

2014  
ANNUAL  
REPORT



PLATAFORMA OCEÁNICA DE CANARIAS

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In March, the Council of Ministers authorised the PLOCAN Consortium to manage a 22.7 km<sup>2</sup> area off-shore in the public domain, on, and off, the island of Gran Canaria. This marks an important milestone regarding the operational capability of the test bed and, as such, for the ICTS as a whole.

After an independent international evaluation process, the Science, Technology and Innovation Council meeting of 7<sup>th</sup> October approved the decision to finally include PLOCAN in the Map of Outstanding Scientific and Technical Infrastructures (ICTS, as it is known in Spanish), which was a major step for our infrastructure in the current context. The up-date of the ICTS Map addressed by the Council has been included in the Spanish Science, Technology and Innovation Strategy as a tool to plan and develop these facilities in co-ordination with the Autonomous Regions. The up-date of the map has taken into consideration criteria of top scientific, technological and innovation quality.

Law 27/2013 of 27<sup>th</sup> December 2013 on the rationalisation and sustainability of the Local Administration stipulated that the statutes of Consortia like ours had to be adapted to bring them under one of the public administrations involved in the consortium. On 3<sup>rd</sup> December 2014, the Board agreed to put PLOCAN under the

Central Spanish Administration. At the same meeting, the Board also agreed to start the process of presenting the pertinent addenda to the co-operation agreement to create the PLOCAN consortium signed on 10<sup>th</sup> December 2007 and amended on 28<sup>th</sup> December 2012, to allow the amendment of the statutes to be formalised and to include the aforementioned public domain land and sea reserve.

The Consortium signed a co-operation agreement in February with the Public Business Entity Red.es, with a view to creating and managing a public showcase for innovation in maritime information and communication technologies. The co-operation forms part of the Digital Agenda for Spain that promotes incentives for the transformational use of ICTs in enterprise as a tool to enhance the productivity of the economy. Creating this showcase centre will allow meeting areas to be created between the supply of the ICT sector and the potential demand from business, facilitating the transfer of know-how to companies of the maritime ICT sector by advising them and providing them with technological capacity building and also by providing them with the means to run tests. This centre, located in PLOCAN, will be comprised of a set of communication and processing facilities where tech-based companies interested can exhibit technological products and services

aimed at enhancing productivity and competitiveness to potential SME users.

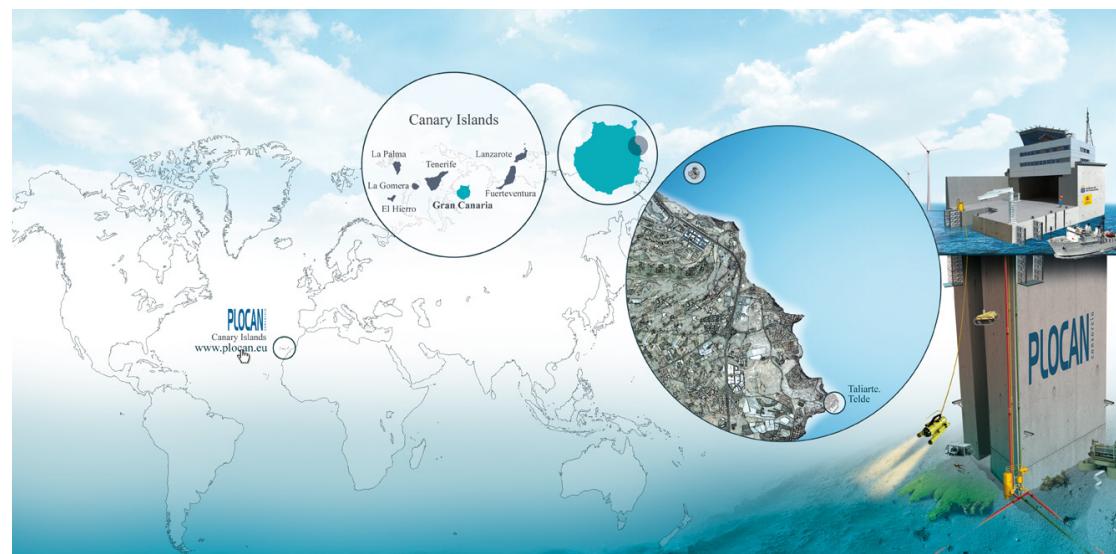
This activity would drive the facet of PLOCAN's role as a catalyst for the transfer of know-how to enterprise and, therefore to society.

The glider training school was held in November, an event that is held every year in the PLOCAN head offices in Taliarte, attended by the manufacturers of all the models of this device currently on the market and the main scientific users of the data generated by the gliders from several countries. On this occasion, the workshop

was held under the auspices of a quality management system that has been rolled out this year with the aim of certifying the quality of the training schools organised in PLOCAN.

The certification of this field of training opens the doors to certifying other activities of the Consortium, in line with our Social Responsibility policy.

This year saw the culmination of the TROPOS project. The final objective of the project, to design a multi-use platform, was successfully attained with platform's central unit having been tested in the



# 1 INTRODUCTION

hydro-dynamic experiences tank of the Ecole Centrale de Nantes (France) and the satellite unit in the National Ocean Wave Basin - Cork (Ireland). This project has also demonstrated the potential of the multi-use platform in several configurations, based on the transport, energy, aquiculture and leisure components that form part of the project to conform three distinct concepts: Green & Blue, Sustainable Service Hub and Leisure Island.

The wave power converter designed and built as part of the Undigen Project (Functionality of Wave-Powered Electricity Generation Systems) completed its final integration in the port of Las Palmas de Gran Canaria this year and it completed the test stage both in dry dock and in confined waters within the port. It was moored and installed on the PLOCAN test bed in March, marking the start of the stage of trials in real conditions, which ran through to August 2014.

Finally, at the end of the year, the seventy researchers of the KOSMOS project who have conducted their scientific activities

in our facilities for two months completed their second stay at PLOCAN. This project is a joint activity of the German BIOACID research network (biological impacts of biological acidification) and SOPRAN (superficial oceanic processes in the Anthropocene). KOSMOS aims to discover how the plankton community of open oceanic waters poor in nutrients reacts to the acidification of the ocean. To this end, they installed nine meso-cosmoses – floating laboratories capable of holding 50,000 litres of water where the long-term behaviour of ecosystems is simulated – in Gando Bay. PLOCAN hosted the experiment for the second time in 2014 and provided the scientists with the necessary services for running it. Co-operating in this project led to a framework co-operation agreement being signed between PLOCAN, ULPGC (University of Las Palmas de Gran Canaria) and GEOMAR (*Helmholtz Center for Ocean Research Kiel*) for the joint development of academic and research programmes. The director of GEOMAR came down to Gran Canaria to sign the agreement in the offices of the President of the Canary Island

Government, where he was received by the President of the Canary Island Government.

With respect to the other activities organised by the Consortium in 2014, proposals continue to be prepared in the normal manner for new projects and for managing those awarded and the staff regularly attend both national and international scientific and technological forums to promote the facilities among the scientific and technological community. Concerning the European Commission studies into the need to stimulate scientific and technological vocations to drive a continual advance of scientific-technological know-how and its applications, and therefore the welfare of society, PLOCAN is aware of the need to participate actively and constantly in the dissemination of marine sciences and technology and for this reason, makes every attempt to attend most of the fairs held.

This report reviews the Consortium's most important activities in 2014

# 1 INTRODUCTION

On 7<sup>th</sup> October, the Science, Technology and Innovation Policy Council approved the Map of Outstanding Scientific and Technical Infrastructure (ICTS), including PLOCAN. The map is underpinned by the commitment of the Administrations and entities who own the ICTS to ensure the operational capacity of the infrastructures and the corresponding offer of competitive open access during the term of the Map. The up-date of the ICTS Map addressed by the Council is included in the Spanish Scientific, Technological and Innovation Strategy as a tool for planning and developing these facilities in co-ordination with the Autonomous Regions. The Strategy sets the ICTS in the objective of "Fostering Scientific and Technical Research of Excellence" and, within this, in the specific objective of "Consolidation and uses of Outstanding Scientific and Technological Infrastructures".

The map has been up-dated, bearing in mind criteria of maximum scientific, technological and innovation quality, for which the proposals submitted by the candidate infrastructures were assessed independently by the CAIS (Advisory Committee on Outstanding Infrastructures).

Up-dates of the Map will put mechanisms in place for infrastructures operating in the same field to co-operate operationally and strategically; drive their international expansion; open up the ICTS to the international scientific and technological community and promote active co-operation with the infrastructures belonging to the ESFRI Road Map or with other major Pan-European infrastructures.

The ICTS Map up-date 2013-2016 is set to create networks of infrastructures made up of infrastructures with a common theme

offering supplementary services. The infrastructure networks must put in place general co-ordination mechanisms, develop a common strategy and development plan and promote joint actions of common interest. PLOCAN forms part of the Network of Marine Infrastructures (RIM as it is known in Spanish), together with SOCIB (Baleares Island Coastal Observation System, in Spanish). The main objective of RIM is to drive the exchange and development of methodologies and tools in the area of knowledge shared by the different marine infrastructures and other I+D+I actors.

PLOCAN and SOCIB will share a collective strategy, developing co-ordination initiatives of common interest. They will also drive co-ordination with other Spanish entities and bodies engaging in activities in their scope of action.

## MISSION

PLOCAN's mission is to help to bring the best research, technological development and innovation to the market as soon as possible to generate economic growth and employment by providing efficient and environmentally sustainable access to the ocean at ever-greater depths.

## Vision

The vision is to become an international effective benchmark in the field of marine, maritime science and technology by offering a meeting point between public and private R+D+i.

## Objectives

The general objective of PLOCAN is to provide the scientific-technological community with the most efficient conditions and the most effective means in an international context to make observations, experiences and tests at increasing depths on the oceanic platform and its surroundings.

The specific objectives are:



Provide enterprise with the best, and often the best, and often the only test bed for activities in the deep ocean, with sufficient environmental guarantees.

Make a base for vehicles and instruments that work in the deep ocean permanently operational and available for all kinds of tasks that require devices of this kind.

Offer a unique meeting point between the very best and most dynamic public sector scientific and technical community and the enterprises with the greatest innovative initiative in gaining understanding and use to the deep ocean.

Offer a series of training programmes, from the vocational training to post-doctorate training, including specific training to use the facilities, working devices and access to the deep ocean.

Test an innovative and enterprising public-sector scientific-technical organisation capable of efficiency managing highly qualified teams of people, complex, expensive instrumental devices and their relations with innovative public and private-sector companies and institutions.

In 2014, and in line with the guidelines established the previous year, the consortium's activities continued to focus on laying the foundations to achieve the aforementioned objectives in the most effective manner and always within the general objective of a convergence of marine-maritime R+D+i of excellence as the foundation for economic growth and sustainable jobs.

Once the platform and test bed are fully operational, the Consortium will have the following marine-maritime and land-based facilities and infrastructures to achieve its objectives:



Illustration 1. Computer graphic of the platform

## a OCEANIC PLATFORM

The Oceanic Platform, currently under construction, will be located in the sea, 1.5 km off the north east coast of Gran Canaria in 30 metres of water. It is an outstanding structure without any precedent of a similar structure having been built at sea.

The location of the platform was decided from three possible alternatives, after analysing the results of a geo-physical survey, maritime climate studies and an environmental analysis of each option. The structure had to be situated in an area with a thinner layer of unconsolidated sediment,

and bearing in mind the significant wave height to get the necessary stability and safety co-efficient for the platform as a whole. All this, along with the environmental conditions of the area and respecting the boundaries of the polygon established for the possible location, led to the decision concerning the final site. This option turned out to be the most feasible from an environmental point of view, and ideal from a technical and financial perspective.

The singularity of the structure lies not only in what it is, but also in the way it is built. Part of the construction will be carried out in port and part at sea. The construction process is divided into ten stages. The

initial stages comprise the construction of the box or caisson on a coffer or pontoon dock, launching it and towing it to the mooring area in port, mooring it to continue the construction process, filling the caisson with granular material and the construction of the superstructure and buildings. These initial phases will be completed in port. It

will all then be re-floated and taken to its final location, where the footing that will support the caisson will already have been built. Once at the final location, it will be moored; a protective berm will be placed at the foot of the caisson and the rest of the building will be completed and the platform fitted out.

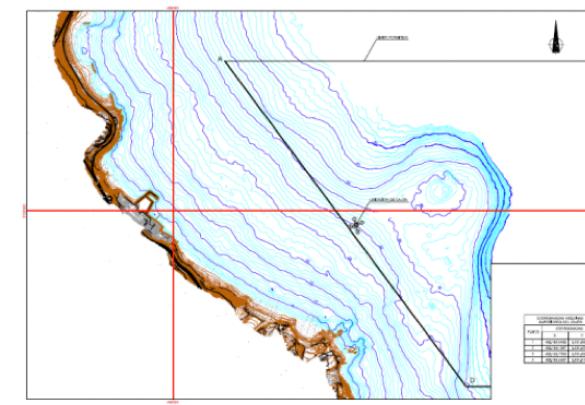


Illustration 2. Final site of the platform at sea

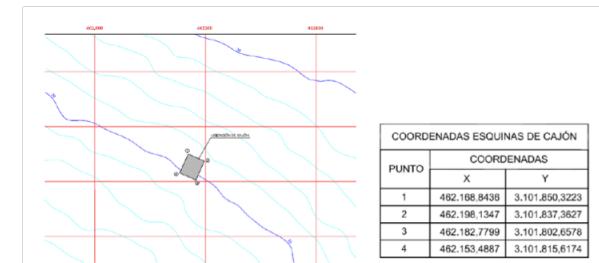


Illustration 3. Caisson location co-ordinates

## 3 INFRASTRUCTURES AND FACILITIES

The building that will be sited above the surface of the marine infrastructure is comprised of the following different levels, each for a different use:

#### HELIPORT

Situated over the bridge, capable of housing helicopters up to a maximum length of 15,7 m.

#### COMMAND CENTRE

Raised above the deck, with 360° vision. All control and operational activities of the platform and its surroundings are run from here.

#### BUILDING

Divided into two floors housing laboratories, classrooms, kitchen, dinning room, lounge, etc. All rooms will have natural light and ventilation.

#### PLATFORM LEVEL

This is an open working areas where there is a test tank and a hangar. It will have a hoist with telescopic arm and a crane for stacking containers. The test tank will facilitate sea trials and launching specific underwater vehicles and equipment into the sea.

#### BASEMENT LEVEL

Houses the installations rooms (store rooms, waste treatment, general circuit breakers, tanks, waste waters, etc.).

Once the use requirements had been analysed and the space optimised to the maximum, a simple and highly functional building was designed. Materials were chosen with care to guarantee their resistance to adverse environmental conditions (constant action of the wind and marine environment) they will face. Selection was also made with a view to reducing building time as much as possible and making later maintenance tasks (cleaning and replacement) as easy as possible.

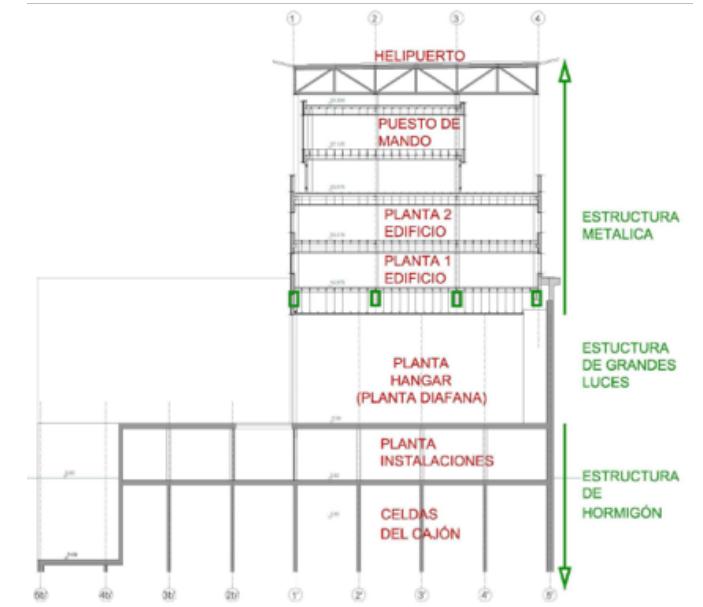


Illustration 4. Cross section of the platform

The platform building project is accompanied by an environmental impact study that develops and analyses all the aspects arising from the implementation and commissioning of the project that could have a real or potential effect on the local environment. The study decided that the final site of the platform does not spatially affect, or bounds on or is close to any Sensitive Ecological Area or Protected Natural Area, nor does it affect any area in the Canary Islands that forms part of the Natura 2000 Network.

## 3 INFRASTRUCTURES AND FACILITIES

The image below shows the closest protected areas to the site:



Illustration 5  
Closest protected areas to the site of the platform

The environmental study includes an analysis of possible impacts on the environment that could occur during the stages of construction, operation and dismantling. To carry out the study, the different stages of the construction project were analysed, a study was made of site alternatives, an environmental inventory was drawn up, the potential impacts of each stage were assessed and a series of corrective measures were established. The first stages of building will take place in ports where there are no protected areas that can be affected by the construction

and where any possible impact will be under perfect control. The study concludes that during the other stages of construction, the potential negative effects on the environment are of little or no significance. The area chosen for the platform site is characterised by being an anthropised environment due to the significant presence of uses on the coast of Jinámar.

Other specific studies that formed part of the environmental study include an appraisal of the visual intrusion of the

platform, which concludes that the impact of the project on the landscape will be of little significance. The study of possible impacts on the submarine archaeological heritage concludes that there are no remains or evidence of archaeological material or elements of interest from a heritage point of view, so it declares that there is no impact. The study of the bird life concludes that there are no ornithological assets in the area and for both the building and the operational phase it draws the conclusion that any potentially negative effects are insignificant.

The study considers the environmental impact of the project as a whole of little significance and suggests a series of protective and corrective measures aimed at minimising or correcting any effect on the environment that could occur due to the construction and operation of the platform. The environmental surveillance plan guarantees compliance with the instructions and protective and corrective measures set out in the environmental study. In 2013, the environmental body ruled that the project did not have to undergo an environmental impact procedure. Despite the ruling, PLOCAN adopted the environmental surveillance plan included in the environmental impact study that accompanied the project.

## b ON-SHORE OFFICES

The on-shore offices, granted by the Autonomous Region of the Canary Islands, are located in Taliarte (Telde) in the former facilities of the Canary Island Institute of Marine Sciences, next to the Port of Taliarte, some 8 kilo metres away from Gran Canaria Airport and about 20 km from the city of Las Palmas de Gran Canaria and the Port of La Luz and Las Palmas.



Illustration 6. Google Earth image of the on-shore offices

This facility has meeting rooms, assembly halls, workshops, operation control rooms, submarine vehicle workshop (LT1), calibration tank for submarine vehicles, laboratories (dry and wet), classrooms, offices and multi-purpose rooms..



Figure 7. Taliarte on-shore offices and dock

# 3 INFRASTRUCTURES AND FACILITIES

The glider laboratory covers an area of 120 m<sup>2</sup> and can house between eight and ten units at the same time. It is used for maintenance, accommodation and training activities. Next to it is a wet laboratory with a sea-water tank and a hoist for handling the devices, where they are calibrated



Illustration 8. Glider workshop

The operation control room is 80 m<sup>2</sup> and can hold forty people, ten of them at work stations with a computer. It is fitted with hardware and software tools to control, supervise, manage and display the information provided by the different observation platforms operating at any one time in real time.



Illustration 9. Operation control room

The centre also has a workshop, basically for handling oceanographic instruments, and an electronics workshop.



Illustration 10. Workshop



## BERTHS AND WAREHOUSES

The berth and warehouses are located in the scientific port of Taliarte. The port has a ramp to provide access to the sea, facilitating trial operations.



Illustration 11. Access ramp to the sea in the port of Taliarte



## TEST BED

The test bed is comprised of an area of public sea-land domain situated off the north-west coast of Gran Canaria. The objective of this area is to drive marine-maritime R+D+i. It covers an area of approximately 23 Km<sup>2</sup>, with a maximum depth of 600 metres, for testing and monitoring marine-energy-driven devices with the capacity to make observations of meteo-oceanographic parameters. It will also be fitted with electric and communications infrastructure to feed energy and data from the test devices on trial at the test bed to shore.

