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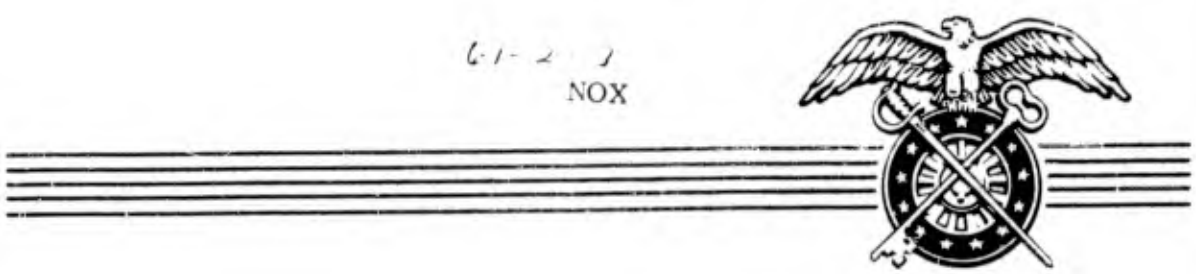
TECHNICAL REPORT
EP-142

Canal Zone Analogs X

ANALOGS OF CANAL ZONE CLIMATE IN THE PACIFIC ISLANDS



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NATICK, MASSACHUSETTS

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ANALOGS OF CANAL ZONE CLIMATE IN THE PACIFIC ISLANDS

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FOREWORD

A SUCCESSFUL RESEARCH, DEVELOPMENT, OR TRAINING PROGRAM REQUIRES A KNOWLEDGE OF THE EXTENT OF ENVIRONMENTAL REPRESENTATIVENESS OF TEST SITES AND TRAINING AREAS. THE QUARTERMASTER CORPS, AT THE REQUEST OF THE CORPS OF ENGINEERS, WATERWAYS EXPERIMENT STATION, UNDER A DIRECTIVE FROM THE U.S. ARMY GENERAL STAFF, IS DEVELOPING A GENERALIZED, COMPARATIVE, CLIMATIC PICTURE OF THE WET TROPICS THROUGHOUT THE WORLD BY A SERIES OF TROPICAL ANALOG STUDIES. THE SERIES PARALLELS TWO SERIES ALREADY COMPLETED COMPARING YUMA, ARIZONA, WITH THE VARIOUS DESERT REGIONS OF THE NORTHERN HEMISPHERE, AND FORT GREELY, ALASKA, AND FORT CHURCHILL, CANADA, WITH THE SUBARCTIC REGIONS OF NORTH AMERICA AND EURASIA.

THIS IS THE TENTH AND FINAL REPORT OF THE TROPICAL SERIES. IT COMPARES THE CANAL ZONE CLIMATE WITH THAT OF THE PACIFIC ISLANDS, AND BY SO DOING PROVIDES A CLIMATIC REFERENCE FOR MILITARY PLANNERS AND TEST PERSONNEL.

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CONTENTS

	Page
Abstract	iv
1. Purpose and scope	1
2. Delimitation and geography of the Pacific Islands	1
3. Climatic summary of the Canal Zone	5
4. Criteria and methods	7
5. Analysis of single-element maps	9
6. Analysis of composite maps	15
7. Tables of monthly values	16
8. Bibliography	26
9. Acknowledgments	27
10. Maps	28
Addenda and errata for maps	29

ABSTRACT

The climate of the Pacific Islands is compared with that of two localities in the Canal Zone: Balboa Heights, representing the drier, leeward, Pacific side of the Isthmus of Panama, and Cristobal, representing the wetter, windward, Atlantic side. Distribution of areas of analogy of pertinent climatic elements and combinations of these elements are shown on maps.

The temperatures of most of the Pacific area are greatly modified by the warm ocean currents. Only on the mountainous islands do the temperatures vary greatly within short vertical distances from the lowlands to the highlands. The windward slopes of the mountainous islands are the wettest areas to be found in the Pacific area. Relative humidities are high in general because of the nearness of large water areas. Cloudiness is greatest near the "heat equator" and over the ocean areas. Windspeeds are steady but not excessive in the Pacific area.

Complete 4-way analogy with both Canal Zone stations occurs in parts of the Fiji and Society Islands. Parts of the Marshall Islands are analogous to Balboa Heights and parts of the Marquesas Islands are analogous to Cristobal. The Gilbert Islands are too hot, and the Palau Islands are too wet for complete 4-way analogy. Many of the Pacific Islands have insufficient rainfall to be analogous to either Balboa Heights or Cristobal. Of the climatic elements used, the single most limiting element is the mean temperature for the coldest month. The higher slopes of the volcanic islands are too cold in winter to be analogous to either Canal Zone station. The lee exposure of Honolulu, Hawaii, is the only place analogous outside of the zone north of 20°N or south of 20°S latitude.

ANALOGS OF CANAL ZONE CLIMATE IN THE PACIFIC ISLANDS

1. Purpose and scope

This report is the tenth and last study of a series comparing the climate of other tropical regions with that of Cristobal and Balboa Heights, Canal Zone. These two stations were selected to represent the climates of the Atlantic and Pacific portions of the Canal Zone, respectively. The environment of Cristobal is described in a previous report (Wiley and others, 1955).

No attempt has been made to provide a regional climatology of the Pacific Islands. Instead, the method has been to select certain climatic elements that are considered particularly significant and, for each of these, to map the areas within the region considered closely analogous to either Balboa Heights or Cristobal. Some of the information presented on these maps of single climatic elements has been consolidated into two composite maps, one for each of the two Canal Zone Stations, indicating the coincidence of analogy for 1 to 4 elements. In the Pacific Islands only the Hawaiian and Fiji Islands were selected as being large enough to be shown on these two composite maps without taking in large areas of the Pacific Ocean.

2. Delimitation and geography of the Pacific Islands

The Pacific Islands, as defined for this study, include most of the islands and island groups of the Pacific Ocean within 30°N and S of the Equator and between the Galapagos Islands in the eastern Pacific and the Palau Islands in the western Pacific. New Guinea and the Solomon Islands, although in this region, were covered in a previous study, Analogs of Canal Zone Climate in Australia and New Guinea, and therefore are excluded.

A. Topography

In general, the eastern Pacific has almost no islands, whereas the western Pacific is characterized by numerous islands. Typically, the islands rise from submarine platforms of lava as volcanic cones or coral atolls. Thus, the islands of the Pacific are either very mountainous or very flat and low-lying, the only exceptions being a few which are composites of both primary types.

There are about 559 Pacific Islands (not including the thousands of tiny islets). The total land area is approximately 32,536 square miles. For convenience, in this report the Pacific is divided into six regions: the southeastern, the central, the northeastern, the western, the northwestern, and the southwestern Pacific.

The following alphabetized index gives the regional location of each of the island groups (single islands are in parentheses) mentioned in the

DISCUSSION OF TOPOGRAPHY, ACCORDING TO THE REGIONAL AREA OF THE PACIFIC. THIS INDEX MAY BE USEFUL IN FOLLOWING THE DISCUSSION OF THE INDIVIDUAL MAPS (PARAGRAPHS 5 AND 6).

BANKS	SW	LOYALTY	SW	PITCAIRN	SE
BONIN	NW	MARIANA	W	SAMOA	CEN
CAROLINE	W	MARQUESAS	SE	SANTA CRUZ	SW
COOK	CEN	MARSHALL	W	SOCIETY	SE
DUKE OF GLOUCESTER	SE	(NAURU	W)	TOKELAU	CEN
ELLICE	CEN	NEW CALEDONIA	SW	TONGA	CEN
FIJI	SW	NEW HEBRIDES	SW	TUAMOTU	SE
GALAPAGOS	SE	(NIUE	CEN)	TUBUAI	SE
GILBERT	W	(NORFOLK	SW)	VOLCANO	NW
HAWAIIAN	NE	(OCEAN	W)	WALLIS &	
LINE	CEN	PALAU	W	FUTUNA	CEN
		PHOENIX	CEN		

THE TOPOGRAPHY OF THE 6 REGIONS IS DISCUSSED BELOW.

SE PACIFIC. IN THE SOUTHEASTERN PACIFIC THERE ARE 133 MAJOR ISLANDS TOTALING 4,371 SQUARE MILES. INCLUDED ARE THE FOLLOWING ISLAND GROUPS:

DUKE OF GLOUCESTER	PITCAIRN
GALAPAGOS	SOCIETY
MARQUESAS	TUAMOTU
TUBUAI	

THERE ARE 110 FRENCH ISLANDS (MARQUESAS, SOCIETY, TUAMOTU AND TUBUAI), WITH A TOTAL LAND AREA OF 1,450 SQUARE MILES. TAHITI IN THE SOCIETY ISLANDS HAS THE HIGHEST ALTITUDE OF ANY OF THE ISLANDS IN THE SE PACIFIC, WITH AN ELEVATION OF 7,321 FEET. THE DUKE OF GLOUCESTER ISLANDS AND THE 4 ISLANDS IN THE PITCAIRN COLONY ARE SMALL, THE PITCAIRN ISLANDS TOTALLING APPROXIMATELY 6 SQUARE MILES. THE 18 GALAPAGOS ISLANDS (BELONGING TO ECUADOR), EXCLUSIVE OF NUMEROUS ROCKS AND ISLETS, CONTAIN APPROXIMATELY 2,870 SQUARE MILES. ALBERMARLE (OR ISABELLA), THE LARGEST IN THE GROUP, HAS AN AREA OF APPROXIMATELY 900 SQUARE MILES AND A MAXIMUM ELEVATION OF 5,620 FEET.

CEN PACIFIC. IN THE CENTRAL PACIFIC REGION THERE ARE 224 ISLANDS, TOTALING 2,038 SQUARE MILES. THE REGION INCLUDES THE FOLLOWING GROUPS:

COOK	SAMOA (AMERICAN & WESTERN)
ELLICE	TOKELAU
LINE	TONGA
PHOENIX	WALLIS & FUTUNA

AND THE FOLLOWING INDIVIDUAL ISLAND:

NIUE (SSE OF SAMOA)

THE TONGA GROUP HAS THE LARGEST NUMBER OF ISLANDS, 160, BUT IT HAS A TOTAL AREA OF ONLY 269 SQUARE MILES. IN CONTRAST, WESTERN SAMOA IS COMPOSED OF ONLY 4 ISLANDS, BUT THEY COVER 1,138 SQUARE MILES. SAVII, THE LARGEST ISLAND, WITH AN AREA OF 703 SQUARE MILES, HAS A PEAK ELEVATION OF 6,094 FEET.

NE PACIFIC. THE NORTHEASTERN PACIFIC REGION COMPRISES 20 ISLANDS, WHICH TOTAL 6,443 SQUARE MILES IN AREA. THE AREA OF THE 8 LARGEST ISLANDS TOTALS 6,435 SQUARE MILES. INCLUDED IS THE FOLLOWING ISLAND GROUP:

HAWAIIAN

ALSO INCLUDED ARE NUMEROUS LOW ATOLLS, ISLETS, REEFS AND SHOALS, (FOR EXAMPLE: KAULA, NIHOA, NECKER, FRENCH FRIGATE SHOAL, GARDNER PINNACLES, LAYSAN, LISIANSKI, PEARL AND HERMES REEF, MIDWAY AND KURE ISLAND). THE ISLAND OF HAWAII, THE LARGEST IN THE HAWAIIAN GROUP, IS 4,030 SQUARE MILES IN AREA, AND HAS A PEAK ELEVATION OF 13,784 FEET.

W PACIFIC. IN THE WESTERN PACIFIC REGION, THE 129 LARGE ISLANDS COVER APPROXIMATELY 1,054 SQUARE MILES OF LAND AREA. THEY INCLUDE THE FOLLOWING GROUPS:

CAROLINE
GILBERT
MARIANA
MARSHALL
PALAU

AND THE 2 ISLANDS:

NAURU
OCEAN

LOCATED WEST OF THE GILBERTS.

THE CAROLINE GROUP INCLUDES 60 ISLANDS WHOSE TOTAL AREA IS 461 SQUARE MILES. THE MARIANAS ARE 17 ISLANDS WHOSE TOTAL AREA IS 399 SQUARE MILES. GUAM, THE LARGEST ISLAND OF THIS GROUP, HAS OVER HALF THE LAND AREA, WITH 216 SQUARE MILES. THE MARSHALLS AND GILBERTS ARE CORAL ATOLLS, RANGING IN SIZE FROM APPROXIMATELY 1 SQUARE MILE TO NEARLY 850 SQUARE MILES. THE MARSHALLS ARE A GROUP OF 34 ISLANDS WHOSE LAND AREA IS 70 SQUARE MILES. KWAJELEIN, THE LARGEST ISLAND IN THE MARSHALLS, IS 6 SQUARE MILES IN AREA. THE GILBERTS INCLUDE 16 ISLANDS, WHICH OCCUPY 114 SQUARE MILES OF LAND AREA.

NW PACIFIC. IN THE NORTHWEST PACIFIC REGION THERE ARE 19 ISLANDS WHOSE TOTAL LAND AREA IS APPROXIMATELY 39 SQUARE MILES. THE REGION INCLUDES:

BONIN
VOLCANO

There are 16 Bonin Islands, with a total area of 28 square miles. Chichi Shima, the largest island, has approximately 10 square miles of land area. There are only 3 Volcano Islands, and they have 11 square miles of land area; Iwo Jima, the largest, has approximately 8 square miles.

SW Pacific. In the southwestern Pacific there are 34 large islands, covering approximately 18,591 square miles of land area. The region includes the following island groups:

Banks	New Caledonia
Fiji	New Hebrides
Loyalty	Santa Cruz

and the island of Norfolk.

The Fijis, the largest group, is composed of 7 large islands, which total 6,661 square miles of land. Viti Levu, with 4,053 square miles of land, and Vanua Levu, with 2,137 square miles, are the principal islands of this group. The New Hebrides has 14 large islands and 3,590 square miles of land. Santo, the largest island of the group, has 1,500 square miles of land and a peak elevation of 6,195 feet. There are 3 Loyalty Islands, with a total of 800 square miles of land area. New Caledonia, the largest island in the study area, has a total of 6,200 square miles. There are 5 small islands associated with New Caledonia that total 800 square miles. The Santa Cruz Islands have 350 square miles and the 7 islands of the Banks group have 190 square miles of land area.

B. Major climatic controls

Major influences on the climate of the Pacific Islands are the general circulation of the atmosphere, the currents of the Pacific Ocean, and the orographic effect of the mountains.

The northeast and southeast trade-wind belts are regions of fairly strong and steady winds. The southeast trade belt extends from about latitude 25°S to 5°N, and the northeast trade belt is generally between 5° and 25°N. The general area where the trade wind belts meet is known as the doldrums, or the zone of intertropical convergence. In this 200- to 300-mile-wide zone, astride or near the Equator, winds are light and variable, cloudiness is generally heavy, and thunderstorms are frequent. At both poleward sides of the trade-wind belts, owing to subsidence of cooler air into semipermanent high pressure cells, weather conditions are generally fair. In the western Pacific the trade winds are considerably modified by the Asian monsoon. In the northern summer, when the monsoon blows landward, the trade winds tend to be intensified. In winter they

TEND TO BE OVERSHADOWED BY THE SEAWARD FLOW. IN BOTH CASES THE NORMAL SOUTHEAST AND NORTHEAST DIRECTIONS ARE SOMEWHAT CHANGED BY THE INFLUENCE OF THE MONSOON.

THE CLIMATE IN THE PACIFIC REGION IS GREATLY MODIFIED BY THE OCEAN CURRENTS. THE WARM EQUATORIAL CURRENT FLOWS WESTWARD BOTH NORTH AND SOUTH OF THE DOLDRUMS. WHEN THIS CURRENT REACHES THE ISLANDS OF THE WESTERN PACIFIC THE WATER PILES UP AND DIVIDES; PART IS DEFLECTED NORTH TO FEED THE NORTH PACIFIC DRIFT, AND PART RETURNS EASTWARD THROUGH THE DOLDRUMS TO FORM THE EQUATORIAL COUNTERCURRENT. THE EQUATORIAL CURRENT AND EQUATORIAL COUNTERCURRENT ARE WARM AND STEADY IN THEIR FLOW. THE HUGE MASS OF THE PACIFIC OCEAN AND ITS WARMTH PREVENT LOW TEMPERATURES ON ALL BUT THE HIGHEST MOUNTAINS IN THE ISLANDS.

BECAUSE THE MOUNTAINS ON SOME ISLANDS ACT AS BARRIERS AND FORCE THE MOIST TRADE WINDS TO RISE AND COOL, THE WINDWARD SIDES OF THESE MOUNTAINOUS ISLANDS ARE VERY WET, WHILE THE LEE SIDES OF THE ISLANDS ARE COMPARATIVELY HOT AND DRY. THUS, THE CLIMATE OF THE MOUNTAINOUS ISLANDS MAY VARY CONSIDERABLY WITHIN SHORT VERTICAL AND HORIZONTAL DISTANCES, WHILE THE LOW FLAT ISLANDS ARE FAIRLY DRY AND UNIFORM IN THEIR CLIMATE.

3. Climatic summary of the Canal Zone

THE PACIFIC PORTION OF THE CANAL ZONE, REPRESENTED BY BALBOA HEIGHTS, HAS A MODERATELY HUMID, TROPICAL CLIMATE WITH A RELATIVELY DRY SEASON OF FOUR MONTHS (FIG. 1). THE DIFFERENCE IN MEAN MONTHLY TEMPERATURES OF THE WARMEST AND COLDEST MONTHS IS ONLY 2F°, AND THE RANGE FROM THE HIGHEST MEAN DAILY MAXIMUM (MARCH AND APRIL, 90°F) TO THE LOWEST MEAN DAILY MINIMUM (FEBRUARY, 71°F) IS ONLY 19F°. THE MEAN ANNUAL TEMPERATURE OF 79°F IS TYPICAL OF EQUATORIAL AREAS. PRECIPITATION, AVERAGING 70 INCHES ANNUALLY, IS MARKEDLY SEASONAL. TWO MONTHS, FEBRUARY AND MARCH, HAVE LESS THAN 1 INCH OF RAINFALL, AND 5 MONTHS HAVE MORE THAN 8 INCHES. THE DRY SEASON BEGINS IN DECEMBER AND ENDS IN APRIL. RAINFALL DURING THE REMAINING MONTHS IS MORE THAN 7 INCHES; OCTOBER AND NOVEMBER BOTH HAVE MORE THAN 10 INCHES. RELATIVE HUMIDITY IS HIGH FROM JUNE THROUGH NOVEMBER. CLOUDINESS IS AT A MAXIMUM FROM MAY THROUGH NOVEMBER, COINCIDING WITH THE WET SEASON; SKY COVERAGE AVERAGES ABOUT 8 TENTHS AT BALBOA HEIGHTS AT THAT SEASON. WINDSPEED, HOWEVER, IS GREATEST DURING THE DRY SEASON; WINDS AVERAGE 9 TO 10 MPH AT BALBOA HEIGHTS FROM JANUARY THROUGH APRIL, BUT ONLY ABOUT 5 TO 6 MPH IN THE OTHER MONTHS. SOUTHEASTWARD TOWARD THE COAST, THERE IS A SLIGHT DECREASE IN RAINFALL AND AN INCREASE IN TEMPERATURE, AS ELEVATION DROPS TO SEA LEVEL FROM 118 FEET AT BALBOA HEIGHTS.

THE ATLANTIC PORTION OF THE CANAL ZONE, REPRESENTED BY CRISTOBAL, HAS A WET-TROPICAL CLIMATE (FIG. 1). THE DIFFERENCE IN MEAN TEMPERATURES OF THE WARMEST AND COOLEST MONTHS IS ONLY 2F°, AND THE RANGE FROM THE

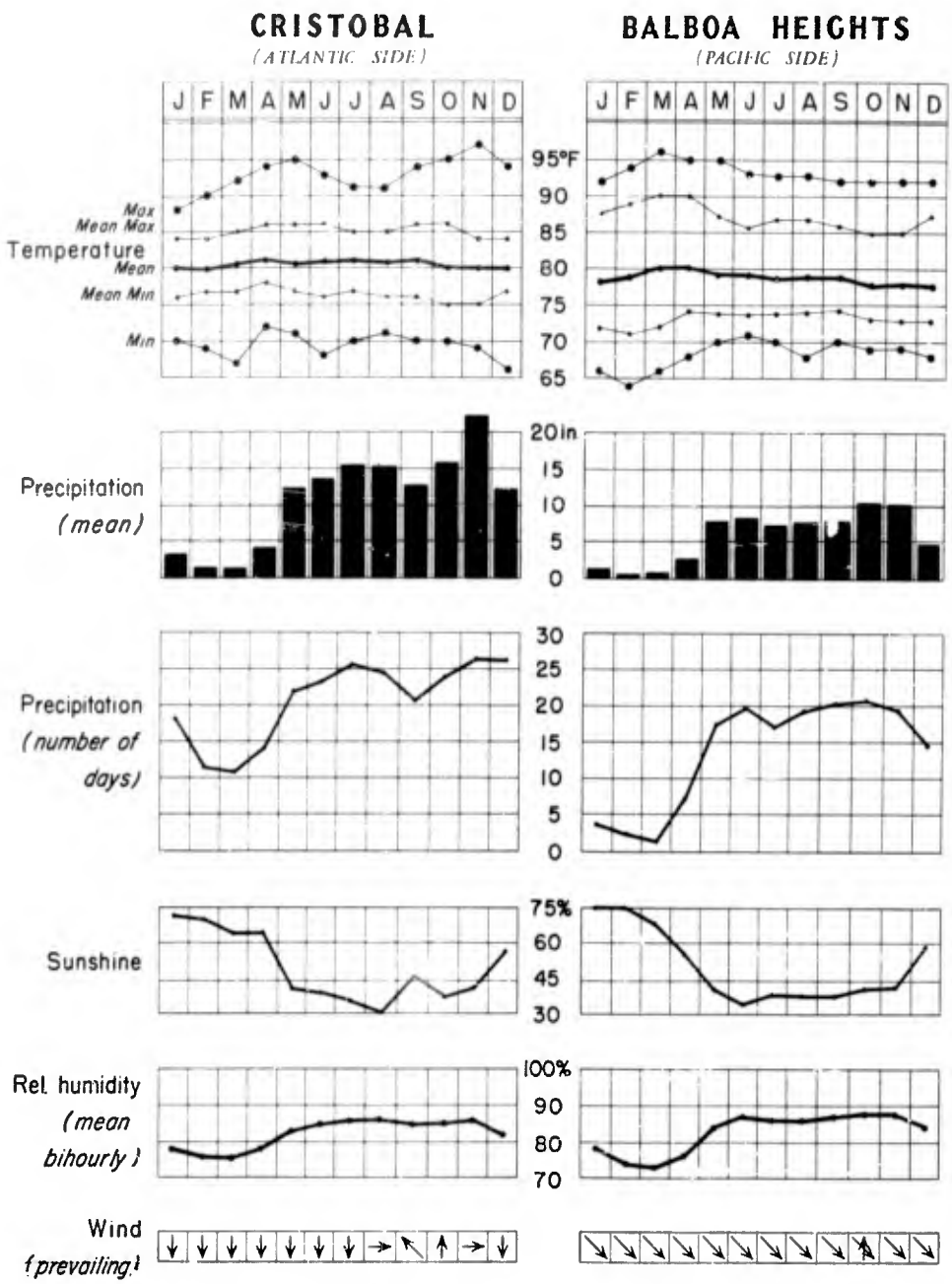

Figure 1. Climatic Summary of 2 Canal Zone stations

HIGHEST MEAN DAILY MAXIMUM (APRIL, MAY, JUNE, SEPTEMBER, AND OCTOBER, 86°F) TO THE LOWEST MEAN DAILY MINIMUM (OCTOBER AND NOVEMBER, 75°F) IS ONLY 11F°. THE MEAN ANNUAL TEMPERATURE OF 81°F IS TYPICAL OF EQUATORIAL AREAS. PRECIPITATION AVERAGES 130 INCHES A YEAR, AND THE MONTHLY DISTRIBUTION IS UNEVEN. ALTHOUGH NO MONTH CAN BE CONSIDERED COMPLETELY DRY, 2 MONTHS HAVE LESS THAN 2 INCHES OF RAINFALL, WHILE 8 MONTHS HAVE MORE THAN 11 INCHES. THE "DRY" SEASON AT CRISTOBAL BEGINS IN JANUARY (3.4 INCHES) AND ENDS IN APRIL (4.1 INCHES). DURING THE REMAINING MONTHS, AVERAGE RAINFALL RANGES FROM NEARLY 12, TO MORE THAN 22 INCHES IN NOVEMBER. MEAN RELATIVE HUMIDITY IS HIGH IN ALL MONTHS; THE LOWEST MEAN VALUE, 77 PERCENT, OCCURS IN BOTH FEBRUARY AND MARCH. CLOUD COVER IS GREATEST IN JULY, 8 TENTHS, AND LEAST IN FEBRUARY, 5.5 TENTHS. MEAN WINDSPEED IS GREATEST IN FEBRUARY AND MARCH (NEARLY 15 MPH) AND LEAST IN SEPTEMBER (ABOUT 6 MPH).

4. CRITERIA AND METHODS

A. CLIMATIC ELEMENTS SELECTED FOR STUDY

AS IN THE PREVIOUS STUDIES OF THIS SERIES, TEMPERATURE, PRECIPITATION, HUMIDITY, CLOUD COVER, AND WINDSPEED WERE THE CLIMATIC ELEMENTS CONSIDERED MOST IMPORTANT TO MILITARY ACTIVITIES. IT WAS ASSUMED THAT TEST AUTHORITIES ARE MORE INTERESTED IN STRESS PERIODS (E.G., HOTTEST AND WETTEST) AND ANNUAL FLUCTUATIONS THAN IN THE DATA FOR SPECIFIC CALENDAR MONTHS; ACCORDINGLY, THE WARMEST, COLDEST, WETTEST, AND DRIEST MONTHS OF THE YEAR AT EACH STATION WERE SELECTED FOR STUDY. THE FOLLOWING SPECIFIC COMBINATIONS OF ELEMENT AND MONTH WERE STUDIED:

(1) MEAN TEMPERATURE OF THE WARMEST MONTH
(2) MEAN DAILY MAXIMUM TEMPERATURE OF THE WARMEST MONTH
(3) MEAN TEMPERATURE OF THE COLDEST MONTH
(4) MEAN DAILY MINIMUM TEMPERATURE OF THE COLDEST MONTH
(5) MEAN DAILY TEMPERATURE RANGE OF THE WARMEST MONTH
(6) MEAN ANNUAL PRECIPITATION
(7) MEAN PRECIPITATION OF THE WETTEST MONTH
(8) NUMBER OF WET MONTHS
(9) RELATIVE HUMIDITY OF THE DRIEST MONTH
(10) MEAN CLOUD COVER OF THE WETTEST MONTH
(11) MEAN WINDSPEED OF THE WETTEST MONTH

B. "ANALOGOUS" AND "SEMIANALOGOUS" RANGES DEFINED

CLASSES WERE ESTABLISHED DEFINING THE RANGES OF VALUES CONSIDERED CLOSELY ANALOGOUS TO THOSE FOR BALBOA HEIGHTS AND CRISTOBAL. FAIRLY NARROW LIMITS OF ANALOGY WERE USED TO KEEP COMPARISONS CLOSELY REPRESENTATIVE OF THE TWO REFERENCE STATIONS. TABLE I LISTS THE CLASSES OF

ANALOGY AND SEMIANALOGY SELECTED FOR EACH ELEMENT. FOR TEMPERATURE, A DEPARTURE OF 4 DEGREES (EXCEPT WHERE A MEAN WAS TAKEN FOR THE TWO REFERENCE STATIONS) FROM THE MEAN AT THE CANAL ZONE STATION WAS ALLOWED FOR EACH ANALOGY CLASS, AND AN ADDITIONAL 4 DEGREES FOR SEMIANALOGY. FOR PRECIPITATION, DEPARTURES OF 15 INCHES OF MEAN ANNUAL RAINFALL WERE CONSIDERED ANALOGOUS TO BALBOA HEIGHTS AND AN ADDITIONAL 15 INCHES FOR SEMIANALOGY. THE MEAN ANNUAL RAINFALL OF 70 INCHES AT BALBOA HEIGHTS IS SOMEWHAT BELOW THAT NORMALLY CONSIDERED HUMID EQUATORIAL FOR A LOCALITY WITH A DRY SEASON; THEREFORE, IN THIS STUDY THE LIMITS OF ANALOGY WERE SET AT 55 TO 85 INCHES, DIFFERENTIATING IT FROM MOST EVERGREEN RAIN FOREST AREAS, ON THE UPPER MARGIN, AND SAVANNA AREAS, ON THE LOWER MARGIN. CRISTOBAL, WHICH HAS A TROPICAL EVERGREEN RAIN FOREST TYPE OF CLIMATE, HAS A MEAN ANNUAL RAINFALL OF 130 INCHES. DEPARTURES OF 30 INCHES OF MEAN ANNUAL RAINFALL WERE CONSIDERED ANALOGOUS TO CRISTOBAL AND AN ADDITIONAL 30 INCHES WAS CONSIDERED SEMIANALOGOUS. DEPARTURES OF 5 PERCENT IN MEAN RELATIVE HUMIDITY, 1 TENTH IN AMOUNT OF CLOUDINESS, AND 2 MPH IN WINDSPEED WERE SELECTED AS RANGES OF ANALOGY FOR THESE RESPECTIVE ELEMENTS.

C. EXPLANATION OF MAPS

MOST OF THE CLIMATIC ELEMENTS SELECTED FOR STUDY ARE REPRESENTED BY TWO MAPS; ONE ("A" SERIES) IS A VERY SMALL-SCALE MAP OF THE WHOLE REGION, WHICH SHOWS THE DEGREE OF ANALOGY BY SYMBOL, AND THE OTHER ("B" SERIES) IS A LARGER-SCALE MAP OF THE HAWAIIAN AND FIJI ISLANDS, WHICH DEPICTS ANALOGY, BOTH BY STATION SYMBOL AND BY MEANS OF ISOPLETHS AND SHADING. FROM THE SEPARATE MAPS SHOWING ANALOGOUS AREAS FOR EACH ELEMENT, TWO COMPOSITE MAPS WERE PREPARED (ONE FOR BALBOA HEIGHTS AND ONE FOR CRISTOBAL) INDICATING AREAS IN THE HAWAIIAN AND FIJI ISLANDS WHERE THE FOLLOWING FOUR SINGLE ELEMENTS ARE ANALOGOUS: MEAN TEMPERATURE OF THE WARMEST MONTH, MEAN TEMPERATURE OF THE COLDEST MONTH, MEAN ANNUAL PRECIPITATION, AND NUMBER OF WET MONTHS.

D. LIMITATIONS OF DATA

THE PROCEDURES AS OUTLINED HAVE CERTAIN DEFINITE LIMITATIONS IN A CLIMATIC COMPARISON OF THIS SORT. FOREMOST AMONG THESE IS THE NECESSITY, OFTEN ENCOUNTERED IN CLIMATOLOGY, OF ASSUMING CLIMATIC CONDITIONS IN AREAS HAVING FEW IF ANY STATIONS. A SECOND LIMITATION IS THAT SOME ELEMENTS, SUCH AS DEW POINT, SOLAR RADIATION, AND VISIBILITY, WHICH WOULD HAVE PROVED VALUABLE AS INDICATORS OF CLIMATIC ANALOGY, WERE NOT INCLUDED IN THIS STUDY BECAUSE OF THE LIMITED AMOUNT OF DATA AVAILABLE. THE ASSUMPTION HAS BEEN MADE THAT BALBOA HEIGHTS AND CRISTOBAL ARE REPRESENTATIVE OF THE PACIFIC AND ATLANTIC PORTIONS OF THE CANAL ZONE. DATA FROM SOME PACIFIC ISLAND STATIONS ARE NOT GIVEN IN A FORM DIRECTLY COMPARABLE TO THOSE FROM BALBOA HEIGHTS AND CRISTOBAL. WHERE PERIODS OF RECORD, HOURS OF OBSERVATION, OR MANNER OF OBSERVATION DIFFERED, STATION RECORDS HAD TO BE INTERPOLATED. VALUES OUTSIDE THE LIMITS OF ANALOGY OR SEMIANALOGY WERE NOT ANALYZED, NOR WERE COMBINATIONS OF CLIMATIC ELEMENTS OTHER THAN THOSE INVOLVED IN COMPUTING NUMBER OF WET MONTHS.

