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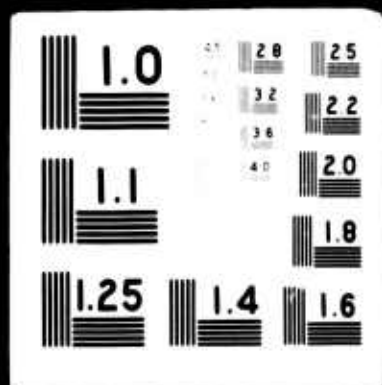
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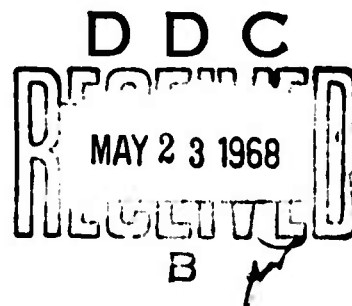
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Availability of Meteorological Data in Southeast Asia

M. M. Orgill



Pacific Southwest Forest and Range Experiment Station
Forest Service - U.S. Department of Agriculture
P. O. Box 245, Berkeley, California 94701

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1968

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Fort Monmouth, N. J.
Attn: AMSEL- BL-AP

58

AVAILABILITY OF METEOROLOGICAL DATA IN
SOUTHEAST ASIA

M. M. Orgill

Sponsored by
Advanced Research Projects Agency
Remote Area Conflict
ARPA Order No. 818

Part of this work was sponsored by the U. S. Army
Electronics Research and Development Laboratory
under Contract No. DA36-039SC-89080, Project No.
3A99-27-005-09 and Contract No. DA36-039SC-89080(E),
Project No. 1 A0-11001-B-021-09.

*Contractor: Colorado State University
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Pacific Southwest Forest and Range Experiment Station
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FOREWORD

During the late summer seasons of 1962 and 1963 I traveled to Southeast Asia as a consultant for the U.S. Army and as a representative of Colorado State University.

The purpose of these trips was three-fold: (1) to survey and collect meteorological data; (2) to consult with various operational groups concerning meteorological problems; and (3) to work with various national weather services concerning data and research.

Listed below are the countries, cities, and agencies visited during these trips. Visits to Burma and Cambodia were not possible in 1963 for various reasons.

<u>Country or State</u>	<u>Location</u>	<u>Agency</u>
Philippines	Clark AFB Manila	Weather Detachment (1st Weather Wing) Philippine Weather Bureau
South Vietnam	Saigon	Civil Aviation Assistance Group 1st Weather Wing Detachment (Tan-Son-Nhut Airport) Direction de la Meteorologie
Thailand	Bangkok	Thailand Meteorological Department ECAFE-Mekong River Project Advanced Research Projects Agency CDTC Field Unit JUSMAG
Burma	Rangoon	Burma Meteorological Department
Cambodia	Phnom Penh	Cambodian Meteorological Service
Malaysia	Singapore	Malaysia Meteorological Department
Hong Kong	Kowloon	Royal Observatory
Japan	Tokyo Fuchu AB	Japan Meteorological Agency Headquarters, 1st Weather Wing
Hawaii	Honolulu	Hawaii Institute of Geophysics, Department of Meteorology and Oceanography

A fairly comprehensive data survey was obtained during these two trips to Southeast Asia, but plans for publishing this information were not included in the Army research contract.

Information was compiled from three sources: (1) personal communication with personnel associated with the various national weather services of Southeast Asia; (2) personal communication and correspondence with the National Weather Records Center at Asheville, North Carolina; (3) information from Clyde O'Dell, who visited Southeast Asia in 1967.

Primarily, the survey indicates what type of meteorological data are available within the respective countries of Southeast Asia, and what are available in the United States. Although, for the latter, the survey is less comprehensive, since it was not the purpose to locate every possible source of data within this country.

A fair amount of literature review accompanied this work, but again it was not comprehensive. Although a very thorough survey is perhaps worthwhile, the magnitude of such an effort was much beyond the scope of the author's interest and the initial Army research contract. Therefore, even though the survey is not totally comprehensive, it is hoped that some of the information may be of value to those people or groups interested in Southeast Asia.

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VIETNAM AND LAOS

RADAR SURVEY

None now used, except for military radars.

UPPER AIR OBSERVATIONS

1. Pilot balloon data:

Includes Vietnam and Laos (see also section on Cambodia). Printed monthly summaries do not contain daily ascents, but only wind data according to frequency distribution. Two original copies exist: (1) a booklet with information written in pencil; and (2) a time-section form which could be microfilmed.

<u>Pilot Balloon (Pibal)</u>	<u>Length of Record</u>	<u>Pibal Data in Monthly Summaries</u>	<u>Pibal Data in Original Copies</u>	<u>Pibal Data Not Available</u>
Da Nang (Tour- ane)	1931-43; 49-62	1952 to date	IV/1949-1962	1931-1943
Hoang Sa (Pat- tle)	XII/1947- 1962	1952 to date	XII/1947-1962	--
Qui Nhon	1957-1962	1957 to date	1957-1962	--
Nha Trang	1938-42; 48-62	1952 to date	X/1947-1962	1938-1942
Lien-Khuong (Dalat Air- port)	IX/1959- 1962	1960 to date	IX/1959-1962	--
Pleiku	XI/1960- 1962	XI/1960 to date	XI/1960-1962	--
Saigon	1930-42; X/47-62	1952 to date	X/1947-1962	1930-1942
Rach Gia	III/1957- 1962	IV/1957 to date	III/1957-1962	--
Conson	II/1948- 1962	1952 to date	II/1948-1962	--
Vientiane	1931-39; 41-42; 1949-62	1952 to date	X/1947-1962	1931-39; 41-42
Seno	1950-62	1952 to date	1950-1962	--
Xieng Khou- ang (Khang Khag)	1952-54	1952-1954	1952-1954	--
Hanoi	1930-39; 48-54	1952-1954	1951-X/1955	1930-39; 48- 51; 11/1955 to present
Phnom Penh	1937-41; 49-54	1952-1954	1938-39 (months 1, 2, 4, 7, & 12) 1940-43-44 Missing Apr & Dec 1957	1937-41; 49- 54

2. Rawinsonde data:

<u>Station</u>	<u>Length of Record</u>	<u>Data Published</u>	<u>Data Unpublished</u>
Saigon	Irregular 1952-57	At least 1956-60	1952-56
	Regular 1957-62	1961 to date	--
	00 and 12 GMT	--	--
Tourane	Started July 1962	To be published	--
	00 and 12 GMT	--	--

SYNOPTIC CHART AND DATA SURVEY

1. Surface charts:

- a. Historical Record: 1936-42; 1943-45; 1946-61; and 1961-62
- b. Map Scales:
 1936-42--1:7,500,000; 1:12,500,000; and 1:15,000,000
 1943-45--1:3,500,000; 1:7,500,000; and 1:15,000,000
 1946-61--1:7,500,000; 1:12,000,000; and 1:15,000,000
 1961-62--1:12,500,000
- c. Time of Charts:
 1936-44--5, 6, 13, 14, 16, and 18 hours local time
 1944-61--21, 22, 23, 00, 03, 06, 09, 12, and 18 GMT
 1961-62--00, 06, 12, and 18 GMT

2. Pilot Balloon Charts:

- a. Historical Record: 1946 to date
- b. Map Scales: 1:30,000,000
- c. Times of Analysis: 18, 00, 06, and 12 GMT
- d. Analysis Levels (Streamlines): 300, 900, 1500, 2100, 3000, and 5000 meters

3. Radiosonde or Rawinsonde Charts:

- a. Historical Record: 1950 to date
- b. Map Scales:
 1950-56--1:12,500,000 and 1:15,000,000
 1956 to date--1:12,500,000
- c. Times of Analysis:
 1950-57--03, 15 GMT
 1958-62--00, 12 GMT
- d. Analysis Levels:
 1950-51--850, 700, and 500 mbs
 1952-59--700, 500, and 300 mbs
 1960-62--700, 500, 300, and 200 mbs

4. 1962 Maps:

- a. Surface
 Times of analysis: 00, 06, 12, and 18 GMT
- b. Pilot Balloon

- 1). Times of analysis: 18, 00, 07, and 12 GMT
- 2). Levels of analysis: 900, 1500, 2100, 3000, 4500 and 6000 meters.
- c. Pressure-height contour charts:
 - 1). Times of analysis: 00 and 12 GMT
 - 2). Levels of analysis: 700, 500, 300, and 200 mbs.

PRECIPITATION DATA

1. Number of ordinary rain gage stations:
 Vietnam - 310
 Laos - 5
2. Length of record: 1949 to date
3. Size of rain gage: 8 inch
4. Recording rain gage stations:

<u>Station</u>	<u>Length of Record</u>	<u>Data Available</u>
Quang Tri	from 1-2-1962	same period
Hoang Sa	1953-62	1959-62
Hue	1953-62	same period
Da Nang (Tourane)	1953-62	1953, 54, 55, 62
Quang Ngai	from 1-3-1959	same period
Qui Nhon	from 1-8-1959	same period
Tuy Hoa	from 1-3-1959	same period
Nha Trang	1953-62	same period
Phan Thiet	from 1-6-1960	same period
Pleiku	from 1-6-1961	same period
Banmethuot	from 1-4-1959	same period
Lien-Khuong (Dalat)	from 1-10-1954	same period
Saigon	1953-1962	same period
Rachgia	from 1-1-1960	same period
Soc Trang (Khanh Hung)	from 1-8-1960	same period
Phuoc Long	from 1-3-1961	same period
Vinh Long	from 1-7-1960	same period
Long Xuyen	from 1-8-1960	same period
Dakmil	from 1-1-1961	same period
Mytho	from 1-5-1960	same period
Lasan (Kontum)	from 1-6-1961	same period
Tansonhoa	from 1-6-1962	same period
Laikhe	from 1-8-1961	same period
Saigon (Mac Din Chi)	from 1-9-1953	same period
Chaudoc	from 1-8-1960	same period

5. Published recording rain gage data

Data are published in monthly publications from 1956-1962 (Bulletin Mensuel Du Temps). Data for the years 1950-1955 also are published but copies are scarce. Only reference copies are available in Saigon.

AIRCRAFT REPORTS

Tan Son Nhut Airport Meteorological Office receives aircraft reports from most commercial flights.

PUBLICATIONS (SEE ALSO SECTION ON SOURCES)

1. Annual Climatological Summary
2. Monthly Climatological Summary: 1936-39; 1946-48; 1940-45 (missing); 1949, 1950-55; 1956 to date.

MICROFILMED DATA

Climatology Group of First Weather Wing, Fuchu Air Base, Tokyo, Japan has microfilmed a certain amount of the Vietnam meteorological data. (See also Section on Data Available Elsewhere)

VIETNAM METEOROLOGICAL SERVICE

Address: Main Office, Nha Giam Doc Khituong
8 Macdinh Chi
Saigon Phone: 21403
Airport (Tan-Son-Nhut) Phone: 21402

Director	M. Do-Dinh-Cuong
Chief of the Technical Service	M. Lang-Phuc-Dinh
Forecasting Bureau	M. Nguyen Kim Mon
Climatology Bureau	M. Nguyen Gi
Telecommunication Bureau	M. Nguyen-Dinh-Thuyet
Chief of the Southern Area (Meteorological Network)	M. Dang-Uan-Nhan
Chief of the Airport (Met. Office)	M. Nguyen Huu Hau
Radiosonde Station	M. Doan-Duc-Hinh

SOURCES OF WEATHER DATA¹

The sources of climatological statistics for stations in the Republic of Vietnam may be grouped by content into three categories: short-period summaries, long-term summaries, and other documents. The short-period summaries consist mainly of daily or monthly totals, means and extremes from recent observations. These climatic data are the primary contents of sources 3, 4, 5, 6, 7, 8, and 16. While apparently reliable data have been included for many stations, they are essentially only temperature, precipitation, and wind data. Sources 3, 4, and 6 are comparable summaries covering different period of record.

Climatological statistics in the form of long-term summaries are contained in sources 1, 2, 9, and 17. The most current and complete summaries for the major and most secondary stations are included in source 17. While the other sources have only a small portion of data pertaining to aircraft operations, source 9 is a fairly complete summarization of ceilings and visibilities at Tan

¹Comments about sources of weather data by 1 Weather Group Climatologist, Det. 14, 1 Wea. Gp., as obtained by Clyde O'Dell, U.S. Weather Bureau, winter 1967.

Son Nhut airport. Although the data are somewhat older in source 1, there is a concise descriptive text.

Graphs of monthly climatology averages for available stations are shown in sources 10 and 11. Analysis of mean monthly and mean annual precipitation amounts are contained in the chart series of source 12. Tracks of tropical storms and typhoons which have entered the South China Sea are displayed in sources 13 and 14. Source 18 provides reliable information on the coastal sections of the country.

The major deficiencies encountered are the limited amount of data pertaining to aircraft operations and scarcity of descriptive text on the climate. Round-the-clock hourly observations with an awareness of intra-hourly weather changes have not been taken for sufficient time to obtain adequate data on visibilities, ceilings, and present weather at some locations. Also, data on the destructive effects of storms, floods, hail, high winds, and other such phenomena are lacking.

