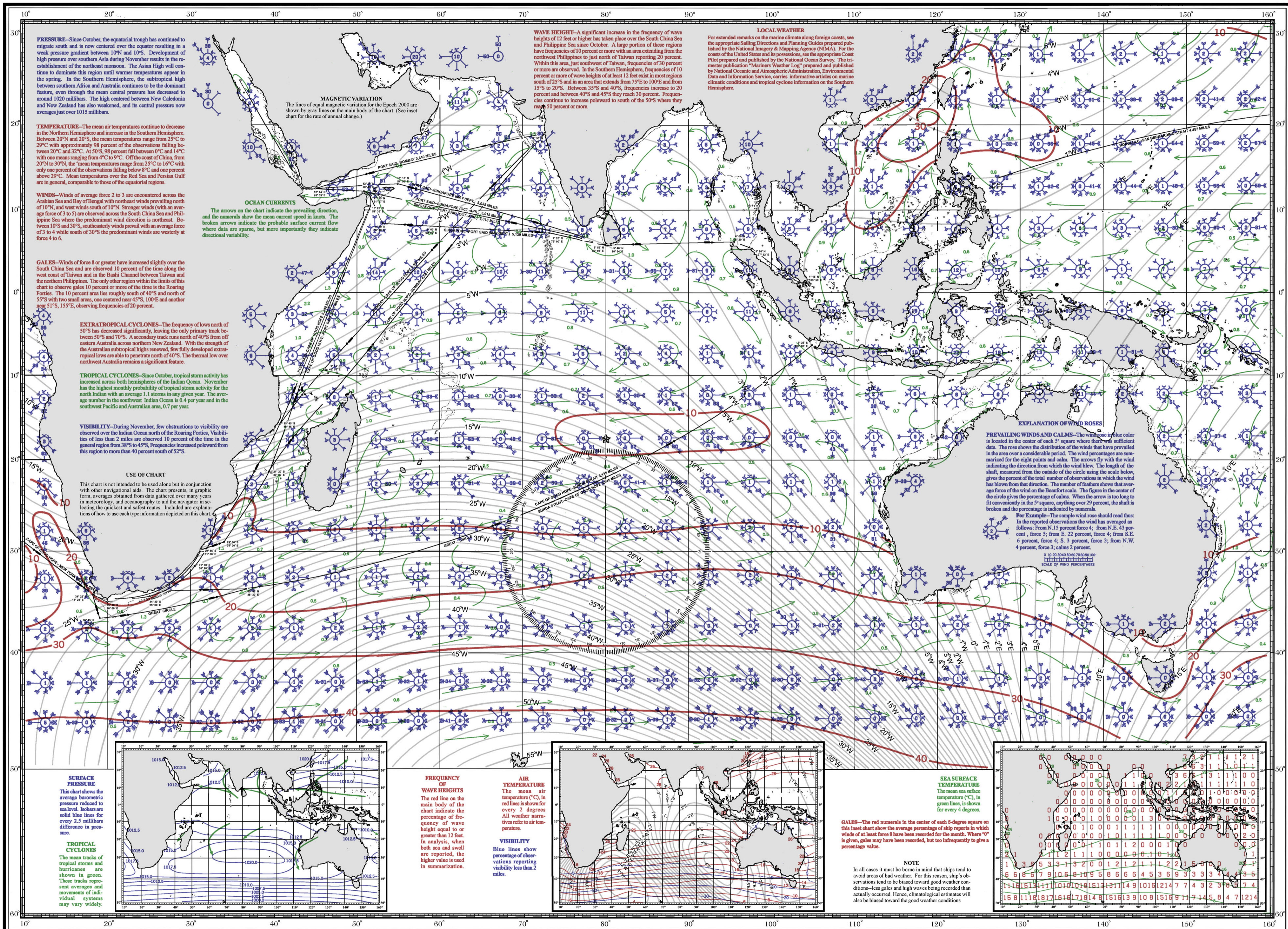




# PILOT CHART OF THE INDIAN OCEAN

## NOVEMBER



**PRESSURE**—Since October, the equatorial trough has continued to migrate south and is now centered over the equator resulting in a weak pressure gradient between 10°N and 10°S. Development of high pressure over southern Asia during November results in the re-establishment of the northeast monsoon. The Asian High will continue to dominate this region until warmer temperatures appear in the spring. In the Southern Hemisphere, the subtropical high between southern Africa and Australia continues to be the dominant feature, even though the mean central pressure has decreased to around 1020 millibars. The high centered between New Caledonia and New Zealand has also weakened, and its central pressure now averages just over 1015 millibars.

**TEMPERATURE**—The mean air temperatures continue to decrease in the Northern Hemisphere and increase in the Southern Hemisphere. Between 20°N and 20°S, the mean temperatures range from 25°C to 29°C with approximately 98 percent of the observations falling between 20°C and 32°C. At 50°S, 98 percent fall between 0°C and 14°C with one means ranging from 4°C to 9°C. Off the coast of China, from 20°N to 30°N, the mean temperatures range from 25°C to 16°C with only one percent of the observations falling below 8°C and one percent above 29°C. Mean temperatures over the Red Sea and Persian Gulf are in general, comparable to those of the equatorial regions.

**WINDS**—Winds of average force 2 to 3 are encountered across the Arabian Sea and Bay of Bengal with northeast winds prevailing north of 10°N, and west winds south of 10°N. Stronger winds (with an average force of 3 to 5) are observed across the South China Sea and Philippine Sea where the predominant wind direction is northeast. Between 10°S and 30°S, southeasterly winds prevail with an average force of 3 to 4 while south of 30°S the predominant winds are westerly at force 4 to 6.

