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DE CIENCIA, INNOVACIÓN
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CSIC
CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS
C.N. INSTITUTO ESPAÑOL DE OCEANOGRAFÍA (IEO)

GLOSS National Report
Spain

8 march 2025[1]

Coastal sea level monitoring on the Spanish coastline is currently carried out by a series of organizations, as listed below. For description of each network, a table with the list of available tide gauges is shown.

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1. Puertos del Estado (PdE, Harbours Authority) REDMAR network

The REDMAR network is composed of 41 stations and was established by the Spanish Harbours Authority (Puertos del Estado: PdE) in 1992, as an aid to port operations and coastal and harbour engineering. Today the network is based on Frequency Modulated Continuous Wave (FMCW) radar sensors, which provide sea level and waves measurements, except Sevilla 2 (Sevilla port, Guadalquivir River), which has a pulse radar sensor (only sea level measurements). Huelva station, in the Gulf of Cádiz, has also a redundant pressure sensor (tsunami-ready). In recent years, ancillary meteorological sensors (atmospheric pressure and wind, with 1-min time resolution for meteotsunami studies) have been added to 25 of the stations, and 9 of them have been co-llocated with Global Navigation Satellite System (GNSS) receivers (on top of the radar sensor) (Figure 1).

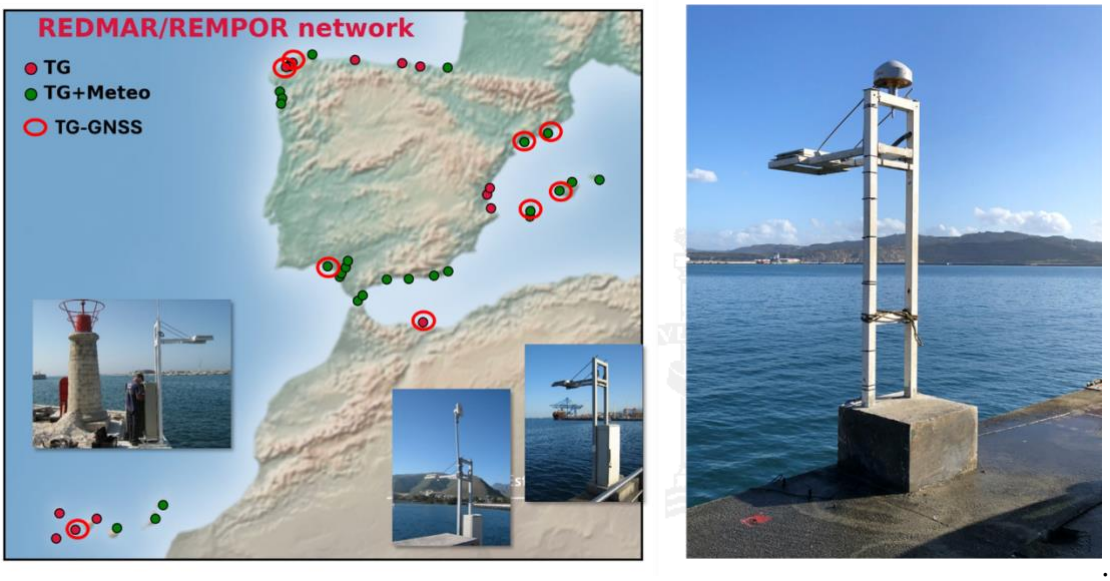


Figure 1: Left: Stations in REDMAR network. Right: GNSS-collocated tide gauge in Langosteira port (A Coruña, Spain).

The oldest REDMAR stations were originally based on acoustic or pressure sensors, which were upgraded to radar sensors as described in Pérez Gómez et al., 2014 (see Comments, column in Table 1). A few additional stations are managed by the ports at this moment (e.g. Avilés, a pulse radar sensor, Carboneras and Ferrol4) and contributing to PdE data flow.

Data are displayed through PdE visualization tools (Portus: https://portus.puertos.es/?locale=en#/, last access: 23 February 2025). In 2022 the data transmission method was upgraded from email to WebSocket (HTTP), enabling real-time, bidirectional communication for faster and more efficient data exchange with PdE and the National Geographic Institute (National Tsunami Warning System). All the stations transmit 1-min data with 1-min latency to IOC Sea Level Station Monitoring Facility (IOC-SLSMF). Automatic quality control

and processing is applied every 15 min for integration in the multimodel sea level forecasting system (Pérez Gómez et al., 2021). In addition, high-frequency sea level oscillations (30s – 1 hour) are detected, characterized, recorded and displayed from the raw 2Hz data every hour, by NivMarHF software (García Valdecasas et al., 2020).

