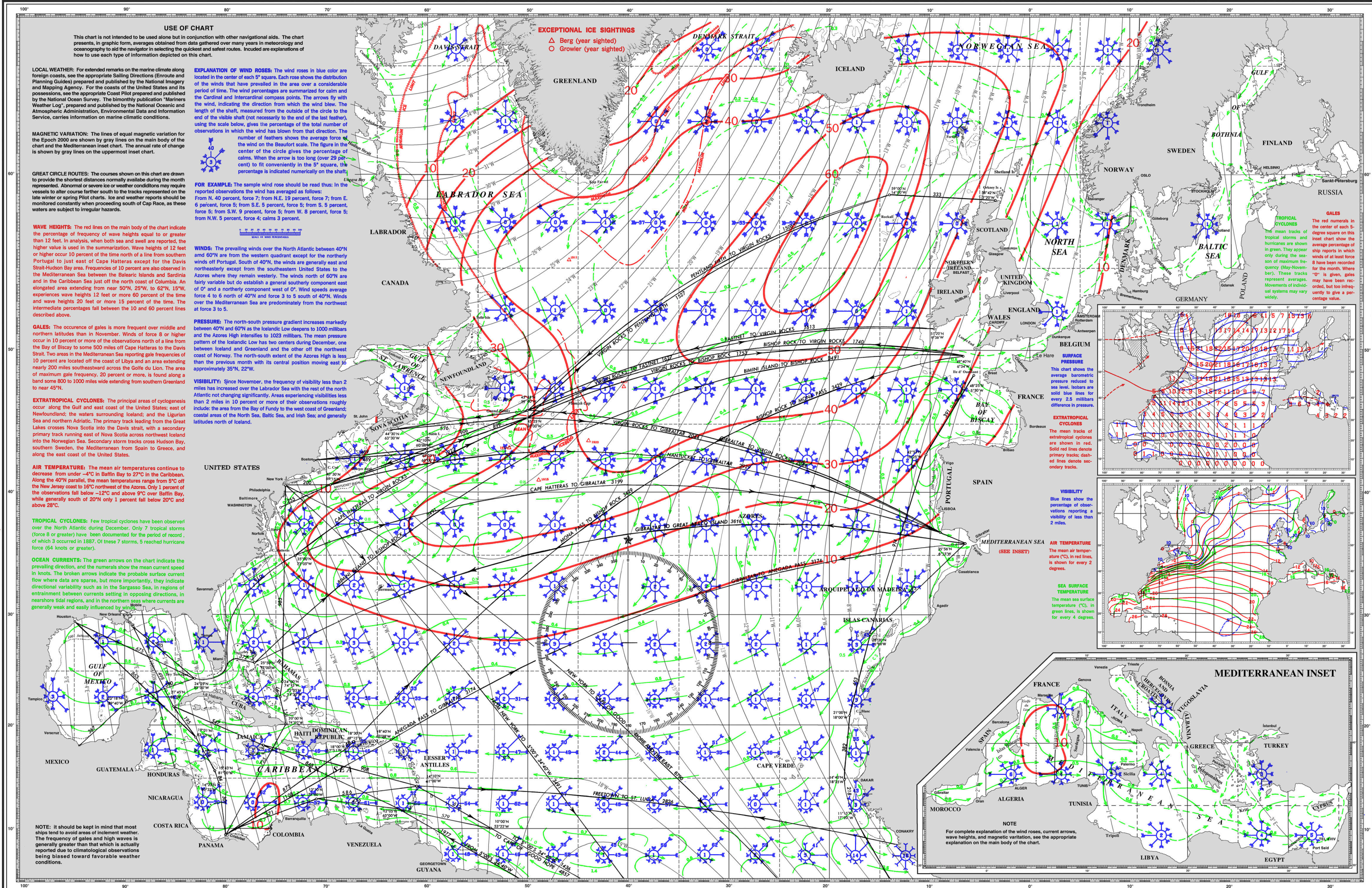


PILOT CHART OF THE NORTH ATLANTIC OCEAN



USE OF CHART

This chart is not intended to be used alone but in conjunction with other navigational aids. The chart presents, in graphic form, averages obtained from data gathered over many years in meteorology and oceanography to aid the navigator in selecting the quickest and safest routes. Included are explanations of how to use each type of information depicted on this chart.

