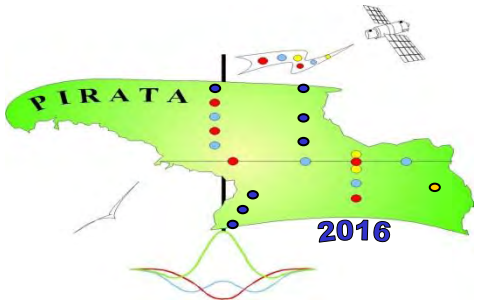
PIRATA

(PredIction and Research moored Array in the Tropical Atlantic)

French national report & status



- *A few recalls & french cruises*
- *PIRATA status in France (S.O.)*
- *About the PIRATA FR 26 cruise*
- *Scheduled cruise in 2017*
- *Other activities & issues*

Members in FRANCE of the PIRATA-SSG:

-Bernard BOURLES (IRD-LEGOS, Brest; coord. SO PIRATA in France; co-chairman of the PIRATA SSG)

- Fabrice HERNANDEZ (IRD-LEGOS, Toulouse)

- Hervé GIORDANI (Météo-France, CNRM, Toulouse)

http://www.brest.ird.fr/pirata/

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METEO FRANCE

PIRATA status in France :

PIRATA-France recognized as a National SO-AO (Service d'Observations Océan-Atmosphère) as part of a larger « Service d'Observations » (CTDO2) dedicated to ocean operational observations (PIRATA, SSS, ARGO, SONEL –tide gauges-) closely linked to CORIOLIS.

PIRATA is supported by IRD, Météo France and also by the **Observatoire Midi-Pyrénées** (Toulouse University; *PIRATA mostly supported by IRD/LEGOS, part of the OMP)* **and by INSU/CNRS** *(for instruments/sensors)* through CTDO2

⇒ **IMPORTANT & SUCCESSFUL NATIONAL EVALUATION (by CSOA) made in August 2015,**

=> **« SO label »** important for endorsements of national programs and/or research organisms + potential funding support for material + vessel time + potential dedicated recruitment (no success yet…).

BUT:

Probable re-organization of « Open Ocean Observations » in France
⇔ Need of a closer linkage with EUROPEAN institutions (Research Infrastructures)…
Process just begins (also through AtlantOS)

PIRATA status in France :

ALSO: Evaluation by IRD in 2015:

=> PIRATA-France got an official label « SOUTH » by IRD, being recognized as an important tool for environmental observation, research and capacity buiding in southern areas.

=> This label should help to maintain IRD fundings on the long term…

ABOUT THE METEO-FRANCE involvement:

GOOD NEWS:
The « convention » for the PIRATA maintenance established between IRD & Meteo-France HAS BEEN RENEWED in October 2016 (for 4 years) with same fundings amount (30k€/y).

This convention IRD/MF WAS absolutely needed for PIRATA-France…!

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PIRATA status in France : « Observatoire de la Recherche en Environnement »

Fundings since 2003 & perspectives (*vessel time & salaries & laboratory infrastructures not taken into account*):

	METEO FRANCE	IRD	ORE & SOERE INSU	O.M.P./U.P.S.	**Total:**
2006:	22,430 €	50,000 €	2,300 €	0 €	74,730 €
2007:	22,430 €	50,000 €	0 €	5,000 €	77,430 €
2008:	22,430 €	49,000 €	0 €	5,000 €	76,430 €
2009:	40,000 €	49,000 €	0 €	5,000 €	94,000 €
2010:	40,000 €	45,000 €	20,000 € (exceptionnal)	5,000 €	110,000 €
2011:	40,000 €	45,000 €	15,000 € (exceptionnal)	4,500 €	104,500 €
2012:	30,000 €	45,000 €	5,000 € (exceptionnal, CTDO2)	4,200 €	84,200 €
			+ exceptionnal inputs by LEGOS: 8,000 € => 92,200 €		
2013:	30,000 €	49,000 €	20,000 € (exceptionnal, CTDO2) (from 2012 remnant funds…)	4,200 €	103,200 €
2014:	30,000 €	45,000 €	5,000 € (exceptionnal, CTDO2)	4,200 €	84,200 €
2015:	30,000 €	45,000 €	0 € (no direct funds)	4,200 €	79,200 €
2016:	30,000 €	45,000 €	26,000 € (exceptionnal)	2,940 €	103,940 €

- Exceptionnal support by CNRS/INSU (through CTDO2), used for ADCP moorings material purchase
- Weak decrease of the support by OMP/UPS

=> **weak decrease of regular running funds from MF, IRD & OMP : 77,940 € instead 79,200€**

⇒ **potential future problems due to consequent transports & missions increasing costs IF NO additional support (CNRS, EU?...)**

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Actual French contribution to PIRATA in 2016 (for cruises) :

Total costs in 2016:

- vessel time : 65 days (40 for cruise +25 for transits from/to Fr to/from Afr) of R/V THALASSA
(at ~20k€/day) => ~1,3 M€
(more explanations below)…
(paid by several organisms as contribution to the national oceanographic fleet, with a high level contribution by IFREMER)

technical support, cruises, transports, material etc… (ie working funds)
- => ~100 k€ (in 2016)
(paid by IRD & Meteo France & OMP & CNRS/INSU)

Total: almost 1,4 M€ (*without salaries…*)

2016 Engineers/Technicians PIRATA dedicated time (estimated) :

- participation to cruises (40 days at sea + trips) :
- PIRATA FR26 (J.Grelet, F.Roubaud, F.Baurand, C.Bachelier) : 180 days

-cruises preparation, cruises data treatment, logistics, etc.
(J.Grelet, F.Roubaud, F. Baurand, S.Hillion, C.Bachelier, D.Lopes) : 120 days

Total: 300 days

French PIRATA dedicated cruises : 26 french cruises from 1997 to 2015

Rappel des campagnes précédentes (depuis le début de la série)			
Nom de la campagne	Navire	Dates	Chef de mission
PIRATA FR1	ANTEA	09/09-16/09 1997	Jacques SERVAIN
PIRATA FR1 bis	ANTEA	30/01-03/02 1998	Jacques SERVAIN
PIRATA FR2	ANTEA	30/10-10/11 1998	Jacques SERVAIN
PIRATA FR3	ANTEA	23/01-01/02 1999	Jacques SERVAIN
PIRATA FR4- EQUALANT 1999	THALASSA	13/07-21/08 1999	Yves GOURIOU
PIRATA FR5	ANTEA	25/10-08/11 1999	Jacques SERVAIN
PIRATA FR6	SUROIT	08/03-19/03 2000	Jacques GRELET
PIRATA FR7 – EQUALANT 2000	THALASSA	23/07-21/08 2000	Bernard BOURLÈS
PIRATA FR8	ATALANTE	17/11-03/12 2000	Jacques GRELET
PIRATA FR9	ATALANTE	20/10-11/11 2001	Jacques GRELET
PIRATA FR10	ATALANTE	06/12-21/12 2001	Jacques SERVAIN
PIRATA FR11	SUROIT	17/12-03/01 2002-2003	Jacques GRELET
PIRATA FR12	ATALANTE	28/01-19/02 2004	Bernard BOURLÈS
PIRATA FR13	SUROIT	23/05 - 05/06 2005	Jacques GRELET
PIRATA FR14 – EGEE 1	SUROIT	07/06 - 05/07 2005	Bernard BOURLÈS
PIRATA FR15 – EGEE 3	ATALANTE	24/05 - 05/07 2006	B.BOURLÈS/Y.GOURIOU
PIRATA FR16	ANTEA	19/05 - 01/06 2007	Jacques GRELET
PIRATA FR17 – EGEE 5	ANTEA	04/06 – 09/07 2007	Frédéric MARIN
PIRATA FR18	ANTEA	01/09 – 06/10 2008	Jacques GRELET
PIRATA FR19	ANTEA	16/06 – 24/07 2009	Jacques GRELET
PIRATA FR 20	ANTEA	13/09 – 22/10/2010	Jacques GRELET
PIRATA FR 21	SUROIT	01/05 – 16/06/2011	B.BOURLÈS/J.GRELET
PIRATA FR 22	SUROIT	19/03 – 02/05/2012	B.BOURLÈS/J.GRELET
PIRATA FR 23	SUROIT	09/05 – 20/06/2013	B.BOURLÈS/J.GRELET
PIRATA FR 24	SUROIT	09/04 – 22/05/2014	B.BOURLÈS/Y.GOURIOU
PIRATA FR 25	THALASSA	18/03 – 16/04/2015	B.BOURLÈS
PIRATA FR 26	THALASSA	07/03 – 13/04/2015	B.BOURLÈS

=> ~ 715 days at sea

=> Vessels time availability & R/V

VESSEL TIME PROCESSES:

Yearly vessel time demand forms to fill in order to get vessel time;

Vessel time demand evaluation every 4 years => **evaluation in 2012 (very good)**.

