

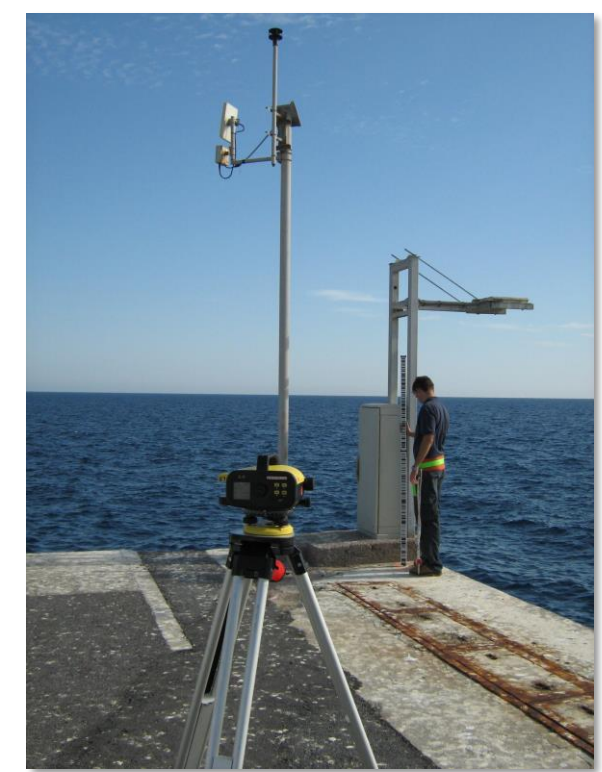
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EuroGOOS: European Global Ocean Observing System

EuroGOOS (<http://www.eurogoos.eu/>) is an International Non-Profit Organisation committed to **European-scale operational oceanography within the context of the Global Ocean Observing System** of the Intergovernmental Oceanographic Commission of UNESCO (GOOS, IOC). For a more efficient coordination between different countries, EuroGOOS has established a number of **Task Teams**, each focusing on one marine observation technology, namely HF-Radars, Tide Gauges, Gliders, ARGO floats, Marine Mammals, Fixed Platforms and FerryBox. These intend to **promote scientific synergy and technological collaboration among the countries**. Task Team members exchange open source tools, collaborate in areas of common interest, and jointly make European data available to the **EuroGOOS ROOS regional data portals**, which in turn are feeding data to the **European Marine Observation and Data Network (EMODnet)** and **Copernicus Marine Environmental Monitoring System (CMEMS)**. Task Teams are set up within the framework of the **European Ocean Observing System (EOOS)**, setting out a vision for truly **integrated end-to-end ocean observing in Europe**, for the benefit of society, science and innovation.

