

Australian National Report to the XVIth GLOSS Group of Experts Meeting held at Busan, 11th-13th April 2019

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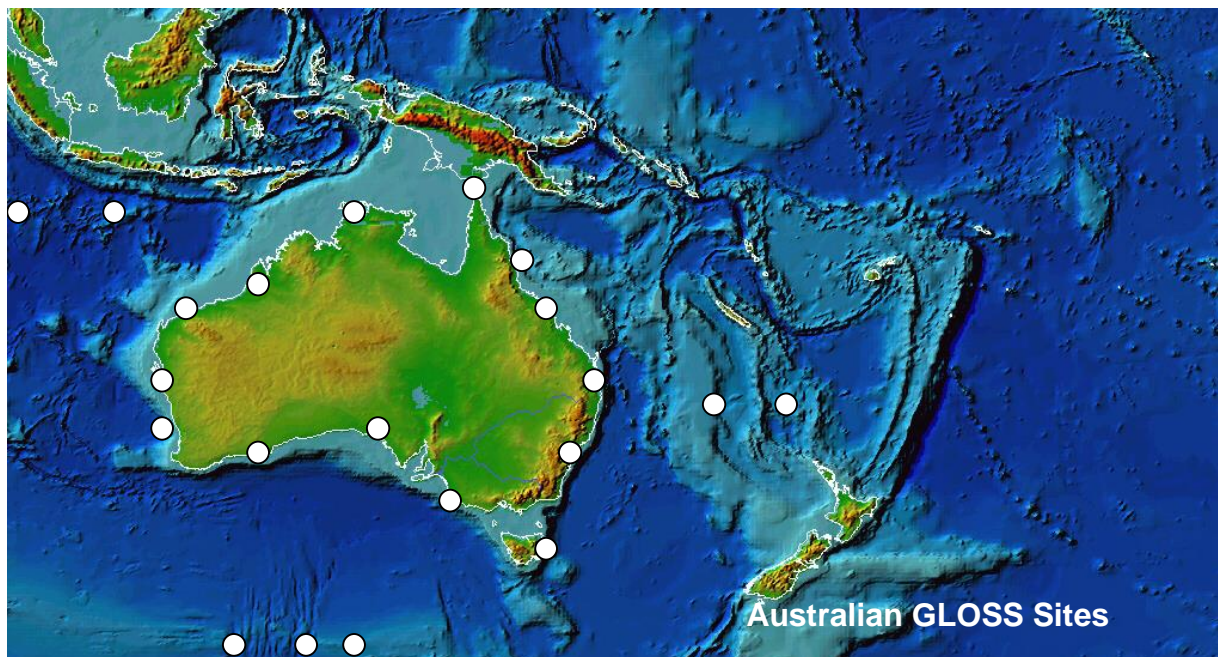
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<http://www.bom.gov.au/oceanography/tides.shtml>

Australia has over 130 operational sea level stations distributed around the continent, in Antarctica and on island territories. Most of these stations have been operating for over thirty years, some for many years longer and in the cases of Fort Denison in Sydney harbour and Fremantle near Perth, near to one hundred years. In Figure 1 each dot represents a station attributed to the Australian domain of responsibility in the GLOSS core network. There are 22 stations and Table 1 lists these and their locations. All stations are operational but for Christmas Is. where there are concerns over the benchmark network and thus is not a station operating yet to GLOSS standards. This issue will be resolved in the near future.



GLOSS Number	Station name	Location	Operator	GNSS
61	Booby Island	10° 36.1520' S 141° 54.6080' E	AMSA	
58	Brisbane	27° 22' S 153° 10' E	MSQ	
40	Broome	18° 00' 03.0"S 122° 13' 07.1"E	BoM	Y
59	Bundaberg	24° 45.40' S 152° 24.20' E	BPA	
52	Carnarvon	24° 53' 55.3"S 113° 39' 03.7"E	DPI	
278	Casey	66° 17' S 110° 32' E	AAD	
47	Christmas Is	10° 25' 45.87"S 105° 40' 09.74"E	BoM	
46	Cocos Is	12° 07' 07.1"S 96° 53' 30.9"E	BoM	Y
62	Darwin	12° 28' 18.4"S 130° 50' 45.1"E	BoM	Y
277	Davis	68° 27' S 77° 58' E	AAD	Y
54	Esperance	33° 52' 15.2"S 121° 53' 43.3"E	BoM	Y
53	Fremantle	32° 03' 56"S 115° 44' 53.3"E	DPI	
148	Lord Howe Is	31° 30' 59.97"S 159° 3'59.97" E	MHL	
130	Macquarie Is	54° 30' S 158° 55' E	AAD	Y