=> PIRATA-FR cruises national evaluation should be going on…

Excellent evaluation in 2016 related to PIRATA-FR cruises scientific valuation (publications,PhD etc…)

In 2015 & 2016 and now…

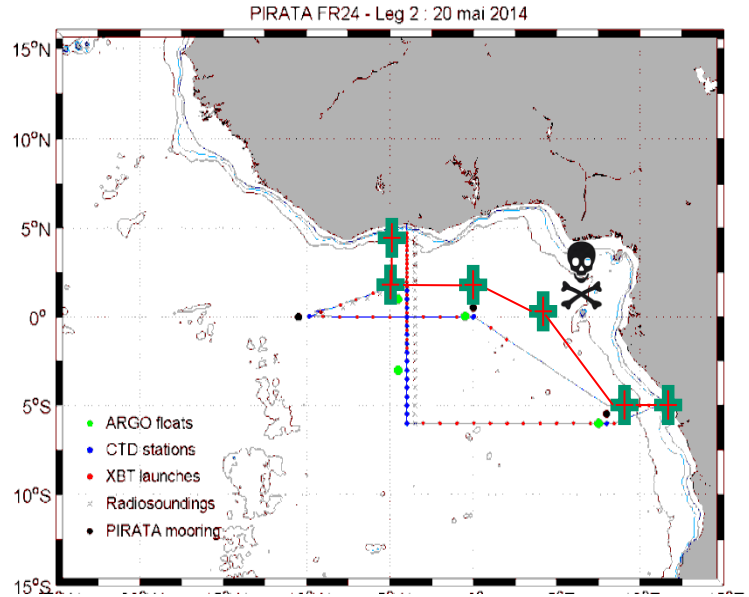
PIRACY in the GG => no calls in West Africa => one leg : need an long autonomy R/V

the PIRATA-FR cruises carried out with the R/V THALASSA

LA THALASSA:
74m length, up to 23 scientists, 6-7 moorings onboard
45 days autonomy, very safe & comfortable.
Also acoustic sensors (initialy for fishery dedicated research), flurorimeter, and efficient cable reels for Mooring operations…

Major issue for the French PIRATA cruises: piracy activities in the north of the Gulf of Guinea:

Piracy events from 2013:
all the region east of Côte d"Ivoire,
and north of the equator toward Sao Tomé,
and off the coast toward 5S,
are „security areas"=> « exclusion zone ».



⇒ **No possible measurements in this area of interest from 2012 !**

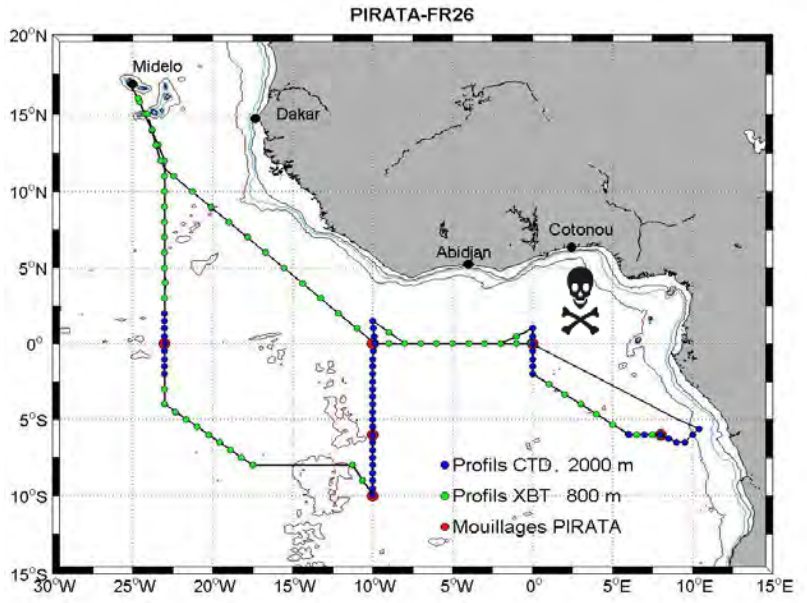
=> No calls in the Gulf of Guinea !

Piracy in 2016 (=> Nov 22, 2016)

What have been done in 2016 « on the field » ?

PIRATA FR26 cruise:

March 7, April 13, 2016
(from Cabo-Verde)



- 6 buoys replaced (+ CO2 sensors replacement at 6S-10W)
- 2 ATLAS replaced by T-FLEX (at 23W-0N & 10W-10S)
- NEW ADCP mooring at 0E-0N
  (*PIRATA-FR contribution to EU PREFACE*)
- 50CTD-02/LADCP profiles (0-2000m) :
  sections along 23W, 10W, 0E, and 6S
- 77 XBTs
- 6 profilers (Arvor) deployed *(ARGO/CORIOLIS)*
- 15 SVP-B deployed (*Meteo-France contribution to AtlantOS*)
- 615 sea water samplings
  (surface: SSS, CO2, nutrients, Chl pigments
  & along the vertical during CTD-02 casts: S, O2, nutrients, Chl pigments, CO2 at 6S-10W)

+

- OTN sensors replacement at all ATLAS buoys (*for Dalhousie University, Canada, F. Whoriskey*)
- Servicing of 10 Xpods at 23W-0N and 10W-0N,
  (*for Oregon Univ., J.Moum; agreement by PIRATA SSG in July 2013*)
- Continuous ADCP, Tsgraph + ACOUSTIC measurements (vertical & horizontal) + fluorimetry
- Plancton sampling at the buoys positions (11 Bongo net profiles: 0-200m)

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=> The PIRATA network at now :