The activities offered by the test bed are the following:

Harnessing marine renewable energies (wave, tide, currents and wind).

Oceanic observation.

Development of underwater vehicles, instruments and machinery.

Off-shore aquaculture.

Studies of how materials behave in extreme environments.

The general objective of the test bed is to help research companies and groups to move forward in demonstrating that the technologies they develop work before marketing them.

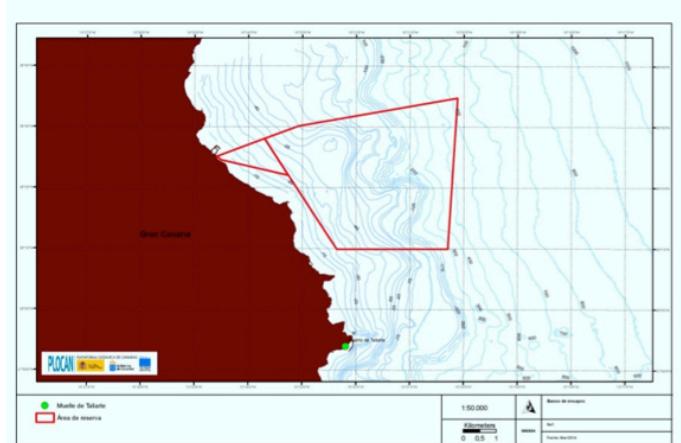


Illustration 12. Test bed reserve area

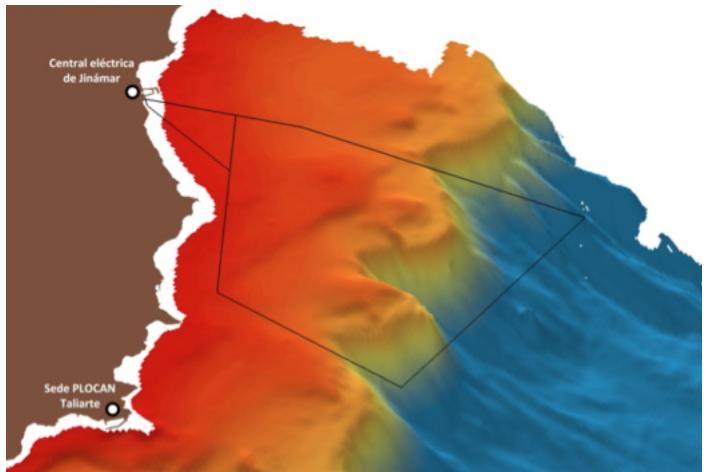


Illustration 13.  
3-D graphic representation of  
the test bed area

The administrative process for creating the reserve area was completed on 14th March 2014 with the Declaration of the Reserve Area issued by the Council of Ministers. The reserve was declared in the name of the Ministry of Economy and Competitiveness (MINECO, as it is known in Spanish), authorising PLOCAN to manage it. Granting this permit implicitly implies authorisation for the platform currently under construction and the submarine electrical infrastructure that is currently in the planning stage, to occupy marine public domain.

The environmental characterisation of the test bed area continued in 2014. The following activities have been undertaken in this context:

- Environmental impact study associated with installing off-shore wind generators. This study is aimed at assessing the environmental impact of these technologies within the test bed area.
- Measuring underwater noise in the test area by installing a hydrophone. This study is aimed at determining the background levels associated with existing underwater noise in the area. This way, the excess noise introduced into the marine environment by the technologies that are installed can be assessed in the future and thus, an assessment can be made of any potential environmental impact arising from such activities.
- Geo-physical study of the sea beds aimed at determining the thickness of the layer of unconsolidated sediment and the morphology of the bottom. This study is vital in order to be able to plan the mooring sites of the different technologies that are tested at the test bed.
- Oceanographic campaign to measure marine physical and chemical parameters. This activity has been on-going since 2011 and consists of measuring indicator parameters that provide information on the characteristics of the water mass within the test bed area. To this end, sampling is conducted at eleven stations to measure the following parameters: temperature, salinity, pH, dissolved oxygen, chlorophyll, nutrients, heavy metals and hydrocarbons.
- Measuring marine currents by installing a current metre. This reveals the intensity and direction of the marine currents within the test area.
- Submarine videos taken with a camera towed behind a boat. This provides visual information on the kind of sea bed and the benthic communities to be found in the area.

# 3 INFRASTRUCTURES AND FACILITIES

- Study of the wildlife diversity and fisheries resources. This study is aimed at determining the intensity of artisanal fishing in the area and managing test bed activities to make them compatible with artisanal fishing activities.
- Study of the climatic spectrum of wave action. This study enables us to determine the frequency distribution of the wave action, thus facilitating the design of technology to harness wave energy.

In January, PLOCAN applied to the State Air Safety Agency (AENA, in Spanish) for authorisation to install five wind generators and a meteorological tower on the test bed. This authorization was issued in April, limiting the maximum altitude of all components installed to 160 metres.

In June, PLOCAN filed an application for authorisation to generate electricity in territorial waters (pursuant to Royal Decree 1028/2007) which the state grants through the Ministry of Industry, Energy and Tourism (MINETUR). The application includes generating electricity from experimental off-shore wind technologies and wind power, with a maximum generating power of 15 MW. This process is set to be completed during the first half of 2015.

At the same time, the test bed has been promoted throughout 2014 with a view to attracting potential users. The experiments that are carried out on the test bed in the future will culminate with the evacuation of the energy generated into the on-shore electricity grid. That is why the work aimed at getting the electricity and communications infrastructure (IECOM) and the underwater transformer station (ETS) have been PLOCAN's first priority. The main actions implemented in this area were the following:

- PLOCAN worked for several months in conjunction with the Las Palmas de Gran Canaria City Council and with its public-private Enterprise EMALSA, to reach an agreement to connect the test bed electricity infrastructure (IECOM Project) to the transmission grid in the facilities and areas belonging to the City Council, which are managed by EMALSA. This connection would be made at a 66kV sub-station located in the Jinámar Power Station, and this would evacuate the electricity generated off-shore by the technologies on trial in the PLOCAN test bed area. This option was chosen after conducting a detailed analysis of the possible alternatives and after determining that this was the most feasible option from a technical and financial point of view.

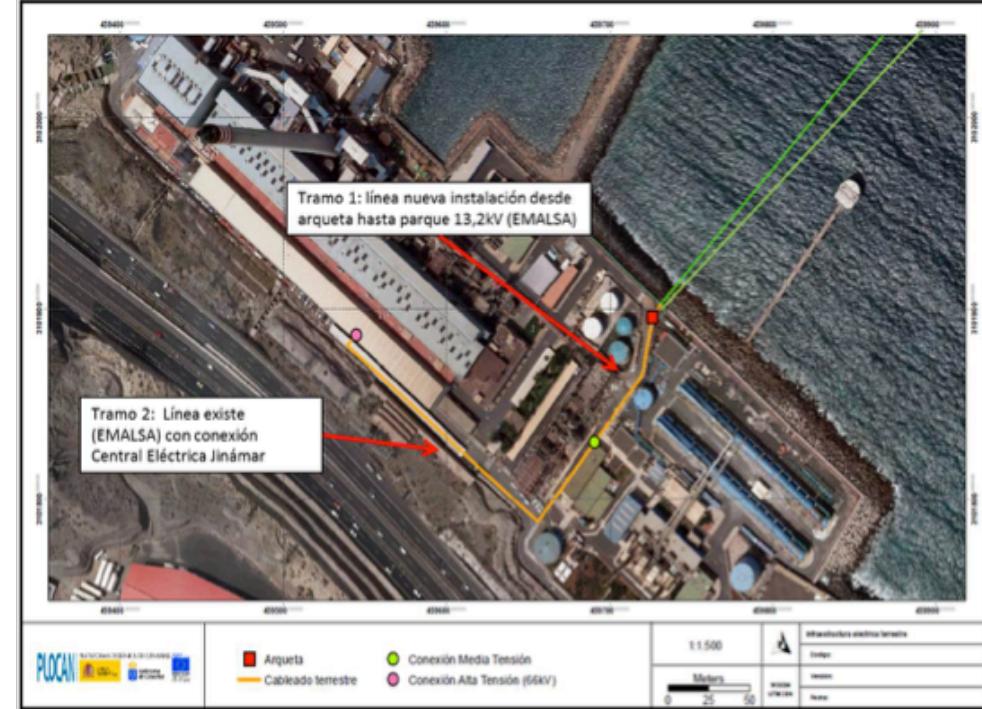


Illustration 14 Access point in the Jinámar power station

- Also with respect to ETS, a second objective was implemented; "Acquisition of advanced equipment for the environmental control of the operation and interaction of the concentration of generation devices". In the course of the

year, an Observation Glider (*GliderP202*) and a remote observation vehicle were acquired (ROV).

# 3 INFRASTRUCTURES AND FACILITIES

The description of the IECOM and ETS projects co-financed by the ERDF Operational Programme Technology Fund is as follows:

## IECOM

PLOCAN marine electrical and communication infrastructure

### ERDF Technological Fund Operational Programme

The object of this project is to design, acquire and install the Electrical and Communications infrastructure necessary for operations in the marine area reserved for PLOCAN activities and to facilitate the achievement of their objectives.

This infrastructure will be especially useful for the PLOCAN test bed, observatory and VIMAS base, which intends to offer the possibility of implementing innovative activities and projects in the field of observation and, in particular, in the next few years, those related to marine renewable energies.

The infrastructure will, in general, be made up of medium voltage wiring (13.2kV) and a maximum evacuation power of 15MW. Most of this will be underwater, made up mainly of hybrid wiring (copper wire for transmitting the electricity and fibre optic cables for data and image transmission) and underwater hybrid connectors, including a short land section to allow this to be connected to the electricity sub-station on land.

## ETS

Submarine Transformer Station Infrastructure and Equipment for the environmental monitoring of simultaneous operation of new marine electricity generation devices

### ERDF Technology fund Operational Programme

The prime objective of the project is to drive and accelerate the development of marine renewable energies in competitive conditions, in "limited" spaces in environmentally sustainable conditions, laying the scientific-technical foundations to start socially acceptable certification methods and guarantees. This general objective translates into two specific objectives:

1. Investment in acquiring, installing and commissioning a Submarine Transformer Station (ETS) for multiple marine production devices: This infrastructure will facilitate trials for emerging technologies for harnessing the energy potential of the seas, based initially on wave-generated energy.
2. Acquisition of advanced equipment for the environmental monitoring of the operation and interaction of a concentration of generating devices. The environmental impact of a concentration of initiatives in a relatively small area is the emerging factor to be assessed, monitored and "certified", for which complex equipment has to be available, some of which has to be specifically designed for this mission.



## OCEANIC OBSERVATORY

There are three aspects to the oceanic observatory managed by PLOCAN:

- ▶ European Oceanic Time Series Station in the Canary Islands.
- ▶ Extended observatory.
- ▶ Test bed coastal observatory.

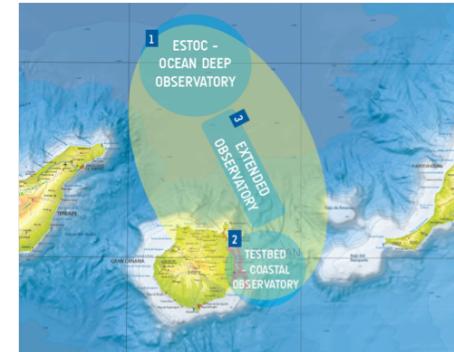
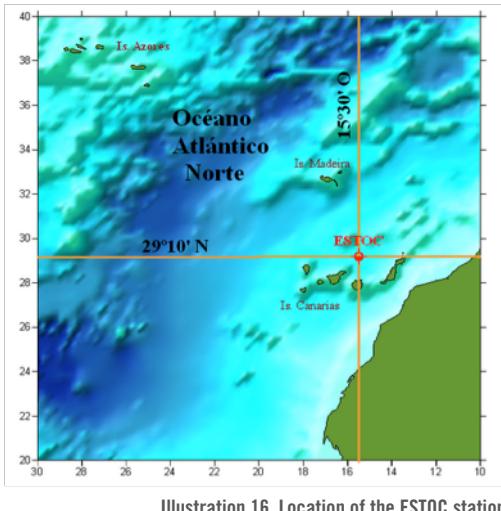


Illustration 15.  
PLOCAN oceanic observatory

On the one hand, the ESTOC station (European Oceanic Time Series Station in Canaries, or ESTOC as it is known in Spanish) situated strategically at 29°10'N latitude and 15°30'O longitude for seasonal campaigns. Its location is oceanic, close to the up-welling, in a terminal region of the arrival of intermediate waters in the eastern part of the North Atlantic sub-tropical gyre. This is a transition area for lenses of Mediterranean waters situated on the same latitude as the BATS station (enabling comparisons to be made between both sides of the ocean) and it has relatively easy access due to its proximity to the island. Over the years, it has demonstrated the importance of its location for monitoring the variability in the distribution of water masses in the area and, therefore, in the circulatory process of the Atlantic and the global circulation of the oceans.

# INFRASTRUCTURES AND FACILITIES

The atmospheric and oceanographic observation instruments were moored at the ESTOC station at the beginning of June. For the first time, the preparation and deployment at sea were done wholly by PLOCAN on this occasion. The mooring is anchored at a depth of 3,624 metres and comprises a surface buoy where the weather sensors and the surface oceanographic sensors are installed to measure physical and bio-chemical parameters of the sea surface. It also contains a structure in sub-surface waters, approximately 100 metres, that holds another set of sensors for measuring physical and bio-chemical parameters in the water column.



The operation was carried out during an oceanographic campaign aboard the Oceanographic Vessel "Sarmiento de Gamboa" (CSIC) to the north of the Canary Islands as part of the co-operation with the Centre for Advanced Scientific Research (CSIC, as it is known in Spanish).



Illustration 17.  
Transfer of the ESTOC buoy to its mooring location

The PLOCAN observatory on the other hand, is comprised of sensors that monitor the test bed and of what is known as the "extended observatory" made up of the areas where the gliders operate periodically and the area between the two locations (test bed and ESTOC).

For technical reasons only two of the campaigns scheduled for ESTOC could be carried out. For these campaigns, the gliders are launched from a vessel, off the coast of Taliarte.

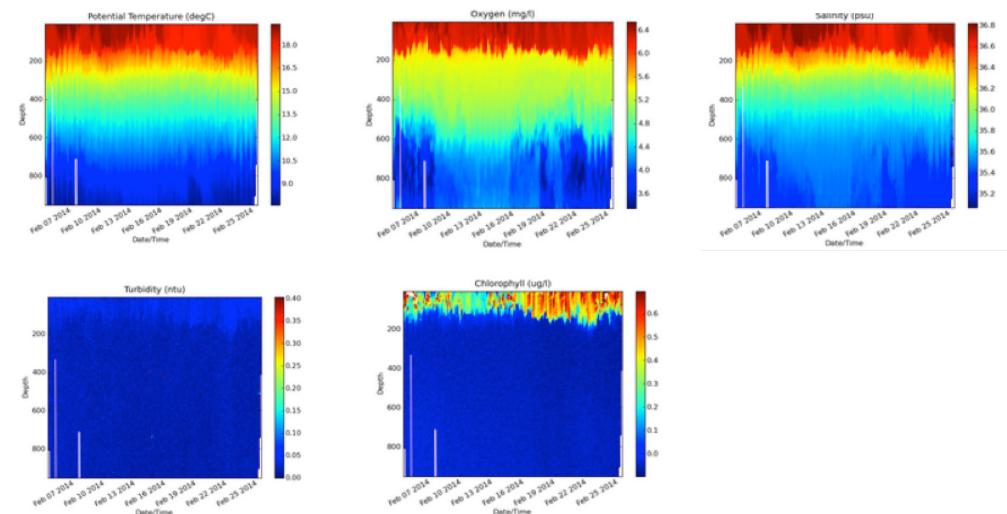
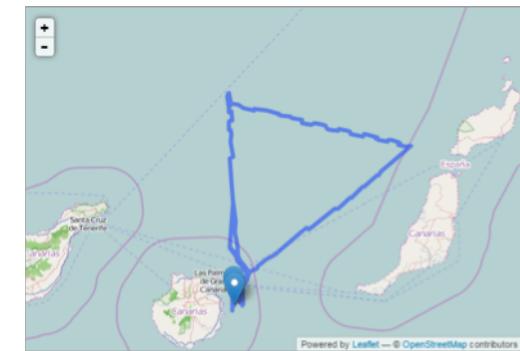
The distance at which the gliders are launched depends on the state of the sea and the atmospheric conditions, but it is usually about two kilometres.

The specific information about the oceanographic missions conducted is as follows:

#### Mission ESTOC2014\_1

This was conducted between the 4<sup>th</sup> and 25<sup>th</sup> of February with P201 gliders. This glider is a Slocum G2- deep engine (1000 m) with CTD, oxygen, turbidity and chlorophyll sensors. The total distance travelled during the mission was 833.41 Km.

The images below describe the route followed by the glider and some of the graphs are of the values of the parameters measured.



## INFRASTRUCTURES AND FACILITIES

## Mission ESTOC2014\_2

The second mission was carried out between the 19th of June and the 11<sup>th</sup> of July with the same glider as the previous mission. A total distance of 687.3 km was travelled.

The images below describe the route followed by the glider and some of the graphs are of the values of the parameters measured.

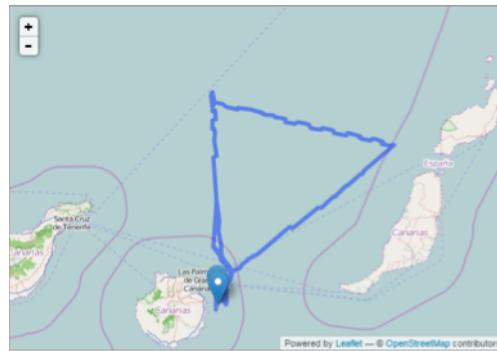
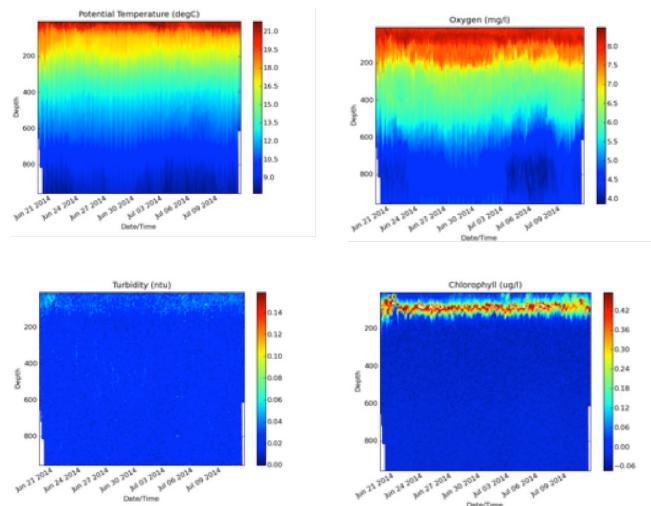


Illustration 19. Route of mission ESTOC2014\_2

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## SUBMARINE INSTRUMENTS AND VEHICLE BASE

The submarine vehicle and instrument base consists of glider type submarine vehicles and ROVs (Remotely Operated Vehicles) and two small vessels.



Illustration 20 PLOCAN UNO light vessel



Illustration 21. Seabotix vLB950 ROV

The vessel PLOCAN UNO is a model adapted to the specific needs of PLOCAN, such as the transport of containers and oceanographic operations. It is 11.84 metres in length and has a 20 m<sup>2</sup> work deck. PLOCAN DOS has a length of 5.20 m and it is used as a support boat for small operations at sea.

The glider fleet is made up of two SLOCUM G2 gliders, one of them a hybrid, and a SPRAY glider. The three devices can reach a depth of 1000 metres. The Seabotix is a small ROV that can operate down to almost one thousand metres. It houses underwater cameras, sensors and other work instruments.

The monitoring and characterisation activities carried out in the test bed area are described in the section on the PCMA project.

