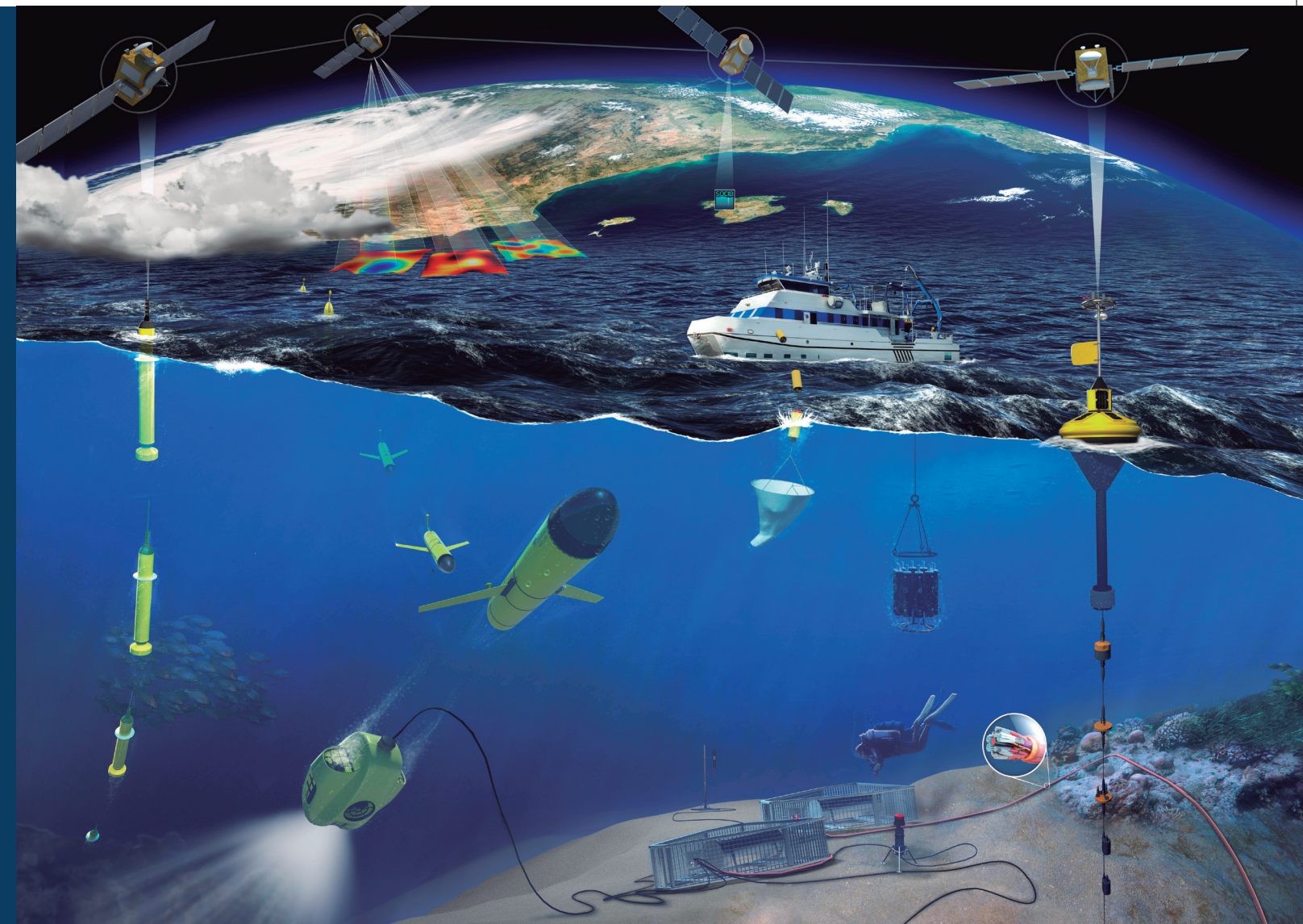




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2018

ICTS SOCIB STRATEGIC PLAN 2017-2020



STRATEGIC PLAN 2017-2020

ICTS SOCIB

Scientific excellence with impact on society



GOBIERNO DE ESPAÑA
MINISTERIO DE CIENCIA, INNOVACIÓN Y UNIVERSIDADES



STRATEGIC PLAN 2017 – 2020

ICTS SOCIB

Scientific excellence with impact on society

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1. GENERAL DESCRIPTION OF THE BALEARIC ISLANDS OBSERVING AND FORECASTING SYSTEM (SOCIB)

1.1. SOCIB RI OVERVIEW

1.1.1. General Information about the SOCIB Research Infrastructure

SOCIB, the Balearic Islands Coastal Ocean Observing and Forecasting System is a Marine Research Infrastructure included in the Spanish Large Scale Infrastructures Network since October 2014. SOCIB is a multi-platform ocean observing system that provides streams of data, added value products, and forecasting services from the coast to the open ocean. SOCIB supports Open Access (OA) to all its data, in line with and extending the principals of the Euro-Argo European Research Infrastructure Consortium (ERIC), which SOCIB joined in 2017. In so doing, SOCIB supports operational oceanography and contributes to establishing and understanding the services that the coastal ocean provides, yielding both ecological and economic benefits. Driving scientific excellence, supporting new technologies and responding to society requirements are our 3 key drivers, thereby contributing to bridge the science-society gap.

SOCIB major components include:

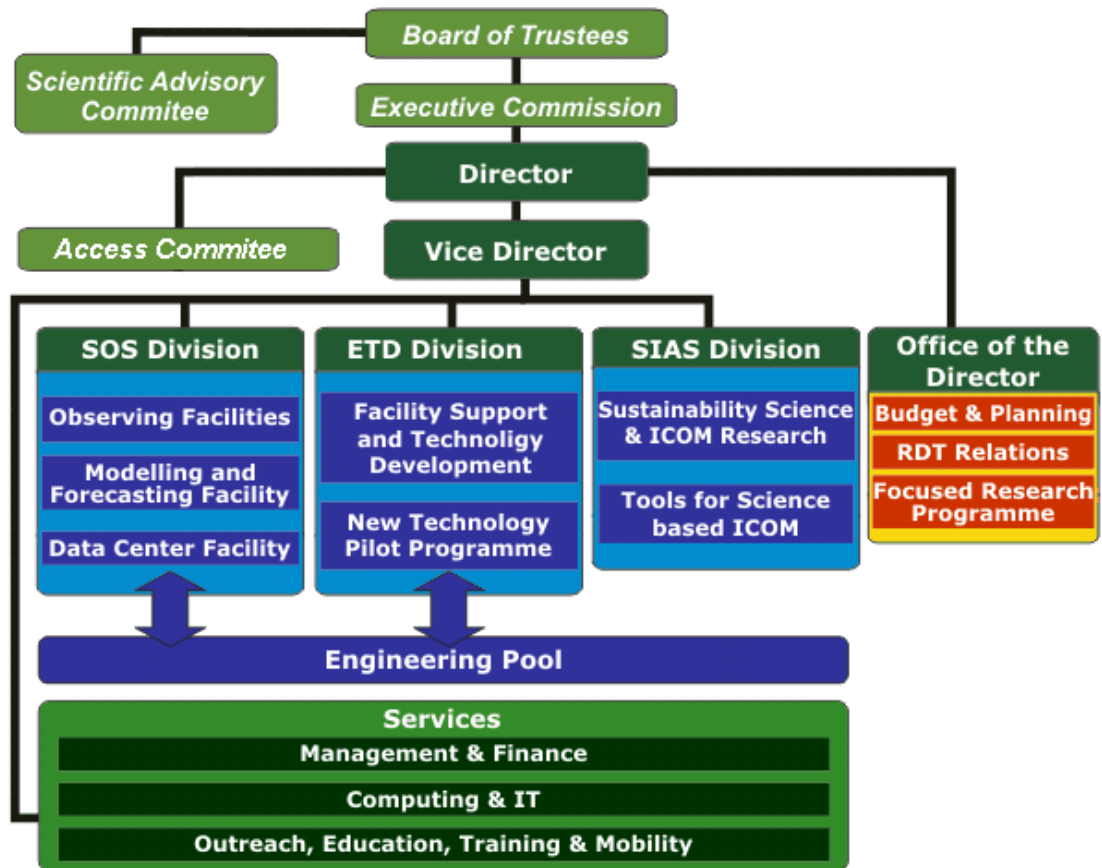
Observing Marine Infrastructure; a multi-platform integrated system for monitoring physical, and more recently and therefore in a less fully developed capacity, biogeochemical data, from the coast to the open ocean inclusively. The platforms include a research vessel, surface drifters, vertical profilers, coastal and deep sea moorings, coastal stations, satellites, High Frequency (HF) radar, gliders, sea-turtles, etc.

Ocean Forecasting Infrastructure: (a) high resolution numerical ocean forecasting models for currents from the coastal to open ocean, (b) high resolution wave forecasting in the coastal ocean and (c) a coupled atmosphere-ocean meteo-tsunami forecasting system.

Data Centre/Cyber-infrastructure: open data is the core of SOCIB that guarantees -real time or quasi real time and delayed mode - data archiving, processing, quality control, visualization, download and distribution from all platforms. All data are available online for scientists and society.

To support these infrastructures, **SOCIB personnel** can be divided into 4 broad categories; scientists, engineers, those that work on technical support issues, and those who give administrative support to the scientists and engineers. The total number of employees, as of September 2017, is 39; of these, 16 staff members have a PhD, 19 staff members are educated to BSc or engineering degree level, and 4 staff members have a Technical engineering or Technical certificate title.

SOCIB is comprised of three Divisions (**Figure 1**), these are supported by three cross division Support Services and the Office of the Director, which is responsible for managing the divisions, support services, governance issues and strategic direction.



1.1.1.1.

Figure 1: SOCIB Structure

The Divisions are organised into:

A Systems Operation and Support Division (SOS), composed of 8 observing, modelling, and data handling facilities as follows:

- The Coastal Ocean Research Vessel Facility
- The Glider Facility
- The Beach Monitoring Facility
- The Forecasting and Modelling Facility
- The Data Centre Facility
- The High Frequency (HF) Radar Facility
- The Fixed Stations Facility (buoys and moorings) and
- The Lagrangian Platforms Facility (drifters and floats).

An Engineering and Technology Development Division (ETD), providing the engineering and technological backbone to develop and operate the observing facilities network and is responsible for the practical integration of new and emerging technologies.

A Strategic Issues and Applications for Society Division (SIAS), that seeks to understand and bridge the gaps between society, policy, science and observations. This division develops applications, operational tools and products and services, for science-based management of the coastal and marine environment, within the context of sustainability science.

The central Support Services are organised into:

A Management and Finance Support Service; which manages the financial and human resources aspects of SOCIB's operation.

A Computing and IT Support Service; which manages the essential IT and computing infrastructure to support SOCIB's growing capabilities.

An Outreach and Education Support Service, responsible for the creation of the SOCIB visual identity and the communication of SOCIB news and activities across different media and sectors

The **Office of the Director**, responsible for planning, overall management, and communication with stakeholders and governing bodies.

This structure, described in detail in the [SOCIB Strategic Plan 2013-16](#), was designed in order to respond effectively to the key SOCIB mission and drivers, that is to provide oceanographic data to support research and technology development on key internationally established topics, to support the strategic needs of society in the context of global change, and to consolidate operational oceanography and associated marine technology development in the Balearic Islands and in Spain. Minor adjustments are made to the structure, as the demands on SOCIB increase and evolve, and as the administrative constraints regarding new contracts change.

Integrated into the SOCIB infrastructure, through partner agreements, are key regional, national and international research institutions with which SOCIB shares resources and experiences, in order to maximise the advancement of marine and coastal research and promote the most efficient use of public funds. Important agreements have been reached with CSIC, IEO, Puertos del Estado, Ports de les Illes Balears, SASEMAR, Instituto Hidrográfico de la Marina, Mercator Ocean, MONGOOS, among others.

1.1.2. SOCIB Facilities

As described above, SOCIB is a multi-platform facility of facilities responding to society requirements, supporting new technologies and driving scientific excellence; which it employs to support and promote the ecological and economic benefits of a healthy and sustainable coastal ocean. In this section and the next section we present the facilities and the services, respectively, in order to allow the reader a good understanding of the capabilities of SOCIB's Research Infrastructure.

As described in the ICTS DATA application **catalogue of facilities** and above, SOCIB has 8 facilities, one of these, the R/V SOCIB, is included in the FLOTA ICTS, however it needs to be included here also as it is critical to the provision of some of the SOCIB services. In addition to these, SOCIB has an additional platform, a Zodiac Hurricane boat, which is also important to the provision of SOCIB operations and services.

The **Coastal Ocean Research Vessel Facility** is one of SOCIBs **Outstanding Facilities**; this facility operates R/V SOCIB, a fast 24 m catamaran, equipped for modern, multi-disciplinary ocean science, and capable of sustained operations of up to 5-7 days at sea. The facility supports competitive Open Access (OA) to R/V SOCIB for enabling outside scientific groups to access the platform for oceanographic research. As discussed in more detail later, R/V SOCIB is a regional and European asset, available for external users as part of the Spanish oceanographic fleet ([COCSABO](#)), offering labs, a suite of oceanographic equipment at a lower daily cost than larger vessels. R/V SOCIB has a focus area of the Balearic Islands, including offshore transects, for SOCIB's scientific priorities. In addition to this other Spanish national and European requirements extend this range to the Strait of Gibraltar to the west and Sardinia to the east. Further, recent commercial contracts have taken R/V SOCIB out into the open Atlantic to Madeira. R/V SOCIB scientific users include physicists,

biogeochemists, biologists, in fact frequently a mixture of all three, and fisheries science. Commercial users are more frequently concerned with seabed surveys and mapping. In the ICTS Data application, R/V SOCIB is formally included in the FLOTA ICTS.

The **Glider Facility** is another of SOCIB's **Outstanding Facilities**: it is a leading European operation and a flagship facility for both SOCIB and Spain. The SOCIB glider fleet consists of 7 gliders (including in-kind support from CSIC with 3 gliders). A leading monitoring resource in a Mediterranean context, the Glider Facility offers a national, European and international capability. The facility maintains one sustained and semi-permanent endurance line in the Ibiza and Mallorca channels in order to understand spatial and temporal variability in the Mediterranean circulation. The facility supports competitive Open Access (OA) to the platforms for more focused process studies, thus enabling outside scientific groups to access these platforms for oceanographic research. Some OA programs have now become mature enough to have been repeated as additional endurance lines, for example the JERICO-NEXT EU funded project Trans-National Access (TNA) supported ABACUS line which has now been repeated for 3 years, and is planned for at least a further year.

The **Beach Monitoring Facility** is a technology leader in the monitoring of the short to long-term evolution of beach morphology, and is another of SOCIB's **Outstanding Facilities**. Its system of beach installations, supported by the Engineering and Technical Division, and associated field campaigns is unique and delivers data streams to meet science needs at a cost level that is sustainable, and is being adopted by the Spanish Coastal Research Community and institutes internationally as a reference system. Specific societal focused data products, such as for the tourism sector, have been initiated over the past four years through interaction with hotel chains.

The **Modelling and Forecasting Facility** is an **Outstanding Facility** that has three different operational forecasting systems: firstly a high-resolution ocean current forecasting system (WMOP), secondly a wave forecasting system (in collaboration with [Puertos del Estado](#)) and thirdly a meteo-tsunami (RISSAGA) forecasting system in collaboration with AEMET. These forecasting systems make up an Outstanding Service described in the next section, and are continually improved and tested through specific process studies, thus contributing to both enhancing our scientific understanding and our modelling skills and capabilities. The ocean currents forecasting system (WMOP) provides predictions in the Balearic Islands and adjacent sub-basins and the wave forecasting system provides high resolution forecasts around the Balearic Islands in collaboration with *Puertos del Estado*. The RISSAGA forecasting system was created in direct response to a Balearic government request to help protect the Menorcan harbour of Ciutadella.

The **Data Centre Facility** is another of SOCIB's **Outstanding Facilities** and takes streams of data from the Observing and Modelling Facilities, applies automatic data specific and internationally established quality controls, then archives and streams the data for display through SOCIB and other web portals. It is the data hub of the SOCIB structure. The archived data is made available to scientists over the long term for search and discovery in a THREDDS catalogue system and this data access capability is expanding to encompass advanced data combination and user specific applications. The infrastructure, technology development and knowledge required to achieve this level of data management is non trivial and the Data Centre Facility could provide regional/national marine data services if required. The Data Centre also makes the data free and open to non-expert users for direct society access through mobile Apps, both iOS and Android, and web based data visualisation tools.

The **Coastal HF Radar Facility** operates in the Ibiza Channel and provides hourly surface current maps. The facility provides detailed real time 24/7 surface current velocity data with a spatial resolution of approximately 3 km and a range reaching up to 40 nautical miles offshore. The high resolution of these data allow characterisation of the surface expression of

meso- and submeso- scale current structures in the Ibiza Channel. The data are fully exploited by the Modelling Facility and available for other regional and international uses and users, for example safety at sea support through SASEMAR.

The **Fixed Stations Facility** operates up to 18 autonomous measurement platforms deployed around the Balearic Islands and connected to SOCIB's central servers to have real-time and long-term knowledge of different oceanographic and meteorological parameters. The facility therefore provides continuous time series of essential water and weather variables that can be incorporated into a broad range of applications for science and society. The different platforms can be grouped into four groups:

- Sea level stations
- Ocean-meteorological buoys
- Weather stations
- Coastal stations

The Fixed Station facility does not have its own staff. For its installation, maintenance and data management the facility counts on:

- Engineering and Technical Division staff for station installation, maintenance and data transmission
- Data Centre Facility staff for data management (quality control, publication, etc.)

The Facility is marked by its successful and supportive partnerships with local institutions. Two Met-Ocean instrumented buoys are included in the FSF platforms, one deep-ocean in the Ibiza Channel location (inside the HF radar coverage area) and another in the Bay of Palma. A number of other major achievements between 2013 and 2017 include:

- The integration of sea level measurement into the European Tsunami Warning Network, through the Instituto Geográfico Nacional.
- The integration of sea level data into the Puertos del Estado sea level network
- The recovery of the sea level stations (instrumentation and locations) from the PortsIB-Rissaga Project and the integration of their data into the SOCIB data and modelling system
- The Facility also provides key met-ocean data from Ciutadella Son Blanc harbour to the Balearic Harbour Authority to support daily port operations

The **Lagrangian Facility** manages the deployment strategy for Argo floats and surface drifters, which form a significant part of the Spanish contribution to the international Argo network and the Global Drifter Program respectively. SOCIB is now a signed up member of Euro-Argo ERIC. Through an annual deployment of 3 Argo floats and 8 drifters SOCIB directly contributes over the long term to maintaining a consistent spatial coverage in the north western Mediterranean, intended to meet the needs of, amongst other users, global climate models. The facility has an automated QC protocol and data available through the SOCIB website and the regional Argo GDAC.

All the facility development been made possible through the strong cross facility support provided by the ETD Division, and SOCIB Support Services. The ETD Division providing field and engineering operational support, the Outreach and Education Service in creating a strong and appealing visual identity across different media and sectors, and the Management and Finance Service and Computing and IT Services providing a strong and well-managed infrastructure. In addition, some SOCIB Facilities have been supported by strong regional in-kind contributions from IMEDEA (CSIC-UIB) and IEO, in terms of personnel and infrastructure.

1.1.3. SOCIB Services

The **Catalogue of Services**, as listed in the ICTS Data application, are the following:

Beach Monitoring Facility Services are supported by the Beach Monitoring Facility and are considered to be one of SOCIB's **Outstanding Services**. These services include hourly beach images for selected beaches, real time weather station data, continuous Acoustic Wave and Current profiling (AWAC) datasets (collected biannually) and periodic beach and sediment surveys. These services form SOCIB's Modular Beach Integral Monitoring System ([MOBIMS](#)), as part of which, coastal video monitoring allows the autonomous and sustained collection, analysis and storage of high-resolution digital pictures, that are then used to observe and quantify a wide range of coastal phenomena.

R/V SOCIB Competitive Access Service is supported by the Coastal Ocean Research Vessel Facility and the Engineering and Technical Division. Considered to be one of SOCIB's **Outstanding Services**, R/V SOCIB has been operational since 2013. A detailed description, including technical details, equipment, crew, berths, endurance etc. can be found in the [SOCIB catamaran brochure](#). R/V SOCIB has been a member of the European Research Vessels Operators (ERVO) since the beginning. External scientific users can apply on a competitive OA basis for ship time on-board R/V SOCIB. The procedure for competitive access to R/V SOCIB ship time is the same as for all R/V that are managed by the Spanish Commission responsible for coordination of R/V activities (COCSABO, Comisión de Coordinación y Seguimiento de las Actividades de los Buques Oceanográficos) where R/V SOCIB has been included since 2013. R/V SOCIB is also frequently accessed in an External On Demand basis for commercial contract and as a complementary competitive OA resource for launch and recovery of gliders.

The **Forecasting Service** is supported by the Forecasting and Modelling Facility, and is a SOCIB **Outstanding Service** providing three different maritime forecasts in response to societal needs. The service provides the daily production of a 48 hour [Rissaga](#) (meteo tsunami) BRIFFS forecast for the Menorcan harbour of Ciutadella. The service also provides daily 3.5 day WMOP ocean forecasts for the Balearic islands including temperature salinity and ocean currents. Thirdly the service provides a 72 hour Wave forecasting capability for the Balearic Islands. These forecasts are free Open Access, thereby aligning the competitive access one stage further towards the principals of EuroARGO and EuroGOOS.

Open Access Data Service is the SOCIB **Outstanding Service** delivered by the Data Centre Facility. Through this service Free Open Access to all SOCIB oceanographic and metocean data are openly available to all, in real and near-real time, and delayed mode. For Scientists the data are openly available through the SOCIB THREDDS server structure, this includes data from gliders, Argo, moorings, beach monitoring, R/V SOCIB, drifters, HF Radar etc. Open access to all SOCIB model forecasts are also available through the same THREDDS server structure. Open Access for non-scientific users is made possible through tools developed by the Data Centre Facility to bridge the science society gap. These tools include iOS and android Apps for visualization of real-time data from ocean observing platforms and model forecasts; and web browser visualization tools through links on the SOCIB homepage.

Glider Competitive Access Service is a SOCIB **Outstanding Service** provided by the Glider Facility. There are two modes of competitive Open Access (OA) to the platforms and capabilities offered by the Glider Facility. The first allows external scientific users to apply on a competitive OA basis for glider operations through SOCIB's own competitive access [application procedure](#) discussed further under modes of Open Access later in this report. The second mode of competitive Open Access follows EU project Trans National Access (TNA), such as that which was associated with JERICO and now that associated with the [JERICO-NEXT TNA](#). This service represents a leading monitoring resource in a Mediterranean context, through this service the Glider Facility offers a national, European and international

capability for Spain.

ZODIAC HURRICANE boat operation Services are supported by the Engineering and Technical Division and involves the use of a semi-rigid professional workboat for deployment, recovery and maintenance operations. The ZODIAC work boat is also made available through External on Demand access through both commercial contract and as a complementary competitive OA resource for launch and recovery of gliders.

All these services are aligned with and connected to the 10 stakeholder key User Sectors identified and described later in the self assessment section. Services develop predominantly through the requests from new stakeholders in the marine environment.

1.1.4. Modes of access to SOCIB RI

Here we describe the different access modes offered by SOCIB's Research Infrastructures, these broadly fall in to three characteristic fundamental modes of access:

Competitive Open Access, where requests are made under projects that have been scientifically peer review evaluated. Predominantly this applies to the R/V catamaran Facility and the Glider Facility; both of these facilities have their own Open Access committee as explained later in Part II.

Free Open Access, applies to all platforms and data associated with SOCIB's multi-platform observational infrastructures, this includes the R/V SOCIB monitoring programme, the SOCIB glider endurance lines and the Beach Monitoring services. The exceptions are data resulting from Competitive Open Access and External on Demand Access, although users of these two modes of access are encouraged to share data openly on as short a timescale as possible. Following the examples of NANOOS, IMOS, EuroGOOS and EuroARGO ERIC, this fundamental mode of access is viewed internationally as one stage more advanced and societally relevant than competitive open access.

External on Demand Access, associated with requests from the public or private sector, and this may be via commercial contract or an agreement with SOCIB.

Within this broad access to the SOCIB Research Infrastructure, some of SOCIB's **Outstanding Facilities** and some of its other facilities have more specific modes of access and these are discussed in overview below:

Access to the **Coastal Ocean Research Vessel Facility** has four specific modes: (1) free open access to data from SOCIB monitoring programmes, (2) internal or propriety access through collaborative projects with international or European partners (e.g. ONR), (3) open competitive access and (4) external on demand access through commercial contract. In the first three of these modes the access almost always implies access to the full services of the Coastal Ocean Research Vessel Facility; for the fourth, contracted mode of access, the access may often just be for the R/V SOCIB and crew.

Access to the **Glider Facility** also has four modes: (1) free open access to data from SOCIB endurance lines, (2) internal or propriety access through collaborative projects with international or European partners (e.g. ONR), and (3 and 4) two modes of open competitive access. The open competitive access maybe through SOCIB's competitive access programme (3), or it maybe through a European Trans National Access (TNA) programme (4) associated with a large EU funded initiative such as JERICO-NEXT in which SOCIB is a partner. In both of these competitive access modes, access maybe to all the services of the Glider Facility, or to as little as just a vehicle or just piloting depending on the facilities of the competitive access applicant.

Access to the **Data Centre Facility** follows an open data policy, in line with international leading Research Infrastructures such as EuroARGO ERIC. This policy enables the free open access to SOCIB platforms where the data from these platforms is part of SOCIB's endurance lines or monitoring programmes. SOCIB's data policy considers data in three different ways, which naturally derive from the SOCIB mission and its resultant focus on the data lifecycle.

1) A principle component of SOCIB's mission is the monitoring and dissemination of observations from the coast and seas around the Balearic Islands and the western Mediterranean as a whole. To facilitate this, data collected by SOCIB are available as close to real-time as possible, near real time (NRT), on the SOCIB website. In general the NRT data will also pass to the electronic data portal for open access to all for download as NetCDF files. It should be noted that despite the short timescale allowed for access to data in NRT mode, a sophisticated level of automated data quality control (QC) is applied, for example to ensure that the instruments are still operating correctly, that data and position/time variables are within sensible ranges, and that unrealistic gradients in data variables are removed as spikes etc. These automated QC tests follow international standards, but are adapted carefully by the SOCIB Data Centre for application relevance in the western Mediterranean.

2) Following detailed calibration, validation and quality control, the data are made available as delayed mode data from the SOCIB electronic data portal and with other oceanographic portals on request. The delayed mode (**DM**) data are stored in the SOCIB electronic data portal and are available through the SOCIB website for delivery to the requester as [NetCDF](#) files. Following the policy clearly stated in the SOCIB mission, these data are freely available, however as DM data contains significant added value funded by the Spanish and Balearic Islands government grants, there are some exceptions to this policy particularly for external commercial use. This is discussed more fully on the SOCIB web pages under charges and intellectual property. SOCIB actively encourages the timely availability of the DM data, this is usually several months after the initial real-time dissemination in order to allow for the careful calibration, validation and quality control of these important datasets.

3) Further use of near real time and delayed mode data comes from the interpretation, multidisciplinary combination, development of applications and high level derived analysis of the various data types, such as the solving of fluid dynamic equations, the correlation of biological samples with water properties or the assimilation of real-time observational data into model forecast data sets. Broadly these are included as data products.

1.2. RELATIONAL ANALYSIS

It is not easy to benchmark SOCIB against other infrastructures operating in the same field either nationally or internationally because SOCIB quickly displays a number of areas of uniqueness. SOCIB, as a multi-platform, multi-disciplinary, observing and forecasting infrastructure is unique because of its 3 drivers, science, new technologies and society. It is unique as a result of its coverage of the marine system from the beach head, to the open ocean; and it is unique for its multi-platform approach to understanding the responses to ocean variability at the meso- and submeso- scales in the Mediterranean Sea. Nonetheless, in this section we will compare SOCIB with other Spanish and foreign research infrastructures and highlight our competitive strengths.

