

# OBSERVING THE SOUTHERN OCEAN AND BEYOND WITH AN EXTREMELY LONG-LIVED DRIFTING BUOY



By Graeme Ball, Sergey Motyzhev, Eugene Lunev and Alexey Tolstosheev

The Southern Ocean is the birth place of many weather systems and is therefore of great meteorological importance to Australia. This vast expanse of water dotted with a few small islands is all that separates Australia from the Antarctic and weather observations from this area are highly valued. The number of ships travelling in the Southern Ocean, particularly at higher latitudes, is small which places a very high reliance on drifting buoy observations. The SVP-B buoy (WMO No. 56531, Argos PTT 67381), deployed by the Australian Bureau of Meteorology in 2006 provided surprising observations of the Southern Ocean and beyond for nearly 8 years, as Graeme Ball explains.

Despite limited opportunities, caused by the low number of Antarctic re-supply ships leaving from an Australian port, the Bureau of Meteorology regularly deploys 3-5 Bureau-funded, barometer-equipped surface velocity program buoys (SVP-B) each year. These deployments are planned to be upstream from Australia to maximise the period that data from the buoys will be of direct benefit to the Bureau.

### Vital information for ocean forecasts and warning

The mean sea-level pressure and sea-surface temperature reported by the buoys improves our knowledge of the present weather situation and assists in the preparation of ocean forecasts and warning. This is vital in meeting the Bureau's obligations to the International Convention for the Safety of Life at Sea (SOLAS). A favoured location of the Bureau to deploy buoys is near

Heard Island, a small Australian sub-Antarctic island near 50S 70E. One of the many buoys to have been deployed near Heard Island was a Marlin-Yug SVP-B buoy (WMO No. 56531, Argos PTT 67381) that was deployed on 2 December 2006 near 50S 74E.

### From the Southern Ocean to the Pacific Ocean gyre

This particular buoy exhibited a different behaviour to that seen from other buoys deployed in the same region. Instead of continuing to track quickly eastward and pass to the south of Cape Horn, its trajectory changed soon after entering the Pacific Ocean and it began to track slightly towards the northeast. This track continued until its meteorological sensors failed after 954 days of operation on 12 July 2009 near 41S 103E, at which time the Bureau stopped the buoy reporting on the Global Telecommunication System (GTS).

The buoy continued to report its position through the Argos System well after the meteorological sensors failed. The trajectory plot [Figure 2] shows the buoy eventually becoming caught in a westward current before becoming trapped in a central Pacific Ocean gyre. From deployment until it finally stopped transmitting, the buoy was tracked for 2,800 days through the Argos System.



SVP-B buoys awaiting deployment

## ABOUT THE BUOY

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The Marlin-Yug SVP-B buoy (WMO No. 56531, Argos PTT 67381) that was deployed on 2 December 2006 near Heard Island (50S 74E) was a standard 40 cm-hull drifting buoy with alkaline batteries and a "Holey Sock" drogue.

The buoy electronics are based on the Argos Platform Transmitter Terminal (PTT) MT105A (Fig.1), certified by CLS in 2004. The output power of PTT is 1.4 W. The sensor block has the MM400 data logger with individual calibrated sea surface temperature and air pressure sensors as well as barometric port with vertical membrane. The PTT, sensors block and buoy as a whole are the product of Marlin-Yug company. Marlin-Yug develops and manufactures all of the components in-house, as this is the best way to guarantee an extremely operational device with optimal performances. As an example, the Argos PTT has an ultra-low-power microcontroller, which controls not only PTT functions, but supports all other parts and represents the "heart" of the buoy system. Moreover, the microcontroller feels the position of the surface float relative to sea surface thanks to a submergence sensor and tries to prevent "wasted" Argos messages when buoy is submerged.



Fig. 1 - Argos Platform Transmitter Terminal MT105A



Figure 2. SVP-B buoy (WMO No. 56531, Argos PTT 67381) was deployed on 2 December 2006. The meteorological sensors failed after 954 days of operation on 12 July 2009, but the buoy continued to send position information via the Argos system until 2 August 2014, for a total of 2,800 days.



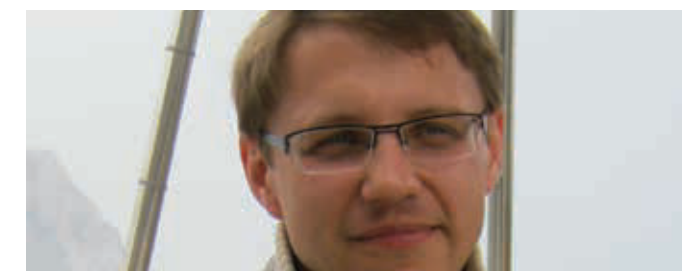
### GRAEME BALL

Graeme Ball is the manager of the Marine Operations Group for the Australian Bureau of Meteorology. His responsibilities include managing the Bureau's operational marine networks, including the Australian Voluntary Observing Ships, Ship of Opportunity Programme, Meteorological Drifting Buoys, Argo Profiling Floats, Waverider Buoys and Coastal Sea-Level Network. His current international activities include serving as Chair of the JCOMM Ship Observations Team (SOT) and as Vice-Chair (Southern Hemisphere) of the JCOMM Data Buoy Cooperation Panel (DBCPC). He formerly served as Chair of the International Buoy Programme for the Indian Ocean (IBPIO), an action group of the DBCPC.



### SERGEY MOTYZHEV

Sergey Motyzhev is Director of Marlin-Yug, Ltd. He is the scientific, engineering and financial manager of the company. Dr. Motyzhev studied theoretical engineering at Sevastopol State University before obtaining his doctor of science degree in oceanography from the Marine Hydrophysical Institute.



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