18 meteo-oceanic buoys

3 ADCP moorings (0-300m)

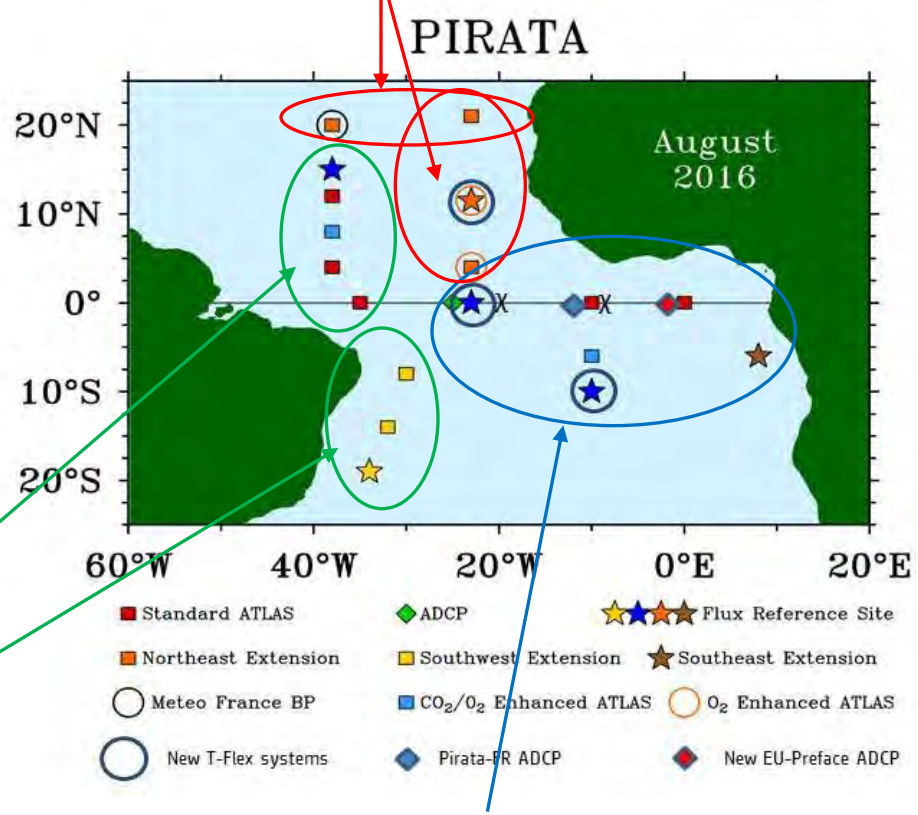
6 Flux Reference sites

2 with surface CO2 sensors

2 with 02 subsurface sensors

1 with P_{atm}

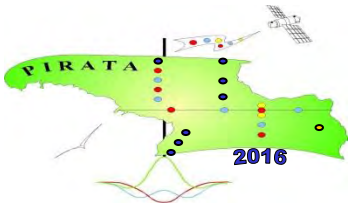
Maintained by USA *: 4 buoys : 3 ATLAS & 1 TFLEX*
PIRATA NEE from 2006



Maintained by Brazil:
8 ATLAS buoys:
5 from 1998,
3 as the PIRATA SWE from 2005

Maintained by France *:*
6 meteo-oceanic buoys: 4 ATLAS & 2 TFLEX
5 from 1997
+ PIRATA SEE at 6S-8E in 2006 – 2007 (by South Africa & BCLME)
then from 2013 (EU PREFACE programme)

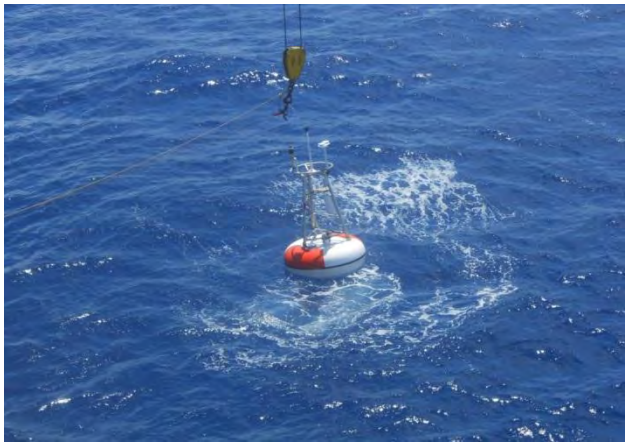
3 ADCP moorings (23° W, 10° W & 0° E along the equator);
Contribution by US & Germany for 23W-Eq site from 2006.



What have been done in 2016 « on the field » ?

PIRATA FR26 cruise:

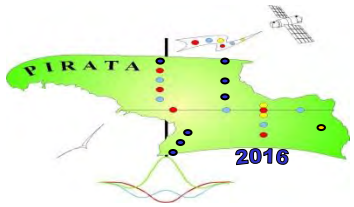
About T-Flex



Thanks to NOAA/PMEL for the training period in Dec 2015
of Jacques Grelet & Fabrice Roubaud (IRD, US IMAGO)

⇒ Successfull deployments of the 2nd & 3rd PIRATA T-Flex systems
at 23W-0N & 10W-10S (Flux Reference sites).

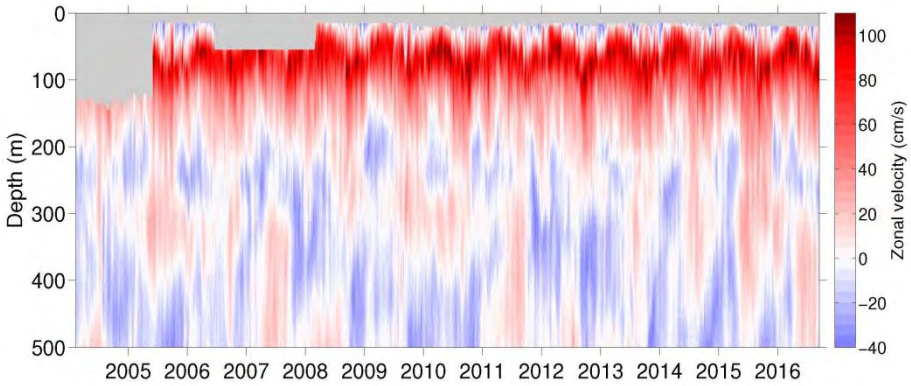
Also, data acquisition (ADCP, CTD-O2, meteo) close to the 12N-23W T-FLEX buoy on March 9 & April 10, 2016



What have been done in 2016 « on the field » ?

ADCP moorings:

23W-0N ADCP from 2001,
replaced in September 2016 (GEOMAR)

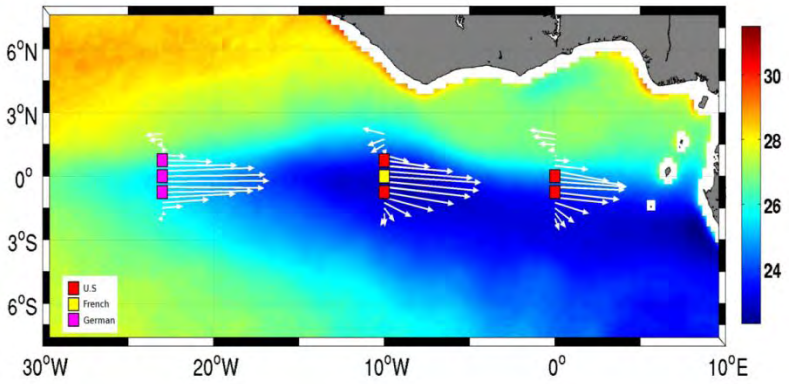


(2004-2016 time serie: R.Kopte, pers. comm.)

10W-0N ADCP from 2005,
replaced in March 2015 (FR25) after one year only (to check it)… next in March 2017

New 0E-0N ADCP from March 2016 => *EUC studies, vertical shear, waves… next in 2018*

Data treatment going on
(J.Habasque, AtlantOS post doc);



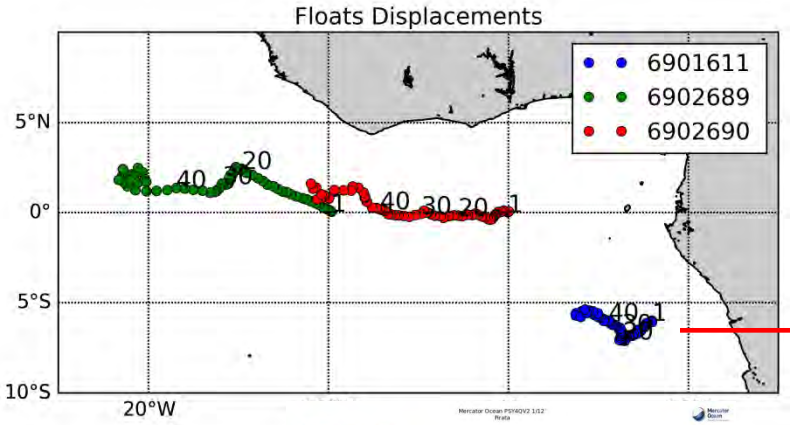
(TACE: Kolodziejczyk et al., 2009; Johns et al., 2013; Perez et al., 2014…)

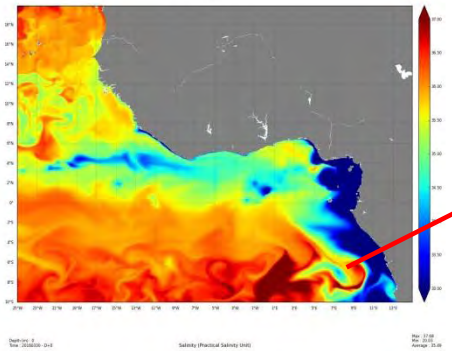
What have been done in 2016 « on the field » ?

