Recent GUAN and VCP support projects

Richard Smout, John Nash, Jeremy Gillham, Steve Palmer, Mark Smees and Carl Bower (NOAA)

Met Office, Fitzroy Road, Exeter, Devon, EX1 3PB
Tel. +44 (0) 1392 885641, Fax. +44 (0) 1392 885681, E-mail: richard.smout@metoffice.gov.uk

Abstract

Since 2001 the Met Office (UK) has participated and assisted with the organisation of 2 international radiosonde comparisons, 2 international radiosonde training workshops and performed 7 overseas installations / system evaluations as part of the GUAN GOS network.

International radiosonde inter-comparisons

The first test was performed at Alcantara in Brazil May / June 2001. 4 manufacturers took part in this inter-comparison. Graw (Germany), Modem (France), Sippican (America) and Vaisala (Finland). Meteolabor (Switzerland) loaned a Thygan thermo-hygrometer for the duration of the test. Project Leader was Reinaldo da Silveira, from INMET. Other project officers included Dr. Gilberto Fisch and colleagues from the Brazilian Air Force.

A follow up radiosonde inter-comparison occurred in February 2005, this time in Mauritius. The Project Leader was Dr. Beenay Pathack, the test was held at the headquarters of the Mauritius Meteorological Services at Vacoas. In both tests local staff were responsible for balloon filling, rig assembly and launching. The scale of the second test had increased with 6 manufacturers now involved. Graw (Germany), Meisei (Japan), Meteolabor (Switzerland), Modem (France), Sippican (America) and Vaisala (Finland). The Met Office (UK) was responsible for training local staff in balloon filling, rig preparation (bamboo or plastic pipe supports for flying a number of radiosondes together), and balloon launching techniques. Technical difficulties were resolved as the tests progressed.

Figure 1. Flight preparation at Alcantara Brazil. The ‘rig’ is constructed from plastic pipes and is supporting 4 radiosondes.

Figure 2. Pre-flight preparations in Mauritius, here the ‘rig’ is made from bamboo; sourced locally, sustainable and in plentiful supply.

WMO Training Workshop on Upper Air Observations

Two upper air training workshops were held. The first one during April 2003 was hosted by the Botswana Meteorological Services at the main office in Gaberone. The second workshop was hosted by the Argentina Meteorological Services at their head office in Buenos Aires during May 2006. Each workshop consisted of a theory and practical element.

The theory element covered the changes in the designs of radiosondes and their sensors. Other presentations covered the density of observations, GPS measurements and alternative technology for measuring meteorological parameters remotely, such as satellites, microwave radiometers, cloud radars and wind profilers. The list is by no means exhaustive but introduced the delegates to alternative measurements available to the climatologists and forecasters!

The practical element encouraged the delegates to participate in launching a time series of radiosonde ascents as well as launching a multiple rig with more than one radiosonde tied on, but only where this was possible! The results of these were displayed the following day and showed how the atmosphere varied during the day. Flying more than one radiosonde together allowed the delegates to see the differences between measurements from different sensors types used by manufacturers.

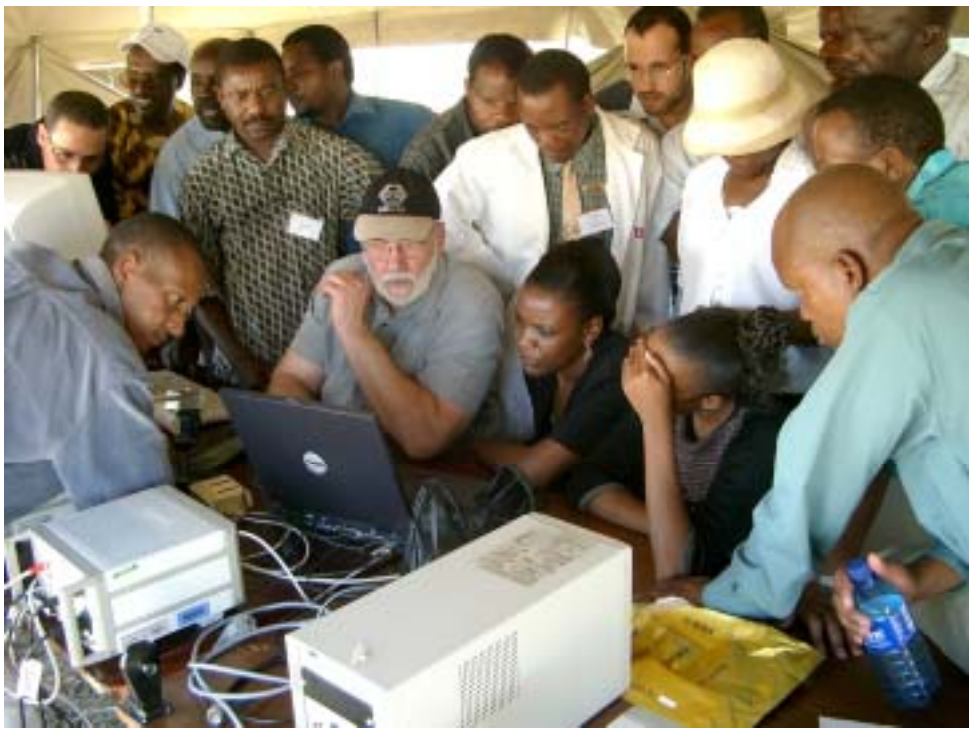

Figure 3. Delegates in Botswana discuss the finer details of point selection with the late David Drew from the Met Office (UK).

