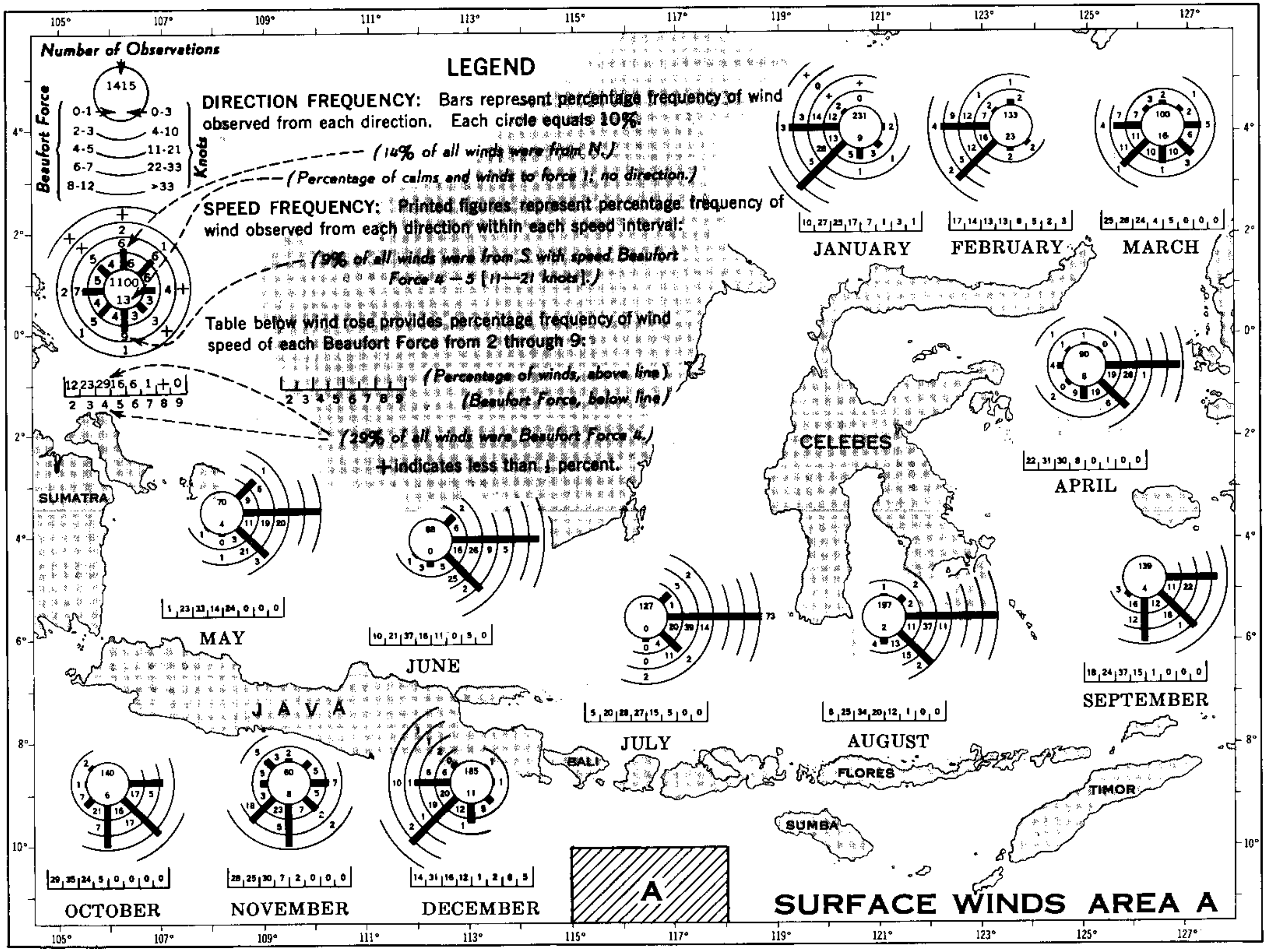

LEGEND
Number of Observations
1415
Beaufort Force
Knots
0-1 0-3
2-3 4-10
4-5 11-21
6-7 22-33
8-12 >33
DIRECTION FREQUENCY: Bars represent percentage frequency of wind observed from each direction. Each circle equals 10%.
(14% of all winds were from N.)
(Percentage of calms and winds to force 1; no direction.)
SPEED FREQUENCY: Printed figures represent percentage frequency of wind observed from each direction within each speed interval:
(9% of all winds were from S with speed Beaufort Force 4—5 [11—21 knots].)
Table below wind rose provides percentage frequency of wind speed of each Beaufort Force from 2 through 9:
(Percentage of winds, above line)
(Beaufort Force, below line)
(29% of all winds were Beaufort Force 4.)
+ indicates less than ½ percent.
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
SUMATRA
JAVA
CELEBES
BALI
FLORES
SUMBA
TIMOR
A
SURFACE WINDS AREA A

Fig. 1

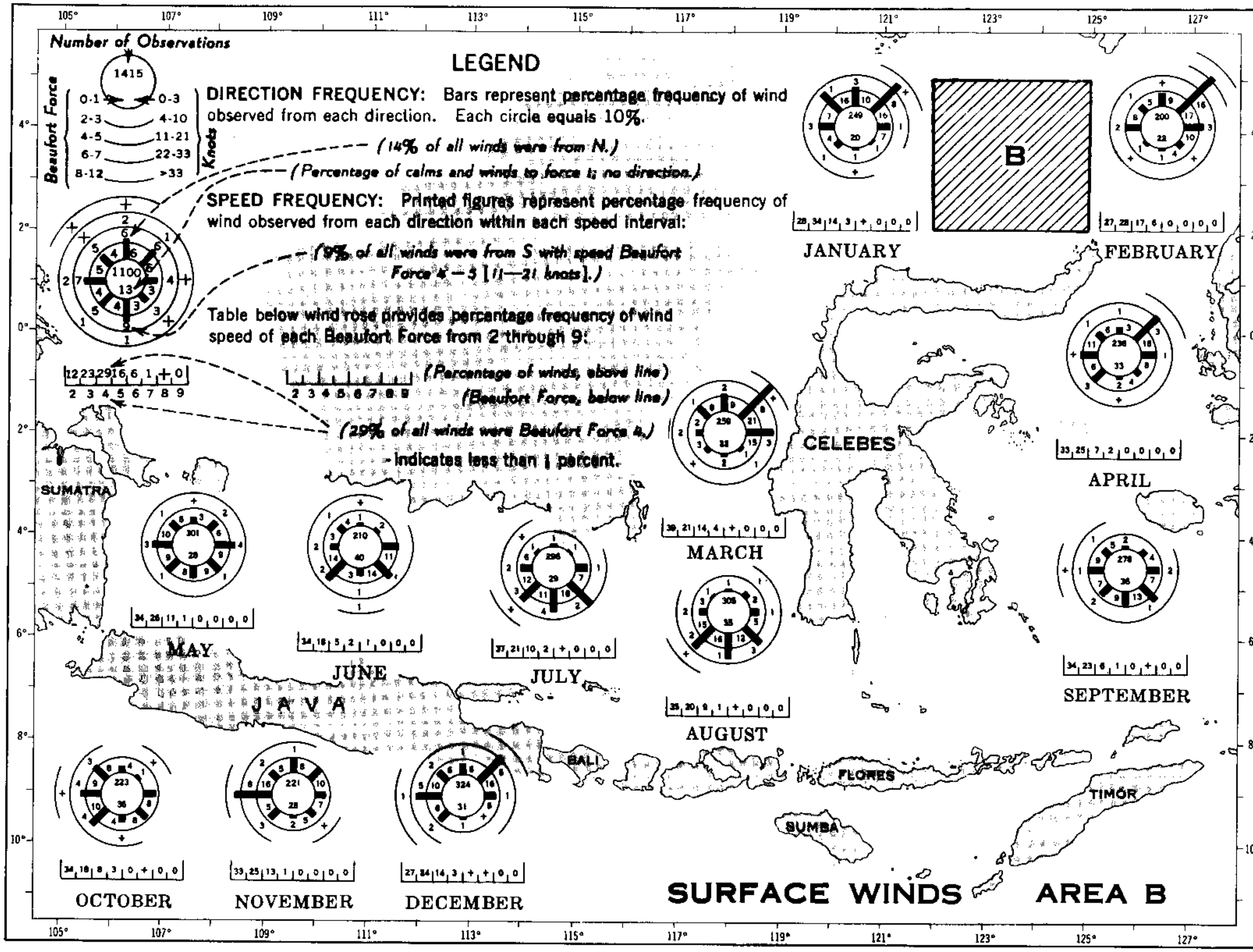

SURFACE WINDS AREA B
LEGEND
Number of Observations
1415
Beaufort Force
Knots
0-1 0-3
2-3 4-10
4-5 11-21
6-7 22-33
8-12 >33
DIRECTION FREQUENCY: Bars represent percentage frequency of wind observed from each direction. Each circle equals 10%.
(14% of all winds were from N.)
(Percentage of calms and winds to force 1; no direction.)
SPEED FREQUENCY: Printed figures represent percentage frequency of wind observed from each direction within each speed interval:
(9% of all winds were from S with speed Beaufort Force 4—5 [11—21 knots].)
Table below wind rose provides percentage frequency of wind speed of each Beaufort Force from 2 through 9:
(Percentage of winds, above line)
(Beaufort Force, below line)
(29% of all winds were Beaufort Force 4.)
+ indicates less than 1 percent.
JANUARY
FEBRUARY
MARCH
APRIL
MAY
JUNE
JULY
AUGUST
SEPTEMBER
OCTOBER
NOVEMBER
DECEMBER
B
CELEBES
SUMATRA
JAVA
BALI
FLORES
SUMBA
TIMOR

Fig. 2

the Banda Sea to the west of the Aru Islands. Their general direction of movement is toward the west and southwest across or near Timor. The ones passing south of Timor usually have a longer life. The average frequency is somewhat less than one a year, and they occur from late March through early May. The "Willy-Willies" of the northwest Australian coast originate in the Timor Sea and may touch the extreme south portion of the area described in this volume. They are more frequent and more severe closer toward the Australian coast. The season is generally from December through April. In the extreme north portion of the area included in this volume there is also a very small chance that a North Pacific tropical cyclone (typhoon) may occur. Typhoons very rarely enter the Celebes Sea, but once every few years one does occur in the Sulu Sea west of Mindanao.

WINDS

1–34 WINDS—GENERAL—The description of the wind regimes is given below. In addition figures 1 and 2 give monthly wind roses of percentage frequencies of direction and force for two sea areas located in the north and south portion of the area contained within this volume. Climatological data published in the appendix give similar information for some coastal stations.

MONSOONS

1–35 MONSOONS—The seasonal reversal of the northwest-southeast pressure gradient across the archipelago described in the paragraph discussing pressure gives rise to a monsoon type climate with a seasonal reversal of the direction of the prevailing winds. The north-south extent of the area across both sides of the Equator makes the wind picture slightly complicated. In the regions north of the Equator, the Coriolis effect deflects the winds in such a way that they blow almost parallel to the isobars with a component toward lower pressure and with higher pressure to the right. In the southern hemisphere higher pressure is on their left, while in the immediate area near the Equator, winds blow directly from high to low pressure as the Coriolis effect becomes zero here.

During the northern hemisphere winter, the sea level barometric pressure is high over Asia and low over Australia. In the regions north of the Equator, the prevailing winds blow from the north and east (northeast monsoon). At the Equator they become more northerly and north-northwesterly. Continuing southward past the Equator the winds gradually back from a northwesterly through a westerly to southwesterly direction (west monsoon).

During northern hemisphere summer, the pressure gradient is reversed, the pressure being low over Asia and the South China Sea and high over Australia. North of the Equator winds are mainly blowing from directions between south and west (southwest monsoon). The prevailing winds at the Equator are from the south. Over southern portions of the area, wind directions between east and south predominate (east monsoon).

The changes in the monsoons are not quite simultaneous everywhere, but move with the sun from north to south and from south to north. In general the dry season (the east monsoon) has a slightly longer duration over the south and east sections than the corresponding south or southwest monsoon over the more northern areas. It usually sets in during May and lasts until October, or even November in the south. The north or northeast monsoon begins in November over north portions and the corresponding west monsoon sets in during December in the extreme south. The transition months have mostly variable winds. The monsoons are most steady in January and August, but their direction is by no means constant. The strength of the wind does usually not exceed that of a gentle breeze. The greatest mean wind force is experienced in the Banda

Sea. Also the east portions of the Java Sea and the Indiau Ocean south of the Sunda Islands have relatively high means of wind force. Calms rarely are of long duration in any area at sea within this archipelago.

Near the coasts of the larger islands we have the diurnal variation in direction (or strength) of the wind caused by the land and sea breeze effect superimposed on the monsoonal flow.

TEMPERATURE

1–36 TEMPERATURE.—The equatorial situation of the islands and the surrounding seas combine to produce equability of temperature. The mean annual temperature is high, being 78°–80° F. at sea level. The annual range is very small with the lower temperatures occuring in the winter season of the corresponding hemisphere. In July and August the temperature decreases about 3° F. from north Borneo and Celebes to Java and Timor. In January and February there is an even smaller decrease in the opposite direction.. At a particular latitude there is also a slight increase in temperature going in the downwind direction in either monsoon season. Most areas, and in particular the ones south of the Equator, also have a twice annual temperature maximum in the monsoon changes shortly after the sun has passed its zenith. The lowest monthly mean temperatures occur in the southeast during very dry east monsoons when July and August mean temperatures at Kupang on Timor in some years reach 75°–76° F. against the normal of 79°–80° F. The highest monthly means usually are found along the north coast of east Java and Madura in October toward the close of the dry season. They seem to occur in particular when the rains arrive unusually late. The extreme maximum temperatures recorded here are about 100° F. with the monthly means of the daily maxima reaching 94°–95° F. in some Octobers. The daily range in temperature is small over the open sea, but can reach considerable values along the coasts of the larger islands during the dry season. Here the daily range during dry days often exceeds 20° F.

For additional data on temperatures see tables in the appendix.

HUMIDITY

1–37 HUMIDITY.—The moisture content of the air is generally high except during the dry season of the east monsoon over the south portions, when winds generally blow from ocean areas with cooler water temperatures. Low relative humidities are also found in coastal regions, mainly on the north coasts of the islands from Java to Timor, where the prevailing winds during the east monsoon descend to the lowlands after having crossed mountain ranges.

For additional data on relative humidity see tables in the appendix.

CARGO CARE

1–38 CARGO CARE.—Under conditions of high humidity protection of cargo from moisture damage often becomes a serious problem. The following use of temperature observations taken aboard ship may assist the mariners in minimizing damage caused by cargo sweat.

When free air has a dew point temperature higher than the temperature of the surfaces with which it comes in contact the air is often cooled sufficiently to release moisture. When this happens aboard ship, condensation will take place on the relatively cool cargo or on the ship's structure within the hold where it later drips onto the cargo.

Thus if cargo is stowed in a cool climate and the ship sails into tropical waters, ventilation of the hold with outside air will likely lead to sweat damage in any cargo sensitive to moisture. The following recommendations to minimize cargo sweat have been tested and are successful.

(1) Compute the dew point temperature

from wet and dry bulb temperature readings taken each watch.

(2) Take the temperature of the cargo each day.

(3) Plot these readings on a graph.

(4) Ventilate when (1) is below (2).

(5) Cease ventilation when (2) is below (1).

NOTE: Values of dew point temperature and relative humidity can be easily interpolated from wet and dry bulb temperature readings by the use of psychrometric tables which are provided for all ships cooperating in the marine weather reporting program of the U.S. Weather Bureau.

PRECIPITATION

1–39 PRECIPITATION.—Annual rainfall totals are high throughout the region. Most coastal stations in the area described in this volume receive from 50 to 100 inches per year. Over open water south of Java and the Lesser Sunda Islands annual rainfall totals are probably considerably less. Near the equator and in the regions to the north, the precipitation is fairly evenly distributed throughout the year. Going southward from the equator, a division into a dry and wet season becomes apparent. South of the equator the two seasons are called the east and west monsoon. The east monsoon is dry and usually persists from May to October, and the west monsoon is the wet season lasting from November to March. The greatest contrast between a dry and a wet season is found in the southern and eastern Sunda Islands. The north coasts, in particular, experience a very dry season from May through September.

For additional monthly precipitation data see appendix tables.

THUNDERSTORMS

1–40 THUNDERSTORMS.—The annual variation of thunderstorm frequency is less than that of rainfall. The maximum usually occurs during the monsoon changes and in some areas during the west monsoon (northern hemisphere winter). Over most of the areas of the Java Sea and the seas more to the east, November and December, during the transition period before the onset of the west monsoon have the maximum frequency. The south coast of Java and the extreme western Lesser Sunda Islands have their maximum in April and May during the changing monsoons of that period. North of the equator, in the Celebes and Sulu Seas, June through October are generally the months with maximum thunderstorm frequency. Squalls frequently accompany the more severe thunderstorms, and there have been rare reports of tornadoes or damaging waterspouts at some locations on the coasts. Over open water weaker waterspouts are fairly frequent.

CLOUDINESS

1–41 CLOUDINESS.—The period of maximum cloudiness generally coincides with the wet season (November–March) in most areas. The average cloud amount is most variable throughout the archipelago with higher values found along windward coasts of high land and lower values along the leeward coasts. September and October are the months with the greatest frequency of clear skies. The Banda and Timor seas in particular enjoy extended periods of clear weather during this period. The ocean areas of the Indian Ocean south of Java and the western Lesser Sunda Islands have a maximum of clear weather in July. Over land areas, and especially the plains, there is a large daily variation in cloud amount with mostly cloudy afternoons and frequent clear conditions at night. This does not hold for all coasts. At Djakarta heavy cloudiness at night is quite common during the west monsoon, and most of the rain falls at night. At sea the diurnal variation in cloudiness is much less, and there seems to be a tendency for maximum cloudiness to occur at night over many sea areas. Cumulus clouds

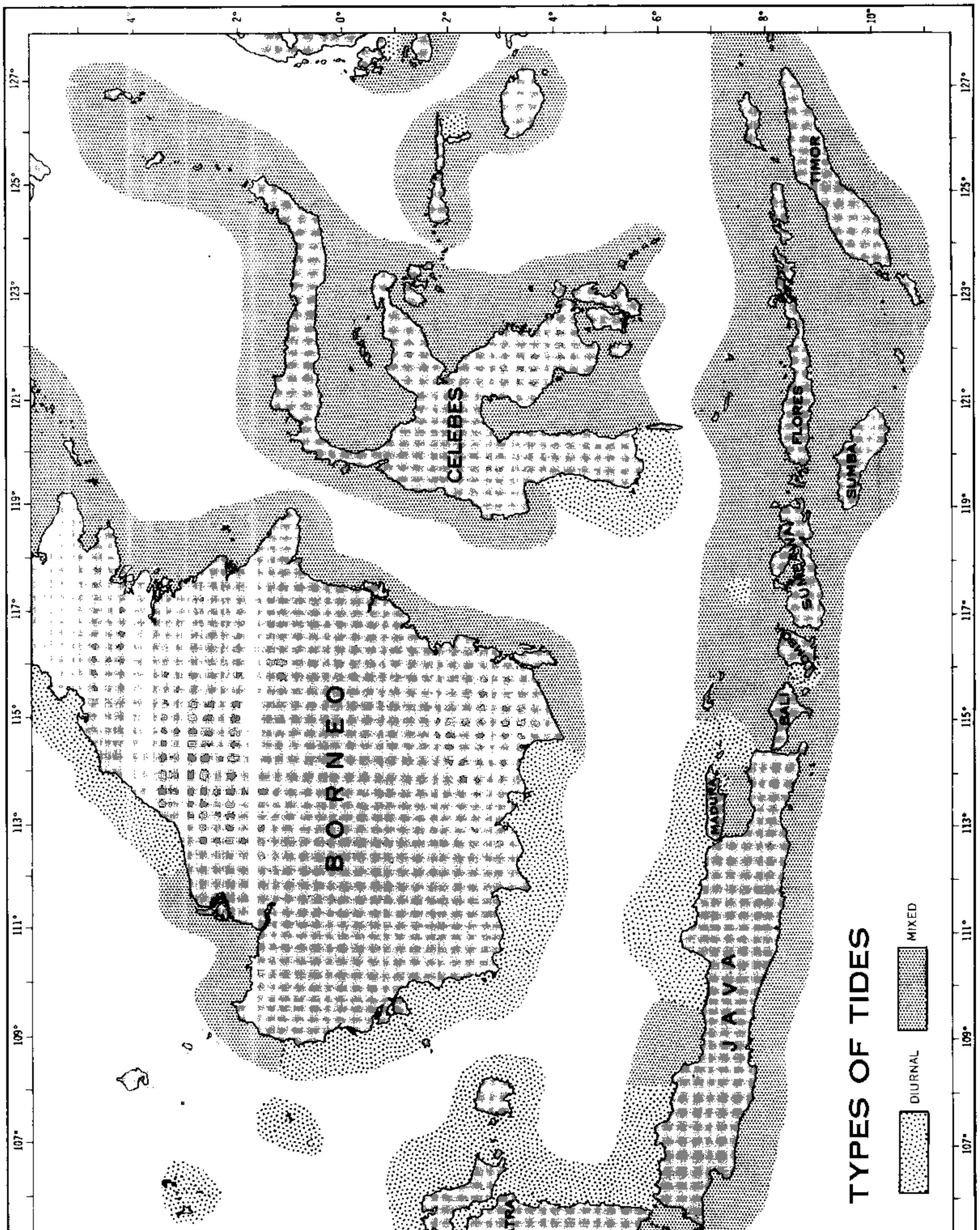

TYPES OF TIDES
DIURNAL
MIXED
BORNEO
CELEBES
JAVA
SUMATRA
MADURA
BALI
FLORES
SUMBA
TIMOR

Fig. 3

are the most prevalent type of clouds both over land and sea.

