Stability of the Regional Brewer Calibration Center for Europe Triad during the period 2005 – 2016 Sergio Fabián León-Luis, et al. AMT-2017-460

Overview

This is an important paper of interest to the community monitoring ozone from the ground and from space. It contains information which needs to be retained in the literature for the long-term understanding of the performance of the global ozone observing system. However, it is not publishable in its current state and requires major revisions. Some comments were accumulated in the course of making this assessment and are included herein. Hopefully, these will be of use to the authors and perhaps identify some of the shortcomings in the presentation that are hindering its publication at this time. After revision it will need a further review.

General comments

Both "Center" and "Centre" have been used to describe the "Regional Brewer Calibration Center for Europe". One should be chosen consistent with its formal use or the style guide for AMT.

The expression 'lines' is usually reserved for emission and absorption lines, which are very narrow. The word bands seems a better choice in referring to the Brewer measurement wavebands. This has been noted in some places but not all.

There is a tendency throughout to use language loosely and elliptically. For example, one does not compare results to a Brewer, one compares Brewer data or measurements to those of another instrument.

Detailed comments

Page numbers listed are the PDF pages

Abstract

Page 1 Line 1	"Total ozone column measurements can be made using""
Page 1 Line 2	"In 2003,"
Page 1 Line 3	" and since 2011 it has transferred"
Page 1 Line 4	" calibration, mainly to other European Brewers, using Brewer #185"
Page 1 Line 5	" annually, alternating"
Page 1 Line 6	" focused on reporting on the stability "

Page 1 Line 10	" to the data from the Izana triad allows the comparison of the"
Page 1 Line 13	" standard deviation of the mean equal" "In opposite, using" Suggest " Alternatively, using the procedure used to analyze the data from the Arosa Triad"
Page 1 Line 14	" presents a relative standard deviation of about"
Page 1 Line 15	" method used for the data from the World Triad Reference"
Page 1 Line 16	" gives monthly values of 0.3%"
Page 1 Line 17	" datasets were analyzed" " second only included "
Page 1 Line 18	"Furthermore, this paper also describes the Langley method used to determine the Extra-Terrestrial Constants (ETC) for the RBCC-E Triad, the necessary first step toward accurate ozone measurement."
Page 2 Line 2	"Until a few decades ago, it was thought that the ozone concentration was constant in the stratosphere. However, after the discovery of the hole in the ozone layer in the mid-1980s, this idea was discarded (Farman et al., 1985)". This is a problematic statement. Ozone is variable, it has annual cycles - and longer-term cycles - and a non-uniform global distribution. It is not clear how to accurately express the simple thought the authors are searching for. Perhaps something like "Historical measurement s - pre 1980 - indicated that the morphology of ozone was not changing significantly with time. However, the Antarctic measurements of Farman et al., published in 1985, changed that view"
Page 2 Line 4	"Concerns related to the negative effects that UV radiation can have on terrestrial life"
Page 2 Line 6	" agents that led to this decrease"
Page 2 Line 8	" total ozone column abundance"
Page 2 Line 9	" Fioletov et al., 2005." And reference: Fioletov, V. E.; J. B. Kerr, C.T. McElroy, D.I. Wardle, V. Savastiouk, and T.S. Grajnar, The Brewer reference triad, Geophys. Res. Lett., 32, 10.1029, 2005.
Page 2 Line 12	Fioletov, V. E.: Comparison of Brewer ultraviolet irradiance measurements with total ozone mapping spectrometer satellite retrievals, Optical Engineering, 41, 3051, https://doi.org/10.1117/1.1516818, http://opticalengineering.spiedigitallibrary.org/article.aspx?doi=10.1117/1. 1516818, 2002. This is not a good reference for Brewer aerosol

	measurements. It is, however, appropriate for UV Irradiance measurements. Suggest that the references be segregated and repeatd if necessary to make this clear.
Page 2 Line 14	" wavelenght separation" Spelling: " wavelength separation" " spectral bands [regions?]" " These bands"
Page 2 Line 16	"Although the prototype Brewer was developed in the early 1970s" " has had on-going technical improvements to improve its accuracy"
Page 2 Line 20	Delete "concentration"
Page 2 Line 21	Capitalize "Brewers present this"
Page 2 Line 24	" consisting of"
Page 2 Line 26	" (Fioletov et al., 2005)"
Page 2 Line 27	" parallel with the World Triad Reference"
Page 2 Line 30	" are calibrated by comparison with the travelling"
Page 3 Line 9	" Observatory is located on the island of Tenerife"
Page 3 Line 15	" campaigns through the travelling "
Page 3 Line 16	"These values were calculated using measurements in a range where Brewer #017 measurements are not strongly affected by stray light"
Page 3 Line 23	" each Brewer at its local station"
Page 3 Line 32	" which will allow the calculation of the TOC in near real time"
Page 4 Line 1	"Currently, approximately 40 Brewers"
Page 4 Line 9	"Also in this section the results of a study on the behavior of the RBCC-E Triad as a function of SZA range at which the measurements were performed."
Page 4 Line 13	" four spectral bands which"
Page 4 Line 14	" with local maximum and minimum ozone absorption cross-sections." "The light intensity"
Page 4 Line 16	" the contribution of Rayleigh"

Page 4 Line 17	" more than one band is" This is not the main reason. The ratio technique eliminates the dependence of the absorption function on absolute intensity signal and the right wavelength weighting stops aerosol from interfering." 17 and 18 need a little more work. A fifth wavelength is included to measure SO_2
Page 4 Line 19	Suggest: "The Beer-Lambert law"
Page 4 Line 22	"where τ is the gas concentration" 1. τ is used in the literature for optical depth, 2. X is normally used for ozone amount, not in concentration (molecules/cm ³) but in cm (or other length units) to go along with α in cm ⁻¹ . The airmass for ozone is usually written as μ to distinguish it from the airmass for Rayleigh scattering, m.
Page 4 Line 29	The equations in the PDF did not fare well.
Page 4 Line 15	Measurements on slits 2 to 6 are used for SO_2 and ozone.
Page 4 Line 24	See earlier notes on variable names.