THE METHOD OF RECORDING TEMPERATURES VARIES FROM ISLAND TO ISLAND. MEAN TEMPERATURES ARE USUALLY DETERMINED BY AVERAGING THE DAILY MAXIMUM AND MINIMUM TEMPERATURE; HOWEVER, AT SOME STATIONS IN THE PACIFIC ISLANDS, THE MEANS ARE OBTAINED BY AVERAGING BI-HOURLY TEMPERATURE OBSERVATIONS, AS AT BALBOA HEIGHTS AND CRISTOBAL. EXPERIENCE HAS SHOWN THAT THE DIFFERENCE BETWEEN MEAN TEMPERATURES DERIVED IN THESE DIFFERENT WAYS IS SELDOM MORE THAN 1F°. HOURS OF OBSERVATION OF RELATIVE HUMIDITY, WINDSPEED, AND CLOUDINESS VARY WIDELY THROUGHOUT THE STUDY AREA.

5. ANALYSIS OF SINGLE-ELEMENT MAPS

STATION LOCATIONS ARE GIVEN ON FIGURE 2A AND 2B. IN THE ANALYSIS BELOW, THE "A" SERIES MAP WILL BE DISCUSSED FIRST, THEN THE "B" SERIES (HAWAIIAN AND FIJI ISLANDS). INDIVIDUAL MAPS SHOWING ANALOGOUS AREAS FOR THE HAWAIIAN AND FIJI ISLANDS ("B" SERIES) HAVE BEEN PREPARED FOR THE FIRST 8 CLIMATIC ELEMENTS LISTED IN PARAGRAPH 4A ABOVE. BECAUSE THE DATA FOR THE OTHER 3 ELEMENTS ARE NOT ADEQUATE FOR ISOLINE ANALYSIS, THEY ARE SHOWN ONLY AS VALUES FOR INDIVIDUAL STATIONS ON THE SMALL-SCALE MAP, AND NO ANALOGOUS ("B" SERIES, HAWAIIAN AND FIJI ISLANDS) MAPS FOR THESE ELEMENTS WERE PREPARED.

A. MEAN TEMPERATURE, WARMEST MONTH (FIGS. 3A AND 3B)

AS TABLE I* INDICATES, THE ANALOGOUS RANGE OF THE MEAN TEMPERATURE FOR THE WARMEST MONTH FOR BALBOA HEIGHTS AND CRISTOBAL IS 77° TO 85°F. MOST OF THE PACIFIC ISLANDS APPEARING IN THE STUDY AREA SOUTH AND WEST OF THE HAWAIIAN ISLANDS ARE ANALOGOUS WITH THE EXCEPTION OF THE GILBERT ISLANDS, WHICH ARE TOO HOT, AND THE HIGHLAND AREAS OF THE MOUNTAINOUS ISLANDS, WHICH ARE TOO COLD.

IN THE HAWAIIAN ISLANDS, ONLY LOWLAND AREAS WITH LEE EXPOSURES ARE ANALOGOUS. FAIRLY LARGE AREAS OF THE FIJIS ARE ANALOGOUS, WITH SMALLER INLAND AREAS TOO COOL FOR ANALOGY.

B. MEAN DAILY MAXIMUM TEMPERATURE, WARMEST MONTH (FIGS. 4A AND 4B)

AT BALBOA HEIGHTS, THE MEAN DAILY MAXIMUM TEMPERATURE FOR THE WARMEST MONTH IS 90°F; AT CRISTOBAL IT IS 86°F. AS RANGES OF ANALOGY FOR THE TWO STATIONS ARE RESPECTIVELY 86° TO 94°F AND 82° TO 90°F, THERE IS A RANGE OF COMPLETE ANALOGY FOR BOTH STATIONS FROM 86° TO 90°F. MUCH OF THE PACIFIC AREA IS ANALOGOUS TO BOTH STATIONS. ABAING ISLAND IN THE GILBERTS IS TOO HOT TO BE ANALOGOUS TO EITHER CANAL ZONE STATION; NORFOLK ISLAND IN THE FAR SOUTHWESTERN PART OF THE STUDY AREA AND ALL HIGHLAND AREAS ARE TOO COLD TO BE ANALOGOUS. THERE ARE SINGLE STATIONS IN THE LOYALTY, MARIANA, AND MARQUESAS ISLANDS WHICH ARE ANALOGOUS TO BALBOA HEIGHTS ONLY. IN THE AFTERNOON, TEMPERATURES ARE USUALLY MUCH HIGHER ON THE LEE SIDES THAN ON THE WINDWARD SIDES OF THE ISLANDS.

*ALL TABLES ARE GIVEN IN PARAGRAPH 7.

In the Hawaiian and Fiji Islands there are large areas analogous to Cristobal alone or to both Cristobal and Balboa Heights.

c. Mean temperature, coldest month (Figs. 5A and 5B)

Analogy for both Balboa Heights and Cristobal is 75° to 83°F for the mean temperature of the coldest month. The Pacific Islands are analogous, except the following:

Banks	Loyalty
Bonin	New Caledonia
Cook (part)	New Hebrides
Duke of Gloucester	Norfolk
Fijis (part)	Santa Cruz
Galapagos	Society (part)
Gilbert (part)	Tonga
Hawaii (part)	Volcano
Wake	

In the Hawaiian Islands, only Honolulu, with its lee exposure, is analogous. Fiji is analogous, except for southern parts.

d. Mean daily minimum temperature, coldest month (Figs. 6A and 6B)

The analogous range for mean daily minimum temperature of the coldest month for Balboa Heights is 67° to 75°F, and for Cristobal, the analogous temperatures are 71° to 79°F. Therefore, 71° to 75°F is analogous to both stations. Stations are analogous as in the following lists:

Balboa Heights	Both	Cristobal
Cook (parts)	Carolines (western)	Carolines (eastern)
Duke of Gloucester	Ellice	Gilbert
Galapagos	Line (part)	Line (northern)
Samoa (parts)	Marianas	Marshall
Santa Cruz	Marquesas	Phoenix
Society (parts)	Samoa (part)	Tokelau
	Society (part)	
	Tuamotu	

All of Hawaii is too cool for analogy with either station for this climatic element. A very small area in Fiji is analogous with Balboa Heights and an even smaller area is analogous with both stations.

e. Mean daily temperature range, warmest month (Figs. 7A and 7B)

At Balboa Heights, the mean daily temperature range for the warmest month is 16F°, and at Cristobal it is 8F°. Temperatures within 4F° of

THESE TWO RANGES ARE CONSIDERED CLOSELY ANALOGOUS. THE ANALOGOUS AREAS MAY BE GENERALLY STATED AS FOLLOWS:

BALBOA HEIGHTS	CRISTOBAL	
ALL, EXCEPT THOSE LISTED FOR CRISTOBAL	CAROLINES	LINE (PARTS)
	COOK	MARSHALLS
	ELLICE	PHOENIX
	GILBERTS (PARTS)	SANTA CRUZ
	GUAM	TOKELAU

MOST OF THE HAWAIIAN ISLANDS ARE ANALOGOUS TO BALBOA HEIGHTS, EXCEPT FOR A SMALL AREA ANALOGOUS TO CRISTOBAL AND ANOTHER SMALL AREA TOO COOL FOR ANALOGY. MOST OF THE FIJI ISLANDS ARE ANALOGOUS TO BALBOA HEIGHTS, EXCEPT FOR A VERY SMALL AREA ANALOGOUS TO CRISTOBAL.

F. MEAN ANNUAL PRECIPITATION (FIGS. 8A AND 8B)

THE RANGE OF ANALOGY OF MEAN ANNUAL PRECIPITATION IS 55 TO 85 INCHES FOR BALBOA HEIGHTS, AND 100 TO 160 INCHES FOR CRISTOBAL. THE AREAS OF ANALOGY ARE AS FOLLOWS:

BALBOA HEIGHTS	CRISTOBAL
BONIN	CAROLINES
COOK	ELLICE (PARTS)
ELLICE (PARTS)	MARQUESAS (PARTS)
FIJIS (PARTS)	NEW HEBRIDES (PARTS)
GILBERTS (PARTS)	PALAU
LOYALTY (PARTS)	SAMOA (PARTS)
MARIANAS	SANTA CRUZ
MARQUESAS (PARTS)	SOCIETY (PARTS)
MARSHALLS	TOKELAU
NAURU	
OCEAN	
SOCIETY (PARTS)	
TONGA	

THE HAWAIIAN ISLANDS AND PARTS OF THE FIJI ISLANDS ARE ANALOGOUS TO BALBOA HEIGHTS, AND PARTS ARE ANALOGOUS TO CRISTOBAL.

THE EXPOSURE OF ANY WEATHER STATION WITH RELATION TO THE LOCAL TOPOGRAPHY OFTEN DETERMINES BOTH THE TOTAL ANNUAL RAINFALL AND ITS SEASONAL COURSE. FOR EXAMPLE, THE ISLAND OF HAWAII ILLUSTRATES ITS DEPENDENCE UPON THE TOPOGRAPHY. THE ISLAND CONSISTS OF TWO VOLCANIC MOUNTAINS NEARLY 14,000 FEET ABOVE MEAN SEA LEVEL. THE PREVAILING TRADE WIND IS FROM THE NORTHEAST, AND THE MAXIMUM RAINFALL OF 320 INCHES OCCURS AT ELEVATIONS OF

1,800 to 3,000 feet on the eastern slope of the island. By contrast, the western slope, only a few miles away on the lee side of the mountains, usually receives less than 40 inches per year.

g. Mean precipitation, wettest month (Figs. 9A and 9B)

Wettest month precipitation analogy with Balboa Heights is 8 to 14 inches; with Cristobal, 15 to 29 inches. Areas of analogy are as follows:

Balboa Heights		Cristobal
Bonins	New Hebrides	Carolines (parts)
Carolines (parts)	Phoenix	Ellice (parts)
Cook	Santa Cruz	Marquesas (parts)
Ellice (parts)	Society (parts)	Palau
Gilberts	Tokelau	Samoa
Line (parts)	Tonga	Society (parts)
Loyalty	Tuamotu	
Marquesas (parts)		

Parts of the Hawaiian Islands and the Fiji Islands are analogous to Balboa Heights; parts are analogous to Cristobal.

h. Number of wet months (Figs. 10A and 10B)

In this series of analogs the term "wet month" is based on the Thornthwaite (1931) formula, in which higher temperatures must be associated with more precipitation in order for a month to be called humid. Mean monthly precipitation for any given mean monthly temperature must be at least as high as the values indicated below in order to be called wet.

Mean monthly temperature (°F)	Mean monthly precipitation (in.)
95	2.88
90	2.71
85	2.54
80	2.37
75	2.20
70	2.03
68	1.96

ANALOGOUS AREAS ARE AS FOLLOWS:

BALBOA HEIGHTS ONLY	BOTH	CRISTOBAL ONLY	
NONE	MARQUESAS (PARTS)	COOK (PARTS)	MARSHALLS (PARTS)
	MARSHALLS (PARTS)	ELLICE (PARTS)	MIDWAY
	PHOENIX	GILBERTS	NEW CALEDONIA (PARTS)
	SOCIETY (PARTS)	GUAM	SOCIETY (PARTS)
		LOYALTY (PARTS)	TONGA (PARTS)
		MARQUESAS (PARTS)	

AREAS WHICH ARE TOO DRY TO BE ANALOGOUS TO BALBOA HEIGHTS, AND THOSE TOO WET TO BE ANALOGOUS TO CRISTOBAL ARE AS FOLLOWS:

TOO DRY FOR BALBOA HEIGHTS	TOO WET FOR CRISTOBAL		
GALAPAGOS	BONIN	MARIANAS (PARTS)	SAMOA
WAKE	CAROLINES	MARQUESAS (PARTS)	SOCIETY (PARTS)
	COOK (PARTS)	MARSHALLS (PARTS)	TOKELAU
	DUKE OF GLOUCESTER (PARTS)	NEW HEBRIDES (PARTS)	TONGA (PARTS)
	LINE (PARTS)	NORFOLK	TUAMOTU (PARTS)
	LOYALTY (PARTS)	OCEAN	TUBUAI (PARTS)
		PALAU	

PART OF THE HAWAIIAN ISLANDS IS THE ONLY AREA ANALOGOUS TO BALBOA HEIGHTS ALONE. PARTS OF THE HAWAIIAN ISLANDS AND FIJI ISLANDS ARE ANALOGOUS TO BOTH BALBOA HEIGHTS AND CRISTOBAL. PARTS OF THE FIJI ISLANDS ARE ANALOGOUS TO CRISTOBAL ALONE. PARTS OF THE HAWAIIAN ISLANDS ARE TOO DRY TO BE ANALOGOUS TO BALBOA HEIGHTS, WHILE PARTS OF BOTH THE HAWAIIAN ISLANDS AND THE FIJI ISLANDS ARE TOO WET FOR ANALOGY TO CRISTOBAL.

1. RELATIVE HUMIDITY, DRIEST MONTH (FIG. 11)

RELATIVE HUMIDITIES OF THE DRIEST MONTH OF 70 TO 80 PERCENT AND 72 TO 82 PERCENT ARE CONSIDERED ANALOGOUS FOR BALBOA HEIGHTS AND CRISTOBAL, RESPECTIVELY. ANALOGOUS AREAS ARE AS FOLLOWS:

BALBOA HEIGHTS ONLY	BOTH	CRISTOBAL ONLY
NONE	CAROLINES (PARTS)	CAROLINES (PARTS)
	COOK	MARSHALLS
	LOYALTY	PHOENIX
	MARQUESAS (PARTS)	SAMOA
	NEW HEBRIDES (PARTS)	SOCIETY
	TONGA	TOKELAU
	TUAMOTU	

AREAS WHICH ARE NOT ANALOGOUS TO EITHER STATION BECAUSE THE RELATIVE HUMIDITY IS EITHER TOO HIGH OR TOO LOW ARE AS FOLLOWS:

Too high RH	Too low RH
Bonin	Gilberts
Marquesas (parts)	Line
Midway	New Caledonia
Niue	

PARTS OF THE HAWAIIAN ISLANDS AND FIJI ISLANDS ARE ANALOGOUS TO BOTH STATIONS. PARTS OF THE FIJI ISLANDS ARE ANALOGOUS TO CRISTOBAL ALONE.

J. MEAN CLOUDINESS, WETTEST MONTH (FIG. 12)

SKY COVER OF 7 TO 9 TENTHS IS CONSIDERED ANALOGOUS FOR BOTH CANAL ZONE STATIONS IN THE WETTEST MONTH. THE AREAS OF ANALOGY ARE AS FOLLOWS:

Both

Bonin	Line (parts)
Carolines	Marianas
Cook (parts)	Samoa
Gilberts (parts)	Tonga (parts)

ALL OTHER STATIONS (INCLUDING HAWAII AND FIJI) HAD LESS MEAN CLOUDINESS DURING THE WETTEST MONTH. MAXIMUM CLOUDINESS OCCURS NEAR THE EQUATOR OR NEAR THE NORMAL POSITION OF THE "HEAT EQUATOR," WHILE A MINIMUM OCCURS NEAR LATITUDES 25°N AND S, NEAR THE NORMAL POSITION OF THE SUBTROPICAL ANTICYCLONIC BELT. CLOUDINESS ON THE WHOLE IS GREATER OVER THE OCEAN THAN OVER THE LAND.

K. MEAN WINDSPEED, WETTEST MONTH (FIG. 13)

WINDSPEED ANALOGY OF BALBOA HEIGHTS FOR THE WETTEST MONTH IS 4 TO 8 MPH AND THAT OF CRISTOBAL IS 6 TO 10 MPH. AREAS OF ANALOGY ARE AS FOLLOWS:

Balboa Heights only	Both	Cristobal only
Carolines (parts)	Bonins	Line (parts)
Marianas (parts)	Carolines (parts)	New Hebrides (parts)
New Hebrides (parts)	Galapagos	Ocean
Samoa	Gilberts (parts)	Phoenix
Society	Marianas (parts)	Tonga
	New Hebrides (parts)	

Areas with windspeeds either lower or higher than those of either Canal Zone station are as follows:

Lower windspeed	Higher windspeed
Marshalls	Cook
New Caledonia	Line (parts)
	Midway
	Norfolk
	Wake

The best-developed land and sea breezes are found on the lee sides of mountainous islands.

The Hawaiian Islands are analogous to Cristobal alone, and the Fiji Islands are analogous to Balboa Heights alone.

6. Analysis of composite maps (Figs. 14 and 15)

Composite analogy maps were prepared for only the Hawaiian and Fiji Islands; Figure 14 compares them with Balboa Heights and Figure 15 compares them with Cristobal. The elements for which areas of analogy are fully plotted on the composite maps are (1) the mean temperature of the warmest month, (2) the mean temperature of the coldest month, and (3) mean annual precipitation. Because of the importance of precipitation in the tropics, areas which are analogous with respect to (4) the number of wet months are also shown, but only where they occur within areas analogous with respect to the other three elements. This is done because full presentation of a fourth element would make the maps more difficult to read.

The following areas have complete 4-way analogy:

Balboa Heights only	Both	Cristobal only
Marshalls (parts)	Fijis (parts)	Marquesas (parts)
	Society (parts)	

The Gilbert Islands are too hot and the Palau Islands are too wet (the number of wet months) for complete 4-way analogy.

The following areas had 3-way analogy:

Balboa Heights only	Both	Cristobal only
Cook (parts)	Ellice	Palau
Marianas (parts)	Phoenix	Samoa (parts)
Marquesas (parts)	Tuamotu	Tokelau
Nauru		
Ocean		

Most of the remaining Pacific Islands have insufficient rainfall to be analogous to either Canal Zone station. Mean temperature for the coldest month appears to be the most limiting single element. The high mountainous slopes which are exposed to the trade winds and receive the largest amounts of rainfall are also too cold in the winter to be analogous to either Canal Zone station. The atolls and the lee sides of mountainous islands are too dry to be analogous to either Canal Zone station.

7. Tables of monthly values

Tables II thru IX show the monthly and yearly mean of the climatic elements for 21 key stations. These stations were selected for length of reliable record and representativeness. In each table, the mean values for Balboa Heights and Cristobal are shown for comparison. The tables reveal certain characteristics of climatic analogy which are not manifest in the maps.

The southeastern Pacific is represented by 3 key stations: Atuona on Hiva-Oa Island in the Marquesas group; Papeete on Tahiti in the Society Islands; and Seymour Island in the Galapagos Archipelago.

The central Pacific is represented by 6 key stations: Avarua on Rarotonga Island in the Cook Islands; Apia on Upolu Island in the Samoa Islands; Nukualofa on Tongatabu Island in the Tonga Islands; Atafu Island in the Tokelau Islands; and Fanning and Malden Islands in the Line Group.

The northeastern Pacific is represented by 3 key stations: Honolulu on Oahu and Hilo on Hawaii in the Hawaiian Islands, and Midway Island.

The western Pacific is represented by 5 key stations: Ponape Island in the Caroline Islands; Sumay on Guam in the Marianas; Koror Island in the Palau group; Jaluit Island in the Marshall Islands; and Ocean Island in the Gilbert Islands.

The northwestern Pacific is represented by 1 key station, Chichi Shima, the largest island in the Bonian Islands.

The southwestern Pacific is represented by 3 key stations: Suva on Viti Levu Island in the Fiji Islands; Vila Harbor on Efate Island in the New Hebrides; and Ro on Mare Island in the Loyalty Islands.

TABLE I: CLIMATIC ELEMENTS AND CLASSES OF ANALOGY

STATION INDEX	BALBOA HEIGHTS VALUE AT B.H. (MEAN)	BALBOA HEIGHTS ANALOGOUS (RANGE)	BALBOA HEIGHTS SEMI ANALOGOUS (RANGE)	CRISTOBAL VALUE AT CRIS. (MEAN)	CRISTOBAL ANALOGOUS (RANGE)	CRISTOBAL SEMI ANALOGOUS (RANGE)
TEMPERATURE (°F)						
MEAN, WARMEST MONTH*	80	77-85	73-76 86-89	82	77-85	73-76 86-89
MEAN DAILY MAXIMUM, WARMEST MONTH	90	86-94	82-85 95-98	86	82-90	78-81 91-94
MEAN, COLDEST MONTH*	78	75-83	71-74 84-87	80	75-83	71-74 84-87
MEAN DAILY MINIMUM, COLDEST MONTH	71	67-75	63-66 76-79	75	71-79	67-70 80-83
MEAN DAILY RANGE, WARMEST MONTH	16	12-20	8-11 21-24	8	4-12	0-3 13-16
PRECIPITATION						
MEAN ANNUAL (INCHES)	70	55-85	40-54 86-100	130	100-160	70-99 161-190
MEAN, WETTEST MONTH (INCHES)	11	8-14	5-7 15-17	22	15-29	8-14 30-36
NUMBER OF WET MONTHS	9	8-10	7 11	10	9-11	8 12
RELATIVE HUMIDITY (%)						
MEAN, DRIEST MONTH	75	70-80	65-69 81-85	77	72-82	67-71 83-87
CLOUDINESS						
MEAN, WETTEST MONTH (TENTHS)	7.6	7.0-8.9	6.0-6.9 9.0-10.0	7.6	7.0-8.9	6.0-6.9 9.0-10.0
WIND SPEED (MPH)						
MEAN, WETTEST MONTH	5.8	4-8	2-3 9-10	8	6-10	4-5 11-12

*SEE SECTION 4B FOR EXPLANATION OF RANGES OF ANALOGY; SOMETIMES A MEAN OF THE 2 REFERENCE STATIONS IS USED.

TABLE II: STATIONS USED IN TABLES OF MONTHLY VALUES

Stations	Elev. (ft)	Lat.	Long	Period of Record (Yr) Temp.	Precip.	Other
1. Apia, Upolu I. (Samoa, Cen Pacific)	16	13°48'S	171°46'W	42	48	9-47
2. Atafu I. (Tokelau, Cen Pacific)	6	8°32'S	172°31'W	4	5	3- 5
3. Atuona, Hiva-Oa I. (Marquesas, SE Pacific)	16	9°48'S	139°02'W	3	3	3
4. Avarua, Rarotonga I. (Cook, Cen Pacific)	20	21°12'S	159°47'W	24	27	2-23
5. BALBOA HEIGHTS (Canal Zone)	118	9°50'N	79°34'W	12-34	22-38	11-34
6. Chichi Shima (Bonin, NW Pacific)	13	27°05'N	142°11'E	23	23	6-23
7. CRISTOBAL (Canal Zone)	36	9°25'N	79°52'W	7-32	8-60	3-41
8. Fanning I. (Line, Cen Pacific)	17	3°54'N	159°23'W	10	25	9-17
9. Hilo, Hawaii I. (Hawaii, NE Pacific)	40	19°44'N	155°05'W	34	53	34
10. Honolulu, Oahu I. (Hawaii, NE Pacific)	38	21°19'N	157°52'W	34	35	16-52
11. Jaluit I. (Marshall, W Pacific)	15	6°00'N	169°35'E	8	17	3-11
12. Koror I. (Palau, W Pacific)	102	7°30'N	134°38'E	9	18	9-18
13. Malden I. (Line, Cen Pacific)	26	4°01'S	155°01'W	24	33	2-28
14. Midway I. (Cen Pacific)	19	28°13'N	177°21'W	9	9	6- 9
15. Nukualofa, Tongatabu I. (Tonga, Cen Pacific)	10	21°08'S	175°12'W	4-14	14	3-14
16. Ocean I. (Gilbert, W Pacific)	134	0°52'S	169°35'E	21-28	36	5-24
17. Papeete, Tahiti I. (Society, SE Pacific)	20	17°32'S	149°34'W	5	21	5-12
18. Ponape I. (Caroline, W Pacific)	127	6°58'N	158°13'E	7	15	5- 9
19. Ro, Mare I. (Loyalty, SW Pacific)	55	21°23'S	167°52'E	2	4	2- 4
20. Seymour I. (Galapagos, SE Pacific)	34	0°28'S	90°17'W	2	2	2
21. Sumay, Guam I. (Marianas, W Pacific)	61	13°24'N	144°38'E	26	31	9-26
22. Suva, Viti Levu I. (Fiji, SW Pacific)	44	18°08'S	178°25'E	43	55	29-46
23. Vila Harbor, Efate I. (New Hebrides, SW Pacific)	187	17°44'S	169°19'E	7	24	5-11

TABLE III: MEAN MONTHLY TEMPERATURE (°F)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr
Apia	80	80	80	80	79	78	78	78	79	79	79	80	79
Atafu I.	82	82	83	83	83	82	83	82	83	82	83	82	83
Atuona	79	79	80	80	79	78	78	77	78	79	79	79	79
Avarua	78	78	78	76	73	71	70	70	71	73	74	76	74
BALBOA HEIGHTS	78	79	80	80	79	79	79	79	79	78	78	78	79
Chichi Shima	64	63	65	70	73	79	82	82	81	79	73	67	73
CRISTOBAL	80	80	81	82	81	81	81	81	81	80	80	80	81
Fanning I.	82	82	82	82	82	82	82	83	82	83	84	82	82
Hilo	70	70	71	71	73	74	75	75	75	75	73	72	73
Honolulu	71	71	72	73	75	77	78	78	78	77	75	73	75
Jaluit	82	82	83	82	82	82	82	82	82	84	82	82	82
Koror I.	80	80	81	82	81	81	80	81	81	81	81	81	81
Malden I.	81	82	82	82	82	83	82	82	83	82	82	82	82
Midway I.	66	65	67	68	71	75	78	79	78	75	71	67	72
Nukualofa	78	80	79	77	74	71	70	71	71	73	75	76	75
Ocean I.	82	82	82	82	82	82	82	82	83	83	83	82	82
Papeete	81	81	81	81	79	77	76	76	78	79	79	80	79
Ponape I.	80	80	80	80	80	80	80	80	79	80	80	80	80
Ro, Mare I.	80	81	78	76	75	71	71	70	72	72	75	77	75
Seymour I.	80	81	82	81	80	78	76	74	73	74	74	76	77
Sumay	79	79	80	82	82	83	81	81	81	81	81	80	81
Suva	79	80	80	78	76	74	73	73	74	75	77	79	77
Vila Harbor	81	81	80	79	76	75	72	72	74	76	78	80	77

TABLE IV: MEAN DAILY MAXIMUM TEMPERATURE (°F)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Yr
Apia	85	85	86	86	85	84	84	84	84	85	85	85	85
Atafu I.	86	86	87	87	87	86	86	86	86	86	86	86	86
Atuona	88	90	89	93	90	90	90	88	89	89	90	90	90
Avarua	84	84	84	82	79	77	76	76	77	78	80	82	80
Balboa Heights	88	89	90	90	87	86	87	87	86	85	85	87	87
Chichi Shima	69	69	71	75	78	84	88	87	86	84	78	72	78
Cristobal	84	84	85	86	86	86	85	85	86	86	84	84	85
Fanning I.	87	86	87	87	87	88	88	89	89	89	90	88	88
Hilo	78	78	78	78	80	81	82	83	83	82	80	79	80
Honolulu	76	76	77	78	80	81	82	83	83	82	80	78	80
Jaluit I.	86	87	88	87	87	87	88	88	88	90	88	87	88
Koror I.	84	85	86	87	86	86	85	86	86	86	86	85	86
Malden I.	89	90	90	90	90	90	90	90	90	90	90	89	90
Midway I.	72	71	72	74	78	82	84	85	85	80	77	72	78
Nukualofa	84	86	85	83	80	78	77	76	77	79	81	81	81
Ocean I.	88	88	88	88	88	88	88	88	89	89	89	88	88
Papeete	88	88	87	87	85	84	84	84	86	87	87	87	86
Ponape I.	84	85	85	85	85	85	86	86	85	86	85	85	85
Ro, Mare I.	91	91	88	85	83	79	79	80	81	82	86	90	85
Seymour I.	87	87	88	87	87	85	83	81	80	81	81	83	84
Sumay	84	84	85	87	88	88	86	86	86	86	86	85	86
Suva	86	86	86	84	82	80	79	79	80	81	83	85	83
Vila Harbor	87	88	86	84	81	80	78	78	80	83	84	87	83

TABLE V: MEAN DAILY MINIMUM TEMPERATURE (°F)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YR
APIA	75	75	75	74	74	73	72	73	73	74	74	75	74
ATAFU I.	79	78	79	79	80	79	79	79	79	78	79	79	79
ATUONA	73	73	73	73	73	72	72	72	72	73	72	73	73
AVARUA	73	74	73	71	69	67	65	66	67	68	69	72	70
BALBOA HEIGHTS	72	71	72	74	74	74	74	74	74	73	73	73	73
CHICHI SHIMA	58	57	59	64	68	73	75	76	76	73	68	62	67
CRISTOBAL	76	77	77	78	77	76	77	76	76	75	76	77	77
FANNING I.	77	77	77	77	77	77	77	77	76	77	77	77	77
HILO	63	63	63	64	65	67	68	68	68	67	66	64	66
HONOLULU	67	67	67	68	70	72	73	74	73	72	70	68	70
JALUIT I.	77	78	78	78	77	77	77	77	77	77	77	77	77
KOROR I.	75	75	76	77	77	76	76	76	76	77	77	76	76
MALDEN I.	75	75	75	76	76	76	75	76	75	75	75	75	75
MIDWAY I.	60	59	61	61	64	69	71	72	71	68	65	61	55
NUKUALOFA	73	74	73	71	68	65	64	65	64	67	70	69	69
OCEAN I.	76	77	77	77	77	77	76	77	77	77	77	77	77
PAPEETE	74	75	75	74	72	70	68	68	71	71	71	72	72
PONAPE I.	76	76	76	76	75	75	74	73	73	73	74	75	75
RO, MARE I.	70	71	69	68	66	63	63	60	63	62	65	65	65
SEYMOUR I.	73	74	75	75	73	71	69	67	66	67	67	69	71
SUMAY	75	74	75	76	77	77	76	76	76	76	77	76	76
SUVA	74	74	74	73	71	69	68	68	69	70	71	73	71
VILA HARBOR	74	75	74	73	71	69	67	67	68	70	71	73	71

TABLE VI: MEAN MONTHLY PRECIPITATION (INCHES)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YR
APIA	18.3	15.5	14.4	10.3	6.7	5.0	3.3	3.8	5.4	7.2	10.6	14.7	115.2
ATAFU I.	9.7	11.9	8.7	9.7	6.9	7.6	6.0	7.2	6.5	7.5	6.6	14.0	102.3
ATUONA	6.7	6.5	8.5	5.4	8.2	5.9	7.2	3.0	3.1	10.1	5.5	4.1	74.2
AVARUA	9.2	10.1	11.2	7.7	5.9	4.8	4.4	4.7	5.0	5.3	6.4	8.1	82.8
BALBOA HEIGHTS	1.0	0.6	0.7	2.9	8.0	8.4	7.3	7.8	8.2	10.2	10.5	4.7	70.3
CHICHI SHIMA	3.9	3.1	4.2	4.8	8.1	5.1	4.1	6.7	5.4	5.6	5.7	5.2	61.9
CRISTOBAL	3.4	1.5	1.5	4.1	12.5	13.9	15.6	15.3	12.8	15.8	22.3	11.7	130.4
FANNING I.	10.3	10.3	10.8	13.5	12.5	10.1	8.4	4.6	3.2	3.7	3.1	8.5	99.0
HILO	12.2	10.7	15.7	13.5	9.6	7.3	10.0	12.2	10.9	10.9	13.8	13.1	139.9
HONOLULU	4.1	2.6	3.1	1.9	1.0	0.7	0.9	1.1	1.4	1.9	2.5	4.1	25.3
JALUIT I.	10.2	8.5	14.2	15.8	16.6	15.3	15.4	12.0	13.1	12.2	11.9	13.6	158.8
KOROR I.	12.5	8.5	7.1	7.2	13.9	12.0	19.7	14.8	12.9	12.5	12.2	14.4	147.7
MALDEN I.	3.5	1.9	4.5	4.5	4.3	2.1	1.9	1.6	0.8	0.9	0.7	0.7	27.4
MIDWAY I	4.2	3.7	4.2	5.1	3.6	3.4	3.1	3.5	5.0	5.2	1.7	3.6	46.3
NUKUALOFA	6.8	6.7	8.1	4.4	6.1	4.2	4.8	4.9	4.1	4.2	4.3	5.7	64.3
OCEAN I.	11.9	8.5	7.1	5.3	4.0	3.9	5.8	4.6	3.7	3.6	5.4	8.1	71.9
PAPEETE	11.7	11.8	7.0	7.4	4.8	3.3	2.2	1.9	1.8	3.6	6.8	11.8	74.1
PONAPE I.	11.9	8.2	11.4	19.3	19.4	16.2	16.9	15.5	16.0	16.7	14.6	17.5	183.6
RO, MARE I.	6.7	3.3	9.2	5.1	3.9	4.5	4.9	4.9	4.4	3.1	1.8	2.4	54.2
SEYMOUR I.	0.2	1.0	1.7	1.5	T	T	T	T	T	T	T	T	4.5
SUMAY	3.0	2.7	3.0	2.0	4.3	5.6	14.2	14.8	14.2	13.1	7.7	4.9	89.5
SUVA	11.9	11.2	14.9	12.3	10.8	6.3	5.5	8.1	7.7	9.1	10.3	12.7	120.8
VILA HARBOR	10.2	11.2	11.7	9.6	5.6	4.9	3.8	3.5	3.8	4.8	6.6	7.1	82.8

