NATIONAL INTELLIGENCE SURVEY

CUBA

SECTION 23

WEATHER AND CLIMATE

CENTRAL INTELLIGENCE AGENCY
Washington, D. C.

CHAPTER II

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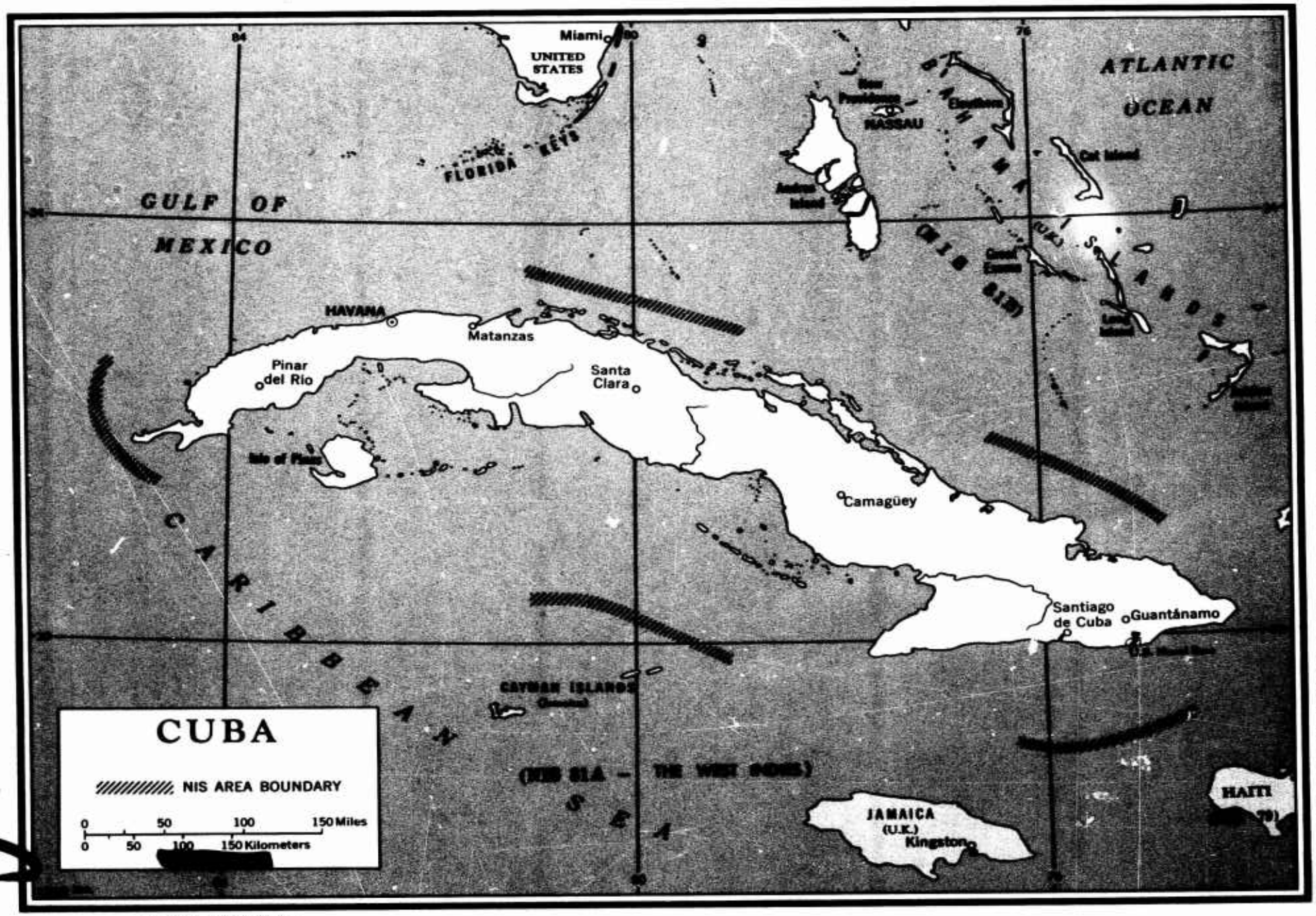

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This Section was prepared for the NIS under the general supervision of the Assistant Chief of Staff, Intelligence, USAF, by the Air Weather Service, with contributions on clothing, storage, and temporary shelter from the Office of the Quartermaster General, Department of the Army, and on amphibious operations from the Naval Weather Service Division.

23. Weather and Climate

The user can supplement the information in this Section by referring to Section 20 for an evaluative summary of the Area's external geographic relationships and its significant internal geographic characteristics, including internal routes, barriers, and strategic areas. Topical treatment of Coasts and Landing Beaches, including some aspects of weather in amphibious operations, is given in Section 22; topography, including State of the Ground, in Section 24; and Urban Areas in Section 25. Integration and analysis of key military aspects of these topical sections by regions is presented in Section 21.

A. General weather and climatic conditions

1. Introduction

NIS 78, with a land area slightly over 46,700 square miles, includes the island of Cuba, the Isle of Pines, and the hundreds of smaller islands which lie along the Cuban coast. The Area is bounded by the Caribbean Sea, the Gulf of Mexico, and the Atlantic Ocean. Generally low hilly terrain, with extensive swampy regions along the coasts, is characteristic of Cuba and the Isle of Pines. Most of the land surfaces are below 700 or 800 feet in elevation, with only scattered peaks above 1,000 feet. There are, however, several mountainous sections in Cuba. The most outstanding is the Sierra Maestra along the southern coast of eastern Cuba. Ridges in these mountains are generally above 3,000 feet and a few peaks rise above 5,000 feet. The eastern end of the island is also mountainous with many ridges over 2,000 feet and some peaks above 3,000 feet. Along the south-central coast and in the west are less extensive mountainous areas where the peaks extend somewhat above 3,000 and 2,000 feet, respectively.

Despite the fact that there are local variations in climate due to location, altitude, and exposure, the climate of Cuba is generally tropical throughout. The persistent trade winds are the dominant weather factor, while tropical storms and hurricanes generally account for most of the weather extremes. Although temperatures and humidities are quite high, the weather is rarely enervating because of the alleviating effect of the persistent easterly winds. Aside from precipitation, most meteorological elements show little change from month to month. Mean early morning relative humidities, for example, vary less than 10% throughout the year, and mean July temperatures are seldom much more than 10 Fahrenheit degrees warmer than January temperatures. The variation in mean cloudiness is more pronounced from place to place and diurnally than it is from month to month. The sky is seldom completely clear or overcast; mean cloudiness generally averages about 2-tenths to 6-tenths throughout the year.

Based on the distribution of mean monthly precipitation amounts the year is divided into two seasons, a wet season from May through October and a dry season from November through April. These two seasons are used in discussions throughout this Section. Average rainfall varies considerably from place to place. Mean annual amounts vary from less than 35 inches to as much as 70 inches, with the western part of Cuba and the Isle of Pines receiving the larger amounts. The characteristic rainfall regime also changes from place to place, but, in general, there are two rainfall peaks, one in May or June and the other in September or October. Although hurricanes have occurred in the Area in almost every month of the year, by far the majority of these storms occur during the months June through November. These storms are often accompanied by heavy rainfall, strong winds, and high tides; occasionally, they are extremely devastating, causing heavy loss of life and property throughout the Area.

2. Climatic controls

The climate of this NIS Area is controlled by a number of factors. The main controls on weather are the airflow resulting from the Azores high-pressure cell and the composition and frequency of the air masses affecting the Area. The infrequent departures from average conditions result from the intrusions of various migratory pressure systems and convergence lines; the most impressive of these are the easterly waves and tropical cyclones. The effects of topography and of the surrounding tropical ocean are also important.

NOTE Requests for solutions to specific problems involving interpretation of the weather factor in the user's unique operational terms should be directed to the Director, Climatic Center, Headquarters, Air Weather Service, Annex 2, 225 D Street, S. E., Washington 25, D. C.

a. GENERAL CIRCULATION — The NIS 78 Area lies in a region dominated by the anticyclonic circulation around the Azores *high*. The shifting of the center of this *high* and its expansion and contraction are responsible for the large-scale seasonal changes in the weather. The Azores *high* is the Atlantic cell of the high-pressure belt that encircles the oceans at about 30°N. Following the annual march of the sun, this belt of high pressure moves southward in the Northern Hemisphere winter and northward in the summer. A counterpart of this shifting high-pressure belt exists in the Southern Hemisphere. On the equatorial sides of both hemispheric high-pressure belts are the trades, broad bands of easterly winds, northeasterly in the Northern Hemisphere and southeasterly in the Southern Hemisphere. These trade winds have a remarkable constancy. They blow throughout the year, producing a simple predominant wind regime which in the Caribbean region varies between northeast and southeast (FIGURES 23–1 and 23–2). Between the trade-wind belts, particularly over the oceans, there is an ill-defined area of low pressure and variable winds variously known as the equatorial trough, rainy belt, belt of calms, or, most commonly, the doldrums. Often present within this trough of low pressure is a definite band of bad weather, composed of towering cumulus or cumulonimbus. In the vicinity of the Caribbean the trough lies farthest north in August or September, and farthest south, near the Equator, in February or March. It occasionally moves far enough north in its day-to-day oscillations to affect the Area.

During December, January, and February the oceanic high-pressure cells are weakest and the continental *highs* are the strongest. The Azores *high* at this time contracts to its smallest extent, forming a belt of high pressure oriented along the 30°N. latitude line, with a weak center southeast of the Azores. However, the atmospheric pressure in the Caribbean region is the highest of the year, owing to reinforcement from the strong high-pressure cells over North America. Subsiding air aloft over this region results in the least rainfall of the year. In March, April, and May, pressure over the Caribbean decreases; it is generally lowest in

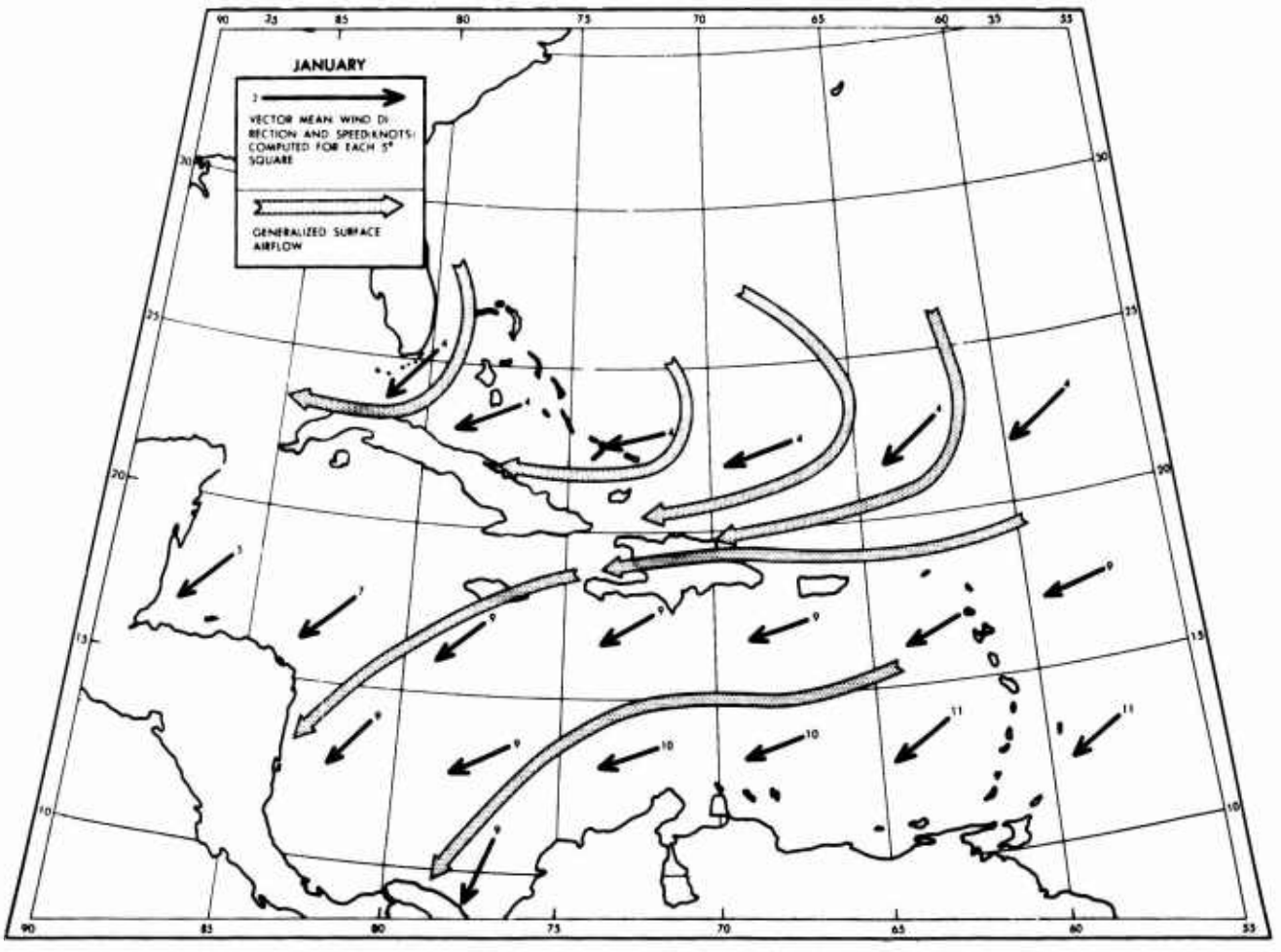


FIGURE 23–1. GENERALIZED SURFACE AIRFLOW AND VECTOR MEAN WIND, JANUARY

May. The Azores *high* center moves westward and the cell expands greatly, with isobars oriented southeast – northwest over the Caribbean region. In July a tongue of the high-pressure cell pushes westward into the NIS Area and creates a secondary maximum of pressure. Associated with this secondary maximum are an intensification of the trades and a period of decreased rainfall at most stations in the Area. During September, October, and November, the Azores *high* shrinks and moves eastward, and the pressure in the Area reaches the annual minimum in September and October. The maximum frequency of hurricanes accompanies this pressure minimum.

b. AIR MASSES — Although greatly modified middle-latitude air masses, particularly polar continental (*cP*), occasionally reach as far south as about 15°N. latitude, the predominant air mass overlying the NIS 78 Area throughout the year is tropical maritime (*mT*). This air is warm and moist in the lower layers and relatively dry aloft. The dryness aloft is caused by the subsiding air within the upper layers of the Azores anticyclone. The vertical extent of the moist lower layers of air varies seasonally. Vertical temperature measurements through the trade winds indicate a zone in which an inversion exists (the trade-wind inversion). This inversion is as much a moisture discontinuity as a temperature discontinuity. Below the inversion the air is moist, and above, dry. The inversion is strongest where its base is lowest and weakest where its base is highest. The trade-wind inversion has a marked effect on the climate of the Caribbean region. Below the inversion the air is convectively unstable (thermodynamic state of a layer of air which will become unstable if given sufficient lift). If the inversion is relatively strong, however, the instability is seldom realized because of the inversion cap on convection; that is, a strong inversion limits cloud buildups and tends to dissipate, because of dryness aloft, such cloudiness as may occasionally penetrate the inversion layer. In addition, dust, smoke, and salt particles are frequently trapped by the inversion, resulting in haze in the lower layers.

The trade-wind inversion occurs throughout the year, but its frequency, intensity, and height vary both daily and seasonally. Over Cuba the fre-

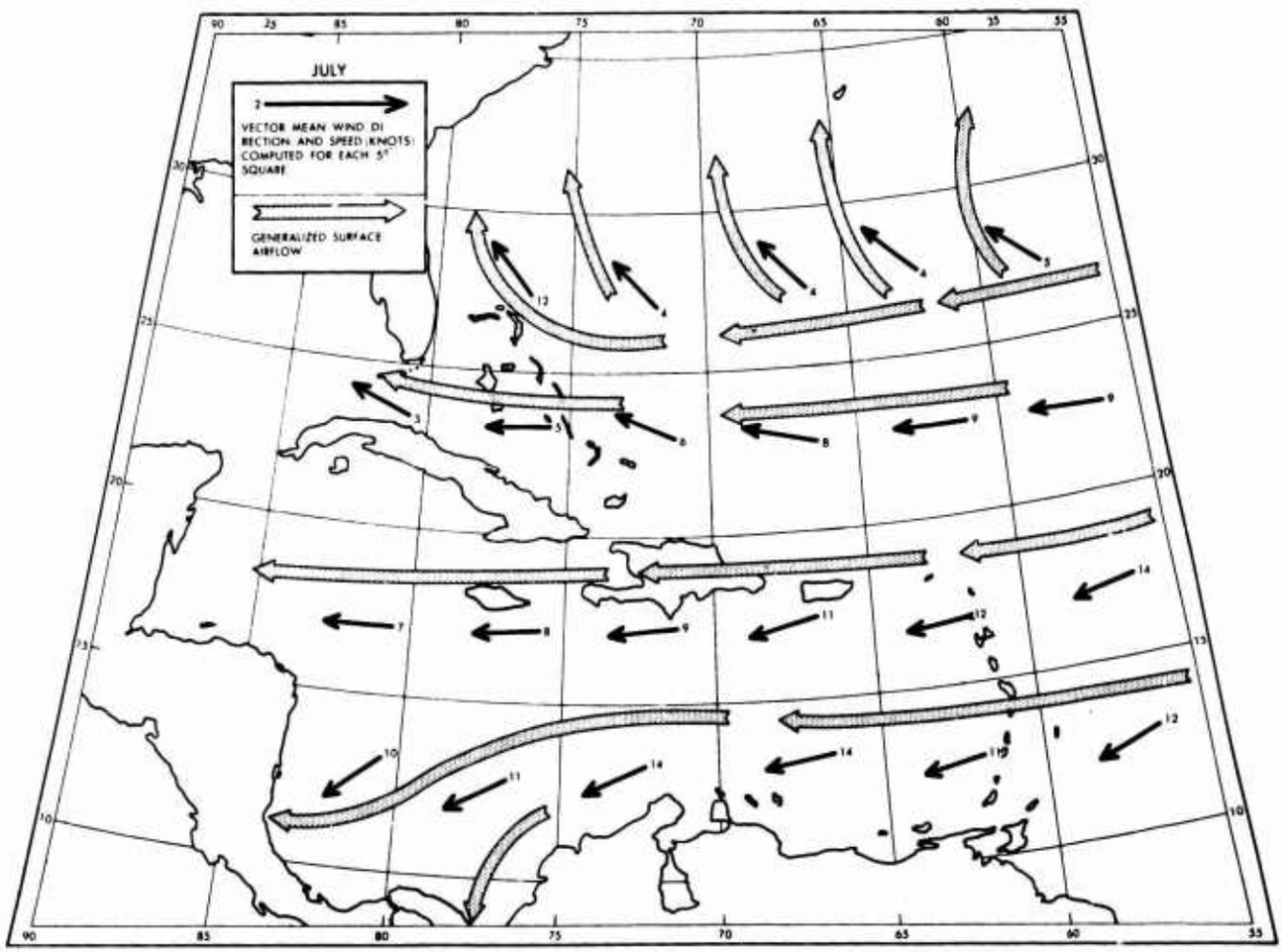


FIGURE 23–2. GENERALIZED SURFACE AIRFLOW AND VECTOR MEAN WIND, JULY

quency generally reaches a maximum during January and decreases to a minimum in October. The frequency at Guantanamo Bay is given in the following tabulation:

	JAN	APR	MAY	JUL	OCT	NOV
Frequency (%)	85	65	45	44	34	59

The intensity of the trade-wind inversion is indicated, to a great extent, by the change in temperature and humidity through the inversion layer, with the greater change accompanying the stronger inversion. This inversion is usually strongest over Cuba during January, as indicated in the following tabulation which gives data taken at Guantanamo Bay:

	JAN	APR	JUL	OCT
Change in temperature (°C.) through the inversion	1.8	1.0	0.7	0.5
Change in relative humidity (%) through the inversion	35	28	18	21

The thickness of the inversion layer over Cuba can vary from less than 200 feet to more than 1,600 feet, but, on the average, is about 900 to 1,000 feet. There is a rough inverse correlation of the height of the inversion with surface pressure; that is, when the surface pressure is high the inversion is generally low and strong, while the converse is true when the surface pressure is low. During the Northern Hemisphere winter, the period of highest surface pressure, the trade-wind inversion is at its maximum intensity and minimum height. The average height of the base of the inversion during January is about 7,000 to 9,000 feet. The inversion weakens and rises during March, April, and May. The inversion is weakest and at its maximum elevation (generally above 9,000 feet) during most of the warmer months. At this time the *mT* air is very moist and convectively unstable to high levels. However, for a short interval in July a southwestward and westward extension of the Azores *high* temporarily strengthens and lowers the inversion, bringing back some of the dryness and stability aloft characteristic of the dry season.

c. MIGRATORY PRESSURE SYSTEMS AND FRONTS — The regularity of the weather in regions dominated by the trade winds, especially during the warmer months, is in marked contrast to the irregular and pronounced fluctuations of the weather in middle latitudes. The NIS 78 Area is normally front free except at times during December, January, and February when the polar front (frontal zone between air masses of polar origin and those of tropical origin) is temporarily displaced south of 25°N. latitude. In these comparatively rare instances, frontal phenomena are encountered in the Area. During the warmer months, easterly waves and tropical cyclones are not uncommon and the equatorial trough occasionally moves over the Area.

(1) *Wet season (May through October)* — Easterly waves, the equatorial trough, and tropical cyclones may interrupt the normal weather regime during the wet season. Tropical cyclones are discussed more fully in Subsection A, 3.