SOCIB is designed around science for society, it is not the re-focus of a previous organisation, neither is it a department of a larger organisation. SOCIB covers the marine environment from the deep ocean, through the littoral zone and right up to the head of the beaches and the users. SOCIB is a facility of facilities exploiting the whole range of instrument and platform technologies currently available for marine observation, from

weather protected video cameras to sea-bed mounted pressure gauges, and from world class research vessel sampling to leading edge autonomous glider vehicles, not forgetting moorings and lagrangian drifters. SOCIB's high resolution modelling programme extends from waves to currents and extreme meteo-tsunamis. In addition to modelling and observing the maritime environment, SOCIB serves data and products and SOCIB develops user friendly interfaces for society access. This envelope makes the SOCIB effort unique, not just in the Mediterranean, not just in Europe, but globally. SOCIB provides the people of the Balearic Islands with a competitive advantage to sustainably exploit and sensitively manage their marine environment better than anyone else; provided the investment is safeguarded.

SOCIB follows international protocols and standards for ocean observations (as discussed earlier) and actively collaborates, and even enters partnerships, with similar leading edge Research Infrastructures. From the regional needs to international partnerships, SOCIB applies its three core drivers, science, new technologies and society, as follows:

Regional: SOCIB plays an important role in the local Balearic community, providing emergency response capacity through fixed and re-locatable observing platforms and knowledge. SOCIB scientists and engineers are involved in forecasting currents and providing information on the regional coastline to support sustainable usage and protection of the coast. SOCIB also actively participates in local marine related policy and public events, and has developed different types of educational and outreach material for public access targeting all ages, including an online educational tool for gliders, '[Follow the Glider](#)'. SOCIB has also developed marine science open days on the R/V SOCIB, the most recent one held just three weeks ago on the 29th September 2017. SOCIB supports the development of marine research expertise in the islands, investing in the development of marine engineers, scientists and data management experts, and responding to regional marine issues as they arise; for example, government concern related to jelly fish blooms and their tourism impact, and the inter-annual variability in Red Prawn recruitment. SOCIB's Forecasting and Modelling Facility provides the daily production of a 48 hour [Rissaga](#) (meteo tsunami) BRIFFS forecast for the Menorcan harbour of Ciutadella. SOCIB's HF Radar Facility and Forecasting and Modelling Facility provide wave height and current direction information to SASEMAR to help with safety at sea issues. SOCIB's Fixed Station Facility provides key met-ocean data from Ciutadella Son Blanc harbour to the Balearic Harbour Authority for use in daily port operations.

National: We serve science and society through providing free and open access to our data, in both a science mode, access to the THREDDS catalogue infrastructure; and a society mode, access to mobile phone and web-based environmental visualisation tools. In line with other ICTS, such as PLOCAN, we provide open and competitive access to our ocean observing platforms, including the R/V SOCIB and Glider Facility. The PLOCAN observing laboratory in the Canary Islands is SOCIB's only obvious national counterpart. This is an extensive laboratory facility and glider/mooring facility. The objectives, however, are different and direct comparison is misleading. SOCIB has a much larger envelope of facilities and actions than its Canary Island relative. SOCIB has modelling and forecasting, and the data management actions at its core. In addition, whilst its data gathering from shelf to open ocean is expected to be world standard like that of SOCIB, PLOCAN does not have the same remit to either connect this through the littoral zone or to serve a suite of public information and education products. PLOCAN has an important focus on alternative energies, which is not amongst the present SOCIB objectives. Since December 2016, we have been signed up to a complementarity agreement with PLOCAN specifically covering glider vehicles, data management and administration/finance; such that Spain benefits from our working together and working independently in a cooperative way, thereby driving a scientific service that is greater than simply the sum of the two parts.

Europe: SOCIB represents Spain in being both a full member of EuroGOOS and EuroARGO ERIC in its own right. We are an agile and relatively young ICTS for ocean and coastal observation, our structure provides a blue print for a future network of regional ocean observing systems in Europe. Within Europe SOCIB is clearly a leading coastal ocean observing system; the multiplatform science to society approach covering from the nearshore to the open ocean makes SOCIB a unique infrastructure; specifically we are leaders in:

- Multi-platform infrastructure operation, data archive, management, integration and visualization
- Glider operations, we operate one of the main glider labs in Europe
- Linking observations and modelling at a regional level
- Being driven by the needs of science, society and technology
- Extending from nearshore to open ocean

COSYNA, MOOSE and POSEIDON are SOCIB's European counterparts. MOOSE is a French observation network to monitor the NW Mediterranean and has clearly followed the model of a regional component of GOOS/EuroGOOS. However it is driven largely by global change and scientific interests with little focus on user services and products. COSYNA on the other hand is a German observing and modelling system of much greater similarity to SOCIB. Predominantly focussed on the southern North Sea, COSYNA has a similar array of monitoring platforms to SOCIB, and has also worked to assimilate data into wave and current forecasting models of the region. POSEIDON is the Greek monitoring, forecasting and information system based at the Hellenic Centre for Marine Research. It comprises a network of observing buoys gathering meteorological and oceanographic surface information and an operational centre where these data are used to validate atmospheric and oceanographic forecast models for the Mediterranean Sea, with a higher resolution focus on the Aegean and Black Seas.

International: SOCIB's closest example internationally is NANOOS, the Pacific northwest ocean observing system of IOOS (Integrated Ocean Observing System). Based predominantly on the Washington and Oregon coasts, NANOOS was the principal inspiration for the SOCIB concept. Having been in existence for perhaps twice the length of time of SOCIB, NANOOS is considerably larger and has access to a very much bigger budget. But in a clear sibling analogy, SOCIB has benefitted from following closely the ideas and concepts of NANOOS; of course SOCIB has some of its own ideas, NANOOS does not yet employ beach cameras, possibly because tourism and the interests of hotels may be a bigger driver in the Balearic Islands.

The Australian Integrated Marine Observing System (IMOS), founded in 2006, is probably the worlds largest observing and monitoring network, covering the seas and oceanic regions around the entirety of Australia and Tasmania. The IMOS structure and its facilities have been a clear source of inspiration for SOCIB, and strong links exist at the science and data management level. The Observing systems include, AUVs, gliders, HF radar, moored platforms, Argo floats, experimental cruises, animal tagging, ferryboxes and ships of opportunity observations. The IMOS facilities are served by the Australian Ocean Data Network (AODN) for data archiving, data access policy and an electronic data portal, which provides model outputs for coastal marine forecasting and the Oceanic region around Tasmania in particular. Although its sheer size makes a comparison with SOCIB difficult, it is clear that IMOS does not have the same socio-economic focus on monitoring; IMOS has a more conventional science research focus spread across 5 principal themes, climate variability and weather extremes, multi-decadal ocean change, major boundary currents and inter-basin flows, continental shelf processes, and ecosystem responses.

2. SELF-ASSESSMENT ON SOCIB'S FULFILLMENT OF ICTS REQUIREMENTS AND CRITERIA

2.1. SOCIB'S UNIQUENESS AND STRATEGIC CHARACTER.

SOCIB is a multi-platform facility of facilities that provides streams of data, added value products, and forecasting services from the coast to the open ocean. In this, SOCIB is unique in Spain, and has only a few counterparts internationally, as discussed in part I. SOCIB supports Open Access (OA) to all its data, in line with and extending the principals of the Euro-Argo ERIC, of which SOCIB is a member and Spain's representative. SOCIB has three key pillars, driving scientific excellence, supporting new technologies, and responding to society requirements; which it employs to support and promote the ecological and economic benefits of a healthy and sustainable coastal ocean.

SOCIB has evolved, and continues to evolve, to promote the paradigm shift that has occurred in ocean observation and data availability: from the historical, single platform ship based observation with delayed mode data availability to the current multi-platform, integrated and multidisciplinary observing systems that supply open access data real time or quasi real time and quality controlled data and state of the art ocean forecasting. These types of Marine Research Infrastructures are being progressively implemented in all oceans and seas. SOCIB is the Balearic Islands', and Spain's, equivalent of these new observing systems, such as IMOS (Australia), OOI and IOOS (USA), VENUS/NEPTUNE (Canada), among others; which provide sustained and reliable multidisciplinary ocean and coastal data that are available for science and society in quasi real time, thereby delivering new insight into ocean variability.

ICTS SOCIB adds value to regional, national and European initiatives by:

1. Assuring the highest level of scientific excellence.
2. Operating a system of integrated multi-platform observing and forecasting platforms from the near-shore to open ocean, relevant for society.
3. Providing free, quality assured and controlled, and open data
4. Developing mission oriented innovation; from basic research to products and services for 10 different user sectors and multiple end users.
5. Working with policy makers and responding to specific society needs, supporting answers to key scientific questions and programs
6. Training a new generation of researchers and technicians
7. Participating in educative programs (e.g. glider school).
8. Engaging with society, ocean literacy and outreach: science with and for society
9. Establishing international partnerships to reach high level goals (EuroGOOS, GODAE, ONR, etc.).

Accordingly, at SOCIB we are committed to scientific and technical excellence with impact and relevance to and for society.

SOCIB carries out world class science and technology development: responding to national and international priorities. This scientific and technical excellence is measured in terms of publications, projects, training and novel systems for observing and QC.

SOCIB provides services: in response to science, technology and society drivers, for example, free open access to all SOCIB data, free open access to model forecasting (ocean circulation model, Waves modeling, and meteo-tsunami modeling). SOCIB achieves this through the operation of a system of integrated multi-platform observing and forecasting platforms and associated capacity development.

SOCIB develops Products: again in response to science, technology and society drivers. For

example, the glider toolbox freely available for the scientific processing of glider data, data visualization and download tools/products, GIS beach and beach viewer for tourism and society, and ‘Follow the glider’ and other interactive educational packages.

The ocean covers 71% of the Earth's surface and is one of the most important components of the climate system. **Oceans and climate** are inextricably linked and oceans play a fundamental role in mitigating climate change by serving as a major heat and carbon sink. **Human induced climate change** threatens coastal and marine ecosystems through sea-level rise, acidification, and changes in weather patterns and water temperatures. These changes in turn impact the **health of the oceans**, marine species, ecosystems and coastal communities.

The ocean is linked to **human livelihoods** and **quality of life** in numerous ways. From its role in modulating the climate to how it provides a variety of socio-economic, cultural and environmental benefits, the ocean contributes significantly to human wellbeing. Today, the interrelationship between oceans and climate is recognized, understood, and incorporated into policies contributing to bridge the science-policy gap.

A better **understanding** of ocean variability and ecosystems’ response, as well as human impacts and vulnerabilities, requires the coordination of a continuous and long-term system of ocean observations at different scales and covering from the nearshore to the open ocean. Observing the ocean is necessary to predict the climate evolution of our planet and to preserve healthy and sustainable oceans for future generations.

In this context, the [GOOS](#) (Global Ocean Observing System) coordinates ocean observations around the world around three critical themes: **climate**, **ocean health**, and **real-time services**. These themes correspond to the GOOS mandate to contribute to the UNFCCC Convention on climate change, the UN convention on biodiversity and the IOC/WMO mandates to provide operational ocean services, respectively.

The **Mediterranean Sea** is a well-established small-scale ocean, an ideal laboratory to address long term climate tendencies and to study key phenomena such as heat storage and transport by currents; trying to unravel the contribution of meso and submesoscale eddies and resolving the complex ocean-atmosphere-coastal interactions. A better understanding of oceanic climate and ecosystems and their vulnerability, as well as human impact, requires the coordination of long-term systematic multidisciplinary observations. The Balearic Islands and the Balearic Sea are the perfect place to carry out the observations that the SOCIB makes.

In this sense, technological advances have allowed the development of new systems of observation that facilitate a new understanding of ocean processes and their driving roll in the earth system. Within this paradigm shift, the ICTS SOCIB has a multiplatform system of observation for the Western Mediterranean. SOCIB is a scientific reference infrastructure at the international level in the implementation and integration of Oceanographic Observation using multiplatform systems. SOCIB, through operational oceanography and prediction systems, promotes and consolidates a science of excellence in the Balearic Islands. SOCIB also provides answers to specific problems in a constantly evolving environment, but it is also an element that guarantees independence and rigor in scientific advice thanks to its collaborations with internationally accepted projects and quality assessment systems; whilst adapting to the needs of the society of the Balearic Islands.

Recent studies have demonstrated the maturity of the integrated multi-platform systems of the SOCIB in the Western Mediterranean demonstrating the high variability and importance of mesoscale and sub-mesoscale phenomena in the transport of Atlantic and Mediterranean water masses. In the study of marine ecosystems and biogeochemical cycles, dependence on traditional methods and platforms (e.g. sparse CTD sampling on oceanographic research vessels) has resulted in unrepresentative sampling of the high variability of biological and

biogeochemical processes. It is critical to expand and adapt integrated multiplatform observation to measure biological and biogeochemical parameters; SOCIB is beginning to explore this, through its multiplatform observation system and the data available in real time facilitates, in the Balearic Islands.

The strategic plan of the SOCIB and its objectives are explicitly aligned with international strategies for ocean observation, such as the [GOOS](#). As an integral member of EuroGOOS, SOCIB is the international leader for Spain and the Balearic Islands in maintaining the health status of the Western Mediterranean.

SOCIB has a broad range of platform focused, quality-controlled, and freely available data as well as apps for visualisation. These already represent a benchmark in a new era of ocean observation, however to enable SOCIB to deliver data to new users and to increase its utility to society SOCIB recently undertook a review of its products and services (**Table 1**), with the aim of developing a Products and Services Strategy. The results of this review are discussed in section II, Production and Performance.

FACILITY	PRODUCT (DATA/OTHER)	DESCRIPTION	AVAIL.
BMF			
	Beamon	Beach Monitoring Facility viewer - real time images from monitored beaches	Online
	Beach Data Viewer	GIS Maps and data – beach data viewer for historical data – 877 beaches in the Balearic region	Online
	Hotel Seaboards	Seaboards for hotel partners	Online
	Sa Costa	Balearic coastal sensitivity index	Online
	Beach Tutorial	App for Android, for kids giving information on elements and dynamics of a beach	On request
	Rips Tutorial	App for Android, for kids giving information on Rip currents	On request
DCF			
	Profiles Viewer	Interactive viewer for data profiles - Argo, Ship, Glider - accessible through DAPP	Online
	Lw4nc2	Application to display gridded data both observational and forecasting - HF Radar, WMOP	Online
	Dapp	Viewer for current and historical missions mobile platforms - ship, glider, Argo, drifters, turtles - with access to visualisations of data, Jwebchart (engineering data), profiles viewer (ocean profiles), plots of variables.	Online
	Jwebchart	Interactive viewer of time series datasets	Online
	Sorrento Seaboard	Seaboard to illustrate the type of data available for SAR services (e.g. Sorrento)	Online
	Socib Mobile App	Application to view data and forecasts for iOS and Android	Online
	Thredds Catalogue	Application to catalogue, distribute and access all SOCIB data	Online
MF			
	WMOP Forecast Access	Web page with access to ocean forecast, by variable and regions (driven by Lw4nc2)	Online
	WMOP Validation Access	Web page with access to model validations agaons in situ platforms	Online
	Wmop Hindcast	SOCIB WMOP hindcast datasets	On request
	Wmop Ocean Indicators	Timeseries of key variables along key sections	Online
	BRIFS Forecast	Balearic RIssaga Forecasting System (BRIFS) - predicting extreme sea level oscillations from meteotsunamis Ciutadella harbour	Online
	Sapo-Ib	Web page with wave forecast and real-time data	Online

	Lagrangian Tool	Forecast of particle trajectory within WMOP, forward and backwards in time	On request
GF			
	Glider Toolbox	MATLAB/Octave scripts to manage data collected by a glider fleet, including data download, data processing and product and figure generation, both in real time and delayed time	Online
CORVF			
	Ship Seaboard	Seaboard for viewing data live from sensors onboard R/V during a cruise	Online
FSF			
	Fixed Station Viewer	Viewers for each fixed station (link is one example)	Online
HFRF			
	Hf Radar Validation Report	Monthly validation report for HF Radar data	Online
	Seaboard Hf Radar	Seaboard for HF Radar Facility with partner hotel	Online
O&E			
	Medclie	Online descriptions of facilities and observations for school kids and teachers	Online
	Follow The Glider	Educational tool on gliders, how function and what they observe, for school kids and teachers	Online
SIAS			
	Indicators For ICZM	System of Indicators for Integrated Coastal Zone Management (ICZM) in the Balearic Islands	Online
	Coastal Environmental Sensitivity Atlas	Coastal Environmental Sensitivity Atlas of the Balearic Islands (NEW 2015 EDITION)	Online

Table 1: SOCIB's current list of products, by facility.

In summary, SOCIB, because of its critical mass, multidisciplinary, integrated and targeted approach, and sustained funding, has established a new research ecosystem that facilitates directed scientific excellence; while at the same time, enhancing technology development, and responding to society needs and challenges through science-society engagement, contributing to bridge the science-policy gap with innovation and new products. In other words, we are establishing new ways of international partnership that are leading to major science breakthroughs, innovations in ocean observation and new ways of more efficient and science based coastal and ocean management to guarantee healthy oceans in a sustainable planet for future generations.

Outstanding Facilities

The **Coastal Ocean Research Vessel Facility** is one of SOCIBs **Outstanding Facilities** because this facility operates R/V SOCIB, a fast 24 m catamaran, equipped for modern, world-class, multi-disciplinary ocean science, and capable of sustained operations of up to a week at sea. R/V SOCIB is a regional and European asset, available for external users as part of the Spanish oceanographic fleet ([COCSABO](#)). The facility maintains the labs, and a suite of oceanographic equipment at a lower daily cost than larger vessels. The facility focuses on the Balearic Islands and the Spanish mainland, including offshore transects, for SOCIBs scientific priorities. However, the facility also responds to Spanish national and European requirements extending this range to the Strait of Gibraltar to the west and Sardinia to the East. Furthermore, commercial contracts are actively encouraged by the facility and have taken R/V SOCIB out into the open Atlantic to Madeira.

The **Glider Facility** is another of SOCIBs **Outstanding Facilities** because it supports, from mobilisation to demobilisation, one of the most significant glider vehicle fleets in the Mediterranean. It is a leading flagship facility for both SOCIB and Spain, and it includes

pressure testing, compass calibration and field calibration capability. These capabilities have been developed by SOCIB, the most recent being the field calibration capability which involves mounting the glider vehicle on a traditional CTD frame using a specially designed rotating cradle, such CTD stations are known as GARICASTS (Glider Against Rosette Intercomparison CASTS). The GARICAST is a world unique capability for SOCIB and Spain as a routine procedure. A leading monitoring resource in a Mediterranean context, the Glider Facility offers a national, European and International capability. The facility maintains one sustained and semi-permanent endurance line in the Ibiza and Mallorca channels in order to understand spatial and temporal variability at a critical ‘choke-point’ in the Mediterranean circulation. Competitive Open Access (OA) to the facility and not just the glider platforms is supported for focused process studies, this includes piloting of third party vehicles, training, and maintenance and engineering. Some OA programs have now become mature enough to have been repeated as additional endurance lines, for example the JERICO-NEXT TNA supported ABACUS line which has now been repeated for 3 years, and is planned for at least a further year. The SOCIB glider fleet is addressing important scientific questions, leading to the publication of 6 peer-reviewed research articles and 24 communications in international conferences and workshops over the period 2014-2017, many of these lead by Competitive Open Access partners and collaborators.

The **Beach Monitoring Facility** is a science, technology and society leader in the monitoring of the short to long-term evolution of beach morphology, and is therefore another of SOCIB’s **Outstanding Facilities**. Its system of beach installations, supported by the Engineering and Technical Division, and associated field campaigns, is unique and delivers data streams to meet science needs at a cost level that is sustainable. From a significant population of beach cameras through to acoustic Doppler current profiler (ADCP) and a programme of bathymetric and sediment sampling, the monitoring covers the beach head to the wave breaking zone. A continuous, large and high-resolution dataset on coastline evolution, nearshore waves and currents, sediments and beach bathymetry is a key issue in order to characterize and manage coastal systems properly. The Beach Monitoring Facility is being adopted by the Spanish Coastal Research Community and institutes internationally as a reference system. Specific societal focused data products, such as for the tourism sector, have been initiated over the past four years through interaction with hotel chains. The Beach Monitoring Facility has operated since 2012. It has 3 sites and 5 stations on the Mallorca and Menorca Islands. Each site comprises fixed video-monitoring cameras, 14 in Platja de Palma, 5 in Cala Millor, both in Mallorca, and 5 in Son Bou, Menorca, and meteo-stations and fixed ADCPs. Operational wave modelling is provided with 60 m resolution for each of the systems, nested by the Beach Monitoring Facility, with support from Puerto del Estades, into the Modelling and Forecasting Facility’s Balearic Seas Waves model.

The **Modelling and Forecasting Facility** is an **Outstanding Facility** through its development, implementation, operation and evaluation of numerical ocean prediction systems all aimed directly at responding to science and society needs in the Balearic Islands and Western Mediterranean Sea. It also conducts scientific research to advance the understanding of ocean processes and improve model forecasting skills. The facility has three different operational forecasting systems: firstly a high-resolution ocean current forecasting system (WMOP), secondly a wave forecasting system (in collaboration with [Puertos del Estado](#)) and thirdly a meteo-tsunami (RISSAGA) forecasting system. These forecasting systems make up an Outstanding Service discussed below, and are continually improved and tested through specific process studies, thus contributing to both enhancing our scientific understanding and our modelling skills and capabilities. The ocean currents forecasting system (WMOP) provides predictions in the Balearic Islands and adjacent sub-basins and the wave forecasting system in the region South of Mallorca is operational in collaboration with *Puertos del Estado*. The RISSAGA forecasting system was created in direct response to a Balearic government request to help protect the Menorcan harbour of Ciutadella. Model

implementations would not be possible without the strong support from the Computing and IT Support Service (**Figure 1**) and the Data Center Facility, providing high performance computing capabilities, and access to ocean data and a portal for model forecasts, respectively. Modelling and Forecasting Facility activities are also carried out in close collaboration with scientists from the observing facilities for the understanding of processes, model validation and data assimilation purposes. The Modelling and Forecasting Facility has successfully reached a fully operational phase with daily predictions of currents, meteotsunamis and waves, allowing the development of downstream products (e.g. a safety at sea service to SASEMAR). At the same time it has addressed important scientific questions relevant for the further development of modelling tools, leading to the publication of 20 peer-reviewed research articles and 54 communications in international conferences and workshops over the period 2014-2017.

The **Data Centre Facility** is another of SOCIBs **Outstanding Facilities** and takes streams of data from the Observing and Modelling Facilities in the SOS Division and some SOCIB Partners, applies automatic data specific and internationally established quality controls, then archives and streams the data for display through SOCIB and other web portals. It is the data hub of the SOCIB structure, and the cornerstone of the free and open access to data principal at SOCIB. The Data Centre Facility is responsible for covering the whole data life-cycle, ranging from data acquisition using observational platforms, numerical models or information generated by other divisions, to distribution and visualization through the development of specific tools for expert and non-expert (society) visualisation of the data sets, including both dedicated web and Mobile (both iOS and Android) applications. The Archived data is made available to scientists over the long term for search and discovery in a THREDDS catalogue system and this data access capability is expanding to encompass advanced data combination and user specific applications. The infrastructure, technology development and knowledge required to achieve this level of data management is non trivial and the Data Centre Facility could provide regional/national marine data services if required. The Data Centre Facility also makes the data free and open to non-expert users for direct society access through mobile Apps, both iOS and Android, and web based data visualisation tools. The Data Centre Facility collected data from 400 instruments, 230 platforms and 1,400 sensors in the last 7 years (**Figure 2**) providing free and open data to more than 1,200 users identified since 2015. Free open access to data through the iOS and Android Apps., since 2015, stands at 2229 downloads for Android and 3285 downloads for iOS.

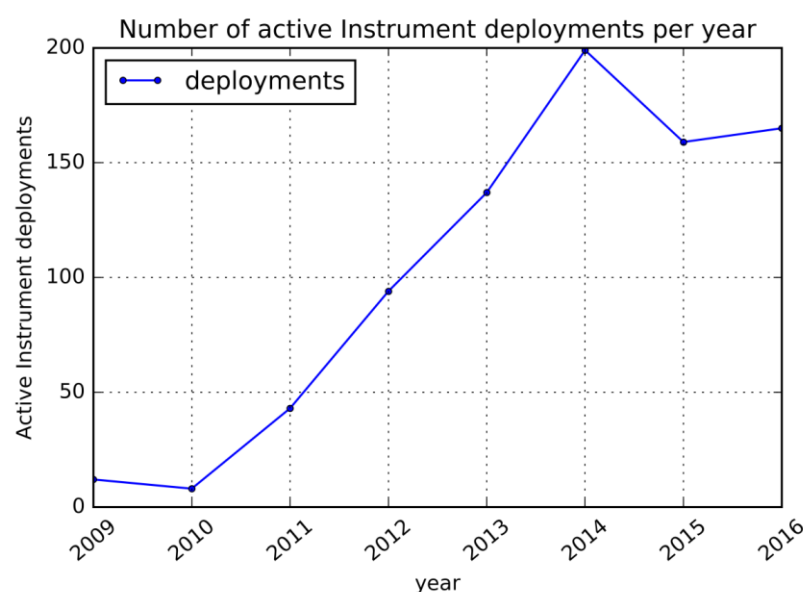


Figure 2: the number of active instrument deployments for which the Data Centre Facility has curated the data, by year, since 2009.

Outstanding Services

Beach Monitoring Facility Services are supported by the Beach Monitoring Facility and are considered to be one of SOCIB's **Outstanding Services** because they provide a total inclusive response to the requirements of the tourism sector and societal well-being. These services include hourly beach images for selected beaches, real time weather station data, continuous Acoustic Wave and Current profiling (AWAC) datasets (collected biannually) and a programme of periodic beach and sediment sampling surveys. These services form SOCIB's Modular Beach Integral Monitoring System (**MOBIMS**). Coastal videomonitoring allows the autonomous and sustained collection, analysis and storage of high-resolution digital pictures, that are then used to observe and quantify a wide range of coastal phenomena. MOBIMS at SOCIB incorporates the SIRENA coastal imaging system developed at the Mediterranean Institute for Advanced Studies, IMEDEA (CSIC-UIB).

R/V SOCIB Competitive Access Service is supported by the Coastal Ocean Research Vessel Facility and the Engineering and Technical Division. This is one of SOCIB's **Outstanding Services** because R/V SOCIB is a world class research vessel built to work from near shore to deep blue ocean. Employing leading edge navigation systems, including the latest 3D-GPS, R/V SOCIB is capable of world leading positioning and attitude measurement; this results in a platform capable of delivering the most accurate acoustic mapping and current profiling possible with modern instrument capabilities. The procedure for competitive access to R/V SOCIB ship time is the same as for all R/V that are managed by the Spanish Commission responsible for coordination of R/V activities (COCSABO, Comisión de Coordinación y Seguimiento de las Actividades de los Buques Oceanográficos) where R/V SOCIB has been included since 2013.

The **Forecasting Service** is supported by the Forecasting and Modelling Facility, and is a SOCIB **Outstanding Service** providing three different maritime forecasts in response to societal needs. The service provides the daily production of a 48 hour [Rissaga](#) (meteo tsunami) BRIFFS forecast for the Menorcan harbour of Ciutadella. The service also provides daily 3.5 day WMOP ocean forecasts for the Balearic islands including temperature salinity and ocean currents. Thirdly the service provides a 72 hour Wave forecasting capability for the Balearic Islands. These forecasts are fully OA, thereby aligning the competitive access one stage further towards the principals of EuroARGO and EuroGOOS.

