

## Taiwan CWB - 2007 Calibration Report of Brewer Ozone Spectrophotometers

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April 9, 2007

Calibration and service checks on the three Taiwan Brewers were completed at the Central Weather Bureau in Taipei, from March 24-April 1. The weather was poor initially for the ozone calibration checks however the last four days allowed comparative results to be collected but the sky was partly cloudy. The Chengkung instrument #061 without its tracker was relocated here for this campaign. All instruments have been working quite well for 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 were mostly stable at values of 480/975 as previous years. During this visit version 3.76A software was installed which completes the HP test automatically whenever the HG (wavelength calibration) is called.

It was determined that the ETC constants only should be adjusted slightly to values of 1750/700 to obtain best agreement to #017.

Sun Scan tests showed the cal step of 285 continues to be proper. The dead time (DT) results have been stable this past year at values of 32 ns. 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 V375f software (operating (\brewer\brew-f) directory) was upgraded to version V376A which includes aerosol optical depth calculations in real time, faster UV scans and remove the need to program HP tests in schedules. The random problem of software crashes during the reset RE test at local midnight were reduced. Hopefully it will not be necessary to switch back to V375E software in the \Brewer directory. It was recommended that the control computers be re-booted at least each week.

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

This Brewer was performing well and its standard lamp ratios have been stable at 1442/2685 since last September, after they had slowly decreased -18/-15 units from 2006 calibration period. The ozone results were a lower than #017 results and so the ETC constants were adjusted to values of 2545/2265, change of -15/-15 from last year values. The ETC constants of 2575/2290 from 2005 were still in use on arrival.

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 were higher than #061 and so the NO<sub>2</sub> ETC constants were adjusted to values of 470/480 from 535/515. UV calibration results produced file UVR08707.023 which was put into use. This new file was very close to 2006 file but the older uvr04904 file was in use which was producing ~8% higher UV results.

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

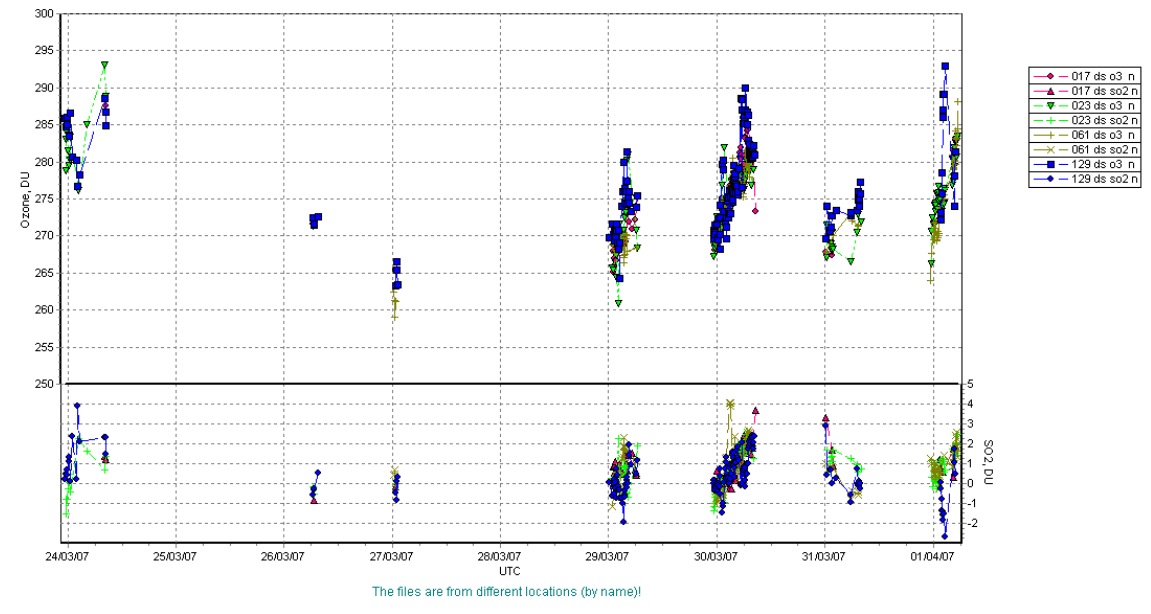
The SL ratios have continued to decrease since the 2006 calibration. The ETC's in use were 1955/785 (SL corrected by user). The SL ratios have decreased to 775/1175 from 2006 values of 1000/1650. These ETC's were found to give close agreement to #017 but the final recommended ETC's are 1950/850. Sun Scan test results showed that the cal step of 160 was still proper. The dispersion test results produced differences of <1.2 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 UVR08707.061 was different by ~-10% to last year calibration and so was put into use.