**GALES**—Winds of force 8 or greater have increased slightly over the South China Sea and are observed 10 percent of the time along the west coast of Taiwan and in the Bashi Channel between Taiwan and the northern Philippines. The only other region within the limits of this chart to observe gales 10 percent or more of the time is the Roaring Forties. The 10 percent area lies roughly south of 40°S and north of 55°S with two small areas, one centered near 45°S, 100°E and another near 51°S, 155°E, observing frequencies of 20 percent.

**EXTRATROPICAL CYCLONES**—The frequency of lows north of 50°S has decreased significantly, leaving the only primary track between 50°S and 70°S. A secondary track runs north of 40°S from off eastern Australia across northern New Zealand. With the strength of the Australian subtropical highs renewed, few fully developed extratropical lows are able to penetrate north of 40°S. The thermal low over northwest Australia remains a significant feature.

**TROPICAL CYCLONES**—Since October, tropical storm activity has increased across both hemispheres of the Indian Ocean. November has the highest monthly probability of tropical storm activity for the north Indian with an average 1.1 storms in any given year. The average number in the southwest Indian Ocean is 0.4 per year and in the southwest Pacific and Australian area, 0.7 per year.

**VISIBILITY**—During November, few obstructions to visibility are observed over the Indian Ocean north of the Roaring Forties. Visibilities of less than 2 miles are observed 10 percent of the time in the general region from 38°S to 45°S. Frequencies increased poleward from this region to more than 40 percent south of 52°S.