Why an EuroGOOS Tide Gauge Task Team (TGTT)?: rationale



Radar gauge at Almería (Spain). Source: Puertos del Estado



Float gauge at Punta della Salute (Venezia, Italy). Source: ISPRA

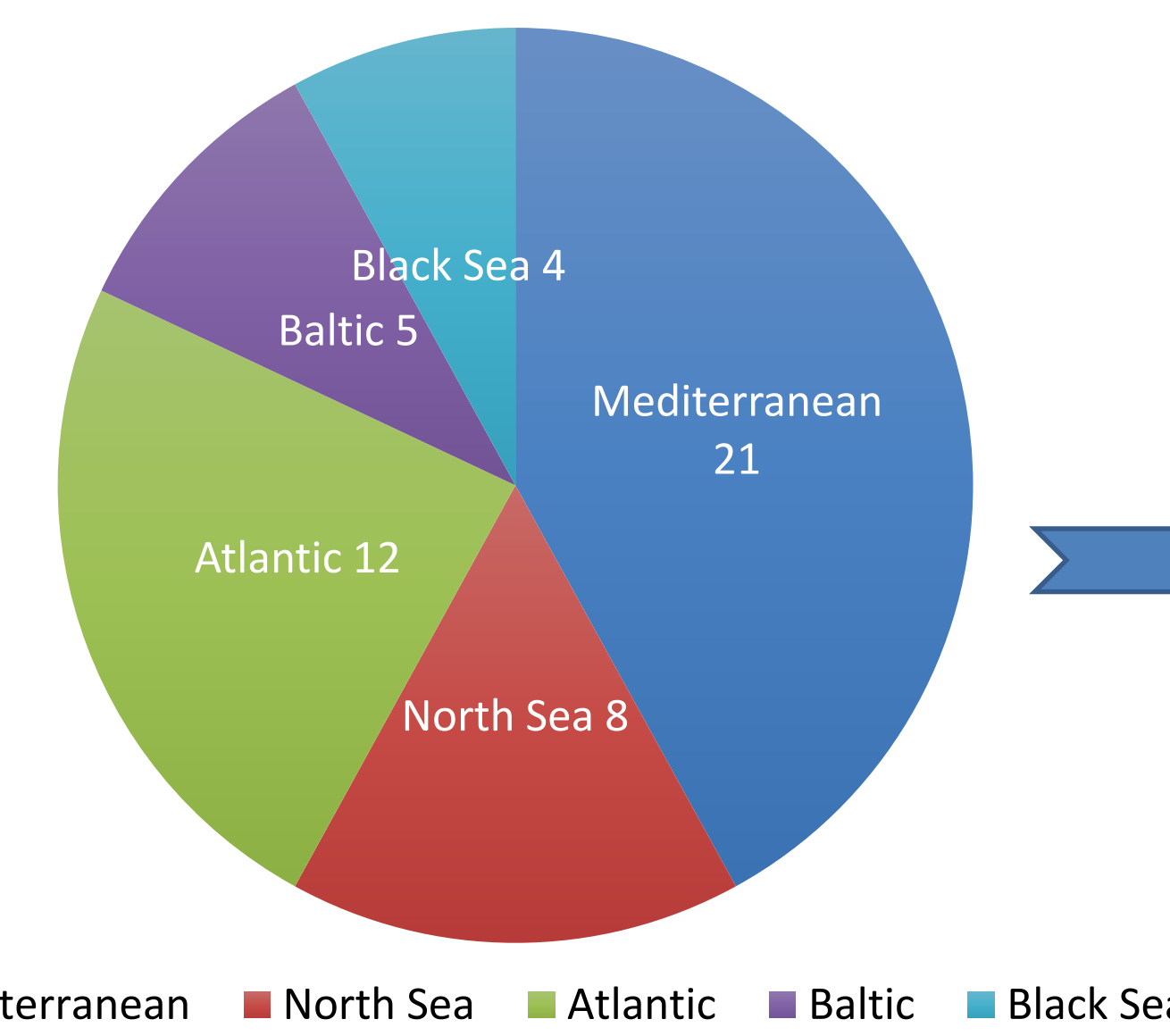
Sea level is one of the critical variables of our environment and clearly one of the marine parameters with more impact on the coastal population. Its measurement along the coasts has been made since the end of XIX century by means of tide gauges that still today represent one of the fundamental methods of determination of trends in mean sea level and extremes (and their relation to climate change), tidal computation, geodetic applications, harbor operations and navigation and, more recently, integration in new **sea level hazards warning systems** (tsunamis and storm surges).

This **critical and increasing need for tide gauge data**, based on recent coastal disasters and the projections of sea level changes in the future, has yielded the establishment, in 2015, of the **EuroGOOS Tide Gauge Task Team (EuroGOOS TGTT)**:

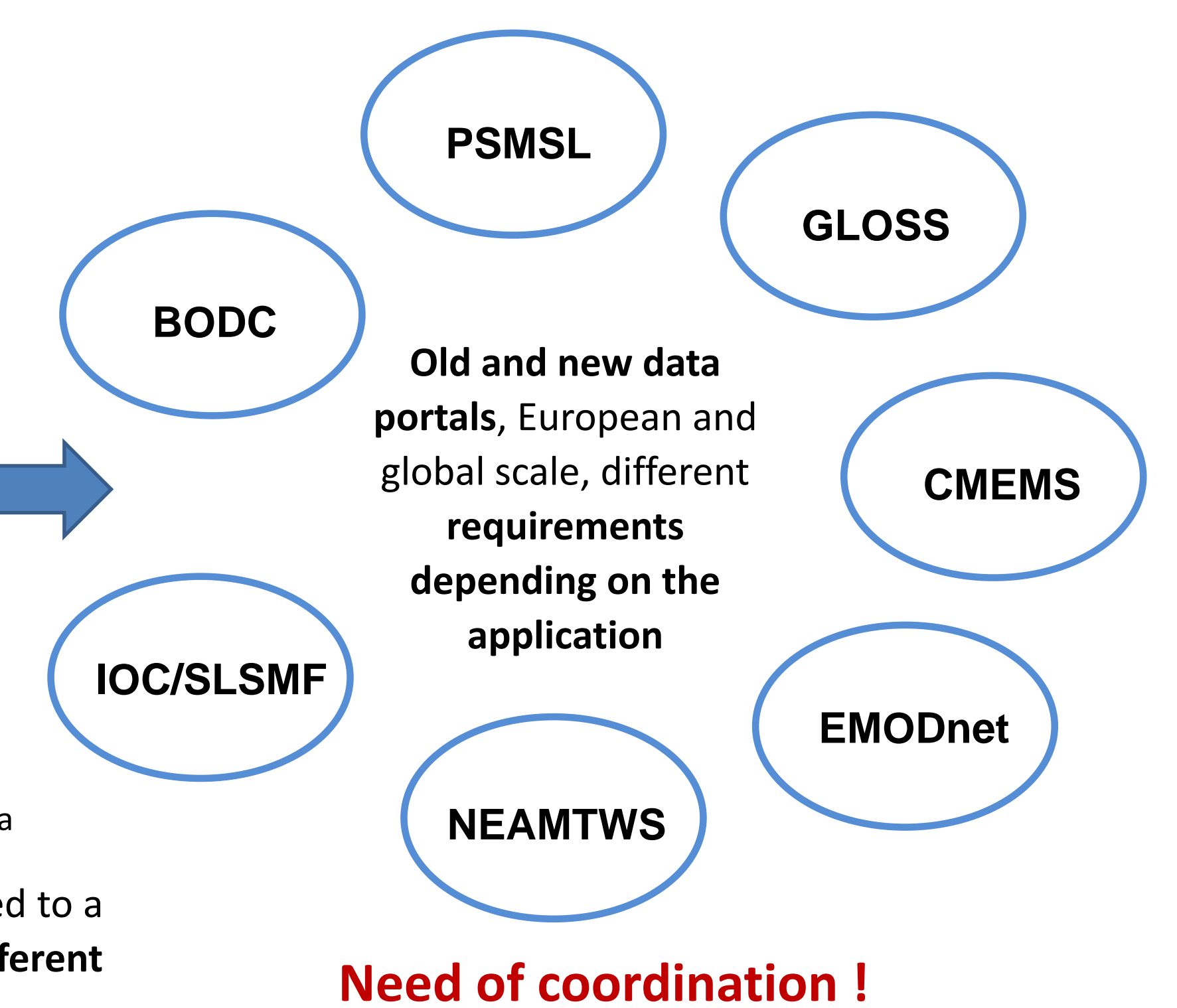
<http://www.eurogoos.eu/tide-gauge-task-team/>), that has the role of **bringing together the European and adjacent seas tide gauge community** by: compiling information on existing sea level networks, providing expertise on tide gauge observations to operators and scientists and supporting national and regional sea level initiatives to maintain a **permanent and sustainable system**.

The initiative is not trying to replicate existing efforts but **fostering collaboration**, scientific and technological development and by this enhancing the European and adjacent countries capacity, under the new umbrella of international programs of data exchange such as **CMEMS**, as well as the existing ones such as the **Global Sea Level Observing System (GLOSS)** or the **Permanent Service for Mean Sea Level (PSMSL)**.

Institutions with tide gauges in the different basins



Distribution of institutions per basin, from those that answered to a survey launched in 2016: **41 institutions from 24 different countries**, most of them in the Mediterranean Sea

