

PIRATA-15
5 March 2010



NOAA's Atlantic Oceanographic and Meteorological Laboratory
Miami, FL USA

The PIRATA program would like to recognize the invaluable contributions from NOAA's Mike Johnson, who retired late last year. Mike's efforts over many years helped create and sustain PIRATA, and guide it into its current status as the backbone of the tropical Atlantic ocean observing system.

National and programmatic reports

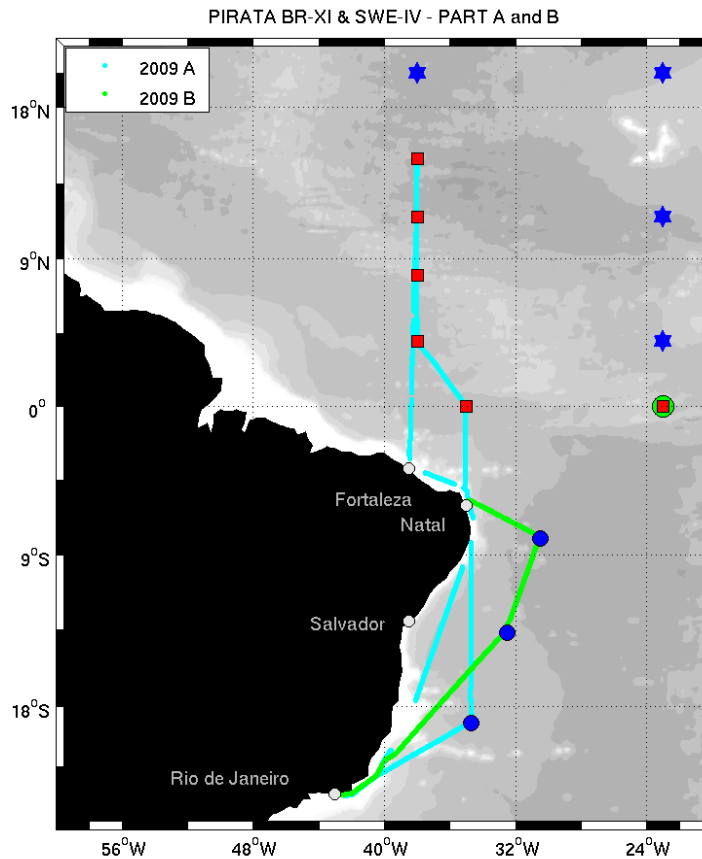
Brazilian activities and plans

Paulo Nobre presented a summary of the Brazilian 2009 activities, which included:

- PIRATA BR-XI and SWE-IV cruises [Mar/Apr and Aug/Sep'09] with underway CO2 monitoring.
- ATLAS sensors and electronic shipped to PMEL [May/Jun]
- 8N, 38W PIRATA Backbone buoy recovery [January 2010]
- Created <http://pirata.cptec.inpe.br> containing auxiliary oceanographic data
- CNPq Grant of US\$1.5M
- [\$750K] Improvement of oceanographic and atmospheric monitoring – PIRATA-BR (Paulo Nobre)
- [\$250K] Ocean circulation and Island monitoring (Domingos Urbano)
- [\$250K] Biogeochemistry modeling over tropical Atlantic (Moacyr Araujo)
- [\$250K] ATLAS-like buoy construction in Brazil (Edmo Campos, coop. PMEL)
- Nathalie Lefèvre will embark PIRATA BR-XII for pCO2 at ANTARES and maintenance of CO2 sensors at 38°W, 8°N

On 19 January 2010, PMEL detected that the Brazilian ATLAS buoy at 8°N, 38°W was drifting, and issued an alert to all PIRATA partners. The Brazilian Navy Hydrographic Service (DHN) was aware of the situation and formulating plans in less than half an hour from when this alert was issued. Current nowcasts/forecasts from MERCATOR were distributed by Fabrice Hernandez to aid in the recovery. In less than two days, the DHN vessel Comandante Manhães sailed from Fortaleza to rescue the buoy. The ship intercepted the buoy on 26 Jan 2010 at 8:40am, at 05°17'59"N, 039°09'30"W. It was recovered, with all underwater sensors lost, and a damaged anemometer. The buoy sensors and electronics are currently at INPE/Natal, and will be shipped to PMEL with PIRATA-BR12 materials in June 2010.

Domingos Urbano presented results from last year's Brazil cruises. He noted that during the 2009 SWE cruise, CTD casts had to be cut between the moorings and were collected only at the mooring sites. Underway pCO2 is collected in collaboration with Nathalie Lefèvre.



2009 Brazilian PIRATA cruise BR-XI (courtesy D. Urbano)

Frederico Nogueira presented Brazilian plans for the coming year. The 2010 cruise PIRATA Brazil XII of the R/V Antares, will represent 41 days at sea and will consist of the following legs:

Leg 1: RIO DE JANEIRO – FORTALEZA, 06 to 13 APR

- Radiosonde profiling once per day;
- Underway measurements with ADCP and TSG

Leg 2: FORTALEZA – FORTALEZA, 15 to 30 APR

- Service buoys No. 1 to 4¹.
- 15 CTD-Rosette stations, up to 500m, sampling at 6 (six) levels using two bottles of 5 liters /level between 03°S and 15°N, along 038°W, 60 nm apart. At each level, the following properties will also be analyzed: H, dissolved oxygen, CO₂ and bacteria.
- Underway measurements with ADCP, TSG and CO₂
- Radiosonde profiling once a day

Leg 3: FORTALEZA – NATAL, 05 to 14 MAY

- Buoys 05 and 06 (SW extension)

¹ Buoys are number from north to south. Buoy #1 is 15°N, 38°W. The Brazilian PIRATA backbone is Buoys 1—5; the Southwest Extension is Buoys 6—8.

