U. S. FISH AND WILDLIFE SERVICE
BUREAU OF COMMERCIAL FISHERIES
450-B JORDAN HALL
STANFORD, CALIFORNIA
May 1, 1958

Dear Sir:

The attached Ocean Research Note 8 is sent to you for your use. This is a manuscript for information and is not to be considered as a publication.

The list of sources was compiled from information readily available at Ocean Research, so does not pretend to be a complete bibliography on the subject. Your comments and especially additional information to improve and expand the list will be greatly appreciated.

Sincerely,

O. E. Sette
Chief, Ocean Research

TO:
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R. Van Cleve, U. of Wash.
W. V. Burt, OSC
M. B. Schaefer, IATTC
T. Cromwell, IATTC
W. M. Chapman, ATBA
W. S. Wooster, CIH (Peru)
J. P. Tully, POG
J. C. Stevenson, PBS (Nanaimo)
R. C. Miller, Calif. Acad. Sc.
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U. S. Coast and Geodetic Survey, Division of Tides and Currents
National Weather Records Center, Asheville, North Carolina
University of Hawaii, Institution of Geophysics

U.S. Fish and Wildlife Service,

OCEAN RESEARCH NOTE 8

SOURCES OF TIME-SERIES OCEANOGRAPHIC AND METEOROLOGICAL DATA OF THE PACIFIC OCEAN

(Preliminary)

At the annual meeting of the Eastern Pacific Oceanic Conference at Lake Arrowhead in October 1957 a need was expressed for a bibliography or reference publication on sources of climatological and time-series data for both the atmosphere and ocean in the Pacific area. Ocean Research agreed to undertake this project because one of its objectives is to bring together data on ocean circulation and related meteorological conditions for utilization on particular fishery problems by the more localized and specific research units.

This research note is a preliminary listing. Corrections, comments, and additions to this list are hereby solicited from other activities. Information on foreign sources is particularly needed. Comments are also requested regarding the organization of the bibliography for easiest use. For example, would it be desirable to list all references alphabetically, number them serially, and have a detailed subject index? If there is sufficient additional information a revised version will be issued at a later date.

SCOPE AND ORGANIZATION OF REFERENCES

The area covered is the Pacific Ocean. However, primary interest of EPOC organizations, and therefore the data, center on the North Pacific and to 20° S with somewhat more emphasis on the Eastern Pacific. More references for this region, therefore, will be found herein.

The publications of interest are those which may be used in establishing and analyzing time-series meteorological and oceanographic data. This means not only the source of time-series data, but also such information as long and short term mean charts, summaries and analyses, and special data collections. For ready reference, a list of organizations engaged in data collection, tabulation, and/or analyses related to the subject is also included. The source list concludes with a number of tables listing the type, location, and starting date of stations taking time-series observations.

Because many publications deal with both oceanography and meteorology these have not been used as major headings in grouping the references. The major breakdown is according to the character of the material with both oceanographic and meteorological material listed under each heading. This follows generally the procedure used by Cuthbert M. Love in his "Sources of Oceanographic Data for a Portion of the North Pacific Ocean", Special Report No. 25, University of Washington, Department of Oceanography, Nov. 1956. However, references to individual oceanographic expeditions, which make up the major portion of the above report, are not included herein.

The references to source publications and charts in Love's report served as an excellent starting point and acknowledgement is hereby given that portions of it have been utilized with very little or no change. Gratitude is expressed to Mrs. Margaret K. Robinson, Scripps Institution of Oceanography, to Pacific Oceanographic Group, Canada, and to the U. S. Coast and Geodetic Survey, for supplying information not readily available at Ocean Research and to Mrs. Betty Unterseher for the extensive typing necessary in the organization and preparation of this listing.

For convenience in locating material a list and page numbers of the major headings are as follows:

J. F. T. Saur
April 28, 1958

BIBLIOGRAPHIES, CATALOGS, AND REFERENCE PUBLICATIONS

1. American Meteorological Society
"Meteorological Abstracts and Bibliography"
American Meteorological Society, Lancaster Press Inc.
Lancaster, Pa., 1950

Abstracts of current meteorological material, published monthly. In addition, each issue includes annotated bibliography on some given subject of meteorological interest, references to reviews, translations, reprints, routine data publications, and analytics from recent serials and collected works.

2. Canada, Hydrographic Map Service
"Catalogue of nautical charts, sailing directions and tidal information and other Canadian government publications of interest to Mariners" Ottawa, 1955

3. Commissione Internazionale Per L'Esplorazione Scientifica Del Mare Mediterraneo - Delegazione Italiana.
"Bibliographia Oceanographia"
(New Series), Vol. 23 (1950)
B. Coppini & Co., Firnze, 1956

Broad bibliography on all phases of oceanography including commercial fisheries and marketing, Italian and English text, annotated.

4. Great Britain, Air Ministry, Meteorological Office
"Improvement of Data Coverage in the Pacific Ocean"
C. E. N. Frankcom
Meteorological Office, Harrow, Middlesex, England (From paper given at the Ninth Pacific Science Congress Nov. 18-30, 1957).

Discussion of improving coverage of meteorological observations in the Pacific. Through World Meteorological Organization Commission on Maritime Meteorology, meteorology observations from mainly four nations (Germ., Neth., U.K., USA) are on punch cards for the last 100 years. Chart shows density of "selected British ship" observations per marsden squares in Pacific for periods 1855-1956 and 1953-1956. "Selected" ships make full observations including sea temperature. "Supplementary" ships report air temperature and pressure. "Auxilliary" ships are volunteer "non-instrumental" observations. (See Special Data, reference 64).

10. U. S. Weather Bureau
"Inventory of Master Punched Card Library, Dec. 15, 1955"
National Weather Records Center,
Asheville, North Carolina, 1955

11. Vaughan, Thomas Wayland, et al
"International Aspects of Oceanography"
National Academy of Sciences, Washington, D.C., 1937

Repeats Defant's list of sources of data to 1928 and adds sources from 1928 to 1937. Charts show the positions of stations.

12. Weyler, H. and M. Tepper
"Results of the Wartime Historical and Normal Map Program"
Bulletin, American Meteorological Society, Vol. 28, No. 4,
April 1947, pp. 175-178.

An inventory list of the results of a wartime project under Weather Bureau supervision to analyze Northern Hemisphere sea level maps. Five series of daily historical maps of sea level and troposphere cover years 1899-1939. Normal monthly weather weather maps were drawn for sea and higher levels, wind speed, stream lines and relative topography. Other charts were constructed for 5-day mean pressure, mean pressure for each month of the period 1899-1939, flying weather, wind frequency, distribution and tracks of low pressure centers. Most of the data available in published or unpublished form.

16. Canada, Fisheries Research Board
"Observations of Seawater Temperature and Salinity on the Pacific Coast of Canada, Series from 1914--"
Fisheries Research Board of Canada, Pacific Oceanographic Group, Nanaimo, B.C.

Vol. I, 1914 to 1934
Vol. II, 1935 to 1937
Vol. III, 1938 to 1939
Vol. IV, 1940 to 1941
Vol. V, 1942 to 1943
Vol. VI, 1944 to 1945
Vol. VII, 1946 to 1947
Vol. VIII, 1948 etc.
Vol. XVI, 1956

Tabulations of daily temperature, salinity and density observation at 6 to 21 (most recent count) stations. Density tabulations discontinued in 1951 volume. (See table 4).

17. Canada, Joint Committee on Oceanography
Hecate Project, group of data reports on repeat cruises issued by Pacific Oceanographic Group, Nanaimo, B.C. Although the main project was during 1954-1955 supporting data for earlier years have been collected.

