The Permanent Service for Mean Sea Level (PSMSL)

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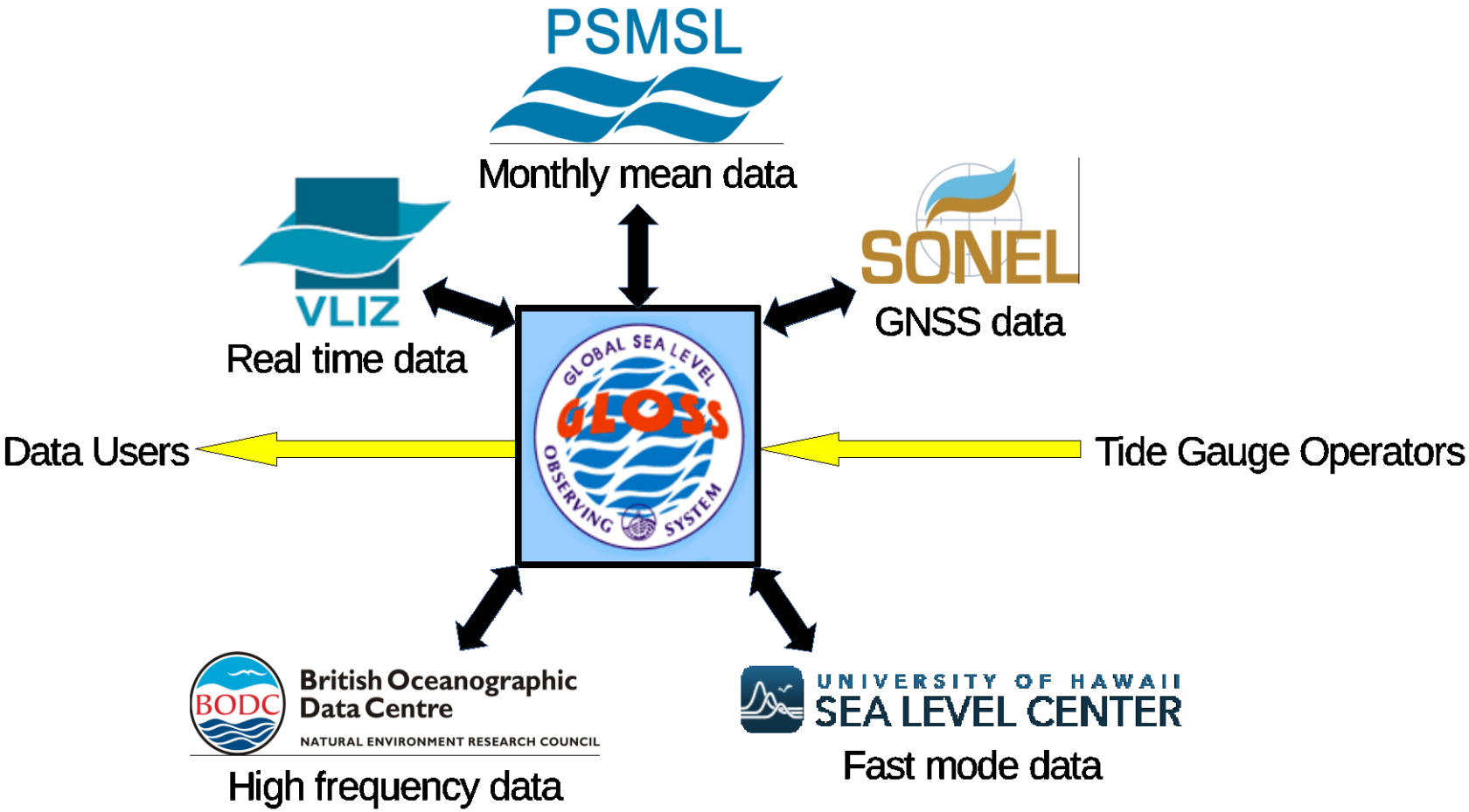
The Wider Sea Level Community

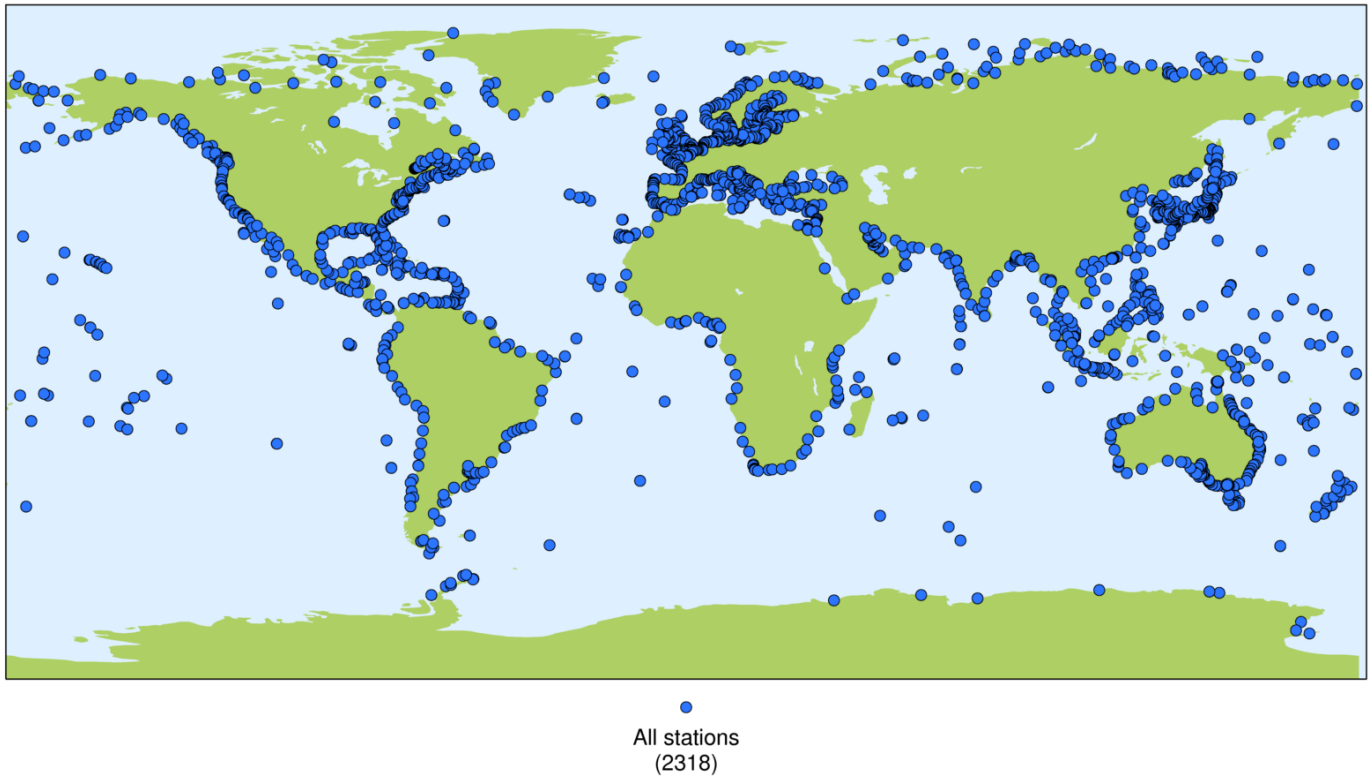


The PSMSL

- Founded in 1933 under the auspices of the International Council for Science
- Committee formed "For the study of tides and tidal currents, of other movements of the sea surface and of currents of different origins..."
- This was about ocean dynamics and land movement, not monitoring sea level rise.
- 1936 – decided to produce a volume of globally collected monthly and annual sea level with updates every 5 years.
- Much of the work fell to the secretary of the committee – Professor Proudman of the Liverpool Tidal Institute, now NOC.