**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.

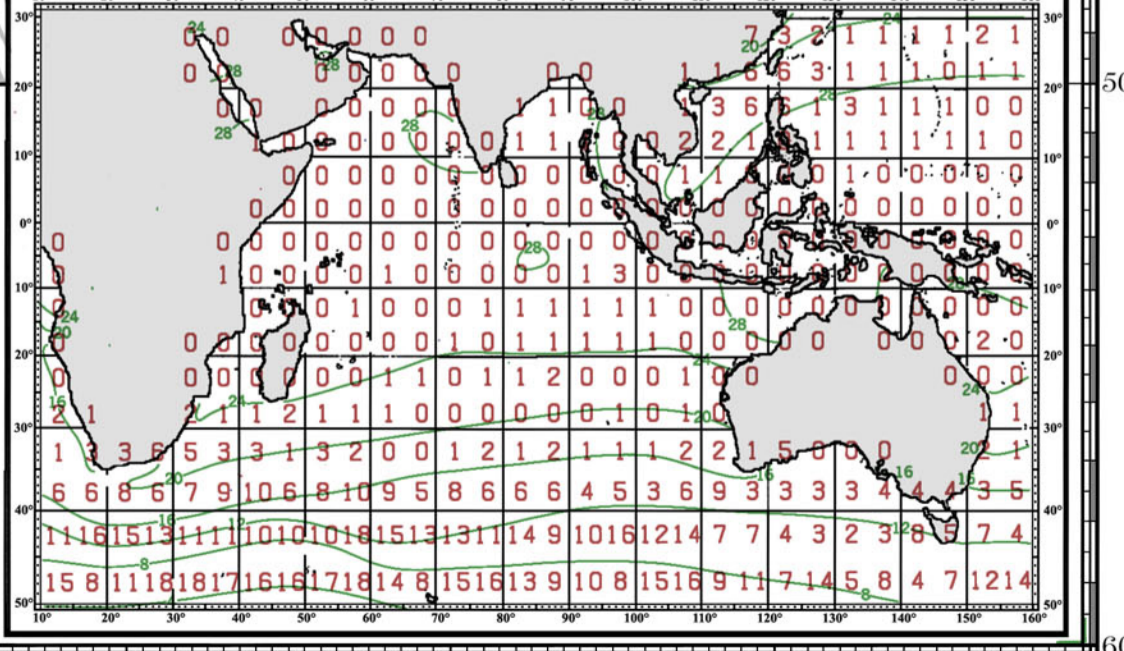
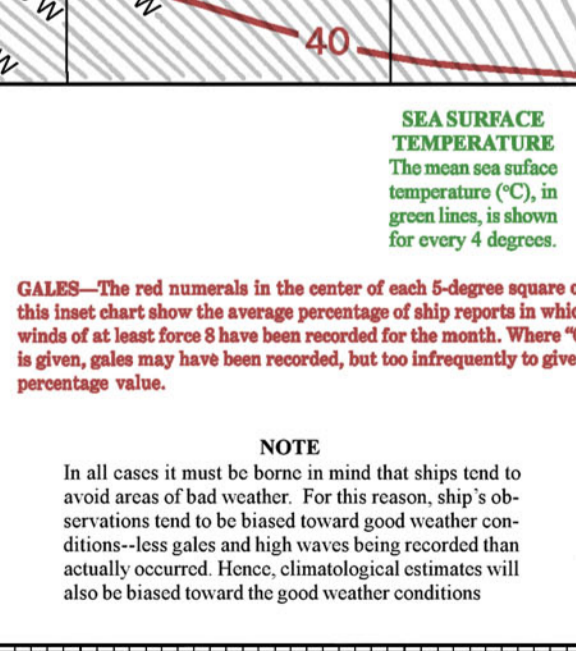
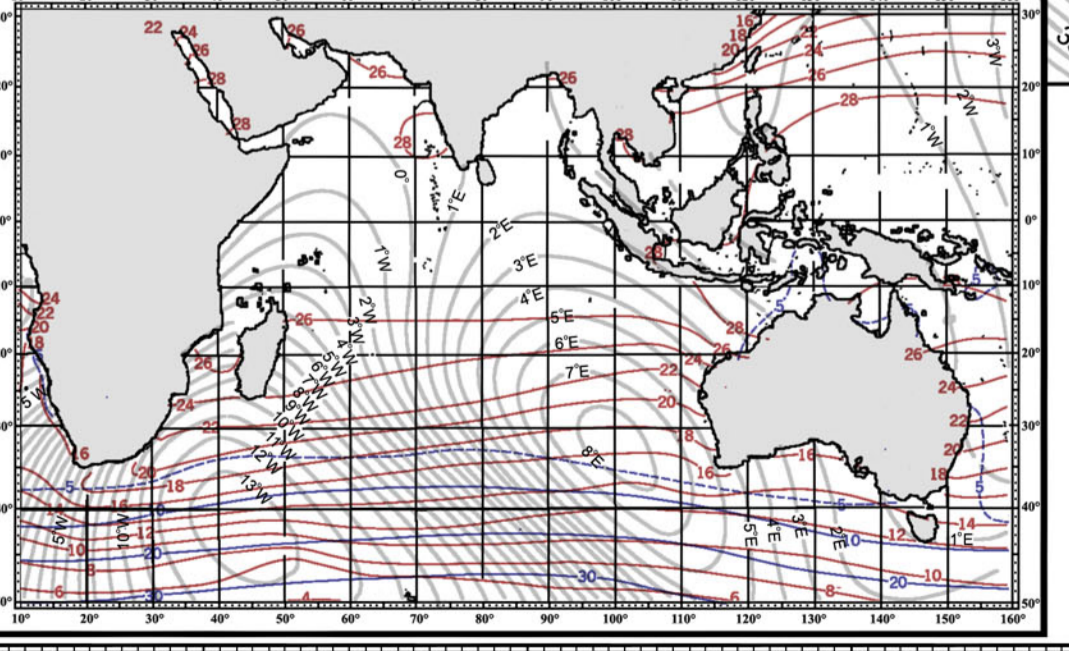
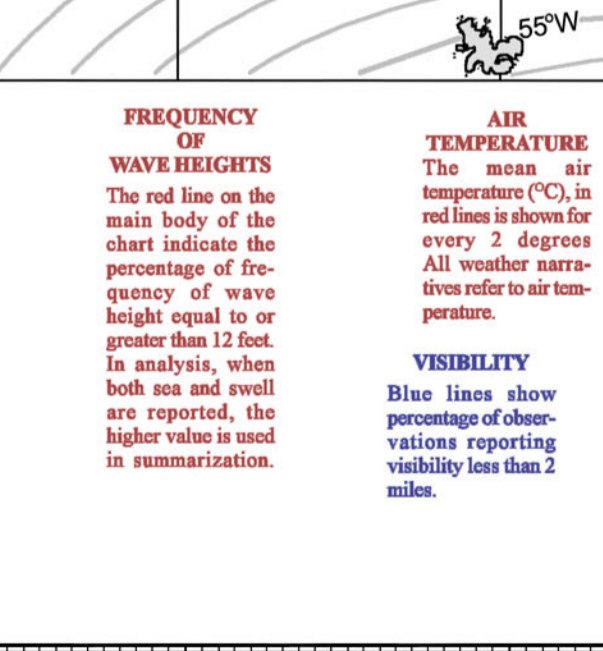
