

Project	AtlantOS - 633211
Deliverable number	D3.11
Deliverable title	Consolidation of Atlantic EGO Network Activities Report
Description	Report on the network consolidation activities including the reports on the different meetings and personal exchanges.
Work Package number	WP3
Work Package title	Enhancement of autonomous observing networks
Lead beneficiary	All task partners
Lead authors	Victor Turpin (CNRS), Pierre Testor (CNRS)
Contributors	Carlos Barrera (PLOCAN), Estelle Dumont (SAMS), Ilker Fer (UiB), Tania Morales (PLOCAN), Johanness Karstensen (GEOMAR)
Submission data	03 November 2018
Due date	31 July 2018
Comments	<p>This report compile notes and minutes from the meetings hold during the period of the project.</p> <p>Late delivery due to capture evolving input from the International Conference on Glider Data Management in Genoa, Italy, 18-20 September 2018, and the preparation of the Community White Paper for the OceanObs'19 conference in Honolulu, Hawaii, 16-20 September 2019.</p>



This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement n° 633211.

Stakeholder engagement relating to this task*

<p>WHO are your most important stakeholders?</p>	<p><input checked="" type="checkbox"/> Private company If yes, is it an SME <input checked="" type="checkbox"/> or a large company <input checked="" type="checkbox"/>? <input checked="" type="checkbox"/> National governmental body <input checked="" type="checkbox"/> International organization <input type="checkbox"/> NGO <input checked="" type="checkbox"/> others Please give the name(s) of the stakeholder(s): Marine research institutes, Scientific and technological infrastructures and gliders/sensors manufacturers</p>
<p>WHERE is/are the company(ies) or organization(s) from?</p>	<p><input checked="" type="checkbox"/> Your own country <input checked="" type="checkbox"/> Another country in the EU <input checked="" type="checkbox"/> Another country outside the EU Please name the country(ies): Spain, Germany, France, United Kingdom, Norway, Brazil, Canada, USA, South Africa and others out of the AtlantOS scope.</p>
<p>Is this deliverable a success story? If yes, why? If not, why?</p>	<p><input checked="" type="checkbox"/> Yes, because this report demonstrates the improvement of the organisation of the network in terms of data management, partners involvement and international coordination. <input type="checkbox"/> No, because</p>
<p>Will this deliverable be used? If yes, who will use it? If not, why will it not be used?</p>	<p><input checked="" type="checkbox"/> Yes, the report will be disseminated to international organisations and to the glider community to emphasize the reinforcement of our network. <input type="checkbox"/> No, because</p>

NOTE: This information is being collected for the following purposes:

1. To make a list of all companies/organizations with which AtlantOS partners have had contact. This is important to demonstrate the extent of industry and public-sector collaboration in the obs community. Please note that we will only publish one aggregated list of companies and not mention specific partnerships.
2. To better report success stories from the AtlantOS community on how observing delivers concrete value to society.

Table of Contents

Executive Summary.....	4
Introduction.....	5
General context.....	5
A short history of the glider network.....	6
Initial plans and strategy.....	6
Structure of the report :.....	7
Section 1 : A chronological review of the meetings activity during the AtlantOS project.	8
Meeting Timeline.....	8
Key messages from the meetings.....	8
2015 :.....	8
2016 :.....	9
2017 :.....	11
2018 :.....	12
Section 2 : Community development.....	14
Tools for the community.....	14
An harmonized EGO format user manual and common best practices for data management.	14
The EGO format checker.....	14
The data management processing chain.....	14
JSON editor for better management of metadata.....	15
Technical development.....	15
Contribution to strategical documentation.....	16
Section 3 : Achievements thanks to AtlantOS project and future priorities.....	19
Achievements of AtlantOS Task 3.4.....	19
Launch of the OceanGliders program and European leadership.....	19
Creation of the EuroGOOS Glider Task Team.....	19
Increasing sustainability of the European and Atlantic glider activity.....	20
Data management.....	20
Priorities for the next years.....	20
Annexes.....	22

Executive Summary

This report describes the overall Atlantic glider network activities during the AtlantOS project that have contributed in its reinforcement. The first part consists in a review of the meetings held in that context, the second part reports on the different developments and actions achieved during the project. Both, meetings and actions are organized around 4 themes : international coordination, data and metadata management, connection with other EU Project and other AtlantOS work packages, and network capacity development. The report gives a complete overview of the Atlantic glider network current situation, and demonstrates the great achievements made by the Atlantic glider network thanks to the AtlantOS project and points out future priorities for further development of our network.

Main successes

The **launch of the OceanGliders program and its European leadership** formalizes the integration of the glider networks in the GOOS. The important role played by the AtlantOS glider partners in this crucial step was crucial. Europe is currently chairing the program, reflecting thus the leadership taken by our partners.

The **creation of the EuroGOOS Glider Task Team**, is an important body for the European and Atlantic glider network organizations. Created just after FP7 GROOM project, it played a key role for the European gliders network During the AtlantOS project, the task team has been involved in the redaction of several strategical document related to the EOOS and it will continue.

The **increasing capacity of the European and Atlantic glider activity** during the AtlantOS project is measured by the growing number of gliders and glider teams involved in the network, their technical capacities, the number of days at sea and the general level of investment around the glider technology.

The **enhancement of our data management system**.

Our network is now fully integrated in Ocean Observing Systems, whether it is AOOS, EOOS or GOOS, any glider data set following the agreed flow is Findable, Accessible, Interoperable and Reusable in data integrator systems.

Priorities for the next years

The overall priority is to ensure the sustainability of the network activities in scientific, technological, data management and international cooperation areas.

To maintain such dynamism and continue to reinforce the glider network at the Atlantic level and beyond, we clearly rely on our ability to get funding from national and international projects on technical development and ocean science process studies but more importantly on our institutions recognizing the need for sustained glider observations and our coordination activities.