"Physical and Chemical Data Record, Hecate Project, 1934, 1937, 1938, 1951" P.O.G., April 15, 1956. Data for Sept. '34, July '37, May-June '38, July '51.

"Physical..., Hecate Project, 1954", P.O.G., Jan. 15, 1955. Data for May, June-July, Aug.-Sept., Nov. - Dec.

"Data Record, Current Measurements, Hecate Project, 1954" P.O.G., March 1, 1955. Data for May July, September.

"Physical..., Hecate Project, with App. I, Current Observations, 1955", P.O.G., Aug. 15, 1955. Data for Feb., April, May-June.

18. Smithsonian Institution
"World Weather Records"
Smithsonian Miscellaneous Collections
Smithsonian Institution, Washington, D.C.
Vol. 79 (1944), Up to 1920
Vol. 90 (1944), 1921 to 1930
Vol. 105 (1947), 1931 to 1940

Monthly and annual means of pressure, temperature and totals of rainfall for selected stations throughout the world. Appendix of monthly and annual sunspot numbers. Vol. 105 also has mean sea level pressure at 10° intersections of lines of latitude and longitude over the northern hemisphere by individual months from 1929 through 1939 and mean monthly values.

19. U. S. Coast and Geodetic Survey
"Density of Sea Water at Tide Stations, Pacific Coast, North and South America and Pacific Ocean Islands"
U. S. Coast and Geodetic Survey, Special Publications No. 281, Washington, D.C. (Sold by Superintendent of Documents, Government Printing Office, Washington 25, D.C.

Summaries of daily surface sea water density observations made primarily at tide stations by C&GS and data from other countries. Tables give monthly means, annual mean and extremes for each year. Also given are grand monthly means together with corresponding salinity, maximum density, mean of monthly maxima, mean of monthly minima, and minimum. Observed densities are reduced to standard temperature of 15° C (59°F) and with respect to density of pure water at 4°C. Revised editions issued periodically, (See Table 3 for stations).

20. U. S. Coast and Geodetic Survey
"Surface Water Temperatures at Tide Stations, Pacific Coast, North and South America and Pacific Ocean Islands"
U. S. Coast and Geodetic Survey, Special Publication No. 280, Washington, D.C. (Sold by Superintendent of Documents, Government Printing Office, Washington 25, D.C.)

Summaries of daily surface water temperature observations made primarily at tide stations by C&GS and data from other countries. Tables give monthly means, annual mean and extremes for each year. Also given are the following monthly values: grand monthly mean, maximum, mean of the monthly maxima, mean of the monthly minima, and minimum. Revised editions issued periodically. (See Table 3 for stations).

ATLASES AND MEAN CHARTS

21. Great Britain, Air Ministry, Meteorological Office
"Monthly Meteorological Charts of the Western Pacific Ocean"
(Rev. 1945)
H. M. Stationery Office, MO 484, London, 1947 (Formerly MOM 422)

Mean monthly charts of
Winds: Resultant; Barometric pressure; Frequency of gales; Predominant direction; Constancy and force; wind frequency, force and direction (roses).
Swell: Frequency, type, and direction (roses)
Weather: Fog; Fog, mist, and haze; Snow; Precipitation
Cloudiness: Mean Amounts; Clear; Partly cloudy; Overcast
Temperature: Mean; Range; Maximum and minimum of both sea and air temperatures; Air-sea temperature difference
Lightning: Frequency
Typical tracks of tropical cyclones.

22. Great Britain, Air Ministry, Meteorological Office
"Monthly Meteorological Charts of the Eastern Pacific Ocean"
H.M. Stationery Office, MO 518, London, 1956 (Formerly MOM 446)
See MO 484 above.

23. Great Britain, Air Ministry, Meteorological Office
"Monthly Sea Surface Temperatures of Australian and New Zealand Waters"
H.M. Stationery Office, MO 516, London, 1949 (Formerly MOM 482)

Mean monthly sea surface isotherms for each one degree Fahrenheit.

24. Great Britain, Air Ministry, Meteorological Office
"Monthly Sea Surface Temperatures and Surface Current Circulation of the Japan Sea and Adjacent Waters" MOM 447, London, 1944.

Insets show only direction of currents. Isotherms for each one degree Fahrenheit. (May be out of print now)

25. Great Britain, Air Ministry, Meteorological Office
"South Pacific Ocean Currents"
H.M. Stationery Office MO 435, London, 1938 (Reprinted 1955)

Quarterly charts (Nov. Dec. Jan. etc.) of current roses and current arrows (direction, speed, and number of observations) plus graphs and summarized data on major currents.

26. Great Britain, Air Ministry, Meteorological Office
"Quarterly Surface Current Charts of the Western North Pacific Ocean, Westward of 160° W, with Monthly Chartlets of the China Seas" H.M. Stationery Office, MO 485, London, 1949
(Formerly MOM 476)

Quarterly charts (Dec. Jan. Feb. etc.) of current roses, predominant direction and rate of current, resultant rate and direction of current.

27. U. S. Navy, Chief of Naval Operations
"Marine Climatic Atlas of the World"
NAVAER 50-1C-528, Vol. I, North Atlantic Ocean
NAVAER 50-1C-529, Vol. II, North Pacific Ocean
U. S. Government Printing Office, Washington, D.C. 1955 and 1956 respectively.

Prepared by the U. S. Weather Bureau

Surface Section
Monthly charts of surface winds, Gales, Visibility, Low visibility, Precipitation, Cloudiness, Wind-Visibility-Cloudiness, Ceiling and visibility, Temperature, Wet bulb temperature, Low temperature, Sea level pressure.
Seasonal charts of air-sea temperature difference and low pressure centers.

Upper Air Section
Seasonal charts at each of five pressure levels (850, 700, 500, 300, 200 millibars) of Wind aid, Wind retard, Wind roses, Height of pressure surface, Temperature and humidity.
Seasonal charts of modified refractive index, Inversions, Height of tropopause, Height of freezing level, Potential aircraft icing. (Data summaries at oceanic islands, coastal stations and weather ships where upper air soundings are made)

Excellent bibliography for marine meteorological data.

28. U. S. Fish and Wildlife Service
"Wind Atlas of the North Pacific"
James W. McGary and Thomas M. Naito
U. S. Fish and Wildlife Service, Special Scientific Report - Fisheries No. 243, Washington, D.C. September 1957.

Summary of average wind speeds in the Pacific north of 30° N, prepared to aid in evaluating fishing conditions. For each month, with a few exceptions, there are five charts; geographic variation of frequency of wind speed less than 20, less than 25, less than 30, and less than 35 knots, and maximum observed wind for each 5 degree square of latitude and longitude.

29. U. S. Navy, Hydrographic Office
"World Atlas of Sea Surface Temperatures"
Hydrographic Office Publication No. 225, 1944

Monthly temperature charts for all oceans showing mean sea surface temperatures, from data over a period of thirty years, and limits of sea ice. Isotherms for each 2.5° F.

30. U. S. Navy, Hydrographic Office
"Atlas of Monthly Pilot Charts of the Upper Air, North Atlantic and North Pacific Oceans"
Hydrographic Office Publication No. 560, 1945

Wind roses for 5 degree squares, current directions, some current speeds, magnetic variation, insets of monthly mean pressure distribution and frequency of gales, storm tracks, mean atmospheric temperatures, and miscellaneous information. Individual charts 26 x 40 inches also published monthly:
H.O. Chart No. 1400 Pilot Chart of North Atlantic Ocean
H.O. Chart No. 1401 Pilot Chart of North Pacific Ocean
with general marine information or articles on reverse side.