Delayed mode quality control and processing is performed annually, and monthly mean sea levels are sent to the Permanent Service for Mean Sea Level (PSMSL). The data are also available through the Copernicus Marine Service In Situ Thematic Assembly Centre (Copernicus Marine Service In Situ TAC), the EMODnet (European Marine Observation and Data Network) portal, and the Global Extreme Extreme Sea Level Analysis (GESLA) dataset. Stations operated by PdE and Spanish ports are listed in Table 1.

Table 1: Stations operated by Puertos del Estado (REDMAR network) and Spanish ports, and data availability.

GLOSS code	PSMSL ID	Station	Technology	Lat.	Lon.	Data Period	Ancillary meas.	Comments
	2063	**Alcudia**	Radar	39.83456	3.13898	Sep 2009 present	Atm. pressure, wind	
	2055	**Algeciras**	Radar	36.17700	-5.39838	Jul 2009 present	Atm. pressure, wind	
	2056	**Almería**	Radar	36.83002	-2.47835	Jul 2006 present	Atm. pressure, wind, GNSS	
	1811	**Barcelona2**	Radar	41.34177	2.16570	Aug 1992 present	GNSS	Upgraded in 2008
		Carboneras	Radar	36.97430	-1.89959	Jun 2013 present	Atm. pressure, wind	Managed by the port
	2060	**Formentera**	Radar	38.73466	1.41903	Sep 2009 present	Atm.pressure, wind	
	2058	**Gandía**	Radar	38.99521	-0.15139	Sep 2007 present		
	1932	**Ibiza**	Radar	38.91123	1.44984	Jan 2003 present	Atm. pressure, wind, GNSS	Upgraded in 2010
	2062	**Mahón**	Radar	39.89304	4.27056	Nov 2009 present	Atm. pressure, wind	
	1810	**Málaga3**	Radar	36.71184	-4.41709	Jul 1992 present	Atm. pressure	Upgraded in 2010
	2061	**Mallorca**	Radar	39.56015	2.63748	Sep 2009 present	Atm. pressure, wind, GNSS	

	2057	**Melilla**	Radar	35.29061	-2.92853	Oct 2007 present	GNSS	
	1940	**Motril2**	Radar	36.72024	-3.52360	Jan 2005 present	Atm. pressure, wind	Upgraded in 2007
	2059	**Sagunto**	Radar	39.63392	-0.20624	Sep 2007 present		
	2054	**Tarifa**	Radar	36.00646	-5.60351	Jul 2009 present	Atm. pressure, GNSS	
	2182	**Tarragona**	Radar	41.07897	1.21325	May 2011 present	Atm. pressure, wind, GNSS	
	1813	**Valencia3**	Radar	39.44203	-0.31128	Jul 1992 present		Upgraded in 2006
	2047	**Sevilla 2**	Radar	37.33107	-5.99579	Nov 2011 present	Atm. pressure, wind	
		Guadalquivir-Caseta	Radar	37.10	-6.08	Apr 2021 present		
		Guadalquivir-Puntal	Radar	36.91	-6.27	Apr 2021 present		
	1809	**Bonanza 2**	Radar	36.80221	-6.33813	Jul 1992 present	Atm. pressure, wind.	Upgraded in 2008
	1883	**Huelva 5**	Radar	37.13202	-6.83369	Sep 1996 present		Upgraded in 2007
	1898	**Vigo 2**	Radar	42.24314	-8.72600	Nov 1992 present	Atm. pressure, wind	Upgraded in 2010
	2181	**Marín**	Radar	42.40612	-8.69108	Jan 2010 present	Atm. pressure, wind	
	1897	**Villagarcía 2**	Radar	42.60072	-8.77001	April 1997 present	Atm. pressure, wind	Upgraded in 2009
	2308	**Langosteira**	Radar	43.34653	-8.53012	Nov 2012 present		
		Langosteira 2	Radar	43.34767	-8.50086	Feb 2021 present		
243	1808	**A Coruña 2**	Radar	43.35727	-8.38938	Jul 1992 present	GNSS	Upgraded in 2008
		Ferrol 1	Radar	43.46285	-8.32582	Dec 2016 present	Atm. pressure, wind	
	2053	**Ferrol 2**	Radar	43.47618	-8.24851	Oct 2010 present		
		Ferrol 4	Radar	43.37	-8.32	May 2014 present		Managed by the port

