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Atmospheric Measurement Techniques Discussions

Interactive comment on "Quality assessment of ozone total column amounts as monitored by ground-based solar absorption spectrometry in the near infrared ($> 3000\,\mathrm{cm}^{-1}$)" *by* O. E. García et al.

Anonymous Referee #1

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The paper describes a careful evaluation of column ozone measurements derived from measurements performed by an NDACC FTIR instrument operated at Izana (Canary Island of Tenerife, Spain) by examining different wavelength ranges: 1000.00 – 10005.00 cm-1 (abbreviated as 1000 cm-1 region and commonly used in the NDACC network), 3041.47 – 3045.66 cm-1 (abbreviated as 3040 cm-1 region) and 4026.50-4029.14 cm-1 (abbreviated as 4030 cm-1 region). The basic motivation is to explore whether one of the wavelength range measured by the TCCON network (Total Carbon Column Observing Network) could be used to provide valuable column ozone

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measurements allowing for a significant extension of the column ozone measurements presently performed by GAW and NDACC. The authors conclude that valuable column ozone measurements can be obtained using the 3040 cm-1 wavelength region (basically measured at many (?) TCCON sites) which, however, requires measurements of high wavelength resolution and installation of a InSb detector at many TCCON sites. Column ozone retrieved from the 3040 cm-1 region shows a systematic seasonal bias with data retrieved from the 1000 cm-1 region which was attributed to different vertical sensitivities, which needs to be taken into account when comparing with column ozone measurements of standard total ozone monitoring instruments such as Brewer, Dobson and SAOZ. The careful analysis looks very reasonable to me (though I have to admit that my expertise in retrieval algorithms of FTIR instruments is limited) showing that the precision of column ozone is decreasing from the 1000 cm-1 to the 3040 cm-1 and to the 4030 cm-1 region as derived from theory and confirmed by long-term observation. Systematic differences (around 7% when comparing the 1000 cm-1 and the 3040 cm-1 wavelength regions) were attributed to deficiencies of the used spectroscopic data (as published in HITRAN 2012, which needs possibly improved laboratory data for confirmation (?)) and systematic differences in seasonal variation are interpreted in terms of vertical sensitivity, tropopause variability and tropospheric vs. stratospheric ozone abundance. The paper is well written and I support publication if the following points are adequately addressed:

1. The systematic seasonal differences in retrieved column ozone were attributed to the combination in differences in vertical sensitivities, tropopause altitude and the ozone evolution in tropospheric ozone as observed in Izania, a subtropical site (see Section 4.2): How large and how systematic are these differences in seasonal variation expected to be at extra tropical (mid-latitude and polar) sites, or in case of different humidity condition ?

2. At the end of the Abstract and in Section 4.3 the authors argue, that the examined series demonstrate the long-term stability (“good consistency”) of the OTC (ozone total

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column amount) retrievals for 2005-2012 as deduced by the FTIR measurements of Izania using a rather sophisticated procedure. For (even more convincing) support of this point I recommend to compare the FTIR-data with collocated Brewer data, also taking into account the newest development of the analysis of Brewer data (see A. Redondas, R. Evans, R. Stuebi, U. Köhler, and M. Weber, Evaluation of the use of five laboratory-determined ozone absorption cross sections in Brewer and Dobson retrieval algorithms, Atmos. Chem. Phys., 14, 1635–1648, 2014, doi:10.5194/acp-14-1635-2014.

3. You might also consider how the FTIR instruments operated in NDACC could contribute to the goals of the TCCON network as they might be interested in synergies as well.

4. For the general readers of AMT it might be useful to provide some additional information on the status and planning of the TCCON network: How many stations are presently operated/planned at TCCON ? How many sites could produce column ozone data and how many sites would need additional technical installations ?

5. I suggest to consider to include the concrete recommendation in the Abstract (not only in the conclusions)

Interactive comment on Atmos. Meas. Tech. Discuss., 7, 2071, 2014.