# INFRAESTRUCTURAS E INSTALACIONES

# 4 TIME LINE

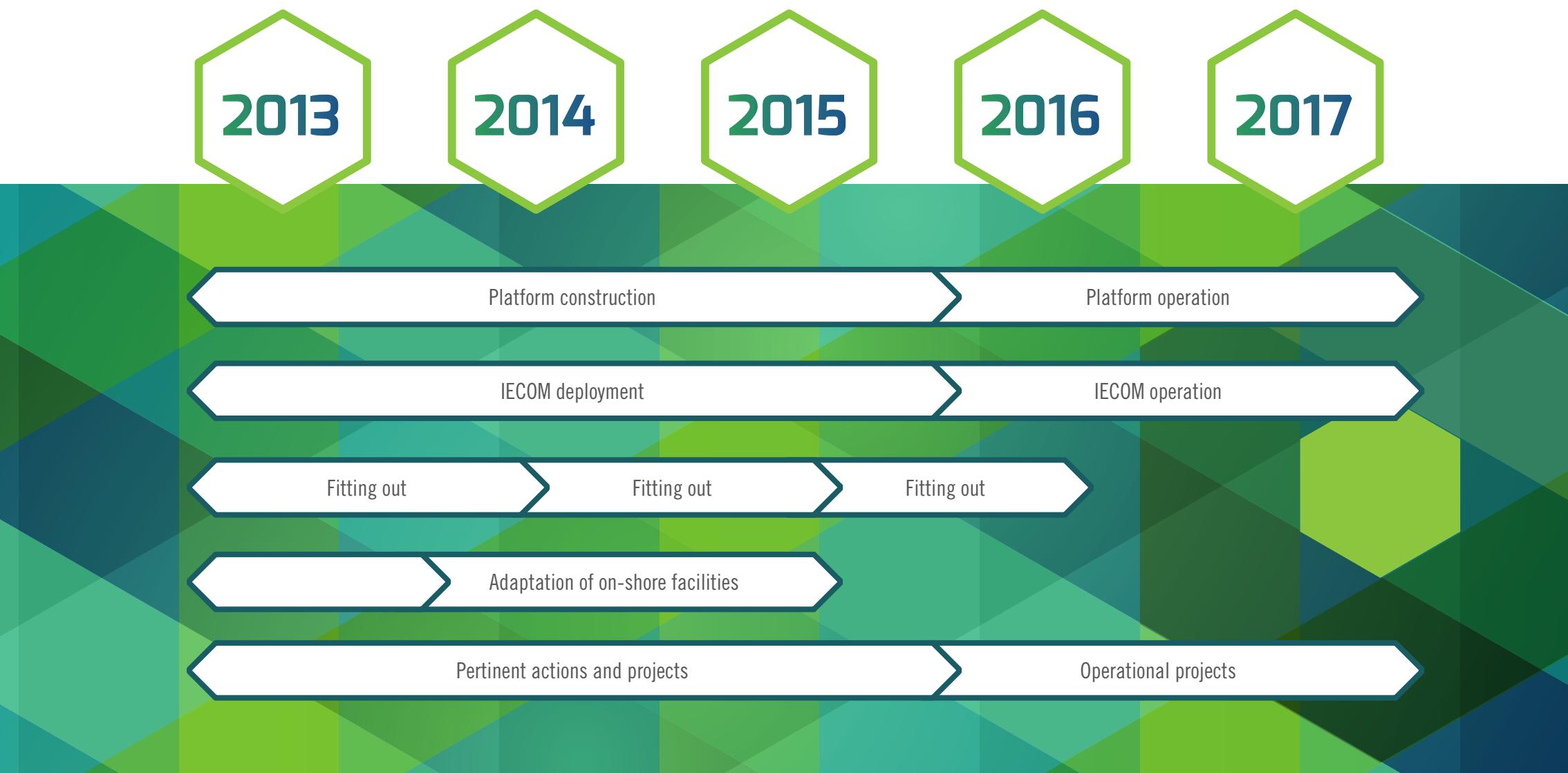




Illustration 22. Organisational structure of the Consortium

The **Strategic Council** is the highest authority for managing and directing the Consortium. It is made up of the Chair, the Deputy Chair and the Members. The Chair and Deputy Chair rotate and the office is taken on alternatively for a period of two years by MINECO (Ministry of Economy and Competitiveness) and the CAC (Canary Islands Autonomous Community). The board members represent the MINECO and the CAC (four representing each institution). The secretary, appointed by the Board of Governors, attends the meetings, as does the director of the infrastructure.

The powers of the Strategic Council

include the power to set out guidelines and the general framework for drawing up the project, for setting the rules, guidelines and general criteria for the Consortium's actions and operations, approving the management style to ensure the fulfilment of its purposes and approve the Consortium's annual budget, proposed by the Executive Committee, the annual accounts and how the last budget has been spent.

The **Strategic Council** meets in ordinary session twice a year and in extraordinary session at the request of the Chair, or whenever one of the institutions represented on it so requests. The Chair

of the Strategic Council is the highest representative of the Consortium.

At its last meeting, held in 2014, the **Strategic Council** was made up as follows:

#### **CHAIR**

**Mr Juan Ruiz Alzola**, Director General of the Canary Islands Research, Innovation and Information Society Agency (ACIISI).

#### **DEPUTY CHAIR**

**Mrs María Luisa Castaño Marín**, Director General of International Co-operation and Institutional Relations of MINECO.

#### **VOCALES**

**Mr José Ignacio Doncel Morales**, Deputy Director General of Scientific and Technological Infrastructure Planning at MINECO.

**Mr Eduardo Balguerías Guerra**, Director of the Spanish Oceanographic Institute (IEO).  
**Mr José Ramón Urquijo Goitia**, Deputy Chair of Organisation and Institutional Relations at the State Council of Scientific Research (CSIC).

**Mr. Jesús Velayos Morales**. Deputy Minister of the Treasury and Planning of the Canary Islands Regional Government.

**Mr Jorge Marín Rodríguez**, Deputy Minister of the Office of the President of the Canary Islands Regional Government.

**Mrs María Antonia Moreno Cerón**, Director General of Industry and Energy of the Canary Islands Regional Government.

The **Executive Board** is a governing body created to monitor and implement the Consortium's activities, comprised of four representatives of the CAC, at least one of which must be a member of the Strategic Council, and four representatives of MINECO, at least one of which must be a member of the Strategic Council. The Chair and Deputy Chair of the Committee rotate in the same way as in the Strategic Council, bearing in mind that the Chair of both bodies cannot be held by the same institution at the same time.

The **Executive Board** is the body tasked with presenting the budget, the annual accounts and the liquidation of the previous budget to the Strategic Council for their approval, together with an Annual Action and Project Plan and the scientific programme to be implemented in the facilities.

The **Executive Board** meets in ordinary session at least once a quarter and in extraordinary session whenever it is convened by the Chair, or whenever either of the institutions represented on it so request.

# ORGANISATIONAL STRUCTURE (BODIES OF GOVERNANCE AND COMMITTEES)

At the last meeting held in 2014, the **Executive Board** was made up of the following people:

#### CHAIR

**Mr José Ignacio Doncel Morales**, Deputy Director General of Scientific and Technological Infrastructure Planning at MINECO.

#### DEPUTY CHAIR

**Mr Juan Ruiz Alzola**, Director General of ACIISI.

#### VOCALES

**Mr Javier Querol Carceller**, Co-ordinator or the Area of Natural Resources at CSIC  
**Mr Eladio Santaella Álvarez**, Advisor Member to the Spanish Oceanographic Institute.

**Mrs Ana Aricha Yanguas**, Head of the environmental division of the Department of Scientific and Technological Infrastructure Planning.

**Mr. Eladio Santaella**. Advisor member to the Spanish Oceanographic Institute

**Mrs Patricia Escobar Díaz**, Head of Research Support Services of the Canary Islands Research, Innovation and Information Society Agency (ACIISI).

**Mr Antonio Lopez Gulías**, Director of Innovation of the Canary Islands Research, Innovation and Information Society Agency.

**Mrs María Eulalia Gil Muñiz**, Director

General of Planning and Budget of the Canary Islands Government.

The **Socio-Economic Activities Advisory Committee** (CASE) is an advisory body to the Consortium that advises on PLOCAN's scientific and technological activities and plans and proposes future actions that can focus the Consortium's work to make a contribution to the sustainable socio-economic development of oceanic activities.

The CASE is made up of a group of people of repute in the socio-economic fields related to the aims and activities of the Consortium. The functions of the CASE include drawing up an advisory report every four years on the future opportunities, prospects and capacities of the centre. This report is presented to the Board of Governors to help to orient the strategy of the centre.

In 2014, the composition of the **CASE** was as follows:

#### Chair:

**Mr José Regidor García**. Chancellor of ULPGC (University of Las Palmas de Gran Canaria).

#### Members:

**Mr Rafael Rodríguez Valero**. Director General of the Merchant Navy.  
**Mr Andrés Hermida Trastoy**. Director

General of Fisheries Planning.

**Mr Vicente Marrero Domínguez**. Chair of the Canary Islands Maritime Cluster.

**Mr Miguel Montesdeoca Hernández**. Chair of the Canary Islands Engineering Cluster.  
**Mr Fernando Redondo Rodríguez**. Chair of the Canary Islands Economic and Social Committee.

**Mr Antonio Sánchez Godínez**. Rear Admiral Engineer, Director of naval constructions at the Ministry of Defence.

#### Secretario:

**Mr Arturo González Romero**. Director General of the INNOVAMAR Foundation.

The fifth **CASE (Socio-Economic Activity Advisory Committee)** meeting was held in the PLOCAN office son 10<sup>th</sup>July. The director shared the progress made on the infrastructure applications with members of the committee and they planned activities aimed at driving socio-economic business.



Illustration 23. CASE meeting in the PLOCAN offices

The **Scientific and Technical Advisory Committee** (COCI) is the other advisory body to the Consortium. Its objective is to advise on PLOCAN's scientific and technological activities, programmes and plans, propose future actions that could enhance the quality and the scope of the work and set out and propose modes of access for external scientists to the platform and to make the final selection of these.

The COCI is made up of people of international repute in fields related to the aims and activities of the Consortium. Its members were appointed by the Board of Governors, at the proposal of the institutions that form part of the Consortium. The fourth meeting of the COCI was held in Madrid on 27th of May 2013.

The functions of the COCI include drawing up an advisory report every four years on the future opportunities, prospects and capacities of the centre, with is then presented to the Board of Governors to help them with the strategic orientation of the centre.

In 2014, the composition of the **COCI** was as follows:

#### Chair:

**Prof. Gerold Wefer**. Professor from the University of Bremen.

# ORGANISATIONAL STRUCTURE (BODIES OF GOVERNANCE AND COMMITTEES)

## Members:

**Dr. Enrique Álvarez Fanjul.** Head of the Area of Knowledge of the Physical Environment of the State Ports Authority.

**Dra. María Soledad Izquierdo López.** Professor at the University of Las Palmas de Gran Canaria.

**Dra. Alicia Lavín Montero.** Researcher from the Oceanographic Centre in Santander, Spanish Oceanographic Institute (IEO).

**Prof. Chris Barnes.** Professor of the University of Victoria (Canada).

## Secretaria:

**Prof. Aída Fernández Ríos.** Researcher of the Marine Research Institute of Vigo (CSIC).

The fifth COCI (Scientific and Technical Advisory Committee) meeting was held in the PLOCAN offices on the 15th and 16th of May 2014. On the first day, committee members visited the PLOCAN on-shore facilities and met the PLOCAN staff to get a first-hand view of the nature and status of the Consortium's activities. As the chairman of the COCI was unable to travel from Germany, he attended the meeting via video-conference.

On the second day, members made their contributions to planning the scientific and technological management of the infrastructure and, when the meeting was

over, they were received by the president of the Canary Island Government, Paulino Rivero Baute.



Illustration 24.  
COCI members visiting the glider laboratory



Illustration 25.  
Audience of the members of COCI with the president of the Canary Island government

The visit coincided with the Canary Island Government initiative to support European maritime day with an institutional declaration made the day before, pointing out the opportunities offered by the marine-maritime sector as a supplementary and strategic driving force for the Canary Island economy. The members of the COCI thanked the president for his support for the Canary Island Oceanic Platform and they passed on their satisfaction with the development of the initiative.

The diagram below shows the organisational structure of the Consortium, with three different areas into which the Consortium staff is divided.



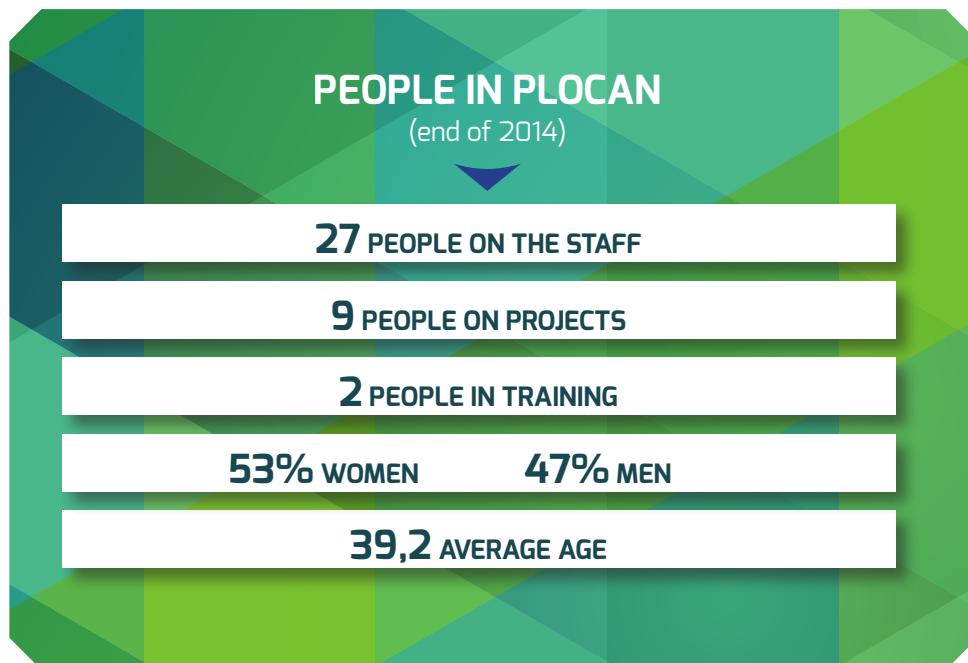
Illustration 26. Organisational structure of the PLOCAN Consortium

At 31 December 2014, the PLOCAN team is made up of thirty eight people. Twenty seven of these are full-time staff, nine are on secondment from R+D+i projects and two people belong to the training plan.

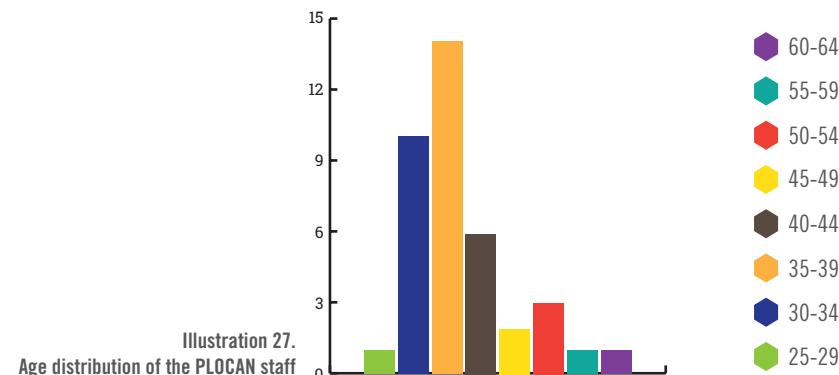
Furthermore, as can be seen from the previous illustration, the organisation has a support group in the socio-economic area. This group is made up of staff from the former Canary Island

institute of Marine Sciences that the Canary Island Government has loaned to PLOCAN for support in these early stages of creating the infrastructure against a backdrop over the last few years that has made it impossible to hire staff at the rate that the project initially planned.

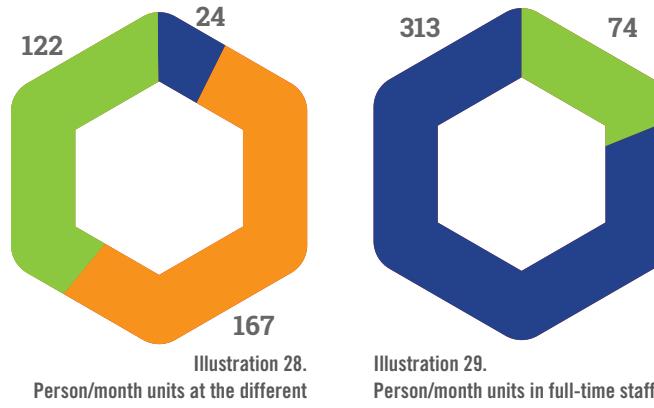
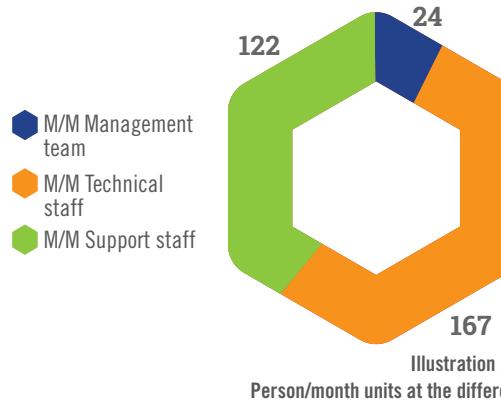
The following illustration provides information on the PLOCAN staff, except for the support group.



The figure below shows the age distribution of the PLOCAN staff at the end of 2014. Most of the staff falls into the 30-44 age range.



The following figures show the proportion between the person/month unit at the different levels of the organisation (full-time staff) and the relations between the person/month unit for the people on secondment for projects and the full-time Consortium staff.



Section 14 provides information concerning the calls for applications for jobs published.

A total of nineteen one projects were managed in 2014. Six of these were led by PLOCAN and PLOCAN was a partner in the remaining thirteen.

Twelve of the projects managed received European funding and eight domestic funding.

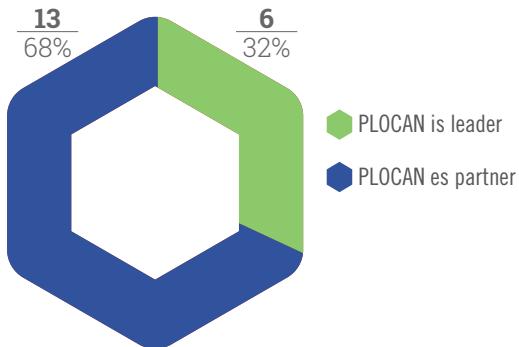


Illustration 30.  
Role of PLOCAN in the projects carried out in 2014

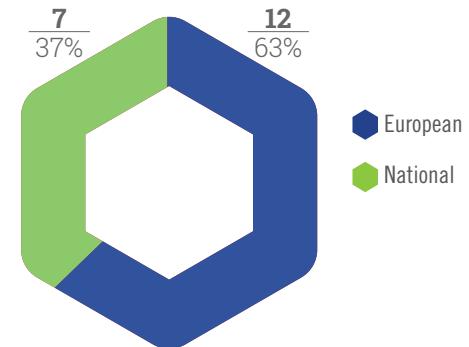


Illustration 31.  
On-going projects by origin of funding

The next figure shows the total amount funded according to the origin of the funding.

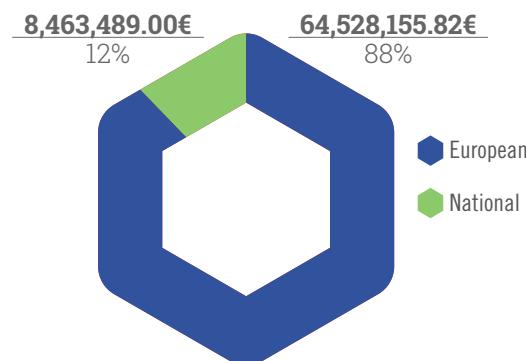


Illustration 32.  
Total funding of projects implemented in 2014

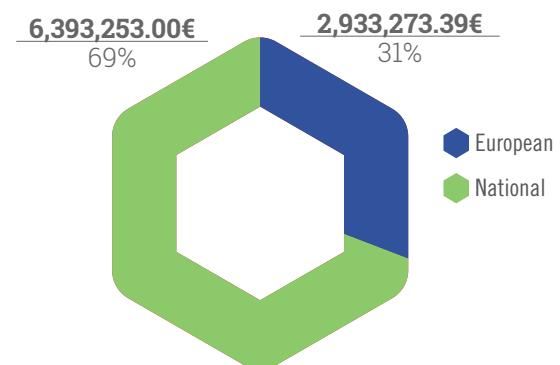


Illustration 33.  
PLOCAN funding from the projects implemented in 2014

## PROJECTS

The list and description of the projects managed by PLOCAN in 2014, can be found below in alphabetical order:

## ► CANAUTIC

Canaries-Cape Verde leisure sailing co-operation platform. Socio-economic and environmental diagnosis of sailing activities and proposals for planning leisure and sports sailing activities.

