**Report by the DBCP IBPIO Action Group to the**

**Thirty-Seventh session of the DBCP**

*(Virtual Session, 08-11 Nov 2021)*

**1) Summary**

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| **Name of Action Group** | **International Buoy Programme for the Indian Ocean (IBPIO)** |
| **Date of report** | 25 October 2021 |
| **Overview and main requirements addressed** | The International Buoy Programme for the Indian Ocean (IBPIO) was formally established at a meeting in La Reunion in 1996.  The primary objective of the IBPIO is to establish and maintain a network of platforms in the Indian Ocean to provide meteorological and oceanographic data for both real time and research purposes.  More specifically, the IBPIO supports the World Weather Watch Programme (WWW); the Global Climate Observing System (GCOS); the World Climate Research Programme (WCRP); the Global Ocean Observing System (GOOS); tropical cyclone forecast and monitoring; as well as the research activities of the participating institutions.  The programme is self-sustaining, supported by voluntary contributions from the participants in the form of equipment and services (such as communications, deployment, storage, archiving, co-ordination...). |
| **Area of interest** | Indian Ocean North of 55°S and between 25°E and 120°E (130°E in the North of Australia) |
| **Type of platform and variables measured** | Drifting buoys: Air pressure, SST  Moorings: air pressure, wind, air temperature, SST, waves, relative humidity, radiation, rainfall, SSS, subsurface temperature and salinity, current… |
| **Targeted horizontal resolution** | 500 km x 500 km |
| **Chairperson/Managers** | Mr Shaun Dolk, NOAA/AOML, USA – Chair  Ms Tammy Morris SAWS, South Africa – Vice chair |
| **Coordinator** | No Coordinator |
| **Participants** | Australia (ABOM), France (Météo-France), India (NIO, NIOT, INCOIS), Kenya (KMD), Mozambique (EMU), South Africa (SAWS), TIP (Tropical Moored Buoy Implementation Panel), USA (GDP, Navoceano). |
| **Data centre(s)** | CORIOLIS as French trial GDAC for drifting buoys  DFO/OS as Canadian trial GDAC for drifting buoys  NOAA/AOML for DBCP/GDP |
| **Website** | <http://esurfmar.meteo.fr/ibpio/> **(new URL)**  **QCTools :** <http://esurfmar.meteo.fr/qctools/> **(new URL)** |
| **Meetings** | Annual meetings in conjunction with DBCP meetings.  Next meeting planned 08 November 2021 as a virtual session. |
| **Current status summary** | 163 drifters (134 with Air Pressure)  22 moored buoys (RAMA-2.0 array : 85%) |
| **Challenges/Opportunities/Risks** *(intersessional period)* | Challenges :   * To fill the gap in Northern Indian Ocean * To improve KPIs * Drifter Availability (DoD Deactivated Drifters) * Organizational Transition due to member retirement and/or relocation * No RAMA cruises due to COVID restrictions * Budget restrictions   Opportunities :   * 2022 RAMA cruises to provide deployment opportunities for surface drifters and Argo floats. * Kaharoa (NZ) deployments   Risks:   * Perception of environmental impact * Increase of piracy * Further budget restrictions |
| **Summary of plans for 2022** | Maintain a network of at least 150 drifters.  Maintain or expand the moored buoy arrays. |

**2. Deployment plans for 2022**

*Details on deployment plans, and opportunities for next year.*

IBPIO participants are regularly encouraged to maintain their contributions of buoys, or to fund barometers to equip SVP drifters provided by GDP. Météo-France, ABOM and SAWS, regularly, fund barometer upgrades in the Indian Ocean.

Météo-France plans to deploy ~10 SVP-B buoys, mainly upgrades. All buoys are deployed from La Réunion using merchant ships or fishing ships, in accordance with agreement established with companies, or scientific ships. It is difficult to find ship sailing North of the Indian Ocean, so most of the buoys are deployed South of 10S.

BOM plan to deploy ~40 buoys, 20 of them are barometer upgrades : 10 drifting buoys to be deployed in early December from the Japanese Antarctic re-supply vessel, Shirase, between 45°S 110°E and 60°S 80°E, and 5 to be deployed from the Aurora Australis to assist in the forecasting of severe weather events over south eastern Australia during Summer. The regular re-seeding of drifting buoys along XBT sampling lines IX01 and IX09, to help to fill gaps over the central Indian Ocean. The regular re-seeding of drifting buoys in the Indian Ocean gyre, near 30°S 90°E. Barometer upgrade drifting buoys to be deployed from La Reunion & Fremantle, targeting the Southern Ocean and Southern Indian Ocean.

The SAWS plans to obtain buoys on behalf of South Africa. 5 drifters will be deployed during any Agulhas System research activities. A Further 5 drifters will be deployed on the Crossroads line during Marion Island logistical cruise in April/May and any other research taking place in this region.

NIOT is maintaining a network of 12 deep sea buoys with subsurface measurements radiation and precipitation sensors (Ocean Observation Systems, OOS): there are 7 sites in the Bay of Bengal, 5 in Arabian Sea. These OMNI buoys are similar to RAMA moorings but also include current measurements.