31. U. S. Navy, Hydrographic Office
"Atlas of Pilot Charts of the South Pacific and Indian Oceans"
Hydrographic Office Publication No. 577, Second Edition, 1955

(See above, Atlas for North Atlantic and North Pacific)

32, U. S. Navy, Hydrographic Office
"Atlas of Current Charts, Southwestern Pacific Ocean"
Hydrographic Office Publication No. 568, 1944

Direction and speed of mean vector with number of observations by one degree squares. Also mean sea surface temperature (5° F isotherms)

33. U. S. Navy, Hydrographic Office
"Atlas of Surface Currents, Northwestern Pacific Ocean"
Hydrographic Office Publication No. 569, 1944

Current roses for 5 degree squares. Mean vector direction and speed with number of observations by one degree squares. Also shows mean sea surface temperatures (5° isotherms)

34. U. S. Navy, Hydrographic Office
"Atlas of Surface Currents, Northeast Pacific Ocean"
Hydrographic Office Publication No. 570, 1947

(See Atlas for Northwest Pacific Ocean)

35. U. S. Weather Bureau
"Atlas of Climatic Charts of the Oceans"
WB 1427, U. S. Government Printing Office,
Washington, D.C., 1938

Atlas based on data from about 5½ million marine weather observations between 1885 and 1933. Charts show number and distribution of observations, Predominant wind direction, constancy, and forces, by months; Resultant wind direction and force by months; Average wind velocity in knots by season; Frequency of calms, by season; Frequency of winds Beaufort force 7 and higher, by months; Frequency of winds Beaufort force 8 and higher by seasons; Fog, by season; Mist, by season; Haze, by season; Exceptional horizontal visibility, by season; Average cloudiness, by season; Studies of cloud forms, by season; Rain, by season; Thunderstorms, by season; Depression of wet bulb, by season; Average air and sea surface temperatures over the North Atlantic and North Pacific by months; Air-sea temperature difference of North Atlantic and North Pacific, by season.

36. U. S. Weather Bureau
"Normal Weather Charts for the Northern Hemisphere"
Weather Bureau, Technical Paper No. 21, October, 1952.

Monthly Mean Charts	Period Used
Sea level pressure	1909-14, 1924-37*
700 mb height (ft) and temp. (C)	1946-50 **
Thickness (ft) of 700 mb to 1000 mb	1946-50 **
500 mb height (ft)	1946-50 **

* Period 1946-50 used for Arctic Regions and adjusted to twenty year period.

** Adjusted to twenty year period

Data also tabulated with value for each point separated by ten degrees latitude and longitude in a diamond grid.

CHARTS ISSUED PERIODICALLY

37. Japan, Meteorological Agency
"Ten Day Marine Report, Isotherms of the Sea (Surface)"

Sea surface isotherms (°C) for northwest Pacific (7°-50°N, 115°E-180°) based on 10-day mean temperature for one-degree squares. Inset charts: (a) Anomaly from mean and (b) Anomaly from previous year. Miscellaneous information on the back. Three charts for each month.

Ocean Research files cover period from first ten days of April 1956. Serial numbers indicate series may begin October 1946.

38. Japan, Regional Fishery Research Laboratory
"Oceanographical Chart"
Tokai Regional Fishery Research Laboratory

Sea surface isotherms in northwest Pacific (21°-47°N, 110°-165°E) and contours for "normal" year (1941) based on 10-day mean temperature for one-degree squares.

Ocean Research Files:
Feb 1950 - Dec 1951: Mean sea surface isotherms for three ten day periods each month, 100 meter layer temperature and 100 meter layer chlorinity and surface chlorinity (one chart only for each) for area of restricted coverage. Lengthy Japanese text. 1952-1955 charts for first decade only of each month. Also includes surface chlorinity, 100 M chlorinity and 100 M temperature (probably monthly mean)

Above two sets have continuous serial numbers. Series could date back to August 1922.

39. U. S. Army Air Force, Air Weather Service
"Northern Hemisphere Historical Weather Maps, Sea Level and 500 Millibars" October 1945 to December 1948 inclusive.

(See reference No. 41)

40. U. S. Fish and Wildlife Service, P.O.F.I.
"Sea Surface Temperature, Anomaly of Sea Surface Temperature and Distribution of Observations (10 day period) N. E. Pacific" Prepared by R. J. Callaway and E. W. Mendiola, Pacific Oceanic Fishery Investigations, Honolulu, T.H.

Charts prepared on routine basis starting October 1957 for middle 10-day period of each month from sea surface temperatures collected from ship's weather reports. Area of N. E. Pacific north from 20° N and east from 180°. Will be issued on a one-year trial basis.

41. U. S. Weather Bureau
"Synoptic Weather Maps, Part I, Northern Hemisphere, Sea Level and 500 Millibar Charts" (Daily Series)
Present Series, Jan. 1949--
Superintendent of Documents, Washington 25, D.C.

Daily surface map of northern hemisphere for 1230 GMT and upper air for 0300 GMT. Bound by months. Period Sept. 1954 through July 1955 yet to be published. This series provides continuity with other series published or in preparation since January 1899. Present time delay is six months. (See also reference No. 6)

42. U. S. Weather Bureau
"Daily Series Synoptic Weather Maps, Northern Hemisphere Sea Level and 500 MB Charts" Dec. 1944 to Sept. 1945, inclusive. (See reference No. 41)

43. U. S. Weather Bureau
"Daily Series Synoptic Weather Maps, Northern Hemisphere Sea Level Charts" January 1942 to November 1944, inclusive. (Being completed) (See reference No. 41)

44. U. S. Weather Bureau
"Daily Synoptic Series Historical Weather Maps, Northern Hemisphere, Sea Level" January 1899 to June 1939, inclusive. (See reference No. 41)

45. U. S. Weather Bureau, Extended Forecast Section
"Sea Level Chart, Monthly Mean Pressure" 1899-

Northern Hemisphere, Mean Pressure Chart. Issued for each month 1899 through 1943 (July 1939-Sept. 1940 missing). Starting January 1944 issued twice monthly for overlapping thirty day periods.

Ocean Research and MLR program at SIO have sets and are on current mailing list.

46. U. S. Weather Bureau, Extended Forecast Section
"Sea Level Chart, 5-Day Mean Pressure"

Northern Hemisphere, Mean Pressure Chart.
Overlapping 5-day periods. Present series has periods beginning on Tuesday, Thursday and Saturday.

Ocean Research has series beginning January 1943.

PUBLICATIONS ISSUED PERIODICALLY

47. U. S. Coast and Geodetic Survey
"Tide Tables" USCGS, Washington, D.C. (issued annually)

Predicted times and heights for every day of the year for reference stations and differences for obtaining predictions at numerous other places. (See Table 7 for tide recording stations)

Tide Tables, West Coast, North and South America
Tide Tables, Central and Western Pacific and Indian Oceans

48. U. S. Coast and Geodetic Survey
"Tidal Current Tables Pacific Coast, North America, and Asia"
USCGS, Washington, D.C. (issued annually)

Predictions of time of slack water and time and velocity of flood and ebb currents for numerous waterways.

49. U. S. Weather Bureau
"The Mariner's Weather Log" Washington, D.C.
Vol. 1, No. 1, Jan. 1957 (Bi-monthly)

Review of weather over the oceans and Great Lakes; Articles on subjects in marine meteorology; marine meteorological data; ship reports of wind, pressure, visibility, weather, air and sea temperature and wave direction, period, and heights; tracks of cyclones during two months (6-month lag) in N. America, E. Pacific, and W. Atlantic.