**Origin of funding:** PCT-MAC 2007-2013

**Participation:** Partner

**Total Project funding:** 160.000

**Funding for PLOCAN:** 36.550

The CANAUTIC project seeks to use collaboration between maritime and marine institutions of the Canary Islands and Cape Verde to foster sustainable regional development by integrating the economic activities of the coastal areas of the Canary Islands and Cape Verde to establish a framework of rational use of the coastal areas based on social, economic and environmental criteria. The project is divided into three distinct phases:

- **Phase one:** to identify port infrastructures devoted to sailing activities and an environmental and socio-economic diagnosis. The sustainability component will be a study of the use of Renewable Energy in port facilities associated with leisure and sports sailing in Cape Verde and the Canary Islands.
- **Phase two:** the distinguishing features will be to use maps of the coast, with these focusing on sports and leisure sailing-related uses. Moreover, there will be descriptions of all the sailing connections between the Canary Islands and Cape Verde, which will be fed into the CANAUTIC Web GIS. On the other hand, a CANAUTIC conference is planned.
- **Phase three:** roll out the CANAUTIC Co-operation Platform and implement a project communication plan.

## ► EGO-COST Action ES0904

*European Gliding Observatories Network*

**Origin of funding:** COST European Cooperation in Science and Technology

**Participation:** Partner

**Total Project funding:** 12.307,88

**Funding for PLOCAN:** 12.307,88

The main objective of this action is to co-ordinate on-going research that uses gliders and the conception of future research, to operate fleets of autonomous submarine gliders to provide profitable methods for discovering and monitoring the ocean on a global, regional and coastal scale, providing benefits for basic oceanographic research and for operational applications for marine activities. The gliders are cheap smart platforms that are useful for long-term multi-parameter observations. They play an important role in both present and planned marine observation networks.

Deployed in groups, they provide high spatial and temporal resolution data almost in real time that will efficiently fill the gaps left by the existing, in situ networks based on other marine platforms, such as ARGO on-line profiling floats. This will be beneficial both for oceanographic research and for operational oceanography systems in which many marine activities currently confide. However, the deployment of groups of gliders requires highly-qualified operators and a sophisticated level of co-operation. The objective of the “European Glider Observatories” action is to build scientific, technological and organisational co-operation for a European capacity for sustained ocean observation with submarine gliders.

# PROJECTS

## ► ESTRAMAR

Marine-Maritime R+D+i Strategy for Macaronesia

**Origin of funding:** PCT-MAC 2007-2013

**Participation:** Partner

**Total Project funding:** 383.000

**Funding for PLOCAN:** 110.968,86

The object of the Project is to promote the Marine-Maritime R+D+i of the European and African Macaronesian regions so that their approaches and results are aimed at helping to enhance the articulation of the science-technology-business system in fields such as transport safety and sustainability, maritime tourism and ports, enhancing protection of coastal areas, resources and marine bio-diversity and the forecasting and management of natural risks, and hence drive the socio-economic development of these regions by continuing with international objectives.

This objective is a specific contribution to improve the deficient R+D+i system in a specific area – Marine/Maritime -, where the regions of Macaronesia face their own conditions and have their own potential that, if harnessed, will contribute significant value to their development. Prior experience and the agreements established between partners and other stakeholders of the sector guarantee continuity in strengthening a sound base for co-operation and financial sustainability.

## ► EURATHLON

*Support action form a targeted intelligent autonomous robotic contest:  
the European RoboAthlon*

**Origin of funding:** FP7-ICT-2011-9

**Participation:** Partner

**Total Project funding:** 1.649.996

**Funding for PLOCAN:** 111.066

EUROATHLON is a new open-air robotics competition that invites candidate teams to test the intelligence and autonomy of their robots in realistic, simulated emergency-response scenarios. Inspired by the Fukushima accident in 2011, the EUROATHLON competition will require a team of land, marine and air robots to work together to inspect the scene, gather environmental data and identify critical risks. Before this “grand challenge” in 2015, one land-based and one marine-based competition are to be held in 2013 and 2014 respectively. The EUROATHLON competitions will be supported by annual workshops for competitors. At the same time, there will be an open process for developing standards to allow a comparison of different robots in the EUROATHLON competitions.

Associated audience-participation activities will connect EUROATHLON to research into robotics, the industry and the emergency services, and also with the general public. The public will be welcome to attend and the EUROATHLON events are expected to draw considerable attention from the press and the media. As it addresses a specific and pressing need – smart robots for disaster response – EUROATHLON will provide European robotics with a platform to challenge the world to spread and show-case an increasingly challenging, wide-spread and high-profile European cognitive robot technology.

# PROJECTS

## ► FIX03

*Fixed point open ocean observatory network*

**Origin of funding:** FP7-INFRASTRUCTURES-2012-1

**Participation:** Partner

**Total Project funding:** 6.999.999,37

**Funding for PLOCAN:** 613.282,61

The fixed point observatory network (Fix0 3) seeks to integrate European fixed point open ocean observatories and enhance access for the community in general to these key facilities. This will provide multi-disciplinary observations in all parts of the oceans from the air-sea interface to the deep ocean bed. Co-ordinated by the National Oceanography Centre, United Kingdom, Fix0 3 will be based on the significant advances achieved by the EuroSITES, ESONET and CARBOOCEAN FP 7 programmes. With a budget of €8.4m over 4 years (from September 2013), the initiative has 29 partners from the areas of academe, research institutions and SMEs. Moreover, 14 international experts from a wide range of disciplines make up the Advisory Committee.

The programme will be achieved by means of:

1. Co-ordination activities to integrate and harmonise the current technological, procedural and electronic infrastructure processes. Strong ties will be fostered with a broad community from academe, industry, politics and the general public via dissemination, an exchange of know-how and training activities.

2. Support actions to offer a) access to observatory facilities for those who do not currently have such access and b) free access to data and product services.
3. Joint research activities to innovate and improve the current capacity for multi-disciplinary in-situ observation of the ocean. Open ocean observation is currently a priority for European marine and maritime activities, as reflected in the recent declaration made by the EurOCEAN 2010 Conference, and internationally from the declaration of the OceanObs09 Conference.

The programme proposals will provide important data on environmental products and services to tackle the Framework Directive on Marine Strategy and to provide support for the E.U. Integral Maritime Policy. The Fix0 3 network will provide free access to top-quality in-situ fixed point data. It will provide an integral framework of open ocean facilities in the Atlantic Ocean from the Arctic to the Antarctic and throughout the Mediterranean, allowing for an integral, regional and multi-disciplinary approach to understand natural and man-made changes in the ocean.

## ► GROOM

*Gliders for research, ocean observation and management*

**Origin of funding:** FP7-INFRASTRUCTURES-2011-1

**Participation:** Partner

**Total project funding:** 3.500.000

**Funding for PLOCAN:** 117.799,76

Gliders are cheap, smart platforms, useful for long-term, multi-parameter marine observation. Thanks to their remote controlled sailing capacity and the high spatial and temporal resolution of the measurements in real time, gliders have been identified to fill existing gaps in the current ocean observation systems. Together with a rapid increase in their importance in purely scientific applications, the application of gliders in the World Ocean Observation System has been recognised as a key point for improving the observation capacity of observation systems.

The objective of GROOM is to design a new European research infrastructure for using gliders to the benefit of European citizens, researchers and industry. GROOM will define scientific, technological and organisational levels of a European glider infrastructure for sustained research and observation of the oceans, in line with European and international initiatives. The proposal of this new infrastructure is based on the EuroARGO and JERICO infrastructures that are emerging and also takes into consideration important international co-ordination bodies like GOOS. The technological infrastructure is based on a range of dedicated glider ports to maintain and operate a European fleet of gliders in co-ordination with the United States, Canada, Australia and other similar infrastructure. This new infrastructure will be beneficial for oceanographic research and for the operational oceanography systems in that a large number of marine and maritime activities currently place their trust.

## LEANWIND

Logistic efficiencies and naval architecture for wind installations with novel developments

Origin of funding: FP7-OCEAN-2013

Participation: Partner

Total project funding: 9.986.231

Funding for PLOCAN: 203.930

The main objective of LEANWIND is to reduce costs over the whole life cycle and supply chain of offshore wind farms and to develop state-of-the-art tools and technologies. The marine wind energy industry in inshore shallow water sites still has to become economically competitive with conventional energy sources while new sites are planned further off-shore or in deeper waters, giving rise to new challenges. The off-shore wind power industry has still to apply lean principles in the logistics operations of wind farms and in all stages of its life cycle, as the LEANWIND Project proposes. Lean principles were originally developed by Toyota to optimise the processes of the manufacturing industry. These optimisation and efficiency principles have subsequently been adopted by many other industries to eliminate wasteful stages and to make processes more responsive. These principles will be applied to each of the critical stages of the project: logistics processes, land-based transport links, temporary storage and port facilities, vessels, cranes and lifting machinery, safety and operations and maintenance.

The LEANWIND approach will ensure the elimination of unnecessarily complex or wasteful stages of the development process, which makes the transition between stages faster, enhances quality and hence optimises time and costs to enable the industry to reduce the gap between current expenditure and the economic aspirations of the industry.

## NETBIOME-CSA

*Strengthen European research cooperation for smart and sustainable management of tropical and subtropical biodiversity in ORs and OCTs*

Origin of funding: FP7-ENVIRONMENT-2013

Participation: Partner

Total project funding: 999.615

Funding for PLOCAN: 88.573

NetBiome-CSA will extend and strengthen research and co-operation alliances for the smart and sustainable management of tropical and sub-tropical biodiversity in the Outermost Regions (ORs) and the Overseas Countries and Territories (OCTs). This will be achieved through a participative process, mobilising the stakeholders, their know-how and resources for initiatives such as policy and priority analysis, dialogue among multiple interested parties, exchange of best practices, training and recommendations.

The project is based on the association of existing biodiversity researchers created through the ERA-Net NetBiome Project and takes up the challenge of mobilising more parties interested on all levels of the quadruple helix (knowledge institutions, business, government and civil society) to tackle the top-priority challenges identified to reconcile conservation and the sustainable handling of tropical biodiversity with the sustainable development of European regions and territories, based on the

benefits arising from the enormous biodiversity. The project activities, specifically adapted to the needs and priorities identified by the ORs and OCTs, will help with: an improvement in the governance of research and innovation; an alignment of research efforts with political needs, strengthening evidence-based policies; improved implementation and impact of EU biodiversity strategy and the CDB strategy plan; A Biodiversity Management Toolbox, and increase in social, economic and cultural development of the regions; a higher profile for the ORs and the OCTs and an up-take of best practises, experience and know-how; efficient international and trans-national co-operation among European ORs and OCTs and with third countries. NetBiome-CSA addresses the (ENV.2013.6.5-2) issue completely and sub-issue (g) of the work programme as its activities will promote research alliances towards the sustainable management of biodiversity in European ORs and OCTs, giving rise to a continuation and extension of the NetBiome alliance.

# PROJECTS

## NEXOS

Next generation, cost-effective, compact, multifunctional web enabled ocean sensor systems empowering marine, maritime and fisheries management

**Origin of funding:** FP7-OCEAN-2013

**Participation:** Leader

**Total project funding:** 5.906.479

**Funding for PLOCAN:** 500.324

According to those responsible for marine research in Europe in the Ostend Declaration of 2010, support for the development of a truly integrated and sustainably funded European oceanographic observation system is a major challenge.

This can be achieved with the long term measurement of key parameters but it is hindered by the cost and the lack of reliability of oceanographic sensors in general. The NeXOS Project aims to improve the time and space cover, the resolution and the quality of marine observations by developing cheap, innovative and inter-operable in-situ sensors that can be deployed from multiple platforms and web services for key domains and applications. This will be achieved by developing new, low-cost, compact, integrated sensors, with multiple functions, including the measurement of key parameters that are useful for a series of objectives, from more accurate marine monitoring and modelling to better evaluation of fisheries.

Seven new, compact, efficient sensors will be developed, based on optic and acoustic technologies, aimed at most of the descriptors identified by the Framework Directive on Marine Strategy aimed at attaining a good ecological state. Two of the new sensors will contribute specifically to the Common Fisheries Policy with the pertinent variables for an eco-systemic approach to fisheries. All the new sensors will meet the need for multi-platform integration, inter-operability of data and sensors with quality guarantees and the reliability requisites. All of these will be specified for each new sensor system. All the new sensors will be calibrated, integrated in several types of platform, scientifically validated and demonstrated. Finally, one of the main objectives of NeXOS is to improve the competitiveness of European SMEs in the marine sensor market. With this purpose, the specifications and requisites of the sensors will be evaluated in an early stage of the project for market penetration.

## OCEANERA-NET

Coordination of national research activities of member states and associated states in the field of ocean energy

**Origin of funding:** FP7-ERANET-2013

**Participation:** Partner

**Total project funding:** 2.205.037,57

**Funding for PLOCAN:** 125.034,61

The vast European coastline houses enormous potential for ocean energy to be exploited as a source of renewable electricity, contributing to the objectives for 2020 and beyond. The ocean is a complex working environment, relatively little is known about it and it is widely used by other sectors, such as fishing, transport and leisure. However, the price of generating ocean energy is high, estimated by DG MARE, for 380 GW.

Several member states and regions are currently funding ocean energy research, demonstration, technology and innovation (R+D+T+i). There is a common objective to generate know-how of the marine environment and to accelerate the development of this emerging sector. But these research efforts are not co-ordinated. For this reason, member states are proposing the ocean energy ERA-NET as described in this document. The ERA-NET will provide a framework for joint, trans-national activities and will co-operate with the EERA Ocean Energy Joint Programme and other

important European projects and the industry stakeholders.

This wide-reaching ERA-NET brings together 16 partners from nine states with the intention of obtaining the benefits of a co-ordinated funding of research. The member states have different levels of commitment to the ocean energy sector, and it is important that the ERA-NET actions reflect this fact. The objective is to improve the quality, scope and fragmentation of research with better networks, tackling common barriers and improving co-ordination. The proposal establishes the implementation of the project from the creation of networks and sharing of know-how, to the launch of at least one joint, trans-national call for projects. This way, the partners will develop a shared vision of the sector, an action plan to deliver and a toolbox for administration. The result will be less fragmentation in funding research, the development and greater dissemination of best practices and support for marketing the ocean energy sector.

# PROJECTS

## ► PCMA

PLOCAN test bed electricity generation device observation and environmental control programme

**Origin of funding:** ERDF Technology Fund Programme

**Participation:** Leader

**Total project funding:** 560.000

**Funding for PLOCAN:** 560.000

The central objective of the project is to develop an observation and environmental control programme for the concentration of electricity generation devices on the PLOCAN test bed.

This objective fits the raft of regular activities aimed at the environmental observation and assessment of the marine environment, including aspects of design, realisation, data generation, evaluation and production of useful information for the management and administration of marine renewable energies. This information is placed at the service of companies and public administrations interested in the field of marine renewable energies.

The objective considered in this project is to monitor all the activities that are taking place, or which are going to take place in the Electricity and Communications Infrastructure of the PLOCAN Test Bed and the Submarine Transformer Sub-Statin permanently and in real time. To this end, an operational and environmental surveillance plan is established that will provide greater insight

into the interaction between the components that make up an electricity production network at sea and its effects on the surrounding marine environment.

In this sense, the observation programme will enable us to study different operating and management methodologies for the structural components of the network (cables, wave energy converters, observation instruments, etc.). In particular, methodologies can be studied for working with divers and ROVs. On the other hand, it will allow key environmental parameters to be monitored, such as the electro-magnetic fields generated, facilitating the trials of different sensors and sampling methodologies that will subsequently help to assess the effects on the marine environment better.

## ► PERSEUS

Protection of European seas and borders through the intelligent use of surveillance

**Origin of funding:** FP7-SECURITY RESEARCH-2010

**Participation:** Partner

**Total project funding:** 27.847.579

**Funding for PLOCAN:** 374.056,67

PERSEUS contributes to Europe's efforts to control illegal immigration and fight the associated crime and smuggling by proposing a large-scale demonstration of an EU-wide marine surveillance system, based on existing national surveillance systems, improving them with innovative capacities and going beyond the expectations of EUROSUR 2013, by tackling the key challenges:

- Support for the network created by the national contact centres, Frontex and EMSA by means of greater capacities, including the trans-national exchange of useful and available information and of the associated mechanisms and procedures, thus supporting the creation of a common environment of exchange of information.
- Generation of a common situation dashboard
- Improved detection and identification of non-collaborative/suspicious small boats and low-flying aircraft
- Improved and increasingly automated detection of abnormal behaviour of boats, threat identification and monitoring and

reports on non-identified boats. PERSEUS organises this demonstration in 5 exercises grouped together in 2 campaigns, carrying out drug-smuggling and illegal immigration missions and providing continual surveillance from the coast to the high seas.

PERSEUS offers a broad set of validated and proven recommendations and proposes standards. PERSEUS has brought together the main users and suppliers, ensuring privileged access to existing surveillance systems and resources for optimum cover of the area in question. These users will define, assess and validate the alignment of the PERSEUS recommendations with their own needs. PERSEUS also includes a mechanism to extend the user base and integrate emerging technologies during its life time. PERSEUS will enhance the efficiency and operational capacity of existing systems and it will make an important and co-ordinated contribution to establishing an integral system of Europe-wide maritime border control.

# PROJECTS



## TROPOS

Modular multi-use deep water offshore platform harnessing and servicing Mediterranean subtropical and tropical marine and maritime resources

**Origin of funding:** FP7-SECURITY RESEARCH-2010

**Participation:** Leader

**Total project funding:** 4.877.911

**Funding for PLOCAN:** 641.380

The essential objective of the TROPOS Project is to develop a modular, multi-use floating system for use in deep water, with an initial geographic focus on the tropical and sub-tropical Mediterranean regions, but designed to be flexible enough so that it is not limited in its geographic scope.

The TROPOS approach focuses on modular development, where different kinds of module can be combined in accordance with the area. This way, the TROPOS multi-use platform system can integrate a wide range of functions from the sectors of transport, energy, aquaculture and leisure, in a larger number of geographic areas than if were a fixed platform design. Consequently, it provides greater opportunities of profitability.

The TROPOS design will focus on a multi-use floating structure capable of operating and exploiting deep waters, where fixed structures like those driven into the ocean bed are not feasible. The multi-use platforms designed from the concept designs will have the potential to provide European coastal regions with adequate aquaculture systems, innovative transport services and leisure

and marine energy solutions.

The main scientific and technological objectives of the project are:

- To determine the optimum sites for off-shore, multi-use platforms in Mediterranean, sub-tropical and tropical latitudes, based on numeric and physical models.
- To research the relations between oceanic activities, including wind energy, aquaculture, maritime transport solutions and other additional services
- To develop new designs for economically-efficient, multi-use modular platforms that allow an optimum coupling of different services and activities
- To study the logistics needs of the new multi-use platform
- To assess the viability and economic feasibility of the platform
- To develop an integral environmental impact methodology and its evaluation
- To set out at least three complete solutions for the Mediterranean, sub-tropical and tropical areas.

# PROJECTS

## ► UNDERWORLD

*UNDERWater radiocommunications for Optimized monitoring using multiRelay Devices*

**Origin of funding:** Proyectos I+D+i Retos 2013

**Participation:** Partner

**Total project funding:** 314.524

**Funding for PLOCAN:** 113.619

The two research groups from the University of Las Palmas de Gran Canaria and from the Polytechnic University of Madrid have been working on HF communications over for the last sixteen years. Most of their achievements have been obtained thanks to funding obtained from previously awarded domestic projects (TEC2004-06915-C03, TEC2007-67520-C02 and TEC2010-21217-C02) and several private projects funded by AEMIA and the Ministry of Defence. When PLOCAN joined, a sound consortium was created able to face the scientific, technical and technological challenges of this proposal: the re-assessment of electro-magnetic communications (EM) in networks of submarine sensors. To date, most wireless underwater communications have been implemented with acoustic systems, generally considering that underwater communications by radio cannot meet the requirements set.