PIRATA FR26 cruise:

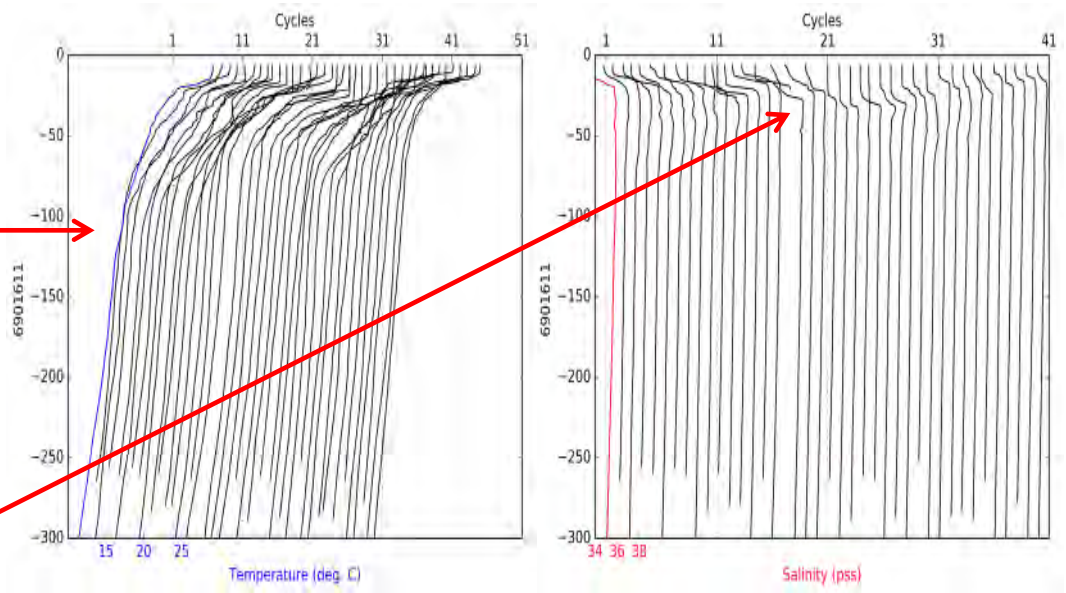
Deployment of 8 ARGO profilers =
Contribution to ARGO/CORIOLIS

Including 3 new profilers with double programmation:
high frequency profiles: 0-300m every 2 days during 3 months…





Signature of a Congo water cell



(N. Kolodziejczyk, pers. Comm.)

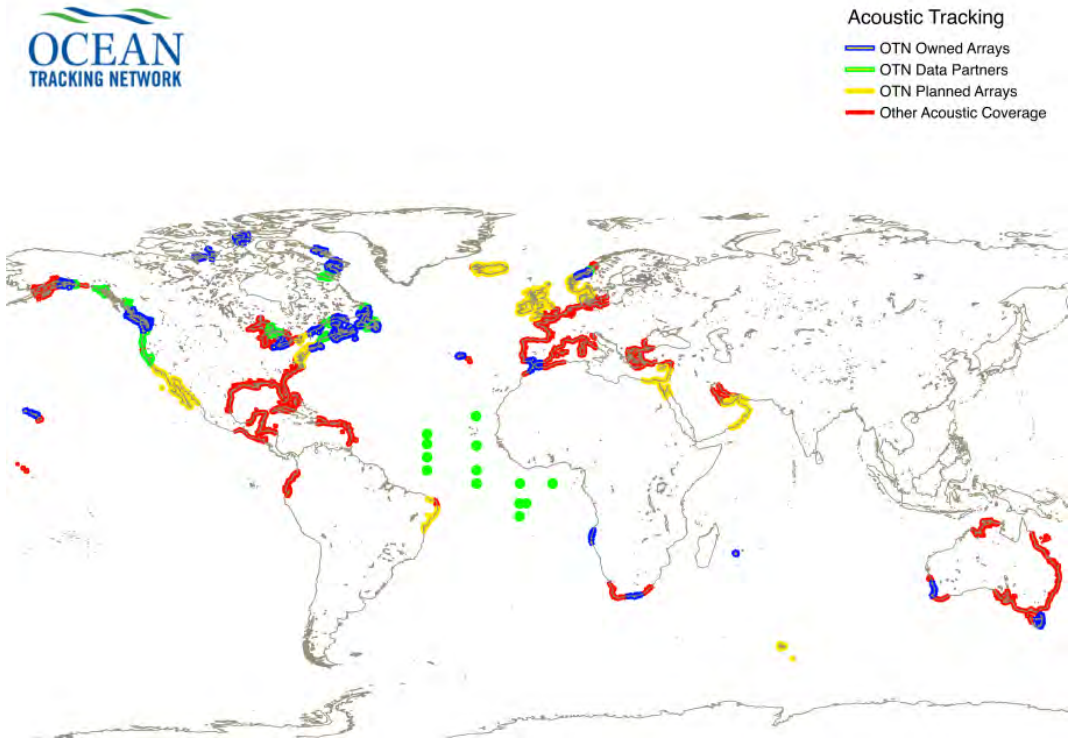
What have been done in 2016 « on the field » ?

PIRATA FR26 cruise:

1) successfull servicing of Xpods at 23W-0N & 10W-0N

See Jim Moum's report sent to all (SSG&PRB) before the meeting…

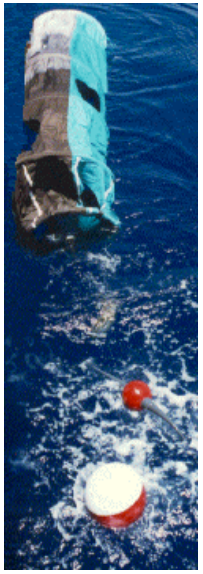
2) successfull servicing of OTN at 200m (OTN also involved in AtlantOS)



What have been done in 2016 « on the field » ?

PIRATA FR26 cruise:

Deployment of 15 SVP-BS =
Contribution to Global Drifter Program (GOOS) and AtlantOS



Example:
Trajectories of the 15
SVP-BS from their launch in March 2016
during PIRATA FR26,
as contribution to AtlantOS
(date: Sept 26, 2016; M. Le Garrec, pers. comm.)

What have been done in 2016 « on the field » ?

PIRATA FR26 cruise: ***Acoustic data***

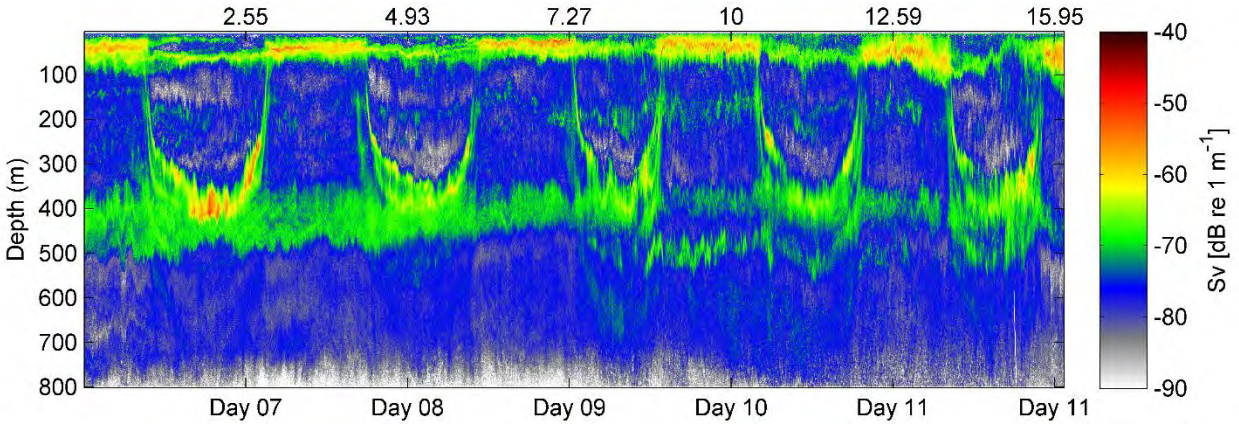
THALASSA equipped with a Simrad EK60:

6 frequencies for the vertical (18, 38, 70, 120, 200 & 333 kHz),
& horizontal sensor (120 kHz)

⇒ **Of great interest for** biotic and abiotic ecosystem components ⇔ PREFACE & AWA

⇒ Links with dynamics (currents shear etc).

