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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.

Anonymous Referee #1

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The author's reply does not address my initial concern regarding the effective SZA correction:

- The proposed ESZA correction is meritorious for species with relatively short photochemical lifetimes, NO2 in particular. Considering the sensitivity of the issue (e.g., ∼30% NO2 changes between SZA=90 and SZA=86.8 cases around the winter solstice), there is a lack of detail about the ESZA evaluation. Using some overly simplistic assumptions, one may arrive at EZSA∼85 instead of the used ESZA=86.8. Unless all the underlying details and assumptions are explicitly mentioned by the authors, it is

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impossible to judge validity of the approach.

- The same applies to the effective (projected) DOAS pathway used in the DOAS-satellite collocations. Why the authors arrive at the 300 km estimate instead of, e.g., ∼360 km (again, using, for a sake of argument, overly simplistic, purely geometric assumptions and ESZA=86.8)? Is there some optical-pathway weighting applied by the authors? [There should be some.] Please provide more details.

Additional remarks:

- Figure 4, bottom-left panel: Why the DOAS-FTIR SZA=90 difference is negative? I see a positive shift in the upper-left panel. Two panels contradict each other. Now, going to Table 2, I also see the negative SZA=90 DOAS-FTIR shift. The negative sign also quoted in the text (Section 7) and re-confirmed in Figure 6. This contradiction must be resolved. What FTIR and DOAS data are used in the plot and the stats (Table 2)? AM? PM? Both?

- Please clarify the AM/PM split in the FTIR data (Fig. 5). Is this related to how the FTIR data are referenced to the either DOAS-AM or DOAS-PM observations? Or you really subdivide the FTIR records into the AM and PM parts? If the latter is true, then Fig. 6 should have two FTIR points. So does Table 3. Please be explicit in description of the data sets in Table 3: e.g., does the OMI-DOAS mean OMI-DOAS(AM), or OMI-DOAS(PM), or something else?

- The caption of Figure 10 mentions two panels, (a) and (b). I see only one.

- Lines 400-405. The more pronounced NO2 trends seen in the DOAS observations are ascribed to the relatively higher DOAS sensitivity to the lower-stratospheric NO2 concentrations. How does this questionable conclusion come along with the factor-of-three lower changes detected by SCIAMACHY and OMI, despite their comparatively high strat-trop sensitivity (cf. the DOAS and satellite AVKs in Fig.1)? It seems, in this respect the DOAS observations are the only outstanding category, since both FTIR

and satellites deliver comparable results, despite their different sensitivity to various stratospheric NO2 layers.

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