For additional monthly cloud data see appendix tables.

VISIBILITY

1–42 VISIBILITY.—Fog is very rare over the open sea in the area discussed in this volume. During the west monsoon visibility is generally good except during heavy rains. Low visibilities are frequently encountered during the dry east monsoon when dust and smoke frequently remains in the air for extended periods due to restrictions in vertical mixing of the lower atmosphere caused by a temperature inversion aloft. Part of the dust and smoke seems to originate over Australia, while much of it may be attributed to brush fires and the local custom of burning the dry fields after harvest. Haziness is especially dense in September and the beginning of October over the southeast part of the archipelago with the Timor Sea having quite low visibilities during strong winds in the east monsoon. The Selat Madura also frequently experiences a dense form of haze during the dry east monsoon. No part of the archipelago is completely free of this bothersome haze, which at times along the east coast of Borneo in the Makasar Strait has been pictured as a dense fog. The haziness is usually worst during abnormally dry years.

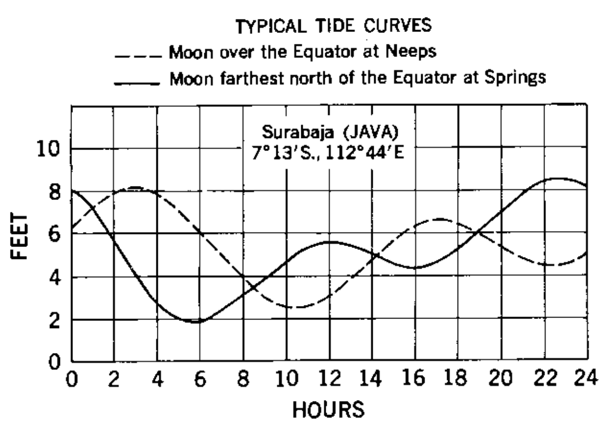
OCEAN CURRENTS–OCEANOGRAPHY

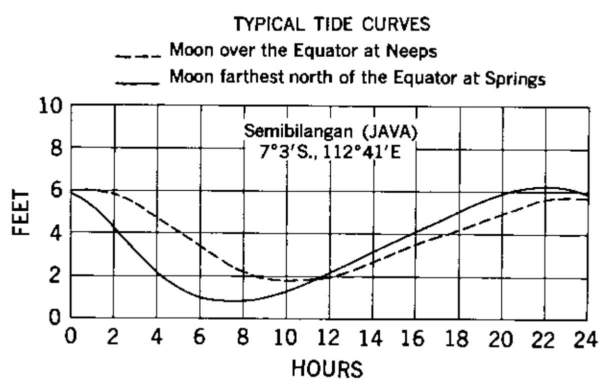
TIDES

1–43 THE TIDES throughout this region are diurnal and mixed. In areas where diurnal tides predominate the moon's influence is observed mainly in tidal heights, the greatest ranges occurring during maximum lunar declination. Also, in these areas the predominant diurnal tide may become mixed near minimum lunar declination. Tide ranges throughout the archipelago are 2 to 4 feet.

Types of tide are shown in Figure 3. Typical tide curves are shown below.

TIDAL CURRENTS.—Throughout the archipelago, tidal currents generally are weak and merely strengthen or reduce the speed of nontidal currents. In the channels to Djakarta, tidal currents are perceptible only during the transition periods between monsoons when the prevailing current systems are not fully developed. Through the straits east of Java, the flood sets northward and the ebb southward. In Selat Madura, the flood sets westward and the ebb eastward.





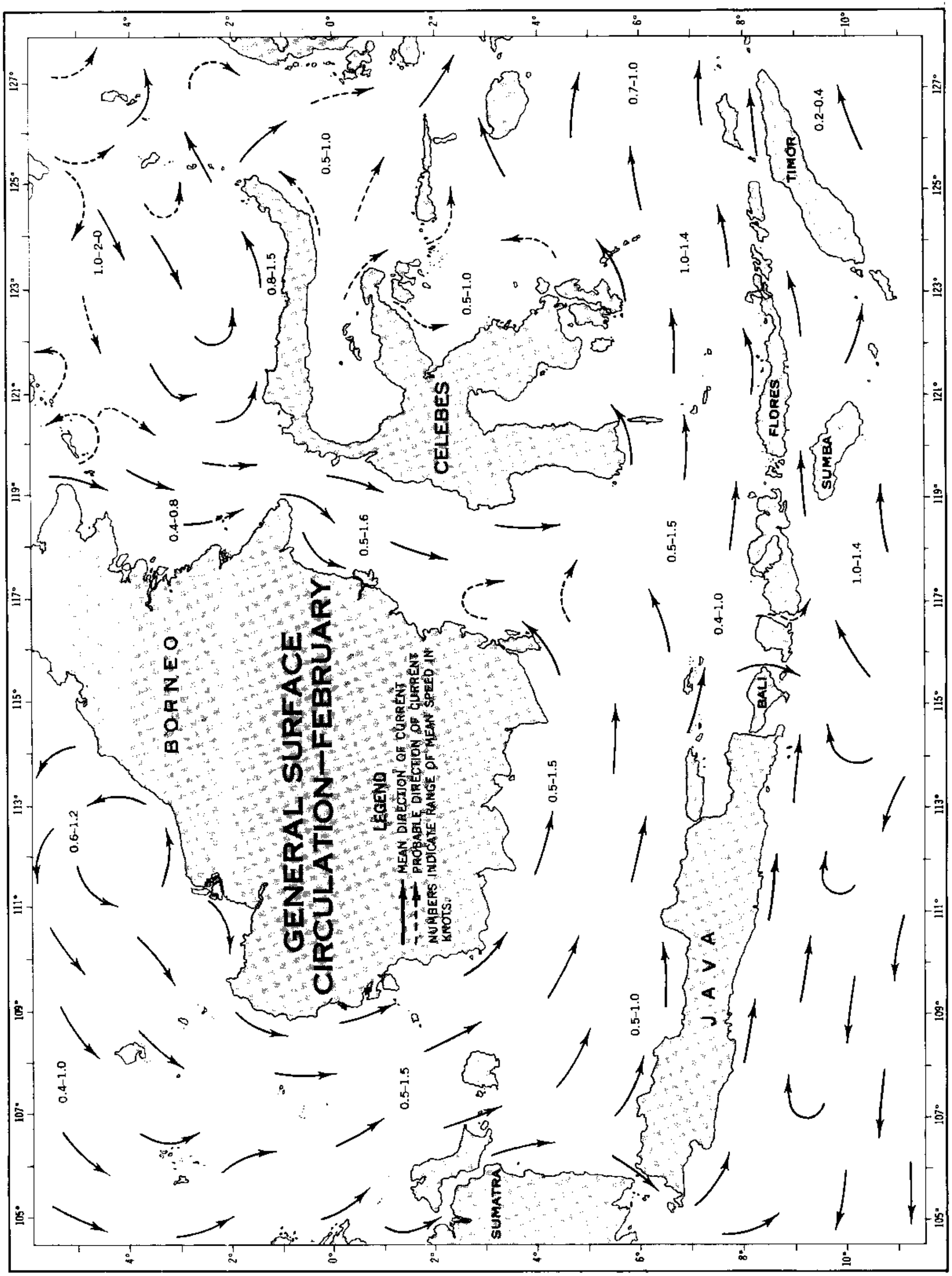

GENERAL SURFACE
CIRCULATION—FEBRUARY
LEGEND
MEAN DIRECTION OF CURRENT
PROBABLE DIRECTION OF CURRENT
NUMBERS INDICATE RANGE OF MEAN SPEED IN KNOTS.
BORNEO
CELEBES
JAVA
SUMATRA
BALI
FLORES
SUMBA
TIMOR
1.0-2.0
0.8-1.5
0.5-1.0
0.7-1.0
0.2-0.4
1.0-1.4
0.4-0.8
0.5-1.6
0.5-1.5
1.0-1.4
0.4-1.0
0.6-1.2
0.4-1.0
0.5-1.5
0.5-1.0
0.5-1.5

Fig. 4

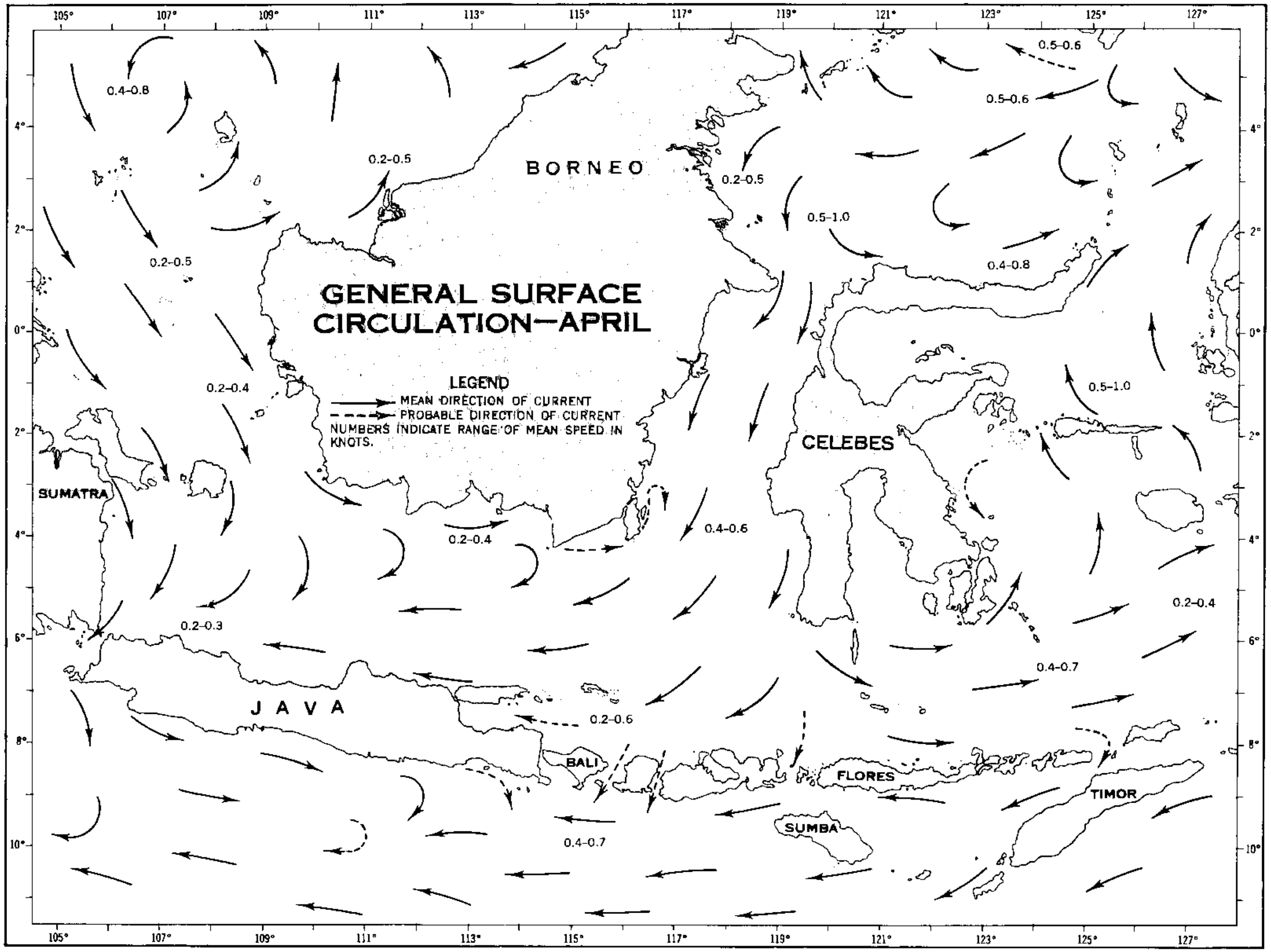


Fig. 5

644480 O—62——4

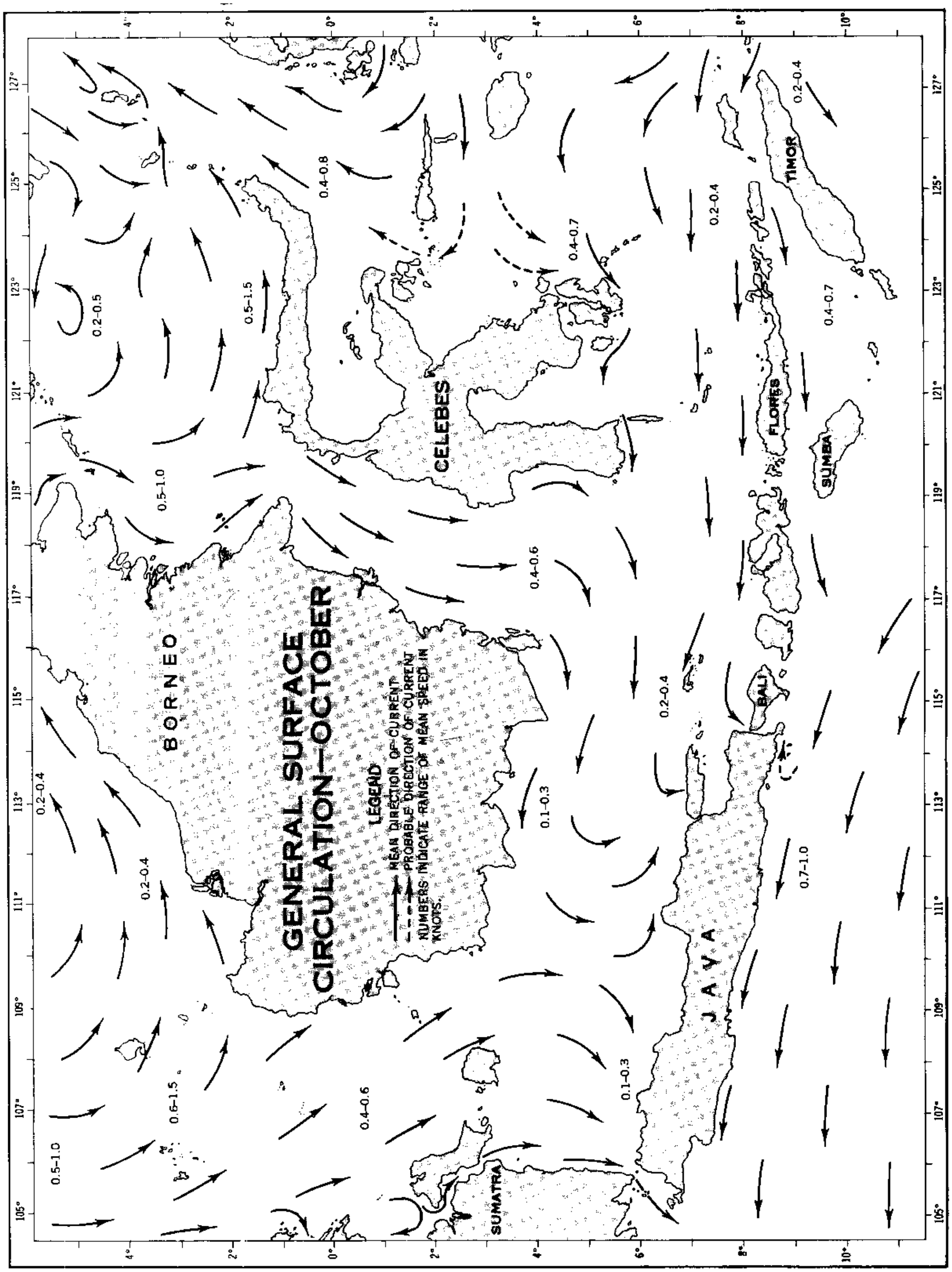

GENERAL SURFACE CIRCULATION—OCTOBER
LEGEND
MEAN DIRECTION OF CURRENT
PROBABLE DIRECTION OF CURRENT
NUMBERS INDICATE RANGE OF MEAN SPEED IN KNOTS.
BORNEO
CELEBES
JAVA
SUMATRA
BALI
FLORES
SUMBA
TIMOR
0.5–1.0
0.6–1.5
0.4–0.6
0.1–0.3
0.2–0.4
0.7–1.0
0.5–1.5
0.2–0.5
0.4–0.8
0.4–0.7

Fig. 6

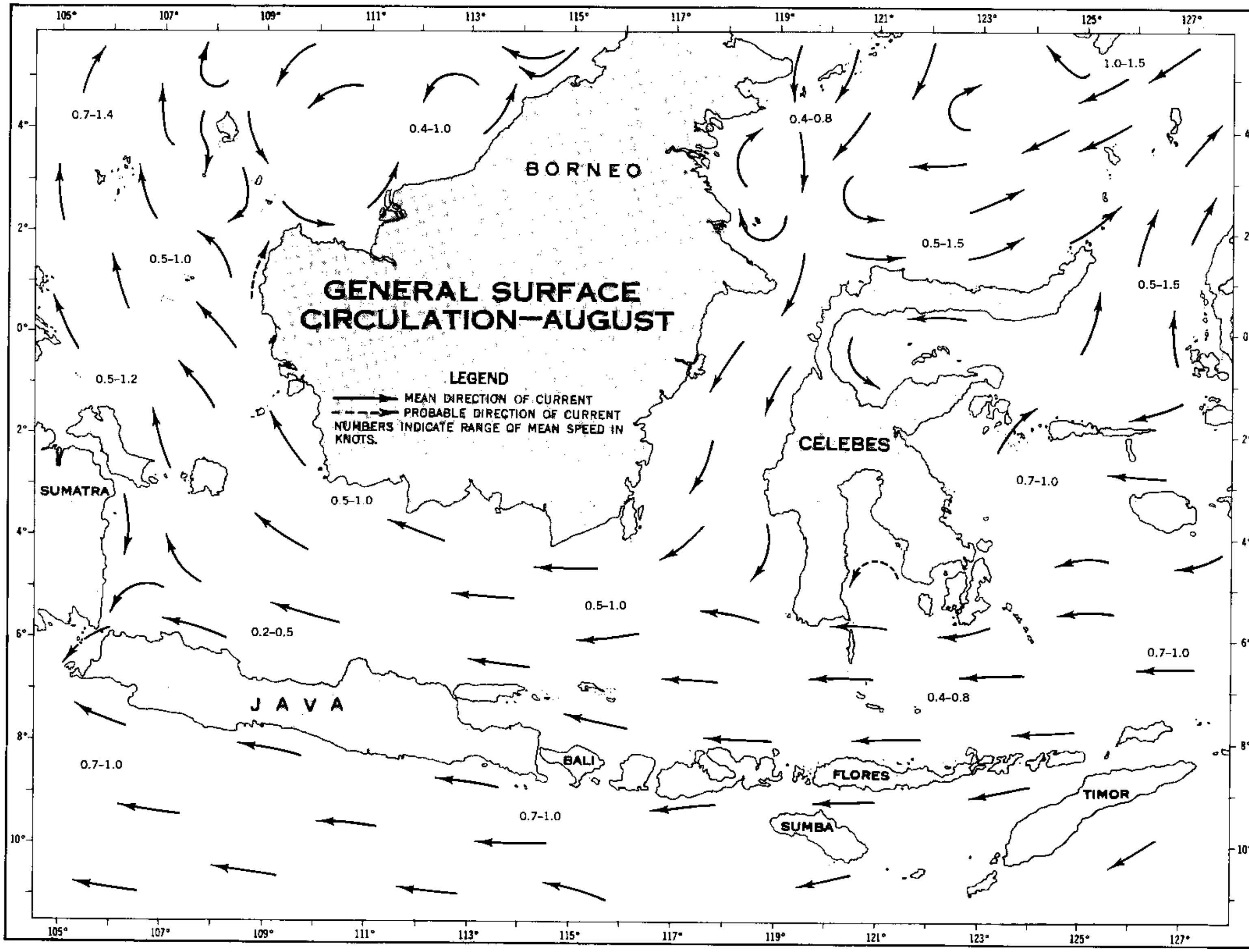

GENERAL SURFACE
CIRCULATION—AUGUST
LEGEND
MEAN DIRECTION OF CURRENT
PROBABLE DIRECTION OF CURRENT
NUMBERS INDICATE RANGE OF MEAN SPEED IN KNOTS.
BORNEO
CELEBES
SUMATRA
JAVA
BALI
FLORES
SUMBA
TIMOR
0.7-1.4
0.4-1.0
0.4-0.8
1.0-1.5
0.5-1.0
0.5-1.5
0.5-1.5
0.5-1.2
0.5-1.0
0.7-1.0
0.5-1.0
0.2-0.5
0.7-1.0
0.4-0.8
0.7-1.0
0.7-1.0
105° 107° 109° 111° 113° 115° 117° 119° 121° 123° 125° 127°
4° 2° 0° 2° 4° 6° 8° 10°

Fig. 7

CURRENTS

1–44 The speed and direction of surface currents throughout the archipelago are determined primarily by the seasonal winds of the northerly and southerly monsoons. These seasonal winds do not begin uniformly throughout the area, that is, the influence of northerly monsoon winds on current speed and direction is observed earlier north of the Equator in the South China Sea than south of the Equator in the Java, Flores, and Banda Seas. The opposite occurs with the advent of southerly monsoon winds.