The PSMSL Dataset Today

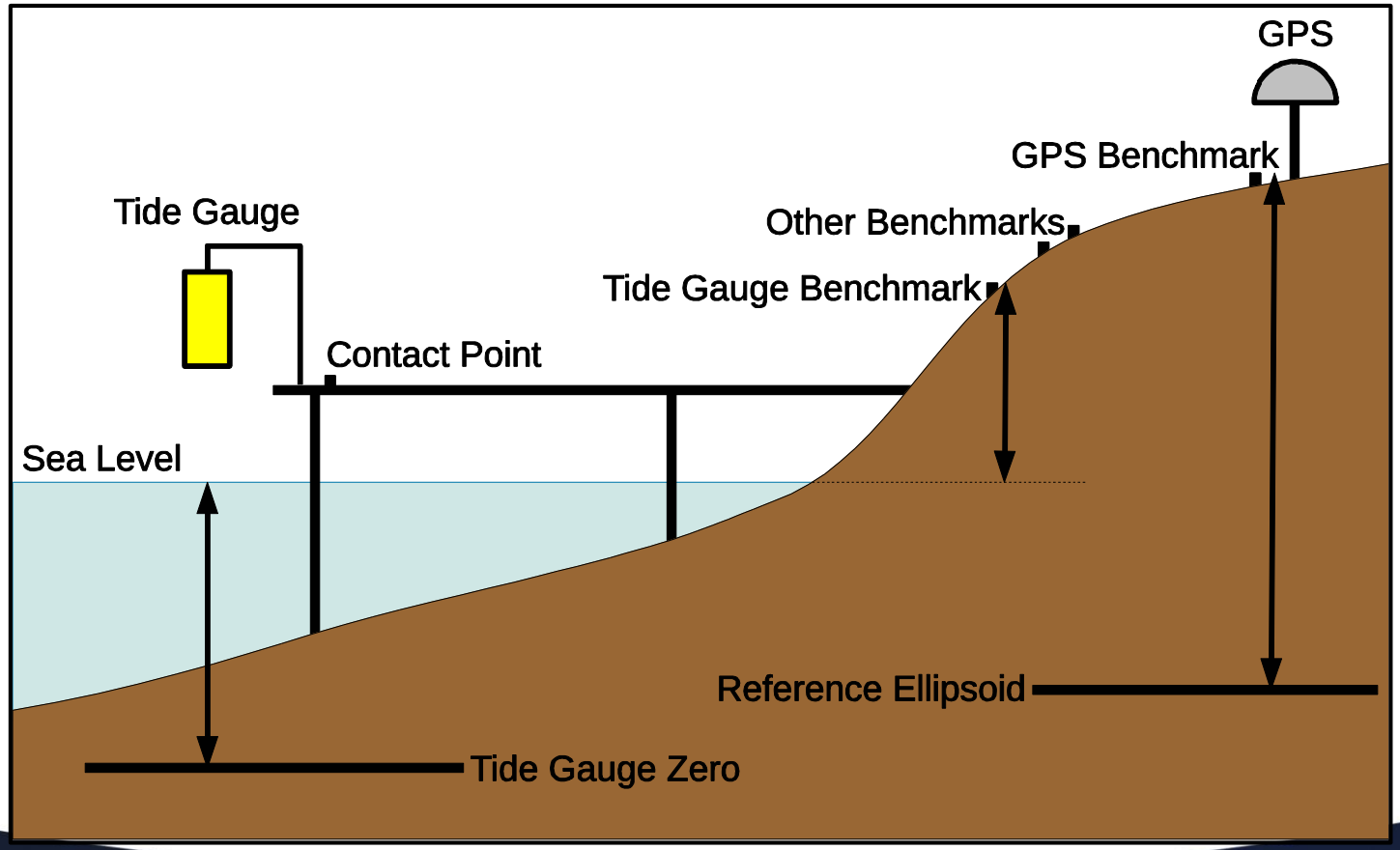
- Contains 54000 station years from >2000 different sites in 200 different countries



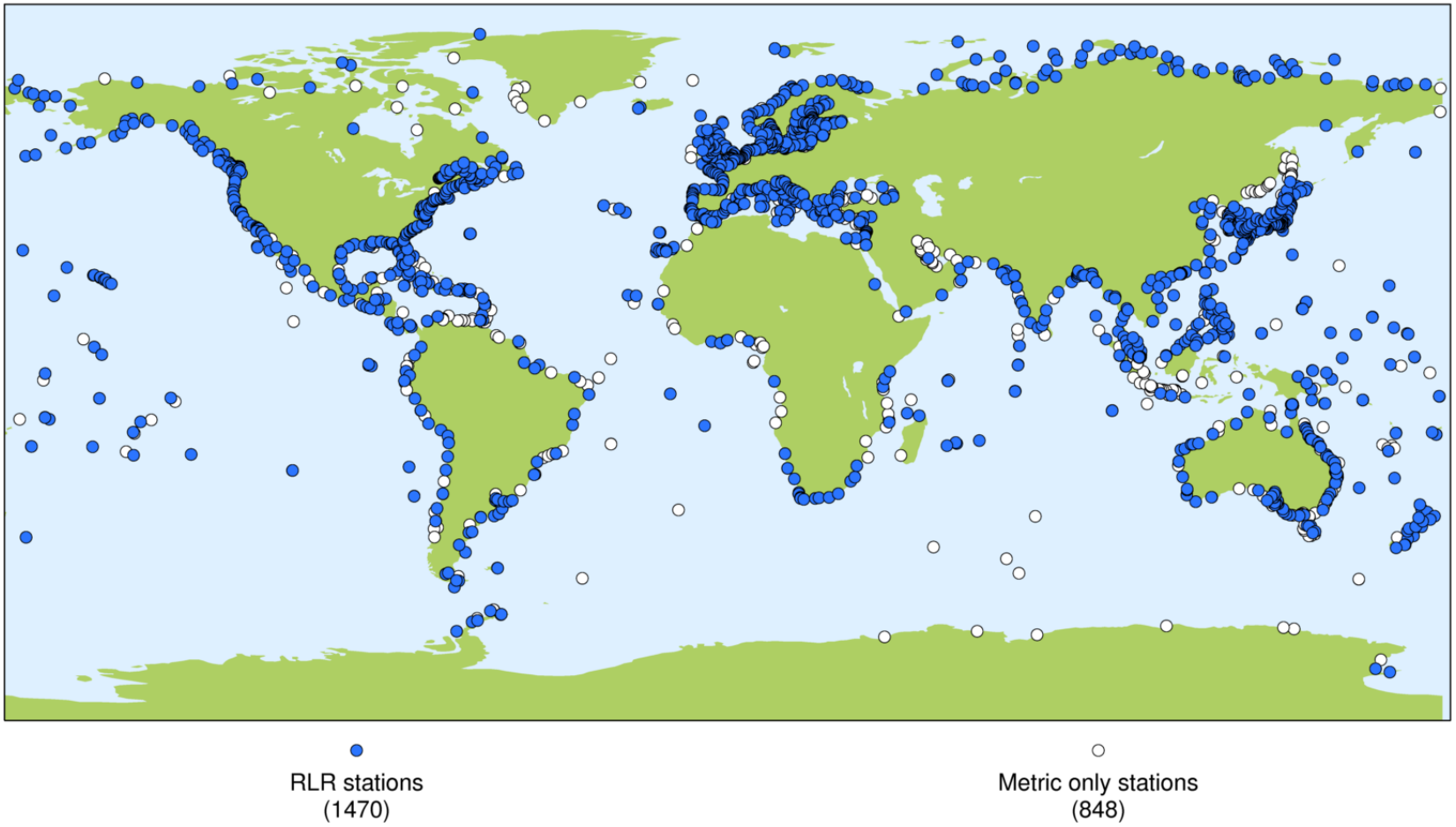
- All data are freely available for use without restriction from www.psmsl.org, which is updated every Wednesday.

