The authors described an innovative tool for ground-level vertical profile observations of atmospheric composition. The data could be used publicly. The manuscript is well-written.

Response: We would like to thank the reviewer for careful reading, and valuable suggestions. Point-to-point responses are given below. The original comments are in black and our responses are in blue.

Some minor comments as follows:

(1) It would also be great to know that limitation of this data so that the potential users could use the data appropriately.

Response: Thanks for your suggestion. We added limitation in the revised manuscript.

The limitations of this data are described as follows. (1) MAX-DOAS in ultraviolet and visible spectral ranges are typically affected by photon-shot noise, and the retrieval errors usually increase under heavy haze or cloudy conditions. The data with relative retrieval errors larger than 50% were filtered in this study; (2) only the daytime vertical profiles of aerosol, NO_2, HCHO and HONO were retrieved since MAX-DOAS relies on scattered sunlight. The spectral collected when solar zenith angle (SZA) are larger than 75^o were filtered to avoid the strong absorption of stratosphere (Xing et al., 2017); (3) the vertical resolution of 100 m is the highest resolution at present, which still needs to be improved with the development of hardware and algorithms in the future.

(2) The authors could also provide more information regarding how to potentially apply this dataset to other studies.

Response: Thanks for your suggestion. The potential applications of this dataset include: (1) Performances of chemical transport models are commonly poor when applied over the Tibet plateau due to complex topography and meteorology, etc. This dataset can be used to reduce the uncertainties of these models, especially in the vertical direction (Liu et al., 2021a); (2) this dataset can assist in the source apportionments of atmospheric composition at different altitudes over the Tibet Plateau; (3) observed atmospheric composition over the TP is valuable inputs for box models to understand atmospheric oxidation capacity at different altitudes on the Tibet Plateau.

(3) The methods for data retrieval were well written. However, it would also be great if there is a bit more details regarding why using these methods and how accurate these methods can be.

Re: Thanks for your suggestion. Three algorithms, namely parameterized, optimal estimation and look-up table, are currently widely used in this field. The optimal estimation algorithm often shows the highest sensitivity in vertical space (Frieß et al., 2017). Reasonably good agreements were previously found in validation of retrieved vertical profiles using optimal estimation method with lidar and balloon observations (Wang et al., 2019). We also provided here an example of retrieval errors, averaging kernel and degree of freedom of the retrieved profiles of aerosol, NO_2, HCHO and HONO in Figure R1, which has been inserted into the supplement.

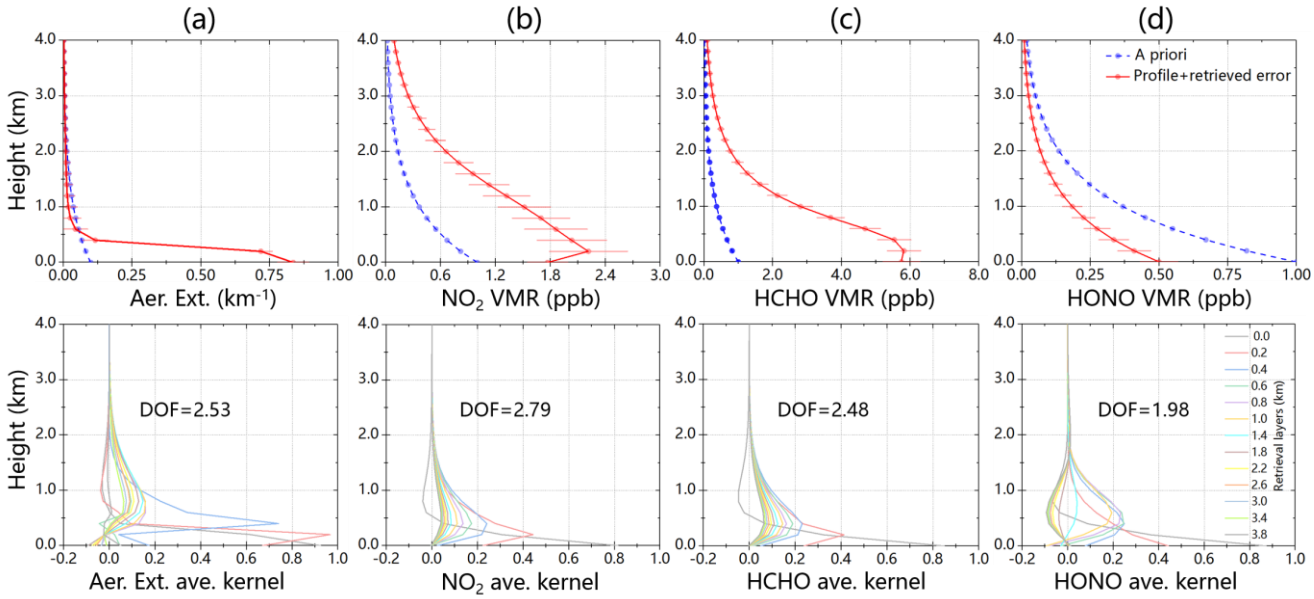

Figure R1. Retrievals at 11:30 (LST) on 10 March at the CAS (QOMS) station. (a) aerosol extinction, (b) NO2, (c) HCHO and (d) HONO. The top row shows the retrieved profiles, plotted with their associated a priori profile and retrieved errors. The bottom row presents the averaging kernels and degrees of freedom for signal associated with the profile retrieval.

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