50. U. S. Weather Bureau
"Synoptic Weather Maps, Part II, N. Hemisphere Sea Level and Upper Air Data Tabulations" Present Series: Jan. 1949—
Superintendent of Documents, Washington 25, D.C.

Jan. 1949-Dec. 1951	Bound with Charts
Jan. 1952 - Dec. 1955	Separate Vol. for each month
Jan. 1956 --	Daily Pamphlet

Data: Synoptic Chart, Surface 1230 GMT
Upper Air Winds 0300 GMT
Radiosonde and Rawinsonde 0300 GMT

These are tabulations of original data used to prepare historical series of daily surface and upper air charts. (See Reference 41).

SUMMARIES FOR PARTICULAR AREAS

51. A & M College of Texas
"Summary of North Pacific Weather Station Bathythermograph Data, 1943 - 1952" D. F. Leipper and Project Staff Technical Report No. 7, Texas A & M Res. Foundation, Project 29, January 1954.

Graphs for various weather stations showing five day running averages of (a) Mixed layer depth (b) Depth of water 2° F colder than mixed layer (c) Temperatures at selected depths, and(d) Depths to selected differences from sea surface temperatures.

52. Leipper, D.F. and E. R. Anderson
"Sea Temperatures, Hawaiian Island Area", Pacific Science, Vol. 4, 1950, pp. 228-248, (Also SIO, Oceanographic Report No. 12, 1948)

Contoured charts showing monthly average temperatures at the surface and at various lower levels. Study primarily from BT observations.

53. Pattulo, June G., J. D. Cochrane, and W. V. Burt
"Sea Temperature in the Aleutian Island Area", Scripps Institution of Oceanography, Oceanographic Report No. 24, 1950 (mimeographed)

(See reference 52, above)

54. Robinson, Margaret K.
"Sea Temperature in the Marshall Islands Area, 20°N-5°S, 155°E-175°W", Scripps Institution of Oceanography, Ref. 51-20, 1952 (mimeographed)

(See reference 52, above)

55. Robinson, Margaret K.
"Sea Temperature in the Gulf of Alaska and in the Northeast Pacific Ocean, 1941-1952", Bulletin, Scripps Institution of Oceanography, Vol. 7, No. 1, University of California Press, Berkeley and Los Angeles, 1957.

Analysis of 16,103 individual bathythermograms and 129 serial reversing thermometer observations in Gulf of Alaska and NE Pacific is presented in monthly charts of average temperature for surface, 100, 200, 300 and 400 feet. Additional charts are of average temperature cycles, average vertical temperature sections, typical bathythermograms, and typical T-S curves. Statistical analysis of temperature variation at three locations is included.

56. U. S. Navy Hydrographic Office
"Weather Summaries"

Both surface and upper air climatological data, tables and text of average weather conditions, and tables of upper air winds; illustrated by charts, graphs and wind roses.

H.O. Pub. No.	Area
270	Central Pacific--Hawaiian Islands, 1944
271	South Pacific--Tuamotu Archipelago, 1944
272	Southwest Pacific--Fiji and Samoa, 1943
273	West Pacific--Caroline & Marshall I., 1943
275	Southwest Pacific--Solomon I., 1943
276	New Guinea, 1943
526	Alaska, 1944
528	South America--North and Northwest part, 1945
529	South America, Southern part, 1945
531	Central America, 1948
532	Mexico, 1949

SPECIAL DATA

TABULATIONS AND COLLECTIONS

Air and Sea Temperatures

57. "Mean Air and Sea Temperatures for the North Pacific Ocean by 10° Squares for each Month in each Year 1944 through 1953"

Data Available: SPFI and Ocean Research

Special tabulation for South Pacific Fishery Investigations (Job No. 8111), U. S. Weather Bureau, National Weather Records Center, Mar. 21, 1955. Covers Marsden squares 045-061, 081-097, 117-133, 153-169, 189-205, 225-241, number of observations and mean for sea and air temperatures.

Meteorology - Central and Western Pacific

58. Synoptic Observations and Analyses

Data Available: University of Hawaii, Institute of Geophysics.

The Institute is collecting all meteorological data for North and South Pacific from 1955 through 1958, at least, for special study. Includes surface and upper air observations including sea surface temperatures. Data are collected for four synoptic charts (00, 06, 12, 18, GMT) and four supplementary observations (03, 09, 15, 21, GMT)

The analyses are made of pressure, streamlines, and isotach fields from 55° S to 55° N and between 120 W and 70 E. Series July 16, 1956 to August 31, 1956 is half completed and series January and February 1957 is being plotted. (As of January 1958)

Sources of data are:

(a) Teletype messages received at USWB, Honolulu, and Hickam A.F.B. directly and from Tokyo.
(b) Teletype messages received at Clark A.F.B., P.I., from Guam.
(c) Southern hemisphere weather broadcast received at USWB, Honolulu and Clark A.F.B.
(d) Southeast Asia weather broadcast received at Clark A.F.B.
(e) China weather broadcasts received at Tokyo Weather Central.

For years prior to 1955 published data have been obtained from New Zealand, Japan, Singapore, Hongkong, Viet Nam, Northern Hemisphere (U.S.)

Temperature Observations from Commercial Liners

59. McEwen's Temperature Charts - Northeast Pacific, 1917-1934

Data Available: Bathythermograph Section,
Scripps Institution of Oceanography

These are a series of charts showing mean sea surface temperatures by one degree or half degree squares for given months and year along certain steamer lanes in the Northeast Pacific for various periods between 1917 and 1934. The charts were compiled by Dr. McEwen from ship weather reports and/or thermograph records. Data are given in degrees and tenths for each unit area. Observations cover only the narrow strip of the steamer lanes, and normally averages are computed from about 1 to 4 observations in each unit square. The following sets comprise the collection:

1. San Francisco to Hawaii, by one-degree squares. January 1917- August 1923.

2. Los Angeles to Hawaii, by one-degree squares. January 1917-August 1923.

3. Los Angeles to Hawaii, by half-degree squares. August 1927-June 1932. (June 1929, February 1932, and May 1932 are missing).

4. San Francisco to Panama (7° N - 38° N, 79°W - 123°W) by one-degree squares. May 1932-November 1934. (December 1932 is missing)

5. San Francisco to Panama, by half-degree squares. May 1932-November 1934. (December 1932 is missing).

6. San Francisco to Hawaii, by one-degree squares. Based on observations made 1915 to 1924. One chart for each month. January through May. (A notation on these charts says that the information was taken from the North Pacific Pilot Chart for June 1934).

7. Eastern North Pacific (15° N - 50° N, West Coast - 150° W), by one-degree squares. Based on all available data up to 1950. One chart for each month.

60. Eastern Central Pacific - Coastal, 1932-1934

Data Available: Bathythermograph Section,
Scripps Institution of Oceanography

Monthly and seasonal averages of thermograph records from Grace Liners between San Diego, Panama, and South America between May 1932 and November 1934.

61. Central Pacific 1956 -

Data Available: Pacific Oceanic Fishery Investigations,
Honolulu, T.H.

Temperature observations are being compiled by POFI from Matson Liners out of Honolulu. Data are utilized presently in preparation of ten day temperature and anomaly charts for Northeast Pacific (See reference 40)

Data are as follows:

Vessel	Start	End	Results (as of 10-8-57)
Mariposa	Nov. '56	May '57	5 trips, Honolulu to Tahiti
	Nov. '56	Indef.	7 trips, Pago Pago to Hon.
Monterey	Jan. '57	Jul.'57	4 trips, Tahiti to Honolulu
	Jan. '57	Indef.	6 trips, Honolulu to Pago Pago or v.v.
Mariposa) Monterey)	May '57		2 legs each, Honolulu to San Francisco, Los Angeles to 20° N, and Pago Pago to Honolulu.