Easterly waves are sinusoidal oscillations in the deep trade winds of the warmer months. These perturbations in the easterlies are usually quite deep, often extending from the surface to above 15,000 feet. Ahead of the axis of the wave is a zone of divergence, and to the rear, a zone of convergence. The clouds and weather sequence that are usually experienced during the passage of a typical easterly wave are as follows:

> In the forward zone are trade-wind cumulus clouds of average height, with no precipitation. Ahead of the axis scattered cumulonimbus clouds, with strong haze but no precipitation, occur. Close to the axis are found cumulus of above-average development, some cirrus and altocumulus, improving visibility, and scattered showers. At the axis, towering cumulus and cumulonimbus occur with broken to overcast middle and high clouds and frequent and often heavy showers or rain.
>
> To the rear of the axis, towering cumulus and cumulonimbus with layers of low, middle, and high clouds are usually found, with frequent moderate to heavy showers and thunderstorms. Finally, in the eastern outskirts are found large cumulus, occasionally cumulonimbus, with some middle and high clouds and moderate to light showers. During easterly wave passages, as much as 8 inches of rain may occur in a 24-hour period.

Although the mean position of the low-pressure trough between the two trade-wind belts is near or south of the Caribbean Sea during the wet season, day-to-day oscillations sometimes bring it over the Caribbean Sea and close enough to Cuba to affect the weather in this NIS Area. The weather associated with this trough varies greatly, depending on the intensity of convergence. At times the trough contains a continuous band of bad weather with intense thunderstorm activity, while at other times it consists of only scattered storms of small intensity with no definite boundary.

(2) *Dry season (November through April)* — From time to time during the colder months of the year the normal trade-wind pattern of the Caribbean region is interrupted as the result of synoptic situations originating in the middle or higher latitudes. These synoptic situations are known as *northers* and are characterized by deep penetrations of relatively cold polar continental air (*cP*) into the Gulf of Mexico and the Caribbean. In general, these situations arise when the strength of the west to east upper-air circulation

over the continent is weak and there is a marked north – south transport of air It is not uncommon for the polar front (the leading edge of the *cP* air) to move into the Atlantic off the east coast of North America, assuming a northeast – southwest position with the southern end curving westward across southern Florida and into the Gulf of Mexico region. A cold front in this position is often subjected to a series of marked wave developments, especially in the Gulf of Mexico region, with each wave developing into a depression of major proportions. Following the last wave of the series, the cold air breaks through into subtropical latitudes. By the time the cold front reaches Cuba, the cold air has lost most of its polar continental characteristics because of modification on its long southward trajectory. Thus, in most cases the cold front reaches Cuba as a discontinuity in the wind field (often referred to as a shear line). Within the shear zone there is frequently a line of towering cumulus or cumulonimbus with rainshowers which resemble typical cold-front weather of the middle latitudes. On occasions when the gradient in the polar air is sufficiently steep, wind speeds of gale force or more may be encountered.

The usual effect of middle-latitude disturbances entering the Caribbean is to lift, weaken, or destroy the trade-wind inversion. If the disturbance is weak, all that may occur is an increase in the normal cloudiness and perhaps a little light rain. On the other hand, a strong disturbance can give rise to extensive cloudiness and heavy rain.

d. TOPOGRAPHIC AND OCEANIC INFLUENCES — The topography has pronounced effects on the climate of much of this NIS Area; in fact, the height and exposure of a place usually has almost as much effect on its climate as its location within the Area. One exception, however, is the difference in the rainfall regime from the east to the west ends of the island of Cuba. The persistent trade winds bring great quantities of moisture into the Area, and the extent to which the moisture falls as rain depends considerably on the steepness and height of the features which lift the moist air. Thus, some of the more protected locations, Central Los Caños for example, average less than 35 inches of precipitation annually, while other exposed locations average more than 65 inches. The topography also affects the frequency and duration of rainfall, as well as most other meteorological elements to some degree.

The effect of ocean waters upon the climate of the Area is quite apparent. The high temperature and moisture content of the trade winds over the Area is due to their extended trajectory over the warm waters of the equatorial portion of the Atlantic Ocean. The ocean waters around Cuba also tend to equalize the temperatures; the range of sea-surface temperatures is remarkably small, with average values in the high 70's in the coldest month (February) and in the low 80's in July, August, and September. The equalizing effect of the warm waters is most pronounced over the low, flat coastal regions and least in the mountainous interior.

3. Special phenomena

Although loss of life and property has resulted from various weather conditions such as flash floods, cloudbursts, thunderstorms, and strong northers, the most catastrophic events in this NIS Area have been associated with tropical storms and hurricanes. It has been estimated, for example, that in the 25-year period 1920 through 1944, more than 10,000 lives and billions of dollars of property were lost in the Caribbean – Central America – Mexico region because of these storms.

Hurricane winds have been measured at speeds of over 135 knots, and estimates of peak gusts over 200 knots have been made by experienced observers. A very important effect on shipping and shore installations is the storm surge or so-called tidal wave, which accounts for a large fraction of the loss of both life and property in hurricanes. Adequate construction standards and evacuation procedures would minimize risk from this cause. During recent years, new and improved observational equipment, such as radar equipment and reconnaissance aircraft, together with improved communication facilities have contributed to better and more complete forecasts, thus providing more time for setting up the necessary protective measures. In this way the risk of loss of life and property has been considerably reduced. Another very important aspect of hurricane damage is the enormous rainfall amounts sometimes deposited in a relatively short period of time; for example, Havana received over 20 inches of rain in 24 hours during the October 1926 hurricane. Excessive rainfall results in overflowing of streams and inundation of lowlands, greatly affecting movement of troops, vehicles, and supplies.

Tropical storms and hurricanes affecting the Caribbean region form, as a general rule, in the easterlies and move westward with the prevailing upper winds. Although some move westward into the Gulf of Mexico, the majority turn gradually northward and come under the influence of the westerlies, recurving into a northeasterly direction of motion. It is not unusual for a storm to last for 6 or 8 days. FIGURE 23–3 illustrates some

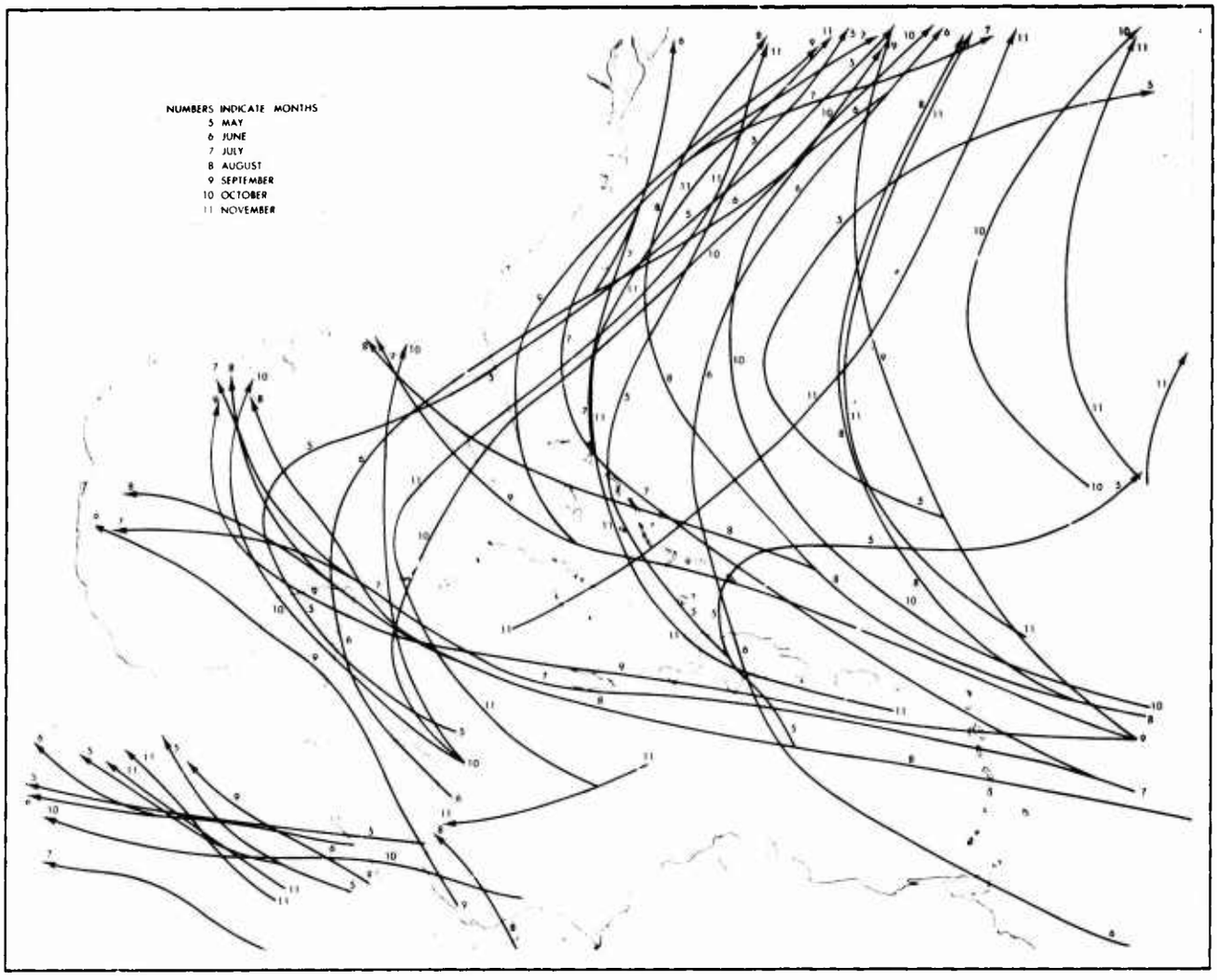


FIGURE 23-3. TYPICAL PATHS OF TROPICAL STORMS AND HURRICANES, MAY THROUGH NOVEMBER

typical paths of tropical storms and hurricanes through the southwestern North Atlantic, Caribbean Sea, and Gulf of Mexico. Considering this region as a whole, the annual frequency of tropical storms and hurricanes varies considerably from year to year, ranging from only 1 recorded storm to a maximum of 21 storms in 1 year. The annual average appears to be about 8 storms per year. The frequency of tropical storms of all intensities varies greatly from place to place throughout the region. FIGURE 23-4, covering the area from 16° to 26°N. latitude and from 70° to 88°W. longitude, presents an isoline analysis of the total number of all storms occurring during the period 1886-1957. The basic data for this figure were computed for 2½ degree squares, and a smoothing procedure applied. There is an area of low frequency between Cuba and Puerto Rico with a pronounced trough extending northwestward over this NIS Area. A region of high frequency of tropical storms is located in the western Caribbean Sea with a high frequency ridge curving northward around the western tip of Cuba. Another ridge of high frequency is found to the north of Cuba. Also shown in FIGURE 23-4 are arrows representing the mean directions of forward motion of the storms in September (the month having the maximum frequency of storms in the NIS Area). The major difference between the mean directions of motion of storms in October (the month with the second highest frequency) and those of September is that a few storms in October move northward across the eastern end of Cuba. The thickness of the arrows in FIGURE 23-4 has no relation to the speed of forward motion or the frequency of the storms whose movement is shown by the arrow.

A study has been made of the storms which passed through the NIS 78 Area or close enough to influence its weather. Tropical storms affecting the Area may occur in any month of the year, but fullfledged hurricanes (storms with wind

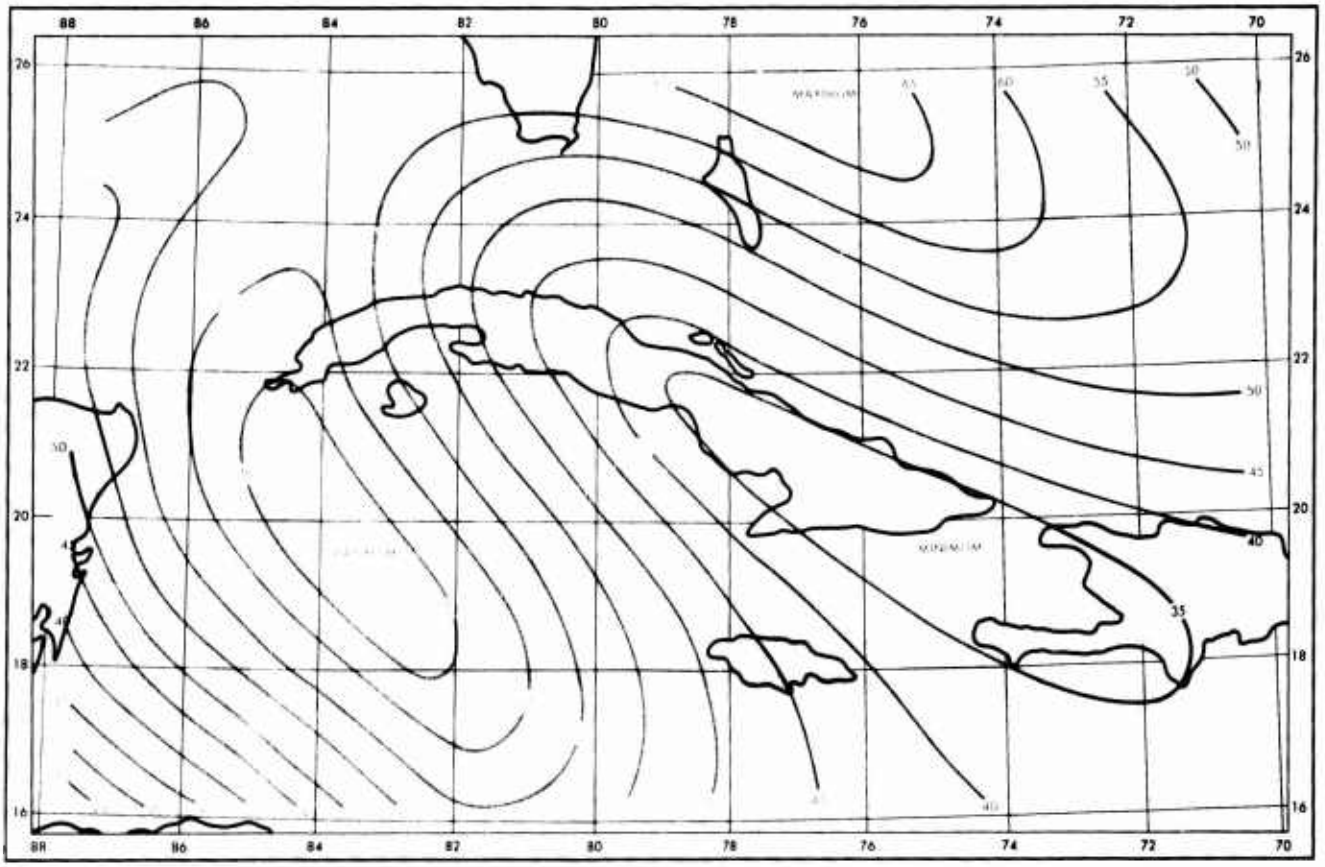


FIGURE 23-4. TOTAL NUMBER OF TROPICAL STORMS OF ALL INTENSITIES BY 2½-DEGREE SQUARES FOR 72 YEARS (1886–1957) AND MEAN DIRECTIONS OF MOTION FOR SEPTEMBER STORMS

speeds equal to or greater than 65 knots) are generally limited to June through November. FIGURE 23–17 is a tabulation showing the monthly frequencies in February through November of both tropical storms and hurricanes which passed close enough to the Area to affect its weather. The total storm and hurricane frequencies for the 72-year period, 1886–1957, are given. The annual frequency of storms in this period varies from no storms in some years to a maximum of 11 storms, with an average of about 3 storms per year. Storm intensity also varies considerably; of the total number of storms influencing the weather in the Area during the 72-year period tabulated, almost 45% were of hurricane intensity while in the vicinity of the Area. During the peak of the hurricane season (September has the highest frequency of total storms) over 50% of all storms have hurricane-force winds.

4. Seasonal climatic variations

In this NIS Area the two main climatic seasons, the wet season and the dry season, are based primarily on monthly precipitation amounts throughout Cuba. They divide the year into two approximately equal parts. Monthly or seasonal variations in other climatic elements, such as temperature, relative humidity, and cloudiness, are much less pronounced.

a. WET SEASON (MAY THROUGH OCTOBER) — The precipitation regime in this season has a very distinct pattern, with rainfall peaks at the beginning and end of the season at almost every station and only moderate amounts in midseason. The rainfall peaks fall most frequently in May or June and in September or October, although along the northern coast at the eastern end of the island the heaviest rainfall occurs in November. Average rainfall in the peak months is mostly 4 to 10 inches, although some localities have as much as 15 inches. Rainfall varies greatly from year to year and from place to place in Cuba. Heaviest amounts are usually recorded in western Cuba, on the Isle of Pines, and on the windward slopes of the eastern tip of Cuba. Tropical storm and hurricane activity reaches a maximum during this season, with more than one-half of all storms occurring during September and October. The western part of the island in particular is frequently affected by the strong winds and torrential rainfall of these storms. Thunderstorm activity is also at a maximum in this season, al-

though frequencies vary from place to place. Mean maximum temperatures are generally in the 80's or low 90's, with mean minimums mostly in the 60's or low 70's. There is little day-to-day variation. Relative humidity is high everywhere in the early morning, dropping to 50% to 70% in early afternoon; the variation from month to month and place to place is very small. Cloudiness is relatively uniform throughout the Area, averaging generally from 3-tenths to 6-tenths, with largest amounts in the afternoons as the cumulus clouds build up. Except on windward slopes, ceilings and visibilities are seldom low enough to interfere with air operations except for short periods in heavy showers.

b. DRY SEASON (NOVEMBER THROUGH APRIL) — Average monthly rainfall is small throughout most of the Area during this season; average amounts vary from less than 1 to about 4 inches. An exception is along the north coast of eastern Cuba, where averages of 5 to 15 inches are recorded in November. Tropical storm activity decreases rapidly in November and reaches a minimum in December through April. Thunderstorms are also infrequent in the dry season. Mean maximum temperatures are mostly in the upper 70's or in the 80's, while minimums vary more widely, ranging from the upper 50's to near 70° F. Relative humidities, while still high in the mornings, are somewhat lower in the afternoons in the dry season than in the wet season. Cloudiness is relatively uniform, averaging 2-tenths to 5-tenths cloud cover during the season. The diurnal variation, however, is less pronounced. Low ceilings and fog are more prevalent in this season, especially near sunrise, but seldom interfere for long with air operations.

B. Weather and military operations

This Subsection is concerned with the effects of the meteorological elements upon military operations, which are here divided into four basic groups: air, air-ground, ground surface, and amphibious. Under each group are discussed the weather elements primarily relevant to the operations in that group. However, weather elements which are considered most applicable to one basic group may also affect operations in others. In such cases, reference should be made to the appropriate Subsection. The meteorological information contained herein is organized to highlight conditions that may be pertinent factors in planning. Discussion of the effects of weather on specific operations is not attempted since the weather factor in an operation is subject to change with the changing requirements of the operation itself.

1. Air operations

a. CLOUDINESS — Cloud cover in this NIS Area does not vary greatly throughout the year, except for a slight increase in cloud cover during the wet season. The mean cloud cover is generally 6-tenths or less during the wet season and 5-tenths or less during the dry season; very seldom does the mean cloud cover fall below 20%. The amount of cloudiness at any place is influenced by many factors, such as elevation, location on a windward or a leeward slope in regard to the prevailing winds, exposure to land and sea breezes, and the frequency of tropical storms. In general, the variation of mean cloudiness is very similar to that of rainfall. FIGURE 23-18 shows not only the monthly variations in cloudiness but also the more distinct diurnal variations. During both seasons, maximum cloudiness is generally observed during the afternoon hours, occurring slightly earlier in the afternoon during the wet season. The frequencies of clear, partly cloudy, and cloudy days, based on early morning and midday observations at representative stations in Cuba are presented graphically in FIGURES 23-5 and 23-6. FIGURE 23-19 gives tabular data on clear days (days with $\leqq$3-tenths cloud cover), and FIGURE 23-20 gives tabular data on cloudy days (days with $\geqq$7-tenths cloud cover). Generally, the number of cloudy days reaches a maximum in the afternoon during the wet season. Trade-wind cumulus is the predominant cloud type throughout the Area. This type of cumulus is generally of small vertical extent, with the bases averaging 2,000 to 3,000 feet over the lowlands and coastal regions. Cloud bases are usually somewhat lower over the windward mountain slopes and slightly higher over the leeward side. Cloud tops over most of the Area vary from about 6,000 to 8,000 feet during the dry season and from about 8,000 to 9,000 feet during the wet season; somewhat higher cloud tops are found along mountain ridges. FIGURE 23-21 shows the frequency of the simultaneous occurrence of total cloud cover equal to or less than 3-tenths and visibility equal

NOTE Air operations are defined as those operations taking place primarily above the frictional influence of the surface terrain on atmospheric circulation. The meteorological elements discussed in this Subsection are those which are of primary importance to such operations as high-level visual bombing, radar bombing, aerial photography, most types of aerial reconnaissance, and fighter support and interception.