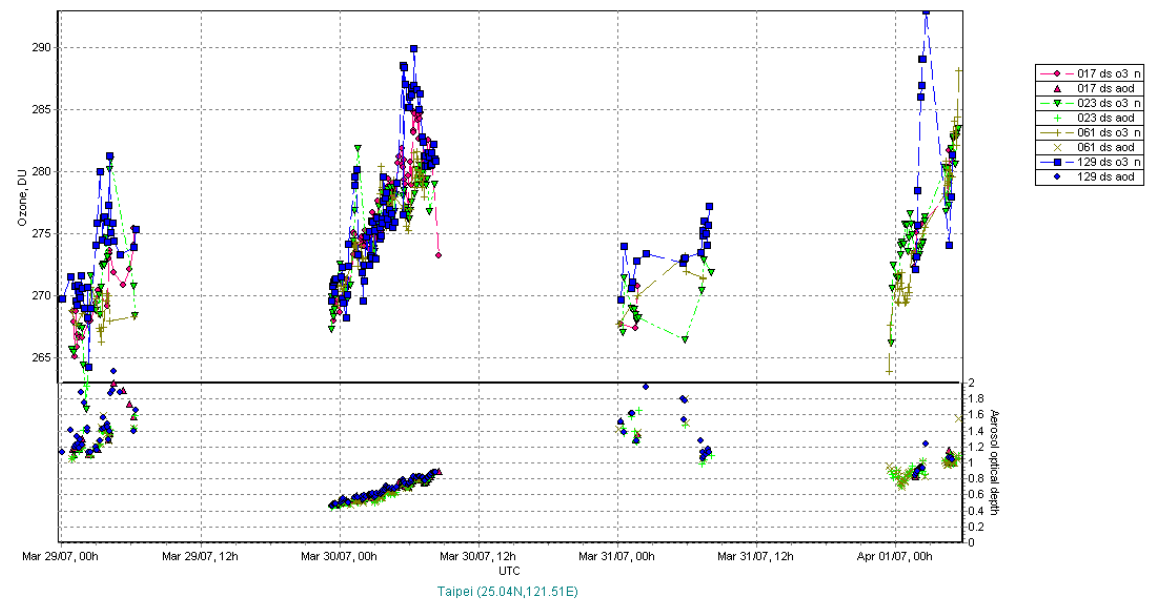
A revised global irradiance (GI) routine was installed on all computers and added to schedules to allow use of this new measurement which is believed to be more accurate than zenith sky measurements. The O3brewer program can be setup in the future to process this data recorded in the B-files. The 2006 ozone data was processed with the O3brewer program to produce WOUDC daily mean files.

**Final results:**

There was no major servicing required on any instrument. The shock mount seals were checked on #061 and based on the reported humidity control performance the other two instruments must still be good. Below are the final ozone and SO<sub>2</sub> results for the 8 days using the final constants on all:



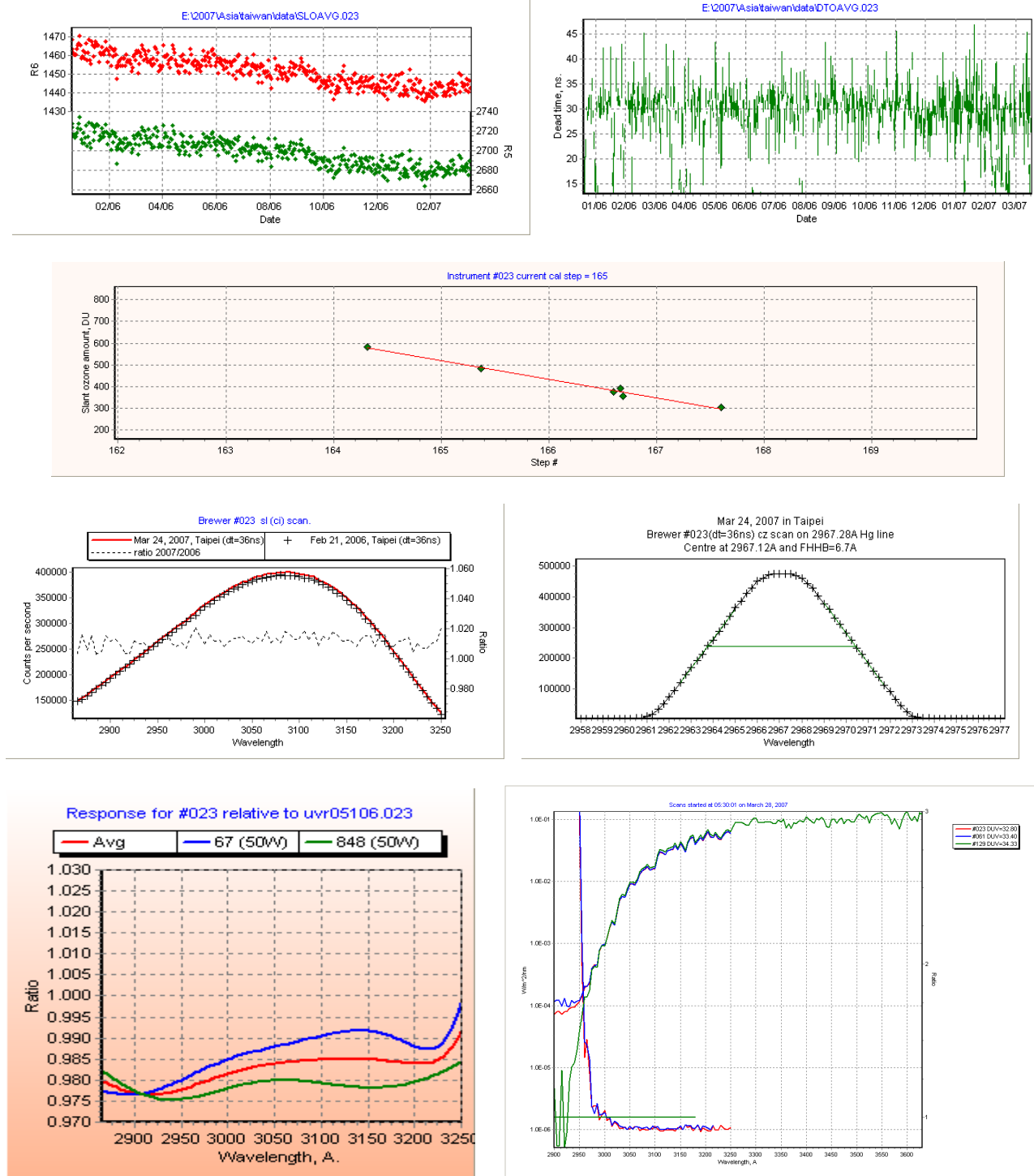
Below are the ozone and Aerosol Optical Depth (AOD) results from the same direct sun measurements for the last 4 days. Each instrument was using the following AOD ETC constants, (etc06.023, etc06.061 and etc04.129). The revised control software (V376A) calculates AOD in real time with the use of new AODVAL.nnn files for each instrument.