Sea Surface Temperature

62. Shore Station Temperatures, West Coast of South America 1927 - 1931

Data Available: Bathythermograph Section,
Scripps Institution of Oceanography

Mimeographed summary sheets of temperature records for West coast of South America for variable periods from 1927 to 1931. Data include weekly average, weekly range, and monthly average sea surface temperatures for the following locations and periods:

Chimbote, Peru; 9° 04'S, 78° 35' W, 8/28-2/29
Escuelo Naval del Peru, La Punta, Callos; 12° 04'S, 77° 11'W, 1/27-11/31*
Ilo, Peru; 17° 38' S, 71° 22' W; 9/27-2/29

* Weekly data through 1930 only. (List continued on next page).

La Libertad, Ecuador;; 3° 20'S, 79° 50' W; 1/29-6/29, 10/29-6/30
Lobitis, Peru; 4° 43'S, 81° 22'W; 1/28-6/29, 12/29-6/30
Paita, Peru; 5° 05' S, 81° 07' W; 1/27-10/27
Pisco, Peru; 13° 43' S, 76° 14' W; 1/28-2/29

PUNCH CARD DATA

Marine Meteorological Observations

63. U. S. Navy, U. S. Merchant Marine, and others.

Data Available: National Weather Records Center, U. S. Weather Bureau

The Weather Records Center has on file marine weather observations collected by ships of the United States and other nations dating back to at least 1885. Many of these observations include sea temperature observations from injection thermometers, and more recently sea surface temperatures. All data are on IBM cards and machine tabulations for any area can be purchased from the Weather Bureau. Address inquires to the National Weather Records Center, Arcade Building, Ashville, North Carolina.

64. Selected British Ships

Data Available: British Air Ministry, Meteorological Office

Complete meteorological observations including sea surface temperature for the Pacific Ocean. Table below summarizes density of observations and indicates regions of minimum coverage. (See reference 4)

Area	1855-1956	1953-1956
NE Pacific (0-60° N; West to 170° W)		
Total observations	281,655	17,279 (3)
Minimum in one Marsden Square	1,556	42
Maximum in one Marsden Square	28,802	4,356
NW Pacific (0-50° N; East to 170° W)		
Total observations	240,098 (1)	16,123 (4)
Minimum in one Marsden Square	321	23
Maximum in one Marsden Square	29,244	2,527
SE Pacific (0-60° S; West to 170° W)		
Total observations	329,069 (2)	28,755 (5)
Minimum in one Marsden Square	129	0
Maximum in one Marsden Square	17,950	2,826

See footnotes on following page.

Area	1855-1956	1953-1956
SW Pacific (0-50° S; 100° East - 170° W)		
Total observations	493,480	26,580 (6)
Minimum in one Marsden Square	2,401	78
Maximum in one Marsden Square	36,399	2,843

Regions of Minimum Coverage:

(1) (10°-20°N, 160°-170°E)
(2) (10°-20°S, 80°-90°W)
(3) (50°-60°N, 130°-140°W)
(4) (0°-10°N, 170°E-180°)
(5) (30°-40°S, 80°-110°W)
(6) (0°-10°S, 170°E-180°) excluding two squares south of Australia.

Oceanographic Station Data (Physical)

65. Deep Stations, Pacific Ocean

Data Available: E. R. Anderson or R. M. Lesser,
U. S. Navy Electronics Laboratory

All data below 3000 meters in the North and South Pacific taken through 1956 are in punched card form. Data listed are depth, temperature and salinity. A list of the station locations, approximately 700, is available in manuscript form.

66. West Coast of North America

Data Available: E. R. Anderson or R. M. Lesser,
U. S. Navy Electronics Laboratory

Physical data through 1954 for a 500 mile strip along the West coast of North America from 15° N to 55° N. to depths of about 1500 meters have been placed on punch cards. Observed and computed data include depth, temperature, salinity, sigma-t, thermosteric anomaly, and sound velocity. Data include about 8000 stations.

The upper 300 meters of the above data have been studied to determine "representative" temperature-salinity curves and salinity-depth curves for certain areas for given periods of time, as follows:

Latitude Strip	Longitudinal Sectors	Seasons
30°-31°	2	4
36°-37°	2	4
48°-49°	4	Spring, Summer

66a. Oceanographic Station Data, General

Data Available: U. S. Navy Hydrographic Office

The U. S. Navy Hydrographic Office collects and analyzes oceanographic data - physical, chemical, geological, and biological - for the Federal government. Oceanographic station data are placed on punch cards and dynamic heights and sound velocity are computed. All U. S. bathythermogram data are also held here. Duplicate cards, data summaries, etc. may be purchased from the Hydrographic Office. Address inquiries to the Hydrographer, U. S. Navy Department, Washington 25, D.C.

Sea Level and Associated Meteorological Variables

67. Central Pacific Ocean

Data Available: SUB-DIEM Group (Munk, Groves, Miller, Cromwell), Scripps Institution of Oceanography

SUB-DIEM group is obtaining data on punch cards for study of sea level oscillations with periods of one day to one month. Data are:

I Sea Level - Hourly tide heights from data taken at
Honolulu, T.H. - 1905 -
Hilo, T.H. - Dec. 1946 -
Nawiliwili, Kauai, T.H. - Dec. 1954 -
Kahului, Maui, T.H. - 1951 -
Canton Island - June 1949 -
Christmas I. - Dec. 1955 -
Balboa Canal Zone - 1907 -

II Sea Level Pressure - Hourly sea level pressure for the time intervals indicated at

Hickam A.F.B. June 1939 - Dec. 1949
Rogers Airport (Honolulu) Nov. '49-Sept. '56
Balboa, Canal Zone, Oct. 1936 - Sept 1956

III Wind - Daily Means (not punched) for Honolulu, T.H., from June 1939 through Dec. 1948.

ORGANIZATIONS AND ADDRESSES

CANADA

Canadian Meteorological Service
315 Bloor Street, West
Toronto 5, Ontario
Controller, Meteorology Division, Andrew Thomson, O.B.E.

Fisheries Research Board of Canada
Biological Station
Nanaimo, B.C.
Director, Dr. A.W.H. Needler

Fisheries Research Board of Canada
Pacific Oceanographic Group
Nanaimo, B.C.
Oceanographer-in-Charge, Dr. J. P. Tully

JAPAN

Japan Meteorological Agency
Ote-machi, Chiyoda-ku
Tokyo, Japan
Chief, Oceanography Section, Y. Takenouti

Tokai Regional Fisheries Research Laboratory
Tsukishima, Chuo-ke, Tokyo
Acting Chief, Oceanographic Section, N. Watanabe

PERU

Consejo de Investigacion Hidrobiologica
Director de Pesqueria y Cazo Edificione
Piso 18, Lima, Peru
Director, Dr. W. S. Wooster

UNITED STATES

California Fish and Game
Marine Fisheries Branch
722 Capitol Avenue
Sacramento 14, California
Chief, Mr. R. N. Croker

Geophysics Research Directorate
Air Force Cambridge Research Center
Cambridge, Massachusetts

Office of Naval Research
Geophysics Branch (Code 416)
Washington 25, D.C.
Dr. Gordon G. Lill

