PIRATA-8 Meeting Report

Paris, France, 29-31 August, 2001

This document aims at reporting the work developed during the three day meeting of the PIRATA program, that took place at the University of Paris 6, during the period of 29 - 31 August, 2001. During each session, notes were taken by *rapporteurs* and audio tapes were recorded with the objective of registering the main topics of discussions, the presentations done, conclusions reached, recommendations etc. From the collected notes, we extracted the most relevant information and conclusions. The adopted Agenda is provided in Annex 1. The list of Participants is in Annex 2.

DAY 1: August 29, 2001 (Wednesday, Afternoon: 2 pm – 6 pm) Chair T. Busalacchi - Rapporteur: I. Wainer

The Meeting was declared open by the Chair of the PIRATA-SSC, Jacque Servain, who thanked everybody for the attendance and for the support of LOYDC.

The Chair presented the proposed Agenda, which was discussed and slightly altered. A copy of the accepted Agenda is in Annex 1.

J. Servain informed that due to a late arrival of M. McPhaden, he would present Report/Status for France and the USA (material provided previously by McPhaden).

A) National and International Status and Support of PIRATA (original array)

- Introduction J. Servain
- PIRATA-France: Status and national support + Cruises Data Report J. Servain
- PIRATA-USA: Status and national support + ATLAS data report J. Servain & M. McPhaden

The original backbone array consists of 12 ATLAS moorings, with 2 meridional (at 38°W and 10°W) and 1 zonal line along the equator. This configuration of mooring sites was designed to monitor the two main modes of variability of the Tropical Atlantic (TA). The low resolution (daily average) data is transmitted via ARGOS system; the high resolution data (every 10 min) is internally recorded at buoy site for later recovery. Both data sets are available through the Web. Meteorological stations and tide-gauges complement the mooring sites. The USA (PMEL) provides buoy/mooring hardware, sensors and technical assistance. France maintains the eastern part of array and Brazil the western part of it.

A concern was raised regarding the insufficient average data return. Predominantly caused by vandalism (possibly by tuna fishing), the PIRATA data return has been on the order of 70%, as compared to 80% for the TAO array in the Pacific. One possible approach

to improve data return would be to increase maintenance cruises to twice per year, but this is not feasible at present due to ship time constraints.

A PIRATA mooring inventory was presented (by J. Servain), but a more detailed explanation about it was felt necessary, although not possible due to absence of M. McPhaden.

Examples of data plots for all mooring sites were presented to highlight the data gaps, that in some cases are quite extensive.

A list of all maintenance cruises done up to the present and scheduled for this year was presented.

Beginning this year (2001), two ADCPs -which have been provided by Brazil- are scheduled for installation at the mooring site Jazz ($0^{\circ}N-23^{\circ}W$) and Java ($0^{\circ}N-10^{\circ}W$) by the French who provide the mooring hardcores.

For the year 2002, the plans include a Brazilian cruise (PIRATA-BRV) to maintain the 5 westernmost moorings, and the PIRATA-FR11 French cruise for the maintenance of the other 5 sites plus the maintenance of the 2 ADCP moorings.

A CD-Rom has been prepared by the French containing the PIRATA data collected on board for all cruises (CTD, Met. data, Thermosalinograph and XBT). Copies of these CD-Rom were distributed to the audience.

Following this, the Chair presented a summary of the previous meeting and highlighted the fact that the PIRATA-8 meeting marks the beginning of the consolidation phase of the project and of a strengthening of the relationship between PIRATA and the CLIVAR program.

An estimate of the level of funding allocated by France for the year 2000 to the PIRATA was presented. The total figure, including ship time, was about US\$ 500K.

The level of technical PMEL personnel participation in cruises was presented in a summary table.

A final point was raised on the necessity of getting statistics of who is using the data and the publications using PIRATA data.

• PIRATA-Brazil: Status and national support – J. Lorenzzetti

- Brazil has been responsible for the maintenance of the western part of the PIRATA array (along 38°W; 0°N-35°W and 0°N-23°W). Starting this year, the 0+N-23°W mooring site has been transferred to the French as agreed in the last PIRATA meeting in Natal (PIRATA-7) in April 2000. All maintenance cruises have been made using the Brazilian Navy ship ANTARES.
- Some transparencies were presented showing cruises and sensors status and examples of data plots for all "Brazilian" sites. A sequence of pictures taken during some of ANTARES cruises was presented to illustrate the onboard logistics required to ATLAS mooring recovery and deployment. Complementing pictures were shown of problems related to tuna fishing gear that gets entangled with mooring line and that generally result in loss of sensors and sometimes in mooring at the northern part of the 38°W line was presented by pictures taken on board last PIRATA-BRIV cruise. An analysis of the effect of this marine dust on the sensors response (particularly on the SW radiation) and near surface salinity seems needed.

