

# **Report to the Fourteenth Session of the IOC Group of Experts On the Global Sea Level Observing System (GLOSS)**

## **Chilean Sea Level Network: Current State**

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### **Introduction**

Since 1941, the Chilean Navy Hydrographic and Oceanographic Service (SHOA) has established a sea level network that currently comprises 40 sea level recorders covering a long coast of more than 4000 kilometers in the mainland, as well as in some islands and the Antarctic Continent (see fig.1).

During the year 2014, two new stations have been installed in order to increase the densification of sea level stations along the coast of Chile, particularly in areas where population centers are located and nearby country's main ports. In 2010 the original network considered 16 stations with an average distance between them of approximately 300 kilometers. Currently the average distance between the 40 stations is roughly 110 kilometers.

Up to date, all the sea level stations operate with a primary and a secondary sea level sensor (mainly a hydrostatic pressure sensor and a radar sensor), as well as redundant transmission system for the collected data.

Regarding telemetry systems, GOES remains the main data transmission system and text messages through cell phone GPRS network, is used as a secondary telemetry system. It should be noted that sea level stations of Caleta Meteoro (Lat: 52° 58' 00"S; Long: 74° 03' 58"W), San Felix Island (Lat: 26° 17' 32"S; Long: 80° 06' 31"W) and Puerto Soberanía (Lat: 62° 28' 00"S; Long: 59° 39' 00"W), are the only stations that have double satellite telemetry systems, GOES and INMARSAT-BGAN, due to the absence in these sectors of GPRS network.

The sampling interval of sea level data is set to 1 minute. The data transmission frequency mostly ranges from 2 to 5 minutes. Usually data is transmitted every 5 minutes via the GOES satellite system and GPRS, while transmission is every 2 minute in those stations that have Inmarsat BGAN antennas.

Currently, San Pedro, (Lat: 47° 43'S ; Long: 74° 54'W) and Rada Covadonga, (Lat: 63° 19'S ; Long: 57° 55'W), are the only sea level stations operating with AANDERAA devices, being the data downloaded in those places during annual field campaigns.

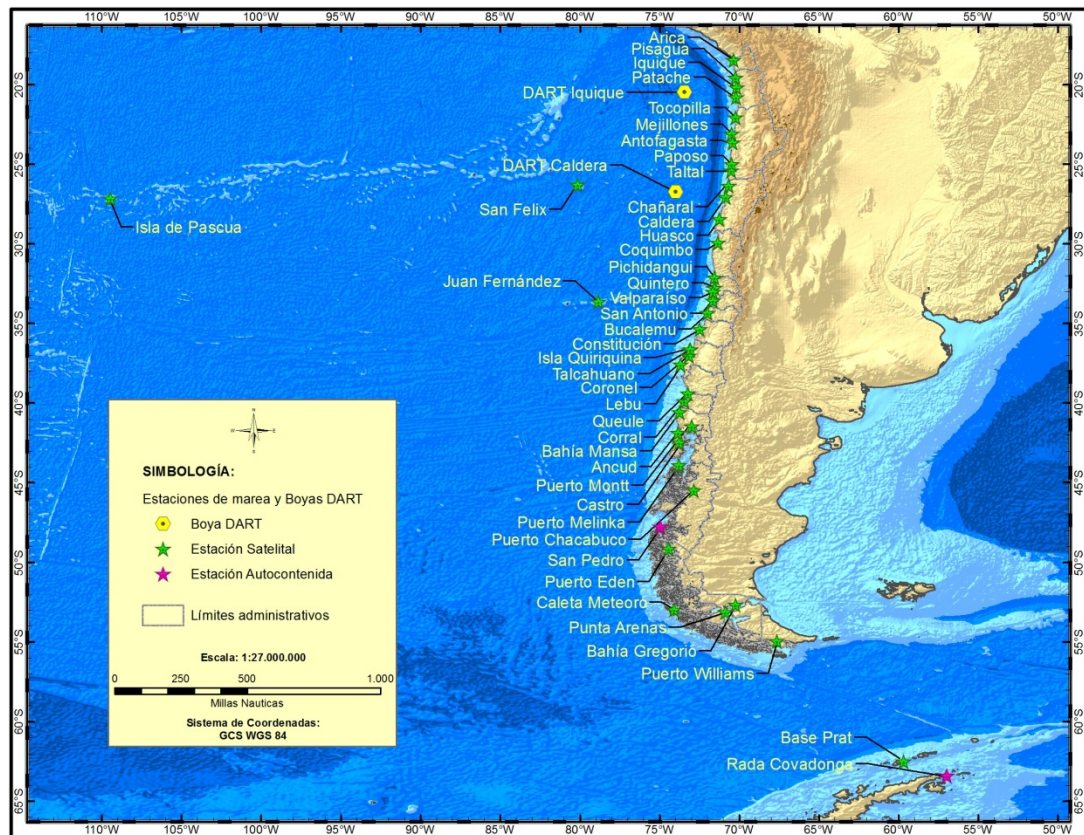


Figure 1: Chilean Sea Level Network

The new stations capabilities have allowed us to achieve a reliable network supplying data for operational and scientific purposes.

