Review of the manuscript "Black carbon physical properties and mixing state in the European megacity Paris" by Laborde et al.

General comments:

In this study the authors report very interesting ground-based measurements of aerosol hygroscopicity and black carbon (BC) properties during wintertime in Paris. BC properties are analyzed as a function of aerosol source and air mass type. The authors find that BC originating from traffic was non-hygroscopic and does not show a coating while biomass burning aerosol is slightly more hygroscopic with a medium coating thickness and a larger mean BC-core diameter. The largest coating thickness and largest growth-factors are reported for aerosol originating from Eastern Continental Europe.
In this study an interesting data set of quality-controlled aerosol measurements is presented. The structure of the manuscript is reasoned and the paper is well-written. However, the manuscript is full of acronyms of instruments and campaigns that can hardly be avoided. I would recommend to avoid too many acronyms in a publication if the reader might be overwhelmed by so much capitalised material. For example, I did not remember at this point what a COA is.
I recommend this manuscript for publication in ACP after the following minor comments have been addressed:

Specific comments:

Use of the term "biomass burning" in this study: Please define how the term "biomass burning" is used in this study. Do the authors refer to emissions from the burning of living dead vegetation (boreal/tropical forests, savannas, agricultural land) or do they rather refer to the emissions from residential heating or something else?

p. 25122, l. 17: Coating thickness of ~ 2nm: How meaningful is this number given the uncertainty of ±10 nm reported in section 2.3.1.

p. 25122, l. 23: Please define D0.

p. 25123, l. 1 : What is a boxdetectable BC core? Please clarify.

p. 25124, l. 4: "primary organic matter (POM)". Has already been defined on page 25123

p. 25124, l. 3ff: "In Paris, the smaller EC-containing particles ($D_{va} \leq 400$ nm) were mainly externally mixed, indicating local or regional sources, while bigger EC-containing particles $D_{va} \geq 400$ nm) were mainly internally mixed with nitrate compounds, indicating medium- to long-range transport." → Results should not be presented in the introduction.

p. 25128, l. 5: remove "and"

p. 25129, l.4: bias or uncertainty?

p. 25129, l.12: "(…) long wavelength (…)"→ add: compared to the size of the BC particles

p. 25129, l.21: "(…) while single particle data can have even more negative values due to random noise (as seen in Fig. 10). Please give a little bit more detail, since this might not be clear to non-SP2 users.

p. 25129, l.23: with above assumptions. → add "the" between "with" and "above"

p. 25129, l. 18 ff: "Briefly, sizing differences between the first and second DMA are corrected for with dry measurements of ambient air.(…)" → please give more detail

p. 25129, l. 22: TDMAinv → HTDMAinv??

p. 25131, l.22: "C = 4.2 (…)f =1.3" → define "C" and "f" and give more detail.

p. 25147, l.11: "brush fire" → bush fire?