- CTD-Rosette stations, up to 500m, sampling at 6 (six) levels using 2 5 liter bottles per level between 03°S and 15°N, along 038°W, 60 nm apart from one to another, with pH and dissolved oxygen;
- Underway measurements with ADCP, TSG and CO₂;
- Underway Bacteria analyses, twice a day, in depths above 50 meters;
- Radiosonde profiling once a day; and
- Deployment of a drift buoy near the Equator, after maintenance of Buoy 5, thanks to Dr. Moacir Araújo from UFPE.

Leg 4: NATAL – RIO DE JAEIRO, 18 to 28 MAY

- Buoys 07 and 08 (both at SW extension);
- 10 CTD-Rosette stations, up to 500m, sampling at 6 (six) levels using 2 bottles of 5 liters /level, 60 nm apart along the SW extension (from buoy 06 to 08), with pH, dissolved oxygen, CO₂ and bacteria;
- Underway measurements with ADCP, TSG and CO₂;
- Underway Bacteria analyses, twice a day, in depths above 50 meters;
- Radiosonde profiling once a day.

French activities and plans

Bernard Boulès presented the French national report. The French component of the PIRATA array includes 5 Atlas buoys of the backbone, plus 1 Atlas for the PIRATA SEE (from 2006 to 2007, and possibly in the future). They additional have maintained a surface ADCP mooring at 0°, 23°W since 2001, and at 0°, 10°W since June 2006 as part of AMMA, PIRATA-France and CLIVAR/TACE.

2009 was an important year for PIRATA in France, as it was the end of the national “Research Observatory for Environment” (ORE). This will change in 2010 to the “SOERE: Service d’Observation et d’Expérimentation, sur le long terme, pour la Recherche et l’Environnement” label. A national evaluation in late 2009 of ORE PIRATA concluded positively.

The convention for the PIRATA maintenance established between IRD & Météo-France was renewed and implemented in 2008. PIRATA is supported by IRD, Météo France, occasionally by CNRS/INSU and also by the Observatoire Midi-Pyrénées (IRD/LEGOS, contributes to the OMP).

2009-2010 funding (vessel time & salaries & laboratory infrastructures not taken into account):

	METEO FRANCE	IRD	ORE & SOERE INSU	O.M.P./U.P.S.	Total:
2009:	40,000 €	49,000 €	0 €	5,000 €	94,000 €
2010:	40,000 €	45,000 €	20,000€ ¹	5,000 €	110,000 €

1: for material acquisition

Part of the additional resources in 2009-2010 has been dedicated as follows:

- to partly replace some sensors of the meteorological station at Sao Tomé

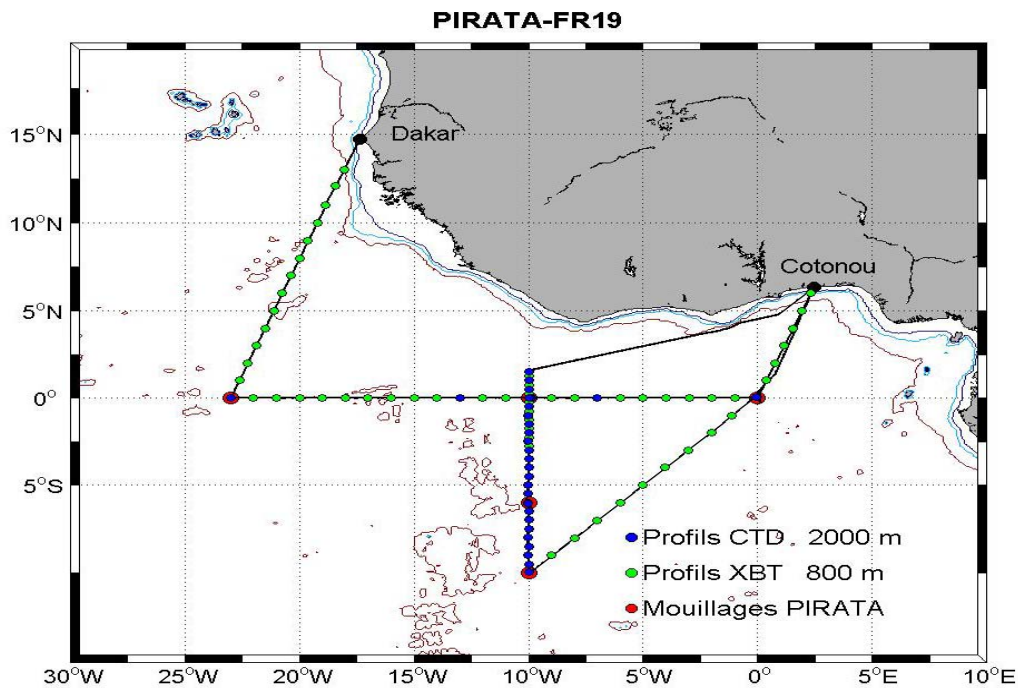
- to cover the important increase of the material transports (by sea -containers- and plane (acoustic releases and sensors after each cruise), also due to the different calls by using the R/V ANTEA.
- NEED in 2010 to buy new ADCP for moorings.