TABLE VII: MEAN CLOUDINESS (TENTHS OF SKY COVERED)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YR
APIA	7.6	7.2	7.1	6.7	5.7	5.2	5.0	5.0	5.5	6.0	6.8	7.1	6.2
ATAFU I.	-	-	-	-	-	-	-	-	-	-	-	-	-
ATUONA	4.2	4.0	3.3	4.0	3.6	4.4	4.7	3.9	4.1	3.8	3.5	2.7	3.9
AVARUA	6.0	6.5	7.0	5.7	5.8	5.8	5.2	5.4	5.9	5.5	6.5	6.6	6.0
BALBOA HEIGHTS	4.8	4.8	5.0	6.3	7.6	8.0	7.6	7.7	7.7	7.7	7.6	6.3	6.8
CHICHI SHIMA	6.8	6.3	6.7	7.1	7.8	7.9	6.6	7.4	6.3	7.2	6.7	7.9	7.0
CRISTOBAL	5.9	5.5	5.8	6.4	7.8	7.9	8.0	7.6	7.1	7.4	7.6	6.8	7.0
FANNING I.	5.9	5.9	5.9	6.3	5.9	5.8	5.4	5.0	4.9	5.0	4.9	5.5	5.5
HILO	5.9	7.2	7.8	8.0	8.4	7.9	7.6	7.9	6.7	7.1	7.3	7.6	7.5
HONOLULU	5.3	4.8	5.4	5.5	5.1	5.0	4.9	4.7	4.7	4.6	5.2	5.1	5.0
JALUIT I.	6.5	6.4	6.8	7.1	7.1	6.9	6.8	6.5	6.5	6.6	7.0	7.0	6.8
KOROR I.	7.7	7.5	7.5	7.3	7.9	7.9	8.7	8.4	P 0	7.8	7.4	7.6	7.8
MALDEN I.	2.4	3.0	3.3	2.7	3.6	3.3	1.5	2.3	2.3	1.1	2.5	3.1	2.6
MIDWAY I.	6.3	6.5	6.5	6.4	6.0	5.8	5.8	5.4	6.2	6.4	5.9	6.4	6.1
NUKUALOFA	6.6	6.2	7.0	6.4	6.3	6.5	6.4	6.5	6.8	6.5	6.3	6.3	6.5
OCEAN I.	5.9	5.4	5.5	4.4	4.3	4.2	4.6	4.2	4.3	4.4	4.8	5.5	4.8
PAPEETE	6.7	6.3	5.6	5.8	5.7	5.6	5.1	5.5	4.5	5.2	5.4	6.6	5.7
PONAPE I.	8.8	8.4	8.5	8.6	8.6	8.6	8.1	8.1	8.4	8.0	8.3	8.4	8.4
RO, MARE I.	6.2	5.1	5.2	5.4	5.5	5.7	5.2	4.7	5.2	5.4	5.2	4.8	5.3
SEYMOUR I.	-	-	-	-	-	-	-	-	-	-	-	-	-
SUMAY	7.2	7.2	6.9	6.7	6.8	7.5	8.2	8.8	8.7	8.4	7.7	7.3	7.6
SUVA	5.7	5.6	5.6	5.5	5.9	5.6	5.6	6.3	6.2	6.1	6.3	5.9	5.9
VILA HARBOR	6.5	6.0	6.6	6.1	6.3	6.4	6.9	6.6	6.5	6.3	6.2	6.0	6.4

TABLE VIII: MEAN RELATIVE HUMIDITY (%)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YR
APIA	85	85	85	85	84	83	82	81	81	82	83	83	83
ATAFU I.	-	-	-	-	-	-	-	-	-	-	-	-	-
ATUONA	83	83	84	86	85	85	85	84	84	83	85	81	84
AVARUA	87	86	83	82	84	83	80	79	84	76	83	86	83
BALBOA HEIGHTS	78	75	73	77	85	87	86	87	87	88	88	84	83
CHICHI SHIMA	75	75	77	85	89	92	90	90	90	88	82	77	84
CRISTOBAL	78	77	77	79	83	85	86	86	85	85	86	82	82
FANNING I.	77	78	79	81	79	77	75	72	69	69	69	74	75
HILO	80	81	79	80	82	80	80	83	79	81	82	82	81
HONOLULU	73	73	71	71	71	70	70	70	70	72	72	74	71
JALUIT I.	85	82	81	83	83	82	82	81	80	80	81	84	82
KOROR I.	82	82	79	80	83	82	83	81	82	82	83	83	82
MALDEN I.	70	71	72	74	73	71	69	68	66	66	65	67	69
MIDWAY I.	91	88	89	90	91	90	85	86	89	90	87	87	89
NUKUALOFA	80	79	80	78	80	78	79	78	75	76	76	77	78
OCEAN I.	83	83	83	85	83	83	83	82	81	80	81	82	82
PAPEETE	82	82	84	85	84	85	83	83	81	79	80	81	82
PONAPE I.	80	79	80	84	85	87	90	91	91	90	88	85	86
RO, MARE I.	81	81	82	82	83	79	83	81	78	75	77	76	80
SEYMOUR I.	-	-	-	-	-	-	-	-	-	-	-	-	-
SUMAY	84	84	84	83	84	85	88	90	89	88	87	85	86
SUVA	78	80	81	81	82	81	80	80	78	76	76	77	79
VILA HARBOR	75	79	81	82	80	80	77	76	74	72	72	72	77

TABLE IX: MEAN WINDSPEED (MPH)

	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC	YR
APIA	5.2	5.3	5.0	5.0	5.9	6.3	6.1	7.5	6.9	6.7	5.2	5.0	5.8
ATAFU I.	-	-	-	-	-	-	-	-	-	-	-	-	-
ATUONA	-	-	-	-	-	-	-	-	-	-	-	-	-
AVARUA	12.8	14.4	13.8	15.5	14.4	17.8	16.1	20.2	15.0	17.8	19.0	17.8	16.2
BALBOA HEIGHTS	8.8	10.1	10.3	8.8	6.1	5.4	5.9	5.9	5.6	6.3	5.8	6.4	7.1
CHICHI SHIMA	7.0	7.6	7.9	7.1	6.8	6.6	5.9	6.7	6.9	7.7	6.6	6.8	7.0
CRISTOBAL	14.0	15.0	15.0	12.0	8.0	7.0	8.0	8.0	6.0	7.0	8.0	12.0	10.0
FANNING I.	13.2	14.7	13.6	13.2	11.1	8.8	11.1	12.1	12.1	11.1	12.1	12.1	12.1
HILO	8.1	7.8	7.8	8.0	7.2	7.1	6.9	7.1	7.1	6.9	7.2	7.9	7.4
HONOLULU	9.5	8.8	9.6	10.4	10.1	9.8	10.4	9.8	9.2	8.4	9.0	9.4	9.5
JALUIT I.	15.5	15.5	14.8	13.3	11.0	11.0	7.7	6.0	6.0	7.7	10.0	14.2	11.1
KOROR I.	6.5	6.5	6.7	5.6	4.9	3.6	5.4	5.1	4.5	5.4	4.3	5.1	5.3
MALDEN I.	11.4	10.2	8.6	6.9	7.5	9.2	10.2	11.4	10.2	9.2	8.6	9.5	9.4
MIDWAY I.	14.8	17.3	15.5	15.1	11.8	8.4	13.2	11.1	12.1	13.5	14.6	18.2	14.0
NUKUALOFA	10.8	10.2	10.2	9.7	7.5	7.8	8.3	9.7	10.8	10.8	10.2	11.8	9.8
OCEAN I.	10.4	11.5	11.5	10.4	9.2	9.2	10.4	11.5	11.5	12.7	10.4	10.4	10.7
PAPEETE	-	-	-	-	-	-	-	-	-	-	-	-	-
PONAPE I.	8.1	8.3	8.1	6.7	5.6	4.7	3.5	3.1	3.1	3.5	4.1	5.8	5.4
RO, MARE I.	-	-	-	-	-	-	-	-	-	-	-	-	-
SEYMOUR I.	-	-	-	-	-	-	-	-	-	-	-	-	-
SUMAY	8.4	8.5	8.0	6.8	5.3	4.4	3.6	5.4	3.5	3.9	6.5	8.1	6.0
SUVA	7.8	5.0	4.5	5.2	5.2	5.2	5.2	5.6	7.8	7.8	7.8	6.9	6.1
VILA HARBOR	6.9	5.8	4.6	4.6	5.8	5.8	6.9	6.9	8.1	8.1	6.9	8.1	6.5

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10. MAPS

FIGURE

2A & 2B*	STATION LOCATIONS
3A & 3B*	MEAN TEMPERATURE, WARMEST MONTH
4A & 4B*	MEAN DAILY MAXIMUM TEMPERATURE, WARMEST MONTH
5A & 5B*	MEAN TEMPERATURE, COLDEST MONTH
6A & 6B*	MEAN DAILY MINIMUM TEMPERATURE, COLDEST MONTH
7A & 7B*	MEAN DAILY TEMPERATURE RANGE, WARMEST MONTH
8A & 8B*	MEAN ANNUAL PRECIPITATION
9A & 9B*	MEAN PRECIPITATION, WETTEST MONTH
10A & 10B*	NUMBER OF WET MONTHS
11	RELATIVE HUMIDITY, DRIEST MONTH
12	MEAN CLOUDINESS, WETTEST MONTH
13	MEAN WIND SPEED, WETTEST MONTH
14*	COMPOSITE OF ANALOGOUS AREAS - BALBOA HEIGHTS
15*	COMPOSITE OF ANALOGOUS AREAS - CRISTOBAL

*HAWAII AND FIJI ONLY

ADDENDA AND ERRATA FOR MAPS

FIGURE		"REGION"
ALL "A"	BANKS (N OF NEW HEBRIDES)	SW
	LINE (S OF HAWAII, N & S OF EQUATOR)	CEN
	PITCAIRN (JUST OFF MAP: E OF MANGAREVA)	SE
	VOLCANO (S OF BONIN)	NW
2A	RAPA: (ADD, AT SE END OF TUBUAI CHAIN)	SE
	NUKU-HIVA (NOT NUKO-HIVA) /MARQUESAS/	SE
	KWAJELEIN (ADD, W. MARSHALLS)	W
	LAU (NOT MUNIA) /SEE	SW
	LEVUKA (NOT PVALAU) FIG.	SW
	MBUA (NOT BUA) 2B/	SW
	NANDARIVA (NOT NADARIVATU)	SW
	NANDRALA (NOT NADROGA)	SW
	NAUSORI (NOT NAVUA)	SW
	IWO JIMA (ADD, VOLCANO ISLANDS)	NW
	HAABAI GROUP (NOT HAABAI GR) /TONGA/	CEN
	NANUMEA (NOT NAMONEA) /ELLICE/	CEN
	NIUE (NOT NIVE) /TONGA/	CEN
	TONGA IS (NOT TONGUA IS) /TONGA/	CEN
	WALLIS & FUTUNA, (ADD, NE OF FIJI)	CEN

	3A	3B	4A	5A	5B	6A	7A	8A	9A	11	12	13
APIA	80D-AP		86MA, AP	78JN-A		72J					7.6JA	
ATAFU						78F, O						
ATUONA			93AP			72JN-S, N						
AVARUA				70J, A		65J						
CHICHI SHIMA	82J-A									75F	7.8M	
FANNING I.				82D-J, S		76S						
HILO				70JA, F		63JA-MA	15J-S				7.8MA	8MA
HONOLULU	78J-S			71JA, F		67JA-MA	9A, S		4JA-D	70JN		
JALUIT I.	83A		90-O	82JA, F AP-D		77M-JA			17M	82F	7.1M	11M
KALAWAO								64				
KOROR I.						75JA, F						
LAUTOKA		81JA-MA										
MALDEN I.			90F-N			75JA-MA, J, S-D					3.3MA	9MA
MIDWAY I.	79A		85A, S							8[illegible]		14-O
NUKUALOFA						64J, O						
OCEAN I.	83S-N		89S-N	82D-A		76JA, J				80-O	6.3F	
PAHALA					69JA, F			43				
PAPEETE			88JA, F							81 S	5.8A	
PONAPE I.	80-04		86J, A, O	79A		73A-O				79 F	8.6M	
RO, MARE I.			91JA, F									
SEYMOUR I.				73S		67A, O, N						
SUHAY			88M-JN			74F				83 AP	8.8A	
SUVA	80F, M			73J, A		68J, A			15MA			
VILA HARBOR	81J, F		88F	72J, A		67J, A			12MA	76A		5MA

ERRATA SHEET

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Main Navy Bldg.
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Strategic Air Command
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Air Development Center
Aero-Medical Lab.
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1 Director
Naval Research Laboratory
4th & Chesapeake St., S. W.
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1 Naval Medical Research Institute
National Naval Med. Res. Center
Bethesda, Md.

2 Chief of Naval Research
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Attn: Code 402S

1 Chief, Bureau of Ships
Department of the Navy
Washington 25, D. C.
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Chief, Research & Development
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1 Army Research Committee
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1 QM Representative
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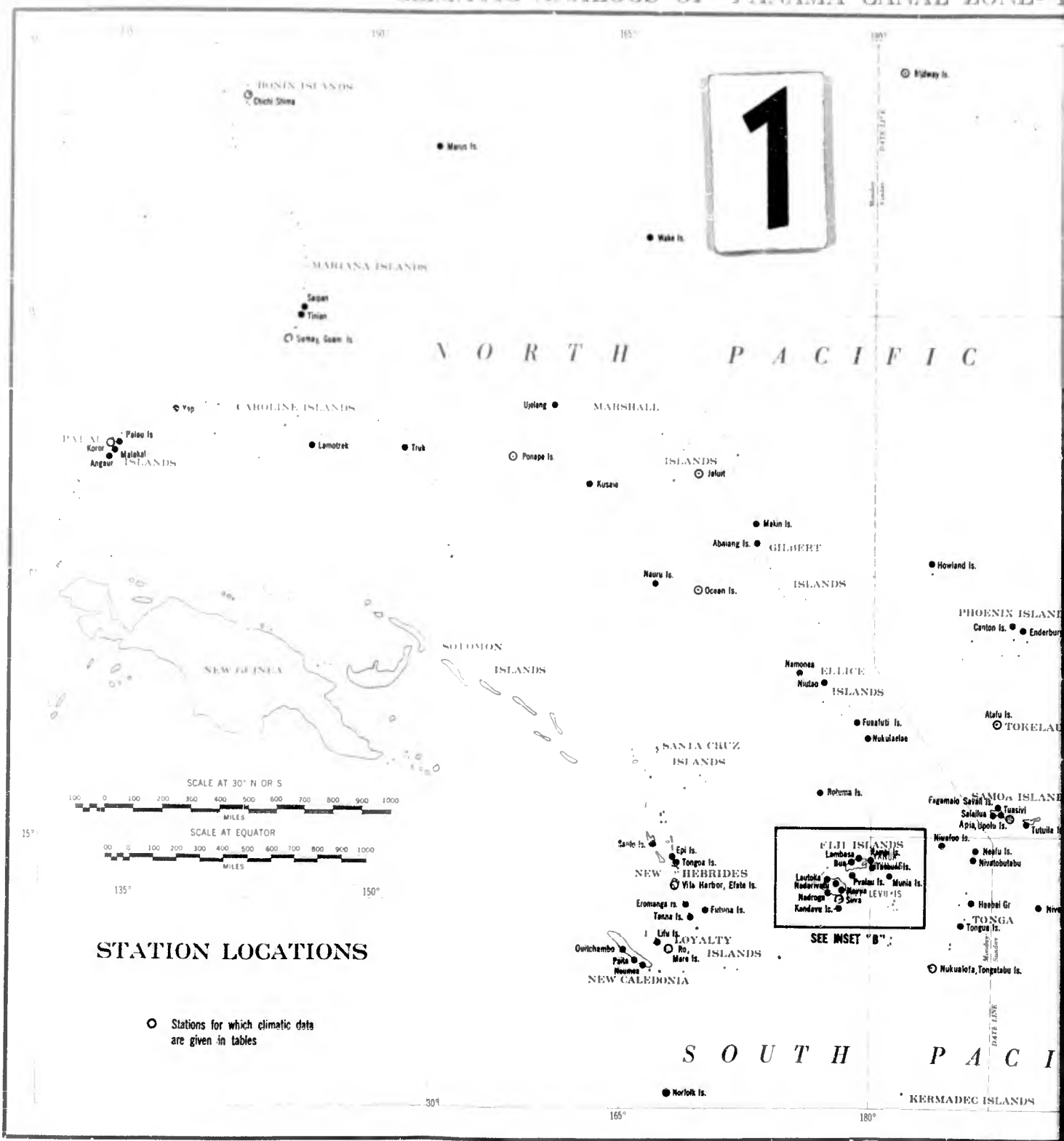
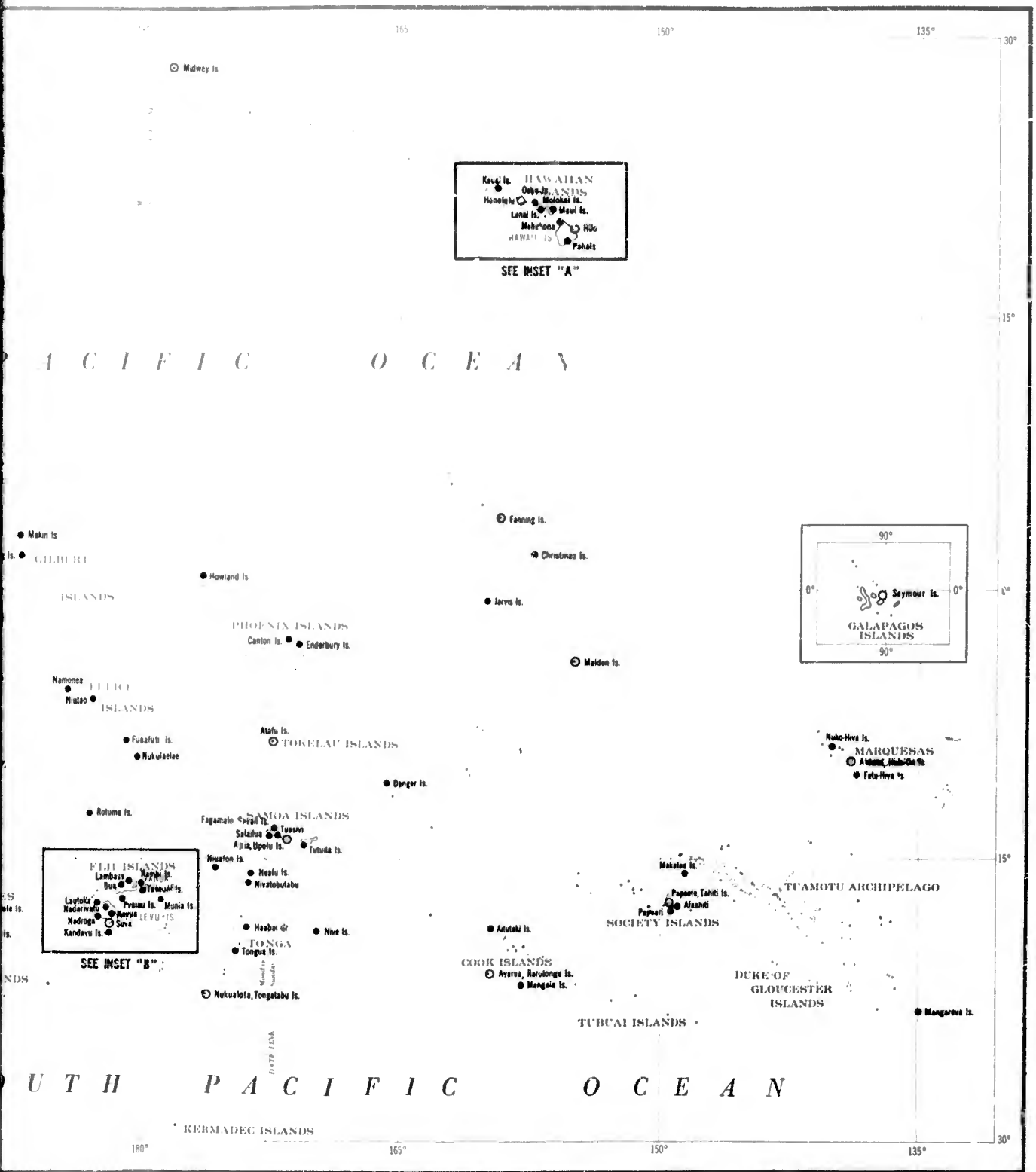

1
BONIN ISLANDS
Chichi Shima
Marus Is.
Midway Is.
Wake Is.
MARIANA ISLANDS
Saipan
Tinian
Guam Is.
N O R T H P A C I F I C
Yap
CAROLINE ISLANDS
Palau Is
Koror
Malakal
Angaur
PALAU ISLANDS
Lamotrek
Truk
Ponape Is
Kusaie
Ujelang
MARSHALL
ISLANDS
Jaluit
Makin Is.
Abaiang Is.
GILBERT
ISLANDS
Nauru Is.
Ocean Is.
Howland Is.
PHOENIX ISLAND
Canton Is.
Enderbury
NEW GUINEA
SOLOMON
ISLANDS
Namonea
ELLICE
Niutao
ISLANDS
Funafuti Is.
Nukulaelae
Atafu Is.
TOKELAU
SANTA CRUZ
ISLANDS
Rotuma Is.
Fagamalo Savaii Is.
Tuasivi
Salailua
Apia, Upolu Is.
Tutuila
SCALE AT 30° N OR S
100 0 100 200 300 400 500 600 700 800 900 1000
MILES
SCALE AT EQUATOR
00 0 100 200 300 400 500 600 700 800 900 1000
MILES
15°
135°
150°
Santo Is.
Epi Is.
Tongoa Is.
NEW HEBRIDES
Vila Harbor, Efate Is.
Eromanga Is.
Tanna Is.
Futuna Is.
Lifu Is.
LOYALTY
Ouvichambo
Ro,
Mare Is.
ISLANDS
Paita
Noumea
NEW CALEDONIA
FIJI ISLANDS
Lambasa
Bua
Lautoka
Nadarivatu
Nadroga
Kandavu Is.
Praslin Is.
Munia Is.
Mavua
LEVU-IS
Suva
SEE INSET "B"
Niuafoo Is.
Niuafu Is.
Niuatobutabu
Haabai Gr
TONGA
Tongua Is.
Nukualofa, Tongatabu Is.
DATE LINE
S O U T H P A C I
Norfolk Is.
KERMADEC ISLANDS
30°
165°
180°
STATION LOCATIONS
Stations for which climatic data are given in tables

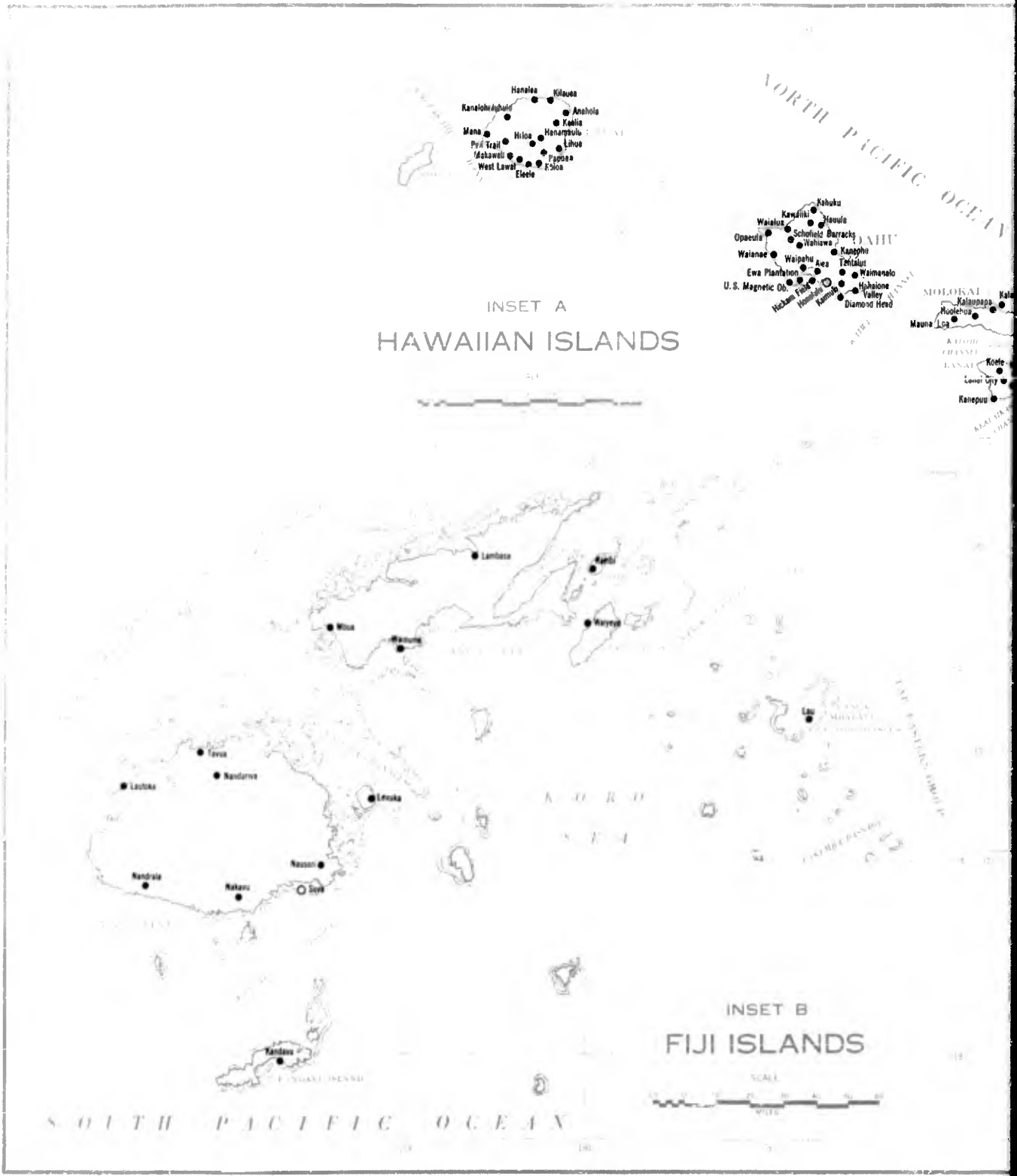
Figure 2A

PANAMA CANAL ZONE- THE PACIFIC ISLANDS



2

ARMY-MRC VICKSBURG, MISS.


Hanalei
Kilauea
Kanaloh
Anahola
Kekaha
Mana
Hilo
Hanapepe
Lihue
Pohakea
Makaweli
Papaaa
West Lawai
Eleele
NORTH PACIFIC OCEAN
Kahuku
Kawailiki
Waialua
Hauula
Schofield Barracks
Opaeula
Wahiawa
Waianae
Kaneohe
Waipahu
Aiea
Tantalus
Ewa Plantation
Waimanalo
U.S. Magnetic Obs.
Honolulu
Kaimuki
Diamond Head
OAHU
INSET A
HAWAIIAN ISLANDS
MOLOKAI
Kalaupapa
Hoolehua
Mauna Loa
Koele
Lanai City
Kanepuu
Lambasa
Kadavu
Wilia
Wainunu
Waryeya
Lau
Tavua
Nandarwa
Lautoka
Levuka
Nausori
Nandrala
Nakaru
Suva
Kandavu
FIJI ISLANDS
SCALE
SOUTH PACIFIC OCEAN

1

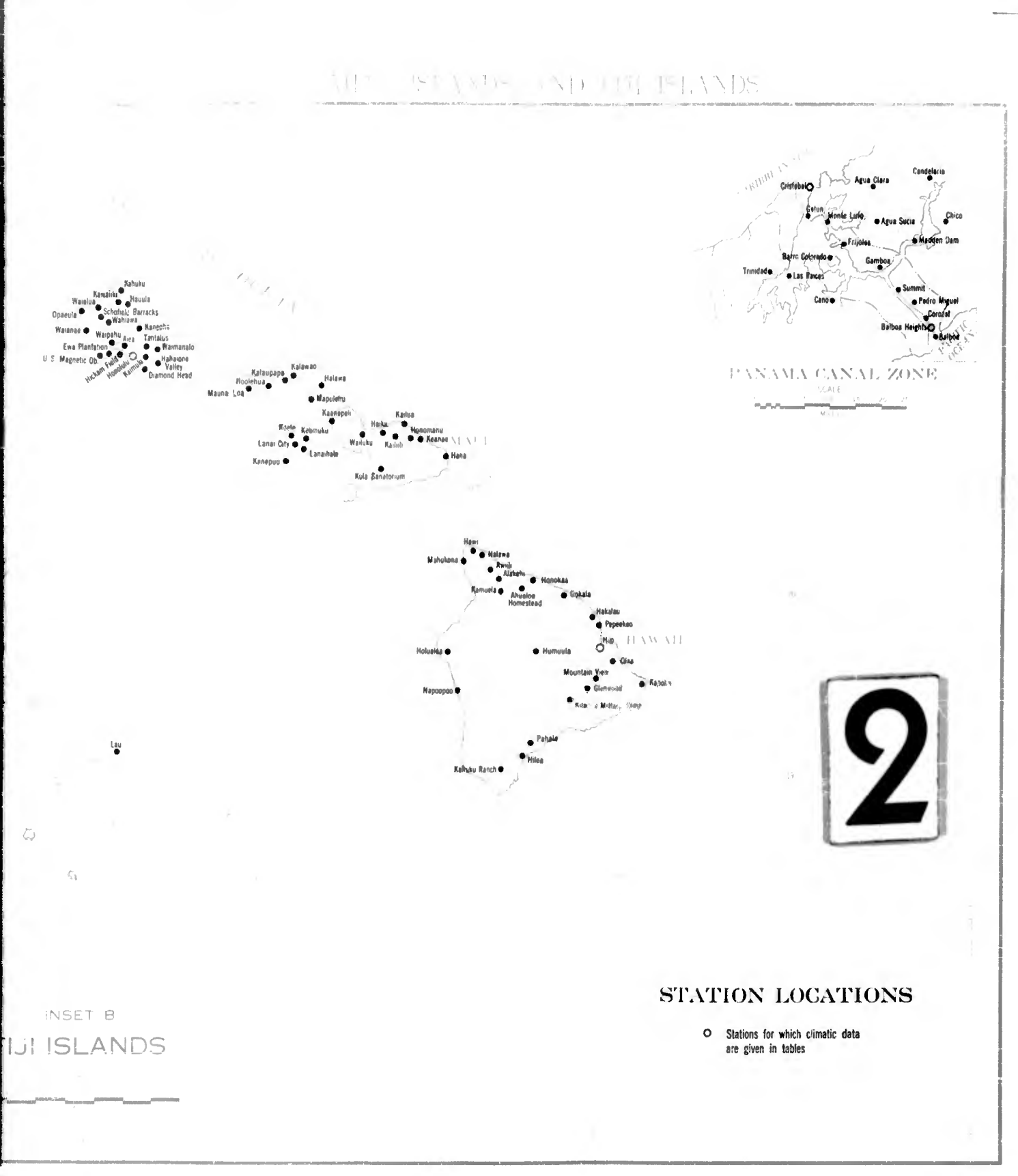

Kahuku
Kawailoa
Waialua
Haleiwa
Opaeula
Schofield Barracks
Wahiawa
Waianae
Kaneohe
Waipahu
Aiea
Tantalus
Ewa Plantation
Waimanalo
U.S. Magnetic Ob
Hickam Field
Honolulu
Kaimuki
Hahaione Valley
Diamond Head
Kalaupapa
Kalawao
Hoolehua
Mauna Loa
Halawa
Mapulehu
Kaanapali
Kahului
Makawao
Haiku
Honomanu
Keanae
Lahaina
Wailuku
Kaluhi
Hana
Kanepuu
Kula Sanatorium
Hawi
Kamuela
Honokaa
Ahualoa Homestead
Hakalau
Papaikou
Hilo
Holualoa
Humuula
Olaa
Mountain View
Glenwood
Napoopoo
Pahala
Hilea
Kahuku Ranch
Lau
Cristobal
Agua Clara
Candelaria
Gatun
Monte Lirio
Agua Sucia
Chico
Frijoles
Madden Dam
Barro Colorado
Gamboa
Trinidad
Las Cascadas
Summit
Cano
Pedro Miguel
Corozal
Balboa Heights
Balboa
PANAMA CANAL ZONE
SCALE
INSET B
IJI ISLANDS
STATION LOCATIONS
Stations for which climatic data are given in tables
2