Refer to presentation by Habasque et al.

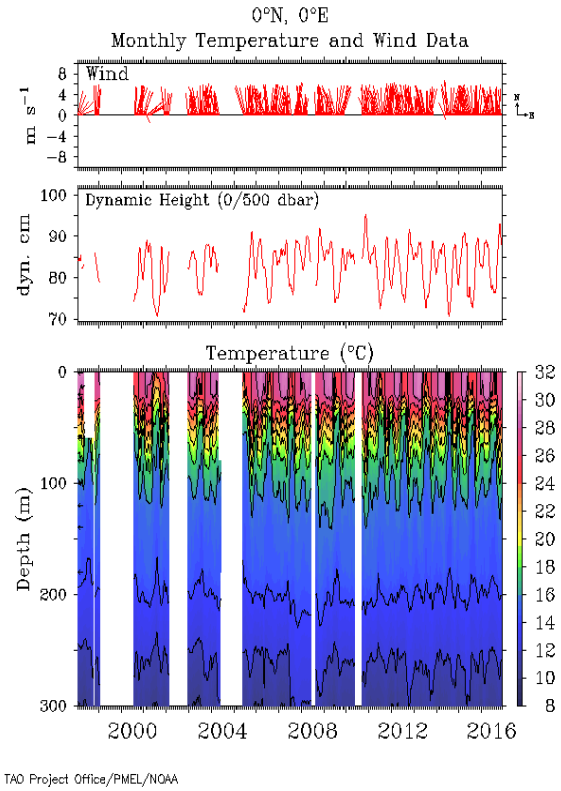


3N 15N

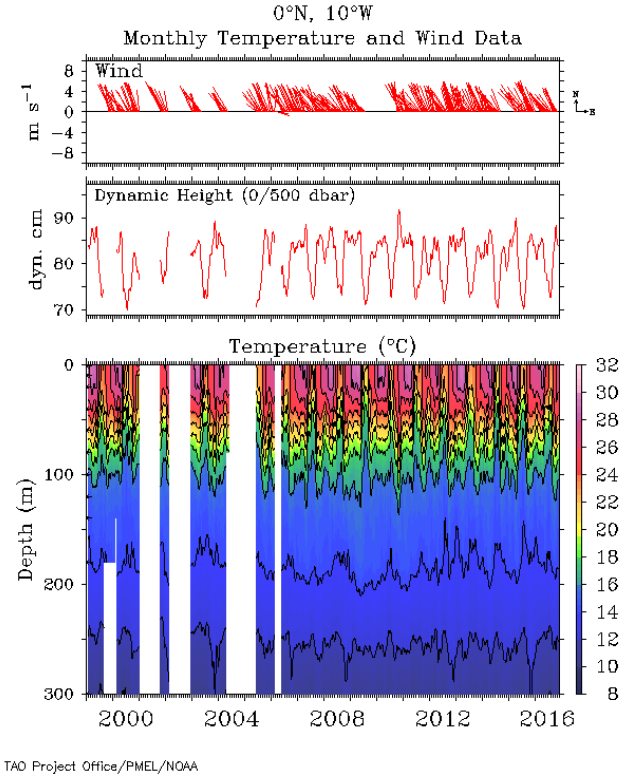
PIRATA ATLAS time series east of 23W: rather successful 2015-2016 years !

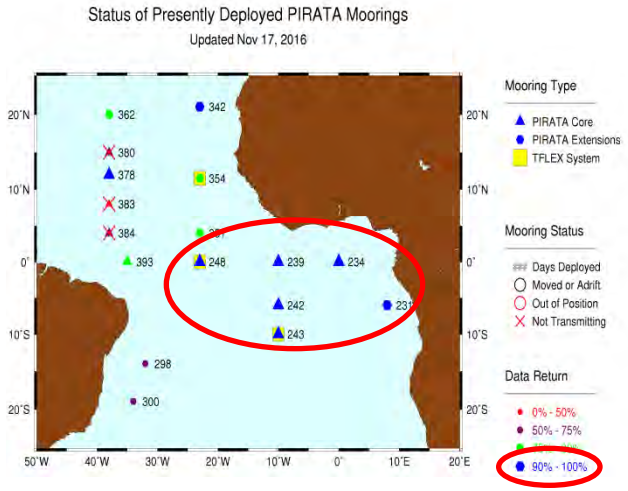
No major issues on the 6 Fr buoys from 2008

Ex: 0-0



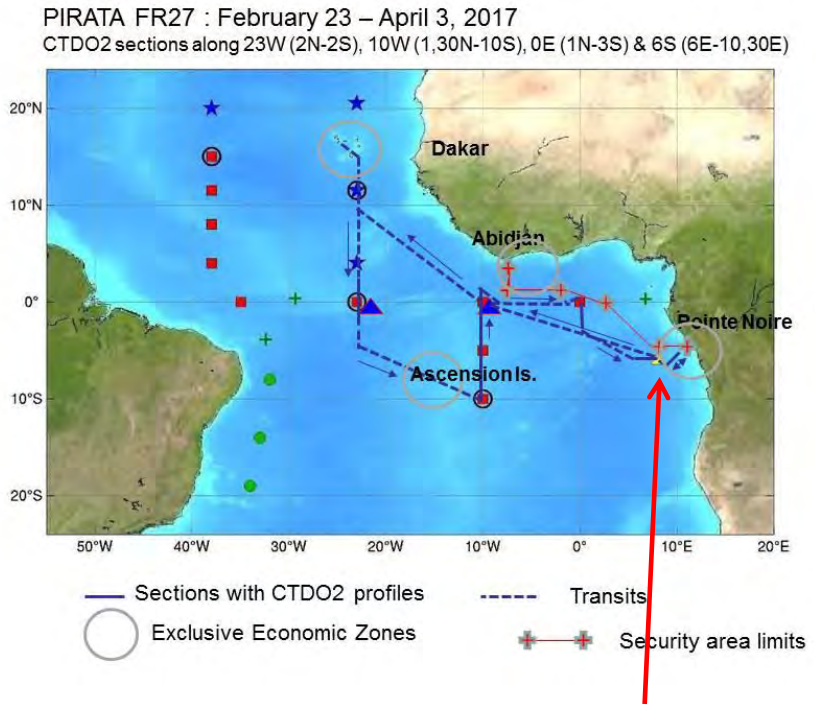
10W-0





2017 PIRATA cruise:

⇒ R/V THALASSA, one leg from Cabo-Verde (Mindelo)



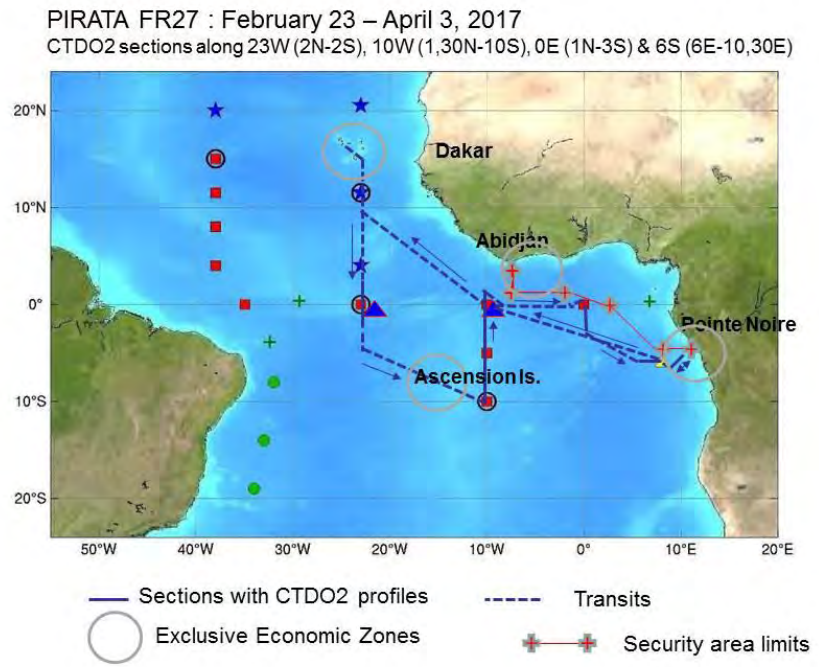
Dates: February 25 – April 3, 2017

1) One additionnal T-FLEX at 6S-8E (Flux Reference site)
2) One additionnal CO2 sensor at 6S-8E (AtlantOS; N.Lefevre)