		San Cibrao	Radar	43.70904	-7.46093	Dec 2018 present	Atm. pressure, wind	
		Avilés	Radar	43.59	-5.93	Oct 2017 present		Managed by the port
	1871	**Gijón 2**	Radar	43.55803	-5.69835	Jun 1995 present	Wind	Upgraded in 2010
	1807	**Santander 2**	Radar	43.46130	-3.79076	Jul 1992 present		Upgraded in 2008
	1806	**Bilbao 3**	Radar	43.35153	-3.04513	Jul 1992 present		Upgraded in 2010
		Pasaia	Radar	43.32321	-1.92329	Sep 2019 present		
	2066	**Arrecife**	Radar	28.96582	-13.53786	Mar 2008 present	Atm. pressure, wind	
	2048	**Fuerteventura 2**	Radar	28.49251	-13.85822	Jan 2004 present	GNSS	Upgraded in 2010
251	1802	**Las Palmas 2**	Radar	28.14056	-15.41181	Jul 1992 present	Atm. pressure, wind	Upgraded in 2010
	1803	**Tenerife 2**	Radar	28.47721	-16.24111	Jul 1992 present		Upgraded in 2009
	2065	**Gomera**	Radar	28.08777	-17.10831	Nov 2006 present		
	2051	**El Hierro 2**	Radar	27.78410	-17.90161	May 2005 present		Upgraded in 2009
	2064	**La Palma**	Radar	28.67780	-17.7679	Nov 2006 present		

2. National Council for Scientific Research (CSIC)

2.1. Spanish Institute of Oceanography RONIMAR tide gauge network

The sea level data network operated by the Spanish Institute of Oceanography (Instituto Español de Oceanografía: IEO) consists of 11 stations: 6 on the Iberian Peninsula, 1 at Ceuta on the northern Africa coast, 1 in the Balearic Islands, and 3 in the Canary Islands. For historical operative reasons, most of these locations are those in which IEO local headquarters are located. Each tide gauge station is equipped with two sensors: an analogue float-type tide gauge with a digital encoder and a radar-based one.

The network is one of the oldest ones in Spain, with some of the measurements dating back to 1943. Historical data are made available through the SeaDataNet data portal (https://www.seadatanet.org/, last access: 14 November 2022). Each of the analogue sensors consists of a float gauge, mechanically connected to an analogue–digital encoder, which converts the data for an on-site computer. The radar sensors duplicate the

measurements and ensure measurement continuity when one of the two devices fails. The 1 min sampled data are stored locally and recovered via modem by the central data centre once a day, where the data quality is assessed and archived.

The routines for data recovery, quality assessment, the detection of high-frequency events, and data representation are currently being updated, and it is expected that the frequency of data availability will reach one per minute by the end of the year 2022. Stations operated by IEO are listed in Table 2.

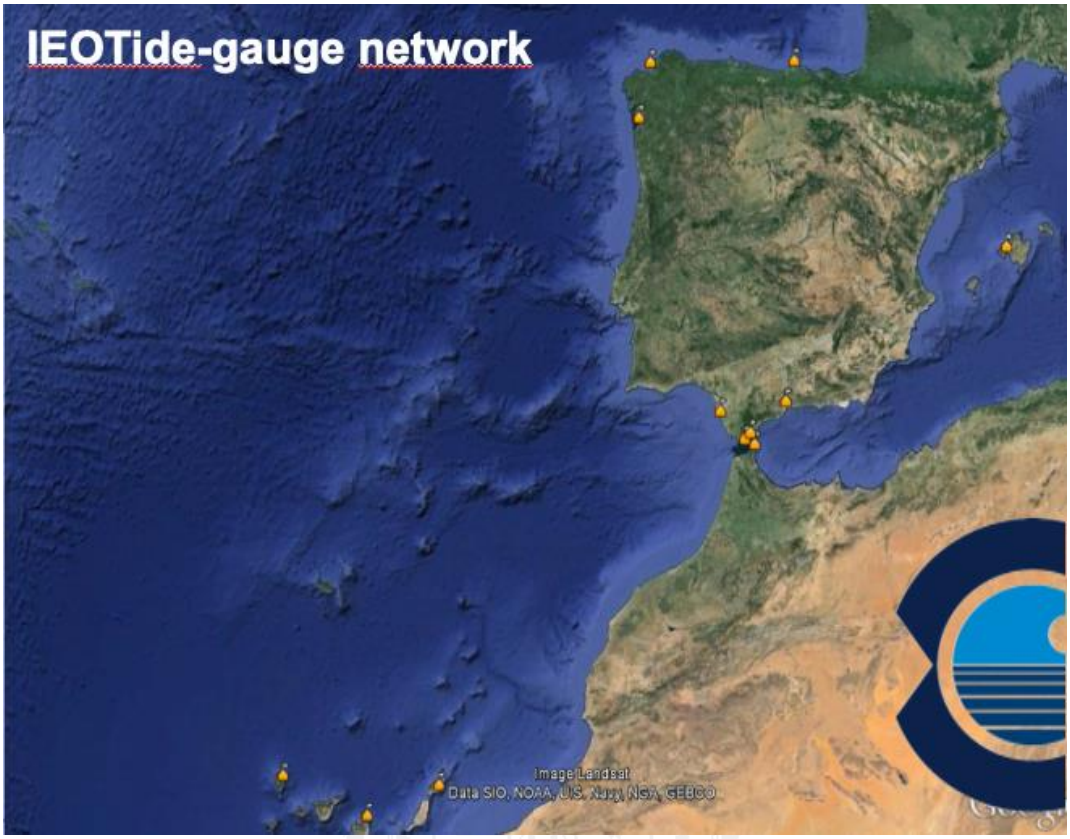
Table 2: Stations operated by Spanish Institute of Oceanography on the Spanish coastline and data availability.