CURRENTS (NORTHERLY MONSOON).—Figure 4 is representative of the general surface current circulation that occurs from November through March. During the northerly monsoon, a current sets southward from the South China Sea through Karimata Strait, ranging in speed from ½ knot to 1½ knots. Upon entering the Java Sea this southeastward flowing current divides; part sets southwestward through Sunda Strait, and part sets eastward along the north coast of Java. This eastward flowing current merges with the somewhat swifter southward flowing Makasar Strait current, then continues east toward the Flores and Banda Seas.

Along the south coast of Java, a strong countercurrent (that is, counter to the westward flowing South Equatorial Current) influenced by strong northerly monsoon winds sets eastward through the Savu and Timor Seas, ranging in speed from ⅕ to 1⅖ knots.

The counterclockwise currents characteristic of the Celebes Sea are not monsoonal in origin but are formed by a branch of the North Equatorial Current which enters the north part of the Celebes Sea throughout the year. Generally, currents in the Celebes Sea are strong, ranging in speed from ⅘ knot to 2 knots throughout the year. At times, particularly during the strength of the northerly monsoon, currents with speeds of 2 to 3 knots may occur.

TRANSITION PERIODS.—During April and October, the transition periods between monsoons (Figures 5 and 6, respectively), currents are weak and variable owing to the cessation of monsoonal winds.

CURRENTS (SOUTHERLY MONSOON).—Figure 7 representative of the general surface current circulation that occurs from May through September. A branch of the Arafura Sea current, augmented by southerly monsoon winds, sets westward through the Banda, Flores, and Java Seas, ranging in speed from ⅕ to 1 knot. Along the northwest coast of Java, this westward flowing current divides; part sets southwestward through Sunda Strait and joins the current flowing westward along the south coast of Java, and part sets through Karimata Strait into the South China Sea.

Throughout the Ceram and Molucca Seas the prevailing set of the current is northwestward to westward becoming northeastward upon entering Molucca Passage. In both the Ceram and Molucca Seas, currents are slightly stronger during the southerly monsoon than those during the northerly monsoon.

South of Java and the islands east of Java, including Flores Island, a branch of the Arafura Sea current, influenced by strong southerly monsoon winds, sets westward through the Timor and Savu Seas at speeds from 7/10 to 1 knot.

In the Celebes Sea, winds of the southerly monsoon, although strong, do not disrupt the counterclockwise circulation pattern characteristic of this sea, nor do these persistent winds reverse the southward flowing current in Makasar Strait. However, in Makasar Strait, this southward flowing current sets more to the southwest during southerly monsoon winds and more to the southeast during northerly monsoon winds.

SEA AND SWELL

1–45 The term *sea* refers to waves caused by local winds, whereas the term *swell* refers to waves that have progressed beyond the influence of the generating winds. The direction of the sea is that of the local wind, whereas the direction of swell is essentially the same as that of the parent waves when they leave the generating area. Sea and swell generally are present in a water area at the same time, although on occasion one may obscure the other.

Although ocean waves are generated as a direct result of wind action, other factors directly and indirectly affect their magnitude and direction. A general knowledge of some of these factors aids in making the best use of sea and swell charts and observations.

(1) CURRENTS—When waves enter an area of strong opposing currents, the wave form steepens even to the point of breaking. However, when waves move with a component of the current, they increase in length and decrease in height.

(2) BOTTOM TOPOGRAPHY—For certain theoretical reasons, water is defined as shallow if the depth is less than one-half the surface wave length. Differences in depth within this shallow-water zone produce velocity changes in various segments of a wave. This process, called wave refraction, is similar to the bending of light rays when they pass through various media. Wave velocity decreases as water depth decreases and, unless the direction of propagation is at right angles to the bottom contours, the portion of a wave entering shallow water moves more slowly than that portion of the same wave in deeper water.

The portions of shallow water waves passing over depressions on the bottom move faster than the portions on either side. Hence, wave crests stretch, and wave heights may indicate the approximate position of underwater ridges and depressions. Islands lying in the paths of waves cause refraction around their sides. Leeward of an island the waves may meet and pass through each other, producing a confused cross sea.

(3) LOCAL WINDS.—All sea areas near the shores of continents and larger islands are influenced by land and sea breezes. Modification of prevailing winds by onshore winds during the afternoon and by offshore winds during the early morning causes corresponding increases or decreases in sea heights. Gravity winds result when dense coll air, which accumulates on continental highlands, flows rapidly down the slope and out over the sea and produces high waves for short distances from shore.

Figures 8 through 11, presenting sea and swell roses for the four seasons, give the relative frequencies of selected wave-height categories by directions, together with the number of observations making up each rose. The bargraph associated with each rose gives the total relative frequency for each height category. Since both roses and bargraphs were plotted to the nearest whole cumulative percent, slight differences may occur between the total percentage of any height category of the rose and the bargraph.

1–46 PRINCIPAL CLIMATIC FEATURES AND GENERAL DISTRIBUTION.—The climate in this area is similar to that of all oceans near the Equator with some exceptions. The large scale climatic features controlling sea and swell in this region are characterized by the effects of the changing monsoons. North of the Equator, during winter, the general air flow is from the high pressure regions in the Northern Hemisphere to the low pressure areas in northern Australia, resulting in the northeast monsoon north of the Equator and the west monsoon south of the Equator. During northern summer, the general air flow is from the high pressure centers in the Southern Hemisphere to the low pressure cells over Asia, resulting in the Southwest monsoon north of the Equator and the east monsoon south of the Equator. These seasons are interrupted by short transition periods

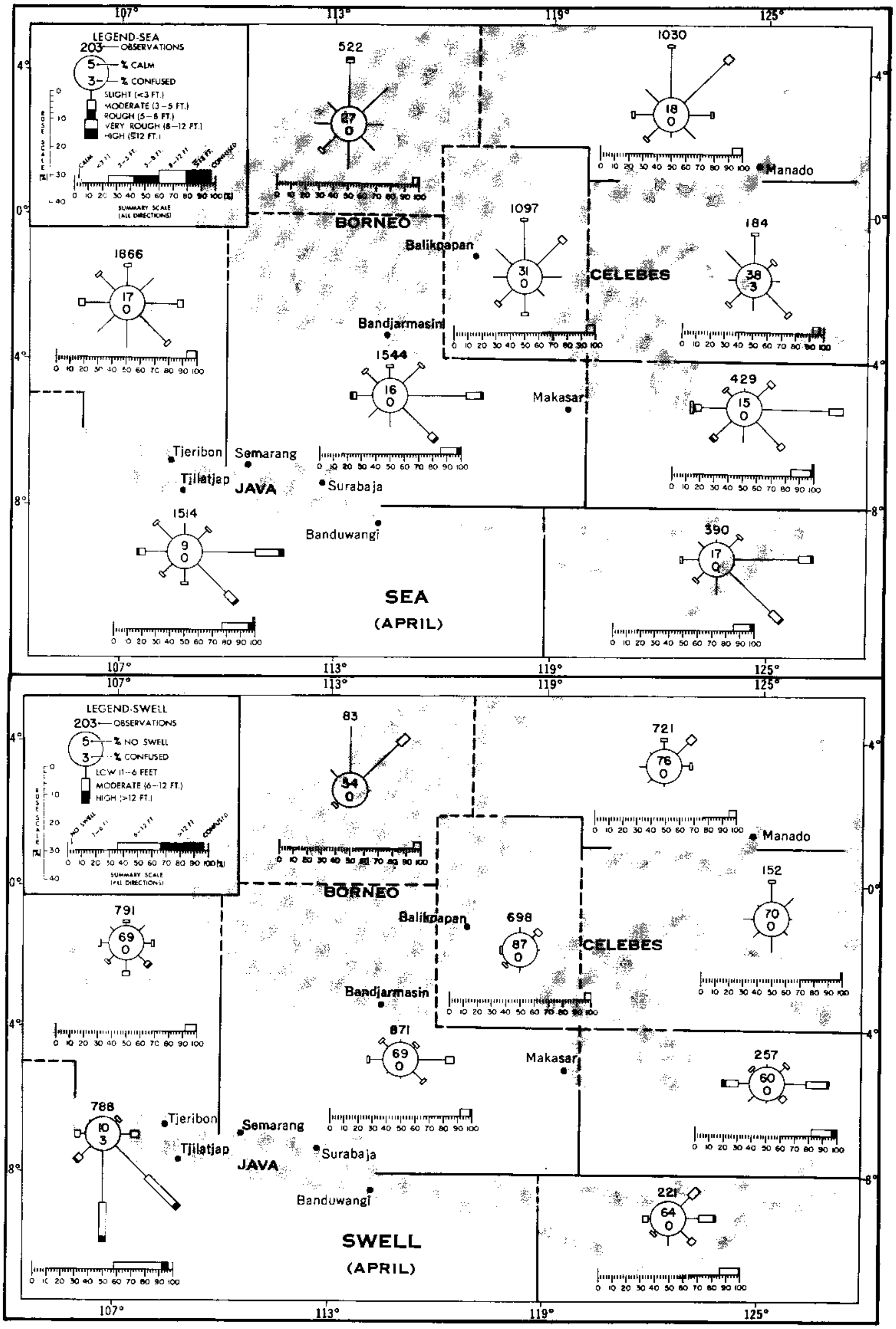


Figure 8—Percent Frequencies Sea and Swell

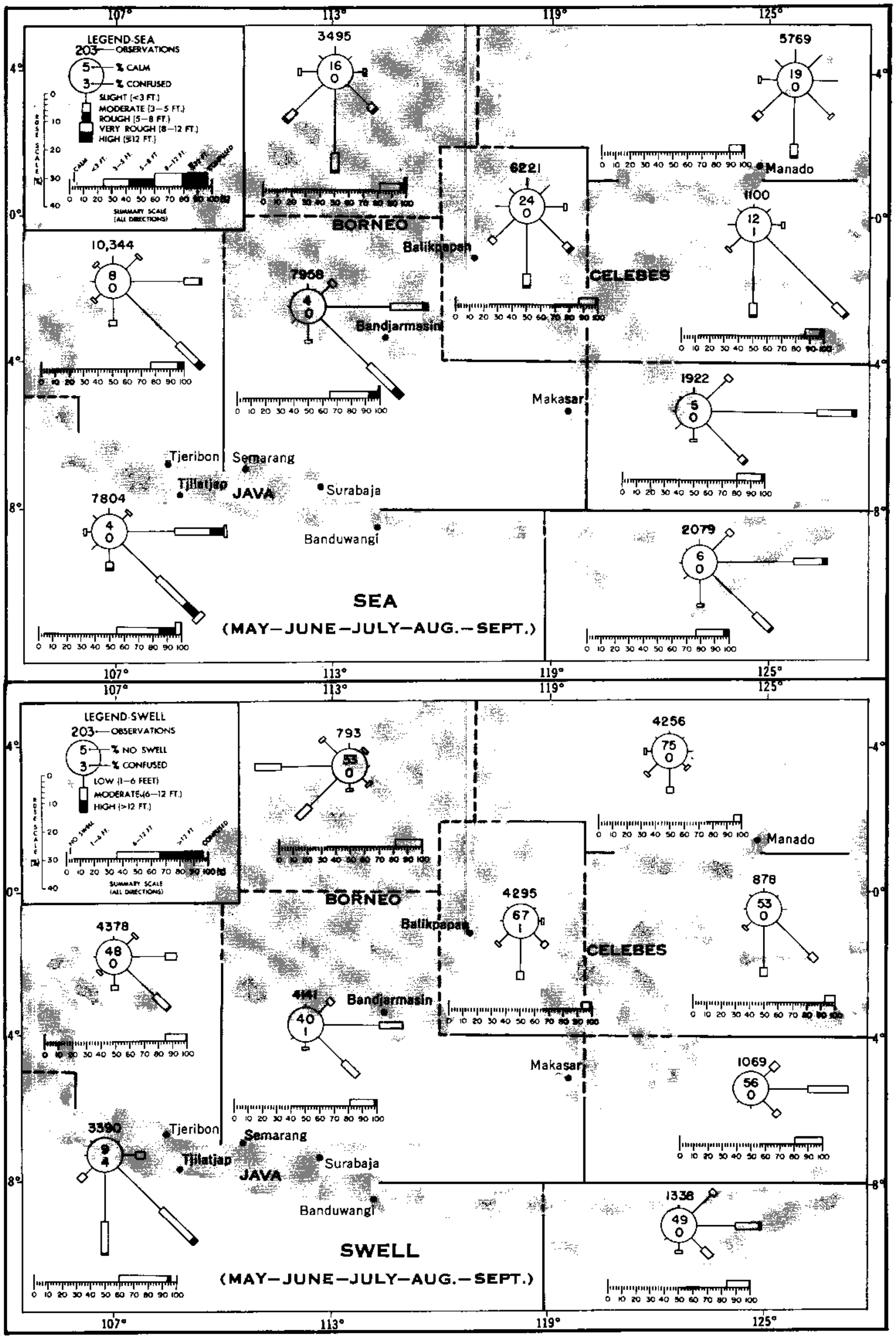
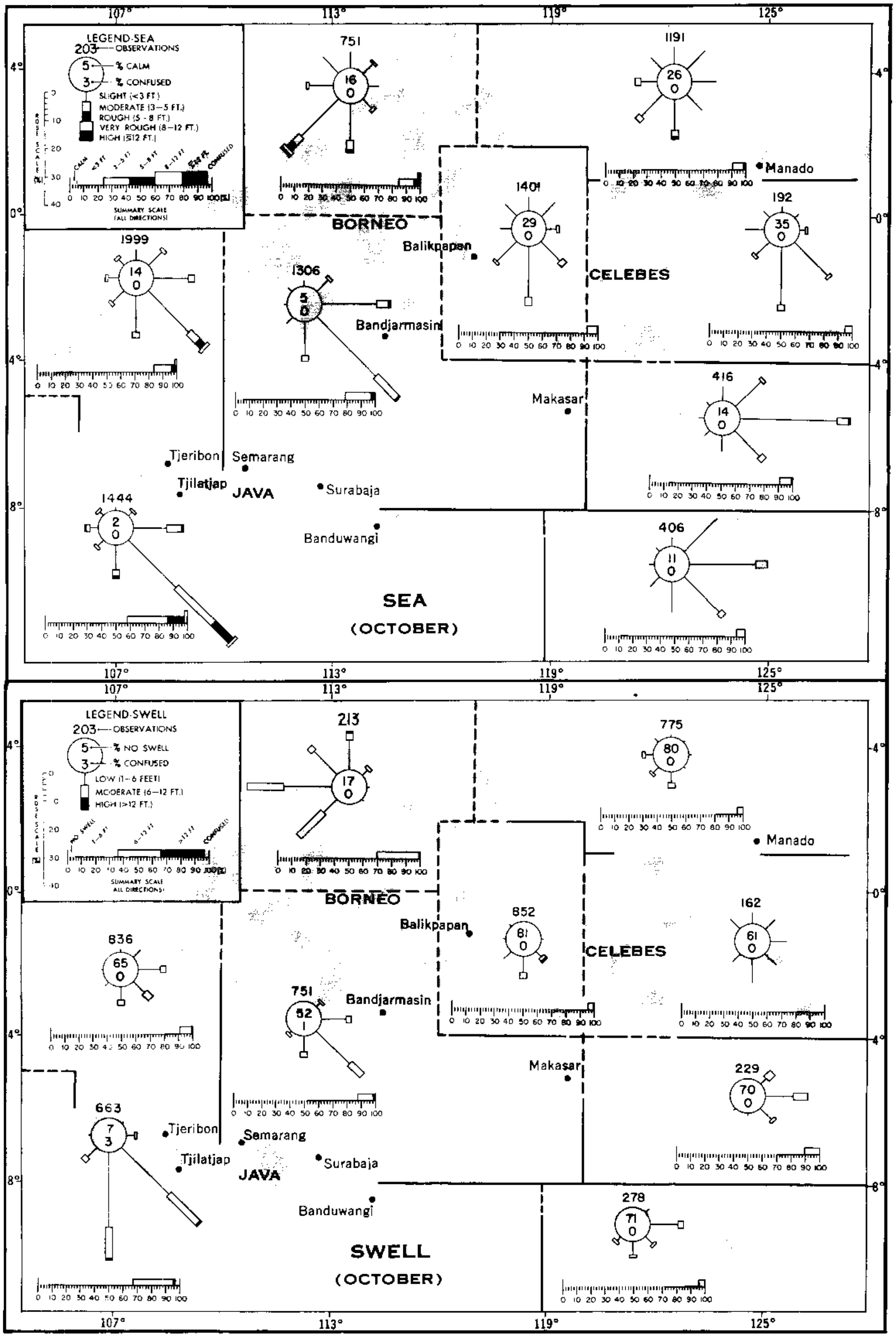


Figure 9—Percent Frequencies Sea and Swell



H.O. 72 Figure 10—Percent Frequencies Sea and Swell

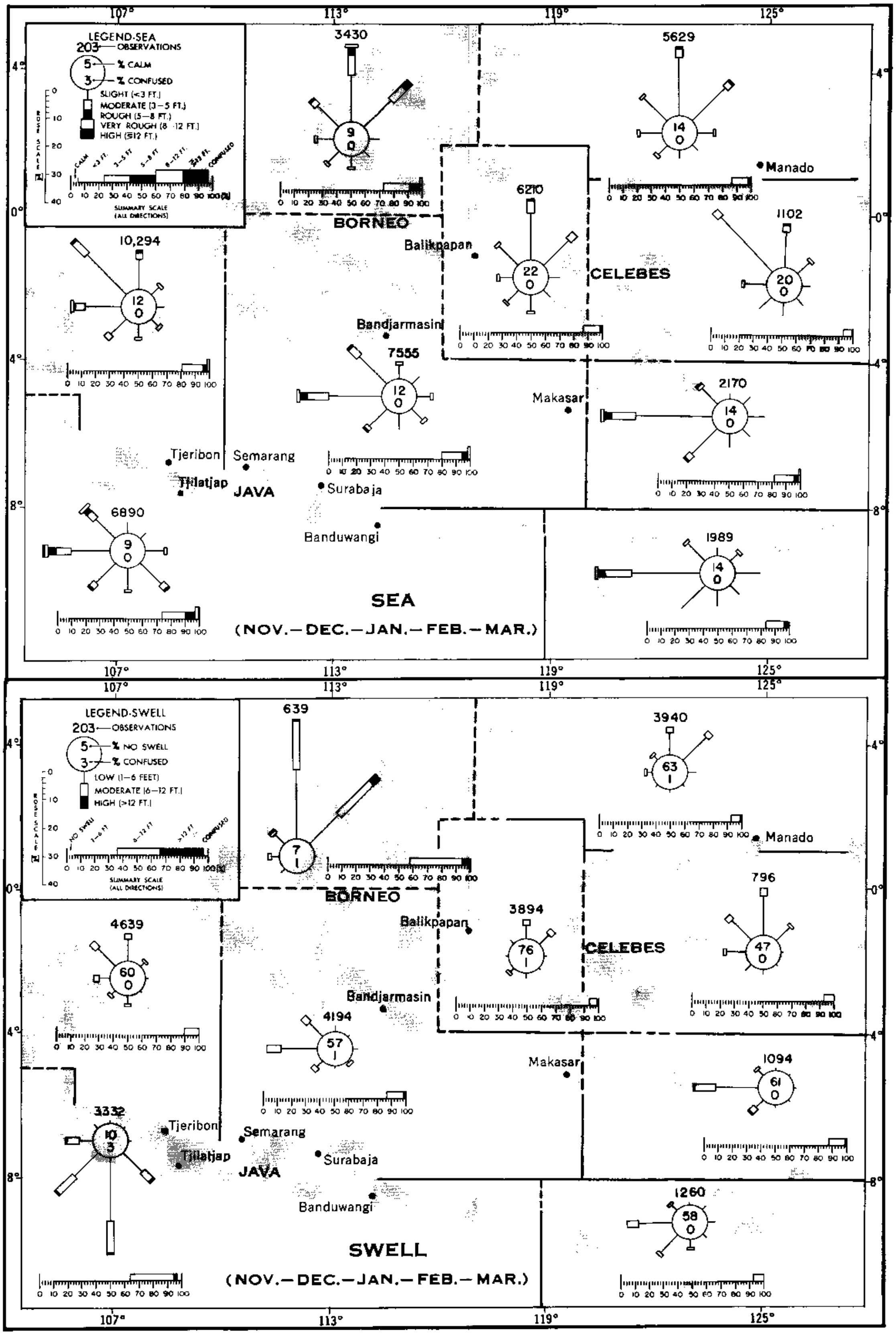


Figure 11—Percent Frequencies Sea and Swell

which are characterized by variable winds, squalls, and thunderstorms. Occasional displacement of these wind systems by land and sea breezes and by topographic influences results only in slight variations of sea and swell.

