

# **PIRATA-20 meeting report**

(Cape Town, South Africa, August 24-28, 2015)

The 20<sup>th</sup> PIRATA meeting was held during the joint PIRATA-PREFACE-Tropical Atlantic Variability (TAV)-CLIVAR-Atlantic meeting co-organized in Cape Town, South Africa by PREFACE, NANSEN-Tutu Center at University of Cape Town (UCT) and PIRATA-France (see <http://mathieurouault6.wix.com/PIRATAprefaceconf>). About 90 people attended these meetings, in which scientific presentations were held during specific sessions on Tuesday through Thursday, August 24-27<sup>th</sup>. An open PIRATA-dedicated session was held on Wednesday, August 26<sup>th</sup> in the afternoon, during which a general overview and some scientific highlights were presented to the whole assembly; the closed SSG PIRATA session has been held on Thursday, August 27<sup>th</sup> in the afternoon, where national status reports were presented. This meeting was mainly sponsored by IRD and Météo-France. No PIRATA PRB member was present.

## **Attendees to the SSG closed session:**

### **- SSG member participants:**

Bernard Boulrès (IRD, France; co-chair); Moacyr Araujo (UFPE, Brazil; co-chair); Michael McPhaden (NOAA/PMEL, USA); Rick Lumpkin (NOAA/AOML, USA); Ramalingam Saravanan (Texas A&M University, USA), Hervé Giordani (Météo-France/CNRM, France), and Fabrice Hernandez (IRD/LEGOS, France).

Paulo Nobre (INPE, Brazil) was absent and excused, and represented by Carlos Fonseca (INPE/CPTEC, Brazil), after a prior official agreement of all SSG members.

Peter Brandt (GEOMAR, Germany) was absent (attending to PREFACE parallel sessions) and excused. Edmo Campos (IOUSP, Brazil) was absent (no news from him since last meeting).

### **- PRB member participants:**

None (for the 1<sup>st</sup> time); all excused.

### **- Invitees :**

Jacques Servain (IRD/LOCEAN, France & FUNCEME, Brazil), was invited, as co-lead of a PIRATA network enhancement proposal.

The first part of this report summarizes the overall and national PIRATA status reports.

The priority actions for the PIRATA SSG meeting are then summarized, with a summary at the end for the PIRATA PRB.

## PIRATA global and national status:

### 1) NOAA/PMEL PIRATA overall report (Mike McPhaden)

Mike McPhaden presented the current flavor of the PIRATA buoy network, including recent addition of OTN (acoustic sensors installed on all ATLAS buoys from 2013) and Chipods (see figure).

He showed the present status of the presently deployed moorings (see figure) with a good data return keeping in mind that the next BR cruise will be soon.

The Real Time (RT) data return during Oct 2014-Jul 2015 (and extrapolated through the US fiscal year of Oct 2014-Sept 2015) is 84% for all sites, higher than previous recent years. Lower values are explained at i) 10W-0N by fishing vandalism and a wind sensor failure; ii) 34W-19S by failure of the wind sensor and 4 subsurface sensors; iii) 38W-20N by some sensor failures and intermittent subsurface data.

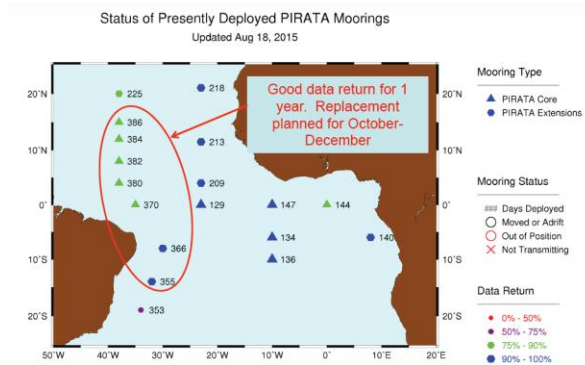
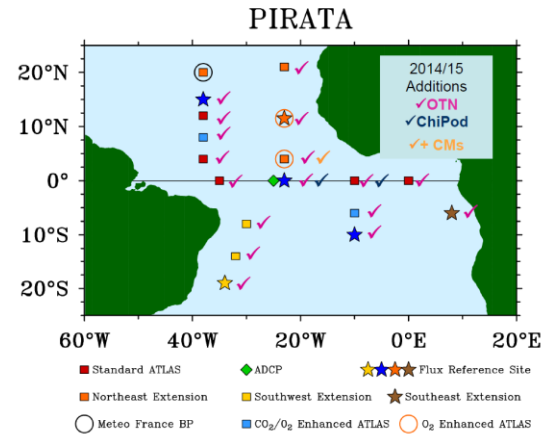
The overall Delayed Mode (DM) data return was 83% during the last US fiscal year (Oct 2014-Jul 2015), i.e. larger than during the two last years and very satisfying. Annual data return and number of moorings operating has been steady and similar for several years and, from 2003, dedicated maintenance cruises have kept moorings within their design lifetime.