**3 Data management**

3.1 Distribution of the data

3.1.1 Data policy

*Details on data exchange policy.*

IBPIO encourages free and open access to data, in the spirit of WMO data exchange policy defined in WMO Congress Resolution (Cg-XII). All basic meteorological and oceanographic data are coded in the appropriate WMO code form and inserted to the Global Telecommunication System (GTS).

Météo-France drifter data are processed to DDB GDAC in Coriolis DataCenter.

3.1.2 Real-time data exchange

*Details on percentage of data distributed on GTS.*

77 buoys (148 last year) were deployed of which about **93**% measured air pressure (SVP-B).

All the data are sent on the GTS as quickly as possible. The North of the Indian Ocean, which is a very complicated area to feed, is still very poor. This situation is particularly prejudicial for general forecasts and weather warnings, especially during tropical storm season.

The use of the Iridium communication system continued, which improves data timeliness.

*Details on data timeliness (i.e. reception time at operational meteorological services minus observation time), including known problems, possible solutions, statistics, etc.*

3.1.3 Delayed mode data exchange

*Details on delayed mode data exchange, data centres, and archives.*

*Details on the collection and distribution of instrument/platform metadata*

*Details on the provision of discovery metadata about available data-sets using ISO 19115 standard.*

Data are routinely archived by various centres (for drifting buoys : ISDM, GDP, Coriolis DataCenter (GDAC DDB), Meteorological Services for drifting and moored buoys).

Archived data from drifters are also used to produce surface currents deduced from the buoys movement on a weekly basis, for Coriolis DataCenter.

The metadata system at JCOMMOPS is filled in every week for FR drifting buoys.

PMEL’s Tropical Moored Buoy website displays and distributes the RAMA data (<http://www.pmel.noaa.gov/tao/rama/>).

INCOIS’s website displays Indian moored buoys availability and data (<http://www.incois.gov.in/portal/datainfo/mb.jsp>).

3.2 Data quality

*Details on data quality, quality control procedures, including detected problems, correction of systematic errors and bias, reporting of data quality, feedback from data users, statistics, etc.*

The transmission delays onto the GTS are monitored through the Météo-France QC tools webpage: <http://esurfmar.meteo.fr/qctools/> (**Please, pay ATTENTION to the URL change, update your bookmarks !**). Monthly statistics and 14-day graphs are available for all surface marine observations through the same website. The blacklists, automatically issued for air pressure every day, are used to identify and correct potential problems.

**One reminder :**

QCTools is collecting all DB and MB data sent on the GTS, received through Météo-France node.

For this purpose, **all the producer centers and the headers of the BUFR messages have to be known by Météo-France.**

If an operator change one of them (producer and/or header), and you don’t see your buoys data on QCTools, please forward these informations to [cmm\_op@meteo.fr](mailto:cmm_op@meteo.fr) .

**4) Instrument practices**

*Details on instrument practices, followed standards and procedures, traceability to SI units, instrument inter-comparisons, etc.*

IBPIO drifting buoys use recommended DBCP formats (DBCP-M2 for Argos, formats published in Recommanded Iridium SBD dataformats for buoys : v1.8- October 29, 2018, <http://esurfmar.meteo.fr/doc/o/db/others/DB_Iridium_formats.pdf> ).

NIOT is following best of practise method vetted by NOAA PMEL and NDBC.

**5)Details of Challenges/Opportunities/Risks**

**Challenge :**

One may see a great gap of data buoys in the North of the Indian Ocean, the objective of the next intersessional period is to fill this gap.

KPIs for Indian Ocean are available on jcommops website and must be improved:

* by filling up the gap in the coverage,
* by improving QC for drifting buoys. Air Pressure Gross Errors (> 10 hPa) which has increased due to a little number of buoys (3 buoys concerned).

Drifter availability was a limiting factor during the intersessional period, as many drifters staged for deployment were affected by the iridium contract negotiations with the GDP and their provider. As a result, members were unable to deploy drifters and deployment opportunities were missed.

Due to COVID restrictions and travel limitations, no RAMA cruises were conducted in the intersessional period. This is a significant impact, as many ancillary projects (including drifters) are conducted during these cruises, so impact of this lost activity was compounded.

We saw many IBPIO members retire and/or relocate in recent years. We wish our friends and colleagues the best in their new endeavors and we will search for their replacement within the group during the upcoming intersessional period.

**Opportunities :**

As RAMA cruises resume in 2021/2022, they will continue to provide deployment opportunities for surface drifters and Argo floats, which are widely needed throughout the region.

The Kaharoa (New Zealand vessel) continues to be a reliable deployment opportunity. Notification for cruise(s) will come through official New Zealand Met Office.

**Risks :**

Perception of environmental impact: Non-systematic recovery of drifting buoys is exposing the activity to new regulations, such as the Marine Strategy Framework Directive (MSFD) requiring EU Member States to ensure that "properties and quantities of marine litter do not cause harm to the coastal and marine environment", and other similar national initiatives.

Budget restrictions, by some partners involved, may decrease the number of drifters purchased and/or upgraded through the Barometer Upgrade Program.

Piracy is still a risk, especially for RAMA buoys South of Bay of Bengal.

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**Annex (optional)**

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