



AtlantOS - Enhancement of autonomous observing networks

WP3 Task web-conference, 15 December 2015

Minute WP3-1

The aim of this web conference was to update the WP3 task leaders on the advances made within the WP3 but also to have the opportunity to raise issues (regarding deliverables or milestones) or present new opportunities for the group. Each task leader presented a short PPT summarizing the updates on:

- i) network enhancement: concept/prototype, EOVs,
- ii) data management, data fluxes, calibration, standardization
- iii) long term sustainability

plus Interaction with sub task leaders, or Interactions with other WPs.

Hervé Claustre mentioned several additional point:

- The OSSE meeting in Toulouse (17.Dec.2015) will be joined by WP3 members and will provide the opportunity to optimize future system development. An email was circulating within the WP3 few weeks ago to ask for specific inputs.
- A collaborative WP3 abstract to be submitted to the Conference " Global Climate Observation: the Road to the Future", to be held from 2-4 March 2016 at the Royal Academy of Arts and Science.

Task 3.1 –Grigor Obolensky and Sylvie Pouliquen: ARGO.

Partners: Euro-Argo ERIC, IFREMER , CNRS/UPMC (LOV) , GEOMAR

D3.14 Enhancement of the Argo core mission:

Deployment of Bio-Argo and O₂-deep floats and improvement of the network capabilities:
The procurement process for 7 biogeochemical floats and 7 deep floats is started. The call for tender has been officially released on 09th of November 2015. The answering deadline is fixed to the 24th of December 2015 and the delivery to Spring 2016 (end of May probably although it depends on the call). A particular emphasis has been held on air O₂ measurements to meet the community recommendations. This concerns both Bio and Deep floats. Further discussion have to be organized concerning deployment strategy and operational plan.

Analysis of the on-going improvement of RUDICS (Router based Unrestricted Digital Interworking Connectivity Solution): NKE has already implemented a software based and a hardware based solution on their CTS4 platforms for a "over-the full" capacity of the Iridium



performances if RUDICS is used. Other manufacturers will be required to produce an equivalent work if selected as providers for the floats.

Improvement of Bio-Argo float capabilities by adapting novel optode-based sensors for CO₂ and O₂ partial pressure [Geomar] and new pH sensors [UPMC]: In partnership with Seabird, LOV foresees a delivery of the first pH sensor for the first half of 2016. Significant advances have been proved on calibration issues, next step in progress is to develop a stand-alone sensor rather than the existing integrated one. Concerning O₂ sensor enhancements, the partnership with Contros company will come out on the provision of two prototypes sensors in March 2016 for an inter-comparison with existing Aanderaa optodes, and possibly with Seabird sensors if available at this time.

Development of an Autonomous System For Argo float Release (ASFAR) [Ifremer]: Two prototypes have been deployed outside AtlantOS. Some issues occurred on the first scheduled launch, still under investigation. The project waits for the second scheduled release, enhancements on the prototypes will come out in 2016, next launch of ASFAR systems scheduled for 2017.

D3.15 Argo Dataset production: Real-time data-management and delayed-mode qualified dataset for O₂, Chlorophyll *a*, backscattering and NO₃.

- Data distribution and real time process is already organized following the International Argo Data Management Team recommendations.
- Delayed Mode management has to be refined with a working plan shared between the scientific partners.
- The Production of a consistent Argo and Bio-Argo validated dataset will take place after the floats deployments. First discussions with the involved partners ([Ifremer], [ACRI]) have to be planned in the second half of 2016 for the Dataset specifications.