GLOSS code	PSMSL ID	Station	Technology	Lat.	Lon.	Data Period	Ancillary meas.	Comments
	490	**Algeciras**	Radar	36.12077	-5.43497	1943 present		IEO ID: 010; 2002: upgraded from float to radar. Link[2]
249	498	**Ceuta**	Radar	35.89240	-5.31589	1943 present		IEO ID: 019; 2002: upgraded from float to radar. Link[3]
	1892	**Palma de Mallorca**	Radar	39.55238	2.63891	1997 present		IEO ID; 014; 2002: upgraded from float to radar. Link[4]
	488	**Tarifa**	Radar	36.00860	-5.6026	1943 present		IEO ID: 009; 2002: upgraded from float to radar. Link[5]
	985	**Cádiz**	Radar	36.54010	-6.2862	1945 present		IEO ID: 008; 2002: upgraded from float to radar. Link[6]

[2] http://nodc.ieo.es:8080/geonetwork/srv/spa/catalog.search#/metadata/efefe996-d0f6-4fe7-a4c0-4fb2555b66a2
[3] http://nodc.ieo.es:8080/geonetwork/srv/spa/catalog.search#/metadata/e391017a-7b64-44e9-a7bd-40e539c16f2f
[4] http://nodc.ieo.es:8080/geonetwork/srv/spa/catalog.search#/metadata/cd43588f-f14d-40d0-a982-20deae9fbe0c
[5] http://nodc.ieo.es:8080/geonetwork/srv/spa/catalog.search#/metadata/f296f868-dd72-4b97-bb42-94360984555e
[6] http://nodc.ieo.es:8080/geonetwork/srv/spa/catalog.search#/metadata/fdc14555-82c8-4476-b993-3f71d3b5da33

	483	**Vigo**	Radar	42.23800	-8.73100	1943 present	IEO ID: 006; 2002: upgraded from float to radar. Link[7]
243	484	**A Coruna**	Radar	43.36860	-8.39775	1943 present	IEO ID: 005; 2002: upgraded from float to radar. Link [8]
	485	**Santander**	Radar	43.46130	-3.79080	1943 present	IEO ID: 002; 2002: upgraded from float to radar. Link[9]
	593	**Arrecife**	Radar	28.97186	-13.53005	1980 present	IEO ID: 015; 2002: upgraded from float to radar. Link [10]
251	565	**Puerto de La Luz**	Radar	28.13632	-15.42568	1997 present	IEO ID: 016; 2002: upgraded from float to radar. Link [11]
	585	**Santa Cruz de La Palma**	Radar	28.67972	-17.76638	1997 present	IEO ID: 017; 2002: upgraded from float to radar. Link [12]

[7] http://nodc.ieo.es:8080/geonetwork/srv/spa/catalog.search#/metadata/0c07de29-efb4-420c-813c-0b40f13bdb71
[8] http://nodc.ieo.es:8080/geonetwork/srv/spa/catalog.search#/metadata/d53486f6-8b59-4b7b-b070-623ae02760fa
[9] http://nodc.ieo.es:8080/geonetwork/srv/spa/catalog.search#/metadata/d869ef26-ad72-4a5b-a49a-b749dc39dd90
[10] http://nodc.ieo.es:8080/geonetwork/srv/spa/catalog.search#/metadata/951667fd-e8cf-4d9e-89f1-60719dae8705
[11] http://nodc.ieo.es:8080/geonetwork/srv/spa/catalog.search#/metadata/948690fb-6294-4796-beaf-71a5cd453b05
[12] http://nodc.ieo.es:8080/geonetwork/srv/spa/catalog.search#/metadata/4ceac1ea-df5c-4985-b8ec-6a237eab9954