Logistic problems were reported as one of the most difficult issues yet to be solved related to the joint operations of Brazil and USA. Among these, the following points were highlighted (see also the post-note prepared by M. McPhaden at the end of this report):

- a) Equipment is shipped from the USA to Brazil with serious problems of documentation prepared by NOAA; Invoices not always detail correctly the shipped material.
- b) Limited time for shipping/customs clearances before cruises (with some cruises having almost to be postponed or cancelled).
- c) Some equipment has been brought and/or taken back as "luggage" or without doing proper Customs clearances.
- d) Because a) and c), the customs processing in Brazil necessary for shipping the equipment back to the USA for maintenance and calibration has been very difficult and delays have been unavoidable. This ends up in problem b).

Brazilian ship time commitment:

During the Pilot Phase of PIRATA (1998-2001), DHN has allocated about 60 days/year of ship time to honor Brazil's commitments with PIRATA.

For the Consolidation Phase (2001-2005), ship time has been committed for 2002-2003. For 2003-2004 no final word of commitment was issued by DHN.

Brazilian funding for PIRATA:

The lack of a secure, dedicated and adequate budget to the project has been a serious drawback. INPE has used funds from several projects within INPE to support PIRATA.

• Extra instrumentation on PIRATA moorings - J. Servain

After the presentation of Brazil Status report, J. Servain asked to present the following points for analysis and discussion, related to extra instrumentation to be installed at some PIRATA sites:

- acoustic systems to repel tuna fish away from ATLAS mooring and possibly reduce induced fisherman vandalism
- installation of multispectral radiometers on 1-3 mooring to investigate biological productivity and look effect of marine dust
- installation of CO₂ sensors (CARIOCA type)
- installation of ADCP on ATLAS buoys (Sontech system): 0°N-23°W and 4°N-38°W are important regions for seasonal variability.

The Session was interrupted for a Coffee Break. On the continuation of the Session, it was asked that each participant would introduce himself or herself. A list of participants is provided in Annex 2.

B) International and National Institutions Supporting PIRATA

-GLOSS needs – Y. du Penhoat

It was highlighted that one of the closest related activities to PIRATA is the global sea level observing system, the task of the GLOSS program. The GLOSS community is seeking input from the PIRATA program for that purpose. Sea level is a crucial variable for studies regarding sea level changes related to ocean circulation and climate changes and to practical applications related to coastal management. Data information about program can be obtained at the following site: <u>http://www.pol.ac.uk/psml</u>.

Large data gaps were reported for Brazilian tide gages. Also the flow of PIRATA tide data has not been continuous.

The GLOSS program wishes that the PIRATA community supports GLOSS activities in the tropical Atlantic either by statements or direct assistance. A list of stations of interest for PIRATA (if any) would be helpful.

- GOOS program – J. Trotte

Janice Trotte presented an update on the GOOS program and the latest deliberations of its Governing bodies. She also provided information on the interest of having PIRATA as the main reference and backbone to other operational projects in the South and Tropical Atlantic.

Finally, information has been provided on the interest of the Brazilian Government through DHN, to set up a GOOS (IOC) Regional Office, under the auspices of IOC/UNESCO. The Office, that is planned to start its activities by late 2001, will also facilitate PIRATA technical secretariat activities in liaison with IOC Secretariat in Paris.

- CLIVAR program – T. Busalacchi

T. Busalacchi presented the CLIVAR Principal Research areas, and pointed out the importance of PIRATA also for land base programs such as VAMOS and CLIVAR-Africa. For example, VAMOS looks at PIRATA to provide up-stream data such as moisture fluxes. International programs add value to National Research programs, for ex. German CLIVAR.

It was stressed the necessity of PIRATA giving input to the CLIVAR Atlantic Panel as well as receiving their advises and activities. In particular, CLIVAR-TAV highlights:

- Developing links with SPARC and NAO

- Concern for lack of measurements in the South Atlantic.

