



Improving monitoring capabilities in the Macaronesia region with ocean gliders

C. Barrera, R. Caldeira, C. Waldmann, M.J. Rueda, J. Brito and O. Llinas.
5JEH. Lisbon. 19th-21st June 2018.

Outline

- The **PLOCAN** infrastructure
- **Gliderport** facility
- Glider **missions** across the Macaronesia

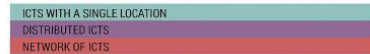


PLOCAN INFRASTRUCTURE



MAP OF UNIQUE SCIENTIFIC AND TECHNICAL INFRASTRUCTURES (ICTS)

TYPES OF ICTS



SCIENTIFIC FIELDS



National Government
(50%)

50 M€
2007-2021

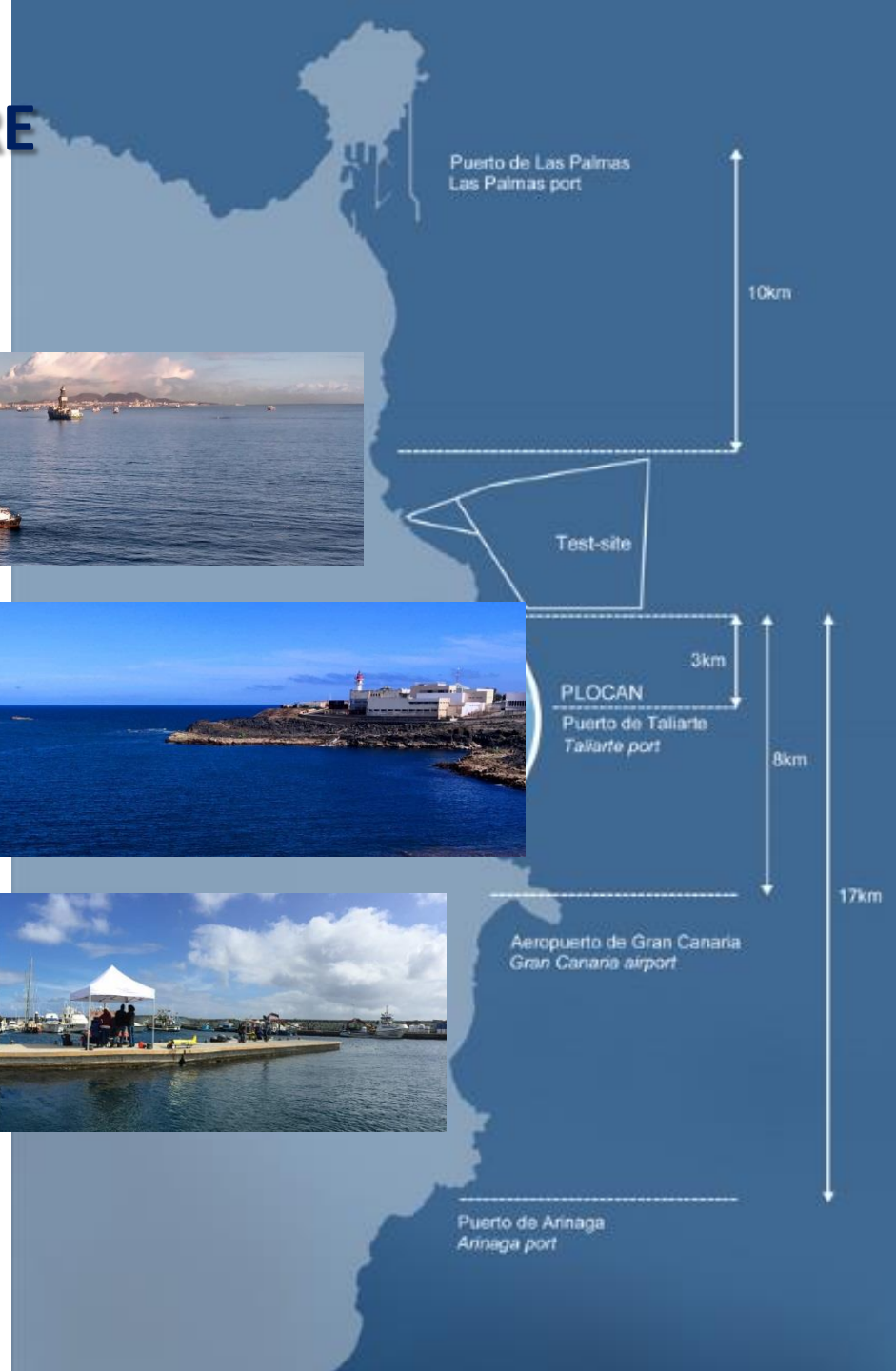
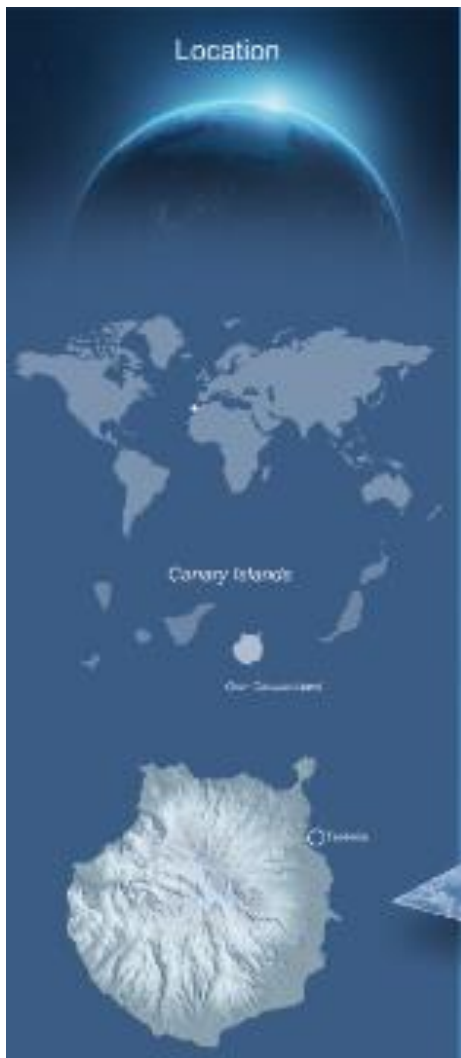
Regional Government
(50%)

□ **Main goal :**
Design, Construction and Operation of an offshore platform for *Research & Innovation* in the field of marine science and technologies.

□ **Strategy in key words:**

Interdisciplinary, large projects, innovation oriented, Testing and Demonstration, cluster local R&D, international alliance, tailored infrastructures and services, leverage funds, public and political support.

PLOCAN INFRASTRUCTURE

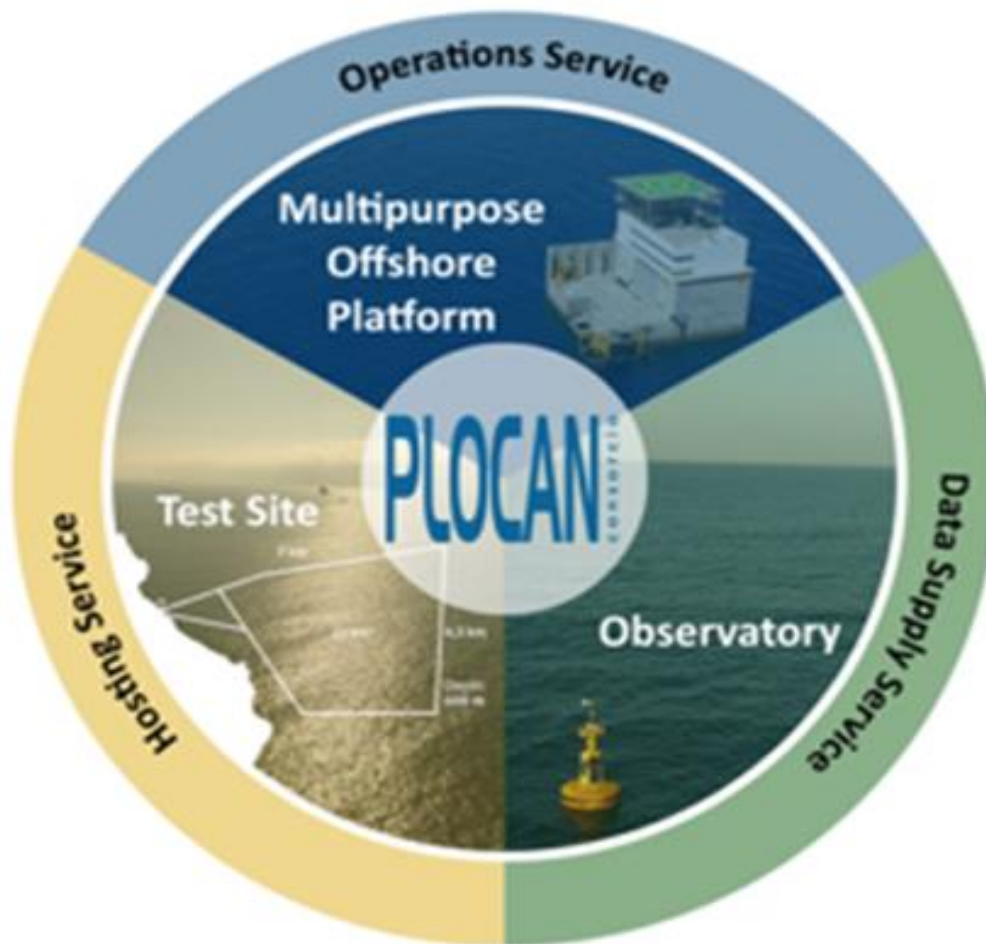


PLOCAN INFRASTRUCTURE

PLOCAN

consorcio

Plataforma Oceánica de Canarias
Ciencia y Tecnología para la Sostenibilidad del Océano
Oceanic Platform of the Canary Islands
Science and Technology for Ocean Sustainability



PLOCAN es una Infraestructura Científica y Técnica Singular (ICTS) incluida en el mapa de ICTS españoles.

PLOCAN dota a la comunidad científico-técnica pública y privada de una infraestructura multidisciplinar, única en su género, con el objetivo fundamental de facilitar el acceso al océano profundo.

PLOCAN (Oceanic Platform of the Canary Islands) is a Unique Scientific and Technical Infrastructure (ICTS) set out in the Spanish roadmap.

PLOCAN provides the scientific and technological community, both public and private with a unique multidisciplinary infrastructure, whose core purpose is to facilitate the access to the deep ocean.

La actividad de PLOCAN girará en torno a cinco conceptos fundamentales:

- Plataforma de innovación socioeconómica
- Banco de ensayos
- Observatorio
- Base de vehículos marinos autónomos
- Centro de alta especialización

PLOCAN's activity will focus on five key concepts:

- Platform for social and economic innovation
- Marine Test Site
- Observatory
- Fleet of unmanned marine vehicles
- Highly specialised centre

Se sitúa junto al borde de la plataforma continental al nordeste de la Isla de Gran Canaria.

La Plataforma ofrece una plena garantía medioambiental de las actividades que se desarrollan en ella.