D3.16 Report on the organisation of the post-AtlantOS Bio-Argo and Deep-Argo sustainability in the context of the Euro-Argo ERIC. The Management Board of the Euro-Argo ERIC has stated in December 2015 its strategic plan including the extensions of the Core Argo program to the Biogeochemical measurements and the exploration of the deep ocean. Three areas have been identified for the deployment plan: North high latitudes, Marginal seas (Mediterranean, Baltic, Black Sea) and South Atlantic

Developing international partnership and long-term agreements with the Euro-Argo members for the organization and funding of these new phases of Argo

The Euro-Argo Implementation Plan is in its writing phase. It will describe how the strategic plan will be applied, with the respective contributions of the national facilities and the ERIC specific ones. This plan will be discussed inside Euro-Argo member states, and the implementation regarding AtlantOS will be discussed with the teams implicated (UPMC-LOV, Ifremer, etc). The release of the Implementation plan is scheduled for first half of 2016

.Further points discussed

Regarding the deployment plan and link to WP1, WP5, with respect to OSSE, a meeting will be organized in Toulouse the last week of December and feedback are expected. On January 11 day, a meeting in Villefranche will gather about 30 experts willing to develop and



implement a global Bio-Argo plan through a white paper. This International event is organized by Hervé and Ken Johnson (MBAR, USA) will led to a Bio-Argo strategy which will be connected to EuroArgo.

Additionally, Hervé Claustre with several AtlantOS partners will submit a Marie Curie ITN project 'Argonauts' on Bio-Argo development, based on cooperation.

Task 3.2 Richard Lampitt : OceanSITES biogeochemistry
Funded partners: NERC, GEOMAR, AWI, PLOCAN & Ribocon,

no slides available, Richard was unable to join but he sent afterwards the updates within its taks:

Progress to date on this task has been made in purchasing equipment, employing staff, and developing analytical capability. This is to address the three associated deliverables (3.8, 3.13 and 3.17) and other work described in the DOA.

Network enhancement

1: Personnel: At NOC Dr Katsia Pabortsava who has expertise in chemical cycling and downward particle flux has been employed as a post-doc to work on microplastics and Ms Lucy Dickinson will now be the main data manager for the task. At AWI recently appointed Dr Ian Salter who has considerable expertise in fixed point observatories and in particular downward particle flux will now be working on this task and in addition a post-doc position has been advertised.

2: Equipment procurement: PLOCAN is organising public tenders to purchase phytoplankton, zooplankton and microcat sensors, as well as a deep ocean sediment trap to enhance ESTOC. Unfortunately the McLane Zooplankton sampler planned for deployment in 2016 has a fundamental design flaw which the manufacturers have just announced. As a consequence deployments cannot take place as planned at PAP by NOC and ESTOC by PLOCAN until a replacement sampler has been identified.

3: Analytical capability preparation: Ribocon has started to explore and optimize data analysis strategies for genetic-based microbial community profiling which can be done with minimal computational resources available to enable on-site (on board) diversity monitoring. A proof of principle (prototype) is envisaged for mid of 2016. NOC has collected a variety of types of deep water particulate material from the PAP observatory and various methods are being examined for analysis of microplastics.

4: Deliverables: D3.8 OceanSITES Networking Report: Report and linked workshop on the European and Transatlantic plan for sustaining ocean observation by biogeochemical Eulerian Observatories. PM36 (May 2018)

The workshop identified for this deliverable will take place following a relevant conference such as the annual OceanSITES conference in order to reduce travel costs. This will most likely take place in September 2017 allowing time for a substantive report to be written before the due date. A preparatory meeting will take place during EGU, Vienna (18-22nd April 2016) or OceanSITES, Southampton (25-29th April 2016) but with videoconference for partners not present.



Task 3.3 - Torsten Kanzov: Ocean Sites Transport, Partners: AWI, GEOMAR, HAV, NERC, DSS, SAMS, CNRS

The challenge is to conduct the *research and innovation activities* necessary to increase performance and efficiency of the observing system, building on existing capacities around the Atlantic and also to fill the observational gaps through the optimization of existing systems by better coordination, harmonization and integration and the use of new ocean observation technologies.

