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JOINT ARCHIVE FOR SEA LEVEL ANNUAL DATA REPORT: OCTOBER 1999

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JIMAR CONTRIBUTION NO. 99-325
DATA REPORT NO. 17

October 11, 1999

*A report of the University of Hawaii pursuant to the National Oceanographic and Atmospheric Administration Award No. NA67RJ0154.

Abstract

The Joint Archive for Sea Level (JASL) is a collaboration between the University of Hawaii Sea Level Center (UHSLC) and the World Data Center-A (WDCA) for Oceanography, which is co-located at the US National Oceanographic Data Center. The JASL is based at the UHSLC and grew out of the need for data management support of the Tropical Ocean Global Atmosphere (TOGA) Sea Level Center, founded by Dr. Klaus Wyrtki in 1985 at the University of Hawaii. The primary objective of the JASL is to prepare a scientifically valid, well-documented archive of hourly, daily, and monthly sea level values in standardized formats that are readily available to the international research communities. The successful growth of the JASL has been made possible through the generous contributions of over 60 agencies representing over 70 countries. On an annual basis, copies of the cumulative data holdings are submitted to the WDCA, the Permanent Service for Mean Sea Level, and the World Ocean Circulation Experiment 'Delayed-Mode' Sea Level Center. This data report was prepared to describe the present archive as of October 1999 and to highlight new and updated series.

Contents

1 HISTORY

Over the past few decades, the scientific community has become increasingly interested in the predictability of climate. Consequently, the World Climate Research Programme (WCRP) was created by the World Meteorological Organization (WMO) and the International Council of Scientific Unions (ICSU) with the objective to determine the extent of climate predictability and of man's influence on climate.

A key activity of the WCRP in the 1980s was the Tropical Ocean Global Atmosphere (TOGA) Project, which was organized with the joint support of the ICSU's Scientific Committee on Oceanic Research (SCOR) and the Intergovernmental Oceanographic Commission (IOC) of UNESCO. A major component of the plan was to monitor the global atmosphere and the upper layers of the three tropical oceans during the ten-year period of 1985-1994. Existing meteorological and oceanographic observation systems were maintained and new networks were installed. These observations along with available historical data have provided a description of the ocean-climate system and its variability from sub-seasonal to interannual scales and have served as the basis for studies of oceanic and atmospheric dynamics and for model input and verification. A secondary goal was to encourage the continuation of an indefinite observational oceanic and atmospheric monitoring system.

An important parameter of the ocean monitoring system is sea level. The TOGA program required daily sea level values with an accuracy of 2 cm. Sea level measurements have been made throughout the world by various national agencies, local ports authorities, and research organizations, but a centralized archive of daily data did not exist.

In order to concentrate the efforts of acquiring, processing, and archiving the sea level data, the TOGA Sea Level Center (TOGA SLC) was established in 1985 at the University of Hawaii (UH) under the direction of Dr. Klaus Wyrtki, who had been responsible for the North Pacific Experiment (NORPAX) network of sea level stations, most of which were installed in the mid-1970s. The UH pursued the duel responsibilities of maintaining a large sea level network and serving as a scientific data center. In the late 1980s, the UH increased the number of sites in the Pacific and expanded into the Indian Ocean; thus, the UH Indo-Pacific Sea Level Network (IPSLN) was formed. Moreover, national and international agencies with sea level gauges in tropical and subtropical locations were solicited for contributions of hourly data, which allowed better quality control than is possible with only daily values. The TOGA SLC was operated as part of the UH Sea Level Center (UHSLC), which also managed the IPSLN. The UHSLC continues to operate the IGOSS Sea Level Program in the Pacific and the 'Fast-Delivery' Sea Level Center, a Data Acquisition Center (DAC) for the World Ocean Circulation Experiment (WOCE). In 1997, the UHSLC gained responsibility of the National Oceanographic and Atmospheric Administration

(NOAA) National Ocean Service's (NOS) overseas network, which includes sites in all oceans. Thus, the IPSLN was renamed the UH Global Sea Level Network (UHGSLN). The UHSLC is supported by NOAA and is presently directed by Dr. Mark Merrifield, who took the helm from Dr. Gary Mitchum in February 1996. Dr. Mitchum directed the center after Dr. Wyrtki's retirement in 1992.

As the quantity of data collected by the TOGA SLC increased, assistance with data management was provided by the United States (US) National Oceanographic Data Center (NODC) and the co-located World Data Center-A (WDCA) for Oceanography with the establishment in 1987 of the Joint Archive for Sea Level (JASL) at the UH. The JASL supplements the UHSLC with acquisition, quality review, data documentation, and archival of sea level values from contributing agencies. The proximity of JASL staff to the sea level experts at UH ensures a research data set of the highest quality, while the NODC lends its skills in data management to aid in timely turnaround of concise, standardized, well-documented data sets to the scientific community. The JASL is the primary avenue of acquistion of finalized data sets and annually requests data contributions from agencies around the globe. The JASL promotes the creation of high quality data sets by offering a sea level processing package [2] upon request and participating in technical workshops sponsored by the IOC's Global Sea Level Observing System (GLOSS) [1, 6, 7].

The first seven years of the TOGA SLC were dedicated to collection of data from the Pacific and Indian Oceans. Starting in 1990, efforts were expanded to acquiring data for the tropical Atlantic Ocean. With the conclusion of the TOGA Program in 1995, the TOGA SLC was absorbed within the JASL's duties of maintaining a research quality data archive. Many of the observing stations implemented by the TOGA Program continue to function and most of the collaborative agencies continue to provide sea level data on a regular basis. Over the past few years, the JASL has requested finalized, quality-controlled hourly data from agencies which maintain gauges at oceanographically important high latitude sites, such as those of the WOCE or GLOSS networks. Many of these sites serve as ground truth stations for the joint US/France TOPEX/POSEIDON altimetry program [5].

In recent years, the NODC has focused significant attention on the coastal zone [3]. Part of the strategy of the NODC Director, Dr. Hank Frey, was the formation in 1997 of the Coastal Ocean Laboratory (COL), under leadership of Dr. Wayne Wilmot. An initial emphasis of the COL is to acquire coastal data within the United States that were collected and are maintained by federal agencies. Thus, efforts have increased at the JASL to obtain a copy of data holdings for most coastal tide gauges maintained by the NOS.

This data report describes the present data holdings at the JASL and highlights new and updated series. Methods of acquisition, quality control, and assessment have been documented [1, 4] and will not be elaborated upon in this text.

2 DATA HOLDINGS AS OF OCTOBER 1999

The JASL prepares scientifically valid data sets of hourly, daily, and monthly values which are submitted annually to international data banks and are made readily available in a more timely fashion through the Internet. As of October 1999, 419 stations with 7021 station-years of quality-assured data have been submitted to the WDCA, US NODC, the Permanent Service for Mean Sea Level (PSMSL), and the WOCE 'Delayed-Mode' Data Assembly Center at the British Oceanographic Data Center (BODC). In support of the GLOSS, the JASL now includes 174 of the 287 GLOSS sites, with 124 of the 171 sites within the TOGA domain, which is defined as the zone between 30°north and south latitude. Within the past year, 41 new series with 911 site-years have been added to the JASL, while 209 site-years were added to 115 of the existing series (Figure 1 and Appendix A.1). Since 1997, the number of site-years in the archive has increased by about 32% (Figure 2) and the number of series has increased by roughly 20%. This abundance of data is possible through the collaboration of over 60 agencies representing over 70 countries (Appendix B).

The meridional distribution of the data holdings is shown in Figure 3 which depicts the highest concentration of sites in the northern hemisphere. Historically the holdings at the JASL focused on the tropics and subtropics as a reflection of the TOGA program. Since 1995, holdings at higher latitude stations have steadily increased as WOCE stations were received, GLOSS sites were sought, and NOAA/NOS US coastal series were acquired. For WOCE stations that are part of the 'Fast-Delivery' system, the JASL presently includes 32 of the 39 stations that are poleward of the TOGA domain. Those not included are withheld from the JASL archive due to non-finalized status of a data series or because official permission has not been received from the data originator. For GLOSS sites, the JASL now includes 50 of the 116 stations outside the TOGA domain. For NOAA/NOS stations, a large number of new stations from outside the TOGA zone have been added to the JASL this year from Alaska and the East and Gulf Coasts of the USA. Refer to the blue triangles in Figure 1.

The spatial distribution by site of the series lengths is depicted in Figure 4. This shows the excellent space and time coverage of the tropical Pacific, the Japanese and Chinese coasts, and selected sites in South, Central, and North America. The concentration of sites with roughly 25-year time spans in the tropical Pacific mostly reflects the NORPAX sites that were adopted by the UHGSLN. This figure also shows the shorter time spans of the records in the Indian Ocean and the tropical Atlantic.

The series are of variable length (Figure 4) with the greatest concentration between 5 to 15 years (Figure 5). However, the number of series with records longer than 30 years has expanded to 72, while 15 sites have series greater than 60 years. The temporal coverage of the sea level records is depicted well in Figure 6. Data rescue efforts at the JASL have increased the holdings significantly. A majority of these older records originated from the US Coastal Geodetic Survey (USCGS). After World War II, the USCGS initiated the collection of sea level at many sites around the globe, but primarily on US territories in the Pacific and along the Pacific coast of the Americas. These data are maintained at the National Ocean Service, mostly in paper form. Dr. Doug Luther, presently of the UH, obtained copies of the paper records and directed the digitization and processing of the series, which in turn, were submitted to the JASL for additional quality control and public dissemination. Other historic series were obtained directly from NOAA/NOS either as digitized hourly values or in paper form which were digitized at the UHSLC. Historic series were also contributed by various agencies such as the Panama Canal Commission and the Ministerio de Medio Ambiente of Colombia. The data holdings increased sharply in 1984 through the efforts of the UHGSLN and the outreach of the TOGA program. Figure 6 also shows the typical time lag from collection to public dissemination, which is on the order of a few years.

For the October 1999 submission, 146 series with the year 1998 are included (Appendix A.2) thanks to the very rapid turnaround provided by over 15 agencies. This short turnaround from collection to distribution is also a result of the efforts of the WOCE 'Fast-Delivery' Center, which is one of the primary components of the UHSLC and encourages agencies to contribute routinely in near-real time. In all, 115 series had data appended totaling 209 new years (Appendix A.5) while three series were extended backwards adding 40 years to the JASL (Appendix A.3).

New series were added to the JASL (Appendix A.4) for 41 sites totaling 911 years. The majority are from the NOAA/NOS US national water level measuring network. The sites are primarily from the East and Gulf Coasts, yet several new stations were acquired from Alaska. Several new sites from equatorial Brazil have been received from the LPAO/INPE Oceanografia. Two of the sites, Suape and Luis Corriea, are from conventional float and well instruments and were installed and maintained by the Instituto Nacional de Pesquisas Hidroviarias, National Port Authority (PORTOBRAS). The third site, Fortaleza, utilizes a bottom pressure sensor without atmospheric pressure corrections; thus, it is not sea level as defined for most other sites, but serves as a useful proxy. Several new data sets were also received from the Directorate of Hydrography, Maritime Headquarters, South Africa, for both the Atlantic and Indian Ocean sides. A few short series were received from the Transport Engineering Design Incorporation of Hanoi, Vietnam. Finally a new site was made available by the Servicio Hydrografico y Oceanografico de la Armada for Puerto Williams in the extreme south of Chile.

A few series within the existing archive were modified after continued quality control produced better estimates of the calibration to a reference level or as redundant data became available to fill data gaps (see notes in the far right column of Appendix A.5). From the UHGSLN, eight series were modified, and from Puertos del Estado, Spain, one series was replaced.

Several unique sites have multiple independent series due to reference levels that have not been linked from one time span to the next. In several cases, a series was broken into multiple segments at the point of a reference level shift. For the given site, if new time span(s) that were not linked to the reference level of the existing series were added, then a separate series was established. The filename of each site with multiple series is appended by letters and the filenames are ordered chronologically (i.e. the earliest data is version A, e.g. Callao-A and Callao-B). Thus, series names are changed if the series is extended backwards and the new span is not linked to the same reference level. However, during the past year, this situation did not occur.

3 DATA REQUESTS

Hourly, daily, and monthly data constitute the permanent archive of sea level. The archive is presently composed of 419 sites for 7021 site-years. The success of the sea level archive is possible through the generous contributions of many data collecting agencies around the globe. The data and quality assessments are stored digitally on the hard disk of a SUN workstation computer at the UH and on various archival media. On an annual basis, the data sets and documentation files are submitted to the World Data Center-A for Oceanography, which assures widespread advertisement of the data availability and allows easy access for the scientific and public communities.

Data are available from a variety of sources: an anonymous FTP account, a World Wide Web site, on CDROM, or directly from the WDCA or JASL on the transfer media of choice. From October 1998 through September 1999, 1,993 requests have been serviced consisting of 309,363 site-years for 17,208 series through anonymous and hands-on transfers at the JASL.

3.1 Anonymous FTP

The Joint Archive for Sea Level has available the research quality sea level data set of hourly, daily, monthly values on its "anonymous" FTP account. Since October 1998, over 1,000 transfers of data, metadata, and/or inventories, were passed through the anonymous FTP public access site.

For those on Internet, the account may be accessed by typing:

ftp ilikai.soest.hawaii.edu
or
ftp 128.171.154.59
user: anonymous
password: please enter your Internet address

Once you have successfully logged on, please see the README file for information and instructions. The ASCII data files in the JASL final archive format are within a subdirectory named "rqds" and are organized by ocean. This FTP account contains the most recent holdings of the JASL data set for series that have been quality controlled, assessed, and documented.