- IRI – D. Moura

Divino Moura pointed out the importance of IRI for regional climate prediction. IRI is a data "user", in particular with respect to data assimilation activities.

-IRD - Jacques Merle

Jacques Merle expressed the IRD support for PIRATA and an optimistic view of possible future funding.

- Météo-France – S. Planton

Meteo-France has interest in weather forecasting and in real time data retrieval and suggests the use of their data retrieval system. It was pointed out the involvement of Meteo-France in data assimilation and the importance of PIRATA in this activity.

- NOAA/OGP - M. Johnson

NOAA is interested in building a sustained Global Ocean Observing System for Climate. The plan develops from the results of the Ocean Obs/1999 Conference. NOAA realizes that building a global observing system has to be through the cooperation of the international community. This system should respond to the long term observational needs

of the Operational Centers, International Research Programs and major science assessments. The importance of PIRATA for the Tropical Atlantic observing system was acknowledged. It was also shown that reference sites are needed. The observing system is composed by: ARGO floats, ship lines (high and low density), moored buoys, drifter array, and satellite.

- Some specific points of view:

- A research topic example – P. Chang

Ping Chang presented a work done on the impact of sub-surface temperature on predictability using a linear inverse model technique in the forecast. The idea is: by including sub-surface temperature, how much improvement is achieved? Results show that forecasts get improved where surface and sub-surface temperatures are well correlated. Highest correlation between SST and heat content (400 m) are found in upwelling regions. Places where the sub-surface temperature impacts the surface temperature are those where forecast skill gets improved by its inclusion. With assimilation experiment, Ping Chang showed that North West Atlantic is a difficult region to model.

- Commenting on this issue of data assimilation, **T. Busalacchi** pointed out that one of the most problematic areas for models is the stratus-cloud region off Benguela.

- An analysis of PIRATA back-bone – M. Vianna

M. Vianna made a presentation arguing on the inadequacy of the original PIRATA back-bone to provide a good description of the seasonal-to-interannual variability of the upper tropical Atlantic ocean. Points were raised on the dynamical relationship (if any) between North-South ends of Dipole Mode. Does the present array geometry make it possible the evaluation of sub-surface processes necessary for prediction? His arguments are that for a realistic sampling of the important dynamical processes controlling the airsea and inter-hemisphere exchanges, the back-bone should be expanded into the SW Atlantic.

- A final point raised by T. Busalacchi (CLIVAR)

A clearer context setting of PIRATA is needed to be taken for the CLIVAR TAV. It should be taken into account that one of the main goals of the next CLIVAR TAV meeting is to produce recommendations for an implementation plan for the tropical Atlantic. PIRATA community should develop a position for the mooring evaluation/review meeting.

The Session was closed at 6 pm.

DAY 2: August 30, 2001 (Thursday; Morning Session: 9 am – 12 am) *Chair G. Reverdin - Rapporteur: S. Planton*

C) <u>The Pilot Extensions of the PIRATA Backbone Array</u>

The session was introduced by J. Servain who recalled the different steps of the PIRATA network extensions (see the reports of the previous PIRATA meetings and those of the workshops of PIRATA-SEE, PIRATA-NEE and PIRATA-WE). The scientific

motivation and the level of development of the three extension projects where then presented.

- PIRATA-SEE (M. Rouault)

The SE extension is motivated by two main concerns: water resources and fisheries. The positive correlation between SST off-shore Angola and rainfall over the Angola coast was demonstrated by the analysis of climatological data sets. Whereas a connection between the Southern Africa rainfall and the ENSO of the Indian ocean SST exists, the role of tropical Atlantic is also apparent. This was particularly the case during the so-called Benguela Niño of 1984 and 1995, concomitant with warm ENSO-like events in the equatorial Atlantic, and that were associated to a very high negative impact on fisheries. In his presentation M. Rouault pointed out the need for further discussion on the scientific issues, in particular the analysis of boreal winter data sets, a season which is of great interest for South Africa.