The overall (1997-2015) mooring survival (i.e. fully recovered/deployed moorings ratio) is 211/226, and still shows lowest values for the two equatorial buoys in the Gulf of Guinea due to vandalism. But vandalism due to fishing activity in this area has been considerably reduced in the past decade: from 2008, this ratio is 118/121 (i.e. remarkably close to 1). Thus the PIRATA mooring survival rate is 100% for 14 sites (out of 18) from 2008, which is an excellent overall result and a measure of PIRATA's success.

Field work since Oct 2014 (the beginning of the past US fiscal year) involved 74 days at sea across all partners but Brazilian ones (see next chapter about Brazil status). PMEL sent 2 persons to sea for 88 days on the last PNE cruise (Dec 2014-Feb 2015).

Data files delivered through the web decreased from 2013 but were offset by increase in ftp file downloads (266,349 in 2014 and 360,872 in 2015).

Then, M. McPhaden presented some comparisons between the T-FLEX and ATLAS systems. 8 side-to-side ATLAS comparisons were done (4 in PIRATA and 4 in RAMA). The 8<sup>th</sup> mooring pair is presently being tested in PIRATA at 4°N 23°W. T-FLEX and ATLAS systems provide equivalent data and T-FLEX performance (i.e. real-time and delayed-mode data return) is equal to or better than ATLAS. M. McPhaden noted that an evaluation Tech Memo is being drafted and that standalone T-FLEX systems will begin in RAMA (7 sites) and PIRATA (3 sites, in late 2015 – early 2016). In PIRATA, locations will be decided by



the SSG; See “SSG issues and discussion” chapter below). M. McPhaden says that PMEL can offer T-FLEX orientation training in Seattle and PMEL technicians available to participate on initial French and Brazilian cruises.

M. McPhaden also showed some experiments carried out during the last PNE cruise (AOML radiometer cleaning system and TACOS experiment; see PNE report below).

About piracy, M. McPhaden showed that some incidents in Gulf of Guinea continue, but confined mainly to coastline, and piracy is abating off the horn of Africa.

Then M. McPhaden showed a status of PIRATA enhancements (additional sensors) and potential enhancements thanks to the EU AtlantOS project. He also mentioned the issue about 2017-2018 PNE cruises and potential cruise options and agreements between NOAA and IFREMER. Such issues are discussed below.

To conclude the PIRATA overview, M. McPhaden listed some major issues to be discussed (see below), *i.e.* i) Sensor enhancements, ii) piracy; iii) US-French Ship for 2017-18; iv) T-FLEX implementation and v) T-FLEX training for INPE/IRD technicians.

### NOAA/AOML PIRATA Northeast Extension (PNE) report (Rick Lumpkin)

Rick Lumpkin presented the most recent PNE cruise, PNE 2014. The cruise started on the December 28<sup>th</sup>, 2014 in Bridgetown -Barbados and ended on February 12<sup>th</sup>, 2015 in San Juan – Puerto Rico. It was performed on the R/V Endeavor, which is not an ideal vessel for PIRATA campaigns due to deck space. Despite these challenges a total of 51 CTD stations were carried out (43 along 23°W), underway ADCP and TSG measurements were performed, 12 surface drifters were deployed and dust samples were collected at all PNE sites.

Regarding the mooring work, R. Lumpkin provided the following summary:

- ATLAS recovery/deployment on all 23°W sites (20.5°N, 11.5°N, 4°N) and also on 20°N-38°W (buoy was adrift);
- T-FLEX recovery from 20°N-38°W and redeployed at 4°N-23°W;
- A flyby on the site 0°N-23°W, spotted an additional flotation device which was informed to the French team. Also the SWR shield was missing ;
- A SWR spritzer was installed at 11.5°N-23°W (Dr. Greg Foltz, AOML, is the leading PI);
- Current meter buoy at 4°N-23°W (TACOS experiment) was deployed with 10 additional point acoustic current meters, but the directions on the point ADCP current meters were biased;
- Five hydrophone moorings to monitor seismic activity were recovered (PI: Dr. R. Dziak from PMEL);
- Oxygen sensors (PI: GEOMAR/Germany), were installed at 300m and 500m on the 4°N-23°W and 11.5°N-23°W sites;
- OTN sensors from Dalhousie University were installed at 200m at 4°N-23°W, 11.5°N-23°W and 20.5°N-23°W sites.

