

Applicability of the low-cost optical particle counter OPC-N3 for microphysical measurements of fog.

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Decision: Major revisions

General

This paper studies OLV and OPCN3 measurements for fog studies. Compare the measurements after some adjustments for RefIndex and bin intervals. They claimed that OPC can be used for drone applications although significant diff exists, but they never used a drone for this application. Overall significant diff exists between OPC and OLV obs. OLV measures higher spectral densities for a given bin and based on shadow detecting technique versus OPC optical counts. OPC values are corrected based on OLV fit data. OLV measured higher Nd values compared to OPC that leads to higher LWC. Overall manuscript focuses on a good subject but many issues exist based on text flow, analysis, results and conc etc. I feel manuscript needs to be more focused. I suggest major corrections and they are given below.

Major issues

1. Abstract

Needs grammatical corrections such as proprieties.....

Within drones.....using drones, I don't like the drone name change it to UAS or UAV.

Last sentence is not proven and not used. Take it out.

OPC should be corrected based on "prof equipment" doesn't make sense, and how do you know OLV is the best?

Pearson corr coeff? This is for what? Not clear in the text. Why you used <xx>, take it out and use overbar for mean but not needed here.

Issues exist with sentence structures.

INTRODUCTION

After 1 sentence add Gultepe et al 2008 (AMS and Gultepe et al Atmos Res 2017) for warm fog and ice fog definitions.

There are diff types of fog..... Change to this.

L26The cold surface cools..... This sentence not right, needs corrected.

Li23; it to Fog

Line 23-25, very rough sentence, fog affects not only aviation but others.... Check the work.

Ln28; SO2 changes related to fog?

Ln30; liquid??? PM is solid particles not liquid...

Ln34; urban aerosols to marine ones??? Are you sure?

Ln35; increased LWC with smaller droplets? Usually LWC is fixed.

Ln37; last sentence, decrease in LWC??? Not right, remove this sentence.

Intro is not designed properly, for ex, climate info given in diff locations.

Ln49; it is for aerosols but not for fog, correct this....

Ln58; remove this sentence, not written properly.

Ln60; not really correct, usually LWC and Nd or LWC and MVD (see Gultepe et al 2021, Marine fog book)

Ln60 references please

23 channels; not correct, it is adjustable (see Gultepe et al 2008 AMS bull)

Ln65 and 66; allows for consistent comparisons based on various field observations.

Ln68; see Gultepe et al microphysics review in BLM that uses a gondola with CDP2 and BCP, should be ref here.

Ln80; clear sky , no fog, remove this sentence.

Ln85; see Gultepe et al for Radiometrics MWR for fog research (AMS Bull 2008; Atmos Res 2017, Gultepe et al)

Ln92-93; doesn't make sense bad writing.

Ln98-100; TBS balloons are already being used for this purpose, this is not new.....

<Reff>; take out <> if needed use an overbar.

Section 2; WEATHER CONDITIONS; provide overall weather conditions and a table for cases here.

3. INSTRUMENTS

3.1 OPC

3.2 OLV

4. METHOD

4.1 microphysical parameters

4.2 Data reduction

Averaged for 10 mins intervals.....and analysis

5. RESULTS

5.1 light fog case

5.2 heavy fog case

5.3 Discussions e.g. issues, problems

6. CONCLUSIONS

Bullet 1: OPC has issues

Bullet 2 : OPC underestimates Nd and LWC

Bullet 3 OVL did not measures <5 micron etc

bullet 4 why OPC measurements wrong? Why OVL taken as ref?

-viewing issues?

-sampling issues 1 sec versus 10 min and 1 hr comparisons?

Other issues:

-table 3; why upper limit is different? This affects LWC

Fig 3; OLV has 3 x more Nd? Why is that?

Eq 5; take out mean brackets, no need

Section 4.1; move after introduction

Line 279; detection... sentence, take it out.

Fig07; after corrections OPC measure more than OLV???? But one of previous figs was different.

Ln306; not clear..... why has measurements more than at 20 micron? Data available but company did not say?

Ln320; check this parag based on previous graphs.