After the set-up of an action committee for PIRATA-SEE at the South Africa Marine Science Conference in September 1999, the project has been developed in the context of the Benguela Current Large Marine Ecosystem (BCLME) project. This last has received a funding of 15 M\$US by the World Bank for a five year period and is now in the phase of appointing a Director. A feasibility study for one mooring was decided in September 2000 in order to give insight in the possibility to maintain a site. A stronger link with the southern African BENEFIT program (including scientific collaboration with German and Norwegian teams in the field of oceanography) may help at finding the needed ship-time to settle and maintain this site. The PIRATA-SEE extension project is thus now ready to start but the feasibility study will only start when money will become available (linked to the nomination of a Director for the BCLME project). The project need further input and suggestions to be pursued.

- PIRATA-NEE (A. Mokssit)

The main motivation for the NE extension comes from the interest of the collection of atmospheric and upper ocean data in this region for climate studies, climate and weather prediction and for fisheries. The SST anomalies centered between 15°S and 15°N are indeed pertinent for the ITCZ position which determine the rainy season in the region. It is also important to know the convective activity off the Senegal and Guinea coasts. The North tropical Atlantic interacts with the mid-latitude, and particularly with the NAO which affects the winter rainfall in North Africa. New observations in the northeastern part of tropical Atlantic may help at developing and improving weather forecast and climate prediction in the region.

Since the formation of a Steering Committee at the PIRATA-NEE Workshop of Casablanca (March 2000), a document on the strategy of the project was adopted (September 2000) and a first version of the Scientific and Operational plan was elaborated (May 2001). This document includes a presentation of the scientific rationales, a description of the observing network and of the observing system, the relation to other national or international programmes and a plan of implementation including a cost evaluation. The next step consists in looking for the funding of the project at the regional or

at the international levels. A meeting of the PIRATA-NEE Committee should be quickly invited in order to increase the co-ordination between the participating countries, finalise the Scientific and Operational plan and to prepare new funding proposals. There is a lack for additional support to start a feasibility study and there is a need to promote and support the project.

- PIRATA-WE (P. Nobre and M. Vianna)

The motivation of the WE extension is to collect near surface and upper ocean data in a region where observations are missing, for climate variability and predictability studies and for weather forecast. Many scientific issues already raised in the literature could be better addressed with this data. Among them, the relation between SST and thermocline depth variability, the link between the Subtropical Cell and larger scale circulation, the subsidence rates in the region, the diurnal to seasonal cycles of rainfall over the Eastern Nordeste associated with the South Atlantic Convergence Zone (SACZ) and its link to the local SST anomalies, the importance of the southwestern subtropical-tropical Atlantic in the interactions between the tropics and the extra-tropics. Eastern Nordeste mean seasonal rainfall appears to be very predictable when local (southwestern) SST, adjacent to Nordeste, is known or can be predicted. P. Nobre presented research results that suggest the possibility to predict the rainfall probability distribution function with the use of nested regional atmospheric models and the improvement of the data observing system over the adjacent ocean.

It was proposed to enhance the PIRATA backbone by means of 4 additional moorings located off-shore of Brazil between 8 and 20°S. Two PIRATA-like buoys should be funded by the US and moored in 2003. The two others are planed for 2004-2005.

- Discussion

The presentations on the extension of the PIRATA network were followed by a general discussion from which we have here extracted some specific points. The three extension projects are at different stages of development, with ship-time being viewed as a limiting factor. The Brazilian representatives in the meeting argued that this is not the case for the SW Extension, since only a few extra days of ship time would be needed to implement the SW enhancement, relative to the ship time necessary to fulfill their present commitment to maintain the PIRATA backbone. The participants agreed that the extension projects must not jeopardise the consolidation of the existing backbone of PIRATA. The issue of shiptime implies to try to develop a co-ordination between the countries that organise cruises in the same region. This could be done with the formation of a ship-time clearinghouse to support and plan for the cruises in the area long time in advance. The particular issue of the maintenance of the 15°N mooring was raised and it was considered that its maintenance is of the responsibility of the PIRATA Steering Committee. The issue of the minimum requirement for a mooring to be considered as part of the PIRATA network was also raised. It was concluded that the collected data set that could be useful for regional applications, must be linked to climate studies. The use of an ATLAS mooring is not required even if they are economic, but the real time data transmission has to be performed for the data to be used for prediction.

DAY 2: August 30, 2001 (Thursday; Afternoon Session: 2 pm – 6 pm) Chair: M. McPhaden - Rapporteur: P. Chang

D) PIRATA after 2004?