2.2. Spanish Institute of Oceanography, VENOM tide gauge network

In the framework of the VENOM project (https://projectevenom.wordpress.com/), a collaboration between the Spanish Institute of Oceanography and the University of the Balearic Islands, a high-density tide gauge network has been deployed in the Balearic Islands. The network is based on in-house developed devices based on open-source and low-cost technology. The data from the acoustic VENOM tide gauges has been extensively validated showing a very good performance when compared to radar-based tide gauges (RMS error for hourly data below 1 cm, RMS error for minute data below 2 cm). 22 tide gauges measuring at 1-min resolution are included in the VENOM network with the aim of capturing the small scale variability of sea level variations. Details of the network status (as in February 2025) are presented in Table 3 which includes 13 operating devices.

Table 3: Stations belonging to the VENOM project.

GLOSS code	PSMSL ID	Station	Technology	Lat.	Lon.	Data Period	Ancillary meas.	Comments
		Ses Salines	Acoustic	38.839064	1.381823	Jun 2021 March 2023		Decomissioned in March 2023

	Portinatx	Acoustic	39.113691	1.519429	Jun 2021 December 2023	Decomissioned in December 2023
	Santa Eulália	Acoustic	38.981778	1.538861	Mar 2021 Present	
	Cabrera 1	Acoustic	39.150833	2.933222	Jun 2020 Summer 2022	Decomissioned in summer 2022
	Cabrera 2	Acoustic	39.150897	2.933226	Nov 2020 Summer 2022	Decomissioned in summer 2022
	S'Arenal	Acoustic	39.501583	2.747694	Jan 2021 Present	
	Palma	Acoustic	39.560167	2.637472	Jan 2021 Present	Control device installed close to the Puertos del Estado tide gauge
	Sant Elm	Acoustic	39.578694	2.350472	Jul 2020 Summer 2022	Decomissioned in spring 2022
	Port de Valldemossa	Acoustic	39.717944	2.586972	Jul 2020 Summer 2022	Decomissioned in spring 2022
	Port de Sóller	Acoustic	39.796083	2.693278	Jun 2020 Present	
	Sa Calobra	Acoustic	39.851167	2.800667	Feb 2021 Present	
	Cala Sant Vicer	Acoustic	39.921991	3.055071	Jun 2021 Present	
	Can Picafort	Acoustic	39.765722	3.160500	Mar 2021 Present	
	Cala Rajada	Acoustic	39.710975	3.463681	Mar 2021 Present	
	Cala Bona	Acoustic	39.614583	3.392222	Feb 2021 Present	
	Portocolom	Acoustic	39.424275	3.261186	Feb 2020 Present	
	Portopetro	Acoustic	39.360639	3.212139	Jun 2020 Present	
	Cala Galdana	Acoustic	39.937833	3.958472	Mar 2021 Present	
	Cala'n Bosch	Acoustic	39.929056	3.833944	Mar 2021 Present	
	Fornells	Acoustic	40.054306	4.131056	Aug 2020 Present	
	Port d'Addaia	Acoustic	40.007194	4.198556	Mar 2021 Present	
	Lo Pagan (Mar Menor)	Acoustic	37.815200	0.783157	Dec 2024 Present	

2.3. L'Estartit tide gauge (Meteolestartit, in collaboration with ICM/CSIC-Spain)

The tide gauge is a part of the Meteorological and Oceanographic Station (Meteolestartit) in the harbour of L'Estartit, a coastal town on the Catalan coast, in the NW Mediterranean. It is a float type or analogue tide gauge which records sea level measurements on paper. Recordings are collected every week and digitized with a 2 h resolution. Paper records are preserved for further detailed analyses if required in some special circumstances, such as seiches. The position of the tide gauge is georeferenced every 5 years by the Catalan Cartographic Institute, and sea level data are linearly corrected backwards for each period. Sea level record collection at this point started in January 1990, as part of Meteolestartit, which started in 1969, as a personal initiative of Josep Pascual with the collaboration of the Marine Sciences Research Institute in Barcelona (ICM/CSIC). Data collected included basic meteorological and oceanographic data. More details can be found in Pascual and Salat (2019) and Salat et al. (2019). Details about L'Estartit tide gauge are in Table 4.