Scripps Institution of Oceanography
La Jolla, California

Director, Dr. R.R. Revelle
BT Section, Margaret Robinson (Mrs.)
SUB-DIEM Group, Dr. W. H. Munk
Tuna Oceanography Project, Dr. M. Blackburn
Marine Life Research, Dr. J. D. Isaacs

U. S. Coast and Geodetic Survey
Washington 25, D.C.
Chief, Tides and Current Division, K. G. Crosby

U. S. Fish and Wildlife Service
Ocean Research
450-B Jordan Hall
Stanford, California
Chief, Dr. O. E. Sette

U. S. Fish and Wildlife Service
Pacific Oceanic Fishery Investigations
P.O. Box 3830
Honolulu 14, Hawaii
Chief, Mr. G. I. Murphy

U. S. Fish and Wildlife Service
South Pacific Fishery Investigations
P.O. Box 271
La Jolla, California
Chief, Mr. J. C. Marr

U. S. Fish and Wildlife Service
Pacific Salmon Investigations
2725 Montlake Boulevard
Seattle, Washington
Chief, Mr. C. E. Atkinson

U. S. Navy Hydrographic Office
Washington 25, D.C.
Director, Division of Oceanography - Dr. John Lyman
Deputy Director, Division of Oceanography - Mr. Boyd Olson

U. S. Navy Electronics Laboratory
San Diego 52, California

Head, Oceanography Section, Dr. E. C. LaFond
Acoustic Oceanography, Dr. E. R. Anderson

U. S. Weather Bureau
2400 M Street N. W.
Washington, D.C.

Chief of Bureau - Dr. F. W. Reichelderfer

Office of Climatology
Director - Dr. H. E. Landsberg

Forecasts and Synoptic Reports Division
Chief - Mr. E. M. Vernon

National Weather Analysis Center
Director - Mr. A. K. Showalter

Hydrological Services Division
Chief - Mr. W. E. Hiatt

Instrument Engineering Division
Chief - Mr. W. R. Thickstun

Office of Meteorological Research
Director - Dr. Harry Wexler

Extended Forecast Section
Chief - Mr. Jerome Namias

Observations and Station Facilities Division
Chief - Mr. N. A. Lieurance

U. S. Weather Bureau
National Weather Records Center
Asheville, North Carolina
Director - Mr. Leslie Smith

University of Washington
Department of Oceanography
Seattle 5, Washington
Dr. R. H. Fleming

INTERNATIONAL

Inter-American Tropical Tuna Commission
c/o Scripps Institution of Oceanography
La Jolla, California
Director - Dr. M. B. Schaefer

Secretary - General
World Meteorological Organization
Campagne Rigot
Geneva, Switzerland

Table 1. Daily Surface Temperature Stations - SIO
West Coast of the United States

Surface temperature observations commenced in 1955 and made daily at approximately 0900 P.S.T. Daily values for 1955 published in Scripps Institution of Oceanography, Reference 57-28, 5 July 1957. Only monthly mean, 10-day mean, maximum, minimum range, and standard deviation will be published in the future. Daily values available on request to BT Section, Scripps Institution of Oceanography.

Station	Latitude	Longitude	Footnotes/Remarks
Scripps Pier, Calif.	32.9 N	117.2 W	See also Table 3
San Clemente I., Calif.	33.0 N	118.5 W	
Oceanside, Calif.	33.2 N	117.4 W	
San Nicholas I., Calif.	33.3 N	119.5 W	
Avalon, Catalina I., Calif.	33.3 N	118.3 W	
Catalina Isthmus, Calif.	33.4 N	118.5 W	
Doheny Beach, Calif.	33.5 N	117.7 W	
Balboa, Calif.	33.6 N	117.9 W	See also Table 3
Huntington Beach, Calif.	33.7 N	118.0 W	
Marineland (Pacific), Calif.	33.7 N	118.4 W	
Santa Rosa I., Calif.	33.9 N	120.1 W	
Santa Monica, Calif.	34.0 N	118.5 W	See also Table 3
Anacapa I., Calif.	34.0 N	119.4 W	
Santa Cruz I., Calif	34.0 N	119.7 W	
Port Hueneme, Calif.	34.2 N	119.2 W	See also Table 3
Santa Barbara, Calif.	34.4 N	119.7 W	
Gaviota, Calif.	34.5 N	120.2 W	
Point Arguello, Calif.	34.6 N	120.6 W	
Port San Luis, Avila, Calif.	35.2 N	120.7 W	See also Table 3
Hopkins Marine Station, Calif.	36.6 N	121.9 W	See also Table 3
Santa Cruz, Calif.	37.0 N	122.0 W	
Farallon I., Calif.	37.7 N	123.0 W	See also Table 3 *
Fort Ross, Calif.	38.5 N	123.2 W	
Blunts Rf. Lgtship, Calif.	40.5 N	124.5 W	See also Table 3
Port Orford, Oregon	42.7 N	124.5 W	
Columbia R. Lgtship, Oregon	46.2 N	124.2 W	Light Station
Swiftsure Bk. Lgtship, Wash.	48.5 N	125.0 W	See also Table 4

* Light Station

Table 2. Monthly Sea Surface Temperature Stations
San Diego and Baja California

Monthly surface temperature observations made by Dr. Carl L. Hubbs' group, Scripps Institution of Oceanography. 1955 data published in SIO Reference 57-28, July 5, 1957. No longitudes given. All stations are on the West coast.

Station No.	Locality	Latitude
		32° N
1-	Base of Scripps Pier	52.0'
2-	Grand Ave., Pacific Beach	47.6'
3-	S. Luis Rey Pl., Mission Beach	45.7'
2A-	Bonita Cove, Mission Bay	46.3'
4-	North end of Coronado	41.3'
4A-	South San Diego Bay	39.5'
5-	Silver Strand	39.0'
6-	Imperial Beach	35.1'
7-	N. of Rosarita Beach	20.7'
8-	N. of Pta. Descanso	16.7'
9-	S. of Pta. Descanso	16.0'
10-	Arroyo Medano	14.4'
11-	Halfway House	10.8'
12-	N. of Arroyo San Miguel	06.0'
		31° N
13-	North of Sanzal	54.0'
14-	N. of El Morro Lt.,	52.1'
15A-	In Ensenada	51.6'
16-	Estero Beach	46.9'
16A-	Entrance to Estero	46.7'
16B-	S. End of Estero	42.3'
16C-	Pta. Banda Beach	43.2'
16D-	Papalote, Pta. Banda	43.4'
16E-	Arbolitos, Pta. Banda	42.5'
21A-	Puerto Sto. Tomas	33.5'
21-	Puerto Sto. Tomas	33.4'
22-	Bahia Sto. Tomas	33.0'
23-	Bahia Sto. Tomas	32.4'
24-	Boca Sto. Tomas	32.2'
20-	Punta Clara	31.9'
19-	SE. of Pta. Clara	31.6'
18-	NW. side of Pta. China	31.3'
17-	SE. tip of Pta. China	31.3'
24A-	Punta Calavera	31° N 21.7'
24B-	N. of Punta Cabras	21.1'
25-	S. side of Pta. Cabras	20.0'
26-	SE. of Pta. Cabras	19.0'
28-	N. side of Pta. San Isidro	17.8'
27-	S. side of Pta. San Isidro	17.8'
29-	N. of Rio San Isidro	16.8'
29A[1]-	S. of Rio San Isidro	13.8'
29A-	S. of Rio San Isidro	13.0'
29B-	NE of rock	12.0'
29C-	San Antonio del Mar	05.3'
		30° N
31-	S. of Rio San Rafael	57.8'
30-	S. of Rio San Telmo	56.1'
32-	SE. of Pta. San Telmo	54.9'
33-	NW. of Pta. San Jacinto	52.6'
34-	NW. of Pta. Camalu	49.7'
35-	E. of Pta. Camalu	49.1'
36-	S. of Rio Santo Domingo	42.5'
37-	Old Pier, B. San Quintin	28.4'
38-	Playa Santa Maria	23.8'
39-	Socorro Ranch	19.2'
40A-	S. of Socorro Ranch	16.2'
41-	S. of Canon Hondo	12.2'
42-	Canon Rosario	09.8'
43A-	S. of Canon Rosario	07.8'
		29° N
44-	W. side of Pta. Baja	57.1'
45-	E. side of Pta. Baja	57.1'
46-	2 miles E. of Pta. Baja	57.3'