The **Open Access Data Service** is the SOCIB **Outstanding Service** delivered by the Data Centre Facility. Through this service Open Access to all SOCIB oceanographic and metocean data are openly available to all both in real and near-real time, and delayed mode. For Scientists the data are openly available in numerical form through the SOCIB THREDDS server structure, this includes data from gliders, Argo, moorings, beach monitoring, R/V SOCIB, drifters, HF Radar etc. Open access to all SOCIB model forecasts are also available through the THREDDS server structure. Open Access for non-scientific users is made possible through tools developed by the Data Centre Facility to bridge the science society gap. These tools include iOS and android Apps for graphical access to real-time data from ocean observing platforms and model forecasts; and web browser visualization tools through links on the SOCIB homepage.

The **Glider Competitive Access Service** is a SOCIB **Outstanding Service** provided by the Glider Facility because it encompasses all aspects of operating glider vehicles on one site. There is a spectrum of ways in which these services can be delivered in competitive Open Access (OA) and these relate to the extent to which the access is required to the platforms and to the complementary capabilities offered by the Glider Facility services. For convenience

there are three categories of modes that requested access to SOCIB's Glider Facility and their available infrastructure can follow:

- **Remote:** the experiment is implemented by SOCIB and the presence of the user group is not required, i.e. all or most of the end to end collection and recovery of glider data for a competitive OA user group is carried out by the SOCIB glider Facility.
- **Partially remote:** the presence of the user group is required at some stage of the experiment, i.e. the competitive OA user group, may be wanting to get training experience from the SOCIB glider Facility, or perhaps the competitive OA user group may want the SOCIB glider Facility to pilot and support their own glider vehicle.
- **"In person/hands-on":** the presence of the user group is required during the whole access period of the experiment, i.e. the competitive OA user group is expert in glider operations, but for logistic purposes it is more convenient for them to operate a SOCIB glider Facility vehicle or use SOCIB glider Facility engineering or calibration equipment.

2.2. GENERAL OBJECTIVES OF THE INFRASTRUCTURE.

Primary Objective – science for society

The central objective of ICTS SOCIB is to be a world class observing system providing observations, forecasts, products and services for Europe, Spain and the Balearic Islands. By forging relationships with and listening to key users, recently identified and classified in 10 sectors as discussed earlier, SOCIB has targeted and continues to target observational capacity and model building to underpin relevant and essential products and services for societal benefit. The societal benefits can be economic, safety, sustainability, and also new opportunities. In order to achieve this central objective it is critical that SOCIB maintains and drives a world class standard in earth observation, in response to state of the art scientific priorities. To this end SOCIB has become a full member of EuroGOOS and EuroARGO ERIC and is Spain's representative at this level. In line with these and SOCIB's international counterparts, SOCIB has specific objectives driven by international scientific priorities and state of the art technology that answer two priorities:

- Addressing and responding to international scientific, technological and strategic challenges for operational oceanography in the coastal ocean and
- Enhancing operational oceanography research and technology activities being carried out in the Balearic Islands and western Mediterranean.

Thus SOCIB's specific science and technology objectives are as follows:

1. To support peer reviewed research along three internationally established research lines that have particular relevance to the oceanography and societal needs of the Balearic region, namely understanding:

- The role of the oceans in our climate system, climate impact and climate variability effects in the Mediterranean Sea
- The interaction between major Mediterranean currents and the shelf environments and their influence on the ecosystem variability
- The nearshore morpho-dynamics and sea level variability in response to climate change

2. To contribute to the development of operational oceanography technologies, specifically:

- To develop new products, tools and systems, and support sensor development, to enhance the real-time capabilities of the observational facilities and numerical modelling.
- To expand SOCIB operational oceanography activities through adding new, complementary platforms, techniques and processes, in response to identified science, technology or society needs. This includes the recent addition of leading Edge biogeochemical measurements to support sensors and platforms that can help tackle societally important biological issues such as red prawn recruitment and jellyfish Bloom success.
- To progressively improve the observed information, adding new variables, increased range of spatial-temporal scales, and developing additional products and services in response to stakeholders needs.

3. To support the strategic needs from society in the context of global change:

- Through developing operational tools for decision support and the transfer of knowledge for sustainable management of the coastal ocean
- Through the development of science based (ICOM) coastal and ocean management, in the general frame of sustainability science.

4. To support and encourage the broad use of SOCIB data and services through:

- Open, well designed and easy to use data access systems
- Partnership with external research organisations
- Transfer of knowledge, through outreach, education, training and mobility activities

5. To develop and maintain an international perspective, in order to increase the international visibility of the ICTS, to attract the participation of the best researchers from around the world, and over the medium term to advance towards participation within the European ESFRI framework.

6. To support SOCIB publications made in collaboration with key Balearic research institution, such as IMEDEA (CSIC-UIB), COB-IEO and UIB, and other national and international, and progressively with other key national and international partners and collaborators.

2.3. INVESTMENT

SOCIB has made a cumulative investment of € 10,254,486.28 since the beginning of 2007, in technological infrastructure; this includes all its multi-platform and instrumental assets. SOCIB's annual operating costs have increased from ~ 1.5 to ~ 2.8 million Euro in the period 2013-16; both of these figures fulfilling the investment requirements of an ICTS-RC. Please note, this Information is provided in detail in the Statements and Commitments Form, and in the ICTS Data application.

2.4. OPEN ACCESS

2.4.1. Open access website:

As discussed in Part I, SOCIB provides Free Open Access to its outstanding Forecasting and

Modelling Facility through its outstanding Forecast Service on the SOCIB website, for its RISSAGA [forecast](#), its Wave [forecast](#), and its WMOP ocean circulation [forecasts](#).

SOCIB provides Free Open Access to its outstanding Data Centre Facility through its outstanding Open Access to Ocean Data service on the SOCIB website, providing open access to research vessel [monitoring programs](#), glider [endurance lines](#), fixed station facility [data](#), Lagrangian facility [data](#), HF radar facility [currents](#), and satellite [data](#).

SOCIB also provides Free Open Access to its outstanding Beach Monitoring Facility through its outstanding Beach Monitoring Facility services on the SOCIB [website](#).

SOCIB provides Competitive Open Access to it's the R/V SOCIB and to its fleet of ocean gliders through the websites [R/V competitive access](#) and [glider facility competitive access](#) respectively.

2.4.2. Open access policy:

Following the international leading standards of EuroGOOS and EuroARGO ERIC, of which SOCIB is Spain's signed up representative full member, and as discussed in (i) above, SOCIB has an Open Access policy to its data and services where these are engaged in SOCIB's extensive programme of marine monitoring, Beach monitoring and model forecasting, this policy is provided on the SOCIB website [here](#). SOCIB also has a Competitive Open Access Policy to its Research Vessel Facility and its Glider Facility, again these policies are presented on the websites [R/V competitive access](#) and [glider facility competitive access](#) respectively.

The protocols and guidelines for competitive Open Access are provided separately for [R/V SOCIB](#) and the [glider facility](#) in a simple, clear and understandable, step-by-step approach with clearly linked downloadable documents duplicated in Microsoft word and PDF format. These documents are proposal templates and guidelines as appropriate.

The procedures for Open Access will remain in full force and effect as long as the ICTS qualification is granted, and both eligibility and transparency are described carefully in the guidelines documents. The private sector is clearly described as being fully eligible to apply for Competitive Open Access; this sector is encouraged through scientific and technical meeting/forum attendances by SOCIB staff, open day events on board R/V SOCIB, the continued development of an interesting and easy to navigate website and regular presentations at societal events such as La Caixa sponsored public educational evening programmes. For the R/V SOCIB, the Engineering and Technical Division carries out periodic emailing to companies, for example survey companies, who may be interested in contracting the vessel. SOCIB also holds at least one 'Open Day' on the R/V SOCIB per year.

2.4.3. Open Access Committees:

DATA: The free Open Access to SOCIB data does not require a peer review committee by definition. However, SOCIB's External Scientific and Technical Advisory Committee, discussed later, is always invited to comment and advise on the policy, and the level of access and how this can be improved.

GLIDERS: The Access Committee, formed on the 28th March 2014, comprises internationally well-recognised experts in new ocean observing platforms and glider operations. They operate for us at least twice a year in the corresponding periods of proposal evaluation.

- a. Stefania Sparnocchia, CNR-IT
- b. Lukas Merckelback, HZG-GE
- c. Pierre Testor, CNRS/INSU-FR

- d. Carlos Barrera, PLOCAN-SP
- e. Marc Torner, SOCIB-SP

CATAMARAN : The procedure for competitive access to SOCIB R/V ship time is the same as for all R/V that are managed by the Spanish Commission responsible for coordination of R/V activities (COCSABO, Comisión de Coordinación y Seguimiento de las Actividades de los Buques Oceanográficos) where she has been included since 2013.

COCSABO coordinates all the scientific and technical activities carried out by the Spanish oceanographic research vessels (those belonging to IEO and CSIC, and also the BIO Hesperides), including the scheduling and calendar of each vessel.

In order to apply for competitive ship time on-board R/V SOCIB the formal procedure includes an application form ([proposal template Annex](#)) that is evaluated by the COCSABO. More detailed information, including prices, forms and availability can be found at the [COCSABO](#) website.

2.4.4. Rate of competitive open access:

The details of access to SOCIB infrastructures during the period 2013-2016, have been provided as requested in the information supplied in ICTS-DATA. Here we summarise this and comment on the significance of the data, by access service.

R/V SOCIB

Year	SOCIB managing days	SOCIB Activity days	SOCIB	SOCIB + collaborators	External customers
2015	275	65	28	36	1
2016	366	100	30	25	45
2017 (up to 30 Sept.)	304	113	21	32	60

Table 2: R/V SOCIB deployment statistics.

It should be noted that there are no statistics for 2013 or 2014 in the above table, **Table 2**. The reason for this is that until 2015, R/V SOCIB was managed by the IEO through an agreement between IEO, CSIC and SOCIB for the management of R/V SOCIB.

Glider Services

Year	SOCIB Competitive OA	JERICO NEXT TNA Competitive OA	Total Glider Days	% OA
2014	6		196	3.1%

2015	54		299	18.1%
2016	17	50	379	17.7%
2017 (up to 30 Sept.)	41		203	20.2%

Table 3: Glider vehicle deployment statistics.

The competitive open access programme to the Glider Facility services began in 2014. In the two following years the total percentage of glider days awarded to competitive open access was very close to our target of 20% (**Table 3**). In fact it is important to note that we could easily inflate that figure to meet our target simply by removing engineering trials days from the total, or indeed by allocating a proportion of the engineering trials days to the competitive open access program, both of these could be justified. As of September 2017, the total number of competitive open access days has already reached 41 days, in a total glider usage of 203 days, providing a figure of 20.2 % competitive open access commitment.

Data Centre Service

The volume of data transferred and number of accesses increased around 3-4 times between the end of 2015 and mid-2016 (**Figure 2**). Furthermore, SOCIB's data are being exposed significantly at an international level (**Figure 3**). It should be noted that there is a data gap in the first half of 2016, this resulted from the further development of the analysis system that SOCIB now has in place to monitor data downloading and usage.

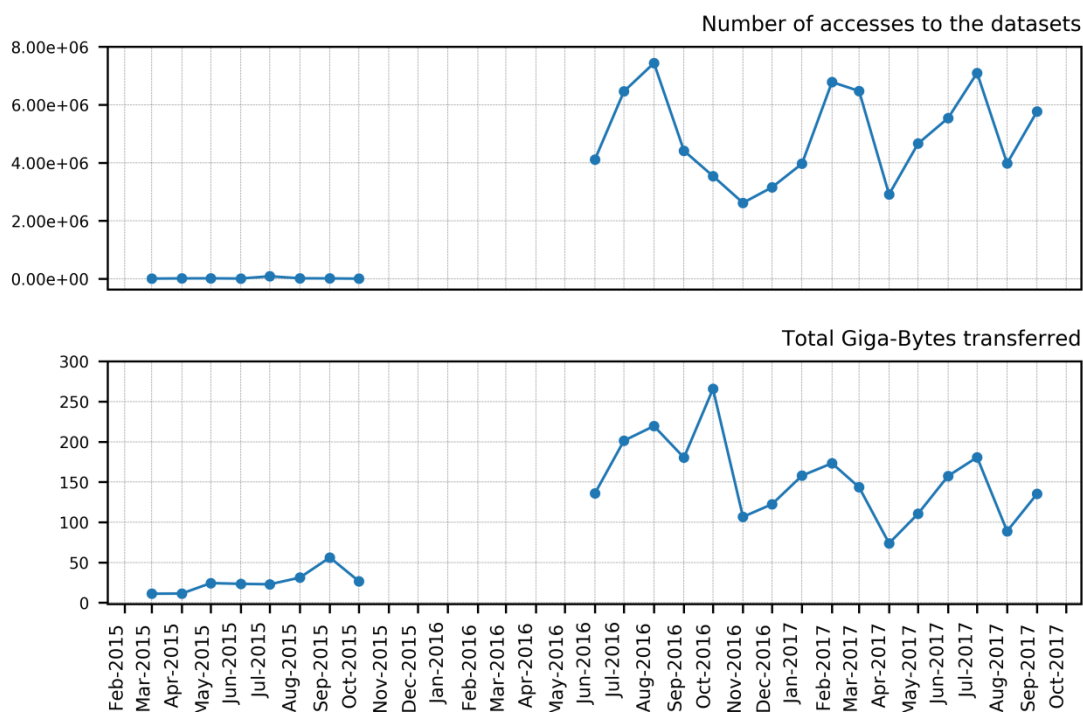


Figure 2: Data access to the Data Centre Facility servers as recorded in the new access log files, presented as the total number of accesses by month (top), and the number of Giga-Bytes downloaded by month (bottom).

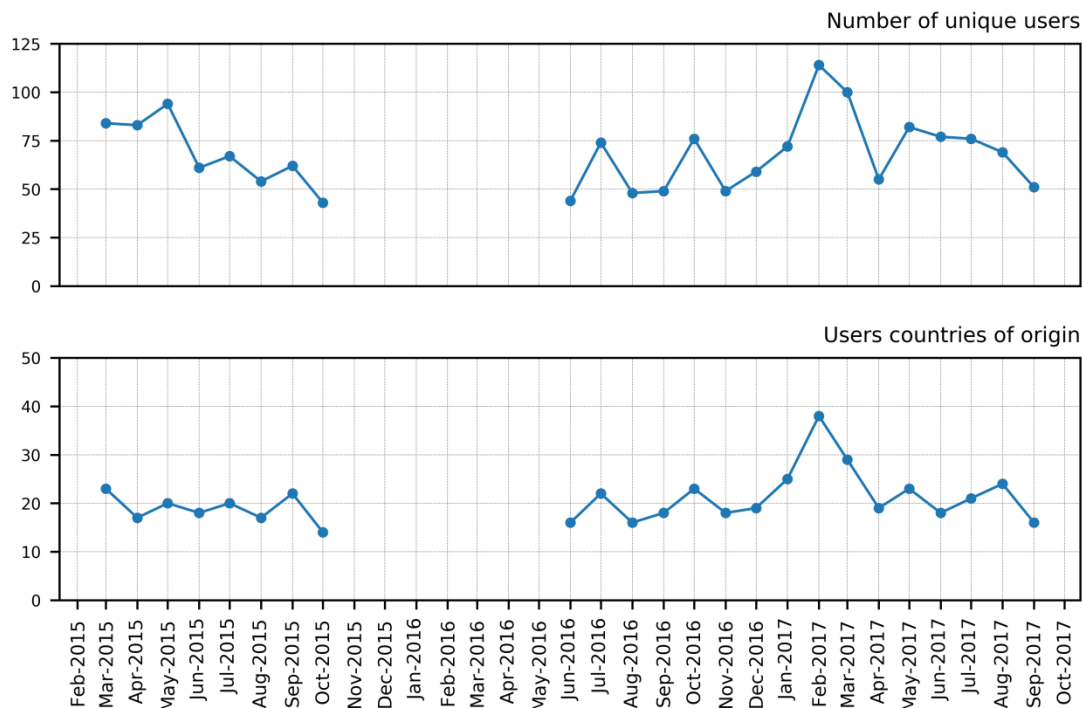


Figure 3: Data access to the Data Centre Facility servers as recorded in the new access log files, presented as the total number of unique users by month (top), and the number of user nations by month (bottom).

2.4.5. Open access calls:

SOCIB's Glider Facility organizes two calls a year. Please note that 1st calls are normally for projects commencing in the first 6 months of the following year, and 2nd calls are for projects commencing in the second 6 months of the following year. Under certain circumstances alternative timings may be requested, but it is strongly recommended on the web pages that the proposed user group discuss this directly with the SOCIB Glider facility for proposal preparation, before project submission. The current call program can be found [here](#).

SOCIB encourages the development of dedicated calls in emergent international themes and programmes where there is an opportunity for the overall achievement to be much greater than simply the sum of the individual proposals. Any such theme will follow an opportunity linked for example, to either a natural event (this could be an active under-sea volcano or a meteo- tsunami event etc.) or a community driver, acknowledging the timing of a consortium project, such as the current alignment with the EU project JERICO-NEXT Trans National Access call programme, in which SOCIB is a member, this is clearly advertised on the [Competitive Access](#) website.

Access to the SOCIB research vessel, R/V SOCIB, is via an [open call](#), and managed through the [COCSABO](#) website, as discussed earlier.

2.4.6. Complementary access services:

There are a number of support operations and services that are complementary to the access to SOCIB's competitive open access to its glider fleet.

- Access to both R/V SOCIB and the ZODIAC is complementary to successful competitive Open Access glider proposals for launch and recovery purposes
- Access to glider platforms prepared and ready for operation in line with the highest international standards.
- Qualified personnel for the management of the gliders (platforms and sensors), including logistics for deployment and recovery.
- A 24/7 operational system to pilot the gliders at sea.
- Access to a collaborative piloting system.
- Access to a collaborative Data Management system.
- Quasi Real Time (usually less than 6 hours) reception of data
- A SOCIB standard post mission glider report

In addition all open access to SOCIB's data comes with complementary access to

- A sophisticated data and geographic visualization system
- Delayed Mode data in NetCDF format
- State of the art quality control procedures, both for Real Time and Delayed Mode data

There are also support operations and services that are complementary to the access to SOCIB's research vessel R/V SOCIB.

- Access to SOCIB instrumentation within the Engineering and Technology Division for deployment and use on board
- Access to ship fitted instrument and computing infrastructures
- Access to highly qualified personnel for the management of R/V SOCIB, including its mobilization and de-mobilisation.
- Access to highly qualified marine crew

All successful SOCIB facility and service access requests have complementary access to the management and administrative support capabilities of SOCIB's Office of the Director.

2.4.7. OA user demand:

SOCIB has considerable user demand for its competitive open access facilities and services by both the Spanish and International communities. This is clear from the number of applications that have not been successful for logistical reasons. In many cases we hope that these will lead to successful applications in the future. There are two main reasons why a competitive open access call may be turned down for logistical reasons, firstly that we do not have enough vehicles to cover all the applications at a particular requested period of time, and secondly that the region of operation is very remote and the additional service costs to meet the applicants requirements are too high for the applicant at that time.

As examples, in 2016, SOCIB received two competitive Open Access proposals for the use of its glider fleet that were successful in scientific review by the Open Access Committee, but were not successful overall.

1) A proposal to use SOCIB glider vehicles to study the retroflection region of a major current system off the north coast of Brazil. This was a major undertaking and the request was for 20 days glider time over two equal length survey periods some months apart. The Glider Facility worked with the Office of the Director to work out sensible costs for the transportation of gliders across the south Atlantic and the necessary support by the Glider

Facility team to ensure a successful campaign. Unfortunately despite cutting these costs as low as SOCIB could achieve, the final sum was not acceptable to the applicant.

2) A proposal to use a SOCIB glider vehicle to make an offshore transect westwards from Finisterre, in the north Atlantic. Again this represented a major undertaking for the Glider Facility. Again the request was for a significant period of 21 days glider time. In this case a combination of cost and the availability of a glider vehicle at the time requested, meant that the application eventually did not go ahead. However, the glider facility staff worked hard to find an alternative glider group, including the option of using the PLOCAN laboratory, better placed to answer their request at that time.

In conclusion, in recent years demand has often been in excess of capability for SOCIB to supply, indicating that we can guarantee a sufficient supply of high quality user requests, as assessed by the access committee, into the future.

2.5. SCIENTIFIC & TECHNICAL ADVISORY COMMITTEE.

The External Scientific and Technical Advisory Committee was established in December 2009 and is composed of ten senior scientists of international standing in marine science. The committee has a remit to advise on scientific and technology goals, achievements and SOCIB's long-term strategic plan. It was always intended that the External Scientific and Technical Advisory Committee should meet once a year, or once every two years, to advise the SOCIB Director with regard to SOCIB strategic objectives and also review the free Open Access to SOCIB facilities. A combination of the very difficult financial situation at that time and for many years afterwards and the associated frequent changes of scenarios (very difficult to explain and/or understand for non directly involved experts), and the difficulty of finding mutually convenient dates for 10 such eminent experts, it has not been considered appropriate to hold a formal meeting. However, accordingly, the SOCIB Director has maintained frequent personal and/or Skype meetings with the different members of the External Scientific and Technical Advisory Committee. Now in November 2017, a formal meeting is being arranged to present the new Strategic Plan and discuss priorities and actions. The supporting comments that we have received from the members of the committee during the preparation for the forthcoming November meeting clearly indicate that they are most impressed with our progress.

The members of the External Scientific and Technical Advisory Committee are:

- Enrique Álvarez Fanjul, Puertos del Estado, enrique@puertos.es
- Alicia Lavin, Centro Oceanográfico de Santander, IEO, alicia.lavin@st.ieo.es
- Sylvie Pouliquen, IFREMER, sylvie.pouliquen@ifremer.fr
- Nadia Pinardi, INVG, n.pinardi@sincem.unibo.it
- Pierre Testor, LOCEAN, Pierre.Testor@lodyc.jussieu.fr
- Jaume Piera, UTM, CSIC, jaume.piera@icm.csic.es
- Dong-Ping Wang, SUNY, Stony Brook, dong-ping.wang@sunysb.edu
- Vangelis Papathaniassou, HCMR, vpapath@ath.hcmr.gr
- Francisco Werner, Rutgers University, IMSc, cisco@marine.rutgers.edu
- Miguel Angel Losada, University of Granada, mlosada@ugr.es

These are all highly recognised and published scientists and technologists in fields of great relevance to SOCIB. Two of them are now retired, but they have kindly agreed to stay on as Committee members for the next 4 years. Renewal of membership of the External Scientific and Technical Advisory Committee is automatic whilst the member wishes to remain so, this way we can ensure a long history of involvement with the majority of committee members whilst welcoming new committee members when and as necessary.

2.6. MANAGEMENT.

SOCIB is formally a consortium with its own legal entity created through a joint agreement between the Government of the Balearic Islands (CAIB) and the Spanish Ministry of Science and Innovation (MICINN), now changed to Ministry of Economy, Industry and Competitiveness (MINECO), and with funds approved into 2021. The governance of this consortium is managed through the Board of Trustees, an Executive Commission and an External Scientific and Technical Advisory Committee (**Figure 1**). The SOCIB Director is appointed by the Board of Trustees and is responsible for the overall development and administration of SOCIB. The SOCIB Director reports to the Board of Trustees and the Executive Commission. The Board of Trustees meets twice a year in order to approve the annual accounts and the Budget and Activities Plan for the forthcoming year. The Executive Commission is second to the Board of Trustees and meets once per quarter to discuss and approve the annual Activities Plan and the associated annual budgets to be put forward to the Board of Trustees. The number of meetings that have taken place in the 2013-2016 period is an indication that SOCIB development has been continuously monitored and evaluated, and that SOCIB is well supported by the governing bodies.

The **Office of the Director** is responsible for planning, overall management, and communication with stakeholders and governing bodies. The Office of the Director is lead by the Director, who has a permanent position in CSIC and has a mandate to manage SOCIB granted by SOCIB's Board of Trustees, as above. The Director is ably assisted by the Financial Manager and the Senior Executive Officer of the Office of the Director; who in turn are ably assisted by one Technical Assistant to the Management and Finance Service. The fifth member of the Office of the Director is the Science Director who is responsible for monitoring and enabling Division operation and support, and Facility coordination.

Each Division, Support Service, and Facility, has a manager whose job it is to support and encourage their staff in that component of SOCIB, and to manage the interaction between their team and others, alongside the science director. The exception here is the Fixed Station Facility, which is run by a close partnership between the Engineering and Technology Development Division and the Data Centre Facility.

2.7. STAFF.

SOCIB staff can be divided into 4 broad categories; scientists, technologists, those that work on technical support issues, and those who give administrative support to the scientists or engineers. The total number of employees, as of September 2017, is 39; of these, 16 staff members have a PhD, 19 staff members are educated to BSc or engineering degree level, and 4 staff members have a Technical engineering or Technical certificate title.

Scientists are responsible for the supervision and maintenance of the operational systems in addition to the design and execution of science driven projects; which also have to be related to the enhancement of operational capacities and products. Engineers and technicians are responsible for enabling the computing, laboratory and fieldwork associated with the operational and science driven SOCIB objectives, as well as the outreach developments of SOCIB. In some specific cases, partial commitment to technology development and/or

scientific support, also exists. Support staff are responsible for providing the administration and support needs to all SOCIB staff.

2.8. STRATEGIC PLANNING.

SOCIB's strategic plan is reviewed at staff meetings and in discussions with External Scientific Steering Committee members. Periodically SOCIB holds one or two day meetings for all its staff to present their achievements and work to each other, the SOCIB management use these meetings to support future strategic planning. We look present SOCIB's current future strategic plan in Section 3.

2.9. PRODUCTION AND PERFORMANCE.

In the period 2011-2017, SOCIB staff have published more than 95 papers in ISI journals. In the period 2014-2017 SOCIB has been participating as a partner in 10 projects, including VII FP, H2020, Foundation funded, and other international projects. These statistics are particularly pleasing when we consider that SOCIB staff have well defined mission oriented priorities as follows.

Scientists are responsible for the supervision and maintenance of the operational systems in addition to the design and execution of science driven projects which also have to be related to the enhancement of operational capacities and products. Overall, SOCIB scientists invest more than 50% of their time to operational tasks, leaving only the remainder for ISI journal publishable research. Specifically, as of July 2017, SOCIB has 12 scientists providing an equivalent fulltime research personnel complement of just 4.3. Strong collaboration exists in the Balearic Islands between SOCIB and scientists from two other key organisations, IMEDEA and IEO (5 and 2 scientists, respectively), who spend approximately 20% of their full time research working on topics related to SOCIB scientific objectives. Therefore, the total equivalent fulltime research personnel complement can be increased to 5.7.

SOCIB to date has developed a range of products and ocean data visualisation tools, in line with the observing and modelling facilities, with the support of the Data Center Facility. In order to continue SOCIBs development and to gain more users, to deliver data to new users, and to increase our utility to society, SOCIB recently undertook a products review and from this developed a sector-focused Products & Services Strategy. The review considered both internal developments and external factors, including; the range of potential users of in situ and forecast ocean data in the Balearic region, the Western Mediterranean or globally, the successes of other international ocean observatories in developing ocean data based products and services to match their observations to regional/national needs, the existing SOCIB products and users, and the known economic value or estimated societal benefit of different types of ocean data.

The analysis enabled SOCIB to identify 10 key user sectors, groups of users with common data interests and needs, that are important to the region (economically/societal benefit) and for which SOCIB can provide data of value (e.g. value to decision making), both observed variables (e.g. wave height) and derived/value added variables were considered (e.g. predicted wave height, divergence/convergence zones, spawning habitat mapping of top predator fish species). The importance of taking a sector based approach is that end users are identified, products can be created that combine data streams and knowledge to fulfil user needs, with the participation of user groups (alpha testing), and potential users can be notified of product availability (marketing).