French costs in 2009:

Vessel time : 44 days of R/V ANTEA (at ~10k€/day)	=>	440 k€
Technical support, cruises, transports etc... (ie working funds)	=>	75 k€
Total: 515 k€(ie around 720k\$)		(without salaries)

2009 Engineers/Technicians PIRATA dedicated time (estimated):

PIRATA FR18 (J.Grelet, F.Roubaud, N.Khatir, R. Chuchla, F.Baurand, D.Dagorne) :	160 days
cruise preparation, cruises data treatment etc. (J.Grelet, F.Roubaud, N.Khatir) :	30 days
Trip & maintenance at São Tomé (Y.Gouriou, F.Roubaud)	15 days
Total:	195 days



The cruise PIRATA FR 19 was conducted 13 June 13 through 24 July 24 2009 by the R/V Antéa, representing 44 days at sea. The following data were collected:

- 31 CTD/LADCP casts;
- 56 XBT profiles (every ½ degrees along transits and 10°W);
- 4 Provor Argo profilers deployed at 13°W-Eq, 7°W-Eq, 0°E-0°N, 10°W-8°30'S
- water samplings (S, O₂, nutrients);
- TSG along the track line.

The following problems were noted:

- Failure of sensors on the buoy at 23°W-Eq, shortly after deployment (maintenance subsequently conducted during the 2009 NOAA PIRATA NEE cruise);

- The first operation at 0-0 was to retrieve the vandalized buoys and left in place in 2008;
- NO VM-ADCP data (failure of acoustic base) during this cruise. The VM-ADCP of the ANTEA should be replaced in spring 2010 in South Africa.

On São Tomé Island (0°N, 6°E), the meteorological station has been maintained since October 2003, with data transmission through the GTS from October 2006. An autonomous ONSET thermometer was installed in 2005 to measure SST. A tide gauge station had been maintained by IRD since the 1980s, measuring pressure, atmospheric pressure, SST and SSS. A dedicated mission was carried out in April 2009, for replacement of sensors, material (mast), and the ONSET thermometer. It was noted that the wind speeds at São Tomé Island are lower than in surrounding waters, due to the orographic effects of the island on the local winds. This is a real effect, not an error bias in the measurements.

The ADCP mooring at 0°, 23°W is monitored thanks to IFM-GEOMAR since 2006. Many problems have been identified with the PIRATA ADCP data (limited to above 100m depth) in 2003-2008, and as a result the data during the periods 2003-2005 and 2006-2008 must be suppressed. A new ADCP was deployed in 2008 and retrieved in 2009, and replaced with a new IRD ADCP in November 2009. At 0°, 10°W, the ADCP mooring was deployed thanks to IFM-GEOMAR in 2006. It was replaced in October 2008 during the PIRATA FR18 cruise, and will be replaced in September 2010 during the next PIRATA FR20 cruise. A new 150 kHz ADCP is desired at this site, which is not currently funded but another funding solution may be announced. It is not clear if a 300 kHz is relevant and appropriate for this site.

The pCO₂ sensor installed at 6°S-10°W has been sending since June 6th, 2006. CO₂ and O₂ data are transmitted in real-time using ARGOS. The sensor was replaced annually during the PIRATA FR17, FR18 and FR19 cruises. Bernard noted some recent results of CO₂ studies using these data (courtesy N. Lefèvre).

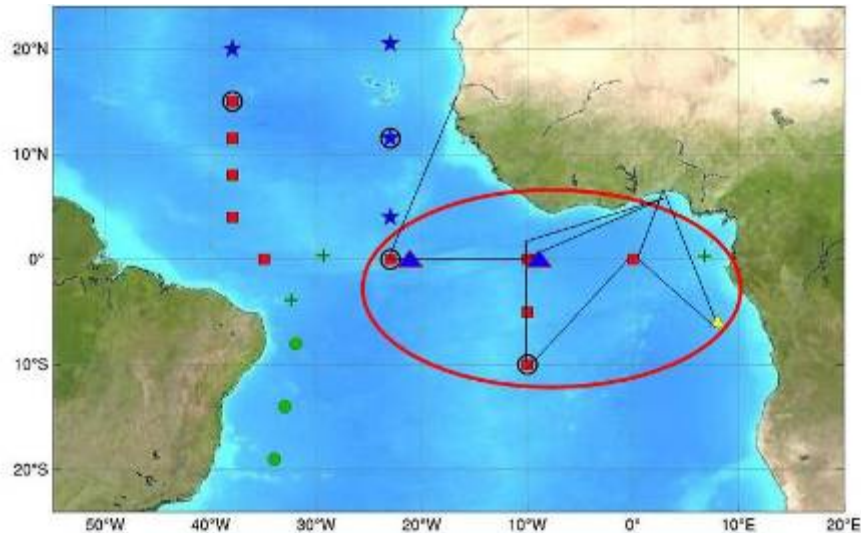
A new French PIRATA website was launched at <http://www.ifremer.fr/ird/pirata/>, which contains more information, easier access to data sets (cruises, Sao Tome, etc.) and reports & documents. Bernard also noted a number of other lab activities supporting PIRATA, including theses, Météo-France funding to add a barometer at the Northeast Extension site 20°N, 38°W, research actions by Herve Giordani, and postdoctoral students funded by Météo-France and IRD.