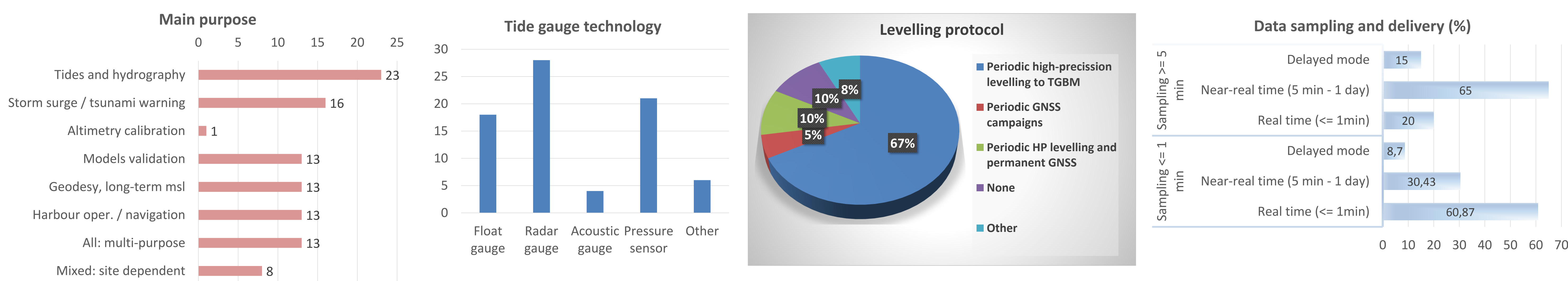


TGTT Core Group June 2017: chair: Begoña Pérez Gómez, co-chair: Vincent Donato; Angela Hibbert, Fabio Raicich, Laurent Testut, Thomas Hammarklint, Marta Marcos, Guy Westbrook, Anna von Gyldenfeldt, Alessandro Annunziato, Aksel Voldsun (NHS, Norway), Karim Hilmi (INRH-Morocco), Deirdre Fitzhenry (MI, Ireland), Francisco Hernández (VLIZ, Belgium)

Survey on status of European and nearby countries tide gauge networks

The EuroGOOS TGTT launched a questionnaire in 2016 to evaluate the type of problems the existing national tide gauge networks may have to survive during next years: maintenance, personnel, etc.. The questionnaire provided as well basic information on the status, characteristics and main applications of existing tide gauge stations right now. Based on just 10 simple but relevant questions, the **web-based survey was sent to 110 contact persons from 35 different countries**; main bottlenecks were: 1) problems to identify adequate national contact or responsible person on charge of tide gauges, 2) delay on the answers and 3) absolute lack of answer from several countries, mainly in the Mediterranean Sea North Africa coast.

Basic statistics based on the number of respondents (institutions) to each question of the survey:



41 respondents from 24 different countries



Summary:

- The **main purpose** of the stations is still **tide computation and hydrography** (Hydrographic offices), followed by **storm surge and tsunami warning**
- Near an **80%** of the respondents use only their **own personnel and resources**
- Only **37%** have an **open and free data policy**. This may explain the lack of tide gauge data in international data portals, especially from the Mediterranean countries
- Sampling around 5-min and near-real time transmission is still the most common measurement strategy in the region, although **significant increase of 1-min sampling and real time transmission** is evident (61% of respondents)
- Radar gauges** are the most used in the region (68% of institutions) followed by pressure sensors.
- Most of the institutions (67%) perform periodic high-precision levelling to the TGBM. **Only 4 respondents (10%) use also permanent GNSS stations while 4 do nothing**
- Atmospheric pressure, wind and water temperature** are the most common ancillary measurements. Only 19% of the respondents mention wave parameters
- Only **37%** of the respondents perform **automatic NRT quality control of data**, 3 of them do not perform QC and data processing at all
- Only **47%** of the respondents claim **having no problems of funding for maintenance** now or in the future. Four institutions clearly indicate they have not funds at all for maintenance nowadays; up to a 30% of the respondents consider that there is risk of funding problems in the near future

Main concern: urgent need of ensuring the sustainability of tide gauge stations in the region, especially in the Mediterranean Sea

Other recent and on-going activities of the EuroGOOS Tide Gauge Task Team :

- November 3rd, 2016:** side meeting during the altimetry OST/ST International Congress on Satellite Altimetry: *Altimetry and tide gauges for sea level* (La Rochelle): link with the altimetry community and preparation of a list of recommendations for the Task Team from the altimetry perspective (available on-line at EuroGOOS website)
- November 4th, 2016:** one-day workshop of Tide Gauge operators and sea level experts (University of La Rochelle): presentations and conclusions available on-line at EuroGOOS website
- May 2017:** recommendations of EuroGOOS Tide Gauge Task Team and GLOSS/PSMSL representatives for CMEMS In-Situ Tacs (European Regional In-situ oceanographic observations data portals) on standard NetCDF format for tide gauge data
- June 2017:** collaboration with SONEL (GLOSS GNSS Data Bank) on the preparation of the list of tide gauges in Europe with a nearby permanent GNSS station (requested by CMEMS and Mercator Ocean for models and altimetry validation)
- June-December 2017:**
 - ✓ update of existing metadata inventories of the tide gauges in the region (with additional information according to the new requirements of new data portals)
 - ✓ analysis of existing gaps in the data portals providing sea level data from European tide gauges
 - ✓ Identification of funding opportunities for improving/increase the existing tide gauge networks

Acknowledgements: to all the national tide gauge operators and sea level experts that contributed to the survey and the workshops organized at La Rochelle in November 2016, as well as the EuroGOOS office personnel.