DBCP SCIENTIFIC AND TECHNICAL WORKSHOP

Cape Town, South Africa, 13 October 2008

PROGRAM

WORKSHOP THEMES:

The Workshop requested abstracts that addressed the following themes*:*

Technological Demands and Developments – demands for enhanced observations collection technology; innovations or developments in related marine observation systems; developments in buoys/instruments (e.g. wave measurements).

Operational Practices and Enhancements – evaluation or analysis of operational performance or trials; data communications and data assimilation; performance and efficiency benchmarking; new systems and practices.

Applications of Collected Data – research and operational data applications; case studies.

Special Focus. In addition to the regular themes, this year's workshop will have a major focus on ''Marine forecast and services, Numerical Weather Prediction, and coastal risk management'' Topics of interest are:

Marine forecast – National experience with regard to marine forecast and impact of buoy observations.

Numerical Weather Prediction – National experience with regard to NWP and impact of buoy observations.

Use of wave information – The use of wave information (in situ observations, satellite products, models) for shipping, port management, and coastal risk management; and the need for *in situ* observational data for the validation of wave models and satellite wave products, and for specific coastal applications.

Data timeliness – Improvement of data timeliness by using specific data distribution systems via national and/or international gateways, existing and new satellite data telecommunication systems and their developments; DBCP drifter Iridium Pilot Project.

Presentation slots – 20 mins including 15 mins presentation + 5 mins questions / discussion (except where variation agreed)

MONDAY 13 OCTOBER

	#	TIME	TOPIC	PRESENTER / AUTHOR
Operational Practice and Enhancements		09:00 – 09:15	Opening of Scientific and Technical Workshop	David Meldrum, DBCP Chair
		0915 – 09:25	Technical Workshop Program (whole) 1st Session Organisation	Co-Chairs S&T Workshop
	1	09:25 – 09:45	Wave Measurements and the Impact of Sea State around the Southern African Coastline	Ian Hunter *(SAWS)*
	2	09:45 – 10:05	The Restrained ADOS-V: A lightweight, self-deploying coastal mooring	Luca Centurioni and Peter Niiler *(Scripps)*
	3	10:05 – 10:25	Operational Deployments of Drifting Buoys into Targeted Tropical Cyclones	Peter Niiler (*Scripps*) , Rick Lumpkin (*AOML*) and Luca Centurioni (*Scripps*)
	4	10:25 – 10:45	Development and Testing of NDBC Standard Buoys	Chung-Chu Teng and Bill Burnett *(NDBC)*
	5	10:45 – 11:05	Partnerships for New GEOSS Applications	Sidney Thurston *(NOAA)*
	6	11:05 – 11:25	Optimizing Buoy Deployments in the South Atlantic to Maximize Benefits for Weather Forecasting	Shinte Lithakazi Mkatshwa *(SAWS)*
	7	11:25 – 11:45	Drogue-On Sensors: An Analysis of Existing Sensors and the New Strain Gauge.	Andrew Sybrandy *(Pacific Gyre)*
	8	11:45 – 12:05	Drifter Performance by Locations: Do Drifters Perform Badly in Specific Areas Around the World? If So, Why?	Andrew Sybrandy *(Pacific Gyre)*
			Lunch	
Technological Demands and Developments	**#**	**TIME**	**TOPIC**	**PRESENTER / AUTHOR**
		13:00 – 13:05	Session Organisation / Introduction of Speakers	Chair – 2nd Session
	9	13:05 – 13:25	Development and Evaluation of Iridium SVP-B Mini and Other Versions of Drifters	Sergey Motyzhev *(Marlin-Yug Ltd.)*
	10	13:25 – 13:45	Buoy Technology Demands, Developments, Operational Challenges and Forecasting Improvements in India	V. Rajendran and G. Latha *(NIOT, India)*
	11	13:45 – 14:05	A First Look at Drifters with Integrated Sonic Anemometers	Andrew Syrandy *(Pacific Gyre)*
	12	14:05– 14:25	Evaluation of SVP-B Drifters Reporting Through Iridium	Pierre Blouch and Jean Rolland (*Météo - France)*
	13	14:25 – 14:45	Advances in Operational Wind Wave Prediction Systems at KMA and Their Validation	Sangwook Park, Jong Suk Park, Jan-Won Seo and Kum-Lan Kim *(KMA)*

