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Review of “The Persistent Cold-Air Pool Study” by N.P Lareau, et al.

Overall, I believe that this is an interesting, well-written, and informative paper on the Salt Lake City PCAPS—their causes (and causes for termination), important meteorological processes, associated air quality impacts and other deleterious effects, etc. The authors give a good description of the overall goals of the project, the terrain involved, instrumentation used in the field study, and a brief timeline and analysis of the conditions on different periods or IOPs with strong PCAPS including the associated air quality. I believe that the paper is appropriately written and aimed for a BAMS audience. Based on my review, I believe that the paper should be published with attention to the following specific comments.

Specific Comments

- 1) On Fig. 1, it would be helpful for the reader to add a reference distance scale, e.g., 2- or 5-km or other.
- 2) In all of the figures and in the text, the authors always refer to time in UTC, which is fine. However, in the first place time is mentioned (as UTC) and in the Fig. 3 caption, the authors should note the local time (1700?) corresponding to 0000 UTC. This would be most helpful for the reader in distinguishing daytime, end of the day, nighttime, etc.; this is primarily for stability and diurnal effects considerations.
- 3) page 12, lines 256 - 258. It would appear from Fig. 3 that the more persistent of the PCAPS with higher $\Delta\Theta$'s that larger values of the time-integrated $\Delta\Theta$, i.e., $\int_0^t \Delta\Theta dt'$, are required to produce (or correlated with) the NAAQS exceedances. The exceedances are found for IOPs 1, 5, 6, and 9, which all appear (just by eye) to have higher time-integrals than the other IOPs.
- 4) A pragmatic issue or outcome. Is there a long-term meteorological monitoring capability in place to obtain potential temperature profiles (e.g., from HOBOS, additional “opportunistic” radiosondes, etc) so that the authors or others could define PCAP met conditions and correlate the above temperature-time integral and/or other parameters with high particulate levels and exceedances of the NAAQS; i.e., to build up a long term data base/record and continue what was done during the field campaign. For example, perhaps a Froude number based on the inversion height, the $\Delta\Theta$ across the layer, and the wind speed at the inversion base would correlate well with the PCAP intensity and the particulate/air quality levels.
- 5) Are the authors considering making these data available to the general meteorological/air quality community and if so, perhaps they could say that.