We truly grateful for the reviewers' positive assessments of our manuscript and the helpful suggestions. We have revised the manuscript carefully according to the reviewers' comments. Point-to-point responses are given below. The original comments are black in color, while our responses are in blue. The revised parts in the manuscript are marked in red. All the page number and line number are referred to the revised manuscript.

Major comments

(1) The observation period of this paper is as short as 2 weeks. It is true that it produced important results for the generation and diffusion of yellow dust and pollutants, but it seems that it is difficult to generalize the results of the study due to the limited number of analyzes with a short observation period. Therefore, I hope there is an expression that the paper can be applied under special conditions.

R: We have further supplemented the observation data in the manuscript and supplementary material (Figure R1 and Figure S5 in the supplementary materials). Nine heavy pollution incidents (HPI) have been observed and 8 HPIs present aerosol stratification (except HPI 3), the duration of each case is listed in the Table R1 and Table S1 in the supplementary materials. The aerosol stratification is most prominent in HPI 1 and HPI 2, the VDR in the upper lidar layer during dissipation stage was greater than 0.3, suggesting almost pure dust. We have analyzed these two HPIs in detail in the manuscript. In addition, we describe the scope of application of this article in the summary section of the manuscript. When the southerly wind bringing anthropogenic aerosols was dominant in the planetary boundary layer and northwest wind bringing dust was prevailing in the free troposphere (dust), the stratification of aerosols occurred. Upper dust enhances temperature inversions, reduces PBL height, and suppresses convection, ultimately resulting in the increase of surface air pollutants. We supplemented these materials in the manuscript. Please refer to Page 8 Line 11–15 and Page 12 Line 20–30.

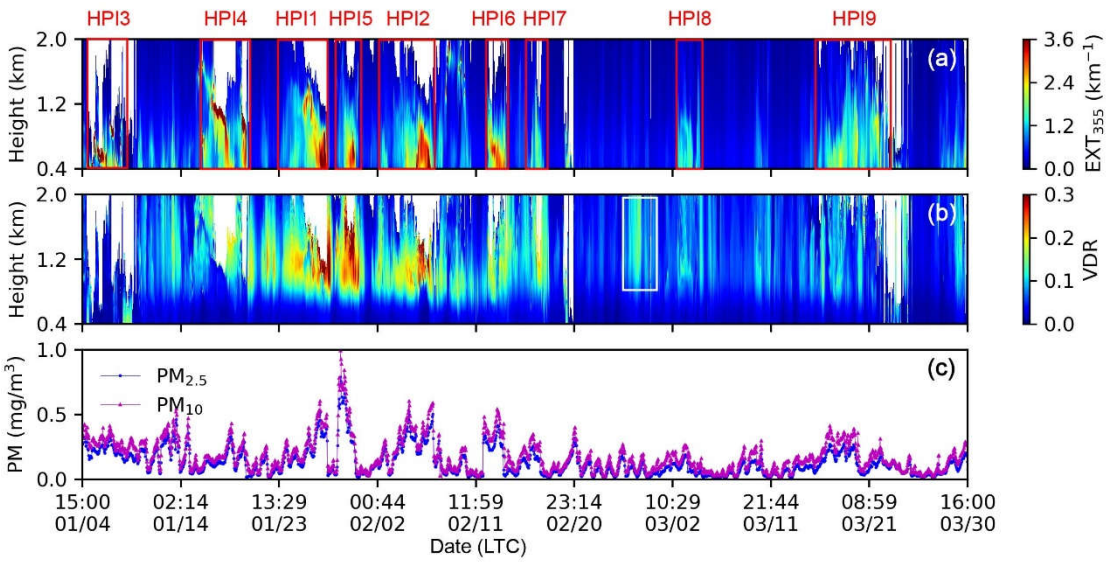

Figure R1. *Periodic air pollution cycles during our whole observation. The color contours show the vertical structure of (**a**) EXT_{355} and (**b**) VDR. (**c**) Temporal evolutions of surface average $PM_{2.5}$ and PM_{10} mass concentrations observed by six environmental monitoring stations in Baoding. Each HPI is marked with a red rectangle in (**a**), and the HPI number is displayed on the top of each red rectangle. The detailed date of each HPI is listed in Table R1.*

Table R1. *The duration of each HPI during our whole observation.*

Case	Period (LTC)
HPI 1	2017/01/22 11:00–2017/01/26 23:00
HPI 2	2017/02/01 11:00–2017/02/05 06:00
HPI 3	2017/01/05 04:00–2017/01/08 04:00
HPI 4	2017/01/15 10:00–2017/01/19 12:00
HPI 5	2017/01/27 14:00–2017/01/29 07:00
HPI 6	2017/02/14 16:00–2017/02/16 13:00
HPI 7	2017/02/18 00:00–2017/02/19 18:00
HPI 8	2017/03/03 10:00–2017/03/05 20:00
HPI 9	2017/03/16 03:00–2017/03/23 05:00

(2) In order to understand the overall content of the paper, it seems necessary to check the supplementary materials. Including some of the materials in the supporting materials directly in the paper seems to be more helpful in understanding the paper. In particular, Figure S2 should be included in the next of the Figure 4 in the paper. Figure S3 also should be included in the paper.