LOCAL WEATHER: For extended remarks on the marine climate along foreign coasts, see the appropriate Sailing Directions (Enroute and Planning Guides) prepared and published by the National Imagery and Mapping Agency. For the coasts of the United States and its possessions, see the appropriate Coast Pilot prepared and published by the National Ocean Survey. The bimonthly publication "Mariners Weather Log", prepared and published by the National Oceanic and Atmospheric Administration, Environmental Data and Information Service, carries information on marine climatic conditions.

MAGNETIC VARIATION: The lines of equal magnetic variation for the Epoch 2000 are shown by gray lines on the main body of the chart and the Mediterranean inset chart. The annual rate of change is shown by gray lines on the uppermost inset chart.

GREAT CIRCLE ROUTES: The courses shown on this chart are drawn to provide the shortest distances normally available during the month represented. Abnormal or severe ice or weather conditions may require vessels to alter course farther south to the tracks represented on the late winter or spring Pilot charts. Ice and weather reports should be monitored constantly when proceeding south of Cape Race, as these waters are subject to irregular hazards.

WAVE HEIGHTS: The red lines on the main body of the chart indicate the percentage of frequency of wave heights equal to or greater than 12 feet. In analysis, when both sea and swell are reported, the higher value is used in the summarization. Wave heights of 12 feet or higher occur 10 percent of the time north of a line from southern Portugal to just east of Cape Hatteras except for the Davis Strait-Hudson Bay area. Frequencies of 10 percent are also observed in the Mediterranean Sea between the Balearic Islands and Sardinia and in the Caribbean Sea just off the north coast of Colombia. An elongated area extending from near 50°N, 25°W, to 62°N, 15°W, experiences wave heights 12 feet or more 60 percent of the time and wave heights 20 feet or more 15 percent of the time. The intermediate percentages fall between the 10 and 60 percent lines described above.

GALES: The occurrence of gales is more frequent over middle and northern latitudes than in November. Winds of force 8 or higher occur in 10 percent or more of the observations north of a line from the Bay of Biscay to some 500 miles off Cape Hatteras to the Davis Strait. Two areas in the Mediterranean Sea reporting gale frequencies of 10 percent are located off the coast of Libya and an area extending nearly 200 miles southeastward across the Golfe du Lion. The area of maximum gale frequency, 20 percent or more, is found along a band some 800 to 1000 miles wide extending from southern Greenland to near 45°N.

EXTRATROPICAL CYCLONES: The principal areas of cyclogenesis occur along the Gulf and east coast of the United States; east of Newfoundland; the waters surrounding Iceland; and the Ligurian Sea and northern Adriatic. The primary track leading from the Great Lakes crosses Nova Scotia into the Davis Strait, with a secondary primary track running east of Nova Scotia across northwest Iceland into the Norwegian Sea. Secondary storm tracks cross Hudson Bay, southern Sweden, the Mediterranean from Spain to Greece, and along the east coast of the United States.

AIR TEMPERATURE: The mean air temperatures continue to decrease from under -4°C in Baffin Bay to 27°C in the Caribbean. Along the 40°N parallel, the mean temperatures range from 5°C off the New Jersey coast to 16°C northwest of the Azores. Only 1 percent of the observations fall below -12°C and above 9°C over Baffin Bay, while generally south of 20°N only 1 percent fall below 20°C and above 28°C.

TROPICAL CYCLONES: Few tropical cyclones have been observed over the North Atlantic during December. Only 7 tropical storms (force 8 or greater) have been documented for the period of record, of which 3 occurred in 1887. Of these 7 storms, 5 reached hurricane force (64 knots or greater).

OCEAN CURRENTS: The green arrows on the chart indicate the prevailing direction, and the numerals show the mean current speed in knots. The broken arrows indicate the probable surface current flow where data are sparse, but more importantly, they indicate directional variability such as in the Sargasso Sea, in regions of entrainment between currents setting in opposing directions, in nearshore tidal regions, and in the northern seas where currents are generally weak and easily influenced by winds.

NOTE: It should be kept in mind that most ships tend to avoid areas of inclement weather. The frequency of gales and high waves is generally greater than that which is actually reported due to climatological observations being biased toward favorable weather conditions.

EXPLANATION OF WIND ROSES: The wind roses in blue color are located in the center of each 5° square. Each rose shows the distribution of the winds that have prevailed in the area over a considerable period of time. The wind percentages are summarized for calm and the Cardinal and Inter-cardinal compass points. The arrows fly with the wind, indicating the direction from which the wind blew. The length of the shaft, measured from the outside of the circle to the end of the visible shaft (not necessarily to the end of the last feather), using the scale below, gives the percentage of the total number of observations in which the wind has blown from that direction. The number of feathers shows the average force of the wind on the Beaufort scale. The figure in the center of the circle gives the percentage of calms. When the arrow is too long (over 29 percent) to fit conveniently in the 5° square, the percentage is indicated numerically on the shaft.

