

Interactive comment on “Intercomparison of lidar, aircraft, and surface ozone measurements in the San Joaquin Valley during the California Baseline Ozone Transport Study (CABOTS)” by Andrew O. Langford et al.

Anonymous Referee #2

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This paper describes the measurement campaign configuration of an extensive field campaign involving lidar, airborne in-situ and ground based in situ observations. The main purpose of the paper is to assess the data quality from the instruments during the campaign so that the data can be used for further process studies which are not described in the paper.

As is usual for large field campaigns, the set up is complex and involves many instruments (with different properties), operated at different sites or platforms (with consequently differing times and locations of observation). Taking this into account, the paper

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is well organised and gives a clear view of the overall experiment. Some interpretation of the atmospheric chemistry cannot be avoided in order to interpret some of the differences observed, where perhaps better similarities would have been expected.

A few minor suggestions follow meant to improve the text. - 1. introduction - The first sentence mentions a 2016 design value, which is not easily understood. This sentence and concepts should be clarified. - 2. campaign design. Some of the abbreviations are rather long and awkward (i.e. SJVUAPCD) whereas in the figures all sites and instrument data are shortened to three letters. I suggest to shorten the unnecessarily long abbreviations and while at it harmonise with the labels and annotations in the figures. - 3.1 TOPAZ. Is it relevant to mention the changes to the instrument? Were this made since the last campaign and is this paper the source where these changes are documented? If not (i.e. reporting of changes has been done elsewhere) these details can be removed. - 3.1.pp4 line 9. A single sentence could be added to explain the expected effects of Nix emissions on measured ozone concentrations. - 3.2pp4 line 29. Explain why a Nox monitor with photolytic converter measuring NO and NO₂ was sufficient and no NO₂ specific instrument was used. - 4.1 comparison lidar surface. TOPAZ was compared to in-situ observations using a low elevation angle of the lidar and a distance of about 800 m along the profile. This results in a height above ground of about 27 m. The agreement with the corrected in-situ observations is good. However, the interval along the lidar profile at 800 m distance is only a small part of the full profile. Have there been attempts to validate/intercompare different ranges of the lidar profile with the ground based in-situ monitors? - 4.1 pp5 line 25 - I consider it a weak point that the TOPAZ truck was only equipped with an in-situ ozone monitor and no NO_x or NO₂ monitor. This would have been helpful since NO₂ titration effects were expected in a polluted environment. Why was there no NO_x/NO₂ monitor? - 4.2.2 pp8 line 31. This sentence should probably be rearranged or split in two to clarify what was in agreement with what. - 5 summary pp9 line 25. Remove 'Although', add a full stop after 'with the lidar' and add 'However' before TOPAZ. This is to explain why the ozone sonde data has not been used in the intercomparison.

Figures - Fig. 3. mention the retrieval is lidar retrieval. Add the distance between the lidar volume and the location of the in-situ monitor. - Fig. 8. add in the caption the relevance of subfigures a,b,c and d.

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