	#	TIME	TOPIC	PRESENTER / AUTHOR
	14	14:45 – 15:05	Analysis and Modelling of the Upwelling Region of the Somali Coast	Ali J. Mafimbo and John G. Mungai *(Kenya Meteorological Services)*
		15:05 – 15:30	**Afternoon Break – 30 mins**	
Special Focus		15:30 – 15:35	Session Organisation / Introduction of Speakers	Chair – 3rd Session
	15	15:35 – 15:55	Pilot Project for Wave Measurements from Drifters	David Meldrum (*Scottish Association for Marine Science*)
	16	15:55 – 16:15	Pilot Project for Wave Measurement Test and Evaluation	Val Swail (*Environment Canada*)
	17	16:15 – 16:35	WIGOS Pilot Project for JCOMM	Etienne Charpentier (*WMO*)
	18	16:35 – 16:55	Integration of the Argos 3 PMT into an SVP Drifter: Opportunities and Challenges	Gary Williams (Clearwater, Instrumentation)
		16:55 – 17:00	Session Close Remarks & Quests + Announcements	Session Chair
		17:00	**WORKSHOP CLOSE**	

PROVISIONAL AGENDA FOR
THE SCIENTIFIC AND TECHNICAL WORKSHOP
OF THE DATA BUOY COOPERATION PANEL (DBCP) XX-IV

VENUE: ***Protea Hotel Sea Point, Cape Town, South Africa***

DATE : ***October 13, 2008***

WORKSHOP CHAIRS: Bill Burnett *U.S. National Data Buoy Center*
Johan Stander *South African Weather Service*

PRESENTATION ABSTRACTS

1. Wave Measurements and the Impact of Sea State around the Southern African Coastline

Author: Ian Hunter *(South African Weather Service)*

Abstract: The South African Weather Service has been very fortunate to get access to the regional wave measurement network, real-time, since 1997. A large archive of historical wave data is also available for research purposes.

For over a decade SAWS has been providing monthly data sets of hourly wave parameters to several global wave modelling centres. This data is measured at the 'FA' gas production platform on the Agulhas Bank. NOAA (WAVEWATCH III model) very kindly reciprocated by providing detailed, hourly wave predictions for the FA site, including directional wave spectra.

The two deep water, real-time wave measurement sites play a vital role in verifying the wave model analyses plus the initial, short-term prognostic fields. The South African Weather Service has to provide wave predictions over a very large area with fetch zones related to anything from explosive cyclogenesis in the Southern Ocean to a tropical cyclone marking time in the southern Mozambique Channel.

This presentations looks briefly at the wave network, past and present. Some case studies are then provided in order to give an idea of the impact of the wave environment on the maritime industry and coastal management.

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2. The Restrained ADOS-V: A lightweight, self-deploying coastal mooring

Authors: L. R. Centurioni and P. P. Niiler (*Scripps Institution of Oceanography)*

Abstract: The ADOS drifter, which has been successfully used to make observations of the upper ocean during hurricanes and the occurrence of large amplitude internal waves, was recently reconfigured into a light-weight, low-cost, coastal mooring to which temperature and

pressure sensors are attached every 10 m, together with an Acoustic Doppler Current Profiler. We refer to this instrument as to the “Restrained ADOS-V”.

The main differences between restrained and the drifting ADOS are that a larger weight at the bottom and a larger surface floatation element are used, and an acoustic release is also added when the instruments need to be recovered.

The restrained ADOS-V is wrapped inside a deployment box and can be parachuted from aircrafts or deployed from ships of opportunity, thus allowing, respectively, the fast implementation of an array of moorings and a sensible reduction of the operating costs. We are in the process of implementing real-time data transmission of pressure, temperature and 3-D velocity profile data through the Iridium satellite system. Two units will be deployed for the first time in a pilot experiment in the southern East China Sea in September 2008. A detailed description of the instrument will be presented together with the preliminary results from our pilot experiment.

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3. Operational Deployments of Drifting Buoys into Targeted Tropical Cyclones

Authors: Peter Niiler (*Scripps),* Rick Lumpkin (*NOAA/AOML),* and Luca Centurioni (*Scripps)*

Abstract: Under joint sponsorship of NOAA and ONR, we have developed the instrumentation, air-deployment methodology, operational targeting and data codes for GTS fore deployment of drifters in front of targeted tropical cyclones. SVP-W and SVP-T(z)-W drifters have been deployed in front of Hurricanes in 2005 (Rita), 2007 (Deane) and 2008 (Gustav) with 100% success rate. This report details the technical advances that have made these deployments successful and the developing technology of subsurface temperature, wind (and wave) observations from drifters.