PIRATA FR 20

The next PIRATA FR 20 cruise is scheduled in September-October 2010, with the following activities planned:

- 1) Current meter mooring operations at 23°W-Equator: the surface ADCP (PIRATA) has been replaced during the IFM-GEOMAR cruise in November 2009, and thus will not happen in FR 20.
- 2) ATLAS mooring at 23°W-Equator: the ATLAS buoy replacement is planned.
- 3) Moorings in the Gulf of Guinea: the 4 ATLAS buoys will be replaced.

- 4) Current meter mooring at 10°W-Eq (in the framework of TACE&AMMA&PIRATA-France): the surface ADCP (PIRATA) has to be replaced but is it better if a new ADCP is acquired in France (no guarantee of this).
- 5) Miscellaneous: 10 ARGO (Hapex) profilers will be deployed, CTD/LADCP casts, XBT, samplings, pCO₂.



Bernard also described the new PROPAO program, a 3-year (2007-2010) program funded by the French Foreign Affairs Ministry to support scientific programs dedicated to West African climate and societal impacts of climate changes. It is a regional program of physical oceanography in West Africa, involving Nigeria, Benin, Togo, Ghana, Côte d'Ivoire and France (IRD/LEGOS; B.Bourlès in Cotonou/Benin from 2007 for this purpose). Its goals are: 1) to maintain an autonomous coastal network of temperature sensors; 2) establish a regional data bank for studying coastal SST, upwelling, links with local & regional climate and resources, and coastal environment (erosion, etc.); 3) Formation and capacity building: a regional Master in Physical Oceanography has been launched in 2008 at the Cotonou University. The PROPAO goals for the next several years are to extend the PROPAO network eastward and westward, with SST autonomous sensors along with tide gauges. PROPAO could become an African contribution to the Tropical Atlantic observing network.

Bernard noted the following issues:

- There is a need to send a little bit earlier the material if possible (OK last year) as, with the ANTEA, schedules have to be done with a lower transit speed, leading to additional days and costs.
- There is need of official communication for fishers. The West Pacific Tuna Commission of the Western and Central Pacific Fisheries Commission (WCPFC) adopted a resolution in December 2009 that prohibits any fishery actions at and around the scientific buoys in the Pacific. Alain Fonteneau will submit this text at the International Commission for the Conservation of Atlantic Tunas (ICCAT) and the Indian Ocean Tuna Commission (IOTC) during their next Scientific

Committees Meetings (October and December 2010 respectively) in order to adopt the same resolution for these oceans.

- Fish repellent system: one solution is with the NEOTEK system (flipper repellent), autonomous, 150€each, to be tested (5-160kHz signal transmission). (this will be checked by J.Grelet). This was announced in 2009 but not yet implemented.
- Sao Tome winds: it is not obvious how these data should be addressed. The wind magnitude is not representative of the larger scale wind intensities, but does represent a physical process that would be resolved in high-resolution models.

The PIRATA Southeast Extension and possible collaboration with Total

Mathieu Rouault presented a summary of activities related to the SEE. He noted that the mooring made the cover of the *African Journal of Marine Science*, gaining traction with fisheries researchers and marine biologists in the region.

A major new development is interest by the oil company Total (<http://www.total.com>) to collaborate with PIRATA in implementing a site that could possibly become the next SEE. Total is primarily interested in current and wave information at Block 17, near the CLOV field, at 7°26'-7°29' S / 11°30'-11°40' E (The PIRATA SE Extension mooring was at 6 S 8 E). The CLOV fields are located in the Eastern part of Block 17, approximately 200 km from the coast of the Republic of Angola and about 25 km NW of Girassol. The CLOV Project develops fields within the Cravo, Lirio, Orquidea and Violeta Development Areas. The water depth over the CLOV area ranges from approximately 1050 m (Violeta) to 1350m (Cravo-Lirio). Sea bottom conditions are similar to those of Rosa and Girassol with a regular downward slope in SW Direction of 2%.

Total would provide the ship support and pay for an ATLAS buoy for this site. In return, they require that the buoy be placed in Block 17, include current measurements in the 0-30m layer, high time resolution (eg at 6, 12 & 20m & 10-30mn) transmitted in real time, and include wave measurements (something not done by an ATLAS buoy). Other potential challenges include data treatment (would Total provide the data to PIRATA?), and logistical issues dealing with a buoy in an EEZ.

The PIRATA SSG discussed this possibility and concluded that further conversations between PMEL and Total should be initiated prior to PIRATA commitment, to assess the feasibility of this potential collaboration (see attached SSG report).