22	Mawson	67° 42' S	62° 51' E	AAD	Y
124	Norfolk Is	29° 3'59.98"S	167° 57'0.00" E	MHL	
51	Port Hedland	20° 19' 03.3"S	118° 34' 27.9"E	PHPA	
55	Portland	38° 20' 36.4"S	141° 36' 47.4"E	BoM	Y
56	Spring Bay	42° 32' 45.1"S	147° 55' 57.8"E	BoM	Y
57	Sydney	33° 51' 16.8"S	151° 13' 32.8"E	SPC	
308	Thevenard	32° 08' 56.2"S	133° 38' 28.8"E	BoM	Y
60	Townsville	19° 15' S	146° 50' E	TPA	

Figure 1 and Table 1: GLOSS stations in the Australian region. Those stations which are already collocated with GNSS monitors are designated with a Y. Precise levelling between the tide gauge benchmarks and the CGPS benchmarks is undertaken every 18 months.

There are other GLOSS designated stations in the region that do not belong to Australia but are monitored under an Australian Aid project to the South Pacific Countries. These GLOSS designated stations are shown in Figure 2.

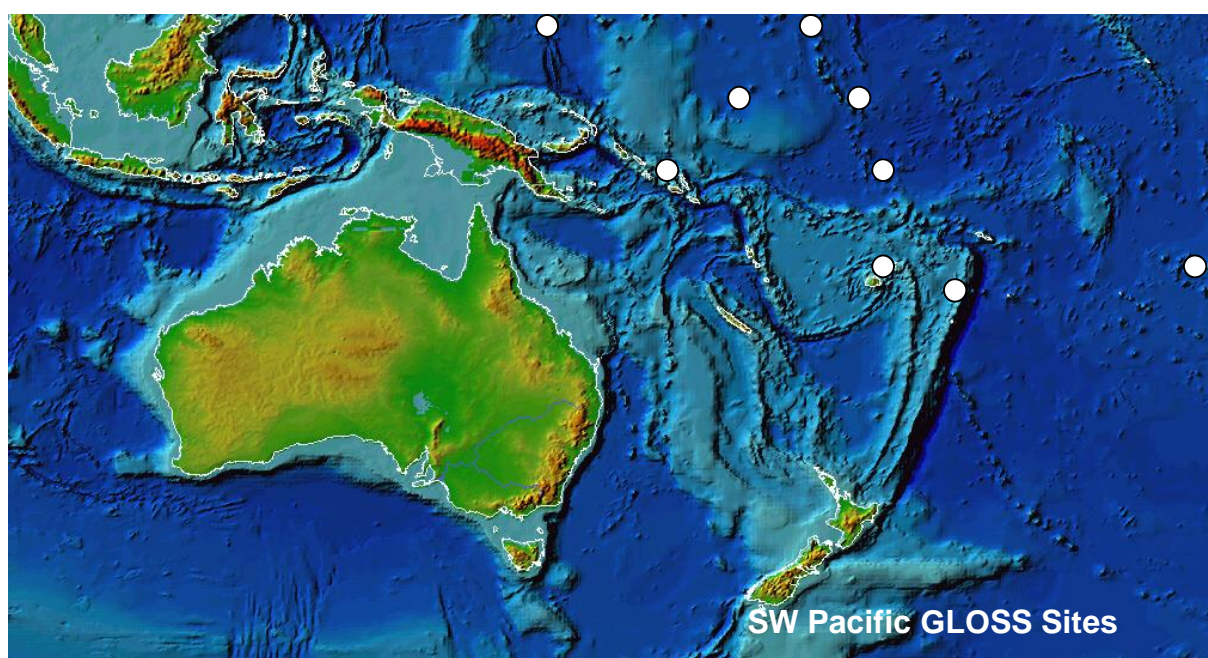
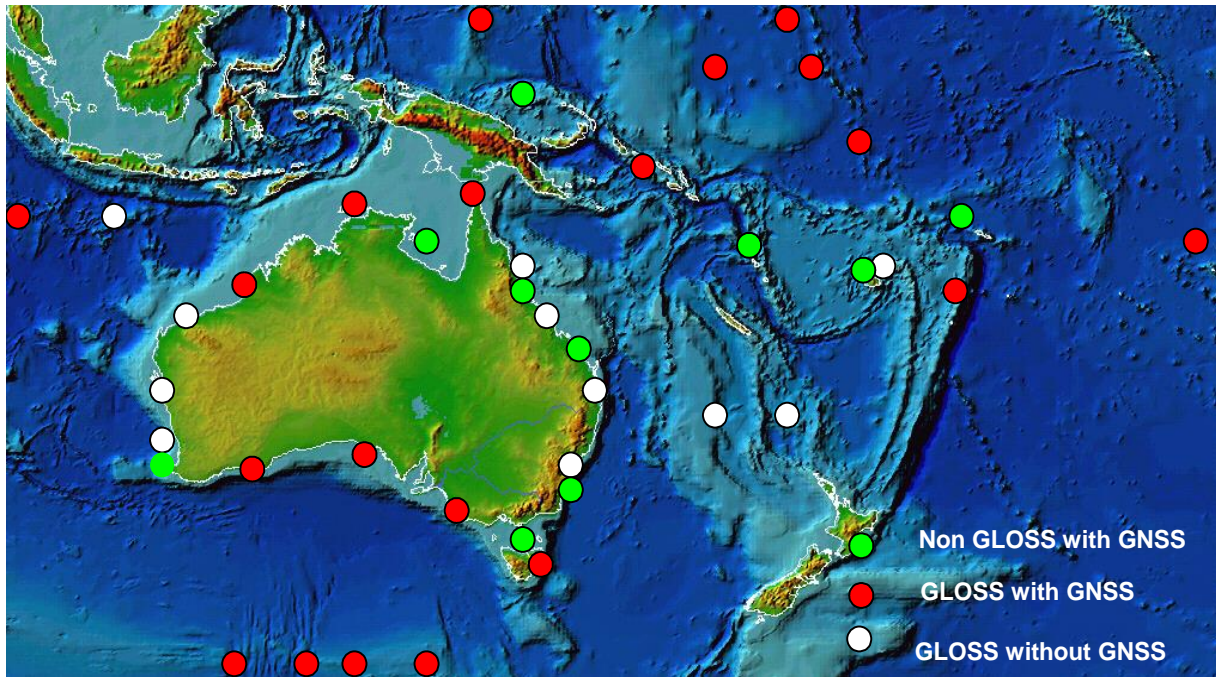