### Taipei Calibration Results - Brewer #023 graphs 2007

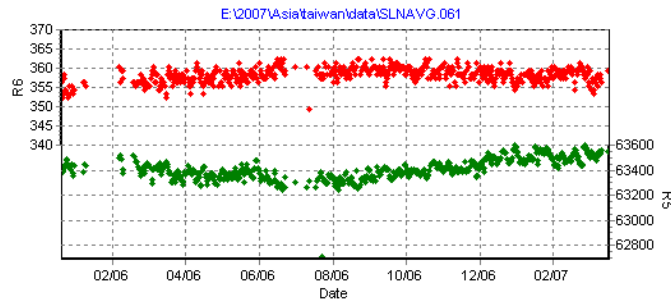
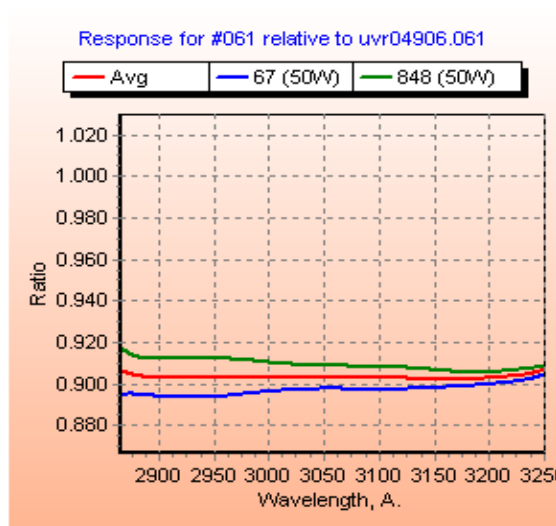
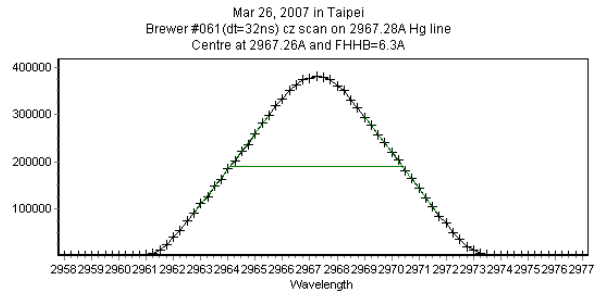
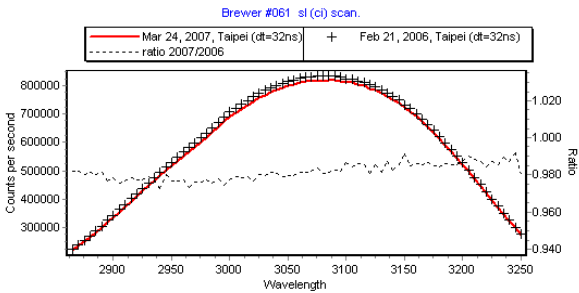
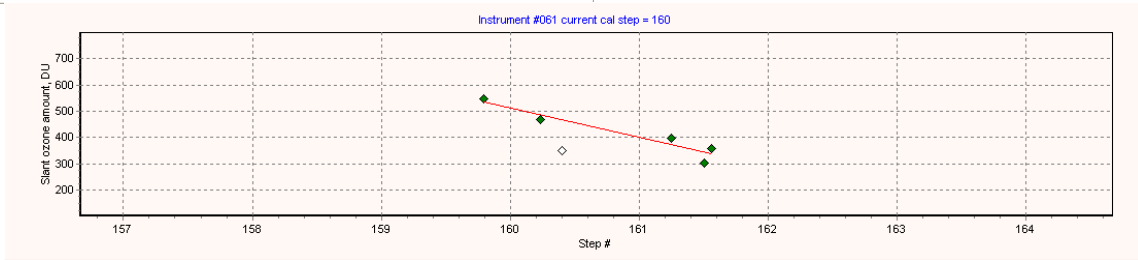
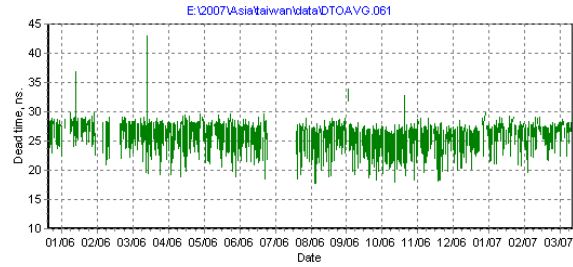
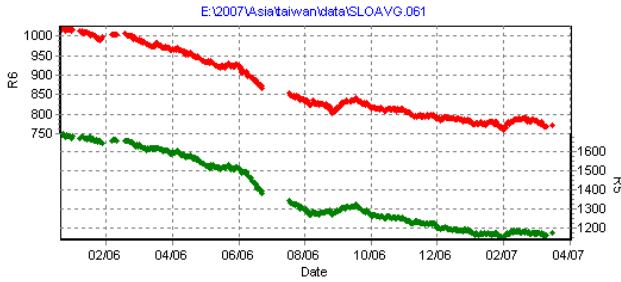
The SL ratios and DT results for past year are shown along with sun scan and standard lamp CI scan result compared to last year. Note data since September 15 should be reprocessed with the final ETC constants of 2545/2265 and with the 2006 recommended ETC's of 2560/2265 for period July/05 to Sept/06.

Then graphs of the slit function using HG line 2967A and comparison of new UV response file (uvr08707.023) to last year are shown at the bottom. Finally a comparison of processed UA scans using final recommended response files on each instruments using #129 as the reference for the ratios displayed.



### Taipei Calibration Results - Brewer #061 graphs 2007

The SL ratios and DT results for past year are shown along with sun scan results. Then a standard lamp CI scan compared to a 2006 scan and slit function plot (CZ) of Hg line 2967A. The large change in SL ratios in the past year is a concern and next year the UV filter should be changed. At the bottom is graph of new UV response file (uvr048707.061) compared to last year calibration and then the NO2 SL F-ratio and counts. Since the user reported tracking problems in Chengkung the procedures and recommended equipment for leveling the system were reviewed.



### Taipei Calibration Results - Brewer #129 graphs 2007

The standard lamp ratios and the DT results are shown below for the past year. The sun scan result shows that the cal step of 285 is still proper. Then standard lamp CI scan comparison to last year and CZ scans (slit function) of Hg lines 2967A and 3341A. Finally the ratio of the new UV response file to last year. The GS constants were found to be still proper set at values of 1.005 / -30.