This platform is located on the edge of the continental platform, on the North-East of the Island of Gran Canaria.

The Platform guarantees that all the activities performed on it will be fully environmentally friendly.



PLOCAN es una iniciativa movilizadora de ciencia y tecnología marinas de carácter general, que promueve la sostenibilidad y la competitividad socioeconómica empresarial internacional derivada del acceso al espacio marino oceánico.

PLOCAN is an initiative deploying general marine science and technology so as to promote sustainability and international social and economic business competitiveness based on the access to the ocean.



Consorcio Científico y Técnico de Canarias



PLATAFORMA OCEÁNICA DE CANARIAS
Gobierno de Canarias



PLATAFORMA OCEÁNICA DE CANARIAS
Gobierno de Canarias





PLOCAN INFRASTRUCTURE



PLOCAN FACILITY – TEST SITE

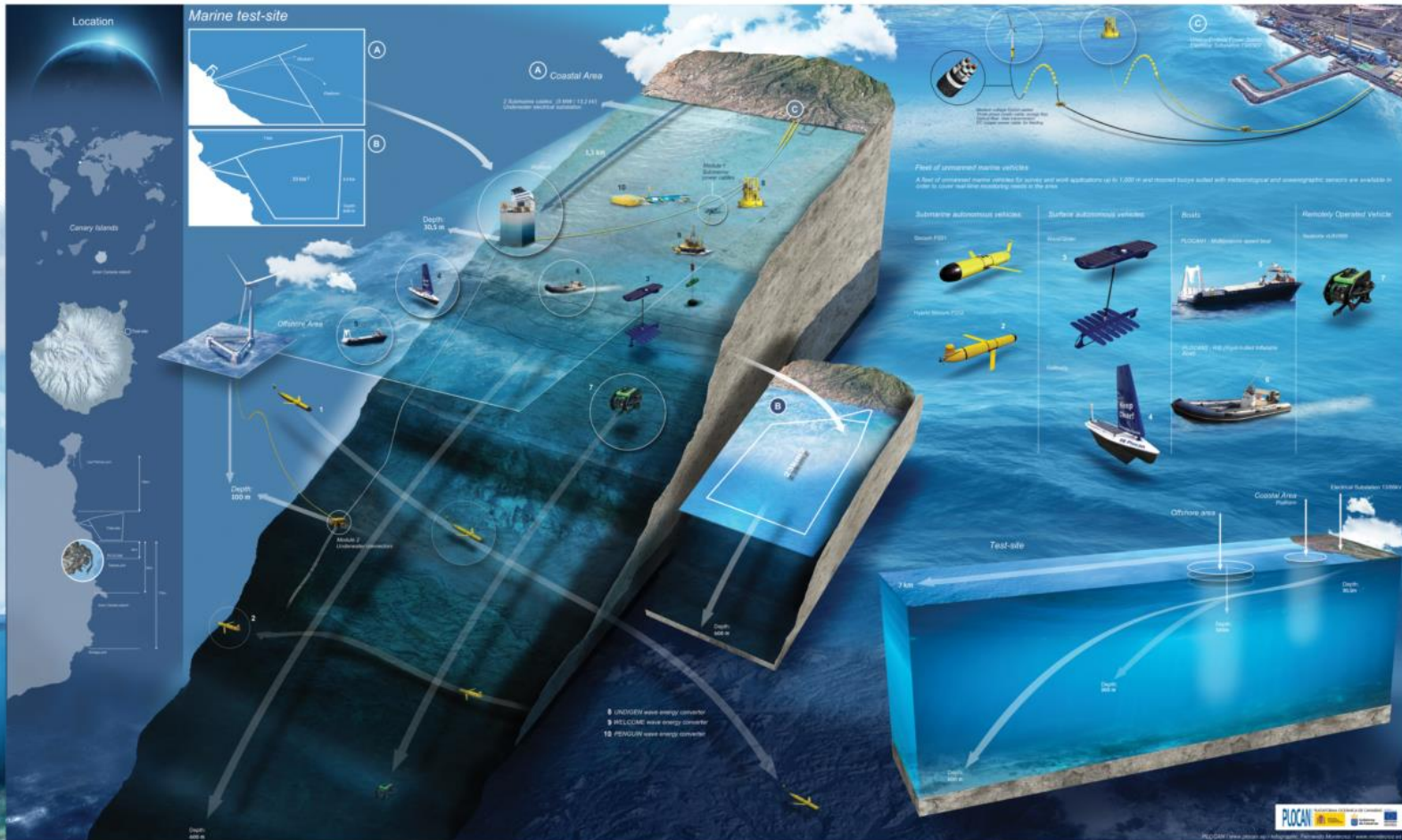
PLOCAN Marine Test Site

The PLOCAN offshore test site area is 23 km², located 3 nautical miles from the PLOCAN Land Base and also quite near to the major harbor of Gran Canaria Island (Las Palmas Port). The area offers progressive depths from shore up to 600 m (deeper upon request) dedicated to study the behaviour and efficiency of different types of maritime devices and technologies and contributing to speed up the process of their introduction into the market.

The marine area of PLOCAN test site was comprehensively studied with a view of offering an optimal space in terms of logistics, supported infrastructures and grid connection. In addition, the area has excellent environmental conditions facilitating at least 9 months of operational window and optimal wind and wave energy resources for testing/demonstration operations, which range from 300-400 kW for wind power density and from 4 to 8 kW/m of wave power.

Platform

Technical zone (400 m²)
Length: 37.9m
Main crane
Gantry crane
Expo Room
Training Room
Warehouses
Break Room
8 double rooms
3 individual rooms

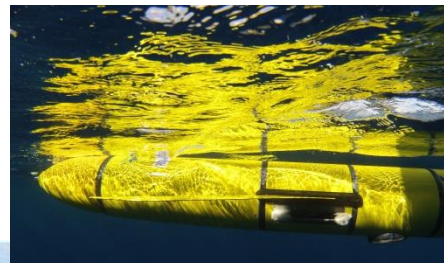
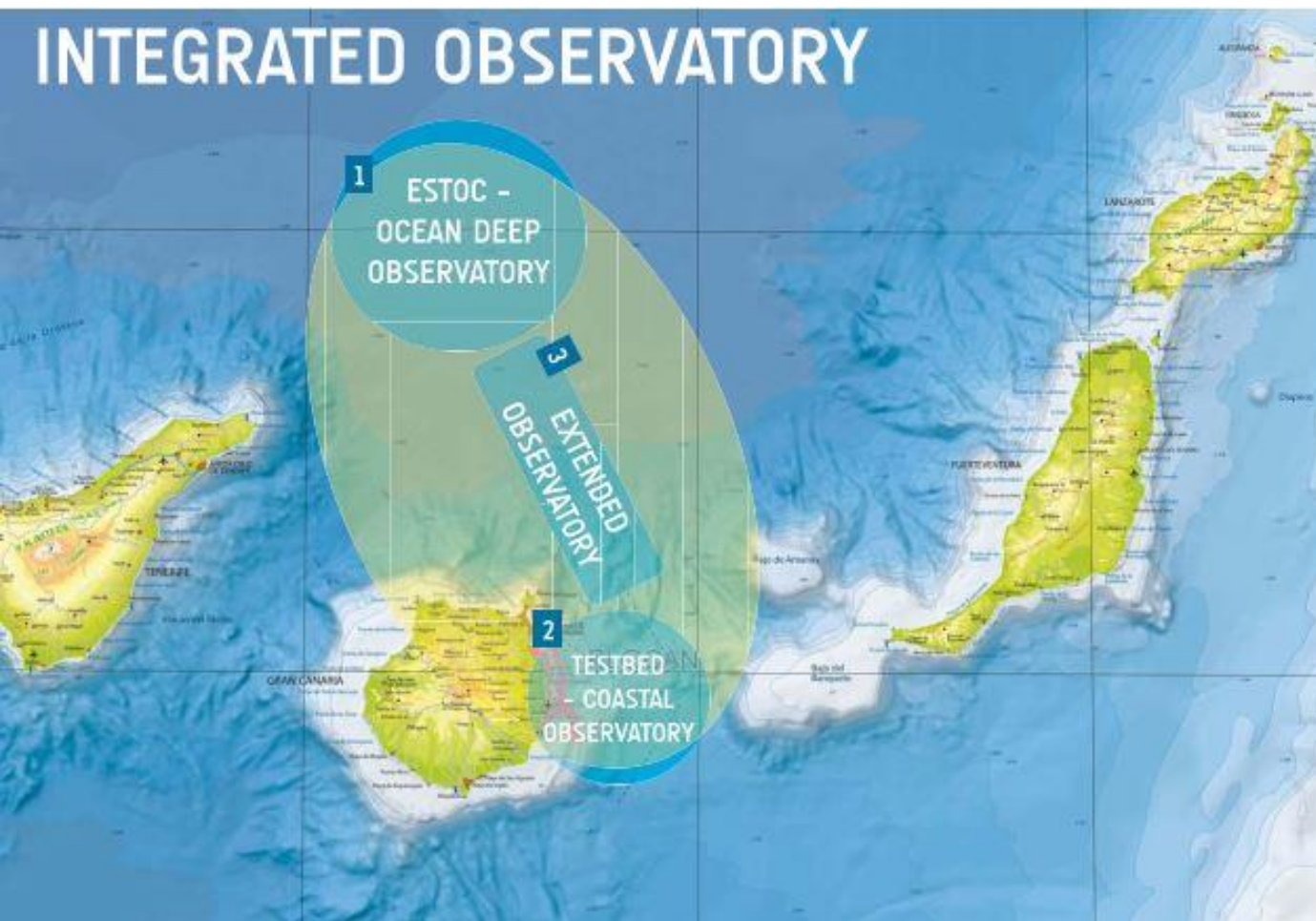


PLOCAN FACILITY – TEST SITE



PLOCAN FACILITY – OBSERVATORY

INTEGRATED OBSERVATORY



PLOCAN FACILITY – GLIDERPORT



VIMAS

Vehículos Instrumentos y Máquinas Submarinas

FLEET

FACILITIES

ACTIVITIES

PARTNERSHIP



- **Slocum glider G3 (1000 m.)**
CTD, DO, TURB and FLU
- **Slocum glider G2 (1000 m.)**
CTD, DO, TURB and FLU
- **Seaglider M1 (1000 m.)**
CTD, DO, TURB and FLU.
- **SeaExplorer (700 m.)**
CTD, DO, TURB, FLU and HC
- **Wave Glider (SV2)**
CTD, DO, MET and PAM
- **Sailbuoy**
CTD, DO, MET, TUR, FLU and HC
- **ROV SeaBotix vLBV 950 (950 m.)**
TEMP, ALTIM, B/W and COL CAM, IMAG SONAR
- **ROV BlueROV2 (100 m.)**
TEMP, COLOR CAM

- **Wet and Dry lab (200 m²)**
- **Dedicated benches and tooling**
- **Ballasting area (fresh and target water)**
- **Storage area**
- **Control room**
- **Teaching and meeting rooms**
- **Transport VAN**

- **Mission planning and performance.**
- **Maintenance.**
- **Subsystem integration and testing.**
- **Piloting.**
- **Training.**
- **Deployment/Recovery maneuvers.**