During northern winter (November through March), sea and swell are predominantly northerly and northeasterly. The spring transition (April) shows the same prevailing directions, but the frequency of sea and swell diminishes. A notable change occurs during the northern summer (May through September) when a considerable portion of the sea and swell arises from the south and southwest. During the autumn transition (October), sea and swell directions remain the same as those of summer but, as in spring, decrease in frequency.

During the southern summer (November through March), the area south of the Equator is dominated by sea and swell from the southwest through the northwest. During the southern autumn transition (April), sea and swell are mainly from the east and southeast increasing in frequency during winter (May through September) and then decreasing during the spring transition (October).

1–47 SEASONAL DISTRIBUTION OF SEA AND SWELL NORTH OF THE EQUATOR.—Generally, this area is characterized by a high percentage of calm through moderate seas and low swell. The annual frequency of calm through moderate seas (0 to 5 feet in height) is 91 to 99 percent of the time with the maximum occurring during the spring transition. The annual frequency of no swell through low swell (0 to 6 feet in height) is 58 to 96 percent of the time. In general, the maximum of no swell through low swell occurs during spring; however, in the east portion of the area the maximum occurs during the autumn transition.

High sea and swell are uncommon throughout the year, but the maximum frequency usually occurs during winter and summer. In the west portion of the area the maximum occurs during the autumn transition.

The doldrums are responsible for the extremely large amount of calm through moderate seas and low swell in this area. This belt of light and variable winds lies in the vicinity of the Equator during spring and summer and begins to migrate northward during the autumn transition, accounting for the slight decrease in the percentage of seas <5 feet and low swell during autumn and winter.

1–48 SEASONAL DISTRIBUTION OF SEA AND SWELL SOUTH OF THE EQUATOR.—During summer (November through March) the west monsoon, which is the result of the general airflow from a semipermanent low over Australia, causes sea and swell to be predominantly from the southwest through the northwest. Calm through moderate seas (0 to 5 feet in height) occur on the average of 95 percent of the time. The average seasonal frequency of no swell through low swell (0 to 6 feet in height) is 86 percent, with high swell (>12 feet in height) occurring less than 2 percent of the time. The north portion of the area shows a slightly higher frequency of calm through moderate seas and low swell than does the south portion of the area.

In autumn (April), the influence of the east monsoon becomes predominant as the airflow from the semipermanent high pressure cell of the Southern Hemisphere causes the winds to shift to an easterly component and establishes a pattern which prevails throughout the remaining seasons. Calm through moderate seas are at a maximum for the year, occurring with an average frequency of 97 percent. The average frequency of no swell through low swell decreases slightly from summer to 85 percent. As in summer, high swell occurs less than 2 percent of the time. Again, the north portion of the area shows a slightly higher percentage of calm through moderate seas and low swell than does the south portion. The east monsoon reaches its maximum intensity during the Southern Hemisphere winter (May through September), resulting in a minimum for the year of calm through moderate seas and low swell. Calm through moderate seas occur on the average 94 percent of the time, whereas no swell through low swell occurs 81 percent of the time. The frequency of high swell is nearly 2 percent.

During the spring transition period (October), the east monsoon diminishes in intensity, but the easterly wind pattern is still a dominant feature. The average frequency of calm through moderate seas increases to 96 percent. No swell through low swell reaches a maximum for the year, occurring on an average 89 percent of the time. High swell is at a minimum for the year, occurring slightly more than 1 percent of the time.

SELECTED PORTS AND HARBORS

1–49 Table 1 shows expected frequencies of sea and swell by height and direction for selected ports and harbors in this area. In this table the wave frequencies by direction apply to the entrances. The orientation and exposure of the different ports and harbors together with the general climatic conditions are such that waves of appreciable heights are rarely experienced from any direction.

Table 2 can be used to determine wave heights which may be expected in harbors and bays with short fetches when strong winds prevail.

TABLE 1.—*Percent frequencies of sea and swell for selected port entrances*

Port	Season	Principal directions	Sea-wave height (feet)						Swell-wave height (feet)				Comments
			<3	3-5	5-8	8-12	≥12	Calms	1-6	6-12	>12	Calms	
Bandjarmasin	November, December, January February, March.	S	6	(*)	(*)	0	0	12	1	(*)	0	57	
		SW	9	1	1	(*)	(*)		3	2	(*)		
		W	19	7	3	1	(*)		13	5	(*)		
	April	S	5	(*)	0	0	0	16	1	(*)	0	66	
		SW	5	(*)	(*)	0	0		1	0	0		
		W	6	1	1	(*)	0		5	1	(*)		
	May, June, July, August, September.	S	6	1	(*)	(*)	0	4	2	1	(*)	40	
		SW	2	(*)	(*)	0	0		1	(*)	0		
		W	1	(*)	(*)	0	0		(*)	0	0		
	October	S	12	2	0	0	0	5	6	2	(*)	52	
		SW	3	(*)	0	0	0		1	1	(*)		
		W	1	0	0	0	0		(*)	0	0		
Balikpapan	November, December, January, February, March.	E	4	(*)	(*)	0	0	22	1	(*)	0	76	
		SE	4	(*)	(*)	0	0		1	(*)	(*)		
		S	6	1	(*)	0	0		2	(*)	(*)		
	April	E	7	(*)	0	0	0	31	1	(*)	0	87	
		SE	4	(*)	0	0	0		(*)	(*)	0		
		S	7	1	(*)	0	(*)		2	(*)	0		
	May, June, July, August, September.	E	7	1	(*)	(*)	0	24	1	1	(*)	67	
		SE	13	2	1	(*)	0		5	2	(*)		
		S	18	4	1	(*)	0		12	3	(*)		
	October	E	4	1	(*)	0	0	29	1	(*)	0	81	
		SE	10	2	(*)	0	0		3	1	1		
		S	18	3	(*)	0	0		6	2	0		

See footnote at end of table.

TABLE 1.—*Percent frequencies of sea and swell for selected port entrances*—Continued

Port	Season	Principal directions	Sea-wave height (feet)						Swell-wave height (feet)				Comments
			<3	3-5	5-8	8-12	>12	Calms	1-6	6-12	>12	Calms	
Banjuwangi	November, December, January, February, March.	N	4	(*)	(*)	0	0	9	1	(*)	0	10	
		NE	3	(*)	0	0	0	--------	1	0	0	--------	
		E	7	1	(*)	(*)	0	--------	1	(*)	0	--------	
		SE	11	2	1	(*)	(*)	--------	10	4	1	--------	
		S	8	1	(*)	(*)	(*)	--------	23	11	1	--------	
		SW	10	2	1	(*)	(*)	--------	12	8	1	--------	
	April	N	4	(*)	(*)	0	0	9	(*)	0	0	10	
		NE	5	1	(*)	0	0	--------	1	1	0	--------	
		E	19	8	2	(*)	(*)	--------	4	3	(*)	--------	
		SE	15	4	1	(*)	0	--------	16	14	2	--------	
		S	5	1	(*)	0	0	--------	19	12	2	--------	
		SW	5	1	(*)	0	0	--------	5	2	1	--------	
	May, June, July, August, September.	N	2	(*)	(*)	--------	(*)	4	(*)	0	0	9	
		NE	3	1	(*)	(*)	(*)	--------	1	(*)	0	--------	
		E	17	12	5	1	(*)	--------	5	3	(*)	--------	
		SE	18	13	6	2	(*)	--------	22	5	2	--------	
		S	5	2	1	(*)	(*)	--------	18	11	1	--------	
		SW	3	(*)	(*)	(*)	0	--------	4	3	(*)	--------	
	October	N	1	(*)	(*)	0	0	2	0	0	0	7	
		NE	2	1	(*)	0	0	--------	1	(*)	0	--------	
		E	12	5	1	(*)	0	--------	3	1	0	--------	
		SE	24	18	9	1	0	--------	24	14	1	--------	
		S	9	2	1	(*)	0	--------	27	11	1	--------	
		SW	3	1	(*)	0	0	--------	5	2	(*)	--------	
Tjeribon	November December January, February March	N	11	2	1	(*)	0	12	8	2	0	60	
		NE	4	1	(*)	0	0	--------	2	1	(*)	--------	
		E	3	(*)	(*)	0	0	--------	1	(*)	(*)	--------	
	April	N	7	1	(*)	0	0	17	1	1	0	69	
		NE	7	(*)	(*)	0	0	--------	3	(*)	0	--------	
		E	12	2	(*)	(*)	0	--------	3	1	(*)	--------	
	May, June July, Angust, September.	N	3	(*)	(*)	0	0	8	1	(*)	0	48	
		NE	6	1	(*)	(*)	0	--------	4	1	(*)	--------	
		E	19	5	1	(*)	(*)	--------	12	4	(*)	--------	
	October	N	4	(*)	(*)	0	0	14	1	(*)	0	65	
		NE	7	1	(*)	(*)	0	--------	4	(*)	0	--------	
		E	13	2	(*)	(*)	0	--------	8	2	(*)	--------	
Tjilatjap	November December January, February March.	E	7	1	(*)	(*)	0	9	1	(*)	0	10	
		SE	11	2	1	(*)	(*)	--------	10	4	1	--------	
		S	8	1	(*)	(*)	(*)	--------	23	11	1	--------	
	April	E	19	8	2	(*)	(*)	9	4	3	(*)	10	
		SE	15	4	1	(*)	0	--------	16	14	2	--------	
		S	5	1	(*)	0	0	--------	19	12	2	--------	
	May, June July, August, September.	E	17	12	5	1	(*)	4	5	3	(*)	9	
		SE	18	13	6	2	(*)	--------	22	15	2	--------	
		S	5	2	1	(*)	(*)	--------	18	11	1	--------	
	October	E	12	5	1	(*)	0	2	3	1	0	7	
		SE	24	18	9	1	(*)	--------	24	14	1	--------	
		S	9	2	1	(*)	0	--------	27	11	1	--------	

See footnote at end of table.

TABLE 1.—*Percent frequencies of sea and swell for selected port entrances*—Continued

Port	Season	Principal directions	Sea-wave height (feet)						Swell-wave height (feet)				Comments
			<3	3-5	5-8	8-12	≥12	Calms	1-6	6-12	>12	Calms	
Makasar	November, December, January, February, March.	N	5	1	(*)	0	0	12	2	(*)	0	57	
		NW	14	4	1	(*)	0		7	3	(*)		
		W	19	7	3	1	(*)		13	5	(*)		
		SW	9	1	1	(*)	(*)		3	2	(*)		
		S	6	(*)	(*)	0	0		1	(*)	0		
	April	N	4	1	(*)	0	0	16	1	(*)	0	66	
		NW	6	1	(*)	0	0		3	1	0		
		W	6	1	1	(*)	0		5	1	(*)		
		SW	5	(*)	(*)	0	0		1	0	0		
		S	5	(*)	0	0	0		1	(*)	0		
	May, June, July, August, September.	N	2	(*)	0	0	0	4	1	(*)	0	40	
		NW	1	(*)	(*)	0	0		(*)	(*)	0		
		W	1	(*)	(*)	0	0		(*)	0	0		
		SW	2	(*)	(*)	0	0		1	(*)	0		
		S	6	1	(*)	(*)	0		2	1	(*)		
	October	N	2	(*)	0	0	0	5	(*)	0	0	52	
		NW	2	0	0	(*)	0		0	0	0		
		W	1	0	0	0	0		(*)	0	0		
		SW	3	(*)	0	0	0		1	1	(*)		
		S	12	2	0	0	0		6	2	(*)		
Manado	November, December January, February, March.	W	8	1	(*)	(*)	0	14	2	1	(*)	63	
		NW	12	1	(*)	(*)	0		3	1	(*)		
	April	W	7	1	(*)	0	0	18	3	(*)	0	76	
		NW	7	(*)	0	0	0		1	0	0		
	May, June, July, August, September.	W	6	1	(*)	(*)	0	19	3	1	(*)	75	
		NW	4	(*)	(*)	0	0		1	(*)	0		
	October	W	6	2	(*)	(*)	0	26	3	(*)	0	80	
		NW	6	(*)	(*)	0	0		2	(*)	0		
Semarang	November, December, January, February, March.	N	5	1	(*)	0	0	12	2	(*)	0	57	
		NW	14	4	1	(*)	0		7	3	(*)		
		W	19	7	3	1	(*)		13	5	(*)		
	April	N	4	1	(*)	0	0	16	1	(*)	0	66	
		NW	6	1	(*)	0	0		3	1	0		
		W	6	1	1	(*)	0		5	1	(*)		
	May, June, July, August, September.	N	2	(*)	0	0	0	4	1	(*)	0	40	
		NW	1	(*)	(*)	0	0		(*)	(*)	0		
		W	1	(*)	(*)	0	0		(*)	0	0		
	October	N	2	(*)	0	0	0	5	(*)	0	0	52	
		NW	2	0	0	(*)	0		(*)	0	0		
		W	1	0	0	0	0		0	0	0		
Surabaja	November, December, January, February, March.	N	5	1	(*)	0	0	12	2	(*)	0	57	
		NE	4	(*)	(*)	(*)	0		1	(*)	0		
		E	5	1	(*)	0	0		2	(*)	0		
		NW	14	4	1	(*)	0		7	3	(*)		
	April	N	4	1	(*)	0	0	16	1	(*)	0	66	
		NE	9	1	(*)	0	0		1	1	0		
		E	21	5	1	0	0		10	3	0		
		NW	6	1	(*)	0	0		3	1	0		
	May, June, July, August, September.	N	2	(*)	0	0	0	4	1	(*)	0	40	
		NE	5	2	(*)	0	0		5	2	0		
		E	23	11	2	(*)	(*)		20	8	(*)		
		NW	1	(*)	(*)	0	0		(*)	(*)	0		
	October	N	2	(*)	0	0	0	5	(*)	0	0	52	
		NE	6	1	(*)	0	0		2	1	0		
		E	20	4	1	(*)	0		9	2	0		
		NW	2	0	0	(*)	0		0	0	0		

*Less than 0.5 percent.
< Less than
> Greater than
≥ Equal to or greater than

TABLE 2.—*Wave heights (feet) expected in areas with short fetches and selecting wind speeds.*

Wind (Beaufort force) \ Fetch (nautical miles)	1	3	5	8	10
6	1.3	2.6	3.4	4.3	4.9
8	1.8	3.4	4.8	6.2	7.2
10	2.5	4.5	6.4	8.5	9.4

1-50 COMMENTS ON PORTS AND HARBORS:

Bandjarmasin____ Because of climatic conditions and sheltering from the open ocean, high sea and swell are not experienced.

Balikpapan______ This harbor is sheltered under all conditions of wind and sea.

Banjuwangi______ High swell is sometimes experienced from the south and southwest during the east monsoon.

Tjeribon_________ During the east monsoon, there is is often heavy swell in the outer harbor. The inner harbor is rarely affected.

Tjilitjap_________ This port is well protected from prevailing southerly winds, resulting in only occasional high swell.

Makasar_________ The reefs and breakwaters do not completely shelter the harbor; thus during the west monsoon considerable swell is often experienced.

Manada__________ This harbor is seldom completely calm and is subject to heavy sea and swell during the west monsoon.

Samarang________ During the west monsoon, strong winds cause high seas for short periods.

Surabaja________ This port is sheltered; thus high sea and swell are not experienced.

SEA SURFACE TEMPERATURE, SALINITY, AND DENSITY

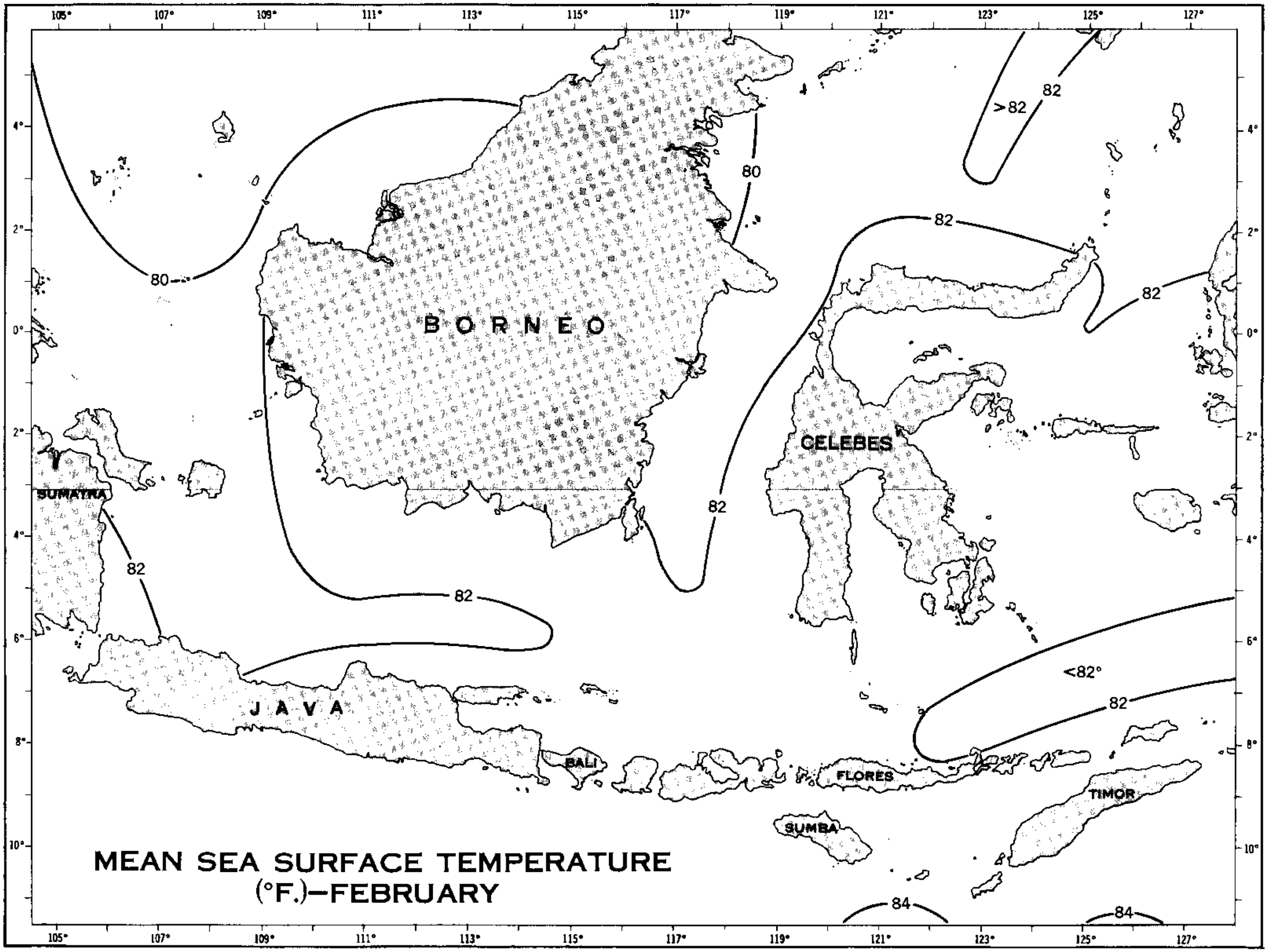
1-51 The dominant climatic feature influencing the distribution of sea surface temperature, salnity, and density in this area is the monsoonal circulation. Also, the waters of this area are affected by the great permanent currents of the Indian and Pacific Oceans.

