

## Taiwan CWB - 2008 Calibration Report of Brewer Ozone Spectrophotometers

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Calibration and service checks on the three Taiwan Brewers were completed at the Central Weather Bureau in Taipei, from March 24-31. The weather was quite co-operative during the first 5 days for the ozone and UV calibration checks. The Chengkung instrument #061 was relocated here for this campaign. All instruments appear to have worked very well during the past year, reference SL ratios and other graphs on pages 3-5. The Canadian traveling standard Brewer #017 was used as the ozone reference instrument again.

### **MKIII #129 Brewer Taipei:**

The standard lamp ratios have been stable at values of 495/990 for the past year and were at values of 480/975 during the last calibration period. A new computer with XP operating system was installed after last visit and operation has been very good using the faster V376A software (in \brewer\brew-f directory).

It was determined that the ETC constants only should be adjusted slightly to values of 1760/730 to obtain best agreement to #017, which was consistent with the change in SL ratios. Reference the ozone results on next page note the scatter in ozone results for #129 during the first three days and then the reduction in the final two days. It was determined that many of the noisy results were when second neutral density (n.d.) filter was selected which has lower than optimal attenuation values. The software is designed to alternative between filters if the light level is too high for one filter and too low for next or oscillation mode. There now is setting at start of main program where the next or previous filter can be selected or not if in the oscillation mode. This setting was set for higher filter during the final two days and resulted in improved ozone results. The main program was changed and saved this way (line 5 - HIFW2=1) for #129 only.

Sun Scan tests showed the cal step of 285 continues to be proper. The dead time (DT) and run stop (RS) results have continued to be very stable this past year. Dispersion test results produced constants very close to the file (dcf05505.129) in use and so no changes were made.

This year's UV calibration results showed file UVR05306.129 is still proper, reference ratio graph on last page. The new response file UVR08808.129 was put into use for the future.

### **MKIV Brewer #023 Taipei:**

This Brewer was performing well and its standard lamp ratios have been quite stable at or near last year's values of 1442/2685. The ozone results were in good agreement with #017 results and so the ETC constants were left at 2007 values of 2545/2265, which had been use. The shutter timing constant was changed to 86 from 80 based on SH test results which may improve DT/RS results slightly. The n.d. filter for ozone lamp tests was set at 1 and was changed to 0 in constants file to improve SL and DT results.

Sun Scan test results showed that the cal step of 165 was still proper. The dispersion test results were very similar to constants in use (< 4 steps difference and so file (dcf09299.023) was left in use. The NO<sub>2</sub> results using last year's revised NO<sub>2</sub> ETC constants of 470/480 were found to be quite similar the DS/ZS NO<sub>2</sub> results from #061. UV calibration results produced file UVR08608.023 that was found to be lower than the 2007 file by -14 to -7% and so was put into use.

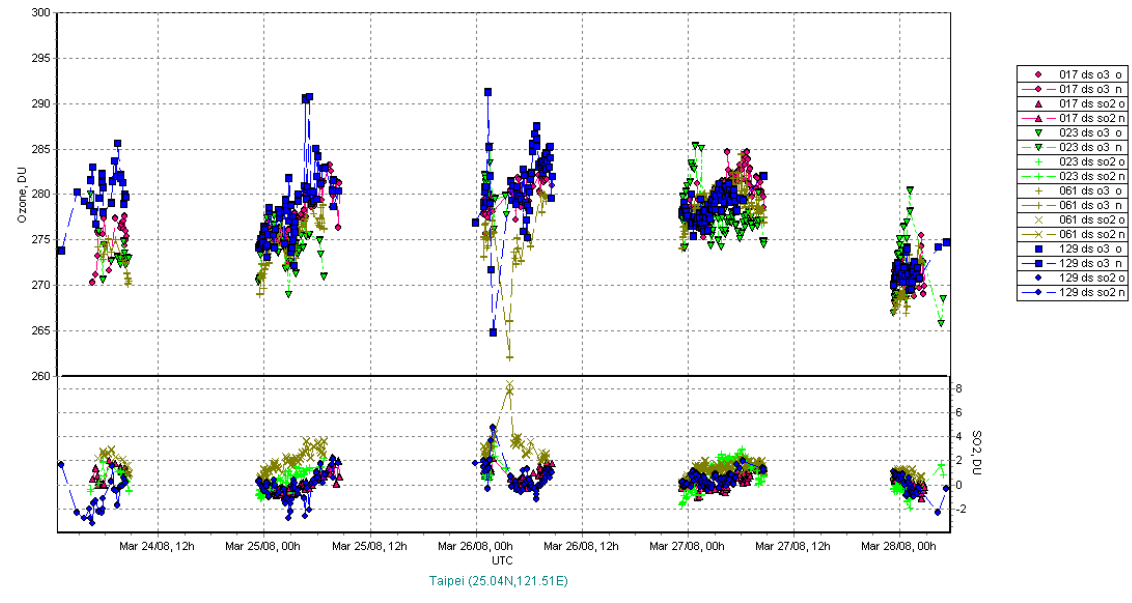
### **MKIV Brewer #061 from Chengkung:**