1. Bruzon, E., Carton, P., and Romar, A. *Le Climat de L'Indochine, Apercu General et Regime des Vents* (The Climate of Indochina, General Survey and Wind Regime).
2. Republic of Vietnam, Directorate of Meteorology, *Khi-Hau Vietnam* (Climatology of Vietnam). Saigon. 1964.
3. Vietnam, Service Meteorologique, *Resume mensuel de Temps en Indochine* (Monthly Weather Summary in Indochina). Saigon 1949-54.
4. Republique du Vietnam, Direction de la Meteorologie, *Resume mensuel du Temps* (Monthly Weather Summary). Saigon. 1955-63.
5. Republique du Vietnam, Direction de la Meteorologie, *Bulletin mensuel du Temps* (Monthly Weather Summary). Saigon. 1957-63.
6. Republic of Vietnam, Directorate of Meteorology. *Monthly Weather Summary*. Saigon. 1964-66.
7. Republic of Vietnam, Directorate of Meteorology. *Yearly Weather Summary*. Saigon. 1962-65.
8. Republic of Vietnam, Directorate of Meteorology. *Meteorology Daily Data*. Saigon. 1964-65.
9. Republic of Vietnam, Directorate of Meteorology. *Climatological Summaries, Models A, B, C, D, K for Saigon - Tan Son Nhut*. Saigon. 1966.
10. Republic of Vietnam, Direction of Meteorology. *Climatic Charts, Upper Wind at Selected Stations (7) of Vietnam, Laos and Cambodia*. Saigon. 1958.

11. Republic of Vietnam, Direction of Meteorology. Climatic Charts, Pressure-Temperature-Humidity-Nebulosity-Rainfall and Surface Wind at Selected Stations (26). Saigon. 1958.
12. Republic of Vietnam, Direction of Meteorology. Climatic Charts, Average Precipitation in Vietnam, Laos and Cambodia. Saigon. 1958.
13. Republic of Vietnam, Direction of Meteorology. Typhoon Tracks (1948-57). Saigon. 1958.
14. Republic of Vietnam, Directorate of Meteorology. Typhoon Tracks (1958-65). Saigon. 1966.
15. Republic of Vietnam, Directorate of Meteorology. Radiosonde and Upper Air Wind Observations. Saigon. 1964-65.
16. Republic of Vietnam, Directorate of Meteorology. Monthly Rainfall for Rain Gauging Stations. Saigon. 1962-65.
17. Republic of Vietnam, Directorate of Meteorology. Climatological Mean Values. Saigon. 1966.
18. U.S. Navy Oceanographic Office. Sailing Directions for the Western Shores of South China Sea. H. O. Publications 93. Washington. 1957.
19. U.S. Air Force. Climatic Atlas of Indochina. First Weather Wing Special Study 105-6. 1954.
20. U.S. Air Force. Climate of Republic of Vietnam. First Weather Wing Special Study 105-9. 1965.
21. U.S. Air Force. (Month) Climate of Southeast Asia. First Weather Wing Special Study 105-11/1-12. 1965-66.

DATA AVAILABLE ELSEWHERE

At National Weather Records Center, Asheville, N.C.

Vietnam

1. Publications:

- a. Resume Mensuel du Temps en Indochine, January 1949-December 1954.
- b. Resume Mensuel du Temps, 1955-December 1961.
- c. Reference Manual 274 Saigon Intercept.
- d. Reference Manual 587 Indo-China Pibals.

2. Data on Card Decks or Electronic Tape:

a. Surface data:

- 1) Twenty-six stations in Vietnam (North and South) as shown in Reference Manual 274 Saigon Intercept or Deck 1311 (Electronic Data Processing),

covering a 93-month period from January 1949 to October 1956 with observations taken at 00, 03, 06, 09, 12, 15, 18, and 21 GMT. Number of observations vary with observation time.

- 2) Twenty-one stations in South Vietnam from January 1957 to June 1961 as contained in Card Deck 274 Saigon Intercept.

b. Pilot balloon data:

- 1) The following as shown in Reference Manual 587 Indo-China Pibals with one or two observations per day:

<u>Station</u>	<u>Period of Record</u>
Phu-Lien	April 1938 - April 1942
Hanoi	April 1938 - December 1943, except October 1940, February 1941, and May 1941
Vinh	April 1938 - December 1942
Tourane	April 1938 - December 1943, except February - May 1943
Nha Trang	April 1938 - December 1942, except May 1939.
Saigon	April 1938 - December 1943
Haitien	October 1941 - October 1942

- 2) The following as contained in Card Deck 561 or Deck 5200 (Electronic Data Processing):

<u>Station</u>	<u>Period of Record</u>
Da Nang	July 1954 - June 1961
Hoang Sa (Pattle Is.)	July 1954 - June 1961
Qui Nhon	August 1956, June 1957, June 1961
Nha Trang	July 1954 - June 1961
Saigon	July 1954 - June 1961
Rach Gia	March 1957 - June 1961
Conson (Poulo Condore)	July 1954 - August 1955; March 1956 - January 1958; March 1958 - June 1961

3. Additional or Duplicate Data:

a. Punched Card Data Catalog, 0 Index

<u>Name</u>	<u>Card Deck</u>	<u>Period Covered</u>
Indo China Synoptic	104	1937-45
Saigon Intercept Data	274	1949 to date
SE Asian Winds Aloft Intercept	561	July 1954 to date
SE Asian Radiosonde Intercept	562	July 1954 to date
Indo Chinese Pibals	587	1938-43

b. Punched Card Data Catalog 18 Southeast Asia

Laos

1. Data on Card Decks or Electronic Tape:

a. Surface data:

- 1) The following stations as shown in Reference Manual 274 Saigon Intercept or Deck 1311 for observations 00, 03, 06, 09, 12, 15, 18, and 21 GMT. Number of observations vary with observation time:

<u>Station</u>	<u>Period of Record</u>
Luang Prabang	June 1951 - October 1956
Plaine Des Jarres	November 1951 - March 1955
Vientiane (Viengchan)	January 1949 - October 1956
Seno (Savannakhet)	January 1949 - October 1956
Pakse	August 1949 - October 1956

- 2) The following stations as shown in Card Deck 274 Saigon Intercept:

<u>Station</u>	<u>Period of Record</u>
Vientiane	January 1957 - 1960
Seno	April 1957 - 1960
Pakse	February 1957 - 1960

b. Pilot Balloon Data:

- 1) The following stations as shown in Reference Manual 587 Indo China Pibals with one or two observations a day:

<u>Station</u>	<u>Period of Record</u>
Pakse	January 1940 - January 1941
Vientiane	April 1938 - November 1942, except December 1949 - June 1941, September 1942
Seno	April 1942 - March 1943, May 1943
Thakhek	April 1938 - June 1940

- 2) The following stations as shown on Card Deck 561 or Deck 5200 (Electronic Data Processing):

<u>Station</u>	<u>Period of Record</u>
Vientiane	July 1954 - June 1957; August 1957 - June 1961
Seno	July 1954 - April 1957; June 1957, September 1957 - June 1961

2. Additional or Duplicate Data as listed in Punched Card Catalog, 0 Index and 18 Southeast Asia.

At Other Locations

1. The following daily precipitation data is available at ECAFE (Mekong River Project) in Bangkok, Thailand:

<u>Station</u>	<u>Months</u>	<u>Years</u>
Luang Prabang	May-December	1931-1940, 1949-1958
Pakse	May-December	1931-1940, 1949-1957
Seno	May-December	1931-1940, 1949-1957
Vientiane	May-December	1907-1940, 1931-1940, and 1949-1959
Xieng Khouang	May-December	1938-1944, 1952-1959
Phong Saly	January-December	1921-1944
Muong Sing	January-December	1929-1944
Ban Houei Sai	January-December	1912-1944
Paklay	January-December	1929-1940
Sam Neua	January-December	1930-1943

2. Synoptic observations from January 1940 through December 1944 with observations taken three times daily at several stations in Indo China are available at the United States Weather Bureau Library.
3. Daily precipitation data of Indo China are published in the Bulletin Pluviometrique Indo China at the Royal Observatory, Hong Kong, for the years: 1906-1915; 1916-1920; 1921-1925; 1926-1927; and 1928-1929.
4. Data from recording rain gages are available at Thailand Meteorological Department Library, Bangkok, Thailand in the publication: Ministere des Travaux Publics, Des transports et du Tourisme, Secretariat General a L'Aviation Civile et Commerciale, Direction de la Meteorologie Nationale. Annales des Services Meteorologiques de la France D'OutreMer. Territoires Francais de L'Ocean Indian du Pacifique et de L'Amerique. Etata Associe de L'Indochine. Vols. 2^e, Years 1951-55.

CAMBODIA

RADAR SURVEY

1.

<u>Type</u>	<u>Wave Length</u>	<u>Range</u>	<u>Location</u>
Decca	3 cm.	400 km (approx.)	Pochentong (Phnom Penh Airport)
2. Photographic equipment consists of a movie camera; thus, still and movie pictures are possible.

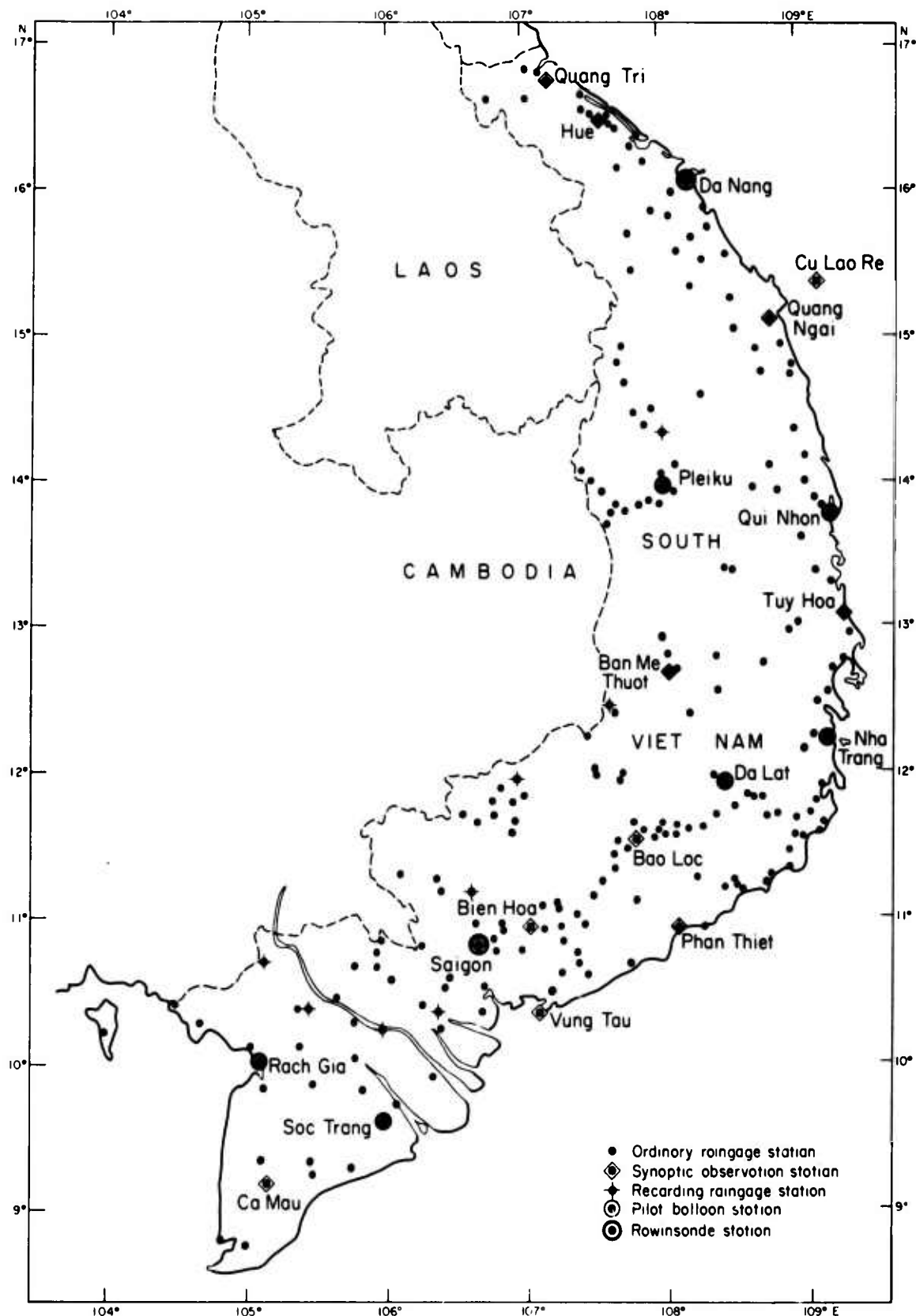


Figure 1.--Distribution of Meteorological Stations for South Vietnam.