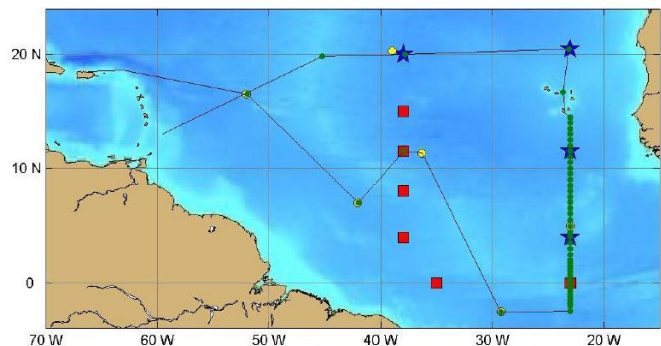


Fig. 1: Cruise track of PNE2014 (black). Barbados to San Juan. Blue stars indicate the locations of PIRATA Northeast Extension ATLAS moorings; red squares are PIRATA backbone moorings. Yellow circles indicate the locations of subsurface hydrophone moorings. Green dots are the locations of CTD casts conducted during the cruise. During the cruise, a next-generation T-FLEX mooring was recovered at 20°N 38°W and redeployed at 4°N 23°W.

R. Lumpkin stated that calibrated CTD-O2 data are relayed to PMEL and NOAA/National Centers for Environmental Information (NCEI), and served on the PNE web page in delayed mode.

R. Lumpkin also mentioned that the 2015 PIRATA-PNE cruise would be on the NATO ship R/V Alliance most likely from November 15<sup>th</sup> to December 15<sup>th</sup>, 2015.

After 2015, R. Lumpkin mentioned that conversations started between NOAA and IFREMER regarding combined French and US cruises in 2017 and 2018 (the latter year when the R/V Ron Brown will be in the Indian Ocean). B. Bourlès is also aware of these exchanges. This initiative started from the upper management of NOAA and IFREMER and is now reaching relevant SSG members in each country. M. McPhaden mentioned that despite the fact that none of the SSG members were involved in the first discussions, that upper management from both NOAA and IFREMER are discussing PIRATA is a measure of the importance of the program. R. Lumpkin mentioned that AOML performance ratings were increased due to the national and international cooperation on the PIRATA project.

R. Lumpkin mentioned that the number of sea days (60) offered in the first conversations of the combined cruise would not be enough to cover all the operations usually done from both PNE and FR cruises. R. Lumpkin and B. Bourlès agreed to share cruise plans to further discuss planning. R. Lumpkin also mentioned two backup plans for the US in in case the combined cruise is not possible (1) 2 PNE cruises in early 2017 and late 2017 with the R/V Ron Brown, then next in 2019; 2) PNE cruise in 2017 with the R/V Ron Brown and chartering an R/V in 2018).

R. Lumpkin also gave inputs from the US CLIVAR Phenomenon, Observations and Synthesis (POS) Panel. Most of the suggestions (listed below) were in sync with PIRATA enhancements goals (e.g. current meter at 10m at all sites, more salinity measurements on the upper 100m, more biogeochemical observations) although no funding is expected from US CLIVAR to the PIRATA project. R. Lumpkin also mentioned that ship time will be a big concern for US CLIVAR.

Finally, R. Lumpkin mentioned the updates on the PNE PIRATA website (<http://www.aoml.noaa.gov/phod/pne/>), as well on the publication lists ([http://www.aoml.noaa.gov/phod/pne/pdf/PIRATA\\_references.pdf](http://www.aoml.noaa.gov/phod/pne/pdf/PIRATA_references.pdf)). He emphasized the importance of the French and Brazilian Team submitting updates of their publications. F. Hernandez mentioned a search also in scientific search engines (like ScienceDirect) in order to make the publications list as complete as possible.