- **Joining R&D projects with private and public entities.**
- **Support activities into specific programs and initiatives.**
- **Glider School.**
- **Prototype testing.**

PLOCAN GLIDERPORT FACILITY



PLOCAN GLIDERPORT FACILITY

9th

International Glider School
Gran Canaria 1-5 October 2018



www.gliderschool.eu

Partners:



PLOCAN GLIDERPORT FACILITY

PLOCAN

Home

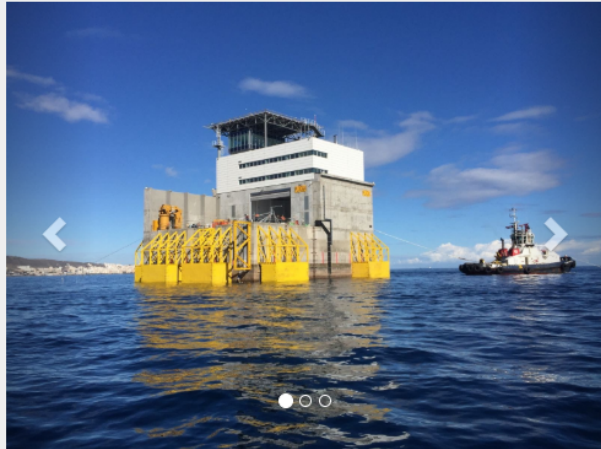
Vehicles

Drifters

Educational Passages

Climatology

Contact Us



Oceanic Platform of the Canary Islands (PLOCAN)

Research Infrastructure (RI) labeled by the ICTS (Unique Scientific and Technological Infrastructure) Spanish National Roadmap.

PLOCAN is a multipurpose technical-scientific service infrastructure that provides support for research, technological development and innovation in the marine and maritime sectors, available to public and private users. PLOCAN offers both onshore and offshore experimental facilities and laboratories, operational throughout the whole year thanks to the Canary Islands excellent climatic conditions. PLOCAN also brings a broad experience in large national and EU marine/maritime projects.

As part of its activities, PLOCAN manages a variety of Observation Platforms in order to provide a continuous and real-time in-situ monitoring of the ocean. These platforms can be both fixed or mobile, providing information about the ocean surface and/or the water column. Different sensors are placed in PLOCAN Observation Platforms allowing access to physical, biochemical and climatological data.



VEHICLES



DRIFTERS



FIXED STATIONS



CLIMATOLOGY



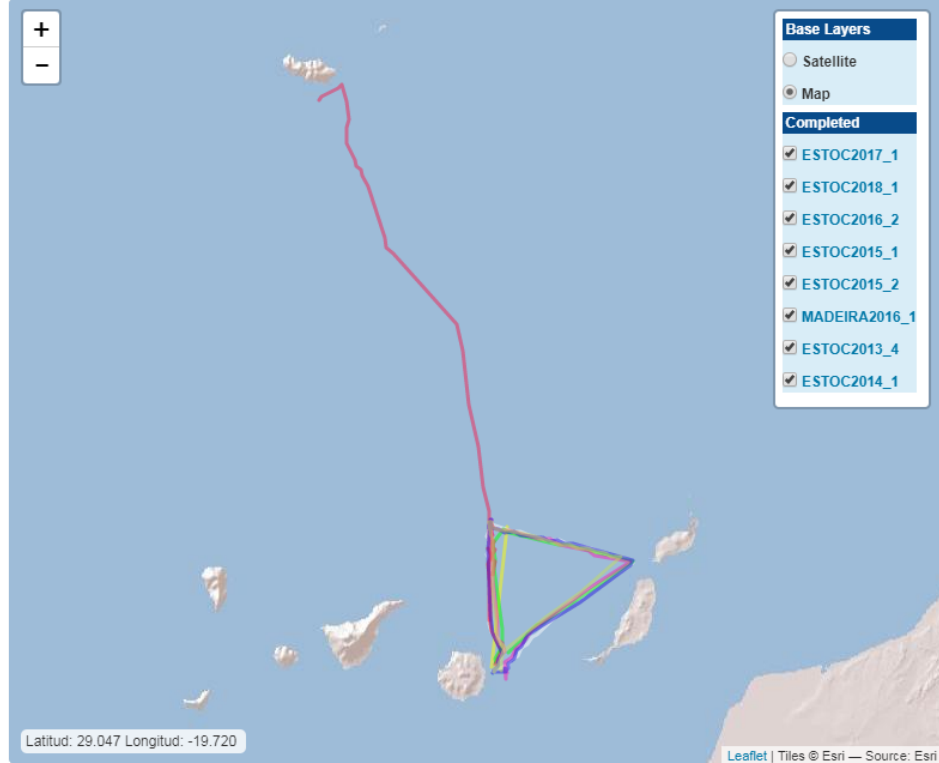
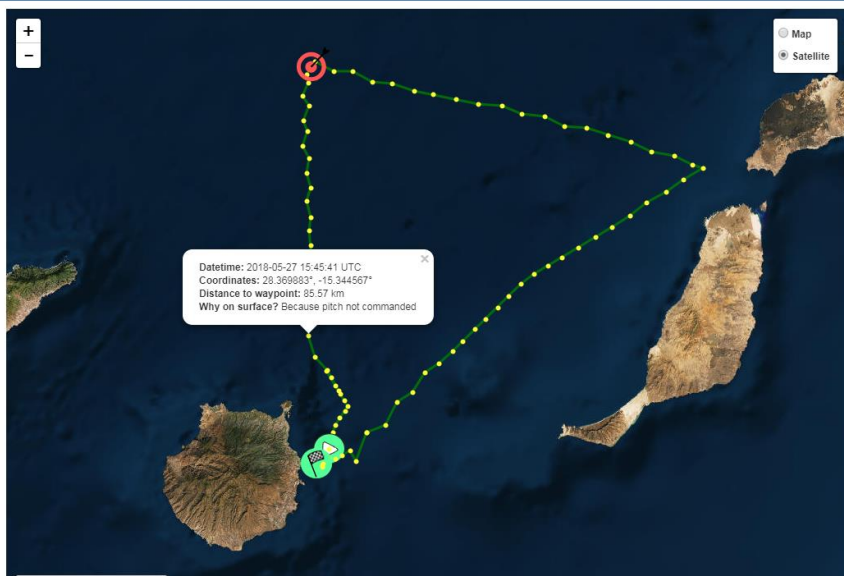
EDUCATIONAL PASSAGES

<http://obsplatforms.plocan.eu/>

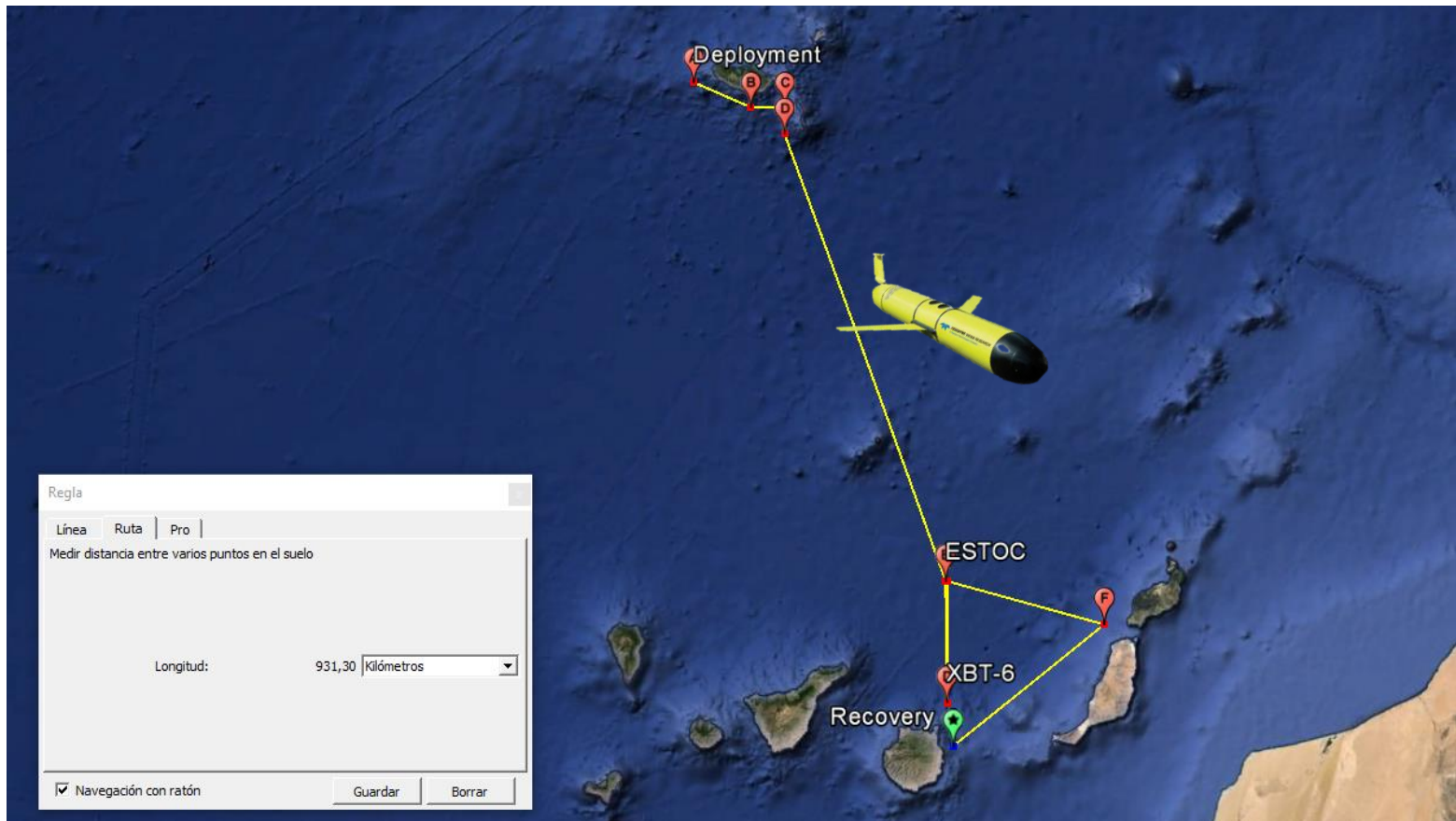
PLOCAN GLIDERPORT FACILITY



Mission	Gliders	Start	Last comm	State
ESTOC2018_1	P202	2018-05-25 09:38	2018-06-13 12:42	Completed
ESTOC2017_2	P202	2017-06-19 10:34	No comms available	Completed
ESTOC2017_1	P202	2017-03-08 10:42	2017-03-09 11:12	Completed
ESTOC2016_1	P202	2017-03-02 10:12	No comms available	Completed
ESTOC2016_2	P201	2016-11-15 10:29	2016-11-20 00:04	Completed
MADEIRA2016_1	P201	2016-04-11 15:41	2016-05-09 12:38	Completed
TEST-SITE2016_1	P202	2016-01-13 09:30	No comms available	Completed

[1](#)[2](#)[3](#)[4](#)[»](#)[»](#)

GLIDER MISSIONS ACROSS THE MACARONESIA



- 7 weeks duration (360 dives@1000 m. depth)
- Seawater parameters sampled: CTD, DO, TURB and CHL-A
- Partnership with OOM, IH/Marinha y Armada.