Because of the area's wide latitudinal range, the surface distribution of temperature, salinity, and density are further influenced by other factors. Land runoff and precipitation are important influences along the west coast of Borneo and in the Karimata Strait. Along the east coast of Borneo, land drainage, currents, and the broad Continental Shelf in the west part of Makasar Strait modify the surface distribution of temperature, salinity, and density. There is very little seasonal change in mean surface temperature through out the area. Salinity generally increases northward and southward of the Equator. Surface density shows roughly the same general pattern as salinity.

TEMPERATURE.—Mean sea surface temperatures for February, May, August, and November are shown in Figures 12 through 15. The annual range within this area is about 7° F. In the south portion, around the island arc, sea surface temperatures range from a recorded minimum of approximately 69° F. during July, to a recorded maximum of about 88° F. during November.

SALINITY.—Mean sea surface salinity, reported as the weight in grams of dissolved material contained in a kilogram of sea water, is presented for February and August (figures 16 and 17). Surface salinities range from about 29.00% along the west and south shores of Borneo to about 34.00% in the northeast and south sections of the area. Low salinity values

Fig. 12



MEAN SEA SURFACE TEMPERATURE (°F.)—FEBRUARY

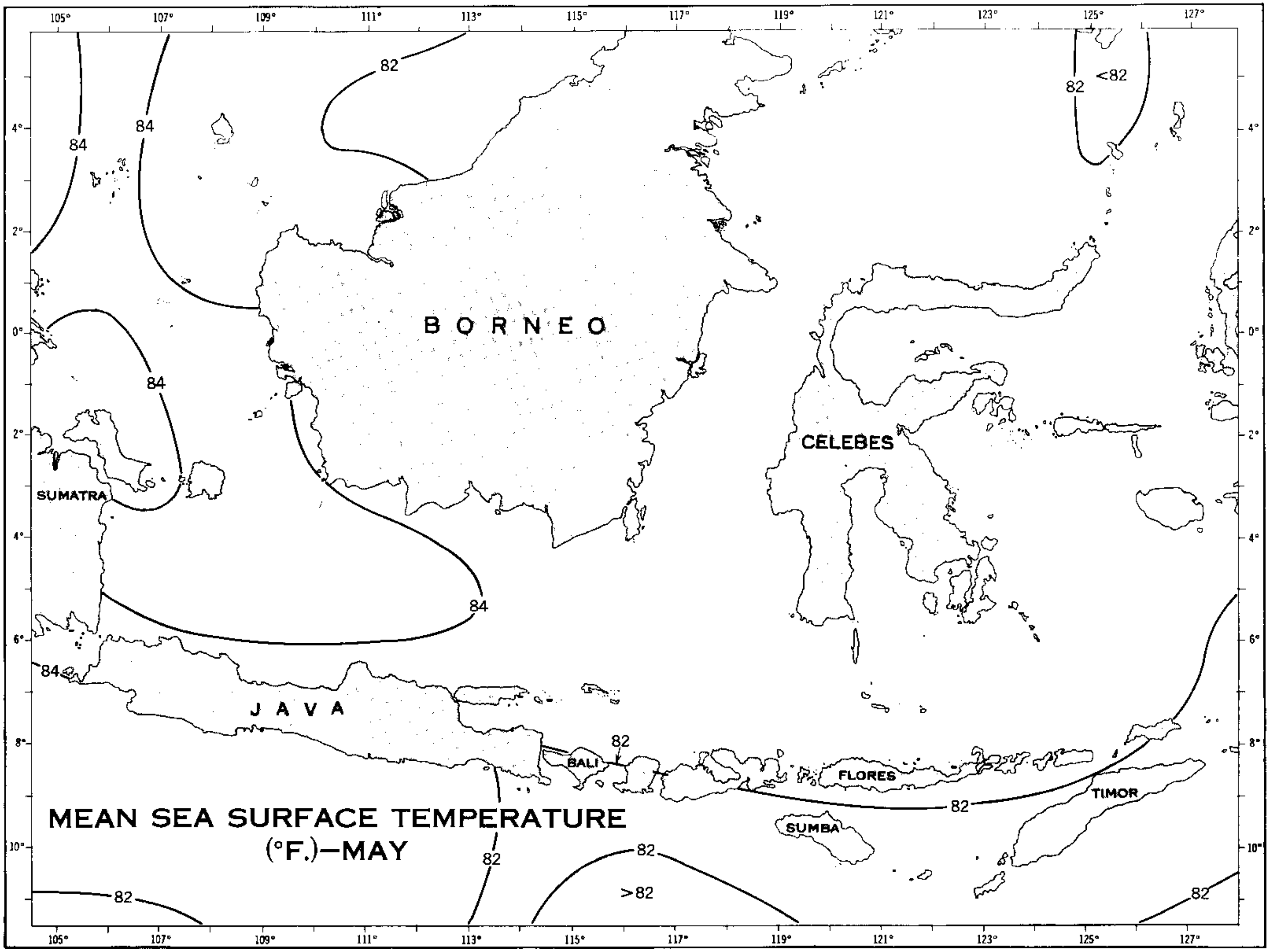
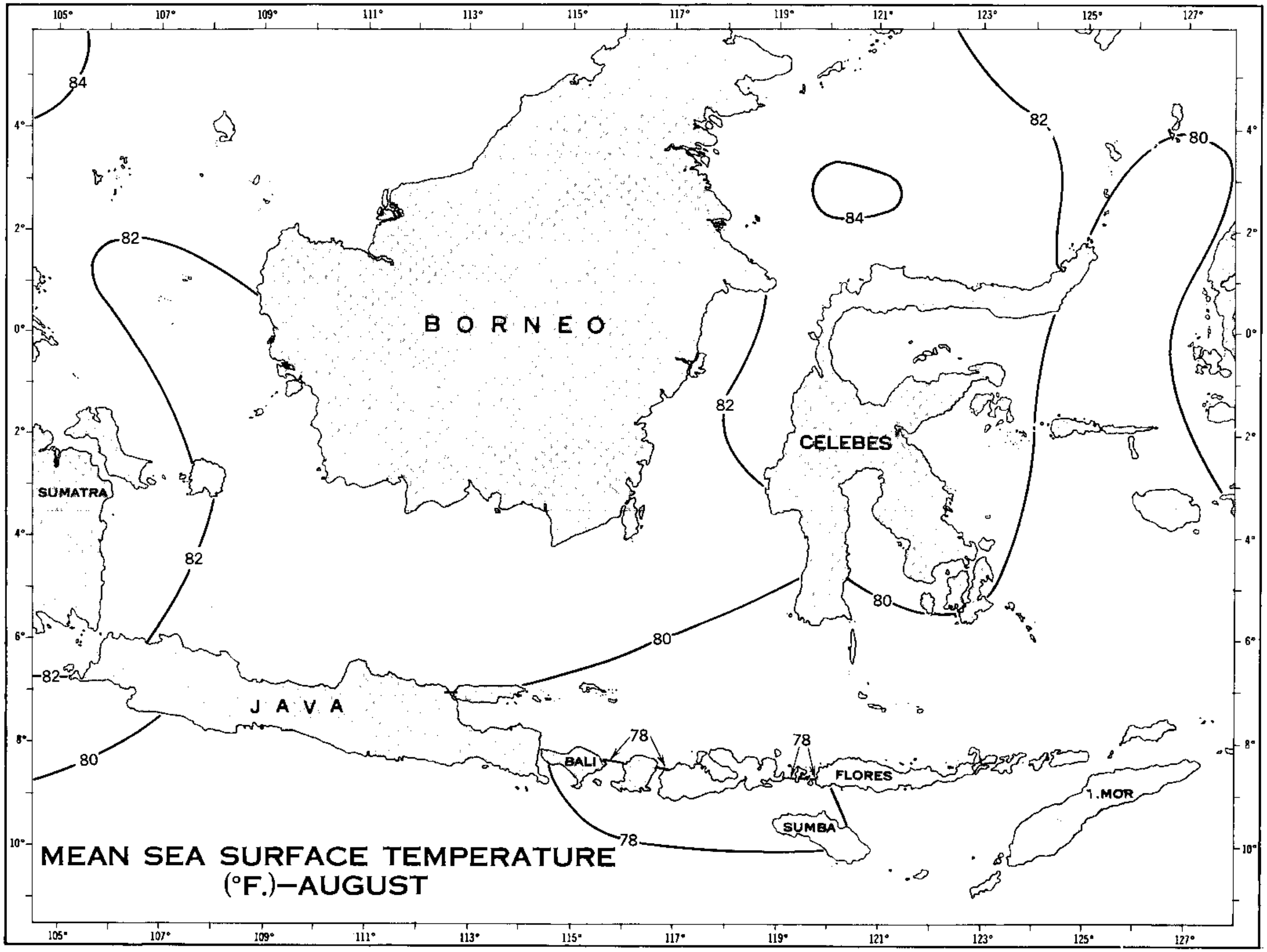

MEAN SEA SURFACE TEMPERATURE
(°F.)—MAY
BORNEO
CELEBES
SUMATRA
JAVA
BALI
FLORES
SUMBA
TIMOR
84
82
<82
>82
105°
107°
109°
111°
113°
115°
117°
119°
121°
123°
125°
127°
4°
2°
0°
2°
4°
6°
8°
10°

Fig. 13

644480 O—62——5



MEAN SEA SURFACE TEMPERATURE (°F.)—AUGUST

Fig. 14

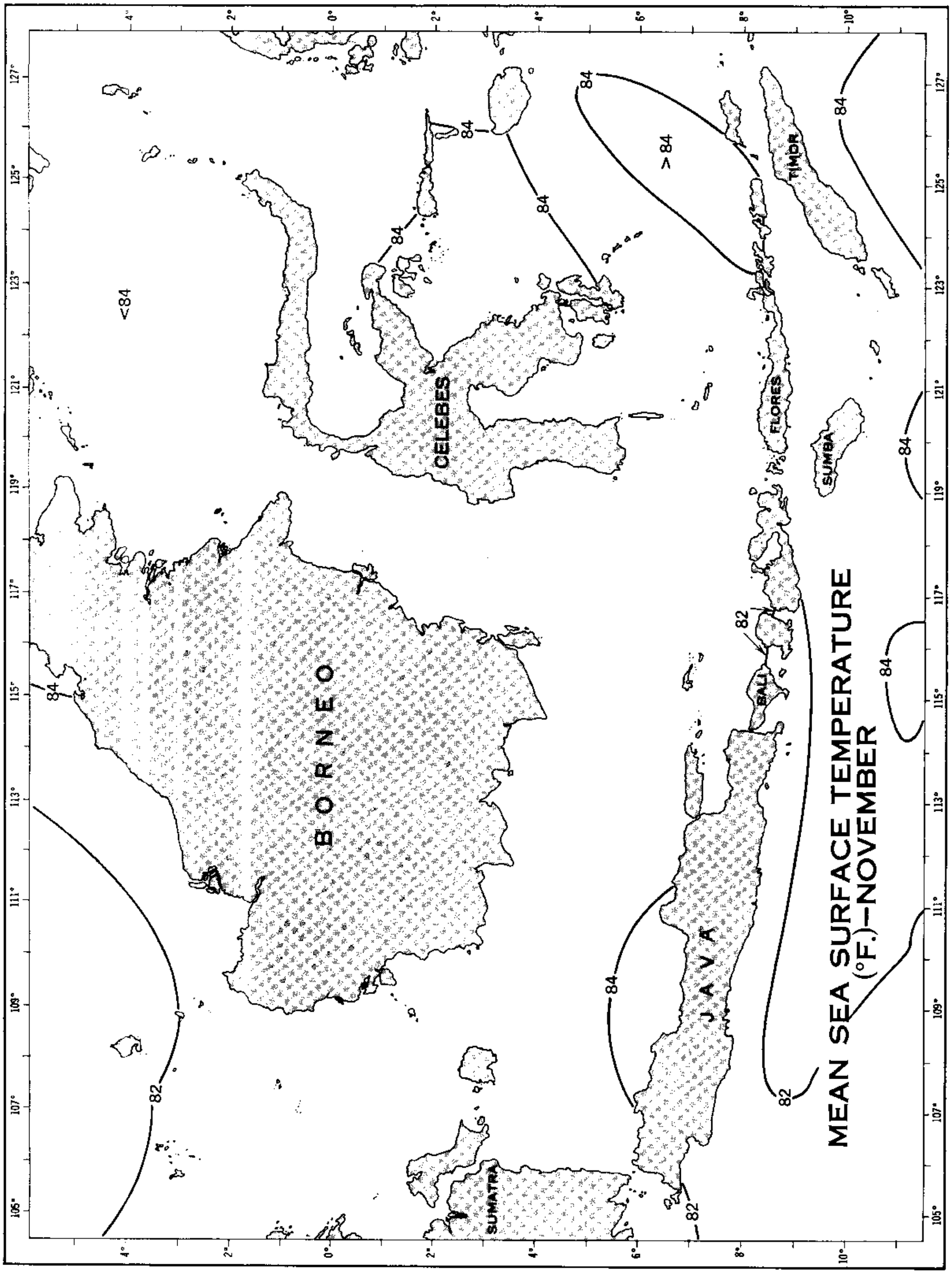

MEAN SEA SURFACE TEMPERATURE
(°F.)—NOVEMBER
BORNEO
CELEBES
JAVA
SUMATRA
BALI
FLORES
SUMBA
TIMOR
<84
>84
84
82

Fig. 15

(454) **EAST INDIES—Java—North coast—Surabaja approach—Lightship moved.**—Surabaja Westgate Pilot Lightship (6°52.3′ S., 112°45.7′ E. approx.) has been moved and reestablished in 6°50′40″ S., 112°44′25″ E.

(See N.M. 29 (3885) 1962.

(N.M. 4/63.)

(B.P.I. 51 (408), Djakarta, 1962.)
H.O. Charts **6324, 3331, 3332, 3055, 3001.**
H.O. Pub. 112, No. **27980.**
H.O. Pub. 72, 1952, page 53.

(454) **EAST INDIES—Java—North coast—Surabaja approach—Lightship moved.**—Surabaja Westgate Pilot Lightship (6°52.3′ S., 112°45.7′ E. approx.) has been moved and reestablished in 6°50′40″ S., 112°44′25″ E.

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H.O. Charts **6324, 3331, 3332, 3055, 3001.**

H.O. Pub. 112, No. **27980.**

H.O. Pub. 72, 1952, page 53.

and rapid changes along the coasts may result from land drainage, river discharge, and shallow depths.

DENSITY.—Density, as used in this chapter, is the specific gravity of the sea water or the ratio between the weight of a sea water sample and the weight of an equal volume of distilled water at 39.2° F. (4.0° C.). Mean sea surface densities for February and August are shown in figures 18 and 19.

In this area surface densities are fairly uniform throughout the year except in the coastal regions around Borneo, Java, and the Celebes, where densities and salinities are affected similarly.

SEISMICITY

1–52 This area lies in the middle of one of the earth's most active seismic zones. Most of the islands here, with the exception of large portions of Borneo, have been subjected to damaging or destructive earthquakes. For 1955, the U.S. Coast and Geodetic Survey lists approximately 20 earthquakes which were strong enough to be detected by their network of seismic stations. The year 1955 is considered representative of the frequency of occurrence of moderate to large earthquakes in this area.

The archipelago contains 56 volcanoes which have been active within historic times. Of these, 51 are located on islands and 5 are submarine volcanoes. The majority of these volcanoes lies along the arc formed by the Indonesian islands. (See Figure 20.)

The most famous volcano in this area is Rakatau (Krakatau), whose explosive eruption in 1883 was one of the world's most devastating natural phenomena. The waves of the tsunami generated by this explosion were identified as far away as the English Channel. On the Sumatra shore, in the vicinity of Rakatau, the wave was 80 feet high. At Merak, on the Java shore, the wave was estimated to be 100 to 135 feet high, 33 feet high at Anjer, 72 feet high at Batong, and 17 feet high at Djakarta. Waves of lesser heights probably occurred along all shores throughout this area. Tsunamis caused by lesser volcanic eruptions and/or earthquakes have been reported from numerous places in this area.

In May 1962, Rakatau was inactive. No smoke or light could be seen.

BIOLUMINESCENCE (PHOSPHORESCENCE)

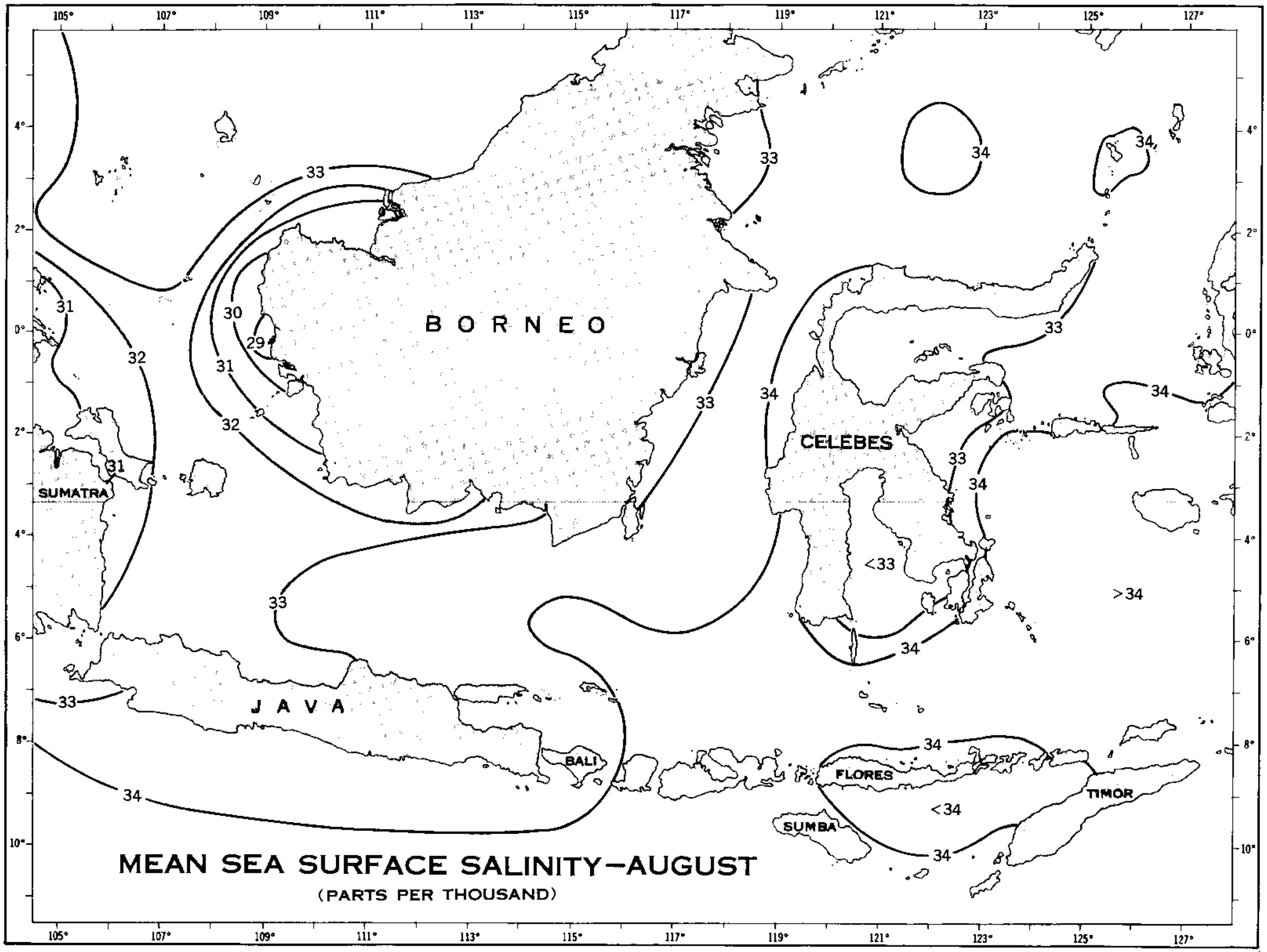
1–53 BIOLUMINESCENCE is the production of light by living organisms. Luminescent displays may be grouped into three general categories: (1) sheet-type, often appearing as a diffuse glow extending over a large area of the sea surface; (2) spark-type, observed as innumerable flickering points of light; and (3) globe-type, appearing as glowing balls of light. The organisms causing these displays include various types of microscopic one-celled organisms called protozoa, minute shrimplike copepods, and jellyfishes, respectively.