US CLIVAR POS recommendations:

*Measurements:*

*Minimum one current meter at 10 m depth; More velocity shear estimates in surface mixed layer; More salinity measurements in the upper 100m; Multidisciplinary biogeochemical observations (O<sub>2</sub>, CO<sub>2</sub>, DIC...); Self-cleaning radiometers.*

*Sites/moorings to add: a) More off-equatorial sites, especially along the African coast in the Benguela region, where model biases largest; b) more sites in biologically active coastal zone/river discharge regions; c) Dust deposition moorings.*

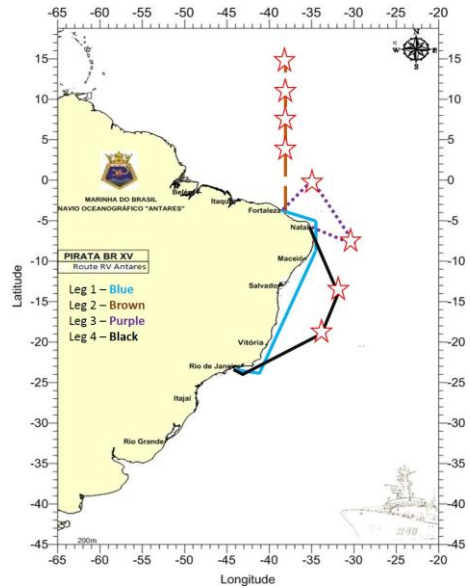
*More integrated ocean-atmosphere cruises to study stratus deck formation-upwelling system in eastern Atlantic.*

## 2) Brazilian PIRATA report (Moacyr Araujo)

The status of PIRATA-Brazil was presented by M. Araujo, who began with the most recent PIRATA BR XV 2014 cruise. This 40 days cruise was achieved in 4 legs from the R/V Antares. Due a problem in the deck unit no CTD data was collected although 15 underway-CTD (uCTD), 74 XBT and 27 radiosonde profiles were acquired.

M. Araujo also showed the plans for the upcoming PIRATA Brazil cruise. The most probable dates are November – December 2015; part of reason for the delay in this cruise was the arrival of a new research vessel NPqHo Vital de Oliveira, and the option to use it on the next PIRATA campaign (R/V Antares has a great history with PIRATA and can be considered as dedicated to PIRATA). Sensors from PMEL were shipped and were expected to arrive on August 29<sup>th</sup>. Sensors for the CARIOCA-pCO<sub>2</sub> buoy are waiting for the final cruise dates to be shipped from France.

M. Araujo showed some results from the first campaign of the Vital de Oliveira from Cape Town to Rio de Janeiro (FORSA Cruise – Following Ocean Rings in the South Atlantic) and also showed an update on the 2015 publications (7) associated with PIRATA project.



## 3) Brazilian PIRATA data report (Carlos Fonseca)

C. Fonseca gave an update on the data status of the PIRATA-Brazil cruises. C. Fonseca recalls that 15 oceanographic cruises were carried out with CTD, SADCP, XBT, uCTD, radiosondes, measurements (TSG, MET, and pCO<sub>2</sub>) and some biogeochemical data. The main goals of the PIRATA-Brazil data management effort are: i) Technical qualification of Brazilian researchers and students; ii) Processing and documentation of all the data collected; iii) Provide the access to the data to PIRATA partners and whole scientific community; iv) Improve the data acquisition quality by creating procedures and best practices for every instrument and v) Increase the synergy among the Brazilian institutions. C. Fonseca mentioned the strategies to process every dataset, as well plans for QC and final format of the processed files (NetCDF). C. Fonseca also mentioned the updated PIRATA-Brazil website (<http://PIRATA.ccst.inpe.br/>) as well the information regarding the host server and noted that it would be available to host all the data from PIRATA maintenance cruises. Work on XBT drop rate equation adjustments is going on, along with on uCTD data treatment that would need help from partners at AOML. M. McPhaden mentioned the importance to having a unique source and format for the PIRATA dataset.

## 4) French PIRATA report (Bernard Boulès)

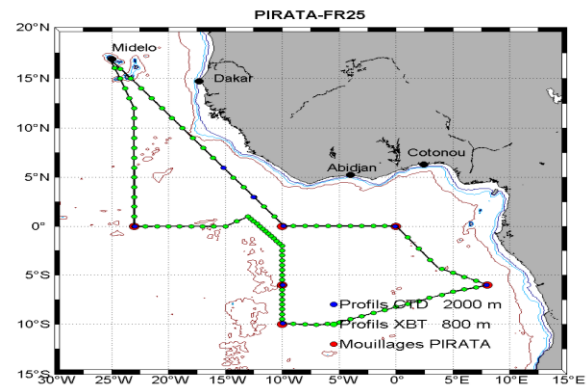
B. Boulès first recalled the French status of PIRATA as it is recognized as a national observatory (Système d'Observation Océan-Atmosphère) and part of a larger SOERE (Service d'Observation et d'Expérimentation, sur le long terme, pour la Recherche et l'Environnement CTDO<sub>2</sub>) dedicated to ocean operational observations (PIRATA, SSS, ARGO, CORIOLIS). Such a SO label is important for

endorsements of national programs and/or research institutions, plus potential funding support for material and vessel time. Thus, the vessel time is ensured yearly (thanks to the “Observatory” status).