GLIDER MISSIONS ACROSS THE MACARONESIA



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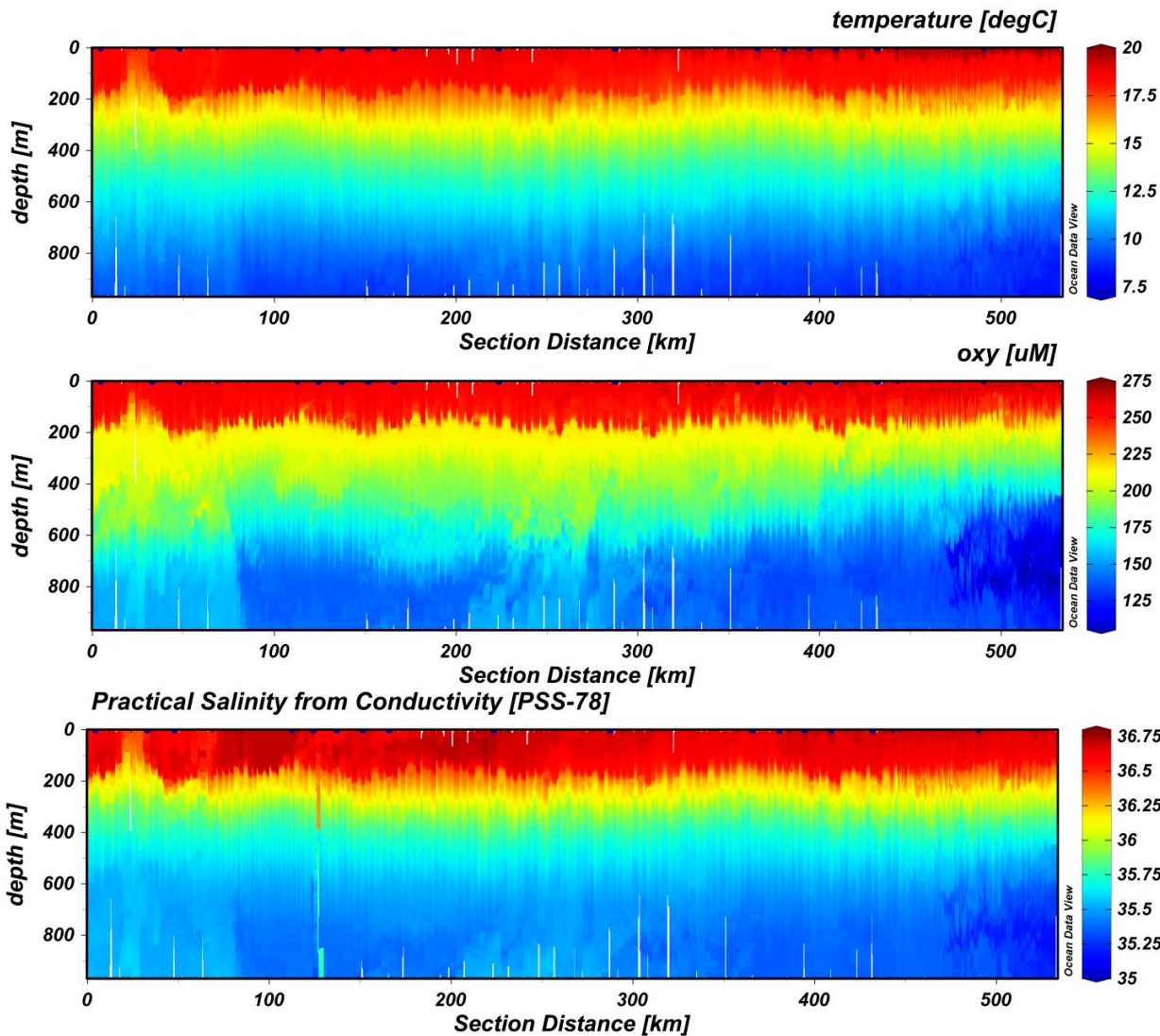
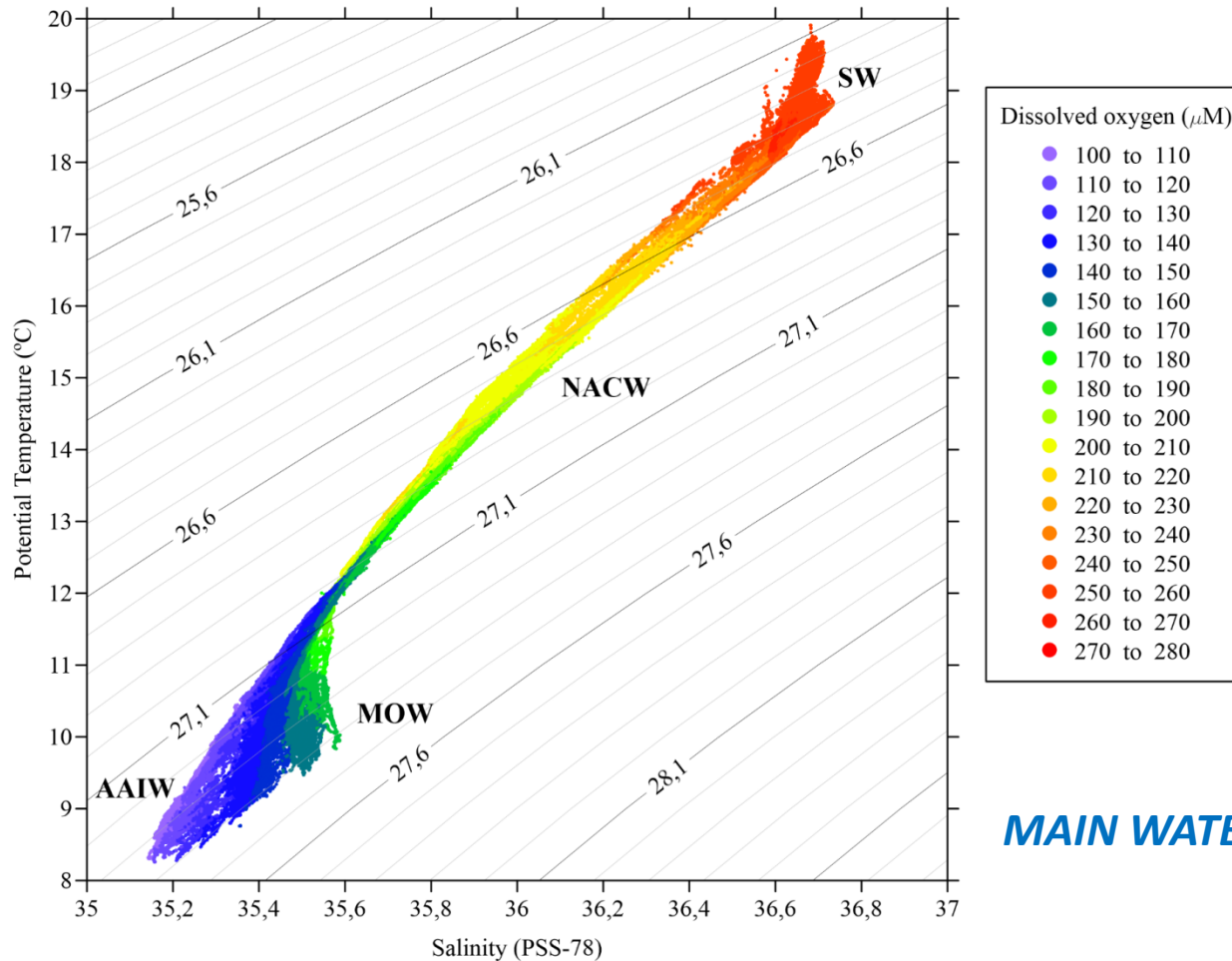
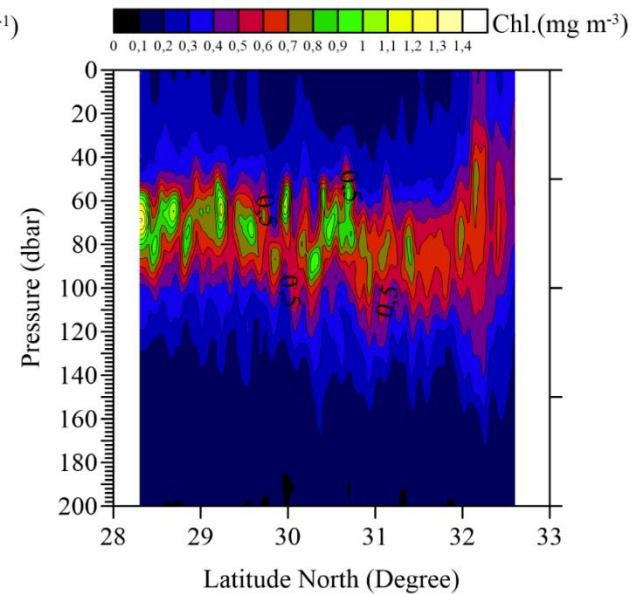
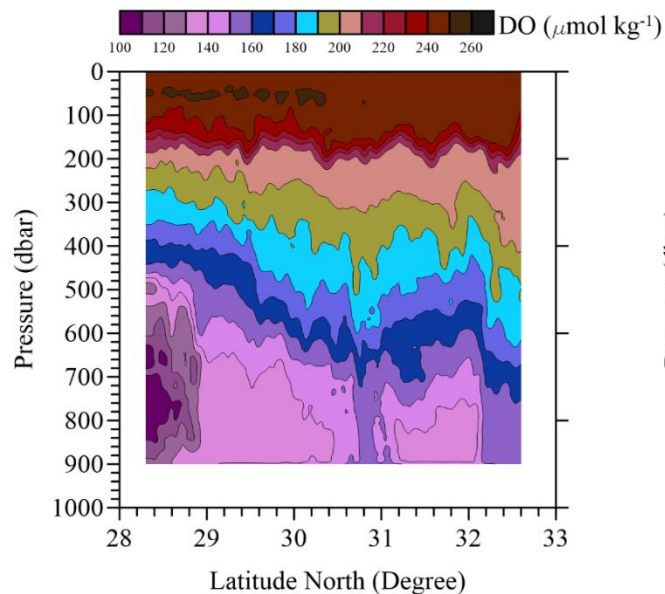
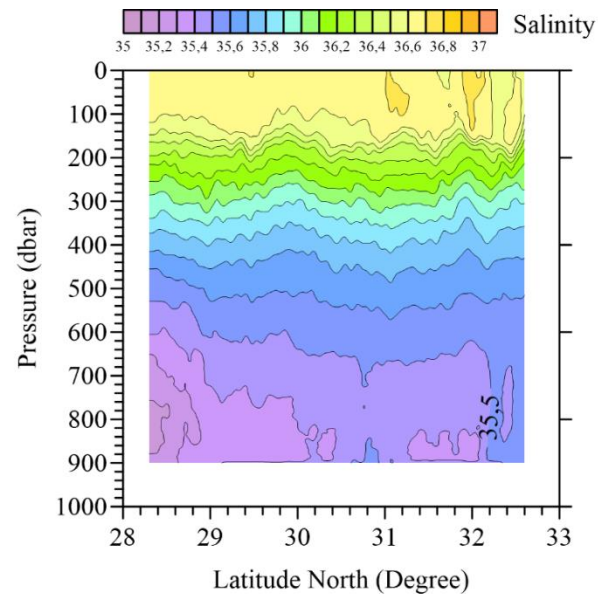
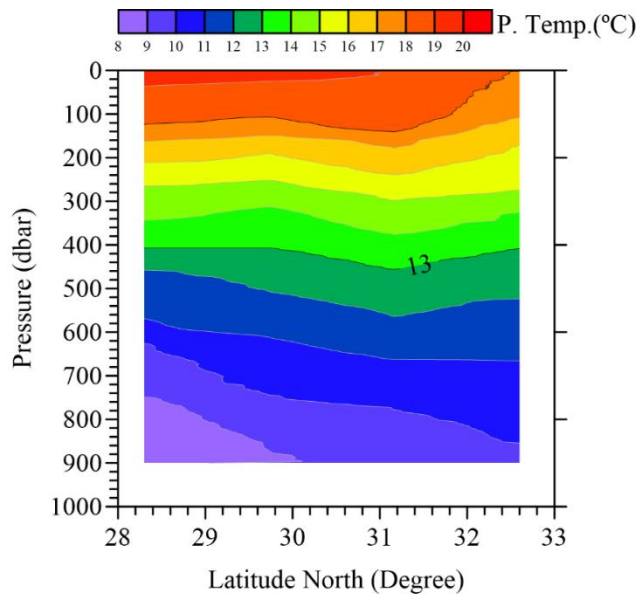


