WORLD METEOROLOGICAL ORGANIZATION

DATA BUOY COOPERATION PANEL

THIRTIETH SESSION

WEIHAI, CHINA
27-31 OCTOBER 2014

INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (OF UNESCO)

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PROGRAMME OF THE SCIENTIFIC AND TECHNICAL WORKSHOP

(Submitted by Johan Stander (South Africa))

SUMMARY AND PURPOSE OF DOCUMENT

The Scientific and Technical (S&T) Workshop of the Data Buoy Cooperation Panel (DBCP) has become an important forum for stimulating discussion among data buoy operators, designers, and data users. This year's workshop will be held on Monday 27 October 2014 in Weihai, China, in conjunction with the 30th Session of the DBCP (Weihai, 27-31 Oct. 2014). It will at 10:00, and end at 17:30.

The interest and participation of oceanographic and marine meteorological experts in the activities of the DBCP is high. The DBCP Scientific and Technical Workshop presents an ideal opportunity for scientists, operators, and manufacturers to relate their experiences, to exchange knowledge, and to build on or learn from the innovations, developments and good practices of their peers.

The theme of the Workshop will be "Buoy Science, Technology, and Instrumentation". Presentations will be made in the following areas: (i) Marine meteorological and oceanographic instrumentation, calibration, and traceability; (ii) Technical development; (iii) Operational Enhancements; (iv) Marine Forecast and Disaster Risk Reduction (DRR); and (v) Research Applications.

This document provides for the Workshop programme and the list of submitted abstracts.

ACTION PROPOSED

The workshop is expected to make some recommendations to be considered by the 30th Session of the DBCP.

Appendix: **A.** Programme of the Workshop
B. Submitted abstracts

APPENDIX A

PROGRAMME OF THE SCIENTIFIC AND TECHNICAL WORKSHOP

(Weihai, China, Monday 27 October 2014)

MONDAY 27 OCTOBER 2014			
#	TIME	TOPIC	PRESENTER / AUTHOR
	08:30 – 08:35	Opening of DBCP (5min)	Al Wallace, DBCP Chair
	08:35 – 08:45	Welcome by SOA officials (10min)	
	08:45 – 09:05	Welcome by WMO and IOC Secretariats(20min)	
	09:05 – 09:15	Welcome by Local Government officials(10min)	
	09:15 – 09:25	Welcome by NCOSM officials (10min)	
	09:25 – 10:00	Group Photo& Tea Break (35min)	
	10:00 – 10:10	Technical Workshop Programme introduction	Co-Chairs S&T Workshop
1	10:10 – 10:30	Response of upper ocean currents to Typhoon Fanapi	Verena Hormann, Luca R. Centurioni, Luc Rainville, Craig M. Lee, and Lancelot J. Braasch
2	10:40 – 11:00	An Update from AXYS Technologies Inc on Key In-House Developments	Mark Blaseckie
3	11:10 – 11:30	Omni Buoys close monitoring the Phailin Cyclone and the launch of new Indian Omni Buoy System	R.Venkatesan,G Latha, Arul Muthiah, Simi Mathew
4	11:40 – 12:00	Lagrangian Model Used to Simulate Oil Spills in the Caribbean Sea, Gulf of Mexico, and Florida Straits	Shaun R. Dolk
5	12:10 – 12:30	Mooring Data Buoy of China - Technology and Applications	Bo Wang
	12:30 – 14:00	Lunch	
6	14:00 – 14:20	The Argos Chipset: Less Power=Longer Buoy Lifetimes	*Michel Guigue, Yann Bernard, Bill Woodward,*
7	14:30 – 14:50	Global observations of persistent looping drifter trajectories	Rick Lumpkin
8	15:00 – 15:20	Sea Seurface Salinity observations from drifters during SPURS	L. R Centurioni, V. Hormann and Y. Chao
	15:30 – 16:00	Tea	
9	16:00 – 16:20	SIO Drogue Investigation	L. Curtiss, L. Braasch, & L. Centurioni
10	16:30 – 16:50	2014 Drifter Developments at SIO	Lance Braasch, Luca Centurioni
11	17:00 – 17:20	How we calibrate the Wave Height and Period Measurements from the Gravitational Acceleration Wave Buoys in RMIC/AP	YU Jianqing
	17:30	Concluding remarks	