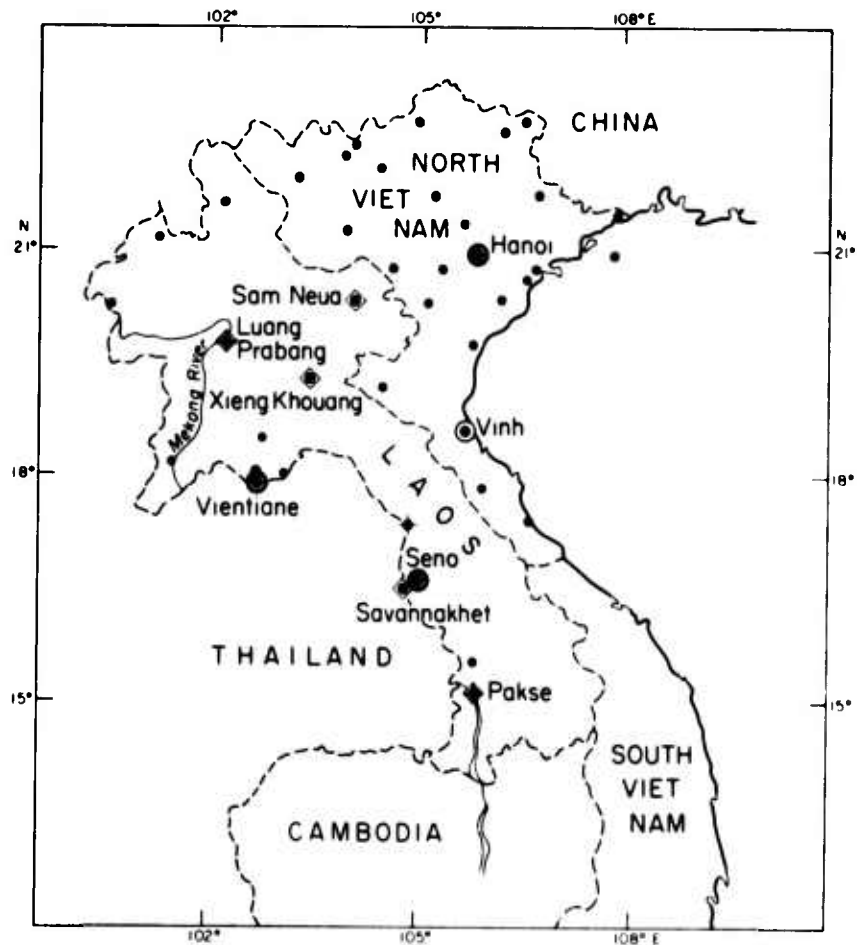


Figure 2.--Distribution of Meteorological Stations for Laos and North Vietnam (incomplete).

UPPER AIR OBSERVATIONS

1. Pilot Balloon Data:

Includes the following with times of observations at 06, 12, 18, and 00 GMT. All pibal data are in original copies, consisting of small booklets with information copied in pencil.

<u>Station</u>	<u>Length of Record</u>
Pochentong (Phnom Penh)	1941, 1948-1962 (also see Pibal Record of Vietnam Weather Service)
Kampot	1961-1962
Siemreap	1936-1943; 1949-1959; 1961-1962
Stung Treng	1956 (some months)

2. Radiosonde/Radarwind Data:

Pochentong just starting this year (1962) with no accumulated data.

SYNOPTIC CHART AND DATA SURVEY

Cambodian Weather Service is rather new; thus it was felt that this type of survey would be of little value. Weather Service was started after independence around 1954-1955.

PRECIPITATION DATA

The following are recording rain gage stations which started observations in the latter part of 1960:

- | | |
|-----------------------------|--------------------------|
| 1. Phom Penh (4 or 5 types) | 16. Cheam Ksam |
| 2. Kirirom (2) | 17. Rovieng |
| 3. Slakou | 18. Tabeng |
| 4. Kampot | 19. KG-Thom |
| 5. Sihanoukville | 20. Chamcar Krauch |
| 6. Svay Rieng (2) | 21. KG Chhnang |
| 7. KG-Cham | 22. Krakor |
| 8. Snoul | 23. Daphat |
| 9. O-Raing | 24. Tuol Kruos |
| 10. Kratie | 25. Pailin |
| 11. Sre Sbau | 26. Battambang |
| 12. Stung Treng | 27. Sisophom |
| 13. Lomphat | 28. Siemreap (Kok Patri) |
| 14. Andoung Pich (Bokeo) | 29. Sam Rong |
| 15. Voeun Sai | 30. KG-Kdey |

PUBLICATIONS (All listed are in French)

1. Monthly Summary (winds, special phenomena, precipitation included).
2. Annual Summary.
3. Monthly Summary (for all precipitation stations).

CAMBODIAN WEATHER SERVICE

Director, Khiou Bonthonn
Deputy Director, Chheng-Yoeun
Forecasters, K. Bonthonn, C. Yoeun, T. Litte, and M. Maudit (French)

Another person of importance, also, but not with the Cambodian Weather Service is M. Faivre-Dupaigre, World Meteorological Organization, UNTAB office located at the airport.

PLANS

Publish meteorological data.

DATA AVAILABLE ELSEWHERE

Available at the National Weather Records Center, Asheville, N.C.

1. Data on Card Decks or Electronic Tape

a. Surface Data

The following as shown in Reference Manual 274 Saigon Intercept or Deck 1311 (Electronic Data Processing); with observations at 00, 03, 06, 09, 12, 15, 18, and 21 GMT:

<u>Station</u>	<u>Period of Record</u>
Battambang	September 1951-September 1954
Siemreap	January 1949-October 1956
Krakor	September 1949-May 1955
Stung Treng	January 1949-October 1956
Kampot	January 1949-December 1955
Phnom Penh	January 1949-October 1956
Kompong Cham	January 1949-October 1956
Svay Rieng	May 1949-October 1956

b. Pilot Balloon Data

- 1) The following as shown in Reference Manual 587 Indo China Pibals with one or two observations a day:

<u>Station</u>	<u>Period of Record</u>
Siemreap	January 1941-October 1942 except February and August 1941
Phnom Penh	April 1938-June 1940
Battambang	April 1938-June 1940
Stung Treng	February 1941-September 1942

- 2) The following as shown in Card Deck 561 or Deck 5200 (Electronic Data Processing):

<u>Station</u>	<u>Period of Record</u>
Siemreap	July 1954-November 1954; January 1955-August 1956; October 1956-May 1958, and November 1958
Stung Treng	June 1957-April 1958, and November 1958
Kampot	July 1954-September 1954 November 1954, and January 1955-September 1958
Phnom Penh	July 1954-April 1958; August 1958-June 1961

2. Additional or Duplicate Sources.

- a. Punched Card Data Catalog 0 Index
- b. Punched Card Data Catalog 18 Southeast Asia

THAILAND

RADAR SURVEY

- | <u>1. Type</u> | <u>Wave Length</u> | <u>Range</u> | <u>Location</u> |
|------------------------------------|--------------------|--------------|-------------------------|
| Decca
(storm
detec-
tion) | 3 cm. | 120 miles | Bangkapi (Bang-
kok) |
2. At this time cameras were not present at the radar site in Thailand.
 3. In 1963 radar was not in operating condition.

UPPER AIR OBSERVATIONS

1. Pilot Balloon Data

<u>Stations</u>	<u>Pibal Data Published</u>	<u>Pibal Data in Original Copies</u>	<u>Pibal Data Not Available</u>
Bangkok	1937-42;1949-54	1955 to date	1943-48
Chiengmai	1949-54	1955 to date	--
Songkhla	1951-54	1955 to date	--
Bandon	1937-42;1949-54	1955 to date	1943-48
Nakorn Rajasima	1937-42;1951-54	1955 to date	1943-50
Udorn Dhani	1949-54	1955 to date	--
Phitsanulok	1937-42;1952-54	1955 to date	1943-51
Chantaburi	1954	1955 to date	--
Ubol Ratch- atani	None	1956 to date	--
Puket	None	1957 to date	--
Prachuap Kirikhan	None	1957 to date	--

Months and times of observations are available on a more detailed summary.

2. Published pilot balloon data (see also section on Vietnam):

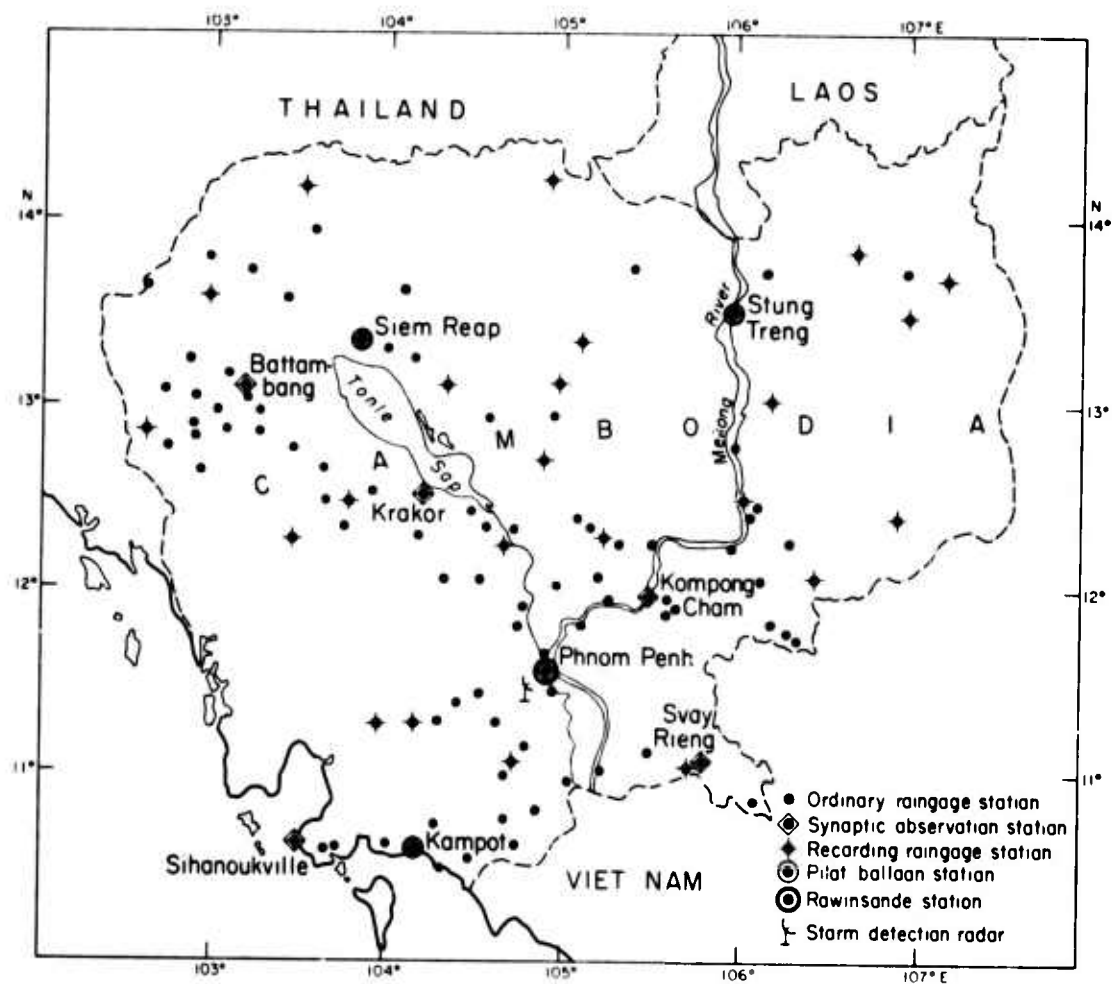


Figure 3.--Distribution of Meteorological Stations for Cambodia.

<u>Year</u>	<u>Months</u>
1937	February, March, August, and December
1938	July and August
1939	March, August, and December
1940	September
1941	February-April, June-August, and October-December
1942	January-June and August-December
1943-48	None
1949	January-December, inclusive
1950	January, February, and August-December
1951	January-December, inclusive
1952	Unknown
1953	January-December, inclusive
1954	January-December, inclusive

3. Pibal Data in Summary Form:

<u>Year</u>	<u>Months</u>
1938	January, February, October and December
1939	May, June, September, and November
1940	March, April, May, and August
1941	January, May, and September

4. Unaccountable Pibal Data:

<u>Year</u>	<u>Months</u>
1937	January, April, May, June, July, September, October, and November
1938	January-June and September-December
1939	January, February, April-July, and September-November
1940	(
1941	(See page 24.
1942	(
1950	March-July

5. Rawinsonde Data:

<u>Station</u>	<u>Published Data</u>	<u>Original Data</u>	<u>Data not available</u>
Bangkok	1946 (Feb.-Dec., no data for Jan.)	1953 to date	1947-52
Songkhla	None	1953 to date	--
Chiangmai	None	1953 to date	--
Ubon Ratchathani	Started July 10, 1962	--	--
Chantaburi	Started May 18, 1962; was terminated. Resumed July 4, 1962. These are Radar Winds; no temperature data.		

6. Times of Rawinsonde Observations:

<u>Station</u>	<u>Times</u>
Bangkok	03 GMT (1953-56), for IGY (1957-58) 00 GMT, 12 GMT, 00 GMT (1959-62), June 1962 00 GMT, 12 GMT
Songkhla	03 GMT (1953-56), 00 GMT (1957 to date)
Chiengmai	Same as Songkhla
Ubon Ratchathani	00 GMT, 12 GMT July 10, 1962
Chantaburi	00 GMT (1947 to date)

SYNOPTIC CHART AND DATA SURVEY

1. Surface Charts

a. Historical Record:

<u>Years</u>	<u>Times of Analysis</u>
1936-43	00 GMT (Thailand and other countries) 06 GMT (Thailand only) 09 GMT (Thailand only) 00 and 06 GMT optional; pressure change (inches) and temperature change
1944-45	Majority of maps are not available
1946	00 GMT
1947-1952	00 and 06 GMT
1953	00, 06, and 12 GMT
1954 to date	00, 06, 12, and 18 GMT (Surface charts are complete from this date.)

b. Map scales have changed often since 1936; present scale is 1:10,000,000.