DIAGRAM OF TEMPERATURE- SALINITY AND DISSOLVED OXYGEN

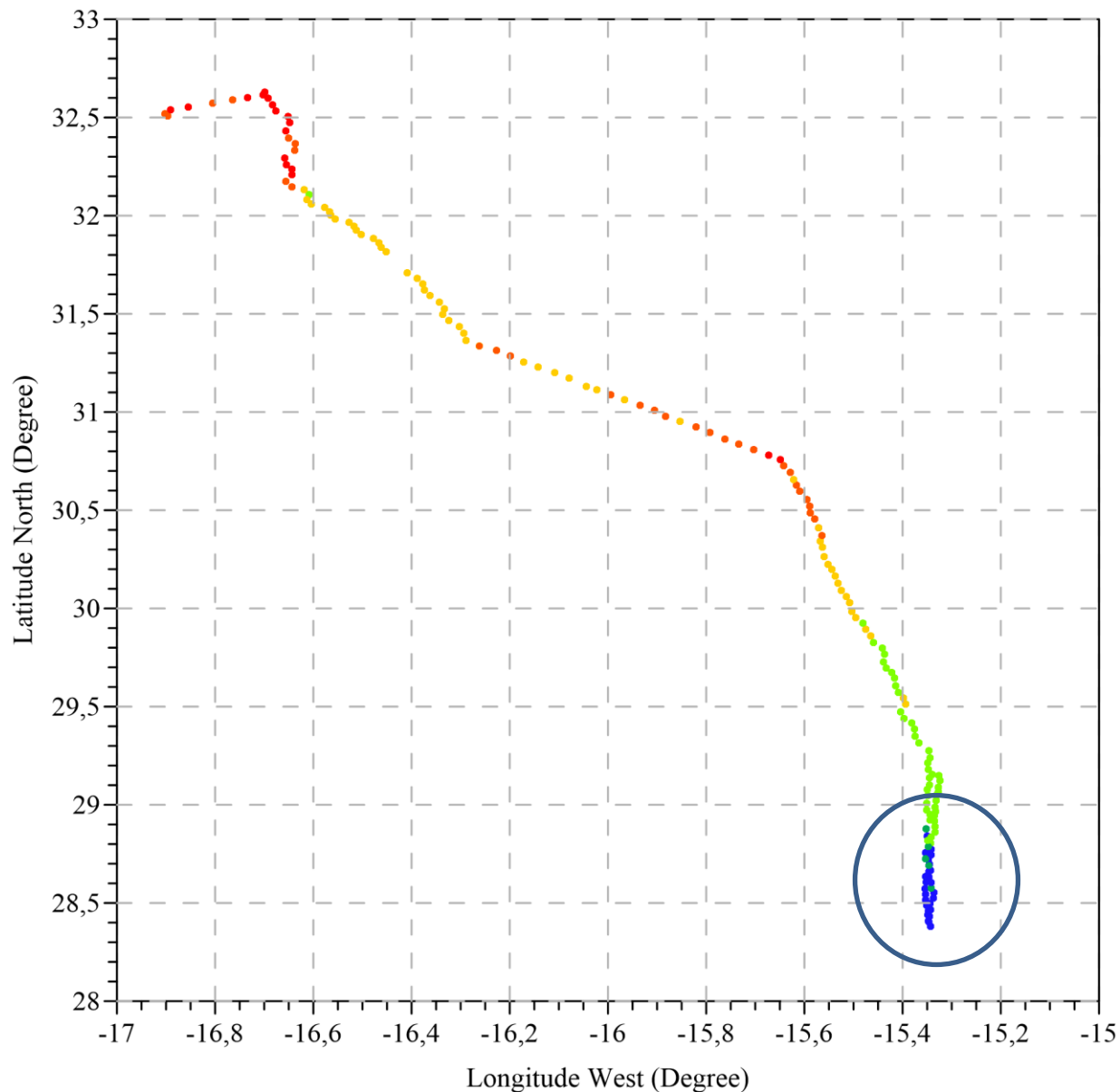


MAIN WATER MASSES

GLIDER MISSIONS ACROSS THE MACARONESIA



GLIDER MISSIONS ACROSS THE MACARONESIA



**SPATIAL
DISTRIBUTION OF
HIGHER PROPORTION
OF AAIW
(27,3- 27,4) SIGMA
THETA**



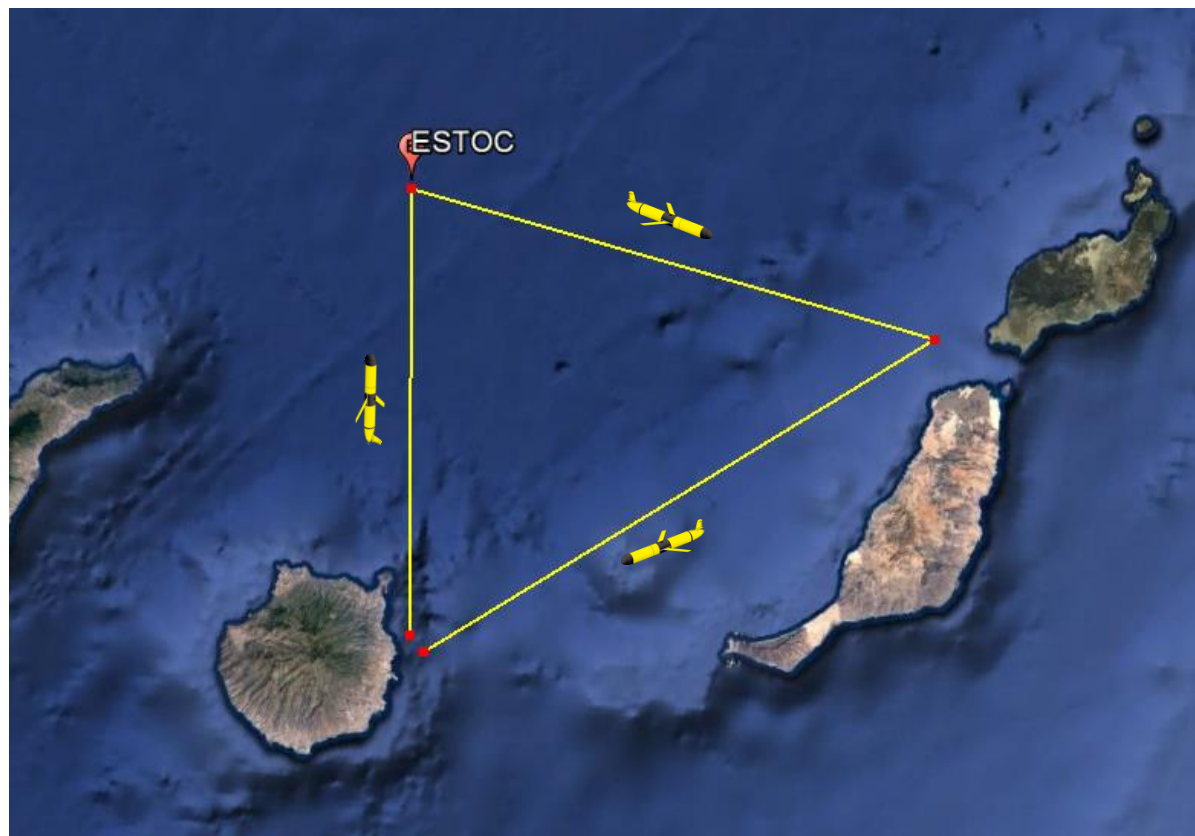
GLIDER MISSIONS ACROSS THE MACARONESIA

ESTOC ocean time-series site, as deep-node of the PLOCANS' Integrated Ocean Observatory, has a permanent multiplatform monitoring program since 1994, where ocean-gliders nowadays represent a key-one of the latest technologies able to provide data in NRT.

Different glider technologies (buoyancy-driven and surface) are operated interchangeably to support a seasonal observations program. Primary sampled parameters are conductivity, temperature, dissolved oxygen, Chl-a, turbidity and CDOM.

Gliders provide useful information for surface and intermediate water masses characterization (MMW, NASTMW, ENAW, MW, AAIW, etc.) in the area of interest. Each seasonal mission last three weeks in order to cover the distance of 200 nautical miles.