D1) A Climatic Center in NE Brazil - J. Lorenzzetti

Arguments were made for the development of an international collaborative oceanographic and climatic center in NE Brazil region, probably in the city of Natal. The arguments included:

a) Natal is an ideal geographic location for maintaining and servicing PIRATA buoys. With a center in Natal, it would be possible to survey the PIRATA moorings on a twice-a-year base, instead of current once-a-year base;

b) The Center would be a node of a network linking several universities, oceanography and climatic centers/institutions in Brazil and abroad;

c) The Center would enhance collaboration among oceanographers/climate researchers in Brazil and in different countries;

e) The center would provide a mean of capacity building for transferring buoy and mooring technology from NOAA/PMEL and other institutions in the U.S. to other countries in Africa and the Americas;

f) The Center will host short and long-term visitors and provide training for oceanographers from different countries;

g) The Center would not only provide services for buoys and other equipment, but also provide data processing and serve as a reference data center for the tropical Atlantic.

INPE has been discussing the implementation of this Center in its Natal Regional Campus for several years and some level of investment in infrastructure of office space for researchers, laboratory, and storage space has already been done.

It is expected that some level of American and French participation in the formation and functioning of such facility in Natal could be committed by the US and France. As a short-term goal, it is envisaged that a capacity building program can begin in the near future, mostly related to existing ATLAS mooring technology.

Discussion:

- * Busalacchi: supported the concept in general, but argued that the proposal lacked details. He suggested that all interested parties should get together to scope out a detailed plan of action. He also indicated that it would be worthwhile contacting and visiting relevant institutions in Japan, since a similar technology transfer in TAO array has been made from PMEL to Japan.
- * I.Wainer: University of São Paulo has already started capacity building in sensor and oceanographic instrumentation, sending people abroad.
- * M.Vianna: mentioned having spoken to McPhaden about this issue, when he expressed concerns about lacking supporting staff at PMEL for training oceanographers from other countries.

* P.Nobre: proposed to form a task force to lay out a more detailed plan about the center.

- * M. Johnson: stated that NOAA generally supports this idea of having a center in Brazil, but a detailed written documentation is necessary before further actions can be taken.
- * K. Mooney: reiterated that NOAA is committed to this. JAMSTEC is a good example of transferring TAO technology from PMEL to Japan, supported by NOAA. PMEL is not a training site and a training facility is needed.
- * J. Merle: France also supports this idea. It seems that the next logic step is to appoint a leader of the task force as soon as possible to deal with specific issues.
- * M. Rouault: This training effort should include scientists from African countries as well.
- * K. Mooney: The task force should identify resources needed for the center.
- * M. Johnson: It is important that scientists should be involved in the task force.
- * K. Mooney: It is likely that funds/resources are limited. Priority items are needed.
- * D. Moura: PIRATA SSG and resource board should meet and appoint a task force.
- * A. Mokssit: An observer from African country should be present in the task force.

D2) A dedicated R/V for Operational Oceanography in the TA - J. Servain

J. Servain presented a proposal for a dedicated research vessel for maintaining PIRATA array and supporting observations in the South Atlantic. A detailed justification for a dedicated research vessel can be found in the written document "A Tool for Operational Oceanography in the Tropical and South Atlantic" by J. Servain, P. Marchand and R. Zaharia. It is recognized that the currently available classical R/Vs are not well suited for covering the entire Tropical Atlantic and South Atlantic, as PIRATA moves into its full operational phase and Argo networks grow in the future. A remedy to this foreseeable difficulty is a new dedicated R/V which is light, fast and cost effective. The proposed R/V "NOR-50" will have the capability to service at least 4 PIRATA/ATLAS buoys, travel 22 Knots in cruise (twice that of a classical R/V), carry 10 crew member and 4 scientists, and cost less than US\$5 Million.

Discussion:

- * M. Johnson: If this ship will be built outside of the United States, it will be very difficult for the U.S. government to provide financial support.
- * R. Zaharia: This is a new concept and a necessary building block for operational oceanography in the tropical Atlantic. In the long run, a dedicated R/V is also more economical.
- * T. Busalacchi: Expressed the need of a detailed price analysis and that it may be necessary to get price estimates from other builders.
- * J. Merle: It appears that the idea of having a dedicated R/V needs support from a larger group of scientists than just PIRATA.
- *K. Mooney: OGP can not, and does not have the budget to support building a ship, even though this may be an attractive idea.

