

EGU21-15316

<https://doi.org/10.5194/egusphere-egu21-15316>

EGU General Assembly 2021

© Author(s) 2021. This work is distributed under the Creative Commons Attribution 4.0 License.



## A new data set for the Brewer spectrophotometer uncertainty budget in the total ozone column measurements

**Francisco Carlos Parra-Rojas**<sup>1,2</sup>, Alberto Redondas<sup>1,2</sup>, Alberto Berjón<sup>1,3</sup>, and Javier López-Solano<sup>1,3</sup>

<sup>1</sup>Agencia Estatal de Meteorología, Izaña Atmospheric Research Center, Santa Cruz de Tenerife, Spain (fparraro@gmail.com)

<sup>2</sup>Regional Brewer Calibration Center for Europe, Izaña Atmospheric Research Center, Tenerife, Spain

<sup>3</sup>TRAGSATEC, Madrid, Spain

Brewer spectrophotometers are one of the most widely used instruments for measuring the Total Ozone Column (TOC) in the world, which is obtained by measuring solar radiance at a set of UV sensible wavelengths. To date, the value of the uncertainty in these measures has not been obtained quantitatively. With this work, we have carried out an exhaustive study of the uncertainties that have affected the measure of TOC with data obtained during the first ATMOZ field campaign carried out between 12-25 September 2016 at the Izaña Atmospheric Observatory, Canary Islands, Spain at 2373 m.a.s.l., organized by the Spanish Meteorological Agency (AEMET) and the World Radiation Center (PMOD/WRC). For this, we have differentiated between three uncertainty components: related to the measure (dead time, filters, etc), model components (cross sections, etc) and atmospheric components (effective temperatures and heights, etc). The total uncertainty has been obtained through the propagation of errors of the different parameters, and the cross-correlations between the model and atmospheric components, using two different data sets. With the standard algorithm we have obtained the expected  $2\sigma$ -uncertainty, around 2.4% for the three RBCC-E Triad Brewer double-monochromator spectrophotometers studied (Br157, Br183 and Br185) at noon and using the Extra-Terrestrial Constant (ETC) Langley calibration. On the other hand, for these same spectrophotometers, and using an updated algorithm the  $2\sigma$ -uncertainty are reduced to values around 1.3 % in the TOC measurement. In first approximation, ignoring the cross-correlations the ozone absorption coefficient covers the most of total ozone uncertainty in both algorithms, followed by the ozone optical mass, the ETC and the measurement uncertainties.