Figure 4. A theory session at the Argentina workshop.

VCP / GOS

Radiosonde installations, upgrades and system evaluations

Seven stations were upgraded or had new equipment installed as part of VCP (Voluntary Co-operation Program) supporting the GUAN (Global Upper Air Network) upgrade program, by staff from the Met Office (UK).

Pristina, Kosovo October 2003, the Met Office successfully bid for a contract to equip the airport with forecaster aids and two Vaisala DigiCORA III MW21 GPS radiosonde systems.

Gan, Maldives September 2004. The most southerly island in the Maldives chain had been silent for almost 30 years. Training here consisted of hydrogen safety, balloon handling, pre and post flight procedures. A Vaisala DigiCORA III MW21 GPS radiosonde system was installed and two PCs.

Figure 5. Hydrogen safety, the balloon handler is encouraged to wear personal protection equipment (PPE)!

Dar Es Salaam, Tanzania October 2004. This was a request from Richard Thigpen at WMO to evaluate and assess for operational use an InterMet IMS1500 radio-theodolite.
On arrival at Dar Es Salaam the IMS1500 was not operating due to a technical fault. However engineers from South Africa and the United States of America soon had things under control. Whilst the system was being repaired the UK delegation gave the local staff training in general radiosonde techniques and balloon handling. However even this did not get off to an easy start as customs problems delayed the release of the balloons and radiosondes sent in advance. Once the radio theodolite was operational an intensive period of training took place to ensure that the local staff became familiar with pre-flight preparation and acquiring lock on the balloon after launch. The TEMP code produced by the system was found to have a number of problems; Carl Bower from NOAA assisted by Mark Smees from the Met Office (UK) worked extremely hard to resolve the issues. By the end of the two weeks the IMS1500 had been thoroughly “debugged” and was declared fit for purpose.

Figure 6. Mark Smees (Met Office UK) and IMS1500 Radio-theodolite.

Yerevan in Armenia followed in March 2005. The installation was delayed three months from January to March 2005 whilst customs problems were resolved. The radiosonde station on the outskirts of the city was housed in an old radar tracking station. Installing the new UHF antenna (RB21) was thankfully simplified as the old stand was found to be free of corrosion. The local staff proved extremely adept at changing the antennas over! A Vaisala DigiCORA III MW21 GPS was installed.

Figure 7, the stand was reused to mount the RB21 antenna.

Seychelles were upgraded in September 2005. Their Vaisala MW15 GPS ground station was upgraded to fly the RS92 GPS radiosonde. Nairobi followed in July 2006 and Addis Ababa in August 2006. Their existing equipment a Vaisala MW11/12 was replaced with an MW15 that had previously been returned to Vaisala for refurbishment and tested at Camborne in the UK prior to shipping. The GPS card and main processing unit cards were removed from the MW11/12s and upgraded before being inserted in to the MW15s.

Figure 8. Observers and technical staff at the Kenya Meteorological Services.

Figure 9. A training session for observing and technical staff at the Ethiopia Meteorological Services.

All stations had 'Metgraph' software included as part of the system software or as an "add on". Metgraph allows data such as temperature, pressure, humidity, wind speed and direction to be displayed. It also allows an operator to apply manual quality control to an ascent. This was introduced at all the sites that were visited by the Met Office team. Manual quality control of the ascent reduces biases and increases detail. Automatic selection can introduce biases and reduce detail therefore distorting the temp message! Figure 5 shows the late Dave Drew explaining the finer details of good point selection to delegates at the Botswana workshop. Another feature of Metgraph is the formation of 'Climat' temp messages. Important for the monitoring of climate trends and changes!

Training

Training is a particular issue to the developing countries! Participating in two workshops proved a very useful experience and preparation for Mark Smees and Richard Smout, responsible for the two African upgrades. Most of the answers to questions were found within the notes and material presented at the two workshops. Copies of the workshop notes and all documents referred to during the installation were left at each station. The workshops have proved to be a very effective means of delivering training!

Conclusions

The site visits showed common problems with training of the operations staff. In particular, there is a need to organise training and instructions for the observers in a systematic way. Often the main training route was on-the-job verbally from one observer to another; inevitably important issues are overlooked or bad practices institutionalised. There is a need for practical instruction manuals which cover the whole process of preparing the equipment, making the sounding, and coding and sending the observations. A set of guides was prepared as part of the training workshops, but there is a need for these to be amplified, and especially for them to be adapted with local information at every station, to be made easily available to the observers at their place of work, and to be kept up to date. Of course such instructions and guides are an essential part of any Quality Management System.

Yerevan continue to have problems, support is ongoing! Discussions have taken place at the Met Office (UK) and the New Zealand Met Service regarding the writing of a simplified set of diagnostic instructions for the radiosonde systems, work in this area is ongoing. Pristina remain silent, Seychelles, Gan, Dar Es Salaam, Nairobi and Addis Ababa are all reporting radiosonde temp messages. The successful reception of “Climat” messages remains an issue. Unfortunately the complexities of the GTS (Global Telecommunications Network) make fault diagnostics difficult; a satisfactory resolution is still being sought.

When planning installations in developing countries customs and clearance procedures must be performed well in advance of the actual planned installation date!

These seven new installations / upgrades have benefited both GUAN and the station by providing modern supported equipment. Old obsolete systems have been replaced!