NOAA/PMEL report and plans

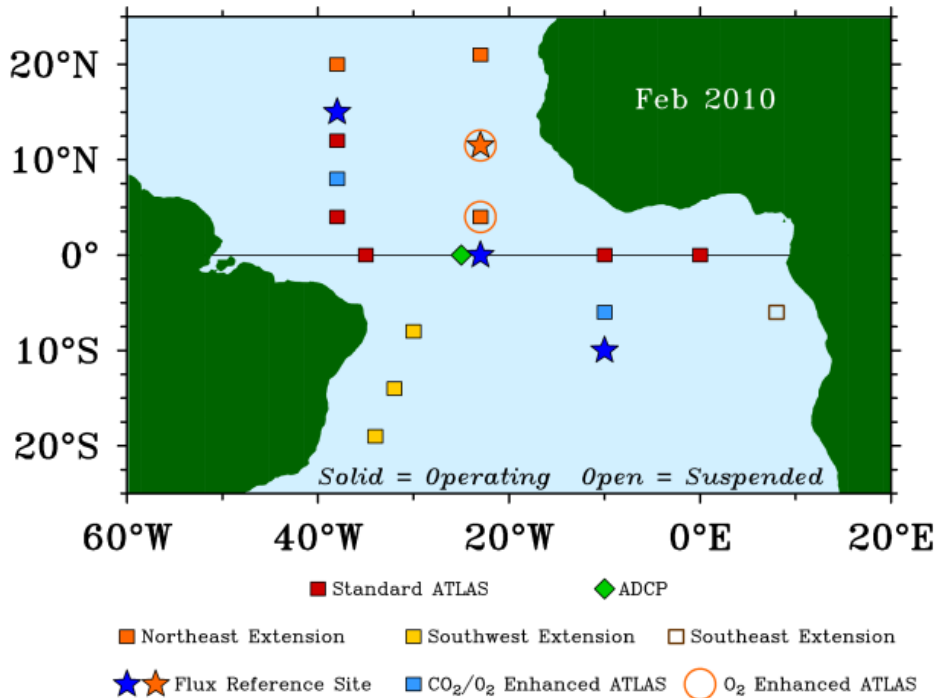
Michael McPhaden presented an overview of the types of observations being collected by the PIRATA array (see figure below). In FY09 (October 2008—September 2009), PMEL conducted the following activities:

ATLAS Moorings Deployed: 17

Cruises: 104 days
 -ANTARES (Mar–Apr 09; Aug 09) —33 days
 -ANTEA (Jun-Jul 09)—39 days
 -BROWN (Jul-Aug 09)—32 days

PMEL Person-days at sea: 105
 -ANTARES: 25
 -ANTEA: 16
 -BROWN: 64

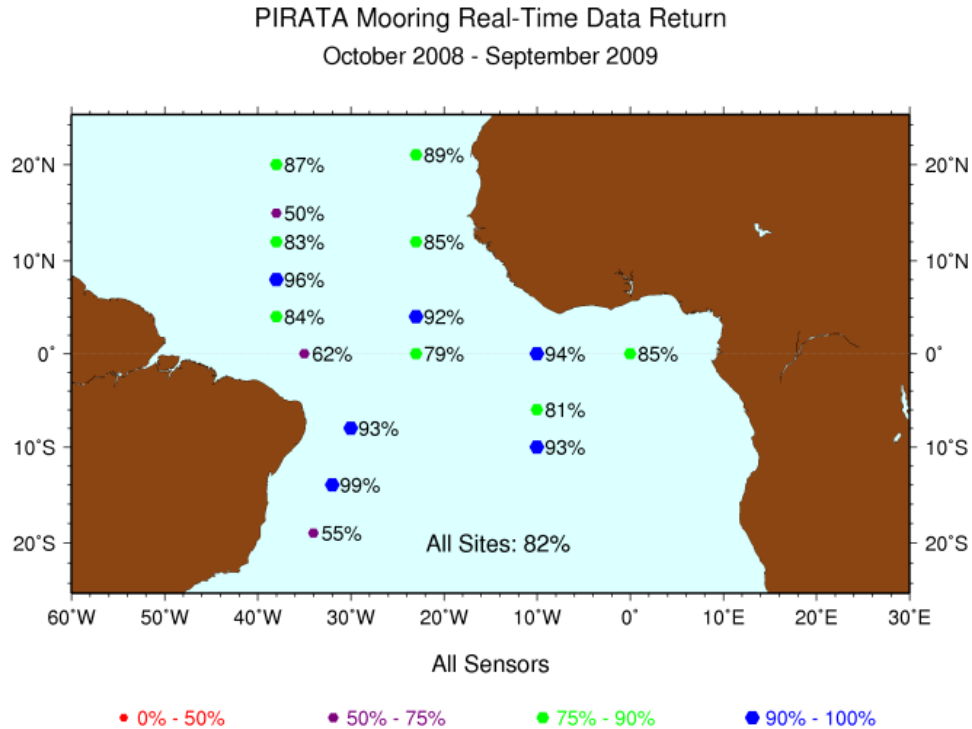
The Flavors of PIRATA



Observations collected by the PIRATA array (courtesy Mike McPhaden)

The overall near-real time data return in FY09 from all PIRATA sensors was 82%. For individual sensor types, this was distributed as follows: 90% for air temperature, 87% for SST, 84% for T(z), 90% for winds, 91% for relative humidity, 70% for rain, 88% for shortwave radiation, 80% for salinity, 42% for currents (at seven sites), 80% for longwave radiation (at four sites), 84% for air pressure (four sites). Mike noted the relatively poor performance of the Sontek current meters, and the lack of appropriate and timely response from the manufacturer. To address this problem, PMEL implemented a current meter experiment at 0°, 23°W to compare a number of sensors from various manufacturers. Mike presented data from this experiment and noted that at this point, the Nortek Aquadopp and the RDI DVS are considered to be leading contenders for implementation at PIRATA sites to replace the Sontek.

The over data return rate for delayed mode was 86%. This, and the 82% real time return rate, is the second best year ever for the PIRATA program, and a clear improvement over the relatively dismal 2008 (principally caused by cancellation of the Ronald H. Brown PNE cruise that year). The distribution of data return by site is shown in the following figure.



Mike McPhaden presented a Certificate of Recognition plaque from PIRATA to the officers and crew of the Brazilian Navy ship NB Comandante Manhães, to recognize their prompt and valuable service in recovering the adrift buoy from the 8°N, 38°W site.