2. Pilot Balloon Charts (analysis is streamlines only):

<u>Years</u>	<u>Times of Analysis</u>	<u>Levels</u>
1936-43	00 GMT	200, 500, 1000, 1500, 2000, and 3000 meters
1944-46	Majority of maps missing	(Plotted in Beaufort Scale)
1947-49	None	--
1950-52	00, 06 GMT 09, 12 GMT	1, 2, 3, 5, 7, 10, 12-15, 18- 20, and 25-30 thousand feet
1953-54	03, 09 GMT	--
1955	03, 09, and 21 GMT	--
1962	00, 06, 12, 18 GMT	--

3. Rawinsonde Charts:

<u>Years</u>	<u>Levels of Analysis</u>
1950-54	700 and 500 mb
1955	700, 500 mb, and a thickness chart
1955-62	(See 1962 survey)

4. General Survey of 1962 Maps: (See p. 20.)

PRECIPITATION DATA

1. Stations that record rainfall:

- a. Four (4) stations--hourly observation stations with 24-hour periods.
- b. Six (6) stations--three hourly interval observation stations with 24-hour period.
- c. Twenty-three (23) stations--observations at 0100, 0700, 1000, 1300, 1600, and 1900 hours only.
- d. Ten (10) stations--observations at 0700, 1000, 1300, 1600, and 1900 only.

2. Period of records for stations with self-recording rain gage:

<u>Stations</u>	<u>Abbreviation</u>	<u>Period of Record</u>
Chiangrai	CR	January 1958 to date
Chiangmai	CM	June 1953 to date
Nan	NN	April 1959 to date
Lampang	LG	January 1958 to date
Phrae	PR	May 1960 to date
Uttaradit	UT	June 1961 to date
Udon Thani	UD	April 1954 to date
Phitsanulok	PI	April 1954 to date
Phetchaboon	PN	June 1961 to date
Ubon Ratchathani	UB	September 1954 to date
Nakkon Ratchasima	KO	March 1954 to date
Lopburi	LI	October 1957 to date
Prachinburi	PC	June 1961 to date
Donmuang	DM	July 1954 to date
Aranyaprathet	AP	July 1961 to date
Chonburi	JB	February 1956 to date
Chanthaburi	CB	January 1961 to date
Prachuap Khirikhan	PK	June 1961 to date
Chumphon	CP	April 1956 to date
Ranong	RN	June 1961 to date
Bandon	BD	June 1961 to date
Phuket (Airport)	PU	July 1961 to date
Songkhla	SI	June 1954 to date
Bangkok	BK	May 1937 to date

(Note: Some of these records are missing due to World War II. Two additional stations started in 1962 and others will follow.)

3. Distribution of stations recording rain fairly good with exception of the west-central and northwest mountainous section.
4. Data have not been summarized or published as of 1963.
5. Stations recording rainfall with the longest records.

<u>Stations</u>	<u>Started</u>	<u>Remarks (daily graph)</u>
Chiangrai	January 2480 (1937)	January 2501 (1958)
Mae Nongson	October 2484 (1941)	--
Mae Sariang	January 2485 (1942)	--
Chiangmai	August 2480 (1967)	January 2498 (1955)
Nan	March 2487 (1944)	May 2502 (1959)
Lampang	September 2486 (1943)	January 2501 (1958)
Phare	February 2495 (1952)	--
Uttaradit	June 2480 (1937)	--
Loei	January 2497 (1954)	--
Udon Thani	May 2480 (1937)	April 2497 (1954)
Nakhon Phanon	July 2495 (1952)	--
Mukdahan	May 2436 (1943)	--
Sakon Nakhon	April 2486 (1943)	--
Khon Kaen	January 2487 (1944)	--
Roi Et	February 2486 (1943)	--
Chaiyaphum	July 2499 (1956)	--
Ubon Ratchathani	May 2486 (1943)	September 2497 (1954)
Nakhon Ratchasima	August 2479 (1936)	January 2497 (1954)
Surin	May 2486 (1943)	--
Sub Muang	January 2499 (1956)	--
Aranyaprathet	November 2480 (1937)	--
Prachinburi	January 2491 (1948)	--
Chonburi	November 2486 (1943)	January 2497 (1954)
Sattahip	October 2480 (1937)	January 2497 (1954)
Chanthaburi	December 2480 (1937)	--
Khlong Yai	January 2487 (1944)	--
Pom Phrachun	June 2499 (1956)	--
Tak	February 2497 (1954)	--
Mae Sot	August 2489 (1937)	--
Phitsanulok	May 2480 (1937)	April 2497 (1954)
Phetchabun	May 2498 (1950)	--
Makhon Sawan	March 2481 (1938)	--
Suphanburi	January 2490 (1947)	--
Lopburi	April 2486 (1937)	--
Kanchanaburi	May 2487 (1944)	--
Bangkok	January 2480 (1937)	--
Bang Khon	August 2486 (1943)	--
Don Muang	August 2479 (1936)	--
Hua Hin	June 2483 (1940)	--
Prachuap Khirikhan	April 2481 (1938)	--
Chumphon	April 2483 (1940)	--
Ranong	January 2436 (1943)	--
Bandon	May 2480 (1937)	--
Nahkon Si Thammarat	April 2486 (1943)	--
Phuket	January 2481 (1936)	--

<u>Stations</u>	<u>Started</u>	<u>Remarks (daily graph)</u>
Phuket Airport	January 2495 (1962)	--
Songkhla	January 2480 (1937)	--
Trang Airport	August 2491 (1948)	--
Narathiwat	August 2486 (1943)	--
Pai	June 2501 (1958)	--
Khun Yuam	April 2502 (1959)	--
Bhumibol Dam	September 2502 (1959)	--
Si Chang	October 2501 (1958)	--
Phu Kradung	September 2505 (1962)	--

AIRCRAFT REPORTS

Thai Meteorological Department keeps aireps in three forms:

1. Flight folders.
2. Teletype data.
3. Special aircraft report plotted maps.
4. General Survey of 1962 Maps.
 - a. Surface:

Times of analysis: 00, 06, 12, and 18 GMT for airport and main office in Bangkok.
 - b. Pilot balloon:
 - 1) Times of analysis: 00, 06, 12, and 18 GMT for airport at main office in Bangkok. (Bangkok winds above 24,000 ft. taken at 00 and 12 GMT only.)
 - 2) Levels of analysis: 2, 5, 10, 15, 20, 24, 30, 35, 40, and 47,000 feet taken at airport; 2, 5, 7, 10, 12, 15, 18, 20, 24, 30, 35, 40, 47, 50, 54, 60, 65, and 70,000 ft. taken at Bangkok main office.
 - 3) Other supplementary charts that are plotted and analyzed:
 - (a) Three hourly maps of Thailand and neighboring countries plotted for 03 and 09 GMT.
 - (b) Time sections for Rawinsonde stations.
 - (c) Twenty-four hour rainfall charts.

PUBLICATIONS

1. Monthly Climatological Data.
2. Ten Year Climatological Summary.
3. Thailand Daily Weather Bulletin.
4. Weekly Temperature and Rainfall.

THAI METEOROLOGICAL SERVICE

Main Office: Sukhumvit Road, Bangkok
Phone: Bangkok 56178, 56014, 57313

Airport Office: Don Muang Airport
Terminal Building, Third Floor
Phone: 70010

Director	Vice Admiral Charoon Vichayapai Bunnag (Retired September 1962; acted as advisor thereafter.)
Deputy Director	Rear Admiral Sanit Vesa-rajananda
Executive Officer	Commodore Khun Visisht Dhararaks
Chief, Division of Station Operations	Captain Seri Buspabutr
Chief, Division of Weather Forecast	Captain Prasert Soontarotok
Executive Officer	Captain Charoen Charoen-Rajapark
Chief, Division of Agricultural Met.	Commander Duan Bunnag
Deputy Chief, Division of Weather Forecast	Commander Kiti Ratanarome
Deputy Chief, Division of Upper Air and Maritime Meteorology	Commander Charal Phandhudawi
Chief, Division of Meteorology	Commander Sawai Suwanpong
Chief, Foreign Section	Commander Thamrong Kitisin
Deputy Chief, Division of Station Operations	Commander Samram Vaabhasiri
Deputy Chief, Division of Climatology	Commander Kajit Buajitti
Chief, Division of Hydrometeorology	Lt. Commander Dumrong Chareonsook

PLANS

Purchase of a new radar set.

DATA AVAILABLE ELSEWHERE

Available at the National Weather Records Center, Asheville,
North Carolina.

1. Publications.

a. Daily Weather Bulletin:

June-December 1952; February-December 1953, October miss-
ing; 1954-1957; January-June 1958; February-December 1959,
July, November missing; 1960, July missing; February-Decem-
ber 1961; 1962, August missing; January-April 1963.

b. Weekly Weather Report: 8 October 1962-7 July 1963.

- c. Weekly Rainfall: 16 July 1962-7 October 1962.
- d. Weekly Temperature and Rainfall: 26 February-4 March 1958;
27 August-28 October, 18-25 November and 24-31 December
1958; 1 January-14 October 1959; 25 March 1960-July 15, 1962.

2. Data on Card Decks or Electronic Tape.

a. Surface data:

- 1) Forty-three stations in Thailand as shown in Reference Manual 276 Bangkok Intercept or Reference Manual Deck 1311 covering a 7-year period of January 1949-December 1955 and with eight observations, 00, 03, 06, 09, 12, 15, 18, and 21 GMT.
- 2) Surface observations:

<u>Station</u>	<u>Time Period</u>
Don Muang	1956-1962
Chiengmai	1956-1962
Songkhla	1956-1962
Bangkok	1958-1962
Nakhon Ratchasima	December 1956-April 1961
Prachuap Khirikhan	December 1956-March 1959
Sattahip	December 1956-November 1958
Takhli	October 1958-December 1962

- 3) Punched card data catalog 0 index:

<u>Card Deck</u>	<u>Name</u>	<u>Period of Record</u>
227	Thailand Synoptic	1937-1942
276	Bangkok Intercept Data	1954-December 1957
427	Thailand Summary of Day	1937-1942
433	Thailand Synoptic/Summary of Day	1943

- 4) Punched card data catalog 18 southeast Asia.

b. Pilot balloon data:

- 1) The following as shown in Reference Manual 584 Siam Pibal with about two observations a day.

<u>Station</u>	<u>Period of Record</u>
Don Muang	September 1936-December 1939
Ban Don	September 1936-December 1939
Phitsanulok	December 1936-December 1939, except March-April 1937
Nakhon Ratchasima	February 1938-December 1939, except April 1938

- 2) Card Deck 561 or Deck 5200 (Electronic Data Processing):

<u>Station</u>	<u>Period of Record</u>
Chiengmai	July 1954-October 1957, Decem- ber 1957-June 1961
Udon Thani	July 1954-October 1957, February 1958-June 1961

<u>Station</u>	<u>Period of Record</u>
Phitsanulok	July 1954-November 1957, January 1958-June 1961
Ubon Rachathani	September 1956-August 1958, November 1958-June 1961
Nakon Ratchasima	July 1954-June 1961
Bangkok	July 1954-June 1961
Chanthaburi	July 1954-October 1957, Jan- uary 1958-June 1961
Prachuap Khiri Khan	July 1956-October 1957, Feb- ruary 1958-April 1958-July 1958, September 1958, Decem- ber 1958-June 1961
Surat Thani (Ban Don)	July 1954-August 1957, October 1957-June 1961
Songkhla	July 1954-October 1957, Decem- ber 1957-June 1961

3) Punched card data catalog 0 index:

<u>Card Deck</u>	<u>Name</u>	<u>Period of Record</u>
561	SE Asian Winds Aloft Intercept	July 1954-May 1957
584	Siam Pibals	1936-1939
522	Northern Hemisphere Upper Air	1946 to date
523	Northern Hemisphere Winds Aloft-B	1949 to date

4) Punched card data catalog 18 southeast Asia.

Individual stations for different periods in some cases
duplicates other references.

c. Rawinsonde or radiosonde data:

1) <u>Station</u>	<u>Period of Record</u>
Bangkok	1958 to date
Chiengmai	January 1959 to date
Songkhla	January 1959 to date

2) Punched card data catalog 0 index:

<u>Card Deck</u>	<u>Name</u>	<u>Period of Record</u>
524	Northern Hemisphere Radio- sonde-C	1949-1959
525	Northern Hemisphere Radio- sonde-C	1960 to date
562	SE Asian Radiosonde Intercept	July 1954-May 1957

3. Microfilmed Data:

a. Microfilm: Surface and 700 mb, Recordak Film Records.

Pan American Airways Weather Maps
January 1950-January 1951, 700 mb, 00 and 12 GCT

Pan American Airways Weather Maps
April 1954-September 1954, 700 mb, 00 and 12 GCT

Royal Thai Navy Weather Maps
January 1951-December 1953, Surface, 00 GCT

Pan American Airways Weather Maps
February 1951-December 1951, 700 mb, 00 and 12 GCT

Royal Thai Navy Weather Maps
1950 Surface, 00 GMT

Royal Thai Navy Weather Maps
January 1951-December 1951, Surface

- b. Surface weather observations and psuedo-adiabatic diagrams, 1953-1961 for several stations in Thailand.

AVAILABLE AT OTHER LOCATIONS

1. Pilot balloon data, individual ascents, for period of January-October 1940 and 1949-1954 located at U.S. Weather Bureau Library.
2. Pilot balloon data for periods January-August 1940, October-December 1940, January, May, and September 1941, and July 1942 located at the Department of Atmospheric Sciences, Colorado State University, Ft. Collins, Colorado.

BURMA

RADAR SURVEY

No radar now. Burma Meteorological Department hopes to install a storm detection radar set at the Mingaladon Airport.

