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Variability and Trend of Total Ozone Column from Brewer Spectrophotometer and Satellite Measurements Over South of Brazil

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Total ozone columns (TOC) have been measured in the South of Brazil, at Santa Maria, since 1992, by the use of three Brewer spectrometers: MKIV#081 from 1992 to 2000, MKII#056 from 2000 to 2002 and MKIII #167 from 2002 to the present. All the maintenance and observations have been made within the Brewer Brazilian network in the Southern Space Observatory (SSO). For the purpose of this study we combined all the Brewer datasets for comparison with satellite observations over the South of Brazil, i.e. TOMS (Total Ozone Mapping Spectrometer) aboard Nimbus-7 from 1979 to 1993, Meteor-3 between 1991 and 1994 and Earth Probe from 1996 to 2005) and OMI (Ozone Monitoring Instrument) aboard Aura (from 2004 till now). Similar to Brewer datasets, monthly values of TCO observations recorded by satellites over the Brazilian Southern Space Observatory in São Martinho da Serra (29.42°S, 53.87°W) are merged in one continuous 36-year time-series. On the merged datasets we applied the Trend-Run model (Bencherif et al., 2006; Begue et al, 2010), a multi-regression model based on the principle of breaking down the variations of ozone time-series into a sum of several forcings (seasonal cycles, QBO, ENSO, Solar cycles. . .). Besides to trend estimate, the trend-Run model enable to study TCO variability between 1979 and 2014. The trend values are derived from the residual terms as a linear function. A preliminary study has been conducted to validate the merged satellite data by comparing with Brewer measurement. A good agreement that is expressed by regression coefficient (R^2) > 0.82 and 0.93 is observed between the ground-based (Brewer) and satellite TOMS and OMI data, respectively and the coefficient C_2 , used to quantify how well the fitting model describes the observed data, is 0.87. The results show a significative negative trend over the whole period ($-1.39 \pm 0.30\%$) per decade over the south of Brazil. In the present work, we also investigate and discuss the contributions of the main forcings as estimated by the model.