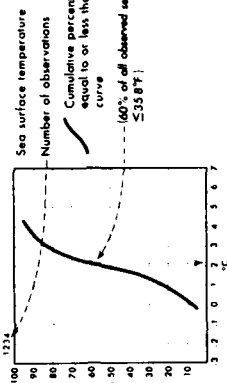


APRIL

AIR AND SEA TEMPERATURE

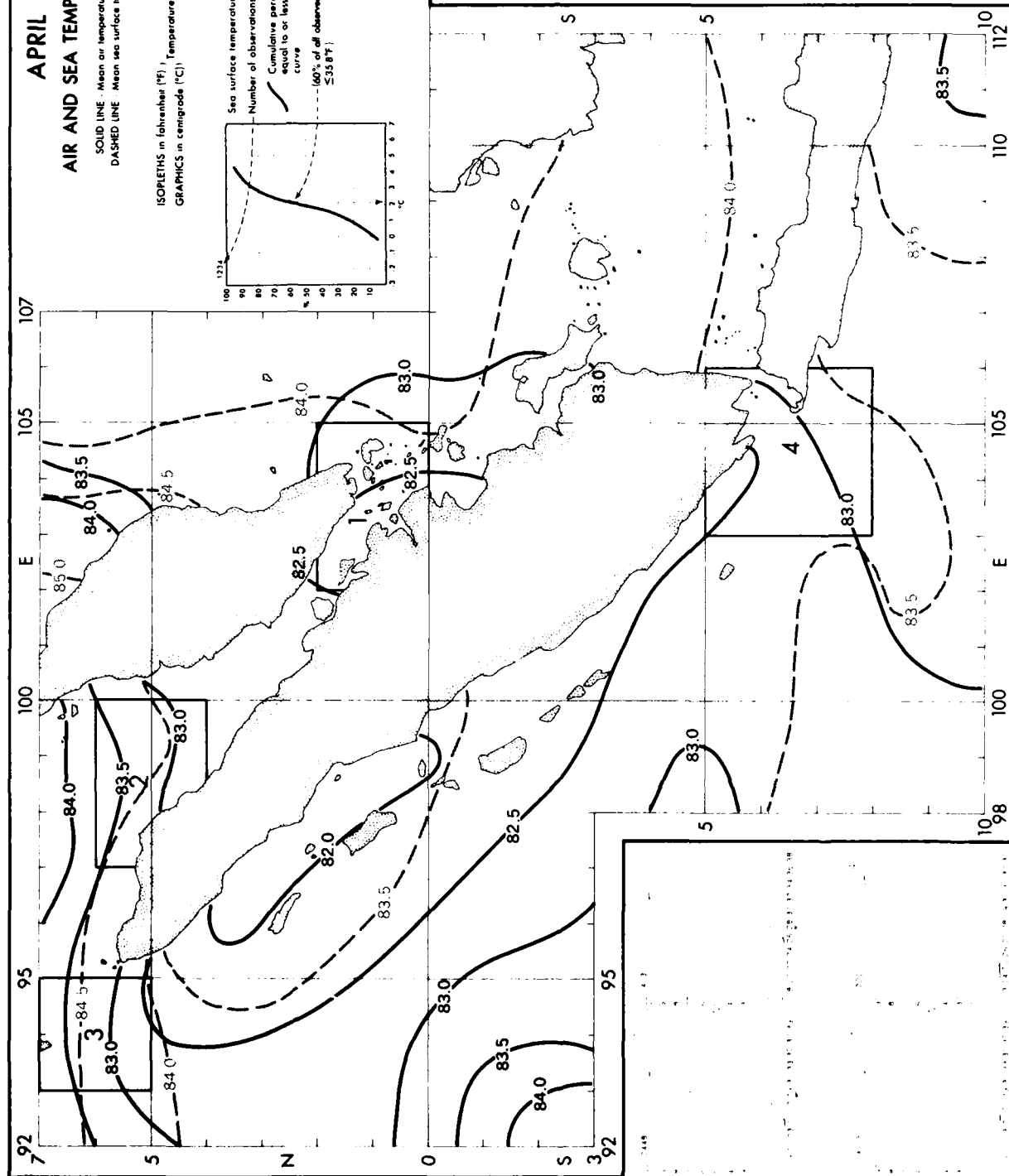
SOLID LINE - Mean air temperature (°F)
DASHED LINE - Mean sea surface temperature (°F)

ISOPLETHS in Fahrenheit (°F) Temperature conversion table below
GRAPHICS in Centigrade (°C)



CONVERSION TABLE

°C	°F
16	60.8
17	62.6
18	64.4
19	66.2
20	68.0
21	69.8
22	71.6
23	73.4
24	75.2
25	77.0
26	78.8
27	80.6
28	82.4
29	84.2
30	86.0
31	87.8
32	89.6
33	91.4
34	93.2
35	95.0
36	96.8
37	98.6
38	100.4
39	102.2



APRIL WAVES

SOLID LINE Percent frequency of wave height ≥ 3 feet
DASHED LINE Percent frequency of wave height ≥ 8 feet

Wave direction and height

Direction frequency (top scale). Bars represent percent frequency of waves from each direction.
Height frequency (bottom scale). Printed figures represent percent frequency of wave heights.

0 10 20 30 40 50 60 70 80 90 100

15% of all waves were from the N.

indicates $< 5\%$ but > 0

Number of observations

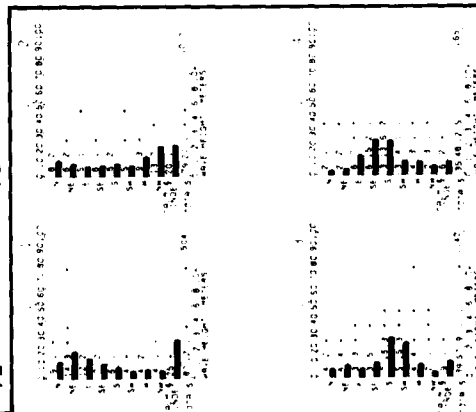
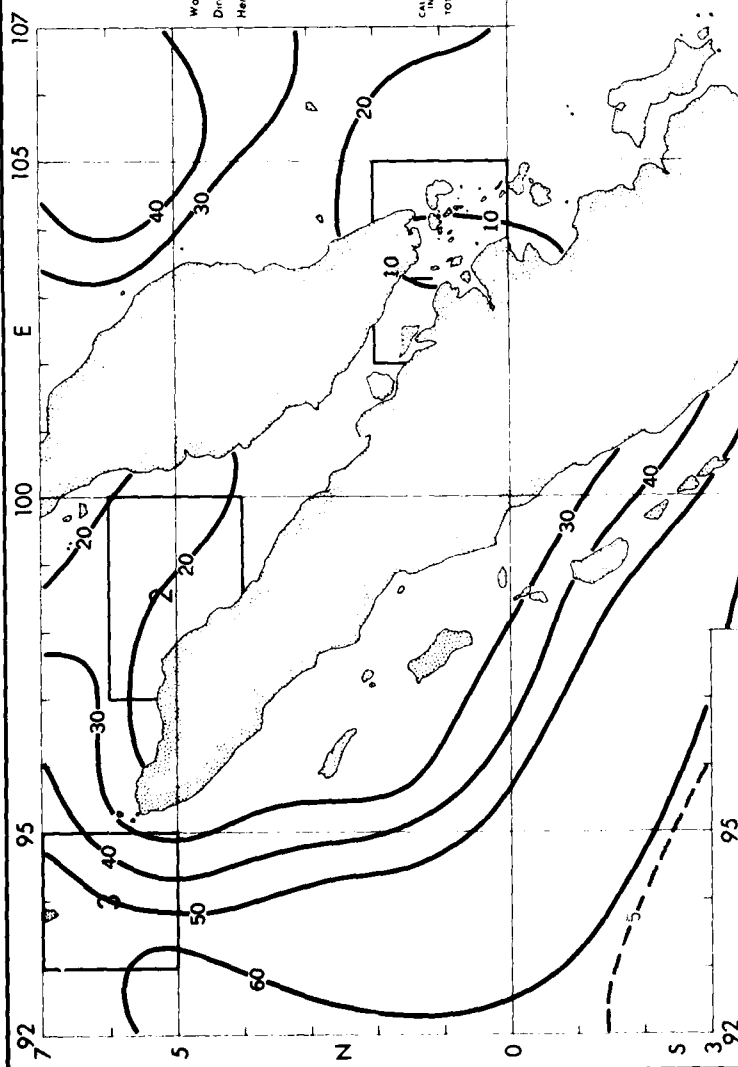
1% of all waves were from the S with heights from 6.75 meters.

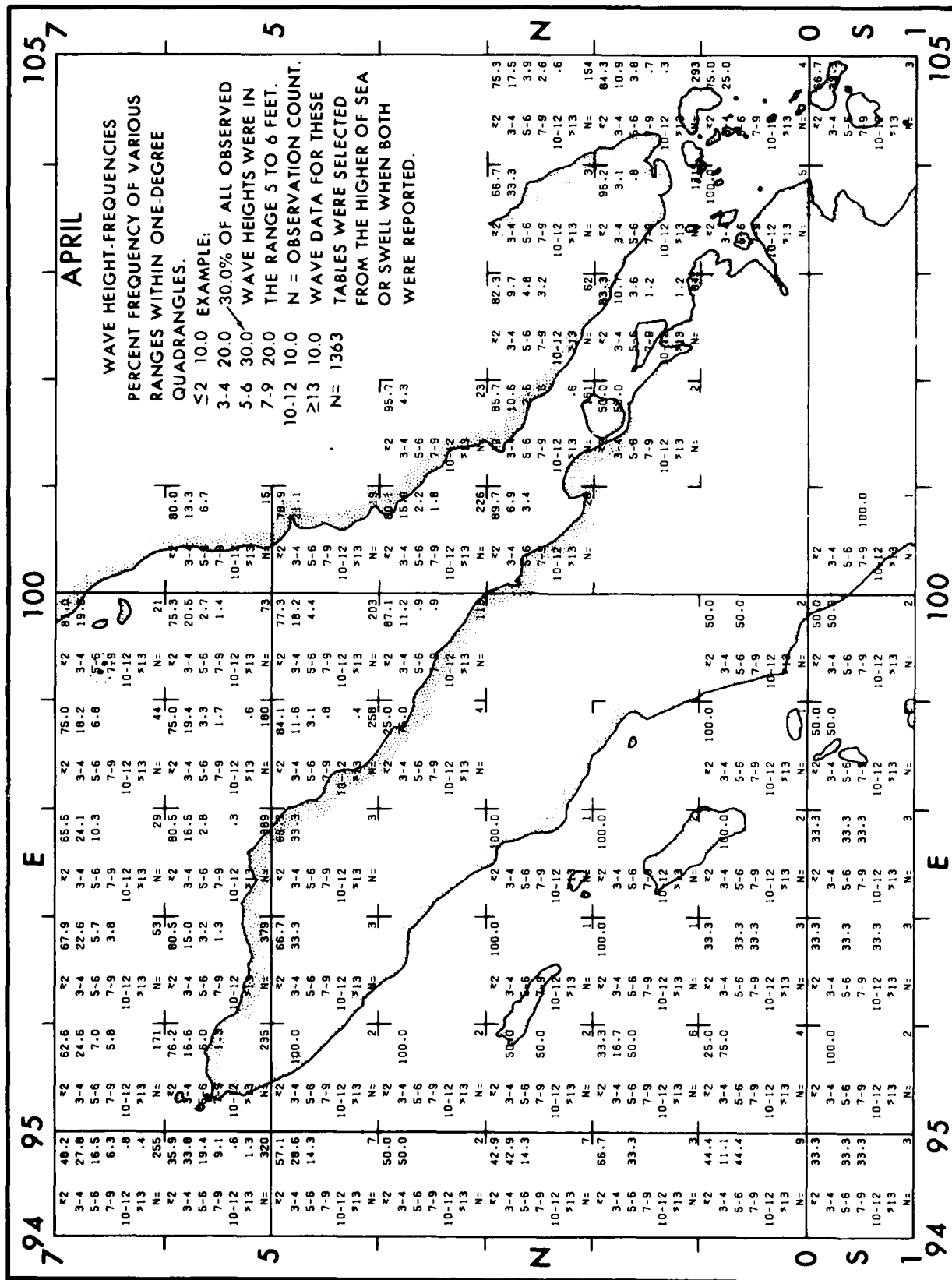
2% of the waves from all directions had heights ≥ 10 meters.

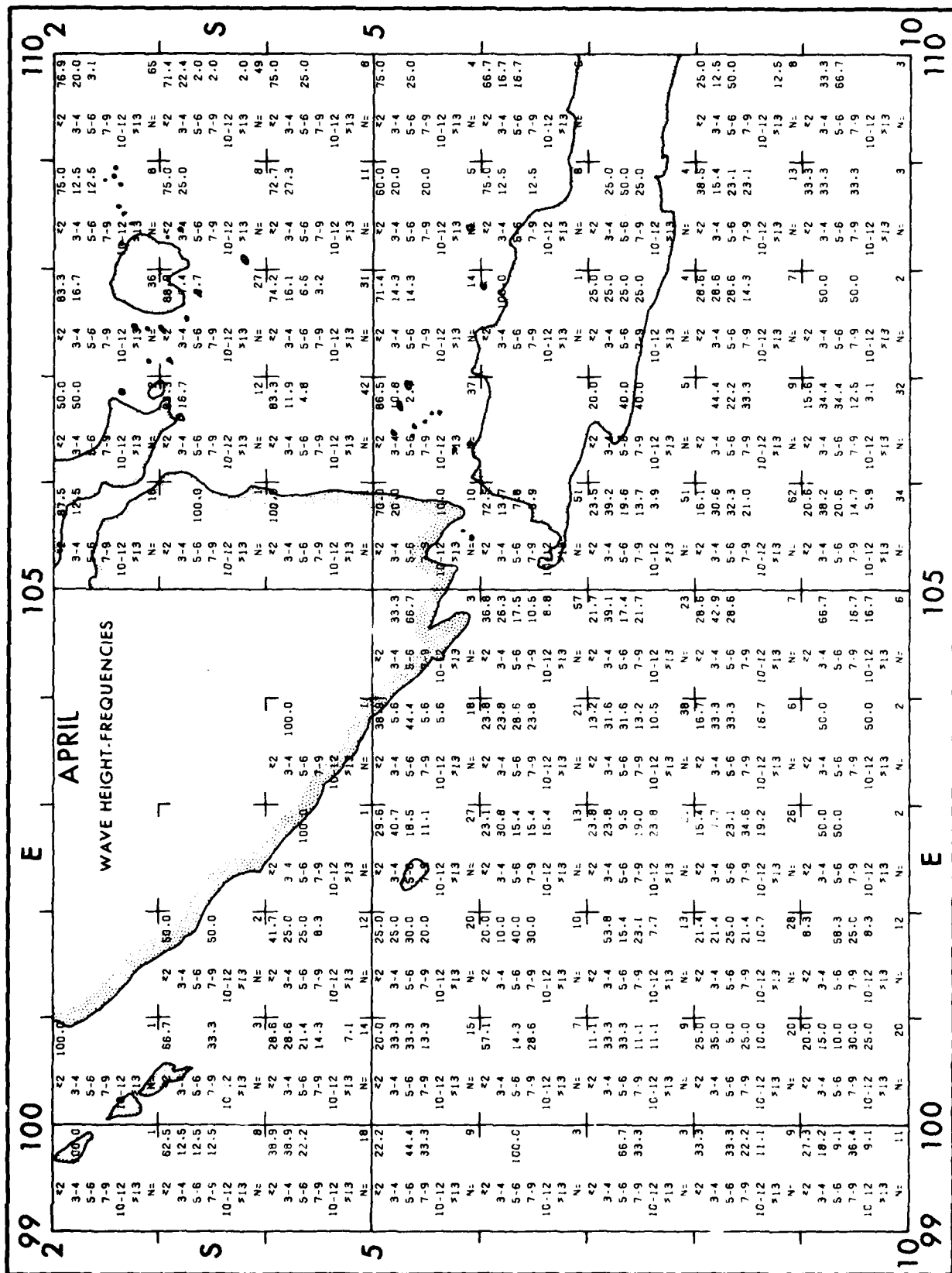
WAVE HEIGHT INTERVAL

Feet 0.2 3.6 7.9 10.1 12.1 13.1 19.20 23.26 32.233
Meters 0.5 11.5 22.5 33.5 45.5 67.5 89.5 110

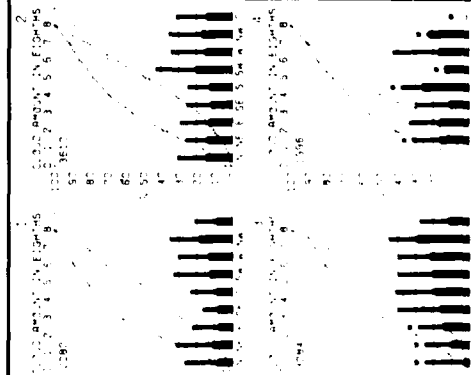
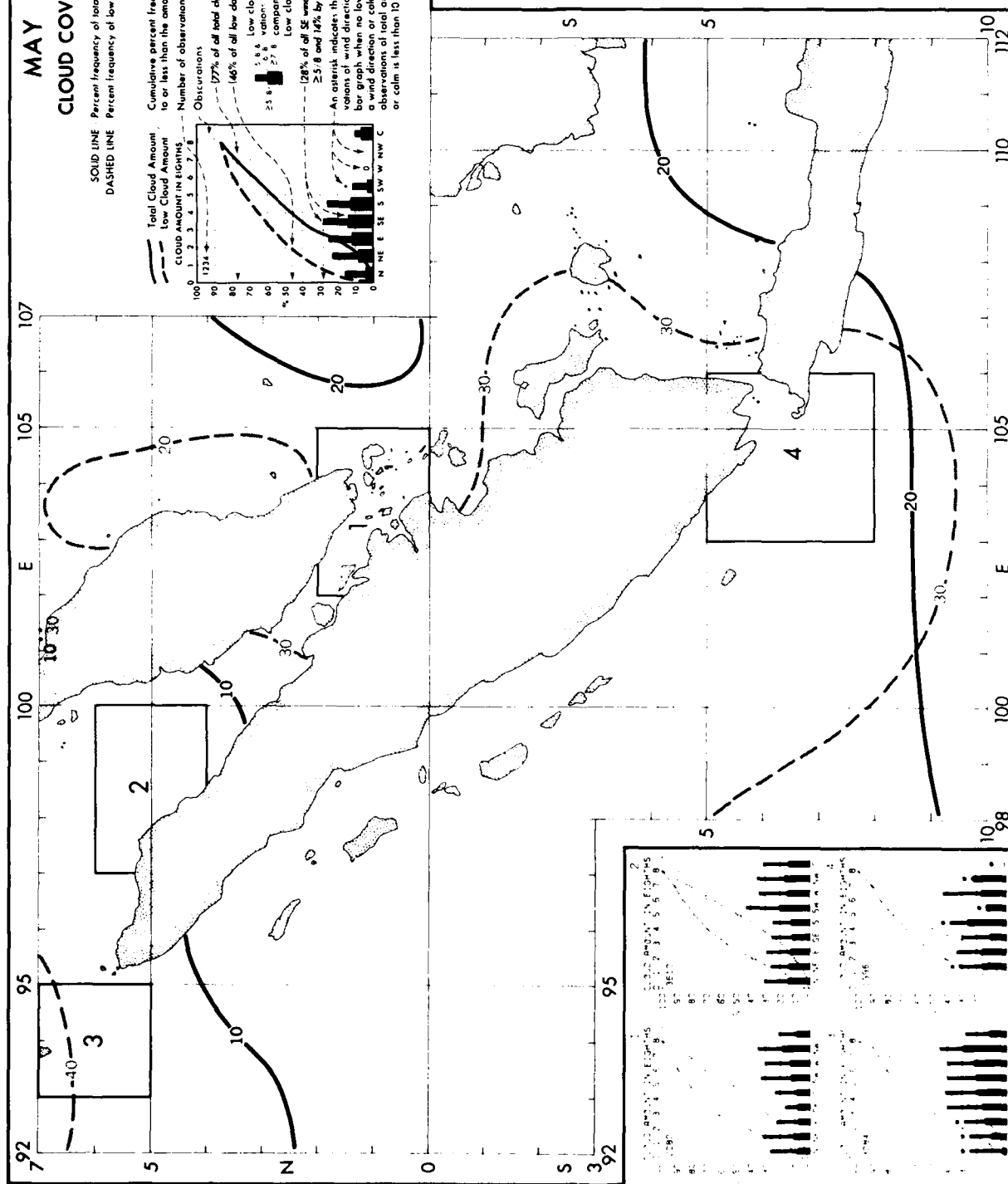
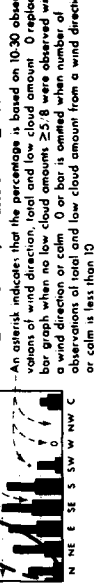
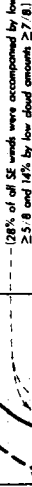
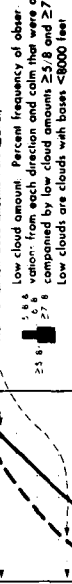
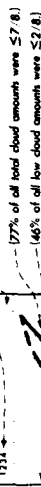
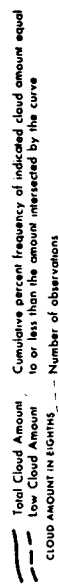
Printed scale on bottom of chart

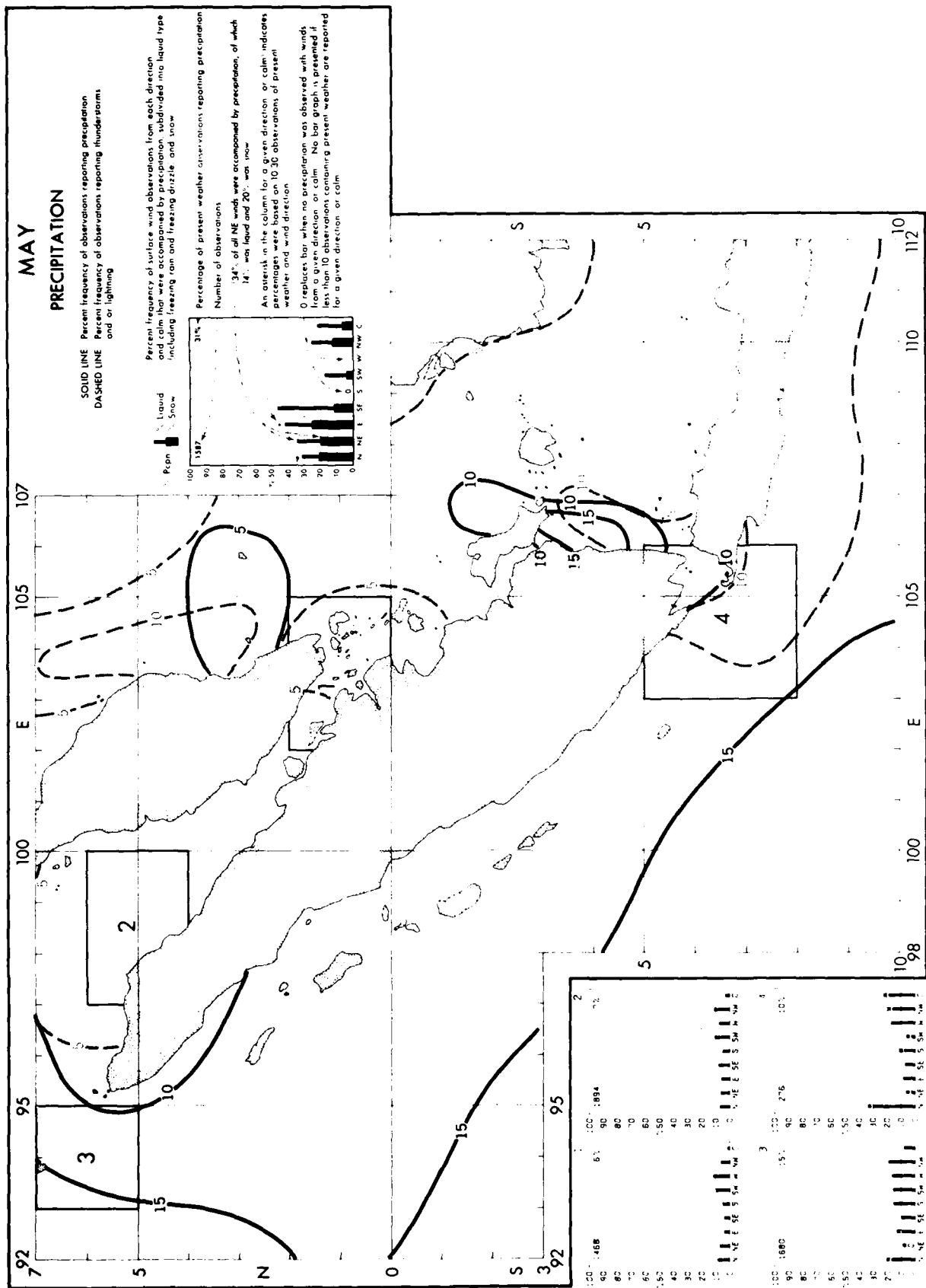


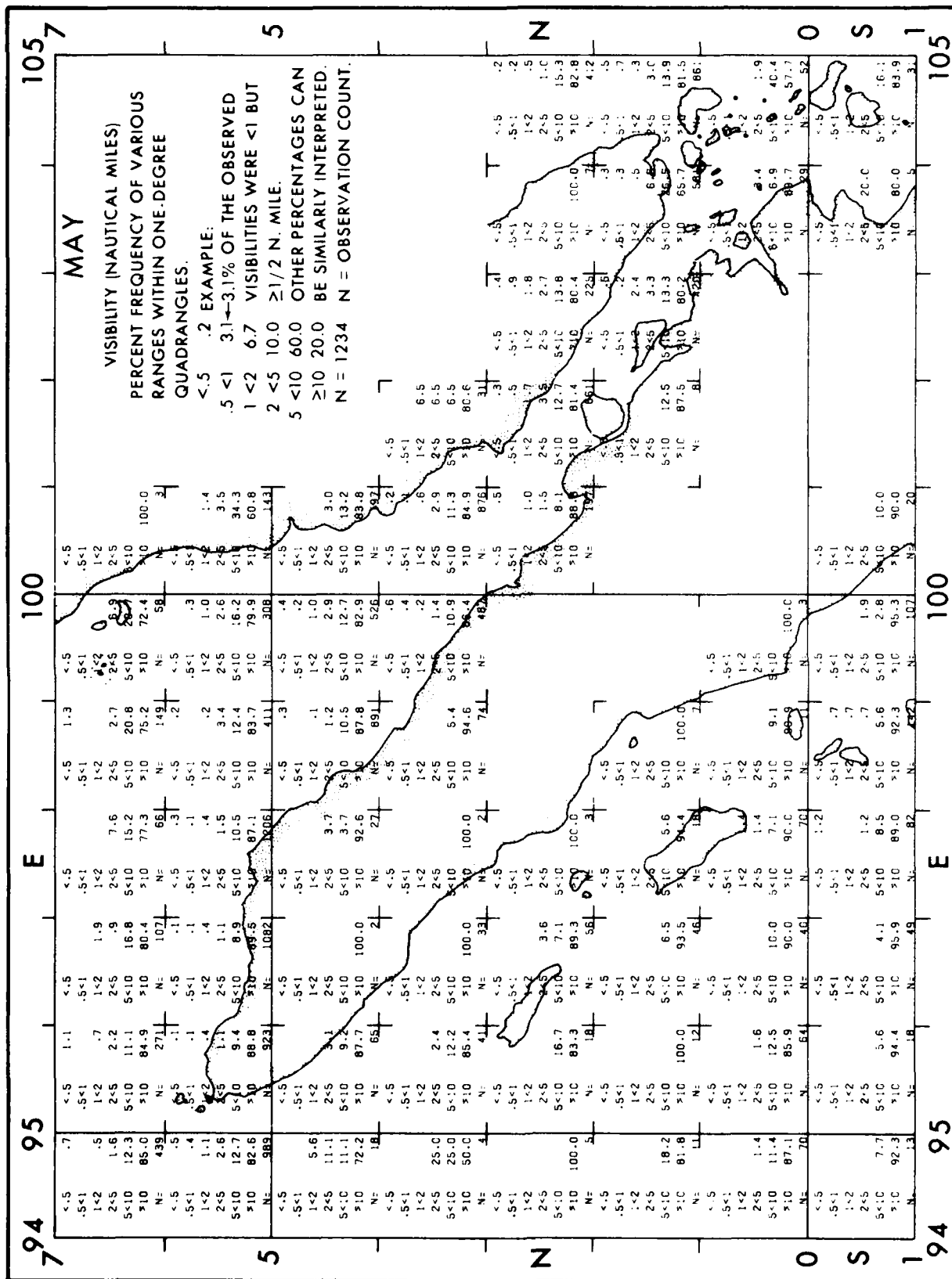


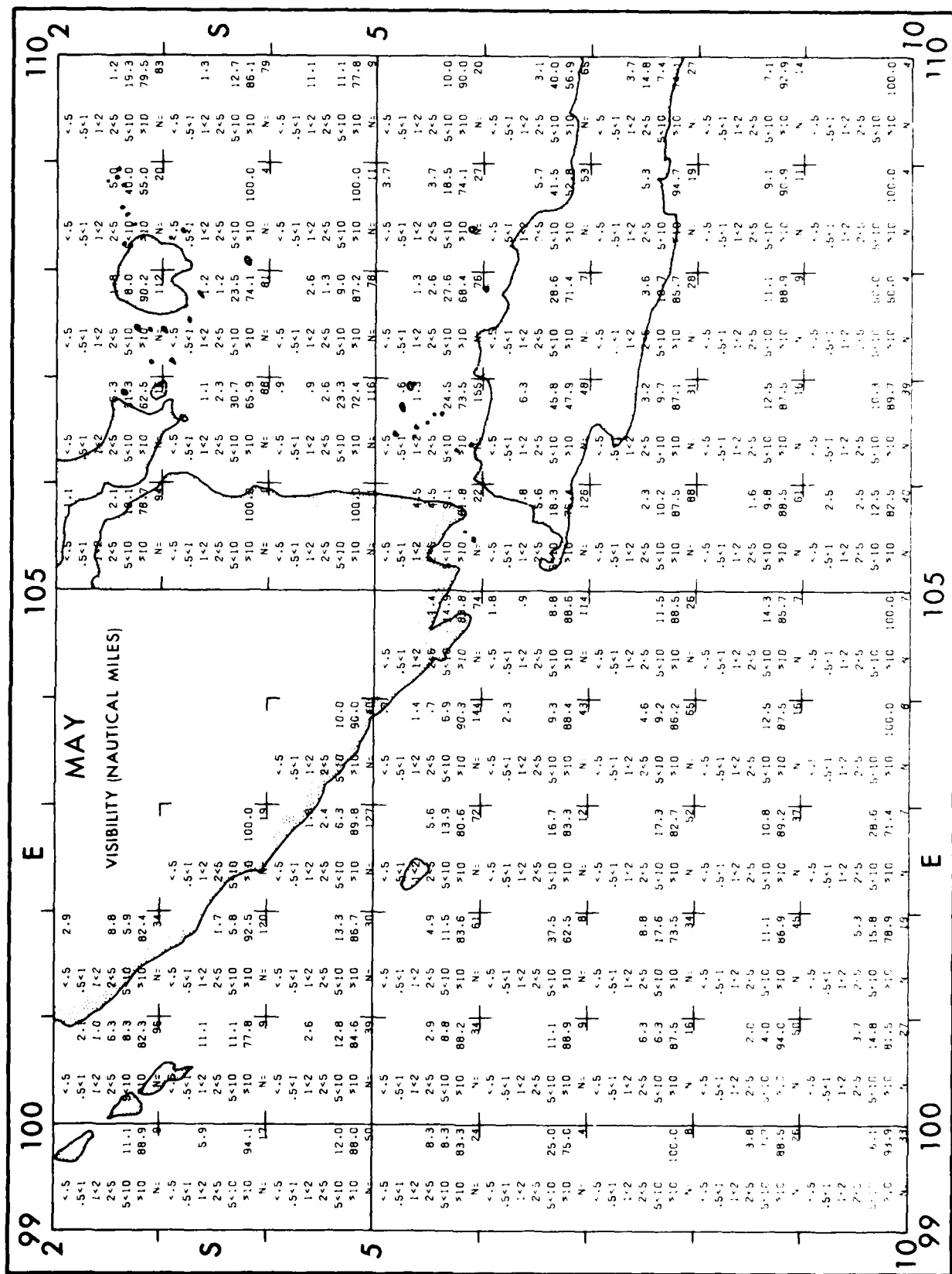


SOLID LINE: Percent frequency of total cloud amount ≤ 2.8
 DASHED LINE: Percent frequency of low cloud amount ≥ 5.8









CEILING-VISIBILITY

SOLID LINE	Percent frequency of ceiling <1000 feet and or visibility <5 nautical miles
DASHED LINE	Percent frequency of ceiling <8000 feet and or visibility <10 nautical miles

low cloud ceiling Visibility

Percent frequency of simultaneous occurrence of specified low cloud ceilings, hundreds of feet and visibility, nautical miles

low cloud ceiling heights are estimated from the height of low cloud base, when low cloud amount $N_1 \geq 5.8$

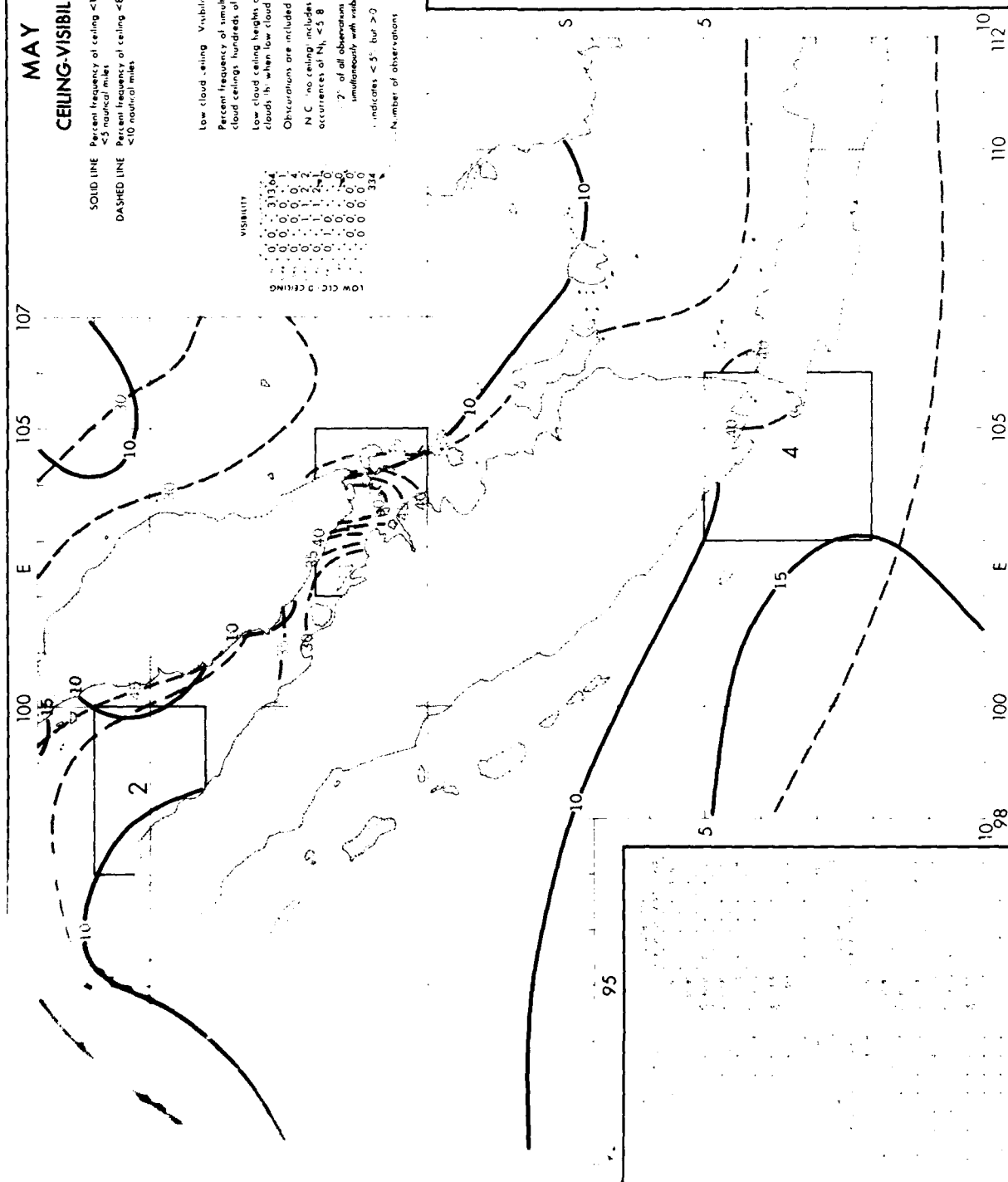
Observations are included under ceiling $0 < 1.5$

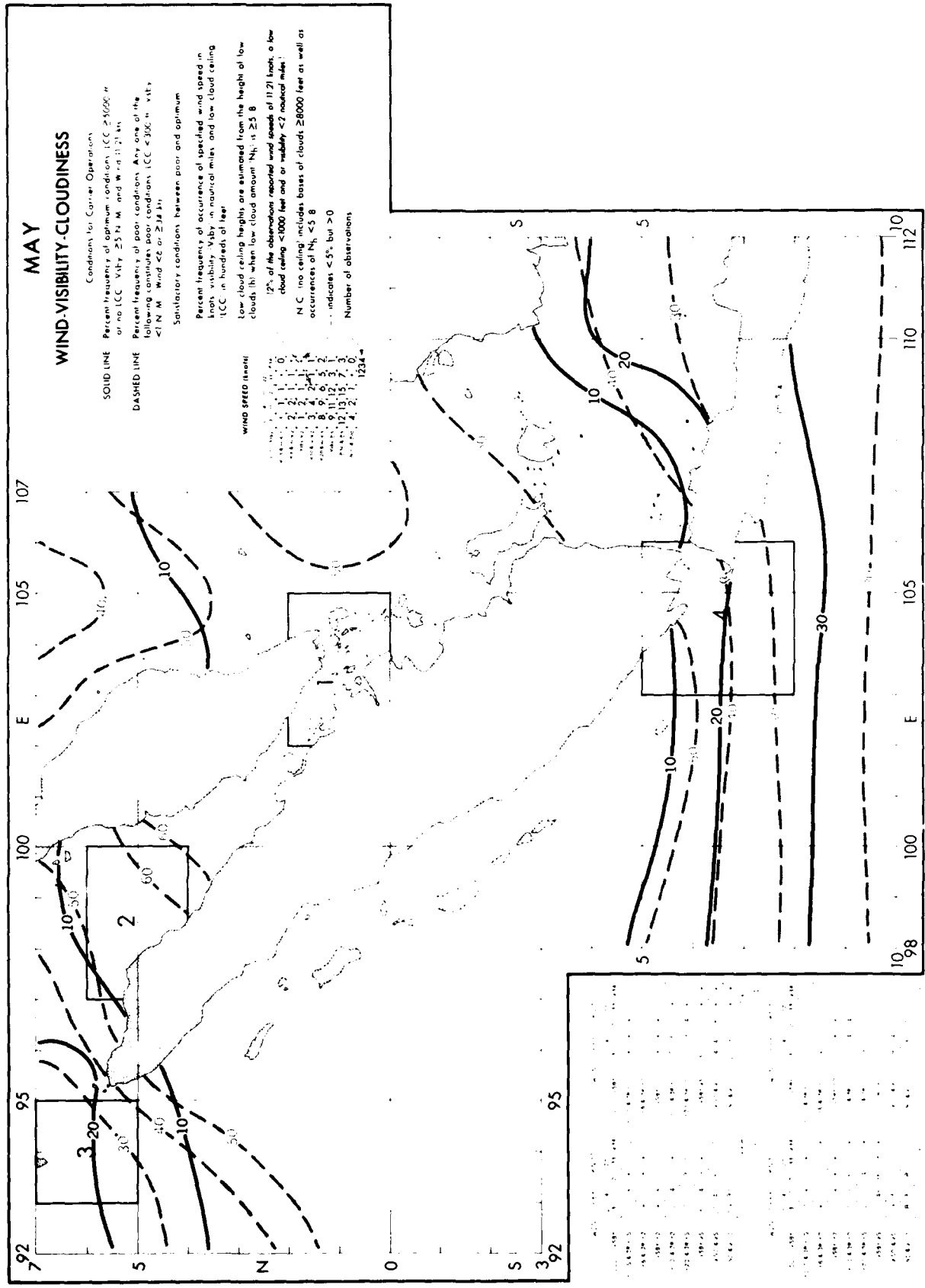
Occurrences of no ceiling include bases of clouds ≥ 8000 feet as well as occurrences of $N_1 \leq 5.8$

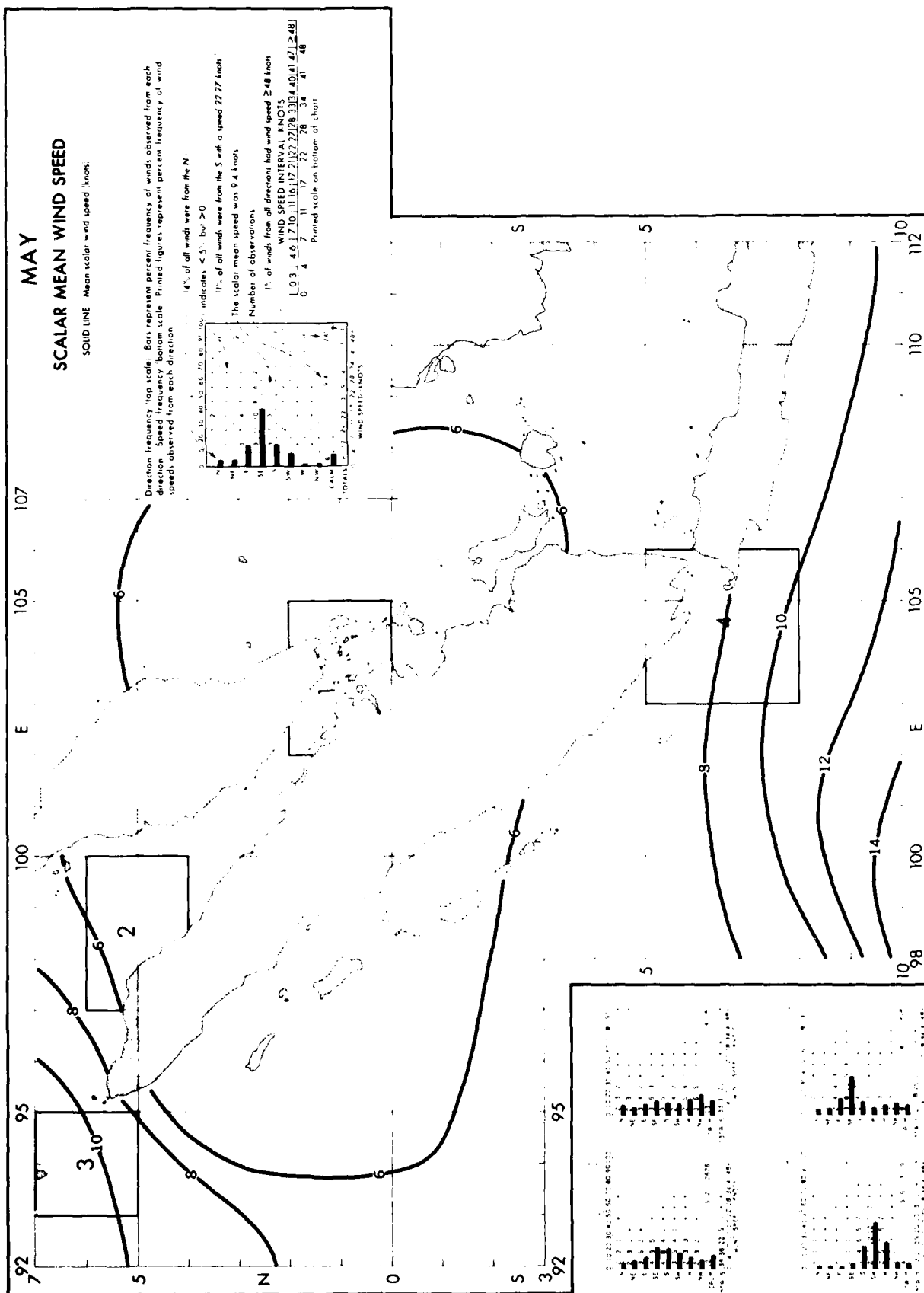
2' of all observations reported ceiling ≥ 1000 feet and < 2000 feet simultaneously with visibility ≥ 3.5 but < 10 nautical miles

ABILITY

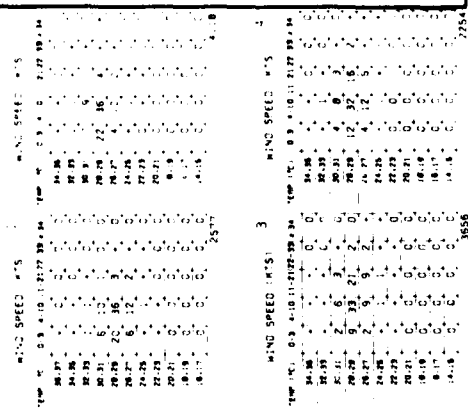
LOW D C 210 MOI

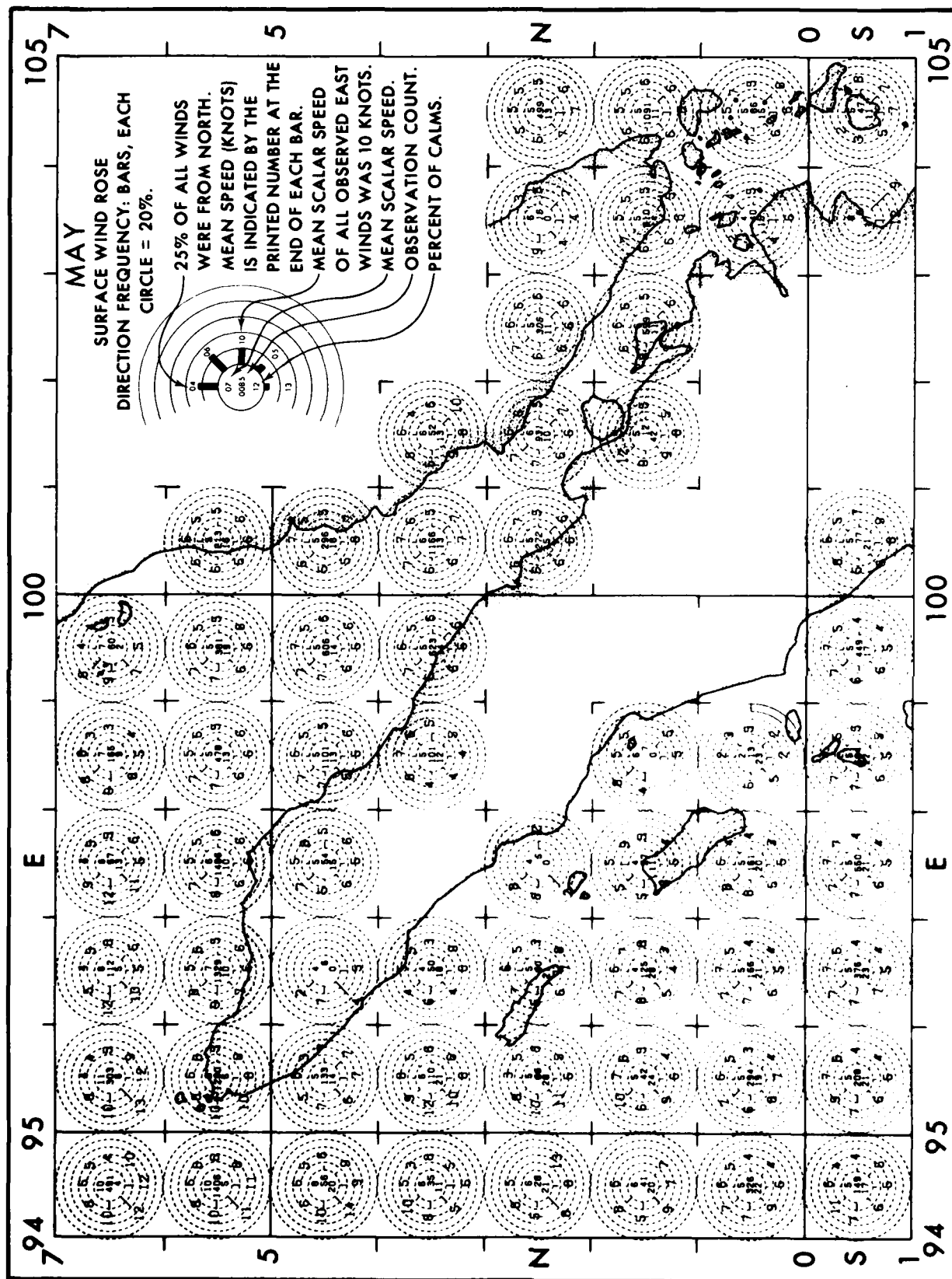


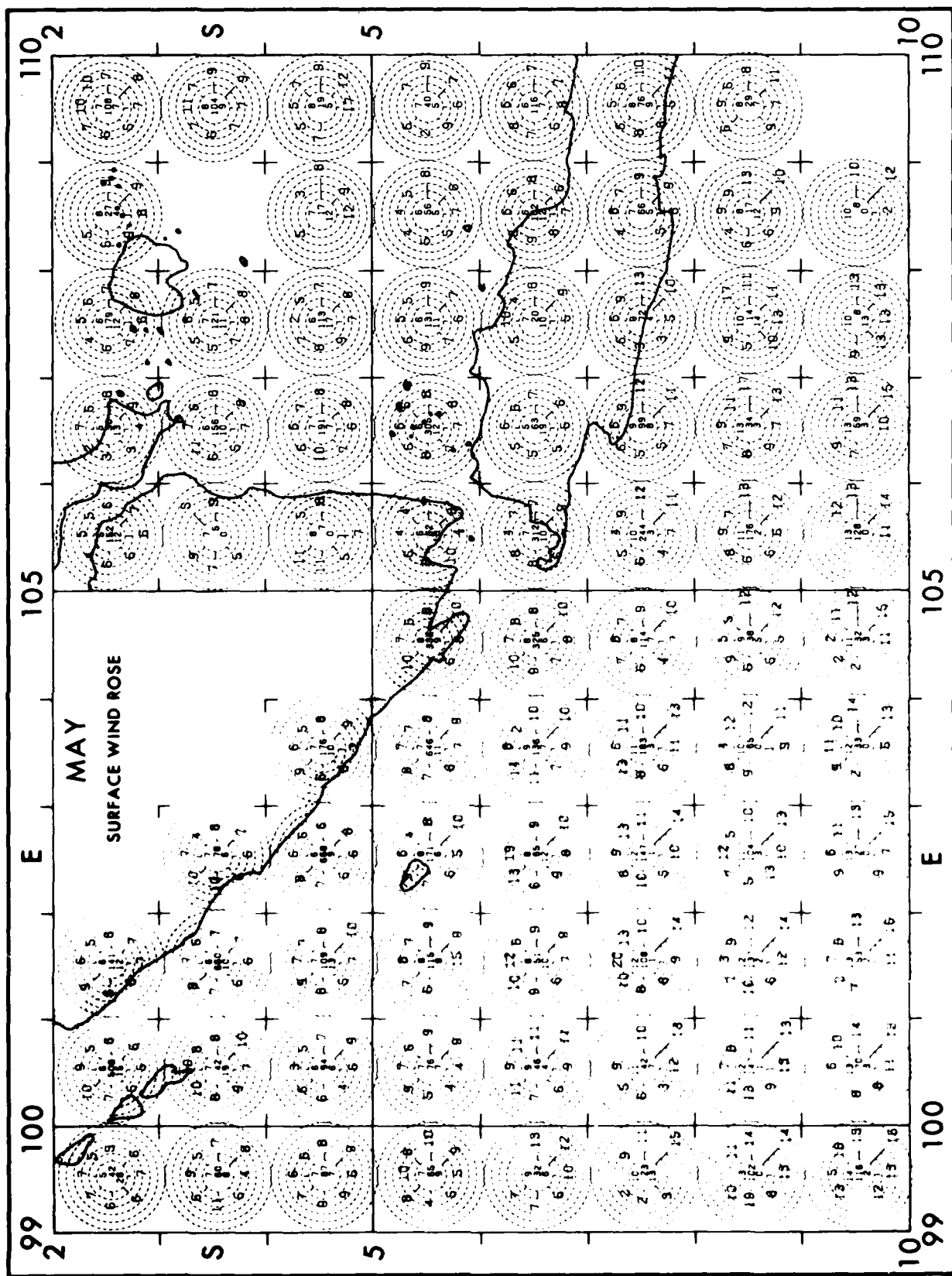


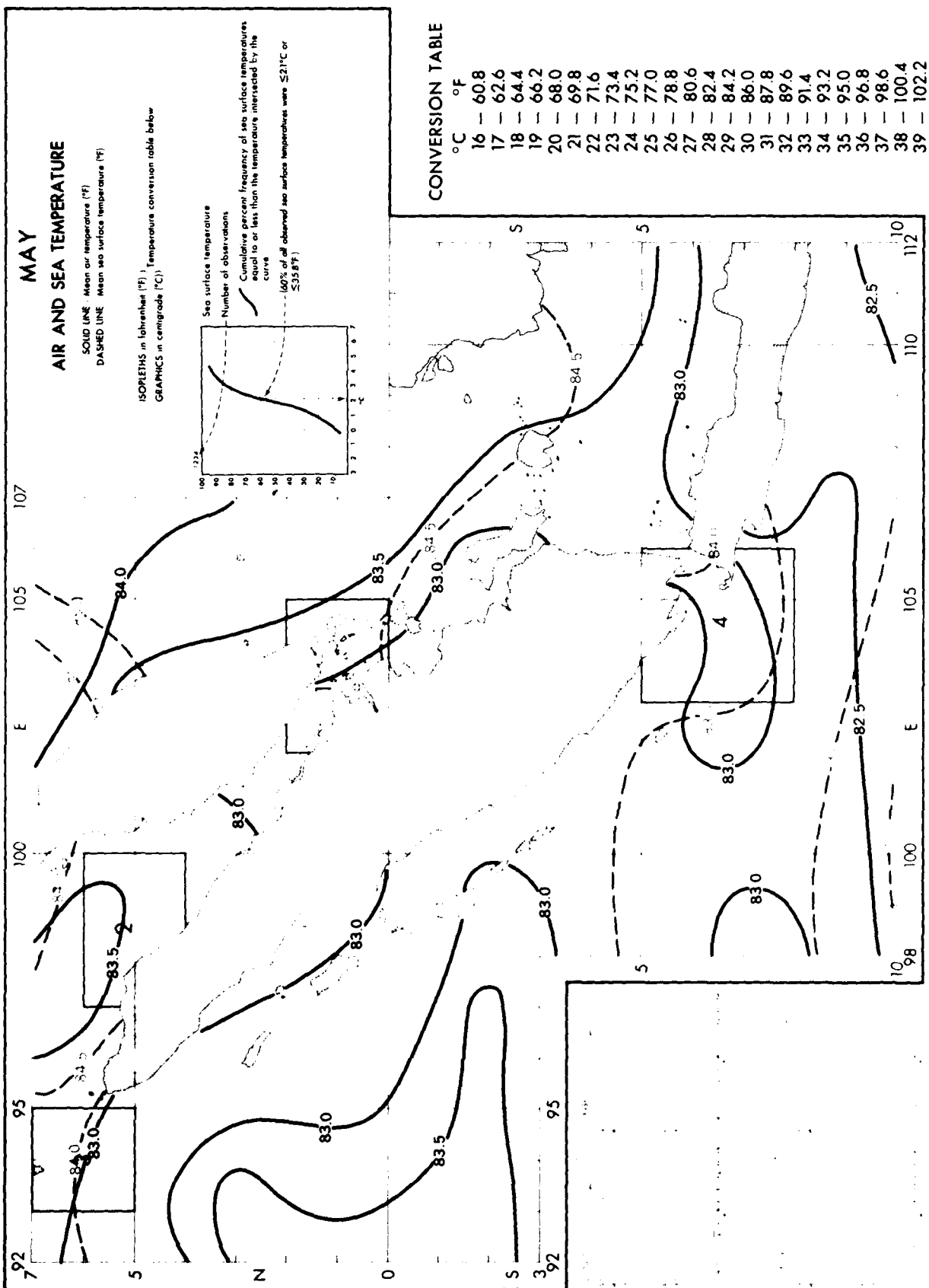


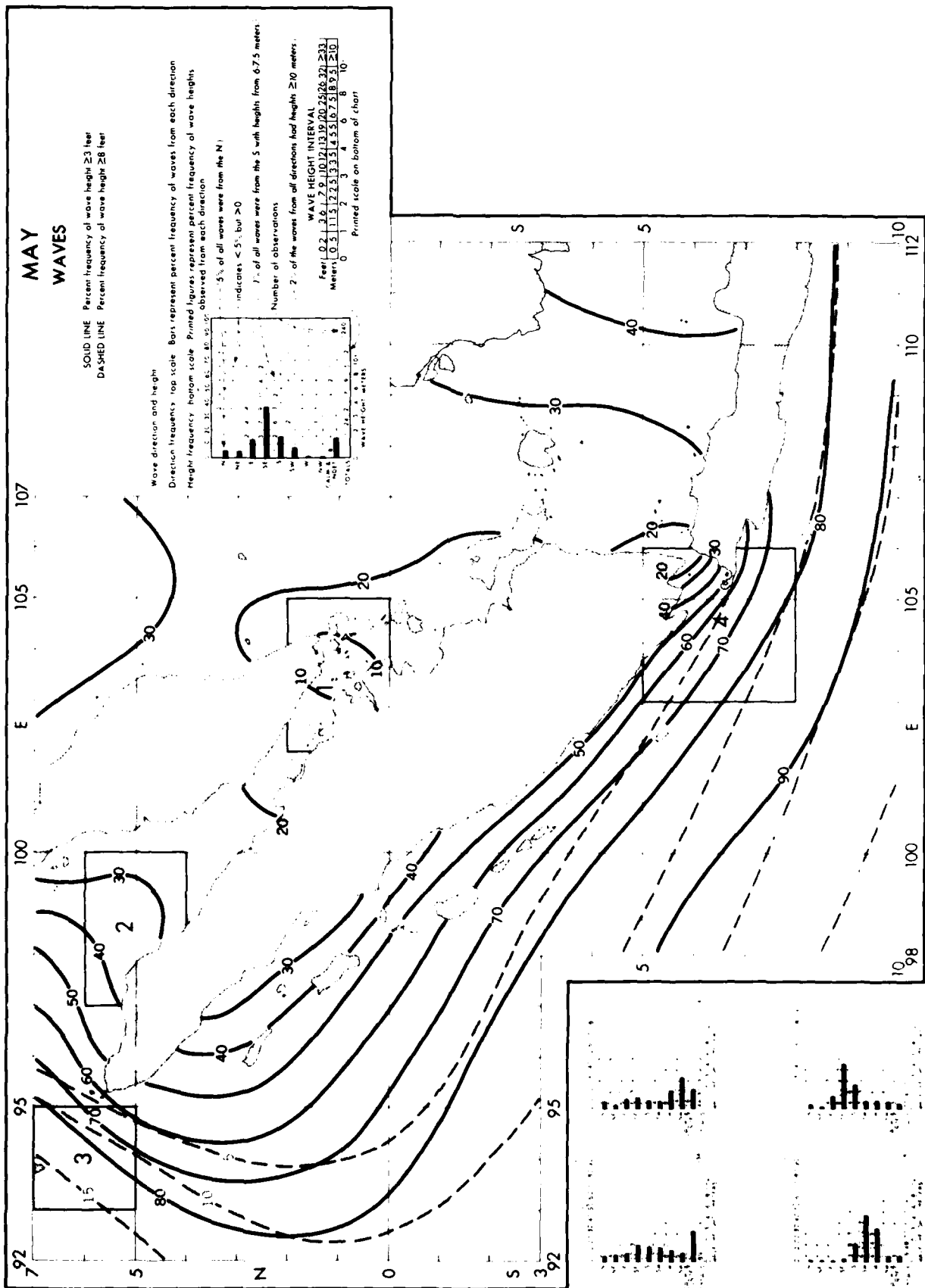
SOLID LINE Percent frequency of wind speed <11 knots
DASHED LINE Percent frequency of wind speed 11-21 knots