Table 3. Sea Water Observation Stations
North and South America and Pacific Ocean Islands

From daily observations of temperature and density, summaries are tabulated of monthly means and annual means and extremes, plus grand monthly means of temperature, density, and salinity by U. S. Coast and Geodetic Survey, References 19 and 20. Only those stations with five years or more data or currently operative are listed here. Stations with obviously poor exposure are also omitted.

Station	Lat.	Long.	Start	Footnotes/Remarks
Scripps Pier (La Jolla), Calif.	32.9N	117.2W	1-17	(1),(2),(3) See Table 1
Balboa, Calif.	33.6N	117.9W	1-25	(4) See also Table 1
Los Angeles (outer harbor),Calif.	33.7N	118.3W	1-24	
Santa Monica, Calif.	34.0N	118.5W	1-46	See also Table 1
Port Hueneme, Calif.	34.2N	119.2W	1-20	(5), See also Table 1
Avila, Calif.	35.2N	120.7W	1-45	See also Table 1
Pacific Grove (Hopkins Mar.St.)	36.6N	121.9W	1-20	(5),See also Table 1
Farallon I., Calif.	37.8N	123.0W	1-26	(6), See also Table 1
San Francisco (Fort Point)Calif.	37.8N	122.5W	1-22	
Blunt's Reef Lightship, Calif.	40.5N	124.5W	1-23	(7), See also Table 1
Crescent City, Calif.	41.8N	124.2W	1-34	
Neah Bay, Washington	48.4N	124.6W	1-36	
Seattle (Elliot Bay), Wash.	47.6N	122.3W	1-22	
Friday Harbor(San Juan I.)Wash.	48.6N	123.0W	1-35	
Ketchikan, Alaska	55.3N	131.6W	1-22	
Sitka, Alaska	57.0N	135.3W	11-24	
Juneau, Alaska	58.3N	134.4W	1-37	(8)
Yakutat, Alaska	59.6N	139.7W	1-41	
Women's Bay, Kodiak I., Alaska	57.7N	152.5W	6-50	(9)
Dutch Harbor, Unalaska I.,	53.9N	166.5W	7-46	End data 5/55
Unalaska, Unalaska I., Alaska	53.9N	166.5W	5-55	Replaces Dutch Harbor
Sweeper Cove, Adak I., Alaska	51.8N	176.6W	1-44	
Massacre Bay, Attu I., Alaska	52.8N	173.2E	10-47	Also May-Nov. '46
Midway I., T.H.	28.2N	177.4W	3-44	
Honolulu, T.H.	21.3N	157.9W	3-45	
Hilo, T.H.	19.7N	155.0W	1-47	
Johnston I., T.H.	16.8N	169.5W	2-50	Some data in 47,48,49
Canton I., Phoenix I.	2.8S	171.7W	7-50	
Pago Pago, Samoa I.	14.3S	170.7W	2-50	
Apia, Samoa I.	13.8S	171.8W	7-44	
Wake I.	19.3N	166.6E	6-50	
Kwajalein I., Marshall I.	8.7N	167.7E	2-49	Exposure not known
Truk I. (Moen I.),Caroline I.	7.4N	151.8E	10-52	Some data in 49,50,51
Guam (Apra Hrbr) Marianas I.	13.4N	144.6E	5-49	
Manila,Luzon I., Philippine I.	14.6N	121.0E	7-47	
Legaspi, Luzon I., Philippine I.	13.2N	123.8E	5-47	
Tacloban, Leyte I., Philippine I.	11.2N	125.0E	6-51	
Cebu, Cebu I., Philippine I.	10.3N	123.9E	5-47	
Davao, Mindanao I., Philippine I.	7.1N	125.6E	5-47	

See Footnotes on following page.

Station	Lat.	Long.	Start	Footnotes/Remarks
Jolo, Jolo I., Philippine I.	6.1N	121.0E	10-47	
Punta Arenas, Mag. St., Chile	53.2S	70.9W	5-44	(10)
Puerto Montt, Chile	41.5S	73.0W	5-44	
Talcahuano, Chile	36.7S	73.1W	2-45	
Valparaiso, Chile	33.0S	71.6W	4-44	
Caldera, Chile	27.1S	70.8W	1-51	Density start 11/50
Antofagasta, Chile	23.6S	70.4W	1-46	
Arica, Chile	18.5S	70.3W	1-51	
Matarani, Peru	17.0S	72.1W	3-44	(11)
Callao (Naval Arsenal), Peru	12.1S	77.2W	2-44	
Callao (La Punta), Peru	12.1S	77.2W	1-54	
Chimbote, Peru	9.1S	78.6W	11-54	
Talara, Peru	4.6S	81.3W	3-44	Density start 6/44
Tumaco, Colombia	1.8N	78.7W	10-51	
Buenaventura, Colombia	3.9N	77.1W	5-53	
Naos I., Canal Zone	8.9N	79.5W	5-49	
Puerto Armuelles, Panama	8.3N	82.9W	2-51	Data missing 1/55-7/55
Puntarenas, Costa Rica	10.0N	84.8W	1-48	
San Juan Del Sur, Nicaragua	11.2N	85.9W	1-50	
La Union, El Salvador	13.3N	87.8W	9-49	
San Jose, Guatemala	13.9N	90.8W	10-49	
Salina Cruz, Mexico	16.2N	95.2W	4-52	
Acapulco, Mexico	16.8N	99.9W	6-50	
Manzanillo, Mexico	19.0N	104.3W	4-53	
Mazatlan, Mexico	23.2N	106.4W	1-53	
Puerto Penasco, Mexico	31.3N	113.6W	5-52	Brks in 52, 53
La Paz, Mexico	24.2N	110.3W	7-50	

(1) Surface density start 1/25
(2) 5 meter temperature start 1/27
(3) 5 meter salinity start 1/55
(4) Temperature data only, plus grand monthly mean salinity for 1925-53.
(5) Temperature data only, plus grand monthly mean salinity for 1920-1953.
(6) Temperature only, plus grand monthly mean salinity 1926-42. No data 1943-1/55
(7) Temperature only, plus grand monthly mean salinity 1923-41. No data 12/42-1/55.
(8) Large influence of fresh water in summer. No data 8/40-8/41.
(9) Restricted circulation in harbor.
(10) No data 6/45-6/46 Brks 5/54-12/54 and 8/55-11/55.
(11) Data missing 2/49-9/49. Some in '54 and '55.

Table 4. Daily Sea Water Observation (Temperature and Salinity) Stations - West Coast of Canada

Tabulation of daily observations (temperature and salinity) taken at time of daytime high tide. Each year's data presently tabulated in separate volume by Pacific Oceanographic Group, Canada. (See Reference 16). Density also tabulated through 1950. Also listed are monthly mean for given year and decade monthly means. Stations listed are those having at least five years' record or presently continuing observations.