R: We have carefully checked the content of the supplementary material and included the Figure S2, Figure S3 and some important descriptions in the manuscript.

(3) Figure S5. In Figure S5, Data comparison of RL and MAX-DOAS is shown. But, just shown as correlation plot. Since the paper indicates that MAX-DOAS can be observed at different altitudes with a resolution of 100 m, it would be wise to show a graph that is compared with a profile that includes altitude distribution of RL and MAX-DOAS instead of a correlation plot like Figure S5 (c) and (d). Also, Figure S5 should be included the paper in "2 Measurements and methodology" part.

R: The comparison of mean aerosol extinction coefficient (EXT) profile during HPI 1 and HPI 2 between Raman lidar (RL) and MAX–DOAS was shown in Fig. R2 and Figure S2 in the supplementary materials. The EXT profile measured by RL usually greater than the EXT profile observed by RL. The correlation of hourly and spatially average EXT from 400 m to 600 m and 600 m to 800 m between RL and MAX–DOAS show a reasonably good agreement ($R > 0.8$), while the slope of linear regression between RL and MAX–DOAS measured EXT is considerably less than 1 (Fig. 2 in the manuscript). Because the sensitivity of the MAX–DOAS measurements decreases with increasing altitude in the troposphere (Frieß et al., 2006). Thus, only the EXT profiles below 800 m measured by MAX–DOAS were used in the manuscript. In addition, MAX–DOAS and lidar measurements were made with different geometries (a combination of zenith–sky and off–axis versus zenith–sky only, respectively) and different integration times for completing a set of measurements (15 versus 22 min, respectively), which may also explain part of the differences between the EXT profiles measured by RL and MAX–DOAS (Irie et al., 2008).

In addition, we have also supplemented the Figure R2 in the supplementary materials and included the Figure S5 and some important descriptions in the manuscript.

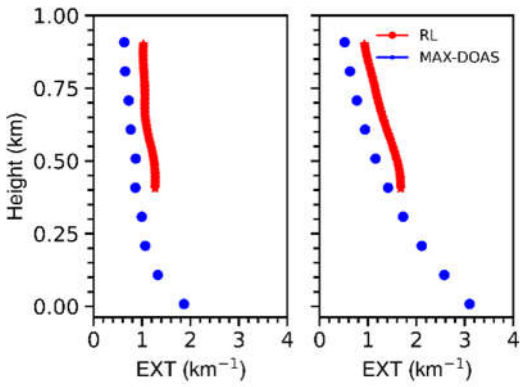

Figure R2. *Comparison of average EXT profile during HPI 1 (left) and HPI 2 (right) between RL and MAX–DOAS.*

(4) Suggestion: Figure 2 (a, b, d) and Figure 3, 4 (b, c, d) are overlapping. It would be nice to remove Figures 3 and 4 and express them as one in Figure 2.

R: We have followed this suggestion and express them as one in Figure 3 in the manuscript.

Technical comments

① Page 5 line 5: Please include explain of "VMR".

R: We have followed this suggestion and corrected the mistake accordingly.

Reference:

Draxler, R. R., and Hess, G.: An overview of the HYSPLIT_4 modelling system for jectories, Aust. Meteorol. Mag., 47, 295-308, 1998.

Frieß, U., Monks, P. S., Remedios, J. J., Rozanov, A., Sinreich, R., Wagner, T., and Platt, U.: MAX-DOAS O4 measurements: A new technique to derive information on atmospheric aerosols: 2. Modeling studies, J. Geophys. Res., 111, D14203 doi: 10.1029/2005jd006618, 2006.

Irie, H., Kanaya, Y., Akimoto, H., Iwabuchi, H., Shimizu, A., and Aoki, K.: First retrieval of tropospheric aerosol profiles using MAX-DOAS and comparison with lidar and sky radiometer measurements, Atmos. Chem. Phys., 8, 341-350, doi: 10.5194/acp-8-341-2008, 2008.