PIRATA Resources Board Meeting

DAY 3: August 31, 2001 (Friday; Morning: 9 am – 1 pm) Chair: D. Moura; Rapporteur: P. Nobre

E) Final Discussion & Recommendations

E1) Topics to be presented in the CLIVAR/TAV coming workshop:

After a presentation given by J. Servain, the following discussion took place.

- * T. Busalacchi: More background work needs to be brought into the TAV meeting. What is needed to make the project successful in the future: more strength on modeling and case study research.
- * D. Moura: Real time data acquisition system could serve as the base for other initiatives. Need to be more specific about the project. Lesson learned: There must be the willingness to share the experience.
- * S. Planton: Make reference to GODAE consolidation phase.
- * P. Chang: Shall give specific examples of how useful PIRATA data has been, to demonstrate and clarify why should we continue with it.
- * M. McPhaden: To date, there has not been a high level of research activity with the PIRATA data; there have been discontinuities in the time series, so we don't have much to show at this moment. However, it must be shown PIRATA's uniqueness as an observing system. It must be complemented by in situ and remote sensed data.
- * D. Moura: Has to convey that PIRATA partnership is a very successful one.
- * P. Chang: Surface flux measurements can be shown as an example of the use of PIRATA observations.
- * J. Lorenzzetti: In situ PIRATA & satellite data gathering can be used to show the usefulness of the symbiosis between in situ and satellite data.
- * M. Vianna: Backbone needs to be enhanced to the south, in order to understand the meridional mode [of SST variability].
- * J. Merle: It is good to insist that PIRATA is a near-operational program, it has a continuous stream of data, and is the result of international cooperation among three countries.

E2) Center/Laboratory of Oceanography/Climatology in NE Brazil: Vision, Goals, Implementation strategy, a Task Force

J. Servain started by proposing a list of names, from France, US, and Brazil, to form the task force to elaborate the Terms of Reference for the Center in Natal.

- * M. McPhaden: Asked more details about the real scope of this lab? Would it start small as a pilot project and then grow with time?
- * D. Moura: Argued that this is a possibility, but one can also have a large vision and then scope in the details.
- * M. McPhaden: It is a pragmatic issue. Starting with the large vision, there is the need to include in the initial team other people relevant to the matter.
- * J. Lorenzzetti: The participation of other institutions in the elaboration of the laboratory proposal is necessary.
- * M. Johnson: I would require including international institutions, like the National Data Buoy Center.
- * D. Moura: Implementation will allow several institutions to participate (like Funceme, Universities...). The aspect is how we do about it.

- * T. Busalacchi: Two activities are identified here: one very ambitious, long time range, and which must be done. For this, the set of people indicated is not adequate, as it does not include people/institutions relevant to various segments of the data collection scheme being proposed. The other activity is to build a smaller, more narrowly focused lab to the PIRATA activities, for which the group of people suggested seems OK. I suggest that activities be done in parallel, so that the maturing of the larger vision does not hinder the more focused facility in Natal.
- * D. Moura: Capacity building is an important activity and can be started immediately. The question to be posed, however, is: what is the time line for this proposal?
- * J. Lorenzzetti: Having the vision in mind, we must start with things that we can do in the short term.
- * K. Mooney: The vision needs to be grand, combined with the implementation of small things.
- * D. Moura: IRI was proposed as a big vision, then scoped into.
- * M. Rouault: If this lab includes a calibration facility, it is a difficult thing to be done.
- * F. Assis: FUNCEME (State of Ceara Meteorology Foundation) offers local support to the task force.
- * P. Nobre: It shall be a facility where PMEL, IRD, and INPE [and other institutions] would work together/cooperate toward a same set of goals.
- * J. Servain: The proposed names are only a draft composition of the draft force.
- * T. Bussalachi: argued that a proposed group for the Task Force seems more appropriate to support PIRATA array system. If the grand vision is what is being sought after, then other people must be included. e.g., ARGO people are not included in this group.
- * D. Moura: stated that a Term of Reference is missing.
- * J. Lorenzzetti: Activities should be focused to PIRATA, and then grow.
- * J. Merle: A timetable could be: first year to concentrate on the PIRATA.
- * O. Baddour: A Vision requires Objectives, and that requires a task force. Suggests the inclusion of other people/regions from the beginning.
- * D. Moura: Should circulate the draft of the term of reference among the SSC and PRB within one month.
- * J. Lorenzzetti: Recommendations will be included in the final report of this meeting.