PSMSL Datasets

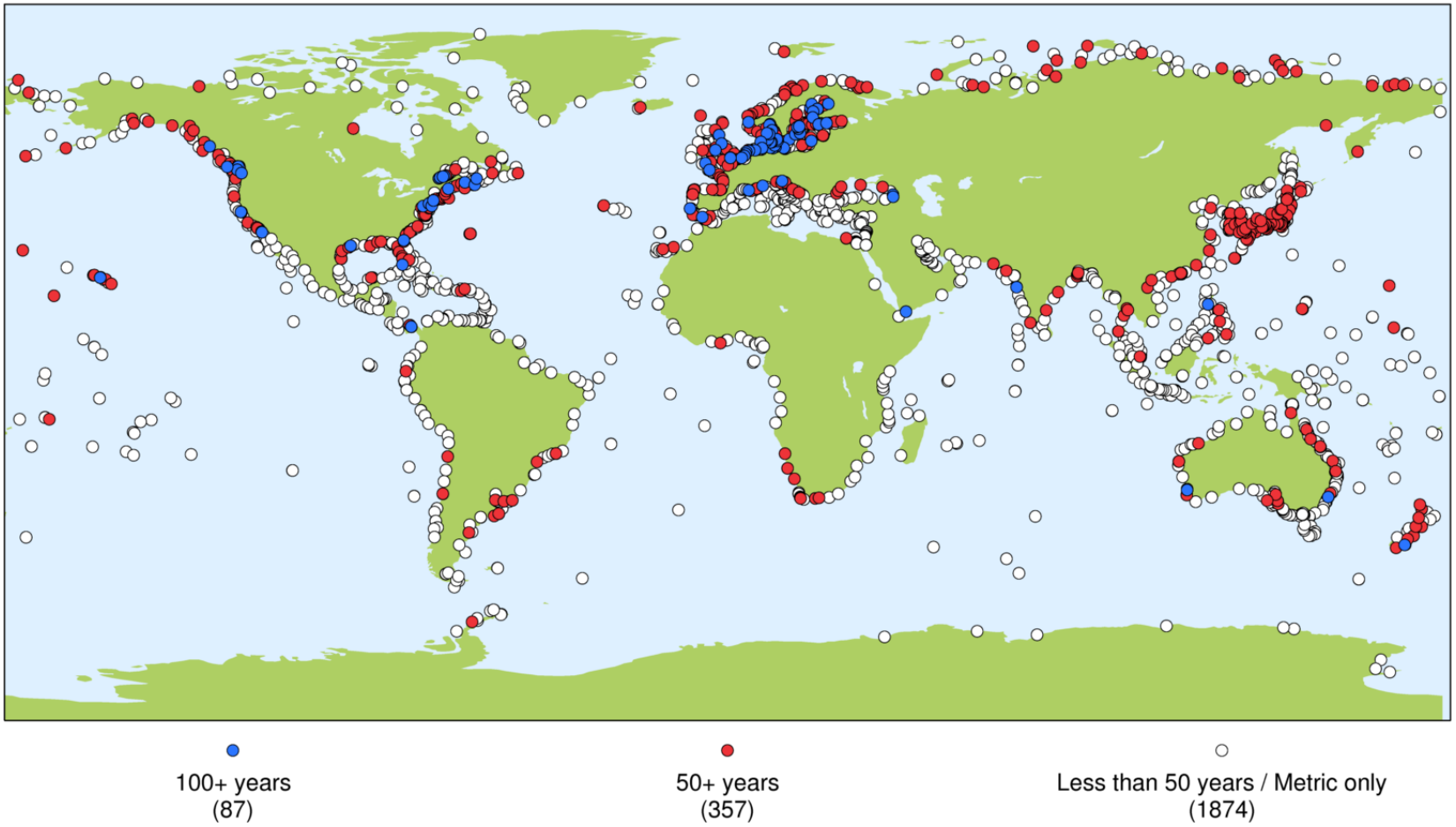
- Where possible, all data for a station are related through time to a consistent set of locally defined benchmarks.
- Two main datasets: (1) Revised Local Reference (RLR): with datum control (2) Metric: no datum control