A scientific evaluation is needed every four years, thus PIRATA has been successfully (results just arrived during the meeting...) evaluated in 2015 at a national level in order to maintain this SO label. PIRATA has also been evaluated by IRD, and got the “Observatory for the South” label by IRD, so being recognized as an important tool for environmental observation, research and capacity building in southern areas and also indicating the IRD concern for PIRATA’s successes which should help in maintaining the long term funding for the project.

B. Bourlès also mentioned that the institutional convention/agreement between IRD and Meteo-France must be renewed in 2016. He presented the evolution of PIRATA-FRANCE budget, as well the financial costs for the fiscal year of 2015, and the total of sea days dedicated to PIRATA-France cruise and its preparations. In 2015 the contribution by Météo-France was 30k€, by IRD 45k€, and by OMP 4.2k€. Thus, total supports amounted to less than 80k€, i.e. less than in previous years.

Due to the Ebola Fever epidemic and piracy in the Gulf of Guinea the 2015 PIRATA-FR25 cruise had to be organized in one leg from Cabo-Verde without any call in West Africa. It was thus done from the R/V THALASSA, larger than the R/V SUROIT and with 45 days endurance. Due to logistical problems (mostly MSC shipping agent reliability) inducing delay for the US material delivery in France, the cruise was reduced by about 10 days and conducted from March 18 to April 16, mostly dedicated to mooring operations, with no CTDO<sub>2</sub>/LADCP possible except at buoy locations (and 2 Argo profilers deployments).



The 6 buoys at 23°W-0°N, 10°W-0°N, 6°S, 10°S, 0°E-0°N, and 6°S-8°E (PIRATA SEE) were serviced. The ADCP mooring at 10W-0N was also replaced. Another ADCP mooring at 0E-0N was deployed in the framework of the EU-PREFACE program, but the deployment failed; another deployment is planned in 2016 if lost material can be purchased (i.e., mostly 2 acoustic releasers). A total of 109 XBT profilers, 8 Arvor profilers (including 2 new Argo float prototypes), 5 SVP-BS profilers were deployed, three of which were equipped with thermistor chains down to 80m depth for a Météo-France contribution to AtlantOS. 82 sea surface water samples for diverse biogeochemical and physical parameters were collected during the cruise altogether with continuous underway ADCP, TSG, fluorimeter and acoustic measurements (the R/V THALASSA is equipped with a SIMRAD EK60 6 frequencies acoustic sensor, and such measurements are of great interest for biotic and abiotic ecosystem components that could be used by PREFACE colleagues). The following additional operations were carried out at some moorings: i) Retrieving of 2  $\chi$ pods at 0°N-23°W and 0°N-10°W and deployment of another 10  $\chi$ pods at the same locations (5 at each site); ii) OTN sensors from Dalhousie University were replaced on all ATLAS buoys, iii) fly byes of the PNE buoys at 4N-23W (to check current meters installed on ATLAS & T-FLEX) and 12N-23W.

B. Bourlès noted that Sargassum samples should be collected during PIRATA cruises for genetic sampling. These samples should be dried in the sun, and then put in a bag with the date and location of collection. The samples could then be sent to him for analysis (by colleagues at the LEMAR in Brest).

B. Bourlès mentioned that for the first time a PIRATA buoy at the symbolic location (0°N-0°E) was used as a memorial for a German military person. He said that the processing of the PIRATA SADCP data from 2007 has been achieved and made available through the PIRATA-FR website (by G.Herbert, collaboration PREFACE & CORIOLIS, using the LPO Cascade software).

About the CARIOCA CO<sub>2</sub> sensors: i) at 6S-10W it did not work in 2014-2015; it indicated blank variations & sensor drift since April 2015, after its replacing during the FR25 cruise; ii) at 8N-38W, too high values then stopped since August 1<sup>st</sup>, 2015. These sites will be serviced during next BR and FR cruises. Data are available through CDIAC (Carbon Dioxide Information Analysis Center): <http://cdiac.ornl.gov/oceans/index.html> and SOCAT (surface Ocean CO<sub>2</sub> Atlas project): <http://www.socat.info/>.