Over the history of PIRATA, 138 moorings have been deployed, with ~128 recovered (including “half recoveries”, where the buoy is recovered without the mooring and subsurface sensors). This is an overall vandalism rate comparable to the TAO array in the Pacific.

Mike described the ATLAS update project, which aims to update PMEL’s ATLAS with more modern, commercially available components. This effort is currently focusing on adapting new electronics to existing mooring hardware, and involves many updates and changes. One major improvement will come from switching to Iridium transmissions, which will allow hourly transmission of subsurface data (this is currently only sent as a daily average in real-time transmissions over ARGOS). The first deployment of this updated ATLAS buoy will be in Fall 2010.

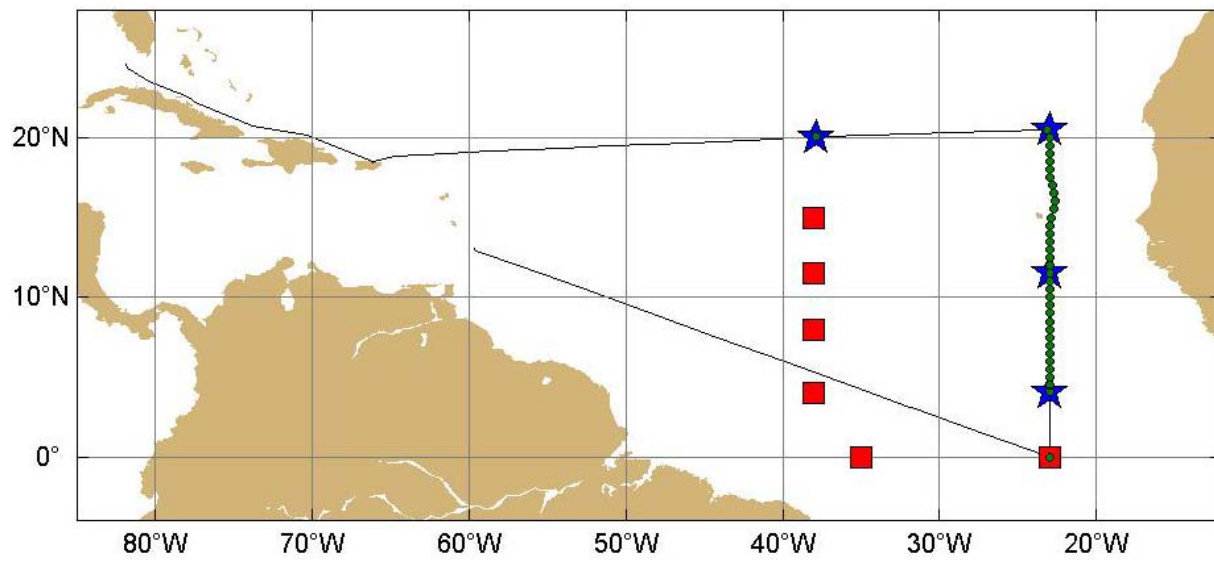
On the longer term, the ATLAS replacement project seeks to develop small, easily deployed and transported mooring systems that last 2—3 years and are vandalism-resistant. These are colloquially known as the “buoy in a box.”

PMEL plans for 2010 include:

- Continue to support PIRATA core activities: provide mooring equipment, support PIRATA cruises, and continue data processing, web display and data distribution;
- Staff PNE Cruise on NOAA Ship Ron Brown in May/June 2010;
- Continue scientific analysis of PIRATA data;
- Analyze Current Meter Experiment data; and
- Continue engineering development.

NOAA/AOML report and plans

Rick Lumpkin presented the results of the 2009 PNE cruise and future plans.



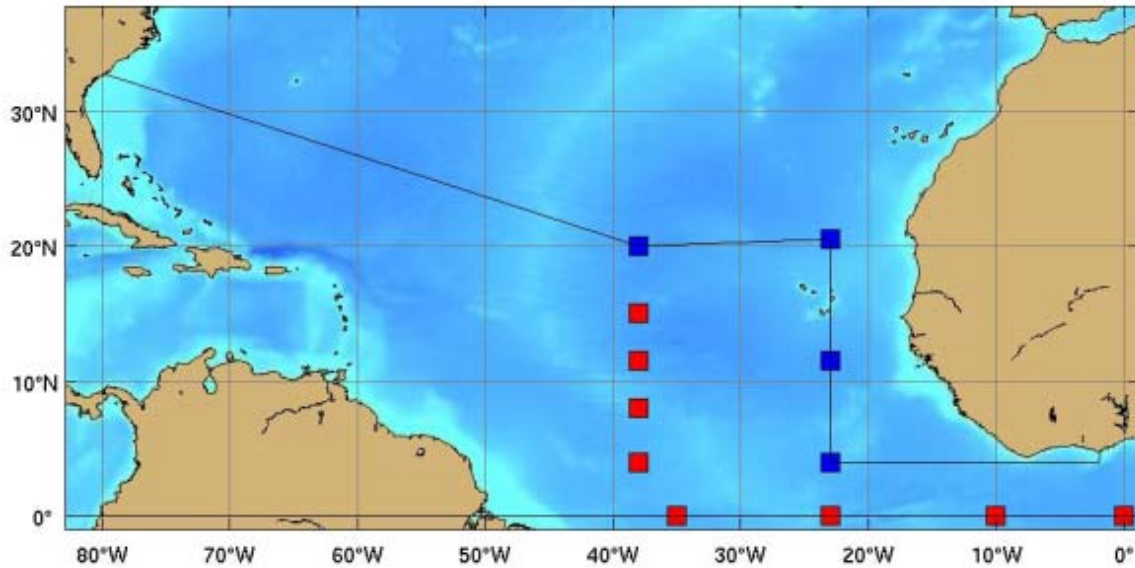
Cruise track of the R/V *Ronald H. Brown* during the 2009 PNE cruise (black), 11 July through 11 August, with CTD stations (green bullets), PNE mooring sites (blue stars), and the PIRATA backbone sites (red squares) superimposed.