(needed changes in sizes, as T-Flex are filled; this will be a « test »)

2017 PIRATA cruise:

⇒ R/V THALASSA, one leg from Cabo-Verde (Mindelo)



Dates: February 25 – April 3, 2017

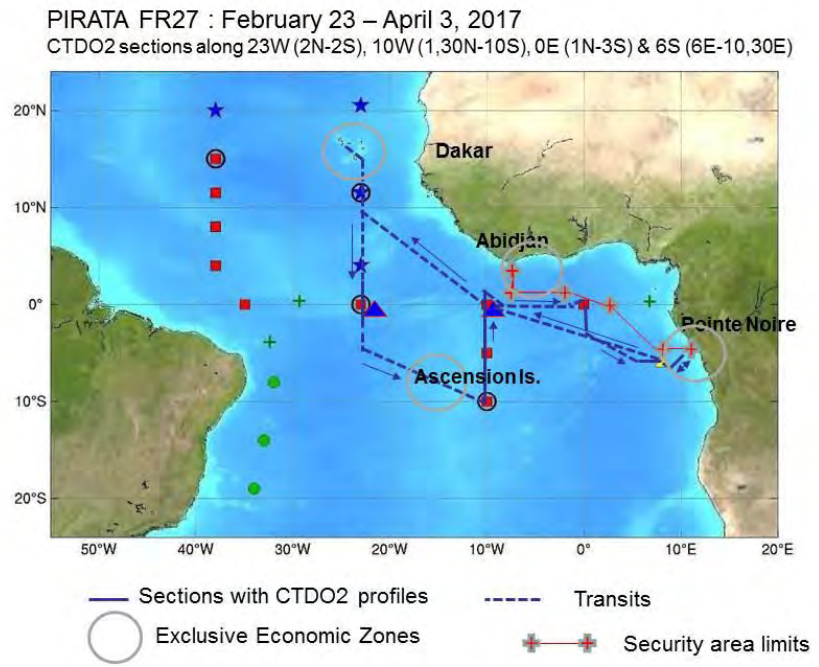
3) 6 ARGO profilers (double programmation, Iridium transmission)

4) 21 SVP-BS drifters (11 by Meteo-France/AtlantOS, 10 by GDP/AOML)

5) Continuous pCO2 measurements (IRD/LOCEAN, N.Lefevre)

2017 PIRATA cruise:

⇒ R/V THALASSA, one leg from Cabo-Verde (Mindelo)



Dates: February 25 – April 3, 2017

6) Acoustic measurements (vertical, lateral) & plancton sampling

7) 50 0-2000m CTDO2/LADCP & about 75 XBT profiles

What have been done (and going on) in 2016 « in the labs » ?

1) All PIRATA-FR cruises have a DOI: *http://dx.doi.org/10.18142/14*

=> access to documents, reports, some related publications, data…

2) PIRATA S-ADCP data treatment:

Work done by Gaëlle Herbert (as post doc funded by PREFACE).
All 2007-2016 cruises SADCP data treated through the CASCADE adapted software.

S-ADCP have a DOI : *http://doi.org/10.17882/44635*

3) L-ADCP data treatment: should be achieved by mid-2017 with a DOI

Work going on by Gaelle Herbert (post doc AtlantOS) with Frédéric Marin

4) Moored ADCP data treatment: should be achieved by 2017 with a DOI

Work going on by Jérémie Habasque (post doc AtlantOS); coll. GEOMAR

5) Chemical data sets: should be achieved by mid-2017 with a DOI

S, O2, nutrients, pigments: all in a unique file (work by IRD/US IMAGO)
& made available through the PIRATA-FR web site…

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What have been done (and going on) in 2016 « in the labs » ?

PIRATA CTD-0_2 data treatment:

- Concern about a precise O_2 data treatment/validation (for CTD-O2 profiles)

- Collaborations with LOPS/Ifremer & IRD/US-IMAGO & LEGOS
  (J.Grelet, C.Kermabon, A.Ganachaux, P.Lherminier…).
  New LPO software (Cadhyak) & comparison with Hawaï's process.

  Contribution of CNRS/INSU through SOERE CTD-O2 to fund some engineer time:
  (GlazeO, Carole Saout-Grit, http://www.glazeo.net)

⇒ 2013-2016 PIRATA CTD-O2 data should be « clean » and fully available by mid-2017
(CTD already available… only O2 issue!).

DOI also planed for PIRATA-FR CTDO2 data sets…

What have been done (and going on) in 2015-2016 « in the labs » ?

French contribution to publications with peer reviews from Sept 2015 : 13 (published, in press & in revision)

- Camara, I., N. Kolodziejczyk, J. Mignot, A. Lazar, and A. T. Gaye: On the seasonal variations of salinity of the tropical Atlantic mixed layer, *J. Geophys. Res. Oceans,* 120, 4441–4462, doi 10.1002/2015JC010865, 2015.
- Hounsou-Gbo, A., M. Araujo, B. Bourlès, D. Veleda, and J. Servain, Tropical Atlantic contributions to strong rainfall variability along the Northeast Brazilian coast, *Adv. Meteor.*, 2015, doi 10.1155/2015/902084, 2015.
- Kolodziejczyk, N., G. Reverdin, and A. Lazar: Interannual Variability of the Mixed Layer Winter Convection and Spice Injection in the Eastern Subtropical North Atlantic, *J. Phys. Oceanogr.,* 45, 504–525, doi 10.1175/JPO-D-14-0042.1, 2015.
- Rodríguez-Fonseca, B., E. Mohino, C. R. Mechoso, C. Caminade, M. Biasutti, M. Gaetani, J. Garcia-Serrano, E. K. Vizy, K. Cook, Y. Xue, I. Polo, T. Losada, L. Druyan, B. Fontaine, J. Bader, F. J. Doblas-Reyes, L. Goddard, S. Janicot, A. Arribas, W. Lau, A. Colman, M. Vellinga, D. P. Rowell, F. Kucharski, and A. Voldoire: Variability and Predictability of West African Droughts: A Review on the Role of Sea Surface Temperature Anomalies. *J. Climate,* 28, 4034–4060, doi 10.1175/JCLI-D-14-00130.1, 2015.
- Tchilibou M., T. Delcroix, G. Alory, S. Arnault, and G. Reverdin. Variations of the Tropical Atlantic and Pacific SSS minimum zones and their relations to the ITCZ and SPCZ rain bands (1979-2009). *J. Geophys. Res. Oceans,* 120, 5090-5100, doi:10.1002/2015JC010836, 2015.
- Benetti, M., H.C. Steen-Larsen, G. Reverdin, Á.E. Sveinbjörnsdóttir, G. Aloisi, M.B. Berkelhammer, B. Bourlès, D. Bourras, G. de Coetlogon, A. Cosgrove, A.K. Faber, J. Grelet, S. B. Hansen, R. Johnson, H. Legoff, N. Martin, A.J. Peters, T.J. Popp, T. Reynaud, and M.N. Winther, Stable isotopes in the atmospheric marine boundary layer water vapour over the Atlantic Ocean, 2012-2015, *in press in Nature Scientific Data*, 2016.
- Bonou F. K., C.D. Noriega, N. Lefèvre, M. Araujo, Distribution of CO_2 parameters in the Western Tropical Atlantic Ocean. *Dyn. Atmosph. and Oceans*, v. 73, p. 47-60, doi :10.1016/j.dynatmoce.2015.12.001, 2016.
- Boutin, J., Y. Chao, W. Asher, T. Delcroix, R. Drucker, K. Drushka, N. Kolodziejczyk, T. Lee, N.Reul, G. Reverdin, J. Schanze, A. Soloviev, L. Yu, J. Anderson, L. Brucker, E. Dinnat, A. Santos-Garcia, W. Jones, C. Maes, T. Meissner, W. Tang, N. Vinogradova, and B. Ward: Satellite and In Situ Salinity : Understanding Near-Surface Stratification and Sub-footprint Variability. *Bull. Amer. Meteor. Soc*., in press, doi: 10.1175/BAMS-D-15-00032.1, 2016.
- Da-Allada, J. Jouanno, F. Gaillard, N. Kolodziejczyk, C. Maes, N. Reul, and B. Bourlès, Role of the Equatorial undercurrent salinity maximum in the seasonal variability of sea surface salinity in the Equatorial Atlantic Cold tongue, *submitted to J. Geophys. Res. Oceans,* 2016.