UPPER AIR OBSERVATIONS

1. Pilot Balloon Data:

<u>a. Pilot Balloon Stations</u>	<u>Time of Ascent</u>	<u>Years of Data</u>
Victoria Point	00,06, and 12 GMT	1947 to date
Mergui	00,06, and 12 GMT	1947 to date
Tavoy	00,06, and 12 GMT	1947 to date
Mingaladon	00,06, and 12 GMT	1947 to date
Bassein	00,06, and 12 GMT	1947 to date
Cocos Island	00,06, and 12 GMT	1958 to date
Sandoway	00,06, and 12 GMT	1947 to date
Akyab	00,06, and 12 GMT	1947 to date
Mandalay	00,06, and 12 GMT	1947 to date
Meiktila	00,06, and 12 GMT	1954 to date
Bhamo	00,06, and 12 GMT	1959 to date
Kengtung	00,06, and 12 GMT	1962 to date

- b. Pibal data is in printed or published form for years 1948, 1949, 1950, 1951-1956, and 1957.
- c. Pibal data in original form only (i.e., only one copy available):

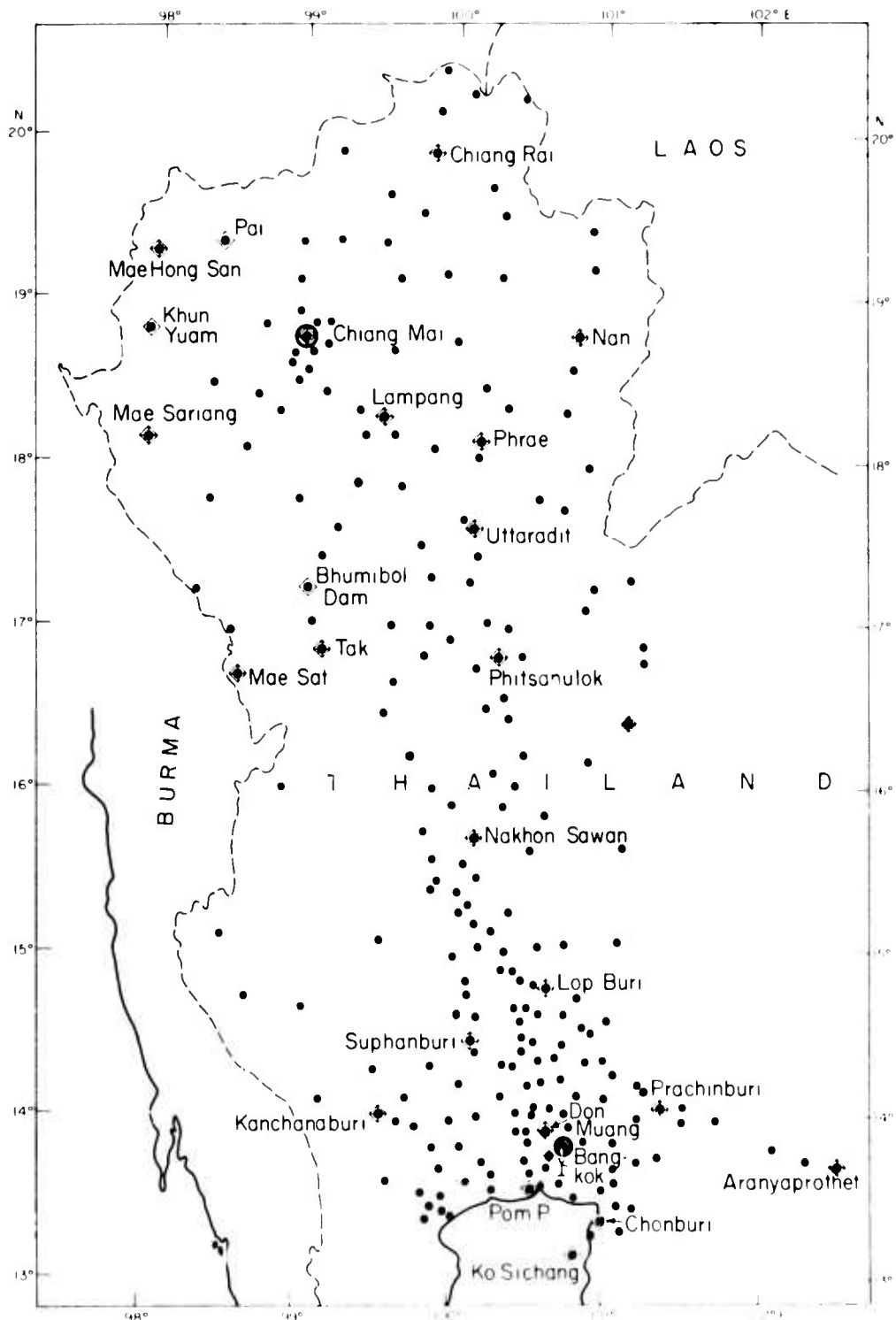


Figure 4.--Distribution of Meteorological Stations for Northern Thailand and the Chao Phraya Lowlands.

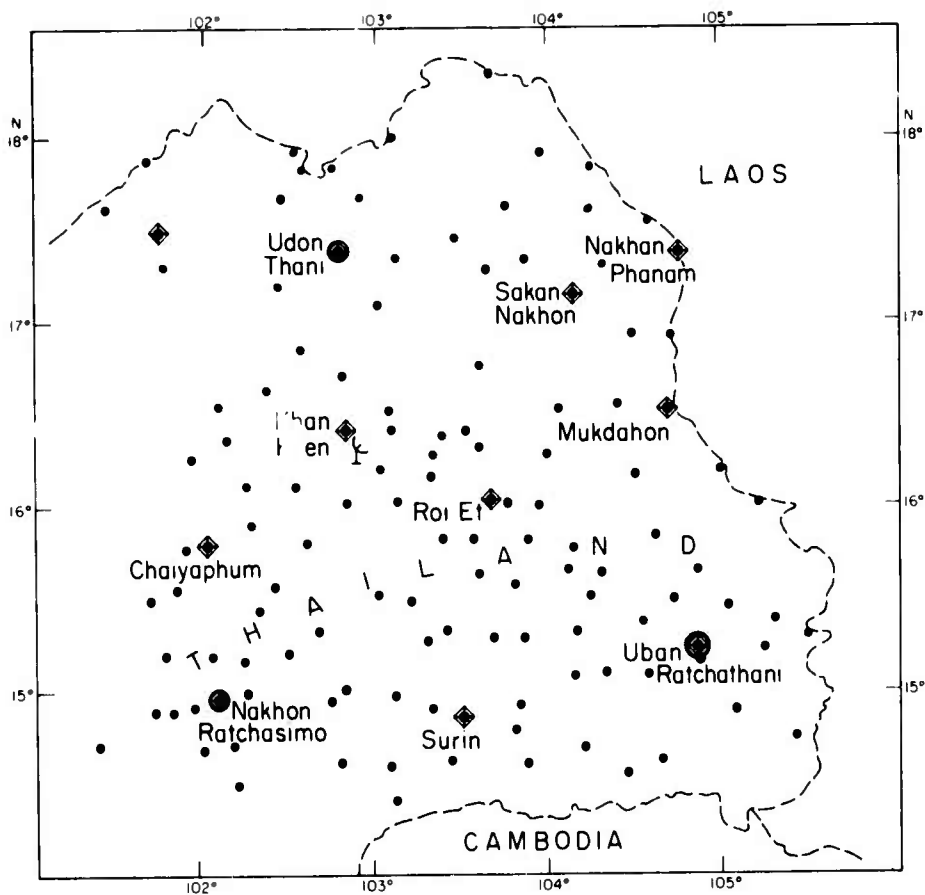


Figure 5.--Distribution of Meteorological Stations for Northeast Thailand.

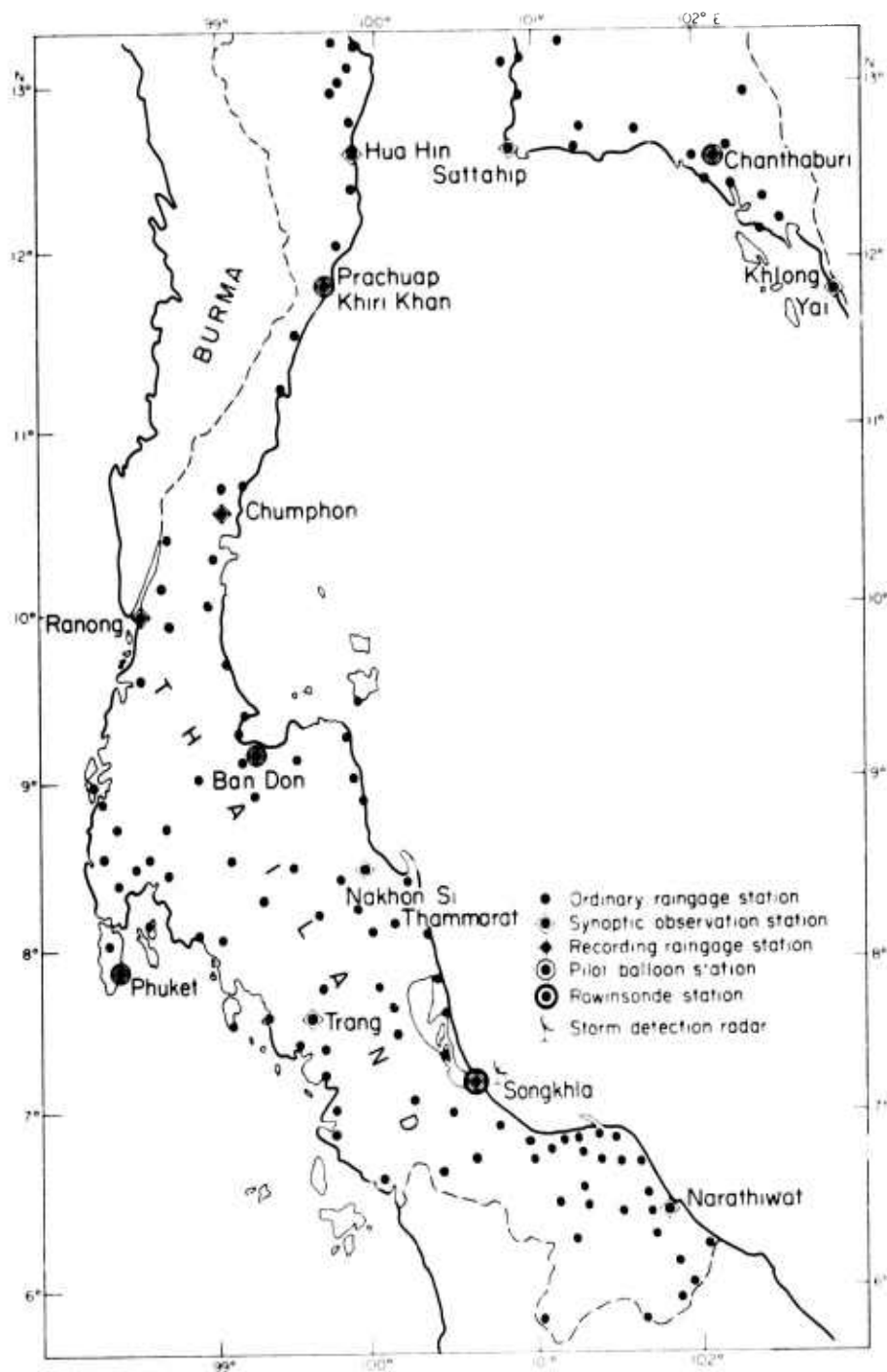


Figure 6.--Distribution of Meteorological Stations for Southern Thailand.

- 1) Year 1947 (only three or four stations).
 - 2) Years 1952-1955 and 1958, but to be printed by the Burma Government printing press.
 - 3) Years 1959, 1960, 1961, and 1962, located at meteorological office.
- d. Pibal data not available in Burma:
- 1) About 1936-1941; see also Indian Daily Weather Reports.
 - 2) All 1941-1946, World War II data. (Burma Meteorological Department inquired about this information from the Japanese and U.S. Military Services and found that the data had been lost or destroyed.)
2. Rawinsonde Data:
- a.

<u>Station</u>	<u>Time of Ascent</u>	<u>Years of Data</u>
Mingaladon	00 GMT (only every other day)	1958 to date
Meiktila	00 GMT (only every other day)	1960 to date
 - b. All radiosonde data are unpublished, i.e., only original copies exist. However, Burma Meteorological Department states that it sends information to the Weather Bureau in Washington, D. C.

SYNOPTIC CHART AND DATA SURVEY

1. Surface Charts:
 - a. Historical record: Data before World War II should be with the Indian Meteorological Department; none during the war; and data from June 1947 to 1961 are in bound volumes by months; the earliest charts are poorly stored and deteriorating.
 - b. Map scales: 1:10,000,000.
 - c. Time of charts: 00, 03, 06, 09, and 12 GMT (Burma Meteorological Department plans to analyze an 18 GMT chart by 1963.)
2. Pilot balloon charts:
 - a. Historical record: Data before World War II should be with the Indian Meteorological Department; none during the war; and data from June 1947 to 1961 are in bound volumes, by months; the earliest charts are poorly stored and deteriorating.
 - b. Map scales: 1:30,000,000
 - c. Time of analysis: 00, 06, and 12 GMT

- d. Analysis levels: 1,000, 2,000, 3,000, 5,000, 7,000, 10,000, 12,000, 15,000, 20,000, 25,000, 30,000, 35,000, and 40,000 ft.