APPENDIX B

SUBMITTED ABSTRACTS FOR THE DBCP SCIENTIFIC AND TECHNICAL WORKSHOP
(Weihai, China, Monday 27 October 2014)

Response of upper ocean currents to Typhoon Fanapi

Verena Hormann[1], Luca R. Centurioni[1], Luc Rainville[2], Craig M. Lee[2], and Lancelot J. Braasch[1]

[1]Scripps Institution of Oceanography, University of California - San Diego, La Jolla, California, USA
[2]Applied Physics Laboratory and School of Oceanography, University of Washington, Seattle, Washington, USA

The response of upper ocean currents to Typhoon Fanapi in fall 2010 was studied using an extensive air-deployed drifter array. Separation of the observations into near-inertial and sub-inertial motions quantified the importance of strong advection by the sub-inertial circulation for the evolution of the cold wake formed by Typhoon Fanapi. The near-inertial currents generated during the storm showed the expected rightward bias, with peak magnitudes of up to 0.6 m/s and an *e*-folding time of about 4 days for the strong currents within the cold wake. The shear of the near-inertial currents is crucial for the storm-induced cooling and deepening of the mixed layer and such instabilities were here directly observed across the base of the mixed layer in Typhoon Fanapi's cold wake. During the recovery, the diurnal cycle - a dominant process for the wake warming - was found to be noticeably reduced when the near-inertial motions were strongest.

An Update from AXYS Technologies Inc on Key In-House Developments

Mark Blaseckie

There have been a number of technological developments at AXYS since the last presentation.

1. In late October 2013 the UK based Carbon Trust released their Roadmap for the Commercial Acceptance of Floating LiDAR Technology. This document set out the first third party key performance indicators for Floating LiDAR Devices (FLDs), providing guidelines for the use of these systems as part of an offshore wind resource assessment campaign. This presentation will outline the key features of the roadmap and detail the steps taken to date to validate existing technologies against the new KPI.
2. In 2011 Environment Canada requested that AXYS look at the feasibility of having a way to remotely control and reconfigure the data collection systems on their Marine Buoy Network. To date, AXYS has delivered 14 systems which allow the Buoy Technicians to power cycle the Processor Module and GOES transmitter as well as to make configuration changes to any

of the sampling and transmitting parameters. This presentation will show the details of the system, lessons learned and successes to date.

3. AXYS has completed development of third generation of our TRIAXYS Directional Wave Sensor. With the same accuracy as the TRIAXYS Classic and TRIAXYS Next Wave sensors, the reduced power consumption and smaller footprint of the TRIAXYS Next Wave II is a more adaptable sensor for use on a variety of moored and drifter buoys, as well as other platforms requiring the measurement of directional waves.

AXYS Technologies Inc. (ATI) is a Canadian company specializing in the design and manufacture of environmental data acquisition, processing and telemetry systems. Since 1986 we have been responsible for supplying systems for the entire Canadian network of Met/Oceanographic buoys. We apply our extensive knowledge and experience to marine and freshwater buoy platforms that measure aquatic, oceanic and atmospheric parameters. Our systems utilize proven cost-effective technology applicable to a wide range of applications. With more than 500 systems successfully deployed and in use around the world, ATI is considered a world leader in buoy based systems for environmental monitoring and data acquisition.

Omni Buoys close monitoring the Phailin Cyclone and the launch of new Indian Omni Buoy System