The data collected at the Chilean Sea Level Network are available through the website developed and maintained by VLIZ for UNESCO/IOC. Additionally, data can be accessed in real time at SHOA's website through the link: <http://www.shoa.mil.cl/mareas/mapa.php>

Additionally, at SHOA headquarters were installed more powerful data centers to implement a new data management and visualization system, strengthening the capabilities in data availability and response within the framework of the National Tsunami Warning System. Given the critical importance of this network during Tsunami emergencies, a stronger redundancy of all data center is ensured by having backup Servers hosted outside of the main country, by private companies that ensure a 24/7 reliability.

## Chilean Sea Level Stations with real time telemetry

The table below summarizes the geographic location and year of installation of the data collection platforms with real time sea level data transmissions.

Station Name	Latitude	Longitude	Date of installation Satellite platform
Arica	18° 28' 33"	070° 19' 23"	1999
Pisagua	19° 35' 48"	070° 12' 49"	2010
Iquique	20° 12' 16"	070° 08' 52"	1999
Patache	20° 48' 01"	070° 11' 39"	2011
Tocopilla	22° 05' 35"	070° 12' 53"	2010
Mejillones	23° 05' 51"	070° 27' 03"	2011
Antofagasta	23° 39' 11"	070° 24' 16"	1999
Paposo	25° 00' 32"	070° 28' 07"	2013
Taltal	25° 24' 26"	070° 29' 23"	2010
Isla San Félix	26° 17' 32"	080° 06' 31"	1999
Isla de Pascua	27° 09' 17"	109° 28' 22"	1999
Chañaral	26° 21' 24"	070° 38' 46"	2012
Caldera	27° 03' 52"	070° 49' 29"	1999
Huasco	28° 27' 39"	071° 13' 25"	2010
Coquimbo	29° 57' 00"	071° 20' 07"	1999
Pichidangui	32° 08' 08"	071° 31' 46"	2010
Isla Robinson Crusoe	33° 38' 09"	078° 49' 47"	1999
Quintero	32° 46' 32"	071° 31' 31"	2011
Valparaíso	33° 01' 38"	071° 37' 33"	1999
San Antonio	33° 34' 56"	071° 37' 08"	1999
Bucalemu	34° 38' 22"	072° 02' 46"	2014
Constitución	35° 21' 21"	072° 27' 28"	2010
Talcahuano	36° 41' 43"	073° 06' 23"	1999
Isla Quiriquina	36° 38' 10"	073° 03' 25"	2013
Coronel	37° 01' 44"	073° 09' 07"	2012
Lebu	37° 35' 39"	073° 39' 50"	2010
Queule	39° 23' 52"	073° 12' 54"	2013
Corral	39° 52' 42"	073° 25' 22"	1999
Bahía Mansa	40° 34' 51"	073° 44' 14"	2011
Puerto Montt	41° 29' 06"	072° 57' 39"	1999
Ancud	41° 52' 01"	073° 49' 55"	1999
Castro	42° 28' 50"	073° 45' 30"	2011
Melinka	43° 53' 54"	073° 44' 54"	2011
Puerto Chacabuco	45° 28' 02"	072° 49' 13"	2001
Puerto Edén	49° 07' 54"	074° 25' 19"	2011
Punta Arenas	53° 07' 25"	070° 51' 37"	2001
Bahía Gregorio	52° 38' 54"	070° 12' 29"	2014
Caleta Meteoro	52° 58' 00"	074° 03' 58"	2011
Puerto Williams	54° 56' 00"	067° 36' 36"	1999
Base Prat, Antártica	62° 28' 00"	059° 39' 00"	2013

## Status of GLOSS Stations in Chile

The seven Chilean stations that have been considered in the GLOSS core network are as follows :