FOR EXAMPLE: The sample wind rose should be read thus: In the reported observations the wind has averaged as follows: From N, 40 percent, force 7; from N.E. 19 percent, force 7; from E. 6 percent, force 5; from S.E. 5 percent, force 5; from S, 5 percent, force 5; from S.W. 9 percent, force 5; from W. 9 percent, force 5; from N.W. 5 percent, force 4; calms 3 percent.

WINDS: The prevailing winds over the North Atlantic between 40°N and 60°N are from the western quadrant except for the northerly winds off Portugal. South of 40°N, the winds are generally east and northeasterly except from the southeastern United States to the Azores where they remain westerly. The winds north of 60°N are fairly variable but do establish a general southerly component east of 0° and a northerly component west of 0°. Wind speeds average force 4 to 6 north of 40°N and force 3 to 5 south of 40°N. Winds over the Mediterranean Sea are predominately from the northwest at force 3 to 5.

PRESSURE: The north-south pressure gradient increases markedly between 40°N and 60°N as the Icelandic Low deepens to 1000 millibars and the Azores High intensifies to 1023 millibars. The mean pressure pattern of the Icelandic Low has two centers during December, one between Iceland and Greenland and the other off the northwest coast of Norway. The north-south extent of the Azores High is less than the previous month with its central position moving east to approximately 35°N, 22°W.

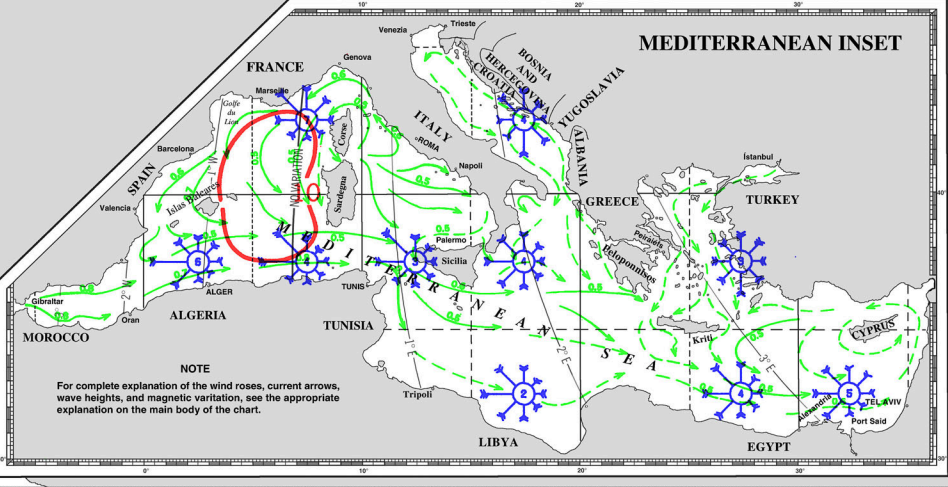
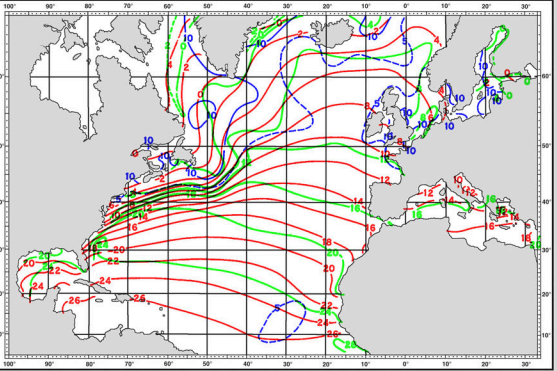
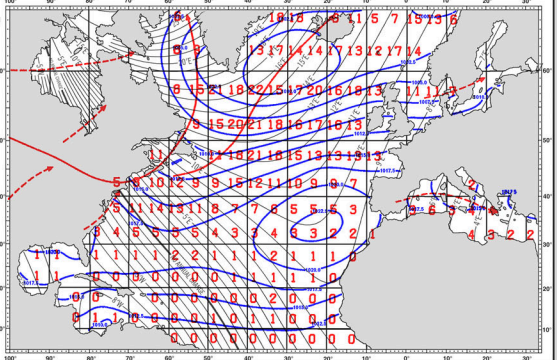
VISIBILITY: Since November, the frequency of visibility less than 2 miles has increased over the Labrador Sea with the rest of the north Atlantic not changing significantly. Areas experiencing visibilities less than 2 miles in 10 percent or more of their observations roughly include: the area from the Bay of Fundy to the west coast of Greenland; coastal areas of the North Sea, Baltic Sea, and Irish Sea; and generally latitudes north of Iceland.