The next PIRATA FR26 cruise is scheduled from March 8 to April 13, 2016, also from the R/V THALASSA and from Cabo-Verde (the R/V SUROIT is now “out of service”). B. Bourlès also noted that 3 African PhD students defended in early 2015 (2 in Cotonou/Benin, 1 in Recife/Brazil; all issued from the Master 2 program launched in 2008 in Cotonou). Other PhD projects related to PIRATA scientific themes are underway. B. Bourlès showed a list of recent publications (13 published or in press since fall 2014 including French “pirates”).

Then, B. Bourlès continued about some more general issues (manpower in France and national support, enhancements and links with AtlantOS, T-FLEX systems implementation, Brazilian proposal by FUNCEME for T/C vertical enhancement in the west, PIRATA data DOI, next MoU, etc.) that are presented in detail in the next paragraphs.

## **5) SSG issues and discussion:**

### **- PIRATA concern in France:**

B. Bourlès finished the PIRATA-France presentation talking about some uncertainties on future long-lasting fundings (but by IRD), some uncertainties about human power (need of engineers; however one recruitment is expected by late 2015 at IRD/US IMAGO) and the strong need of a scientist/manager for the project. First, the official convention between IRD and Météo-France has to be renewed in 2016; H. Giordani and B. Bourlès will first have to convince Météo-France to continue his funding at the highest level possible (30k€ from 2012). Second, in order to convince at the national level that a scientist/manager is needed and that PIRATA is an efficient international observatory for which the contribution of France is essential, B. Bourlès asked help to the partners of PIRATA-France in writing recommendation letters to be signed by the main PIRATA partners (ie NOAA, INPE...) and also by international organisms/programs (*e.g.* CLIVAR, PREFACE, AtlantOS...); all agreed to help.

### **- About future T-FLEX deployments:**

After 8 T-FLEX systems have been tested (4 in RAMA, 4 in PIRATA), PMEL is now confident to progressively replace ATLAS by T-FLEX systems in PIRATA. In recent email exchanges, Paul Freitag

(PMEL) suggested to deploy in 2016 3 T-FLEX buoys at some locations with less vandalism, *i.e.* at 10S-10W, 0N-23W and 12N-23W during the next PNE & FR cruises. Sites in the west could also be T-FLEX equipped during the 2016 BR cruise in fall 2016. All agreed with these suggestions for these three sites to be the first to have operational T-FLEX systems replacing the ATLAS systems.

**- Enhancement of sensors through the EU AtlantOS project:**

B. Bourlès confirmed that the EU AtlantOS (“Optimizing and Enhancing the Integrated Atlantic Ocean Observing System”) project was officially launched in April 2015 and at the kick-off meeting in June 2015 at Bruxelles (see <https://www.atlantos-h2020.eu/>). PIRATA is directly involved as it addresses the dedicated 5<sup>th</sup> task of the AtlantOS WP3 (“Enhancement of autonomous observing networks”), with 3 main (funded) operations:

- addition of traditional sensors (T/C, current, flux) to some particular sites (PI: B. Bourlès, IRD)
- addition of one CO<sub>2</sub> sensor at the PIRATA SEE (PI/ N. Lefèvre, IRD)
- addition of O<sub>2</sub> along 23W at 300m & 500m (PI: P. Brandt, GEOMAR)

100k€ have been made available for the traditional sensors, that could be (at least for some sites) installed as early as 2016. Some ocean sensors (T/C and current, specifically Seabird SBE37 and Nortek respectively) have to be used for T-FLEX systems to get the data in real time. F. Hernandez mentioned that would be beneficial to have some salinity measurements below 120 m in some areas of the South Atlantic. M. McPhaden mentioned that first the correlation of the TS relationship should be carefully checked prior moving toward deeper sensors for salinity. Finally, all agreed to favor additional T/C sensors and current meters for better monitoring and understanding of mixed layer processes. Considering previous mail exchanges and inputs by P. Freitag (NOAA/PMEL) about feasibility & sensor types according to T-FLEX versus ATLAS systems, and according to previous cost estimates (to be checked, due to the US\$/€ rate changes), it has been chosen to:

- i) add, at the 0N-10W site where an ADCP mooring is maintained, 2 T/C sensors at 5m and 10m, along with a current meter at 10m,
- ii) add currentmeters at 10m and about 40-50m depth (*i.e.* in and below the mixed layer) at 8N-38W, where Amazon plumes are present, and
- iii) if possible, one current meter at 0N-35W (each one being purchased in double for servicing)...

Note that, even if purchased soon, these sensors could be only deployed on T-FLEX systems, *i.e.* in 2017 for the earliest.

Also note that an AtlantOS deliverable (D3.3 PIRATA Data System Upgrade Report: Report on new -physical, meteorological and biogeochemical- sensor implementation and derived time series) has to be provided (by B. Bourlès, N. Lefèvre & P. Brandt) in April 2017.