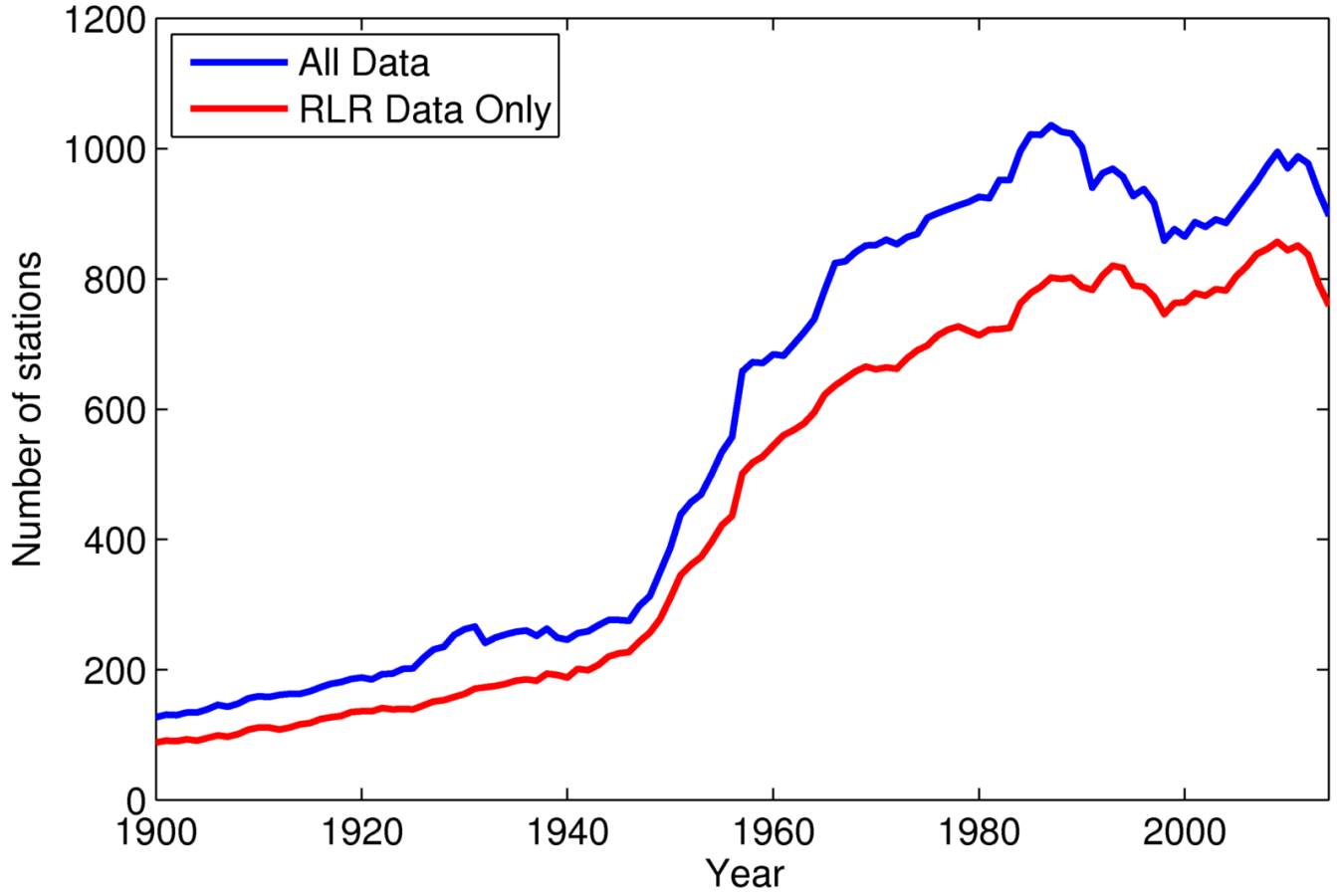
RLR (Datum Controlled) Dataset



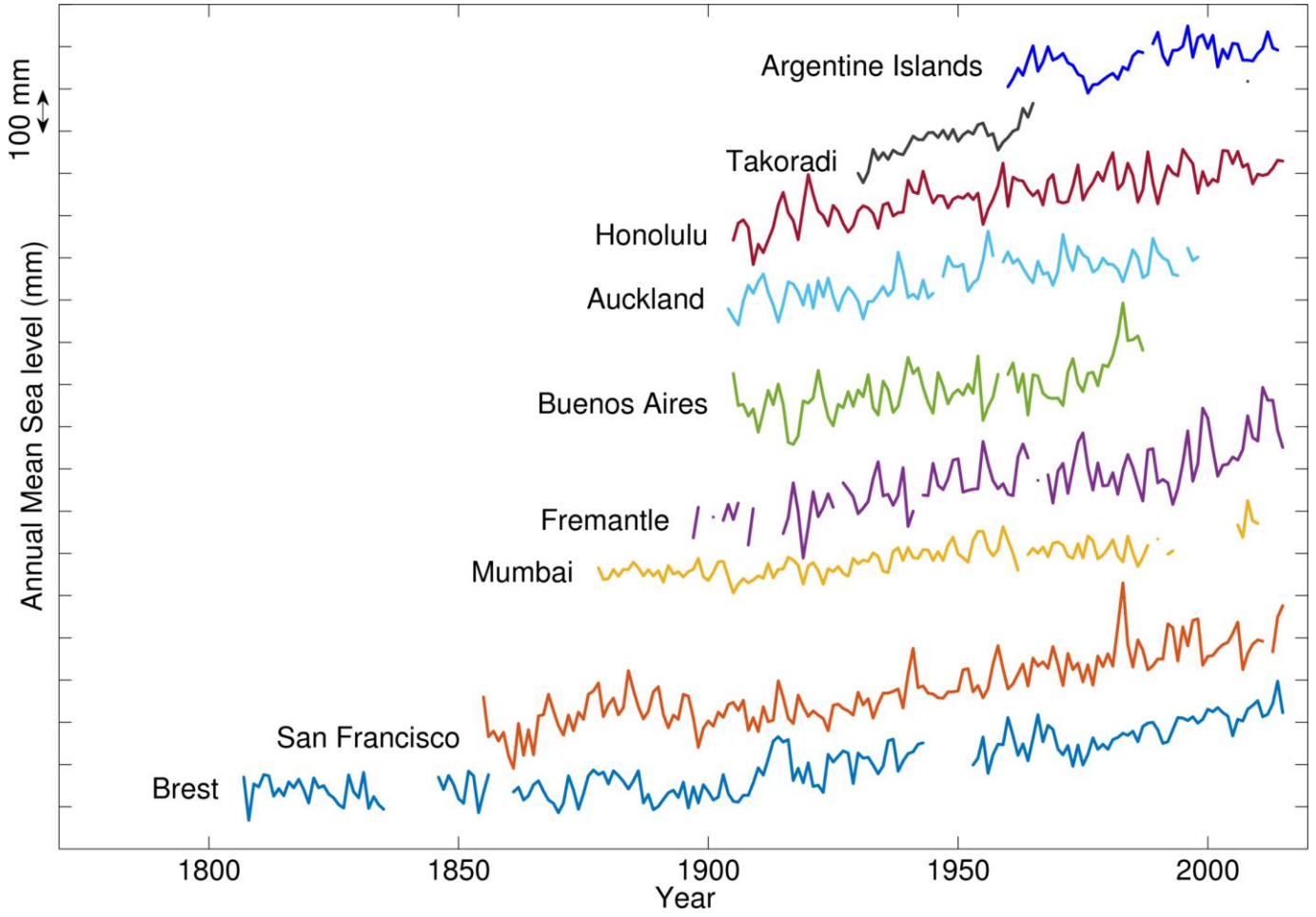
Longer RLR Records



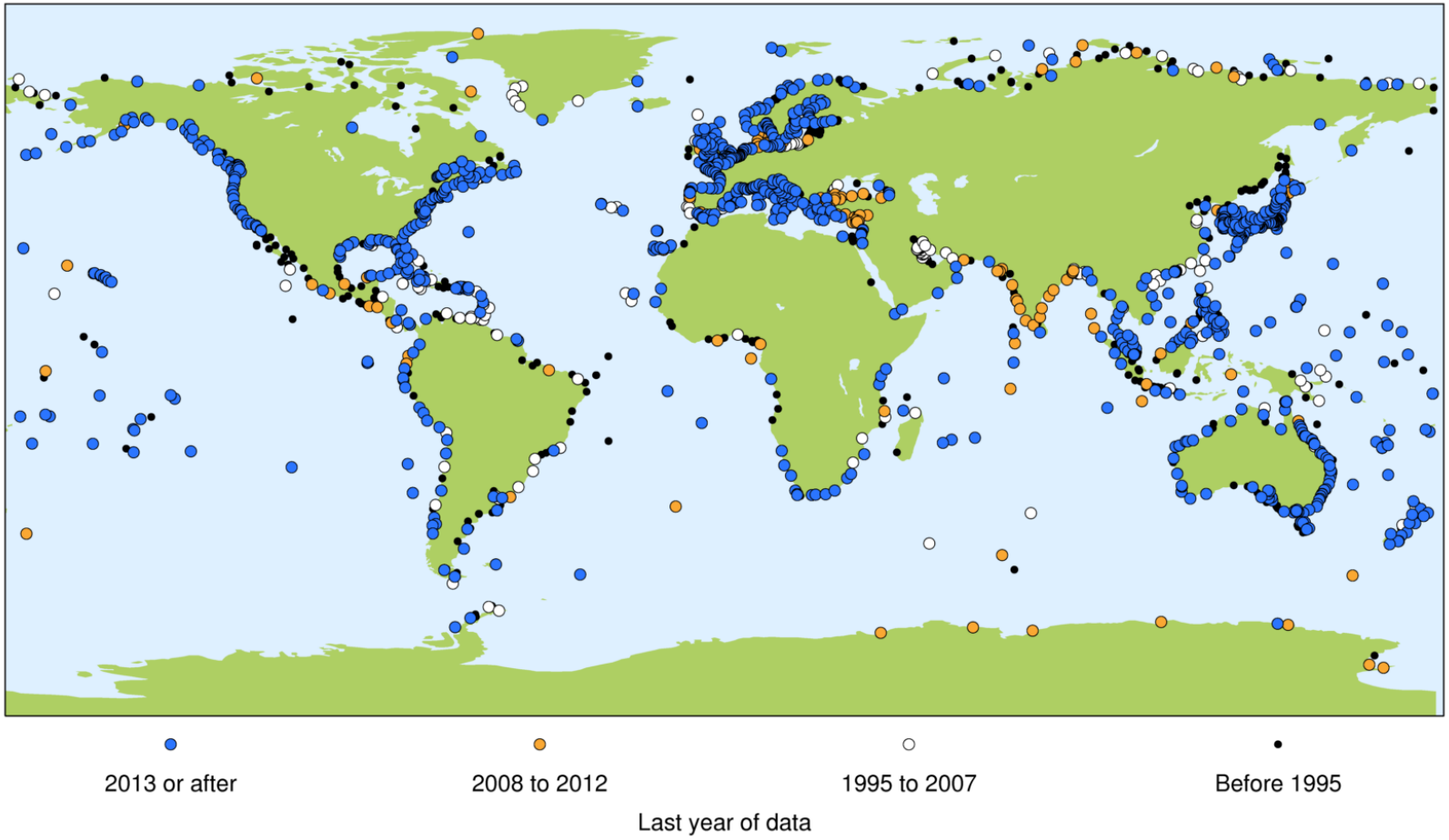
Number of stations per year



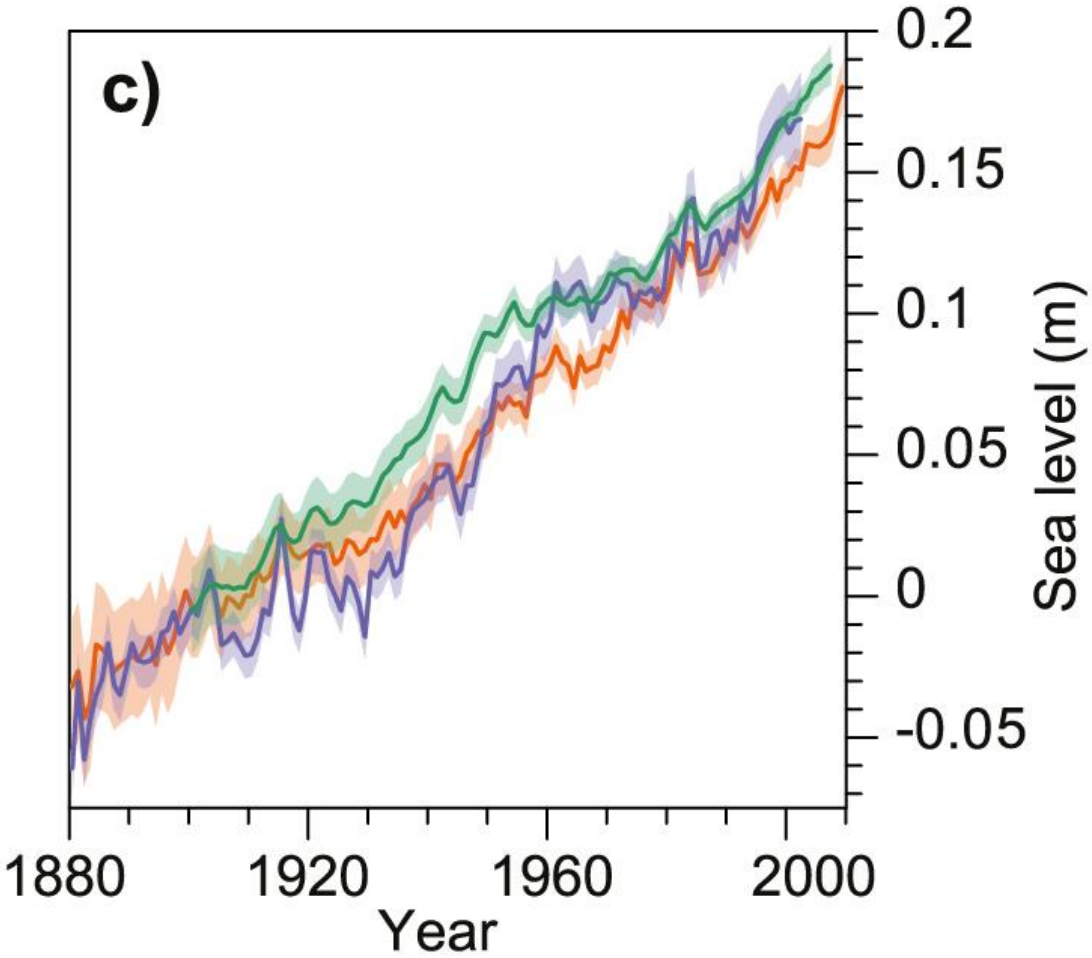
PSMSL Data


Argentine Islands
Takoradi
Honolulu
Auckland
Buenos Aires
Fremantle
Mumbai
San Francisco
Brest
100 mm
Annual Mean Sea level (mm)
1800
1850
1900
1950
2000
Year