EXCEPTIONAL ICE SIGHTINGS

- △ Berg (year sighted)
- Growler (year sighted)

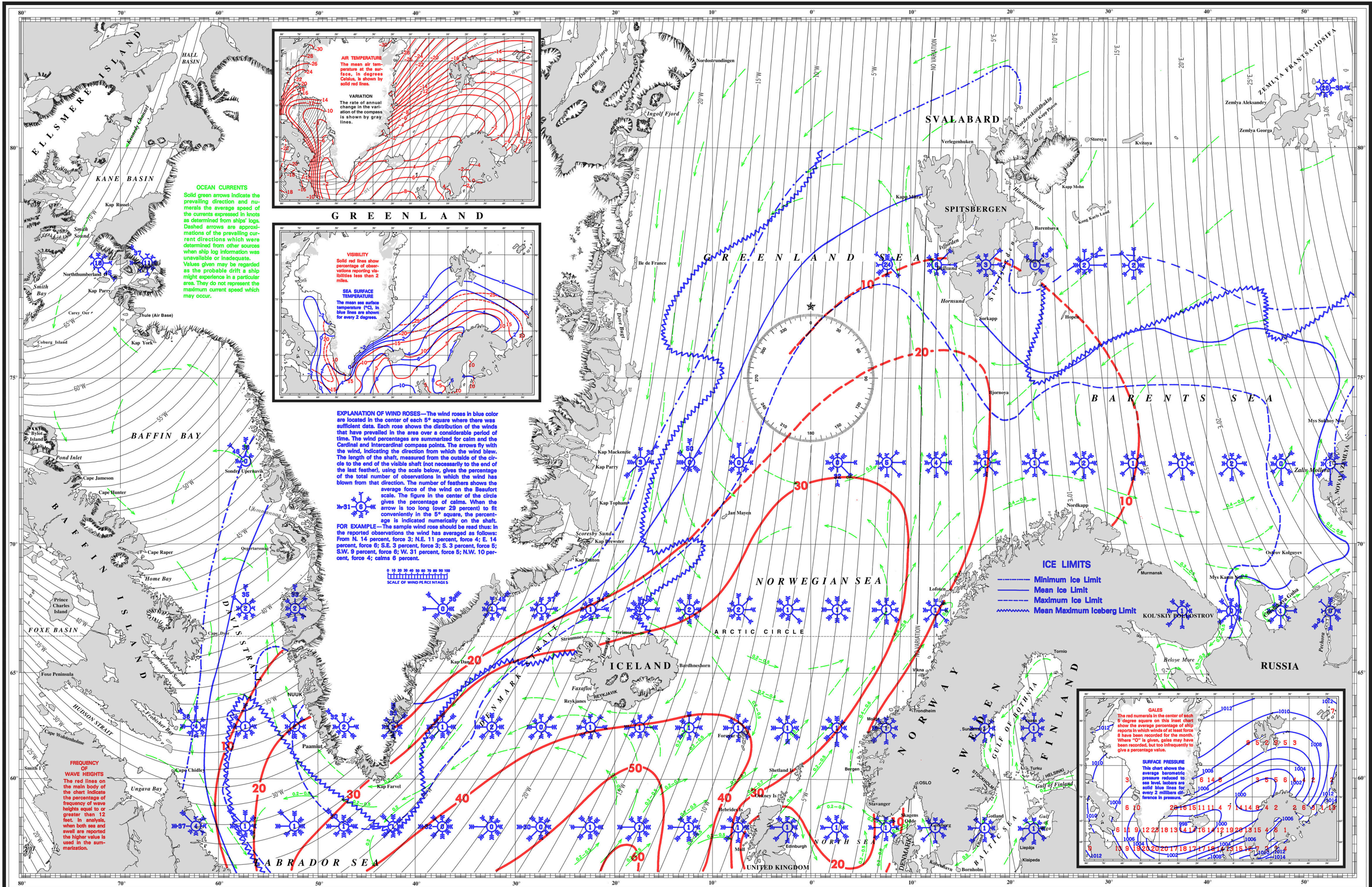
TROPICAL CYCLONES
The mean tracks of tropical storms and hurricanes are shown in green. They appear only during the season of maximum frequency (May-November). These tracks represent averages. Movements of individual systems may vary widely.