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4. Development and Testing of NDBC Standard Buoys

Author: Chung-Chu Teng *(National Data Buoy Center, USA)*

Abstract U.S. National Weather Service (NWS)/National Data Buoy Center’s (NDBC) Ocean Observing System of Systems (NOOSS) operates three major buoy networks: (1) Meteorological and Ocean Platforms (MOP), (2) Deep-ocean Assessment and Reporting of Tsunamis (DART) buoys, and (3) Tropical Ocean Atmosphere (TAO) buoy array. These three buoy networks/programs use different types of buoy hulls and systems. Recently, NDBC developed and designed a Standard Buoy in an attempt to bridge the gap between the three programs by using the same platform for all three applications.

The Standard Buoy uses common parts and form factors and there are a number of “stations” for both sensors and payloads to keep the programs independent. By using this approach a single platform has the ability to host multiple programs operating simultaneously with minor compromises limited by available “Real Estate”.

NDBC deployed three prototype buoys near Point Conception in Southern California in July 2008. Each buoy represented one of the three main NDBC programs; MOP, DART, and TAO. From the analysis of the data collected during their initial evaluation period and some field

observations, these three buoys have performed well. NDBC will continue to test and evaluate the performance and interoperability of the Standard Buoys.

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5. Partnerships for New GEOSS Applications

Author: Sidney Thurston *(U.S/NOAA)*

Abstract: Partnerships for New GEOSS Applications in the Indian Ocean Region are being established to help build sustainable capacity in maritime regions by conducting in-country, practical, socio-economic applications training by U.S. experts to decision-makers, policy and budget administrators, scientists, end-users and other stakeholders, in exchange for regional ship time for the deployment of new in-situ ocean observations for IOGOOS/CLIVAR IndOOS Research Moored Array for African-Asian-Australian Monsoon Analysis and Prediction (RAMA) and other 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 existing and new data. This presentation will provide an updated brief on recent successes, and future plans for the implementation of capacity building and ocean observations for the Indian Ocean and surrounding rim Nations
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6. Optimizing Buoy Deployments in the South Atlantic to Maximize Benefits for Weather Forecasting

Author: Shine Lithakazi Mkatshwa *(SAWS)*

Abstract: The South African Weather Service makes use of the network of drifting weather buoys in the South Atlantic Ocean in carrying out surface analyses for use in operational forecasting. The SAWS deploys drifting weather buoys from the *SA Agulhas* during voyages to Gough Island, Marion Island and the Antarctic continent. More recently, however, partnerships with “seafaring” institutions have allowed us the opportunity to increase the spatial coverage of the data sparse oceans areas to include those previously out of reach.

Looking at past deployment patterns and analysing drift trajectories over buoy lifetimes will give a clear picture of which sea areas have a tendency to disperse or retain buoys within important ocean areas. Further to this the presentation will explore those ocean areas that are postulated to have a significant effect on Southern African weather and climate patterns, whether these areas can be effectively monitored by buoy networks and how we can achieve buoy coverage for those areas. This presentation will encourage the exploration of innovative ways of increasing the coverage of the buoy networks to aid forecasting for the Southern African region.

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7. Drogue-On Sensors: An Analysis of Existing Sensors and the New Strain Gauge

Author: Andrew Sybrandy *(Pacific Gyre)*

Abstract: Sensors used to indicate a loss fo drogue have been used on drifters since the mid-1980s. The first drogue-on sensors were a simple salt water switch arrangement. In the early 1990s, Clearwater Instrumentation and the Scripps Institution of Oceanography developed a sensor utilizing a strain gauge. Presently, all manufacturers are switching to the strain gauge in order to simplify interpretation of drogue-on status. This presentation looks at the salt water switch and strain gauge sensors and compares them as drogue-on sensors.

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8. Drifter Performance by Location: Do Drifters Perform Badly in Specific Areas Around the World? If So, Why?

Author: Andrew Sybrandy *(Pacific Gyre)*

Abstract: There is plenty of anecdotal evidence concerning poor drifter performance in different areas of the world. Taking a close look at specific areas shows there are indeed differences. This presentation looks at a few of those areas and explores how drifters perform in them.