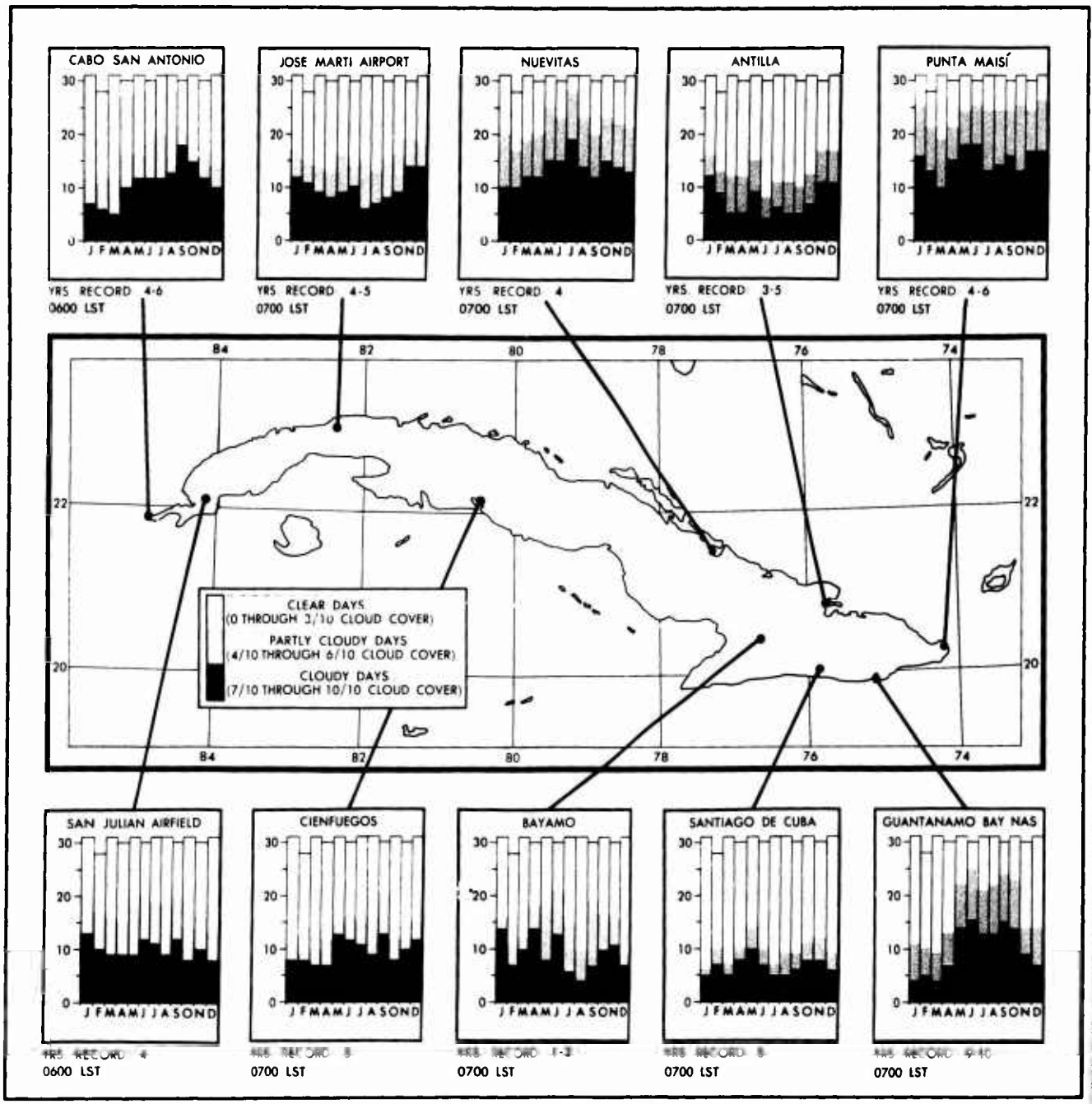


FIGURE 23–5. MEAN NUMBER OF CLEAR, PARTLY CLOUDY, AND CLOUDY DAYS IN EARLY MORNING. (For tabular data see FIGURES 23–19 and 23–20.)

to or greater than 2½ miles at specified times during the day. Such information may be valuable for certain types of air operations, such as aerial reconnaissance and photographic missions.

b. THUNDERSTORMS AND TURBULENCE — Thunderstorms are usually associated with the polar fronts, easterly waves, equatorial troughs, and tropical storms which affect this NIS Area. Occasionally they also occur as isolated air-mass thunderstorms. Although thunderstorms may be observed at any time of the year in this NIS Area, they are infrequent during the dry season, generally averaging fewer than 3 thunderstorms per month except in April when they occur slightly more often. During the wet season, thunderstorm activity reaches a maximum. The frequency of thunderstorms during this season, however, varies considerably from place to place (FIGURE 23–22). At stations for which data are available, the frequency varies from only a few to as many as 20 storms per month. Thunderstorms probably occur on as many as 150 days

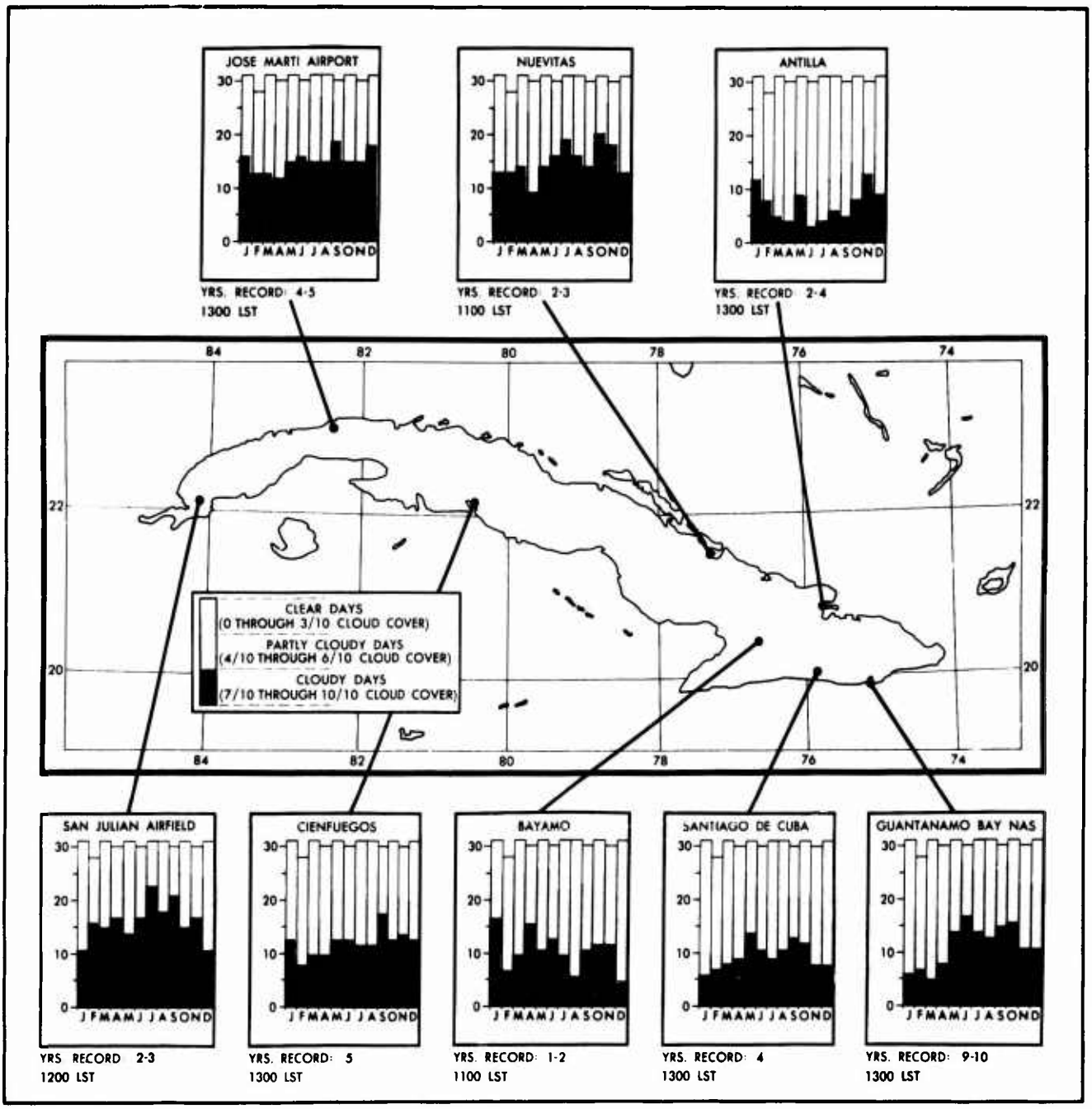


FIGURE 23-6. MEAN NUMBER OF CLEAR, PARTLY CLOUDY, AND CLOUDY DAYS AT MIDDAY. (For tabular data see FIGURES 23-19 and 23-20.)

per year in windward mountainous districts, although weather records for such regions are very sparse.

Turbulence is seldom a serious problem to air operations in this NIS Area. Severe turbulence is encountered only within thunderstorms and hurricanes, which are infrequent during the dry season and can usually be avoided in air operations. Light to moderate turbulence is sometimes found where the trade winds are forced over mountain ridges. In the lower levels, turbulence may result from strong surface heating, especially over cleared areas during the warmer months of the year. Also, light to moderate turbulence often occurs in the relatively thick transitional zone between the trades and the westerly winds in the upper air.

c. UPPER-AIR WINDS — There are, in general, two airstreams which dominate the upper-air circulation below about 60,000 feet over Cuba. The lower airstream, known as the trade winds, consists of relatively constant easterly winds, pre-

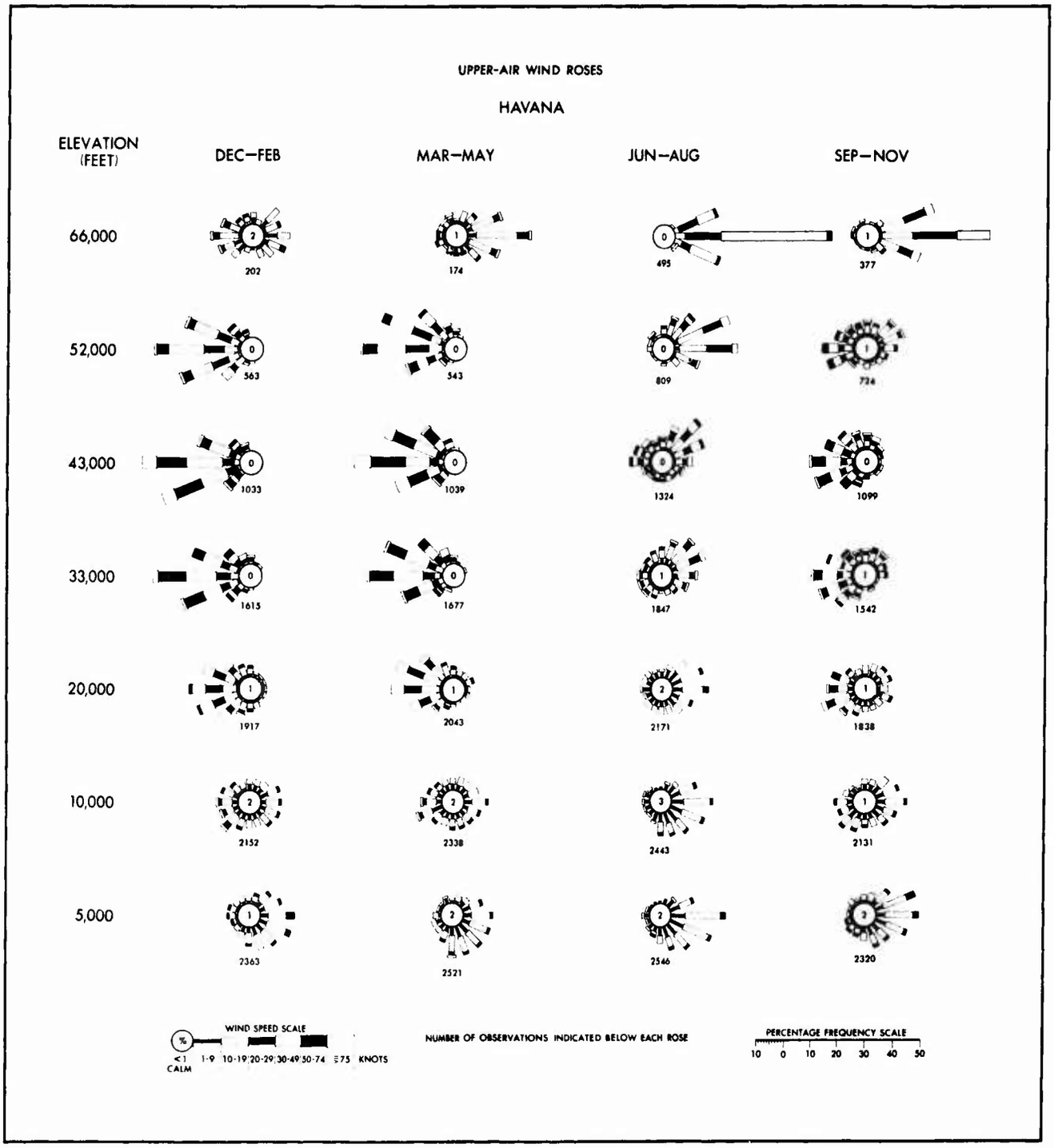


FIGURE 23-7. UPPER-AIR WIND ROSES, HAVANA

vailing in all seasons; in the upper layer, westerly winds predominate, except in June through August when winds are mostly easterly or variable. The transitional zone between these two circulations is a region of turbulence and shifting winds. This zone is most pronounced during the colder months of the year, the time when the westerlies are generally strongest. The average upper limit of the constant easterly trade winds ranges from about 8,000 to 12,000 feet in January to above 20,000 feet in July. The westerly flow is strong and constant between about 20,000 and 60,000 feet in December through May, but is often variable at these altitudes in September through November. In June through August, winds from 20,000 to 60,000 feet are easterly or variable, with the easterly winds more prevalent above about 45,000 feet. Above about 60,000 feet easterly winds prevail in all seasons but are most constant in June through November.

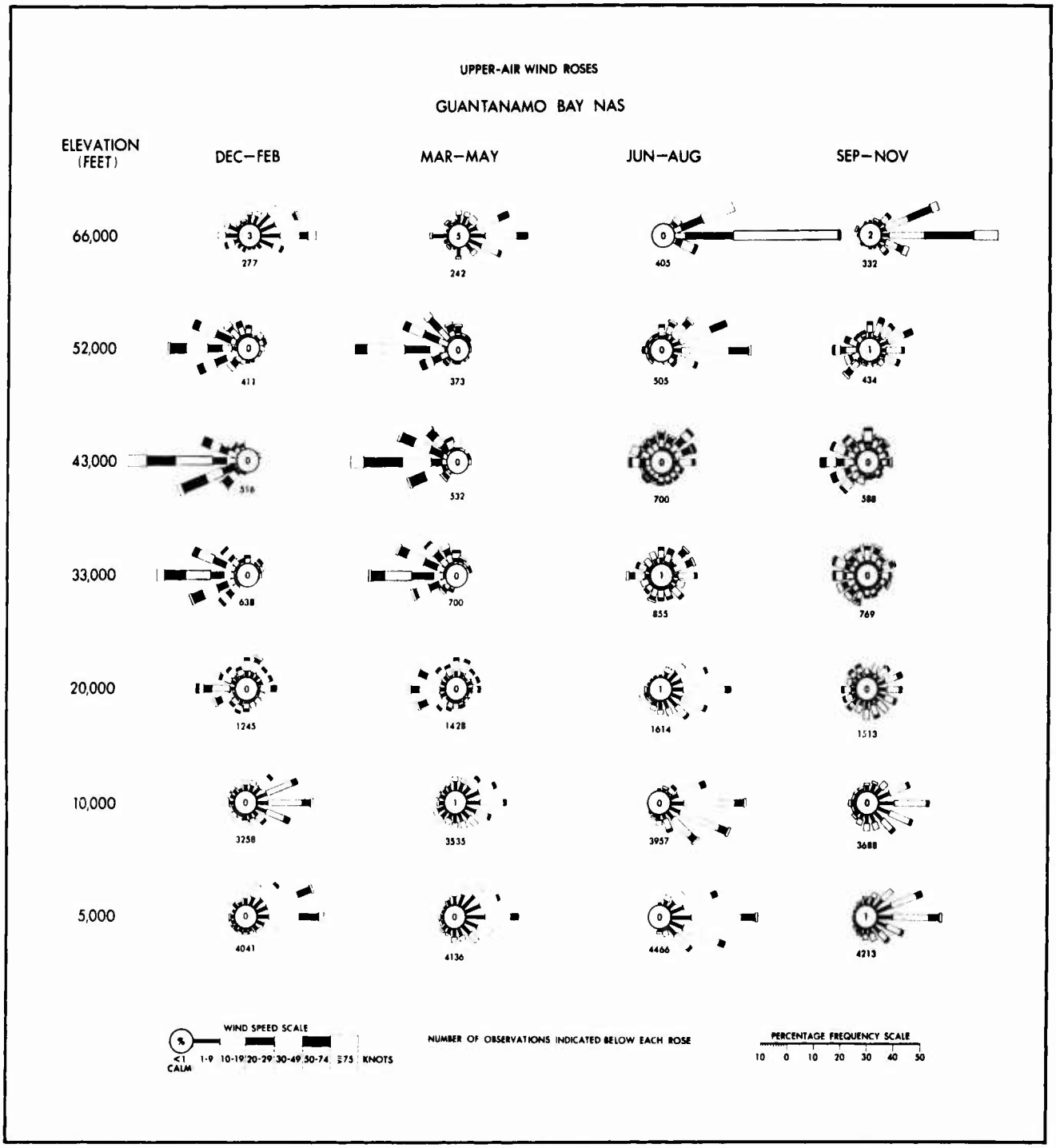


FIGURE 23–8. UPPER-AIR WIND ROSES, GUANTANAMO BAY NAS

The mean speed of the easterly trades is about 10 to 15 knots in all seasons. In the westerlies, in September through May, speeds are stronger, ranging from a low of about 15 to 20 knots at 20,000 feet to 45 to 55 knots near 45,000 feet. In June through August, speeds from 20,000 to 60,000 feet average 15 to 30 knots, increasing with altitude. At 66,000 feet, speeds range from 10 to 15 knots in December through May to 30 to 35 knots in June through August. FIGURES 23–7 and 23–8 give upper-air wind roses to 66,000 feet at Havana and Guantanamo Bay NAS.

d. UPPER-AIR TEMPERATURES AND AIRCRAFT ICING — Mean temperature at any given level to about 50,000 feet remains essentially constant over the NIS Area throughout the year. Day-to-day variations are also small. Mean temperature-height curves for January and July at Guantanamo Bay NAS, considered fairly representative of

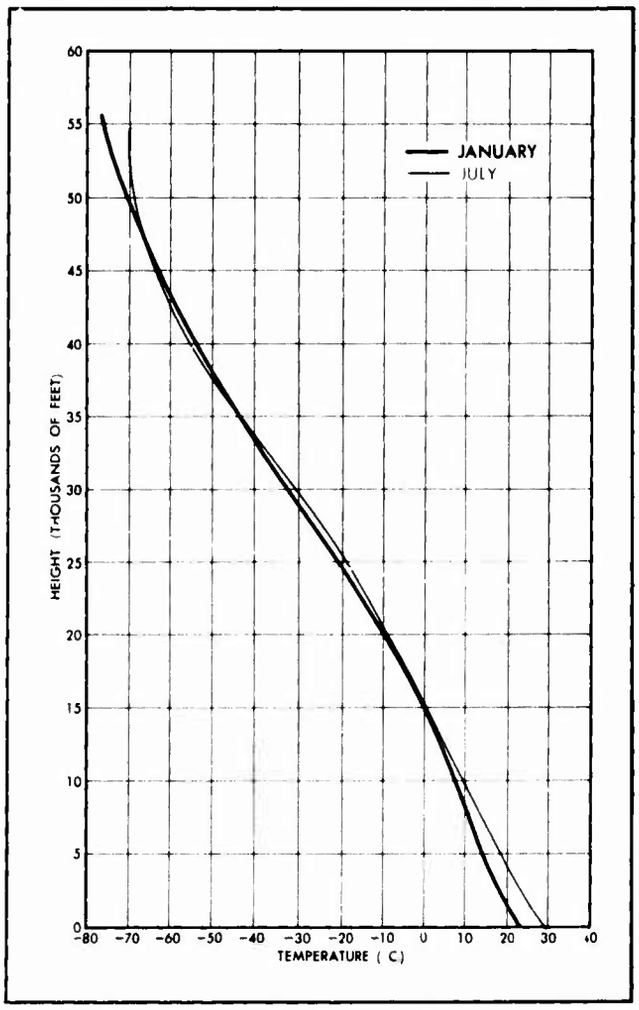


FIGURE 23–9. MEAN TEMPERATURE-HEIGHT CURVES, GUANTANAMO BAY NAS

the Area, are given in FIGURE 23–9. A statistical analysis of the temperatures above 5,000 feet indicates that the standard deviation is about 3.5° C. This means that 68% of the time the existing temperature is within ±3.5° C. of the temperature indicated on the temperature-height curves and 95% of the time it is within ±7° C. The average height of the tropopause over Cuba varies from about 54,000 feet in January to about 48,000 feet in June.

In order for aircraft icing to occur, the air temperature must be below freezing and there must be sufficient moisture present. Because the freezing level rarely drops below 15,000 feet, there is little chance of aircraft icing occurring below this level. At altitudes above 15,000 feet, there is normally little moisture in the air. However, on occasions when thunderstorms are present, there is danger of icing in them; it can be severe in the top portions of thunderstorm clouds. The stratiform clouds sometimes found at higher levels normally contain little moisture, and, at worst, cause only light aircraft icing.