Figure 2B

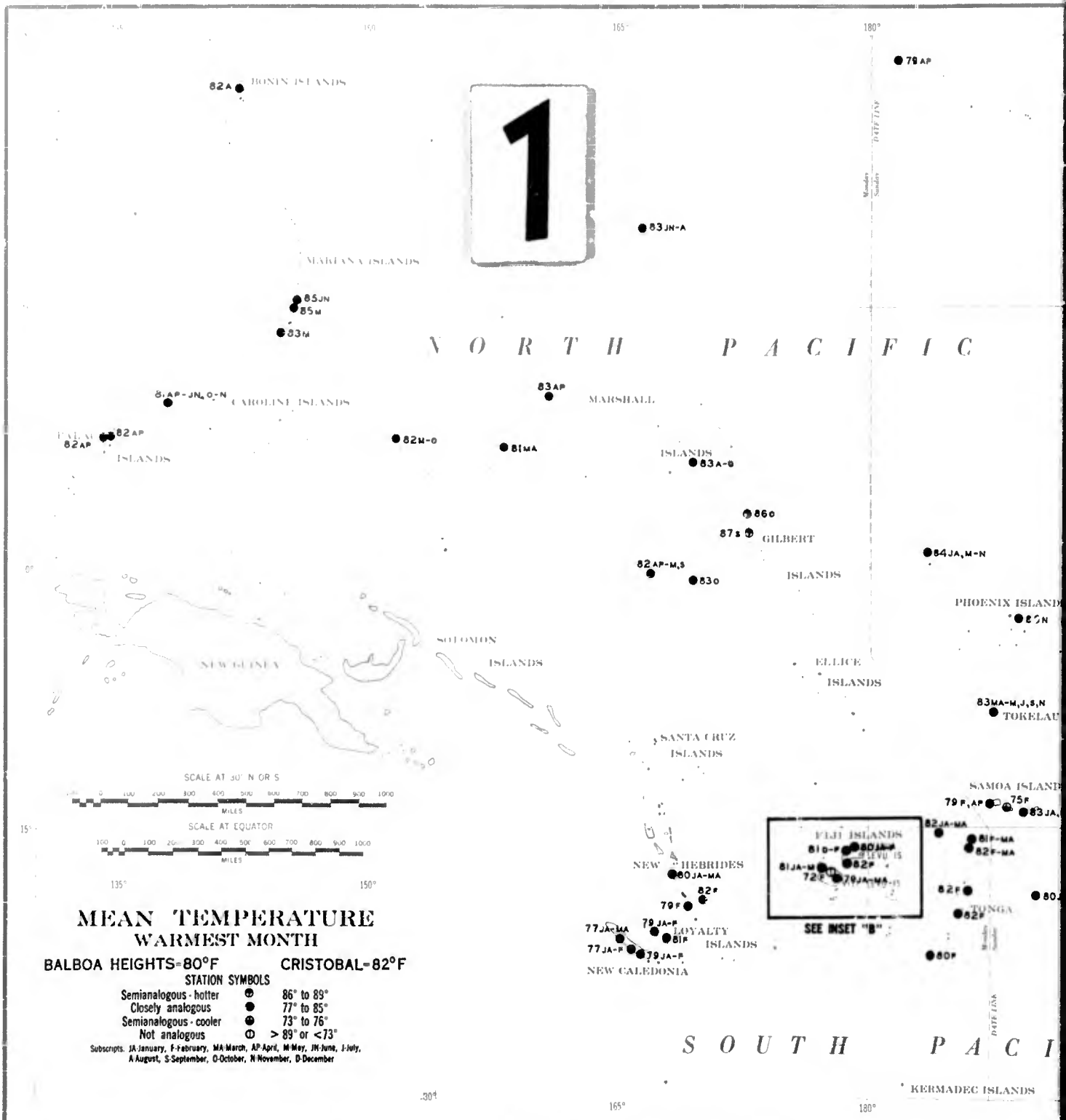
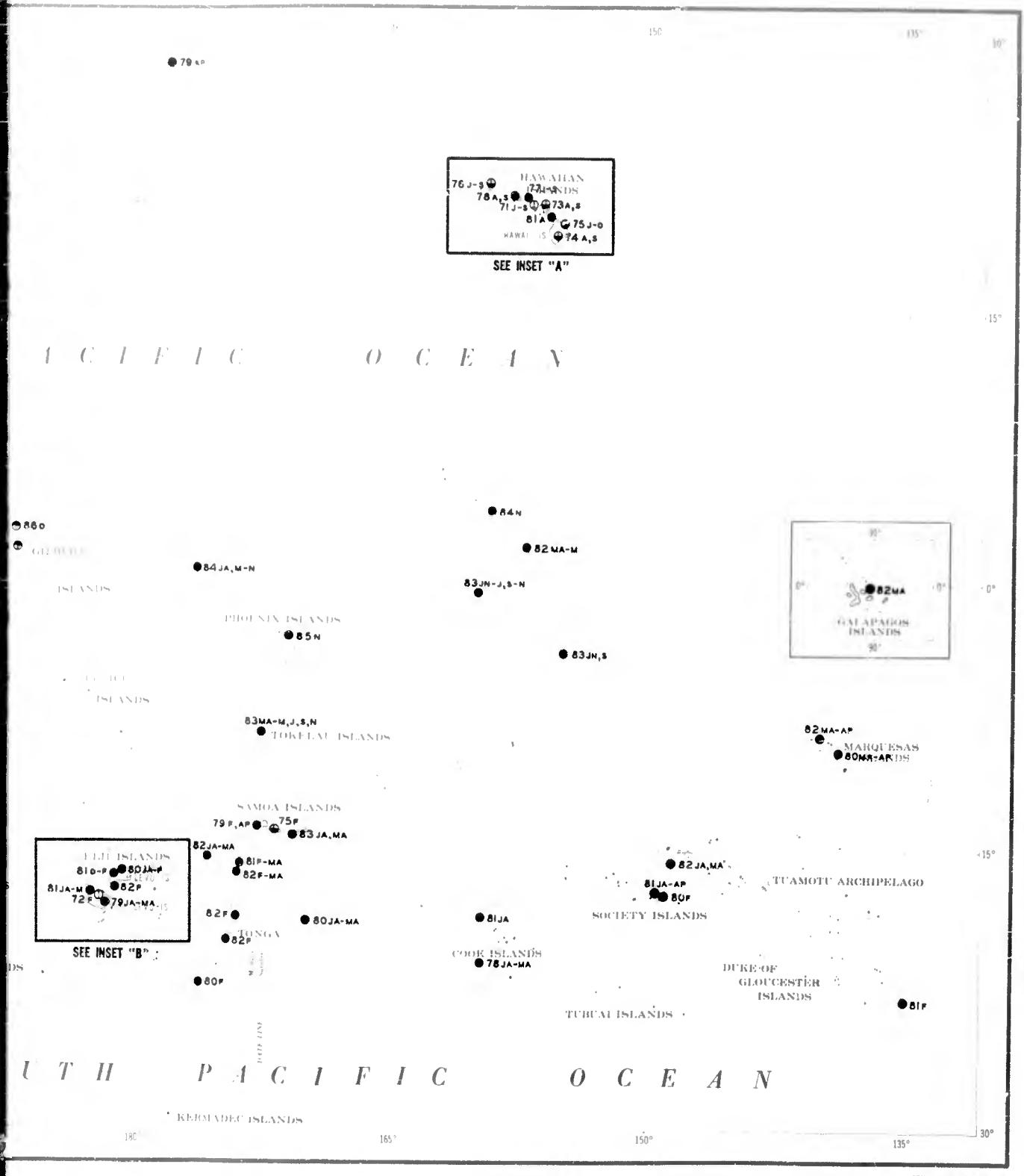
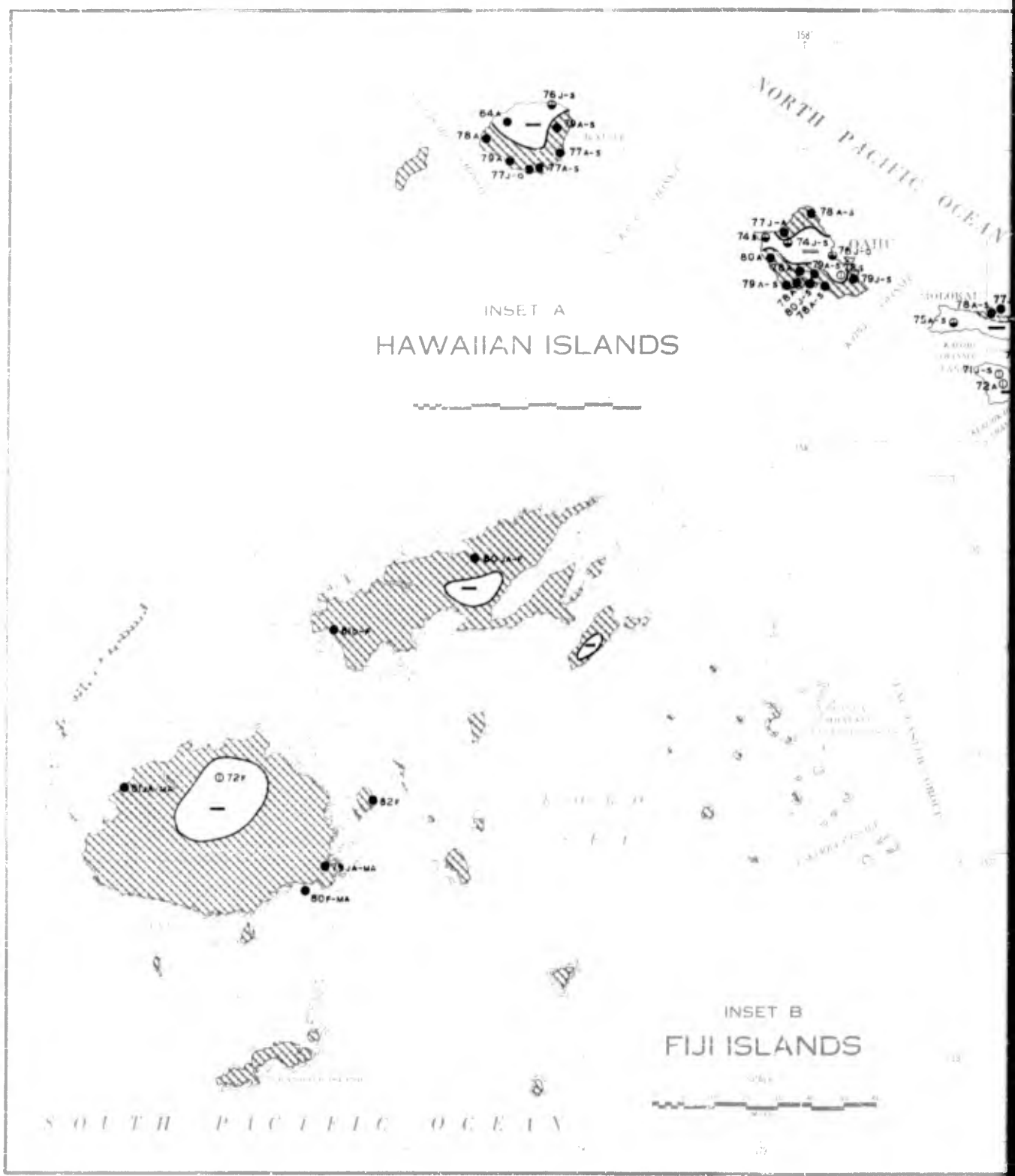

1
BONIN ISLANDS
82A
MARIANA ISLANDS
85JN
85M
83M
79AP
83JN-A
NORTH PACIFIC
CAROLINE ISLANDS
MARSHALL ISLANDS
GILBERT ISLANDS
PHOENIX ISLANDS
ELLICE ISLANDS
TOKELAU
SOLOMON ISLANDS
NEW GUINEA
SANTA CRUZ ISLANDS
NEW HEBRIDES
LOYALTY ISLANDS
NEW CALEDONIA
FIJI ISLANDS
SEE INSET "B"
TONGA
SAMOA ISLANDS
KERMADEC ISLANDS
SOUTH PACI
DATE LINE
SCALE AT 30° N OR S
SCALE AT EQUATOR
MILES
MEAN TEMPERATURE
WARMEST MONTH
BALBOA HEIGHTS-80°F
CRISTOBAL-82°F
STATION SYMBOLS
Semianalogous - hotter 86° to 89°
Closely analogous 77° to 85°
Semianalogous - cooler 73° to 76°
Not analogous > 89° or <73°
Subscripts. JA-January, F-February, MA-March, AP-April, M-May, JN-June, J-July, A-August, S-September, O-October, N-November, D-December

Figure 3A

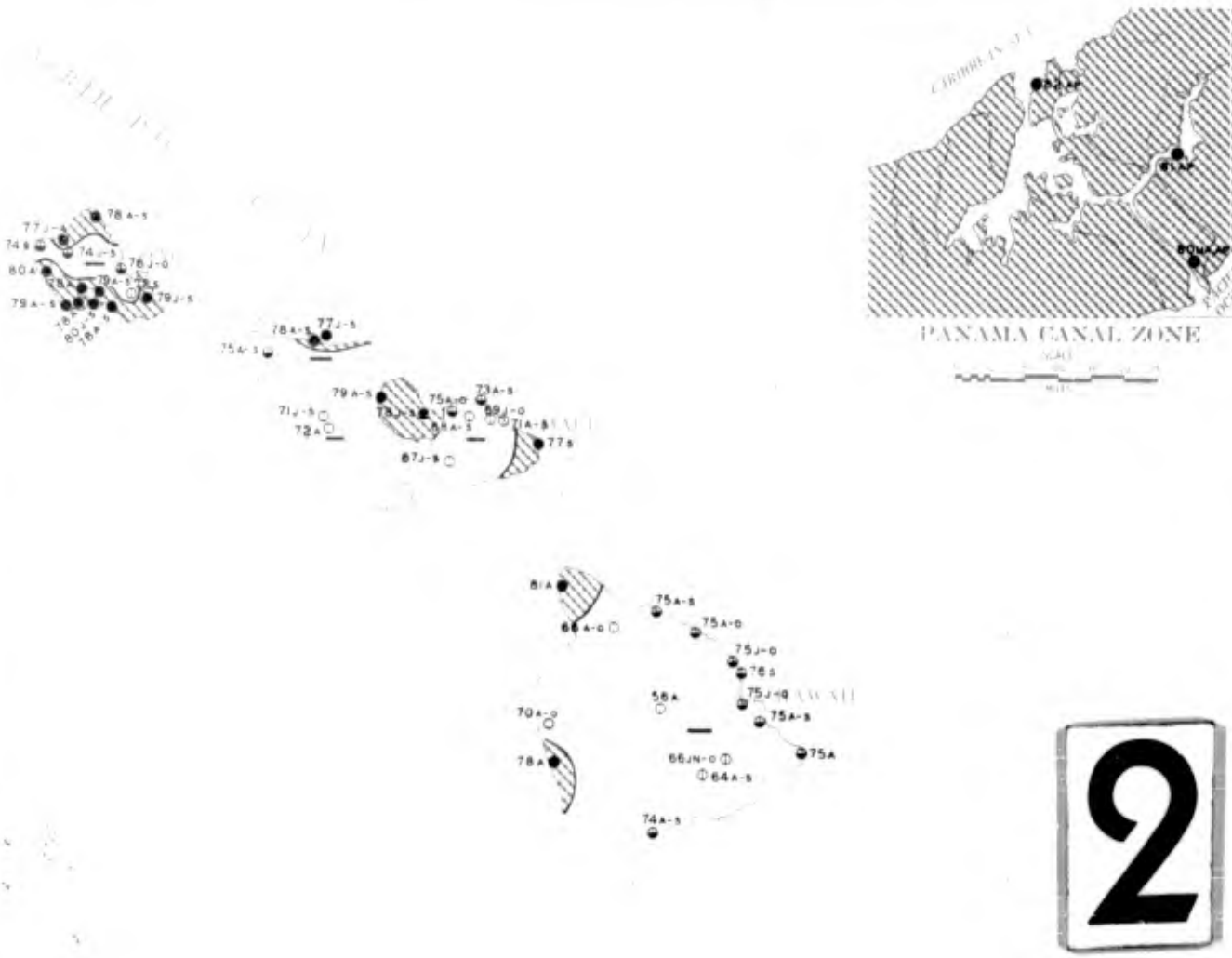


2

ARMY NRC VICKSBURG, MISS


158°
NORTH PACIFIC OCEAN
INSET A
HAWAIIAN ISLANDS
INSET B
FIJI ISLANDS
SOUTH PACIFIC OCEAN

1



MEAN TEMPERATURE
WARMEST MONTH

BALBOA HEIGHTS=80°F CRISTOBAL=82°F

Closely analogous areas

STATION SYMBOLS

Semianalogous - hotter	◓	86° to 89°
Closely analogous	●	77° to 85°
Semianalogous - cooler	◒	73° to 76°
Not analogous	ⓘ	> 89° or <73°

Subscripts JA January, F February, MA March, AP April, M May, JN June, J July, A August, S September, O October, N November, D December

Cocler areas —

RELIABILITY Fair to good ——

Figure 3B

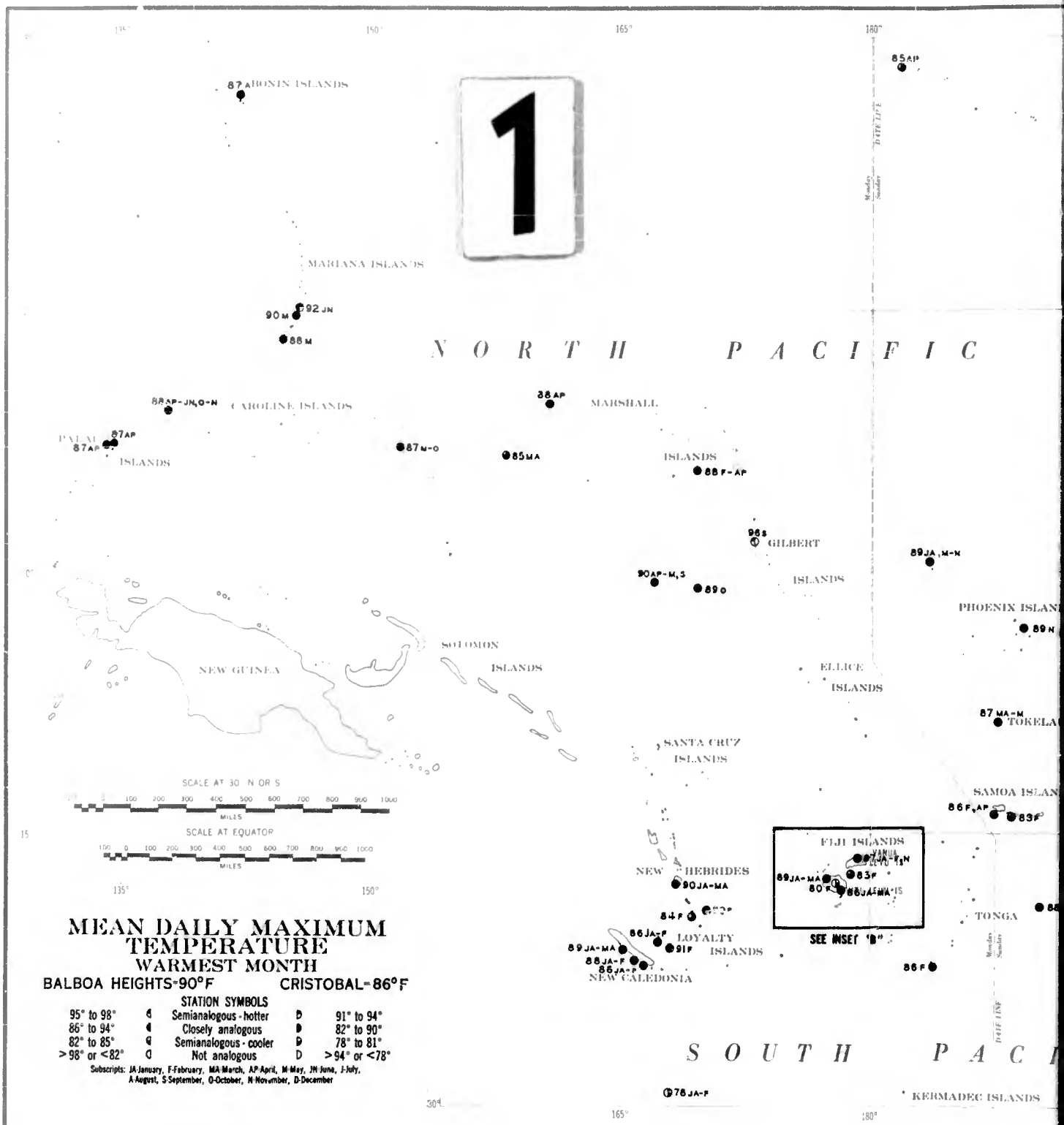
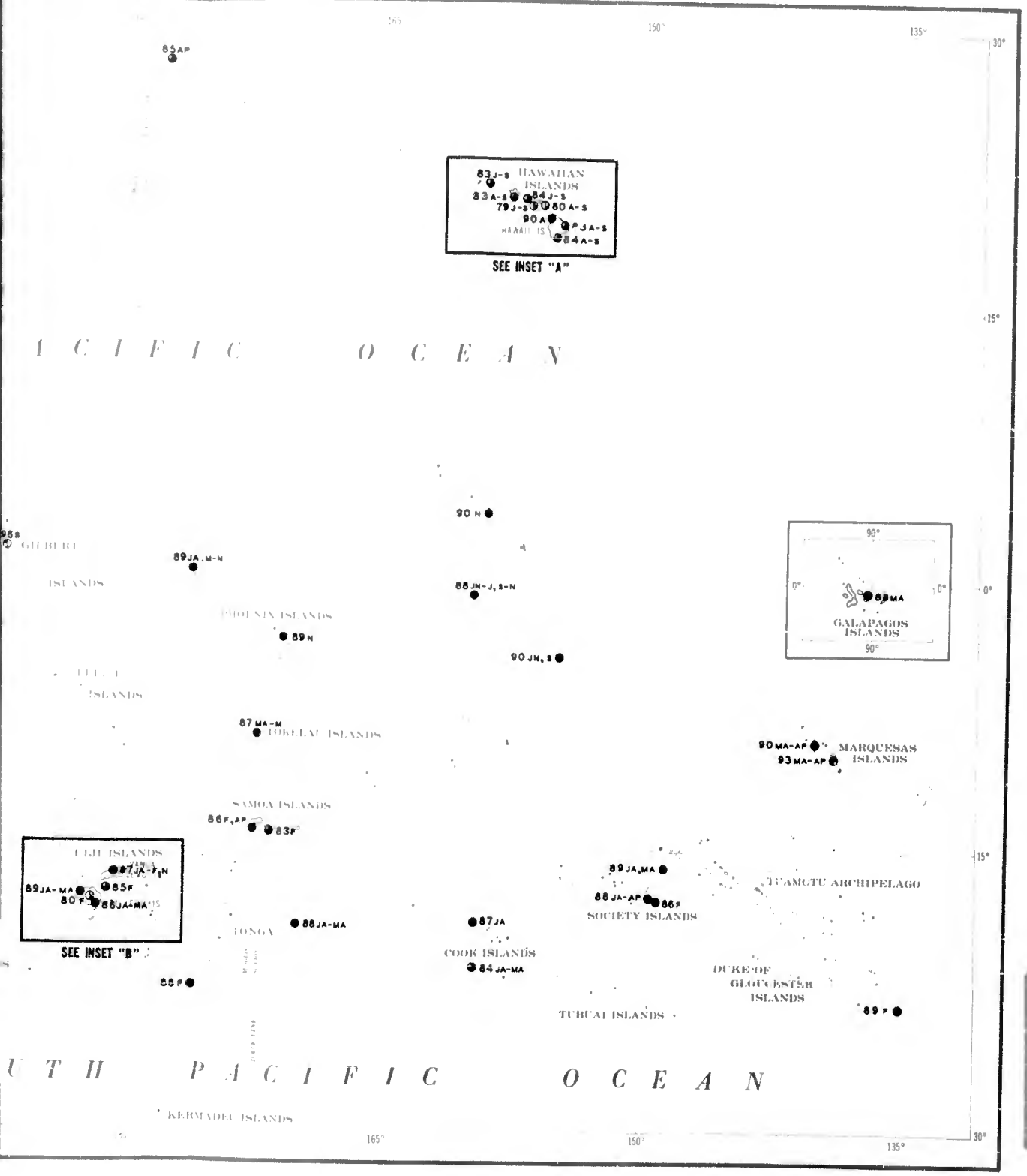

1
87A ABONIN ISLANDS
MARIANA ISLANDS
90M 92JN
88M
NORTH PACIFIC
88AP-JN,O-N CAROLINE ISLANDS
87AP
87AP
ISLANDS
87M-O
85MA
88AP MARSHALL
ISLANDS
88F-AP
85AP
98S GILBERT
ISLANDS
89JA,M-N
90AP-M,S
89O
PHOENIX ISLAN
89N
SOLOMON
ISLANDS
NEW GUINEA
ELLICE
ISLANDS
87MA-M TOKELA
SANTA CRUZ
ISLANDS
SAMOA ISLAN
86F,AP
83F
FIJI ISLANDS
87JA-F,N
83F
89JA-MA
80F
86JA-MA
SEE INSET "B"
NEW HEBRIDES
90JA-MA
84F
86JA-F
LOYALTY
ISLANDS
89JA-MA
91F
88JA-F
86JA-F
NEW CALEDONIA
TONGA
86F
SOUTH PACI
78JA-F
KERMADEC ISLANDS
SCALE AT 30° N OR S
0 100 200 300 400 500 600 700 800 900 1000
MILES
SCALE AT EQUATOR
100 0 100 200 300 400 500 600 700 800 900 1000
MILES
135° 150° 165° 180°
MEAN DAILY MAXIMUM TEMPERATURE
WARMEST MONTH
BALBOA HEIGHTS-90°F CRISTOBAL-86°F
STATION SYMBOLS
95° to 98° G Semianalogous - hotter D 91° to 94°
86° to 94° G Closely analogous D 82° to 90°
82° to 85° G Semianalogous - cooler D 78° to 81°
>98° or <82° G Not analogous D >94° or <78°
Subscripts: JA-January, F-February, MA-March, AP-April, M-May, JN-June, J-July, A-August, S-September, O-October, N-November, D-December

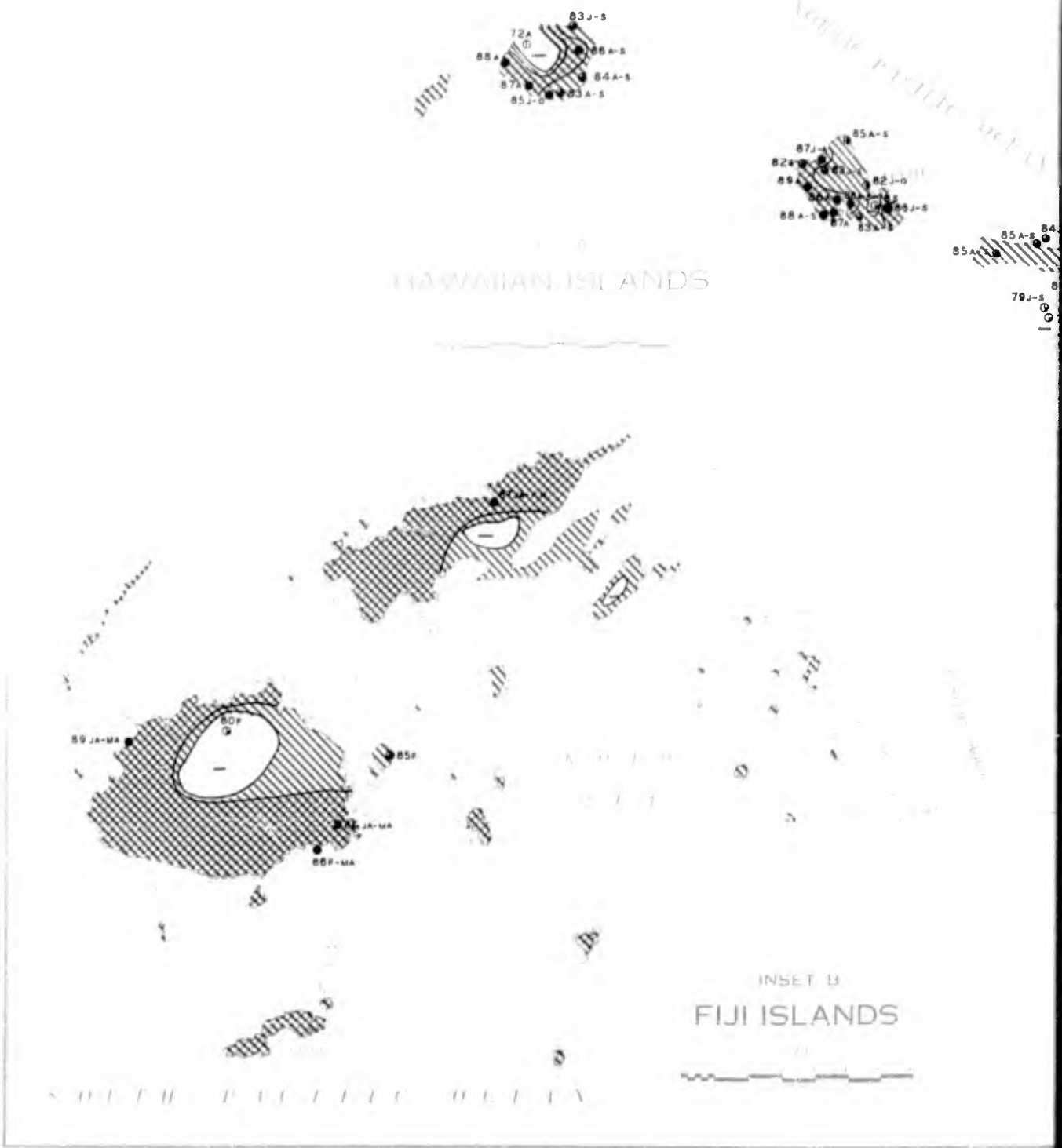
Figure 4A

ANAMA CANAL ZONE-THE PACIFIC ISLANDS



2

ARMY MRC VICKSBURG, MISS.



