Atmospheric
Chemistry
and Physics
Discussions

Interactive comment on "Boundary layer structure characteristics under objective classification of persistent pollution weather types in the Beijing area" *by* Zhaobin Sun et al.

Anonymous Referee #1

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The manuscript covers the important topic of haze due to air pollution from a major source region in China, Beijing and its surrounding area. This is an issue for the population of this region due to degraded air quality and visibility, but is just as important due to the adverse impacts of the associated pollutants on climate.

The authors have developed, or perhaps refined, the Rotated Empirical Orthogonal Function method to classify 125 days of haze over two years, 2014-16, into four types distinguished by their weather patterns and boundary layer structure. The novelty of their approach, according to the authors, is in the combined analysis of synoptic-scale circulation and the boundary layer structure in the analysis of pollution transport into,

within and out of the source region.

My overall assessment is that this topic is worthy of analysis, but the paper leans very heavily on the authors' prior knowledge of meteorology and presents little information on the haze episodes themselves, and how the data were analyzed. The most relevant data for the subject of haze, i.e., the aerosol backscatter data, and the PM monitor data over the region are presented for just four days representing each of the four types, but it is not clear how they were selected, nor where they fall within the range of temporal averages presented in other plots. Likewise, time-averaged meteorological data are presented with no information about why, how, and over what period the temporal averaging was done.

That leads me to the presentation, which needs a lot of work. Most critically the conceptual model that the authors developed to understand the meteorological categories is described but refers to the wrong figure. Figures have not been checked for visual quality of presentation and completeness. Figure captions are incorrect or incomplete, and some figures (Fig. 1i, for example) are included without explanation of their purpose. The section on results and discussion is not well organized, and the information density makes it virtually unreadable in some segments. There are also innumerable instances of typographical and syntax errors, as well as confusing sentence structure.

My recommendation is to reconsider the paper after major revisions, at a minimum to address the comments I have included in sticky notes in the attached manuscript (as a supplement file).

Please also note the supplement to this comment:
https://acp.copernicus.org/preprints/acp-2020-538/acp-2020-538-RC2-supplement.pdf

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