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Interactive comment on "Detection and measurement of total ozone from stellar spectra: Paper 2. Historic data from 1935–1942" *by* R. E. M. Griffin

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Griffin compares the total ozone data derived from stellar spectra from Mount Wilson, 1935-1941, with total ozone at Arosa, which, however, is too far away for a reasonable comparison. Which other series, then, could be used for quality assessment? Unfortunately, there are not many series available. At Mt. Palomar and Pasadena, total ozone was measured in 1939 and 1940 with a double-quartz monochromator; if that data could be found somewhere, this would be very useful for this or future studies. Total ozone data are available, however, from Table Mountain, just a few kilometres from Mount Wilson, where the Smithsonian Institution operated an observatory. From August 1928 to August 1929, total ozone was measured with a Dobson (Féry prism) spectrophotograph (Dobson et al., 1930). These data do not overlap with the data presented by Griffin, but could be useful as a "background" climatology or for future studies of earlier Mount Wilson stellar spectra. From 1925 to 1948, thus overlapping with the period studied by Griffin, the Smithsonian Institution also performed extinction measurements in the visible wavelength range using a spectrobolometer. Measurements were sparse, only about 3-10 measurements were taken per month. Several researchers tried to derive total ozone from these data by making use of the ozone absorption in the Chappuis band. Angione and Roosen (1983) used transmission at two wavelengths (574 and 615 nm) for independent determination of ozone while the transmission at 11 other wavelengths was used to fit the background spectrum attenuated by Mie and aerosol scattering. Absorption by other gases was corrected in the 574 nm band. The results were interesting, but ozone columns obtained in this way are obviously too low for the 615 nm and probably also for the 574 nm band, and the day-to-day variability is relatively large. Therefore, the data were met with scepticism by the scientific community and quickly forgotten. However, I think that they might be valuable, especially in the case of Griffin's paper.

A few years ago I tried a re-evaluation of the Table Mountain total ozone data, but never published the results. Since the data could be useful for the author, I now put both the spectrobolometer data and the Dobson data from Table Mountain on a website (http://www.giub.unibe.ch/˜broenn/o3_data/index.html) and give a very brief description here. For the spectrobolometer data I digitized the tabulated data (970 measurements) from Angione and Roosen (1981) and recalculated ozone using more recent absorption coefficients (Burkholder and Talukdar, 1994) thereby applying the slit functions suggested by the authors. This had only a small effect; total ozone values for the 574 (615) nm bands increased (decreased) by about 1% (2.5%). Compared with 1979-1981 TOMS data, the 574 nm determination is about 10% lower. The increase in tropospheric ozone between the first half of the century and 1980 might explain some, but not all of the difference. The seasonal cycle of the Smithsonian data, however, is very similar to the one from TOMS, including characteristic features such as the steep decrease from May to June and the dip in November. I flagged some outliers based on deviations in the ratio of the two wavelength determinations. The correlation between the two determinations (574 and 615 nm) in the final data is 0.77, and correlation between pairs of observations performed on the same day is 0.94 (0.90) for the 574 (615) nm determination.

The originally published Dobson total ozone data were digitised and converted to Bass-Paur absorption cross sections by multiplying them with a factor of 1.246 as described in Brönnimann et al. (2003). Nothing else was done. The data again show the characteristics of the seasonal cycle (steep decrease in June) and are about 4% lower than 1979-1981 TOMS data. This means that the agreement is relatively good. The data are around 6% higher than the simultaneous spectrobolometer data. The correlations between the two are 0.71 (0.73) for the 574 (615) nm determination. It should be noted, however, that the variability in the spectrobolometer data significantly decreased in later periods, which could be due to an increased quality.

With respect to Mount Wilson data as published in the paper by Griffin, one could compare the seasonal cycles or try to compare pairs of observations taken on the same day. I briefly went through the data and unfortunately found no observation performed on the same day as at Mount Wilson. One has to admit a maximum time mismatch of 4 days (after which the autocorrelation in corresponding TOMS data drops to 0.55) to find Table Mountain total ozone values for 9 out of the 16 reported Mount Wilson total ozone values. Comparing the two data samples, there is a large (20%) difference in the absolute values. Obviously, one or both of the data sets has a systematic offset. Nevertheless, the correlations between Mount Wilson and Table Mountain total ozone are 0.90 for the 574 nm band (which I consider the more reliable of the two determinations) and 0.42 for the 615 nm band. Maybe the author finds the data useful for further comparisons in the current paper or for future work with additional Mount Wilson total ozone data.

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