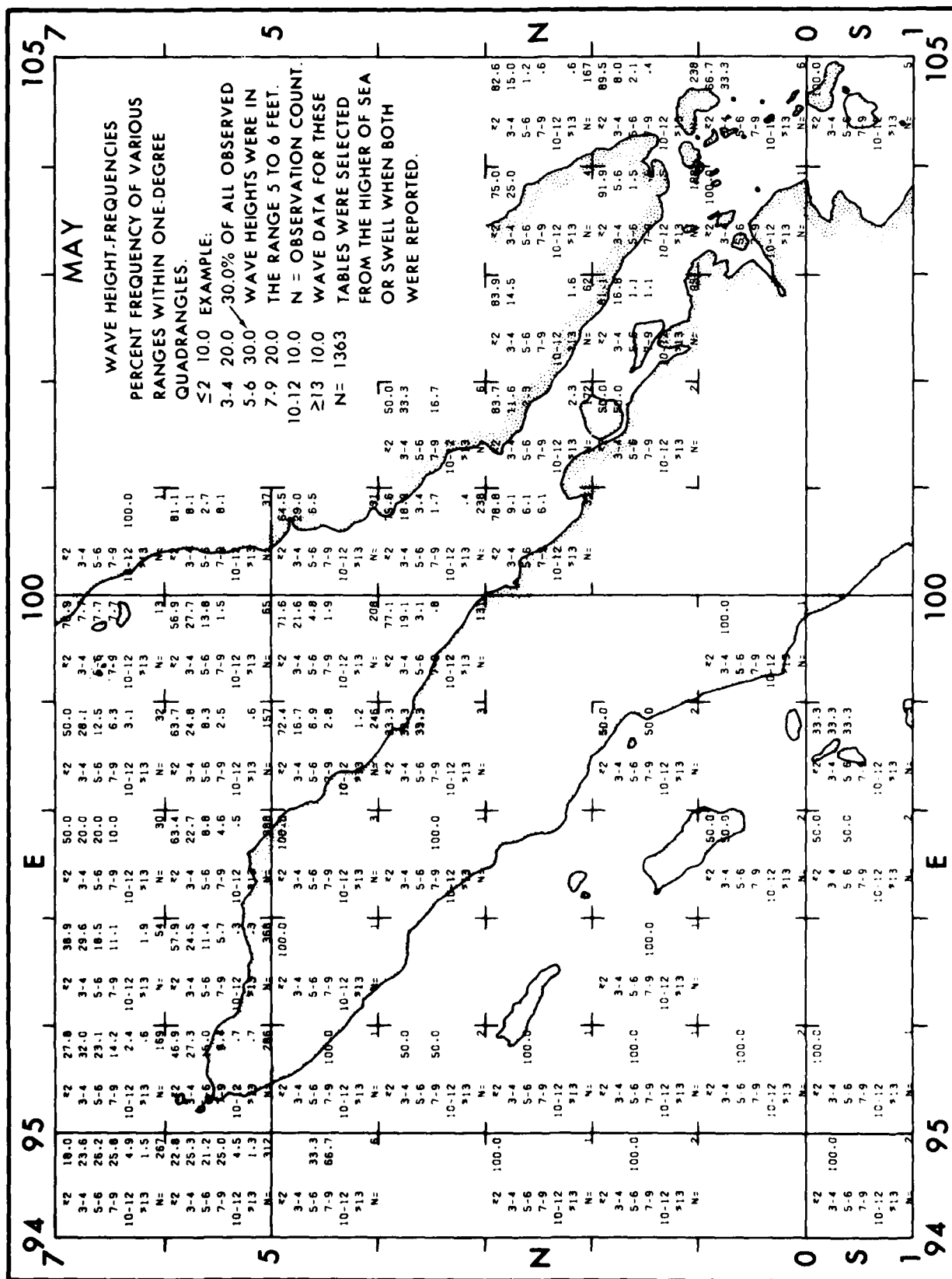


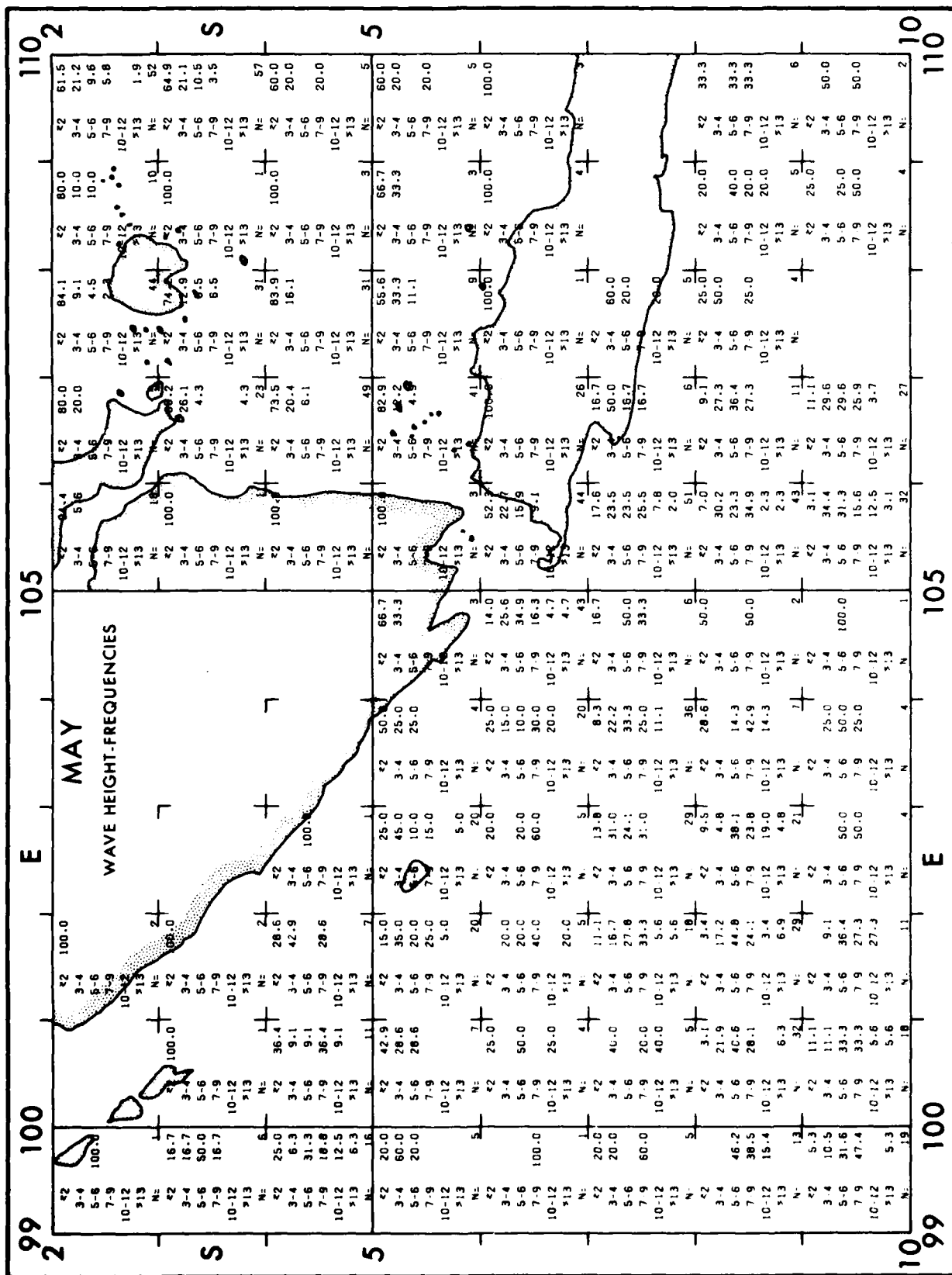




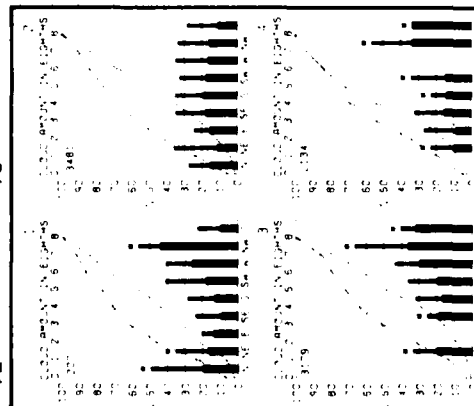


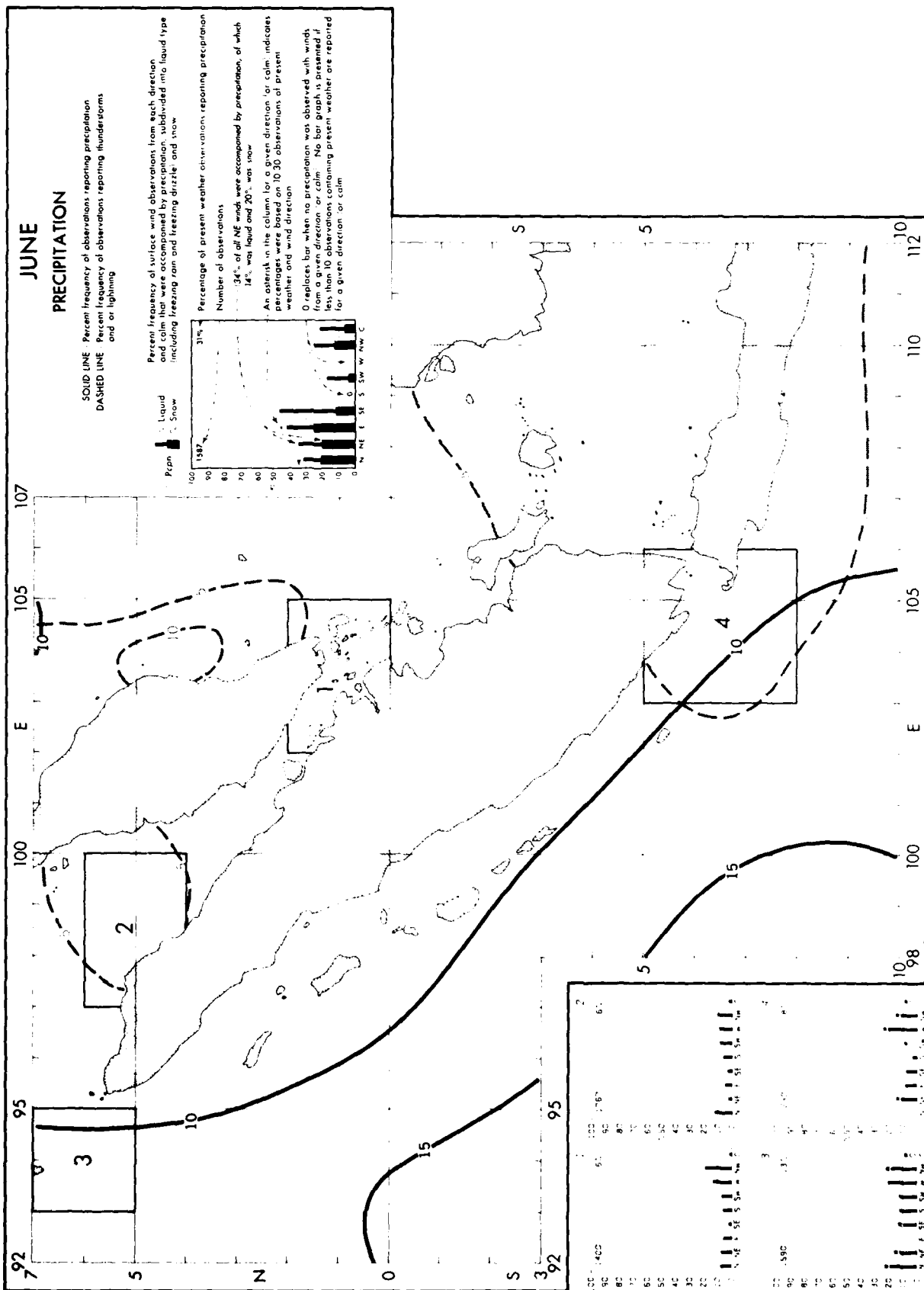


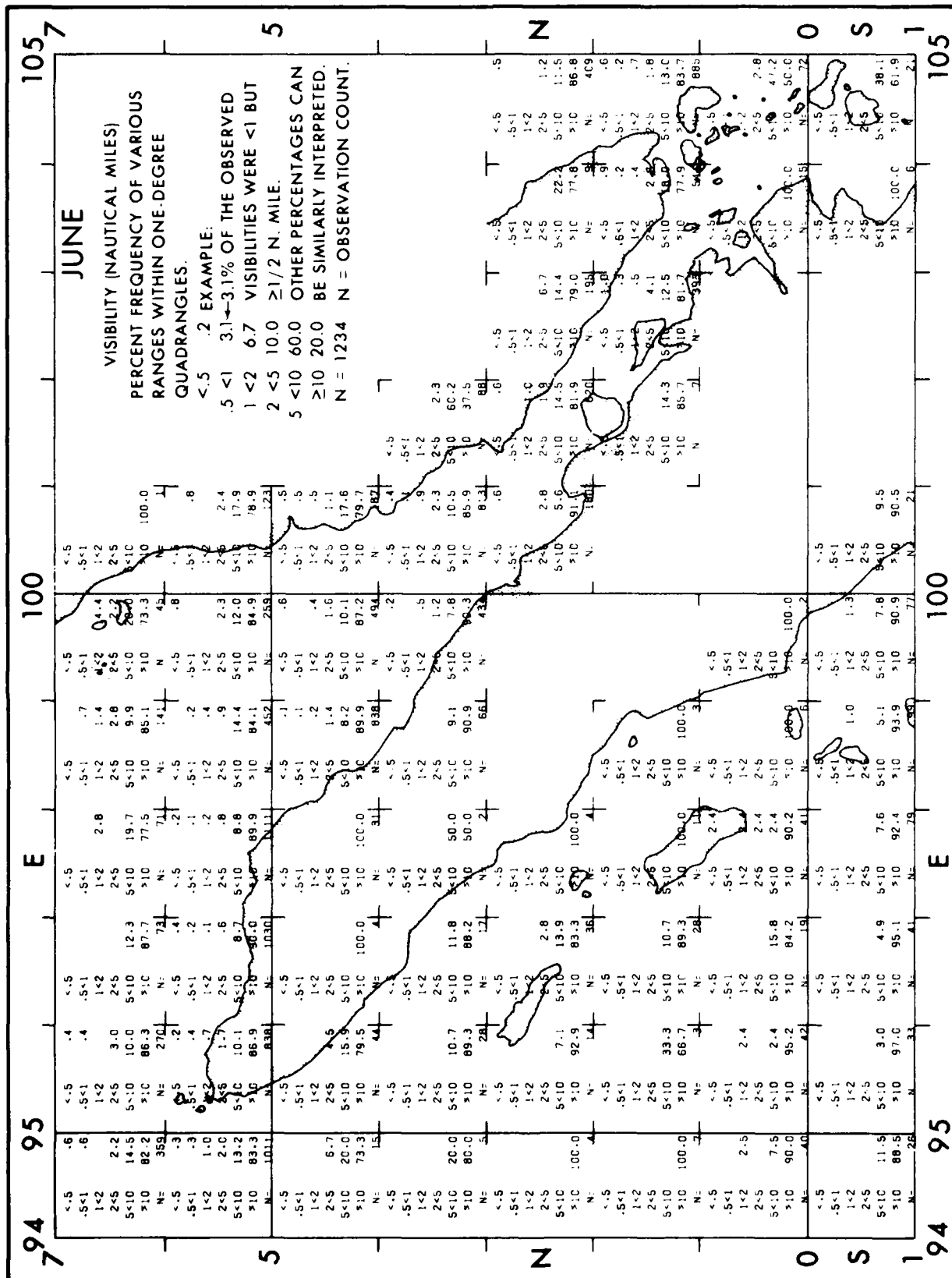


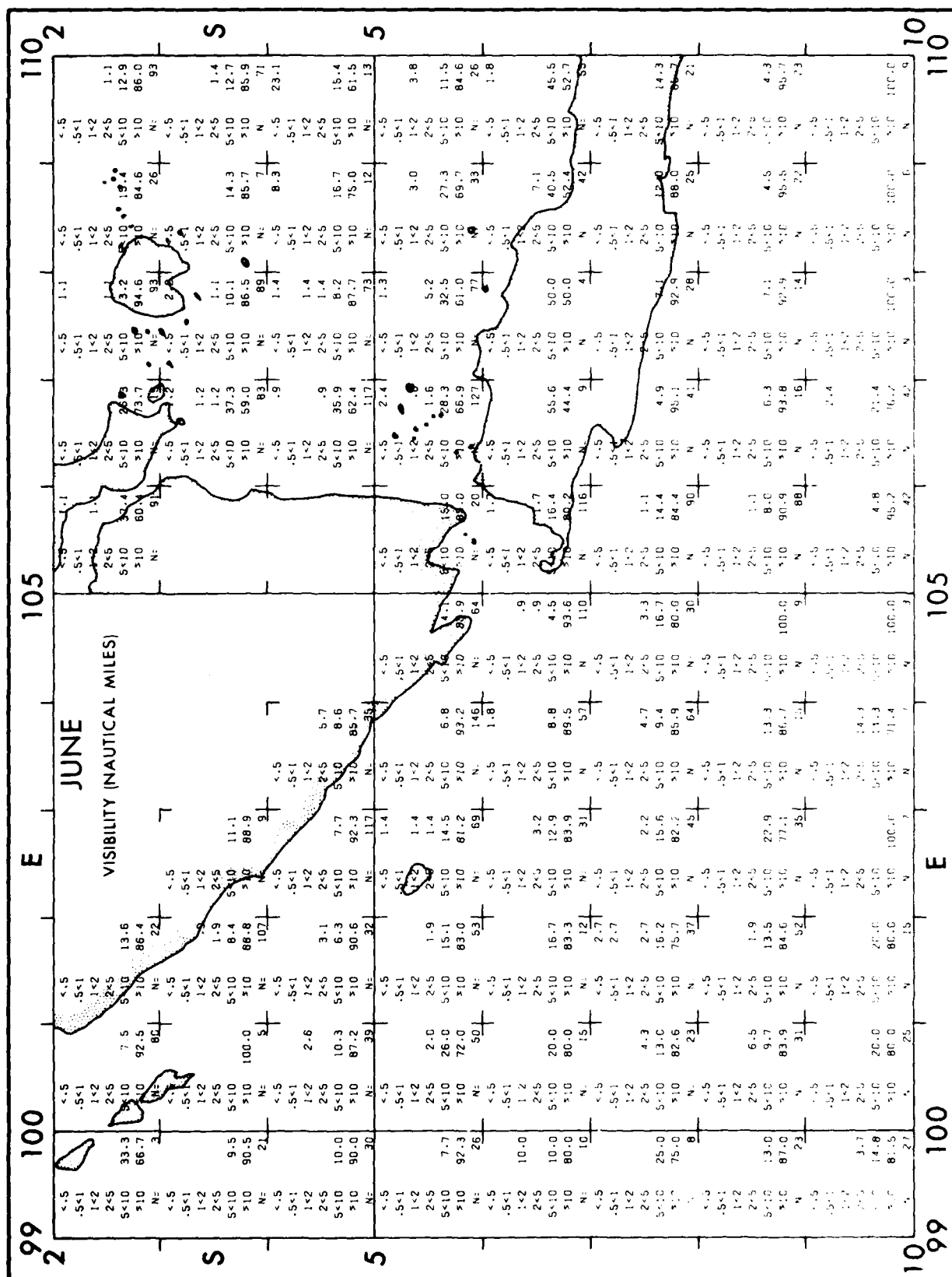


SOLID LINE Percent frequency of total cloud amount ≤ 2.8
DASHED LINE Percent frequency of low cloud amount ≥ 5.8









AD-A115 323

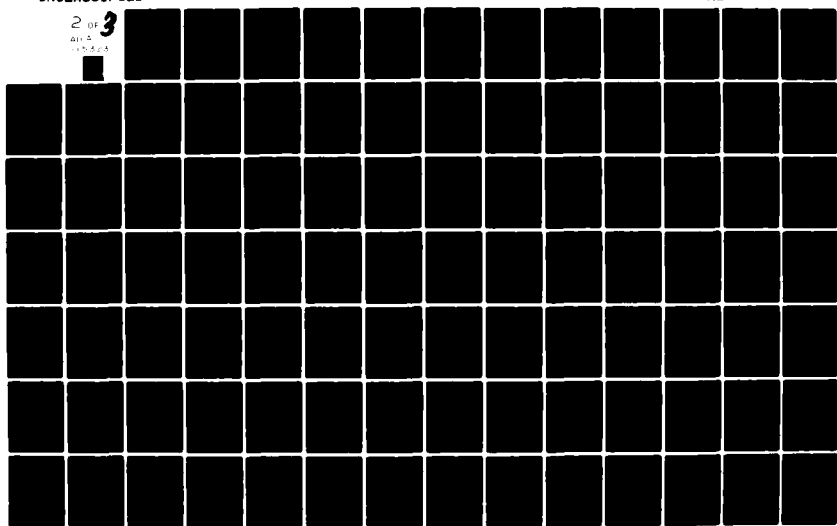
NAVAL OCEANOGRAPHY COMMAND DETACHMENT ASHEVILLE NC
CLIMATIC STUDY OF THE MALACCA AND SUNDA STRAITS, NEAR COASTAL Z--ETC(U)
APR 82

F/8 4/2

UNCLASSIFIED

NL

2 OF 3
AD-A115 323



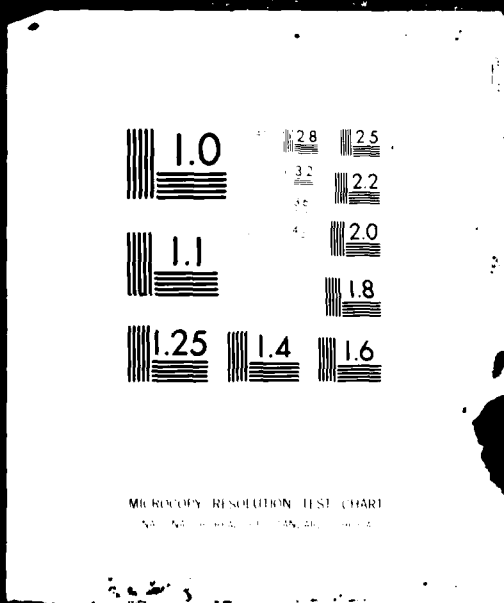
2

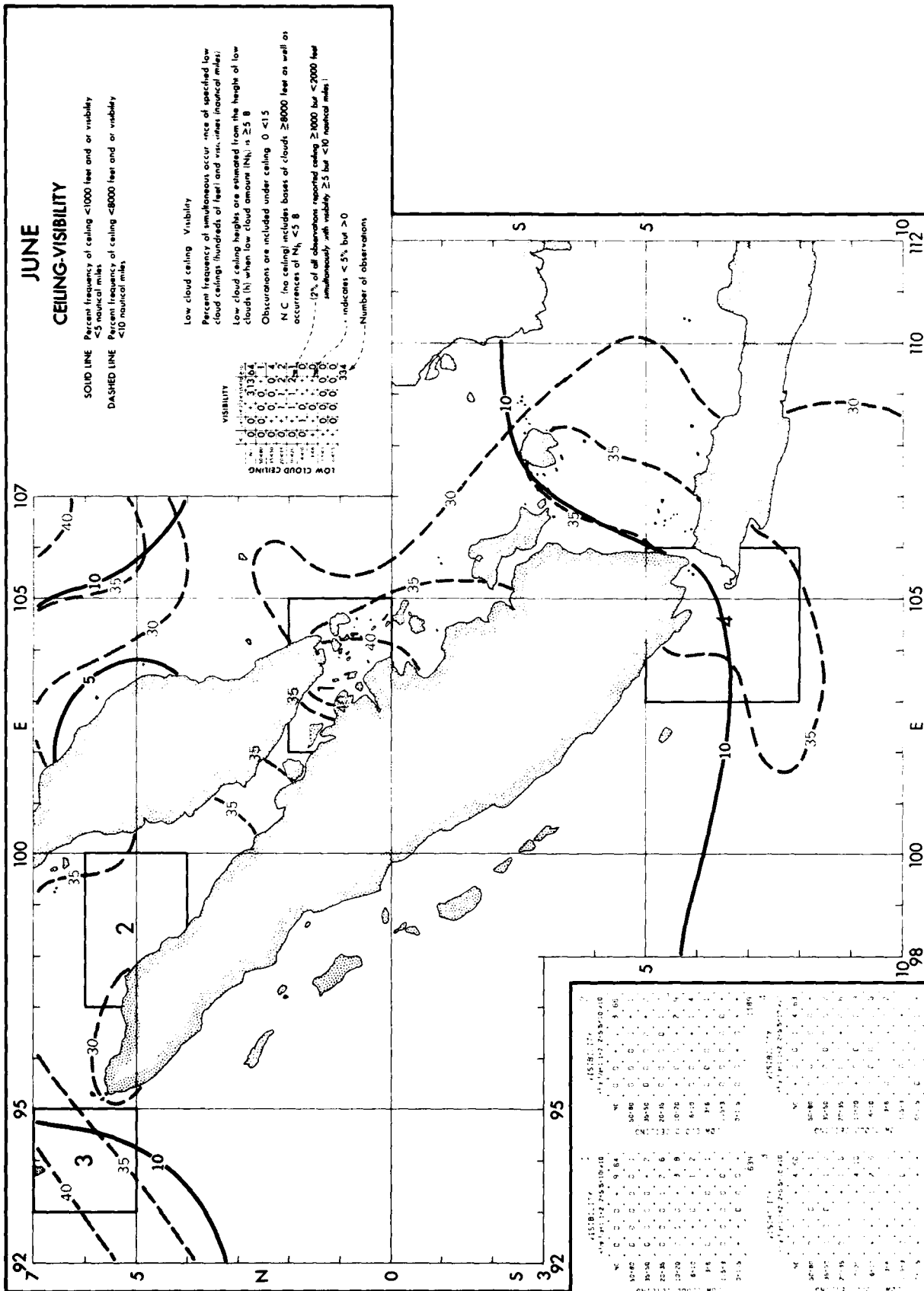
OF



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WIND-VISIBILITY-CLOUDINESS

Conditions for Carrier Operations

SOLID LINE: Percent frequency of optimum conditions LCC ≥ 5000 ft (or no LCC), Vtby ≥ 5 N Mi and Wind If 21 kts

DASHED LINE Percent frequency of poor conditions. Any one of the following constitutes poor conditions: LCC <300 ft, Vlsby <1 N mi, Wind <6 or ≥ 34 kts

Satisfactory conditions - between poor and optimum

Percent frequency of occurrence of specified wind speed in knots, visibility (Vby) in nautical miles, and low cloud ceiling (LCC) in hundreds of feet

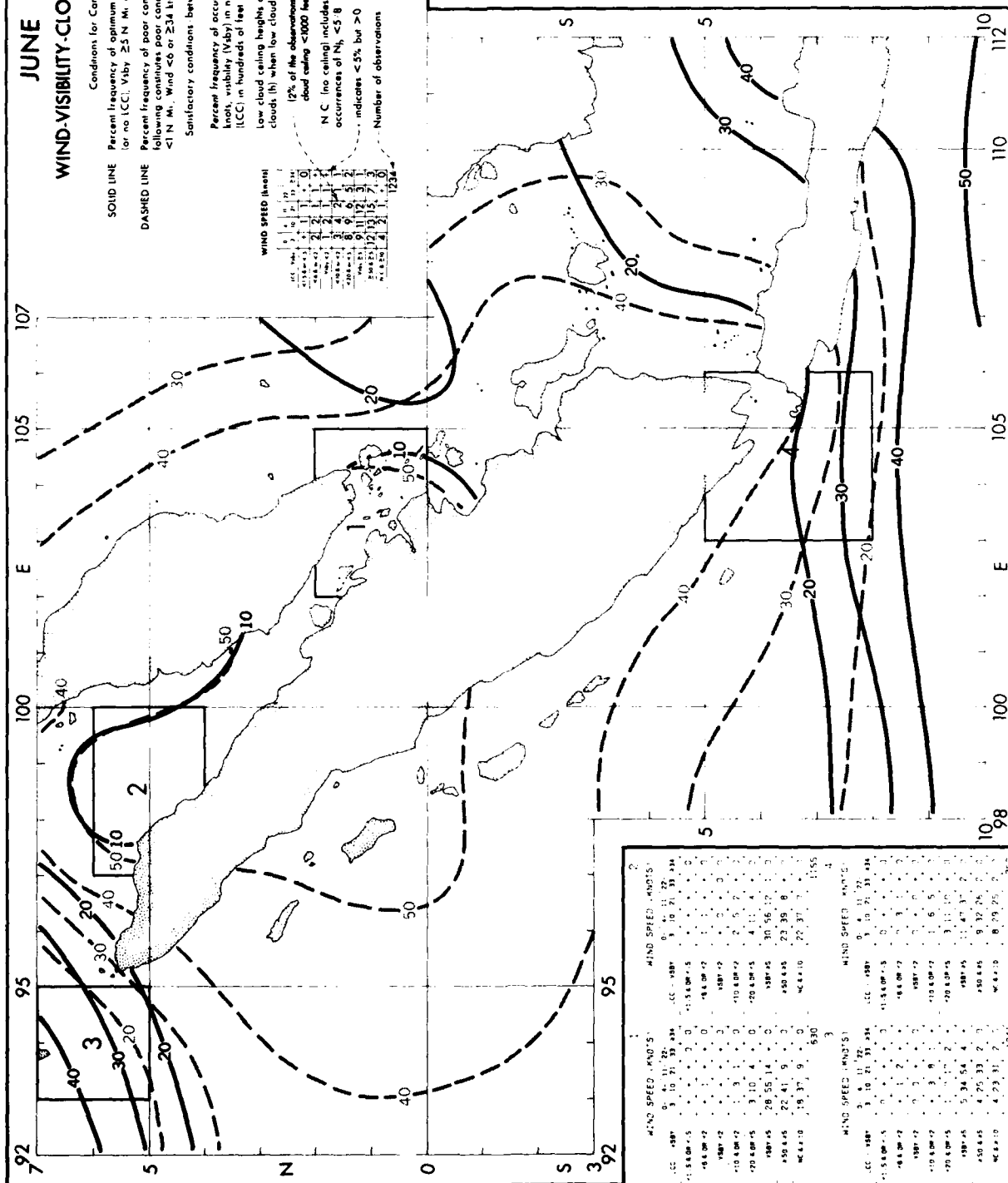
Low cloud ceiling heights are estimated from the height of low clouds (h) when low cloud amount (N_L) is ≥ 5.8 . (2% of the observations reported wind speeds of 11.2 knots, a low cloud ceiling < 1000 feet and/or visibility ≤ 2 nautical miles)

N.C. (no ceiling) includes bases of clouds ≥ 8000 feet as well as occurrences of $N_h < 5.8$.

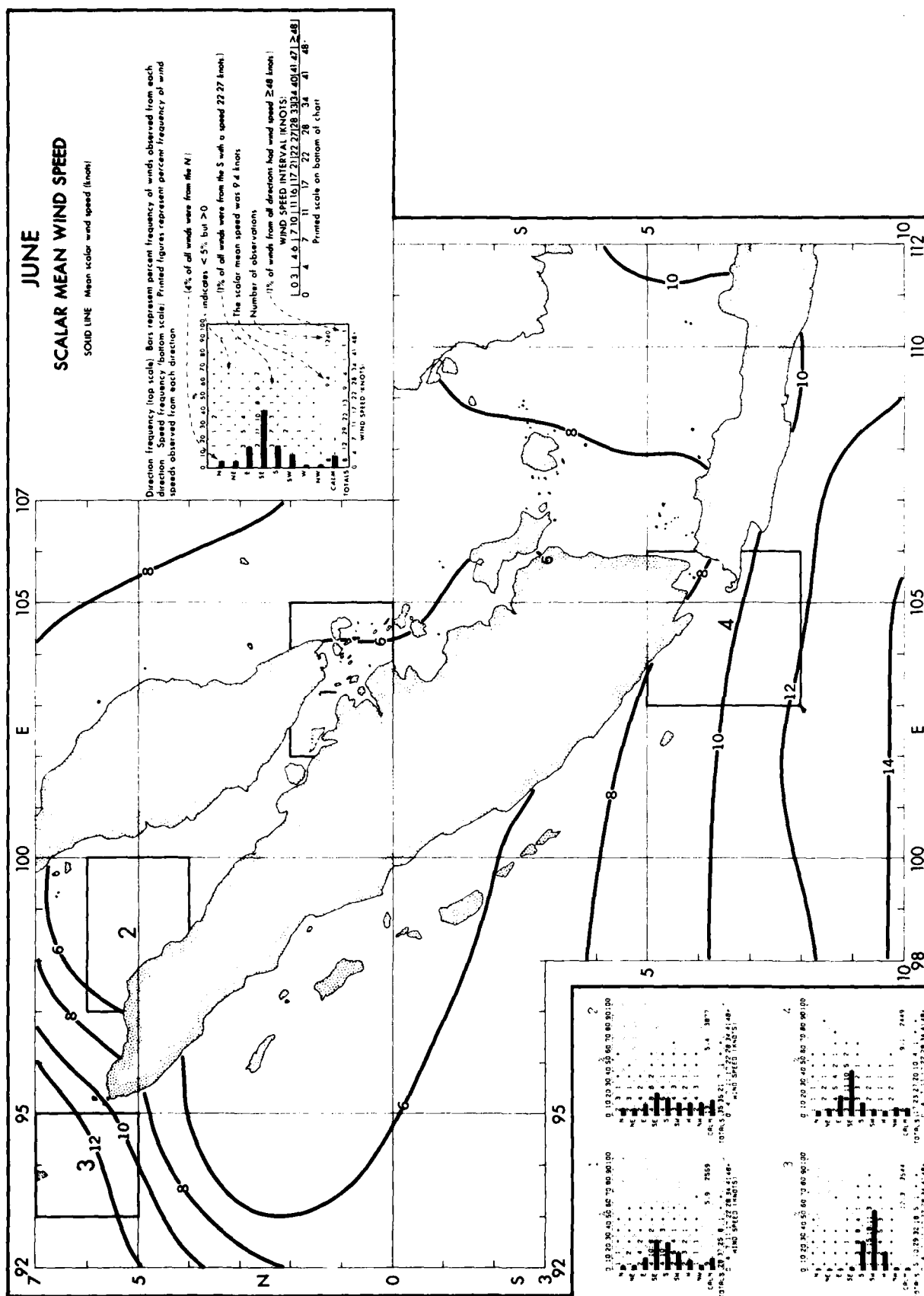
Number of observations

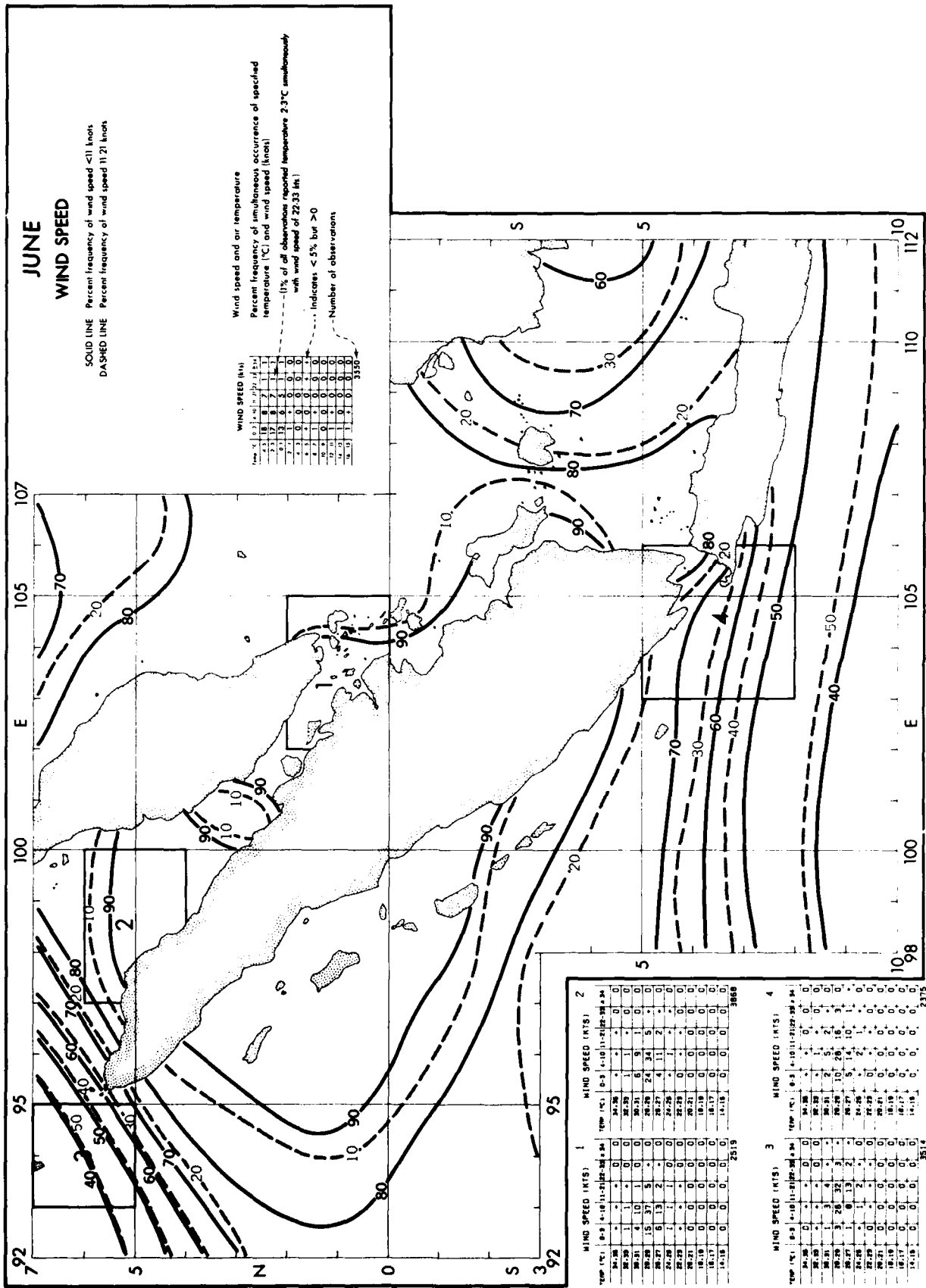
WIND SPEED (knots)

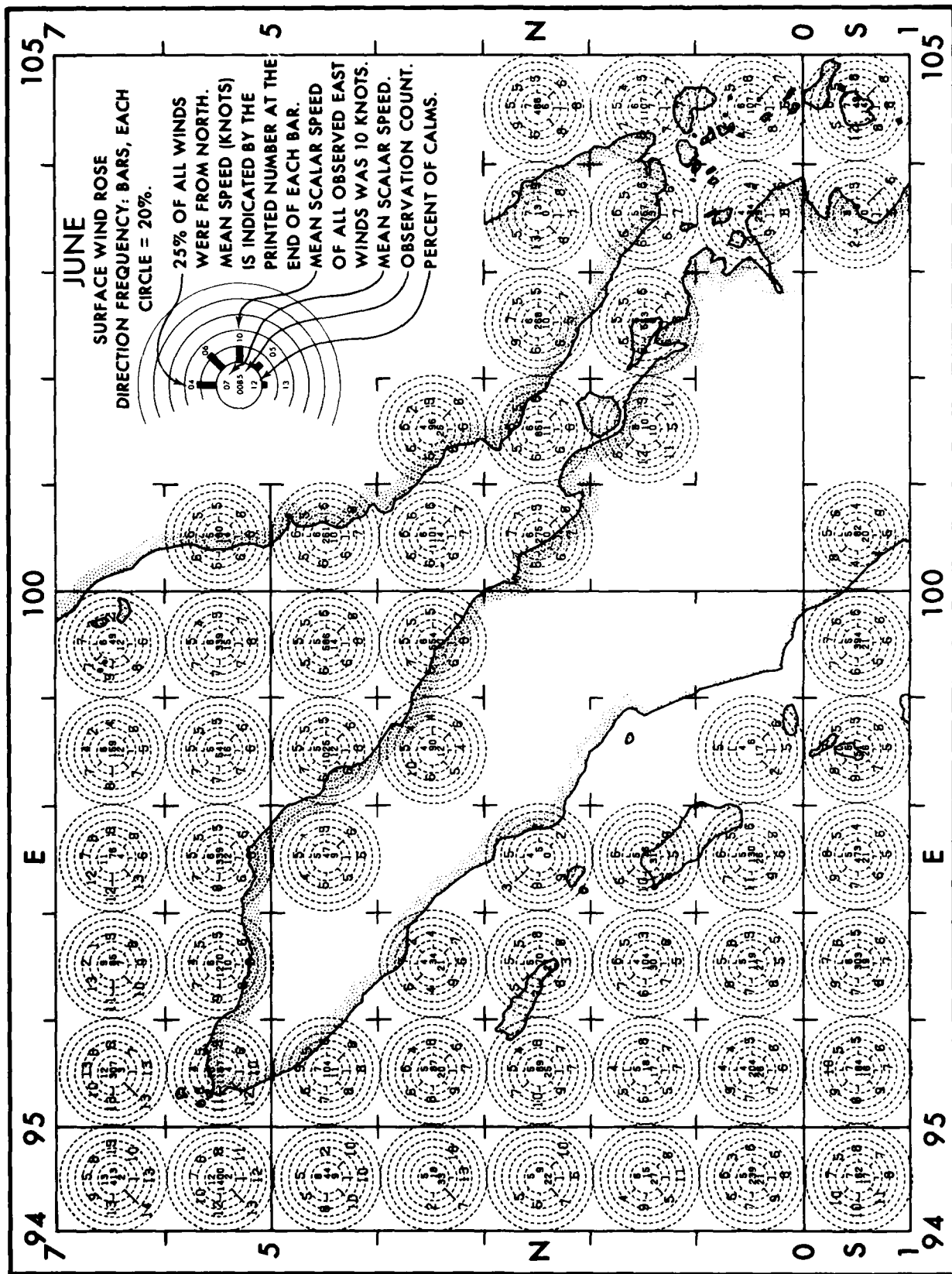
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1	0	0	1	1	0	0
2	2	2	1	1	1	1
3	2	2	1	1	1	1
4	3	4	2	2	1	1
5	8	9	12	3	2	1
6	9	11	12	3	2	1
7	12	13	15	7	3	0
8	2	2	1	1	0	0
9	4	2	1	1	0	0
10	4	2	1	1	0	0
11	4	2	1	1	0	0
12	4	2	1	1	0	0
13	4	2	1	1	0	0
14	4	2	1	1	0	0
15	4	2	1	1	0	0
16	4	2	1	1	0	0
17	4	2	1	1	0	0
18	4	2	1	1	0	0
19	4	2	1	1	0	0
20	4	2	1	1	0	0
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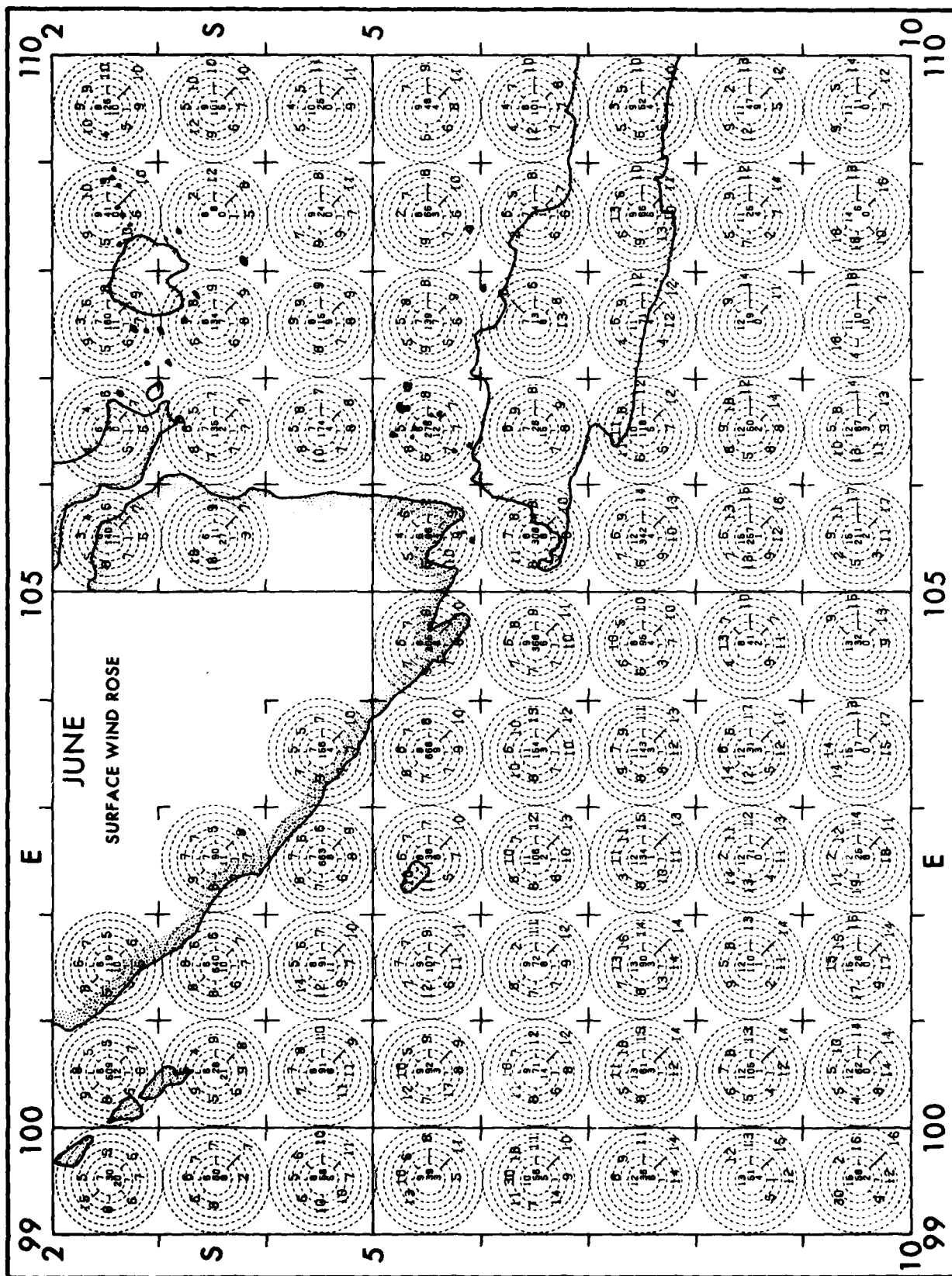


WIND SPEED - MPH/5'S		WIND SPEED - MPH/5'S	
CC - 180°	3 10 17 33 334	CC - 180°	9 10 17 33 334
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+10.000-12	0	+10.000-12	0
+5.000-7	0	+5.000-7	0
0	0	0	0
-5.000-2	0	-5.000-2	0
-10.000-7	3 10 17 33 334	-10.000-7	2 5 7 7
-15.000-12	0	-15.000-12	0
-20.000-15	3 10 17 33 334	-20.000-15	3 10 17 33 334
-25.000-18	0	-25.000-18	0
-30.000-21	0	-30.000-21	0
-35.000-24	0	-35.000-24	0
-40.000-27	0	-40.000-27	0
-45.000-30	0	-45.000-30	0
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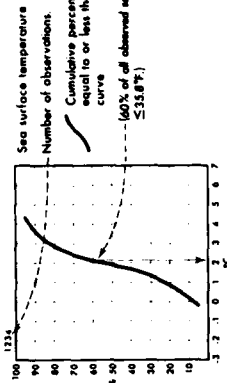


JUNE

AIR AND SEA TEMPERATURE

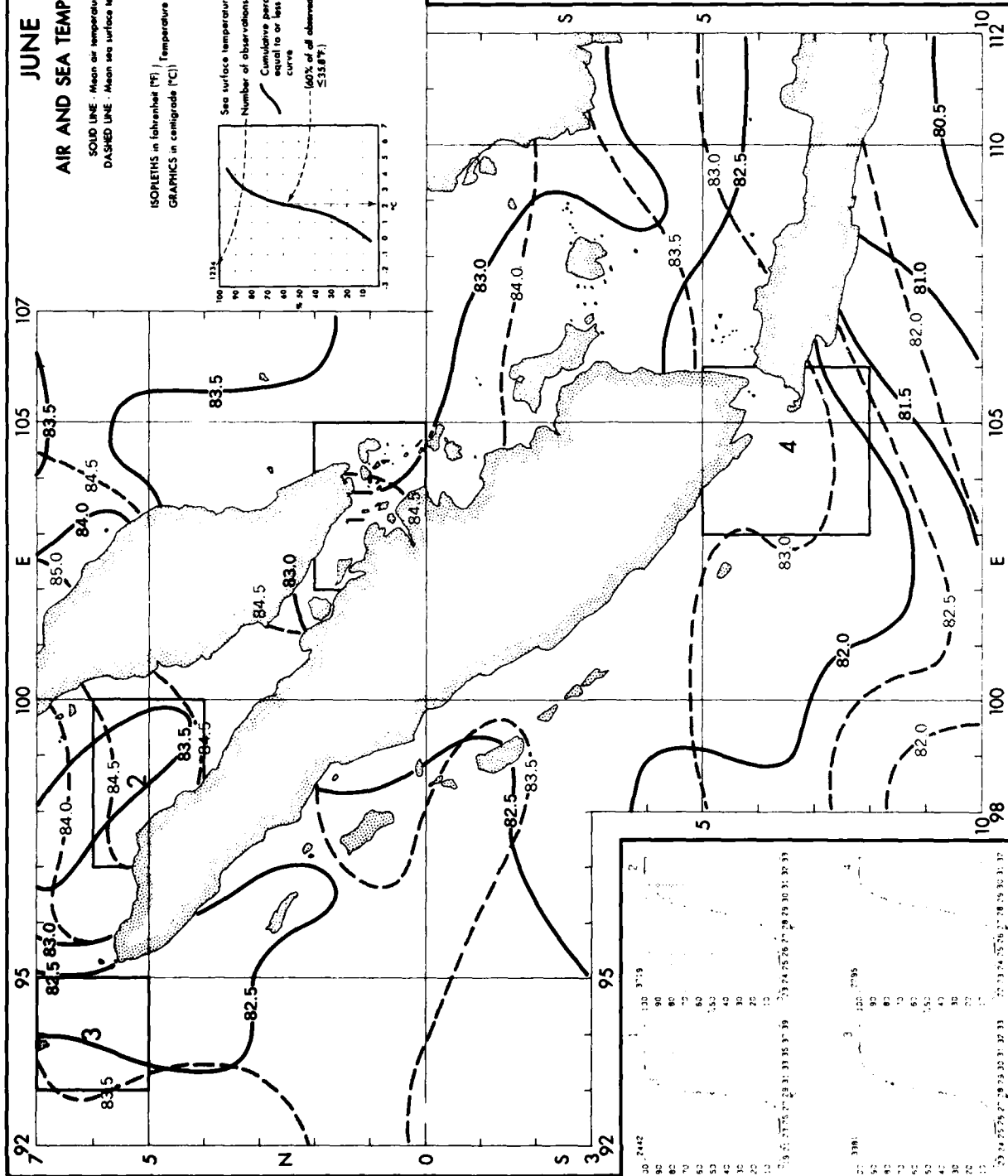
SOLID LINE - Mean air temperature (°F)
DASHED LINE - Mean sea surface temperature (°F)

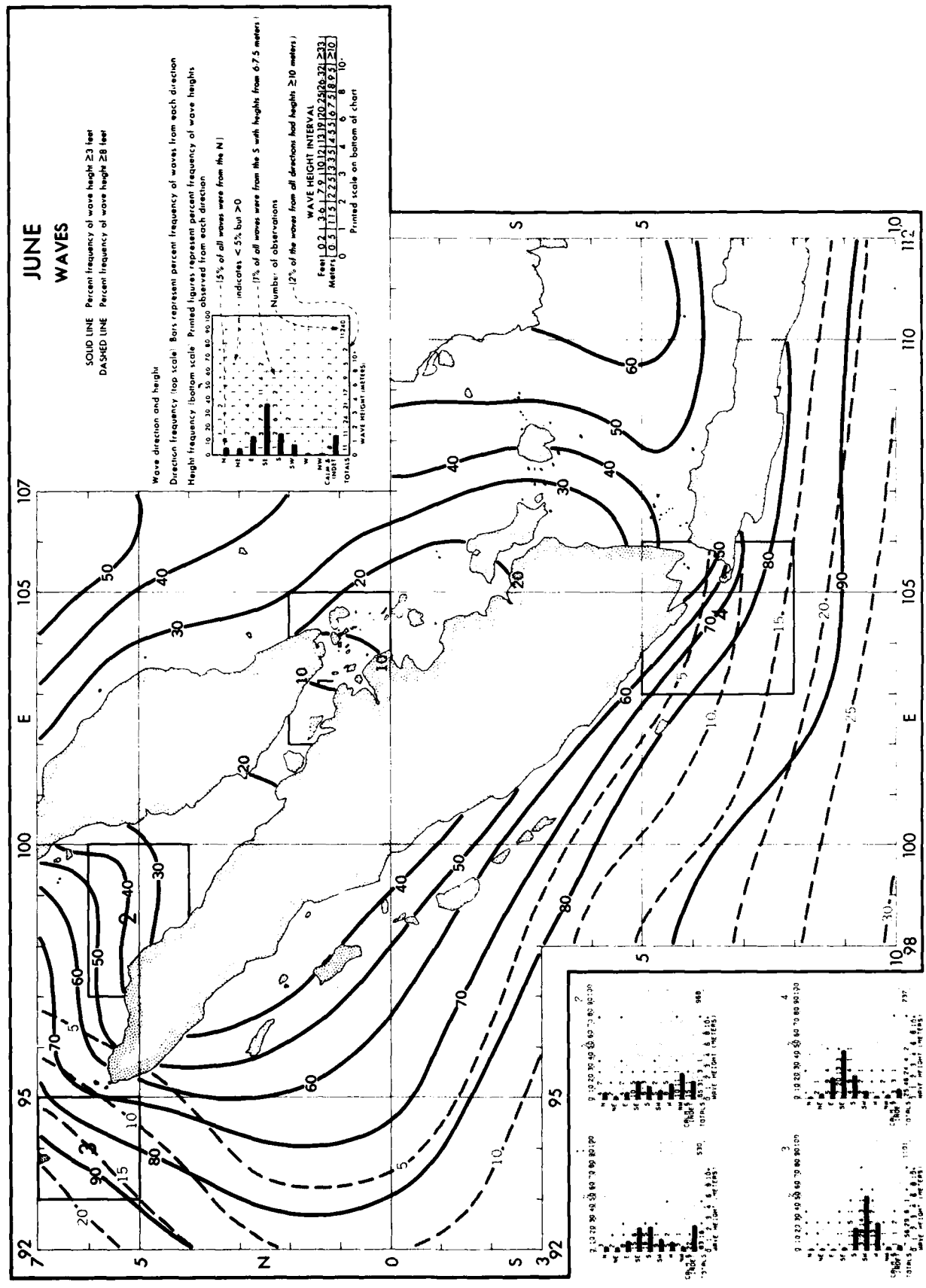
ISOPLTHS in Fahrenheit (°F) / Temperature conversion table below.
GRAPHICS in centigrade (°C)

