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Atmospheric Measurement Techniques Discussions

Interactive comment on "Developing a portable, autonomous aerosol backscatter lidar for network or remote operations" *by* K. B. Strawbridge

Anonymous Referee #2

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Comments on Strawbridge "Developing a portable, autonomous aerosol backscatter lidar for network or remote operations"

This paper describes an elastic lidar system developed for routine observations in a network environment. The system has been demonstrated in the CORALNET across Canada and clearly meets the requirements of nearly routine observations in non-precipitating conditions. The paper could be strengthened, however, by retaining the latter as the focus of the discussion and give some additional motivation for what a networked series of lidars would do for Canada (firstly) and globally. For example, section 4 discusses CORALNET but this is abruptly introduced and not mentioned by name in the Abstract or Introduction. Since this is the "why" of the paper, it seems

buried.

The majority of the paper is a description of an engineering exercise to build identical autonomous lidars and a thorough description documenting the lidars is appropriate for publication in AMT. Should others wish to use data from CORALNET's lidars, this would provide a sufficient reference to understand the technical nature of the instruments. CORALNET's website does not allow public access to the measurements at this point as some discussion of the status of the webpage is appropriate should an interested user try to access the data.

The one event that is discussed from July 2011 is an example of the utility of such a network. This reviewer notes however that there were multiple sources of smoke over North America during that week (it happened to be the BORTAS period as well). The URL below has captured one of the images from the NOAA Hazard Mapping System (archive data only exists there for six months but can be requested from OSDPD at NOAA ... http://alg.umbc.edu/usaq/images/currenthms_072611.jpg). Major fires existed in Washington state and in Nunavut during that week. Perhaps reference to the BORTAS data could give a bit more information on these fires.

The paper uses qualitative descriptors which make it sound like a promotional document rather than a paper and an effort should be made in the final draft to balance those out. In particular, the paper expresses a conjecture that the network will be useful for air quality policymaking. How would that be done? Some papers are quoted which describe the long range importation of dust from Asia and it is not clear from just a reference that CORALNET contributed to those works. Be more explicit on how the contribution came about. Is it possible to get a frequency of observation of such events by mining the CORALNET data set? If so, that could lead to policy relevant assessments of Asian dust on Canada. Similarly, a case could be made for smoke observations or sulfate observations. That doesn't seem to be clearly stated in the paper as a goal of using the past data set.

In conclusion, the paper should be published but work still remains on cleaning up the writing and strengthening the science impact.

Specific comments:

Abstract: Line 28: In addition (sp)

Page 2: Line 3: "The establishment of using..." poor grammar

Line 4-5: an aerosol is a mixture of particles and the air in which it resides. The sentence reads awkwardly since it could be read equivalently as "Particulate matter are tiny particles" Leave out the parentheses.

Line 6-13: This sentence is a literature search, which is ok, but reads poorly. Naturally (biogenic... bring up the Pierce reference) does not refer to the other natural dust types in the following clauses.... Some occur naturally: biogenic (ref), volcanoes(ref), dust storms (ref), forest....

Line 25: here the author might introduce a reference which captures the overview of how lidars would be used in policy development.

Line 26-28: does the author mean to say that such a lidar system does not exist elsewhere or does he mean within the Canadian context? It could be argued that ceilometers or modified lidars used in a ceilometer context could fill this role. Unless, there is something this type of lidar brings that a ceilometer does not.

Page 3: line 1: MPLNET would argue with this assessment that it does not retrieve aerosol extinction throughout the pertinent lidar column.

line 9: aerosols scattering or aerosol scattering

line 15: NU is an acronym that may not be understood. Spell out.

line 18: what is an S ratio value?

line 19: "autonomously lidar system" ???

line 26: "research" is misspelled

line 28: "On the other hand" from what... from line 26 and line 27? The author did more than consider this....

Pg 5: equation 2, this looks to be typeset awkwardly as K and α are not on the same line.

Line 12-18: if S is not going to be measured by comparison with the sunphotometer, why is attenuated backscatter not quoted as the primary product of the instruments? One only needs extinction in a quantitative not qualitative sense. For example attenuated backscatter is the CALIPSO primary product.

Pg 6: "modified, Wells-Cargo" remove the comma.

Pg 7: line 14-15: diverged, why?

Pg 8: line 18 "Stanford"

Line 22: "Windows-based"

Lines 25-27: how precisely did the laboratory temperature need to be maintained?

Pg 9: line 25: what is "spoke data"?

Pg 11: section 3.3: Does the author know how many people accessed this site? Utilization statistics or evidence that the network did what it was intended to do would be useful.

line 29: 100 profiles = 10s? confirm

Pg 12 lines 4-12.... this does not sound like a fixed S ratio of 33 sr is used... The author may want to correct that misconception on pg 5: lines 12-18

Pg 12 Section 4... as noted above, the use of the technology in a network seems to be the core of the paper, but it is pushed to section 4 and the CORALNet name does not show up until page 12. This should be in the introduction and abstract.

Pg 13 line 33: environments

Pg 14 line 16 remove comma after motivation

Pg 16, line 14 room

Line 29; atmosphere

Line 31: autonomous

Pg 17 line 2: "analogue"

line 3: amplifier (because of the copious errors, this section needs a critical rereading by the author)

line 27 addition misspelled

line 29: "immensely" How so? Examples of cases where the vertical profile helps in the assessment of local pollution? This reads too much like a sales brochure instead of a scientific paper.

P 18 line 8-on... where was this fire? What details do you know about the source? Did it come from the US or from the North? Was it near Vancouver?

line 13 precipitation is misspelled

line 21-22: where is the evidence that the particle numbers at the surface increased? Is that published and if not, why not include that?

Page 19 line 1: HYSPLIT needs a reference or a URL.

line 28: attenuated misspelled

pg 21, line 8: autonomous and remove the comma after Fig. 8 (c)

Pg 22 line 4: depolarization is misspelled

Pg 24 Lighty reference put in sentence case as for other references

The McKendry (2011) reference is repeated twice

Figure 7: Any explanation for the slight depolarization of the other layer aloft? Is that smoke?

Figure 8. It would be helpful to have an arrow point to the interpreted smoke feature. Include the year in the caption.

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