GALES
The red numerals in the center of each 5-degree square on this inset chart show the average percentage of ship reports in which winds of at least force 8 have been recorded for the month. Where "0" is given, gales may have been recorded, but too infrequently to give a percentage value.

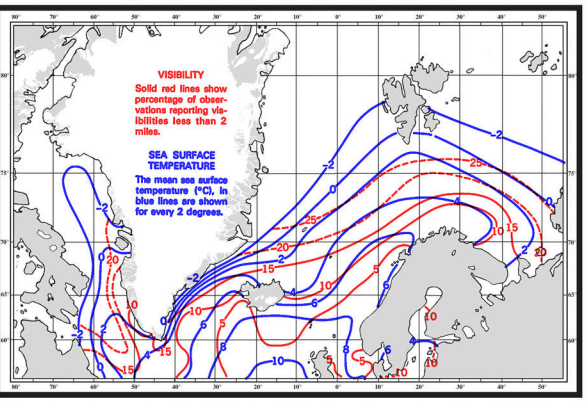
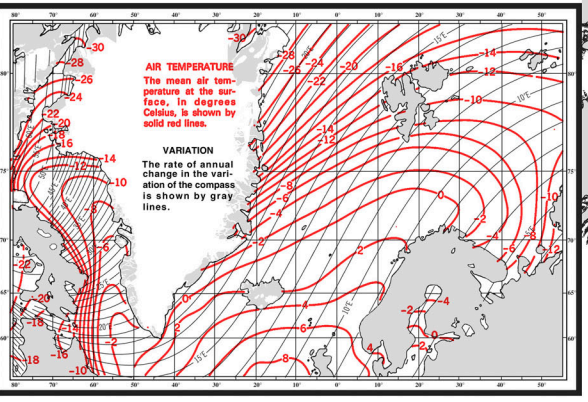


PILOT CHART OF THE NORTHERN NORTH ATLANTIC OCEAN

(THIS CHART SHOULD NOT BE USED FOR NAVIGATIONAL PURPOSES)



OCEAN CURRENTS
 Solid green arrows indicate the prevailing direction and numericals the average speed of the currents expressed in knots as determined from ships' logs. Dashed arrows are approximations of the prevailing current directions which were determined from other sources when ship log information was unavailable or inadequate. Values given may be regarded as the probable drift a ship might experience in a particular area. They do not represent the maximum current speed which may occur.



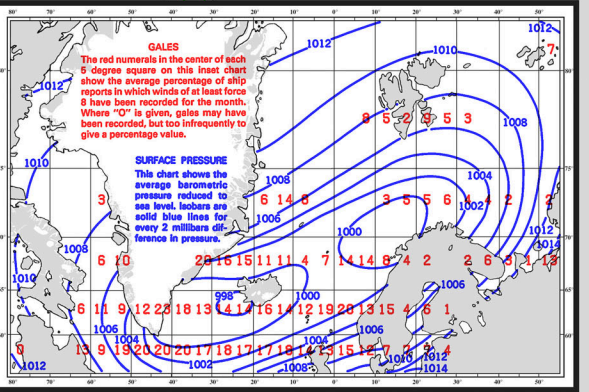
EXPLANATION OF WIND ROSES—The wind roses in blue color are located in the center of each 5° square where there was sufficient data. Each rose shows the distribution of the winds that have prevailed in the area over a considerable period of time. The wind percentages are summarized for calm and the Cardinal and Inter-cardinal compass points. The arrows fly with the wind, indicating the direction from which the wind blew. The length of the shaft, measured from the outside of the circle to the end of the visible shaft (not necessarily to the end of the last feather), using the scale below, gives the percentage of the total number of observations in which the wind has blown from that direction. The number of feathers shows the average force of the wind on the Beaufort scale. The figure in the center of the circle gives the percentage of calms. When the arrow is too long (over 25 percent) to fit conveniently in the 5° square, the percentage is indicated numerically on the shaft.

FOR EXAMPLE—The sample wind rose should be read thus: in the reported observations the wind has averaged as follows: From N, 14 percent, force 3; N.E. 11 percent, force 4; E, 14 percent, force 6; S.E. 3 percent, force 3; S, 3 percent, force 5; S.W. 9 percent, force 5; W, 31 percent, force 5; N.W. 10 percent, force 4; calms 6 percent.