R.Venkatesan,G Latha, Arul Muthiah, Simi Mathew

Ocean Observation Systems

Esso - National Institute Of Ocean Technology

Minstry Of Earth Sciences, Chennai India 600100

The Indian moored buoy network comprising of Ocean Moored Network for the Northern Indian Ocean (OMNI) buoys is providing valuable data up to 500m depth continuously from 2010 and gives insight to understand the dynamics of Northern Indian Ocean (NIO). The continuous time series data from moored buoys is extremely useful for predicting the track and intensity of cyclone. Deep ocean moored buoy is one of the best platforms for validating satellite derived parameters and model outputs. The Arabian Sea (AS) and Bay of Bengal (BoB) even though lie in the same latitudinal belt, due to high evaporation rate in the AS over BoB and high river discharges into the BoB, it was found that AS waters are high saline compared to BoB. The winds during North East Monsoon (NEM) favour the formation of EICC (East India Coastal Currents) along the east coast of India. The bifurcation of EICC to the east at the southern tip of Sri Lanka brings in low surface saline waters to the buoy location. The low saline waters are associated with strong north east currents and the geostrophic currents during this period and sea surface height obtained from AVISO satellite clearly shows this low saline water as a wing of EICC. The salinity profiles obtained from the buoy locations shows the presence of subsurface high salinity associated with strong southwest currents. This

clearly shows the origin of these subsurface maximum saline waters to the northern BoB. The river discharges can only affect the upper water column 0-50m depth. The high saline waters are confined to 50-100m depth in the northern BoB. Earlier studies conducted during SWM period also shown the presence of high saline waters in the south central BoB and since the currents were northeast during this period this high saline waters were originated from Arabian Sea high saline waters. The presence of high saline waters observed by the OMNI buoys during NEM period is of interest since it shows the presence of barrier layer in the southern BoB.The network of moored buoys with seven buoys of Ocean Moored Network for the Northern Indian Ocean (OMNI) and coastal met-buoys closely watched the evolution and intensification of the Phailin cyclone during October, 2013. The BD10 buoy located under the eye of the cyclone recorded the minimum pressure of 920.6 hPa, which is the lowest ever instrumentally recorded pressure during cyclone in the Northern Indian ocean. The role of stratification of the western BoB in the intensification of the Phailin cyclone compared to Lehar cyclone during the northeast monsoon season is also made possible with the help of sub-surface data on salinity and temperature. A high TCHP was measured during the Phailin cyclone compared to the other two very severe cyclonic storm periods which was obtained from the respective buoy closer to the cyclone track. The newly designed Indian buoy which transmits more than 100 parameters was deployed in the Arabian Sea during 11th October, 2013 and is working till date. This paper describes the new Indian moored buoy system with salient features and significant data analysis.

Lagrangian Model Used to Simulate Oil Spills in the Caribbean Sea, Gulf of Mexico, and Florida Straits

Shaun R. Dolk

Using a stochastic model to simulate oil spills in the Caribbean Sea, Gulf of Mexico, and Florida Straits is becoming increasingly necessary, as countries throughout the region expand offshore oil explorations. Therefore, using monthly mean data from the historical drifter dataset, projected oil spills may provide key information for the containment and clean up, estimate the magnitude and size of affected areas, as well as provide a timeline for possible landfall.

Evaluation of a CTD for the Deep Argo program and inter-laboratory comparison of salinity measurements made by Sea-Bird Electronics, NIWA and CSIRO

David Murphy, Carol Janzen, Nordeen Larson

As part of an effort to develop a high accuracy and high stability conductivity, temperature and depth (CTD) instrument for the Deep Argo program a cruise was fielded aboard the RV Tangoroa in June of 2014. The cruise was a collaborative effort between Sea-Bird Electronics, US National

Oceanographic and Atmospheric Administration, Scripps Institute of Oceanography, New Zealand's National Institute of Water and Atmospheric research (NIWA) and Australia's Commonwealth Scientific and Industrial Organization (CSIRO). The purpose of the cruise was to compare ocean profiling measurements made by the Deep Argo CTD with those made by the ship board SBE9/11 CTD system and salinity measurements of discrete samples. Discrete samples were collected and analyzed on board the Tangoroa by NIWA, samples were collected on board by Sea-Bird and CSIRO and were analyzed in each respective laboratory. Results of the CTD comparison are discussed as well as the inter-laboratory salinity analysis.

The Argos Chipset: Less Power=Longer Buoy Lifetimes

Michel Guigue, CLS Toulouse

Yann Bernard, CLS Toulouse

Bill Woodward, CLS America

Extending unattended buoy lifetimes by minimizing the power consumption of their data communications systems is the holy grail of the design engineers. An 18 month CLS project to minimize Argos data communications power requirements is currently underway. The project objective is to design, build and test a miniature, low-cost ARGOS-3/4 chipset (Asic) that enables two-way data communications and is fully backward compatible with Argos 2. This presentation identifies the overall goals of the project, describes the specifics and status of the development plan and schedule, and outlines the CLS vision for implementing this technology in the buoy community.