2. Air-ground operations

Operations in this category are generally confined to the layer within 3,000 or 4,000 feet of the ground. Within this layer, conditions are seldom unfavorable for air-ground operations. Adverse conditions exist only during the relatively rare occasions when easterly waves, fronts, tropical storms and hurricanes, or thunderstorms are in the vicinity. Among the weather factors involved in these unfavorable conditions are low ceilings, restricted visibilities, strong winds, and low-level turbulence (Subsection B, 1, b).

a. CEILINGS — Cloudiness within the friction layer would not, as a general rule, seriously hinder air-ground operations over Cuba. FIGURE 23–23 shows the variations in the frequency of several ceiling heights at specified hours at selected stations throughout the Area. This figure indicates that ceilings below 1,000 feet are infrequent, occurring less than 4% of the time annually. The month of maximum occurrence of these low ceilings varies from station to station depending on exposure and location. Ceilings below about 3,000 feet are infrequent in the mornings over most of the Area but increase in late mornings and afternoons as the cumulus clouds increase. From the sparse data, it appears that the western portion of the island and the interior lowlands have more frequent ceilings below 10,000 feet than the eastern and central coasts. Low ceilings are also frequent on all windward mountain slopes.

b. VISIBILITY — Visibilities in this NIS Area are seldom very good or very poor. They generally range between about 7 and 15 miles. A persistent faint haze, present most of the time, seldom permits visibilities over 15 miles. FIGURE 23–24 indicates that visibilities less than 6 miles occur generally less than 10% of the time. Low visibilities are most frequent at inland stations and are especially prevalent during the early morning hours in December through February. The frequency of very low visibilities, almost always caused by thick or dense fog, is indicated in FIGURE 23–25 giving the mean number of days per

NOTE Air-ground operations are defined as those operations taking place in, or primarily influenced by, the meteorological conditions existing within the friction layer above the earth's surface. The meteorological elements discussed in this Subsection are those which are of primary importance to such operations as parachute drops, chemical and biological warfare, tactical support, low-level reconnaissance, and air rescue. The success or failure of many of these operations may also depend to a large degree upon the conditions above the friction layer or near the surface. A detailed discussion of such conditions may be found in Subsection B, 1 and B, 3.

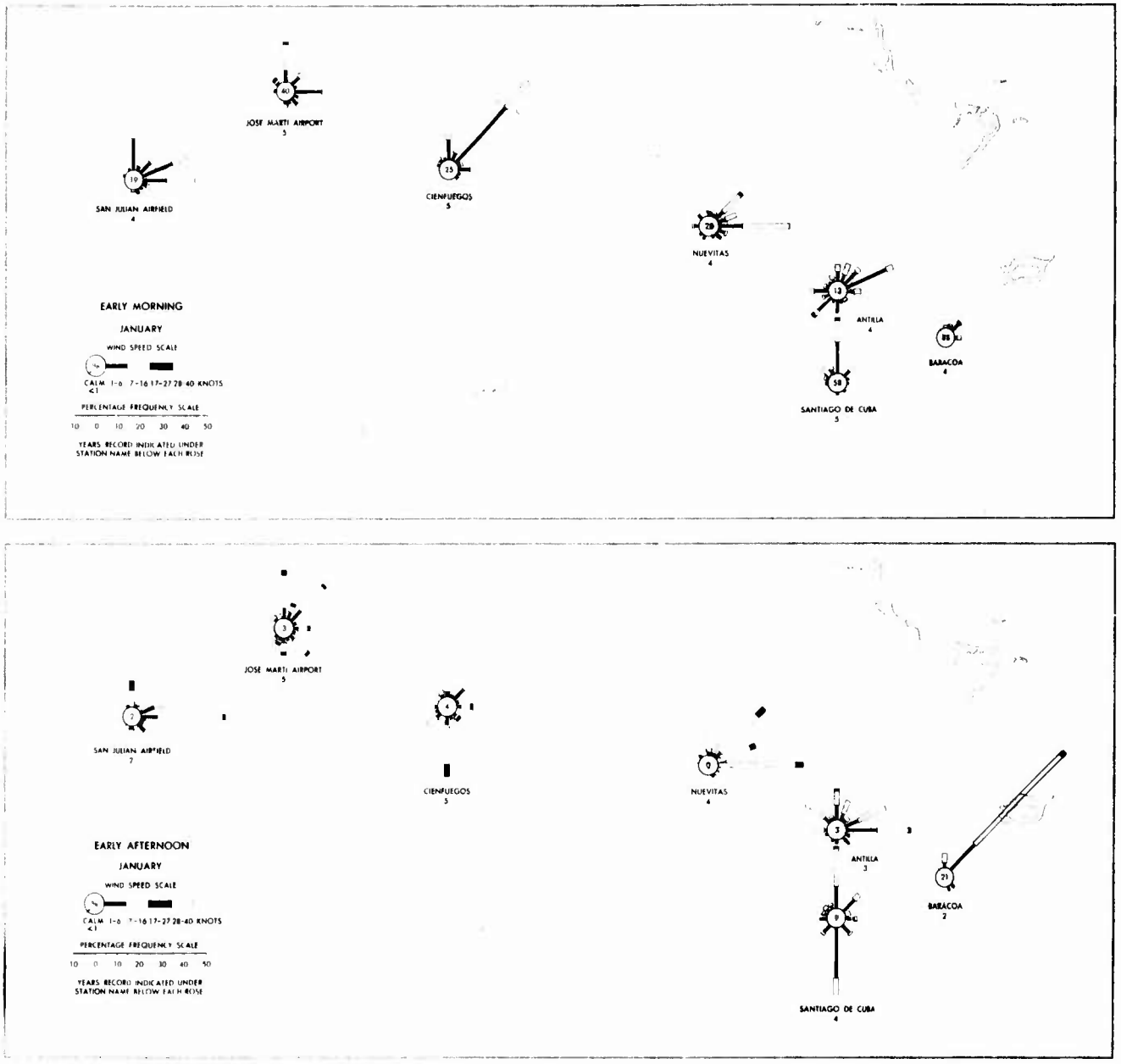


FIGURE 23-10. SURFACE WIND ROSES, JANUARY

month with visibilities less than 1 mile. Visibilities this low would be expected only about 5 to 20 days per year at most localities.

Combined ceiling and visibility data are presented in FIGURE 23-26. As shown by these data, ceilings equal to or greater than 1,000 feet with visibilities equal to or greater than 2½ miles occur more than 95% of the time at most stations. Adverse conditions are most often observed during the early morning hours from November through February.

c. SURFACE WINDS — FIGURES 23-10 through 23-13 give surface wind roses for early morning (at 0600 LST or 0700 LST) and early afternoon (at or between 1200 LST and 1500 LST) during January, April, July, and October for several locations in the Area. Surface winds are generally from the east throughout the year as a result of the trade-wind flow. The strength of the trades is quite uniform, wind speeds usually averaging between 5 and 15 knots, with the lower average speeds in April and October. Although the persistency of the trade winds is rather high over the Area, the land- and sea-breeze effect is pronounced throughout the year, with maximum effect usually evident during the warmer months. This effect is clearly demonstrated by the diurnal shift in wind directions, with early morning winds

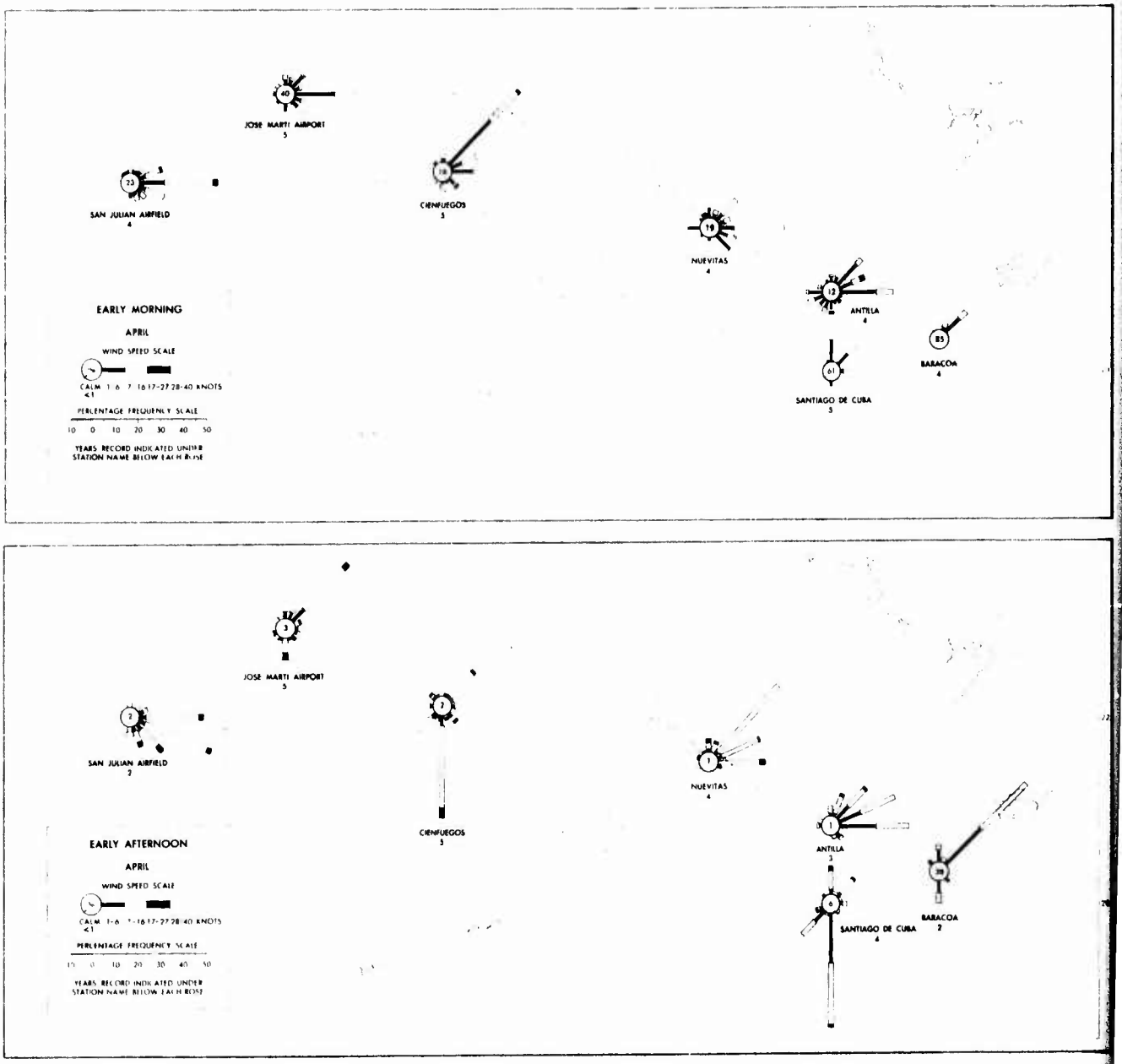


FIGURE 23–11. SURFACE WIND ROSES, APRIL

blowing out to sea and afternoon winds blowing toward the heated land.

Very strong winds in this NIS Area are associated with the hurricanes, fronts, and easterly waves that occasionally invade the Area. In the case of hurricanes, winds may exceed 100 knots and cause considerable damage. Because these disturbances are distributed throughout the year, strong winds may also occur in any month, but their period of maximum occurrence is August through October. Although the frequency of strong winds is low, their damaging effect is such that they should be considered in respect to any planned operation, especially operations in low coastal sections of the Area.

Certain types of military operations, such as incendiary, biological, chemical, and radiological warfare, depend on favorable combinations of surface winds and precipitation. FIGURE 23–27 gives in tabular form one combination sometimes specified as favorable for incendiary operations—the mean number of days when surface winds equal to or greater than 16 knots occur simultaneously with no precipitation in progress at specified hours. These data, like the surface wind roses but to a lesser degree, also show a slight diurnal variation. Favorable conditions usually reach their maximum frequency during the early afternoon.

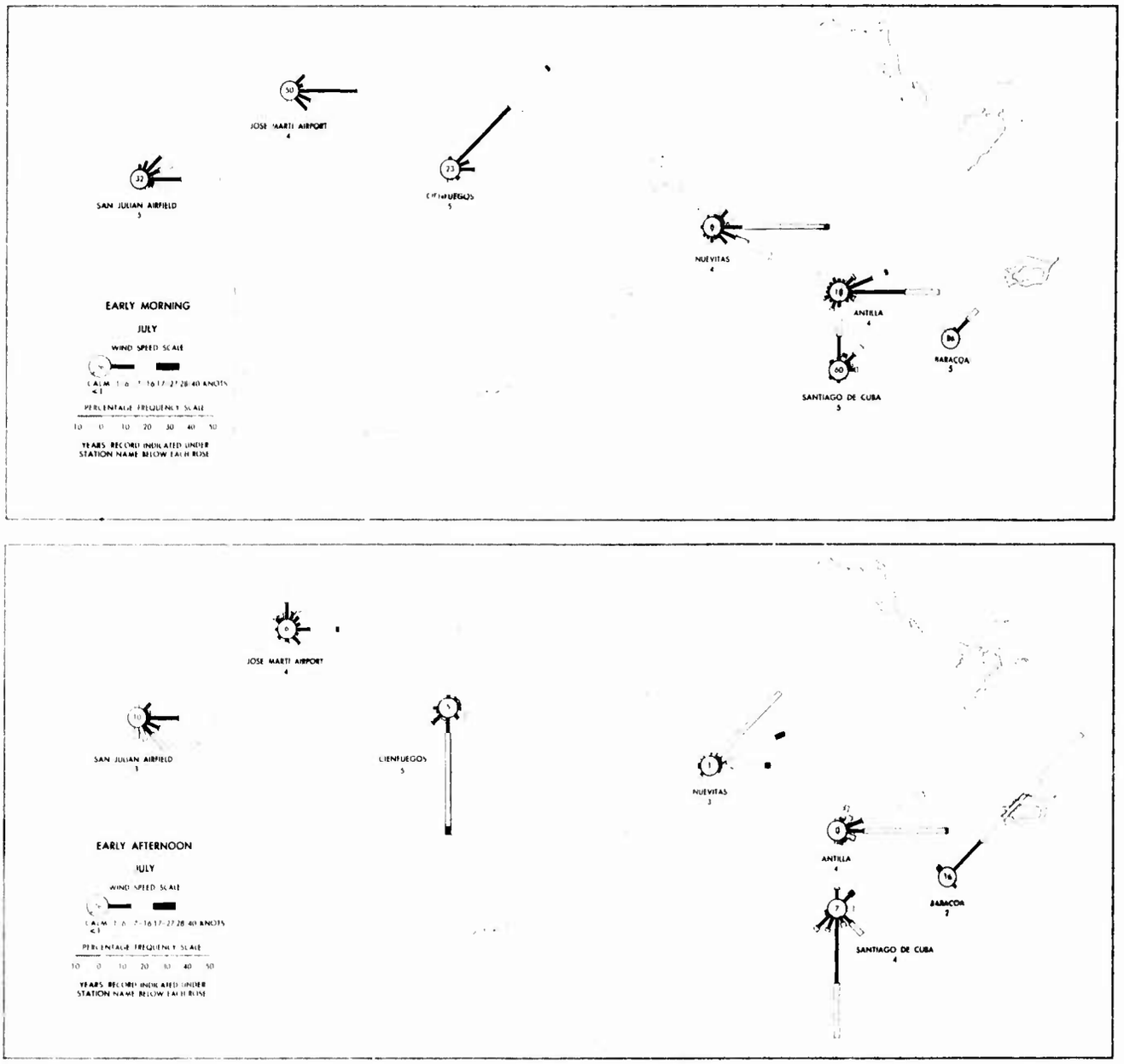


FIGURE 23–12. SURFACE WIND ROSES, JULY

3. Ground surface operations

a. TEMPERATURE — Temperatures in this NIS Area are remarkably uniform. Although there are the usual variations resulting from topography, exposure, and other factors, these variations are insignificant compared to those of a more temperate climate. The mean daily temperatures in the Area vary only about 7 to 12 Fahrenheit degrees throughout the year, ranging mostly from the low 70's in January and February to the low 80's in July and August (FIGURE 23–28). The mean daily range of temperatures is generally between 14 and 22 Fahrenheit degrees in all months at most localities (FIGURE 23–29); however, along the higher mountain ridges a slightly greater daily range probably occurs, and Havana has a range of only 9 degrees in several months.

NOTE Ground surface operations are defined as those operations taking place primarily at or very near the earth's surface. The meteorological elements discussed in this Subsection are those which are of primary importance to such operations as movement of troops and vehicles, selection of clothing and equipment, storage of supplies, and maintenance of armament and equipment. Some meteorological conditions which may also have an effect upon this type of operation are discussed in Subsections B, 1 and B, 2.

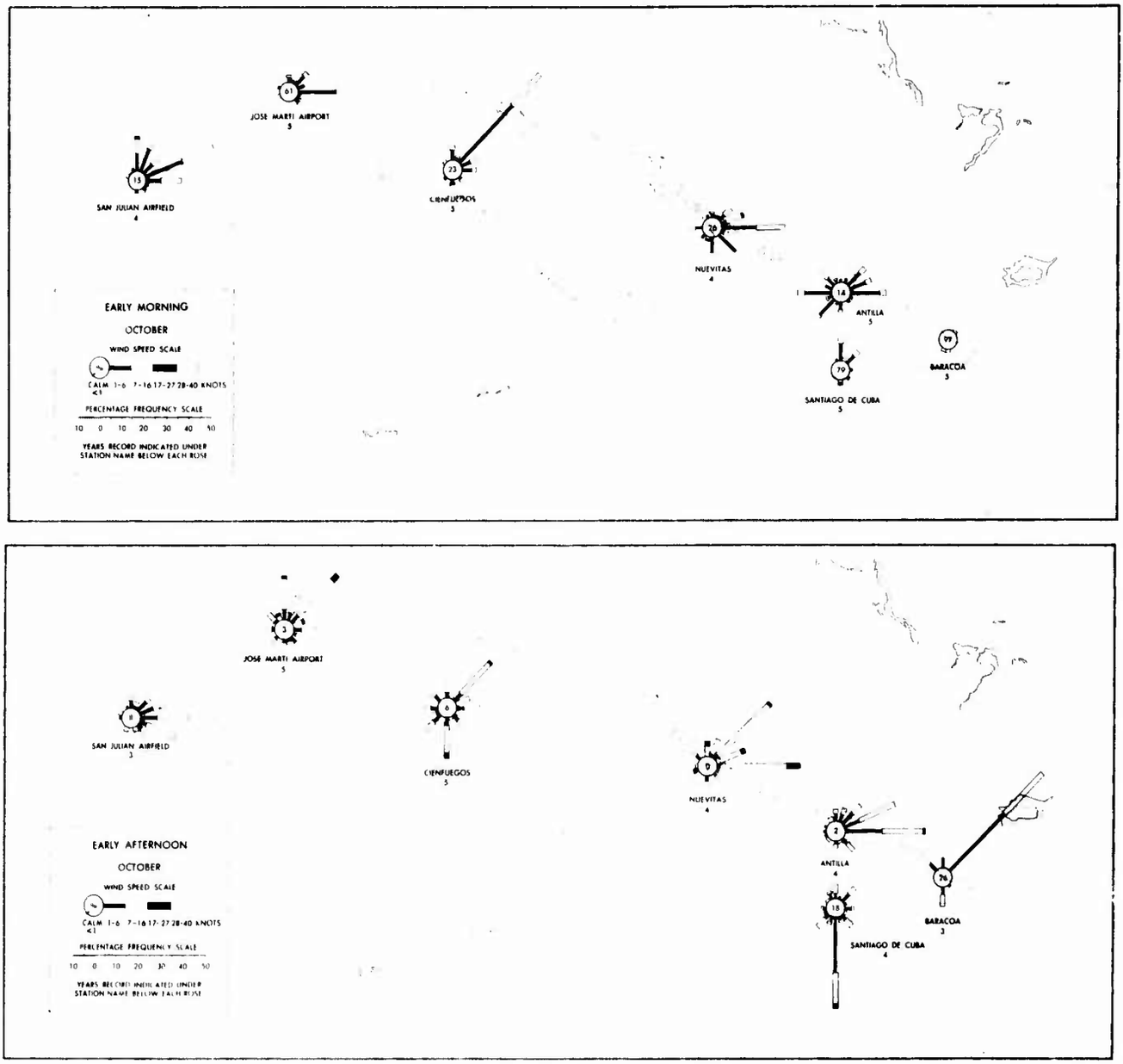


FIGURE 23–13. SURFACE WIND ROSES, OCTOBER

Unusually high or low temperatures are almost unknown in the Area. FIGURE 23–30 gives tabular data showing the absolute maximum and minimum temperatures for a number of stations. This figure indicates that freezing temperatures never occur over the lowlands; the lowest recorded temperature, 40° F., occurred at Camajuaní in December. Freezing temperatures could occur, however, along the higher mountain ridges. Absolute maximum temperatures are generally near 100° F. The highest, 104° F., has been recorded at Pinar del Río in July. FIGURE 23–14 serves to graphically emphasize the temperature distribution in the NIS Area.

b. RELATIVE HUMIDITY — Relative humidity is fairly stable at specified hours throughout the Area, varying only slightly from station to station and from month to month. The diurnal variation in the mean relative humidity, however, is generally of the order of 25% to 45% (FIGURE 23–31). Relative humidities in the 80's and 90's are common during the early morning hours, dropping to a minimum ranging usually from 45% to 65% in the afternoon.