The implementation of this strategy is now underway and by the end of 2017 the SOCIB website will include a new searchable product catalogue, with detailed information on the existing and developing products (**Table 4**), and new sector focused product and information zones. The 10 sectors and related end users that are now core to the SOCIB products strategy are as follows:

1. Marine and coastal research (academia, government policy makers and responsible, NGOs)
2. Maritime safety (SAR operators, coastguard, oil spill response managers, maritime emergency managers, navy & national security agency)
3. Marine sports (recreational sailing, sports sailing/regattas, surfing, diving)
4. Beach and coastal communities (citizens, tourists)
5. Coastal protection, planning and governance (government environmental managers, beach and coastal planners, energy company managers)
6. Ports and Shipping (port managers, port pilots, ferry companies/captains, shipping companies/captains, cruise companies/captains)
7. Integrated coastal zone and ocean management (ICOM managers, MPA managers, marine managers, water quality operators)
8. Sustainable marine ecosystems (fisheries managers, fisheries scientists, commercial fishermen, recreational fishermen, sustainability managers)
9. Sustainability of islands and climatic change (government policy, sustainability managers)
10. Education and kids (school kids/teachers, higher education kids/ teachers, society)

DATA PRODUCTS	DEVELOPER	DESCRIPTION	STATUS	TYPE OF PRODUCT
Marine and Coastal Research		Academia, Government Policy, NGOs		
SOCIB API*	SOCIB	Web based search interface for all SOCIB data (model and observational, excepting GIS vector based data)	In Development	Tool/Utility
GIS Catalogue**	SOCIB	Web based catalogue for all GIS/vector based datasets	In Development	Tool/Utility
DAPP	SOCIB	Viewer for current and historical missions mobile platforms - ship, glider, Argo, drifters, turtles - with access to visualisations of data, Jwebchart (engineering data), profiles viewer (ocean profiles), plots of variables.	Online	Tool/Utility
THREDDS Catalogue	SOCIB	Web and standards based access portal to SOCIB observational and model data	Online	Tool/Utility
Lw4nc2	SOCIB	Application to display gridded data both observational and forecasting - HF Radar, WMOP	Online	Tool/Utility
Profiles viewer***	SOCIB	Interactive viewer for data profiles - Argo, Ship, Glider - accessible through DAPP	Online	Data Visualisation

Jwebchart***	SOCIB	Interactive viewer of time series datasets	Online	Data Visualisation
WMOP forecast visualisation	SOCIB	Web page with access to ocean forecast, by variable and regions (driven by Lw4nc2)	Online	Data Visualisation
SAPO-IB wave forecast visualisation	SOCIB	Web page with wave forecast and real-time data	Online	Data Visualisation
Fixed station viewer	SOCIB	Viewers for each fixed station (link is one example)	Online	Data Visualisation
Marine Sports				
Recreational Sailing, Sports Sailing/Regattas, Surfing, Diving				
Dive App	SOCIB	Web based application providing forecast and data for divers - planning/decision making	Pre-Alpha	Advanced Tool/Decision Support
Live Meteo	Ocean Drivers	Application for race sailing in Palma Bay - streams data from the SOCIB Palma Bay (ENDERROCAT) buoy	Online	Advanced Tool/Decision Support
Beach, Coastal Communities & Tourists				
Citizens, Tourists				
Beach Lifeguard App	SOCIB	Mobile app bringing together the information on sea/met conditions required by beach lifeguards daily at the beach, and for later seasonal analyses	Alpha - User Tested	Advanced Tool/Decision Support
Hotel Seaboards	SOCIB	Seaboards for hotel partners displaying marine and met forecasts and beach images for tourists staying in hotels - online and hotel screens	Online	Advanced Tool/Decision Support
Coastal Protection, Planning And Governance				
Local, Regional And Balearic Environmental And Emergency Response Managers, Beach And Coastal Planners And Environmental Managers				
Beach data viewer	SOCIB	Web based GIS map and data viewer for historical beach data in the Balearics - information on 877 beaches in the Balearic region	Online	Tool/Utility
Sa Costa	SOCIB	Balearic coastal sensitivity index	Online	Tool/Utility
GIS Catalogue**	SOCIB	Web based catalogue for all GIS/vector based datasets	In Development	Tool/Utility
Sustainable Marine Ecosystems				
Fisheries Managers, Fisheries Scientists, Commercial Fishermen, Recreational Fishermen, Sustainability Managers				
Sustainable resources planning tool	SOCIB	Web based interactive maps displaying key ocean variables, forecasts & derived features for ecosystem assessment and management	Alpha - User Tested	Advanced Tool/Decision Support
Integrated Coastal Zone And Ocean Management				
ICOM Managers, MPA Managers, Marine Managers Other, Water Quality				
None to date				
Ports And Shipping				
Port Managers, Port Pilots, Ferry, Shipping And Cruise Companies/Captains				
BRIFS forecast	SOCIB	Balearic Rissaga Forecasting System (BRIFS) - predicting extreme sea level oscillations from meteotsunamis Ciutadella harbour	Online	Advanced Tool/Decision Support
Sustainability Of Islands And Climatic Change				
Government Policy, Sustainability Managers				
None to date				
Maritime Safety				
Search And Rescue, Coastguard, Oil Spill Response, Maritime Emergency Managers				

Environemntal Data Server (EDS)	RPS	SASEMAR use the EDS (developed by RPS) to aggregatrte ocean data and forecasts for their operations. SOCIB provide data from HF Radar and WMOP model to EDS and the data have been used in operations by SASEMAR. Data from buoys and drifetrs will be added	Alpha	Advanced Tool/Decision Support
Sorrento Seaboard	SOCIB	Seaboard to illustrate the type of data available for SAR services (e.g. Sorrento), as when required - created for specific emergency	Online	Advanced Tool/Decision Support
Education And Kids				
Follow the Glider	SOCIB	Educational tool on gliders, how function and what they observe, for school kids and teachers	Online	Tool/Utility
MedClic	SOCIB	Online descriptions of facilities and observations for school kids and teachers	Online	Data Visualisation
Navy And National Security				
None to date				
Cross-Sector Products				
SOCIB Products Catalogue	SOCIB	Access all SOCIB products via search interface	In Development	Tool/Utility
SOCIB Mobile App	SOCIB	Application to view data and forecasts for iOS and Android	Online	Advanced Tool/Decision Support
SOCIB API*	SOCIB	Interface for 3rd party developers to access SOCIB datasets	In Development	Tool/Utility

* & ** noted twice as relevant to two sectors

*** only available within other applications

Technology/Software Products				
Lagrangian tool	SOCIB	Forecast of particle trajectory within WMOP, forward and backwards in time	Online	Technology/I P/Software External
Glider Toolbox	SOCIB	MATLAB/Octave scripts to manage data collected by a glider fleet, including data download, data processing and product and figure generation, both in real time and delayed time. Used by other institutes (10 - 20)	Online	Technology/I P/Software External
HR Radar QC reports generator code	SOCIB	A python command line tool to create the monthly reports of the HF Radar managed by SOCIB.	Online	Technology/I P/Software External
API (3rd party integration)	SOCIB	Data access API developed by DCF	Online	Technology/I P/Software External
Leaflet Time Dimension Tool	SOCIB	Tool for visualising trajectories and gridded data, in use by other institutes	Online	Technology/I P/Software External
QC & Information Products				
HF Radar reports	SOCIB	Monthly validation report for HF Radar data	Online	Information
Model validations	SOCIB	Validation of WMOP and SAPO-IB against various in situ platforms	Online	Information
Indicators for ICZM	SOCIB	System of Indicators for Integrated Coastal Zone Management (ICZM) in the Balearic Islands	Online	Information
Coastal Environmental Sensitivity Atlas	SOCIB	Coastal Environmental Sensitivity Atlas of the Balearic Islands (NEW 2015 EDITION)	Online	Information
WMOP Ocean Indicators	SOCIB	Timeseries of key variables along key sections	Online	Information

Table 4: SOCIB's proposed list of products, by sector.

2.10. FUNDING.

Since the creation of SOCIB in 2007, and as it is stated in the agreement between the regional government of the Balearic Islands and the former ministry of Education and Science (now Ministry of Economy, Industry and Competitiveness), SOCIB has received approximately 1.2 M Euro annually from each of its founders (i.e. approximately 2.4 M Euro in total annually). This is the amount dedicated to the investments and operations. The total contribution from both founders since the creation of SOCIB (December 2007) till 2021 is stated to be 36.3 M€.

During 2015 and 2016, when SOCIB was a fully operational ICTS, SOCIB started to apply for a portfolio of European funds in order to participate in different scientific research projects of European society importance. From that activity and for those 2 years, SOCIB received 337,150 Euros. The committed income from these projects for their lifespan totals 953,063 Euros, with current commitments to 2019.

Private funding has been also present since 2014, in the form of agreements and contracts with different foundations in order to develop research and communications projects. The total amount for the period 2014-2016 was 500,000 Euros, and it is expected that these agreements will be renewed into the future with expected incomes to be accordingly increased.

Finally, Open Access to Gliders and External access to the R/V SOCIB has generated additional income from private companies and research teams, that have added a value of 516,705 Euros since SOCIB has been Operational.

Ensuring adequate and sustainable funding in science and technology has not been easy since the financial crisis in Europe began nearly 10 years ago. However, from the above we believe we have formed a sound track record with a wide portfolio of funding streams, such that ‘not all of our eggs’ are in one basket and therefore we have developed considerable resilience. We believe we can conservatively use past success to predict a maintained income for the future. Nonetheless this is not a time when we can take on much expansion or too many new science drivers without looking carefully at the long-term funding offered to support them.

2.11. PUBLIC OWNERSHIP.

SOCIB ICTS is 100% publically owned by the Spanish National and Balearic Island Regional Governments, as formally declared in the Statements and Commitments Form.

2.12. OPEN COMPOSITION.

SOCIB ICTS has no clear competitors or complementary infrastructures in Spain, that provide an observing and forecasting capacity, covering the marine system from the beach-head to the open ocean, providing data and services for society and science alike. As mentioned earlier, since the end of 2016, SOCIB has had a collaboration agreement in place with the Glider facility of the Canary Islands, PLOCAN. This collaboration has taken the form of three working groups, covering the subject areas of glider vehicles, data management practices, and administrative issues. However, whilst this collaboration offers added value to Spain, the objectives and remit of the PLOCAN Laboratory is only science based and very different to that of SOCIB; although further developments in the future are not ruled out.

3. SOCIB's STRATEGIC PLAN 2017-2020

3.1. ANALYSIS OF COMPLIANCE WITH THE PREVIOUS STRATEGIC PLAN

3.1.1. Executive Summary

SOCIB, the Balearic Islands Coastal Ocean Observing and Forecasting System became a fully operational and recognised ICTS in 2014. Almost all of the deadlines, deliverables and milestones of the 2013-2016 Strategic Plan and the associated objectives have been met and completed on schedule or without significant delay; SOCIB team has been able to implement a new marine research infrastructure, a multi-platform ocean observing system that is leading a new era of ocean observation, a key grand challenge our society is facing today. A key element of SOCIB strategy has been the mission-oriented innovation approach that combines scientific excellence with impact and relevance to society. In other words, SOCIB contributes to state of the art science, implements new technologies, responds to society needs and challenges, develops new products, and through all this, and with well-focused outreach and science-society engagement, SOCIB team in partnership with IMEDEA and UTM from CSIC and in collaboration with COB and COC from IEO contributes to bridge the science-policy gap.

One of the key values of the infrastructure investment is its integrated nature that is a key foundation element of the new needs of multi-platform ocean observation; the coordinated deployment of a wide range of 'state of the art' multi-platform monitoring technologies, deriving critical data sets, which are the essential base for research and stakeholder knowledge at climate, seasonal and weather/events scales. SOCIB remains responsive to new calls from society and proactive in bringing its products and services to the attention of society stakeholders; this is a critical foundation stone for maintaining and promoting an integrated and sustainable 'coastal ocean observing and forecasting system' that addresses the needs and wishes of the people of the Balearic Islands and Spain as a whole, in a European and international context. SOCIB is contributing to the establishment of a new European Ocean Observing System. SOCIB is in summary establishing new ways of international partnership to reach high level goals & grand challenges that are leading to major science breakthroughs, innovations in ocean observation and new ways of more efficient and science based coastal and ocean management to guarantee healthy oceans for a sustainable planet of our future generations.

3.1.2. Analysis

3.1.2.1. Achievements 2013-2016

SOCIB is uniquely designed to provide a sustained approach to ocean and coastal monitoring that is responsive **to three key drivers; namely science, technology and society**. SOCIB's overall achievements 2013-2016 matched well with the objectives described in the [2013-2016 Strategic Plan](#):

- Developed and maintained an international perspective, in order to increase the international visibility of the ICTS, to attract the participation of the best researchers from around the world, and over the medium term to advance towards participation within the European ESFRI framework.
- Increased SOCIB scientific recognition through publications made in collaboration with key Balearic research institutions, such as IMEDEA (CSIC-UIB), COB-IEO and UIB, and other national and international partners and collaborators (including recognition for

SOCIB data, data products and access provided under the open access policy). These publications were presented in Phase 1.

- Maintained and enhanced the SOCIB operational observing and forecasting network; which included identifying regional observational gaps, for example additional glider endurance lines, increasing the number and use of biogeochemical sensors, e.g. to support MFSD indicators, and studying process oriented topics, for example physical/biological coupling and submesoscale dynamics, of key relevance to increase our operational model skills and in response to key worldwide scientific priorities.
- Developed a focussed strategy towards data, product and services for end users. Increased awareness and use of SOCIB data by key societal stakeholders. This involved Outreach activity to key stakeholders/end users, including dialogue with regional end users, and exploring partnerships with private/creative sector to develop new products and services. It culminated in the identification of 10 heterogeneous user groups of quasi homogeneous requirements and the production of a new, more relevant, classification of SOCIB's products and services.

3.1.2.2. Specific achievements per division, facility and service 2013-2016

Coastal Ocean Research Vessel Facility

R/V SOCIB is a core outstanding open access facility of the SOCIB ICTS. In the ICTS evaluation process Phase I 2017/18, R/V SOCIB is formally included in the FLOTA ICTS also and excellent support and collaboration exists on a weekly or even daily basis with CSIC teams from IMEDEA and UTM. Major achievements for 2013-2016 were:

- Coordinated a new contract management for the crew of the R/V SOCIB provided by TRAGSA from 2015 until present, after the agreement between SOCIB and IEO unfortunately failed in December 2014 due to internal procedures at IEO. SOCIB has provided management of the R/V with external users, both private companies and public bodies; the preparation of pre-campaigns, contracts, and operational planning, has been carried out by the SOCIB team.
- Achieved a very reasonable number of days at sea per year, combining public and private sector given the financial crisis that has characterized the 2013-2016 period and the lack of use of IEO, a major partner in the islands.
- Established the operational costs of the modes of access to R/V SOCIB as a regional and European asset, available for external users as part of the Spanish oceanographic fleet ([COCSABO](#)) and a member of ERVO, the European Research Vessels Operators, offering labs and a suite of oceanographic equipment at a lower daily cost than larger vessels.
- Developed an efficient system of Open Access to the vessel for national and international scientists. Access to the Coastal Ocean Research Vessel Facility has four specific modes: (1) free open access to data from SOCIB monitoring programmes, (2) internal or propriety access through collaborative projects with international or European partners (e.g. ONR), (3) open competitive access and (4) external on demand access through commercial contract.

Coastal HF Radar Facility

- Carried out in-situ validation of the installed HF Radar system. This required comparative analysis of Lagrangian drifters and data from fixed current measurement stations with the HF Radar derived current data, within the Radar range.
- Developed Quality Control Procedures for the real-time HF Radar data, with support from the Data Centre Facility (DCF) and IMEDEA/TMOOC. Many factors can affect the radar signal and these require continuous oversight, and correction by the SOCIB DCF.

- Examined small-scale features. The Ibiza Channel is a highly dynamic area with small scale variability affected by different processes. The study of the Radar data through Lyapunov exponents has allowed us to examine the small-scaled Lagrangian features, which can block the general circulation patterns in the channel.
- Begun the Data Assimilation of HF Radar data to drive an improvement in the skill, constraint, forecasting and evaluation of SOCIB modelling products, in strong collaboration with the Modelling Facility.

Glider Facility

- Maintained endurance lines, increasing capacity in terms of temporal coverage and initiated a second endurance line under competitive open access with Italian partners.
- Update the glider labs, warehouse and pressure chamber at IMEDEA/TMOOC in response to the needs.
- Supported specific process-oriented studies, as bid for competitively, and granted as partners.
- Provided approximately 90 days of Open Access per annum, EU Transnational Access to SOCIB's GF through EU JERICO NEXT RI was significantly over-subscribed. Very positive responses.
- Initiated Facility automation projects, including autopilot, automatic pressure chamber, and automatic report generation
- Continued Quality Control and Validation development in collaboration with the DCF, including finalising the Near Real Time and Delayed Mode data processing routes and implementing automated QC and V procedures for glider.
- Constructed Glider Compass Calibration and Error Measurement equipment and procedures: a precisely calibrated compass and a controlled deviation ensures that gliders measure Depth Averaged Currents properly. A glider frame was built to allow calibration with three degrees of freedom (heading, roll and pitch).
- Hired a new engineer for piloting gliders & contribute to automation development.
- Two new gliders were purchased to support the endurance monitoring lines and open access missions.
- Refurbishment of the existing Slocum G1 gliders was funded and carried out as planned.

Lagrangian Platforms Facility.

- Updated QC controls to allow regional specifications, in cooperation with the DCF
- Updated the protocol for daily monitoring of Argo and surface drifters, in cooperation with the DCF
- Developed a Delayed Mode Quality control procedure for improved salinity data
- Developed a protocol to modify sampling strategy to avoid beaching of the Argo floats
- Worked with the Modelling and Forecasting Facility and to support the routine assimilation of ARGO data into forecast models; both to quantify and constrain uncertainty in model predictions, and to increase forecasting skill
- Strengthened the Spanish contribution to the international Argo network by joining the Euro-Argo European Research infrastructure (EuroARGO ERIC).
- Maintained a fleet of 8 ARGO floats and 10 surface drifters in the Western Mediterranean through carefully managed annual investment.

Fixed Stations Facility

- Revised and updated the QC procedures for all variables, in cooperation with the DCF, with particular attention to biogeochemical parameters

- Incorporated in the FSF the instrumentation and stations from the “Rissagues Monitoring System” belonging to PortsIB
- SOCIB became the new "Rissagues System" operator (formerly operated by PortsIB). This system is a part of the infrastructure created during the construction of the new Ciutadella harbour (Menorca) and its mission was to create an alarm system to predict and warn of possible "Rissagues" events.
- Installation of a Sea Level Network station at the port of Sant Antoni (Ibiza).
- Installation of Buoy “Canal de Ibiza”. Second trimester 2013
- Incorporation of the replacement Buoy “Cabrera” from Parques Nacionales.

Beach Monitoring Facility

- Monitored the variability and trends in shoreline evolution, sediment budget analysis and beach profile evolution.
- Addressed the integration of local winds in beach wave forecasting models and incorporate these effects in tools related to beach wave forecasting.
- Updated products from the different dissemination platforms (thredds, NCfiles, GIS Beach viewer)
- Worked with hotels to establish beach monitoring cameras on the roof line balconies of the buildings. Disseminated the society focused BMF advances and results to beach-coastal stakeholders and the general public.
- Developed open-access services through the availability of SOCIB BMF equipment and related human resources.
- Established agreements with academic institutions in order to incorporate the SOCIB BMF in BSc and MSc training; including offering internship visits to the BMF.
- Acquired a multi-beam echo sounder, in cooperation with the ETD, for improved bathymetric surveys.

Modelling Facility

- Developed new techniques for multivariate model validation, and model constraint through data assimilation. This included HF Radar, surface drifters, Argo float profiles, gliders, R/V SOCIB, fixed moorings and satellite data.
- Determined optimal initial and boundary conditions: it was well known the realism of downscaling depended strongly on the initial and open boundary conditions (OBC). The period 2011-2013 was used for hindcasting with different OBCs.
- Validated the BRIFS Meteo-tsunamis forecasting system: assessed an extreme Rissaga event generated by a strongly convective system. Also assessed a Rissaga generated by Atmospheric Internal Gravity Waves (AIGWs) and forecast in collaboration with AEMET.
- Maintained and extended the wave model to all the islands, updating QC procedures established across datasets and data integrated into the SOCIB data portal, in excellent collaboration with PE.
- Developed bio-physical coupling for modelling ecosystem response. Advanced towards a solid and science based modelling of the ecosystem response to the physical variability in the Western Mediterranean.
- Investigated the effects of "Extreme events" on the physical system and their likely biogeochemical impacts. In particular looking at the relative roles of the Northern Current and the fresh water induced coastal currents provided by the Ebro and Rhone Rivers to the buoyancy-induced boundary current system along the Catalano-Balearic coast.

Data Centre Facility

- Developed new data visualization solutions
- Implemented the SOCIB Data Policy and made information available to data users who visit the SOCIB web site.
- Developed web based information for the open access to selected SOCIB Facilities
- Developed quality control procedures to respond to continued developments in scientific community good practice, some of which are being led by SOCIB
- Developed advanced web tools and both i-OS and Android SOCIB mobile applications
- Complemented the DCF documentation with teaching material such as online tutorials, screencasts and examples of use that are being actually used at European level, CMEMS INSTAC for example.
- Implemented an improved version of the SOCIB DCF web section. This section includes documentation about the DCF itself, teaching material, and data statistics.
- Collaborated with key EU institutions to improve the interoperability and sharing of oceanographic data, through participation in key EU projects such as ODIP2, JERICONEXT, CMEMS INSTAC, etc.

Engineering and Technology Development Division

- Supported the Facilities in their operations and developments, including the increases in the Fixed Station network.
- Updated the 'Rissaga stations' from PortsIB (Porto Cristo, Colonia de Sant Pere, Cala Ratjada and Ciutadella) – a request from the Balearic Government, to SOCIB Sea Level Station's system.
- Installed the oceano-meteorological buoy (AXYS watchMate) in the Ibiza Channel
- Incorporated the new instrument/platform acquisitions in the ETD maintenance schedule
- Supported and facilitated the initial HF Radar location infrastructure.
- Facilitated the removal, rebuild and re-installation of the HF Radar infrastructure.
- Supported glider deployments and recoveries, for both endurance monitoring lines, open access and process studies.
- Enabled BMF field campaigns and beach monitoring stations.
- Supported field measurement campaigns on board the R/V SOCIB.

SIAS Division

- Maintained and developed tools for ICCM.
- Initiated, and successfully competed for funding for a marine animal instrumentation and tracking programme for Loggerhead turtles in the Western Mediterranean.
- Created a digital atlas of the marine and coastal zone (Coastal Atlas) and a new cartographic visor with socioeconomic, bio-ecologic and geomorphologic information, related to the ICMM.
- Applied a cumulative pressure assessment in Alcudia Bay as a pilot case study to support the implementation of the Marine Strategy Framework Directive and the new proposal of a Directive on Marine Spatial Planning and Integrated Coastal Management
- Initiated an integrated study of maritime traffic using AIS data in order to evaluate the capabilities of this system to provide new indicators related to the MSFD and MSP Directives
- Characterised the main hubs or hotspots of the coastal area of the Balearic Islands (e.g. Bay of Palma, Bay of Alcudia – Pollença, coasts of Mahón, Southeastern and Western coast of Ibiza, Formentera, etc.).

Outreach

- Provided continuity on specific actions such as participation in the Science Fair and Forum, participation in the International Ocean Film (Maremostra), tracking SOCIB's campaigns (Bluefin, installation of new instruments, etc.) and in each case providing new content and outreach material, mainly for SOCIB's Web site.
- Developed new multimedia content generated during science campaigns and the integration of SOCIB's YouTube video channel in the multimedia tab.
- Began the presentation of SOCIB facilities, services and products in the form of posters and/or micro videos to different key stakeholders. Amongst others, the tourism sector (HF radar and beach monitoring facilities in particular), and the importance of science for sustainable 'blue' growth in the Balearic Islands.
- Developed a specific Outreach section on the SOCIB web site including an outreach archive
- Publicly advertised and promoted the "Glider Educational Tool". Engaged schools through a focused website with adapted outreach material for both teachers and students
- CosmoCaixa 2013 "Mediterranean", presentation of a specific multimedia application – October 2013
- Created the Meteo-tsunamis 3d animation / Rissagues (3d animation with LADAT).
- Engaged with numerous stakeholder sectors, specifically, fishermen, marine sports, marinas, tourists, etc.

Computing and IT Service

- Ensured that all data (raw data, processed data, derived data) were managed and stored in a proper way following international good practice and a duty of care, allowing its wider and further access into the future.
- Established a high performance computing system allowing the execution of complex numerical models to simulate oceanographic and meteorological processes.
- Supported all the Facilities, Divisions and Services of SOCIB
- Ensured affordability, efficiency and longevity of the computing system
- Ensured data circulation and availability for end-users
- Developed a mechanism to obtain feedback from researchers and technicians
- Expanded redundancies and parallel communication pathways to critical systems in order to avoid dependencies on a single infrastructure external provider.
- Created the Computing & IT site for the SOCIB webpage
- Defined a new data policy (data access and distribution).
- Established additional web services: wiki, personal pages (blog), etc.
- Hired an additional IT engineer to support the work of the Computing and IT Service.

Management and Finance Service

- Highly efficient management of the purchasing process, including specific rules governing the spending of public funds.
- Management of suppliers and associated contracts, tender processes and public calls.
- Creation of annual accounts (Balance sheets, statement of losses and gains, and retained earnings) and management reports.
- Management of social security payments and compliance with health and safety at work legislation (prevención de riesgos laborales), and finally the fiscal duties, which includes the management of financial assets and the timely payment of all relevant taxes.

Office of the Director

- Steered and developed strategy for the operational phase of SOCIB, whilst improving and strengthening areas.
- Expanded internationally: enhancing the multi-platform SOCIB approach, key elements were the EC's Horizon 2020 Program, the Blue Growth Strategy, and ESFRI. Specific achievements were among others JERICO-NEXT, ODIP2, CMEMS, INCREASE, EMODnet partnerships, membership of the EUROArgo ERIC, and membership of EUROGoos, advisory committee from EOOS, scientific committee from French oceanographic fleet, etc.
- Applied dedicated effort to integrate & create links with similar ocean observing initiatives such as those in the USA, Canada or Australia. As a result SOCIB will now be partnering US colleagues in an important ONR funded programme in 2018-2021¹, [CALYPSO](#) that explicitly mentions SOCIB and IMEDEA expertise and background in the call.
- Sought agreement for a new SOCIB building in line with the needs already expressed in previous strategic plans; An agreement will be signed on May 17, 2018 for dedicated terrain in Palma harbour 960 m², that can host a 3.650 m² building as described in the Annex III.
- Negotiated new sources of funding, and widened the funding portfolio, in particular through agreements with the private sector.
- Hired a new senior scientist to support the work of the Office of the Director, including co-ordinating facilities and managing a multidisciplinary observational science programme.
- Hired a new scientist to support multi-platform facilities integration; to work on the data exploitation and synergies from the different facilities (initially, gliders and R/V) and to support products development and knowledge transfer activities between SOCIB and its governmental, policy-advising, public and private stakeholders.

The BluefinTuna Project

- Developed statistical models relating the location of spawning grounds and the environmental conditions obtained from satellite and hydrodynamic models.
- Analysed the vertical distribution of Bluefin tuna larval abundance in relation to hydrographic variables.
- Evaluated how environmental scenarios drove the spatial overlap of Bluefin tuna larvae with their potential prey and predators.
- Estimated the trajectories of the Bluefin tuna larvae after hatching from a particle tracking model to assess the viability of the larvae in different environmental scenarios.
- Developed an Individual Based Model able to simulate larval survival rates in relation to biotic and abiotic factors.
- Conducted field sampling campaigns during summer to collect Bluefin tuna larvae and hydrographic data in the Balearic Sea using a standard sampling grid.
- Compared data from the field and operational model predictions to evaluate the reliability of the models
- Examined the relevance of mesoscale oceanography on the spawning ecology of Bluefin and other tuna species in a broad geographical context.