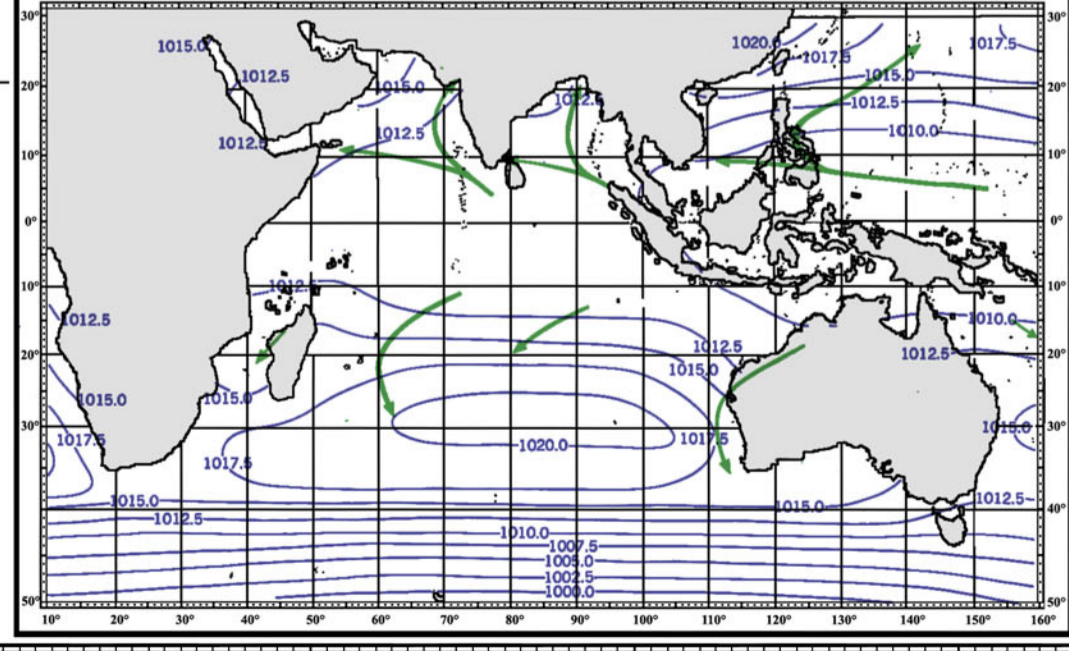
**MAGNETIC VARIATION**  
The lines of equal magnetic variation for the Epoch 2000 are shown by gray lines on the main body of the chart. (See inset chart for the rate of annual change.)