Ideas for sustainability: One Stop Shop: One of the objective is to create and present network overarching products and analyses. One stop shop web site for TMAs is under development and will be finalized soon. A major contribution would come from an aside workshop to the Ocean Sciences Meeting planned for February 2016 to convince partners to engage (so far 13 participants registered from EU and US). This website will be the first deliverable and is designed as an easy access web presentation as show below (further pages are available in the P3 task2 PPT).

Network enhancement/Technical Innovation

D3.18 Report on the observational potential of the Transport Monitoring Arrays and Synergies with the Wider Atlantic Observing System - One workshop will be held to prepare the report and foster the cooperation on cross-TMA analyses. PM45 (December, 2018).

1. Assessment of the impact of upper-ocean measurements: no progress so far with respect to close to surface measurements

2. Coherent integration of O₂ measurements for transports and fluxes in the Atlantic TMAs: Oxygen I: RAPID 26N : deployment for the first time of biogeochemical sensors across the array on the latest cruise (part of the ABC fluxes project lead by Elaine McDonagh (NOC). They will make measurements of oxygen, Ph and take remote samples from RAS instruments (Remote Access Samplers) for unique observations of biogeochemical time series.

Oxygen II: Enhancement of the Transport Monitoring Arrays (OSNAP). We will add oxygen sensors - which have demonstrated a high readiness level (TRL6) - to existing moorings to coherently monitor the overflow water masses at four key TMA sites: Denmark Strait; Faroe Bank and Shetland Channels; Wyville Thomson Ridge Overflow

Synergies with the Wider Atlantic Observing System: Four Oxygen Optodes for the OSNAP array (NIOZ Reykjanes Ridge array & SAMS Rockall Trough Array). The Rockall Trough OSNAP array will also be instrumented with oxygen, pH, alkalinity and nutrient sensors as part of ATLAS (A Trans-AtLantic Assessment and deep-water ecosystem-based Spatial management plan for Europe, BG-01-2015-2, H2020-BG-2015-

Enhancement of the Transport Monitoring Arrays: Three oxygen optodes have been purchased by HAV and will be deployed at the next mooring turn around in spring/summer 2016 at the Faroe Bank Channel central overflow mooring (HAV) and two overflow moorings in the Denmark Strait (UHAM, MRI)

It turned out that the AtlantOS funding did not fully cover the costs of the oxygen optodes. A MoU was made between AtlantOS and NAACLIM on cost-sharing for the oxygen optodes.



D3.7 Technical enhancement of a TMA site for data safety & cost efficiency. The Objectives are to (GEOMAR with DSS, HAV, NERC) work on the timely availability of TMA data by demonstrating the implementation of subsea real-time data telemetry systems. The Definition of the requirements of a subsea telemetry system has been done and transferred to Develogics who will design and develop the system. Plan to come: Deployment of system in the subpolar North Atlantic in summer 2015 (in conjunction with WP5 "Regional Observing") – cruise MSM54 and Release and Transmission tests will be done in the months following the deployment

RAPID 26°N: Current funding includes money to deliver telemetry from the array, which links in with objectives III—enhancing the observational potential of TMAs. We have deployed our new telemetry system on one mooring for the first time on the cruise we have just returned from. If this works, we will roll it out to enough of the array to deliver near realtime AMOC estimates in 18 months.

Points discussed: data accessibility and one stop shop

Sylvie Pouliquen, also WP7 leader, questioned on how the data will be integrated with WP7 / Copernicus for validation purposes? For most installations data will be available only in delayed mode as download typically only happens during installation maintenance, i.e., every 1-2 years. Feedback from WP7 will be made available as part of an upcoming deliverable but personal communication also seems important.

An ftp server to transfer data from TMA to WP7 seems a practical solution as this is already available at OceanSITES. However, there may still be issues concerning the different data policies of the partners involved. Using the planned TMA one stop shop web site for this purpose will have some other difficulties as data from other institution would then be provided by an AWI-hosted service.

The release date of the one stop shop is not yet settled but full implementation will probably take one year still. The web site is expected to be an ongoing development that is continuously improved and updated. In February 2016 decisions will be taken about what the one stop shop should provide.

