

Calibration Report on Brewers #033, #157, #183, #185 at Izaña – July 18-22, 2011

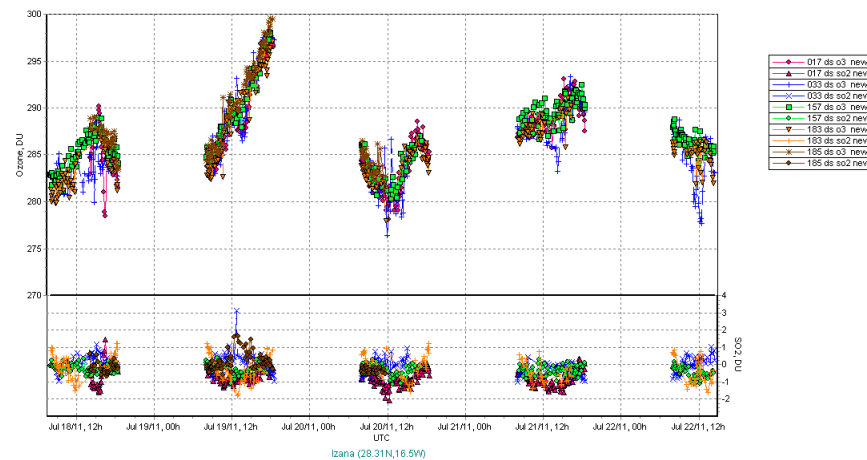
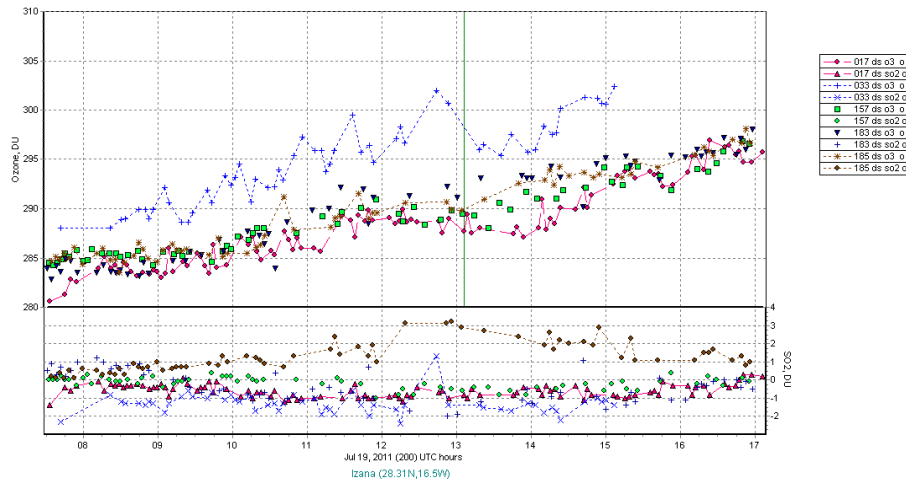
I. Introduction and Instrument Status:

The ozone calibration and servicing of four AEMET Brewer Spectrophotometers was completed by International Ozone Services Inc. (IOS). The traveling standard instrument #017 along with local standard #185 were used as the ozone calibration references. #185 had just previously been at the RBCC-E campaign with #017 as well. These Brewers appear to have operated well in the past year as monitored by the Standard Lamp (SL), DT and RS test results that have all been quite stable.

II. Ozone Test Results:

The weather co-operated reasonably well for the 5 days for direct sun observations and UV scans. Dispersion tests (dsp) were completed on #033 and recent data from #183 was processed to check the wavelength accuracy for UV scanning, ozone operating wavelengths and absorption coefficient.

Below is a graph of the ozone/SO₂ results from the second day of the local instruments before any corrections were made. The ozone from #033 was higher than the rest but became good after applying the change in SL ratios to the ETC constants. The SO₂ ETC constants for #157 and #183 were adjusted to obtain better agreement. The second graph below shows all of the results using final constants.