¹ Up to 20 million Euros in the Alborán Sea.

3.2. VISION/MISSION STATEMENT

Vision

Our vision is to advance on the understanding of physical and multidisciplinary processes and their non-linear interactions, to detect and quantify changes in coastal systems, to understand the mechanisms that regulate them and to forecast their evolution and/or adaptation under, for example, different IPCC scenarios. Specifically addressing the preservation and restoration of the coastal zone and its biodiversity, through the analysis of its vulnerability to climatic change and through considering new approaches, such as the SOCIB Bluefin Tuna multidisciplinary study and in the near future connectivity studies and Marine Protected Areas optimal design, to advance and progressively establish a more science based sustainable management of the ocean and coastal areas. SOCIB aspires to become an internationally recognized coastal observing and forecasting reference facility, contributing to scientific excellence, technology transfer and knowledge dissemination, capable of adapting and responding to society's needs and by this contributing to narrow the 'science-policy' gap².

Mission

To develop a coastal ocean observing and forecasting system, a scientific and technological infrastructure that provides free, open, quality controlled and timely streams of oceanographic data, in order to: (1) Support research and technology development on key internationally established topics such as: the role of the ocean in the climate system at an inter-annual scale, the interaction between currents and eddies, addressing vertical exchanges and physical and ecosystems variability, the variability in nearshore morpho-dynamics and the sea level variability in response to climate change. (2) Support (on a longer term) strategic needs from society in the context of global change: sustainable management, science-based mitigation and adaptation strategies and also policy development and operational tools for decision support. (3) Consolidate operational oceanography in the Balearic Islands, in Spain and Europe, contributing to the establishment of a well-structured center of excellence in an international frame (e.g., GOOS, EuroGOOS, [MONGOOS](#)).

3.3. SWOT ANALYSIS

Please note that this SWOT analysis table was taken from individual analyses per Facility, Division and Service within SOCIB, however in the space available it was necessary to combine these inputs into a single abbreviated table.

² in line with Lubchenco and Sutley (2010, *Science*) and following the work of Economy Nobel Price, Elinor Orstom, 2012: [The Future of the Commons; Beyond Market Failure and Government Regulation](#). *The Institute of Economic Affairs*.

<p><u>STRENGTHS:</u></p> <ul style="list-style-type: none"> • R/V SOCIB is well equipped, stable platform, suitable for a wide variety of modern oceanographic operations • Effective coordination & strong collaboration between SOCIB's facilities. • Strong network of international contacts. • Awareness of forthcoming joint-actions and calls. • Gliders facility is complete and running. Stands as a solid based upon to which built better capabilities. • Lagrangian Facility well integrated in has close relations with recognized international scenario (EUROArgo-ERIC, GDP) • Long-term objectives enable a top-level reliable ocean modelling infrastructure • Closeness to data collection very useful for model validation and data assimilation • Highly motivated, multidisciplinary teams. • Systems and tools based on open source solutions 	<p><u>WEAKNESSES:</u></p> <ul style="list-style-type: none"> • Non-permanent staff in the R/V SOCIB from TRAGSATEC. • Sustainability depends on external funds. • Difficulties in keeping the HFR operational. Need complementarity with other technologies and observing platforms. • limited resources to keep in mind when committing to new glider missions (personnel, glider fleet, lab-spaces, etc) • Currently there is no full time structural technician to Maintain the fleet of 8 Argo floats and 10 surface drifters. • Limited personnel of SOCIB IT infrastructure. • Difficult balance between operational work and process-oriented studies. • High percentage of non-structural personnel. • Limited career structure and uncompetitive salaries.
<p><u>OPPORTUNITIES:</u></p> <ul style="list-style-type: none"> • RADMED, TUNIBAL, MOSAICS and other cruises have been identified as potential R/V SOCIB targets for cooperation between IEO and SOCIB. • Involvement in several EU-funded collaborative projects. • Partnership with leading organisations, e.g. for HFR in Europe (AZTI). • Good international image and consideration, with fruitful (inter)national partners. • Good products and services strategy with an end user focus. • Great opportunities for staff to learn new techniques. • Highly experienced in the communication and dissemination of marine science. • Co-operation with external institutions, provides added knowledge transfer. • Coastal data volume and variety is unusual at the international level. 	<p><u>THREATS:</u></p> <ul style="list-style-type: none"> • No current vessel access mechanism for National Competitive science programmes. • Heavy manufacturer dependence, high dependency on future development of technology. • Invisibility of HFR work and applications. • Overflow of near-real-time and post-mission scientific data to control and validate. • Many different international initiatives that potentially overlap. • The growth in the number of tasks, products and services is faster that the growth in resources. • Structural funding for purchasing and maintenance now insufficient. • Administrative hurdles to coastal observations can arise at the height of the tourism season

3.4. OBJECTIVES OF THE 2017-2020 STRATEGIC PLAN

In this section, the major objectives, the strategy for achieving these objectives, the work plan and a brief description of available resources are given for each SOCIB Facility, Division and Service. The Investments necessary to achieve this, both Capital and Personnel, are given in Annexes I and II respectively.

3.4.1. Coastal Ocean Research Vessel Facility

Description of the Objectives

From the beginning, the mission and objectives of R/V SOCIB has been to conduct multidisciplinary coastal ocean research, monitoring, operational oceanography, education

and public outreach, and if required, scientific/environmental emergency response related operations in the Balearic and northwest Mediterranean Seas. The following specific objectives are the steps towards achieving these main goals:

- To perform operations in the Balearic Islands environment (4 islands, 1.200 km of coastline), Mediterranean Seas and, even, Atlantic waters such as Madeira, Cadiz, Huelva, etc.
- To achieve SOCIB's scientific and strategic objectives
- To support interdisciplinary research and monitoring objectives.
- To be able to perform detailed sea floor mapping, habitat characterization, bi-monthly glider deployment and recovery missions, quarterly physical oceanography and biogeochemical fluxes monitoring cruises, mooring deployment/data collection, tri-dimensional physical and ecosystem variability monitoring, monitoring of key species (e.g. BlueFin Tuna, *Posidonia Oceanica* meadows) and Marine Protected Areas, practical experience for university students and public engagement with marine science, Water Framework Directive Implementation, etc.

Strategy for achieving the objectives

Four strategic lines are outlined:

- Actively advertise R/V SOCIB to scientific community and private companies
- Maintain and increase the number of operational days per year.
- Ensure Customers satisfaction.
- Achieve Outreach activities.

Work Plan to effect this strategy (action plan)

The above-mentioned strategy will be implemented through **specific tasks** as follows;

TASKS	2017	2018	2019	2020
Broadcast campaign of R/V SOCIB	X	X	X	X
Get public surveys (Agreements)	X	X	X	X
Get private surveys	X	X	X	X
Ensure a stable crew on-board by guaranteeing 130/150 operation days/year	X	X	X	X
Apply the maintenance plans on-board	X	X	X	X
Keep R/V SOCIB in full operational conditions	X	X	X	
Keep R/V Documentation/certificates updated	X	X	X	X
Assist in all the outreach activities and "open days" on-board	X	X	X	X
Development a "R/V SOCIB procedures guideline document"	X	X		

Resources available

The current infrastructure of the R/V SOCIB is 1 full time ETD technician, 4 part time ETD technicians (when needed), 1 "Systems department" technician (when needed), and TRAGSA crew services. Lab at IMEDEA/TMOOC spaces.

3.4.2. Coastal HF Radar Facility

Description of the Objectives

The main goals of the HF radar (HFR) facility for 2017- 2020 are aligned with the European HFR roadmap and with strategic and specific ongoing projects. This includes: i) Integration of standardized high-quality HFR data in the EU Marine Downstream Services; ii)

Complementarity with other technologies and modeling products; iii) Creation of tailored products for end-users; iv) Improvement of coastal ocean characterization, monitoring, understanding and forecasting.

The following **specific objectives** are the steps towards achieving the stated main goals:

- To implement the EU standard data harmonization and QA/QC procedures.
- To validate HFR data vs. multi-platform observations (NRT & DM³)
- To integrate HFR with other observing technologies and numerical modelling.
- To develop added-value products and customized services.
- To analyse small-scale features and inter/intra-annual variability of surface flow.
- To promote the HFR data and engagement of new-users and the general public.

Strategy for achieving the objectives

Five strategic lines are outlined ensuring the objectives achievement: i) maintain and enhance the HFR surface current monitoring in the Ibiza Channel; ii) increase HFR data accuracy and consistency; iii) promote the HFR data usage and applications, attracting new communities; iv) boost networking and involvement at global level; v) development of advanced products, turning data into information.

Work Plan to effect this strategy (action plan)

The above-mentioned strategy will be implemented through specific tasks as following:

TASKS	2017	2018	2019	2020
HFR operation and system maintenance	X	X	X	X
Dissemination of standardized HFR data in SOCIB, EU and global marine portals		X	X	X
Upgrade the HFR data Quality Control following the new defined EU standards		X	X	X
Validation of HFR vs. multiplatform observations	X	X	X	X
Surface currents WMOP model assessment using HFR, including HFR data assimilation tasks from Modelling and Forecasting Facility	X	X	X	X
Implementation of new HFR visualization interfaces, warning displays, statistics NRT validation, upgrade monthly reports		X		
Scientific exploitation of HFR data to study patterns and spatio-temporal variability of surface currents in Ibiza Channel		X	X	X
Implementation of Lagrangian Diagnostics for the detection of coherent structures		X	X	
Development of a method to provide short term predictions of currents from HFR			X	X
Skill assessment validation for real-time met-ocean data product ranking	X	X	X	X
Development of added-value products & services for specialized targeted users		X	X	X
Support the SOCIB Communication plan (HFR outreach activities participation)	X	X	X	X

Resources available

The current infrastructure of the HFR facility consists of: i) 2 radial radar site stations, including a control cabin, ii) 1 central station; iii) equipment to perform the antenna pattern calibration. Human resources are 1 full-time > 9-year-experience researcher, and in 2018, a PostDoc will be hired in support of the HFR Facility with Copernicus Marine Service funds. No specific lab exists.

3.4.3. Glider Facility

Description of the Objectives

The three main objectives sought by the Glider Facility (GF), for 2017- 2020 are as follows:

- To provide the scientific community with reliable and state-of-the art measurements of key variables for coastal, shelf and oceanic waters; including both physical and biogeochemical variables.
- To contribute to the consolidation and innovation of glider technology by developing and improving procedures, systems, tools and infrastructures in collaboration with manufacturers and other glider users.
- To foster and support education, dissemination, knowledge-transfer and applied-products-delivery, all related to glider surveys, to society.

Strategy for achieving the objectives

The proposed strategy is based on continuity and resource-adjusted improvements in performance. The four main components of this strategy will be, allocation of Resources (glider units, sensors, batteries, tools and staff), organizational Design (enabling the necessary structure, systems and tools), commitment management (prioritisation), capability balance (merge scientific-sensor-pool management with engineering management of the glider fleet).

Work Plan to effect this strategy (action plan)

The key aspects of the plan to accomplished the objectives and strategy mentioned above are:

TASKS	2017	2018	2019	2020
Management of Glider Fleet seeking 2 units field deployed, 1 unit in preparation and 1 unit being factory-refurbished	X	X	X	X
Soliciting the purchase of 2 new deep gliders		X		
Continuing with the practical and theoretical training of the Glider Staff members	X	X	X	X
Hosting international glider events for training, education and outreach	X		X	
Purchase of a new salt-water tank for glider preparation		X		
Upgrad the pressure facility with a hydraulic power pack		X		
Reduced R&D projects to develop tools and artefacts to improve the performance of the Glider Facility	X	X	X	X
Defining, Implementing and Running an Integral Management Plan for Glider Sensors and Glider-data	X	X	X	X
Purchase of a small van to support the logistical capabilities of the facility		X		
Defining, Implementing and Running an Integral Management Plan for Glider Sensors and Glider-data	X	X	X	X
Implementing a quality management plan to increase overall efficiency		X	X	X
Continue improving documentation system producing reports, checklists, worksheets, protocols and dedicated web-site	X	X	X	X

Resources available

Most significant resources, used are: 3 full-time > 4-year-experience technicians, 4 fully-operational Slocum® gliders, a 4000 L sea-water tank, a 120 bar pressure vessel and a fully-equipped 20 m² glider lab at IMEDEA/TMOOC spaces.

3.4.4. Lagrangian Platforms Facility

Description of the Objectives

The LF contributes to SOCIB's main key-drivers, science, technology, and society through the following overall objectives:

- To contribute to the understanding of the exchange of heat and mass between the northern and the southern Mediterranean and also to the knowledge of the circulation at basin and sub-basin scale.
- To develop the know-how and skill for deploying, maintaining and processing the data from an active fleet of 8 Argo floats and 12 surface drifters.
- To contribute to education and outreach by enabling access to upper ocean information, including products and services, useful to students, policy makers and the general public.
- To constitute the Spanish contribution to the Global Drifter Program and, together with the IEO, constitutes the Spanish contribution to the EUROArgo ERIC.

Strategy for achieving the objectives

There are two different types of actions: the core actions (CA) that are related with the operational tasks of upper ocean monitoring and imply a long-life time span, and the specific actions (SS), that are focused on particular experiments, answer particular scientific questions or form upgrades to the core actions.

Work Plan to effect this strategy (action plan)

The key aspects of the plan to accomplished the objectives and strategy mentioned above are:

ACTION	2017	2018	2019	2020
CA. Maintain and monitor an active fleet of 8 Argo floats and 12 surface drifters in Western Mediterranean.	X	X	X	X
CA. Make data publically available in 24-hours. Maintenance and upgrade of LF data management and visualization protocols	X	X	X	X
CA Expand international dimension of SOCIB, participation in the EUROArgo ERIC and GDP	X	X	X	X
SS. Optimization of the Lagrangian fleet. Establish a protocol to recover Argo and surface drifters. Establish a protocol to modify, in real time, the Argo sampling strategy.	X	X	X	
SS. Determine the slope circulation at mid-depth and the north-south exchange of heat and freshwater..			X	X
SS. Increase the services provide by the LF. Ensemble surface and mid-depth velocities.			X	X

Resources available

Presently, there are no fully dedicated technical or scientific personnel in the facility. The LF maintains an operating fleet of 8 Argo floats and 12 surface drifters, replacing the platforms at a rate defined by platform lifetime, typically 3 Argo floats and 8 surface drifters per year.

3.4.5. Fixed Stations Facility

Description of the Objectives

The overall objective of the Fixed Station Facility (FSF) for the period 2017-2020 is to provide continuous high quality data from the stations established along the coast and the buoys deployed in the Balearic Seas; specifically:

- To keep all measurement networks in a good operational state, producing reliable and quality data for the scientific community and for society.
- To Work to find an optimum way of offering information related to the stations (installation, maintaining operations, calibrations, etc) through a new web page.
- To homogenize the data logging system in the stations by passing them to a raspberry pi system that will help in the maintenance of the network.
- To maintain the schedule of sensor calibration.

Strategy for achieving the objectives

The proposed strategy focuses in follow the procedures established in previous years, acting on any detected weakness:

- Initiate homogeneous documentation for the different stations (installation, sensors, record of intervention, maintenance period, etc...)
- Standardize operations and perform an optimum maintenance plan.
- Integrate new stations through agreements with other organizations

Work Plan to effect this strategy (action plan)

Based on previous years, the proposed plan of activities for the period 2017-2020 is:

TASK	2017	2018	2019	2020
Stations documentation		X		
Annual maintenance of buoys (4/5 working days in workhouse)	X	X	X	X
On-site maintenance of the Palma Bay buoy and the Ibiza Channel buoy	X	X	X	X
Annual maintenance of weather stations and coast stations	X	X	X	X
Biannual maintenance of sea level stations	X	X	X	X
Routine bi-annual calibration of all sensors	X	X	X	X
Develop new tools for automated monitoring remote stations		X		
Purchase new buoys			X	

Resources available

To achieve the proposed objectives, the FSF count on the technical support of the ETD team for the field operations and the data processing and quality control system performed in the SOCIB DataCenter

3.4.6. Beach Monitoring Facility

Description of the Objectives

The main objective for the period 2017-2020 is to maintain the full operational capability of the BMF revising and updating as required. New initiatives for this period involve the development of tools and applications and encouraging wider use of the datasets by stakeholders (i.e. academic, hotel companies, beach security services, etc.). Specific objectives under this include:

- To maintain and explore weekly shoreline evolution and beach sediment transport.
- To develop tools related to the Beach Wave Forecasting System (SIPOP2), e.g. Safety Alerts, etc., in collaboration with Conselleria d'Interior from Balearic Islands Government.
- To develop a policy of data dissemination to end-users, to ensure full Facility exploitation.
- Develop web-based applications related to beach users security and risk forecasting in kind
- To establish agreements with academic institutions in order to facilitate enrolments in BSc and MSc training schedules or internship visits to the BMF.
- To participate in coastal meetings and disseminate BMF products, tools and services.

Strategy for achieving the objectives

The BMF mission is organized in different projects in order to achieve its objectives. Since 2013 it deals with two different types of projects: the FRAME projects (FP) that relate with the main tasks of coastal video-monitoring and implies a long-life time span, and BMF

products, and the specific projects (SP) that are punctual actions or projects. Additionally there are some actions (DA) related to outreach and education issues.

Work Plan to effect this strategy (action plan)

The key aspects of the plan to accomplished the strategies mentioned above are:

PROJECTS		2017	2018	2019	2020
FP MANPLAT	Maintenance and updating of SIRENA components	X	X	X	X
FP MANEC	Maintenance and updating of moorings and survey instruments	X	X	X	X
FP MANTOOLS	Maintenance and updating of BMF data management and visualization applications	X	X	X	X
FP C_imaging	Coastline extraction and analysis of coastline variability	X	X	X	X
FP C_morpho	Sediment budget and profile extraction and analysis of the beach evolution	X	X	X	X
FP BDM	Integration of Beach Data Management in Beach Data Viewer	X	X	X	X
SP TUACOAST	Improving scripts and codes used by BMF in data exploitation		X	X	
SP SHORE CAPTURE	Analysis and comparison of different methods related to shoreline extraction from videomonitoring systems		X	X	X
SP LIFEGUARDS	Development of tools to support lifeguard activities	X	X		
SP PIT_10	Analysis of sediment pits related to nourishment activities after 10 years			X	X
DA MANAG_IN	Introducing BMF to public and coastal managers	X		X	
DA_TRAINING	Students training	X	X	X	X

Resources available

Presently, key resources used by the BMF, are 3 coastal video-monitoring stations, an RTK station and a laser granulometer.

3.4.7. Modelling Facility

Description of the Objectives

The Modelling and Forecasting Facility (MFF) overall objective is to produce, analyze and improve numerical simulations of the ocean to support SOCIB activities and provide short-term predictions of currents, waves and meteotsunamis in the Western Mediterranean Sea and around the Balearic Islands. More specifically, models are used to address the following scientific challenges:

- To understand the physical processes detected in the observations
- To integrate the information from multi-platform observations into a unified picture
- To provide predictions of future states
- To objectively design optimal sampling programs.

Strategy for achieving the objectives

Ocean currents: the overall strategy consists in progressively upgrading the standard configuration of the Western Mediterranean Operational Model (WMOP), which produces, as a result of SOCIB MFF efforts since 2009, mesoscale-resolving simulations representing the ocean variability from the sub-basin to the coastal scale. Important advancements concern multi-platform data assimilation and resolution refinement.

Waves: SOCIB MFF closely collaborates with Puertos del Estado (PE) to generate refined operational short-term wave predictions around the Balearic Islands, which support beach monitoring activities and feed SOCIB products and services.

Meteotsunamis: an atmosphere-ocean modelling system is used to investigate and predict the occurrence of meteotsunamis (“rissagues”) in the Menorcan harbor of Ciutadella. An improved understanding of the phenomenon is achieved through the analysis of past cases (~3-4 per year). Developing collaborations with AEMET, UIB and European researchers concerned with meteotsunamis is also part of the strategy.

Work Plan to effect this strategy (action plan)

Ocean currents: maintain the present system and adapt to changes in AEMET forcing and CMEMS models

- Implement the system on a new computing platform
- Develop the data assimilation capability
- Study the impact of HF radar and glider data on the model
- Develop the model nesting capability
- Analyze the impact of model grid refinements
- Analyze ocean variability in the hindcast simulation and the impacts on ecosystems
- Investigate mesoscale and submesoscale processes
- Investigate water mass formation and spreading
- Develop the Lagrangian trajectory module
- Promote and facilitate the use of the simulations to external users (e.g. SASEMAR)

Waves: maintain the present system

- Consolidate the operational chain
- Adapt to PE SAPO evolutions.

Meteotsunamis: maintain the present system and adapt to changes in external forcing

- Implement the models on a new computing platform.
- Perform atmospheric model sensitivity tests.
- Investigate optimal configurations of the ocean model.
- Implement and analyze the potential of ensemble prediction.
- Promote collaborations with AEMET, UIB and the international meteotsunami research community.

Resources available

The 120-core HPC cluster at SOCIB used to produce these simulations will be replaced during 2019; a significant critical investment. MFF also uses a high-memory server, powerful work stations and backup systems for the simulations. Structurally, the MFF has a leading scientist and a research engineer. This is insufficient for the ambitious objectives of the Facility. The support from external projects and students is essential for capacity of the team.

3.4.8. Data Centre Facility

Description of the Objectives

- To Implement a Data Management Program, following a quality management system based on the IODE Quality Management Framework.

- To improve data quality: Operational processes need to be reviewed and improved in order to guarantee a high level of data quality.
- To improve dissemination across oceanographic global data networks.
- To promote an open source initiative: add key DCF projects to open source repositories.
- To improve core processes and tools architecture: include upgrade of software libraries.
- To support the product and services strategy; product returning information to society.
- Maintain the DCF outreach initiative: as part of the communication strategy a Twitter channel will be maintained.
- To collaborate with international initiatives in the framework of data management.
- Support and implement the new SOCIB website.

Strategy for achieving the objectives

The implementation of the DCF Data Management Program will ensure the best strategy to achieve the objectives. FMOelling the the new SOCIB API with advanced data catalog capabilities, and for that the current metadata strategy will be reviewed. Data objectives will benefit from the review of quality control procedures.

Work Plan to effect this strategy (action plan)

TASK	2017	2018	2019	2020
Development of new capabilities of SOCIB REST API .x	X	X	X	
Development of a GeoNetwork architecture that powers the metadata strategy			X	X
Development of the Data Management Program .	X	X		
Upgrade the current software.		X	X	
Development of new requirements from the data quality strategy.			X	X
Review of the quality control procedures	X	X		
Implementation of the new quality control procedures			X	
Outreach initiative		X	X	X
Implementation of the SOCIB DOI strategy	X	X		
Android and web beach status app		X		
Diving seaboard			X	
Bluefin Tuna web tool	X	X		
Glider toolbox evolution and international stakeholders integration	X	X	X	X
Netcdf JSON wrapper				X
New SOCIB website support		X	X	X
Support to other facilities tasks in the scope of EU/national projects	X	X	X	X

Resources available

Currently 8 people:

- Structural: 1 data center manager, 4 software engineers.
- Linked to project: 2 marine scientist and 1 civic engineer.
- Software stack and documentation.

3.4.9. Engineering and Technology Development Division

Description of the Objectives

The main objective of the ETD division for the period 2017-2020 is to continue providing technical support (especially in field operations) to all SOCIB's facilities; in summary:

- To provide technical support to the facilities.
- To maintain the vehicles and small boats of SOCIB in perfect working order, in addition to supporting the maintenance of other large infrastructures (R.V. SOCIB, Can Valero workshop, ballasting tank and pressure chamber, etc ...)
- To carry out technological development projects that contribute to the improvement of the functioning of the monitoring stations and to the data management.

Strategy for achieving the objectives

The proposed way to achieve the objectives is based on: 1) a strong collaboration with SOCIB's facilities to determine an optimum schedule of actions, 2) to follow the instrument manufacturers' recommendations to assure the quality of recorded data, and 3) to align the workflow with international established standards for monitoring and research projects

Work Plan to effect this strategy (action plan)

The work of the ETD is structured around the needs established by the SOCIB's facilities, i.e.:

WORKING PACKAGES	2017	2018	2019	2020
Participation in oceanographic campaigns	X	X	X	X
Punctual support to Radar HF maintenance operations and biannual Radar APM campaign		X		X
Give support to glider on field operations (deployment, recovery and emergency actions)	X	X	X	X
Semestral maintenance of the Sea Level Stations	X	X	X	X
Periodic maintenance of the oceanographic buoys (monthly / trimestral in situ revision and yearly in-land maintenance)	X	X	X	X
Yearly maintenance of weather stations	X	X	X	X
Semestral maintenance of coastal stations	X	X	X	X
Participation in Beach monitoring campaigns (semestral in 2 sites)	X	X	X	X
Constant supervision of the working order of vehicles and boats. Periodic revisions and maintenance.	X	X	X	X
Support to R.V. SOCIB instrumentation (maintenance and calibration)	X	X	X	X

Resources available

To achieve the SOCIB objectives, the ETD has the following resources:

- Staff: a team composed of 3 technicians
- Vehicles and boats: one big van (equipped as workshop), a RIB Zodiac Hurricane (9m length) with capacity to sail until 60 nm off coast, a RIB Valiant DR620 (6m length) focused for coastal operations.
- Instrumentation: Rosetta + CTD (SBE9+), multinet MOCNESS, autonomous CTD (SBE25), coastal multibeam echo sounder

3.4.10. SIAS Division

Description of the Objectives

The mission of this research group is to advance sustainability science to support the implementation of ICMM through conducting research at local, regional, and international scales. The integration of animal observations, AIS data and ocean numerical models, under the Tortugas project, builds on current research at SOCIB. We expect this to be a foundation for a new operational ecology facility; the general aim being to investigate the links between ship-based activities and marine megafauna in order to advance towards a dynamic and sustainable use of the marine environment. The biogeochemical line, again not yet a Facility by itself, started in 2015 following the SOCIB general strategy line for 2013-2016 (see ICTS SOCIB strategic plan 2013-16 section 4.2). The objective of this line is to study the interconnection between the physical and the biogeochemical processes in the Western Mediterranean. A brief description of the main objectives for years 2017 to 2020 follows.

- To develop and evaluate science-based decision-making tools and methods to support ICMM and related frameworks, with particular emphasis on the integration of social and ecological dimensions,
- To integrate research with environmental governance and management systems and to transfer science to society.
- To maintain the operational capability of the biogeochemistry group, with a special focus on protocols for key relevant biological and biogeochemical Essential Ocean Variables (EOVs).
- To monitor the interaction between Mediterranean currents and shelf environments across the Ibiza Channel, particularly their influence on biogeochemical cycles and ecosystem variability.
- To study what parameters are critical in bloom triggering and fate in the Mallorca and Ibiza channels; e.g. temperature, stratification and/or nutrient concentration.
- To support the Fixed Stations, Coastal R/V, Glider, modelling and forecasting facilities, and the ETD through inter-platform comparison and calibration/validation measurements.
- To facilitate education, and knowledge-transfer to society by exploiting and transforming the biogeochemical data to useful information for scientific and society requirements.
- To develop a program of animal-borne sensors. Animal telemetry observations have been integrated into well-renowned ocean observing systems (e.g. IOOS, IMOS).
- To assess human impacts on marine ecosystems for a better integration of Blue Growth.

Strategy for achieving the objectives

We will analyse the cumulative effects of human pressures on marine megafauna, considering the temporal dynamics of their interactions. We will calculate the cumulative utilization and impact (CUI) on a regular basis (e.g. weekly). A common challenge in ecology is the mapping of dynamic patterns of human activity across vast areas in order to understand and track their ecosystem impacts at regional and global scales. An emergent electronic monitoring technology, the automated identification system (AIS), provides transparent real-time and historical location data of shipping activities. Animal-borne sensors (ABS) are cost-effective platforms that can provide high quality oceanographic data in undersampled areas. A clear example is the current work developed at SOCIB using ABS on loggerhead turtles. In addition we will improve the Canals monitoring in the Ibiza and Mallorca channels for biogeochemistry; expanding ship deployed CTD / glider cross calibration for biochemical variables (e.g. Winkler titration to Seabird 43 to Aanderaa Optode for oxygen). Strong collaboration and involvement in national and international projects will provide visibility.