Figure 2 and Table 2: GLOSS core network gauges in the South West Pacific. There are other GLOSS stations in the region operated by other agencies and countries.

GLOSS Number	Station name	Location		Operator	GNSS
139	Rarotonga	21° 12' 17.1"S	159° 47' 5.2"W	BoM	Y
115	Pohnpei	6° 58' 49.9"N	158° 12' 0.8"E	BoM	Y
122	Suva	18° 8' 8.44"S	178° 25' 22.22"E	BoM	
113	Tarawa	1° 21' 54.2"N	172° 55' 58.8"E	BoM	Y
112	Majuro	7° 6' 21.7"N	171° 22' 22.1"E	BoM	Y
114	Nauru	0° 31' 45.9"S	166° 54' 36.2"E	BoM	Y
66	Honiara	9° 25' 44.1"S	159° 57' 19.3"E	BoM	Y
125	Nuku'Alofa	21° 8' 12.5"S	175° 10' 50.5"W	BoM	Y
121	Funafuti	8° 30' 8.9"S	179° 11' 42.6"E	BoM	Y

All these stations with the exception of Suva have collocated GNSS monitoring with precise levelling connections every 18 months.

There are other stations in the Australia and South West Pacific region that are very high quality with GNSS collocated. Figure 3 shows these are located mainly around the Australian mainland where there is considerable stability.



Station name	Location	Operator	GNSS
Groote Eylandt	13° 51' 36.2"S 136° 24' 56.1"E	BoM	Y
Hillarys	31° 49' 32.0"S 115° 44' 18.9"E	BoM	Y
Port Stanvac	35° 06' 31.0"S 138° 28' 01.3"E	BoM	Y
Burnie	41° 03' 0.3"S 145° 54' 54.0"E	BoM	Y
Port Kembla	34° 28' 25.5"S 150° 54' 42.7"E	BoM	Y
Rossllyn Bay	23° 09' 39.7"S 150° 47' 24.6"E	BoM	Y
Cape Ferguson	19° 16' 38.4"S 147° 03' 30.4"E	BoM	Y
Port Vila	17° 45' 19.2"S 168° 18' 27.7"E	BoM	Y
Manus Is	02° 02' 31.5"S 147° 22' 25.6"E	BoM	Y
Lautoka	17° 36' 17.7"S 177° 26' 17.7"E	BoM	Y
Apia	13° 49' 36.4"S 171° 45' 40.7"W	BoM	Y

Figure 3 and Table 3: Non-GLOSS stations that have (Y) GNSS in the Australian and South West Pacific region.