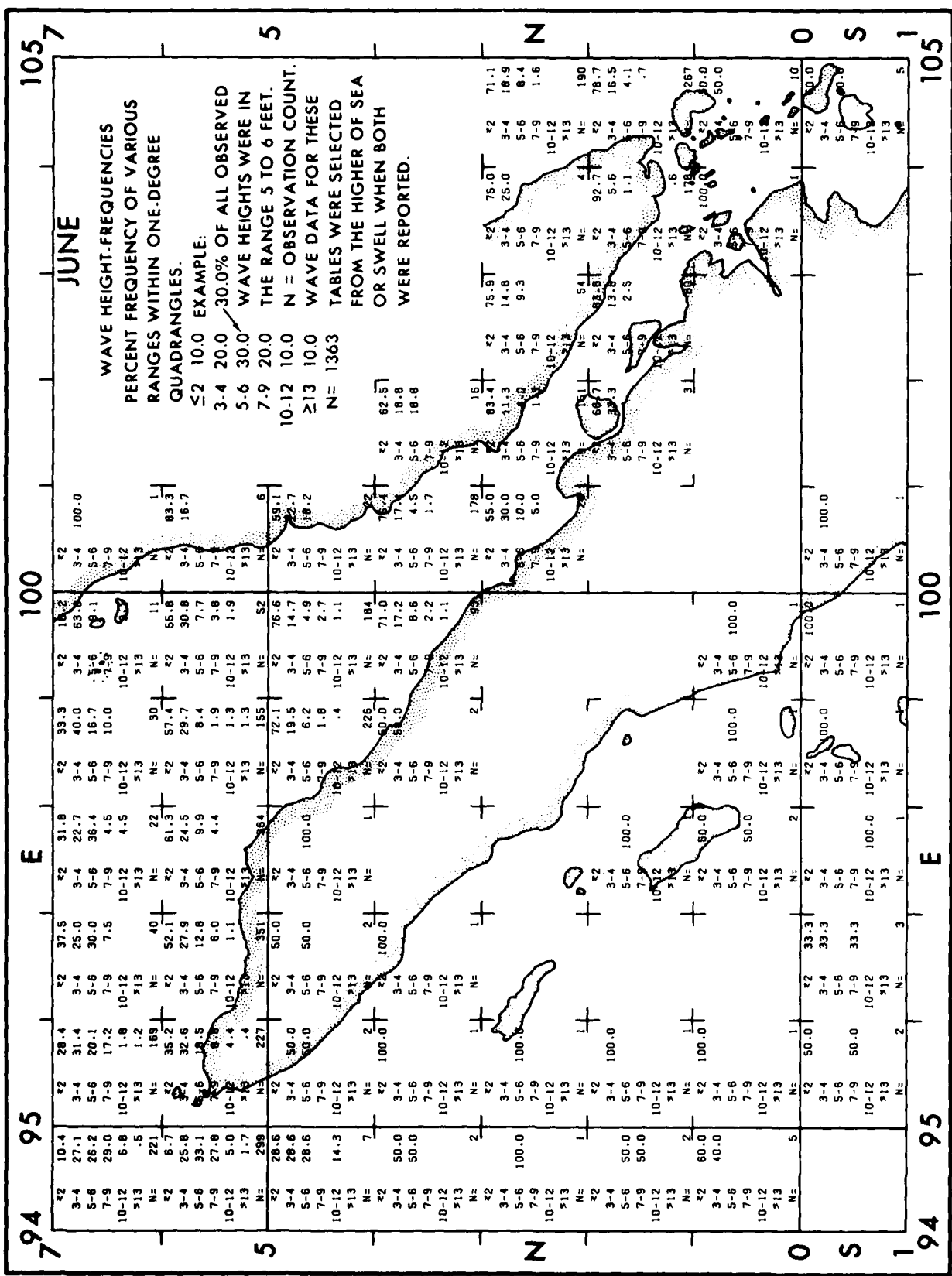


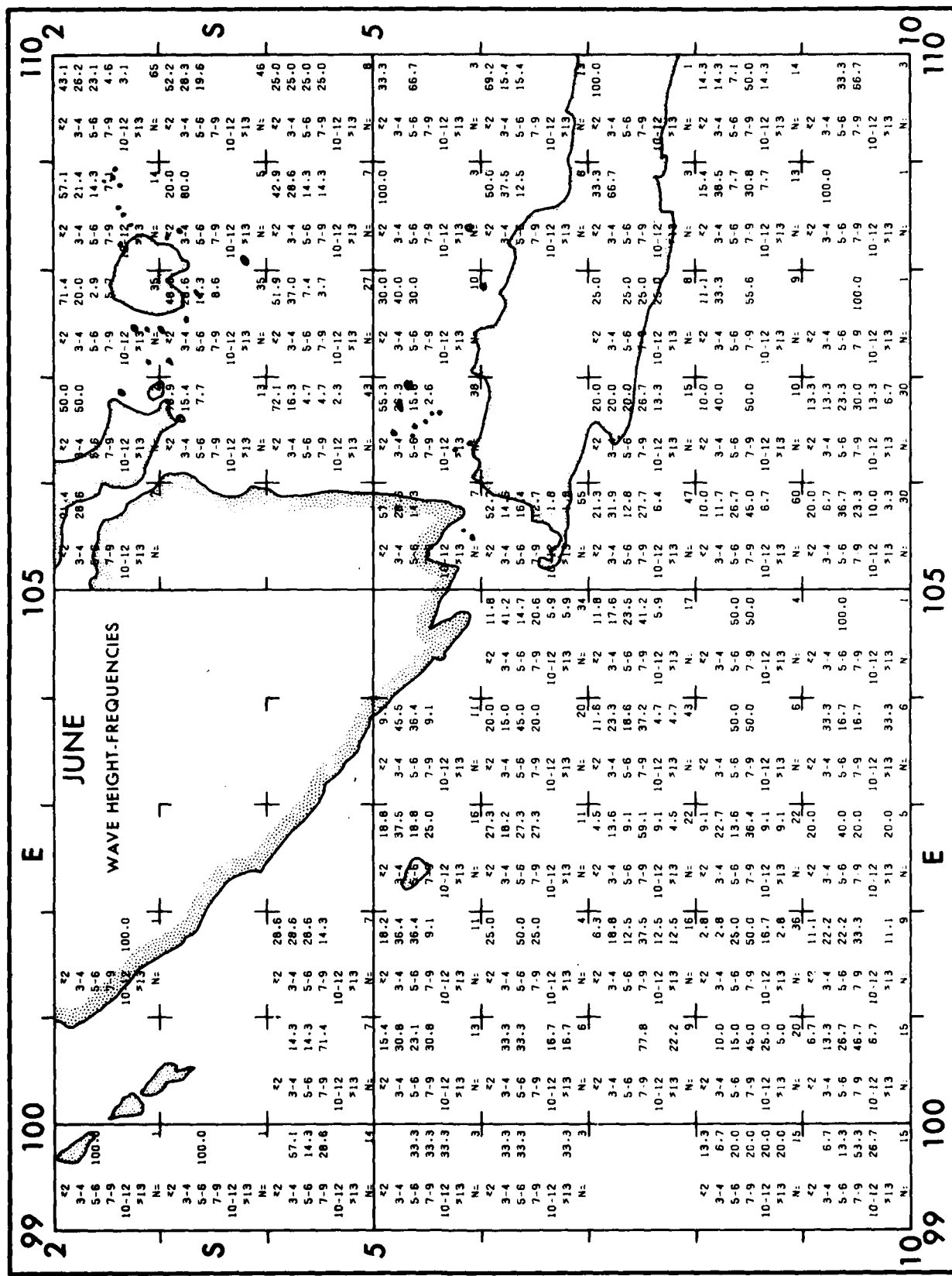
CONVERSION TABLE

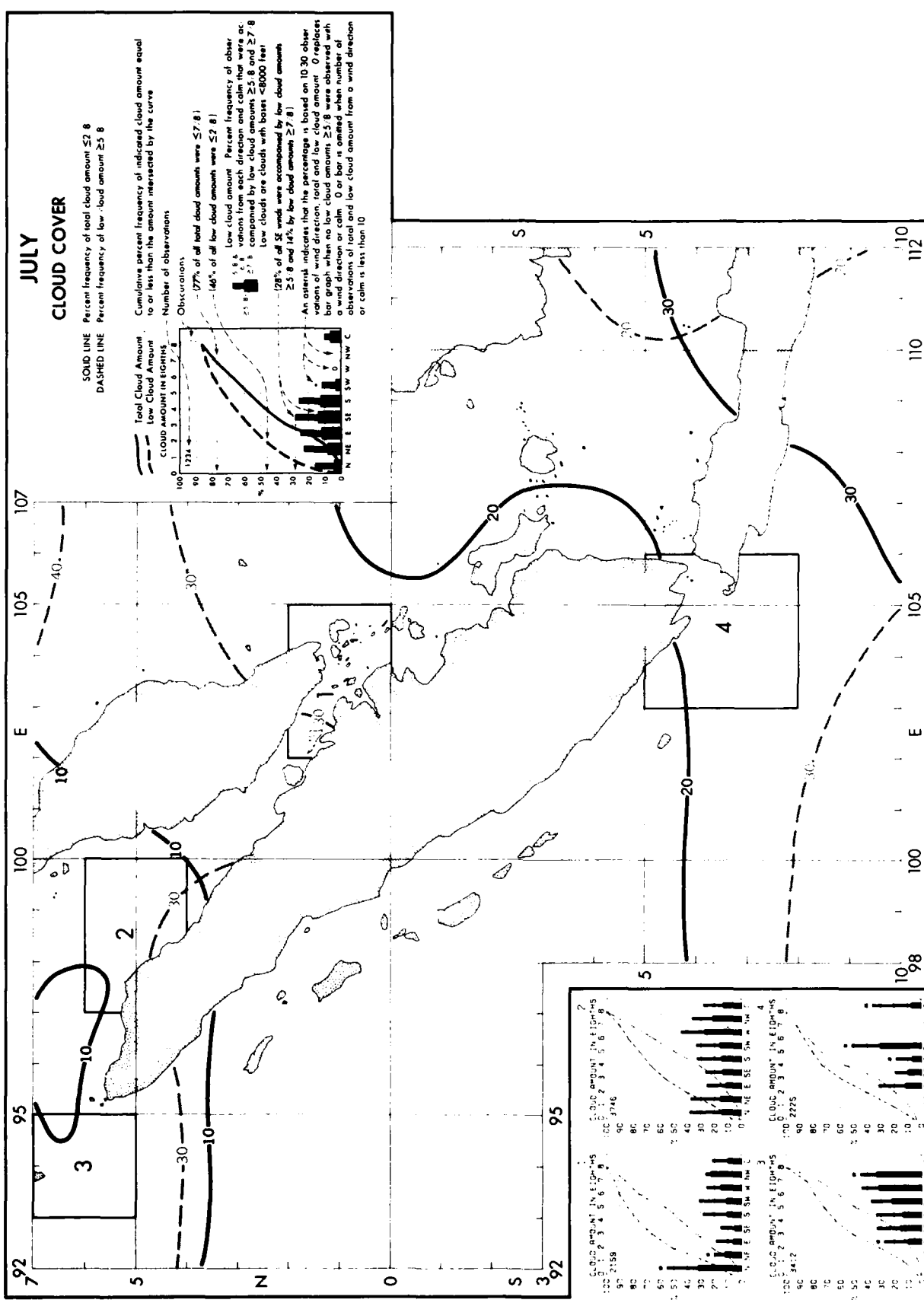
°C	°F
16	60.8
17	62.6
18	64.4
19	66.2
20	68.0
21	69.8
22	71.6
23	73.4
24	75.2
25	77.0
26	78.8
27	80.6
28	82.4
29	84.2
30	86.0
31	87.8
32	89.6
33	91.4
34	93.2
35	95.0
36	96.8
37	98.6
38	100.4
39	102.2

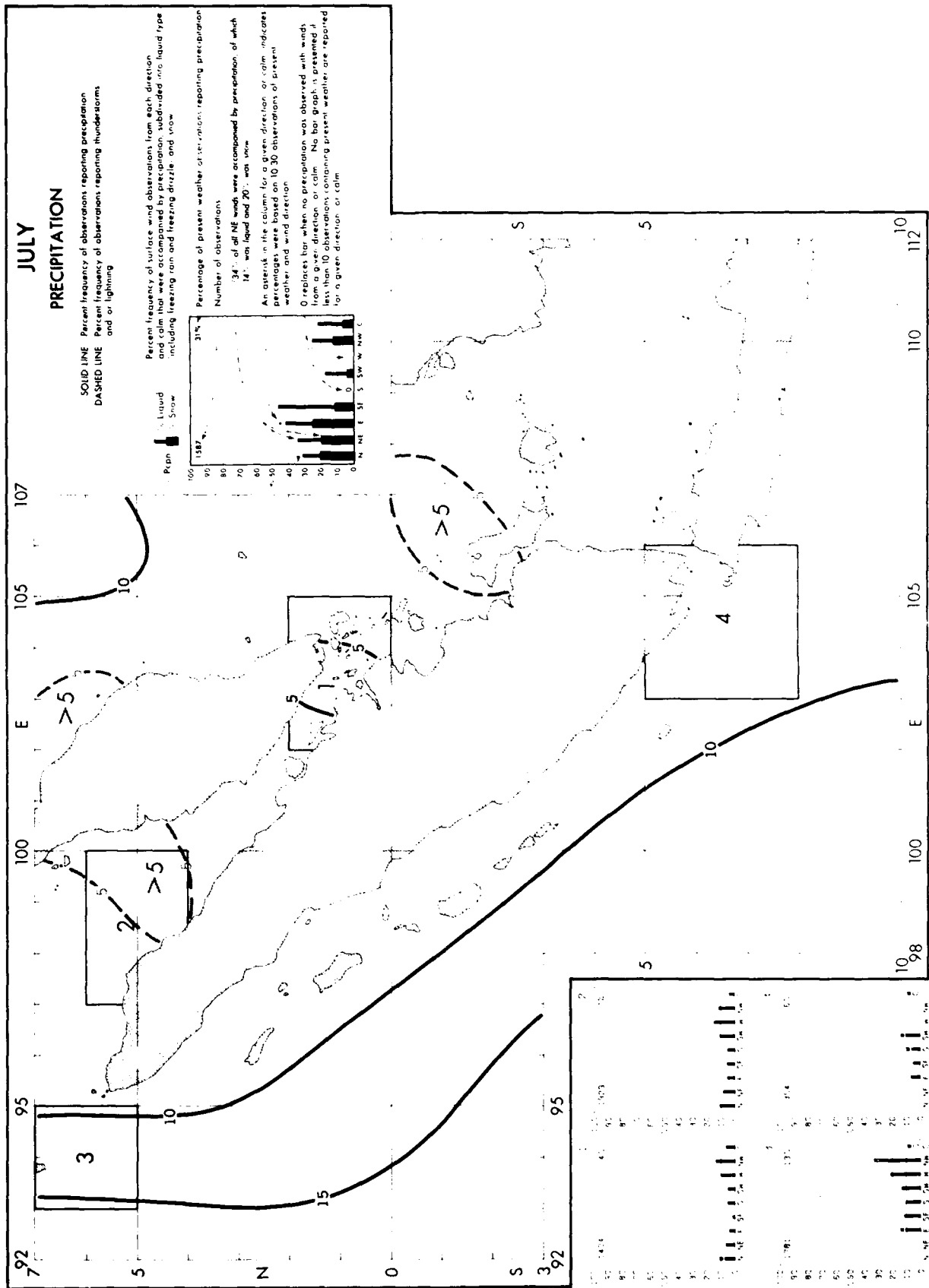


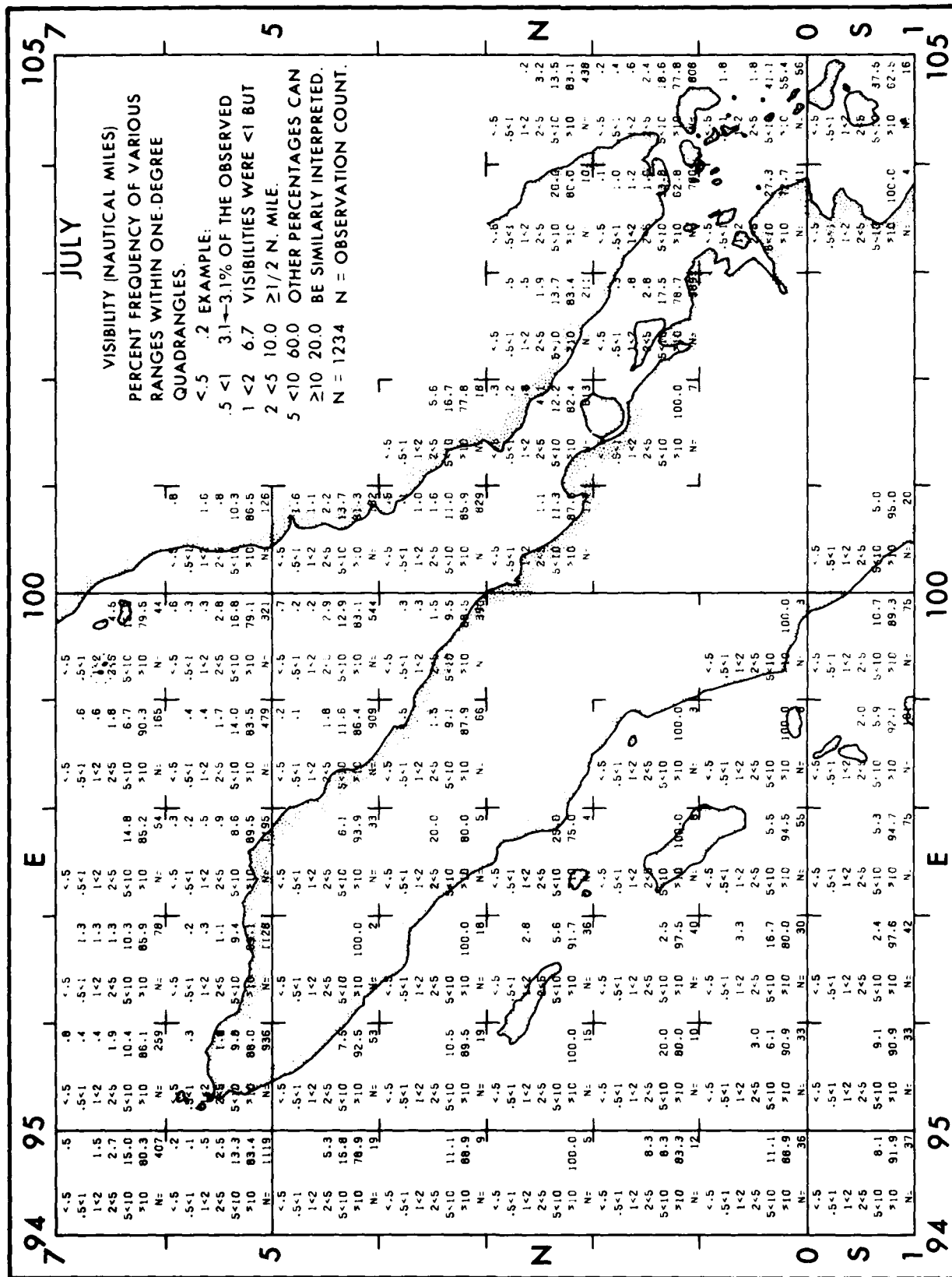


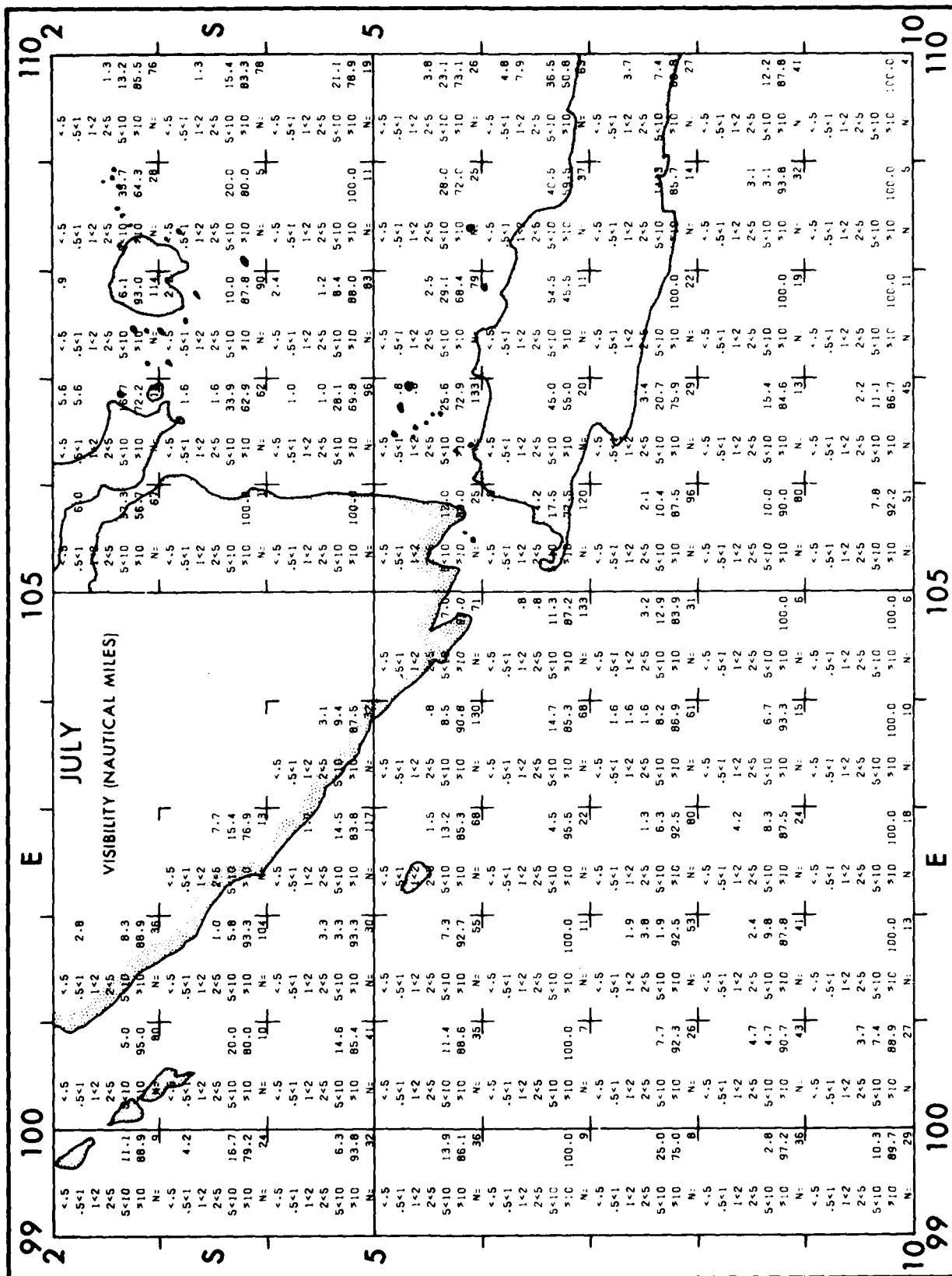












JULY

CEILING-VISIBILITY

SOLID LINE Percent frequency of ceiling <1000 feet and or visibility <5 nautical miles
DASHED LINE Percent frequency of ceiling <8000 feet and or visibility <10 nautical miles

Low cloud ceiling Visibility

Percent frequency of simultaneous occurrence of specified low cloud ceilings (hundreds of feet) and visibilities (nautical miles):

Low cloud ceiling heights are estimated from the height of low clouds (h) when low cloud amount (N_h) is ≥ 5.8

Observations are included under ceiling 0 <15

N.C. (no ceiling) includes bases of clouds ≥8000 feet as well as occurrences of N_h <5.8

1% of all observations reported ceiling ≥1000 but <2000 feet simultaneously with visibility ≥5 but <10 nautical miles

indicates <5% but >0

Number of observations

LOW CLOUD CEILING	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	12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JULY

WIND-VISIBILITY-CLOUDINESS

Conditions for Carrier Operations

SOLID LINE Percent frequency of optimum conditions (CC ≥ 3000 h or no ICC, Vby ≥ 5 N Mi, and Wind 11-21 kts)
DASHED LINE Percent frequency of poor conditions Any one of the following constitutes poor conditions (CC < 300 h, Vby < 1 N Mi, Wind ≤ 6 or ≥ 24 kts)

Semi-velocity conditions between poor and optimum

Percent frequency of occurrence of specified wind speed in knots, visibility (Vby) in nautical miles, and low cloud ceiling (LCC) in hundreds of feet

Low cloud ceiling heights are estimated from the height of low clouds (h) when low cloud amount (N_h) is ≥ 5

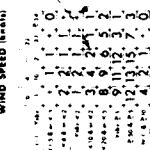
(2% of the observations reported wind speeds of 11-21 knots, a low cloud ceiling < 1000 feet and or visibility < 2 nautical miles)

N.C. (no ceiling) includes bases of clouds ≥ 8000 feet as well as occurrences of N_h ≤ 5

... indicates $< 5\%$, but > 0

Number of observations

WIND SPEED (knots)



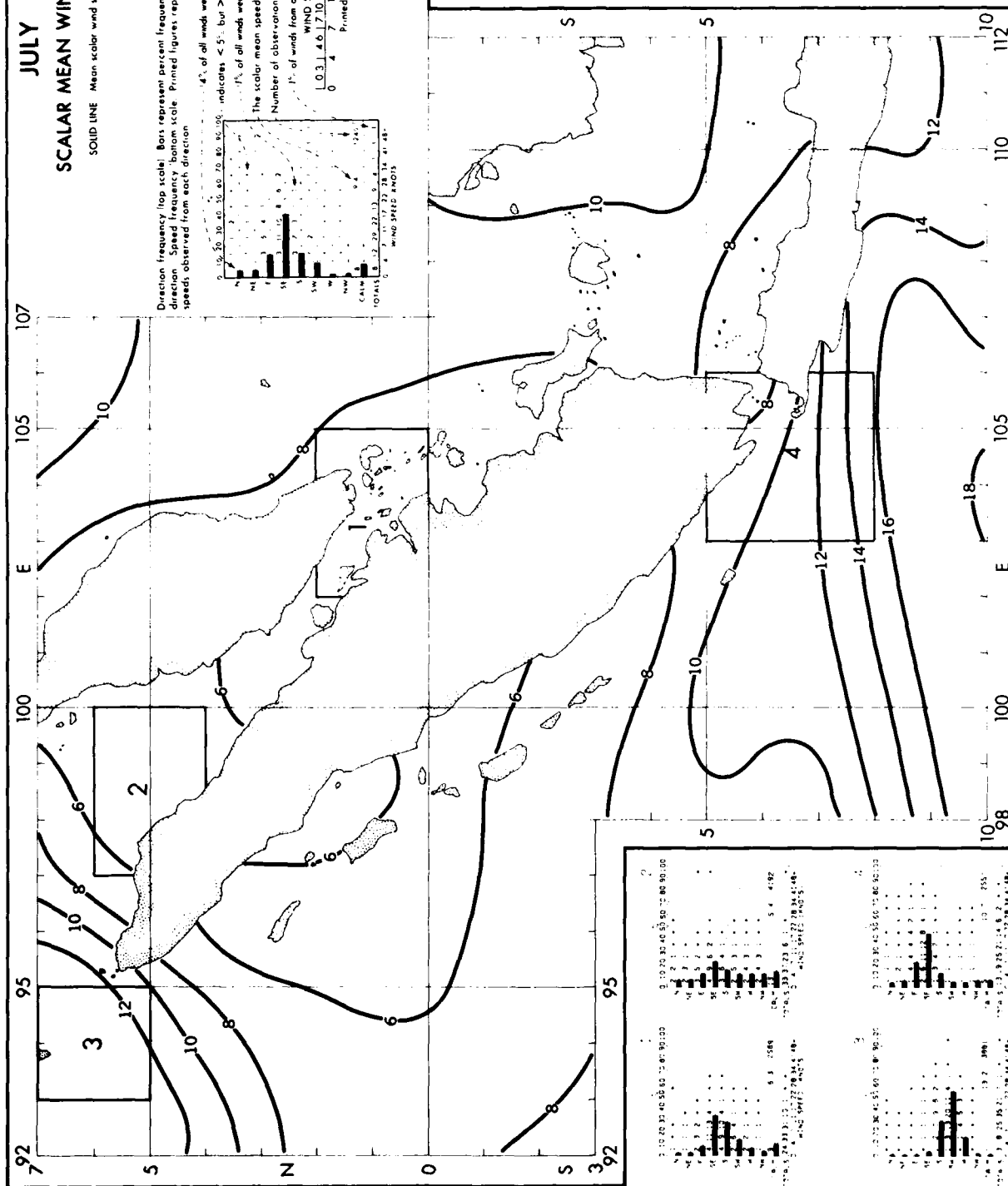
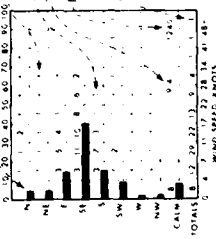
JULY SCALAR MEAN WIND SPEED

SOLID LINE Mean scalar wind speed (knots)

Direction frequency (top scale). Bars represent percent frequency of winds observed from each direction. Speed frequency bottom scale. Printed figures represent percent frequency of wind speeds observed from each direction.

4% of all winds were from the N;
1% of all winds were from the S with a speed 22-27 knots.
The scalar mean speed was 9.4 knots.
Number of observations: 17

1% of winds from all directions had wind speed ≥ 48 knots.
WIND SPEED INTERVAL (KNOTS)
0.3 1 4.6 17 10 11 16 17 22 27 28 33 34 40 41 47 48
Printed scale on bottom of chart



WIND SPEED

SOLID LINE Percent frequency of wind speed < 11 knots
DASHED LINE Percent frequency of wind speed 11-21 knots

Wind speed and air temperature

Percent frequency of simultaneous occurrence of specified temperature (°C) and wind speed (knots)

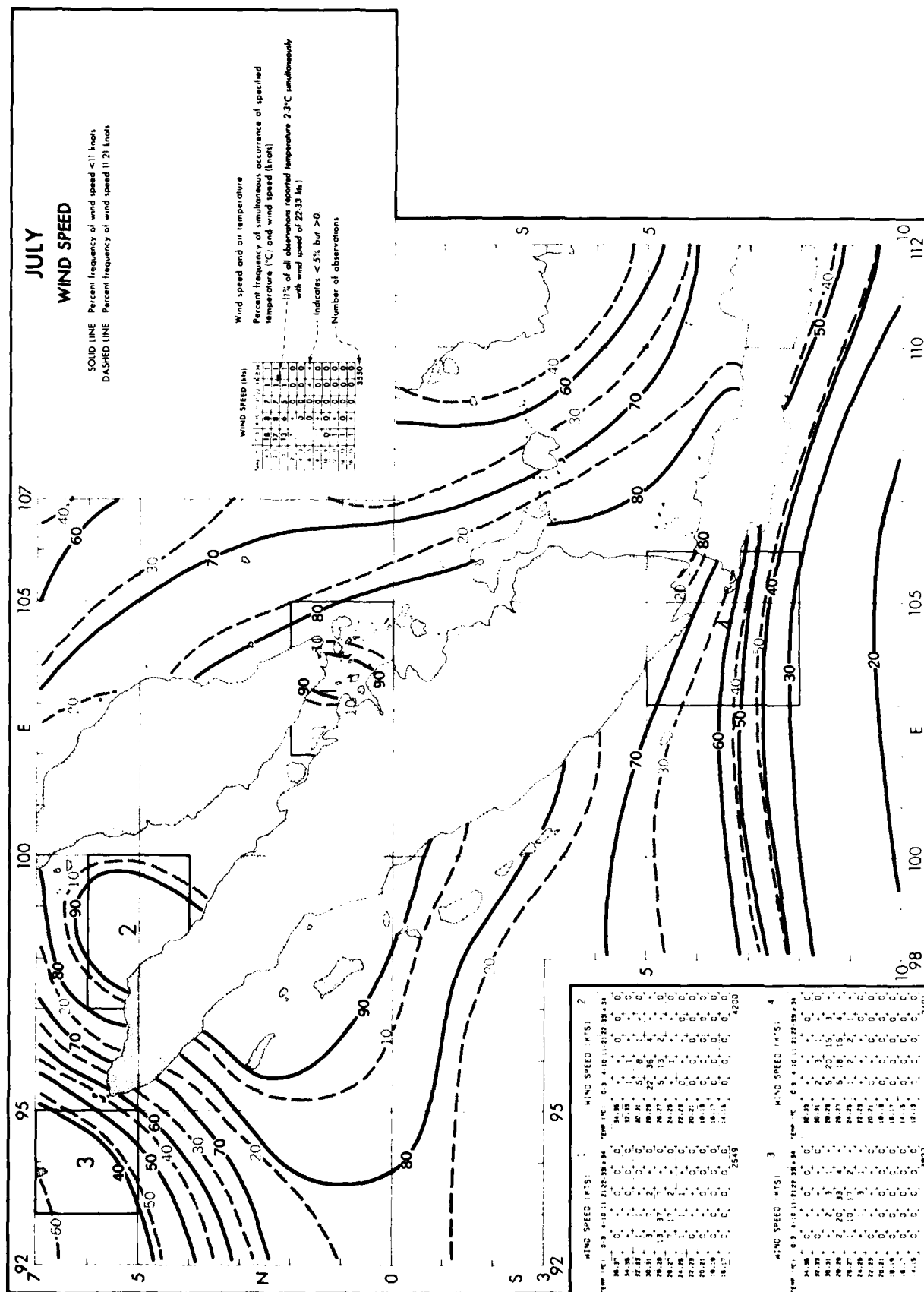
11% of all observations reported temperature 2.3°C simultaneously with wind speed of 22.33 km/h .)

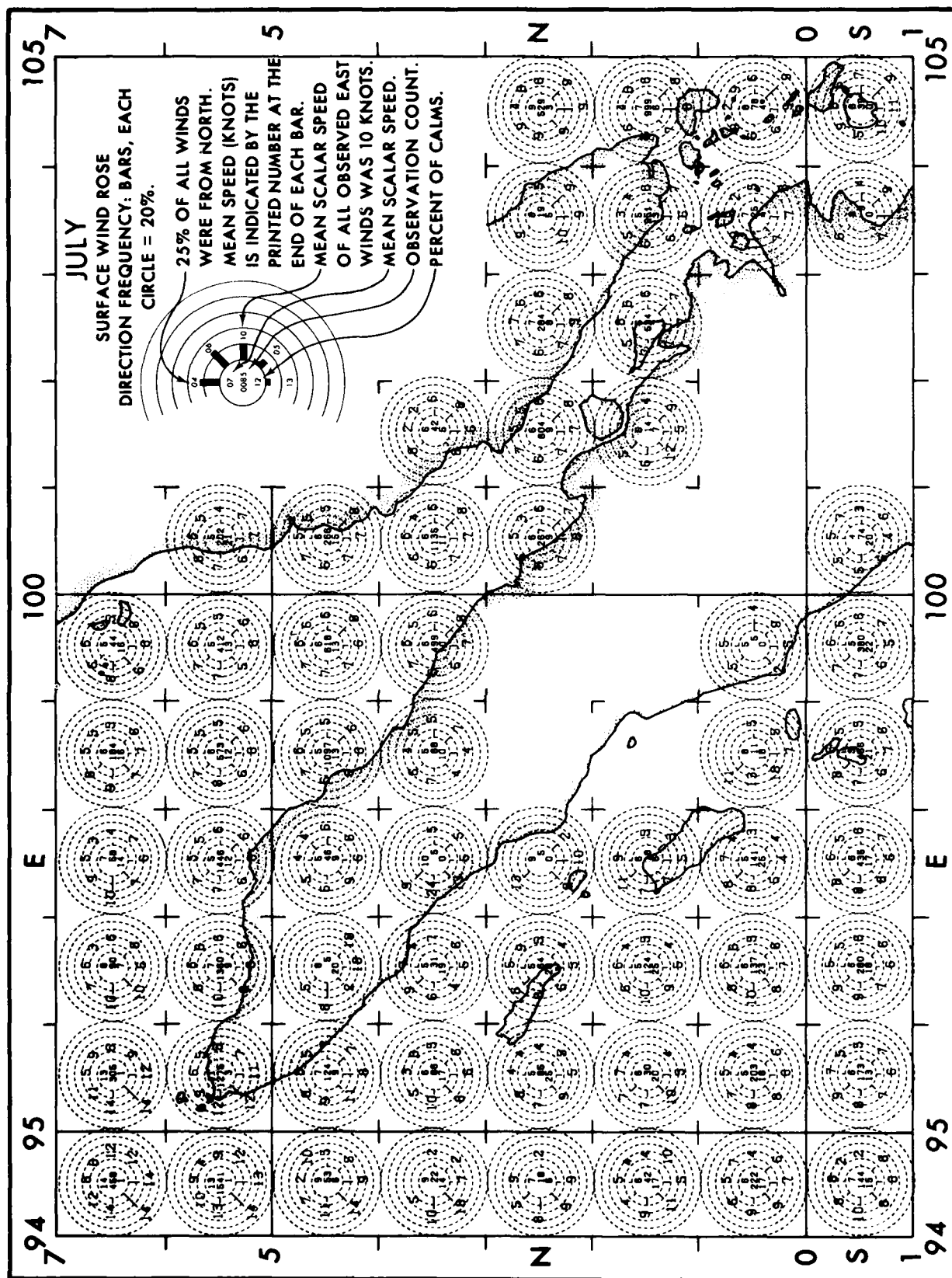
 $0 < \text{mg \%} < 5\%$

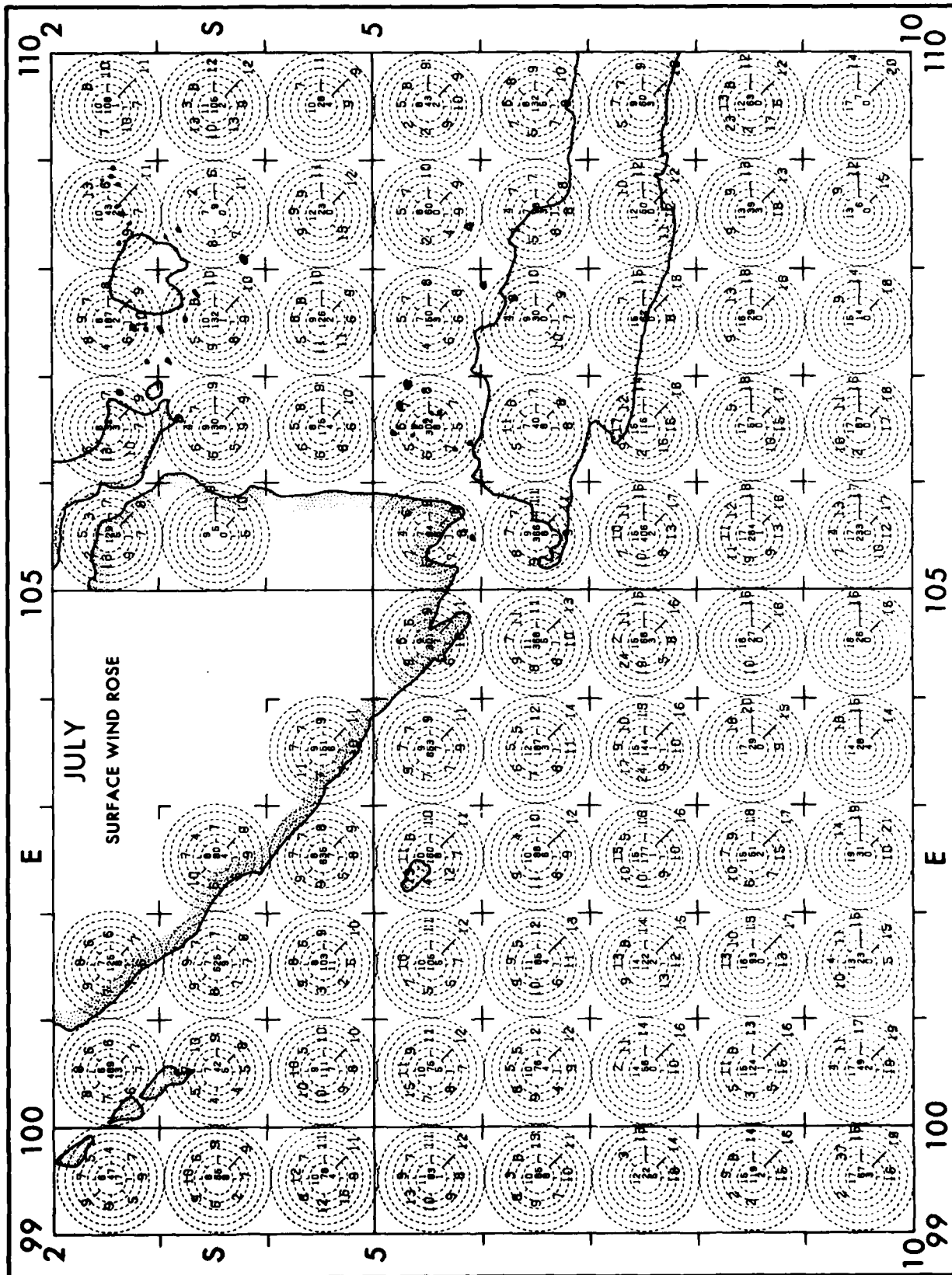
Number of observations

WIND SPEED (kts)

15	10	9	7	7	7	7	7	7	7
14	10	9	7	7	7	7	7	7	7
13	10	9	7	7	7	7	7	7	7
12	10	9	7	7	7	7	7	7	7
11	10	9	7	7	7	7	7	7	7
10	10	9	7	7	7	7	7	7	7
9	10	9	7	7	7	7	7	7	7
8	10	9	7	7	7	7	7	7	7
7	10	9	7	7	7	7	7	7	7
6	10	9	7	7	7	7	7	7	7

[illegible][illegible]



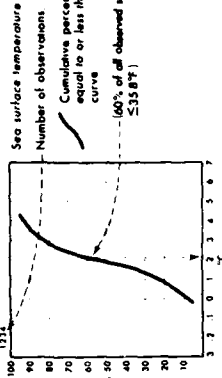


JULY

AIR AND SEA TEMPERATURE

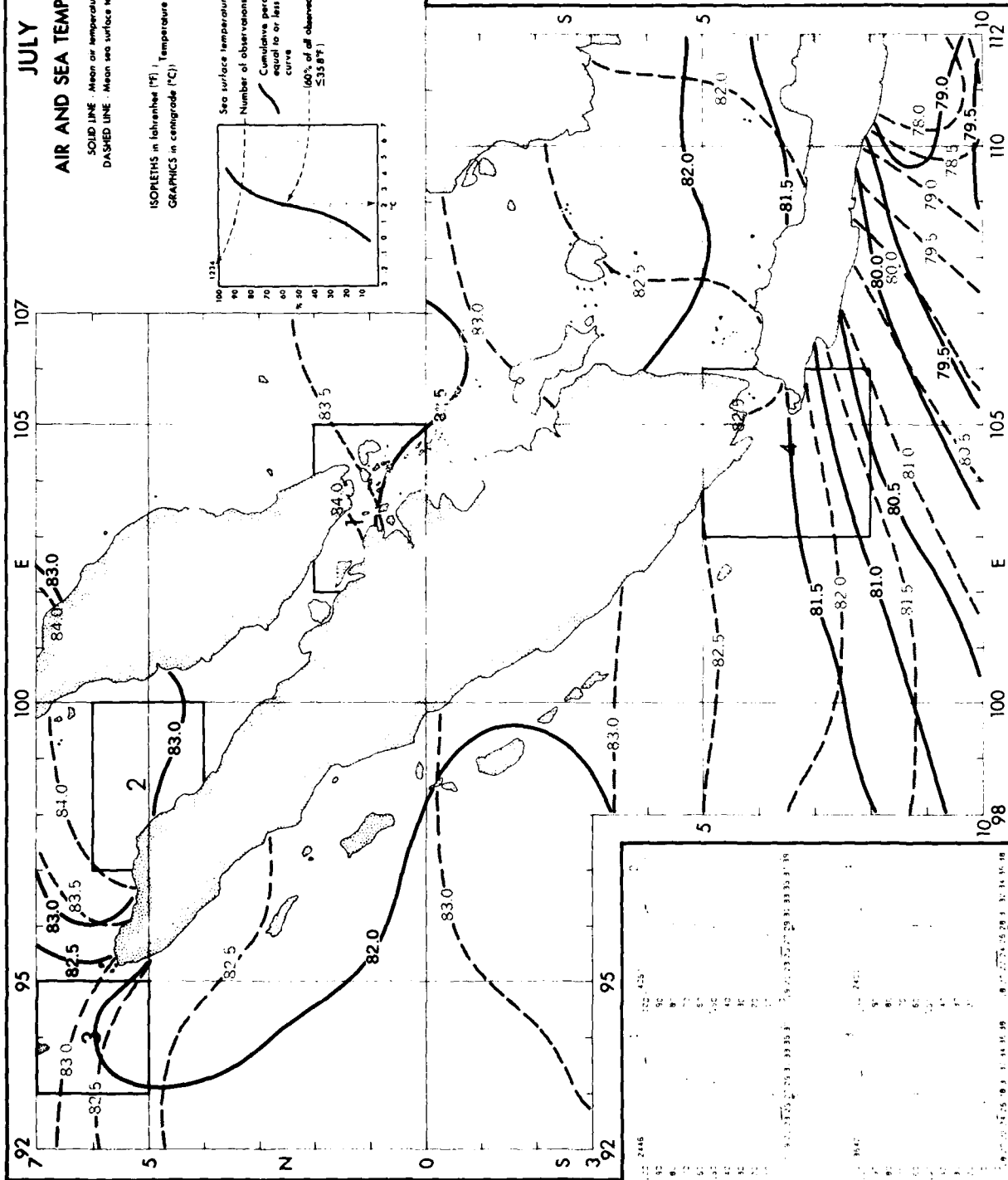
SOLID LINE: Mean air temperature (°F)
DASHED LINE: Mean sea surface temperature (°F)

ISOPLTHS in Fahrenheit (°F) | Temperature conversion table below
GRAPHICS in centigrade (°C)



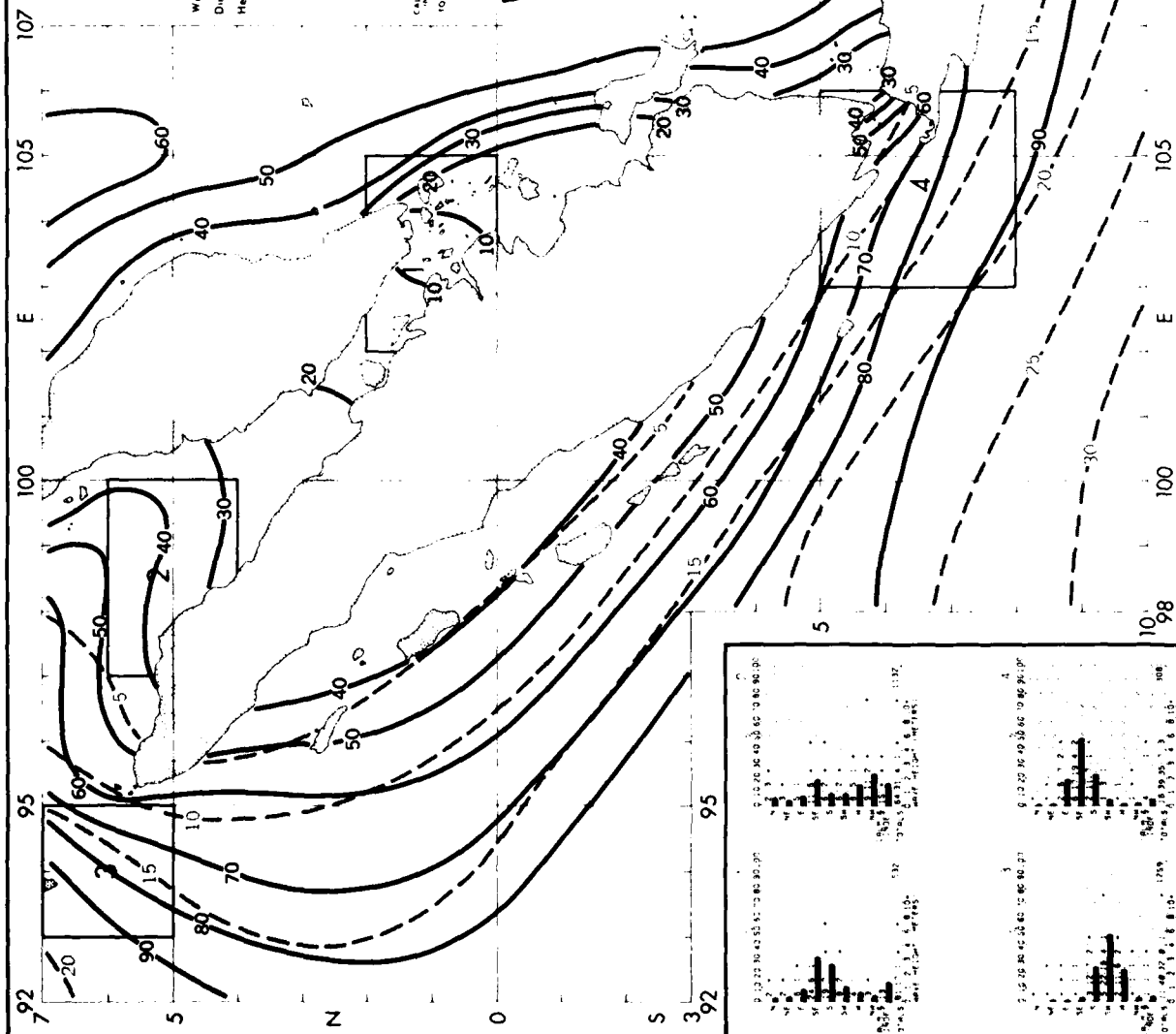
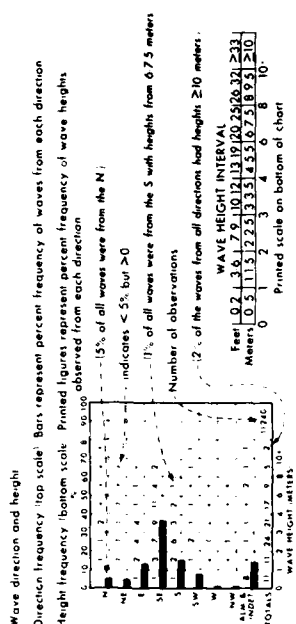
CONVERSION TABLE

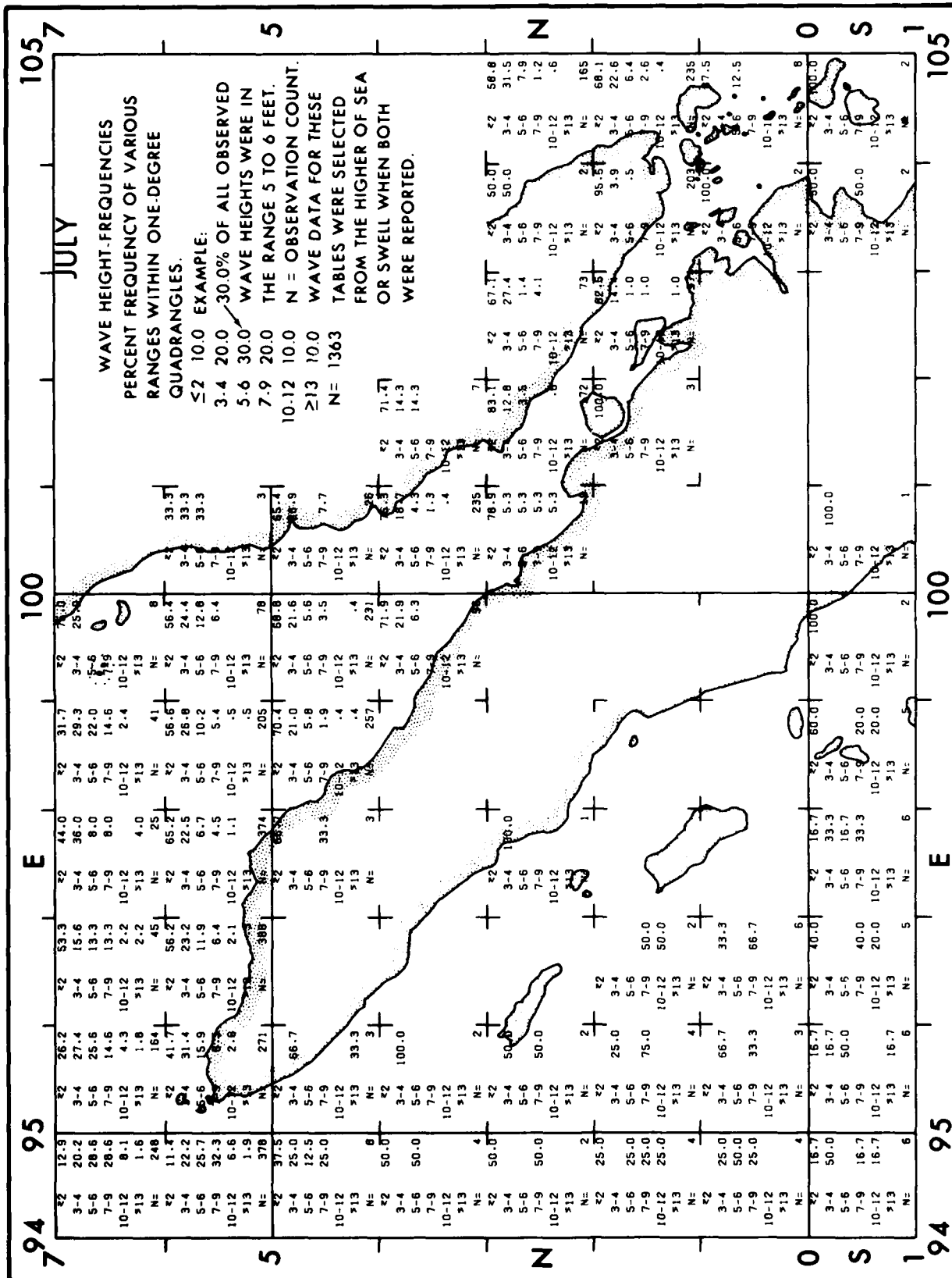
°C	°F
16	60.8
17	62.6
18	64.4
19	66.2
20	68.0
21	69.8
22	71.6
23	73.4
24	75.2
25	77.0
26	78.8
27	80.6
28	82.4
29	84.2
30	86.0
31	87.8
32	89.6
33	91.4
34	93.2
35	95.0
36	96.8
37	98.6
38	100.4
39	102.2

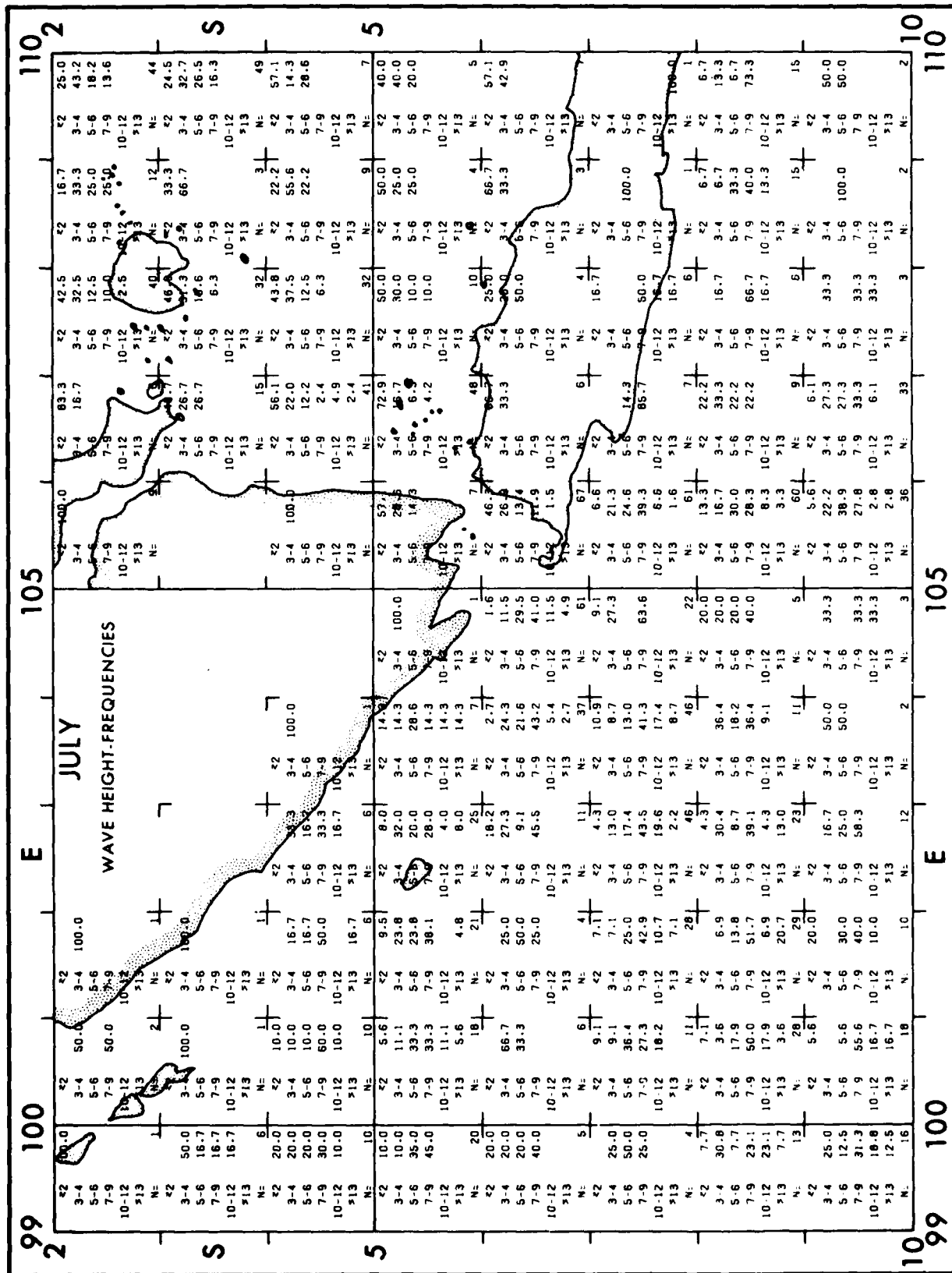


JULY WAVES

SOLID LINE Percent frequency of wave height 23 feet
DASHED LINE Percent frequency of wave height 28 feet







AUGUST CLOUD COVER

SOLID LINE Percent frequency of total cloud amount ≤ 2.8
DASHED LINE Percent frequency of low cloud amount ≥ 2.8

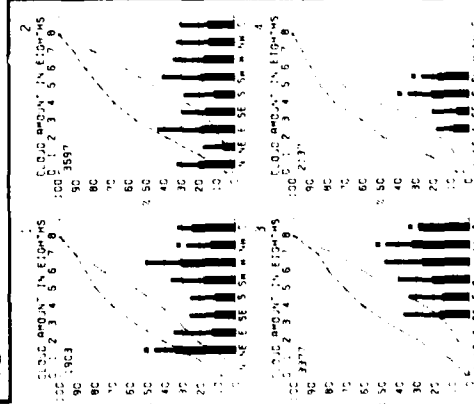
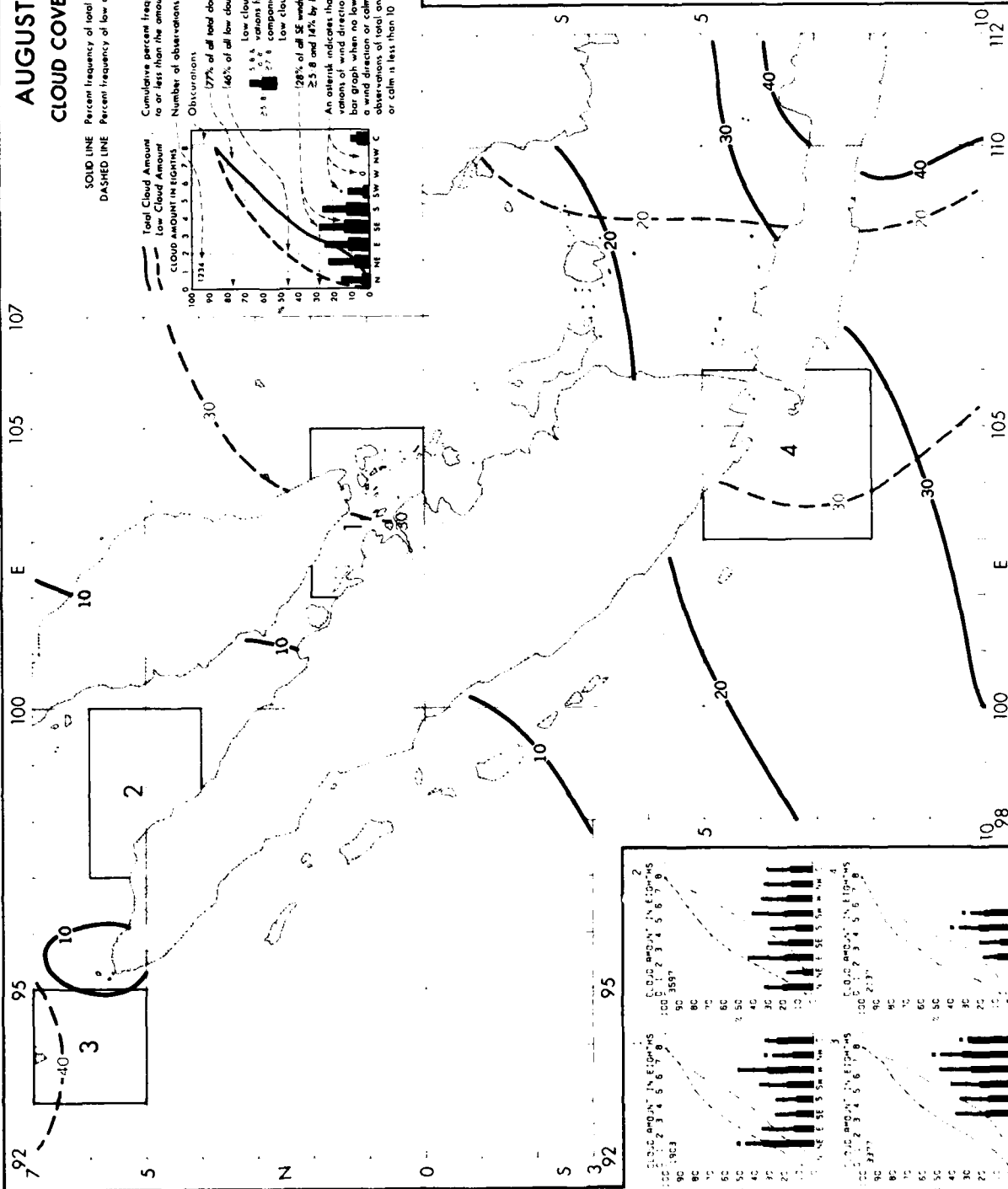
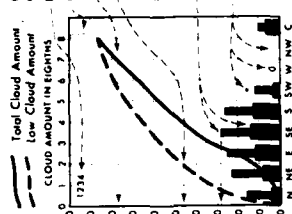
Cumulative percent frequency of indicated cloud amount equal to or less than the amount intersected by the curve