Since March of 1998, hourly data have been made available through FTP to complement the daily and monthly values which have been maintained online since 1994. The hourly data files are grouped by year, then compressed using Info-Zip into a single file per time series. The Info-Zip web site is at http://www.cdrom.com/pub/infozip and the software can be directly downloaded from ftp://ftp.cdrom.com/pub/infozip/. This freeware zip utility is compatible to most platforms and operating systems.

The hourly, daily, monthly, and document files are updated a few times a year as new sets are added to the final archive.

3.2 World Wide Web

In December 1994, the World Wide Web site for the UHSLC came online. It provided pointers to the data holdings of the UHSLC anonymous FTP area using simple lists of sites. In February 1996, the web site was upgraded with a modified geographical information system that allows one to select data and metadata for sites from global and regional maps. In March of 1998, the hourly data were made available as well. Since October 1998, nearly 1,000 downloads of data, metadata, and/or inventories, have been made.

The URL for this site is:

http://www.soest.hawaii.edu/UHSLC

3.3 Sea Level CDROM

In October 1994, the US NODC prepared a CDROM containing hourly, daily, and monthly sea level holdings of the TOGA archive as of July 1994. The ASCII files are stored in the JASL final archive format and are organized by ocean and data type. Also on the CDROM are the PSMSL's public access files of monthly sea level heights. In February of 1998, a CDROM for the WOCE program, called the WOCE Global Data Set, Version 1.0, was made consisting of datasets from the JASL (status August 1997), the UHSLC 'Fast-Delivery' WOCE DAC, the BODC 'Delayed-Mode' WOCE DAC, and the PSMSL. WOCE expects to produce Version 2.0 in Spring 2000.

CDROMs can also be made upon request at the JASL for the most up-to-date version of the archive. For production versions, see below.

3.4 Direct Requests

The sea level holdings are available on a variety of storage media or through FTP transfer on Internet directly from the WDCA or UHSLC. Since October, 1998, the WDCA has filled several requests consisting of the entire database on CDROM and the JASL has answered 6 direct requests. For copies of the CDROMs or subsamples of the database, contact

The World Data Center-A for Oceanography
c/o NOAA/NESDIS/NODC
User Services E/OC1
SSMC3, 4th Floor
1315 East-West Highway
Silver Spring, MD 20910-3282 USA
phone: 301-713-3277 or -3278
fax: 301-713-3302
email: services@nodc.noaa.gov
WWW: http://www.nodc.noaa.gov

Some stations may have unresolved problems. These data are retained at the UH Sea Level Center and may be obtained on a case-by-case basis. Questions concerning the data and preparation should be directed to:

Joint Archive for Sea Level
Dept. of Oceanography
University of Hawaii at Manoa
1000 Pope Rd. MSB 316
Honolulu, Hawaii 96822 USA
phone: 808-956-4105
fax: 808-956-2352
email: caldwell@soest.hawaii.edu
WWW: http://uhslc.soest.hawaii.edu

References

[1] Caldwell, P., and B. Kilonsky, 1992. *Data processing and quality control at the TOGA Sea Level Center.* Joint IAPSO-IOC Workshop on Sea Level Measurements and Quality Control, Paris, 12-13 October, 1992. IOC Workshop Report No. 81, UNESCO. pp. 122-135.

[2] Caldwell, P. 1998. *Sea Level Data Processing on IBM-PC Compatible Computers, Version 3.0 (Year 2000 Compliant).* JIMAR Contribution No. 319, SOEST, University of Hawaii, 72 pp.

[3] Cohen, R., 1997. *NODC focuses on the coastal ocean.* Earth System Monitor, Vol. 8, No. 2, December 1997. pp 10-11.

[4] Kilonsky, B. J. and P. Caldwell, 1991. *In pursuit of high- quality sea level data.* IEEE Oceans Proceedings. Vol. 2, October 1-3, 1991.

[5] Mitchum, G. T., 1994. *Comparison of TOPEX sea surface heights and tide gauge sea levels.* Journal of Geophysical Research, Vol. 99, No. C12, pp. 24541-24553.

[6] UNESCO, 1993. *IOC Training Course for the Global Sea Level Observing System (GLOSS) directed to the African and South American Portuguese- and Spanish-speaking Countries.* Sao Paulo, Brazil, 1-19 February, 1993. IOC Training Course Reports No. 20.

[7] UNESCO, 1995. *IOC/GLOSS-GOOS Training Workshop on Sea-Level Data Analysis.* Geodetic and Research Branch, Survey of India. Dehra Dun, India. 21 November - 1 December, 1995. IOC Training Course Reports No. 39, 17 p.

[1]

[1] We are deeply appreciative to the technicians, tide station operators, digitizers, data processors, coordinators, principle investigators, and directors of the many agencies who have made possible the collection and processing of the raw data and the contribution of the finalized data to the Joint Archive for Sea Level. This paper is funded by Cooperative Agreement #NA67RJ0154 from National Oceanographic and Atmospheric Administration (NOAA). The views expressed herein are those of the authors and do not necessarily reflect the view of NOAA or any of its sub-agencies.

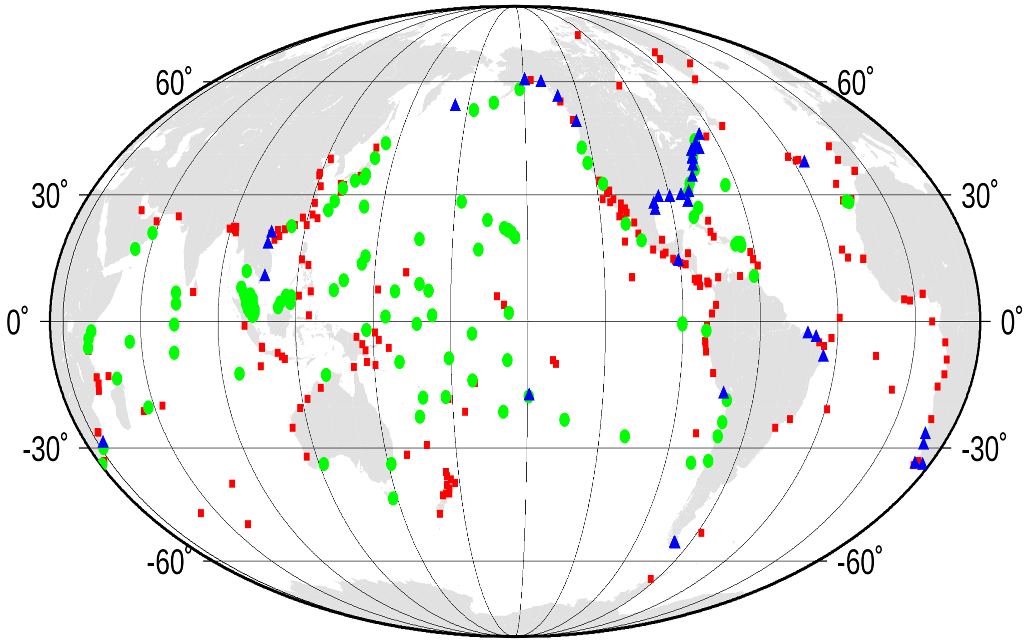

Figure 1: As of October 1999, the Joint Archive for Sea Level has submitted 419 series to the World Data Center for Oceanography-A (WDCA). The status relative to the 1998 submission to the WDCA is depicted as follows: new (blue triangles), updated (green circles), and unchanged (red squares) series.

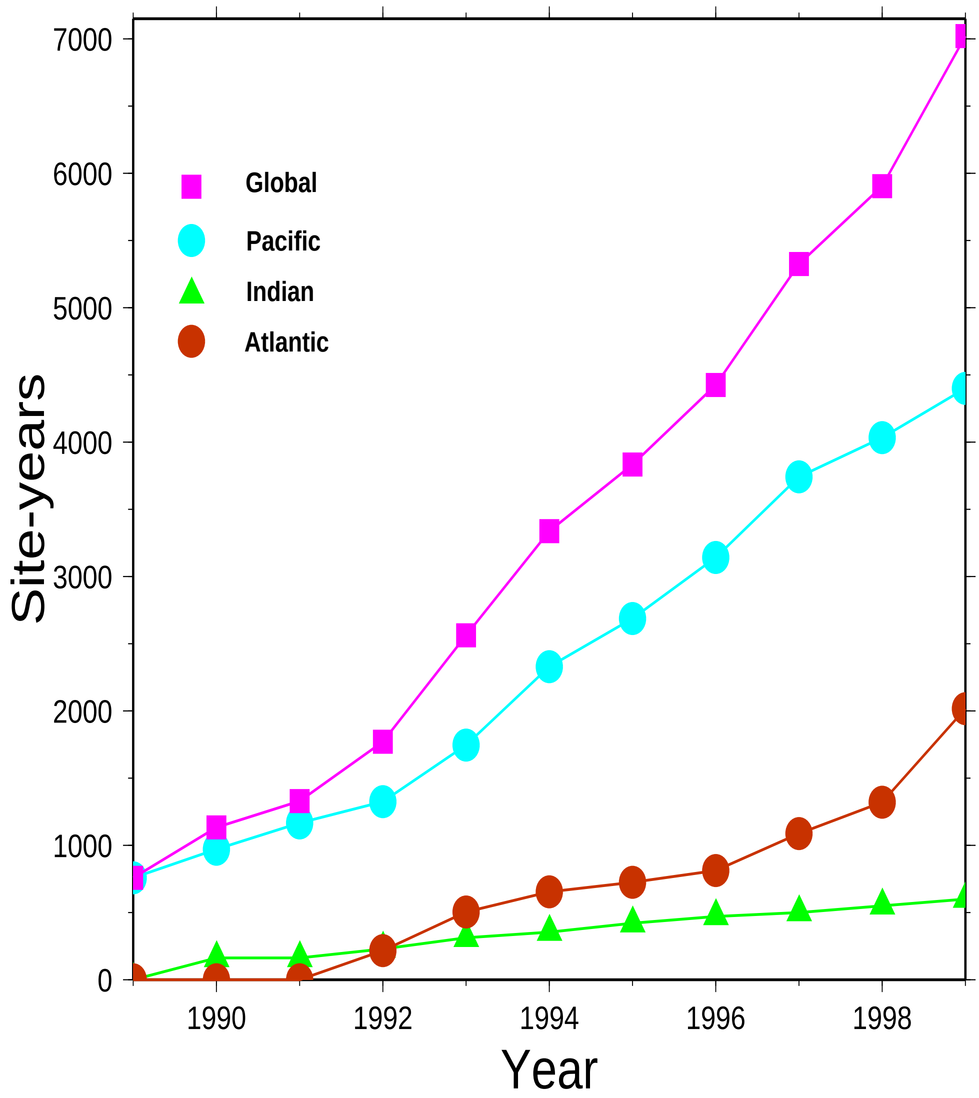

Figure 2: Cumulative site-years by ocean for annual submissions from the Joint Archive for Sea Level to the World Data Center for Oceanography-A. The data holdings have increased by 32% relative to 1997. The archive now consists of 7021 site-years for 419 sites.

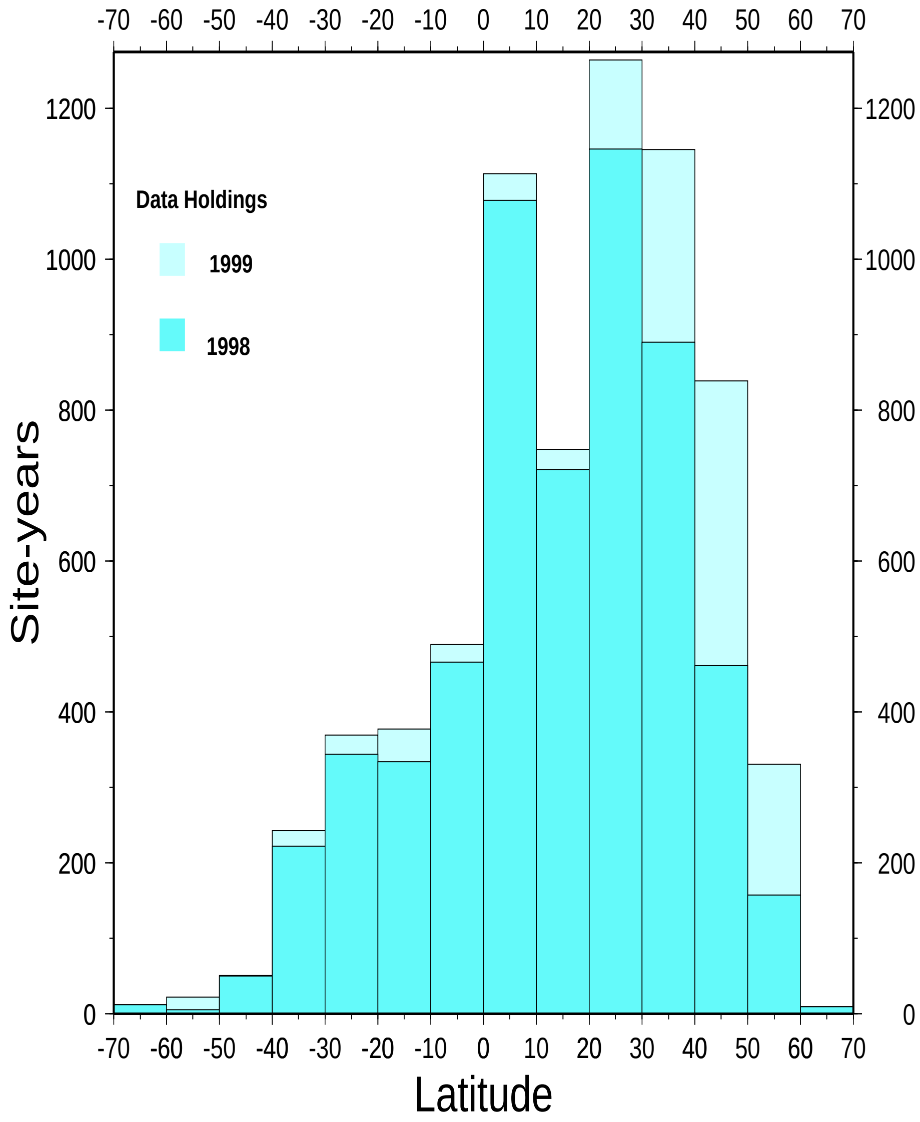

Figure 3: Meridional distribution of site-years for the total sea level archive. The darker shading represents the cumulative archive as of August 1998; the lighter, October 1999.