Work Plan to effect this strategy (action plan)

The tasks to accomplish the objectives and strategy mentioned above are:

TASKS	2017	2018	2019	2020
Maintain SOCOSTA web tool	X	X	X	X
Expand cumulative impact mapping of human ecosystem pressures	X	X	X	X
Dissemination of standardized biogeochemical data and marine portals (e.g. EMODnet chemistry), focused on EOVS		X	X	X
Exploitation of the R/V SOCIB, glider and fixed stations biogeochemical data to study daily, weekly & seasonal changes		X	X	X
Analyze and compare biogeochemical glider and CTD data (e.g. field cross-calibration and GARICASTS), reports	X	X	X	X
Develop an operational habitat model for turtles.		X	X	X
Study the key parameters in bloom triggering and fate in the Ibiza and Mallorca Channels (e.g. nutrient concentration, stratification, temperature) and the interconnection with physical processes in the area		X	X	X
Study nitrate concentration and distribution to quantify the role of mesoscale and submesoscale vertical nutrient fluxes in the Western Mediterranean (using the experimental SUV-51 sensor)		X		
Support other facilities and the implementation of the QC for biogeochemical sensors	X	X	X	X
Tagging turtles with ABS. Standardize QC/QA data distribution procedures.	X	X	X	X

Resources available

One full-time > 3-year-experienced scientist/technician, 2 full-time technicians (SOCIB/Balearic Islands Government) and a fully-equipped laboratory (as support in-kind from IMEDEA). SOCIB has 5 AIS antennas installed by ETD, and a signed agreement with an AIS data provider (MarineTraffic) and has developed an AIS database which covers the Western Mediterranean from 2014 to present and includes > 700 million ship positions. SOCIB also has an historical database of ~ 80 turtle trajectories, and operational capacity for instrumenting new animals.

3.4.11. Outreach

Description of the objectives

The main mission of SOCIB Outreach Service is to provide visibility to SOCIB activities as a key ocean observing system. The Outreach Service promotes ocean literacy and raises awareness of the impact that research in ocean sciences has on enhancing knowledge, and management and preservation of marine and coastal resources. It promotes marine environment interest into the classroom designing educational materials and training for kids as well as specific workshop activities for teachers. The Outreach Service also promotes engagement with citizens and social agents in scientific and environmental projects to enhance Responsible Research and Innovation (RRI) of the oceans providing rigorous, readily understandable and up-to-date information to all audiences and media.

Strategy for achieving the objectives:

The strategy combines the skills, experience and methodologies of a multidisciplinary team. Teamwork presents a clear advantage, since it allows the combination of sensitivities and

knowledge to elaborate contents and design actions that allow the science to reach out to the target: e.g. the general public, educational community, managers, researchers and last but not least, media. This strategy also creates new channels of internal communication to achieve greater and better quality of the information.

Work Plan to reach this strategy (action plan)

TARGET	ACTIONS
General public	<ul style="list-style-type: none"> - Conceptualization and design of dissemination material - Launch of on-site actions - Conceptualization and implementation of web content - Campaign to promote dissemination materials
Educational community	<ul style="list-style-type: none"> - Conceptualization and design of educational material - Development of workshops for students and teachers - Campaign to promote educational information and materials - Mailing campaigns
Managers and researchers	<ul style="list-style-type: none"> - Conceptualization and design of dissemination material - Campaign to promote dissemination materials
Media	<ul style="list-style-type: none"> - Conceptualization and design of informative material - Elaboration of “news” on the SOCIB website - Compilation, edition and implementation of contents for the new SOCIB website (main communication channel) - Management of social networks (Web, Facebook, Twitter, Flickr, Youtube) - Drafting and preparation of press releases and dossiers, as well as convening press conferences
Internal	<ul style="list-style-type: none"> - Coordination meetings - Monthly mailing to SOCIB staff to communicate and publish their activities (news on the SOCIB website, Social Network, etc.)

Resources available

(44) Training resources and educational material: teaching units, infographics, online games, board games, educational sheets, motion graphics;

(81) Digital resources and other materials for the general: videos, posters, presentations, brochures, art. Inc. in magazines, bookmarks;

(5) Web pages: SOCIB, MEDCLIC, Follow the glider, La Mar de Ciencia, MedcllicPhoto.

3.4.12. Computing and IT Service

Description of the Objectives

SOCIB’s strategic computational objective is to fully support the data management system, including observational data, numerical models and users’ information. The main specific objectives of the C&IT Service are:

- To store and organize data, ensuring its availability and reliability.
- To maintain the HPC system allowing the execution of complex numerical models.
- To ensure affordability, efficiency and longevity of the computing system.
- To operate, monitor and maintain the IT facilities (local and remote).
- To maintain data synchronization services between remote locations and the core system.
- To efficiently service the whole organization’s IT needs (users, services and facilities).
- To support the tasks of other facilities (help-desk and user support).

- To support and maintain business and scientific software.

Strategy for achieving the objectives

In general terms, the proposed strategy is based on the continuity of the current system, following a renewing and upgrading plan in order to adapt the core IT system to new requirements and to ensure its performance and availability.

Work Plan to effect this strategy (action plan)

TASKS	2017	2018	2019	2020
Purchase and installation of new unified storage system.	X	X		
Configure new storage system. Data migration (data, models, VMs, users)		X		
Upgrade local backup storage system.		X	X	
Purchase and installation of new HPC system.			X	
Migrate operational models to new system. Define HPC testing environment.				
Continuous maintenance and upgrading general IT infrastructure.			X	
Update and consolidate virtualization environment.		X	X	
Purchase, installation and configuration of new general servers.		X	X	
Purchase and installation of new wired networking infrastructure.		X	X	
Purchase and installation of new wireless networking.	X			
Upgrade unified storage system.			X	X
Upgrade serial computing systems.		X	X	X
Purchase and installation of new videowall system	X	X		
Upgrade IT Research Vessel infrastructure.	X	X	X	
Implement a cloud backup system (L2 backup system).		X	X	
Establish a complete disaster recovery plan.		X	X	X

Resources available

Since early 2010, one full time employee computer engineer has been responsible for the system management. A full time computer technician is required, currently only part-time, to provide additional help-desk and support system management.

3.4.13. The BLUEFIN TUNA Project

Description of the Objectives

The main objective of the bluefin tuna project is the application of operational oceanography to the sustainability of Atlantic bluefin tuna (*Thunnus thynnus*); developing science based technology solutions for the assessment and management of the species. Specifically:

- To develop operational oceanography products to identify bluefin tuna spawning areas and optimal larval habitats.
- To develop indices of environmental variability to standardize bluefin tuna abundances based on periodic sampling of early life stages and to improve knowledge on the spatial and temporal variability in larval growth and survival.
- To facilitate knowledge-transfer from scientists to fisheries assessment and management bodies, e.g. specifically the International Commission for the Conservation of Atlantic Tunas (ICCAT).

Strategy for achieving the objectives

The strategic approach to achieve the main goals is based on: 1) a strong collaboration with scientific experts in bluefin tuna ecology and fisheries assessment from the Spanish Institute of Oceanography and other international institutions, 2) a direct involvement in the activities carried on by the ICCAT, to ensure the adequate knowledge transfer from science to management, and 3) alignment with the developmental strategies of the main fisheries bodies.

Work Plan to effect this strategy (action plan)

The summary of the project working plan is given below structured in seven work packages:

WORKING PACKAGES	2017	2018	2019	2020
Development of a data repository of time series of operational oceanographic data from remote sensing and hydrographic models	X	X		
Assessment of the location of bluefin tuna spawning areas in the Balearic sea.		X	X	X
Incorporating information from oceanographic circulation models & Lagrangian trajectories		X	X	X
Assessment of the viability of bluefin tuna eggs and larvae survival in different environmental scenarios	X	X		
Online accessibility to operational derived products		X	X	X
Collection of in-situ data (field data acquisition)	X	X	X	X
Transfer of knowledge gained through the ongoing research to stakeholders involved in bluefin tuna management	X	X	X	X

Resources available

A full time PhD (expert in operational oceanography for fisheries), the collaboration of two members of hydrodynamic modeling, and one member from Data Center Facility. Field work activities involves 17 days of the R/V SOCIB per year, deploying the MOCNESS (Multiple Opening/Closing Net and Environmental Sensing System) and the CTD rosette.

3.5. SCHEDULE AND PROGRAMME MANAGEMENT, SCHEDULE/TIMELINE AND MONITORING INDICATORS/MILESTONES

The monitoring milestones are highlighted in **red** in the Timeline

1) Hosting international glider training event	Sep 2017
2) Disseminate Beach Monitoring capacity to public and coastal managers	Sep 2017
3) Purchase and installation of new wireless network	Dec 2017
4) Purchase and installation of new videowall system	Apr 2018
5) SOCIB childrens educational Apps	Jun 2018
6) Acquisition and installation of new unified data storage system	Jun 2018
7) Bi-annual HF radar planned maintenance campaign	Sep 2018
8) Complete and disseminate the fixed stations report and guidelines	Dec 2018
9) Implementation of SOCIB DOI strategy	Dec 2018
10) Implementation of the Bluefin Tuna web tool	Dec 2018
11) Complete data repository structure for Bluefin tuna data	Dec 2018
12) Implement Beach Monitoring tools to support Lifeguards	Dec 2018
13) Launch lifeguard and Socorrista IB App	Feb 2019
14) Complete and disseminate the R/V SOCIB procedures guidelines	Jun 2019
15) Implement new HF radar visualization interfaces	Jun 2019
16) Acquisition of 2 new glider vehicles	Jun 2019
17) Implement new HF radar visualization interfaces	Jun 2019
18) Complete new tools for remote monitoring of fixed stations	Jun 2019
19) Implementation of the new Data Management programme	Jun 2019
20) New SOCIB web	Jun 2019
21) Assessment of Bluefin tuna recruitment in different environments	Jun 2019
22) Hosting international glider training event	Sep 2019
23) Disseminate Beach Monitoring capacity to public and coastal managers	Sep 2019
24) Implementation of Lagrangian diagnostics for coherent structure detection	Dec 2019
25) Acquire small van for independent glider facility mobility	Dec 2019
26) Implement optimisation protocols for Lagrangian platform strategies	Dec 2019
27) Implementation of the new SOCIB Data Centre API	Dec 2019
28) Upgrade Data Centre software libraries	Dec 2019
29) Implementation of the diving seaboard	Dec 2019
30) Upgrade local data backup storage system	Dec 2019
31) Acquisition and installation of new HPC system	Dec 2019
32) Update virtualization environment	Dec 2019
33) Implementation of new data Quality Control procedures	Feb 2020
34) Update Beach Monitoring scripts and software libraries	Feb 2020
35) Implementation of a cloud backup system	Mar 2020
36) Major R/V SOCIB maintenance programme	Apr 2020
37) Targetted HF radar products for end-users	Jun 2020
38) Implement Glider Facility quality management plan	Jun 2020
39) La Mar de Ciencia International contest	Jun 2020
40) Purchase, installation and configuration of new IT servers	Jun 2020
41) Purchase and installation of new wired network infrastructure	Jun 2020
42) Upgrade research vessel IT infrastructure	Jun 2020
43) Bi-annual HF radar planned maintenance campaign	Sep 2020
44) Acquisition and installation of new salt water tank for glider preparation	Dec 2020
45) Upgrade glider pressure facility with new hydraulic power pack	Dec 2020
46) Ocean literacy conference	Jun 2021
47) Acquisition of new buoys and instrumentation for IC and PB	Dec 2021

3.6. RISK AND RISK MANAGEMENT

In the following table, the major risks to SOCIB, many identified in the weaknesses and threats from the SWOT analysis presented earlier (section 3), are assessed in terms of both likelihood and impact. Please note, that as with the earlier SWOT analysis, this is an abbreviated table taken from the risk analyses maintained by each of SOCIB's Facilities, Divisions and Services.

RISK	L ^{1,3}	I ^{2,3}	4,5	MANAGEMENT (MITIGATION MEASUREMENTS)
Non-permanent staff in the R/V SOCIB from TRAGSATEC	H	H	P	Guarantee funding to have a full crew the whole year
			R	Ensure a minimum of operation days/year
Non-permanent staff in the facilities	M	VH	P	Submissions of proposals to get budget for maintaining/hiring employees.
			R	Promoting permanent in-house staffing employment
Employee Burnout	M	H	P	Relieve stress (e.g. encourage employees to take mental health days, value vacations; work-from-home; being proactive; work/life balance)
			R	Adjust the workload (e.g. create fair workloads; monitor scheduling; involve team members in any decisions; weigh priorities; realistic job design)
Lack of competitively funded public surveys for R/V SOCIB	H	H	P	Improve relationships with public administrations to find agreements
			R	Improve relationships with public administrations to find agreements
Insufficient % of operational gliders	M	VH	P	Thorough execution of the protocols. Strict control of stocks (batteries,...). Fluent execution of the Factory-Survey-Storage cycle.
			R	Rapid contact to the manufacturer's customer support. Making a repair plan and executing it as soon as possible. Also looking for rental gliders.
Poor quality of scientific measurements	M	VH	P	Scientifically reviewed sampling strategy based on clear, achievable and profitable objectives. Frequent checks on near-real-time data
			R	Determining if the problem is recoverable without aborting. Consider an in-field intervention to solve the problem. Recover the instrumentation if the correct sampling cannot be resumed.
Modelling systems becoming deprecated	M	H	P	Continuously upgrade modelling systems. Anticipate future evolutions to remain state-of-the-art.
			R	Redefine strategy to reach state-of-the-art level. Reduce the number of models/applications when necessary.
Not following standards and best practices	L	H	P	Training strategies should be the preferred option. Specific further analysis should be mandatory in case this wasn't possible.
			R	Design a strategy to progressively migrate the wrong solution to the correct one.
Instrument failure and obsolescence	VH	VH	P	Planning a renovation of instrument components (optics, cameras, sensors etc.)
			R	Having a stock of components for quickly correcting failures
Multiple data workflows	VH	VH	P	Implementation of a Data Management Program following Quality Management System based on IODE Quality Management Framework.

			R	Decrease the work capacity in order to guarantee data quality.
Non-recovery disaster (CPD destruction)	L	VH	P	Implement a full cloud backup system (level-2 backup). Establish a fully Disaster Recovery Plan.
			R	Follow Disaster Recovery Plan.
Communication or energy failure	M	H	P	Redundant external communication channel (communications).
			R	Establish a fully disaster recovery plan.

¹Likelihood | ²Impact | ³VL='Very Low'; L='Low'; M='Medium'; H='High'; VH='Very High' |
⁴Preventive | ⁵Reactive

ICTS SOCIB

Annex I

Investment Plan 2017-2020



ANEX I – INVESTMENT PLAN 2017 - 2020

1. EXECUTIVE SUMMARY

SOCIB, the Balearic Islands Coastal Ocean Observing and Forecasting System became a fully operational and recognised ICTS in 2014. Almost all of the deadlines, deliverables and milestones of the 2013-2016 Strategic Plan and the associated objectives have been met and completed on schedule or without significant delay. More specifically, it is important to note that since the initial proposal back in 2006-2007, the structural funding that had been agreed has of course decreased in real terms by around 2-3 % per annum. Even this scenario, the SOCIB team has been able to implement a new marine research infrastructure, a multi-platform ocean observing system that is leading a new era of ocean observation, a key grand challenge our society is facing today. A key element of SOCIB strategy has been the mission-oriented innovation approach that combines scientific excellence with impact and relevance to society. SOCIB has carefully applied its Investments to state of the art science, implementing new technologies, and responding to society needs and challenges. With this track record behind us, in this Annex we present our investment plan for 2017-2020, which pays attention to the needs but also to the general economic conditions.

2. PLANNED INVESTMENTS BY FACILITY, DIVISION OR SERVICE

2.1. Coastal Ocean Research Vessel Facility

RV_SOCIB investment plan

The RV SOCIB is a key infrastructure from the SOCIB multi-platform observing system. Accordingly, it is included here for completeness. However, the RV SOCIB is, as requested, included in the ICTS FLOTA and as a result, the planned investments and costs are all included and should be considered in the ICTS FLOTA spreadsheet.

The text below supplements and provides the details supporting the summary investment table presented in the excel spreadsheet attached which is a copy of content of RV SOCIB investments in the ICTS FLOTA spreadsheet, listing the projects included in the investment plan of SOCIB-RV_SOCIB for the 2017-2020 period.

In other words, the RV_SOCIB investments have been, as requested, included under the ICTS FLOTA (MAPAICTS-2017-012) investment plan; they are also described here for completeness, providing further details where helpful, but zero cost has been attributed here, since the costs are attributed to the ICTS FLOTA investment plan.

Investment projects

There are 7 RV_SOCIB investment projects as follows

TITLE	CODE
RV_SOCIB essential upgrades to the vessel	ICTS_SOCIB_RV_001
DESCRIPTION	
Includes the expenses on compulsory future proofing upgrades to perform on board concerning main engines and other major components of RV_SOCIB (hull, propellers, transmission, etc.), Biannual drydock is compulsory to keep all the navigation certificates. a) 6000 h. re-condition or replace main engines	

b) Most efficiently carried out at biannual drydock

TOTAL COST	BUDGET PER YEAR
0 € - (700.000 € ICTS FLOTA investment MAPAICTS-2017-012)	

TITLE	CODE
RV_SOCIB Compulsory Improvements	ICTS_SOCIB_RV_002
DESCRIPTION	
Includes the investment on demanded improvement by official services of the engines and that must be performed on-board to guarantee the proper functioning of this infrastructure. Includes:	
<ol style="list-style-type: none"> 1. Gasoil filtration system 2. Gasoil refrigeration system 	
TOTAL COST	BUDGET PER YEAR
0 € - (27.000 € ICTS FLOTA investment MAPAICTS-2017-012)	

TITLE	CODE
RV_SOCIB new laboratory instrumentation	ICTS_SOCIB_RV_003
DESCRIPTION	
Essential investment in ship's laboratory instrumentation. Keeping the biogeochemical scientific capabilities of R/V SOCIB up to international standards and a strong scientific tool. This wil allow the RV_SOCIB to achieve new and additional objectives and challenges.	
TOTAL COST	BUDGET PER YEAR
0 € - (120.000 € ICTS FLOTA investment MAPAICTS-2017-012)	

TITLE	CODE
RV_SOCIB Essential Improvements	ICTS_SOCIB_RV_004
DESCRIPTION	
Includes the investment in improvement suitable on-board to update the boat	
Includes:	
<ol style="list-style-type: none"> 1- Increase electric power supply available 2- Increase power of manoeuvring thrusters to improve DP behaviour 3- Enlarge the stern A-Frame 4- Install auto-trim system 5- Renovate the Air conditioning system 6- Renovate the Hydraulic installation 7- Improve emergency security hydraulic installation. 8- Opened hatches sensor 9- Bow bagpipe 10- Put together both transformers existing on-board 11- Improve the light mast 12- Acquire a 10 foot container/warehouse instead of renting the existing currant ones 13- Add a side door to the bridge 14- Add a ventilation window in the bridge 15- Isolation of skate rooms (doors and closets) 	
TOTAL COST	BUDGET PER YEAR
0 € - (654.000 € ICTS FLOTA investment MAPAICTS-2017-012)	

TITLE	CODE
RV_SOCIB current scientific instrumentation upgrade	ICTS_SOCIB_RV_005
DESCRIPTION	
This includes all the investments for the proper operation of the current scientific equipment on-board (thermosalinometer, ADCP, weather station, sensor upgrades, repairs, etc.).	
TOTAL COST	BUDGET PER YEAR
0 € - (120.000 € ICTS FLOTA investment MAPAICTS-2017-012)	30.000 €

TITLE	CODE
RV_SOCIB new scientific instrumentation compulsory acquisition	ICTS_SOCIB_RV_006
DESCRIPTION	
Includes the investment for new scientific instrumentation which must be acquired: <ul style="list-style-type: none"> 1- Oceanographic rosette 2- Deck unit 3- UCTD – 150.000 € 4- 3000m coaxial cable renewal – 50.000 € 	
TOTAL COST	BUDGET PER YEAR
0 € - (315.000 € ICTS FLOTA investment MAPAICTS-2017-012)	

TITLE	CODE
RV_SOCIB new scientific instrumentation suitable acquisition	ICTS_SOCIB_RV_007
DESCRIPTION	
Includes the investment for new scientific instrumentation (Deep multibeam echo sounder 800.000 €, Scientific rosette, oceanographic bottles, and sensors of conductivity, oxygen, temperature, Fluorescence, PAR and nitrate concentration)	
TOTAL COST	BUDGET PER YEAR
0 € - (1.015.000 € ICTS FLOTA investment MAPAICTS-2017-012)	

Investment plan schedule (2017-2020 and >2020)

This section lists the investment projects by their codes and shows their timelines. Note that some of the investments have implementations timelines longer than the 4-year planning horizon used in this investment plan (with an outlook towards 2022).

INVESTMENT PROJECT CODE	2017	2018	2019	2020	2021	2022	BUDGET/PROJECT
ICTS_SOCIB_RV_001			X				0 €
ICTS_SOCIB_RV_002	X	X	X	X			0 €
ICTS_SOCIB_RV_003	X	X	X	X			0 €
ICTS_SOCIB_RV_004	X	X	X	X	X	X	0 €
ICTS_SOCIB_RV_005	X	X	X	X	X	X	0 €
ICTS_SOCIB_RV_006	X	X	X	X			0 €

ICTS_SOCIB_RV_007	X	X	X	X	X	X	0 €
TOTAL BUDGET (2017-2020)							0 €
TOTAL BUDGET (2017- > 2020)							0 €

2.2. Coastal HF Radar Facility

HFR investment plan

This descriptive text file supplements and provides the details supporting the summary investment table presented in the excel spreadsheet attached, listing the projects included in the investment plan of SOCIB-HFR Facility for the 2017-2020 period. These investments will enable the ongoing delivery of projects' outcomes and the achievements of the objectives for the duration of the investment-planning horizon (four years).

Investment Project

TITLE	CODE
Lagrangian surface drifters	ICTS_SOCIB_HFR_001
DESCRIPTION	
The acquisition of Lagrangian surface drifters for open ocean operation for validation campaigns will allow the checking of the HFR platform performance by routine comparison between drifters buoys trajectories versus the trajectories computed from the high-resolution surface currents measured by the coastal HFR.	
TOTAL BUDGET COSTS	BUDGET PER YEAR
56.000 €	14.000 €

Apart from the HFR investment projects described above, there are other HFR Facility requests that have been included in the investment plan of other facilities:

- Hardware updating and renewal as well as repair or replacement part (*macminis, combine central station, Macbook-Pro*), UPS updating and renewal as well as UPS replacement batteries and general software licenses (*Matlab, EndNote, Skype for Business*) are included in the CIT investment plan.
- Auxiliary instrumentation such as one weather station and one web cam to be installed at FORM HFR radial site are included in the FSF investment plan.

Investment plan schedule (2017-2020 and >2020)

This section lists the investment projects by their codes and shows their timelines. Note the investments have implementations timelines longer than the 4-year planning horizon used in this investment plan (with an outlook towards 2022).

PROJECT CODE	BUDGET/YEAR	2017	2018	2019	2020	2021	2022	BUDGET/PROJECT
ICTS_SOCIB_HFR_001	14,000 €	X	X	X	X	X	X	56,000 €
TOTAL BUDGET (2017-2020)								56,000 €
TOTAL BUDGET (2017- > 2020)								84,000 €

2.3. Glider Facility

Investment plan

This descriptive text file supplements and provides the details supporting the summary investment table presented in the excel spreadsheet attached, listing the project included in the investment plan of SOCIB-GF Facility for the 2017-2020 period. This investment will enable the ongoing delivery of projects' outcomes and the achievements of the objectives for the duration of the investment-planning horizon (four years).

Investment projects

This section includes a list and description of individual investment projects:

TITLE	CODE
GF_Glider-Fleet_New_Units	ICTS_SOCIB_GF_001
DESCRIPTION	
The main objective is to assure that the SOCIB Glider Fleet will have the resources to keep up with its forthcoming and expected commitments with respect to glider surveys. 3rd-generation gliders will provide modernity and state-of-art operational capabilities	
INITIAL BUDGET COSTS	BUDGET PER YEAR
350.000 €	175.000 €

Investment plan schedule (2017-2020 and >2020)

PROJECT CODE	BUDGET/YEAR	2017	2018	2019	2020	2021	2022	BUDGET/PROJECT
ICTS_SOCIB_GF_001	175,000 €			X	X			350,000 €
TOTAL BUDGET (2017-2020)								350,000 €

2.4. Lagrangian Platforms Facility

TITLE	CODE
Updating the lagrangian fleet: Argo	ICTS_SOCIB_LPF_001
DESCRIPTION	
The goal of the LF is to maintain an active fleet of 8 Argo floats and 12 drifters. Due to the lifetime of the Argo floats, this requires to purchase and deploy 3 floats per year. The Lagrangian facility (LF) uses drifting platforms to provide a quantitative description of the changing state of the upper ocean (0 - 2000 dbar) at regional level. The Argo floats provide a geostrophic description of the upper ocean, with hydrographic (temperature, salinity and pressure) measurements in the upper 2000 dbar.	
INITIAL BUDGET COSTS	BUDGET PER YEAR
180,000 €	45,000 €

TITLE	CODE
Participation in Euro-Argo: Membership	ICTS_SOCIB_LPF_002
DESCRIPTION	
The Euro-Argo ERIC is the european contribution to the international program Argo. Euro-Argo coordinates the contributions from the European institutions. Additionally, Euro-Argo	

coordinates European projects to improve the Argo network. Membership fee to maintain the central infrastructure of the Euro-Argo ERIC.

INITIAL BUDGET COSTS	BUDGET PER YEAR
78,000 €	19,500 €

Investment plan schedule (2017-2020 and >2020)

This section lists the investment projects by their codes and shows their timelines.
Note the investments have implementations timelines longer than the 4-year planning horizon used in this investment plan (with an outlook towards 2022).

PROJECT CODE	BUDGET/YEAR	2017	2018	2019	2020	2021	2022	BUDGET/PROJECT
ICTS_SOCIB_LPF_001	45,000 €	X	X	X	X	X	X	180,000 €
ICTS_SOCIB_LPF_002	19,500 €	X	X	X	X	X	X	78,000 €
TOTAL BUDGET (2017-2020)								258,000 €
TOTAL BUDGET (2017- > 2020)								387,000 €

2.5. Fixed Stations Facility

TITLE	CODE
Replacement of Ibiza Channel and Palma Bay moorings	ICTS_SOCIB_FSF_001
DESCRIPTION	
This investment will make a future proof upgrade to the IC and PB moorings, replacing the buoys and much of the instrumentation. This investment will upgrade the instruments that collect the biogeochemical data in the fixed stations and provide data to the DC in RT. Upgrading the sensors will also facilitate the implementation of QC.	
TOTAL BUDGET COSTS	BUDGET PER YEAR
460,000 €	115,000€

Investment plan schedule (2017-2020 and >2020)

This section lists the investment projects by their codes and shows their timelines.

PROJECT CODE	BUDGET/YEAR	2017	2018	2019	2020	2021	2022	BUDGET/PROJECT
ICTS_SOCIB_FSF_001				X	X			460,000 €
TOTAL BUDGET (2017-2020)								460,000 €

2.6. Modelling Facility

TITLE	CODE
High-Performance Computing cluster	ICTS_SOCIB_MFF_001
DESCRIPTION	
Purchase of a High-Performance Computing cluster and associated serial computation software to execute SOCIB MFF numerical simulations. The High Performance Computing	

System is critical to generate numerical predictions of ocean currents, waves and meteotsunamis, both operationally and in reanalysis mode. These predictions support a wide range of SOCIB applications both for science and society. In particular, they are essential to the SOCIB Products and Services strategy.