Table 4: Station operated by Josep Pascual (meteorological observer, Meteolestartit/CSIC).

GLOSS code	PSMSL ID	Station	Technology	Lat.	Lon.	Data Period	Ancillary meas.	Comments
	1764	**L'Estartit**	Float	42.05375	3.20601	1990 present	Atm. pressure and other meteorological data	

3. Spanish National Geographic Institute (IGN) tide gauge network

The tide gauge network of the National Geographic Institute of Spain (IGN) was started in the 19th century, with tide gauges were set up in Alicante, Santander, and Cádiz. This tide gauge network has been extended and its instruments have been improved since then, including recent upgrades from float to radar sensors. Nowadays IGN has 17 tide gauges: 10 are located in the Iberian Peninsula, 1 on Alboran Island, and 6 in the Canary Islands. All of them have one or two radar sensors and are linked to GNSS permanent stations. In addition to maintenance work, network management, and connection to High Precision Levelling Network (REDNAP), IGN analyses the historical series of its tide gauges and are part of the Spanish Tsunami Alert System. Stations operated by IGN are listed in Table 5.

Table 5: Stations operated by National Geographic Institute of Spain on the Spanish coastline and data availability.

GLOSS code	PSMSL ID	Station	Technology	Lat.	Lon.	Data Period	Ancillary meas.	Comments

		Alborán	Radar	35.93890	-3.034167	Oct present	2016	GNSS	
	208	**Alicante 1**	Radar	38.33833	-0.47778	May present	1928	GNSS	1999: upgraded from mechanical recorder to angle encoder. 2010: upgraded from float to radar.
	960	**Alicante 2**	Radar	38.33889	-0.48139	Mar 1957present		Atm. pressure, GNSS	1996: upgraded from mechanical recorder to angle encoder. 2010: upgraded from float to radar.
	1455	**Almería**	Radar	36.83222	-2.48472	Jan present	1990	GNSS	2010: upgraded from float to radar.
	1460	**Cartagena**	Radar	37.59639	-0.97361	Jul present	2002	GNSS	
		Cartagena	Radar (IDSL-07)	37.56714	-0.97895	Oct present	2015	Air temperature	
		Ceuta	Radar (IDSL-31)	35.89583	-5.31153	Sep present	2017	Air temperature	
		Ciutadella	Radar (IDSL-30)	39.98758	3.82815	Oct 2017present		Air temperature	
		La Mola de Mahon Menorca	Radar (IDSL-29)	39.87230	4.30836	Oct present	2017	Air temperature	
		Cádiz	Radar (IDSL-06)	36.54214	-6.280612	Oct present	2015		
		Tazacorte (La Palma)	Radar (IDSL-50)	28.640915	-17.94385	Nov present	2021	Optical camera	
		Garachico (Tenerife)	Radar (IDSL-37)	28.373379	-16.75287	Dic present	2021		
		Fuerteventura 2	Radar	28.49806	13.85639	Dec present	2018	GNSS	
	303	**Tenerife 13**	Radar	28.47722	-16.24111	Feb present	1992	GNSS	1997: upgraded

								from mechanical recorder to angle encoder. 2007: upgraded from float to radar.
	Tenerife 21	Radar	28.41833	-16.55056	Nov present	2008	GNSS	
	Tenerife 31	Radar	28.16944	-16.71806	Jan present	2010	GNSS	
763	**A Coruna 1**	Radar	43.36444	-8.39888	Jan present	1950	GNSS	1997: upgraded from mechanical recorder to angle encoder. 2012: upgraded from float to radar.

4. Spanish Hydrographic Office (IHM)

Since 2021, the IHM has been developing a network of permanent tide gauges along the Spanish coast. To access the data of this network, a request must be made via email to the IHM data center. These tide gauges are equipped with sensors for measuring atmospheric pressure, air temperature, humidity and GNSS. It is expected that in the coming years the number of tide gauges installed will increase. The following is a list of the equipment that is currently operational:

Table 6: Stations operated by Spanish Hydrographic Office on the Spanish coastline and data availability.