The session adjourned at 11 a.m.

PRB meeting with the official signatures of the PIRATA-MOU by the official representatives of the Institutes supporting PIRATA.

Social Aperitif

Post-meeting recommendations and notes:

1) Among the several important topics of discussion during the meeting, one that needs a formal statement from the PIRATA-SSC is the following argument made by the Brazilian participants:

The full scientific agenda of the PIRATA Project can only be accomplished if the present backbone array is enhanced to include at least two moorings at 6°S-8°S and 15°S-

18°S, at the 34-30°W meridian. This is an important source region of the Equatorial Undercurrent waters, where the variability of the mixed layer depth is forced by the strong localized heat and freshwater fluxes. The monitoring of which cannot be made by satellite, or floats/drifters, which rapidly drift away by strong currents. It is suggested that only by moored measurements it is possible to assess the importance of such forcings and interactions, which impact the long term evolution of SST and rainfall correlation in the Tropical Atlantic. The Brazilians are proposing a SW extension that would fill in this data gap. A detailed scientific justification of this SW extension is being finalized and will be submitted for analysis soon. It is being asked that all participants of the PIRATA SSC make an analysis of that document and provide to SSC Chairman a written reply with comments (in email form).

It was recognized that the "modus operandum" of the pilot phase of PIRATA (i.e., with the buoys and sensors being sent back and forth between Seattle and the ports of call to serve the array) is not adequate to be continued during the consolidation phase. One alternative agreed by all participants would be the formation of a research/support basis in Natal, Brazil, where several activities in support to PIRATA could be done. This including capacity building, instrument recuperation and calibration, data collecting, research in cooperation with regional, national, and international Universities and Research Institutes. For this end, the plenary recommended that a task force among Brazilian, French and American representatives were formed to scope out a term of reference to the formation of such center in Nordeste.

It was still recognized that the formation of a clearinghouse to optimize ship-time to assist PIRATA and a larger and more comprehensive observing system over the tropical Atlantic would greatly enhance the operational capability of PIRATA in the future.

2) M. McPhaden commented regarding shipments into and out of Brazil, that the problems are more complicated than indicated in the Brazilian national report. PMEL has successfully made shipments throughout the world for many years (for example, to mainland France, New Caledonia, Ivory Coast, Chile, Peru, China, Japan, Taiwan, Korea, Micronesia, Guadeloupe, Australia, to name a few) without the extraordinary delays and complications experienced in Brazil. He acknowledged that there had been problems with documentation of equipment which previously had entered Brazil. However, he also pointed out that equipment recovered in April and May 2001 on the Antares (for which updated documentation was provided by PMEL in early June 2001) had yet to return to PMEL by early January 2002, a delay of 7 months. He expressed the hope that with new shipping procedures agreed to for the consolidation phase, both sides would be able to work together more efficiently in the future.

ANNEX – 1

PIRATA-8 Meeting

29-30-31 August 2001 University of Paris 6

AGENDA

DAY 1: August 29, 2001 (Wednesday)

Afternoon (2 pm – 6 pm) Chair: T. Busalacchi ; *Rapporteur*: I. Wainer

- 1) National and International Status and Support of PIRATA (original array)
- F) Introduction J. Servain
- G) PIRATA-France: Status and national support + Cruises Data Report J. Servain
- H) PIRATA-USA: Status and national support + ATLAS data report (J. Servain/M. McPhaden)
- I) PIRATA-Brazil: Status and national support J. Lorenzzetti
- J) International and National Institutions Supporting PIRATA: DHN, IOC/GOOS, CLIVAR, IRI, ... (J.Trotte, C. Summerhhayes, D. Moura, J. Merle, D. Cariolle, M. Johnson, ...)
- a. Preliminary discussion on the context setting for input to the TAV meeting (T. Busalacchi)

DAY 2: August 30, 2001 (Thursday)

Morning (9 am – 12 am) Chair: G. Reverdin; *Rapporteur*: S. Planton

- 1) Presentation of the Science and Implementation Plans of the PIRATA Extensions
 - PIRATA-SEE (+discussion) (M. Rouault)
 - PIRATA-NEE (+discussion) (A.Mokssit)
 - PIRATA-SWE (+discussion) (P. Nobre)
- 2) Open discussion on the adequacy between the 3-extended projects and the original array.