The following activities were conducted during the 2009 PNE cruise:

- ATLAS operations (lead by J. Michael Strick and Corey Martin, PMEL): all four PNE sites, plus a tube swap at the Eq-23°W site. This French backbone site had failed within weeks of being replaced, and was added to the cruise plan days before the cruise began.
- 36 CTD casts were collected, at all five ATLAS sites and along 23°W, cutting through the oxygen minimum zone of the North Atlantic.
- 32 drifters were deployed as part of NOAA's Global Drifter Program
- 154 XBTs were deployed, many from various years of manufacture alongside CTD casts to test their drop rate characteristics.
- Shipboard ADCP, TSG, and underway meteorology along the trackline.

Five AOML personnel participated in this cruise. Additional members of the scientific party hailed from PMEL, Univ. Miami, NESDIS/STAR, Howard Univ., Hampton Univ.,

City College of New York, Univ. Puerto Rico and Univ. Texas El Paso. Opportunistic measurements collected by these additional members included sonde and ozone sonde profiles, M-AERI measurements, and a suite of meteorological observations.



Planned cruise track of the R/V *Ronald H. Brown* during PNE2010, Ghana to Charleston.

PNE2010 is scheduled on the R/V Ronald H. Brown for 26 April through 26 May 2010, Takoradi, Ghana to Charleston, SC. Claudia Schmid (NOAA/AOML) will be chief scientist. The current plan is to transit directly to 4°N, 23°W and occupy the four PNE sites, servicing the buoys and collecting CTD and XBT casts and opportunistic oceanographic and meteorological observations. If departure is not delayed, the chief scientist may opt to start the 23°W CTD line at Eq-23°W and provide an additional calibration point for those ATLAS data.

The PNE cruise is on the Brown's 2011 schedule, tentatively in May—June, from Capetown South Africa to Bridgetown, Barbados. Rick Lumpkin will be chief scientist.

Discussion items

It was noted that uncalibrated, real-time hydrography should be submitted to Coriolis and the National Ocean Data Center, for use in real time ocean state estimation. In turn, MERCATOR can offer products and forecasts along a cruise track.

Nico Caltabiano noted the value of a centralized data source for tropical Atlantic data, in a uniform format. This issue was discussed by the PIRATA SSG (see attached SSG report).

Bernard Bourlès noted that AMMA-Ocean, TACE, and the CLIVAR Atlantic Implementation Panel have all recommended that additional conductivity and current

measurements should be included in PIRATA moorings for characterizing the mixed layer. AMMA-Ocean concluded, “Notable gaps exist in the southern part of the central and eastern tropical Atlantic basin. In the framework of PIRATA, a proposal has been endorsed for a South-Eastern Extension -PIRATA SEE- that has been tested during a one-year experiment at one location off Congo in 2006-2007. Such a proposal is presently in stand by for funding support problem but should be strongly supported and endorsed. Also, the CLIVAR AIP strongly recommended in 2006 a PIRATA extension toward the southern ocean, around 23°W-10°S mostly motivated by improvement of the climate and weather prediction. However PIRATA has to deal with vessel time availability... that is a major issue.”

Bernard Bourlès also noted that processes responsible for upwelling along the southern African coast in the north of the Gulf of Guinea (Congo-Gabon upwelling region) are still not precisely known. Potential impacts of this upwelling on regional climate and WAM onset are still an issue of concern and the analysis of its variability, from seasonal to interannual scales, and could be important for climate change. This particular upwelling was poorly studied during AMMA. An oceanic experiment should be dedicated, at the time of the upwelling onset (during the preconditioning phase of the cold tongue) to the surveying the ocean-atmosphere coupling, the setup of the meridional temperature and radiative flux gradients, on both sides of the equatorial thermal front. Such an experiment could be carried out during a specific PIRATA cruise between 23°W and 0°E, possibly with a glider component. He also noted that a process study could help resolve vertical velocities in the eastern equatorial Atlantic, and (if the SEE is reoccupied) in the Congo-Gabon upwelling region, and recommended that a longwave sensor be included at the 10°W-Eq site.

Conclusions and plans for PIRATA-16

A number of conclusions and recommendations were issued by the PIRATA Science Steering Group; for these, see the attached SSG report.

Peter Brandt compiled the following list of upcoming cruises in the Tropical Atlantic:

- Apr. 2010, RON BROWN, PNE2010, NOAA, C. Schmid
- Oct. 2010, MERIAN, IFM-GEOMAR, M. Visbeck, tracer survey, Guinea Dome
- Sep./Oct. 2010, PIRATA FR 20, IRD, B. Bourlès
- May 2011 (between May and October), PIRATA FR 21, IRD, B. Bourlès, possibly with glider swarm experiment
- Jun./Jul. 2011, 23°W-10°W, MERIAN, IFM-GEOMAR, P. Brandt/A. Körtzinger, glider swarm experiment
- Summer 2011, RON BROWN, PNE2011, NOAA, R. Lumpkin
- Nov. 2012, 23°W, MERIAN, IFM-GEOMAR, P. Brandt, subsurface moorings

The possibilities for collaborative multi-ship operations (which could also include the Brazilian vessel servicing the western part of PIRATA) are particularly enticing in summer 2011. This is anticipated to be a major topic of discussion in next year's PIRATA meeting, especially as ship schedule dates will be more exact by then.