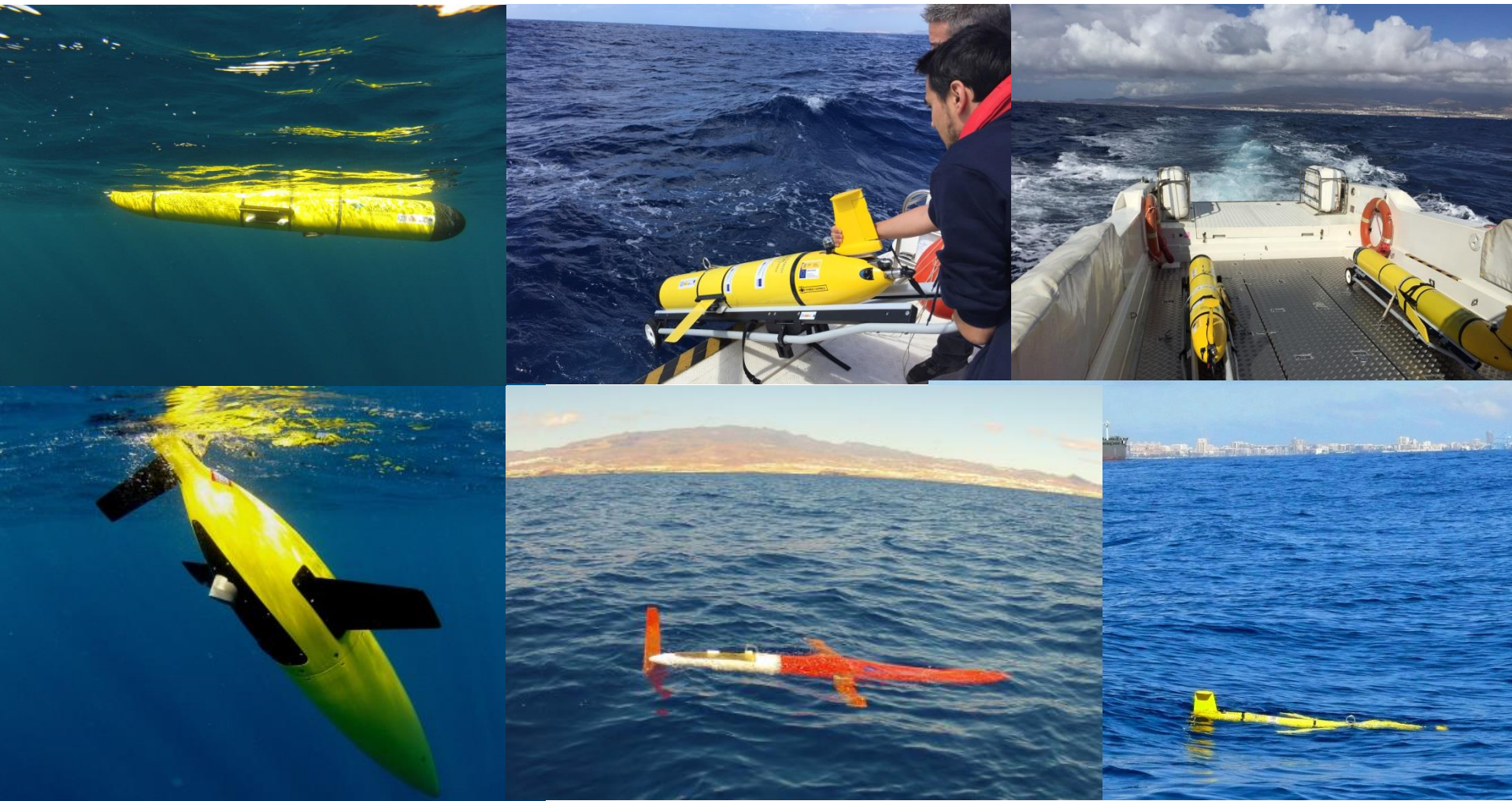
<http://gliders.plocan.eu>



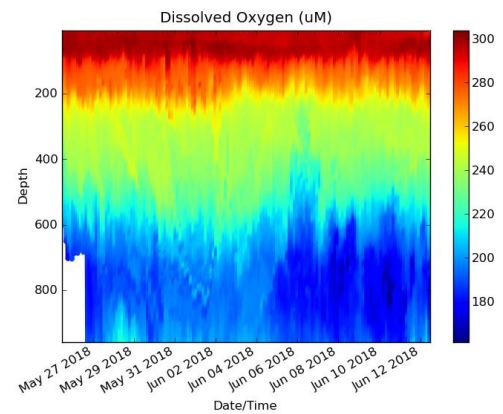
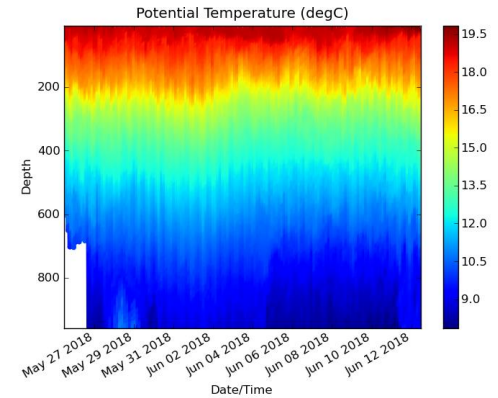
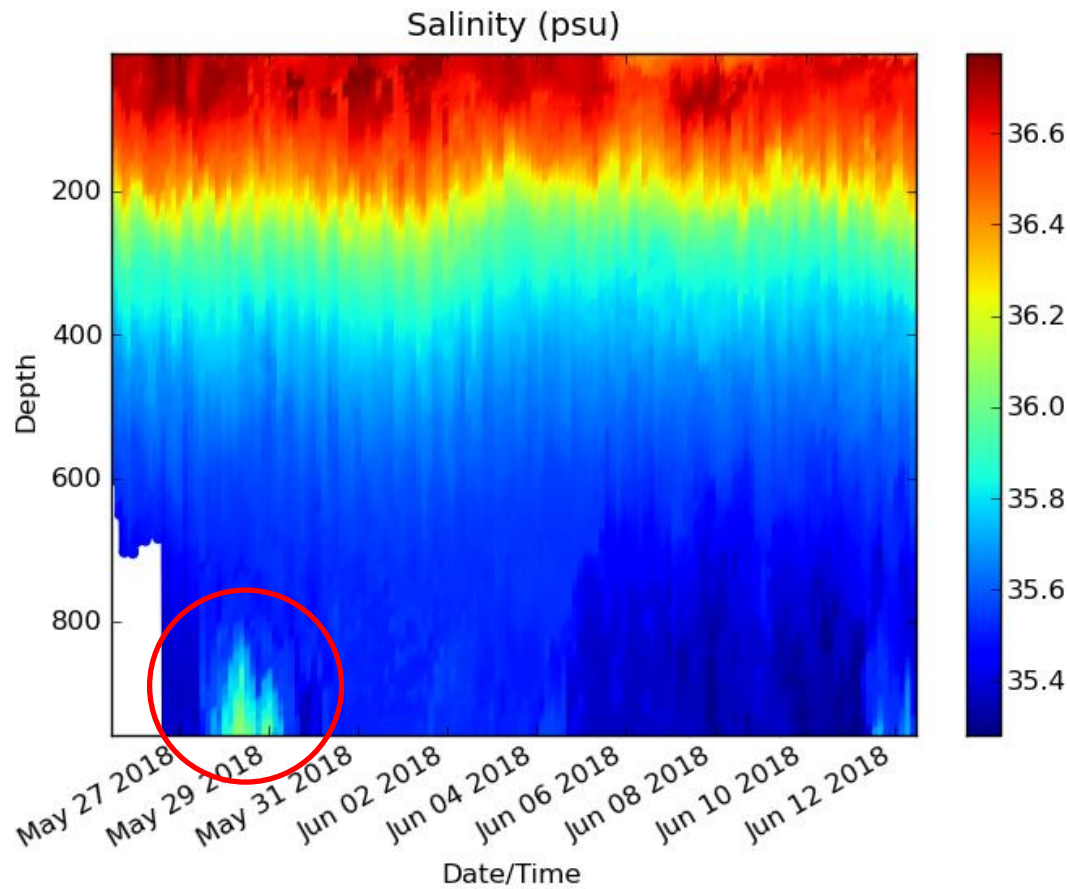
- Seasonal mission – Endurance line.
- 3 weeks duration (aprox. 170 dives@1000 m. depth)
- Seawater parameters sampled: conductivity, temperature, dissolved oxygen, turbidity and chlorophyll-a
- Partnership with IEO (RAPROCAN line support)



GLIDER MISSIONS ACROSS THE MACARONESIA



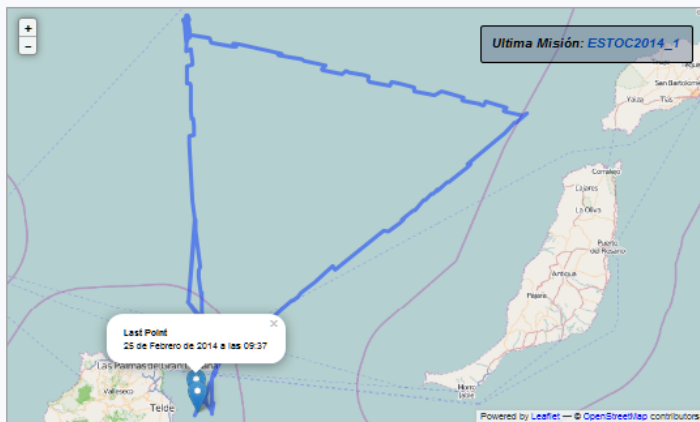
GLIDER MISSIONS ACROSS THE MACARONESIA



GLIDER MISSIONS ACROSS THE MACARONESIA



Misiones Glider



Misión	Glider	Fecha de Inicio	Fecha de Fin	Institución	KML
ICOVBO	P201	12 de Septiembre de 2011 a las 09:48	26 de Septiembre de 2011 a las 11:25	PLOCAN	Descargar kml
ESTOC2012_1	P201	28 de Febrero de 2012 a las 15:02	6 de Marzo de 2012 a las 11:55	PLOCAN	Descargar kml
ESTOC2012_2	P201	24 de Octubre de 2012 a las 14:39	31 de Octubre de 2012 a las 20:24	PLOCAN	Descargar kml
ESTOC2013_1	P201	15 de Febrero de 2013 a las 12:58	27 de Febrero de 2013 a las 11:42	PLOCAN	Descargar kml
ESTOC2013_2	P201	20 de Abril de 2013 a las 09:49	22 de Mayo de 2013 a las 02:18	PLOCAN	Descargar kml
ESTOC2013_3	P201	24 de Julio de 2013 a las 11:33	6 de Agosto de 2013 a las 09:52	PLOCAN	Descargar kml
FMI-GROOM-BOTHNIAN	P201	13 de Septiembre de 2013 a las 09:44	15 de Septiembre de 2013 a las 09:32	PLOCAN	Descargar kml
FMI-GROOM-ARCHIPELAGO	P201	16 de Septiembre de 2013 a las 07:39	17 de Septiembre de 2013 a las 12:38	PLOCAN	Descargar kml
ESTOC2013_4	P201	22 de Octubre de 2013 a las 10:25	11 de Noviembre de 2013 a las 10:15	PLOCAN	Descargar kml
ESTOC2014_1	P201	4 de Febrero de 2014 a las 11:02	25 de Febrero de 2014 a las 10:54	PLOCAN	Descargar kml

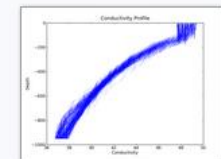
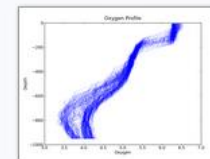
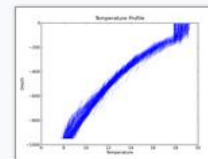
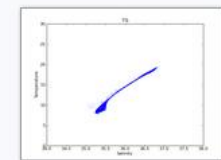
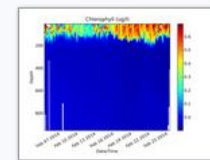
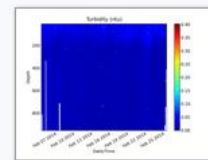
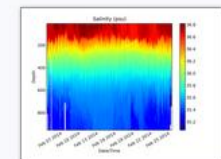
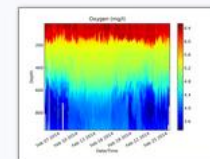
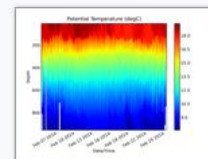