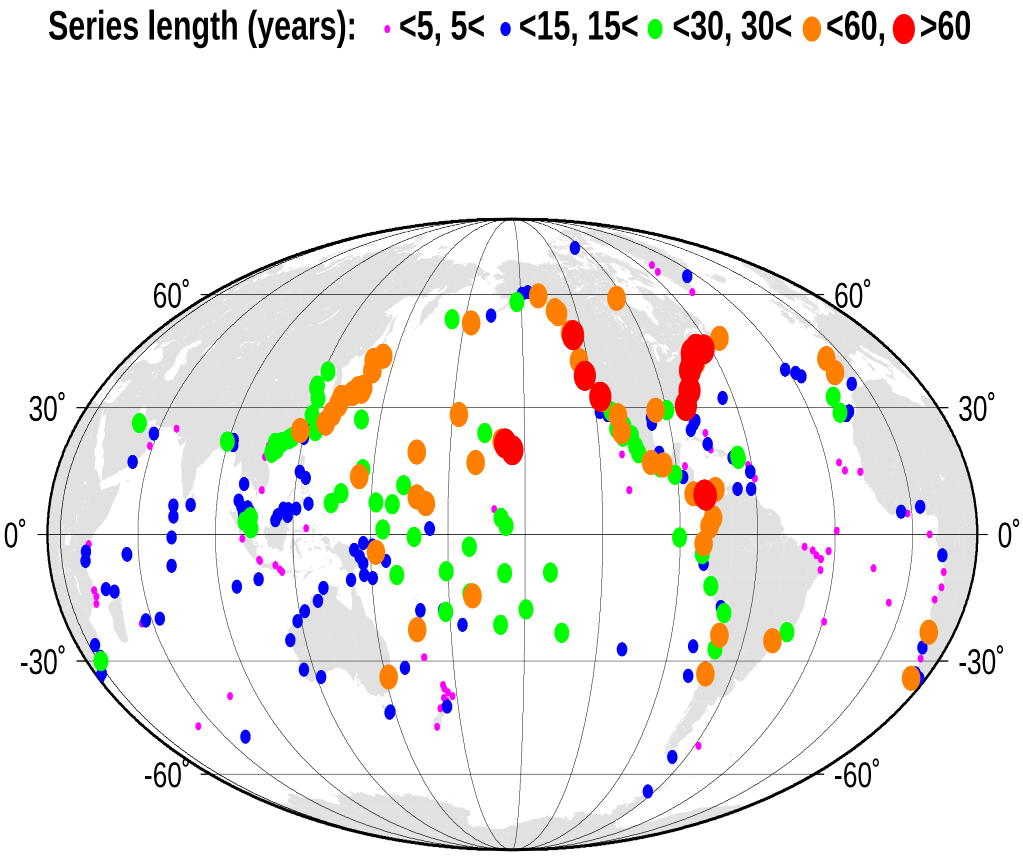

Figure 4: Lengths of the time series as of October 1999. The size of the circle represents the length of the series. The majority of the record lengths are between 5 and 15 years.

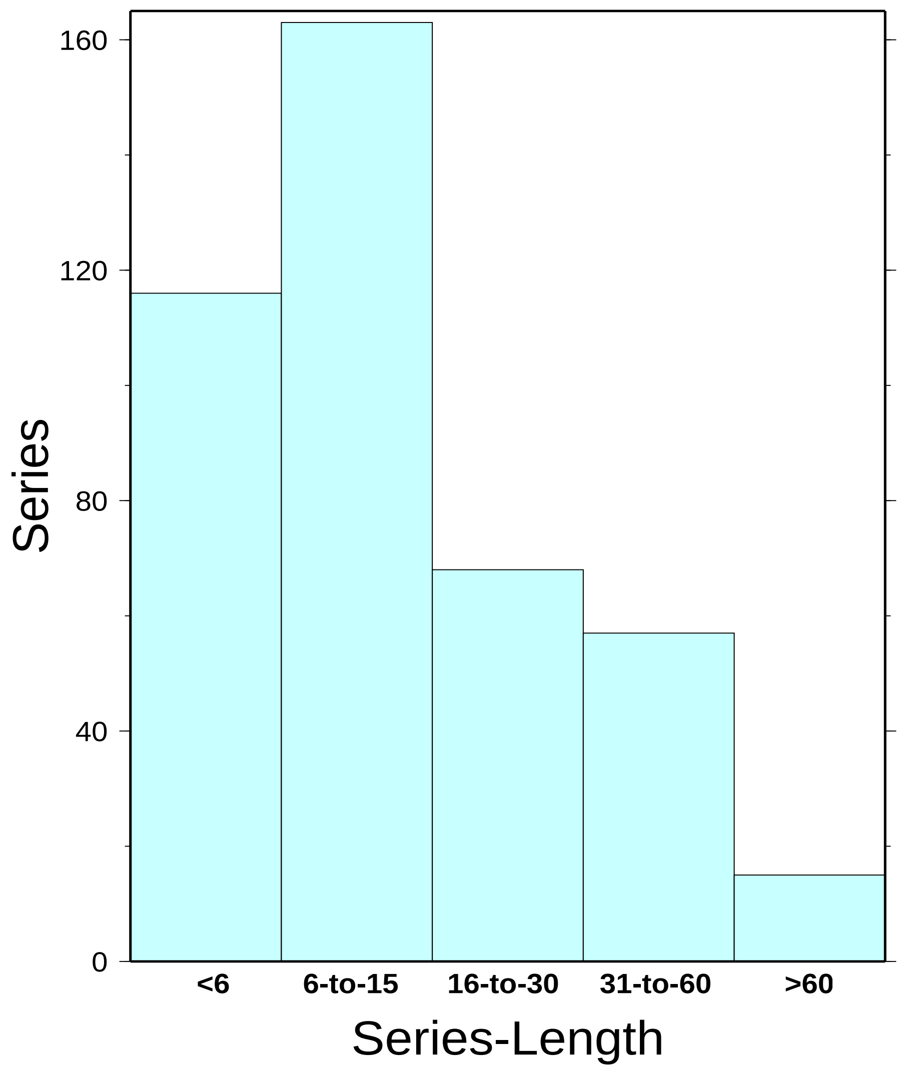

Figure 5: Lengths (years) of the time series. A majority of the record lengths are less than 30 years long; however, 72 series have record length greater than 30 years, while 15 series have length greater than 60 years.

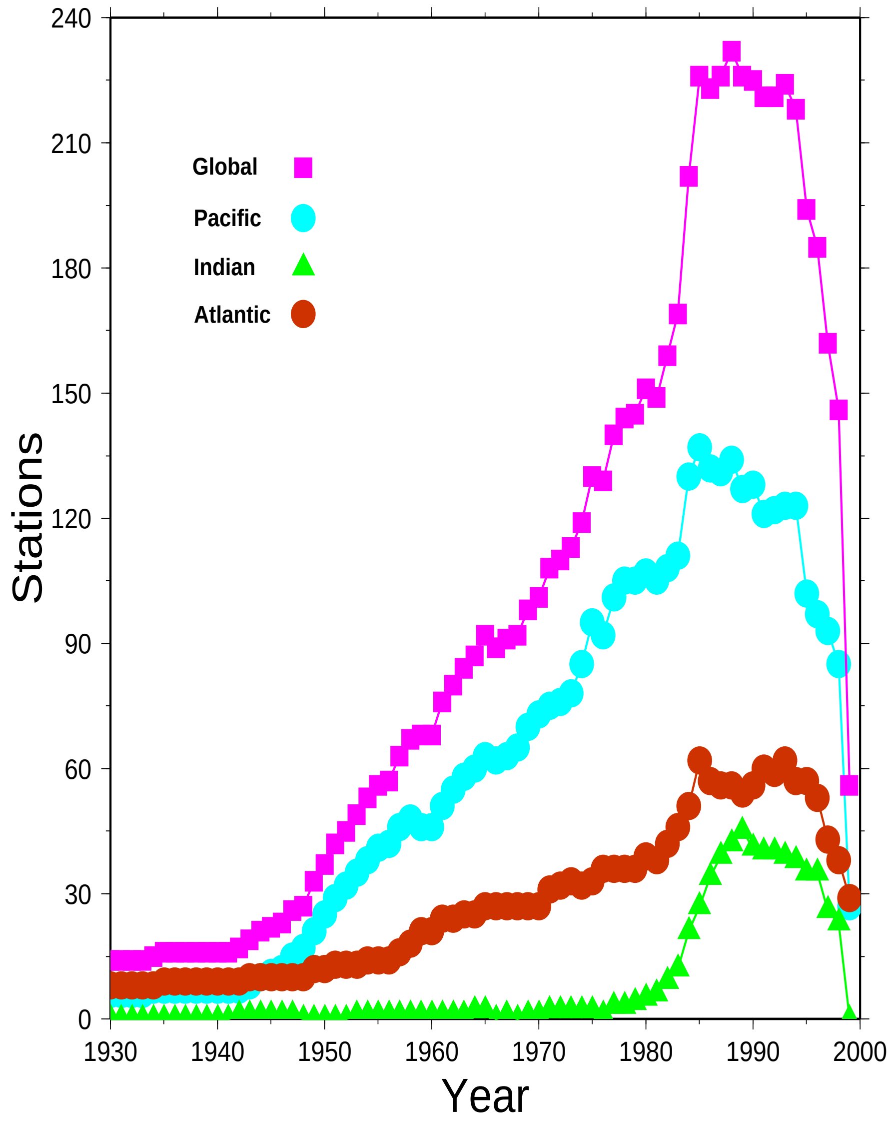

Figure 6: For each year, the number of series with data for that year are depicted by ocean. The data availability increases rapidly in 1984 through efforts of the TOGA program. Data rescue efforts at the JASL have also successfully increased the holdings.

A STATION LISTS

A.1 1999 Submission to the World Data Center

The Joint Archive for Sea Level (JASL) is a collaboration between the University of Hawaii Sea Level Center and the World Data Center-A for Oceanography, co-located at the United States National Oceanographic Data Center. This appendix summarizes the holdings of the JASL as of October 1999. The JASL archive is made possible through the generous contributions from over 60 agencies representing over 70 countries. The data have been quality-controlled, documented, and placed in standardized formats for the hourly, daily, and monthly values.

GLOBAL DATA SET FROM THE TROPICS

	1999	1998	# increase
*TOTAL Number Stations :	419	378	41
*TOTAL Number Site-Years:	7021	5904	1117

I. PACIFIC

	1999	1998	# increase
*TOTAL Number Stations :	227	214	13
*TOTAL Number Site-Years:	4402	4032	371

II. INDIAN OCEAN

	1999	1998	# increase
TOTAL Number Stations :	71	69	2
TOTAL Number Site-Years:	602	551	51

III. ATLANTIC OCEAN

	1999	1998	# increase
TOTAL Number Stations :	121	95	26
TOTAL Number Site-Years:	2017	1321	696

A list of series by ocean follows. Column title CI denotes Completeness Index, or percentage of series without gaps. QC-YEARS refers to quality-controlled years.

Pacific Ocean

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JASL	TOGA	GLOS	STATION	COUNTRY	LAT	LONG	QC-YEARS	CI
001A	Pxxx	115	Pohnpei-A	Fd St Micronesia	06-59N	158-14E	1969-1971	100
001B	Pxxx	115	Pohnpei-B	Fd St Micronesia	06-59N	158-15E	1974-1998	97
002A	Pxxx	113	Tarawa-A,Betio	Rep. of Kiribati	01-22N	172-56E	1974-1983	78
002B	Pxxx	113	Tarawa-B,Bairiki	Rep. of Kiribati	01-20N	173-01E	1983-1988	98
002C	Pxxx	113	Tarawa-C,Betio	Rep. of Kiribati	01-22N	172-56E	1988-1998	100
003A	Pxxx	169	Baltra-A	Ecuador	00-26S	090-17W	1968-1977	93
003B	Pxxx	169	Baltra-B	Ecuador	00-26S	090-17W	1985-1998	97
004A	Pxxx	114	Nauru	Rep. of Nauru	00-32S	166-54E	1974-1998	94
005A	Pxxx	112	Majuro	Rep. Marshall I.	07-06N	171-22E	1968-1998	92
006A	Pxxx	xxx	Enewetok-A	Rep. Marshall I.	11-26N	162-23E	1951-1971	98
006B	Pxxx	xxx	Enewetok-B	Rep. Marshall I.	11-26N	162-23E	1974-1979	94
007A	Pxxx	120	Malakal	Rep. of Belau	07-20N	134-28E	1969-1998	95
008A	Pxxx	119	Yap-A	Fd St Micronesia	09-31N	138-08E	1951-1952	100
008B	Pxxx	119	Yap-B	Fd St Micronesia	09-31N	138-08E	1969-1998	91
009A	Pxxx	066	Honiara	Solomon Islands	09-26S	159-57E	1974-1998	97
010A	Pxxx	065	Rabaul	Papua New Guinea	04-12S	152-11E	1966-1997	85
011A	Pxxx	146	Christmas-A	Rep. of Kiribati	01-59N	157-29W	1955-1972	89
011B	Pxxx	146	Christmas-B	Rep. of Kiribati	01-59N	157-28W	1974-1998	95
012A	Pxxx	xxx	Fanning-A	Rep. of Kiribati	03-54N	159-23W	1957-1958	88
012B	Pxxx	xxx	Fanning-B	Rep. of Kiribati	03-54N	159-23W	1972-1987	95
012C	Pxxx	xxx	Fanning-C	Rep. of Kiribati	03-51N	159-22W	1988-1990	78
013A	Pxxx	145	Kanton-A	Rep. of Kiribati	02-49S	171-43W	1949-1967	100
013B	Pxxx	145	Kanton-B	Rep. of Kiribati	02-49S	171-43W	1972-1998	93
014A	Pxxx	107	French Frigate S	USA	23-52N	166-17W	1974-1998	97
015A	Pxxx	140	Papeete-A	French Polynesia	17-32S	149-34W	1969-1975	91
015B	Pxxx	140	Papeete-B	French Polynesia	17-32S	149-34W	1975-1999	99
016A	Pxxx	138	Rikitea	French Polynesia	23-08S	134-57W	1969-1998	92
017A	Pxxx	xxx	Hiva Oa	French Polynesia	09-49S	139-02W	1977-1980	75
018A	Pxxx	122	Suva	Fiji	18-08S	178-26E	1972-1997	91
019A	Pxxx	123	Noumea	France	22-18S	166-26E	1967-1998	99
021A	Pxxx	176	Juan Fernandez-A	Chile	33-37S	078-50W	1977-1984	67
021B	Pxxx	176	Juan Fernandez-B	Chile	33-37S	078-50W	1985-1988	72
021C	Pxxx	176	Juan Fernandez-C	Chile	33-37S	078-50W	1990-1998	96
022A	Pxxx	137	Easter-A	Chile	27-09S	109-27W	1957-1958	97
022B	Pxxx	137	Easter-B	Chile	27-09S	109-27W	1962-1963	100
022D	Pxxx	137	Easter-D	Chile	27-09S	109-27W	1977-1984	97
022E	Pxxx	137	Easter-E	Chile	27-09S	109-27W	1985-1998	96