The SL ratios have stabilized to values of 765/1270 from 2007 values of 775/1175. The ETC's in use were 1950/850 from 2007 calibration. These ETC's were found to give good ozone agreement to #017 but SO<sub>2</sub> needed adjustment and so the final recommended ETC's are 1938/900. Sun Scan test results showed that the cal step of 160 was still proper. The dispersion test results produced differences of <1.1 steps and so the file (dcf05505.061) was left in use. The NO<sub>2</sub> results from #061 were believed to be proper since the SL F-ratio has not changed in the past 5 years.

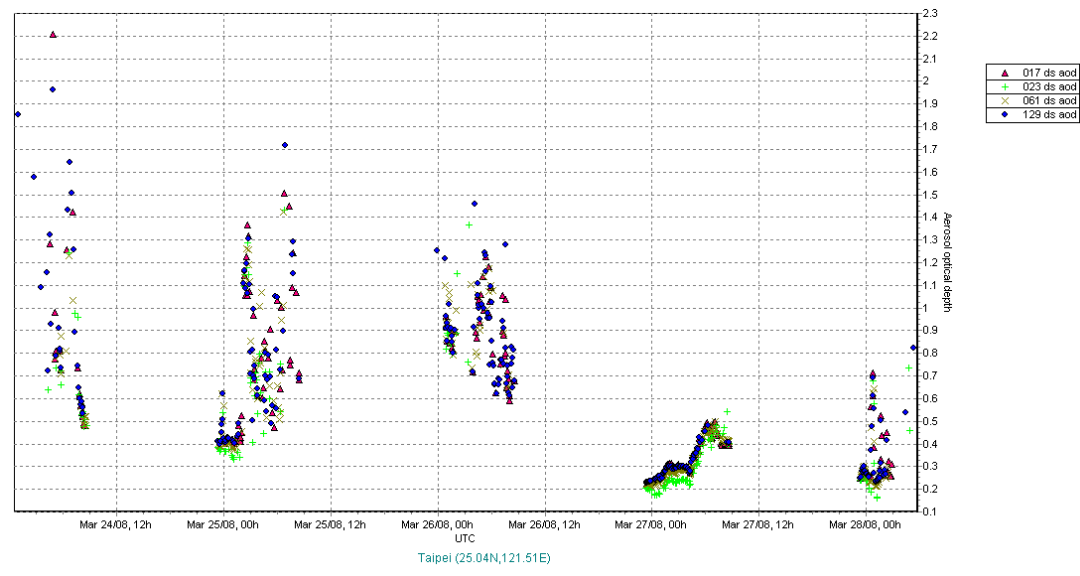
The final UV calibration stored in file UVR08508.061 was different by ~-25 to -15% to last year calibration and so was put into use.

**Final results:**

Below are the ozone and SO<sub>2</sub> results for the 5 days using the 2007 constants (in use on arrival) on all:



Below are the Aerosol Optical Depth (AOD) results from the same 2008 direct sun measurements. Each instrument was using the following AOD ETC constants, (etc06.023, etc06.061 and etc04.129). The revised control software (V376B) calculates AOD in real time with the use of new AODVAL.nnn files for each instrument.