Some spectacular displays of bioluminescence have been reported in the waters adjacent to the Celebes. These displays can occur at any time of the year.

In the Banda Sea large areas of the ocean are luminous at times. The light is very strong and gives the water an appearance of a snow covered plain. The Indonesians refer to this condition as the winter ocean because of its snowy appearance. It is seen very often in July and August. An expanse of sea may turn milky so suddenly that it appears as if a light switch had been thrown.

PYROSOMA (a floating sea squirt) occasionally is present in great numbers and is responsible for some displays of brilliant green light. However, the appearance of masses of *Pyrosoma* is unpredictable. Harbors along the north coast of the Celebes, for example, may be very phosphorescent for a few nights, then may be dark for long periods until the next influx of *Pyrosoma*.

Fig. 17



MEAN SEA SURFACE SALINITY—AUGUST

(PARTS PER THOUSAND)

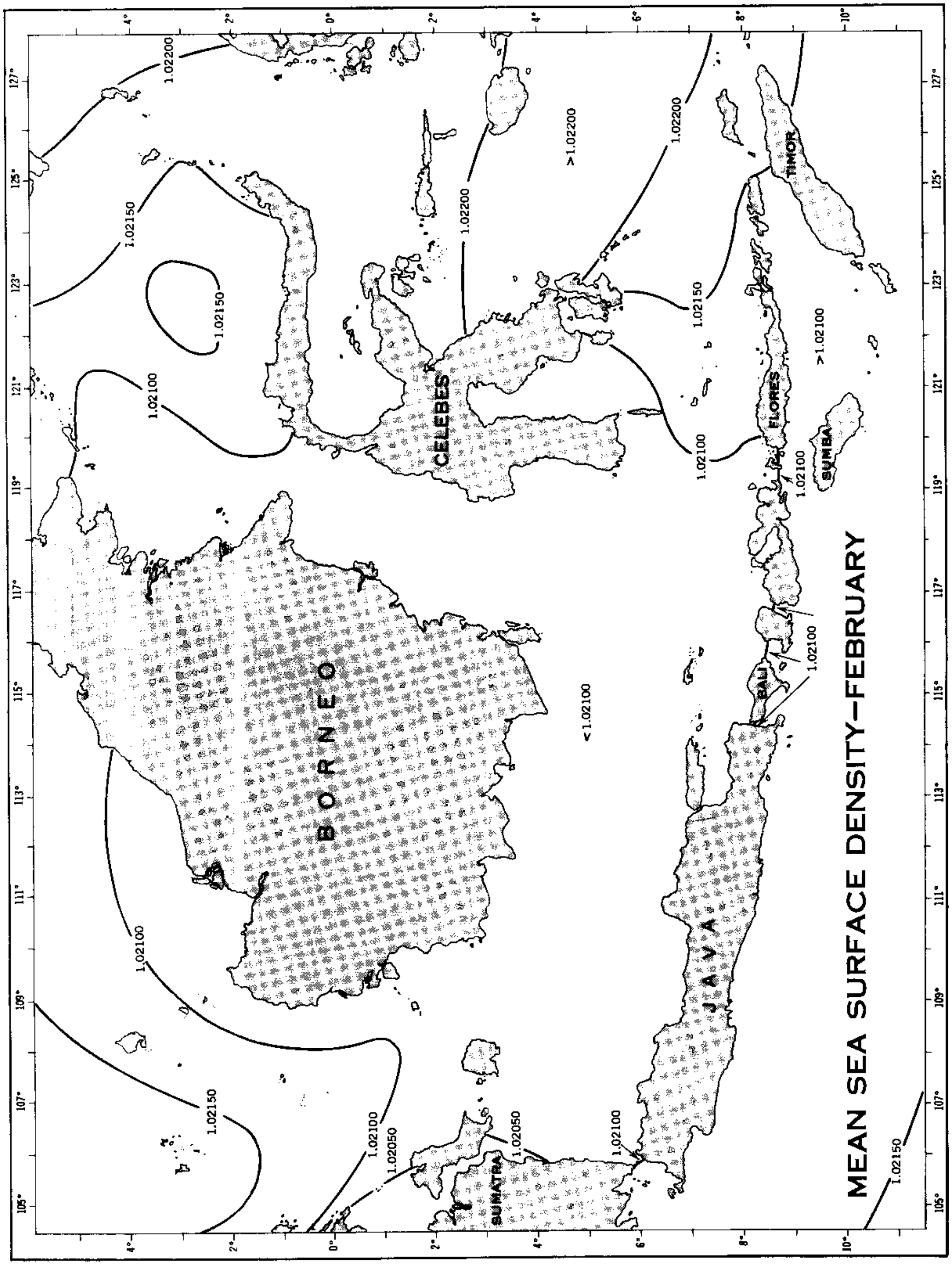

MEAN SEA SURFACE DENSITY–FEBRUARY
BORNEO
CELEBES
JAVA
SUMATRA
BALI
FLORES
SUMBA
TIMOR
1.02200
1.02150
1.02100
1.02050
>1.02200
>1.02100
<1.02100
1.02150

Fig. 18

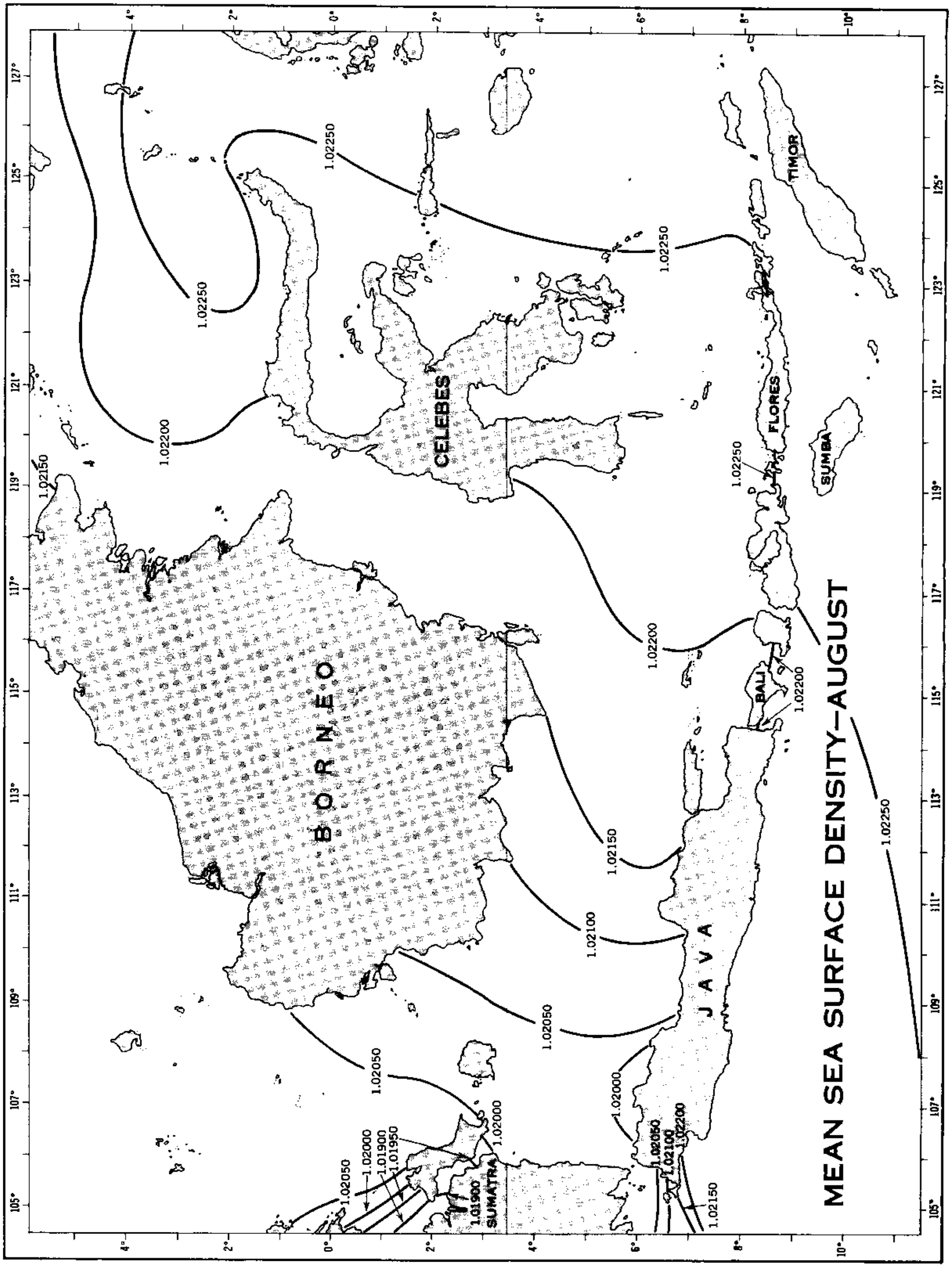
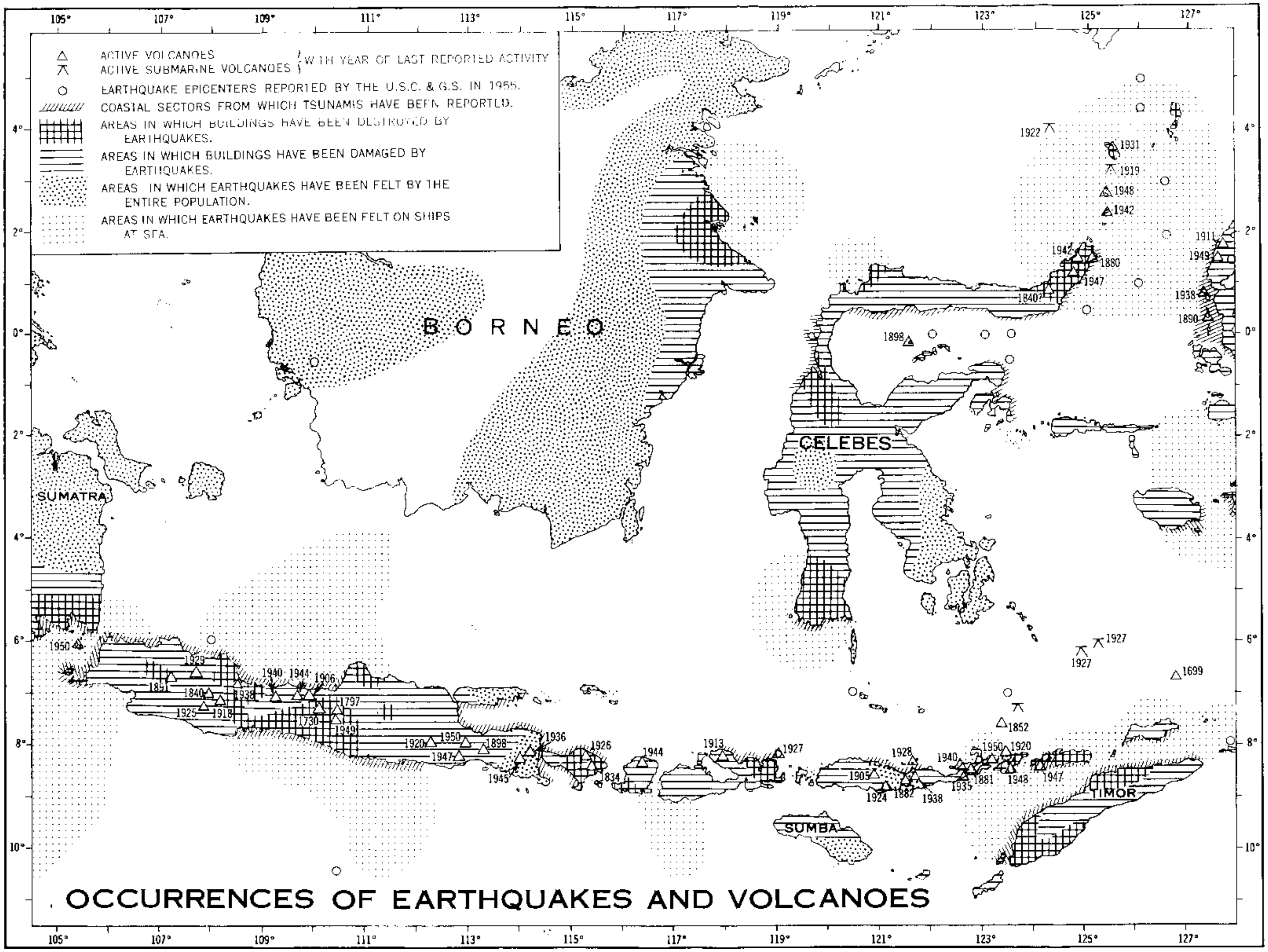

MEAN SEA SURFACE DENSITY—AUGUST
BORNEO
CELEBES
JAVA
SUMATRA
BALI
FLORES
SUMBA
TIMOR
1.02250
1.02200
1.02150
1.02100
1.02050
1.02000
1.01950
1.01900

Fig. 19



ACTIVE VOLCANOES
ACTIVE SUBMARINE VOLCANOES
WITH YEAR OF LAST REPORTED ACTIVITY
EARTHQUAKE EPICENTERS REPORTED BY THE U.S.C. & G.S. IN 1955.
COASTAL SECTORS FROM WHICH TSUNAMIS HAVE BEEN REPORTED.
AREAS IN WHICH BUILDINGS HAVE BEEN DESTROYED BY EARTHQUAKES.
AREAS IN WHICH BUILDINGS HAVE BEEN DAMAGED BY EARTHQUAKES.
AREAS IN WHICH EARTHQUAKES HAVE BEEN FELT BY THE ENTIRE POPULATION.
AREAS IN WHICH EARTHQUAKES HAVE BEEN FELT ON SHIPS AT SEA.
BORNEO
CELEBES
SUMATRA
SUMBA
TIMOR
OCCURRENCES OF EARTHQUAKES AND VOLCANOES

Fig. 20

DANGEROUS MARINE ANIMALS

1–54 The threat of serious injury through contact with marine animals is very great in Celebes waters. A wide variety of venomous organisms is present, as well as several large predatory forms.

The most dangerous venomous animals likely to be encountered here are a small but deadly jellyfish known as the sea wasp, a potentially lethal scorpionfish called the stonefish, and the extremely virulent sea snakes. Painful and possibly fatal wounds may be inflicted upon swimmers or waders by these animals. The danger of the stonefish is in stepping on it as it lies motionless and well camouflaged on the bottom. Handling live specimens of venomous forms, as well as chance contact in the water, frequently leads to serious injuries. Other venomous animals in these waters are sea urchins, various jellyfishes, cone shells (marine snails), stingrays, marine catfishes, and several scorpionfishes related to the stonefish. These marine stingers are primarily inhabitants of coastal waters.

Sharks reported from these waters include the mako, hammerhead, and tiger. These large predators usually stay well offshore but may invade coastal waters in search of prey.

Barracuda lurk about wharves, wrecks, and coral heads, attacking their victims with swift savage strikes. Rocky ledges and coral crevices provide refuge for moray eels. Morays attack viciously when cornered or molested and inflict severe lacerations with their sharp teeth.

The estuarine or salt water crocodile is common about river mouths and mangrove swamps. This huge reptile displays surprising cunning and agility in capturing its prey. Its reputation as a maneater is well deserved.

Certain fishes commonly used as food occasionally may be responsible for outbreaks of ciguatera, a form of poisoning caused by the ingestion of toxic fish. Symptoms often associated with ciguatera are general weakness, diarrhea, tingling or numbness of lips, hands, and feet, nausea, confusion of sensations of heat and cold, loss of muscular coordination, and difficulty in breathing. This type of fish poisoning has been reported from many tropical west Pacific and Indo-Australian localities, though not from Celebes. The toxic condition of the fishes causing ciguatera is usually temporary and quite localized, rather than general over large areas. The species involved often are large reef inhabitants or semioceanic fishes such as barracuda, snappers, groupers (sea basses), surgeonfishes, and jacks. In tropical regions it is wise to observe local custom in choosing fish for food.

ROUTES

1–55 Routes in this book are given from the junction points of the main straits as follows:

(*a*) Sunda Strait (6°04′ S., 105°50′ E.).
(*b*) Selat Karimata (2°23′ S., 109°11′ E.).
(*c*) Selat Lombok (8°50′ S., 115°43′ E.).
(*d*) Wetar Strait (8°19′ S., 127°27′ E.).
(*e*) Sibutu Passage (5°02′ N., 119°40′ E.).

SUNDA STRAIT

1–56 SUNDA STRAIT—TJIREBON.—From a position about 2¾ miles west-northwestward of Tandjung Tjikoneng proceed on a northeasterly course to a position about 2¾ miles northwestward of Tandjung Pudjut. Thence proceed on an easterly course to a position in midchannel between Pulau Pajung and Pulau-pulau Agenieten. Thence an east-northeasterly course leads to a position (5°47′ S.. 106°49′ E.), northward of Nassau Reef. Thence an easterly course leads to a position 9½ miles north-northeastward of Tandjung Sedari. Thence an east by southerly course leads to a position about 2½ miles southward of Pulau Menjawak. Thence a southeasterly course leads to a position with Gunung Kromong bearing 249°, distant 32 miles. Thence follow the directions for Tjirebon.

SUNDA STRAIT-SEMARANG.—From the position 2½ miles southward of Pulau Menjawak, an east-southeasterly course leads to a position about 1½ miles northeastward of Karang Bapang. Thence a southeasterly course leads to a position about 4½ miles northward of the port.

SUNDA STRAIT TO SURABAJA.—From the position 2½ miles southward of Pulau Menjawak, an east by southerly course leads to a position about 7½ miles northward of Pulau Mondoliko. Thence an east-southeasterly course leads to a position off Surabaja Outer Lighted Buoy.

SUNDA STRAIT TO TJILATJAP.—From a position about 5½ miles west-southwestward of Tandjung Lajar, steer a southeasterly course to position 6°54′ S., 105°12′ E. thence an east-southeasterly course leads to a position 8½ miles southwestward of Udjung Genteng. Thence an east by southerly leads to a position (7°55′ S., 108°26′ E.) 5½ miles southward of Legokdjawa. Thence an east by northerly course leads to a position about 4 miles southward of the southeast end of Nusa Kambangan. Thence see directions for Tjilatjap.

SUNDA STRAIT TO BANDJERMASIN.—From the position (5°47′ S., 106°49′ E.), northward of Nassau Reef, vessels should steer an east by northerly course to position 4°30′ S., 114°05′ E. thence a northeasterly course should be steered to a position about 12 miles westward of Tandjung Selatan.

SUNDA STRAIT-BALIKPAPAN.—Follow the Sunda Strait-Tjirebon route to a position 5°47′ S., 106°49′ E., northward of Nassau Reef. Thence an east by northerly course leads to position 5°04′ S., 112°00′ E. Thence an east-by northerly course leads to a position about 15 miles west-southwestward of The Brothers. Thence a northeasterly course leads northwestward of The Brothers to a position 10 miles eastward of Pulau Serudung. Thence a north by easterly course leads to a position 10 miles northeastward of Tandjung Mangkok. Thence a north by easterly course leads to a position about 2½ miles west-northwestward of Hercules Reef. Thence a north-northeasterly course leads about 3 miles eastward of Aru Bank to a position about 3 miles southeastward of the outer buoy of Teluk Balikpapan.

SUNDA STRAIT TO LINKAS (TARAKAN).—Follow the Sunda Strait-Balikpapan route to a position 2½ miles west-northwestward of Hercules Reef. Thence a course of about 017° for 6 miles leads to a position 3 miles eastward of Aru Bank. Thence a northeasterly course leads to a position about 5 miles eastward of Tandjung Mangkalihat. Thence a northerly course leads to a position about 6 miles eastward of the reef surrounding Pulau Bilangbilangan. Thence a northwesterly course leads to a position in midchannel between Pulau Sangalakki and Pulau Kakaban. Thence a north-northwesterly course leads to a position about 6 miles southeastward of the outer sea buoy of the channel leading to Tarakan Roadstead.

SUNDA STRAIT TO MAKASAR.—Follow the Sunda Strait-Tjirebon route to a position 5°47′ S., 106°49′ E., northward of Nassau Reef. Thence an east by southerly course leads to a position about 8 miles northward of Pamanukan Rock. Thence an easterly course leads to a position 6°10′ S., 110°20′ E. This course leads southward of Pulau Menjawak. Thence an easterly course leads to a position 6°10′ S., 112°00′ E. Continue on an easterly course to a position about 9 miles southeastward of De Bril Reef. Thence a north by easterly course leads to a position 1 mile southeastward of Pulau Dajangdajangan in the south approach to Makasar.