c. PRECIPITATION — The climatic element having the greatest seasonal and regional variation in this NIS Area is precipitation. Average annual rainfall amounts vary from slightly less than 33

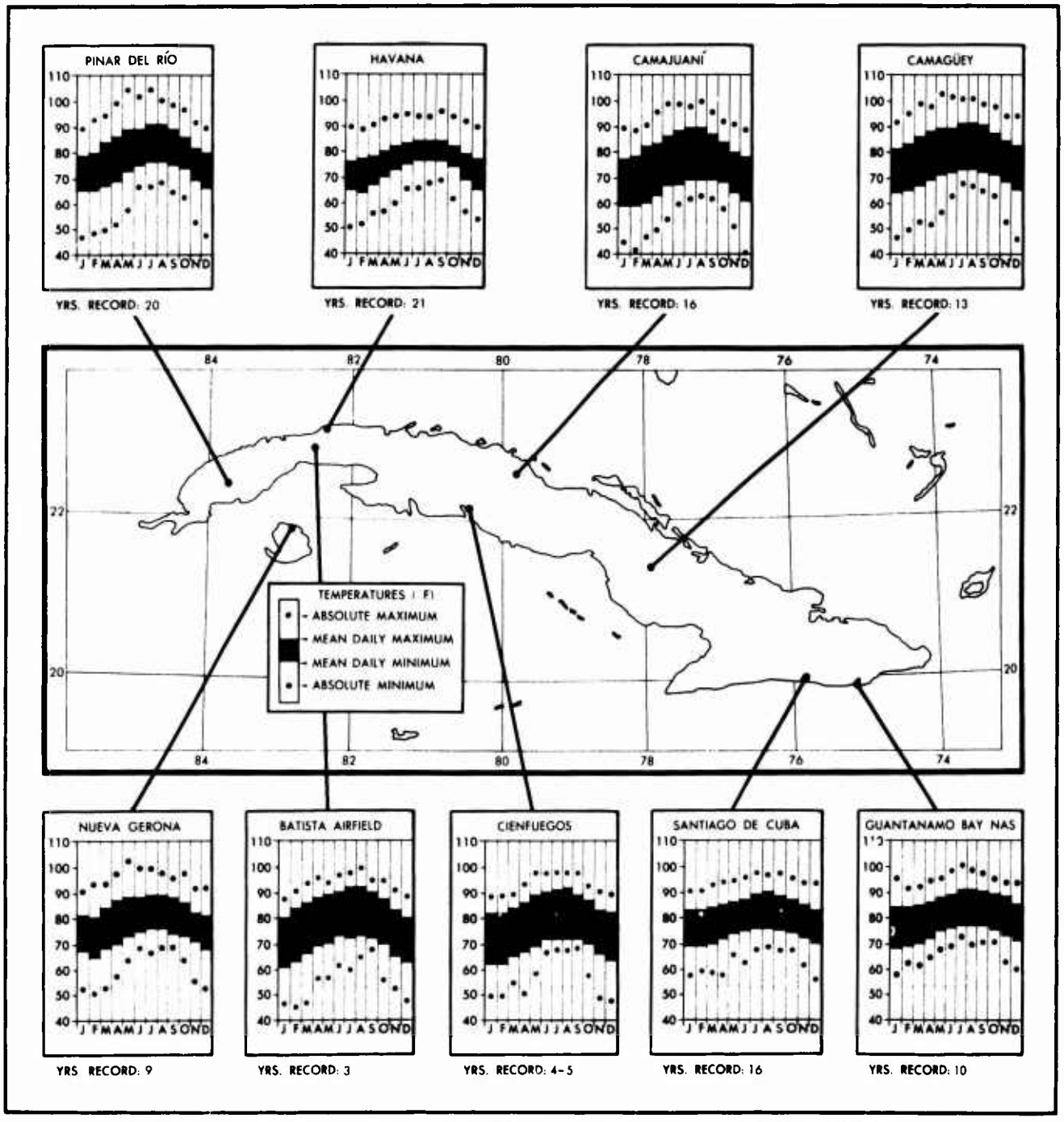


FIGURE 23-14. TEMPERATURES (° F.). (For tabular data see FIGURES 23-29 and 23-30.)

inches at Central Los Caños, located in an enclosed valley in eastern Cuba, to a little more than 70 inches at Nueva Gerona on the Isle of Pines. The variations in rainfall, expressed in average monthly amounts, are given in tabular and graphic form in FIGURES 23-32 and 23-15. The most important factors contributing to regional variation in precipitation are location, elevation, and exposure. Thus, the western third of Cuba, most often affected by tropical storms (FIGURE 23-4), is the major rainfall center. Baracoa, exposed on a rising slope to the steady easterly winds, is very wet, and locations higher on the hills to the west are probably wetter. Sheltered Central Los Caños, on the other hand, is remarkably dry.

Most of the precipitation in Cuba falls as instability showers, which, quite often, are of less than 1 hour's duration. Much of this type of rain is ineffective because the hot sunshine quickly evaporates the moisture. Day-long rains are rare, occurring only when well-developed easterly

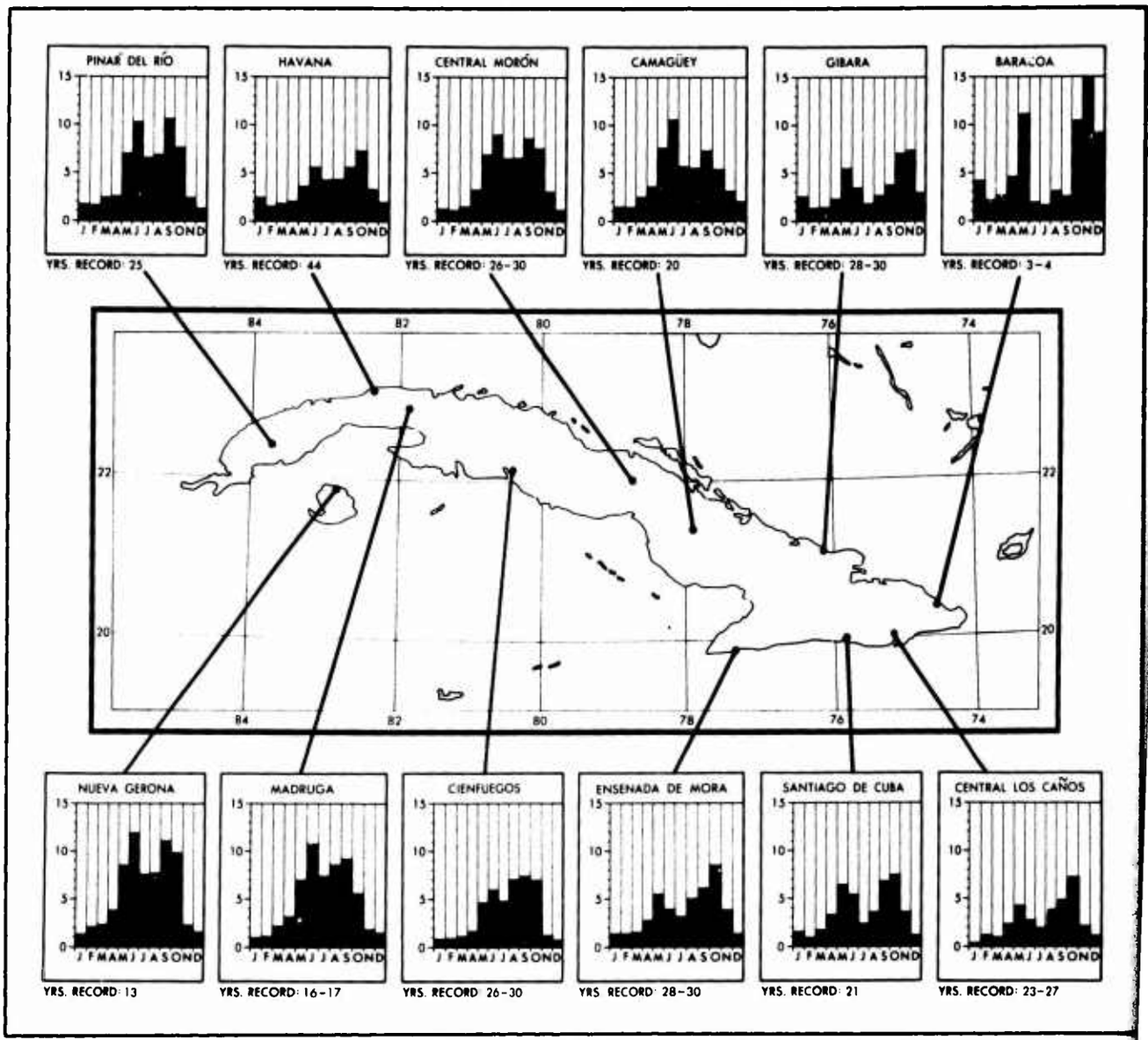


FIGURE 23-15. MEAN PRECIPITATION (INCHES). (For tabular data see FIGURE 23-32.)

waves or tropical storms move slowly through the Area. Monthly rainfall amounts may vary greatly from year to year and from place to place. This variation is illustrated in FIGURE 23-33 which gives the greatest and least monthly precipitation amounts which have occurred at selected stations. Of the 26 stations given, 17 have reported at least 1 month with 20 or more inches, and 6 have reported 25 inches in 1 month.

During periods when tropical storms are in the vicinity, large amounts of rain may fall. At such times, amounts in excess of 10 inches in 24 hours have been recorded (FIGURE 23-34). An outstanding 24-hour total occurred at Havana in October 1926 when over 20 inches was reported. Rainfall amounts of such magnitude undoubtedly cause extensive flooding.

The seasonal variation in rainfall in Cuba is pro nounced, with two seasons, a wet season and dry season, dividing the year into approximatel equal parts. FIGURE 23-35, which gives the mea number of days with precipitation equal to greater than 0.01 inch, illustrates this season variation. It should be noted, however, that th pattern in rainfall days is more obscure tha that in mean precipitation amounts since eac shower counts as much as a day-long deluge. Th same rainfall pattern is characteristic of most l calities, but a few sections vary somewhat fro the general trend.

(1) *Wet season (May through October)* - Mean monthly precipitation amounts have greater variation than most elements in Cub Almost all stations show a double peak in month

raintall; the first peak occurs in May or June and the second usually in September or October, except on the northern coast of eastern Cuba where the second peak is recorded in November. Although average precipitation amounts for each of these peaks generally range from about 4 to 10 inches per month, average amounts as high as 15 inches occur at a few localities. The midseason rainfall amounts vary greatly, sometimes dropping to about 10% of the peak value, but mostly averaging 40% to 70% of the higher peak rainfall. Neither of these two rainfall peaks could be considered as the primary one for the entire Area, although at many stations the difference in highest values is pronounced. The year-to-year and month-to-month variation in the monthly precipitation amounts throughout the wet season is very large. These extreme variations can be explained by the heavy rainfall associated with hurricanes and in some cases with lesser intense tropical storms and thunderstorms. There is little doubt that tropical storms and hurricanes contribute to a large extent to the existence of the rainfall peak in September, October, or November.

The areal distribution of average monthly rainfall amounts throughout the wet season shows that the western end of Cuba and the Isle of Pines are the sites of the major rainfall center. This is generally true for each individual month. In addition, the windward slopes of the mountains in eastern Cuba also receive heavy precipitation, possibly the heaviest in the Area, although records are very sparse. The mean number of days with rain in this season varies from about 8 to 15.

(2) *Dry season (November through April)* — Mean precipitation amounts during the dry season are generally less than 4 inches per month, reaching a minimum of less than 1 inch at many stations during January and February. An exception occurs along the northern coast of eastern Cuba, where average amounts in November are 5 to 15 inches, making this the rainfall center during the dry season. The year-to-year and month-to-month variation in monthly rainfall amounts throughout the dry season is also large. Many of the large monthly amounts can be attributed to heavy rainfall associated with tropical storms or hurricanes, especially during November, and to thunderstorms, fronts, and squall lines during the remainder of the season.

The reduced amount of rainfall during the dry season, as compared with that of the wet season, can be attributed to two major factors: first, to the stability and dryness of the trades above the trade-wind inversion, and second, to the rapid decrease in tropical storm and hurricane activity. Except for the month of November, the frequency of these storms during the dry season is practically zero.

d. OVERALL EFFECT OF SURFACE WEATHER ON CLOTHING, STORAGE, AND SHELTER

(1) *Clothing*

(a) MAJOR INFLUENCES — The most important climatic factors affecting clothing requirements for this NIS Area, where the climate is tropical, are temperature, precipitation, and relative humidity.

(b) REGIONAL REQUIREMENTS — Regional clothing requirements for Cuba (FIGURE 23-16) are given in terms of clothing assemblies that have been prescribed for worldwide military use according to the following mean monthly temperatures:

CLOTHING ASSEMBLIES	MEAN MONTHLY TEMPERATURES
Warm-weather	Above 68° F.
Cool-weather	50° to 68° F.

Appropriate service regulations list the exact nomenclature and the basis for issue of various components of these clothing assemblies. For planning purposes, however, the clothing assembly components are described in general terms. Also listed are special items which would be required because of varying climatic factors.

The warm-weather clothing assembly is a cotton outfit (visored cap, shirt, trousers, and underwear). It also includes tropical combat boots and a poncho. A single woolen blanket is adequate sleeping equipment for use with this assembly.

The cool-weather clothing assembly supplements the warm-weather assembly with a water-repellent wind-resistant jacket. The leather combat boot may be worn in place of the tropical combat boot. Two woolen blankets or a lightweight sleeping bag are adequate sleeping equipment for use with this assembly.

FIGURE 23-16. CLOTHING REQUIREMENTS

ELEVATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Sea level to 3,000 feet	W	W	W	W	W	W	W	W	W	W	W	W
3,000 to 4,000 feet	C	C	C	W	W	W	W	W	W	W	W	C
4,000 to 5,000 feet	C	C	C	C	W	W	W	W	W	W	C	C
Above 5,000 feet	C	C	C	C	C	C	C	C	C	C	C	C

W – warm-weather clothing assembly; C – cool-weather clothing assembly.

Northeast and east surface winds dominate the south coast and average 6 to 10 knots. Diurnal variations can be pronounced. Southerly winds are still observed but not of the strength or persistence shown during June through August. Rainfall amounts to 1 to 4 inches per month, with the largest amounts falling in the transitional months of November and April. Thundershowers are infrequent.

The dry season is characterized by trade cumulus and good visibility. Cloudiness varies from 20% to 50%, with scattered to broken cumulus of small vertical extent. Ceilings are generally above 2,000 feet. Visibility is occasionally reduced to less than a mile in showers, and periods of poor visibility are also associated with fronts in advance of the cool polar air. Fog is observed infrequently along the coast. The mean air temperature is generally in the 70's. The mean daily range of temperature is usually about 15 Fahrenheit degrees. Temperatures have been known to drop sharply during the cool polar outbreaks but rarely below 50° F. The sea-surface temperature is 1 to 3 Fahrenheit degrees warmer than the mean air temperature. Swells from the east and southeast are observed in over 60% of the observations, being occasionally interrupted by periods of southerly and southwesterly swells. Low to moderate swells are observed normally, although high swells are observed during northers and with November tropical storms.

C. Meteorological facilities and organization (as of July 1958)

1. Organization

After the Spanish American War, a section of the U.S. Weather Bureau was established in Havana. When Cuba became an independent republic, this section of the Weather Bureau became known as the National Observatory and continued its work under the Cuban Government, staffed by Cuban personnel. In 1942 the National Observatory was transferred from the Department of Agriculture to the Cuban Navy, with headquarters in Casa Blanca, Havana. The National Observatory is considered the national weather service and furnishes services similar to the U.S. Weather Bureau.

The International Airports Company (CAISA), organized shortly after World War II, provides meteorological services for most civil airlines.

The Cuban Army Air Force (CAAF) Meteorological Department provides the necessary meteorological services to the Cuban Army Air Force, Cuban Navy Air Force, and "Q" Airlines (Aerovías "Q"), a civil airline operating out of the military airport in Havana.

All three of the aforementioned weather services have 24-hour teletype connection with the U.S. Weather Bureau in Miami and receive a great deal of information about weather in the Caribbean area from this source. Coordination between these three organizations is generally good. During the hurricane season especially, personnel, facilities, and information are made available to each other as needed. Competence and accuracy of all three organizations are, generally speaking, high.

In addition to the three major meteorological services (National Observatory, CAISA, and CAAF) there are several other organizations or institutions which do some meteorological work. The Belén Observatory, Buena Vista Marianao, is part of a private Catholic school in Havana. It issues bulletins in connection with tropical disturbances and hurricanes; no other forecasting service is available. The Meteorological Departments of the Central University of Las Vallas, at Santa Clara, and the University of Oriente, at Santiago de Cuba, and several small private institutions also do some meteorological work.

2. Observing and forecasting facilities

Most stations are equipped with sufficient standard meteorological instruments to maintain at least an adequate minimum observational program. The competence and accuracy of most observations are generally high. Standard surface and/or upper-air observations are made with reasonable regularity at some 30 to 40 stations. Additionally, there are another 70 to 80 stations which record daily temperature and/or rainfall data. Many of these stations are located at sugar mills and plantations.

The National Observatory issues daily weather bulletins to newspapers and radio stations, giving daily weather summaries and 24-hour forecasts for the island. During tropical storm and hurricane threats, special forecasts are issued several times daily, sometimes hourly. Long-range weather forecasts are also prepared and issued by the National Observatory. Short-range weather forecasts for the Area are issued every 12 hours by the CAISA Weather Section, which also prepares airway-type forecasts for various air routes to and from Cuba, as well as those over the island. The CAAF Meteorological Department issues daily general forecasts for Cuba and surrounding area as well as specific forecasts for military flights as needed. Competence and accuracy are considered generally high.

3. Training of meteorologists

LCDR José Carlos Millás, Director of the National Observatory, has studied at length in the United States and is a graduate of the Massachusetts Institute of Technology. He has participated in numerous training schools and conferences and is highly regarded in his field. His assistant, Lieutenant Mario Rodríguez, has also studied in the United States and is considered a top man in the field in Cuba. Some other personnel have received specialized training in the United States and/or Cuba and are considered well qualified. In the CAISA Weather Section practically all forecasters and their assistants have studied meteorology in the United States; a number of the personnel received International Cooperation Administration (ICA) scholarships for this purpose. All are considered to be well trained. Almost all of the personnel of the CAAF Department of Meteorology are reported to be graduates of schools of meteorology in Cuba. Very few have studied meteorology outside Cuba.

There are only limited meteorological training facilities available in Cuba. Most training courses are on the observer level. No colleges or universities offer courses leading to a degree in meteorology.

4. Communications

For complete information on broadcast times, call letters, and frequencies, reference should be made to World Meteorological Organization Publication No. 9, vol. C, *Transmissions;* to the U.S. Navy Hydrographic Office Publication No. 206, *Radio Weather Aids;* and to the appropriate Air Force and Navy Radio Facility Charts and Supplements.

D. Climatic data tables

The various climatic data tables referred to in Subsections A and B are contained in this Subsection. The annual values in some tables are slightly different from the sums or the means of the monthly values because of the rounding-off of fractions. The data shown in the tables under Jose Marti Airport were taken at the Havana Airport which was previously known as International Airport, Rancho Boyeros. FIGURE 23–36, a map of station locations with an accompanying list giving latitude, longitude, and elevation of the stations mentioned in Subsections A, B, and D, appears at the end of this Section.

FIGURE 23–17. TROPICAL STORMS AND HURRICANES IN THE VICINITY OF THE NIS 78 AREA DURING THE PERIOD 1886–1957

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	TOTAL
Tropical storms*	0	1	0	0	4	15	6	19	31	32	9	0	117
Hurricanes**	0	0	0	0	0	3	7	19	34	25	5	0	93
Total	0	1	0	0	4	18	13	38	65	57	14	0	210
Percentage frequency of all storms	0	***	0	0	2	9	6	18	31	27	7	0	100

* Storms with wind speeds 34 to 64 knots while in vicinity of NIS 78 Area.