1

MEAN DAILY MAXIMUM TEMPERATURE
WARMEST MONTH

BALBOA HEIGHTS-90°F CRISTOBAL-86°F

Closely analogous areas

STATION SYMBOLS

95° to 98°	G	Semianalogous - hotter	D	91° to 94°
86° to 94°	A	Closely analogous	B	82° to 90°
82° to 85°	G	Semianalogous - cooler	B	78° to 81°
>98° or <82°	D	Not analogous	D	>94° or <78°

Subscripts JA January, F-February, MA-March, AP-April, M-May, JN-June, J-July, A-August, S-September, O-October, N-November, D-December

Cooler areas —

RELIABILITY: Fair to good ———

Figure 4B

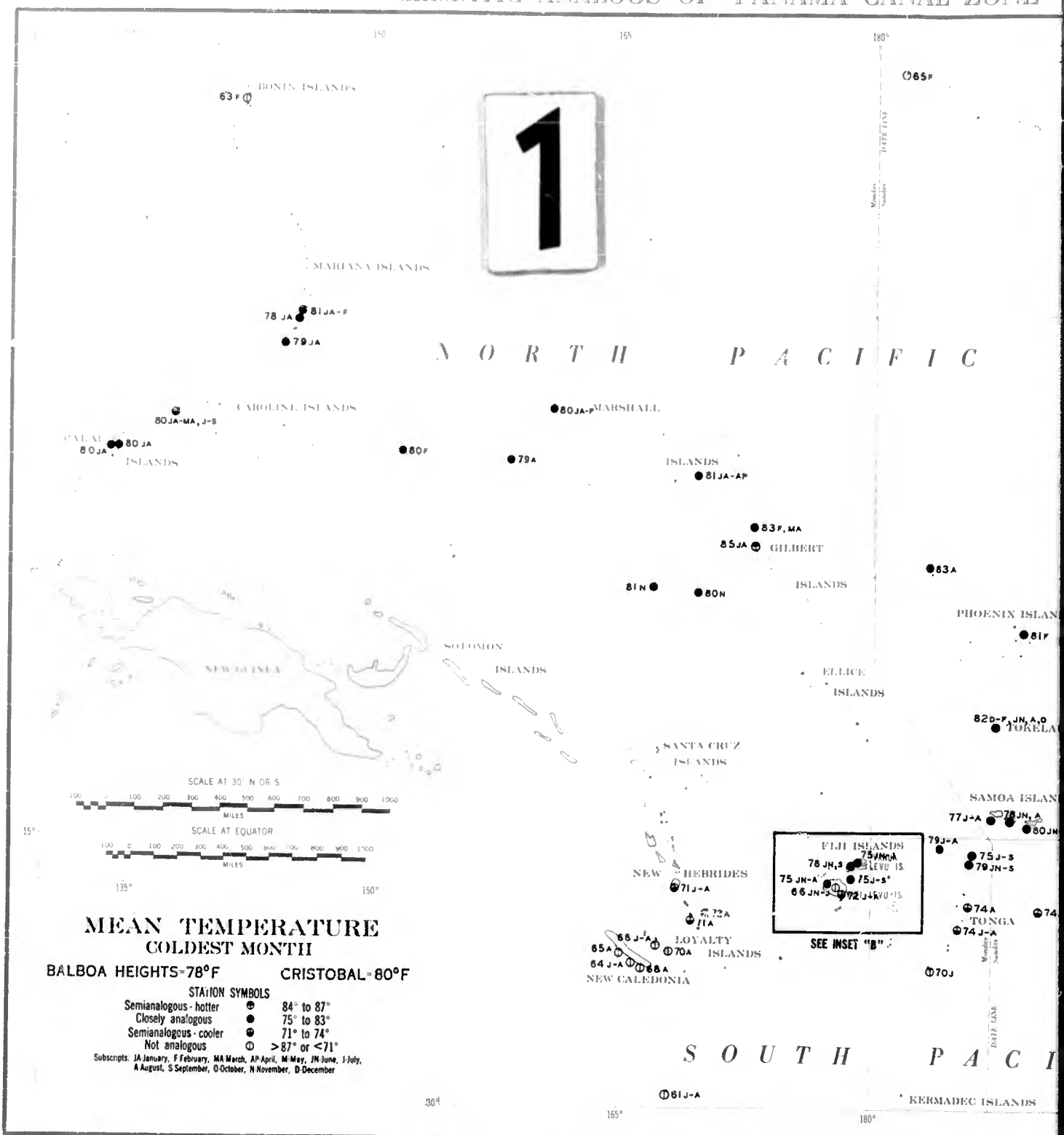
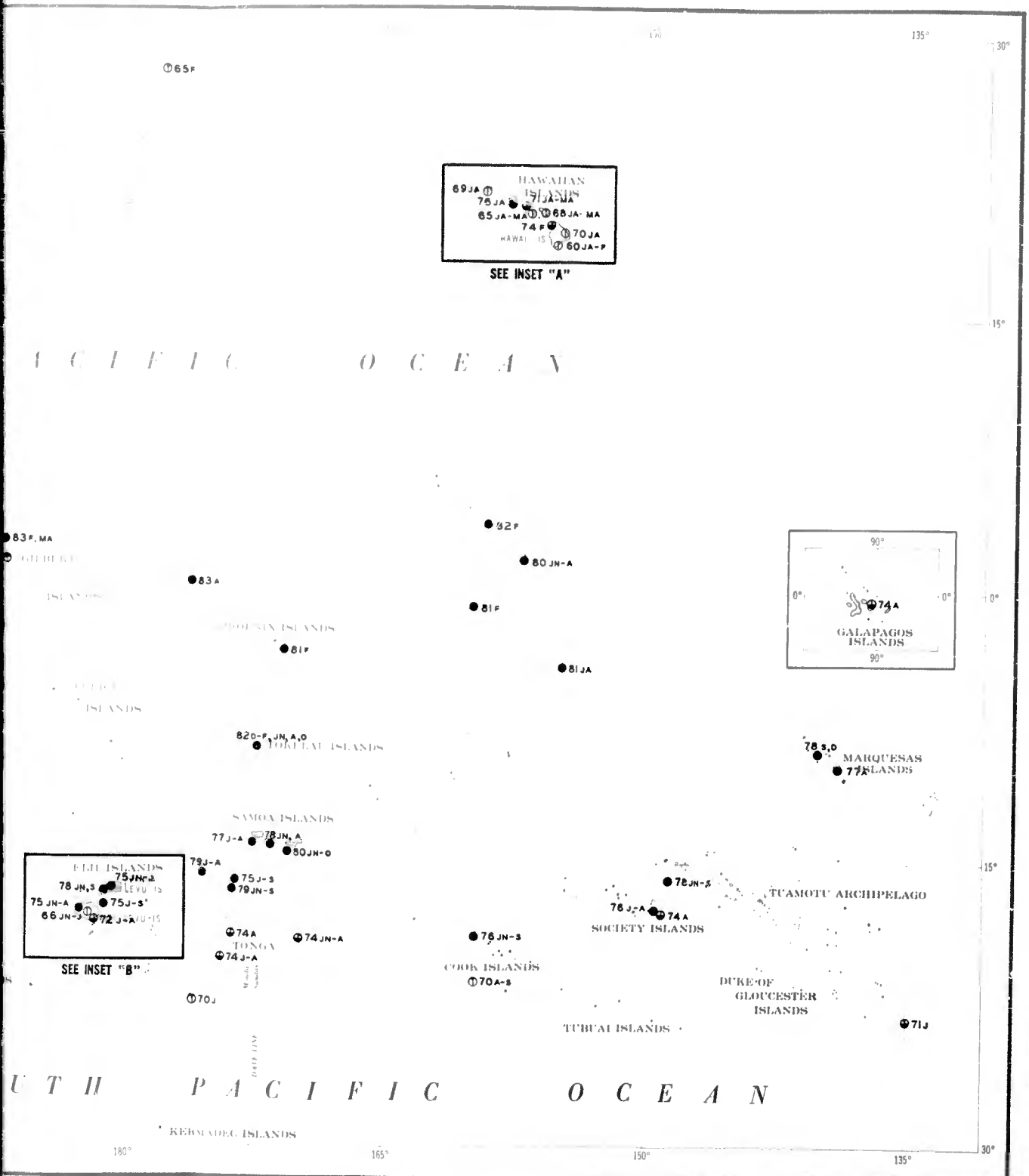
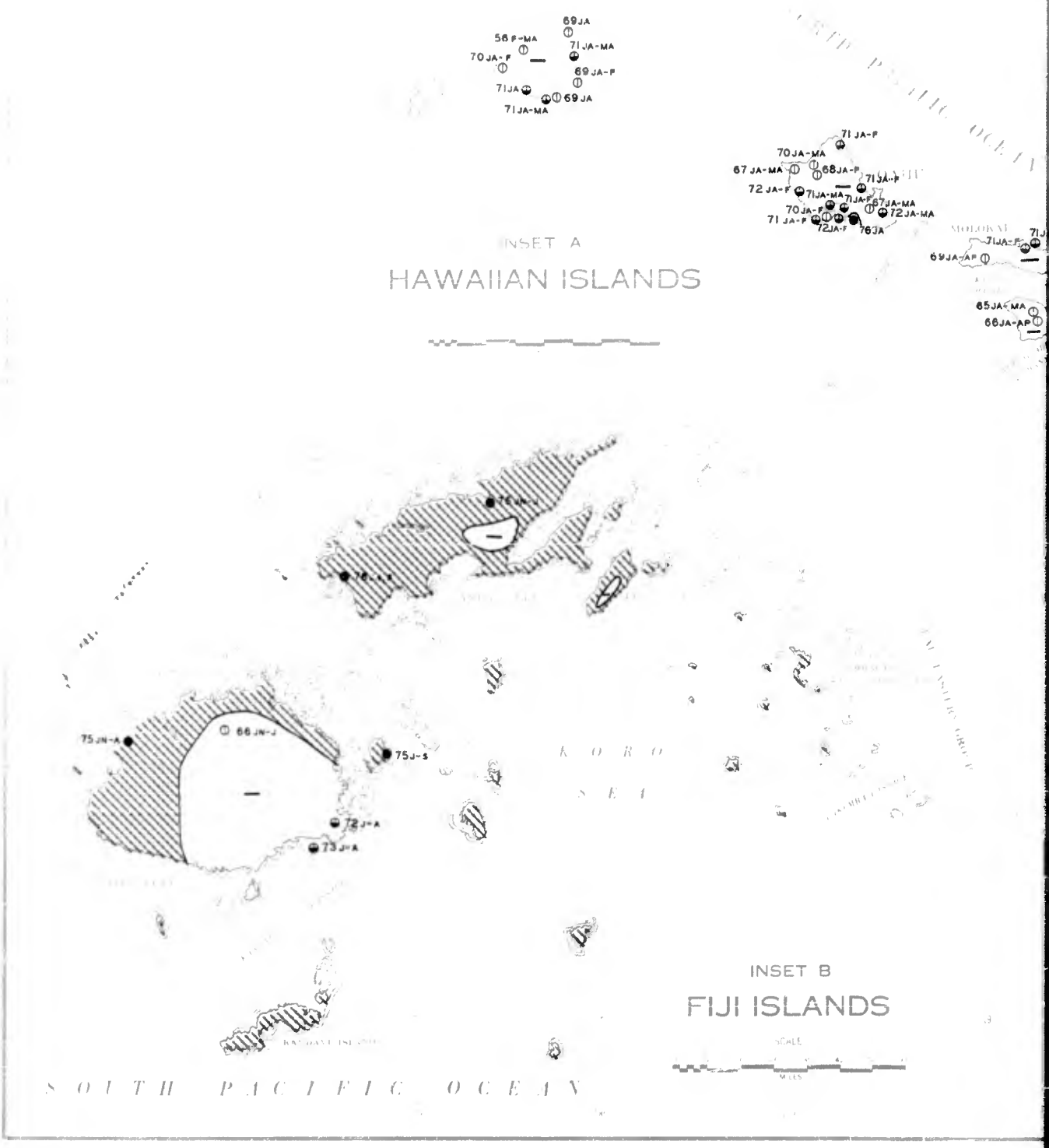

1
BONIN ISLANDS
63F
65F
MARIANA ISLANDS
78 JA
81JA-F
79JA
NORTH PACIFIC
CAROLINE ISLANDS
80JA-MA, J-S
80JA-P MARSHALL
80 JA
80JA
ISLANDS
80F
79A
ISLANDS
81JA-AP
83F, MA
85JA GILBERT
ISLANDS
83A
81N
80N
PHOENIX ISLAN
81F
SOLOMON
ISLANDS
ELLICE
ISLANDS
82D-F, JN, A, O
TOKELA
SANTA CRUZ
ISLANDS
SAMOA ISLAN
77J-A
78JN, A
80JN
79J-A
FIJI ISLANDS
75JN-A
LEVU IS.
78 JN, S
75 JN-A
75J-S*
66 JN-S
72J-A
LEVU IS.
75J-S
79JN-S
NEW HEBRIDES
71J-A
72A
71A
74A
TONGA
74
74J-A
68J-A
LOYALTY
ISLANDS
65A
70A
64J-A
68A
NEW CALEDONIA
SEE INSET "B"
70J
SOUTH PACI
61J-A
KERMADEC ISLANDS
SCALE AT 30° N OR S
MILES
SCALE AT EQUATOR
MILES
MEAN TEMPERATURE
COLDEST MONTH
BALBOA HEIGHTS=78°F
CRISTOBAL=80°F
STATION SYMBOLS
Semianalogous - hotter 84° to 87°
Closely analogous 75° to 83°
Semianalogous - cooler 71° to 74°
Not analogous >87° or <71°
Subscripts: JA January, F February, MA March, AP April, M May, JN June, J July, A August, S September, O October, N November, D December

Figure 5A

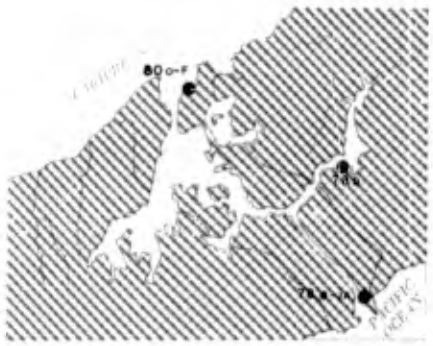


2

ARMY-MRC VICKSBURG, MISS.


INSET A
HAWAIIAN ISLANDS
INSET B
FIJI ISLANDS
SCALE
MILES
SOUTH PACIFIC OCEAN
KORO SEA
69JA
56 P-MA
71JA-MA
70JA-F
69JA-F
71JA
69JA
71JA-MA
71 JA-F
70JA-MA
67 JA-MA
68JA-P
71JA-F
72 JA-F
71JA-MA
71JA-F
67JA-MA
70JA-F
72JA-MA
71 JA-F
72JA-F
76JA
69JA-AP
65JA-MA
66JA-AP
75JN-J
75JN-A
66JN-J
75J-S
72J-A
73J-A

1



2

INSET B

IJI ISLANDS

MEAN TEMPERATURE
COLDEST MONTH

BALBOA HEIGHTS 78°F CRISTOBAL 80°F

Closely analogous areas

STATION SYMBOLS

Semianalogous - hotter	◒	84° to 87°
Closely analogous	●	75° to 83°
Semianalogous - cooler	◓	71° to 74°
Not analogous	⊕	>87° or <71°

Subscripts: JA January, F February, MA March, AP April, M May, JR June, J July, A August, S September, O October, N November, D December

Cooler areas —

RELIABILITY: Fair to good ———

Figure 5B

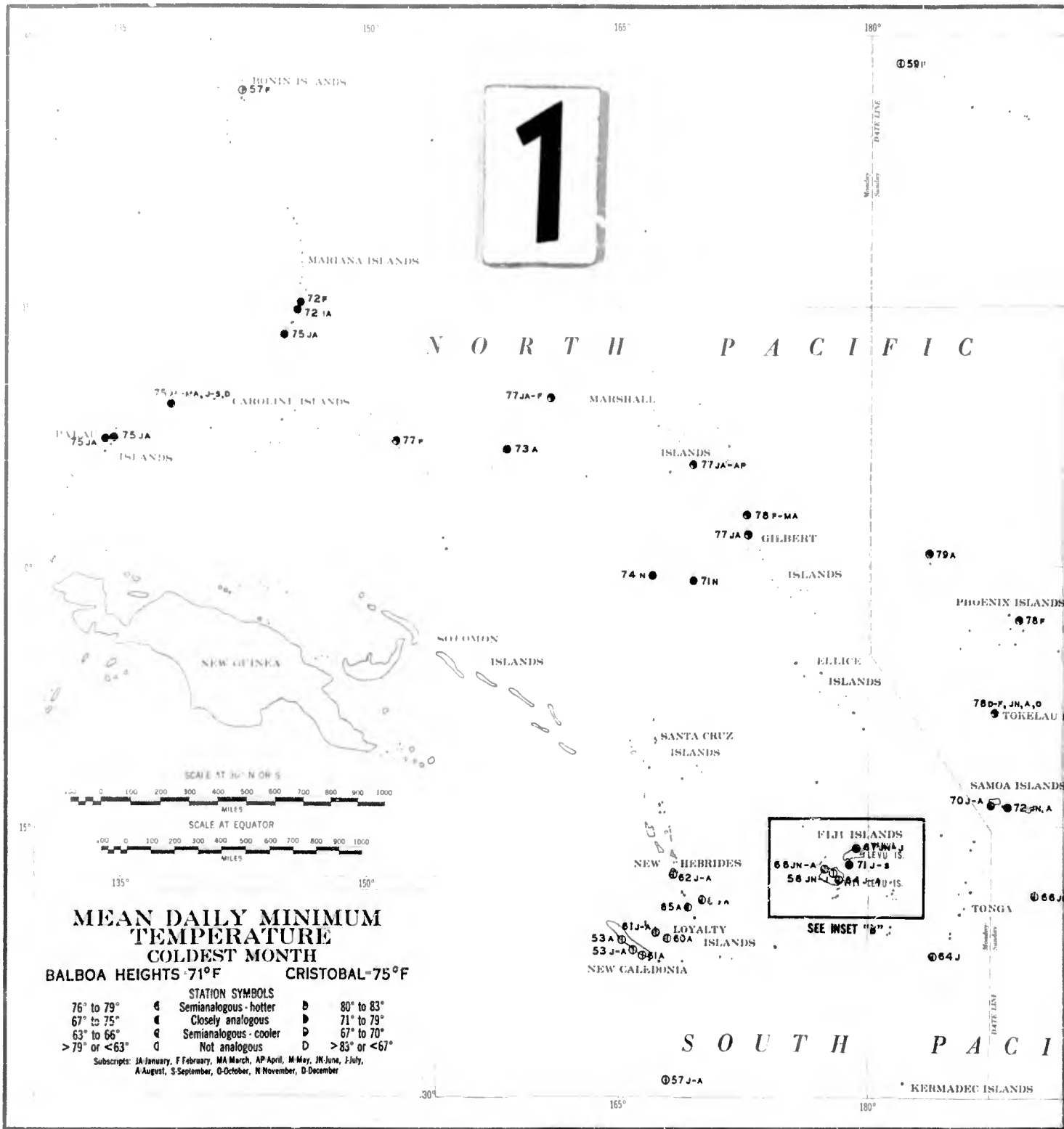
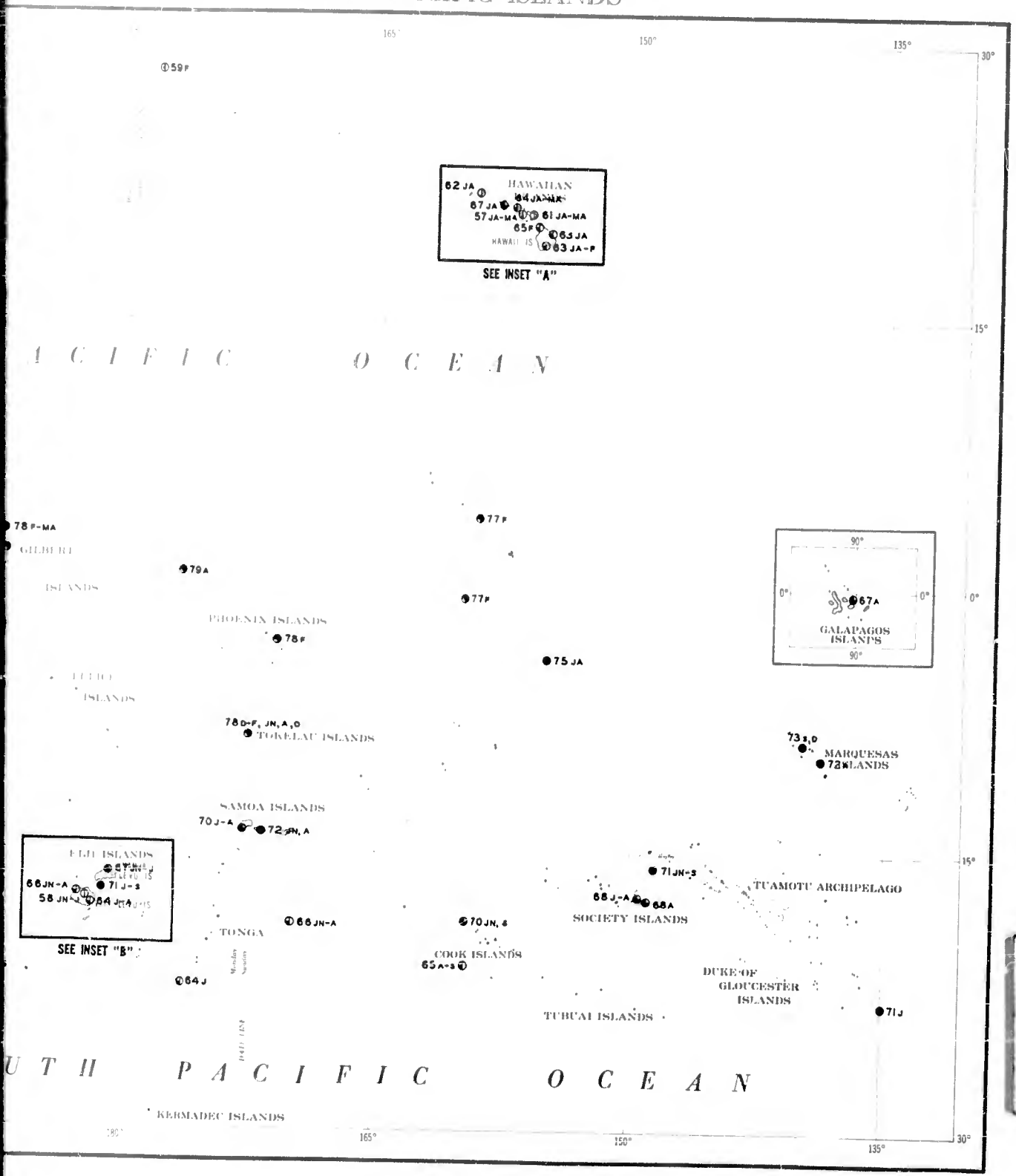

1
NORTH PACIFIC
SOUTH PACI
MARIANA ISLANDS
CAROLINE ISLANDS
MARSHALL ISLANDS
GILBERT ISLANDS
ELLICE ISLANDS
PHOENIX ISLANDS
SOLOMON ISLANDS
NEW GUINEA
SANTA CRUZ ISLANDS
NEW HEBRIDES
LOYALTY ISLANDS
NEW CALEDONIA
FIJI ISLANDS
TONGA
SAMOA ISLANDS
KERMADEC ISLANDS
TOKELAU
SEE INSET "B"
DATE LINE
SCALE AT EQUATOR
MILES
MEAN DAILY MINIMUM TEMPERATURE
COLDEST MONTH
BALBOA HEIGHTS 71°F
CRISTOBAL 75°F
STATION SYMBOLS
76° to 79° Semianalogous - hotter 80° to 83°
67° to 75° Closely analogous 71° to 79°
63° to 66° Semianalogous - cooler 67° to 70°
>79° or <63° Not analogous >83° or <67°
Subscripts: JA January, F February, MA March, AP April, M May, JN June, J July, A August, S September, O October, N November, D December

Figure 6A

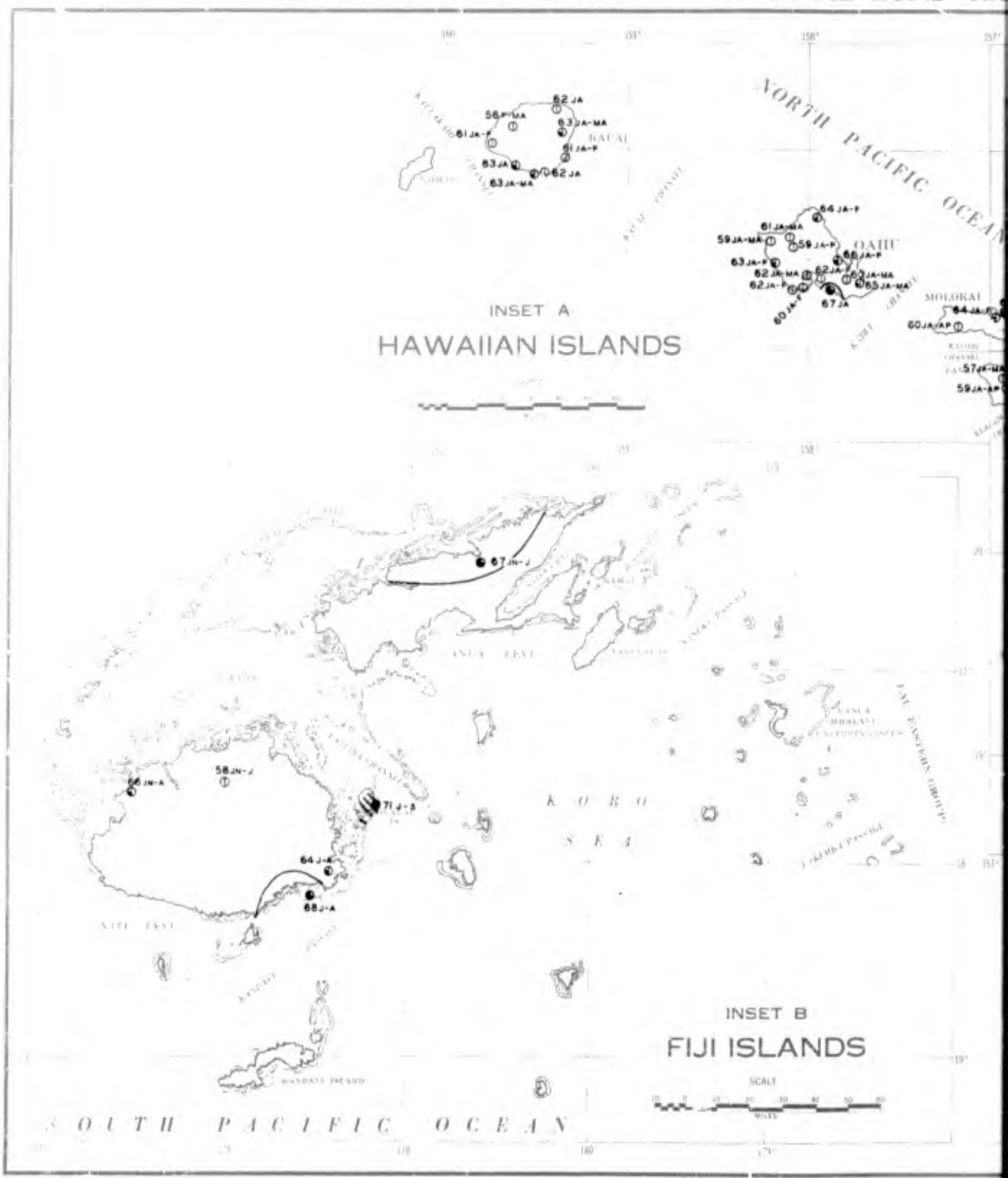
ANAMA CANAL ZONE- THE PACIFIC ISLANDS



2

ARMY-MRC VICKSBURG, MISS.

CLIMATIC ANALOGS OF PANAMA CANAL ZONE- HA



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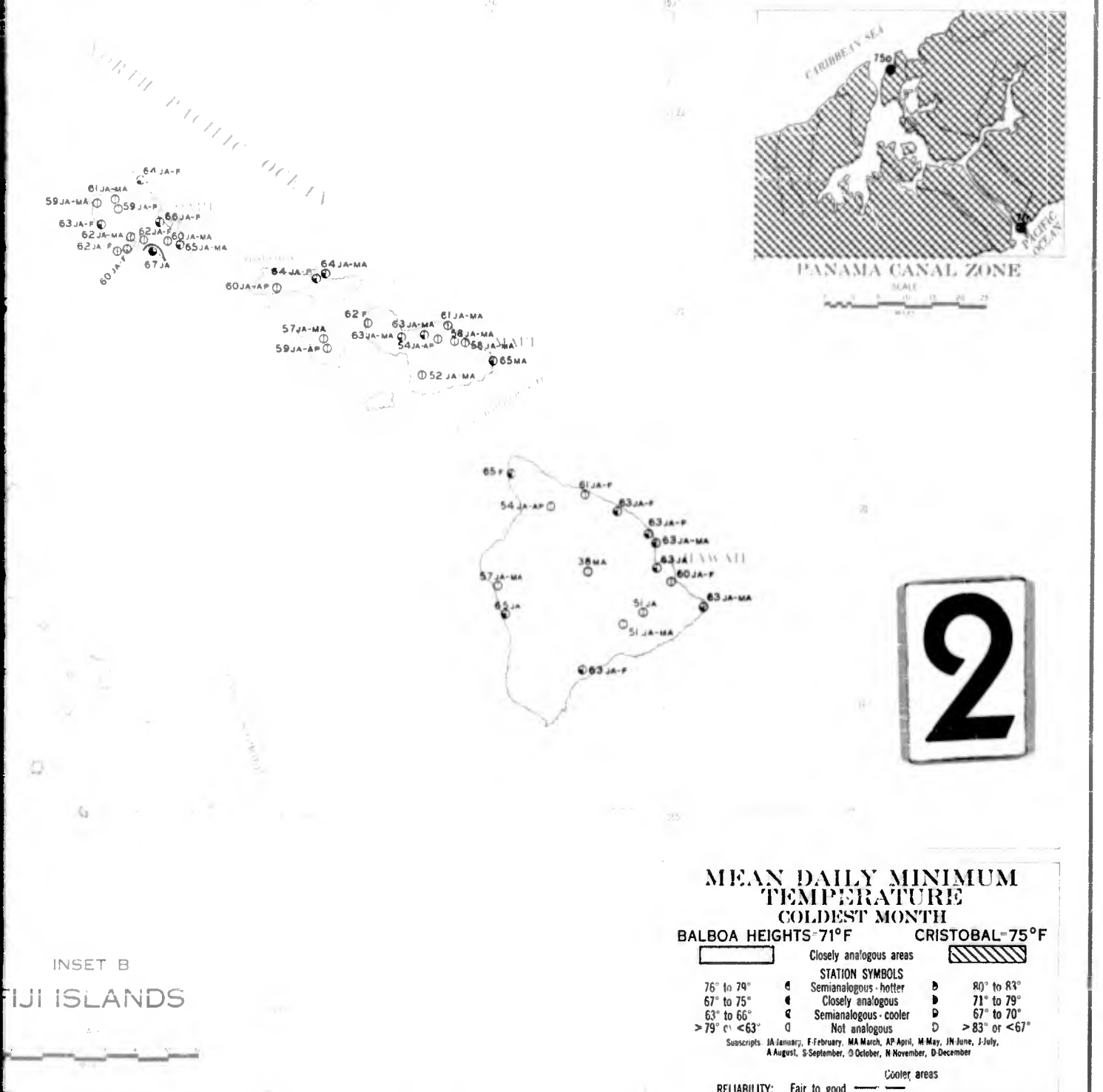

CARIBBEAN SEA
75e
30
PACIFIC OCEAN
PANAMA CANAL ZONE
SCALE
64 JA-F
61 JA-MA
59 JA-MA
59 JA-P
66 JA-P
63 JA-F
62 JA-MA
62 JA-F
60 JA-MA
62 JA-F
65 JA-MA
60 JA-F
67 JA
64 JA-F
64 JA-MA
60 JA-AP
62 F
63 JA-MA
61 JA-MA
57 JA-MA
63 JA-MA
58 JA-MA
59 JA-AP
54 JA-AP
58 JA-MA
65 MA
52 JA-MA
65 F
61 JA-F
54 JA-AP
63 JA-F
63 JA-P
63 JA-MA
38 MA
63 JA
60 JA-F
57 JA-MA
63 JA-MA
63 JA
51 JA
51 JA-MA
63 JA-F
2
MEAN DAILY MINIMUM TEMPERATURE
COLDEST MONTH
BALBOA HEIGHTS-71°F
CRISTOBAL-75°F
Closely analogous areas
STATION SYMBOLS
76° to 79° e Semianalogous - hotter D 80° to 83°
67° to 75° E Closely analogous D 71° to 79°
63° to 66° e Semianalogous - cooler D 67° to 70°
>79° or <63° O Not analogous D >83° or <67°
Subscripts: JA-January, F-February, MA March, AP-April, M-May, JN-June, J-July, A-August, S-September, O-October, N-November, D-December
Cooler areas
RELIABILITY: Fair to good
INSET B
FIJI ISLANDS