023A	Pxxx	139	Rarotonga	Cook Islands	21-12S	159-47W	1977-1998	98
024A	Pxxx	143	Penrhyn	Cook Islands	08-59S	158-03W	1977-1998	95
025A	Pxxx	121	Funafuti	Tuvalu	08-32S	179-12E	1977-1998	97
026A	Pxxx	xxx	Honolulu,Kewalo	USA	21-18N	157-52W	1978-1986	96
027A	Pxxx	xxx	Honolulu,Pier 45	USA	21-19N	157-53W	1985-1988	100
028A	Pxxx	118	Saipan	N. Mariana Is.	15-14N	145-45E	1978-1998	92
029A	Pxxx	117	Kapingamarangi	Fd St Micronesia	01-06N	154-47E	1978-1998	93
030A	Pxxx	xxx	Santa Cruz	Ecuador	00-45S	090-19W	1978-1998	94
031A	Pxxx	142	Nuku Hiva	French Polynesia	08-56S	140-05W	1982-1997	70
033A	Pxxx	069	Bitung	Indonesia	01-26N	125-12E	1986-1990	94
034A	Pxxx	161	Cabo San Lucas	Mexico	22-53N	109-55W	1973-1998	82
035A	Pxxx	177	San Felix	Chile	26-17S	080-08W	1987-1997	69
036A	Pxxx	160	Guadalupe	Mexico	28-53N	118-18W	1977-1985	75
038A	Pxxx	xxx	Nuku'alofa	Tonga	21-08S	175-10W	1990-1996	98
039A	Pxxx	xxx	Kodiak,Alaska	USA	57-44N	152-31W	1975-1999	78
040A	Pxxx	302	Adak,Alaska	USA	51-52N	176-38W	1950-1999	91
041A	Pxxx	102	Dutch Harbor-A,AK	USA	53-53N	166-32W	1950-1955	100
041B	Pxxx	102	Dutch Harbor-B,AK	USA	53-53N	166-32W	1992-1999	100
043A	Pxxx	xxx	Palmyra	proprietary	05-53N	162-05W	1947-1949	95
046A	Pxxx	xxx	Port Vila-A	Vanuatu	17-44S	168-19E	1977-1982	87
046B	Pxxx	xxx	Port Vila-B	Vanuatu	17-46S	168-18E	1993-1998	86
047A	Pxxx	103	Chichijima	Japan	27-06N	142-11E	1975-1999	99
048A	Pxxx	xxx	Anewa Bay	Papua New Guinea	06-11S	155-53E	1968-1977	85
050A	Pxxx	106	Midway	USA Trust	28-13N	177-22W	1947-1999	93
051A	Pxxx	105	Wake	USA Trust	19-17N	166-37E	1950-1999	92
052A	Pxxx	109	Johnston	USA Trust	16-44N	169-32W	1947-1999	97
053A	Pxxx	149	Guam	USA Trust	13-26N	144-39E	1948-1999	93
054A	Pxxx	116	Truk	Fd St Micronesia	07-27N	151-51E	1963-1991	89
055A	Pxxx	111	Kwajalein	Rep. Marshall I.	08-44N	167-44E	1946-1999	98
056A	Pxxx	144	Pago Pago	USA Trust	14-17S	170-41W	1948-1992	96
057A	Pxxx	108	Honolulu	USA	21-18N	157-52W	1905-1999	98
058A	Pxxx	xxx	Nawiliwili	USA	21-58N	159-21W	1954-1999	99
059A	Pxxx	xxx	Kahului	USA	20-54N	156-28W	1950-1999	92
060A	Pxxx	287	Hilo	USA	19-44N	155-04W	1927-1999	79
061A	Pxxx	xxx	Mokuoloe	USA	21-26N	157-48W	1957-1999	75
062A	Pxxx	124	Norfolk Island-A	Australia	29-04S	167-57E	1985-1986	98
062B	Pxxx	124	Norfolk Island-B	Australia	29-04S	167-56E	1994-1994	92
063A	Pxxx	xxx	Wewak	Papua New Guinea	03-34S	143-38E	1984-1993	89
064A	Pxxx	xxx	Port Moresby	Papua New Guinea	09-29S	147-08E	1984-1993	98
065A	Pxxx	xxx	Manus	Papua New Guinea	02-01S	147-16E	1984-1994	73
066A	Pxxx	xxx	Madang	Papua New Guinea	05-12S	145-48E	1984-1994	93
067A	Pxxx	xxx	Lae	Papua New Guinea	06-44S	146-59E	1984-1994	86
068A	Pxxx	xxx	Kavieng	Papua New Guinea	02-35S	150-48E	1984-1994	95
069A	Pxxx	063	Alotau	Papua New Guinea	10-10S	150-27E	1984-1994	62
070A	Pxxx	127	Auckland	New Zealand	36-51S	174-46E	1984-1988	100

071A	Pxxx	101	Wellington	New Zealand	41-17S	174-47E	1984-1990	91
072A	Pxxx	129	Bluff	New Zealand	46-36S	168-21E	1984-1988	88
073A	Pxxx	xxx	Tauranga	New Zealand	37-39S	176-11E	1984-1985	99
074A	Pxxx	xxx	Westport	New Zealand	41-44S	171-36E	1984-1985	100
075A	Pxxx	xxx	Wanganui	New Zealand	39-57S	174-59E	1984-1985	97
076A	Pxxx	xxx	Taranaki	New Zealand	39-03S	174-02E	1984-1985	79
077A	Pxxx	xxx	Port Nelson	New Zealand	41-16S	173-16E	1984-1985	97
078A	Pxxx	xxx	Gisborne	New Zealand	38-41S	178-02E	1984-1985	98
080A	Pxxx	174	Antofagasta	Chile	23-39S	070-24W	1945-1998	96
081A	Pxxx	175	Valparaiso-A	Chile	33-02S	071-38W	1944-1978	90
081B	Pxxx	175	Valparaiso-B	Chile	33-02S	071-38W	1982-1998	99
082A	Pxxx	182	Acajutla	El Salvador	13-35N	089-50W	1971-1980	100
083A	Pxxx	xxx	Arica	Chile	18-28S	070-20W	1982-1998	98
084A	Pxxx	xxx	Lobos de Afuera	Peru	06-56S	080-43W	1982-1994	95
085A	Pxxx	170	Buenaventura	Colombia	03-54N	077-06W	1953-1998	92
086A	Pxxx	xxx	La Union-A	El Salvador	13-20N	087-49W	1961-1965	98
086B	Pxxx	xxx	La Union-B	El Salvador	13-20N	087-49W	1971-1980	98
087A	Pxxx	167	Quepos	Costa Rica	09-24N	084-10W	1961-1994	83
088A	Pxxx	xxx	Caldera	Chile	27-04S	070-50W	1980-1998	97
089A	Pxxx	xxx	Manta	Ecuador	00-57S	080-44W	1979-1981	100
090A	Pxxx	162	Socorro	Mexico	18-44N	111-01W	1957-1959	81
091A	Pxxx	172	La Libertad	Ecuador	02-12S	080-55W	1949-1998	97
092A	Pxxx	xxx	Talara	Peru	04-35S	081-17W	1950-1965	92
093A	Pxxx	173	Callao-A	Peru	12-03S	077-09W	1950-1965	98
093B	Pxxx	173	Callao-B	Peru	12-03S	077-09W	1970-1994	100
094A	Pxxx	xxx	Talara	Peru	17-00S	072-07W	1954-1964	98
300A	Pxxx	xxx	Naos	Panama	08-55N	079-32W	1991-1997	83
301A	Pxxx	xxx	Puerto Quetzal-A	Guatemala	13-55N	090-47W	1983-1984	90
301B	Pxxx	xxx	Puerto Quetzal-B	Guatemala	13-55N	090-47W	1992-1995	77
302A	Pxxx	168	Balboa	Panama	08-58N	079-34W	1907-1997	98
303A	Pxxx	171	Tumaco	Colombia	01-50N	078-44W	1951-1998	86
304A	Pxxx	xxx	Pto. Armuelles-A	Panama	08-16N	082-52W	1955-1968	95
304B	Pxxx	xxx	Pto. Armuelles-B	Panama	08-16N	082-52W	1983-1995	99
305A	Pxxx	xxx	Cedros Island	Mexico	28-06N	115-11W	1976-1989	75
307A	Pxxx	xxx	San Felipe	Mexico	31-01N	114-49W	1982-1986	52
308A	Pxxx	xxx	San Quintin	Mexico	30-29N	115-59W	1977-1990	97
310A	Pxxx	xxx	Bahia Los Angeles	Mexico	28-58N	113-33W	1973-1994	74
313A	Pxxx	xxx	Catalina-A	USA	33-27N	118-29W	1978-1979	96
313B	Pxxx	xxx	Catalina-B	USA	33-27N	118-29W	1980-1988	86
316A	Pxxx	267	Acapulco-A	Mexico	16-50N	099-55W	1952-1962	99
316B	Pxxx	267	Acapulco-B	Mexico	16-50N	099-55W	1962-1995	88
317A	Pxxx	xxx	Ensenada	Mexico	31-51N	116-38W	1956-1991	84
318A	Pxxx	xxx	Puerto Madero	Mexico	14-43N	092-26W	1986-1988	99
319A	Pxxx	xxx	Loreto	Mexico	26-01N	111-22W	1975-1988	73
320A	Pxxx	293	Cendering	Malaysia	05-16N	103-11E	1984-1998	98

321A	Pxxx	xxx	Johor Baharu	Malaysia	01-28N	103-48E	1983-1998	95
322A	Pxxx	xxx	Kuantan	Malaysia	03-59N	103-26E	1983-1998	99
323A	Pxxx	xxx	Tioman	Malaysia	02-48N	104-08E	1985-1998	96
324A	Pxxx	xxx	Sedili	Malaysia	01-56N	104-07E	1986-1998	98
325A	Pxxx	xxx	Kukup	Malaysia	01-20N	103-27E	1985-1998	97
326A	Pxxx	xxx	Geting	Malaysia	06-14N	102-06E	1986-1998	99
327A	Pxxx	044	Keppel Harbour	Singapore	01-16N	103-49E	1981-1990	99
328A	Pxxx	039	Ko Lak	Thailand	11-48N	099-49E	1985-1998	96
329A	Pxxx	077	Hong Kong-A	China	22-18N	114-12E	1962-1985	97
329B	Pxxx	077	Hong Kong-B	China	22-18N	114-13E	1986-1998	99
333A	Pxxx	057	Fort Denison	Australia	33-51S	151-14E	1965-1998	93
335A	Pxxx	056	Spring Bay	Australia	42-33S	147-56E	1985-1998	93
336A	Pxxx	061	Booby Island	Australia	10-36S	141-55E	1988-1996	93
337A	Pxxx	044	Victoria Dock	Singapore	01-16N	103-49E	1972-1981	95
338A	Pxxx	xxx	Macau	Portugal	22-10N	113-33E	1978-1985	80
339A	Pxxx	056	Hobart	Australia	42-53S	147-20E	1985-1996	83
340A	Pxxx	xxx	Kaohsiung	Rep. of China	22-37N	120-18E	1980-1991	100
341A	Pxxx	xxx	Keelung	Rep. of China	25-09N	121-45E	1980-1991	100
350A	Pxxx	089	Kushiro	Japan	42-58N	144-23E	1963-1999	96
351A	Pxxx	087	Ofunato	Japan	39-04N	141-43E	1965-1999	100
352A	Pxxx	086	Mera	Japan	34-55N	139-50E	1965-1999	93
353A	Pxxx	085	Kushimoto	Japan	33-28N	135-47E	1961-1999	97
354A	Pxxx	082	Aburatsu	Japan	31-34N	131-25E	1961-1999	100
355A	Pxxx	081	Naha	Japan	26-13N	127-40E	1966-1999	100
356A	Pxxx	xxx	Maisaka	Japan	34-41N	137-37E	1968-1998	96
357A	Pxxx	xxx	Miyakejima	Japan	34-04N	139-29E	1965-1998	99
358A	Pxxx	xxx	Hosojima	Japan	32-25N	131-41E	1933-1975	86
359A	Pxxx	xxx	Naze	Japan	28-23N	129-30E	1961-1998	94
362A	Pxxx	083	Nagasaki	Japan	32-44N	129-52E	1985-1998	100
363A	Pxxx	xxx	Nishinoomote	Japan	30-44N	130-60E	1964-1998	91
364A	Pxxx	088	Hakodate	Japan	41-47N	140-44E	1964-1998	92
365A	Pxxx	xxx	Ishigaki	Japan	24-20N	124-09E	1969-1998	100
370A	Pxxx	073	Manila	Philippines	14-35N	120-58E	1984-1990	99
371A	Pxxx	072	Legaspi	Philippines	13-09N	123-45E	1984-1990	100
372A	Pxxx	071	Davao	Philippines	07-05N	125-38E	1984-1990	100
373A	Pxxx	070	Jolo	Philippines	06-04N	121-00E	1984-1990	86
376A	Pxxx	247	Xiamen	China	24-27N	118-04E	1954-1994	100
385A	Pxxx	xxx	Tawau	Malaysia	04-14N	117-53E	1987-1998	95
386A	Pxxx	xxx	Kota Kinabalu	Malaysia	05-59N	116-04E	1987-1998	98
387A	Pxxx	xxx	Bintulu	Malaysia	03-13N	113-04E	1992-1998	95
388A	Pxxx	xxx	Miri	Malaysia	04-24N	113-58E	1992-1998	91
389A	Pxxx	xxx	Sandakan	Malaysia	05-49N	118-04E	1993-1998	99
391A	Pxxx	165	Clipperton-A	France	10-17N	109-13W	1985-1985	47
391B	Pxxx	165	Clipperton-B	France	10-17N	109-13W	1986-1988	100
393A	Pxxx	xxx	Puerto Vallarta	Mexico	20-37N	105-15W	1973-1991	40