GLOSS ID.	Location	Status
137	I. Pascua Lat : 27° 09' S Lon: 109° 27' W	<ul style="list-style-type: none"> <li>• Field Unit : VAISALA MAWS110</li> <li>• Sea Level Sensors : - Differential Pressure Transducer DRUCK PTX1830 - Radar model VEGAPULSE62</li> <li>• Record Spans : 1970 – 2014</li> <li>• Gaps : 1980 ; 1982 ; 1983</li> <li>• Monthly Height Data up to 2014, has been sent to PSMSL</li> <li>• Hourly Height Data up to 2014, has been sent to UHSLC</li> </ul>
74	Antofagasta Lat : 23° 39' S Lon: 70° 24' W	<ul style="list-style-type: none"> <li>• Field Unit : VAISALA MAWS110</li> <li>• Sea Level Sensors : - Differential Pressure Transducer DRUCK PTX1830 - Radar model VEGAPULSE62</li> <li>• Record Spans : 1970 – 2014</li> <li>• Gaps :</li> <li>• Monthly Height Data up to 2014, has been sent to PSMSL</li> <li>• Hourly Height Data up to 2014, has been sent to UHSLC</li> </ul>
175	Valparaíso Lat : 33° 02' S Lon: 71° 37' W	<ul style="list-style-type: none"> <li>• Field Unit : VAISALA MAWS110</li> <li>• Sea Level Sensors : - Differential Pressure Transducer DRUCK PTX1830 - Radar model VEGAPULSE62</li> <li>• Record Spans : 1944 – 2014</li> <li>• Gaps : 1971 - 1981</li> <li>• Monthly Height Data up to 2014, has been sent to PSMSL</li> <li>• Hourly Height Data up to 2014, has been sent to UHSLC</li> </ul>
176	I.J.Fernández Lat : 33° 37' S Lon: 78° 50' W	<ul style="list-style-type: none"> <li>• Field Unit : VAISALA MAWS110</li> <li>• Sea Level Sensors : - Differential Pressure Transducer DRUCK PTX1830 - Radar model VEGAPULSE62</li> <li>• Record Spans : 1985 – 2014</li> <li>• Gaps :</li> <li>• Monthly Height Data up to 2014, has been sent to PSMSL</li> <li>• Hourly Height Data up to 2014, has been sent to UHSLC</li> </ul>
177	I.San Félix Lat : 26° 17' S Lon: 80° 07' W	<ul style="list-style-type: none"> <li>• Field Unit : VAISALA MAWS110</li> <li>• Sea Level Sensors : - Differential Pressure Transducer DRUCK PTX1830 - Radar model VEGAPULSE62</li> <li>• Record Spans : 1989 – 2014</li> <li>• Gaps :</li> <li>• Monthly Height Data up to 2014, has been sent to PSMSL</li> <li>• Hourly Height Data up to 2014, has been sent to UHSLC</li> </ul>

GLOSS ID.	Location	Status
178	P.Montt Lat : 41° 29' S Lon: 72° 58' W	<ul style="list-style-type: none"> <li>• Field Unit : VAISALA MAWS110</li> <li>• Sea Level Sensors : - Differential Pressure Transducer DRUCK PTX1830 - Radar model VEGAPULSE62</li> <li>• Record Spans : 1945 – 2014</li> <li>• Gaps :</li> <li>• Monthly Height Data up to 2014, has been sent to PSMSL</li> <li>• Hourly Height Data up to 2014, has been sent to UHSLC</li> </ul>
189	P. Soberanía (Base Prat) Lat : 62° 29' S Lon: 59° 38' W	<ul style="list-style-type: none"> <li>• Field Unit : VAISALA MAWS110</li> <li>• Sea Level Sensors : Differential Pressure Transducer (2) DRUCK PTX1830</li> <li>• Record Spans : 1984 – 2013</li> <li>• Gaps : 2004 – 2008</li> <li>• Station closed in January 2004 and reactivated in January 2009.</li> <li>• Monthly Height Data up to Aug 2013, has been sent to PSMSL</li> <li>• Hourly Height Data up to Aug 2013, has been sent to UHSLC</li> </ul>

### Data Streams

Chile contributes to GLOSS maintaining adequate data streams to GLOSS archiving Centres.

We have delivered to PSMSL the following monthly mean sea level data for some specific locations along the Chilean coast:

Location	Lat (S)	Long (W)	Record
Arica	18° 29'	70° 19'	1992 – 2014
Iquique	20° 13'	70° 10'	1984 – 2014
Caldera	27° 04'	70° 50'	1992 – 2014
Talcahuano	36° 41'	73° 06'	1992 – 2014
Corral	39° 52'	73° 26'	1984 – 2014
Ancud	41° 52'	73° 51'	1999 – 2014
Melinka	43° 54'	73° 45'	2011 – 2014
Punta Arenas	53° 10'	70° 54'	1988 – 2014
Puerto Williams	54° 56'	67° 37'	1971 – 2014