III. Summary of results and changes:

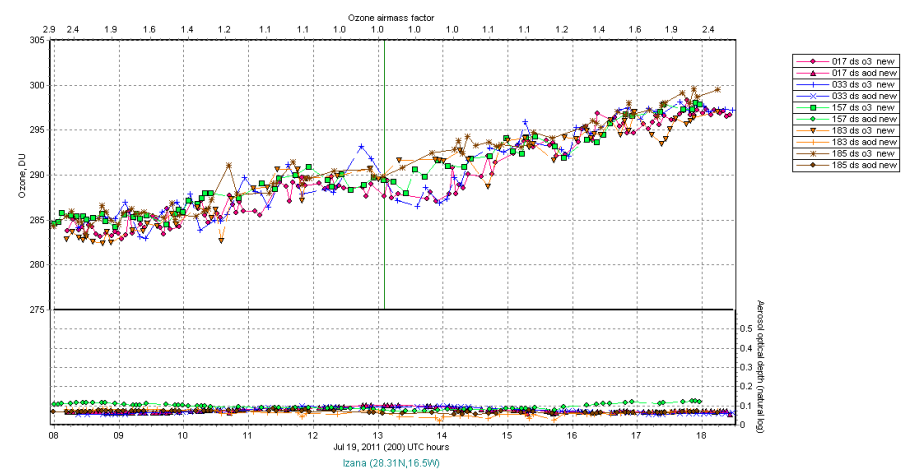
Instrument	#033	#157	#183	#185
SL ratios 2011 - initial -> final	2300 / 4305	351 / 585	333 / 602	311 / 445 -> 190 / 300 ?
SL ratios change from 2010	35 / 70	0	0	shifted after mic adjust
ETC constants 2011 (chg?)	3605 / 3910 (35 / 85)	1605 / 225 (0 / 45)	1600 / 270 (4 / 50)	1580 / 120 -> ? / ?
ETC constants last cal 2010	3570 / 3825	1605/180	1596 / 220	1574 / 115
Cal step (old / new)	920 -> 920	1026	1023	284 -> 1020
Absorption Coeff's (change)	.3365 / 1.1362	.3397 / 1.15	.3415 / 1.146	0.341 / 1.1495
ICF file recommended	icf19911.033	icf19911.157	icf19911.183	?
DCF file recommended	dcf27900.033	dcf25601.157	dcf20206.183	dcf20204.185
DT present/last/setting	37 / 38 / 40	23 / 25 / 32	23 / 23 / 26	30 / 30 / 33
GS const. (change?)	n / a	.998 / -10 (n/c)	.990 / 18 (chg)	.995 / 2.5 (n/c)
CI scan on SL to 2007 scan	~+35%	+10%	-8 to -4%	+ 5 -> +3%
CZ on 2967.28A hg - , fhbb	2967.1, 6.1A	2967.28, 6.3A	2967.49, 6.2A	2967.3, 6.3A
Repairs made	none	none	none	mic #1 bracket, chip

IV. Servicing and Software changes and Recommendations:

There were no serious servicing issues with any the instruments other than with #185 during the last 2 days. On day 201 a small adjustment of micrometer #1 bracket was made to allow proper operation to the end of the maximum range, i.e. the end barrel that activates the sensor would touch the bulkhead first. This should be an inconsequential action but the SL ratios decreased - by 110 units on ratio R6 and micrometer 1 position shifted to 12.48mm from 11.82mm. Testing was also completed to change the constants so that the 2967A Hg line would be used for wavelength calibration. Then when re-installed outside communications ceased and much time was spent looking for solutions. In the end the last communications chip on large electronics board was replaced and proper operation returned. But due to time constraints the ozone re-calibration of #185 could not be completed. IOS would like to receive data from the three MKIII instruments after this servicing and help with the evaluation of final constants.