394A	Pxxx	xxx	Salina Cruz	Mexico	16-10N	095-12W	1952-1991	81
395A	Pxxx	163	Manzanillo-A	Mexico	19-03N	104-20W	1953-1982	95
395B	Pxxx	163	Manzanillo-B	Mexico	19-03N	104-20W	1992-1998	72
396A	Pxxx	xxx	Puntarenas	Costa Rica	09-58N	084-50W	1970-1980	71
397A	Pxxx	xxx	Guaymas	Mexico	27-56N	110-54W	1953-1986	81
398A	Pxxx	xxx	Marsden Point	New Zealand	35-50S	174-30E	1984-1985	99
399A	Pxxx	148	Lord Howe-A	Australia	31-31S	159-04E	1958-1967	80
399B	Pxxx	148	Lord Howe-B	Australia	31-31S	159-04E	1991-1994	99
400A	Pxxx	xxx	Lombrum	Papua New Guinea	02-02S	147-22E	1994-1998	80
401A	Pxxx	xxx	Apia-A	Western Samoa	13-49S	171-45W	1954-1971	88
401B	Pxxx	xxx	Apia-B	Western Samoa	13-49S	171-45W	1993-1998	100
402A	Pxxx	xxx	Lautoka	Fiji	17-36S	177-26E	1992-1998	98
540A	Pxxx	155	Prince Rupert-A	Canada	54-19N	130-20W	1910-1918	79
540B	Pxxx	155	Prince Rupert-B	Canada	54-19N	130-20W	1963-1995	99
542A	Pxxx	156	Tofino	Canada	49-09N	125-55W	1963-1995	94
550A	Pxxx	303	Massacre Bay,AK	USA	52-50N	173-12E	1943-1966	88
551A	Pxxx	158	San Francisco	USA	37-48N	122-28W	1901-1999	100
552A	Pxxx	xxx	Kawaihae	USA	20-02N	155-50W	1989-1997	90
553A	Pxxx	xxx	Port Allen	USA	21-54N	159-36W	1989-1996	98
556A	Pxxx	xxx	Crescent City,CA	USA	41-45N	124-11W	1951-1999	96
558A	Pxxx	xxx	Neah Bay	USA	48-22N	124-37W	1934-1999	97
560A	Pxxx	150	Seward-A,AK	USA	60-07N	149-26W	1925-1932	98
560B	Pxxx	150	Seward-B,AK	USA	60-07N	149-26W	1944-1949	77
560C	Pxxx	150	Seward-C,AK	USA	60-07N	149-26W	1967-1974	92
569A	Pxxx	159	San Diego	USA	32-43N	117-10W	1906-1999	97
570A	Pxxx	xxx	Yakutat	USA	59-33N	139-44W	1961-1999	90
571A	Pxxx	xxx	Ketchikan	USA	55-20N	131-38W	1949-1999	93
583A	Pxxx	xxx	Cordova-A,Alaska	USA	60-34N	145-45W	1949-1953	94
583B	Pxxx	xxx	Cordova-B,Alaska	USA	60-34N	145-45W	1964-1974	80
590A	Pxxx	xxx	Matavai	French Polynesia	17-31S	149-31W	1958-1967	65
630A	Pxxx	079	Dalian-A	China	38-56N	121-40E	1975-1990	98
631A	Pxxx	079	Laohutan-A	China	38-52N	121-41E	1991-1994	100
632A	Pxxx	094	Kanmen-A	China	28-05N	121-17E	1975-1994	100
633A	Pxxx	283	Lusi-A	China	32-08N	121-37E	1975-1994	98
635A	Pxxx	078	Zhapo-A	China	21-35N	111-50E	1975-1994	100
636A	Pxxx	xxx	Beihai	China	21-29N	109-05E	1975-1994	100
637A	Pxxx	xxx	Dongfang	China	19-06N	108-37E	1975-1994	100
638A	Pxxx	xxx	Haikou	China	20-01N	110-17E	1976-1994	100
639A	Pxxx	xxx	Lianyungang	China	34-45N	119-25E	1975-1994	99
641A	Pxxx	xxx	Shanwei	China	22-45N	115-21E	1975-1994	100
642A	Pxxx	xxx	Shijiusuo	China	35-23N	119-33E	1975-1994	100
650A	Pxxx	xxx	Hon Dau-A	Vietnam	20-40N	106-49E	1960-1960	100
650B	Pxxx	xxx	Hon Dau-B	Vietnam	20-40N	106-49E	1995-1995	75
651A	Pxxx	xxx	Vung Ang	Vietnam	18-05N	106-17E	1996-1997	100
652A	Pxxx	xxx	Vung Tau	Vietnam	10-20N	107-04E	1992-1992	100

670A	Pxxx	xxx	Champerico	Guatemala	14-18N	091-55W	1974-1975	98
671A	Pxxx	xxx	La Paz	Mexico	24-10N	110-21W	1952-1983	71
672A	Pxxx	xxx	Puerto Angel	Mexico	15-39N	096-30W	1962-1984	74
673A	Pxxx	xxx	Mazatlan	Mexico	23-12N	106-25W	1953-1975	97
674A	Pxxx	xxx	San Carlos	Mexico	24-47N	112-07W	1968-1983	51
675A	Pxxx	xxx	San Jose	Guatemala	13-55N	090-50W	1955-1975	93
676A	Pxxx	xxx	Topolobampo	Mexico	25-36N	109-03W	1956-1974	94
677A	Pxxx	xxx	Yavaros	Mexico	26-42N	109-31W	1970-1973	85
678A	Pxxx	xxx	Paita	Peru	05-05S	081-10W	1981-1984	100
699A	Pxxx	044	Tanjong Pagar	Singapore	01-16N	103-51E	1988-1998	94

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JASL	TOGA	GLOS	STATION	COUNTRY	LAT	LONG	QC-YEARS	CI
201A	Axxx	199	St. Peter&Paul R.	Brazil	00-55N	029-21W	1982-1985	99
202A	Axxx	197	Natal-A	Brazil	05-45S	035-12W	1982-1983	100
202B	Axxx	197	Natal-B	Brazil	05-45S	035-12W	1983-1984	99
202C	Axxx	197	Natal-C	Brazil	05-45S	035-12W	1984-1985	100
203A	Axxx	198	Fer. de Nor.-A	Brazil	03-50S	032-24W	1982-1983	100
203B	Axxx	198	Fer. de Nor.-B	Brazil	03-50S	032-24W	1984-1985	99
204A	Axxx	265	Trindade	Brazil	20-30S	029-19W	1983-1983	16
205A	Axxx	xxx	Arrecife-A	Spain	28-57N	013-34W	1959-1973	98
205B	Axxx	xxx	Arrecife-B	Spain	28-57N	013-34W	1973-1985	69
205D	Axxx	xxx	Arrecife-D	Spain	28-57N	013-34W	1987-1991	90
206A	Axxx	xxx	S.Cruz Palma-A	Spain	28-41N	017-33W	1949-1959	100
206B	Axxx	xxx	S.Cruz Palma-B	Spain	28-41N	017-33W	1959-1981	93
206D	Axxx	xxx	S.Cruz Palma-D	Spain	28-41N	017-33W	1989-1990	93
207A	Axxx	249	Ceuta-A	Spain	35-54N	005-19W	1971-1974	98
207B	Axxx	249	Ceuta-B	Spain	35-54N	005-19W	1975-1977	97
207C	Axxx	249	Ceuta-C	Spain	35-54N	005-19W	1978-1980	92
207D	Axxx	249	Ceuta-D	Spain	35-54N	005-19W	1980-1991	90
208A	Axxx	xxx	Vigo	Spain	42-14N	008-44W	1943-1990	100
209A	Axxx	246	Cascais	Portugal	38-42N	009-25W	1960-1991	85
210A	Axxx	244	Flores-A,Azores	Portugal	39-27N	031-07W	1976-1977	100
210B	Axxx	244	Flores-B,Azores	Portugal	39-27N	031-07W	1984-1994	63
211A	Axxx	245	Ponta Delgada-A	Portugal	37-44N	025-40W	1978-1991	68
211B	Axxx	245	Ponta Delgada-B	Portugal	37-44N	025-40W	1998-1998	98
212A	Axxx	xxx	Horta,Azores	Portugal	38-32N	028-37W	1984-1986	87
215A	Axxx	xxx	Angra Heroismo	Portugal	38-39N	027-14W	1976-1983	94
216A	Axxx	254	Porto Grande	Portugal	16-52N	024-59W	1990-1993	38
217A	Axxx	251	Las Palmas-A	Spain	28-06N	015-24W	1949-1956	95
217B	Axxx	251	Las Palmas-B	Spain	28-06N	015-24W	1971-1982	88
217C	Axxx	251	Las Palmas-C	Spain	28-06N	015-24W	1983-1991	73
217D	Axxx	251	Las Palmas-D	Spain	28-09N	015-24W	1992-1998	98
218B	Axxx	250	Funchal-B	Portugal	32-38N	016-54W	1976-1994	59

220A	Axxx	267	Walvis Bay	Namibia	22-57S	014-30E	1959-1993	67
221A	Axxx	268	Simon's Bay	South Africa	34-11S	018-26E	1958-1996	93
222A	Axxx	xxx	Praia-A	Cape Verde	14-55N	023-30W	1984-1985	100
222C	Axxx	xxx	Praia-C	Cape Verde	14-55N	023-31W	1995-1996	64
223A	Axxx	253	Dakar-A	Senegal	14-40N	017-26W	1982-1983	100
223B	Axxx	253	Dakar-B	Senegal	14-40N	017-26W	1983-1985	100
223C	Axxx	253	Dakar-C	Senegal	14-40N	017-26W	1986-1986	44
223D	Axxx	253	Dakar-D	Senegal	14-40N	017-26W	1986-1989	94
225A	Axxx	260	Sao Tome	Sao Tome/Principe	00-01N	006-31E	1985-1988	58
228A	Axxx	xxx	Tenerife	Spain	28-29N	016-14W	1992-1998	91
230A	Axxx	257	Abidjan-Vridi	Ivory Coast	05-15N	004-00W	1982-1988	100
231A	Axxx	xxx	Takoradi	Ghana	04-53N	001-45W	1983-1986	100
233A	Axxx	259	Lagos-A	Nigeria	06-25N	003-27E	1961-1969	63
233C	Axxx	259	Lagos-C	Nigeria	06-25N	003-25E	1992-1996	74
234A	Axxx	261	Pointe Noire	Congo	04-48S	011-51E	1980-1988	77
236A	Axxx	xxx	Luanda	Angola	08-47S	013-14E	1972-1975	100
237A	Axxx	262	Lobito	Angola	12-20S	013-34E	1971-1975	88
238A	Axxx	xxx	Mocamedes	Angola	15-12S	012-09E	1971-1975	98
240A	Axxx	xxx	Fernandina Beach	USA	30-40N	081-28W	1985-1999	89
241A	Axxx	218	Miami	USA	25-54N	080-07W	1985-1992	96
242A	Axxx	216	Key West	USA	24-33N	081-49W	1985-1999	99
244A	Axxx	276	Gibara	Cuba	21-07N	076-07W	1985-1992	100
245A	Axxx	206	San Juan	USA	18-28N	066-07W	1985-1999	95
246A	Axxx	xxx	Magueyes Island	USA	17-58N	067-03W	1985-1999	100
247A	Axxx	xxx	La Guaira	Venezuela	10-37N	066-56W	1985-1991	96
248A	Axxx	203	Port-of-Spain	Trinidad/Tobago	10-39N	061-31W	1984-1992	81
249A	Axxx	xxx	Bridgetown-A	Barbados	13-06N	059-37W	1990-1991	92
249B	Axxx	xxx	Bridgetown-B	Barbados	13-06N	059-37W	1993-1996	45
250A	Axxx	212	Veracruz	Mexico	19-12N	096-08W	1985-1995	99
251A	Axxx	xxx	Guantanamo Bay	Cuba	19-54N	075-09W	1995-1997	89
252A	Axxx	xxx	Portland,ME	USA	43-39N	070-15W	1910-1999	97
253A	Axxx	290	Newport,RI	USA	41-30N	071-20W	1930-1999	95
254A	Axxx	xxx	Limetree Bay	USA	17-42N	064-45W	1984-1999	93
255A	Axxx	xxx	Charlotte Amalie	USA	18-20N	064-55W	1984-1999	96
256A	Axxx	012	Exuma Cays	Bahamas	23-46N	076-06W	1992-1993	99
257A	Axxx	211	Settlement Point	Bahamas	26-46N	078-60W	1985-1999	92
259A	Axxx	221	Bermuda	United Kingdom	32-22N	064-42W	1985-1999	95
260A	Axxx	219	Duck Pier,NC	USA	36-11N	075-44W	1985-1999	99
261A	Axxx	xxx	Charleston,SC	USA	32-47N	079-56W	1985-1999	97
264A	Axxx	220	Atlantic City,NJ	USA	39-21N	074-25W	1911-1999	95
265A	Axxx	207	Cartagena-A	Colombia	10-23N	075-32W	1951-1993	90
265B	Axxx	207	Cartagena-B	Colombia	10-23N	075-32W	1993-1998	75
266A	Axxx	208	Cristobal	Panama	09-21N	079-55W	1907-1997	96
268A	Axxx	xxx	Limon	Costa Rica	10-00N	083-02W	1970-1981	66
269A	Axxx	xxx	Cochino Pequeno	Honduras	15-57N	086-30W	1995-1996	100

