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INTERGOVERNMENTAL OCEANOGRAPHIC COMMISSION (OF UNESCO)

DATA BUOY COOPERATION PANEL

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EVALUATION GROUP REPORT

(Submitted by Bill Burnett, Evaluation Group Chairperson)

Summary and purpose of document

This document contains the report by the Chairperson of the DBCP Evaluation Group.

ACTION PROPOSED

The panel will be invited to comment, and particularly make decisions or recommendations, as appropriate on the following topics:

(a) Note and comment on the information contained in this document;

(b) To provide the Group with guidance regarding its future work, as necessary.

Appendices: None.

DISCUSSION

Drifter Evaluation Group Report for 2007

Current Technology

During the intersessional period, the DBCP drifters performed well in general.

The Global Drifter Program reported that there was an increase in the drifter deaths manufactured by Clearwater Instrumentation since around March 2007, between 50-60 Clearwater Drifters died every month, where only 20-30 died per month previously. Clearwater looked into this issue and determined that a battery voltage was rapidly decreasing in the latest set of buoys, causing the transmitter to quit prematurely.

The Centre of Marine Meteorology of Météo-France focused mainly on its technical activities – evaluating the Iridium Short Burst Data (SBD) transmission as an alternative to Argos for operational purposes. The work, which concerns SVP-B drifters as well as other platforms, is partly seen as a contribution to the DBCP drifter Iridium Pilot Project. A complete report on the evaluation of Iridium drifting buoys will be presented at the Technical and Scientific Workshop.

Three SVP-B prototypes built by Metocean and fitted with GPS have been deployed in the North Atlantic since the end of 2006. The first prototype stopped transmitting after 8 months. The second and third prototypes are still operating.

Comparisons with Argos SVP-B clearly show a similar availability and quality of the data but a better timeliness and lower transmission cost. Although the cost of Iridium drifters is higher than the Argos, the unit cost per observation is lower, based on Météo-France Argos rates and an estimate of buoy lifetime. It must be noticed that the battery consumption was higher than expected on the first two prototypes. GPS positions were received every three hours.

The evaluation of the first prototypes also shows that Iridium positions are sufficiently accurate for meteorological purposes and, apparently for GDP. The removing of the GPS form the drifters will significantly increase their lifetime. Other Iridium SVP-B drifters from Metocean, Marlin Yug, Technocean and Pacific Gyre were built or are under construction. They should be deployed soon.

A standard data format has been agreed upon for Iridium SVP-B drifters. Version 3.2 is the current version and manufactures are invited to use it. Raw data are presently received and processed at Météo-France in real-time for GTS.

<u>Ice drifters reporting Air Pressure</u>

In the frame of the International Polar Year, Météo-France is evaluating different kind of drifters reporting Air Pressure at the sea surface in the Arctic Ocean through an EUCOS/E-SURFMAR funding. Nine buoys were purchased: two IcexAir from CMR (deployed one year ago), two Iridium SVP-B, two standard Argos SVP-B and three ICEB buoys from Metocean. The last seven will be soon deployed. IcexAir and ICEB buoys report the Air Temperature in addition of Air Pressure. One of the objectives is to assess the operation cost per observation for each kind of buoy.

Optimized GTS Technical File templates were recently set up at CLS to process data from ICEB and "canister" ice buoys. Applied to existing IABP buoys, they significantly improved the GTS transmission of these latest.

<u>SVP-BS (salinity) and SVP-BTC (temperatures in depth)</u>

Fifteen SVP-BS prototypes from Metocean and Pacific Gyre were deployed in the Bay of Biscay in

2005. Scientific results from this campaign will be soon published in the Journal of Atmospheric and Oceanic Technology: "Surface salinity measurements - CoSMOS 2005 experiment in the Bay of Biscay" by Reverdin, G., P. Blouch, J. Boutin, P. P. Niiler, J. Rolland, W. Scuba, A. Lorenco and F. Rios, 2007: Surface Salinity Measurements — COSMOS 2005 Experiment in the Bay of Biscay. Journal of Atmospheric and Oceanic Technology, Vol. 24, No. 9, 1643-1654. Improvements must be brought to the drifters but the measurement principle is promising. The evaluation continues with improved buoys. These will be particularly used for the calibration and the validation of SMOS (Soil Moisture and Ocean Salinity) satellite which should fly in 2009.

Météo-France also continues to evaluate SVP-BTC drifters from Marlin Yug. Seven buoys of that kind have been deployed in North Atlantic since 2005. The longer time-series of subsurface temperatures - up to 60 metres - didn't exceed 3 months. A new version of the thermistor string (80 metres) will be tested soon.

