

Taiwan CWB - 2006 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 February 17-23. The weather was poor initially for the ozone calibration checks however the last two days were good. The Chengkung instrument #061 had been 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 reference standard again.

MKIII #129 Brewer Taipei:

The standard lamp ratios were mostly stable at values of 475/950 as previous years, however periodically they jump +20/+40 units. This instability that has been reported on in previous calibration reports is believed to be due to small variations in the setting of the second micrometer with the HP test. IOS is still investigating this performance and is improving the software. During this visit version 3.76 software was installed which completes the HP test automatically when the HG (wavelength calibration) is done. The new software also includes Aerosol Optical Depth (AOD) output with each direct sun (DS) measurement.

It was determined that the ETC constants only should be adjusted down slightly to values of 1760/660 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 33 ns. Dispersion test results produced constants very close to the file (dcf05505.129) in use and so no changes were made.

The new UV calibration (file UVR05306.129) was found to be very similar to files from the past 3 years and is recommended for future use. IOS in July 2005 adjusted its reference calibration lamps to the European PTB scale and this increased IOS lamp irradiances by an average of +7% and so this means #129 sensitivity has decreased by ~5%.

The V375f software (operating (\brewer\brew-f) directory) was upgraded to version V376 which includes aerosol optical depth calculations in real time and removing the need to program HP tests in schedules. This is because the revised HG routine calls the HP test first each time. However the random problems with this system of software crashes during the reset RE test continued during the visit and so it may be necessary to switch back to V375E software in the \Brewer directory. IOS is still searching for the reasons for this problem that occurs mainly on Asian computers.

MKIV Brewer #023 Taipei:

This Brewer was performing well and its standard lamp ratios have been stable at 1460/2715 since last July, when they decreased -10/-20 units for unknown reasons. The ozone results were a little lower than #017 results and so the ETC constants were adjusted to values of 2560/2265, change of -15/-25 from last year values.

Sun Scan test results showed that the cal step of 164 should be increased to step 165 and this was done on day 052 at 06 GMT. The dispersion test results were very similar to constants in use (< 3 steps difference and so file (dcf09299.023) was left in use. The NO2 results compared well to #061 and so no changes were made to these constants. UV calibration results produced file UVR05106.023 for the future, which was +14-8% higher than the last calibration. Reference note on page 3 regarding IOS calibration levels.

MKIV Brewer #061 from Chengkung:

The SL ratios decreased rapidly after the last calibration one year ago and since last August have been relatively stable. The desiccant was completely replaced at that time including on the inside of the spectrometer cover. The ETC's in use were 2206/1330 (SL corrected by user). The SL ratios have decreased to 1000/1650 from 2005 values of 1320/2260. These ETC's were found to give quite good agreement to #017. Sun Scan test results showed that the cal step of 162 should be changed to 160 and this was done on day 052 at 06 GMT. The dispersion test results produced differences of <1.5 steps and so the

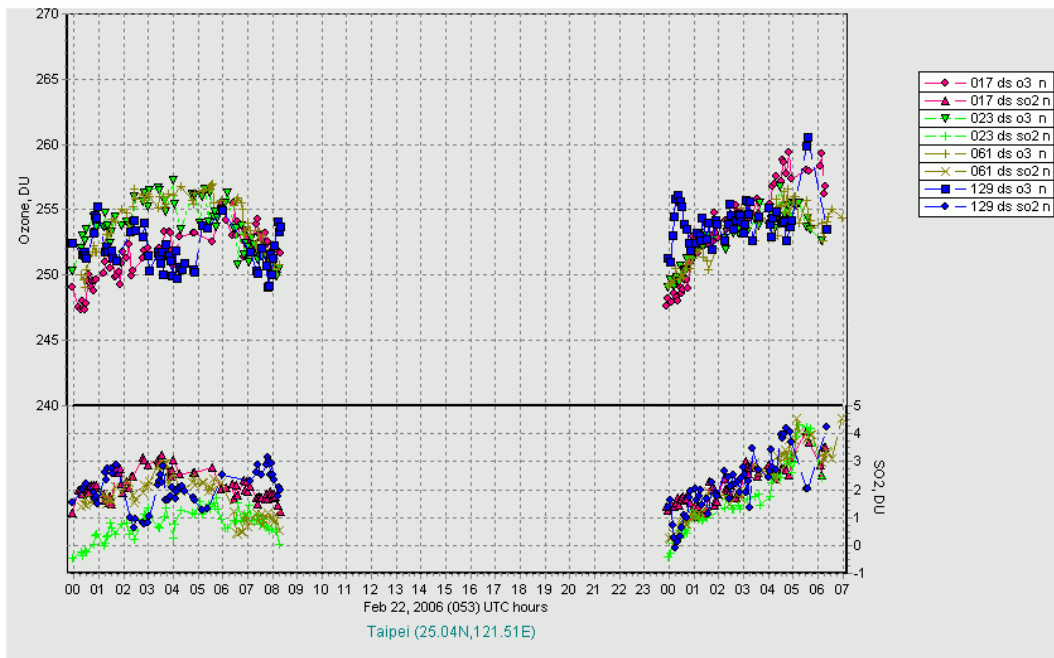
file (dcf05505.061) was left in use. The NO₂ results from #061 compared well with #023 and no changes to constants were made.

