Anonymous Referee #1

This is an interesting study about the interactions between pollutant concentration, surface energy budget and PBL evolution over Beijing. I have only a few minor comments that need to be addressed.

Responses: Many thanks for the positive comments and constructive and valuable suggestions.

Detailed points:

1. Line 9. In which sense transportation is affected by air pollution? Usually is the opposite (transportation affects air pollution)

Responses: "The main hazards or negative effects of air pollution generally fall into two categories: human health and transportation". Actually, here the "transportation" is not "wind transportation" but "traffic". To avoid the misleading expression, "transportation" is changed to "traffic".

2. Line 186. U, and v are not used in equation (1) and (2). Only w is represented.

Responses: Corrected.

3. Line 187. The water vapor density is not in the equations either. Instead, there is Lv

Responses: Corrected.

4. Line 190. In which sense the SEB is one dimensional?

Responses: Thanks for good suggestion. The turbulent exchanges of heat are in both vertical and horizontal directions (e.g., Foken, 2008; Leuning et al., 2012). The one-dimensional SEB in the original paper means the idealized formation of the surface energy budget, which ignores the horizontal dimension. Now "The one-dimensional SEB" has been changed to "The SEB without consideration of horizontal advection".

References:

Foken, T.: The energy balance closure problem: an overview, Ecol. Appl., 18, 1351–1367, 2008.
Leuning, R., van Gorsel, E., Massman, W. J., and Isaac, P. R.: Reflections on the surface energy imbalance problem, Agr. Forest Meteorol., 156, 65–74, https://doi.org/10.1016/j.agrformet.2011.12.002, 2012.

5. Line 200. Instead of neglecting the anthropogenic heat flux, I suggest to just analyze the sun of storage and anthropogenic heat flux.

Responses: We agree with the reviewer on this. Now the term $G - Q_F = R_n - H - LE$ is analyzed in the revised paper. Thanks for the comment.

6. Line 216. It is not clear what is the standard deviation between lidars.

Responses: The Doppler lidar can obtain three-dimensional wind, and the vertical velocity variance σ_w^2 can be used to describe the density of the turbulence. This sentence has changed to "The turbulence method to define the BLH has been proposed by using the Doppler lidar which can obtain three-dimensional wind. The vertical velocity variance σ_w^2 can be used to describe the density of the turbulence, hence the height of the layer in which vertical velocity variance σ_w^2 exceeds a given threshold is considered as the BLH".

7. Figures 8 and 9. The day 4th, during the daytime, the net radiation is negative (the surface is losing energy through radiation), the sensible heat flux is also negative (the air is hotter than the surface), and the storage term is positive (energy is stored in the surface). How can this be explained? Is there a hot advection to the site?

Responses: The change of net radiation on 4 December illustrated in Fig. 7 was not clear, due to range setting of Y axis. Actually Net radiation was positive during daytime, about 45 W m^{-2} at 1200 LST on 4 December (Fig. R1). Now a line y=0x has been added in the revised Fig. 7e. Sorry for this confusion.

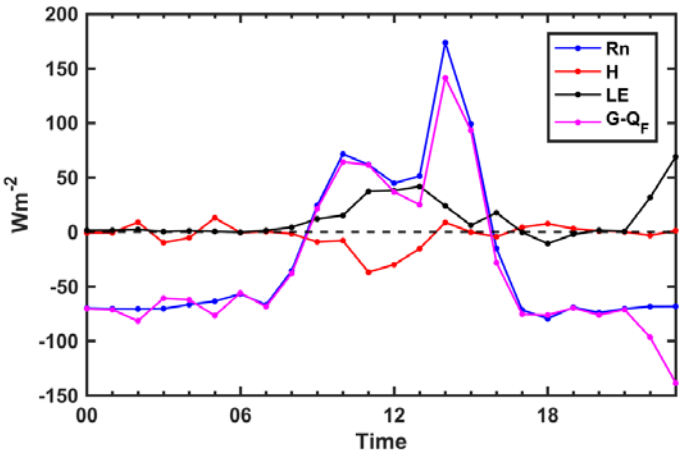

Fig. R1 Diurnal cycle of net radiation (blue line),sensible heat flux (red line), latent heat flux (black line), and heat storage minus anthropogenic heat flux (termed as $R_n - H$ – LE, purple line), observed at the 140-m level of the 325-m tower on 4 December 2016.