

The manuscript by Debing Kong et al. try to explore the potential between different types of temperature diurnal cycle and air quality forecasting. The authors identify different types of diurnal cycles of day-to-day temperature change in a complex topography by taking the Sichuan Basin of China as an example. Overall, this paper is well written, and their findings are interesting and important to the community of atmospheric environment and air quality forecast. I would like to recommend an acceptance after addressing my following concerns.

1. The authors have emphasized the day-to-day variation of air quality is affected by temperature diurnal cycle, but there is no figure to show the day-to-day changes of air pollutants and meteorological conditions of hourly data.

2. The details of K-means clustering method should be specified, also the uncertainties of this method should be discussed in the section 2.5.

3. This paper shows three types of day-to-day temperature change, namely, cluster 1 (diurnal cycle with increasing temperature throughout all day), Cluster 2 (diurnal cycle with decreasing temperature in the afternoon), and Cluster 3 (diurnal cycle with decreasing temperature in the morning). The authors also showed that clusters 1 and 3 increase the air pollution in the following day while cluster 2 decreases that. Moreover, the potential physical processes related to the impacts of these clusters on air quality are also revealed. These results are interesting, but they can be further examined by including some discussion of radiation or cloud cover changes, so as to further reveal why the three types of day-to-day temperature change occur in the Sichuan Basin in winter from the view of radiation.

4. The Sichuan basin is located in the east of the Tibetan Plateau, and its weather and climate are greatly influenced by the topography. It is thus likely that topography in the Tibetan Plateau may play some roles in modulating the three types of day-to-day

temperature change. Some vertical profile of the u- and/or v-components of the wind by including the topography maybe useful to uncover the physical and dynamics reasons of the three types.

5. Are the analysis results of Sichuan Basin applicable to other heavily polluted areas? Or what is the guiding significance for the application in a wide range of areas?

Specific comments

Figure 1: does the white text indicate the name of the weather stations or the name of the major cities? Please indicate clearly.

Figure 3: please also include the percentage of the three types in this figure.

Figures 4&5: Can these figures be combined into one figure? As both of them show the changes of air pollutants associated with the three types of day-to-day temperature change.

Figure 6: does “24 h potential temperature change” mean “24 h potential change of temperature” or “24 h change of potential temperature”. Please indicate it clearly. BTW, please also change “24 h” to “24-h” or “24-hour”.

L48. despite -> , although

L92-93. Why not delete the data of December, 2014 to be consistent?

L95. Why 2006?

L293-294: The authors may want to indicate again clearly the data sources.