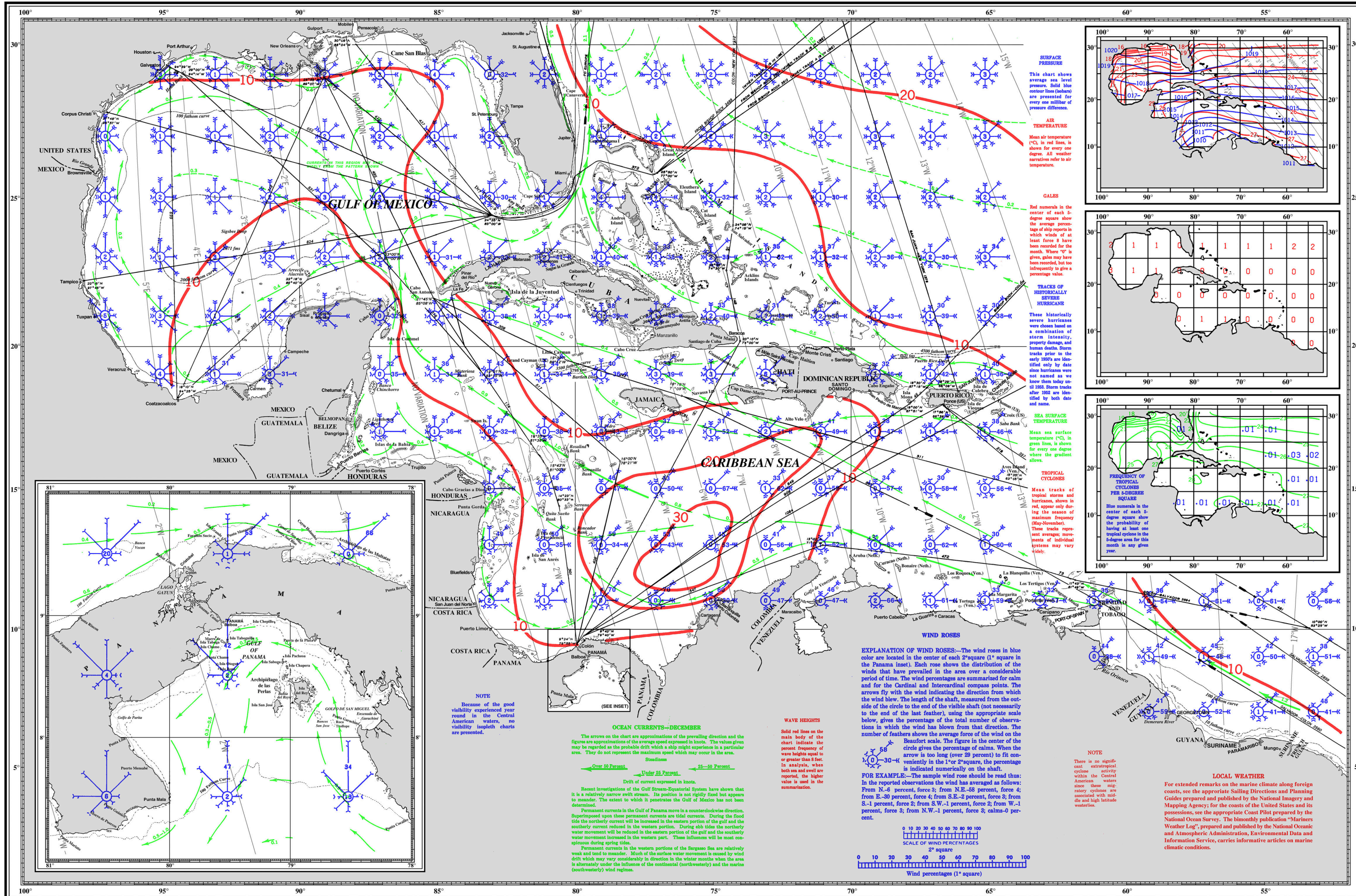
ICE LIMITS

- Minimum Ice Limit
- Mean Ice Limit
- Maximum Ice Limit
- Mean Maximum Iceberg Limit



FREQUENCY OF WAVE HEIGHTS
 The red lines on the main body of the chart indicate the percentage of frequency of wave heights equal to or greater than 12 feet. In analysis, when both sea and swell are reported the higher value is used in the summarization.

PILOT CHART OF CARIBBEAN SEA AND GULF OF MEXICO



SURFACE PRESSURE
This chart shows average sea level pressure. Solid blue contour lines (isobars) are presented for every one millibar of pressure difference.