Introduction

The AtlantOS WP3 “Enhancement of autonomous observing networks” aims to organize, reinforce and demonstrate the importance of a well developed network of autonomous observing platforms in the Atlantic Ocean. Task 3.4 “Gliders” is dedicated to the glider network that was in a critical phase of development at the beginning of the project in 2015. The task was designed to structure and strengthen the Atlantic glider network, to develop tools that are relevant for the glider community, and to illustrate the essential role autonomous platforms play in observing eastern boundary regions of the Atlantic Ocean.

General context

Many aspects of our environment, such as the characteristics and changes of the global/regional climate, the weather, ecosystems, the living resources and the biodiversity are strongly linked to the ocean. The ocean also plays a major role in many human activities like coastal protection, tourism, search and rescue, defense and security, shipping, aquaculture, offshore industry and marine renewable energy. Not to mention the fact that half of the mankind lives not farther than 50km from the coast, resulting in major impacts on the ocean, in particular coastal ecosystems and sustainability of resources. These activities are all major drivers for research aiming at a better understanding of (physical and biological) ocean functions, including the research for societal applications. They also motivated the Intergovernmental Oceanographic Commission (IOC of UNESCO) to develop the Global Ocean Observing System (GOOS) more than 2 decades ago in order to coordinate the different national efforts in terms of sustained ocean observations throughout the world and maximize the societal benefits of ocean observations. GOOS is evolving under the guidance of the WMO/IOC Joint Commission on Oceanography and Marine Meteorology (JCOMM) for technical coordination of on-going observations. GOOS also serves as the ocean component of the Global Climate Observing system (GCOS), is implemented through GOOS Regional Alliances and is supported by a wide range of bodies such as the Committee on Earth Observing Satellites (CEOS), the Partnership for Observation of the Global Ocean (POGO) and the GEO Blue Planet initiative.

The OceanObs’09 conference assessed the progress made in that direction from an early stage of GOOS that was very climate-oriented, towards a full system addressing climate, ecosystems, ocean and human health and security issues. It also managed to reach an international consensus on how the GOOS should evolve in the coming decade taking into account the readiness of the different subsystems that it could be composed of. The conclusions of the conference clearly highlighted the tremendous potential value for multi-variable (physical, biogeochemical, biological) observations, in particular of the transition between the open ocean and the coastal environment, which is a key area for societal issues and economical applications. This is considered very seriously in Europe since similar conclusions are supported by the “Blue Book”, with the corresponding “Marine Strategy Framework Directive” (MSFD) publication in 2008 and later the “Marine Spatial Planning” (MSP) Directive, that have clearly stressed the need for a multi-dimensional mapping of Member States' waters, including activities developed in the framework of Copernicus Marine

Environment Monitoring System (CMEMS). It was also clearly stated the important role the glider technology (which emerged in the late 1980s but became really available only a decade ago) could play filling this gap, when reaching a sufficient level of maturity.

A short history of the glider network

In 2010, the COST Action ES0904 “Everyone's Gliding Observatories” (EGO) built on the early European glider activity to coordinate the glider activity in Europe (and beyond) in that perspective, as well as on other scientific, technological and logistical aspects related to this technology. As a major spin-off, a FP7 Design Study for a European Research Infrastructure “Gliders for Research Ocean Observation and Management” (GROOM, hereafter GROOM-FP7) evaluated several scientific and technical requirements to set up a sustainable European glider infrastructure to safely operate individual as well as fleets of gliders in order to create a continuum of observations from the coastal seas to the open ocean. In the meantime, other FP7 and H2020 project for Ocean Observing emerged, including gliders observations for different purposes : JERICO to support coastal observing and PERSEUS addressing Ocean Observing issues for policy makers at the forefront. Following on these European initiatives, the 8th Framework program of the European Commission (H2020) also encourage the development of the glider community through different project like BRIDGES for the development of deeper glider capacity, JERCIO NEXT or ODYSSEA aiming at operating a network of integrated systems in the Mediterranean seas, NEXOS to improve autonomous sensor capabilities and AtlantOS to strengthen the Ocean Observing System in the Atlantic.

Initial plans and strategy

The overarching objective of AtlantOS is to achieve a transition from a loosely-coordinated set of existing ocean observing activities producing fragmented, often monodisciplinary data, to a sustainable, efficient, and fit for-purpose Integrated Atlantic Ocean Observing System (IAOOS). For the glider community, this was the opportunity to define requirements and systems design, in particular toward the sampling of Eastern Boundary Region, improve the readiness of observing networks and our data systems, and better engaging with stakeholders around the Atlantic (North and South America and Africa), as well as strengthening Europe’s contribution to the Global Ocean Observing System (GOOS).

To achieve such objectives our agenda was strongly constrained by the agenda of the different international stakeholders. We have adapted our priorities to the program of WMO/IOC JCOMM (OCG), EuroGOOS and even G7 : “Future of the Seas and Oceans Action one” in order to significantly contributes to trans-Atlantic cooperation by integrating existing glider observing activities established by European, North and South American, and African countries and by filling existing gaps in Atlantic Ocean observing.

The strategy we implemented to achieve this target was organized around the following 4 theme.

Theme 1 : International Coordination

This theme refers to the work done in order to better coordinate the international community around the Atlantic. That includes meetings, development of collaborations, “informal” meetings (short videoconferences, side meetings), and scientific production with American (north and south) and African partners. This theme also includes work done with international organizations such as

WMO/IOC JCOMM (OCG), G7, EuroGOOS and JCOMMOPS to deeply structure the glider activity.

Theme 2 : Data Management

Since data and metadata management is a key elements for an observing network, a lots of work has been done to encourage, support and further develop that aspect at the glider community level together with WP7 All these activities will be reported under this theme.

Theme 3 : Connection with other AtlantOS work packages and other EU Project

Part of the work done during the project to strengthen the network refers to other AtlantOS work packages. WP3 is strongly connected to WP4 and WP7 for example. Our community has been also involved in other H2020 project (JERICO-NEXT, AORAC, ENVRI-PLUS BRIDGES) concerning ocean observing from 2015 until now.

