Atmospheric
Chemistry
and Physics
Discussions

Interactive comment on "Remote sensing of exceptional winter aerosol pollution events and representativeness of the surface – column relationship over Paris metropolitan area" *by* Alexandre Baron et al.

In this interesting paper, Baron and co-authors describe ground-based lidar sensing and in situ measurements in Paris, during two high pollution events in winter 2016/17. Surface PM10 reached the 121 and 156 ug/m3 levels, respectively, with an AEC of 0.6-1 km-1 in the second event. The optical properties of the aerosols are characterised, and the measurements are complemented using spaceborne instruments (MODIS, CALIPSO and CATS) and ECMWF reanalyses. The event size around Paris is quantified (250 km diameter) and the boundary layer depth is measured (300 m above ground level). The data collected during the two events is incidentally used

to briefly discuss the relationship between remote sensing observations and surface in-situ measurements.

I believe that the data collected are very valuable, but I have a major objection with the scope of the paper: in its present form, it sets the expectation too high. The title specifies that this is a paper about the "representativeness of the surface - column relationship", and this is reinforced in the first two sentences of the abstract: "In this study an optical parameter derived from lidar measurements is found to be relevant to monitor the evolution of near-surface particulate concentrations. This highlights the opportunities offered by future spaceborne lidar missions in air quality assessment on a global scale."

However, this paper is mainly focused on reporting and describing some very interesting (but necessarily limited) observations. Incidentally, it touches on the issue of the relationship between surface and remote sensing observations, but this is far from being its main topic. If it were, it would use a multitude of datasets to address just this point, and it would not spend much time describing these events themselves in detail. The conclusions drawn are valid for the two events considered, and perhaps for similar meteorological conditions (anticyclonic with a shallow boundary layer). A reader may feel disappointed by how little of the paper is about the topic indicated in the title and abstract.

I suggest that prior to considering this paper for publication, therefore, the words quoted above should be removed from the title and the abstract, which would then start with "This work is carried out following a dedicated field campaign in the Paris area (France) during winter 2016-2017", clarifying from the onset what is the main content of the paper. The incidental study on the representativeness is mentioned towards the end of the abstract and this is ok ("During these two events [...] allows us to investigate the representativeness of optical parameters found in the planetary boundary layer to assess surface aerosol concentration."). What is in my opinion should be avoided is to start with a very broad promise, and then not be able to satisfy the reader's curiosity.

In summary, the dataset is too limited to be suitable for a general study on the above-mentioned representativeness (few observations and specific meteorological conditions). This is was already addressed in the "quick review" report, but it seems that I have not persuaded the authors. I suggest that in the present form of the paper, the authors have not presented sufficient evidence to be able to state that the observations are generally representative of pollution events over Paris in the winter and therefore that the results can hint a relationship between surface and columnar properties, but cannot be considered to be general.

I will also try and produce a detailed review, but please consider the above to be the major point to be addressed (in my opinion).

Best regards.