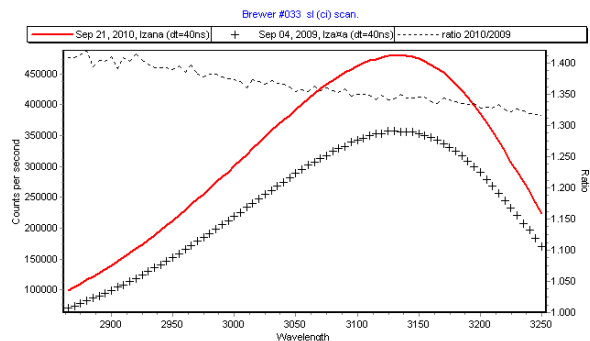
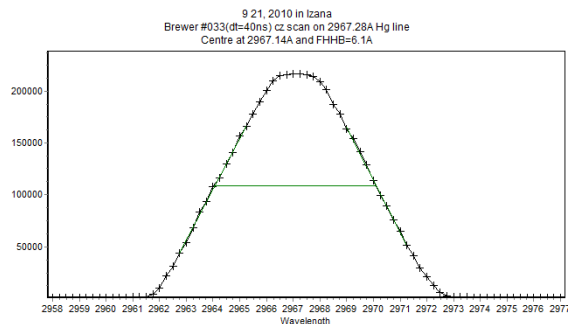
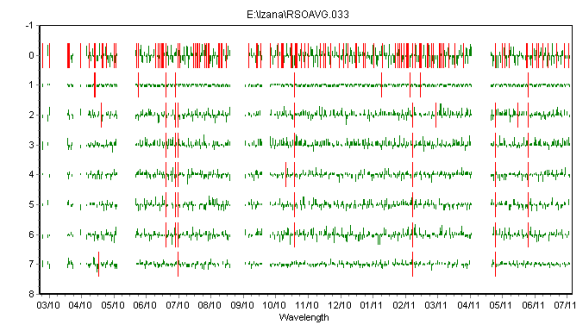
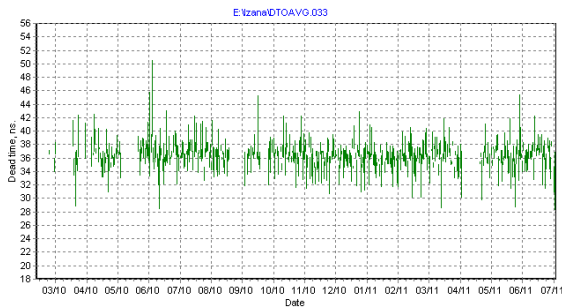
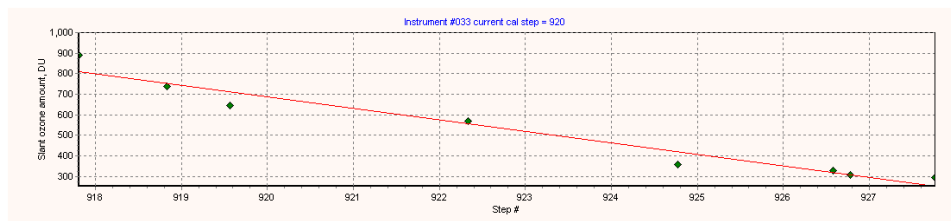
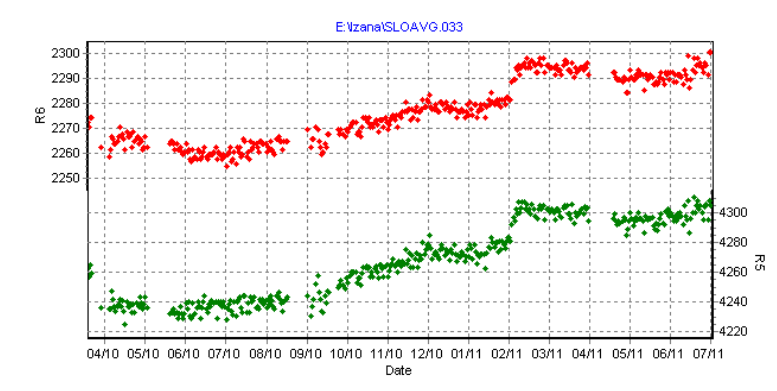
V. AOD results:

Below are the final ozone and aerosol optical depth (AOD) results for day 200. The AOD ETC constants for each instrument were adjusted down due to revised calibration constants for #017 established at this campaign. The final AOD levels at 320nm agreed much better with Cimel instrument results in Izaña. Revised AODVAL files are being provided with this report and with final recommended constants files.