Theme 4 : Network Capacity Development

The capacity of the community to grow in terms of members, number of registered gliders, number of observations is a important index of the dynamism of the network. The implementation of new capabilities (sensors, technologies, tools) is also reported under this theme as a an element of our reinforcement.

Structure of the report :

The report is organized in 3 sections :

Section 1 : A chronological review of the meetings.

This review will provide a complete overview of the meeting activity leaded during the AtlantOS project. This section is represented by a timeline from the beginning of AtlantOS project to the end. The key message from the different meeting will be highlighted and linked to the different themes described above.

All the meeting minutes will be reported in the joined zip file.

Section 2 : Community development

A review of the different development made by task partners during the time of the project. Tools development and implementation, sensors integration, capacity development will be described and linked to the different themes listed above.

Section 3 : Achievements thanks to AtlantOS project and future priorities.

This section serves as conclusion of these report. Based on the theme classification made previously the strengths, weaknesses of the Atlantic Network will be analyzed. Priorities for further development will be defined.

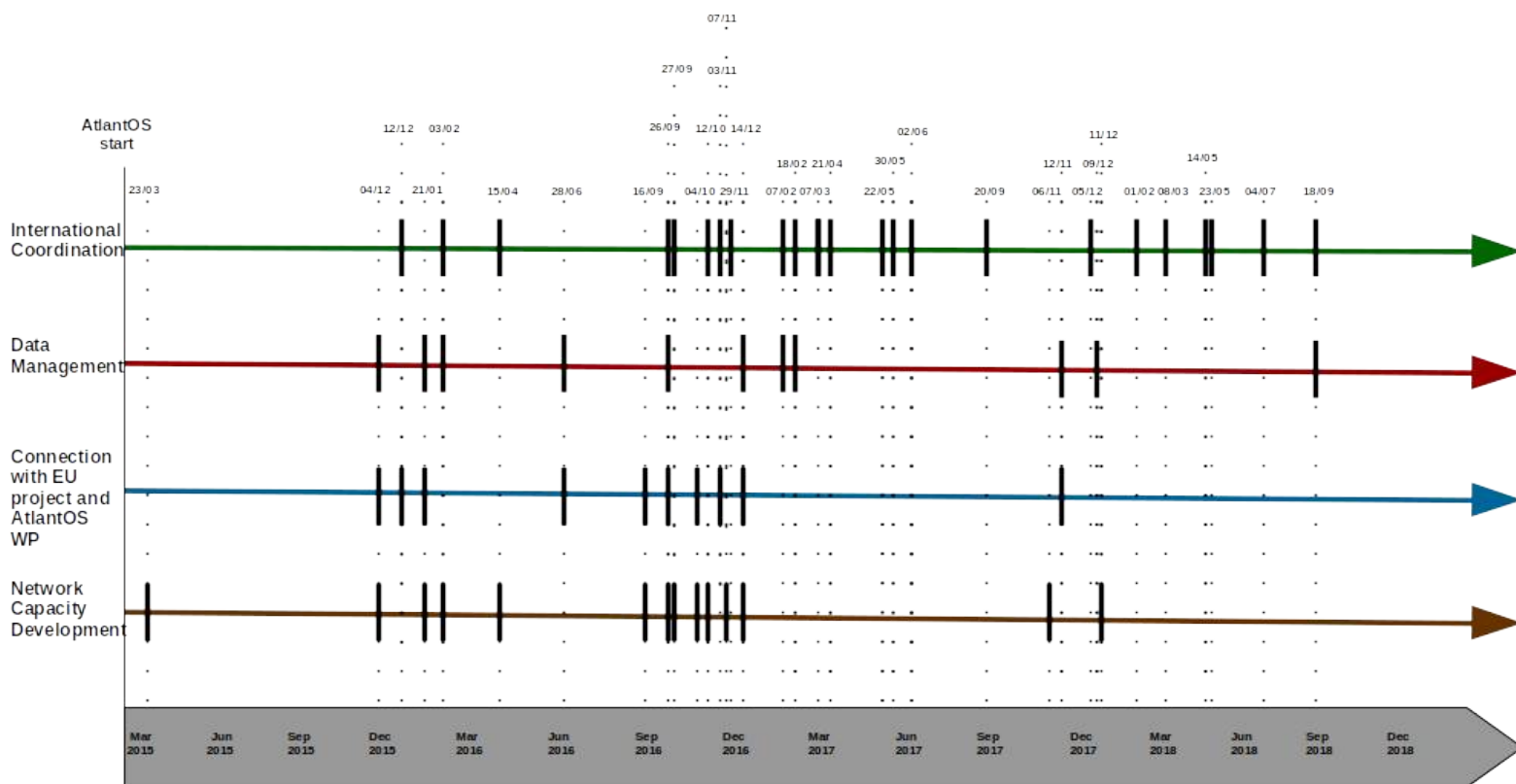
Annex : Note and minute from the meetings.

This section compile the notes, agendas and minutes from the different meetings reported in section 1.

Section 1 : A chronological report of the meeting activities during the AtlantOS project.

Strengthening the glider network at the Atlantic level necessitates to connect with the glider partners, but also with existing observing initiatives that contribute to develop the Atlantic Observing System. The attendance of the Atlantic glider community to the following meetings has been motivated by the need to include the glider network development in a wider context and in an harmonized way. The overall objective is to support an efficient, integrated and interoperable development of the glider observing network in the Atlantic.

Meeting Timeline



Timeline representing the activity of meeting and networking done during the AtlantOS project.

Key messages from the meetings

2015 :

20150309 : Report on the Skype meeting about the deliverable D3.6 , the “Glider Mobile App” - 1 day, Webconference
 Definition of the content of the glider App that has been developed during AtlantOS project.
 Discussion about the **glider app development**, requirements and planning.
 Minutes are available in the annexe [20150309](#)

20151204 : WP7 of AtlantOS "Data Flow and Data Integration" held a meeting last week about task 7.1 "Data harmonization on the data management activities" and tasks 7.2 "Data flow and integration to existing system" – 2 days, Paris, France

We organize this meeting and this gave us the opportunity to agree on the **data management system we planned to reinforce**. It was the occasion to agree on a DOI strategy and our contribution to the catalogues for better **data access and discovery**.