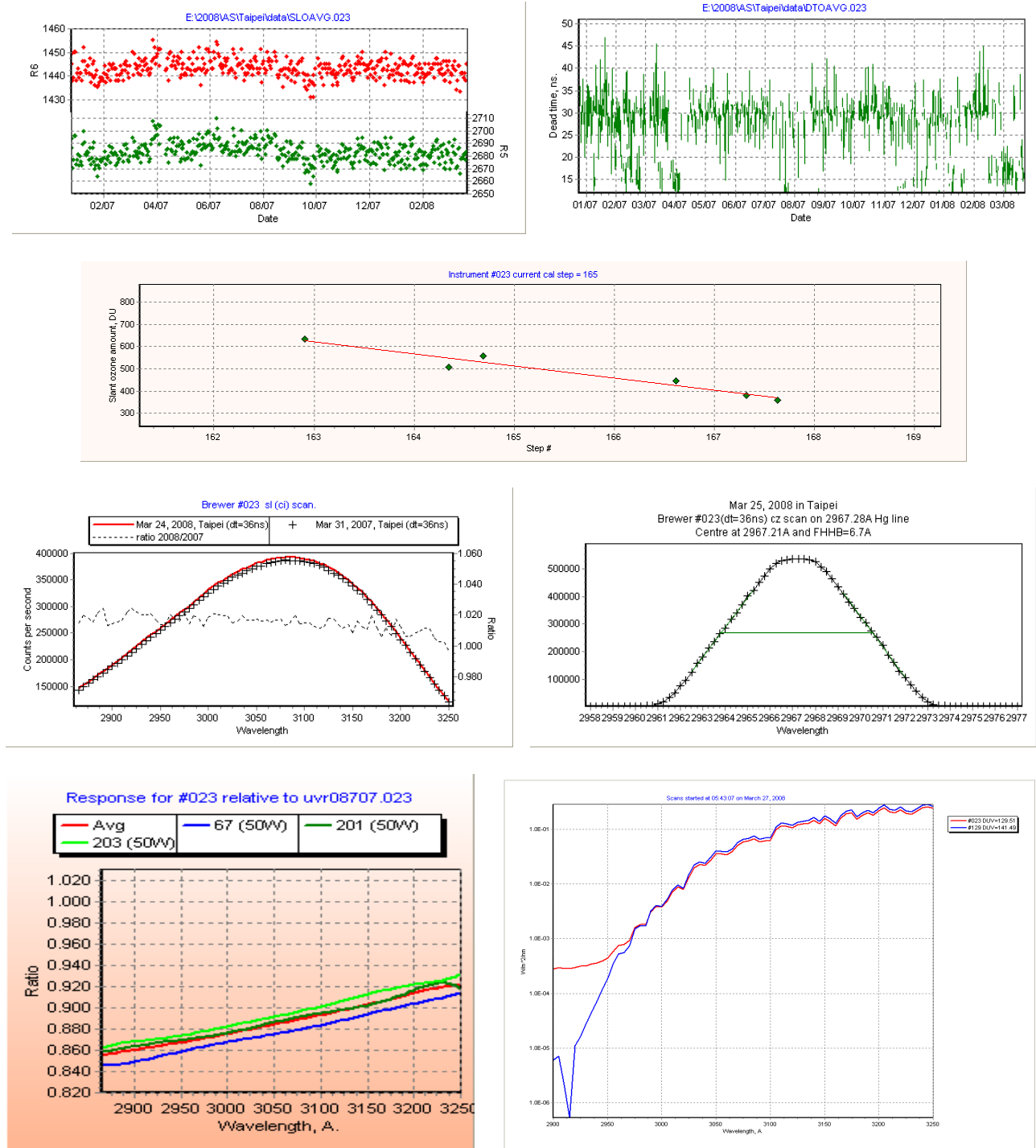


There was no major servicing required on any of the instruments except the drive wheel on #061 tracker was dirty. The shock mount seals were checked on #023 and #061 and based on the reported humidity control performance #129 must also still be good.