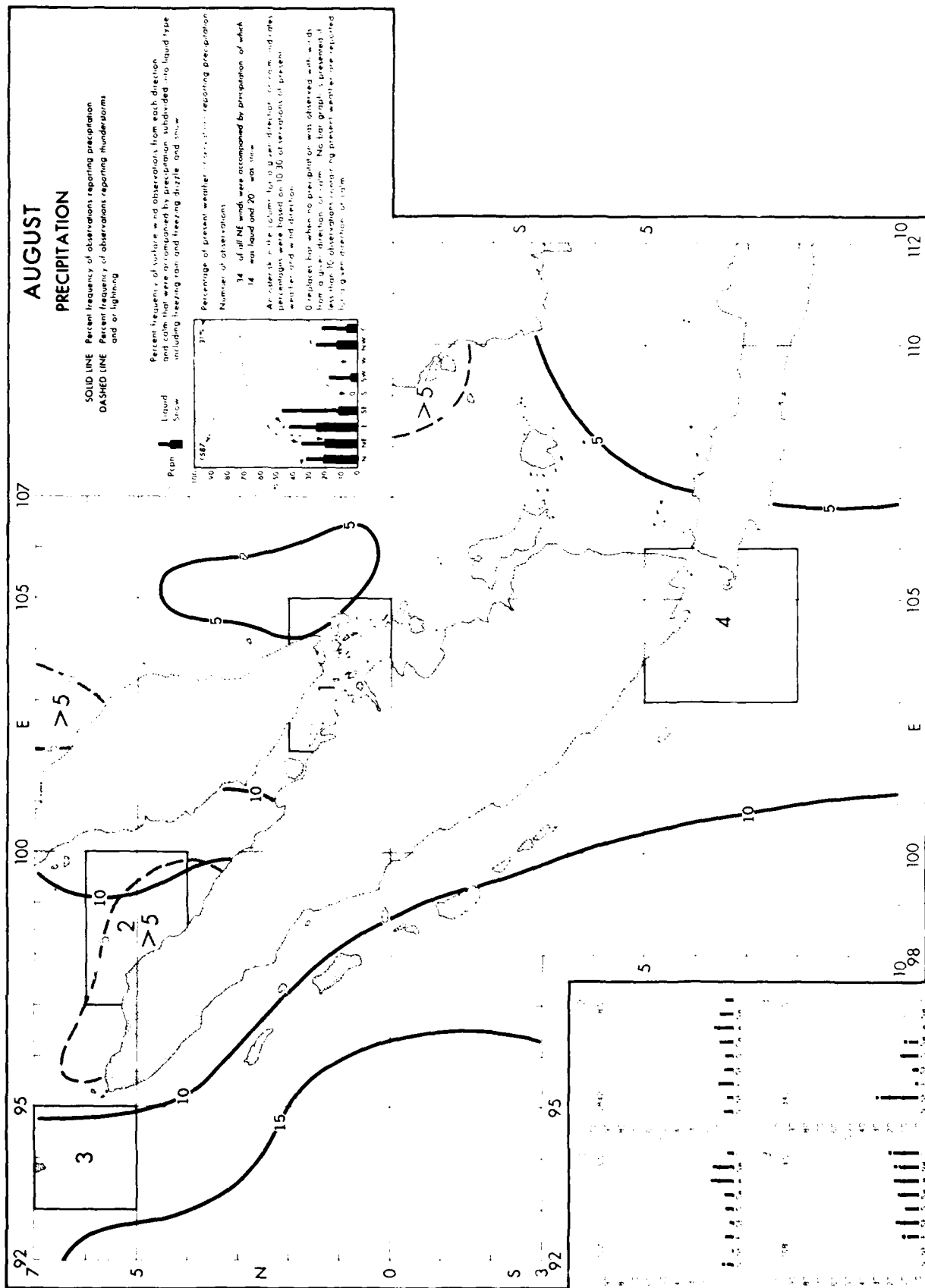
Number of observations

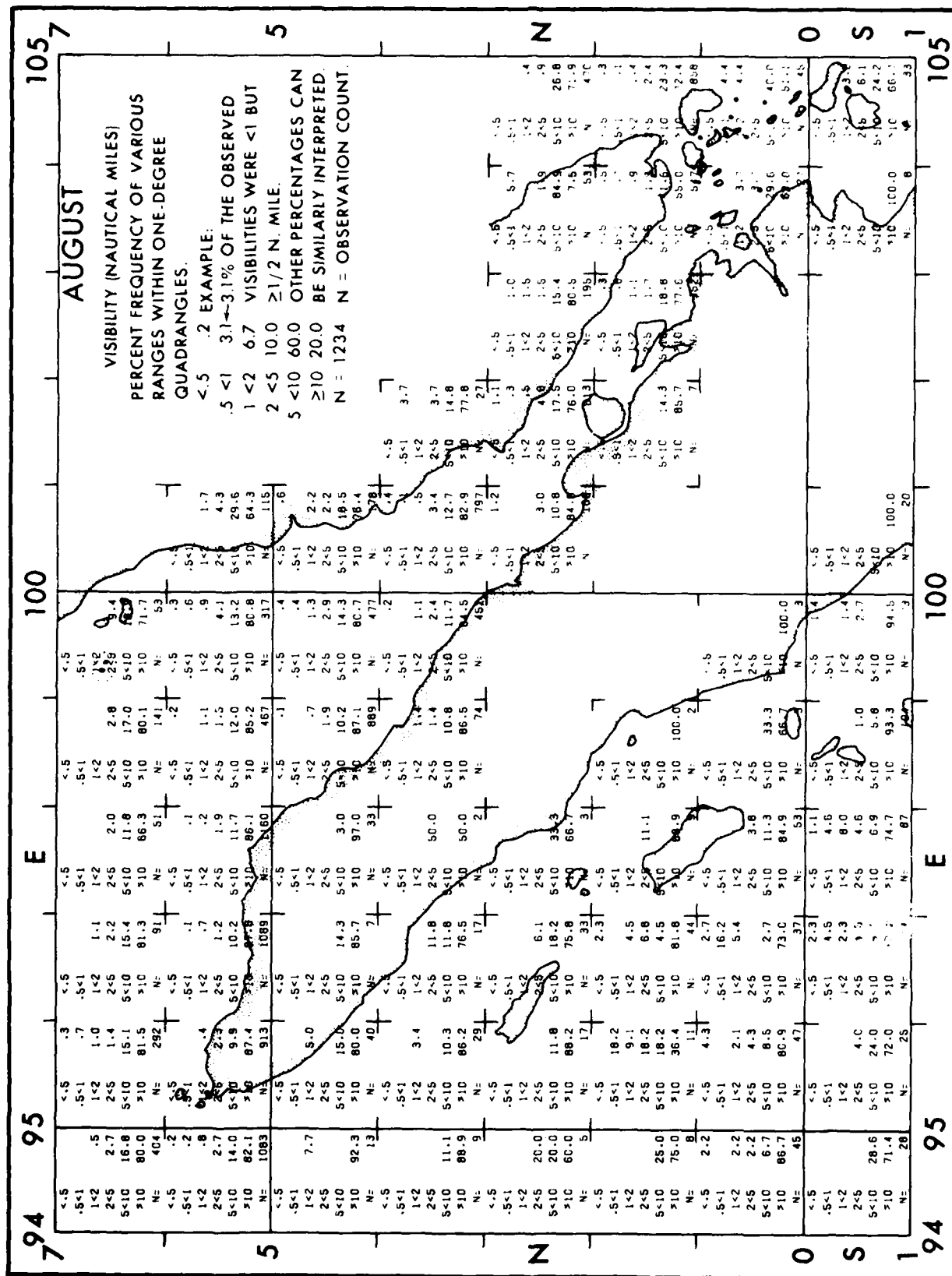
177% of all total cloud amounts were ≤ 2.8
146% of all low cloud amounts were ≤ 2.8

Low cloud amount Percent frequency of observations from each direction and calm that were accompanied by low cloud amounts ≥ 2.8 and ≥ 7.8
Low clouds are clouds with bases < 8000 feet
28% of all SE winds were accompanied by low cloud amounts ≥ 2.8 and 14% by low cloud amounts ≥ 7.8

An asterisk indicates that the percentage is based on 1030 observations of wind direction, total and low cloud amount. 0 replaces bar graph when no low cloud amounts ≥ 2.8 were observed with a wind direction or calm. 0 or bar is omitted when number of observations of total and low cloud amount from a wind direction or calm is less than 10







AUGUST CEILING-VISIBILITY

SOLID LINE Percent frequency of ceiling <1000 feet and/or visibility <5 nautical miles
DASHED LINE Percent frequency of ceiling <8000 feet and/or visibility <10 nautical miles

LOW CLOUD CEILING

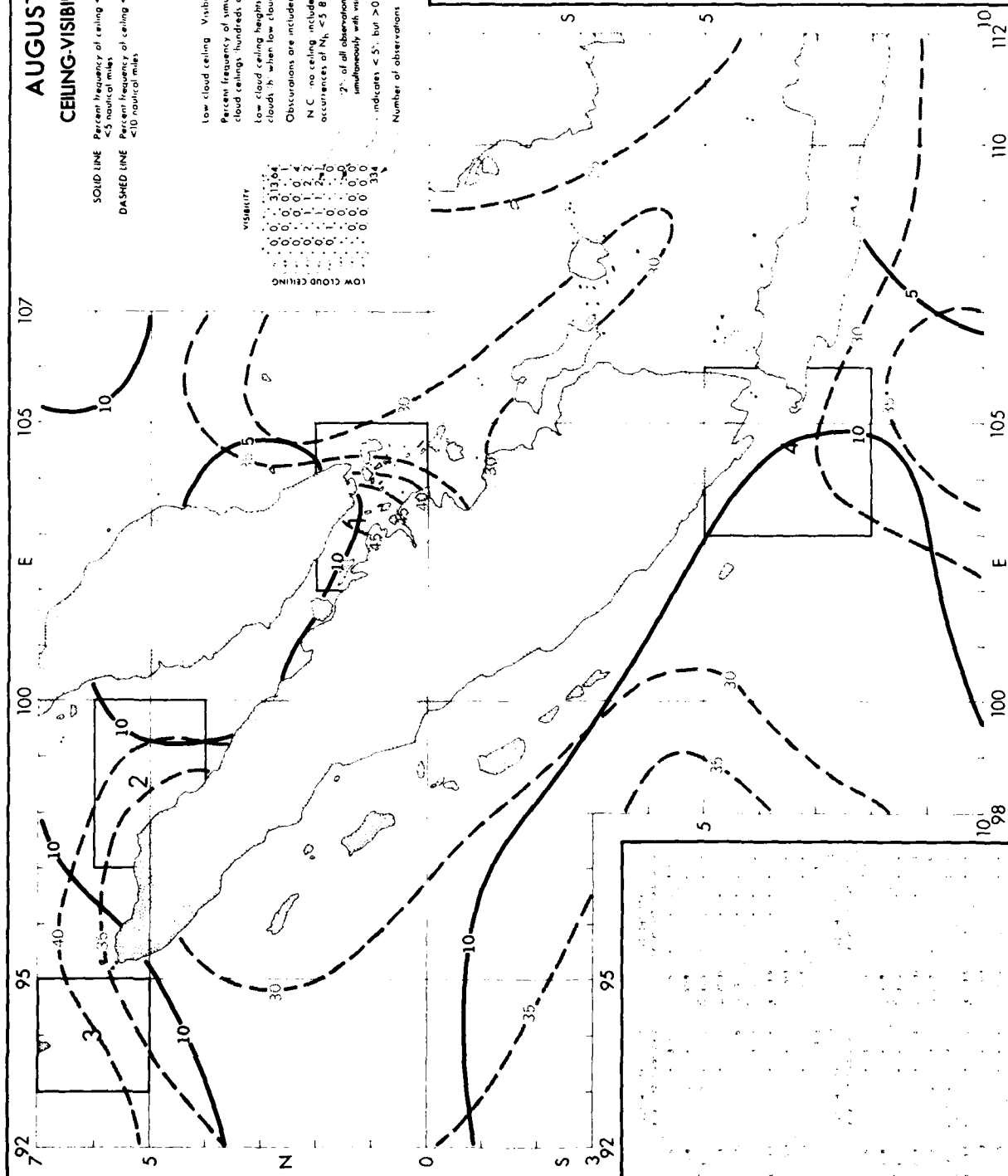
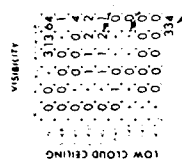
Percent frequency of simultaneous occurrence of specified low cloud ceilings, hundreds of feet and visibilities, nautical miles. Low cloud ceiling heights are estimated from the height of low clouds "h" when low cloud amount N_h is ≥ 5 .

Observations are included under ceiling 0 <15
N.C. no ceiling, includes bases of clouds >300 feet as well as occurrences of N_h <5.8

2% of all observations reported ceiling ≥ 1000 but <2000 feet simultaneously with visibility ≥ 5 but <10 nautical miles

indicates <5% but >0

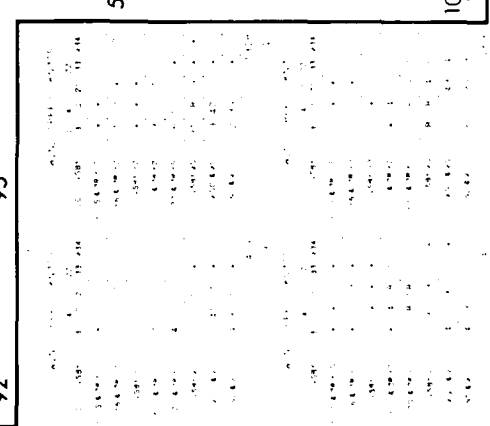
Number of observations



WIND SPEED (knots)

0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22

0-5 knots
6-10 knots
11-15 knots
16-20 knots
21-25 knots
26-30 knots
31-35 knots
36-40 knots
41-45 knots
46-50 knots
51-55 knots
56-60 knots
61-65 knots
66-70 knots
71-75 knots
76-80 knots
81-85 knots
86-90 knots
91-95 knots
96-100 knots
101-105 knots
106-110 knots
111-115 knots
116-120 knots
121-125 knots
126-130 knots
131-135 knots
136-140 knots
141-145 knots
146-150 knots
151-155 knots
156-160 knots
161-165 knots
166-170 knots
171-175 knots
176-180 knots
181-185 knots
186-190 knots
191-195 knots
196-200 knots
201-205 knots
206-210 knots
211-215 knots
216-220 knots
221-225 knots
226-230 knots
231-235 knots
236-240 knots
241-245 knots
246-250 knots
251-255 knots
256-260 knots
261-265 knots
266-270 knots
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276-280 knots
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296-300 knots
301-305 knots
306-310 knots
311-315 knots
316-320 knots
321-325 knots
326-330 knots
331-335 knots
336-340 knots
341-345 knots
346-350 knots
351-355 knots
356-360 knots
361-365 knots
366-370 knots
371-375 knots
376-380 knots
381-385 knots
386-390 knots
391-395 knots
396-400 knots
401-405 knots
406-410 knots
411-415 knots
416-420 knots
421-425 knots
426-430 knots
431-435 knots
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441-445 knots
446-450 knots
451-455 knots
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701-705 knots
706-710 knots
711-715 knots
716-720 knots
721-725 knots
726-730 knots
731-735 knots
736-740 knots
741-745 knots
746-750 knots
751-755 knots
756-760 knots
761-765 knots
766-770 knots
771-775 knots
776-780 knots
781-785 knots
786-790 knots
791-795 knots
796-800 knots
801-805 knots
806-810 knots
811-815 knots
816-820 knots
821-825 knots
826-830 knots
831-835 knots
836-840 knots
841-845 knots
846-850 knots
851-855 knots
856-860 knots
861-865 knots
866-870 knots
871-875 knots
876-880 knots
881-885 knots
886-890 knots
891-895 knots
896-900 knots
901-905 knots
906-910 knots
911-915 knots
916-920 knots
921-925 knots
926-930 knots
931-935 knots
936-940 knots
941-945 knots
946-950 knots
951-955 knots
956-960 knots
961-965 knots
966-970 knots
971-975 knots
976-980 knots
981-985 knots
986-990 knots
991-995 knots
996-1000 knots



AUGUST SCALAR MEAN WIND SPEED

SOLID LINE Mean scalar wind speed (knots)

Direction frequency (top scale): Bars represent percent frequency of winds observed from each direction. Speed frequency (bottom scale): Printed figures represent percent frequency of wind speeds observed from each direction.

14% of all winds were from the N

indicates < 5% but > 0

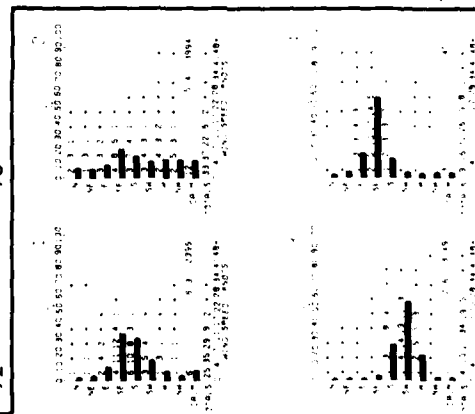
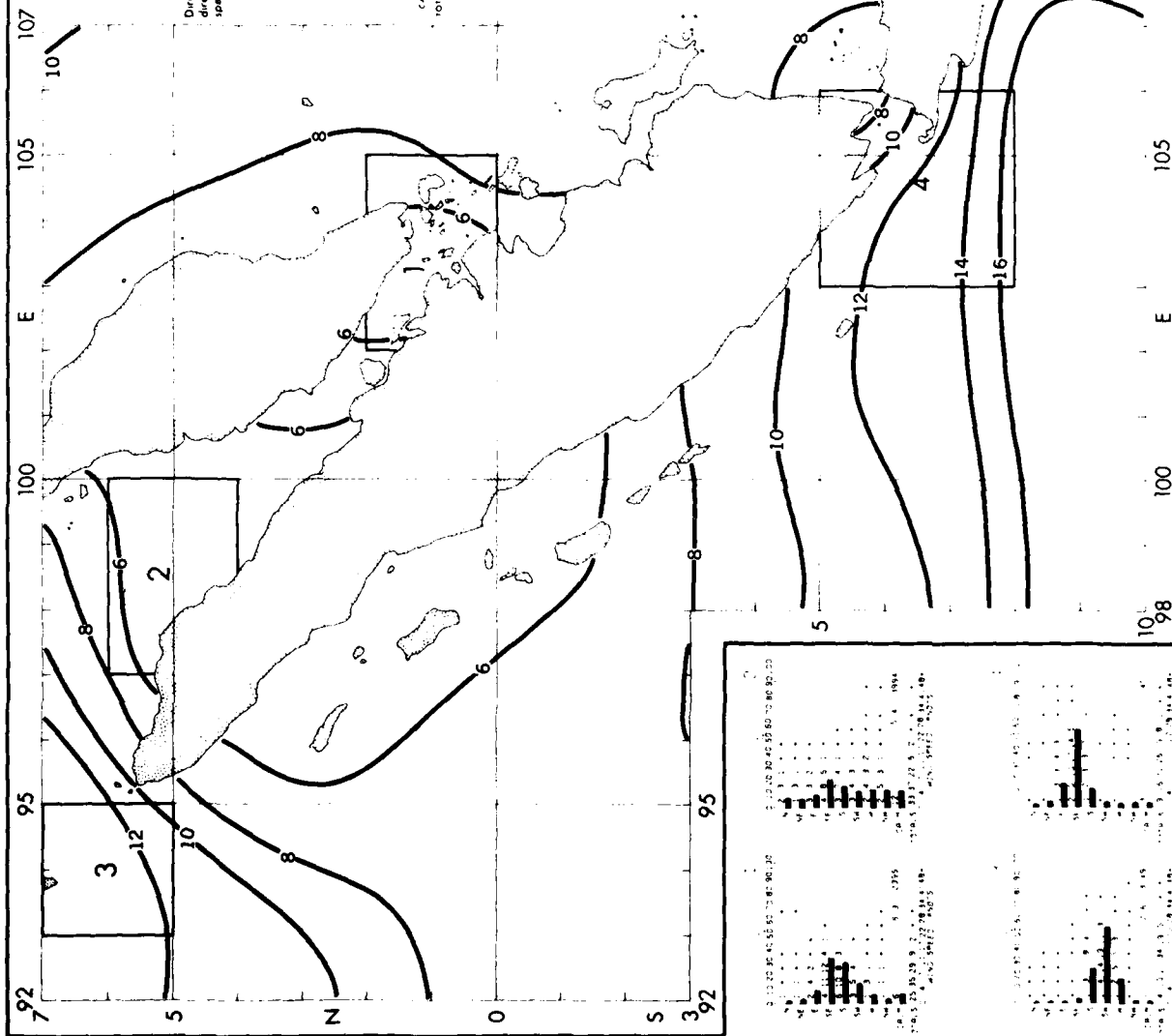
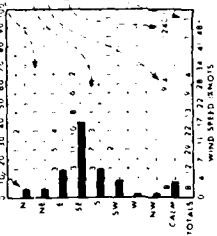
17% of all winds were from the S with a speed 22-27 knots
The scalar mean speed was 9.4 knots

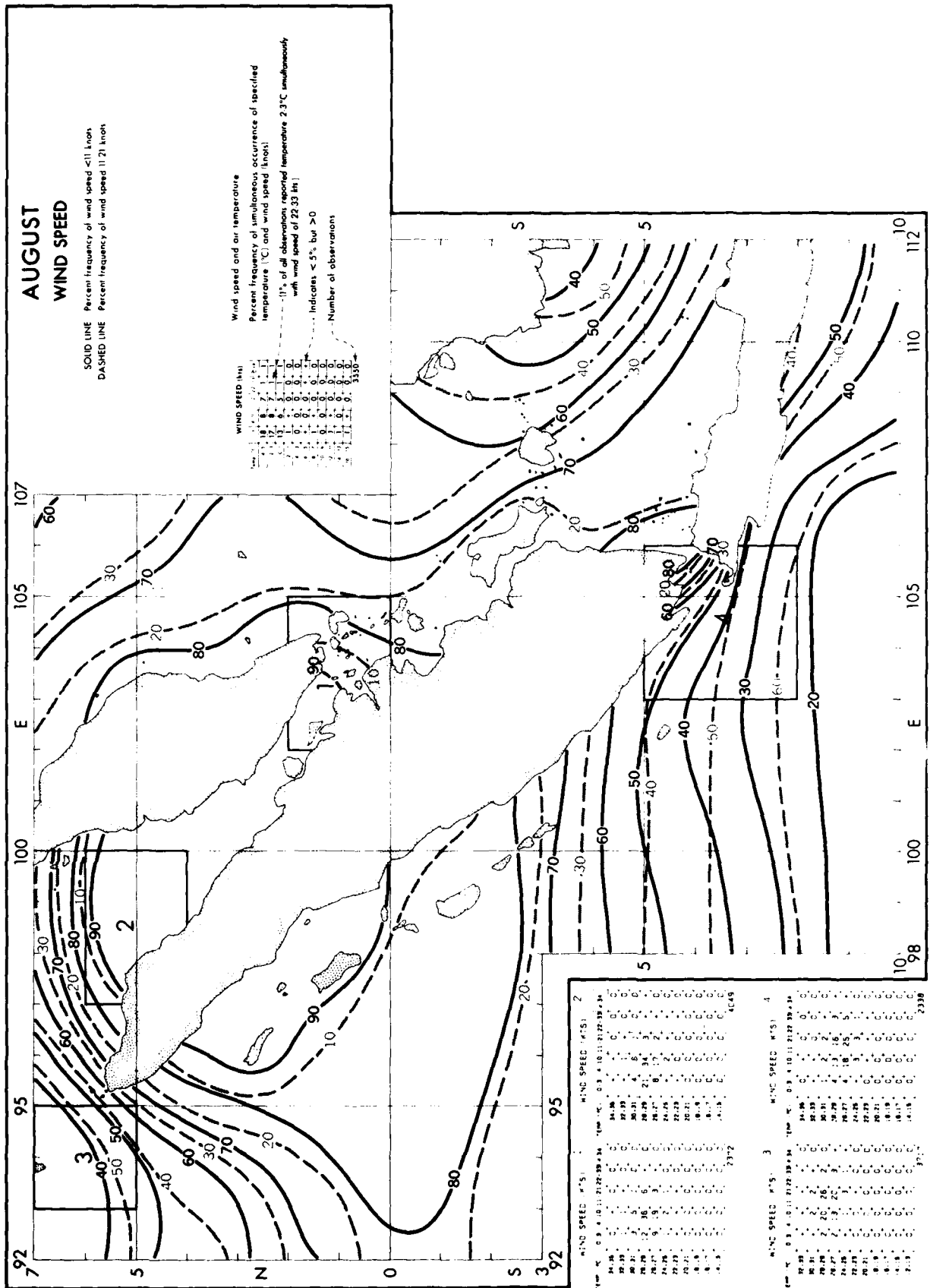
Number of observations

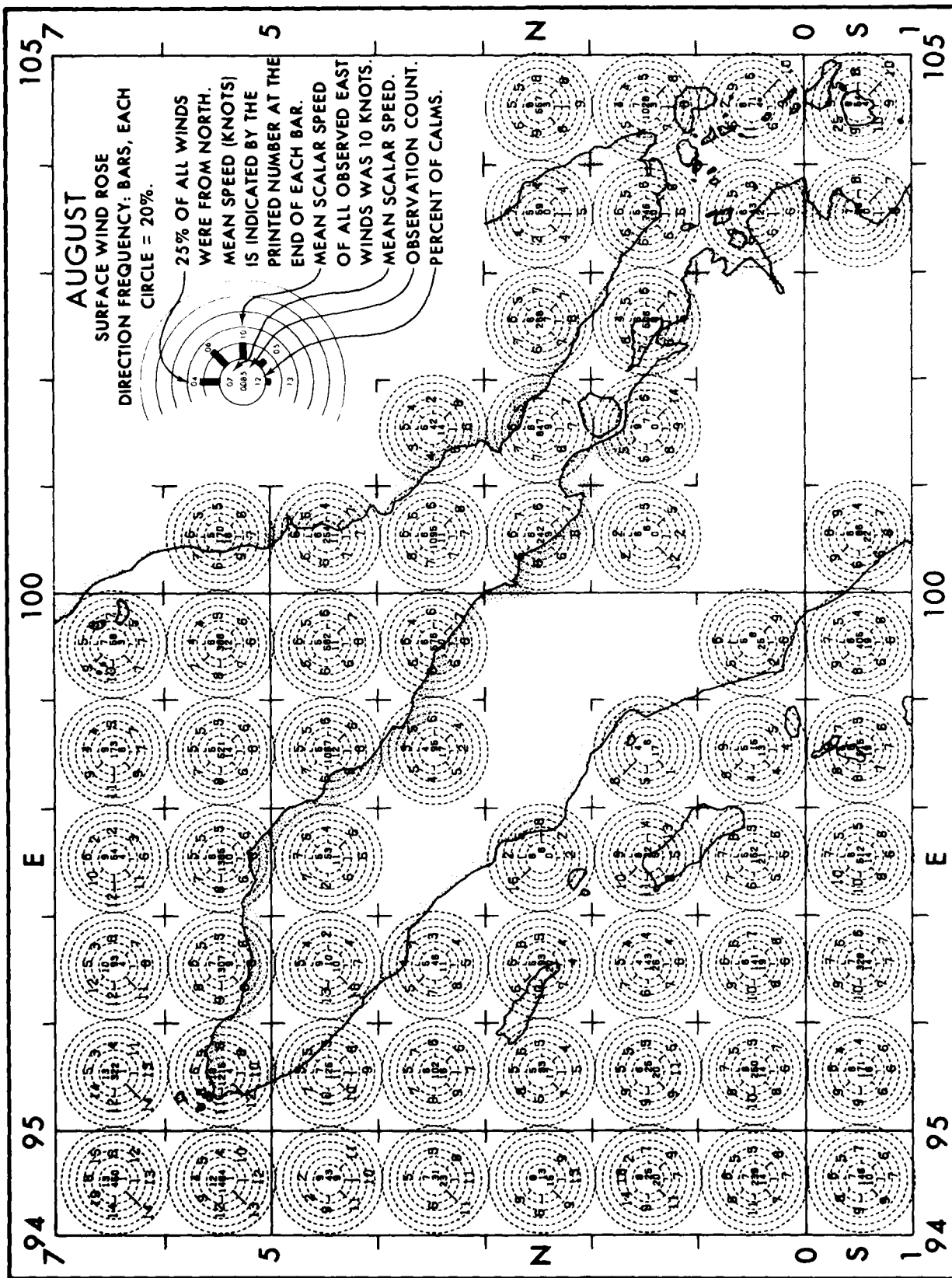
17% of winds from all directions had wind speed ≥ 48 knots

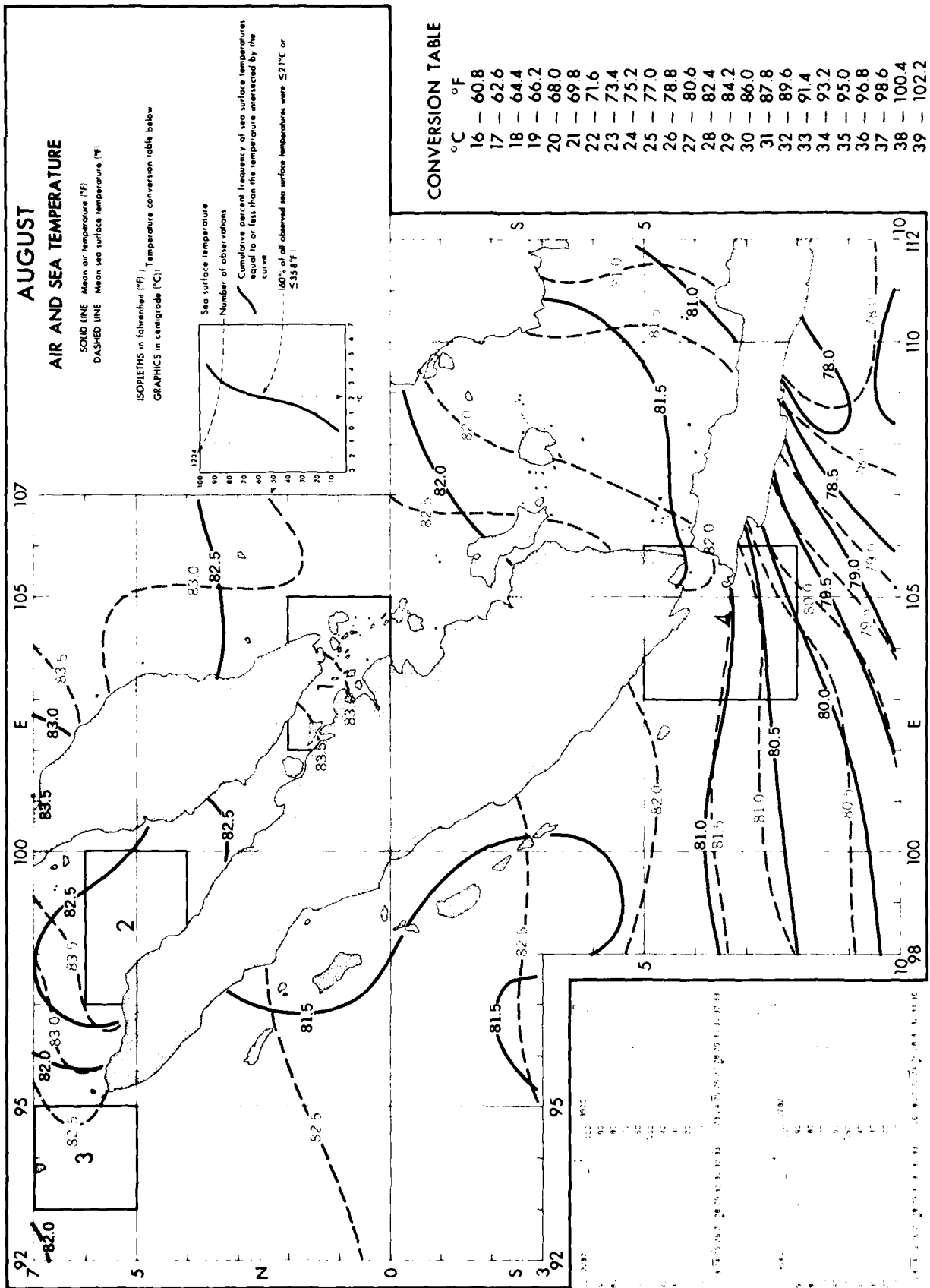
WIND SPEED INTERVAL KNOTS

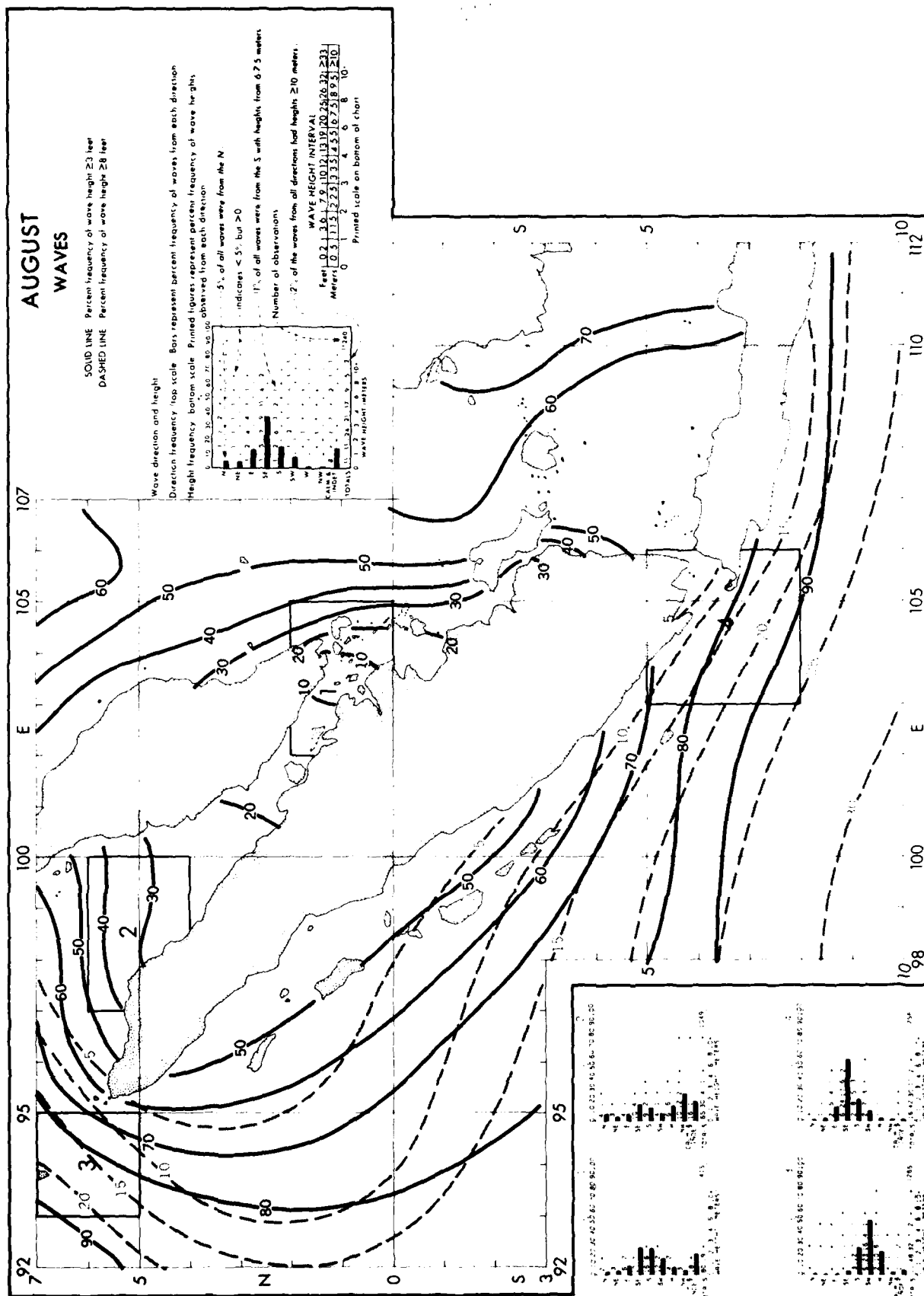
0 4 7 11 17 22 27 28 34 41 48
1.0 3.4 6.7 10.1 16.7 21.2 27.8 33.4 40.4 47.2 48.1
Printed scale on bottom of chart

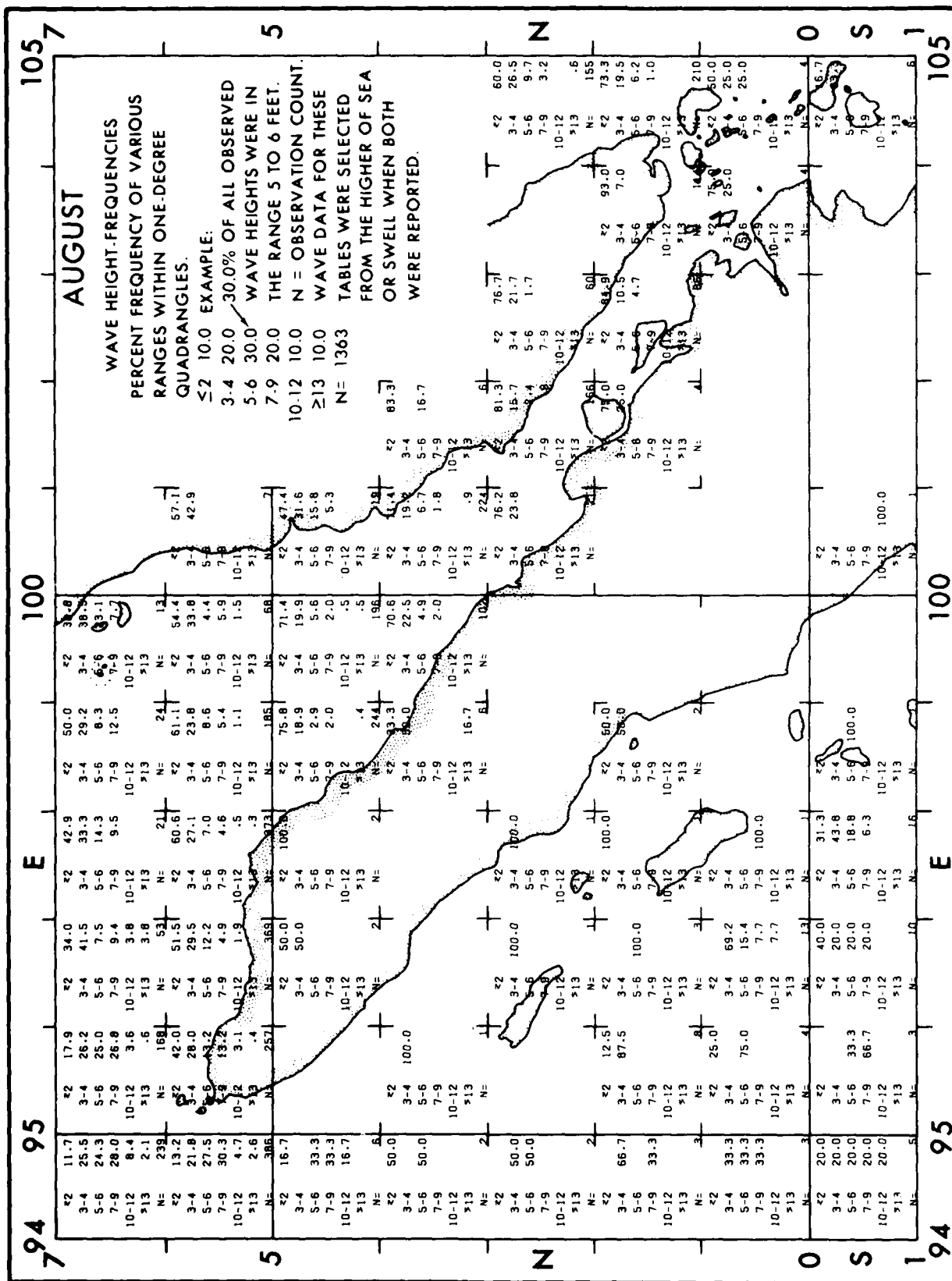


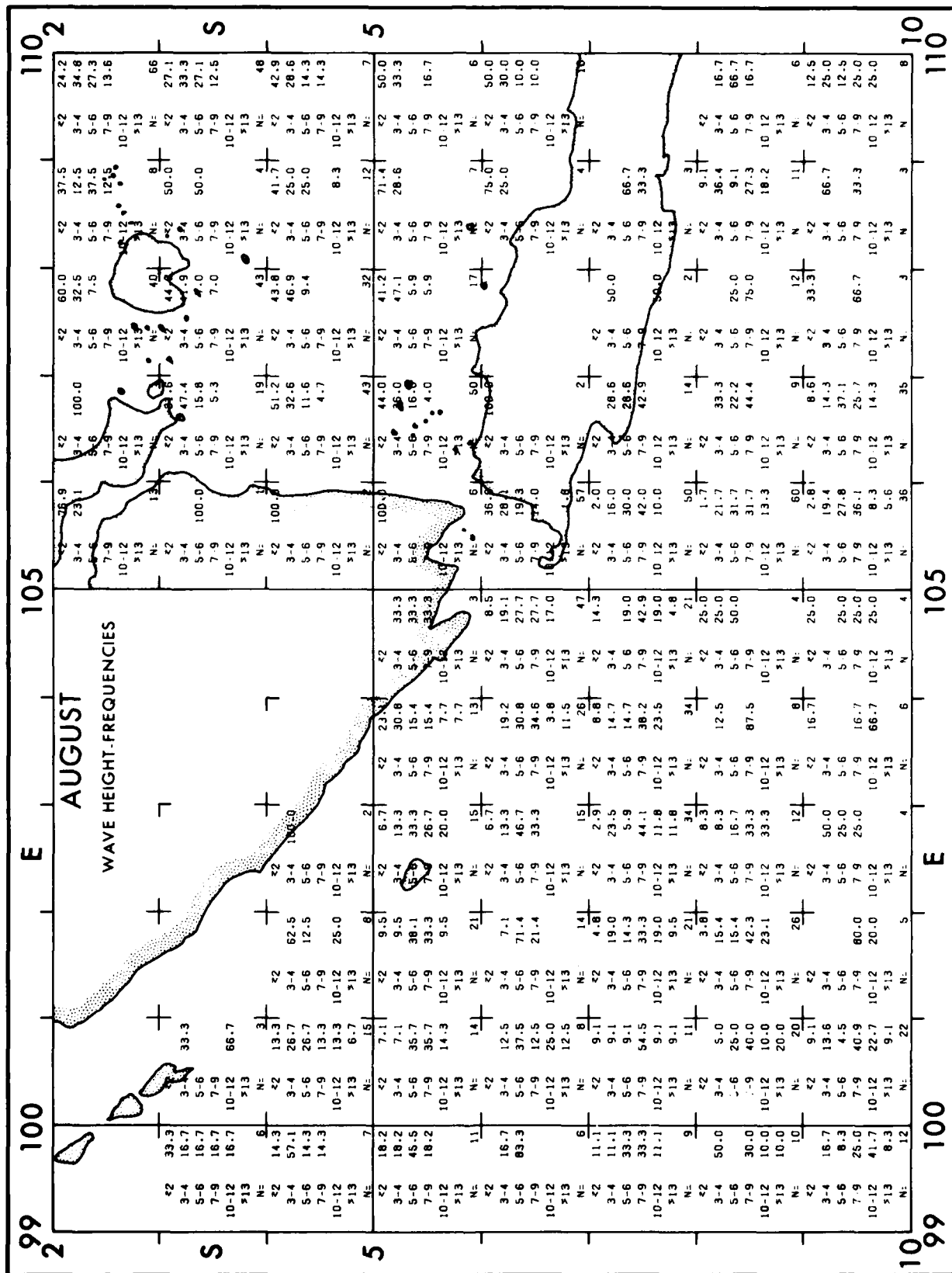












SEPTEMBER CLOUD COVER

SOLID LINE Percent frequency of total cloud amount ≤ 7.8
DASHED LINE Percent frequency of low cloud amount ≤ 7.8

Cumulative percent frequency of indicated cloud amount equal to or less than the amount intersected by the curve
Number of observations

Observations

17% of all total cloud amounts were ≤ 7.8

46% of all low cloud amounts were ≤ 7.8

Low cloud amount Percent frequency of observations from each direction and calm that were accompanied by low cloud amount ≥ 7.8 and ≥ 7.8

Low clouds are clouds with bases < 8000 feet

≥ 5.8 and 14% by low cloud amount ≥ 7.8

An asterisk indicates that the percentage is based on 1030 observations of wind direction, total and low cloud amount. 0 replaces bar graph when no low cloud amount ≥ 7.8 are observed with observations of total and low cloud amount from a wind direction or calm is less than 10

0 N NE E SE S SW W NW C

1234

100 90 80 70 60 50 40 30 20 10 0

100 90 80 70 60 50 40 30 20 10 0

100 90 80 70 60 50 40 30 20 10 0

100 90 80 70 60 50 40 30 20 10 0

100 90 80 70 60 50 40 30 20 10 0

100 90 80 70 60 50 40 30 20 10 0

100 90 80 70 60 50 40 30 20 10 0

100 90 80 70 60 50 40 30 20 10 0

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100 90 80 70 60 50 40 30 20 10 0

100 90 80 70 60 50 40 30 20 10 0

100 90 80 70 60 50 40 30 20 10 0

100 90 80 70 60 50 40 30 20 10 0

SEPTEMBER PRECIPITATION

SOLID LINE Percent frequency of observations reporting precipitation
DASHED LINE Percent frequency of observations reporting thunderstorms and/or lightning

Percent frequency of surface wind observations from each direction and calm that were accompanied by precipitation, subdivided into liquid type including freezing rain and freezing drizzle and snow

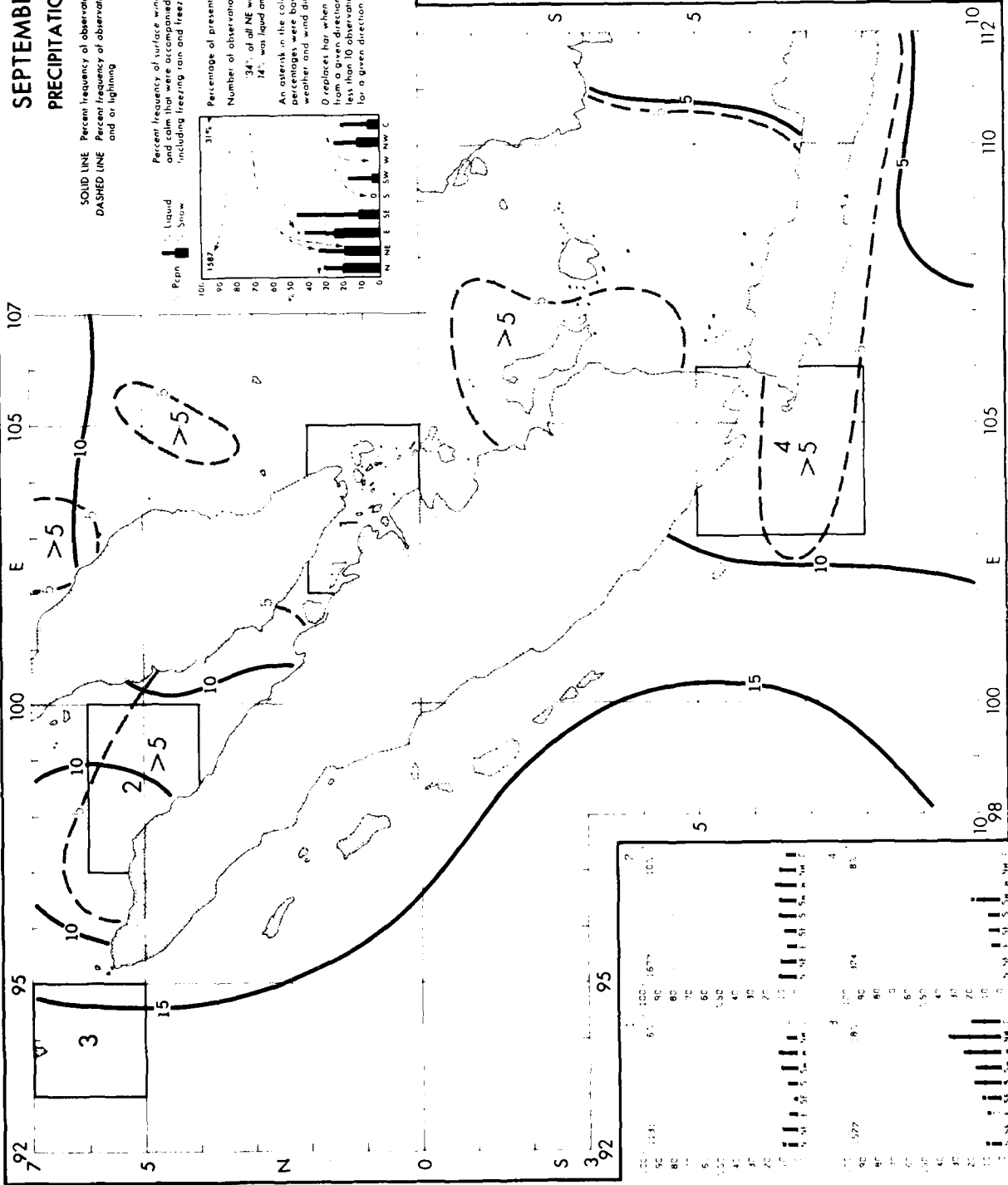
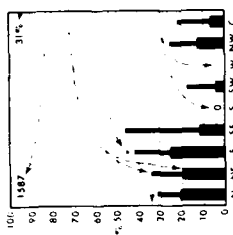
Percent frequency of present weather observations reporting precipitation

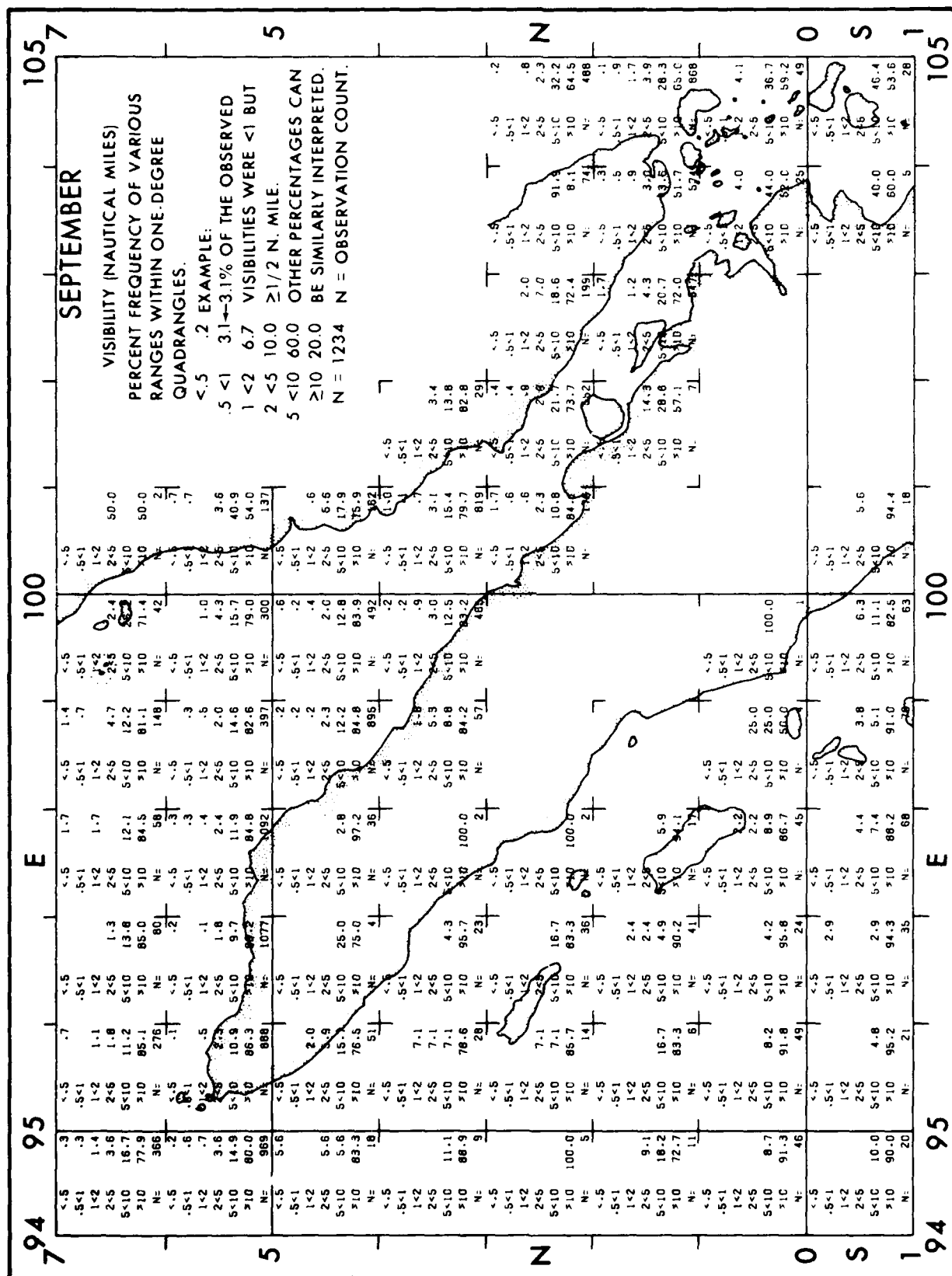
Number of observations

34% of all NE winds were accompanied by precipitation, of which 14% was liquid and 20% was snow

An asterisk in the column for a given direction or calm indicates precipitation was reported on 10 or more observations of present weather and wind direction

0 replaces bar when no precipitation was observed with winds from a given direction or calm. No bar graph is presented if less than 10 observations containing present weather are reported for a given direction or calm



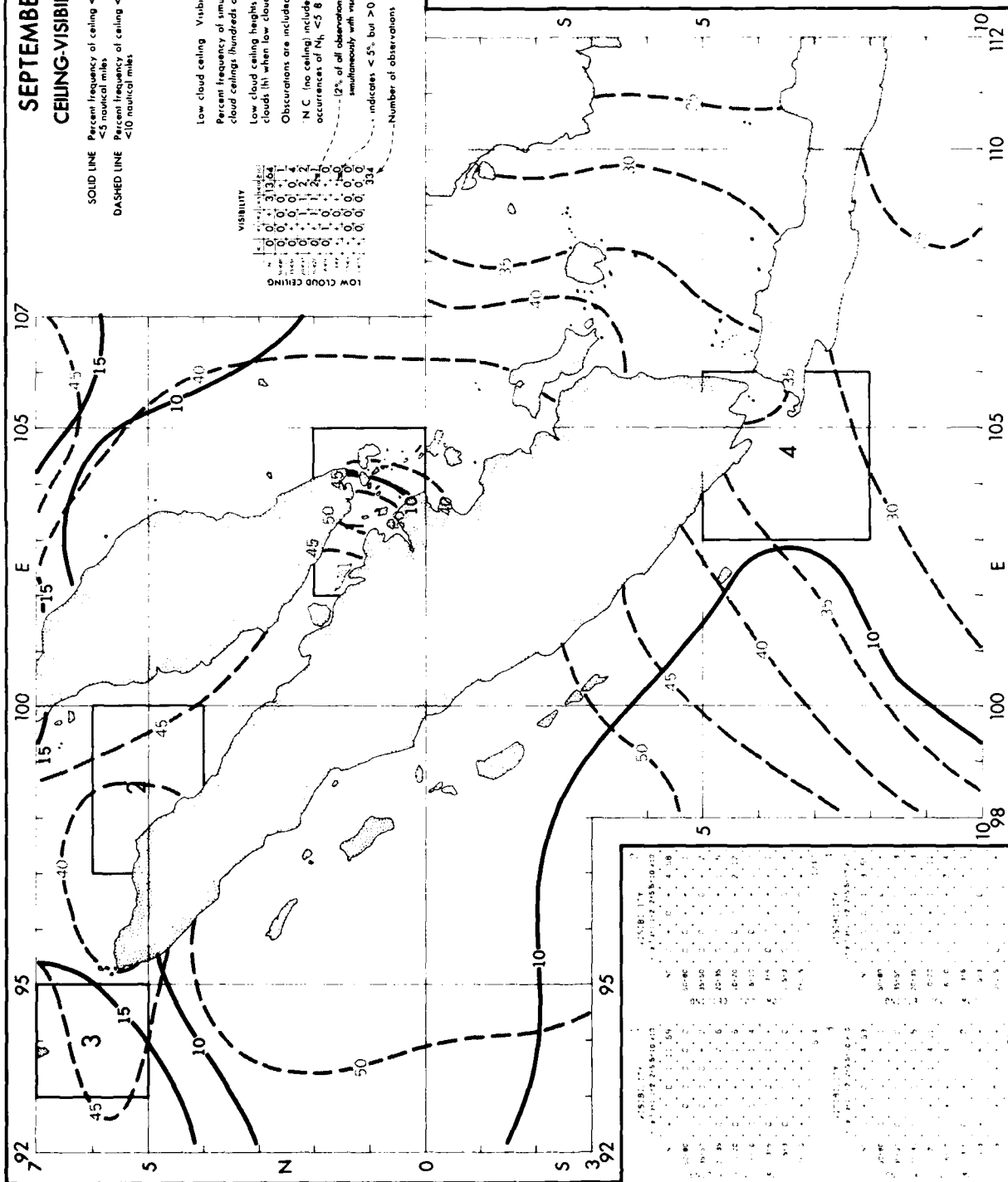


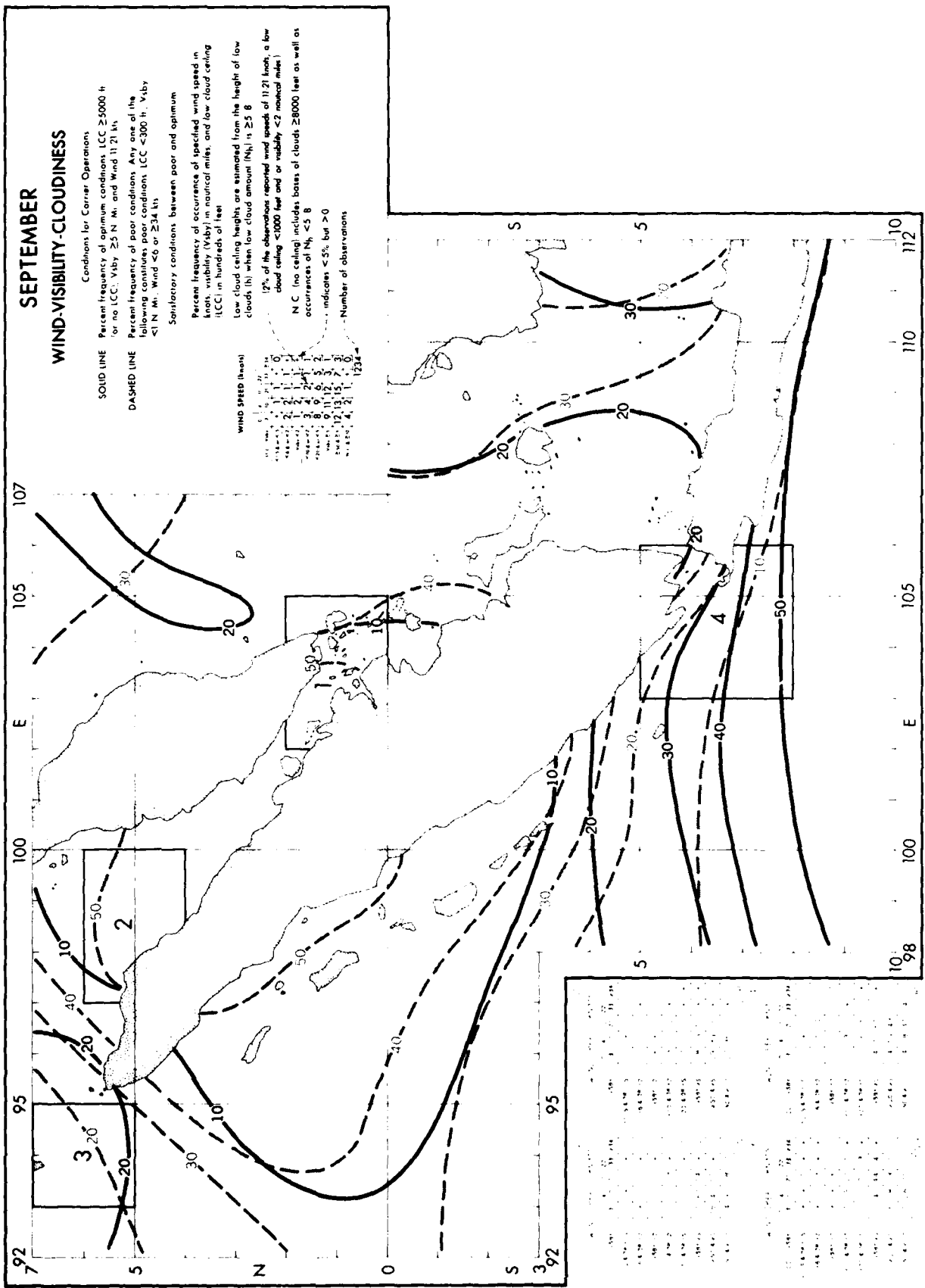
SEPTEMBER CEILING-VISIBILITY

SOLID LINE Percent frequency of ceiling <1000 feet and or visibility <5 nautical miles
DASHED LINE Percent frequency of ceiling <8000 feet and or visibility <10 nautical miles

Low cloud ceiling Visibility
Percent frequency of simultaneous occurrence of specified low cloud ceilings (hundreds of feet) and visibilities (nautical miles). Low cloud ceiling heights are estimated from the height of low clouds (h) when low cloud amount (N_h) is ≥ 8. Observations are included under ceiling 0 < 15. 'N C' (no ceiling) includes bases of cloud ≥ 8000 feet as well as occurrences of N_h < 8. 12% of all observations reported ceiling ≥ 1000 but < 2000 feet simultaneously with visibility ≥ 5 but < 10 nautical miles. indicates < 5%, but > 0. Number of observations

LOW CLOUD CEILING	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000
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SEPTEMBER SCALAR MEAN WIND SPEED

SOLID LINE Mean scalar wind speed (knot)

Direction frequency (loop scale). Bars represent percent frequency of winds observed from each direction. Speed frequency (bottom scale). Printed figures represent percent frequency of wind speeds observed from each direction.