Figure 6B

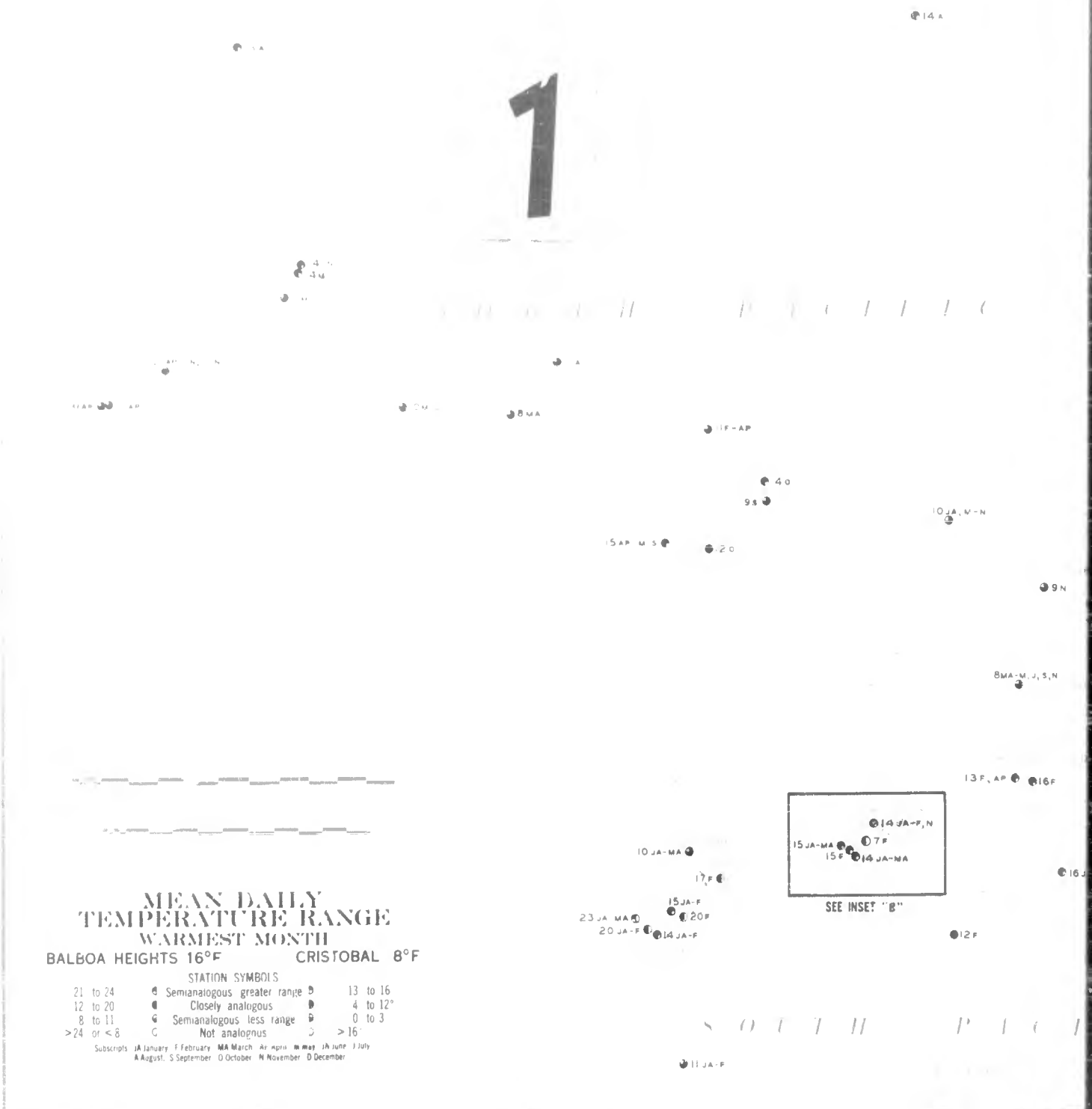
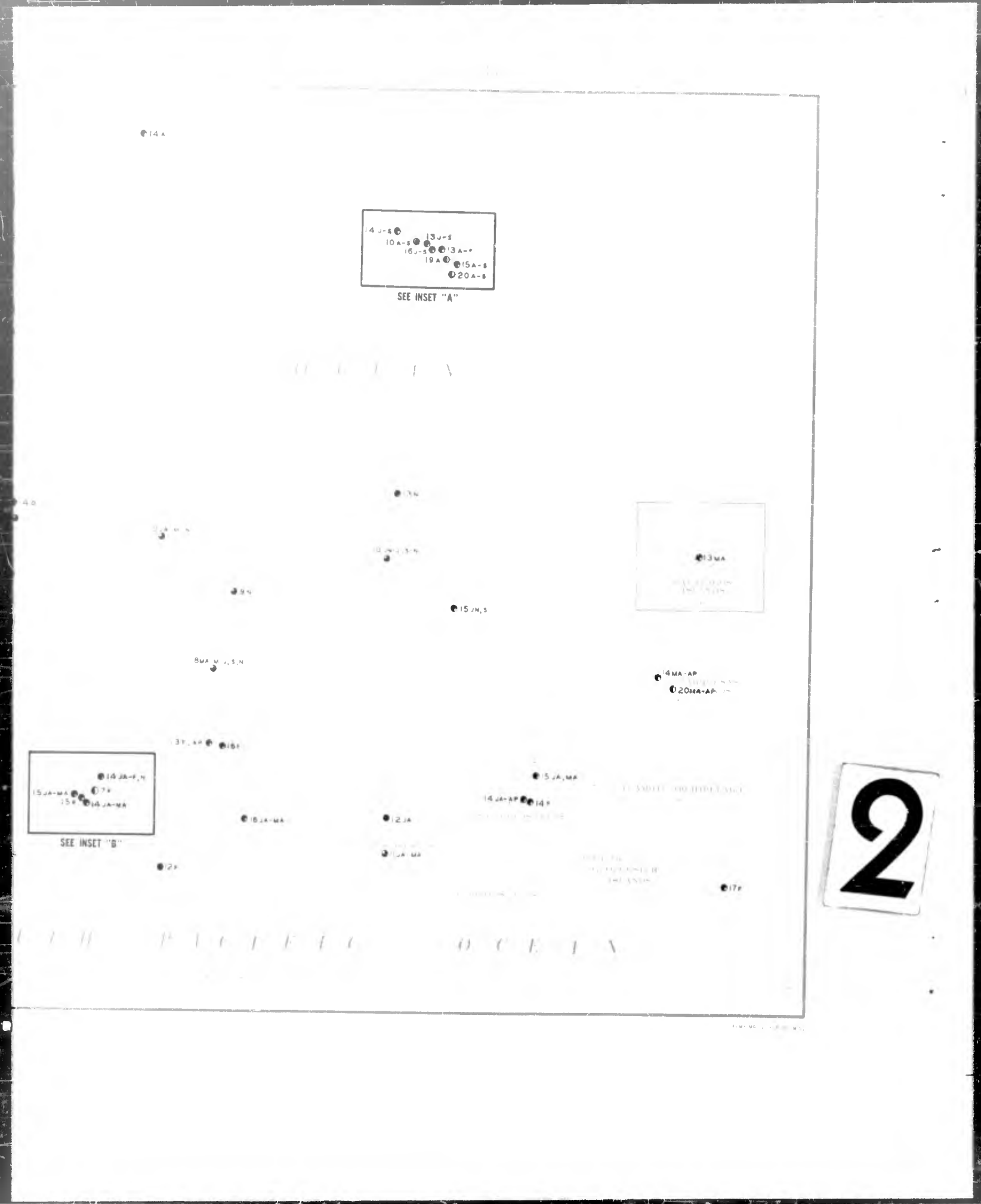
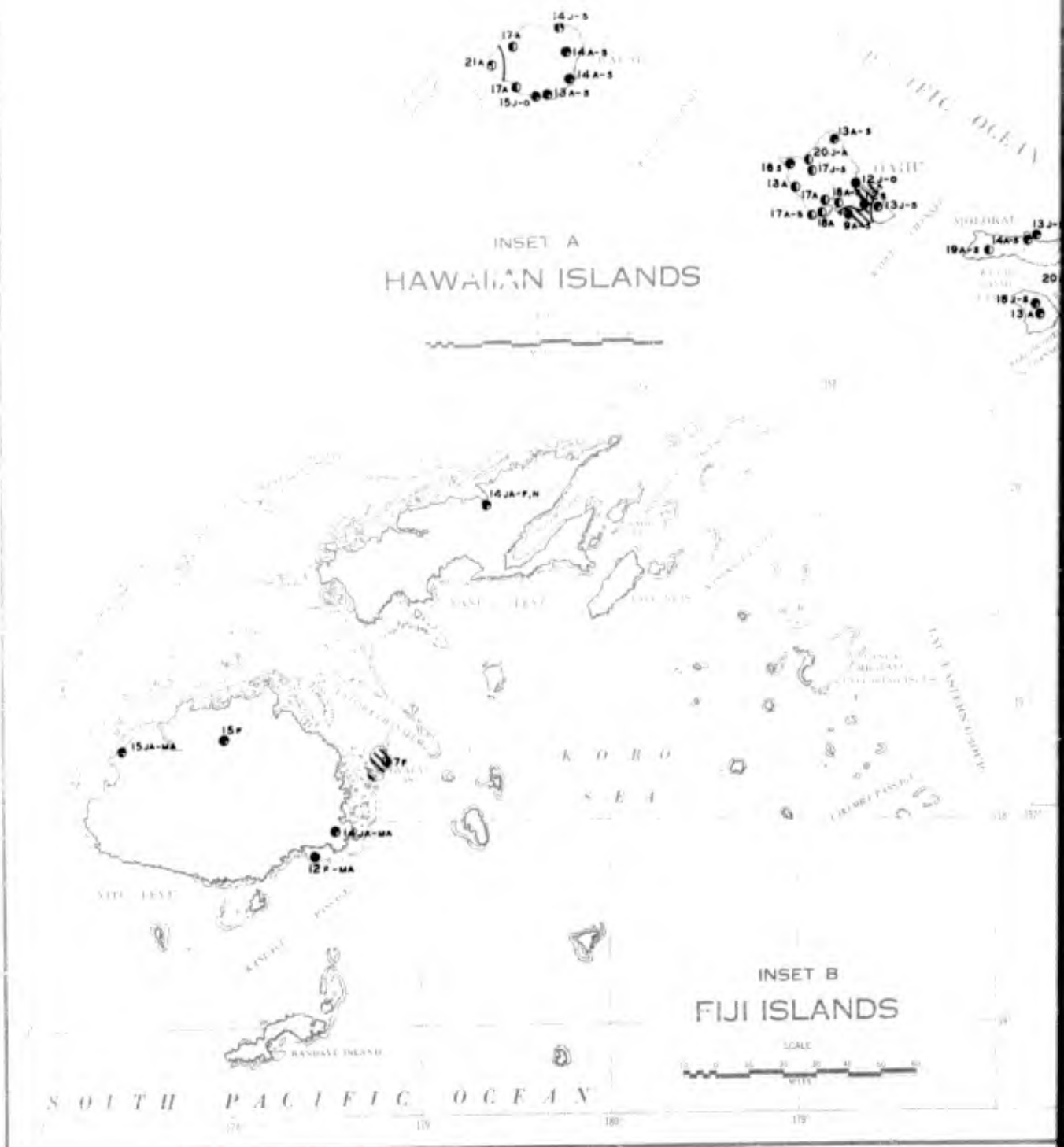

1
8MA
11F-AP
40
9S
10JA,M-N
15AP M S
20
9N
8MA-M,J,S,N
13F,AP
16F
14JA-F,N
7F
15JA-MA
15F
14JA-MA
10JA-MA
17F
15JA-F
23JA MA
20JA-F
20F
14JA-F
SEE INSET "B"
12F
16J
11JA-F
MEAN DAILY
TEMPERATURE RANGE
WARMEST MONTH
BALBOA HEIGHTS 16°F
CRISTOBAL 8°F
STATION SYMBOLS
21 to 24 Semianalogous greater range 13 to 16
12 to 20 Closely analogous 4 to 12°
8 to 11 Semianalogous less range 0 to 3
>24 or < 8 Not analogous >16°
Subscripts JA January F February MA March Ap April M May JN June J July
A August S September O October N November D December

Figure 7A


14 J-S
13J-S
10A-S
16J-S
13A-P
19A
15A-S
20A-S
SEE INSET "A"
13MA
15 JN,S
14MA-AP
20MA-AP
14 JA-S,N
15JA-MA
7P
15P
14JA-MA
SEE INSET "B"
15JA,MA
14JA-AP
14P
18JA-MA
12JA
2P
17P
2


INSET A
HAWAIIAN ISLANDS
INSET B
FIJI ISLANDS
SCALE
SOUTH PACIFIC OCEAN
KORO SEA
VITI LEVU
VANUA LEVU
RAKIRAKI ISLAND
SOLEDRAT
14J-S
17A
14A-S
21A
14A-S
17A
15J-O
13A-S
13A-S
20J-A
18S
17J-S
12J-O
13A
17A
13J-S
17A-S
18A
9A-S
19A-S
14A-S
18J-S
13A
14JA-F,N
15F
15JA-MA
7F
14JA-MA
12F-MA

1

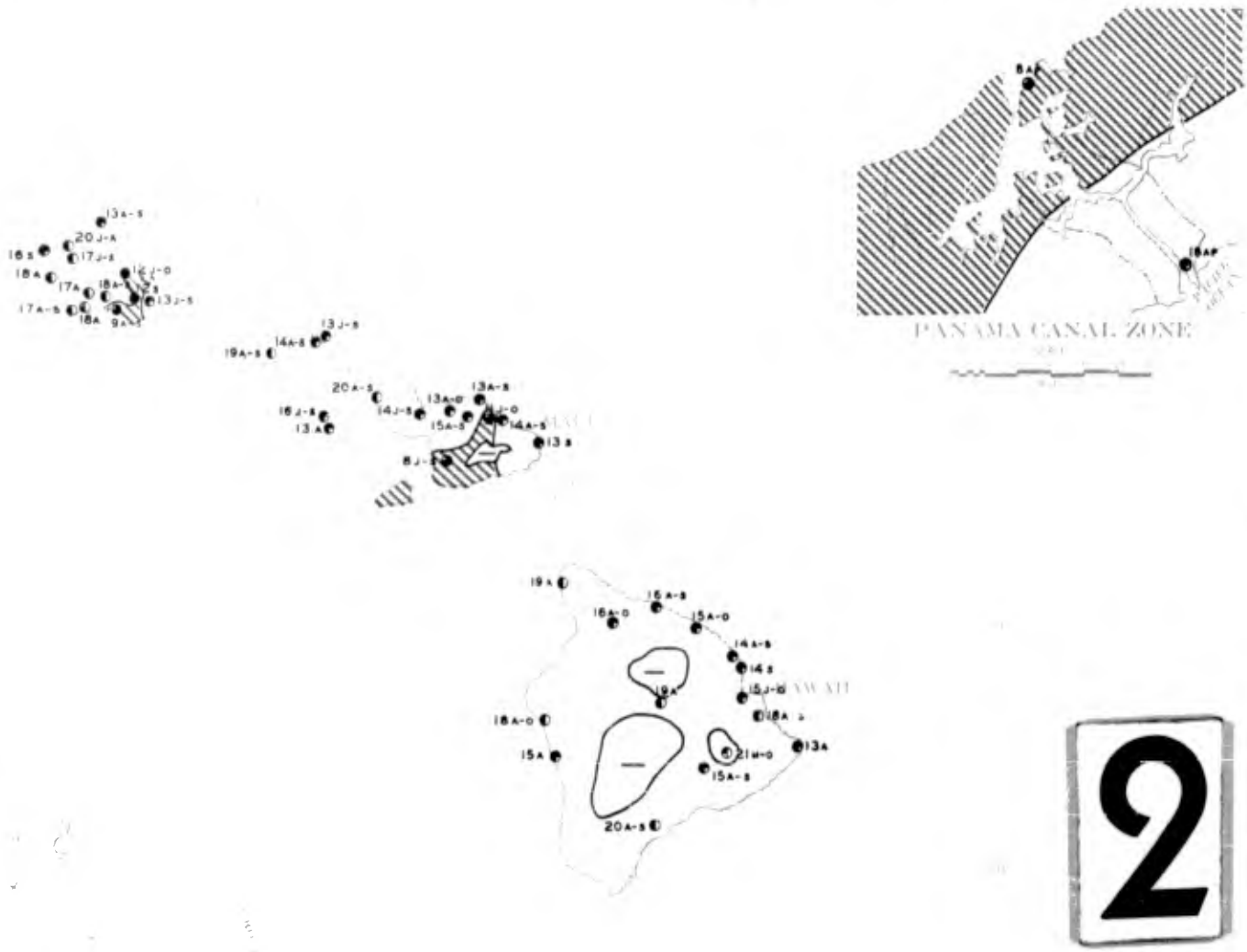

PANAMA CANAL ZONE
INSET B
FIJI ISLANDS
2
MEAN DAILY
TEMPERATURE RANGE
WARMEST MONTH
BALBOA HEIGHTS-16°F
CRISTOBAL-8°F
Closely analogous areas
STATION SYMBOLS
21° to 24°
12° to 20°
8° to 11°
>24° or <8°
Semianalogous-greater range
Closely analogous
Semianalogous-less range
Not analogous
13° to 16°
4° to 12°
0° to 3°
>16° or <0°
Subscripts: JA-January, F-February, MA March, AP April, M-May, JN-June, J-July, A-August, S-September, O-October, N-November, D-December
Areas with greater range
Areas with less range
RELIABILITY: Fair to good

Figure 7B

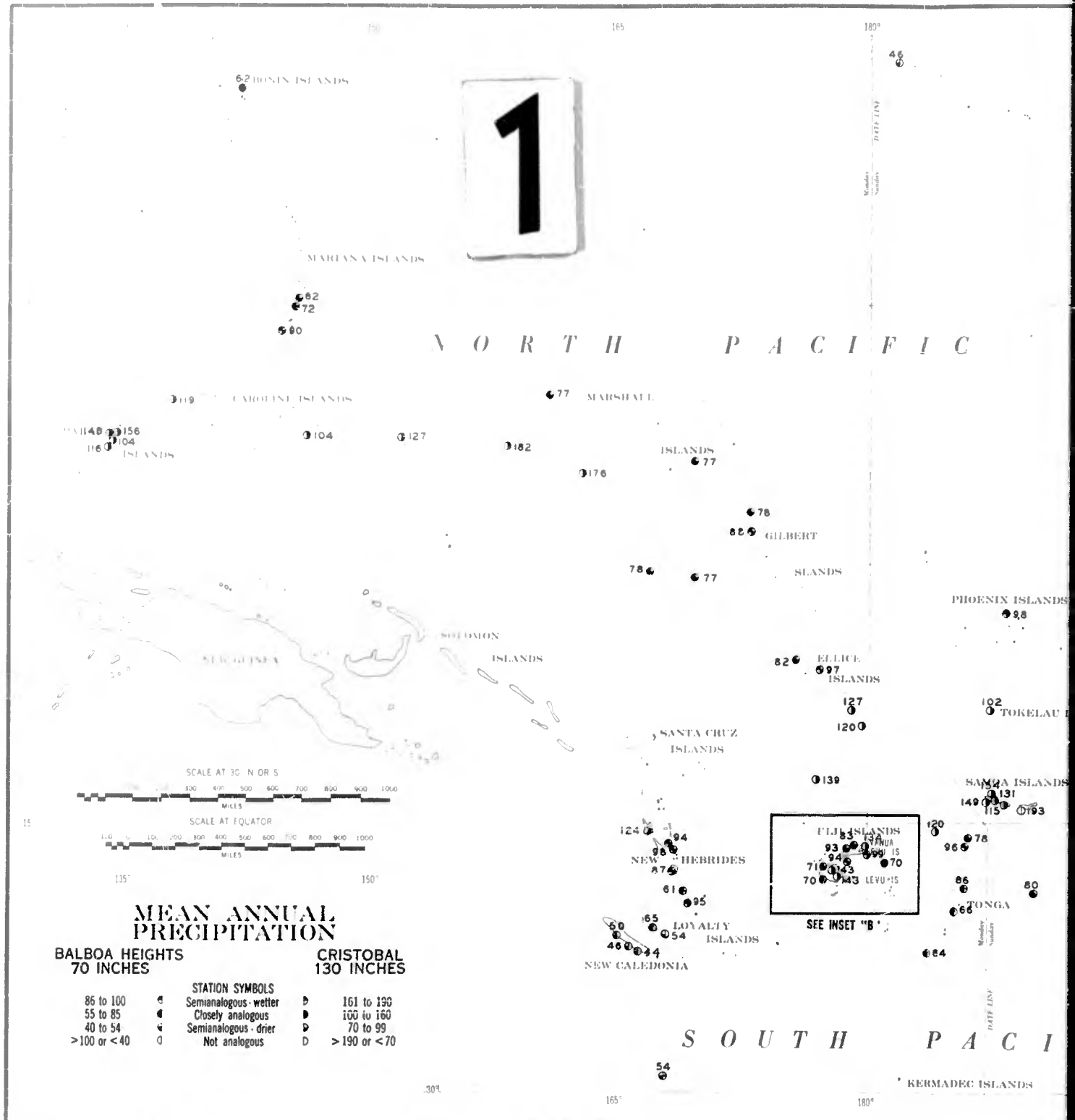
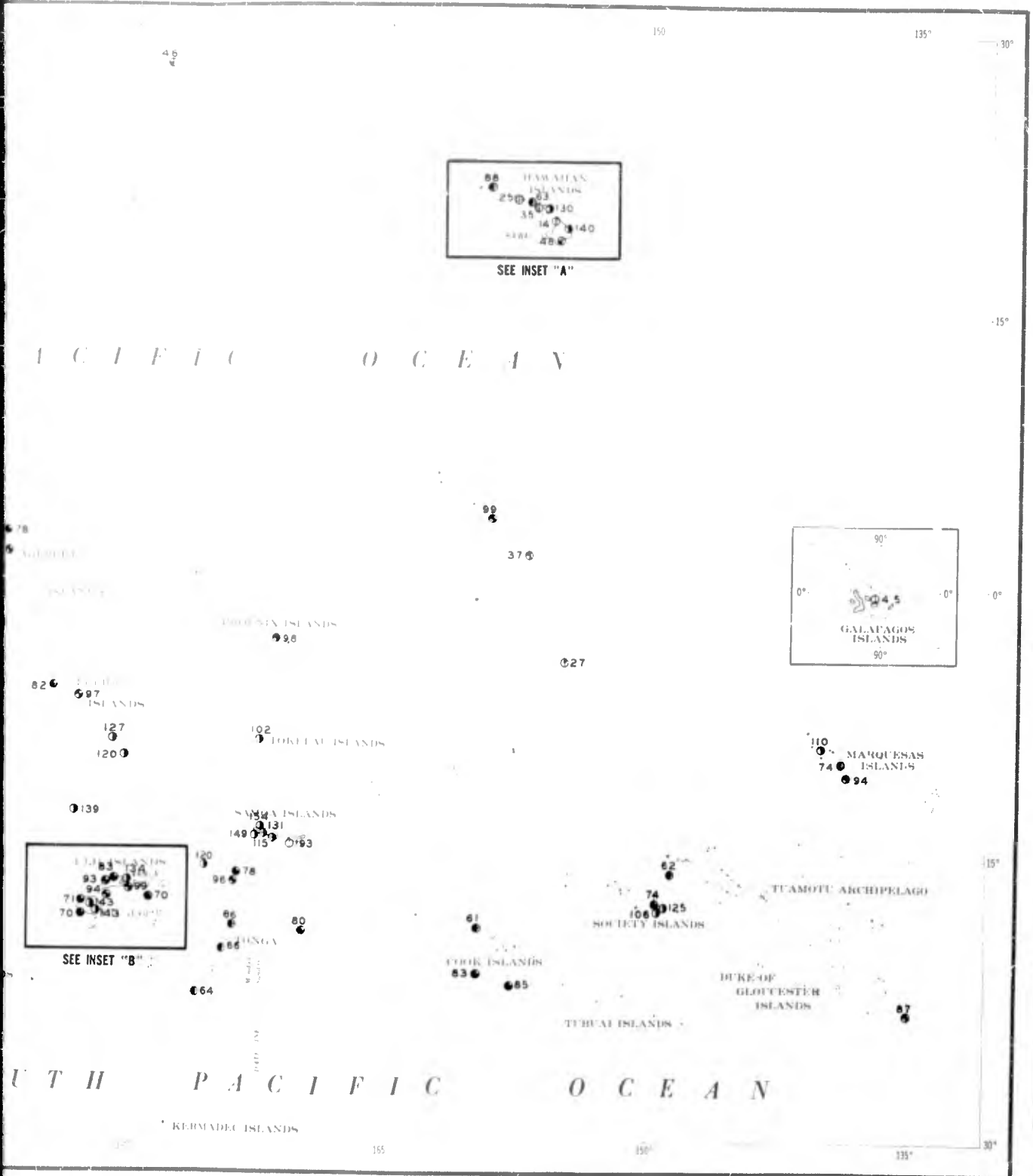

1
BONIN ISLANDS
MARIANA ISLANDS
NORTH PACIFIC
CAROLINE ISLANDS
MARSHALL ISLANDS
GILBERT ISLANDS
PHOENIX ISLANDS
SOLOMON ISLANDS
CORAL SEA
ELLICE ISLANDS
TOKELAU
SANTA CRUZ ISLANDS
NEW HEBRIDES
FIJI ISLANDS
SAMOA ISLANDS
TONGA
LOYALTY ISLANDS
NEW CALEDONIA
KERMADEC ISLANDS
SOUTH PACI
SEE INSET "B"
DATE LINE
SCALE AT 30° N OR S
SCALE AT EQUATOR
MILES
MEAN ANNUAL PRECIPITATION
BALBOA HEIGHTS 70 INCHES
CRISTOBAL 130 INCHES
STATION SYMBOLS
86 to 100 — Semianalogous - wetter — 161 to 190
55 to 85 — Closely analogous — 100 to 160
40 to 54 — Semianalogous - drier — 70 to 99
>100 or <40 — Not analogous — >190 or <70

Figure 8A

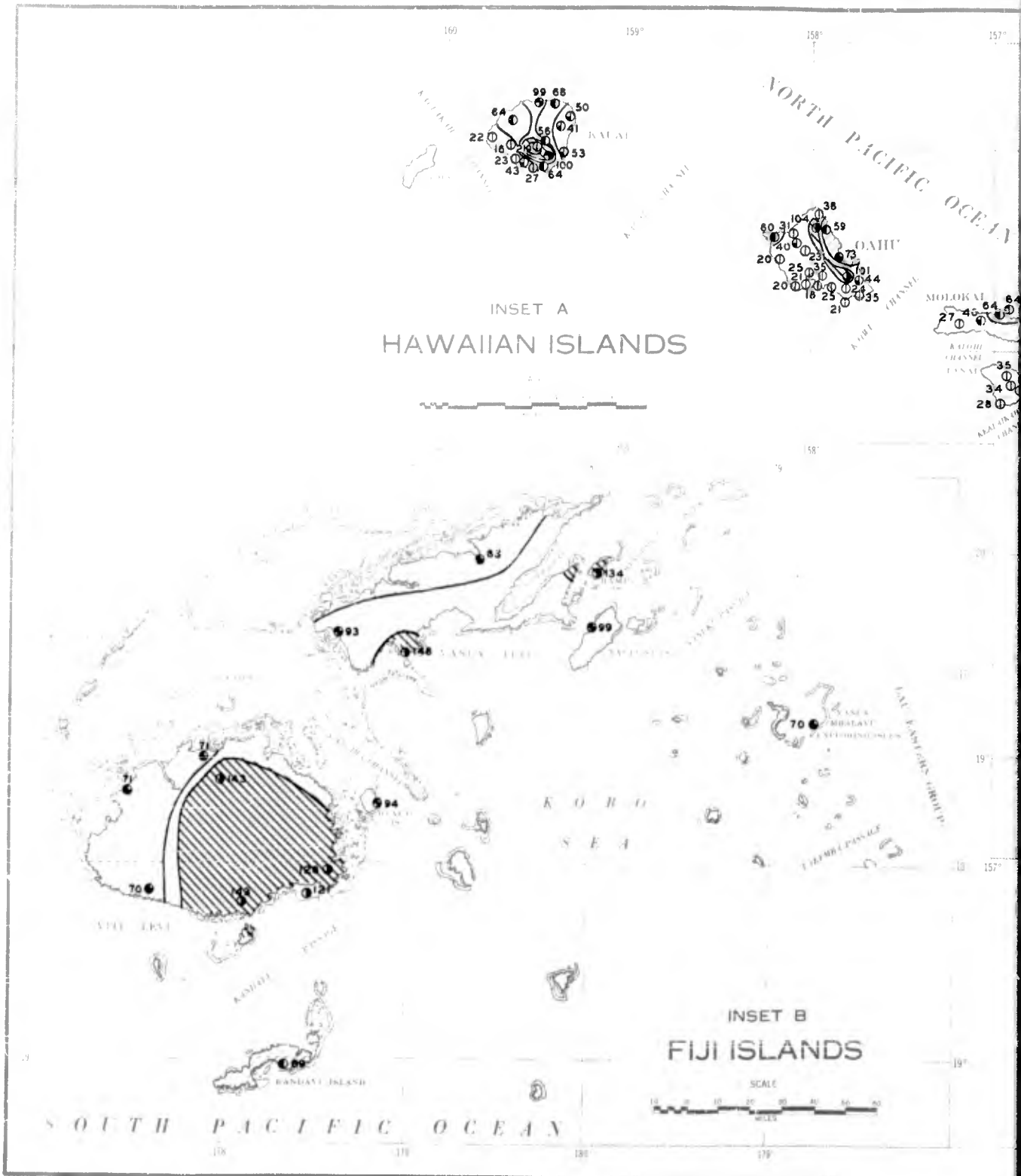
PANAMA CANAL ZONE- THE PACIFIC ISLANDS



2

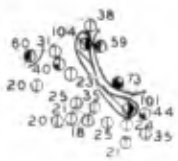
ARMY MRC VICKSBURG, MISS.

