

Interactive comment on “Re-evaluation of the 1950–1962 total ozone record from Longyearbyen, Svalbard” by C. Vogler et al.

Anonymous Referee #1

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General remarks:

This paper is very useful in that it presents an attempt to extend and improve the past data set of total ozone measurement in the Arctic, in a period before the effects of CFC emissions on total ozone. A major problem is that the analysis uses information from the TOMS satellite data set, Version 7, which was replaced by Version 8 in 2004. The analysis in this paper will have to be redone with the Version 8 data set, and conclusions reevaluated.

The analysis using the TOMS data set is to define a relationship between Troms? and Longyearbyen, and that relationship is then used to evaluate the reprocessing of data a much earlier period. This assumes the two periods have similar atmospheric

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dynamics. Using the techniques described in the WMO/GAW report no. 29 (referenced in this paper) sections 3.3.1 would perhaps determine if this assumption is valid.

The "error bars" associated with the resultant monthly values are not presented or discussed, and would help the user.

Specific Comments:

Section 2. *Para. 1: Is there a reference for the claim: "Dobson measurements were, until recently, the only technique which gave satisfactory results under cloudy conditions.?"

*Para. 2: Any known period of possible volcanic aerosol interference during this study?

*Para. 3. last sentence: "artificial light sources." These are better named "instrumental standard lamps." Is there any record of the tests made with the instruments standard lamps?

Section 3. *Para. 4. Calculation of airmass for Dobson measurements (called μ) from Solar Zenith Angle (μ) is different from that calculation for normally defined airmass. The difference can large at large SZA, and is dependent on the choice of the height of the peak of the ozone profile. An explicit depiction of the equation used to convert SZA to μ would be helpful.

*Para. 5. Unclear if the 1993 O₃ absorption coefficients were used. A table of the ozone absorption coefficients and Rayleigh scattering values, and a depiction of the equations used would be helpful.

* Last Para. The μ limits for a measurement using a particular wavelength pair are different depending on the wavelength pair being used. It's not clear if the limit chosen is for just C pair. DS observations need clear view of the sun, not completely clear sky.

Section 4. This reviewer found the title of section not quite descriptive. "Using the TOMS Data Set to establish the relationship between Longyearbyen and Tromsø"?

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* Para 4. The reason for taking the C direct sun observations as the basis for the reference data set is understood. Consider this: The single pair equation has a large term for Rayleigh scattering, and this term is dependent on atmospheric pressure. Was the effect of the actual station pressure included in the calculation, or the magnitude the effect investigated?

*Para 5. If double pair DS measurements are made, then an estimation of the effect of aerosol, or of the calibration error can be made. Considering a perfectly calibrated instrument and a double pair observation, the difference between the ozone calculated from the two single pair measurements in the observation, and the ozone calculated from the combination is an indication of the aerosol effect. Again, a more complete calculation including the atmospheric pressure at the time of the measurement should be used. If the sky is very clear, then this investigation gives an indication of the calibration error. Was any investigation made into the double pair vs. single pair ozone, in the period that double pair observations were made?

Technical suggestions:

Sec 8. parentheses should be parenthesis

References:

Correct reference for Report#6: Komhyr, W.D., Operations Handbook - Ozone Observations with a Dobson Spectrophotometer, WMO Global Ozone Research and Monitoring Project, Report No. 6, 1980.

Suggest reading this reference:

Basher, R.E., Review of the Dobson Spectrophotometer and Its Accuracy, WMO Global Ozone Research and Monitoring Project, Report No. 13, December 1982.

(<http://www.cmdl.noaa.gov/ozww/dobson/papers/report13/report13.html>)

Interactive comment on Atmos. Chem. Phys. Discuss., 6, 3913, 2006.