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Atmospheric Measurement Techniques Discussions

Interactive comment on "Comparison of co–located rBC and EC mass concentration measurements during field campaigns at several European sites" *by* Rosaria E. Pileci et al.

Anonymous Referee #2

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The manuscript fits within the scope of AMT and presents new data on the comparison on EC and rBC measurements. Data are novel but the discussion would need to be improved. The manuscript would be acceptable after major revisions.

Some sections of the manuscript, especially the methods are excessively wordy and could be substantially tightened as too much background information is given that is neither relevant nor appropriate for a method comparison paper. It is unusual in a method section to have paragraphs explaining the basic functioning of commercial instruments (e.g. SP2).

There is also an excessive discussion of artifacts in the thermal methods that does not

really belong here as it does not seem relevant because it is not included in the results discussion. In fact a lot of the discussion is on TOR (reflectance) and the IMPROVE method, when the authors actually use TOT (transmittance). They seem to confuse themselves as in table 1 they refer to IMPROVE protocols as TOT. So this needs to be cleaned up and checked for accuracy. Also ENCan-total-900 (see Sharma et al., ACP, 2017) is neither TOT nor TOR (see your table 1) but I guess you would call it TOA as it has no pyrolysis correction neither by reflectance nor by transmittance. So less text and more accuracy. (BTW quiet a few people also use CTO-375, not mentioned at all)

There is a 7 year delay between the first and the latest studies. With changes in Diesel emission regulations and in car/truck fleet overall in Europe and significant differences between countries France/Germany/Italy. . . one wonders any impact of this on observations. Still there is no discussion at all on temporal and spatial variability of diesel emissions. Same applies to other "soot" emission sources such as heating, there is only a small discussion on coal. The sites are very different and one would expect different source contributions which will substantially impact results.

Related to the sites. It seems a little "odd" to refer to Paris as a European background site (L22). So I recommend streamlining the names of the sites, so for Paris call it or Paris or Palaiseau but not randomly one or the other plus the site code confuses even more as it is different form the other two. Also overall I am not convinced that it is appropriate to consider Palaiseau as a background site. The same applies to the CNR site in Bologna, which is quite central and not what one would think of as a Po Valley background site. Please be clearer in the description of the sites and the local impact Cabauw is described by its distance to the sea, which is funny when it is closer to both Rotterdam (a major port with related truck traffic))and Utrecht than the ocean.

A critical scientific issue is artifacts because of particle sizes. This is discussed to a certain extent. However, here again one wonders why there is not more discussion on local sources and differences between sites which will impact particle processing and association of refractory BC and EC with larger (or smaller) particles. That issue is

passed upon. In particular for larger particles and the fact that Cabauw has a PM10 inlet vs a PM2.5.. it misses completely that many studies documented that in processed aerosol EC and BC are associated wo a significant amount with larger particles.

Other (details)

The manuscript preparation could benefit form more attention to detail and is quite careless 2 examples: 1) basic text formatting, starting with the affiliations where none of lines are really aligned in how they start. 2) Melpitz coordinates " MEL; 51° 320' N, 12° 560' E" really?

Please do not use qualitative statements that have no meaning e.g. abstract "the high correlation" what does this mean? Is it statistically significant? Is it not? "high correlation" has no intrinsic meaning. Same in the text.

The abstract is too wordy and especially the second paragraph has no quantitative information is provided. You do not need to have a 3 paragraph abstract.

Your referencing is not very up to date. Many recent papers addressed EC and BC optical properties especially relative to the aethalometer including brown carbon and how this relates to SOA and biomass burning, at the wavelengths used! Please update your referencing and include recent work insights there in your discussion.

You cite so many thermal methods that are not really used. Hardly anybody in air pollution uses the actual NIOSH protocols, nor the Birch and Cary 96, while they are cited, people used variable timesteps or for the least longer time steps. Also the air pollution community hardly ever uses the same final temperature level than NIOSH. SO please clean this up for what is actually being used in the community (e.g. table 1)

The whole discussion on "coarse" BC is misleading (late in the manuscript ∼LK500). In the air quality/aerosol community, coarse tends to mean something very specific: particles between PM2.5 and PM10, sometimes particles larger than PM10 but never to my knowledge particles between PM1 and PM2.5 as it is used here. So or clearly

define but better formulate this differently because it crates confusion given that you have PM10 and PM2.5 size cuts too.

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