The final UV calibration stored in file UVR04906.061 was different by ~-10% to last year calibration and so was put into use. The TU (UV alignment) tests showed similar results to last year.

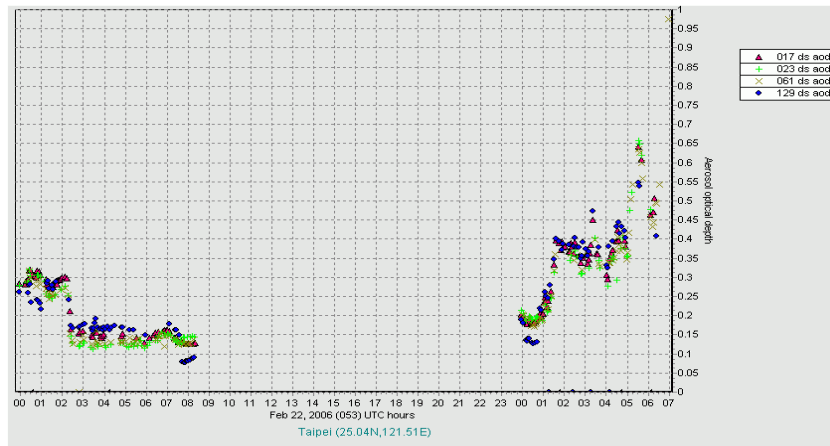
Servicing completed:

The three shock mount were checked on two instruments and the humidity control performance indicated they were all probably good. The seals on viewing window and cover on #061 were replaced. The tracker from #061 was serviced including repair of cables and after it was tested successfully. The spectrometer desiccant was replaced in all instruments. The third I/O board (I/O-D) was replaced in #023 and the operation of filterwheel FW#3 became proper again. The clock board batteries should be replaced in #061.

Below are the final ozone and SO₂ results for days 052 and 053 using the final constants on all:



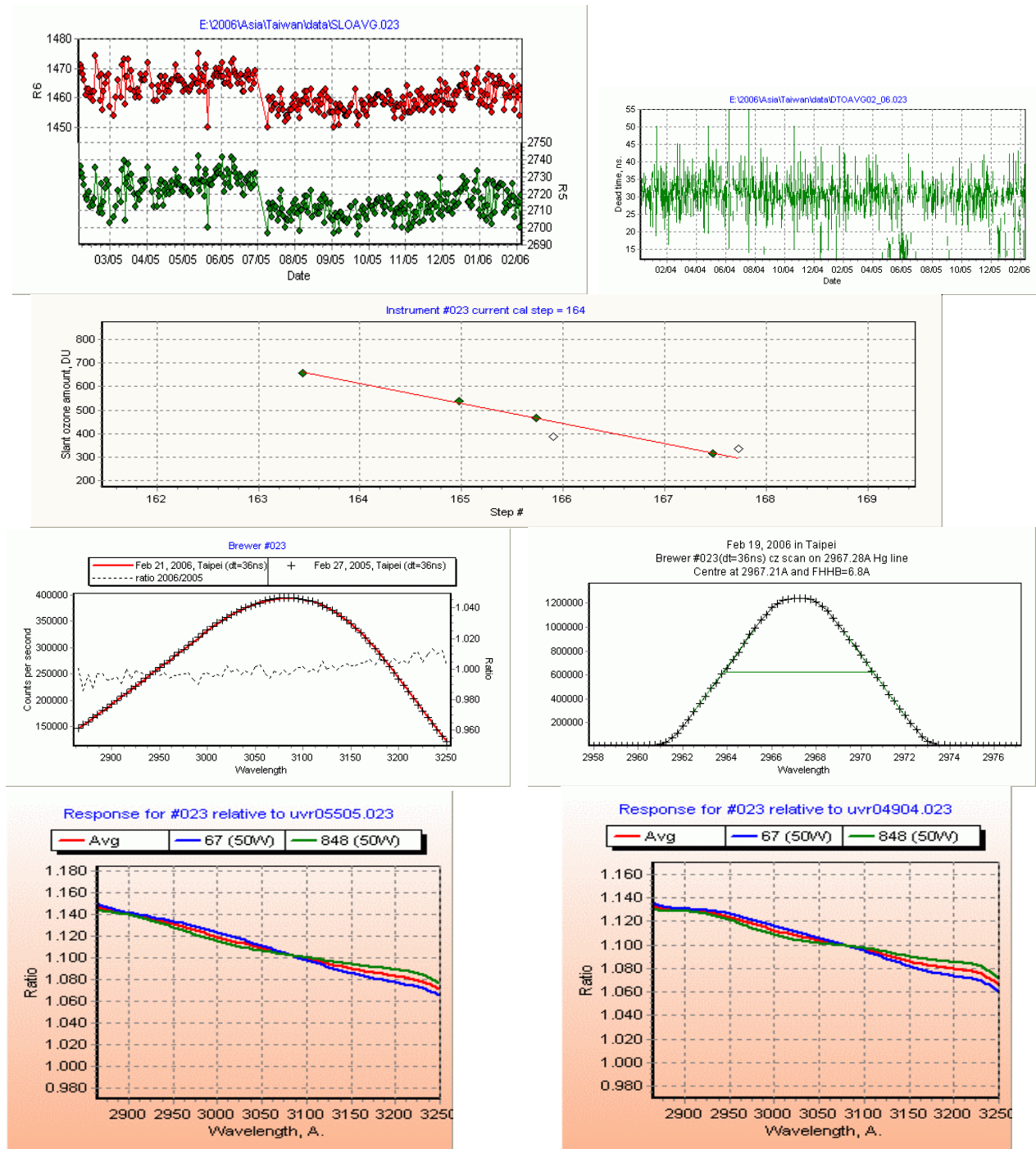
Below are the Aerosol Optical Depth (AOD) results from the same direct sun measurements as above using an IOS program which can also transfer an AOD calibration from #017 to each instrument. Each instrument now has revised AOD ETC constants, (etc06.nnn). The new control software (V376) calculates AOD in real time with the use of new AODVAL.nnn files for each instrument.