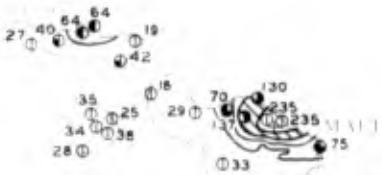
CLIMATIC ANALOGS OF PANAMA CANAL ZONE- HA



1

ARMY MRC VICKSBURG MISS





2

MEAN ANNUAL PRECIPITATION

BALBOA HEIGHTS 70 INCHES

CRISTOBAL 130 INCHES

Closely analogous areas

STATION SYMBOLS

86 to 100	d	Semianalogous - wetter	B	161 to 190
55 to 85	d	Closely analogous	B	100 to 160
40 to 54	d	Semianalogous - drier	B	70 to 99
>100 or <40	d	Not analogous	D	>190 or <70

Wetter areas + Drier areas

RELIABILITY: Fair to good ——

INSET B

JI ISLANDS

Figure 8B

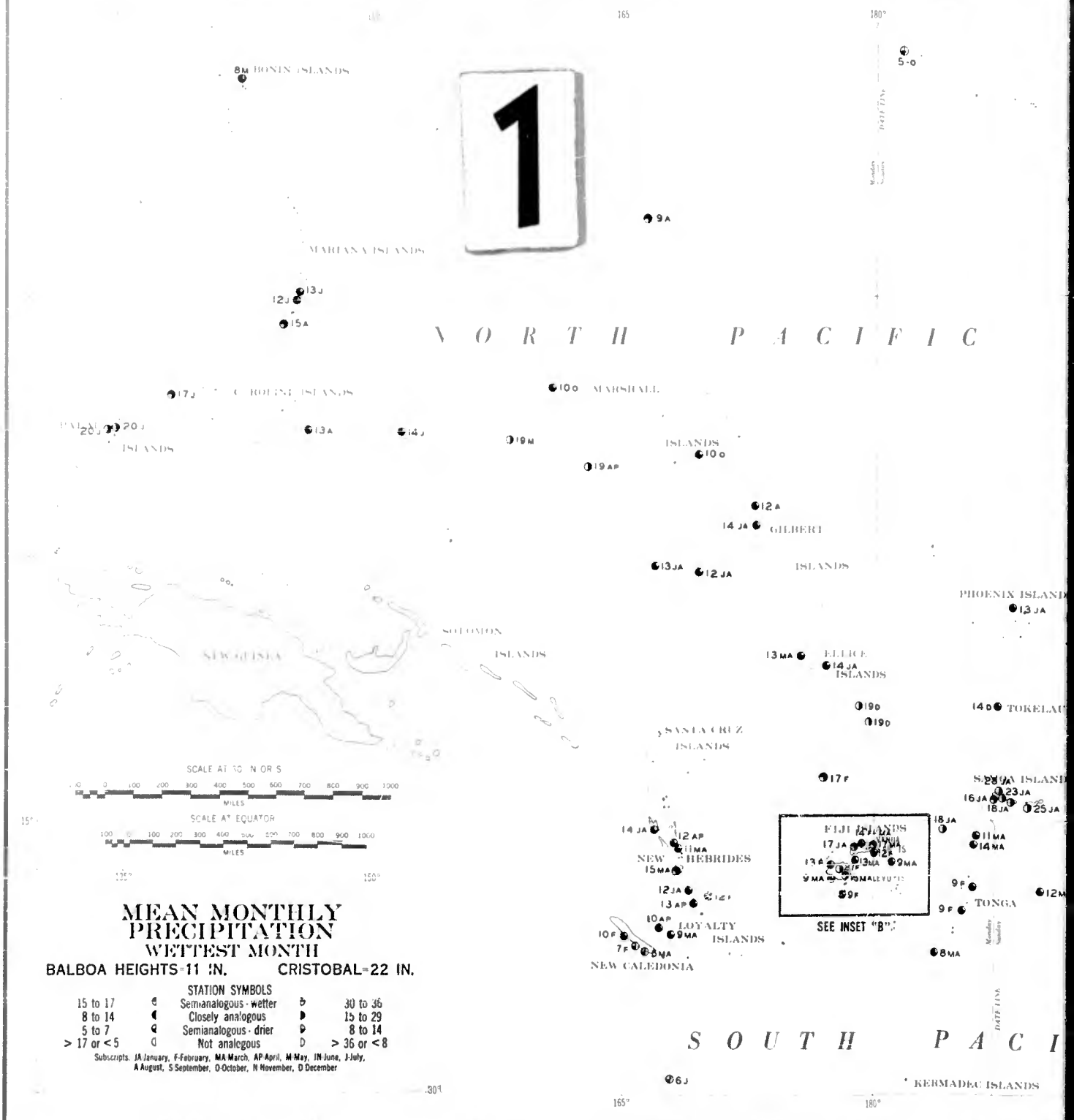
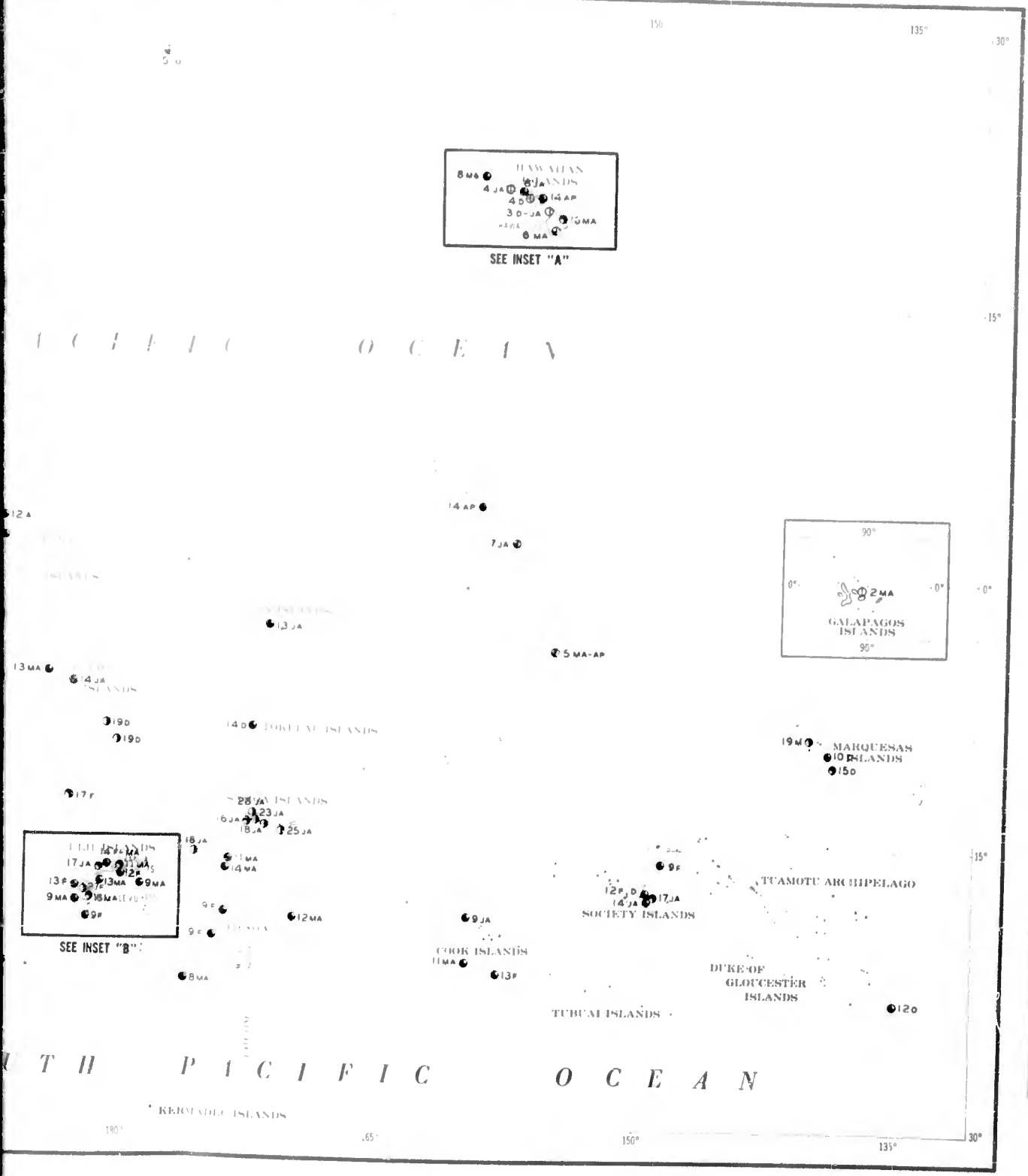
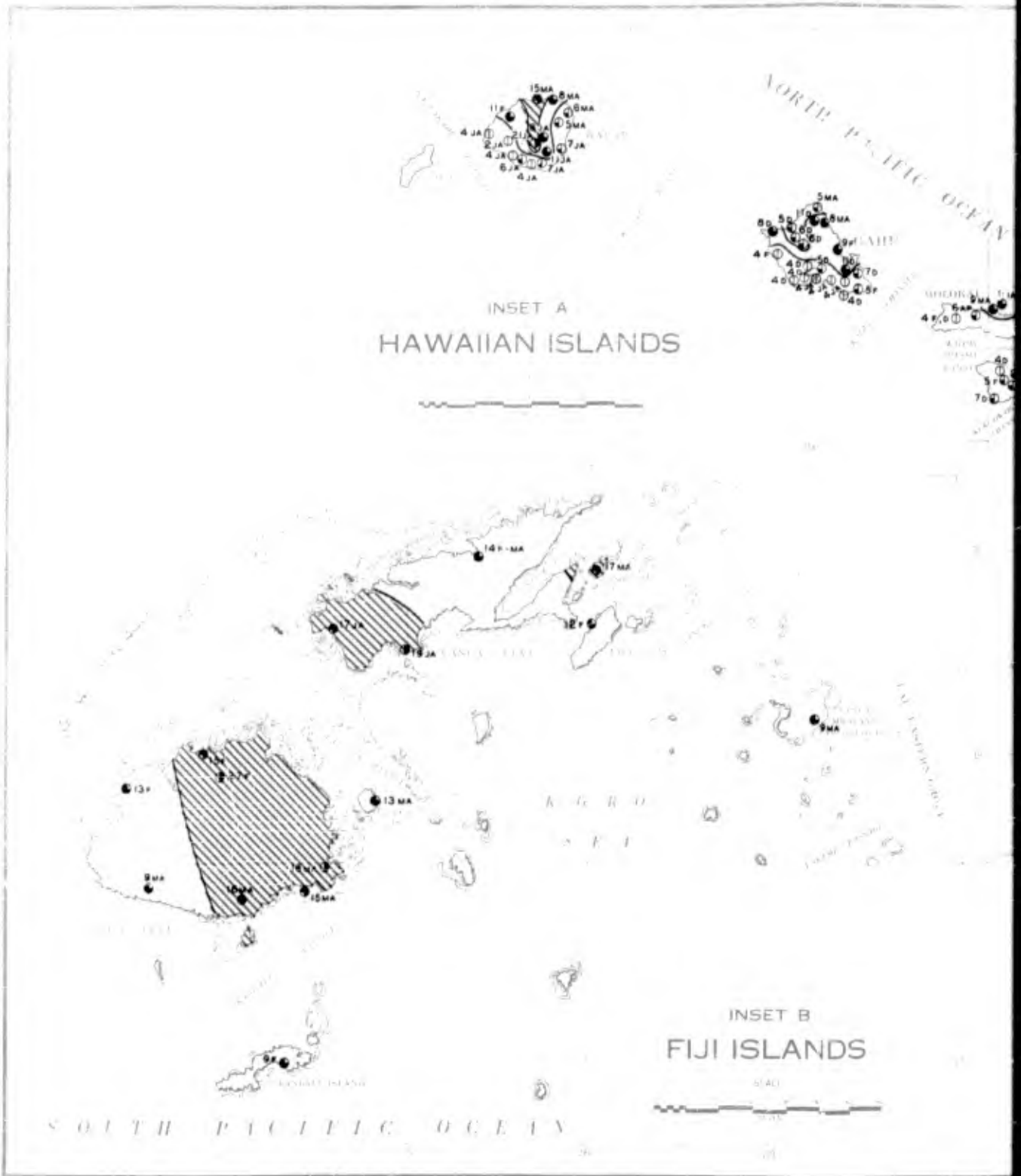

1
BONIN ISLANDS
MARIANA ISLANDS
CAROLINE ISLANDS
MARSHALL ISLANDS
GILBERT ISLANDS
ELLICE ISLANDS
PHOENIX ISLAND
SOLOMON ISLANDS
NEW GUINEA
SANTA CRUZ ISLANDS
NEW HEBRIDES
LOYALTY ISLANDS
NEW CALEDONIA
FIJI ISLANDS
TONGA
SAMOA ISLAND
KERMADEC ISLANDS
SEE INSET "B"
NORTH PACIFIC
SOUTH PACI
SCALE AT 30° N OR S
MILES
SCALE AT EQUATOR
MILES
MEAN MONTHLY PRECIPITATION
WETTEST MONTH
BALBOA HEIGHTS=11 IN. CRISTOBAL=22 IN.
STATION SYMBOLS
15 to 17 — Semianalogous - wetter — 30 to 36
8 to 14 — Closely analogous — 15 to 29
5 to 7 — Semianalogous - drier — 8 to 14
> 17 or < 5 — Not analogous — > 36 or < 8
Subscripts. JA January, F February, MA March, AP April, M May, JN June, J July, A August, S September, O October, N November, D December

Figure 9A



2

ARMY MRC VICKSBURG, MISS.


INSET A
HAWAIIAN ISLANDS
INSET B
FIJI ISLANDS
NORTH PACIFIC OCEAN
SOUTH PACIFIC OCEAN

1

MEAN MONTHLY PRECIPITATION
WETTEST MONTH

BALBOA HEIGHTS=11 IN. CRISTOBAL=22 IN.

Closely analogous areas

STATION SYMBOLS

15 to 17	◐	Semianalogous - wetter	◑	30 to 36
8 to 14	◖	Closely analogous	◗	15 to 29
5 to 7	◒	Semianalogous - drier	◑	8 to 14
> 17 or < 5	○	Not analogous	●	> 36 or < 8

Subscripts JA January, F February, MA March, AP April, M May, JN June, J July, A August, S September, O October, N November, D December

RELIABILITY: Fair to good —— Wetter areas Poor —— Drier areas

Figure 9B

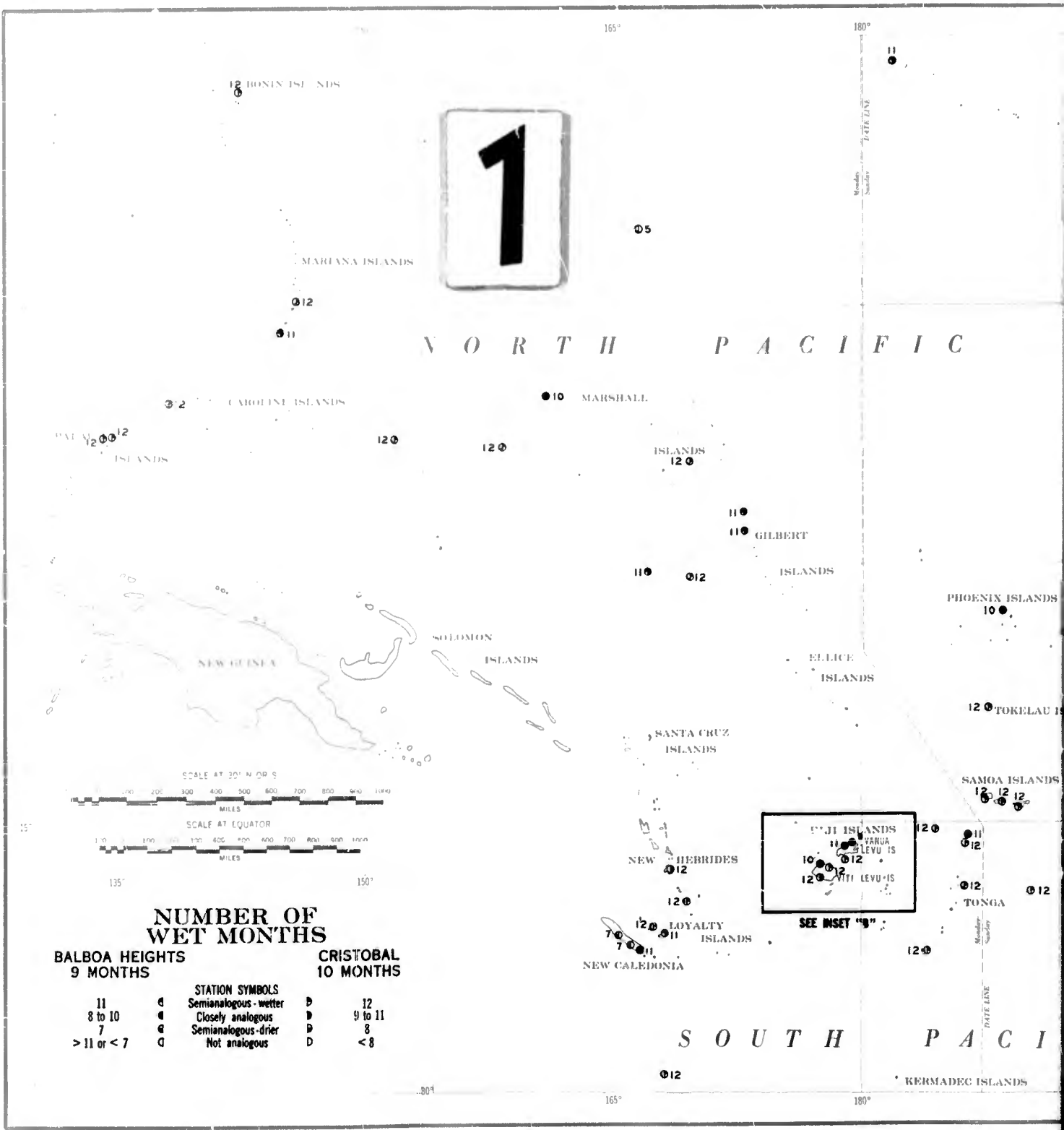
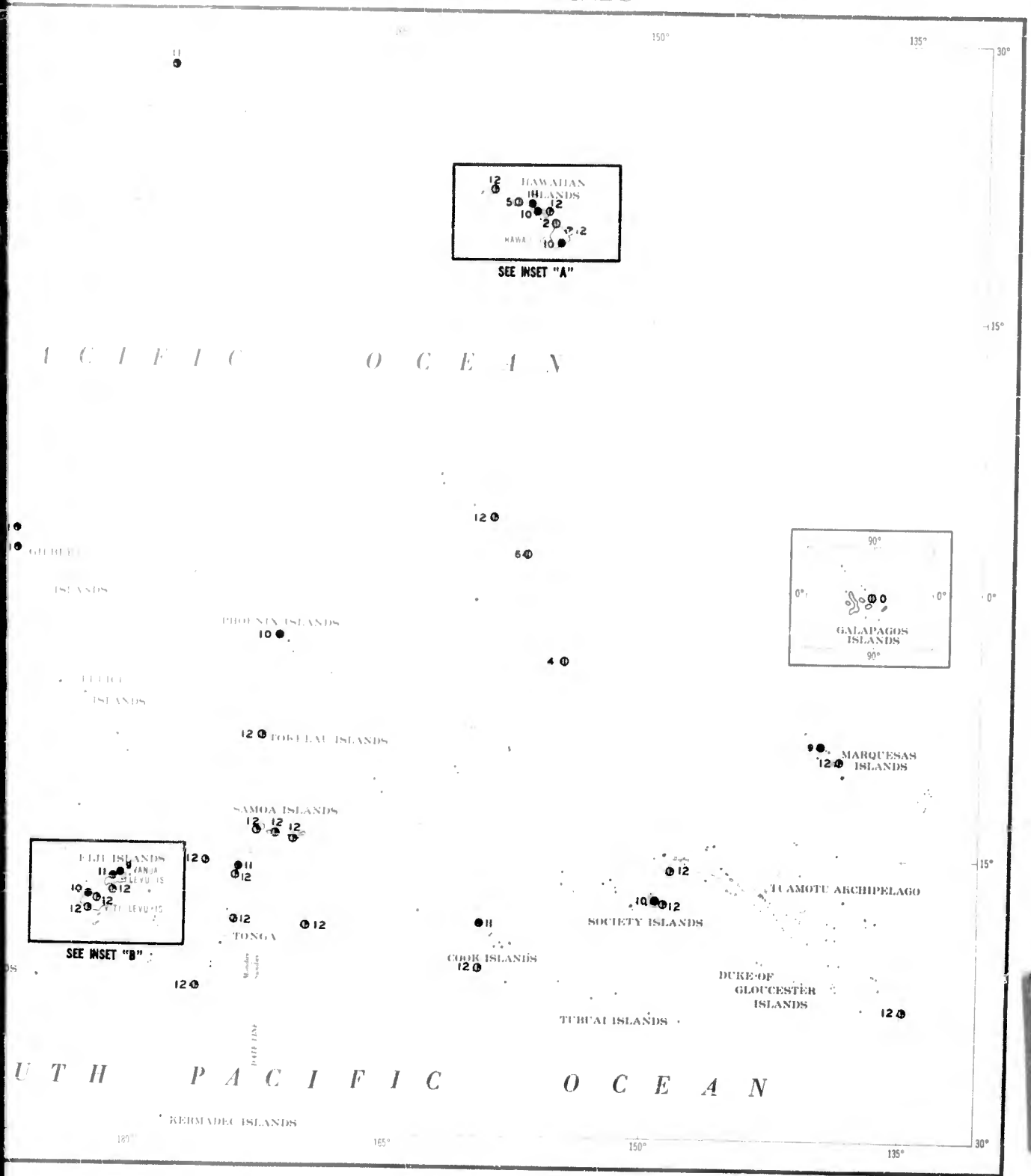

1
NORTH PACIFIC
SOUTH PACI
BONIN ISLANDS
MARIANA ISLANDS
CAROLINE ISLANDS
MARSHALL ISLANDS
GILBERT ISLANDS
PHOENIX ISLANDS
ELLICE ISLANDS
TOKELAU IS
SAMOA ISLANDS
TONGA
SOLOMON ISLANDS
NEW GUINEA
SANTA CRUZ ISLANDS
NEW HEBRIDES
LOYALTY ISLANDS
NEW CALEDONIA
FIJI ISLANDS
VANUA LEVU IS
VITI LEVU IS
SEE INSET "9"
KERMADEC ISLANDS
DATE LINE
SCALE AT 30° N OR S
MILES
SCALE AT EQUATOR
MILES
NUMBER OF WET MONTHS
BALBOA HEIGHTS 9 MONTHS
CRISTOBAL 10 MONTHS
STATION SYMBOLS
11 — Semianalogous - wetter — 12
8 to 10 — Closely analogous — 9 to 11
7 — Semianalogous - drier — 8
> 11 or < 7 — Not analogous — < 8

Figure 10A

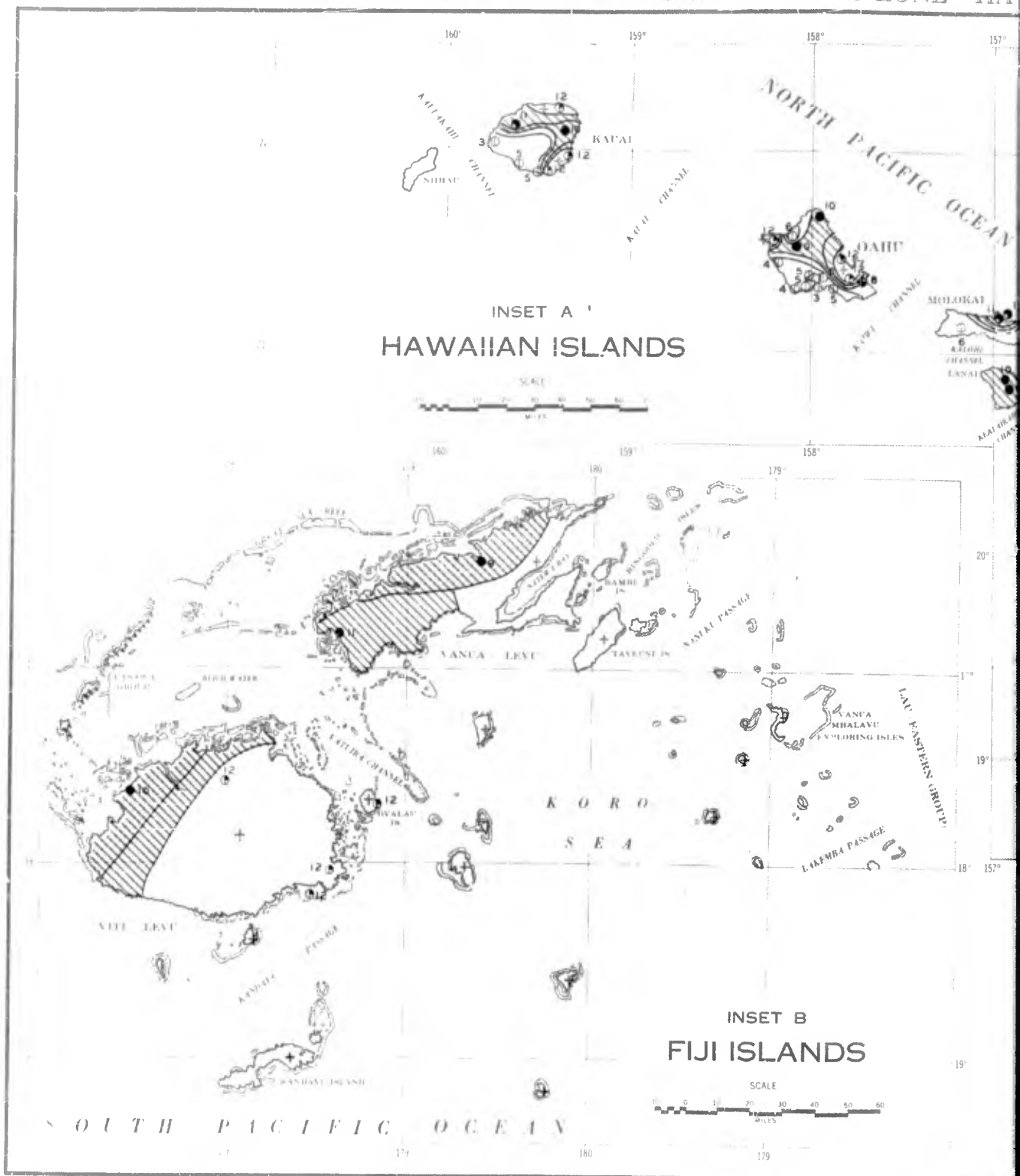
PANAMA CANAL ZONE- THE PACIFIC ISLANDS



ARMY-MRC VICKSBURG, MISS.

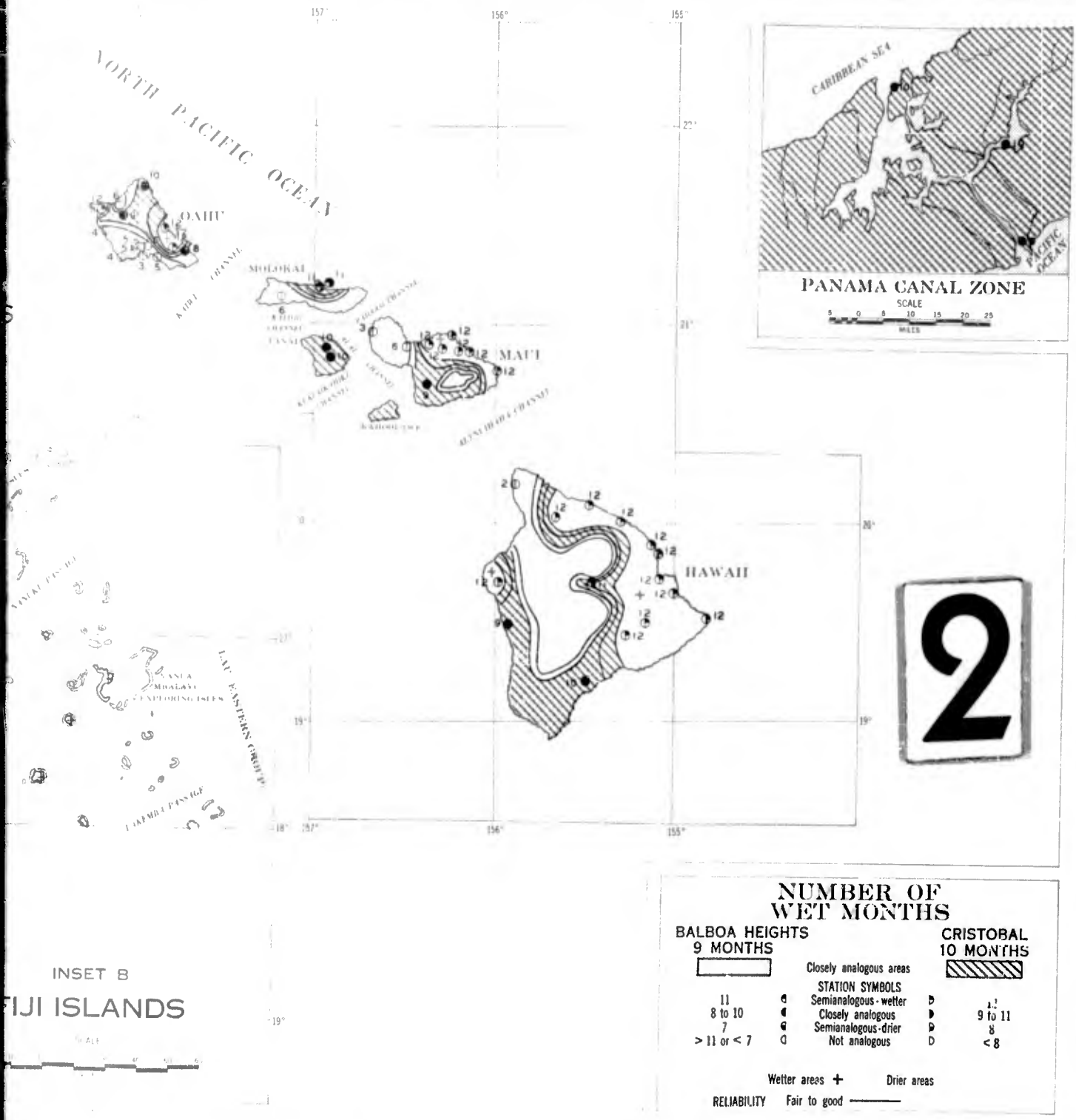
2

CLIMATIC ANALOGS OF PANAMA CANAL ZONE- HA



1

...AWAIIAN ISLANDS AND FIJI ISLANDS



2

INSET B

FIJI ISLANDS

SCALE

NUMBER OF WET MONTHS

BALBOA HEIGHTS 9 MONTHS

CRISTOBAL 10 MONTHS

Closely analogous areas

STATION SYMBOLS

11	C	Semianalogous - wetter	D	10
8 to 10	C	Closely analogous	D	9 to 11
7	C	Semianalogous - drier	D	8
> 11 or < 7	C	Not analogous	D	< 8

Wetter areas + Drier areas

RELIABILITY Fair to good ———

Figure 10B

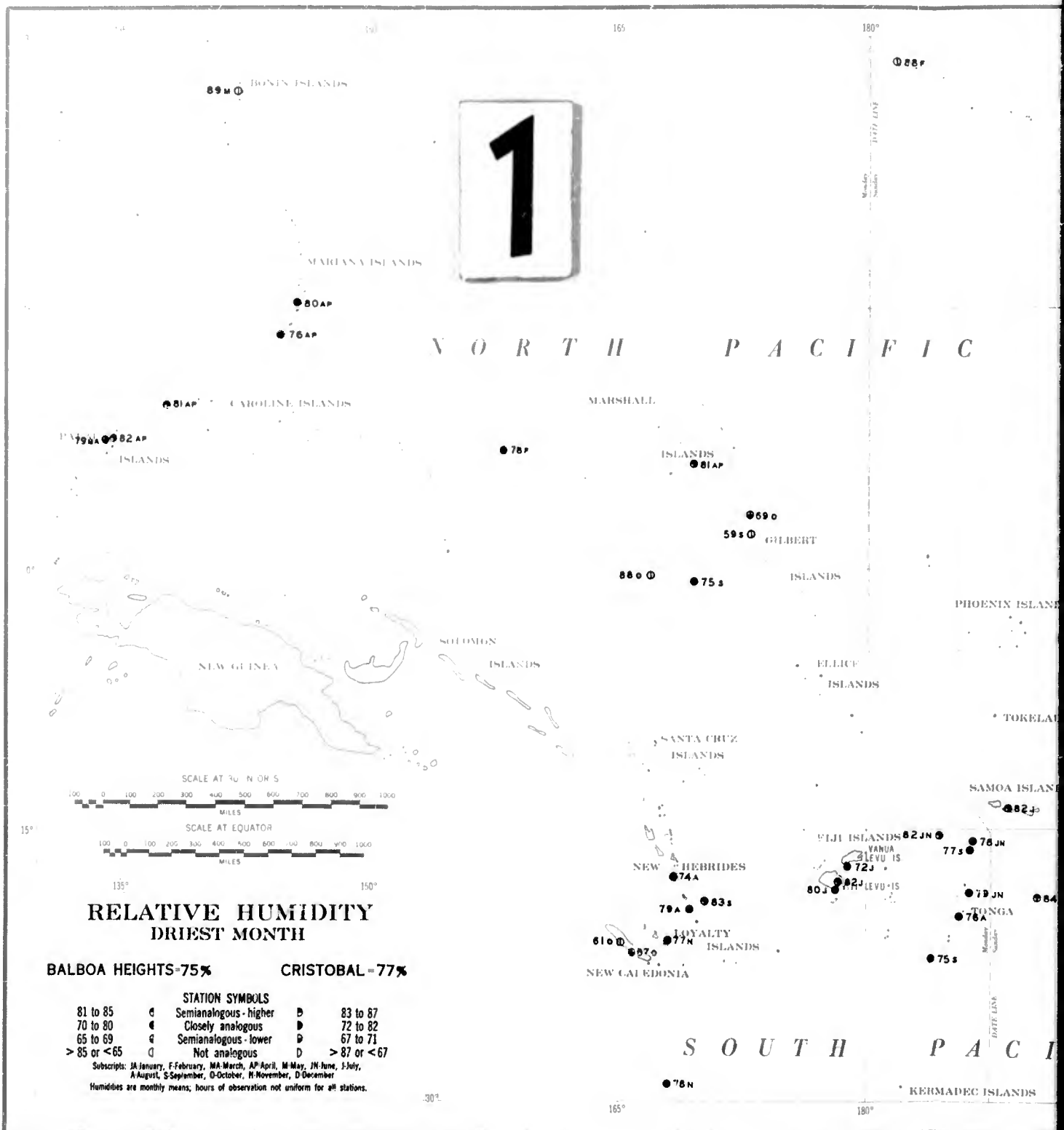
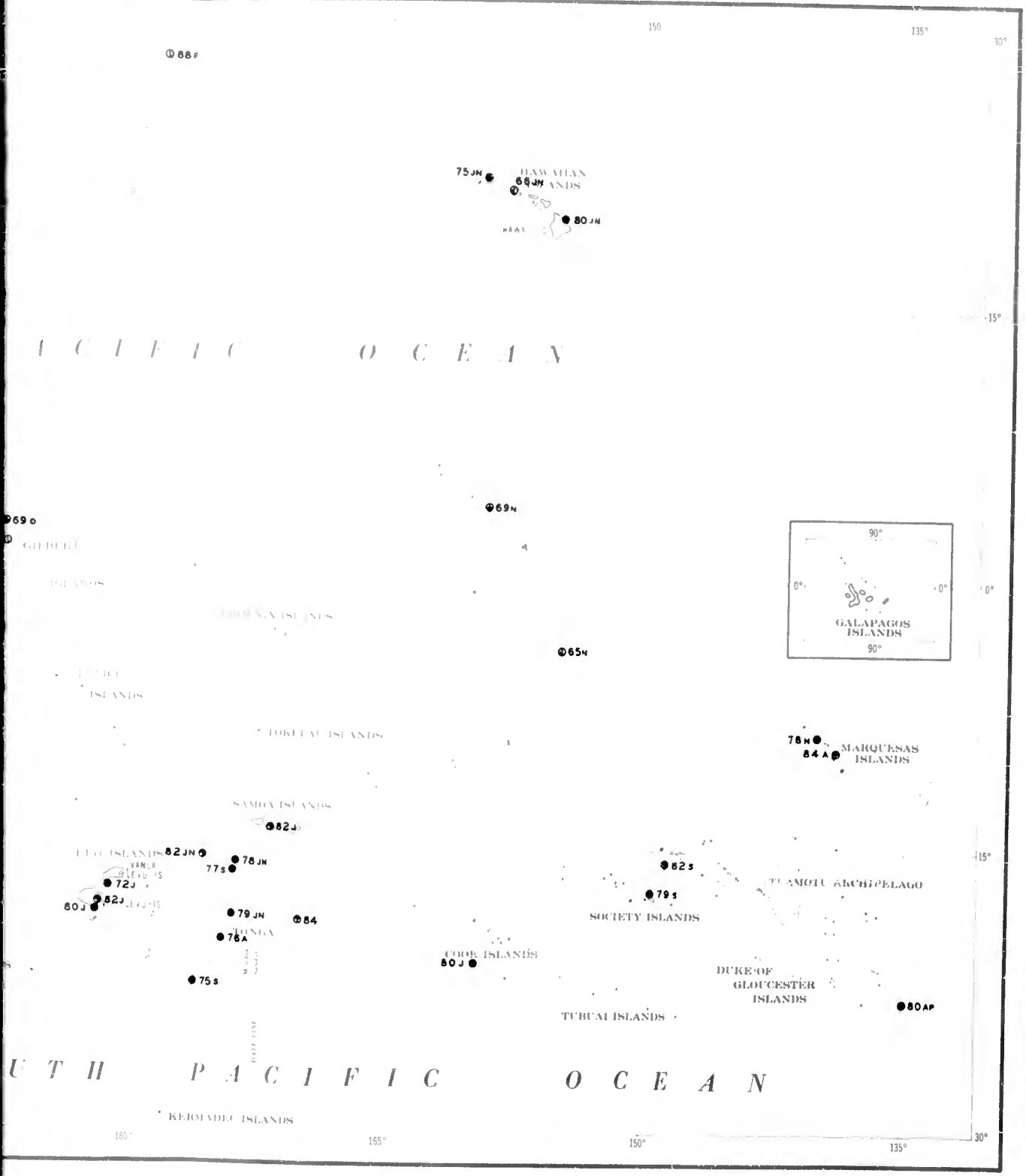

1
BONIN ISLANDS
89M
MARIANA ISLANDS
80AP
76AP
NORTH PACIFIC
CAROLINE ISLANDS
81AP
79A
82AP
ISLANDS
78P
MARSHALL
ISLANDS
81AP
69O
59S
GILBERT
ISLANDS
88O
75S
PHOENIX ISLAND
SOLOMON
ISLANDS
NEW GUINEA
ELLICE
ISLANDS
TOKELAU
SANTA CRUZ
ISLANDS
SAMOA ISLAND
82J
FIJI ISLANDS
82JN
76JN
77S
VANUA LEVU IS
72J
NEW HEBRIDES
74A
82J
80J
LEVU IS
79JN
84
TONGA
76A
79A
83S
LOYALTY
ISLANDS
61O
77N
87O
75S
NEW CALEDONIA
SCALE AT 30° N OR S
100 0 100 200 300 400 500 600 700 800 900 1000
MILES
SCALE AT EQUATOR
100 0 100 200 300 400 500 600 700 800 900 1000
MILES
15°
135°
150°
165
180°
30°
DATE LINE
SOUTH PACI
78N
KERMADEC ISLANDS
RELATIVE HUMIDITY
DRIEST MONTH
BALBOA HEIGHTS=75%
CRISTOBAL=77%
STATION SYMBOLS
81 to 85 c Semianalogous - higher D 83 to 87
70 to 80 C Closely analogous D 72 to 82
65 to 69 c Semianalogous - lower D 67 to 71
> 85 or < 65 C Not analogous D > 87 or < 67
Subscripts: JA January, F-February, MA-March, AP-April, M-May, JN-June, J-July, A-August, S-September, O-October, N-November, D-December
Humidities are monthly means; hours of observation not uniform for all stations.