Minutes are available in the annexe [20151204](#)

20151215 - AtlantOS mid term meeting : Enhancement of autonomous observing networks – WP3.

This meeting has been organized in order to provide update and implementation plan for task 3.4.

It was also the occasion to discuss our **connection with WP5/WP1 around OSSE and WP9 with JCOMMOPS** – 1 day, Webconference

Agenda, presentations and minutes are available in the annexe [21051203](#)

2016 :

20160121 : follow on meeting – D3.6 – Update on the development of the glider App’.

This follow on meeting was important to make sure that the **implementation of the glider app** was progressing. 1 day, Webconference

Minutes and agenda are available in the annexe [20160121](#)

20160201* : Coriolis (GDAC), AtlantOS WP7 and EGO meeting – 1day, Brest, France

Lacks in **glider data management** have been identified since the beginning of AtlantOS. This meeting was set up between Coriolis and EGO to discuss these lacks and adjust procedures to simplify and **strengthen the glider data flow**. This meeting was also an opportunity **to initiate discussion about delayed mode data management**.

Minutes are available in the annexe [20160201](#)

20160203 : JCOMMOPS and EGO meeting, 1day, Brest, France

First meeting with **JCOMMOPS** in the perspective of the implementation of the glider network in the JCOMMOPS monitoring system. **Data flow and minimal metadata set** has been agreed. Short mid term integration into JCOMMOPS is a key aspect for an efficient monitoring of the glider networks.

Minutes are available in the annexe [20160203](#)

20160415 : PROOCEANO and EGO Meeting, 1 days, webconference

First meeting with PROOCEANO aiming to **include PROOCEANO in the Atlantic glider network**. Integration of Non European Groups was a priority of the AtlantOS project. Minutes are available in the annexe [20160415](#)

20160628 : AtlantOS GA, WP7 meeting, WP3 meeting and Task 3.4 meeting – 4 days meeting, Keil, Germany

We attended the Second General assembly meeting in order to report **progresses within WP3 and WP7**. It was also the time for the glider community to get together and initiate the implementation of the new data management scheme, and **report on each partners glider activities**.

Minutes, agenda and presentation are available in the annexe [20160628](#)

20160916 : *Task 1.3 – Task 5.3 / OSSEs – AtlantOS Workshop September 7&8 2016 – 2 days, Toulouse, France*

We attended this meeting **about AtlantOS Task 1.3 and 5.3** to work on the **design of gliders OSSE experiment** that has been planned in the AtlantOS project. This was the occasion to further develop the idea about measuring the impact of gliders data on operational systems.

Minutes, agenda and presentation are available in the annexe [20160916](#)

20160926 : *7th EGO meeting – 5 days, Southampton, UK*

We organize in collaboration with NOC the 7th EGO meeting that brought together about 150 worldwide glider scientists, engineers, technician and manufacturer world wide during a week. The meeting saw the **launch of OceanGliders program** was launch during this meeting, and was later officially become the glider associated program of the GOOS.

Minutes, agenda and presentation are available in the annexe [20160926](#)

20160927 : *1st OceanGliders meeting EGO meeting – 1 day, Southampton, UK*

We organized the 7th EGO meeting in Southampton. About 150 participants from all over the world attended and reported on their glider activities. Besides, the **OceanGliders program** was launched at that time with the first meeting of its steering team.

Minutes, agenda and presentation are available in the annexe [20160927](#)

20161004 : *7th Ordinary Nexos Project Meeting Agenda – 1 day, Toulon, France*

The general objective of NeXOS is to develop new cost-effective, innovative and compact integrated multifunctional sensor systems, which can be deployed from mobile and fixed ocean observing platforms. We attended this meeting to stay tuned about recent developments on sensor integration on autonomous platforms.

Agenda and presentation are available in the annexe [20161004](#)

20161012 : *CMRE and EGO meeting – 1 days, Livorno, Italy*

CMRE has been deploying gliders for NATO in the Atlantic during important NATO exercises. This meeting was the occasion to share the **tools developed by Coriolis for data management**.

Minutes are available in the annexe [20161012](#)

20161103 : *AtlantOS workshop on strategies, methods and new technologies for a sustained and integrated autonomous in-situ observing system for the Atlantic Ocean, supported by the AORA-CSA – 3 days, Telde, Spain*

The objective of the meeting was to better **integrate activities in AtlantOS across work packages (WP3, WP6)** thus focusing on the project's cross-cutting issues, emerging networks and technological innovation activities with the enhancement of the Atlantic network of autonomous observing systems, fixed and mobile.

Presentation and agenda are available in the annexe [20161103](#)

20161107 : *PLOCAN Glider School – 5 days, Telde, Spain*

Participating the PLOCAN glider school was a priority for us in to raise awareness among the glider network of the **new comers**. It is also an opportunity to **demonstrate the usefulness of EGO** and the benefits form being part of the network.

Presentation and agenda are available in the annexe [20161107](#)

20161129 : *EuroGOOS executive board and chair meeting – 1 days, Brussels, Belgium*

As chair of the EuroGOOS glider task team we regularly attended and **reported to the EuroGOOS board** about our activity as a European network.

Presentation and agenda are available in the annexe [20161109](#)

20161214 : *Data flow and Data integration – WP7 – 3 days meeting, Brest, France*

After 18 months of work between the partners of **WP7** to define the integrated AtlantOS system, time has come to move towards **implementation of the recommended Data Exchange backbone to facilitate access to and use of AtlantOS data** and products both at Network and Integrator level, (2) and prepare the Implementation phase that aims to feed operational models and facilitate enhanced products from AtlantOS data.

Minutes, agenda and presentation are available in the annexe [20161214](#)

2017 :

20170207 : *1st data management meeting of the Canadian Glider Network – 3 days, Victoria, British Columbia, Canada*

The **Canadian glider community** is developing a coordinated and integrated plan for managing gliders data. In that context, we (EGO) have been invited to attend, as network advisor, the 1st data management meeting of the Canadian Glider Network. This meeting was also **the occasion to promote the OceanGliders program** and its data management task team.

