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Atmospheric Chemistry and Physics Discussions

Interactive comment on "Stratospheric ozone interannual variability (1995–2011) as observed by Lidar and Satellite at Mauna Loa Observatory, HI and Table Mountain Facility, CA" *by* G. Kirgis et al.

Anonymous Referee #2

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In the paper continuous long-term ozone measurements of Lidar instruments from two sites (Mauna Loa Observatory, 34oN, 155oW and JPL Table Mountain Facility, 34oN, 117oW) are presented and analyzed in comparison with merged overpass satellite data (SAGE II, UARS-HALOE and Aura MLS). The study documents the key role of reliable, high quality long-term ozone measurements of ground based instruments. For the analysis statistical multiple linear regression modeling was used. The study convinces by the careful analysis, e.g. concerning selection and discussion of the used proxies. I propose publication if the following points are adequately addressed: General points: 1. I miss more discussion of vertical resolution of the measurements, both concerning Lidar and satellite measurements. What means "high vertical resolution" in

case of Lidar measurements, how are the averaging kernels of satellite measurements addressed ? 2. Drift between ground based and satellite series: I think relative drifts in the order of 5% per year are dramatic preventing any useful comparison of trend analysis. Specific points: 3. p. 30828, line 10: How is "high resolution vertical profile" defined ? 4. p. 30830, line 11-14: . . .. Using air density and temperature obtained from Lidar or from daily NCEP data: How good is the quality of the retrieved ozone profiles when NCEP daily analysis are used instead of air density and temperature of Lidar measurements ? 5. p. 30830, line 14: How is "high vertical resolution" defined ? 6. p. 30830, line 16: Can you give a reference (possibly report) concerning the technical details of instrumental changes ? 7. p. 30830, line 27: Please give a reference for definition of relative error. 8. p. 30832: Fig. 1: I suggest to mention in the text, that no measurements of the TMF Lidar are available around the year 2000. 9. p. 30832, line 25: (lack of) correlation between at TMF and satellite series in higher stratosphere: Is it not possible, that the large drift between Aura MLS and other data also affects the correlation at these altitudes ? 10. p. 30833, line 7: . . . drifts are also low. . ..: I find the relative drift of Aura MLS vs. other satellite and Lidar data of 5% yr-1 at altitudes of 35 km and above dramatic making it useless to include the MLS data in the upper stratosphere for reliable trend analysis. 11. p. 30834, line 27: you might add the reference: S. Brönnimann, et al.: Extreme Climate of the Global Tropopsphere and Stratosphere 1940-1942 related to El Nino, Nature, 431, 971-974 (2004). 12. p. 30836, line 15: Linear trends: I think you should be more precise: Single negative linear trend components were used in regression models when fitting ozone measurements until around 1995 and two slopes when fitting ozone data covering longer periods. 13. p. 30836, line 26 ff: ODGI (vs. EESC) definition: I am skeptical concerning the selection of zero in 1980: this would imply that anthropogenic stratospheric ODS concentrations were negligible before 1980 – though I admit that this is not relevant in the context of this paper. 14. p. 30838, line 20: How is the "scale factor" defined ? 15. p. 30841, last paragraph and Fig. 9: I believe that the nonlinear time evolution of ODGI (or EESC) in the years after 1995 (see Fig. 4) explains, why a linear trend term is not appropriate to

fit the time series. Spelling mistakes: 16. p. 30827, line 4: (35 – 45) 17. missing dots: p. 30827, line 7: after . . .... Ozone Assesessments) ; p. 30828, line 5, after . . . 2008) ;p . 30829, line 3, after . . .. and Thompson, 2011); p. 30829, line 10, after . . .... Mäder et al., 2007). 18. p. 30831, line 19: spelling error: from instead of form. 19. p. 30844, line 9: Moreover, during . . . 20. p. 30845, line 27; I think, the sentence is not complete: Hence the study shows the need for high quality . . ...

Interactive comment on Atmos. Chem. Phys. Discuss., 12, 30825, 2012.