270A	Axxx	204	Le Robert	France	14-41N	060-56W	1976-1984	61
271A	Axxx	xxx	Fort de France	France	14-35N	061-03W	1976-1985	37
272A	Axxx	xxx	Pointe-a-Pitre	France	16-14N	061-32W	1994-1997	98
274A	Axxx	xxx	Churchill	Canada	58-47N	094-12W	1961-1997	90
275A	Axxx	222	Halifax	Canada	44-40N	063-35W	1920-1997	99
276A	Axxx	223	St. John's-A	Canada	47-34N	052-42W	1961-1993	96
276B	Axxx	223	St. John's-B	Canada	47-34N	052-42W	1993-1998	98
280A	Axxx	195	Rio de Janeiro	Brazil	22-52S	043-08W	1963-1991	91
281A	Axxx	194	Cananeia	Brazil	25-01S	047-56W	1954-1993	100
283A	Axxx	xxx	Fortaleza	Brazil	03-43S	038-28W	1995-1998	100
284A	Axxx	xxx	Termisa	Brazil	04-49S	037-03W	1993-1995	97
287A	Axxx	180	Puerto Williams	Chile	54-56S	067-37W	1985-1998	92
290A	Axxx	305	Port Stanley	United Kingdom	51-45S	057-56W	1992-1996	100
291A	Axxx	263	Ascension	United Kingdom	07-55S	014-25W	1993-1997	97
292A	Axxx	264	St. Helena	United Kingdom	15-55S	005-43W	1993-1996	96
296A	Axxx	xxx	Sisimiut	Denmark	66-56N	053-40W	1991-1995	93
297A	Axxx	228	Ammassalik	Denmark	65-36N	037-00W	1990-1995	81
298A	Axxx	xxx	Ilulissat	Denmark	69-13N	051-06W	1992-1995	90
299A	Axxx	xxx	Qaqortoq	Denmark	60-43N	046-02W	1991-1995	99
600A	Axxx	181	Ushuaia	Argentina	54-48S	068-18W	1996-1998	77
700A	Axxx	188	Faraday	United Kingdom	65-15S	064-16W	1984-1995	96
701A	Axxx	xxx	Port Nolloth	South Africa	29-15S	016-52E	1991-1994	49
702A	Axxx	xxx	Luderitz	South Africa	26-39S	015-09E	1991-1996	34
703A	Axxx	xxx	Saldahna Bay	South Africa	33-01S	018-58E	1991-1996	81
704A	Axxx	xxx	Granger Bay	South Africa	33-54S	018-25E	1991-1996	55
705A	Axxx	153	L. Cornwallis I.	Canada	75-23N	096-57W	1986-1994	100
710A	Axxx	xxx	Suape	Brazil	08-21S	034-57W	1982-1984	98
711A	Axxx	xxx	Luis Corriea	Brazil	02-52S	041-40W	1984-1985	100
740A	Axxx	xxx	Eastport,ME	USA	44-54N	066-59W	1929-1998	93
741A	Axxx	xxx	Boston,MA	USA	42-21N	071-03W	1921-1999	99
742A	Axxx	xxx	Woods Hole,MA	USA	41-31N	070-40W	1957-1999	88
743A	Axxx	xxx	Nantucket,MA	USA	41-17N	070-06W	1965-1999	95
744A	Axxx	xxx	New London,CT	USA	41-21N	072-05W	1957-1999	93
745A	Axxx	xxx	New York,NY	USA	40-42N	074-01W	1976-1999	75
746A	Axxx	xxx	Cape May,NJ	USA	38-58N	074-58W	1965-1999	87
747A	Axxx	xxx	Lewes,DE	USA	38-47N	075-07W	1957-1999	96
749A	Axxx	xxx	Chesapeake BBT,VA	USA	36-58N	076-07W	1975-1999	99
750A	Axxx	xxx	Wilmington,NC	USA	34-14N	077-57W	1935-1999	98
753A	Axxx	xxx	Mayport,FL	USA	30-24N	081-26W	1928-1999	99
760A	Axxx	xxx	Apalachicola,FL	USA	29-44N	084-59W	1996-1999	99
765A	Axxx	xxx	Grand Isle,LA	USA	29-16N	089-57W	1980-1999	98
767A	Axxx	217	Galveston,P.Pier	USA	29-17N	094-47W	1958-1999	96
770A	Axxx	xxx	Corpus Cristi,TX	USA	27-35N	097-13W	1992-1999	100
772A	Axxx	xxx	Port Isabel,TX	USA	26-04N	097-13W	1987-1999	100
773A	Axxx	xxx	Clearwater Bch,FL	USA	27-59N	082-50W	1996-1999	97

Indian Ocean
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JASL	TOGA	GLOS	STATION	COUNTRY	LAT	LONG	QC-YEARS	CI
101A	Ixxx	008	Mombasa	Kenya	04-04S	039-39E	1986-1998	79
102A	Ixxx	xxx	Dar Es Salaam	Tanzania	06-49S	039-17E	1986-1990	87
103A	Ixxx	018	Port Louis-A	Mauritius	20-09S	057-29E	1942-1947	90
103B	Ixxx	018	Port Louis-B	Mauritius	20-09S	057-29E	1964-1965	86
103C	Ixxx	018	Port Louis-C	Mauritius	20-09S	057-30E	1986-1998	99
104B	Ixxx	026	Diego Garcia-B	United Kingdom	07-14S	072-26E	1969-1969	41
104C	Ixxx	026	Diego Garcia-C	United Kingdom	07-17S	072-24E	1988-1998	83
105A	Ixxx	019	Rodrigues	Mauritius	19-40S	063-25E	1986-1997	94
106A	Ixxx	xxx	Praslin	Seychelles	04-21S	055-46E	1987-1989	89
107A	Ixxx	045	Padang	Indonesia	01-00S	100-22E	1986-1990	86
108A	Ixxx	028	Male-A	Rep. of Maldives	04-11N	073-31E	1988-1989	100
108B	Ixxx	028	Male-B,Hulule	Rep. of Maldives	04-11N	073-32E	1989-1998	88
109A	Ixxx	027	Gan	Rep. of Maldives	00-41S	073-09E	1987-1998	83
110A	Ixxx	xxx	Muscat	Oman	23-38N	058-34E	1987-1993	77
111A	Ixxx	273	Port Victoria-A	Seychelles	04-37S	055-28E	1977-1982	84
111B	Ixxx	273	Port Victoria-B	Seychelles	04-37S	055-28E	1986-1992	96
113A	Ixxx	xxx	Masirah	Oman	20-41N	058-52E	1996-1998	100
114A	Ixxx	004	Salalah	Oman	16-56N	054-00E	1989-1998	91
115A	Ixxx	033	Colombo-A	Sri Lanka	06-56N	079-51E	1953-1965	94
115B	Ixxx	033	Colombo-B	Sri Lanka	06-57N	079-51E	1989-1992	96
117A	Ixxx	xxx	Hanimaadhoo	Rep. of Maldives	06-46N	073-10E	1991-1998	97
121A	Ixxx	273	Pt. La Rue	Seychelles	04-40S	055-32E	1993-1998	97
134A	Ixxx	xxx	Hiron Point	Bangladesh	21-47N	089-28E	1977-1994	99
135A	Ixxx	xxx	Khal #10	Bangladesh	22-16N	091-49E	1983-1992	62
136A	Ixxx	xxx	Cox's Bazaar	Bangladesh	21-27N	091-50E	1983-1994	98
137A	Ixxx	xxx	Teknaf	Bangladesh	20-53N	092-18E	1983-1988	59
138A	Ixxx	036	Charchanga	Bangladesh	22-13N	091-03E	1980-1994	96
139A	Ixxx	xxx	Khepupara	Bangladesh	21-50N	089-50E	1987-1994	96
140A	Ixxx	xxx	Kelang	Malaysia	03-03N	101-22E	1983-1998	99
141A	Ixxx	xxx	Keling	Malaysia	02-13N	102-09E	1984-1998	98
142A	Ixxx	xxx	Langkawi	Malaysia	06-26N	099-46E	1985-1998	99
143A	Ixxx	043	Lumut	Malaysia	04-14N	100-37E	1984-1998	97
144A	Ixxx	xxx	Penang	Malaysia	05-25N	100-21E	1984-1998	96
147A	Ixxx	030	Karachi	Pakistan	24-48N	066-58E	1985-1987	91
148A	Ixxx	042	Ko Taphao Noi	Thailand	07-50N	098-26E	1985-1998	98
149A	Ixxx	xxx	Lamu	Kenya	02-16S	040-54E	1989-1989	68
149B	Ixxx	xxx	Lamu-B	Kenya	02-16S	040-54E	1995-1998	100

150A	Ixxx 015	Nosy Be	Madagascar	13-24S	048-18E	1987-1998	54
151A	Ixxx 297	Zanzibar	Tanzania	06-09S	039-11E	1984-1998	99
155A	Ixxx 096	Dzaoudzi	Mayotte	12-47S	045-15E	1985-1995	67
158A	Ixxx xxx	Meneng	Indonesia	08-07S	114-23E	1987-1989	94
159A	Ixxx xxx	Pari	Indonesia	05-51S	106-37E	1987-1990	84
160A	Ixxx 292	Surabaya	Indonesia	07-13S	112-44E	1988-1990	93
161A	Ixxx xxx	Jakarta	Indonesia	06-06S	106-53E	1984-1985	100
163A	Ixxx 049	Benoa	Indonesia	08-45S	115-13E	1988-1990	97
164A	Ixxx 017	Reunion	France	20-55S	055-18E	1982-1986	93
165A	Ixxx xxx	Wyndham	Australia	15-27S	128-06E	1984-1996	96
166A	Ixxx 040	Broome	Australia	18-00S	122-13E	1986-1996	72
167A	Ixxx 052	Carnarvon	Australia	24-54S	113-39E	1984-1994	64
168A	Ixxx 062	Darwin	Australia	12-28S	130-51E	1984-1998	97
169A	Ixxx 051	Port Hedland	Australia	20-19S	118-34E	1984-1996	96
170A	Ixxx 047	Christmas	Australia	10-25S	105-40E	1986-1993	52
171A	Ixxx 046	Cocos	Australia	12-07S	096-53E	1985-1998	92
175A	Ixxx 053	Fremantle	Australia	32-03S	115-43E	1984-1996	99
176A	Ixxx 054	Esperance	Australia	33-52S	121-54E	1985-1998	99
178A	Ixxx 021	Crozet	France	46-26S	051-52E	1995-1997	95
179A	Ixxx 024	Saint Paul	France	38-43S	077-32E	1994-1998	97
180A	Ixxx 023	Kerguelen	France	49-21S	070-13E	1993-1998	99
181A	Ixxx 013	Durban	South Africa	29-52S	031-03E	1970-1996	82
182A	Ixxx xxx	Mina Sulman	Bahrain	26-14N	050-36E	1979-1997	88
184A	Ixxx 076	Port Elizabeth	South Africa	33-58S	025-38E	1985-1996	78
185A	Ixxx xxx	Mossel Bay	South Africa	34-11S	022-08E	1991-1996	91
187A	Ixxx xxx	East London	South Africa	33-01S	027-55E	1991-1996	68
188A	Ixxx xxx	Richard's Bay	South Africa	28-48S	032-05E	1991-1996	47
190A	Ixxx xxx	Maputo-A	Mozambique	26-10S	032-42E	1974-1974	100
190B	Ixxx xxx	Maputo-B	Mozambique	25-59S	032-34E	1981-1986	49
191A	Ixxx xxx	Antonio Enes	Mozambique	16-14S	039-54E	1967-1967	31
192A	Ixxx 011	Pemba-A	Mozambique	12-58S	040-30E	1971-1973	25
192B	Ixxx 011	Pemba-B	Mozambique	12-58S	040-29E	1982-1984	64
193A	Ixxx xxx	Nacala-A	Mozambique	14-28S	040-41E	1975-1975	18
193B	Ixxx xxx	Nacala-B	Mozambique	14-28S	040-41E	1982-1983	100