4% of all winds were from the N.

indicates < 5% but > 0.

1% of all winds were from the S with a speed 22-27 knots.

The scalar mean speed was 9.4 knots.

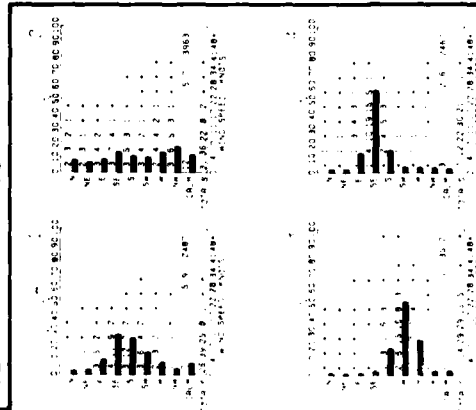
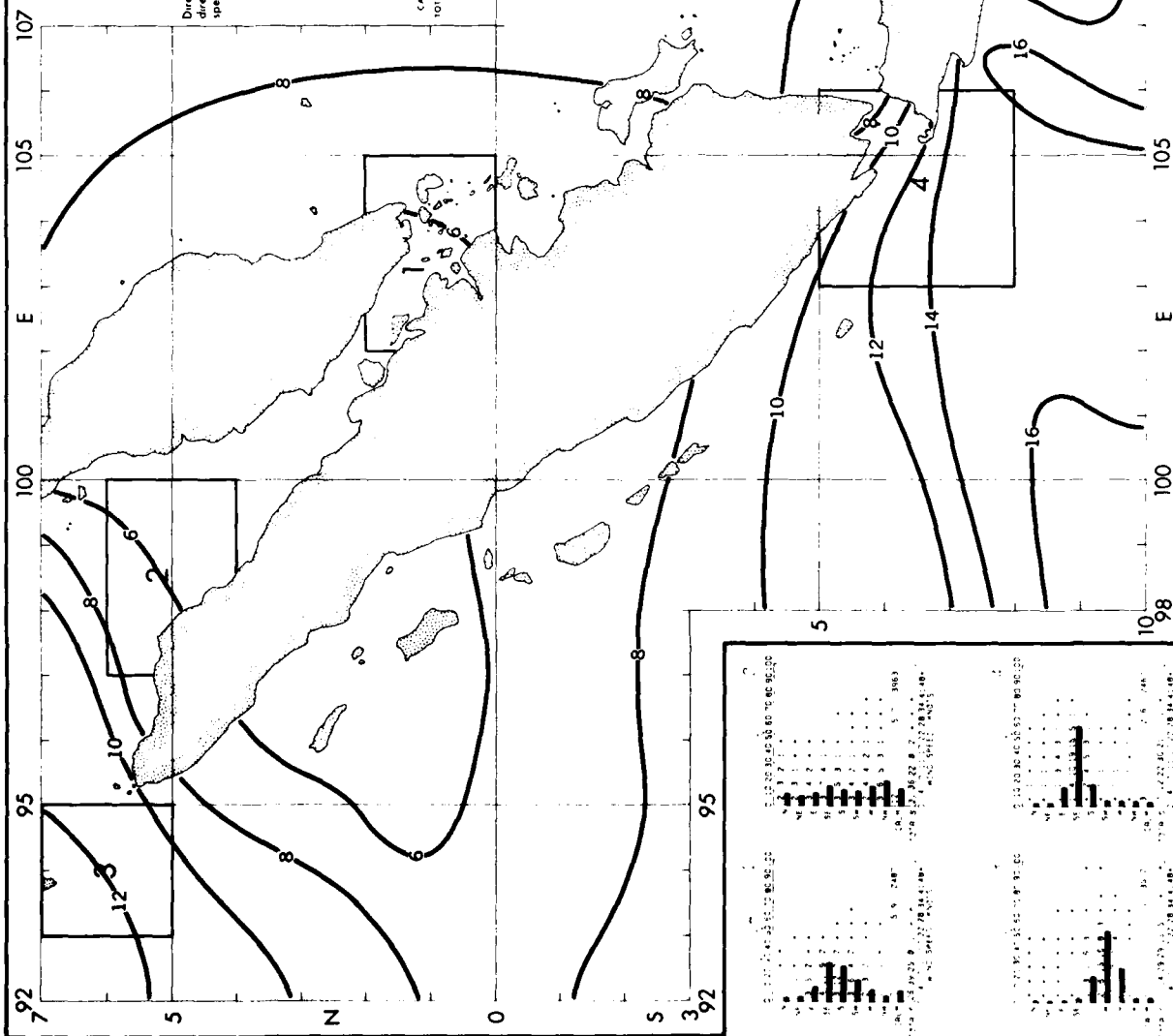
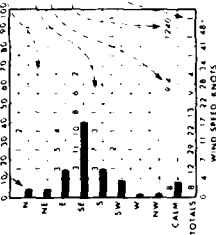
Number of observations

1% of winds from all directions had wind speed ≥ 48 knots.

WIND SPEED INTERVAL (KNOTS)

0 3 4 6 7 10 11 16 17 22 27 28 33 34 40 41 47 48

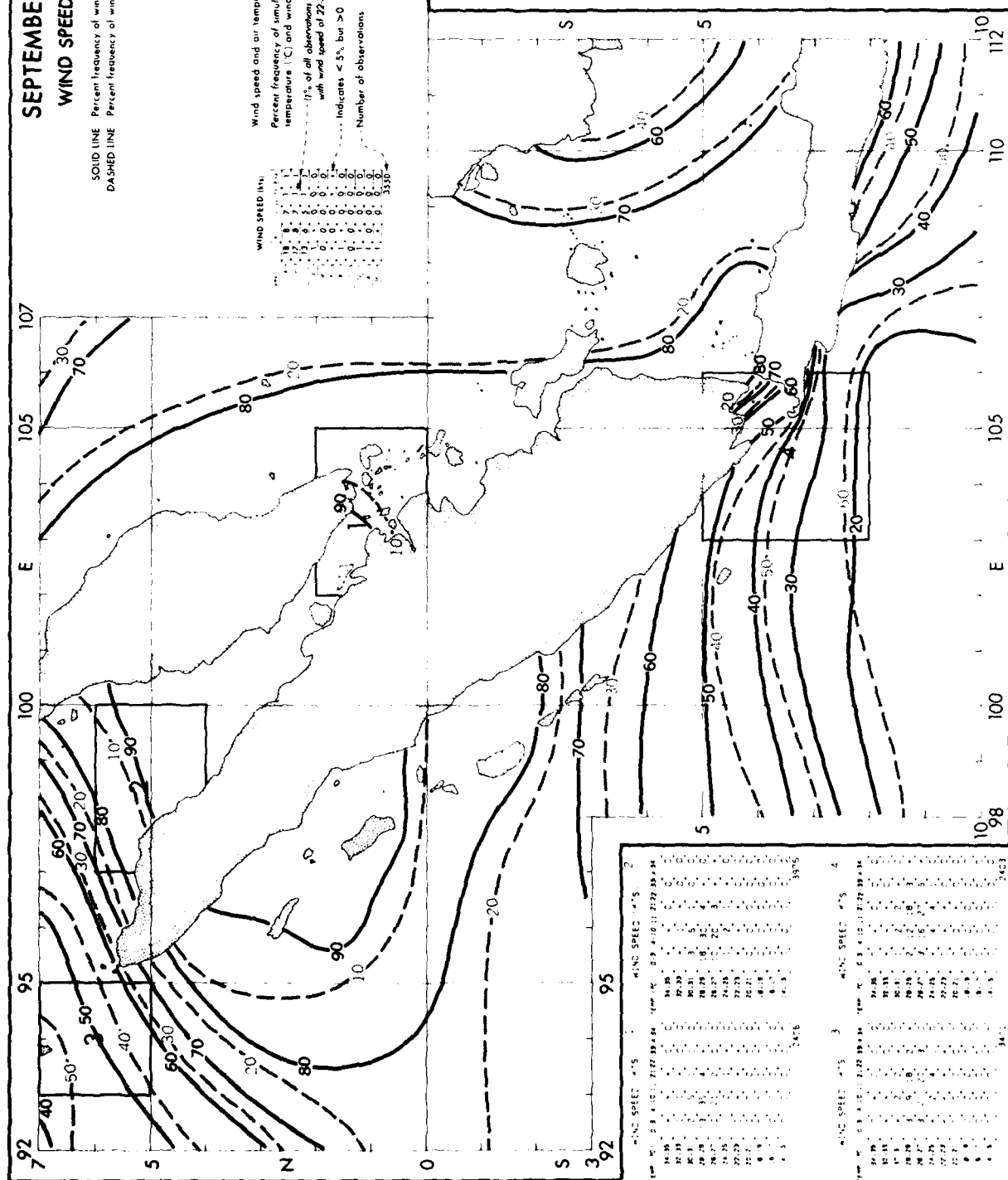
Printed scale on bottom of chart

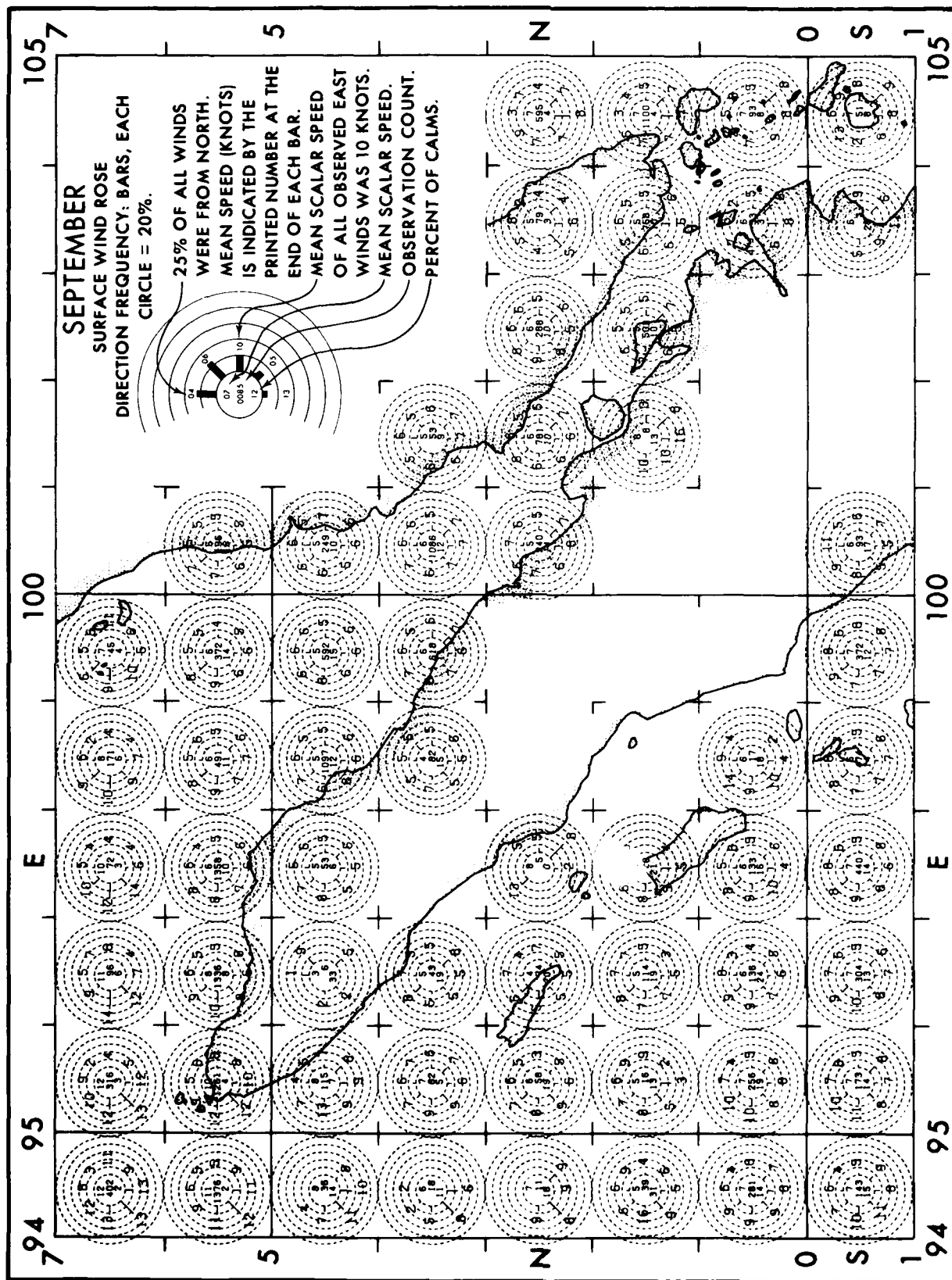


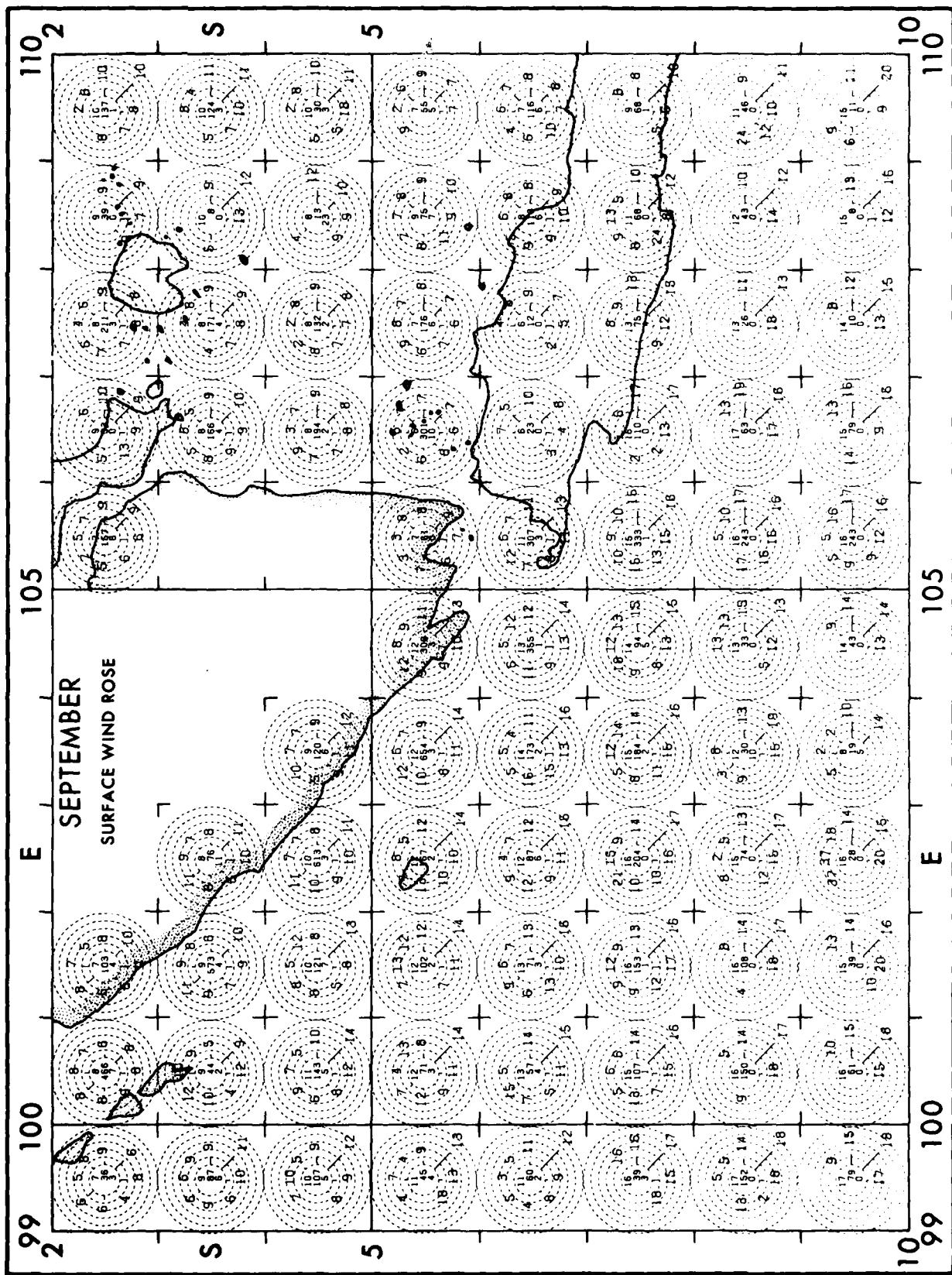
WIND SPEED

SOLID LINE Percent frequency of wind speed ≤ 11 knots
DASHED LINE Percent frequency of wind speed ≥ 21 knots

Wind speed and air temperature
Percent frequency of simultaneous occurrence of specified
temperature (°C) and wind speed (knots)
- - - - - 1% of all observations; reported temperature 23°C simultaneously
with wind speed of 22-33 kt;
• Indicates < 5%, but > 0
Number of observations





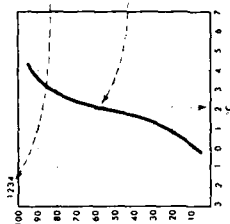


SEPTEMBER

AIR AND SEA TEMPERATURE

SOLID LINE Mean air temperature (°F)
DASHED LINE Mean sea surface temperature (°F)

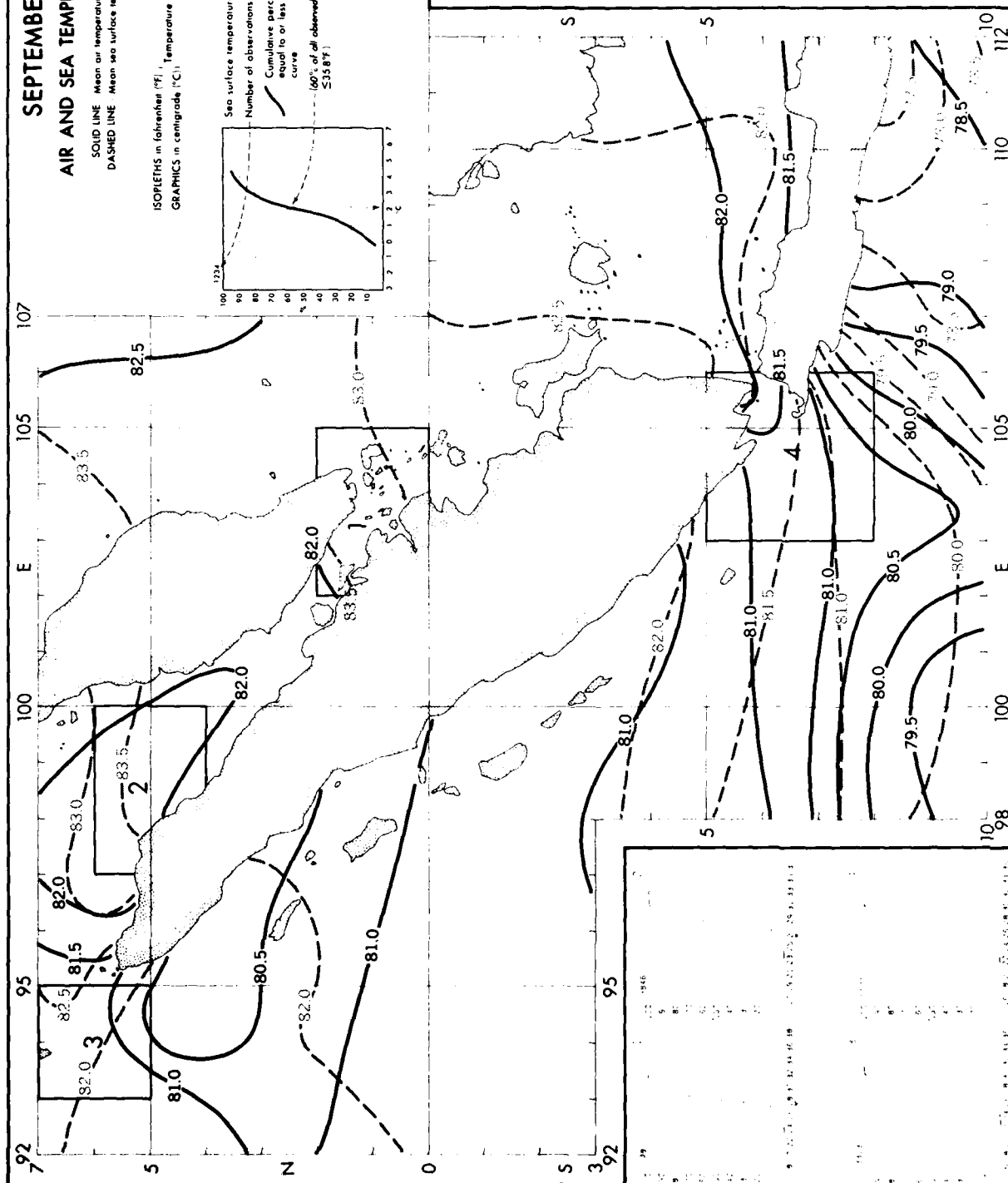
ISOPLETHS in Fahrenheit (°F).
TEMPERATURE CONVERSION TABLE BELOW



Cumulative percent frequency of sea surface temperatures equal to or less than the temperature intersected by the curve
(60% of all observed sea surface temperatures were $\leq 21^{\circ}\text{C}$ or $\leq 69.8^{\circ}\text{F}$)

CONVERSION TABLE

°C	°F
16	60.8
17	62.6
18	64.4
19	66.2
20	68.0
21	69.8
22	71.6
23	73.4
24	75.2
25	77.0
26	78.8
27	80.6
28	82.4
29	84.2
30	86.0
31	87.8
32	89.6
33	91.4
34	93.2
35	95.0
36	96.8
37	98.6
38	100.4
39	102.2



SEPTEMBER WAVES

SOLID LINE Percent frequency of wave height ≥ 3 feet
DASHED LINE Percent frequency of wave height ≥ 8 feet

Wave direction and height

Direction frequency 'top scale': Bars represent percent frequency of waves from each direction
Height frequency 'bottom scale': Printed figures represent percent frequency of wave heights

Number of observations

15% of all waves were from the N

indicates < 5% but ≥ 0

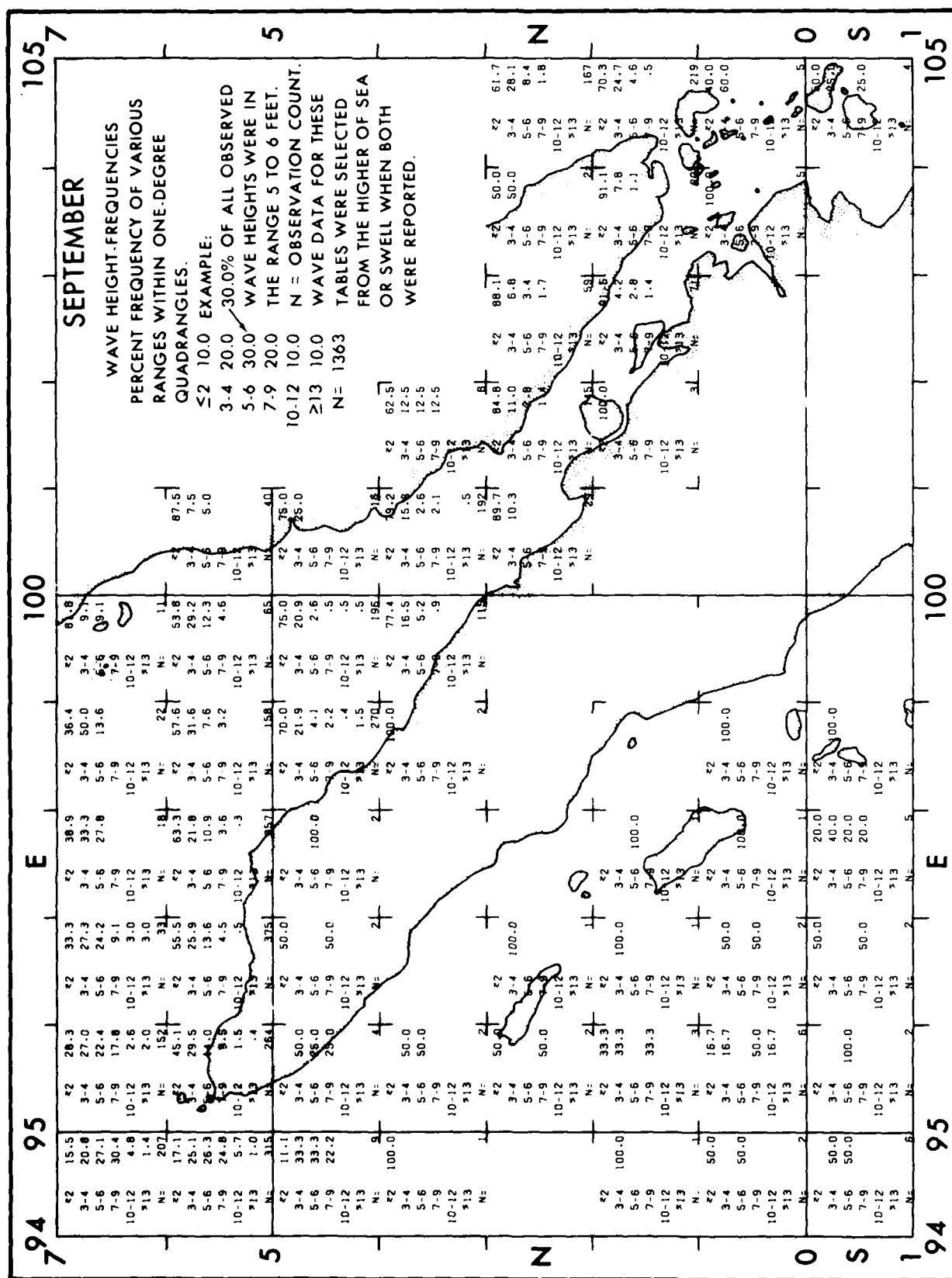
11% of all waves were from the S with heights from 6.75 meters

Number of observations

12% of the waves from all directions had heights ≥ 10 meters

WAVE HEIGHT INTERVAL

Feet 0.2 3.6 7.9 10.1 13.1 19.2 23.3 26.3 30.3 33.3 36.3 40.3 43.3 46.3 50.3 53.3 56.3 60.3 63.3 66.3 69.3 72.3 75.3 78.3 81.3 84.3 87.3 90.3 93.3 96.3 99.3 102.3 105.3 108.3 111.3 114.3 117.3 120.3 123.3 126.3 129.3 132.3 135.3 138.3 141.3 144.3 147.3 150.3 153.3 156.3 159.3 162.3 165.3 168.3 171.3 174.3 177.3 180.3 183.3 186.3 189.3 192.3 195.3 198.3 201.3 204.3 207.3 210.3 213.3 216.3 219.3 222.3 225.3 228.3 231.3 234.3 237.3 240.3 243.3 246.3 249.3 252.3 255.3 258.3 261.3 264.3 267.3 270.3 273.3 276.3 279.3 282.3 285.3 288.3 291.3 294.3 297.3 300.3 303.3 306.3 309.3 312.3 315.3 318.3 321.3 324.3 327.3 330.3 333.3 336.3 339.3 342.3 345.3 348.3 351.3 354.3 357.3 360.3 363.3 366.3 369.3 372.3 375.3 378.3 381.3 384.3 387.3 390.3 393.3 396.3 399.3 402.3 405.3 408.3 411.3 414.3 417.3 420.3 423.3 426.3 429.3 432.3 435.3 438.3 441.3 444.3 447.3 450.3 453.3 456.3 459.3 462.3 465.3 468.3 471.3 474.3 477.3 480.3 483.3 486.3 489.3 492.3 495.3 498.3 501.3 504.3 507.3 510.3 513.3 516.3 519.3 522.3 525.3 528.3 531.3 534.3 537.3 540.3 543.3 546.3 549.3 552.3 555.3 558.3 561.3 564.3 567.3 570.3 573.3 576.3 579.3 582.3 585.3 588.3 591.3 594.3 597.3 600.3 603.3 606.3 609.3 612.3 615.3 618.3 621.3 624.3 627.3 630.3 633.3 636.3 639.3 642.3 645.3 648.3 651.3 654.3 657.3 660.3 663.3 666.3 669.3 672.3 675.3 678.3 681.3 684.3 687.3 690.3 693.3 696.3 699.3 702.3 705.3 708.3 711.3 714.3 717.3 720.3 723.3 726.3 729.3 732.3 735.3 738.3 741.3 744.3 747.3 750.3 753.3 756.3 759.3 762.3 765.3 768.3 771.3 774.3 777.3 780.3 783.3 786.3 789.3 792.3 795.3 798.3 801.3 804.3 807.3 810.3 813.3 816.3 819.3 822.3 825.3 828.3 831.3 834.3 837.3 840.3 843.3 846.3 849.3 852.3 855.3 858.3 861.3 864.3 867.3 870.3 873.3 876.3 879.3 882.3 885.3 888.3 891.3 894.3 897.3 900.3 903.3 906.3 909.3 912.3 915.3 918.3 921.3 924.3 927.3 930.3 933.3 936.3 939.3 942.3 945.3 948.3 951.3 954.3 957.3 960.3 963.3 966.3 969.3 972.3 975.3 978.3 981.3 984.3 987.3 990.3 993.3 996.3 999.3 1002.3 1005.3 1008.3 1011.3 1014.3 1017.3 1020.3 1023.3 1026.3 1029.3 1032.3 1035.3 1038.3 1041.3 1044.3 1047.3 1050.3 1053.3 1056.3 1059.3 1062.3 1065.3 1068.3 1071.3 1074.3 1077.3 1080.3 1083.3 1086.3 1089.3 1092.3 1095.3 1098.3 1101.3 1104.3 1107.3 1110.3 1113.3 1116.3 1119.3 1122.3 1125.3 1128.3 1131.3 1134.3 1137.3 1140.3 1143.3 1146.3 1149.3 1152.3 1155.3 1158.3 1161.3 1164.3 1167.3 1170.3 1173.3 1176.3 1179.3 1182.3 1185.3 1188.3 1191.3 1194.3 1197.3 1200.3 1203.3 1206.3 1209.3 1212.3 1215.3 1218.3 1221.3 1224.3 1227.3 1230.3 1233.3 1236.3 1239.3 1242.3 1245.3 1248.3 1251.3 1254.3 1257.3 1260.3 1263.3 1266.3 1269.3 1272.3 1275.3 1278.3 1281.3 1284.3 1287.3 1290.3 1293.3 1296.3 1299.3 1302.3 1305.3 1308.3 1311.3 1314.3 1317.3 1320.3 1323.3 1326.3 1329.3 1332.3 1335.3 1338.3 1341.3 1344.3 1347.3 1350.3 1353.3 1356.3 1359.3 1362.3 1365.3 1368.3 1371.3 1374.3 1377.3 1380.3 1383.3 1386.3 1389.3 1392.3 1395.3 1398.3 1401.3 1404.3 1407.3 1410.3 1413.3 1416.3 1419.3 1422.3 1425.3 1428.3 1431.3 1434.3 1437.3 1440.3 1443.3 1446.3 1449.3 1452.3 1455.3 1458.3 1461.3 1464.3 1467.3 1470.3 1473.3 1476.3 1479.3 1482.3 1485.3 1488.3 1491.3 1494.3 1497.3 1500.3 1503.3 1506.3 1509.3 1512.3 1515.3 1518.3 1521.3 1524.3 1527.3 1530.3 1533.3 1536.3 1539.3 1542.3 1545.3 1548.3 1551.3 1554.3 1557.3 1560.3 1563.3 1566.3 1569.3 1572.3 1575.3 1578.3 1581.3 1584.3 1587.3 1590.3 1593.3 1596.3 1599.3 1602.3 1605.3 1608.3 1611.3 1614.3 1617.3 1620.3 1623.3 1626.3 1629.3 1632.3 1635.3 1638.3 1641.3 1644.3 1647.3 1650.3 1653.3 1656.3 1659.3 1662.3 1665.3 1668.3 1671.3 1674.3 1677.3 1680.3 1683.3 1686.3 1689.3 1692.3 1695.3 1698.3 1701.3 1704.3 1707.3 1710.3 1713.3 1716.3 1719.3 1722.3 1725.3 1728.3 1731.3 1734.3 1737.3 1740.3 1743.3 1746.3 1749.3 1752.3 1755.3 1758.3 1761.3 1764.3 1767.3 1770.3 1773.3 1776.3 1779.3 1782.3 1785.3 1788.3 1791.3 1794.3 1797.3 1800.3 1803.3 1806.3 1809.3 1812.3 1815.3 1818.3 1821.3 1824.3 1827.3 1830.3 1833.3 1836.3 1839.3 1842.3 1845.3 1848.3 1851.3 1854.3 1857.3 1860.3 1863.3 1866.3 1869.3 1872.3 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2304.3 2307.3 2310.3 2313.3 2316.3 2319.3 2322.3 2325.3 2328.3 2331.3 2334.3 2337.3 2340.3 2343.3 2346.3 2349.3 2352.3 2355.3 2358.3 2361.3 2364.3 2367.3 2370.3 2373.3 2376.3 2379.3 2382.3 2385.3 2388.3 2391.3 2394.3 2397.3 2400.3 2403.3 2406.3 2409.3 2412.3 2415.3 2418.3 2421.3 2424.3 2427.3 2430.3 2433.3 2436.3 2439.3 2442.3 2445.3 2448.3 2451.3 2454.3 2457.3 2460.3 2463.3 2466.3 2469.3 2472.3 2475.3 2478.3 2481.3 2484.3 2487.3 2490.3 2493.3 2496.3 2499.3 2502.3 2505.3 2508.3 2511.3 2514.3 2517.3 2520.3 2523.3 2526.3 2529.3 2532.3 2535.3 2538.3 2541.3 2544.3 2547.3 2550.3 2553.3 2556.3 2559.3 2562.3 2565.3 2568.3 2571.3 2574.3 2577.3 2580.3 2583.3 2586.3 2589.3 2592.3 2595.3 2598.3 2601.3 2604.3 2607.3 2610.3 2613.3 2616.3 2619.3 2622.3 2625.3 2628.3 2631.3 2634.3 2637.3 2640.3 2643.3 2646.3 2649.3 2652.3 2655.3 2658.3 2661.3 2664.3 2667.3 2670.3 2673.3 2676.3 2679.3 2682.3 2685.3 2688.3 2691.3 2694.3 2697.3 2700.3 2703.3 2706.3 2709.3 2712.3 2715.3 2718.3 2721.3 2724.3 2727.3 2730.3 2733.3 2736.3 2739.3 2742.3 2745.3 2748.3 2751.3 2754.3 2757.3 2760.3 2763.3 2766.3 2769.3 2772.3 2775.3 2778.3 2781.3 2784.3 2787.3 2790.3 2793.3 2796.3 2799.3 2802.3 2805.3 2808.3 2811.3 2814.3 2817.3 2820.3 2823.3 2826.3 2829.3 2832.3 2835.3 2838.3 2841.3 2844.3 2847.3 2850.3 2853.3 2856.3 2859.3 2862.3 2865.3 2868.3 2871.3 2874.3 2877.3 2880.3 2883.3 2886.3 2889.3 2892.3 2895.3 2898.3 2901.3 2904.3 2907.3 2910.3 2913.3 2916.3 2919.3 2922.3 2925.3 2928.3 2931.3 2934.3 2937.3 2940.3 2943.3 2946.3 2949.3 2952.3 2955.3 2958.3 2961.3 2964.3 2967.3 2970.3 2973.3 2976.3 2979.3 2982.3 2985.3 2988.3 2991.3 2994.3 2997.3 3000.3 3003.3 3006.3 3009.3 3012.3 3015.3 3018.3 3021.3 3024.3 3027.3 3030.3 3033.3 3036.3 3039.3 3042.3 3045.3 3048.3 3051.3 3054.3 3057.3 3060.3 3063.3 3066.3 3069.3 3072.3 3075.3 3078.3 3081.3 3084.3 3087.3 3090.3 3093.3 3096.3 3099.3 3102.3 3105.3 3108.3 3111.3 3114.3 3117.3 3120.3 3123.3 3126.3 3129.3 3132.3 3135.3 3138.3 3141.3 3144.3 3147.3 3150.3 3153.3 3156.3 3159.3 3162.3 3165.3 3168.3 3171.3 3174.3 3177.3 3180.3 3183.3 3186.3 3189.3 3192.3 3195.3 3198.3 3201.3 3204.3 3207.3 3210.3 3213.3 3216.3 3219.3 3222.3 3225.3 3228.3 3231.3 3234.3 3237.3 3240.3 3243.3 3246.3 3249.3 3252.3 3255.3 3258.3 3261.3 3264.3 3267.3 3270.3 3273.3 3276.3 3279.3 3282.3 3285.3 3288.3 3291.3 3294.3 3297.3 3300.3 3303.3 3306.3 3309.3 3312.3 3315.3 3318.3 3321.3 3324.3 3327.3 3330.3 3333.3 3336.3 3339.3 3342.3 3345.3 3348.3 3351.3 3354.3 3357.3 3360.3 3363.3 3366.3 3369.3 3372.3 3375.3 3378.3 3381.3 3384.3 3387.3 3390.3 3393.3 3396.3 3399.3 3402.3 3405.3 3408.3 3411.3 3414.3 3417.3 3420.3 3423.3 3426.3 3429.3 3432.3 3435.3 3438.3 3441.3 3444.3 3447.3 3450.3 3453.3 3456.3 3459.3 3462.3 3465.3 3468.3 3471.3 3474.3 3477.3 3480.3 3483.3 3486.3 3489.3 3492.3 3495.3 3498.3 3501.3 3504.3 3507.3 3510.3 3513.3 3516.3 3519.3 3522.3 3525.3 3528.3 3531.3 3534.3 3537.3 3540.3 3543.3 3546.3 3549.3 3552.3 3555.3 3558.3 3561.3 3564.3 3567.3 3570.3 3573.3 3576.3 3579.3 3582.3 3585.3 3588.3 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4020.3 4023.3 4026.3 4029.3 4032.3 4035.3 4038.3 4041.3 4044.3 4047.3 4050.3 4053.3 4056.3 4059.3 4062.3 4065.3 4068.3 4071.3 4074.3 4077.3 4080.3 4083.3 4086.3 4089.3 4092.3 4095.3 4098.3 4101.3 4104.3 4107.3 4110.3 4113.3 4116.3 4119.3 4122.3 4125.3 4128.3 4131.3 4134.3 4137.3 4140.3 4143.3 4146.3 4149.3 4152.3 4155.3 4158.3 4161.3 4164.3 4167.3 4170.3 4173.3 4176.3 4179.3 4182.3 4185.3 4188.3 4191.3 4194.3 4197.3 4200.3 4203.3 4206.3 4209.3 4212.3 4215.3 4218.3 4221.3 4224.3 4227.3 4230.3 4233.3 4236.3 4239.3 4242.3 4245.3 4248.3 4251.3 4254.3 4257.3 4260.3 4263.3 4266.3 4269.3 4272.3 4275.3 4278.3 4281.3 4284.3 4287.3 4290.3 4293.3 4296.3 4299.3 4302.3 4305.3 4308.3 4311.3 4314.3 4317.3 4320.3 4323.3 4326.3 4329.3 4332.3 4335.3 4338.3 4341.3 4344.3 4347.3 4350.3 4353.3 4356.3 4359.3 4362.3 4365.3 4368.3 4371.3 4374.3 4377.3 4380.3 4383.3 4386.3 4389.3 4392.3 4395.3 4398.3 4401.3 4404.3 4407.3 4410.3 4413.3 4416.3 4419.3 4422.3 4425.3 4428.3 4431.3 4434.3 4437.3 4440.3 4443.3 4446.3 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4878.3 4881.3 4884.3 4887.3 4890.3 4893.3 4896.3 4899.3 4902.3 4905.3 4908.3 4911.3 4914.3 4917.3 4920.3 4923.3 4926.3 4929.3 4932.3 4935.3 4938.3 4941.3 4944.3 4947.3 4950.3 4953.3 4956.3 4959.3 4962.3 4965.3 4968.3 4971.3 4974.3 4977.3 4980.3 4983.3 4986.3 4989.3 4992.3 4995.3 4998.3 5001.3 5004.3 5007.3 5010.3 5013.3 5016.3 5019.3 5022.3 5025.3 5028.3 5031.3 5034.3 5037.3 5040.3 5043.3 5046.3 5049.3 5052.3 5055.3 5058.3 5061.3 5064.3 5067.3 5070.3 5073.3 5076.3 5079.3 5082.3 5085.3 5088.3 5091.3 5094.3 5097.3 5100.3 5103.3 5106.3 5109.3 5112.3 5115.3 5118.3 5121.3 5124.3 5127.3 5130.3 5133.3 5136.3 5139.3 5142.3 5145.3 5148.3 5151.3 5154.3 5157.3 5160.3 5163.3 5166.3 5169.3 5172.3 5175.3 5178.3 5181.3 5184.3 5187.3 5190.3 5193.3 5196.3 5199.3 5202.3 5205.3 5208.3 5211.3 5214.3 5217.3 5220.3 5223.



OCTOBER CLOUD COVER

SOLID LINE Percent frequency of total cloud amount ≥ 8
DASHED LINE Percent frequency of low cloud amount ≥ 5.8

Cumulative percent frequency of indicated cloud amount equal to or less than the amount indicated by the curve

Number of observations

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Cloud Amount in Eighths

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Cloud Amount in Eighths

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Cloud Amount in Eighths

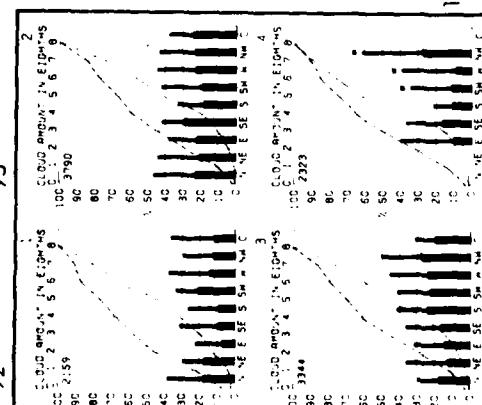
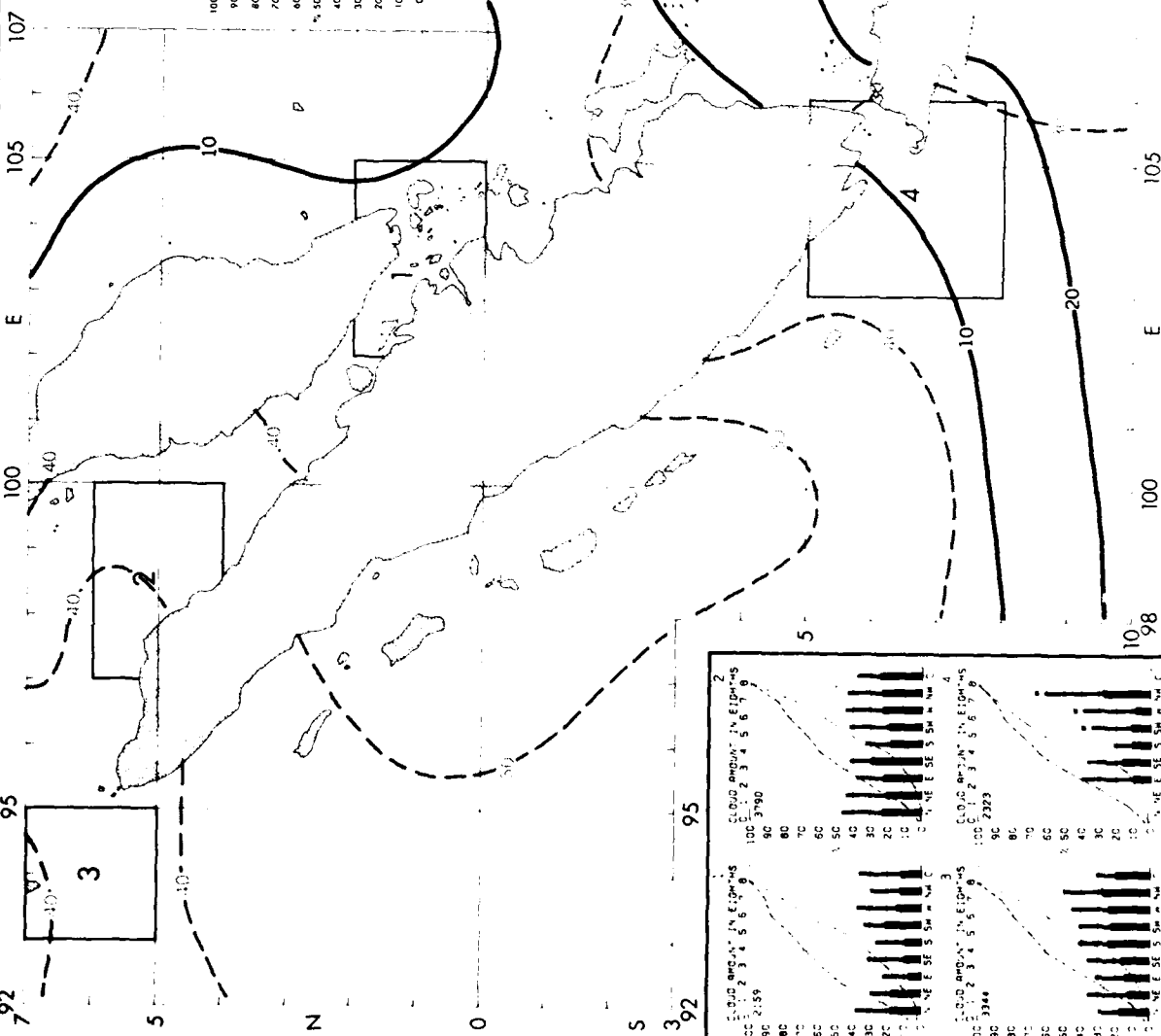
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Cloud Amount in Eighths

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PRECIPITATION

SOLID LINE Percent frequency of observations reporting precipitation
DASHED LINE Percent frequency of observations reporting thunderstorms and or lightning

Percent frequency of surface wind observations from each direction and calm that were accompanied by precipitation subdivided into liquid type including freezing rain and freezing drizzle and snow.

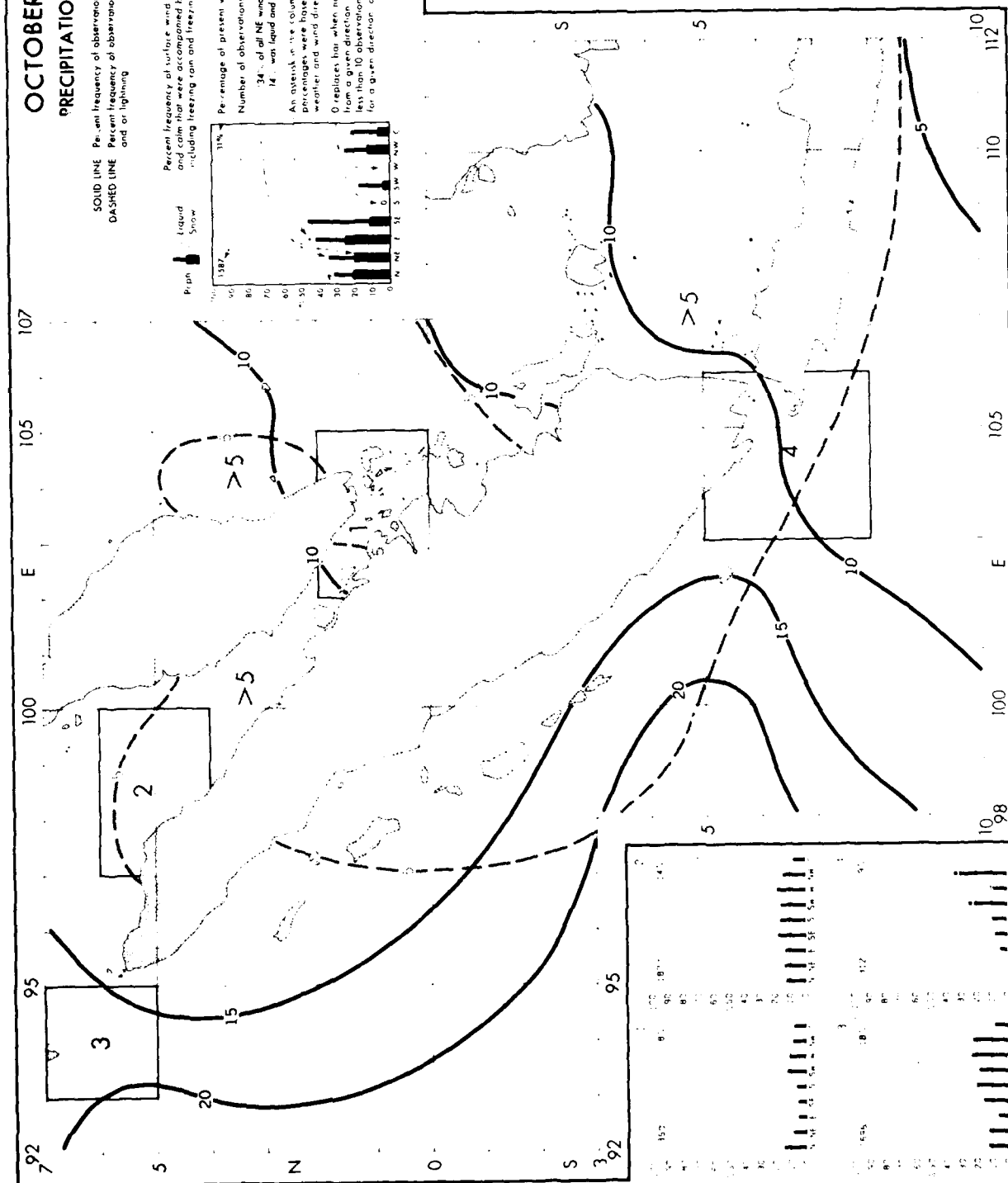
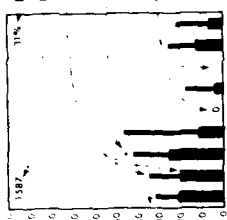
Percentage of present weather observations reporting precipitation

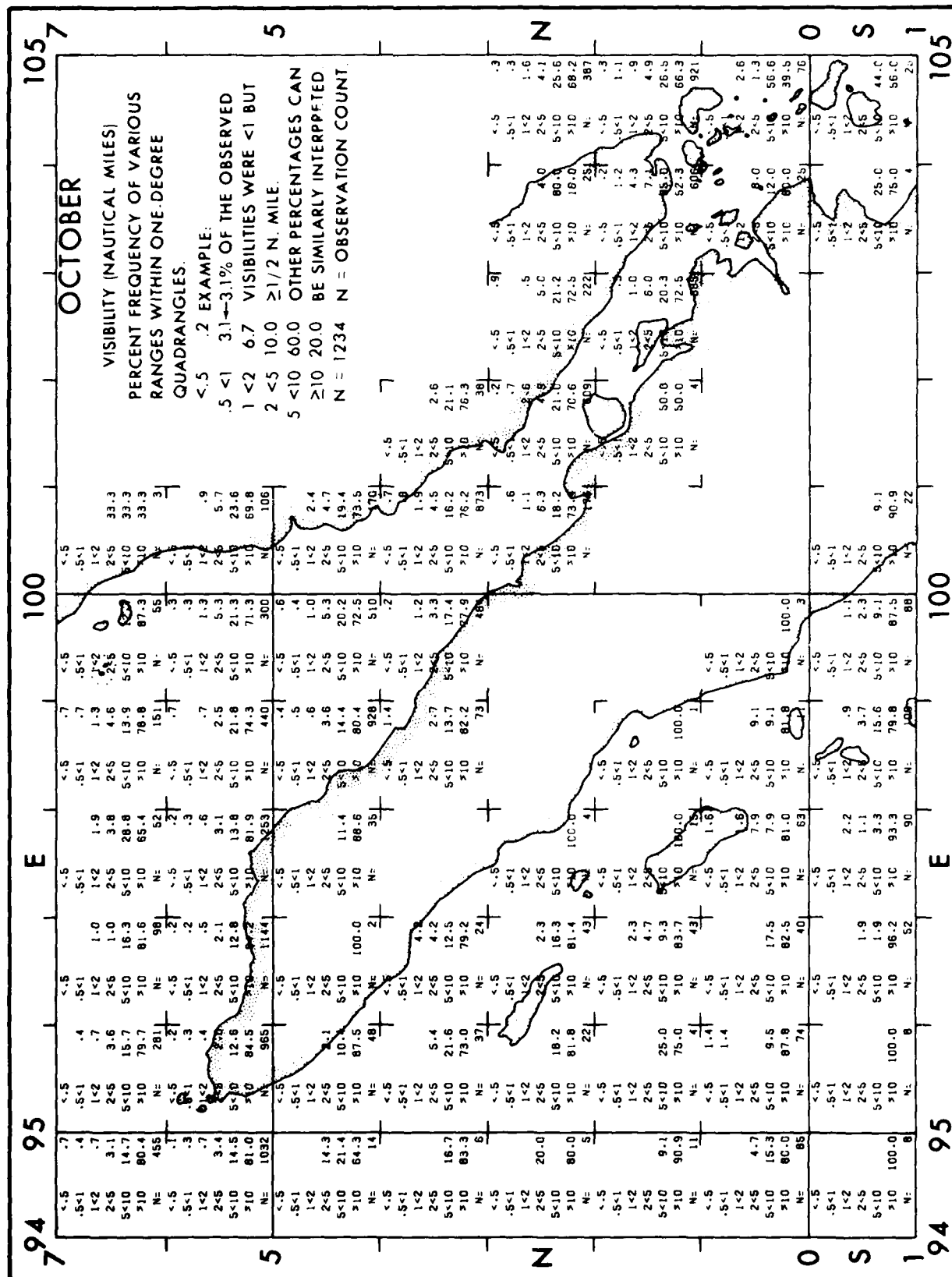
Number of observations

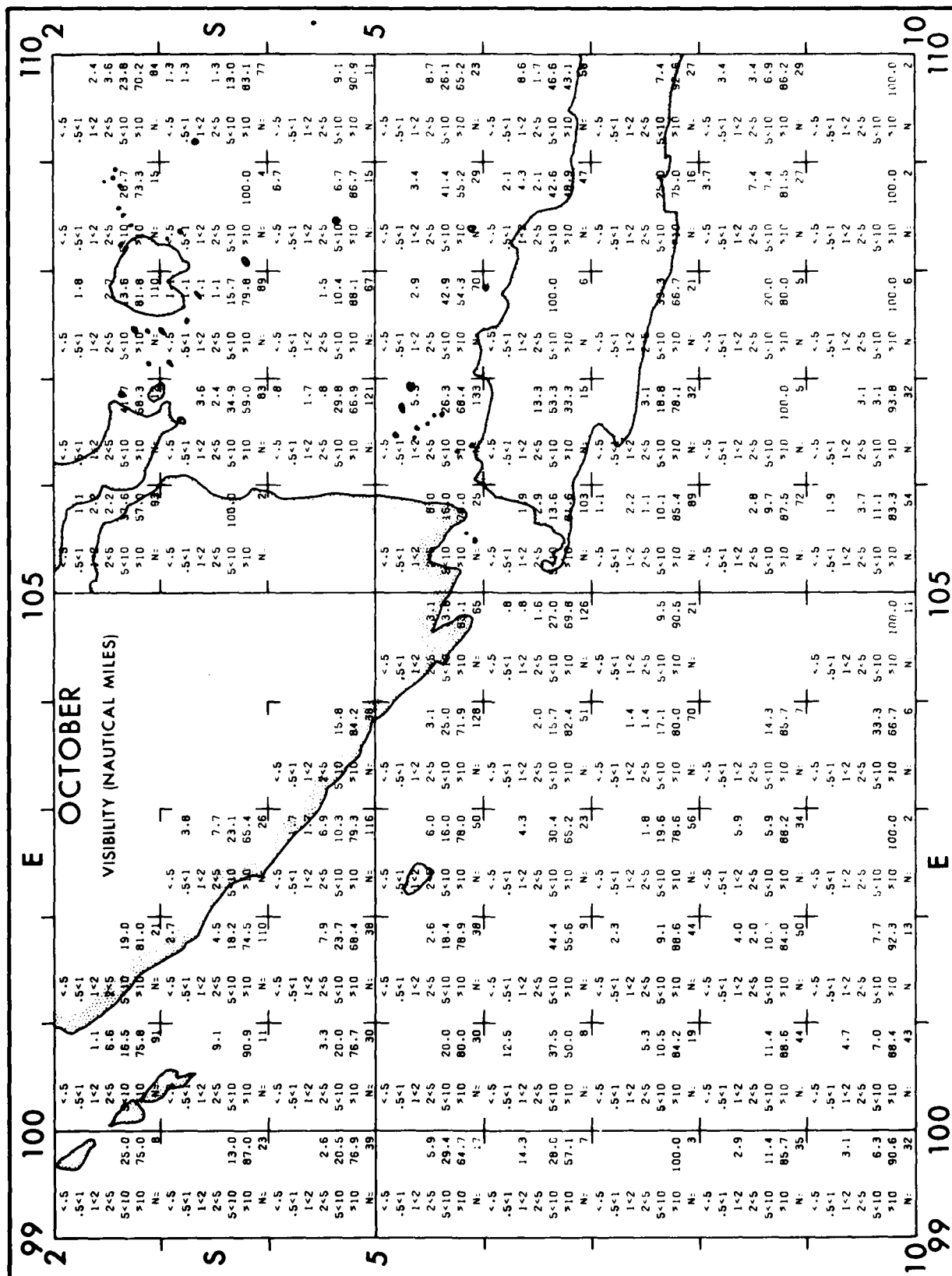
34% of all NE winds were accompanied by precipitation, of which 14% was liquid and 20% was snow.