Task 3.4 - Victor Turpin: Gliders

Partners: CNRS, SAMS, BRUNCIN, NERC, UIB, GEOMAR, PLOCAN

Network Enhancement :

Monitoring the network has been identified as one of the main lack in the community. The decision to develop monitoring system based on the available data from the GDAC data base (Coriolis) has been taken in order to highlight data that have been through the whole data management process. Many tools are now under development (planning tools, data registration and data access tools) and a close collaboration with WP9 (JCOMMOPS) is starting. The EGO meeting (Southampton, September) will be a great opportunity to show of what has been developed to simplify the data processing and present the network monitoring. This event will also be the occasion to bring together EU and Non EU glider teams. It is under preparation.

The development of a glider App' has started 5 month ago after a meeting with CNRS, SAMS and BRUNCIN.



Data Management :

The delivery of specific .json file appears to be one of the main difficulty for some of our partners to send the data to the DAC. We are working on a solution that simplify this tasks with IFREMER. RTQC will be implemented in the next month in some DACs. We have to work with all the DACs to make sure this RTQC are implemented. We are planning to visit some partners at the beginning of the year to discuss this issues and help them to make their data available through the EGO process.

Long term sustainability :

Glider network see sustainability through two angles: The sustainability of the glider sampling. Endurance lines are deployed and planned in the next years in Atlantic. The Sustainability of the glider infrastructure: A quiet recent EuroGOOS glider tasks team has been set during the last 6 month.

Regarding the OSSE meeting, Victor will collect the needs of the glider community to be forwarded to Hervé Claustre and Pierre-Yves Le Traon.

Task 3.5 - Bernard Bourlès: PIRATA (PPT sent in advance to Hervé Claustre) Partners: IRD, GEOMAR, CNRS

Network enhancement: Addition of "classical" sensors (T/C, atm.) on existing ATLAS buoys (resp. B.Bourlès, IRD/LEGOS)

The PIRATA Scientific Steering Group met in CapeTown, South Africa (Aug 27th, 2015). It was decided to add:

- at the 0N-10W site where an ADCP mooring is maintained, T/C sensors at 5m and 10m, along with a current meter at 10m,
- current meters at 10m and about 40-50m depth (i.e. in and below the mixed layer) at 8N-38W, where Amazon plumes are present
- if possible, one current meter at 0N-35W (each one being purchased in double for servicing => 10 sensors)

Note: 100k€ available => depending upon €/ \$ rate

These additions will only be possible from 2017, when ATLAS system will be progressively replaced by new T-FLEX system allowing more data transmission in RT through Iridium (instead Argos), more sensors possible, and standard commercial sensors –eg SBE- instead PMEL ones etc).

2/ Addition of O2 sensors along 23°W + attempt to make O2 data available in "quasi" real time (resp. P.Brandt, GEOMAR)

GEOMAR will continue with the oxygen loggers at 4°N,23°W and 11.5°N, 23°W (at 200m & 500m depth). Geomar will deploy additional oxygen loggers with inductive link only with the new T-FLEX system (from 2016 & 2017). The development (for transmission in "quasi" RT) started and should be ready by 2016, ie at time for deployment with T-FLEX system.



3/addition of one CO₂ sensor at the PIRATA SEE (PI/ N. Lefèvre, IRD)

The purchase process of CO₂ sensors to be added at the PIRATA site 6S-8E (off Congo) is on going. No installation expected before 2017.

Other CO₂ sensors present status:

- 8N- 38W : Since August 1st, 2015: too high values then stopped... Sensor replaced during the last PIRATA-Br cruise (October 2015).

- 6S-10W : No data in 2014-2015;

Since April 2015, blank variations & sensor drift... could be corrected after? Waiting for PIRATA buoy HR SSS data for CO₂ data calibration (from 2012).