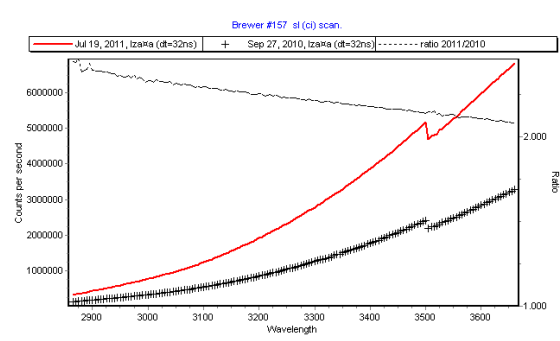
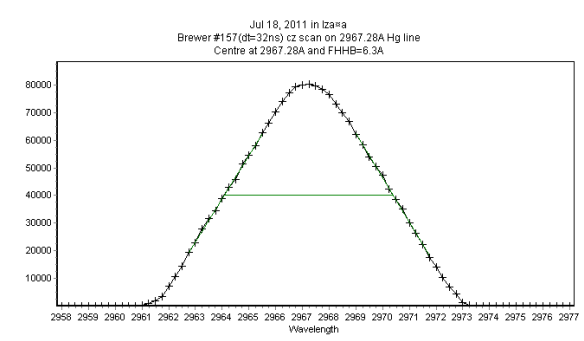
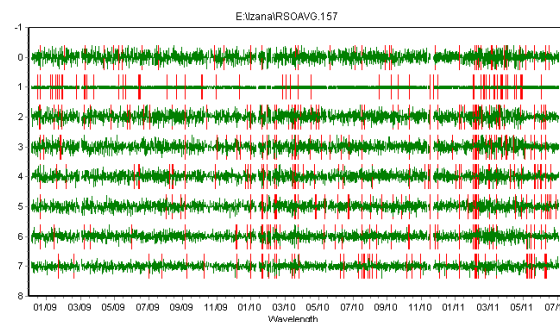
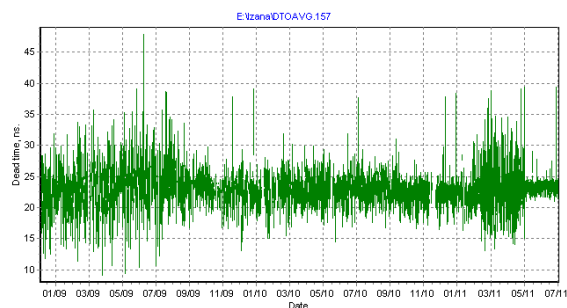
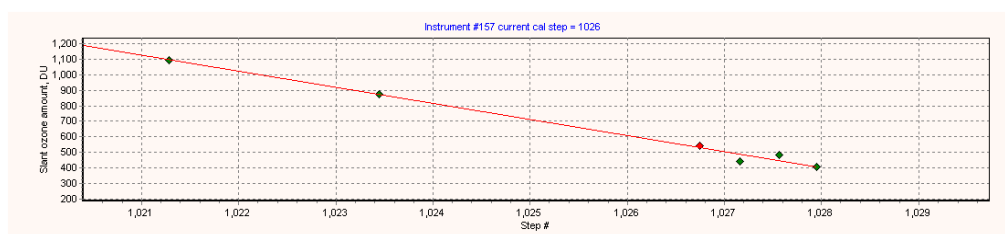
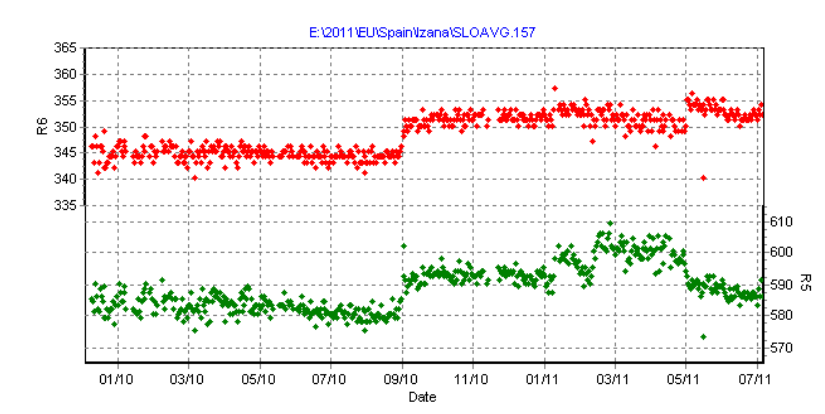
VI. Graphs of SL, SC, DT, RS, CZ and CI results for the MKII Brewer #033:

The SL ratios increased slowly and then more in February 2011 as shown below. When the change in ratios (35/85) was applied to the ETC constants then the ozone agreement to #017 was good. The final ETC constants were 3605/3910. The sun scan results in the graph below showed that the cal step setting of 920 was still ok. The next graphs show the DT, RS and CZ results and finally a comparison of present to previous SL CI scans, note the higher intensity level now.