Drogue detection

Technocean's modification to the sensor system for drogue on/off detection had in sufficient effects on the quality of the submergence data. Even though recommendations have been made to change from submergence sensor to strain gauge to detect drogue on/off status, to strain gauge measurements, only one manufacturer is using this method. As presented at DBCP21, this technology is to be transferred to other manufactures for inclusion in their SVPs.

MetService New Zealand

MetService New Zealand deploys SVPB buoys into the Tasman Sea under the NZ National Programme and works jointly with the GDC to deploy buoys under the Southern Ocean Buoy Programme (SOBP) into the Southern Ocean to the south and east of NZ. The SOBP buoys are a mix of MetService upgrade buoys and GDC SVPB buoys.

MetService is pleased to report that the average lifetime achieved by the three types of buoys (MetService SVP-B buoys, Upgrades buoys and GDC SVP-B buoys) are similar, at about 20 months. All buoys in this sample were Technocean buoys. Being an Operational Weather Forecasting Centre, MetService's primary interest in buoy data is in obtaining reliable pressure, so lifetime is counted until the pressure data is removed from GTS, or until battery or transmission failure. Air pressure measurement problems on SVP-B drifters are not yet fully resolved.

MetService is still seeing problems with spikey pressure from buoys in the Southern Ocean. They believe this problem is related to sea state, because the spikey data is intermittent. There has been no progress in getting anyone to analyze the data from buoys with the TEST format. It was believed that the extra data contained in the DBCP-M2-TEST format might offer clues to how the de-spiking algorithm could be improved.

Météo France

Météo-France evaluated certain buoys that demonstrated distinct problems during the year. Buoy WMO 55927 (Technocean) reported wrong Air Pressure values on August 7th, 2007, which lead them to believe that 1) The buoy may have some difficulties sampling the air pressure between two consecutive waves in rough seas when the water does not have sufficient time to leave the air port before the next wave. When water does not enter the pipe, the buoy is able to report correct values. 2) Some water enters the pipe and avoids good air pressure measurements more or less permanently. Hourly air pressure values are then not scattered but more systematically incorrect when compared to model outputs.

Buoy WMO 55616 (Technocean) reported sea temperatures close to zero, meaning that the air port was regularly frozen and causing incorrect Air Pressure measurements. Monthly statistics show this

buoy correctly worked during the previous months, probably when the sea temperature was higher. This problem is well known in the cold and humid areas close to the sea-ice boundary.

Buoy WMO 55931 (Technocean) showed diurnal signals that could be caused by bad compensation of the barometer – a failure of the internal temperature probe of the barometer. This buoy reported pressure values that were too high during daylight, most especially in the absence of clouds and low wind speed. The internal temperature of the buoy is higher during the day than during the night. This phenomenon is being discussed with the barometer sensor manufacturer.

New Developments

Marlin-Yug Ltd. Reports new developments in a number of areas. SVP-BTC drifters with 80-m temperature chains were modified to have longer lifetime and more reliable measurements of temperature profiles. The buoy has been equipped with GPS receivers to increase space-time resolutions of measurements. The drogue's hub has been modified by means of capsulation of tether and radials point of connection to prevent fast corrosion processes and increase the time of drogue attachment.

To have samples at round hours independently of time when the buoys is switched "on" the MT105AMR Argos PTT was developed. This PTT has an installed real-time clock with a four year autonomous battery. The clock is factory installed to have samples with differences of no more than 10 seconds. After one year of buoy operation, the time shift can be sixty seconds maximum. One SVP-BTC drifter buoy for Météo-France was equipped with this real-time clock system to evaluate the buoy in operation for this year.

Technocean reports continued progress with GPS through integration of the latest GPS technology into their buoys. This effort will have future implications for use with both Argos and Iridium in several drifting buoy applications.

Three SVP-B and 1 SVP-B mini drifters were developed and built for Météo-France and Dunstaffnage Marine Laboratory, Scotland. All the buoys were equipped with Iridium modems and GPS receivers. They used the new data format developed by Météo-France. This format is flexible enough to satisfy the requirements of users and manufactures, and it will be used for the next generation of Iridium drifters. Two SVP-B drifters from the block above will be deployed in the Black Sea this September. The remainder of SVP-B and SVP-B mini drifters will be deployed according to the schedules of Météo-France and Dunstaffnage Marine laboratory.

The Chair of the Drifter Evaluation Team would like to thank members for their hard work during the intersessional period, and for providing the input for this report.

Appendix: None