The next PIRATA meeting will be held in Brazil, approximately in March 2011, alongside the 2011 Tropical Atlantic Climate meeting.

PIRATA-15 meeting participants

Moacyr Auaujo (DOCEAN UFPE)
Bernard Boulès (IRD/LEGOS/CRHOB)
Peter Brandt (IFM-GEOMAR)
Nico Caltabiano (International CLIVAR Project Office)
Roberto De Almeida (CST INPE)
Hervé Giordani (CNRM)
Fabrice Hernandez (IRD Mercator Océan)
Rick Lumpkin (NOAA/AOML)
Michael McPhaden (NOAA/PMEL)
Paulo Nobre (INPE)
Frederico Nogueira (DHN)
Yves du Penhoat (LEGOS IRD)
Renellys Perez (NOAA/AOML, U.Miami/CIMAS)
Joel Poitevin (Météo-France)
Regina Rodrigues (Univ. Sao Paolo)
Mathieu Rouault (Univ. Cape Town)
Ramalingam Saravanan (Texas A&M Univ.)
Claudia Schmid (NOAA/AOML)
Domingos Urbano (INPE)

Report from the PIRATA Science Steering Group (SSG)

The PIRATA SSG welcomed new member R. Saravanan of Texas A&M University.

Peter Brandt noted that he will be collecting extensive observations, including microstructure and glider surveys, between 10°W and 23°W in May 2011. Michael McPhaden noted that PMEL will offer a Sentinel (600 kHz RDI profiler) to include at the 0°, 10°W site. The SSG discussed possible collaborative efforts with simultaneous cruises during the spring 2011 time frame.

The SSG considered the offer by Total for a possible replacement Southeast Extension mooring. In summary, with some conditions, Total is willing to support a mooring near the pilot SEE site. At this point, the SSG recommends that PMEL and Total have an informal conversation to assess the feasibility of this collaboration. A number of issues, ranging from engineering challenges to data release issues, must be weighed in this assessment. For example, Total wants high frequency current and wave measurements in real time, not presently possible with ATLAS technology used in PIRATA.

Presently, Brazilians, French and Americans offer shipboard data such as CTD and XBT separately and in varying formats. The SSG declared that a centralized and unified “PIRATA ancillary data” web page should be created to link the shipboard and ancillary mooring data currently collected and offered by individual PIRATA partners. Paulo Nobre offered to host this effort. The data on this page must be uniform in format, and should include as a first priority CTD and hull-mounted ADCP data and as a second priority thermosalinograph, XBT and shipboard met data. The SSG decided that the Brazilians and Americans should use the French format, which already adheres to international standards. This effort will be initiated by Bernard Bourlès, who will forward example data files formatted by Jacques Grelet to the SSG.

Domingos Urbano noted the need for more in-situ measurements to characterize net heat flux, including parameterized turbulent fluxes, for satellite product calibration, and reminded the SSG of the justification provided by Lisan Yu. In this light, Brazil is planning to upgrade the 19°S, 34°W site to full-flux this year.

The SSG discussed a proposal to add a new PIRATA site in the central South Atlantic, for example at 15-20°S, 10°W. While it is unclear who would provide the ship time to service this site, the scientific justification can and should be provided. This will be done in a 2-page proposal involving Michael McPhaden, Domingos Urbano and Bernard Bourlès, and possibly also Mathieu Rouault. The SSG also discussed recommending more temperature and salinity sensors to existing PIRATA sites, and noted that a well-defined scientific justification for how many sensors should be added, to which sites, must be provided. This will be done in a 2-page rationale involving Fabrice Hernandez, Bernard Bourlès, Domingos Urbano and Paulo Nobre, with contributions invited from Michael McPhaden and others of the SSG.

The largest biases in coupled air-sea models are found in the Benguela coastal region. Successfully collecting observations in these EEZ waters will require taking advantage of existing partnerships. The PIRATA SSG recommends that CLIVAR Atlantic, CLIVAR Africa and PIRATA should work together to address this issue.

The PIRATA SSG commended the Brazilian DHN for its exceptionally quick response on recovering the 8°N, 38°W drifting ATLAS buoy from the NB Commandante Manhaes. The ship recovered the buoy on 26 January 2010 with only one week's notice. This quick action saved valuable data and equipment that would otherwise have been lost.

SSG meeting participants:

Moacyr Auaujo (DOCEAN UFPE)
Bernard Boulès (IRD/LEGOS/CRHOB)
Peter Brandt (IFM-GEOMAR)
Hervé Giordani (CNRM)
Fabrice Hernandez (IRD Mercator Océan)
Rick Lumpkin (NOAA/AOML)
Michael McPhaden (NOAA/PMEL)
Paulo Nobre (INPE)
Frederico Nogueira (DHN)
Yves du Penhoat (LEGOS IRD)
Joel Poitevin (Météo-France)
Ramalingam Saravanan (Texas A&M Univ.)
Domingos Urbano (INPE)