Minutes and agenda are available in the annexe [20170207](#)

20170218 : *1st US national glider Network meeting – 4 days, Stennis, Missisipi, US*

We attend this **1st meeting of the US glider community** in order to foster collaboration and to promote the need of and foster coordination between the EGO community and the US Glider Network.

Minutes and agenda are available in the annexe [20170218](#)

20170307 : *EuroGOOS executive board and chair meeting – 1 days, Brussels, France*

As chair of the EuroGOOS glider task team we regularly attended and **reported to the EuroGOOS board** about our activity as a European network.

Presentation and agenda are available in the annexe [20170307](#)

20170421 : *2nd OceanGliders Streering team meetings – 3 days, Paris, France*

The second meeting of OceanGliders was the occasion to **assess the progress of the program** and discuss the G7 initiative on ocean observing, and to report to the community.

Meeting minutes and G7 recommendations are available in the annexe [20170421](#)

20170522 : *8th WMO/IOC JCOMM Observing Coordination Group 9 meeting – 4 days, Quindao, China*

As the glider component of the GOOS, **OceanGliders chair reports to the OCG meeting about the status and evolution of the program**. After first discussions during previous OCG meetings, this meeting was the first one for the OceanGliders program which had juststarted with the objectives to strengthen the glider community and facilitate the sustained use of gliders globally.

Minutes are available in the annexe [20170522](#)

20170530 : *EuroGOOS executive board and chair meeting -1 day, Brussels, Belgium*
As chair of the EuroGOOS glider task team we regularly attended and **reported to the EuroGOOS board** about our activity as a European network.
Presentation and agenda are available in the annexe [20150530](#)

20170602 : *EuroGOOS GA -2days, Brussels, Belgium*
The GA of EuroGOOS is the occasion to **present the progresses made by our networks to the members of the EuroGOOS association**. It was the time for them to ask questions about our networks and evaluate its evolution.
Presentation is available in the annexe [20170602](#)

20170920 : *EuroGOOS executive board and chair meeting – 1 days, Brussels, Belgium*
As chair of the EuroGOOS glider task team we regularly attended and **reported to the EuroGOOS board** about our activity as a European network.
Presentation and agenda are available in the annexe [20170920](#)

20171106 : *PLOCAN Glider School -5 days, Telde, Spain*
Attending the PLOCAN glider school was a priority for us in to **raise awarness among the glider network** of the new comers. It is also an opportunity to demonstrate the usefulness of EGO and the benefits form being part of the network.
Presentation and agenda are available in the annexe [20171106](#)

20171112 : *AtlantOS GA, WP7 meeting and Task 3.4 meeting – 2 days, Brest, France*
The glider community reported on its progresses to WP3 and WP7 task leaders. It was also the occasion to meet the AtlantOS glider community and to follow on the implementation of the network stratgy at the Atlantic level.
Minutes, presentations and agendas are available in the annexe [20171112](#)

20171205 : *EuroGOOS board and EuroGOOS Glider Task Team meetings – 1 days, Brussels, Belgium*
The objectives of these meetings were to define a « road map » for 2018 for the EuroGOOS glider task team in order to **align its work with the long term strategy of EuroGOOS**.
Minutes are available in the annexe [20171205](#)

20171209 : *Coriolis (GDAC) and EGO meeting -1 days, Teleconference*
This regular meeting was planned to continue the **evolution of the EGO format** for data management and **fill the gap between available data at the GDAC and available data in the EGO system** and further develop best practices for O2 metadata and data management.
Minutes are available in the annexe [20171209](#)

20171211 : *O2 meeting, 2 days, Brest, France*
We attended this meeting on Oxygen in order to **increase our knowledge** in Oxygen measurements.
Minutes are available in the annexe [20171211](#)

2018 :

20180201 : *EuroGOOS board and EuroGOOS Glider Task Team meetings – 1 days, Brussels, Belgium*

The objectives of these meetings were to define a « road map » for 2018 for the EuroGOOS glider task team in order to **align its work with the long term strategy of EuroGOOS**.

Minutes are available in the annexe [20180201](#)

20180308 : *EOOS Forum – 3 days, Gergen, Norway*

With support building across the observation community, the EOOS 2018 Forum was **bringing together ocean observing funders, implementers and users** for the first time to explore how they can work together and what we need to do to make this vision of an EOOS a reality

Minutes are available in the annexe [20180308](#)

20180514 : *9th WMO/IOC JCOMM Observing Coordination Group meeting*

- As the glider component of the GOOS, **OceanGliders program reports to OCG on its status and in particular on its contribution in the Atlantic**.

presentation is available in the annexe [20180514](#)

20180523 : *EuroGOOS GA – 2 days, Brussels, Belgium*

The GA of EuroGOOS was **the occasion to present the progresses made by our networks** to the members of the EuroGOOS association.

Presentation is available in the annexe 20180523

20180704 : *Workshop on “CMEMS requirements for the In-situ Observing System”*

EuroGOOS in collaboration with CMEMS, organised a workshop with the observing networks and the ROOSs to **bring together Ocean forecasters, Observatories and observing networks** to define requirements. We represented the Atlantic Glider Network.

Minutes are available in the annexe [20180704](#)

20180918 : *Connecting glider data flows in Europe and beyond – Glider data management meeting*

We organised a **first meeting only dedicated to glider data management**. This meetings brought together the EU community but also the US, Canadian and Brazilian glider communities in the AtlantOS scope as well as Australia.

Minutes are available in the annexe [20180918](#)

20181101 : *Elaboration of the OceanGliders Community White Paper (CWP) for OceanObs'19*.

After a number of videoconferences starting in Spring 2018, the CWP entitled “OceanGliders : a component of the integrated Global Ocean Observing System” by Testor and 100 co-authors was submitted on 31st October 2018.

