

Meteorological data from remote locations

Australian Offshore AWS Installations

Automatic weather stations have contributed significantly to a number of aspects of the observation program in Australia. In particular, the Bureau of Meteorology's program for offshore island monitoring has seen a vast improvement in both the quality and quantity of observations undertaken through the use of AWS. The sites are often very remote and have little or no infrastructure to house human observers, making it otherwise difficult to maintain on-going observations.



The offshore AWS installations are close to the Great Barrier Reef Marine Park off the East Coast of Australia.

Australia has had an automatic weather station (AWS) network since 1966 when the first of 16 AWS were installed off the West and North coasts of Australia. These early AWS were often large structures and needed banks of batteries to operate. The AWS utilized electro-mechanical technology to translate sensor readings into a simple al-

phabetic Morse code that was then sent via HF radio to the mainland. Once received the messages were manually re-encoded to recover the meteorological data.

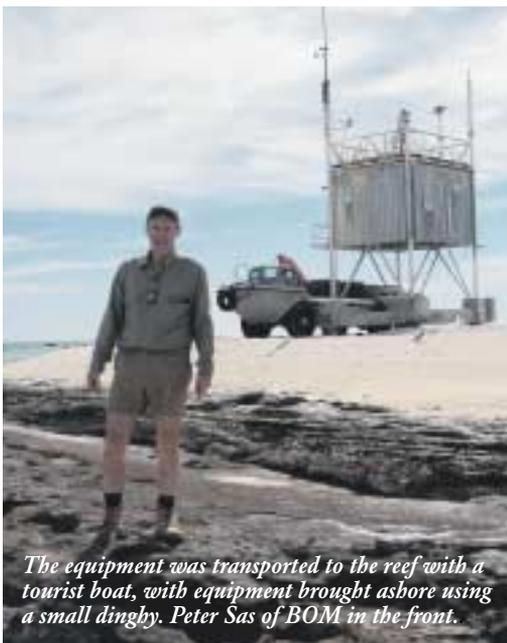
During the 1980s this first generation of offshore island AWS was replaced with micro-processor-based technology. These systems use the Japanese GMS geo-stationary satellite to

transfer data back to the Bureau of Meteorology Head Office at a very low cost. To conserve power the AWS is only "awake" for 10 minutes each hour to perform measurements. This results in large gaps in the meteorological data samples. As there is no way to interrogate the AWS prior to visiting the site, expensive travel costs for maintenance visits have been incurred to perform a sim-

ple task such as a system reset. Although state-of-the-art when installed, these second-generation offshore island AWS are proving difficult and costly to maintain with spares and software upgrades.

Enhancing performance

In investigating a suitable replacement, the aim was to build upon the advantages of the cur-



The equipment was transported to the reef with a tourist boat, with equipment brought ashore using a small dinghy. Peter Sas of BOM in the front.



The reefs prove a demanding installation site for AWS. They are subject to the effects of the sea, high winds and an abundance of bird life.

The station at Holmes Reef is located in the ocean.

rent AWS, whilst eliminating some of its limitations. The MILOS platform was considered based upon its reliable performance record in the Bureau AUTOSONDE and Ship AWS programs. Vaisala's ability to supply an in-house satellite transmitter with a proven track record, the SE300 from Vaisala Sunnyvale (formerly Handar) offered an additional benefit. The Vaisala MILOS 500 was chosen for its flexibility, software upgrade capability, built-in logging memory and its ability to incorporate a full duplex satellite phone connection in addition to the GMS satellite transmitter.

Remote locations

The first site selected for the MILOS installation was Bedout Island, an uninhabited island located north of Port Headland in Western Australia. Bedout Island has a 31-hectare Nature Reserve and supports an extensive population of birdlife. After assessing the performance of the AWS at the Bedout Island site, three additional systems were purchased. Two of these were recently installed off the East Coast of Australia, on remote



coral reefs close to the Great Barrier Reef National Marine Park - Flinders Reef and Holmes Reef.

The offshore AWS installation sites are more demanding than traditional land based ones. The installations consist of a structure located either on a small coral reef or in the open sea. Sea birds use these as nesting and roosting places, resulting in the whole platform being covered with bird excrement. The platforms consist of a 3 x 3 meter stainless steel room supported by a steel frame anchored with concrete to the coral below. The room is used to house the AWS equipment and batteries and the meteorological instruments, antennas and solar panels are mounted on top.