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9. Development and Evaluation of Iridium SVP-B Mini and Other Versions of Drifters

Authors: T.G. Lunev, S. V Motyzhev and A. G. Krichenko *(Marine Hydrophysical Institute / Marlin-Yug Ltd, Ukraine)*

Abstract: According to the DBCP Workplan for this intersessional period, Marlin-Yug Ltd has been concentrating its efforts to support the evaluation phase of Iridium PP as well as to get some progress with creation of SVP-B drifter, which can be dropped from deck of moving ship with following automatic self-deployment. According to this goal the Iridium SVP-B mini drifter with hourly GPS locations was developed in 2007. The buoy was deployed by SAMS in Drake Strait on December 2, 2007 and it continues to be in operation hitherto. The main results of this experimental buoy evaluation are the followings: modified barometric port provides reliable AP samples for any weather conditions; the buoy has good quality of data sent via Iridium. It has been investigated the reasons of double Iridium sessions and loss of GPS locations when tough weather conditions. Some updating has been done to eliminate these problems for next generation of SVP-B mini drifters produced in this year. This modification of Iridium barometric mini buoys has near 20% more lifetime in contrast with last year buoy. Since this year all the Marlin buoys are equipped with RTC (Real Time Clock) to get for a buoy the GMT synchronization, e.g. for measurements at round hours. Two RTC have been developed: autonomous system with factory installed watch and GPS-RTC, when GMT synchronization can

be automatically achieved and supported inside a buoy by means of GPS receiver. The first system can be used for Argos and Iridium buoys without GPS; the second one is intended for drifters with GPS. Experimental clusters of drifters of both kinds were built in 2008 for evaluation of the buoys in-situ. The surface drifter with GSM link (cell phone) and GPS receiver has been developed to study currents in shallow and coastal areas with GSM coverage.

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10. Buoy Technology Demands, Developments, Operational Challenges and Forecasting Improvements in India

Authors: V. Rajendran and G. Latha *(National Institute of Ocean Technology, India)*

Abstract: India being an agricultural based country is heavily dependent on the timeliness and intensity of the monsoon. Systematic time series measurements of meteorological & oceanographic parameters are necessary to improve predictive capability in short term and long term climatic changes. In order to accomplish systematic collection of met ocean data, the National Data Buoy Programme has been established in 1996 and has come a long way in maintaining the buoy network in Indian seas. This paper presents the buoy technology developments and demands, operational challenges of sustaining the buoys in seas and requirements for improvements in forecasting capabilities.

After the initial collaboration with Norway for import/deployment of buoys, the NDBP worked on the indigenization of buoy technology and successfully achieved the same in the year 2002. Since then the mechanical/electronic components of buoys are made indigeneously along with the processing data acquisition units. A 20 buoy network was accomplished in 2004 and a 35 buoy network is achieved in 2008. NDBP is striving to reach the target of 40 buoy network by end of 2008. In order to cater to different needs, categorized data buoys like Environmental, Port, Wave and Met buoys have been deployed in Bay of Bengal and Arabian seas. The communication link between the buoys and the data reception centre in NIOT through satellite modems have been made, but data gaps due to failure of communication has been a problem area. India has been availing INMARSAT and INSAT is being attempted now.

As for as the demands are concerned, buoy measurements with continuous records over years has been the need and the program has been able to achieve this for a few number of buoy locations. Also denser network of buoys in specific regions has been a demand for particular application areas.

Buoy data has been used in India for Weather Prediction / Early Cyclone Warning, Ocean State Model Calibration, Climate Research, Satellite Data Validation, Port Development / Navigational Use, Engineering / offshore project and Safety of Life at Sea.

However, the operational challenges in maintaining the buoy network remains to be tackled as these buoys are vulnerable for damage by fishermen community either knowingly or unknowingly. Though NIOT has conducted awareness campaigns this problem is yet to be solved.

With regard to forecasting systems in India, though buoy data is used for operational forecasts, the accuracy of forecasts still need to improved and to achieve this better modeling capabilities with fine grid data for data assimilation/model calibration and validation need to be looked into.

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11. A First Look at Drifters With Integrated Sonic Anemometers

Author: Andrew Sybrandy *(Pacific Gyre)*

Abstract: Current wind drifters utilize the WOTAN technique to determine wind speed and a magnetic compass and wind vane to measure wind direction. While the compass and wind vane work well, the WOTAN technique cannot measure the high winds of hurricanes. While most anemometers cannot be easily mounted on a drifter, newer sonic anemometers may work. Two drifters outfitted with sonic anemometers were deployed in the northern Santa Barbara channel in August 2008. This is a presentation of the results of that deployment.

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12. Evaluation of SVP-B Drifters Reporting Through Iridium

Authors: Pierre Blouch and Jean Rolland *(Météo-France)*

Abstract: Météo-France and E-SURFMAR have been actively participating in the DBCP drifter Iridium Pilot Project since its beginning. **Eleven SVP-B prototypes** fitted with a GPS and an Iridium SBD transmitter (9601) have been deployed since 2006. In addition, **45 SVP-B drifters** without GPS were purchased for E-SURFMAR in 2007 for operational purposes. Most of them have been deployed and 80 others were ordered. Out of these, 40 are ready for deployment and the remaining will be delivered to various deployment centers in September.
The raw Iridium data of these buoys are received and processed at Météo-France. Coded into FM18-BUOY - and FM96-BUFR soon -, they are sent onto the GTS a few minutes after each observation.