Instrumentation

All the stations in colour in Figure 3 are SEAFRAME gauges that record sea level by two independent sensors, a primary acoustic sensor and a secondary pressure sensor. They also measure atmospheric pressure, air and water temperature and wind speed and direction. For a description of the SEAFRAME station configuration see the monthly data reports at

<http://www.bom.gov.au/oceanography/projects/abslmp/abslmp.shtml>

and

<http://www.bom.gov.au/oceanography/projects/spslcmp/spslcmp.shtml>

The acoustic sea level sensors are calibrated and replaced approximately every 18 months. The connections between tide gauge and CGPS benchmarks are also made on an 18 month cycle.

Data Availability

All one minute primary sea level data is made available via the GTS every 3 minutes using the CREX format for tsunami monitoring purposes. Within the Bureau of Meteorology all the data are ingested and displayed in visual form every minute for network monitoring purposes and quality control. Hourly atmospheric pressure, temperatures and wind gusts are also displayed for operational purposes.

Every month the data are quality controlled and monthly data reports are produced and placed on the above websites. At the same time the monthly statistics and data are compiled, plotted and made available on the web, including all the monthly means, maxima and minima plus elementary statistics.

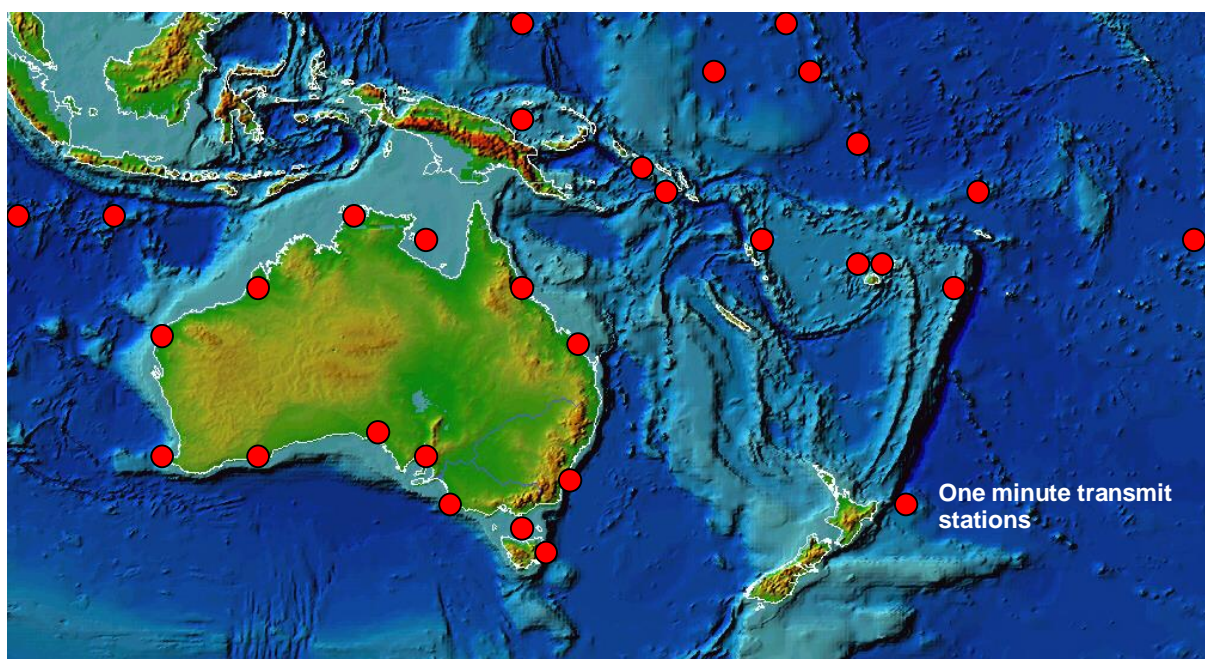
Hourly data of all sea level and meteorological parameters are provided via the Bureau's website at

<http://www.bom.gov.au/oceanography/projects/abslmp/data/index.shtml>

and

<http://www.bom.gov.au/oceanography/projects/spslcmp/data/index.shtml>

These datasets are updated monthly once they have been quality controlled by the NTC.



Those stations that are not operated by the Bureau but are part of the GLOSS core network are generally transmitted to the GLOSS fast data centre at UHSLC once a month due to the need for quality control and lack of resources at some of those port operating agencies.

Geodetic connections are monitored by Geoscience Australia and can be found at

<https://www.ga.gov.au/scientific-topics/positioning-navigation/geodesy/pacificsealevel>

Acronyms

AAD	Australian Antarctic Division
AMSA	Australian Maritime Safety Authority
BoM	Bureau of Meteorology
BPA	Bundaberg Port Authority
DPI	Department for Planning and Infrastructure, WA
MHL	Manly Hydraulics Laboratory, NSW
PHPA	Port Hedland Port Authority
SPC	Sydney Ports Corporation
TPA	Townsville Port Authority