Herbert, G., B. Bourlès, P. Penven, J. Grelet, New Insight on the upper layer circulation north of Gulf of Guinea, *in press J. Geophys. Res. Oceans*, *121*, doi:10.1002/2016JC011959, 2016.

- Hounsou-Gbo, A., J. Servain, M. Araujo, E.S. Martins, B. Bourlès, and G. Caniaux, Oceanic indices for forecasting seasonal rainfall over Northern Northeast of Brazil, *American Journal of Climate Change (AJCC)*, 5, 261-274, doi 10.4236/ajcc.2016.52022., 2016.

Djakouré, S., P. Penven, B. Bourlès and V. Koné, Inertial terms effects on the ocean dynamics in the Gulf of Guinea, *in revision for J. Geophys. Res. Oceans*, 2016.

- Lefèvre N., D. Veleda, M. Araujo, G. Caniaux, Variability and trends of carbon parameters at a time-series in the Eastern Tropical Atlantic. *Tellus B*, 68, 30305, doi: 10.3402/tellusb.v68.30305, 2016.
- Nubi, O.A., B. Bourlès, C.A. Edokpayi, and N. Hounkonnou, The influence of the equatorial upwelling on nutrient distribution and phytoplankton biomass in the Gulf of Guinea as inferred from *in situ* measurements, *J. Oceanogr. Mar. Sci. (JOMS),* 7(1), 1-11, doi 10.5897/JOMS2016.0124, 2016.
- Planton, Y., A. Voldoire, H. Giordani, and G. Caniaux, Processes of interannual variability of the Atlantic cold tongue, *in revision pour Climate Dynamics*, 2016.

What have been done (and going on) in late 2015 & 2016 « in the labs » ?

PhD Thesis: 7 (to our knowledge) & Capacity building related to PIRATA (others with PREFACE).

Achieved:

- at Meteo-France: „bias on coupled model CNRM-CM5 in Trop. Atlantic", Yann Planton, defense done Nov. 2015
- in Brazil by a Beninese student (Master 2 Cotonou) at Univ. of Recife (granted by FACEPE) „CO2 fluxes in Western Trop Atl", Frédéric Bonou, defense done in Feb. 2016.

Running:

- in Brazil by a Cameroonese student (Master 2 Cotonou) at Univ. of Recife (granted by FACEPE) „ROMS&Ichtyop, Islands impacts in the Western Eq Atl", Christine Tchamabi, defence in 2017.
- in France & Benin, at LEGOS & ICMPA, by a Beninese student (Master 2 Cotonou) „SSS & tropical modes in the Atlantic", Mesmin Awo, from Oct. 2015
- In France, at LEGOS, by a Cameroonese student (Master 2 Cotonou), „meso & sub-meso scales in the tropics from SWOT", Michel Tchibilou, from Oct. 2015

Two new ones:

- in Brazil by a Togolese student (Master 2 Cotonou) at Univ. of Recife (granted by FACEPE) „heat transport in the Western tropical Atl.", Minto Dimoune, from Oct. 2016
- in Brazil by a Cameroonese student (Master 2 Cotonou) at Univ. of Recife (granted by FACEPE), „circulation off the NE Brazil"Nathanael Alina Dossa, from Oct. 2016

NOTE the important involvement of UFPE-Recife in the capacity building program!!!

What have been done (and going on) in late 2015 & 2016 « in the labs » ?

CAPACITY BUILDING DIRECTLY RELATED TO PIRATA in WEST AFRICA

recall:

regional Master 2 in « Physical Oceanography & Applications »
from 2008 (at Univ. of Abomey Calavi, Cotonou, Benin): UNESCO Chair
with Univ. of Toulouse, IRD, and from 2015: UFPE/Univ. Recife (Brazil).

United Nations Educational, Scientific and Cultural Organization

INTERNATIONAL CHAIR IN MATHEMATICAL PHYSICS AND APPLICATIONS (ICMPA)
UNESCO CHAIR IN MATHEMATICAL PHYSICS AND APPLICATIONS
established in 2006 at the University of Abomey-Calavi (Republic of Benin)
UNITWIN/UNESCO Chairs – Twinning networks and university networks
University of Abomey-Calavi

MULTI-UNIVERSITY MASTER'S DEGREE AND DOCTORAL TRAINING PROGRAMME IN *PHYSICAL OCEANOGRAPHY AND APPLICATIONS*

Considering the needs of capacity building in environmental sciences, climate and coastal environment, a regional master in "Physical Oceanography and Applications" is being organized by the International Chair of Mathematical Physics and Applications (ICMPA-UNESCO Chair) of the University of Abomey-Calavi at the Faculty of Sciences and Technology, involving the following universities, research institute and organizations:

Intergovernmental Oceanographic Commission (IOC) of UNESCO	Paul Sabatier University (France)	University of Abomey-Calavi (Benin)	Institut de Recherche pour le Développement (France)	Total (France)
Mr Justin Ahanhanzo, Coordinator and Team Leader, Intergovernmental Oceanographic Commission of UNESCO (IOC/UNESCO) UNESCO, 1 Rue Miollis, 75732 Paris Cedex 15, France Tel: +33 1 45 68 36 41 Fax: +33 1 45 68 58 10/12/13 E-mail: j.ahanhanzo@unesco.org http://ioc.unesco.org	Prof. Nicholas Hall, Laboratoire d'Etudes en Géophysique et Océanographie Spatiales (LEGOS), 18 Avenue Edouard Belin, 31401 Toulouse cedex 9, France Tel: +33 5 61 33 29 19 Fax: +33 5 61 25 32 05 E-mail: Nick.Hall@legos.obs-mip.fr	Prof. Mahouton Norbert Hounkonnou, International Chair of Mathematical Physics and Applications (ICMPA-UNESCO Chair), 072 B.P. 50 Cotonou, Republic of Benin, Tel: +229-21 38 61 27/ +229 95 06 26 89 Fax: +229-21 31 31 38 E-mail: norbert_hounkonnou@cipma.net or hounkonnou1@yahoo.fr	Dr Bernard Bourlès, Laboratoire d'Etudes en Géophysique et Océanographie Spatiales (LEGOS) Centre de Recherches Halieutiques et Océanologiques du Bénin (CERHOB), Représentation IRD de Cotonou, 08 BP 841 Cotonou, Republic of Benin Tel: +229 21 30 03 54 / + 229 90 08 94 56 Fax: +229 21 30 88 60 E-mail: bernard.bourles@ird.fr	Mme Valérie Quiniou-Ramus TOTAL S.A. DGEP/TDO/TEC/GEO – 21E09, Tour Coupole, 2, Place Jean Millier La Défense 6 - Cedex 45 92078 Paris La Défense, France Tel: +33 1 47 44 44 83 Fax: +33 1 47 44 49 48 E-mail: Valerie.Quiniou@total.com

Official languages: English and French. English is the preferred choice, though, given the international attendance

What have been done (and going on) in late 2015 & 2016 « in the labs » ?

CAPACITY BUILDING DIRECTLY RELATED TO PIRATA in WEST AFRICA

regional Master 2 in « Physical Oceanography & Applications »
from 2008 (at Univ. of Abomey Calavi, Cotonou, Benin): UNESCO Chair
with Univ. of Toulouse, IRD, and from 2015: UFPE/Univ. Recife (Brazil).