Document in Annexe, CWP

Section 2 : Community development

If actually, meeting and networking are necessary to strengthen the glider networks in the Atlantic and beyond it is certainly not the only leverage. The reinforcement of our network will also be the result of our capacity to innovate and to increase the capabilities and knowledge of our community. During the 4 years of the AtlantOS project, we have made technical and organisational improvements in many domains (data management, observing capacities, sensor integration, scientific results, etc.). Our recent contributions to important strategical documents about Ocean Observing addressed to political stakeholders is also a good index of the strengthening of our network.

This section reports about the different developments and important contributions to strategic documents made within and by the glider network during the AtlantOS project.

Tools for the community

An harmonized EGO format user manual and common best practices for data management.

One of the major outcome of the GROOM-FP7 project was the agreement reached by the project consortium made of the European Glider Groups to follow a common real time gliders data format and the same data flow.

The theoretical aspect of the gliders data management has been set up during the previous framework program and the implementation of the data flow needed further work. This effort has been made possible during the AtlantOS project thanks to the coordination with WP7 and the different stakeholders involved in data management. Since 2017, it is possible to access “up-to-date” EGO user manual that describe the common format here : <https://archimer.ifremer.fr/doc/00239/34980/>

The EGO format checker

Coriolis is a Global Data Assembly Center for the glider network. It plays the role of data format controller, agregator, diffuser and archiver. Coriolis is committed to check the format of the glider files they are receiving from the different European glider groups in the Atlantic and beyond. In order to assess the compliance of the data file with the EGO format description they developed a format checker. This checker is freely accessible : <https://www.seanoe.org/data/00344/45538/>

The data management processing chain.

We also develop with Coriolis the EGO data processing chain that decodes, processes, formats and performs quality control on glider data and metadata. The decoder performs the following actions for a glider deployment:

- Decode and format the glider deployment data and metadata into an EGO NetCDF time series file
- Apply Real Time Quality Control (RTQC) tests on EGO NetCDF time series file,

- For Slocum gliders, estimate subsurface currents and store them into the EGO file,
- Generate NetCDF profile files from EGO file data and apply specific RTQC tests to them.

This tool is very useful for the glider groups to produce EGO format in real time. It is also accessible on line here : <https://www.seanoe.org/data/00343/45402/>

JSON editor for better management of metadata.

One of the major difficulties for glider data management is the management of the metadata. These are critical for a usefull use of the gliders data. During AtlantOS project we took time to define the right set of metadata needed for a glider deployment (reported in the EGO format user manual) and developed an online tool to support beginners in the management of metadata for gliders. This tool is available on the EGO website : [here](#).

AtlantOS Catalogue and Network Description : As a front window for the AtlantOS efforts to aggregate and federate observations, a catalogue of data products has been build and presented in searchable web pages. The catalogue is implemented with the geonetwork component of the Sextant Spatial Data Infrastructure. The Gliders data are now well described and visible in this Catalogue thanks to the joint effort of the WP3 AtlantOS gliders partners and WP7 . This effort is beneficial for the entire European glider community : [AtlantOS Catalogue](#)

All these tools are freely available on the EGO website :

<https://www.ego-network.org/dokuwiki/doku.php?id=public:datamanagement>

Technical development.

Working in collaboration with many other EU ocean observing related project during the period of the AtlantOS project, many different technical developments occurred.

- **H2020 BRIDGES** is developing a glider with deeper capacities. Currently gliders can dive to 1000m maximum depth. Only one type of glider can reach 6000m but still with a “basic” CTD sensor. The BRIDGES project is currently developing sensors able to sample at greater depth and gliders reaching 2500m and 6000m. Such capabilities development and innovation are different ways to measure the dynamism and the strength of our network. Within AtlantOS, we have been working closely with BRIDGES to contribute to develop these new capabilities.

- **H2020 NEXOS** aims to develop new cost-effective, innovative and compact integrated multifunctional sensor systems (ocean optics, ocean passive acoustics, and sensors for an Ecosystem Approach to Fisheries (EAF)), which can be deployed from mobile and fixed ocean observing platforms, as well as to develop downstream services for the Global Ocean Observing System. In particular, PLOCAN, one of the AtlantOS partners have been developing and testing the integration of acoustic sensor particularly usefull in ocean boundary regions (see D3.12).

- **H2020 JERICO-NEXT** contribute to improve and innovate the cooperation in coastal observatories in Europe by implementing the coastal part of a European Ocean Observing System, to cooperate with other European initiatives as ESFRI (EURO-ARGO, EMSO, EMBRC), Integrated Infrastructures (FIXO3 etc.). Noteworthy, , the Atlantic glider network

partners have deployed some gliders throughout the TNA procedure of the JERICO-NEXT project. We attempted in particular to deploy a first glider with the University of Calabar (Nigeria) in the coastal seas of the Gulf of Guinea. As gliders are identified as a key element in JERICO NEXT, we also contributed to the JERICO Next data management meetings in Bergen in October 2017.

Contribution to strategical documentation

The reinforcement of the Atlantic (and beyond) glider network is also measurable by our increasing capacity to contribute and review strategical documentation about ocean observing at the European and international levels. In consequence we are contributing the ocean observations development, making sure the glider network is well identified, fully understood and taken into account in the long term vision of the system.

During the AtlantOS project we have contributed to a number of documents at the European, and international levels.