### Taipei Calibration Results - Brewer #023 graphs 2008

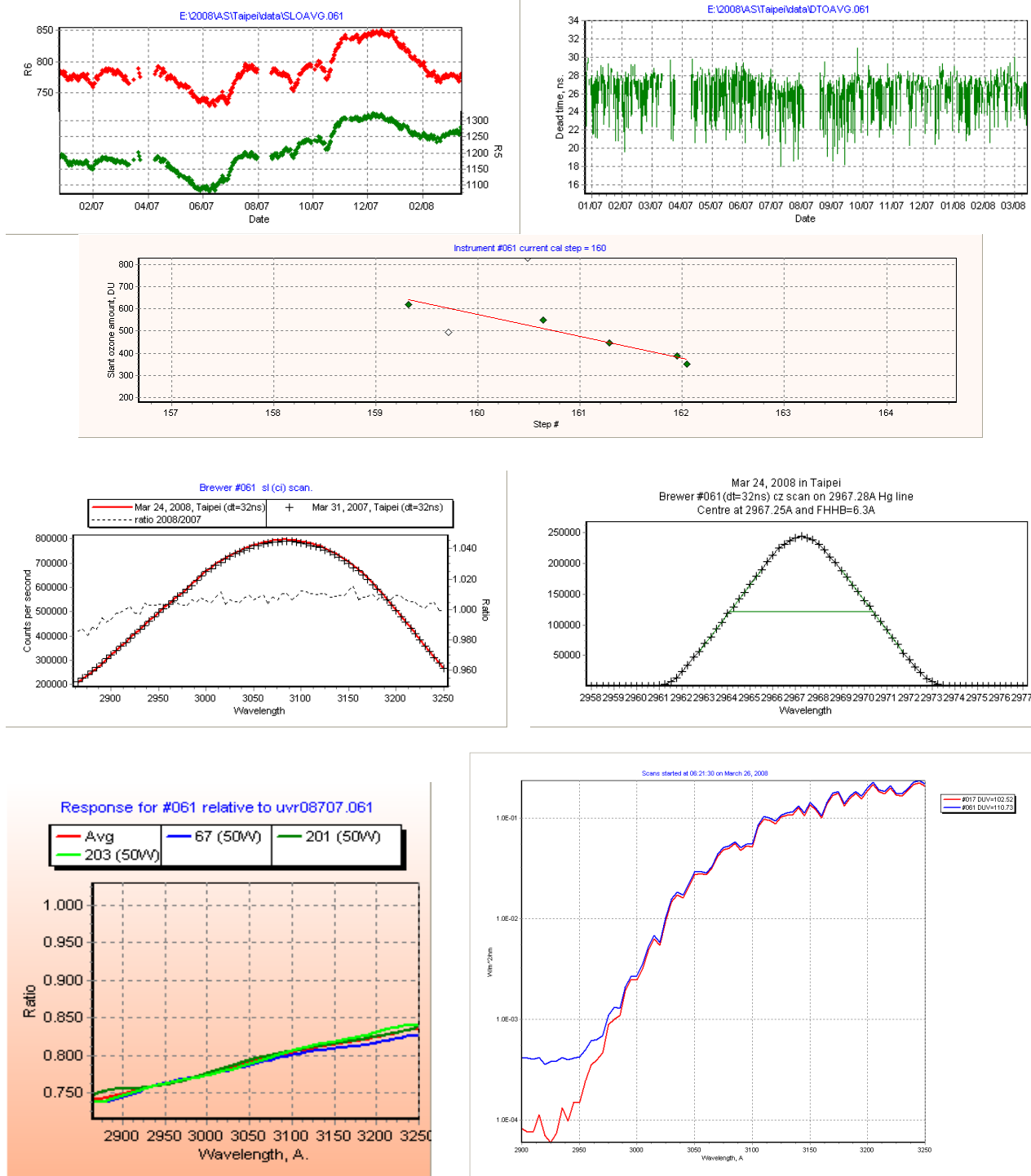
The SL ratios and DT results for past year are shown below with sun scan results. The shutter timing test was completed and the constant was adjusted to 86 from 80. This change produced slight improvement in the DT and RS results.

Then a standard lamp CI scan compared to a 2007 scan and the slit function using HG line 2967A. Then a ratio comparison of new UV response file (uvr08608.023) to last year is shown at the bottom. Finally a comparison of processed UF scans using in use response files on #023 and #129.



## Taipei Calibration Results - Brewer #061 graphs 2008

The SL ratios and DT results for past year from #061 are shown along with sun scan results. Then a standard lamp CI scan compared to a 2007 scan and slit function plot (CZ) of Hg line 2967A. The SL ratios did not change as much as previous years and so the UV filter was not changed. At the bottom is graph of new UV response file (uvr08508.061) compared to last year calibration and then a graph of a UF scan from #017 and #061 using the new response file. The tracker from #061 was cleaned and tested successfully.



## Taipei Calibration Results - Brewer #129 graphs 2008

The very stable standard lamp ratios, DT and RS results are shown below for the past year. The fourth graph is processing of GA (grating slope test) results using slightly revised GS constants of 1.006/-34. These constants should reduce variability in UV scans slightly. The previous constants were 1.005/-30. The sun scans showed that the cal step of 285 was still proper. Then a graph of standard lamp CI scan comparison to last year and CZ scan (slit function) of Hg line (2967A). Finally the new UV response file UVR08808.129 obtained from the 3 IOS 50w lamps and then compared to 2006 file in use.