Afternoon (2 pm – 6 pm) Chair: M. McPhaden; *Rapporteur*: P. Chang

1) PIRATA after 2004?

- A Climatic Center in NE Brazil (J. Lorenzzetti, A. Filho, ...)
- A dedicated R/V for Operational Oceanography in the TA (J. Servain)

2) PRB Meeting

DAY 3: August 31, 2001 (Friday)

Morning (9 am – 13 pm) Chair: D. Moura; Rapporteur: P. Nobre

- a) Final discussion & recommendations (if necessary).
- b) PRB meeting with the official signatures of the PIRATA-MOU by the official representatives of the Institutes supporting PIRATA.
- c) Social Aperitif.

ANNEX - 2

PIRATA-8 Meeting

29-30-31 August 2001 University of Paris 6

List of Attendees

	Name	First name	Organization	Country	e-mail
1	BADDOUR	Omar	DMN	Morocco	Omar.Baddour@yahoo.com
2	BLOCH	Olivier	Météo France	France	Olivier.Bloch@meteo.fr
3	BOURLES	Bernard	IRD	France	Bernard.Bourles@ird.fr
4	BUSALACCHI	Antonio	ESSIC	U.S.A.	tonyb@essic.umd.edu
5	CHANG	Ping	TAMU	U.S.A.	ping@ocean.tamu.edu
6	FIDEL	Quilanda	IIM, Luanda	Angola	fisofide@hotmail.com
7	HOEPFFNER	Michel	IRD/Médias	France	Michel.Hoepffner@medias.cnes.fr
8	JOHNSON	Michael	NOAA/OGP	U.S.A.	johnson@ogp.noaa.gov
9	KERMOND	John	NOAA/OGP	U.S.A.	John.Kermond@NOAA.gov
10	KONARE	Abderahamane	Univ. Abidjan	Côte d'Ivoire	konarea@ci.refer.org
11	LAZAR	Alban	LODYC	France	ala@lodyc.jussieu.fr
12	LORENZZETTI	João A.	INPE	Brazil	loren@ltid.inpe.br
13	MARTINS	Alexandrina	INMG	Capo Verde	snmg.dgc@cvtelecom.cv
14	MCPHADEN	Mike	NOAA	U.S.A.	mcphaden@pmel.noaa.gov
15	MERLE	Jacques	IRD	France	merle@paris.ird.fr
16	MOKSITT	Abdalah	DMN	Morocco	moksitt@mtnet.gou.ma
17	MOONEY	Kenneth	NOAA/OGP	U.S.A	mooney@ogp.noaa.gov
18	MORENO	José Manuel	INMG	Capo	institutometeo@cutelecom.cv
				Verde	
19	MOURA	Antonio	IRI	Brazil	amoura@iri.columbia.edu
20	NOBRE	Paulo	CPTEC/INPE	Brazil	pnobre@cptec.inpe.br
21	du PENHOAT	Yves	IRD	France	Yves.du-Penhoat.@cnes.fr
22	PICAUT	Joel	IRD	France	Joel.Picaut@cnes.fr
23	PLANTON	Serge	Météo France	France	Serge.Planton@meteo.fr
24	PROVOST	Christine	CNRS	France	cp@lodyc.jussieu.fr
25	MURTUGUDDE	Ragu G.	ESSIC	U.S.A.	ragu@seetha.gsfc.nasa.gov
26	REBERT	Jean-Paul	IRD	France	rebert@paris.ird.fr
27	REVERDIN	Gilles	CNRS	France	Gilles.Reverdin@cnes.fr
28	SEND	Uwe	IFM Kiel	Germany	usend@ifm.uni-kiel.de
29	SERVAIN	Jacques	IRD	France	Jacques.Servain@ird.fr
30	TODD	Jim	NOAA/OGP	U.S.A.	todd@ogp.noaa.gov
31	TROTTE	Janice	DHN	Brazil	j.trotte@openlink.com.br
32	VIANNA	Marcio L.	INPE	Brazil	vianna@liv.inpe.br
33	WAINER	Ilana	USP	Brazil	wainer@usp.br
34	ZAHARIA	Raymond	CNES (retired)	France	raymond.zaharia@wanadoo.fr