Installation trip

A lot of thought and preparation is put into the trip, as no additional equipment or materials can be sourced once at sea. A small tourist diving vessel is used to travel to the installation sites. Unfortunately such a small vessel makes for rather unpleasant sailing in average sea conditions.

Once at the reef, all equipment is transferred from the diving vessel to the AWS platform in a small outboard dinghy. At the site, the first task is to clean up the platform roof and remove all the old equipment. During the Flinders reef and Holmes reef installations two teams were formed. Team one was responsible for installing the MILOS Automatic Weather System and terminating inside the structure, while team two worked on the rooftop, mounting the wind cross-arm, solar panels, sensors and antennas. At times it was rather hazardous on top of the building with winds speeds of up to 37 knots. Each installation took two days to complete, however it didn't take nearly as long for the local birds to issue their stamp of approval on the job!

System configuration

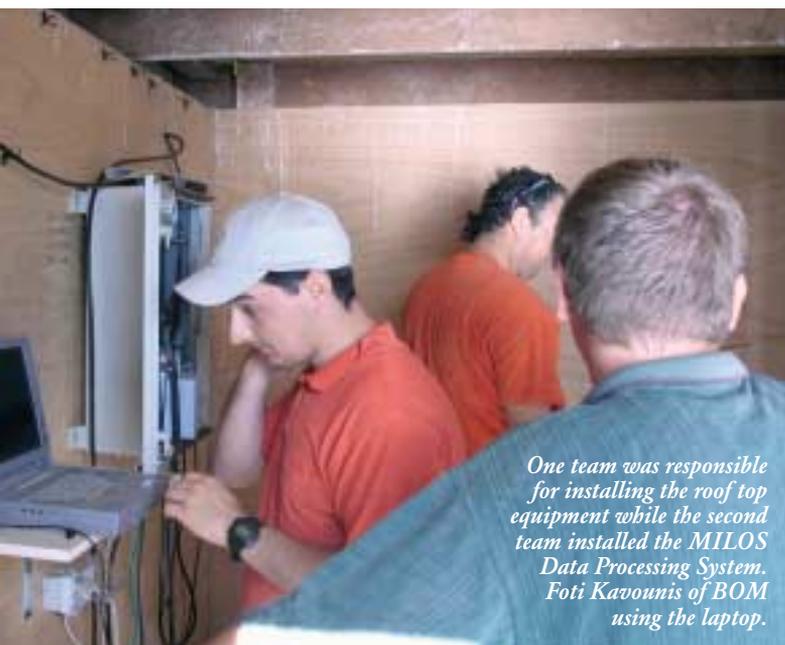
The Vaisala MILOS 500 Data Collection System is equipped with wind speed, wind direction, air temperature and barometric pressure sensors. Every hour a SYNOP message is compiled and sent to a GMS satellite via the SE 300 GMS satellite transmitter. The same message is also

stored on the MILOS memory card, along with 10-minute and 30-minute data.

An Inmarsat mini-m satellite telephone is on continuous standby to receive incoming calls from Bureau maintenance personnel based in Townsville. It provides a full duplex connection and allows full access to the MILOS 500 command set. Logged data can be downloaded, system parameters changed and diagnostic functions carried out. For example, an operator can choose to have the half-hourly METAR/SPECI message sent via satellite phone to provide more frequent data during cyclones. Logged high-resolution data can be retrieved after a cyclone to help research and understanding of such events. The satellite telephone link has also been particularly useful in enabling an overview of the station's status prior to a calibration visit.

Assessment after cyclone season

To date, all three installations have performed well, providing continuous transmission of data to the GMS satellite. The performance of the most recent installations on Flinders Reef and Holmes Reef will be assessed over the coming cyclone season. Following this, a review of design and requirements for the system based on an operational trail period will take place. A program will then be established to progressively replace existing equipment through the Bureau's Asset Replacement Program. ●



One team was responsible for installing the roof top equipment while the second team installed the MILOS Data Processing System. Foti Kavounis of BOM using the laptop.