A.2 Series with 1998 data

JASL	TOGA	GLOS	STATION	COUNTRY	LAT	LONG	QC-YEARS	CI
001B	Pxxx	115	Pohnpei-B	Fd St Micronesia	06-59N	158-15E	1974-1998	97
002C	Pxxx	113	Tarawa-C,Betio	Rep. of Kiribati	01-22N	172-56E	1988-1998	100
003B	Pxxx	169	Baltra-B	Ecuador	00-26S	090-17W	1985-1998	97
004A	Pxxx	114	Nauru	Rep. of Nauru	00-32S	166-54E	1974-1998	94
005A	Pxxx	112	Majuro	Rep. Marshall I.	07-06N	171-22E	1968-1998	92
007A	Pxxx	120	Malakal	Rep. of Belau	07-20N	134-28E	1969-1998	95
008B	Pxxx	119	Yap-B	Fd St Micronesia	09-31N	138-08E	1969-1998	91
009A	Pxxx	066	Honiara	Solomon Islands	09-26S	159-57E	1974-1998	97
011B	Pxxx	146	Christmas-B	Rep. of Kiribati	01-59N	157-28W	1974-1998	95
013B	Pxxx	145	Kanton-B	Rep. of Kiribati	02-49S	171-43W	1972-1998	93
014A	Pxxx	107	French Frigate S	USA	23-52N	166-17W	1974-1998	97
015B	Pxxx	140	Papeete-B	French Polynesia	17-32S	149-34W	1975-1999	99
016A	Pxxx	138	Rikitea	French Polynesia	23-08S	134-57W	1969-1998	92
019A	Pxxx	123	Noumea	France	22-18S	166-26E	1967-1998	99
021C	Pxxx	176	Juan Fernandez-C	Chile	33-37S	078-50W	1990-1998	96
022E	Pxxx	137	Easter-E	Chile	27-09S	109-27W	1985-1998	96
023A	Pxxx	139	Rarotonga	Cook Islands	21-12S	159-47W	1977-1998	98
024A	Pxxx	143	Penrhyn	Cook Islands	08-59S	158-03W	1977-1998	95
025A	Pxxx	121	Funafuti	Tuvalu	08-32S	179-12E	1977-1998	97
028A	Pxxx	118	Saipan	N. Mariana Is.	15-14N	145-45E	1978-1998	92
029A	Pxxx	117	Kapingamarangi	Fd St Micronesia	01-06N	154-47E	1978-1998	93
030A	Pxxx	xxx	Santa Cruz	Ecuador	00-45S	090-19W	1978-1998	94
034A	Pxxx	161	Cabo San Lucas	Mexico	22-53N	109-55W	1973-1998	82
039A	Pxxx	xxx	Kodiak,Alaska	USA	57-44N	152-31W	1975-1999	78
040A	Pxxx	302	Adak,Alaska	USA	51-52N	176-38W	1950-1999	91
041B	Pxxx	102	Dutch Harbor-B,AK	USA	53-53N	166-32W	1992-1999	100
046B	Pxxx	xxx	Port Vila-B	Vanuatu	17-46S	168-18E	1993-1998	86
047A	Pxxx	103	Chichijima	Japan	27-06N	142-11E	1975-1999	99
050A	Pxxx	106	Midway	USA Trust	28-13N	177-22W	1947-1999	93
051A	Pxxx	105	Wake	USA Trust	19-17N	166-37E	1950-1999	92
052A	Pxxx	109	Johnston	USA Trust	16-44N	169-32W	1947-1999	97
053A	Pxxx	149	Guam	USA Trust	13-26N	144-39E	1948-1999	93
055A	Pxxx	111	Kwajalein	Rep. Marshall I.	08-44N	167-44E	1946-1999	98
056A	Pxxx	144	Pago Pago	USA Trust	14-17S	170-41W	1948-1992	96
057A	Pxxx	108	Honolulu	USA	21-18N	157-52W	1905-1999	98
058A	Pxxx	xxx	Nawiliwili	USA	21-58N	159-21W	1954-1999	99
059A	Pxxx	xxx	Kahului	USA	20-54N	156-28W	1950-1999	92
060A	Pxxx	287	Hilo	USA	19-44N	155-04W	1927-1999	79
061A	Pxxx	xxx	Mokuoloe	USA	21-26N	157-48W	1957-1999	75
080A	Pxxx	174	Antofagasta	Chile	23-39S	070-24W	1945-1998	96
081B	Pxxx	175	Valparaiso-B	Chile	33-02S	071-38W	1982-1998	99
083A	Pxxx	xxx	Arica	Chile	18-28S	070-20W	1982-1998	98

085A	Pxxx	170	Buenaventura	Colombia	03-54N	077-06W	1953-1998	92
088A	Pxxx	xxx	Caldera	Chile	27-04S	070-50W	1980-1998	97
091A	Pxxx	172	La Libertad	Ecuador	02-12S	080-55W	1949-1998	97
303A	Pxxx	171	Tumaco	Colombia	01-50N	078-44W	1951-1998	86
320A	Pxxx	293	Cendering	Malaysia	05-16N	103-11E	1984-1998	98
321A	Pxxx	xxx	Johor Baharu	Malaysia	01-28N	103-48E	1983-1998	95
322A	Pxxx	xxx	Kuantan	Malaysia	03-59N	103-26E	1983-1998	99
323A	Pxxx	xxx	Tioman	Malaysia	02-48N	104-08E	1985-1998	96
324A	Pxxx	xxx	Sedili	Malaysia	01-56N	104-07E	1986-1998	98
325A	Pxxx	xxx	Kukup	Malaysia	01-20N	103-27E	1985-1998	97
326A	Pxxx	xxx	Geting	Malaysia	06-14N	102-06E	1986-1998	99
328A	Pxxx	039	Ko Lak	Thailand	11-48N	099-49E	1985-1998	96
329B	Pxxx	077	Hong Kong-B	China	22-18N	114-13E	1986-1998	99
333A	Pxxx	057	Fort Denison	Australia	33-51S	151-14E	1965-1998	93
335A	Pxxx	056	Spring Bay	Australia	42-33S	147-56E	1985-1998	93
350A	Pxxx	089	Kushiro	Japan	42-58N	144-23E	1963-1999	96
351A	Pxxx	087	Ofunato	Japan	39-04N	141-43E	1965-1999	100
352A	Pxxx	086	Mera	Japan	34-55N	139-50E	1965-1999	93
353A	Pxxx	085	Kushimoto	Japan	33-28N	135-47E	1961-1999	97
354A	Pxxx	082	Aburatsu	Japan	31-34N	131-25E	1961-1999	100
355A	Pxxx	081	Naha	Japan	26-13N	127-40E	1966-1999	100
356A	Pxxx	xxx	Maisaka	Japan	34-41N	137-37E	1968-1998	96
357A	Pxxx	xxx	Miyakejima	Japan	34-04N	139-29E	1965-1998	99
359A	Pxxx	xxx	Naze	Japan	28-23N	129-30E	1961-1998	94
362A	Pxxx	083	Nagasaki	Japan	32-44N	129-52E	1985-1998	100
363A	Pxxx	xxx	Nishinoomote	Japan	30-44N	130-60E	1964-1998	91
364A	Pxxx	088	Hakodate	Japan	41-47N	140-44E	1964-1998	92
365A	Pxxx	xxx	Ishigaki	Japan	24-20N	124-09E	1969-1998	100
385A	Pxxx	xxx	Tawau	Malaysia	04-14N	117-53E	1987-1998	95
386A	Pxxx	xxx	Kota Kinabalu	Malaysia	05-59N	116-04E	1987-1998	98
387A	Pxxx	xxx	Bintulu	Malaysia	03-13N	113-04E	1992-1998	95
388A	Pxxx	xxx	Miri	Malaysia	04-24N	113-58E	1992-1998	91
389A	Pxxx	xxx	Sandakan	Malaysia	05-49N	118-04E	1993-1998	99
395B	Pxxx	163	Manzanillo-B	Mexico	19-03N	104-20W	1992-1998	72
400A	Pxxx	xxx	Lombrum	Papua New Guinea	02-02S	147-22E	1994-1998	80
401B	Pxxx	xxx	Apia-B	Western Samoa	13-49S	171-45W	1993-1998	100
402A	Pxxx	xxx	Lautoka	Fiji	17-36S	177-26E	1992-1998	98
551A	Pxxx	158	San Francisco	USA	37-48N	122-28W	1901-1999	100
556A	Pxxx	xxx	Crescent City,CA	USA	41-45N	124-11W	1951-1999	96
558A	Pxxx	xxx	Neah Bay	USA	48-22N	124-37W	1934-1999	97
569A	Pxxx	159	San Diego	USA	32-43N	117-10W	1906-1999	97
570A	Pxxx	xxx	Yakutat	USA	59-33N	139-44W	1961-1999	90
571A	Pxxx	xxx	Ketchikan	USA	55-20N	131-38W	1949-1999	93
699A	Pxxx	044	Tanjong Pagar	Singapore	01-16N	103-51E	1988-1998	94
101A	Ixxx	008	Mombasa	Kenya	04-04S	039-39E	1986-1998	79

103C	Ixxx	018	Port Louis-C	Mauritius	20-09S	057-30E	1986-1998	99
104C	Ixxx	026	Diego Garcia-C	United Kingdom	07-17S	072-24E	1988-1998	83
108B	Ixxx	028	Male-B,Hulule	Rep. of Maldives	04-11N	073-32E	1989-1998	88
109A	Ixxx	027	Gan	Rep. of Maldives	00-41S	073-09E	1987-1998	83
113A	Ixxx	xxx	Masirah	Oman	20-41N	058-52E	1996-1998	100
114A	Ixxx	004	Salalah	Oman	16-56N	054-00E	1989-1998	91
117A	Ixxx	xxx	Hanimaadhoo	Rep. of Maldives	06-46N	073-10E	1991-1998	97
121A	Ixxx	273	Pt. La Rue	Seychelles	04-40S	055-32E	1993-1998	97
140A	Ixxx	xxx	Kelang	Malaysia	03-03N	101-22E	1983-1998	99
141A	Ixxx	xxx	Keling	Malaysia	02-13N	102-09E	1984-1998	98
142A	Ixxx	xxx	Langkawi	Malaysia	06-26N	099-46E	1985-1998	99
143A	Ixxx	043	Lumut	Malaysia	04-14N	100-37E	1984-1998	97
144A	Ixxx	xxx	Penang	Malaysia	05-25N	100-21E	1984-1998	96
148A	Ixxx	042	Ko Taphao Noi	Thailand	07-50N	098-26E	1985-1998	98
149B	Ixxx	xxx	Lamu-B	Kenya	02-16S	040-54E	1995-1998	100
150A	Ixxx	015	Nosy Be	Madagascar	13-24S	048-18E	1987-1998	54
151A	Ixxx	297	Zanzibar	Tanzania	06-09S	039-11E	1984-1998	99
168A	Ixxx	062	Darwin	Australia	12-28S	130-51E	1984-1998	97
171A	Ixxx	046	Cocos	Australia	12-07S	096-53E	1985-1998	92
176A	Ixxx	054	Esperance	Australia	33-52S	121-54E	1985-1998	99
179A	Ixxx	024	Saint Paul	France	38-43S	077-32E	1994-1998	97
180A	Ixxx	023	Kerguelen	France	49-21S	070-13E	1993-1998	99
211B	Axxx	245	Ponta Delgada-B	Portugal	37-44N	025-40W	1998-1998	98
217D	Axxx	251	Las Palmas-D	Spain	28-09N	015-24W	1992-1998	98
228A	Axxx	xxx	Tenerife	Spain	28-29N	016-14W	1992-1998	91
240A	Axxx	xxx	Fernandina Beach	USA	30-40N	081-28W	1985-1999	89
242A	Axxx	216	Key West	USA	24-33N	081-49W	1985-1999	99
245A	Axxx	206	San Juan	USA	18-28N	066-07W	1985-1999	95
246A	Axxx	xxx	Magueyes Island	USA	17-58N	067-03W	1985-1999	100
252A	Axxx	xxx	Portland,ME	USA	43-39N	070-15W	1910-1999	97
253A	Axxx	290	Newport,RI	USA	41-30N	071-20W	1930-1999	95
254A	Axxx	xxx	Limetree Bay	USA	17-42N	064-45W	1984-1999	93
255A	Axxx	xxx	Charlotte Amalie	USA	18-20N	064-55W	1984-1999	96
257A	Axxx	211	Settlement Point	Bahamas	26-46N	078-60W	1985-1999	92
259A	Axxx	221	Bermuda	United Kingdom	32-22N	064-42W	1985-1999	95
260A	Axxx	219	Duck Pier,NC	USA	36-11N	075-44W	1985-1999	99
261A	Axxx	xxx	Charleston,SC	USA	32-47N	079-56W	1985-1999	97
264A	Axxx	220	Atlantic City,NJ	USA	39-21N	074-25W	1911-1999	95
265B	Axxx	207	Cartagena-B	Colombia	10-23N	075-32W	1993-1998	75
276B	Axxx	223	St. John's-B	Canada	47-34N	052-42W	1993-1998	98
283A	Axxx	xxx	Fortaleza	Brazil	03-43S	038-28W	1995-1998	100
287A	Axxx	180	Puerto Williams	Chile	54-56S	067-37W	1985-1998	92
600A	Axxx	181	Ushuaia	Argentina	54-48S	068-18W	1996-1998	77
740A	Axxx	xxx	Eastport,ME	USA	44-54N	066-59W	1929-1998	93
741A	Axxx	xxx	Boston,MA	USA	42-21N	071-03W	1921-1999	99