Volver a Misiones

Misión ESTOC2014_1

Glider: P201
 Fecha de Inicio: 4 de Febrero de 2014 a las 11:02
 Fecha de Fin: 25 de Febrero de 2014 a las 10:54
 Institución: PLOCAN
 Distancia Recorrida: 823,905680071 km

[Descargar kml](#)



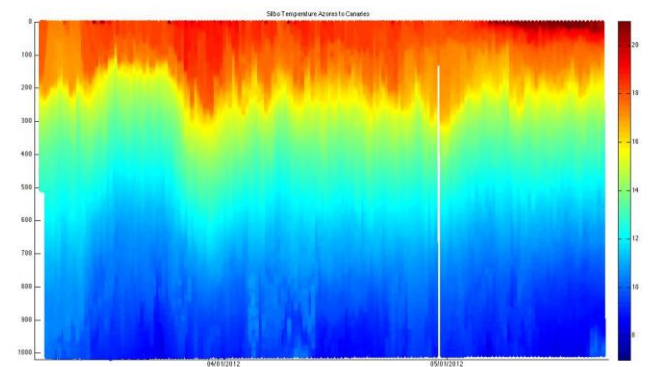
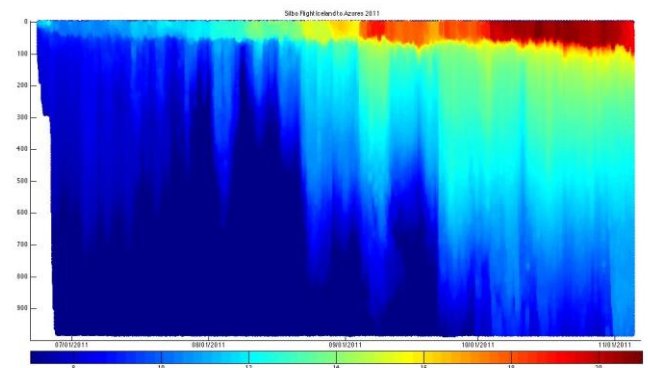
GLIDER MISSIONS ACROSS THE MACARONESIA



TELEDYNE
WEBB RESEARCH
Everywhere you lool



RUTGERS
UNIVERSITY

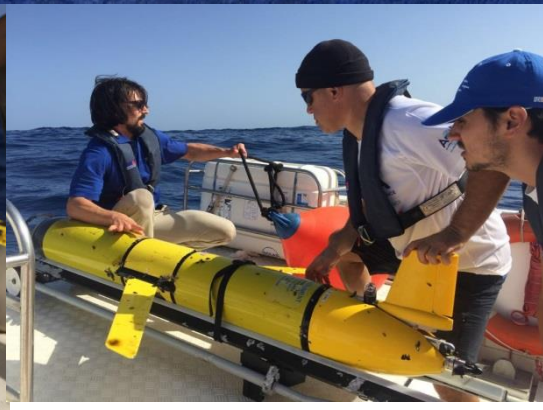
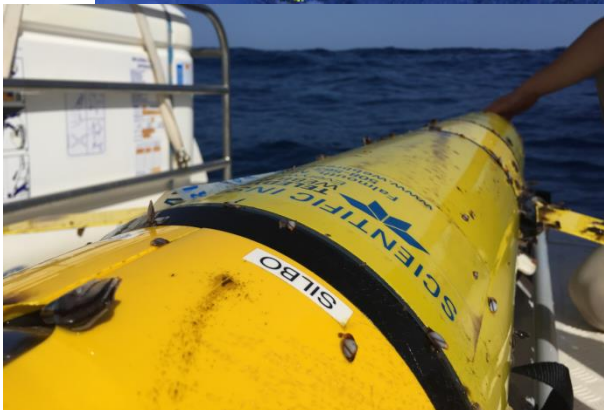


- Atlantic crossing mission / Challenger-One program.
- 614 days mission / 4925 dives@1000m. depth / 12030 kms.
- Deployment: Reykjavik (Iceland) /Recovery: Barbados (Caribbean).
- Refurbishment: Sao Miguel (Açores) and Gran Canaria (Canary Islands).
- Seawater parameters sampled: conductivity, temperature and pressure.
- Partnership with Teledyne Webb Research (USA) and Rutgers University (USA).

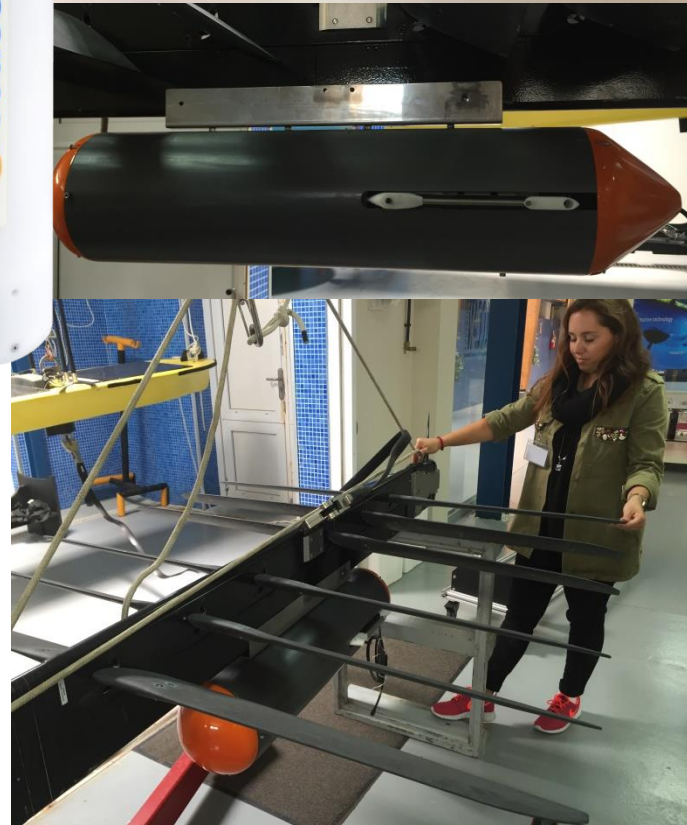
GLIDER MISSIONS ACROSS THE MACARONESIA

The **Challenger One** is an international program initiative where PLOCAN cooperates with Teledyne Marine and Rutgers University in regards a Slocum G2 glider unit, under the name of **Silbo**, that attempts to circumnavigate the North Atlantic basin, for scientific and technological purposes. Deployed in Ireland in May 2017, after 178 days of navigation across the Macaronesia, **Silbo** reached Gran Canaria on November 2017, where, after a maintenance and battery replacement was re-deployed in April 2018.

Glider	Project	Deployed	Recovered	Days	Distance
silbo17-507	Challenger	2017-05-14 11:25 GMT	2017-11-08 14:45 GMT	178.14	3714.5 km



GLIDER MISSIONS ACROSS THE MACARONESIA



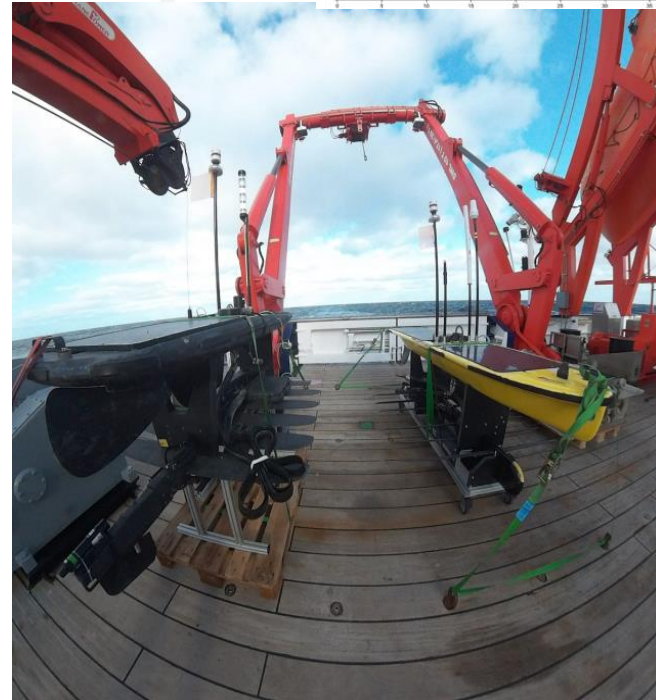
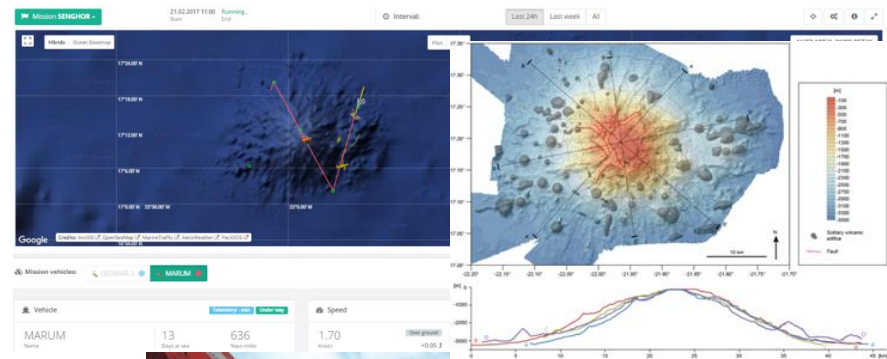
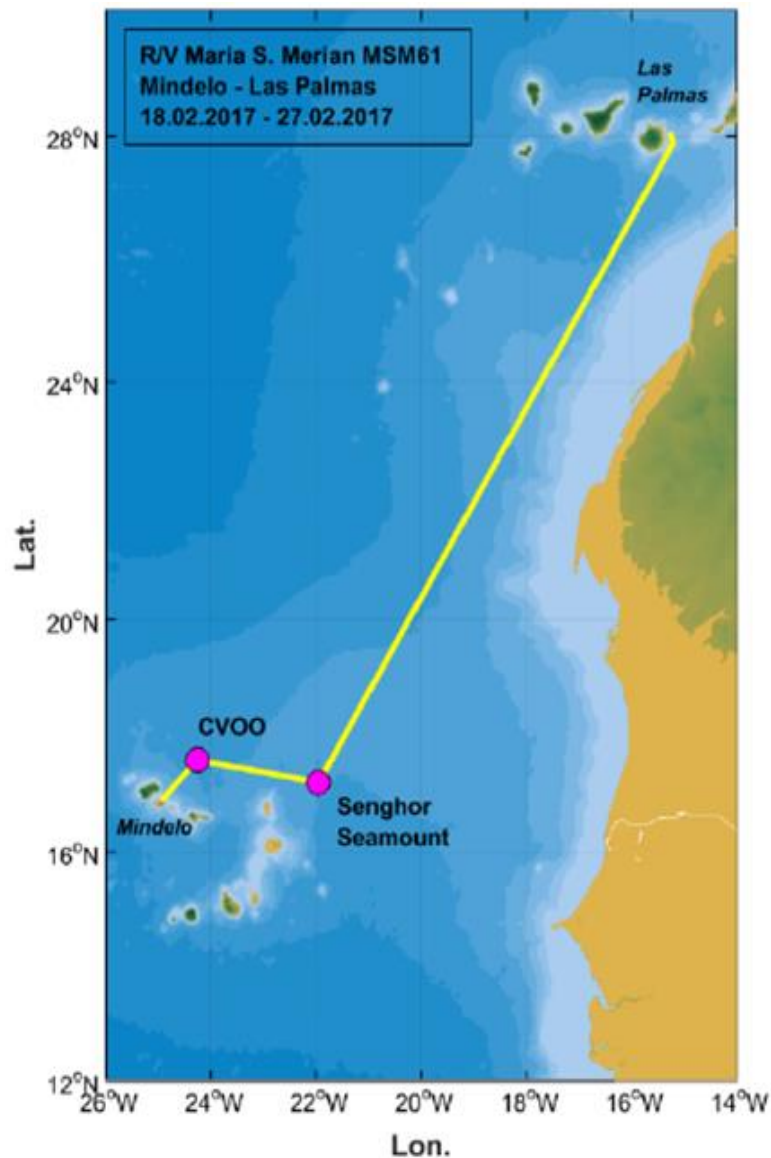
GLIDER MISSIONS ACROSS THE MACARONESIA

