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Atmospheric Measurement Techniques Discussions

Interactive comment on "Nitrogen dioxide stratospheric column at the subtropical NDACC station of Izaña from DOAS, FTIR and satellite instrumentation" *by* Cristina Robles-Gonzalez et al.

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1. Izaña Observatory is located at 2370 m.a.s.l. well above the marine boundary layer. DOAS measurement on horizontal path at the level of the station show concentration of 20-40 pptv (Gómez et al., 2014, Gil-Ojeda et al., 2015). As a consequence stratospheric products have been used for this work, as it is described in the satellite instrumentation section. OMI data are from NASA algorithm (OMNO2 (Collection 3), web page: http://avdc.gsfc.nasa.gov) and SCIA data are from Bremen University (IUPB, v2.0, web page: http://www.iup.uni-bremen.de/doas/scia_no2_data_acve.htm).

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Discussion paper

Differences in the mean value of those two datasets for the 2005-2011 period are of 18% (OMIstrat=1.18*SCIAstrat). If we take into account that OMI overpass the station few hours later than SCIA, and that represent a mean increase of the column of 12% according to photochemical models, the observed real difference between instruments is of only 6% for the Canary island area. This is what we can say on this issue.

2. AMF used in DOAS technique are, essentially, geometric calculations. Traditionally, corrections to reach the common reference for instruments measuring photochemically changing species at twilight and daytime have been based in NO2 differences between szas calculated from simple boxmodels. The effective AMF is useful since it accounts for the fact that when DOAS GB measure at 90°, the bulk of NO2 is at lower sza. Is a simple correction and the improvement in the comparison between instruments is obvious from figure 4. Concerning the use of a single height for the corrections, we do not claim that this approach is valid for all stations. At the subtropics, the winter-summer temperature excursions is low (4-5K at 10 hPa) and changes in the NO2 height are also small (Spinei et al. 2015 data are from latitudes 46°-52°). The calculations have been carried out assuming the maximum of the layer at 30km, as reviewer correctly points out (see caption figure 2). Line 245 is therefore misunderstanding and we will remove it. The profile selection for the AMFs is always a source of uncertainty. Not only the height of the maximum but the changing NO2 vertical distribution between AM and PM. However as the reviewer mentions, the impact in the AMF has minor effect in the result. We agree to add a sentence such as “at high sza, the slant radiation observed in the surface crosses stratospheric layers of different SZA. Strictly, the correction should be applied separately for each layer. To simplify, a layer representative of the slant path is the stratosphere has been selected.”

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