742A	Axxx	xxx	Woods Hole,MA	USA	41-31N	070-40W	1957-1999	88
743A	Axxx	xxx	Nantucket,MA	USA	41-17N	070-06W	1965-1999	95
744A	Axxx	xxx	New London,CT	USA	41-21N	072-05W	1957-1999	93
745A	Axxx	xxx	New York,NY	USA	40-42N	074-01W	1976-1999	75
746A	Axxx	xxx	Cape May,NJ	USA	38-58N	074-58W	1965-1999	87
747A	Axxx	xxx	Lewes,DE	USA	38-47N	075-07W	1957-1999	96
749A	Axxx	xxx	Chesapeake BBT,VA	USA	36-58N	076-07W	1975-1999	99
750A	Axxx	xxx	Wilmington,NC	USA	34-14N	077-57W	1935-1999	98
753A	Axxx	xxx	Mayport,FL	USA	30-24N	081-26W	1928-1999	99
760A	Axxx	xxx	Apalachicola,FL	USA	29-44N	084-59W	1996-1999	99
765A	Axxx	xxx	Grand Isle,LA	USA	29-16N	089-57W	1980-1999	98
767A	Axxx	217	Galveston,P.Pier	USA	29-17N	094-47W	1958-1999	96
770A	Axxx	xxx	Corpus Cristi,TX	USA	27-35N	097-13W	1992-1999	100
772A	Axxx	xxx	Port Isabel,TX	USA	26-04N	097-13W	1987-1999	100
773A	Axxx	xxx	Clearwater Bch,FL	USA	27-59N	082-50W	1996-1999	97

A.3 Series extended backwards

JASL	TOGA	GLOS	STATION	COUNTRY	LAT	LONG	QC-YEARS	#Y
040A	Pxxx	302	Adak,Alaska	USA	51-52N	176-38W	1950-1999	35
359A	Pxxx	xxx	Naze	Japan	28-23N	129-30E	1961-1998	4
248A	Axxx	203	Port-of-Spain	Trinidad/Tobago	10-39N	061-31W	1984-1992	1

Total number of years extended backward = 40

(#Y denotes years extended backward for each series)

A.4 New series

JASL	TOGA	GLOS	STATION	COUNTRY	LAT	LONG	QC-YEARS	CI
094A	Pxxx	xxx	Talara	Peru	17-00S	072-07W	1954-1964	98
185A	Ixxx	xxx	Mossel Bay	South Africa	34-11S	022-08E	1991-1996	91
188A	Ixxx	xxx	Richard's Bay	South Africa	28-48S	032-05E	1991-1996	47
211B	Axxx	245	Ponta Delgada-B	Portugal	37-44N	025-40W	1998-1998	98
283A	Axxx	xxx	Fortaleza	Brazil	03-43S	038-28W	1995-1998	100
287A	Axxx	180	Puerto Williams	Chile	54-56S	067-37W	1985-1998	92
301B	Pxxx	xxx	Puerto Quetzal-B	Guatemala	13-55N	090-47W	1992-1995	77
550A	Pxxx	303	Massacre Bay,AK	USA	52-50N	173-12E	1943-1966	88
558A	Pxxx	xxx	Neah Bay	USA	48-22N	124-37W	1934-1999	97
560A	Pxxx	150	Seward-A,AK	USA	60-07N	149-26W	1925-1932	98
560B	Pxxx	150	Seward-B,AK	USA	60-07N	149-26W	1944-1949	77
560C	Pxxx	150	Seward-C,AK	USA	60-07N	149-26W	1967-1974	92
570A	Pxxx	xxx	Yakutat	USA	59-33N	139-44W	1961-1999	90
571A	Pxxx	xxx	Ketchikan	USA	55-20N	131-38W	1949-1999	93
590A	Pxxx	xxx	Matavai	French Polynesia	17-31S	149-31W	1958-1967	65
600A	Axxx	181	Ushuaia	Argentina	54-48S	068-18W	1996-1998	77
650B	Pxxx	xxx	Hon Dau-B	Vietnam	20-40N	106-49E	1995-1995	75
651A	Pxxx	xxx	Vung Ang	Vietnam	18-05N	106-17E	1996-1997	100
652A	Pxxx	xxx	Vung Tau	Vietnam	10-20N	107-04E	1992-1992	100
701A	Axxx	xxx	Port Nolloth	South Africa	29-15S	016-52E	1991-1994	49
702A	Axxx	xxx	Luderitz	South Africa	26-39S	015-09E	1991-1996	34
704A	Axxx	xxx	Granger Bay	South Africa	33-54S	018-25E	1991-1996	55
710A	Axxx	xxx	Suape	Brazil	08-21S	034-57W	1982-1984	98
711A	Axxx	xxx	Luis Corriea	Brazil	02-52S	041-40W	1984-1985	100
740A	Axxx	xxx	Eastport,ME	USA	44-54N	066-59W	1929-1998	93
741A	Axxx	xxx	Boston,MA	USA	42-21N	071-03W	1921-1999	99
742A	Axxx	xxx	Woods Hole,MA	USA	41-31N	070-40W	1957-1999	88
743A	Axxx	xxx	Nantucket,MA	USA	41-17N	070-06W	1965-1999	95
744A	Axxx	xxx	New London,CT	USA	41-21N	072-05W	1957-1999	93
745A	Axxx	xxx	New York,NY	USA	40-42N	074-01W	1976-1999	75
746A	Axxx	xxx	Cape May,NJ	USA	38-58N	074-58W	1965-1999	87
747A	Axxx	xxx	Lewes,DE	USA	38-47N	075-07W	1957-1999	96
749A	Axxx	xxx	Chesapeake BBT,VA	USA	36-58N	076-07W	1975-1999	99

750A	Axxx	xxx	Wilmington,NC	USA	34-14N	077-57W	1935-1999	98
753A	Axxx	xxx	Mayport,FL	USA	30-24N	081-26W	1928-1999	99
760A	Axxx	xxx	Apalachicola,FL	USA	29-44N	084-59W	1996-1999	99
765A	Axxx	xxx	Grand Isle,LA	USA	29-16N	089-57W	1980-1999	98
767A	Axxx	217	Galveston,P.Pier	USA	29-17N	094-47W	1958-1999	96
770A	Axxx	xxx	Corpus Cristi,TX	USA	27-35N	097-13W	1992-1999	100
772A	Axxx	xxx	Port Isabel,TX	USA	26-04N	097-13W	1987-1999	100
773A	Axxx	xxx	Clearwater Bch,FL	USA	27-59N	082-50W	1996-1999	97

A.5 Updated series

JASL	STATION	IN 1998 FINAL SET	IN 1999 FINAL SET	NUMBER YR_ADDED	REPLACED DATA
001B	Pohnpei-B	1974-1997	1974-1998	1	
002C	Tarawa-C,Betio	1988-1997	1988-1998	1	
003B	Baltra-B	1985-1997	1985-1998	1	1997*
004A	Nauru	1974-1996	1974-1998	2	
005A	Majuro	1968-1997	1968-1998	1	1997#
007A	Malakal	1969-1997	1969-1998	1	
008B	Yap-B	1969-1997	1969-1998	1	10-12/1997*
009A	Honiara	1974-1996	1974-1998	2	
011B	Christmas-B	1974-1997	1974-1998	1	
013B	Kanton-B	1972-1997	1972-1998	1	
014A	French Frigate S	1974-1997	1974-1998	1	4/1997*
015B	Papeete-B	1975-1996	1975-1999	3	
016A	Rikitea	1969-1997	1969-1998	1	
019A	Noumea	1967-1997	1967-1998	1	
021C	Juan Fernandez-C	1990-1997	1990-1998	1	
022E	Easter-E	1985-1997	1985-1998	1	
023A	Rarotonga	1977-1997	1977-1998	1	
024A	Penrhyn	1977-1997	1977-1998	1	
025A	Funafuti	1977-1997	1977-1998	1	
028A	Saipan	1978-1997	1978-1998	1	
029A	Kapingamarangi	1978-1997	1978-1998	1	
030A	Santa Cruz	1978-1997	1978-1998	1	
034A	Cabo San Lucas	1973-1997	1973-1998	1	
038A	Nuku'alofa	1990-1996	1990-1998	2	
039A	Kodiak,Alaska	1975-1998	1975-1999	1	
040A	Adak,Alaska	1985-1998	1950-1999	36	
041B	Dutch Harbor-B,AK	1992-1998	1992-1999	1	
046B	Port Vila-B	1993-1996	1993-1998	2	
047A	Chichijima	1975-1998	1975-1999	1	
050A	Midway	1947-1998	1947-1999	1	
051A	Wake	1950-1998	1950-1999	1	
052A	Johnston	1947-1998	1947-1999	1	
053A	Guam	1948-1997	1948-1999	2	
055A	Kwajalein	1946-1998	1946-1999	1	
057A	Honolulu	1905-1998	1905-1999	1	
058A	Nawiliwili	1954-1998	1954-1999	1	
059A	Kahului	1950-1998	1950-1999	1	
060A	Hilo	1927-1998	1927-1999	1	
061A	Mokuoloe	1957-1998	1957-1999	1	
080A	Antofagasta	1945-1997	1945-1998	1	
081B	Valparaiso-B	1982-1997	1982-1998	1	

083A Arica	1982-1997	1982-1998	1	
088A Caldera	1980-1997	1980-1998	1	
091A La Libertad	1949-1996	1949-1998	2	
320A Cendering	1984-1997	1984-1998	1	
321A Johor Baharu	1983-1997	1983-1998	1	
322A Kuantan	1983-1997	1983-1998	1	
323A Tioman	1985-1997	1985-1998	1	
324A Sedili	1986-1997	1986-1998	1	
325A Kukup	1985-1997	1985-1998	1	
326A Geting	1986-1997	1986-1998	1	
328A Ko Lak	1985-1996	1985-1998	2	
329B Hong Kong-B	1986-1997	1986-1998	1	
333A Fort Denison	1965-1997	1965-1998	1	
335A Spring Bay	1985-1997	1985-1998	1	
350A Kushiro	1963-1998	1963-1999	1	
351A Ofunato	1965-1998	1965-1999	1	
352A Mera	1965-1998	1965-1999	1	
353A Kushimoto	1961-1998	1961-1999	1	
354A Aburatsu	1961-1998	1961-1999	1	
355A Naha	1966-1998	1966-1999	1	
357A Miyakejima	1965-1997	1965-1998	1	
359A Naze	1965-1997	1961-1998	5	
385A Tawau	1987-1997	1987-1998	1	
386A Kota Kinabalu	1987-1997	1987-1998	1	
387A Bintulu	1992-1997	1992-1998	1	
388A Miri	1992-1997	1992-1998	1	
389A Sandakan	1993-1997	1993-1998	1	
395B Manzanillo-B	1992-1996	1992-1998	2	
400A Lombrum	1994-1996	1994-1998	2	
401B Apia-B	1993-1996	1993-1998	2	
402A Lautoka	1992-1996	1992-1998	2	
551A San Francisco	1901-1998	1901-1999	1	
556A Crescent City,CA	1951-1984	1951-1999	15	
569A San Diego	1906-1998	1906-1999	1	
217D Las Palmas-D	1992-1994	1992-1998	4	
228A Tenerife	1992-1994	1992-1998	4	1992-1994*
240A Fernandina Beach	1985-1998	1985-1999	1	
242A Key West	1985-1998	1985-1999	1	
245A San Juan	1985-1998	1985-1999	1	
246A Magueyes Island	1985-1998	1985-1999	1	
248A Port-of-Spain	1985-1990	1984-1992	3	
252A Portland,ME	1910-1998	1910-1999	1	
253A Newport,RI	1930-1998	1930-1999	1	
254A Limetree Bay	1984-1998	1984-1999	1	
255A Charlotte Amalie	1984-1996	1984-1999	3	

257A	Settlement Point	1985-1998	1985-1999	1	
259A	Bermuda	1985-1998	1985-1999	1	
260A	Duck Pier,NC	1985-1998	1985-1999	1	
261A	Charleston,SC	1985-1996	1985-1999	3	
264A	Atlantic City,NJ	1911-1998	1911-1999	1	
101A	Mombasa	1986-1997	1986-1998	1	9/1997*
103C	Port Louis-C	1986-1996	1986-1998	2	
104C	Diego Garcia-C	1988-1997	1988-1998	1	
105A	Rodrigues	1986-1997	1986-1998	1	10-12/1997*
108B	Male-B,Hulule	1989-1997	1989-1998	1	
109A	Gan	1987-1997	1987-1998	1	
113A	Masirah	1996-1997	1996-1998	1	1996-1997*
114A	Salalah	1989-1997	1989-1998	1	
117A	Hanimaadhoo	1991-1997	1991-1998	1	
121A	Pt. La Rue	1993-1997	1993-1998	1	10-12/1997*
140A	Kelang	1983-1997	1983-1998	1	
141A	Keling	1984-1997	1984-1998	1	
142A	Langkawi	1985-1997	1985-1998	1	
143A	Lumut	1984-1997	1984-1998	1	
144A	Penang	1984-1997	1984-1998	1	
148A	Ko Taphao Noi	1985-1995	1985-1998	3	
149B	Lamu-B	1995-1997	1995-1998	1	
150A	Nosy Be	1987-1994	1987-1998	4	
151A	Zanzibar	1984-1997	1984-1998	1	
168A	Darwin	1984-1996	1984-1998	2	
171A	Cocos	1985-1994	1985-1998	4	
176A	Esperance	1985-1996	1985-1998	2	
181A	Durban	1970-1993	1970-1996	3	
184A	Port Elizabeth	1985-1992	1985-1996	4	

*denotes month/year when existing data (1998 final set) were replaced for the 1999 final set due to reference level correction.
#denotes a replacement using a redundant sensor.

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