TOTAL BUDGET COSTS	BUDGET PER YEAR
100,000 €	115,000€

Investment plan schedule (2017-2020 and >2020)

This section lists the investment projects by their codes and shows their timelines. Note the investments have implementations timelines longer than the 4-year planning horizon used in this investment plan (with an outlook towards 2022).

PROJECT CODE	BUDGET/YEAR	2017	2018	2019	2020	2021	2022	BUDGET/PROJECT
ICTS_SOCIB_MF F_001	€			X	X	X	X	100,000 €
TOTAL BUDGET (2017-2020)								100,000 €

2.7. Data Centre Facility

Investment plan

This descriptive text file supplements and provides the details supporting the summary investment table presented in the excel spreadsheet attached, listing the project included in the investment plan for SOCIB-DATACENTRE Facility for the 2017-2020 period.

These investments will enable the ongoing delivery of projects' outcomes and the achievements of the objectives for the duration of the investment-planning horizon (four years).

Investment Project

TITLE	CODE
SOCIB Mobile Apps strategies	ICTS_SOCIB_DCF_001
DESCRIPTION	
<ul style="list-style-type: none"> - Contract of the development of the project's client side (Mobile). Both Android and iOS apps will be developed. These apps are designed in collaboration with Direcció General de Emergencies of the Govern de las Islas Baleares, and it will improve the security management of the balearic lifeguards. - A new mobile app will be developed, in line with the products and services strategy, to facilitate the decision making of the diving sector. - The current SOCIB mobile app, in both Android and iOS platforms, is using deprecated versions of the operating system SDK and need to be upgraded (a major refactor is needed). New features and data sources will be added. - Development of an Android mobile app that will have the required subset of features of the Instrumentation Web 2.0. This tool will improve the operational processes. 	
INITIAL BUDGET COSTS	BUDGET PER YEAR
70.000 €	17.500 €

Investment plan schedule (2017-2020 and >2020)

This section lists the investment project by its code and shows its timelines.

PROJECT CODE	BUDGET/YEAR	2017	2018	2019	2020	2021	2022	BUDGET/PROJECT
ICTS_SOCIB_MF F_001	€		X	X				70,000 €
TOTAL BUDGET (2017-2020)								70,000 €

2.8. Engineering and Technology Development Division

TITLE	CODE
Individual Equipment	ICTS_SOCIB_ETD_001
DESCRIPTION	
4 full sets of diving equipment, 4 dry suits, 4 wet suits, 4 bottles 12l, 4 bottles 15l, Mobilphone. Personal Protection Equipment. It is essential that the fieldwork staff are equipped with security features and specific equipment that allows them to provide assistance both on board vessels and in underwater operations.	
INITIAL BUDGET COSTS	BUDGET PER YEAR
25,000 €	

TITLE	CODE
Storage equipment	ICTS_SOCIB_ETD_002
DESCRIPTION	
Mobile crane (3 tons) and tools. To move big elements easily and safely (e.g. buoys) and to store SOCIB equipment (boats, spare parts, boxes, etc....); it is necessary to enable staff to handle bulky and heavy elements.	
INITIAL BUDGET COSTS	BUDGET PER YEAR
25,000 €	

Investment plan schedule (2017-2020 and >2020)

This section lists the investment projects by their codes and shows their timelines.

PROJECT CODE	BUDGET/YEAR	2017	2018	2019	2020	2021	2022	BUDGET/PROJECT
ICTS_SOCIB_ETD_001	N/A		X	X	X			25,000 €
ICTS_SOCIB_ETD_002	N/A		X	X	X			25,000 €
TOTAL BUDGET (2017-2020)								50,000 €

2.9. SIAS Division

Investment plan

This document provides supplemented information to the investment table (see the attached spreadsheet). The included investments will provide the support needed in order to achieve the objectives presented in the strategic plan for this facility (period 2017-2020).

Investment Project

TITLE	CODE
Animal-borne sensors	ICTS_SOCIB _SIAS_001
DESCRIPTION	
Acquisition of animal-borne sensors. The goal of the Animal Telemetry programme is to maintain a program of 5 animal-borne sensors per year. Due to the lifetime of the tags (6-10 months), this requires to purchase and deploy 5 tags per year. Animal-borne sensors provide information about the movement and habitat use of turtles, while collects depth and temperature of the water column.	
INITIAL BUDGET COSTS	BUDGET PER YEAR
45000 €	15000 €

Investment plan schedule (2017-2020 and >2020)

This section lists the investment projects by their codes and shows their timelines. Note the investments have implementations timelines longer than the 4-year planning horizon used in this investment plan (with an outlook towards 2022).

PROJECT CODE	BUDGET/YEAR	2017	2018	2019	2020	2021	2022	BUDGET/PROJECT
ICTS_SOCIB_SIA S_001	15,000 €		X	X	X	X	X	45,000 €
TOTAL BUDGET (2017-2020)								45,000 €
TOTAL BUDGET (2017- > 2020)								75,000 €

2.10. Computing and IT Service

C&IT Investment Plan 2017-2020

The Computing & IT Service comprises a full set of physical systems, computational and network services, to support all SOCIB's requirements in terms of the total data lifecycle, from collection and processing to distribution and visualization. The C&IT investment plan for the period 2017-2020 is based on the continuity of the current system, following a continuous plan for the renewal of the actual equipment. The investment plan contemplates the acquisition of the three main components of the SOCIB computing system: unified storage system, backup storage system and general servers. Additionally, the investment plan includes the necessary renewal of obsolete networking components and the installation of a new videowall system.

In addition, the investment plan comprises the renovation of the full IT infrastructure for the HF radar facility and for the Research Vessel Facility, including computers, servers, communication devices and any additional elements. Finally, the plan includes a general investment for the continuous maintenance and upgrading of personal user devices and general office equipment, along with the acquisition and maintenance of any additional IT equipment, such as UPS, environmental monitoring, etc.

Investment plan

This descriptive text file supplements and provides the details supporting the summary investment table presented in the excel spreadsheet attached, listing the projects included in the investment plan of SOCIB-RV_SOCIB for the 2017-2020 period.

Investment projects

This section includes a list and description of individual investment projects:

TITLE	CODE
New SOCIB Unified Storage System	ICTS_SOCIB_CIT_001
DESCRIPTION	
Purchase of new unified storage system in order to replace the initial system that has reached its EOL. Increase general storage capacity. Ensure data availability and reliability. Ensure affordability, efficiency and longevity of the C&IT system.	
TOTAL COST	BUDGET PER YEAR
60,000 €	

TITLE	CODE
New SOCIB Backup System	ICTS_SOCIB_CIT_002
DESCRIPTION	
Purchase of new backup storage system, in order to improve and increase the capacity of the backup infrastructure. Increase backup storage capacity. Ensure data availability and reliability. Ensure data protection and afford the implementation of disaster recovery plans.	
TOTAL COST	BUDGET PER YEAR
50,000 €	

TITLE	CODE
Update Research Vessel IT Infrastructure	ICTS_SOCIB_CIT_003
DESCRIPTION	
Renew Research Vessel IT equipment. Ensure operation and maintenance of Research Vessel IT resources.	
TOTAL COST	BUDGET PER YEAR
50,000 €	

TITLE	CODE
Update SOCIB General Servers	ICTS_SOCIB_CIT_004
DESCRIPTION	
Purchase of new servers for SOCIB's virtualization environment. Ensure operation, affordability, efficiency and longevity of the computing system. Fulfil new computing requirements for services and products.	
TOTAL COST	BUDGET PER YEAR
20,000 €	

TITLE	CODE
Update SOCIB Videowall	ICTS_SOCIB_CIT_005
DESCRIPTION	
Purchase of a new videowall system (computer and screens).	

Ensure operation and maintenance of IT resources. Service and support the whole organization.	
TOTAL COST	BUDGET PER YEAR
20,000 €	

TITLE	CODE
Networking and communications	ICTS_SOCIB_CIT_006
DESCRIPTION	
Upgrade networking equipment, for inner and outer communications. Ensure inner and outer communications. Ensure data availability and system access. Ensure the adaptation to new communication technologies. Improve data accessibility and products and services high-availability.	
TOTAL COST	BUDGET PER YEAR
10,000 €	

TITLE	CODE
Software acquisition and license renewal	ICTS_SOCIB_CIT_007
DESCRIPTION	
Purchasing and renovation of software licenses (general and scientific) Ensure system operation and availability. Support the other facilities and end-user support.	
TOTAL COST	BUDGET PER YEAR
20,000 €	5,000 €

TITLE	CODE
Update HF Radar IT Infrastructure	ICTS_SOCIB_CIT_008
DESCRIPTION	
Renew and maintain HF Radar IT equipment. Ensure operation and system high-availability.	
TOTAL COST	BUDGET PER YEAR
15,000 €	

Investment plan schedule (2017-2020 and >2020)

This section lists the investment projects by their codes and shows their timelines.
Note that some of the investments have implementations timelines longer than the 4-year planning horizon used in this investment plan (with an outlook towards 2022).

INVESTMENT PROJECT CODE	2017	2018	2019	2020	2021	2022	BUDGET/PROJECT
ICTS_SOCIB_CIT_001	X	X					60,000 €
ICTS_SOCIB_CIT_002		X					50,000 €
ICTS_SOCIB_CIT_003	X	X	X				50,000 €
ICTS_SOCIB_CIT_004		X	X				20,000 €
ICTS_SOCIB_CIT_005	X	X					20,000 €
ICTS_SOCIB_CIT_006	X	X	X	X			10,000 €
ICTS_SOCIB_CIT_007	X	X	X	X	X	X	20,000 €
ICTS_SOCIB_CIT_008	X	X	X	X			15,000 €

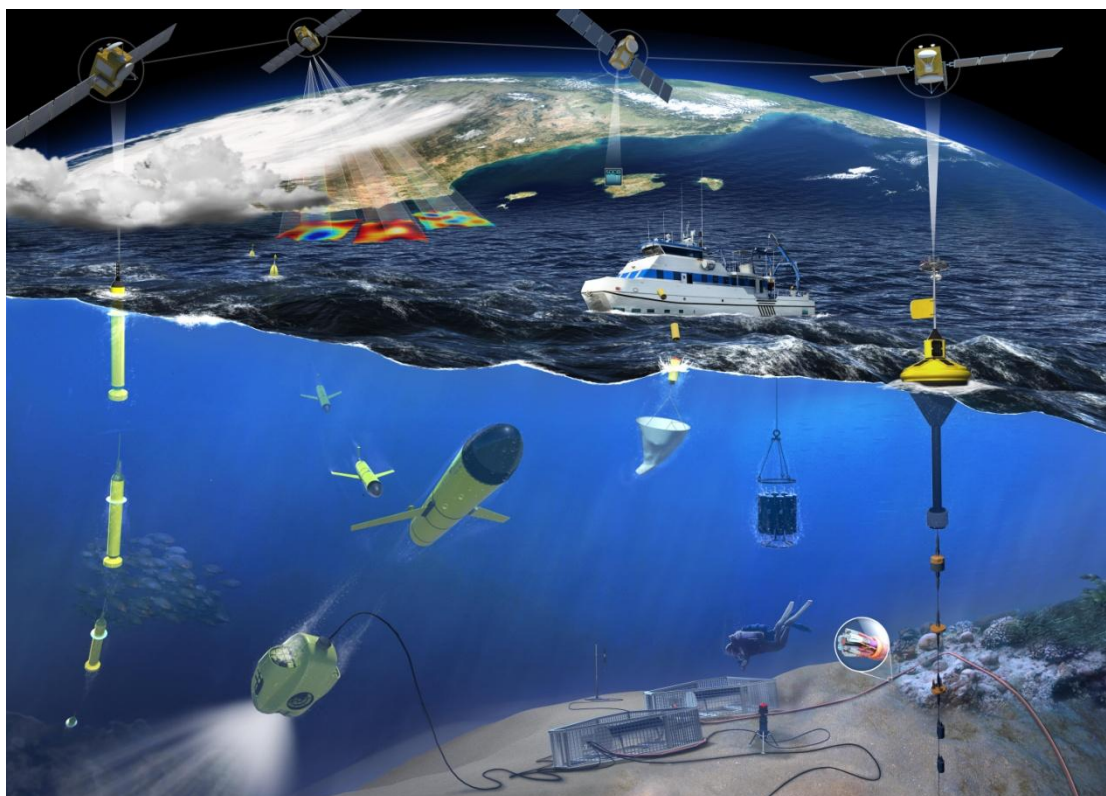
TOTAL BUDGET (2017-2020)	245,000 €
<i>TOTAL BUDGET (2017- > 2020)</i>	<i>255,000 €</i>

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Annex II

SOCIB Annual Operations Funding Revision

Plan 2017-2020



ANEX II – SOCIB ANNUAL OPERATIONS FUNDING REVISION

SOCIB, the Balearic Islands Coastal Ocean Observing and Forecasting System became a fully operational and recognised ICTS in 2014. Almost all of the deadlines, deliverables and milestones of the 2013-2016 Strategic Plan and the associated objectives have been met and completed on schedule or without significant delay; all at a time of one of the worst financial crises in recent history, so without being complacent, we are pleased with the achievements of a great team. More specifically, it is important to note that since the initial proposal back in 2006-2007, the structural annual operations funding that had been agreed -approximately 2 million euros/year- has of course decreased in real terms by around 2-3 % per annum. After 10 years, this aggregates to a reduction of 20 - 30%.

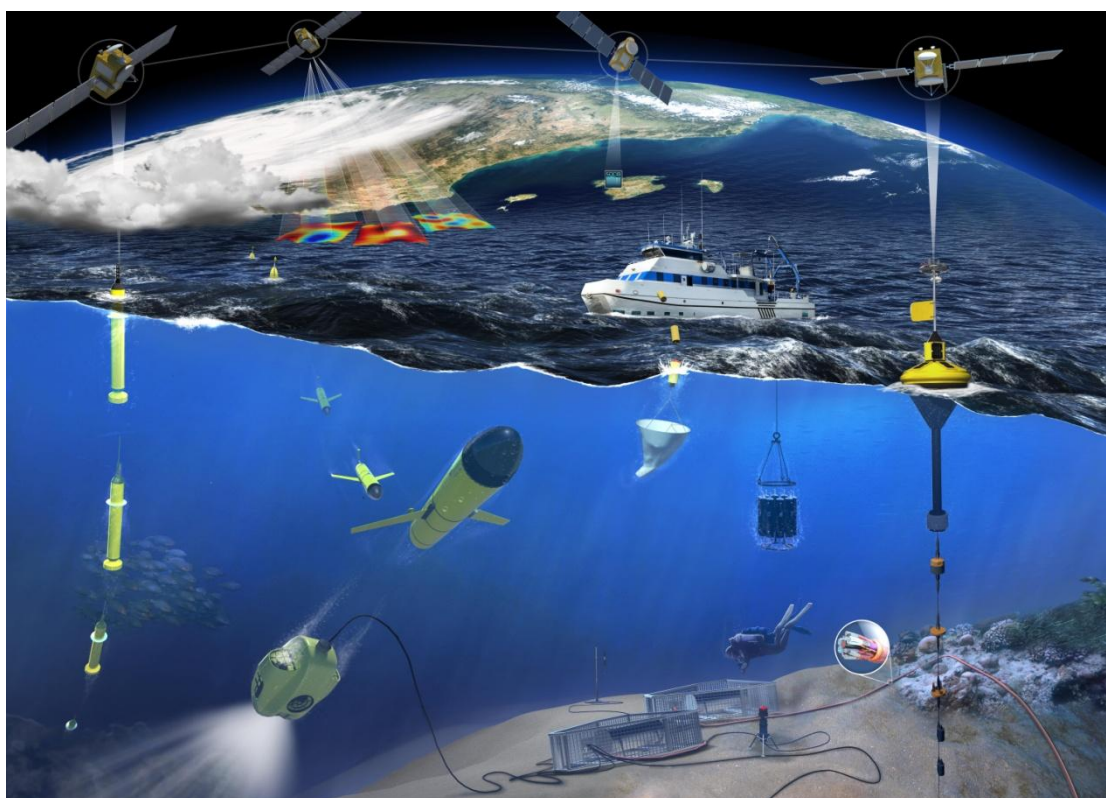
Even under this scenario, the SOCIB team has been able to implement a new marine research infrastructure, a multi-platform ocean observing system that is leading a new era of ocean observation. Accordingly, the SOCIB team develops products and services of very high scientific and societal relevance, actions that should be expected to become structural under normal financial circumstances. We have bridged the widening funding gap through the excellence of the SOCIB team successfully winning competitive and solicited funding from the EU, internationally and commercially. However, short term competitive funding carries the inevitable association of increased risk as critical society focussed products and services become more and more dependent on contract staff on fixed term appointments.

To guarantee the sustainability of SOCIB activities and scientific, technological and societal contributions an increase in structural annual operations funding of 30% for 2019 and an additional 10% in 2020 is respectfully but strongly requested now that the economic status appears to be recovering and the financial and economic outlook has improved.

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Annex III

New Building Investment



ANEX III – NEW BUILDING INVESTMENT

Executive Summary

The IP2010 described the need for a new building with sufficient space to hold the laboratories, warehouses, offices and the Data Center of SOCIB, all of which are currently spread across several different buildings (ParcBit, IMEDEA and Can Valero). Since the beginning, the spread out location of SOCIB staff has been considered a significant difficulty for the essential teamwork between the facilities, divisions and services of SOCIB.

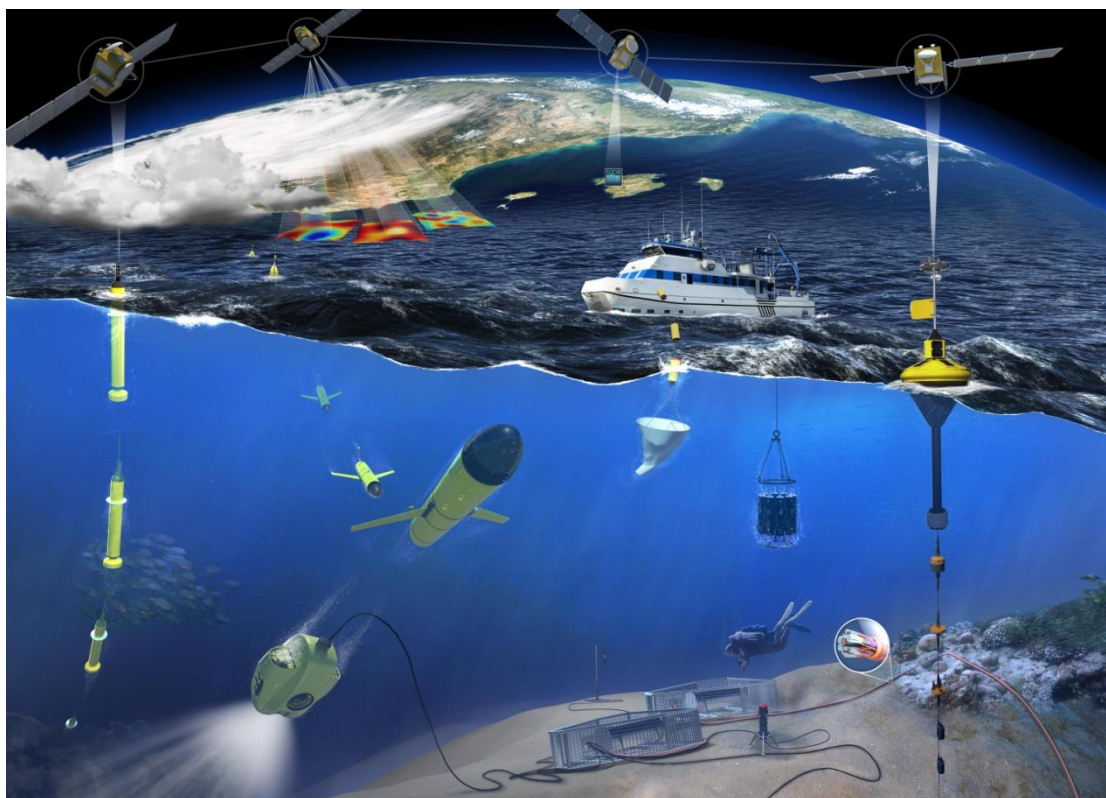
In the Strategic Plan SP2013-16, it was noted that work had been undertaken in the Office of the Director with Autoridad Portuaria de Balears (APB, Palma harbour) to secure a location for a combined SOCIB office/technical building. Work has continued and at present, since January 2018, in the frame of the RIS3 EU Strategy, refurbishment of a building has been decided upon by APB, MINECO and Balearic Government with funding planned and quasi-secured from regional European Funds (FEDER), Balearic Government and SOCIB with MINECO contributing to the scientific equipment of the building.

As a result, architectural plans now exist and they are presented in this Annex. The plans offer mixed office/technical space spread over four floors, each around 900 m² in area, approximately 3600 m² in total in a key area of Palma harbour.

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Annex IV

SOCIB Team Research Record 2011-2018



SOCIB TEAM RESEARCH RECORD 2011 - 2018

June 2018

Presentation and institutional context

OVERVIEW, SOCIB 4 VISION AND CHALLENGES

SOCIB, the Balearic Islands Coastal Ocean Observing and Forecasting System) is part of the Spanish large scale research and technology infrastructures (known as ICTS in Spanish - *Infraestructuras Científicas y Tecnológicas Singulares*) and represents a new way to fund marine R&D activities in Spain and a significant change in Spanish marine and coastal observing strategy. It has a strategic regional approach with a view to establishing a coordinated and sustained marine and coastal observing system integrated at a national and/or European level.

Formal agreement between the Spanish Government (Ministry of Science and Innovation, MICINN) and the Balearic Islands Government (Ministry of Economy, Finance and Innovation), reached in December 2007, established this new Coastal Ocean Observing and Forecasting System in the Balearic Islands (SOCIB). SOCIB was established as new consortium with legal entity funded jointly by MICINN (50%) and the Balearic Islands Regional Government (50%). Total funding of up to 36.316.342 € until 2021, consisting of 11.536.345 € for investment in scientific equipment and facilities and just over 2 million € per year to support operations from 2011 through to 2021. The funding is provided annually and investment of this funding in equipment and operations is managed by SOCIB in line with legal Spanish requirements for public consortiums and governance procedures.

Balearic Islands research institutions constitute a broad base of knowledge and already demonstrated international leadership in operational oceanography. The vision for SOCIB developed from over 15 years of internationally acknowledged research by the researchers and technicians based in the Department of Marine Technologies, Operational Oceanography and Sustainability (TMOOS) at IMEDEA (CSIC-UIB) in collaboration with other internationally acknowledged Balearic research groups at COB-IEO and in different departments and services at UIB. Together, the people and resources of these groups constitute a critical mass of multi-disciplinary personnel and facilities, located in the Balearic Islands and working at the forefront of international oceanographic research.

SOCIB is composed by three major subsystems: (1) an observing sub-system (Observing Facilities), (2) a forecasting and modelling sub-system (Forecasting and Modelling Facility) and (3) a data management sub-system (Data Centre Facility). Combined these three components form the Systems Operation and Support Division (SOS Division). The Engineering and Technology Development Division (ETD Division) provides the engineering and technical backbone to develop and operate the facilities of the SOS Division and is also responsible for the application, development and testing of new technologies for future observing systems and for developing new analytical tools for the effective management of new, high volumes, of observational data and modelling output. The third Division, the Strategic Issues and Applications for Society (SIAS Division), develops applications and operational tools for science-based management of the coastal and marine environment, within the general frame of sustainability science, thus supporting the development and transfer of strategic knowledge to meet the needs of society in the context of global change. It is important to consider that the sound management of the coastal zone is of utmost importance in the Balearic Islands and elsewhere to guarantee both the quality of

⁴ More detailed information can be found at [SOCIB web-page](#) in where all activities are explained: offices and lab activities, field campaigns, technical resources, human team, data publication and outreach activities.

life of residents and the competitiveness and sustainability of the economic activity in the Balearic Islands.

SOCIB's objectives are driven by international scientific priorities, state of the art technology and also by specific interests from the Spanish and Balearic Islands society. The general objectives are twofold: (1) to contribute to addressing and responding to international scientific, technological and strategic challenges for operational oceanography in the coastal ocean and (2) to enhance operational oceanography research and technology activities being carried out in the Balearic Islands, contributing to the consolidation of a well-structured centre of excellence.

Scientific publications

Preliminary note

SOCIB staff has well defined mission oriented objectives.

Scientists are responsible for the supervision and operation of the operational systems and also for the design and execution of science driven projects directly related to the enhancement of operational capacities (at sea, numerical, etc.). In general terms, SOCIB scientists invest around 50% of their time to operational tasks, the other 50% being devoted to research. In July 2017, SOCIB has 12 scientists with an equivalent full time personnel of 4,3. Strong collaboration exists in the Balearic Islands between SOCIB and scientists from two other key players, such as IMEDEA and IEO (5 and 2 scientists, respectively) that spend approximately 20% of their time in topics related to SOCIB scientific objectives. Therefore, total amount of scientists at SOCIB is 5,7.

Engineers and technicians are responsible for the computing, laboratory and field work associated with the operational and science driven SOCIB objectives, as well as for the outreach developments. In some specific cases, partial commitment to technology development and/or scientific support, also exists.

Support staff is responsible for providing the administration and support needs to all SCIB staff.

In the period 2011-2017, SOCIB have published 95 papers in ISI magazines.

In the period 2014-2017 SOCIB have been participating as partner in 10 projects (VII FP, H2020, Foundations, and other international projects).

Papers in ISI magazines

Papers In press

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2. Álvarez-Berastegui D., Coll J., Rueda L., Stobart B., Morey G., Navarro O., Aparicio-González A., Grau A. M., Reñones O., Multiscale seascape habitat of necto-benthic littoral species, application to the study of the dusky grouper habitat shift throughout ontogeny, Marine Environmental Research". under review. June 2018

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4. P. Reglero, R. Balbín, F.J. Abascal, A. Medina, D. Alvarez-Berastegui, L. Rasmuson, B. Mourre, A. Ortega, E. Blanco, F. de la Gándara, F. Alemany, G.W.Jr. Ingram, M. Hidalgo, Pelagic habitat and offspring survival in the Eastern stock of Atlantic bluefin tuna, ICES-JMS, In Review, under review. June 2018
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3. Onken R., H.V. Fiekas, L. Beguery, I. Borrione, A. Funk, M. Hemming, J. Hernandez-Lasheras, K.J. Heywood, J. Kaiser, M. Knoll, B. Mourre, P. Oddo, P.M. Poulain, B. Queste, A. Russo, K. Shitashima, M. Siderius and E.T. Küsel (2018). High-resolution observations in the Western Mediterranean Sea : the REP14-MED experiment. Ocean Science, 14, 321-335, doi :10.5194/os-14-321-2018.
4. Calò A., Lett C., Mourre B., Pérez-Ruzafa A. and J.A. García-Charton (2018). Use of Lagrangian simulations to hindcast the geographical position of propagule release zones in a Mediterranean coastal fish. Marine Environmental Research, 134, 16-27, doi :10.1016/j.marenvres.2017.12.011.
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 8. Gómez-Pujol, L. (2012). Contribución al conocimiento del papel de las acumulaciones de *Posidonia oceanica* en la morfodinámica de las playas mediterráneas. In González Díez, A. (coord.). Avances de la Geomorfología en España: 327-330. Ediciones de la Universidad de Cantabria, Santander. ISBN-978-84-86116-54-5.
 9. [Ministerio de Agricultura, Alimentación y Medio Ambiente, \(2012\). Documento técnico sobre impactos y mitigación de la contaminación acústica marina. Madrid.](#) 146 pp. Joaquín Tintoré miembro del Grupo de Expertos Nacional de Ruidos Submarinos.
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 11. Pomar, F., Fornós, J.J., Gómez-Pujol, L., del Valle, L. (2012). Microformas de erosión por cianobacterias en rocas carbonatadas litorales y su relación con parámetros ambientales (Mallorca, Mediterráneo occidental). In González Díez, A. (coord.). Avances de la Geomorfología en España: 421-424. Ediciones de la Universidad de Cantabria, Santander. ISBN-978-84-86116-54-5.
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 13. Ingram G.W., Jr., Alemany F., Alvarez D. and García A. (2012): Development of indices of larval bluefin tuna (*thunnus thynnus*) in the western mediterranean sea, Report series: Report of the 2012 Atlantic Bluefin tuna stock assessment session, SCRS/2012/164, SCRS: BFT Stock Assess. Meeting Report, Madrid, Spain – September 4 to 11, 2012

2011

1. Deudero, S., A. Box, A. Sureda, J. Tintoré, S. Tejada. (2011). Combining stable isotopes and biochemical markers to assess organic contamination in transplanted Mussels *Mytilus Galloprovincialis*. Mussels; Anatomy, habitat and environmental impact. L. E. McGevin ed. Chapter 11. Nova Science Publishers ISBN 978-1-61761-763-8.