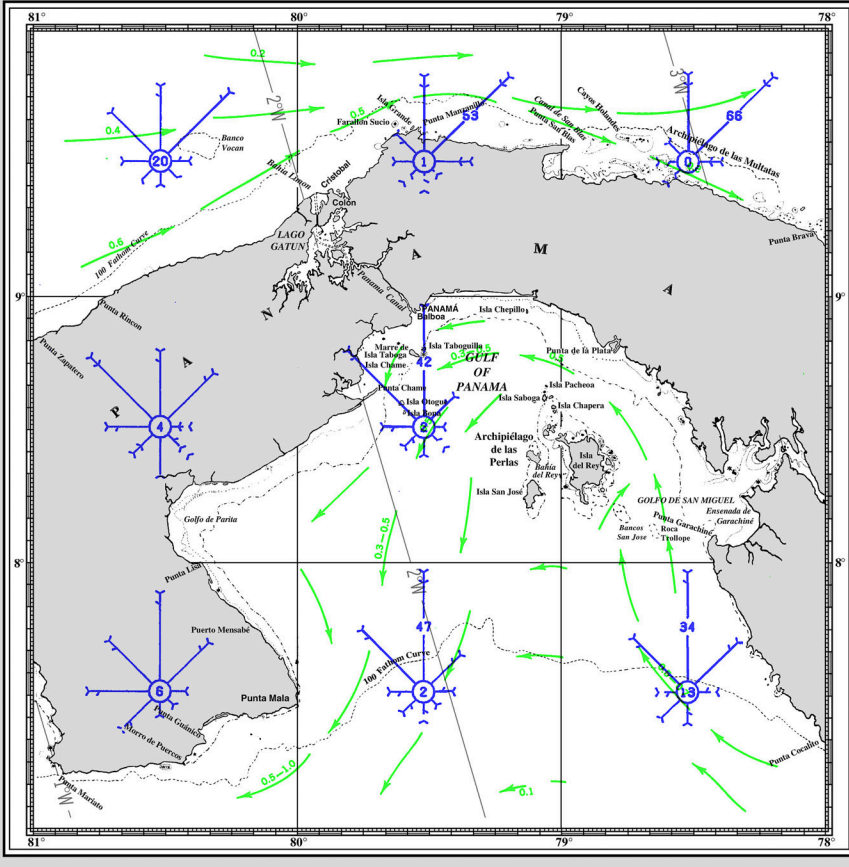
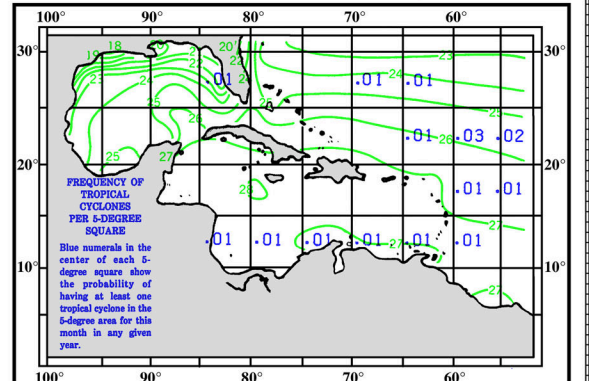
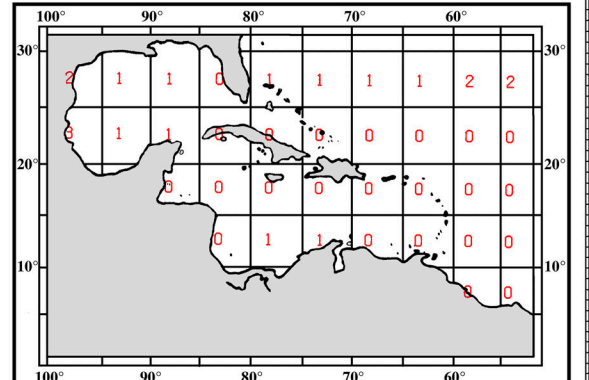
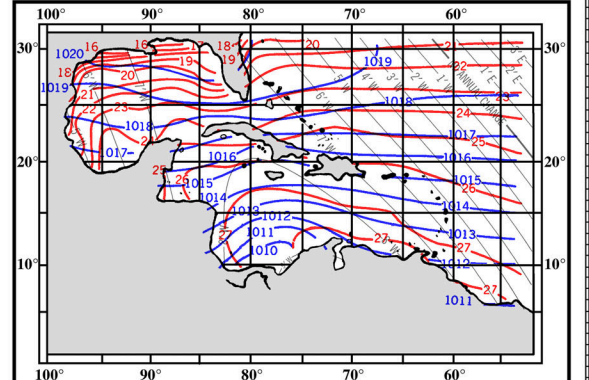
AIR TEMPERATURE
Mean air temperature (°C), in red lines, is shown for every one degree. All weather narratives refer to air temperature.