Latest Available Data

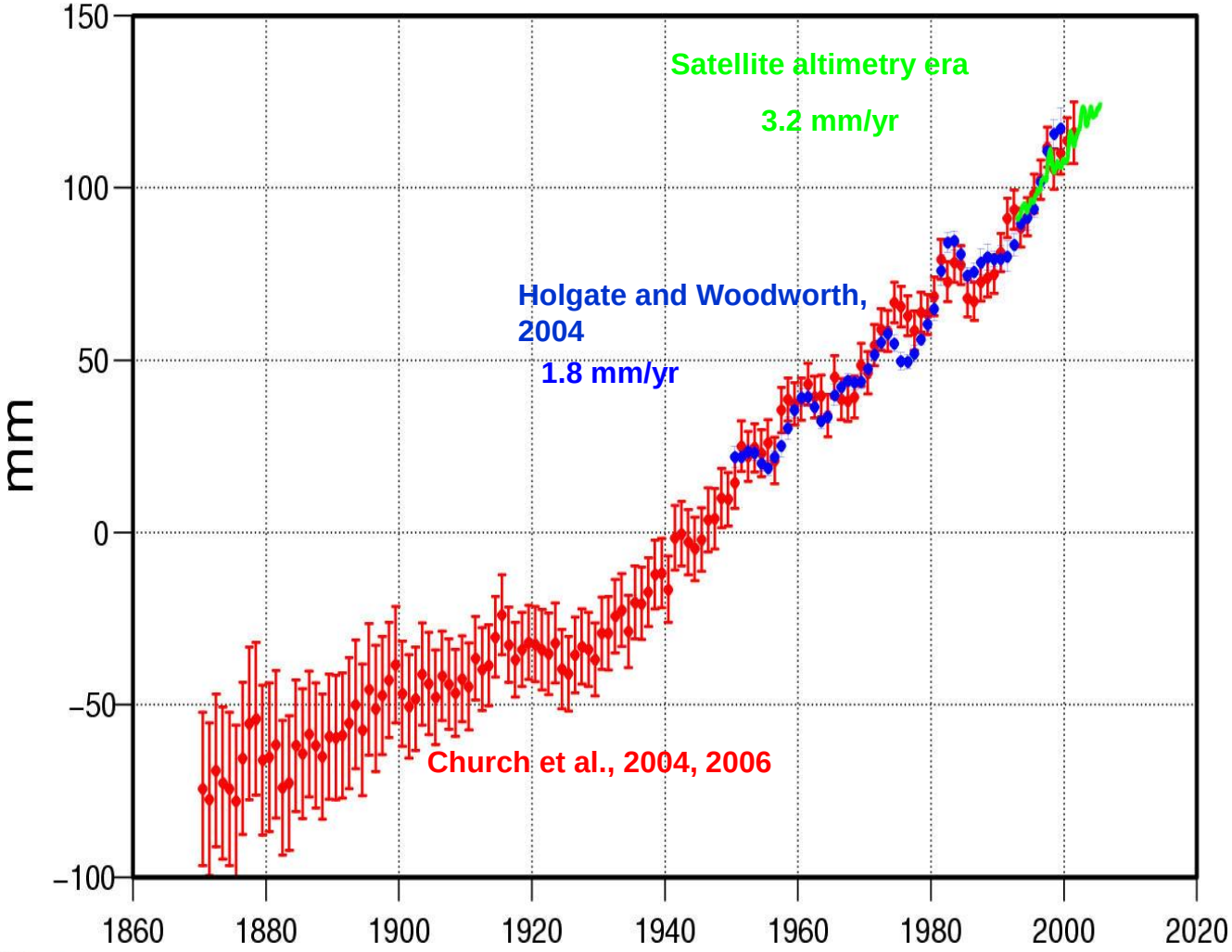


Use of PSMSL data

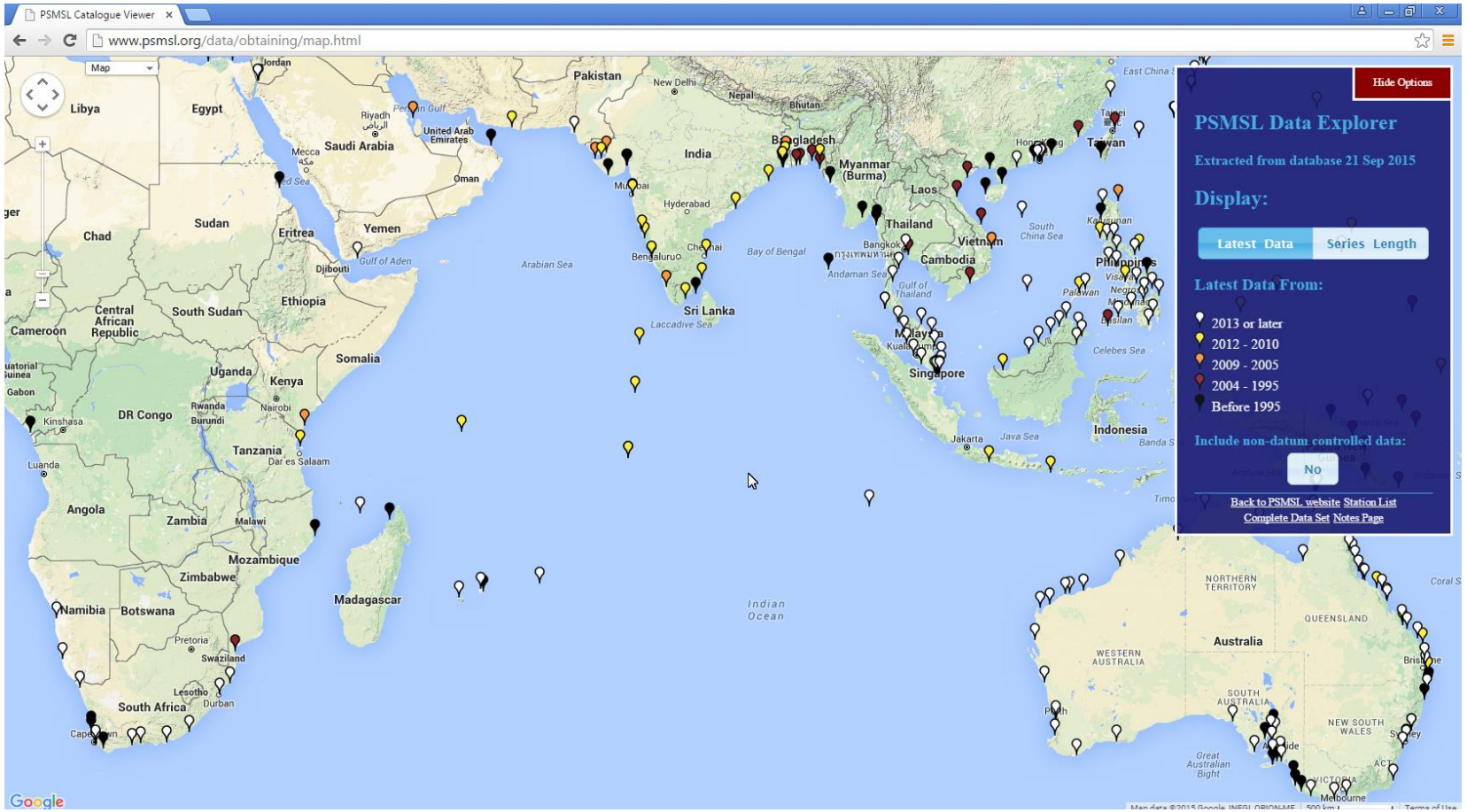


Global Mean Sea Level reconstructions: from IPCC AR5 Chapter 13

Use of PSMSL data



Data Explorer
www.psmsl.org/data/obtaining/map.html



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Extracted from Database
03 Oct 2016

Other Links

Obtaining Tide Gauge Data

Referencing PSMSL data

When using the tide gauge data set from the PSMSL, we ask that you reference the last paper describing the data set, as well as the data set itself. As an example, "the tide gauge data [Holgate et al., 2013; PSMSL, 2016] show that ...". See our referencing recommendation for more information.

To obtain individual records, click on the appropriate Station ID in the table below and go to the Data section of the next page. The PSMSL help file is available to

- Describe the terminology used
- Explain the differences between the Metric and RLR data sets

More information on the data files and plots found in the links to the individual station pages below is available in a notes page. The listing is in coastline/station code order (essentially west to east around the world) from which RLR data and information can be obtained. We have created a separate page that lists stations with only Metric data.

Table Notes: If javascript is enabled, click on the headers of the columns below to sort them. A second click on the same column reverses the sort direction. To select more than one column, click the first header then hold down the SHIFT key while clicking on the second and subsequent headers.

The dates listed below refer to the last update of the station record in our database. A date of 01/01/80 indicates that the station record has not been updated since our initial switch to the current database system (ca. 1987).