The presentation describes the results got from these drifters, including operations and performances. For instance, the recovery and the timeliness of the data, the occurrence of failures, the lifetimes and the observation costs are compared to those got from Argos buoys

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13. Advances in Operational Wind Wave Prediction Systems at KMA and Their Validation

Authors: Sangwook Park, Jong Suk Park, Jang-Won Seo and Kum-Lan Kim *(Korea Meteorological Administration / National Institute of Meteorological Research)*

Abstract: The operational ocean wind wave prediction at KMA has begun in 1992 as part of numerical weather prediction (NWP) system. The 1st generation wave model was adapted with 80km spatial resolution near Korean peninsular. The 1st major upgrade has been made in 1999 with 3rd generation wave model WAM (WAMDI, 1988) for regional (ReWAM, 0.25°) covering Northeast Asia and extension to global (GoWAM, 1.25°) domain. This upgrade kept pace with the development of NWP system and new installation of supercomputer at KMA. The GDAPS (Global Data Assimilation and Prediction System) T426 and the RDAPS (Regional Data Assimilation and Prediction System) 30km versions provide sea surface wind forecast in corresponding resolution for wave model. In 2005, the 224 GFlops NEC SX5 is replaced by 18 TFlops Cray X1E which is Parallel Vector Processor (PVP) machine

with 128 node modules. With this enhancement of computing environment, it becomes feasible expanding the existing operational ocean wind wave prediction system with spatial and spectral resolution increase and optional choice of advanced physical schemes. The new higher resolution regional (ReWW3) and coastal wind wave prediction system (CoWW3) is under operational since March 2008. The mesh size of 1km with 6 encompassing 3° longitude and 2° latitude domains nested inside regional system. The directional wave spectra at boundaries were provided from 1/12° ReWW3. The WAVEWATCH-III code (Tolman, 2002) is adapted for the new ReWW3 and CoWW3 system. The upgrade of global system (GoWW3) with 0.5° resolution is planned for 2009. The sea surface wind and significant wave height are verified routinely in monthly bases. The global moored buoy data including the coastal ones operated by KMA and remote sensing data from Jason retrieval wave height and QuikSCAT retrieval wind data are used for verification of wave prediction system.

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14. Analysis and Modelling of the Upwelling Region of Somali Coast

Authors: Ali J. Mafimbo and John G. Mungai *(Kenya Meteorological Services)*

Abstract: During the southwest monsoon two upwelling cells (gyres) are established along the Somali coast, around 4-5^{0}N and 10^{0}N respectively. The mesoscale structure of the low-level wind field associated with a strong southern upwelling event was investigated. During July 2005 when a strong event occurred, the Somali jet was found to have oscillated at lower frequency of 3-7 weeks and mesoscale winds exhibited high co-variability with prevailing SSTs. Strong values of alongshore winds were observed from late June to mid-July which weakened significantly in the third and fourth week of July. A large off-shore pressure gradient due to differential thermal properties of land and sea was also observed. The results show that prolonged active (break) periods of the jet results in acceleration (deceleration) of alongshore winds. These strong wind stress values during a prolonged active period accelerate the Somali current. The strong alongshore winds result in enhanced Ekman pumping and strong upwelling. In the prolonged break period, the current decelerates, turns east and then southwards. High co-variability of mesoscale winds and SSTs was found in the upwelling zone. To improve understanding of the intra-seasonal to seasonal circulation patterns within the region, the surface circulation of the western Indian Ocean during the summer (JAS) and winter (JFM) monsoon winds was investigated using the Regional Ocean Modelling System (ROMS). The model results suggest a seasonally reversing Somali current with a sub-surface counter current, consistent with observations. The two upwelling cells (gyres) are also apparent in the simulation. The model is applied to better understand the annual cycle of SST, heat fluxes and circulation in the region.

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18. Integration of the Argos 3 PMT into an SVP Drifter: Opportunities and Challenges

Author: Gary Williams (Clearwater Instrumentation, Inc.)

Abstract: The advent of Argos 3 services should mean that the relationship of the SVP drifter to the Argos system is changing in ways that offer the opportunity to improve data collection from drifting buoys. These improvements will affect how ocean observers collect data, the quality of the data and the cost of collecting it. All of these changes are coming, because the PMT and Argos 3 satellites talk to each other exchanging valuable information that can greatly improve the operation of a drifter, as well exchanging data.