ABSTRACTS
Tropical Moored Buoy Implementation Panel
Oban, Scotland
26 September 2010

The Global Tropical Moored Buoy Array

M. J. McPhaden
NOAA/PMEL, Seattle, USA

This presentation describes the Global Tropical Moored Buoy Array, which is a multi-national effort to provide data in real-time for climate research and forecasting. Major components include the Tropical Atmosphere Ocean/Triangle Trans-Ocean Buoy Network (TAO/TRITON) in the Pacific, the Prediction and Research Moored Array in the Tropical Atlantic (PIRATA), and the Research Moored Array for African-Asian-Australian Monsoon Analysis and Prediction (RAMA) in the Indian Ocean. The arrays are based primarily on surface moorings, a technology that is valuable for tropical climate studies because: 1) They can be instrumented to measure both upper ocean and surface meteorological variables involved in ocean-atmosphere interactions; 2) They provide time series measurements at fine temporal resolution (minutes to daily averages) to resolve high frequency oceanic and atmospheric fluctuations that would otherwise be aliased into the lower frequency climate signals of primary interest; 3) The data can be transmitted to shore via satellite in real-time, which benefits operational forecasting and ensures retrieval of the data even if a mooring is lost.

Physical oceanographic and meteorological data collected within the Global Tropical Moored Buoy Array come primarily from ATLAS and TRITON moorings. Many institutions are developing, or have already developed, similar surface moorings for introduction into the array. It is important that these mooring systems be functionally equivalent in terms of sensors, sample rates, and data quality. It is also important that data from these arrays be available on the GTS and be integrated into common data bases for widespread distribution.

Current status of TRITON and m-TRITON buoy array and its data system

K. Ando (andouk@jamstec.go.jp) and I. Ueki
Japan Agency for Marine and Earth Science and Technology (JAMSTEC), Yokosuka, Japan

We will report the current status of TRITON and m-TRITON data system such as data recovery ratio, and data consistency of two mooring systems (TRITON and m-TRITON) and new data display web (Mr Ishihara will will report on the

hardware issues of TRITON and m-TRITON). We will also report the bilateral activities with Indonesia/BPPT, Korea/KORDI and US/PMEL and NDBC, and emphasis the importance of international collaboration to maintain and develop the TAO/TRITON and RAMA. JAMSTEC would like to seek possibility of establishment of multinational framework such as IRF for IndOOS for maintaining TAO/TRITON in the Pacific Ocean.

m-TRITON and TRITON buoy system

Y. Ishihara (ishiharay@jamstec.go.jp), M. Yamaguchi and T. Murashima
Japan Agency for Marine and Earth Science and Technology (JAMSTEC), Yokosuka, Japan

I would like to introduce our measures to improve/renew the electrical system, communication system and sensor system of TRITON and m-TRITON buoys for the purpose of lowering the running costs and as a countermeasure against the aging of the buoy system. Also I would like to introduce our countermeasures against the vandalism to the buoys as a part of the improvements in the rate of the data acquisition.

Operation of a Data Buoy in the tropical western Pacific

D. Jeon (dcjeon@kordi.re.kr), E. Kim, C.W.Shin, S.C. Hwang, and D.G. Kim
KORDI, Ansan, Korea

A tropical data buoy has been launched to the north of Chuuk, Micronesia (approx. 10^{o}N, 152^{o}E), which includes a current meter and CO2 flux sensor, 4 CTs and 2 CTDs in the upper 400m layer as well as meteorological sensors in the air during the 2010 POSEIDON cruise (between May 14 and June 12, 2010). CTD and ADCP castings were carried out as well as biogeochemical samplings by the KORDI team in the northwestern Pacific Ocean during the cruise.

Satellite transmitting data buoy system is undoubtedly an essential network to monitor ocean circulation and climate change. For real-time quality control and monitoring, the KORDI's tropical buoy system should be tested until next year, especially for supplying the solar power to CO2 flux sensor. Corrosion is a serious problem that may be faced with under the environment of forming an electrical circuit with the inductive cable and the surrounding seawater in the upper layer. Vandalism by illegal fishing activities and damages by marine mammals, fish and sea birds' nesting could be another problem that should be potentially considered.

Warm pool monitoring is one of the most important scientific missions of the data buoys in the western tropical Pacific, especially under the new type of El Nino. Besides the ENSO monitoring in the Pacific, the data buoy system may also

contribute to figure out the differences from the interior environment of the tropical island's reef system.

The background satellite altimeter data and the TAO-TRITON arrays may be referenced to the KORDI's buoy, which will be hopefully merged into a vital component of the tropical Pacific Buoy System in the near future.

FIO-AMFR RAMA Buoy/Mooring Observation

C. Ning (clning@fio.org.cn) and W. Yu
Lab. Ocean-Atmosphere Interaction and Climate Change, First Institute of Oceanography, SOA, China

China's State Ocean Administration (SOA), First Institute of Oceanography (FIO), Qingdao, in collaboration with Agency for Marine & Fisheries Research (AMFR), in Jakarta, Indonesia, has organized 6 times FIO-AMFR joint cruise since 2007. Two Research Moored Array for African-Asian-Australian Monsoon Analysis and Prediction(RAMA) sections are completed: one is ADCP buoy, located at Latitude 8°31′ South and Longitude 100°45′ East vicinity, and the other is Surface buoy, located at Latitude 7°56′ South and Longitude 100°2′ East vicinity. The ADCP buoy has collected 18 months data since 26 Dec. 2008 and these data will be post on FIO website soon. The data includes 0 – 200 meters current profile and 200 – 500 meters temperature profile. The surface buoy has collected 4 months data since 30 May 2010 .The buoy transmit subsurface oceanographic data: currents, temperature, conductivity and pressure from 17 instruments(700 meters to the surface) along with full MET: wind speed/direction, precipitation, relative humidity, sea surface temperature, barometric pressure, and air temperature at the surface. In LOAICC,FIO lab., these data can be auto-received every three hours interval. After checking by LOAICC engineer, these data will be post to fio ftp website every day. The PMEL can get them through it. Wet and dry pCO2 measurements are planned for the next deployment, which has been passed the test in lab.