- **The Atlantic Ocean Observing blue print** : *“The Atlantic BluePrint document proposes a strategy for building an Integrated Ocean Observing in the Atlantic. It will help policymakers and oceanographic community to move towards a more sustainable, coordinated and comprehensive ocean observing system delivering relevant information. Such system will serve a wide range of societal benefit areas spanning ocean change, near-real-time ocean state estimation, ocean prediction and base-line information to support sustainable ocean use. The BluePrint for an Integrated Atlantic Ocean Observing System should go beyond the state-of-the-art and provide a vision for the Atlantic Ocean observing in the next decade. It should integrate existing ocean observing activities into a sustainable, efficient, and fit-for-purpose system.”*

We contributed to this important document and in particular to the section 4: Ocean Observing networks description, current status and future potential. The blue print is available : <http://atlanticblueprint.net/>

- **European Ocean Observing System (EOOS) – Towards an end-to-end, integrated and sustained ocean observing system for Europe** : *“This document is designed to support a first engagement with a broad community of stakeholders on how EOOS should be taken forward. This document aims to:*

- *Describe in simple language what EOOS is, why it is needed, and some of the next steps in making it happen;*
- *Engage political and policy stakeholders to ensure that the EOOS vision and implementation is in step with current and planned policy objectives in Europe and further afield;*
- *Provide the basis for an open stakeholder consultation on EOOS which will gather views on the scope of EOOS and how it should evolve”.*

The request for a contribution of the Atlantic and European glider network to this document is a consequence of the work done in AtlantOS in particular. Document is available here :

http://www.eoos-ocean.eu/download/promotional_materials/EOOS_ConsultationDocument_02.12.2016.pdf

- **European Strategy for Atlantic Ocean Observing** : This document, currently under review by EuroGOOS, will support the implementation of the GOOS and contributes to the Blue Planet Initiative of the Group on Earth Observations (GEO). It describes how to carry out the Atlantic component of the European Ocean Observing System (EOOS) by adapting priorities to the identified gaps and promising new technologies. In this document, gliders are clearly identified as a developing network that should be encouraged. We also coordinated the writing of section 3: Existing and evolving Observing Networks and Systems that reports about status of the networks, gaps, new technologies and opportunities.

- **The OceanObs'19 Glider Community White Paper** : In line with the essential work done by the observing glider community during OceanObs'99 in Saint-Raphaël, France and the later glider community for the OceanObs'09 in Venice, Italy, the glider networks in the Atlantic and Beyond have been writing a community white paper that reviews the progress done in the last decade and highlights the tremendous possibilities offered by glider observations for the next 10 years. Such document will play an important role in the design of the future of Ocean Observing. The European glider team, and the Atlantic part in particular, has led and coordinated the production of this reference document. Such responsibility is a recognition of the coordination activities developed by the Atlantic glider network. The community white paper is available in the attached zip file and in the annex to this report.

- **Contribution to the research and innovation results of projects contributing to the implementation of the Galway Statement on Atlantic Ocean Cooperation** : As representatives of the global glider community, our members have been involved in the G7 Future of the Seas and Oceans initiatives to support the development of a global initiative for an enhanced, global, sustained sea and ocean observing system. This high level international ambition aims to :

- review the current suite of Ocean Observing systems and programs in the context of key environmental drivers and policy objectives,
- identify gaps in coverage (e.g. inadequate spatial/ temporal coverage, inaccessibility of key regions such as the deep and polar oceans or unsuitable vehicles/ platforms or sensors) and to prioritise these against the key challenges faced,
- develop initial proposals for how G7 countries can accelerate the current direction of travel towards a low cost, comprehensive, open access, sustainable, interoperable network of observing systems which will enable the future sustainable management of the Global Ocean.

We contributed to this initiative through the definition of a 2 years and 5 years action plan for gliders.

Full report available at : http://www.g7italy.it/sites/default/files/documents/G7%20Innovation%20Week%20Manifesto_1.pdf

- **JCOMMOPS Report Card 2018** : *“The Report Card is a JCOMM effort to standardize and publish the annual status and health of the Global Ocean Observing System. The 2018 Report Card seeks to inform ocean observing stakeholders, society and decision-makers, about the status*

of the global ocean observing system in an era when marine hazards and increasing stress on the ocean from human activities both pose challenges to sustainable development”.

For the first time and as a consequence of the implementation of OceanGliders program of the GOOS, we have been asked by JCOMMOPS to contribute to this document. The glider networks is now recognized at the same level of other important observing systems like ARGO, SOT/VOS, GLOSS, DBCP, OceanSites and GO-SHIP.

See JCOMMOPS Report Card 2018 is available at : <http://www.jcommops.org/reportcard2018/>

- **Copernicus Marine Environment Monitoring System requirement for the evolution of the Copernicus In Situ Component** : *“The Copernicus Marine Environment Monitoring Service (CMEMS) provides regular and systematic information on the state of the physical ocean at global and regional level. There are four main areas of benefits covered by the service: maritime safety, coastal and marine environment, marine resources, and weather seasonal forecasting and climate activities. In-situ data are of paramount importance for CMEMS as they can provide information of the ocean interior which cannot be observed from space”.*

We have been invited to report on the status of the network and define requirements for the development of our network to complete this document. See full report at : <https://atlas.mercator-ocean.fr/s/n9SDHXTmGXQQFHE>

- **AtlantOS D3.11 – Estern Boundary Survey** : The report on glider surveys in eastern boundary regions, key regions for the Atlantic fishery and connected with the WP4, provides the scientific backbone for the European glider network development in the Atlantic. Survey, sampling and data delivery in these regions is investigated and reported.

Section 3 : Achievements thanks to AtlantOS project and future priorities.

Strengthening the network of an observing system distributed within 6 countries along the Atlantic coast is not a clear and well defined task. As coordinator of that task, we have considered that all the possible actions related to Ocean Observing and involving directly or indirectly gliders, whether it concerns meetings, scientific cooperations, contribution to strategical documents, technical and technological developments should be encourage and supported during the AtlantOS project as soon as it could be beneficial for the all Atlantic glider community itself. This philosophy leads to a number of main achievements that we are describing below.

Main achievements of AtlantOS Task 3.4

The previous section intended to describe as exhaustively as possible the different actions which contributed to the strengthening of the Atlantic glider networks. This important effort made by the Atlantic glider networks lead to a number of achievements that illustrate the reinforcement of our community not only at the Atlantic level, and also globally.

Launch of the OceanGliders program and European leadership.