An asterisk in the column for a given direction or value indicates percentages were based on 10/30 observations of present

0 replaces bar when no precipitation was observed with winds from a given direction or calm. No bar graph is presented if less than 10 observations containing present weather are reported for a given direction or calm.

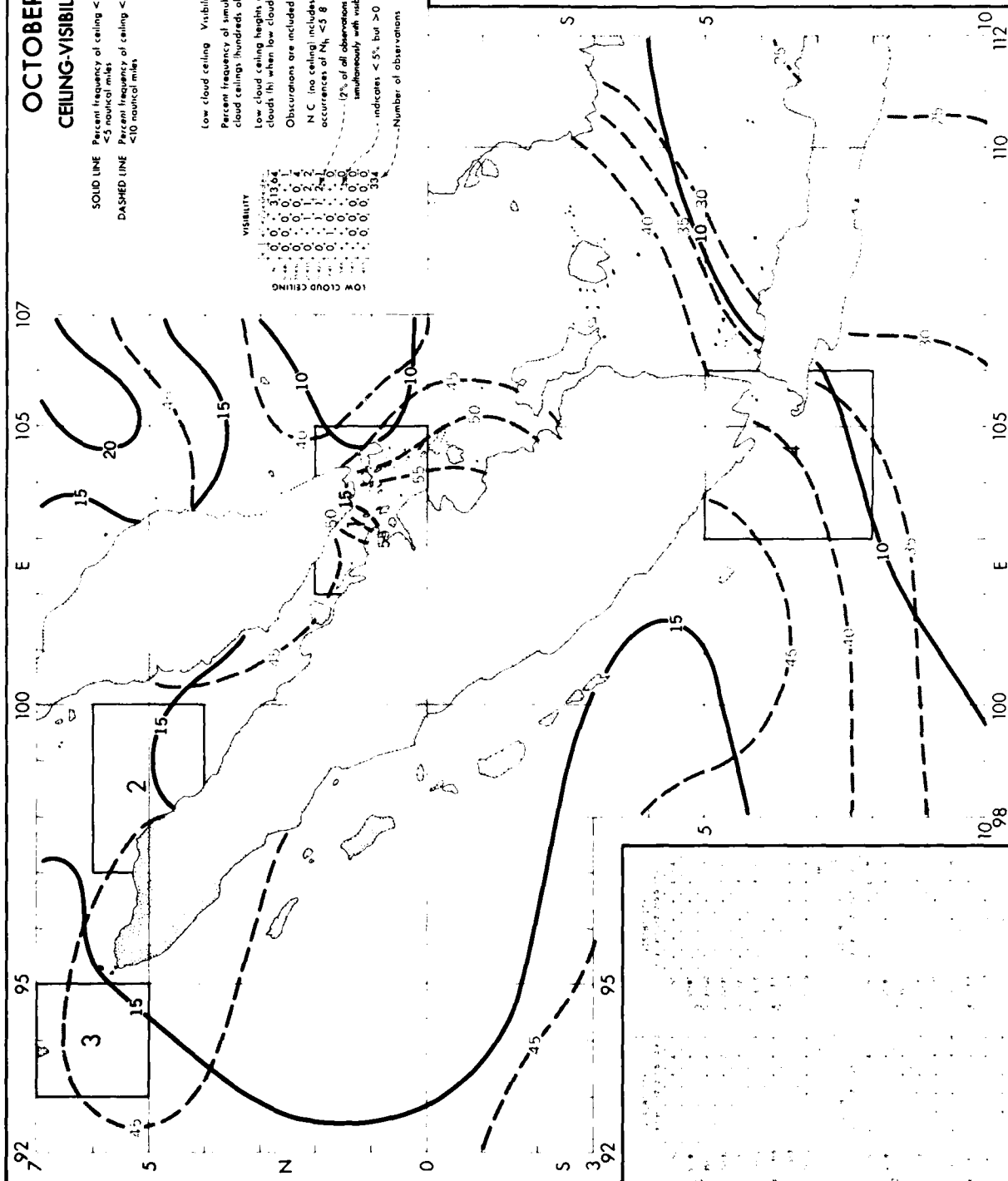






SOLID LINE Percent frequency of ceiling <1000 feet and or visibility <5 nautical miles

DASHED LINE Percent frequency of ceiling <8000 feet and or visibility <10 nautical miles



OCTOBER WIND-VISIBILITY-CLOUDINESS

Conditions for Carrier Operations

SOLID LINE Percent frequency of optimum conditions, LCC 25000 ft or no LCC, Vbty ≥ 5 N Mi, and Wind 11-21 kts

DASHED LINE Percent frequency of poor conditions. Any one of the following constitutes poor conditions, LCC < 300 ft, Vbty < 1 N Mi, Wind < 6 or ≥ 34 kts

Satisfactory conditions between poor and optimum

Percent frequency of occurrences of specified wind speed in North visibility < 1/2 mi in nautical miles, and low cloud ceiling LCC in hundreds of feet

Low cloud ceiling heights are estimated from the height of low clouds (ft) when low cloud amount (N_h) is ≥ 8

7% of the observations reported wind speeds of 11-21 kts, a low cloud ceiling < 1000 feet and or visibility < 2 nautical miles

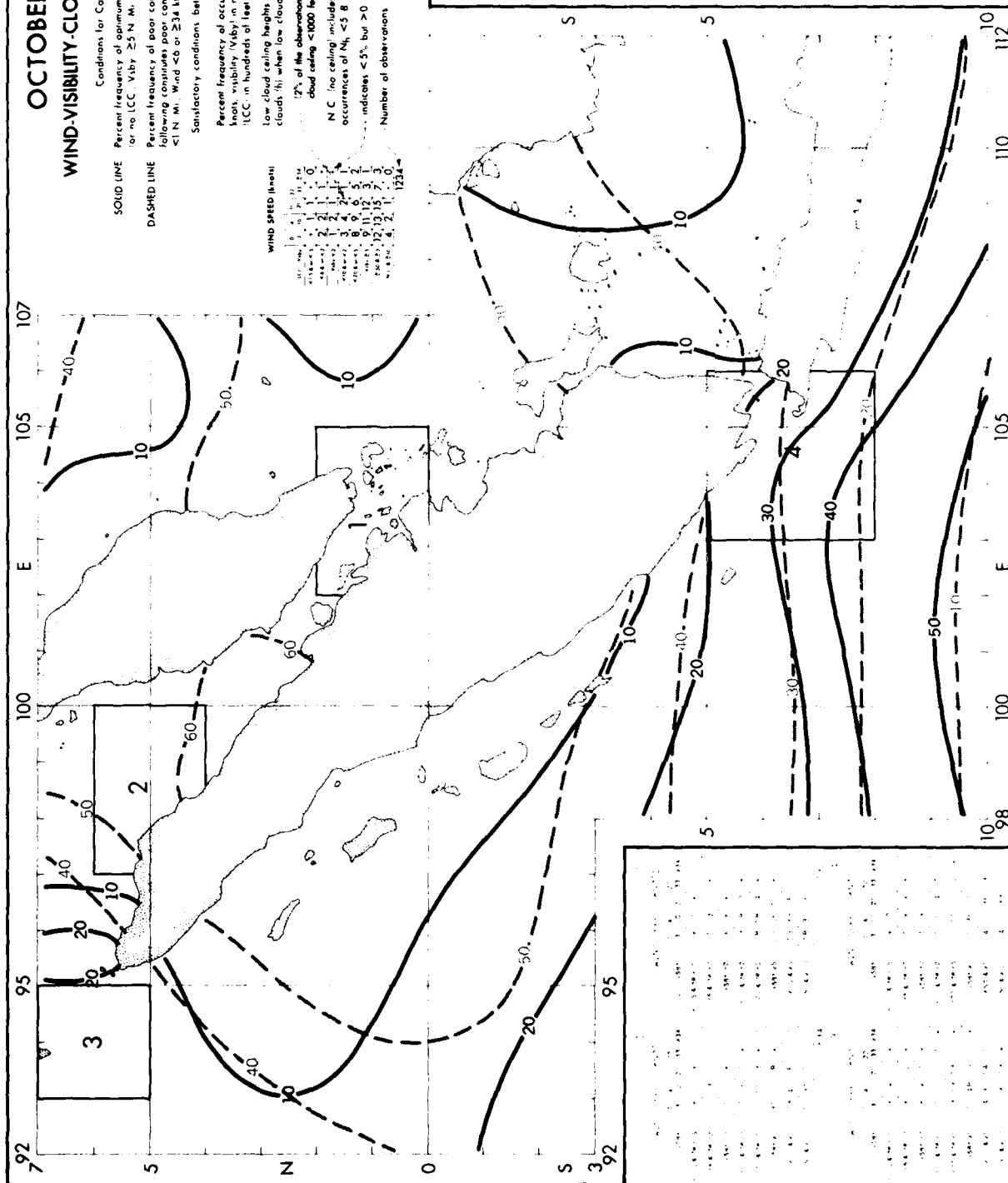
N C (no ceiling) includes bases of clouds 28000 feet as well as occurrences of N_h < 5

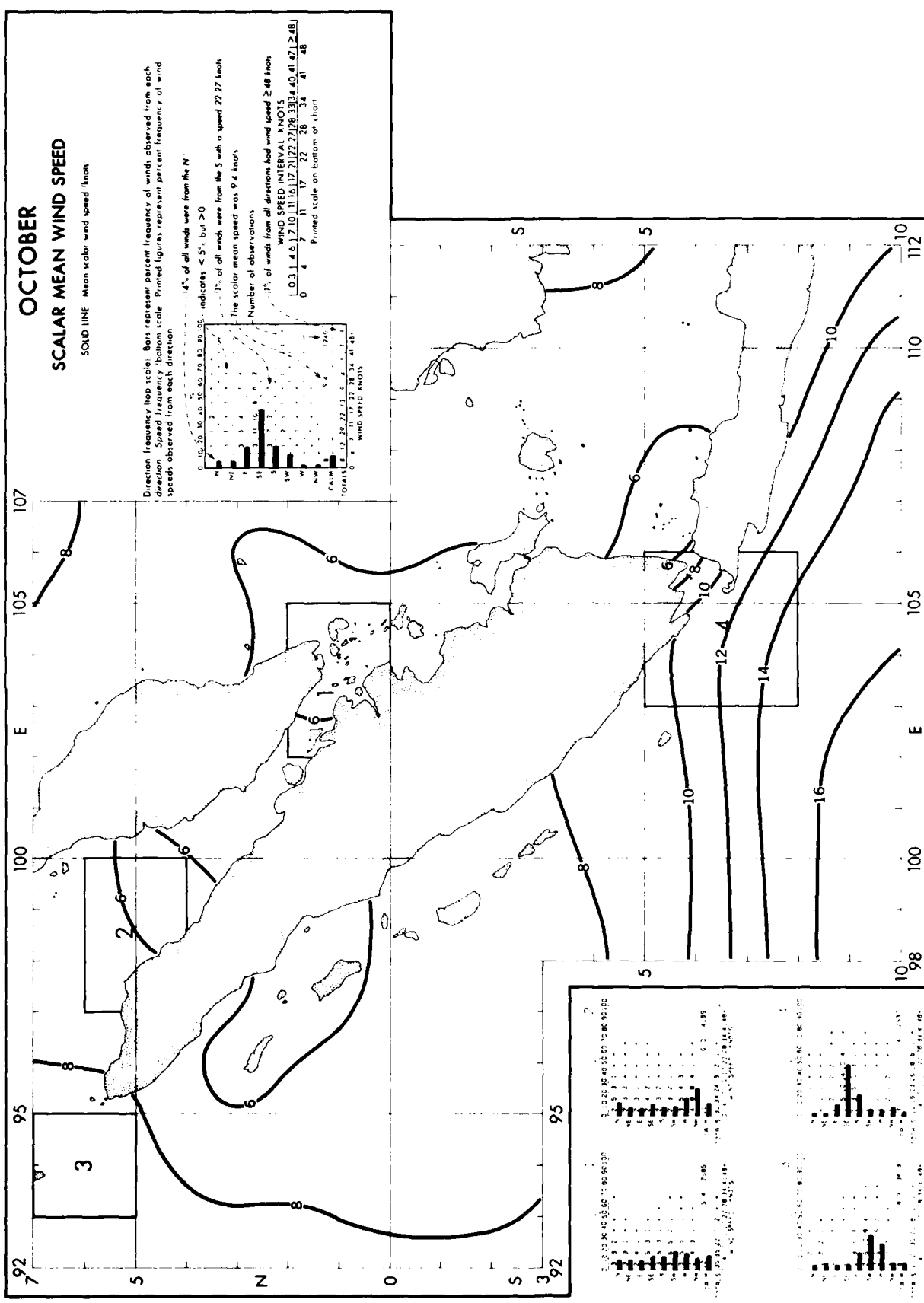
indicates < 5%, but > 0

Number of observations

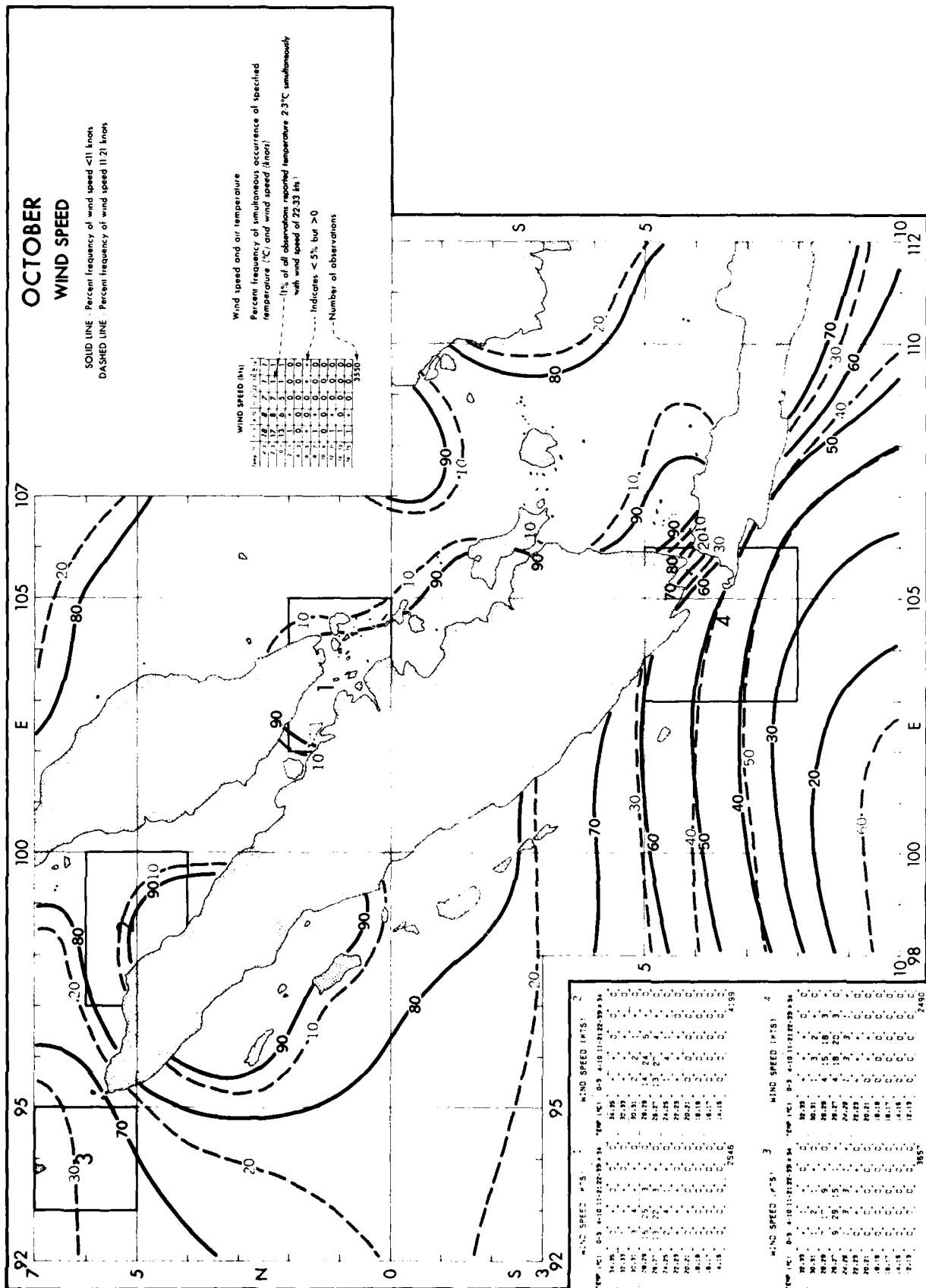
WIND SPEED (kts)

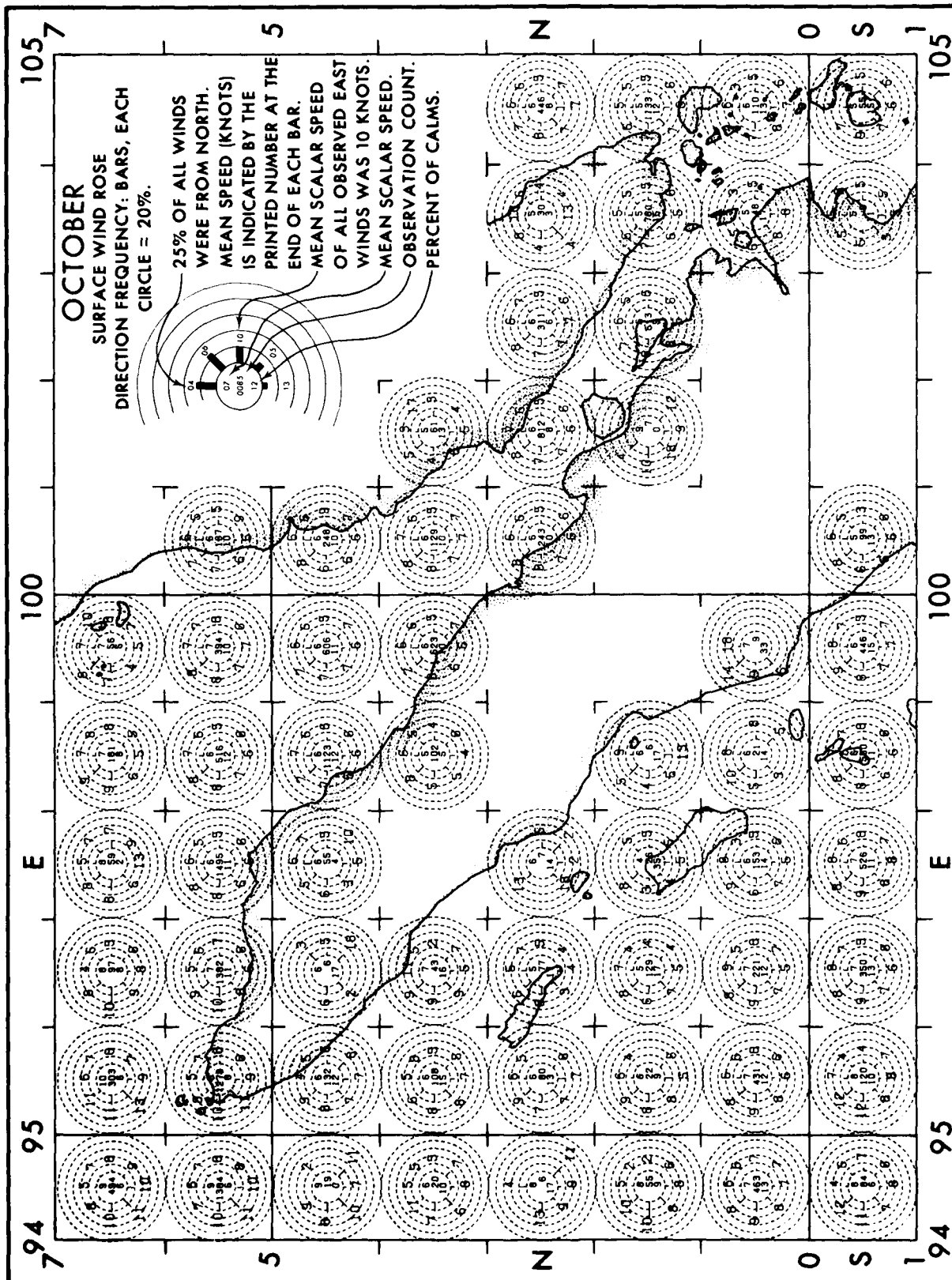
0-5	6-10	11-15	16-20	21-25	26-30	31-35	36-40	41-45	46-50	51-55	56-60	61-65	66-70	71-75	76-80	81-85	86-90	91-95	96-100	101-105	106-110	111-115	116-120	121-125	126-130	131-135	136-140	141-145	146-150	151-155	156-160	161-165	166-170	171-175	176-180	181-185	186-190	191-195	196-200	201-205	206-210	211-215	216-220	221-225	226-230	231-235	236-240	241-245	246-250	251-255	256-260	261-265	266-270	271-275	276-280	281-285	286-290	291-295	296-300	301-305	306-310	311-315	316-320	321-325	326-330	331-335	336-340	341-345	346-350	351-355	356-360	361-365	366-370	371-375	376-380	381-385	386-390	391-395	396-400	401-405	406-410	411-415	416-420	421-425	426-430	431-435	436-440	441-445	446-450	451-455	456-460	461-465	466-470	471-475	476-480	481-485	486-490	491-495	496-500	501-505	506-510	511-515	516-520	521-525	526-530	531-535	536-540	541-545	546-550	551-555	556-560	561-565	566-570	571-575	576-580	581-585	586-590	591-595	596-600	601-605	606-610	611-615	616-620	621-625	626-630	631-635	636-640	641-645	646-650	651-655	656-660	661-665	666-670	671-675	676-680	681-685	686-690	691-695	696-700	701-705	706-710	711-715	716-720	721-725	726-730	731-735	736-740	741-745	746-750	751-755	756-760	761-765	766-770	771-775	776-780	781-785	786-790	791-795	796-800	801-805	806-810	811-815	816-820	821-825	826-830	831-835	836-840	841-845	846-850	851-855	856-860	861-865	866-870	871-875	876-880	881-885	886-890	891-895	896-900	901-905	906-910	911-915	916-920	921-925	926-930	931-935	936-940	941-945	946-950	951-955	956-960	961-965	966-970	971-975	976-980	981-985	986-990	991-995	996-1000
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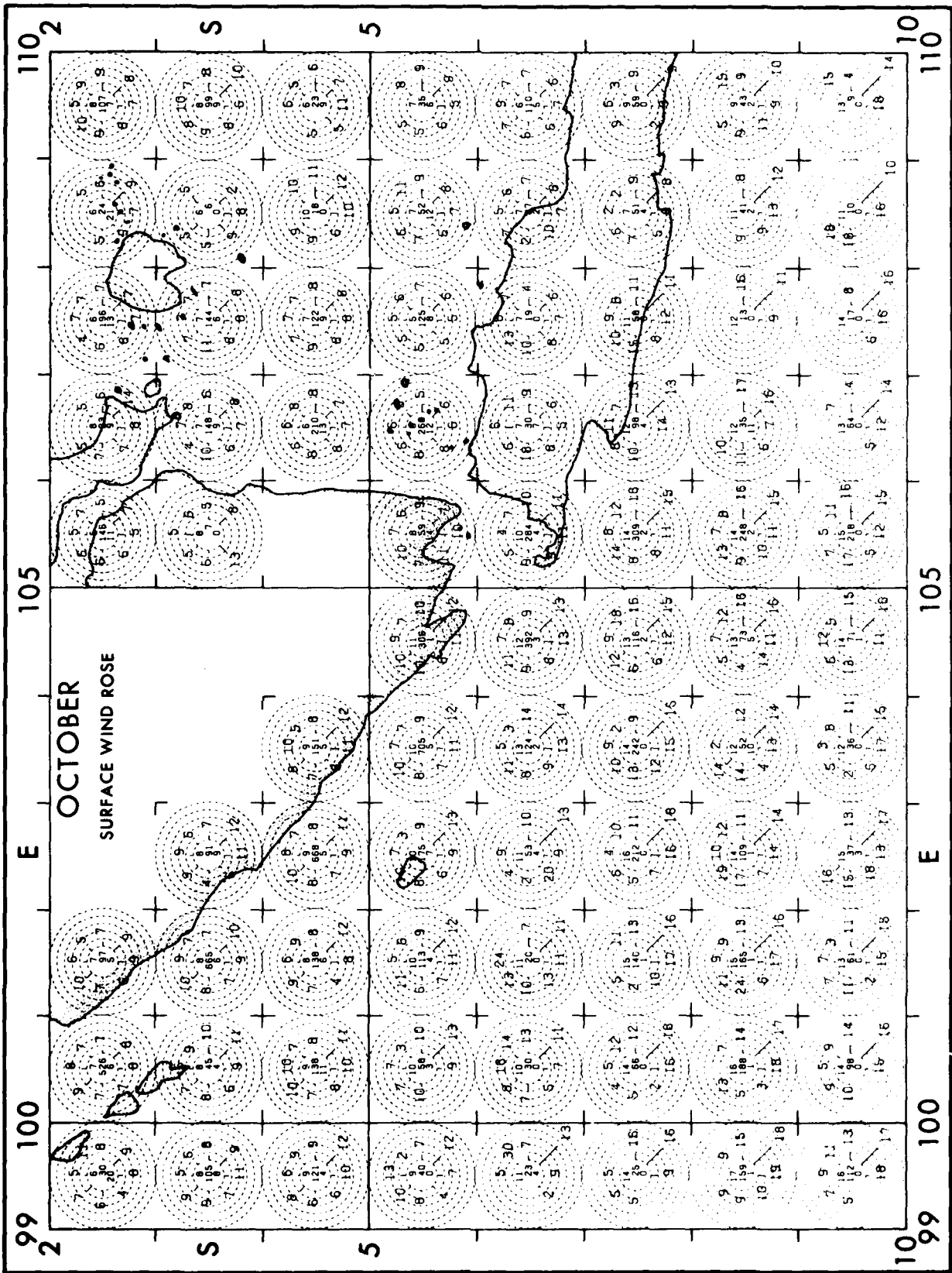




SOLID LINE · Percent frequency of wind speed <11 knots
DASHED LINE · Percent frequency of wind speed 11-21 knots



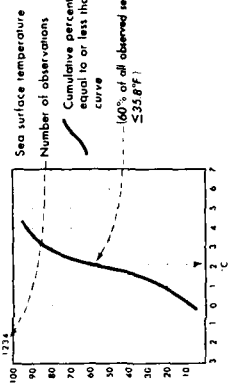




OCTOBER AIR AND SEA TEMPERATURE

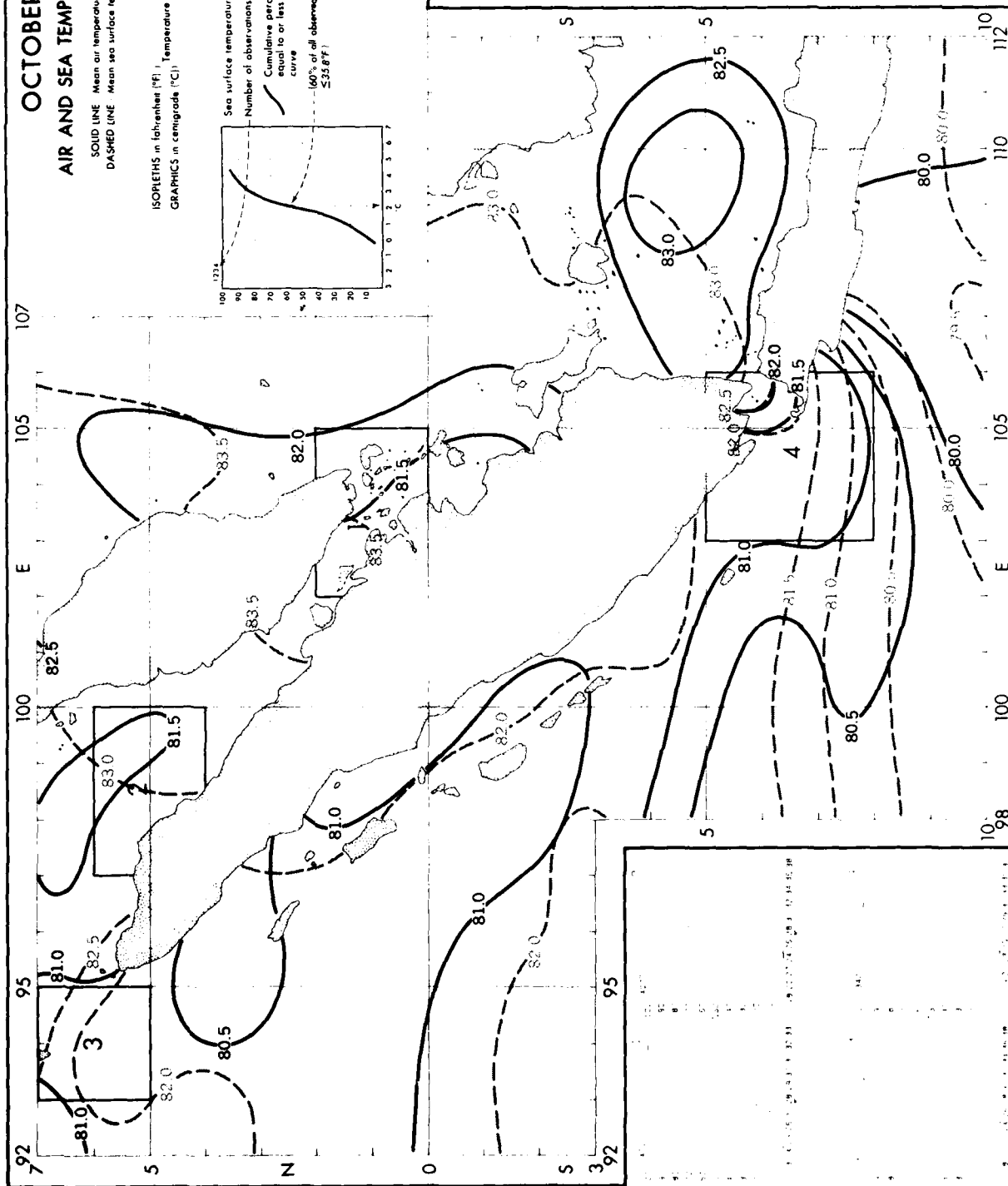
SOLID LINE Mean air temperature (°F)
DASHED LINE Mean sea surface temperature (°F)

ISOPLTHS in Fahrenheit (°F) Temperature conversion table below
GRAPHICS in centigrade (°C)



CONVERSION TABLE

°C	°F
16	60.8
17	62.6
18	64.4
19	66.2
20	68.0
21	69.8
22	71.6
23	73.4
24	75.2
25	77.0
26	78.8
27	80.6
28	82.4
29	84.2
30	86.0
31	87.8
32	89.6
33	91.4
34	93.2
35	95.0
36	96.8
37	98.6
38	100.4
39	102.2



OCTOBER WAVES

SOLID LINE Percent frequency of wave height ≥ 3 feet
DASHED LINE Percent frequency of wave height ≥ 8 feet

Wave direction and height

Direction frequency top scale. Bars represent percent frequency of waves from each direction.
Height frequency bottom scale. Printed figures represent percent frequency of wave heights.

--- 5% of all waves were from the N

indicates $< 5\%$ but > 0

1% of all waves were from the S with heights from 6.75 meters

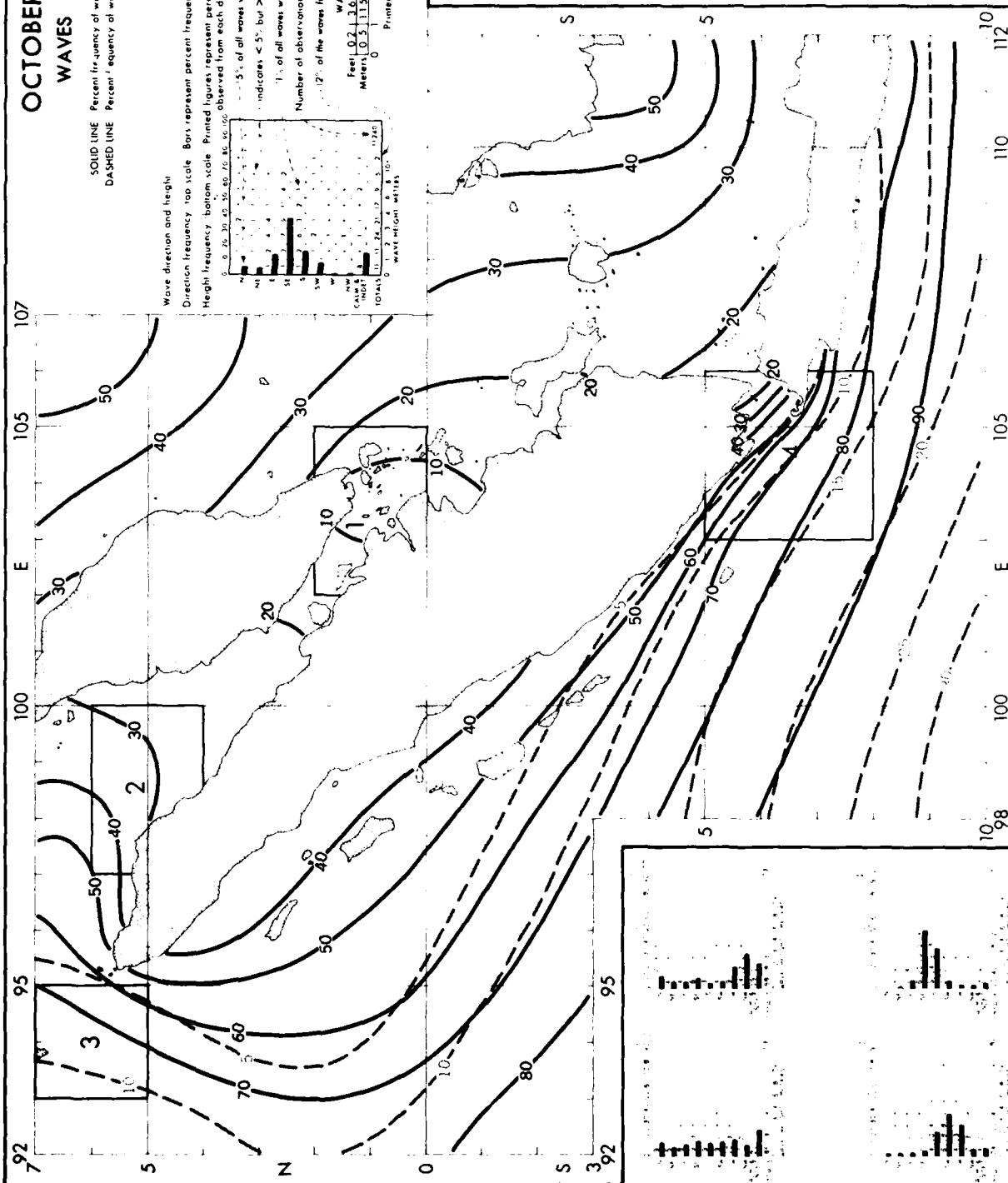
Number of observations

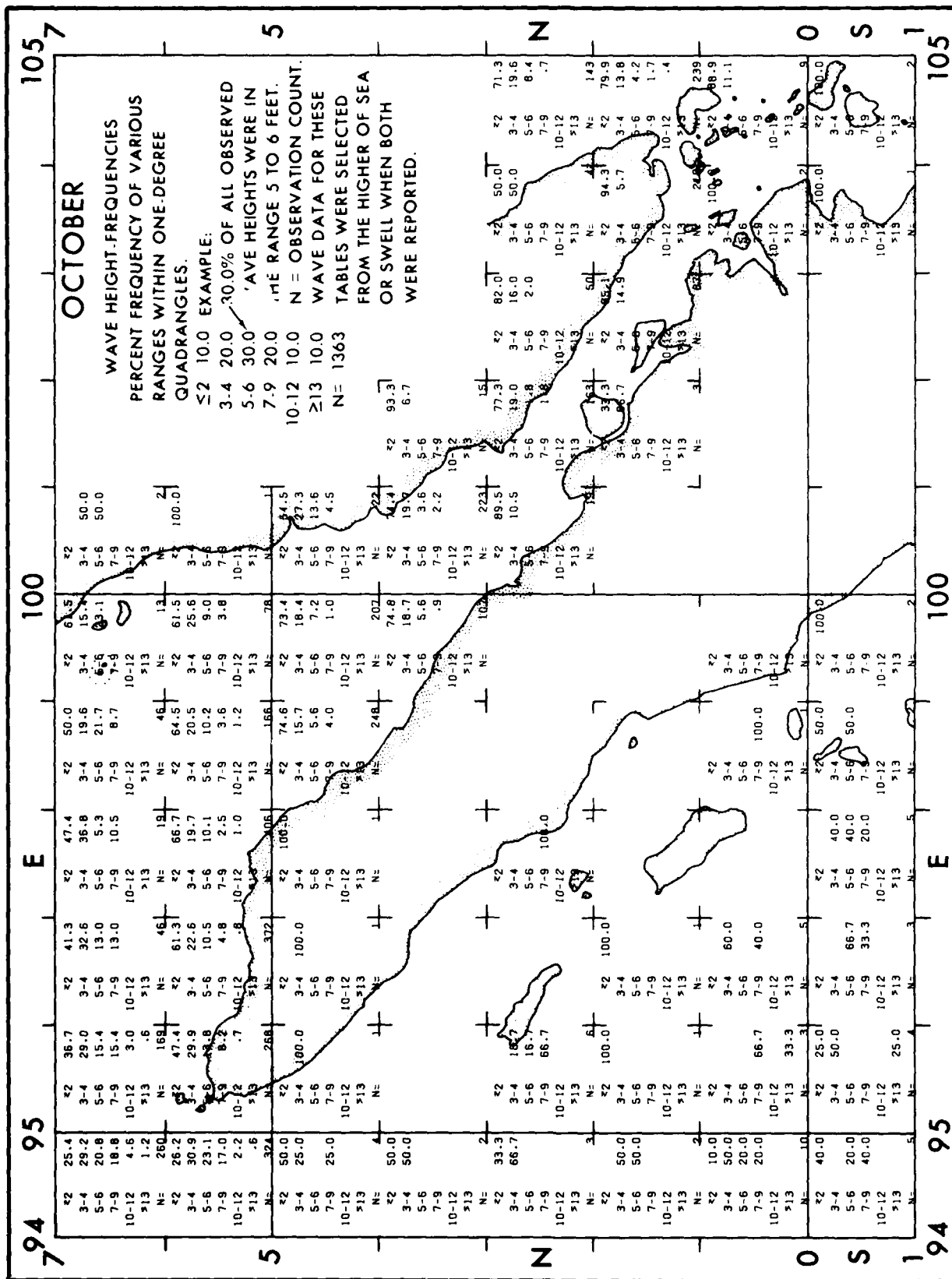
12% of the waves from all directions had heights ≥ 10 meters

WAVE HEIGHT INTERVAL

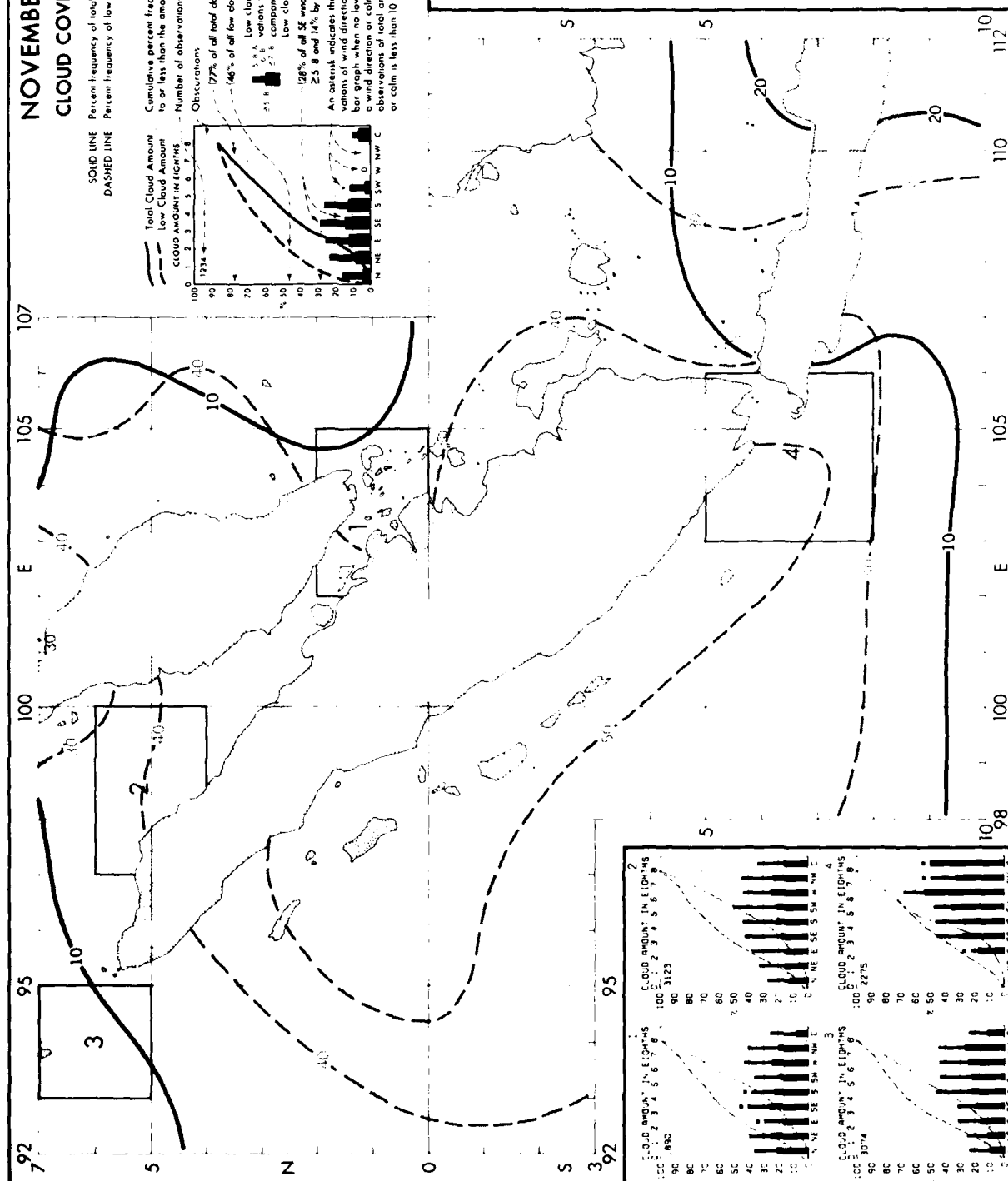
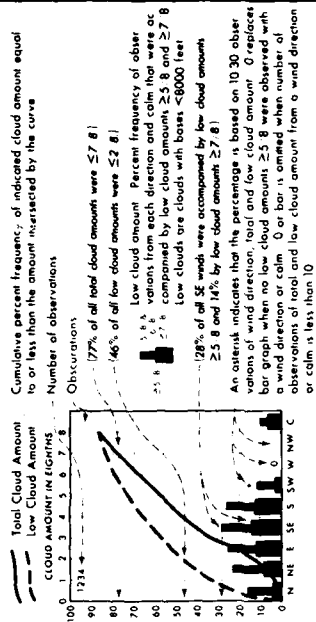
Feet: 0.2 0.5 1.0 1.5 2.0 2.5 3.0 3.5 4.0 4.5 5.0 5.5 6.0 6.5 7.0 7.5 8.0 8.5 9.0 9.5 10.0
Meters: 0.1 0.2 0.3 0.4 0.5 0.6 0.7 0.8 0.9 1.0 1.1 1.2 1.3 1.4 1.5 1.6 1.7 1.8 1.9 2.0

Printed scale on bottom of chart





SOLID LINE Percent frequency of total cloud amount ≤ 2.8
DASHED LINE Percent frequency of low cloud amount ≥ 5.8

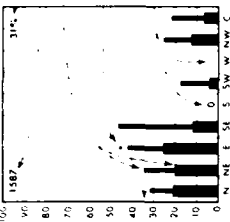


NOVEMBER PRECIPITATION

SOLID LINE Percent frequency of observations reporting precipitation
DASHED LINE Percent frequency of observations reporting thunderstorms and/or lightning

Percent frequency of surface wind observations from each direction and calm that were accompanied by precipitation subdivided into liquid type including freezing rain and freezing drizzle and snow

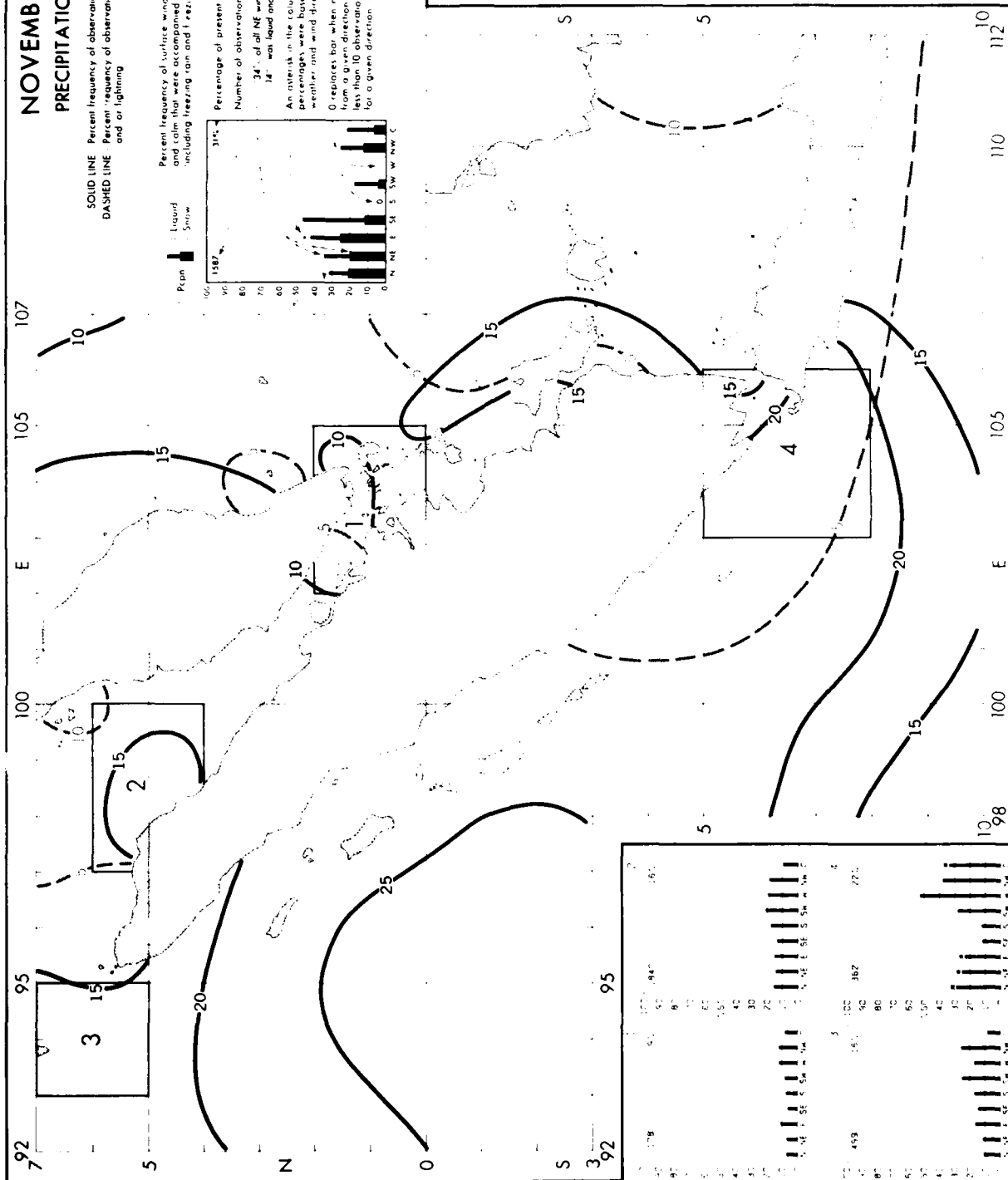
Rain
Snow

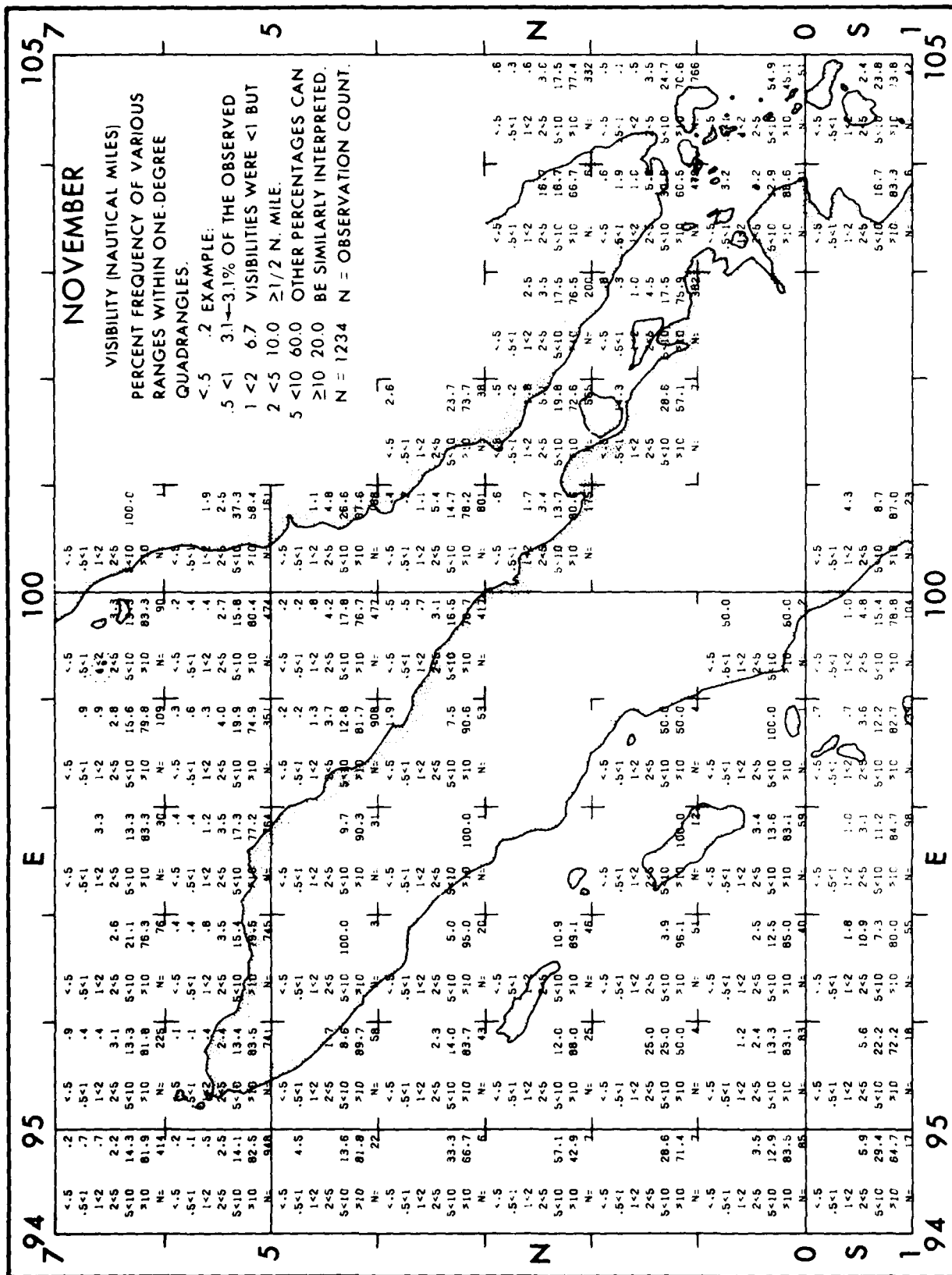


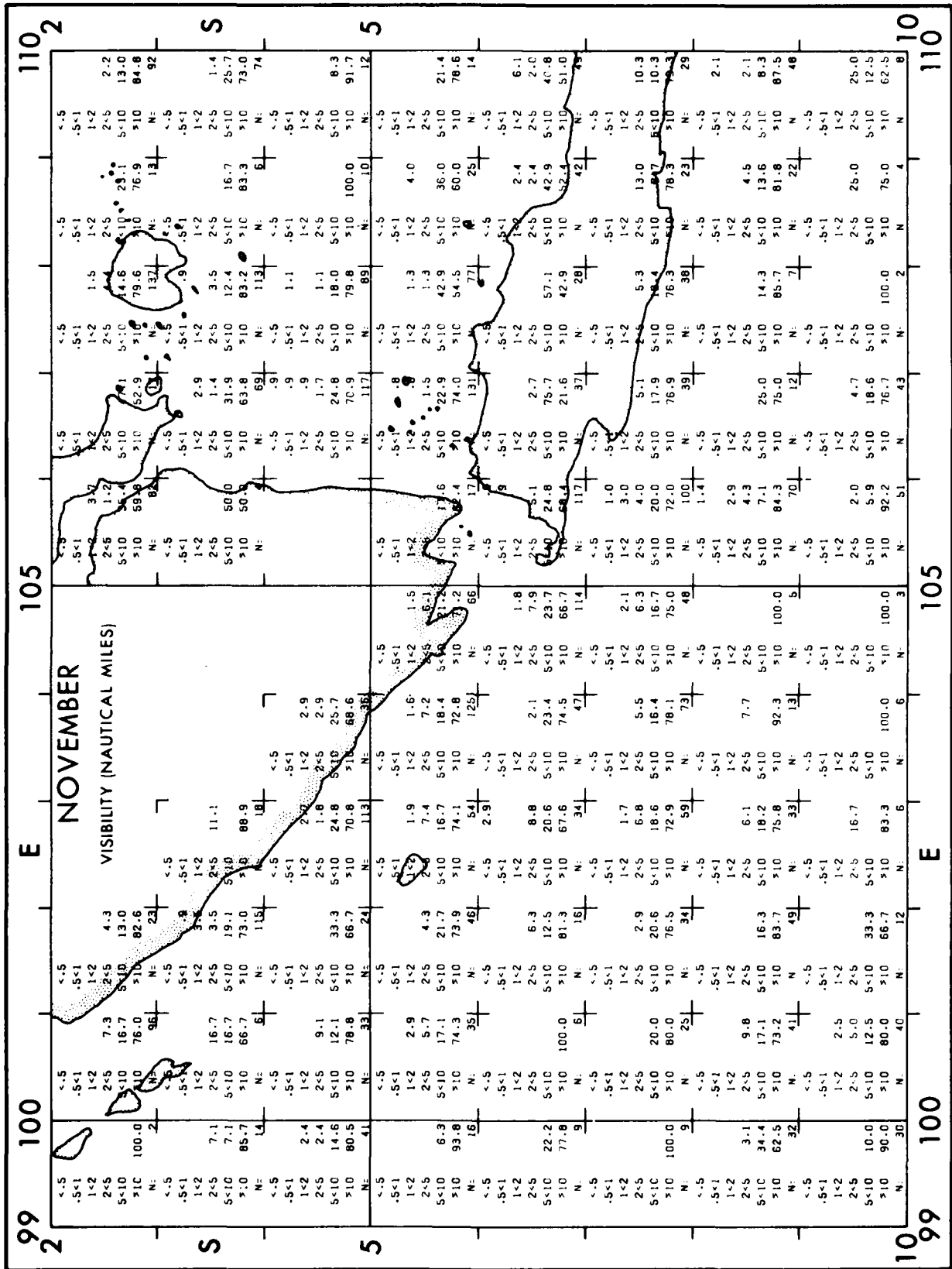
Number of observations
34% of all NE winds were accompanied by precipitation of which 14% was liquid and 20% was snow

An asterisk in the column for a given direction or calm indicates percentages were based on 10-30 observations of present weather and wind direction

0 replaces bar when no precipitation was observed with winds from a given direction or calm. No bar graph is presented if less than 10 observations containing present weather are reported for a given direction or calm







NOVEMBER

WIND-VISIBILITY-CLOUDINESS

Conditions for Carrier Operations
 Percent frequency of optimum conditions (CC ≥ 5000 h for no ICC, Vby ≥ 5 N Mi, and Wind ≤ 17 kt)
 Percent frequency of poor conditions. Any one of the following constitutes poor conditions: (CC < 300 h Vby < 1 N Mi, Wind > 23 kt)

Satisfactory conditions between poor and optimum

Percent frequency of occurrence of specified wind speed in knots, visibility (Vby) in nautical miles, and low cloud ceiling (LCC) in hundreds of feet

Low cloud: ceiling heights are estimated from the height of low clouds (h) when low cloud amount (N_h) is ≥ 5 8

(2% of the observations reported wind speeds of 11-21 knots, a low cloud ceiling < 1000 feet and or visibility < 2 nautical miles)

N.C. (no ceiling) includes boxes of clouds ≥ 8000 feet as well as occurrences of N_h < 5 8

indicates $\leq 5\%$ but > 0

Number of observations

WIND SPEED (knots)

0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92	93	94	95	96	97	98	99	100	101	102	103	104	105	106	107	108	109	110	111	112	113	114	115	116	117	118	119	120	121	122	123	124	125	126	127	128	129	130	131	132	133	134	135	136	137	138	139	140	141	142	143	144	145	146	147	148	149	150	151	152	153	154	155	156	157	158	159	160	161	162	163	164	165	166	167	168	169	170	171	172	173	174	175	176	177	178	179	180	181	182	183	184	185	186	187	188	189	190	191	192	193	194	195	196	197	198	199	200	201	202	203	204	205	206	207	208	209	210	211	212	213	214	215	216	217	218	219	220	221	222	223	224	225	226	227	228	229	230	231	232	233	234	235	236	237	238	239	240	241	242	243	244	245	246	247	248	249	250	251	252	253	254	255	256	257	258	259	260	261	262	263	264	265	266	267	268	269	270	271	272	273	274	275	276	277	278	279	280	281	282	283	284	285	286	287	288	289	290	291	292	293	294	295	296	297	298	299	300	301	302	303	304	305	306	307	308	309	310	311	312	313	314	315	316	317	318	319	320	321	322	323	324	325	326	327	328	329	330	331	332	333	334	335	336	337	338	339	340	341	342	343	344	345	346	347	348	349	350	351	352	353	354	355	356	357	358	359	360	361	362	363	364	365	366	367	368	369	370	371	372	373	374	375	376	377	378	379	380	381	382	383	384	385	386	387	388	389	390	391	392	393	394	395	396	397	398	399	400	401	402	403	404	405	406	407	408	409	410	411	412	413	414	415	416	417	418	419	420	421	422	423	424	425	426	427	428	429	430	431	432	433	434	435	436	437	438	439	440	441	442	443	444	445	446	447	448	449	450	451	452	453	454	455	456	457	458	459	460	461	462	463	464	465	466	467	468	469	470	471	472	473	474	475	476	477	478	479	480	481	482	483	484	485	486	487	488	489	490	491	492	493	494	495	496	497	498	499	500	501	502	503	504	505	506	507	508	509	510	511	512	513	514	515	516	517	518	519	520	521	522	523	524	525	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	545	546	547	548	549	550	551	552	553	554	555	556	557	558	559	560	561	562	563	564	565	566	567	568	569	570	571	572	573	574	575	576	577	578	579	580	581	582	583	584	585	586	587	588	589	590	591	592	593	594	595	596	597	598	599	600	601	602	603	604	605	606	607	608	609	610	611	612	613	614	615	616	617	618	619	620	621	622	623	624	625	626	627	628	629	630	631	632	633	634	635	636	637	638	639	640	641	642	643	644	645	646	647	648	649	650	651	652	653	654	655	656	657	658	659	660	661	662	663	664	665	666	667	668	669	670	671	672	673	674	675	676	677	678	679	680	681	682	683	684	685	686	687	688	689	690	691	692	693	694	695	696	697	698	699	700	701	702	703	704	705	706	707	708	709	710	711	712	713	714	715	716	717	718	719	720	721	722	723	724	725	726	727	728	729	730	731	732	733	734	735	736	737	738	739	740	741	742	743	744	745	746	747	748	749	750	751	752	753	754	755	756	757	758	759	760	761	762	763	764	765	766	767	768	769	770	771	772	773	774	775	776	777	778	779	780	781	782	783	784	785	786	787	788	789	790	791	792	793	794	795	796	797	798	799	800	801	802	803	804	805	806	807	808	809	810	811	812	813	814	815	816	817	818	819	820	821	822	823	824	825	826	827	828	829	830	831	832	833	834	835	836	837	838	839	840	841	842	843	844	845	846	847	848	849	850	851	852	853	854	855	856	857	858	859	860	861	862	863	864	865	866	867	868	869	870	871	872	873	874	875	876	877	878	879	880	881	882	883	884	885	886	887	888	889	890	891	892	893	894	895	896	897	898	899	900	901	902	903	904	905	906	907	908	909	910	911	912	913	914	915	916	917	918	919	920	921	922	923	924	925	926	927	928	929	930	931	932	933	934	935	936	937	938	939	940	941	942	943	944	945	946	947	948	949	950	951	952	953	954	955	956	957	958	959	960	961	962	963	964	965	966	967	968	969	970	971	972	973	974	975	976	977	978	979	980	981	982	983	984	985	986	987	988	989	990	991	992	993	994	995	996	997	998	999	1000	1001	1002	1003	1004	1005	1006	1007	1008	1009	1010	1011	1012	1013	1014	1015	1016	1017	1018	1019	1020	1021	1022	1023	1024	1025	1026	1027	1028	1029	1030	1031	1032	1033	1034	1035	1036	1037	1038	1039	1040	1041	1042	1043	1044	1045	1046	1047	1048	1049	1050	1051	1052	1053	1054	1055	1056	1057	1058	1059	1060	1061	1062	1063	1064	1065	1066	1067	1068	1069	1070	1071	1072	1073	1074	1075	1076	1077	1078	1079	1080	1081	1082	1083	1084	1085	1086	1087	1088	1089	1090	1091	1092	1093	1094	1095	1096	1097	1098	1099	1100	1101	1102	1103	1104	1105	1106	1107	1108	1109	1110	1111	1112	1113	1114	1115	1116	1117	1118	1119	1120	1121	1122	1123	1124	1125	1126	1127	1128	1129	1130	1131	1132	1133	1134	1135	1136	1137	1138	1139	1140	1141	1142	1143	1144	1145	1146	1147	1148	1149	1150	1151	1152	1153	1154	1155	1156	1157	1158	1159	1160	1161	1162	1163	1164	1165	1166	1167	1168	1169	1170	1171	1172	1173	1174	1175	1176	1177	1178	1179	1180	1181	1182	1183	1184	1185	1186	1187	1188	1189	1190	1191	1192	1193	1194	1195	1196	1197	1198	1199	1200	1201	1202	1203	1204	1205	1206	1207	1208	1209	1210	1211	1212	1213	1214	1215	1216	1217	1218	1219	1220	1221	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NOVEMBER SCALAR MEAN WIND SPEED

SOLID LINE - Mean scalar wind speed (knots)

Direction frequency (top scale): Bars represent percent frequency of winds observed from each direction. Speed frequency (bottom scale): Printed figures represent percent frequency of wind speeds observed from each direction.

