This manuscript describes ground-based MAX-DOAS measurements in Nam Co over the Tibetan Plateau (TP). The measurements are used to obtain vertical distributions of several atmospheric components (aerosol, H2O, NO2, HONO and O3) via spectral analysis and OEM profile retrieval. The data are further used to analyze the temporal and vertical evolutions for these species. The OH production as well as possible daytime HONO and O3 sources were also discussed during the field campaign. Overall, observing and investigating the vertical profiles of atmospheric components at the background station in the relatively remote and high-altitude region are significant. However, two concerns at least should be clarified in detail before the manuscript is considered to be accepted.

(1) Firstly, the reliabilities of vertical profile of atmospheric components (aerosol, H2O, NO2, HONO and O3) should be validated. Just using the parameter setting scheme of spectral analysis and profile retrieval in previous studies won't do for the specific station over the TP. For example, the HONO spectral structures are almost drowned in the noise in Figure 2d. The sensitivity tests about the parameter setting scheme of spectral analysis and profile retrieval should be presented in detail. In addition, just according to the comparison of surface multi-source data in Section 3.3, it cannot illustrate the reliabilities of vertical profiles. Also, the correlation was weak for HONO (R^2=0.38) with larger deviations in Figure 6b.

(2) The manuscript tried to analyze the OH production (Section 4.1) from HONO and O_3 at different height layers through vertical observations and TUV calculations. The TUV model is suitable for exploring the photolysis rates, but OH production is determined by complex chemical process involving many atmospheric components. The equations in Line 342 and 343 are simplified for studying OH production. It should present more details on the parameter scheme during simulation by TUV model, and more comparisons of OH production simulated by other models if possible.

specific comments

1. Authors' affiliations and addresses should be numbered in the appearance order of their names, to avoid the misunderstanding of academic misconduct.

2. Line 4: The full name should be given when the abbreviation ("MAX-DOAS") first appears. Please modify similar problems elsewhere (For example, "TUV" in Line 100).

3. Line 27 and Line 575: The references' format is not consistent between the text and the reference section, which leads to poor readability of the manuscript for review. Please modify all the similar problems.

4. Line 26-38: This paragraph is not closely related to the key ideas of this paper. Moreover, the last sentence is lack of proper deduction.

5. Line 39-73: This paragraph is lack of many key references for MAX-DOAS observations over the Tibetan Plateau. It is not appropriate to cite only the studies from author's group.

6. Line 75: The O_3 will be diluted when the air mass comes from clean source regions, such as marine atmosphere.

7. Line 122: Again, sensitivity test and profile validation by independent data should be presented to confirm the reliability of retrieval results.

8. Line 156: The cross sections are lack of references in Table 1.

9. Line 165: Are only the HONO and O3 data in clear sky condition used to calculate the photolysis rates. If so, there may be many missing data in summer due to clouds over the TP. This information should be explicitly mentioned in section 4.1.

10. Line 177: Please add references.

11. Line 204-207： With respect to the enhancement of AOD during 15:00-17:00, the explanations are far-fetched. The daytime AOD diurnal variations at other time are probably affected by the long-range transport of aerosol and local anthropogenic sources (such as cooking in the morning).

12. Line 215: The manuscript selected 5 height layer to analyze temporal and vertical variations of atmospheric components. But why are the five height layers "typical"? The separate layers reduce the vertical resolution of retrieval results. It is better to investigate the daily variations through vertical profiles themselves. Please modify all the similar problems at other sections.

13. Line 224-225, 228-229: The explanations are lack of proper deduction.

14. Line 233-234: As a short-life atmospheric component, can the NO_X around Mt. Tanggula transport to the observation site ? Does the transport effect affect the NO_2 at the bottom layer ? The causes of elevated NO_2 layer are probably complex.

15. Line 240-243: The vertical distributions of O_3 in the lower tropospheric layer are complex over the Tibetan Plateau. Why does the manuscript describe the "exponential shape" derived from previous studies here ? The "exponential shape" is not consistent with the relatively uniform vertical variation of O_3 in this study.

16. Line 251: Please add "O_3".

17. Line 254-255: Why are NO_2 vertical profiles "Gaussian" distribution rather than Lorentz or other peak distribution ?

18. Line 264-265: Please clarify the monsoon transport leading to the elevation of maximum H_2O layer.

19. Line 279-282: With respect to the vertical profiles of atmospheric component at the height of 3-4 km, are the retrieved data valid ? How to understand the differences of O_3 profiles between “exponential shape”(Line 282) and “relatively uniform vertical gradient” (Line 240) ?

20. Line 298-301: It just lists the possible influencing factors here. To what extent, can the weak surface wind affect the sand-raising process ?

21. Line 302-308: Please check the attribution of H_2O and NO_2 variations. For example, the monsoon not only affect the H_2O variation in the morning but also in the afternoon.

22. Line 314-315: Please check that the text description is consistent with the figures.

23. Figure 7: The validity of results above 3 km should be carefully checked. Probably the concentrations of atmospheric component at higher height mainly reflected a priori information.

24. Line 388-390: Is that so ?

25. Figure 9: Please add the graphic symbol description, such as error bar. Please modify all the similar problems in other figures.

26. Line 420: three clusters ? There are four clusters in Figure S7e.

27. Line 434-437: The discussion of stratospheric O_3 intrusion is too simple. The logic is confusing between stratosphere intrusion and long-range transport.

28. Section References (Line 482-854): Although there are too many references, the key references related to this topic are missing.