The *OceanGliders* program started in September 2016 to support active coordination and enhancement of the worldwide glider activity. *OceanGliders* contributes to the present international efforts for Ocean Observation for Climate, Ocean Health and Real Time Services. It brings together marine scientists and engineers deploying gliders all over the world to: (1) observe the long-term physical, biogeochemical, and biological ocean processes and phenomena that are relevant for societal applications; and, (2) contribute to the GOOS through real-time and delayed mode data dissemination.

The launch of OceanGliders during the 7th EGO meeting supported by AtlantOS and organized by the AtlantOS partners in 2016 is a very important step to strengthen in the long term the global glider network in general and the Atlantic Glider network in particular. Europe (France) is currently chairing the program.

OceanGliders traduces also the increasing cooperation between Europe, Australia and North American glider groups. This is the result of the particular effort engaged by Europe, thanks to AtlantOS funding, to meet US, Australian and Canadian glider teams. We also had the opportunity to engage with South American and African countries that will certainly lead to a strongest scientific cooperation in the next coming years.

Creation of the EuroGOOS Glider Task Team.

A EuroGOOS glider task team, mainly composed of AtlantOS members, was created in 2015. The Task Team is contributing to the reporting of the European glider observing system. The task team was involved in the writing of several strategical documents related to the EOOS and will continue to do so. WP 3.4 partners have been attending every EuroGOOS executive board and chair meeting and General Assembly every 4 month since 2015 thanks to AtlantOS support.

Increasing sustainability of the European and Atlantic glider activity

During the AtlantOS project, the number of glider teams involved in the European and Atlantic Network has increased. The number of gliders, their capacity in terms of depth and measurements, the number of deployments and repeated sections and the general level of investment around the glider technology have increased steadily. Even if assessing the sustainability is sometimes difficult, it is clear that the AtlantOS project drove the development and the organization of glider networks not only for the Atlantic but also for Europe and beyond.

The role played by AtlantOS partners in the writing of the G7 Future of the Seas and Oceans ACTION 1, by presenting 2 years and 5 years action plans to the highest level of political organization is also a demonstration of the robustness of our evolution.

We have also demonstrated during the 4 years of the AtlantOS project the importance of gliders for sampling the strategical eastern ocean boundary regions. This demonstration made in AtlantOS D3.12 should reinforce the use of gliders and allow to properly sample these areas, connecting offshore observation to coastal ones.

Finally, a major outcome of this vast task of strengthening the glider network will be the creation of a technical coordinator position for the OceanGliders program at JCOMMOPS in 2019. This will ensure the continuity of the work done during AtlantOS and the implementation of the OceanGliders road map in the next decade.

All together, these different results is a showcase for a stronger community and a more efficient network.

Data management

During the AtlantOS project, we paid particular attention to the improvement of metadata and data management. One of the main objective for a network integrated in the Global Ocean Observing System is to be able to deliver data that is Findable, Accessible, Interoperable and Reusable. Thanks to the work done during the AtlantOS project, in strong collaboration with WP7 and Coriolis glider GDAC in particular we have highly improved our capacity in terms of gliders data management. Though a lot needs still to be done in the next decade, the system we set up during AtlantOS should be pointed out as a strong achievement of task3.4 for the global networks.

Priorities for the next years

The overall priority is certainly to ensure the sustainability of the network activities in scientific, technological, data management or international cooperation areas.

To maintain such dynamism and continue to reinforce the glider networks at the Atlantic level and beyond, we clearly rely on our ability to drive money from national and international projects on technical development and process studies but more importantly directly on our institutions recognizing the need for sustained glider ocean observations, and on our coordination activities.

Without going into the details of the road maps collaboratively defined by OceanGliders steering team and EuroGOOS glider task team, they both describe priorities, while the implementation of such road maps depends on our capacity to get more and sustain this funding for long term glider observations.

Here are 3 suggestions :

- Securing the technical coordinator position at JCOMMOPS is a priority shared by the AtlantOS task 3.4 partners in particular but also shared at the global level by OceanGliders partners. This on going program will certainly be at the basis of the future success in the implementation of the previously cited road maps.
- Joining EU Project consortium is also a lead to follow in the next months. We have already identified one of them : INFRAIA-01-2018-2019: Integrating Activities for Advanced Communities Coastal and shelf seas observing research infrastructures, under the theme : Coastal and shelf seas observing research infrastructures. Moreover, the Ocean Flagship Initiative (BG07) will certainly open the floor for a call related to the implementation of EOOS, following achievements of AtlantOS and the glider networks should also be present in this consortium.
- Finally, we seriously consider the opportunity to set up a consortium to answer H2020 INFRADEV-01-2019-2020: Design Studies call to give a crucial push toward a steady and long term integration of the glider network in the GOOS, through JCOMMOPS, a better structure of the network and the design of a robust and sustained financial model to support our observing activities on the long term in Europe.

Annexes

All agenda, presentation and minutes are available in the compressed file delivered with this report and available online following the links below.

20150309 : Minutes

20151204 : Minutes

21051215 : Agenda, presentation and minutes

20160121 : Agenda and minutes

20160201 : Minutes

20160203 : Minutes

20160415 : Minutes

20160628 : Minutes, agenda and presentation

20160916 : Minutes, agenda and presentation

20160926 : Minutes, agenda and presentation

20160927 : Agenda and Minutes

20161004 : Agenda and presentation

20161012 : Minutes

20161103 : Agenda and presentation

20161107 : Agenda and presentation

20161109 : Minutes, agenda and presentation

20161214 : Agenda and minutes

20170207 : Minutes and agenda

20170218 : Minutes and agenda

20170307 : Minutes, agenda and presentation

20170421 : Minutes

20170522 : Minutes

20170530 : Minutes, agenda and presentation

20170602 : Presentation

20170920 : Minutes, agenda and presentation

20171106 : Agenda and presentation

20171112 : Minutes, agenda and presentation

20171205 : Minutes

20171209 : Minutes

20171211 : Minutes

20180201 : Minutes

20180308 : Minutes and agenda

20180514 : presentation

20180523 : Presentation

20180704 : Minutes, agenda and presentation

20180918 : Minutes and agenda.

CWP : Paper