Station	Lat. N	Long. W	Start	Footnotes/Remarks
Amphitrite Pt., Vancouver I., B.C.	48.9	125.6	8-34	
Kains I., B.C.	50.4	128.1	1-35	
Nootka Light	49.6	126.7	8-34	End data 6/53
Race Rocks, Vancouver I., B.C.	48.3	123.6	5-41	
Swiftsure Bank Lgtshp.	48.5	125.0	7-54	
Umatilla Reef Lgtshp.	48.2	124.8	7-55	
East Point, Bndry Pass, B.C.	48.8	123.2	7-53	
Pine I., B.C.	50.9	127.8	1-37	
Pulteney Pt., B.C.	50.7	127.2	8-54	
McInnes I., B.C.	52.3	128.7	8-54	
Ivory I., B.C.	52.2	128.4	7-37	End data 12/55
Triple I., B.C.	54.3	130.8	11-39	
C St. James, Queen Charlotte I.,	51.9	131.0	7-34	
Sandspit, Queen Charlotte I., B.C.	53.3	131.8	8-53	
Langara I., B.C.	54.2	133.0	3-40	
Ocean Station "PAPA"	50.0	145.0	7-52	See also Table 6.

Table 5. Weekly Sea Water Observation (Temperature and Salinity) Stations - Pacific Ocean Islands

Weekly observations of temperature and salinity available on request from Pacific Oceanic Fishery Investigations, Honolulu, T.H.

Station	Lat.	Long.	Start	Footnotes/Remarks
Christmas I.	2.0N	157.5W	11-53	(Also surface weather three times daily)
French Frigate Shoals, T.H.	23.9N	166.3W	3-57	
Johnston I., T.H.	16.8N	169.5W	3-57	
Koko Head, Oahu, T.H.	21.3N	157.7W	11-55	
Midway I., T.H.	28.2N	177.4W	3-57	
Upolu Pt., Hawaii, T.H.	20.3N	155.9W	3-57	
Ocean Station "VICTOR"	34.0N	164.0E	1-57	Daily temperature observations
Wake I.,	19.3N	166.6E	2-57	

Table 6. Weather Ships

Weather ships with sufficient data to merit use in reference 27 or 51. National Weather Records Center compiles weather data from all weather ships. Stations listed for BT data only, undoubtedly made weather observations, but were not used for climatic charts of oceans so no dates available.

Station	Lat. N	Long. W	Type	Start	End	Footnotes/Remarks
P, "PAPA" (1)	50	145	Wx	6-46	6-52	Operated by U.S. Navy
(2)	50	145	BT	7-49	6-51	
(3)	50	145	Wx	7-52	Indef.	Operated by Canadian Navy
A, "ABLE"	49	148	BT	7-48	6-50	No data 7-8/46
Q, "QUEEN"(1)	42.5	167	Wx	4-52	12-53	
(2)	42	173	Wx	10-45	1-48	(1)
#3	40	150	BT	7-43	6-45	(2)
O, "OBOE"	40	142	BT	7-49	6-50	
G, "GEORGE"	38	158	BT	7-46	6-47	
#4	33	135	BT	7-50	6-52	(2)
N, "NAN" (1)	30	140	BT,Wx	7-46	6-50	
(2)	30	140	Wx	12-53	Indef.	
U, "UNCLE"	28	145	BT	7-50	6-52	
#6	25.7	149	BT	7-45	6-46	(2)
#7	12.8	180	BT	7-45	6-46	(2)
	N	E				
S,"SUGAR" (1)	48	162	BT	7-50	6-52	
(2)	48	162	Wx	7-50	12-53	
NAVY, 1	44	165	Wx	9-45	9-49	(1) No data 6-8/46
X,"XRAY"	39	153	Wx	10-47	7-53	Operated by Japan
V, "VICTOR" (1)	31	164	Wx	11-50	Indef.	
(2)			BT	7-51	6-52	
T, "TARE"	29	135	Wx	6-50	8-53	(1) Also 9-10/48, 6-10/49
NAVY, 2	11	156	Wx	7-46	7-49	(1) Also 9/45-2/46

(1) Limited amount of BT data.
(2) Station number given in Texas A & M Report, See Reference No. 51.
Type of observation: BT, bathythermograph; Wx weather.

Table 7. Tide Stations - West Coast of United States, Alaska, and Pacific Ocean Stations

Tide stations operated by U. S Coast and Geodetic Survey having records for five or more years as of December 1957. Mean monthly sea level data available on request from Division of Tides and Currents, U. S. Coast and Geodetic Survey.

Station	Lat.	Long.	Start	Breaks in data/Footnotes
San Diego	32.7N	117.2W	7-26	
La Jolla	32.9N	117.2W	11-25	Jan. 1954-Sept. 1955
Terminal Island	33.8N	118.2W	4-41	
San Pedro (Breakwater)	33.7N	118.2W	8-49	
Los Angeles, Berth 60	33.7N	118.2W	12-23	
Los Angeles, Berth 174	33.7N	118.2W	3-31	
Santa Monica	34.0N	118.5W	1-33	
Port Hueneme	34.2N	119.2W	7-40	
Avila	35.2N	120.7W	7-45	(1)
San Francisco	37.6N	122.5W	8-97	
Alameda	37.8N	122.3W	4-39	
Crescent City	41.7N	124.2W	5-33	(2)
Astoria	46.2N	123.8W	2-25	Aug '45 - Sept. '46
Neah Bay	48.4N	124.6W	8-34	1951, Feb.-Sept.
Seattle	47.6N	122.3W	1-99	
Friday Harbor	48.6N	123.0W	2-34	1943, Jan. - Aug.
Ketchikan	55.3N	131.6W	10-18	
Juneau	58.3N	134.4W	6-36	1941-3
Skagway	59.4N	135.3W	9-44	
Sitka	57.0N	135.3W	6-38	
Yakutat	59.6N	139.7W	5-40	
Womens Bay	57.7N	152.5W	10-39	
Sweeper Cove	51.8N	176.6W	5-43	(3)
Massacre Bay	52.8N	173.2E	7-43	(4)
Hilo, Hawaii, T.H.	19.7N	155.0W	12-46	
Kahului, Maui, T.H.	20.9N	156.5W	1-51	
Honolulu, Oahu, T.H.	21.3N	157.9W	1-05	
Midway I., T.H.	28.2N	177.3W	3-47	
Johnston, T.H.	16.8N	169.5W	1-50	1952-3 broken record
Canton I., Phoenix I.,	2.8S	171.7W	6-49	
Pago Pago, Samoa I.,	14.3S	170.6W	10-48	(5)
Kwajalein, , Marshall I.,	8.7N	167.7E	7-46	
Eniwetok, Marshall I.,	11.3N	162.4E	5-51	'53 June - Aug.
Wake I,	19.3N	166.6E	6-50	
Truk I., Caroline I.	7.4N	151.8E	10-47	(6)
Guam, Marianas I.	13.4N	144.6E	4-48	1948 Sept. Nov. Dec.

(1) 1952, Apr-July; 1956, April - June; 1957, Sept - Oct.
(2) Oct. '43 - Feb. '45; June '47 - April '50; then broken till Jan. 1953.
(3) Oct. '49 - Mar. '50; 1951, April - June; 1957, Jan. - May.
(4) Oct '45 - May '46; Dec '46 - July '47; 1948, Aug - Sept; 1951, Jan.-June.
(5) 1949, Aug. - Oct; 1956, Feb. - Dec.
(6) Broken till Nov. 1952; 1955, May - Aug.