2. Diedrich, A, Balaguer, P, Tintoré, J. (2011). Concepts, methods, and tools to support science-based decision-making in Integrated Coastal and Ocean Management: Examples from the Balearic Islands. ICZM as an Evolution of Territorial Planning&Governance (Joaquín Farinós, ed.). University of Valencia pp.89-110.
3. Espeja, S., F. Navinés, A. Diedrich, D. Carreras, J. Tintoré. (2011) [Herramientas estratégicas de gestión integrada para conseguir la sostenibilidad en las Islas Baleares: La gestión integrada de las zonas costeras](#). Boletín de la Coyuntura económica de las Islas Baleares, julio 2011. Ed. Dirección General de Economía y Estadísticas, Gobierno de las Islas Baleares. España. pp 58-64.
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5. Gómez-Pujol, L., Roig, F.X., Balaguer, P., Mateu, J. Fornós, J.J. (2011). Textura, composición y procedencia del sedimento de las playas de Menorca (Islas Baleares). In Montoya, I. (eds.). Avances Recientes en Geomorfología Litoral: 43-46. Universidad Rey Juan Carlos, Madrid. ISBN-13: 978-84-615-3982-6.

Outreach and on line resources

The main mission of SOCIB Outreach Service is to provide visibility to SOCIB activities in the framework of new observing systems in oceanography. As a result, the Outreach Service promotes ocean literacy and raises awareness on the impact that research in ocean sciences has on enhancing knowledge, management and preservation of marine and coastal resources. Furthermore, it promotes marine environment interest into the classroom designing educational materials and training for kids as well as specific workshop activities for teachers. Also important is engagement of citizens and social agents in scientific and environmental projects to enhance Responsible Research and Innovation (RRI) of the oceans providing rigorous, readily understandable and up-to-date information to all audiences and media. In the period 2010-2017, SOCIB has participated in 39 events with 20.912 participants, has produced 44 training resources and educational material, appearing 621 times in media.

Webs

1. SOCIB website: www.socib.eu (Spanish/Catalan/English)
2. MEDCLIC: the Mediterranean in one click website: www.medcllic.es (Spanish/Catalan/English)
3. Follow the Glider website: www.followtheglider.com (Spanish /English)
4. La Mar de Ciencia website: www.lamardeciencia.es (Spanish/Catalan)

Online activities

1. “Medcllic Ocean Photo Contest”: National photo contest for sustainable management of seas. 2016. [Link](#)
2. La Mar de Ciencia II: online contest coordinated together with CSIC for students (Primary and Secondary education) related to the ocean sciences. Second edition: 2016. [Link](#)
3. “La Mar de Ciencia I: online contest coordinated together with CSIC for students (Primary and Secondary education) related to the ocean sciences. First edition: 2015. [Link](#)

Events

1. Open day access to the SOCIB Catamaran: day of open access for “GODAE Ocean View International School” students, in order to make them know is marine research in a research vessel. Mallorca, october 2017.
2. European Researchers’ Night - Open day access to the SOCIB Catamaran and SOCIB photographic exhibition. Mallorca, September 2017.
3. Open day access to the SOCIB Catamaran: day of open access for “La Mar de Ciencia, second edition” contest winners, in order to make them know is marine research in a research vessel. Mallorca, july 2017.
4. “VIII Campus Científicotècnic d’Estiu”: summer science campus organized by the University of the Balearic Islands for Secondary education students. SOCIB participated with a scientific tour to Es Caragol beach. Mallorca, july 2017.
5. “Ciència per a tothom 2017”: science fair organized by the University of the Balearic Islands for students (Primary and Secondary education). SOCIB participated with and educational and outreach stand. Mallorca, may 2017.
6. Medcliphoto Exhibition: selected “Medclif Ocean Photo Contest” photos. Aula del Mar, Palma. March-April 2017.
7. Open day access to the SOCIB Catamaran: day of open access for teaching science workshop “I Jornadas de enseñanza de las ciencias” participants. Mallorca, february 2017.
8. “Historias del Mediterráneo III”, conferences with the objective of helping to understand scientifically the complexity and importance of the Mediterranean Sea for the general public. Mallorca, february 2017.
9. Medcliphoto Exhibition: selected “Medclif Ocean Photo Contest” photos. CaixaForum Palma. September- October 2016.
10. Open day access to the SOCIB Catamaran: day of open access for “La Mar de Ciencia, first edition” contest winners, in order to make them know is marine research in a research vessel. Mallorca, july 2016.
11. “Ciència per a tothom 2016”: science fair organized by the University of the Balearic Islands for students (Primary and Secondary education). SOCIB participated with and educational and outreach stand. Mallorca, may 2016.
12. Open day access to the SOCIB Catamaran: day of open access for the public, in order to make them know is marine research in a research vessel. Mallorca, may 2016.
13. Open day access to the SOCIB Catamaran: day of open access for Master in Biology and Conservation of Biodiversity students (University of Salamanca). Mallorca, may 2016.
14. “Historias del Mediterráneo II”, conferences with the objective of helping to understand scientifically the complexity and importance of the Mediterranean Sea for the general public. Mallorca, february 2016.
15. Open day access to the SOCIB Catamaran: 5 days of open access for the public, in order to make them know is marine research in a research vessel. Barcelona, november 2014.
16. “Historias del Mediterráneo I”, conferences with the objective of helping to understand scientifically the complexity and importance of the Mediterranean Sea for the general public. Mallorca, february-march 2014.

Seminars/workshops

1. “Posidonia Festival Mallorca 2017”: International ecofestival of Art, Nature & Sustainable Tourism. SOCIB Outreach workshop: “Comic and science workshop for kids”. Mallorca, may 2017.

2. Opening of the exhibition “Mediterráneo” by Joaquín Tintoré. CaixaForum Tarragona, april 2017
3. “I Jornadas de enseñanza de las ciencias” – Follow the glider workshop. February 2017.
4. “I Jornadas de enseñanza de las ciencias”: *Medcllic, el Mediterrani a un clic* - MEDCLIC Flipped Classroom workshop. February 2017.
5. “I Jornadas de enseñanza de las ciencias” – *SOCIB: Investigació i noves tecnologies oceanogràfiques al servei del coneixement i la gestió de la Mediterrània* - Inaugural session by Joaquín Tintoré. February 2017.
6. “I Jornadas de enseñanza de las ciencias” – Teaching science workshop for teachers (Primary and Secondary education), coordinated together with CSIC and Consejo General de los Colegios de Licenciados de España. CaixaForum Palma, february 2017.
7. “Science Week”, guided visits and workshops for students at SOCIB labs in IMEDEA (CSIC-UIB). November from 2014-2017.
8. “VI Jornadas sobre la enseñanza de la física y química” – Teaching physics and chemistry workshop for teachers (Secondary education). Oral presentation by Joaquín Tintoré. Cosmocaixa Barcelona, october 2015.

Training resources and educational materials

1. Teaching units:
 - The Mediterranean and its coastline education programme (MEDCLIC) – [01](#).The Mediterranean Sea, [02](#).Sea Water, [03](#).Sea waves and [04](#).Wind. 2016.
 - Follow the glider: Student [book](#) and teacher’s [guide](#). 2016.
2. Infographics: 12 infographics about SOCIB Facilities, healthy oceans...
3. Online interactive tool/game: Coastal observing systems and tools for decision support, including an oil spill and web versión. Cosmocaixa, Fundació LaCaixa, December 2013. [Link](#)
4. Educational sheets – [01](#).Seawater filtration on R/V SOCIB, [02](#).Glider and cartesian diver.
5. Catalogues: “La Mar de Ciencia”, [first](#) and second edition
6. Board games: SOCIB multiplatform Systems puzzles. 2017

Digital resources and other materials for the general public

1. Leaflets/Brochures
 - ICTS SOCIB [Brochure](#). 2012
 - SOCIB Oceanographic Research Vessel [Brochure](#). 2013
 - MEDCLIC project: Bookmarks and flyers. 2015
 - ICTS SOCIB [Brochure II](#). 2017
 - 7 PINES Supporting Sea and Coastal research. Outreach [leaflet](#) to recognize the collaboration of 7 Pines Resort Ibiza with SOCIB’s HF radar facility. 2017
2. Vídeos ([YouTube](#)): 61 videos and motion graphics about General SOCIB and facilities, SOCIB in mass media, MEDCLIC, ...
3. Articles in outreach magazines:
 - SOCIB: SOCIB: Balearic Islands Coastal Observing and Forecasting System. A solid foundation for multi-platform oceanic research. Supporting oceanographic exploration. (2013). *International Innovation*. pp 37-39. [Link](#)
 - SOCIB, Sistema de Observación y Predicción Costero de las Islas Baleares. (2013). *Magazine Océano*, nº4.0413, pp 49-60. [Link](#).
 - SOCIB: the role of new Marine Research Infrastructures responding to Science, Technology and Society needs Multi-platform integrated observing and

forecasting systems. (2013). *The Parliament Magazine*, issue 369, pages 30-31. www.theparliament.com. [Link](#)

- Observación marina high-tech. (2015). *National Geographic*. p.1. [Link](#)

Advanced resources for scientists and students

1. HF Radar monthly reports: new product for scientists and students. The specific aims of these reports are: i) to assess the reliability of HF radar data; ii) to evaluate the HF radar system performance and status and iii) to identify temporal periods of malfunctioning. Monthly reports are generated automatically selecting requested month from SOCIB web site at: <http://www.socib.es/?seccion=observingFacilities&facility=radar#reports>. September, 2016
2. Krietemeyer, A., Troupin, C., Rogers, G., (2016) SOCIB HF Radar Report Generator, v1 ed. GitHub, SOCIB, p. The SOCIB HF Radar Report Generator is a python command line tool to create automatically the monthly reports of the HF Radar managed by SOCIB. The monthly reports aim to extract useful and meaningful information from the HF radar data using qualitative and quantitative data analysis methods.

SOCIB contributions to external projects

1. INSTAC Website. Frontend developed for the INSITU component of the Copernicus Marine Service (CMEMS). (2017). Available at: <http://www.marineinsitu.eu/>
2. Copernicus Marine Service Use Case. Oceanography exploration tool to support fisheries management. (2017). Available at: <http://marine.copernicus.eu/wp-content/uploads/use-cases/oceanography-exploration-tool-support-fisheries-management.pdf>
3. INSTAC NEWS for Copernicus Marine Service (CMEMS). 2017: A year of record breaking sea surface temperatures (2017). Available at: <http://marine.copernicus.eu/2017-year-record-breaking-sea-surface-temperatures/>
4. INSTAC training material. A collection of Jupyter notebooks to support end users needs regarding INSITU data download, processing and visualization. INSTAC Workshops held in parallel to the Marine Week and Nor-shipping. (2017). Available at: <https://github.com/CopernicusMarineInsitu/INSTACTraining>

Research Projects

Financed by the European Commission

1. **CMEMS-INCREASE:** Innovation and Networking for the integration of Coastal Radars into European mArine Services.
CMEMS-Service Evolution 21-SE-CALL1
IP@SOCIB: J. Tintoré Dates: 04/2016 – 04/2018
2. **MedSUB:** Understanding meso and submesoscale ocean interactions to improve Mediterranean CMEMS products. (CMEMS Service Evolution Call for Tender 21-SE-CALL1)
IP@SOCIB: Joaquín Tintoré Dates: 05/2016 – 03/2018
3. **JERICO – NEXT:** Joint European Research Infrastructure network for Coastal operational Observatories.
European Commission H2020. Project number 654.410.
IP@SOCIB: J. Tintoré. Dates: 09/2015 – 08/2019
4. **ODIP2:** Extending the ocean data interoperability platform.
European Commission, H2020
IP@SOCIB: J. Tintoré Dates: 04/2015 – 03/2018
5. **COPERNICUS_IN SITU TAC:** Copernicus Marine Environment Monitoring Service: IN SITU TAC
European Commission, Main Contractor: MERCATOR
IP@SOCIB: Joaquín Tintoré Dates: 04/2015 – 04/2018
6. **COPERNICUS_MED MFC:** Copernicus Marine Environment Monitoring Service
European Commission, Main Contractor: MERCATOR
IP@SOCIB: Joaquín Tintoré Dates: 04/2015 – 04/2018
7. **MEDSEA Check Point:** Growth and innovation in ocean economy; gaps and priorities in sea basin observation and data.
European Commission, DG for Maritime Affairs and Fisheries. Contract MARE/2012/11-
Contract Number: SI2.658137. € 135.000 €
IP@SOCIB: J. Tintoré Dates: 12/2013 – 06/2017
8. **COPERNICUS_IN SITU TAC - Phase II:** Copernicus Marine Environment Monitoring Service: IN SITU TAC - Phase II
European Commission, Main Contractor: MERCATOR
IP@SOCIB: Joaquín Tintoré Dates: 01/2018 – 03/2021
9. **67-UU-DO-CMEMS-DEM4 - IBISAR:** Skill assessment service for real-time met-ocean data product ranking in the IBI area for emergency and SAR operators
European Commission, Main Contractor: MERCATOR
IP@SOCIB: Emma Reyes Dates: 15/05/2018 – 15/11/2019

Private Research Agreements

1. **MEDCLIC 4,** El Mediterráneo a un clic. Nuevos sistemas de observación par a la ciencia y la sociedad: más allá de la divulgación

Fundació La Caixa

IP@SOCIB: J. Tintoré

Dates: 10/2017 – 10/2018

2. **MEDCLIC 3**, El Mediterráneo a un clic. Nuevos sistemas de observación par a la ciencia y la sociedad: más allá de la divulgación

Fundació La Caixa

IP@SOCIB: J. Tintoré

Dates: 10/2016 – 10/2017

3. Convenio de colaboración ente el SOCIB y la Fundación BBVA para la financiación del proyecto **Tortugas Oceanógrafas**, dentro de la convocatoria 2016 de ayudas a la investigación.

IP@SOCIB: D. March

Dates: 09/2016 – 03/2018

4. **MEDCLIC 2**, El Mediterráneo a un clic. Nuevos sistemas de observación par a la ciencia y la sociedad: más allá de la divulgación

Fundació La Caixa

IP@SOCIB: J. Tintoré

Dates: 10/2015 – 10/2016

5. Convenio específico de colaboración entre el Consejo Superior de Investigaciones científicas, la Consejería de agricultura, medio ambiente y territorio del Gobierno de las Illes Balears, y el Consorcio Sistema de Observación y Predicción Costero de las Islas Baleares para establecer un **Sistema de Observación y Predicción de Medusas en el Mar Balear**

Dates: 05/2015 – 12/2017 (Addenda)

6. **Estudio morfodinámico de Cala Deià**

Ayuntamiento de Deià

IP@SOCIB: L. Gómez-Pujol

Dates: 04/2015 – 12/2015

7. **MEDCLIC 1**, El Mediterráneo a un clic. Nuevos sistemas de observación par a la ciencia y la sociedad: más allá de la divulgación

Fundació La Caixa

IP@SOCIB: J. Tintoré

Dates: 06/2014 – 11/2015

SOCIB internal projects

1. **Proyecto "Gliding Turtles": proyecto de lanzamiento de gliders dentro del proyecto financiado BBVA**

Dates: march-june 2017

2. **Bluefin Tuna Project:** Understanding the interannual variability of Bluefin Tuna spawning sites and the application of operational oceanography to the conservation and management of tuna species in the Balearic Sea.

Plan Estratégico SOCIB y Convenio marco de colaboración entre el SOCIB y el IEO para el desarrollo de la Investigación e Innovación Tecnológica en Ciencias Marinas.

Dates: 05/2012 – 05/2019

Conferences and main contributions to scientific meetings

Invited talks

1. Mourre B., E. Aguiar, A. Alvarez-Ellacuría, S. Gómara, M. Gomila, J. Hernandez, E. Heslop, M. Juza, T. Oguz, E. Reyes, M.A. Rújula, M. Torner and J. Tintoré (2017). SOCIB: observaciones, predicciones y servicios marinos en el Mediterráneo Occidental. Servicios marinos y supercomputación: experiencias y retos futuros, Santiago de Compostela (Spain).
2. Alvarez-Berastegui D., Reglero P., Hidalgo M. , Balbín R. , Mourre B. , Coll J., Alemany F. , Tintoré J. 2017, Towards Operational Fisheries Oceanography in the Mediterranean, 6th Mediterranean Oceanography Network for the Global Ocean Observing System (MonGOOS), (Athens, Greece. 14,15, 16 November 2017) , Invited oral presentation
3. Tintoré J. Paradigm change in ocean studies: multi-platform observing and forecasting integrated approach in response to science and society needs. Keynote speaker. “Marine Environmental Monitoring, Modelling And Prediction. 47th International Liege Colloquium”. 4-8 May, Liege (Invited communication). 2015
4. Sardá, R.; T. O’Higgins, R. Cormier, A. Diedrich, J. Tintoré. The Ecosystem-Based Management System: Linking the Theory of Environmental Policy and Practice of Environmental Management. 2nd International Ocean Research Conference (IORC), “One Planet, one Ocean” liderada por UNESCO. Barcelona (Invited). 2014
5. Tintoré J., Euro-Argo and Multiplatform observing systems. Strategy for future Marine Operational Systems. Marginal Seas Workshop - The East Sea and the Mediterranean Sea. Busan, Korea. (Key-note speaker). 2014
6. Tintoré, J. Balearic Islands-Spain case study: SOCIB contribution to the Observing System of the European Seas and Coasts, in line with Blue Growth initiatives. Workshop on the use of Structural Funds for the construction of distributed e-Infrastructures supporting environment initiatives. Brussels. (Key-note speaker). 2014
7. Tintoré, J. RITMARE SP5 'Observing System' workshop. Lisbon. Instituto Hidrografico. (Key-note speaker). 2014
8. Tintoré, J. Science & Technology Based Blue-Growth Initiatives in a Touristic Destination; SOCIB contribution to fill the science-policy gap. Perseus Interactive Stakeholder Session. Green Infrastructure and Sustainable Societies / Cities. GreInSus Conference. Izmir (Key-note speaker). 2014
9. Tintoré, J. Sesión “Robotics for Nex-Generation Ocean Science”. Euroscience Open Forum (ESOF) 2014. Copenhagen. (Key-note speaker). 2014
10. Tintoré, J. Strategy for future Marine Operational Systems in the SES. RInES (“Research and Innovation in the service of Economy and Society-EU Neighborhood and the Black Sea region”) Thessaloniki, Greece, 29-30/05/2014 (Key-note speaker). 2014
11. Tintoré, J. The Dawn of the Robotic Exploration of our Planet Ocean. 2nd International Ocean Research Conference (IOC-UNESCO, FNOB and The Oceanography Society). Barcelona. (Key-note speaker). 2014
12. Tintoré, J. The impact of new multi-platform observing systems in science, technology development and response to society needs; from small to large scales... Conferencia Internacional de Manejo Integrado de Zonas Costeras. Los nuevos sistemas de observación y predicción, elementos clave para un manejo sostenible de mares y costas combinando, ciencia, tecnología y respuesta a la sociedad. 15-17 Mayo, 2013. Santiago de Cuba. (Keynote speaker). 2013
13. Tintoré, J. The impact of new multi-platform observing systems in science, technology development and response to society needs; the challenge for the next decade: from small to large scales...GNOO. Oristano, Cerdeña. (Keynote speaker). 2013
14. Tintoré, J. The impact of new multi-platform observing systems in science, technology development and response to society needs; from small to large scales... Eurocast 2013 – 11-13 February 2013. Workshop on Marine Robotics and Applications. Las Palmas. (Keynote speaker). 2013

15. Diedrich, A. Bridging the science-policy gap. International Workshop on New Practices of Participative Planning to Face New Environmental, Economic and Territorial Challenges, hosted by the University of Valencia, Spain, junio 2011 (Keynote speaker)
16. Diedrich, A. Integrated Coastal Zone Management and coastal governance in the Balearic Islands. Special Session on Coastal Governance and ICZM in the Mediterranean, hosted by the MAREMED Project, Valencia, abril 2011 (Keynote speaker)
17. Diedrich, A. Espeja, S., Navinés, F. II Conferencia Económica del Mediterráneo Nord-Occidental, Barcelona, Presentación oral sobre el desarrollo de un sistema de indicadores para la GIZC en las Illes Balears, junio 2011 (Keynote speaker)

Communications

1. Alvarez-Berastegui D. et al. 2017, Operational oceanography for sustainable fisheries. Application to bluefin tuna in the Western Mediterranean, The Copernicus Marine Week, Brussels, 25-29 September 2017, Poster
2. Emma Heslop, Joaquín Tintoré, Biel Fontera, Baptiste Mourre, Benjamin Casas, Diego Alvarez-Berastegui, Luís Gómez-Pujol, Tomeu Cañellas, Glenn Nolan, Dominique Duran, 2017, SOCIB Products & Services Strategy : Harnessing multi-platform data, model forecasting, scientific research & technology, to enhance the value of ocean data for end-user sectors, The Copernicus Marine Week, Brussels, 25-29 September 2017, Poster
3. Alvarez-Berastegui D., Alemany F., Ingram W., Reglero P., Mourre B., Balbín R., Juza M., Tintoré J. 2017, Multi-platform integrated assessment for the sustainability of Bluefin Tuna in the Mediterranean Sea, The Copernicus Marine Week, Brussels, 25-29 September 2017, Invited oral presentation
4. Heslop E., B. Mourre, M. Juza, E. Aguiar, F. Margirier, A. Bosse, P. Testor, M. Torner and J. Tintoré (2018). Understanding drivers of variability in water mass exchange through a circulation 'choke' point, using ocean gliders as part of a multi-platform approach. AGU Ocean Sciences Meeting 2018, Portland (USA).
5. Reyes E., B. Mourre, J. Tintoré, A. Orfila, E. Comerma, T. Bakhsh, C. De Lara Fernández (2018). Real-time met-ocean data ranking for emergency responders (SAR operators). Oceanology International 2018, London (United Kingdom).
6. Aguiar E., B. Mourre, E. Reyes, J. Hernandez-Lasheras, E. Heslop, M. Juza, E. Mason and J. Tintoré (2018). Downscaling CMEMS Mediterranean model over the Western basin: impacts on mean flows and mesoscale eddies. EGU General Assembly 2018, Vienna (Austria).
7. Alexander Barth, C. Troupin, E. Reyes, A. Alvera Azcárate, J. Tintoré, J.-M. Beckers, 2018. "Variational analysis of high-frequency radar surface currents using DIVA". EGU2018, Viena, Austria.
8. Jaime Hernandez Lasheras, Baptiste Mourre, Emma Reyes, Jano Orfila, Melanie Juza, Eva Aguiar, and Joaquin Tintore. "Assimilating Ibiza Channel HF radar currents in a high resolution model" EGU2018, Viena, Austria.
9. Eva Aguiar, B. Mourre, E. Reyes, J. Hernández, E. Heslop, M. Juza, E. Mason, J. Tintoré "Downscaling CMEMS Mediterranean model over the Western basin: impacts on mean flows and mesoscale eddies". EGU2018, Viena, Austria.
10. Miguel V. Charcos-Lloréns, M. À. Rújula, E. Heslop, A. Novellino, P. Gorringer, J. G. Fernández, B. Frontera, C. Muñoz, X. Notario, E. Reyes, P. Rotllan, I. Ruiz, and J. Tintoré. "Multi-Platform Data Distribution Challenges from Observing Systems to Data Distribution". EGU2018, Viena, Austria.
11. Emma Reyes, Baptiste Mourre, Alejandro Orfila, Eric Comerma, Tayeb Bakhsh, Christian De Lara Fernández, Joaquín Tintoré. "Real-Time Met-Ocean Data Ranking for Emergency Responders (SAR Operators)". *Oceanology Internacional*, 13 - 15 March 2018, London (UK)

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6. Oberto, K. (2011). *Caruao, el desarrollo turístico sostenible de la Zona Litoral*. Máster en gestión turística y máster en dirección de empresas de servicios, Universitat de les Illes Balears. Dir.: P. Balaguer (SOCIB). Septiembre 2011.

Post-doctoral contracts

2016 – 2018. David March. Programa Juan de la Cierva, MINECO. SIAS Division. Supervisor: J. Tintoré (SOCIB).

2016 – 2018. Ismael Hernández. Programa Juan de la Cierva, MINECO. Beach Monitoring. Supervisor: A. Orfila (SOCIB).

Student grants and interships

Since 2010, SOCIB has had some students in different modalities and different universities, being the usual length of the stay between 3 and 6 months.

The origin of these students is mainly the UIB (University of the Balearic Islands). Among them, SOCIB has had 5 MSc students, 2 students with an agreement called “convenio de cooperación educativa”, 2 students of the Physics Grade and 12 students doing their practical module in the Geography Grade. Also, SOCIB has had 2 students of the TUO modality for graduate students managed by the Fundación Universidad Empresa de la UIB. ALSO, the R/V SOCIB has had up till now 3 students from the la Escuela Náutico Pesquera de Palma. The agreement with this Professional School is ongoing.

Every year SOCIB receive 1 or 2 students granted by the Santander Bank, in the Programmed called CRUE-CEPYME, and up to date SOCIB has trained 5 graduate students in this modality.

Also, there has been 1 student in SOCIB during 6 months from the Castilla la Mancha University, doing her final grade research.

Additionally, SOCIB have regularly students from different European universities, as for example, from 2014 up till now:

- 2 students from l’ Ecole Centrale de Nante, France
- 2 students from the Van Hall Larensten University, Netherlands
- 1 student from the La Rochelle University, France
- 2 students from ENSTA Paris Tech, Ecole Nationale Supérieure de Techniques Avancées
- 1 student from the Bretagne Occidental University

SOCIB Products & Services Strategy

SOCIB to date has developed a range of products and ocean data visualisation tools, in line with the observing and modelling facilities, with the support of the Data Center Facility. In order to continue SOCIBs development and to gain more users, to deliver data to new users, and to increase our utility to society, SOCIB recently undertook a products review and from this developed a sector-focused Products & Services Strategy. The review considered both internal developments and external factors, including; the range of potential users of in situ and forecast ocean data in the Balearic region, the Western Mediterranean or globally, the successes of other international ocean observatories in developing ocean data based products and services to match their observations to regional/national needs, the existing SOCIB products and users, and the known economic value or estimated societal benefit of different types of ocean data.

The analysis enabled SOCIB to identify 10 key user sectors, groups of users with common data interests and needs, that are important to the region (economically/societal benefit) and for which SOCIB can provide data of value (e.g. value to decision making), both observed variables (e.g. wave height) and derived/value added variables (e.g. predicted wave height, divergence/convergence zones, spawning habitat mapping of top predator fish species). The importance of taking a sector based approach is that end users are identified, products can be created that combine data streams and knowledge to fulfil user needs, with the participation of user groups (alpha testing), and potential users can be notified of product availability (marketing).

The implementation of this strategy is now underway and by end 2017 the SOCIB website will include a new searchable product catalogue, with detailed information on the existing and developing products, and new sector focused product and information zones.