- ~80 students from 2008:
(Benin, Ivory Coast, Cameroon, Togo, Ghana, Senegal, Nigeria, Congo)

- 27 (at least) continued in PhD; 6 (at least) in post doc:
(in France, Brazil, South Africa, Germany, Canada, Cameroon, Benin).

What have been done (and going on) in late 2015 & 2016 « in the labs » ?

CAPACITY BUILDING DIRECTLY RELATED TO PIRATA in WEST AFRICA

Recent (2015-2016) PIRATA related publications by Master 2 Cotonou former students: 10 (*to my knowledge!*)

Bonou F. K., C.D. Noriega, N. Lefèvre, M. Araujo, Distribution of CO_2 parameters in the Western Tropical Atlantic Ocean. *Dyn. Atmosph. and Oceans*, v. 73, p. 47-60, doi :10.1016/j.dynatmoce.2015.12.001, 2016.

Da-Allada, C., J. Jouanno, F. Gaillard, N. Kolodziejczyk, C. Maes, N. Reul, B. Bourlès. Role of the Equatorial undercurrent salinity maximum in the seasonal variability of sea surface salinity in the Equatorial Atlantic Cold tongue, *in revision for J. Geophys. Res.-Oceans*, 2016.

Djakouré, S., P. Penven, B. Bourlès, J .Veitch, V. Koné. Coastally trapped eddies in the north of the Gulf of Guinea, *J. Geophys. Res.*, 2014, 119, p. 6805-6819, doi 10.1002/2014JC010243.

Djakouré, S., P. Penven, B. Bourlès, V. Koné. Respective roles of the Guinea Current and local winds on the coastal upwelling in the northern Gulf of Guinea, *revised version submitted to Journal of Physical Oceanography*, 2016.

Hounsou-Gbo, A., M. Araujo, B. Bourlès, D. Veleda, J. Servain. Tropical Atlantic contributions to strong rainfall variability along the Northeast Brazilian coast, *Adv. Meteor.*, 2015, 2015, 13p., doi 10.1155/2015/902084.

Hounsou-Gbo, A., J. Servain, M. Araujo, E.S. Martins, B. Bourlès, G. Caniaux. Oceanic indices for forecasting seasonal rainfall over Northern Northeast of Brazil, *American Journal of Climate Change (AJCC)*, 2016, 5, 261-274, doi 10.4236/ajcc.2016.52022.

Nubi, O.A., B. Bourlès, C.A. Edokpayi, and N. Hounkonnou. On the nutrient distribution and phytoplankton biomass in the equatorial Gulf of Guinea as inferred from in situ measurements, *J. Oceanogr. Mar. Sci. (JOMS)*, 2016, 7(1), 1-11, doi 10.5897/JOMS2016.0124.

Tchamabi, C.C., M. Araujo, M. Silva, and B. Bourlès. A study of the Brazilian Fernando de Noronha Island and Rocas Atoll wakes in the tropical Atlantic, *re-submitted after revision to Ocean Modelling,* 2016.

Tchamabi, C.C., M. Araujo, M. Silva, B. Bourlès, and O. Travassos. Ichthyoplankton transport in the Brazilian tropical islands, Fernando de Noronha archipelago and Rocas Atoll: Is there any connectivity patterns?, *accepted in Indian Journal of Geo-Marine Sciences,* 2016.

Tchilibou M., T. Delcroix, G. Alory, S. Arnault, and G. Reverdin. Variations of the Tropical Atlantic and Pacific SSS minimum zones and their relations to the ITCZ and SPCZ rain bands (1979-2009). *J. Geophys. Res. Oceans,* 120, 5090-5100, doi:10.1002/2015JC010836, 2015.

M2 program ENDANGERED !!!

=> NOT ENSURED AFTER 2016-2017… => 50k€/year needed

Contribution of PIRATA-Fr to PREFACE (& vice-versa):

PREFACE purchases for the PIRATA observation network:

-*The equivalent (in terme of funds, ie ~149.245€) of a new full-equiped ATLAS buoy has been purchased in 2014, through 25 T/C and 9 T Seabird sensors (delivered at NOAA/PMEL in early October 2014)*

⇒ The PIRATA SEE (6S-8E) is now fully ensured from May 2013.

⇒ IMPORTANT as crucial contribution to PREFACE too.

- *A new ADCP has been purchased (same as 23W, 10W…) for 0-0 (~43.600€)*

⇒ ADCP mooring deployment at 0-0 achieved in March 2016.

Post Doc recruitments :

Gaelle Herbert (July 2014 – June 2016) in Brest with B.Bourlès

(S ADCP data treatment & ROMS simulations in the Eastern TA) see her presentation.

Olga Hernandez (September 2014- August 2016) in Toulouse with J.Jouanno

(Impact of freshwater fluxes on Tropical Climate from TATL025 regional simulations

Contribution of PIRATA-Fr to PREFACE (& vice-versa):

PREFACE DELIVERABLE:

CT2, WP4:

D4.4: Suggestion for a sustainable long term monitoring system

due November 2017…

(more info after this PREFACE conference…

PIRATA and the EU H2020 'AtlantOS' project

AtlantOS =
"Optimizing and Enhancing the Integrated Atlantic Ocean Observing System "
2nd meeting in June 2016 (Kiel) & Workshop in Las Palmas (Nov 2016).
https://www.atlantos-h2020.eu/

WP3 = "Enhancement of autonomous observing networks"

WP3.5 => PIRATA => purchased sensors & planed enhancements:

- 3 currentmeters at 10W-0N, 38W-8N & 35W-0N (at 10m) (IRD/LEGOS)

- 2 T/C at 10W-0N (at 5m & 10m) (IRD/LEGOS)

- O2 at 23W-4N and 23W/11.5N with RT data transmission (GEOMAR)

- CO2 at 8E-6S (IRD/LOCEAN) *in 2017*

Post Doc recruitments through AtlantOS:

Gaelle Herbert (July 2016 – June 2017) in Brest with B.Bourlès

=> L ADCP data treatment & ROMS simulations in the Eastern TA: see her presentation.

Jérémie Habasque (April 2016- May 2017) in Brest with B.Bourlès

=> ADCP moorings data treatment & acoustic measurements (from FR25): see his presentation

AtlantOS 3.5 deliverables:

1) D3.3 PIRATA Data System Upgrade Report: « PIRATA network improvement report »

Report on new (physical, meteorological and biogeochemical)
sensor implementation and derived time series. **PM24 (due March 30, 2017)**

Report established by B.Bourlès (IRD);

(*already drafted; will refer to additional sensors, T-FLEX,*
& about measurements during cruises ; got some inputs by Rick & Moacyr)

AtlantOS 3.5 deliverables:

2) **D3.9** PIRATA Data System Upgrade Report:

Technical report mostly related to biogeochemical sensors (O_2 and CO_2 sensors) data, their real-time transmission and O_2 and CO_2 data control quality and their integration to existing systems, in relation with the WP7. **PM36 (due March 30, 2018)**

Report established by P.Brandt (GEOMAR, O_2 sensors) & N.Lefevre (IRD, CO_2 sensors) after expected sensors deployments on ATLAS buoys, mentioning technical aspects and statements about data transmission & QC before diffusion in —quasi-RT"

=> ***contributions of PIRATA Fr & US cruises (along 23W & 10W for O_2, at 6S-8E for CO_2)***

AtlantOS 3.5 deliverables:

3) **D3.19** Organization & sustainability of PIRATA network Report:
A detailed report on the renewed PIRATA network, and its potential sustainability over long-term. This deliverable will be established with the contribution of the PIRATA International Scientific Steering Group and PIRATA partners. **PM45 (due November 30, 2018)**

Report established in close collaboration with PIRATA SSG and other partners, in charge of other potential "piggy-back" operations/sensors (Xpods, biogeochemistry, OTN…), after a rigorous evaluation of additional needed funding/human powers (for different kinds of sensors, their servicing, data QC & transmission, network extension)

⇒ ***to be discussed***

Strongly related to "PIRATA in the future" by 2018 !

⇒ ***Also related to AtlantOS perspectives & other EU partners…***