Station Name	ID	Lat.	Lon.	GLOSS ID	Country	Date	Coastline	Station
REYKJAVIK	638	64.151	-21.940	229	ISL	14/06/2016	010	001
GRINDAVIK	877	63.833	-22.433		ISL	01/01/1980	010	011
TORSHAVN	839	62.017	-6.767	237	FRO	30/10/2007	015	011
BARENTSBURG	541	78.067	14.250	231	SJM	26/01/2016	025	001
BARENTSBURG II (SPITSBERGEN)	547	78.067	14.250	231	SJM	17/01/2003	025	002
NY-ALESUND	1421	78.929	11.938	345	SJM	08/09/2016	025	021
RUSSKAYA GAVAN	711	76.200	62.583	99	RUS	12/07/1994	030	001
RUSSKAIA GAVAN II	710	76.183	62.583	99	RUS	17/01/2003	030	003
BELYI NOS	859	69.600	60.217		RUS	17/01/2003	030	007
BUGRINO	2025	68.800	49.333		RUS	20/07/2010	030	010
KRENKELIA (HEISA OSTROV)	1012	80.617	58.050		RUS	17/01/2003	030	014

Station Metadata (1)
www.psmsl.org/data/obtaining/stations/202.php

NEWLYN

Station Information

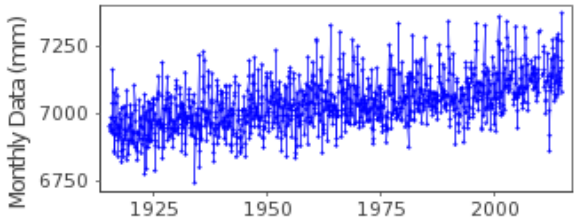
Station ID:	202
Latitude:	50.103
Longitude:	-5.542833
GLOSS ID:	241
Coastline code:	170
Station code:	161
Country:	UNITED KINGDOM
Time span of data:	1915 – 2014
Completeness (%):	99
Frequency Code:	24
Date of last update:	06 May 2015

Green Arrow:	Current Station
Yellow Marker:	Neighbouring RLR Station

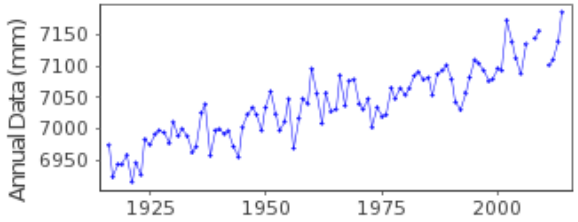
Please note: In many cases, the station position in our database is accurate to only one minute. Thus, the tide gauge may not appear to be on the coast.

Station Metadata (2)
www.psmsl.org/data/obtaining/stations/202.php

Tide Gauge Data



Link to larger image of monthly data plot.
Download monthly mean sea level data.



Link to larger image of annual data plot.
Download annual mean sea level data.

Download metric sea level data. Use only with extreme caution.

NOTE: If some of the data are red in the plots above, the 'flag for attention' is set. Please see the documentation below.

Additional Data Sources (guide to additional data sources)

Nearby GNSS Stations from SONEL: NEWL
Nearby Real Time Stations from VLIZ: newl2
Fast Delivery Data from UHSLC station 294: hourly and daily
Research Quality Data from UHSLC station 294: hourly and daily

Station Documentation

Link to RLR information.

Station Metadata (3)
www.psmsl.org/data/obtaining/rlr.diagrams/202.php

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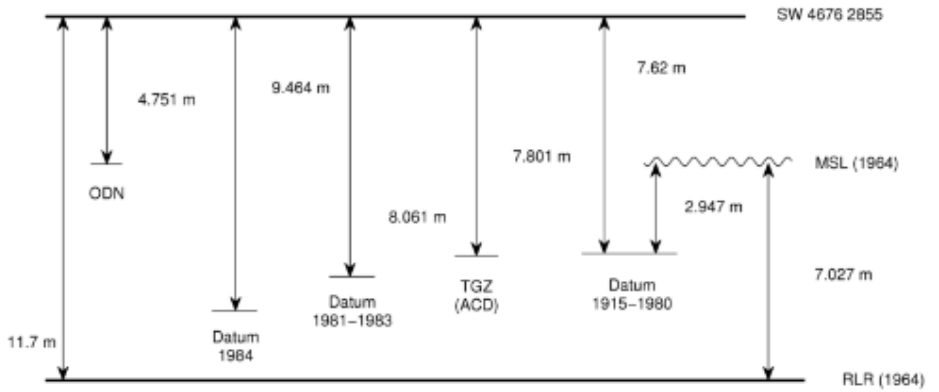
Other Links

- RLR Definition

Revised Local Reference (RLR) Diagram for NEWLYN

Station ID: 202



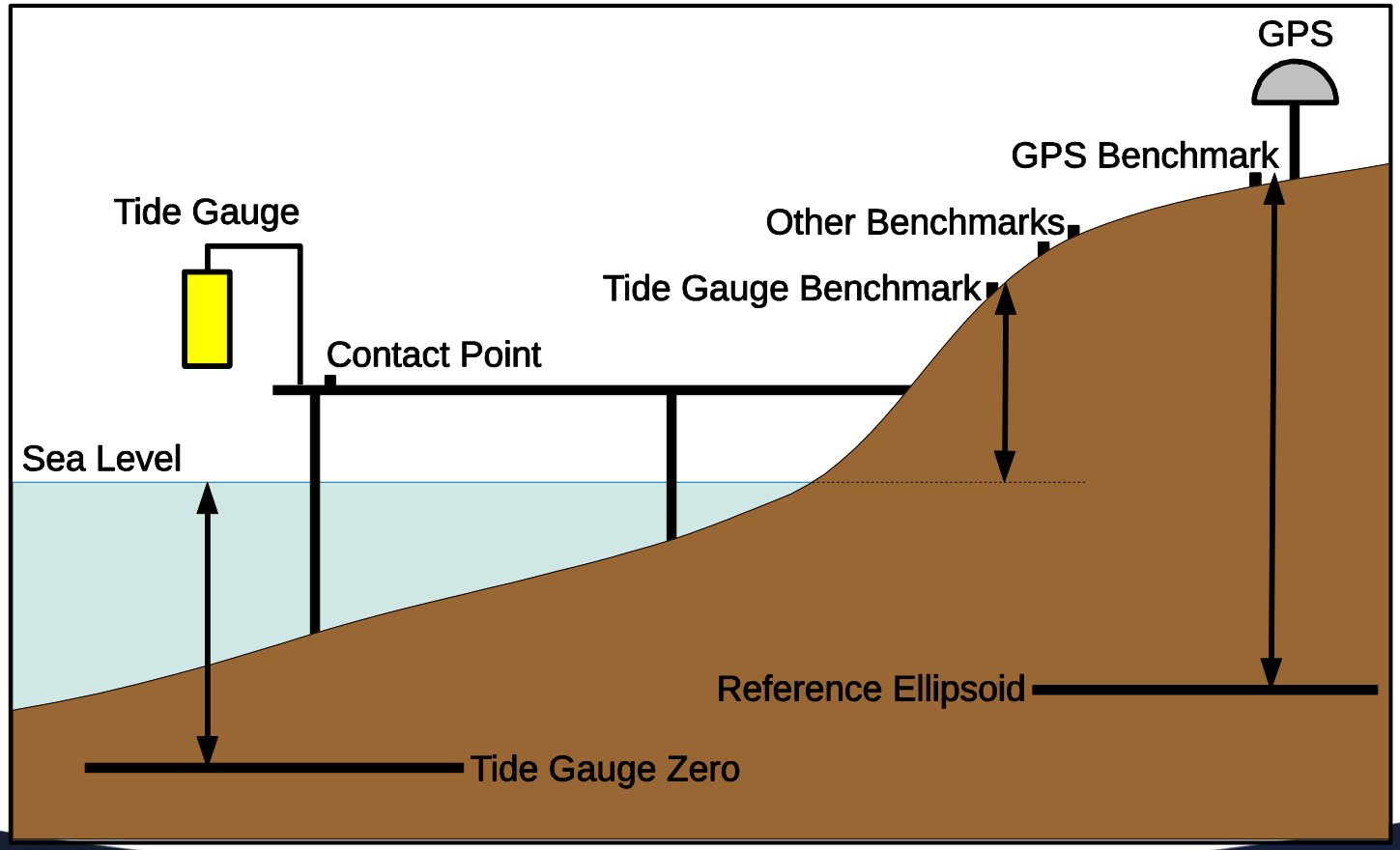
If the image above appears blurry, or you would like to see a larger image, please view the full-sized image of the RLR diagram.