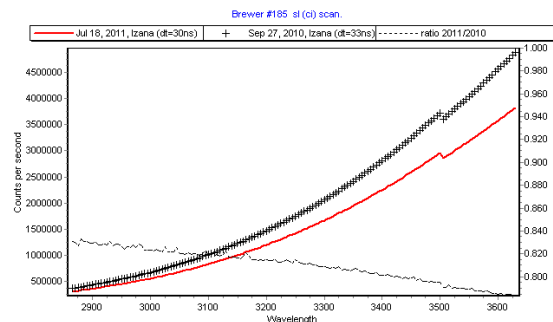
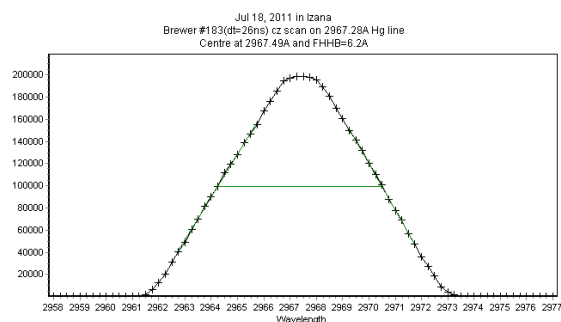
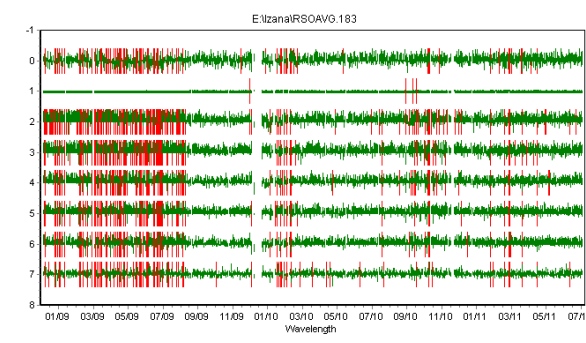
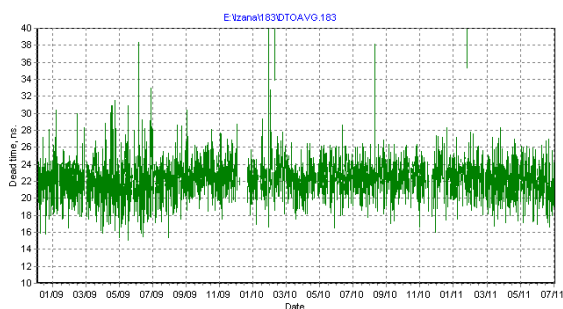
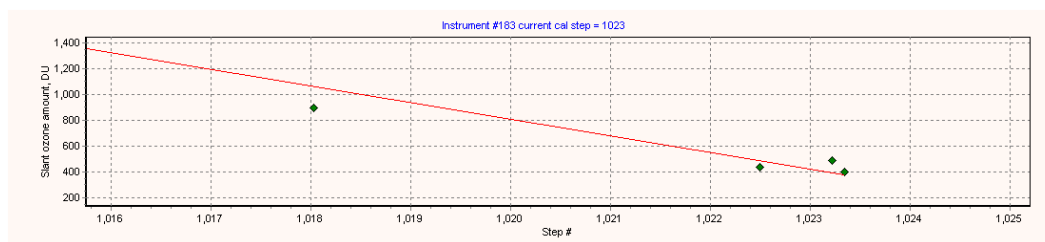
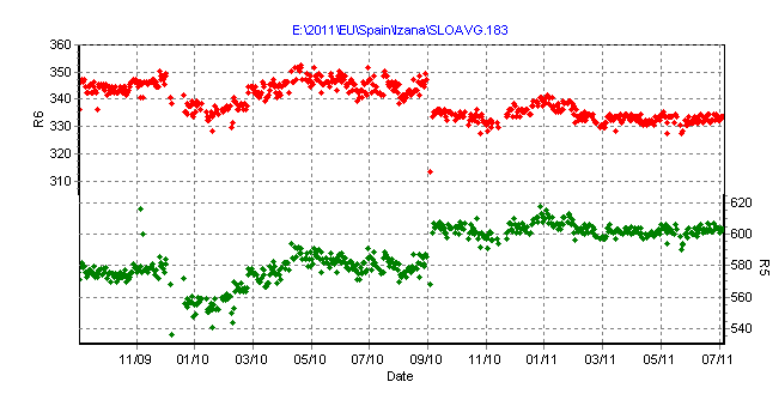
VII. Below are graphs of MKIII Brewer #157 of SL, SC, DT, RS, CZ and CI results:

In the past year the SL, DT and RS lamp tests from #157 have continued to be quite stable except for periods this year when zenith prism operation was poor. The sun scan results show cal step 1026 is still the proper position. The last graphs show the CZ scan of Hg lamp line and comparison of SL CI scans from now to last year.



VIII. Below are graphs of SL, SC, DT, RS, CZ and CI test results from the MKIII Brewer #183:

Note the stable SL ratios in the past year and the DT/RS results for the past two years. The sun scan results show that the cal step setting of 1023 was still the proper setting. The last graphs show the CZ scan of Hg lamp line and comparison of SL CI scans from now to last year.



IX. Below are graphs of SL, SC, DT, RS, CZ and CI test results from the MKIII Brewer #185:

All of these test results below show quite good stability. The instrument had just returned from El Arenosillo and was in Finland earlier in 2011. The sun scan results from El Arenosillo showed that the cal step setting of 284 was still correct. The next graphs of DT and RS results are normal and then the CZ scan of Hg lamp line and comparison of SL CI scans from now to last year. However as noted on page 2 the instrument SL ratios shifted significantly after servicing.