3. Radiosonde Charts:

- a. Historical record: Data before World War II should be with the Indian Meteorological Department; none during the war; and data from June 1947 to 1961 are in bound volumes, by months; the earliest charts are poorly stored and deteriorating.
 - b. Map scales: 1:20,000,000
 - c. Time of analysis: once or twice a day
 - d. Analysis levels: 700, 500, 300, and 200 mbs
4. Standard analysis is used on charts (more or less)--isobars on surface charts, streamlines (no isotachs) on pibal charts, and pressure-height contours on Raob charts. Burma Meteorological Department also uses pressure change and departure charts. Analysis of all charts is often incomplete.

PRECIPITATION DATA

1. Number of rain gage stations: 250 with 5-inch diameter rain gage.
2. Length of record: from 1920 to 1940 and from 1946 to date.
3. Recording rain gage stations in Burma:

<u>Station</u>	<u>Length of Record</u> (years)	<u>Station</u>	<u>Length of Record</u> (years)
Loi Kaw	9	Akyab	13
Mandalay	9	Sandoway	2
Kengtung	9	Mergui	9
Rangoon	13	Tavoy	9
Taunggyi	11	Coco Island	2
Lashio	9	Prome	3
Toungoo	11	Meiktila	2
Bassein	10	Myitkyina	2
Pyinmana	9	Tharrawaddy	2
Mingaladon	13	Pegu	8 (months)
Bhamo	13	Hmawbi	10

4. Comments on rain gage network: Some records are not continuous. The network is good through the Irrawaddy River area. Areas in the west and east mountains lack rain gages as also in the extreme south.

AIRCRAFT REPORTS

Aireps are received by the Rangoon office but the number is not too great since Rangoon is often by-passed. Co-pilots or navigators fail to send reports a good share of the time.

PUBLICATIONS

1. Hydrologic summaries--yearly.
2. Climatological summaries--yearly.
3. Daily rainfall--monthly.
4. Daily weather review.
5. Monthly weather review.
6. Climatological summaries:
 - a. 1948-1949 published
 - b. 1950 in press
 - c. 1951-1962 with Burma Meteorological Department (original only)
7. Burma Meteorological Department Four Year Plan--projects planned for execution during 1960-1964.
8. Paper distributed on occasion of First World Meteorological Day.
9. The Pegu Division Flood of August 1958.
10. Ten years review of storms and depressions which crossed the Burma coast from 1948-1957.
11. Evidence of strong vertical motion in a post-monsoon period in Burma.

BURMA METEOROLOGICAL DEPARTMENT

Address: Burma Meteorological Department
New Secretariat Bldg., 5th Floor
Strand Road, Rangoon

Director	Dr. PO E (Thiri Pyanchi)
Deputy Director	Utun Yin (Wunna Kyan Htin)
Assistant Director	Uhla
Assistant Director	Ubakyi
Meteorological Officer	Ulun Maung

PLANS

1. To open Radiosonde/Radarwind stations at Rangoon (Mingaladon), Meiktila, Myitkyina, Akyab, Cocos Island, and Victoria Point.
2. To make Radiosonde and Radarwind observations daily at 00 GMT at Rangoon and Meiktila.
3. To increase the number of rain gages (ordinarily 5-inch) stations from 250 to 1,000 with 50 automatic stations operating.

DATA AVAILABLE ELSEWHERE

At the National Weather Records Center, Asheville, North Carolina.

1. Publications:

a. Daily Weather Review:

1952-1953, except September each year; 1954, except May 11-26 and one day in September; January-July 1955; May-December 1956; 1957, except June; January and February 1958.

b. Burma Monthly Weather Review

January 1938-December 1940.

2. Data on Card Decks or Electronic Tape

a. Surface data:

- 1) Twenty-five stations in Burma as shown in Reference Manual 277 Burma Intercept or Deck 1311 for a 7-year period, January 1949-December 1955 with 8 observations, 00, 03, 06, 09, 12, 15, 18, and 21 GMT. Number of observations vary with observation time.

2) Punched card data catalog 0 index:

<u>Card Deck</u>	<u>Name</u>	<u>Period of Record</u>
277	Mingaladon Intercept Data	1954-December 1957

3) Punched card data catalog 18 Southeast Asia:

<u>Card Deck</u>	<u>Name</u>	<u>Period of Record</u>
152	Indian Synoptic	1946-1948
SFC	Surface Observations of U.S. Services	1943-1945

b. Pilot balloon data.

1) Punched card data catalog (amendment) 18 Southeast Asia:

<u>Station</u>	<u>Card Deck</u>	<u>Period of Record</u>
Akyab	554	May 1946-December 1948
Akyab	WA	March 1945-October 1945
Bhamo	WA	February 1945-September 1945
Fort Hertz	WA	April 1944-July 1944
Kyaukpyu, Ramree Is.	WA	May 1945-June 1945
Lashio	WA	May 1945-August 1945
Mingaladon	583	July 1928-December 1935
Myitkyina AAB	WA	July 1944-November 1945
Rangoon	554	May 1946-December 1948
Rangoon	WA	June 1945-April 1946

<u>Station</u>	<u>Card Deck</u>	<u>Period of Record</u>
Sadoway	583	June 1932-December 1935
Shwebo AAB	WA	February 1945-August 1945
Tavoy	554	January 1947-December 1948
Tingkawk Sakan	WA	June 1944-February 1945
Victoria Point	554	May 1947-December 1948
Victoria Point	583	October 1932-December 1935
Warazup	WA	February 1945-June 1945

554-Indian Daily Weather Report Pibals

WA-Winds aloft observations of U.S. Military Services

583-Indian Pibals

2) Card Deck 561 or Deck 5200 (Electronic Data Processing):

<u>Station</u>	<u>Period of Record</u>
Bhamo	September 1954-July 1955, May 1956-March 1957, June 1957-June 1961
Mandalay	July 1954-December 1955, April 1956-February 1957, April 1957-July 1957, September 1957-June 1961
Meiktila	October 1956-January 1959
Akyab	July 1954-December 1955, March 1956-July 1958
Sadoway	July 1954-December 1955, May 1956-July 1958, January 1959-June 1961
Bassein	July 1954-August 1955, October 1955, December 1955, February 1956, April 1956, July 1958, September 1958, November 1959, and January 1959
Mingaladon	July 1954-June 1961
Tavoy	July 1954-December 1955, February 1956-April 1958, June 1958-July 1958, October 1958, December 1958
Mergui	July 1954-December 1955, February 1956-May 1956, July 1956-June 1961
Victoria Point	July 1954-August 1955, October 1955-December 1955, February 1956-June 1961

3) Punched card data catalog 0 index:

<u>Card Deck</u>	<u>Name</u>	<u>Period of Record</u>
522	Northern Hemisphere Upper Air	1946 to date
523	Northern Hemisphere Winds Aloft-B	1949 to date
554	Indian Daily Weather Report Pibals	1944-1948, 1951-57
561	SE Asian Winds Aloft Intercept	July 1954-May 1957
583	Indian Pibals	1928-1935
585	Burma Pibals	1938-1940

c. Rawinsonde or radiosonde data:

<u>Card Deck</u>	<u>Name</u>	<u>Period of Record</u>
524	Northern Hemisphere Radio-sonde-C	1949-1959
525	Northern Hemisphere Radio-sonde-C	1960 to date
562	SE Asian Radiosonde Intercept	July 1954-May 1957

AVAILABLE AT OTHER LOCATIONS

1. The following are available at the U.S. Weather Bureau Library:
 - a. Pilot balloon data and surface data of Indian Daily Weather Reports, 1936 to date.
 - b. Upper air data, Part A, Monthly Means of Pilot Balloon Data, 1926-1946.
2. Published data located at Atmospheric Science Library, Colorado State University, Ft. Collins, Colorado, includes the following:
 - a. Pilot balloon data for the years 1948, 1949, 1950-1956, and 1957.
 - b. Hydrologic summaries for the years 1957, 1958, 1959, and 1960.
 - c. Climatological summaries for 1948 and 1949.
 - d. Climatological data of Selected Meteorological Stations in Burma, 1950-1960.
 - e. Statement showing the monthly and annual rainfall at rain-recording stations in Burma for the years 1952-1954.

SINGAPORE, MALAYA, SARAWAK, AND NORTH BORNEO

RADAR SURVEY

- | <u>1. Type</u> | <u>Wave Length</u> | <u>Range</u> | <u>Location</u> |
|---------------------|--------------------|----------------------|---|
| Decca Weather Radar | 3 cm. | 250 mi.
(approx.) | Kota Bahru
Kuala Lumpur
Singapore |
2. Photographic equipment is available. They have two sets which can be transferred from one station to another.
 3. Availability of radars for research by interested groups can be arranged.
 4. Meteorological service has maps of daily radar coverage over Malaya. This has been done for 3 or more years, at an average of four times a day (00, 06, 12, and 18 GMT, none for Singapore at 18 GMT). It is possible to microfilm or recopy these. Photographs for certain periods may also be available.

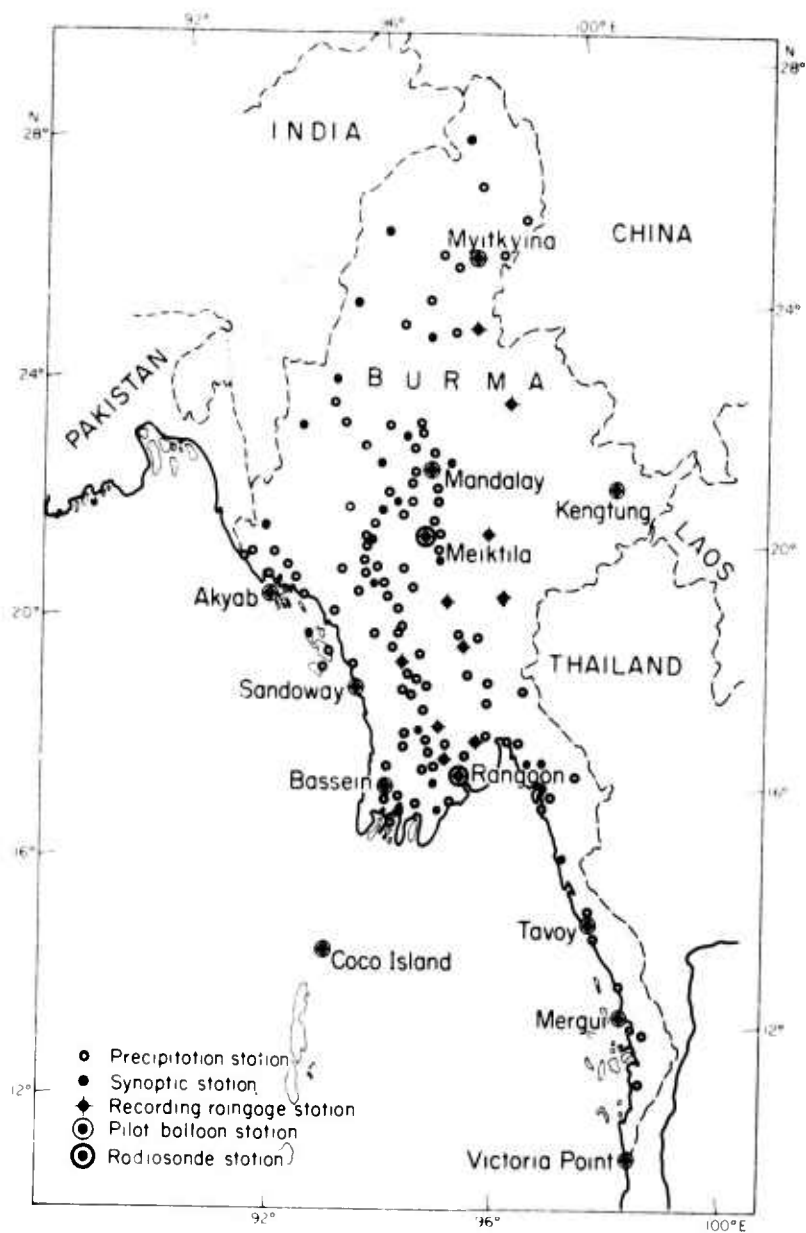


Figure 7.--Distribution of Meteorological Stations for Burma.

UPPER AIR OBSERVATIONS

1. Pilot balloon data.
 - a. Number of pibal stations: five in Malaya, including Singapore; and four in British Borneo and Sarawak.
 - b. Length of record: 1936 to 1941 (only one copy available) and 1948 to date.
 - c. Data in printed form: 1948 to 1960; 1961 in press; and 1936 to 1941 (only one copy).
 - d. Pibal data not available: 1942-1947.
 - e. Printed pibal data: 1948 to date.
2. Radiosonde or Rawinsonde data.
 - a.

<u>Stations</u>	<u>Length of Record</u>
Singapore	Since January 1954 (breaks in record)
Butterworth (R.A.F.)	1960 to date (ascents vary due to operation of jets, probably 00 and 12 GMT)
 - b. Data are in printed form in Northern Hemisphere tabulations for Singapore only.
 - c. Data in original form: January 1954 to 1959, Singapore and Butterworth.
 - d. Printed data: 1960 to date.

SYNOPTIC CHART AND DATA SURVEY

1. Surface charts.
 - a. Historical record:

Surface charts probably started in 1937 and ended in 1941, evidently destroyed during World War II, but the British Air Ministry Library may have copies of the data. Surface charts were started again in January 1949 and have continued to date.
 - b. Chart scales: 1:10,000,000.
 - c. Time of charts: 00, 06, 12, and 18 GMT.
2. Pilot balloon charts.
 - a. Historical record:

Charts probably started in 1937, ending in 1941, evidently destroyed during World War II. British Air Ministry Library may have copies. Started again in 1949 to date.
 - b. Chart scales: 1:30,000,000.
 - c. Times of analysis: 00, 06, 12, and 18 GMT (18 GMT plotted but not analyzed).

d. Analysis levels: 3,000, 5,000, 7,000, 10,000, 14,000, 18,000, 24,000, 30,000, 34,000, 39,000, and 45,000 foot levels. (Analysis is streamlines only.)