In fact, the limited range of water due to attenuation is the main obstacle to the environment we face. The reasons that arouse interest in the project are as follows:

The growing interest of the civil and military industry, environmental and port management entities, among others, in achieving reliable underwater links with higher data rates than acoustic communications. Have a specific key application as an objective: environmental monitoring: in general, it is considered that this is not a better alternative to acoustic communications at great depth between remote sites, with limitations on power or on high data rates. But our scenario focuses on shallow areas both in sea water

on the coast and in fresh water in rivers, dams and reservoirs. In this situation, EM systems are the best option as acoustic systems lose performance.

Finally, the paradigm change that has come about thanks to aspects such as DSPs, new, more efficient antenna or new considerations concerning alternative propagation mechanisms.

This project will help: 1) to design new antennae, 2) propagation models, 3) to design low power communications systems and mainly, 4) in a new paradigm in which submarine communications are based on a set of static nodes and also on unmanned vehicles (UUV) that resolve the existing attenuation with multi-jump communication protocols. This new network will be able to both improve existing detection and estimation procedures with data fusion and distributed consensus/ dissemination algorithms, apart from including functions such as self-location, tracking vehicles or providing help to shipping.

All this can be achieved thanks to the combination of theoretical contributions, measuring campaigns, modelling and the development of software and hardware. In fact, the best asset of this project is the balance between these aspects with a view to creating an operational wireless network of submarine sensors that will also be attractive for transferring technology to the interested entities. The major challenge is only feasible thanks to merging the experience and the skills acquired by each of the institutions involved.

# 7 PROJECTS

## UNDIGEN

Functionality of wave-driven electricity generation systems

**Origin of funding:** INNPACTO CONVOCATORIA 2011

**Participation:** Partner

**Total project funding del proyecto:** 2.260.510,19

**Funding for PLOCAN:** 614.466

The Wedge Global, S.L. technology company has developed a direct electricity generation “Power Take-off System (PTO)” to harness the sea’s wave energy that is potentially right for different kinds of Wave Energy Converters - WEC’s (Vertical and pendulum point absorbers and oscillating water column absorbers, among others).

This PTO is the prime part of the WEC, because it has an autonomous capacity to optimise the complete WEC function, apart from converting the energy. This direct electricity generation solution (key component) has been satisfactorily tested and validated in the laboratory (Cedex-Ciemat), so it would appear to be essential to carry out marine trials on this innovative solution as the natural next step in the technological development, aimed at its industrial purpose in a future commercial phase.

The project objective focuses on developing a basic collector that will act as a PTO test bed in order to carry out the marine functionality trials effectively to confirm the good laboratory results and, in turn, allow for an analysis of different control strategies in real application.

## UNDIGEN+

*UNDIGEN Marine Autonomous System*

**Origin of funding:** Retos-Colaboración 2014

**Participation:** Partner

**Total project funding:** 266.454,81

**Funding for PLOCAN:** 43.168

The consortium for the Undigen Project (MINECOIPT- 2011-1770-920000), led by the tech company Wedge Global, S.L. has developed a wave energy converter that is in the final stages of sea trials with an innovative electricity generation system, which, in turn, is potentially ideal for different kinds of Wave Energy Converters – WECs –(including Vertical and pendulum point absorbers and Oscillating Water Column).

Notwithstanding the potential of this innovative electricity generation system from a purely energy point of view, it also opens up the possibility of applying this technology autonomously; in other words, as a platform for installing equipment to measure the marine environment with a view to addressing a potential industrial-commercial development as imminently as possible.

It is worth mentioning that the Wedge approach to wave power, focusing from the beginning and giving priority to PTO as they consider it the key component of the global conversion system (WEC), once this key component can

modify the properties of the collector, configured, in turn, as a direct conversion system that eliminates intermediate stages and, therefore, provides greater reliability and associated shelf life, together with a significant reduction in operating costs and maintenance of WECs.

Consequently, the central objective of the project focuses on rolling out this action with a view to being able to use the renewable energy generated to autonomously feed the equipment installed in the collector. This can be equipment of different kinds, coastal surveillance equipment, marine research equipment, etc., along with the characterisation of the marine environment for different purposes from a global perspective.

# PROJECTS

## ► VOTEMAR

Foster professional vocations in marine technologies

**Origin of funding:** Convocatoria de ayudas para el fomento de la cultura científica y de la innovación FECYT

**Participation:** Leader

**Total project funding:** 22.000

**Funding for PLOCAN:** 22.000

This action seeks to drive professional vocations in science and technology by helping to enhance and promote innovation and creativity in secondary education, vocational training and 6th form in the field of marine technologies. Based on the knowledge acquired in preliminary workshops on the construction of prototype submarine robots in the University of Girona (UdG) and in the Canary Islands (PLOCAN), we want to drive and extend the experience among non-university education centres throughout the country.

The idea is to train teachers about the workshop and get the students, under their supervision, to be able to creatively and innovatively develop ROV prototypes from the low-cost, every-day materials supplied by the Action. In turn, there will be virtual co-operation and support between PLOCAN, the UdG and the teachers from schools, to finally organise several meetings where the ROVs made in each school will be presented and demonstrated. Harnessing these events, and to reach a wider audience, an exhibition on marine technologies will be organised.

The remote controlled vehicles (ROVs) represent what is currently an innovative technology and very much in demand for operations of different kinds in the marine environment (e.g. salvage and rescue, renewable energies, deep-water sampling). There are already a range of ROVs on the market that vary depending on their application, although these are a minority and their development represents the blooming of a growing industry. There is currently demand for people in the submarine robot sector, so new professional courses must be created and vocations fostered among non-university students to apply for these courses.

This proposal is a PLOCAN's initiative with the support of the UdG.

# PROJECTS

Below are several graphs providing information about the active project partners in 2014 by their origin, kind of institution and partners by specific project.

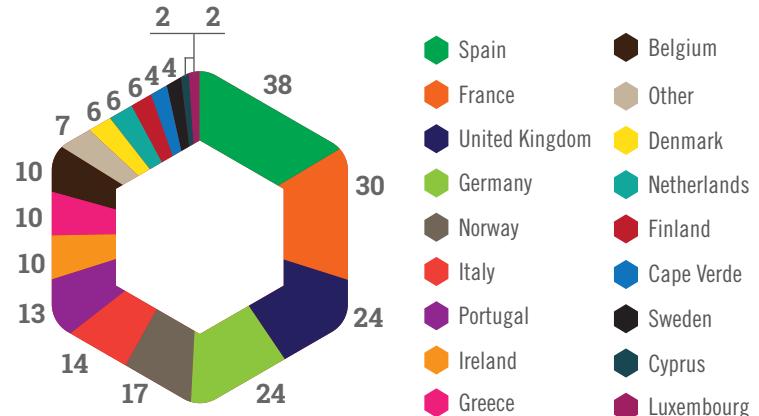


Illustration 34. Project partners by countries



Illustration 35. Project partners by kind of organisation

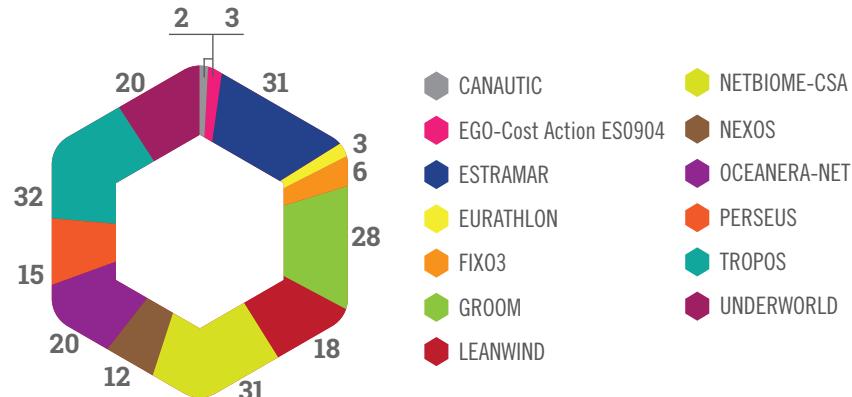


Illustration 36. Project partners by specific project

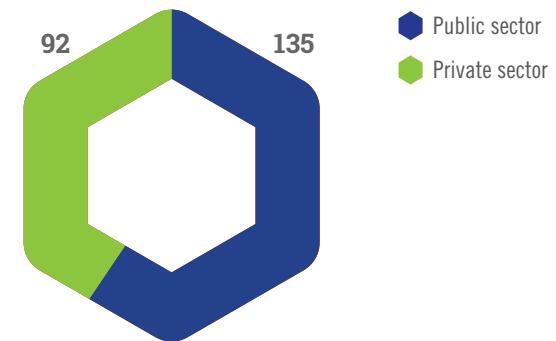
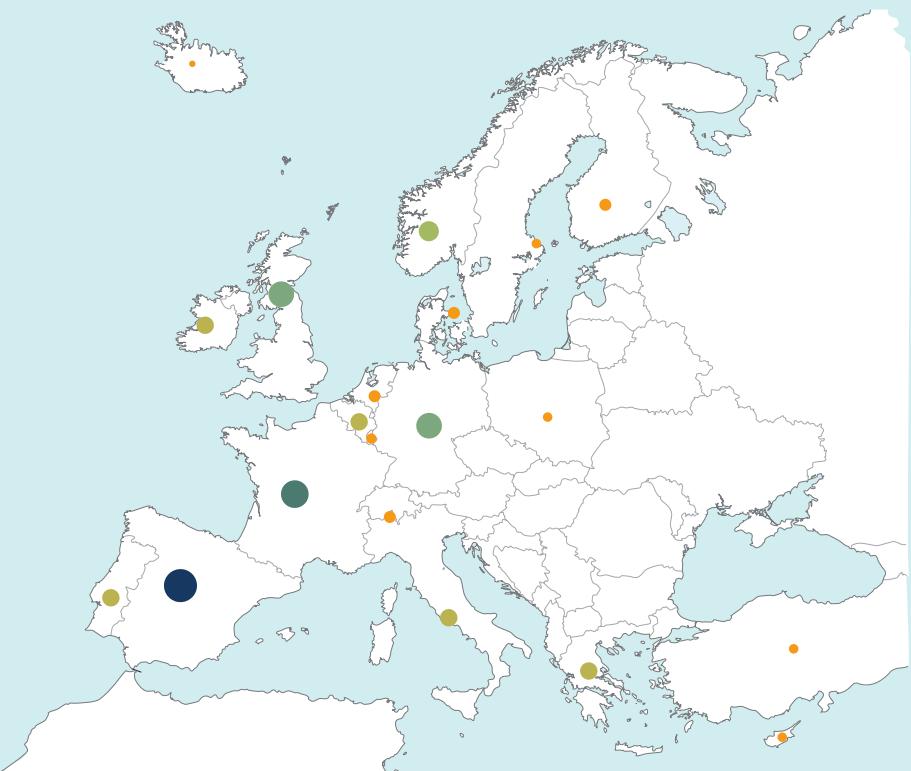
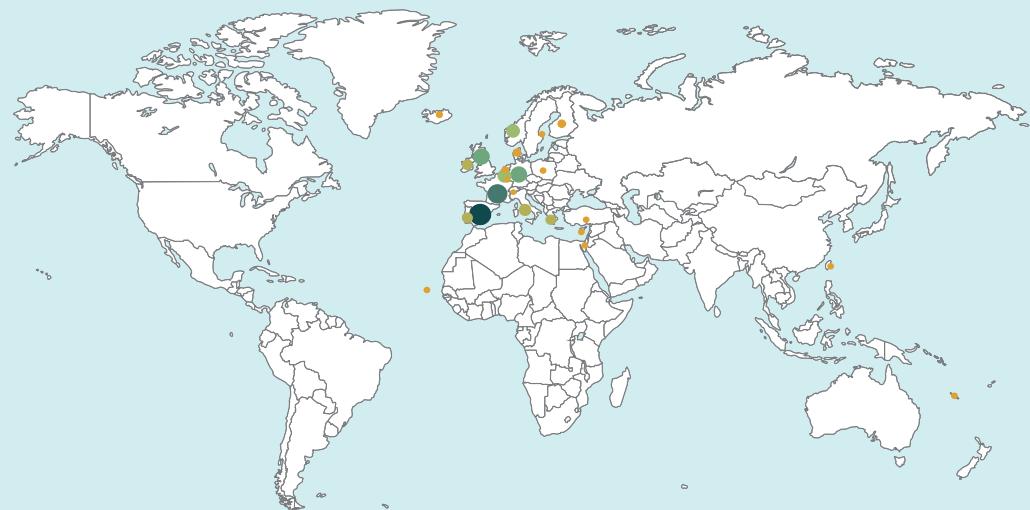


Illustration 37. Project partners by kind of organisation



1      42

Illustration 38. European distribution of project partners



1      42

Illustration 39. Global distribution of project partners

# PROJECTS

Below are several graphs providing information about the active project partners in 2014 by their origin, kind of institution and partners by specific project.

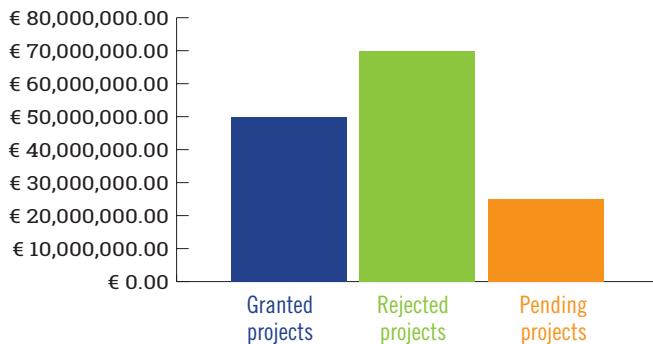


Illustration 40. Total funding applied for by complete projects in 2014

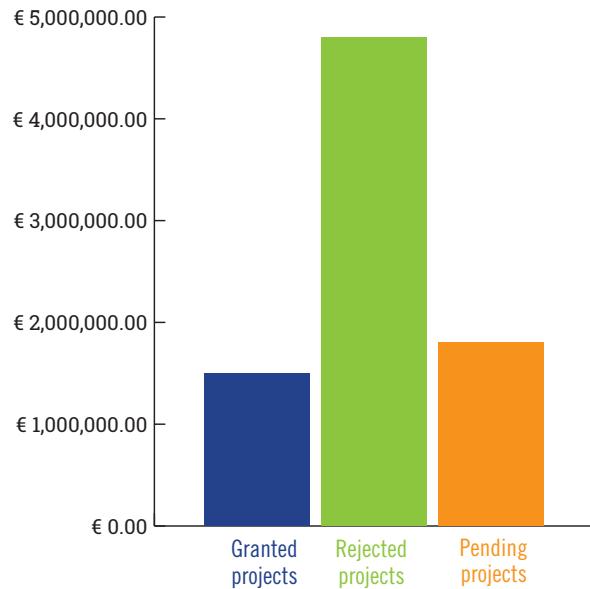


Illustration 41. Funding applied for by PLOCAN in 2014

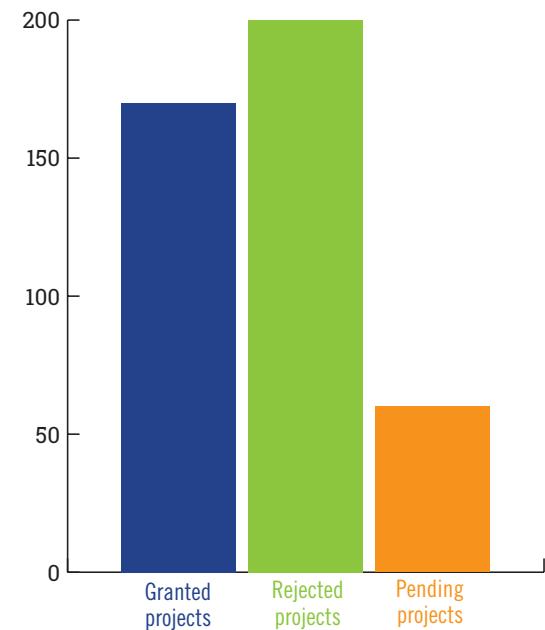


Illustration 42. Number of partners involved in projects applied for in 2014

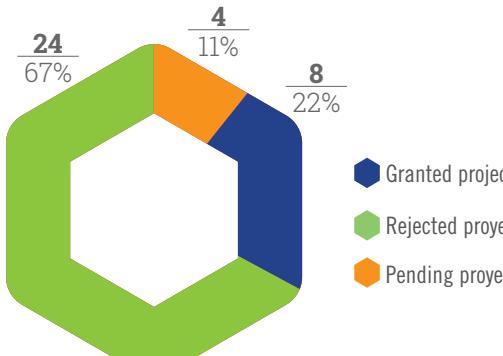


Illustration 43. Success rate of projects applied for in 2014

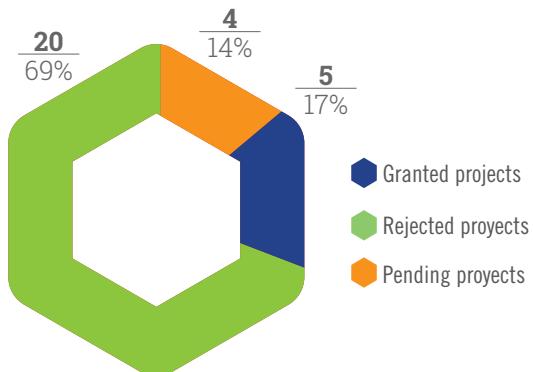


Illustration 44. Success rate of European projects applied for in 2014

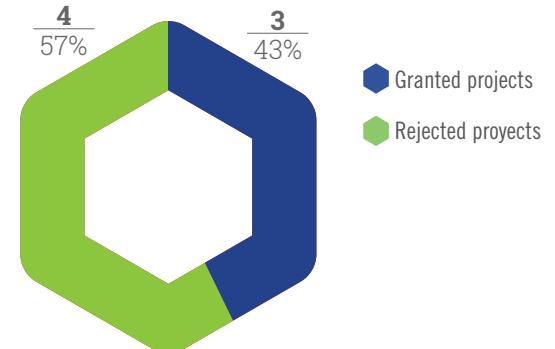


Illustration 45. Success rate of National projects applied for in 2014

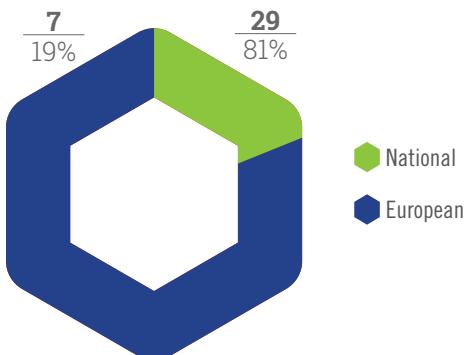


Illustration 46. Projects applied for in 2014 by origin of funding

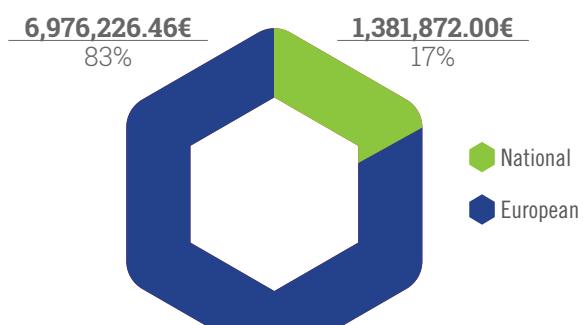


Illustration 47. Funding applied for by PLOCAN in 2014

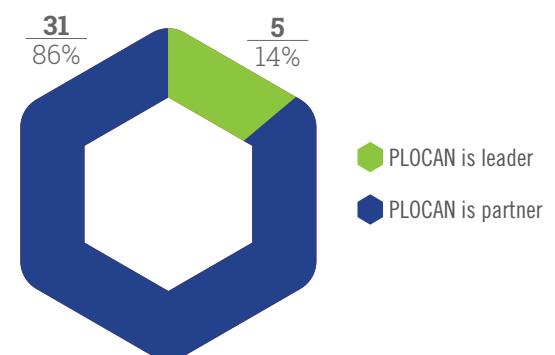


Illustration 48. Role of PLOCAN in projects applied for in 2014

## The following agreements were signed in 2014:

- Co-operation agreements between the Canary Island Government, the University of Las Palmas de Gran Canaria and the PLOCAN Consortium about the remit or temporary mobility of the personnel of the Canary Island regional administration at the service of the other signatory institutions, signed 5<sup>th</sup> February.
- Co-operation agreement between the publicly owned company Red.es and the PLOCAN Consortium to create and run the public demonstration centre for innovation in maritime information and communications technologies signed on 20<sup>th</sup> February 2014.
- One-off co-operation agreement between the Consortium to design, build and run the Canary Island oceanic platform (PLOCAN) and Red Eléctrica de España (REE), to study and research the environmental, bathymetric and geo-physical requirements and the layout of underwater electricity transmission grids signed on 24<sup>th</sup> February 2014.
- Specific co-operation agreement between the Consortium and the University of Las Palmas de Gran Canaria to design, build, fit out and run the Canary Island Oceanic Platform in the European NeXOS Project signed on 10<sup>th</sup> June 2014.
- Specific co-operation agreement between the Consortium the University of Las Palmas de Gran Canaria to design, build, fit out and run the Canary Island Oceanic Platform and in the Leanwind European Project signed on 10<sup>th</sup> June 2014.
- Co-operation agreement for student internships between the International University of La Rioja S.A. UNIR and the job placement centre signed on 4<sup>th</sup> August 2014.
- Protocol between the University of the Azores, the University of Las Palmas de Gran Canaria, The Administration of the Ports of the Autonomous Region of Madeira (APRAM), the Instituto Nacional de Desenvolvimento das Pescas (INDP) and the Canary Island Oceanic Platform (PLOCAN), to maintain co-operation between partners of the ESTRAMAR (MAC/3/c177) Project signed on 20<sup>th</sup> October 2014.
- Framework co-operation agreement between the University of Las Palmas de Gran Canaria, GEOMAR Helmholtz Center for Ocean Research Kiel and the PLOCAN Consortium for the joint development of academic and research programmes signed on 12<sup>th</sup> November 2014.