** Storms with wind speeds $\geq$ 65 knots while in vicinity of NIS 78 Area.

*** $<0.5\%$.

FIGURE 23-18. MEAN CLOUDINESS (%) AT SPECIFIED HOURS

STATION	HOUR (LST)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
Antilla	0700	39	34	28	28	33	23	26	26	26	31	42	37	31	3-5
	1300	40	34	28	28	39	25	28	31	31	36	47	37	34	2-4
	1700	35	43	42	43	62	45	42	43	48	41	46	35	44	1-3
Baracoa	0700	43	49	43	44	49	47	43	44	43	45	53	49	46	3-4
Bayamo	0700	38	27	35	44	37	45	33	23	36	38	38	25	35	1-2
	1100	51	39	43	52	45	48	40	36	44	47	49	33	44	1-2
Cabo San Antonio	0600	30	29	28	37	39	42	43	40	52	44	39	33	38	4-6
Camagüey	0700	28	36	25	31	37	47	36	36	43	43	41	41	37	6
Cienfuegos	0700	27	27	24	27	34	37	33	34	42	29	32	34	32	5
	1300	41	34	35	38	45	45	41	42	52	45	46	42	42	5
	1700	37	34	39	42	54	56	55	56	61	47	41	43	47	3-4
Guantanamo Bay NAS	0700	24	28	20	32	54	62	50	51	59	55	35	33	42	9-10
	1300	38	41	30	41	57	64	56	55	62	62	51	49	51	9-10
	1900	23	31	34	50	69	77	65	62	69	67	42	31	52	9-10
Havana	0700	30	32	26	35	34	37	34	33	42	42	41	37	35	6
Jose Marti Airport	0700	38	37	32	31	34	35	32	30	36	35	44	41	35	4-5
	1300	51	46	45	44	47	51	48	49	54	50	51	52	49	4-5
	1700	44	41	46	43	45	59	59	55	60	43	45	51	49	2-4
Nuevitas	0700	40	38	41	39	48	47	52	44	41	45	46	43	44	4
	1100	46	45	47	42	47	53	54	49	48	56	52	45	49	2-3
	1500	42	42	39	36	49	55	51	49	51	50	47	46	46	3-4
Punta Maisí	0700	49	46	39	44	51	55	46	48	51	49	51	50	48	4-6
San Julian Airfield	0600	43	40	36	37	38	43	40	36	44	33	40	31	38	4
	1200	45	50	48	53	49	55	57	53	59	48	50	43	51	2-3
	1600	50	50	51	54	54	61	62	62	62	51	50	47	55	2-3
Santiago de Cuba	0700	15	25	17	23	30	24	18	21	23	25	28	22	23	5
	1300	28	30	34	38	48	42	38	41	43	44	40	34	38	4
	1700	30	32	38	46	55	56	51	55	53	50	43	35	45	2-4

FIGURE 23-19. MEAN NUMBER OF CLEAR DAYS (≦3-TENTHS CLOUD COVER) AT SPECIFIED HOURS

STATION	HOUR (LST)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
Antilla	0700	15	15	19	18	16	22	20	20	20	19	13	14	211	3-5
	1300	15	14	22	18	14	21	21	19	17	16	8	14	199	2-4
	1700	15	11	9	9	4	10	9	10	7	15	9	15	123	1-3
Baracoa	0700	12	7	14	10	10	8	7	9	10	10	6	8	111	3-4
Bayamo	0700	15	17	19	12	13	9	16	21	11	14	14	22	183	1-2
	1100	6	9	6	2	5	4	9	11	7	6	3	14	82	1-2
Cabo San Antonio	0600	19	17	19	14	15	12	11	15	8	13	14	17	174	4-6
Camagüey	0700	20	16	21	18	15	9	16	16	12	13	14	14	184	6
Cienfuegos	0700	20	19	21	18	16	14	16	15	10	19	18	16	202	5
	1300	12	15	16	13	9	8	11	10	4	10	9	11	128	5
	1700	14	15	15	10	7	4	4	4	3	10	12	12	110	3-4
Guantanamo Bay NAS	0700	20	18	22	17	9	5	10	9	6	8	16	17	157	9-10
	1300	12	12	18	12	6	3	6	4	3	4	7	8	95	9-10
	1900	21	14	15	8	3	1	4	4	1	3	11	17	102	9-10
Havana	0700	18	16	20	15	17	14	16	17	11	11	11	15	181	6
Jose Marti Airport	0700	14	13	17	17	15	16	16	18	15	15	11	13	180	4-5
	1300	5	6	8	8	6	5	3	4	4	4	5	5	63	4-5
	1700	9	9	9	11	7	4	4	4	3	11	8	6	85	2-4
Nuevitas	0700	11	11	12	10	6	7	3	8	10	8	8	10	104	4
	1100	6	7	5	6	4	2	1	4	5	2	4	7	53	2-3
	1500	10	10	13	14	8	3	4	7	5	5	6	8	93	3-4
Punta Maisí	0700	6	7	12	9	7	5	7	7	6	6	6	5	83	4-6
San Julian Airfield	0600	11	11	15	15	13	10	12	13	10	17	14	18	159	4
	1200	5	5	5	1	4	1	1	2	2	3	5	7	41	2-3
	1600	5	3	4	4	2	1	0	1	1	5	8	7	41	2-3
Santiago de Cuba	0700	25	18	24	20	17	20	24	22	21	20	18	22	251	5
	1300	21	18	15	12	6	9	13	11	9	10	10	15	149	4
	1700	19	17	13	8	6	3	4	4	5	7	8	14	108	2-4

FIGURE 23-20. MEAN NUMBER OF CLOUDY DAYS (≧7-TENTHS CLOUD COVER) AT SPECIFIED HOURS

STATION	HOUR (LST)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
Antilla	0700	12	9	5	5	9	4	6	5	5	7	11	11	89	3-5
	1300	12	8	5	4	9	3	4	6	5	8	13	9	86	2-4
	1700	8	10	9	13	25	15	11	13	15	13	15	9	156	1-3
Baracoa	0700	13	15	14	14	18	15	12	14	13	15	20	17	180	3-4
Bayamo	0700	14	7	10	14	8	13	6	4	7	10	11	7	111	1-2
	1100	17	7	10	16	11	13	10	6	11	12	12	5	130	1-2
Cabo San Antonio	0600	7	6	5	10	12	12	12	13	18	15	12	10	132	4-6
Camagüey	0700	7	10	7	9	10	15	10	11	12	14	13	13	131	6
Cienfuegos	0700	8	8	7	7	13	12	11	9	13	8	10	12	118	5
	1300	13	8	10	10	13	13	12	12	18	13	14	13	149	5
	1700	13	8	12	14	21	23	23	23	24	16	13	15	205	3-4
Guantanamo Bay NAS	0700	4	5	4	7	14	16	13	13	15	14	9	7	121	9-10
	1300	6	7	5	8	14	17	14	13	15	16	11	11	137	9-10
	1900	4	5	7	11	19	22	19	16	19	19	9	6	156	9-10
Havana	0700	7	8	5	9	10	10	8	8	12	13	12	10	112	6
Jose Marti Airport	0700	12	11	9	8	9	10	6	7	8	9	14	14	116	4-5
	1300	16	13	13	12	15	16	15	15	19	15	15	18	182	4-5
	1700	11	10	16	12	13	21	24	21	22	12	12	18	192	2-4
Nuevitas	0700	10	10	12	12	15	15	19	14	12	15	14	13	161	4
	1100	13	13	14	9	14	16	19	16	14	20	18	13	179	2-3
	1500	12	12	11	9	16	18	17	16	17	18	12	14	172	3-4
Punta Maisf	0700	16	13	10	15	18	18	13	14	16	13	17	17	180	4-6
San Julian Airfield	0600	13	10	9	9	9	12	11	9	12	8	10	8	120	4
	1200	11	16	15	17	14	17	23	18	21	15	17	11	195	2-3
	1600	16	14	18	19	18	24	26	26	24	18	17	14	234	2-3
Santiago de Cuba	0700	5	7	5	8	10	7	5	5	6	8	8	6	80	5
	1300	6	7	8	9	14	11	9	11	13	12	8	8	116	4
	1700	8	8	12	13	20	20	18	22	20	17	10	9	177	2-4

FIGURE 23-21. MEAN NUMBER OF DAYS WITH TOTAL CLOUD COVER ≦3-TENTHS AND VISIBILITY ≧2½ MILES AT SPECIFIED HOURS

STATION	HOUR (LST)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
Antilla	0700	14	15	19	18	16	22	20	20	20	19	12	13	208	3-5
	1300	15	14	21	18	14	22	21	19	17	16	9	14	199	2-4
Baracoa	0700	11	7	14	11	10	8	8	9	10	10	7	8	113	3-5
Bayamo	0700	16	17	18	12	13	9	15	21	11	13	14	24	183	1-2
	1100	6	9	6	2	5	4	10	11	7	6	3	14	83	1-2
Cabo San Antonio	0600	19	17	19	14	15	12	12	15	8	13	14	17	175	4-6
Camagüey	0700	18	15	20	17	14	9	15	16	11	13	13	12	173	5-6
Cienfuegos	0700	20	19	22	18	16	15	16	15	10	19	18	16	204	5
	1300	12	15	16	13	9	8	11	9	5	10	9	11	128	5
	1700	14	15	14	10	7	4	5	4	3	10	12	12	110	3-4
Guantanamo Bay NAS	0700	20	18	22	17	9	5	10	9	5	8	16	17	156	9-10
	1300	12	12	18	12	6	3	5	4	2	4	7	8	93	9-10
	1900	21	14	15	8	3	1	4	4	2	4	11	17	104	9-10
Havana	0700	18	16	20	15	17	14	16	17	11	11	11	15	181	5-6
Jose Marti Airport	0700	13	12	16	17	15	16	16	18	14	15	10	11	173	4-5
	1300	5	6	8	8	7	5	3	4	4	4	6	5	65	4-5
	1700	9	9	9	11	7	4	4	4	3	11	8	6	85	3-4
Nuevitas	0700	11	11	12	10	6	8	3	8	10	8	8	10	105	4-5
	1100	6	7	5	6	4	2	1	3	5	2	4	7	52	2-3
	1500	10	10	13	14	8	3	4	7	5	5	6	8	93	3-4
Punta Maisf	0700	6	7	13	9	7	5	7	7	6	6	6	5	84	4-6
San Julian Airfield	0600	11	10	15	15	13	10	11	13	10	18	14	18	158	4-5
	1200	5	5	5	1	4	0	1	2	2	3	5	8	41	2-3
	1600	5	3	4	4	2	1	0	1	1	5	8	7	41	2-3
Santiago de Cuba	0700	25	18	24	20	18	20	24	22	21	20	19	22	253	4-5
	1300	21	18	16	12	6	9	12	11	9	10	10	15	149	4-5
	1700	19	17	13	7	6	3	4	4	5	7	8	14	107	3-4

FIGURE 23-22 MEAN NUMBER OF DAYS WITH THUNDERSTORMS

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
Antilla	0	0	0	*	2	1	1	2	2	2	0	1	11	3-4
Baracoa	0	0	0	0	0	0	0	0	0	0	0	0	0	3-4
Camagüey	0	0	0	0	0	3	2	1	1	1	0	*	8	3-4
Cienfuegos	*	1	2	4	10	16	20	19	16	9	1	1	99	17
Guane	1	1	*	3	6	9	7	6	4	5	*	1	43	8
Havana	1	1	2	3	7	12	12	14	11	6	1	1	71	20
Nuevitas	0	0	0	2	3	5	5	7	7	4	0	0	33	4-5
Santiago de Cuba	1	1	2	3	6	9	9	12	11	6	2	1	63	8

* <0.5 day.

FIGURE 23-23. PERCENTAGE FREQUENCY OF SPECIFIED CEILING RANGES AT SPECIFIED HOURS

STATION	HOUR (LST)	RANGE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
		feet														
Antilla*	0700	<1,000	8	5	2	1	0	1	1	0	1	1	9	6	3	3-
		<3,300	18	13	10	4	5	6	6	4	1	9	20	20	10	
		<8,300	22	17	12	7	8	6	6	4	3	9	23	20	11	
	1300	<1,000	5	1	0	0	2	0	0	1	0	2	4	3	2	2-
		<3,300	13	9	9	6	12	2	2	3	0	8	19	12	8	
		<8,300	16	15	10	6	15	2	2	5	1	9	24	16	10	
Batista Airfield**	0700	<1,000	0	4	3	0	0	0	0	0	0	1	1	4	1	
		<3,000	9	7	5	1	2	2	0	1	2	4	8	10	4	
		<10,000	22	13	15	10	9	17	0	2	3	16	21	39	14	
	1300	<1,000	0	1	0	0	1	0	0	0	1	2	1	1	1	
		<3,000	29	26	15	27	32	27	24	17	23	31	30	22	25	
		<10,000	61	58	42	55	59	53	60	61	66	64	61	58	58	
	1900	<1,000	1	1	0	0	0	0	0	0	1	0	0	0	***	
		<3,000	10	13	10	7	7	12	4	3	13	14	8	10	9	
		<10,000	25	21	21	20	23	28	16	13	29	22	18	27	22	
Cabo San Antonio*	0600	<1,000	0	0	0	0	0	0	0	0	1	0	0	0	***	4-
		<3,300	5	4	1	1	2	2	1	1	2	3	8	5	3	
		<8,300	13	8	3	10	4	4	1	2	5	7	10	10	6	
Camagüey**	0700	<1,000	3	0	3	0	5	0	2	4	0	2	1	5	2	2-
		<3,000	8	4	9	0	10	9	8	7	1	7	11	21	8	
		<10,000	16	10	13	10	13	12	10	10	2	12	18	35	13	
	1300	<1,000	2	1	1	0	0	0	0	0	0	2	2	0	1	2-
		<3,000	43	24	11	25	18	28	27	16	19	26	38	38	26	
		<10,000	82	71	72	88	69	59	71	63	73	77	77	75	73	
	1900	<1,000	0	1	0	1	0	0	0	0	1	2	3	3	1	2-
		<3,000	4	5	10	18	15	20	12	16	20	15	12	13	13	
		<10,000	15	13	27	40	33	32	32	32	28	28	19	27	27	
Cienfuegos*	0700	<1,000	1	0	1	0	0	0	0	0	0	1	1	1	***	
		<3,300	6	3	1	4	4	1	1	1	2	4	6	4	3	
		<8,300	8	9	4	7	8	2	2	1	2	4	9	6	5	
	1300	<1,000	1	1	1	0	1	1	1	1	1	2	1	1	1	
		<3,300	11	7	6	4	5	3	3	3	6	14	8	6	6	
		<8,300	16	7	9	9	11	3	5	3	8	15	13	11	9	
	1700	<1,000	1	0	2	0	1	1	0	1	1	5	0	2	1	3-
		<3,300	8	5	9	8	23	10	11	16	11	18	9	7	11	
		<8,300	12	7	15	19	28	17	16	19	13	20	13	14	16	

See footnotes at end of table.

FIGURE 23-23 (*Continued*)

STATION	HOUR (LST)	RANGE	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
		feet														
Guantanamo Bay NAS**	0700	<1,000	0	***	0	***	1	***	0	0	1	1	0	0	***	9–10
		<3,000	1	4	1	3	5	4	2	3	7	4	0	***	3	
		<10,000	9	12	7	8	15	10	5	7	10	9	5	6	9	
	1300	<1,000	0	***	0	0	***	***	0	***	***	***	0	0	***	9–10
		<3,000	3	2	3	2	3	3	0	2	4	9	5	3	3	
		<10,000	22	17	9	8	10	9	2	6	11	14	15	19	12	
	1900	<1,000	0	0	0	***	0	1	0	0	***	2	0	0	***	9–10
		<3,000	1	4	4	5	6	4	2	6	8	12	5	3	5	
		<10,000	13	17	16	23	21	13	5	13	16	19	12	9	15	
José Martí Airport*	0700	<1,000	1	2	0	1	0	0	0	0	1	1	1	1	1	4–5
		<3,300	19	19	10	9	5	9	1	0	4	8	17	14	10	
		<8,300	21	23	11	9	7	10	2	0	5	9	17	15	11	
	1300	<1,000	2	0	1	1	0	1	0	1	0	1	0	1	1	4–5
		<3,300	25	21	19	13	14	18	9	15	18	14	21	22	17	
		<8,300	28	25	24	19	19	19	11	17	24	19	25	28	22	
	1700	<1,000	1	1	1	0	0	0	2	1	1	1	2	0	1	2–4
		<3,300	18	14	23	15	10	33	30	15	27	14	12	16	19	
		<8,300	19	23	29	18	13	36	34	17	32	17	14	20	22	
Nuevitas*	0700	<1,000	3	0	0	1	1	2	0	0	0	1	2	0	1	3–4
		<3,300	8	5	4	5	3	2	4	3	1	6	8	9	5	
		<8,300	8	5	4	5	4	3	5	3	2	7	9	9	5	
	1100	<1,000	0	0	0	0	0	1	0	0	0	0	1	0	***	2–3
		<3,300	7	11	7	0	2	1	7	5	4	7	20	11	7	
		<8,300	7	11	7	0	2	3	7	5	8	7	20	11	7	
	1500	<1,000	1	1	1	0	3	4	1	0	1	3	2	2	2	3–4
		<3,300	6	15	7	1	11	7	7	6	2	10	9	11	8	
		<8,300	6	15	7	1	12	8	7	6	4	10	10	13	8	
Punta Maisí*	0700	<1,000	0	0	0	0	0	1	0	0	0	0	0	1	***	4–6
		<3,300	12	14	8	23	11	14	10	10	8	6	17	17	13	
		<8,300	20	21	11	24	11	17	11	11	9	7	19	23	15	
San Julian Airfield*	0600	<1,000	0	1	0	1	1	1	1	0	0	0	0	0	***	4
		<3,300	17	15	16	13	13	18	9	6	16	9	19	7	13	
		<8,300	18	15	16	13	13	18	9	7	16	9	19	7	13	
	1200	<1,000	0	2	2	2	0	0	0	0	3	0	0	0	1	2–3
		<3,300	19	30	23	29	33	28	33	27	33	18	27	7	26	
		<8,300	19	30	23	29	33	28	33	27	34	18	27	7	26	
	1600	<1,000	2	0	0	0	2	2	0	0	1	0	0	0	1	2–3
		<3,300	25	19	22	33	29	38	31	37	44	22	23	12	28	
		<8,300	25	19	24	33	29	38	31	39	45	24	24	12	29	
Santiago de Cuba*	0700	<1,000	1	0	1	0	1	0	0	0	1	3	2	0	1	4–5
		<3,300	5	9	3	7	6	4	0	1	3	5	5	5	4	
		<8,300	9	15	8	13	11	9	1	4	8	9	9	8	9	
	1300	<1,000	1	0	0	1	2	1	0	1	1	1	2	1	1	3–4
		<3,300	6	7	8	13	16	7	6	8	5	14	5	2	8	
		<8,300	10	14	16	20	25	15	10	14	20	21	13	12	16	
	1700	<1,000	0	1	0	3	2	0	0	1	2	0	1	0	1	2–4
		<3,300	12	11	14	22	27	22	15	23	10	23	7	5	16	
		<8,300	18	22	23	32	33	31	28	38	24	35	19	16	27	

* Ceiling defined as ≦7-tenths cloud cover.

** Ceiling defined as ≦6-tenths cloud cover.

*** <0.5%.

FIGURE 23–24. PERCENTAGE FREQUENCY OF VISIBILITY <6 MILES AT SPECIFIED HOURS

STATION	HOUR (LST)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
Antilla	0700	16	7	6	1	3	2	1	4	3	2	9	10	5	3–5
	1300	5	1	2	1	4	0	9	2	1	3	5	2	3	2–4
Batista Airfield*	0700	27	30	20	6	10	6	4	3	6	15	23	27	15	3
	1300	5	1	3	4	12	6	4	4	2	8	8	5	5	3
	1900	6	6	6	5	8	7	5	4	9	11	10	7	7	3
Cabo San Antonio	0600	2	2	0	1	0	2	0	2	7	8	9	3	3	4–6
Camagüey*	0770	37	26	17	6	10	4	11	13	2	9	9	18	14	2–3
	1300	2	1	3	2	4	4	7	4	2	7	4	1	3	2–3
	1700	1	4	4	5	10	10	3	8	9	2	8	2	6	2–3
Cienfuegos	0700	1	1	1	1	1	1	0	0	1	1	1	2	1	5
	1300	1	2	1	0	1	1	1	1	2	3	1	2	1	5
	1700	1	3	2	3	4	4	2	6	5	6	0	2	3	3–4
Guantanamo Bay NAS*	0700	**	1	5	8	3	2	**	0	2	3	**	0	2	9–10
	1300	0	**	0	3	1	3	0	**	2	3	0	**	1	9–10
	1900	0	0	1	2	2	2	1	2	2	3	0	0	1	9–10
Jose Marti Airport	0700	17	18	15	9	6	3	2	5	3	9	15	17	10	4–5
	1300	6	1	2	3	1	3	1	2	3	1	5	3	3	4–5
	1700	5	1	1	1	0	0	6	4	4	7	3	1	3	2–4
Nuevitas	0700	5	3	5	7	2	3	2	4	2	4	4	1	4	3–4
	1100	2	1	1	2	1	4	1	5	3	7	4	1	3	2–3
	1500	2	3	4	5	6	9	7	3	3	7	3	1	4	3–4
Punta Maisí	0700	0	2	0	4	3	2	0	1	2	6	6	1	2	4–6
San Julian Airfield	0600	14	5	6	7	5	4	0	2	5	3	2	4	5	4
	1200	1	0	2	3	4	3	1	4	9	2	0	0	2	2–3
	1600	6	1	3	1	3	6	0	3	11	6	0	0	3	2–3
Santiago de Cuba	0700	3	3	1	0	1	2	0	1	1	5	1	1	2	4–5
	1300	2	3	1	2	2	2	0	2	1	4	3	1	2	3–4
	1700	5	4	4	4	7	1	0	1	0	8	4	1	3	2–4

* Visibity <7 miles.

** <0.5%.

FIGURE 23–25. MEAN NUMBER OF DAYS WITH VISIBILITY <1 MILE

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
Antilla	3	1	1	*	1	*	*	1	1	1	4	2	15	3–4
Baracoa	2	*	1	1	1	0	*	0	*	1	3	1	10	3–4
Camagüey	4	1	1	1	4	1	1	0	1	1	2	1	18	3–4
Cienfuegos	*	*	*	*	*	*	1	1	1	1	*	*	4	7–8
Guane	1	1	*	*	1	1	0	1	1	1	*	1	8	8
Havana	1	1	1	1	*	1	1	*	1	1	1	1	10	8
Nuevitas	1	*	0	*	1	2	1	*	1	2	1	*	9	4–5
Santiago de Cuba	0	0	0	0	0	*	*	*	1	1	1	*	3	8

* <0.5 day.