SELAT KARIMATA

1-57 SELAT KARIMATA-TJIREBON.—From the position 2°23′ S., 109°11′ E., steer a south by easterly course to a position about 18 miles eastward of Discovery East Bank. Thence a south by westerly course leads to the position with Gunung Kromong bearing 249°, distant 32 miles. Thence follow the directions for Tjiribon.

SELAT KARIMATA-SEMARANG.—Follow the Selat Karimata-Tjiribon route to a position about 18 miles eastward of Discovery East Bank. Thence a south-southeasterly course leads to a position about 10 miles westward of Karang Katang. Thence a south-southeasterly course leads to a position about 4½ miles northward of Semarang.

SELAT KARIMATA-SURABAJA.—Follow the Selat Karimata-Tjirebon route to a position about 18 miles eastward of Discovery East Bank. Thence a southeasterly course leads to a position off Surabaja Outer Lighted Buoy.

SELAT KARIMATA-TJILATJAP.—Follow the Selat Karimata-Tjirebon route to a position about 18 miles eastward of Discovery East Bank. Thence a southwesterly course leads to a position 5°47′ S., 106°49′ E. Then follow the reverse directions for the Sunda Strait-Tjirebon route, pass through Sunda Strait and thence follow Sunda Strait-Tjilatjap route.

SELAT KARIMATA-BANDJERMASIN.—Follow the Selat Karimata-Tjirebon route to a position about 18 miles eastward of Discovery East Bank. Thence steer an east by southerly course to a position 3°50′ S., 110°25′ E. Thence steer an east by southerly course to a position 4°30′ S., 114°05′ E. Thence a northeasterly course should be steered to a position 12 miles westward of Tandjung Selatan.

SELAT KARIMATA-BALIKPAPAN.—Follow the Selat Karimata–Bandjermasin route to position 4°30′ S., 114°05′ E. Thence steer an east by northerly course to a position 5 miles northward of Duand Shoal. Thence an easterly course leads to a position 15 miles west-southwestward of The Brothers. Thence follow Sunda Strait–Balikpapan route.

SELAT KARIMATA-LINKAS (TARAKAN).—Follow the Selat Karimata-Balikpapan route as above. Thence follow the Sunda Strait-Balikpapan route to a position 2½ miles west-northwestward of Hercules Reef. Thence follow the Sunda Strait-Linkas (Tarakan) route.

SELAT KARIMATA-MAKASAR.—Follow the Selat Karimata-Balikpapan route to a position 15 miles west-southwestward of The Brothers. Thence steer a southeasterly course and pass through the channel between Pulau Sebaru and Pulau Masalima. This channel should only be attempted under favorable conditions. Having cleared this channel, the course should be set to pass northward of the reefs and shoals surrounding Pulau Butong-butongan and northward of Taka Bakang to the entrance of the west channel which passes northward of Pulau Lanjukang.

SELAT LOMBOK

1–58 SELAT LOMBOK-SURABAJA.—From a position 8°18′ S., 115°46′ E., about 5 miles northeastward of Tandjung Ibus, a north-westerly course is steered to a position about 5 miles southward of Sapudi. Thence vessels pass through Selat Sapudi, between Sapudi and Gili Tjang to a position about 8 miles northward of the latter island. Thence vessels can steer a westerly course for a position about 10 miles north-northwestward of Tandjung Modung, off the entrance of Selat Surabaja.

SELAT LOMBOK-SEMARANG.—Follow the Selat Lombok-Surabaja route to the position 8 miles northward of Gili Tjang. Thence steer a west by northerly course to a position about 18 miles north-northwestward of Tandjung Modung. Thence proceed to a position about 6¾ miles northward of Pulau Mondoliko. Thence proceed southwestward to a position about 10 miles westward of Udjung Piring and thence southward to a position about 4½ miles northward of the port.

SELAT LOMBOK-TJIREBON.—Follow the Selat Lombok-Semarang route to a position about 6¾ miles northward of Pulau

Mondoliko. Thence proceed on a west by southerly course to a position 5 miles northward of Udjung Brebes. Thence a westerly course should be steered to the roadstead, passing southward of Tjeribon Reef.

SELAT LOMBOK-TJILATJAP.—From the position about 5 miles northeastward of Tandjung Ibus steer a southerly course through the middle of Selat Lombok to a position 8°50′ S., 115°43′ E., thence steer a westerly course to a position about 10 miles southward of Tandjung Bantenan thence steer a west by northerly course to a position about 10 miles southward of Pulau Sempu. Thence vessels can steer westerly and west by northerly courses, keeping from 5 to 10 miles off the steep-to coast of Java, to a position about 4 miles southward of the southeast end of Nusa Kambangan.

SELAT LOMBOK-BANDJERMASIN.—Follow the Selat Lombok-Surabaja route to a position about 8 miles northward of Gili Tjang. Thence northerly courses can be steered, so as to pass westward of Pulau Masalembo-besar, Pulau Masalembo-ketjil, and Janssens Reef, to a position about 12 miles westward of Tandjung Selatan.

SELAT LOMBOK-BALIKPAPAN.—From a position 8°50′ S., 115°43′ E., vessels can steer a north-northeasterly course to a position about 7½ miles eastward of Pulau Sakala. Thence a northerly course should be steered to a position about 10 miles eastward of Pulau Serudung. Thence the Sunda Strait—Balikpapan route should be followed.

SELAT LOMBOK-LINKAS (TARAKAN).—Follow the Selat Lombok–Balikpapan and Sunda Strait-Balikpapan route to a position 2½ miles west-northwestward of Hercules Reef. Thence follow the Sunda Strait-Linkas (Tarakan) route.

SELAT LOMBOK-MAKASAR.—Follow the Selat Lombok-Balikpapan route to position 8°01′ S., 116°00′ E. Thence steer a northeasterly course to a position 7½ miles northwestward of Pulau Dewakang Lompo. Thence an east-northeasterly course should be steered to the entrance of the west channel which passes northward of Pulau Lanjukang.

WETAR STRAIT

1–59 WETAR STRAIT-SURABAJA.—From the position 8°19′ S., 127°27′ E., a west by northerly course is steered to a position 8½ miles northward of Tandjung Babi. This course leads about 3 miles southward of Pulau Liran, between that island and Ilha de Atauro (Kambing). Thence a westerly course is steered to a position about 12 miles southward of Angelica Shoal and thence to position 8°00′ S., 117°10′ E. Thence a west-northwesterly course is steered to a position about 5 miles southward of Pulau Sapudi. Thence vessels follow the Selat Lombok-Surabaja route.

WETAR STRAIT-SEMARANG.—Follow the Wetar Strait-Surabaja route to the position 5 miles southward of Pulau Sapudi. Thence follow the Selat Lombok-Surabaja route to a position 8 miles northward of Gili Tjang. Thence follow the Selat Lombok-Semarang route to destination.

WETAR STRAIT-TJIREBON.—Follow the routes in the above paragraph to a position about 6¾ miles northward of Pulau Mondoliko. Thence follow the Selat Lombok-Tjirebon route to destination.

WETAR STRAIT-TJILATJAP.—Follow the Wetar Strait-Surabaja route to a position 8°00′ S., 117°10′ E. Thence steer a west by southerly course to Selat Lombok, passing at least 2½ miles northward of Lombok and into Selat Lombok. Thence follow the Selat Lombok-Tjilatjap route.

WETAR STRAIT-MAKASAR.—Follow the Wetar Strait-Surabaja route to position 8°00′ S., 121°21′ E. Thence steer a northwesterly course to a position about 9 miles southeastward of De Bril Reef. Thence follow the Sunda Strait-Makasar route.

WETAR STRAIT-BALIKPAPAN.—Follow the Wetar Strait-Surabaja route to a position about 8½ miles northward of Tandjung Babi. Thence a westerly course is steered to a position about 8 miles southward of Angelica Shoal. Thence a west by northerly course should be steered to a position 8 miles southward of Marianne Reef. Thence a west-northwesterly course leads to a position about 16½ miles southwestward of Tana Djampea. Thence a northwesterly course leads to a position 5°28′ S., 118°53′ E. Thence a north by westerly course should be steered to a position 2°54′ S., 118°23′ E. Thence a northwesterly course leads to a position about 9½ miles north-northeastward of Pulau Balabalangan. Thence a northwesterly course can be steered to a position about 3 miles southeastward of the outer buoy of Teluk Balikpapan.

WETAR STRAIT-LINKAS (TARAKAN).—Follow the Wetar Strait-Balikpapan route to the position 5°28′ S., 118°53′ E. Thence a northerly course is steered to a position 10 miles west-northwestward of Tandjung Rangasa (Kaap William). Thence a north by easterly course leads to a position about 5 miles eastward of Tandjung Mangkalihat. Thence follow the Sunda Strait-Linkas (Tarakan) directions to destination.

WETAR STRAIT-BANDJERMASIN.—Follow the Wetar Strait-Surabaja route to a position 3 miles southward of Pulau Liran. Thence steer a west-northwesterly course to a position about 2 miles northward of Pasi Tanete. Pass through Saleier Strait to position 5°52′ S., 120°15′ E. Thence steer a west by southerly course to a position about 5 miles southward of De Bril Reef. Thence a westerly course is steered to a position 6°00′ S., 117°08′ E. Thence a northwesterly course leads to a position about 3 miles southwestward of Pulau Kalembau and thence about 12 miles westward of Tandjung Selatan. This latter course leads northeastward of Duand Shoal.

SIBUTU PASSAGE

1–60 SIBUTU PASSAGE-LINKAS (TARAKAN).—From the position 5°02′ N., 119°40′ E., steer a south by westerly course to a position about 7 miles eastward of Saluag Island. Thence steer a southwesterly course to a position about 6 miles southeastward of the outer sea buoy of the channel leading to Tarakan Roadstead.

SIBUTU PASSAGE-BALIKPAPAN.—From the position 7 miles eastward of Saluag Island, a south by westerly course can be steered to a position about 5 miles eastward of Tandjung Mangkalihat. Thence steer a south-southwesterly course to a position 1°00′ S., 117°45′ E. Thence a west-southwesterly course can be steered to a position about 3 miles southeastward of the outer buoy of Teluk Balikpapan.

SIBUTU PASSAGE-BANDJERMASIN.—Follow the Sibutu Passage–Balikpapan route to a position 1°00′ S., 117°45′ E. Thence steer a southwesterly course to a position about 2½ miles west-northwestward of Hercules Reef. Thence follow reverse of the Sunda Strait-Balikpapan route to a position about 2 miles southeastward of Pulau Karajan. Thence steer a west by southerly course to a position about 5 miles southward of Tandjung Selatan. Thence steer a west-northwesterly course to a position 12 miles westward of the same point.

SIBUTU PASSAGE-SURABAJA.—Follow the Sibutu Passage-Bandjermasin route to a position about 2 miles southeastward of Pulau Karajan. Thence proceed on a southwesterly course to a position about 15 miles west-southwestward of The Brothers. Thence proceed on a southwesterly course to a position about 5 miles westward of Pulau Kalambau. This course passes between Pulau Kadapongan and Pulau Matasiri. Thence a southwesterly course is steered to a position about 10 miles eastward of Pulau Masalembo-besar and thence to a position off Surabaja Outer Lighted Buoy.

SIBUTU PASSAGE-SEMARANG.—Follow the Sibutu Passage-Surabaja route to the position 5 miles westward of Pulau Kalambau. Thence steer a west-southwesterly course to a position about 10 miles southward of Pulau Keramian (Arends Island). Thence continue on a west-southwesterly course to a position 10 miles southward of Pulau Bawean. Thence steer a west by southerly course to a position about 7½ miles northward of Pulau Mondolika. Thence proceed southwestward to a position about 10 miles westward of Udjung Piring and thence southward to a position about 4½ miles northward of the port.

SIBUTU PASSAGE-TJIREBON. Follow the Sibutu Passage-Semarang route to a position 7½ miles northward of Pulau Mondoliko. Thence proceed on a west-southwesterly course to a position 5 miles northward of Udjung Brebes. Thence a westerly course should be steered to the roadstead, passing southward of Tjirebon Reef.

SIBUTU PASSAGE-MAKASAR.—From the position 5°02′ N., 119°40′ E., steer a southerly course to a position about 20 miles eastward of Tandjung Mangkalihat. Thence steer a south by westerly course to a position about 10 miles west-northwestward of Tandjung Rangasa (Kaap William). Thence steer a south by easterly course to a position 5 miles westward of Pulau Kapoposang at the entrance of Hoven Channel, the northwest passage to Makasar.

SIBUTU PASSAGE-TJILATJAP.—Follow the Sibutu Passage-Makasar route to a position 5 miles westward of Pulau Kapoposang. Thence steer a southwesterly course, passing eastward to Taka Bakang, to a position 7½ miles northwestward of Pulau Dewakang Lompo. Thence continue on a southwesterly course to position 8°01′ S., 116°00′ E. Thence steer a south-southwesterly course through the middle of Selat Lombok to a position 8°50′ S., 115°43′ E. Thence follow the Selat Lombok-Tjilatjap route to destination.

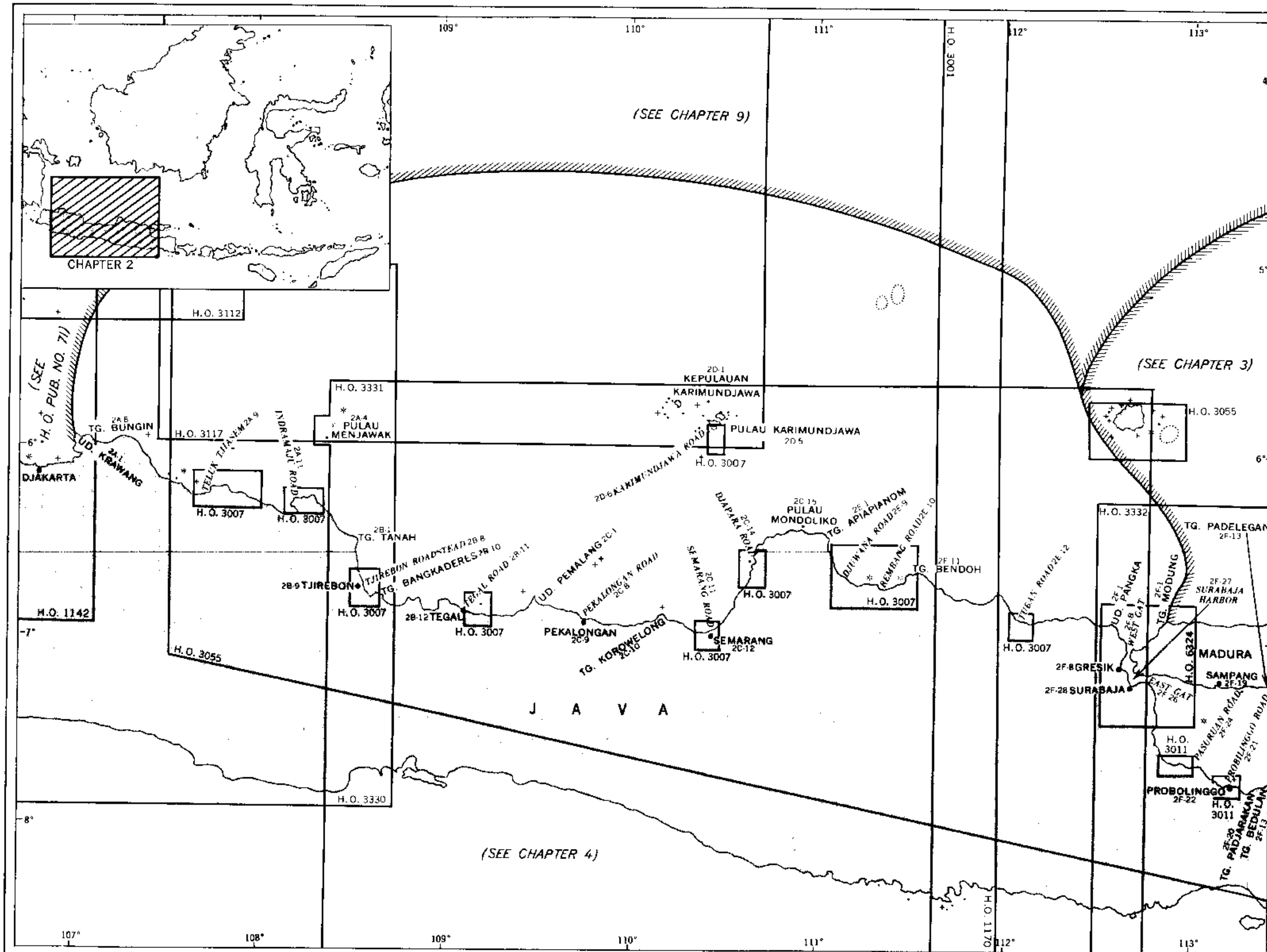


Chart limits shown are of the best scale charts issued to naval vessels by the U.S. Navy Hydrographic Office.
Numbers refer to the section in the text describing a designated locality.

CHAPTER 2—GRAPHIC INDEX

CHAPTER 2

NORTH COAST OF JAVA—UDJUNG KRAWANG TO SURABAJA, INCLUDING KEPULAUAN KARIMUNDJAWA

PLAN.—This chapter describes the north coast of Java from Udjung Krawang to Udjung Pangkah, including Kepulauan Karimundjawa. The arrangement is from west to east. Selat Surabaja, its approaches, and Surabaja are then described.

GENERAL REMARKS

2–1 The north coast of Java is low in places and is indented by many bays, none of which penetrate deeply. Djakarta, described in H.O. Pub. 71, and Surabaja are the most important ports. The latter port is approached through Selat Surabaja which separates Java from Madura. Tjirebon, Tegal, and Semarang are lighterage ports of some importance.

NAVIGATION

2–2 Vessels bound for Surabaja from Djakarta should round Udjung Krawang at a distance of about 5 miles, and then pass about 5½ miles northward of Tandjung Bungin. Thence they should steer for a position about 2 miles southward of Pulau Menjawak, having passed well northward of Sedari Reef and Pamanukan Rock. Thence the course should be set so as to pass about 7½ miles northward of Pulau Mondoliko. Thence a direct course can be steered for Surabaja Outer Lighted Buoy.

Coastal vessels visiting the various anchorages should keep well outside the 10-fathom curve in rounding the salient points.

WINDS AND WEATHER

2–3 In the Java Sea winds will blow for 7 months, from April to November, from east-southeast in the west part, from east in the center, and east-southeast to southeast over the east portion. In the Java Sea the Northwest Monsoon, blowing from west-northwest to west, is stronger in force than the Southeast Monsoon and lasts from December to March. Thunderstorms and squalls may be encountered during the change of seasons.

Land and sea breezes seldom extend more than 15 miles off the north coast of Java. During the Southeast Monsoon, a southeasterly or south-southeasterly wind sets in stiffly during the night. The atmosphere is hazy during daylight hours.

In the vicinity of Kepulauan Karimundjawa the monsoon winds are more regular and stronger than those along the coasts of Java. Temperatures are similar to those found in the Java coastal areas.

CURRENTS

2–4 A monsoon current predominates in the Java Sea. Its rate seldom exceeds 2 knots. In

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addition a weak current setting constantly south-southwestward has been noticed. Along the north coast of Java the monsoon current sets westward from May to October, inclusively. December is the month of transition. In January and February the current sets eastward. At the end of March and in the first part of April the transitional period occurs again. Land and sea breezes influence the direction. The tidal currents were not observed to have any effect on the monsoon currents, except perhaps close offshore. Only the currents produced by the monsoons are felt at the various roadsteads. The current sets with some force around the salient points and in general follows the contour of the coast.

The east-going current in and around Kepulauan Karimundjawa during January and February is stronger on the average than the west-going current in July and August.

CAUTIONS

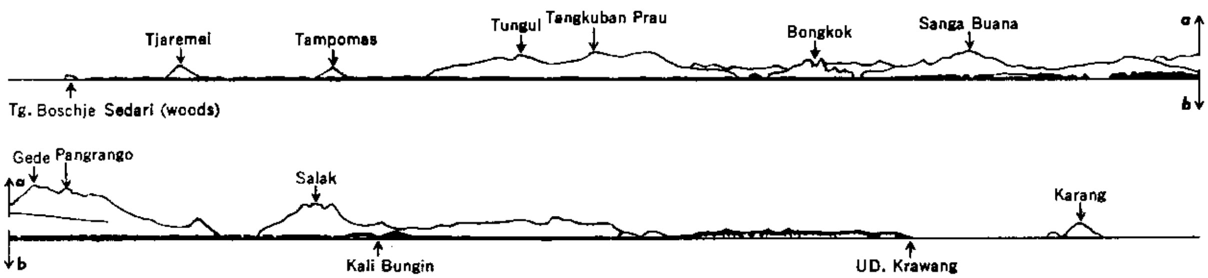
2–5 MUDDY RIVERS empty out in the vicinity of most low points of land. Because of this the land, as well as the coastal bank, or these two together, are moving forward markedly. Fishing stakes are often encountered along the coast and in the approaches to the various roadsteads.