(4% of all winds were from the N)
indicates < 5% but > 0

(1% of all winds were from the S with a speed 22-27 knots)
The scalar mean speed was 9.4 knots

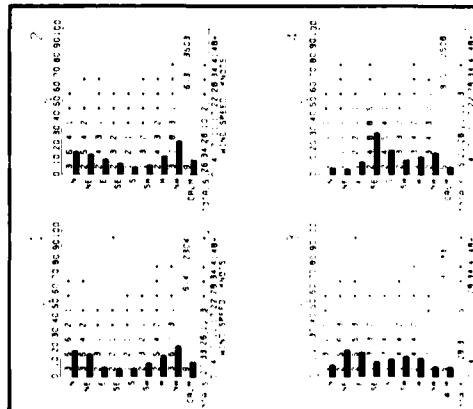
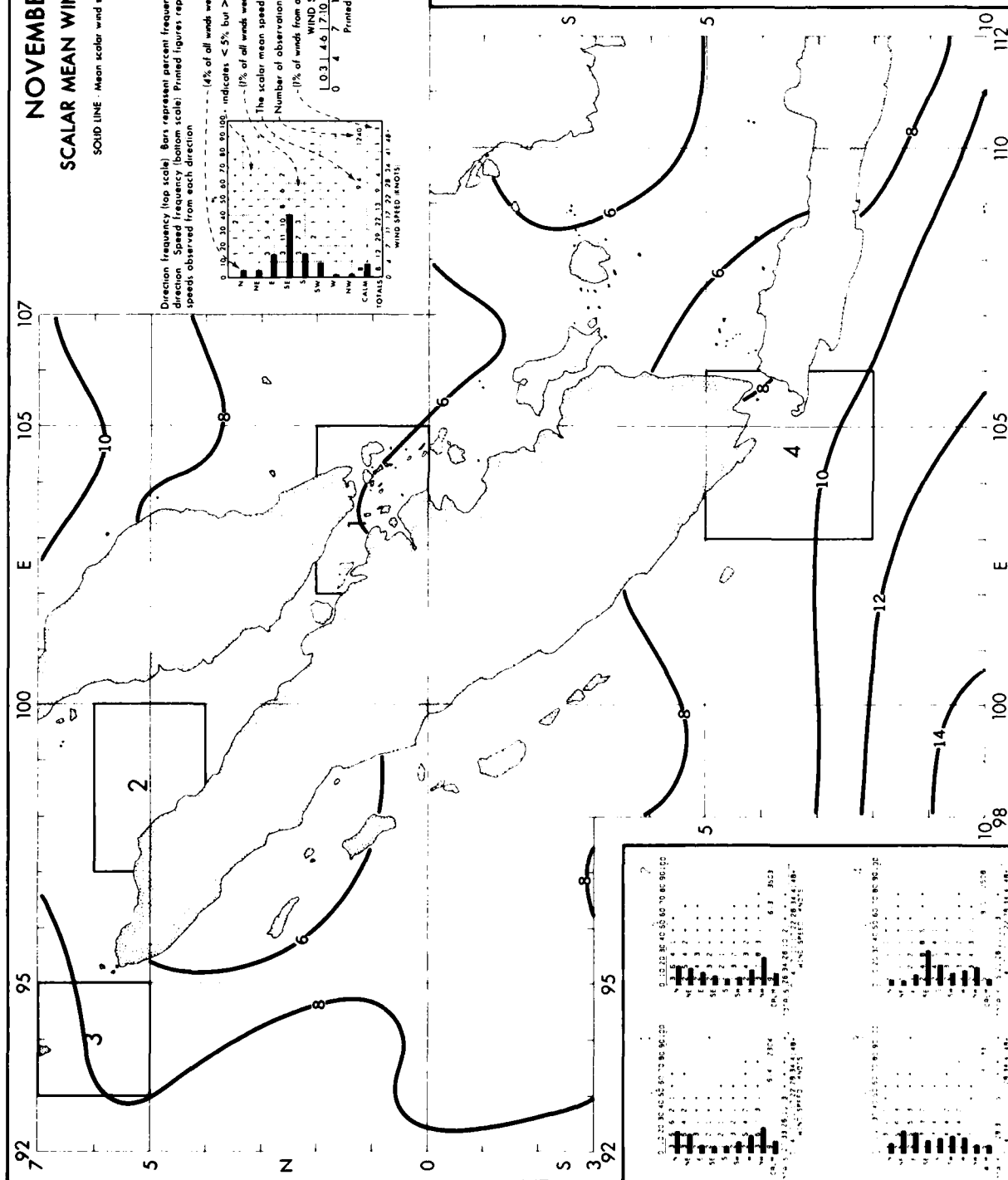
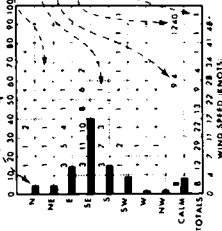
Number of observations

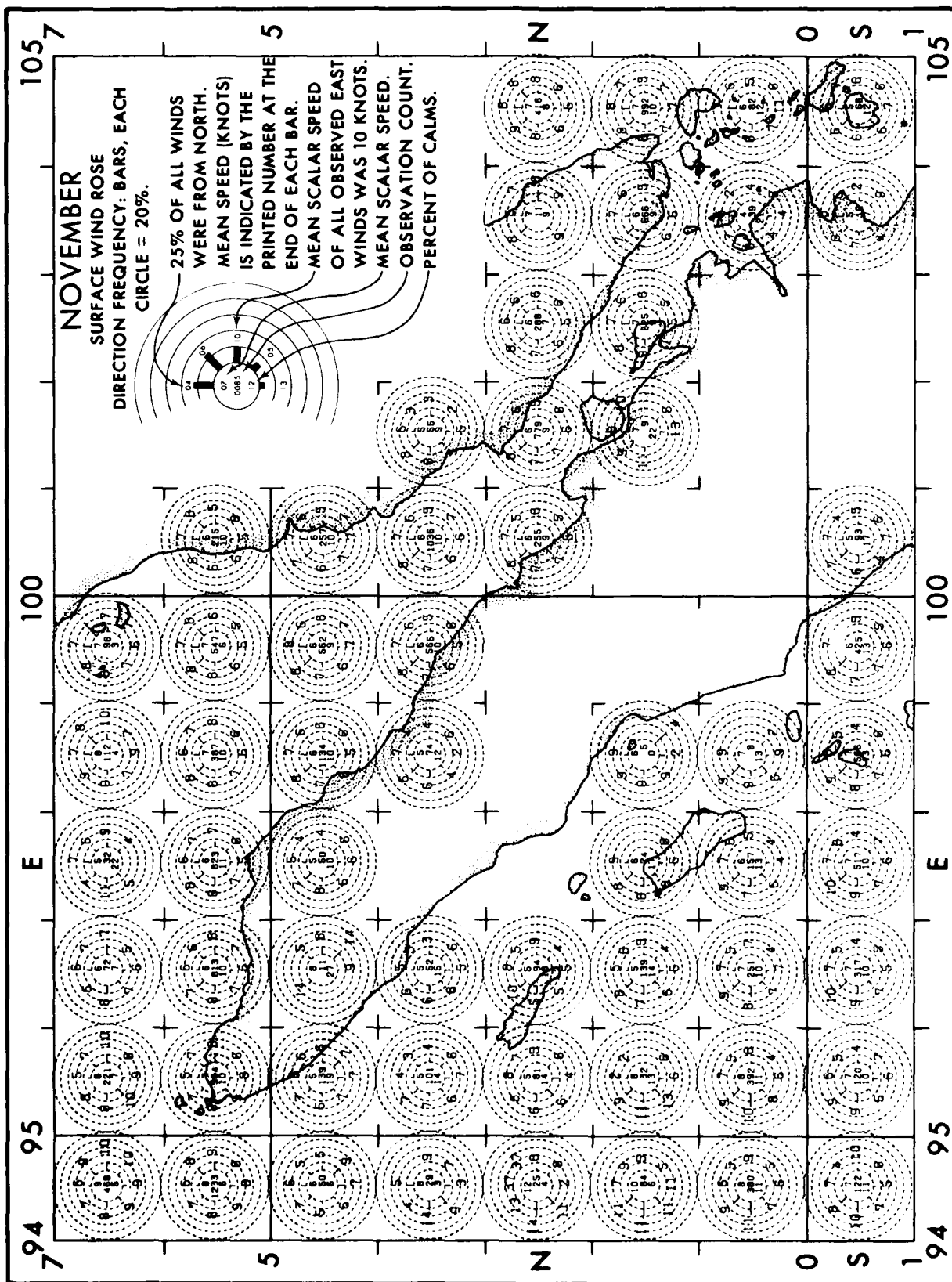
(1% of winds from all directions had wind speed 2-4 knots)

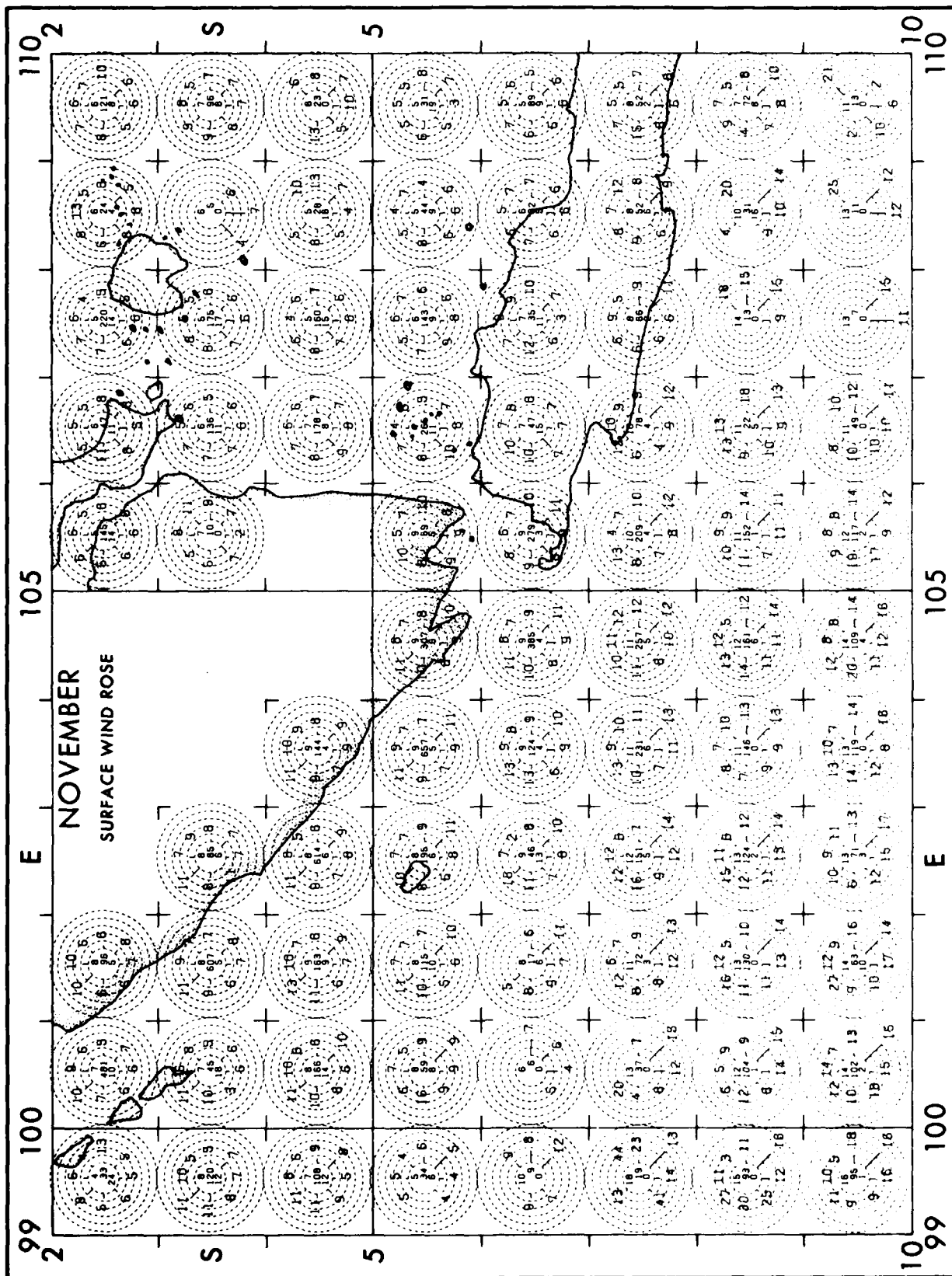
WIND SPEED INTERVAL (KNOTS)

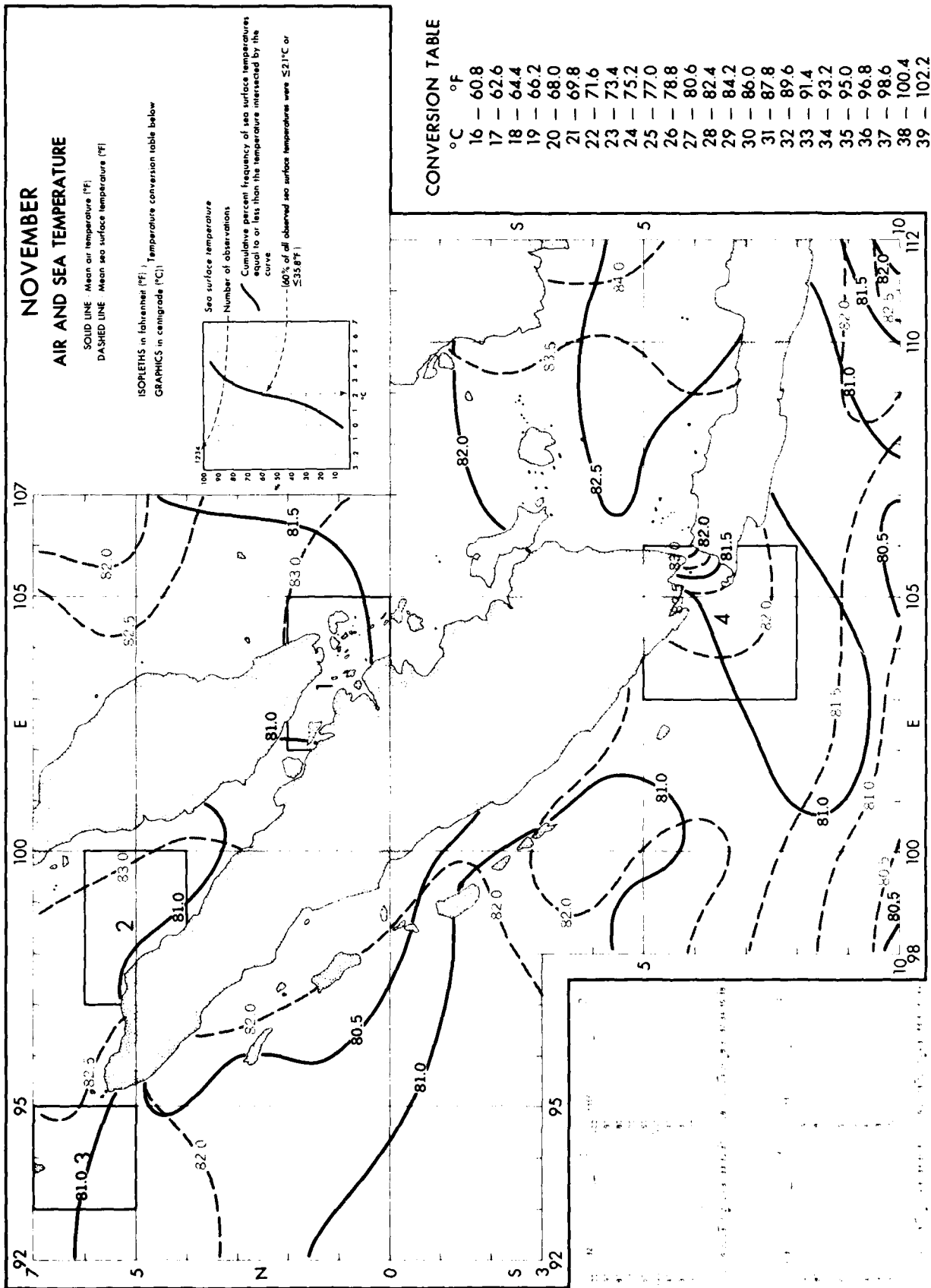
0 3 4 6 7 10 11 16 17 22 27 28 33 34 40 41 47 48

Printed scale on bottom of chart









NOVEMBER WAVES

SOLID LINE Percent frequency of wave height ≥ 3 feet
DASHED LINE Percent frequency of wave height ≥ 8 feet

Wave direction and height

Direction frequency top scale. Bars represent percent frequency of waves from each direction
Height frequency bottom scale. Printed figures represent percent frequency of wave heights
observed from each direction

5% of all waves were from the N

indicates $< 5\%$, but > 0

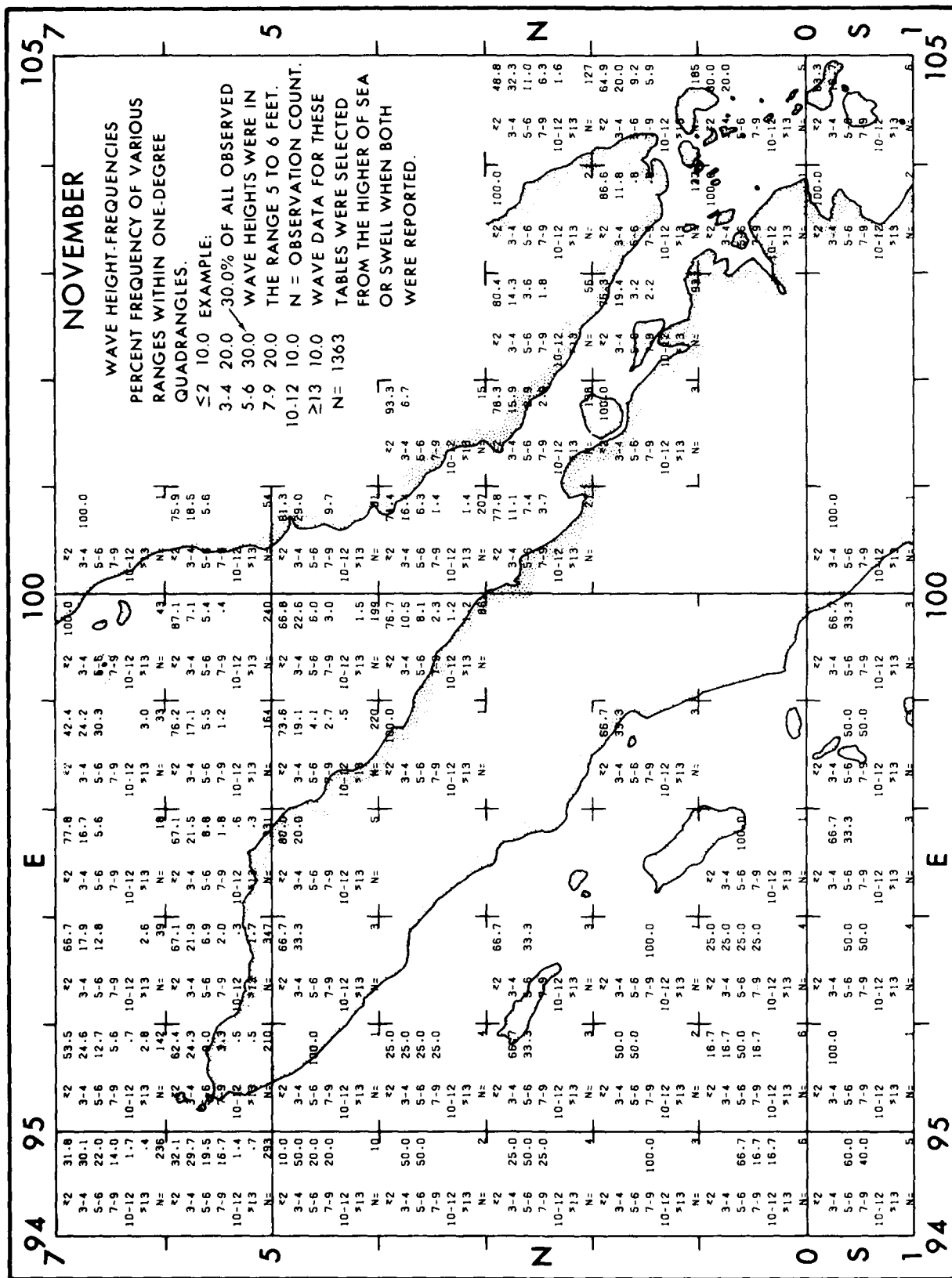
1% of all waves were from the S with heights from 6.75 meters

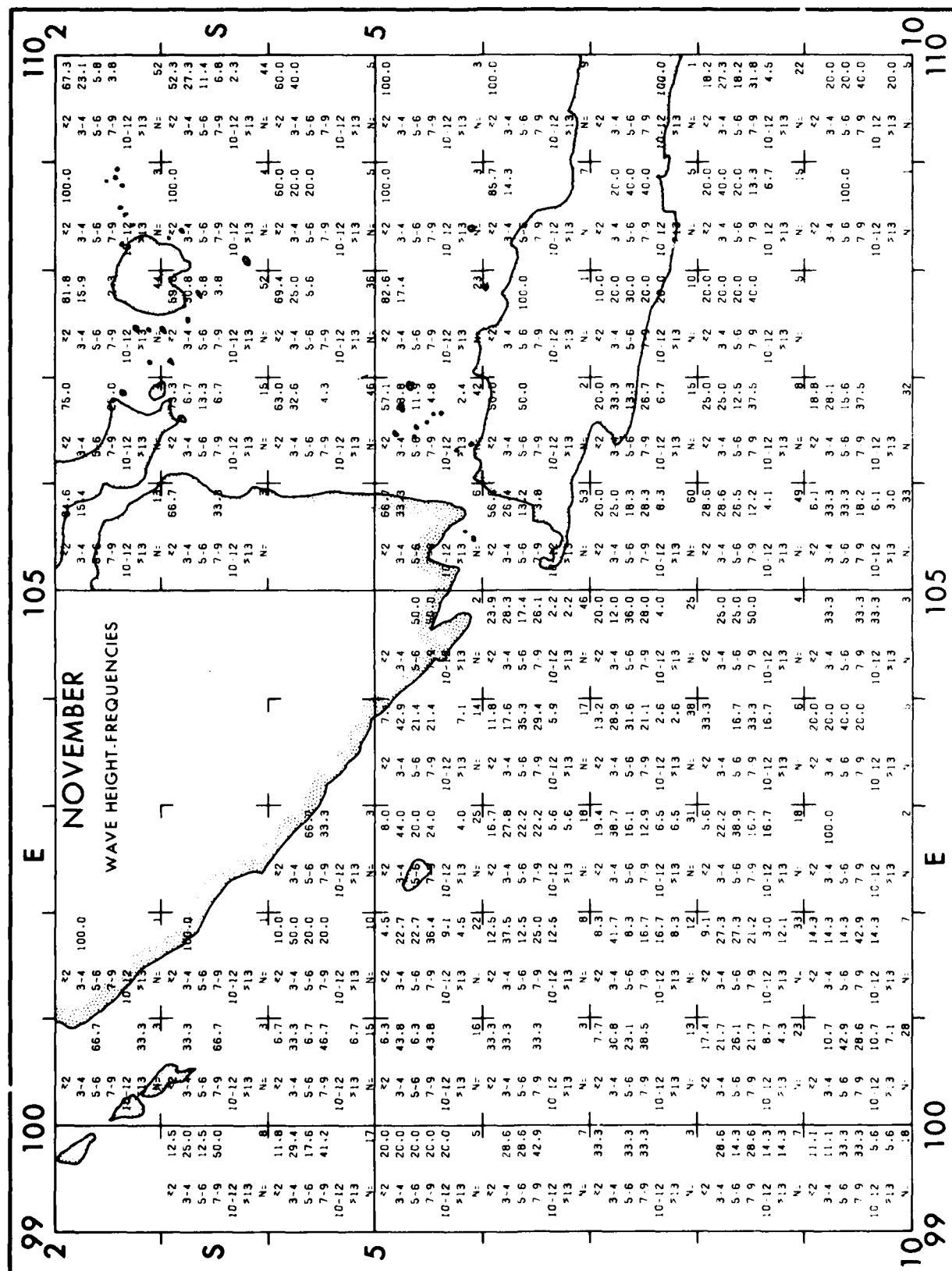
Number of observations

2% of the waves from all directions had heights ≥ 10 meters

WAVE HEIGHT INTERVAL

Feet 0.2 1.3 2.5 3.7 4.9 6.1 7.3 8.5 9.7 10.9 12.1 13.3 14.5 15.7 16.9 18.1 19.3 20.5 21.7 22.9 24.1 25.3 26.5 27.7 28.9 30.1 31.3 32.5 33.7 34.9 36.1 37.3 38.5 39.7 40.9 42.1 43.3 44.5 45.7 46.9 48.1 49.3 50.5 51.7 52.9 54.1 55.3 56.5 57.7 58.9 60.1 61.3 62.5 63.7 64.9 66.1 67.3 68.5 69.7 70.9 72.1 73.3 74.5 75.7 76.9 78.1 79.3 80.5 81.7 82.9 84.1 85.3 86.5 87.7 88.9 90.1 91.3 92.5 93.7 94.9 96.1 97.3 98.5 99.7 100.9 102.1 103.3 104.5 105.7 106.9 108.1 109.3 110.5 111.7 112.9 114.1 115.3 116.5 117.7 118.9 120.1 121.3 122.5 123.7 124.9 126.1 127.3 128.5 129.7 130.9 132.1 133.3 134.5 135.7 136.9 138.1 139.3 140.5 141.7 142.9 144.1 145.3 146.5 147.7 148.9 150.1 151.3 152.5 153.7 154.9 156.1 157.3 158.5 159.7 160.9 162.1 163.3 164.5 165.7 166.9 168.1 169.3 170.5 171.7 172.9 174.1 175.3 176.5 177.7 178.9 180.1 181.3 182.5 183.7 184.9 186.1 187.3 188.5 189.7 190.9 192.1 193.3 194.5 195.7 196.9 198.1 199.3 200.5 201.7 202.9 204.1 205.3 206.5 207.7 208.9 210.1 211.3 212.5 213.7 214.9 216.1 217.3 218.5 219.7 220.9 222.1 223.3 224.5 225.7 226.9 228.1 229.3 230.5 231.7 232.9 234.1 235.3 236.5 237.7 238.9 240.1 241.3 242.5 243.7 244.9 246.1 247.3 248.5 249.7 250.9 252.1 253.3 254.5 255.7 256.9 258.1 259.3 260.5 261.7 262.9 264.1 265.3 266.5 267.7 268.9 270.1 271.3 272.5 273.7 274.9 276.1 277.3 278.5 279.7 280.9 282.1 283.3 284.5 285.7 286.9 288.1 289.3 290.5 291.7 292.9 294.1 295.3 296.5 297.7 298.9 300.1 301.3 302.5 303.7 304.9 306.1 307.3 308.5 309.7 310.9 312.1 313.3 314.5 315.7 316.9 318.1 319.3 320.5 321.7 322.9 324.1 325.3 326.5 327.7 328.9 330.1 331.3 332.5 333.7 334.9 336.1 337.3 338.5 339.7 340.9 342.1 343.3 344.5 345.7 346.9 348.1 349.3 350.5 351.7 352.9 354.1 355.3 356.5 357.7 358.9 360.1 361.3 362.5 363.7 364.9 366.1 367.3 368.5 369.7 370.9 372.1 373.3 374.5 375.7 376.9 378.1 379.3 380.5 381.7 382.9 384.1 385.3 386.5 387.7 388.9 390.1 391.3 392.5 393.7 394.9 396.1 397.3 398.5 399.7 400.9 402.1 403.3 404.5 405.7 406.9 408.1 409.3 410.5 411.7 412.9 414.1 415.3 416.5 417.7 418.9 420.1 421.3 422.5 423.7 424.9 426.1 427.3 428.5 429.7 430.9 432.1 433.3 434.5 435.7 436.9 438.1 439.3 440.5 441.7 442.9 444.1 445.3 446.5 447.7 448.9 450.1 451.3 452.5 453.7 454.9 456.1 457.3 458.5 459.7 460.9 462.1 463.3 464.5 465.7 466.9 468.1 469.3 470.5 471.7 472.9 474.1 475.3 476.5 477.7 478.9 480.1 481.3 482.5 483.7 484.9 486.1 487.3 488.5 489.7 490.9 492.1 493.3 494.5 495.7 496.9 498.1 499.3 500.5 501.7 502.9 504.1 505.3 506.5 507.7 508.9 510.1 511.3 512.5 513.7 514.9 516.1 517.3 518.5 519.7 520.9 522.1 523.3 524.5 525.7 526.9 528.1 529.3 530.5 531.7 532.9 534.1 535.3 536.5 537.7 538.9 540.1 541.3 542.5 543.7 544.9 546.1 547.3 548.5 549.7 550.9 552.1 553.3 554.5 555.7 556.9 558.1 559.3 560.5 561.7 562.9 564.1 565.3 566.5 567.7 568.9 570.1 571.3 572.5 573.7 574.9 576.1 577.3 578.5 579.7 580.9 582.1 583.3 584.5 585.7 586.9 588.1 589.3 590.5 591.7 592.9 594.1 595.3 596.5 597.7 598.9 600.1 601.3 602.5 603.7 604.9 606.1 607.3 608.5 609.7 610.9 612.1 613.3 614.5 615.7 616.9 618.1 619.3 620.5 621.7 622.9 624.1 625.3 626.5 627.7 628.9 630.1 631.3 632.5 633.7 634.9 636.1 637.3 638.5 639.7 640.9 642.1 643.3 644.5 645.7 646.9 648.1 649.3 650.5 651.7 652.9 654.1 655.3 656.5 657.7 658.9 660.1 661.3 662.5 663.7 664.9 666.1 667.3 668.5 669.7 670.9 672.1 673.3 674.5 675.7 676.9 678.1 679.3 680.5 681.7 682.9 684.1 685.3 686.5 687.7 688.9 690.1 691.3 692.5 693.7 694.9 696.1 697.3 698.5 699.7 700.9 702.1 703.3 704.5 705.7 706.9 708.1 709.3 710.5 711.7 712.9 714.1 715.3 716.5 717.7 718.9 720.1 721.3 722.5 723.7 724.9 726.1 727.3 728.5 729.7 730.9 732.1 733.3 734.5 735.7 736.9 738.1 739.3 740.5 741.7 742.9 744.1 745.3 746.5 747.7 748.9 750.1 751.3 752.5 753.7 754.9 756.1 757.3 758.5 759.7 760.9 762.1 763.3 764.5 765.7 766.9 768.1 769.3 770.5 771.7 772.9 774.1 775.3 776.5 777.7 778.9 780.1 781.3 782.5 783.7 784.9 786.1 787.3 788.5 789.7 790.9 792.1 793.3 794.5 795.7 796.9 798.1 799.3 800.5 801.7 802.9 804.1 805.3 806.5 807.7 808.9 810.1 811.3 812.5 813.7 814.9 816.1 817.3 818.5 819.7 820.9 822.1 823.3 824.5 825.7 826.9 828.1 829.3 830.5 831.7 832.9 834.1 835.3 836.5 837.7 838.9 840.1 841.3 842.5 843.7 844.9 846.1 847.3 848.5 849.7 850.9 852.1 853.3 854.5 855.7 856.9 858.1 859.3 860.5 861.7 862.9 864.1 865.3 866.5 867.7 868.9 870.1 871.3 872.5 873.7 874.9 876.1 877.3 878.5 879.7 880.9 882.1 883.3 884.5 885.7 886.9 888.1 889.3 890.5 891.7 892.9 894.1 895.3 896.5 897.7 898.9 900.1 901.3 902.5 903.7 904.9 906.1 907.3 908.5 909.7 910.9 912.1 913.3 914.5 915.7 916.9 918.1 919.3 920.5 921.7 922.9 924.1 925.3 926.5 927.7 928.9 930.1 931.3 932.5 933.7 934.9 936.1 937.3 938.5 939.7 940.9 942.1 943.3 944.5 945.7 946.9 948.1 949.3 950.5 951.7 952.9 954.1 955.3 956.5 957.7 958.9 960.1 961.3 962.5 963.7 964.9 966.1 967.3 968.5 969.7 970.9 972.1 973.3 974.5 975.7 976.9 978.1 979.3 980.5 981.7 982.9 984.1 985.3 986.5 987.7 988.9 990.1 991.3 992.5 993.7 994.9 996.1 997.3 998.5 999.7 1000.9 1002.1 1003.3 1004.5 1005.7 1006.9 1008.1 1009.3 1010.5 1011.7 1012.9 1014.1 1015.3 1016.5 1017.7 1018.9 1020.1 1021.3 1022.5 1023.7 1024.9 1026.1 1027.3 1028.5 1029.7 1030.9 1032.1 1033.3 1034.5 1035.7 1036.9 1038.1 1039.3 1040.5 1041.7 1042.9 1044.1 1045.3 1046.5 1047.7 1048.9 1050.1 1051.3 1052.5 1053.7 1054.9 1056.1 1057.3 1058.5 1059.7 1060.9 1062.1 1063.3 1064.5 1065.7 1066.9 1068.1 1069.3 1070.5 1071.7 1072.9 1074.1 1075.3 1076.5 1077.7 1078.9 1080.1 1081.3 1082.5 1083.7 1084.9 1086.1 1087.3 1088.5 1089.7 1090.9 1092.1 1093.3 1094.5 1095.7 1096.9 1098.1 1099.3 1100.5 1101.7 1102.9 1104.1 1105.3 1106.5 1107.7 1108.9 1110.1 1111.3 1112.5 1113.7 1114.9 1116.1 1117.3 1118.5 1119.7 1120.9 1122.1 1123.3 1124.5 1125.7 1126.9 1128.1 1129.3 1130.5 1131.7 1132.9 1134.1 1135.3 1136.5 1137.7 1138.9 1140.1 1141.3 1142.5 1143.7 1144.9 1146.1 1147.3 1148.5 1149.7 1150.9 1152.1 1153.3 1154.5 1155.7 1156.9 1158.1 1159.3 1160.5 1161.7 1162.9 1164.1 1165.3 1166.5 1167.7 1168.9 1170.1 1171.3 1172.5 1173.7 1174.9 1176.1 1177.3 1178.5 1179.7 1180.9 1182.1 1183.3 1184.5 1185.7 1186.9 1188.1 1189.3 1190.5 1191.7 1192.9 1194.1 1195.3 1196.5 1197.7 1198.9 1200.1 1201.3 1202.5 1203.7 1204.9 1206.1 1207.3 1208.5 1209.7 1210.9 1212.1 1213.3 1214.5 1215.7 1216.9 1218.1 1219.3 1220.5 1221.7 1222.9 1224.1 1225.3 1226.5 1227.7 1228.9 1230.1 1231.3 1232.5 1233.7 1234.9 1236.1 1237.3 1238.5 1239.7 1240.9 1242.1 1243.3 1244.5 1245.7 1246.9 1248.1 1249.3 1250.5 1251.7 1252.9 1254.1 1255.3 1256.5 1257.7 1258.9 1260.1 1261.3 1262.5 1263.7 1264.9 1266.1 1267.3 1268.5 1269.7 1270.9 1272.1 1273.3 1274.5 1275.7 1276.9 1278.1 1279.3 1280.5 1281.7 1282.9 1284.1 1285.3 1286.5 1287.7 1288.9 1290.1 1291.3 1292.5 1293.7 1294.9 1296.1 1297.3 1298.5 1299.7 1300.9 1302.1 1303.3 1304.5 1305.7 1306.9 1308.1 1309.3 1310.5 1311.7 1312.9 1314.1 1315.3 1316.5 1317.7 1318.9 1320.1 1321.3 1322.5 1323.7 1324.9 1326.1 1327.3 1328.5 1329.7 1330.9 1332.1 1333.3 1334.5 1335.7 1336.9 1338.1 1339.3 1340.5 1341.7 1342.9 1344.1 1345.3 1346.5 1347.7 1348.9 1350.1 1351.3 1352.5 1353.7 1354.9 1356.1 1357.3 1358.5 1359.7 1360.9 1362.1 1363.3 1364.5 1365.7 1366.9 1368.1 1369.3 1370.5 1371.7 1372.9 1374.1 1375.3 1376.5 1377.7 1378.9 1380.1 1381.3 1382.5 1383.7 1384.9 1386.1 1387.3 1388.5 1389.7 1390.9 1392.1 1393.3 1394.5 1395.7 1396.9 1398.1 1399.3 1400.5 1401.7 1402.9 1404.1 1405.3 1406.5 1407.7 1408.9 1410.1 1411.3 1412.5 1413.7 1414.9 1416.1 1417.3 1418.5 1419.7 1420.9 1422.1 1423.3 1424.5 1425.7 1426.9 1428.1 1429.3 1430.5 1431.7 1432.9 1434.1 1435.3 1436.5 1437.7 1438.9 1440.1 1441.3 1442.5 1443.7 1444.9 1446.1 1447.3 1448.5 1449.7 1450.9 1452.1 1453.3 1454.5 1455.7 1456.9 1458.1 1459.3 1460.5 1461.7 1462.9 1464.1 1465.3 1466.5 1467.7 1468.9 1470.1 1471.3 1472.5 1473.7 1474.9 1476.1 1477.3 1478.5 1479.7 1480.9 1482.1 1483.3 1484.5 1485.7 1486.9 1488.1 1489.3 1490.5 1491.7 1492.9 1494.1 1495.3 1496.5 1497.7 1498.9 1500.1 1501.3 1502.5 1503.7 1504.9 1506.1 1507.3 1508.5 1509.7 1510.9 1512.1 1513.3 1514.5 1515.7 1516.9 1518.1 1519.3 1520.5 1521.7 1522.9 1524.1 1525.3 1526.5 1527.7 1528.9 1530.1 1531.3 1532.5 1533.7 1534.9 1536.1 1537.3 1538.5 1539.7 1540.9 1542.1 1543.3 1544.5 1545.7 1546.9 1548.1 1549.3 1550.5 1551.7 1552.9 1554.1 1555.3 1556.5 1557.7 1558.9 1560.1 1561.3 1562.5 1563.7 1564.9 1566.1 1567.3 1568.5 1569.7 1570.9 1572.1 1573.3 1574.5 1575.7 1576.9 1578.1 1579.3 1580.5 1581.7 1582.9 1584.1 1585.3 1586.5 1587.7 1588.9 1590.1 1591.3 1592.5 1593.7 1594.9 1596.1 1597.3 1598.5 1599.7 1600.9 1602.1 1603.3 1604.5 1605.7 1606.9 1608.1 1609.3 1610.5 1611.7 1612.9 1614.1 1615.3 1616.5 1617.7 1618.9 1620.1 1621.3 1622.5 1623.7 1624.9 1626.1 1627.3 1628.5 1629.7 1630.9 1632.1 1633.3 1634.5 1635.7 1636.9 1638.1 1639.3 1640.5 1641.7 1642.9 1644.1 1645.3 1646.5 1647.7 1648.9 1650.1 1651.3 1652.5 1653.7 1654.9 1656.1 1657.3 1658.5 1659.7 1660.9 1662.1 1663.3 1664.5 1665.7 1666.9 1668.1 1669.3 1670.5 1671.7 1672.9 1674.1 1675.3 1676.5 1677.7 1678.9 1680.1 1681.3 1682.5 1683.7 1684.9 1686.1 1687.3 1688.5 1689.7 1690.9 1692.1 1693.3 1694.5 1695.7 1696.9 1698.1 1699.3 1700.5 1701.7 1702.9 1704.1 1705.3 1706.5 1707.7 1708.9 1710.1 1711.3 1712.5 1713.7 1714.9 1716.1 1717.3 1718.5 1719.7 1720.9 1722.1 1723.3 1724.5 1725.7 1726.9 1728.1 1729.3 1730.5 1731.7 1732.9 1734.1 1735.3 1736.5 1737.7 1738.9 1740.1 1741.3 1742.5 1743.7 1744.9 1746.1 1747.3 1748.5 1749.7 1750.9 1752.1 1753.3 1754.5 1755.7 1756.9 1758.1 1759.3 1760.5 1761.7 1762.9 1764.1 1765.3 1766.5 1767.7 1768.9 1770.1 1771.3 1772.5 1773.7 1774.9 1776.1 1777.3 1778.5 1779.7 1780.9 1782.1 1783.3 1784.5 1785.7 1786.9 1788.1 1789.3 1790.5 1791.7 1792.9 1794.1 1795.3 1796.5 1797.7 1798.9 1800.1 1801.3 1802.5 1803.7 1804.9 1806.1 1807.3 1808.5 1809.7 1810.9 1812.1 1813.3 1814.5 1815.7 1816.9 1818.1 1819.3 1820.5 1821.7 1822.9 1824.1 1825.3 1826.5 1827.7 1828.9 1830.1 1831.3 1832.5 1833.7 1834.9 1836.1 1837.3 1838.5 1839.7 1840.9 1842.1 1843.3 1844.5 1845.7 1846.9 1848.1 1849.3 1850.5 1851.7 1852.9 1854.1 1855.3 1856.5 1857.7 1858.9 1860.1 1861.3 1862.5 1863.7 1864.9 1866.1 1867.3 1868.5 1869.7 1870.9 1872.1 1873.3 1874.5 1875.7 1876.9 1878.1 1879.3 1880.5 1881.7 1882.9 1884.1 1885.3 1886.5 1887.7 1888.9 1890.1 1891.3 1892.5 1893.7 1894.9 1896.1 1897.3 1898.5 1899.7 1900.9 1902.1 1903.3 1904.5 1905.7 1906.9 1908.1 1909.3 1910.5 1911.7 1912.9 1914.1 1915.3 1916.5 1917.7 1918.9 1920.1 1921.3 1922.5 1923.7 1924.9 1926.1 1927.3 1928.5 1929.7 1930.9 1932.1 1933.3 1934.5 1935.7 1936.9 1938.1 1939.3 1940.5 1941.7 1942.9 1944.1 1945.3 1946.5 1947.7 1948.9 1950.1 1951.3 1952.5 1953.7 1954.9 1956.1 1957.3 1958.5 1959.7 1960.9 1962.1 1963.3 1964.5 1965.7 1966.9 1968.1 1969.3 1970.5 1971.7 1972.9 1974.1 1975.3 1976.5 1977.7 1978.9 1980.1 1981.3 1982.5 1983.7 1984.9 1986.1 1987.3 1988.5 1989.7 1990.9 1992.1 1993.3 1994.5 1995.7 1996.9 1998.1 1999.3 2000.5 2001.7 2002.9 2004.1 2005.3 2006.5 2007.7 2008.9 2010.1 2011.3 2012.5 2013.7 2014.9 2016.1 2017.3 2018.5 2019.7 2020.9 2022.1 2023.3 2024.5 2025.7 2026.9 2028.1 2029.3 2030.5 2031.7 2032.9 2034.1 2035.3 2036.5 2037.7 2038.9 2040.1 2041.3 2042.5 2043.7 2044.9 2046.1 2047.3 2048.5 2049.7 2050.9 2052.1 2053.3 2054.5 2055.7 2056.9 2058.1 2059.3 2060.5 2061.7 2062.9 2064.1 2065.3 2066.5 2067.7 2068.9 2070.1 2071.3 2072.5 2073.7 2074.9 2076.1 2077.3 2078.5 2079.7 2080.9 2082.1 2083.3 2084.5 2085.7 2086.9 2088.1 2089.3 2090.5 2091.7 2092.9 2094.1 2095.3 2096.5 2097.7 2098.9 2100.1 2101.3 2102.5 2103.7 2104.9 2106.1 2107.3 2108.5 2109.7 2110.9 2112.1 2113.3 2114.5 2115.7 2116.9 2118.1 2119.3 2120.5 2121.7 2122.9 2124.1 2125.3 2126.5 2127.7 2128.9 2130.1 2131.3 2132.5 2133.7 2134.9 2136.1 2137.3 2138.5 2139.7 2140.9 2142.1 2143.3 2144.5 2145.7 2146.9 2148.1 2149.3 2150.5 2151.7 2152.9 2154.1 2155.3 2156.5 2157.7 2158.9 2160.1 2161.3 2162.5 2163.7 2164.9 2166.1 2167.3 2168.5 2169.7 2170.9 2172.1 2173.3 2174.5 2175.7 2176.9 2178.1 2179.3 2180.5 2181.7 2182.