FIGURE 23-26. PERCENTAGE FREQUENCY OF OBSERVATIONS WITH SPECIFIED CEILING AND VISIBILITY AT SPECIFIED HOURS

STATION	HOUR (LST)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
Antilla*	0700	88	96	97	98	98	97	99	100	99	99	89	91	96	3-5
	1300	95	99	100	99	96	100	100	98	100	98	97	97	98	2-4
Baracoa*	0700	98	95	95	97	96	100	100	99	99	96	90	99	97	3-5
Batista Airfield**	0700	93	88	94	100	98	100	100	100	100	97	95	87	96	3
	1300	99	99	100	100	97	100	100	100	98	98	99	98	99	3
	1900	99	99	100	100	100	100	100	100	97	99	100	100	99	3
Bayamo*	0700	92	93.	93	93	98	98	100	100	100	100	98	96	97	1-2
	1100	100	93	100	100	100	100	100	100	100	100	96	100	99	1-2
Cabo San Antonio*	0600	100	100	100	100	100	100	100	99	99	99	100	100	100	4-6
Camagüey**	0700	78	89	94	99	94	100	97	95	99	96	94	86	93	2-3
	1300	98	99	99	100	99	100	99	100	100	97	98	100	99	2-3
	1900	100	99	100	99	99	100	100	100	99	98	97	97	99	2-3
Cienfuegos*	0700	98	100	99	100	100	100	100	100	100	99	99	99	99	5
	1300	99	99	99	100	99	99	99	99	99	97	99	99	99	5
	1700	99	100	98	100	98	98	98	98	97	94	100	98	98	3-4
Guantanamo Bay NAS**	0700	100	100	100	99	99	99	100	100	99	99	100	100	100	9-10
	1300	100	100	100	100	100	99	100	100	99	99	100	100	100	9-10
	1900	100	100	100	100	99	99	100	100	100	99	100	100	100	9-10
Havana*	0700	99	99	99	98	100	99	100	100	100	98	99	97	99	6
Jose Marti Airport*	0700	94	95	99	98	99	99	100	99	98	96	95	89	97	4-5
	1300	97	100	99	99	100	99	100	99	99	99	98	99	99	4-5
	1700	99	99	99	100	100	100	96	99	98	98	97	100	99	2-4
Nuevitas*	0700	96	99	99	96	99	97	100	99	100	97	97	100	98	3-4
	1100	100	100	100	99	100	99	100	100	100	99	99	99	100	2-3
	1500	99	98	98	100	95	95	97	100	99	96	98	98	98	3-4
Punta Maisí*	0700	100	99	100	99	99	99	100	99	100	100	100	99	99	4-6
San Julian Airfield*	0600	91	96	98	99	98	96	99	100	99	100	98	98	98	4
	1200	99	98	99	98	99	100	99	99	96	100	100	100	99	2-3
	1600	95	100	100	100	99	96	100	100	94	97	100	100	98	2-3
Santiago de Cuba*	0700	98	100	99	100	99	100	100	99	99	97	98	100	99	4-5
	1300	98	99	100	99	98	99	100	99	99	99	99	99	99	3-4
	1700	97	99	100	97	98	100	100	98	98	98	98	100	98	2-4

* Ceiling (≦7-tenths cloud cover) ≧ 1,000 feet and visibility ≧ 2½ miles.

** Ceiling (≦6-tenths cloud cover) ≧ 1,000 feet and visibility ≧ 3 miles.

FIGURE 23-27. MEAN NUMBER OF DAYS WITH SUFRACE WIND ≥16 KNOTS AND NO PRECIPITATION OCCURRING AT SPECIFIED HOURS

STATION	HOUR (LST)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
Antilla	0700	1	1	0	*	*	*	*	0	0	0	1	*	3	3-5
	1300	*	2	2	1	2	*	*	*	*	*	1	1	11	2-4
Baracoa	0700	*	0	0	0	0	0	0	0	0	0	*	0	*	3-5
Batista Airfield	0700	0	*	0	0	0	*	0	0	0	*	*	1	2	3-4
	1200	4	3	6	4	2	0	2	*	0	3	3	4	31	3-4
	1600	0	1	1	1	1	0	0	0	*	0	1	1	6	3-4
Bayamo	0700	0	0	0	1	0	0	0	1	0	0	0	0	2	1-2
	1100	1	1	0	1	0	0	*	0	0	0	2	0	5	1-2
Cabo San Antonio	0600	2	2	*	1	*	*	0	0	*	1	2	2	11	4-6
Camagüey	0700	0	0	0	1	1	1	2	*	0	*	0	0	5	3
	1300	2	4	8	3	3	1	5	4	2	3	5	6	46	3
	1900	0	1	2	3	1	*	1	1	0	*	0	1	10	3
Cienfuegos	0700	0	*	*	1	0	*	*	0	*	0	0	1	3	5
	1300	2	2	5	3	2	2	1	1	1	*	1	1	21	5
	1700	2	2	5	3	1	1	2	*	1	1	1	2	21	3-4
Guantanamo Bay NAS	0700	*	*	*	*	0	0	0	0	*	0	*	*	1	9-10
	1300	6	6	8	6	3	3	7	5	2	1	2	3	52	9-10
	1900	1	1	1	1	*	*	1	*	0	*	*	*	5	9-10
Havana	0700	2	2	1	1	*	0	0	*	*	1	2	2	11	5-6
Jose Marti Airport	0700	1	1	*	0	0	0	0	0	0	0	*	1	3	4-5
	1300	2	3	4	2	3	1	*	1	1	2	4	3	26	4-5
	1700	2	2	4	4	6	0	1	1	1	2	3	2	28	3-4
Nuevitas	0700	*	1	2	*	*	0	1	0	*	*	2	1	8	4-5
	1100	3	3	5	2	*	0	1	1	1	3	4	4	27	2-3
	1500	3	4	5	2	2	*	2	1	1	3	4	4	31	3-4
Punta Maisí	0700	8	4	5	4	2	2	4	2	2	1	4	8	46	4-6
San Julian Airfield	0600	0	*	1	1	0	*	0	*	1	*	0	*	4	4-5
	1200	2	1	2	3	2	0	0	0	*	0	2	3	15	2-3
	1600	0	1	1	1	*	0	0	0	0	*	*	*	4	2-3
Santiago de Cuba	0700	*	*	1	*	0	0	*	*	0	0	0	*	2	4-5
	1300	*	2	2	1	0	0	*	1	0	1	*	1	8	4-5
	1700	1	1	1	1	0	*	1	*	1	1	0	*	7	3-4

* <0.5 day.

FIGURE 23-28. MEAN DAILY TEMPERATURE (°F.)

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
Batista Airfield	70	73	75	78	79	81	82	82	81	78	73	71	77	3
Camagüey	72	73	76	78	79	80	82	82	80	79	77	73	78	13
Camajuaní	68	68	71	73	76	77	78	78	77	76	72	69	74	16
Central Elia	74	74	76	78	80	81	82	82	81	79	76	74	78	12-16
Central Francisco	73	73	76	78	80	81	82	82	80	78	76	74	78	13-15
Central Hershey	72	71	74	76	78	80	81	81	81	78	74	72	77	7-8
Central Soledad	72	73	74	77	79	81	81	81	81	79	77	74	77	6-8
Cienfuegos	74	74	76	78	80	82	83	83	82	79	76	75	79	13-16
Gibara	75	75	76	78	79	81	83	83	82	81	77	75	79	21-23
Guane	73	73	75	79	80	81	82	83	81	80	76	74	78	14-15
Guantanamo Bay NAS	75	76	77	79	81	82	83	84	83	82	80	77	80	10
Havana	72	72	74	77	79	81	82	82	81	79	75	72	77	60
Herradura	71	72	74	79	80	82	83	83	82	78	73	72	77	3-6
Holguín	75	75	77	78	79	82	84	83	83	81	78	77	79	3-5
Nueva Gerona	73	72	75	78	80	81	82	82	81	79	76	74	78	21
Omaja	73	73	75	77	79	79	80	80	80	78	74	73	77	5
Pinar del Río	71	72	75	77	81	82	83	83	82	79	75	73	78	20
Santiago de Cuba	75	75	77	78	80	81	82	82	81	80	78	76	79	16
Santiago de las Vegas	69	73	73	77	78	80	81	80	79	77	74	72	76	2-4

FIGURE 23-29. MEAN DAILY MAXIMUM AND MINIMUM TEMPERATURES (°F.)

STATION		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
Batista Airfield	Max	80	84	86	88	89	90	92	92	90	87	83	80	87	3
	Min	60	62	65	68	69	72	71	72	71	69	64	62	67	3
Camagüey	Max	81	83	86	88	89	89	91	91	90	87	84	82	87	13
	Min	63	64	66	68	70	71	72	72	71	70	67	64	68	13
Camajuaní	Max	77	78	82	83	86	88	89	89	87	84	80	78	83	16
	Min	58	58	59	62	66	66	68	68	68	67	63	60	64	16
Cienfuegos	Max	82	82	84	86	89	90	91	92	89	87	83	82	86	4-5
	Min	61	61	64	66	68	71	71	71	71	69	65	63	67	4-5
Guantanamo Bay NAS	Max	84	84	85	86	88	89	91	91	90	89	88	85	88	10
	Min	67	68	69	71	74	75	76	76	76	74	72	70	72	10
Havana	Max	76	77	78	80	82	83	84	84	84	82	79	77	81	21
	Min	64	63	66	69	72	74	75	75	75	73	68	64	70	21
Nueva Gerona	Max	81	80	84	87	88	88	89	89	88	86	82	81	85	9
	Min	66	64	67	69	72	74	75	75	73	72	70	67	70	9
Pinar del Río	Max	79	80	84	86	89	89	91	91	89	86	82	80	85	20
	Min	64	64	66	68	72	74	75	75	74	73	68	65	70	20
Santiago de Cuba	Max	83	83	84	85	86	87	89	90	88	87	85	83	86	16
	Min	68	68	69	71	73	74	75	75	74	73	71	69	72	16

FIGURE 23-30. ABSOLUTE MAXIMUM AND MINIMUM TEMPERATURES (°F.)

STATION		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
Batista Airfield	Max	87	90	93	95	93	96	97	99	94	94	90	88	99	3
	Min	46	45	46	56	56	61	59	64	67	55	52	47	45	3
Camagüey	Max	91	94	98	97	102	101	100	100	98	97	93	93	102	13
	Min	46	49	52	51	56	62	67	66	64	62	52	45	45	13
Camajuaní	Max	89	88	90	95	98	98	97	99	95	91	90	88	99	16
	Min	44	41	46	49	53	59	61	62	61	57	50	40	40	16
Cienfuegos	Max	88	88	89	93	97	97	97	97	97	92	90	89	97	4-5
	Min	49	49	54	50	58	66	67	67	68	57	48	47	47	4-5
Guantanamo Bay NAS	Max	95	91	92	94	95	98	100	98	97	95	93	93	100	10
	Min	57	62	61	64	67	68	72	69	70	70	62	59	57	10
Havana	Max	89	88	90	92	93	94	93	93	95	93	91	89	95	21
	Min	50	51	55	56	59	65	65	67	68	61	56	53	50	21
Nueva Gerona	Max	90	93	93	97	102	99	99	97	95	97	91	91	102	9
	Min	52	50	52	57	63	68	66	68	68	63	55	52	50	9
Pinar del Río	Max	89	92	94	99	104	101	104	100	98	96	91	89	104	20
	Min	46	48	49	51	57	66	66	68	64	62	52	47	46	20
Santiago de Cuba	Max	90	90	92	93	94	95	97	96	97	95	93	93	97	16
	Min	57	59	58	57	65	62	67	68	67	67	61	55	55	16

FIGURE 23-31. MEAN RELATIVE HUMIDITY (%) AT SPECIFIED HOURS

STATION	HOUR (LST)	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
Batista Airfield	0700	91	91	87	85	83	84	85	87	86	92	89	91	88	3
	1300	59	53	53	53	53	59	57	61	59	66	60	60	58	3
	1900	80	75	75	73	72	78	79	81	88	88	83	82	80	3
Cabo San Antonio	0600	90	88	89	89	91	92	94	93	94	92	88	91	91	4-6
Camagüey	0700	94	93	89	87	84	87	87	89	91	88	90	92	89	2-3
	1300	55	47	45	47	51	55	54	54	57	63	62	60	54	2-3
	1900	84	76	73	75	80	81	78	81	85	88	87	87	81	2-3
Cienfuegos	0700	90	89	86	83	83	86	88	89	91	92	91	92	88	4-5
	1800	68	66	69	69	72	77	75	76	80	81	76	72	74	4-5
Guantanamo Bay NAS	0700	86	86	84	83	83	84	82	84	86	88	87	88	85	10
	1300	57	58	58	60	63	63	59	60	63	64	61	60	61	10
	1900	70	70	71	72	75	74	70	72	75	77	75	73	73	10
Havana	0700	87	84	86	84	88	89	90	90	92	89	85	87	88	6
Punta Maisí	0700	85	87	86	88	88	89	86	86	87	89	89	88	88	4-6

FIGURE 23-32. MEAN PRECIPITATION (INCHES)

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
Antilla	1.6	0.7	3.4	0.8	2.4	1.1	1.5	1.8	3.8	5.3	13.4	2.5	38.3	3-4
Baracoa	4.2	2.2	2.7	4.6	11.1	1.9	1.6	3.1	2.6	10.4	14.8	9.2	68.4	3-4
Camagüey	1.5	1.4	2.4	3.6	7.6	10.5	5.6	5.5	7.3	5.4	3.1	2.0	55.9	20
Camajuaní	2.1	1.1	1.5	2.9	6.4	9.3	5.2	5.4	6.4	7.1	4.9	2.8	55.1	21
Ceballos	1.0	0.8	1.5	3.4	8.3	8.3	5.4	6.4	7.3	8.3	2.6	0.9	54.2	19-20
Central Conchita	1.3	1.3	2.1	3.6	6.9	9.8	7.4	7.5	8.7	5.7	1.7	1.6	57.6	14-17
Central Constancia	0.9	1.2	1.4	2.9	7.9	9.2	6.1	8.0	8.8	7.4	1.4	0.9	56.1	23-30
Central Elia	0.7	0.8	1.7	4.0	9.5	7.7	6.4	8.0	8.3	6.5	2.9	0.9	57.4	28-29
Central Francisco	0.6	0.7	1.4	3.6	8.3	9.2	6.9	7.8	7.6	6.6	2.2	0.7	55.6	28-30
Central Hershey	3.0	2.1	1.8	2.6	4.9	5.9	5.0	5.0	6.2	7.9	3.4	2.1	49.9	29-30
Central Los Caños	0.4	1.2	1.0	2.3	4.2	2.7	1.9	3.8	4.8	7.2	2.1	1.1	32.7	23-27
Central Lugareño	1.9	0.9	1.4	3.4	7.2	6.1	4.0	3.9	4.7	6.5	4.6	1.8	46.4	24-27
Central Manatí	1.4	0.8	1.1	3.1	5.9	5.9	2.9	5.0	4.4	6.3	5.4	2.3	44.5	21-24
Central Morón	1.3	1.1	1.5	3.3	7.0	9.0	6.5	6.6	8.6	7.6	3.1	1.2	56.8	26-30
Central Preston	2.8	2.0	1.8	3.4	7.0	4.4	2.3	2.8	4.1	6.5	7.1	3.6	47.8	30-32
Central Río Cauto	0.7	0.6	0.9	3.1	9.5	7.8	5.5	6.8	6.6	5.3	2.1	0.7	49.6	25-28
Central Soledad	1.1	1.1	1.9	3.2	7.2	8.1	7.0	8.1	8.2	5.8	1.4	1.1	54.2	24-28
Cienfuegos	0.9	1.0	1.2	1.7	4.7	6.0	4.8	7.1	7.4	7.0	1.2	0.8	43.8	26-30
Ensenada de Mora	1.4	1.4	1.5	2.8	5.4	3.9	3.1	5.0	6.0	8.4	3.7	1.2	43.8	28-30
Gibara	2.5	1.3	1.4	2.2	5.4	3.4	1.8	2.6	3.7	7.0	7.3	2.9	41.5	28-30
Guane	1.7	1.5	1.8	2.0	5.5	7.6	5.5	7.3	8.0	7.0	1.5	1.0	50.4	30-31
Guantánamo	0.7	1.0	2.1	3.4	6.5	4.5	3.0	3.4	6.1	7.0	2.3	1.1	41.1	23
Havana	2.5	1.6	1.9	2.1	3.7	5.7	4.3	4.3	5.7	7.3	3.4	2.0	44.5	44
Herradura	1.5	1.2	2.3	2.9	5.7	9.4	4.8	5.5	7.6	8.7	2.1	1.3	53.0	15
Jatibonico	1.0	0.7	1.7	2.7	8.0	8.5	7.1	7.0	7.1	7.8	1.7	0.9	54.2	27-30
Madruga	1.1	1.2	2.3	3.3	7.1	10.9	7.5	8.7	9.3	5.7	1.9	1.6	60.6	16-17
Nueva Gerona	1.5	2.2	2.4	3.9	8.6	12.0	7.6	7.7	11.1	9.9	2.3	1.6	70.8	13
Nuevitas	1.7	1.2	2.1	2.0	7.1	4.9	3.1	3.2	3.4	7.5	3.8	2.6	42.6	4-5
Pinar del Río	1.8	1.7	2.5	2.6	7.0	10.3	6.6	7.0	10.7	7.7	2.5	1.4	61.8	25
Santiago de Cuba	1.5	0.9	1.7	3.3	6.4	5.4	2.3	3.6	6.7	7.4	3.6	1.1	43.9	21
Santiago de las Vegas	2.7	1.9	2.6	4.2	7.6	10.3	7.9	9.4	7.7	8.8	2.9	1.5	67.5	16-19

FIGURE 23-33. GREATEST AND LEAST PRECIPITATION (INCHES)