Global observations of persistent looping drifter trajectories

Rick Lumpkin

A new methodology is developed to automatically detect drifters which persistently loop. The global distribution of loopers is examined for characteristics such as mean sense of rotation, size, and period of orbits. Characteristics such as mean speed and kinetic energy is compared for loopers vs. non-loopers, and are shown to be dramatically different in some parts of the ocean.

Sea Seurface Salinity observations from drifters during SPURS

L. R Centurioni, V. Hormann and Y. Chao

Eighty-four Surface Velocity Program Salinity (SVP-S) drifters and eighty-eight Surface Velocity Program (SVP) drifters were released in the tropical North Atlantic Ocean near 24.5N, 38W to measure sea surface salinity (SSS) and near-surface ocean currents as part of the Salinity Processes in the Upper Ocean Regional Study (SPURS) experiment, whose goal is to investigate the physical

processes that lead to the formation of the salinity maximum in the region and to compare the in-situ observation with the SSS retrieval from satellite (Aquarius). The drifters measure the water velocity in a Lagrangian sense at a depth of 15 m (i.e. within the surface mixed layer), SSS and Sea Surface Temperature (SST) at a depth of ~0.5m and ~0.1 m respectively. The SVP drifters are identical to the SVP-S drifters with the exception that they don't have a salinity sensor. These 172 drifters represent the Global Drifter Program (NOAA's funded) contribution to SPURS.

This talk will discuss the main results from our experiment. Particular emphasis will be placed on the analysis of the performance of the salinity drifters, on the quantification of the near surface transport (fluxes) of salt, and on the variability of SSS within the Aquarius footprint.

SIO Drogue Investigation

L. Curtiss, L. Braasch, & L. Centurioni

Since SIO began producing the SVP drifter, experimental materials and methods have been used to connect the surface float to the drogue. Design changes include ABS injection molded terminations, rigid ABS drogue bridal, and nylon impregnated wire rope. With the use of drogue detection methods this configuration proved to underperform lifetime requirements. To isolate the underperforming variable, methods including tether replacement, termination techniques, and analysis of the drogue bridal have taken place. Here we present the findings.

2014 Drifter Developments at SIO

Lance Braasch, Luca Centurioni

At DBCP 29, SIO presented a number of changes to their SVP drifter configuration which included battery pack ruggedization and updated software configurations for optimizing satellite telemetry solutions. Since initial reporting, the second generation configuration has been deployed globally for over 1 year. Here, we present the progress and findings of technical developments, status of deployed units, and potential impacts on the scientific community. Particular emphasis will be placed on the electronics package and sensor suite upgrades to be utilized in 2014.

How we calibrate the Wave Height and Period Measurements from the Gravitational Acceleration Wave Buoys in RMIC/AP

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The Gravitational Acceleration Wave Buoys are used widely for wave information. They measures near surface waves, and are often taken as the measurement standards (reference instruments) to assess the performance of other types of wave measuring instruments. Given the critical need for accurate and reliable wave information, the metrology engineers from the RMIC/AP researched and established a laboratory device for the calibration of the wave height and period measurements from the gravitational acceleration wave buoys.

When calibrated, the wave buoy is mounted on a round-truss which is electrically controlled to rotate to simulate the sine function of wave in the real sea. With this device, the calibration measuring range of the wave height is 1~6 m and of the wave period is 2~40 s. The maximum permissible error of the wave height is ±0.3% F.S and of the wave period is ±0.5 s. The max loading weight of a buoy is 180 kg with its diameter of 0.5~1.0 m. We also build the measurement traceability system, and do the QA/QC. The calibration procedures are presented. The calibration is traceable to the SI, and it is in compliance with the specific verification regulations issued in China and ISO/IEC 17025:2005. NCOSM acts as a super technical supporter to ensure the accuracy and reliability of data of national marine observation projects in China.