**- Enhancement of T/C sensors in the west through a FUNCEME/Brazil proposal:**

According to recent research done by a PhD candidate at UFPE in Recife that suggest the influence of barrier layer on predictability of precipitation in the Nordeste, a Brazilian proposal (sent to the SSG in early 2015 by Jacques Servain and Moacyr Araujo) recommends adding 9 T/C sensors at 3 sites (0N-35W, 4N-38W and 8N-38W). FUNCEME is ready to fund 54 T/C sensors such additional sensors now. The SSG agrees to support the purchase and future installation of 27 T/C sensors (T-FLEX compatible) with 27 in reserve and will send a letter to Brazil in this regard. Also note that, even if purchased soon, these sensors could be only deployed on T-FLEX systems beginning in 2017 for the earliest. M. McPhaden said that priority for these three sites will be given in the 2017 T-FLEX implementation plan, and that he will check maintenance and data transmission costs required for the additional sensors.



- **PNE & FR 2017-2018 cruises:**

Following R. Lumpkin & B. Bourlès comments about the NOAA/IFREMER discussions to perform combined PNE and FR cruises in 2017 & 2018 (R/V Ron Brown will be in the Atlantic in 2017, but may be in the Indian Ocean in 2018), they both agreed to share cruise plans and work together to argue for more sea days from US with the R/V Ron Brown in 2017. They also agreed to go over the details of this operation and its logistics, if such ideas are agreed to NOAA & IFREMER (at the upper levels). B. Bourlès mentioned that he will have a dedicated meeting with IFREMER on this issue on August 31<sup>st</sup>, and will inform NOAA partners (R. Lumpkin, AOML, and M. McPhaden, PMEL) on the IFREMER's point of view.

- **PIRATA “in the future” and future MoU:**

B. Bourlès explained that another AtlantOS deliverable (to be provided at the end of the project in December 2018) will be dedicated to the renewed PIRATA network and its potential sustainability over the long-term. This deliverable will obviously be established with the contribution of the PIRATA International SSG and PIRATA partners, but also CLIVAR, PREFACE & TAV partners. An “in situ” measurements meeting for the “future observing system” would be useful for defining priorities, with all these partners involved. F. Hernandez mentioned that very few observations are found in the South Atlantic south of 10°S. M. Araujo mentioned that a discussion will happen in Brasilia-DF () regarding observational networks in the South Atlantic (South-South Workshop in the Tropical and South Atlantic Research, October 21<sup>th</sup>-22<sup>th</sup>, 2015). B. Bourlès mentioned, and all members agreed, that a recommendation should be made to US CLIVAR to include a day for Tropical Atlantic Studies during the next yearly meeting (see below) and invitations should be send to all scientists involved. The SSG agrees that more cooperation should happen with all the observational projects in the Atlantic, especially between PIRATA, RAPID-MOCHA and SAMOC. A suggestion of organizing a meeting (probably under the GOOS sponsorship) among all observational programs in the Atlantic was very well accepted. Such discussions could also be useful for defining the future MoU. Presently, B. Bourlès mentioned the renewal of the MoU is due in 2018. All members agreed that the starting document should be the present MoU. All members also agreed that a technical revision should be performed by the SSG and the editions/revisions should be discussed during the 2016 PIRATA meeting. This preliminary version should then be forwarded to the PRB and other agencies for legal review. All members agreed with this strategy.

- **Next 2016 PIRATA meeting:**

The present 2015 meeting in Cape Town was organized jointly with the EU PREFACE program, TAV and CLIVAR-Atlantic (and was mainly sponsored by France, responsible for this year's PIRATA meeting, through IRD and Météo-France). It is important to maintain such enlarged meeting to gather the maximum of involved/interested scientists. The next 2016 meeting should in principle be organized by US partner but it is unrealistic to organize two independent meetings, one in the US and one for PREFACE will also have a meeting in 2016 and also wishes to involve the TAV community. Even though a meeting in US would be relevant and attractive for the North American community, the SSG agrees to again hold its next meeting with PREFACE & TAV in Europe. This will be discussed with PREFACE (B. Bourlès). However, a session for the Tropical Atlantic should be included at the Fall 2016 AGU meeting and the upcoming CLIVAR meeting in China in September 2016.

It should be noted that 2017 will coincide with the 20<sup>th</sup> anniversary of PIRATA! In 2017, Brazil is planning to host the meeting, and all agree that organizing it back in Fortaleza (the location of the 1<sup>st</sup>

PIRATA meeting) would be extremely symbolic. This meeting could be the opportunity of special events like a summer school; see below “Capacity building”.