**OCEAN CURRENTS**  
The 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.

**WAVE HEIGHT**—A significant increase in the frequency of wave heights of 12 feet or higher has taken place over the South China Sea and Philippine Sea since October. A large portion of these regions have frequencies of 10 percent or more with an area extending from the northwest Philippines to just north of Taiwan reporting 20 percent. Within this area, just southwest of Taiwan, frequencies of 30 percent or more are observed. In the Southern Hemisphere, frequencies of 10 percent or more of wave heights of at least 12 feet exist in most regions south of 25°S and in an area that extends from 75°E to 100°E and from 15°S to 20°S. Between 35°S and 40°S, frequencies increase to 30 percent and between 40°S and 45°S they reach 50 percent. Frequencies continue to increase poleward to south of the 50°S where they reach 50 percent or more.

**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 & Mapping Agency (NIMA). For the coasts of the United States and its possessions, see the appropriate Coast Pilot prepared and published by the National Ocean Survey. The tri-semester publication "Mariners Weather Log" prepared and published by National Oceanic and Atmospheric Administration, Environmental Data and Information Service, carries informative articles on marine climatic conditions and tropical cyclone information on the Southern Hemisphere.

**EXPLANATION OF WIND ROSES**  
**PREVAILING WINDS AND CALMS**—The wind rose in blue color is located in the center of each 5° square where there was sufficient data. The rose shows the distribution of the winds that have prevailed in the area over a considerable period. The wind percentages are summarized for the eight points and calm. 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 using the scale below, gives the percent of the total number of observations in which the wind has blown from that direction. The number of feathers shows that 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 to fit conveniently in the 5° square, anything over 29 percent, the shaft is broken and the percentage is indicated by numerals.  
For Example—The sample wind rose should read thus:  
In the reported observations the wind has averaged as follows: From N. 15 percent force 4; from N.E. 43 percent, force 5; from E. 22 percent, force 4; from S.E. 6 percent, force 4; S. 3 percent, force 3; from N.W. 4 percent, force 3; calm 2 percent.



**NOTE**  
In all cases it must be borne in mind that ships tend to avoid areas of bad weather. For this reason, ship's observations tend to be biased toward good weather conditions—less gales and high waves being recorded than actually occurred. Hence, climatological estimates will also be biased toward the good weather conditions.