3. Radiosonde or Rawinsonde charts.

Data are combined with pibal data (see section on Pilot balloon charts).

PRECIPITATION DATA

1. Number of recording rain gage stations.

Alor Star	Kuala Lumpur
Bayan Lepas (Penang)	Malacca
Ipoh	Mersing
Kota Bahru	Singapore
Kuala Trengganu	Sitiawan
Kuantan	

2. Length of record: 1929-1942; no data 1942-1947; 1947 to date.

3. Data summarized and published: Data in monthly summaries from 1946-1956, 1957 (out-of-print), 1958-1960, 1961 (at printers).

4. Hourly precipitation data are totaled for the whole month for each station in summaries. The monthly data showing hourly precipitation by days are used only as worksheets for the other summaries. Thus, these are only original copies, which may be microfilmed.

PUBLICATIONS

1. Annual summary of observations.

2. Pilot balloon and radar wind observations (monthly).

3. Frequency tables (low cloud, visibility, sunshine) and anemogram analysis.

MICROFILMED DATA

A few years (exact unknown) of charts were microfilmed for a hydrologist studying flooding situations. Only those days near the flood situation were recorded; thus, the record is rather sporadic. The Meteorological Service claims that it does not have copies of the microfilm.

PLANS

It has been proposed for a long time that a RAWIN station be put in at Labuan because of international and civil aviation, but this work is still in the planning stages. Other plans include:

1. Another RAWIN station at Bayan Lepas (Penang) or Kuala Lumpur.
2. Facsimile reception apparatus at Singapore, later at Kuala Lumpur.
3. Radio teletype meteorological broadcasts.
4. Another one or two pibal stations.
5. Another 10 recording rain gage stations.

MALAYSIAN METEOROLOGICAL SERVICE*

Director
Assistant Director
Senior Meteorological
Officer
Phone: 82-321

K. Rajendram
Foong Sze Fook
Hwang Tiaw Sooi (Airport)

Forecasters: Singapore Airport

1. Liow Leng Kung
2. M. S. Gill
3. Paul LoSu Siew
4. Gan Tong Liang
5. K. Koruthu

Forecasters: Kuala Lumpur

1. Ho Tong Yuen
2. Ng Tai Er
3. Tan Beng Keat

*

Meteorological Headquarters, Singapore

6th floor, Fullerton Bldg. 1 (on the water front)
Phone: 95-401

*

This was before Singapore became independent from Malaysia

DATA AVAILABLE ELSEWHERE

Meteorological data available at the National Weather Records Center, Asheville, North Carolina.

1. Data on card decks or electronic tape.

a. Punched card data catalog 0 index:

<u>Card Deck</u>	<u>Name</u>	<u>Period Covered</u>
229	Malay Synoptic	1907-1916
429	Malay Summary of Day	1907-1916
432	Malay Synoptic/Summary	October 1947-December 1953

2. The following as shown in Reference Manual Deck 1311 (Electronic Data Processing):

<u>Station</u>	<u>Period of Record</u>
Penang (Bayan Lepas)	January 1949-December 1955
Butterworth	January 1949-June 1955
Alor Star	January 1949-December 1955
Kota Bharu	March 1949-December 1955
Kuala Trengganu	March 1949-December 1955
Kampung Sitiawan	January 1949-December 1955
Ipoh	January 1949-December 1955
Kuala Lipis	January 1949-October 1953
Kuala Lumpur	January 1949-December 1955
Temerloh	January 1949-October 1953
Kuantan	January 1949-December 1955
Port Swettenham	January 1949-October 1953
Malacca	January 1949-December 1955
Mersing	January 1949-December 1955
Singapore/Tengah Airport	January 1949-December 1955
Singapore Airport	January 1949-December 1955

and six stations in Sarawak and North Borneo

3. Punched card data catalog 18 southeast Asia

a. Pilot balloon data and rawin or radiosonde data.

1) The following as shown in Reference Manual 516 Malay Pibals:

<u>Stations</u>	<u>Period of Record</u>
Labuan	June 1938-November 1941
Singapore	January 1936-November 1941
Kuala Pahang	June 1938-June 1940
Kota Bharu	July 1940-October 1941
Alor Star	June-December 1936, January-March 1937
Bayan Lepas, Penang Is.	April 1937-August 1939
Kuala Lumpur	January 1936-December 1938, January 1939-November 1941

- 2) The following as shown in Reference Manual Deck 5200 or card deck 561:

<u>Stations</u>	<u>Period of Record</u>
Penang (Bayan Lepas)	July 1954-June 1961
Butterworth	July 1954-July 1958, December 1958
Kota Bharu	July 1954-June 1961
Kuala Lumpur	July 1954-June 1961
Kuantan	July 1954-June 1961
Singapore/Tengah	January 1955-July 1958
Singapore/Seletar	July 1954-June 1961
Singapore Airport	July 1954-June 1961
Singapore/Changi	July 1954-December 1958
Kuching, Sarawak	July 1954-June 1961
Lubuan, North Borneo	July 1954-June 1961
Sandakan, North Borneo	July 1954-April 1956, June 1956-June 1961

- 3) Punched card data catalog 0 index:

<u>Card Deck</u>	<u>Name</u>	<u>Period of Record</u>
522	Northern Hemisphere Up- per Air	1946 to date
523	Northern Hemisphere Winds Aloft-B	1949 to date
524	Northern Hemisphere Radiosonde-C	1949-1959
525	Northern Hemisphere Radiosonde-C	1960 to date
561	SE Asian Winds Aloft Intercept	July 1954-July 1957
562	SE Asian Radiosonde Intercept	July 1954-May 1956

- 4) Punched card data catalog 18 Southeast Asia.

METEOROLOGICAL DATA AVAILABLE AT OTHER LOCATIONS

1. The following are located at the Department of Atmospheric Sciences, Colorado State University, Ft. Collins, Colorado.
 - a. Published pilot balloon data, 1948 to date.
 - b. Published Radiosonde or Rawinsonde data, 1960 to date.
 - c. Hourly rainfall data on microfilm, 1961, 1962, and 1963.
 - d. Annual summary of observations, 1946-1960, but 1957 out of print, 1961 to date.
2. Annual summaries of observations for years 1928-1931, 1932-1934, 1935-1938, 1939-1941 are located at the Royal Observatory at Hong Kong.

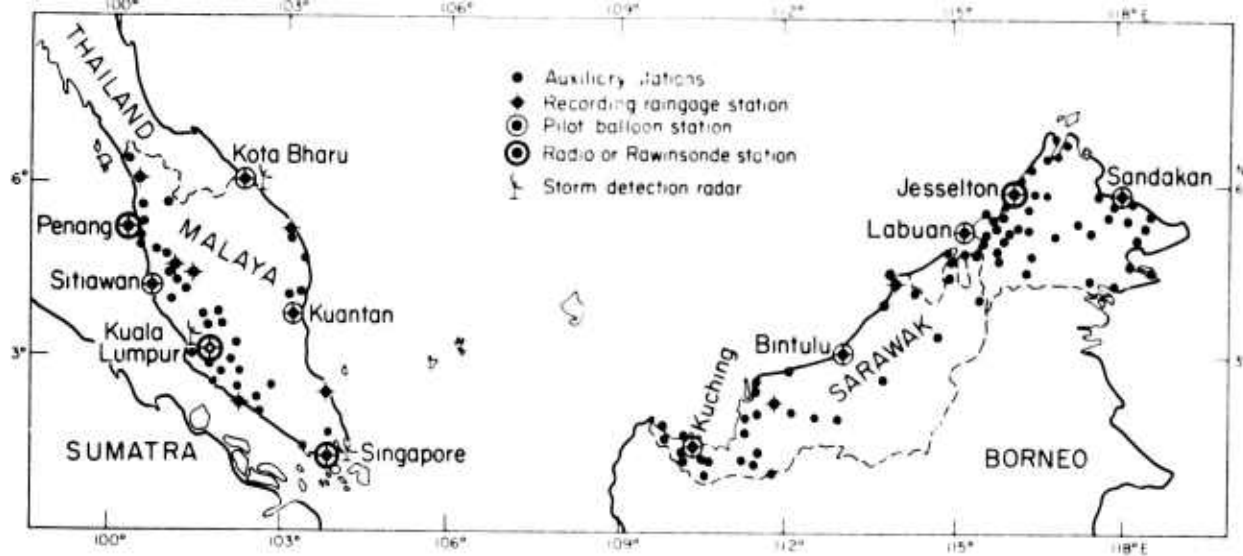


Figure 8.--Distribution of Meteorological Stations for Malaysia.

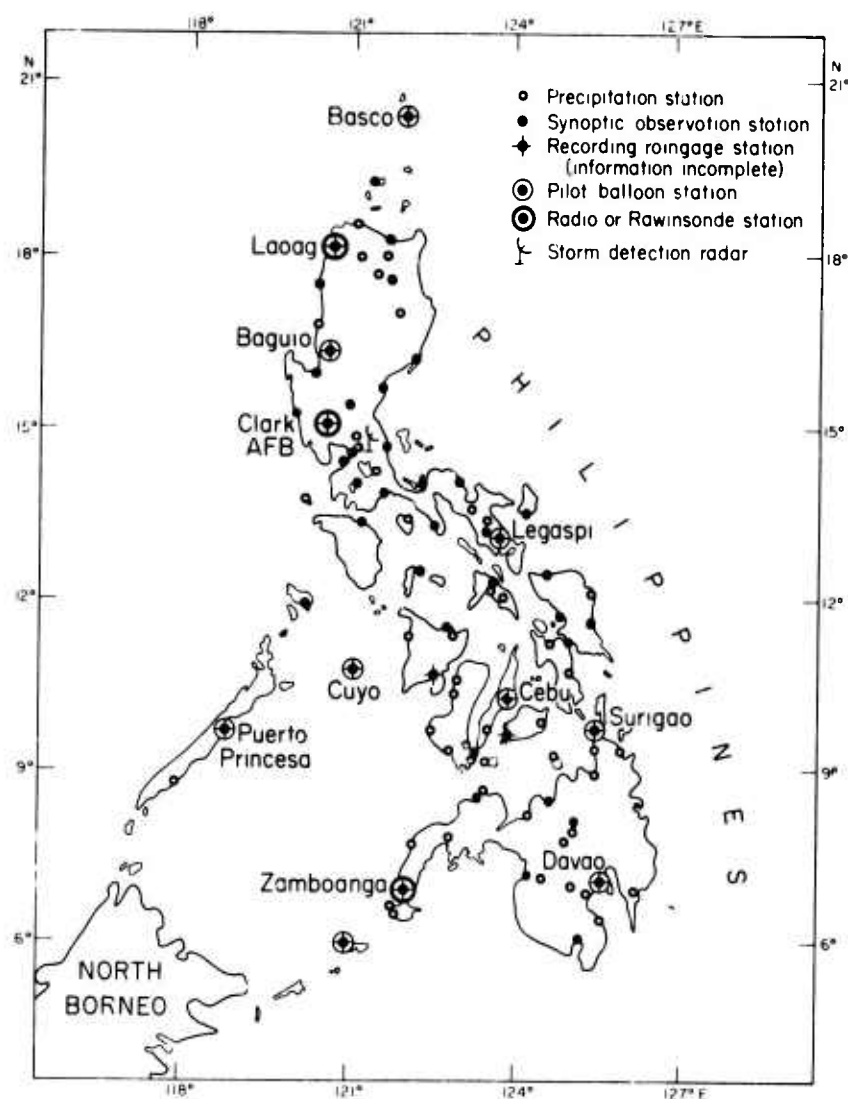


Figure 9.--Distribution of Meteorological Stations for the Philippines.

THE PHILIPPINES

RADAR SURVEY

1.

<u>Type</u>	<u>Wave Length</u>	<u>Range</u>	<u>Location</u>
	5.7 cm		Manila
2. Photographic equipment is available. Observations taken every three hours or more when required.

UPPER AIR OBSERVATIONS

1. Pilot balloon data.
 - a. Number of pibal stations: 11.
 - b. Length of record: 1946 to date.
 - c. Pibal data in original form: from 1946 to date (in process of being published).
 - d. Pibal data not available: 1936 to December 1941.
 - e. Data on cards: Cebu, 1957-1962; Legaspi, 1962.
 - f. Data in printed form (daily ascents): 1959 to date.
2. Radiosonde data.
 - a.

<u>Station</u>	<u>Length of Record</u>
Cebu	1949-May 1959 (18 observations during 1959)
Zamboanga	1949-April 1959 (7 observations during 1959)
Laoag	October 1952-October 1953 (a total of 103 observations only)
 - b. Data published: (see p. 44)
 - c. Data in original copies: not completely available.

SYNOPTIC CHART AND DATA SURVEY

1. Surface charts.
 - a. Historical record: 1947 to date.
 - b. Map scales: 1:12,500,000 and 1:7,500,000.
 - c. Time of charts:
 - 1) Large area surface chart: 0000, 0600, 1200, and 1800 GMT.
 - 2) 1952-1956 small area domestic chart: 0000, 0300, 0600, 1200, and 1800 GMT (1500 and 2100 GMT done during the existence of tropical disturbance only).
 - 3) 1957-1959 small area domestic chart: 0300, 0900, 1500, and 2100 GMT.