In 1945 Kepulauan Karimundjawa was reported to lie about 2½ miles eastward of its charted position. See section 3–4 for additional cautions.

PART A. UDJUNG KRAWANG TO TANDJUNG TANAH

2A–1 UDJUNG KRAWANG (5°56′ S., 107°00′ E.), the eastern boundary of the bay at whose head is Djakarta, is low and muddy. There are a number of prominent bare trees on its west extremity, and a clump of bare trees to the eastward, visible about 13 miles. A mudbank extends 1 mile northward from the point.

BUOY.—A lighted buoy, painted red, is moored 1⅔ miles northwestward of Udjung Krawang.



NORTH COAST OF JAVA, UD. KRAWANG 9½ MILES, 238°

COAST—GENERAL

2A–2 The north coast of Java, between Udjung Krawang and Tandjung Tanah, is flat and covered with large trees. Several conspicuous mountains, located from 25 to 50 miles inland, are often visible during the Northwest Monsoon. They are rarely seen during the Southeast Monsoon due to haze.

ASPECT.—Gunung Pangrango, located about 52 miles southward of Udjung Krawang, is dome-shaped. Gunung Gede, 9,704 feet high and consisting of two peaks, is located close southeastward of Gunung Pangrango. A white column of smoke is often seen to rise from the north side of the west peak. Gunung Sanga Buana, to the northeastward of Gunung Gede, is a round saddle-shaped mountain 4,235 feet high. Gunung Bongkok, located 7 miles eastward of Gunung Sanga Buana, is 3,169 feet high. It is the tallest of several adjacent peaks

(2850) **INDONESIA—Java—North coast—Pulau Menjawak—Wreck south-southwestward.**—A barge has been reported sunk in 6°01.0′ S., 108°21.0′ E. (approx.).

Note.—1. On H.O. Chart 3055, the legend "Boompjes I" in 5°56′ S., 108°25′ E. will be changed to read "Pulau Menjawak".

2. On H.O. Chart 1170, the legend "Rakit" in 5°56′ S., 108°25′ E. will be changed to read "Pulau Menjawak".

(N.M. 18/66.)

(H.O. Chart 3330.)
(B.P.I. 1(002), Djakarta, 1966.)
H.O. Charts **3330, 3331, 3055, 1170.**
H.O. Pub. 72, 1962, page **67.**

(6412) INDONESIA—Java—North coast—Pamanukan Rock—Wreck.—A dangerous wreck should be charted in 06°03′00″ S., 107°41′00″ E. (approx.).

(N.M. 48/64.)

(B.P.I. 44 (338), Djakarta, 1964.)
H.O. Charts **3330, 3055, 1170, 5591.**
H.O. Pub. 72, 1962, page **67.**

which on the whole have a sharply cut into appearance. Gunung Tangkuban Prau, 6,827 feet high, is located about 18 miles southeastward of Gunung Bongkok. It has the appearance of a vessel with bottom upwards; there is an extinct crater on its east side. Gunung Bukittunggul, 7,247 feet high and located 8 miles southeastward of Gunung Tangkuban Prau, is a somewhat bare peak, with its highest point to the westward. A low ridge connects the two mountains.

Gunung Tampomas, an isolated conical peak with a round top, 5,525 feet high, is located 14 miles east-northeastward of Gunung Bukittunggul. Gunung Kromong, located 18 miles south-southwestward of Tandjung Tanah, is a chain of low peaks standing close together, the highest being 1,926 feet in elevation. Gunung Tjaramei, 10 miles southward of Gunung Kromong, is 10,098 feet high. It has but one peak on the northwest edge. Smoke occasionally rises from this truncated conical volcano.

DEPTHS—DANGERS

2A–3 DEPTHS.—The 10-fathom curve lies from 1½ to 10 miles offshore. Inshore the bottom consists of soft, grayish mud. Farther offshore this muddy bottom is mixed with sand and broken shells. Vessels should keep in depths of at least 12 fathoms in rounding the salient points.

OFF-LYING DANGER. — Pamanukan Rock (6°01′ S., 107°53′ E.), a dangerous coral rock 300 yards in length and 200 yards in width, has a least depth of 1½ fathoms. The rock is sometimes marked by rips, and the water in its vicinity is discolored. A LIGHT is shown from a black and white horizontally banded beacon that stands about 23 feet high.

OFFLYING ISLAND AND ADJACENT DANGERS

2A–4 PULAU MENJAWAK (5°56″ N., 108°23′ E.) is a coral island that is thickly covered with vegetation. A reef, 200 to 600 yards wide, fringes the island. Depths of 20 to 28 fathoms, blue mud with sand and shells, are found close outside the reef. A black and white iron framework TOWER, 164 feet high, from which a LIGHT is shown, is located 50 yards from the south side of the island. A pier extends southward of the light tower to the edge of the reef. There is a flagstaff at the inner end of the pier.

Gosong Reef and Tjandikian Reef are steep-to coral atolls, marked by discolored water. At high water these reefs are covered, but at low water there are several rocks that uncover. Depths of 15 fathoms, sand and mud, are found in the middle of the lagoon in Gosong Reef, and depths of 7 fathoms in the middle of Tjandikian Reef.

CURRENTS

2A–5 Currents in the vicinity of Pulau Menjawak are mostly wind drifts, setting eastward from December to March, with maximum strength in January and February. They set westward from April to November, being strongest from July to October. The volume of current to the westward is considerably in excess of that to the eastward. In November there is now and then at Tandjung Indramaju an easterly monsoon current with a rate of 2 knots.

WINDS

2A–6 At Pulau Menjawak, from April to September, the mean direction of the wind is southeast at 0900, east by south at 1400 and east by north at 1800. In other seasons, October to March, west-southwesterly, northwesterly, and northwesterly winds occur during the same hours.

NAVIGATION

2A–7 It is advisable for deep-draft ships to pass well outside of Sedari Reef and between Pamanukan Rock and Pulau Menjawak. (See section 2–2.)

COASTAL FEATURES (CONTINUED)

2A-10 TANDJUNG PAMANUKAN AND TANDJUNG BOBOS, both low, form the northwest and north points of the delta of the Kali Tjipunagara. Both points are thickly wooded, the trees backing Tandjung Bobos being somewhat higher.

WRECK.—A dangerous wreck lies about 11 1/2 miles northwestward of Tandjung Bobos.

Between Tandjung Bobos and Tandjung Sentigi, the coast is well wooded and is intersected by some small rivers. Eretan, a small village which can be distinguished by some scattered palms with bare stems, and by the red roofs of its houses, is located about 1 mile westward of the mouth of the Kali Kandanghauer in a position about 6 3/4 miles west-southwestward of Tandjung Sentigi. Three or four prominent casuarina trees, which form a good mark for the entrance of a canal, stand about 4 miles eastward of the mouth of the above river.

This canal, which leads to Losarang and which is only navigable by small craft, forms a broad creek at its mouth, the entrance of which is marked by a FLAGSTAFF and BEACON with a triangle.

ANCHORAGE.—Vessels anchoring off the canal should not approach nearer than 2 miles, nor in depths of less than 4 3/4 fathoms. The anchorage bearings are the flagstaff 142°, the prominent casuarina trees 186° and the trees on Tandjung Sentigi, 071°.

INDRAMAJU (WEST ROAD AND EAST ROAD)

2A-11 TANDJUNG SENTIGI is fronted by a bank of sand and mud. This bank extends about 1 mile seaward and is marked by brown discoloration. Tandjung Indramaju has a bank of hard sand extending 2 miles northeastward.

CAUTION.—The coastline and depths are subject to change. In 1963 the coastline in the vicinity of the mouth of the Kali Tjimanuk, located about halfway between Tandjung Sentigi and Tandjung Indramaju, had extended 1 1/2 miles seaward from its charted position. Fishing stakes are often placed in depths of 4 fathoms in the vicinity of Tandjung Sentigi, especially during the Northeast Monsoon.

DANGER.—A 1 1/2-fathom shoal lies about 1 mile offshore in a position about 4 miles westward of Tandjung Indramaju. A conical BUOY with red and white stripes is moored in 10 fathoms about 3 1/2 miles northwest by westward.

ANCHORAGES.—West Road is used during the east monsoon, vessels anchoring in convenient depths. This anchorage is considered unsafe during the west monsoon.

East Road offers a safer anchorage during the west monsoon, but there is little shelter against a high northwesterly sea. Anchorage can be taken in 3 to 5 fathoms, mud.

INDRAMAJU, the capital of the district, is located about 10 miles upstream on the Kali Tjimanuk which is navigable only by small craft. Some fresh provisions can be obtained. The town is connected with the state railroad, and there is telegraph connection with the rest of Java. There is a doctor in the town.

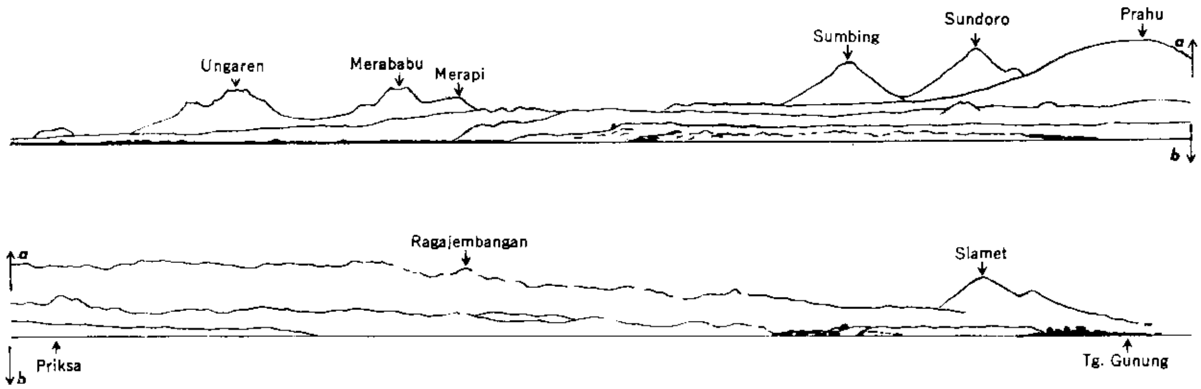
COASTAL FEATURES (CONTINUED)

2A-12 BETWEEN TANDJUNG INDRAMAJU AND TANDJUNG TANAH, the coast is wooded, but there are many kampungs visible from the sea. The most prominent object is a tall white chimney of a sugar factory in the village of Karangampel. The chimney serves as a good mark for vessels approaching the ANCHORAGE off the village of Dadap. A rice storehouse with a red roof stands amid the trees in the village.

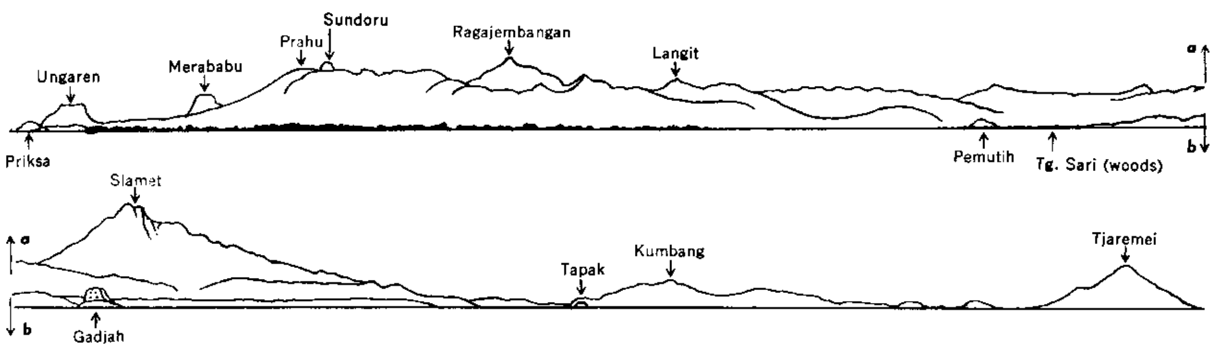
ANCHORAGE can be taken northwestward of Tandjung Tanah in 3 to 5 fathoms. The anchorage can be approached on a course of about 200° with the chimney ahead.

PART B. TANDJUNG TANAH TO UDJUNG PEMALANG

2B-1 TANDJUNG TANAH (6° 29′ S., 108° 33′ E.) is low, covered with bushes, and appears to be eroding. There are villages near the shore, the trees being higher in their vicinity.



NORTH COAST OF JAVA, SLAMET 50 MILES, 241°



NORTH COAST OF JAVA, SLAMET 35 MILES, 195°

COAST—GENERAL

2B-2 BETWEEN TANDJUNG TANAH AND TJIREBON, the coast is low and flat. Eastward of Tjirebon, the mountains approach nearer to the coast. The only shipping places of importance are Tjirebon Road and Tegal Road. The former affords protection during the west monsoon and the latter is fully exposed.

ASPECT.—An elongated ridge of mountains, lying nearly parallel to the coast, extends eastward from the south slopes of Gunung Tjaremai at a distance of 20 miles from the coast. The ridge terminates in Gunung Kumbang, a prominent round summit, 3,999 feet high, located 24 miles southwestward of Tegal. Gunung Tukung, an isolated hill, 604 feet high, stands between this range and the coast. Gunung Tapak, 1,115 feet high and located 21¾ miles south-southeastward of Tandjung Losari, and Gunung Sirantjang, 479 feet high and located 5 miles northeastward of Gunung Tapak, are prominent.

Gunung Slamet, a flat-topped mountain, 11,260 feet high, has a prominent peak, formed by the edge of the old crater, on its northeast side. The crater, active at present, is on the southwest side of the mountain. A thick column of smoke is often seen rising from it.

Gunung Gajah, 13½ miles southeastward of Tegal, is an almost bare rock, 1,017 feet high, standing in the middle of a densely wooded hill. It resembles a gigantic elephant with its head to westward. Two wooded hills, located about 2 miles eastward of Gunung Gajar, are of about the same height and appear as two coffins. A hill, 364 feet high, is located about 7 miles east-northeastward of Gunung Gajar.

DEPTHS—DANGERS

2B-3 The 10-fathom curve lies from 19 to 2 miles offshore. The detached dangers to avoid are Karang Djeruk, Sugali Rock, and Pemalang Rock, all of which lie outside this curve.

Karang Djeruk, a reef located 4 1/2 miles northeastward of Tegal, is about 800 yards in length and 400 yards in breadth. A rock, always awash, stands on its north side. A number of fishing stakes are located between the rock and the port.

Pemalang Rock, a coral patch 100 yards in extent, has a least depth of 14 feet. Sugali Rock, a steep-to coral pinnacle, is 200 yards in length east and west and has a least depth of 13 feet. A conical BUOY, painted in yellow and black checkers with a black conical topmark, is moored about 1 mile northeastward of Pemalang Rock.

CURRENTS

2B-4 See section 2-4.

WINDS AND WEATHER

2B-5 In the vicinity of Tjirebon Roadstead during the east monsoon (May to October) the "angin kumbang" generally begins between 1900 and 2100, lessening in force at sunrise and ceasing entirely between 0900 and 1000. A couple of hours later a northeast to east breeze sets in, usually weak, but sometimes for a day or so rising to a stiff force during the afternoon hours. When the latter is the case, the sea breeze then shifts to about east. In spite of these generally weak sea breezes, a high swell from east-northeast or east frequently arises in the roadstead, usually increasing in the evening and nighttime, but again decreasing by morning.

During the west monsoon there are seldom any rough seas. During the forenoon thick white clouds gather near the slopes of Gunung Tjaremai and Gunung Slamet. By afternoon these clouds form into a thick black sky, and by sundown discharge heavy rain and thundersqualls out of the west and southwest. At this time the wind usually shifts abruptly to the westward. Sometimes the weather remains squally all night, but on other days after the squall it is still for a time and a weak breeze comes from the southwest to west. After midnight the wind again blows strongly from the northwest, usually becoming west-northwest by morning. The wind increases in force in the forenoon or afternoon and shifts again to the northwest. These strong northwesterly winds, which continue for days on end in February, are mostly coupled with dry weather, but occasionally with showers.

NAVIGATION

2B-6 See Section 2-2.

COASTAL FEATURES

2B-7 BETWEEN TANDJUNG TANAH AND TJIREBON the coast is mostly low. Djati Hill, 197 feet high and tree-covered, is the only prominent land feature along this coast. From Tandjung Tanah and the adjacent coast to the southward there is an extensive shoal, composed of sand and mud, here and there mixed with broken shells. The bottom in the north part of this shoal is mostly hard sand and mud, and farther southward, soft mud.

NAVIGATIONAL AIDS.—A beacon stands on the coast in a position about 2 miles northward of Djati Hill.

A lighted buoy, painted in black and white checkers, is moored on the east side of Tanah Reef in about 4 1/2 fathoms.

A lighted buoy, painted in red and white checkers, is moored about 3/4 mile north-by-eastward of Tandjung Sanggarung. It marks the north side of the gully between the south edge of Tjirebon Reef and the shoal fringing Tandjung Sanggarung.

TJIREBON ROADSTEAD

2B-8 TJIREBON ROADSTEAD is a lighterage port of some importance. It is a port of call for large vessels. The coast in the vicinity of Tjirebon is covered with monotonous vegetation. The town is surrounded by flat swampy land.

LANDMARKS.—The spires of a church, the towers of the Java bank, the chimneys of the power plant, the water tower, and the chimneys of a tobacco company are prominent. Some aluminum tanks standing near the harbor canal are prominent.

DEPTHS.—The eastern and deeper approach has a least depth of 4 1/4 fathoms. The channel leads between the south edge of Tjirebon Reef and the shoal fringing Tandjung Sanggarung. The approach from northeastward through the center of the bight has a depth of 3 1/2 fathoms. The dredged channel between the two moles is from 145 to 500 feet wide. The harbor is dredged as soon as the depth is reduced to 6 1/2 feet and the dredging is stopped whenever the depths are 8 feet. This applies to the entrance.

CAUTIONS.—Charted depths in the approach and in the roadstead are unreliable due to silting. Fishing stakes are found in the approaches to the roadstead.

A wreck lies about 1 mile northwestward of Tanah Reef Buoy in a position about 10 miles east-southeastward of Tandjung Tanah.

A wreck, the position of which is doubtful, is located about 9 miles northward of Tandjung Sanggarung.

A wreck lies about 3 1/8 miles north-northeastward of Tjirebon.

NAVIGATIONAL AIDS.—A light is shown from an iron framework, 46 feet high and painted in black and white bands, located on the inner end of east mole.

Lights are shown from the outer extremities of east and west moles. A light is shown on the bend of west mole. A SIGNAL STATION is located at this light.

ANCHORAGE.—Tjirebon Roadstead affords protection during the west monsoon. Vessels anchor in 2 3/4 fathoms to 4 fathoms, soft mud, about 1 mile to 2 miles offshore, with the main harbor light bearing between 279° and 225°.

A 1961 report states that during the west monsoon (15 November to 15 April) the roadstead affords good anchorage, secure against high seas. At this period, vessels anchor with the main harbor light bearing between 210° and 220°, 2 miles off. Heavy rains and squally weather mark this season, and owing to the swell, cargo can be worked over the lee side only at times.

During the east monsoon (15 April to 15 November), a period of dry fair weather, vessels can anchor with the main harbor light bearing 240°-250°, 2 miles off.

DIRECTIONS.—Vessels approaching from westward should keep in 7 or 8 fathoms until Djati Hill is in range with Gunung Kromong (sec. 2A-2) bearing about 249°. Vessels should cross the bar southward of this range. Vessels of deeper draft should use the channel southward of Tjirebon Reef.

The master of a vessel visiting Tjirebon Roadstead in 1960 states that vessels should not attempt to enter the road if of more than 23-foot draft. They should use the south approach only, and time their arrival for high water. When approaching the fairway buoy, they should proceed at dead slow.

TJIREBON (6° 43′ S., 108° 34′ E.)

2B-9 FACILITIES.—TJIREBON is the capital of the Tjirebon District. The town contains the residence of a government officer and a customs office. The chief exports are copra, timber, tapioca, and spirits.

BERTHS.—There are no berths except those for lighters and small craft. Railroad sidings are located near the inner basins.

TUGS.—Several small tugs are available.

CARGO INFORMATION.—It was reported (1964) that 37 lighters were available but that many of them were unseaworthy. Loading and unloading of large ships is by lighter at the roadstead. There are two mobile cranes, one of 1 1/2-tons and the other of 3-tons capacity. There is about 365,000 square feet of covered storage space.