The director of GEOMAR, Peter Herzig, signed the agreement in the presence of the president of the Canary Island Government, Paulino Rivero. After signing, there was a press conference at which the director of GEOMAR declared that the marine infrastructure and experience available at the University of Las Palmas de Gran Canaria and PLOCAN make Gran Canaria a privileged place for conducting research on the open ocean and the development of Europe. He added that by teaming up with these two reputed institutions, he hoped to foster new scientific activities that would address burning issues relating to the ocean and progress in the services that the oceans are providing for society.



Illustration 49.  
Visit from the Red  
Eléctrica delegation to  
sign the agreement



Illustration 50.  
Signing the agreement  
in the offices of  
the President of  
the Canary Island  
Government

The nature of the agreements signed by PLOCAN from when it was set up until the end of 2014 is shown in graph form as follows:

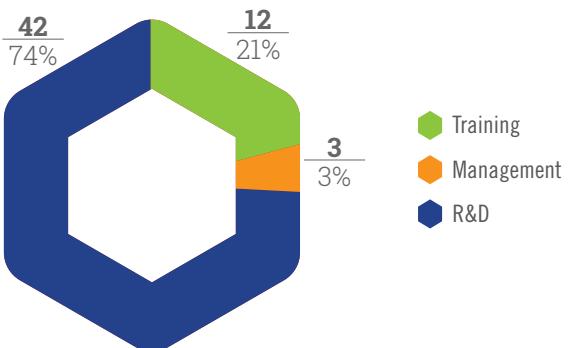


Illustration 52. Classification of agreements signed in accordance with the nature of them

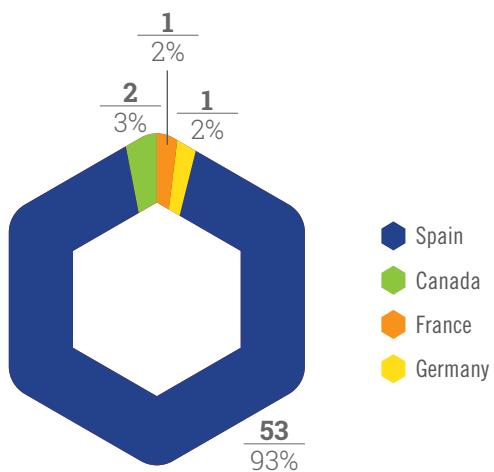


Illustration 51. Agreements signed by countries

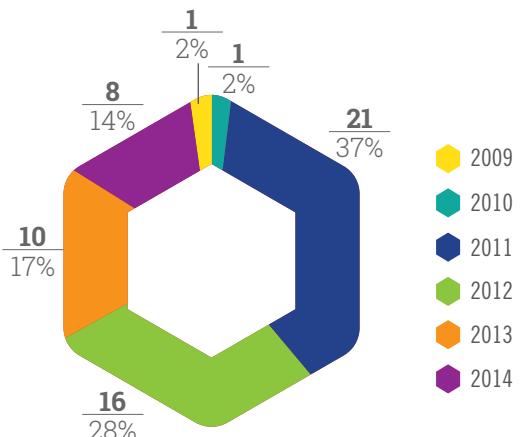


Illustration 53. Agreements signed by years

## CO-OPERATION AGREEMENTS

One of the requirements of new degree and post-graduate studies to obtain the final qualification is to do an internship in specialist companies. PLOCAN has taken students from a range of universities for internships in different qualifications related to PLOCAN activities, including Engineering (electronic, telecommunications, computer), Sea Sciences, Translating and Interpreting and Law.

A total of six students have taken part in this training programme in 2014 (excluding those who have taken part in specific schools):

- Degree internship of a Sea Sciences student from the Catholic University of Valencia. Her task was to process oceanographic data obtained by gliders and other observation platforms.
- Extra-curricular degree internship of a student from Gdansk University of Technology (Faculty of Ocean Engineering and Ship Technology), Poland, on an Erasmus programme at the University of Las Palmas de Gran Canaria. Her job was linked to the "TROPOS" project.
- Extra-curricular degree internship of an Electronic Engineering student from the University of Las Palmas de Gran Canaria. She worked in co-operation with the

company Wedge as part of the UNDIGEN project for checking and monitoring the energy obtained from a wave-powered generating buoy.

- Master's internship of a student from the University of La Rioja, Master in the Design and Management of Technological Projects. He worked on the NeXOS project.
- Presentation of the Final Project of a Master in Shipping Business, Administration and Logistics (of the Spanish Maritime Institute) tutored by PLOCAN. Dissertation entitled: "Liquid Natural Gas: Global Chain, Market and Impact on the Maritime Industry"

Internships in PLOCAN encompass all levels of education, Vocational Training and Secondary Education:

- Vocational Training internships (Higher Grade) in I.T. Systems and Networks (a student from Siete Palmas High School, Gran Canaria).
- Observation Internship of a Lower Sixth Form student (Lycee Francais Primary Secondary School, Gran Canaria).

A series of training activities have taken place in PLOCAN in 2014, some focusing on dissemination and fostering scientific and technological vocations::

### **Glider School 2014**

The international glider school "PLOCAN Glider School" is held every year in PLOCAN. In the 2014 school, all the places were filled with ten students from six different countries: United States, Brazil, Cyprus, United Kingdom, Germany and Spain.

The course was given by a total of twenty three external teachers, members of reputed companies and institutions in the area of submarine vehicles and marine sensors, most from abroad. Zenda Wills, Director of NOAA's International Ocean Observing Systems took part in the opening ceremony this year, showing her support for the school.

The 2014 course was run in accordance to the quality management system (Standard UNE-EN ISO 9001-2008) that will be described in section 16..



Illustration 54.  
Students of the glider school in the PLOCAN facilities



Illustration 55.  
Students taking to sea

# **TRAINING, FOSTERING SCIENTIFIC TECHNOLOGICAL VOCATIONS AND DISSEMINATION**

## ROV Workshop

This project is run every year to attract and motivate secondary education students towards technology by building and remotely operating underwater vehicles (ROVs). It also fosters the students' imagination and their environmental awareness. The specific objective of the project is to build simple but functional, small-scale prototypes built from everyday materials.



Illustration 56. Final demonstration of the ROV workshop

Two publications were made in this project, each registered with its ISBN. One of them was edited and published in 2014:



## Educational Passages

On 19 February, students from a range of Secondary Schools in Gran Canaria took part in launching two small, 1.5 metre, unmanned sailing dinghies. The "*Educational Passages*" project marked the first time this had been done in Spain. Its objective is to bring science to young people and promote co-operation between students from different countries.

*Educational Passages* was created in 2008 in the state of Maine (USA), run by Dick Baldwin. It provides packages of basic materials for primary and secondary school students to build small, unmanned sailing dinghies fitted with GPS that are launched into the sea to study the course they take in the ocean. To date, these dinghies had always been launched off the east coast of the United States, but now, for the first time, with the co-operation of students from Gran Canaria, two dinghies were launched in Canary Island waters, christened "Glenna" and "SS Eagle". "Glenna" reached the coast of Brazil, just six weeks later..



Illustration 57. Course of the educational passages



Illustration 58. Students with educational dinghies

**TRAINING, FOSTERING SCIENTIFIC TECHNOLOGICAL VOCATIONS AND DISSEMINATION**

PLOCAN took part in the following fairs:

### FIMAR 2014

For the third year in a row PLOCAN set up a stand at the International Sea Fair organised by the Department of the Sea of the Las Palmas de Gran Canaria City Council between the 4th and 6<sup>th</sup> April in Plaza de Canarias.

This year, the area was laid out in two marquees covering a total of 27 m<sup>2</sup>, showing the TROPOS Project and the dissemination and training projects that PLOCAN is currently involved in, such as the Submarine Robotics Workshop, the launching of the Educational Passages and the Glider School. The exhibition panels were supplemented with other activities aimed at school children, who could experiment with building a submarine robot in the Submarine Robotics Workshop.

During the fair, the socio-economic impact of the TROPOS Project was studied with a survey of visitors.

### ICOE 2014

PLOCAN took part in the International Ocean Conference on Ocean Energy (ICOE 2014) held in Halifax (Canada) between the 4<sup>th</sup> and 6<sup>th</sup> of November 2014. ICOE is an international event on renewable off-shore energy. PLOCAN went in conjunction with Tecnalía, the Basque Energy Agency and the Institute of Environmental Hydraulics of the University of Cantabria to jointly promote the activities of the four organisations.



Illustration 59. PLOCAN stand in FIMAR



Illustration 60. Stand at ICOE 2014

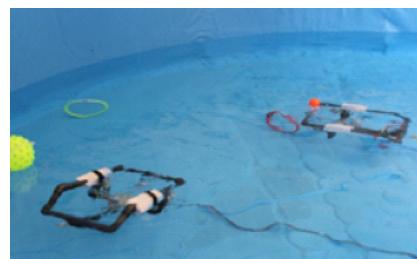


Illustration 61. Test pool set up at the vocations fair



Illustration 62. Test pool during Science Week



Illustration 63. Students from the Stocksund Navy High School in PLOCAN

### Scientific and Technological Vocations Fair

PLOCAN took part in the Scientific Vocations Fair organised by the Science Park Foundation of the University of La Laguna in Tenerife on the 16<sup>th</sup> and 17<sup>th</sup> of October. The ROV Workshop project was presented at the fair, in the context of the other activities organised by PLOCAN. Apart from general informative material, a small pool was set up in the stand for testing and demonstrating small prototypes.

### Science Week

Science Week is held every year in the annex to Parque Santa Catalina in Las Palmas de Gran Canaria. It was held between the 6<sup>th</sup> and 8<sup>th</sup> of November with the same format that had been used some weeks earlier at the Scientific and Technological Vocations Fair in Tenerife as it was so successful with the public there.

### Visit by from the Swedish Navy High School

In December, a group of twenty two students from the Navy High School of Stocksund (Sweden) came to visit us. The students showed special interest in the applications of marine technologies in the ocean, such as remote control submarine robots and the gliders.

**TRAINING, FOSTERING SCIENTIFIC TECHNOLOGICAL  
VOCATIONS AND DISSEMINATION**

Additional activities related to training and dissemination were carried out:

## B3M

In 2014 a new edition of the magazine B3M was published: Boletín Marino-Marítimo Macaronésico, published jointly in Spanish and Portuguese. On this occasion, it focused on the activities organised for the closure of the ESTRAMAR project.

## PLOCAN's virtual classroom

PLOCAN has had a virtual classroom since 2012. This is a fully open, free on-line education service that hosts PLOCAN's main dissemination and educational projects:

- The ROV Workshop
- The Chemistry of Life
- B3M
- PLOCAN Informative Material

The tool was up-dated in 2014 to a more modern and accessible platform that allows for control over downloading informative material and analysing the interest generated by the contents published in order to plan future contents.



Illustration 64. Front cover of the B3M newsletter



Illustration 65. PLOCAN virtual classroom

## Publications and Informative Material:

Informative material was constantly produced throughout the year for distribution in the dissemination and informative activities. PLOCAN has a repertoire of information sheets, leaflets and posters that are up-dated and modified to suit the audience they are for.

## Presentations in different forums:

Finally, PLOCAN presentations have been made throughout the year in different forms, including the presentation made on 4 November in London at the "Financial Times Investing in Gran Canaria Forum". Dozens of businessmen and investors interested in gaining a foothold in Gran Canaria and West Africa met the Spanish Minister of Industry and the president of the Gran Canaria Cabildo (Island Government). The objective was for people to discover another facet of the island: as a destination for developing marine knowledge, innovation and technology.

As for training opportunities for the PLOCAN staff, an annual plan was implemented that included the following training courses:

- Health and safety in the workplace. Specific risks
- Piloting and maintaining ROVs
- Specific training on Gliders
- Quality training session
- Implementing a quality system in 16 hours
- Technical issues about public contracting
- Negotiation and conflict resolution techniques
- Quality management system
- New trends from an innovative and creative perspective for strategic skills. Management and coaching.
- Quality audits. Methodology
- Customs procedure
- Confection DUA. Import/export
- ArcGIS Desktop.
- Neos A3 portal advisory system, electronic notifications
- InDesign CC.
- Advanced Word
- BrIne tool modelling desalination plant spills
- Customer service by telephone
- Fork-lift trucks.
- European Union R+D+i project advisors seminar

# TRAINING, FOSTERING SCIENTIFIC TECHNOLOGICAL VOCATIONS AND DISSEMINATION

PLOCAN has hosted many events in 2014 relating to marine science and technology and other similar fields. In some cases the meetings were organised by PLOCAN as part of managing one of the projects it was involved in. In other cases, PLOCAN provided the facilities and logistics for other entities that organised their own meetings. All the events held have raised the profile of PLOCAN and have driven the establishment of relations with potential future users of the platform.

## KOSMOS

PLOCAN hosted the KOSMOS 2014 GC study on the acidification of the ocean conducted by GEOMAR Helmholtz Centre for Ocean Research, Kiel, on two different occasions in 2014. Hosting KOSMOS was a challenge for PLOCAN, due both to the number of participants in the study and because of the magnitude and specificity of the tasks the experiment required.

The first occasion was between January and April. In January, the German oceanographic ship POSEIDON carried over 24 tonnes of equipment to Gran Canaria. The experiment was located in Melenara Bay, where nine, eight-metre high structures, each weighing two tonnes, were installed. The structures were surrounded by eighteen metres of flexible plastic that isolated a 40 cubic metre water column in each one. Once

the water column becomes a water-tight compartment, the acidification study starts by adding CO<sub>2</sub>. KOSMOS 2014 GC is a joint activity of the German BIOACID (Biological Impacts of Biological Acidification) research network and SOPRAN (Superficial Oceanic Processes in the Anthropocene) and aims to discover how the plankton community of open oceanic waters poor in nutrients reacts to the acidification of the ocean. The long-term behaviour of ecosystems is simulated in the floating structures.

An average of seventy researchers (chemists, molecular, evolutionary, marine and fisheries biologists, physiologists, ecologists and bio-chemists) from different countries took part in the study and they were assisted by the PLOCAN staff for the logistics. In the months they were with us, they took samples from PLOCAN boats and processed the samples collected three times a day, every day, in the laboratories of PLOCAN's on-shore facilities.

The scientists' activities included introducing fish larvae in the mesocosmoses to study their development under the experimental conditions designed. Moreover, they added waters collected at depth to the mesocosmoses to simulate an up-welling episode, an experiment that had not been attempted until now.

Unfortunately, the experiment had to be suspended due to an unusual series of storms that affected the activities scheduled by the scientists. The meso-cosmoses were brought to shelter and the experiment postponed until September.

The second part of this experiment took part between September and December 2014. The meso-cosmoses were deployed with the help of the oceanographic ship Hespérides. They were installed in Gando Bay in order to protect them from the effects of possible storms. The meso-cosmoses acted as giant test tubes that contained carbon dioxide levels similar to those expected to be reached between now and 2100. The scientists took samples and measured 50 different biological, chemical and physical parameters. The samples were processed in the PLOCAN laboratories and were prepared for more in-depth experiments in their institutes of origin.

Co-operation was provided to local aquaculture for growing fish larvae that were put in the meso-cosmoses. A natural fertilisation was also simulated, like the one that occurs in this area due to the up-welling of deep, nutrient-laden waters. As a new aspect, the study included the effect of the dust from the Sahara in the waters of the meso-cosmoses. Dust was collected from Cape Verde for this experiment. For

the scientists in charge of the experiment, these studies in the Canary Island Current supplement the extensive data they already have on the impact of acidification on the pelagic area of the ocean that have been collected over the last five years.

PLOCAN provided the researchers with logistical support during their stay on Gran Canaria, loaning them its laboratories for analysing the samples, it managed the dissemination of the experiment in the media, organised the transport of the scientific equipment and responded to the everyday needs of the experiment.



Illustration 66. Meso-cosmoses installed in Melenara Bay

## **NOC/S/TWR - Slocum Trials and Training**

Between the 10<sup>th</sup> and 21<sup>st</sup> of February, NOC (National Oceanographic Centre of Southampton, United Kingdom) chose the PLOCAN facilities for carrying out acceptance trials in deep waters for twelve new glider units that the British government acquired to increase its fleet of underwater vehicles. They organised a glider pilot training course at the same time.

For this, a team of 19 people made up of technicians from NOC, future glider pilots and staff from Teledyne Webb Research came to Gran Canaria. The NOC, an international oceanographic benchmark, centralised the unit specialising in handling and operating this kind of remote devices in Great Britain.



Illustration 67. Testing new NOC gliders in PLOCAN

## **Monthly meeting of the city of Las Palmas de Gran Canaria Internationalisation Plan (PIC)**

The Las Palmas de Gran Canaria City Council chose the PLOCAN facilities to hold their monthly meeting of the city's Internationalisation Plan on 14<sup>th</sup> March. The Internationalisation Plan comprises a total of forty five public institutions and companies, including the City Council of Las Palmas de Gran Canaria, the Cabildo (Island Government) of Gran Canaria, the Central Government regional office and the University of Las Palmas de Gran Canaria.



Illustration 68. PIC meeting in PLOCAN

## **Macaronesian marine-maritime panel**

On 10th April, PLOCAN organised the Macaronesian marine-maritime panel in collaboration with the AFRICAN Project. The meeting was chaired by the Director General for Relations with Africa from the Canary Island Government and was attended by representatives from Cape Verde, Senegal, Madeira, Azores and the Canary Island Marine-Maritime Cluster.

One of the panel's main considerations was to promote economic and trading relations between the Canary Islands and Africa and public-private alliances with a view to ensuring that public sector (government, public companies and institutes) actions also help to drive the activity of the private sector by supporting the international expansion of Canary Island enterprise.



Illustration 69. Macaronesian marine-maritime panel

## **IEAWind "Floating offshore wind plants"**

The committee of experts on floating wind plants of the international energy organisation (IEA) met in the PLOCAN facilities on the 28<sup>th</sup> and 29<sup>th</sup> April. The basic objective of the meeting is to promote co-operation activities and the exchange of information about aspects (scientific, technological, socio-economic and environmental) relating to research, development and innovation of off-shore wind energy by using floating platforms. The meeting was attended by some 20 delegates from different institutions from 15 countries, including USA, China, Japan, Korea, Mexico, Germany, Great Britain and Denmark.

## Ninth assembly of the IEC TC88 PT61400-3-2 for the international technical specifications for off-shore floating wind turbines

The International Electro-technical Commission (IEC) held a meeting in PLOCAN on the 30<sup>th</sup> April and 1<sup>st</sup> May. The IEC is a world-wide standards organisation encompassing all the national electro-technical committees. The IEC promotes international co-operation on all issues relating to standardisation in the fields of electricity and electronics. This assembly (IEC TC88 PT61400-3-2) was devoted to the international technical specifications for off-shore floating wind turbines. The meeting was attended by approximately twenty delegates.