STATION		JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
Camagüey	Greatest	4.4	5.0	7.6	10.0	16.5	17.5	12.5	12.7	15.4	11.5	12.7	6.7	71.8	20
	Least	0.2	0.0	0.0	0.2	0.9	4.6	1.7	0.9	1.8	0.7	0.0	0.0	36.0	20
Camajuaní	Greatest	4.4	2.5	4.5	7.9	12.9	20.1	11.7	9.0	11.3	13.6	18.2	10.0	65.8	21
	Least	0.2	0.2	0.1	0.4	1.1	5.7	1.8	0.4	1.9	2.0	0.3	0.2	34.0	21
Ceballos	Greatest	3.5	4.9	7.0	12.6	17.8	19.8	11.4	14.4	12.6	16.0	6.2	6.6	72.4	19-20
	Least	0.1	0.0	0.0	0.1	3.2	2.9	2.1	1.2	0.7	2.8	0.1	*	38.8	19-20
Central Conchita	Greatest	3.0	4.0	6.3	7.8	16.6	17.0	12.9	21.7	16.3	12.0	6.6	4.1	74.5	14-17
	Least	0.0	0.0	0.0	0.4	2.6	3.7	2.1	3.4	2.6	1.3	0.1	0.0	45.0	14-17
Central Constancia	Greatest	4.1	5.4	6.5	5.8	20.3	22.8	12.1	23.9	17.8	20.0	4.6	3.5	84.0	23-30
	Least	0.0	0.0	0.0	0.0	1.8	0.4	0.0	1.8	0.0	0.0	0.0	0.0	30.5	23-30
Central Elia	Greatest	2.6	3.0	7.0	8.9	18.0	12.1	13.9	15.1	18.2	17.6	10.4	3.1	76.0	28-29
	Least	0.0	0.0	0.0	0.3	3.5	3.5	1.2	2.1	3.3	1.4	0.2	0.0	47.6	28-29
Central Francisco	Greatest	3.5	2.3	5.5	8.5	17.5	18.3	14.2	14.9	15.1	21.8	8.7	4.8	73.4	28-30
	Least	0.0	0.0	0.0	0.0	1.9	4.1	3.5	2.8	1.9	0.9	0.2	0.0	42.4	28-30
Central Hershey	Greatest	21.2	6.7	5.1	7.4	15.0	15.9	10.3	10.5	15.2	18.8	10.7	6.0	77.0	29-30
	Least	0.0	0.0	0.0	0.0	0.2	1.8	1.4	0.7	1.6	1.4	0.2	*	32.7	29-30
Central Los Caños	Greatest	1.8	8.0	3.8	5.7	20.8	18.8	6.9	19.7	13.8	18.5	9.9	5.3	59.4	23-27
	Least	0.0	0.0	0.0	0.3	0.8	0.0	0.1	0.2	0.6	2.2	0.1	0.0	21.4	23-27
Central Lugareño	Greatest	4.0	2.5	4.9	9.2	16.5	15.8	8.6	8.4	8.8	15.2	11.4	4.2	66.8	24-27
	Least	0.3	0.0	0.0	0.6	1.1	0.2	0.2	0.6	1.5	0.3	0.2	0.1	32.6	24-27
Central Manatí	Greatest	5.1	2.1	3.9	12.1	15.7	19.7	8.5	15.3	9.0	14.9	13.8	6.6	76.3	21-24
	Least	0.0	0.0	0.0	0.0	0.7	0.0	0.0	0.3	0.0	0.0	0.5	0.1	20.8	21-24
Central Morón	Greatest	4.9	5.3	5.2	16.6	16.4	20.4	14.2	12.7	19.6	14.0	11.8	6.4	87.6	26-30
	Least	0.0	0.0	0.0	0.0	2.2	1.0	2.7	2.0	1.9	0.7	0.4	0.0	36.7	26-30
Central Preston	Greatest	9.3	6.3	6.0	10.1	12.2	11.5	4.7	7.0	10.8	14.0	18.1	12.7	69.7	30-32
	Least	0.3	0.1	0.1	0.2	1.0	0.5	0.4	0.4	1.9	1.0	1.1	1.0	31.5	30-32
Central Río Cauto	Greatest	4.9	3.0	2.9	13.5	15.4	12.9	9.5	11.9	13.1	9.9	4.9	3.7	71.7	25-28
	Least	0.0	0.0	0.0	0.1	2.9	2.6	2.9	2.6	2.1	0.8	0.2	0.0	37.8	25-28
Central Soledad	Greatest	4.3	4.6	4.8	8.1	20.2	16.9	14.2	11.9	13.8	13.3	4.3	5.7	78.5	24-28
	Least	0.0	0.0	*	0.2	1.2	3.5	1.8	3.3	1.9	0.0	0.0	0.0	40.0	24-28
Cienfuegos	Greatest	4.2	3.4	5.3	3.9	13.5	20.2	8.9	14.1	17.8	19.5	5.4	3.4	77.9	26-30
	Least	0.0	0.0	0.0	0.0	0.5	1.5	1.2	2.6	0.0	0.0	0.0	0.0	23.9	26-30
Ensenada de Mora	Greatest	7.1	5.1	4.7	6.0	11.3	22.3	6.7	18.1	17.1	22.2	8.1	5.6	73.2	28-30
	Least	0.0	0.0	*	0.8	1.2	0.7	0.6	1.5	1.2	1.0	0.1	0.1	29.5	28-30
Gibara	Greatest	7.4	5.0	5.4	8.1	14.9	9.8	5.8	6.9	8.6	18.3	21.7	8.6	60.1	28-30
	Least	0.4	0.0	*	*	0.9	*	0.2	0.4	0.7	0.3	0.8	0.4	26.8	28-30
Guane	Greatest	4.8	3.6	9.4	7.9	14.5	17.7	15.1	18.7	15.7	23.1	5.3	4.3	67.8	30-31
	Least	0.1	*	*	*	1.0	0.9	1.3	1.9	3.6	0.8	*	0.0	31.5	30-31
Havana	Greatest	17.8	5.0	5.4	5.7	16.7	16.7	7.6	11.6	10.9	26.3	16.5	6.0	71.0	44
	Least	*	0.0	*	0.0	0.0	0.9	0.9	1.0	0.7	0.3	0.5	0.1	25.2	44
Jetibonico	Greatest	3.5	3.4	6.6	6.8	16.5	15.3	12.0	12.0	18.7	16.1	6.3	5.1	79.0	27-30
	Least	0.0	0.0	0.0	0.0	1.3	2.4	2.5	0.0	2.0	1.1	0.1	0.0	35.8	27-30
Madruga	Greatest	2.8	4.0	9.8	8.9	18.4	25.0	11.5	15.6	15.1	10.6	6.7	5.8	75.4	16-17
	Least	0.0	0.0	0.0	0.7	1.1	4.8	4.5	3.4	2.8	0.9	0.3	0.1	39.7	16-17
Nueva Gerona	Greatest	4.4	8.3	4.3	8.9	16.9	20.1	14.4	12.9	16.0	26.3	11.2	5.1	84.6	13
	Least	0.0	0.0	0.0	0.6	2.6	6.0	3.2	4.1	4.5	3.0	0.0	0.0	40.6	13
Pinar del Río	Greatest	7.4	4.7	7.9	6.7	15.2	23.7	12.1	14.4	24.5	27.0	21.6	7.5	84.7	25
	Least	0.0	0.0	0.2	0.1	2.0	2.8	3.4	2.1	1.0	1.4	0.2	0.0	39.8	25
Santiago de Cuba	Greatest	4.0	2.6	3.6	10.9	12.0	15.4	9.8	8.7	29.5	19.1	11.8	3.0	66.9	21
	Least	*	0.0	0.0	0.0	0.1	*	0.1	0.2	1.4	2.7	*	0.0	21.8	21
Santiago de las Vegas.	Greatest	7.5	6.2	7.8	12.4	19.5	27.0	12.1	16.4	14.1	20.9	10.1	6.8	94.3	16-19
	Least	0.5	0.0	*	0.3	1.1	3.2	3.0	4.8	3.0	2.0	0.5	0.0	40.5	16-19

* <0.05 inch.

FIGURE 23-34. MAXIMUM 24-HOUR PRECIPITATION (INCHES)

STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
Camagüey	2.0	2.6	*11.8	4.6	6.1	4.9	4.2	4.4	4.1	4.3	7.7	3.4	11.8	17
Camajuaní	1.3	1.3	1.8	2.9	3.8	5.1	2.7	3.3	3.4	4.2	8.7	2.7	8.7	17
Havana	6.8	3.1	2.6	3.7	5.6	5.8	3.7	3.7	3.5	20.1	8.0	2.7	20.1	33
Nueva Gerona	1.9	3.5	3.5	4.6	3.7	4.5	2.5	3.6	6.9	6.4	3.9	2.8	6.9	10
Pinar del Río	3.5	2.8	5.2	2.8	5.0	5.2	2.2	3.6	12.7	8.5	18.0	4.0	18.0	19
Santiago de Cuba	3.5	1.0	1.6	3.9	4.5	7.3	6.2	4.4	14.3	8.6	5.1	2.1	14.3	16

* This 24-hour maximum occurred at a time not included in period of record shown in FIGURE 23-33.

FIGURE 23-35. MEAN NUMBER OF DAYS WITH PRECIPITATION ≧0.01 INCH

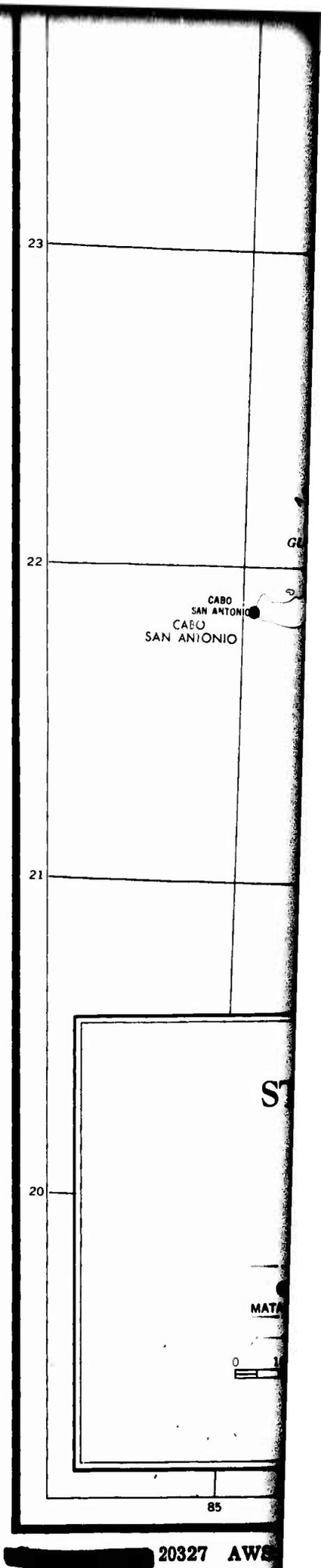
STATION	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	ANN	YRS REC
Antilla	5	3	3	2	6	6	4	5	8	8	12	8	70	3-4
Baracoa	7	7	3	4	11	7	5	8	8	13	16	9	98	3-4
Camagüey	5	8	6	6	12	15	11	11	13	13	9	5	114	18
Camajuaní	7	4	5	6	11	14	11	10	14	15	10	8	115	20
Ceballos	5	3	3	7	13	14	11	11	14	13	8	3	105	17-19
Central Conchita	3	3	4	6	11	15	15	13	17	9	3	3	102	14-17
Central Elia	3	2	3	7	13	13	13	12	14	10	7	3	100	25-29
Central Francisco	3	3	4	7	13	14	14	15	15	11	6	3	108	26-30
Central Hershey	5	4	4	5	7	10	10	9	11	12	7	5	89	22-24
Central Lugareño	4	3	3	5	9	8	6	8	10	11	10	6	83	16-17
Central Manatí	4	3	3	4	9	6	4	6	9	10	9	5	72	13-17
Central Morón	4	3	3	5	10	11	9	10	12	11	6	3	87	23-27
Central Preston	11	8	6	8	16	14	13	13	17	17	16	13	152	23-27
Central Río Cauto	2	1	2	5	13	12	11	11	12	9	5	2	85	18-21
Central Soledad	3	3	4	5	12	14	14	15	15	9	5	3	102	16-21
Cienfuegos	2	3	3	4	9	12	11	13	14	10	3	2	86	24-28
Ensenada de Mora	4	5	6	9	13	9	8	11	13	15	8	5	106	25-30
Gibara	9	5	4	5	11	8	7	7	10	13	14	11	104	28-30
Guane	4	3	3	4	9	10	9	12	13	11	3	3	84	28-31
Havana	6	5	5	6	8	11	10	11	13	12	9	6	102	44
Jatibonico	3	3	3	5	12	15	12	12	15	12	5	3	100	21-27
Madruga	3	3	4	5	9	15	15	14	16	11	5	4	104	15-17
Neuva Gerona	3	4	5	6	12	17	14	14	16	14	3	3	111	12
Nuevitas	9	4	4	4	10	9	8	9	9	16	9	9	100	4-5
Pinar del Río	4	4	5	4	11	14	13	13	14	11	4	3	100	23
Santiago de Cuba	4	3	4	6	10	10	8	10	11	14	7	5	92	17
Santiago de las Vegas	5	4	4	6	11	14	13	14	14	11	6	3	105	12-16

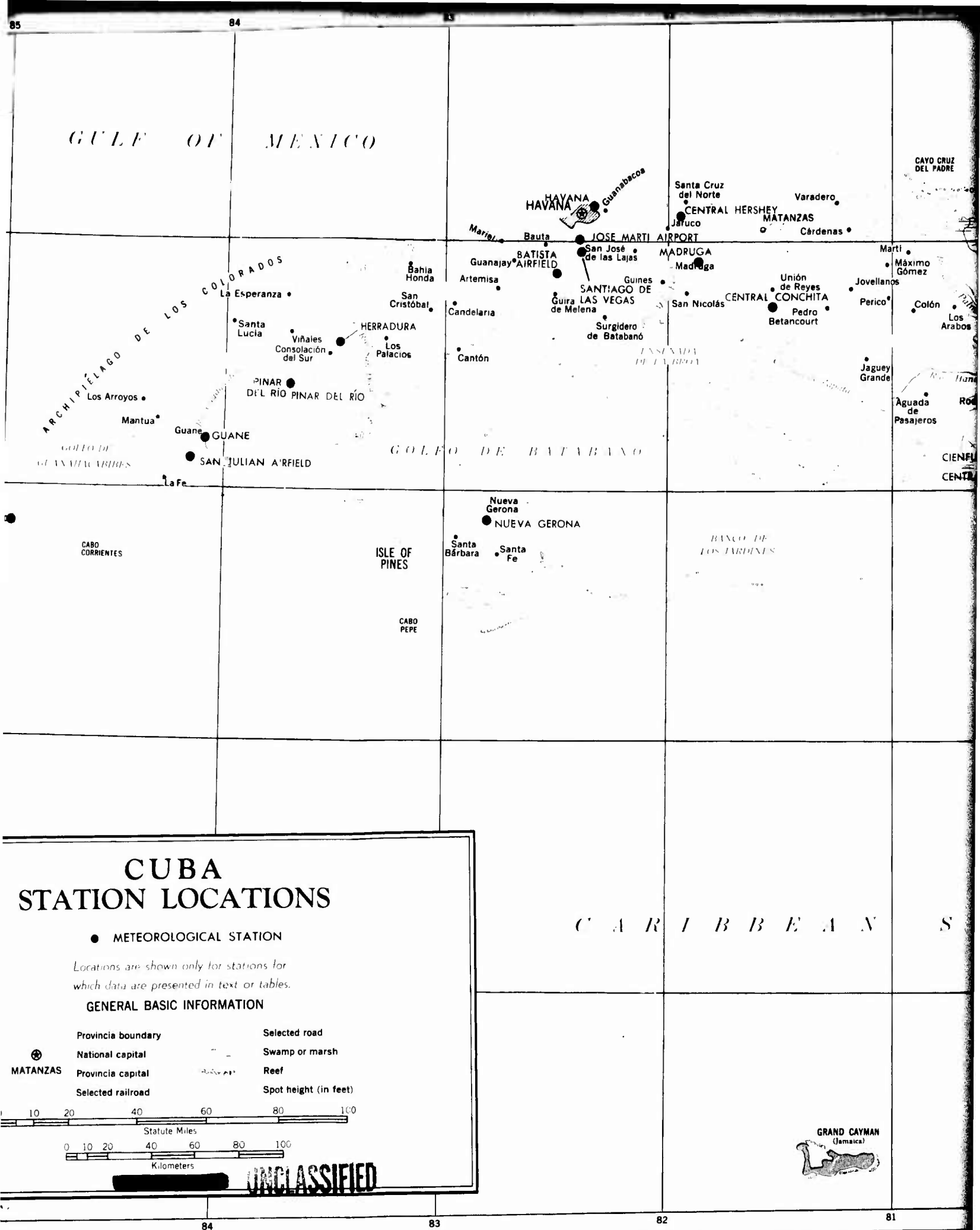
LIST OF STATIONS

STATION	LATITUDE*	LONGITUDE*	ELEVATION
	° 'N.	° 'W.	*feet*
Antilla	20 50	75 43	10
Baracoa	20 22	74 30	50
Batista Airfield	22 53	82 30	156
Bayamo	20 27	76 38	330
Cabo San Antonio	21 52	84 58	29
Camagüey	21 25	77 52	402
Camajuaní	22 35	79 48	325
Ceballos	21 56	78 45	149
Central Conchita	22 45	81 32	*n a*
Central Constancia	22 14	80 33	*n a*
Central Elia	20 58	77 27	*n a*
Central Francisco	20 48	77 35	9
Central Hershey	23 07	81 56	318
Central Los Caños	20 03	75 08	*n a*
Central Lugareño	21 35	77 29	*n a*
Central Manatí	21 19	76 57	*n a*
Central Morón	22 01	78 43	*n a*
Central Preston	20 45	75 40	39
Central Rio Cauto	20 32	76 55	*n a*
Central Soledad	22 07	80 20	58
Cienfuegos	22 09	80 27	98
Ensenada de Mora	19 53	77 20	*n a*
Gibara	21 07	76 08	33
Guane	22 11	84 05	*n a*
Guantánamo	20 08	75 12	*n a*
Guantanamo Bay NAS	19 54	75 09	54
Havana	23 09	82 20	161
Herradura	22 36	83 29	*n a*
Holguín	20 53	76 16	350
Jatibonico	21 56	79 11	*n a*
Jose Marti Airport	23 01	82 24	225
Madruga	22 55	81 52	*n a*
Nueva Gerona	21 53	82 48	200
Nuevitas	21 33	77 16	10
Omaja	20 51	76 45	275
Pinar del Rio	22 25	83 42	180
Punta Maisí	20 16	74 09	21
San Julian Airfield	22 08	84 09	186
Santiago de Cuba	20 02	75 51	118
Santiago de las Vegas	22 58	82 23	*n a*

n a Data not available.

* Coordinates give locations of weather stations and do not necessarily correspond to those for populated places.





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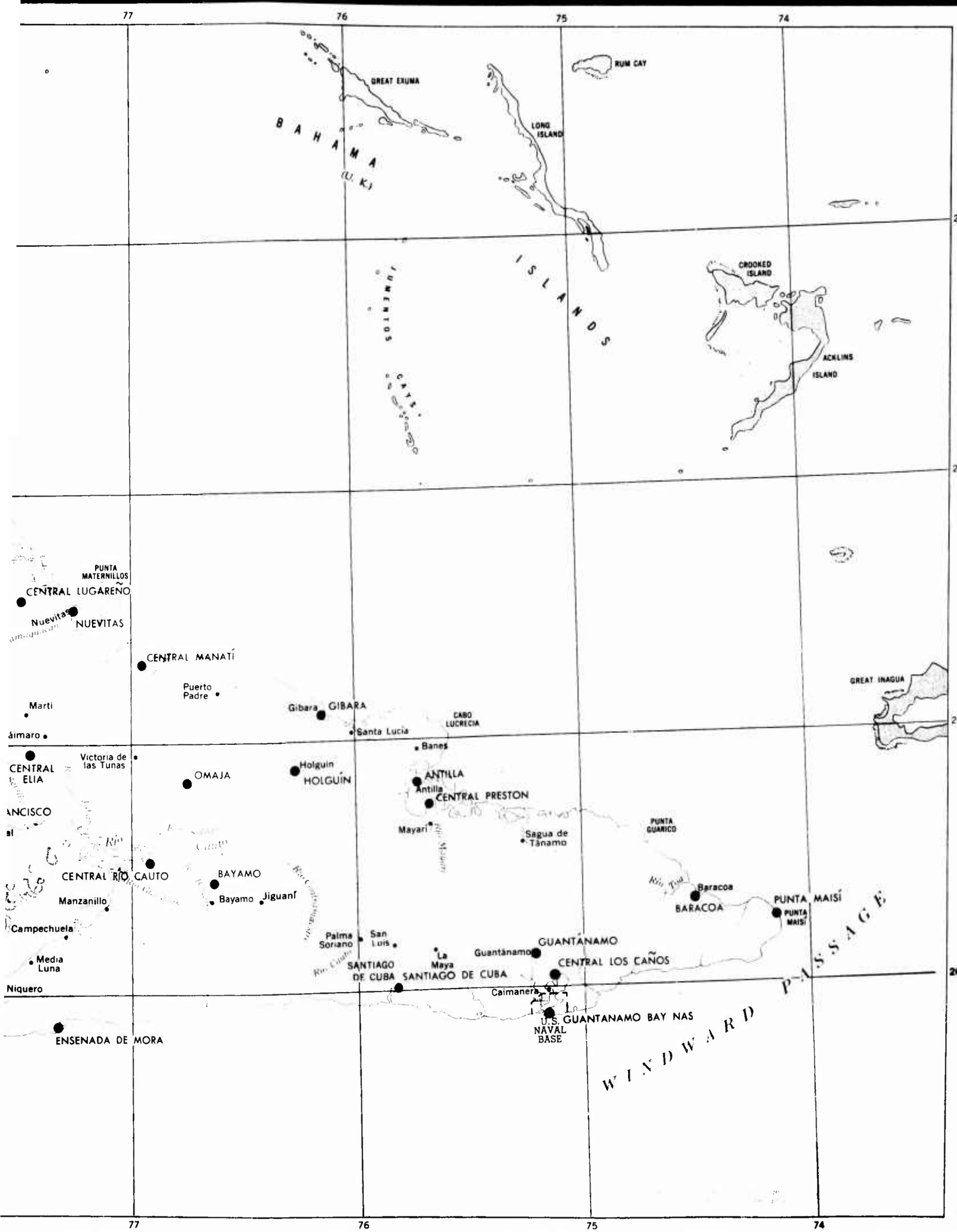
ANDROS ISLAND
CAY SAL
ANGUILLA CAYS
CAYO BLANQUIZAL
Corralillo
La Isabela
CAYOS DEL PAJONAL
Quemado de Guines
Sagua la Grande
CAYO SANTA MARIA
Encrucijada
CAMAJUANÍ
Esperanza
Remedios
Caibarién
CAYO COCO
Camajuani
Lajas
SANTA CLARA
Rodas
Yaguajay
Cruces
CENTRAL CONSTANCIA
Palmira
Placetas
Cienfuegos
Fomento
Cabaiguán
Morón
CENTRAL MORÓN
CEBALLOS
Sancti Spiritus
JATIBONICO
Jatibonico
Ciego de Ávila
Esmeralda
Trinidad
PUNTA MATERNILLOS
CENTRAL LUGARENO
Júcaro
Tunas de Zaza
Florida
Nuevitas
NUEVITAS
CAMAGUEY
o CAMAGUEY
CENTRAL MANATÍ
Puerto Padre
Marti
Guáimaro
Victoria de las Tunas
CENTRAL ELIA
OMAJA
CENTRAL FRANCISCO
Santa Cruz del Sur
Guayabal
CENTRAL RÍO CAUTO
BAYAMO
Bayamo
Manzanillo
Campechuela
Media Luna
Niquero
CABO CRUZ
ENSENADA DE MORA
JARDINES DE LA REINA
LESSER CAYMANS
(Jamaica)


77
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GREAT EXUMA
RUM CAY
LONG ISLAND
BAHAMA (U.K.)
CROOKED ISLAND
ACKLINS ISLAND
ISLANOS
JUMENTOS
CAYS
PUNTA MATERNILLOS
CENTRAL LUGAREÑO
Nuevitas
NUEVITAS
CENTRAL MANATÍ
Puerto Padre
Marti
Gibara
GIBARA
Santa Lucia
CABO LUCRECIA
GREAT INAGUA
Victoria de las Tunas
CENTRAL ELIA
OMAJA
Holguin
HOLGUÍN
Banes
ANTILLA
Antilla
CENTRAL PRESTON
Mayari
Sagua de Tánamo
PUNTA GUARICO
CENTRAL RIO CAUTO
BAYAMO
Bayamo
Jiguaní
Manzanillo
Campechuela
Media Luna
Niquero
Palma Soriano
San Luis
La Maya
SANTIAGO DE CUBA
SANTIAGO DE CUBA
GUANTÁNAMO
Guantánamo
CENTRAL LOS CAÑOS
Caimanera
U.S. GUANTANAMO BAY NAS
NAVAL BASE
Baracoa
BARACOA
PUNTA MAISÍ
PUNTA MAISÍ
PASSAGE
WINDWARD
ENSENADA DE MORA