Datum information

Add 4.08m to data values up to 1980 to refer to RLR(1964)
Add 3.639m to data values 1981-1983 to refer to RLR(1964)
Add 2.236m to data values for 1984 to refer to RLR(1964)
Add 3.899m to data values 1985 onwards to refer to RLR(1964)
RLR (1964) is 11.7m below TGBM SW 4676 2855

Reference ellipsoid

- Tide gauge measures relative sea level (i.e. sea level relative to the height of land
- Height of tide gauge relative to reference ellipsoid gives an indication of absolute sea level change

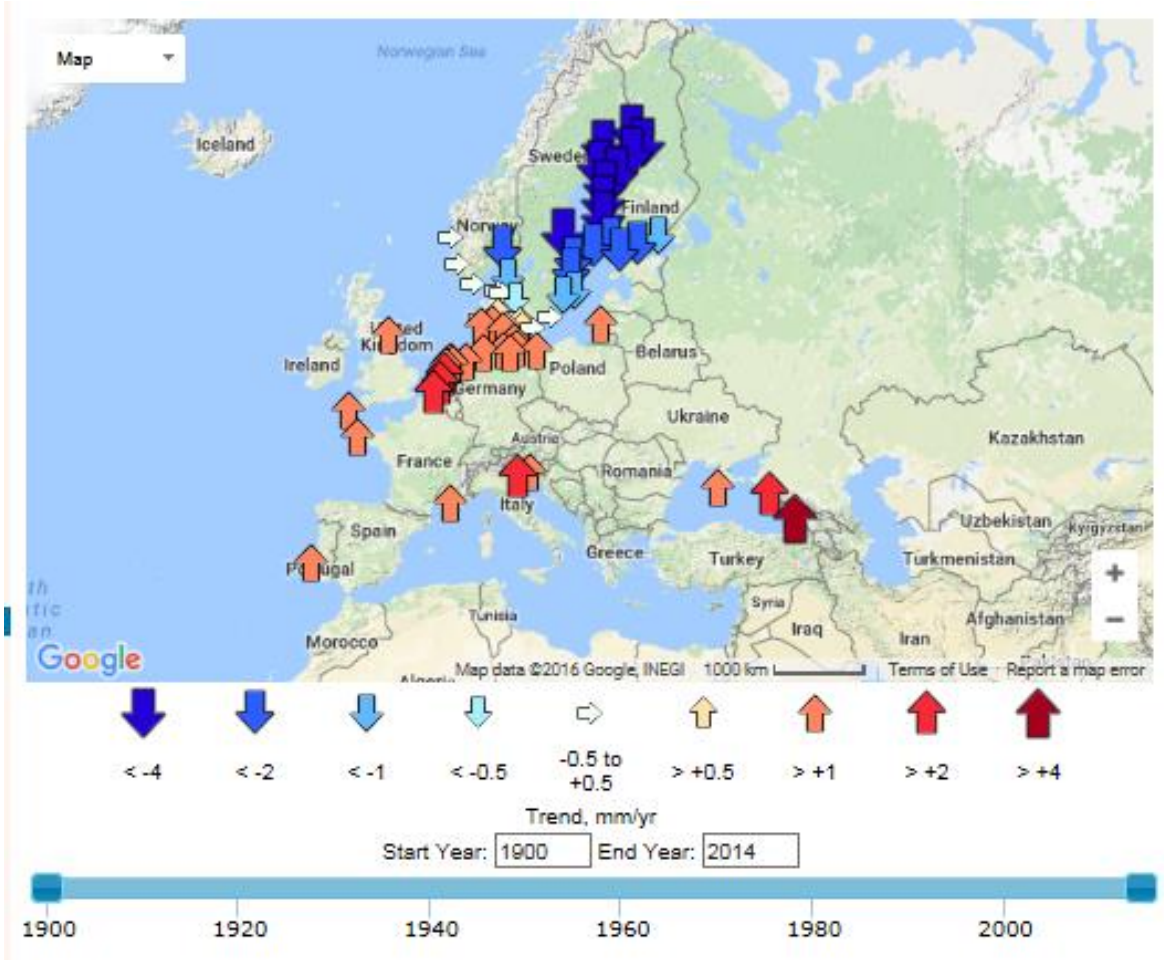


Station Metadata (4)
www.psmsl.org/data/obtaining/rlr.diagrams/202.php

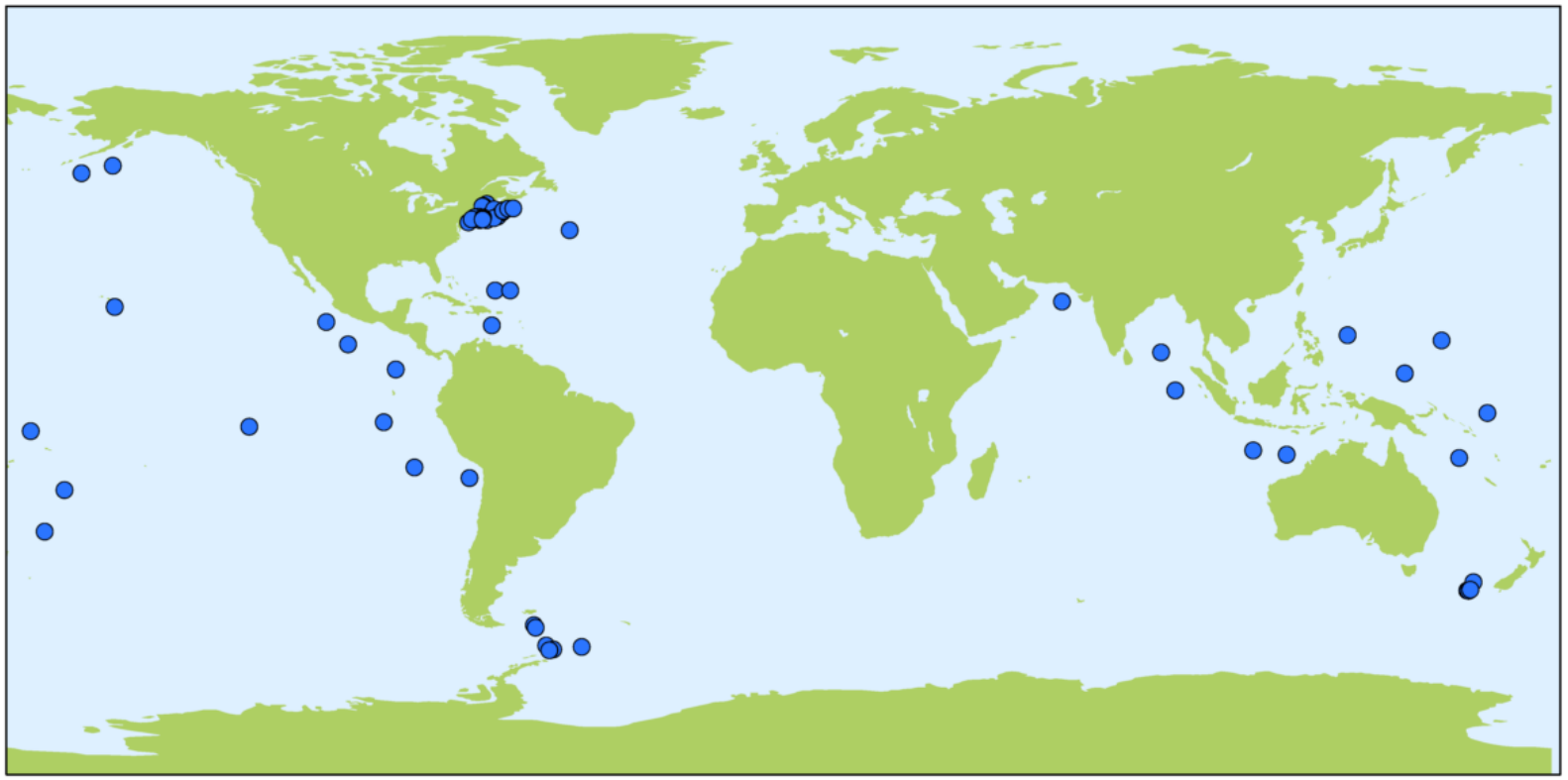
Ellipsoidal information from SONEL (explanation)

RLR Height above ellipsoid:	46.044 ± 0.010 m
Vertical Land Movement Rate:	-0.21 ± 0.13 mm/yr
Epoch:	2008.1569
GPS Solution:	ULR6
GPS Used:	NEWL
GPS Availability:	1998-09-30 to 2016-09-28

Trend Explorer
www.psmsl.org/products/trends/



Bottom Pressure Recorder Dataset



Bottom Pressure Recorder Dataset

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Ocean Bottom Pressure Records