GLOSS code	PSMSL ID	Station	Technology	Lat.	Lon.	Data Period	Ancillary meas.	Comments
		Getaria	Acoustic	43.30395	-2.20112	Mar 2023 present	Atm. pressure, air temperature, humidity, GNSS	
		Celeiro	Acoustic	43.67913	-7.59902	Sept 2023 present	Atm. pressure, air temperature, humidity, GNSS	
		Cariño	Acoustic	43.73768	-7.86680	Sept 2023 present	Atm. pressure, air temperature, humidity, GNSS	
		Cedeira	Acoustic	43.68698	-8.07121	Sept 2023 present	Atm. pressure, air temperature, humidity, GNSS	
		Camariñas	Acoustic	43.12755	-9.18214	May 2024 present	Atm. pressure, air temperature, humidity, GNSS	
		Fisterra	Acoustic	42.90873	-9.25819	Ago 2023 present	Atm. pressure,	

						air temperature, humidity, GNSS
	Portosin	Acoustic	42.76327	-8.94473	Ago 2023 present	Atm. pressure, air temperature, humidity, GNSS
	Santa Uxía de Ribeira	Acoustic	42.56245	-8.99005	Ago 2023 present	Atm. pressure, air temperature, humidity, GNSS
	Baiona	Acoustic	42.11849	-8.84526	Oct 2024 present	Atm. pressure, air temperature, humidity, GNSS
	Ayamonte	Acoustic	37.21094	-7.40624	Oct 2023 present	Atm. pressure, air temperature, humidity, GNSS
	Huelva	Acoustic	37.24116	-6.95872	Jun 2024 present	Atm. pressure, air temperature, humidity, GNSS
	Rota	Acoustic	36.61331	-6.32751	Apr 2023 present	Atm. pressure, air temperature, humidity, GNSS
	Cádiz (Puerto América	Acoustic	36.54033	-6.28342	Jun 2024 present	Atm. pressure, air

						temperature, humidity, GNSS
	Cádiz (Puntales)	Acoustic	36.50755	-6.26023	Nov 2024 present	Atm. pressure, air temperature, humidity, GNSS
	San Fernando (La Carraca)	Acoustic	36.49751	-6.18328	Nov 2022 Present	Atm. pressure, air temperature, humidity, GNSS
	Conil de la Frontera	Acoustic	36.29615	-6.13828	May 2025 present	Atm. pressure, air temperature, humidity, GNSS
	Barbate	Acoustic	36.18523	-5.93321	Ago 2023 present	Atm. pressure, air temperature, humidity, GNSS
	Ceuta	Acoustic	35.89123	-5.31656	Jun 2023 present	Atm. pressure, air temperature, humidity, GNSS
	Adra	Acoustic	36.74567	-3.01966	Oct 2025 present	Atm. pressure, air temperature, humidity, GNSS
	Cartagena	Acoustic	37.60122	-0.99282	May 2024 prsent	Atm. pressure, air temperatur

						e, humidity, GNSS
	Castellón	Acoustic	39.96820	0.01988	Ago 2021 Present	Atm. pressure, air temperature, humidity, GNSS
	La Rápita	Acoustic	40.61201	0.59855	Ago 2023 present	Atm. pressure, air temperature, humidity, GNSS
	L'Ampolla	Acoustic	40.80767	0.71025	Apr 2024 present	Atm. pressure, air temperature, humidity, GNSS
	Vilanova i la Geltrú	Acoustic	41.21287	1.73643	May 2024 present	Atm. pressure, air temperature, humidity, GNSS
	Roses	Acoustic	42.25532	3.17820	Dec 2024 present	Atm. pressure, air temperature, humidity, GNSS
	Sant Antoni de Portmany	Acoustic	38.97701	1.29878	Apr 2023 present	Atm. pressure, air temperature, humidity, GNSS
	Soller	Acoustic	39.79645	2.69113	Apr 2024	Atm. pressure, air temperature,