## First international conference of the Net-Biome project

The Net-Biome Project, in which PLOCAN is a partner, held a conference entitled "Fostering high biodiversity-based sustainable development: prospects for green and blue growth in the ORs and the OCTs". This activity is described in the section on projects. It was held on 27th May and attracted at total of approximately forty participants from eight ORs and OCTs, six European countries and others such as Cape

Verde and Barbados. The second general assembly for co-ordinating the project and the executive committee for the call for projects NB ERA-Net 2010 were held at the same time.

## Visit by a delegation from the Portuguese Hydrographic Institute

On 12<sup>th</sup> and 13<sup>th</sup> June, a delegation from the Portuguese Hydrographic Institute, with offices in Lisbon, visited PLOCAN. This was directly part of the Marine Observation Atlantic Initiative that Portugal and Spain specifically and strategically promote in Macaronesia in the archipelagos of Azores, Madeira and the Canary Islands respectively, as outermost regions. The visit focused on presenting and sharing skills and resources available between the institutions as a foundation for consolidating future co-operation synergies in the field of instrumental monitoring of the marine environment, both in coastal and oceanic areas, and the technological developments and services emerging (real time information and prognosis) in response to the growing demand from and need by a broad number of socio-economic sectors associated with the marine-maritime environment.



Illustration 70.  
The Portuguese delegation at the PLOCAN facilities



Illustration 71.  
General Assembly of marine APPA



Illustration 72.  
Closing ceremony of the fifth ENERMAR conference

## APPA Marine Meeting

On 26<sup>th</sup> June, the marine section of the Association of Renewable Energy Producers (APPA, as it is known in Spanish) held its general assembly in the PLOCAN facilities. Marine APPA is made up of twenty-something companies interested in harnessing the energy resources of the sea and working to develop these technologies in Spain, co-ordinating their efforts in order for these technologies to obtain the support of the different administrations and enjoy remuneration in accordance with generating costs and specific objectives for installed power for 2020.

## 5<sup>th</sup> ENERMAR Technical Conference

The Association and College of Marine and Oceanic Engineers of Spain, in collaboration with PLOCAN and the Canary Island Maritime Cluster, organised the fifth conference "The Sea and renewable energies (ENERMAR) on the 26th and 27th of June.

This technical conference is the main annual activity organised by the working group of the Technology Action Plan "PAT 18", devoted to promoting marine and oceanic engineering in the field of marine renewable energies, the dissemination of the functions and capacities of marine and oceanic engineering to the public sector, companies, bodies, entities, etc. related to the ENERMAR and to drive marine renewable energies for sustained energy development and support the 20/20/20 objective.

The conference congregated over seventy participants between associates, college members and professionals working in the ENERMAR field. The UNIDIGEN, TROPOS and LEANWIND projects were presented during the conference.

## TP OCEAN MEETING

The TP Ocean Meeting was held in the PLOCAN facilities on 3rd September. A total of approximately thirty participants attended. TP Ocean (Technology & Innovation Platform for Ocean Energy) was created at the conference on ocean energy held in Edinburgh in October 2013 to promote co-operation between European countries and ensure that innovation and research pertaining to oceanic energies focuses on the needs of the industry.

## SMSPELC Project technical conference

CETECIMA organised a technical conference in the PLOCAN facilities on 29<sup>th</sup> October to disseminate the SMSPELC ship location and safety system and the technical results and conclusions of the project, which was carried out with the boats of the co-operative The "Test bed and development of new bespoke functions of the artisanal fishing boat location and safety system in Gran Canaria, SMSPELC Trials" Project is a project to demonstrate the technology of the new system to locate fishing boats in the Canary Islands. The objective is to save human lives at sea and to act as an information support for fishing management and sustainability.

## 5th Glider School

PLOCAN organised the fifth glider training school described above in the section of this report on training in its facilities.

## Advanced seminar on measuring at sea

The Advanced Seminar on Measuring at Sea (ASMS) was held in the PLOCAN facilities on 4<sup>th</sup> December. The seminar attracted international benchmark companies in the oceanographic instrumentation field and the attendance of technical and research personnel from institutions working in the field of observation, study and management of the marine environment in the Canary Islands, such as the University of Las Palmas de Gran Canaria, the Department of Fisheries of the Canary Island Government and personnel from PLOCAN.

## NAUCAMNET

On 10<sup>th</sup> December, the Marine Sciences Technology Centre (CETECIMA) held the first NAUCAMNET workshop in the PLOCAN facilities, dealing with rolling out the On-Line Direct Berth Reservation Platform for the marinas of the Canary Islands and Agadir.

The event attracted a broad representation of both public and private managers form the yacht marinas of the Canary Islands and the director of the Agadir Marina.

## CANAUTIC

The presentation of the Canautic Project, involving the participation of PLOCAN as a partner, was held in the PLOCAN facilities at the beginning of December, along with the signing of the Canautic protocol. This activity is described in the section on projects.

## MACSA

The Marine Sciences Technology Centre (CETECIMA) and the University of Las Palmas de Gran Canaria (ULPGC) held a working session of the MACSA Project in the PLOCAN facilities on 11<sup>th</sup> December. The general objective of MACSA is to drive trade and shipping in West Africa and the Canary Islands by developing a framework to bring policies, legislation and infrastructure in line to allow the international safety and protection of maritime transport protocols to be implemented in the region. Participants came from Senegal, Cape Verde and the port authorities of the Canary Islands.



Illustration 73. SMSPELC conference



Illustration 74. Session of the seminar on measuring at sea



Illustration 75. NAUCAMNET workshop



Illustration 76. Working conference of the MACSA project

PLOCAN as an oceanic observation initiative is a Spanish site in the EMSO network of European observatories (*European Multidisciplinary Seafloor Observatory*).

PLOCAN belongs to the robotics and automation group and to the maritime safety group of the Spanish Maritime Sector Technology Platform. This organisation provides a place for meeting and dialogue for all actors related to the sea and other aquatic environments.

PLOCAN is a member of the Spanish Standards and Certification Association (AENOR) as a member of its AEN/206/SC114 sub-committee. The objective of this sub-committee, known as "Marine energies: Wave and current converters", is to draw up standards for everything relating to harnessing marine wave and current energy to produce electricity. The duties of this sub-committee pertain to standardising the technology and procedures associated with transforming the energy contained in marine waves and currents into electricity. PLOCAN currently contributes by providing experts for the working groups related to the environmental impact assessment and the assessment of energy resources. PLOCAN is a member of the Association of Renewable Energy Producers APPA Marine, which has twenty six members. It was founded in 2006 with a view to bringing the

industry together and working to develop this technology in Spain. It encompasses most of the companies and entities that engage in activities in this sector in Spain, putting it in an ideal position to provide an overview of the technology. The immediate objective of the Marine section of APPA is to promote a suitable legal framework and the associated technological development to attain considerable importance for marine energy in renewable energy production by 2020.

PLOCAN appears as an infrastructure for testing devices in the open sea on the Ocean Energy Systems network, an initiative of the international energy agency on oceanic energy.

PLOCAN has been a member of the international network of innovative maritime territories since 2012. Members of the network include Spain, France, Germany, Italy, Argentina, Mexico, the United States and Vietnam.

PLOCAN participates in the "Energy and Sustainability School" of the University of Las Palmas de Gran Canaria. This school came about with the objective of acting as a venue for meeting and debate between University and Society on issues of interest for the future of the Canary Islands. It is part of the university function of dissemination,

revaluation and transfer of knowledge at the service of culture, quality of life and economic development.

In 2013, PLOCAN signed up to the initiative of setting up a Steering Committee for the Macaronesian Marine-Maritime Cluster that pursues co-operation and synergies in the maritime sector for the purpose of formulating projects and making an optimum use of the legislative and financial instruments of the EU for 2014-2020.

In 2014 a member of the organisation joined as the Spanish representative in the standardisation group: International Electro-technical Commission (IEC) / TC114: *Marine energy - Wave, tidal and other water current converters*, Subcommittee: 114/136: *Acoustic characterization of marine energy converters*.

PLOCAN has been a member of the FECYT EURAXESS network on research mobility since July.

PLOCAN also participates in the following forums and working groups:

- EuroGOOS HF-Radar Group, led by EMODNet Physics (<http://www.emodnet-physics.eu/hfradar/Home>)
- *Scientific Access Committee* of the EU-TNA Glider Programme.
- National Co-ordination of the AEN/CTN 206/SC 114/ GT 10 "Assessment of mooring systems for marine energy converters".
- *Atlantic Stakeholder Forum* for galvanising blue growth in the European Atlantic arc
- *Galway Statement Implementation* to define strategies relating to blue growth in the framework of the European Atlantic
- Programme Committee of Oceans of Tomorrow Projects to assess advances, contributions and impact of projects financed by the European call for projects *Oceans of Tomorrow*
- *Ocean Energy Forum* to galvanise the marine energies sector in Europe
- Participation in the *H2020 Project Coordinators' Day* for strategic planning, monitoring and assessment of the results of the H2020 programme
- GTEO-Working Group on Wave Energy with the objective of galvanising technological advance and the application of wave powered electricity generating device technology. The GTEO is driven by EVE
- Ocean Energy ERA-Net Consortium to galvanise the marine renewable energies sector in Europe
- FP-7 JERICO General Assembly to create a joint European coastal observation infrastructure initiative

# 1 ASSOCIATION AND CORPORATE ACTIVITIES

In 2014, PLOCAN personnel participated in the following publications, communications to conferences and other dissemination activities.

#### Publications:

- **D.M. Toma, J. Del Rio, S. Jirka, E. Delory, and J. Pearlman**, "Smart electronic interface for Web Enabled Ocean Sensor Systems," in Sensor Systems for a Changing Ocean (SSCO), 2014 IEEE, 2014, pp. 1-4.
- **S. Sparnocchia, P. Farcy, and E. Delory**, "The trans-national access in FP7 and H2020: A tool for sensor testing, observing system validation and collaborative research," in Sensor Systems for a Changing Ocean (SSCO), 2014 IEEE, 2014, pp. 1-3.
- **L. Shiau-Yun, J. C. S. Yu, L. Golmen, J. Wesnigk, N. Papandroulakis, P. Anastasiadis, et al.**, "Environmental aspects of designing multi-purpose offshore platforms in the scope of the FP7 TROPOS Project," in OCEANS 2014 - TAIPEI, 2014, pp. 1-8.
- **J. Pearlman, R. Garello, E. Delory, A. Castro, J. Del Rio, D. Mihai Toma, et al.**, "Requirements and approaches for a more cost-efficient assessment of ocean waters and ecosystems, and fisheries management," in Oceans - St. John's, 2014, 2014, pp. 1-9.

- **S. Jirka, D. Mihai Toma, J. Del Rio, and E. Delory**, "A Sensor Web architecture for sharing oceanographic sensor data," in Sensor Systems for a Changing Ocean (SSCO), 2014 IEEE, 2014, pp. 1-4.
- **J. Gille, L. de Swart, I. Giannelos, E. Delory, and A. Castro**, "Marine sensors; the market, the trends and the value chain," in Sensor Systems for a Changing Ocean (SSCO), 2014 IEEE, 2014, pp. 1-14.
- **B. J. Galvan, A. S. Marco, J. F. Rolin, and L. Delauney**, "NeXOS contribution to the adaptation of system analysis engineering tools for mature and reliable ocean sensors," in Sensor Systems for a Changing Ocean (SSCO), 2014 IEEE, 2014, pp. 1-6.
- **E. Delory, L. Corradino, D. Toma, J. Del Rio, P. Brault, P. Ruiz, et al.**, "Developing a new generation of passive acoustics sensors for ocean observing systems," in Sensor Systems for a Changing Ocean (SSCO), 2014 IEEE, 2014, pp. 1-6.
- **E. Delory, A. Castro, C. Waldmann, J. F. Rolin, P. Woerther, J. Gille, et al.**, "NeXOS development plans in ocean optics, acoustics and observing systems management," in Sensor Systems for a Changing Ocean (SSCO), 2014 IEEE, 2014, pp. 1-6.

"management," in Oceans - St. John's, 2014, 2014, pp. 1-9.

"interoperability," in Sensor Systems for a Changing Ocean (SSCO), 2014 IEEE, 2014, pp. 1-3.

- **E. Quevedo, J. de la Cruz, G. M. Callicó, F. Tobajas and R. Sarmiento**, "Video Enhancement using Spatial and Temporal Super-Resolution from a Multi-Camera System", IEEE Transactions on Consumer Electronics, JCR = 1.157 , vol. 60, issue 3, pp. 420-428, Aug. 2014.

#### Communications to conferences:

- **E. Delory, D. Toma, J. del Rio, P. Ruiz, L. Corradino, P. Brault, et al.**, "NeXOS objectives in multi-platform underwater passive acoustics," presented at the Underwater Acoustics International Conference and Exhibition, Rhodes, Greece, 2014.
- **E. Delory, A. Castro, O. Zielinski, C. Waldmann, L. Golmen, J. F. Rolin, et al.**, "Objectives of the NeXOS project in developing next generation ocean sensor systems for a more cost-efficient assessment of ocean waters and ecosystems, and fisheries management," in OCEANS 2014 - TAIPEI, 2014, pp. 1-6.
- **E. Quevedo, J. de la Cruz, G. M. Callicó, F. Tobajas and R. Sarmiento**, "Spatial-Temporal Video Enhancement using Super-Resolution from a Multi-Camera System", Institute of Electrical and Electronic Engineers (IEEE) International Conference on Consumer Electronics, Las Vegas, USA, pp. 536-537, Jan. 2014..
- **C.Barrera, E. Quevedo, J. Hernández and O. Llinás, for the PERSEUS Consortium**, "The role of unmanned ocean surface vehicles for maritime security applications in the FP7 PERSEUS project", Oceanology International, London, United Kingdom, Mar. 2014.
- **E. Quevedo, J. Rodríguez, D. Horat. A. Quesada-Arencibia, F. Tobajas, G.M. Callicó and R. Sarmiento**, "Improving underwater video navigation systems using Georeferencing and Super-Resolution techniques", Institute of Electrical and Electronic Engineers (IEEE) Marine Technology Society (MTS) OCEANS conference, Taipei, Taiwan, pp. 1-7, Apr. 2014.
- **S. Lu, J.Yu, J. Wesnigk, E. Delory, E. Quevedo, J. Hernández, O. Llinás, L. Golmen, N. Papandroulakis and P. Anastasiadis**, "Environmental aspects of designing multi-purpose offshore platforms in the scope of the FP7 TROPOS Project", Institute of Electrical and Electronic Engineers (IEEE) Marine Technology Society (MTS) OCEANS

conference, Taipei, Taiwan, pp. 1-8, Apr. 2014.

- L.G. Golmen, W. Chen, E. Quevedo, E. Delory, J. Hernández, K. Mintenbeck, S.Yu and J. Yu, "The multipurpose offshore TROPOS platform: environmental and societal issues", Environmental Interactions of Marine Renewable Energy Technologies (EIMR), Stornoway, United Kingdom, May 2014.
- Montes, E., F. Muller-Karger, L. Lorenzoni, M. W. Lomas, A. Cianca, S. Habtes, and R. T. J. Masserini (2014), Climate driven changes in oxygen inventories of North Atlantic Subtropical Underwater captured by oceanographic time series stations, paper presented at Ocean Carbon and Biogeochemistry (OCB) Summer Workshop, Woods Hole Oceanographic Institution, MA, July 21-24.
- N. Papandroulakis, P. Anastasiadis, C. Thomsen, E. Koutandos, P. Mayorga, E. Quevedo and J. Brito, "Modular multipurpose offshore platforms, innovative opportunities for aquaculture", Aquaculture Europe 2014, Donostia – San Sebastián (Spain), Oct. 2014.
- C. Barrera, E. Quevedo, M.J. Rueda, J. Hernández-Brito and O. Llinás, Ocean

surface vehicles (OSV) for maritime security applications -The PERSEUS project, EUROGOOS 2014, Lisboa (Portugal), Oct. 2014.

- Cianca, T. Morales, M.G. Villagarcía, C. Barrera, M. D. Gelado and O. Llinás (2014), Progress towards the harmonization of oceanic observations from different platforms, paper presented at EuroGOOS meeting, Lisbon, Portugal, October 28-30
- L. Cardona, M. Villagarcía, A. Cianca, C. Barrera, D. Vega-Moreno, M.J. Rueda and O. Llinás, Measuring surface currents in the Canary Region with Fifteen years of drifting buoy data, EUROGOOS 2014, Lisboa (Portugal), Oct. 2014.
- J. Hernández, J. Schallenberg, E. Quevedo, V. Monagas, J. González and O. Llinás, The Integration of Marine Renewable Energies in Multi-Use Offshore Platforms in the scope of the FP7 TROPOS Project, 5th International Conference on Ocean Energy, Halifax – Nova Scotia (Canada), Nov. 2014.
- T. Szydzik, E. Quevedo, G. M. Callicó, A. Nunez, F. Tobajas, and R. Sarmiento, "Optimization of non-uniform grid projection image super-resolution algorithms by reduced granularity and modified addressing", 29th Conference

on Design of Circuits and Integrated Systems (DCIS), Madrid, Spain, Nov. 2014.

- López, L., D. Vega and Cianca, A (2014). Short-term variability of the Dissolved oxygen and chlorophyll a in the upper waters at ESTOC. IV congreso de Ciencias del Mar, Las Palmas de Gran Canaria, España. 11- 13 Junio.

Others:

- The Directory of Atmospheric, Hydrographic and Biological datasets for the Canary Current Large Marine Ecosystem. IOC-UNESCO Technical Series 110.
- Article on the Leanwind Project in the journal Energética XXI
- Workshop on submarine robotics, materials, improvements, techniques and adapting to the education system. ISBN 84-695-8341-7
- World Meteorological Organisation Newsletter on greenhouse gases published on 9 September 2014, citing the ESTOC station as a data supplier for the study of the acidification of the ocean, analysing and comparing its data with the data collected in the other time series stations of the world.



## PUBLICATIONS AND COMMUNICATIONS TO CONFERENCES

# 13 COMMUNICATION

For PLOCAN to engage with society in general and more specifically with its immediate surroundings, it needs a communication plan that makes it possible for the man in the street to discover the objectives of the ICTS and the most interesting activities they carry out. Press releases were sent out to the media in 2014 for dissemination and on some occasions the press was convened in the PLOCAN facilities, generally to disseminate scientific-technological events and milestones.

