South African Weather Service

A Short Report on the IRENE Dobson IC Event

G J R Coetzee 15 January 2010

Background

The South African Weather Service, under the auspices of the World Meteorological Organisation (WMO) hosted the 3rd African Regional Dobson Spectrophotometer Intercomparison (IC) meeting. The meeting took place during the period 12- 30 October 2009, and was conducted at the Irene Technical Centre, close to Pretoria, South Africa. Arrangements of this magnitude posed many challenges with time constraints and as a result of many factors such as legal agreements, participant arrangements, funding transfers, instrument import and export challenges, specific resource staff short falls, etc the IC meeting was conducted in two parts in order to ensure that if not all, at least most of the planned African instruments can be inspected, assessed, intercompared and recalibrated where possible. During the period 15- 26 November the South African Weathers Service Dobson staff continued with the second part of the work on four remaining instruments which could not make it in time for the initial scheduled event.

From this point of view we must acknowledge that crucial Dobson Observers training was not being address during the IC event, except for the only participant from Kenya who attended for a short period in the first part. The historical and recent Dobson data sets of the instruments also were not reviewed and deliberated upon.

These intercomparison events for the Dobson Ozone Spectrophotometers are held every three to four years, to ensure that the primary ground-based network of Dobson Instruments, which measures atmospheric ozone, is maintained through well calibrated instruments. The 2nd IC meeting were held in 2004 in Dahab, hosted by the Egyptian Meteorological Service. These events therefore aims to ensure that the Dobson Spectrophotometers attached to the African continent (and other world regional instruments) are in excellent operating condition, with refreshed training of participants as observers and data analysis, and that all Dobson's are traceable to the World Standard Dobson Instrument located at Mauna Loa, Hawaii.

PARTICPATION AND PROCCEEDINGS

From the organizing challenges we were confronted the major goals of the Intercomparison became: - 1) to evaluate each instrument calibration and the existing calibration data sets, 2) Repair, clean and improve the instrument as needed and 3) redefine a new calibration levels (where applicable) for the future measurements at the home station before returning the instruments back to the home station in good operating order.

As the instrument arrived, it and its accessories were inspected. No repairs, except those to make the instrument operate were made. The instrument was then operated in the condition that it would be at the home station. Once the successful initial intercomparison was made, the results of that dictated whether significant repairs, such as the replacement of optical, mechanical or electronic parts were needed, before further final Intercomparison were concluded with improved results.

Final results mean that the existing data sets can be easily reprocessed with a) linear correction from the last calibration, or b) a correction based on a known episode in the instrument history. A comparison with other ozone measurements can indicate which method is more appropriate. In cases where shifts are less than 1% (0.7 Nad) then the existing data set requires no reprocessing based on the intercomparison. Certain recommendations for each instrument were formulated.

Other tasks included cleaning of optics and/or repaired/replaced followed by so called Wedge calibrations. Series of lamp calibrations were also done on a daily basis.

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Instruments participating during 12-30 October 2009

The IC event was technically headed by Mr Robert Evans, head of the WMO World Calibration Centre from NOAA, USA together with the reference standard D083 instrument. Mr Ulf Kohler from DWD, MOHP Germany participated with the European Standard instrument D063. Mr J Easson from BoM, Australia also participated with the Australian standard instrument D105, which was in desperate need of recalibration and world referencing after the instrument was damaged.

Other instruments that were attended to during this period were the three instruments from South African, D035 from Cape Town, D132 from Springbok and D089 from Irene. The Botswana Instrument (D015) and Seychelles (D057) instruments arrived during the conclusion of the first part as the expert staff had to return back to their respective countries and they were only briefly inspected.

Instruments participating during 15-26 November 2009

The instruments that were attended to by SAWS staff during this period were S5703 from Lagos- Nigeria, D018 from Nairobi - Kenya, D057 from Mahe -Seychelles and D015 from Maun – Botswana.

FINAL RESULTS AND RECOMMENDATIONS

Technical

The official technical report consisting of the detailed worked performed on the instruments and new calibration results/data review requirements is currently under preparation and will be submitted to WMO for publishing through Mr B Evans. However, it can be said at this stage that all the participating instruments above mentioned are well calibrated and in good operational condition, except for D057 from Mahe, which still remains within a marginal calibration error. This instrument may need better expert attention before a next IC event, which is to be scheduled in 3 - 4 years time from now. The situation for D057 will be followed up. Overall thus we can mention that from the revised IC Objectives that most of these were met satisfactorily under challenging circumstances.

Financial

From the initial budgets and Letter of Agreement which was concluded between WMO and SAWS an amount of 20 350 US$ (147 914ZAR) were transferred to SAWS for local use during this event. A full financial statement is being prepared as the final information is gathered and audited by the SAWS financial systems and will be submitted to WMO.

At this stage I can estimate that the total amount of funds spent correctly by SAWS from the transfer is approximately 16 000 US$, which means that about **4 350 US$** will not be spent and will be **transferred back** to WMO in due course.

However, to estimates the **total cost of this IC** event, please anticipate and take into account the cost occurred from the WMO side. This will include the funds for Mr J Nguyo who participated for about 10 days from Kenya (per diem and air-travel). Also to note is the cost of in-country Dobson transport/airfreight to and from Johannesburg. These costs will be reclaimed from WMO, and will come from the NMS's of Nigeria, Kenya, Seychelles and also from Botswana who paid the way by road transport to and from Irene.

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Final recommendations to note

The Dobson instruments and staff from Algeria and Egypt should be assisted and be enabled to take part in scheduled IC events planned in the European networks throughout 2010, as they could not participate during the Irene event. Financial support thus should be reserved.

Due to the omitted country participations, training for Dobson Observers from Nairobi - Kenya, Mahe – Seychelles, but especially for Lagos - Nigeria and Maun –Botswana remains outstanding and crucial. It is highly recommended that they are supported to participate in similar events to be conducted elsewhere at Regional IC centres/events, such as the Dobson IC and data workshop event being planned at the SOO-HK Observatory in the Czech Republic in early May 2010. Nigeria and Maun has their own challenges which they face through new and totally inexperienced available staff to operate the instruments. They are also in great need of serious training and to learn more from data processing / analysis techniques and tools and WOUDC data submitting requirements.