humidity,
GNSS

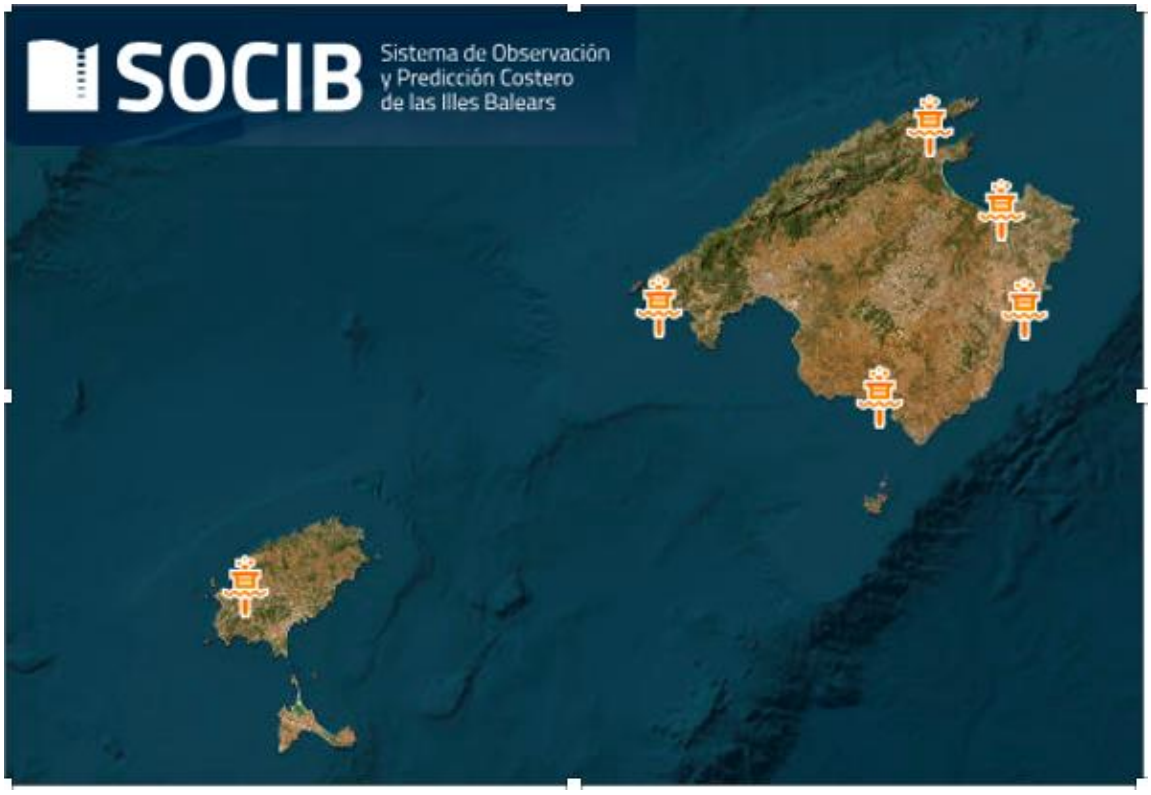
5. SOCIB tide gauge network in the Balearic Islands.

The SOCIB (Balearic Islands Coastal Observing and Forecasting System) tide gauge network (Tintoré et al., 2013, 2019) was established in 2009 and currently consists of six stations around the Balearic Islands, five of which are located on Mallorca and one on Ibiza. The length of the tide gauge records varies between 6 and 13 years, with the shortest series dating back to 2016. With the exception of the tide gauge in Sant Antoni (Ibiza), which is a radar gauge, the rest are pressure gauges. The sampling frequency is 1 min for all gauges. All stations measure atmospheric pressure, sampled every 30 s, together with sea level, and five of them also monitor water temperature every minute. All data are freely distributed in near-real time through the SOCIB website (http://apps.socib.es/data-catalog) and are also available through the Copernicus Marine Service In Situ TAC data portal. Sea level observations are referenced to the tide gauge benchmarks, whose positions are controlled on a yearly basis through GNSS surveys. Stations operated by SOCIB are listed in Table 7.

Table 7: Tide gauge stations in the Balearic Islands operated by SOCIB.

GLOSS code	PSMSL ID	Station	Technology	Lat.	Lon.	Data Period	Ancillary meas.	Comments
		Andratx	Pressure	39.544189	2.378460	Jun 2011 present	Atm. pressure	

	Col. Sant Pere	Pressure	39.737317	3.273358	Apr 2016 present	Atm. pressure
	Pollença	Pressure	39.904701	3.088516	Jul 2009 present	Atm. pressure
	Porto Cristo	Pressure	39.539174	3.335090	Mar 2016 present	Atm. pressure
	Sa Rapita	Pressure	39.360062	2.953671	May 2011 present	Atm. pressure
	Sant Antoni	Radar	38.977001	1.298762	Mar 2015 present	Atm. pressure



6. Pasaia tide gauge (AZTI).

Daily and monthly sea level data for Pasaia Harbour are supplied on a monthly basis by the GEOLAB Pasaia Team. GEOLAB is an agreement between ARANZADI and AZTI.

Table 8: Station operated by AZTI-ARANZADI.

GLOSS code	PSMSL ID	Station	Technology	Lat.	Lon.	Data Period	Ancillary meas.	Comments
	2338	**Pasaia**	Radar	43.32176	-1.93151	2007 present	GNSS	

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