Figure 11

PANAMA CANAL ZONE—THE PACIFIC ISLANDS



2

ARMY MRC VICKSBURG, MISS.

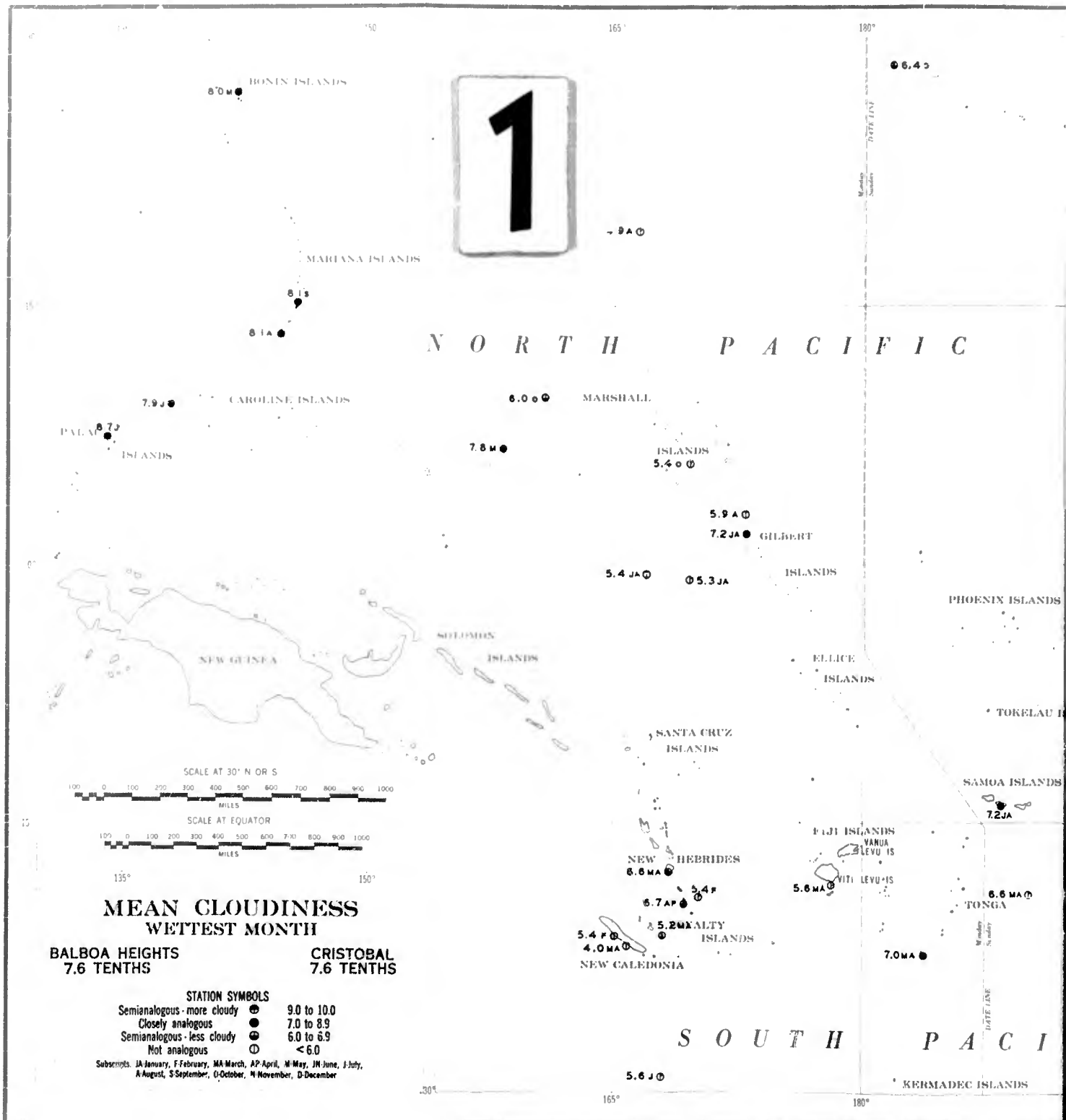
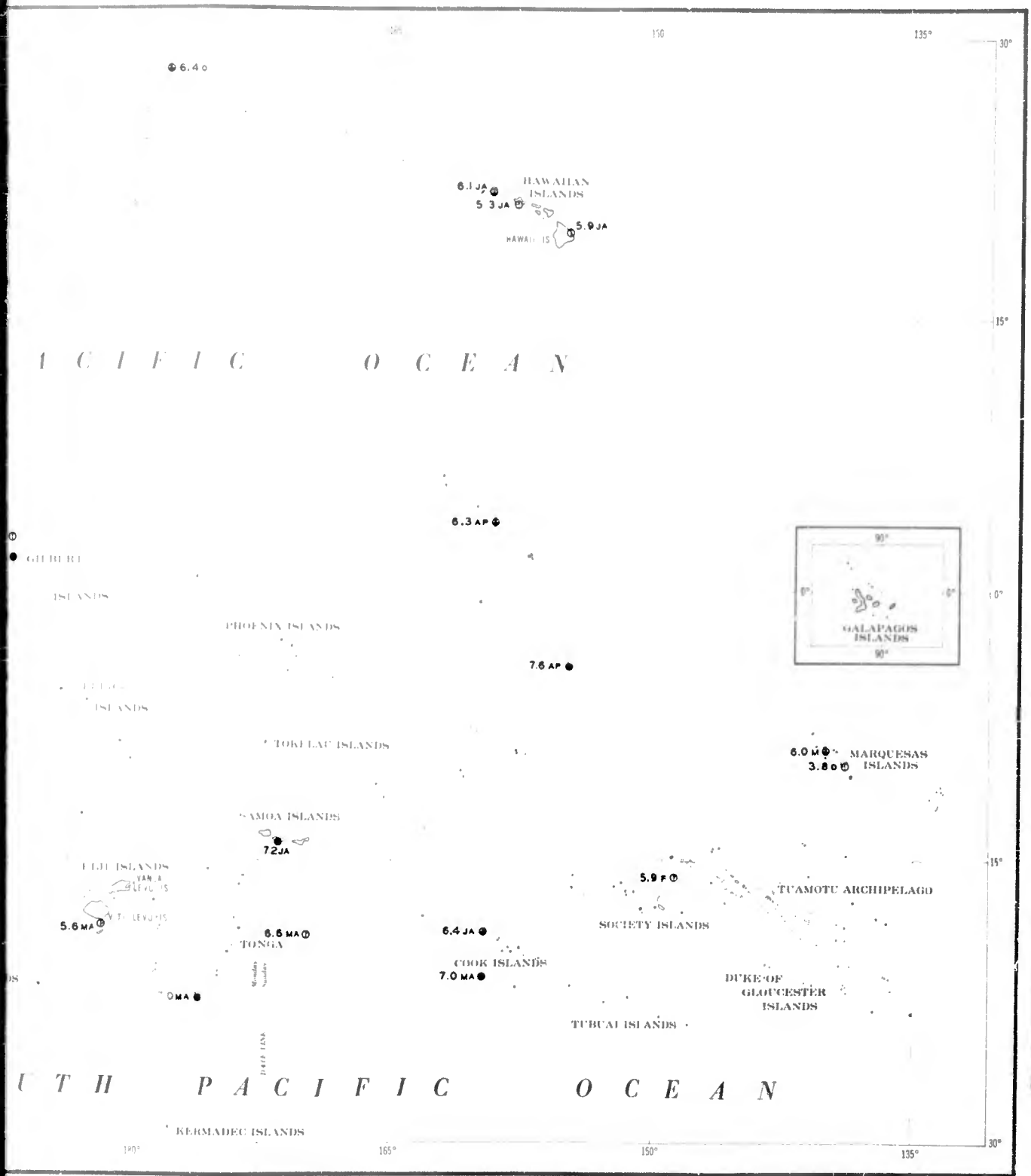

1
BONIN ISLANDS
8.0 M
MARIANA ISLANDS
8.1 S
8.1 A
N O R T H P A C I F I C
7.9 J
CAROLINE ISLANDS
8.7 J
ISLANDS
7.8 M
6.0 O
MARSHALL
ISLANDS
5.4 O
5.9 A
7.2 JA
GILBERT
ISLANDS
5.4 JA
5.3 JA
PHOENIX ISLANDS
NEW GUINEA
SOLOMON
ISLANDS
ELLICE
ISLANDS
TOKELAU I
SANTA CRUZ
ISLANDS
SAMOA ISLANDS
7.2 JA
FIJI ISLANDS
VANUA
LEVU IS
VITI LEVU IS
5.6 MA
NEW HEBRIDES
6.6 MA
5.4 F
6.7 AP
5.2 MA
LOYALTY
ISLANDS
5.4 F
4.0 MA
NEW CALEDONIA
7.0 MA
6.6 MA
TONGA
S O U T H P A C I
5.6 J
KERMADEC ISLANDS
DATE LINE
SCALE AT 30° N OR S
100 0 100 200 300 400 500 600 700 800 900 1000
MILES
SCALE AT EQUATOR
100 0 100 200 300 400 500 600 700 800 900 1000
MILES
135°
150°
165°
180°
30°
MEAN CLOUDINESS
WETTEST MONTH
BALBOA HEIGHTS
7.6 TENTHS
CRISTOBAL
7.6 TENTHS
STATION SYMBOLS
Semianalogous - more cloudy 9.0 to 10.0
Closely analogous 7.0 to 8.9
Semianalogous - less cloudy 6.0 to 6.9
Not analogous < 6.0
Subscripts. JA January, F February, MA March, AP April, M May, JN June, J July, A August, S September, O October, N November, D December

Figure 12

ANAMA CANAL ZONE- THE PACIFIC ISLANDS



2

ARMY MRC VICKSBURG, MISS.

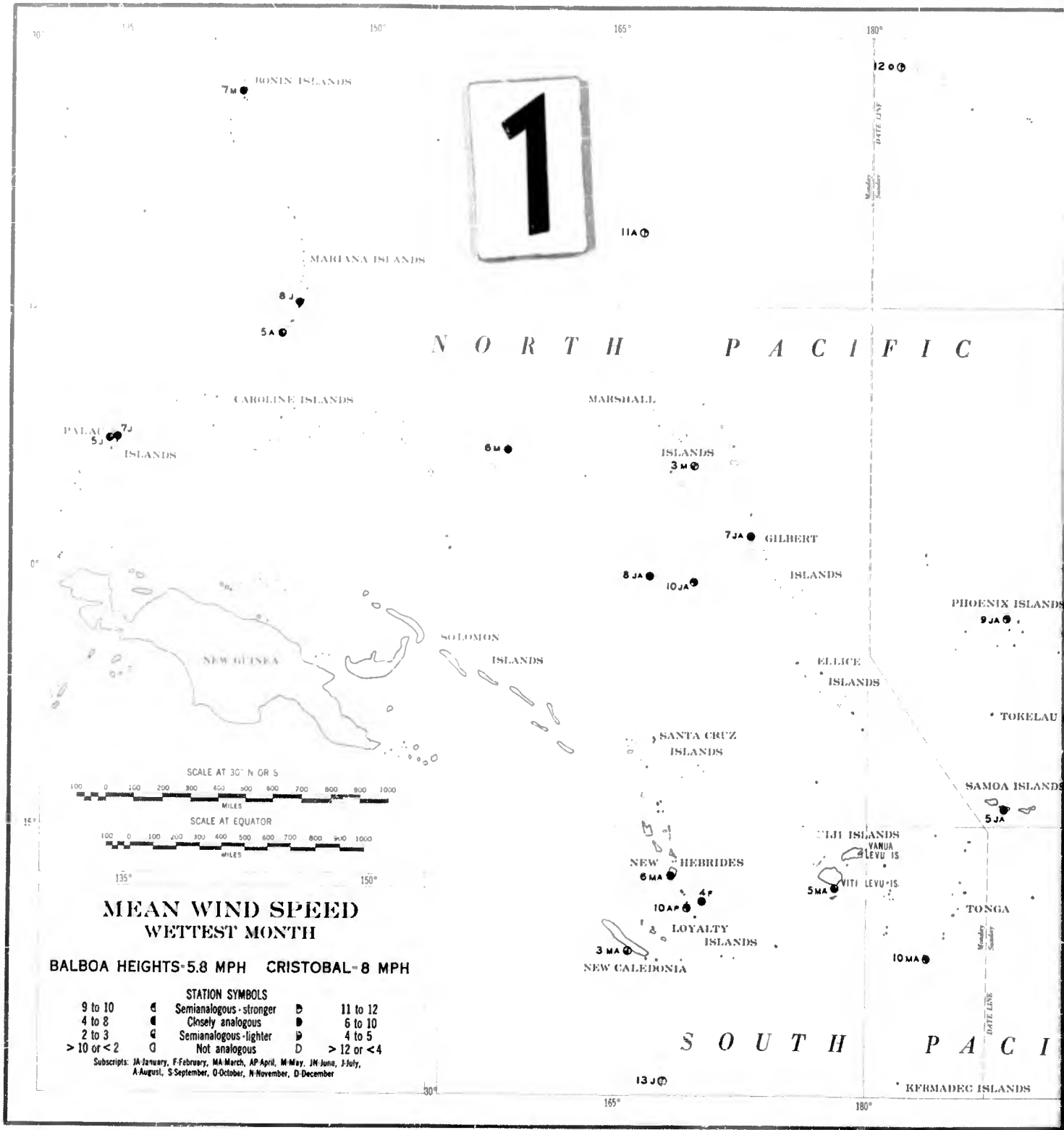
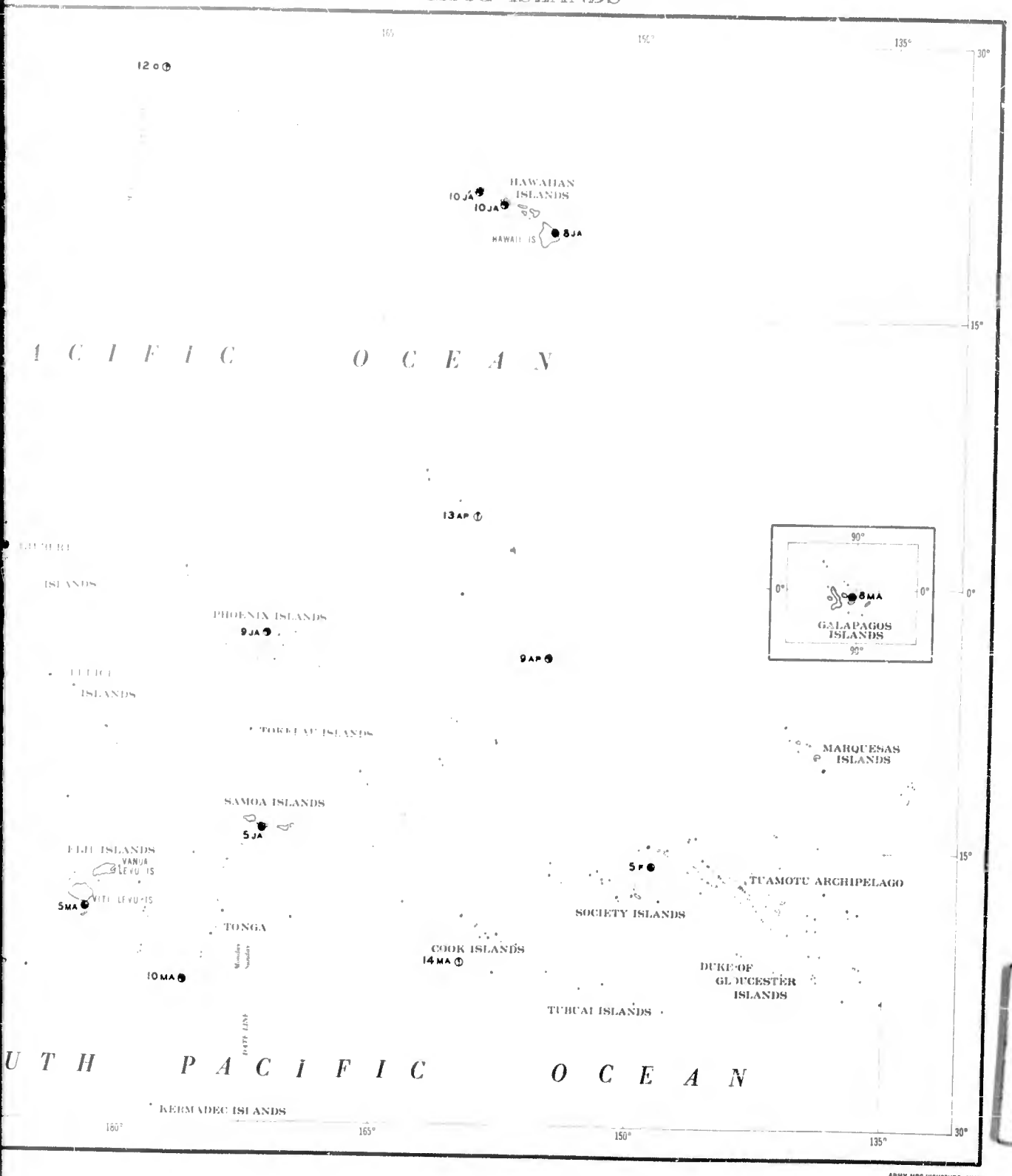

1
BONIN ISLANDS
7M
12O
11A
MARIANA ISLANDS
8J
5A
NORTH PACIFIC
CAROLINE ISLANDS
MARSHALL
PALAU
5J
7J
ISLANDS
6M
ISLANDS
3M
7JA
GILBERT
8JA
10JA
ISLANDS
PHOENIX ISLANDS
9JA
SOLOMON
ISLANDS
NEW GUINEA
ELLICE
ISLANDS
TOKELAU
SANTA CRUZ
ISLANDS
SAMOA ISLANDS
5JA
FIJI ISLANDS
VANUA LEVU IS
VITI LEVU IS
5MA
NEW HEBRIDES
6MA
4P
10AP
TONGA
LOYALTY
ISLANDS
3MA
NEW CALEDONIA
10MA
SOUTH PACI
13J
KERMADEC ISLANDS
SCALE AT 30° N OR S
100 0 100 200 300 400 500 600 700 800 900 1000
MILES
SCALE AT EQUATOR
100 0 100 200 300 400 500 600 700 800 900 1000
MILES
135°
150°
165°
180°
DATE LINE
Monetary Sanders
MEAN WIND SPEED
WETTEST MONTH
BALBOA HEIGHTS-5.8 MPH CRISTOBAL-8 MPH
STATION SYMBOLS
9 to 10 d Semianalogous - stronger D 11 to 12
4 to 8 d Closely analogous D 6 to 10
2 to 3 d Semianalogous - lighter D 4 to 5
> 10 or < 2 d Not analogous D > 12 or < 4
Subscripts: JA January, F February, MA March, AP April, M May, JN June, J July, A August, S September, O October, N November, D December

Figure 13

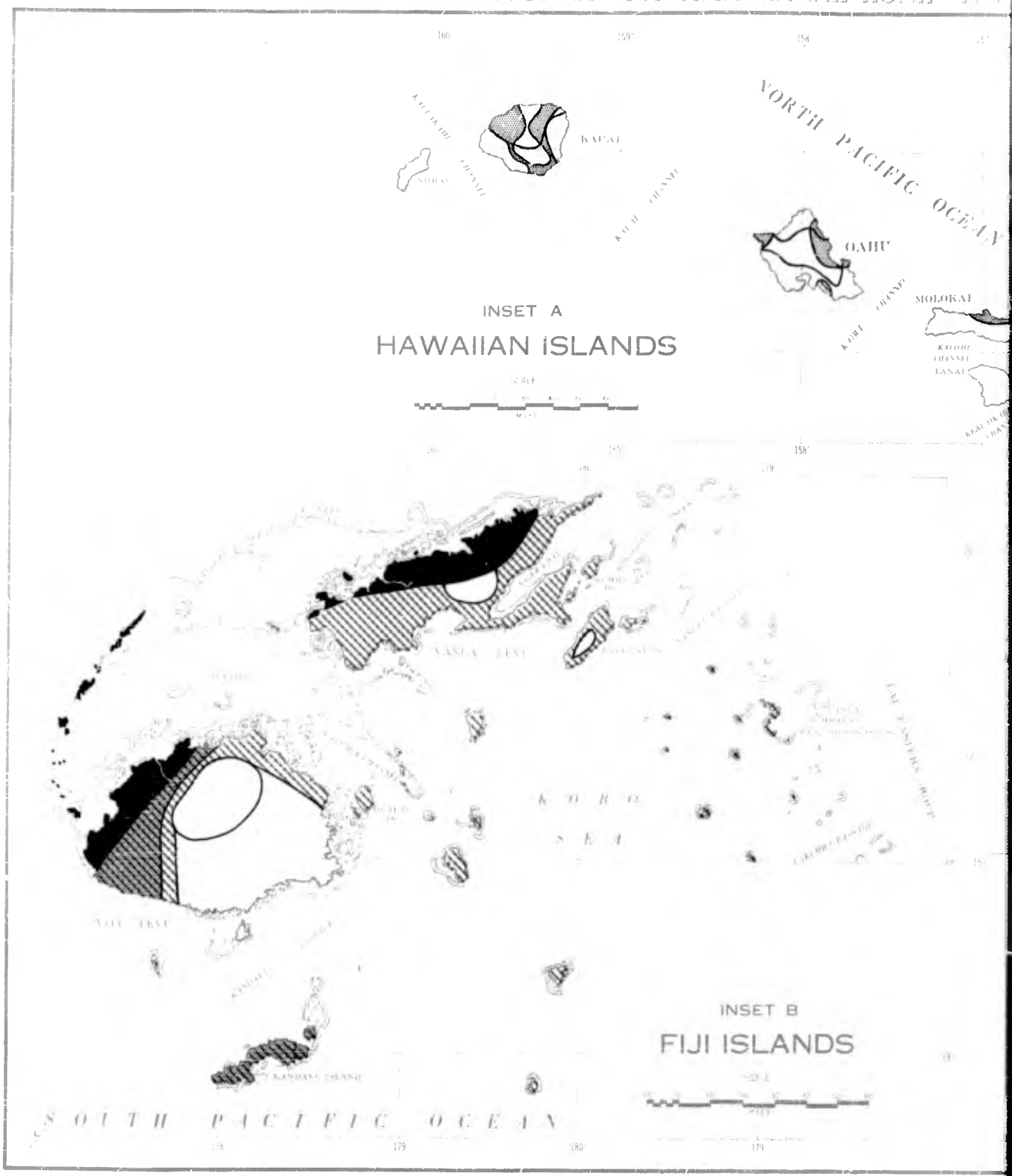
ANAMA CANAL ZONE- THE PACIFIC ISLANDS



2

ARMY-MRC VICKSBURG, MISS.

CLIMATIC ANALOGS OF PANAMA CANAL ZONE- HA



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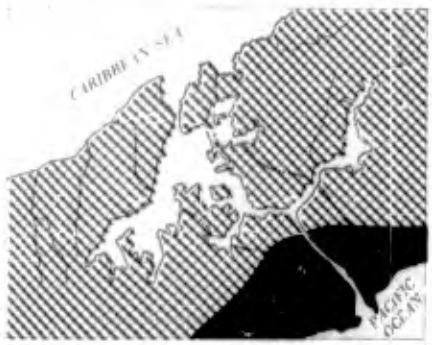


PANAMA CANAL ZONE

SCALE

MAUI

HAWAII

2

INSET B

IJI ISLANDS

COMPOSITE ANALOGOUS AREAS

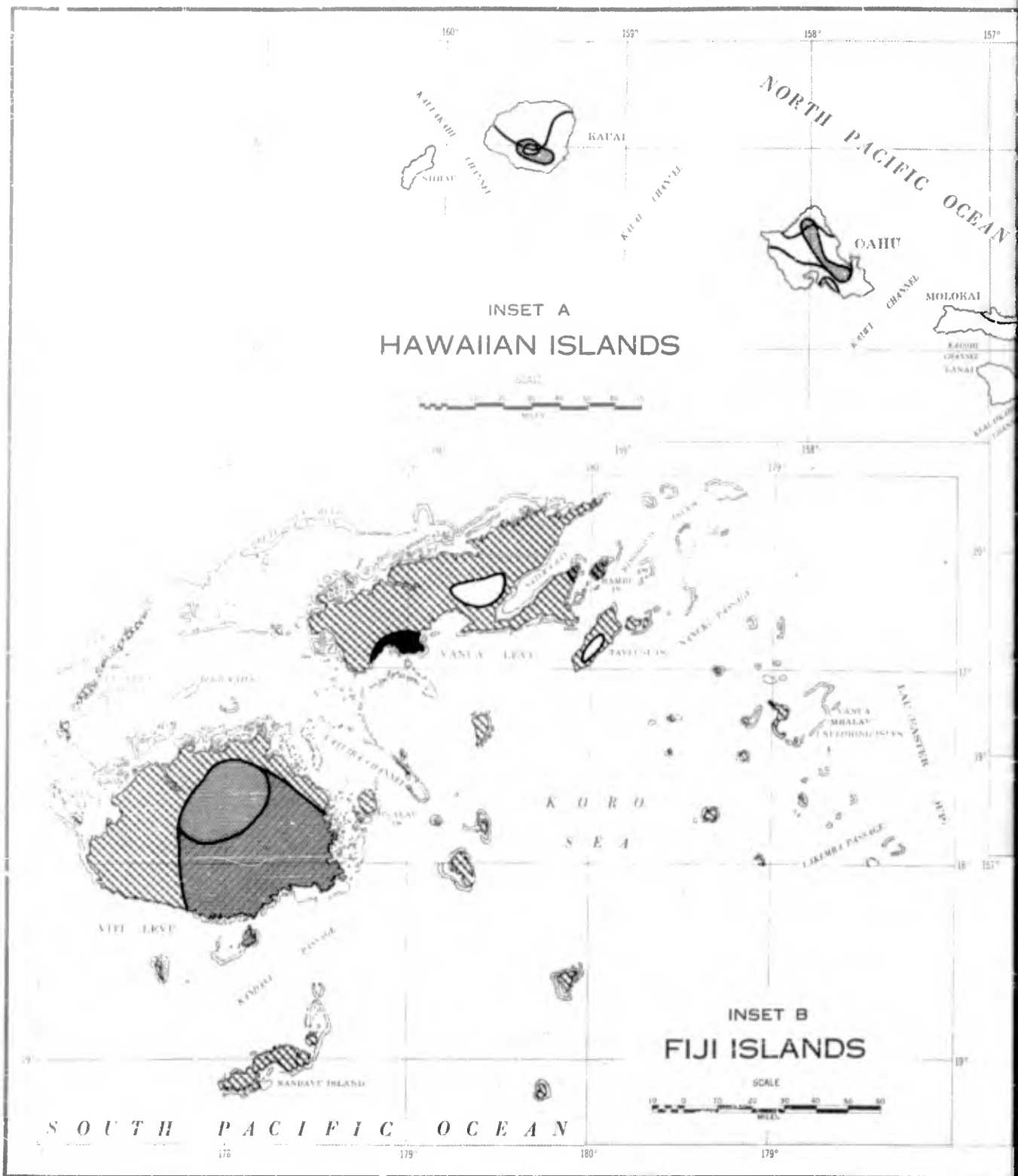
BALBOA HEIGHTS

- Mean temperature - warmest month
- Mean temperature - coldest month
- Mean annual precipitation
- Mean temperatures - warmest and coldest months
- Mean temperatures - warmest and coldest months, mean annual precipitation, and number of wet months

RELIABILITY: Fair to good

Figure 14

CLIMATIC ANALOGS OF PANAMA CANAL ZONE- HAV



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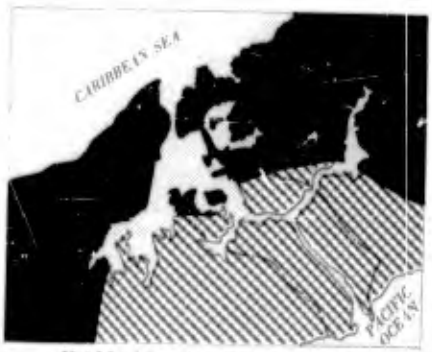

PANAMA CANAL ZONE

SCALE

MILES

MAUI

HAWAII

2

INSET B

JI ISLANDS

SCALE

MILES

COMPOSITE ANALOGOUS AREAS

CRISTOBAL

- Mean temperature - warmest month
- Mean temperature - coldest month
- Mean annual precipitation
- Mean temperatures - warmest and coldest months
- Mean temperatures - warmest and coldest months, mean annual precipitation, and number of wet months

RELIABILITY: Fair to good ————

Figure 15

UNCLASSIFIED