Last information (B. Bourlès): A PREFACE generally assembly was held on Friday August 28<sup>th</sup>, one day after the PIRATA SSG meeting. It was decided, taking into account the SSG agreement transmitted to the PREFACE assembly, that the next 2016 PIRATA meeting will be organized commonly with PREFACE, TAV and CLIVAR-Atlantic. This meeting will be organized in Paris, France around October-November 2016.

- **Capacity building:**

It has been noticed that several presentations during the PREFACE-PIRATA meeting were done by young African scientists (post doc & PhD), some of them issued from the Master 2 program (dedicated to physical oceanography and applications) initiated by IRD in Benin. M. McPhaden congratulated this capacity building by the French in Benin ... such a regional M2&PhD program is surely useful for PIRATA in the future! During the PIRATA “open session”, B. Bourlès mentioned that the M2 program in Cotonou was endangered in the short term because TOTAL has withdrawn its 50k€ funding and sponsorship.

The SSG followed discussion about further potential actions to contribute to capacity building, e.g. through summer schools related to PIRATA related themes (science, data treatment, etc). B. Bourlès noted that some summer schools were recently organized with PREFACE (see website) in Cape Town and Cotonou. The idea was raised to organize a summer school associated with the 20<sup>th</sup> anniversary of PIRATA, in Brazil in 2017 (maybe at UFPE/Recife, not far from Fortaleza). R. Saravanan says that it could be straightforward to get support from US universities. M. Araujo remembered that UFPE and TAMU signed a specific agreement for scientific and capacity building cooperation in Ocean Science. This idea will be raised with the PRB for support.

- **Piracy:**

One can note a slow decrease in piracy in the Gulf of Guinea these last months (see <https://icc-ccs.org/>). Presently, piracy has precluded any measurement in coastal parts of the Gulf of Guinea since 2011, but not PIRATA network servicing (all buoys are out of any EEZ and limited access areas).

- **Miscellaneous:**

B. Bourlès mentioned that maybe it is time for a PIRATA data DOI (at least moored met-ocean buoys data). M. Araujo mentioned it would be important and very beneficial to the PIRATA project and suggested C.Fonseca to get more information and proceed towards accomplishing this task (in collaboration with PMEL).

J. Servain mentioned a conversation with C. Fonseca and M. Araujo regarding writing a scientific paper with 10 years of the PIRATA SW Extension and invited all members to collaborate. B. Bourlès asked for the follow-ups on the OceanSites and Black Carbon and Aerosols initiatives; none of the members had any inputs or updates.

F. Hernandez mentioned that a figure must be added to quickly show all the sensors available for each PIRATA site. Mr. Fonseca will follow up on this task.

Finally it was mentioned that a renewal of the Scientific Steering Group does not seem an issue (in spite of E. Campos’ silence since the last meeting).

### **PRIORITY ACTIONS SSG:**

- 2017-2018 PNE & FR cruises.
- SSG chairs=> letter of agreement to Brazil (Funceme proposal)
- Impact of enhancements (additional sensors) for PMEL human power & resources...
- PRB: what does SSG have to provide for the MoU?
- Consider PIRATA data base DOI.
- Consider summer school in 2017 in Brazil (20<sup>th</sup> PIRATA anniversary)

### **Summary to PRB:**

- T-FLEX systems will begin to be implemented in an operational way during the next FR & PNE cruises. 3 first sites at 12N-23W, 0N-23W, 10S-10W.
- PIRATA & H2020 AtlantOS project: additional sensors through EU funding and stronger programmatic collaborations. T/C sensor, currentmeter & biochemistry enhancements on future T-FLEX buoys (IRD: type of sensors, locations and depths finalized during the SSG; CO<sub>2</sub> at 6S-10W by IRD; O<sub>2</sub> at 200 and 500m depth along 23W by GEOMAR).
- Potential T/C enhancement at 3 buoys in the west (0N-35W, 4N-38W, 8N-38W) thanks to a Brazilian/FUNCEME (funded) proposal.
- PMEL human power (and resource) potential issues to respond to future enhancements.
- Issue about the 2018 PNE cruise. Exchanges going on between NOAA & IFREMER.
- Future PIRATA support concerns in France. Need of recommendation letters by “high level” US & BR partners, and other international programs (CLIVAR, AtlantOS, ...).
- 2017 20<sup>th</sup> PIRATA birthday. Possibility of organizing a PIRATA focused summer school.

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