PtBAL OBSERVATIONS

Stations	1956		1957		1958		1959		1960		1961		Remarks
		Time (GMT)		Time (GMT)		Time (GMT)		Time (GMT)		Time (GMT)		Time (GMT)	
BASCO (135)	21	09		21 09 06* 18*		06 18	00* 06	12* 18	00 12		00 12	00 12	00 12 begin April 1959 06 18 begin April 1957 Dec 1957 none
LAOAG (223)		03 15		21 03 09 15 00* 06* 12* 18*		00 06 12 18	00 06	12 18	00 06 12 18		00 06 12 18	00 06 12 18	*00 06 12 18 begin Apr 1957 1957 March 1958 only 12
BAGUIO (328)	21	03		21 03 00* 06*		00 12	00	12	00 12		00 12	00 12	*00 06 begin April 1957 *00 12 begin June 1957 March 1958 only 1200
LEGASPI (444)	00*	03 15 06* 12* 18*				00 06 12 18	00 06	12 18	00 06 12 18		00 06 12 18	00 06 12 18	*00 06 12 18 begin Apr 1957 1957 March 1958 only 1200
CUYO (630)	21	03		06* 18* 21 03		06 18	00* 06	18	00*	18	00	00	*06 18 begin April 1957 *00 18 begin April 1959 Mar 1958 none begin Feb 1961 00 only
CEBU (645)		03 15		03 06 12 18 00 06 12 15		00 06 12 18	00 06	12 18	00 06 12 18		00 06 12 18	00 06 12 18	*00 06 12 18 begin Apr 1957 1957 March 1958 1200 only
SURIGAO (653)	21	03		21 03 06* 18*		06 18	06	18	06	18	06	18	*06 18 begin April 1957 March Nov, Dec 1958 none Jan 1959 none *00, 06 begin April 1959
P. PRINCESA (618)	03	09		03 09 00* 06*		00 06	00 06		00 06		00 06	00 06	*00 06 begin April 1957 Mar 1958, Aug 1960 none begin Feb 1961 00 only
DAVAO (754)	03	09		03 09 06* 00*		00 06	00 06	12*	00 12		00 12	00 12	*00 06 begin April 1957 *00 12 begin April 1959
ZAMBOANGA (836)		09 15		00* 06* 12* 18*		00 06 12 18	00 06	12 18	00 06 12 18		00 06 12 18	00 06 12 18	*00 12 begin Apr 1957 *00 06 12 18 begin June 1957, Mar, Apr 1959 12, 18 none Mar 1958 only 12
JOLO (830)	21	03		21 03 00* 18*		00 18*	00 06	18	00 06		00 06	00 06	*00 18 begin April 1957 *00 06 begin May 1959, Mar, Apr 1959 none *Begin Feb 1961, 00 only

- 4) 1960 to date small area domestic chart: Every three hours and done only during the existence of tropical disturbances.
2. Pilot balloon data.
 - a. Historical record: 1949 to date.
 - b. Map scales: 1:40,000,000
 - c. Times of analysis:
 - 1) 1949-1956: 0300, 0900, 1500, and 2100 GMT.
 - 2) 1957-1959: 0000, 0600, 1200, and 1800 GMT.
 - 3) 1960 to date: 0000 and 1200 GMT.
 - d. Analysis levels:
 - 1) 1949-1953: 2,000, 4,000, 6,000, 8,000, 10,000, 12,000, 16,000, 20,000, and 25,000 feet.
 - 2) 1954-1959: 2,000, 5,000, 8,000, 12,000, 16,000, 20,000, 25,000, 30,000, 35,000, 40,000, and 45,000 feet.
 - 3) 1960 to date: 3,000, 5,000, 7,000, 12,000, 14,000, 25,000, 36,000, 47,000, and 54,000 feet.
3. Radiosonde data.
 - a. Historical record: 1947 to date.
 - b. Map scales: 1947-1959, 1:12,500,000; 1960 to date, 1:25,000,000.
 - c. Times of analysis: 1952-1956, 0300, and 1500 GMT; 1957 to date, 0000, 1200 GMT.
 - d. Analysis levels: 700, 500, 300, and 200 mbs.

PRECIPITATION DATA

1. Number of recording rain gage stations: 13.
2. Length of record: 2 stations with a 2-year record and 11 stations with 11 to 14 years records.
3. Data in tabulated form for Manila: 1950 to date.
4. Daily totals published in Monthly Summaries (see item 9 under publications, p. 43)
5. Daily totals published in Monthly Bulletin: Years 1897, 1900, 1902-1939, 1949 to date.

AIRCRAFT REPORTS

Reports serve only a functional purpose and are not stored.

PUBLICATIONS

1. Pilot Balloon Data (quarterly publications).
2. Tropical Cyclones.
3. Weekly Weather and Crop Bulletin.

4. Climate of the Philippines.
5. Climate of different ports of entry in the Philippines.
6. Monthly average rainfall and rainy days in the Philippines.
7. Monthly average temperature in the Philippines.
8. Monthly average relative humidity in the Philippines.
9. Monthly summaries of meteorological observations at 10 key weather stations (1949 to date--contains 24 hour totals of precipitation for 10 stations).
10. Annual climatological review.

SURFACE DATA ON CARDS

Data taken from WBANS or hourly observations (24 hr. totals of precipitation included):

Punched & Verified Cards As of May 31, 1963 (77,078 cards)

Ambulong	1951-1960
Aurora	1951-1960
Baguio	1951-1960
Basco	1951-1960
Borongan	1951-1960
Cagayan de Oro	1951-1960
Calayan	1951-1960
Cebu	1951-1960
Davao	1951-1960
Iloilo	1951-1960
Jolo	1951-1960
Laoag	1951-1960
Legaspi	1951-1960
Manila	1951-1960
Pto. Princesa	1951-1960
Surigao	1951-1960
Virac	1951-1960
Zamboanga	1951-1960
W. B. F. C.	1951-1960

Incomplete

Aparri	1953-1960
Dagupan	1953-1960
Dumaguete	1956-1960

PLANS

Special projects in progress:

1. Surface wind roses (all synoptic stations)
2. Upper air wind roses (all upper air stations)
3. Upper air publications (all upper air stations)
4. Climatological atlas (all synoptic stations)

5. Climatological temps (all radiosonde stations)
6. Aero meteorological summaries (all airport stations)
7. Analogue forecasting of temperature and precipitation (all stations)

PHILIPPINE WEATHER BUREAU

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 P.O.Box 2277
 Republic of the Philippines
 Phone: 36401

Director	Dr. Roman L. Kintanar
Head, Forecasting Center,	
Manila Airport	Jesus Flores
Technical Services	Hugo De La Cruz
Head, Climatology	Eugenio Manalo
Research and Training	C. Reyes
Field Service, Technical	
Assistant to Director	J. Tecson
Head, Synoptic Observation Div.	Z. Macaraig
Head, Astronomical Division	M. Bonjoc

DATA AVAILABLE ELSEWHERE

Meteorological data available at the National Weather Records Center, Asheville, North Carolina.

1. Publications.

a. Annual reports of the Weather Bureau:

<u>Years Available</u>	<u>Description</u>
1917-1918	--
1920	--
1922	--
1924-1929	--
1934-1935	--
1936.	20--1st and 2nd class stations--80 pages
	32--3rd class and rain stations--64 pages
1937.	21--1st and 2nd class stations--84 pages
	38--3rd class and rain stations--76 pages
1939.	21--1st and 2nd class stations--84 pages
	41--3rd class and rain stations--82 pages

b. Daily precipitation data, by city and period:

<u>City</u>	<u>Periods</u>	<u>No. Pages</u>
Cebu	April-July 1952-1954, 1956, 1959-1960, 1962 (years 1955, 1957-1958, 1961 not available)	28

<u>City</u>	<u>Periods</u>	<u>No. Pages</u>
Davao	April-July 1952-1956, 1959-1960, 1962 (Apr. 1962, July 1954, July 1955, and years 1957-1958, 1961 not available)	29
Iloilo	April-July 1952-1956, 1959-1960, 1962 (July 1955, and years 1957-1958, 1961 not available)	31
Laoag, Ilocos Norte	April-July 1952-1956, 1959-1960, 1962 (July 1955, and years 1957-1958, 1961 not available)	31
Legaspi	April-July 1952-1956, 1959-1960, 1962, (July 1955, and years 1957-1958, 1961 not available)	31
Manila Central	April-July 1952-1956, 1959-1960, 1962 (July 1955, and years 1957-1958, 1961 not available)	31
Manila International Airport	April-July 1959-1960, 1962	12
Paranaque, Rizal	April-July 1952-1956	18
Puerto Princesa	April-July 1952-1956, 1959-1960, 1962	31
Surigao	April-July 1952-1956, 1959-1960, 1962 (July 1955, and years 1957-1958, 1961 not available)	31
Zamboanga	April-July 1952-1956, 1959-1960, 1962 (July 1955 and years 1957-1958, 1961 not available)	31

c. Monthly summary of meteorological observations (10 cities):

<u>Station</u>	<u>Period of Record</u>
Cebu	1952-1954, January-June 1955, 1956, 1960, 1962
Davao	1952-1954, January-June 1955, 1956, 1960, 1962
Iloilo	1952-1954, January-June 1955, 1956, 1960, 1962
Laoag	1952-1954, January-June 1955, 1956, 1960, 1962
Legaspi	1952-1954, January-June 1955, 1956, 1960, 1962
Manila Central Office	1950-1954, January-June 1955, 1956, 1960, 1962
Puranaqua	1952-1954, January-June 1955, 1956
Puerto Princesa	1952-1954, January-June 1955, 1956, 1960, 1962
Surigao	1952-1954, January-June 1955, 1956, 1960, 1962
Zamboanga	1952-1954, January-June 1955, 1956, 1960, 1962

2. Data on card decks or electronic tapes.

a. Surface data.

- 1) One-hundred and six stations in The Philippine Islands, Hong Kong, Celebes Islands, Indonesia, and a portion of

China as shown in Reference Manual Intercept 273 covers a 7-year period, January 1949-December 1955, with eight observations, 00, 03, 06, 09, 12, 15, 18, and 21 GMT.

2) Punched card data catalog 0 index:

<u>Card Deck</u>	<u>Name</u>	<u>Period of Record</u>
106	Cavite Intercept Synoptic	1937-41, March 58
271	Philippine Synoptic	1929-1938
272	Manila Intercept Data	September 1945- March 1949
273	Manila Intercept Data	April 1949- December 1958
396	Manila Summary of Day 1	1929-1938
397	Manila Summary of Day 2	1907-1916
461	Philippine Summary of Day 1	1929-1938
462	Philippine Summary of Day 2	1907-1916

2) Forty-four stations in the Philippines as shown in Reference Manual Deck 1311 and Reference Manual 273.

b. Pilot balloon data and Radiosonde Data.

1) Punched card data catalog 0 index:

<u>Card Deck</u>	<u>Name</u>	<u>Period of Record</u>
522	Northern Hemisphere Upper Air	1946 to date
523	Northern Hemisphere Winds Aloft-B	1949 to date
524	Northern Hemisphere Radio-sonde-C	1949-1959
525	Northern Hemisphere Radio-sonde-C	1960
561	SE Asian Winds Aloft Intercept	July 1954-May 1957
562	SE Asian Radiosonde Intercept	July 1954-May 1957
598	Cavite Intercept Pibals	1937-1941

2) Eleven stations in The Philippines as shown in Reference Manual Deck 5200 or Card Deck 561 (Electronic Data Processing) cover period of July 1954-June 1961.

HONG KONG²

RADAR SURVEY

1. <u>Type</u>	<u>Wave Length</u>	<u>Range</u>	<u>Location</u>
--	10 and 5.7 cm.	--	Hong Kong

SURFACE OBSERVATIONS

<u>Years</u>	<u>Price</u>
1949 to 1958	HK \$6.00 per copy
1959	HK \$8.00 per copy
1960	HK \$9.00 per copy
1961	(No information on later years.)

UPPER AIR OBSERVATIONS

<u>Years</u>	<u>Price</u>
1949 to 1955	HK \$6.00 per copy
1956	HK \$7.00 per copy
1957 to 1959	HK \$9.00 per copy
1960 to 1961	HK \$20.00 per copy

(In 1962 official rate 1 US dollar equivalent to 5.71 HK dollar.)

ROYAL OBSERVATORY PUBLICATIONS³

<u>R.O. Technical Memoirs</u>	<u>Author</u>	<u>Year of Publication</u>
Meteorological Information for Aviation Purposes	N. Lawrence	1948
A Statistical Survey of Hong Kong Rainfall	L. Starbuck	1950
Hong Kong Typhoons	G.S.P. Heywood	1950
A Statistical Survey of Typhoons and Tropical Depressions in the Western Pacific and China Sea from Observations and Tracks Recorded at the Royal Observatory Hong Kong from 1884 to 1947	L. Starbuck	1951
Hong Kong Meteorological Records and Climatological Notes--60 Years, 1839-1884, 1947-1950	J.E. Peacock	1952
Surface Pressure-Patterns and Weather Around the Year in Hong Kong	G.S.P. Heywood	1954

²Hong Kong was not included in survey so this information is optional.

³Obtained by Clyde O'Dell.

<u>R.O. Technical Memoirs</u>	<u>Author</u>	<u>Year of Publication</u>
Tropical Cyclones in the Western Pacific China Sea Area from 1884-1953	P.C. Chin	1958
The Effect of Meteorological Conditions on Tide Height at Hong Kong	I.E.M. Watts	1959
Climatology of China and Korea	I.E.M. Watts	1965
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