Highlights of the NOAA TAO Program's Technology Refresh Project

S. McArthur (Shannon.mcarthur@noaa.gov) and R. Crout
NOAA National Data Buoy Center, Stennis Space Center, MS USA

The NOAA Tropical Atmosphere Ocean (TAO) Program maintains 55 operational moored buoy stations located in the equatorial Pacific Ocean which provide near real-time, high quality meteorological and oceanographic observations. These observations enable a better understanding of the climate variations associated with El Niño and La Nina.

To manage the risk associated with aging components and continually evolving technology, the TAO Program will periodically initiate projects to update or "refresh" the technology utilized in the TAO system. The TAO Program is presently planning and executing such a project and wishes to share the technology enchantments and to communicate the highlights of the project.

Our presentation will highlight the major refreshed components of the deployed TAO system which include enhancements to the data logger, the subsurface conductivity/temperature (CT) sensors, and the compass for measurement of wind direction. We will highlight the operational and user benefits of changing the TAO data collection relay system from ARGOS to IRIDUM and we will discuss shore-side data processing enhancements that will improve data quality assurance and control.

In order to support our customers and stakeholders while protecting the continuity of long-term ocean climate data, the NOAA TAO Program is committed to transparently managing our inevitable technology change requirements while adhering to the Climate Monitoring Principles established by the Global Climate Observing System (GCOS).

Our presentation will highlight the inter-comparison results that have collected thus far between the in situ technology and the "refreshed" technology. We will discuss our plans for further testing and how the results of these tests will be communicated to the stakeholder community.

Construction and Mooring of an ATLAS-like buoy in Brazil

Edmo Campos (edmo@usp.br)
University of Sao Paulo, Sao Paulo, Brazil

The South Atlantic Covergence Zone (SACZ) plays a key role in South American climate, its variability and change. Model experiments show a consistent air-sea coupling associated with the SACZ variability, although the lack of observations of both ocean and atmospheric conditions over the southwestern Atlantic has limited the understanding of such interaction. It is therefore expected that a moored platform for observation of the air and surface and subsurface ocean conditions over the SW Atlantic will help validate and improve climate models, provide data required for prediction purposes, and for climate variability and climate change monitoring. The PIRATA backbone and its southwest extension, off Brazil, are located to the north of the region of high precipitation associated to the SACZ. Thus, as part of a Brazilian funded project, an ATLAS-type buoy is being built, in cooperation with NOAA/PMEL, for deployment near 28S,43W. The new site will complement the PIRATA southwestern extension and provide the much needed information necessary to better understand the role of sea-air

interactions and vertical mixing at the base of the ocean mixed layer.

NOAA-PMEL's T-FLEX system for PIRATA and RAMA

C. Meinig (Christian.Meinig@noaa.gov), P. Mclain, P. Freitag, N. Lawrence-Slavas, and T. Smith
NOAA/PMEL, Seattle, USA

NOAA PMEL's T-FLEX (Tropical-Flexible and low-cost electronics) system is a configurable and expandable sensor I/O platform for collecting and telemetering surface and subsurface ocean observations in real-time . The T-FLEX system is designed to accept commercial off the shelf sensors and represents a new generation of electronics which can be deployed on several of NOAA-PMEL's moored platform s. The electronics and software are built around a flexible architecture that allows for user configuration of sampling, averaging and telemetering intervals to meet varying scientific needs and mooring endurance requirements. The T-FLEX system is designed to be robust and streamlined, yet flexible enough to be re-configured as new and emerging sensors are developed. The system incorporates software features that support the complete lifecycle of a moored system, including: lab checkout/qualification, calibration, pre-deployment, deployment, recovery, and evolving system design requirements. T-FLEX versions have been deployed and compared to standard ATLAS type sensors for > 4 years as part of PMEL's Ocean Climate Stations at PAPA and KEO and are currently undergoing qualifications testing for introduction into the RAMA and PIRATA arrays.

Resource Sharing Considerations of Implementing the Indian Ocean RAMA Moored Buoy Array

Sidney Thurston (Sidney.thurston@noaa.gov), NOAA Climate Program Office, Washington, DC, USA

Partnerships for New GEOSS Applications (PANGEA) in the Indian Ocean Region are being established to help build sustainable capacity in maritime regions by convening in-country, practical, socio-economic applications training by U.S. experts for decision-makers, policy and budget administrators, scientists, end-users and other stakeholders. In exchange, Partners are providing ship time for the deployment and maintenance of new in-situ ocean observations for IOGOOS/CLIVAR IndOOS *Research Moored Array for African-Asian-Australian Monsoon Analysis and Prediction* (RAMA) and other in-situ ocean-climate deployments. By building on and complementing existing capacity building programs, a sustainable capacity for the region is being achieved through the increases in both near real-time in-situ ocean observational data and information as well as demonstrating the more effective applications of, and access to, existing and new data. This presentation will provide an updated brief on recent NOAA agreements with India, Indonesia and the Agulhas-Somali Current Large

Marine Ecosystem (ASCLME) as well as fruitful results from the Spring 2010 DBCP Capacity Building Workshop for the implementation and societal applications of ocean observations for the Western Indian Ocean Nations.