DECEMBER CLOUD COVER

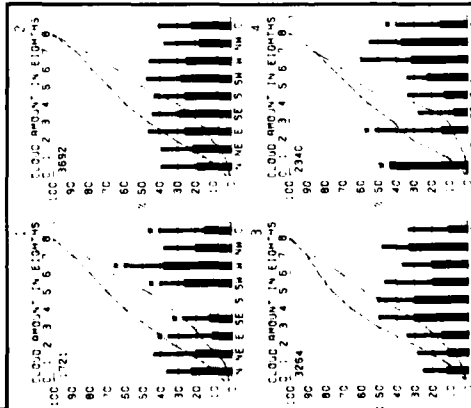
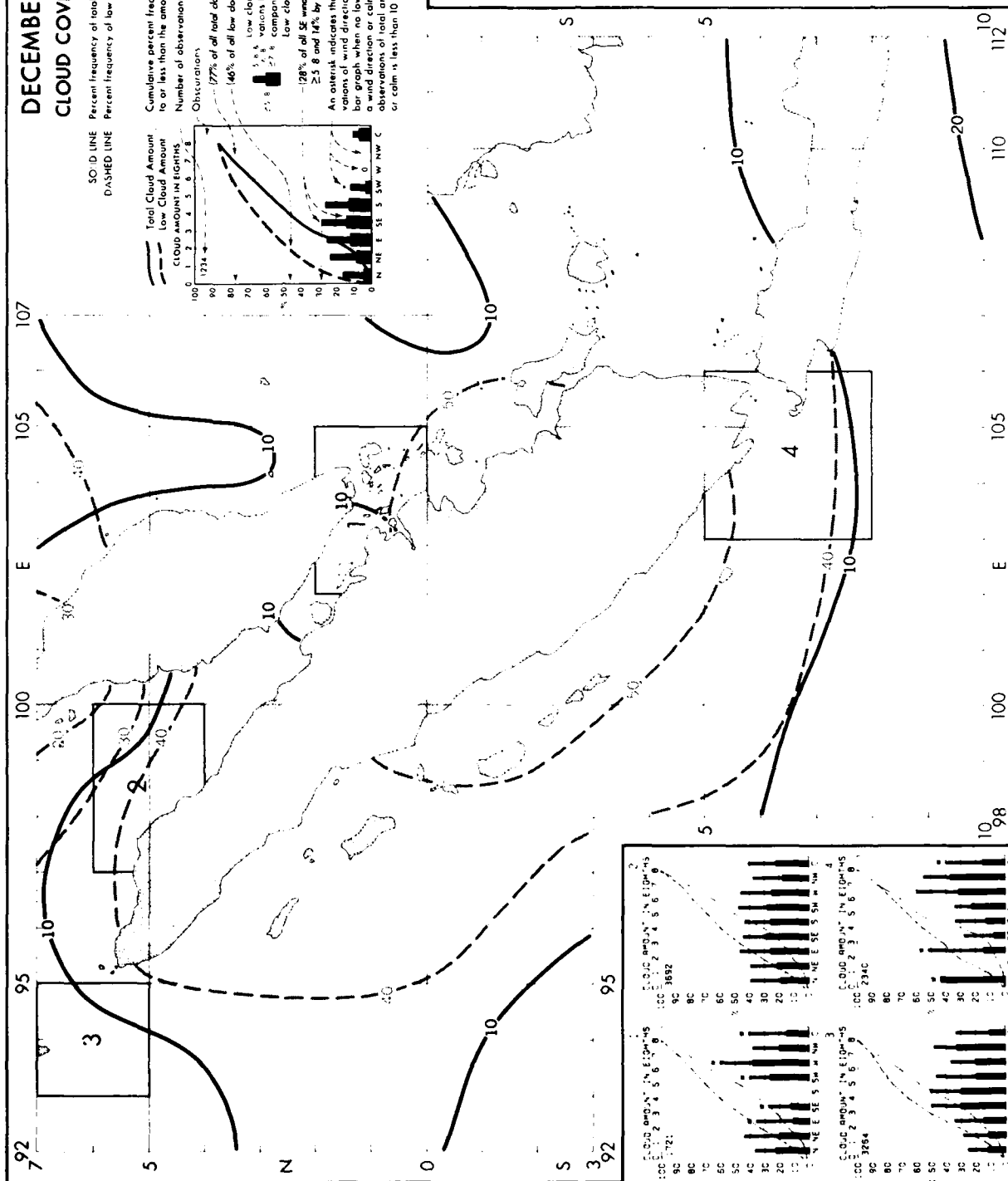
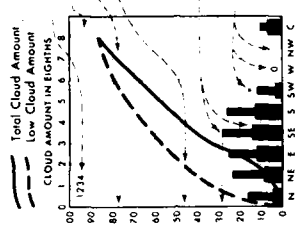
SOLID LINE Percent frequency of total cloud amount ≤ 7.8
DASHED LINE Percent frequency of low cloud amount ≤ 7.8

Cumulative percent frequency of indicated cloud amount equal to or less than the amount intersected by the curve

Number of observations

Observations
177% of all total cloud amounts were ≤ 7.8
146% of all low cloud amounts were ≤ 7.8
Low cloud amount Percent frequency of observations from each direction and calm that were accompanied by low cloud amounts ≥ 7.8 and ≥ 7.8
Low clouds are clouds with bases < 8000 feet
28% of all SE winds were accompanied by low cloud amounts ≥ 7.8
25% of all SE winds were accompanied by low cloud amounts ≥ 7.8

An asterisk indicates that the percentage is based on 10-30 observations of wind direction, total and low cloud amount. 0 replaces bar graph when no low cloud amounts ≥ 7.8 were observed with a wind direction or calm. 0 or bar is omitted when number of observations of total and low cloud amount from a wind direction or calm is less than 10

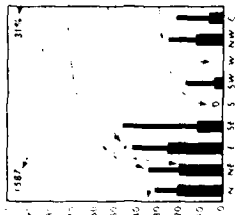


DECEMBER PRECIPITATION

SOLID LINE Percent frequency of observations reporting precipitation
DASHED LINE Percent frequency of observations reporting thunderstorm
and or lightning

Percent frequency of surface wind observations from each direction
and calm that were accompanied by precipitation subdivided into liquid free
including freezing rain and freezing drizzle and snow

Legend
Liquid
Snow

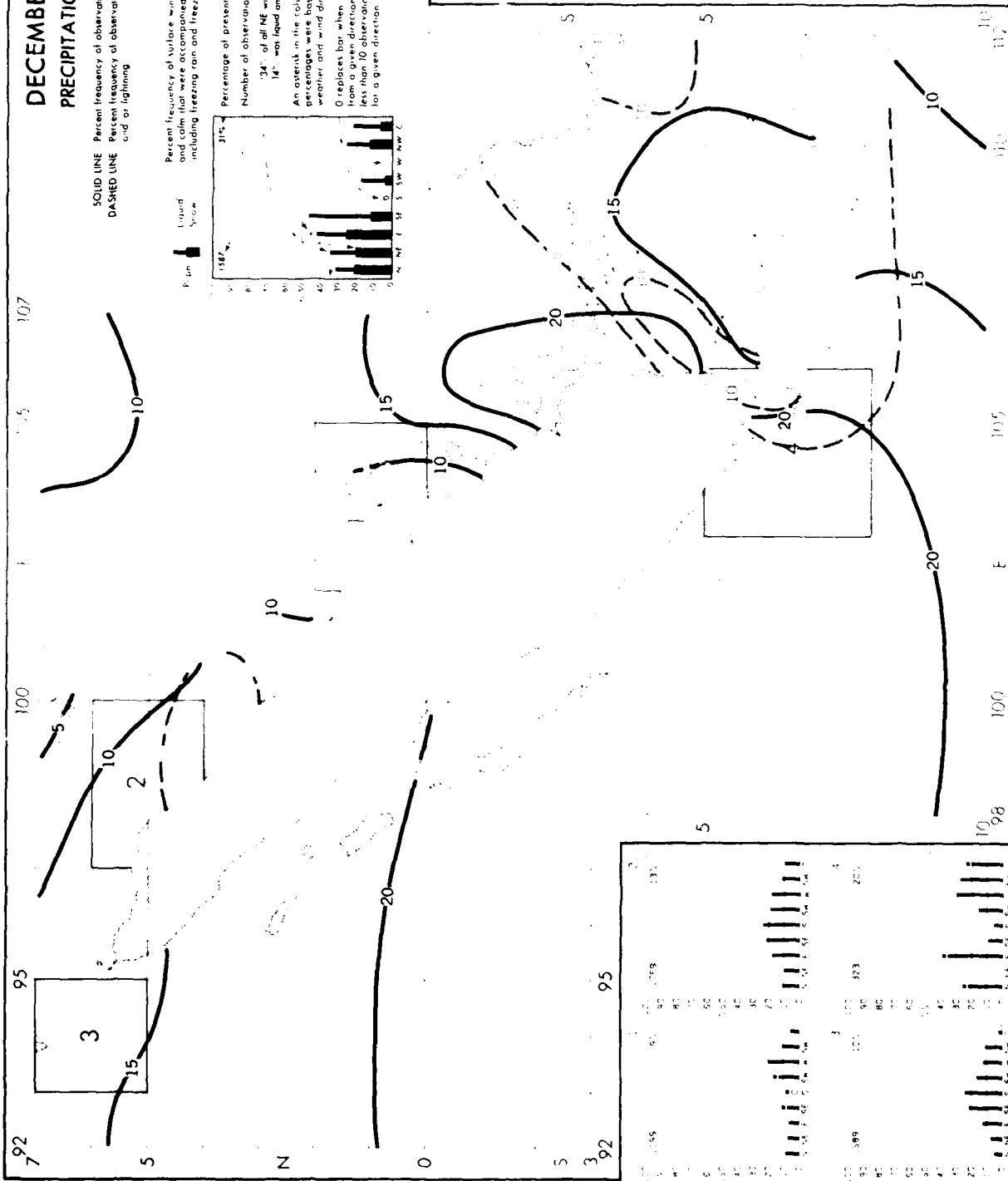


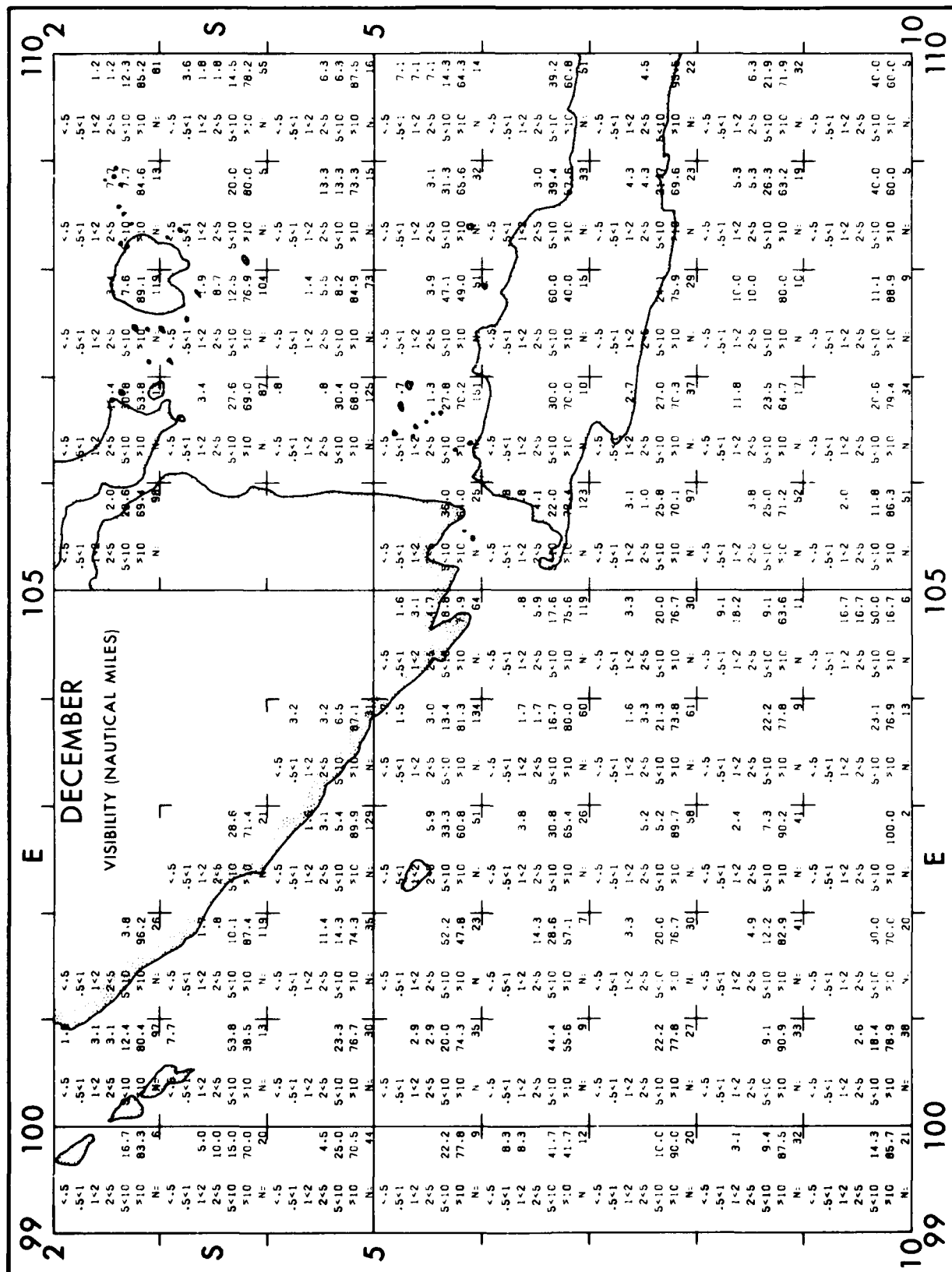
Percentage of present weather observations reporting precipitation
Number of observations

34% of all NE winds were accompanied by precipitation of which
14% was liquid and 20% was snow

An asterisk in the column for a given direction or calm indicates
percentages were based on 10 observations of present
weather and wind direction

0 replaces bar when no precipitation was observed with winds
from any direction. Calm has no bar graph is presented if
less than 10 observations containing present weather are reported
for a given direction or calm





DECEMBER

WIND-VISIBILITY-CLOUDINESS

SOLID LINE
Conditions for Carrier Operations
Percent frequency of optimum conditions (CC ≥ 5000 ft., for no LCC, Vby ≥ 5 N Mi. and Wind 11-21 kts)

DASHED LINE
Percent frequency of poor conditions Any one of the following continues poor conditions (CC < 500 ft., Vby < 1 N Mi., Wind ≤ 6 or ≥ 24 kts)

Satisfactory conditions between poor and optimum

Percent frequency of occurrence of specified wind speed in knots, visibility (Vby) in nautical miles, and low cloud ceiling (LCC) in hundreds of feet

Low cloud ceiling heights are estimated from the height of low clouds (h) when low cloud amount (N_L) is ≥ 5.8

12% of the observations reported wind speeds of 11-21 knots, a low cloud ceiling < 1000 feet and or visibility < 2 nautical miles

N.C. (no ceiling) includes bases of clouds ≥ 8000 feet as well as occurrences of N_L < 5.8

indices $< 5\%$ but > 0

Number of observations

WIND SPEED (knots)	0	4	11	22	33	44	55	66	77	88	99	100	111	122	133	144	155	166	177	188	199	200	211	222	233	244	255	266	277	288	299	300	311	322	333	344	355	366	377	388	399	400	411	422	433	444	455	466	477	488	499	500	511	522	533	544	555	566	577	588	599	600	611	622	633	644	655	666	677	688	699	700	711	722	733	744	755	766	777	788	799	800	811	822	833	844	855	866	877	888	899	900	911	922	933	944	955	966	977	988	999	1000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
ALL WINDS	0	10	11	22	33	44	55	66	77	88	99	100	111	122	133	144	155	166	177	188	199	200	211	222	233	244	255	266	277	288	299	300	311	322	333	344	355	366	377	388	399	400	411	422	433	444	455	466	477	488	499	500	511	522	533	544	555	566	577	588	599	600	611	622	633	644	655	666	677	688	699	700	711	722	733	744	755	766	777	788	799	800	811	822	833	844	855	866	877	888	899	900	911	922	933	944	955	966	977	988	999	1000																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																			
0-5	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

DECEMBER SCALAR MEAN WIND SPEED

SOLID LINE Mean scalar wind speed (knots)

Direction frequency (top scale) Bars represent percent frequency of winds observed from each direction. Speed frequency (bottom scale) Printed figures represent percent frequency of wind speeds observed from each direction

(4% of all winds were from the N)
indicates < 5% but > 0
(0% of all winds were from the S with a speed 22-27 knots.)
The scalar mean speed was 9.4 knots

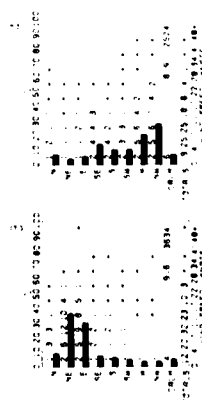
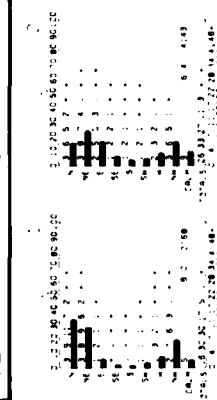
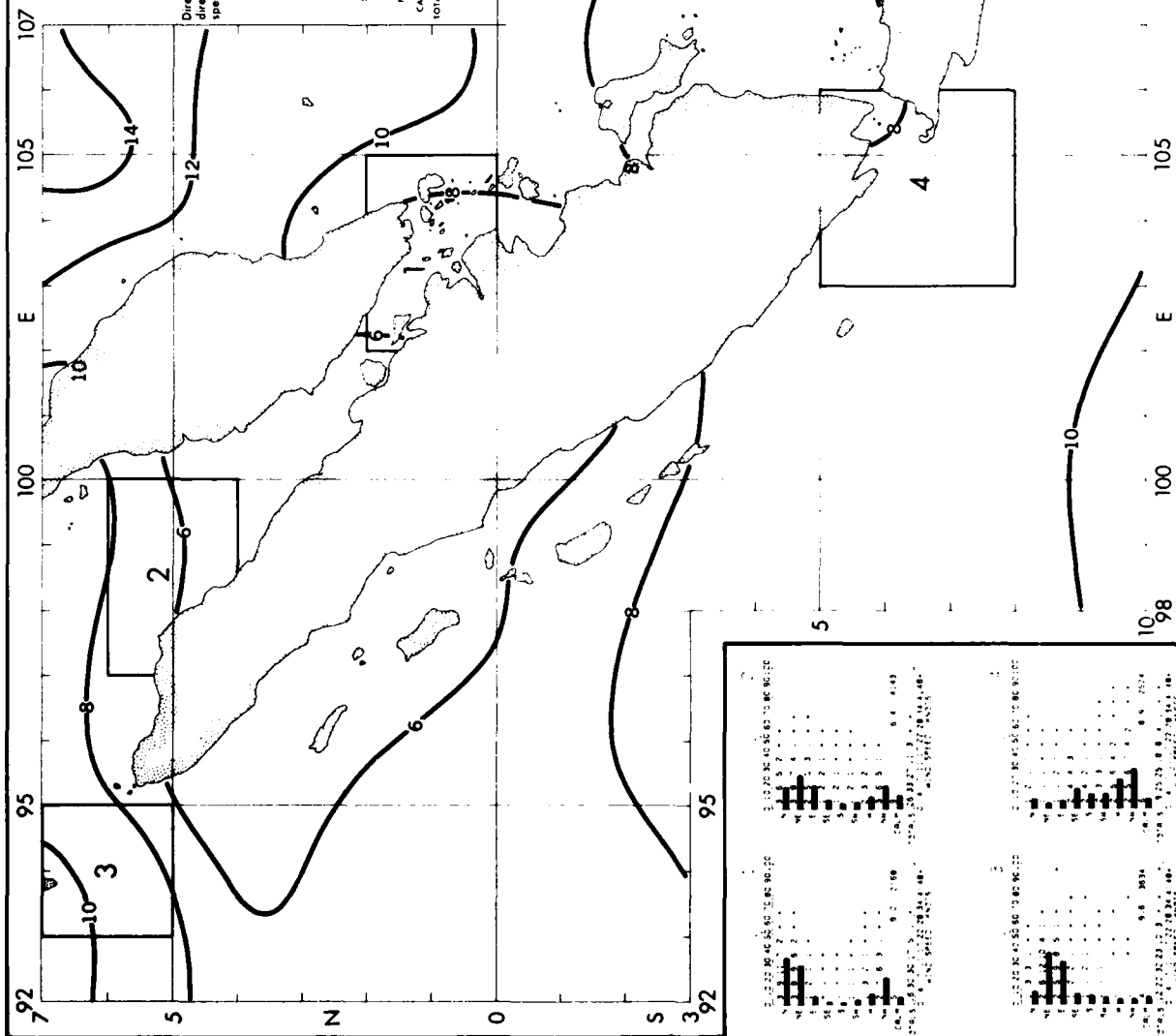
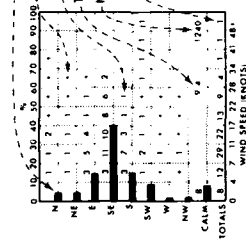
Number of observations

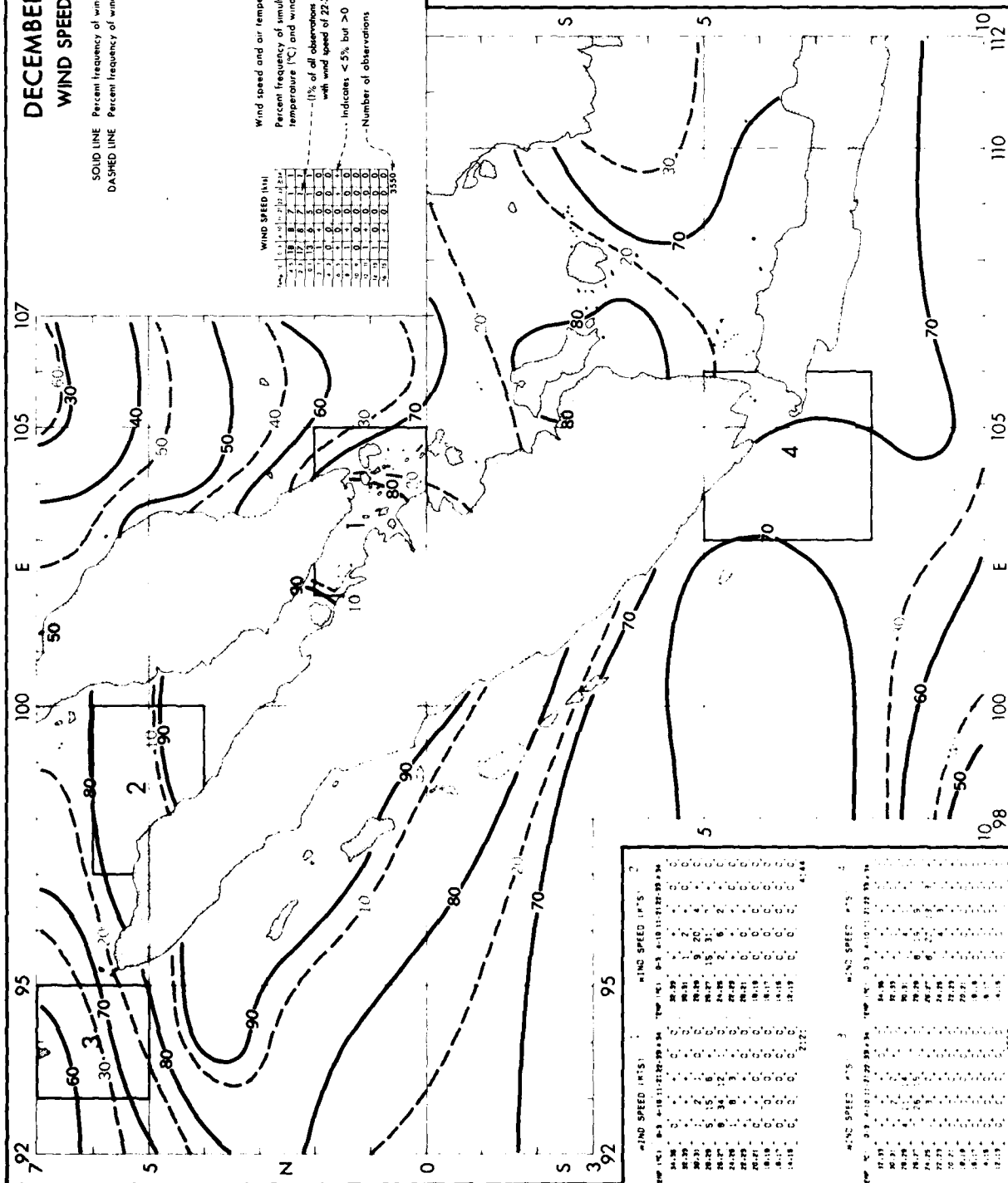
(0% of winds from all directions had wind speed ≥ 48 knots.)

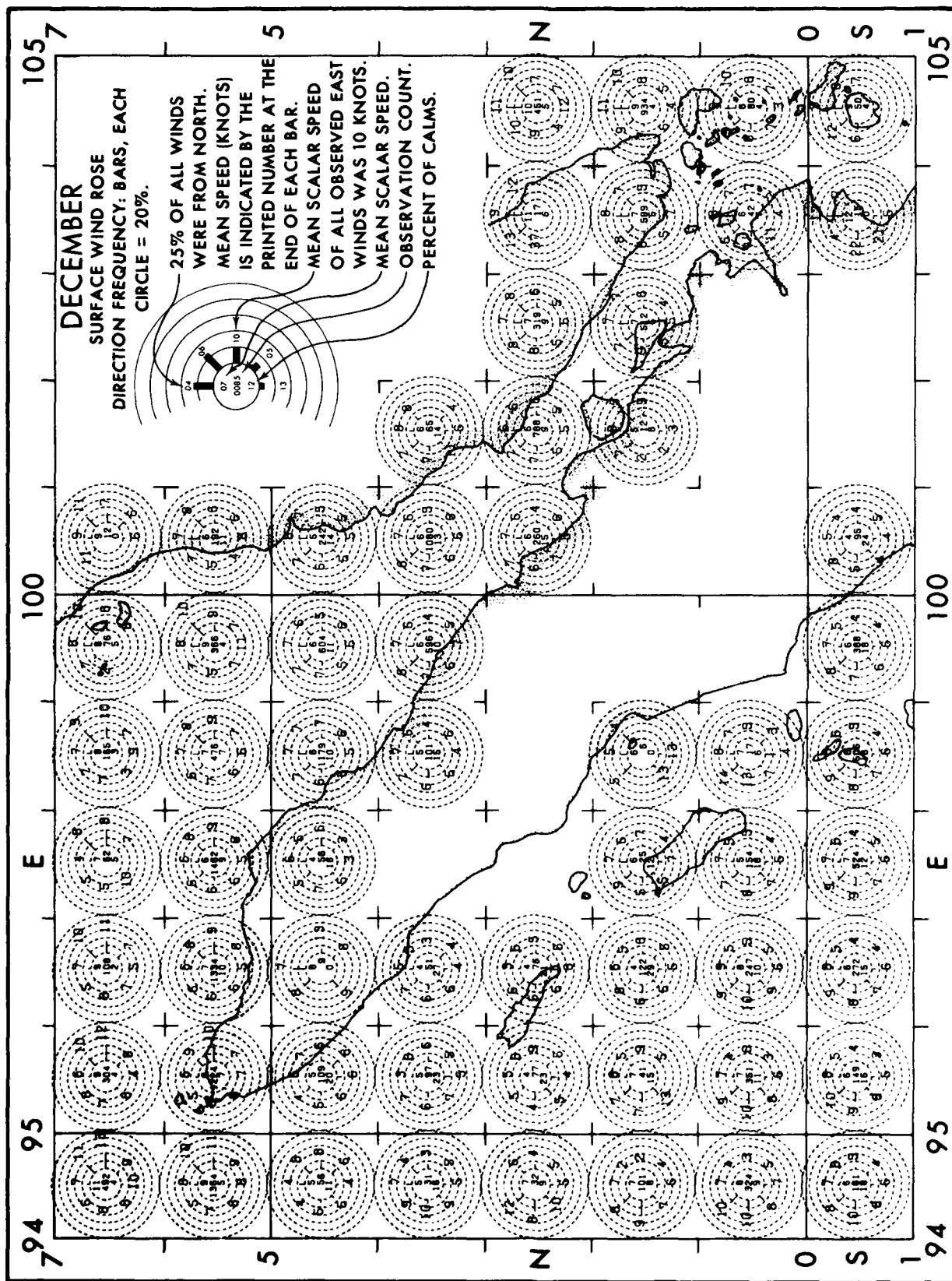
WIND SPEED INTERVAL (KNOTS)

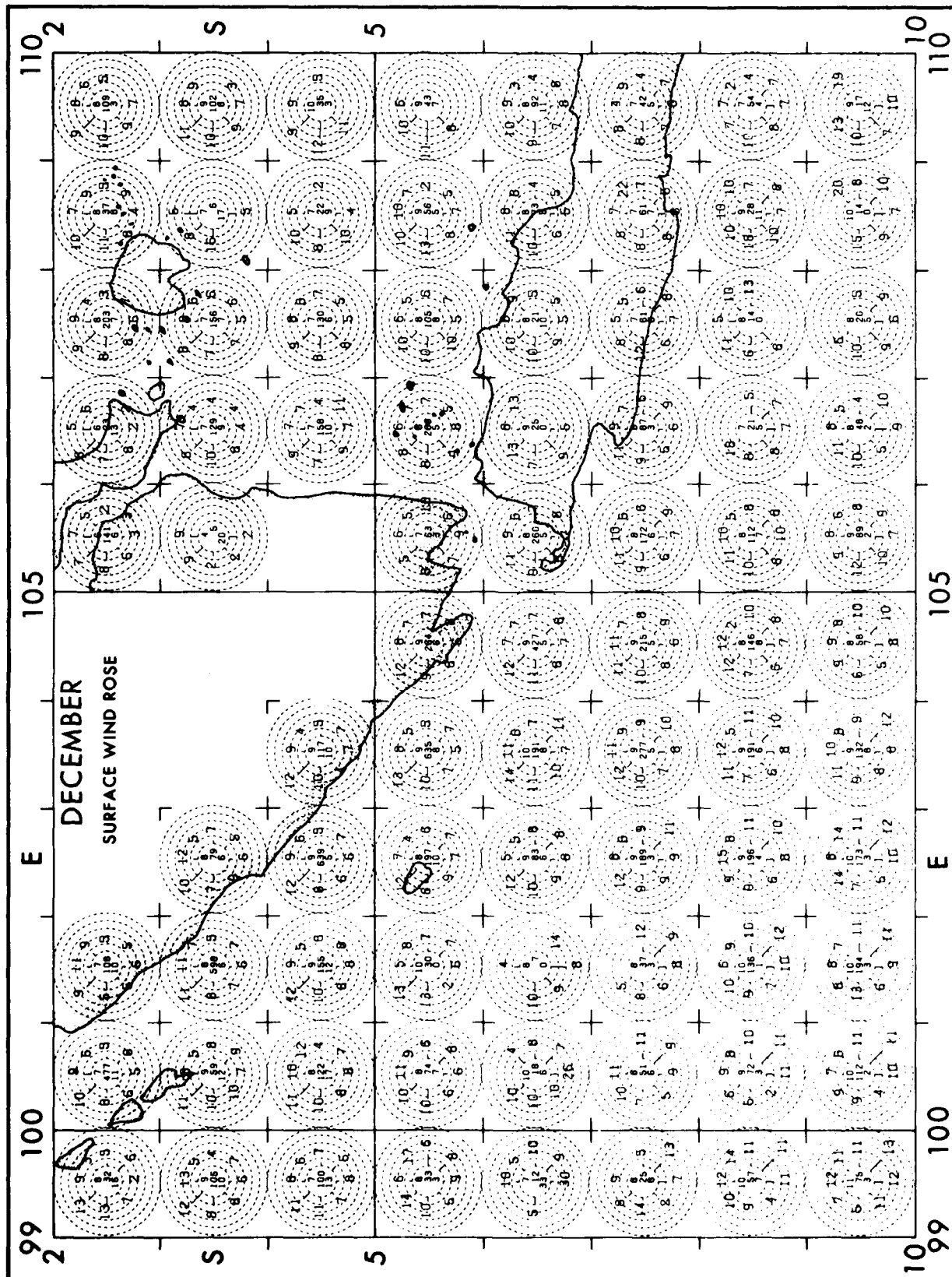
0 3 4 6 7 10 11 16 17 22 28 34 41 48

Printed scale on bottom of chart





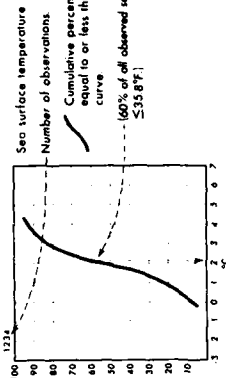




DECEMBER AIR AND SEA TEMPERATURE

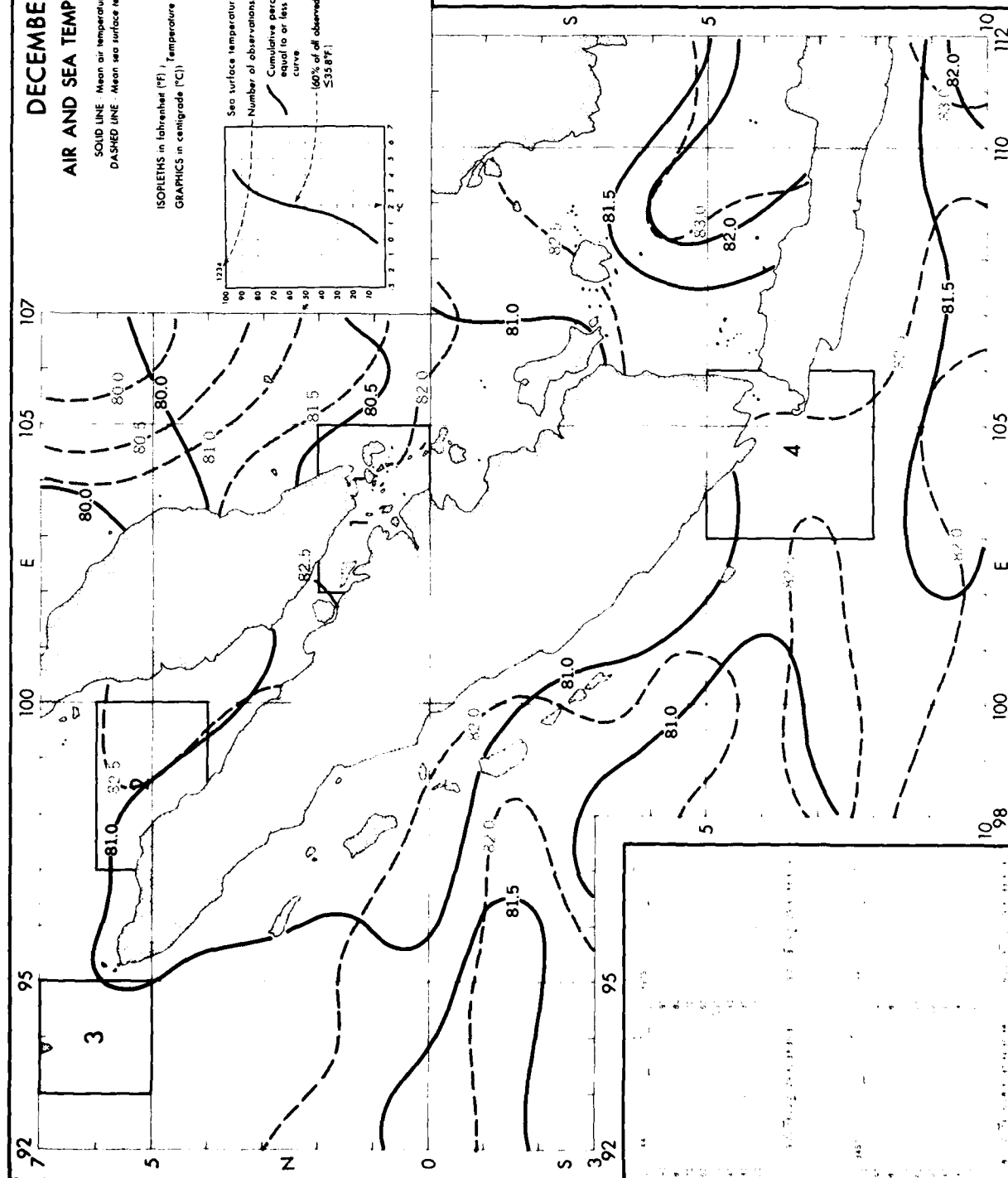
SOLID LINE - Mean air temperature (°F)
 DASHED LINE - Mean sea surface temperature (°F)

ISOPLETHS in Fahrenheit (°F) / temperature conversion table below.
 GRAPHICS in centigrade (°C)

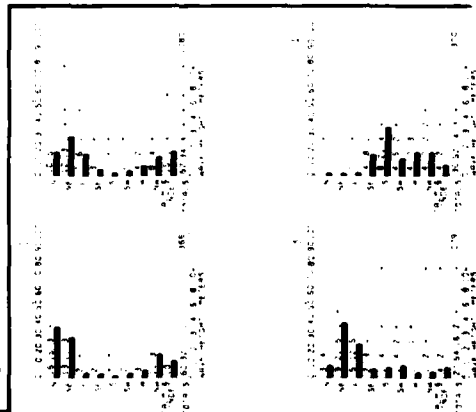


CONVERSION TABLE

°C	°F
16	60.8
17	62.6
18	64.4
19	66.2
20	68.0
21	69.8
22	71.6
23	73.4
24	75.2
25	77.0
26	78.8
27	80.6
28	82.4
29	84.2
30	86.0
31	87.8
32	89.6
33	91.4
34	93.2
35	95.0
36	96.8
37	98.6
38	100.4
39	102.2



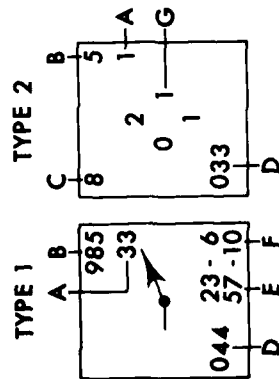
SOLID LINE Percent frequency of wave height ≥ 3 feet
DASHED LINE Percent frequency of wave height ≥ 8 feet



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 (°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.

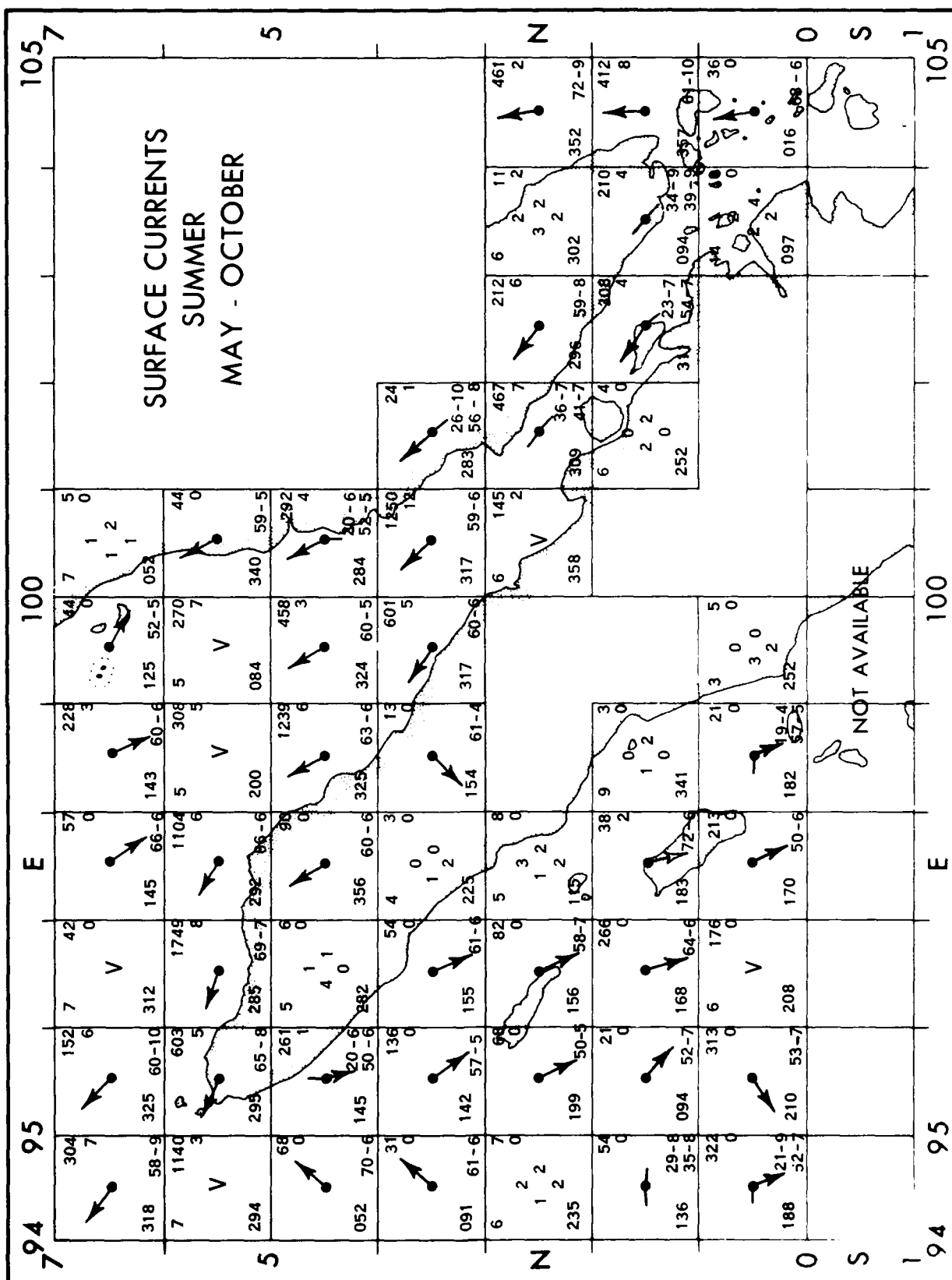
↗ Primary Current with Secondary Direction - Primary Current - 50 percent or more of all observations fall within three adjacent 45° sectors.

↗ 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.



AD-A115 323

NAVAL OCEANOGRAPHY COMMAND DETACHMENT ASHEVILLE NC
CLIMATIC STUDY OF THE MALACCA AND SUNDA STRAITS, NEAR COASTAL Z--ETC(U)
APR 82

F/G 4/2

UNCLASSIFIED

NL

3 of 3

AD-A115 323



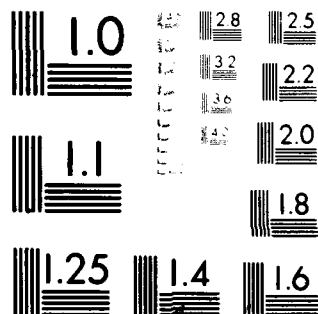
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DATE

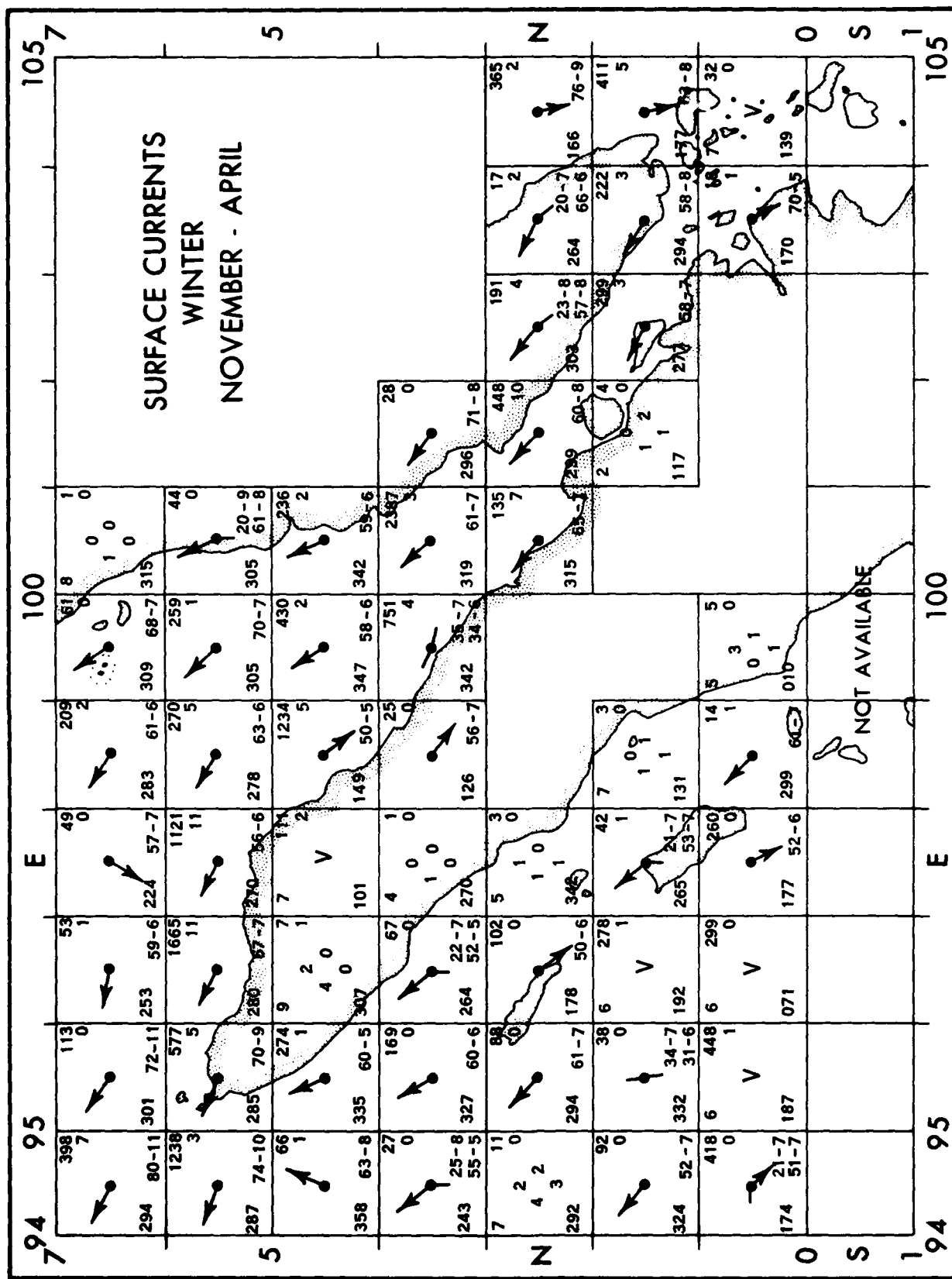
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07-82

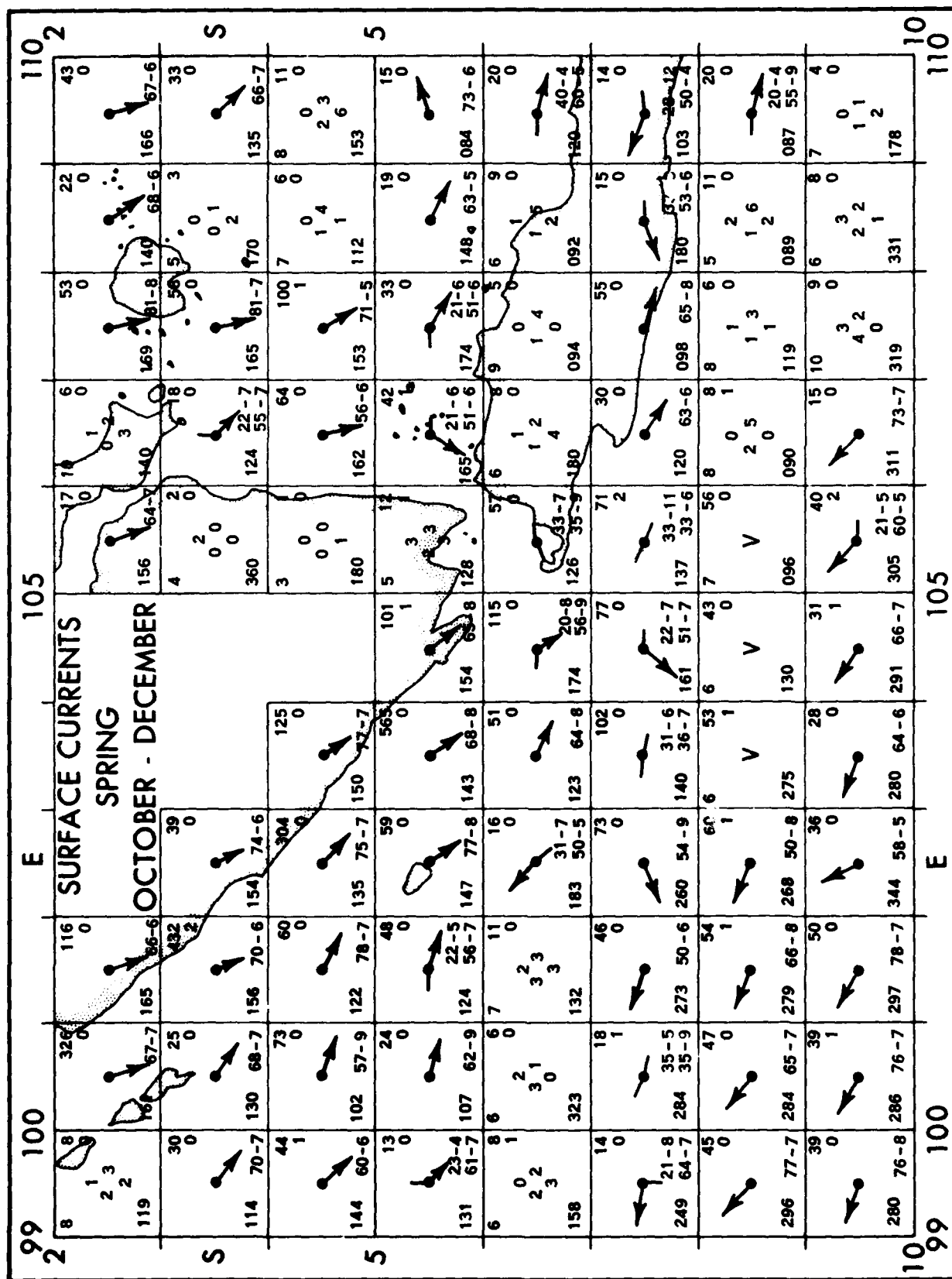
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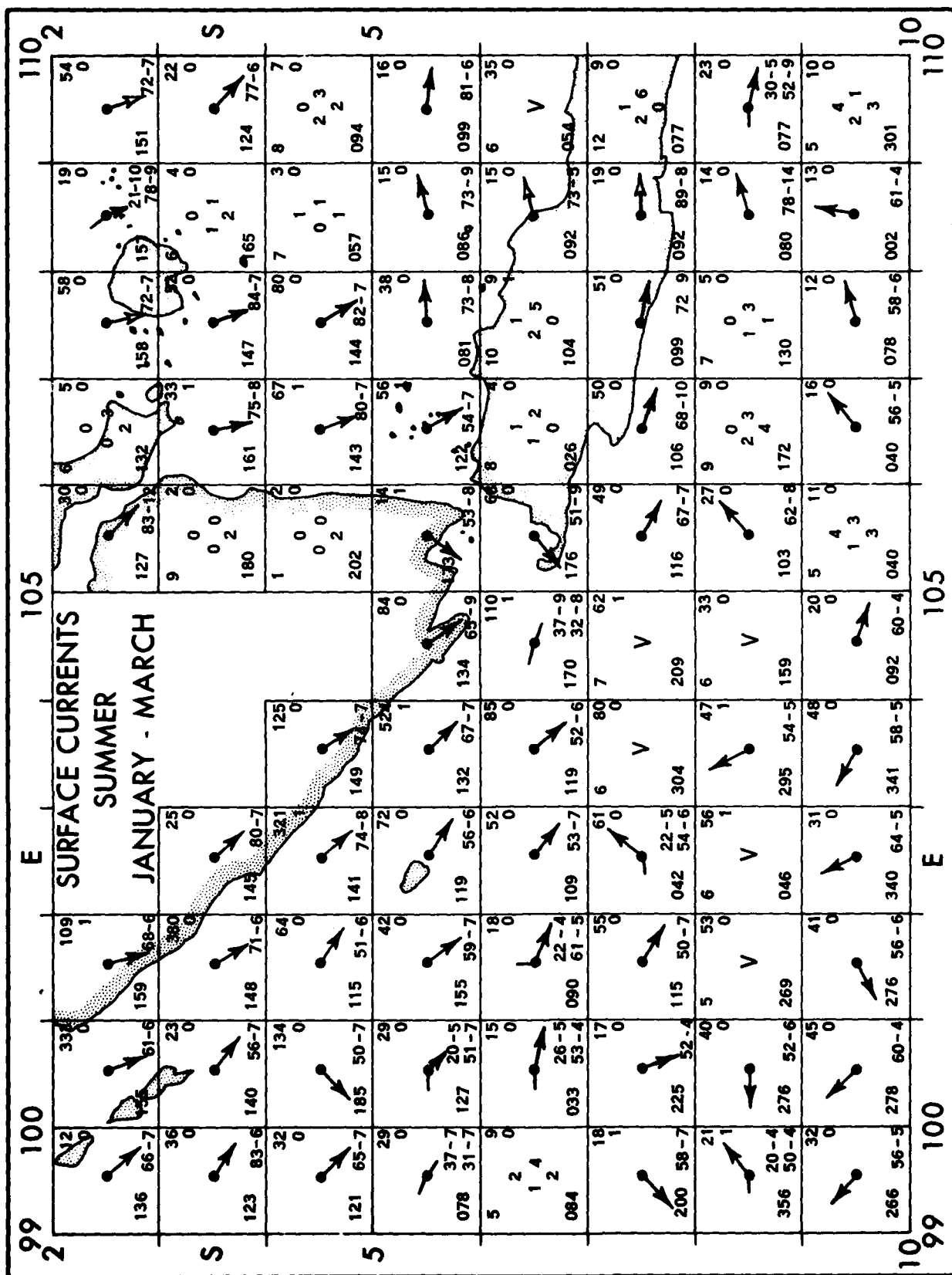


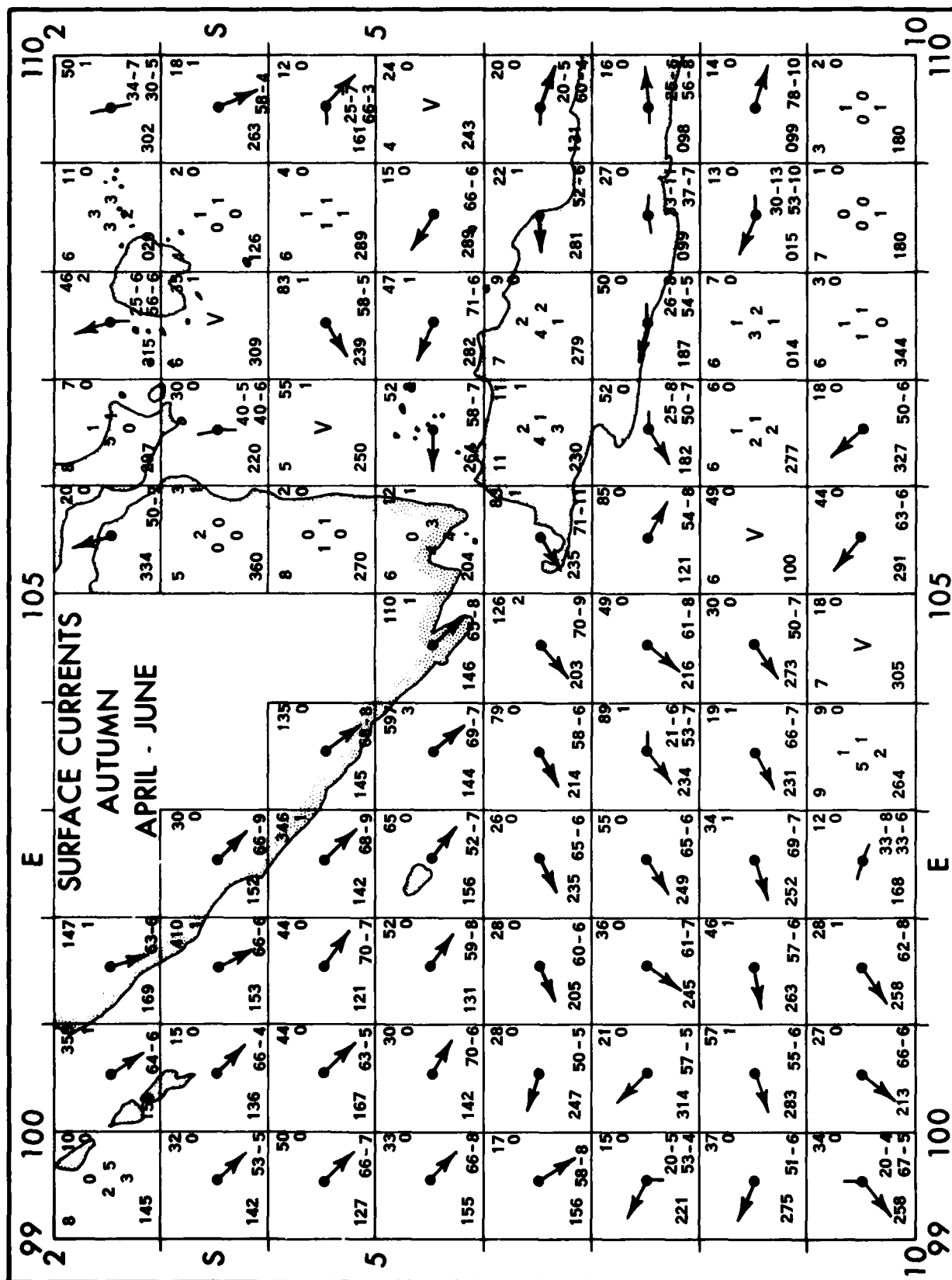
MICROCOPY RESOLUTION TEST CHART
NATIONAL BUREAU OF STANDARDS-1963-A

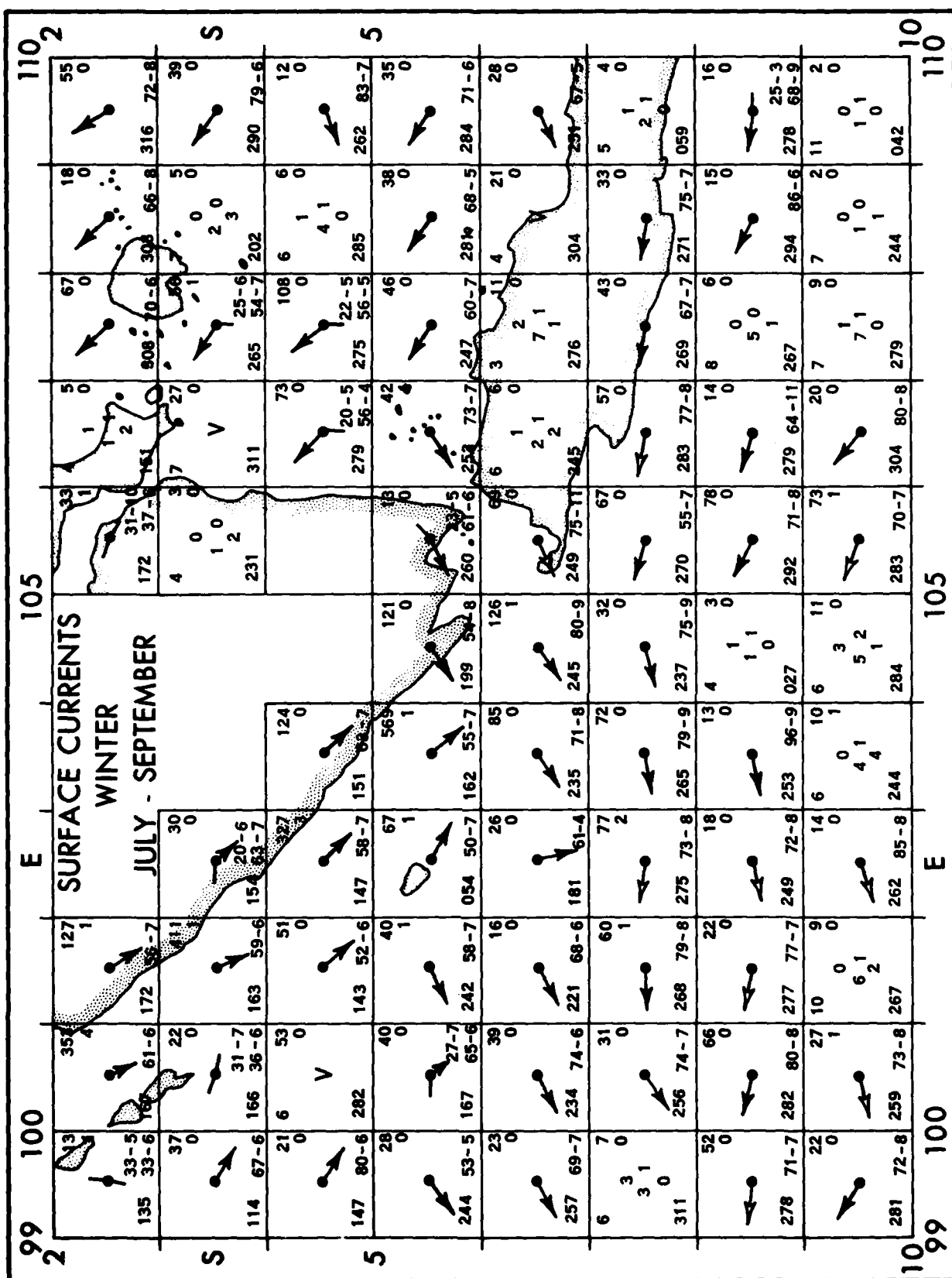


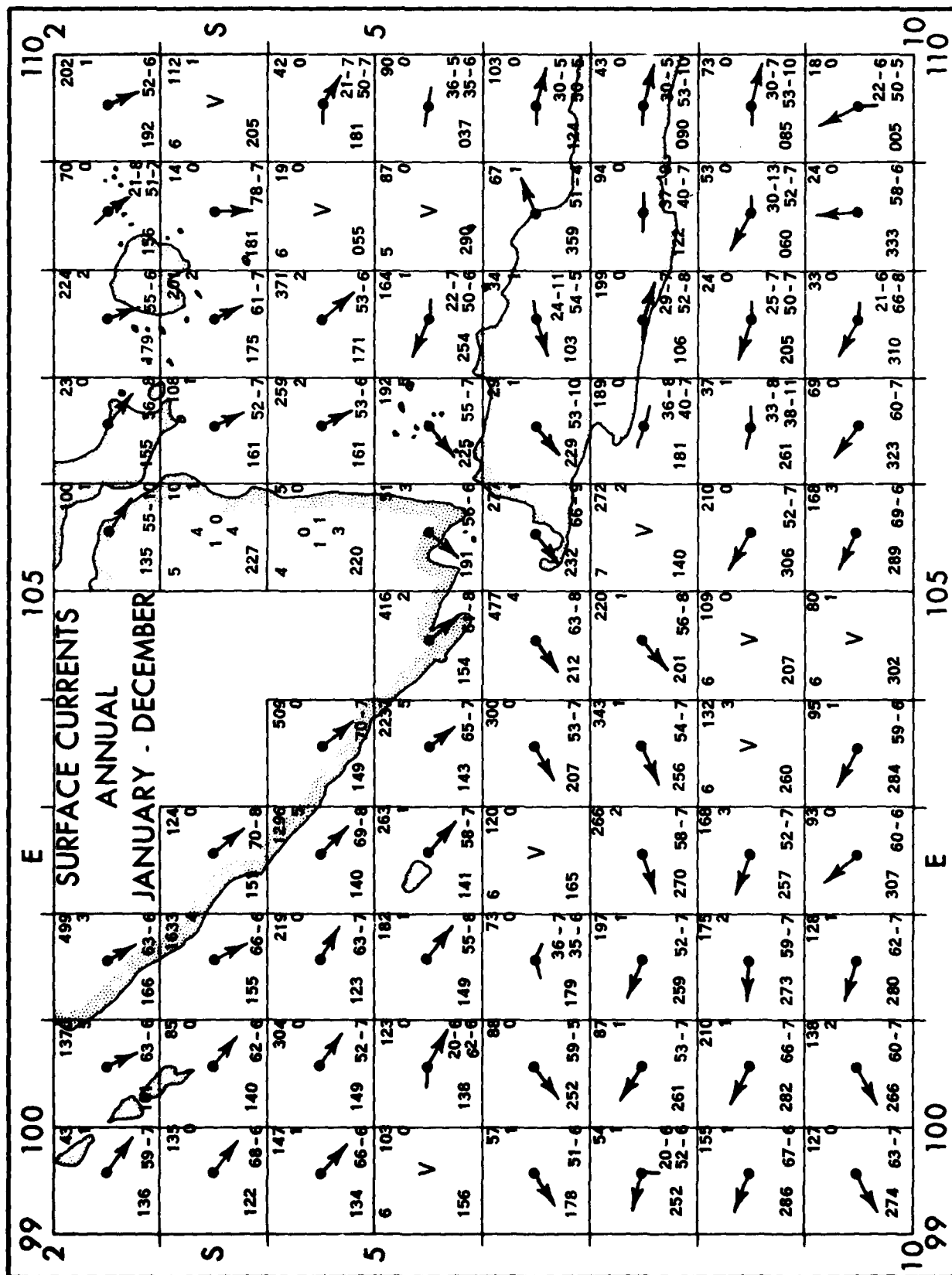
Map of the North Pacific showing surface currents for January-December. The map includes a grid with latitude (105, 100, 95) and longitude (105, 100, 95) markings. Currents are indicated by arrows and numbers. A large area is labeled 'NOT AVAILABLE'.











DATE
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7-8