GALES
Red numerals in the center of each 5-degree square show the average percentage of ship reports in which winds of at least force 8 have been recorded at least once in the month. Where "0" is given, gales may have been recorded, but too infrequently to give a percentage value.

TRACKS OF HISTORICALLY SEVERE HURRICANE
These historically severe hurricanes were chosen based on a combination of storm intensity, property damage, and human deaths. Storm tracks prior to the early 1950's are identified only by date since hurricanes were not named as we know them today until 1953. Storm tracks after 1953 are identified by both date and name.

SEA SURFACE TEMPERATURE
Mean sea surface temperature (°C), in green lines, is shown for every one degree where the gradient shows.

TROPICAL CYCLONES
Mean tracks of tropical storms and hurricanes, shown in red, appear only during the season of maximum frequency (May-November). These tracks represent averages; movements of individual systems may vary widely.



NOTE
Because of the good visibility experienced year round in the Central American waters, no visibility isopleth charts are presented.

OCEAN CURRENTS—DECEMBER
The arrows on the chart are approximations of the prevailing direction and the figures are approximations of the average speed expressed in knots. The values given may be regarded as the probable drift which a ship might experience in a particular area. They do not represent the maximum speed which may occur in the area.

Steadiness
Over 50 Percent Under 25 Percent 25-50 Percent

Drift of current expressed in knots.

Recent investigations of the Gulf Stream-Equatorial System have shown that it is a relatively narrow swift stream. Its position is not rigidly fixed but appears to meander. The extent to which it penetrates the Gulf of Mexico has not been determined.

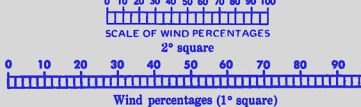
Permanent currents in the Gulf of Panama move in a counterclockwise direction. Superimposed upon these permanent currents are tidal currents. During the flood tide the northerly current will be increased in the eastern portion of the gulf and the southerly current reduced in the western portion. During ebb tides the northerly water movement will be reduced in the eastern portion of the gulf and the southerly water movement increased in the western part. These influences will be most conspicuous during spring tides.

Permanent currents in the western portions of the Sargasso Sea are relatively weak and tend to meander. Much of this surface water movement is caused by wind drift which may vary considerably in direction in the winter months when the area is alternately under the influence of the continental (northwesterly) and the marine (southwesterly) wind regimes.

WAVE HEIGHTS
Solid red lines on the main body of the chart indicate the percent frequency of wave heights equal to or greater than 5 feet. In analysis, when both sea and swell are reported, the higher value is used in the summarization.

EXPLANATION OF WIND ROSES—The wind roses in blue color are located in the center of each 2° square (1° square in the Panama inset). Each rose shows the distribution of the winds that have prevailed in the area over a considerable period of time. The wind percentages are summarized for calm and for the Cardinal and Inter-cardinal compass points. The arrows fly with the wind indicating the direction from which the wind blew. The length of the shaft, measured from the outside of the circle to the end of the visible shaft (not necessarily to the end of the last feather), using the appropriate scale below, gives the percentage of the total number of observations in which the wind has blown from that direction. The number of feathers shows the average force of the wind on the Beaufort scale. The figure in the center of the circle gives the percentage of calms. When the arrow is too long (over 25 percent) to fit conveniently in the 1° or 2° square, the percentage is indicated numerically on the shaft.

FOR EXAMPLE—The sample wind rose should be read thus: In the reported observations the wind has averaged as follows: From N.-6 percent, force 3; from N.E.-58 percent, force 4; from E.-30 percent, force 4; from S.E.-2 percent, force 3; from S.-1 percent, force 2; from S.W.-1 percent, force 2; from W.-1 percent, force 3; from N.W.-1 percent, force 3; calms-0 percent.



NOTE
There is an significant extratropical cyclone activity within the Central American waters since these migratory cyclones are associated with middle and high latitude westerlies.

LOCAL WEATHER
For extended remarks on the marine climate along foreign coasts, see the appropriate Sailing Directions and Planning Guides prepared and published by the National Imagery and Mapping Agency; for the coasts of the United States and its possessions, see the appropriate Coast Pilot prepared by the National Ocean Survey. The bimonthly publication "Mariners Weather Log", prepared and published by the National Oceanic and Atmospheric Administration, Environmental Data and Information Service, carries informative articles on marine climatic conditions.