Oceanographic cruise MSM61 aboard the German research vessel **RV/Maria S. Merian** to study the physical and bio-geo-chemical characterization of the outstanding ecosystem of the **Senghor Sea Mount** located Northwards **Cape Verde Archipelago**, and to assess the operational response and capability of new, autonomous oceanic observation technologies in real operational scenarios.

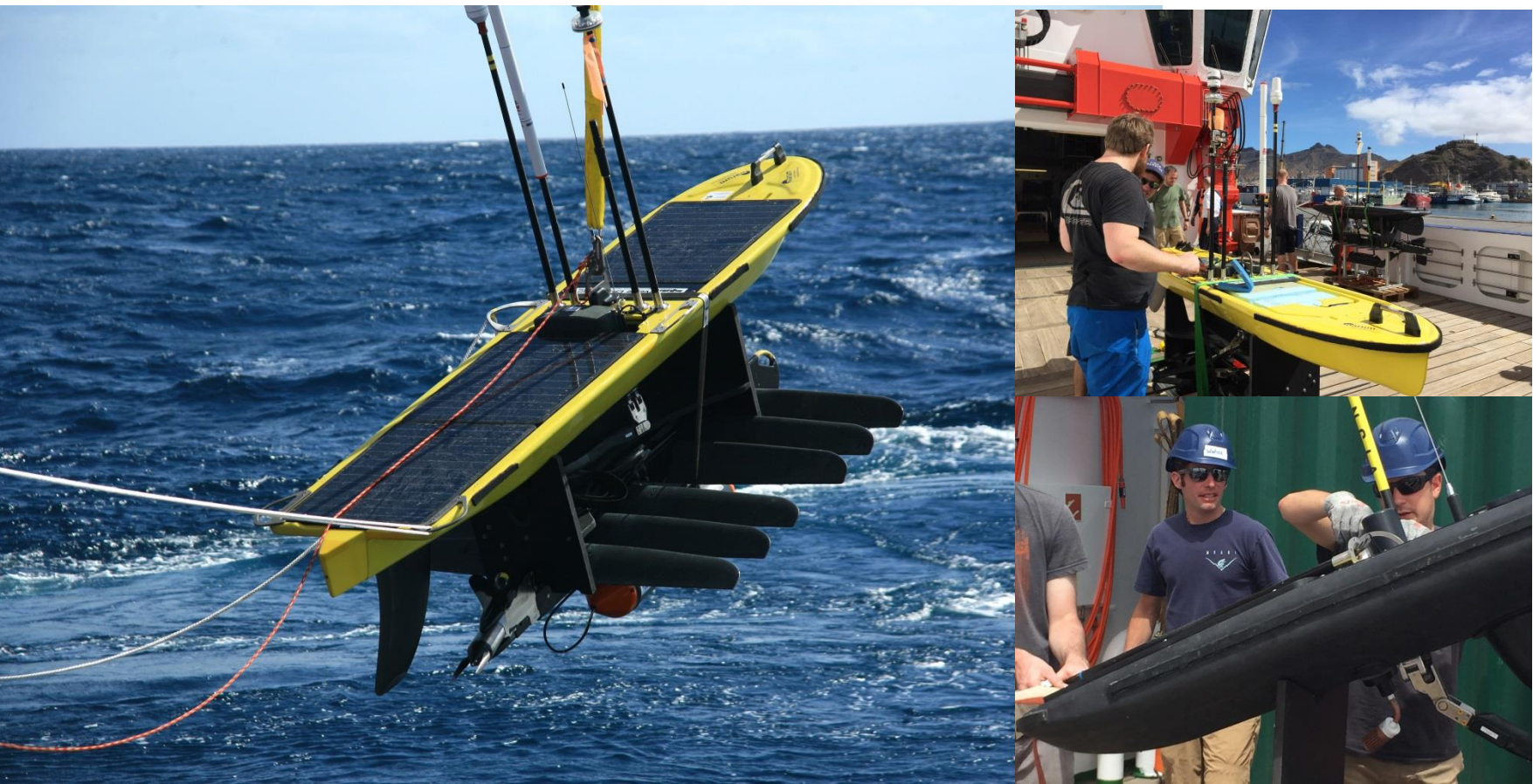
The study is part of the **AtlantOS EU-project**, and includes deploying and operating a range of autonomous observation equipment and platforms, such as multi-parameter modules anchored in the water column and on the seabed, autonomous surface marine vehicles (gliders) - SV2 and SV3 Wave Gliders - and profilers (Slocum G2-1000), all fitted with specific sensor equipment for taking samples and data in-situ, in response the scientific and technical needs and objectives set for the mission and the project.



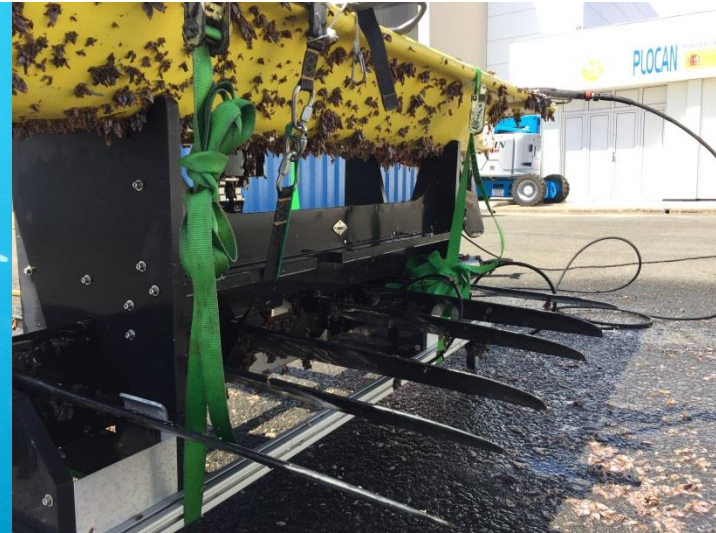
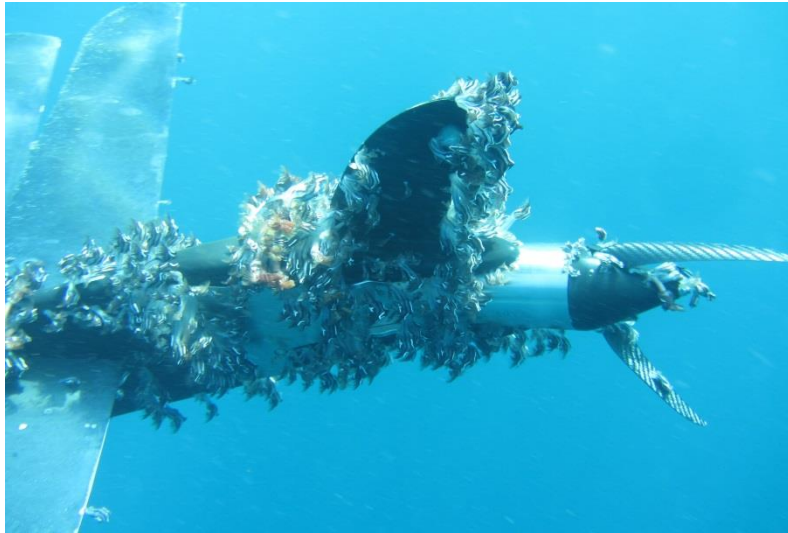
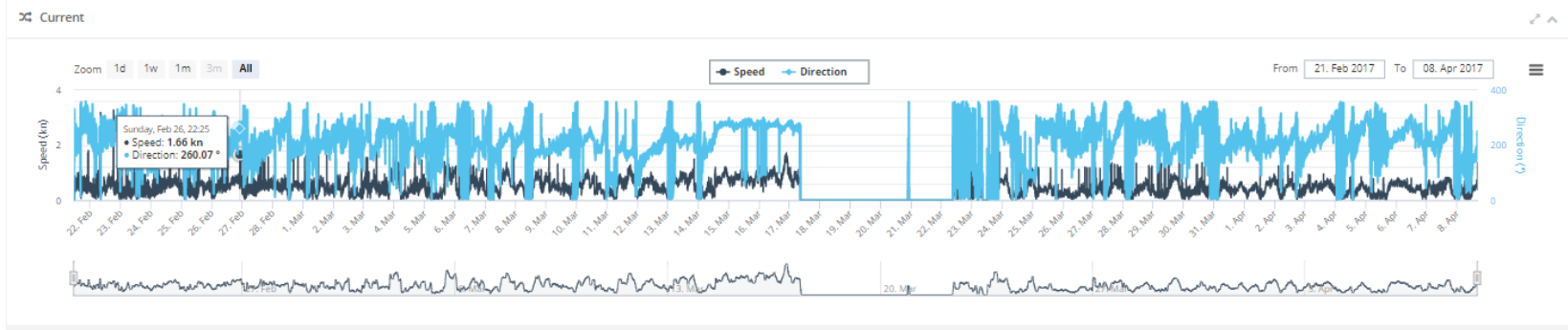
GLIDER MISSIONS ACROSS THE MACARONESIA



GLIDER MISSIONS ACROSS THE MACARONESIA



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GLIDER MISSIONS ACROSS THE MACARONESIA





Thank you / Muito obrigado

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DE ECONOMÍA
Y COMPETITIVIDAD



Gobierno
de Canarias

canarias
OBJETIVO de PROGRESO



Unión Europea
Fondo Europeo de
Desarrollo Regional