Taipei Calibration Results - Brewer #023 graphs 2006

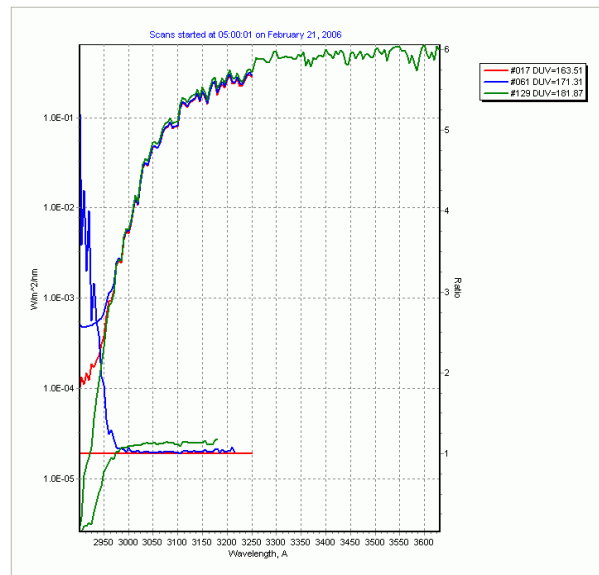
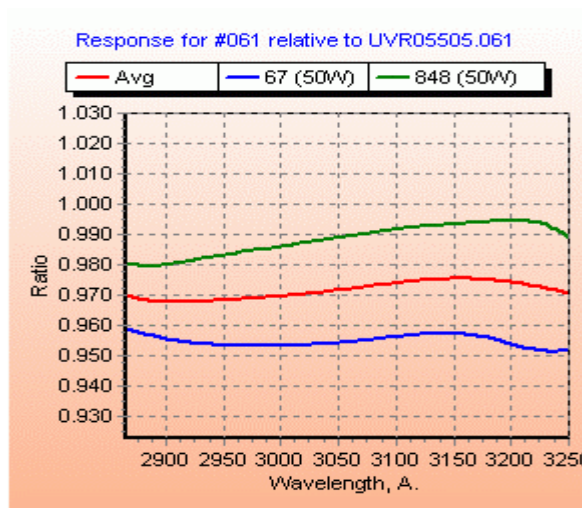
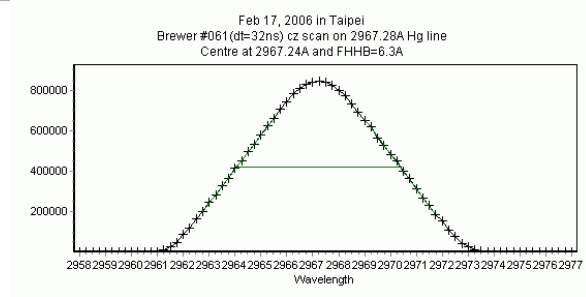
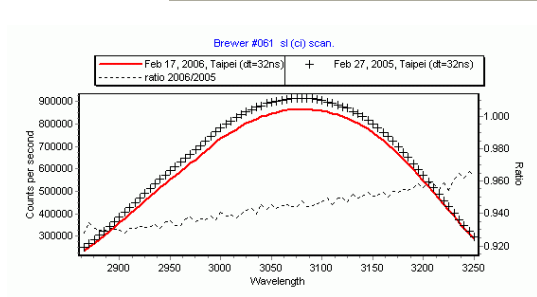
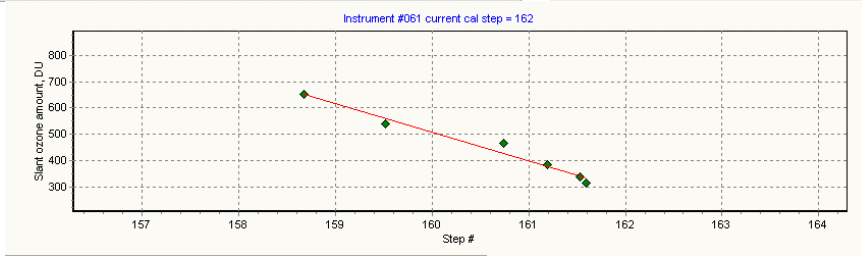
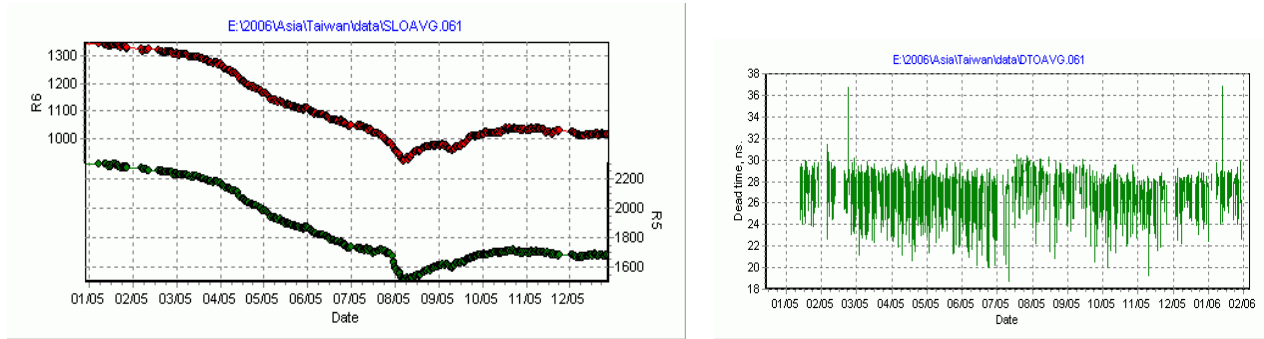
The SL ratios and DT results for past year are shown along with sun scan and standard lamp CI scan result compared to last year. Note data since last July should be reprocessed with the final ETC constants of 2575/2290 to correct ozone results. The reason for the sudden shift in ratios last year is unknown.

Then graphs of the slit function using HG line 2967A and comparison of new UV response file (uvr05106.023) to last two years are shown at the bottom. IOS in July 2005 adjusted its reference calibration lamps to the European PTB scale and this increased IOS lamp irradiances by an average of +7%, which explains part of the increase. Overall the instrument shows quite stable results compared to last year performance.



Taipei Calibration Results - Brewer #061 graphs 2006

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 2005 scan and slit function plot (CZ) of Hg line 2967A. The large change in SL ratios in the past year is a concern, however the change has slowed and hopefully the humidity can be kept under control with the new cover seals. At the bottom is graph of new UV response file (uvr04906.061) compared to last year calibration and finally UV scans from #061, #129 and #017 which show good agreement.



Taipei Calibration Results - Brewer #129 graphs 2006

The standard lamp ratios and the DT results are shown below for the past two years. 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 scan (slit function) of Hg line 2967A. Then the ratios of the new UV response file to result this year that is very similar to results last year. The last graph shows grating slope test results (G1, G5 files) from IOS program (graspro.exe) and it was concluded that the GS constants should be adjusted to values of 1.0058 / -28 from 1.005 / -30. This change should improve the differences at start and end of wavelength scans. Note also that IOS adjusted its calibration lamp levels up 7% in past year.