The following actions had media repercussion:

- 6 February KOSMOS project
- 25 and 28 February, Educational Passages project
- 2 March, TROPOS project
- 4 March, Agreement signed by PLOCAN and Red Eléctrica
- 9 March, TROPOS project
- 15 March, Test bed reserve area
- 16 March, TROPOS project
- 20 March, UNDIGEN project
- 13 April, Test bed reserve area
- 17 April, Educational Passages project
- 29 April, Meeting of the International Energy Agency
- 28 May, Submarine robotics workshop
- 28 May, Netbiome conference
- 31 May, Report on gliders
- 26 June, UNDIGEN project
- 4 July, Meeting of marine APPA
- 24 October, KOSMOS2 project
- 13 November, GEOMAR agreement
- 2 December, KOSMOS2 project
- 3 December, Visit by Swedish students
- 11 December, CANAUTIC project

Only one call for applications for jobs was made in 2014, in which nine contracts were on offer. A public competition was held on the principles of merit, transparency, publicity, equity and impartiality. The call for applications was managed electronically; candidates entered their applications and sent their curriculums via an on-line application. The data on the call for applications is presented graphically below:

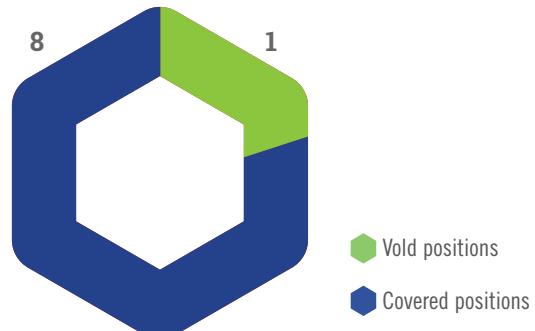


Illustration 77. Ratio between vacancies filled and cancelled

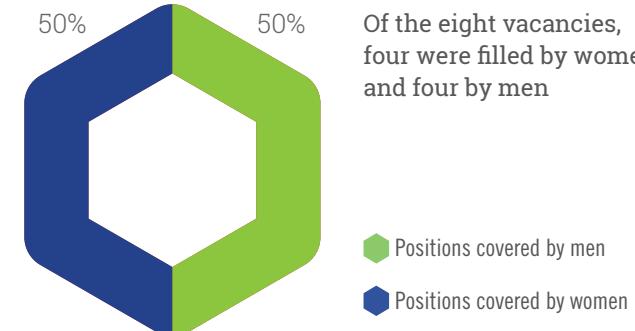


Illustration 78. Ratio between vacancies filled by women and men

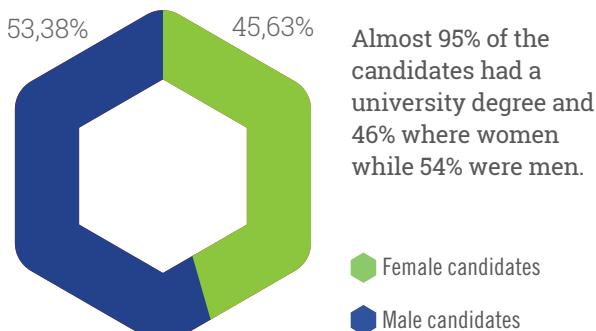


Illustration 79. Candidates answering the call for applications by sex

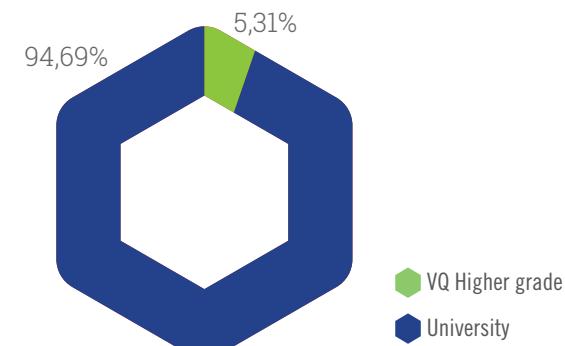


Illustration 80. Candidates applying by qualifications

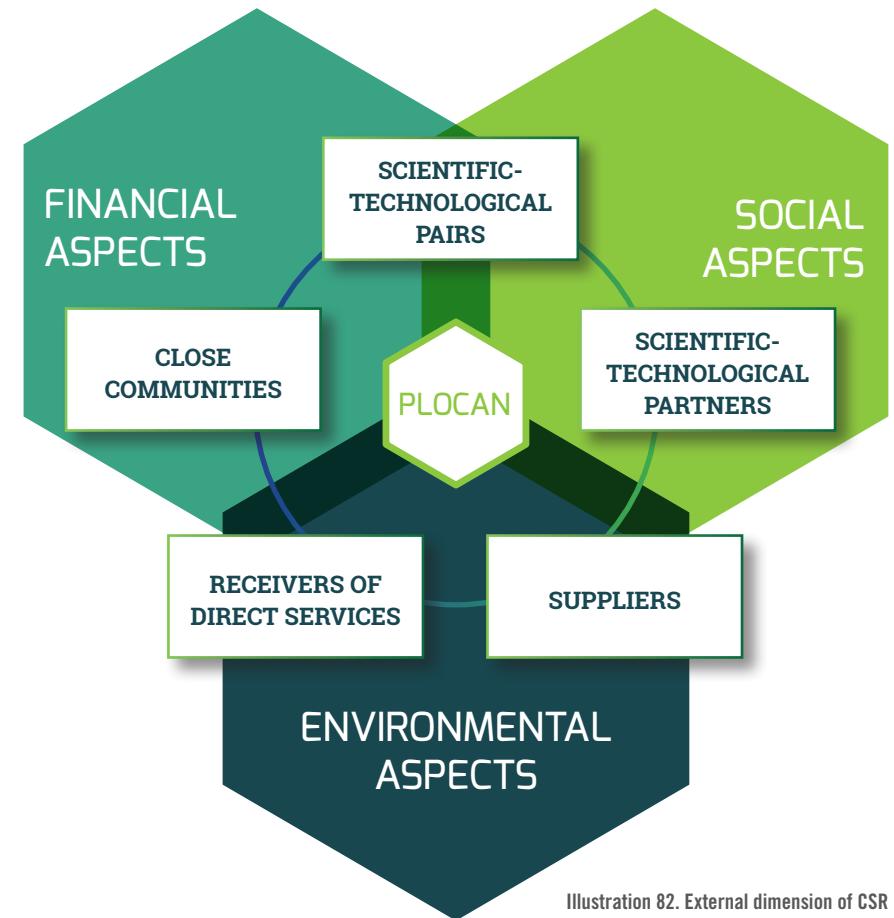
PLOCAN considers Social Responsibility to be the “series of commitments of different kinds, economic, social and environmental, adopted by organisations and institutions that provide value added to complying with the legal obligations, while at the same time contributing to social and economic progress in the framework of sustainable development”. The final purpose of Social Responsibility is to promote sustainable development and social welfare.

The model of the Annual Report on Social Responsibility of the General State Administration (AGE, as it is known in Spanish) 2012, published by the Ministry of Finance & Public Administrations through the Secretariat of State for Public Administrations has been followed to classify the socially responsible actions that PLOCAN implements.

The issues included in Social Responsibility are divided into three blocks:



Social Responsibility has an internal dimension that includes responsible practises that affect the activities that the organisation itself controls directly, without intermediation, in economic, social and environmental aspects. The external dimension includes responsible practises of the activities that affect the organisation in the aforesaid aspects. The two dimensions are inter-dependent.



**Actions aimed at SCR compliance continued to be rolled out in 2014. These measures are included in both the PLOCAN annual action plan and in the CSR plan itself.**

In the case of Strand 1 actions, some concern the management and internal operation of the Consortium and others the marine-maritime scientific-technological activity per se. Measures include:

- Developing an environmental surveillance plan for construction that goes beyond the obligations set out by the environmental impact statement.
- Continuous monitoring of the test bed
- Energy-saving measures relating to climate control and office equipment
- Measures aimed at reducing paper consumption
- Measures aimed at implementing waste sorting and awareness raising among the staff

Strand 2 includes the measures aimed at improving the welfare and working atmosphere of the employees. Those implemented in 2014 include:

- Training actions. Drafting and assessment of the annual training plan
- Measures aimed at motivating the staff regarding the vision and understanding of the project objectives
- Enhance health and safety beyond regulatory compliance
- Flexibility in working hours
- Work resources and systems that provide ideal conditions
- Work in co-ordination with staff representatives to improve the working atmosphere
- Enhance communication. Provide information of interest to the staff on the intranet.

Strand 3 includes measures relating to good governance. These include:

- Implementing the UNE ISO9001 quality standard in organisational procedures to obtain the quality certificate
- The senior management's firm commitment to quality
- Implement the CSR plan
- Engage people and stakeholders. Develop and improve the communications plan. Attention to stakeholders.
- Foster scientific-technological vocations
- Shared management of the infrastructures with other institution and synergic use of resources
- Co-operation with public and private entities. Propitiate national and international co-operation agreements with public and private entities.

- Roll out work and document management systems that promote collaboration between members of the organisation and third parties
- Propitiate an exchange of know-how and temporary mobility with other institutions for personnel
- Attract new projects that provide the Consortium with additional funding
- Increase the type and number of services
- Assess project management
- Up-date and maintain documented work procedures

A quality system pursuant to the UNE-EN ISO 9001:2008 standard was rolled out in the organisation. PLOCAN's aim with investing in quality is to certify the quality and gradually increase the scope of certified activities. The main core of the certification comprises training activities, directly involving mainstream activities such as procurement management (purchases, selection, contracting and supplier management) and human resources management (selection, contracting, training and monitoring the competence of the staff).

Quality is a direct commitment by the senior management as they state in the quality policy appended to the organisation's quality manual. PLOCAN pursues the maximum objectives of customer service and quality in all its activities, which focus on ensuring that the best research,

technological development and innovation come to market as soon as possible to drive economic growth and jobs by providing efficient access to the ocean at increasing depths in an environmentally sustainable fashion.

PLOCAN's definition of quality combines a concern for doing the best possible job and constantly improving, in order to meet the requisites of our customers and comply with legal and regulatory requirements.

The management has created a quality department to oversee compliance in the organisation in legal matters and with the ISO 9001:2008 standard, and to orient the organisation as a whole towards continual improvement. The personnel of the organisation have received quality training in 2014.

Below is an analysis of the most important figures with respect to implementing the 2014 budget.

Contribution received by PLOCAN in 2014 come from:

- Members:** Ministry of Economy and Competitiveness (MINECO) and the Canary Island Government with respect to creating the PLOCAN Consortium (A)
- Other Sources of Funding:** Revenues arising from PLOCAN participation in R+D+i projects that allow for the research and scientific and technological development of the marine-maritime sciences, provision of services and financial revenues (B)

The following table shows the aforementioned contributions along with the total sums of expenses arising from creating the PLOCAN Consortium (C) and those incurred through PLOCAN participation in R+D+i projects, provision of services and financial revenues (Other Expenses, D).



Illustration 83. Income and expenditure report 2014

The total sum of the contribution from the Ministry of Economy and Competitiveness and the Canary Island Government in 2014 amounted to €2,467,950.

The total revenues received by PLOCAN during the year for participating in R+D+i projects, from domestic and international bodies, centres, companies and other sources of funding, was €2,112,550.12€.

The proportion of revenues received in 2014 according to their origin is shown in graph form below:

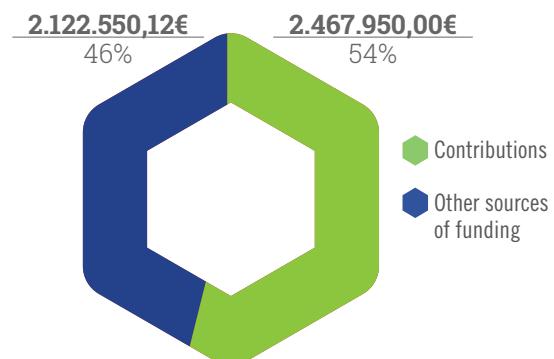


Illustration 84. Revenues 2014

The total expenses incurred in 2014 amounts to €3,061,432.27, part of which is used to cover expenses arising from creating the PLOCAN Consortium (€2,351,892.85€) and part is used on research and scientific and technological development in the marine-maritime sector (€709,539.42).

Below are the expenses percentages for 2014:

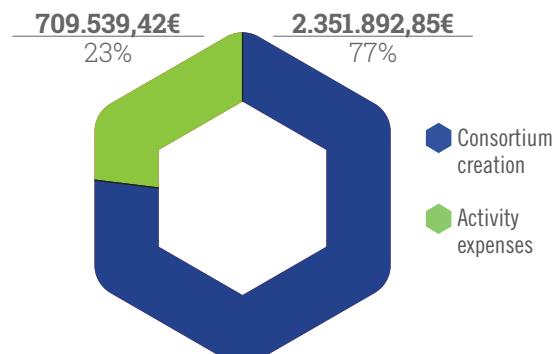


Illustration 85. Expenses 2014

Five contract procedures were processed in 2014 and another was started. Of the five contract procedures processed, three contracts were awarded, as one was declared null and void and another remains open at the end of 2014. All the procedures were implemented in accordance with the Amended Text of the Public Sector Procurement Act (Texto Refundido de la Ley de Contratos del Sector Público).

Information on each of the aforementioned tender processes is provided below.

CONTRACT FILE CODE	L-CPS-PA-1/2014
TITLE	Cleaning the on-shore buildings of the Consortium for designing, building and managing the Canary Island Oceanic Platform
KIND OF CONTRACT	Service
TENDER PROCEDURE	Open
BASIC TENDER BUDGET (TAXES NOT INCLUDED)	€ 168.000,00
SUM AWARDED (TAXES NOT INCLUDED)	€ 151.158,46
OBJECT OF THE CONTRACT	<p>The object of the contract is to provide a cleaning service for the following properties belonging to the PLOCAN on-shore facilities:</p> <ul style="list-style-type: none"><li>• Main, two-story office building, with a built surface area of approximately 2,590 m<sup>2</sup>.</li><li>• Central building consisting of two wings, the main wing with two floor to the south, while the northern wing has only one floor, with an approximate built area of 1,250m<sup>2</sup>.</li><li>• Northern Warehouse building, with a built Surface area of approximately 574m<sup>2</sup>.</li></ul> <p>This service is justified because PLOCAN has a series of offices, rooms and other premises that are continually in use by workers and visitor that require a cleaning service that ensures the hygiene and health of the employees and for the proper maintenance of their jobs.</p>
AGREEMENT IT FALLS IN	None

# 18 CONTRACT PROCEDURES

CONTRACT FILE CODE ➤ L-CSU-PA-2/2014

TITLE ➤ Acquisition of an underwater, unmanned autonomous profiler glider

KIND OF CONTRACT ➤ Supply

TENDER PROCEDURE ➤ Open

BASIC TENDER BUDGET (TAXES NOT INCLUDED) ➤ € 182.000,00

SUM AWARDED (TAXES NOT INCLUDED) ➤ € 180.000,00

OBJECT  
OF THE  
CONTRACT ➤

The object of the contract is the acquisition of an underwater, unmanned, autonomous profiler glider; consisting of the following main parts and components:

- Deep hybrid glider
- Power feed cable to the glider
- Kit structure for launch and recovery
- Transport and storage box
- Spare alkaline battery pack
- Spare pair of fins
- Took kit and basic spares
- Year of service of secondary server
- Complete technical documentation (manuals, specification sheets and calibration)

The acquisition of a commercial glider is specifically justified because it can carry reference instrumentation for measuring physical and bio-chemical variables of interest and carry out missions in the area autonomously for prolonged periods of time and covering large areas, while at the same time providing real time data via a two-way satellite communication system.

This supply fall within the co-operation agreement between the General State Administration (Ministry of Economy and Competitiveness) and PLOCAN for the project “Underwater transformer station and equipment for the environmental control of concurrent operation of new marine electricity-generating devices (ETS)”, related to outstanding scientific and technical infrastructures co-financed by the ERDF Operational Technology Fund Programme.

AGREEMENT  
IT FALLS IN ➤

Co-operation agreement with the General State Administration (Ministry of Economy and Competitiveness) for the project “Underwater transformer station and equipment for the environmental control of the concurrent operation of new marine powered electricity generating devices (ETS)”.

Co-financed in 80% by the R+D+i Operating Programme and by the benefit of the Enterprise – Technology Fund, 2007-2013, ERDF Funds.

CONTRACT FILE CODE ➤ L-CSU-PA-3/2014

TITLE ➤ Acquisition of an autonomous, unmanned simultaneous surface and sub-surface observation vehicle

KIND OF CONTRACT ➤ Supply

TENDER PROCEDURE ➤ Open

BASIC TENDER BUDGET (TAXES NOT INCLUDED) ➤ € 290.000,00

SUM AWARDED (TAXES NOT INCLUDED) ➤ Procedure declared null and void. The only bid presented could not accredit the required technical solvency

OBJECT  
OF THE  
CONTRACT ➤

The object of the contract was the acquisition of an autonomous, unmanned, simultaneous surface and sub-surface observation vehicle (ASSV); comprising the following main parts and components:

- ASSV with a propulsion system based solely on wave action parameters
- Graphic user interface
- Dedicated graphic interface for the passive acoustic module (MAP)
- Yearly license for the MAP graphic interface
- Submarine recovery system
- Complete technical documentation (manuals, specification sheets and calibration)
- Transport and storage box
- Transport and storage support
- Tool kit and basic spares

The acquisition of this latest-generation design vehicle is specifically justified because, given the specificity of the operational scenario posed, it is necessary to have mobile observation platforms capable of housing non-conventional instrumentation (normally heavy and voluminous)

This supply also falls within the co-operation agreement between the General State Administration (Ministry of Economy and Competitiveness) and PLOCAN for the project “Underwater transformer station and equipment for the environmental control of the concurrent operation of new marine electricity-generating devices (ETS)”, related to outstanding scientific and technical infrastructures co-financed by the ERDF Technology Fund operational programme.

AGREEMENT  
IT FALLS IN ➤

Co-operation agreement with the General State Administration (Ministry of Economy and Competitiveness) for the project “Underwater transformer station and equipment for the environmental control of the concurrent operation of new marine electricity-generating devices (ETS)”.

80% co-financed by the R+D+I Operational Programme for the benefit of Enterprise – Technology Fund, 2007-2013, ERDF Funds.

CONTRACT FILE CODE ➤ L-CSU-PA-4/2014

TITLE ➤ Acquisition of a ROV system (*Remotely operated vehicle*).

KIND OF CONTRACT ➤ Supply

TENDER PROCEDURE ➤ Open

BASIC TENDER BUDGET (TAXES NOT INCLUDED) ➤ € 175.000,00

SUM AWARDED (TAXES NOT INCLUDED) ➤ € 173.100,00

OBJECT  
OF THE  
CONTRACT

The object of the contract is the acquisition of a ROV system (Remotely Operated Vehicle) comprised of the following main parts and components:

- ROV vehicle, with a transport and storage box
- Umbilical cable, with transport and storage box
- Reel for stowing the umbilical cable
- Surface console, with transport and storage case
- Set of spares and specialised tools
- Complete technical documentation (manual, specification sheet and calibration)

The acquisition of a ROV system (Remotely Operated Vehicle) is specifically justified because among the current options in marine observation platforms, and more specifically vehicles, the only one that can carry underwater cameras are what are known as ROVs, which translated into being able to observe what happens under the surface of the sea remotely and in real time.

This supply also falls within the co-operation agreement between the General State Administration (Ministry of Economy and Competitiveness) and PLOCAN for the project "Underwater transformer station and equipment for the environmental control of the concurrent operation of new marine electricity-generating devices (ETS)", related to outstanding scientific and technical infrastructures co-financed by the EFDR Technology Programme Operational Programme.

AGREEMENT  
IT FALLS IN

Co-operation agreement with the General State Administration (Ministry of Economy and Competitiveness) for the project "Underwater transformer station and equipment for the environmental control of the concurrent operation of new marine electricity-generating devices (ETS)".

80% co-financed by the R+D+I Operational Fund for the benefit of Enterprise – Technology Fund, 2007-2013, ERDF Funds.

The next procedure was opened in 2014 but it was not published in that year:

CONTRACT FILE CODE ➔ L-CSU-PA-5/2014

TITLE ➔ Supply contract for the acquisition of a LARS system (*Launch and Recovery System*)

KIND OF CONTRACT ➔ Supply

TENDER PROCEDURE ➔ Open (processed in advance)

BASIC TENDER BUDGET (TAXES NOT INCLUDED) ➔ € 200,000.00

SUM AWARDED (TAXES NOT INCLUDED) ➔ Pending awarding

OBJETO DEL CONTRATO ➔

The object of the contract is the acquisition of a LARS system (Launch and Recovery System) comprised of the following main parts and components:

- 1 A-Frame type hoist, fold-away and able to be dismantled.
- 1 Anchoring platform
- 1 Basket system with capacity for a minimum of two divers
- 1 Control unit
- 1 Remote control unit
- 1 Hydraulic unit
- 1 Gangway.
- 1 Lighting system
- 2 Winches with stainless steel cables
- 1 Set of spares and specialised tools.
- 1 Complete technical documentation (manuals, specification sheets and calibration)

The acquisition of a LARS system (Launch and Recovery System) is specifically justified because the launch and recovery operations of observation devices (including divers too) require a certain, in some cases, highly specific logistic to allow these operations to be carried out in the best, easiest and above all, the safest manner. To that end, it is considered essential to have a fold-away hoist with a LARS system with all the necessary accessories to be able to carry out the aforesaid operations with the maximum operational expediency and safety. This LARS system will have features to be used initially and preferably from a fixed platform, although the design and installation will mean it can be used from a boat of a certain size if required.

CONVENIO EN EL QUE SE ENMARCA ➔

This supply also falls within the co-operation agreement with the General State Administration (Ministry of Economy and Competitiveness) for the project "Underwater transformer station and equipment for the environmental control of the concurrent operation of new marine electricity generating devices (ETS)", related to outstanding scientific and technical infrastructures co-financed by the EFDR Technology Programme Operational Programme.

# 18 CONTRACT PROCEDURES