The PIRATA network is already sustained and for Data management there is collaboration with WP7 via OceanSITES.

Task 3.6 - Pierre Blouch: Drifters

Partners: NKE, EUMETNET, CNRS

Network enhancement

Half of the standard SVP-B drifters funded by AtlantOS (52 in all) to fill up a gap in the east of 20°W (spatial coverage increase) were purchased. Their deployment started in April 2015 thanks to a container carrier sailing between Le Havre and Cape Town. A second deployment occurred in August and next is planned at the beginning of 2016. A new ship must however be found. The opportunity of PIRATA network maintenance cruise in February will be also seized. It is planned to regularly launch 4 to 5 buoys every 4 months.

The drifter task group met at NKE by the end of November. NKE proposed a conductivity sensor that could be suitable for the project. The specifications for a prototype of drifter fitted with this sensor have been defined. The study on existing bathythermic string drifter data will start in 2016.

Data from AtlantOS funded drifting buoys are sent in real-time onto the GTS (BUFR template TM315009). Near real-time quality controls are performed every day as for EUMETNET buoys. Measurements are acquired by AOML and MEDS for delayed mode distribution. Discussions are ongoing on the possible set up of a JCOMM GDAC for drifting buoys at Coriolis (interaction with WP7).

Network sustainability: Eumetnet may be able to provide 13 drifters per year for the South Atlantic, at the end of AtlantOS, if studies show beneficial impacts. Paul Poli will take over the task lead by next autumn. Paul already works with Pierre Blouch to prepare the transition (concerns E-SURFMAR too). Paul was formerly working on data assimilation at ECMWF. He will attend the meeting organized by P.-Y. Le Traon in Toulouse, on OSSEs, this week.



**Task 3.7 -Pedro Afonso: The European Aquatic Animal Tracking Network (EAATN)
Partners: IMAR, VLIZ, DAL**

Several activities were done during this period. A scientific steering committee (SSC) of selected PIs and a WS is being organized for late spring 2016. Concept/prototype EOVs were defined, to be refined by the SSC. A metadata database (researchers, species, etc.) is being built by OTN based on a survey (April 2015, permanently updated), and it was decided that VLIZ will host and develop the data node based on the software architecture and data standards in existing telemetry networks (OTN, AATAMS, ATN) and link the database to European data sharing efforts (e.g. EMODNET). An (extra) WS held at the 3rd International Fish Telemetry Conference in Halifax, July 2015, to launch EAATN and discuss overall network issues (PM4), attended by over 25 researchers. A showcase was done by invitation in the EC/Brazil bilateral high-level meeting (Copacabana declaration – Nov 2015).

Further information:

A joint abstract for Poster at the Global Climate Observation: the Road to the Future' in Amsterdam conference (2-4 march 2016) will be submitted and participants at the session II: - Successes of the current global observing system. The title is "Enhancement of autonomous ocean observation networks in the Atlantic Ocean" signed by all WP3 task leaders

The next WP3 meeting will be organised in the last week of June as a side meeting of the second AtlantOS General Assembly: WP3 meeting: 28 June (9-12h).

Minute of the mid-term WP3 Task meeting, Webmeeting, 15 December 2015,

Michèle Barbier, Felix Janssen and Hervé Claustre

Participants: Hervé Claustre (UPMC), Giorgio Dall'Olmo (PML), Fred Whorisky (DAL), Valérie Harscoat (Ifremer), Sylvie Pouliquen (Euro-Argo ERIC/Ifremer), Grigor Obolensky (Euro-Argo ERIC), Felix Janssen (AWI), Ian Salter (AWI), Pierre Blouch (EUMETNET), Victor Turpin (CNRS/LOCEAN), Torsten Kanzow (AWI) and Michèle Barbier (UPMC)), Pedro Afonso (IMAR, via Skype)

Excused: Antje Boetius (AWI), Pierre Testor (CNRS), Richard Lampitt (NOC) and Bernard Bourles (IRD)