Location	Lat.	Lon.	Reg.	Start Date	End Data	Len.	Long.
Drake Passage North	-54.9464	-58.3405	1.4	1992-11-09	2013-10-05	6513	748
Drake Passage North Deep	-55.5370	-57.9573	4.2	2012-12-14	2015-01-18	771	393
Drake Passage South	-60.8570	-54.7147	4.2	1992-11-08	2011-12-06	7294	755
Drake Passage South Deep	-60.8249	-54.7264	4.2	2009-11-08	2013-12-31	1524	767
Gulf Of Maine - Cape Porpoise	43.2150	-70.2770	1.2	1974-11-19	1975-01-15	56	56
Gulf Of Maine - Cashes Ledge	43.1820	-70.0830	1.2	1974-11-19	1975-01-15	56	56
Gulf Of Maine - Monhegan Basin	43.6720	-69.3780	1.2	1974-11-19	1975-01-15	56	56
Gulf of Maine 1977-78 - Picket A	43.1110	-70.4180	1.2	1977-06-14	1977-10-15	123	123
Gulf of Maine 1977-78 - Picket B	43.1180	-70.4100	1.2	1977-10-16	1978-04-16	182	182
MYRTLE a	-59.7282	-55.4917	4.2	1992-11-13	1996-11-19	1467	1467
MYRTLE b	-60.0497	-47.1700	4.2	1999-10-26	2003-11-03	1468	1468
MYRTLE c	-60.6200	-53.8488	4.2	2005-12-12	2008-01-17	766	766
Nantucket Shoals - N1	40.6930	-70.1430	1.2	1979-09-20	1980-04-19	391	211
Nantucket Shoals - N2	40.4930	-70.2130	1.2	1979-03-07	1980-05-24	449	158
Nantucket Shoals - N4	40.2150	-70.3070	1.2	1979-03-20	1980-04-18	487	277
Nantucket Shoals - N5	40.0350	-70.3750	1.2	1979-03-20	1980-04-17	391	209
NDBC 23228 - Arabian Sea	20.7990	65.3470	3.2	2011-10-27	2013-12-01	762	431
NDBC 23401 - 600 NM West-Northwest of Phuket, Thailand	8.9050	88.5370	3.1	2006-12-04	2013-08-21	1995	1011
NDBC 32401 - 260 NM WSW of Arica, Chile	-20.4730	-73.4290	2.3	2005-03-23	2014-11-27	3022	1166

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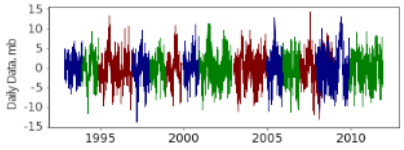
Drake Passage South

Information

Latitude:	-60.8570
Longitude:	-54.7147
Start of first deployment:	1992-11-08
End of last deployment:	2011-12-06
Ocean region:	4.2

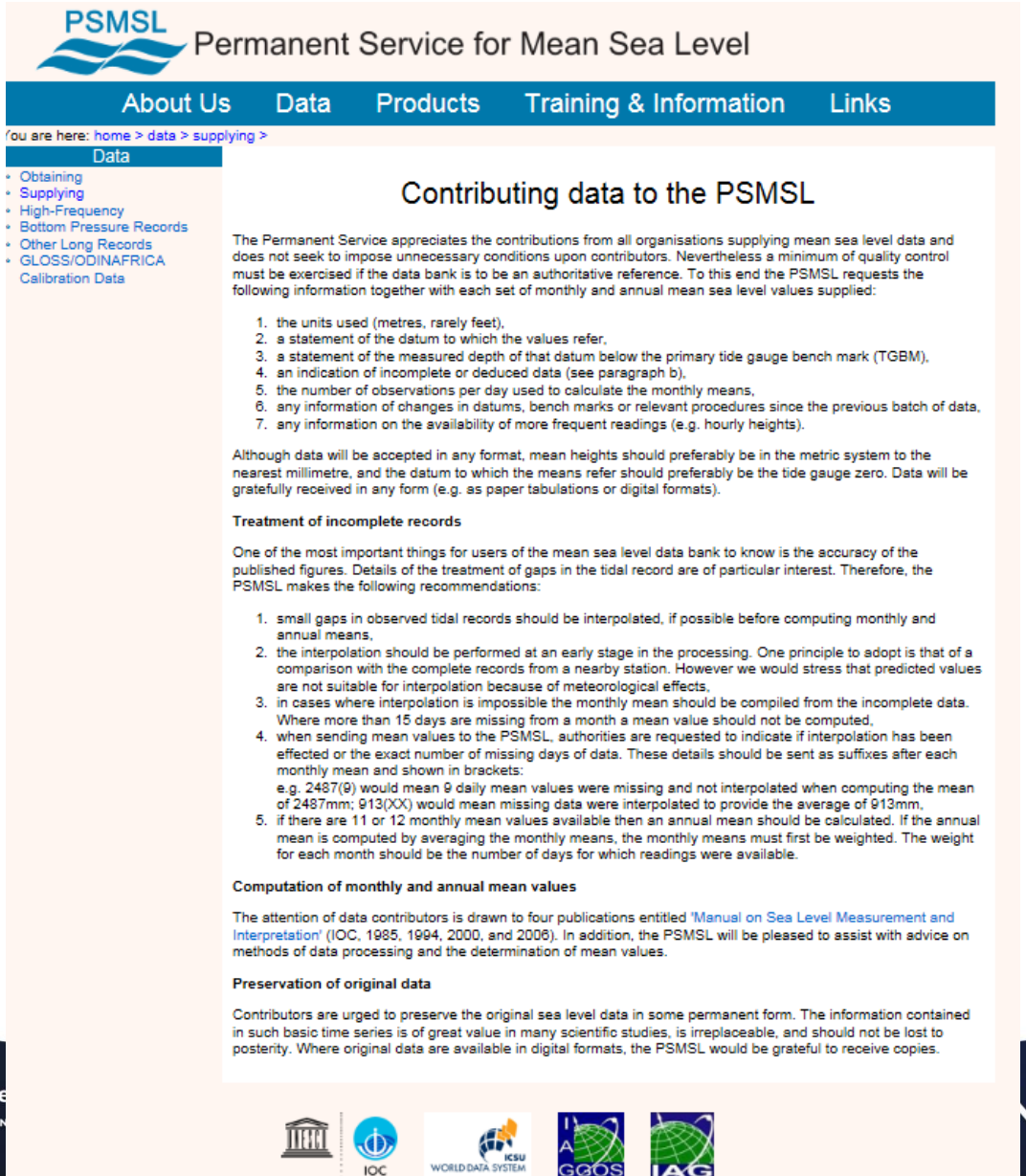
Green arrow: Current Bottom Pressure Location
Yellow Marker: Other Bottom Pressure Location

All Data



All Best Hourly
All Best Daily

www.psmsl.org/data/supplying/



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Contributing data to the PSMSL

The Permanent Service appreciates the contributions from all organisations supplying mean sea level data and does not seek to impose unnecessary conditions upon contributors. Nevertheless a minimum of quality control must be exercised if the data bank is to be an authoritative reference. To this end the PSMSL requests the following information together with each set of monthly and annual mean sea level values supplied:

1. the units used (metres, rarely feet),
2. a statement of the datum to which the values refer,
3. a statement of the measured depth of that datum below the primary tide gauge bench mark (TGBM),
4. an indication of incomplete or deduced data (see paragraph b),
5. the number of observations per day used to calculate the monthly means,
6. any information of changes in datums, bench marks or relevant procedures since the previous batch of data,
7. any information on the availability of more frequent readings (e.g. hourly heights).

Although data will be accepted in any format, mean heights should preferably be in the metric system to the nearest millimetre, and the datum to which the means refer should preferably be the tide gauge zero. Data will be gratefully received in any form (e.g. as paper tabulations or digital formats).

Treatment of incomplete records

One of the most important things for users of the mean sea level data bank to know is the accuracy of the published figures. Details of the treatment of gaps in the tidal record are of particular interest. Therefore, the PSMSL makes the following recommendations:

1. small gaps in observed tidal records should be interpolated, if possible before computing monthly and annual means,
2. the interpolation should be performed at an early stage in the processing. One principle to adopt is that of a comparison with the complete records from a nearby station. However we would stress that predicted values are not suitable for interpolation because of meteorological effects,
3. in cases where interpolation is impossible the monthly mean should be compiled from the incomplete data. Where more than 15 days are missing from a month a mean value should not be computed,
4. when sending mean values to the PSMSL, authorities are requested to indicate if interpolation has been effected or the exact number of missing days of data. These details should be sent as suffixes after each monthly mean and shown in brackets:
   e.g. 2487(9) would mean 9 daily mean values were missing and not interpolated when computing the mean of 2487mm; 913(XX) would mean missing data were interpolated to provide the average of 913mm,
5. if there are 11 or 12 monthly mean values available then an annual mean should be calculated. If the annual mean is computed by averaging the monthly means, the monthly means must first be weighted. The weight for each month should be the number of days for which readings were available.

Computation of monthly and annual mean values

The attention of data contributors is drawn to four publications entitled 'Manual on Sea Level Measurement and Interpretation' (IOC, 1985, 1994, 2000, and 2006). In addition, the PSMSL will be pleased to assist with advice on methods of data processing and the determination of mean values.

Preservation of original data

Contributors are urged to preserve the original sea level data in some permanent form. The information contained in such basic time series is of great value in many scientific studies, is irreplaceable, and should not be lost to posterity. Where original data are available in digital formats, the PSMSL would be grateful to receive copies.

http://www.psmsl.org/

Try it out!